STATE OF MAINE
BOARD OF ENVIRONMENTAL PROTECTION

IN THE MATTER OF

NORDIC AQUAFARMS, INC		
Belfast and Northport	)	APPLICATION FOR AIR EMISSION, SITE
Waldo County, Maine	)	LOCATION OF DEVELOPMENT,
	)	NATURAL RESOURCES PROTECTION
A-1146-71-A-N	)	ACT, and MAINE POLLUTANT
L-28319-26-A-N	)	DISCHARGE ELIMINATION
L-28319-TG-B-N	)	SYSTEM/WASTE DISCHARGE LICENSES
L-28319-4E-C-N	)	
L-28319-L6-D-N	)	
L-28319-TW-E-N	)	
W-009200-6F-A-N	)	

PRE-FILED TESTIMONY OF MICHAEL LANNAN NVC/UPSTREAM W1

1. I am Michael Lannan, an environmental engineer with experience in all aspects of air quality management, including air permitting, compliance assessments, control technology evaluations and air pollution control designs, dispersion modeling and air monitoring. I have provided air quality, odor control, noise abatement, and dust solutions for municipalities, industries, and government agencies since during my co-operative education days at Northeastern University three decades ago when I was working for a large engineering firm in the air quality group of their planning and permitting division (See Addendum W1-A).

2. This is my 18th year at Tech Environmental, and I have been the president of Tech Environmental for the past five years, and Tech Environmental is a consulting firm that specializes in helping facilities, neighbors of facilities, and regulators navigate the permitting process with respect to environmental concerns, and with a special emphasis on nuisance potential. Tech Environmental has offices on Front Street in Belfast, in Waitsfield, Vermont, and in Waltham, Massachusetts.

3. Tech Environmental was retained by Upstream Watch to perform technical reviews of Nordic Aquafarms' Site Law of Development Act (SLODA) and Chapter 115 Minor New Source applications, specific to federal, state, and local permitting concerns of air, noise, odor, traffic, and solid waste.

4. Tech Environmental was contracted to review several hundred pages of Nordic Aquafarms' application materials and responses to Requests for Information (RFIs), perform predict project sound levels estimates of the proposed Nordic Aquafarms (the proponent), and evaluate if the provided information given in the application and RFIs is adequate for establishing the burden of proof with respect to "No Adverse" conditions.

Nordic Aquafarms SLODA Application Consultants

6. Section 4 of the Nordic Aquafarm's SLODA application discusses the technical ability of the proponent and the external project team experience. It states that Acentech, was *"retained to provide environmental noise consulting services associated with the design, construction, operation, and maintenance of the Project"* (Exhibit W1-A).

7. The application discusses a subconsultant Gridworks that is evaluating multiple energy options were noise could be a topic of concern, so it appears that Acentech was retained by Gridworks Energy Consulting LLC (Gridworks), to prepare Section 5 of Nordic Aquafarms SLODA application while the primary consultant for Nordic Aquafarms Salmon Facility is Ransom Consulting, Inc. (Exhibit W1-B).

8. Grid works was retained to *"create a sustainable energy infrastructure and ecosystem at its Belfast facility"* (Exhibit W1-A). It is unclear if, or how, noise from the other sustainable energy infrastructures were incorporated in noise assessment. There has been discussion of solar, heat pumps, etc., all of which add noise, but have not been discussed in the application.

9. Acentech is the sub-consultant to Gridworks who is the sub-consultant to the primary consultant Ransom. Because of this arrangement it is imperative that the noise section of the application discusses how a subconsultant-to-a-subconsultant understood the project needs and properly represented the project. This is typically done in the application text itself. It was not.

10. The proponent, and its consulting expert read the BEP rules, and provided a construction sound discussion. There is a list of construction related equipment and associated potential sound at 500 feet, and a qualitative construction sound analysis that suggests compliance with the DEP construction sound requirements presented in Section 5 of the application (Exhibit W1-B). Yet the application has no actual discussion of construction operating scenarios or how many pieces of each piece of construction equipment are included, but no operations equipment list that was used for modeling. Per prior testimony, there is disagreement that construction noise is exempt from regulation, their rules require the information be provided to make sure the facility will not exceed the OSHA limits at the fenceline included in their construction noise rules.

11. Even if the list and approach was representative at the time, the assumptions made in May of 2019, before the many rounds of RFIs and responses were provided could not still be accurate. If one simply considers the stack sound emissions alone, at the higher stack height, this is clear.

Nordic Aquafarms SLODA Application Section 5-Noise

12. Section 5: Noise of the SLODA application assumes that the applicable regulation for the project is Chapter 375.10 of Maine's Site Location of Development Law Regulations: Control of Noise and the city of Belfast Code of Ordinance. And that the limits are 55 dBA and 45 dBA for daytime and nighttime respectively. This is because of the existing nature trails, houses of worship, and residential uses abutting nearly 100% on the fenceline (with the exception of the corner of the property that abuts Matthews Brothers).

13. The proponent did not perform the collection of, or at least did not provide in its permit documents, background sound data.

14. In its application, the proponent did not include the project's predicted tonal sound level impacts as per Chapter 3755.10.C.1.d: *"For the purposes of determining compliance with the above sound level limits, 5 dBA shall be added to the observed levels of any tonal sounds that result from routine operation of the development "(*Exhibit W1-C).

15. Exhibit W1-B states that the *"Sound associated with routine operation of the proposed Project will be produced by electric motors, water pumps, fans, filters, water flow, boilers, chillers, and engine-driven*

electric generators with all to be located inside industrial-grade Project buildings. Sounds associated with routine operation of exterior equipment will be produced by ventilation intakes and exhausts, cooling towers, and registered over-the-road trucks coming to and from the Project site." Many of these sounds often have peaks in common octave bands.

16. Figure 3 of the noise assessment presents contours of the A-weighted hourly equivalent Leq sound levels. *"The buildings and individual equipment are shown in blue on this figure"* (Exhibit W1-B).

17. The noise assessment report simply describes the sources as *"building and individual equipment"*. This is obviously not detailed enough to determine what, where, how, why, and when with respect to potential for adverse impacts.

18. In the final paragraphs of the noise assessment the proponent states that *"It is expected that regulated equipment during routine operation will produce sound levels that are equal to or lower than the applicable noise level limits contained in Chapter 375.10 of Maine's Site Location of Development Law Regulations. See Sections 3 and 5 of this report for a more detailed discussion"* (Exhibit W1-B). This *"detailed discussion"* suggests in paragraph 4 on page 5, *"The Project will be designed and operated such that the routine hourly equivalent operating sound levels from regulated equipment will comply with noise limits that are applicable to the Project."* This paragraph could apply to any project anywhere. This statement is not a detailed discussion. If fact, it suggests that the noise modeling was done with generic information prior to design. If so, what are the assumptions, and why this is in conflict with a direct response to an RFI that they were based upon "project supplied information".

<u>Nordic Aquafarms Response to Request for Information</u>

19. In response to the Request for Information (RFI) dated October 9th, 2019, Nordic Aquafarms stated that their *"sound model was based on project-supplied information, which identified the ventilation systems, generator system, building construction, attenuators, and equipment layout. The 180 sources in the sound model cover primarily air inlet fans, air outlet fans, and open vents for the various tank buildings with attenuators as necessary to provide a typical sound power level for each individual source of 60 to 65 dBA"* (Exhibit W1-D). The proponent does not provided *"sound level specifications"* for the 180 sound sources they have stated was modeled as requested in Question #2. If this statement were accurate, it would take no time to put them all into a table with the uncontrolled data and the control assumed to meet their source-by-source limit. Nordic chose not once, but more than once to not provide this information, at DEP's and at my personal requests.

20. Question #2 in Exhibit W1-D asked for the equipment sound information and also some other questions. While it may be possible to think that their response was sufficient to address the request for the equipment data by their response discussing 180 source in a holistic manner, the very next question, Question #3 said **"Please submit sound level specifications for all outside sound-generating machinery"**. This question ONLY asked for the data. It could only be interpreted as a site-wide sound discussion request. It was plainly an equipment sound data request. The response completely ignored this request, and simply stated *"Please see above answer to Question 2 for response""*. There can be no doubt that the proponent understood this question and simply chose not to provide the required information. Without this information provided, their sound analysis is a completely hypothetic, unsubstantiated exercise. It was performed by a subconsultant to a subconsultant and there is no text in the application that justifies that the subconsultant to the subconsultant understood the actual project at the time this analysis was provided. Therefore, it should be stricken from the application. This fact alone should be sufficient to understand that the proponent has not and cannot possible satisfy the burden of proof for this project under the SLODA requirements with this unsubstantiated report.

21. In response to the RFI dated October 9th, 2019, the proponent states that the *"Dynamic insertion loss values for these attenuators range from 0 to 29 dBA."* Again as requested in the question they respond to as seen in Exhibit W1-D, the proponent does not provided *"sound level specifications"*, and depending on the equipment location and the dynamic insertion loss values for the attenuators it can determine whether the project has an adverse impact at the protected project locations. This not a typical approach to sound mitigation. It is unrealistic, and unlikely to be followed.

Nordic Aquafarms Inconsistencies and Lack of Information

22. The proponent elected not to include the project's predicted tonal sound level impacts or to provide equipment tonal sound data. This decision was made by the proponent. There was a conscience decision to not provide the equipment, total, and tonal sound. This is not standard environmental consulting practice.

23. Because the proponent did not consider tonal sound directly, it is required to add 5 dBA to the results to adjust for this decision per SLODA rule Chapter 3755.10.C.1.d. When Tech applied the additional 5 dBA factor that is required in lieu of providing the tonal sound, with no other adjustments to the proponent's analysis, to the revised Table 2 provide in response to RFI dated August 22nd, 2019 (see Exhibit W1-E). Please note that this 5 dBA adder is not a "penalty", but a "short-cut". It is typically used by smaller projects where a basic analysis will suffice. This is not one of those proposed projects. The proponent elected to take this short-cut, and complete the analysis this way. The estimated sound levels with an additional 5 dBA to account for tonal sound, the project estimated sound levels ends up being over the nighttime limit of 45 dBA at the nearby protected location 3 (Exhibit W1-F, Table 1).

24. Please note that this analysis only included six fenceline receptors and not the entire offsite area. Since no modelling files were provided, it is not possible to know how many areas of exceedance are also present in addition to this discrete location.

25. Exhibit W1-G is an annotated image of Figure 3 from the sound report, illustrating how the provided inconsistencies in the figure and unrealistic results determine that the project would be not be incompliance. The bullets below refer to different colored arrows that Tech has superimposed on the "compliance" figure to spatially locate the bullet on the figure:

a. The yellow arrow points to the general area of the engine plant. The stacks exact location, orientation, stack height with respect to its enclosure, base elevation to surroundings buildings is unknown. Since the proponent did not provide building and site information, and modeling assumptions, it did not demonstrate that the assessment includes the proper physical operating scenarios.

b. The orange arrow shows a very dense area with a receptor, a contour and the property line. It is unclear whether the maximum sound is actually at this receptor or further away. Also in the more recent plans, there is an additional building in the upper right corner that is not shown in the original figure. The six receptors may, or may not represent worst-case concerns.

c. The purple arrow points to a clear channeling of sound, which is outlined by the yellow contour. It is unclear whether equipment, terrain, or modeling assumptions created this anomaly, but it should have been discussed and explained.

d. The blue arrows refer to the Town of Northport, which is not mentioned in a discussion of protected areas; therefore, the proponent needs to provide the required land uses, local zoning, and comprehensive plan to complete the assessment for Northport. In addition it should have included receptor locations that extend to Northport. It is as if the BEP process that acknowledged that the project is located in both Belfast and Northport does not exist. The proponent's noise analysis cannot be considered complete as it does not even address noise into Northport.

e. The red arrow points to the far side of the wastewater plant. This building contains a large pump station, multiple stages of wastewater treatment processes for up to 8 million gallons per day, and water treatment processes for up to 2 million gallons per day, but according to the model, the net effect of the building is actually blocking sound instead of emitting sound. This is simply not consistent with any other wastewater treatment plant, we have ever seen. It is as if there are no intakes or exhausts, no odor control, no process equipment, no operational doors, nothing present. It is simply not representative.

f. A general observation for this figure, is that their six receptors are not representative of worst-case ground level sound. While worst-case sound is at the fenceline, it is not always at exposure height. In this case, the buildings are so massive and so close to the fenceline, they actually shield the sound at ground level directly at the fenceline in some locations, but further away the direct line-of-sight to the abutters is established, so the worst-case sound impacts in some cases are clearly within the abutters' properties. This is evident by the isopleth patterns.

26. Exhibit W1-G just scratches the surface with respect to glaring omissions and inconsistencies. It cannot be the basis of establishing the burden of proof with respect to sound emissions. The acoustical modeling provided raises more questions about the projects adverse effect on nearby protected locations than clarifies them.

27. The proponent does not provided *"sound level specifications"* for the 180 sound sources they have stated was modeled, but they do suggest that an unknown number of mitigation scenarios with *"0-29 dBA"* of mitigation is proposed. This is simply unhelpful for determining compliance or offering conditions. Furthermore, it is simply impossible to perform a direct an independent model comparison.

Tech Environmental Acoustic Modeling

28. User selected noise modeling parameters that are incorporated in the model (terrain, ground absorption, reflection loss, attenuation, building heights, equipment heights, receptor heights, number of sound sources etc.) can drastically alter the final results of the acoustic model, and one will not know by simply examining a model output figure and comparison table. If equipment information that is not applicable to this proposed project is provided to the modeler, or inappropriate site assumptions have been made, then the results may not be representative. It is an industry standard to provide these.

29. Without the actual model, Tech was still able to perform an adjustment to their modeling for the change in stack heights. We performed two different acoustic models, with the information provided in the SLODA application and sound data from Tech's sound database to examine potential changes to their modeling that were clearly identified like stack height changes, building changes, etc.

30. Tech's sound database is a collection of equipment data obtained from different vendors over our many years of acoustical modeling. The engine exhaust sound data that was used in the model is for a CAT 3512 which is similar to the engine CAT 3516 (A CAT 3512 has four cylinders, and the CAT 3516 has 16 cylinders) that the proponent states that they will be using, and which is referred to in Chapter 115 Minor New Source

License Application (Exhibit W1-H. For the condenser, the sound pressure level used was what was provided in the response to RFI dated October 9th, 219 (Exhibit W1-D).

31. The first acoustic model was performed based on the worst case scenario of 8 Engine Exhaust and 8 condensers, and using the most current building plans and elevations provided in the response to RFI November 8, 2019 (Exhibit W1-I). Again, if the engines are run for peak shaving approximately 10% of the year, they must be run at 85% or less to keep them within warranty and within Best Management Practices for maintaining any air emission guarantees (that have not been formally provided, but nonetheless) and for prolonging equipment life cycles.

32. The second model run was based on the original building plans and elevations, and only 7 engines that the proponent states they modelled (Exhibit W1-J).

33. Since we do not have their noise model files, the receptors were placed graphically in the same locations as they were shown in the noise assessment figure (Exhibit W1-B).

30. The stack height was higher in the modified application run because the stack heights were raised from the actual stack heights proposed in the application to reduce the air impacts from the proposed buildings. This added stack height unfortunately also reduces the shielding for sound. The modified application modeling run at the higher stack height had a much great localized sound impact. While on may suggest that the modeling was an approximation with similar sound data. Tech did not attempt to use the modified model run directly. Instead the difference between the two model runs at the six receptors where examined. By examining the difference, Tech could isolate the increase in sound from the increase height, and then add hat to the original model. The revised sound values provided with the self-imposed 5 dBA adder for tonal sound are included in a new table. (Exhibit W1-F, Table 2).

31. Table 2 (Exhibit W1-F) demonstrates that after the stack height adjustment is considered the only receptor location that could possibly still meet both the 55 dBA and 45 dBA limits was location 6 which was the furthest away, and the most shielded from the change in stack height.

32. Although, the previous stack height adjustment clearly does not demonstrates compliance, Tech wanted to also examine the generic 180 sources controlled to 60 to 65 dBA, so Tech also did one hypothetical model. We took the bare minimum of information provided for the engine plant and of the 180 sources. The engine plant sources were placed at the engine plant, and the remaining sources were spread out generically over the other process buildings. With these generically controlled sources, Tech still experienced modeling results that suggests that the project does not comply with the 55 dBA nighttime and 45 dBA nighttime limits.

33. I am not presenting results of the generic hypothetical analysis of equally spaced sources, as I cannot defend the source locations, or the approach. It was merely completed to see if what they proposed generically in their RFI response, with the new stack height, was even a reasonable approximation of the results presented, and I could then provide a professional opinion. The statement that the 180 sources located somewhere around the site, and are all limited to a maximum of 65 dBA simply does demonstrate the burden of prove that the facility will not cause adverse noise impacts. And this is with us hypothetically spreading the sources out around the buildings. In reality they will need to be, where they need to be so it is likely that here will be clusters of sound sources creating higher potential sound to some areas.

34. Standard sound modeling protocol would require a proponent to discuss uncontrolled/unmitigated sound or mitigated sound with a discussion of the specific mitigation. Unfortunately, neither were provided. In addition no receptors were provided in the Town of Northport, and Northport was not discussed in the sound study. Upstream Watch had requested equipment sound data multiple times so we could assess the impact

on both Belfast and Northport. DEP requested equipment sound information on more than one occasion and it was not provided to us or to them. Any modeling performed that could be considered appropriate would have assumptions that should have been provided for:

i. terrain,
ii. ground absorption,
iii. building reflection loss,
iv. building material,
v. building heights,
vi. building location,
vii. receptor locations,
viii. receptor heights,
ix. type of sound sources,
x. the number of sound sources to incorporated,
xi. sound source locations,
xii. sound source heights,
xiii. sound source octave band data,
xiv. attenuation octave band data, and
xv. Safety factors.

35. It is now clear that no actual equipment sound information was provided prior to the air quality pre-filed deadline, so unfortunately, a noise analysis had to be completed now with the information available. Although noise was excluded as a hearing topic, it is being provided herein as sworn written testimony, at the same time as the odor rebuttal and air quality pre-filed testimony because they are all interrelated. It is important that the analyses use the same "data availability snapshot in time".

36. Based upon the multiple approaches taken to analyze this sound study, it is now clear without a shadow of a doubt that noise will project towards the Little River and beyond. It was clear from our stack analysis alone, it was also obvious when the incremental stack sound was added to their factors, and even with multiple hypothetical analyses, that noise will reach Northport to the south, southwest, and west.

37. I have supplied our noise data assumed for our stack height differential analysis (Exhibit W1-K). While I would normally propose to share our analysis as well at this time, that is simply not prudent. We used the same model, Cadna-A that the proponent used with very reasonable assumptions, but it is simply not practical for our analysis, submitted by a concerned citizens group's expert, to be scrutinized without the proponent's sound data and modeling information that is required by rule to be provided as part of the permitting process. We will gladly share any and all modeling files and assumptions, if the proponent shares theirs, so they can be scrutinized equally. This is really overly generous by Upstream Watch, as the burden of proof is still squarely on the proponent.

38. As a result of this analysis of the available information and my testimony, it is my professional opinion, that this project as proposed will have a significant adverse impact on infrastructure and noise beyond the boundaries of the property line in nearly all directions.

39. As a result of this analysis of the available information and my testimony, it is my professional opinion, that this project as proposed will be plainly audible in Belfast and in Northport and have a significant adverse noise impact on nature trails in both Belfast and in Northport.

40. As a result of this analysis of the available information and my testimony, it is my professional opinion that the proponent has never provided sound receptors in Northport, and has never suggested that it would be

plainly audible Northport to any degree.

41. As a result of this analysis of the available information and my testimony, it is my professional opinion, that this project as proposed will have a significant impact on infrastructure and noise beyond the boundaries of the municipality within which the development is to be located.

42. As a result of this analysis of the available information and my testimony, it is my professional opinion, that the proponent has not provided adequate information in the permit application suggesting it would produce noise beyond the boundaries of the municipality within the Town of Northport and therefore must resubmit its applications with proper notice to the Town of Northport.

43. Based upon my opinion and my residency in Northport, this written testimony is also a formal request that the Commissioner, or in this case the Board of Environmental Protection, provide infrastructure and noise limits and conditions, and require pre-permit compliance demonstrations that the proposed facility can meet these limits and conditions to protect Northport's interests including, but not limited to, the bypass road construction, construction traffic, construction noise, operation noise, and long-term traffic concerns.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

_____ Date:

Printed Name:
Title:

Parties Assisting:

Name:	Address:	Signature: _____
Name:	Address:	Signature: _____

TECH environmental

FOCUSED KNOWLEDGE. REAL SOLUTIONS.

Michael T. Lannan, P.E.
President

Education

B.S. Chemical Engineering
Northeastern University,
1991

M.S. Environmental
Engineering
Northeastern University,
1993

Certification

Professional Engineer:
Maine
Vermont
Massachusetts
New York

Affiliations

New England
Environmental Business
Council,
Air Quality Committee
Past Chair

Northeast Biosolids and
Residuals Association,
Board of Directors

Fiberglass Reinforced
Plastics Institute,
Board of Advisors Chair

New England
Environmental Business
Council,
Solid Waste and C & D
Committees

Water Environment
Federation, Air Quality
Committee

New England Water
Environment Association
Residuals Management
Committee

Air and Waste Management
EE-6 Odors Committee,
Past Chair

Air and Waste Management
AE-2 Odors, Solvents, and
Gases Committee

SWANA Air Quality
Committee

Michael T. Lannan is an environmental engineer who has identified nuisance conditions for owners, operators, and regulators alike for close to 30 years. He started his career exploring proposed projects for airborne nuisance, or for facilities experiencing nuisance complaints, but over the years, his expertise has expanded into all types of compliance concerns. He has testified at dozens of hearings and court cases on ordinances, regulations, due diligence, and compliance. He has assisted many cities and towns with ordinance development, and is currently assisting about six municipalities and public organizations with specific procedures for compliance with state and their local ordinances.

He has presented seminars on nuisance science and control to colleges, regulators, facility operators, consultants, and neighbors. He has trained MaineDEP, NHDES, MassDEP, Allegheny County Health officials, the Puget Sound Clear Air Agency in Seattle, and the Oregon DEQ, on nuisance monitoring and response procedures. Most training results in changes to nuisance, zoning, or permitting regulations. The training for the Oregon DEQ resulted in a very proactive 10-year project for the regulators to completely revamp their approach to compliance, and to proactively employ scientific monitoring with facilities, before the issues become political and legal concerns.

He has worked on hundreds of nuisance related projects and can quickly and effectively identify areas of concern. He has provided site assignment and nuisance testimony for facilities or proposed regulations predominantly focused in Maine, New England, throughout the northeast, but also throughout the country at request. He assisted Maine DEP when a specific nuisance policy was required, after a legislative initiative was passed. He is currently assisting one Maine area with seafood processing odor concerns, and another with a noise assessment for refrigerated seafood transfer and trucking operation.

Recently, he trained a number of federal contractors on odor detection procedures at a federal facility in Colorado that is biologically degrading old mustard gas munitions. It was important that the procedures not only address the science of the concern, but the potential public outcry detectable emissions from an old nerve gas munition facility could produce. He recently also provided training for those odor nuisance monitoring thresholds and odor complaint response procedures personnel in September at, or near, NYSDEC headquarters in Albany and at another location in upstate NY.

For over a decade he has been reviewing potential air, odor, noise, dust, lighting, and vibration adverse impacts on a fast track basis for residential, commercial, and industrial mixed used projects for compliance with a regional planning commission's Industrial Performance Standards. The commission has been tasked with redeveloping an old Air Force base that spans three municipalities.

Noise and Blasting - Impact Analysis for Gilboa Dam Reconstruction Project, Gilboa, NY. The Gilboa Dam, on the Schoharie Reservoir collects and supplies nearly 10% of the total fresh water to New York City. The dam located upstate, in Gilboa, New York, required extensive repairs. Mr. Lannan was asked to perform noise, vibration, and impact sound analyses caused by the reconstruction of the dam, from building roads during site preparation, blasting, jack hammering and demolition, on-site cement production, trucking and spoils disposal, since the dam was going to be reconstructed 24 hours a day in a rural area for a number of years. Mr. Lannan's sound assessments included a mixture of standard and site specific usage factors for various construction activities, and an extensive noise compliance monitoring program that covered all surrounding residences and municipal structures (e.g. schools and museums). Mr. Lannan was able to work directly with the contractor to determine the maximum amount of construction flexibility for day and night operations over the different project phases. The noise impact analysis included a variety of noise sources that were modeled with the CadnaA model and the Federal Highway Administration Transportation Noise Model (TNM).

Odor - Public Testimony for Addressing Odor Control at a Municipal Landfill in Newfoundland. Mr. Lannan was retained by the City of St. John's, Newfoundland to examine odor emissions from its older downtown landfill and to develop an odor reduction strategy to eliminate a public odor concern. Mr. Lannan was brought in as an outside expert on odor control. Mr. Lannan's testimony was presented at a press conference where local groups and lawmaker's grilled him on his approach. Mr. Lannan was able to identify the cause of the spike in odor, and recommended a number of operational changes and public outreach programs to eliminate the concern. Mr. Lannan developed a comprehensive odor control strategy and defended it in a confrontational environment that was broadcast on TV to the province.

Vibration - Residential Impact Study for Train Sound. A new residential development was proposed in Massachusetts for a site adjacent to an area where Amtrak and commuter trains travelled, and commuter trains typically idled all night. The developers were concerned that potential sound and vibration from train traffic, especially the idling, would adversely affect potential future residents. Mr. Lannan used Tech Environmental's database of noise factors and train schedules to examine the acoustic impacts of train traffic within the proposed residential dwellings. Although the initial findings were excessive low frequency sound potential, Mr. Lannan specified a sound mitigation wall solution specifically for the low vibrational frequencies of concern.

Air Pollution Control - Industrial Interceptor Emission Estimation and Reduction for 80 Chemical Processing Industries. Mr. Lannan used chemical fate modeling to determine the potential emissions from the largest industrial sewer in Houston, TX. The BIOSAN interceptor collects wastewater from Houston's chemical processing and manufacturing clients and transports it to its own industrial wastewater treatment plant. Mr. Lannan discovered many air emission hotspots during the fate modeling and recommended a combination of covering and ventilation, siphon systems, and air pollution control technologies to reduce the air emission potential to a low level so complete covering, ventilating, and air pollution control of the entire system was not necessary.

Air Emissions Assessment - Department of Energy Emissions Inventory. Mr. Lannan performed an emissions inventory for approximately 200 emission points at the Department of Energy's Savannah River (GA) Site in Georgia. He examined emission operating and monitoring data for boilers and emergency generators, and estimated vapor phase chemical transport for research laboratories and batch chemical facilities using chemical properties and EPA-approved emission models. The emission inventory proved the facility's claim that total annual air emissions had been reduced by an order of magnitude in recent years

Employment History

2018 to present	Tech Environmental, Inc., Belfast, Maine President
2015 to 2018	Tech Environmental, Inc., Waltham, Massachusetts President
2004 to 2015	Tech Environmental, Inc., Waltham, Massachusetts Vice President, Air Quality and Nuisance Services
2002 to 2004	Tech Environmental, Inc., Waltham, Massachusetts Associate, Air Quality and Odor Control Services
1991 to 2002	Camp Dresser and McKee, Cambridge, Massachusetts Air Quality and Odor Control Engineer, Air Quality Group Services

4.0 TECHNICAL ABILITY

The project team assembled for this development brings together national and international recirculating aquaculture systems (RAS) farm capabilities, combined with local civil engineering expertise. The assembled project team is highly qualified with extensive experience in developing, permitting, constructing, managing, and operating large scale developments projects, including land-based fish farms. The project has been under the supervision of Nordic's senior project and technical staff.

4.1 Applicant's Prior Experience

Nordic Aquafarms, based in Norway, is one of the world's largest investors and developers of land-based seafood production. We are dedicated to the highest environmental and quality standards in the industry, and already have development of three facilities in Europe behind us (Maximus, Sashimi Royal and Fredrikstad Seafoods). Our company has grown rapidly since its establishment in 2014 with a total of 54 employees at the time this application is filed. In 2017, we established a new subsidiary in the US, Nordic Aquafarms Inc., to pursue expansion in the US. The Belfast project is the company's fourth expansion step, with a fifth location in progress in Eureka, California.

Nordic Aquafarms has assembled significant experience and technical skill the design, development and operation of RAS. We have experienced commercial executives, experienced production leaders, and have a highly specialized internal engineering practice.

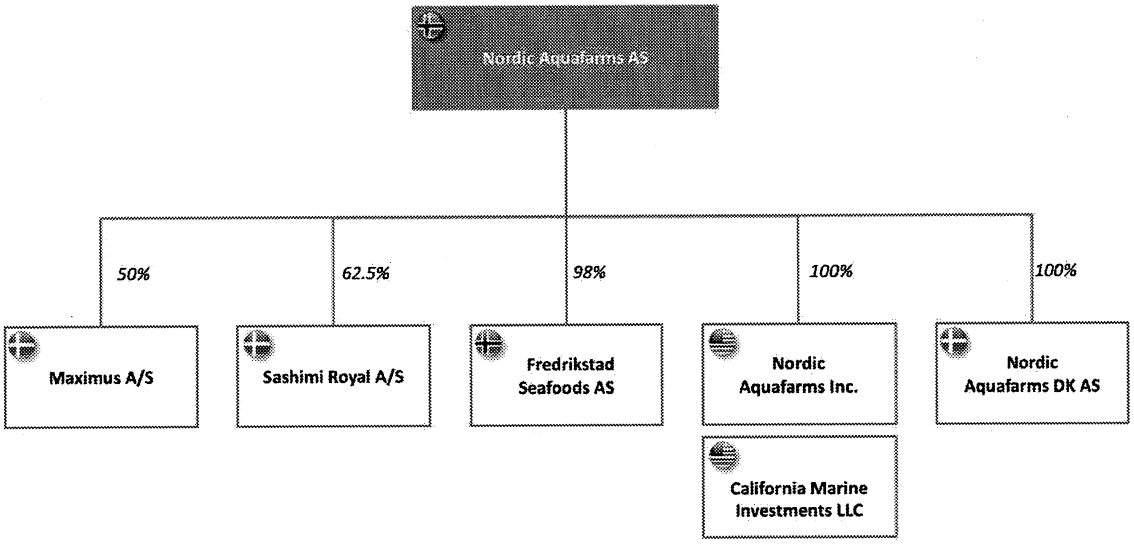
Nordic Aquafarms has the largest and strongest in-house engineering department in the land-based fish farming sector. Nordic Aquafarms has 14 full time engineers on staff, with the main design hub in Nordic Aquafarms DK, Denmark. The core civil team sits in Norway, with further expansions in the US team. Technical RAS design capabilities were expanded in 2018 with hires of six senior Inter Aqua Advance staff who had previously worked on our projects as consultants. Inter Aqua Advance has been a pioneer in RAS with delivery of designs and facilities to major seafood players all over the world for over 20 years. Inter Aqua built the first salmon smolt recirculating aquaculture system in the world for Scottish Seafarms, and the first salmon grow-out RAS design concept for Marine Harvest Canada. Our senior staff have several decades of working knowledge and experience in the industry and are viewed as experts in their field. Ivar Warren Hansen has 32 years of experience in aquaculture and has been involved with 45 separate RAS systems. Our most experienced engineers have delivered projects to international leaders in the segment such as Cooke, Grieg, Leroy Seafood, and Mowi amongst others.

In civil engineering and construction, Nordic Aquafarms has several experienced profiles. The engineering Director in Norway, Ketil Fjeld, has 30 years of project management experience from large commercial projects. We also have experienced construction designers. In Denmark we have Claus Rom with a long executive career in the construction industry. Civil capabilities are under expansion in the US (see below).

Our production and operations staff have decades of experience working in the industry, while making important contributions in pushing the industry to where it is today. As the Production Manager for Kuterra, Cathal Dineen helped bring commercial land-based aquaculture to North America. Cathal has been working for the last two years to successfully open Norways' largest land-based Salmon grow out facility in Fredrikstad for Nordic Aquafarms. He has over 20 year's experience with RAS production management and will be filling the position as production Director in Belfast. Site manager for Fredrikstad, Roger Fredriksen, has over 30 year's experience in Norway with farming several species, although he has worked primarily with large-scale commercial production of salmon.

Nordic Aquafarms currently operates the world's largest land-based Yellowtail Kingfish farm in Hanstholm, Denmark. Yellowtail are among the most demanding fish to raise. Nordic Aquafarms has been successfully producing 4 kg fish at this 1,200 mt farm for the European market in the past year with high praise from customers for several years, supported by the vertically integrated marine hatchery Maximus that holds approx. 90 brood stock. The facility received certifications from the Aquaculture Stewardship Council (ASC) in 2018. Sashimi Royal has never had any major incidents or issues with disease since the brood stock fish arrived three years ago.

The current legal structure of Nordic Aquafarms is as follows:



The company owns a number of patents and has a patent pending application for its new generation of RAS facility designs.

Nordic Aquafarms draws a vast amount of experience and operating knowledge from its Norwegian roots. Norway is a world leader in Salmon production, aquaculture technology, and research. Denmark has also developed a strong technical expertise in RAS through several world-class design vendors. Nordic Aquafarms has a foot in each of these markets and has now extended this to the US where we are also developing relations with many expert partners.

The company has systematically built its US executive team since 2018:

1. Nordic Aquafarms Inc President Erik Heim has overseen all company projects and has extensive experience in bringing together the various disciplines in project planning and execution.

2. Ed Cotter Nordic Aquafarms US project director has delivered 10 major projects totaling $750m in value in his 12-year career with Gilbane, a respected leader in construction management. He had various construction management experience before this.

3. Cathal Dinneen is production director for the Maine facility with over 20 years of experience in RAS farming with numerous species. Dinneen has a long track-record of working with Salmon in RAS, including start-up of the first North-American land-based salmon facility Kuterra.

4. Marianne Naess is an experienced international executive from large companies such as Aker Solutions, McKesson, and others. She has experience from large construction, market development, and strategic organizational development. She is commercial director.

5. Nordic Aquafarms CTO David Noyes has worked for multiple land-based aquaculture companies and research groups such as the University of Maine Aquaculture Research Institute and the USDA ARS National Cold Water Marine Aquaculture Center in Maine, both are viewed as National experts on aquaculture.

6. Brenda Chandler is an experienced financial profile with a long track-record from the semi-conductor industry and complex projects, and is our CFO in the US.

The Nordic Aquafarms Inc organization will be scaled up further with expert resources upon permit clarifications, while working in concert with the Nordic organization.

4.2 External Project Team Experience

External consultants were selected based on their extensive experience and local expertise in their respective fields. The permitting phase has included contributions from the following vendors:

4.2.1 Ransom Consulting, Inc.

Ransom Consulting, Inc. (Ransom) has been retained to provide overall permitting and public participation services for local, state and federal permits, geotechnical engineering, storm water management analysis and design, environmental due diligence, hydrogeologic investigation, and coastal engineering services. Our staff includes professionals in civil, transportation, utility, stormwater, environmental, geotechnical, and coastal engineering, and we have been serving municipalities throughout New England for over 30 years.

Our services typically fall into the following major categories: civil/site engineering, municipal engineering/utility design services, geotechnical engineering, Brownfields redevelopment, environmental due-diligence and remediation services. Additionally, our Portland, Maine office has areas of specialty technical services that include storm water management analysis and design, civil/infrastructure design, geotechnical engineering, environmental permitting, public participation facilitation and local, state and federal permitting.

Providing civil, geotechnical, and environmental consulting and engineering services to municipal and private clients are all part of Ransom's core services, as such, these are areas in which our team members have exceptional expertise. We have worked collaboratively with diverse groups including municipal and state officials, regional planning and development commissions, developers, financial institutions, special interest groups, community groups, various review and approval agencies, as well as other consultants, engineers, architects, and construction experts. Ransom staff has provided professional engineering and environmental consulting services to municipalities throughout Maine and New England for many years. Some of the municipalities in Maine include Belfast, Bath, Eliot, Gardiner, Freeport, Camden, Rockland, Dover-Foxcroft, Kennebunk, Falmouth, Yarmouth, Brunswick, York, Portland, South Portland, and Cumberland for several years. This experience has served to build strong working relationships with federal, state, and local officials as well.

Our past clients include municipalities, utilities, large and small industrial companies, attorneys, real estate developers, hazardous waste contractors, and government agencies, among others. Our clients' satisfaction with our services has resulted in a large volume of repeat and referral business which has been a significant contribution to our sustained growth. Ransom has established a strong reputation in Maine and throughout New England by helping clients achieve project regulatory objectives.

4.2.2 SMRT Architects and Engineers

SMRT Architects and Engineers (SMRT's) roots go back to 1884, when John Calvin Stevens established his architectural design firm in Portland, Maine. Over the next 134 years, his one-man firm would evolve to become a multi-disciplinary industry leader with more than 100 employees. SMRT's integrated architectural and engineering practices support every project from the outset, bringing informed insight to ensure a facility functions dependably and efficiently and reflects its mission and culture.

Designing and engineering complex buildings for today's specialized technology industries requires both technical expertise and operations/facilities management experience. Our integrated and collaborative approach allows us to provide a full-responsibility model of project management. Given the high levels of coordination and oversight needed for the complexity of our clients' projects, SMRT's full-service team approach allows us to develop creative – yet practical – solutions to complex building problems.

While offering comprehensive services in-house, SMRT routinely partners with other consultants offering similar services. Our philosophy is simple: "structure a project in the way that is best for the client and the project's needs." We value our partnering relationships, often with firms that others would consider competitors. A member of the US Green Building Council, SMRT considers sustainable design fundamental to our commitment to quality service. We practice "Green for a Reason," where each sustainability element must fit our clients' operations, economic and schedule requirements. With Leadership in Energy and Environmental Design (LEED) certified professionals in every discipline, we develop each project using an integrated green planning program to ensure our clients fully understand their choices and implications.

We understand the importance of the functionality of a site design and the impacts on efficient operations while respecting the site attributes and natural environment surrounding the site. SMRT's landscape architects and consultant Civil Engineer, Andrew Johnston, are experienced in permitting a wide range of projects with the State of Maine Department of Environmental Protection (MEDEP) through Site Law (SLODA) and Natural Resources Protection Act (NRPA); Maine Department of Transportation (MEDOT), Army Corp of Engineers; and numerous local municipalities. Permitted projects range in size and complexity and include a new regional hospital, numerous medical office buildings and a cancer center in Scarborough. Our working relationships with state and local agencies and regulatory knowledge will ensure efficient communication among the team and to keep the project on schedule.

4.2.3 Cianbro Corporation

Cianbro Corporation (Cianbro) of Pittsfield, Maine, has been retained to provide the design and construction of the sea water access system, which includes saltwater intakes, pump station mechanical systems, and process water discharge.

Cianbro is a diversified full-service construction firm experienced in marine projects and the environmental considerations with water and wastewater treatment facilities. Since the company was formed in 1949, Cianbro has successfully performed both design-build and construction services for this type of work and many other construction projects of a waterborne nature. Cianbro specifically self-performs and subcontracts civil-structural, mechanical, piping and electrical construction tasks that this project will require.

Cianbro's key project team members have many years of combined expertise and experience in environmentally sensitive water and marine projects. Our management team is backed by a workforce of 1,500 craftspeople of all trades as well as a host of long standing subcontractor relationships to execute all aspects of this project. Cianbro's corporate support services include in house professional engineers to assist with temporary construction design, means and methods. Our local yards and facilities include shoreline deep water access for materials, tools and equipment to become waterborne for immediate and efficient deployment to the site.

Cianbro is the largest owner/operator in this region of the heavy construction equipment applicable for this type of work including cranes, barges, tugboats, dredges and clamming equipment, boats and sediment booms, compressors, welders and the applicable tooling. Cianbro has a long history of diving operations and underwater work. Cianbro is well equipped and staffed to efficiently work on water and land alike.

Cianbro's history of projects include bridges over coastal and inland waterways, hydro-electric facilities, wind projects and overland power lines to name a few. All these projects require extensive environmental and sediment controls and best management practices (BMPs). A broad variety of Cianbro supervisors and craftspeople have training and experience in applying the proper BMPs and controlling sediment during construction operations.

4.2.4 Woodard & Curran

Woodard & Curran (W&C) of Portland, Maine, has been retained to complete the design associated with the saltwater intake, pump station and process water discharge for the project. W&C is a national consulting engineering firm focused on water and the environment with expertise in civil, water and wastewater engineering, and the operations of water and wastewater treatment facilities. Since the company was formed in 1979, W&C has successfully designed, permitted and constructed projects for industrial, manufacturing, and municipal clients throughout the United States, and specifically within our home state of Maine. For this project, W&C's key project team members include Barry Sheff, PE (Principal in Charge), Jim Wilson, PE (Project Manager), and Technical Managers Jason Kreil, PE and Paul Porada, PE leading the pumping system and pipeline hydraulics designs respectively. The team has been selected based on specific expertise and experience with projects located adjacent to and within marine environments. Key team members have an average of 25 years of related professional experience in Maine and New England, including Ellsworth ME Wastewater Treatment Facility, Vinalhaven ME Wastewater System Design, Bucksport ME Water Filtration and Treatment Facility, St. Agatha ME Effluent Transmission System, Portland ME Rockland Avenue Outfall, Portland ME Preble Street Combined Sewer Outfall Alternatives Analysis, Portland ME Curtis Road and Franklin Street Pump Station Upgrades, MEDOT Ocean Gateway Multimodal Facility, Rockport ME Wastewater Discharge Licensing, McCain Foods Waste Discharge Licensing, Salem MA Canal Flood Mitigation Pump Station, and Lawrence MA Pump Station Upgrades among others.

4.2.5 Normandeau Associates, Inc.

Normandeau Associates, Inc. (Normandeau) has been retained to assist with natural resource assessments, environmental permitting, and related aspects of the project within the terrestrial and coastal zones, as well as within Belfast Bay. In business since 1970, Normandeau has been providing environmental consulting services for nearly 50 years, including natural resource surveys and permitting support for public and private sector clients throughout the Northeast and nationwide. We understand the issues unique to each state's regulatory programs in which we work and have broad understanding of state and federal permitting requirements. With offices in twelve states and nearly 200 staff, of which nearly 70 are positioned in the Northeast, our staff has the depth and breadth of highly-qualified technical leaders and field staff to provide the requested services. Normandeau's technical and regulatory staff and capabilities are well-known and respected by state and federal regulatory and resource agencies. For this assignment, Normandeau's Key Staff include Adele Fiorillo (PWS, NHCWS), Sarah Allen (PWS, NHCWS), Sarah Barnum (CWB), Ben Griffith, and Tyler Parent, supported by well-qualified field and laboratory staff, including Mike Taylor, Matt Balge, Joel Detty, and Hannah Proctor. Our Key Staff each have over 20 years of relevant experience in Maine and New England, including the Peirce Island Wastewater Treatment Facility (Portsmouth, NH), multiple tasks under our MEDOT MSA, town-wide wetland modeling for the Piscataqua Region Estuaries Partnership (Kittery, ME), long-term wetlands and biological resource monitoring throughout Maine including Waste Management's Crossroads facility, Maine Transit Authority, Great Bay Eelgrass Studies for the Great Bay Municipal Coalition and others, water quality and fisheries studies in various locations throughout coastal Maine, and shoreline characterizations for various towns in coastal Maine (Harpswell, Saco and Scarborough to name a few). Normandeau's regulatory and field efforts are supported by the latest in GIS, CAD, and GPS technologies. Our GIS mapping department has developed maps for wetland stream and river and watershed delineation, vernal pools and habitat mapping, soils mapping, vegetation classification, fish and turtle studies, as well as bathymetric maps, side-scan sonar images for substrate classification, acoustic Doppler current profiles, aquatic habitat maps, land use maps, natural resource maps, water resource maps, topographic maps, stream restoration maps, tax maps, environmentally sensitive areas and numerous other location maps utilizing field-collected GPS data, state GIS data, and high resolution remote sensing.

4.2.6 McDonald Morrissey Associates, LLC

McDonald Morrissey Associates, LLC (MMA) of Concord, New Hampshire has been retained to provide numerical modeling services to support the permit application associated with the proposed groundwater withdrawal system. MMA is nationally recognized for expertise in the analysis of complex groundwater flow systems for industrial and government clients. MMA principals share more than 100 years of experience in the conduct, management and technical oversight of a wide variety of groundwater projects. MMA's project experience includes groundwater resource development, wellhead and source-water protection area delineation, mine dewatering, contaminant transport evaluations, groundwater remediation assessment, plume allocation, and regional groundwater flow system analysis. For this project, MMA's key project team members include Michael Mobile, PhD, Charles Spalding, PG, and Daniel Morrissey, RPG.

4.2.7 Acentech, Incorporated

Acentech Incorporated (Acentech) headquartered in Cambridge, Massachusetts, with offices in Philadelphia, PA, Los Angeles, CA, and Charlottesville, VA has been retained to provide environmental noise consulting services associated with the design, construction, operation, and

maintenance of the Project. Acentech is among the largest, most experienced, and oldest acoustical consulting firms in North America with roots dating back to the late 1940's serving engineering, architectural, industrial, commercial, institutional, environmental, legal, education, and cultural clients throughout the United States and many countries overseas. For this Project, Acentech's project team members include James D. Barnes, PE, Alex Odom, and Eric Wood with an average of more than 30 years of related professional consulting experience serving industrial, commercial, and engineering clients. Representative consulting projects for clients in the State of Maine have included energy plants, manufacturing plants, oil pumping stations, gas compressor stations, transformer substations, paper mills, landfills, schools, office buildings, and entertainment and worship spaces.

4.2.8 Gridworks Energy Consulting LLC

GridWorks Energy Consulting LLC (GridWorks) has been retained to help Nordic Aquafarms create a sustainable energy infrastructure and ecosystem at its Belfast facility. GridWorks was formed in 2017 to help the world's electric grids and microgrids use Transactive Energy Management tools to increase their resilience and sustainability. Its principles bring extensive experience designing and building Transactive Energy systems at VCharge, a company that built and operated the largest Aggregated Transactive Load Asset in the world, doing real-time energy trading and delivering Ancillary Services to PJM (Pennsylvania), ISO-New England (Maine and Massachusetts), National Grid (UK) and EirGrid (Ireland). GridWorks is currently also working with another large industrial energy consumer in Maine and conducting a study for a European grid operator on delivering grid services with residential appliances. One of its principles (George Baker) also has deep experience permitting and financing renewables projects in Maine.

4.2.9 Steven Whipple

Steven Whipple is a licensed Professional Engineer and has worked as an environmental engineer in the field of air quality since 1993. Since 1995, after working for the State of Maine's Bureau of Air Quality, he has practiced as a consulting engineer for a variety of manufacturing, commercial, educational, health care, legal, and government agencies. Projects typically include permitting, regulatory compliance review, environmental impact mitigation, regulatory reporting, control technology analyses, air dispersion modeling analyses, green energy applicability and program implementation, and environmental operations and management.

4.2.10 Broadwater Environmental, LLC

Broadwater Environmental, LLC (Broadwater) is a small consulting firm in South Portland, Maine specializing in natural resource characterization and land use permitting. Ian Broadwater is the owner/operator and has over 32 years of experience in environmental consulting in New England. Broadwater provides services including wetland delineation surveys and characterization, vernal pool surveys, high intensity soil maps and subsurface wastewater disposal system designs. Mr. Broadwater also has completed numerous environmental permit applications, from simple to complex, for a variety of clients. Mr. Broadwater also has experience evaluating and designing river and wetland restorations, conducting environmental and geotechnical drilling oversight, and collecting environmental samples. Mr. Broadwater is a Certified Soil Scientist in Maine (SS305) and a Certified Wetland Scientist in New Hampshire (NHCWS No.162). Mr. Broadwater is also a Licensed Site Evaluator (SE230) in Maine.

4.2.11 Northeast Archaeology Research Center

The Northeast Archaeology Research Center (NE ARC) is a privately-owned corporation established in 2008 located in Farmington, Maine, in the foothills of the Western Maine Mountains. NE ARC is committed to historic preservation and provides a wide range of high quality and cost-effective cultural resource management consulting services to its clients. The principals and staff have over 30 years of consulting archaeology experience in northern New England, primarily in the States of Maine, New Hampshire and Vermont, and have completed several thousand cultural resource consulting studies during this time. These efforts are directed at cultural resource management studies for corporate, private, federal, state and municipal entities; these efforts being the direct result of historic preservation legislation as one compliance component of environmental studies.

The NE ARC co-Principal Investigators and Directors, Gemma Hudgell, Ph.D., and Robert N. Bartone, M.A., in addition to Sarah Loftus, Ph.D., Project Director/Historical Archaeologist are highly qualified with experience far exceeding the Secretary of the Interior's minimum professional qualifications for archaeology (Code of Federal Regulations, 36 CFR Part 61; Federal Register 48, 190:44738-44739). Robert Bartone, Sarah Loftus, and Gemma Hudgell, are qualified to perform all levels of cultural resource work in Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont, although our area of expertise is primarily in the northern New England states.

The NE ARC provides the full range of archaeological services from small-scale assessments to large-scale surveys, evaluations and data recovery. NE ARC has extensive experience with both prehistoric and historic archaeology at sites representing the full range of Native American human occupation in the Northeast from the Paleoindian period to the Contact period and historic occupation to the 20th century.

4.2.12 Maine Drilling & Blasting

Maine Drilling & Blasting has earned a reputation as one of the safest, most experienced rock blasting and drilling companies in the Northeast and Mid-Atlantic areas. During the past 50+ years, they've performed over two million controlled blasts for highways, site development, quarries, houses lots, utilities and marine work. They've drilled some of the most aesthetic presplit faces, helped plan and develop over 180 quarries, installed rock anchors over water, under stadium seating and 50 feet above highways, and mechanically broken hundreds of thousands of cubic yards of rock with hoe rams. Maine Drilling and Blasting has extensive experience in projects from wind farms to ski-slope development.

Recognized as an industry leader in drilling and rock blasting services for the construction and quarry markets, they also offer a variety of specialty services throughout the Northeastern United States including: Foundation Services, Hoe Ramming, Rock Anchors, Engineering, Public Relations, Pre-Blast Surveys, Packaged Explosive Distribution, Quarry Planning & Quarry Blasting, and Leading Industry Technology.

Resumes detailing the experience and qualifications of key Nordic and external consultant personnel are presented in **Appendix 4-A**.

4.3 Project Delivery Phase

An external Construction Manager (CM) is being retained for execution of the proposed construction project in Belfast. The CM will be bringing in a specialized execution team to ensure high-quality delivery of project designs and construction on the site. Nordic Aquafarms is in the final phase of a tender process for a CM with final selection in May 2019. We are currently completing the selection process among a group of CM´s experienced in large-scale project management. The selected candidate will manage bids, daily coordination of construction, and reporting, under supervision of our Project director and an internal steering group consisting of the US executive team. The CM will be selected in May 2019 and will be involved in pre-construction preparations. Nordic will notify MEDEP when a project CM has been selected.

Final contractors will be chosen based on a tender process upon permit clarifications, with support from the chosen CM partner. A range of contractors will be involved in the civil work. Nordic Aquafarms DK and our international installation manager will be responsible for all RAS process installations and commissioning. Our production management and CTO will be responsible for final testing and preparations of the RAS systems.

Final engineering of the civil engineering for the facility will be conducted with retained engineer vendor partners from the permitting phase. This work will commence upon further clarifications about progress on issuance of permits.

APPENDIX 4-A

Resumes

4.0 TECHNICAL ABILITY

The project team assembled for this development brings together national and international recirculating aquaculture systems (RAS) farm capabilities, combined with local civil engineering expertise. The assembled project team is highly qualified with extensive experience in developing, permitting, constructing, managing, and operating large scale developments projects, including land-based fish farms. The project has been under the supervision of Nordic's senior project and technical staff.

4.1 Applicant's Prior Experience

Nordic Aquafarms, based in Norway, is one of the world's largest investors and developers of land-based seafood production. We are dedicated to the highest environmental and quality standards in the industry, and already have development of three facilities in Europe behind us (Maximus, Sashimi Royal and Fredrikstad Seafoods). Our company has grown rapidly since its establishment in 2014 with a total of 54 employees at the time this application is filed. In 2017, we established a new subsidiary in the US, Nordic Aquafarms Inc., to pursue expansion in the US. The Belfast project is the company's fourth expansion step, with a fifth location in progress in Eureka, California.

Nordic Aquafarms has assembled significant experience and technical skill the design, development and operation of RAS. We have experienced commercial executives, experienced production leaders, and have a highly specialized internal engineering practice.

Nordic Aquafarms has the largest and strongest in-house engineering department in the land-based fish farming sector. Nordic Aquafarms has 14 full time engineers on staff, with the main design hub in Nordic Aquafarms DK, Denmark. The core civil team sits in Norway, with further expansions in the US team. Technical RAS design capabilities were expanded in 2018 with hires of six senior Inter Aqua Advance staff who had previously worked on our projects as consultants. Inter Aqua Advance has been a pioneer in RAS with delivery of designs and facilities to major seafood players all over the world for over 20 years. Inter Aqua built the first salmon smolt recirculating aquaculture system in the world for Scottish Seafarms, and the first salmon grow-out RAS design concept for Marine Harvest Canada. Our senior staff have several decades of working knowledge and experience in the industry and are viewed as experts in their field. Ivar Warren Hansen has 32 years of experience in aquaculture and has been involved with 45 separate RAS systems. Our most experienced engineers have delivered projects to international leaders in the segment such as Cooke, Grieg, Leroy Seafood, and Mowi amongst others.

In civil engineering and construction, Nordic Aquafarms has several experienced profiles. The engineering Director in Norway, Ketil Fjeld, has 30 years of project management experience from large commercial projects. We also have experienced construction designers. In Denmark we have Claus Rom with a long executive career in the construction industry. Civil capabilities are under expansion in the US (see below).

Our production and operations staff have decades of experience working in the industry, while making important contributions in pushing the industry to where it is today. As the Production Manager for Kuterra, Cathal Dineen helped bring commercial land-based aquaculture to North America. Cathal has been working for the last two years to successfully open Norways' largest land-based Salmon grow out facility in Fredrikstad for Nordic Aquafarms. He has over 20 year's experience with RAS production management and will be filling the position as production Director in Belfast. Site manager for Fredrikstad, Roger Fredriksen, has over 30 year's experience in Norway with farming several species, although he has worked primarily with large-scale commercial production of salmon.

APPENDIX 4-A

Resumes

Acentech Report No. 0480r3

Acentech Project No. 631096

Nordic Aquafarms Salmon Facility
Belfast, Maine
Construction, Operation, and Maintenance Noise Impact Assessment



James D. Barnes
Alex Odom
Eric W. Wood

April 2019

Submitted by:

Acentech Incorporated
33 Moulton Street
Cambridge, MA 02138

Prepared for:

Gridworks Energy Consulting LLC

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1. Introduction

Nordic Aquafarms proposes to design, build, and operate a land-based salmon farm on a 54-acre site located in the City of Belfast, Maine. Phase 1 will have an annual capacity of about 13,000 metric tons of Atlantic Salmon. With Phase 2 in operation, the annual capacity will increase to about 33,000 metric tons

This report describes noise regulations applicable to the Project followed by an assessment of the sound expected during construction, operation, and maintenance of the Project. Appendix A describes sound in lay terms for the convenience of the reader.

2. Site Description

The proposed land-based salmon farm is to be located on an undeveloped 54-acre site to the southwest of the intersection of Route 1 and Perkins Road, about two miles south of the center of the City of Belfast. The Project site and nearby adjacent areas are shown on the Figure 1 aerial photograph and the Project site layout plan is presented on Figure 2.

The Project site is located in the Route One South Business Park Zoning District of the City of Belfast. The site abuts other properties in the Route One South Business Park Zoning District and in the Residential II Zoning District.

Nearby property to the west of the Project site is undeveloped woodlands beyond which are homes along Herrick and Woods Roads. A large area of undeveloped woodlands and Belfast Reservoir Number One are to the south of the Project site. Property to the east of the Project site is mostly open fields followed by Route 1 (Northport Avenue) and residential areas. To the north of the Project site is the Matthews Brothers business operation as well as nearby open areas with several homes located along Perkins Road. Belfast Municipal Airport is located somewhat more than a mile to the northwest.

3. Noise Regulation Requirements

Federal

No federal noise regulations are applicable to the off-site environmental noise associated with the construction, operation, or maintenance of the proposed salmon farm facility. Federal regulations do limit the noise produced by over-the-road trucks and portable air compressors.

State of Maine

Chapter 375.10 of Maine's Site Location of Development Law Regulations includes the following noise standards applicable to the off-site sound produced during routine operation of regulated equipment at the proposed Project.

- Hourly equivalent operating sound level limits of 60 dBA during daytime hours from 7 a.m. to 7 p.m. and 50 dBA during nighttime hours from 7 p.m. to 7 a.m. at protected locations in areas where the zoning is not predominantly commercial or industrial.

- Hourly equivalent operating sound level limits of 55 dBA during daytime hours from 7 a.m. to 7 p.m. and 45 dBA during nighttime hours from 7 p.m. to 7 a.m. at particularly quiet protected locations where the pre-development ambient hourly sound level is equal to or less than 45 dBA during daytime hours and/or equal to or less than 35 dBA during nighttime hours.

- Hourly equivalent operating sound level limits of 70 dBA during daytime hours from 7 a.m. to 7 p.m. and 60 dBA during nighttime hours from 7 p.m. to 7 a.m. at protected locations in areas where the zoning is predominantly commercial or industrial.

- Hourly equivalent operating sound level limit of 75 dBA at the Facility property boundary.

Sources of sound exempt from the above limits include safety and protective devices and warning signals, construction operations during daytime or daylight hours, and registered and inspected motor vehicles that enter the site to make a delivery or pickup, but not when parked at the facility with the engine running for more than 60 minutes.

City of Belfast
(extracted from the City website)

- The City of Belfast Code of Ordinances includes the following Article IX quantified noise performance standard for certain properties located within the City:

Noise may be equal to but not exceed, during any consecutive eight-hour period, an average of 75 dBA (re 20 micronewtons/m^2) measured at any boundary line. During the peak activity of 60 minutes in a twenty-four-hour period a noise may not exceed 115 dBA when measured at the source.

- The below quantified noise performance standard applies to properties in certain districts in the City of Belfast that are used for nonresidential uses:

(a) Excessive noise at unreasonable hours shall be required to be muffled so as not to be objectionable due to intermittence, beat, frequency, shrillness or volume (refer to table below). The maximum permissible sound pressure level of any continuous, regular or frequent source of sound produced by any commercial or industrial activity regulated by this division shall be established by the time period and type of land

use listed below. Sound pressure levels shall be measured on a sound level meter at all major lot lines of the proposed site, at a height of at least four feet above the ground surface.

Sound Pressure Level Limit

	7:00 a.m.—9:00 p.m.	9:00 p.m.—7:00 a.m.
Commercial activities	60 dBA	55 dBA
Industrial activities	70 dBA	55 dBA

The levels specified above may be exceeded by 10 dBA for a single period, not longer than 15 minutes, in any one day.

Noise shall be measured with a sound level meter meeting the standards of the American National Standards Institute (ANSI S1 4-1961) "American Standard Specification for General Purpose Sound Level Meters". The instrument shall be set to A-weighted response scale and at the meter to the slow response. Measures shall be conducted in accordance with ANSI S1 2-1962 "American Standard Method for the Physical Measurements of Sound", or such standard as may be amended from time to time. The City code enforcement officer, however, may use a portable sound meter available to the City to establish potential noise levels. If the code enforcement officer registers a noise level that is either near to or greater than the above standards, the officer may use these results to require the property owner to conduct a sound level analysis from a licensed engineer that fully complies with the above standards and to present these results to the code enforcement officer for analysis. Further, the planning board may require a noise level study for any use which requests a permit from the City.

(b) No person shall engage in, cause, or permit any person to be engaged in very loud construction activities on a site (active construction area) located within 750 feet of any residential use between the hours of 8:00 p.m. of one day and 7:00 a.m. of the following day. Construction activities shall be subject to the maximum permissible sound level specified for industrial districts for the periods within which construction is to be completed pursuant to any applicable building permit. The following uses and activities shall be exempt from the sound pressure level regulations:

(1) Noises created by construction and maintenance between 7:00 a.m. and 8:00 p.m.

(2) The noises of safety signals, warning devices and emergency pressure relief valves and any other emergency activity.

(3) Traffic noise on existing pubic streets, railways or airports.

No other regulations are applicable to the off-site environmental noise associated with the construction, operation, or maintenance of the Project.

4. Project Construction Sound

Construction of Phase 1 is expected to start within a few months after receiving all necessary approvals and to continue for about two years. Phase 2 will include additional smolt and grow out tanks. Total construction time for both phases is expected to be about six years.

Initial activities will include site clearing, earth moving, excavation, infrastructure connections, and foundations. This will be followed by concrete pouring and steel erection and then by installation of machinery and piping inside and outside of the new buildings. Later stages of construction will include siding installation, completion of interior systems, paving, finishing, testing and commissioning of systems, and final grading. A majority of the exterior construction activities will occur during daytime hours from 7:00 a.m. to 7:00 p.m. or during daylight hours, whichever is longer.

Typical on-site equipment used during construction will include trucks, dozers, excavators, loaders, graders, backhoes, cranes, compressors, pumps, generators, welders, and rollers. Representative equivalent noise levels associated with construction equipment during the workday are listed in Table 1. The noise levels shown in Table 1 are based on the results of extensive previous acoustical studies of engine-powered construction equipment.

Construction equipment noise levels are presented here for informational purposes. Maine's Site Location of Development Law Regulations and the City Ordinances do not regulate noise levels generated by daytime construction activities. However, all equipment used in these activities will comply with any applicable federal noise regulations, and will include noise control devices in proper working condition and maintained as originally provided by the equipment manufacturer.

5. Project Operation and Maintenance Sounds

Sound associated with routine operation of the proposed Project will be produced by electric motors, water pumps, fans, filters, water flow, boilers, chillers, and engine-driven electric generators with all to be located inside industrial-grade Project buildings. Sounds associated with routine operation of exterior equipment will be produced by ventilation intakes and exhausts, cooling towers, and registered over-the-road trucks coming to and from the Project site. The Project will be available to operate 24-hours per day and seven days per week.

The expected hourly equivalent A-weighted sound levels from future operation of regulated equipment operating at the proposed Project have been calculated for nearby protected locations surrounding the site. Calculations were performed with the professional CadnaA computer sound model, which is used to conduct detailed

modeling of sounds from future industrial facilities. The model is based on ISO Standard 9613 that includes downwind atmospheric conditions that are favorable for outdoor sound propagation (i.e., allow for a higher level of anticipated noise so as to conduct a conservative study).

Table 2 lists six protected residential locations near the Project site to the north, south, west, and east together with A-weighted hourly equivalent Leq sound levels that will not be exceeded from regulated Project equipment during future operations of Phases 1 and 2.

Presented in Figure 3 are contours of the A-weighted hourly equivalent Leq sound levels that will not be exceeded from regulated equipment during future operation of Project Phases 1 and 2. The buildings and individual equipment are shown in blue on this figure. Sound levels without Phase 2 and at greater distances from the Project will be lower.

The Project will be designed and operated such that the routine hourly equivalent operating sound levels from regulated equipment will comply with noise limits that are applicable to the Project.

Maintenance of the Project will include operations such as snow removal, machinery inspections, and machinery maintenance. Maintenance activities are not expected to require operations that produce significant off-site sounds that will be intrusive to residential neighbors.

6. Noise Abatement

Measures being adopted to mitigate potential noise impacts associated with construction, operation, and maintenance of the proposed Project include the following:

- Effective exhaust mufflers in proper working condition will be installed on all engine-powered construction equipment at the site. Mufflers found to be defective will be replaced promptly.

- Construction contractors will be required to ensure that their employee and delivery vehicles are driven slowly on site (e.g., 10mph limit with no Jake Brakes) and responsibly when entering and leaving the site.

- A majority of all exterior construction activities will occur during daytime hours from 7:00 a.m. to 7:00 p.m. or during daylight hours, whichever is longer.

- Most facility machinery will be enclosed within facility buildings. The facility buildings will be constructed with industrial-grade sidewalls and roofs specified with the necessary sound transmission loss (STL) to contain noise and will include thermal/acoustic insulation to reduce the buildup of interior noise.

- Sound level specifications will be included in the bidding and purchase documents for the portions of noise producing machinery that are exposed to the outdoors including cooling towers, ventilation systems, and generators.

- The necessary dynamic insertion loss (DIL) will be specified in purchase documents for the mufflers to be installed at building ventilation inlets and exhausts.

- The diesel-engine driven electric generators will be fully enclosed within an industrial-grade insulated building together with mufflers specified to provide the necessary noise attenuation for the engine exhausts and cooling air inlets and exhausts.

- Employees and drivers bringing trucks to and from the site will be required to drive slowly on site (e.g., 10mph limit with no Jake Brakes) and responsibly when entering and leaving the site.

7. Noise Impact Assessment

Most construction activities associated with the proposed Project will be located hundreds of feet and further from protected residential locations. Also, routine outdoor construction activities will be conducted during daytime hours. Construction sounds will vary from hour-to-hour and from day-to-day, depending on the equipment in use and the operations being performed at the site. The temporary sound associated with construction of the Project will be similar to the sound produced during construction activities at many other similar building projects. Equipment used in these activities will comply with applicable federal noise regulations.

The Project will operate seven days per week, 24 hours per day. It is expected that regulated equipment during routine operation will produce sound levels that are equal to or lower than the applicable noise level limits contained in Chapter 375.10 of Maine's Site Location of Development Law Regulations. See Sections 3 and 5 of this report for a more detailed discussion.

Neighbors may at times hear sounds associated with construction, operation, or maintenance of the Project, but the sound levels from the facility will be modest and in compliance with DEP and local noise level requirements.



Figure 1. Project Site and Surrounding Area

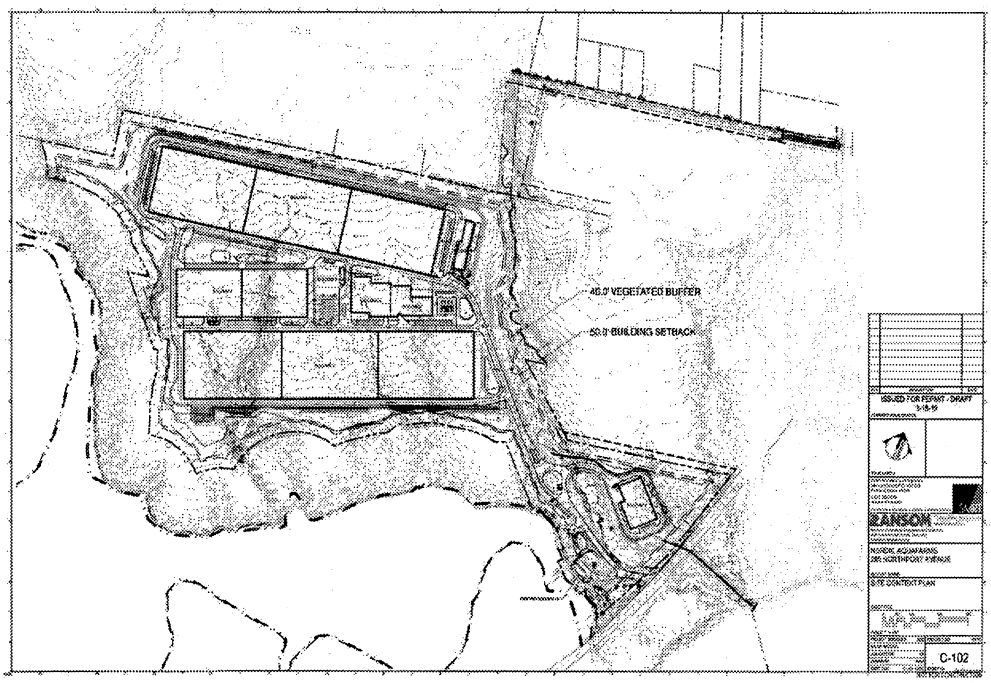


Figure 2. Project Site Layout Plan

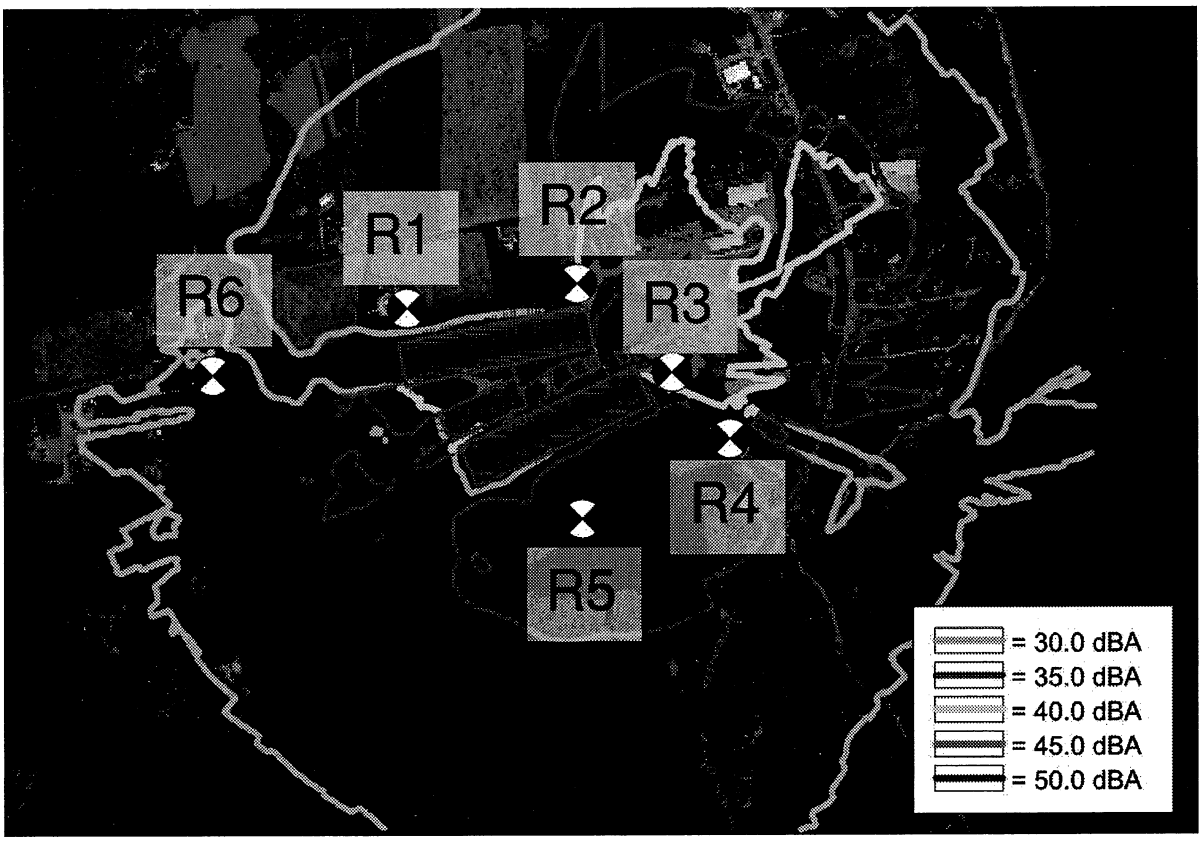


Figure 3. A-weighted Hourly Equivalent Leq Sound Level Contours from Regulated Equipment during Future Routine Operation of both Project Phase 1 and Phase 2

Table 1. Representative Construction Equipment Workday Equivalent Sound Levels

Equipment	Sound Level in dBA at 500 ft
Truck	54
Dozer	58
Excavator	60
Loader	59
Grader	58
Backhoe	60
Crane	47
Compressor	57
Pump	50
Generator	52
Welder	46
Roller	55

Table 2. Project Sound Levels That Will Not be Exceeded during Routine Operation of Both Phase 1 and Phase 2

Nearby Protected Locations and Distance From Project Center	Project Sound Levels Not to be Exceeded	
	Daytime	Nighttime
1 Northwest 975 ft.	< 55 dBA	< 45 dBA
2 North 585 ft.	< 55 dBA	< 45 dBA
3 Southeast 790 ft.	< 55 dBA	< 45 dBA
4 Southeast 1,230 ft.	< 55 dBA	< 45 dBA
5 South 950 ft.	< 55 dBA	< 45 dBA
6 West 2,115 ft.	< 55 dBA	< 45 dBA

Appendix A. Sound in Lay Terms

Sounds we hear come from small pressure oscillations, or sound waves, that travel through the air and actuate our hearing mechanism. These airborne pressure oscillations cause the eardrum and small bones of the middle ear to vibrate. These vibrations are transmitted to the fluid-filled cochlea of the inner ear's sensory organ. Sensory hair cells then transduce these vibrations into nerve impulses that are transmitted to the brain where they are perceived and interpreted.

Noise is often defined as unwanted sound and the degree of disturbance or annoyance of an intruding noise depends on various factors including the magnitude and nature of the intruding noise, the magnitude of the background or pre-development ambient sound present without the intruding noise, and the nature of the activity of people in the area where the noise is heard. For example, people relaxing at home generally prefer a quiet environment, while factory employees may be accustomed to relatively high noise levels when at work.

The magnitude, or loudness, of sound waves (pressure oscillations) is described quantitatively by the terms sound pressure level, sound level, or simply noise level. The magnitude of a sound is measured in decibels, abbreviated dB. Decibels are used to quantify sound pressure levels just as degrees are used to quantify temperature and inches are used to quantify distance. The faintest sound level that can be heard by a young healthy ear is about 0 dB, a moderate sound level is about 50 dB, and a loud sound level is about 100 dB.

Sound level meters are usually equipped with electronic filters or weighting circuits, as specified in ANSI S1.4 – 1983 (and more recent versions), for the purpose of simulating the frequency response characteristics of the human ear. The A-weighting filter included with essentially all sound level meters is most commonly employed for this purpose because the measured sound level data correlate well with subjective response to sounds. Sound levels measured using the A-weighting network are designated by dBA.

Sound energy spreads as it travels away from its source causing the sound level to diminish. Other factors that reduce sound levels include absorption in the atmosphere, diffraction and refraction in the atmosphere, terrain, and forests.

The frequency of a sound is analogous to its tonal quality or pitch. The unit for frequency is hertz, abbreviated Hz (formerly cycles per second or cps). Thus, if a sound wave oscillates 500 times per second, its frequency is 500 Hz. The fundamental frequency of Middle C on a piano keyboard, for example, is 262 Hz. However, most sounds include a composite of many frequencies and are characterized as broadband or random. The normal frequency range of human hearing extends from a low frequency of about 20 to 50 Hz (a rumbling sound) up to a high frequency of about 10,000 to 15,000 Hz (a hissing sound) or even higher for some people. People have

different hearing sensitivity to different frequencies and generally hear best in the mid-frequency region that is common to human speech, about 500 to 4000 Hz.

The background or ambient acoustical environment in most communities varies from place to place and varies with time at any given location due to the composite of many nearby and distant sound sources. The ambient environment includes high sound level single-events such as the passby of an airplane or nearby car, the barking of a dog, thunder, or a siren. The ambient acoustical environment also includes relatively steady residual or background sounds caused by sources such as distant traffic and ventilation equipment. The quantity of the single-event sounds and the amplitude of the background sounds are usually least during the late night hours from about midnight to 5:00 am. Indeed, the pre-development ambient sound level at a location is related to the amount of human activity in its vicinity. The amplitude statistics of this rather complex acoustical environment include the presence of a relatively-steady lower-level background and diurnal and seasonal variations.

At any location, a complete physical description of the ambient acoustical environment might include its sound level at various frequencies, as a function of time. As a first step towards simplifying this multi-dimensional description, it has become common practice to eliminate the frequency variable by measuring the A-weighted sound level (dBA), as observed on a standard sound level meter. The A-weighting filter emphasizes the mid-frequency components of sounds to approximate the frequency response of the human ear. A-weighted sound levels correlate well with our perception of most sounds.

An increase or decrease of the outdoor ambient sound level in a community by 1 or 2 dB is generally not noticeable. Whereas a change of the ambient sound level by 5 or 6 dB is generally noticeable and an increase or decrease of the ambient sound level by 10 dB is generally considered to represent a doubling or halving of the perceived sound.

To evaluate noise impacts and report time-varying ambient sound levels it is common practice, using the A-weighted scale, to measure the equivalent sound level and the day-night sound level. The equivalent sound level is the level of a steady-state sound that has the same total (equivalent) energy as the time-varying sound of interest, taken over a specified time period. Thus, the equivalent sound level is a single-valued level that expresses the time-averaged total energy of the entire ambient sound energy. It includes both the high sound level single-event ambient sounds and the relatively steady background sounds. The day-night sound level is simply the average equivalent sound for 24-hours after 10 dBA has been added to the nighttime sound levels from 10 pm to 7 am. Adding 10 dBA to the nighttime sound levels accounts for people's expectation that nighttime be a quiet period.

Both the equivalent sound level and the day-night sound level have been selected by the U.S. Environmental Protection Agency as the best descriptors to use for the purpose of identifying and evaluating levels of environmental noise.

The hourly equivalent sound level has been selected by the State of Maine DEP and identified in Chapter 375.10 of Maine's Site Location of Development Law Regulations as the descriptor to be used in the regulation and measurement of noise from regulated equipment proposed for new facilities near protected locations. Protected locations (areas) generally include residences, houses of worship, academic schools and colleges, libraries, hospitals and nursing homes, and certain parks and recreation areas. A complete definition of protected locations is provided in Chapter 375.10 of Maine's Site Location of Development Law.

Chapter 375: **NO ADVERSE ENVIRONMENTAL EFFECT STANDARDS OF THE SITE LOCATION OF DEVELOPMENT ACT**

SUMMARY: These regulations describe the scope of review of the Department in determining a developer's compliance with the "no adverse effect on the natural environment" standard of the Site Location Law (38 M.R.S.A. Section 484(3)); the information which shall be submitted, when appropriate, within an application for approval; and, the terms and conditions which the Department may impose on the approval of an application to ensure compliance with the standard.

NOTE: In determining whether the developer has made adequate provision for fitting the development harmoniously into the existing natural environment and that the development will not adversely affect existing uses, scenic character, or natural resources in the municipality or in neighboring municipalities, the Department has identified several specific areas of concern which are dealt with in detail below.

1. No Unreasonable Adverse Effect On Air Quality

A. Preamble. The Department recognizes that point source emissions from certain types of commercial and industrial developments and solid waste disposal facilities and non-point source emissions deriving from industrial, commercial, and governmental developments can have an unreasonable adverse effect on air quality.

B. Scope of Review. In determining whether the proposed development will have an unreasonable adverse effect on ambient air quality, through point or non-point sources of chemical pollutants or particulate matter, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) The best practicable treatment of point sources of air pollution will be utilized and that point source emissions meet state ambient air quality standards and state emissions standards.

(2) The amount of air pollution produced from either point or non-point sources of air emissions will be consistent with the Board's "Policy on Air Quality Use," adopted March 28, 1979.

C. Submissions. Applications for approval of proposed industrial, commercial and governmental developments and solid waste disposal facilities shall include evidence that affirmatively demonstrates that there will be no unreasonable adverse effect on air quality, including information such as the following, when appropriate:

(1) Evidence that an Air Emission License has been or will be obtained.

(2) Evidence that increased traffic generated by the development will not significantly effect the ambient air quality. Modeling of the effect of non-point sources of air pollution on ambient air quality may be requested.

D. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the proposed development will have no unreasonable adverse effect on air quality, such as requiring that:

(1) Emissions from point sources of pollution be monitored.

(2) The size of the parking lots be limited in order to limit the amount of non-point source pollutants generated by the development.

2. No Unreasonable Alteration of Climate

A. Preamble. The Department recognizes the potential of large-scale, heavy industrial facilities, such as power generating plants, to affect the climate in the vicinity of their location by causing changes in climatic characteristics such as rainfall, fog, and relative humidity patterns.

B. Scope of Review. In determining whether the proposed development will cause an unreasonable alteration of climate, the Department shall consider all relevant evidence to that effect.

C. Submissions. Applications for approval of large-scale, heavy industrial developments, such as power generating plants, shall include evidence that affirmatively demonstrates that there will be no unreasonable alteration of climate, including information such as the following, when appropriate:

(1) Evidence that the proposed development will not unreasonably alter the existing cloud cover, fog, or rainfall characteristics of the area.

D. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the proposed development will not cause an unreasonable alteration of climate.

3. No Unreasonable Alteration of Natural Drainage Ways

A. Scope of Review. In determining whether the proposed development will cause an unreasonable alteration of natural drainage ways, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) Where a development site is traversed by a natural water course, drainage way, channel, or stream, a drainage right-of-way will be provided that substantially conforms with the lines of such natural water courses. Such rights-of-way shall be at least thirty feet in width.

(2) Any grading or other construction activity on the site will cause no unreasonable alteration of natural drainage ways such that drainage, other than that which occurred prior to development, will adversely affect adjacent parcels of land and that drainage ways flowing from adjacent parcels of land to the development site will be impeded.

B. Submissions. Applications for approval of proposed developments shall include evidence that affirmatively demonstrates that there will be no unreasonable alteration of natural drainage ways, including information such as the following, when appropriate.

(1) A plan showing all existing water courses, drainage ways, channels, or streams to be affected by the development, and the nature, width and location of proposed easements, rights-of-way, culverts, catch basins or other means of channeling surface water within the development and over adjacent parcels of land.

(2) Deed covenants which establish the easements or rights-of-way and provide for their continued maintenance.

C. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that there will by no unreasonable alteration of natural drainage ways.

4. No Unreasonable Effect on Runoff/Infiltration Relationships

A. Preamble. The Department recognizes that same developments cause unreasonable increases in stormwater runoff by decreasing the infiltrative capacity of the soils on a development site. The Department also recognizes that increases in stormwater runoff cause increased danger of flooding, the pollution of surface water bodies, and the depletion of groundwater resources.

B. Scope of Review. In determining whether the proposed development will have an unreasonable effect on runoff/infiltration relationships, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) A stormwater management system will infiltrate, detain, or retain water falling on the site during a storm of an intensity equal to a twenty-five year, twenty-four hour storm such that the rate of flow of stormwater from the development does not exceed the rate of outflow of stormwater from the site prior to the undertaking of the development.

(a) Developments which convey stormwater directly into the ocean (excluding estuarine tidewaters) exclusively in manmade piped or open drainage systems are exempt from the requirements of this subsection.

(2) The physical, biological, and chemical properties of the receiving waters will not be unreasonably degraded by the stormwater runoff from the development site.

(3) The peak discharge of the receiving waters will not be increased as the result of the stormwater runoff from the development site for storms up to a level of intensity of a twenty-five year, twenty-four hour storm.

C. Submissions. Applications for approval of proposed developments shall include evidence that affirmatively demonstrates that there will be no unreasonable effect on runoff/infiltration relationships, including information such as the following, when appropriate:

(1) Evidence that the proposed stormwater management system has been designed by a professional engineer or other person duly qualified to undertake the design. The designer of the system will evaluate the effectiveness of various stormwater methods and develop and make available for review the hydraulic computations based on accepted engineering practices to demonstrate that the standards established under subsection B, above, will be met.

(2) Evidence that the stormwater management system will take into consideration the upstream runoff which must pass over or through the development site. The system will be designed to pass upstream flows generated by a twenty-five year frequency through the proposed development without overloading the system or flooding areas not specifically planned for such flooding.

(3) Evidence that the design of piped or open channel systems will be based on a ten year flow frequency without overloading or flooding beyond channel limits. In addition, the areas expected to be flooded by runoff of a twenty-five year frequency will be designated, and no structures will be planned within such area.

(4) Evidence that, where permanent embankment-type storage or retention basins are planned, the basins will be designed in accordance with good engineering practice, such as outlined in the Soil Conservation Service Engineering Field Manual or other appropriate references.

(5) Evidence that rights-of-way or easements will be designated for all components of the stormwater management system lying outside of established street lines.

(6) Evidence that the developer will maintain all components of the stormwater management system until it is formally accepted by the municipality or a quasi-municipal district, or is placed under the jurisdiction of a legally created association that will be responsible for the maintenance of the system. The charter of such an association must be acceptable to the Department.

(7) Evidence that the stormwater management system will be fully coordinated with project site plans, including consideration of street patterns, pedestrian ways, open space, building siting, parking areas, recreational facilities, and other utilities, especially sanitary wastewater disposal facilities.

(8) When the construction of a development is to occur in phases, the planning of the stormwater management system should encompass the entire site which may ultimately be developed, and not limited to an initial or limited phases of the development.

NOTE: The following references may be of assistance to a developer in making the necessary computations and in designing the stormwater management system:

"Urban Hydrology for Small Watersheds", Technical Release No. 55, USDA, Soil Conservation Service, University of Maine, Orono, Maine.

"Water Resources Protection Measures in Land Development - A Handbook", Tourbier and Westmacott, University of Delaware Water Resources Center, Newark, Delaware.

D. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that there will be no unreasonable effect on runoff/infiltration relationships.

5. Erosion and Sedimentation Control

A. Preamble. The Department recognizes the importance of controlling erosion and sedimentation to protect water quality and wildlife and fisheries habitat. Additionally, the Department considers topsoil to be a natural resource which should be properly managed. Control of erosion and sedimentation is a concern both during and after construction activities.

B. Scope of Review. In determining whether the developer has made adequate provision for controlling erosion and sedimentation, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) All earth changes will be designed, constructed, and completed in such a manner so that the exposed area of any disturbed land will be limited to the shortest period of time possible.

(2) Sediment caused by accelerated soil erosion will be removed from runoff water before it leaves the development site.

(3) Any temporary or permanent facility designed and constructed for the conveyance of water around, through, or from the development site will be designed to limit the water flow to a non-erosive velocity.

(4) Permanent soil erosion control measures for all slopes, channels, ditches, or any disturbed land area will be completed within fifteen calendar days after final grading has been completed. When it is not possible or practical to permanently stabilize disturbed land, temporary erosion control measures will be implemented within thirty calendar days of the exposure of soil.

(5) When vegetative cover will be established as a temporary or permanent erosion control measure:

(a) Plant species to be used and the seeding rates will take into account soil, slope, climate, and duration and use of the vegetative cover.

(b) Mulch will be provided at rates appropriate to ensure a minimum of soil and seed loss until an acceptable "catch" of seed is obtained.

(c) Reseeding will be done within a reasonable period of time if there is not an acceptable "catch".

(6) All development plans will incorporate building designs and street layouts that fit and utilize existing topography and desirable natural surroundings to the fullest extent possible.

C. Submissions. Applications for approval of proposed developments shall include evidence that affirmatively demonstrates that adequate provision will be made to control erosion and sedimentation, including information such as the following when appropriate:

(1) A comprehensive erosion and sedimentation control plan, designed in accordance with the "Maine Environmental Quality Handbook", the U.S.D.A., Soil Conservation Service's "Engineering Field Manual", or another appropriate reference, which includes the following information:

(a) A description and location of the limits of all proposed construction activities which result in the disturbance of the land.

(b) A description and location of all existing and proposed on-site drainage.

(c) The timing and sequence of all proposed land disturbances.

(d) A description and location of all proposed temporary and permanent erosion and sedimentation control measures, including the timing and sequence of their completion.

(e) A proposed program for the maintenance of all erosion and sedimentation control facilities which will remain after the project is completed, including a designation of the responsible party.

D. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the developer will make adequate provision to control erosion and sedimentation, such as requiring that:

(1) Erosion control devices be in place before the commencing of other construction activities.

(2) Construction activity be limited to certain times of the year, particularly when soil type, slope, and the extent of area to be stripped pose serious potential for erosion and sedimentation.

6. No Unreasonable Adverse Effect on Surface Water Quality

A. Preamble. The Department recognizes that developments have the potential to cause the pollution of surface waters through both point and non-point sources of pollution.

B. Scope of Review. In determining whether the proposed development will have an unreasonable adverse effect on surface water quality, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) The development or reasonably foreseeable consequences of the development will not discharge any water pollutants which affect the state classification of a surface water body (38 M.R.S.A. Section 363 *et seq.*).

(2) The best practicable treatment of point sources of water pollutants will be utilized.

(3) The total phosphorous concentrations in all tributaries to great ponds will not exceed the standard established in Department Regulation 583.1 as the result of the proposed development.

(4) Any effect on surface water temperature will be in compliance with all appropriate standards established in Department Regulations 582.1 - 582.8.

C. Submissions. Applications for approval of proposed developments shall include evidence that affirmatively demonstrates that there will be no unreasonable adverse effect on surface water quality, including information such as the following, when appropriate:

(1) Where sewage disposal is to be handled off-site by a municipal or quasi-municipal sewage treatment facility, a letter from the authorized agent of the facility stating that there is adequate capacity to ensure satisfactory treatment.

(2) Evidence that a waste discharge license, as required by 38 M.R.S.A. Sections 413 *et seq.*, has been or will be obtained.

D. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the proposed development will have no unreasonable adverse effect on surface water quality.

7. No Unreasonable Adverse Effect on Ground Water Quality

A. Preamble. The Department recognizes the importance of protecting ground water resources in order to promote the future health, safety, and welfare of the citizens of Maine through the maintenance of an adequate supply of safe drinking water.

B. Scope of Review. In determining whether the proposed development will have an unreasonable adverse effect on ground water quality, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) The development will not result in the existing ground water quality becoming inferior to the physical, biological, chemical, and radiological levels for raw and untreated drinking water supply sources specified in the Maine State Drinking Water Regulations, pursuant to 22 M.R.S.A. Section 601. If the existing ground water quality is inferior to the State Drinking Water Regulations, the developer will not degrade the water quality any further.

C. Rebuttable Presumption Against Disposal of Waste in Certain Areas. The Department operates under the rebuttable presumption that the storage and/or disposal of solid wastes, hazardous wastes, and leachable or liquid wastes, including petroleum products and septage, pose serious threats to public health, safety, and welfare through the potential pollution of the ground water when such storage and/or disposal occurs on or above sand and gravel aquifers or the recharge areas of sand and gravel aquifers.

NOTE: Maps of sand and gravel aquifers and their recharge areas are available for portions of the state from the Bureau of Geology, Department of Conservation, Augusta.

(1) An applicant seeking approval for a development which involves one or more of the activities specified above, must overcome this presumption by persuasive evidence that the development is unique in some way that allows for compliance with the intent of this subsection.

D. Submissions. Applications for approval of proposed developments shall include evidence that affirmatively demonstrates that there will be no unreasonable adverse effect on ground water quality, including information such as the following, when appropriate:

(1) A comprehensive list, including physical and chemical characteristics and projected quantities of wastes to be disposed of or stored within the proposed development which may potentially contaminate the ground water.

(2) Methods for preventing ground water pollution as the result of the disposal and/or storage of wastes.

(3) An evaluation of the geological, hydrologic, and soils conditions of the development site.

(4) Data establishing background ground water quality.

(5) Proposed plan of action, and alternatives, to be followed in the event the proposed development results in ground water contamination.

E. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the proposed development will have no unreasonable adverse effect on ground water quality, such as requiring that:

(1) A ground water monitoring program be established and reports be filed with the Department at designated intervals.

(2) Specified wastes not be disposed of or stored within the proposed development.

8. No Unreasonable Adverse Effect on Ground Water Quantity

A. Preamble. The Department recognizes the importance of maintaining an adequate supply of ground water for drinking purposes. The Department also recognizes that the depletion of ground water resources can result in the intrusion of salt water into potable ground water supplies and can affect the hydrologic characteristics of surface water bodies (peak flows, low flows and water levels) resulting in adverse effects on their assimilative capacity and recreational use, as well as on certain wildlife habitats. Additionally, new wells can cause a lowering of the ground water supply to the point where existing wells run dry, particularly during the late summer and early fall.

B. Scope of Review. In determining whether the proposed development will have an unreasonable adverse effect on ground water quantity, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) The quantity of water to be taken from ground water sources will not substantially lower the found water table, cause salt water intrusion, cause undesirable changes in ground water flow patterns, or cause unacceptable ground subsidence.

C. Submissions. Applications for approval of proposed developments shall include evidence that affirmatively demonstrates that there will be no unreasonable adverse effect on ground water quantity, including information such as the following, where appropriate:

(1) Estimates of the quantity of ground water to be used by the proposed development.

(2) In the areas where salt water intrusion, the lowering of the ground water level, or land subsidence have been or can be reasonably be expected to be a problem, a report by a duly

qualified person addressing the potential effects of ground water use by the proposed development.

D. Terms and Conditions. The Department may, as a term or condition of approval establish any reasonable requirement to ensure that there will be no unreasonable adverse effect on ground water quantity, such as requiring that:

(1) A development obtain its water from a surface water source, public community supply, or utility.

(2) Wells in the surrounding area be monitored to determine the effect of the development on ground water levels.

(3) People in the surrounding area, whose wells are adversely affected by the development, be provided with new wells or another source of potable water for their use and consumption.

9. Buffer Strips

A. Preamble. The Department recognizes the importance of natural buffer strips in protecting water quality and wildlife habitat. The Department also recognizes that buffer strips can serve as visual screens which can serve to lessen the visual impact of incompatible or undesirable land uses. The width and nature of buffer strips, if required, shall be determined by the Department on a case-by-case basis.

B. Scope of Review. In determining whether the developer has made adequate provision for buffer strips, when appropriate, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) Water bodies within or adjacent to the development will be adequately protected from sedimentation and surface runoff by buffer strips.

(2) Buffer strips will provide adequate space for movement of wildlife between important habitats.

(3) Buffer strips will shield adjacent uses from unsightly developments and lighting.

NOTE: The following GUIDELINES should be considered in establishing visual buffer strips.

(1) Plant materials used in the screen planting will be at least four feet high when planted and be of such evergreen species as will produce ultimately a dense visual screen at least eight feet high. Alternatively, a six-foot high wooden fence, without openings wider than 1", may be substituted.

(2) The screen will be maintained permanently, and any plant material which does not live will be replaced within one year.

(3) Screen planting will be so placed that at maturity it will be no closer than three feet away from any street or property line.

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(4) The screen will be broken only at points of vehicular or pedestrian access.

(5) Fencing and screening will be so located within the developer's property line to allow access for maintenance on both sides without intruding upon abutting properties.

C. **Excavations for Sand, Gravel, Clay, Silt, Topsoil, or Rock** -- Buffer strips associated with an excavation for sand, gravel, clay, silt, topsoil, or rock must meet the buffer strip standards specified in *Performance Standards for Excavations*, 38 M.R.S.A. §490-D, and *Performance Standards for Quarries*, 38 M.R.S.A. §490-Z. These standards apply in lieu of Section 9(B) (1)-(3).

A gravel pit previously licensed under the Site Location of Development Law, 38 M.R.S.A §484, may apply for a modification of the buffer strip requirements in such a permit. The Department may approve such modification if the buffer strip at least meets the minimum standards of §§ 490-D and 490-Z and the proposed excavation will not result in an unreasonable adverse impact on the natural environment.

D. Submissions. Applications for approval of proposed developments shall include evidence that affirmatively demonstrates that adequate provision of buffer strips, when appropriate, will be made, including information such as the following:

(1) The location and width of all natural buffer strips to be retained.

(2) The nature, location, width, and height of all vegetative buffer strips or architectural screens to be established.

(3) Legal provisions for the maintenance of all buffer strips and architectural screens.

E. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the developer has made adequate provision for the establishment of buffer strips, such as requiring:

(1) The maintenance of existing vegetation as a natural buffer strip, which shall remain as a permanent feature of the landscape.

(2) The incorporation of buffer strip maintenance into deed covenants in projects where deed transfers of property to the general public are contemplated.

(3) Written permission of the Department of Environmental Protection for activities which may adversely affect a body of water or wildlife habitat protected by a natural buffer strip, such as: removal of live trees, stump and hot systems, and the displacement of rocks, topsoil and similar activities which would cause or allow increased soil erosion.

(4) The establishment of particular species of vegetation.

(5) The use of particular materials, colors, and styles in the construction of architectural screens.

10. Control of Noise

A. Preamble. The Department recognizes that the construction, operation and maintenance of developments may cause excessive noise that could degrade the health and welfare of nearby neighbors. It is the intent of the Department to require adequate provision for the control of excessive environmental noise from developments proposed after the effective date of this regulation.

B. Applicability

(1) This regulation applies to proposed developments within municipalities without a local quantifiable noise standard and in unorganized areas of the State. When a proposed development is located in a municipality which has duly enacted by ordinance an applicable quantifiable noise standard, which (1) contains limits that are not higher than the sound level limits contained in this regulation by more than 5 dBA, and (2) limits or addresses the various types of noises contained in this regulation or all the types of noises generated by the development, that local standard, rather than this regulation, shall be applied by the Department within that municipality for each of the types of sounds the ordinance regulates. This regulation applies to developments located within one municipality when the noise produced by the development is received in another municipality and, in these cases, the Department will also take into consideration the municipalities' quantifiable noise standards, if any.

(2) This regulation applies to expansions and modifications of developments when such expansions and modifications are proposed after the effective date of this regulation and subject to site location approval, but only to the noise produced by the proposed expansion or modification of the development, unless (1) the existing development was constructed since 1-1-70 and (2) at the time of construction, the existing development was too small to require site location approval. In situations where conditions (1) and (2) above apply, then this regulation applies to the whole development (both existing facility and proposed expansion or modification). This regulation also applies to expansions and modifications of existing developments when such expansions and modifications require an amendment to the development's Site Law permit, but only to the noise produced by the expansion or modification.

(3) This regulation does not apply to existing developments or portions of existing developments constructed prior to 1-1-70 or approved under the Site Law prior to the effective date of this regulation. This regulation does not apply to relicensing of existing solid waste facilities previously approved under the Site Law.

(4) The sound level limits contained in this regulation apply only to areas that are defined as protected locations, and to property lines of the proposed development or contiguous property owned by the developer, whichever are farther from the proposed development's regulated sound sources.

(5) The sound level limits contained in this regulation do not apply to noise received within the development boundary.

NOTE: The Department will reconsider the effect and operation of the regulation one year from its effective date.

C. Sound Level Limits

(1) **Sound From Routine Operation of Developments**

(a) Except as noted in subsections (b) and (c) below, the hourly sound levels resulting from routine operation of the development and measured in accordance with the measurement procedures described in subsection H shall not exceed the following limits:

(i) At any property line of the development or contiguous property owned by the developer, whichever is farther from the proposed development's regulated sound sources:

75 dBA at any time of day.

(ii) At any protected location in an area for which the zoning, or, if unzoned, the existing use or use contemplated under a comprehensive plan, is not predominantly commercial, transportation, or industrial;

60 dBA between 7:00 a.m. and 7:00 p.m.
(the "daytime hourly limit"), and
50 dBA between 7:00 p.m. and 7:00 a.m.
(the "nighttime hourly limit").

(iii) At any protected location in an area for which the zoning, or, if unzoned, the existing use or use contemplated under a comprehensive plan, is predominantly commercial, transportation, or industrial:

70 dBA between 7:00 a.m. and 7:00 p.m.
(the "daytime hourly limit"), and
60 dBA between 7:00 p.m. and 7:00 a.m.
(the 'nighttime hourly limit').

(iv) For the purpose of determining whether the use of an unzoned area is predominantly commercial, transportation, or industrial (e.g. non-residential in nature), the Department shall consider the municipality's comprehensive plan, if any. Furthermore, the usage of properties abutting each protected location shall be determined, and the limits applied for that protected location shall be based upon the usage occurring along the greater portion of the perimeter of that parcel; in the event the portions of the perimeter are equal in usage, the limits applied for that protected location shall be those for a protected location in an area for which the use is not predominantly commercial, transportation, or industrial.

(v) When a proposed development is to be located in an area where the daytime pre-development ambient hourly sound level at a protected location is equal to or less than 45 dBA and/or the nighttime pre-development ambient hourly sound level at a protected location is equal to or less than 35 dBA, the hourly sound levels resulting from routine operation of the development and measured in accordance with the measurement procedures described in subsection H shall not exceed the following limits at that protected location:

55 dBA between 7:00 a.m. and 7:00 p.m.
(the "daytime hourly limit"), and
45 dBA between 7:00 p.m. and 7:00 a.m.
(the "nighttime hourly limit").

For the purpose of determining whether a protected location has a daytime or nighttime pre-development ambient hourly sound level equal to or less than 45 dBA or 35 dBA, respectively, the developer may make sound level measurements in accordance with the procedures in subsection H or may estimate the sound-level based upon the population density and proximity to local highways. If the resident population within a circle of 3,000 feet radius around a protected location is greater than 300 persons, or the hourly sound level from highway traffic at a protected location is predicted to be greater than 45 dBA in the daytime or 35 dBA at night (as appropriate for the anticipated operating schedule of the development), then the developer may ,estimate the daytime or nighttime pre-development ambient hourly sound level to be greater than 45 dBA or 35 dBA, respectively.

NOTE: Highway traffic noise can be predicted using the nomograph method of FHWA Highway Traffic Noise Prediction Model, FHWA-RD-77-108, December, 1978.

(vi) Notwithstanding the above, the developer need not measure or estimate the pre-development ambient hourly sound levels at a protected location if he demonstrates, by estimate or example, that the hourly sound levels resulting from routine operation of the development will not exceed 50 dBA in the daytime or 40 dBA at night.

(b) If the developer chooses to demonstrate by measurement that the daytime and/or nighttime pre-development ambient sound environment at any protected location near the development site exceeds the daytime and/or nighttime limits in subsection 1(a)(ii) or 1(a)(iii) by at least 5 dBA, then the daytime and/or nighttime limits shall be 5 dBA less than the measured daytime and/or nighttime pre-development ambient hourly sound level at the location of the measurement for the corresponding time period.

(c) For any protected location near an existing development, the hourly sound level limit for routine operation of the existing development and all future expansions of that development shall be the applicable hourly sound level limit of 1(a) or l(b) above, or, at the developer's election, the existing hourly sound level from routine operation of the existing development plus 3 dBA.

(d) For the purposes of determining compliance with the above sound level limits, 5 dBA shall be added to the observed levels of any tonal sounds that result from routine operation of the development.

(e) When routine operation of a development produces short duration repetitive sound, the following limits shall apply:

(i) For short duration repetitive sounds, 5 dBA shall be added to the observed levels of the short duration repetitive sounds that result from routine operation of the

development for the purposes of determining compliance with the above sound level limits.

(ii) For short duration repetitive sounds resulting from scrap metal, drop forge and metal fabrication operations or developments which the Department determines, due to their character and/or duration, are particularly annoying or pose a threat to the health and welfare of nearby neighbors, 5 dBA shall be added to the observed levels of the short duration repetitive sounds that result from routine operation of the development for the purposes of determining compliance with the above sound level limits, and the maximum sound level of the short duration repetitive sounds shall not exceed the following limits:

(a) At any protected location in an area for which the zoning, or, if unzoned, the existing use or use contemplated under a comprehensive plan, is not predominantly commercial, transportation, or industrial:

65 dBA between 7:00 a.m. and 7:00 p.m., and
55 dBA between 7:00 p.m. and 7:00 a.m.

(b) At any protected location in an area for which the zoning, or, if unzoned, the existing use or use contemplated under a comprehensive plan, is predominantly commercial, transportation, or industrial:

75 dBA between 7:00 a.m. and 7:00 p.m., and
65 dBA between 7:00 p.m. and 7:00 a.m.

(c) The methodology described in subsection 1(a)(iv) shall be used to determine whether the use of an unzoned area is predominantly commercial, transportation, or industrial.

(d) If the developer chooses to demonstrate by measurement that the pre-development ambient hourly sound level at any protected location near the development site exceeds 60 dBA between 7:00 a.m. and 7:00 p.m., and/or 50 dBA between 7:00 p.m. and 7:00 a.m., then the maximum sound level limit for short duration repetitive sound shall be 5 dBA greater than the measured pre-development ambient hourly sound level at the location of the measurement for the corresponding time period.

(e) For any protected location near an existing development, the maximum sound level limit for short duration repetitive sound resulting from routine operation of the existing development and all future expansions and modifications of that development shall be the applicable maximum sound level limit of (e)(ii)(a) or (e)(ii)(b) above, or, at the developer's election, the existing maximum sound level of the short duration repetitive sound resulting from routine operation of the existing development plus 3 dBA.

NOTE: The maximum sound level of the short duration repetitive sound shall be measured using the fast response [L_{AFmax}]. See the definition of maximum sound level.

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(2) **Sound From Construction of Developments**

(a) The sound from construction activities between 7:00 p.m. and 7:00 a.m. is subject to the following limits:

(i) Sound from nighttime construction activities shall be subject to the nighttime routine operation sound level limits contained in subsections l(a) and 1(b).

(ii) If construction activities are conducted concurrently with routine operation, then the combined total of construction and routine operation sound shall be subject to the nighttime routine operation sound level limits contained in subsections 1(a) and 1(b).

(iii) Higher levels of nighttime construction sound are permitted when a duly issued permit authorizing nighttime construction sound in excess of these limits has been granted by:

1. the local municipality when the duration of the nighttime construction activity is less than or equal to 90 days,

2. the local municipality and the Department when the duration of the nighttime construction activity is greater than 90 days.

(b) Sound from construction activities between 7:00 a.m. and 7:00 p.m. shall not exceed the following limits at any protected location:

Duration of Activity	**Hourly Sound Level Limit**
12 hours	87 dBA
8 hours	90 dBA
6 hours	92 dBA
4 hours	95 dBA
3 hours	97 dBA
2 hours	100 dBA
1 hour or less	105 dBA

(c) All equipment used in construction on development sites shall comply with applicable federal noise regulations and shall include environmental noise control devices in proper working condition, as originally provided with the equipment by its manufacturer.

(3) **Sound From Maintenance Activities**

(a) Sound from routine, ongoing maintenance activities shall be considered part of the routine operation of the development and the combined total of the routine maintenance and operation sound shall be subject to the routine operation sound level limits contained in subsection 1.

(b) Sound from occasional, major, scheduled overhaul activities shall be subject to the construction sound level limits contained in subsection 2. If overhaul activities are conducted concurrently with routine operation and/or construction activities, the combined total of the overhaul, routine operation and construction sound shall be subject to the construction sound level limits contained in subsection 2.

(4) **Sound From Production Blasting**

Sound exceeding the limits of subsection 1 and resulting from production blasting at a mine or quarry shall be limited as follows:

(a) Blasting shall not occur in the period between sundown and sunrise the following day or in the period between the hours of 7:00 p.m. and 7:00 a.m., whichever is greater. In addition, no routine production blasting shall be allowed in the daytime on Sundays.

(b) Blasting shall not occur more frequently than four times per day.

(c) Sound from blasting shall not exceed the following limits at any protected location:

Number of Blasts Per Day	Sound Level Limit
1	129 dBL
2	126 dBL
3	124 dBL
4	123 dBL.

Blast sound shall be measured in peak linear sound level (dBL) with a linear response down to 5 Hz.

NOTE: See Bureau of Mines Report of Investigations 8485 for information on airblast sound levels and pertinent scaled distances.

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(5) **Exemptions**

Sound associated with the following shall be exempt from regulation by the Department:

(a) Railroad equipment which is subject to federal noise regulations.

(b) Aircraft operations which are subject to federal noise regulations.

(c) Registered and inspected vehicles:

(i) while operating on public ways, or

(ii) which enter the development to make a delivery or pickup and which are moving, starting or stopping, but not when they are parked for over 60 minutes in the development.

(d) Watercraft while underway.

(e) Residential developments, except during construction of such developments.

(f) Bells, chimes and carillons.

(g) occasional sporting, cultural, religious or public events allowed by the local municipality where the only affected protected locations are contained within that municipality.

(h) The unamplified human voice and other sounds of natural origin.

(i) Firming, fishing and aquacultural activity.

(j) Forest management, harvesting and transportation activities.

(k) Making, maintaining and grooming snow where the only affected protected locations are contained within the general boundaries of a ski area development.

(1) Snow removal, landscaping and street sweeping activities.

(m) Emergency maintenance and repairs.

(n) Warning signals and alarms.

(o) Safety and protective devices installed in accordance with code requirements.

(p) Test operations of emergency equipment occurring in the daytime and no more frequently than once per week.

(q) Boiler start-up, testing and maintenance operations occurring no more frequently than once per month.

(r) Major concrete pours that must extend after 7:00 p.m., when started before 3:00 p.m.

(s) Sounds from a regulated development received at a protected location when the generator of the sound has been conveyed a noise easement for that location. This exemption shall only be for the specific noise, land and term covered by the easement.

(t) A force majeure event and other causes not reasonably within the control of the owners or operators of the development.

(6) **Noise Abatement Structures**

Noise abatement structures of a non-permanent nature in any one location for a duration of less than one year and erected for the sole purpose of noise control shall not be considered structures as defined in 38 M.R.S.A. subsection 482(6).

D. Submissions

(1) **Developments with Minor Sound Impact**

An applicant for a proposed development with minor sound impact may choose to file as part of the site location application a statement attesting to the minor nature of the anticipated sound impact of their development. An applicant proposing an expansion or modification of an existing development with minor sound impact may follow the same procedure as

described above. For the purpose of this regulation, a development or an expansion or modification of an existing development with minor sound impact means a development where the developer demonstrates, by estimate or example, that the regulated sound from routine operation of the development will not exceed 5 dBA less than the applicable limits established under subsection C. It is the intent of this subsection that an applicant need not conduct sound level measurements to demonstrate that the development or an expansion or modification of an existing development will have a minor sound impact.

NOTE: Examples include subdivisions without structures, office buildings, storage buildings which will not normally be accessed at night, and golf courses.

(2) **Other Developments**

Technical information shall be submitted describing the applicant's plan and intent to make adequate provision for the control of sound. The applicant's plan shall contain information such as the following, when appropriate:

(a) Maps and descriptions of the land uses, local zoning and comprehensive plans for the area potentially affected by sounds from the development.

(b) A description of major sound sources, including tonal sound sources and sources of short duration repetitive sounds, associated with the construction, operation and maintenance of the proposed development, including their locations within the proposed development.

(c) A description of the daytime and nighttime hourly sound levels and, for short duration repetitive sounds, the maximum sound levels expected to be produced by these sound sources at protected locations near the proposed development.

(d) A description of the protected locations near the proposed development.

(e) A description of proposed major sound control measures, including their locations and expected performance.

(f) A comparison of the expected sound levels from the proposed development with the sound level limits of this regulation.

(g) A comparison of the expected sound levels from the proposed development with any quantifiable noise standards of the municipality in which the proposed development will be located and of any municipality which may be affected by the noise.

E. Terms and Conditions

The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the developer has made adequate provision for the control of noise from the development and to reduce the impact of noise on protected locations. Such conditions may include, but are not limited to, enclosing equipment or operations, imposing limits on hours of operation, or requiring the employment of specific design technologies, site design, modes of operation, or traffic patterns.

The sound level limits prescribed in this regulation shall not preclude the Department under Chapter 375.15 from requiring a developer to demonstrate that sound levels from a development will not unreasonably disturb wildlife or adversely affect wildlife populations. In addition, the sound level limits shall not preclude the Department, as a term or condition of approval, from requiring that lower sound level limits be met to ensure that the developer has made adequate provision for the protection of wildlife.

F. Variance From Sound Level Limits

The Department recognizes that there are certain developments or activities associated with development for which noise control measures are not reasonably available. Therefore, the Department may grant a variance from any of the sound level limits contained in this rule upon (1) a showing by the applicant that he or she has made a comprehensive assessment of the available technologies for the development and that the sound level limits cannot practicably be met with any of these available technologies, and (2) a finding by the Department that the proposed development will not have an unreasonable impact on protected locations. In addition, a variance may be granted by the Department if (1) a development is deemed necessary in the interest of national defense or public safety and the applicant has shown that the sound level limits cannot practicably be met without unduly limiting the development's intended function, and (2) a finding is made by the Department that the proposed development will not have an unreasonable impact on protected locations. The Department shall consider the request for a variance as part of the review of a completed Site Location of Development Law application. In granting a variance, the Department may, as a condition of approval, impose terms and conditions to ensure that no unreasonable sound impacts will occur.

G. Definitions

Terms used herein are defined below for the purpose of this noise regulation.

(1) **AMBIENT SOUND**: At a specified time, the all-encompassing sound associated with a given environment, being usually a composite of sounds from many sources at many directions, near and far, including the specific development of interest.

(2) **CONSTRUCTION**: Activity and operations associated with the development or expansion of a project or its site.

(3) **EMERGENCY**: An unforeseen combination of circumstances which calls for immediate action.

(4) **EMERGENCY MAINTENANCE AND REPAIRS**: Work done in response to an emergency.

(5) **ENERGY SUM OF A SERIES OF LEVELS**: Ten times the logarithm of the arithmetic sum of the antilogarithms of one-tenth of the levels. [Note: See Section H(4.2).]

(6) **EXISTING DEVELOPMENT**: A development constructed before 1-1-70 or a development approved under the Site Law prior to the effective date of this regulation or a proposed development for which the site location application is complete for processing on or before the effective date of this regulation. Any development with a site location approval which has been remanded to the Department by a court of competent jurisdiction for further proceedings

relating to noise limits or noise levels prior to the effective date of these regulations shall not be deemed an existing development and these regulations shall apply to the existing noise sources at that development.

(7) **EXISTING HOURLY SOUND LEVEL**: The hourly sound level resulting from routine operation of an existing development prior to the first expansion that is subject to this regulation.

(8) **EQUIVALENT SOUND LEVEL**: The level of the mean-square A-weighted sound pressure during a stated time period, or equivalently the level of the sound exposure during a stated time period divided by the duration of the period.

NOTE: For convenience, a one hour equivalent sound level should begin approximately on the hour.

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(9) **HISTORIC AREAS**: Historic sites administered by the Bureau of Parks and Recreation of the Maine Department of Conservation, with the exception of the Arnold Trail.

(10) **HOURLY SOUND LEVEL**: The equivalent sound level for one hour measured or computed in accordance with this regulation.

(11) **LOCALLY-DESIGNATED PASSIVE RECREATION AREA**: Any site or area designated by a municipality for passive recreation that is open and maintained for public use and which:

(a) has fixed boundaries,

(b) is owned in fee simple by a municipality or is accessible by virtue of public easement,

(c) is identified and described in a local comprehensive plan, and

(d) has been identified and designated at least nine months prior to the filing of the applicant's Site Location of Development application.

(12) **MAXIMUM SOUND LEVEL**: Ten times the common logarithm of the square of the ratio of the maximum sound to the reference sound of 20 micropascals. Symbol: L_{AFmax}.

(13) **MAXIMUM SOUND**: Largest A-weighted and fast exponential-time-weighted sound during a specified time interval. Unit: pascal (Pa).

(14) **RESIDENCE**: A building or structure, including manufactured housing, maintained for permanent or seasonal residential occupancy providing living, cooking and sleeping facilities and having permanent indoor or outdoor sanitary facilities, excluding recreational vehicles, tents and watercraft.

(15) **PRE-DEVELOPMENT AMBIENT**: The ambient sound at a specified location in the vicinity of a development site prior to the construction and operation of the proposed development or expansion.

(16) **PROTECTED LOCATION**: Any location, accessible by foot, on a parcel of land containing a residence or planned residence or approved residential subdivision, house of worship, academic school, college, library, duly licensed hospital or nursing home near the development site at the time a Site Location of Development application is submitted; or any location within a State Park, Baxter State Park, National Park, Historic Area, a nature preserve owned by the Maine or National Audubon Society or the Maine Chapter of the Nature Conservancy, The Appalachian Trail, the Moosehorn National Wildlife Refuge, federally-designated wilderness area, state wilderness area designated by statute (such as the Allagash Wilderness Waterway), or locally-designated passive recreation area; or any location within consolidated public reserve lands designated by rule by the Bureau of Public Lands as a protected location.

At protected locations more than 500 feet from living and sleeping quarters within the above noted buildings or areas, the daytime hourly sound level limits shall apply regardless of the time of day.

Houses of worship, academic schools, libraries, State and National Parks without camping areas, Historic Areas, nature preserves, the Moosehorn National Wildlife Refuge, federally-designated wilderness areas without camping areas, state wilderness areas designated by statute without camping areas, and locally-designated passive recreation areas without camping areas are considered protected locations only during their regular hours of operation and the daytime hourly sound level limits shall apply regardless of the time of day.

Transient living accommodations are generally not considered protected locations; however, in certain special situations where it is determined by the Department that the health and welfare of the guests and/or the economic viability of the establishment will be unreasonably impacted, the Department may designate certain hotels, motels, campsites and duly licensed campgrounds as protected locations.

This term does not include buildings and structures located on leased camp lots, owned by the applicant, used for seasonal purposes.

For purposes of this definition, (1) a residence is considered planned when the owner of the parcel of land on which the residence is to be located has received all applicable building and land use permits and the time for beginning construction under such permits has not expired, and (2) a residential subdivision is considered approved when the developer has received all applicable land use permits for the subdivision and the time for beginning construction under such permits has not expired.

(17) **QUANTIFIABLE NOISE STANDARD**: A numerical limit governing noise from developments that has been duly enacted by ordinance by a local municipality.

(18) **ROUTINE OPERATION**: Regular and recurrent operation of regulated sound sources associated with the purpose of the development and operating on the development site.

(19) **SHORT DURATION REPETITIVE SOUNDS**: A sequence of repetitive sounds which occur more than once within an hour, each clearly discernible as an event and causing an increase in the sound level of at least 6 dBA on the fast meter response above the sound level observed immediately before and after the event, each typically less than ten seconds in

duration, and which are inherent to the process or operation of the development and are foreseeable.

(20) **SOUND COMPONENT**: The measurable sound from an audibly identifiable source or group of sources.

(21) **SOUND LEVEL**: Ten times the common logarithm of the square of the ratio of the frequency-weighted and time-exponentially averaged sound pressure to the reference sound of 20 micropascals. For the purpose of this regulation, sound level measurements are obtained using the A-weighted frequency response and fast dynamic response of the measuring system, unless otherwise noted.

(22) **SOUND PRESSURE**: Root-mean-square of the instantaneous sound pressures in a stated frequency band and during a specified time interval. Unit: pascal (Pa).

(23) **SOUND PRESSURE LEVEL**: Ten times the common logarithm of the square of the ratio of the sound pressure to the reference sound pressure of 20 micropascals.

(24) **TONAL SOUND**: for the purpose of this regulation, a tonal sound exists if, at a protected location, the one-third octave band sound pressure level in the band containing the tonal sound exceeds the arithmetic average of the sound pressure levels of the two contiguous one-third octave bands by 5 dB for center frequencies at or between 500 Hz and 10,000 Hz, by 8 dB for center frequencies at or between 160 and 400 Hz, and by 15 dB for center frequencies at or between 25 Hz and 125 Hz.

Additional acoustical terms used in work associated with this regulation shall be used in accordance with the following American National Standards Institute (ANSI) standards:

ANSI S12.9-1988 - American National Standard Quantities and Procedures for Description and Measurements of Environmental Sound, Part 1;

ANSI S3.20-1973 - American National Standard Psychoacoustical Terminology;

ANSI S1.1-1960 - American National Standard Acoustical Terminology.

H. Measurement Procedures

(1) **Scope**. These procedures specify measurement criteria and methodology for use, with applications, compliance testing and enforcement. They provide methods for measuring the ambient sound and the sound from routine operation of the development, and define the information to be reported. The same methods shall be used for measuring the sound of construction, maintenance and production blasting activities. For measurement of the sound of production blasting activities for comparison with the limits of subsection C(4)(c), these same methods shall be used with the substitution of the linear sound level for the A-weighted sound level.

(2) **Measurement Criteria**

2.1 **Measurement Personnel**

Measurements shall be supervised by personnel who are well qualified by training and experience in measurement and evaluation of environmental sound, or by personnel trained to operate under a specific measurement plan approved by the Department.

2.2 **Measurement Instrumentation**

(a) A sound level meter or alternative sound level measurement system used shall meet all of the Type 1 or 2 performance requirements of American National Standard Specifications for Sound Level Meters, ANSI S1.4-1983.

(b) An integrating sound level meter (or measurement system) shall also meet the Type 1 or 2 performance requirements for integrating/averaging in the International Electrotechnical Commission Standard on Integrating-Averaging Sound Level Meters, IEC Publication 804 (1985).

(c) A filter for determining the existence of tonal sounds shall meet all the requirements of-American National Standard Specification for Octave-Band and Fractional Octave-Band Analog and Digital Filters, ANSI S1.11-1986 for Order 3, Type 3-D performance.

(d) An acoustical calibrator shall be used of a type recommended by the manufacturer of the sound level meter and that meets the requirements of American National Standard Specification for Acoustical Calibrators, ANSI S1.40-1984.

(e) A microphone windscreen shall be used of a type recommended by the manufacturer of the sound level meter.

2.3 **Calibration**

(a) The sound level meter shall have been calibrated by a laboratory within 12 months of the measurement, and the microphone's response shall be traceable to the National Bureau of Standards.

(b) Field calibrations shall be recorded before and after each measurement period and at shorter intervals if recommended by the manufacturer.

2.4 **Measurement Location, Configuration and Environment**

(a) Except as noted in subsection (b) below, measurement locations shall be at nearby protected locations that are most likely affected by the sound from routine operation of the development.

(b) For determining compliance with the 75 dBA property line hourly sound level limit described in subsection C(l)(a)(i), measurement locations shall be selected at the property lines of the proposed development or contiguous property owned by the developer, as appropriate.

(c) The microphone shall be positioned at a height of approximately 4 to 5 feet above the ground, and oriented in accordance with the manufacturer's recommendations.

(d) Measurement locations should be selected so that no vertical reflective surface exceeding the microphone height is located within 30 feet. When this is not possible, the measurement location may be closer than 30 feet to the reflective surface, but under no circumstances shall it be closer than 6 feet.

(e) When possible, measurement locations should be at least 50 feet from any regulated sound source on the development.

(f) Measurement periods shall be avoided when the local wind speed exceeds 12 mph and/or precipitation would affect the measurement results.

2.5 **Measurement Plans**. Plans for measurement of pre-development ambient sound or post-development sound may be discussed with the Department staff.

(3) **Measurement of Ambient Sound**

3.1 **Pre-Development Ambient Sound**

Measurements of the pre-development ambient sound are required only when the developer elects to establish the sound level limit in accordance with subsections C(1)(b) and C(1)(e)(ii)(d) for a development in an area with high ambient sound levels, such as near highways, airports, or pre-existing developments; or when the developer elects to establish that the daytime and nighttime ambient hourly sound levels at representative protected locations exceed 45 dBA and 35 dBA, respectively.

(a) Measurements shall be made at representative protected locations for periods of time sufficient to adequately characterize the ambient sound. At a minimum, measurements shall be made on three different weekdays (Monday through Friday) during all hours that the development will operate. If the proposed development will operate on Saturdays and/or Sundays, measurements shall also be made during all hours that the development will operate.

(b) Measurement periods with particularly high ambient sounds, such as during holiday traffic activity, significant insect activity or high coastline waves, should generally be avoided.

(c) At any measurement location the daytime and nighttime ambient hourly sound level shall be computed by arithmetically averaging the daytime and nighttime values of the measured one hour equivalent sound levels. Multiple values, if they

exist, for any specific hour on any specific day shall first be averaged before the computation described above.

3.2 **Post-Development Ambient Sound**

(a) Measurements of the post-development ambient one hour equivalent sound levels and, if short duration repetitive sounds are produced by the development, the maximum sound levels made at nearby protected locations and during representative routine operation of the development that are not greater than the applicable limits of subsection C clearly indicate compliance with those limits.

(b) Compliance with the limits of subsection C(l)(b) may also be demonstrated by showing that the post-development ambient hourly sound level, measured in accordance with the procedures of subsection 3.1 above during routine operation of the development, does not exceed the pre-development ambient hourly sound level by more than one decibel, and that the sound from routine operation of the development is not characterized by either tonal sounds or short duration repetitive sounds.

(c) Compliance with the limits of subsection C(1)(e)(ii)(d) may also be demonstrated by showing that the post development maximum sound level of any short duration repetitive sound, measured in accordance with the procedures of subsection 3.1 above, during routine operation of the development, does not exceed the pre-development ambient hourly sound level by more than five decibels.

(d) If any of the conditions in (a), (b) or (c) above are not met, compliance with respect to the applicable limits must be determined by measuring the sound from routine operation of the development in accordance with the procedures described in subsection 4.

(4) **Measurement of the Sound from Routine Operation of Developments.**

4.1 **General**

(a) Measurements of the sound from routine operation of developments are generally necessary only for specific compliance testing purposes in the event that community complaints result from operation of the development, for validation of an applicant's calculated sound levels when requested by the Department, for determination of existing hourly sound levels for an existing development or for enforcement by the Department.

(b) Measurements shall be obtained during representative weather conditions when the development sound is most clearly noticeable. Preferable weather conditions for sound measurements at distances greater than about 500 feet from the sound source include overcast days when the measurement location is downwind of the development and inversion periods (which most commonly occur at night).

(c) Measurements of the development sound shall be made so as to exclude the contribution of sound from development equipment that is exempt from this regulation.

4.2 Measurement of the Sound Levels Resulting from Routine Operation of the Development

(a) When the ambient sound levels are greater than the sound level limits, additional measurements can be used to determine the hourly sound level that results from routine operation of the development. These additional measurements may include diagnostic measurements such as measurements made close to the development and extrapolated to the protected location, special checkmark measurement techniques that include the separate identification of audible sound sources, or the use of sound level meters with pause capabilities that allow the operator to exclude non-development sounds.

(b) For the purposes of computing the hourly sound level resulting from routine operation of the development, sample diagnostic measurements may be made to obtain the one hour equivalent sound levels for each sound component.

(c) Identification of tonal sounds produced by the routine operation of a development for the purpose of adding the 5 dBA penalty in accordance with subsection C(l)(d) requires aural perception by the measurer, followed by use of one-third octave band spectrum analysis instrumentation. If one or more of the sounds of routine operation of the development are found to be tonal sounds, the hourly sound level component for tonal sounds shall be computed by adding 5 dBA to the one hour equivalent sound level for those sounds.

(d) Identification of short duration repetitive sounds produced by routine operation of a development requires careful observations. For the sound to be classified as short duration repetitive sound, the source(s) must be inherent to the process or operation of the development and not the result of an unforeseeable occurrence. If one or more of the sounds of routine operation of the development are found to be short duration repetitive sounds, the hourly sound level component for short duration repetitive sounds shall be computed by adding 5 dBA to the one hour equivalent sound level for those sounds. If required, the maximum sound levels of short duration repetitive sounds shall be measured using the fast response [L_{AFmax}]. The duration and the frequency of occurrence of the events shall also be measured. In some cases, the sound exposure levels of the events may be measured. The one hour equivalent sound level of a short duration repetitive sound may be determined from measurements of the maximum sound level during the events, the duration and frequency of occurrence of the events, and their sound exposure levels.

(e) The daytime or nighttime hourly sound level resulting from routine operation of a development is the energy sum of the hourly sound level components from the development, including appropriate penalties, (see (c) and (d) above). If the energy sum does not exceed the appropriate daytime or nighttime sound level

limit, then the development is in compliance with that sound level limit at that protected location.

(5) **Reporting Sound Measurement Data**. The sound measurement data report should include the following:

(a) The dates, days of the week and hours of the day when measurements were made.

(b) The wind direction and speed, temperature, humidity and sky condition.

(c) Identification of all measurement equipment by make, model and serial number.

(d) The most recent dates of laboratory calibration of sound level measuring equipment.

(e) The dates, times and results of all field calibrations during the measurements.

(f) The applicable sound level limits, together with the appropriate hourly sound levels and the measurement data from which they were computed, including data relevant to either tonal or short duration repetitive sounds.

(g) A sketch of the site, not necessarily to scale, orienting the development, the measurement locations, topographic features and relevant distances, and containing sufficient information for another investigator to repeat the measurements under similar conditions.

(h) A description of the sound from the development and the existing environment by character and location.

I. Sound Level Standards for Wind Energy Developments

(1) Applicability

This subsection applies to grid-scale wind energy developments as defined by 35-A M.R.S.A. §3451(6) and small-scale wind energy developments governed by 35-A M.R.S.A. §3456, hereinafter referred to as "wind energy developments." The provisions in Section 10(C)(1), 10(D)(2), 10(F), and 10(H) of this rule do not apply to wind energy developments.

(2) Sound Level Limits for Routine Operation of Wind Energy Developments

The sound levels resulting from routine operation of a wind energy development measured in accordance with the measurement procedures described in subsection I(8) shall not exceed the following limits:

(a) 75 dBA at any time of day at any property line of the wind energy development or contiguous property owned or controlled by the wind energy developer, whichever is farther from the proposed wind energy development's regulated sound sources; and

(b) 55 dBA between 7:00 a.m. and 7:00 p.m. (the "daytime limit"), and 42 dBA between 7:00 p.m. and 7:00 a.m. (the "nighttime limit") at any protected location.

(3) **Tonal Sounds**

For the purposes of this subsection, a tonal sound exists if, at a protected location, the 10 minute equivalent average one-third octave band sound pressure level in the band containing the tonal sound exceeds the arithmetic average of the sound pressure levels of the two contiguous one-third octave bands by 5 dB for center frequencies at or between 500 Hz and 10,000 Hz, by 8 dB for center frequencies at or between 160 and 400 Hz, and by 15 dB for center frequencies at or between 25 Hz and 125 Hz. 5 dBA shall be added to any average 10 minute sound level ($Leq_{A\ 10\text{-}min}$) for which a tonal sound occurs that results from routine operation of the wind energy development.

(4) **Short Duration Repetitive Sounds ("SDRS")**

For the purposes of this subsection SDRS is defined as a sequence of repetitive sounds that occur within a 10-minute measurement interval, each clearly discernible as an event resulting from the development and causing an increase in the sound level of 5 dBA or greater on the fast meter response above the sound level observed immediately before and after the event, each typically ±1 second in duration, and which are inherent to the process or operation of the development.

(a) When routine operation of a wind energy development produces short duration repetitive sound, a 5 dBA penalty shall be arithmetically added to each average 10-minute sound level ($Leq_{A\ 10\text{-}min}$) measurement interval in which greater than 5 SDRS events are present.

(5) **Compliance with the Sound Level Limits**

A wind energy development shall determine compliance with the sound level limits as set forth in subsection I(2) of this rule in accordance with the following:

(a) Sound level data shall be aggregated in 10-minute measurement intervals within a given compliance measurement period (daytime: 7:00 am to 7:00 pm or nighttime: 7:00 pm to 7:00 am) under the conditions set forth in subsection I(8) of this rule.

(b) Compliance will be demonstrated when the arithmetic average of the sound level of, at a minimum, twelve, 10-minute measurement intervals in a given compliance measurement period is less than or equal to the sound level limit set forth in subsection I(2).

(c) Alternatively, if a given compliance measurement period does not produce a minimum of twelve, 10-minute measurement intervals under the atmospheric and site conditions set forth in subsection I(8) of this rule, the wind energy development may combine six or more contiguous 10-minute measurement intervals from one 12 hour (7:00 am to 7:00 pm daytime or 7:00 pm to 7:00 am nighttime) compliance measurement period with six or more contiguous 10-

minute intervals from another compliance measurement period. Compliance will be demonstrated when the arithmetic average of the combined 10-minute measurement intervals is less than or equal to the sound level limit set forth in subsection I(2).

(6) **Variance from Sound Level Limits**

A variance may be granted by the Department if: (1) a development is deemed necessary in the interest of national defense or public safety and the applicant has shown that the sound level limits cannot practicably be met without unduly limiting the development's intended function, and (2) a finding is made by the Department that the proposed development will not have an unreasonable impact on protected locations. The Department shall consider the request for a variance as part of the review of a completed Site Location of Development Law application or a request for certification for a small-scale wind energy development. In granting a variance, the Department may, as a condition of approval, impose terms and conditions to ensure that no unreasonable sound impacts will occur.

(7) **Submissions**

Technical information shall be submitted describing the wind energy developer's plan and intent to make adequate provision for the control of sound. The wind energy developer's plan shall contain the following:

(a) A map depicting the location of all proposed sound sources associated with the wind energy development, property boundaries for the proposed wind energy development, property boundaries of all adjacent properties within one mile of the proposed wind energy development, and the location of all protected locations located within one mile of the proposed wind energy development;

(b) A description of the major sound sources, including tonal sound sources and sources of short duration repetitive sounds, associated with the construction, operation and maintenance of the proposed wind energy development;

(c) A description of the equivalent noise levels expected to be produced by the sound sources at protected locations located within one mile of the proposed wind energy development. The description shall include a full-page isopleths map depicting the modeled decay rate of the predicted sound pressure levels expected to be produced by the wind energy development at each clearly identified protected location within one mile of the proposed wind energy development. The predictive model used to generate the equivalent noise levels expected to be produced by the sound sources shall be designed to represent the "predictable worst case" impact on adjacent properties and shall include, at a minimum, the following:

1. The maximum rated sound power output (IEC 61400-11) of the sound sources operating during nighttime stable atmospheric conditions with high wind shear above the boundary layer and consideration of other conditions that may affect in-flow airstream turbulence;

2. Attenuation due to geometric spreading, assuming that each turbine is modeled as a point source at hub height;

3. Attenuation due to air absorption;

4. Attenuation due to ground absorption/reflection;

5. Attenuation due to three dimensional terrain;

6. Attenuation due to forestation;

7. Attenuation due to meteorological factors such as but not limited to relative wind speed and direction (wind rose data), temperature/vertical profiles and relative humidity, sky conditions, and atmospheric profiles;

8. Inclusion of an "uncertainty factor" adjustment to the maximum rated output of the sound sources based on the manufacturer's recommendation; and

9. Inclusion, at the discretion of the Department, of an addition to the maximum rated output of the sound sources to account for uncertainties in the modeling of sound propagation for wind energy developments. This discretionary uncertainty factor of up to 3 dBA may be required by the Department based on the following conditions: inland or coastal location, the extent and specificity of credible evidence of meteorological operating conditions, and the extent of evaluation and/or prior specific experience for the proposed wind turbines. Subject to the Department's discretion based on the information available, there is a rebuttable presumption of an uncertainty factor of 2 to 3 dBA for coastal developments and of 0 to 2 dBA for inland developments.

(d) A description of the protected locations near the proposed wind energy development.

(e) A description of proposed major sound control measures, including their locations and expected performance.

(f) A comparison of the expected sound levels from the proposed development with the sound level limits of this regulation.

(g) A comparison of the expected sound levels from the proposed development with any quantifiable noise standards of the municipality in which the proposed development will be located and of any municipality which may be affected by the noise.

(h) A description and map identifying one or more compliance testing locations on or near the proposed wind energy development site. The identified compliance testing locations shall be selected to take advantage of prevailing downwind conditions and be able to meet the site selection criteria outlined in subsection I(8)(d)(2).

(i) A description of the compliance measurement protocol as required by subsection 8 below.

(j) A description of the complaint response protocol proposed for the wind energy development. The complaint response protocol shall adequately provide for, at a minimum:

1. A 24-hour contact for complaints;

2. A complaint log accessible by the Department;

3. For those complaints that include sufficient information to warrant an investigation, the protocol must provide for an analysis as set forth in (a) through (c) below. Sufficient information includes, at a minimum: the name and address of the complainant; the date, time and duration of the sound event; a description of the sound event, indoor or outdoor, specific location and a description of any audible sounds from other sources outside or inside the dwelling of the complainant. Analysis of the complaint by the licensee must include:

   (a) documentation of the location of the nearest turbines to the complaint location and ground conditions in the area of the complaint location;

   (b) weather conditions at the time of the complaint and surface and hub height wind speed and direction;

   (c) power output and direction of nearest turbines; and

   (d) notification of complaint findings to the Department and the complainant;

4. A plotting of complaint locations and key information on a project area map to evaluate complaints for a consistent pattern of site, operating and weather conditions; and

5. A comparison of these patterns to the compliance protocol to determine whether testing under additional site and operating conditions is necessary and, if so, a testing plan that addresses the locations and the conditions under which a pattern of complaints had occurred.

(8) **Measurement Procedures**

These procedures specify measurement criteria and methodology for use with wind energy development applications, compliance and complaint response. They provide methods for measuring the sound from operation of the wind energy development and set forth the information to be reported.

(a) **Measurement Criteria**

1. **Measurement Personnel**

   Measurements shall be supervised by personnel who are well qualified by training and experience in measurement and evaluation of environmental sound, or by personnel trained to operate under a specific measurement plan approved by the Department.

(b) **Measurement Instrumentation**

1. A sound level meter or alternative sound level measurement system used shall meet all of the Type 0 or 1 performance requirements of American National Standard Specifications for Sound Level Meters, ANSI S1.4.

2. An integrating sound level meter (or measurement system) shall also meet the Type 0 or 1 performance requirements for integrating/averaging in the International Electrotechnical Commission Standard on Integrating-Averaging Sound Level Meters, IEC Publication 61672-1 and ANSI 1.43.

3. A filter for determining the existence of tonal sounds shall meet all the requirements of the American National Standard Specification for Octave-Band and Fractional Octave-Band Analog and Digital Filters, ANSI S1.11 and IEC 61260, Type 3-D performance.

4. The acoustical calibrator used shall be of a type recommended by the manufacturer of the sound level meter and one that meets the requirements of American National Standard Specification for Acoustical Calibrators, ANSI S1.40.

5. The microphone windscreen used shall be of a type recommended by the manufacturer of the sound level meter.

6. Anemometer(s) used for surface (10 meter (m)) (32.8 feet) wind speeds shall have a minimum manufacturer specified accuracy of ±1 mph providing data in one second integrations and 10 min. average/maximum values for the evaluation of atmospheric stability.

7. Audio recording devices shall be time stamped (hh:mm:ss) and at a minimum 16 bit digital, recording the sound signal output from the measurement microphone at a minimum sampling rate of 24 thousand (k) samples per second to be used for identifying events. Audio recording and compliance data collection shall occur through the same microphone/sound meter and bear the same time stamp.

(c) **Equipment Calibration**

1. The sound level meter shall have been calibrated by a laboratory within 12 months of the measurement, and the microphone's response shall be traceable to the National Institute of Standards and Technology.

3. Field calibrations shall be recorded before and after each measurement period and at shorter intervals if recommended by the manufacturer.

4. Anemometer(s) and vane(s) shall be calibrated annually by the manufacturer to maintain stated specification.

(d) **Compliance Measurement Location, Configuration, and Environment**

1. Compliance measurement locations shall be at nearby protected locations that are most likely affected by the sound from routine operation of the wind energy development subject to permission from the respective property owner(s).

2. To the greatest extent possible, compliance measurement locations shall be at the center of unobstructed areas that are maintained free of vegetation and other structures or material that is greater than 2 feet in height for a 75-foot radius around the sound and audio monitoring equipment.

3. To the greatest extent possible, meteorological measurement locations shall be at the center of open flat terrain, inclusive of grass and a few isolated obstacles less than 6 feet in height for a 250-foot radius around the anemometer location. The meteorological data measurement location need not be coincident with the sound and audio measurement location provided there is no greater than a 5 mile separation between the data collection points and the measurement locations have similar characterization, i.e. same side of the mountain ridge, etc.

4. Meteorological measurements of wind speed and direction shall be collected using anemometers at a 10-meter height (32.8 feet) above the ground. Results shall be reported, based on 1-second integration intervals, and shall be reported synchronously with hub level and sound level measurements at 10-minute measurement intervals. The wind speed average and maximum shall be reported.

5. The sound microphone shall be positioned at a height of approximately 4 to 5 feet above the ground, and oriented in accordance with the manufacturer's recommendations.

6. When possible, measurement locations should be at least 50 feet from any sound source other than the wind energy development's power generating sources.

(e) **Compliance Data Collection, Measurement and Retention Procedures**

1. Measurements of operational, sound, audio and meteorological data shall occur as set forth in subsection I(8)(e)(7 through 10).

2. All operational, sound and meteorological data collected shall be retained by the wind energy development for a period of 1 year from the date of

collection and is subject to inspection by the Department and submission to the Department upon request.

3. All audio data collected shall be retained by the wind energy development for a period of four weeks from the date of collection unless subject to a complaint filed in accordance with the complaint protocol approved by the Department and is subject to inspection by the Department and submission to the Department upon request. Specific audio data collected that coincides with a complaint filed in accordance with the approved complaint protocol shall be retained by the wind energy developer for a period of 1 year from the date of collection and is subject to inspection by the Department and submission to the Department upon request.

4. Written notification of the intent to collect compliance data must be received by the Department prior to the collection of any sound level data for compliance purposes. The notification shall state the date and time of the compliance measurement period.

   ***Note**: Notice received via electronic mail is sufficient regardless of whether it is received during business hours.*

5. Compliance data from the operation of a wind energy development shall be submitted to the Department, at a minimum:

   (a) Once during the first year of facility operation;

   (b) Once during each successive fifth year thereafter until the facility is decommissioned;

   (c) In response to a complaint regarding operation of the wind energy development as set forth in subsection I(7)(j) of the rule and any subsequent enforcement by the Department; and

   (d) For validation of an applicant's calculated sound levels when requested by the Department.

6. All sound level, audio and meteorological data collected during a compliance measurement period for which the Department has been notified that meets or exceeds the specified wind speed parameters shall be submitted to the Department for review and approval. All data submittals shall be submitted to the Department within 30 days of notification of intent to collect compliance data.

7. Measurement shall be obtained during weather conditions when the wind turbine sound is most clearly noticeable, generally when the measurement location is downwind of the wind energy development and maximum surface wind speeds < 6 miles per hour (mph) with concurrent turbine hub-elevation wind speeds sufficient to generate the maximum continuous rated sound power from the nearest wind turbines to the measurement location. A downwind

location is defined as within 45^0 of the direction between a specific measurement location and the acoustic center of the five nearest wind turbines.

[Note: These conditions typically occur during inversion periods usually between 11 pm and 5 am.]

8. In some circumstances, it may not be feasible to meet the wind speed and operations criteria due to terrain features or limited elevation change between the wind turbines and monitoring locations. In these cases, measurement periods are acceptable if the following conditions are met:

   (a) The difference between the L_{A90} and L_{A10} during any 10-minute period is less than 5 dBA; and

   (b) The surface wind speed (10 meter height) (32.8 feet) is 6 mph or less for 80% of the measurement period and does not exceed 10 mph at any time, or the turbines are shut down during the monitoring period and the difference in the observed L_{A50} after shut down is equal to or greater than 6 dBA; and

   (c) Observer logs or recorded sound files clearly indicate the dominance of wind turbine(s).

9. Measurement intervals affected by increased biological activities, leaf rustling, traffic, high water flow, aircraft flyovers or other extraneous ambient noise sources that affect the ability to demonstrate compliance shall be excluded from all compliance report data. The intent is to obtain 10-minute measurement intervals that entirely meet the specific criteria.

10. Measurements of the wind energy development sound shall be made so as to exclude the contribution of sound from other development equipment that is exempt from this regulation.

(f) **Reporting of Compliance Measurement Data**

Compliance Reports shall be submitted to the Department within 30 days of notification of intent to collect compliance data or upon request by the Department and shall include, at a minimum, the following:

1. A narrative description of the sound from the wind energy development for the compliance measurement period result;

2. The dates, days of the week and hours of the day when measurements were made;

3. The wind direction and speed, temperature, humidity and sky condition;

4. Identification of all measurement equipment by make, model and serial number;

5. All meteorological, sound, windscreen and audio instrumentation specifications and calibrations;

6. All A-weighted equivalent sound levels for each 10-minute measurement interval;

7. All L_{A10} and L_{A90} percentile levels;

8. All 10 minute 1/3 octave band linear equivalent sound levels (dB);

9. All short duration repetitive events characterized by event amplitude. Amplitude is defined as the peak event amplitude minus the average minima sound level immediately before and after the event, as measured at an interval of 50 milliseconds ("ms") or less, A-weighted and fast time response, i.e. 125 ms. For each 10-minute measurement interval short duration repetitive sound events shall be reported by number for each observed amplitude integer above 5 dBA.

10. Audio recording devices shall be time stamped (hh:mm:ss) and at a minimum 16 bit digital, recording the sound signal output from the measurement microphone at a minimum sampling rate of 24 thousand (k) samples per second to be used for identifying events. Audio recording and compliance data collection shall occur through the same microphone/sound meter and bear the same time stamp. Should any sound data collection be observed by a trained attendant, the attendant's notes and observations may be substituted for the audio files during the compliance measurement period;

11. All concurrent time stamped turbine operational data including the date, time and duration of any noise reduction operation or other interruptions in operations if present; and

12. All other information determined necessary by the Department.

11. Preservation of Historic Sites

A. Preamble. The Department recognizes the value to society of preserving sites of historic significance.

B. Definition. As used in this section, "historic site" means any site, structure, district or archaeological site which has been officially included on the National Register of Historic Places and/or on the Maine Historic Resource Inventory, or which is established by qualified testimony as being of historic significance.

C. Scope of Review. In determining whether a proposed development will have an adverse effect on the preservation of historic sites either on or near the development site, the Department shall consider all relevant evidence to that effect.

D. Terms and Conditions. The Department, may as a term or condition of approval, establish any reasonable requirement to ensure that a proposed development will not adversely affect preservation of any historic site.

12. Preservation of Unusual Natural Areas

A. Preamble. The Department recognizes the importance of preserving unusual natural areas for educational and scientific purposes.

B. Definition. As used in this section, "unusual natural area" means any land or water area, usually only a few acres in size, which is undeveloped and which contains natural features of unusual geological, botanical, zoological, ecological, hydrological, other scientific, educational, scenic, or recreational significance. By way of illustration, and not limitation, such are, as may include: rare or exemplary plant communities; individual plant species of unusual interest because of size, species or other reasons; unusual or exemplary bogs; unusually important wildlife habitats, particularly those of rare or endangered species; unusual land forms; fossils and other deposits of importance to geologists; outstanding scenic areas; and others of similar character.

C. Scope of Review. In determining whether a proposed development will have an adverse effect on the preservation of unusual natural areas either on or near the development site, the Department shall consider all relevant evidence to that effect.

D. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that a proposed development will not adversely affect the preservation of natural areas.

13. Access to Direct Sunlight

A. Preamble. The Department recognizes that some existing structures utilize active or passive solar energy systems for purposes such as heating air or water, and that, in these instances, it may be an unreasonable effect on existing uses to deny access to direct sunlight.

B. Scope of Review. In determining whether a proposed development will have an adverse effect on access to direct sunlight, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) Structures within the proposed development will not block access to direct sunlight to structures utilizing solar energy through active or passive systems.

C. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that a proposed development will not block access to direct sunlight.

14. No Unreasonable Effect on Scenic Character

A. Preamble. The Department considers scenic character to be one of Maine's most important assets. The Department also feels that visual surroundings strongly influence people's behavior.

B. Scope of Review. In determining whether the proposed development will have an unreasonable adverse effect on the scenic character of the surrounding area, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) The design of the proposed development takes into account the scenic character of the surrounding area.

(2) A development which is not in keeping with the surrounding scenic character will be located, designed and landscaped to minimize its visual impact to the fullest extent possible.

(3) Structures will be designed and landscaped to minimize their visual impact on the surrounding area.

NOTE: The following are GUIDELINES for the landscaping of parking lots, which are structures pursuant to 38 M.R.S.A. Section 482(6) (B).

(a) Lighting will be shielded from adjacent highways and residential areas.

(b) Curbed planting strips will be utilized in parking areas of 2 acres or more. Planting strips will be a minimum of ten (10) feet wide and spaced between every second double bay parking aisle or 200 feet, whichever is less.

(c) When the parking lots are adjacent to a residential use, landscaping and/or architectural screens will be utilized to provide an effective perimeter separation area between property lines and the edge of the pavement and/or structures. There will be a minimum setback of fifteen (15) feet from the property line. The Department may require a similar provision when the parking lot is adjacent to other land uses.

(d) Planting and maintenance program specifications will be developed to provide the earliest establishment of landscape materials and their maintenance.

(e) **Planting specifications**

(i) Shrubs will be planted with a 24" minimum size for those specified by spread.

(ii) Shrubs will be planted with a 36" minimum size for those specified by height.

(iii) Shade trees will be highcrowned species with ascending or lateral branching habit indigenous to the area, tolerant to existing soils and urbanized conditions, two-inch minimum caliper measured six inches up from the base, and planted a maximum of 30' on center.

(iv) Flowering and evergreen trees will be a minimum of 7' tall and planted a maximum of 20' on center.

(v) Selections for ground cover will reflect the project's function, expected foot traffic, exposure, and maintenance program.

(f) Provisions will be made to supply water to planted islands and other vegetated areas.

(4) The plans for the proposed development provide for the preservation of existing elements of the development site which contribute to the maintenance of scenic character.

C. Submissions. Applications for approval of proposed developments shall include evidence that affirmatively demonstrates that there will be no unreasonable adverse effect on the scenic character of the surrounding area, including information such as the following, when appropriate:

(1) Sketches of the proposed development indicating how the development fits into the scenic character of the area.

(2) Landscaping plans for minimizing the visual impact of the parking lots, mining operations and other types of developments.

D. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the proposed development will have no unreasonable adverse effect on scenic character, such as requiring that:

(1) Illumination of the development be limited.

(2) Vegetative or architectural screens be established.

15. Protection of Wildlife and Fisheries

A. Preamble. The Department recognizes the need to protect wildlife and fisheries by maintaining suitable and sufficient habitat and the susceptibility of certain species to disruption and interference of lifecycles by construction activities.

B. Scope of Review. In determining whether the developer has made adequate provision for the protection of wildlife and fisheries, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) A buffer strip of sufficient area will be established to provide wildlife with travel lanes between areas of available habitat.

(2) Proposed alterations and activities will not adversely affect wildlife and fisheries lifecycles.

(3) There will be no unreasonable disturbance to:

(a) High and moderate value deer wintering areas.

(b) Habitat of any species declared threatened or endangered by the Commissioner, Maine Department of Inland Fisheries and Wildlife or the Director of the U.S. Fish and Wildlife Service.

(c) Seabird nesting islands;

(d) Significant vernal pools;

(e) High and moderate value waterfowl and wading bird habitat; and

(f) Shorebird nesting, feeding, and staging areas.

C. Submissions. Applications for approval of proposed developments shall include evidence that affirmatively demonstrates that the developer has made adequate provision for the protection of wildlife and fisheries, including information such as the following, when appropriate:

(1) The location of natural buffer strips and adequate provision for their maintenance.

(2) Plans to mitigate adverse effects on wildlife and fisheries through means that at a minimum include, but are not limited to, design considerations, pollution-abatement practices, the timing of construction activities, and on-site or off-site habitat improvements or preservation.

D. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that a developer has made adequate provision for the protection of wildlife and fisheries.

16. Adequate Provision for Solid Waste Disposal

A. Standard. The applicant shall make adequate provision for solid waste disposal. All solid waste will be disposed of in a manner which ensures that:

(1) No unreasonable adverse effects on the natural environment will result;

(2) Public health, safety, and welfare will not be adversely affected; and

(3) The wastes will not combine with other wastes, water, or other natural or man-made substances to create additional harmful effects to the natural environment or the public health, safety, and welfare.

B. Submissions. The application for approval of a proposed development must include evidence that affirmatively demonstrates the applicant has made adequate provision for solid waste disposal, including, but not limited to, the following information:

(1) The types and estimated quantities of solid waste to be generated by the development and the proposed method of disposal. Types of solid waste may include, but are not limited to, stumps/grubbings, construction debris, demolition debris, household solid waste, industrial solid wastes, special wastes and hazardous wastes.

(2) A letter from the operator of a solid waste management facility or a municipality stating that adequate capacity exists for solid waste generated by the development and that the development may utilize the solid waste management facility. The applicant must identify the method of collection (e.g. private, municipal or commercial) and the location of the solid waste management facility for each waste listed. If waste from the site is taken to a transfer station, the application must identify the facility or facilities at which the waste ~~is~~ would ultimately be managed.

(3) If any stumps, grubbings, or other wood waste or land clearing debris ~~is~~ are to be disposed of on-site, the applicant must comply with 38 M.R.S. §1301 *et seq.* and all applicable sections of the Department's Solid Waste Management Rules. There are provisions within the Solid Waste Management Rules to exempt the processing of certain land clearing debris as described in 06-096 CMR 409(1)(B)(3). The applicant must delineate the disposal area on the site plan. For subdivisions, if waste is proposed for on-site burial on a particular lot, that lot must be conveyed with a deed restriction identifying the disposal area.

(4) If wood wastes are to be burned on-site, the burn area must be shown on the site plan and exclusion plans provided for materials prohibited from being burned (including chemically treated wood, plastics, vinyl, asphalt shingles, etc). On-site burning cannot create a nuisance condition, and evidence of all applicable fire permits must be submitted. Provide plans for handling both unburned wood waste and woodash, including the name of the licensed or exempt solid waste facility that will accept or receive or manage the ash and unburned materials and the name of the licensed or exempt transporter who will transport the materials to the proposed solid waste facility. If applicable, include evidence of capacity to accept the waste from an approved solid waste facility or a plan outlining the usage of these materials in landscaping and reclamation of the site. Include information on ash/topsoil mixing ratios and application rates. Any proposed open burning must comply with the *Rules for Open Burning*, 06-096 CMR 102.

(5) When the proposed development is or includes the establishment of a solid waste disposal facility, the applicant shall supply evidence of compliance with the *Solid Waste Management Act* (38 M.R.S. Section 1301 *et seq.*).

C. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the applicant has made adequate provision for solid waste disposal, such as the following:

(1) a groundwater quality monitoring program;

(2) on-site construction supervision or engineering inspection by a certified engineer or geologist; and/or

(3) operational inspections and reports by an independent consultant.

17. Adequate Provisions for the Control of Odors

A. Standard. The applicant shall make adequate provision for controlling odors.

B. Submissions. The application for approval of any development likely to be the source of offensive odors shall include evidence that affirmatively demonstrates that the applicant has made adequate provision for the control of odors, including, but not limited to, the following information:

(1) the identification of any sources of odors from the development;

(2) an estimation of the area which would be affected by the odor, based on experience in dealing with the material or process used in the development, or similar materials or processes; or

(3) proposed systems for enclosure of odor-producing materials and processes, and proposed uses of technology to control, reduce or eliminate odors.

C. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the applicant has made adequate provision for the control of odors.

18. Adequate Provision for Securing and Maintaining Sufficient and Healthful Water Supplies

A. Standard. The applicant shall make adequate provision for securing and maintaining a sufficient and healthful water supply for the proposed development.

B. Submissions. The application for approval of a proposed developments shall include evidence that affirmatively demonstrates that the applicant has made adequate provision for securing and maintaining a sufficient and healthful water supply, including, but not limited to, the following information:

(1) A letter from the appropriate utility or water district that a sufficient- and healthful water supply exists and may be utilized by the development.

(2) If water is to be supplied on-site, a letter from a geologist or well driller knowledgeable about the area where the development is proposed to be located that a sufficient and healthful water supply is likely to be available.

(a) If there is reasonable doubt that a sufficient and healthful water supply can be provided by means of on-site wells, the following may be required:

(i) water from wells located in close proximity to the development site be tested for potability; and/or

(ii) a test well be dug or drilled on the development site and at report prepared indicating the volume and potability of water obtained from the well.

(3) If water supply and, sewage disposal are to be handled on-site, and if lots are less than 2 acres in size, identification of the location of wells and on-site sewage disposal systems for each lot. The separation distance between wells and on-site sewage disposal areas shall be at least the minimum distance established in the *Subsurface Wastewater Disposal Rules*, 10-144 CMR 241.

(4) If water is to be provided by a common source:

(a) evidence that there will be sufficient water to serve the development;

(b) evidence that the common water supply system will be constructed in conformance with the *Maine Drinking Water Regulations*, authorized by 22 M.R.S. Chapter 601; and

(b) evidence that adequate provision has been made for the establishment of a mechanism to ensure proper operation and maintenance of the water supply system.

(5) Indicate the total anticipated water usage (daily or annual) by the proposed development, including the amount of non-potable water to be used for dust control during construction.

C. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure the adequate provision of a sufficient and healthful water supply, such as requirements that:

(1) One or more central wells be installed with adequate water for the development.

(2) An applicant arrange for adequate water service with a local utility or water district, or provide an adequate off-site common well, in cases where the Department determines that on-site water supplies may not be adequate.

(3) The location of wells and on-site sewage disposal areas be established by deed conditions.

STATUTORY AUTHORITY: 38 M.R.S.A. Section 343

EFFECTIVE DATE:
November 1, 1979, filing 79-507

AMENDED:
November 21, 1989 – Section 10, filing 89-500
June 12, 1991 - Section 9, filing 91-211

EFFECTIVE DATE (ELECTRONIC CONVERSION):
May 4, 1996

AMENDED:
September 22, 2001 - Section 9, filing 2001-402
January 18, 2006 - Section 15, filing 2006-12
June 10, 2012 – Section 10, filing 2012-147 (Final adoption, major substantive)
June 2, 2016 – filing 2016-077 (Final adoption, major substantive)

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August 22, 2019

Project 171.05027.008

Mr. Kevin Martin
Compliance & Procedures Specialist
Maine Department of Environmental Protection
17 State House Station
Augusta, Maine 04333-0017

RE: Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Dear Mr. Martin:

This letter provides responses to the Department of Environmental Protection letter from Kevin Martin to Elizabeth Ransom dated July 3, 2019. For clarity, the entire comment from the letter has been copied below and italicized. Responses are in regular text, and on the attached plans and figures as referenced below.

Natural Resources Protection Act (NRPA) application

Preamble: As discussed in individual responses below, additional assessment of site drainages and wetlands delineation was conducted by Normandeau on July 3, 2019. A Revised Wetland and Stream Survey Map is included as **Attachment A**. Changes include the elongation of streams S3 and S6, along with the expansion of wetland W15 and delineation of wetland W19. These wetland and stream updates, along with minor development alterations, are reflected in the Revised Wetland and Stream Impact Map included as **Attachment B**. Please refer specifically to these drawings to view the most updated wetland and stream mapping. An updated summary of project wetland and stream impacts is provided below in **Tables 1 through 3.** These tables supersede tables provided in the previously submitted NRPA application.

Pease International Tradeport, 112 Corporate Drive, Portsmouth, New Hampshire 03801, Tel (603) 436-1490, Fax (603) 436-6037
400 Commercial Street, Suite 404, Portland, Maine 04101, Tel (207) 772-2891
12 Kent Way, Suite 100, Byfield, Massachusetts 01922-1221, Tel (978) 465-1822
60 Valley Street, Building F, Suite 106, Providence, Rhode Island 02909, Tel (401) 433-2160
2127 Hamilton Avenue, Hamilton, New Jersey 08619, Tel (609) 584-0090

www.ransomenv.com

Table 1. Freshwater Wetlands Impact Table

Wetland ID	[1]Cowardin Class	[2]Temporary Impacts (SF)	Permanent Impacts (SF)	Impact Total (SF)	Impact Characterization
W1	PFO	0	115,674	115,674	Direct, Fill
W2	PFO	0	24,612	24,612	Direct, Fill
W3	PFO	0	5,057	5,057	Direct, Fill
W4	PFO	0	692	692	Direct, Fill
W5	PSS	0	18,672	18,672	Direct, Fill
W6	PFO	2,716	3,120	5,835	Direct, Fill
W13	PEM	0	556	556	Direct, Fill
W15	PEM	0	8,789	8,789	Direct, Fill
W16	PSS	1,245	0	1,245	Direct, Excavation
W19	PEM	0	13,217	13,217	Direct, Fill
Totals	PFO	2,716	149,154	151,870	
	PSS	1,245	18,672	19,917	
	PEM	0	22,562	22,562	
Grand Total	**All**	**3,960**	**190,389**	**194,349**	

1 Cowardin Class: PSS = Palustrine Scrub-Shrub; PFO = Palustrine Forested; PEM = Palustrine Emergent

2 All temporary impacts will be restored in-place.

Table 2. Coastal Wetlands Impact Table

Coastal Zone	Wetland ID	[1]Cowardin Class	Pipeline Station	[2]Temporary Impacts (SF)	Permanent Impacts (SF)	Impact Total (SF)	Impact Characterization
Intertidal	Salt Marsh (W11)	E2EM	5+00 to 5+57	2,295	0	2,295	Direct, Excavation
Intertidal	Cobble Beach (W11)	M2US	5+57 to 5+67	486	0	486	Direct, Excavation
Intertidal	Mudflat	M2US	5+67 to 13+50	78,300	0	78,300	Direct, Excavation
Subtidal	Surf Zone	M1UB	13+50 to 32+00	185,000	0	185,000	Direct, Excavation
Subtidal	Transition Zone	M1UB	32+00 to 36+00	40,000	2,994	42,994	Direct, Excavation, Fill
Subtidal	Underwater Zone 1	M1UB	36+00 to 42+00	60,000	880	60,880	Direct, Excavation, Fill
Subtidal	Underwater Zone 2	M1UB	42+00 to 68+90	269,000	2,751	271,751	Direct, Excavation, Fill
Subtidal	Underwater Zone 3	M1UB	68+90 to 69+25	3,500	78	3,578	Direct, Excavation, Fill
Totals		E2EM		2,295	0	2,295	
		M2US		78,786	0	78,786	
		M1UB		557,500	6,703	564,203	
Grand Total				**638,580**	**6,703**	**645,283**	

1 Cowardin Class: E2EM = Estuarine Intertidal Emergent; M2US = Marine Intertidal Unconsolidated Shore; M1UB = Marine Subtidal Unconsolidated Bottom

2 All temporary impacts will be restored in-place.

Table 3. Streams Impact Table

Stream ID	Flow Regime	[1]Temporary Impacts (LF)	Permanent Impacts (LF)	Impact Total (LF)	[1]Temporary Impacts (SF)	Permanent Impacts (SF)	Impact Total (SF)	Impact Characterization
S3	Intermittent	0	917	917	0	2,751	2,751	Direct, Fill
S5	Intermittent	0	472	472	0	2,832	2,832	Direct, Fill
S6	Intermittent	0	474	474	0	1,422	1,422	Direct, Fill
S8	Intermittent	13	0	13	65	0	65	Direct, Fill
S9	Intermittent	107	0	107	428	0	428	Direct, Excavation, Fill
Grand Total		**120**	**1,863**	**1,983**	**493**	**7,005**	**7,498**	

1 All temporary impacts will be restored in-place.

1. Nordic states that the proposed project would result in 144,000 square feet of permanent alteration to the coastal wetland and 108,000 square feet of temporary alteration of the coastal wetland (Attachment 9, page 21). Further breakdown these impact numbers to explain how much of the alteration would occur to intertidal area and subtidal area and by using the Cowardin classification system for wetlands and deepwater habitats.

Impacts to coastal wetlands have been revised and classified in accordance with the Cowardin System and are presented in **Table 2** above. The impacts have been calculated using the width and length of construction easement for temporary impacts and the footprint of the permanent structures (pipe anchors) on top of the sediment in Belfast Bay for permanent impacts requiring compensation, as presented in the August 13, 2019 Anchoring Requirements for Submerged Pipelines Memorandum (**Attachment C**). The temporary areas include the salt marsh, cobble beach, intertidal and subtidal areas where the pipes will be buried. The permanent impact area is the subtidal portions of the proposed intake and discharge anchoring structures at the point where the pipeline is exposed on the bottom of Belfast Bay to the point of termination in Belfast Bay. Cowardin class for intertidal and subtidal areas were designated based on Mean Low Water elevation -5.4 ft. (NAVD 88) and Mean High Water elevation +4.8 ft. (NAVD 88). The transition from buried to surface pipes is at Station 32+00 for discharge and intake pipes. The discharge pipe terminates at Station 42+00. See the Intake & Discharge Engineering Drawings for details (**Attachment C**).

2. For the proposed work associated with coffer dam system installation and placement of the pipe anchors, please provide the square footage of proposed permanent and temporary impact to the coastal wetland and the Tidal Waterfowl and Wading Bird Habitat.

Within the designated Tidal Waterfowl and Wading Bird Habitat (TWWH) area (**Attachment D**) the pipe will be entirely buried, resulting in only temporary impacts associated with construction activities. The pipe trench will be backfilled with excavated material, and the construction area returned to its original profile, with excess excavated material removed from the site. No pipe anchors are needed where the pipe is buried. During construction, all disturbance, including the coffer dam used to transition the pipe from the upland area to the tidal mudflat, will be contained to an average 100 ft wide construction easement. The coffer dam will be used within the 40 ft easement on the Eckrote property. The area impacted by the coffer dam will be returned to its original condition, as described for the pipe trench area; see the updated Compensation Plan drawings for more details (**Attachment E**, Sheet 2). The expected temporary impacts to the coastal wetland have been presented above in **Table 2**; the expected impacts to the TWWH are listed by wetland type in **Table 4** below.

Table 4. Area of Temporary Construction Disturbance in TWWH, by Wetland Type, within the 100 ft Construction Footprint Width

*Wetland Type	Pipe Length (ft)	Maximum Area of Construction Disturbance (ft^2)
Intertidal Salt Marsh (E2EM)	57	5,700
Intertidal Cobble Beach (M2US)	10	1,000
Intertidal Mudflat (M2US)	783	78,300
Subtidal (M1UB)	420	42,000
Total	1,270	127,000

*E2EM = Estuarine, Intertidal, Emergent; M2US= Marine, Intertidal, Unconsolidated Shore, M1UB= Marine, Subtidal, Unconsolidated Bottom, M2RS = Marine, Intertidal, Rocky Shore

3. Nordic states that the proposed project would result in 144,000 square feet of permanent alteration to the coastal wetland (Attachment 9, page 21). The compensation plan (Attachment 13, page 13) proposes to compensate for 2,611 square feet of the permanent alteration to the coastal wetland. Please revise the compensation plan to compensate for the remaining 141,389 square feet of permanent alteration, or, if no additional compensation is proposed, please explain why.

Proposed compensation has been outlined in the original permit application. Additional impacts resulting from changes in stream designation, revised freshwater wetland boundaries and revised coastal wetland impacts are proposed to be compensated for via the In-Lieu-Fee program. **Table 5** and the calculations below summarize the compensation plan for all impacts.

Table 5. On-Site Stream Compensation

Compensation Area	Functions and Values Provided	Compensation Amount	Compensation Ratio	Total Compensated
Riparian Restoration	-Wildlife Habitat -Improved QHEI Scores* -Visual Quality**	2.05 acre	2:1	1.025 acre
Deeded Riparian Buffer	-Wildlife Habitat	4.77 acre	8:1	0.596 acre
Aquatic Passage Improvements	-Wildlife Habitat -Flood flow Alteration*** -Improved QHEI Scores*	0.014 acre	2:1	0.007 acre
Totals				**1.628 acre**

* Refer to the question #6 response for more information on the QHEI score.
** This is an added value provided through restoration plantings; refer to the question #6 response for details.
*** Floodflow alteration as it relates to S9 will continue to be provided under proposed conditions.

To compensate for freshwater and coastal wetland impacts not compensated for through on-site restoration, the project will pay into the in-lieu-fee program as calculated below using the following formula:

(Direct wetland impact [sq. ft.] x (Natural resource enhancement & restoration cost per sq. ft. + Average assessed land valuation per sq. ft.)) x (Resource multiplier)

The natural resource enhancement and restoration cost for Waldo County is $3.61 per sq. ft. and the average assessed land value is $0.09 per sq. ft. The resource multiplier for coastal wetlands and wetlands of special significance is 2. All other resources are set at a multiplier of 1.

Coastal Wetlands:

These are the permanent sq. ft. impacts from the pipe anchors in the subtidal area. We have assumed the restore-in-place temporary coastal wetland impacts do not require compensation beyond the restoration of these areas.

(6,703 x ($3.61 + $0.09)) x (2) = $49,602.20

Freshwater Wetlands:

These impacts are totaled from the sq. ft. of permanent impacts to freshwater wetlands and streams minus the on-site compensation number of 70,916 sq. ft. (1.628 acres). We have assumed that all restore-in-place temporary impacts, including wetlands of special significance, do not require compensation beyond the restoration of these areas.

((190,389 – 70,916) x ($3.61 + $0.09)) x (1) = $442,050.10

Total Compensation: $491,652.30

4. There are conflicting values of coastal impacts across a few sections of the NRPA application that should be reconciled. Specifically, see the proposed coastal impacts stated on Appendix B (Attachment 0, page 55), compared with the coastal wetland impacts stated in Attachment 1, in Attachment 9 on page 21, and in Attachment 13 on page 13.

Impact values have been revised to address the conflicts in coastal impact numbers and to address changes in NRPA jurisdictional streams and revised wetland boundaries. A summary of all project-related impacts to freshwater wetlands, streams, and coastal wetlands is presented in **Tables 1 through 3** above.

5. Please provide additional description of on-site techniques that were and will be considered to avoid and minimize natural resource impacts, including, but not limited to, different building locations or configurations, minimum widths of driveways, and numbers of parking spaces.

The number of parking spaces were based on Nordic's projected employee count (100) and Belfast's requirement for 1.2 spaces per employee. The 120 spaces included 8 paved spaces at the WWTP, and 2 paved at the existing Building 10. With a current understanding of how employee shifts will work at the facility, this has been revised to accommodate a projected 85 employees. This reduces the number of parking spaces to 105 spaces, as shown on updated engineering drawings CP101-CP107 included as **Attachment F**. Although more expensive and difficult to maintain than typical asphalt, 46 spaces will be constructed with pervious pavement to reduce natural resource impacts.

The driveways allow for two-way traffic to provide best function of the facility, although the drives are not sized to be generous on space. City of Belfast requirements are 25-foot width for two-way driveways and 26-foot width for 2-way driveways with parking. The facility driveways are 25 feet wide and include a striped 3-foot wide pedestrian zone, and also include parking. Most municipal standards for parking are for 24 feet, which the project will satisfy by utilizing

the pedestrian zone for car maneuvering in and out of spaces. This design minimizes pavement and total site disturbance while allowing for site functionality. In addition, the driveway located south of Building 2 will be constructed with a half lane of pervious pavement. See updated engineering drawings CP101-CP107 for details (**Attachment F**).

Multiple potential building layouts were considered for the facility, but due to the size of the RAS tanks in the grow-out buildings, and the need to maintain adequate buffers and stormwater protection for the site, limited options were possible that accommodate the six planned modules. The design presented in the application provides a compact and efficient layout that maximizes site buffers, preserves S9, and minimizes impacts to other site wetlands.

6. Please provide additional information that demonstrates why and how the proposed compensation plan would offset the lost functions and values of the impacted streams. For instance, the narrative should evaluate and compare the functions and values that would be lost by the proposed alteration of on-site streams (labeled as S3, S5, and S6) versus the functions and values that would be gained by the proposed restoration and preservation of stream S9 and the proposed culvert replacement at stream S8.

Normandeau has completed a Stream Assessment Report for the project site which has been included as **Attachment G**. This Stream Assessment Report includes a Qualitative Habitat Evaluation Index (QHEI). A Functions and Values Assessment (FVA) of site streams was previously completed and incorporated into the May 8, 2019 Natural Resources Report (page 8, Table 3) submitted as part of the original NRPA application. Please refer to these specific reports for details on the methodologies and results of the assessments.

The permanent impacts being proposed to the upper reaches of S3, S5, and S6 are being offset by installing a drainage system that will route clean groundwater to the streams to prevent drying while also controlling flows with a weir system that will prevent erosion. This will compensate for the potential loss of groundwater recharge discharge and flood flow alteration, which were identified as functions during the FVA. Additionally, these streams showed "none" to "moderate" erosion during the QHEI portion of the Stream Assessment. The drainage system will maintain stream quality by preventing possible further erosion.

The culvert crossing at S9 located between wetlands W8 and W9 will be constructed using a natural bottom culvert in order to avoid impacts to the streambed and allow it to continue to naturally manage floodflow during storm events. This will maintain the floodflow alteration function of S9, previously identified during the FVA. Additionally, the use of the open bottom culvert will maintain the natural substrate of the streambed, and not negatively impact the substrate value it was given during the QHEI. Additionally, by utilizing a wide culvert span and maintaining existing, natural flows, this culvert crossing will not have a negative impact on the streams channel morphology, bank erosion or pool/glide and riffle/run quality, as these parameters were evaluated during the QHEI.

The impact Compensation Plan proposes riparian buffer restoration around the length of S9. The three sampling reaches of S9 (S9a, S9b, S9c) generally scored low when evaluating their respective riparian zones during the QHEI. S9a scored "narrow," S9b scored "none," and S9c scored "moderate." The riparian buffer restoration is focused around S9a and S9b, which increase the quality and width of the riparian zone, improving their QHEI scores. Additionally, the buffer

restoration and proposed stream plantings will enhance the instream cover parameter by providing overhanging vegetation to the stream, which is all but entirely absent in S9b. These plantings will also improve or maintain bank erosion control and riparian zone quality. The Deeded Riparian Buffer protects S9 and the protection and improvements to S9 will result in increasing the QHEI values for some metrics of these portions of S9.

The table below summarizes the expected improvement in QHEI scores for the portions of S9 benefitting from the buffer restoration:

Table 6.

Stream Reach	Current QHEI Instream Cover	Expected QHEI Instream Cover	Current QHEI Bank Erosion & Riparian Zone	Expected QHEI Bank Erosion & Riparian Zone	Current Total QHEI	Expected Total QHEI
S9a	3	3	7	8	39	40
S9b	4	6	4	6	17	21

In addition to improving the QHEI scores for S9a and S9b with the buffer restoration and stream plantings, the corrugated pipe culverts currently on S8 under the driveway at 282 Northport Road will be removed and replaced with an improved structure for aquatic passage. This will improve substrate quality in this location, as a minimum of 12 inches of natural streambed material will be placed on top of the existing substrate. The culvert upgrade will also enhance aquatic passage through the stream corridor between the lower and middle sections of S8. Additionally, by introducing a riparian buffer to S9b and enhancing the buffer to S9a, this will also enhance wildlife movement throughout the upper reaches of the stream by providing shelter to migrating wildlife, which is currently nonexistent in S9b.

Overall, the proposed natural resources impact compensation plan will improve the quality and value of onsite streams by enhancing or maintaining critical stream characteristics such as cover, riparian buffer width and quality, floodflow alteration, erosion control, habitat connectivity and visual quality.

7. The Department visited the site of the proposed project on May 17, 2019. (See the attached site visit summary.) Based on the Department's observations, Drainages D3, D5, and D6 appear to be channels between defined banks that exhibit two or more characteristics of a stream as defined in 38 M.R.S. §480-B(9). For this reason, the Department requests that additional site surveys of these areas be conducted, with the total amount of proposed stream alteration re-assessed and quantified in linear feet and in square feet.

Normandeau visited the site with representatives of ME DEP and Ransom Consulting on July 3, 2019 to view the site drainages. Additional mapping of site drainages and wetlands delineation was conducted by Normandeau on July 3, 2019. Drainages D3, D5 and D6 have been converted to S3, S5 and S6, respectively. Revisions to the classification of these drainages are reflected on the revised Wetland and Stream Survey map (**Attachment A**) and included in **Table 3** above.

The linear feet of stream impacts have been re-assessed based on GPS mapping of the streams on July 19, 2019 and the subsequent changes to D3, D5 and D6. To assess square feet of stream

impacts each bank of each stream was GPS located on July 19, 2019. These impacts are noted in **Table 3** above.

8. Based on the Department's observations at its May 17, 2019, site visit and given that the functions and values for the streams as outlined in the application are wetland-oriented, the Department requests that the applicant submit a qualitative assessment that includes an evaluation of all physical and biological parameters of each stream. The Department further requests that components and scoring techniques of a Qualitative Habitat Evaluation Index or similar evaluation method be incorporated into the qualitative assessment.

A qualitative assessment of all site streams was conducted on July 19-22, 2019, using the Qualitative Habitat Evaluation Index, concurrent with additional mapping of site drainages and wetlands delineation. Results of this assessment are included in the attached Stream Assessment Report, dated July 29, 2019 (**Attachment G**). In summary the QHEI found that overall the streams scored low. The streams exhibited low invertebrate diversity, largely due to minimal water, and low quality silty substrate and the streams do not have characteristics conducive to providing fish habitat due to either intermittent flows or no potential connection to known downstream fish habitat, low dissolved oxygen, and poor substrate quality. The streams assessed received QHEI scores between 18 and 42 out of 100, and corresponding Index of Biotic Integrity (IBI) ratings were between poor and very poor.

9. Please submit wetland determination data forms for all on-site wetlands. Only data forms for wetlands W1, W5, W10, and W11 have been included in the NRPA application to date (Attachment 12, Appendix A). In addition, the topography and vegetation observed in Wetland W15 by the Department at its May 17, 2019, site visit indicates that Wetland W15 may be greater in size than originally delineated by the applicant. Please provide any additional information you may have supporting this delineation. Further, observations from the Department's site visit suggest that Wetland W1 is a wet meadow freshwater wetland and a forested freshwater wetland, as compared to the applicant's wetland determination data form for Wetland W1, which states that this wetland is a forested freshwater wetland. Please confirm whether the Wetland W1 data form accurately states the appropriate wetland classification for Wetland W1, and that the location of the Army Corps Data Plot points are correctly depicted on the plan titled "Belfast Aquaculture Project Wetland and Stream Survey," which is found in the natural resources report, titled "Natural Resources Report," prepared by Normandeau Associates and dated May 8, 2019.

Data Forms: Data forms have been compiled and are included in **Attachment H**. The compilation includes forms for W1 and W14 (2 transects, 4 plots to document the wet meadow and forested area, all of which is labeled as W1 on the survey plan, which is explained below), W5, W10, W11 (wetland plot only for W11 as the adjacent area is wetland and documented by the plots completed in W10), W15 and W19. Data forms were initially intended to represent each wetland type encountered (forested, wet meadow, etc.) on each of the three properties delineated. Therefore, forms were not completed for all wetlands.

W15: Field data indicates that wetlands on the Perkins property were delineated during a dry year (2018). In 2019 spring rainfall was high. Wet meadows are particularly prone to rapid expansion into transition zones during wet years, especially those consisting predominately of *Calamagrostis canadensis*. A revision to the wetland delineation extending W15 and adding a

wetland finger to S10 (W19), are shown on the Revised Wetland and Stream Survey dated July 26, 2019 (**Attachment A**). The data forms for W15, and W19 are also attached (**Attachment H**).

W1 versus W14: Wetland delineations occurred over the course of time as additional lands were incorporated into the project site. The first to be delineated was the Water District property. The second was the Eckrote property and the third was the Perkins property. The dates of the delineations are shown on the map titled Revised Wetland and Stream Survey (**Attachment A**). W1 was the first wetland to be delineated on the Water District property on May 3 and 4, 2018. On July 24, 2018 the Eckrote property was delineated and the numbering sequence picked up where we left off at number 10 (W10). When the Perkins property became available the wetlands were delineated on August 27-28, 2018, again picking up the numbers where we left off at number 13 (W13). Once all wetlands were delineated W1 and W14 were determined to be contiguous, were joined, and the number W14 was eliminated with the area becoming part of W1. As noted in the Natural Resources Report dated May 8, 2019 (Page 4, Paragraph 4) W1=W14. Attached (**Attachment H**) is the data form for W14, the plots for which are shown on the Revised Wetland and Stream Survey map in the wet meadow area of W1.

10. Please submit a schedule for implementation of the proposed culvert replacement at Stream S8 in accordance with the Department's Wetlands and Waterbodies Rules, Chapter 310 § 6(H).

The proposed culvert replacement at Stream S8, assuming property owner approval, would be conducted during November to April work window or subsequent periods of low flow conditions. Culvert construction is planned for the same mobilization as the pipeline construction to reduce potential impacts to natural resources.

11. Please provide a separate, more detailed planting plan for the entire length of proposed restoration area at stream S9. The information provided appears to be more of a landscaping plan than a restoration plan.

The planting plan for the Stream S9 restoration areas has been revised and is attached (**Attachment E**). It includes a set of four sheets: Sheet 1 shows the deeded buffer, Sheet 2 shows the specifications for all aspects of restoration (restore in place impacts and riparian restoration areas) and, Sheet 3 shows cross sections for restore in place areas for the sewer force main and Rte.1 by-pass. Sheet 4 provides details for planting and seeding.

12. Please provide a copy of the missing planting plan for Area A1 to insert among the other area planting plans in Attachment 13 of the NRPA application.

Drawing LP101a (Area A1) was not included as an appendix to the Compensation Plan because LP101a only references "restoration area" polygons which refers to the Compensation Plans (**Attachment E**). For a clearer distinction between the restoration plantings and general landscaping, project landscaping plans (LP### plans) have been updated to remove call outs on restoration area plantings and include notes to refer to separate restoration area plans for details. Updated landscaping plans (LP101, LP101a, LP102, LP107, and LP501) have been included as **Attachment I**.

13. Please submit cross sectional plans that depict all grading changes that are necessary to implement the proposed restoration at stream S9.

Cross sections of existing conditions at the temporary crossings of S9 have been developed (**Attachment E**, Sheet 3). Cross sections are provided for the sewer crossing of S9 and the Route 1 by-pass crossing of S9. The existing condition cross sections will be used to restore these areas to original grade once the sewer line is installed and the by-pass is removed. Additional grading changes for restoration planting are not planned.

14. Please provide draft deed restriction language that would protect the proposed restoration and preservation areas at stream S9 in perpetuity.

Drafts of the deed restrictions for the two properties included in the Stream S9 restoration are included as **Attachment J**.

15. Please confirm whether the total amount of proposed freshwater wetland alteration includes the 2,000 square feet of alteration associated with NRPA Permit-by-Rule #67077.

Based on the proposed development layout, the 2,000 square feet of freshwater wetland alteration associated with NRPA Permit-by-Rule #67077 will be permanently impacted by the development and have been included in permanent impact numbers.

16. On Drawing CS101, there are two areas that are labeled as "shoreline stabilization." Similarly, there is one area labeled as "shoreline stabilization" on Drawing CS103. Please indicate whether these shoreline stabilization areas are existing or proposed, and, if proposed, submit the necessary NRPA application materials.

The two areas referenced on Drawings CS101 and CS103 as "shoreline stabilization" are for existing areas of stabilization not associated with the proposed project.

<u>Site Location of Development Act (Site Law) application</u>

1. Please confirm Nordic is seeking NRPA and Site Law approval for all phases and the full buildout of this parcel, and not just portions of the phasing. (Section 1.3, Construction Plan.)

Yes, Nordic is seeking NRPA and Site Law approval for all phases and the full buildout of this parcel, and not just portions of the phasing.

2. Please identify and submit representative application materials for any off-site anchor prefabrication/pipe assembly locations. Specifically, if off-site staging areas would be created with new disturbed areas and impervious areas, additional details are needed. Any other applicable Site Law criteria such as noise control, hours of construction, use of concrete batch plants, etc., at these off-site locations should also be submitted. (Section 1.3.1, Construction, page 9.)

In preparation and planning for the proposed development, the construction phasing has been laid out so that a storage and laydown space on site can be used. This location is clearly identified on the permit application drawings CE110-CE118. If site contractors require staging of materials or

fabrication offsite, it will be done at commercial facilities that are currently utilized and permitted for such uses.

For offsite marine activities, the contractor will be utilizing an existing marine facility already permitted and in operation for similar services (loading/unloading of barges, storage of materials). The final location for marine activities has not been selected yet, as competitive pricing closer to the time of construction will determine the final location.

3. Chapter 373 of the Site Law Rules requires an applicant to demonstrate financial capacity to design, construct, operate, and maintain a proposed development. The financial capacity information contained in the application focuses on design and construction of the development. Please provide financial capacity information for operation and maintenance of the facility. (Section 3.)

The original application material focused on the financial capacity of the project. The Board of Nordic Aquafarms AS expects continued equity contributions from the current investors as discussed in Appendix 3-A of the Site Law application. The project and start-up of operations and maintenance will be funded by the sources shown here. Finally, cash flow from operations will sustain the ongoing operation post construction and initial start-up.

Estimated Funding by Source	Equity	Debt	CF	Total
Total Project Combined	40%	50%	10%	100%
Initial Working Capital for Ops and Mtc	50%	50%	0%	100%
Ongoing Support for Ops and Mtc			100%	100%

4. In Table 2 of the Noise Impact Assessment, calculated numeric values should be submitted from the CadnaA computer sound model results for each of the protected locations, instead of a statement that the sound levels will be less than applicable noise standards. (Section 5 Noise.)

A revised Table 2 including the calculated numeric values has been included as **Attachment K**.

5. Please clarify that any construction activities occurring between 7:00 pm and 7:00 am would meet the noise control provisions of Site Law Rule Chapter 375(10)(C)(2). Additionally, please clarify whether any nighttime construction activities would occur on the water. If construction activities for pipe installation that would occur on the water would take place during nighttime hours, please provide noise assessment data for those activities. (Section 5 Noise.)

All construction on site will comply with the noise control provisions of Site Law Rule Chapter 375(10)(C)(2). In addition, no nighttime construction between 7:00 pm and 7:00 am is planned to take place on the water.

6. Please clarify whether the Visual Impact Assessment addresses just the NRPA Chapter 315 scenic standards, or both Chapter 315 and the applicable Site Law statutory and regulatory standards. (Section 6 Visual Quality and Scenic Character.)

The Visual Impact Assessment addresses the NRPA Chapter 315 scenic standards and the applicable Site Law statutory and regulatory standards.

7. Special measures for summer construction are provided in the sediment control section of the application. Similar measures for winter, spring and fall construction should be included, as well, specifying measures to be taken during conditions that would be anticipated to occur. (Section 14.7 Soil Erosion and Sediment Control Best Management Practices.)

The reference in the original text to summer construction is a recognition that summer conditions pose challenges that are not covered by basic soil erosion and sediment control measures that are typically deployed for control of stormwater runoff from exposed areas during more "standard" year-round rain events (i.e. more intense, short duration storms and dry conditions that produce detrimental dust conditions). It is acknowledged that winter construction also has specific challenges and a section has been added to the attached revised narrative to cover this (**Attachment L**). This section also covers fall preparations for winter conditions and preparations for the end of winter Spring thaw. The prevailing climate in Maine during the remainder of the year (late Spring and early Fall) are considered "average" and are generally typified by an absence of extreme or unusual weather conditions. Erosion control measures during these periods are covered by the original narrative.

8. Please describe how turbid runoff would be treated during construction. Silty loam soils on site could create turbid water conditions in the temporary sedimentation basins. Even with the 80,000-sf limit of disturbed soils, heavy rain or snow events could produce significant amounts of turbid runoff, with little additional treatment room available between the developed area, the 250-foot area retained by the City, and the Little River. Please provide additional information about: designing the temporary sedimentation basins for greater than a 10-year storm; describing how turbid flow discharging out of the temporary sedimentation basins via the risers/outlet pipes would be treated before discharge; and modeling the temporary sedimentation basins so they do not drain completely between rain events. Proposed measures to treat turbidity should be submitted, including during winter construction activities. (Section 14 Basic Standards.)



It is acknowledged that any exposure of native soil materials in the contributing construction area could potentially create turbid water conditions in the temporary sediment basins. These Best Management Practices (BMPs) have been designed in accordance with good engineering practice, and in accordance with the applicable regulations and standards to remove suspended sediments from construction runoff, and hence minimize the discharge of turbid water to downstream receiving waters. It should be noted that the aim of the design is to *reduce and minimize* turbidity in runoff from the site and not to completely eliminate it under all conditions. Sediment erosion and transport in drainageways is a natural morphological process that is essential to maintaining many features in the physical landscape. For example, turbid runoff was observed in the site drainageways during snowmelt conditions in March 2019 (see photograph above). This was not associated with precipitation or construction activity and is a natural

condition. The goal of the design is to prevent excessive amounts of sediment from leaving the site and causing significant detrimental impacts during construction.

Clear standards for the design of sediment basins and other similar impoundments is contained within the United States Environmental Protection Agency (U.S. EPA) National Pollutant Discharge Elimination System General Permit for Discharges from Construction Activities (as modified). The U.S. EPA authorized the State of Maine Department of Environmental Protection to administer NPDES program in most areas of the State and the State has produced its own version of this document (MPDES Construction General Permit). However, the State administered document provides no clear guidance on the design of sediment basins. The Maine Erosion and Sediment Control BMPs Manual for Designers and Engineers gives design guidance for the use of permanent stormwater basins as sediment basins only. Therefore, the governing national (U.S. EPA) document is referenced for design guidance. Section 2.2 of the U.S. EPA General Permit is entitled **Erosion and Sediment Control Requirements** and includes the following subsection:

> ***"2.2.12 If you install a sediment basin or similar impoundment:***
> *Situate the basin or impoundment outside of any water of the U.S. and any natural buffers established under Part 2.2.1;*
>
> a. Design the basin or impoundment to avoid collecting water from wetlands;
> b. Design the basin or impoundment to provide storage for either:
>
> i. The calculated volume of runoff from a 2-year, 24-hour storm (see Appendix H); or
> ii. 3,600 cubic feet per acre drained.
>
> c. Utilize outlet structures that withdraw water from the surface of the sediment basin or
> d. similar impoundment, unless infeasible;[25]
> e. Use erosion controls and velocity dissipation devices to prevent erosion at inlets and outlets; and
> f. Remove accumulated sediment to maintain at least one-half of the design capacity and conduct all other appropriate maintenance to ensure the basin or impoundment remains in effective operating condition." (bold text added).

The design requirement for sediment basins to meet the requirements of the U.S. EPA (NPDES) General Permit for Construction Activity, as stated above is that they should be sized to provide storage for the **2-year 24-hour storm event.** This is a design storm event with a statistical probability of 50% of occurring in any given year. The reason for the selection of the 2-year 24-hour design storm event, as explained by U.S. EPA staff to the designer was in tacit recognition that designing temporary sediment basins for larger storm events would not be practically feasible on the majority of construction sites, and thus would place an undue burden on applicants attempting to comply with the General Permit.

For this project, in recognition of the sensitivity of abutting natural resources and downstream receiving waters, the design of the basins has been undertaken to provide storage and filtrations of the **10-year 24-hour storm event** (10% probability of occurrence in any given year). This

effectively reduces the risk of exceedance of the design criteria by **five times**, when compared to the applicable design standard. It is not practically feasible to provide greater storage capacity than this and allow discharge from the basins via the treatment benches. In the event of rainfall greater than the 10-yr 24-hour storm event some runoff will inevitably discharge via the basin primary outlet risers. However, the basins have been designed in accordance with good engineering practice, maximizing the flow paths between inlets and outlets and discharging from the surface of the basin to minimize any turbidity in the outflow. Furthermore, the construction method includes numerous upstream soil erosion and sediment control measures that are specifically designed to reduce the potential for soil exposure and sediment transport. These include the provision of diversion BMPs, the addition of geotextile fabric and granular borrow over exposed subgrades, and the installation of edge drains). It is our opinion that the combination of these measures provides the best available and practically feasible treatment of construction runoff, in accordance with the applicable regulatory requirements and good engineering practice.

In theory it would be possible to add some type of filtration device to the primary outlet to further reduce any potential suspended sediments in runoff discharging via the riser pipes. However, this would also reduce the peak outflow through the primary outlet, leading to earlier discharge over the emergency overflow weir, and hence in our opinion would provide no significant overall benefit.

All of the basins have been modeled to accept and treat the design storm event with the basin starting elevation set at the bench drain outlet (i.e. the model considers the basins to be full to the bench drain prior to occurrence of any storm event). Please see the HydroCAD model and previously provided runoff and routing output results for details.

In the event that unusual winter conditions temporarily prevent outflow from the basins through the bench drains, temporary dirt bags will be deployed to assist with dewatering. However, it is unlikely that this condition will endure during conditions where unfrozen precipitation is falling or anticipated. Inspections and frequent maintenance of the bench drains will be required to maintain the function of the outlets.

9. With regard to Drawing CP105, please describe the purpose of the proposed gravel access driveway in the upper left portion of the drawing, near the west end of Building 1. Could it be removed or relocated outside of the wetland to reduce impacts?

The additional gravel access driveway can be removed. A revised drawing CP105 is included as **Attachment F**.

10. Please review and respond accordingly to the attached stormwater management technical review memorandum dated June 25, 2019.

The response to the June 25, 2019 technical review memorandum is provided as a separate memo that was submitted on August 12, 2019.

Please see the grading plans in **Attachment M** that include spot elevations for the plunge pools, which were inadvertently left off from the plan set provided with the technical memorandum responses.

11. Please submit the electronic files of the HydroCAD model for the following areas:

a. The temporary sediment basin sizing model in Appendix 14-A.
b. The pre-development conditions model in Appendix 12-D.
c. The post-development conditions model in Appendix 12-E.

The pre-and post-development conditions models and sediment basin sizing model, as revised by the comments above, are provided with the electronic submission of this letter and on a pen drive accompanying the hard copy of this letter.

Please contact me with any questions or comments.

Sincerely,

RANSOM CONSULTING, INC.

Elizabeth M. Ransom, P.G.
Digitally signed by Elizabeth M. Ransom, P.G.
Date: 2019.08.22 15:18:51 -04'00'
Senior Project Manager

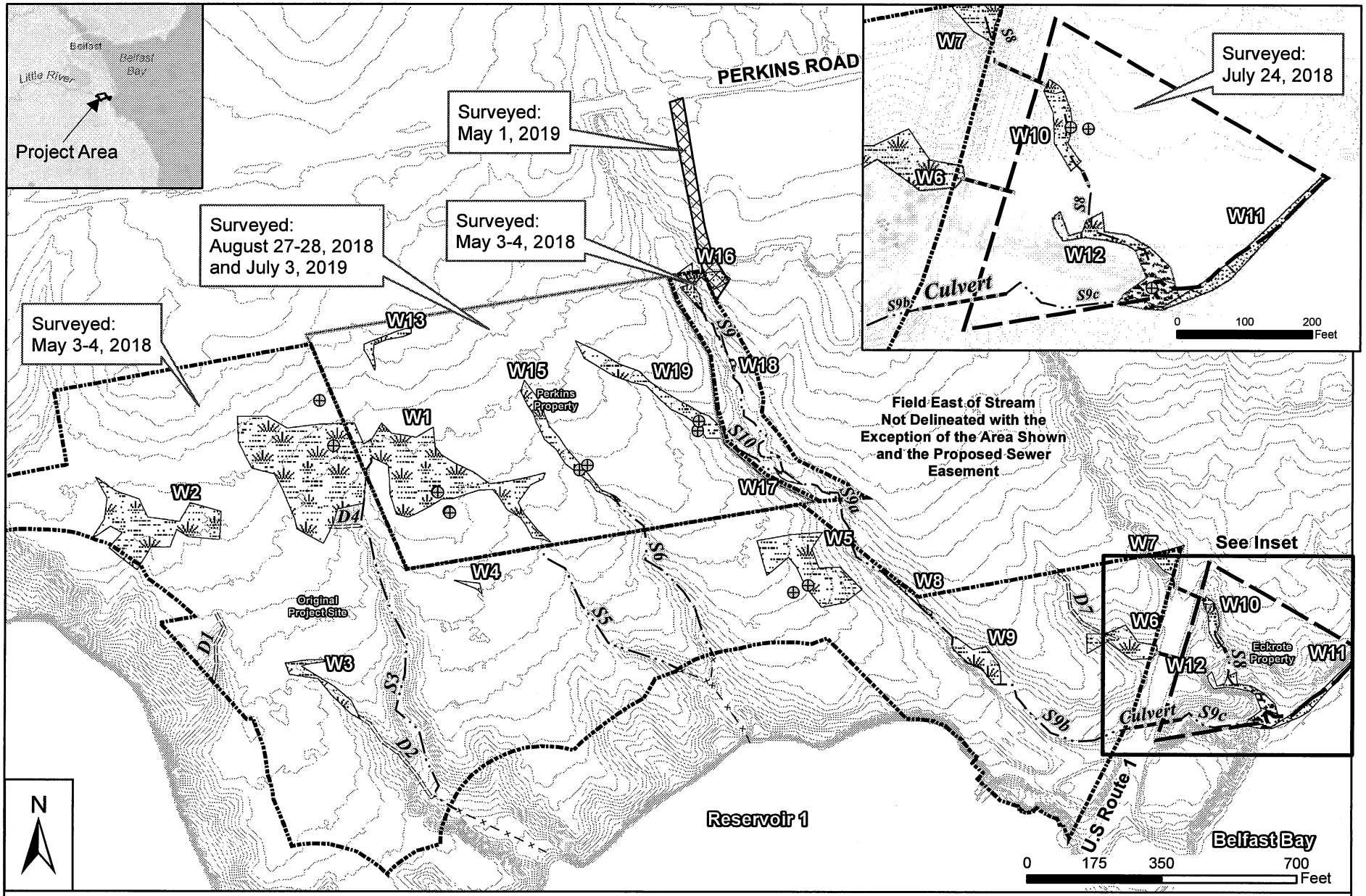
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ATTACHMENT A

Revised Wetland and Stream Survey Map

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

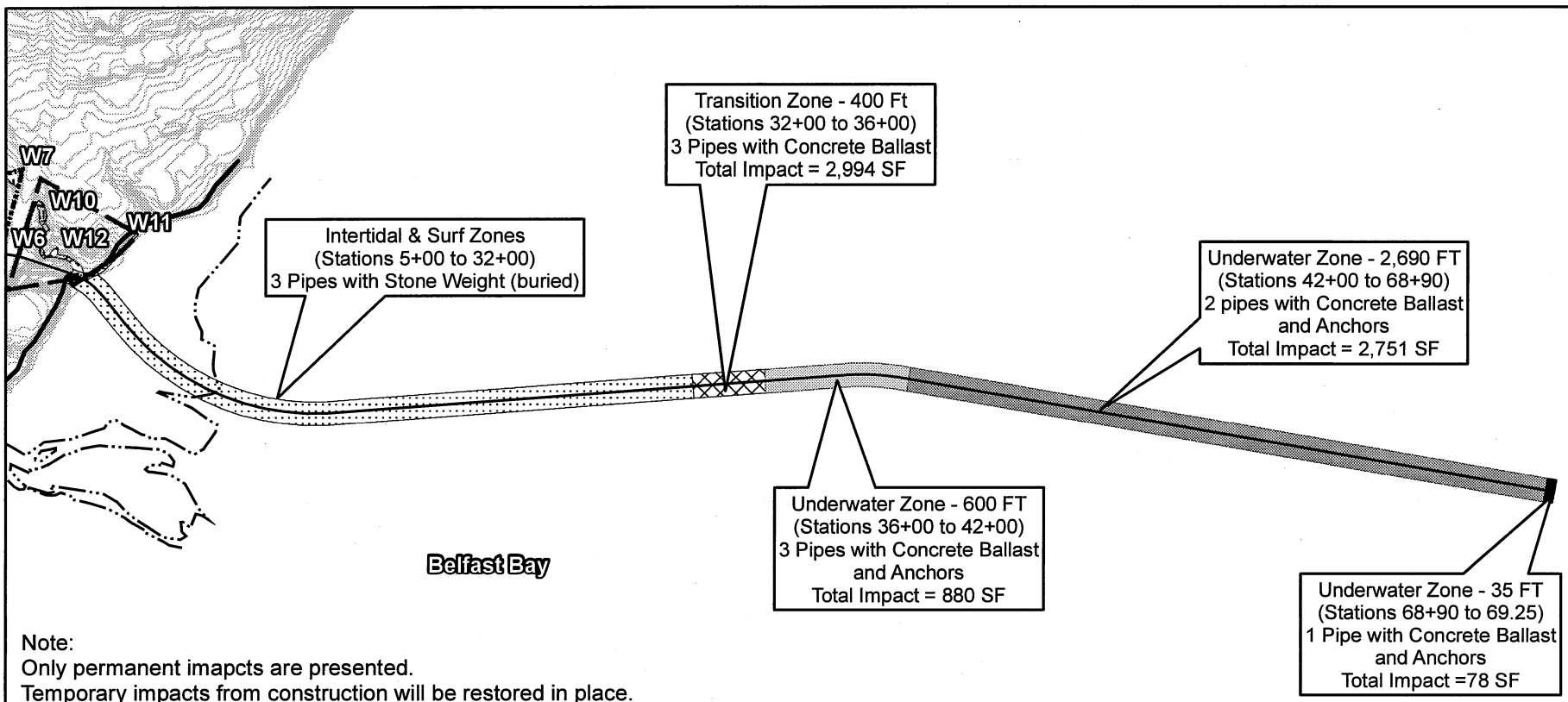
Ransom Consulting, Inc.
Project 171.05027.008


Project Area
Little River
Belfast Bay
PERKINS ROAD
Surveyed: May 1, 2019
Surveyed: August 27-28, 2018 and July 3, 2019
Surveyed: May 3-4, 2018
Surveyed: May 3-4, 2018
Surveyed: July 24, 2018
Field East of Stream Not Delineated with the Exception of the Area Shown and the Proposed Sewer Easement
Perkins Property
Eckrote Property
Original Project Site
See Inset
Culvert
Reservoir 1
U.S Route 1
Belfast Bay
0 100 200 Feet
0 175 350 700 Feet
N
Belfast Aquaculture Project
Revised Wetland and Stream Survey
Date: August 14, 2019
Wetland Survey Date
May 3-4, 2018
July 24. 2018
August 27-28, 2018 and July 3, 2019
May 1, 2019
Existing Culvert
Intermittent Stream
Drainage
Stream Not Field Delineated
Palustrine Wetlands
Salt Marsh
Cobble Beach
2 Foot Contours
Army Corps Data Plot
NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

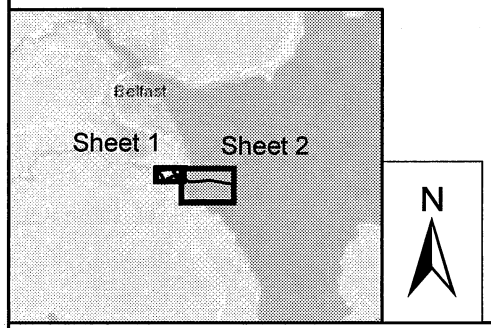
ATTACHMENT B

Revised Wetland and Stream Impact Map

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N



Note:
Only permanent imapcts are presented.
Temporary impacts from construction will be restored in place.



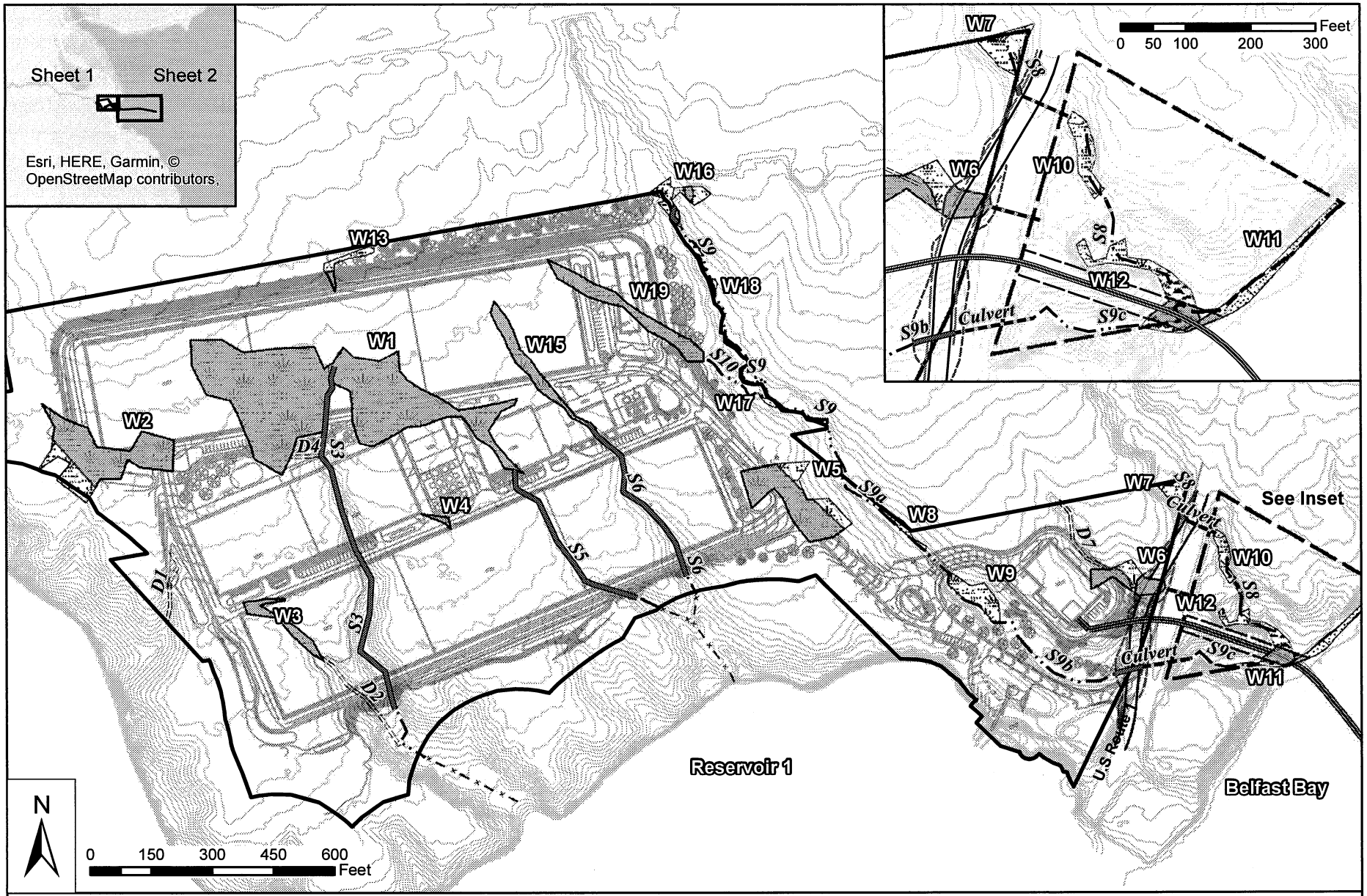
N

Belfast Aquaculture Project
Wetland and Stream Impact Mapping
August 16, 2019 Sheet 2 of 2

Mean High Water
Mean Low Water
Intertidal & Surf Zones
Transition Zone
Underwater Zone - 1 Pipe
Underwater Zone - 2 Pipes
Underwater Zone - 3 Pipes

0 175 350
Feet

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS



Belfast Aquaculture Project
Wetland and Stream Impact Mapping
August 16, 2019

Sheet 1 of 2

Palustrine Wetlands
Salt Marsh
Cobble Beach
Wetland Impact
Existing Culvert
Intermittent Stream
Drainage
Stream/Drainage Not Field Delineated
Stream Impact
Pipeline Route
Site Boundary
Proposed Development
Existing Contours (2 ft)
Eckrote Parcel
Limit of Work
40' Pipeline Easement
Temp US Bypass
Temporary Route 1 By-Pass
Culvert

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

ATTACHMENT C

Anchoring Requirements for Submerged Pipelines Memorandum

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Ransom Consulting, Inc.
Project 171.05027.008

COMMITMENT & INTEGRITY
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One Merchants Plaza | Suite 501
Bangor, Maine 04401
www.woodardcurran.com

T 800.564.2333
T 207.945.5105
F 207.945.5492

MEMORANDUM

WOODARD &CURRAN

TO: Craig Weaver

CC: Parker Hadlock

FROM: Jim Wilson, P.E.

DATE: August 13, 2019

RE: Anchoring Requirements for Submerged Pipelines (REV1)

As requested, we have worked with ATM to review anchoring requirements for the submerged pipelines to consider alternatives that have less environmental impact than the approach shown in the Issued for Permit Drawings. As previously explained, the details contained therein were chosen to keep construction cost, Project schedule, long-term maintenance and diver needs to a minimum.

From earlier Work, we knew that all alternatives required a precast anchor, if for no other purpose than to overcome the buoyancy of the pipe so we could submerge it in place. Even with relatively tight spacing of the concrete anchors, we would also need supplemental anchoring to resist shear forces and potential erosion that can be caused by weather, tides and current.

1.1 Concrete Anchors

To overcome buoyancy and anchor the pipes in place, ATM suggests the precast anchors should be equal to 200 pounds per lineal foot of pipe supported. ATM suggested a 15-foot spacing of the anchors. A benefit of this spacing is that it will allow the pipes to remain suspended above the seafloor having no permanent environmental impact.

We analyzed the load requirements at 15-foot spacings to determine a weight requirement of 3,000, 6,000 and 9,000 pounds for the one-, two- and three-pipe installations. Based on details on Drawing CS501 (attached), we were able to establish the area of the face of the anchor and calculate a minimum anchor thickness to achieve the load requirements. From there, we determined a standard 2-foot thickness for all anchors will meet the design criteria.

The dimensions of the base of each anchor can be established as:

- 3-Pipe Anchor: 11' X 2' = 22 SF
- 2-Pipe Anchor: 7'-6" X 2' = 15 SF
- 1-Pipe Anchor: 4'-6" X 2' = 9 SF

1.2 Supplemental Anchoring

As noted, the precast anchors are insufficient alone to ensure the pipes remain stable against currents, tides and weather. Three supplemental anchoring methods were considered to further anchor the pipelines:

- Rock Mattresses: A stone-filled basket, that can be lowered in place with a barge-mounted crane.
- Helical Anchors: Requires a mechanical drive to install and are often used in marine applications for mooring yards and other anchor points.
- Pile Anchors: Guide piles will be used by Cianbro during installation of the pipelines to keep the alignment in the approved location. They are intended to be temporary and spaced as needed to insure the preferred alignment.

Of the three options, the rock mattresses allow much of the Work to occur on the deck of the barge. Diver assistance is required to observe and confirm placement. Another positive of this approach is that no further maintenance of the rock mattresses would be expected after proper placement of the mattresses during construction.

Helical anchors can be driven from a barge; however, we have not been able to determine how barge-mounted equipment will perform aligning to the concrete anchors. It is believed that this will be a somewhat diver-intensive effort during the initial installation. Due to electrolysis, sacrificial anode bags would also be required at each location. How quickly those require replacement is a function of the seawater and will not be known until post-construction annual inspections begin. It can be expected that replacement will occur in the range of 1-5 years. Inspections may be performed by underwater camera, but anode pack replacement will require a diver.

As noted, guide piles are part of Cianbro's plan for the construction to insure proper alignment. We have also considered how the piles themselves could be left in-place and used successfully as supplemental anchors. They would need to be cut off and chained to the concrete anchors. This too is diver-intensive.

We believe that a combination of 1) concrete anchors and helical anchors or 2) concrete anchors with helical and guide pile anchors would achieve a stable pipeline installation with much less permanent seabed impact. Attached are updated details (Sheet CS501) for your review.

Spacing of the supplemental anchors is required at bends and at approximately 90- to 100-foot intervals or approximately every 6 concrete anchors. This translates to roughly 80 supplemental anchors and anode packs over the length of the exposed pipe. We have assumed that the helical anchors and guide piles would essentially result in negligible seabed permanent disturbance.

1.3 Impact

For the purposes of our Work, we have focused on the portion of the pipelines that permanently affects the seabed. The following 5 zones have been considered:

1. Sta. 32+00 to 33+00: Within this area, the tops of precast anchors will begin to be exposed to the seabed. The pipe will still be below the surface. Based on the 15-foot spacing, we anticipate the tops of seven 3-pipe anchors may be exposed.
2. Sta. 33+00 to 36+00 (Transition Zone): This is the distance it takes for the three pipes to emerge from the seabed according to our profile on Sheet CS101. We assumed impact is the anchor

footprint plus the diameter of the pipes. This is a bit conservative because the pipelines will not be buried to the mid-line for much of the distance, but it seems appropriate.

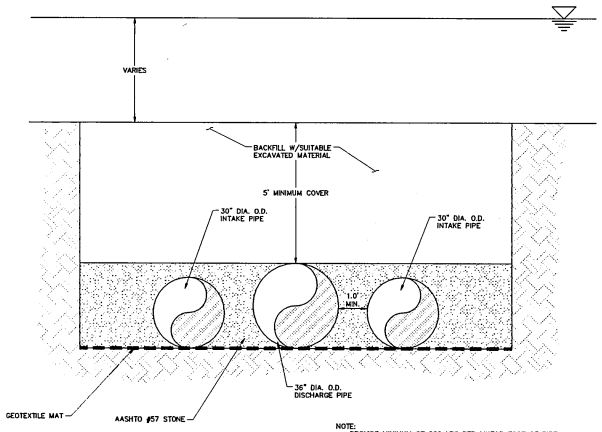
3. Sta. 36+00 to 42+00 (First Underwater Zone): This is the distance from the Transition Zone to the Outfall Structure. This is also a three-pipe alignment; however, the pipes will be fully supported above the seabed by the anchors spaced 15 feet apart. The concrete anchors will be on the seabed but the pipes themselves will not.
4. Sta. 42+00 to 68+90 (Continued Underwater Zone): This is the two-pipe intake alignment after passing the Outfall Diffuser location. The concrete anchors are a bit smaller and will continue to support the pipes above the seabed. Impact is the concrete anchors footprint plus the Intake Structure footprint.
5. Sta. 68+90 to 69+25 (Continued Underwater Zone): This is the short one-pipe trench between the two intake structures. The impact here is the concrete anchor footprint plus the other Intake Structure.

We prepared a spreadsheet to evaluate the seabed impact of this approach with concrete anchors at a 15-foot interval and supplemental helical or guide pile anchors spaced at roughly 90 feet. As noted above, we have ignored the negligible impact of the helical anchors and possible pile anchors. Instead, we have calculated the area of impact for each concrete base anchor, any pipe impacts and the impact of the intake structures.

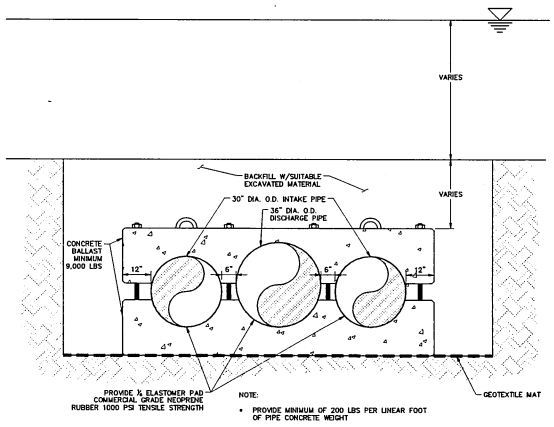
Updated details on attached Sheet CS501 reflect the dimensions and characteristics of the installation. Based on the size and spacing characteristics discussed above, we calculated the permanent impact to be 6,549 SF. See Table 1 below for how we arrived at that number.

Table 1: Anchoring Data

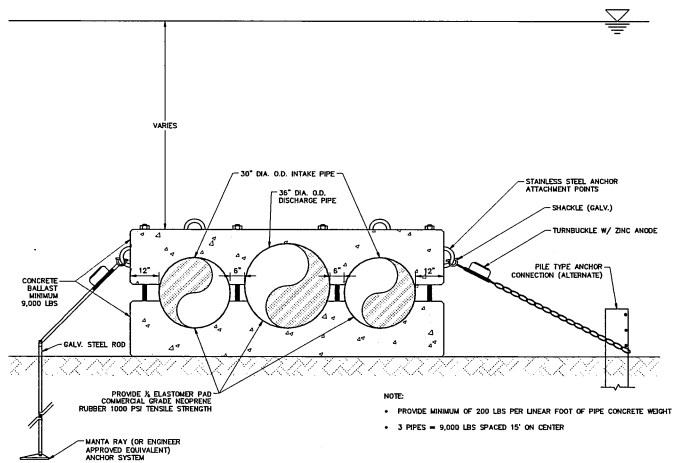
STA	STA	Length (FT)	Anchors Required (@ 15' OC)	Actual Anchors	Anchor Base (SF)	Anchor Impact (SF)	Pipe Impact (SF)	Intake Impact (SF)	Total Impact (SF)
32+00	33+00	100	6.67	7	22	154			154
33+00	36+00	300	20	20	22	440	2,400		2,840
36+00	42+00	600	40	40	22	880			880
42+00	68+90	2,690	179.33	180	15	2,700		51	2,751
68+90	69+25	35	2.33	3	9	27		51	78
								TOTAL	6,703



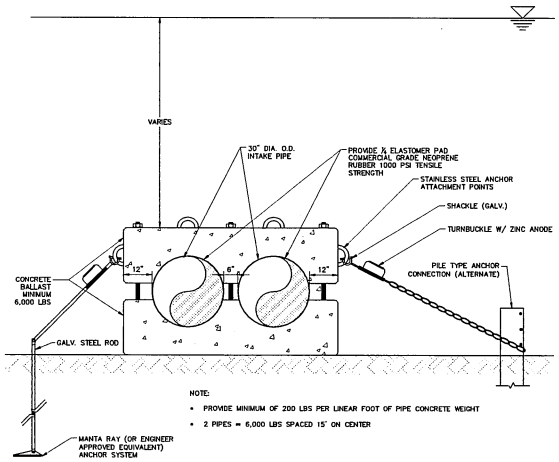
INTERTIDAL & SURF ZONES
(STATIONS 5+00 TO 32+00)
1 / CS503
NOT TO SCALE
CONCEPTUAL NOT FOR CONSTRUCTION



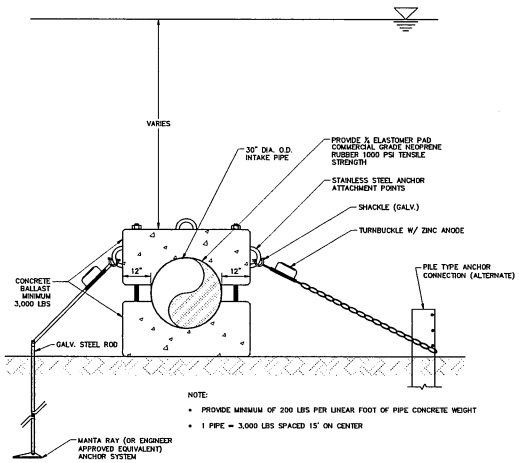
TRANSITION ZONE
(STATIONS 32+00 TO 36+00)
2 / CS503
NOT TO SCALE
CONCEPTUAL NOT FOR CONSTRUCTION



UNDERWATER ZONE
(STATIONS 36+00 TO 42+00)
3 / CS501
NOT TO SCALE
CONCEPTUAL NOT FOR CONSTRUCTION



UNDERWATER ZONE
(STATIONS 42+00 TO 68+90)
4 / CS501
NOT TO SCALE
CONCEPTUAL NOT FOR CONSTRUCTION



UNDERWATER ZONE
(STATIONS 68+90 TO 69+25)
4A / CS501
NOT TO SCALE
CONCEPTUAL NOT FOR CONSTRUCTION

ANSOM Consulting Engineers and Scientists
WOODARD & CURRAN
31 Hudson Drive
Portland, Maine 04102
207-828-4282 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

REV	DESCRIPTION	DATE

08-12-19
CURRENT ISSUE STATUS:

JAMES D. WILSON No. 8592 STATE OF MAINE REGISTERED PROFESSIONAL ENGINEER

TRUE NORTH:

SMRT Architects and Engineers
144 Fore Street, PO Box 618
Portland, Maine 04104
ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY
SMRT

NORDIC AQUAFARMS

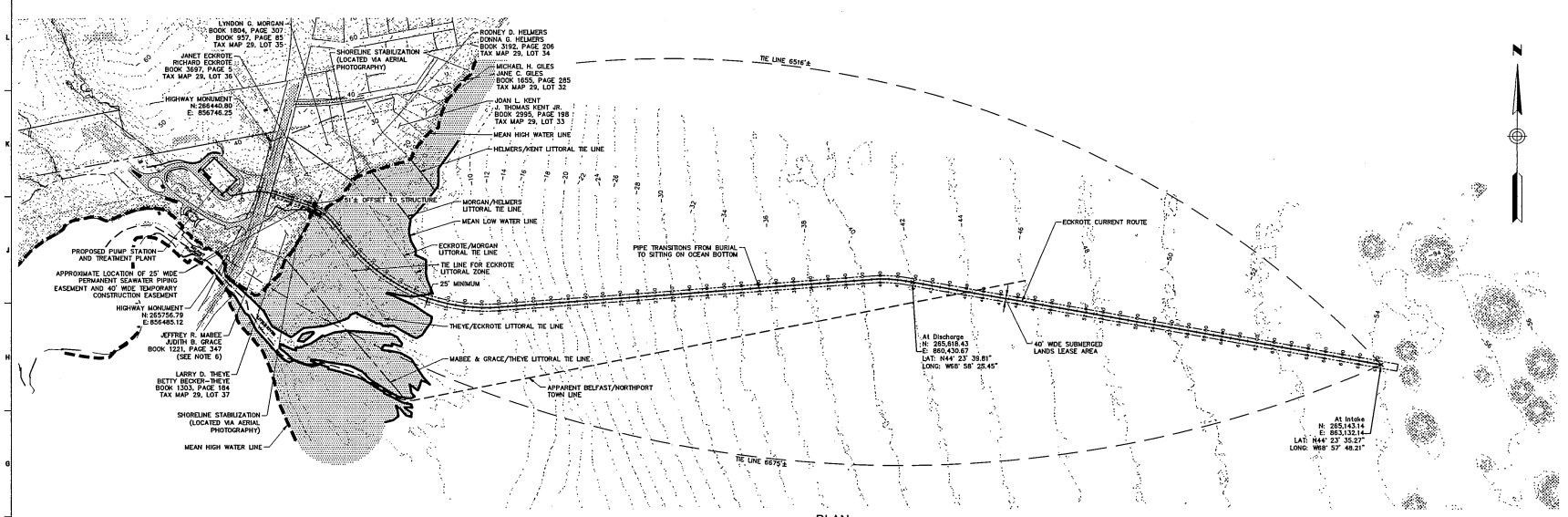
BELFAST, MAINE

CIVIL DETAILS - 1

PROJECT MANAGER:	PROJECT NO: 18078
JOB CAPTAIN:	CS501

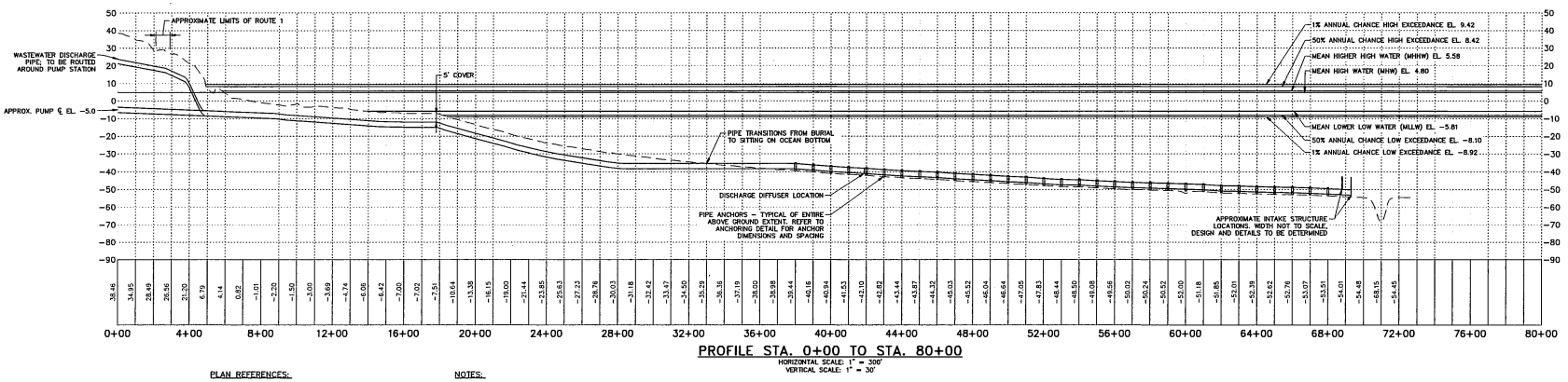
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PLAN

SCALE: 1" = 300'



PROFILE STA. 0+00 TO STA. 80+00

HORIZONTAL SCALE: 1" = 300'
VERTICAL SCALE: 1" = 30'

PLAN REFERENCES:

1. BOUNDARY & TOPOGRAPHIC SURVEY DATED 4-2-2018 BY GOOD DEEDS INC., 109 MAIN STREET, BELFAST, ME 04915, (207) 338-5743
2. 2 FOOT LIDAR CONTOURS OBTAINED FROM THE MAINE OFFICE OF GIS. https://www.maine.gov/megis/
3. BATHYMETRY DATA PROVIDED BY NORMANDEAU ASSOCIATES, ENVIRONMENTAL CONSULTANTS IN OCTOBER 2018.
4. LITTORAL ZONE & TOWN LINE IS BASED ON A PLAN BY GARTLEY & DORSKY ENGINEERING SURVEYING, 59 UNION STREET, UNIT 1, P.O. BOX 1031 CAMDEN, ME 04843-1031, DATED NOVEMBER 14, 2018 AND REVISED FEBRUARY 22, 2019.
5. VERTICAL DATUM IS REFERENCED TO NAVD88 (FEET).

NOTES:

- PROPOSED FEATURES ARE APPROXIMATE IN LOCATION AND SCALE.
- PIPE ALIGNMENT IS SETBACK GREATER THAN 25 FEET FROM TIE LINES.
- ANCHORING LOCATIONS ARE SCHEMATIC ONLY. REFER TO ANCHORING DETAILS FOR ANCHOR DIMENSIONS AND SPACING.
- SINGLE PIPE ROUTE SHOWN FOR CLARITY; SYSTEM CONSISTS OF TWO NOMINAL 30" INTAKE PIPES AND ONE NOMINAL 36" DISCHARGE PIPE.

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NORDIC AQUAFARMS

BELFAST, MAINE

INTAKE/DISCHARGE PIPING PLAN & PROFILE

300' 0 300' 600'

BAR SCALE
1" = 300'
CHECK GRAPHIC SCALE BEFORE USING

PROJECT MANAGER:

PROJECT NO: 18076

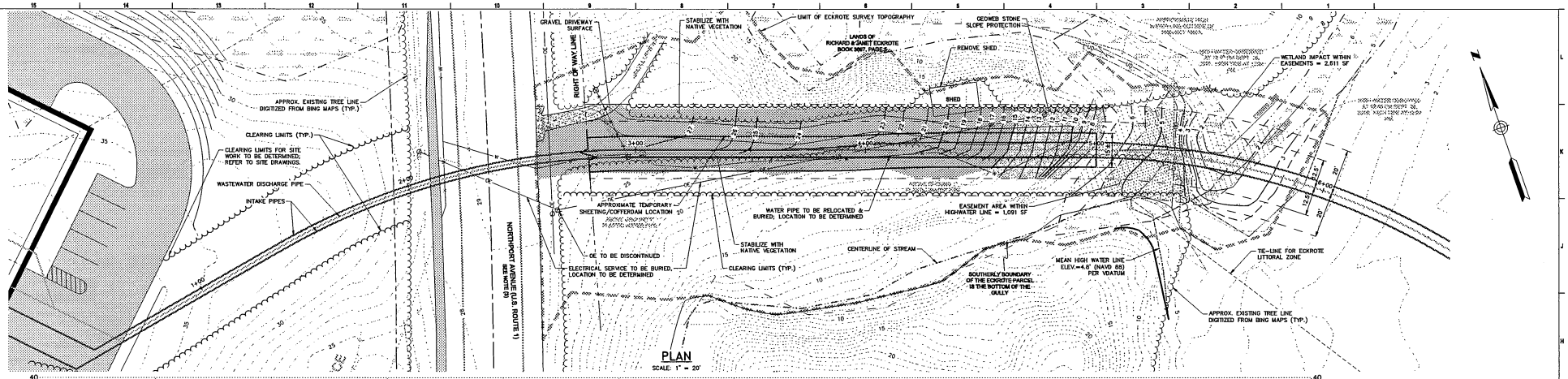
JOB CAPTAIN:

CS101

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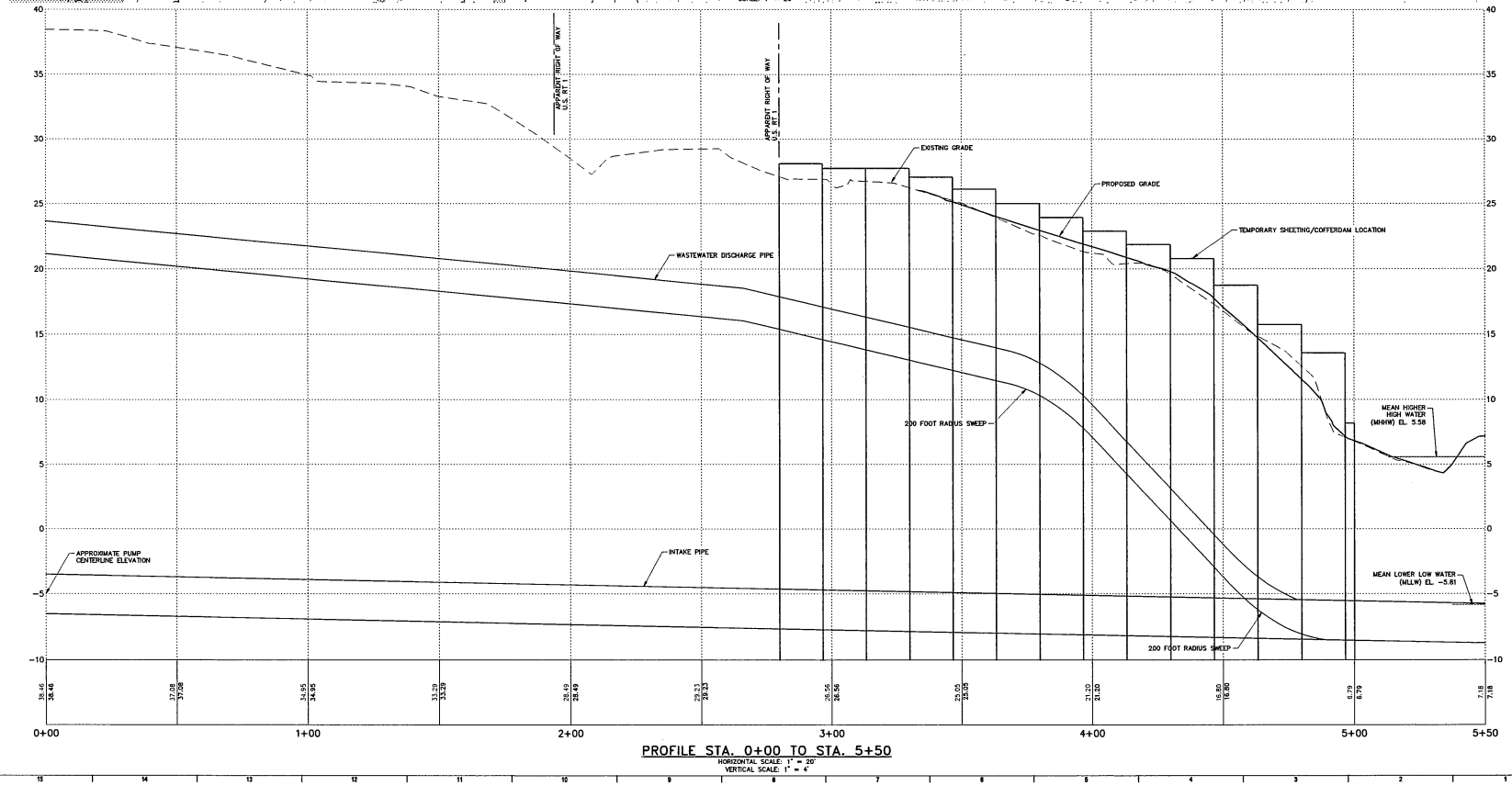
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PLAN

SCALE: 1" = 20'



PROFILE STA. 0+00 TO STA. 5+50

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 4'

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BELFAST, MAINE

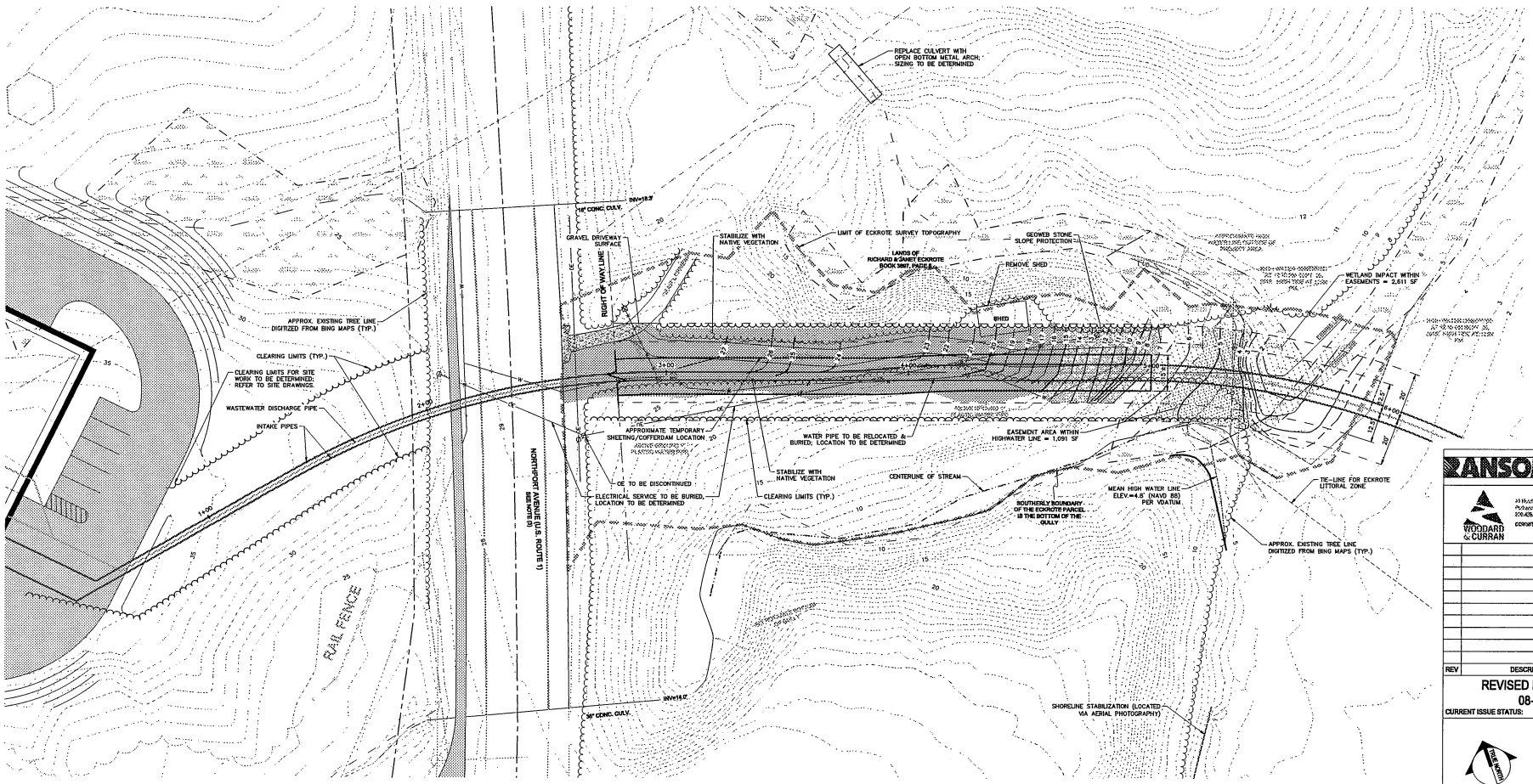
ECKROTE EASEMENT PLAN & PROFILE

BAR SCALE
1" = 20'
CHECK GRAPHIC SCALE BEFORE USING

PROJECT MANAGER:
PROJECT NO: 18078
JOB CAPTAIN:
CS102

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PLAN
SCALE: 1" = 20'

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NORDIC AQUAFARMS

BELFAST, MAINE

CULVERT REPLACEMENT PLAN

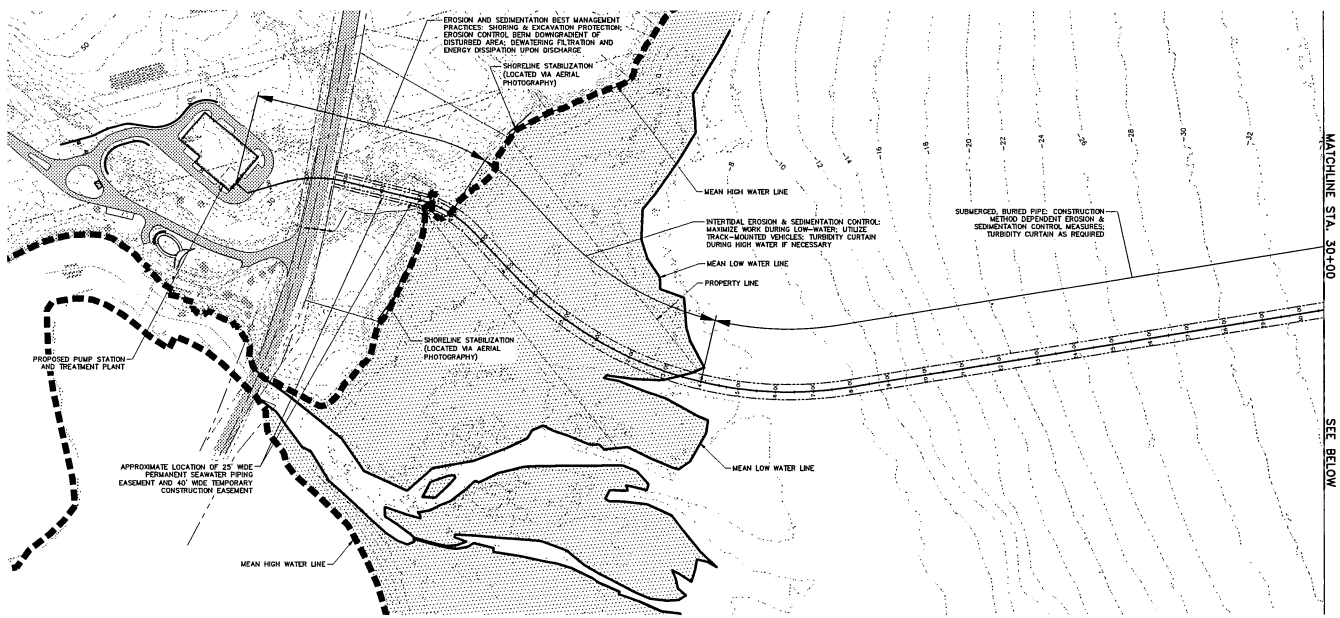
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BAR SCALE
1" = 20'
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JOB CAPTAIN:	CS103

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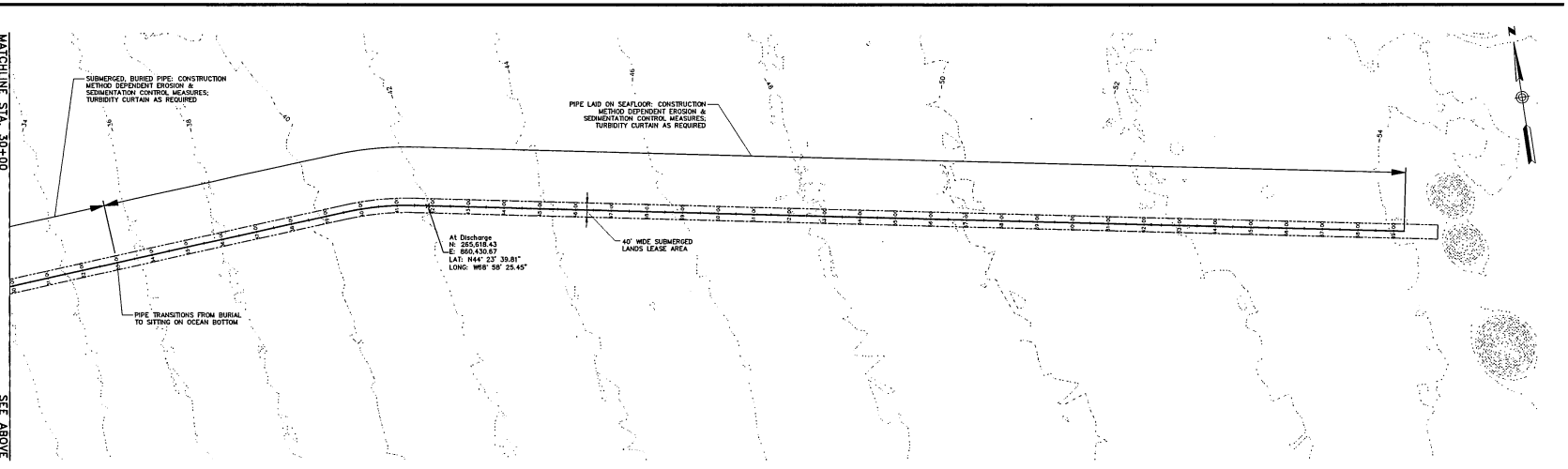
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24x36



PLAN

SCALE: 1" = 150'



PLAN

SCALE: 1" = 150'

PLAN REFERENCES:

1. BOUNDARY & TOPOGRAPHIC SURVEY DATED 4-2-2018 BY GOOD DEEDS INC., 109 MAIN STREET, BELFAST, ME 04915, (207) 338-5743
2. 2 FOOT LIDAR CONTOURS OBTAINED FROM THE MAINE OFFICE OF GIS. https://www.maine.gov/megis/
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BELFAST, MAINE

EROSION CONTROL PLAN

300' 0 300' 600'

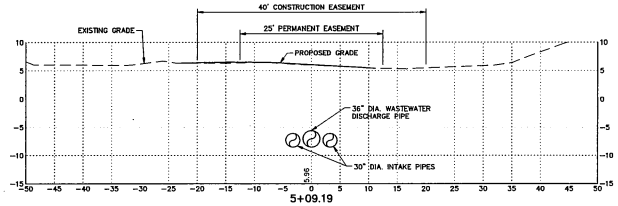
BAR SCALE
1" = 300'
CHECK GRAPHIC SCALE BEFORE USING

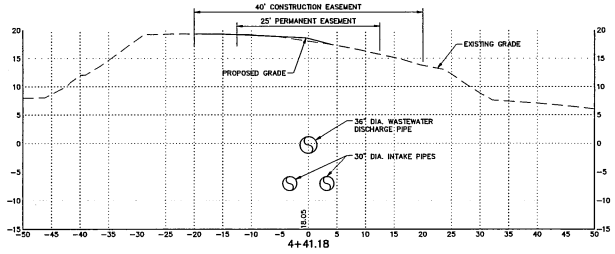
PROJECT MANAGER:	PROJECT NO: 18078
JOB CAPTAIN:	CS104

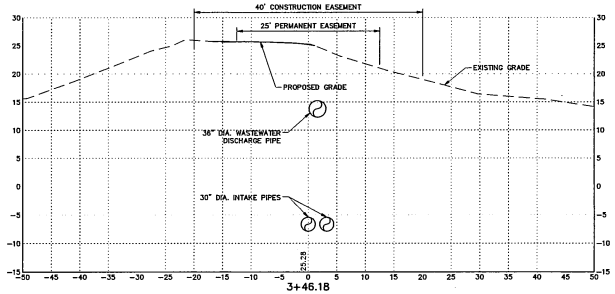
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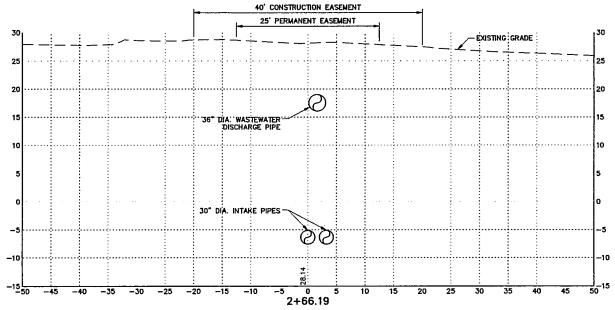
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NORDIC AQUAFARMS

BELFAST, MAINE

CROSS SECTIONS

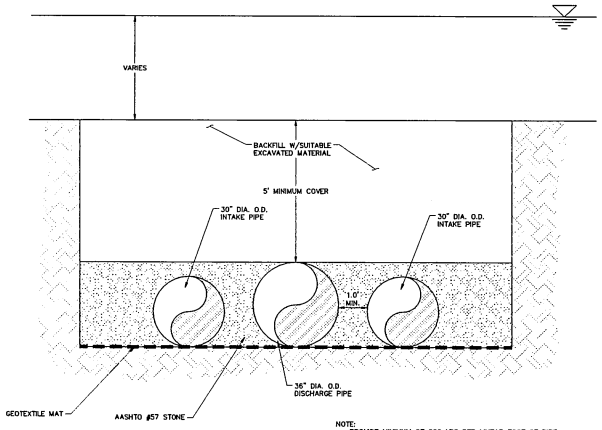
10' 0 10' 20'
BAR SCALE
1" = 10'
CHECK GRAPHIC SCALE BEFORE USING

PROJECT MANAGER:
PROJECT NO: 18078
JOB CAPTAIN:

CS301

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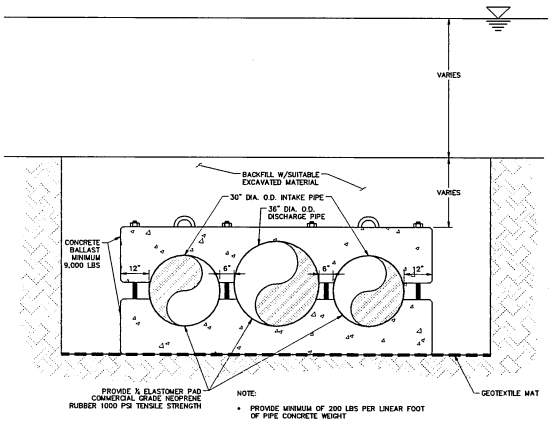


NOTE:
- PROVIDE MINIMUM OF 200 LBS PER LINEAR FOOT OF PIPE STONE WEIGHT IN MARINE MATTRESS (3 PIPES = 600 LBS/LF)
- PENDING PIPELINE INSTALLATION METHODS CONCRETE COLLARS AT 200 LBS PER LINEAR FOOT PER PIPE MAY BE REQUIRED IN TRENCHED AREAS. TYPICAL SPACING 10 FEET TO 20 FEET.

INTERTIDAL & SURF ZONES (STATIONS 5+00 TO 32+00)

1 / CS501

NOT TO SCALE
CONCEPTUAL NOT FOR CONSTRUCTION

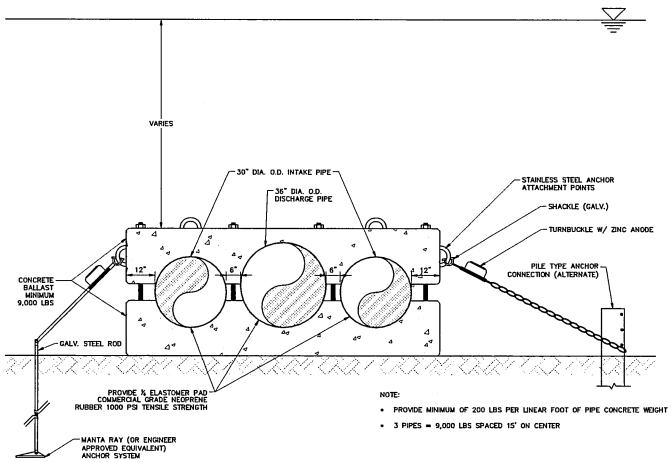


NOTE:
- PROVIDE MINIMUM OF 200 LBS PER LINEAR FOOT OF PIPE CONCRETE WEIGHT
- 3 PIPES = 9,000 LBS SPACED 15' ON CENTER

TRANSITION ZONE (STATIONS 32+00 TO 36+00)

2 / CS501

NOT TO SCALE
CONCEPTUAL NOT FOR CONSTRUCTION

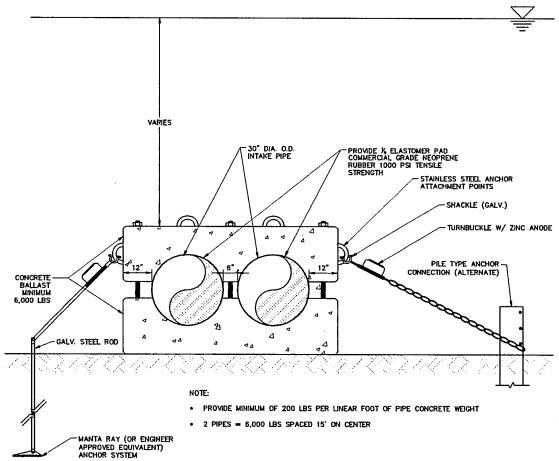


NOTE:
- PROVIDE MINIMUM OF 200 LBS PER LINEAR FOOT OF PIPE CONCRETE WEIGHT
- 3 PIPES = 9,000 LBS SPACED 15' ON CENTER

UNDERWATER ZONE (STATIONS 36+00 TO 42+00)

3 / CS501

NOT TO SCALE
CONCEPTUAL NOT FOR CONSTRUCTION

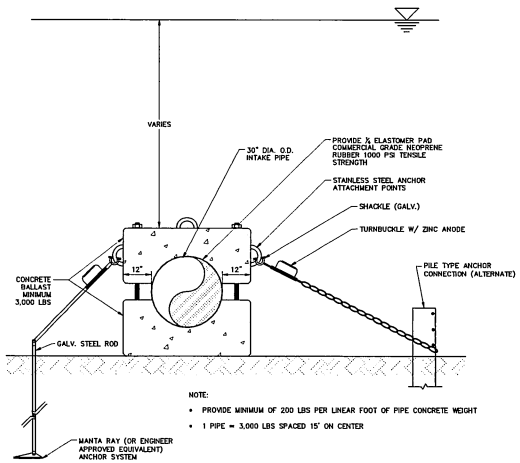


NOTE:
- PROVIDE MINIMUM OF 200 LBS PER LINEAR FOOT OF PIPE CONCRETE WEIGHT
- 2 PIPES = 6,000 LBS SPACED 15' ON CENTER

UNDERWATER ZONE (STATIONS 42+00 TO 68+90)

4 / CS501

NOT TO SCALE
CONCEPTUAL NOT FOR CONSTRUCTION



NOTE:
- PROVIDE MINIMUM OF 200 LBS PER LINEAR FOOT OF PIPE CONCRETE WEIGHT
- 1 PIPE = 3,000 LBS SPACED 15' ON CENTER

UNDERWATER ZONE (STATIONS 68+90 TO 69+25)

4A / CS501

NOT TO SCALE
CONCEPTUAL NOT FOR CONSTRUCTION

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BELFAST, MAINE

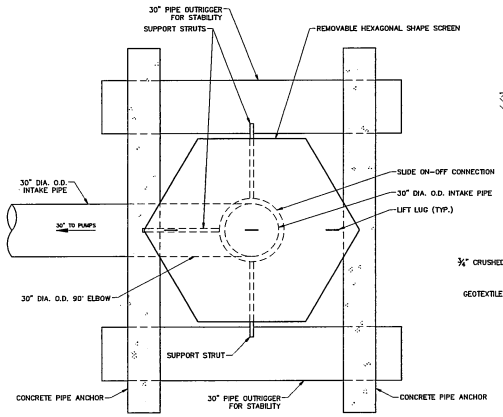
CIVIL DETAILS - 1

PROJECT MANAGER:	PROJECT NO: 18078
JOB CAPTAIN:	CS501

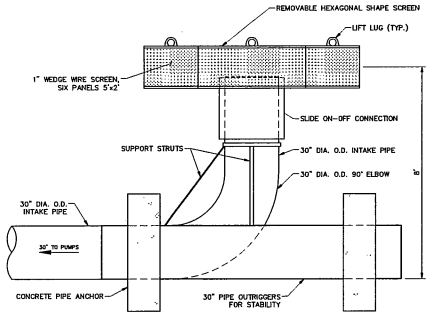
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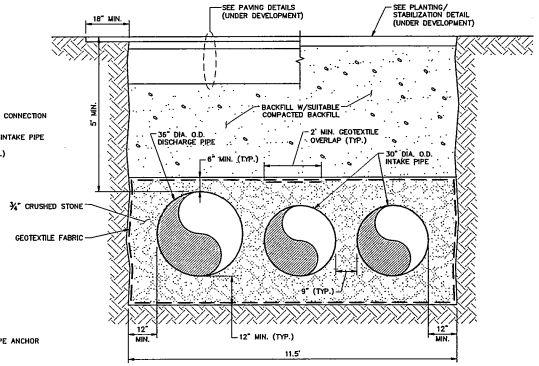


PLAN

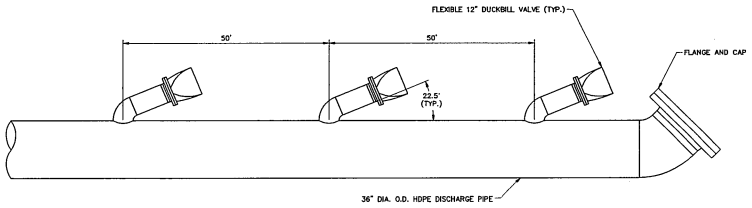


SECTION

6 CS502 **INTAKE STRUCTURE DETAIL**
SCALE: NOT TO SCALE



5 CS502 **BURIED 3-PIPE TRENCH DETAIL (LAND)**
SCALE: 1" = 2'



7 CS502 **DISCHARGE DIFFUSER DETAIL**
SCALE: NOT TO SCALE

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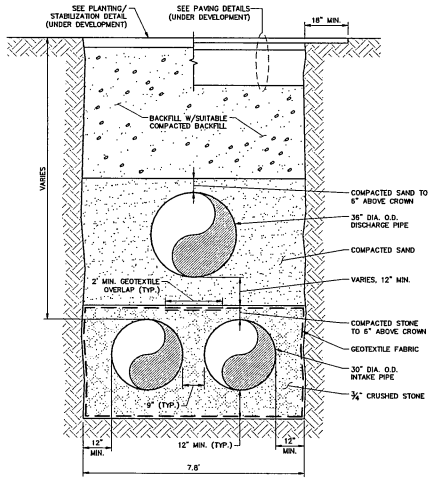
CIVIL DETAILS -2

PROJECT MANAGER:
PROJECT NO: 18078
JOB CAPTAIN:
CS502

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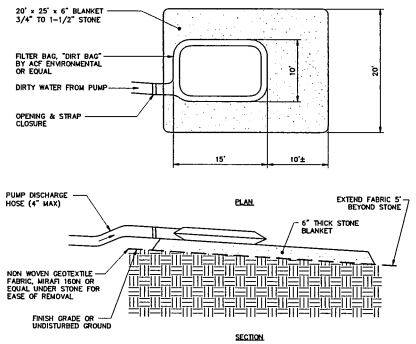
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8 CS503 **BURIED 3-PIPE TRENCH DETAIL (LAND)**

SCALE: 1" = 2'

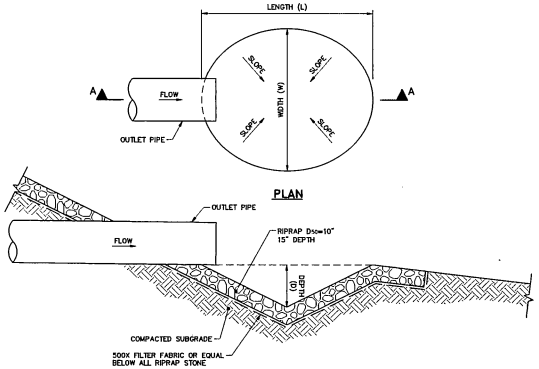


DEWATERING NOTES

1. LOCATE DISCHARGE SITE ON FLAT UPLAND AREAS AS FAR AWAY AS POSSIBLE FROM STREAMS, WETLANDS, OTHER RESOURCES AND POINTS OF CONCENTRATED FLOW.
2. DISCHARGE NOT PERMITTED WITHIN 200' OF A STREAM OR 100' OF A WETLAND.
3. DOWNGRADIENT RECEIVING AREA MUST BE WELL VEGETATED OR OTHERWISE STABLE FROM EROSION, I.E. FOREST FLOOR OR COARSE GRAVEL/STONE.
4. NEVER DISCHARGE TO AREAS THAT ARE BARE OR NEWLY VEGETATED.
5. DIRT BAG MATERIAL BASED ON PARTICLE SIZE IN DIRTY WATER, I.E., FOR COARSE PARTICLES A WOVEN MATERIAL; FOR SILTS/CLAYS A NON-WOVEN MATERIAL.
6. DO NOT OVER PRESSURIZE DIRT BAG OR USE BEYOND CAPACITY.
7. CHANNELS DUG FOR DISCHARGING WATER FROM THE EXCAVATED AREA NEED TO BE STABLE. IF FLOW VELOCITIES CAUSE EROSION WITHIN THE CHANNEL THEN A DITCH LINING SHOULD BE USED.
8. BUCKETED WATER SHOULD BE DISCHARGED IN A STABLE MANNER TO THE SEDIMENT REMOVAL AREA. A SPLASH PAD OF RIPRAP UNDERLAIN WITH GEOTEXTILE MAY BE NECESSARY TO PREVENT SCOURING OF SOIL.
9. DEWATERING IN PERIODS OF INTENSE, HEAVY RAIN, WHEN THE INFILTRATIVE CAPACITY OF THE SOIL IS EXCEEDED, SHOULD BE AVOIDED.
10. INSTALL DIVERSION DITCHES OR BERMS TO MINIMIZE THE AMOUNT OF CLEAN STORMWATER RUNOFF ALLOWED INTO THE EXCAVATED AREA.
11. DURING THE ACTIVE DEWATERING PROCESS, INSPECTION OF THE DEWATERING FACILITY SHOULD BE REVIEWED FREQUENTLY. SPECIAL ATTENTION SHOULD BE PAID TO THE BUFFER AREA FOR ANY SIGN OF EROSION AND CONCENTRATION OF FLOW THAT MAY COMPROMISE THE BUFFER AREA. OBSERVE WHERE POSSIBLE THE VISUAL QUALITY OF THE EFFLUENT AND DETERMINE IF ADDITIONAL TREATMENT CAN BE PROVIDED.
12. EROSION CONTROL REQUIRED AROUND DEWATERING DISCHARGE SEDIMENT CONTROL DEVICE.

9 CS503 **DEWATERING DISCHARGE DEDIMENT CONTROL DEVICE**

SCALE: NOT TO SCALE

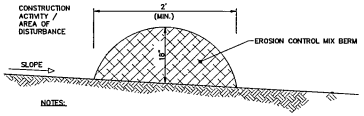


SECTION A-A

PLUNGE POOL DIMENSIONS								
	REQUIRED				PROVIDED			
PIPE SIZE	(L)	(W)	(D)	SLOPE	(L)	(W)	(D)	SLOPE
36"	12'	6'	3'	2:1	28'	22'	3'	3:1
30"	10'	5'	2.5'	2:1	24'	18'	2.5'	3:1

10 CS503 **RIPRAP PLUNGE POOL**

SCALE: NOT TO SCALE



NOTES:

Erosion Control Mix Berms

Erosion control mix can be manufactured on or off the project site. It must consist primarily of organic material and may include: shredded bark, stump grindings, composted bark, or acceptable manufactured products. Wood and bark chips, ground construction debris or reprocessed wood products will not be acceptable as the organic component of the mix.

Composition

Erosion control mix shall contain a well-graded mixture of particle sizes and may contain rocks less than 4" in diameter. Erosion control mix must be free of refuse, physical contaminants, and material toxic to plant growth. The mix composition shall meet the following standards:

- The organic matter content shall be between 80 and 100%, dry weight basis.
- Particle size by weight shall be 100 % passing a 6" screen and a minimum of 70% maximum of 85%, passing a 0.75" screen.
- The organic portion needs to be fibrous and elongated.
- Large portions of silts, clays or fine sands are not acceptable in the mix.
- Soluble salts content shall be < 4.0 mmhos/cm.
- The pH should fall between 5.0 and 8.0.

11 CS503 **SEDIMENT BARRIER - EROSION CONTROL MIX BERM**

SCALE: NOT TO SCALE

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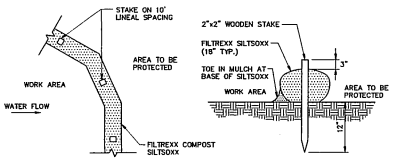
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BELFAST, MAINE

CIVIL DETAILS - 3

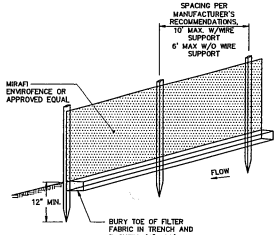
PROJECT MANAGER:	PROJECT NO: 18078
JOB CAPTAIN:	CS503

NOT FOR CONSTRUCTION



12 CS504 SILTSATION BARRIER – SILTSOXX

SCALE: NOT TO SCALE



NOTES:

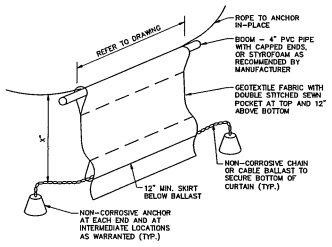
- INSTALL FABRIC ON UPHILL SIDE OF SUPPORT POSTS
- INSTALL SILT FENCE ACROSS SLOPES
- SILT FENCE SHALL NOT BE USED IN DRAINAGE WAYS

MAINTENANCE: INSPECT FOR TEARS IN THE FABRIC OR DAMAGE TO SUPPORTS. REPAIR AS NECESSARY. REMOVE ACCUMULATED SEDIMENT WHEN IT REACHES A DEPTH OF SIX-INCHES OR LESS.

REMOVAL: WHEN UPSLOPE AREAS ARE STABILIZED, THE STRUCTURE AND ANY ACCUMULATED SEDIMENT WILL BE REMOVED.

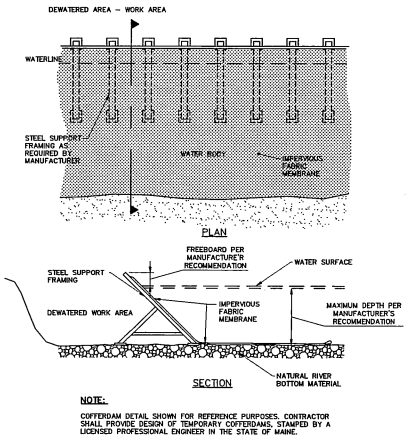
13 CS504 SILTSATION BARRIER – SILTATION FENCE DETAIL

SCALE: NOT TO SCALE



14 CS504 TURBIDITY CURTAIN

SCALE: NOT TO SCALE



NOTE:

COFFERDAM DETAIL SHOWN FOR REFERENCE PURPOSES. CONTRACTOR SHALL PROVIDE DESIGN OF TEMPORARY COFFERDAMS, STAMPED BY A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF MAINE.

15 CS504 TEMPORARY FRAME & FABRIC COFFERDAM DETAIL

SCALE: NOT TO SCALE

TO BE INSTALLED AROUND WORK AREA IN ACCORDANCE WITH CONTRACTOR'S WORK PLAN

EROSION AND SEDIMENT CONTROL NOTES

Temporary Erosion Control

Contractor shall prepare and submit a soil erosion and water pollution control plan to engineer in accordance with section 656.

Measure	Dates For Use	Timing, Activity, and Location
Sedimentation Barrier	ALL	Before soil disturbance, install downhill of areas to be disturbed and around material stockpiles.
Up-slope Diversion	ALL	Before soil disturbance, install uphill of areas to be disturbed and material stockpiles.
Catch Basin Protection	ALL	Before soil or pavement disturbance, install ACF Environmental, Inc. High Flow Siltsack, Siltsaver Inlet Filter, or equal, installed per manufacturer's requirements.
Dust Control	ALL	During dry weather, apply water and calcium chloride to control dust.
Temporary Seeding	April 15 to Oct. 1	Soil stockpiles that are not covered and disturbed areas that will not be disturbed again within 14 days. If grass growth provides less than 95% soil coverage by Nov. 1, apply mulch and anchor with erosion control blanket.
Mulch	April 15 to Sept. 15	On all areas of exposed soil apply 100–150 lbs (2.5 bales) per 1,000 sq ft. by mechanical blower.
Winter Mulch	Sept. 16 to Oct. 31	On all areas of exposed soil apply 150 to 170 lbs. mulch (4 bales) per 1,000 sq. ft. by mechanical blower. Erosion control blanket may be used as a substitute for winter mulch.
	Nov. 1 to April 14	On all areas of exposed soil, apply 150 to 170 lbs. mulch (4 bales) per 1,000 sq. ft. and anchor with netting at the end of each working day. Erosion control blanket may be used as a substitute for winter mulch.
Inspections	Until site is permanently stabilized	Inspect the erosion and sedimentation control measures daily, and maintain and repair as necessary.

Permanent Erosion Control:

Measure	Dates For Use	Timing, Activity, and Location
Pavement – Base Course – Final Course	When no frost is in ground	Install only in areas shown on the plan, shortly after pavement base is brought to final grade. Install near completion of project.
Permanent Seeding	April 15 to Sept. 15	On final grade areas, within 7 days of grade preparation, prepare topsoil, followed by seed and mulch application.
Dormant Seeding	Sept. 16 to April 15	On final grade areas, with prepared topsoil. Apply seed at double the specified rate on bare soil, and follow with an application of winter mulch.
Ground Cover, Trees, Shrubs	April 15 to Nov. 1	Install with final landscaping.
Permanent Mulch	ALL	Install with final landscaping.

Inspections:

Regular inspections of all erosion and sedimentation controls shall be made at least weekly and prior to and following storm events. Minimum inspections shall be made as listed in the table below.

Inspected Item	Look For
Mulched Surfaces	Thin mulch or inadequate application. Wind movement.
Seeded Surfaces	Poor seed germination. Loss of mulch. Development of rivulets.
Sediment Barrier	Sediment build-up to one half the height of the barrier. Undermining of the barrier. Supporting stakes loose, toppled, or unmarked. Breaks in barrier.
Perimeter Diversion	Discharge is to stabilized area. Erosion or breaks in barrier. Supporting stakes loose, toppled or unmarked.
Catch Basin Protection	Sediment build-up and structure blockages. Slow flow/Ponding water. Breaks in fabric or voids in barrier.
Dewatering Filter	Breaks in fabric or supporting structure. Slow flow, indicating high sediment build-up.
Construction Entrance	Sedimentation of roadways. Off-site dust complaints.

EROSION AND SEDIMENTATION CONTROL NOTES

TEMPORARY EROSION CONTROL MEASURES MAY INCLUDE THE USE OF STABILIZED CONSTRUCTION ENTRANCES, HYDRAULIC MULCH, HAY AND STRAW MULCH, EROSION CONTROL BLANKET, TURF REINFORCED MATTING, RIPRAP AND TEMPORARY SEEDING. TEMPORARY SEDIMENT CONTROL MEASURES INCLUDE THE USE OF SILT FENCE, EROSION CONTROL MIX BERMS, PLUNGE POOLS, CHECK DAMS, SEDIMENT TRAPS, CATCHBASIN SEDIMENT COLLECTION BAGS AND GEOTEXTILE FILTER BAGS. PERMANENT MEASURES INCLUDE THE USE OF RIPRAP AT EXPOSED STORMDRAIN AND CULVERT INLETS AND OUTLETS, ARMORED SWALES AND SLOPES AND PERMANENT VEGETATION.

GENERAL

A. THE PROJECT SHALL CONFORM WITH THE STANDARDS OF THE NRPA PERMIT AND ACOE GENERAL PERMIT.

B. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE CONSTRUCTED AND MAINTAINED IN ACCORDANCE WITH THE MAINE EROSION AND SEDIMENT CONTROL BMPS HANDBOOK PUBLISHED BY THE MAINE DEP UNLESS OTHERWISE NOTED IN THESE PLANS. HTTP://MAINE.GOV/DEP/BLWQ/DOCSTAND/ESCBMPS/

C. ANY ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES DEEMED NECESSARY BY THE OWNER'S REPRESENTATIVE, DEPARTMENT OF ENVIRONMENTAL PROTECTION, AND/OR MUNICIPAL OFFICIALS SHALL BE INSTALLED BY THE CONTRACTOR.

D. THE CONTRACTOR IS RESPONSIBLE FOR ALL FINES RESULTING FROM EROSION OR SEDIMENTATION FROM THE SITE TO SURROUNDING PROPERTIES, WATER BODIES, OR WETLANDS AS A RESULT OF THIS PROJECT.

E. THE CONTRACTOR SHALL MINIMIZE DISTURBANCE TO THE SITE WHENEVER POSSIBLE WHILE ALLOWING PROPER SITE DEVELOPMENT.

F. CONSTRUCTION STAGING SHALL BE CONDUCTED IN A WAY TO MINIMIZE THE POTENTIAL FOR STORMWATER RUN-ON TO DISTURBED AREAS.

G. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR/REPLACEMENT/MAINTENANCE OF ALL EROSION CONTROL MEASURES UNTIL ALL DISTURBED AREAS ARE STABILIZED TO THE SATISFACTION OF THE ABOVE PERSONNEL. DESCRIPTIONS OF PERMANENT STABILIZATION FOR VARIOUS COVER TYPES FOLLOWS:

i. FOR SEEDED AREAS, PERMANENT STABILIZATION MEANS THAT 90% OF THE DISTURBED AREA IS COVERED WITH REASONABLY THICK, UNIFORM STAND OF PERMANENT GRASS SPECIES, FREE FROM SIZABLE THIN OR BARE SPOTS.
ii. FOR SODDED AREAS, PERMANENT STABILIZATION MEANS THAT COMPLETE BINDING OF THE SOD ROOTS INTO THE UNDERLYING SOIL WITH NO SLUMPING OF THE SOD OR DIE OFF.
iii. FOR MULCHED AREAS, PERMANENT STABILIZATION MEANS TOTAL COVERAGE OF THE EXPOSED AREA WITH AN APPROVED MULCH MATERIAL.
iv. FOR AREAS STABILIZED WITH RIPRAP, PERMANENT STABILIZATION MEANS THAT SLOPES STABILIZED WITH RIPRAP HAVE AN APPROPRIATE BACKING OF A WELL-GRADED GRAVEL OR APPROVED GEOTEXTILE. STONE MUST BE SIZED APPROPRIATELY AND IN ACCORDANCE WITH SECTION E-6 OF THE MAINE EROSION AND SEDIMENT CONTROL BMP MANUAL.
v. FOR PAVED AREAS, PERMANENT STABILIZATION MEANS THE PLACEMENT OF THE ASPHALT BINDER COURSE.
vi. FOR OPEN CHANNELS, LEVEL SPREADERS, ENGINEERED BUFFERS OR OTHER DESIGNED STORMWATER CONVEYANCE STRUCTURE, PERMANENT STABILIZATION MEANS THE CHANNELIZED AREA(S) IS STABILIZED WITH MATURE VEGETATION AT LEAST THREE INCHES IN HEIGHT, WITH APPROVED RIPRAP, OR WITH OTHER NON-EROSIVE LINING CAPABLE OF WITHSTANDING THE ANTICIPATED FLOW VELOCITIES AND FLOW DEPTHS WITHOUT RELIANCE ON CHECK DAMS TO SLOW FLOW. THERE SHALL BE NO EVIDENCE OF SLUMPING, UNDERCUTTING OR DOWNCUTTING OF THE DESIGNED CHANNEL.

H. IF THE AREA WILL REMAIN UNWORKED FOR MORE THAN ONE YEAR OR HAS BEEN BROUGHT TO FINAL GRADE, AND WILL NOT BE BUILT ON, THEN IMMEDIATELY PROVIDE PERMANENT STABILIZATION USING VEGETATION THROUGH PLANTING, SEEDING, SOD OR THROUGH THE USE OF PERMANENT MULCH OR RIPRAP. IF USING VEGETATION FOR STABILIZATION, SELECT THE PROPER VEGETATION FOR THE LIGHT, MOISTURE, AND SOIL CONDITIONS. AMEND AREAS OF DISTURBED, OVERLY-COMPACTED SUBSOIL WITH TOPSOIL OR COMPOST AND LIGHTLY TILL 2–3" OF SOIL AMENDMENTS INTO THE TOP 8" OF SOIL.

I. PROTECT ALL SEEDED AREAS WITH MULCH OR EROSION CONTROL BLANKET IN AREAS OF SHEET OR CONCENTRATED FLOWS. MULCH ALL AREAS SO THAT SOIL IS NOT VISIBLE THROUGH THE MULCH REGARDLESS OF THE APPLICATION RATE. SCHEDULE SEEDING OR SODDING TO AVOID FAILURE DUE TO SUMMER DROUGHT AND FALL FROST. NEWLY SEEDED AREAS SHOULD BE PROTECTED FROM VEHICLE TRAFFIC, PEDESTRIAN TRAFFIC AND CONCENTRATED RUNOFF UNTIL THE VEGETATION IS WELL ESTABLISHED. AREAS MUST BE REWORKED AND RESTABILIZED IF GERMINATION IS SPARSE OR SURFACE EROSION IS EVIDENT.

J. DITCH LININGS AND RIPRAP INLET AND OUTLET PROTECTION SHALL BE INSTALLED WITHIN 48 HOURS OF COMPLETING THE GRADING OF THAT SECTION OF DITCH OR INSTALLATION OF THE CULVERT.

K. EROSION CONTROL BLANKET SHALL BE INSTALLED ON ALL PERMANENT SLOPES STEEPER THAN 3:1, IN THE BASE OF DITCHES AND ANY DISTURBED AREAS WITHIN 100 FEET OF A PROTECTED NATURAL RESOURCE (WETLANDS AND WATER RESOURCES). EROSION CONTROL BLANKET SHALL BE NORTH AMERICAN GREEN S150BN OR APPROVED EQUAL. EROSION CONTROL BLANKET SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

L. THE CONTRACTOR IS RESPONSIBLE FOR REMOVAL OF ALL TEMPORARY EROSION CONTROL MEASURE UPON STABILIZATION OF PROJECT AREA & COST SHALL BE INCIDENTAL TO CONTRACT.

WINTER CONDITIONS

A. WINTER CONSTRUCTION IS CONSTRUCTION ACTIVITY PERFORMED DURING THE PERIOD FROM NOVEMBER 1 THROUGH APRIL 1. IF AREAS WITHIN THE CONSTRUCTION AREA ARE NOT STABILIZED WITH TEMPORARY OR PERMANENT MEASURES OUTLINED ABOVE BY NOVEMBER 15 THEN THE SITE MUST BE PROTECTED WITH ADDITIONAL STABILIZATION MEASURES THAT ARE SPECIFIC TO WINTER CONDITIONS.

GOOD HOUSEKEEPING AND POLLUTION PREVENTION

A. SPILL PREVENTION CONTROLS MUST BE USED TO PREVENT POLLUTANTS FROM BEING DISCHARGED FROM MATERIALS ON SITE, INCLUDING STORAGE PRACTICES TO MINIMIZE EXPOSURE OF THE MATERIALS TO STORMWATER RUNOFF AND APPROPRIATE SPILL PREVENTION, CONTAINMENT AND RESPONSE PLANNING AND IMPLEMENTATION.

B. DURING CONSTRUCTION, PETROLEUM PRODUCTS AND OTHER HAZARDOUS MATERIALS WITH THE POTENTIAL TO CONTAMINATE GROUND OR SURFACE WATERS MAY NOT BE STORED OR HANDLED IN AREAS OF THE SITE DRAINING TO INFILTRATION AREAS. AN "INFILTRATION AREA" IS ANY ARE OF THE SITE THAT BY DESIGN, OR AS A RESULTS OF SOIL AND TOPOGRAPHY, ACCUMULATES RUNOFF THAT INFILTRATES IN THE SOIL. DIKES, BERMS, SUMPS AND OTHER FORMS OF TEMPORARY SECONDARY CONTAINMENT THAT PREVENT DISCHARGE TO GROUNDWATER MAY BE USED TO ISOLATE PORTIONS OF THE SITE FOR THE PURPOSES OF STORAGE AND HANDLING OF THESE MATERIALS.

C. LOCATE ALL MATERIAL STOCKPILES WITH CONSIDERATION FOR STORMWATER DRAINAGE PATTERNS AND INFRASTRUCTURE.

D. TAKE ALL REASONABLE MEASURES TO MINIMIZE DUST RESULTING FROM THE PROJECT. OIL MAY NOT BE USED FOR DUST CONTROL.

E. LOCATE ALL LITTER, CONSTRUCTION DEBRIS AND CONSTRUCTION CHEMICALS WITH CONSIDERATION FOR STORMWATER DRAINAGE PATTERNS AND INFRASTRUCTURE.

F. TRENCH OR FOUNDATION DE-WATERING MUST BE SPREAD THROUGH SUFFICIENT NATURAL BUFFERS THAT HAVE CAPACITY TO INFILTRATE THE PUMPED WATER OR SHOULD BE PUMPED TO DESIGNED CONSTRUCTION DEWATERING DEVICES AS DESCRIBED IN THE MAINE EROSION AND SEDIMENT CONTROL BMPS HANDBOOK.

G. SEDIMENTS AND SOIL MATERIALS SHOULD BE SWEPT FROM PAVED SURFACES AT THE END OF EACH WORKDAY OR PRIOR TO RAIN EVENTS, WHENEVER POSSIBLE.

INSPECTION AND MAINTENANCE

A. A PERSON WITH KNOWLEDGE OF EROSION AND STORMWATER CONTROLS, INCLUDING THE STANDARDS IN THE MAINE CONSTRUCTION GENERAL PERMIT, THE MAINE EROSION AND SEDIMENT CONTROL BMPS HANDBOOK OR ANY MUNICIPAL REQUIREMENTS MUST CONDUCT THE INSPECTION. THIS PERSON MUST BE IDENTIFIED IN THE INSPECTION LOG. IF ADDITIONAL BMPS OR MODIFICATIONS TO BMPS ARE NECESSARY, THE MODIFICATIONS MUST BE IMPLEMENTED WITH 7 CALENDAR DAYS OR PRIOR TO ANY PRECIPITATION EVENT. ALL MEASURES MUST BE MAINTAINED IN EFFECTIVE OPERATING CONDITION UNTIL AREAS ARE PERMANENTLY STABILIZED.

B. AN INSPECTION AND MAINTENANCE LOG MUST BE KEPT BY THE CONTRACTOR, SUMMARIZING THE SCOPE OF THE INSPECTION, DATE, AND MAJOR OBSERVATIONS RELATING TO THE OPERATION OF EROSION AND SEDIMENT CONTROL BMPS, MATERIAL STORAGE AREAS, AND VEHICLE ACCESS POINTS TO THE CONSTRUCTION AREA. THE INSPECTION LOG SHOULD BE DELIVERED TO THE PROPERTY OWNER OR RESPONSIBLE CONTRACTING ENTITY UPON COMPLETION OF THE PROJECT.

SANSOM Consulting Engineers and Scientists

WOODARD & CURRAN

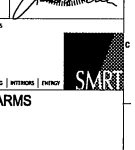
41 Hutchins Drive
Portland, Maine 04102
800.426.4262 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

REV	DESCRIPTION	DATE

REVISED FOR PERMIT
08-14-19

CURRENT ISSUE STATUS:

TRUE NORTH:



SMRT Architects and Engineers
144 Fore Street, PO Box 618
Portland, Maine 04104

ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY

NORDIC AQUAFARMS

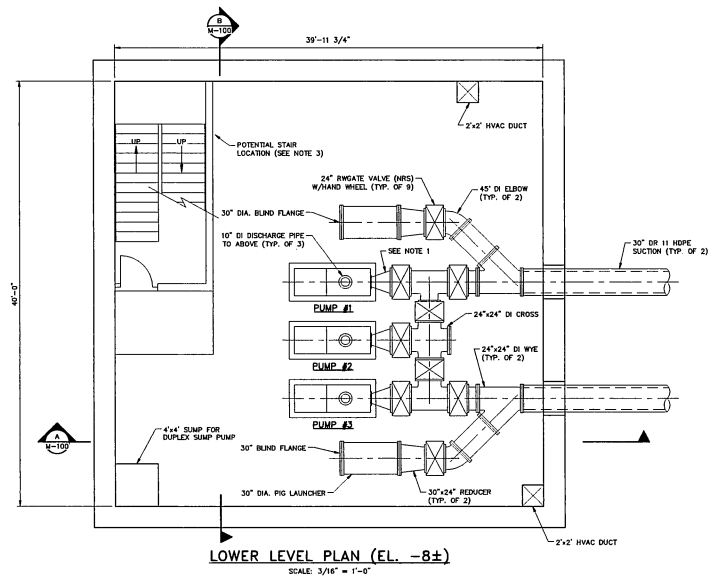
BELFAST, MAINE

CIVIL DETAILS - 4

PROJECT MANAGER:	PROJECT NO: 18076
JOB CAPTAIN:	CS504

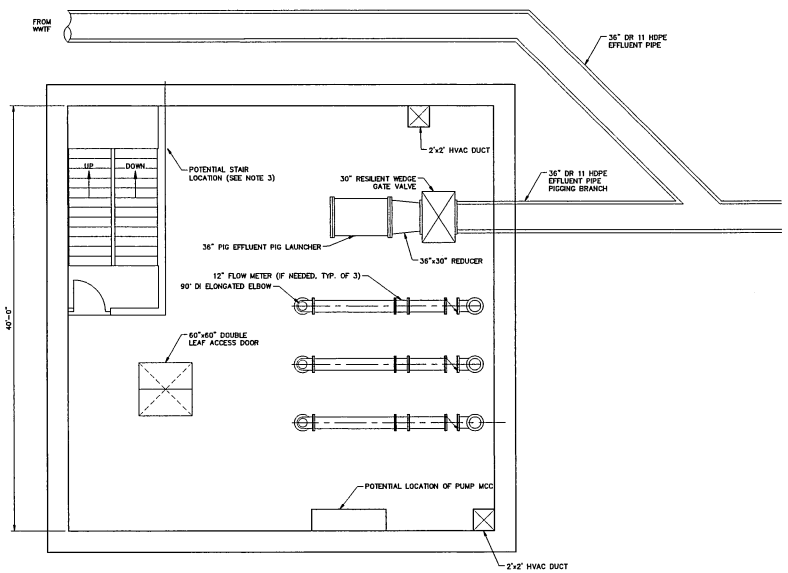
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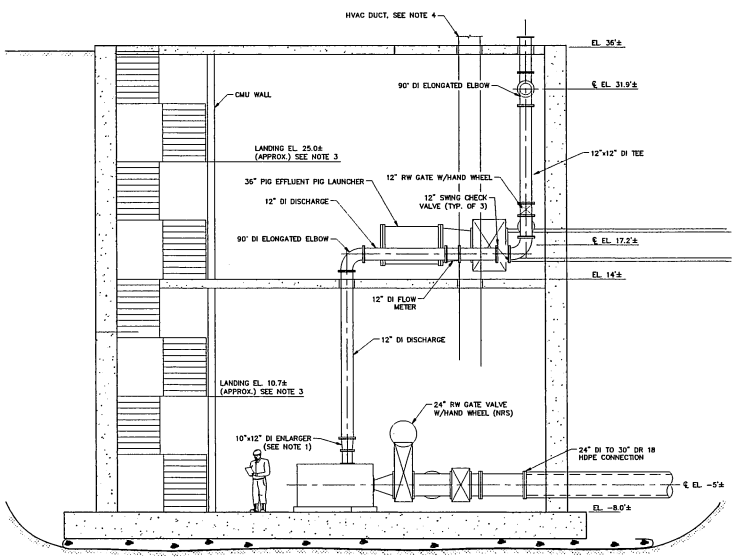
LOWER LEVEL PLAN (EL. -8±)

SCALE: 3/16" = 1'-0"



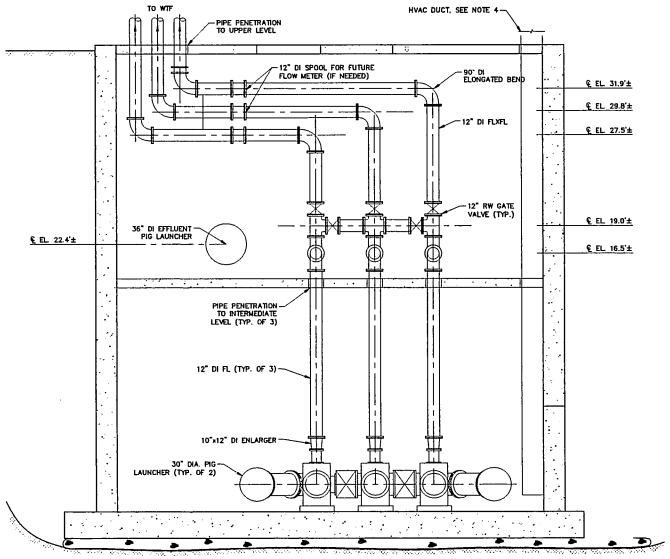
INTERMEDIATE LEVEL PLAN (EL. 14±)

SCALE: 3/16" = 1'-0"



SECTION A M-100

SCALE: 3/16" = 1'-0"



SECTION B M-100

SCALE: 3/16" = 1'-0"

NOTES:

1. SUCTION AND DISCHARGE CONNECTIONS TO BE REVISED BASED ON FINAL PUMP SELECTION.
2. PIG LAUNCHER NOT SHOWN FOR CLARITY.
3. STAIR POSITION TO DEMONSTRATE SPACE REQUIRED FOR STAIRS. FINAL LOCATION, POSITION, FIRE SAFETY, EGRESS CODE BY SMRT.
4. SIZE AND FINAL POSITION OF DUCT TO BE DETERMINED.
5. VALVE ON THE EFFLUENT LINE TO BE LOCATED IN THE WWTF OR BURIED. FINAL LOCATION TO BE DETERMINED.

RANSOM Consulting Engineers and Scientists

WOODARD & CURRAN
COMMITMENT & INTEGRITY DRIVE RESULTS

REV	DESCRIPTION	DATE
	REVISED FOR PERMIT 08-14-19	

CURRENT ISSUE STATUS:

STATE OF MAINE JAMES D. WILSON No. 8592 REGISTERED PROFESSIONAL ENGINEER

TRUE NORTH:

SMRT Architects and Engineers
144 Fore Street, PO Box 618
Portland, Maine 04104

ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENTIRETY SMRT

NORDIC AQUAFARMS

BELFAST, MAINE

PUMP STATION PLAN AND SECTIONS

6' 4' 2' 0 4' 8'
BAR SCALE
3/16" = 1'-0"
CHECK GRAPHIC SCALE BEFORE USING

PROJECT MANAGER:	PROJECT NO: 18078
JOB CAPTAIN:	M-100

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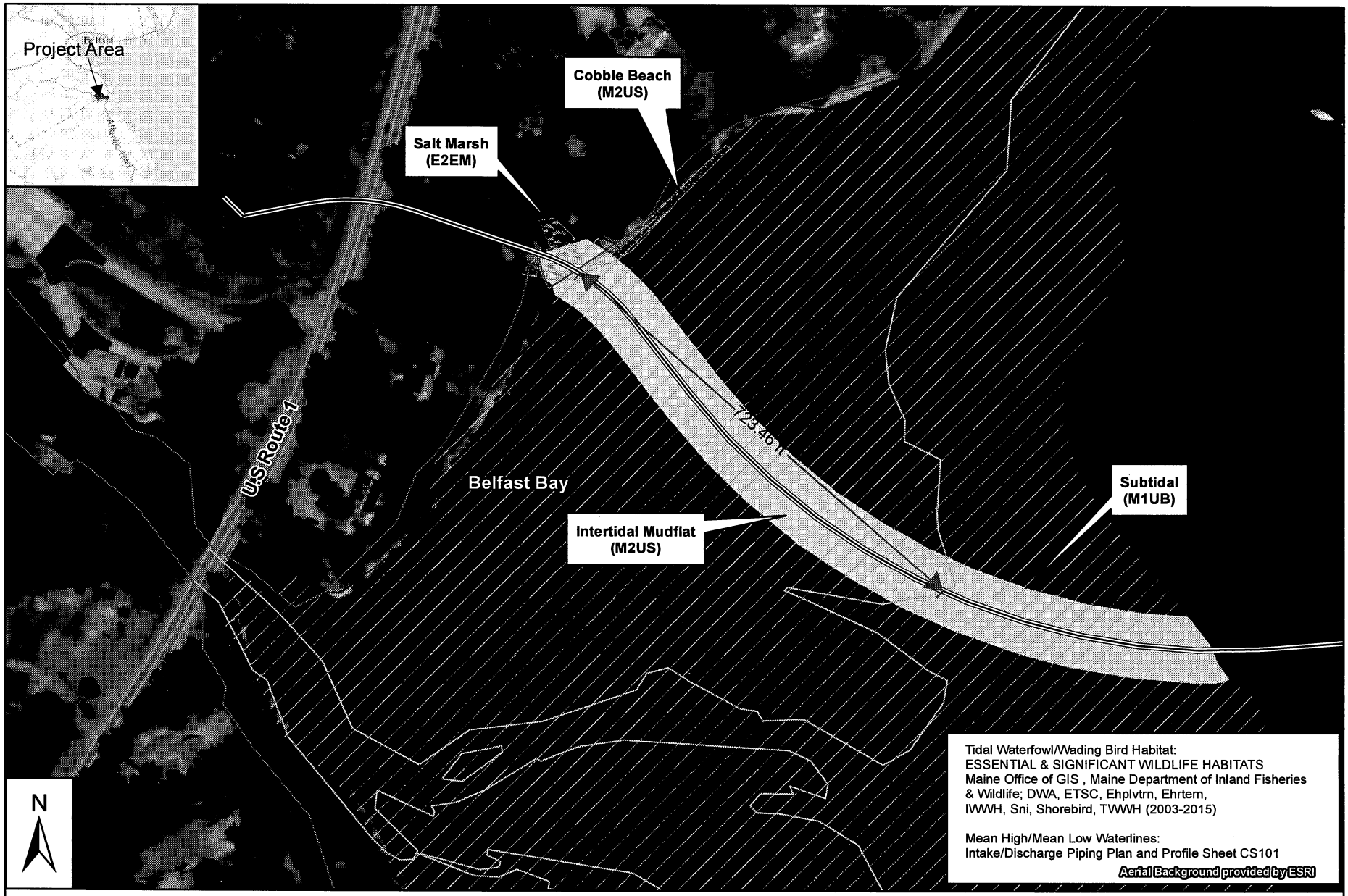
NOT FOR CONSTRUCTION

ATTACHMENT D

Tidal Waterfowl and Wading Bird Habitat Pipeline Impact Area

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Ransom Consulting, Inc.
Project 171.05027.008



Belfast Aquaculture Project
Pipeline Impact Area TWWH
Date: August 13, 2019

Pipeline Route
Mean High Water
Mean Low Water
Salt Marsh
Cobble Beach
Tidal Waterfowl/Wading Bird Habitat (TWWH)
Temporary Pipeline TWWH Impact Area

0 100 200 400 Feet

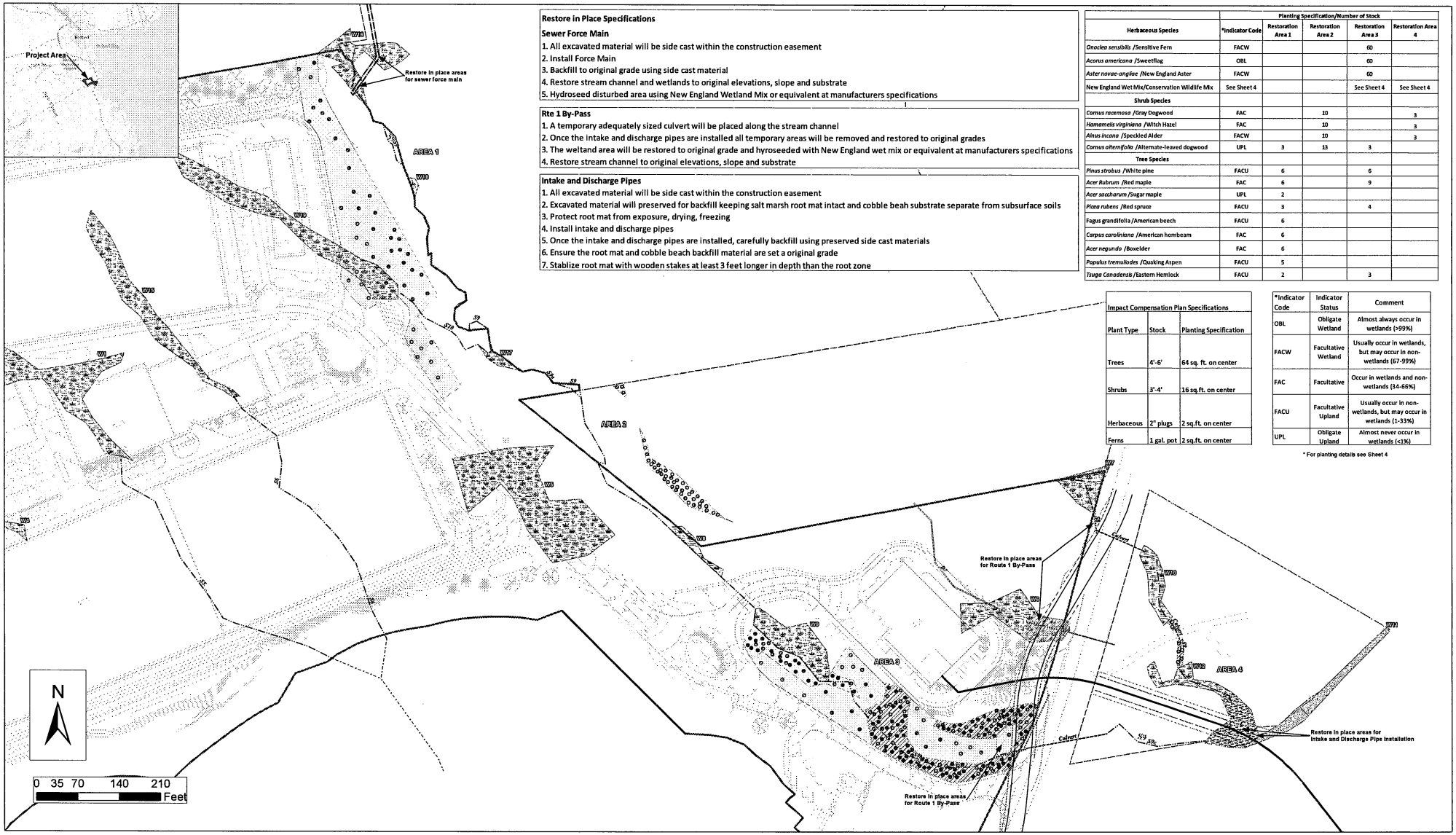
NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

ATTACHMENT E

Updated Compensation Plan Drawings Sheet 1 – Sheet 4

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Ransom Consulting, Inc.
Project 171.05027.008



Restore in Place Specifications

Sewer Force Main

1. All excavated material will be side cast within the construction easement
2. Install Force Main
3. Backfill to original grade using side cast material
4. Restore stream channel and wetlands to original elevations, slope and substrate
5. Hydroseed disturbed area using New England Wetland Mix or equivalent at manufacturers specifications

Rte 1 By-Pass

1. A temporary adequately sized culvert will be placed along the stream channel
2. Once the intake and discharge pipes are installed all temporary areas will be removed and restored to original grades
3. The weltand area will be restored to original grade and hyroseeded with New England wet mix or equivalent at manufacturers specifications
4. Restore stream channel to original elevations, slope and substrate

Intake and Discharge Pipes

1. All excavated material will be side cast within the construction easement
2. Excavated material will preserved for backfill keeping salt marsh root mat intact and cobble beah substrate separate from subsurface soils
3. Protect root mat from exposure, drying, freezing
4. Install intake and discharge pipes
5. Once the intake and discharge pipes are installed, carefully backfill using preserved side cast materials
6. Ensure the root mat and cobble beach backfill material are set a original grade
7. Stablize root mat with wooden stakes at least 3 feet longer in depth than the root zone

Herbaceous Species	*Indicator Code	Planting Specification/Number of Stock: Restoration Area 1	Restoration Area 2	Restoration Area 3	Restoration Area 4
Onoclea sensibilis /Sensitive Fern	FACW			60	
Acorus americana /Sweetflag	OBL			60	
Aster novae-angliae /New England Aster	FACW			60	
New England Wet Mix/Conservation Wildlife Mix	See Sheet 4			See Sheet 4	See Sheet 4
Shrub Species					
Cornus racemosa /Gray Dogwood	FAC		10		3
Hamamelis virginiana /Witch Hazel	FAC		10		3
Alnus incana /Speckled Alder	FACW		10		3
Cornus alternifolia /Alternate-leaved dogwood	UPL	3	13	3	
Tree Species					
Pinus strobus /White pine	FACU	6		6	
Acer Rubrum /Red maple	FAC	6		9	
Acer saccharum /Sugar maple	UPL	2			
Picea rubens /Red spruce	FACU	3		4	
Fagus grandifolia /American beech	FACU	6			
Carpus caroliniana /American hornbeam	FAC	6			
Acer negundo /Boxelder	FAC	6			
Populus tremuloides /Quaking Aspen	FACU	5			
Tsuga Canadensis /Eastern Hemlock	FACU	2		3	

Impact Compensation Plan Specifications		
Plant Type	Stock	Planting Specification
Trees	4'-6'	64 sq. ft. on center
Shrubs	3'-4'	16 sq.ft. on center
Herbaceous	2" plugs	2 sq.ft. on center
Ferns	1 gal. pot	2 sq.ft. on center

*Indicator Code	Indicator Status	Comment
OBL	Obligate Wetland	Almost always occur in wetlands (>99%)
FACW	Facultative Wetland	Usually occur in wetlands, but may occur in non-wetlands (67-99%)
FAC	Facultative	Occur in wetlands and non-wetlands (34-66%)
FACU	Facultative Upland	Usually occur in non-wetlands, but may occur in wetlands (1-33%)
UPL	Obligate Upland	Almost never occur in wetlands (<1%)

* For planting details see Sheet 4

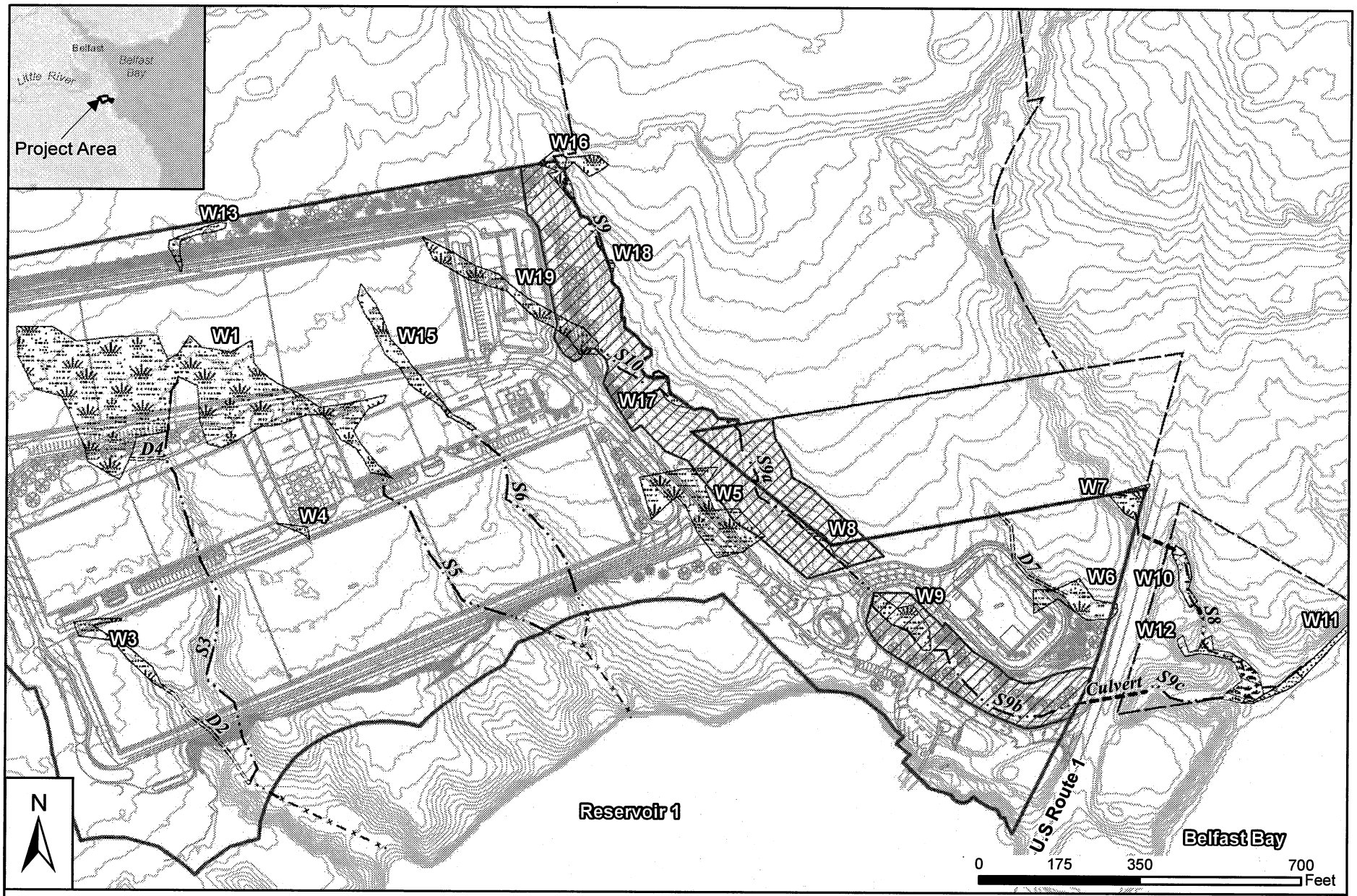
Belfast Aquaculture Project
Impact Compensation Plan
Date: August 16, 2019

Species

- Alternate-leaved Dogwood
- American Beech
- American Hornbeam
- Boxelder
- Eastern Hemlock
- Gray Dogwood
- New England Aster
- Quacking Aspen
- Red Maple
- Red Spruce
- Sensitive Fern
- Speckled Alder
- Sugar Maple
- Sweetflag
- White Pine
- Witch Hazel
- Conservation Wildlife Mix
- New England Wet Mix
- 25' Easement
- 40' Easement
- Temp US Bypass
- Temporary Route 1 By-Pass
- Culvert
- Temporary Culvert
- Limit of Work
- Existing Culvert
- Intermittent Stream
- Drainage
- Stream/Drainage Not Field Delineated
- Current Pipeline Route
- Sewer Easement
- Palustrine Wetlands
- Salt Marsh
- Cobble Beach
- Riparian Restoration Area
- Project Area
- Other Belfast Parcels

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

Sheet 2

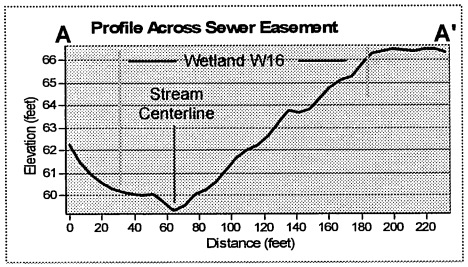


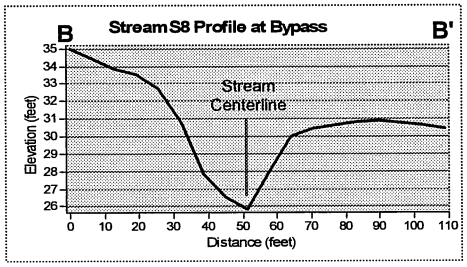
Belfast Aquaculture Project
Deeded Riparian Buffer Map
Date: August 16, 2019

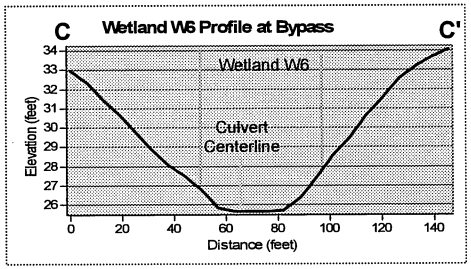
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- Intermittent Stream
- Drainage
- Stream Not Field Delineated
- Palustrine Wetlands
- Salt Marsh
- Cobble Beach
- Deeded Riparian Buffer
- Existing 2 ft Contours
- Proposed Development
- Project Area
- Other Belfast Parcels

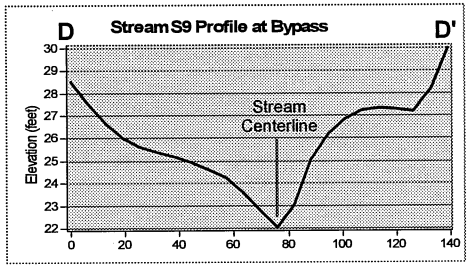
NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS











Belfast Aquaculture Project
Cross Section Map
Date: August 16, 2019
SHEET 3

Cross Section Profiles
Intermittent Stream
Drainage
Existing Culvert
New Culvert (temp)
Toe of Fill
Catch Basin
Storm Manhole
2-ft Contours
Palustrine Wetlands
Salt Marsh
Cobble Beach

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

NEW ENGLAND WETLAND PLANTS, INC

820 WEST STREET, AMHERST, MA 01002
PHONE: 413-548-8000 FAX 413-549-4000
EMAIL: INFO@NEWP.COM WEB ADDRESS: WWW.NEWP.COM

New England Wetmix (Wetland Seed Mix)

Botanical Name	Common Name	Indicator
Carex vulpinoidea	Fox Sedge	OBL
Carex scoparia	Blunt Broom Sedge	FACW
Carex lurida	Lurid Sedge	OBL
Carex lupulina	Hop Sedge	OBL
Poa palustris	Fowl Bluegrass	FACW
Bidens frondosa	Beggar Ticks	FACW
Scirpus atrovirens	Green Bulrush	OBL
Asclepias incarnata	Swamp Milkweed	OBL
Carex crinita	Fringed Sedge	OBL
Vernonia noveboracensis	New York Ironweed	FACW+
Juncus effusus	Soft Rush	FACW+
Aster lateriflorus (Symphyotrichum lateriflorum)	Starved/Calico Aster	FACW
Iris versicolor	Blue Flag	OBL
Glyceria grandis	American Mannagrass	OBL
Mimulus ringens	Square Stemmed Monkey Flower	OBL
Eupatorium maculatum (Eutrochium maculatum)	Spotted Joe Pye Weed	OBL

PRICE PER LB. $135.00 MIN. QUANITY 1 LBS. **TOTAL:** $135.00 APPLY: 18 LBS/ACRE :2500 sq ft/lb

The New England Wetmix (Wetland Seed Mix) contains a wide variety of native seeds that are suitable for most wetland restoration sites that are not permanently flooded. All species are best suited to moist ground as found in most wet meadows, scrub shrub, or forested wetland restoration areas. The mix is well suited for detention basin borders and the bottom of detention basins not generally under standing water. The seeds will not germinate under inundated conditions. If planted during the fall months the seed mix will germinate the following spring. During the first season of growth several species will produce seeds while other species will produce seeds after the second growing season. Not all species will grow in all wetland situations. This mix is comprised of the wetland species most likely to grow in created/restored wetlands and should produce more than 75% ground cover in two full growing seasons.

The wetland seeds in this mix can be sown by hand, with a hand-held spreader, or hydro-seeded on large or hard to reach sites. Lightly rake to insure good seed-to-soil contact. Seeding can take place on frozen soil, as the freezing and thawing weather of late fall and late winter will work the seed into the soil. If spring conditions are drier than usual watering may be required. If sowing during the summer months supplemental watering will likely be required until germination. A light mulch of clean, weed free straw is recommended.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged. Price is $/bulk pound, FOB warehouse, Plus SH and applicable taxes.

NEW ENGLAND WETLAND PLANTS, INC

820 WEST STREET, AMHERST, MA 01002
PHONE: 413-548-8000 FAX 413-549-4000
EMAIL: INFO@NEWP.COM WEB ADDRESS: WWW.NEWP.COM

New England Conservation/Wildlife Mix

Botanical Name	Common Name	Indicator
Elymus virginicus	Virginia Wild Rye	FACW-
Schizachyrium scoparium	Little Bluestem	FACU
Andropogon gerardii	Big Bluestem	FAC
Festuca rubra	Red Fescue	FACU
Sorghastrum nutans	Indian Grass	UPL
Panicum virgatum	Switch Grass	FAC
Chamaecrista fasciculata	Partridge Pea	FACU
Desmodium canadense	Showy Tick Trefoil	FAC
Asclepias tuberosa	Butterfly Milkweed	NI
Bidens frondosa	Beggar Ticks	FACW
Eupatorium purpureum (Eutrochium maculatum)	Purple Joe Pye Weed	FAC
Rudbeckia hirta	Black Eyed Susan	FACU-
Aster pilosus (Symphyotrichum pilosum)	Heath (or Hairy) Aster	UPL
Solidago juncea	Early Goldenrod	

PRICE PER LB. $39.50 MIN. QUANITY 2 LBS. **TOTAL:** $79.00 APPLY: 25 LBS/ACRE :1750 sq ft/lb

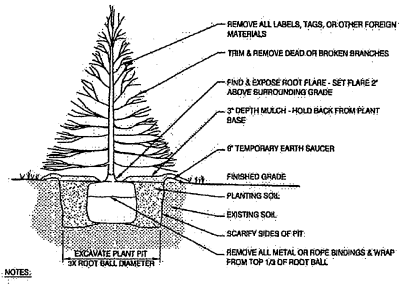
The New England Conservation/Wildlife Mix provides a permanent cover of grasses, wildflowers, and legumes For both good erosion control and wildlife habitat value. The mix is designed to be a no maintenance seeding, and is appropriate for cut and fill slopes, detention basin side slopes, and disturbed areas adjacent to commercial and residential projects.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged. Price is $/bulk pound, FOB warehouse, Plus SH and applicable taxes.

Seeding Notes for Areas 1, 2, and 4:
- Restore to original grade (see cross sections on Sheet 3)
- Hydroseed mulch all areas of disturbed soil

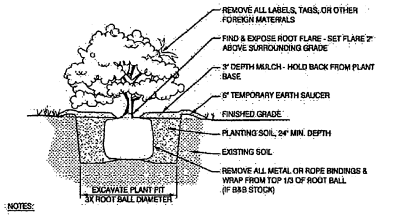
Seeding Notes for Area 3:
- Scarify and decompact soils in areas to be seeded
- Hydroseed mulch with specified seed mix or equivalent

Planting details provided by SMRT



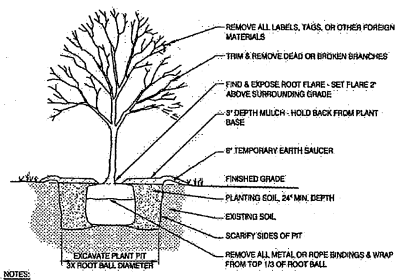
NOTES:
1. TREE TO BE SET PLUMB.
2. SECURE TREE AS MAY BE REQUIRED ACCORDING TO TREE SIZE, LOCATION, & WIND/WEATHER CONDITIONS.
3. IF USING ROOTBALL STABILIZATION, FOLLOW MANUFACTURER'S RECOMMENDATIONS.

STANDARD EVERGREEN TREE PLANTING (H1)
NOT TO SCALE



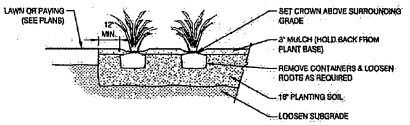
NOTES:
1. SHRUB TO BE SET PLUMB.

STANDARD SHRUB PLANTING (D1)
NOT TO SCALE



NOTES:
1. TREE TO BE SET PLUMB.
2. SECURE TREE AS MAY BE REQUIRED ACCORDING TO TREE SIZE, LOCATION, & WIND/WEATHER CONDITIONS.
3. IF USING ROOTBALL STABILIZATION, FOLLOW MANUFACTURERS RECOMMENDATIONS.

STANDARD DECIDUOUS TREE PLANTING (A1)
NOT TO SCALE



STANDARD PERENNIAL PLANTING (A5)
NOT TO SCALE

NORDIC AQUAFARMS
285 NORTHPORT AVENUE
BELFAST, MAINE

PLANTING DETAILS

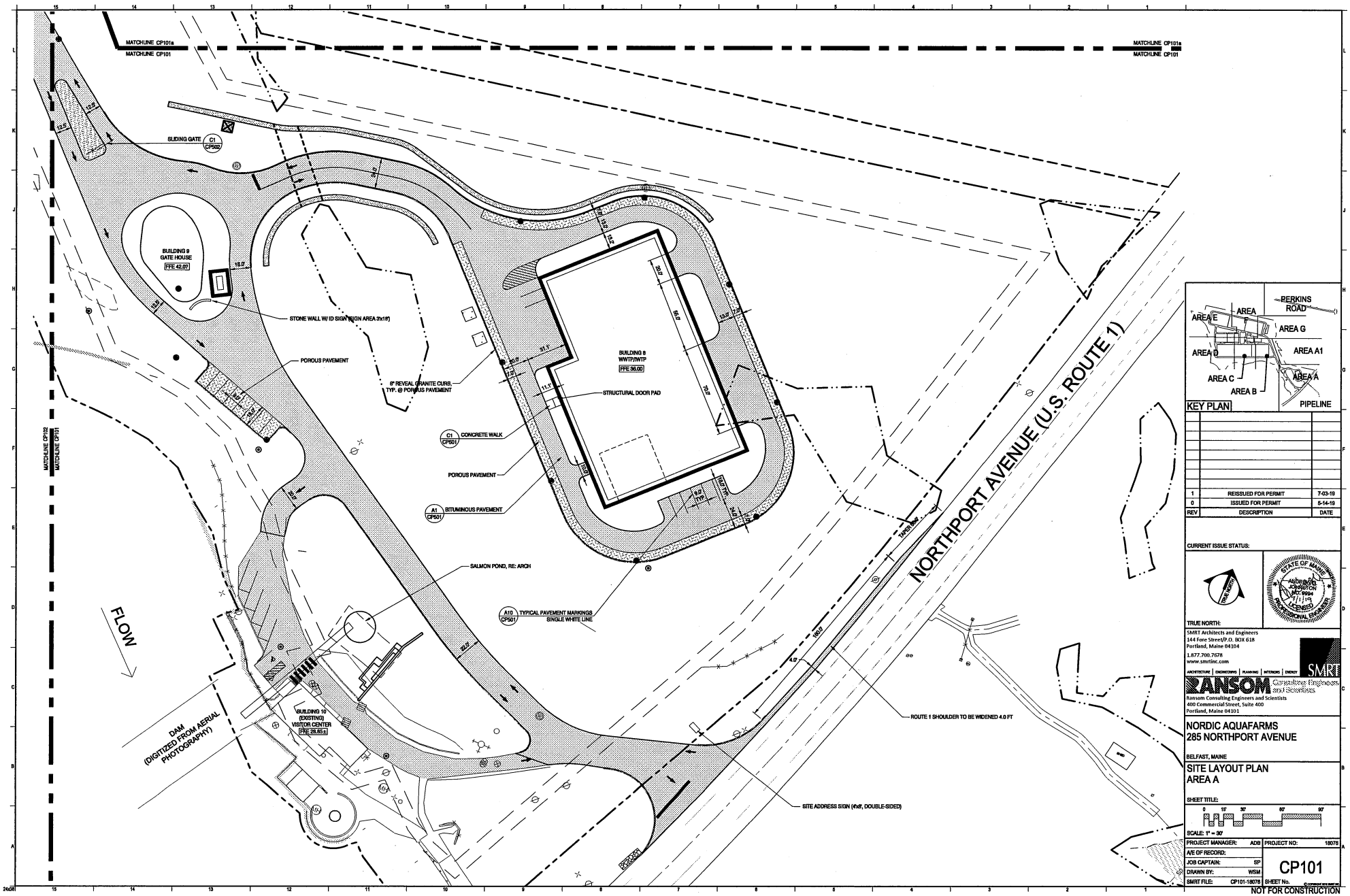
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Sheet 4

ATTACHMENT F

Updated Site Layout Plan Drawings CP101-CP107

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N



KEY PLAN

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STATE OF MAINE ALDEN D. BOYNTON JR. 9264 REGISTERED PROFESSIONAL ENGINEER

SMRT Architects and Engineers
144 Fore Street/P.O. BOX 618
Portland, Maine 04104
1.877.700.7678
www.smrtinc.com
ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY

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Ransom Consulting Engineers and Scientists
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NORDIC AQUAFARMS
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BELFAST, MAINE

SITE LAYOUT PLAN
AREA A

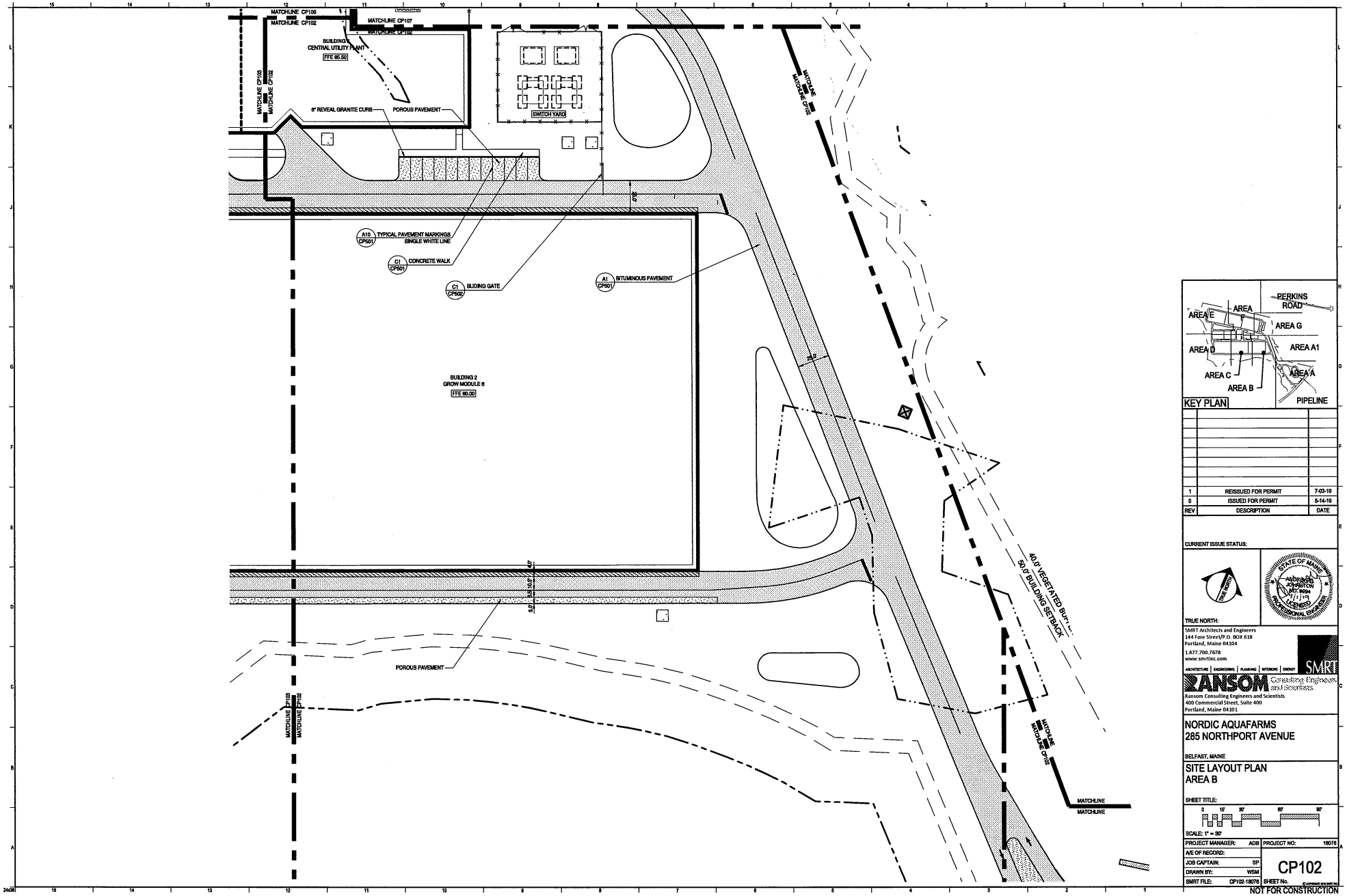
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A/E OF RECORD:			
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144 Fore Street/P.O. BOX 618
Portland, Maine 04104
1.877.700.7678
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SITE LAYOUT PLAN
AREA B

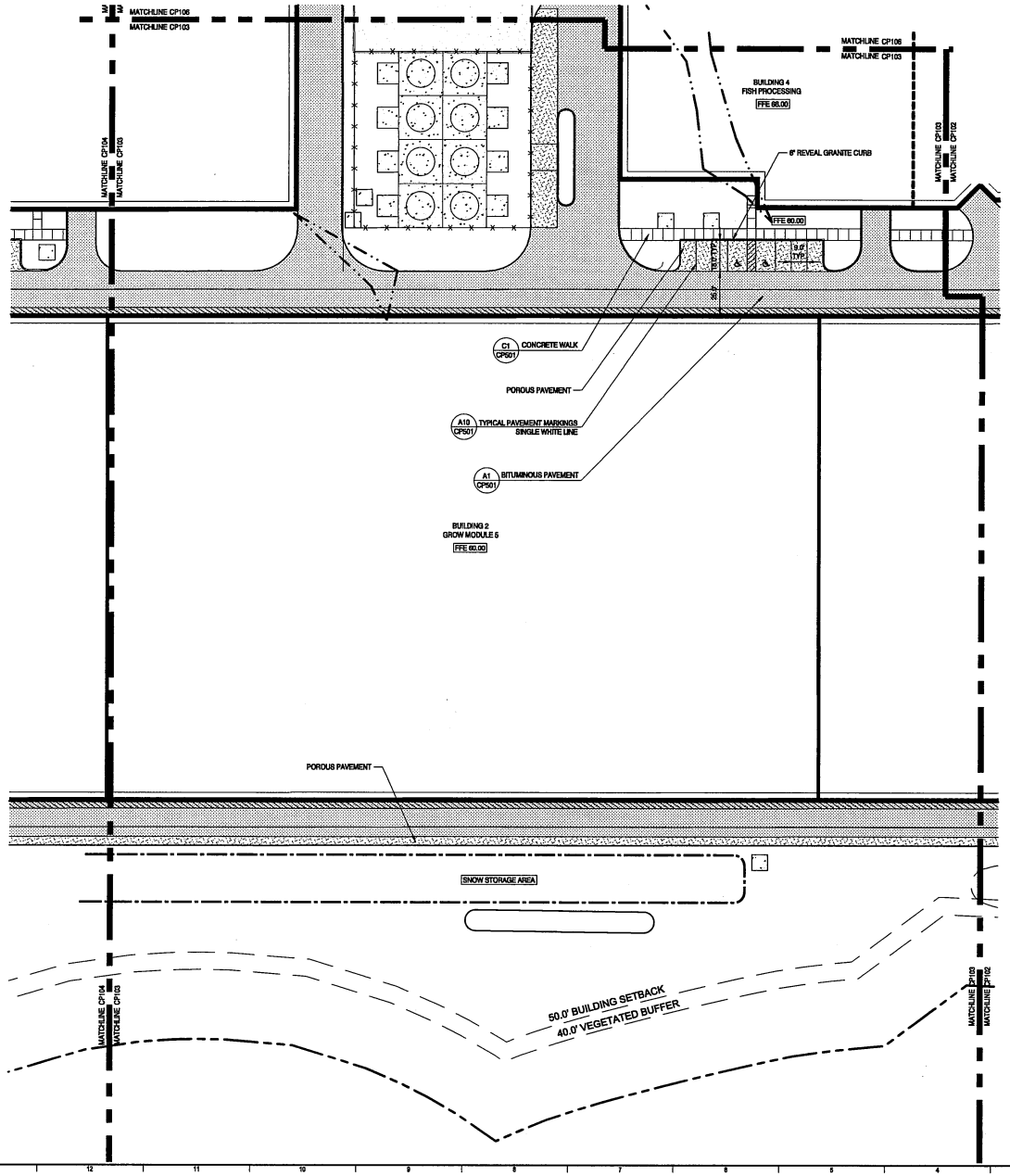
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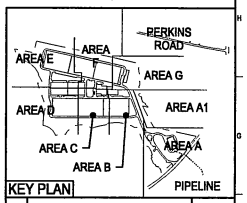
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Portland, Maine 04101

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285 NORTHPORT AVENUE

BELFAST, MAINE

SITE LAYOUT PLAN
AREA C

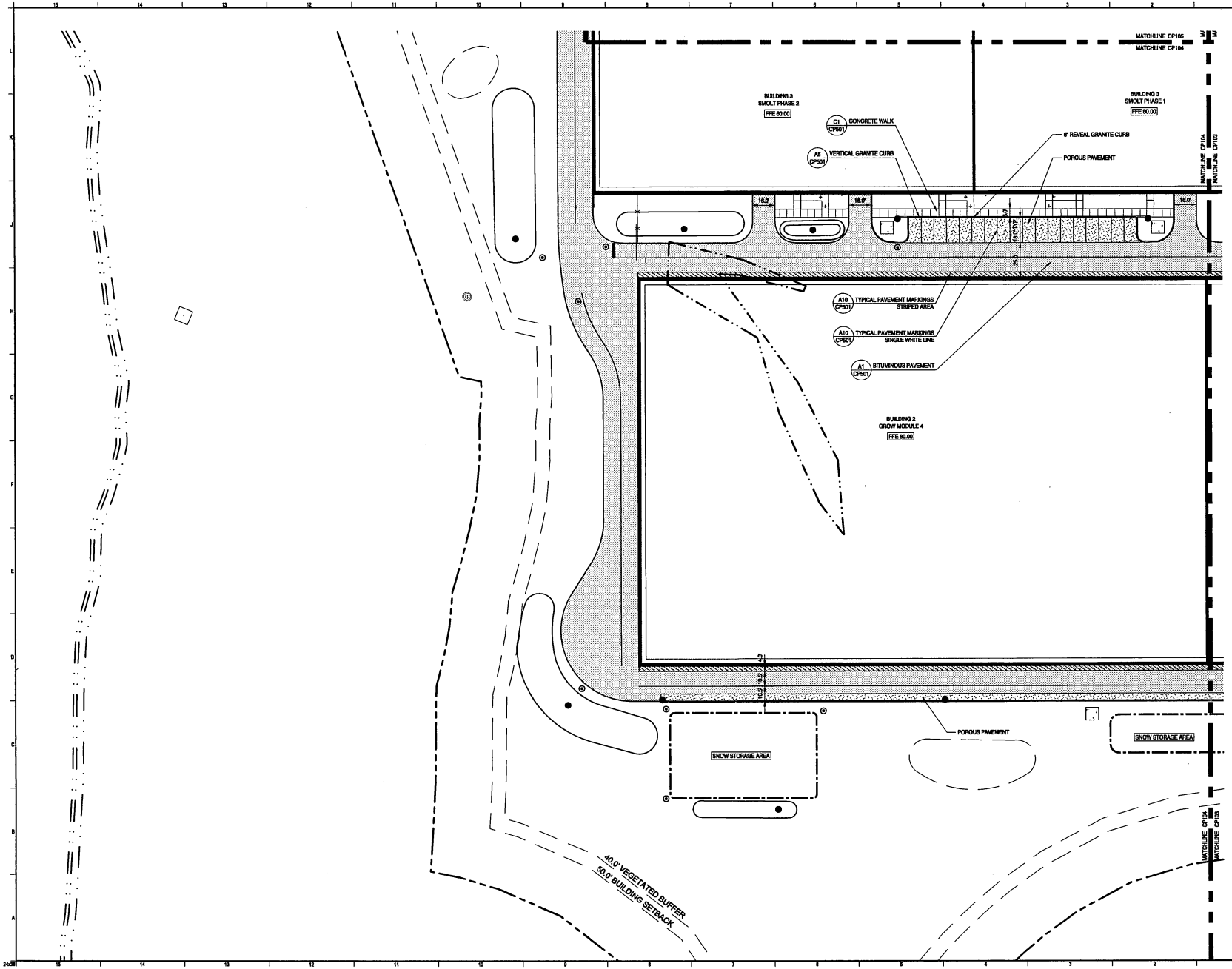
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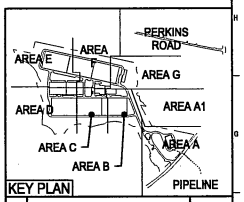
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Ransom Consulting Engineers and Scientists
400 Commercial Street, Suite 400
Portland, Maine 04101

NORDIC AQUAFARMS
285 NORTHPORT AVENUE

BELFAST, MAINE

SITE LAYOUT PLAN
AREA D

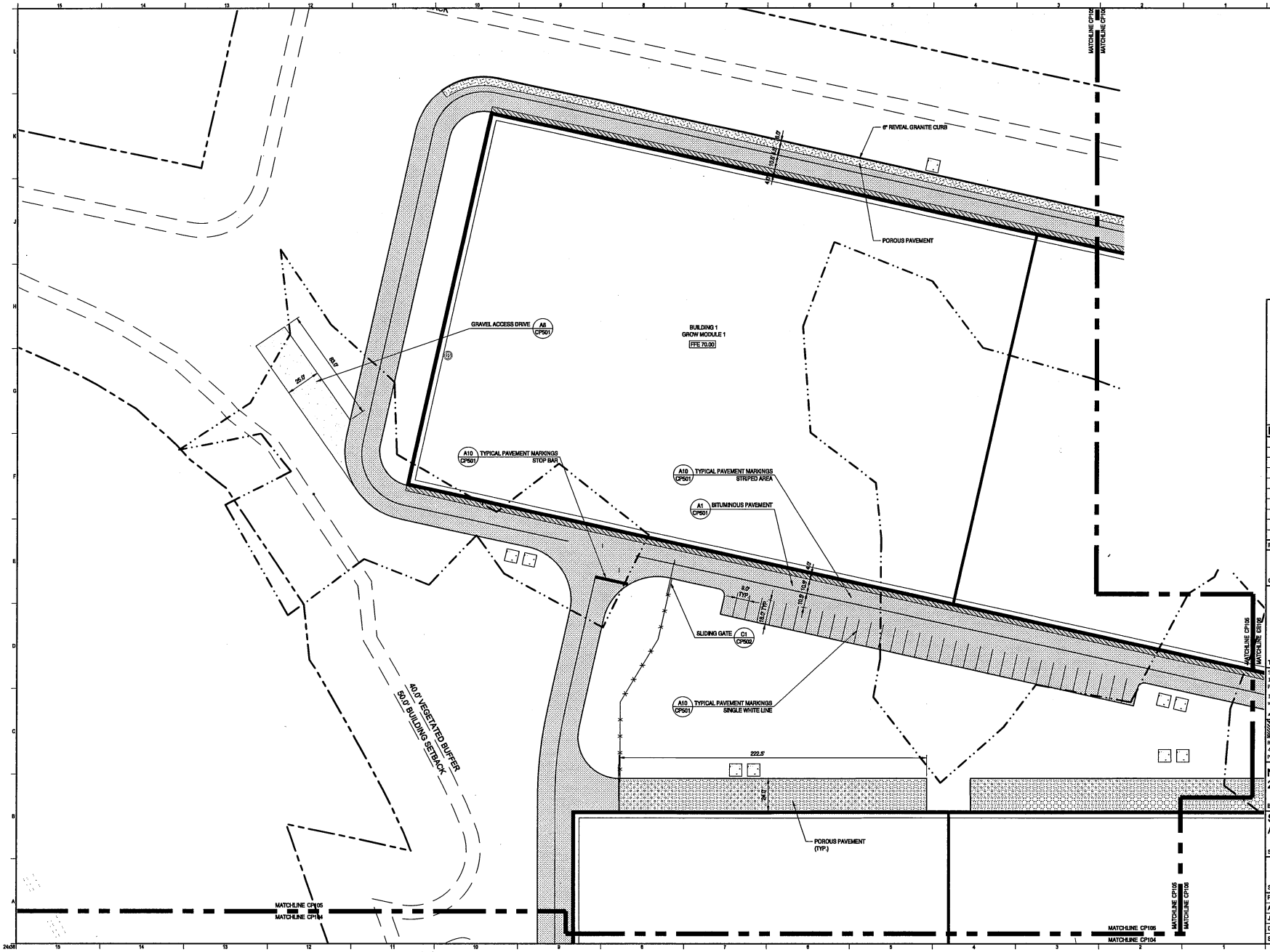
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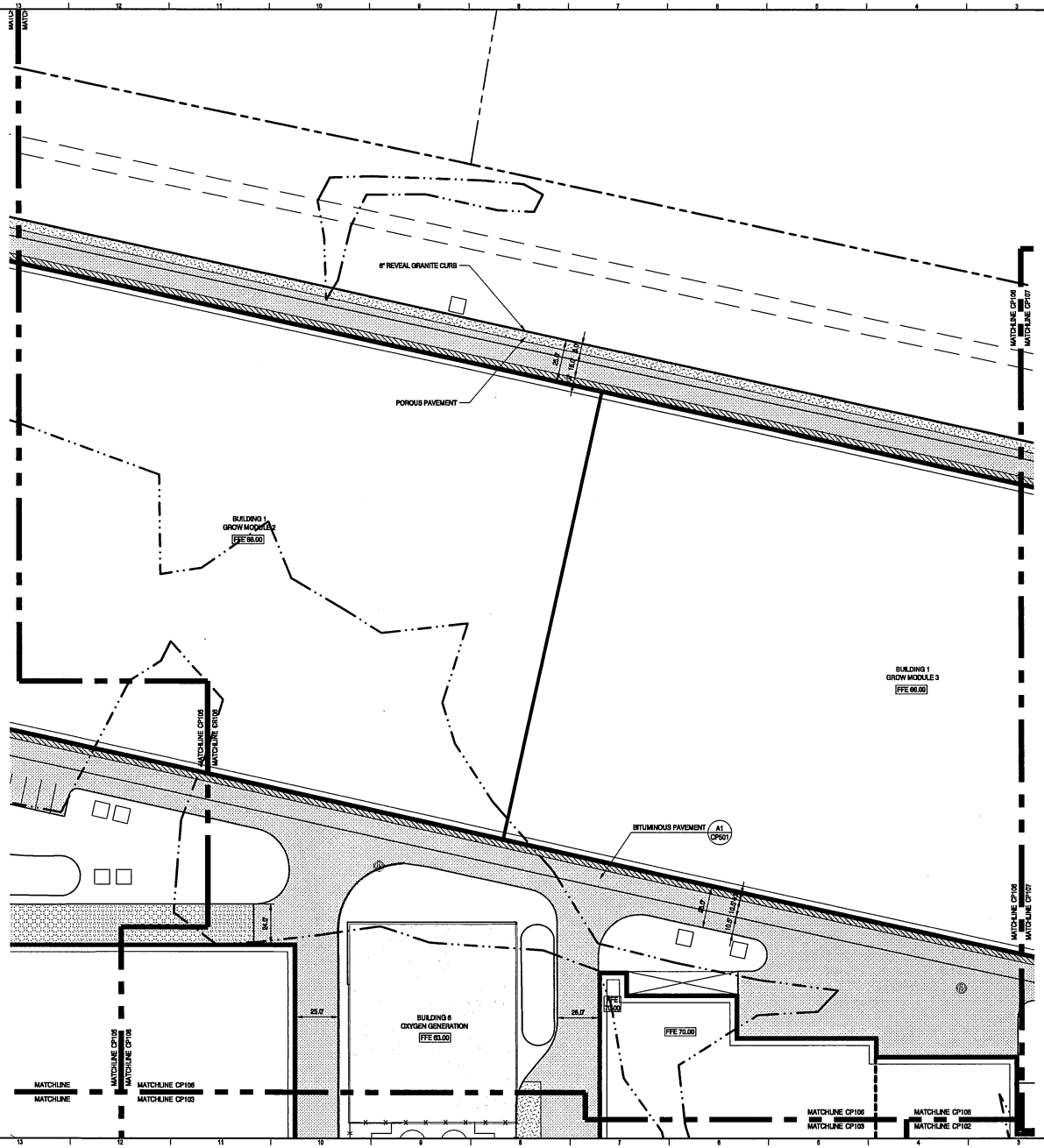
SITE LAYOUT PLAN
AREA E

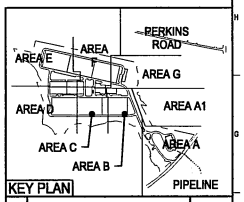
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144 Fore Street/P.O. BOX 618
Portland, Maine 04104
1.877.700.7678
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ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY

RANSOM Consulting Engineers and Scientists
Ransom Consulting Engineers and Scientists
400 Commercial Street, Suite 400
Portland, Maine 04101

NORDIC AQUAFARMS
285 NORTHPORT AVENUE

BELFAST, MAINE

SITE LAYOUT PLAN
AREA F

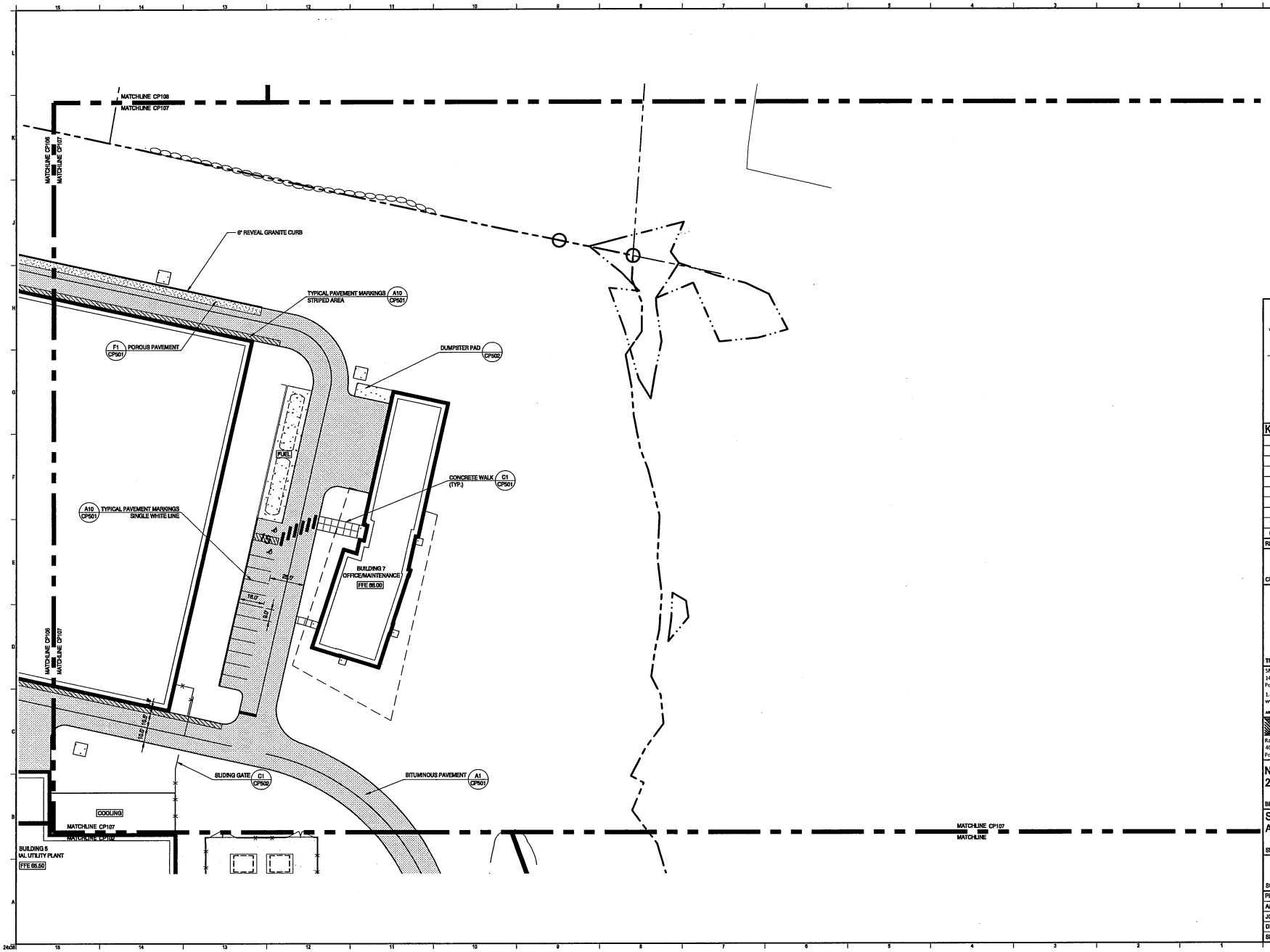
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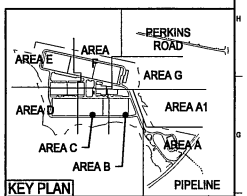
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STATE OF MAINE — ANDREW D. JOHNSTON — NO. 9984 — LICENSED PROFESSIONAL ENGINEER

SMRT Architects and Engineers
144 Fore Street/P.O. BOX 618
Portland, Maine 04104
1.877.700.7678
www.smrtinc.com
ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY

RANSOM Consulting Engineers and Scientists
Ransom Consulting Engineers and Scientists
400 Commercial Street, Suite 400
Portland, Maine 04101

NORDIC AQUAFARMS
285 NORTHPORT AVENUE
BELFAST, MAINE

SITE LAYOUT PLAN
AREA G

SHEET TITLE:

0 15' 30' 60' 90'
SCALE: 1" = 30'

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ATTACHMENT G

Stream Assessment Report

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Ransom Consulting, Inc.
Project 171.05027.008

NORMANDEAU ASSOCIATES
Environmental Consultants

Stream Assessment Report
Nordic Aquafarms Aquaculture Facility
285 Northport Avenue
Belfast, Maine

Prepared For
Ransom Consulting Engineers and Scientists
400 Commercial Street
Suite 404
Portland, Maine 04101

Submitted By
Normandeau Associates, Inc.
550 Forest Avenue
Suite 201
Portland, Maine 04101
(207) 518-6765
www.normandeau.com

July 29, 2019

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4.0 WATER QUALITY 6

5.0 INVERTEBRATE SURVEY 6

6.0 FISHERIES 7

7.0 CONCLUSION 7

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1.0 Introduction

Ransom Consulting, Inc. (Ransom) contracted Normandeau Associates, Inc. (Normandeau) to conduct stream assessments at the site of the proposed Nordic Aquafarms Aquaculture facility in Belfast, Maine. This assessment was conducted on streams that fall under jurisdiction of the Natural Resource Protection Act (NRPA) and is in response to comments provided by the Maine Department of Environmental protection in a letter dated July 3, 2019.

2.0 Methods

Wetland Scientists from Normandeau conducted the stream assessment on July 19, 2019 utilizing "Methods for Assessing Habitat in Flowing Waters: Using the Qualitative Habitat Evaluation Index (QHEI)". The QHEI was developed as an index of macro- habitat quality using physical parameters important to aquatic life. The scoring process assigns numbers to each physical parameter (metric) that, when summed, provide an index that can range in the negative to positive with a maximum score assigned to each metric. The metrics are:

- Substrate
- In stream cover
- Channel morphology
- Riparian Zone
- Pool Quality
- Riffle Quality
- Gradient

Each metric is then summed for a cumulative score for the given stream. The higher the cumulative score the better the habitat quality. Maximum score is 100. A cumulative score of $\geq$70 is considered excellent while scores of <30 are considered very poor.

QHEI data sheets were completed and are included in this report as Appendix A. The results of the QHEI surveys are summarized in **Table 1**. In addition to conducting QHEI's, water quality (temperature, dissolved oxygen and pH) was also assessed on five of the six streams (one of the six streams was dry at the time of the survey) utilizing a Yellow Springs Instrument (YSI) which was calibrated in the field. Results of the water quality monitoring are presented in **Table 2**. Invertebrate surveys were conducted at each stream utilizing a D net for kick-net sampling when possible, dip-netting when there was no flow in the stream, and visual observation when there wasn't enough standing water to submerge the net. The streams were also evaluated for their potential to provide fish habitat based on specific stream characteristics observed in the field and the results the water quality assessment.

For the purposes of this survey, S9 was divided into three sampling reaches (S9a, S9b, and S9c) due to noticeably different stream characteristics and surrounding habitat (**Figure 1**).

3.0 Results

The following summarizes the results of the QHEI survey, water quality analyses, invertebrate survey, and fish habitat assessment.

3.1 QHEI

The QHEI evaluates streams based on six parameters: 1) substrate, 2) instream cover, 3) channel morphology, 4) bank erosion and riparian zone, 5) pool/glide and riffle/run quality, and 6: gradient/drainage area. A score of up to 20 can be given to parameters 1-3 & 5, and a score of up to 10 can be given to parameters 4 & 6. The maximum cumulative QHEI score that can be given to a stream is 100.

Table 1 provides the QHEI scoring results for the eight sampling reaches within each of the six NRPA regulated streams within the project area:

Table 1. QHEI Scoring Summary

Stream ID	Substrate Max. 20	Instream Cover Max. 20	Channel Morphology Max. 20	Bank Erosion & Riparian Zone Max. 10	Pool/Glide & Riffle/Run Quality Max. 20	Gradient & Drainage Area Max.10	Total Max. 100	Rating
S3	7	6	10	9	-2	6	**36**	**Poor**
S5	6	6	10	9	-2	6	**35**	**Poor**
S6	6	10	10	4	-2	6	**38**	**Poor**
S8	7.5	6	12	6	1	6	**38.5**	**Poor**
S9a	7	10	10	7	-1	6	**39**	**Poor**
S9b	-1	4	4	4	-1	6	**17**	**Very Poor**
S9c	8.5	5	13	6.5	3	6	**42**	**Poor**
S10	6	9	9	4	-2	6	**32**	**Poor**

Table 2. Water Quality Results

	Temperature (Degrees Celsius)	pH	Dissolved Oxygen (Mg/L)
S3	16	6.3	3.02
S5	15.8	6	1.20
S6	16.1	6.2	0.81
S8	16.5	6.5	7.78
S9a	17.88	6.7	7.35
S9b	19.6	6.6	6.28
S9c	17.2	6.5	3.82
S10	Dry	Dry	Dry

Substrate

The substrate parameter is scored based on the following criteria: type, origin, and quality (amount of silt and embeddedness). Of the 20 possible points, S9c scored the highest at 8.5, whereas S9b scored the lowest with -1. S8 scored 7.5, S3 and S9a scored 7's and S5 and S6 scored 6. All eight sampling reaches generally scored low in this category due to the amount of silt and embeddedness identified within each stream.

Instream Cover

The instream cover parameter is scored based on the amount and quality of natural, overhanging or instream shelter available to fish and wildlife. While as these streams are intermittent and unlikely to provide suitable habitat to fish, this parameter was still evaluated. Of the 20 possible points, S9a and S6 scored the highest with 10 due to the presence of overhanging vegetation, and S10 scored 9 having similar characteristics. S3, S5, and S8 all scored 6 and S9b scored the lowest with 4 as this stream occurs within maintained lawn and overhanging vegetation is sparse. Logs and/or woody debris were observed within S3, S5, S6, and S8, and boulders were also observed within S8.

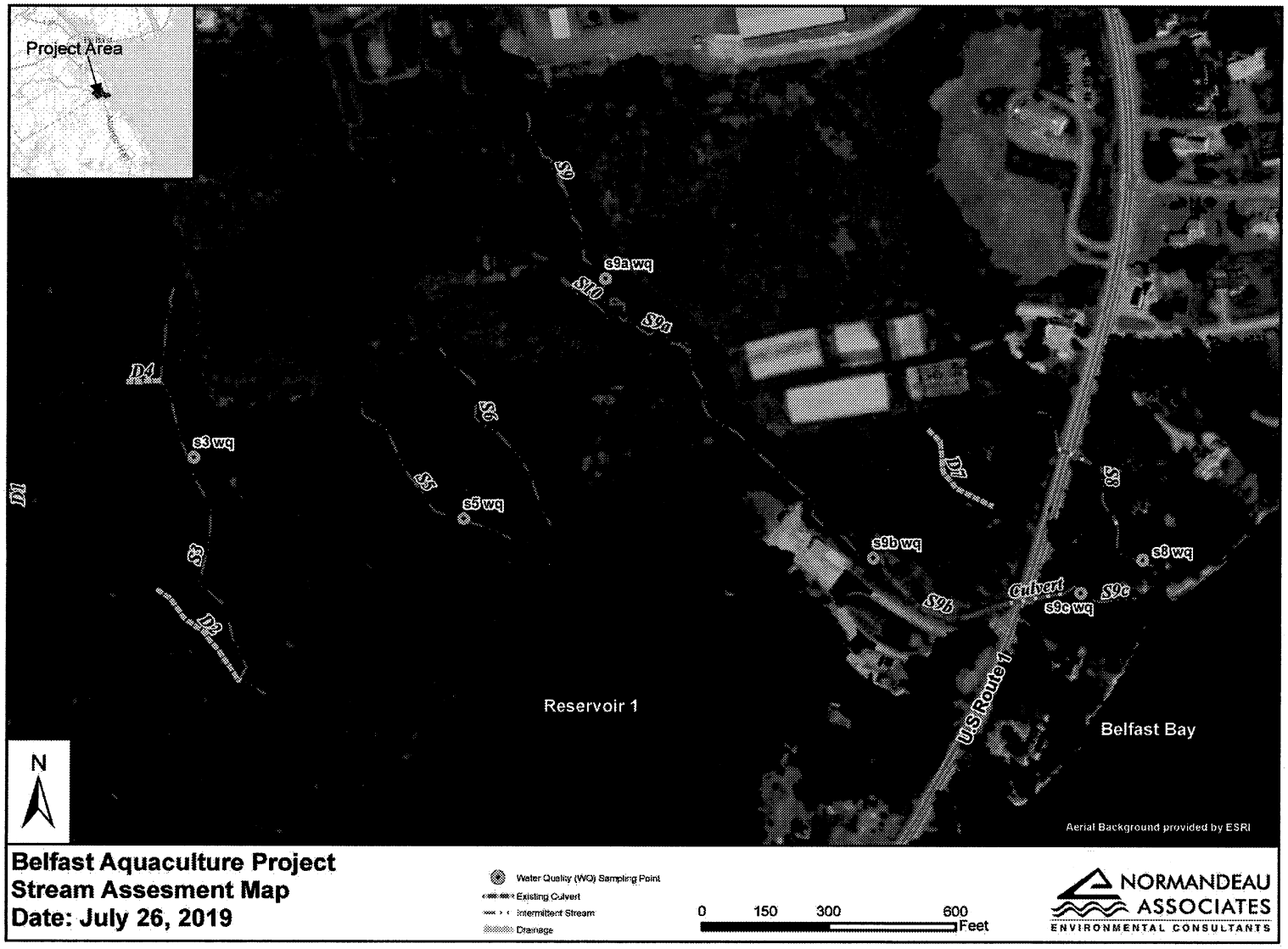


Figure 1. Belfast Aquaculture Project Stream Assessment Map.

Channel Morphology

The channel morphology parameter is scored based on the quality of the stream channel in regards to sinuosity, development, channelization, and stability. It is important to note that "channelization" refers to anthropogenic channelization (ditching, etc.) and not natural channel development, which is discussed as a positive stream attribute in the Wetlands Delineation report Normandeau submitted for this project. Of the 20 possible points, S9c scored the highest with 13 due to low sinuosity (most streams scored 'none'), fair development, no channelization and moderate stability. S9b scored the lowest with no sinuosity, poor development, recent or no recovery from channelization, and low stability. S3, S5, S6 and S9a were all similar in channel characteristics and scored 10 and S8 scored a 12, as it had similar characteristics to S9c except for scoring "none" for sinuosity.

Bank Erosion and Riparian Zone

The bank erosion and riparian zone parameter is scored based on the quality of the surrounding buffer, floodplain, and presence or lack of bank erosion. Of the 10 possible points, S3 and S5 both scored the highest with 9. These two streams are similar in that they both had little or moderate bank erosion, moderate to wide riparian width, and scored high for floodplain quality with either forest or shrub/old field. S6 and S9b scored the lowest with 4. S9b scored low due to having no riparian width and the immediate floodplain being within a maintained lawn; S9b did however show no to little bank erosion due to thick vegetation (grass) along the banks and lack of noticeable flows able to cause erosion. S6 scored low due to heavy/severe erosion and a very narrow riparian width. The remaining streams fell between 7 and 6.5 due to visible erosion and low riparian/floodplain quality: S9a scored 7, S9c scored 6.5, and S8 scored 6.

Pool/Glide and Riffle-Run

The pool/glide and riffle-run parameter is scored based on the depth and width of these features, as well as velocity, substrate type and embeddedness. Of the 20 possible points, the streams scored a range of -2 to 3 (S9c being the highest scoring), largely because these streams are intermittent, mostly lacked flowing water and do not possess riffle and run characteristics.

Gradient

The gradient parameter is based on the elevation drop within the sampling area. The six streams all received the score of "moderate," as they are all intermittent with short sampling areas and are all within similar terrain. Drainage area was not calculated for these streams due to the fact that they are all intermittent with small drainage areas, and this calculation does not add or subtract from the QHEI score.

Summary

Of the 100 total possible QHEI points, the highest scoring sampling stretch was S9c with 42, largely because of the longer hydroperiod resulting in higher scores for substrate, instream cover, channel morphology, and pool/glide and riffle/run quality. S9b scored the lowest with 17, largely because of its channelization, riparian clearing, and other anthropogenic influences. S8 was the second highest scoring stream with 39 and had similarities to S9c in its relatively high scores in substrate quality and channel morphology. S3, S5, S6 and S9a all scored low, within the 30's, as they had relatively similar

characteristics including a shorter flowing hydroperiod, moderate substrate stability, and higher levels of silt and embeddedness.

Although our highest observed score of 42 is higher on the QHEI scale when compared to our lowest observed score of 17, both of these scores indicate low quality habitat. Rankin 1989[1] gives us some context for understanding the observed scores by comparing them to the Index of Biotic Integrity (IBI). Karr 1981[2] elaborates on the strength of IBI and why it is thought to be superior to purely rating aquatic habitat based solely on diversity of species. IBI is a complex rating system for fisheries and invertebrate communities which ensures that species diversity is weighted to reflect the relative environmental tolerances of the species present. This reduces the chances of an artificially inflated habitat quality rating produced by an abundance of only species which can tolerate poor conditions.

With this contextual information in mind, the QHEI scores can be put into perspective. Based on the documented relationship between QHEI and IBI which can be found in Rankin 1989, a QHEI score of 42 would equate to just over 30 on the IBI scale. Karr 1981 suggests that this would fall within the "Poor" rating which is assigned to any score between 28 and 35. A QHEI score of 17 would equate to an IBI score of just over 20, which would receive the worst designation IBI can give, "very poor".

4.0 Water Quality

A YSI was used to sample water quality (temperature, dissolved oxygen and pH) on five of the six streams, and 8 sampling stretches. S10 did not have standing water to sample at the time of the survey. **Table 2** summarizes the results of each sample.

The temperature ranges were typical of what to expect given the atmospheric temperature of approximately 75 degrees Fahrenheit and relative amount of shade, or lack thereof, over each sampling area. The pH was slightly acidic in all of the sampling reaches. Dissolved oxygen was low in most sampling reaches (4 mg/L is generally considered the minimum needed to support populations of fish) with the exception of S8, S9a, and S9b.

5.0 Invertebrate Survey

A D-net was used to survey for invertebrates by conducting kick-netting wherever there was flowing water. Kick-netting was only possible in S8, S9a and S9c as they had slight flows. Dip-netting was done at S9b because there was no flowing water; and invertebrates were recorded as visually observed in S3, S5, S6, and S10 because there were no pools deep enough to submerge the net.

Table 3 summarizes the results of the invertebrate survey. An 'X' indicates 'presence' and a '-' indicates absence.

[1] Rankin E. T. 1989. The Qualitative Habitat Evaluation Index [QHEI]: Rationale, Methods, and Application. State of Ohio Environmental Protection Agency. Ecological Assessment Section. Division of Water Quality. Planning and Assessment.

[2] Karr, James. (1981). Assessment of Biotic Integrity Using Fish Communities. Fisheries. 6. 21-27.

Table 3. Invertebrate Survey Results

Stream Sampling Stretch	Mosquito Larvae	Beetle Larvae	Amphipods	Oligochaetes	Snails
S3	X	-	-	-	-
S5	X	-	-	-	-
S6	X	X	-	-	-
S8	-	-	X	-	-
S10	-	-	-	-	-
S9a	-	-	-	-	X
S9b	-	-	-	-	-
S9c	-	-	-	X	X

The stream reaches sampled exhibited low invertebrate diversity, as just five species were observed. Mosquito and beetle larvae presence was observed in S3, S5, and S6, and the only water in these streams were isolated stagnant pools. A beetle larvae was also observed in S6. Amphipods were observed in S8 which is adjacent to Belfast Bay, and oligochaetes were observed in S9c, which is also adjacent to Belfast Bay. Snails were observed in S9a and S9c.

6.0 Fisheries

During the stream assessment, each sampling reach was evaluated for the potential to provide fish habitat. The potential to provide fish habitat was evaluated based on 1) presence and flow of water, 2) substrate quality, 3) dissolved oxygen, 4) and connectivity to known downstream fish habitat. Connectivity, or lack thereof, was determined based on downstream barriers such as hung culverts and natural barriers including topography and downed logs.

S3, S5, S6, S9a, S9b and S10 were determined to have no potential to provide fish habitat. S3, S5, S6, S8 and S10 have no potential connection with known downstream fish habitat. S10 had no standing water at the time of the survey, while stagnant, shallow, isolated pools were observed in S3, S5, and S6, which is not conducive to providing habitat for fish. Additionally, S3, S5 and S6 all showed dissolved oxygen numbers below 4mg/L (see **Table 2**), which is considered the general accepted minimum needed to support fish populations. S9b is a low gradient, silty, stagnant stretch of stream; upstream from a perched culvert under Route 1 to S9c, so it not considered to provide potential fish habitat. The substrate types in all sampling reaches besides S8 and S9c were predominantly silt based, which is not optimal for fish populations because it can damage gills and cover up eggs.

S8 and S9c are the only two sampling stretches that have an intermittent connection with Belfast Bay. However, both stretches had shallow, isolated pools and did not show an existing connection with Belfast Bay, so the potential for these streams to contain fish is very low.

7.0 Conclusion

Eight sampling reaches within six intermittent streams were evaluated utilizing the QHEI method. Overall the streams scored low out of 100 available points. This is largely because each stream was intermittent and mostly made up of silt, with the exception of S8 and S9c. Each stream also lacked

flowing water that could aid in the identification of pools, glides, riffles and runs with the exception of S8, S9a and S9c; however, riffles and runs were identified based on substrate formations and not active flowing water.

Water quality wasn't conducive to providing fish habitat, particularly in regards to dissolved oxygen with the exception of S8, S9a and 9b.

The streams exhibited low invertebrate diversity, largely due to minimal water, and low quality silty substrate, with the exception of S8 and S9c which had higher quality gravel and cobble for substrate.

Overall, the streams do not have characteristics conducive to providing fish habitat due to either intermittent flows or no potential connection to known downstream fish habitat, low dissolved oxygen, and poor substrate quality.

With all of the streams assessed at the Nordic Aquafarms property receiving QHEI scores between 18 and 42, and corresponding IBI ratings between poor and very poor, it is unlikely that these streams provide adequate habitat to support viable fish populations and generally represent overall low quality stream habitat. However, it is important to note that the project design and proposed impact compensation package focuses on the two highest scoring streams, S9 and S8. The Deeded Riparian Buffer protects all of S9 and the Riparian Restoration plan for S9 focuses on the lowest scoring reaches of S9. The protection and improvements to S9 and the culvert replacement for S8 will result in increasing the QHEI values for some metrics of these two streams.

Appendix A

QHEI Data Sheets

OhioEPA Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 36

Stream & Location: S3 **RM:** _ _ _._ **Date:** 7 / 19 / 19

Sean Moriarty and Ben Griffith **Scorers Full Name & Affiliation:** Normandeau Associates

River Code: N/A - N/A - N/A **STORET #:** N/A **Lat./ Long.:** (NAD 83 - decimal °) 44 . 39604 68.99549 Office verified location ☐

1] SUBSTRATE
Check *ONLY* Two substrate *TYPE BOXES*; estimate % or note every type present

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ BLDR /SLABS [10]			☐ HARDPAN [4]		
☐ BOULDER [9]			☐ DETRITUS [3]		
■ COBBLE [8]	N/A	N/A	☐ MUCK [2]		
☐ GRAVEL [7]			☒ SILT [2]	N/A	N/A
☐ SAND [6]			☐ ARTIFICIAL [0]		
☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ■ 3 or less [0]

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ■ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTURINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

EMBEDDEDNESS

SILT

QUALITY
- ■ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 7 *Maximum 20*

Comments

2] INSTREAM COVER
Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

____ UNDERCUT BANKS [1]	____ POOLS > 70cm [2]	____ OXBOWS, BACKWATERS [1]
1 OVERHANGING VEGETATION [1]	____ ROOTWADS [1]	____ AQUATIC MACROPHYTES [1]
____ SHALLOWS (IN SLOW WATER) [1]	____ BOULDERS [1]	2 LOGS OR WOODY DEBRIS [1]
____ ROOTMATS [1]		

AMOUNT
Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ■ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 6 *Maximum 20*

3] CHANNEL MORPHOLOGY
Check ONE in each category (*Or 2 & average*)

SINUOSITY
- ☐ HIGH [4]
- ☐ MODERATE [3]
- ■ LOW [2]
- ☐ NONE [1]

DEVELOPMENT
- ☐ EXCELLENT [7]
- ☐ GOOD [5]
- ☐ FAIR [3]
- ■ POOR [1]

CHANNELIZATION
- ■ NONE [6]
- ☐ RECOVERED [4]
- ☐ RECOVERING [3]
- ☐ RECENT OR NO RECOVERY [1]

STABILITY
- ☐ HIGH [3]
- ☐ MODERATE [2]
- ■ LOW [1]

Comments

Channel 10 *Maximum 20*

4] BANK EROSION AND RIPARIAN ZONE
Check ONE in each category for *EACH BANK* (*Or 2 per bank & average*)
River right looking downstream

EROSION

L	R	
■	■	NONE / LITTLE [3]
☐	☐	MODERATE [2]
☐	☐	HEAVY / SEVERE [1]

RIPARIAN WIDTH

L	R	
☐	■	WIDE > 50m [4]
■	☐	MODERATE 10-50m [3]
☐	☐	NARROW 5-10m [2]
☐	☐	VERY NARROW < 5m [1]
☐	☐	NONE [0]

FLOOD PLAIN QUALITY

L	R	
☐	■	FOREST, SWAMP [3]
■	☐	SHRUB OR OLD FIELD [2]
☐	☐	RESIDENTIAL, PARK, NEW FIELD [1]
☐	☐	FENCED PASTURE [1]
☐	☐	OPEN PASTURE, ROWCROP [0]

L	R	
☐	☐	CONSERVATION TILLAGE [1]
☐	☐	URBAN OR INDUSTRIAL [0]
☐	☐	MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 9 *Maximum 10*

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (*ONLY!*)
- ☐ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ■ < 0.2m [0]

CHANNEL WIDTH
Check ONE (*Or 2 & average*)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ■ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☐ SLOW [1]
- ■ INTERSTITIAL [-1]
- ■ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current -2 *Maximum 12*

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (*Or 2 & average*). ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH
- ☐ BEST AREAS > 10cm [2]
- ☐ BEST AREAS 5-10cm [1]
- ■ BEST AREAS < 5cm [metric=0]

RUN DEPTH
- ☐ MAXIMUM > 50cm [2]
- ■ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE
- ☐ STABLE (e.g., Cobble, Boulder) [2]
- ☐ MOD. STABLE (e.g., Large Gravel) [1]
- ■ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ NONE [2]
- ☐ LOW [1]
- ☐ MODERATE [0]
- ■ EXTENSIVE [-1]

Comments

Riffle / Run 0 *Maximum 8*

6] GRADIENT (N/A f/mi)
DRAINAGE AREA (N/A mi²)

- ☐ VERY LOW - LOW [2-4]
- ■ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: N/A %GLIDE: N/A
%RUN: N/A %RIFFLE: N/A

Gradient 6 *Maximum 10*

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☐ L. LINE
- ☐ OTHER

STAGE

1st-sample pass-2nd

- ☐ HIGH ☐
- ☐ UP ☐
- ☐ NORMAL ☐
- ☐ LOW ☐
- ☒ DRY ☐

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☐ 0.15 Km
- ☐ 0.12 Km
- ☒ OTHER

<0.12Km meters

CLARITY

1st –sample pass– 2nd

- ☐ < 20 cm ☐
- ☐ 20-<40 cm ☐
- ☐ 40-70 cm ☐
- ☐ > 70 cm/ CTB ☐
- ☐ SECCHI DEPTH ☐

CANOPY

- ☐ > 85%- OPEN
- ☐ 55%-<85%
- ☐ 30%-<55%
- ☐ 10%-<30%
- ☒ <10%- CLOSED

1st pass N/A cm

2nd pass N/A cm

Comment RE: Reach consistency/ Is reach typical of steam?, *Recreation/* Observed - Inferred, *Other/* Sampling observations, Concerns, Access directions, etc.

This sampling reach is generally consistent throughout. Flowing water was not present at the time of the survey and water was only observed in small, stagnant, isolated pools. See Stream Assessment Report for more details.

B] AESTHETICS

- ☐ NUISANCE ALGAE
- ☐ INVASIVE MACROPHYTES
- ☐ EXCESS TURBIDITY
- ☐ DISCOLORATION
- ☐ FOAM / SCUM
- ☐ OIL SHEEN
- ☒ TRASH / LITTER
- ☐ NUISANCE ODOR
- ☐ SLUDGE DEPOSITS
- ☐ CSOs/SSOs/OUTFALLS

C] RECREATION

POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

D] MAINTENANCE

Circle some & *COMMENT*

PUBLIC / PRIVATE / BOTH / NA
ACTIVE / HISTORIC / BOTH / NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OUT / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMOURED / SLUMPS
ISLANDS / SCOURED
IMPOUNDED / DESICCATED
FLOOD CONTROL / DRAINAGE

E] ISSUES

WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENTS

- $\bar{x}$ width 2'
- $\bar{x}$ depth 4"
- max. depth
- $\bar{x}$ bankfull width 6'
- bankfull $\bar{x}$ depth 3'
- W/D ratio
- bankfull max. depth
- floodprone x^2 width
- entrench. ratio

Legacy Tree:

Stream Drawing:

See Figure 1.

OhioEPA Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 35

Stream & Location: S5 **RM:** ___.__ **Date:** 7 / 19 / 19

Sean Moriarty and Ben Griffith **Scorers Full Name & Affiliation:** Normandeau Associates

River Code: N/A - N/A - N/A **STORET #:** N/A **Lat./ Long.:** (NAD 83 - decimal °) 44 . 39614 / 68.99358 Office verified location ☐

1] SUBSTRATE
Check ONLY Two substrate TYPE BOXES; estimate % or note every type present

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ BLDR /SLABS [10]			☐ HARDPAN [4]		
☐ BOULDER [9]			☐ DETRITUS [3]		
☐ COBBLE [8]			☐ MUCK [2]		
☒ GRAVEL [7]	N/A	N/A	☒ SILT [2]	N/A	N/A
☐ SAND [6]			☐ ARTIFICIAL [0]		
☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☒ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTURINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☒ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☒ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 6 *Maximum 20*

Comments

2] INSTREAM COVER
Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

1 UNDERCUT BANKS [1]	POOLS > 70cm [2]	OXBOWS, BACKWATERS [1]
1 OVERHANGING VEGETATION [1]	ROOTWADS [1]	AQUATIC MACROPHYTES [1]
SHALLOWS (IN SLOW WATER) [1]	BOULDERS [1]	1 LOGS OR WOODY DEBRIS [1]
ROOTMATS [1]		

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☒ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 6 *Maximum 20*

3] CHANNEL MORPHOLOGY
Check ONE in each category (Or 2 & average)

SINUOSITY
- ☐ HIGH [4]
- ☐ MODERATE [3]
- ☒ LOW [2]
- ☐ NONE [1]

DEVELOPMENT
- ☐ EXCELLENT [7]
- ☐ GOOD [5]
- ☐ FAIR [3]
- ☒ POOR [1]

CHANNELIZATION
- ☒ NONE [6]
- ☐ RECOVERED [4]
- ☐ RECOVERING [3]
- ☐ RECENT OR NO RECOVERY [1]

STABILITY
- ☐ HIGH [3]
- ☐ MODERATE [2]
- ☒ LOW [1]

Comments

Channel 10 *Maximum 20*

4] BANK EROSION AND RIPARIAN ZONE
Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION

L	R	
☐	☐	NONE / LITTLE [3]
☒	☒	MODERATE [2]
☐	☐	HEAVY / SEVERE [1]

RIPARIAN WIDTH

L	R	
☒	☒	WIDE > 50m [4]
☐	☐	MODERATE 10-50m [3]
☐	☐	NARROW 5-10m [2]
☐	☐	VERY NARROW < 5m [1]
☐	☐	NONE [0]

FLOOD PLAIN QUALITY

L	R	
☒	☒	FOREST, SWAMP [3]
☐	☐	SHRUB OR OLD FIELD [2]
☐	☐	RESIDENTIAL, PARK, NEW FIELD [1]
☐	☐	FENCED PASTURE [1]
☐	☐	OPEN PASTURE, ROWCROP [0]

L	R	
☐	☐	CONSERVATION TILLAGE [1]
☐	☐	URBAN OR INDUSTRIAL [0]
☐	☐	MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 9 *Maximum 10*

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☐ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☒ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☒ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☐ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☒ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current -2 *Maximum 12*

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (Or 2 & average). ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH
- ☐ BEST AREAS > 10cm [2]
- ☐ BEST AREAS 5-10cm [1]
- ☒ BEST AREAS < 5cm [metric=0]

RUN DEPTH
- ☐ MAXIMUM > 50cm [2]
- ☒ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE
- ☐ STABLE (e.g., Cobble, Boulder) [2]
- ☐ MOD. STABLE (e.g., Large Gravel) [1]
- ☒ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ NONE [2]
- ☐ LOW [1]
- ☐ MODERATE [0]
- ☒ EXTENSIVE [-1]

Comments

Riffle / Run 0 *Maximum 8*

6] GRADIENT
(N/A ft/mi)
- ☐ VERY LOW - LOW [2-4]
- ☒ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

DRAINAGE AREA (N/A mi²)

%POOL: N/A %GLIDE: N/A %RUN: N/A %RIFFLE: N/A

Gradient 6 *Maximum 10*

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☐ L. LINE
- ☐ OTHER

STAGE

1st -sample pass-	2nd
☐ HIGH	☐
☐ UP	☐
☐ NORMAL	☐
☐ LOW	☐
■ DRY	☐

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☐ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

<0.12Km meters

CLARITY

1st –sample pass–	2nd
☐ < 20 cm	☐
☐ 20-<40 cm	☐
☐ 40-70 cm	☐
☐ > 70 cm/ CTB	☐
☐ SECCHI DEPTH	☐

1st pass N/A cm

2nd N/A cm

CANOPY

- ☐ > 85% - OPEN
- ☐ 55% -<85%
- ☐ 30% -<55%
- ■ 10% -<30%
- ☐ <10% - CLOSED

B] AESTHETICS

- ☐ NUISANCE ALGAE
- ☐ INVASIVE MACROPHYTES
- ☐ EXCESS TURBIDITY
- ☐ DISCOLORATION
- ☐ FOAM / SCUM
- ☐ OIL SHEEN
- ■ TRASH / LITTER
- ☐ NUISANCE ODOR
- ☐ SLUDGE DEPOSITS
- ☐ CSOs/SSOs/OUTFALLS

C] RECREATION

AREA DEPTH

POOL: ☐ >100ft² ☐ >3ft

Comment RE: Reach consistency/ Is reach typical of steam?, *Recreation/* Observed - Inferred, *Other/* Sampling observations, Concerns, Access directions, etc.

This sampling reach is generally consistent throughout. Flowing water was not present at the time of the survey and water was only observed in small, stagnant, isolated pools. See Stream Assessment Report for more details.

D] MAINTENANCE

Circle some & *COMMENT*

PUBLIC / PRIVATE / BOTH / NA
ACTIVE / HISTORIC / BOTH / NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OUT / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMOURED / SLUMPS
ISLANDS / SCOURED
IMPOUNDED / DESICCATED
FLOOD CONTROL / DRAINAGE

E] ISSUES

WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENTS

$\bar{x}$ width	1'
$\bar{x}$ depth	1/4"
max. depth	
$\bar{x}$ bankfull width	3'
bankfull $\bar{x}$ depth	2'
W/D ratio	
bankfull max. depth	
floodprone x^2 width	
entrench. ratio	

Legacy Tree:

Stream Drawing:

See Figure 1.

OhioEPA Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 38

Stream & Location: S6 **RM:** ___.___ **Date:** 7 / 19 / 19

Sean Moriarty and Ben Griffith **Scorers Full Name & Affiliation:** Normandeau Associates

River Code: N/A - N/A - N/A **STORET #:** N/A **Lat./Long.:** (NAD 83 - decimal °) 44 . 39684 / 68.99313 **Office verified location** ☐

1] SUBSTRATE
Check **ONLY Two** substrate *TYPE BOXES*; estimate % or note every type present

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ BLDR /SLABS [10]			☐ HARDPAN [4]		
☐ BOULDER [9]			☐ DETRITUS [3]		
☐ COBBLE [8]			☐ MUCK [2]		
☐ GRAVEL [7]	N/A	N/A	☐ SILT [2]	N/A	N/A
☐ SAND [6]			☐ ARTIFICIAL [0]		
☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ■ 3 or less [0]

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ■ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTURINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

EMBEDDEDNESS

SILT

QUALITY
- ■ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]
- ■ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 6 *Maximum 20*

Comments

2] INSTREAM COVER
Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

___ UNDERCUT BANKS [1]	___ POOLS > 70cm [2]	___ OXBOWS, BACKWATERS [1]
1 OVERHANGING VEGETATION [1]	___ ROOTWADS [1]	___ AQUATIC MACROPHYTES [1]
___ SHALLOWS (IN SLOW WATER) [1]	___ BOULDERS [1]	2 LOGS OR WOODY DEBRIS [1]
___ ROOTMATS [1]		

AMOUNT
Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ■ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 10 *Maximum 20*

3] CHANNEL MORPHOLOGY
Check ONE in each category (*Or 2 & average*)

SINUOSITY
- ☐ HIGH [4]
- ☐ MODERATE [3]
- ■ LOW [2]
- ☐ NONE [1]

DEVELOPMENT
- ☐ EXCELLENT [7]
- ☐ GOOD [5]
- ☐ FAIR [3]
- ■ POOR [1]

CHANNELIZATION
- ■ NONE [6]
- ☐ RECOVERED [4]
- ☐ RECOVERING [3]
- ☐ RECENT OR NO RECOVERY [1]

STABILITY
- ☐ HIGH [3]
- ☐ MODERATE [2]
- ■ LOW [1]

Comments

Channel 10 *Maximum 20*

4] BANK EROSION AND RIPARIAN ZONE
Check ONE in each category for *EACH BANK* (*Or 2 per bank & average*)

River right looking downstream

EROSION

L	R	
☐	■	NONE / LITTLE [3]
■	☐	MODERATE [2]
☐	☐	HEAVY / SEVERE [1]

RIPARIAN WIDTH

L	R	
☐	■	WIDE > 50m [4]
■	☐	MODERATE 10-50m [3]
☐	☐	NARROW 5-10m [2]
☐	☐	VERY NARROW < 5m [1]
☐	☐	NONE [0]

FLOOD PLAIN QUALITY

L	R	
☐	■	FOREST, SWAMP [3]
☐	☐	SHRUB OR OLD FIELD [2]
■	☐	RESIDENTIAL, PARK, NEW FIELD [1]
☐	☐	FENCED PASTURE [1]
☐	☐	OPEN PASTURE, ROWCROP [0]

L	R	
☐	☐	CONSERVATION TILLAGE [1]
☐	☐	URBAN OR INDUSTRIAL [0]
☐	☐	MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 8 *Maximum 10*

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (*ONLY!*)
- ☐ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ■ < 0.2m [0]

CHANNEL WIDTH
Check ONE (*Or 2 & average*)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ■ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☐ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ■ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current -2 *Maximum 12*

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (*Or 2 & average*). ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH
- ☐ BEST AREAS > 10cm [2]
- ☐ BEST AREAS 5-10cm [1]
- ■ BEST AREAS < 5cm [metric=0]

RUN DEPTH
- ☐ MAXIMUM > 50cm [2]
- ■ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE
- ☐ STABLE (e.g., Cobble, Boulder) [2]
- ☐ MOD. STABLE (e.g., Large Gravel) [1]
- ■ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ NONE [2]
- ☐ LOW [1]
- ☐ MODERATE [0]
- ■ EXTENSIVE [-1]

Comments

Riffle / Run 0 *Maximum 8*

6] GRADIENT (N/A ft/mi)
DRAINAGE AREA (N/A mi²)

- ☐ VERY LOW - LOW [2-4]
- ■ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: N/A %GLIDE: N/A
%RUN: N/A %RIFFLE: N/A

Gradient 6 *Maximum 10*

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☐ L. LINE
- ☐ OTHER

STAGE

1st-sample pass-2nd

- ☐ HIGH ☐
- ☐ UP ☐
- ☐ NORMAL ☐
- ☐ LOW ☐
- ☒ DRY ☐

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☐ 0.15 Km
- ☒ 0.12 Km
- ☒ OTHER

<0.12 meters

CLARITY

1st –sample pass– 2nd

- ☐ < 20 cm ☐
- ☐ 20-<40 cm ☐
- ☐ 40-70 cm ☐
- ☐ > 70 cm/ CTB ☐
- ☐ SECCHI DEPTH ☐

CANOPY

- ☐ > 85% - OPEN
- ☐ 55%-<85%
- ☐ 30%-<55%
- ☒ 10%-<30%
- ☐ <10% - CLOSED

pass 1st N/A cm

pass 2nd N/A cm

Comment RE: Reach consistency/ Is reach typical of steam?, *Recreation/* Observed - Inferred, *Other/* Sampling observations, Concerns, Access directions, etc.

This sampling reach is generally consistent throughout. Flowing water was not present at the time of the survey and water was only observed in small, stagnant, isolated pools. See Stream Assessment Report for more details.

B] AESTHETICS

- ☐ NUISANCE ALGAE
- ☐ INVASIVE MACROPHYTES
- ☐ EXCESS TURBIDITY
- ☐ DISCOLORATION
- ☐ FOAM / SCUM
- ☐ OIL SHEEN
- ☐ TRASH / LITTER
- ☐ NUISANCE ODOR
- ☐ SLUDGE DEPOSITS
- ☐ CSOs/SSOs/OUTFALLS

C] RECREATION

POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

D] MAINTENANCE

Circle some & *COMMENT*

PUBLIC / PRIVATE / BOTH / NA
ACTIVE / HISTORIC / BOTH / NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OUT / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMOURED / SLUMPS
ISLANDS / SCOURED
IMPOUNDED / DESICCATED
FLOOD CONTROL / DRAINAGE

E] ISSUES

WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENTS

- $\bar{x}$ width 2'
- $\bar{x}$ depth 6"
- max. depth
- $\bar{x}$ bankfull width 5'
- bankfull $\bar{x}$ depth 3'
- W/D ratio
- bankfull max. depth
- floodprone x^2 width
- entrench. ratio

Legacy Tree:

Stream Drawing:

See Figure 1.

OhioEPA Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 38.5

Stream & Location: S8 **RM:** _ _ _._ **Date:** 7 / 19 / 19

Scorers Full Name & Affiliation: Sean Moriarty and Ben Griffith, Normandeau Associates

River Code: _ _ _ - _ _ _ - _ _ _ **STORET #:** _ _ _ _ _ _ **Lat./ Long.:** (NAD 83 - decimal °) 44 . 39592 / 68.9673 Office verified location ☐

1] SUBSTRATE
Check ONLY Two substrate TYPE BOXES; estimate % or note every type present

BEST TYPES	POOL	RIFFLE
☐ BLDR /SLABS [10]		
☐ BOULDER [9]		
☐ COBBLE [8]	N/A	N/A
☐ GRAVEL [7]	N/A	N/A
☐ SAND [6]		
☐ BEDROCK [5]		

OTHER TYPES	POOL	RIFFLE
☐ HARDPAN [4]		
☐ DETRITUS [3]		
☐ MUCK [2]		
☐ SILT [2]		
☐ ARTIFICIAL [0]		

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ■ 3 or less [0]

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ■ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTURINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY
- ☐ HEAVY [-2]
- ■ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

SILT / EMBEDDEDNESS

- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Comments

Substrate: 7.5 (Maximum 20)

2] INSTREAM COVER
Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

___ UNDERCUT BANKS [1]	___ POOLS > 70cm [2]	___ OXBOWS, BACKWATERS [1]
1 OVERHANGING VEGETATION [1]	___ ROOTWADS [1]	___ AQUATIC MACROPHYTES [1]
___ SHALLOWS (IN SLOW WATER) [1]	1 BOULDERS [1]	1 LOGS OR WOODY DEBRIS [1]
___ ROOTMATS [1]		

AMOUNT Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ■ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20: 6

3] CHANNEL MORPHOLOGY
Check ONE in each category (Or 2 & average)

SINUOSITY
- ☐ HIGH [4]
- ☐ MODERATE [3]
- ☐ LOW [2]
- ■ NONE [1]

DEVELOPMENT
- ☐ EXCELLENT [7]
- ☐ GOOD [5]
- ■ FAIR [3]
- ☐ POOR [1]

CHANNELIZATION
- ■ NONE [6]
- ☐ RECOVERED [4]
- ☐ RECOVERING [3]
- ☐ RECENT OR NO RECOVERY [1]

STABILITY
- ☐ HIGH [3]
- ■ MODERATE [2]
- ☐ LOW [1]

Comments

Channel Maximum 20: 12

4] BANK EROSION AND RIPARIAN ZONE
Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION

L	R	
■	■	NONE / LITTLE [3]
☐	☐	MODERATE [2]
☐	☐	HEAVY / SEVERE [1]

RIPARIAN WIDTH

L	R	
☐	☐	WIDE > 50m [4]
☐	☐	MODERATE 10-50m [3]
■	■	NARROW 5-10m [2]
☐	☐	VERY NARROW < 5m [1]
☐	☐	NONE [0]

FLOOD PLAIN QUALITY

L	R	
☐	☐	FOREST, SWAMP [3]
☐	☐	SHRUB OR OLD FIELD [2]
■	■	RESIDENTIAL, PARK, NEW FIELD [1]
☐	☐	FENCED PASTURE [1]
☐	☐	OPEN PASTURE, ROWCROP [0]

L	R	
☐	☐	CONSERVATION TILLAGE [1]
☐	☐	URBAN OR INDUSTRIAL [0]
☐	☐	MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10: 6

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)
- ☐ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ■ < 0.2m [0]

CHANNEL WIDTH Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ■ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ SLOW [1]
- ☐ VERY FAST [1]
- ☐ INTERSTITIAL [-1]
- ☐ FAST [1]
- ■ INTERMITTENT [-2]
- ☐ MODERATE [1]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: -2

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (Or 2 & average). ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH
- ☐ BEST AREAS > 10cm [2]
- ☐ BEST AREAS 5-10cm [1]
- ■ BEST AREAS < 5cm [metric=0]

RUN DEPTH
- ☐ MAXIMUM > 50cm [2]
- ■ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE
- ■ STABLE (e.g., Cobble, Boulder) [2]
- ☐ MOD. STABLE (e.g., Large Gravel) [1]
- ☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ NONE [2]
- ☐ LOW [1]
- ■ MODERATE [0]
- ☐ EXTENSIVE [-1]

Comments

Riffle / Run Maximum 8: 3

6] GRADIENT (N/A ft/mi)
DRAINAGE AREA (N/A mi²)

- ☐ VERY LOW - LOW [2-4]
- ■ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: N/A %GLIDE: N/A
%RUN: N/A %RIFFLE: N/A

Gradient Maximum 10: 6

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☐ L. LINE
- ☐ OTHER

STAGE

1st -sample pass-	2nd
☐ HIGH	☐
☐ UP	☐
☐ NORMAL	☐
☐ LOW	☐
■ DRY	☐

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☐ 0.15 Km
- ■ 0.12 Km
- ☐ OTHER

_____ meters

CLARITY

1st –sample pass–	2nd
☐ < 20 cm	☐
☐ 20-<40 cm	☐
☐ 40-70 cm	☐
☐ > 70 cm/ CTB	☐
☐ SECCHI DEPTH	☐

CANOPY

- ☐ > 85% - OPEN
- ☐ 55% -<85%
- ☐ 30% -<55%
- ■ 10% -<30%
- ☐ <10% - CLOSED

1st pass N/A cm

2nd N/A cm

Comment RE: Reach consistency/ Is reach typical of steam?, *Recreation/* Observed - Inferred, *Other/* Sampling observations, Concerns, Access directions, etc.

This sampling reach is generally consistent throughout. Flowing water was not present at the time of the survey and water was only observed in small, stagnant, isolated pools. See Stream Assessment Report for more details.

B] AESTHETICS

- ☐ NUISANCE ALGAE
- ☐ INVASIVE MACROPHYTES
- ☐ EXCESS TURBIDITY
- ☐ DISCOLORATION
- ☐ FOAM / SCUM
- ☐ OIL SHEEN
- ☐ TRASH / LITTER
- ☐ NUISANCE ODOR
- ☐ SLUDGE DEPOSITS
- ☐ CSOs/SSOs/OUTFALLS

C] RECREATION

AREA DEPTH

POOL: ☐ >100ft² ☐ >3ft

D] MAINTENANCE

Circle some & *COMMENT*

PUBLIC / PRIVATE / BOTH / NA
ACTIVE / HISTORIC / BOTH / NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OUT / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMOURED / SLUMPS
ISLANDS / SCOURED
IMPOUNDED / DESICCATED
FLOOD CONTROL / DRAINAGE

E] ISSUES

WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENTS

x̄ width	2'
x̄ depth	4"
max. depth	
x̄ bankfull width	7'
bankfull x̄ depth	2'
W/D ratio	
bankfull max. depth	
floodprone x^2 width	
entrench. ratio	

Legacy Tree:

Stream Drawing:

See Figure 1.

OhioEPA Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 39

Stream & Location: S9a **RM:** _ _ _._ **Date:** 7 / 19 / 19

Sean Moriarty and Ben Griffith **Scorers Full Name & Affiliation:** Normandeau Associates

River Code: N/A - N/A - N/A **STORET #:** N/A **Lat./ Long.:** (NAD 83 - decimal °) 44 . 39713 / 68.99134 Office verified location ☐

1] SUBSTRATE
Check *ONLY* Two substrate *TYPE BOXES*; estimate % or note every type present

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ■ COBBLE [8]	N/A	N/A	☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]	N/A	N/A
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ■ 3 or less [0]

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ■ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTURINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY
- SILT
  - ■ HEAVY [-2]
  - ☐ MODERATE [-1]
  - ☐ NORMAL [0]
  - ☐ FREE [1]
- EMBEDDEDNESS
  - ■ EXTENSIVE [-2]
  - ☐ MODERATE [-1]
  - ☐ NORMAL [0]
  - ☐ NONE [1]

Comments

Substrate 7 *Maximum 20*

2] INSTREAM COVER
Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

- ____ UNDERCUT BANKS [1]
- 3 OVERHANGING VEGETATION [1]
- ____ SHALLOWS (IN SLOW WATER) [1]
- ____ ROOTMATS [1]
- ____ POOLS > 70cm [2]
- ____ ROOTWADS [1]
- ____ BOULDERS [1]
- ____ OXBOWS, BACKWATERS [1]
- ____ AQUATIC MACROPHYTES [1]
- ____ LOGS OR WOODY DEBRIS [1]

AMOUNT Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ■ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20 10

3] CHANNEL MORPHOLOGY
Check ONE in each category (*Or 2 & average*)

SINUOSITY
- ☐ HIGH [4]
- ☐ MODERATE [3]
- ■ LOW [2]
- ☐ NONE [1]

DEVELOPMENT
- ☐ EXCELLENT [7]
- ☐ GOOD [5]
- ☐ FAIR [3]
- ■ POOR [1]

CHANNELIZATION
- ■ NONE [6]
- ☐ RECOVERED [4]
- ☐ RECOVERING [3]
- ☐ RECENT OR NO RECOVERY [1]

STABILITY
- ☐ HIGH [3]
- ☐ MODERATE [2]
- ■ LOW [1]

Comments

Channel Maximum 20 10

4] BANK EROSION AND RIPARIAN ZONE
Check ONE in each category for *EACH BANK* (*Or 2 per bank & average*)

River right looking downstream

EROSION

L	R	
☐	■	NONE / LITTLE [3]
☐	☐	MODERATE [2]
☐	☐	HEAVY / SEVERE [1]

RIPARIAN WIDTH

L	R	
☐	☐	WIDE > 50m [4]
☐	☐	MODERATE 10-50m [3]
■	■	NARROW 5-10m [2]
☐	☐	VERY NARROW < 5m [1]
☐	☐	NONE [0]

FLOOD PLAIN QUALITY

L	R	
☐	☐	FOREST, SWAMP [3]
■	■	SHRUB OR OLD FIELD [2]
☐	☐	RESIDENTIAL, PARK, NEW FIELD [1]
☐	☐	FENCED PASTURE [1]
☐	☐	OPEN PASTURE, ROWCROP [0]

L	R	
☐	☐	CONSERVATION TILLAGE [1]
☐	☐	URBAN OR INDUSTRIAL [0]
☐	☐	MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10 7

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (*ONLY!*)
- ☐ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ■ < 0.2m [0]

CHANNEL WIDTH Check ONE (*Or 2 & average*)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ■ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☐ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ■ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12 -2

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (*Or 2 & average*). ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH
- ☐ BEST AREAS > 10cm [2]
- ☐ BEST AREAS 5-10cm [1]
- ■ BEST AREAS < 5cm [metric=0]

RUN DEPTH
- ☐ MAXIMUM > 50cm [2]
- ■ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE
- ☐ STABLE (e.g., Cobble, Boulder) [2]
- ☐ MOD. STABLE (e.g., Large Gravel) [1]
- ■ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ NONE [2]
- ☐ LOW [1]
- ■ MODERATE [0]
- ☐ EXTENSIVE [-1]

Comments

Riffle / Run Maximum 8 1

6] GRADIENT (N/A ft/mi)
DRAINAGE AREA (N/A mi²)
- ☐ VERY LOW - LOW [2-4]
- ■ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: N/A %GLIDE: N/A
%RUN: N/A %RIFFLE: N/A

Gradient Maximum 10 6

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☐ L. LINE
- ☐ OTHER

STAGE

1st-sample pass-	2nd
☐ HIGH	☐
☐ UP	☐
☐ NORMAL	☐
☐ LOW	☐
☒ DRY	☐

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☐ 0.15 Km
- ☐ 0.12 Km
- ☒ OTHER

<0.12Km meters

CLARITY

1st –sample pass–	2nd
☐ < 20 cm	☐
☐ 20-<40 cm	☐
☐ 40-70 cm	☐
☐ > 70 cm/ CTB	☐
☐ SECCHI DEPTH	☐

CANOPY

- ☐ > 85% - OPEN
- ☒ 55% -<85%
- ☐ 30% -<55%
- ☐ 10% -<30%
- ☐ <10% - CLOSED

1st pass N/A cm

2nd pass N/A cm

Comment RE: Reach consistency/ Is reach typical of steam?, *Recreation/* Observed - Inferred, *Other/* Sampling observations, Concerns, Access directions, etc.

This sampling reach is generally consistent throughout. Flowing water was not present at the time of the survey and water was only observed in small, stagnant, isolated pools. See Stream Assessment Report for more details.

B] AESTHETICS

- ☐ NUISANCE ALGAE
- ☐ INVASIVE MACROPHYTES
- ☐ EXCESS TURBIDITY
- ☐ DISCOLORATION
- ☐ FOAM / SCUM
- ☐ OIL SHEEN
- ☐ TRASH / LITTER
- ☐ NUISANCE ODOR
- ☐ SLUDGE DEPOSITS
- ☐ CSOs/SSOs/OUTFALLS

C] RECREATION

POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

D] MAINTENANCE

Circle some & *COMMENT*

PUBLIC / PRIVATE / BOTH / NA
ACTIVE / HISTORIC / BOTH / NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OUT / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMOURED / SLUMPS
ISLANDS / SCOURED
IMPOUNDED / DESICCATED
FLOOD CONTROL / DRAINAGE

E] ISSUES

WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENTS

x̄ width	1'
x̄ depth	4"
max. depth	
x̄ bankfull width	6'
bankfull x̄ depth	2'
W/D ratio	
bankfull max. depth	
floodprone x^2 width	
entrench. ratio	

Legacy Tree:

Stream Drawing:

See Figure 1.

OhioEPA Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 17

Stream & Location: S9b **RM:** _ _ _._ **Date:** 7 / 19 / 19

Sean Moriarty and Ben Griffith **Scorers Full Name & Affiliation:** Normandeau Associates

River Code: N/A - N/A - N/A **STORET #:** N/A **Lat./ Long.:** 44 . 39539 / 68.98895 (NAD 83 - decimal °) Office verified location ☐

1] SUBSTRATE

Check *ONLY* Two substrate *TYPE BOXES*; estimate % or note every type present

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ BLDR /SLABS [10]			☐ HARDPAN [4]		
☐ BOULDER [9]			☐ DETRITUS [3]		
☐ COBBLE [8]			☐ MUCK [2]		
☐ GRAVEL [7]			■ SILT [2]	N/A	N/A
☐ SAND [6]			☐ ARTIFICIAL [0]		
☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ■ 3 or less [0]

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ■ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTURINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ■ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ■ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate -1 *Maximum 20*

Comments

2] INSTREAM COVER

Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

____ UNDERCUT BANKS [1]	____ POOLS > 70cm [2]	____ OXBOWS, BACKWATERS [1]
1 OVERHANGING VEGETATION [1]	____ ROOTWADS [1]	____ AQUATIC MACROPHYTES [1]
____ SHALLOWS (IN SLOW WATER) [1]	____ BOULDERS [1]	____ LOGS OR WOODY DEBRIS [1]
____ ROOTMATS [1]		

AMOUNT

Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ■ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20 4

3] CHANNEL MORPHOLOGY

Check ONE in each category (*Or 2 & average*)

SINUOSITY
- ☐ HIGH [4]
- ☐ MODERATE [3]
- ☐ LOW [2]
- ■ NONE [1]

DEVELOPMENT
- ☐ EXCELLENT [7]
- ☐ GOOD [5]
- ☐ FAIR [3]
- ■ POOR [1]

CHANNELIZATION
- ☐ NONE [6]
- ☐ RECOVERED [4]
- ☐ RECOVERING [3]
- ■ RECENT OR NO RECOVERY [1]

STABILITY
- ☐ HIGH [3]
- ☐ MODERATE [2]
- ■ LOW [1]

Comments

Channel Maximum 20 4

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for *EACH BANK* (*Or 2 per bank & average*)

River right looking downstream

EROSION L	EROSION R	RIPARIAN WIDTH L	RIPARIAN WIDTH R
■ NONE / LITTLE [3]	■ NONE / LITTLE [3]	☐ WIDE > 50m [4]	☐ WIDE > 50m [4]
☐ MODERATE [2]	☐ MODERATE [2]	☐ MODERATE 10-50m [3]	☐ MODERATE 10-50m [3]
☐ HEAVY / SEVERE [1]	☐ HEAVY / SEVERE [1]	☐ NARROW 5-10m [2]	☐ NARROW 5-10m [2]
		☐ VERY NARROW < 5m [1]	☐ VERY NARROW < 5m [1]
		■ NONE [0]	■ NONE [0]

FLOOD PLAIN QUALITY L	FLOOD PLAIN QUALITY R
☐ FOREST, SWAMP [3]	☐ FOREST, SWAMP [3]
☐ SHRUB OR OLD FIELD [2]	☐ SHRUB OR OLD FIELD [2]
■ RESIDENTIAL, PARK, NEW FIELD [1]	■ RESIDENTIAL, PARK, NEW FIELD [1]
☐ FENCED PASTURE [1]	☐ FENCED PASTURE [1]
☐ OPEN PASTURE, ROWCROP [0]	☐ OPEN PASTURE, ROWCROP [0]

L	R	
☐	☐	CONSERVATION TILLAGE [1]
☐	☐	URBAN OR INDUSTRIAL [0]
☐	☐	MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10 4

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (*ONLY!*)
- ☐ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ■ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (*Or 2 & average*)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ■ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☐ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ■ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12 -1

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (*Or 2 & average*). ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH
- ☐ BEST AREAS > 10cm [2]
- ☐ BEST AREAS 5-10cm [1]
- ■ BEST AREAS < 5cm [metric=0]

RUN DEPTH
- ☐ MAXIMUM > 50cm [2]
- ■ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE
- ☐ STABLE (e.g., Cobble, Boulder) [2]
- ☐ MOD. STABLE (e.g., Large Gravel) [1]
- ■ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ NONE [2]
- ☐ LOW [1]
- ☐ MODERATE [0]
- ■ EXTENSIVE [-1]

Comments

Riffle / Run Maximum 8 1

6] GRADIENT (ft/mi) DRAINAGE AREA (mi²)

- ☐ VERY LOW - LOW [2-4]
- ■ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: N/A %GLIDE: N/A %RUN: N/A %RIFFLE: N/A

Gradient Maximum 10 6

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☐ L. LINE
- ☐ OTHER

STAGE

1st-sample pass-2nd

- ☐ HIGH ☐
- ☐ UP ☐
- ☐ NORMAL ☐
- ☐ LOW ☐
- ☒ DRY ☐

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☐ 0.15 Km
- ☐ 0.12 Km
- ☒ OTHER

<0.12Km meters

CLARITY

1st –sample pass– 2nd

- ☐ < 20 cm ☐
- ☐ 20-<40 cm ☐
- ☐ 40-70 cm ☐
- ☐ > 70 cm/ CTB ☐
- ☐ SECCHI DEPTH ☐

CANOPY

- ☒ > 85%- OPEN
- ☐ 55%-<85%
- ☐ 30%-<55%
- ☐ 10%-<30%
- ☐ <10%- CLOSED

1st pass N/A cm

2nd pass N/A cm

C] RECREATION AREA DEPTH

POOL: ☐ >100ft² ☐ >3ft

Comment RE: Reach consistency/ Is reach typical of steam?, *Recreation/* Observed - Inferred, *Other/* Sampling observations, Concerns, Access directions, etc.

This sampling reach is generally consistent throughout. Flowing water was not present at the time of the survey and water was only observed in small, stagnant, isolated pools. See Stream Assessment Report for more details.

B] AESTHETICS

- ☐ NUISANCE ALGAE
- ☐ INVASIVE MACROPHYTES
- ☐ EXCESS TURBIDITY
- ☐ DISCOLORATION
- ☐ FOAM / SCUM
- ☐ OIL SHEEN
- ☐ TRASH / LITTER
- ☐ NUISANCE ODOR
- ☐ SLUDGE DEPOSITS
- ☐ CSOs/SSOs/OUTFALLS

D] MAINTENANCE

Circle some & *COMMENT*

PUBLIC / PRIVATE / BOTH / NA
ACTIVE / HISTORIC / BOTH / NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OUT / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMOURED / SLUMPS
ISLANDS / SCOURED
IMPOUNDED / DESICCATED
FLOOD CONTROL / DRAINAGE

E] ISSUES

WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENTS

- $\bar{x}$ width 3'
- $\bar{x}$ depth 1'
- max. depth
- $\bar{x}$ bankfull width 7'
- bankfull $\bar{x}$ depth 3'
- W/D ratio
- bankfull max. depth
- floodprone x^2 width
- entrench. ratio

Legacy Tree:

Stream Drawing:

See Figure 1.

OhioEPA Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 42

Stream & Location: S9c **RM:** _ _ _._ **Date:** 7 / 19 / 19

Sean Moriarty and Ben Griffith **Scorers Full Name & Affiliation:** Normandeau Associates

River Code: N/A - N/A - N/A **STORET #:** N/A **Lat./ Long.:** (NAD 83 - decimal °) 44 . 39547 / 68.98747 **Office verified location** ☐

1] SUBSTRATE

Check *ONLY* Two substrate *TYPE BOXES*; estimate % or note every type present

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]	N/A	N/A	☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]	N/A	N/A	☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ■ 3 or less [0]

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ■ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTURINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ■ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☒ NORMAL [0]
- ☐ NONE [1]

Comments

Substrate 8.5 *Maximum 20*

2] INSTREAM COVER

Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

- ____ UNDERCUT BANKS [1]
- 1 OVERHANGING VEGETATION [1]
- ____ SHALLOWS (IN SLOW WATER) [1]
- ____ ROOTMATS [1]
- ____ POOLS > 70cm [2]
- ____ ROOTWADS [1]
- ____ BOULDERS [1]
- ____ OXBOWS, BACKWATERS [1]
- ____ AQUATIC MACROPHYTES [1]
- 1 LOGS OR WOODY DEBRIS [1]

AMOUNT

Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ■ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover *Maximum 20* 5

3] CHANNEL MORPHOLOGY

Check ONE in each category (*Or 2 & average*)

SINUOSITY
- ☐ HIGH [4]
- ☐ MODERATE [3]
- ■ LOW [2]
- ☐ NONE [1]

DEVELOPMENT
- ☐ EXCELLENT [7]
- ☐ GOOD [5]
- ■ FAIR [3]
- ☐ POOR [1]

CHANNELIZATION
- ■ NONE [6]
- ☐ RECOVERED [4]
- ☐ RECOVERING [3]
- ☐ RECENT OR NO RECOVERY [1]

STABILITY
- ☐ HIGH [3]
- ■ MODERATE [2]
- ☐ LOW [1]

Comments

Channel *Maximum 20* 13

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for *EACH BANK* (*Or 2 per bank & average*)

River right looking downstream

EROSION

L	R	
☐	☐	NONE / LITTLE [3]
☐	■	MODERATE [2]
☐	☐	HEAVY / SEVERE [1]

RIPARIAN WIDTH

L	R	
☐	☐	WIDE > 50m [4]
☐	■	MODERATE 10-50m [3]
☐	☐	NARROW 5-10m [2]
☐	☐	VERY NARROW < 5m [1]
☐	☐	NONE [0]

FLOOD PLAIN QUALITY

L	R	
☐	☐	FOREST, SWAMP [3]
☐	☐	SHRUB OR OLD FIELD [2]
■	☐	RESIDENTIAL, PARK, NEW FIELD [1]
☐	☐	FENCED PASTURE [1]
☐	☐	OPEN PASTURE, ROWCROP [0]

L	R	
☐	☐	CONSERVATION TILLAGE [1]
☐	☐	URBAN OR INDUSTRIAL [0]
☐	☐	MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian *Maximum 10* 6.5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (*ONLY!*)
- ☐ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ■ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (*Or 2 & average*)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ■ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☐ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ■ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current *Maximum 12* -1

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (*Or 2 & average*). ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH
- ☐ BEST AREAS > 10cm [2]
- ☐ BEST AREAS 5-10cm [1]
- ■ BEST AREAS < 5cm [metric=0]

RUN DEPTH
- ☐ MAXIMUM > 50cm [2]
- ■ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE
- ■ STABLE (e.g., Cobble, Boulder) [2]
- ☐ MOD. STABLE (e.g., Large Gravel) [1]
- ☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ NONE [2]
- ■ LOW [1]
- ☐ MODERATE [0]
- ☐ EXTENSIVE [-1]

Comments

Riffle / Run *Maximum 8* 4

6] GRADIENT

(N/A ft/mi) ☐ VERY LOW - LOW [2-4] ■ MODERATE [6-10] ☐ HIGH - VERY HIGH [10-6]

DRAINAGE AREA (N/A mi²)

%POOL: N/A %GLIDE: N/A %RUN: N/A %RIFFLE: N/A

Gradient *Maximum 10* 6

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☐ L. LINE
- ☐ OTHER

STAGE

1st-sample pass-	2nd
☐ HIGH	☐
☐ UP	☐
☐ NORMAL	☐
☐ LOW	☐
■ DRY	☐

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☐ 0.15 Km
- ■ 0.12 Km
- ■ OTHER

<0.12 meters

CLARITY

1st –sample pass–	2nd
☐ < 20 cm	☐
☐ 20-<40 cm	☐
☐ 40-70 cm	☐
☐ > 70 cm/ CTB	☐
☐ SECCHI DEPTH	☐

CANOPY

- ■ > 85%- OPEN
- ☐ 55%-<85%
- ☐ 30%-<55%
- ☐ 10%-<30%
- ☐ <10%- CLOSED

1st pass N/A cm

2nd pass N/A cm

Comment RE: Reach consistency/ Is reach typical of steam?, *Recreation/* Observed - Inferred, *Other/* Sampling observations, Concerns, Access directions, etc.

This sampling reach is generally consistent throughout. Flowing water was not present at the time of the survey and water was only observed in small, stagnant, isolated pools. See Stream Assessment Report for more details.

B] AESTHETICS

- ☐ NUISANCE ALGAE
- ☐ INVASIVE MACROPHYTES
- ☐ EXCESS TURBIDITY
- ☐ DISCOLORATION
- ☐ FOAM / SCUM
- ☐ OIL SHEEN
- ☐ TRASH / LITTER
- ☐ NUISANCE ODOR
- ☐ SLUDGE DEPOSITS
- ☐ CSOs/SSOs/OUTFALLS

C] RECREATION

POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

D] MAINTENANCE

Circle some & *COMMENT*

PUBLIC / PRIVATE / BOTH / NA
ACTIVE / HISTORIC / BOTH / NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OUT / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMOURED / SLUMPS
ISLANDS / SCOURED
IMPOUNDED / DESICCATED
FLOOD CONTROL / DRAINAGE

E] ISSUES

WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENTS

$\bar{x}$ width	3'
$\bar{x}$ depth	4"
max. depth	
$\bar{x}$ bankfull width	20'
bankfull $\bar{x}$ depth	2'
W/D ratio	
bankfull max. depth	
floodprone x^2 width	
entrench. ratio	

Legacy Tree:

Stream Drawing:

See Figure 1.

OhioEPA Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 32

Stream & Location: S10 **RM:** _ _ _._ **Date:** 7 / 19 / 19

Sean Moriarty and Ben Griffith **Scorers Full Name & Affiliation:** Normandeau Associates

River Code: _ _ _ - _ _ _ - _ _ _ **STORET #:** _ _ _ _ _ _ **Lat./ Long.:** 44 . 39738 / 68.99205 (NAD 83 - decimal °) Office verified location ☐

1] SUBSTRATE
Check *ONLY* Two substrate *TYPE BOXES*; estimate % or note every type present

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☒ GRAVEL [7]	N/A	N/A	☒ ☐ SILT [2]	N/A	N/A
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ☒ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTURINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

EMBEDDEDNESS

SILT

QUALITY
- ☒ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 6 *Maximum 20*

Comments

2] INSTREAM COVER
Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

____ UNDERCUT BANKS [1]	____ POOLS > 70cm [2]	____ OXBOWS, BACKWATERS [1]
2 OVERHANGING VEGETATION [1]	____ ROOTWADS [1]	____ AQUATIC MACROPHYTES [1]
____ SHALLOWS (IN SLOW WATER) [1]	____ BOULDERS [1]	____ LOGS OR WOODY DEBRIS [1]
____ ROOTMATS [1]		

AMOUNT
Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☒ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20 9

3] CHANNEL MORPHOLOGY
Check ONE in each category (*Or 2 & average*)

SINUOSITY
- ☐ HIGH [4]
- ☐ MODERATE [3]
- ☐ LOW [2]
- ☒ NONE [1]

DEVELOPMENT
- ☐ EXCELLENT [7]
- ☐ GOOD [5]
- ☐ FAIR [3]
- ☒ POOR [1]

CHANNELIZATION
- ☒ NONE [6]
- ☐ RECOVERED [4]
- ☐ RECOVERING [3]
- ☐ RECENT OR NO RECOVERY [1]

STABILITY
- ☐ HIGH [3]
- ☐ MODERATE [2]
- ☒ LOW [1]

Comments

Channel Maximum 20 9

4] BANK EROSION AND RIPARIAN ZONE
Check ONE in each category for *EACH BANK* (*Or 2 per bank & average*)

River right looking downstream

EROSION

L	R	
☐	☐	NONE / LITTLE [3]
☐	☐	MODERATE [2]
☐	☒	HEAVY / SEVERE [1]

RIPARIAN WIDTH

L	R	
☐	☐	WIDE > 50m [4]
☐	☐	MODERATE 10-50m [3]
☐	☐	NARROW 5-10m [2]
☐	☒	VERY NARROW < 5m [1]
☐	☐	NONE [0]

FLOOD PLAIN QUALITY

L	R	
☐	☐	FOREST, SWAMP [3]
☒	☒	SHRUB OR OLD FIELD [2]
☐	☐	RESIDENTIAL, PARK, NEW FIELD [1]
☐	☐	FENCED PASTURE [1]
☐	☐	OPEN PASTURE, ROWCROP [0]

L	R	
☐	☐	CONSERVATION TILLAGE [1]
☐	☐	URBAN OR INDUSTRIAL [0]
☐	☐	MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10 4

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (*ONLY!*)
- ☐ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☒ < 0.2m [0]

CHANNEL WIDTH
Check ONE (*Or 2 & average*)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☒ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY
Check ALL that apply

☐ TORRENTIAL [-1]	☐ SLOW [1]
☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ FAST [1]	☒ INTERMITTENT [-2]
☐ MODERATE [1]	☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12 -2

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (*Or 2 & average*). ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH
- ☐ BEST AREAS > 10cm [2]
- ☐ BEST AREAS 5-10cm [1]
- ☒ BEST AREAS < 5cm [metric=0]

RUN DEPTH
- ☐ MAXIMUM > 50cm [2]
- ☒ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE
- ☐ STABLE (e.g., Cobble, Boulder) [2]
- ☐ MOD. STABLE (e.g., Large Gravel) [1]
- ☒ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ NONE [2]
- ☐ LOW [1]
- ☐ MODERATE [0]
- ☒ EXTENSIVE [-1]

Comments

Riffle / Run Maximum 8 0

6] GRADIENT (ft/mi) DRAINAGE AREA (mi²)
- ☐ VERY LOW - LOW [2-4]
- ☒ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: N/A %GLIDE: N/A %RUN: N/A %RIFFLE: N/A

Gradient Maximum 10 6

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☐ L. LINE
- ☐ OTHER

STAGE

1st -sample pass-	2nd
☐ HIGH	☐
☐ UP	☐
☐ NORMAL	☐
☐ LOW	☐
■ DRY	☐

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☐ 0.15 Km
- ■ 0.12 Km
- ☐ OTHER

_____ meters

CLARITY

1st –sample pass–	2nd
☐ < 20 cm	☐
☐ 20-<40 cm	☐
☐ 40-70 cm	☐
☐ > 70 cm/ CTB	☐
☐ SECCHI DEPTH	☐

CANOPY

- ☐ > 85% - OPEN
- ■ 55% -<85%
- ☐ 30% -<55%
- ☐ 10% -<30%
- ☐ <10% - CLOSED

1st pass: N/A _____ cm

2nd pass: N/A _____ cm

C] RECREATION

AREA DEPTH

POOL: ☐ >100ft² ☐ >3ft

Comment RE: Reach consistency/ Is reach typical of steam?, *Recreation/* Observed - Inferred, *Other/* Sampling observations, Concerns, Access directions, etc.

B] AESTHETICS

- ☐ NUISANCE ALGAE
- ☐ INVASIVE MACROPHYTES
- ☐ EXCESS TURBIDITY
- ☐ DISCOLORATION
- ☐ FOAM / SCUM
- ☐ OIL SHEEN
- ☐ TRASH / LITTER
- ☐ NUISANCE ODOR
- ☐ SLUDGE DEPOSITS
- ☐ CSOs/SSOs/OUTFALLS

D] MAINTENANCE

Circle some & *COMMENT*

PUBLIC / PRIVATE / BOTH / NA
ACTIVE / HISTORIC / BOTH / NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OUT / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMOURED / SLUMPS
ISLANDS / SCOURED
IMPOUNDED / DESICCATED
FLOOD CONTROL / DRAINAGE

E] ISSUES

WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENTS

$\bar{x}$ width	5'
$\bar{x}$ depth	2"
max. depth	
$\bar{x}$ bankfull width	4'
bankfull $\bar{x}$ depth	3'
W/D ratio	
bankfull max. depth	
floodprone x^2 width	
entrench. ratio	

Legacy Tree:

Stream Drawing:

See Figure 1.

Appendix B

Photo Log



Photo #: 1

S3 – dry portion covered with pine needles.



Photo #: 2

S3 – looking downstream near edge of the project area.



Photo #: 3

S3 – near upstream start of channelized flows.



Photo #: 4

S5 – looking downstream from middle section.



Photo #: 5

S5 – Looking upstream from middle section.



Photo #: 6

S5 – Looking upstream in upper portion.



Photo #: 7

S6 – Looking downstream from upstream portion.



Photo #: 8

S6 – Isolated small pool.



Photo #: 9

S8 – Looking downstream from Eckrote driveway.



Photo #: 10

S8 – Looking downstream from Route 1.



Photo #: 11

S8 – Looking upstream from the downstream portion.



Photo #: 12

S9a – Densely vegetated portion, facing downstream.



Photo #: 13

S9a – Densely vegetated portion looking upstream.



Photo #: 14

S9b – Cleared reach, facing downstream.



Photo #: 15

S9b – Cleared reach, facing upstream.



Photo #: 16

S9c – Lower reach near Belfast Bay, facing downstream.



Photo #: 17

S9c – Lower reach, facing upstream.



Photo #: 18

S10 – Looking downstream from field.



Photo #: 19

S10 – Facing upstream from the edge of the field.



Photo #: 20

S10 – Facing upstream from shrub portion.

ATTACHMENT H

Wetland Determination Data Forms

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Ransom Consulting, Inc.
Project 171.05027.008

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Nordic Aquaculture Project City/County: Belfast/Waldo Sampling Date: 5/18/2018
Applicant/Owner: Nordic Aquaculture State: Maine Sampling Point: W1-wet
Investigator(s): E. Lema Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): None
Slope (%): 0 Lat.: 44.2351 Long.: -68.547 Datum: NAD83
Soil Map Unit Name: Swanville Silt Loam 0-3% slopes NWI Classification: N/A
Are climatic/hydrologic conditions of the site typical for this time of the year? ____ (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y		
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	W1

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- X Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches): ____
Water table present?	Yes	X	No	____	Depth (inches): 8-14"
Saturation present? (includes capillary fringe)	Yes	X	No	____	Depth (inches): 0

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Obvious wetland hydrology at surface.

VEGETATION - Use scientific names of plants

Sampling Point: W1-wet

Tree Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1	*Pinus strobus*	40	Y	FACU
2	*Abies balsamea*	25	Y	FAC
3	*Acer rubrum*	25	Y	FAC
4	*Quercus rubra*	5	N	FACU
5				
6				
7				
8				
9				
10				
		95	= Total Cover	

Sapling/Shrub Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1	*Frangula alnus*	40	Y	FAC
2	*Abies balsamea*	10	Y	FAC
3				
4				
5				
6				
7				
8				
9				
10				
		50	= Total Cover	

Herb Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1	*Dryopteris intermedia*	10	Y	FAC
2	*Maianthemum canadense*	3	Y	FACU
3	*Osmundastrum cinnamomeum*	2	N	FACW
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		15	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	19	48
Sapling/Shrub Stratum	10	25
Herb Stratum	3	8
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across all Strata: 7 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 71.43% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0	
FACW species	2	x 2 =	4	
FAC species	110	x 3 =	330	
FACU species	48	x 4 =	192	
UPL species	0	x 5 =	0	
Column totals	160 (A)		526	(B)

Prevalence Index = B/A = 3.29

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- ___ Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- X
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Herbaceous layer sparse due to early season. Morphological adaptations are in the form of extensive networks of tree roots at or above the soil surface in response to a high water table. White Pine and hemlock are especially pronounced throughout wetland areas.

SOIL **Sampling Point:** W1-wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-2	7.5YR2.5/1	100					Loam/Muck	
2-12	2.5Y4/1	45	10YR4/6	10	C	M	Silt Loam	
	10YR5/2	45						
12-18+	2.5Y4/1	80	10YR4/6	15	C	M	Silty Clay Loam	
			2.5Y6/1	5	D	M		

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
_X_ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? ___Y___

Remarks:
Soil color difficult to distinguish due to multiple matrix colors within the fine textured soils. Many prominent con

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Nordic Aquaculture Project City/County: Belfast/Waldo Sampling Date: 5/18/2018
Applicant/Owner: Nordic Aquaculture State: Maine Sampling Point: W1-up
Investigator(s): E. Lema Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): None
Slope (%): 0 Lat.: 44.235 Long.: -68.545 Datum: NAD83
Soil Map Unit Name: Boothbay Silt Loam 3-8% Slopes NWI Classification: N/A
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	N		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes ____	No X	Depth (inches):	
Water table present?	Yes ____	No X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes ____	No X	Depth (inches):	

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Upland forest

VEGETATION - Use scientific names of plants

Sampling Point: W1-up

Tree Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1	*Quercus rubra*	35	Y	FACU
2	*Pinus strobus*	25	Y	FACU
3	*Acer rubrum*	10	N	FAC
4	*Abies balsamea*	5	N	FAC
5	*Tsuga canadensis*	5	N	FACU
6				
7				
8				
9				
10				
		80	= Total Cover	

Sapling/Shrub Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1	*Abies balsamea*	5	Y	FAC
2	*Frangula alnus*	5	Y	FAC
3				
4				
5				
6				
7				
8				
9				
10				
		10	= Total Cover	

Herb Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1	*Pteridium aquilinum*	5	Y	FACU
2	*Osmundastrum cinnamomeum*	5	Y	FACW
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		10	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	16	40
Sapling/Shrub Stratum	2	5
Herb Stratum	2	5
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 6 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 50.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	5	x 2 =	10
FAC species	25	x 3 =	75
FACU species	70	x 4 =	280
UPL species	0	x 5 =	0
Column totals	100 (A)		365 (B)

Prevalence Index = B/A = 3.65

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation
___ Dominance test is >50%
___ Prevalence index is ≤3.0*
___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

Oak/pine upland forest. Fine textured soils and gentle topography provides suitable conditions for mesic species.

SOIL **Sampling Point:** W1-up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-3	10YR3/3	100					Loam	
3-10	10YR4/2	100					Silt Loam	
10-18+	2.5Y4/2	90	10YR4/6	10	C	M	Silt Loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? ___N___

Remarks:
Upland, fine textured soils promote some redox formation.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Nordic Aquaculture Project City/County: Belfast/Waldo Sampling Date: 5/18/2018
Applicant/Owner: Nordic Aquaculture State: Maine Sampling Point: W5-wet
Investigator(s): E. Lema Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): slope Local relief (concave, convex, none): Convex
Slope (%): 2 Lat.: 44.2347 Long.: -68.593 Datum: NAD83
Soil Map Unit Name: Boothbay Silt Loam 3-8% slopes NWI Classification: N/A
Are climatic/hydrologic conditions of the site typical for this time of the year? ____ (If no, explain in remarks)
Are vegetation X, soil X, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y		
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	W5

Remarks: (Explain alternative procedures here or in a separate report.)

Disturbed old field, partially planted with Balsam Fir. Likely developed wetland characteristics due to compaction/disturbance.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes ____	No X	Depth (inches): ____	**Indicators of wetland hydrology present?**	Y
Water table present?	Yes ____	No X	Depth (inches): ____		
Saturation present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____		

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Site is an old field, dominated by hydrophytes, disturbance likely altered hydrology. Marginal area.

VEGETATION - Use scientific names of plants

Sampling Point: W5-wet

Tree Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1	*Spiraea alba*	45	Y	FACW
2	*Frangula alnus*	15	Y	FAC
3				
4				
5				
6				
7				
8				
9				
10				
		60	= Total Cover	

Herb Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1	*Spiraea alba*	30	Y	FACW
2	*Onoclea sensibilis*	10	N	FACW
3	*Solidago rugosa*	5	N	FAC
4	*Potentilla simplex*	5	N	FACU
5	*Doellingeria umbellata*	3	N	FACW
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		53	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	12	30
Herb Stratum	11	27
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0	
FACW species	88	x 2 =	176	
FAC species	20	x 3 =	60	
FACU species	5	x 4 =	20	
UPL species	0	x 5 =	0	
Column totals	113	(A)	256	(B)
Prevalence Index = B/A =			2.27	

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Disturbed old field vegtation

SOIL **Sampling Point:** W5-wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-3	10YR3/2	100					Silt Loam	
3-11	2.5Y4/2	70	10YR4/6	5	C	M	Silty Clay Loam	
	10YR3/3	20	2.5Y5/1	5	D	M	Silty Clay Loam	
11-18	2.5Y4/1	85	10YR4/6	15	C	M	Silty Clay Loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
_X_ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? __Y__

Remarks:
Ap above 11 inches. Significantly disturbed, mixed matrices.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Nordic Aquaculture Project City/County: Belfast/Waldo Sampling Date: 5/18/2018
Applicant/Owner: Nordic Aquaculture State: Maine Sampling Point: W5-up
Investigator(s): E. Lema Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): slope Local relief (concave, convex, none): Convex
Slope (%): 2 Lat.: 44.2347 Long.: -68.593 Datum: NAD83
Soil Map Unit Name: Boothbay Silt Loam 3-8% slopes NWI Classification: N/A
Are climatic/hydrologic conditions of the site typical for this time of the year? ____ (If no, explain in remarks)
Are vegetation X, soil X, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	N		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes ____	No X	Depth (inches): ____	**Indicators of wetland hydrology present?**	N
Water table present?	Yes ____	No X	Depth (inches): ____		
Saturation present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____		

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Old field, marginal area. No hydrology indicators present.

VEGETATION - Use scientific names of plants

Sampling Point: W5-up

Tree Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Frangula alnus*	10	Y	FAC
2				
3				
4				
5				
6				
7				
8				
9				
10				
		10	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Solidago rugosa*	35	Y	FAC
2	*Solidago canadensis*	15	Y	FACU
3	*Hieracium greenii*	15	Y	FACU
4	*Rumex crispus*	2	N	FAC
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		67	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	2	5
Herb Stratum	13	34
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 4 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 50.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	47	x 3 =	141
FACU species	30	x 4 =	120
UPL species	0	x 5 =	0
Column totals	77 (A)		261 (B)

Prevalence Index = B/A = 3.39

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation
___ Dominance test is >50%
___ Prevalence index is ≤3.0*
___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** W5-up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-9	10YR3/3	100					Loam	
9-14	10YR4/3	95	2.5Y5/1	5	D	M	Silt Loam	
14-20	2.5Y4/1	80	2.5Y4/6	10	C	M	Silty Clay Loam	
			10YR4/3	10	C	M		

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? N

Remarks:
Mixed matrix does not meet hydric soil criteria. Disturbed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Nordic Aquaculture City/County: Belfast Sampling Date: 7/24/2018
Applicant/Owner: Ransom State: Maine Sampling Point: W10-wet
Investigator(s): Ben G. Section, Township, Range:
Landform (hillslope, terrace, etc.): Ravine Local relief (concave, convex, none): Concave
Slope (%): 5 Lat.: Long.: Datum:
Soil Map Unit Name NWI Classification:
Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Yes
Hydric soil present? Yes
Indicators of wetland hydrology present? Yes

Is the sampled area within a wetland? Yes

If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches): ____
Water table present?	Yes	X	No	____	Depth (inches): 12
Saturation present? (includes capillary fringe)	Yes	X	No	____	Depth (inches): 4

Indicators of wetland hydrology present? Yes

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: W10-wet

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Alnus incana*	40	Y	FACW
2				
3				
4				
5				
6				
7				
8				
9				
10				
		40	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Impatiens capensis*	30	Y	FACW
2	*Onoclea sensibilis*	20	Y	FACW
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		50	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	8	20
Herb Stratum	10	25
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	90	x 2 =	180
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	90 (A)		180 (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation

_X_ Dominance test is >50%

_X_ Prevalence index is ≤3.0*

___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** W10-wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-2	10YR4/1	100					Silt Loam	
2-12	10YR5/1	80	10YR4/4	20	C	PL	Silt Loam	
-								
-								
-								
-								
-								
-								
-								

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
X Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Yes

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Nordic Aquaculture City/County: Belfast Sampling Date: 7/24/2018
Applicant/Owner: Ransom State: Maine Sampling Point: W10 up
Investigator(s): Ben G. Section, Township, Range:
Landform (hillslope, terrace, etc.): Hilltop Local relief (concave, convex, none): Convex
Slope (%): 2 Lat.: Long.: Datum:
Soil Map Unit Name NWI Classification:
Are climatic/hydrologic conditions of the site typical for this time of the year? No (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? No
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	No	**Is the sampled area within a wetland?**	No
Hydric soil present?	No		
Indicators of wetland hydrology present?	No	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes ____	No	X	Depth (inches):	
Water table present?	Yes ____	No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes ____	No	X	Depth (inches):	

Indicators of wetland hydrology present? No

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: W10 up

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1	*Pinus strobus*	70	Y	FACU
2				
3				
4				
5				
6				
7				
8				
9				
10				
		70	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Prunus serotina*	30	Y	FACU
2	*Acer platanoides*	10	Y	UPL
3	*Quercus rubra*	3	N	FACU
4				
5				
6				
7				
8				
9				
10				
		43	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Hypochaeris radicata*	5	Y	FACU
2	*Trientalis borealis*	5	Y	FAC
3	*Maianthemum canadense*	2	N	FACU
4	*Quercus rubra*	2	N	FACU
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		14	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	14	35
Sapling/Shrub Stratum	9	22
Herb Stratum	3	7
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 5 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 20.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	5	x 3 =	15
FACU species	112	x 4 =	448
UPL species	10	x 5 =	50
Column totals	127 (A)		513 (B)

Prevalence Index = B/A = 4.04

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation
___ Dominance test is >50%
___ Prevalence index is ≤3.0*
___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? No

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** W10 up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-8	10YR5/4	100					Sandy Loam	
####	2.5Y6/4	100					Sandy Loam	
-								
-								
-								
-								
-								
-								
-								

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? No

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Nordic Aquaculture City/County: Belfast Sampling Date: 7/24/2018
Applicant/Owner: Ransom State: Maine Sampling Point: W11 wet
Investigator(s): Ben G. Section, Township, Range: _____
Landform (hillslope, terrace, etc.): Shoreline Local relief (concave, convex, none): None
Slope (%): 2 Lat.: _____ Long.: _____ Datum: _____
Soil Map Unit Name _____ NWI Classification: _____
Are climatic/hydrologic conditions of the site typical for this time of the year? No (If no, explain in remarks)
Are vegetation _____, soil _____, or hydrology _____ significantly disturbed? Are "normal
Are vegetation _____, soil _____, or hydrology _____ naturally problematic? circumstances" present? No
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Yes	**Is the sampled area within a wetland?**	Yes
Hydric soil present?	Yes		
Indicators of wetland hydrology present?	Yes	If yes, optional wetland site ID:	_____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- X Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes ___	No X	Depth (inches):	_____
Water table present?	Yes ___	No X	Depth (inches):	_____
Saturation present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	_____

Indicators of wetland hydrology present? Yes

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
At low tide

VEGETATION - Use scientific names of plants

Sampling Point: W11 wet

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Spartina alterniflora*	50	Y	OBL
2	*Juncus gerardii*	50	Y	OBL
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		100	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	20	50
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	100	x 1 =	100
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		100 (B)

Prevalence Index = B/A = 1.00

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** W11 wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-2	10YR2/1	100					Peat	
####	Gley1 6/10Y	70	10YR3/6	30	C	PL	Loamy Sand	
-								
-								
-								
-								
-								
-								
-								

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
_X_ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
_X_ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Yes

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Belfast City/County: Belfast Sampling Date: 8/28/2018
Applicant/Owner: Ransom/Nordic State: Maine Sampling Point: W14-wet
Investigator(s): Ben G. Section, Township, Range:
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave
Slope (%): 0 Lat.: 44.3970965 Long.: -68.9952423 Datum:
Soil Map Unit Name Boothbay NWI Classification: Upland
Are climatic/hydrologic conditions of the site typical for this time of the year? No (If no, explain in remarks)
Are vegetation X, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? No
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Yes	**Is the sampled area within a wetland?**	Yes
Hydric soil present?	Yes		
Indicators of wetland hydrology present?	Yes	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- X Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes ____	No	X	Depth (inches):	
Water table present?	Yes ____	No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes ____	No	X	Depth (inches):	

Indicators of wetland hydrology present? Yes

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Moderate drought

VEGETATION - Use scientific names of plants

Sampling Point: W14-wet

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Calamagrostis canadensis*	85	Y	OBL
2	*Vicia cracca*	25	N	UPL
3	*Trifolium pratense*	15	N	FACU
4	*Leontodon hispidus*	10	N	UPL
5	*Geranium maculatum*	5	N	FACU
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		140	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	28	70
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	85	x 1 =	85
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	20	x 4 =	80
UPL species	35	x 5 =	175
Column totals	140 (A)		340 (B)

Prevalence Index = B/A = 2.43

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** W14-wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-2	10YR4/1	100					Silt Loam	
4-12	10YR5/1	80	10YR5/6	20	C	PL	Silt Loam	
-								
-								
-								
-								
-								
-								
-								

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
X Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Yes

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Belfast City/County: Belfast Sampling Date: 8/28/2018
Applicant/Owner: Ransom/Nordic State: Maine Sampling Point: W14-up
Investigator(s): Ben G. Section, Township, Range:
Landform (hillslope, terrace, etc.): Mound Local relief (concave, convex, none): Convex
Slope (%): 2 Lat.: 44.396975 Long.: -68.9951379 Datum:
Soil Map Unit Name Boothbay NWI Classification: Upland
Are climatic/hydrologic conditions of the site typical for this time of the year? No (If no, explain in remarks)
Are vegetation X, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation X, soil ____, or hydrology ____ naturally problematic? circumstances" present? No
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	No	**Is the sampled area within a wetland?**	No
Hydric soil present?	Yes		
Indicators of wetland hydrology present?	No	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes ____	No X	Depth (inches):	
Water table present?	Yes ____	No X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes ____	No X	Depth (inches):	

Indicators of wetland hydrology present? No

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: W14-up

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Trifolium pratense*	50	Y	FACU
2	*Vicia cracca*	30	Y	UPL
3	*Leontodon hispidus*	15	N	UPL
4	*Galium mollugo*	5	N	UPL
5	*Geranium maculatum*	5	N	FACU
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		105	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	21	53
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	55	x 4 =	220
UPL species	50	x 5 =	250
Column totals	105 (A)		470 (B)

Prevalence Index = B/A = 4.48

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation
___ Dominance test is >50%
___ Prevalence index is ≤3.0*
___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? No

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** W14-up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-2	10YR4/1	100					Silt Loam	
2-12	10YR5/1	99	10YR5/6	1	C	PL	Silt Loam	
-								
-								
-								
-								
-								
-								
-								

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Yes

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Belfast Aquaculture City/County: Belfast/Waldo Sampling Date: 7/3/2019
Applicant/Owner: Nordic Aquaculture State: ME Sampling Point: W15-wet
Investigator(s): B. Griffith Section, Township, Range:
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave
Slope (%): 2 Lat.: Long.: Datum: WGS1984
Soil Map Unit Name: Boothbay Silt Loam 3-8% slopes NWI Classification:
Are climatic/hydrologic conditions of the site typical for this time of the year? No (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y Hydric soil present? Y Wetland hydrology present? Y	**Is the sampled area within a wetland?** Y If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes	X	No	____	Depth (inches): 2
Water table present?	Yes	X	No	____	Depth (inches): 0
Saturation present? (includes capillary fringe)	Yes	X	No	____	Depth (inches): 0

Wetland hydrology present? Y

Descrive recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Exceptionally wet June

VEGETATION - Use scientific names of plants

Sampling Point: W15-wet

Tree Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shurb Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Staus
1	*Alopecura pratensis*	40	Y	OBL
2	*Calamagrostis canadensis*	30	Y	FAC
3	*Ranunculus acris*	5	N	FAC
4	*Galium mollugo*	5	N	UPL
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		80	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	16	40
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	40	x 1 =	40
FACW species	0	x 2 =	0
FAC species	35	x 3 =	105
FACU species	0	x 4 =	0
UPL species	5	x 5 =	25
Column totals	80 (A)		170 (B)

Prevalence Index = B/A = 2.13

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** W15-wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-10	10YR5/2	90	10YR4/4	10	C	PL	Silt loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? ___Y___

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Belfast Aquaculture City/County: Belfast/Waldo Sampling Date: 7/3/2019
Applicant/Owner: Nordic Aquaculture State: Sampling Point: W15-Up
Investigator(s): B. Griffith Section, Township, Range:
Landform (hillslope, terrace, etc.): Mound Local relief (concave, convex, none): Convex
Slope (%): 2 Lat.: Long.: Datum: WGS1984
Soil Map Unit Name Boothbay Silt Loam 3-8% Slopes NWI Classification:
Are climatic/hydrologic conditions of the site typical for this time of the year? No (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? N Hydric soil present? ____ Wetland hydrology present? N	**Is the sampled area within a wetland?** N If yes, optional wetland site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches): ____
Water table present?	Yes	____	No	X	Depth (inches): ____
Saturation present? (includes capillary fringe)	Yes	____	No	X	Depth (inches): ____

Wetland hydrology present? N

Descrive recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Exceptionally wet June

VEGETATION - Use scientific names of plants

Sampling Point: W15-Up

Tree Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shurb Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5xR)	Absolute % Cover	Dominant Species	Indicator Staus
1	*Festuca filliformis*	70	Y	UPL
2	*Trifolium repens*	20	N	FACU
3	*Calamagrostis canadensis*	15	N	OBL
4	*Stellaria graminea*	15	N	UPL
5	*Chrysanthemum leucanthemum*	5	N	UPL
6	*Solidago rugosa*	5	N	FAC
7	*Galium sp.*	2	N	NI
8	*Viccia cracca*	2	N	UPL
9	*Onoclea sensibilis*	1	N	FACW
10	*Rhinanthus minor*	1	N	FAC
11				
12				
13				
14				
15				
		136	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	27	68
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	15	x 1 =	15
FACW species	1	x 2 =	2
FAC species	6	x 3 =	18
FACU species	20	x 4 =	80
UPL species	92	x 5 =	460
Column totals	134 (A)		575 (B)

Prevalence Index = B/A = 4.29

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation
___ Dominance test is >50%
___ Prevalence index is ≤3.0*
___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** W15-Up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-8	10YR5/2	80	10YR5/6	20	C	PL		
8-14	10YR5/1	70	10YR5/6	30	C	PL		

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? _____

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Belfast Aquaculture City/County: Belfast/Waldo Sampling Date: /3/2019
Applicant/Owner: Nordic Aquaculture State: ME Sampling Point: W19-Wet
Investigator(s): B. Griffith Section, Township, Range:
Landform (hillslope, terrace, etc.): Mound Local relief (concave, convex, none): Convex
Slope (%): 3 Lat.: Long.: Datum: WGS1984
Soil Map Unit Name: Boothbay Silt Loam 3-8% Slopes NWI Classification:
Are climatic/hydrologic conditions of the site typical for this time of the year? No (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y Hydric soil present? Y Wetland hydrology present? Y	**Is the sampled area within a wetland?** Y If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches): ____
Water table present?	Yes	X	No	____	Depth (inches): ____
Saturation present? (includes capillary fringe)	Yes	X	No	____	Depth (inches): 0

Wetland hydrology present? Y

Descrive recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Exceptionally wet June

VEGETATION - Use scientific names of plants

Sampling Point: W19-Wet

Tree Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shurb Stratum	Plot Size (5'R)	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5'R)	Absolute % Cover	Dominant Species	Indicator Staus
1	*Calamagrostis canadensis*	70	Y	OBL
2	*Onoclea sensibilis*	20	Y	FACW
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		90	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	18	45
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	70	x 1 =	70
FACW species	20	x 2 =	40
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	90 (A)		110 (B)

Prevalence Index = B/A = 1.22

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

\

SOIL **Sampling Point:** W19-Wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-4	10YR5/1	100					Silt loam	
4-12	10YR5/1	95	10YR4/6	5	C	PL	Silt loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
X Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? ___Y___

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Maine Aquaculture City/County: Waldo/Belfast Sampling Date: 7/3/2019
Applicant/Owner: Nordic State: ME Sampling Point: W19-UPL
Investigator(s): Benjamin Griffith Section, Township, Range:
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex
Slope (%): 4 Lat.: 44.39758555 Long.: -68.99261121 Datum: WGS1984
Soil Map Unit Name: Boothbay silt loam (0-8% slopes) NWI Classification: UPL
Are climatic/hydrologic conditions of the site typical for this time of the year? No (If no, explain in remarks)
Are vegetation ____, soil X, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? N	**Is the sampled area within a wetland?** N
Hydric soil present? N	
Wetland hydrology present? N	If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes ____	No X	Depth (inches): ____	
Water table present?	Yes ____	No X	Depth (inches): ____	
Saturation present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____	**Wetland hydrology present?** N

Descrive recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: W19-UPL

Tree Stratum	Plot Size (30'R)	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shurb Stratum	Plot Size (15'R)	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5'R)	Absolute % Cover	Dominant Species	Indicator Staus
1	*Festuca filliformis*	35	Y	UPL
2	*Rhinanthus minor*	30	Y	FAC
3	*Trifolium repens*	25	Y	FACU
4	*Galium mollugo*	20	N	UPL
5	*Calamagrotis canadensis*	10	N	OBL
6	*Stellaria graminea*	5	N	UPL
7	*Rumex acetosa*	5	N	UPL
8	*Solidago canadensis*	5	N	FACU
9	*Solidago rugosa*	2	N	FAC
10				
11				
12				
13				
14				
15				
		137	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	27	69
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 33.33% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	10	x 1 =	10
FACW species	0	x 2 =	0
FAC species	32	x 3 =	96
FACU species	30	x 4 =	120
UPL species	65	x 5 =	325
Column totals	137 (A)		551 (B)

Prevalence Index = B/A = 4.02

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation
___ Dominance test is >50%
___ Prevalence index is ≤3.0*
___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** W19-UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-10	10YR5/3	95	10YR6/2	5	C	PL	Silt loam	
10-16	2.5Y6/2	70	2.5Y6/4	30	C	PL	Silt loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? N

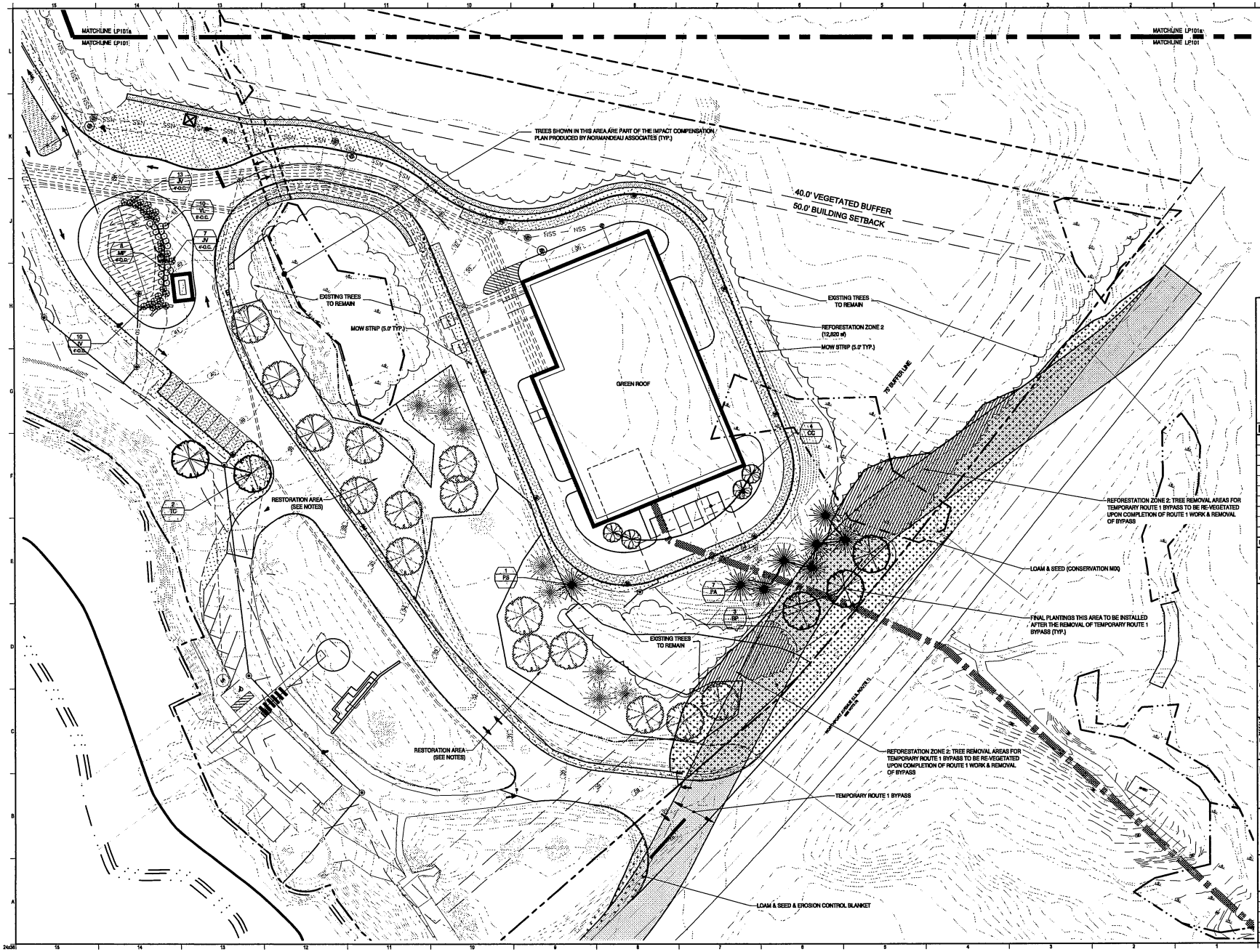
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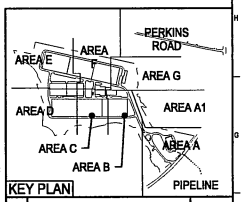
ATTACHMENT I

Updated Landscaping Planting Plans LP101, LP101A, LP102, LP107, and LP501

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Ransom Consulting, Inc.
Project 171.05027.008





KEY PLAN

REV	DESCRIPTION	DATE
2	RESPONSE TO ADDITIONAL DEP QUESTIONS	7-25-19
1	REISSUED FOR PERMIT	7-03-19
0	ISSUED FOR PERMIT	6-14-19

RESPONSE TO DEP
7-25-19
CURRENT ISSUE STATUS:

TRUE NORTH

STATE OF MAINE — ANDREW D. DEMERCHANT — NO. 9994 — REGISTERED PROFESSIONAL ENGINEER

TRUE NORTH:

SMRT Architects and Engineers
144 Fore Street/P.O. BOX 618
Portland, Maine 04104
1.877.700.7678
www.smrtinc.com
ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY
SMRT

RANSOM Consulting Engineers and Scientists
Ransom Consulting Engineers and Scientists
400 Commercial Street, Suite 400
Portland, Maine 04101

NORDIC AQUAFARMS
285 NORTHPORT AVENUE
BELFAST, MAINE

PLANTING PLAN
AREA A

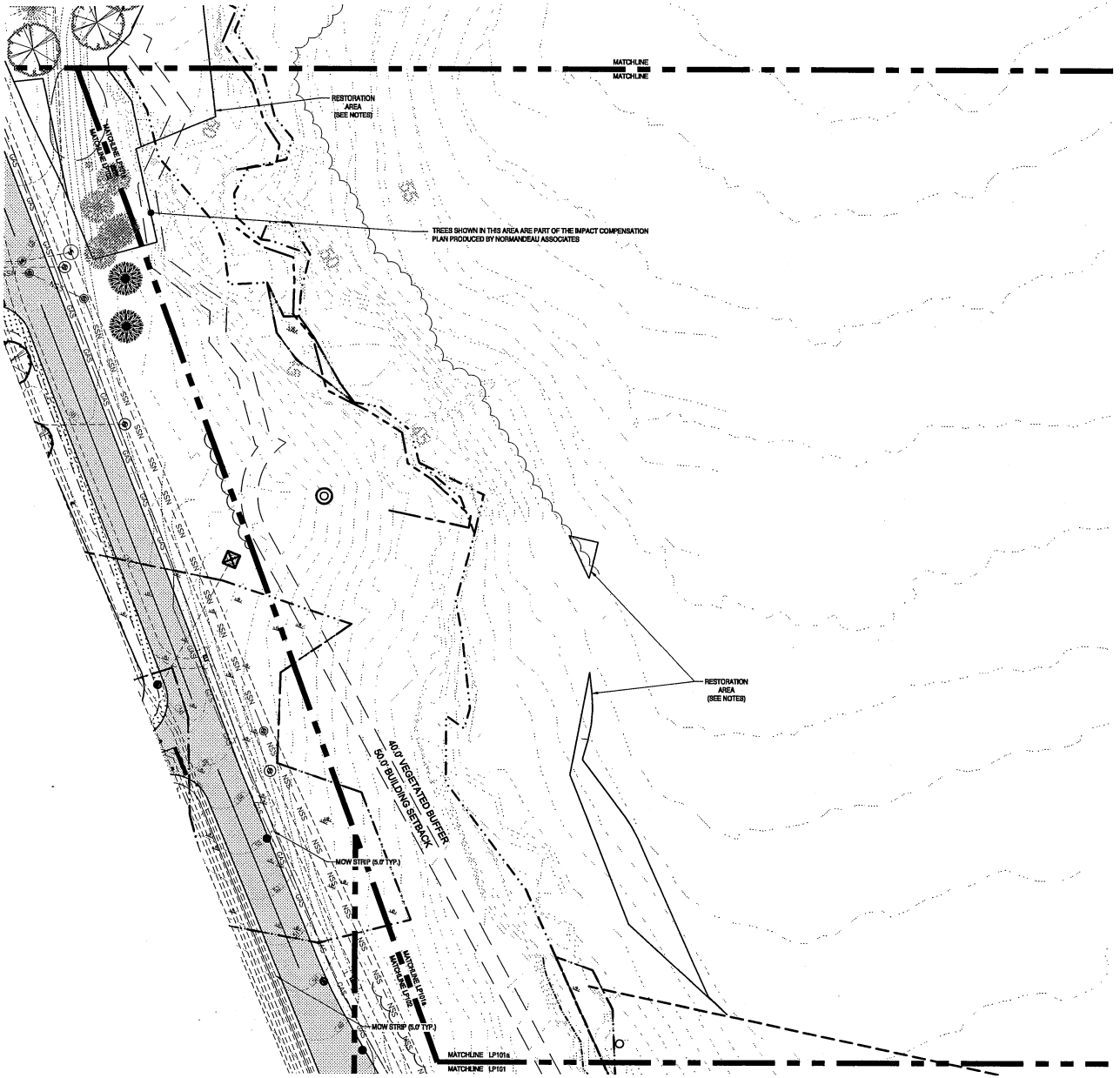
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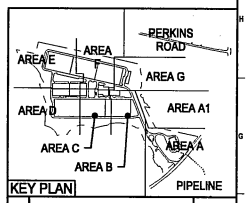
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SCALE: 1" = 30'

PROJECT MANAGER:	ADB	PROJECT NO:	18078
A/E OF RECORD:	MGJ		
JOB CAPTAIN:	SP		
DRAWN BY:	WSM		LP101
SMRT FILE:	LP101-18078	SHEET No.	

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NOT FOR CONSTRUCTION





REV	DESCRIPTION	DATE
1	REISSUED FOR PERMIT	7-03-19
0	ISSUED FOR PERMIT	5-14-19

CURRENT ISSUE STATUS:

TRUE NORTH:

STATE OF MAINE — ANDREW D. BRYSON — NO. 9594 — 7/11/19 — LICENSED PROFESSIONAL ENGINEER

SMRT Architects and Engineers
144 Fore Street/P.O. BOX 618
Portland, Maine 04104
1.877.700.7678
www.smrtinc.com
ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY
SMRT

RANSOM Consulting Engineers and Scientists
Ransom Consulting Engineers and Scientists
400 Commercial Street, Suite 400
Portland, Maine 04101

NORDIC AQUAFARMS
285 NORTHPORT AVENUE
BELFAST, MAINE

PLANTING PLAN
AREA A1

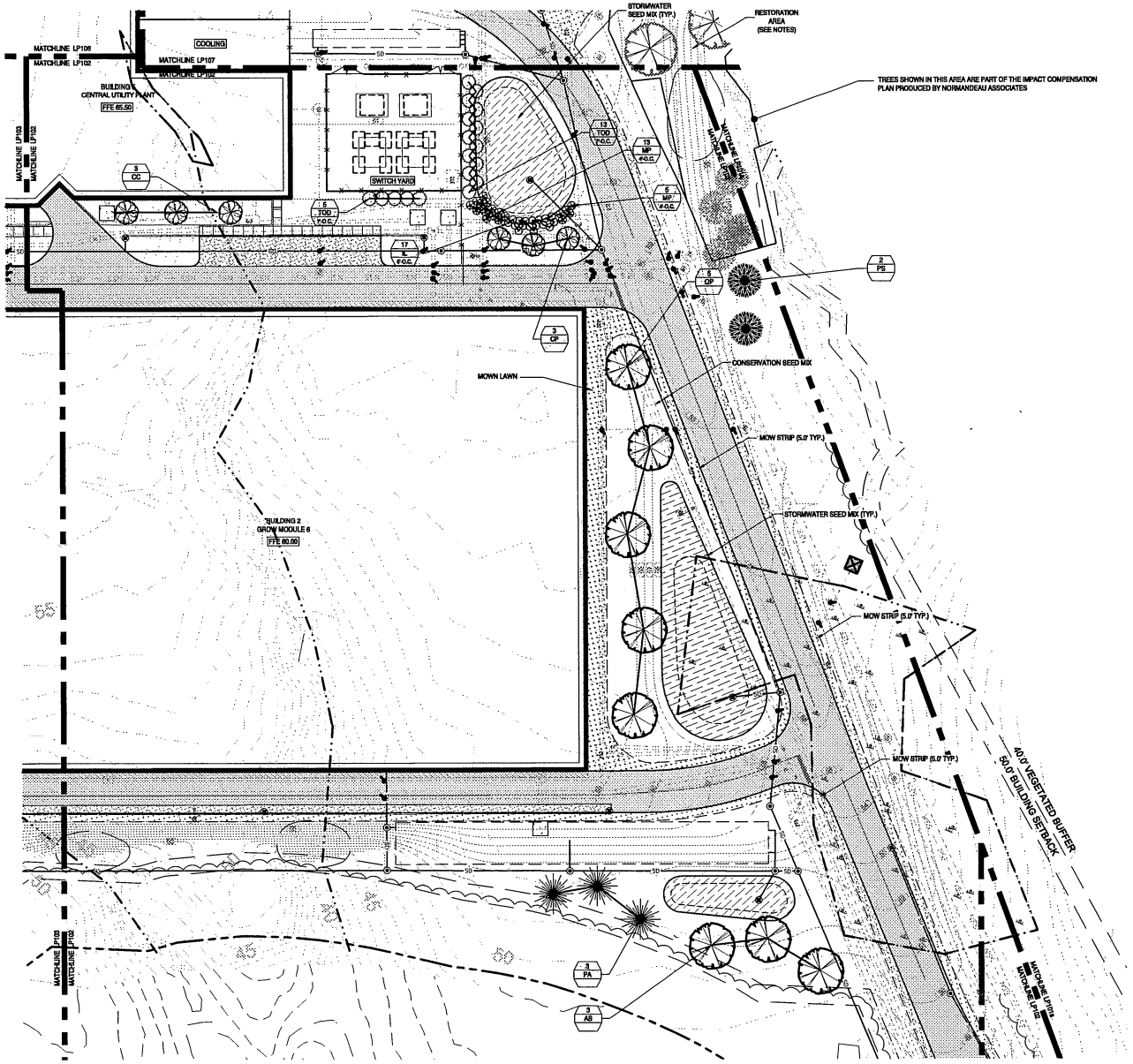
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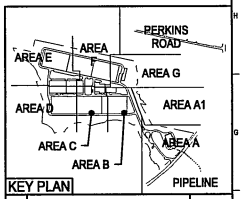
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SCALE: 1" = 30'

PROJECT MANAGER:	ADB	PROJECT NO:	18078
A/E OF RECORD:			
JOB CAPTAIN:	SP		LP101a
DRAWN BY:	WSM		
SMRT FILE:	LP101a-18078	SHEET No.	

NOT FOR CONSTRUCTION





KEY PLAN

REV	DESCRIPTION	DATE
1	REISSUED FOR PERMIT	7-03-19
0	ISSUED FOR PERMIT	5-14-19

CURRENT ISSUE STATUS:

TRUE NORTH:

STATE OF MAINE — ANDREW D. BOBTON — NO. 9994 — REGISTERED PROFESSIONAL ENGINEER

SMRT Architects and Engineers
144 Fore Street/P.O. BOX 618
Portland, Maine 04104
1.877.700.7678
www.smrtinc.com
ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY
SMRT

RANSOM Consulting Engineers and Scientists
Ransom Consulting Engineers and Scientists
400 Commercial Street, Suite 400
Portland, Maine 04101

NORDIC AQUAFARMS
285 NORTHPORT AVENUE

BELFAST, MAINE

PLANTING PLAN
AREA B

SHEET TITLE:

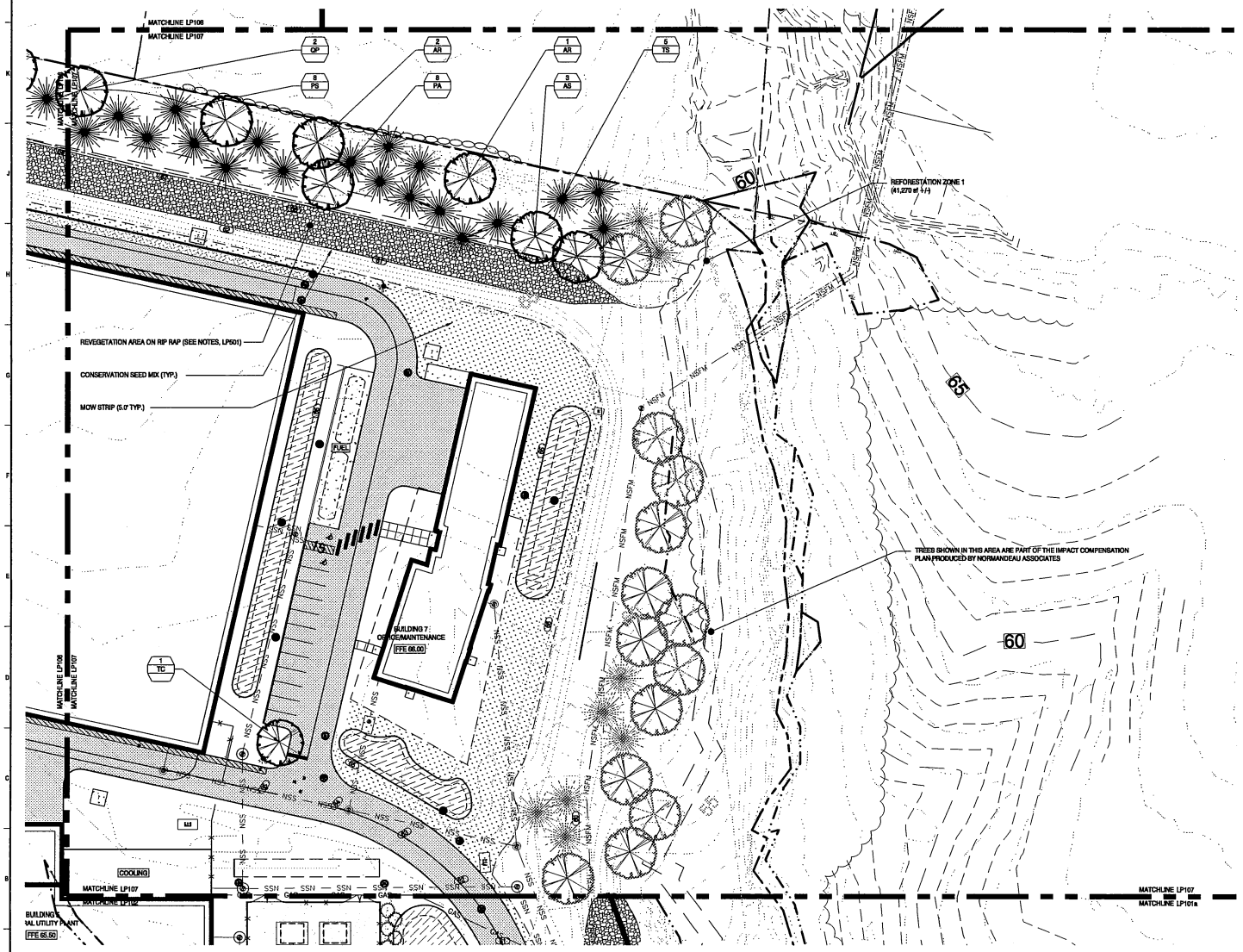
0 15' 30' 60' 90'

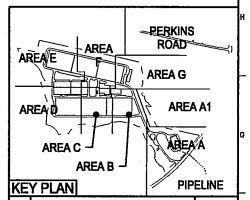
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PROJECT MANAGER:	ADB	PROJECT NO:	18076
A/E OF RECORD:			
JOB CAPTAIN:	SP		LP102
DRAWN BY:	WSM		
SMRT FILE:	LP102-18076	SHEET No.	

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KEY PLAN

REV	DESCRIPTION	DATE
1	REISSUED FOR PERMIT	7-03-19
0	ISSUED FOR PERMIT	5-14-19

CURRENT ISSUE STATUS:

TRUE NORTH:

SMRT Architects and Engineers
144 Fore Street/P.O. BOX 618
Portland, Maine 04104
1.877.700.7678
www.smrtinc.com
ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY

Ransom Consulting Engineers and Scientists
400 Commercial Street, Suite 400
Portland, Maine 04101

NORDIC AQUAFARMS
285 NORTHPORT AVENUE

BELFAST, MAINE

PLANTING PLAN
AREA G

SHEET TITLE:

0 15' 30' 60' 90'

SCALE: 1" = 30'

PROJECT MANAGER:	ADB	PROJECT NO:	18078
A/E OF RECORD:	ADJ		
JOB CAPTAIN:	SP		
DRAWN BY:	WSM		
SMRT FILE:	LP107-18078	SHEET No.	LP107

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24x36

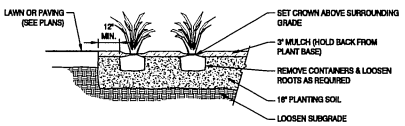
PLANT LIST - REFORESTATION AREAS					
MARK	SCIENTIFIC NAME / COMMON NAME	PERCENTAGE OF MIX	QUANTITY	SIZE/CONDITION	REMARKS
Zone 1					
AREA (ACRES)	1				
RATE (#/ACRE)	450				
TREES					
AB	Abies balsamia / Balsam Fir	12	51		
AR	Acer rubrum / Red Maple	11	47		
AR	Acer saccharum / Sugar Maple	2	9		
BA	Betula alleghaniensis / Yellow Birch	4	17		
BP	Betula papyrifera / Paper Birch	2	9		
PR	Picea rubens / Red Spruce	4	17		
PS	Pinus strobus / Eastern White Pine	9	38		
PG	Populus grandidentata / Bigtooth Aspen	13	56		
QR	Quercus rubra / Red Oak	45	192		
TC	Tsuga canadensis / Eastern Hemlock	3	13		
Zone 2					
AREA (ACRES)	0				
RATE (#/ACRE)	450				
TREES					
AB	Abies balsamia / Balsam Fir	12	18		
AR	Acer rubrum / Red Maple	11	14		
BP	Betula papyrifera / Paper Birch	12	18		
FG	Fagus grandiflora / American Beech	2	3		
PS	Pinus strobus / Eastern White Pine	51	67		
PG	Populus grandidentata / Bigtooth Aspen	10	13		

MARK	SCIENTIFIC NAME / COMMON NAME	SIZE CAL	SIZE HT	ROOT	REMARKS
TREES					
AR	Acer rubrum / Red Maple	2" - 2.5"	12'-14'	B & B	Full, matched specimens
AS	Acer saccharum / Sugar Maple	2" - 2.5"	12'-14'	B & B	Full, matched specimens
BP	Betula papyrifera 'Renaissance Reflection' / Paper Birch	-	8'-10'	B & B	Full, matched specimens; clump form; 3-stem min.
CA	Cornus alternifolia / Pagoda Dogwood	-	8'-10'	B & B	Full, matched specimens
CC	Crataegus crusgalli var. inermis / Cockspur Thornless Hawthorn	1 1/2"	8'-10'	B & B	Full, matched specimens
MS	Malus Donald Wyman / Donald Wyman Crabapple	1 1/2"	8'-10'	B & B	Full, matched specimens
FG	Fagus grandifolia / American Beech	2" - 2.5"	12'-14'	B & B	Full
PA	Picea ables / Norway Spruce	-	5' - 10'	B & B	Equal parts: 5'-6', 6'-8', 8'-10'. Randomly mix.
PR	Picea rubra / Red Spruce	-	5' - 10'	B & B	Equal parts: 5'-6', 6'-8', 8'-10'. Randomly mix.
PS	Pinus strobus / Eastern White Pine	-	5' - 10'	B & B	Equal parts: 5'-6', 6'-8', 8'-10'. Randomly mix.
QP	Quercus palustris / Pin Oak	2" - 2.5"	12'-14'	B & B	Full, matched specimens
TC	Tilia cordata 'Greenspire' / Littleleaf Linden	2" - 2.5"	12'-14'	B & B	Full, matched specimens
TS	Tsuga canadensis / Eastern Hemlock	-	5' - 10'	B & B	Equal parts: 5'-6', 6'-8', 8'-10'. Randomly mix.
TOD	Thuja occidentalis 'Douglasii' / Douglas Arborvitae	-	6'-8'	B & B	Full
SHRUBS					
CS	Cornus sericea 'Bailey#' / Red Twig Dogwood	#3	3'	Cont.	
IV	Ilex verticillata / 'Winter Red' & 'Apollo' / Winterberry	#3	3'	Cont.	Equal numbers of each in each mass; mixed
JV	Juniperus virginiana 'Grey Owl' / Grey Owl Juniper	#3	3'	Cont.	
MP	Myrica pensylvanica / Bayberry	#3	3'	Cont.	
VC	Viburnum carlesii / Koreanspice Viburnum	#3	3'	Cont.	
VL	Viburnum lentago 'Mohican' / Viburnum	#3	3'	Cont.	
VAS	Vaccinium angustifolium / Lowbush Blueberry	-	-	sod	
PERENNIALS					
CP	Carex pennsylvanica / Pennsylvania Sedge	#1	-	Cont.	2 year clump
DM	Dryopteris marginalis / Marginal Wood Fern	#1	-	Cont.	2 year clump
HS	Hemerocallis 'Stella d'Oro' / Daylily	#1	-	Cont.	2 year clump
MD	Monarda didyma 'Jacob Cline' / Bee-Balm	#1	-	Cont.	2 year clump
PV	Panicum virgatum 'Northwind' / Switch Grass	#1	-	Cont.	2 year clump
RF	Rudbeckia fulgida 'Goldstrum' / Black-eyed Susan	#1	-	Cont.	2 year clump
SS	Schizachyrium scoparium 'Blue Paradise' / Little Bluestem	#1	-	Cont.	2 year clump
SH	Sporobulus heterolepis / Prairie Dropseed	#1	-	Cont.	2 year clump

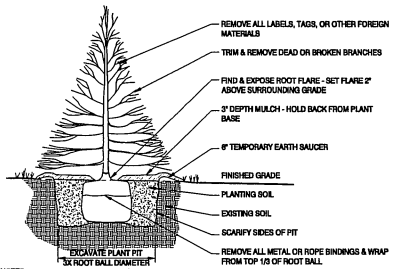
PLANTING SCHEDULES D5

1. ALL DISTURBED AREAS NOT OTHERWISE TREATED OUTSIDE THE PERIMETER DRIVE LIMITS TO BE STABILIZED AS FOLLOWS:
   A. UPPER CUT SLOPE: TEMPORARY RIPRAP TO REMAIN. APPLY SLURRY OF TOPSOIL TO A DEVELOPED DEPTH OF 4 INCHES IN THE INTERSTITIAL SPACES BETWEEN STONES. HYDROSEED/MULCH WITH "NEW ENGLAND ROADSIDE MATRIX UPLAND SEED MIX" (BASIS OF DESIGN) BY NEW ENGLAND WETLAND PLANTS, INC., OR APPROVED EQUAL.
   B. PERIMETER CUT/FILL SLOPES: SCARIFY AND DECOMPACT SOILS BEFORE APPLYING 6 INCHES LOAM, COMPACTING AS SPECIFIED. HYDROSEED/MULCH WITH "NEW ENGLAND CONSERVATION/WILDLIFE MIX" (BASIS OF DESIGN) BY NEW ENGLAND WETLAND PLANTS, INC., OR APPROVED EQUAL.
   C. STORMWATER MANAGEMENT BASINS: PLACE 6 INCHES LOAM TO SIDE SLOPES. HYDROSEED/MULCH WITH "NEW ENGLAND CONSERVATION/WILDLIFE MIX" (BASIS OF DESIGN) BY NEW ENGLAND WETLAND PLANTS, INC., OR APPROVED EQUAL. APPLY JUTE EROSION CONTROL MESH AND PEG AT REGULAR INTERVALS PER MANUFACTURER RECOMMENDATIONS TO PREVENT FLOATING OF SEED UNTIL SECURELY ROOTED. NOTE: VEGETATION IN STORMWATER BASINS IS TO BE FULLY ESTABLISHED AND SOILS STABILIZED PRIOR TO INTRODUCTION OF STORMWATER DRAINAGE.
2. ALL DISTURBED AREAS NOT OTHERWISE TREATED INSIDE THE PERIMETER DRIVE LIMITS TO BE LOAMED (6 INCHES) AND SEEDED WITH LAWN MIX UNLESS NOTED OTHERWISE.
3. LIMITS OF MOWING TO BE AS SHOWN AND GENERALLY 5-FEET +/- PAST THE EDGE OF PAVING.
4. AREAS LABELED "RESTORATION AREAS" ARE TO BE REVEGETATED AS SPECIFIED (REFER TO RIPARIAN BUFFER AND RESTORATION PLAN FOR DETAILS).

PLANTING NOTES A10

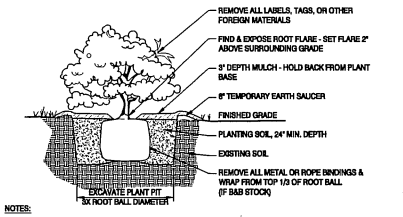


STANDARD PERENNIAL PLANTING A5
NOT TO SCALE



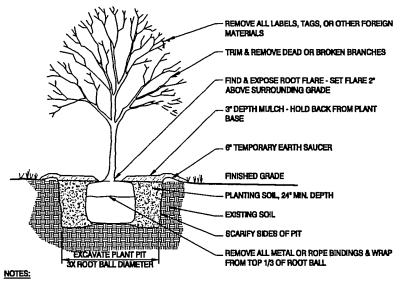
NOTES:
1. TREE TO BE SET PLUMB.
2. SECURE TREE AS MAY BE REQUIRED ACCORDING TO TREE SIZE, LOCATION, & WIND/WEATHER CONDITIONS.
3. IF USING ROOTBALL STABILIZATION, FOLLOW MANUFACTURER'S RECOMMENDATIONS.

STANDARD EVERGREEN TREE PLANTING H1
NOT TO SCALE



NOTES:
1. SHRUB TO BE SET PLUMB.

STANDARD SHRUB PLANTING D1
NOT TO SCALE



NOTES:
1. TREE TO BE SET PLUMB.
2. SECURE TREE AS MAY BE REQUIRED ACCORDING TO TREE SIZE, LOCATION, & WIND/WEATHER CONDITIONS.
3. IF USING ROOTBALL STABILIZATION, FOLLOW MANUFACTURER'S RECOMMENDATIONS.

STANDARD DECIDUOUS TREE PLANTING A1
NOT TO SCALE

REV	DESCRIPTION	DATE
1	REISSUED FOR PERMIT	7-03-19
0	ISSUED FOR PERMIT	5-14-19

CURRENT ISSUE STATUS:

TRUE NORTH:

SMRT Architects and Engineers
144 Fore Street/P.O. BOX 618
Portland, Maine 04104
1.877.700.7678
www.smrtinc.com
ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY
RANSOM Creating Engineers and Scientists
Ransom Consulting Engineers and Scientists
400 Commercial Street, Suite 400
Portland, Maine 04101

NORDIC AQUAFARMS
285 NORTHPORT AVENUE
BELFAST, MAINE

PLANTING DETAILS & SCHEDULE

SHEET TITLE:

SCALE: AS SHOWN

PROJECT MANAGER:	ADB	PROJECT NO:	18078
A/E OF RECORD:	MGJ		
JOB CAPTAIN:	SP		
DRAWN BY:	WSM		
SMRT FILE:	LP501-18078	SHEET No.	LP501

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ATTACHMENT J

Draft Deed Restrictions

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Ransom Consulting, Inc.
Project 171.05027.008

DRAFT Deed Restriction Language for NAF regarding Stream 9 Buffer

WHEREAS a portion of the property owned by Nordic Aquafarms Inc. as shown on Exhibit A attached hereto (the "Protected Property") is a natural area that provides significant habitat for wildlife and plants and wetland functions and values; and

WHEREAS Nordic Aquafarms Inc. ("NAF") plans to construct a land based aquafarm adjacent to the Protected Property and, after the review by Federal and State regulatory agencies has obtained from the United States Army Corps of Engineers Permit #_____ and from the Maine Department of Environmental Protection Site Location of Development, Natural Resource Protection, Water Quality Certification Order #_____ (collectively "the Permits"); and

WHEREAS the Permits require that NAF preserve wetlands against future development; and

WHEREAS the specific conservation values of the Protected Property are documented in an inventory of important features of the property entitled "Natural Resource Compensation Plan" dated May, 10, 2019 and prepared by Normandeau Associates, Inc. ("Compensation Plan"), attached hereto as Exhibit B; and

WHEREAS Grantor intends that the conservation values of the Protected Property, as described in the Compensation Plan, be preserved and maintained in perpetuity; and

WHEREAS Grantor further intends, as owner of the Protected Property, to preserve and protect the conservation values of the Protected Property.

NOW THEREFORE, KNOW ALL MEN BY THESE PRESENTS, in consideration of the facts above recited, and the covenants herein contained, the Grantor does hereby restrict the Protected Property pursuant to the following affirmative rights, terms, covenants and restrictions that will run with the Protected Property in perpetuity and be binding on the Grantor, its successors and assigns forever:

1. Purpose. It is the purpose of this restriction assure that the Protected Property will be retained forever as a riparian buffer that includes wetlands, floodplain and upland areas, and to prevent any use of the Protected Property that will impair or impede the conservation values of the Protected Property.

2. Rights of Grantor. (a) Grantor may freely access and use the Protected Property for any and all uses consistent with the Purpose stated herein; (b) NAF, its successors and assigns shall regularly and no less than annually, inspect the Protected Property to ensure that activity upon and maintenance of the Protected Property is consistent with the conservation values for the Protected Property set forth in Exhibit A; (c) NAF shall also use reasonable diligence to detect and promptly restore conditions on the Protected Property that are inconsistent with the conditions described in Exhibit B; (d) the Maine Department of Environmental Protection and

City of Belfast may, with reasonable advance notice to Grantor, access the Protected Property in order to ensure its condition is consistent with the Compensation Plan.

3. Prohibited Uses/Covenants. Neither the Grantor nor its successors or assigns shall perform the following acts nor permit others to perform them, except as may be required in the course of any permitted activity herein or implementation of the Compensation Plan:

(a) no soil, loam, peat, sand, gravel, concrete, rock or other mineral substance, refuse, trash, vehicle bodies or parts, rubbish, debris, junk waste, pollutants or other fill material will be placed, stored or dumped on the Protected Property and the surface waters contained thereon, nor shall the topography of the area be altered or manipulated in any way except as may be temporarily permitted pursuant to the Compensation Plan;

(b) no trees, grasses, shrubs, vines or other vegetation on the Protected Property shall be cut, destroyed or sprayed with herbicides, insecticides, fungicides, or fertilizers, except as necessary to maintain vegetation described in the Compensation Plan and subject to the conditions and restrictions set forth below: (i) *de minimis* flower picking shall be allowed, (ii) control of invasive species shall be allowed, (iii), removal of vegetation that is inconsistent with the Compensation Plan or that is diseased shall be allowed.

(c) no building, sign, fence, utility pole, or temporary or permanent structure will be constructed, placed, or permitted to remain on the Protected Property unless shown on Exhibit A or described in the Compensation Plan;

(d) no trucks, cars, motorized dirt bikes, ATVs, bulldozes, backhoes, or other motorized vehicles or mechanical equipment shall be permitted on the Protected Property except as described in the Compensation Plan.

4. Permitted Uses. Passive recreational, educational and scientific uses which are not inconsistent with the preservation of the riparian buffer and wetlands situated on the Protected Property, are permitted.

5. Recordation. NAF shall record this instrument in the Waldo County Registry of Deeds.

6. Warranties and Representations. Grantor represents that Grantor owns the Protected Property in fee simple and has good right to grand and convey this restriction.

7. Amendment: This restriction may be amended with the prior written consent of the Maine Department of Environmental Protection.

IN WITNESS WHEREOF, Grantor has executed and sealed this instrument the day and year first above written.

Witness: GRANTOR NAME HERE

DRAFT

_____ _____

By
Its

STATE OF MAINE _____, 2019
COUNTY NAME, ss.

Personally appeared, the above named _____, _____ of _____, and acknowledged the foregoing instrument to be his/her free act and deed in his/her said capacity and the free act of said _____.

Before me,

_____
Notary Public/Attorney at Law
Printed Name:_____
My Commission Expires:_____

DRAFT

DRAFT Deed Restriction Language for Cassida regarding Stream 9 Buffer

WHEREAS a portion of the property owned by Mr. Sam and Ms. Jacki Cassida ("Grantor") and shown on Exhibit A attached hereto (the "Protected Property") is a natural area that provides significant habitat for wildlife and plants and wetland functions and values; and

WHEREAS Nordic Aquafarms Inc. ("NAF") plans to construct a land based aquafarm adjacent to the Protected Property and, after the review by Federal and State regulatory agencies has obtained from the United States Army Corps of Engineers Permit #_____ and from the Maine Department of Environmental Protection Site Location of Development, Natural Resource Protection, Water Quality Certification Order #_____ (collectively "the Permits"); and

WHEREAS the Permits require that NAF preserve wetlands against future development; and

WHEREAS the specific conservation values of the Protected Property are documented in an inventory of important features of the Property entitled "Natural Resource Compensation Plan" dated May, 10, 2019 and prepared by Normandeau Associates, Inc. ("Compensation Plan"), attached hereto as Exhibit B; and

WHEREAS Grantor intends that the conservation values of the Protected Property, as described in the Compensation Plan, be preserved and maintained in perpetuity; and

WHEREAS Grantor further intends, as owner of the Protected Property, to convey to NAF the right to preserve and protect the conservation values of the Protected Property in common with Grantor.

NOW THEREFORE, KNOW ALL MEN BY THESE PRESENTS, in consideration of the facts above recited, and the covenants herein contained, the Grantor does hereby restrict the Protected Property pursuant to the following affirmative rights, terms, covenants and restrictions that will run with the Protected Property in perpetuity and be binding on the Grantor, its successors and assigns forever:

1. Purpose. It is the purpose of this restriction assure that the Protected Property will be retained forever as a riparian buffer that includes wetlands, floodplain and upland areas, and to prevent any use of the Protected Property that will impair or impede the conservation values of the Protected Property.

2. Rights of Grantor. Grantor may freely access and use the Protected Property for any and all uses consistent with the Purpose stated herein.

3. Rights of NAF: NAF, its agents and employees, the Maine Department of Environmental Protection and the City of Belfast shall have the right, in a reasonable manner and at reasonable times, after giving at least 24 hours' notice to the Grantor, its successors and assigns, to enter the

property for the purposes of investigation to ensure that the activity upon and maintenance of the Protected Property is consistent with the conservation values for the Protected Property set forth in Exhibit A.

4. Enforcement. NAF shall also have the right to enforce by proceedings at law or in equity the covenants in this instrument, including but not limited to the right to require the restoration of the Protected Property to the condition described in Exhibit B.

5. NAF Obligations. It is understood by the parties hereto that NAF shall have the obligation to undertake any and all actions required by the Permits and that Grantor, by implementing this restriction and that Grantor assumes no obligations imposed by the Permits, and further assumes no responsibility for complying therewith and, further, shall not in any way be responsible for nor obligated to maintain the Protected Property, including without limitation its wetlands and associated conservation values.

6. Prohibited Uses/Covenants. Neither the Grantor nor its successors or assigns shall perform the following acts nor permit others to perform them, except as may be required in the course of any permitted activity herein or implementation of the Compensation Plan:

(a) no soil, loam, peat, sand, gravel, concrete, rock or other mineral substance, refuse, trash, vehicle bodies or parts, rubbish, debris, junk waste, pollutants or other fill material will be placed, stored or dumped on the Protected Property and the surface waters contained thereon, nor shall the topography of the area be altered or manipulated in any way except as may be temporarily permitted pursuant to the Compensation Plan;

(b) no trees, grasses, shrubs, vines or other vegetation on the Protected Property shall be cut, destroyed or sprayed with herbicides, insecticides, fungicides, or fertilizers, except as necessary to maintain vegetation described in the Compensation Plan and subject to the conditions and restrictions set forth below: (i) *de minimis* flower picking shall be allowed, (ii) control of invasive species shall be allowed, (iii), removal of vegetation that is inconsistent with the Compensation Plan or is diseased shall be allowed.

(c) no building, sign, fence, utility pole, or temporary or permanent structure will be constructed, placed, or permitted to remain on the Protected Property unless shown on Exhibit A or described in the Compensation Plan;

(d) no trucks, cars, motorized dirt bikes, ATVs, bulldozes, backhoes, or other motorized vehicles or mechanical equipment shall be permitted on the Protected Property except as described in the Comepnsation Plan.

7. Permitted Uses. Passive recreational, educational and scientific uses which are not inconsistent with the preservation of the riparian buffer and wetlands situated on the Protected Property, are permitted.

8. Recordation. NAF shall record this instrument in the Waldo County Registry of Deeds upon execution by Grantor.

DRAFT

9. Warranties and Representations. Grantor represents that Grantor owns the Protected Property in fee simple and has good right to grand and convey this restriction.

IN WITNESS WHEREOF, Grantor has executed and sealed this instrument the day and year first above written.

Witness:

GRANTOR NAME HERE

_____

_____
By
Its

STATE OF MAINE
COUNTY NAME, ss.

_____, 2019

Personally appeared, the above named _____, _____ of _____, and acknowledged the foregoing instrument to be his/her free act and deed in his/her said capacity and the free act of said _____.

Before me,

_____
Notary Public/Attorney at Law
Printed Name:_____
My Commission Expires:_____

DRAFT

ATTACHMENT K

Revised Table 2. Estimated Project Sound Levels for Routine Operation of Both Phase 1 and Phase 2

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Reference: Acentech Report No. 0480r3 (April 2019)
Acentech Project No. 631096

Nordic Aquafarms Salmon Facility
Belfast, Maine
Construction, Operation, and Maintenance Noise Impact Assessment

Table 2. (Revised)
Estimated Project Sound Levels for
Routine Operation of Both Phase 1 and Phase 2

Nearby Protected Locations and Distance From Project Center	Estimated Project Sound Levels (dBA)
1 Northwest 975 ft.	34
2 North 585 ft.	37
3 Southeast 790 ft.	44
4 Southeast 1,230 ft.	39
5 South 950 ft.	38
6 West 2,115 ft.	31

(16 July 2019)

ATTACHMENT L

Revised Soil Erosion and Sedimentation Control Plan Narrative

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Ransom Consulting, Inc.
Project 171.05027.008

14. SOIL EROSION AND SEDIMENTATION CONTROL

14.1. INTRODUCTION

Atlantic Resource Consultants (ARC) has been retained for the preparation of soil erosion and sediment control plans for a new aquaculture facility and the associated site improvements on a parcel of land at 285 Northport Avenue in the City of Belfast, Maine. The majority of the site is currently vacant and includes the former Belfast Water District intake and treatment building from Belfast Reservoir Number One, the former water supply source for the City of Belfast. The remainder of the site is largely undeveloped and consists of mature woodland and grass pasture. This site topography slopes in a generally southeasterly direction towards the reservoir and drains via several steep gullies. The majority of these drain into the reservoir, with the exception of the easternmost feature that drains, via a culvert under Route One directly to Penobscot Bay.

The project proposes development of the site to construct a land-based aquaculture facility that will include two large buildings, each consisting of three modules, two smaller Smolt Buildings, a Processing Building, a Central Utility Plant and several other smaller support services and utility buildings. Access roads, parking areas, utility services and stormwater BMPs will be constructed to serve the facility. The overall area of development at the site is approximately 38 acres.

The development will be constructed in two major phases, and these will be further divided into smaller sub-phases in order to effectively manage the construction process and minimize the soil erosion and sediment control risks associated with earthwork development projects of this scale.

A detailed soil erosion and sediment control plan has been developed to guide the management of major earthwork activities at the site. This plan includes a detailed breakdown of project phasing to minimize the exposure of erodible soils and to prevent significant sediment transport both within the site, and to downstream receiving waters. The project Soil Erosion and Sediment Control Plan is intended to be a live document and will be regularly reviewed and amended throughout the construction process to ensure the continued effectiveness of the Best Management Practices at the site, and the adequate protection of downstream resources.

14.2. EXISTING SITE CONDITIONS AND SOIL TYPES

The project site is located at 285 Northport Avenue in the City of Belfast, Maine. The current cover conditions at the site include the impervious paved, gravel and roof areas associated with the previous use. These are all adjacent to the Route One access driveway and encompass an area of approximately 3 acres that formed the Belfast Water District offices and equipment storage facility. The area of the site closest to Reservoir Number One is predominantly wooded, with some unmaintained woods roads providing informal trail access. The northern portion of the development site is currently grassed pasture and has been recently used as a hay field. The grassed area of the site is approximately 11 acres. The topography of the site slopes in a generally southwesterly direction towards the reservoir at an average gradient of between 2 and 3%. There are several steep gullies formed by drainageways that traverse the site. The westerly gullies drain to the reservoir, the easternmost drainageway discharges to a culvert under Route One, crossing the property to the south of the road, and discharging directly to the bay.

Predominant surface soil types at the site are identified as Boothbay and Swanville silt loams by the Natural Resource Conservation Service (NRCS) Web Soil Survey. The susceptibility of soils to erosion is indicated on a relative "K" scale of values over a range of 0.02 to 0.69. The "K" value is frequently used with the universal soil loss equation. The higher values are indicative of the more erodible soils. The K values of the mapped soils at the project site are as follows:

Soil Name	Soil Description	K Value
Boothbay	Silt loam	0.37
Swanville	Silt loam	0.28

Based on a review of the K values, the onsite soils in the area exhibit low to moderately susceptible to erosion after the cover material is stripped.

A more detailed geotechnical investigation of the site has been undertaken by Ransom Consulting, Inc. The explorations generally found glaciomarine silt and clay deposits overlying glacial till and bedrock. A soft, compressible glaciomarine silt and clay deposit was identified and this is likely to consolidate under loading from proposed site fills and building foundations. The current development plan includes removal and off-site disposal of this problematic soil layer. The material will be replaced with imported Granular Borrow material to form a stable and competent subgrade for the proposed improvements.

Natural resource mapping on the site was undertaken in 2018 by Normandeau Associates as part of the site investigations for this project. The mapping identified a number of freshwater wetlands and streams at the site. The natural resources are described in detail in the wetland delineation report that accompanies this submission.

14.3. EXISTING EROSION PROBLEMS

No significant existing erosion problems have been identified at the project site.

14.4. CRITICAL AREAS

The critical areas of the site include the freshwater wetland resources downstream of the construction work area. There are also a number of streams on the project site that fall under the Natural Resource Protection Act jurisdiction. These streams are intermittent and have been designated with the prefix "S" as shown on Figure 14.1 on the following page. Non-jurisdictional drainages are designated with the prefix "D". Three streams extend off site and drain into the adjacent Reservoir One.

Following development of the site the lower reaches of these streams will have been cut off from the hydrological source which is primarily surface run off and groundwater discharge during seasonal high water tables.

To prevent these streams from drying up they will be fed by clean water from a series of foundation drains and bypass culverts that are intended to intercept groundwater from the site both during and post-construction. Riprap plunge pool outlets will be constructed at the discharge points of the new drains to dissipate flow velocities and allow non-erosive discharge to downstream receiving channels. The bypass culverts, foundation drains, and outlet locations are shown on the Soil Erosion and Sediment Control Phasing Plans (Sheets CE-111 to CE-118). In summary, the volume of water will be sufficient to maintain intermittent flows and the plunge pool outlet design will prevent erosion.

Critical resources downstream from the site include Belfast Reservoir Number One and Penobscot Bay.

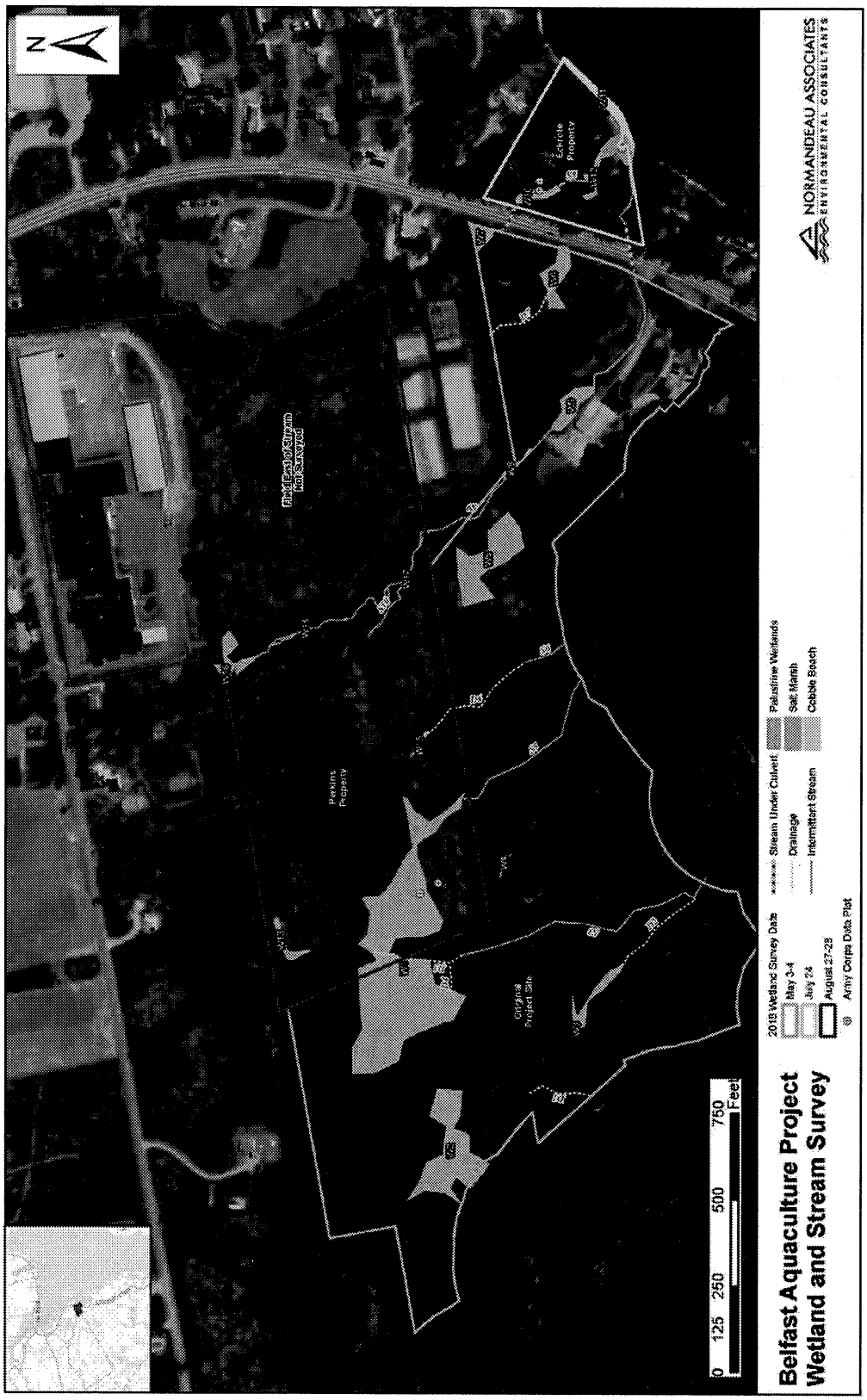

N
Belfast Aquaculture Project
Wetland and Stream Survey
2018 Wetland Survey Date
May 3-4
July 24
August 27-28
Army Corps Data Plot
Stream Under Culvert
Drainage
Intermittent Stream
Palustrine Wetlands
Salt Marsh
Cobble Beach
0 125 250 500 750
Feet
Original Project Site
Perkins Property
Schiele Property
NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

FIGURE 14.1

14.5. SOIL EROSION AND SEDIMENTATION CONTROL PLAN AIMS AND OBJECTIVES

The primary goals of the Soil Erosion and Sediment Control Plan for the project are to avoid and minimize the potential for soil erosion to the maximum extent practical, and to prevent sediment transport to downstream areas, receiving waters and natural resources. Measures will also be taken to ensure sediment is not tracked onto adjacent streets and that stockpiles of controlled imported construction materials are protected from potential contamination by native soils and other deleterious matter. In order to achieve these aims it will be essential to minimize exposure of native soil materials during construction and to install, observe and maintain a range of Best Management Practices.

The primary methods included in the Soil Erosion and Sedimentation Control Plan to be implemented for this project are as follows:

- Construction Phasing - The major earthwork activities will be phased to minimize the area of potentially erodible native soils exposed at any given time. This will minimize the potential for soil erosion and runoff contamination during inclement weather conditions. It will also reduce the potential for sediment transport and result in manageable quantities of accumulation in treatment Best Management Practices. A detailed construction and Soil Erosion and Sediment Control Phasing Plan is included in **Attachment A**.
- Diversion of Run-on from Upstream Areas – Diversion measures will be installed at the beginning of construction to capture and divert surface runoff and groundwater around the work area, reducing the need for de-watering in excavation areas.
- Perimeter Controls – Perimeter sediment barriers will be installed downstream of all work areas to prevent the transport of sediment to receiving waters and natural resources. Stabilized construction entrances (wheel cleaning pads) will be installed at all site entrances to prevent tracking of sediments onto roadways.
- Temporary Cover Materials – The plan includes the installation of temporary cover materials in some areas to prevent erosion from occurring during construction.
- Rapid Stabilization of Excavated Areas – Cover materials including geotextile fabric and imported granular borrow will be placed over exposed native soils immediately after excavation and subgrade preparation to minimize the period of soil exposure.
- Stabilization of drainage outlets and channels to avoid rill and gully erosion.
- Inlet Protection – Silt sacks and coir logs will be installed to protect drainage inlets and conveyances from sediment contamination.
- On-site sediment barriers - On-site measures to capture sediment (hay bales, silt fence, etc.) before it is conveyed to sediment sumps.
- Temporary Sediment Basins and Sumps – Sediment capture and treatment BMPs will be installed to provide detention, storage and treatment of any sediment contaminated runoff generated at the site.
- Permanent Measures – Stormwater BMPs, conveyances and stable permanent cover materials will be installed to provide long-term protection of the site and receiving waters.

14.6. DESCRIPTION AND LOCATION OF LIMITS OF ALL PROPOSED EARTH MOVEMENTS

The proposed project will require major earth moving at the site. The area of proposed development will cover approximately forty acres of the site in total. Substantial cuts and fills will be required to achieve the final grades for the development. Removal of the problematic compressible silt and clay deposits from beneath the proposed improvements will require large volumes of excavation, material export and import of replacement Granular Borrow materials to the site prior to construction of site improvements.

This obviously has major implications on the scope of earthwork required to prepare the site and on materials handling, haulage and disposal. It also presents a significant opportunity to rapidly stabilize the site at an earlier than normal stage of construction. The removal of fine-grained, native soil materials followed by immediate cover of exposed areas with imported granular borrow will effectively limit the potential for soil erosion and mobilization of fine sediments. Large areas of the site will be quickly stabilized, providing a sound working surface for construction

Careful phasing of the project will allow these activities to occur simultaneously, limiting the area of the site that is "open" (i.e. disturbed and not stabilized) at any given time. This will have the additional benefit of increasing the efficiency of materials haulage. Trucks exporting unsuitable materials from the site will be available to convey imported granular material as part of a round trip operation.

14.7. SOIL EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES

Construction Schedule

The primary and most proactive best management practice for soil erosion and sediment control at the site is careful planning and phasing of construction tasks. The major earthwork activities have been broken into manageable phases in order to efficiently accomplish the necessary work while minimizing the risks associated with exposure of native fine-grained soils. The installation of Best Management Practices is integrated into the individual phases to ensure that effective diversion, cover and perimeter control measures are in place to protect the work area, limit soil exposure times and prevent transport of sediment to downstream areas. Major earthwork phasing is described in the narrative and shown on the Earthwork and Soil Erosion and Sediment Control Phasing Plans included in **Attachment A**, and in the project plan set.

Temporary Erosion/Sedimentation Control Measures

As part of the site development, the Contractor will be obligated to implement the following erosion and sediment control devices. These devices shall be installed as indicated on the plans or as described within this report. For further reference on these devices, see the Maine Erosion and Sediment Control Best Management Practices (BMPs) Manual for Designers and Engineers, Maine DEP, October 2016.

1. Crushed stone stabilized construction entrances will be placed at any construction access points from adjacent streets, and at interior locations shown on the phasing plans. The locations of the construction entrances shown on the drawings should be considered illustrative and will need to be adjusted as appropriate and located at any area where there is the potential for tracking of mud and debris onto existing roads or streets. Stone stabilized construction entrances will require the stone to be removed and replaced, as it becomes covered or filled with mud and material tracked by vehicles exiting the site.
2. A Runoff Diversion Trench and upgradient silt fence barrier shall be installed at the northern side of the site prior to major earthmoving activities. The BMPs shall be installed in accordance with the details provided and are intended to divert surface runoff and groundwater around the construction area, minimizing the need for de-watering.
3. Bypass culverts will be installed in gullies and drainageways to intercept groundwater seeps, convey clean water through the construction area and maintain baseflow in downstream receiving channels.
4. Riprap plunge pool outlets shall be constructed at the end of bypass culverts and channels, to dissipate flow velocities and allow non-erosive discharge to downstream receiving channels.
5. Silt fence shall be installed down slope of any disturbed areas to trap runoff borne sediments. The silt fence shall be installed per the detail provided in the plan set and inspected immediately after each rainfall, and at least weekly in the absence of significant rainfall. The Contractor shall make repairs immediately if there are any signs of erosion or sedimentation below the fence line.

If such erosion is observed, the Contractor shall take proactive action to identify the cause of the erosion and take action to avoid its reoccurrence. Proper placement of stakes and keying the bottom of the fabric into the ground is critical to the fence's effectiveness. If there are signs of undercutting at the center or the edges or impounding of large volumes of water behind the fence, the barrier shall be replaced with a stone check dam and measures taken to avoid the concentration of flows not intended to be directed to the silt fence. Wood chips from clearing can be used in front of the silt fence to provide an extra margin of safety and security for the silt fence. This practice is encouraged, provided the chips are removed when the fence is removed. Silt fencing with a maximum stake spacing of 6 feet should be used, unless the fence is supported by wire fence reinforcement of minimum 14 gauge and with a maximum mesh spacing of 6 inches, in which case stakes may be spaced a maximum of 10 feet apart. The bottom of the fence should be properly anchored a minimum of 6" per the plan detail and backfilled. Silt fence shall be installed along the downgradient side of construction work areas, with locations being adjusted along with the construction phasing areas. The Contractor may use erosion mix in place of single row silt fence barrier.

6. Twin rows of siltation fence with hay bales shall be installed at the foot of steep slopes and adjacent to protected natural resources (wetland areas).
7. Erosion Control Mix - Erosion control mix is a dense, processed mixture of intertwining shredded wood fragments and grit that will stabilize a site immediately without vegetation. This product may be used in place of silt fence to protect downstream areas not adjacent to natural resources. Erosion control mix consists primarily of organic material and may include: shredded bark, stump grindings, or partially composted wood products and shall be placed to form berms in accordance with the detail on the plan set. Care shall be taken to ensure berms are level and provide an even depth of protection throughout the length of the berm. The Contractor shall make repairs immediately if there are any signs of erosion or breaches in the berm, and supplement berms with additional material if settlement is observed.
8. Stone check dams, silt logs, or hay bale barriers will be installed at any evident concentrated flow discharge points during construction and earthwork operations.
9. All slopes steeper than 4:1 shall receive erosion control blankets, or temporary riprap stabilization. Where temporary riprap is used, slopes shall be stabilized with loam, seed and erosion control blanket, or sod when the riprap is removed for final stabilization. Slope stabilization fabric shall be a fully biodegradable double net, coir fiber blanket, anchored in accordance with manufacturers recommendations.
10. Areas of visible erosion and the temporary sediment sumps shall be stabilized with crushed stone. The size of the stone shall be determined by the Contractor's designated representative in consultation with the Owner.
11. Temporary sediment sumps and sediment basins will provide sedimentation control for stormwater runoff from disturbed areas during construction until stabilization has been achieved. The sides and floors of sediment basins shall be stabilized with geotextile fabric laid over prepared subgrade materials. Outlets shall be as shown on the construction drawings and shall include sand filters around all risers and outlet pipes.
12. Dirtbags™ will be required to be on site and available for construction dewatering. The Contractor will be required to provide four Dirtbags™ with one prepared for operation prior to commencing any trenching operations.
13. Silt logs may be used in areas where sheet flow drains off impervious surfaces to spread and filter the flow. Silt logs should be anchored in accordance with manufacturer recommendations.

Special Measures for Summer Construction

The summer period is generally optimum for construction in Maine, but it is also the period when intense short duration storms are most common, making denuded areas very susceptible to erosion. Dust

control needs to be the most stringent, and the potential to establish vegetation is often restricted by moisture deficit in the summer. During these periods, the Contractor must:

1. Implement a program to apply dust control measures on a daily basis except those days where precipitation is sufficient to suppress dust formation. This program shall extend to and include adjacent streets.
2. Spray any mulches with water after anchoring to dampen the soil and encourage early growth. Spraying may be required several times. Temporary seed may be required until the late summer seeding season.
3. Cover stockpiles of fine-grained materials, or excavated soils which are susceptible to erosion. To protect from the intense, short-duration storms which are more prevalent in the summer months.
4. Take additional steps when needed, including watering, or covering excavated materials to control fugitive dust emissions to minimize reductions in visibility and the airborne disbursement of fine-grained soils. This is particularly important given the potential presence of soil contaminants, and the proximity of along the adjacent streets and properties.
5. These measures may also be required in the spring and fall during the drier periods of these seasons.

Special Measures for Winter Construction

The winter construction season runs from November 1st through April 15th, however little or no vegetation growth can be anticipated after October 15th. Additional stabilization measures should be provided in the Fall (by November 15th) in preparation for winter conditions and permanent seeding should occur at least 45 days before the first killing frost. More frequent site inspections and BMP maintenance should be scheduled at the site towards the end of winter in preparation for the Spring thaw. The following additional winter measures should be taken:

- **Overwinter Hay Mulch** should be applied at double the normal rate (150 pounds per 1000 square feet or 3 tons/acre) and should be anchored with netting (peg and twine) or a tackifier to prevent mulch displacement before freezing conditions. No soil should be visible through the mulch. Hay mulch cannot be applied over snow.
- **Dormant Seeding and Mulch** should be applied at 3 times the specified amount after the first killing frost. All dormant seeding beds should be covered with overwinter mulch or an anchored erosion control blanket.
- **Temporary vegetation** should be applied by October 1st (to prepare for winter conditions) with winter rye at 3 pounds per 1000 square feet5 and mulched with anchored hay at 75 pounds per 1000 square feet or with erosion control blanket. If the rye fails to grow at least three inches and have 75% coverage by November 1st, the area should be stabilized for overwinter protection.
- **Erosion control mix** is the best overwinter cover, but is not recommended for slopes steeper than 1:1 or in areas with flowing water.
- **Erosion Control Blankets** should be used on slopes where hay would be disturbed by wind or water. The matting should be installed, anchored and stapled in accordance with the manufacturer's recommendations. Full contact between the blanket and the soil is critical for an effective erosion control cover.
- **Riprap** should be properly sized and installed to ensure long-term stability. In the winter, newly constructed ditches and channels should be stabilized with riprap. Widening of the channel may be required to accommodate the placement of stones. Angular riprap is preferred to round stone (tailings).
- **Sod** may be used for late-season stabilization (after October 1st), but it is not recommended for slopes steeper than 3:1 or in areas with groundwater seeps. Follow the supplier's instructions.

A brief Winter Construction Risk Analysis is included on the following page:

Overwinter Construction Risk Analysis		
Subject	Risk	Mitigation
Increased precipitation with no vegetation uptake or evaporation	More surface runoff that can be directed to erosion control measures	Observation and frequent maintenance of BMPs, temporary dewatering deployment
Frozen Grounds	The soil loses it capacity to retain water and cause more surface runoff and potential erosion	Prompt cover and stabilization of exposed soils, maintenance of fill embankments and high traffic areas
Vegetative Ground Cover	Cannot be established outside of growing season.	Seed areas at least 45 days between first frost
Runoff Diversion	Snow or icing may clog diversion structures.	Observation, maintenance and clearing of snow from BMPs where practical
Sedimentation Basins	Can be overwhelmed by spring flows.	Install before ground is frozen, stabilize upstream areas prior to Spring thaw
Silt Fence	Difficult to install on frozen ground. Often fails during spring melt	Use erosion control mix berms if required during winter conditions
Erosion Control Blankets	Cannot be anchored on frozen ground	Install prior to frost, or replace with temporary riprap stabilization over winter
Hydro-seeding	Stabilizers are ineffective in cold temperatures	Install prior to winter
Vegetated Swales	Cannot be established outside of growing season	Establish and seed 45 days prior to first frost, stabilize with temporary riprap
Impervious Stabilization	Base gravel on driving/parking areas. Pavement cannot be installed in winter.	Install sacrificial surface where necessary, frequent winter maintenance of gravel surfaces
'Mud' Season	Spring thaw	Frequent preventative maintenance of BMPs, focus on stabilization prior to onset of thaw

Permanent Erosion Control Measures

The following permanent erosion control measures have been designed as part of the Erosion/Sedimentation Control Plan:

1. The drainage conveyance systems have been designed to intercept and convey the 25-year storm.
2. All areas disturbed during construction, but not subject to other restoration (paving, riprap, etc.), will be loamed, limed, fertilized, mulched, and seeded. Fabric netting, anchored with staples, shall be placed over the mulch in areas where the finish grade slope is greater than 10 percent. Native topsoil shall be stockpiled and temporarily stabilized with seed and mulch and reused for final restoration when it is of sufficient quality.
3. Stormwater BMPs have been designed to capture, treat and discharge runoff from the developed areas of the site in a non-erosive manner to downstream receiving waters. Details of the Stormwater Management Plan are included in Section 12.

4. Catch basins shall be provided with sediment sumps for all outlet pipes that are 12" in diameter or greater or where winter sand use is contemplated. A sediment collection bag shall be installed in all basins.

Timing and Sequence of Erosion/Sedimentation Control Measures

The following general construction sequence shall be followed to ensure the effectiveness of soil erosion and sediment control measures. The detailed phasing plan and narrative should be referred to for the delineation of individual construction phases and descriptions of the associated BMPs and work methods. It is anticipated that project earthwork progress and phasing will be reviewed throughout the project as part of the overall construction schedule management for the project. Therefore, the following is intended for outline guidance only.

1. Install construction entrances.
2. Install safety and construction fence to secure the site for clearing and mobilization.
3. Install perimeter siltation fence and erosion control barriers. Particular attention shall be paid to areas upstream of protected natural resources and in the vicinity of the streams at the project site. Signs shall be erected periodically along these perimeter barriers indicating that the downstream areas are off limits to all construction activities.
4. Install diversion BMPs and stabilized outlet plunge pools to convey water from upstream areas around the project site.
5. Install temporary sediment basins and sumps as shown on the project plans and details.
6. Construct activities on the site to optimize the handling of materials and restrict the denuded areas to the time stipulated, as described in the project phasing plan.
7. Install granular borrow and pavement gravel materials to raise the site to the design subgrade elevation.
8. Construct stabilized pads for foundation and building construction.
9. Maintain erosion controls and stabilized areas throughout the construction period.
10. Install binder pavement.
11. Landscape (loam and seed).
12. Install surface pavements.
13. Install striping, signage, and miscellaneous site improvements.
14. Review the site improvements, identify punch list items and required revisions.
15. Remove any temporary erosion control measures.

The Contractor must maintain an accurate set of record drawings indicating the date when an area is first denuded, the date of temporary stabilization, and the date of final stabilization. On October 1 of any calendar year, the Contractor shall submit a detailed plan for stabilizing the site for the winter and a description of what activities are planned during the winter.

14.8. PERMIT REQUIREMENTS

This project will require review and approval by Federal, State and Local Regulatory Authorities. Permit approvals from these bodies may include specific conditions related to soil erosion and sediment control in addition to the standards described below. The Owner and Contractor will be responsible for review of, and adherence to any and all specific permit conditions applicable to the project, and these will become part of the Contract Documents for the project.

The scale and nature of the project will require coverage under the Maine Pollutant Discharge Elimination System (MPDES) General Permit - Construction Activity. The following procedures will be required to meet the minimum regulatory standards associated with this permit:

Preconstruction Conference

Prior to any construction at the site, representatives of the Contractor, the Project Engineer, the Owner, Regulatory Agency Representatives and the City of Belfast City Engineer shall meet to discuss the

scheduling of the site construction and the designation of the responsible parties for implementing the plan. The Contractor shall be responsible for scheduling the meeting. Prior to the meeting, the Contractor will prepare a detailed schedule and a marked-up site plan indicating areas and components of the work and key dates showing date of disturbance and completion of the work. The Contractor shall conduct a meeting with employees and sub-contractors to review the erosion control plan, the construction techniques which will be employed to implement the plan and provide a list of attendees and items discussed at the meeting to the Owner. Three copies of the schedule, the Contractor's meeting minutes, and marked-up site plan shall be provided to the Owner.

Inspection of Soil Erosion and Sediment Control Measures

The CM shall prepare a list and designate by name, address and telephone number all individuals who will be responsible for implementation, inspection, and maintenance of all erosion control measures identified within this section and as contained in the Erosion and Sedimentation Control Plan of the contract drawings. Specific responsibilities of the inspector(s) will include:

- Execution of the Contractor/Subcontractor Certification contained in **Attachment C** by any and all parties responsible for erosion control measures on the site.
- A weekly certification stating compliance, any deviations, and corrective measures necessary to comply with the erosion control requirements of this section shall be prepared and signed by the inspector(s).

Inspection of the project work site shall include:

1. Identification of proper erosion control measure installation in accordance with the erosion control detail sheet or as specified in this section.
2. Determine whether each erosion control measure is properly operating. If not, identify damage to the control device and determine remedial measures.
3. Identify areas which appear vulnerable to erosion and determine additional erosion control measures which should be used to improve conditions.
4. Inspect areas of recent seeding to determine percent catch of grass. A minimum catch of 90 percent is required prior to removal of erosion control measures.
5. All erosion controls shall be removed within 30 days of permanent stabilization except for mulch and netting not detrimental to the project. Removals shall include but not be limited to all silt fence, hay bales, inlet protection, and stone check dams.
6. Accumulated silt/sediment should be removed when the depth of sediment reaches 50 percent of the barrier height. Accumulated silt/sediment should be removed from behind silt fencing when the depth of the sediment reaches 6 inches.
7. Silt sacks should be removed and replaced at least every three months and at any time where the weekly inspection reveals that siltation has significantly retarded the rate of flow through the silt sack.
8. If inspection of the site indicates a change should be made to the erosion control plan, to either improve effectiveness or correct a site-specific deficiency, the inspector shall immediately implement the corrective measure and notify the Owner of the change.

A summary of standard Erosion Control Inspections is given in the table below. It is anticipated that inspection and maintenance tasks will be adapted throughout the project to reflect field conditions and construction progress:

EROSION AND SEDIMENT CONTROL MEASURES AND ACTIVITY	INSPECTION FREQUENCY		
	Weekly	Before & After a Storm	After Construction
SEDIMENT BARRIERS			

EROSION AND SEDIMENT CONTROL MEASURES AND ACTIVITY	INSPECTION FREQUENCY		
	Weekly	Before & After a Storm	After Construction
Sediment barriers are installed prior to soil disturbances	X	X	
Silt fences are keyed in and tight	X	X	
Barriers are repaired and replaced as necessary	X	X	
Barriers are removed when the site is stabilized - Silt fence should be cut at the ground surface			X
TEMPORARY STABILIZATION			
Areas are stabilized if idle for 14 days or more	X	X	
Daily stabilization within 100 ft of a natural resource	X	X	
MULCH			
Seed and mulch within 7 days of final grading. Ground is not visible	X	X	
Erosion control mix is 4-6 inch thick	X	X	
Erosion control blankets or hay mulch are anchored	X	X	
VEGETATION			
Vegetation provides 90% soil cover	X		X
Loam or soil amendment were provided	X		X
New seeded areas are mulched and protected from vehicle, foot traffic and runoff	X	X	X
Areas that will remain unworked for more than 1 year are vegetated with grass	X		
SLOPES AND EMBANKMENTS			
Final graded slopes and embankments are stabilized	X	X	X
Diversions are provided for areas with rill erosion	X	X	X
Areas steeper than 2:1 are riprapped	X		
Stones are angular, durable and various in size	X		
Riprap is underlain with a gravel layer or filter fabric	X		
STORMWATER CHANNELS AND CULVERTS			
Ditches and swales are permanently stabilized– channels that will be riprapped have been over-excavated	X	X	X
Ditches are clear of obstructions, accumulated sediments or debris	X	X	X
Ditch lining/bottoms are free of erosion	X	X	X
Check dams are spaced correctly to slow flow velocity	X		
Underlying filter fabric or gravel is not visible	X	X	X
Culvert aprons and plunge pools are sized for expected flows volume and velocity	X		
Stones are angular, durable and various in size	X		
Culverts are sized to avoid upgradient flooding	X	X	
Culvert protection extends to the maximum flow elevation within the ditch	X	X	X
Culvert is embedded, not hanging	X	X	X
CATCH BASIN SYSTEMS			
Catch basins are built properly	X		
Accumulated sediments and debris are removed from sump, grate and collection area		X	X
Floating debris and floating oils are removed from trap			X
ROADWAYS AND PARKING SURFACES			

EROSION AND SEDIMENT CONTROL MEASURES AND ACTIVITY	INSPECTION FREQUENCY		
	Weekly	Before & After a Storm	After Construction
The gravel pad at the construction entrance is clear from sediments	X	X	
Roads are crowned		X	X
Cross drainage (culvert) is provided	X		
False ditches (from winter sand) are graded		X	X
BUFFERS			
Buffers are free of erosion or concentrated flows		X	X
The downgradient of spreaders and turnouts is stable		X	X
Level spreaders are on the contour			X
The number of spreaders and ditch turnouts is adequate for flow distribution		X	X
Any sediment accumulation is removed from within spreader or turnouts		X	X
STORMWATER BASINS AND TRAPS			
Embankments are free of settlement, slope erosion, internal piping, and downstream swamping		X	X
All flow control structure or orifices are operational and clear of debris or sediments		X	X
Any pre-treatment structure that collects sediment or hydrocarbons is clean or maintained		X	X
Vegetated filters and infiltration basins have adequate grass growth			X
Any impoundment or forebay is free of sediment		X	X
WINTER CONSTRUCTION (November 1st-April15th)			
Final graded areas are mulched daily at twice the normal rate with hay, and anchor (not on snow)	Daily		
A double row of sediment barrier is provided for all areas within 100 ft of a sensitive resource (use erosion control mix on frozen ground)	Daily		
Newly constructed ditches are riprapped	Daily		
Slopes greater than 8% are covered with an erosion control blanket or a 4-inch layer of erosion control mix	Daily		
HOUSEKEEPING PUNCH LIST			
All disturbed areas are permanently stabilized, and plantings are established (grass seeds have germinated with 90% vegetative cover)			X
All trash, sediments, debris or any solid waste have been removed from stormwater channels, catch basins, detention structures, discharge points, etc.			X
All ESC devices have been removed: (silt fence and posts, diversions and sediment structures, etc.)			X
All deliverables (certifications, survey information, as-built plans, reports, notice of termination (NOT), etc.) in accordance with all permit requirements have been submitted to town, Maine DEP, association, owner, etc.			X

Maintenance of Soil Erosion and Sediment Control Measures

The following general maintenance requirements shall apply to the installed erosion control BMPs. Additional maintenance may be required based on field conditions, or at the recommendation of the Project Engineer, Third Party Inspector, Owners Representative, or regulatory authorities:

1. Stabilized Construction Entrances - Stone stabilized construction entrances will require the stone to be removed and replaced, as it becomes covered or filled with mud and material tracked by vehicles exiting the site.
2. The surface of the Runoff Diversion Trench shall be inspected on a weekly basis and cleared of any accumulating surface debris that could reduce the capacity of the BMP to divert surface water. The outlets should be inspected to ensure that groundwater flows are being adequately conveyed around the construction area.
3. The upgradient (diversion) silt fence barrier shall be repaired or replaced immediately if any breaches are found, or there are signs of undercutting. Sediment and debris shall be removed from the upstream side of the barrier periodically. The downstream ends of the barrier should be checked for any erosion caused by concentrated flows running along the barrier. These areas should be repaired immediately with stone check dams to prevent further damage.
4. Inlets and outlets of bypass culverts shall be cleared of accumulating debris and any signs of erosion shall be repaired immediately with riprap.
5. Riprap plunge pool outlets shall be cleared of debris and monitored for sediment accumulation. If sediment reaches a depth of six inches, it shall be removed, and the plunge pool repaired or re-constructed.
6. Silt Fence Barriers - The Contractor shall make repairs immediately if there are any signs of erosion or sedimentation below the fence line. If such erosion is observed, the Contractor shall take proactive action to identify the cause of the erosion and take action to avoid its reoccurrence. If there are signs of undercutting at the center or the edges or impounding of large volumes of water behind the fence, the barrier shall be replaced with a stone check dam and measures taken to avoid the concentration of flows not intended to be directed to the silt fence.
7. Silt Fence Haybale Barriers – The Contractor shall maintain the silt fence as described above. Should the central haybale barrier deteriorate, or show signs of contamination, the material shall be removed and replaced.
8. Erosion Control Mix – The Contractor shall maintain erosion control berms to ensure they remain level and continue to provide an even depth of protection throughout the length of the berm. The Contractor shall make repairs immediately if there are any signs of erosion or breaches in the berm, and supplement berms with additional material if settlement is observed.
9. Stone check dams, silt logs, or hay bale barriers installed at concentrated flow discharge points shall be inspected and cleared of accumulated debris periodically. If sediment accumulation is observed, this shall be removed when it reaches a depth of not more than six inches.
10. Slopes stabilized with erosion control blankets, or temporary riprap stabilization shall be inspected and repaired if any signs of rill erosion or stone displacement are observed. Sloughing of slopes or evidence of slip, rotational or base failure shall be reported immediately to the project engineer for design of remedial actions.
11. Any open graded areas of visible erosion and the temporary sediment sumps shall be stabilized with crushed stone. The size of the stone shall be determined by the contractor's designated representative in consultation with the Owner.
12. Temporary sediment sumps and sediment basins shall be inspected on a weekly basis. Routine maintenance shall include the removal of debris around inlets and outlets, repair of any uneven areas on basin berms, repair of any observed rill erosion in embankments and replacement of bench and outlet control filter material when slow drainage is observed.
13. Anchoring of silt logs shall be checked on a weekly basis. These shall be removed and replaced when clogged with sediment.
14. Mulched areas shall be repaired when ground is visible through the mulch layer. Anchoring of erosion control blankets and hay mulch shall be repaired is any evidence of separation is observed.
15. Vegetated areas shall be over-seeded and stabilized where 90% cover is not achieved.

Reporting Requirements

In addition to the weekly certifications, the inspector(s) shall maintain written reports recording construction activities on site which include:

1. Dates when major grading activities occur in a particular areas of the site.
2. Dates when major construction activities cease in a particular area, either temporarily or permanently.
3. Dates when an area is stabilized.
4. Inspection of the project work site on a weekly basis and after each significant rainfall event (0.25 inch or more within any consecutive 24-hour period) during construction until permanent erosion control measures have been properly installed and the site has been stabilized.
5. A log (report) must be kept summarizing the scope of the inspection, name(s) and qualifications of the personnel making the inspection, the date(s) of the inspection, and major observations relating to operation of erosion and sedimentation controls and pollution prevention measures. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and location(s) where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken.

Record Keeping

1. All certifications, inspection forms, and written reports prepared by the inspector(s) shall be filed with the Owner, and the Permit File contained on the project site, and available for inspection and review upon request. All written certifications, inspection forms, and written reports must be filed within one (1) week of the inspection date.
2. Inspections Reports and Logs must be made accessible to regulatory agency staff and a copy must be provided upon request.
3. Copies of all reports must be kept on file and available upon request for a period of at least three years from the completion of permanent stabilization.

14.9. CONSTRUCTION PROCUREMENT AND ADMINISTRATION

The project will be constructed by a Construction Manager under contract to the Owner/Applicant. The Construction Manager will submit a detailed schedule for the completion of the work, broken into specific tasks, with anticipated milestones and completion dates, at the start of construction. The project schedule will be reviewed at regular bi-weekly project meetings, with updates and amendments to be recorded in the project file.

The work will be conducted in sections which will limit the amount of exposed area to those areas in which work is expected to be undertaken during the next 30 days. Exposed areas will be covered and stabilized as rapidly as practical. All areas will be permanently stabilized within 7 days of final grading and temporarily stabilized within 7 days of initial disturbance or before a predicted storm event of over ½" of rain. The area of denuded, non-stabilized construction shall be limited to the minimum area practicable. An area shall be considered to be denuded until the subbase gravel is installed in parking areas, or the areas of future loam and seed have been loamed, seeded, and mulched, or stabilized with erosion control blanket.

The Contractor must maintain an accurate set of record drawings indicating the date when an area is first denuded, the date of temporary stabilization, and the date of final stabilization. On October 1 of any calendar year, the Contractor shall submit a detailed plan for stabilizing the site for the winter and a description of what activities are planned during the winter.

The Contractor must install any added measures which may be necessary to control erosion/sedimentation and fugitive dust emissions from the site, with adjustments made dependent upon forecasted and actual site and weather conditions.

The Contractor has sole responsibility for complying with the erosion/sediment control report, including control of fugitive dust, and shall be responsible for any monetary penalties resulting from failure to comply with these standards.

Once construction has been completed, long-term maintenance of the stormwater management system will the responsibility of the applicant. Operations & Maintenance items with a list of maintenance requirements and frequency are listed at the end of Section 12 of the Maine DEP Permit Application.

Attachments

Attachment A – Soil Erosion and Sediment Control Phasing Plans and Narrative
Attachment B – Temporary Sediment Basin Sizing Calculations
Attachment C - Sample Erosion Control Compliance Certification and Inspection Forms

ATTACHMENT A

Major Earthwork Phasing Narrative & Soil Erosion and Sediment Control Phasing Plans

ATTACHMENT B

Temporary Sediment Basin Sizing Calculations

ATTACHMENT C

Sample Erosion Control Compliance Certification and Inspection Forms

CONTRACTOR/SUBCONTRACTOR CERTIFICATION

PROJECT INFORMATION

Project Name:

Address:

CONTRACTOR/SUBCONTRACTOR INFORMATION

Firm Name:

Address:

Telephone:

Type of Firm:

CERTIFICATION STATEMENT

"I certify under penalty of law that I understand the terms and conditions of the Maine Construction General Permit (MCGP) permit that authorizes the stormwater discharges associated with construction activity from the project site identified as part of this certification."

_____
Signature

_____
Typed Name

_____
Title

_____
Date

ATTACHMENT M

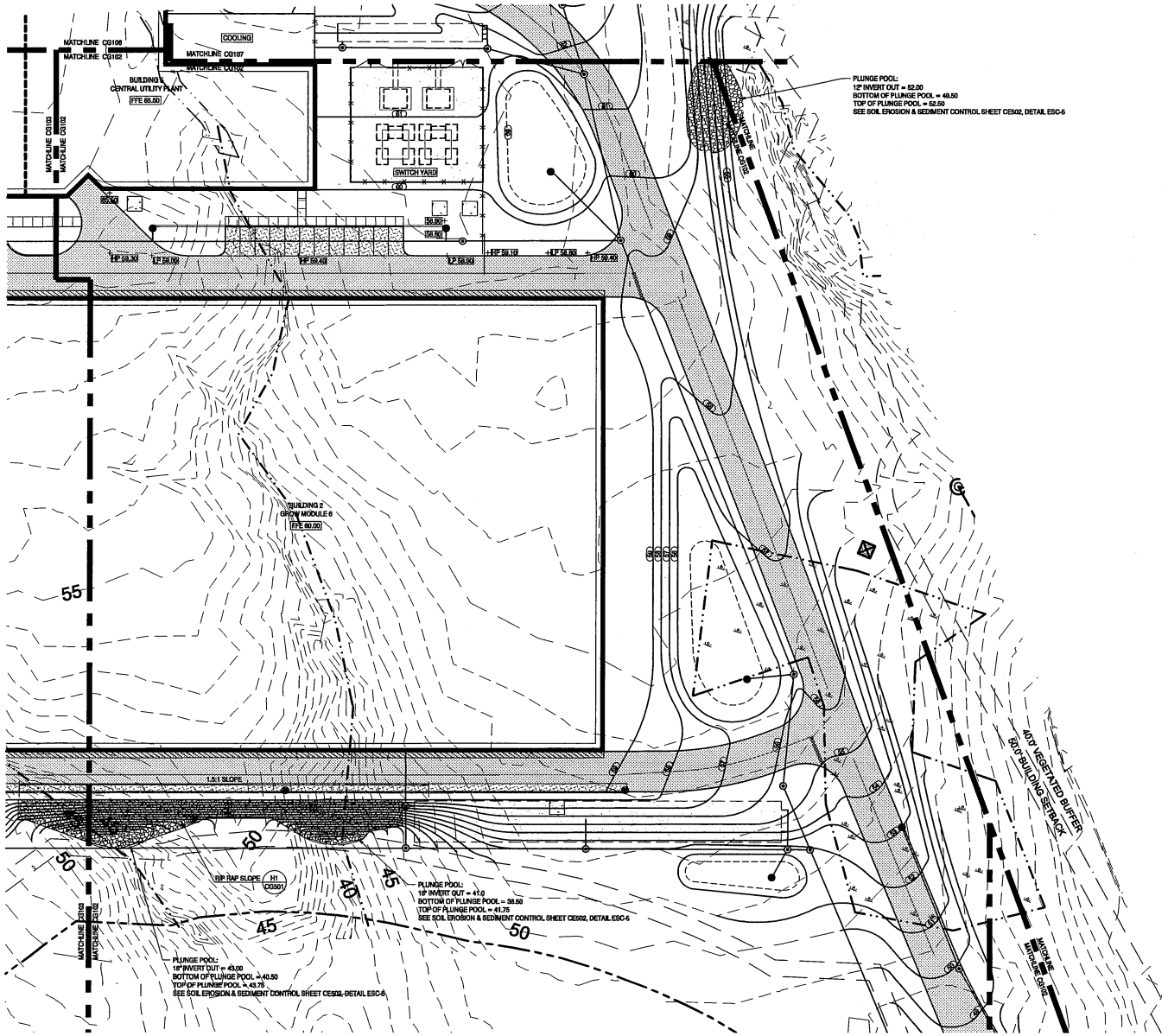
Revised Grading Plans

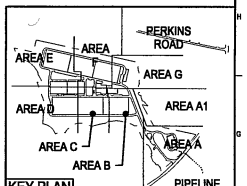
Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Ransom Consulting, Inc.
Project 171.05027.008

NOTE:

SEE CS- DRAWING SERIES FOR STORMWATER SYSTEM INFORMATION.





REV	DESCRIPTION	DATE
2	RESPONSE TO ADDITIONAL DEP QUESTIONS	7-25-19
1	REISSUED FOR PERMIT	7-03-19
0	ISSUED FOR PERMIT	5-14-19

RESPONSE TO DEP
7-25-19

CURRENT ISSUE STATUS:

TRUE NORTH

STATE OF MAINE ANDREW B. JOHNSON No. 9994 REGISTERED PROFESSIONAL ENGINEER

TRUE NORTH:

SMRT Architects and Engineers
344 Fore Street/P.O. BOX 618
Portland, Maine 04104
1.877.700.7678
www.smrtinc.com
ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY
SMRT

RANSOM Consulting Engineers and Scientists
Ransom Consulting Engineers and Scientists
400 Commercial Street, Suite 400
Portland, Maine 04101

NORDIC AQUAFARMS
285 NORTHPORT AVENUE

BELFAST, MAINE

GRADING PLAN
AREA B

SHEET TITLE:

0 15' 30' 60' 90'

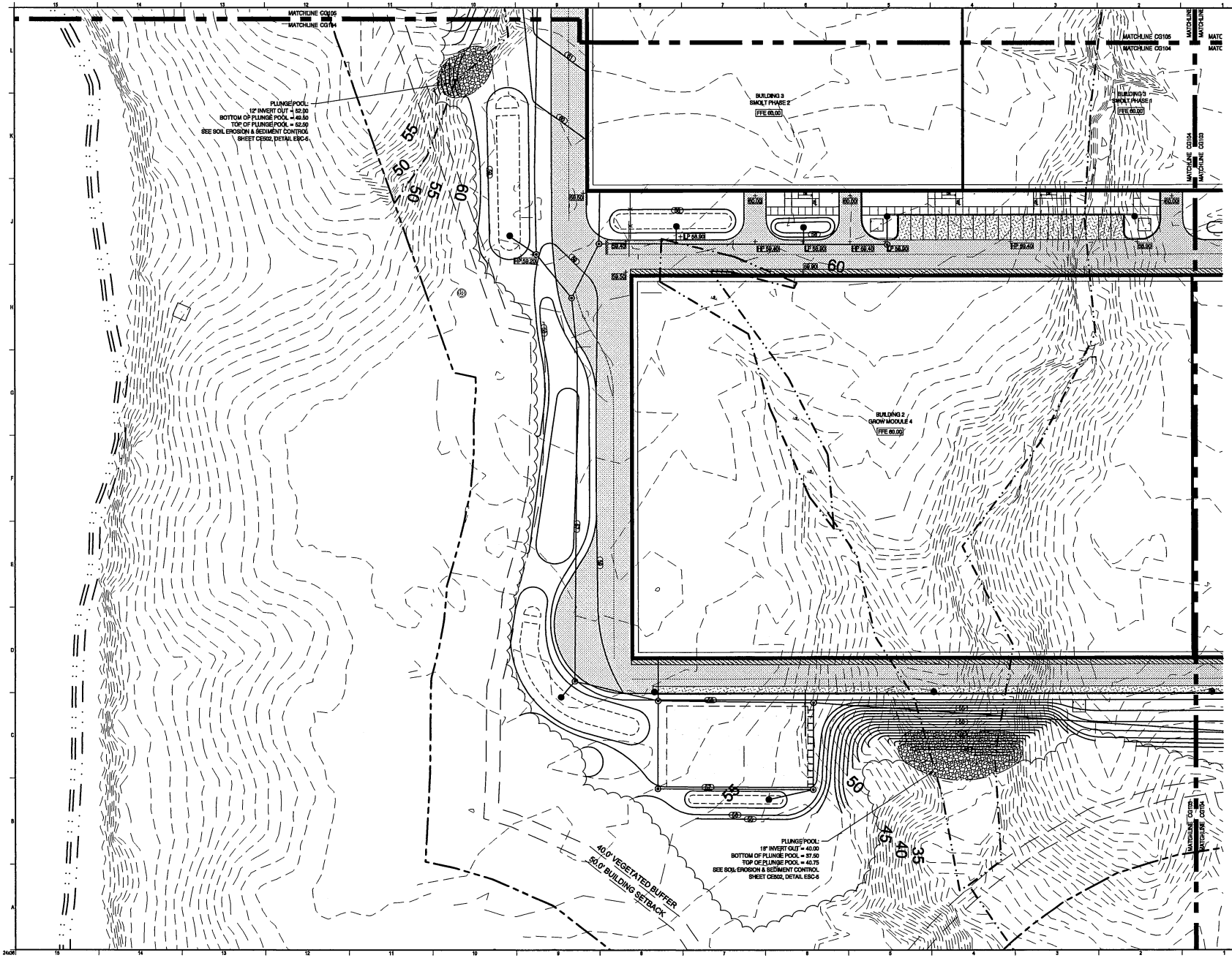
SCALE: 1" = 30'

PROJECT MANAGER:	ADB	PROJECT NO:	18076
A/E OF RECORD:			
JOB CAPTAIN:	SP		
DRAWN BY:	WSM		
SMRT FILE:	CG102-18076	SHEET No.	CG102

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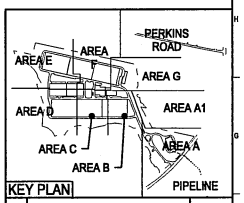
NOT FOR CONSTRUCTION

24x36



NOTE:

SEE CS- DRAWING SERIES FOR STORMWATER SYSTEM INFORMATION.



KEY PLAN

REV	DESCRIPTION	DATE
2	RESPONSE TO ADDITIONAL DEP QUESTIONS	7-25-19
1	REISSUED FOR PERMIT	7-03-19
0	ISSUED FOR PERMIT	6-14-19

RESPONSE TO DEP
7-25-19

CURRENT ISSUE STATUS:

TRUE NORTH:

SMRT Architects and Engineers
144 Fore Street/P.O. BOX 618
Portland, Maine 04104
1.877.700.7678
www.smrtinc.com
ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY

RANSOM Consulting Engineers and Scientists
Ransom Consulting Engineers and Scientists
400 Commercial Street, Suite 400
Portland, Maine 04101

NORDIC AQUAFARMS
285 NORTHPORT AVENUE

BELFAST, MAINE

GRADING PLAN
AREA D

SHEET TITLE:

0 15' 30' 60' 90'

SCALE: 1" = 30'

PROJECT MANAGER:	ADB	PROJECT NO:	18078
A/E OF RECORD:			
JOB CAPTAIN:	SP		
DRAWN BY:	WSM		CG104
SMRT FILE:	CG104-18078	SHEET No.	

NOT FOR CONSTRUCTION

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Table 1

Receptor ID	Nearby Protected Locations and Distance From Project Center	Estimated Project Sound Levels (dBA) *	Estimated Project Sound Levels with additional 5 dBA for Tonal Sounds (dBA)	Maine DEP Sound Limits		Daytime Estimated Project Level Complies?	Nightime Estimated Project Level Complies?
				Daytime	Nightime		
1	Northwest 975 ft.	34	39	55	45	YES	YES
2	North 585 ft.	37	42	55	45	YES	YES
3	Souteast 790 ft.	44	49	55	45	YES	NO
4	Southeast 1,230 ft.	39	44	55	45	YES	YES
5	South 950 ft.	38	43	55	45	YES	YES
6	West 2,115 ft.	31	36	55	45	YES	YES

*Obtained from Response to RFI dated August 22,2019

Table 2

Receptor ID	Nearby Protected Locations and Distance From Project Center	Estimated Project Sound Levels (dBA) *	New Estimated Project Sound Levels **	New Estimated Project Sound Levels with additional 5 dBA for Tonal Sounds (dBA)	Maine DEP Sound Limits		Daytime Estimated Project Level Complies?	Nightime Estimated Project Level Complies?
					Daytime (dBA)	Nightime (dBA)		
1	Northwest 975 ft.	34	44	49	55	45	YES	NO
2	North 585 ft.	37	53	58	55	45	NO	NO
3	Souteast 790 ft.	44	54	59	55	45	NO	NO
4	Southeast 1,230 ft.	39	51	56	55	45	NO	NO
5	South 950 ft.	38	47	52	55	45	YES	NO
6	West 2,115 ft.	31	25	30	55	45	YES	YES

*Obtained from Response to RFI dated August 22,2019

** Tech Modeled the Project based on the most current building plans and worst case scenario (8 Engine xhaust and 8 Condensers) and modeled the project based on the original building plans and elevation (7 Engine Exhuast). The difference was then added to the provide Estimated Project Sound Levels to obtain the New Estimated Project Sound Levels

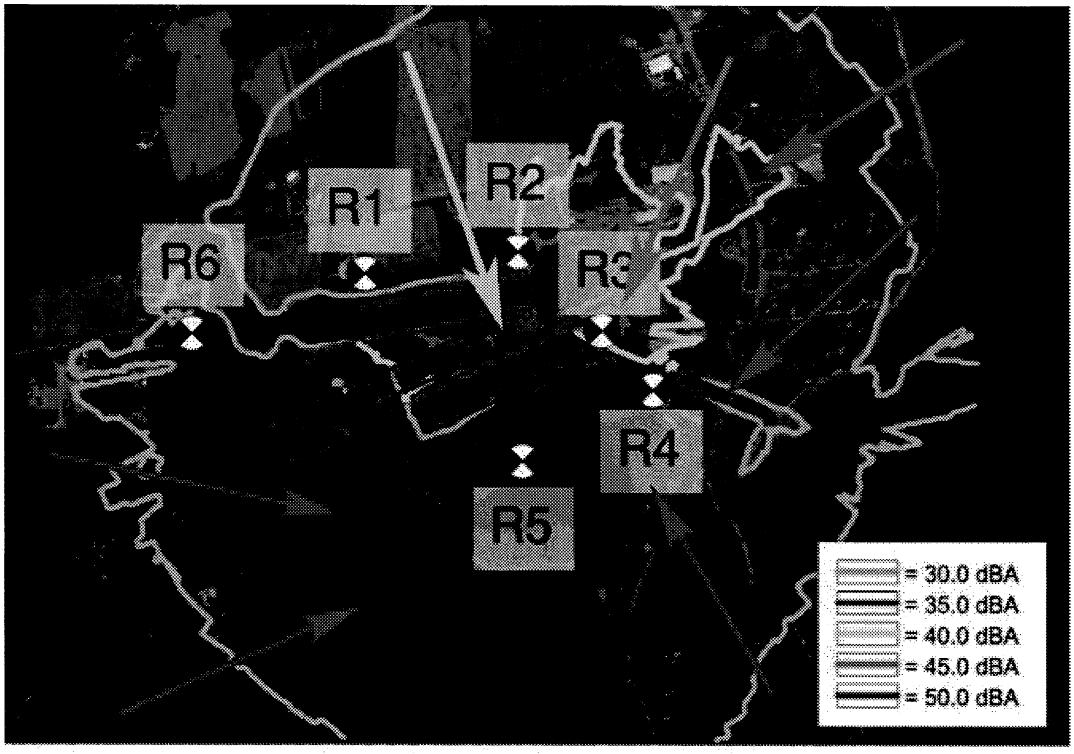


Figure 3. A-weighted Hourly Equivalent Leq Sound Level Contours from Regulated Equipment during Future Routine Operation of both Project Phase 1 and Phase 2

Exhibit W1-G
Annotated Figure 3.
From Nordic Aquafarms Salmon Facility SLODA Application Section 4

TECH environmental



CHAPTER 115 MINOR NEW SOURCE LICENSE APPLICATION

Nordic Aquafarms Inc
May 2019



MainelyEnvironmental.com
60 Pineland Dr., Suite 310
New Gloucester, ME 04260
207-671-7387

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FIGURES

Figure 1: Recirculation Aquaculture System Tank

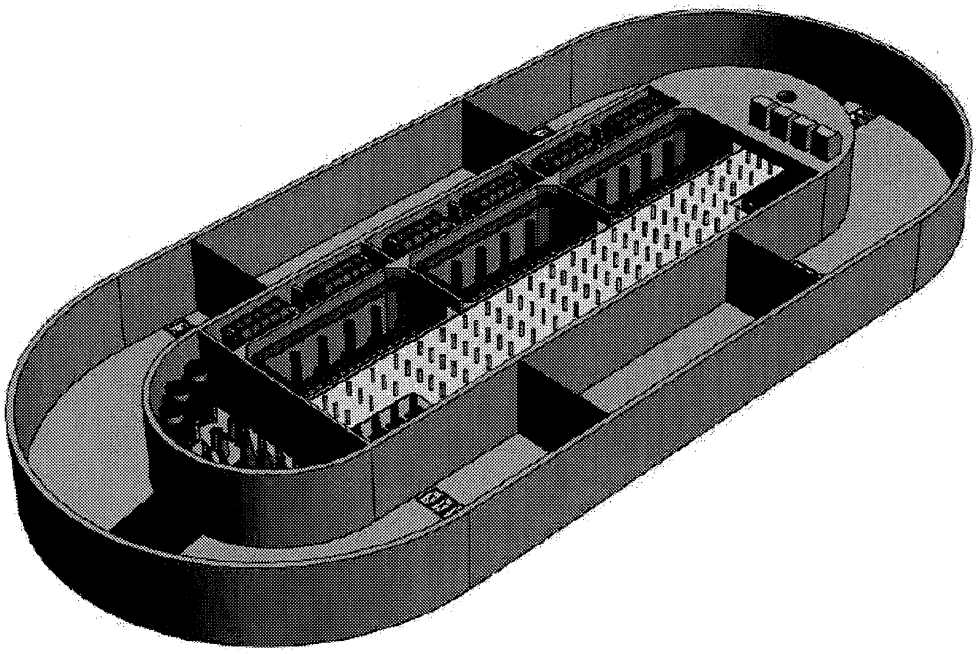
APPENDICES

Appendix A: Maine DEP Chapter 140 Forms
Appendix B: Public Notice and Cover Letters to Town of Belfast
Appendix C: Site Plan
Appendix D: Title, Right, & Interest

1. INTRODUCTION

Nordic Aquafarms Inc is proposing to construct a land-based salmon aquaculture farm on a 54-acre parcel located at 285 Northport Ave in Belfast, Maine. The facility will be an end-to-end operation, from eggs to market size salmon, using Recirculation Aquaculture System (RAS) tank technology for maintaining optimal water quality for fish production. Ultimately the plant will be designed to produce up to 33,000 tons per year of salmon. Provided in Figure 1 is a depiction of the RAS technology followed by a brief description.

Figure 1: Recirculation Aquaculture System Tank



The RAS includes mechanically forced cleaning and degassing/aeration to replace carbon dioxide with oxygen vital for fish health and growth. The RAS module's water circulation, cleaning, degassing, and aeration systems require electricity to operate. Plant electrical needs will mainly be supplied by the local utility; however, Nordic Aquafarms will supplement this with a 14 MW reciprocating engine bank. Facility building and process heating will be provided by electrical heaters. Licensable air emission units include the diesel engines identified in Section 1.2. Potential emissions will be limited by an annual fuel usage limit to ensure that potential emission remain below the "major" source thresholds. Accordingly, this application constitutes a Chapter 115 Minor New Source.

1.1 Report Organization

A description of the licensable equipment is provided in Section 1-2 followed by the construction schedule in Section 1-3. Section 2 identifies the project emission and licensing classification. Section 3 includes the required Best Available Control Technology analysis.

The required Maine DEP application forms, including the certification of a responsible official, are included in Appendix A. A copy of the Public Notice, run in the Bangor Daily News, is included in Appendix B. Copies of the return receipt from notification to the abutters can be found in the SLODA application filed concurrently with this application. Appendix C includes a Site Plan, and Title/Right/Interest is included in Appendix D.

1.2 Regulated Equipment Description

Nordic Aquafarms is planning to install Eight 2-MW reciprocating diesel engine sets. The power plant will be designed to generate 14 MWs of electricity using seven of the eight engines. The eighth engine will be installed as a back-up. Diesel fuel usage will be limited to 900,000 gallons annually.

Regulated fuel burning equipment details are included in Tables 1-1 below.

Table 1-1: Fuel Burning Equipment

Equipment ID	Make/Model	Maximum Design Capacity	Electrical Generating Capacity	Fuel Type (Sulfur Content)	Maximum Hourly Fuel Usage	Control Equipment
		[MMBtu/hr]		[-]	[gal]	[-]
Engines #1 - #8	Caterpillar 3516C Tier 4F **or equivalent**	19.53	2 MW	Diesel, 15 ppm sulfur	139.5	SCR, Oxidation Catalyst, & Particulate Filter

1.3 Construction Schedule

This schedule will commence upon final receipt of all necessary permits and approvals for the project.

1. Construction start within 1-3 months of completion of permitting. Initial construction efforts will include infrastructure connection to site, sitework, the Smolt 1 facility and waste water treatment plant, and supporting facilities and utilities
2. Construction start of grow-out modules will occur within approximately 6 months of the beginning of development. The total period for construction of the first 3 modules and fish processing is projected to be about 24 months.
3. Timeline for Phase 2 expansion (Smolt 2 and remaining 3 grow-out modules), will be decided once Phase 1 development is complete and sufficient time has been allocated for operational startup and optimization

2. PROJECT CLASSIFICATION

2.1 Overview

This application qualifies as a New Source Review (NSR) Chapter 115 Minor New Source. As discussed in Section 1 of this application, Nordic Aquafarms is proposing to limit its fuel usage for the eight diesel engines so that potential emissions will remain below the major source and air dispersion modeling thresholds. Provided in the tables below are proposed short term emission rates for each of the proposed fuel burning sources and the corresponding potential emissions. Table 2-1 includes emissions for the eight engines and Table 2-2 includes facility wide emissions and the corresponding major source and modeling thresholds.

2.2 Equipment and Project Emissions

Nordic Aquafarms is proposing to install Eight 2-MW diesel engines with a total annual diesel fuel limit of 900,000 gallons. The engines are subject to 40 CFR Part 60 Subpart IIII and as such must meet the applicable Tier 4 manufacturer emission standards which are identified in 40 CFR 1039.101 and described in Section 2.3. Table 2-1 includes a summary of the diesel engine equipment specifications, proposed fuel cap, and the proposed emission limits.

Table 2-2 includes a summary of facility wide total emissions as compared to the modeling and major source thresholds. Total facility wide emissions are below the applicable modeling and major source thresholds.

Table 2-1: Proposed Engines #1 - 8 Specifications and Emissions

Proposed Engines #1-8 Specifications and Emissions

Generator Make & Model:	Caterpillar 3516C Tier 4F (Or Equivalent)
Fuel Type:	Diesel
Max Fuel Consumption (gal/hr):	139.5
Max Heat Input (MMBtu/hr):	19.53
Engine Power (kW):	2,000
Proposed Fuel Limit (gal):	900,000

Pollutant	Tier 4 Emission Limit (g/kw-hr)	Emission Factor (lb/MMBtu)	Proposed Limit (lb/hr)	PTE (TPY)
NOx	3.5	0.79	15.4	49.8
PM**	0.1	0.02	0.4	1.4
*PM_{10} & $PM_{2.5}$		0.03	0.6	1.9
CO	3.5	0.79	15.4	49.8
VOC	0.19	0.04	0.8	2.7
*SO_2		0.00	0.03	0.1
*CO_2e		165	3,222.5	10,395.0

*AP-42 Emission Factors
**Alternate FEL standard may apply.See 40 CFR 1039.101 (d)(2)
Note: Proposed Limits are highlighted.

Table 2-2: Facility Wide Annual Potential To Emit (TPY) & Regulatory Thresholds

Pollutant	Engines 1 - 8 PTE	Modeling Threshold	Major Source Threshold	Major/Minor Designation
NOx	49.8	50	100	**Minor**
PM	1.4	n/a	100	**Minor**
PM_{10} & $PM_{2.5}$	1.9	25/15	100	**Minor**
CO	49.8	250	100	**Minor**
VOC	2.7	n/a	50	**Minor**
SO_2	0.1	50.0	100	**Minor**
CO_2e	10395.0	-	-	-

2.3 Regulatory Overview - Engines

2.3.1 Engine NESHAP & NSPS Applicability

The Engines at Nordic Aquafarms are Non-Emergency Compression Ignition (CI) New Stationary Engines Located at Area Source of Hazardous Air Pollutants (HAP), constructed on or after June 12, 2006 and are subject to 40 CFR part 60, subpart IIII (Standards of Performance for Stationary Compression Ignition Internal Combustion Engines).

Provided below is a summary overview of the applicable Requirements of 40 CFR part 60, subpart IIII for Nordic Aquafarms' proposed engines.

Emission Standards: 60.4201(a)

Stationary CI internal combustion engine manufacturers must certify their 2007 model year and later non-emergency stationary CI ICE with a maximum engine power less than or equal to 2,237 kilowatt (KW) (3,000 horsepower (HP)) and a displacement of less than 10 liters per cylinder to the certification emission standards for new nonroad CI engines in 40 CFR 89.112, 40 CFR 89.113, 40 CFR 1039.101, 40 CFR 1039.102, 40 CFR 1039.104, 40 CFR 1039.105, 40 CFR 1039.107, and 40 CFR 1039.115, as applicable, for all pollutants, for the same model year and maximum engine power. Table 3-1 includes the applicable pollutant standards.

Table 3-1: NSPS Subpart IIII Engine Manufacturer Emission Standards

Pollutant	Tier 4 Emission Limit (g/kw-hr)
NOx*	3.5
PM*	0.1
CO	3.5
VOC	0.19

*Alternate FEL standard may apply. See 40 CFR 1039.101 (d)(2)

Fuel Requirements: 60.4207(b)

Owners and operators of stationary CI ICE subject to this subpart with a displacement of less than 30 liters per cylinder that use diesel fuel must purchase diesel fuel that meets the requirements of 40 CFR 80.510(b) for nonroad diesel fuel. (i.e., 15 ppm maximum)

Monitoring Requirements: § 60.4209(b)

Owners or operators of a stationary CI internal combustion engine equipped with a diesel particulate filter necessary to comply with the emission standards in § 60.4204 must be fitted with a backpressure monitor that notifies the owner or operator when the high backpressure limit of the engine is approached.

Compliance Requirements: §60.4204, 60.4211(a) & (c), 60.4206

Owners and operators of stationary CI ICE must operate and maintain stationary CI ICE that achieve the emission standards as required in §60.4204 over the entire life of the engine.

If you are an owner or operator you must:

(1) Operate and maintain the stationary CI internal combustion engine and control device according to the manufacturer's emission-related written instructions; and

(2) Change only those emission-related settings that are permitted by the manufacturer.

Notification, Reporting, and Recordkeeping: §§60.1 & 60.4214 (b) & (c)

The General Provisions of CFR part 60.1 apply to Nordic Aquafarms proposed engines.

For CI internal combustion engines equipped with a diesel particulate filter, the owner or operator must keep records of any corrective action taken after the backpressure monitor has notified the owner or operator that the high backpressure limit of the engine is approached.

2.3.2 State DEP Regulations

The proposed Engines are subject to visible emission, particulate matter, and fuel sulfur and limits established in Maine Department of Environmental Protection Regulation Chapters 101, 103, and 106, respectively.

.

Chapter 101 - Visible Emissions

Stationary internal combustion engines manufactured after the year 2000 are subject to an opacity limit of 20 percent on a six (6) minute block average basis, except for no more than two (2) six (6) minute block averages in a 3-hour period. See Ch. 101 § (2)(B)(1)(d).

Chapter 103 - Particulate Emission Standard

The proposed engines are subject to the 0.12 lb/MMBtu particulate matter (PM) emission limit. See Ch. 103 § (2)(B)(1)(a).

Chapter 106 – Fuel Sulfur Standard

Beginning January 1, 2018, sources must limit fuel sulfur contents to 0.0015% by weight (ultra-low sulfur diesel - ULSD).

3. BEST AVAILABLE CONTROL TECHNOLOGY

3.1 Overview

The proposed installation of Eight 2-MW diesel fired engine sets represents a minor new source in accordance with Maine DEP Chapter 115 regulations. As such Nordic Aquafarms must demonstrate that the emissions from the proposed air emission units will receive Best Available Control Technology (BACT) as defined in Maine DEP Chapter 100 regulations. See Maine DEP Regulation Chapter 115 § 4(A)(4)(d). BACT is defined as:

> An emission limitation (including a visible emissions standard) based on the maximum degree of reduction for each pollutant emitted from or which results from the new or modified emissions unit which the Department on a case by case basis, taking into account energy, environmental and economic impacts and other costs, determines is achievable for such emissions unit through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combination techniques for control of each pollutant. In no event shall application of BACT result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR Part 60 and 61 or any applicable emission standard established by the Department. If the Department determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emission standard infeasible, a design, equipment, work practice, operational standard or combination thereof may be prescribed instead to satisfy the requirement for the application of BACT. Such standard shall, to the degree possible, set forth the emission reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results. (Maine DEP Regulation Chapter 100 § 18)

The proposed engine sets have the potential to emit the following criteria air pollutants: Volatile organic compounds (VOCs), particulate matter ($PM/PM_{10}/PM_{2.5}$), nitrous oxides (NOx), carbon monoxide (CO), and sulfur dioxide (SO_2). The BACT review prepared for the proposed Engines has been prepared in accordance with the Northeast States for Coordinated Air Use Management (NESCAUM) BACT Guideline. There are five key steps in the BACT Procedure:

1. Identify all control technologies applicable to the process;
2. Eliminate technically infeasible options;
3. Rank remaining control technologies by control effectiveness;
4. Evaluate technically feasible control alternatives (energy, environmental, and economic impacts) if a control technology less effective than the top option is proposed as BACT; and
5. Select BACT in consideration of energy, environmental, and economic impacts.

Provided in the following sections is a detailed BACT analysis for the proposed emission units.

3.2 Control of Air Pollutants from Generator #1-8

The air pollution control options available for generators of this size include the installation of add-on pollution control devices, the use of clean fuels, and good combustion practices. The technologies listed in Table 3-1 are determined to be potentially available control technologies for emissions from diesel engines. The technologies are listed by order of effectiveness and described in greater detail in following subsections.

Table 3-1: Control Technology Options for Diesel Engines

Pollutant	Control Technology
NOx	• Add-On Controls (i.e., Selective Catalytic Reduction) • Combustion Control Technologies
$PM/PM_{10}/PM_{2.5}$	• Add-On Controls (i.e., particulate filter) • Combustion Control Technologies
CO	• Oxidation Catalyst • Combustion Control Technologies
VOCs	• Oxidation Catalyst • Combustion Control Technologies
SO_2	• Low Sulfur Fuel

The non-emergency engines proposed for Nordic Aquafarms are subject to 40 C.F.R. 60 Subpart IIII. New non-emergency engines must meet stringent emission standards which require state-of-the-art pollution controls to meet applicable NOx, PM, CO, and VOC emission manufacturing standards. Fuel sulfur content rules require the use of 15 ppm sulfur fuel, thereby almost eliminating SO_2 emissions. Provided in the following paragraphs is a description of the top-level pollution control selected (essentially mandated by rule) for each pollutant.

3.2.1 Control of Nitrogen Oxides (NOx)

NO_x emission may be created through the conversion and release of nitrogen bound in the fuel (i.e., Fuel NOx) and/or by the thermal combustion process (i.e. Thermal NOx).

Fuel NO_x is produced from the reaction of fuel-bound nitrogen compounds with oxygen and is typically in very small quantities in clean diesel fuel. Low nitrogen content diesel releases minimal fuel NOx and is not a focus of controls as compared to thermal NOx.

Thermal NO_x is the primary mechanism of NO_x formation from diesel fuel oil combustion. Thermal NO_x arises from reaction of nitrogen (N_2) and oxygen (O_2) molecules in the combustion of air and is formed at elevated temperatures and pressures and increases with combustion temperature.

Control technologies for NO_x emissions from diesel fired engines may include: 1. add-on controls such as Selective Catalytic Reduction (SCR); 2. combustion control techniques (i.e., injection timing retard, air/fuel ratio optimization, cooled intake air); and 3. combustion of clean fuels.

Nordic Aquafarms has selected non-emergency engines that comply with EPA's Tier 4 emission standards for 40 CFR Part 60 N.S.P.S. Subpart IIII Engines.

Each engine will be fitted with a SCR catalyst, Ammonia Oxidation Catalyst (AMOX) and the Pump Electronics Tank Unit (PETU). These systems use a small amount of Diesel Exhaust Fluid (DEF) to convert NOx emissions in the exhaust into nitrogen and water. DEF is a solution of urea dissolved in deionized water to produce a concentration that is about 1/3 urea and 2/3 water.

In order to ensure sufficient NOx reduction, a small amount of excess DEF is injected into the exhaust stream. This excess DEF may pass through the SCR catalyst as ammonia. To prevent excess ammonia from entering the atmosphere, the exhaust gas flows through an Ammonia Oxidation Catalyst where the ammonia reacts with oxygen in the presence of this catalyst to form nitrogen and water.

Each Engine will meet the manufacturer mandated Tier 4 NOx standards using state of the art pollution controls, which include SCR, AMOX, and DEF. Each engine will meet a limit of 15.4 lb/hr. The proposed state of the art controls and NOx limit meet BACT.

3.2.2 Control of Particulate Matter ($PM/PM_{10}/PM_{2.5}$)

PM from fuel combustion is formed from non-combustible material in the fuel and from incomplete combustion. Potential control technologies for PM emissions from diesel engines include: 1. Add-on control (i.e., filter); and 2. good combustion practices.

Nordic Aquafarms has selected to control $PM/PM_{10}/PM_{2.5}$ emission from each of the engine sets using a Diesel Particulate Filter (DPF). A DPF traps particulate matter that's carried in the exhaust stream, preventing it from being released into the atmosphere. Inside the DPF, particulate matter, sometimes referred to as "soot," is trapped until it is oxidized during regeneration.

Nordic Aquafarms will meet BACT for the engines by fitting them with top level particulate controls and meeting limits of 0.4 and 0.6 lb/hr (includes filterable plus condensable) for PM and $PM_{10}/PM_{2.5}$, respectively.

3.2.3 Control of Carbon Monoxide (CO) & Volatile Organic Compounds (VOCs)

Carbon monoxide (CO) and Volatile Organic Compound (VOC) emissions result from incomplete combustion of fuels. CO/VOC emissions result when there is insufficient residence time or oxygen available to complete the final step in oxidation.

Potential control technologies for CO and VOC emissions from diesel fired engines include: 1. Add-on controls such as Catalytic Oxidation; and 2. Combustion Control Techniques (i.e., fuel injection timing, air to fuel ratios, cooled intake air, etc.).

Nordic Aquafarms has selected a Tier 4 compliant non-emergency engines which use start-of-the-art Diesel Oxidation Catalysts (DOC). The DOC is the top level of control available and uses a chemical process to reduce hydrocarbons and carbon monoxide in the exhaust stream.

Use of the DOC control technology and limits of 15.4 and 0.8 lb/hr, for CO and VOC, respectively, meet BACT.

3.2.4 Control of Sulfur Dioxide (SO2)

Nordic Aquafarms will use ultra-low sulfur diesel (ULSD) with a sulfur content less than or equal to 15 ppm. Burning ULSD fuel represents BACT.

3.3 BACT Summary

Nordic Aquafarms is proposing to install engine sets that will each meet manufacturer mandated Tier 4 standards using state-of-the-art air pollution controls, which include Selective Catalytic Reduction, Oxidation Catalysts, and Particulate Filters. Provided in Table 3-3 is a summary of the proposed lb/hr BACT emission limits.

Table 3-3: Proposed BACT Limits

Pollutant	Engines 1-8 [lb/hr]
NOx	15.4
PM	0.4
PM_{10} & $PM_{2.5}$	0.6
CO	15.4
VOC	0.8
SO_2	0.03

APPENDIX A: MAINE DEP CHAPTER 140 FORMS

APPENDIX B: PUBLIC NOTICE AND COVER LETTERS TO TOWN OF BELFAST

APPENDIX C: SITE PLAN

APPENDIX D: TITLE, RIGHT, & INTEREST

MainelyEnvironmental.com
60 Pineland Dr., Suite 310
New Gloucester, ME 04260
207-671-7387

RANSOM
Consulting, Inc.

Consulting
Engineers
and Scientists

November 19, 2019

Project 171.05028.008

Ms. Jane Gilbert, P.E.
Air Licensing Unit Manager
Maine Department of Environmental Protection
Bureau of Air Quality
17 State House Station
August, ME 04333-0017

RE: Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Dear Ms. Gilbert:

This letter is prepared in response to the November 8, 2019 email request for additional clarification related to the Chapter 115 air emission license for the above-referenced project. For clarity, each comment from that letter has been copied below and italicized and responses are in regular text.

Following up on yesterday's Board meeting, and pursuant to Chapter 3, sections 5(D) and 16(A)(1) of the Department's rules, Department staff requests that the Applicant provide the following information related to its application for a Chapter 115 air emission license:

1. A complete listing of all stationary fuel burning equipment to be installed on-site, including the type of equipment, maximum rated heat input capacity of each unit, and the type and quantity of fuel burned in each unit.

All stationary heaters will be electric and will not emit air pollutants. Nordic understands that we mention in the SLODA application that there could be propane heaters, but our intention now is to only install electric heaters other than the eight diesel engines. Heat pumps, using excess heat from the fish farm water, will provide the majority of process and space heating.

2. Unique identification of each stack and which unit or units exhaust through it, and maximum volumetric flow rate and exhaust temperature from each stack.

There will be eight identical stacks installed to serve the eight engines. Provided below are the stack parameters requested along with updated short term and annual emission rates for the engines. Caterpillar has provided us with refined emission factors. This detail documents significantly lower NOx emissions.

Pease International Tradeport, 112 Corporate Drive, Portsmouth, New Hampshire 03801, Tel (603) 436-1490, Fax (603) 436-6037
400 Commercial Street, Suite 404, Portland, Maine 04101, Tel (207) 772-2891
12 Kent Way, Suite 100, Byfield, Massachusetts 01922-1221, Tel (978) 465-1822
60 Valley Street, Building F, Suite 106, Providence, Rhode Island 02909, Tel (401) 433-2160
2127 Hamilton Avenue, Hamilton, New Jersey 08619, Tel (609) 584-0090

www.ransomenv.com

Proposed Engines #1-8 Specifications and Emissions				
Generator Make & Model:		Caterpillar 3516C Tier 4F (or equivalent)		
Fuel Type:		Diesel		
Max Fuel Consumption (gal/hr):		142.2		
Max Heat Input (MMBtu/hr):		19.91		
Engine Power (kW):		2,050		
BHP		3,004		
Stack Parameters:	Elevation AGL (ft)	67.5		
	Diameter ID (inches)	16		
	Flow (ACFM)	16,586		
	Temperateure (F)	375		
Proposed Fuel Limit (gal):		900,000		

Pollutant	Emission Factor (g/kw-hr)	Emission Factor (lb/MMBtu)	Proposed Limit (lb/hr)	PTE (TPY)
NOx	0.92	0.21	**4.2**	**13.4**
PM	0.037	**0.01**	**0.2**	0.5
*PM_{10} & $PM_{2.5}$		0.02	**0.3**	1.0
CO	3.5	0.81	**16.1**	51.0
VOC	0.19	0.04	**0.9**	2.8
*SO_2		0.00	**0.03**	0.1

*AP-42 Emission Factors

Note: Proposed Limits are highlighted.

3. The height above ground level and inside diameter of each stack.

At the time when Nordic submitted the original air application we calculated and proposed reasonable stack heights based on estimated building dimensions. Based on revised engineering drawings with higher building tier heights we are now proposing to construct stacks each with a height of 67.5' above ground level (AGL), which is 1.5 times the height of the tallest surrounding buildings. Each engine will have its own 16" ID stack but the stacks will be arranged in four sets of two as shown on the site drawing included.

4. A scaled plot plan schematic of the facility that shows the following:

a. the location of all stacks, buildings, and other structures (e.g., tanks, towers, etc.);
b. the base elevation and height above ground level for each stack, building, and other structure;
c. a north arrow;
d. an accurate scale ruler;
e. the facility property boundary; and
f. any areas likely to be fenced surrounding the facility.

A scaled plot plan schematic which shows each of these items is attached as Attachment A.

Ms. Jane Gilbert, P.E.
Maine Department of Environmental Protection

Please contact me with any questions or comments.

Sincerely,

RANSOM CONSULTING, INC.

Elizabeth M. Ransom

Digitally signed by Elizabeth M. Ransom, P.G.
Date: 2019.11.19 12:03:43 -05'00'

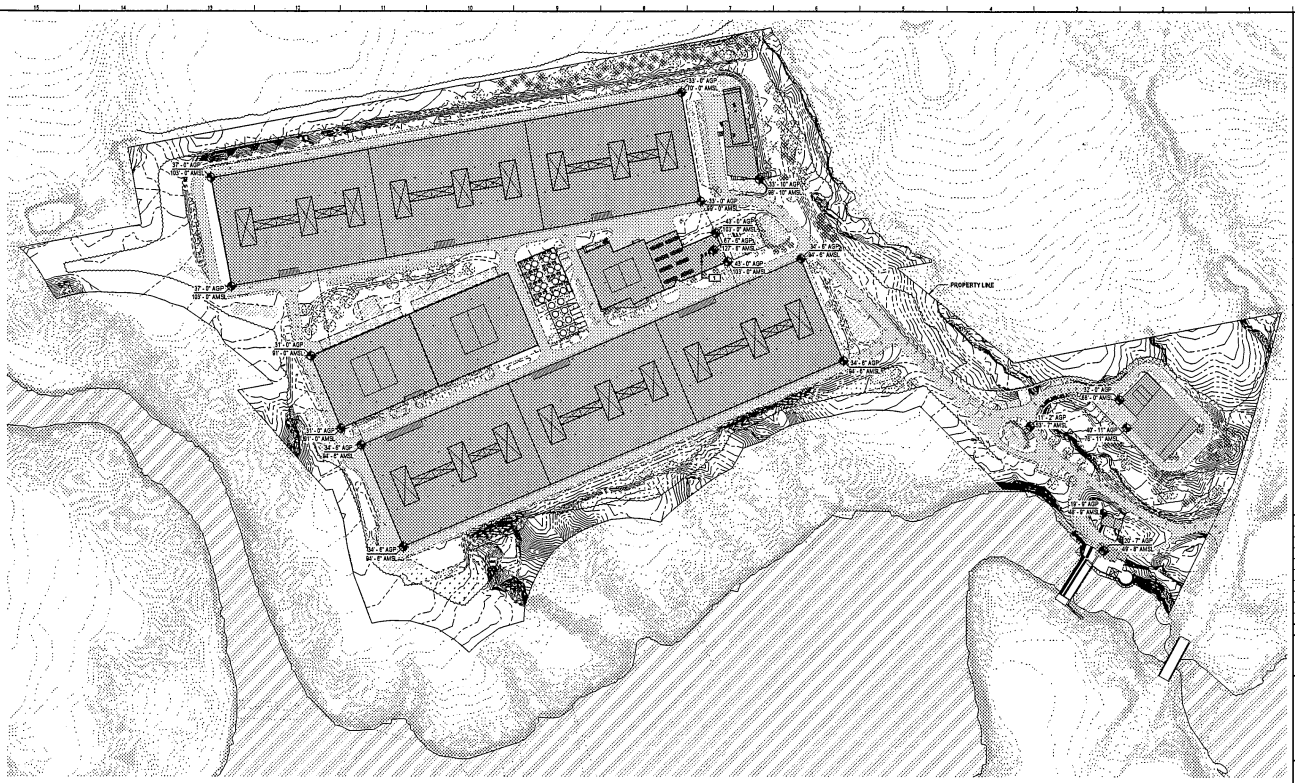
Elizabeth M. Ransom, P.G.
Senior Project Manager

EMR:jar
Attachment

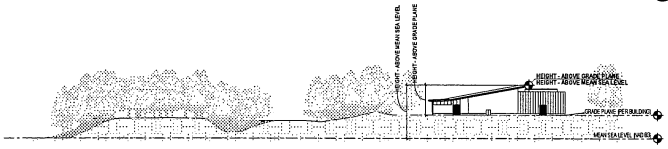
ATTACHMENT A

Plot Plan Schematic

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N



EMISSION STUDY - SITE ROOF PLAN (1)
1" = 120'-0"



KEYNOTE LEGEND

1 LOCATION OF GENERATOR EXHAUST STACKS. 4 GROUP OF 2 STACKS EACH PROVIDES THE 8 PROJECT GENERATORS. STACKS ARE SEPARATED BY APPROXIMATELY 10FT.

REV	DESCRIPTION	DATE
	ISSUED FOR PERMIT	05/14/2019

CURRENT ISSUE STATUS:

PROJECT NORTH:

SMRT Architects and Engineers
144 Fore Street/P.O. Box 618
Portland, Maine 04104

ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | INSIDE+

NORDIC AQUAFARMS
285 NORTHPORT AVENUE

BELFAST, MAINE

EMISSION STUDY PLAN

SHEET TITLE:

SCALE: AS NOTED

PROJECT MANAGER:	ADB	PROJECT NO:	19076-00
AE OF RECORD:	Checker		
JOB CAPTAIN:	FSP	AP005	
DRAWN BY:	Author		
SMRT FILE:	AP005-19076-00	SHEET No.	

NOT FOR CONSTRUCTION

21.0 AIR EMISSIONS

Nordic Aquafarms plans to construct a central utilities plant that will provide electrical and heating to its proposed aquaculture facility. The proposed fuel burning equipment is regulated by Maine Department of Environmental Protection Chapter 115. Plant electrical needs will mainly be supplied by the local utility; however, Nordic Aquafarms will supplement this with a 14 MW reciprocating engine bank, consisting of Eight 2-MW Diesel Engines (one will serve as a back-up). Potential combustion related air emissions will be limited by fuel usage caps to ensure that potential emissions remain below the "major" source thresholds.

The proposed engine sets that will each meet manufacturer mandated Tier 4 standards using state-of-the-art air pollution controls, which include Selective Catalytic Reduction, Oxidation Catalyst, and a Particulate Filter. The proposed boilers will be small package units fueled by inherently clean burning propane gas.

An application for a New "Minor" Source Air Emission License has been prepared and is included as **Appendix 21-A.**

Additionally, Nordic Aquafarms will be subject to Standard Condition 4, which addresses ongoing fugitive dust. This condition is written into every Chapter 115 license issued by the Bureau of Air Quality. Included as **Appendix 21-B** is a fugitive dust standard operating practice (SOP) developed to comply with this standard.

APPENDIX 21-A

Chapter 115 Air Emission License Application

APPENDIX 21-B

Fugitive Dust Standard Operating Practice

STATE OF MAINE
BOARD OF ENVIRONMENTAL PROTECTION

IN THE MATTER OF

NORDIC AQUAFARMS, INC Belfast and Northport Waldo County, Maine	)	APPLICATION FOR AIR EMISSION, SITE LOCATION OF DEVELOPMENT, NATURAL RESOURCES PROTECTION ACT, and MAINE POLLUTANT DISCHARGE ELIMINATION SYSTEM/WASTE DISCHARGE LICENSES
A-1146-71-A-N L-28319-26-A-N L-28319-TG-B-N L-28319-4E-C-N L-28319-L6-D-N L-28319-TW-E-N W-009200-6F-A-N	)	

PRE-FILED REBUTTAL TESTIMONY OF MICHAEL LANNAN

1. I am Michael Lannan, an environmental engineer with experience in all aspects of air quality management, including air permitting, compliance assessments, control technology evaluations and air pollution control designs, dispersion modeling and air monitoring. I have provided air quality, odor control, noise abatement, and dust solutions for municipalities, industries, and government agencies since during my co-operative education days at Northeastern University three decades ago when I was working for a large engineering firm in the air quality group of their planning and permitting division (See Addendum R2-A).

2. This is my 18th year at Tech Environmental, and I have been the president of Tech Environmental for the past five years, and Tech Environmental is a consulting firm that specializes in helping facilities, neighbors of facilities, and regulators navigate the permitting process with respect to environmental concerns, and with a special emphasis on nuisance potential. Tech Environmental has offices on Front Street in Belfast, in Waitsfield, Vermont, and in Waltham, Massachusetts.

3. Tech Environmental was retained by Upstream Watch to perform technical reviews of Nordic Aquafarms' Site Law of Development Act (SLODA) and Chapter 115 Minor New Source applications, specific to federal, state, and local permitting concerns of air, noise, odor, traffic, and solid waste.

4. Tech Environmental was contracted to review several hundred pages of Nordic Aquafarms' application materials and responses to Requests for Information (RFIs), examine odor control estimates of the proposed Nordic Aquafarms (the proponent), and evaluate if the provided information given in the application and RFIs is adequate for establishing the burden of proof with respect to "No Adverse" conditions.

Nordic Aquafarms SLODA Application Section 22- Odor - Rebuttal

5. The first paragraph in the application text in Section 22 stated *"The Belfast salmon farm will not generate noticeable odors. Modern fish production facilities capture and store byproduct streams in airtight and/or cooled storage, to protect their economic value. Odor in the seafood industry generally emanates from waste exposure to air; with the result of also destroying the value of potential byproducts. In our case, that would lead to economic losses"* (Exhibit R2-A).

6. My initial testimony centered on fact that the primary focus of the odor control section was to prevent odor by keeping fish fresh. The single exhibit provided in the prefilled testimony, and provided here again as Exhibit R2-B was included simply to demonstrate that all fish have odor, both fresh fish and aged fish.

7. The secondary theme discussed in the odor control section of the application was that the odor will not be a nuisance because *"All processes with the potential for creating odors will take place in completely enclosed buildings. Nordic will partner with established recycling and disposal professionals with years of experience in odor control. We have obtained capacity to serve letters from multiple companies for each of these byproduct streams. Through consultation with these partners we will install proven equipment at key areas to ensure additional odor control. We will employ air filtration that may include carbon, biofilters, wet scrubbers, and media"* (Exhibit R2-A).

8. This secondary theme suggests that odor will be present from the solid waste, and the recycling and that the disposal professionals contacted (and included in the appendix) have years of experience with controlling solid waste odors, and can make odor control recommendations. It is our experience that solid waste companies do not provide source odor assessments, only product odor assessments.

9. Simply listing that the fish factory solid waste may include odor control technologies in the application does not demonstrate the use of technology use to control or eliminate odor.

10. As concluded previously this is not an odor control plan for a fish farm.

11. This rebuttal testimony is provided because the information from the testimony provided by Cathal Dineen (Exhibit R2-C) differed from the odor information provided in the application in Section 22.

12. In the testimony provided by Cathal Dineen, Nordic Aquafarms provided new or revised odor concern or control discussions (Exhibit R2-C). These changes include, but are not limited to :

    - A paradigm shift from *"will not generate noticeable odors"* to *"prevent the detection of offensive odors outside of the facility"*

    - A shift from *"Nordic will partner with established recycling and disposal professionals with years of experience in odor control"* to *"Air treatment infrastructure will [be]....selected and installed in collaboration with experts in the field of industrial odor control."*

- A shift from no discussion of odor control for HVAC to *"Odors that are produced will be effectively controlled by the installation of proven air treatment infrastructure in key production buildings. HVAC systems within these buildings will be designed to ensure air is appropriately treated by these air treatment installations."*

- A shift from no discussion of odor release points to *"HVAC systems route air through air treatment infrastructure. This ensures that all air exiting areas with the potential for harboring offensive odors is treated prior to expulsion."*

13. The four points analyzed above change the context from "we can do this by odor prevention and solid waste management" to "we will have odor, even with Best Management Practices; we will need to provide odor control all along the way; odor control will be incorporated into our HVAC system; we will release treated air."

14. Merely stating odor prevention thorough Best Management Practices demonstrated adequate provision for control of odors, was easily refuted as inadequate by the simple table provided in my previous pre-filed testimony. Additional testimony is now required to demonstration whether or not the proponent has made adequate provisions for odor control under Maine DEP Site Law, now that proponent is rightfully admitting that it is necessary. Maine DEP Site Law Rules, 06-096 Chapter 375 Section 17. Adequate Provisions for the Control of Odor states the follow (Exhibit R2-D):

A. "Standard. The applicant shall make adequate provision for controlling odors.

B. Submissions. The application for approval of any development likely to be the source of offensive odors shall include evidence that affirmatively demonstrates that the applicant has made adequate provision for the control of odors, including, but not limited to, the following information:

(1) the identification of any sources of odors from the development;

(2) an estimation of the area which would be affected by the odor, based on experience in dealing with the material or process used in the development, or similar materials or processes; or

(3) proposed systems for enclosure of odor-producing materials and processes, and proposed uses of technology to control, reduce or eliminate odors.

C. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the applicant has made adequate provision for the control of odors."

15. The proponent has not identified all sources of odor. From Tech's experience the provided list of potential sources of odor from the source description should include at least, but not be limited to:

a) Ensilage of mortalities,
b) HVAC equipment at each and in every building,
c) Chemical and fuel deliveries and charging of tanks or vessels with these materials,
d) Fish hatchery and associated activities,
e) Smolt operations and associated activities,
f) Fish harvesting, slaughtering, and fileting operations,
g) Wastewater treatment pumping operations,
h) Storage of Fresh Feed and Spoiled Feed,
i) Wastewater treatment operations,
j) Water treatment operations,
k) Wastewater residuals handling, storage, and disposal operations,
l) Water treatment residuals handling, storage, and disposal operations,
m) Fish harvesting waste handling, storage, and disposal operations,
n) Doorways and garage doors that must remain open at times for operations,
o) Power plant operations and exhaust stacks ,
p) All other exhaust stacks (including the odor control systems exhausts).

16. With many of the areas identified above, the odor potential will be directly related to age. This is seen in solid waste disposal, wastewater sludge age, and in the fish odor potential. The Exhibit R2-E is Figure 1 directly from Exhibit R2-B with color coding. The color coding is from blue vertical bar on the left where fresh fish odor dominates to the red vertical bar on the right were decay dominates. The key here again, is that in every stage there are compounds present above the odor detection threshold and therefore, odor potential must be examined from each of the sources above.

17. The proponent does not discuss the extent of area that may be adversely affected by odor potential. This odor potential must be evaluated on a "good day" and a "bad day". Neighbors will not care whether odor experienced (which is an olfactory stimulation) is from a normal process condition or an upset condition. Odor is odor, so all possible operating conditions must be considered when considering adequate provisions, and all potential areas of impact both off site and onsite must be identified. Adequate provisions for odor control must include upset possible upset scenarios that may include events such as major mortality event, storms, and power outages, reduce water supply situations etc.

18. The proponent does not provided a detailed discussion in their testimony or section 22 to demonstrate that they have provided "Adequate Provisions for the Control of Odors". The proponent suggesting that they will contact industrial odor control vendors in the future does not provide adequate provisions.

19. A fully-vetted conceptual design for a project of this magnitude and complexity must be completed before any applications can be submitted. It is very possible that the odor control requirements will be cost prohibited. This project would not be the first project that was not financially or technically feasible because the actual capital and operational costs for odor control were never considered during planning and permitting.

20. Ventilation is paramount to proper odor control function and reliability. There are no

discussions in the application about on how a facility with city-sized wastewater treatment systems, city-sized water treatment systems, city-sized pump stations, city-sized power plants, city-sized solid waste handling facilities, a fish factory, millions and tons of fish, a slaughterhouse, and an education center will be properly powered, heated or conditioned. This project simply cannot be approved without a fully-vetted HVAC/odor control design completed first.

21. Just recently the proponent changed the heating for hundreds of thousands square feet of building from propane heating to heat pumps. Exactly how this will affect the odor control design has not been addressed.

22. As a result of this analysis of the available information and my testimony, it is my professional opinion that this project has not properly evaluated its odor potential on a normal day.

23. As a result of this analysis of the available information and my testimony, it is my professional opinion that this project has not properly considered adequate provisions for the control of odor for its odor potential on a normal day.

24. As a result of this analysis of the available information and my testimony, it is my professional opinion that this project has not properly considered proposed uses of technologies proposed to reduce odor for its odor potential on a normal day.

25. As a result of this analysis of the available information and my testimony, it is my professional opinion that the department may not establish any reasonable requirements to ensure that the applicant has made adequate provision for the control of odor without the proponent fully developing the odor potential and without vetting the conceptual odor designs for normal operations.

26. As a result of this analysis of the available information and my testimony, it is my professional opinion that this project has not properly considered its odor potential on a "non-normal", upset condition day.

27. As a result of this analysis of the available information and my testimony, it is my professional opinion, that this project has not properly considered adequate provisions for the control of odor for its odor potential on a "non-normal", upset condition day.

28. As a result of this analysis of the available information and my testimony, it is my professional opinion that this project has not properly considered proposed uses of technologies proposed to reduce odor for its odor potential on a "non-normal", upset condition day.

29. As a result of this analysis of the available information and my testimony, it is my professional opinion that the department may not establish any reasonable requirements to ensure that the applicant has made adequate provision for the control of odor without the proponent fully developing the odor potential and without vetting the conceptual odor designs for "non-normal", upset condition operations.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

_____ Date:

Printed Name:
Title:

Parties Assisting:

Name:	Address:	Signature: _____
Name:	Address:	Signature: _____

TECH environmental

FOCUSED KNOWLEDGE. REAL SOLUTIONS.

Michael T. Lannan, P.E.
President

Education

B.S. Chemical Engineering
Northeastern University,
1991

M.S. Environmental
Engineering
Northeastern University,
1993

Certification

Professional Engineer:
Maine
Vermont
Massachusetts
New York

Affiliations

New England
Environmental Business
Council,
Air Quality Committee
Past Chair

Northeast Biosolids and
Residuals Association,
Board of Directors

Fiberglass Reinforced
Plastics Institute,
Board of Advisors Chair

New England
Environmental Business
Council,
Solid Waste and C & D
Committees

Water Environment
Federation, Air Quality
Committee

New England Water
Environment Association
Residuals Management
Committee

Air and Waste Management
EE-6 Odors Committee,
Past Chair

Air and Waste Management
AE-2 Odors, Solvents, and
Gases Committee

SWANA Air Quality
Committee

Michael T. Lannan is an environmental engineer who has identified nuisance conditions for owners, operators, and regulators alike for close to 30 years. He started his career exploring proposed projects for airborne nuisance, or for facilities experiencing nuisance complaints, but over the years, his expertise has expanded into all types of compliance concerns. He has testified at dozens of hearings and court cases on ordinances, regulations, due diligence, and compliance. He has assisted many cities and towns with ordinance development, and is currently assisting about six municipalities and public organizations with specific procedures for compliance with state and their local ordinances.

He has presented seminars on nuisance science and control to colleges, regulators, facility operators, consultants, and neighbors. He has trained MaineDEP, NHDES, MassDEP, Allegheny County Health officials, the Puget Sound Clear Air Agency in Seattle, and the Oregon DEQ, on nuisance monitoring and response procedures. Most training results in changes to nuisance, zoning, or permitting regulations. The training for the Oregon DEQ resulted in a very proactive 10-year project for the regulators to completely revamp their approach to compliance, and to proactively employ scientific monitoring with facilities, before the issues become political and legal concerns.

He has worked on hundreds of nuisance related projects and can quickly and effectively identify areas of concern. He has provided site assignment and nuisance testimony for facilities or proposed regulations predominantly focused in Maine, New England, throughout the northeast, but also throughout the country at request. He assisted Maine DEP when a specific nuisance policy was required, after a legislative initiative was passed. He is currently assisting one Maine area with seafood processing odor concerns, and another with a noise assessment for refrigerated seafood transfer and trucking operation.

Recently, he trained a number of federal contractors on odor detection procedures at a federal facility in Colorado that is biologically degrading old mustard gas munitions. It was important that the procedures not only address the science of the concern, but the potential public outcry detectable emissions from an old nerve gas munition facility could produce. He recently also provided training for those odor nuisance monitoring thresholds and odor complaint response procedures personnel in September at, or near, NYSDEC headquarters in Albany and at another location in upstate NY.

For over a decade he has been reviewing potential air, odor, noise, dust, lighting, and vibration adverse impacts on a fast track basis for residential, commercial, and industrial mixed used projects for compliance with a regional planning commission's Industrial Performance Standards. The commission has been tasked with redeveloping an old Air Force base that spans three municipalities.

Noise and Blasting - Impact Analysis for Gilboa Dam Reconstruction Project, Gilboa, NY. The Gilboa Dam, on the Schoharie Reservoir collects and supplies nearly 10% of the total fresh water to New York City. The dam located upstate, in Gilboa, New York, required extensive repairs. Mr. Lannan was asked to perform noise, vibration, and impact sound analyses caused by the reconstruction of the dam, from building roads during site preparation, blasting, jack hammering and demolition, on-site cement production, trucking and spoils disposal, since the dam was going to be reconstructed 24 hours a day in a rural area for a number of years. Mr. Lannan's sound assessments included a mixture of standard and site specific usage factors for various construction activities, and an extensive noise compliance monitoring program that covered all surrounding residences and municipal structures (e.g. schools and museums). Mr. Lannan was able to work directly with the contractor to determine the maximum amount of construction flexibility for day and night operations over the different project phases. The noise impact analysis included a variety of noise sources that were modeled with the CadnaA model and the Federal Highway Administration Transportation Noise Model (TNM).

Odor - Public Testimony for Addressing Odor Control at a Municipal Landfill in Newfoundland. Mr. Lannan was retained by the City of St. John's, Newfoundland to examine odor emissions from its older downtown landfill and to develop an odor reduction strategy to eliminate a public odor concern. Mr. Lannan was brought in as an outside expert on odor control. Mr. Lannan's testimony was presented at a press conference where local groups and lawmaker's grilled him on his approach. Mr. Lannan was able to identify the cause of the spike in odor, and recommended a number of operational changes and public outreach programs to eliminate the concern. Mr. Lannan developed a comprehensive odor control strategy and defended it in a confrontational environment that was broadcast on TV to the province.

Vibration - Residential Impact Study for Train Sound. A new residential development was proposed in Massachusetts for a site adjacent to an area where Amtrak and commuter trains travelled, and commuter trains typically idled all night. The developers were concerned that potential sound and vibration from train traffic, especially the idling, would adversely affect potential future residents. Mr. Lannan used Tech Environmental's database of noise factors and train schedules to examine the acoustic impacts of train traffic within the proposed residential dwellings. Although the initial findings were excessive low frequency sound potential, Mr. Lannan specified a sound mitigation wall solution specifically for the low vibrational frequencies of concern.

Air Pollution Control - Industrial Interceptor Emission Estimation and Reduction for 80 Chemical Processing Industries. Mr. Lannan used chemical fate modeling to determine the potential emissions from the largest industrial sewer in Houston, TX. The BIOSAN interceptor collects wastewater from Houston's chemical processing and manufacturing clients and transports it to its own industrial wastewater treatment plant. Mr. Lannan discovered many air emission hotspots during the fate modeling and recommended a combination of covering and ventilation, siphon systems, and air pollution control technologies to reduce the air emission potential to a low level so complete covering, ventilating, and air pollution control of the entire system was not necessary.

Air Emissions Assessment - Department of Energy Emissions Inventory. Mr. Lannan performed an emissions inventory for approximately 200 emission points at the Department of Energy's Savannah River (GA) Site in Georgia. He examined emission operating and monitoring data for boilers and emergency generators, and estimated vapor phase chemical transport for research laboratories and batch chemical facilities using chemical properties and EPA-approved emission models. The emission inventory proved the facility's claim that total annual air emissions had been reduced by an order of magnitude in recent years

Employment History

2018 to present	Tech Environmental, Inc., Belfast, Maine President
2015 to 2018	Tech Environmental, Inc., Waltham, Massachusetts President
2004 to 2015	Tech Environmental, Inc., Waltham, Massachusetts Vice President, Air Quality and Nuisance Services
2002 to 2004	Tech Environmental, Inc., Waltham, Massachusetts Associate, Air Quality and Odor Control Services
1991 to 2002	Camp Dresser and McKee, Cambridge, Massachusetts Air Quality and Odor Control Engineer, Air Quality Group Services

NVC/UPSTREAM R2

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Date: 01/16/2020

Printed Name: Michael T. Lannan

Title: President

Parties Assisting:

Name: Address: Signature:_____

Name: Address: Signature:_____

NVC/UPSTREAM R2

STATE OF MAINE

COUNTY OF Waldo

PERSONALLY APPEARED, Michael P. Cannan, WHO, UNDERSTANDING THE MEANING OF AN OATH, SWORE THAT THE FORGOING TESTIMONY IS TRUE TO THE BEST OF HIS/HER KNOWLEDGE AND BELIEF, THIS 16 DAY OF JANUARY 2020.

NOTERY PUBLIC Sally L Brophy Sally L. Brophy

MY COMMISSION EXPIRES:

SALLY L. BROPHY
Notary Public-Maine
My Commission Expires
September 14, 2023

22.0 ODORS

The Belfast salmon farm will not generate noticeable odors. Modern fish production facilities capture and store byproduct streams in airtight and/or cooled storage, to protect their economic value. Odor in the seafood industry generally emanates from waste exposure to air; with the result of also destroying the value of potential byproducts. In our case, that would lead to economic losses.

Potential sources of odor in land-based aquaculture include:

1. Ensilage of mortalities;
2. Fish processing;
3. The Waste Water Treatment Plant; and
4. To a lesser extent, feed storage.

The following steps will be taken to avoid odors at each of these points.

22.1 Universally

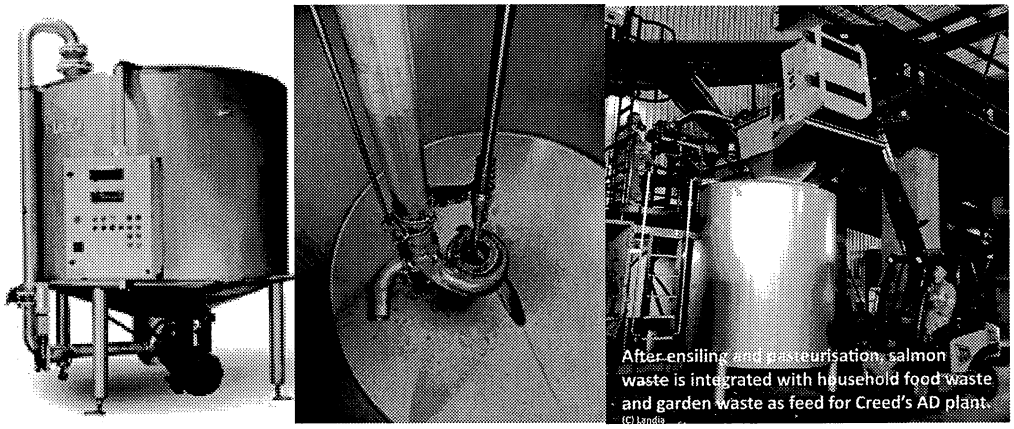
Basic mechanisms for odor control throughout the facility:

1. Sealed enclosure in tanks;
2. Chilling or freezing;
3. Regular out-shipment to off-take partners; and
4. Air treatment systems.

All processes with the potential for creating odors will take place in completely enclosed buildings. Nordic will partner with established recycling and disposal professionals with years of experience in odor control. We have obtained capacity to serve letters from multiple companies for each of these byproduct streams. Through consultation with these partners we will install proven equipment at key areas to ensure additional odor control. We will employ air filtration that may include carbon, biofilters, wet scrubbers, and media.

22.2 Ensilage of Mortalities

Even with well-designed life support systems and husbandry practices, mortalities are a natural part of any farming operation. Mortalities will be removed and tank-stored in a weak organic acid solution to maintain a pH below 4. This is a common means of preserving these materials in air-sealed containers for out-shipment. Following preservation, mortalities will be properly disposed of offsite through one of our professional recycling and disposal partners.



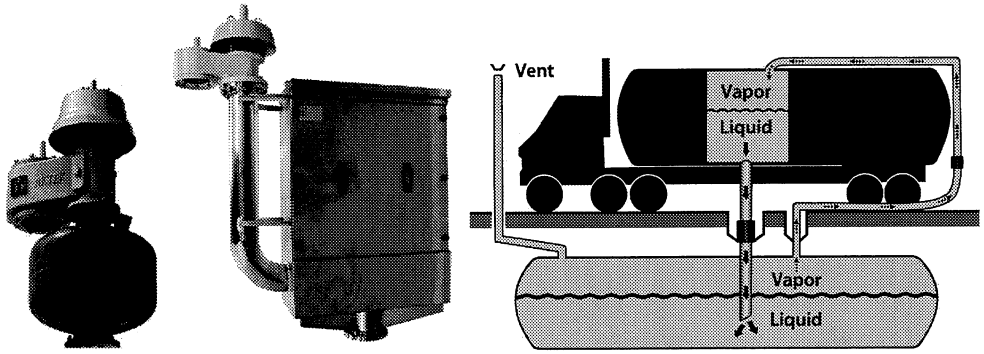
Examples of commercially available fish ensilage systems

22.3 Fish Processing

After processing, residual fish parts, or byproducts, will immediately be stored in insulated, food grade containers for regular out-shipment to offtake partners. Byproducts will be frozen to prevent spoilage. These materials will be processed into secondary products, such as bait, pet food, and human supplements. Recycling for these uses requires that materials be handled and stored in a manner that prevents spoilage, and the associated odor. Reuse retains the value of these byproducts. We have received a capacity to serve letter from a company with a history of providing these services for other salmon and seafood processors in greater New England (**Appendix 22-A**). This company has demonstrated their competency and professionalism over the 57 years they have been in operation.

22.4 Filtrate

Organic material removed by our water filtration systems will be regularly removed from the facility by a partner with demonstrated experience in the transportation, disposal and odor control of similar materials. Materials filtered from the water will be immediately pumped into and stored in sealed tanks until they are outshipped in tank trucks. Filtrate will not be exposed to air, therefore fermentation and resulting odors will not develop. Nordic has received letters of capacity to serve from reputable partners with years of experience (**Appendix 22-B**). These partners have demonstrated their ability to remove odiferous materials from holding tanks in urban settings without releasing odors.



Examples of common odor control filters for tankers and basic recovery method that will be employed to reduce ventilation of air during pumping out of tanks

22.5 Feed

Feed silos will be stored inside fish rearing buildings. There will be no storage of fish feed outdoors. Given the high cost of fish feed, Nordic will manage this resource carefully and will not store more than a week's supply at the time. Thus, we anticipate no odors from fish feed.

22.6 Nordic Aquafarm's Supporting Experience

Sashimi Royal, an Aquaculture Stewardship Council certified facility, is Nordic's sister company and has been producing Yellowtail kingfish in a similar recirculating aquaculture system facility for over two years without complaints of odor. Key staff have 30 years of experience in the fish farming industry and extensive experience in such operations. Our engineering team in Denmark (Nordic DK) is among the most experienced farm designers in the industry and have designed many facilities in the past two decades with waste processing solutions.

Current employees of Nordic have firsthand experience managing recirculating aquaculture systems and these waste streams:

- Cathal Dineen, Production Director
  - Production Director, Fredrikstad Seafoods (Nordic subsidiary)
  - Production Lead, Kuterra RAS salmon farm in British Columbia

- David Noyes, Chief Technology Officer
  - Operations Manager and Systems Lead RAS Yellowtail Kingfish, Black Sea Bass farm in Maine
  - Laboratory assistant, RAS Atlantic Salmon, Arctic char, Lumpfish USDA ARS National Cold Water Marine Aquaculture Center in Maine
  - Research assistant Aquaculture Research institute and University of Maine Animal Health Lab, University of Maine, multiple RAS systems and species

- Erik Heim, President
  - Developer, executive and chairperson in a number of land-based operations internationally.
  - Extensive work with environmental solutions and in setting high standards in modern facilities

In Maine, we are working with environmental consulting companies and vendors to ensure high environmental standards. In future US organizational build-up, additional specialist staff will be hired in Maine.

APPENDIX 22-A

Capacity to Serve Letter –
Channel Fish Co.

APPENDIX 22-B

Capacity to Serve Letters –
Agri-Cycle Energy, Casella Organics, and Waste Management

Odors in the Food Industry

mlannan@techenv.com

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mlannan@techenv.com

Odors in the Food Industry

Edited by

Xavier Nicolay
Institut Meurice
Brussels, Belgium



mlannan@techenv.com

Xavier Nicolay
Ingénieur
Service de Génie Chimique & Biochimique
Instiut Meurice – HELdB
1, avenue Emile Gryzon, bât. 2
1070 Bruxelles
Belgium
xnicolay@ceria.be

Series Editor

Kristberg Kristbergsson
Professor of Food Science
Dept. Food Science and Human Nutrition
University of Iceland
Hjardarhaga 2-6
107, Reykjavik
Iceland

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5

Electronic-Nose Technology: Application for Quality Evaluation in the Fish Industry

Guðrún Ólafsdóttir and Kristberg Kristbergsson

1. INTRODUCTION

The odor of fresh fish is one of the most important quality parameters used to determine whether fish is acceptable for consumption. The composition of volatile compounds in fish contributing to the characteristic odors can be determined and related to quality. Currently there is a need for rapid, automated, and objective tools for process monitoring and quality assurance of perishable food products. The possibility of using electronic nose for rapid quality control of fish therefore is of interest. Knowledge about the composition of the headspace of different fish products during storage is useful to guide the development of electronic noses for quality monitoring of fish products. Complicated postmortem processes in the fish are responsible for the loss of freshness and the onset of spoilage. The spoilage processes are a combination of physical, chemical, biochemical, and microbiological interactions that are species dependent and additionally various extrinsic factors such as handling and different storage conditions will further influence the spoilage pattern and the development of spoilage odors.

2. VOLATILE COMPOUNDS AS INDICATORS OF FISH QUALITY

The odor of fish can be classified as species-related fresh fish odor, microbial spoilage odor, oxidized odor, processing odor, and environmentally derived odor, based on the origin of the volatile compounds (Table 1).

GUðRÚN ÓLAFSDÓTTIR AND KRISTBERG KRISTBERGSSON • Icelandic Fisheries Laboratories, Skúlagötu 4, 101 Reykjavík, Iceland and Department of Food Science, University of Iceland, Hjarðarhaga 2-6, Reykjavík Iceland

mlannan@techenv.com

Because of the nonspecific selectivity and low sensitivity of gas sensors in electronic noses it is necessary to correlate their responses to the main classes of quality indicating volatile compounds of the products. Some compounds present in concentrations below the detection limit of the gas sensors in electronic noses may have an impact on the odor and can function as key odorants due to their low flavor threshold.

Compounds contributing to characteristic fresh fish odors like alcohols, carbonyls, and dienals causing oxidation odors are present in very low concentrations (ppb) but have an impact on the overall odor because of their low odor threshold (see Table 1). Microbially formed degradation compounds like alcohols are present in much higher concentrations (ppm) in the headspace of fish but their odor threshold is much higher so their impact on the odor is less (Olafsdottir and Fleurence, 1998). Therefore, it cannot be assumed that the gas sensors are measuring the overall odor, but rather detecting the components that are in the highest concentration in the headspace, which may be of both odorous and nonodorous nature. In some cases the compounds may have little or no effect on the human olfactory system, but they may be detected by the gas sensors.

Characteristic odor and the progression of odor in fish during storage have been associated with varying levels of different volatile compounds present in the headspace of fish (Lindsay *et al.*, 1986; Josephson *et al.*, 1986).

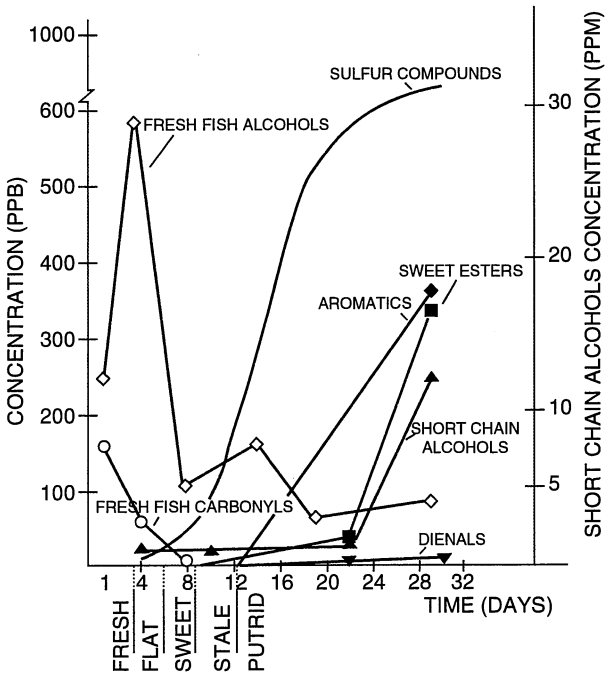


Figure 1. Generalized changes in concentration of groups of influential aroma compounds and sensory quality stages of refrigerated whitefish (from Josephson *et al.*, 1986)

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Table 1. Classes of Odors in Fish and Examples of Compounds Contributing to the Odors (from Olafsdottir and Fleurence, 1998)

Fish odor	Class of chemical species	Examples of compounds	Aroma description	Odor threshold in water
Species-related fresh fish odor	C6-C9 alcohols and carbonyls	Hexanal / t-2-hexenal, 1-octen-3-ol, /1-octen-3-one	Green, aldehyde-like Mushroom	4,5ppb / 17ppb [a] 10ppb/ 0,009ppb[a]
		1,5-octadiene-3-ol	Heavy earthy, mushrooms	10ppb[a]
		1,5-octadiene-3-one	Geranium	0,001ppb[a]
		2,6-nonadienal	Cucumber	0,001ppb[a]
		3,6-nonadienol	Cucumber, melon-like	10ppb[a]
	Bromophenols	2,6-dibromophenol	Iodine- and shrimp-like	0,0005µg/kg[b]
		2,4,6-tribromophenol	Saltwater fish, brine-like.	0,6µg/kg[b]
		2-bromophenol	Sea, marine-like flavor	
	N-cyclic compounds	Pyrrolidine piperidine	Earthy	
	Short chain alcohols	ethanol, propanol, butanol, 3-methyl-1-butanol	Solvent like	1–100 ppm[c]
Microbial spoilage odor	Short chain carbonyls	acetone, butanone ethanal, propanal	Solvent like	
		3-methylbutanal	Malty	0,06ppm [d]
		2-methylbutanal	Malty	0,04ppm [d]
	Amines	ammonia,	Ammoniacal	110 ppm[c]
		TMA	fishy, ammoniacal	30 ppm[c]
		DMA		0,6 ppm[c]
		histamine, putrecine, cadeverine	Putrid, rotten	
	Sulfur compounds	hydrogen sulfide	Sulfury, boiled eggs	5–40 ppb [e]
		methyl mercaptan	Rotten, cabbage	0,05 ppb [e]
		methyl sulfide	Cabbage-like	0,9µg/kg[f]
		dimethyl disulfide	Putrid, onion-like	12 ppb [g]
		dimethyl trisulfide	Putrid, cabbage and onion-Garlic like	0.01ppb[g]
		bis-methylthio methane thioesters		0,3 µg/kg[f]
	Aromatics	phenethyl alcohol	Old roses	
		phenol,	Phenolic,	2 ppm
		p-cresol	Pigpen-odors ,horse manure	300 µg/kg[f]
	N-cyclic compounds	indole skatole	Moth ball or fecal like	
	Acids	acetic acid,		34,2ppm[c]
		butyric acid isobutyric acid	Sour, rotten, old socks	32,8ppm[c]
Oxidized odor	Unsaturated aldehydes	hexanal	green, planty	4,5ppb[f]
		c4-heptenal	cardboard-like, potato-like	0,04ppb[h]
		2,4-heptadienal,	fishy oxidised flavor	
		2,4,7-decatrienal,	burnt, fishy, cod-liver oil-like	

(*Continued*)

miannan@techenv.com

Table 1. Classes of Odors in Fish and Examples of Compounds Contributing to the Odors (from Olafsdottir and Fleurence, 1998)—Cont'd

Processing odors	2,4-heptadienal and 3,5-octadien-2-one	ripened anchovies
	methional	boiled potato - like odor
	2-methyl-3-furanthiol	meaty odor in canned tuna
Environmental odors	methyl sulfide geosmin	petroleum odors
	2-methyl-iso-borneol	earthy, muddy odors

[a]Josephson (1991); [b] Whitfield *et al.* (1988); [c] Kawai T. (1996); [d] Sheldon *et al.* (1971); [e] Fazzalari (1978); [f] Whitfield and Tindale (1984); [g] Buttery *et al.* (1976); [h] McGill *et al.* (1974).

Species-related fresh fish odors have been attributed to long-chain alcohols and carbonyl compounds like 1,5-octadien-3-ol and 2,6-nonadienal, respectively, which are oxidatively derived from polyunsaturated fatty acids such as eicosapentaenoic acid 20:5ω3 (Josephson *et al.*, 1984). Spoilage odors develop as a result of microbial activity and oxidative degradation of the fish components. Compounds such as trimethylamine (Oehlenschläger, 1992), short-chain alcohols (Kelleher and Zall, 1983; Ahmed and Matches, 1983), carbonyls, esters, and sulfur compounds like hydrogen sulfide, methylmercaptan, dimethyl disulfide, and dimethyl trisulfide are produced by microbial degradation of fish constituents (Herbert *et al.*,1975; Kamiya and Ose,1984). Oxidation of fatty acids contributes to the rancid odors of fish with the formation of aldehydes like hexanal, 2,7-heptadienal, and 2,4,7-decadienal (McGill *et al.*, 1974). All these compounds are to some degree volatile and may be used to monitor freshness and spoilage of fish.

Both single compounds or a combination of compounds representing the different changes occurring during spoilage have been suggested as indicators for freshness and spoilage of fish (Lindsay *et al.*, 1986). Ethanol, 3-methyl-1-butanol, 2-methyl-1-propanol, 3-hydroxy-2-butanone, ethyl acetate, and butanoic acid ethyl ester were the most abundant volatiles in the headspace of haddock stored in ice (Olafsdóttir, 2003). Similar volatile compounds were found in cold-smoked salmon during refrigerated storage (Joffraud *et al.*, 2001; Jörgensen *et al.*, 2001). This is expected since similar profiles of microflora emerge in different food products when subjected to the same conditions despite being heterogeneous initially (Gram *et al.*, 2002). The volatile compounds detected in spoiled cold-smoked salmon were mainly alcohols produced by microbial activity. Some of the volatile compounds produced during spoilage of cold-smoked salmon contributed to the spoilage off-flavor of cold-smoked salmon as confirmed by gas chromatography-olfactometry. These were trimethylamine, 3-methyl butanal, 2-methyl-1-butanol, 3-methyl-1-butanol, 1-penten-3-ol, and 1-propanol (Jörgensen *et al.*, 2001).

It is likely that the same set of sensors can be used for monitoring spoilage changes in different fish products because similar volatile compounds emerge

miannan@techenv.com

Fish stored as fillets at 0–2°C (May 2000) spoiled faster than whole fish and had a shelf life of only 8–9 days.

The results of the electronic nose measurements and the microbial and chemical analysis were mostly in agreement with the sensory analysis (Figures 5 and 6). The traditional microbial analysis (TVC) and electronic nose measurements (CO sensor) showed a similar overall trend in the storage studies of whole fish (May 1999 and Sept 1999) and fillets (May 2000) (Figure 5) and likewise the results of TVN chemical measurements and the NH_3 electronic nose sensor showed similar overall trends (Figure 6).

The electronic nose measurements showed that the responses of the sensors were highest for the (May 2000) samples indicating the most rapid spoilage for fish stored as fillets. The results from the sensory analysis, the TVN (total volatile bases) measurements, and the NH_3 sensor showed that recently spawned fish from the spring season (May 1999), stored as whole fish, had higher spoilage rate than fish from the autumn season (Sep 1999). Contradictory to these results the TVC and CO measurements indicated that the spoilage rate appeared to be higher in the fall (Sep 1999) than in the spring (May 1999). However, based on the results of sensory analysis it appears that the spoilage potential of the microflora might have been greater in the spring. This suggests that the role of specific spoilage organisms producing offensive odors should be emphasized and the validity of TVC measurement may be questionable as has been suggested by other researchers (Gram *et al.*, 2002).

When the end of the shelf life was reached, as indicated by sensory analysis, the responses of the NH_3 and SO_2 sensors detecting microbially produced amines and sulfur compounds start to increase rapidly in all experiments. The conclusions drawn from these results indicate that spoilage patterns are different depending on season and fillets spoil faster than whole fish, as was to be expected.

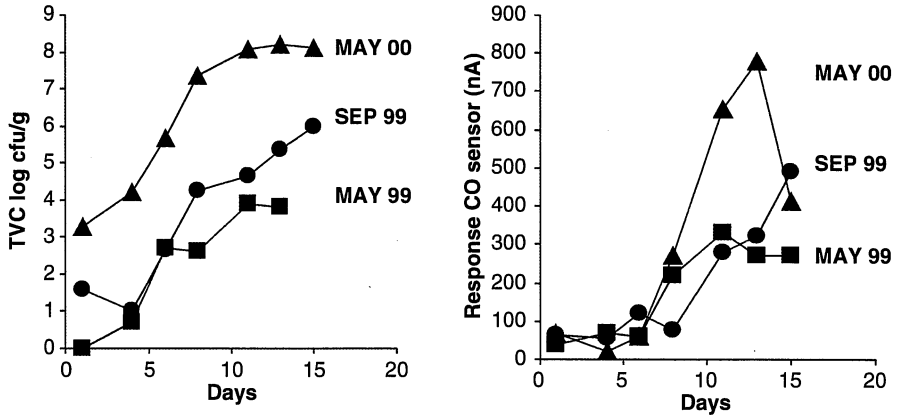


Figure 5. Microbial analysis (TVC) and electronic nose measurements (CO sensor) of haddock fillets from storage studies at 0–2 °C for up to 15 days of whole fish [May 99 (-■-); Sept 99 (-●-)] and fillets [May 00 (-▲-)].

mlannan@techenv.com

STATE OF MAINE

BOARD OF ENVIRONMENTAL PROTECTION

IN THE MATTER OF

NORDIC AQUAFARMS, INC Belfast and Northport Waldo County, Maine	) APPLICATION FOR AIR EMISSION, SITE) LOCATION OF DEVELOPMENT,) NATURAL RESOURCES PROTECTION) ACT, and MAINE POLLUTANT) DISCHARGE ELIMINATION) SYSTEM/WASTE DISCHARGE LICENSES))

PRE-FILED DIRECT TESTIMONY OF CATHAL DINNEEN, M.S. NORDIC AQUAFARMS, INC.

1. My Name is Cathal Dineen. I hold a Master of Science Degree in Aquaculture from University College Cork, Ireland. I have 22 years' experience with land-based farming technologies and developing production management systems in various countries including Ireland, the UK, Iceland, Canada & Norway. I have been involved in the development and operation of some of the largest land-based facilities in the world growing a variety of different fish species, including brown trout, rainbow trout, arctic char, salmon, turbot and halibut. My professional experience and qualifications are further detailed by my curriculum vitae, which is included as Addendum A to this Testimony.

2. In 2017, I joined Nordic Aquafarms AS as the Head of Production, directing operations at Fredrikstad Seafoods, a subsidiary company of Nordic Aquafarms AS. In 2018 I was appointed Production Director of Nordic Aquafarms, Inc., a US subsidiary of Nordic Aquafarms AS. I subsequently moved to Belfast, Maine in July of 2019 to assume this role.

3. To satisfy Section 22 of the Site Location of Development Act I prepared the following testimony identifying the nature and potential sources of offensive odors at the proposed facility. Also described are the measures taken to ensure areas outside the limits of the development will not be affected by offensive odor.

4. Nordic Aquafarm's facility will be designed to prevent the detection of offensive odors outside of the facility. Production of odiferous gases will be mitigated using appropriate storage and handling techniques and best management practices.

5. Odors that are produced will be effectively controlled by the installation of proven air treatment infrastructure in key production buildings. HVAC systems within these buildings will be designed to ensure air is appropriately treated by these air treatment installations.

   Air treatment infrastructure will include tested and proven air filtration technology such as industrial multistage scrubbers and/or carbon adsorption filters selected and installed in collaboration with experts in the field of industrial odor control.

6. HVAC systems route air through air treatment infrastructure. This ensures that all air exiting areas with the potential for harboring offensive odors is treated prior to expulsion. Likewise transport vehicles will be appropriately outfitted to treat any gasses displaced as hauling vessels are loaded.

7. Nordic Aquafarms will partner with established recycling and disposal professionals with years of experience in odor control (See Nordic Exhibit 18). Air treatment systems will be selected and installed through consultation with these partners.

8. Potentially odiferous materials and specific means for odor control are discussed below (9). Processes generating these materials and any storage of the materials will be in enclosed buildings. These materials will be expediently and regularly conveyed off site by disposal partners such that they do not accumulate on-site. These materials have value that is compromised if they are allowed to deteriorate in quality such that they become odiferous. Byproducts can be ameliorated in various ways to add value such as, for example, reducing disposal costs, or creating secondary revenue streams. Generally, the realization of such benefits requires these materials be managed in ways that prevent spoilage and thus odor. Nordic Aquafarms has received written letters indicating the capacity and readiness of various companies to ameliorate the byproducts generated on site (Nordic Exhibit 18)

9. Potential sources of odor in land-based aquaculture operations include:
   a. Ensilage of mortalities. While best efforts are made to minimize mortalities, they are a natural part of any farming operation. Mortalities will be removed, ensiled and tank-stored in a weak organic acid solution to maintain a pH below 4. This prevents spoilage and the accumulation of odiferous compounds. The ensiling tank is contained within an enclosed building which is ventilated through a carbon filter to capture any impurities in the air. Stored materials will be transported to an appropriate receiving facility regularly.
   b. Fish processing. After processing of the fish, the offal is immediately chilled or frozen and stored in insulated, for pick-up by partners.
   c. Filtrate from the Waste-Water Treatment Plant. Organic material removed by water filtration systems will be stored in a sealed tank and removed regularly.
   d. Feed. Due to the cost of feed and its importance to the health of the fish, preventing its spoilage is paramount. Feed will be stored indoors in enclosed silos in temperature-controlled rooms. Due to the constant use of feed during operations, the limited duration for which it is stored on site precludes spoilage and production of offensive odors.

All organic waste materials (9a-c) will be regularly removed from the facility by a partner with demonstrated experience in the transportation, disposal and odor control of similar materials (Nordic Exhibit 18).

[INTENTIONALLY LEFT BLANK]

Dated: December 10,2019

By. C. Dineen

Cathal Dineen

Nordic Aquafarm, Inc

STATE OF MAINE

December 10, 2019

County of Waldo, ss.

Personally appeared the above-named Cathal Dineen and made oath as to the truth of the foregoing pre-filed testimony.

Before me,

Candice Hutchison
Candice Hutchison

Notary Public/ Attorney at Law

Commission expires: 2/1/2021

01/17/2020 NVC/UPSTREAM R2-C

CATHAL DINNEEN

1B Løvliveien, 1639 • Gamle Fredrikstad, Norway
+47 468 40629 • dinneencathal@yahoo.ie

BUSINESS OPERATIONS MANAGEMENT PROFILE

Results-driven, award-winning Business Management Executive, with extensive experience including operations, production management, organizational development, HR, business development and team building within diverse industries. Skilled in planning, coordinating and executing successful production programs, with a track record of improving operational stability, efficiency, and profitability. Exceptional relationship builder and negotiator, successfully presenting and selling strategic business plans and programs to executive-level decision makers. Collaborate with senior stakeholders to effectively prioritize activities and achieve defined objectives, translating business requirements into solutions to achieve corporate performance goals and targets. Broad expertise in aquaculture.

Organizational Management • Business Strategy Development • Production Management • Revenue Generation
Program Management • Organizational Development • Performance Management • Regulatory Compliance
Financial Management • Team Building/Leadership • Facility Management • Relationship Development

PROFESSIONAL EXPERIENCE

FREDRIKSTAD SEAFOOD'S (Nordic Aquafarms affiliated), Øraveien 2, Fredrikstad, Norway • 2017 – Present

Operations / Head of Production

- Collaborate in the development of some of the largest and most advanced RAS systems ever conceived in the 2000T RAS2020 systems and 33,000T D-tank modular concepts.
- Participate in the integration of innovative technologies to increase production and reduce operating costs.
- Maintain compliance with timeframe and budget parameters, while assisting design teams in resolving technical and operational issues jeopardizing project success.
- Optimize production and maximize net returns through continuous optimization of fish husbandry practices, operating parameters and equipment, with the objective of stable and efficient production
- Create models to determine a number of KPIs, monitor system performance and streamline production.
- Procure and develop operating protocols for equipment and develop SOPs, operations manual and program of continuous process improvement.

Key Achievements:

- Played instrumental role in getting these ground-breaking facilities off the ground and progressing to the next phase encompassing the maximization of biological, engineering and operational efficiencies.
- Streamlining operations by integrating advanced Quality Management software tools used to improve data collection, implement continuous risk assessment programs, syncronize training needs, centralize key documenation and consolidate compliance requirements for accreditation bodies and regulatory authorities.

NAMGIS CLOSED CONTAINMENT PROJECT, Vancouver Island, Canada • 2012 – 2016

Operations / General Manager

- Direct the development of a PR Aqua 470T RAS pilot scale project, designed to test the technical and economic feasibility of growing Atlantic salmon to 5kg market size in tanks on land.
- Set and implement plans and budgets for key areas consistent with the overall strategy and financial and other business objectives. Develop and manage supplier contracts for key services and supplies.
- Ensure production supports approved annual business plan with full accountability for quality standards, legal requirements and cost control.
- Defined biosecurity protocols and detailed health plan for the site which has some of the most stringent biosecurity protocols of any fish farm in the world.
- Handle diverse HR functions, recruitment, staff development, leadership, performance management, and health & safety. Developed a training program that was awarded $30k funding in recognition of its efficacy.
- Monitor compliance with industry codes, governmental regulations and environmental standards.
- Serve as spokesperson and contact point with customers, stakeholders, potential investors, high profile visitors and media.
- Liaise with and compile reports for key organizations and funding institutions.

Key Achievements:

- Serve on the Business Development Committee, responsible for development of ancillary businesses such as a hatchery, reducing related operational capital costs more than $250K.
- Worked closely with Seafood Watch, arguably the world's most influential arbiter of seafood sustainability, in

helping to establish a Monterey Bay green "Best Choice" ranking for land based fish farming of Atlantic salmon, a stamp of approval which has helped to positively influence consumers and the entire business supply chain.

ACHILL ISLAND TURBOT FARM, CO., Mayo, Ireland • 2010 – 2011

Operations / General Manager

- Oversaw all operations of new marine recirculation units for the production of 120T of Turbot, implementing protocols and standard operating procedures.
- Played a key role in designing the layout and organization of the new facilities, integration of systems and technology and ensuring deadlines were met.
- Recruiting, managed, trained and mentored employees, and increased business growth and revenue through cost reductions, maximizing growth of the fish and ensuring that all production targets were met.

Key Achievements:

- Received nomination for Irish Rural Enterprise Award (2011); named winner of "Start-up" category.

GLEN OAK FISHERIES, Co. Antrim, Ireland • 2004 – 2009

Operations / General Manager

- Directed day-to-day operations for first and second generation recirculated hatchery units.
- Evaluated and reviewed procedures and systems to optimize operations and productivity.
- Ensuring compliance with requirements of The Irish Quality Trout Standard, Tesco's and the License and Local Authorities during regular internal checks and audits.
- Personally designed and developed a computer program to calculate O_2 consumption in raceways aligned in series.

Key Achievements:

- Successfully redeveloped infrastructure of the hatchery operation which resulted in a 75% increase in production from 200T to over 350T.
- Reduced costs and overheads through close monitoring and control and through introduction of cost reduction measures such as implementing modern techniques and systems.
- Gained recognition and positive feedback by meeting and achieving the new Eco-Standard for which Glen Oak Fisheries was selected as the Pilot Farm in Ireland.

SIMPLE SEAS LTD., Co. Kildare, Ireland • 1999 – 2004

Assistant Manager

- Played a pivotal role in helping to increase production by 35% by using extensive aquaculture knowledge.
- Received Naturlands' Organic Accreditation by meeting all the required standards for an organic smolt farm.
- Implemented nutritional and health management practices, including measures for avoiding stressful or disease inducing environmental conditions in some of Europe's largest tanks.

Key Achievements:

- Received promotion from trainee to assistant manager as result of exemplary performance.
- Completed multiple contract assignments at other fish farms, with responsibility for operations management, production optimization, employee supervision, financial management, health & safety, quality control, and regulatory compliance. Ensured adherence to specified performance deliverables.
- Contracted by one of the World's largest feed producers, Skretting, to undertake a hygiene based risk assessment at Curraun Fisheries fish processing plant. Minimized occurrence of Listeria Monocytogenes by over 90%, avoiding major impact on sales and revenue.

FISKELDI, Atlantic Halibut Marine Farm, Iceland • 07/1998-11/1998

Aquaculture Technician

- Carried out growth trials to compare the %SGR, FCR, and Chemical Composition of Atlantic halibut, fed diets produced by different commercial feed companies.

Key Achievements:

- Identified the optimal diet for the farm to feed this newly cultured species, which dramatically improved performance and revenue.

CATHAL DINNEEN

• Page 3 • dinneencathal@yahoo.ie

EDUCATION

MSc in Aquaculture, 1999 - University College, Cork, Ireland
BSc in Zoology, 1997 - University College, Cork, Ireland

AFFILIATIONS

Member - World Aquaculture Society, European Aquaculture Society and Aquaculture Association of Canada

TECHNICAL SKILLS

- Aquaculture Software Packages for fish growth modelling, feed purchase prognosis, production planning.
- Computer controlled environmental monitoring and alarm systems.
- Computer operated feeding and oxygen injection systems.

AGRI-CYCLE ENERGY

March 22, 2019

Carter Cyr
Nordic Aquafarms, Inc.
PO Box 283
159 High Street
Belfast, Maine 04915

Letter of Intent – Agri-Cycle Energy

Agri-Cycle Energy along with its sister company Exeter Agri-Energy in Exeter, Maine, has the capacity to accommodate the waste streams outlined in this LOI that will be generated by Nordic Aquafarms. Furthermore, Exeter-Agri Energy in conjunction with our digestion partners across New England will be able to manage the anticipated increase in volume of these waste streams as the facility reaches its maximum production capacity over the next 5 years.

Exeter Agri-Energy was commissioned in late 2011 and has experienced unmatched production and reliability throughout the northeast. Exeter is co-located on Stonyvale Farms a family owned operation that manages over 3,500 acres of land base in which the farm and digester are co-located. Food waste and organic waste streams fueling the facility are exclusively supplied by Agri-Cycle and the renewable power is exported to the ISO New England grid system under a 20 yr, fixed rate power purchase agreement with Emera Maine.

Exeter Agri-Energy (EAE) is one of the premier dairy-based biogas plants in the nation utilizing proven technologies from CH-Four Biogas and Martin Energy Group. The 3-megawatt facility is capable of processing up to 100,000 tons per year of organic waste while reusing bi-products as animal bedding and nutrient rich liquid fertilizer. The anaerobic digestion system relies on three vessels operating at approximately 100°F and totaling 3 million gallons of treatment capacity.

Since its inception in 2012, Agri-Cycle Energy, our logistics and hauling company has expanded our collection capabilities across New England, operating a variety of route collection assets and long-haul vehicles in order to move food waste and other organic waste streams from our client locations to our host digester in Exeter as well as a number of other partner digestion facilities across the region. Agri-Cycle has succeeded in moving large volumes of food waste and organic waste streams from generators to these digestors since its formation and services these clients in a manner that contains any vectors or odors which is a critical component to any large-scale operation in the waste industry.

This integrated network of personnel, technology, and equipment has enabled the company to scale exponentially utilizing logistical efficiencies as the primary catalyst. Relying on Exeter Agri-Energy as the insurance outlet for all volume, the result is a reliable, interconnected service offering the following key attributes which are unmatched by any other provider in the Northeast:

- Collection – existing routes covering ME, NH, VT, MA, and NY
  - (15) food waste packer and rendering body vehicles focused on collection of food waste
  - (10) tractor trailers supporting long haul activities
  - (6) 60-100 yard dump trailers to move 30-ton max payloads down the highway
  - (4) 9,000-gallon vacuum tankers supporting liquid organic waste accounts

- Transfer – (5) material aggregation points across the Northeast:
  - Portland, Maine
  - York, Maine
  - Westborough, Massachusetts
  - Charlestown, Massachusetts
  - Springfield, Vermont

- Processing – food waste de-packaging operations:
  - Exeter Agri-Energy - Exeter, Maine
  - EL Harvey & Sons - Westborough, Massachusetts
  - Waste Management – Charlestown, Massachusetts

- Disposal Partners – existing relationships with digestion facilities in five states and Canada:
  - Exeter Agri-Energy – Exeter, Maine
  - Laforge Bioenvironmental – Grand Falls, New Brunswick
  - Vanguard Renewables – (3) locations in Rutland, Haverhill, and Hadley, Massachusetts
  - Lewiston Auburn Pollution Control Authority – Lewiston, Maine

Waste Management, Charlestown, Massachusetts
Client relationships throughout the region with exceptional organizations such as Hannaford, Wal-Mart, Patriot Place, Massachusetts General Hospital, Colby College, Whole Foods, Trader Joe's, Wellesley College, Big Y, Amazon Fresh, Simon Malls, Jones Lang LaSalle, Fidelity, Maine General Medical Center, Bertucci's, Boston Seaport Hotel, Sysco, Kerry Coffee, E.L. Harvey, Newport Biodiesel and Tyson Foods further demonstrate the positive reputation and comprehensive service offering deployed by Agri-Cycle.

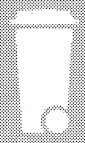
Please check out our website that outlines our company and highlights our services offerings. www.agricycleenergy.com We have also included the following below:

- Process overview of Anaerobic Digestion
- Photos of the Exeter Agri-Energy and Stonyvale Farm
- Photos of Agri-Cycle Energy's collection Fleet

AGRI-CYCLE

What happens to the waste?

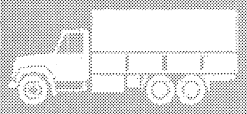




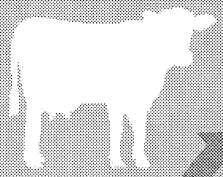
Food waste is saved in separate bins by area businesses, reducing waste discarded in landfills.



Bins are collected regularly and transported to a processing facility.



Food waste is processed through a depackager, and then mixed with manure inside the anaerobic digester.



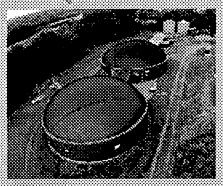
Cow manure is collected and pumped into the anaerobic digester.



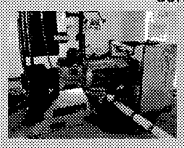
A bio-separator recovers the virtually odorless liquid material for use as natural cropland fertilizer, reducing the need for petroleum-based chemicals

Anaerobic Digestion

can reduce landfill use, save fuel, create energy and produce valuable farm products.



A bio-separator recovers solid material for use as animal bedding or a compost product.



Microorganisms reproduce by feeding on the organic matter in the anaerobic digester, creating biogas.

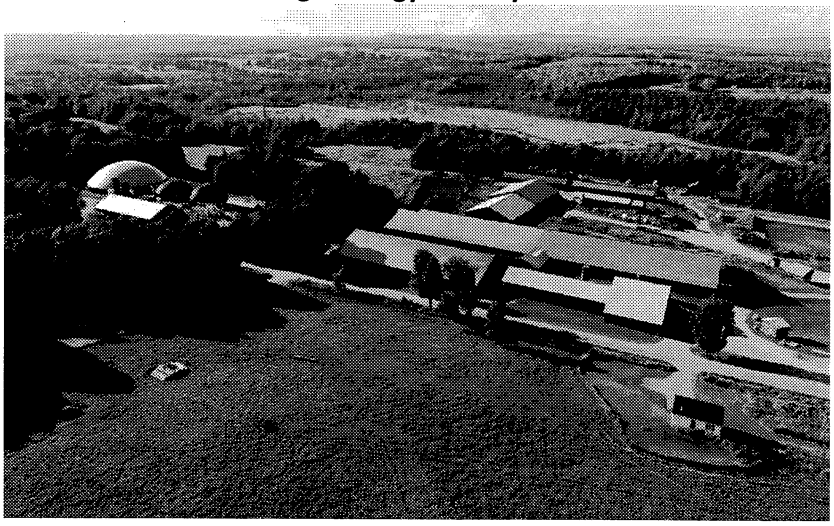


Excess electricity is sold back to the grid, reducing fossil fuel consumption and CO2 emissions.

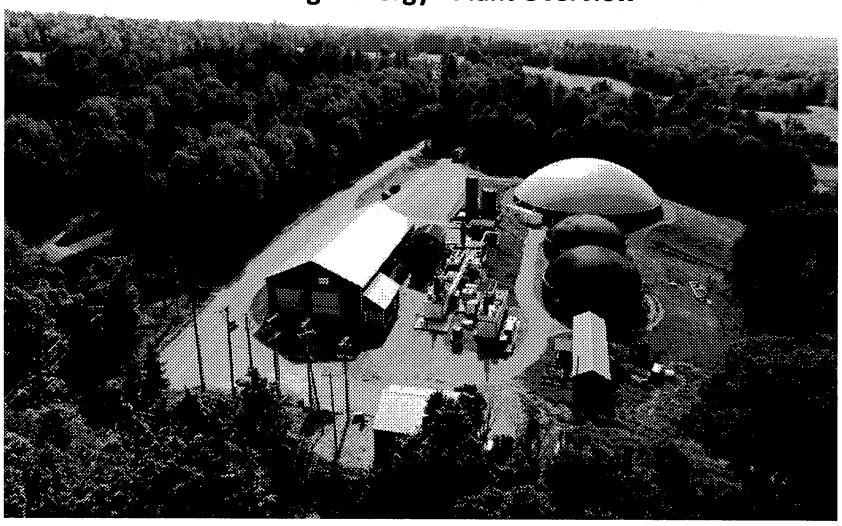
Biogas becomes fuel for the system, a combined heat and power unit.



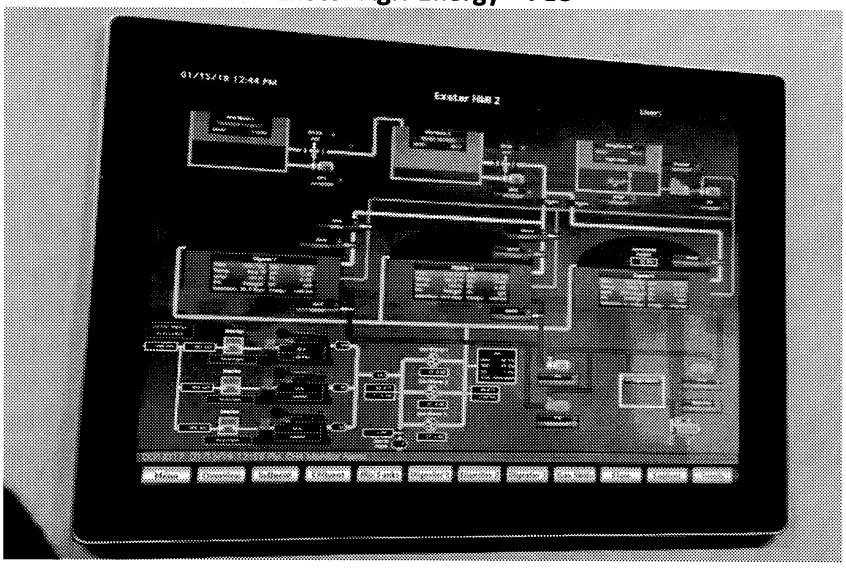
Exeter Agri-Energy & Stonyvale Farm



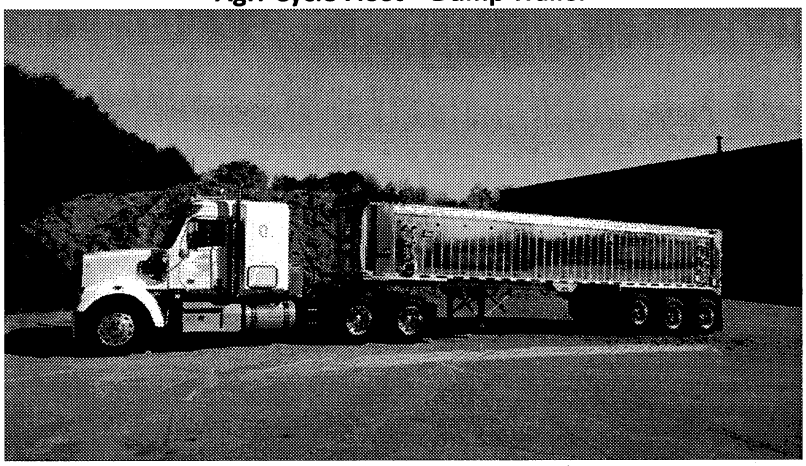
Exeter Agri-Energy - Plant Overview



Exeter Agri-Energy – PLC



Agri-Cycle Fleet – Dump Trailer



Agri-Cycle Fleet – 8,500 gallon vacuum tanker



Agri-Cycle Fleet – Collection Truck



Agri-Cycle is prepared to manage, dispose and process the waste streams outlined below for Nordic Aquafarms as they come online and scale their operation over the next 5 years.

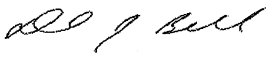
Waste Streams Generated from Nordic Aquafarms:

Agri-Cycle will work with Nordic Aquafarms to manage and dispose of the current amounts listed below and can handle the slow increase to 50% volume from August 2020-August 2021 (Phase 1), followed by a slow Increase from 50-100% from 2024-2025 (Phase 2). We have the capacity to accommodate these volumes for at least five years of operation following each phase.

Sludge (WWTP)	250 cubic yards/day (wet @ 20% DM)
Irone Slough (IWTP)	22 cubic yards/day (wet @ 3%DM)
Salmon Processing Solids (heads, guts, mortalities, etc.)	22 yards/day
Salmon Processing Grease (Fat Trap)	1.5 yards/week

Please feel free to contact us with any questions.

Sincerely,



Daniel J. Bell
Agri-Cycle Energy
Partner / General Manager
(207) 671-3642
dan@agricycleenergy.com



April 2, 2019

Carter Cyr
Nordic Aqua Farms, Inc.
159 High Street
Belfast, Maine 04915

Re: Capabilities Statement

Dear Carter,

This letter is to confirm that Casella Organics has the capabilities to transport, recycle and/or dispose of the all volumes of organic byproducts and waste produced by Nordic Aqua Farms Construction and demolition debris as outlined by the attached Nordic Aquafarms Solid Waste Summary Table A (attached). According to your build-out schedule, Nordic Aqua Farms will eventually be producing 11,500 US short tons of rack waste and 15,400 dry tons filter sludge annually. Of particular importance due to the volumes generated, Casella Organics is uniquely positioned to manage all this waste through one or more of several outlets we manage, namely:

- Transportation Services – Casella operates a fleet of front load, rear load and roll-off collection services to meet any waste generators needs. Additionally, Casella has close relationships with haulers for large volume dump trailer, belt trailer and/or live floor trailer hauling. Our hauling division, Pine Tree Waste Services, can also transport volumes of non-hazardous MSW (Municipal Solid Waste) to the Penobscot Energy Recovery Corporation facility located in Orrington, ME. We are prepared to handle all amounts of recycled products that may be generated from this development, as well Universal Waste and Land Clearing Debris.

- Composting – Casella's Hawk Ridge Compost Facility converts 40,000 tons annually of organic waste into 80,000 yards of commercial compost that is sold throughout Maine and New England. The facility was opened in 1989 and was upgraded to a state of the art in-vessel Gicom tunnel composting technology in 1994. The facility has received many awards over its tenure.

- Land Application – Casella Organics has been operating material marketing and land application programs in the State of Maine since 1983. Many organic residuals can qualify for direct land application which is often less expensive than other recycling or disposal options. Casella offers a turnkey service including material and program licensing, marketing, transportation, field operations, analytical data management and regulatory reporting services. Casella has over 200 farm customers in the State of Maine.

- Anaerobic Digestion – Casella has a close relationship as a supplier to Village Green Ventures, LLC, operator of a commercial anaerobic digestor in Brunswick, Maine. The

facility converts food and organic waste energy to methane which is burned to power energy generation. It is licensed to receive both solid and liquid organic waste.

Casella has a cooperative relationship with Exeter AgriEnergy located in Exeter Maine that receives 80,000 tons annually. Casella provides EAE with commercial and municipal food waste from Maine communities.

- Landfill Services - Special waste such as organic waste and demo debris can also be disposed of at the State of Maine's Juniper Ridge Landfill Facility located in West Old Town, ME that is operated by Casella.

To successfully manage this program, Casella envisions a diverse program utilizing a net work of facilities mentioned above. Casella can provide disposal at Juniper Ridge Landfill as a back-up to the program.

Key Reference Projects – Names and phone numbers of references are available upon request.

Dupont Nutrition USA, Inc. – located in Rockland Maine this plant extracts carrageenan from seaweed and produces approximately 32,000 tons annually of seaweed waste, trademarked as Algefiber. Dupont has a high service need requiring Casella to supply 6 dedicated dump trailers and a 350 day per year operating schedule. Casella markets Algefiber to agricultural and horticultural markets. Casella offers a turnkey service including marketing, transportation, material sampling and analytical, regulatory reporting and back-up storage when fields are unavailable.

Portland Water District – Casella manages the biosolids transportation, recycling and disposal program for Portland Water District East End and Westbrook facilities managing approximately 25,000 tons of biosolids annually to compost, anaerobic digestion and landfill outlets. Casella also provides 3 dedicated water tight dump trailers and services the facilities 365 days per year.

Verso Paper Company – located in Jay, Maine, Casella manages approximately 17,000 tons annually of varied materials including wood ash, primary sludge, combined primary and secondary sludge, flume waste and log truck cleanings. The marketing programs include the processing and production of dairy farm bedding, direct land application and soil blending and horticultural uses.

Carter, I hope this description of service options and reference projects demonstrate the broad capabilities of Casella Organics. This letter is not a quote for services but, rather, it is a statement of capabilities. The sole purpose of this letter is to communicate the willingness and capabilities that Casella Organics has towards providing the service as requested.

Please feel free to contact me with any future requests. I can be reached at (207) 461-1000.

Sincerely,

John Leslie
Division Manager – Maine

TABLE A
NORDIC AQUAFARMS SOLID WASTE STREAMS

Solid Waste Type	Estimated Quantities	Estimated Schec
Construction Phase		August 2019-August 2020, 2024-2025
Construction & Demolition Debris	90 yards/day during construction	August 2019-August 2020, 2024-2025
Land Clearing Debris (timber)	1,146 cords (5433 cubic yards)	August 2019-August 2020, 2024-2025
Land Clearing Debris (brush & stumps)	TBD	August 2019-August 2020, 2024-2025
Land Clearbing Debris (soil)	20,000 cubic yards	August 2019-August 2020, 2024-2025
Land Clearing Debris (rock)	14,000 cubic yards	August 2019-August 2020, 2024-2025
Universal Waste	5 yards/week	August 2019-August 2020, 2024-2025
Special Waste (asbestos insulation and roofing)	100 cu ft vermiculite insulation & 800 sq ft asphalt roofing	August 2019-August 2020
Special Waste (PAH-impacted soils)	TBD	August 2019-August 2020, 2024-2025
Belfast Bay Sediment	15,000 cys	August 2019-August 2020, 2024-2025
Operations Phase		
Sludge (WWTP)	250 cubic yards/day (wet @ 20% DM)	Slow increase to 50% volume from August 2020-August 2021, S
Irone Slough (IWTP)	22 cubic yards/day (wet @ 3%DM)	Slow increase to 50% volume from August 2020-August 2021, S
Salmon Processing Solids (heads, guts, mortalities, etc.)	22 yards/day	Slow increase to 50% volume from August 2020-August 2021, S
Salmon Processing Grease (Fat Trap)	1.5 yards/week	Slow increase to 50% volume from August 2020-August 2021, S
Municipal Solid Waste	60 yards/week	Slow increase to 50% volume from August 2020-August 2021, S
Universal Waste	2 yards /week	Slow increase to 50% volume from August 2020-August 2021, S
Recyclable Products	60 yards/week	Slow increase to 50% volume from August 2020-August 2021, S

WASTE MANAGEMENT

THINK GREEN®

March 25, 2019

Mr. Carter Cyr
Nordic Aquafarms Inc
159 High Street
Belfast, Maine 04915

RE: Letter of Commitment to Manage Solid Waste Streams

Dear Mr. Cyr:

Waste Management Disposal Services of Maine, Inc. (WMDSM) is excited to work with Nordic Aquafarms (NAF) to responsibly and sustainably manage the solid waste streams that will be generated from your proposed project in Belfast, Maine. This letter confirms that WM can manage the waste streams that will be generated from the construction and initial operation phases of the proposed project, as identified in the attached Table A.

We will work with NAF to recycle, or develop plans to recycle, as much of the waste as possible. These options may include, but are not limited to, direct land application, composting, anaerobic digestion, and/or other advanced forms of material conversion to create value added products. Development of long-term recycling plans for any specific waste stream are subject to waste stream characterization, material suitability, an economic and environmental feasibility analysis, and regulatory permitting.

WM has disposal capacity at its site in Norridgewock through December 2024 at present fill rates. We are presently going through the landfill expansion permitting process with the State of Maine to add additional capacity beyond 2024.

Many of the waste streams can be landfilled at our fully permitted landfill in Norridgewock, Maine, provided that the wastes meet all facility, state, and federal requirements for landfill disposal. These requirements include that each waste stream be non-hazardous, have no free liquids, are sufficiently firm to maintain stability, and have low odor. Special waste acceptance at our Norridgewock landfill is also subject to completion of WM waste approval forms, meeting our acceptance criteria, and, in some cases, sufficient compatible waste streams to meet our guidelines for responsible landfill management.

Our services will include comprehensive waste disposal and recycling permitting (if and as needed), full transportation services, and disposal and/or recycling management services.

All services outlined in this Letter are subject to the negotiation of the terms of a mutually acceptable service agreement to be entered into by the parties.

We look forward to working cooperatively with Nordic Aquafarms to manage all the identified waste streams safely, responsibly and sustainably.

If you have any questions, please do not hesitate to call. Thank you.

Sincerely,

Waste Management Disposal Services of Maine, Inc.

Steven Poggi
Director Disposal Operations
ew York - New England Market Area

TABLE A
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Universal Waste	2 yards /week	Slow increase to 50% volume from August 2020-August 2021, S
Recyclable Products	60 yards/week	Slow increase to 50% volume from August 2020-August 2021, S

(617) 569-3200
FAX (617) 561-8471

CHANNEL FISH CO., INC.

370 EAST EAGLE STREET
EAST BOSTON, MASSACHUSETTS 02128-2571

March 11, 2019

Carter Cyr
Nordic Aquafarms, Inc.
PO Box 283
159 High Street
Belfast, Maine 04915

Dear Carter:

Channel Fish Company is a family owned and operated fish processing business in East Boston, Massachusetts. We specialize in processing seafood and seafood by-products for pet food, human consumption, and for bait.

As discussed in our meeting on the 1/11/19, Channel Fish is interested in continuing to discuss opportunities to purchase the salmon by-product that will be generated by Nordic Aquafarms' proposed facility in Belfast, Maine. We believe we are well-positioned to service your needs and have the capacity to do so.

Our facility has a capacity of appx. 10,000 pounds an hour and appx. 40,000 MT per year. As such, we are interested in the appx. 10,000 metric tons/year (21 cubic yards/day) of salmon by-products (fish heads, cuttings, bones, skin, viscera, etc.) you expect to generate. The by-products would be transported in insulated plastic bins and in refrigerated trucks to ensure freshness and minimize any odors or dripping. If needed, liner bags can be used in the bins as another safeguard. We would also work closely with Nordic Aquafarms to develop a comprehensive logistical plan that prioritizes these considerations.

Beyond this, Channel Fish has partnerships and relationships with various other organizations that will allow us to collaborate with Nordic Aquafarm's to help recycle its other waste streams:

1. Sludge (filtrate removed from water treatment containing organic nutrients)
   6,000 metric tons/year (10-22 cubic yards/day)

2. Fish mortalities
   600 metric tons/year (1 cubic yard/day)

We look forward to continuing our discussions.

Sincerely,

Daniel Ryan
Channel Fish Co., Inc.
370 East Eagle St.
East Boston, MA 02128
Phone: 617-569-3200
Mobile: 781-808-1287
Fax: 617-561-8471
[illegible]@channelfishco.com

06-096 DEPARTMENT OF ENVIRONMENTAL PROTECTION

Chapter 375: **NO ADVERSE ENVIRONMENTAL EFFECT STANDARDS OF THE SITE LOCATION OF DEVELOPMENT ACT**

SUMMARY: These regulations describe the scope of review of the Department in determining a developer's compliance with the "no adverse effect on the natural environment" standard of the Site Location Law (38 M.R.S.A. Section 484(3)); the information which shall be submitted, when appropriate, within an application for approval; and, the terms and conditions which the Department may impose on the approval of an application to ensure compliance with the standard.

NOTE: In determining whether the developer has made adequate provision for fitting the development harmoniously into the existing natural environment and that the development will not adversely affect existing uses, scenic character, or natural resources in the municipality or in neighboring municipalities, the Department has identified several specific areas of concern which are dealt with in detail below.

1. No Unreasonable Adverse Effect On Air Quality

A. Preamble. The Department recognizes that point source emissions from certain types of commercial and industrial developments and solid waste disposal facilities and non-point source emissions deriving from industrial, commercial, and governmental developments can have an unreasonable adverse effect on air quality.

B. Scope of Review. In determining whether the proposed development will have an unreasonable adverse effect on ambient air quality, through point or non-point sources of chemical pollutants or particulate matter, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) The best practicable treatment of point sources of air pollution will be utilized and that point source emissions meet state ambient air quality standards and state emissions standards.

(2) The amount of air pollution produced from either point or non-point sources of air emissions will be consistent with the Board's "Policy on Air Quality Use," adopted March 28, 1979.

C. Submissions. Applications for approval of proposed industrial, commercial and governmental developments and solid waste disposal facilities shall include evidence that affirmatively demonstrates that there will be no unreasonable adverse effect on air quality, including information such as the following, when appropriate:

(1) Evidence that an Air Emission License has been or will be obtained.

(2) Evidence that increased traffic generated by the development will not significantly effect the ambient air quality. Modeling of the effect of non-point sources of air pollution on ambient air quality may be requested.

D. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the proposed development will have no unreasonable adverse effect on air quality, such as requiring that:

(1) Emissions from point sources of pollution be monitored.

(2) The size of the parking lots be limited in order to limit the amount of non-point source pollutants generated by the development.

2. No Unreasonable Alteration of Climate

A. Preamble. The Department recognizes the potential of large-scale, heavy industrial facilities, such as power generating plants, to affect the climate in the vicinity of their location by causing changes in climatic characteristics such as rainfall, fog, and relative humidity patterns.

B. Scope of Review. In determining whether the proposed development will cause an unreasonable alteration of climate, the Department shall consider all relevant evidence to that effect.

C. Submissions. Applications for approval of large-scale, heavy industrial developments, such as power generating plants, shall include evidence that affirmatively demonstrates that there will be no unreasonable alteration of climate, including information such as the following, when appropriate:

(1) Evidence that the proposed development will not unreasonably alter the existing cloud cover, fog, or rainfall characteristics of the area.

D. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the proposed development will not cause an unreasonable alteration of climate.

3. No Unreasonable Alteration of Natural Drainage Ways

A. Scope of Review. In determining whether the proposed development will cause an unreasonable alteration of natural drainage ways, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) Where a development site is traversed by a natural water course, drainage way, channel, or stream, a drainage right-of-way will be provided that substantially conforms with the lines of such natural water courses. Such rights-of-way shall be at least thirty feet in width.

(2) Any grading or other construction activity on the site will cause no unreasonable alteration of natural drainage ways such that drainage, other than that which occurred prior to development, will adversely affect adjacent parcels of land and that drainage ways flowing from adjacent parcels of land to the development site will be impeded.

B. Submissions. Applications for approval of proposed developments shall include evidence that affirmatively demonstrates that there will be no unreasonable alteration of natural drainage ways, including information such as the following, when appropriate.

(1) A plan showing all existing water courses, drainage ways, channels, or streams to be affected by the development, and the nature, width and location of proposed easements, rights-of-way, culverts, catch basins or other means of channeling surface water within the development and over adjacent parcels of land.

(2) Deed covenants which establish the easements or rights-of-way and provide for their continued maintenance.

C. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that there will by no unreasonable alteration of natural drainage ways.

4. No Unreasonable Effect on Runoff/Infiltration Relationships

A. Preamble. The Department recognizes that same developments cause unreasonable increases in stormwater runoff by decreasing the infiltrative capacity of the soils on a development site. The Department also recognizes that increases in stormwater runoff cause increased danger of flooding, the pollution of surface water bodies, and the depletion of groundwater resources.

B. Scope of Review. In determining whether the proposed development will have an unreasonable effect on runoff/infiltration relationships, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) A stormwater management system will infiltrate, detain, or retain water falling on the site during a storm of an intensity equal to a twenty-five year, twenty-four hour storm such that the rate of flow of stormwater from the development does not exceed the rate of outflow of stormwater from the site prior to the undertaking of the development.

(a) Developments which convey stormwater directly into the ocean (excluding estuarine tidewaters) exclusively in manmade piped or open drainage systems are exempt from the requirements of this subsection.

(2) The physical, biological, and chemical properties of the receiving waters will not be unreasonably degraded by the stormwater runoff from the development site.

(3) The peak discharge of the receiving waters will not be increased as the result of the stormwater runoff from the development site for storms up to a level of intensity of a twenty-five year, twenty-four hour storm.

C. Submissions. Applications for approval of proposed developments shall include evidence that affirmatively demonstrates that there will be no unreasonable effect on runoff/infiltration relationships, including information such as the following, when appropriate:

(1) Evidence that the proposed stormwater management system has been designed by a professional engineer or other person duly qualified to undertake the design. The designer of the system will evaluate the effectiveness of various stormwater methods and develop and make available for review the hydraulic computations based on accepted engineering practices to demonstrate that the standards established under subsection B, above, will be met.

(2) Evidence that the stormwater management system will take into consideration the upstream runoff which must pass over or through the development site. The system will be designed to pass upstream flows generated by a twenty-five year frequency through the proposed development without overloading the system or flooding areas not specifically planned for such flooding.

(3) Evidence that the design of piped or open channel systems will be based on a ten year flow frequency without overloading or flooding beyond channel limits. In addition, the areas expected to be flooded by runoff of a twenty-five year frequency will be designated, and no structures will be planned within such area.

(4) Evidence that, where permanent embankment-type storage or retention basins are planned, the basins will be designed in accordance with good engineering practice, such as outlined in the Soil Conservation Service Engineering Field Manual or other appropriate references.

(5) Evidence that rights-of-way or easements will be designated for all components of the stormwater management system lying outside of established street lines.

(6) Evidence that the developer will maintain all components of the stormwater management system until it is formally accepted by the municipality or a quasi-municipal district, or is placed under the jurisdiction of a legally created association that will be responsible for the maintenance of the system. The charter of such an association must be acceptable to the Department.

(7) Evidence that the stormwater management system will be fully coordinated with project site plans, including consideration of street patterns, pedestrian ways, open space, building siting, parking areas, recreational facilities, and other utilities, especially sanitary wastewater disposal facilities.

(8) When the construction of a development is to occur in phases, the planning of the stormwater management system should encompass the entire site which may ultimately be developed, and not limited to an initial or limited phases of the development.

NOTE: The following references may be of assistance to a developer in making the necessary computations and in designing the stormwater management system:

"Urban Hydrology for Small Watersheds", Technical Release No. 55, USDA, Soil Conservation Service, University of Maine, Orono, Maine.

"Water Resources Protection Measures in Land Development - A Handbook", Tourbier and Westmacott, University of Delaware Water Resources Center, Newark, Delaware.

D. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that there will be no unreasonable effect on runoff/infiltration relationships.

5. Erosion and Sedimentation Control

A. Preamble. The Department recognizes the importance of controlling erosion and sedimentation to protect water quality and wildlife and fisheries habitat. Additionally, the Department considers topsoil to be a natural resource which should be properly managed. Control of erosion and sedimentation is a concern both during and after construction activities.

B. Scope of Review. In determining whether the developer has made adequate provision for controlling erosion and sedimentation, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) All earth changes will be designed, constructed, and completed in such a manner so that the exposed area of any disturbed land will be limited to the shortest period of time possible.

(2) Sediment caused by accelerated soil erosion will be removed from runoff water before it leaves the development site.

(3) Any temporary or permanent facility designed and constructed for the conveyance of water around, through, or from the development site will be designed to limit the water flow to a non-erosive velocity.

(4) Permanent soil erosion control measures for all slopes, channels, ditches, or any disturbed land area will be completed within fifteen calendar days after final grading has been completed. When it is not possible or practical to permanently stabilize disturbed land, temporary erosion control measures will be implemented within thirty calendar days of the exposure of soil.

(5) When vegetative cover will be established as a temporary or permanent erosion control measure:

(a) Plant species to be used and the seeding rates will take into account soil, slope, climate, and duration and use of the vegetative cover.

(b) Mulch will be provided at rates appropriate to ensure a minimum of soil and seed loss until an acceptable "catch" of seed is obtained.

(c) Reseeding will be done within a reasonable period of time if there is not an acceptable "catch".

(6) All development plans will incorporate building designs and street layouts that fit and utilize existing topography and desirable natural surroundings to the fullest extent possible.

C. Submissions. Applications for approval of proposed developments shall include evidence that affirmatively demonstrates that adequate provision will be made to control erosion and sedimentation, including information such as the following when appropriate:

(1) A comprehensive erosion and sedimentation control plan, designed in accordance with the "Maine Environmental Quality Handbook", the U.S.D.A., Soil Conservation Service's "Engineering Field Manual", or another appropriate reference, which includes the following information:

(a) A description and location of the limits of all proposed construction activities which result in the disturbance of the land.

(b) A description and location of all existing and proposed on-site drainage.

(c) The timing and sequence of all proposed land disturbances.

(d) A description and location of all proposed temporary and permanent erosion and sedimentation control measures, including the timing and sequence of their completion.

(e) A proposed program for the maintenance of all erosion and sedimentation control facilities which will remain after the project is completed, including a designation of the responsible party.

D. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the developer will make adequate provision to control erosion and sedimentation, such as requiring that:

(1) Erosion control devices be in place before the commencing of other construction activities.

(2) Construction activity be limited to certain times of the year, particularly when soil type, slope, and the extent of area to be stripped pose serious potential for erosion and sedimentation.

6. No Unreasonable Adverse Effect on Surface Water Quality

A. Preamble. The Department recognizes that developments have the potential to cause the pollution of surface waters through both point and non-point sources of pollution.

B. Scope of Review. In determining whether the proposed development will have an unreasonable adverse effect on surface water quality, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) The development or reasonably foreseeable consequences of the development will not discharge any water pollutants which affect the state classification of a surface water body (38 M.R.S.A. Section 363 *et seq.*).

(2) The best practicable treatment of point sources of water pollutants will be utilized.

(3) The total phosphorous concentrations in all tributaries to great ponds will not exceed the standard established in Department Regulation 583.1 as the result of the proposed development.

(4) Any effect on surface water temperature will be in compliance with all appropriate standards established in Department Regulations 582.1 - 582.8.

C. Submissions. Applications for approval of proposed developments shall include evidence that affirmatively demonstrates that there will be no unreasonable adverse effect on surface water quality, including information such as the following, when appropriate:

(1) Where sewage disposal is to be handled off-site by a municipal or quasi-municipal sewage treatment facility, a letter from the authorized agent of the facility stating that there is adequate capacity to ensure satisfactory treatment.

(2) Evidence that a waste discharge license, as required by 38 M.R.S.A. Sections 413 *et seq.*, has been or will be obtained.

D. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the proposed development will have no unreasonable adverse effect on surface water quality.

7. No Unreasonable Adverse Effect on Ground Water Quality

A. Preamble. The Department recognizes the importance of protecting ground water resources in order to promote the future health, safety, and welfare of the citizens of Maine through the maintenance of an adequate supply of safe drinking water.

B. Scope of Review. In determining whether the proposed development will have an unreasonable adverse effect on ground water quality, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) The development will not result in the existing ground water quality becoming inferior to the physical, biological, chemical, and radiological levels for raw and untreated drinking water supply sources specified in the Maine State Drinking Water Regulations, pursuant to 22 M.R.S.A. Section 601. If the existing ground water quality is inferior to the State Drinking Water Regulations, the developer will not degrade the water quality any further.

C. Rebuttable Presumption Against Disposal of Waste in Certain Areas. The Department operates under the rebuttable presumption that the storage and/or disposal of solid wastes, hazardous wastes, and leachable or liquid wastes, including petroleum products and septage, pose serious threats to public health, safety, and welfare through the potential pollution of the ground water when such storage and/or disposal occurs on or above sand and gravel aquifers or the recharge areas of sand and gravel aquifers.

NOTE: Maps of sand and gravel aquifers and their recharge areas are available for portions of the state from the Bureau of Geology, Department of Conservation, Augusta.

(1) An applicant seeking approval for a development which involves one or more of the activities specified above, must overcome this presumption by persuasive evidence that the development is unique in some way that allows for compliance with the intent of this subsection.

D. Submissions. Applications for approval of proposed developments shall include evidence that affirmatively demonstrates that there will be no unreasonable adverse effect on ground water quality, including information such as the following, when appropriate:

(1) A comprehensive list, including physical and chemical characteristics and projected quantities of wastes to be disposed of or stored within the proposed development which may potentially contaminate the ground water.

(2) Methods for preventing ground water pollution as the result of the disposal and/or storage of wastes.

(3) An evaluation of the geological, hydrologic, and soils conditions of the development site.

(4) Data establishing background ground water quality.

(5) Proposed plan of action, and alternatives, to be followed in the event the proposed development results in ground water contamination.

E. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the proposed development will have no unreasonable adverse effect on ground water quality, such as requiring that:

(1) A ground water monitoring program be established and reports be filed with the Department at designated intervals.

(2) Specified wastes not be disposed of or stored within the proposed development.

8. No Unreasonable Adverse Effect on Ground Water Quantity

A. Preamble. The Department recognizes the importance of maintaining an adequate supply of ground water for drinking purposes. The Department also recognizes that the depletion of ground water resources can result in the intrusion of salt water into potable ground water supplies and can affect the hydrologic characteristics of surface water bodies (peak flows, low flows and water levels) resulting in adverse effects on their assimilative capacity and recreational use, as well as on certain wildlife habitats. Additionally, new wells can cause a lowering of the ground water supply to the point where existing wells run dry, particularly during the late summer and early fall.

B. Scope of Review. In determining whether the proposed development will have an unreasonable adverse effect on ground water quantity, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) The quantity of water to be taken from ground water sources will not substantially lower the found water table, cause salt water intrusion, cause undesirable changes in ground water flow patterns, or cause unacceptable ground subsidence.

C. Submissions. Applications for approval of proposed developments shall include evidence that affirmatively demonstrates that there will be no unreasonable adverse effect on ground water quantity, including information such as the following, where appropriate:

(1) Estimates of the quantity of ground water to be used by the proposed development.

(2) In the areas where salt water intrusion, the lowering of the ground water level, or land subsidence have been or can be reasonably be expected to be a problem, a report by a duly qualified person addressing the potential effects of ground water use by the proposed development.

D. Terms and Conditions. The Department may, as a term or condition of approval establish any reasonable requirement to ensure that there will be no unreasonable adverse effect on ground water quantity, such as requiring that:

(1) A development obtain its water from a surface water source, public community supply, or utility.

(2) Wells in the surrounding area be monitored to determine the effect of the development on ground water levels.

(3) People in the surrounding area, whose wells are adversely affected by the development, be provided with new wells or another source of potable water for their use and consumption.

9. Buffer Strips

A. Preamble. The Department recognizes the importance of natural buffer strips in protecting water quality and wildlife habitat. The Department also recognizes that buffer strips can serve as visual screens which can serve to lessen the visual impact of incompatible or undesirable land uses. The width and nature of buffer strips, if required, shall be determined by the Department on a case-by-case basis.

B. Scope of Review. In determining whether the developer has made adequate provision for buffer strips, when appropriate, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) Water bodies within or adjacent to the development will be adequately protected from sedimentation and surface runoff by buffer strips.

(2) Buffer strips will provide adequate space for movement of wildlife between important habitats.

(3) Buffer strips will shield adjacent uses from unsightly developments and lighting.

NOTE: The following GUIDELINES should be considered in establishing visual buffer strips.

(1) Plant materials used in the screen planting will be at least four feet high when planted and be of such evergreen species as will produce ultimately a dense visual screen at least eight feet high. Alternatively, a six-foot high wooden fence, without openings wider than 1", may be substituted.

(2) The screen will be maintained permanently, and any plant material which does not live will be replaced within one year.

(3) Screen planting will be so placed that at maturity it will be no closer than three feet away from any street or property line.

(4) The screen will be broken only at points of vehicular or pedestrian access.

(5) Fencing and screening will be so located within the developer's property line to allow access for maintenance on both sides without intruding upon abutting properties.

C. **Excavations for Sand, Gravel, Clay, Silt, Topsoil, or Rock** -- Buffer strips associated with an excavation for sand, gravel, clay, silt, topsoil, or rock must meet the buffer strip standards specified in *Performance Standards for Excavations*, 38 M.R.S.A. §490-D, and *Performance Standards for Quarries*, 38 M.R.S.A. §490-Z. These standards apply in lieu of Section 9(B) (1)-(3).

A gravel pit previously licensed under the Site Location of Development Law, 38 M.R.S.A §484, may apply for a modification of the buffer strip requirements in such a permit. The Department may approve such modification if the buffer strip at least meets the minimum standards of §§ 490-D and 490-Z and the proposed excavation will not result in an unreasonable adverse impact on the natural environment.

D. Submissions. Applications for approval of proposed developments shall include evidence that affirmatively demonstrates that adequate provision of buffer strips, when appropriate, will be made, including information such as the following:

(1) The location and width of all natural buffer strips to be retained.

(2) The nature, location, width, and height of all vegetative buffer strips or architectural screens to be established.

(3) Legal provisions for the maintenance of all buffer strips and architectural screens.

E. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the developer has made adequate provision for the establishment of buffer strips, such as requiring:

(1) The maintenance of existing vegetation as a natural buffer strip, which shall remain as a permanent feature of the landscape.

(2) The incorporation of buffer strip maintenance into deed covenants in projects where deed transfers of property to the general public are contemplated.

(3) Written permission of the Department of Environmental Protection for activities which may adversely affect a body of water or wildlife habitat protected by a natural buffer strip, such as: removal of live trees, stump and hot systems, and the displacement of rocks, topsoil and similar activities which would cause or allow increased soil erosion.

(4) The establishment of particular species of vegetation.

(5) The use of particular materials, colors, and styles in the construction of architectural screens.

10. Control of Noise

A. Preamble. The Department recognizes that the construction, operation and maintenance of developments may cause excessive noise that could degrade the health and welfare of nearby neighbors. It is the intent of the Department to require adequate provision for the control of excessive environmental noise from developments proposed after the effective date of this regulation.

B. Applicability

(1) This regulation applies to proposed developments within municipalities without a local quantifiable noise standard and in unorganized areas of the State. When a proposed development is located in a municipality which has duly enacted by ordinance an applicable quantifiable noise standard, which (1) contains limits that are not higher than the sound level limits contained in

this regulation by more than 5 dBA, and (2) limits or addresses the various types of noises contained in this regulation or all the types of noises generated by the development, that local standard, rather than this regulation, shall be applied by the Department within that municipality for each of the types of sounds the ordinance regulates. This regulation applies to developments located within one municipality when the noise produced by the development is received in another municipality and, in these cases, the Department will also take into consideration the municipalities' quantifiable noise standards, if any.

(2) This regulation applies to expansions and modifications of developments when such expansions and modifications are proposed after the effective date of this regulation and subject to site location approval, but only to the noise produced by the proposed expansion or modification of the development, unless (1) the existing development was constructed since 1-1-70 and (2) at the time of construction, the existing development was too small to require site location approval. In situations where conditions (1) and (2) above apply, then this regulation applies to the whole development (both existing facility and proposed expansion or modification). This regulation also applies to expansions and modifications of existing developments when such expansions and modifications require an amendment to the development's Site Law permit, but only to the noise produced by the expansion or modification.

(3) This regulation does not apply to existing developments or portions of existing developments constructed prior to 1-1-70 or approved under the Site Law prior to the effective date of this regulation. This regulation does not apply to relicensing of existing solid waste facilities previously approved under the Site Law.

(4) The sound level limits contained in this regulation apply only to areas that are defined as protected locations, and to property lines of the proposed development or contiguous property owned by the developer, whichever are farther from the proposed development's regulated sound sources.

(5) The sound level limits contained in this regulation do not apply to noise received within the development boundary.

NOTE: The Department will reconsider the effect and operation of the regulation one year from its effective date.

C. Sound Level Limits

(1) Sound From Routine Operation of Developments

(a) Except as noted in subsections (b) and (c) below, the hourly sound levels resulting from routine operation of the development and measured in accordance with the measurement procedures described in subsection H shall not exceed the following limits:

(i) At any property line of the development or contiguous property owned by the developer, whichever is farther from the proposed development's regulated sound sources:

75 dBA at any time of day.

(ii) At any protected location in an area for which the zoning, or, if unzoned, the existing use or use contemplated under a comprehensive plan, is not predominantly commercial, transportation, or industrial;

60 dBA between 7:00 a.m. and 7:00 p.m.
(the "daytime hourly limit"), and
50 dBA between 7:00 p.m. and 7:00 a.m.
(the "nighttime hourly limit").

(iii) At any protected location in an area for which the zoning, or, if unzoned, the existing use or use contemplated under a comprehensive plan, is predominantly commercial, transportation, or industrial:

70 dBA between 7:00 a.m. and 7:00 p.m.
(the "daytime hourly limit"), and
60 dBA between 7:00 p.m. and 7:00 a.m.
(the 'nighttime hourly limit').

(iv) For the purpose of determining whether the use of an unzoned area is predominantly commercial, transportation, or industrial (e.g. non-residential in nature), the Department shall consider the municipality's comprehensive plan, if any. Furthermore, the usage of properties abutting each protected location shall be determined, and the limits applied for that protected location shall be based upon the usage occurring along the greater portion of the perimeter of that parcel; in the event the portions of the perimeter are equal in usage, the limits applied for that protected location shall be those for a protected location in an area for which the use is not predominantly commercial, transportation, or industrial.

(v) When a proposed development is to be located in an area where the daytime pre-development ambient hourly sound level at a protected location is equal to or less than 45 dBA and/or the nighttime pre-development ambient hourly sound level at a protected location is equal to or less than 35 dBA, the hourly sound levels resulting from routine operation of the development and measured in accordance with the measurement procedures described in subsection H shall not exceed the following limits at that protected location:

55 dBA between 7:00 a.m. and 7:00 p.m.
(the "daytime hourly limit"), and
45 dBA between 7:00 p.m. and 7:00 a.m.
(the "nighttime hourly limit").

For the purpose of determining whether a protected location has a daytime or nighttime pre-development ambient hourly sound level equal to or less than 45 dBA or 35 dBA, respectively, the developer may make sound level measurements in accordance with the procedures in subsection H or may estimate the sound-level based upon the population density and proximity to local highways. If the resident population within a circle of 3,000 feet radius around a protected location is greater than 300 persons, or the hourly sound level from highway traffic at a protected location is predicted to be greater than 45 dBA in the daytime or 35 dBA at night (as

appropriate for the anticipated operating schedule of the development), then the developer may ,estimate the daytime or nighttime pre-development ambient hourly sound level to be greater than 45 dBA or 35 dBA, respectively.

NOTE: Highway traffic noise can be predicted using the nomograph method of FHWA Highway Traffic Noise Prediction Model, FHWA-RD-77-108, December, 1978.

(vi) Notwithstanding the above, the developer need not measure or estimate the pre-development ambient hourly sound levels at a protected location if he demonstrates, by estimate or example, that the hourly sound levels resulting from routine operation of the development will not exceed 50 dBA in the daytime or 40 dBA at night.

(b) If the developer chooses to demonstrate by measurement that the daytime and/or nighttime pre-development ambient sound environment at any protected location near the development site exceeds the daytime and/or nighttime limits in subsection 1(a)(ii) or 1(a)(iii) by at least 5 dBA, then the daytime and/or nighttime limits shall be 5 dBA less than the measured daytime and/or nighttime pre-development ambient hourly sound level at the location of the measurement for the corresponding time period.

(c) For any protected location near an existing development, the hourly sound level limit for routine operation of the existing development and all future expansions of that development shall be the applicable hourly sound level limit of 1(a) or l(b) above, or, at the developer's election, the existing hourly sound level from routine operation of the existing development plus 3 dBA.

(d) For the purposes of determining compliance with the above sound level limits, 5 dBA shall be added to the observed levels of any tonal sounds that result from routine operation of the development.

(e) When routine operation of a development produces short duration repetitive sound, the following limits shall apply:

(i) For short duration repetitive sounds, 5 dBA shall be added to the observed levels of the short duration repetitive sounds that result from routine operation of the development for the purposes of determining compliance with the above sound level limits.

(ii) For short duration repetitive sounds resulting from scrap metal, drop forge and metal fabrication operations or developments which the Department determines, due to their character and/or duration, are particularly annoying or pose a threat to the health and welfare of nearby neighbors, 5 dBA shall be added to the observed levels of the short duration repetitive sounds that result from routine operation of the development for the purposes of determining compliance with the above sound level limits, and the maximum sound level of the short duration repetitive sounds shall not exceed the following limits:

(a) At any protected location in an area for which the zoning, or, if unzoned, the existing use or use contemplated under a comprehensive plan, is not predominantly commercial, transportation, or industrial:

65 dBA between 7:00 a.m. and 7:00 p.m., and
55 dBA between 7:00 p.m. and 7:00 a.m.

(b) At any protected location in an area for which the zoning, or, if unzoned, the existing use or use contemplated under a comprehensive plan, is predominantly commercial, transportation, or industrial:

75 dBA between 7:00 a.m. and 7:00 p.m., and
65 dBA between 7:00 p.m. and 7:00 a.m.

(c) The methodology described in subsection 1(a)(iv) shall be used to determine whether the use of an unzoned area is predominantly commercial, transportation, or industrial.

(d) If the developer chooses to demonstrate by measurement that the pre-development ambient hourly sound level at any protected location near the development site exceeds 60 dBA between 7:00 a.m. and 7:00 p.m., and/or 50 dBA between 7:00 p.m. and 7:00 a.m., then the maximum sound level limit for short duration repetitive sound shall be 5 dBA greater than the measured pre-development ambient hourly sound level at the location of the measurement for the corresponding time period.

(e) For any protected location near an existing development, the maximum sound level limit for short duration repetitive sound resulting from routine operation of the existing development and all future expansions and modifications of that development shall be the applicable maximum sound level limit of (e)(ii)(a) or (e)(ii)(b) above, or, at the developer's election, the existing maximum sound level of the short duration repetitive sound resulting from routine operation of the existing development plus 3 dBA.

NOTE: The maximum sound level of the short duration repetitive sound shall be measured using the fast response [L_{AFmax}]. See the definition of maximum sound level.

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(2) **Sound From Construction of Developments**

(a) The sound from construction activities between 7:00 p.m. and 7:00 a.m. is subject to the following limits:

(i) Sound from nighttime construction activities shall be subject to the nighttime routine operation sound level limits contained in subsections l(a) and 1(b).

(ii) If construction activities are conducted concurrently with routine operation, then the combined total of construction and routine operation sound shall be subject to the nighttime routine operation sound level limits contained in subsections 1(a) and 1(b).

(iii) Higher levels of nighttime construction sound are permitted when a duly issued permit authorizing nighttime construction sound in excess of these limits has been granted by:

1. the local municipality when the duration of the nighttime construction activity is less than or equal to 90 days,

2. the local municipality and the Department when the duration of the nighttime construction activity is greater than 90 days.

(b) Sound from construction activities between 7:00 a.m. and 7:00 p.m. shall not exceed the following limits at any protected location:

Duration of Activity	**Hourly Sound Level Limit**
12 hours	87 dBA
8 hours	90 dBA
6 hours	92 dBA
4 hours	95 dBA
3 hours	97 dBA
2 hours	100 dBA
1 hour or less	105 dBA

(c) All equipment used in construction on development sites shall comply with applicable federal noise regulations and shall include environmental noise control devices in proper working condition, as originally provided with the equipment by its manufacturer.

(3) **Sound From Maintenance Activities**

(a) Sound from routine, ongoing maintenance activities shall be considered part of the routine operation of the development and the combined total of the routine maintenance and operation sound shall be subject to the routine operation sound level limits contained in subsection 1.

(b) Sound from occasional, major, scheduled overhaul activities shall be subject to the construction sound level limits contained in subsection 2. If overhaul activities are conducted concurrently with routine operation and/or construction activities, the combined total of the overhaul, routine operation and construction sound shall be subject to the construction sound level limits contained in subsection 2.

(4) **Sound From Production Blasting**

Sound exceeding the limits of subsection 1 and resulting from production blasting at a mine or quarry shall be limited as follows:

(a) Blasting shall not occur in the period between sundown and sunrise the following day or in the period between the hours of 7:00 p.m. and 7:00 a.m., whichever is greater. In addition, no routine production blasting shall be allowed in the daytime on Sundays.

(b) Blasting shall not occur more frequently than four times per day.

(c) Sound from blasting shall not exceed the following limits at any protected location:

Number of Blasts Per Day	Sound Level Limit
1	129 dBL
2	126 dBL
3	124 dBL
4	123 dBL.

Blast sound shall be measured in peak linear sound level (dBL) with a linear response down to 5 Hz.

NOTE: See Bureau of Mines Report of Investigations 8485 for information on airblast sound levels and pertinent scaled distances.

(5) **Exemptions**

Sound associated with the following shall be exempt from regulation by the Department:

(a) Railroad equipment which is subject to federal noise regulations.

(b) Aircraft operations which are subject to federal noise regulations.

(c) Registered and inspected vehicles:

(i) while operating on public ways, or

(ii) which enter the development to make a delivery or pickup and which are moving, starting or stopping, but not when they are parked for over 60 minutes in the development.

(d) Watercraft while underway.

(e) Residential developments, except during construction of such developments.

(f) Bells, chimes and carillons.

(g) occasional sporting, cultural, religious or public events allowed by the local municipality where the only affected protected locations are contained within that municipality.

(h) The unamplified human voice and other sounds of natural origin.

(i) Firming, fishing and aquacultural activity.

(j) Forest management, harvesting and transportation activities.

(k) Making, maintaining and grooming snow where the only affected protected locations are contained within the general boundaries of a ski area development.

(l) Snow removal, landscaping and street sweeping activities.

(m) Emergency maintenance and repairs.

(n) Warning signals and alarms.

(o) Safety and protective devices installed in accordance with code requirements.

(p) Test operations of emergency equipment occurring in the daytime and no more frequently than once per week.

(q) Boiler start-up, testing and maintenance operations occurring no more frequently than once per month.

(r) Major concrete pours that must extend after 7:00 p.m., when started before 3:00 p.m.

(s) Sounds from a regulated development received at a protected location when the generator of the sound has been conveyed a noise easement for that location. This exemption shall only be for the specific noise, land and term covered by the easement.

(t) A force majeure event and other causes not reasonably within the control of the owners or operators of the development.

(6) **Noise Abatement Structures**

Noise abatement structures of a non-permanent nature in any one location for a duration of less than one year and erected for the sole purpose of noise control shall not be considered structures as defined in 38 M.R.S.A. subsection 482(6).

D. Submissions

(1) **Developments with Minor Sound Impact**

An applicant for a proposed development with minor sound impact may choose to file as part of the site location application a statement attesting to the minor nature of the anticipated sound impact of their development. An applicant proposing an expansion or modification of an existing development with minor sound impact may follow the same procedure as described above. For the purpose of this regulation, a development or an expansion or modification of an existing development with minor sound impact means a development where the developer demonstrates, by estimate or example, that the regulated sound from routine operation of the development will not exceed 5 dBA less than the applicable limits established under subsection C. It is the intent of this subsection that an applicant need not conduct sound level measurements to demonstrate that the development or an expansion or modification of an existing development will have a minor sound impact.

NOTE: Examples include subdivisions without structures, office buildings, storage buildings which will not normally be accessed at night, and golf courses.

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(2) **Other Developments**

Technical information shall be submitted describing the applicant's plan and intent to make adequate provision for the control of sound. The applicant's plan shall contain information such as the following, when appropriate:

(a) Maps and descriptions of the land uses, local zoning and comprehensive plans for the area potentially affected by sounds from the development.

(b) A description of major sound sources, including tonal sound sources and sources of short duration repetitive sounds, associated with the construction, operation and maintenance of the proposed development, including their locations within the proposed development.

(c) A description of the daytime and nighttime hourly sound levels and, for short duration repetitive sounds, the maximum sound levels expected to be produced by these sound sources at protected locations near the proposed development.

(d) A description of the protected locations near the proposed development.

(e) A description of proposed major sound control measures, including their locations and expected performance.

(f) A comparison of the expected sound levels from the proposed development with the sound level limits of this regulation.

(g) A comparison of the expected sound levels from the proposed development with any quantifiable noise standards of the municipality in which the proposed development will be located and of any municipality which may be affected by the noise.

E. Terms and Conditions

The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the developer has made adequate provision for the control of noise from the development and to reduce the impact of noise on protected locations. Such conditions may include, but are not limited to, enclosing equipment or operations, imposing limits on hours of operation, or requiring the employment of specific design technologies, site design, modes of operation, or traffic patterns.

The sound level limits prescribed in this regulation shall not preclude the Department under Chapter 375.15 from requiring a developer to demonstrate that sound levels from a development will not unreasonably disturb wildlife or adversely affect wildlife populations. In addition, the sound level limits shall not preclude the Department, as a term or condition of approval, from requiring that lower sound level limits be met to ensure that the developer has made adequate provision for the protection of wildlife.

F. Variance From Sound Level Limits

The Department recognizes that there are certain developments or activities associated with development for which noise control measures are not reasonably available. Therefore, the Department may grant a variance from any of the sound level limits contained in this rule upon (1) a showing by the applicant that he or she has made a comprehensive assessment of the available technologies for the development and that the sound level limits cannot practicably be met with any of these available technologies, and (2) a finding by the Department that the proposed development will not have an unreasonable impact on protected locations. In addition, a variance may be granted by the Department if (1) a development is deemed necessary in the interest of national defense or public safety and the applicant has shown that the sound level limits cannot practicably be met without unduly limiting the development's intended function, and (2) a finding is made by the Department that the proposed development will not have an unreasonable impact on protected locations. The Department shall consider the request for a variance as part of the review of a completed Site Location of Development Law application. In granting a variance, the Department may, as a condition of approval, impose terms and conditions to ensure that no unreasonable sound impacts will occur.

G. Definitions

Terms used herein are defined below for the purpose of this noise regulation.

(1) **AMBIENT SOUND**: At a specified time, the all-encompassing sound associated with a given environment, being usually a composite of sounds from many sources at many directions, near and far, including the specific development of interest.

(2) **CONSTRUCTION**: Activity and operations associated with the development or expansion of a project or its site.

(3) **EMERGENCY**: An unforeseen combination of circumstances which calls for immediate action.

(4) **EMERGENCY MAINTENANCE AND REPAIRS**: Work done in response to an emergency.

(5) **ENERGY SUM OF A SERIES OF LEVELS**: Ten times the logarithm of the arithmetic sum of the antilogarithms of one-tenth of the levels. [Note: See Section H(4.2).]

(6) **EXISTING DEVELOPMENT**: A development constructed before 1-1-70 or a development approved under the Site Law prior to the effective date of this regulation or a proposed development for which the site location application is complete for processing on or before the effective date of this regulation. Any development with a site location approval which has been remanded to the Department by a court of competent jurisdiction for further proceedings relating to noise limits or noise levels prior to the effective date of these regulations shall not be deemed an existing development and these regulations shall apply to the existing noise sources at that development.

(7) **EXISTING HOURLY SOUND LEVEL**: The hourly sound level resulting from routine operation of an existing development prior to the first expansion that is subject to this regulation.

(8) **EQUIVALENT SOUND LEVEL**: The level of the mean-square A-weighted sound pressure during a stated time period, or equivalently the level of the sound exposure during a stated time period divided by the duration of the period.

NOTE: For convenience, a one hour equivalent sound level should begin approximately on the hour.

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(9) **HISTORIC AREAS**: Historic sites administered by the Bureau of Parks and Recreation of the Maine Department of Conservation, with the exception of the Arnold Trail.

(10) **HOURLY SOUND LEVEL**: The equivalent sound level for one hour measured or computed in accordance with this regulation.

(11) **LOCALLY-DESIGNATED PASSIVE RECREATION AREA**: Any site or area designated by a municipality for passive recreation that is open and maintained for public use and which:

(a) has fixed boundaries,

(b) is owned in fee simple by a municipality or is accessible by virtue of public easement,

(c) is identified and described in a local comprehensive plan, and

(d) has been identified and designated at least nine months prior to the filing of the applicant's Site Location of Development application.

(12) **MAXIMUM SOUND LEVEL**: Ten times the common logarithm of the square of the ratio of the maximum sound to the reference sound of 20 micropascals. Symbol: L_{AFmax}.

(13) **MAXIMUM SOUND**: Largest A-weighted and fast exponential-time-weighted sound during a specified time interval. Unit: pascal (Pa).

(14) **RESIDENCE**: A building or structure, including manufactured housing, maintained for permanent or seasonal residential occupancy providing living, cooking and sleeping facilities and having permanent indoor or outdoor sanitary facilities, excluding recreational vehicles, tents and watercraft.

(15) **PRE-DEVELOPMENT AMBIENT**: The ambient sound at a specified location in the vicinity of a development site prior to the construction and operation of the proposed development or expansion.

(16) **PROTECTED LOCATION**: Any location, accessible by foot, on a parcel of land containing a residence or planned residence or approved residential subdivision, house of worship, academic school, college, library, duly licensed hospital or nursing home near the development site at the time a Site Location of Development application is submitted; or any location within a State Park, Baxter State Park, National Park, Historic Area, a nature preserve owned by the Maine or National Audubon Society or the Maine Chapter of the Nature Conservancy, The Appalachian Trail, the Moosehorn National Wildlife Refuge, federally-designated wilderness area, state wilderness area designated by statute (such as the

Allagash Wilderness Waterway), or locally-designated passive recreation area; or any location within consolidated public reserve lands designated by rule by the Bureau of Public Lands as a protected location.

At protected locations more than 500 feet from living and sleeping quarters within the above noted buildings or areas, the daytime hourly sound level limits shall apply regardless of the time of day.

Houses of worship, academic schools, libraries, State and National Parks without camping areas, Historic Areas, nature preserves, the Moosehorn National Wildlife Refuge, federally-designated wilderness areas without camping areas, state wilderness areas designated by statute without camping areas, and locally-designated passive recreation areas without camping areas are considered protected locations only during their regular hours of operation and the daytime hourly sound level limits shall apply regardless of the time of day.

Transient living accommodations are generally not considered protected locations; however, in certain special situations where it is determined by the Department that the health and welfare of the guests and/or the economic viability of the establishment will be unreasonably impacted, the Department may designate certain hotels, motels, campsites and duly licensed campgrounds as protected locations.

This term does not include buildings and structures located on leased camp lots, owned by the applicant, used for seasonal purposes.

For purposes of this definition, (1) a residence is considered planned when the owner of the parcel of land on which the residence is to be located has received all applicable building and land use permits and the time for beginning construction under such permits has not expired, and (2) a residential subdivision is considered approved when the developer has received all applicable land use permits for the subdivision and the time for beginning construction under such permits has not expired.

(17) **QUANTIFIABLE NOISE STANDARD**: A numerical limit governing noise from developments that has been duly enacted by ordinance by a local municipality.

(18) **ROUTINE OPERATION**: Regular and recurrent operation of regulated sound sources associated with the purpose of the development and operating on the development site.

(19) **SHORT DURATION REPETITIVE SOUNDS**: A sequence of repetitive sounds which occur more than once within an hour, each clearly discernible as an event and causing an increase in the sound level of at least 6 dBA on the fast meter response above the sound level observed immediately before and after the event, each typically less than ten seconds in duration, and which are inherent to the process or operation of the development and are foreseeable.

(20) **SOUND COMPONENT**: The measurable sound from an audibly identifiable source or group of sources.

(21) **SOUND LEVEL**: Ten times the common logarithm of the square of the ratio of the frequency-weighted and time-exponentially averaged sound pressure to the reference sound of 20 micropascals. For the purpose of this regulation, sound level measurements are obtained

using the A-weighted frequency response and fast dynamic response of the measuring system, unless otherwise noted.

(22) **SOUND PRESSURE**: Root-mean-square of the instantaneous sound pressures in a stated frequency band and during a specified time interval. Unit: pascal (Pa).

(23) **SOUND PRESSURE LEVEL**: Ten times the common logarithm of the square of the ratio of the sound pressure to the reference sound pressure of 20 micropascals.

(24) **TONAL SOUND**: for the purpose of this regulation, a tonal sound exists if, at a protected location, the one-third octave band sound pressure level in the band containing the tonal sound exceeds the arithmetic average of the sound pressure levels of the two contiguous one-third octave bands by 5 dB for center frequencies at or between 500 Hz and 10,000 Hz, by 8 dB for center frequencies at or between 160 and 400 Hz, and by 15 dB for center frequencies at or between 25 Hz and 125 Hz.

Additional acoustical terms used in work associated with this regulation shall be used in accordance with the following American National Standards Institute (ANSI) standards:

ANSI S12.9-1988 - American National Standard Quantities and Procedures for Description and Measurements of Environmental Sound, Part 1;

ANSI S3.20-1973 - American National Standard Psychoacoustical Terminology;

ANSI S1.1-1960 - American National Standard Acoustical Terminology.

H. Measurement Procedures

(1) **Scope**. These procedures specify measurement criteria and methodology for use, with applications, compliance testing and enforcement. They provide methods for measuring the ambient sound and the sound from routine operation of the development, and define the information to be reported. The same methods shall be used for measuring the sound of construction, maintenance and production blasting activities. For measurement of the sound of production blasting activities for comparison with the limits of subsection C(4)(c), these same methods shall be used with the substitution of the linear sound level for the A-weighted sound level.

(2) **Measurement Criteria**

2.1 **Measurement Personnel**

Measurements shall be supervised by personnel who are well qualified by training and experience in measurement and evaluation of environmental sound, or by personnel trained to operate under a specific measurement plan approved by the Department.

2.2 **Measurement Instrumentation**

(a) A sound level meter or alternative sound level measurement system used shall meet all of the Type 1 or 2 performance requirements of American National Standard Specifications for Sound Level Meters, ANSI S1.4-1983.

(b) An integrating sound level meter (or measurement system) shall also meet the Type 1 or 2 performance requirements for integrating/averaging in the International Electrotechnical Commission Standard on Integrating-Averaging Sound Level Meters, IEC Publication 804 (1985).

(c) A filter for determining the existence of tonal sounds shall meet all the requirements of-American National Standard Specification for Octave-Band and Fractional Octave-Band Analog and Digital Filters, ANSI S1.11-1986 for Order 3, Type 3-D performance.

(d) An acoustical calibrator shall be used of a type recommended by the manufacturer of the sound level meter and that meets the requirements of American National Standard Specification for Acoustical Calibrators, ANSI S1.40-1984.

(e) A microphone windscreen shall be used of a type recommended by the manufacturer of the sound level meter.

2.3 **Calibration**

(a) The sound level meter shall have been calibrated by a laboratory within 12 months of the measurement, and the microphone's response shall be traceable to the National Bureau of Standards.

(b) Field calibrations shall be recorded before and after each measurement period and at shorter intervals if recommended by the manufacturer.

2.4 **Measurement Location, Configuration and Environment**

(a) Except as noted in subsection (b) below, measurement locations shall be at nearby protected locations that are most likely affected by the sound from routine operation of the development.

(b) For determining compliance with the 75 dBA property line hourly sound level limit described in subsection C(l)(a)(i), measurement locations shall be selected at the property lines of the proposed development or contiguous property owned by the developer, as appropriate.

(c) The microphone shall be positioned at a height of approximately 4 to 5 feet above the ground, and oriented in accordance with the manufacturer's recommendations.

(d) Measurement locations should be selected so that no vertical reflective surface exceeding the microphone height is located within 30 feet. When this is not possible, the measurement location may be closer than 30 feet to the reflective surface, but under no circumstances shall it be closer than 6 feet.

(e) When possible, measurement locations should be at least 50 feet from any regulated sound source on the development.

(f) Measurement periods shall be avoided when the local wind speed exceeds 12 mph and/or precipitation would affect the measurement results.

2.5 **Measurement Plans.** Plans for measurement of pre-development ambient sound or post-development sound may be discussed with the Department staff.

(3) **Measurement of Ambient Sound**

3.1 **Pre-Development Ambient Sound**

Measurements of the pre-development ambient sound are required only when the developer elects to establish the sound level limit in accordance with subsections C(1)(b) and C(1)(e)(ii)(d) for a development in an area with high ambient sound levels, such as near highways, airports, or pre-existing developments; or when the developer elects to establish that the daytime and nighttime ambient hourly sound levels at representative protected locations exceed 45 dBA and 35 dBA, respectively.

(a) Measurements shall be made at representative protected locations for periods of time sufficient to adequately characterize the ambient sound. At a minimum, measurements shall be made on three different weekdays (Monday through Friday) during all hours that the development will operate. If the proposed development will operate on Saturdays and/or Sundays, measurements shall also be made during all hours that the development will operate.

(b) Measurement periods with particularly high ambient sounds, such as during holiday traffic activity, significant insect activity or high coastline waves, should generally be avoided.

(c) At any measurement location the daytime and nighttime ambient hourly sound level shall be computed by arithmetically averaging the daytime and nighttime values of the measured one hour equivalent sound levels. Multiple values, if they exist, for any specific hour on any specific day shall first be averaged before the computation described above.

3.2 **Post-Development Ambient Sound**

(a) Measurements of the post-development ambient one hour equivalent sound levels and, if short duration repetitive sounds are produced by the development, the maximum sound levels made at nearby protected locations and during representative routine operation of the development that are not greater than the applicable limits of subsection C clearly indicate compliance with those limits.

(b) Compliance with the limits of subsection C(l)(b) may also be demonstrated by showing that the post-development ambient hourly sound level, measured in accordance with the procedures of subsection 3.1 above during routine operation of the development, does not exceed the pre-development ambient hourly sound

level by more than one decibel, and that the sound from routine operation of the development is not characterized by either tonal sounds or short duration repetitive sounds.

(c) Compliance with the limits of subsection C(1)(e)(ii)(d) may also be demonstrated by showing that the post development maximum sound level of any short duration repetitive sound, measured in accordance with the procedures of subsection 3.1 above, during routine operation of the development, does not exceed the pre-development ambient hourly sound level by more than five decibels.

(d) If any of the conditions in (a), (b) or (c) above are not met, compliance with respect to the applicable limits must be determined by measuring the sound from routine operation of the development in accordance with the procedures described in subsection 4.

(4) **Measurement of the Sound from Routine Operation of Developments.**

4.1 **General**

(a) Measurements of the sound from routine operation of developments are generally necessary only for specific compliance testing purposes in the event that community complaints result from operation of the development, for validation of an applicant's calculated sound levels when requested by the Department, for determination of existing hourly sound levels for an existing development or for enforcement by the Department.

(b) Measurements shall be obtained during representative weather conditions when the development sound is most clearly noticeable. Preferable weather conditions for sound measurements at distances greater than about 500 feet from the sound source include overcast days when the measurement location is downwind of the development and inversion periods (which most commonly occur at night).

(c) Measurements of the development sound shall be made so as to exclude the contribution of sound from development equipment that is exempt from this regulation.

4.2 **Measurement of the Sound Levels Resulting from Routine Operation of the Development**

(a) When the ambient sound levels are greater than the sound level limits, additional measurements can be used to determine the hourly sound level that results from routine operation of the development. These additional measurements may include diagnostic measurements such as measurements made close to the development and extrapolated to the protected location, special checkmark measurement techniques that include the separate identification of audible sound sources, or the use of sound level meters with pause capabilities that allow the operator to exclude non-development sounds.

(b) For the purposes of computing the hourly sound level resulting from routine operation of the development, sample diagnostic measurements may be made to obtain the one hour equivalent sound levels for each sound component.

(c) Identification of tonal sounds produced by the routine operation of a development for the purpose of adding the 5 dBA penalty in accordance with subsection C(l)(d) requires aural perception by the measurer, followed by use of one-third octave band spectrum analysis instrumentation. If one or more of the sounds of routine operation of the development are found to be tonal sounds, the hourly sound level component for tonal sounds shall be computed by adding 5 dBA to the one hour equivalent sound level for those sounds.

(d) Identification of short duration repetitive sounds produced by routine operation of a development requires careful observations. For the sound to be classified as short duration repetitive sound, the source(s) must be inherent to the process or operation of the development and not the result of an unforeseeable occurrence. If one or more of the sounds of routine operation of the development are found to be short duration repetitive sounds, the hourly sound level component for short duration repetitive sounds shall be computed by adding 5 dBA to the one hour equivalent sound level for those sounds. If required, the maximum sound levels of short duration repetitive sounds shall be measured using the fast response [L_{AFmax}]. The duration and the frequency of occurrence of the events shall also be measured. In some cases, the sound exposure levels of the events may be measured. The one hour equivalent sound level of a short duration repetitive sound may be determined from measurements of the maximum sound level during the events, the duration and frequency of occurrence of the events, and their sound exposure levels.

(e) The daytime or nighttime hourly sound level resulting from routine operation of a development is the energy sum of the hourly sound level components from the development, including appropriate penalties, (see (c) and (d) above). If the energy sum does not exceed the appropriate daytime or nighttime sound level limit, then the development is in compliance with that sound level limit at that protected location.

(5) **Reporting Sound Measurement Data**. The sound measurement data report should include the following:

(a) The dates, days of the week and hours of the day when measurements were made.

(b) The wind direction and speed, temperature, humidity and sky condition.

(c) Identification of all measurement equipment by make, model and serial number.

(d) The most recent dates of laboratory calibration of sound level measuring equipment.

(e) The dates, times and results of all field calibrations during the measurements.

(f) The applicable sound level limits, together with the appropriate hourly sound levels and the measurement data from which they were computed, including data relevant to either tonal or short duration repetitive sounds.

(g) A sketch of the site, not necessarily to scale, orienting the development, the measurement locations, topographic features and relevant distances, and containing sufficient information for another investigator to repeat the measurements under similar conditions.

(h) A description of the sound from the development and the existing environment by character and location.

I. Sound Level Standards for Wind Energy Developments

(1) Applicability

This subsection applies to grid-scale wind energy developments as defined by 35-A M.R.S.A. §3451(6) and small-scale wind energy developments governed by 35-A M.R.S.A. §3456, hereinafter referred to as "wind energy developments." The provisions in Section 10(C)(1), 10(D)(2), 10(F), and 10(H) of this rule do not apply to wind energy developments.

(2) Sound Level Limits for Routine Operation of Wind Energy Developments

The sound levels resulting from routine operation of a wind energy development measured in accordance with the measurement procedures described in subsection I(8) shall not exceed the following limits:

(a) 75 dBA at any time of day at any property line of the wind energy development or contiguous property owned or controlled by the wind energy developer, whichever is farther from the proposed wind energy development's regulated sound sources; and

(b) 55 dBA between 7:00 a.m. and 7:00 p.m. (the "daytime limit"), and 42 dBA between 7:00 p.m. and 7:00 a.m. (the "nighttime limit") at any protected location.

(3) Tonal Sounds

For the purposes of this subsection, a tonal sound exists if, at a protected location, the 10 minute equivalent average one-third octave band sound pressure level in the band containing the tonal sound exceeds the arithmetic average of the sound pressure levels of the two contiguous one-third octave bands by 5 dB for center frequencies at or between 500 Hz and 10,000 Hz, by 8 dB for center frequencies at or between 160 and 400 Hz, and by 15 dB for center frequencies at or between 25 Hz and 125 Hz. 5 dBA shall be added to any average 10 minute sound level ($Leq_{A\ 10\text{-}min}$) for which a tonal sound occurs that results from routine operation of the wind energy development.

(4) Short Duration Repetitive Sounds ("SDRS")

For the purposes of this subsection SDRS is defined as a sequence of repetitive sounds that occur within a 10-minute measurement interval, each clearly discernible as an event

resulting from the development and causing an increase in the sound level of 5 dBA or greater on the fast meter response above the sound level observed immediately before and after the event, each typically ±1 second in duration, and which are inherent to the process or operation of the development.

(a) When routine operation of a wind energy development produces short duration repetitive sound, a 5 dBA penalty shall be arithmetically added to each average 10-minute sound level ($Leq_{A\ 10\text{-}min}$) measurement interval in which greater than 5 SDRS events are present.

(5) **Compliance with the Sound Level Limits**

A wind energy development shall determine compliance with the sound level limits as set forth in subsection I(2) of this rule in accordance with the following:

(a) Sound level data shall be aggregated in 10-minute measurement intervals within a given compliance measurement period (daytime: 7:00 am to 7:00 pm or nighttime: 7:00 pm to 7:00 am) under the conditions set forth in subsection I(8) of this rule.

(b) Compliance will be demonstrated when the arithmetic average of the sound level of, at a minimum, twelve, 10-minute measurement intervals in a given compliance measurement period is less than or equal to the sound level limit set forth in subsection I(2).

(c) Alternatively, if a given compliance measurement period does not produce a minimum of twelve, 10-minute measurement intervals under the atmospheric and site conditions set forth in subsection I(8) of this rule, the wind energy development may combine six or more contiguous 10-minute measurement intervals from one 12 hour (7:00 am to 7:00 pm daytime or 7:00 pm to 7:00 am nighttime) compliance measurement period with six or more contiguous 10-minute intervals from another compliance measurement period. Compliance will be demonstrated when the arithmetic average of the combined 10-minute measurement intervals is less than or equal to the sound level limit set forth in subsection I(2).

(6) **Variance from Sound Level Limits**

A variance may be granted by the Department if: (1) a development is deemed necessary in the interest of national defense or public safety and the applicant has shown that the sound level limits cannot practicably be met without unduly limiting the development's intended function, and (2) a finding is made by the Department that the proposed development will not have an unreasonable impact on protected locations. The Department shall consider the request for a variance as part of the review of a completed Site Location of Development Law application or a request for certification for a small-scale wind energy development. In granting a variance, the Department may, as a condition of approval, impose terms and conditions to ensure that no unreasonable sound impacts will occur.

(7) **Submissions**

Technical information shall be submitted describing the wind energy developer's plan and intent to make adequate provision for the control of sound. The wind energy developer's plan shall contain the following:

(a) A map depicting the location of all proposed sound sources associated with the wind energy development, property boundaries for the proposed wind energy development, property boundaries of all adjacent properties within one mile of the proposed wind energy development, and the location of all protected locations located within one mile of the proposed wind energy development;

(b) A description of the major sound sources, including tonal sound sources and sources of short duration repetitive sounds, associated with the construction, operation and maintenance of the proposed wind energy development;

(c) A description of the equivalent noise levels expected to be produced by the sound sources at protected locations located within one mile of the proposed wind energy development. The description shall include a full-page isopleths map depicting the modeled decay rate of the predicted sound pressure levels expected to be produced by the wind energy development at each clearly identified protected location within one mile of the proposed wind energy development. The predictive model used to generate the equivalent noise levels expected to be produced by the sound sources shall be designed to represent the "predictable worst case" impact on adjacent properties and shall include, at a minimum, the following:

1. The maximum rated sound power output (IEC 61400-11) of the sound sources operating during nighttime stable atmospheric conditions with high wind shear above the boundary layer and consideration of other conditions that may affect in-flow airstream turbulence;

2. Attenuation due to geometric spreading, assuming that each turbine is modeled as a point source at hub height;

3. Attenuation due to air absorption;

4. Attenuation due to ground absorption/reflection;

5. Attenuation due to three dimensional terrain;

6. Attenuation due to forestation;

7. Attenuation due to meteorological factors such as but not limited to relative wind speed and direction (wind rose data), temperature/vertical profiles and relative humidity, sky conditions, and atmospheric profiles;

8. Inclusion of an "uncertainty factor" adjustment to the maximum rated output of the sound sources based on the manufacturer's recommendation; and

9. Inclusion, at the discretion of the Department, of an addition to the maximum rated output of the sound sources to account for uncertainties in the modeling of sound propagation for wind energy developments. This discretionary uncertainty

factor of up to 3 dBA may be required by the Department based on the following conditions: inland or coastal location, the extent and specificity of credible evidence of meteorological operating conditions, and the extent of evaluation and/or prior specific experience for the proposed wind turbines. Subject to the Department's discretion based on the information available, there is a rebuttable presumption of an uncertainty factor of 2 to 3 dBA for coastal developments and of 0 to 2 dBA for inland developments.

(d) A description of the protected locations near the proposed wind energy development.

(e) A description of proposed major sound control measures, including their locations and expected performance.

(f) A comparison of the expected sound levels from the proposed development with the sound level limits of this regulation.

(g) A comparison of the expected sound levels from the proposed development with any quantifiable noise standards of the municipality in which the proposed development will be located and of any municipality which may be affected by the noise.

(h) A description and map identifying one or more compliance testing locations on or near the proposed wind energy development site. The identified compliance testing locations shall be selected to take advantage of prevailing downwind conditions and be able to meet the site selection criteria outlined in subsection I(8)(d)(2).

(i) A description of the compliance measurement protocol as required by subsection 8 below.

(j) A description of the complaint response protocol proposed for the wind energy development. The complaint response protocol shall adequately provide for, at a minimum:

1. A 24-hour contact for complaints;

2. A complaint log accessible by the Department;

3. For those complaints that include sufficient information to warrant an investigation, the protocol must provide for an analysis as set forth in (a) through (c) below. Sufficient information includes, at a minimum: the name and address of the complainant; the date, time and duration of the sound event; a description of the sound event, indoor or outdoor, specific location and a description of any audible sounds from other sources outside or inside the dwelling of the complainant. Analysis of the complaint by the licensee must include:

   (a) documentation of the location of the nearest turbines to the complaint location and ground conditions in the area of the complaint location;

(b) weather conditions at the time of the complaint and surface and hub height wind speed and direction;

(c) power output and direction of nearest turbines; and

(d) notification of complaint findings to the Department and the complainant;

4. A plotting of complaint locations and key information on a project area map to evaluate complaints for a consistent pattern of site, operating and weather conditions; and

5. A comparison of these patterns to the compliance protocol to determine whether testing under additional site and operating conditions is necessary and, if so, a testing plan that addresses the locations and the conditions under which a pattern of complaints had occurred.

(8) **Measurement Procedures**

These procedures specify measurement criteria and methodology for use with wind energy development applications, compliance and complaint response. They provide methods for measuring the sound from operation of the wind energy development and set forth the information to be reported.

(a) **Measurement Criteria**

1. **Measurement Personnel**

Measurements shall be supervised by personnel who are well qualified by training and experience in measurement and evaluation of environmental sound, or by personnel trained to operate under a specific measurement plan approved by the Department.

(b) **Measurement Instrumentation**

1. A sound level meter or alternative sound level measurement system used shall meet all of the Type 0 or 1 performance requirements of American National Standard Specifications for Sound Level Meters, ANSI S1.4.

2. An integrating sound level meter (or measurement system) shall also meet the Type 0 or 1 performance requirements for integrating/averaging in the International Electrotechnical Commission Standard on Integrating-Averaging Sound Level Meters, IEC Publication 61672-1 and ANSI 1.43.

3. A filter for determining the existence of tonal sounds shall meet all the requirements of the American National Standard Specification for Octave-Band and Fractional Octave-Band Analog and Digital Filters, ANSI S1.11 and IEC 61260, Type 3-D performance.

4. The acoustical calibrator used shall be of a type recommended by the manufacturer of the sound level meter and one that meets the requirements of American National Standard Specification for Acoustical Calibrators, ANSI S1.40.

5. The microphone windscreen used shall be of a type recommended by the manufacturer of the sound level meter.

6. Anemometer(s) used for surface (10 meter (m)) (32.8 feet) wind speeds shall have a minimum manufacturer specified accuracy of ±1 mph providing data in one second integrations and 10 min. average/maximum values for the evaluation of atmospheric stability.

7. Audio recording devices shall be time stamped (hh:mm:ss) and at a minimum 16 bit digital, recording the sound signal output from the measurement microphone at a minimum sampling rate of 24 thousand (k) samples per second to be used for identifying events. Audio recording and compliance data collection shall occur through the same microphone/sound meter and bear the same time stamp.

(c) **Equipment Calibration**

1. The sound level meter shall have been calibrated by a laboratory within 12 months of the measurement, and the microphone's response shall be traceable to the National Institute of Standards and Technology.

3. Field calibrations shall be recorded before and after each measurement period and at shorter intervals if recommended by the manufacturer.

4. Anemometer(s) and vane(s) shall be calibrated annually by the manufacturer to maintain stated specification.

(d) **Compliance Measurement Location, Configuration, and Environment**

1. Compliance measurement locations shall be at nearby protected locations that are most likely affected by the sound from routine operation of the wind energy development subject to permission from the respective property owner(s).

2. To the greatest extent possible, compliance measurement locations shall be at the center of unobstructed areas that are maintained free of vegetation and other structures or material that is greater than 2 feet in height for a 75-foot radius around the sound and audio monitoring equipment.

3. To the greatest extent possible, meteorological measurement locations shall be at the center of open flat terrain, inclusive of grass and a few isolated obstacles less than 6 feet in height for a 250-foot radius around the anemometer location. The meteorological data measurement location need not be coincident with the sound and audio measurement location provided there is no greater than a 5 mile separation between the data collection points and the measurement locations have similar characterization, i.e. same side of the mountain ridge, etc.

4. Meteorological measurements of wind speed and direction shall be collected using anemometers at a 10-meter height (32.8 feet) above the ground. Results shall be reported, based on 1-second integration intervals, and shall be reported synchronously with hub level and sound level measurements at 10-minute measurement intervals. The wind speed average and maximum shall be reported.

5. The sound microphone shall be positioned at a height of approximately 4 to 5 feet above the ground, and oriented in accordance with the manufacturer's recommendations.

6. When possible, measurement locations should be at least 50 feet from any sound source other than the wind energy development's power generating sources.

(e) **Compliance Data Collection, Measurement and Retention Procedures**

1. Measurements of operational, sound, audio and meteorological data shall occur as set forth in subsection I(8)(e)(7 through 10).

2. All operational, sound and meteorological data collected shall be retained by the wind energy development for a period of 1 year from the date of collection and is subject to inspection by the Department and submission to the Department upon request.

3. All audio data collected shall be retained by the wind energy development for a period of four weeks from the date of collection unless subject to a complaint filed in accordance with the complaint protocol approved by the Department and is subject to inspection by the Department and submission to the Department upon request. Specific audio data collected that coincides with a complaint filed in accordance with the approved complaint protocol shall be retained by the wind energy developer for a period of 1 year from the date of collection and is subject to inspection by the Department and submission to the Department upon request.

4. Written notification of the intent to collect compliance data must be received by the Department prior to the collection of any sound level data for compliance purposes. The notification shall state the date and time of the compliance measurement period.

   ***Note**: Notice received via electronic mail is sufficient regardless of whether it is received during business hours.*

5. Compliance data from the operation of a wind energy development shall be submitted to the Department, at a minimum:

   (a) Once during the first year of facility operation;

(b) Once during each successive fifth year thereafter until the facility is decommissioned;

(c) In response to a complaint regarding operation of the wind energy development as set forth in subsection I(7)(j) of the rule and any subsequent enforcement by the Department; and

(d) For validation of an applicant's calculated sound levels when requested by the Department.

6. All sound level, audio and meteorological data collected during a compliance measurement period for which the Department has been notified that meets or exceeds the specified wind speed parameters shall be submitted to the Department for review and approval. All data submittals shall be submitted to the Department within 30 days of notification of intent to collect compliance data.

7. Measurement shall be obtained during weather conditions when the wind turbine sound is most clearly noticeable, generally when the measurement location is downwind of the wind energy development and maximum surface wind speeds < 6 miles per hour (mph) with concurrent turbine hub-elevation wind speeds sufficient to generate the maximum continuous rated sound power from the nearest wind turbines to the measurement location. A downwind location is defined as within 45^0 of the direction between a specific measurement location and the acoustic center of the five nearest wind turbines.

[Note: These conditions typically occur during inversion periods usually between 11 pm and 5 am.]

8. In some circumstances, it may not be feasible to meet the wind speed and operations criteria due to terrain features or limited elevation change between the wind turbines and monitoring locations. In these cases, measurement periods are acceptable if the following conditions are met:

(a) The difference between the L_{A90} and L_{A10} during any 10-minute period is less than 5 dBA; and

(b) The surface wind speed (10 meter height) (32.8 feet) is 6 mph or less for 80% of the measurement period and does not exceed 10 mph at any time, or the turbines are shut down during the monitoring period and the difference in the observed L_{A50} after shut down is equal to or greater than 6 dBA; and

(c) Observer logs or recorded sound files clearly indicate the dominance of wind turbine(s).

9. Measurement intervals affected by increased biological activities, leaf rustling, traffic, high water flow, aircraft flyovers or other extraneous ambient noise sources that affect the ability to demonstrate compliance shall

be excluded from all compliance report data. The intent is to obtain 10-minute measurement intervals that entirely meet the specific criteria.

10. Measurements of the wind energy development sound shall be made so as to exclude the contribution of sound from other development equipment that is exempt from this regulation.

(f) **Reporting of Compliance Measurement Data**

Compliance Reports shall be submitted to the Department within 30 days of notification of intent to collect compliance data or upon request by the Department and shall include, at a minimum, the following:

1. A narrative description of the sound from the wind energy development for the compliance measurement period result;

2. The dates, days of the week and hours of the day when measurements were made;

3. The wind direction and speed, temperature, humidity and sky condition;

4. Identification of all measurement equipment by make, model and serial number;

5. All meteorological, sound, windscreen and audio instrumentation specifications and calibrations;

6. All A-weighted equivalent sound levels for each 10-minute measurement interval;

7. All L_{A10} and L_{A90} percentile levels;

8. All 10 minute 1/3 octave band linear equivalent sound levels (dB);

9. All short duration repetitive events characterized by event amplitude. Amplitude is defined as the peak event amplitude minus the average minima sound level immediately before and after the event, as measured at an interval of 50 milliseconds ("ms") or less, A-weighted and fast time response, i.e. 125 ms. For each 10-minute measurement interval short duration repetitive sound events shall be reported by number for each observed amplitude integer above 5 dBA.

10. Audio recording devices shall be time stamped (hh:mm:ss) and at a minimum 16 bit digital, recording the sound signal output from the measurement microphone at a minimum sampling rate of 24 thousand (k) samples per second to be used for identifying events. Audio recording and compliance data collection shall occur through the same microphone/sound meter and bear the same time stamp. Should any sound data collection be observed by a trained attendant, the attendant's notes and observations may be substituted for the audio files during the compliance measurement period;

11. All concurrent time stamped turbine operational data including the date, time and duration of any noise reduction operation or other interruptions in operations if present; and

12. All other information determined necessary by the Department.

11. Preservation of Historic Sites

A. Preamble. The Department recognizes the value to society of preserving sites of historic significance.

B. Definition. As used in this section, "historic site" means any site, structure, district or archaeological site which has been officially included on the National Register of Historic Places and/or on the Maine Historic Resource Inventory, or which is established by qualified testimony as being of historic significance.

C. Scope of Review. In determining whether a proposed development will have an adverse effect on the preservation of historic sites either on or near the development site, the Department shall consider all relevant evidence to that effect.

D. Terms and Conditions. The Department, may as a term or condition of approval, establish any reasonable requirement to ensure that a proposed development will not adversely affect preservation of any historic site.

12. Preservation of Unusual Natural Areas

A. Preamble. The Department recognizes the importance of preserving unusual natural areas for educational and scientific purposes.

B. Definition. As used in this section, "unusual natural area" means any land or water area, usually only a few acres in size, which is undeveloped and which contains natural features of unusual geological, botanical, zoological, ecological, hydrological, other scientific, educational, scenic, or recreational significance. By way of illustration, and not limitation, such are, as may include: rare or exemplary plant communities; individual plant species of unusual interest because of size, species or other reasons; unusual or exemplary bogs; unusually important wildlife habitats, particularly those of rare or endangered species; unusual land forms; fossils and other deposits of importance to geologists; outstanding scenic areas; and others of similar character.

C. Scope of Review. In determining whether a proposed development will have an adverse effect on the preservation of unusual natural areas either on or near the development site, the Department shall consider all relevant evidence to that effect.

D. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that a proposed development will not adversely affect the preservation of natural areas.

13. Access to Direct Sunlight

A. Preamble. The Department recognizes that some existing structures utilize active or passive solar energy systems for purposes such as heating air or water, and that, in these instances, it may be an unreasonable effect on existing uses to deny access to direct sunlight.

B. Scope of Review. In determining whether a proposed development will have an adverse effect on access to direct sunlight, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) Structures within the proposed development will not block access to direct sunlight to structures utilizing solar energy through active or passive systems.

C. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that a proposed development will not block access to direct sunlight.

14. No Unreasonable Effect on Scenic Character

A. Preamble. The Department considers scenic character to be one of Maine's most important assets. The Department also feels that visual surroundings strongly influence people's behavior.

B. Scope of Review. In determining whether the proposed development will have an unreasonable adverse effect on the scenic character of the surrounding area, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) The design of the proposed development takes into account the scenic character of the surrounding area.

(2) A development which is not in keeping with the surrounding scenic character will be located, designed and landscaped to minimize its visual impact to the fullest extent possible.

(3) Structures will be designed and landscaped to minimize their visual impact on the surrounding area.

NOTE: The following are GUIDELINES for the landscaping of parking lots, which are structures pursuant to 38 M.R.S.A. Section 482(6) (B).

(a) Lighting will be shielded from adjacent highways and residential areas.

(b) Curbed planting strips will be utilized in parking areas of 2 acres or more. Planting strips will be a minimum of ten (10) feet wide and spaced between every second double bay parking aisle or 200 feet, whichever is less.

(c) When the parking lots are adjacent to a residential use, landscaping and/or architectural screens will be utilized to provide an effective perimeter separation area between property lines and the edge of the pavement and/or structures. There will be a minimum setback of fifteen (15) feet from the property line. The Department may require a similar provision when the parking lot is adjacent to other land uses.

(d) Planting and maintenance program specifications will be developed to provide the earliest establishment of landscape materials and their maintenance.

(e) **Planting specifications**

(i) Shrubs will be planted with a 24" minimum size for those specified by spread.

(ii) Shrubs will be planted with a 36" minimum size for those specified by height.

(iii) Shade trees will be highcrowned species with ascending or lateral branching habit indigenous to the area, tolerant to existing soils and urbanized conditions, two-inch minimum caliper measured six inches up from the base, and planted a maximum of 30' on center.

(iv) Flowering and evergreen trees will be a minimum of 7' tall and planted a maximum of 20' on center.

(v) Selections for ground cover will reflect the project's function, expected foot traffic, exposure, and maintenance program.

(f) Provisions will be made to supply water to planted islands and other vegetated areas.

(4) The plans for the proposed development provide for the preservation of existing elements of the development site which contribute to the maintenance of scenic character.

C. Submissions. Applications for approval of proposed developments shall include evidence that affirmatively demonstrates that there will be no unreasonable adverse effect on the scenic character of the surrounding area, including information such as the following, when appropriate:

(1) Sketches of the proposed development indicating how the development fits into the scenic character of the area.

(2) Landscaping plans for minimizing the visual impact of the parking lots, mining operations and other types of developments.

D. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the proposed development will have no unreasonable adverse effect on scenic character, such as requiring that:

(1) Illumination of the development be limited.

(2) Vegetative or architectural screens be established.

15. Protection of Wildlife and Fisheries

A. Preamble. The Department recognizes the need to protect wildlife and fisheries by maintaining suitable and sufficient habitat and the susceptibility of certain species to disruption and interference of lifecycles by construction activities.

B. Scope of Review. In determining whether the developer has made adequate provision for the protection of wildlife and fisheries, the Department shall consider all relevant evidence to that effect, such as evidence that:

(1) A buffer strip of sufficient area will be established to provide wildlife with travel lanes between areas of available habitat.

(2) Proposed alterations and activities will not adversely affect wildlife and fisheries lifecycles.

(3) There will be no unreasonable disturbance to:

(a) High and moderate value deer wintering areas.

(b) Habitat of any species declared threatened or endangered by the Commissioner, Maine Department of Inland Fisheries and Wildlife or the Director of the U.S. Fish and Wildlife Service.

(c) Seabird nesting islands;

(d) Significant vernal pools;

(e) High and moderate value waterfowl and wading bird habitat; and

(f) Shorebird nesting, feeding, and staging areas.

C. Submissions. Applications for approval of proposed developments shall include evidence that affirmatively demonstrates that the developer has made adequate provision for the protection of wildlife and fisheries, including information such as the following, when appropriate:

(1) The location of natural buffer strips and adequate provision for their maintenance.

(2) Plans to mitigate adverse effects on wildlife and fisheries through means that at a minimum include, but are not limited to, design considerations, pollution-abatement practices, the timing of construction activities, and on-site or off-site habitat improvements or preservation.

D. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that a developer has made adequate provision for the protection of wildlife and fisheries.

16. Adequate Provision for Solid Waste Disposal

A. Standard. The applicant shall make adequate provision for solid waste disposal. All solid waste will be disposed of in a manner which ensures that:

(1) No unreasonable adverse effects on the natural environment will result;

(2) Public health, safety, and welfare will not be adversely affected; and

(3) The wastes will not combine with other wastes, water, or other natural or man-made substances to create additional harmful effects to the natural environment or the public health, safety, and welfare.

B. Submissions. The application for approval of a proposed development must include evidence that affirmatively demonstrates the applicant has made adequate provision for solid waste disposal, including, but not limited to, the following information:

(1) The types and estimated quantities of solid waste to be generated by the development and the proposed method of disposal. Types of solid waste may include, but are not limited to, stumps/grubbings, construction debris, demolition debris, household solid waste, industrial solid wastes, special wastes and hazardous wastes.

(2) A letter from the operator of a solid waste management facility or a municipality stating that adequate capacity exists for solid waste generated by the development and that the development may utilize the solid waste management facility. The applicant must identify the method of collection (e.g. private, municipal or commercial) and the location of the solid waste management facility for each waste listed. If waste from the site is taken to a transfer station, the application must identify the facility or facilities at which the waste ~~is~~ would ultimately be managed.

(3) If any stumps, grubbings, or other wood waste or land clearing debris ~~is~~ are to be disposed of on-site, the applicant must comply with 38 M.R.S. §1301 *et seq.* and all applicable sections of the Department's Solid Waste Management Rules. There are provisions within the Solid Waste Management Rules to exempt the processing of certain land clearing debris as described in 06-096 CMR 409(1)(B)(3). The applicant must delineate the disposal area on the site plan. For subdivisions, if waste is proposed for on-site burial on a particular lot, that lot must be conveyed with a deed restriction identifying the disposal area.

(4) If wood wastes are to be burned on-site, the burn area must be shown on the site plan and exclusion plans provided for materials prohibited from being burned (including chemically treated wood, plastics, vinyl, asphalt shingles, etc). On-site burning cannot create a nuisance condition, and evidence of all applicable fire permits must be submitted. Provide plans for handling both unburned wood waste and woodash, including the name of the licensed or exempt solid waste facility that will accept or receive or manage the ash and unburned materials and the name of the licensed or exempt transporter who will transport the materials to the proposed solid waste facility. If applicable, include evidence of capacity to accept the waste from an approved solid waste facility or a plan outlining the usage of these materials in landscaping and reclamation of the site. Include information on ash/topsoil mixing ratios and application rates. Any proposed open burning must comply with the *Rules for Open Burning*, 06-096 CMR 102.

(5) When the proposed development is or includes the establishment of a solid waste disposal facility, the applicant shall supply evidence of compliance with the *Solid Waste Management Act* (38 M.R.S. Section 1301 *et seq.*).

C. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the applicant has made adequate provision for solid waste disposal, such as the following:

(1) a groundwater quality monitoring program;

(2) on-site construction supervision or engineering inspection by a certified engineer or geologist; and/or

(3) operational inspections and reports by an independent consultant.

17. Adequate Provisions for the Control of Odors

A. Standard. The applicant shall make adequate provision for controlling odors.

B. Submissions. The application for approval of any development likely to be the source of offensive odors shall include evidence that affirmatively demonstrates that the applicant has made adequate provision for the control of odors, including, but not limited to, the following information:

(1) the identification of any sources of odors from the development;

(2) an estimation of the area which would be affected by the odor, based on experience in dealing with the material or process used in the development, or similar materials or processes; or

(3) proposed systems for enclosure of odor-producing materials and processes, and proposed uses of technology to control, reduce or eliminate odors.

C. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure that the applicant has made adequate provision for the control of odors.

18. Adequate Provision for Securing and Maintaining Sufficient and Healthful Water Supplies

A. Standard. The applicant shall make adequate provision for securing and maintaining a sufficient and healthful water supply for the proposed development.

B. Submissions. The application for approval of a proposed developments shall include evidence that affirmatively demonstrates that the applicant has made adequate provision for securing and maintaining a sufficient and healthful water supply, including, but not limited to, the following information:

(1) A letter from the appropriate utility or water district that a sufficient- and healthful water supply exists and may be utilized by the development.

(2) If water is to be supplied on-site, a letter from a geologist or well driller knowledgeable about the area where the development is proposed to be located that a sufficient and healthful water supply is likely to be available.

(a) If there is reasonable doubt that a sufficient and healthful water supply can be provided by means of on-site wells, the following may be required:

(i) water from wells located in close proximity to the development site be tested for potability; and/or

(ii) a test well be dug or drilled on the development site and at report prepared indicating the volume and potability of water obtained from the well.

(3) If water supply and sewage disposal are to be handled on-site, and if lots are less than 2 acres in size, identification of the location of wells and on-site sewage disposal systems for each lot. The separation distance between wells and on-site sewage disposal areas shall be at least the minimum distance established in the *Subsurface Wastewater Disposal Rules*, 10-144 CMR 241.

(4) If water is to be provided by a common source:

(a) evidence that there will be sufficient water to serve the development;

(b) evidence that the common water supply system will be constructed in conformance with the *Maine Drinking Water Regulations*, authorized by 22 M.R.S. Chapter 601; and

(b) evidence that adequate provision has been made for the establishment of a mechanism to ensure proper operation and maintenance of the water supply system.

(5) Indicate the total anticipated water usage (daily or annual) by the proposed development, including the amount of non-potable water to be used for dust control during construction.

C. Terms and Conditions. The Department may, as a term or condition of approval, establish any reasonable requirement to ensure the adequate provision of a sufficient and healthful water supply, such as requirements that:

(1) One or more central wells be installed with adequate water for the development.

(2) An applicant arrange for adequate water service with a local utility or water district, or provide an adequate off-site common well, in cases where the Department determines that on-site water supplies may not be adequate.

(3) The location of wells and on-site sewage disposal areas be established by deed conditions.

STATUTORY AUTHORITY: 38 M.R.S.A. Section 343

EFFECTIVE DATE:
November 1, 1979, filing 79-507

AMENDED:
November 21, 1989 – Section 10, filing 89-500
June 12, 1991 - Section 9, filing 91-211

EFFECTIVE DATE (ELECTRONIC CONVERSION):
May 4, 1996

AMENDED:
September 22, 2001 - Section 9, filing 2001-402
January 18, 2006 - Section 15, filing 2006-12
June 10, 2012 – Section 10, filing 2012-147 (Final adoption, major substantive)
June 2, 2016 – filing 2016-077 (Final adoption, major substantive)

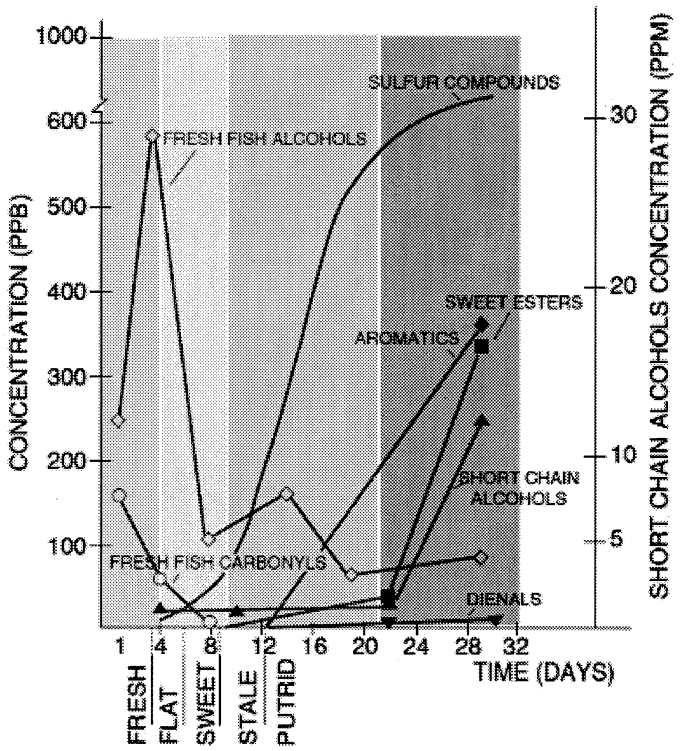


Figure 1. Generalized changes in concentration of groups of influential aroma compounds and sensory quality stages of refrigerated whitefish (from Josephson *et al.*, 1986)

Exhibit R2-E
Figure 1 Color-Coded
From "Odors in the Food Industry" Edited by Xavier Nicolay

TECH environmental

STATE OF MAINE
BOARD OF ENVIRONMENTAL PROTECTION

IN THE MATTER OF

NORDIC AQUAFARMS, INC Belfast and Northport Waldo County, Maine	)	APPLICATION FOR AIR EMISSION, SITE LOCATION OF DEVELOPMENT, NATURAL RESOURCES PROTECTION ACT, and MAINE POLLUTANT DISCHARGE ELIMINATION SYSTEM/WASTE DISCHARGE LICENSES
A-1146-71-A-N L-28319-26-A-N L-28319-TG-B-N L-28319-4E-C-N L-28319-L6-D-N L-28319-TW-E-N W-009200-6F-A-N	)	

PRE-FILED WRITTEN TESTIMONY OF MICHAEL LANNAN

1. I am Michael Lannan, an environmental engineer with experience in all aspects of air quality management, including air permitting, compliance assessments, control technology evaluations and air pollution control designs, dispersion modeling and air monitoring. I have provided air quality, odor control, noise abatement, and dust solutions for municipalities, industries, and government agencies since during my co-operative education days at Northeastern University three decades ago when I was working for a large engineering firm in the air quality group of their planning and permitting division (See Addendum A).

2. This is my 18th year at Tech Environmental, and I have been the president of Tech Environmental for the past five years. Tech Environmental is a consulting firm that specializes in helping facilities, neighbors of facilities, and regulators navigate the permitting process with respect to environmental concerns, and with a special emphasis on nuisance potential. Tech Environmental has offices on Front Street in Belfast, in Waitsfield, Vermont, and in Waltham, Massachusetts.

3. Tech Environmental was retained by Upstream Watch to perform technical reviews of Nordic Aquafarms' Site Law of Development Act (SLODA) and Chapter 115 Minor New Source applications, specific to federal, state, and local permitting concerns of air, noise, odor, traffic, and solid waste.

4. Between October 2019 and January 2020, Tech Environmental was contracted to review several hundred pages of Nordic Aquafarms' application materials and responses to Requests for Information (RFIs), perform emissions estimates of the proposed Nordic Aquafarms construction and operations for the Clean Air Act's (CAA) criteria pollutants, perform dispersion modeling for the criteria pollutants, evaluate the specifications for the Caterpillar 3516C specified engines for emissions performance, review Nordic Aquafarm's Best Available Control Technology (BACT) analysis in their Chapter 115 application, and review Maine Department of Environmental Protection's (MaineDEP's) dispersion modeling.

SLODA Application Section 21 – Air Emissions

5. The focus for this testimony centers on the review of Nordic Aquafarms' Chapter 115 application. However, before one can review the specific application, one must examine the full air permitting requirements to determine whether the application, as submitted, includes all the project air permitting concerns that may be related to this application.

6. The proponent has accepted that it triggers air permitting thresholds by submitting a Chapter 115 air application.

7. Nordic Aquafarms has the potential to emit a major source of air pollution, or possibly even a PSD source based upon the application emissions, without a synthetic minor. This is an important understanding that is discussed throughout this testimony.

8. Nordic Aquafarms has elected to restrict emissions to qualify for the Chapter 115 application process by proposing a synthetic minor. What does this mean? It means that if it can restrict its potential to emit to below the major source thresholds then it can be considered a synthetic minor source. It does not become a true minor source, but it qualifies for the general permitting pathway of a minor source nevertheless.

9. The facility cannot further restrict its operations to require no permitting because it exceeds at least one the four criteria in 06-096 Chapter 115(1)(B)(2)(a) of 10 MMBTU/hr (See Exhibit 13-A). The proposed power capacity is several times the minimum minor source permitting threshold, so this is not a small "minor" source.

10. Please note that there is a distinct difference between what size or type of emission source is considered in 06-096 Chapter 115(1)(B)(2) for establishing the permitting threshold assessment and the actual permitting requirements once the permitting threshold has been established. As described in Chapter 115(1)(B), "Once a source requires an air emission license, all emissions units which emit regulated pollutants at the source must be included in the license..." with some exceptions provided in Appendix B (See Exhibit 13-A).

11. The SLODA permitting requirements, if followed properly, should identify all emission sources, so that one may determine whether the individual emission units identified are included or excluded as per Appendix B (See Exhibit 13-A).

12. The synthetic minor proposed will restrict hours of operation via a maximum fuel usage. The fuel usage will be 900,000 gallons per year (See Exhibit 13-D). The bulk storage facility permitting exemption threshold in Section 1(C) of Chapter 115 (See Exhibit 13-A) is 39,000 gallons or the project is subject to 06-096 CMR 111 and must include the required information in the Chapter 115 Application. The tank size and location has not been provided. The application says TBD but estimates 25,000 gallons; however, that is simply too small as it would only provide about 24 hours of operations. If there is a storm and no fuel can be delivered, then their entire plant would be shut down. It is typically acceptable to have at least a long-weekend's worth of fuel, or more desirably a week's worth of fuel storage on-site. Based upon their application, this would equate to about 160,000 gallons. The application cannot be processed further without the tank capacities and specifications. An improperly

sized tank could very well be a fatal flaw in the entire emergency operations process. Essentially, the tank must exceed the permitting threshold or after about 40 hours the fuel will be completely exhausted, and therefore the storage tank is an air permitted source. No such information has been provided in Section G of the Chapter 115 permit application form (See Exhibit 13-E), as required.

13. Similarly, all HVAC process equipment that will be used to remove regulated pollutants (odor/hydrogen sulfide), is not exempt (See Appendix B(A)(9) of Exhibit 13-A). All of the HVAC equipment should be included in Section E of the Chapter 115 permit application form for stack data and either in Section D or Section H for hydrogen sulfide (Exhibit 13-E). While one may think that the hydrogen sulfide emission rate may be very low, at 200,000 pounds of fillet a day and 7.7 million gallons of wastewater discharged and even more being continually cleaned, it is extremely likely that a facility of this size will trigger the very low 200 pound reporting threshold (Exhibit 13-A). These items must be included in the application.

14. According to Part II, Section 21 of MaineDEP's Site Location of Development 38 M.R.S.A SS 481-490 permit application guidance (Exhibit 13-B), the minimum submissions required to satisfy Section 21 of the SLODA application include providing "a narrative identifying all point source and non-point source air emissions deriving from the development, including but not limited to stacks, unpaved roads or areas and vehicular traffic. For point sources, include a summary of emission components showing types and amounts of particulate matter (particles) and gaseous components." This narrative and these calculations should have been provided and included well before a determination could be made that a Chapter 115 synthetic minor application was possible.

15. Review of Section 21 of Nordic Aquafarms SLODA application found that the proponent provided a half-page of text for the discussion portion of the Section (See Exhibit 13-C). The entire text reads:

> *Nordic Aquafarms plans to construct a central utilities plant that will provide electrical and heating to its proposed aquaculture facility. The proposed fuel burning equipment is regulated by Maine Department of Environmental Protection Chapter 115. Plant electrical needs will mainly be supplied by the local utility; however, Nordic Aquafarms will supplement this with a 14 MW reciprocating engine bank, consisting of eight 2-MW Diesel Engines (one will serve as a back-up). Potential combustion related air emissions will be limited by fuel usage caps to ensure that potential emissions remain below the "major" source thresholds.*
>
> *The proposed engine sets that will each meet manufacturer mandated Tier 4 standards using state-of-the-art air pollution controls, which include Selective Catalytic Reduction, Oxidation Catalyst, and a Particulate Filter. The proposed boilers will be small package units fueled by inherently clean burning propane gas.*
>
> *An application for a New "Minor" Source Air Emission License has been prepared and is included as* ***Appendix 21-A****.*
>
> *Additionally, Nordic Aquafarms will be subject to Standard Condition 4, which addresses ongoing fugitive dust. This condition is written into every Chapter 115 license issued by the Bureau of Air Quality. Included as* ***Appendix 21-B*** *is a fugitive dust standard operating practice (SOP) developed to comply with this standard.*

16. The requirement to identify all point sources is not satisfied by the Section 21 text.

17. The requirement to identify all non-point sources is not satisfied by the Section 21 text.

18. The requirement to include gaseous and particulate emission amounts is not satisfied by the Section 21 text.

19. The Minor New Source Air Emission License application (See Exhibit 13-D) and corresponding Air Emission License Application form (See Exhibit 13-E) in Appendix 21-A of the SLODA application provide the only information pertaining to the eight generators and corresponding gaseous emission components.

20. The SLODA air quality section does not include a general discussion of all emission sources and whether they are excluded or included with respect to Chapter 1115, Appendix B. If it had there would be no need to include it in the Chapter 115 license application. Since it was not, this discussion must be included in the Chapter 115 application or the air permit application is incomplete.

21. Although Nordic Aquafarms has elected to take an operating restriction to be a synthetic minor source, this does not change the facility's obligations to demonstrate their ability to comply with the CAA.

22. The proposed fuel restriction only reduces the facility's major source potential impacts with respect to long-term impact criteria, but does not address the facility's major source potential impacts with respect to short-term impact criteria, or short-term criteria with averaging periods that extend over multiple years.

23. The Minor New Source License application (See Exhibit 13-D) and Air Emissions License Application Form (See Exhibit 13-E) do not propose any testing, monitoring, recordkeeping and reporting that would be used to demonstrate and assure compliance with their fuel restrictions.

24. The Minor New Source License application identifies the eight proposed engines as Caterpillar 3516C Tier 4F or equivalent (See Exhibit 13-D).

25. Table 2-1 of the application presents emission factors of 0.79 pounds per million british thermal units (lbs/MMbtu) for NO_X (See Exhibit 13-D).

26. The Minor New Source License Application (See Exhibit 13-D) and Air Emission License Application Form (See Exhibit 13-E) does not provide any information pertaining to the boilers mentioned in the Section 21 text.

27. The Air Emission License Application Form (See Exhibit 13-E), presents in Section E proposed stack heights of 45 feet above ground level (AGL).

28. The Air Emission License Application Form (See Exhibit 13-E), presents in Section E an exit temperature of 490 Fahrenheit (F).

29. The Air Emission License Application Form (See Exhibit 13-E), presents in Section E an exhaust flow rate of 15,000 actual cubic feet per minute (acfm).

30. Per the requirements of Section 590(2) of Title 38 (See Exhibit 13-F), pertaining to applications for air emission licenses, states that *the department shall grant the license and may impose appropriate and reasonable conditions as necessary to secure compliance with ambient air quality standards if the department finds that the proposed emission will: A. Receive the best practical treatment; B. Not violate or be controlled so as not to violate applicable emission standards; and C. Either alone or in conjunction with existing emissions, not violate or be controlled so as not to violate applicable ambient air quality standards.*

31. The Minor New Source License application (See Exhibit 13-D) and Air Emissions License Application Form (See Exhibit 13-E) do not make any statement pertaining to the facility's ability to comply with the CAA or the National Ambient Air Quality Standards (NAAQS).

32. Subpart B in Section 3 of MaineDEP's Site Location of Development 38 M.R.S.A SS 481-490 permit application guidance (Exhibit 13-B), pertaining to the SLODA application review, states: *in review of an application, the burden is on the applicant to prove that the development will not have an adverse environmental impact. It is not up to the department to prove that a development will have an adverse environmental impact.*

33. The SLODA application (See Exhibit 13-C) and attached Minor New Source License application (See Exhibit 13-D) and Air Emissions License Application Form (See Exhibit 13-E) do not prove that the development will not have an adverse environmental impact on air quality.

Response to July 18, 2019 RFI (Exhibit 13-G)

34. On August 14, 2019, three months after the SLODA and Minor New Source License applications were submitted, Nordic Aquafarms provided new elevation drawings depicting rooftop penthouses that are between 10 and 15 feet above previously-discussed rooftop heights (See Exhibit 13-G).

35. Attachment F of the response to the July 18, 2019 RFI provides the elevation drawings with rooftop penthouses (See Exhibit 13-G).

- The top of the penthouse on Building 1 is 45 feet AGL
- The top of the penthouse on Building 2 is 45 feet AGL.
- Although the height is not provided, using the scale, it is evident that the top of the penthouse on Building 3 is approximately 36 feet AGL.
- Although the height is not provided, using the scale, it is evident that the top of the penthouse on Building 4 is approximately 48 feet AGL.
- Elevation data was not provided for Building 6.

November 19, 2019 Response to November 8, 2019 Comments (Exhibit 13-H)

36. On November 19, 2019, six months after the SLODA and Minor New Source License applications were submitted, in response to an RFI from MaineDEP, Nordic Aquafarms provided entirely new stack parameters, emissions data, exhaust data, and building dimensions (See Exhibit 13-H).

37. Comment 4 reads: *A scaled plot plan schematic of the facility that shows the following:*

a. the location of all stacks, buildings, and other structures (e.g., tanks, towers, etc.);
b. the base elevation and height above ground level for each stack, building and other structure;
c. a north arrow;
d. an accurate scale ruler;
e. the facility property boundary; and
f. any areas likely to be fenced surrounding the facility.

38. Nordic Aquafarms' response to Comment 4 reads: *A scaled plot plan schematic which shows each of these items is attached as Attachment A.*

- The scaled plot plan presents a height of 33 - 37 feet AGL for Building 1. The height presented here is 8 to 12 feet shorter than the top of the penthouse discussed in the application.
- The scaled plot plan presents a height of 34.5 feet AGL for Building 2. The height presented here is 10.5 feet shorter than the top of the penthouse discussed in Item 30.
- The scaled plot plan presents a height of 31 feet AGL for Building 3. The height presented here is approximately 5 feet shorter than that presented in Item 31.
- The scaled plot plan only presents a height for Building 5, and not for Building 4.
- The scaled plot plan now suggests four chimneys that will each encompass two stacks.
- The scaled plot plan does not present any areas that are likely to be fenced, as requested in Comment 4. Only a property line is provided.

39. Building downwash is affected by any rooftop structures, so mechanical penthouses need to be considered to determine impacts to air quality.

40. Comment 1 reads: *A complete listing of all stationary fuel burning equipment to be installed on-site, including the type of equipment, maximum rated heat input capacity of each unit, and the type and quantity of fuel burned in each unit.*

41. Nordic Aquafarms' response to Comment 1 reads: *All stationary heaters will be electric and will not emit air pollutants. Nordic understands that we mention in the SLODA application that there could be propane heaters, but our intention now is to only install electric heater other than*

the eight diesel engines. Heat pumps, using excess heat from the fish farm water, will provide the majority of process and space heating.

42. Nordic Aquafarms response to Comment 1 changes one of the few pieces of information that was provided in the Section 21 text of the SLODA application.

43. MaineDEP's Comment 2 requested: *Unique identification of each stack and which unit or units exhaust through it, and maximum volumetric flow rate and exhaust temperature from each stack.*

44. Nordic Aquafarms response to Comment 2 reads: *There will be eight identical stacks installed to serve the eight engines. Provided below are the stack parameters requested along with updated short term and annual emission rates for the engines. Caterpillar has provided us with refined emission factors. This detail documents significantly lower NO_X emissions.*

45. In response to Comment 2, the proposed generators are now proposed to have an exhaust temperature of 375 F. The temperature presented herein is 115 degrees F less than the temperature discussed in the application.

46. In response to Comment 2, the proposed generators are now proposed to have an exhaust flow rate of 16,586 acfm. The exhaust rate presented herein is 1,586 acfm more than the exhaust flow rate discussed in the application.

47. In response to Comment 2, the proposed generators are now proposed to have a NO_X emission factor of 0.21 lbs/MMbtu. The NO_X emission factor presented in the application of 0.58 lbs/MMbtu, is more than double the NO_X emission factor now proposed. Previously, a general assumption was made, but now every bit of flexibility in the emission factor has been removed.

48. In response to Comment 3, the proposed generators are now proposed to have a stack height of 67.5 feet. The stack height presented here is 22.5 feet, or 50%, higher than the stack height discussed in the application.

49. These changes have impacts that ripple through the original BACT analysis in the Minor New Source License application, the facility's dispersion characteristics, the visual impact analysis, the noise analysis, to name a few. None of which have been updated in the SLODA or Minor New Source License applications to represent these changes.

50. If not every, then nearly every, piece of information submitted in Section 21 of the SLODA application is out-of-date. Although specific modeling parameters were requested and provided, the changes that resulted differ greatly from those presented in the application forms (Exhibit 13-E). Similarly the text, tables, and discussion in the air permit application have significantly changed.

51. In Section 2(D) of Chapter 115 (See Exhibit 13-A) it reads: *After an application has been filed, if the Department determines that the applicant submits significant new or additional*

information or substantially modifies its application at any time after acceptance of the application as complete, the applicant shall provide additional notice to interested persons who have commented on that application. The Department may also require additional public notice and may extend the time to submit requests for a public hearing or for the Board to assume jurisdiction.

52. On November 19, 2019 the entire Chapter 115 application was changed. This action should have required Nordic Aquafarms to submit a new application, which should have then given the public the opportunity to learn of these changes, and comment on these changes. Yet no such process occurred.

Caterpillar-Provided 3516C Tier 4F Generator and Clean Emissions Module Specifications

53. On December 16, 2019, Tech Environmental received specifications from MiltonCat for the Caterpillar 3516C Tier 4F generators (Exhibits I and J) that are specified as the generators, or equal, that will be used at the proposed Nordic Aquafarms facility.

54. The 3516C Tier 4F specifications include the Clean Emissions Module (CEM) that contains a selective catalytic reduction (SCR) catalyst with diesel exhaust fluid (DEF) injection, an ammonia oxidation catalyst (AMOX), and a diesel oxidation catalyst (DOC).

55. These control technologies and engine model match those proposed in Nordic Aquafarms Minor New Source application as equals.

56. Nearly every piece of information submitted in the Minor New Source License application (Exhibit 13-D) and the Air Emission License Application Form (Exhibit 13-E) are out-of-date. The Form, which was originally very vague to begin with, is no longer even remotely complete. If time had been spent to update the forms correctly, maybe some of the errors or omissions made when providing the data to MaineDEP for modeling might not have occurred.

57. The 3516C specifications provide an "Engine Outlet Wet Exhaust Gas Volumetric Flow Rate" of 16,301.3 cubic feet per minute (cfm) at an "Engine Outlet Temp" of 920.6 F (See Exhibit 13-I).

58. The original proposed exhaust flow rate of 15,000 acfm at 490 F (See Exhibit 13-E)), and the recently proposed exhaust flow rate of 16,586 acfm at 375 F (See Exhibit 13-H) are in conflict with the manufacturer-specified 16,301.3 cfm flow rate at 920.6 F (See Exhibit 13-I).

59. Using this engine and these air pollution controls, and then using heat recovery to reduce the exhaust temperature to 375 F, the actual exhaust flow rate is approximately 10,000 cfm, not 16,586 cfm. This essentially means that the previous model runs artificially diluted the emissions, lessening the actual results.

60. If Section B2 of the forms (Exhibit 13-E) had been updated as well, the maximum allowable power rating may have been examined in more detail. Under Ratings Definitions of the 3516C diesel generator set specifications (See Exhibit 13-J), the mission critical rating limits peak demand operation of 100% of rated power for no more than 5% of the operating time. Average power output must be 85% of mission critical rating.

61. Operating at 85% load is a reasonable condition for preventing unnecessary wear on the generators. For the same reason that vehicles have a redline on their tachometers to indicate to the driver not to maintain a high revolutions per minute (rpm) operation for an extended period, a generator is also not meant to be operated at it's redline. It is not sustainable without irreparable damage to parts caused by overheating, which will cause increased emissions.

62. At 85% load, the facility's proposed 14 MW of peak shaving capability, would only equate to 11.9 MW.

63. It is reasonable to assume that the facility will use all eight generators at 85% (including the generator that is proposed for back-up use), when their electricity demands must require at least 12 MW or they would have only proposed six duty engines, and two standby engines to meet their minimum requirements.

64. The potential to emit must be evaluated at eight engines running at 100% or there must be specific operating restrictions proposed to meet their 14 MW of power at a loading of less than 100%.

MaineDEP Dispersion Modeling Summary

65. MaineDEP provided to Tech Environmental the air dispersion modeling files used to determine whether Nordic Aquafarms could comply with the NAAQS, using the modified emissions and stack parameters discussed in Items 34 through 53.

66. The analysis used AERMOD version 19191; 1988 through 1992 surface meteorological data from Bucksport, Maine and upper air meteorological data from Gray, Maine; rural land use, and incorporated downwash effects from buildings (See Exhibit 13-K).

67. The EPA's Tier II Ambient Ratio Method (ARM2) minimum and maximum nitrogen oxides (NO_X) to nitrogen dioxide (NO_2) conversion ratios of 0.5 and 0.9 were used.

68. The analysis incorporated the hourly NO_2 modeled facility impacts to 2016/2017 ambient background concentrations from Presque Isle of 39 micrograms per cubic meter ($\mu g/m^3$).

69. Unfortunately, the inconsistent information provided by Nordic Aquafarms made this exercise especially tedious and susceptible to errors. A dispersion modeling analysis is only as accurate as the facility data that is provided.

70. The modeling used a flow rate of 16,586 cfm at a temperature of 375 F.

71. Based on Caterpillar-provided specifications for the same engine and control technologies, this is not representative of the actual flow rate at a temperature of 375 F. The reduction of volume from the loss of heat would reduce the flow rate to approximately 10,000 cfm.

72. Unfortunately, since no engine specifications have been provided by Nordic Aquafarms it is impossible to determine what is truly representative of the facility's proposed operating conditions.

73. The modeling incorporates a fenceline boundary, despite no fencing information being presented in the scaled plot plan from the November 8, 2019 RFI (See Exhibit 13-H), as had been requested.

74. It is important when considering potential impacts of an hourly ambient air quality threshold, to consider whether a member of the public could gain access to an area that would potentially exceed an hourly health threshold.

75. In the case of hourly NO_2, it is very possible, or even likely, that without a fixed barrier between the proposed facility and the surrounding trails and recreational areas, someone could wander onto the property and become unknowingly exposed to NO_2 concentrations above EPA's health threshold. At the trails, one may actually have a higher respiratory rate and therefore be more susceptible to NO_2 exposure during periods of elevated activity.

76. In this circumstance, limiting receptor locations to areas beyond the property boundary does not address the exposure potential to those who have used this wooded area as a walking trail for many years. The public needs to be protected from impacts to their health while enjoying activities that have never before threatened their health.

77. Receptors must be placed within the property boundary if the public can unknowingly gain access. For example, Nordic plans an education center where the public can have free access to all areas of the site except for the area between Buildings 1 and 2. The only area that should be excluded from having receptors are the buildings and the area between Building 1 and 2.

78. The modeling uses the building heights presented in the scaled plot plan from the November 8, 2019 RFI (See Exhibit 13-H). As stated previously, these heights do not incorporate the heights of mechanical penthouses, which will have significant effect on building downwash.

- Building 1 was represented with a height of 33 feet.
- Building 2 was represented with a height of 34.5 feet.
- Building 3 was represented with a height of 31 feet.
- Building 4 was represented with a height of 43 feet.
- Building 5 was represented with a height of 43 feet.
- Building 7 was represented with a height of 34 feet.

79. It is apparent from the elevation plans provided in Attachment F of Nordic Aquafarms' response to the July 18, 2019 RFI (See Exhibit 13-G), that the mechanical penthouses on the top of each module of Buildings 1 and 2 are almost 100 feet wide and over 300 feet long.

80. A dispersion modeling analysis would never be considered accurate if it disregarded the impacts of six 300-foot by 100-foot buildings.

81. Simply because these structures seem small compared to the 336,669 square-foot buildings that they are on top of does not make their effects on dispersion and downwash insignificant.

82. The modeling also does not account for the effect of downwash caused by the four sizeable chimneys within close proximity to one another. Downwash effects are not limited to strictly buildings, any protruding impervious structure will cause wind to bend, chimneys included.

83. In this analysis, and with all eight generators running, MaineDEP's modeling predicts an hourly NO_2 impact beyond the property line of 140.55 $\mu g/m^3$ (See Exhibit 13-L).

84. Including background, the impact with all eight generators running is 179.55 $\mu g/m^3$, which is 8.45 $\mu g/m^3$ below the 1-hour NO_2 NAAQS, or put another way only 5% from the maximum allowed. (See Exhibit 13-L).

85. With seven generators running, MaineDEP's modeling predicts an hourly NO_2 impact beyond the property line of 123.34 $\mu g/m^3$ (See Exhibit 13-K).

86. Including background, the impact with all eight generators running is 162.34 $\mu g/m^3$, which is 25.66 $\mu g/m^3$ below the 1-hour NO_2 NAAQS (See Exhibit 13-K).

Tech Environmental Dispersion Modeling

87. Tech Environmental used MaineDEP's air dispersion modeling files to perform an air dispersion analysis of the proposed facility.

88. The analysis changed only four things:

- The flow rate was adjusted to 10,028 cfm to account for the loss of volume from heat recovery. This also adjusted the exit velocity from the stack.
- The building heights were adjusted to match the heights of the penthouses as presented in Nordic Aquafarms' response to the July 18, 2019 RFI.
- Four chimneys that each encompass two stacks were added to account for downwash effects. The chimneys were given a height of 62.5 feet AGL (five feet below the stack tips).
- Receptors were added on site to account for the potential for exceedances at and within the property boundary where the public can access.

89. The results of the air dispersion analysis predicts that the facility could well exceed the hourly NO_2 NAAQS as it is currently proposed.

90. The maximum predicted 1-hour NO_2 impacts is provided in Exhibit 13-O.

91. Nordic Aquafarms has yet to prove that the proposed facility will not exceed the CAA.

Providing new applications that incorporate the most-recent facility information with sufficient supporting materials would be a good start to this process.

92. To really appreciate how significant the impact to air quality will be from the proposed facility, you have to consider how many increments of the existing background concentration of hourly NO_2 (39 $\mu g/m^3$) the facility will increase.

93. With eight engines running, the facility will double the existing hourly NO_2 background concentrations throughout a significant portion of Northport and Belfast. Three times over background will still encompass many residential areas of the two towns, four times over background will affect the immediate area, and five times over background will impact the walking trail and other areas with public access (Exhibit 13-P).

Maine's $PM_{2.5}$ State Implementation Plan (SIP) Requirements

94. Chapter 115 of Maine's Regulations (Exhibit 13-A) originates from Maine's State Implementation Plan (SIP), as required by the CAA, which requires each state to develop a plan to achieve, maintain, and enforce the NAAQS. The SIP is submitted to the EPA, who review and solicit public comment, before ultimately deciding whether to approve or disapprove the SIP. If approved, the SIP become federally-enforceable. If a state fails to submit an SIP, or the SIP does not fully comply with the NAAQS, the EPA will develop a Federal Implementation Plan, which gives the EPA jurisdiction over enforcing the NAAQS.

95. In June 2011, a petition for rulemaking filed by the Sierra Club stated that many current SIPs have provisions that the EPA previously-approved, which provide exemptions to emissions standards for emissions sources during periods of startup, shutdown and malfunction (SSM). The petition argued that these provisions do not require facilities to meet the Tier requirements in the CAA and therefore cannot be allowed (See Exhibit 13-M).

96. These blanket statewide SSM exemptions are intended to provide temporary relief on an emission rate per power basis from their New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP) requirements, but they did not allow exceedances of the National Ambient Air Quality Standards.

97. This exceedance is especially significant with respect to particulate matter (PM) emissions. The NAAQS have unique ambient standards for particulate matter with diameters less than 10 micrometers (PM_{10}) and particulate matter with diameters less than 2.5 micrometers ($PM_{2.5}$). During low combustion temperatures, such as during SSM operations, PM_{10} and $PM_{2.5}$ are produced in significantly higher concentrations than during continuous operations. In fact, because of the SSM provisions in the SIP and the significant swing in PM emissions from SSM operations, many facilities were no longer being permitted with numerical limits of PM.

98. However, following the petition for rulemaking by the Sierra Club, the EPA issued a final action in 2015 that required several states, including Maine, to revise their SIPs to correct the SSM provisions and ensure that they are fully consistent with the NAAQS concerning SSM operations (See Exhibit 13-M).

99. For most facilities, their ability to comply with the NAAQS during SSM operations are not a large concern, because they do not often startup or shutdown or it is a small fraction of the operating time. However some facilities, like the one Nordic Aquafarms' has proposed, would operate with frequent startups and shutdowns such as for peak shaving, and with being very near the allowable threshold it simply does not take much start-up or shutdown time to cause an exceedance. Please note that if NO_2 is only 5% of the limit, five percent of an hour is only three minutes. So for very tight pollutants (i.e. pollutant very near the ambient limit with the background and source) SSM can cause localized NAAQS exceedances.

100. An argument can be made that malfunction is not a predictable emission concern, but start up and shutdown are. Obviously with a fuel restriction that restricts operations to approximately 10% of the time, the engines will need to be sparingly cycled on an off, creating many startup/shutdown periods. The potential emissions during these periods would be much higher than those presented in the Minor New Source application (Exhibit 13-D) and in their response to the November 8, 2019 RFI (Exhibit 13-H).

Construction Phase and Operations Phase Overlap Compliance with NAAQS

101. The potential PM_{10} and $PM_{2.5}$ impacts from SSM operations is especially important when considering the period of time that Nordic Aquafarms proposes to be in operations of Phase 1 while also constructing Phase 2.

102. Compliance with the 24-hour $PM_{2.5}$ and PM_{10} NAAQS is determined by averaging the 24-hour impacts over three years (Exhibit 13-N).

103. Therefore, the cumulative impacts from a year of simultaneous construction and operations, followed by several years of full operations with frequent startups and shutdowns needs to be considered to determine whether the proposed facility can comply with the 24-hour $PM_{2.5}$ and PM_{10} NAAQS.

104. NO_2 also must be considered during the overlap of Phase 1 and construction of Phase 2. There will be many pieces of off-road construction equipment on-site emitting NO_2 that, combined with the engine exhausts, could create an even higher potential impact.

105. There is no evaluation for this critical period with operations of Phase 1 occurring with the power plant operational, while additional construction NO_2 emissions are occurring from. It was not evaluated, or even discussed, in this application. As a result it is my professional opinion that this project cannot be approved for air quality.

106. As a result of this analysis of the available information, it is my professional opinion that the proponent has not adequately provided the necessary air permitting analyses to receive an air permit.

107. As a result of this analysis of the available information, it is my professional opinion that the proponent has not adequately completed the necessary air permitting applications to receive an air permit.

108. As a result of this analysis of the available information, it is my professional opinion that the proponent has not demonstrated that it will not exceed the National Ambient Air Quality Standards.

109. As a result of this analysis of the available information, it is my professional opinion that the proponent has not provided adequate consideration to incorporate the odor sources that include hazardous air pollutants, and that may, at a minimum, exceed the air toxics reporting thresholds.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

_____ Date:

Printed Name:
Title:

Parties Assisting:

Name:	Address:	Signature: _____
Name:	Address:	Signature: _____

TECH environmental
FOCUSED KNOWLEDGE. REAL SOLUTIONS.

Michael T. Lannan, P.E.
President

Education
B.S. Chemical Engineering
Northeastern University,
1991

M.S. Environmental
Engineering
Northeastern University,
1993

Certification
Professional Engineer:
Maine
Vermont
Massachusetts
New York

Affiliations
New England
Environmental Business
Council,
Air Quality Committee
Past Chair

Northeast Biosolids and
Residuals Association,
Board of Directors

Fiberglass Reinforced
Plastics Institute,
Board of Advisors Chair

New England
Environmental Business
Council,
Solid Waste and C & D
Committees

Water Environment
Federation, Air Quality
Committee

New England Water
Environment Association
Residuals Management
Committee

Air and Waste Management
EE-6 Odors Committee,
Past Chair

Air and Waste Management
AE-2 Odors, Solvents, and
Gases Committee

SWANA Air Quality
Committee

Michael T. Lannan is an environmental engineer who has identified nuisance conditions for owners, operators, and regulators alike for close to 30 years. He started his career exploring proposed projects for airborne nuisance, or for facilities experiencing nuisance complaints, but over the years, his expertise has expanded into all types of compliance concerns. He has testified at dozens of hearings and court cases on ordinances, regulations, due diligence, and compliance. He has assisted many cities and towns with ordinance development, and is currently assisting about six municipalities and public organizations with specific procedures for compliance with state and their local ordinances.

He has presented seminars on nuisance science and control to colleges, regulators, facility operators, consultants, and neighbors. He has trained MaineDEP, NHDES, MassDEP, Allegheny County Health officials, the Puget Sound Clear Air Agency in Seattle, and the Oregon DEQ, on nuisance monitoring and response procedures. Most training results in changes to nuisance, zoning, or permitting regulations. The training for the Oregon DEQ resulted in a very proactive 10-year project for the regulators to completely revamp their approach to compliance, and to proactively employ scientific monitoring with facilities, before the issues become political and legal concerns.

He has worked on hundreds of nuisance related projects and can quickly and effectively identify areas of concern. He has provided site assignment and nuisance testimony for facilities or proposed regulations predominantly focused in Maine, New England, throughout the northeast, but also throughout the country at request. He assisted Maine DEP when a specific nuisance policy was required, after a legislative initiative was passed. He is currently assisting one Maine area with seafood processing odor concerns, and another with a noise assessment for refrigerated seafood transfer and trucking operation.

Recently, he trained a number of federal contractors on odor detection procedures at a federal facility in Colorado that is biologically degrading old mustard gas munitions. It was important that the procedures not only address the science of the concern, but the potential public outcry detectable emissions from an old nerve gas munition facility could produce. He recently also provided training for those odor nuisance monitoring thresholds and odor complaint response procedures personnel in September at, or near, NYSDEC headquarters in Albany and at another location in upstate NY.

For over a decade he has been reviewing potential air, odor, noise, dust, lighting, and vibration adverse impacts on a fast track basis for residential, commercial, and industrial mixed used projects for compliance with a regional planning commission's Industrial Performance Standards. The commission has been tasked with redeveloping an old Air Force base that spans three municipalities.

Noise and Blasting - Impact Analysis for Gilboa Dam Reconstruction Project, Gilboa, NY. The Gilboa Dam, on the Schoharie Reservoir collects and supplies nearly 10% of the total fresh water to New York City. The dam located upstate, in Gilboa, New York, required extensive repairs. Mr. Lannan was asked to perform noise, vibration, and impact sound analyses caused by the reconstruction of the dam, from building roads during site preparation, blasting, jack hammering and demolition, on-site cement production, trucking and spoils disposal, since the dam was going to be reconstructed 24 hours a day in a rural area for a number of years. Mr. Lannan's sound assessments included a mixture of standard and site specific usage factors for various construction activities, and an extensive noise compliance monitoring program that covered all surrounding residences and municipal structures (e.g. schools and museums). Mr. Lannan was able to work directly with the contractor to determine the maximum amount of construction flexibility for day and night operations over the different project phases. The noise impact analysis included a variety of noise sources that were modeled with the CadnaA model and the Federal Highway Administration Transportation Noise Model (TNM).

Odor - Public Testimony for Addressing Odor Control at a Municipal Landfill in Newfoundland. Mr. Lannan was retained by the City of St. John's, Newfoundland to examine odor emissions from its older downtown landfill and to develop an odor reduction strategy to eliminate a public odor concern. Mr. Lannan was brought in as an outside expert on odor control. Mr. Lannan's testimony was presented at a press conference where local groups and lawmaker's grilled him on his approach. Mr. Lannan was able to identify the cause of the spike in odor, and recommended a number of operational changes and public outreach programs to eliminate the concern. Mr. Lannan developed a comprehensive odor control strategy and defended it in a confrontational environment that was broadcast on TV to the province.

Vibration - Residential Impact Study for Train Sound. A new residential development was proposed in Massachusetts for a site adjacent to an area where Amtrak and commuter trains travelled, and commuter trains typically idled all night. The developers were concerned that potential sound and vibration from train traffic, especially the idling, would adversely affect potential future residents. Mr. Lannan used Tech Environmental's database of noise factors and train schedules to examine the acoustic impacts of train traffic within the proposed residential dwellings. Although the initial findings were excessive low frequency sound potential, Mr. Lannan specified a sound mitigation wall solution specifically for the low vibrational frequencies of concern.

Air Pollution Control - Industrial Interceptor Emission Estimation and Reduction for 80 Chemical Processing Industries. Mr. Lannan used chemical fate modeling to determine the potential emissions from the largest industrial sewer in Houston, TX. The BIOSAN interceptor collects wastewater from Houston's chemical processing and manufacturing clients and transports it to its own industrial wastewater treatment plant. Mr. Lannan discovered many air emission hotspots during the fate modeling and recommended a combination of covering and ventilation, siphon systems, and air pollution control technologies to reduce the air emission potential to a low level so complete covering, ventilating, and air pollution control of the entire system was not necessary.

Air Emissions Assessment - Department of Energy Emissions Inventory. Mr. Lannan performed an emissions inventory for approximately 200 emission points at the Department of Energy's Savannah River (GA) Site in Georgia. He examined emission operating and monitoring data for boilers and emergency generators, and estimated vapor phase chemical transport for research laboratories and batch chemical facilities using chemical properties and EPA-approved emission models. The emission inventory proved the facility's claim that total annual air emissions had been reduced by an order of magnitude in recent years

Employment History

2018 to present	Tech Environmental, Inc., Belfast, Maine President
2015 to 2018	Tech Environmental, Inc., Waltham, Massachusetts President
2004 to 2015	Tech Environmental, Inc., Waltham, Massachusetts Vice President, Air Quality and Nuisance Services
2002 to 2004	Tech Environmental, Inc., Waltham, Massachusetts Associate, Air Quality and Odor Control Services
1991 to 2002	Camp Dresser and McKee, Cambridge, Massachusetts Air Quality and Odor Control Engineer, Air Quality Group Services

NVC/UPSTREAM 13

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Date: 01/16/2020

Printed Name: Michael Lanman

Title: President

Parties Assisting:

Name: Address: Signature:_____

Name: Address: Signature:_____

NVC/UPSTREAM 13

STATE OF MAINE

COUNTY OF Waldo

PERSONALLY APPEARED, Michael P. Cannon, WHO, UNDERSTANDING THE MEANING OF AN OATH, SWORE THAT THE FORGOING TESTIMONY IS TRUE TO THE BEST OF HIS/HER KNOWLEDGE AND BELIEF, THIS 16 DAY OF JANUARY 2020.

NOTERY PUBLIC Sally L Brophy Sally L. Brophy

MY COMMISSION EXPIRES:

SALLY L. BROPHY
Notary Public-Maine
My Commission Expires
September 14, 2023

Chapter 115: MAJOR AND MINOR SOURCE AIR EMISSION LICENSE REGULATION

SUMMARY: This regulation specifies who must obtain an air emission license, what standards and criteria must be complied with and what information an applicant must submit. The rule implements New Source Review (NSR) requirements of the Clean Air Act (CAA) and Section 590 of Title 38 Maine Revised Statutes Annotated for those minor sources that require a license and those major sources that are undergoing changes subject to NSR under the CAA. For minor sources this rule serves both as an operating licensing program as well as the pre-construction New Source Review Program. For major sources the rule serves as a pre-construction New Source Review Program while Chapter 140 implements the operating licensing requirements of 40 CFR Part 70. The pre-construction licenses issued for major sources under Chapter 115 will not expire and will be incorporated into the Chapter 140 licenses. The requirements of this Chapter regarding application pre-filing requirements and public notice requirements for applications and draft licenses supersede Chapter 2 of the Department's Regulations, where applicable. It contains extensive information on a wide variety of variables in the licensing process as specified in the following sections:

Section 1. Applicability (p1)
Section 2. General Terms and Conditions of Applications and Licenses (p3)
Section 3. Renewal (p10)
Section 4. New Source Review for New Sources and Modifications (p16)
Section 5. Minor Revision (p36)
Section 6. License Transfer (p37)
Section 7. Ambient Air Quality Analysis (p38)

1. Applicability

A. Geographic scope. This regulation shall be effective in all ambient air quality control regions in the State.

B. General requirement. An air emission license is required for the sources or emissions units listed below. Once a source requires an air emission license, all emissions units which emit regulated pollutants at the source must be included in the license, except the following: insignificant activities listed in Appendix B of this Chapter; activities which the Department has determined in writing on a case-by-case basis to be substantially equivalent to the insignificant activities specified in Appendix B of this Chapter; and those activities which are clearly trivial. Any person who emits, will emit, or causes to be emitted regulated pollutants from any existing or new source may not begin actual construction, operate, maintain, or modify the new or existing source without an air emission license from the Department, unless the source is listed in subsection 1(C) of this Chapter. At such time that a particular source or modification becomes a major source or major modification solely by virtue of a relaxation in any enforceable limitation which was established after August 7, 1980 on the capacity of the source or modification otherwise to emit a pollutant, such as a restriction on hours of operation, then the requirements of Chapter 115(4)(A) Major Modification or Major Source License shall apply to the source or modification as though actual construction had not yet begun on the source or modification.

An air emission license is required for the following:

(1) Any source whose potential to emit can be determined a Major source and in no case shall a Major source be exempted from the obligation to obtain an air emissions license.

(2) For a Minor source whose facility-wide emissions are generated solely from any one or combination of the following:

(a) Fuel-burning equipment (or combinations thereof), whose total maximum design heat input is equal to or greater than 10.0 million British Thermal Units per hour. Fuel-burning equipment, excluding stationary internal combustion engines, less than 1.0 MMBtu/hr shall not be included in this threshold assessment and stationary internal combustion engine less than 0.5 MMBtu/hr shall not be included in this threshold assessment.

(b) Stationary internal combustion engines (or combinations thereof) whose total maximum design heat input is equal to or greater than 5.0 million British Thermal Units per hour or a gas/propane fired stationary internal combustion engine (or combination thereof) with a total maximum design heat input of equal to or greater than 10.0 million British Thermal Units per hour. Units less than 0.5 MMBtu/hr shall not be included in this threshold assessment.

(c) Total facility general process sources whose emissions without consideration of air pollution control apparatus and under normal operation are equal to or greater than 100 lb/day of any regulated pollutant, except that these numerical limitations may not apply to a source which is subject to regulation for the control of hazardous air pollutants pursuant to Title 38 MRSA Section 585-B, New Source Performance Standards promulgated at 40 CFR Part 60, or National Emission Standards for Hazardous Air Pollutants (NESHAPS) promulgated at 40 CFR Part 61 and 63.

(d) Total facility general process sources whose emissions without consideration of air pollution control apparatus and under normal operation are equal to or greater than 10 lb/hr of any regulated pollutant, except that these numerical limitations may not apply to a source which is subject to regulation for the control of hazardous air pollutants pursuant to Title 38 MRSA Section 585-B, New Source Performance Standards promulgated at 40 CFR Part 60, or National Emission Standards for Hazardous Air Pollutants (NESHAPS) promulgated at 40 CFR Part 61 and 63.

C. Exemptions

(1) An air emission license issued pursuant to this Chapter is not required for Part 70 requirements and other non-NSR amendments issued pursuant to Part 70 Air Emission License Regulation, 06-096 CMR 140.

(2) An air emission license is not required for a Minor source whose facility-wide emissions are generated solely from any one or combination of the following:

(a) Incinerators with a primary chamber volume no greater than 133 cubic feet or 1000 gallons that burn only wood waste as defined in Title 12, Section 9324, subsection 7-A and painted and unpainted wood from construction and demolition debris;

(b) Units whose emissions are generated from the sole function of providing power for propulsion of mobile sources, including vessels;

(c) Bulk gasoline terminals and gasoline service stations with a maximum design daily throughput of less than 20,000 gallons;

(d) Bulk petroleum storage facilities with petroleum products stored in tanks with a maximum design capacity of less than 39,000 gallons;

(e) Dry cleaner system that engages in the cleaning of fabric by means of one or more washes in perchloroethylene, extraction of the solvent by spinning, and drying by tumbling in an air stream; and

(f) Gasoline-powered ski lift emergency back-up motors. Such motors shall not be included in determining whether the thresholds in subsections 1(B)(2)(a) or 1(B)(2)(b) of this Chapter are exceeded.

(3) An air emission license issued pursuant to this Chapter is not required for rock crushers issued a Crusher Identification Number (CIN) pursuant to General Permit for Nonmetallic Mineral Processing Plants, 06-096 CMR 149 and the associated stationary internal combustion engines.

(4) An air emission license issued pursuant to this Chapter is not required for concrete batch plants issued a general permit number (GPN) pursuant to General Permit for Concrete Batch Plants, 06-096 CMR 164 and the associated stationary internal combustion engines.

(5) An air emission license issued pursuant to this Chapter is not required for a Class IV-A human crematory incinerator or a veterinary incinerator issued a general permit number (GPN) pursuant to General Permit for Class IV-A Incinerators, 06-096 CMR 165.

(6) Any source listed in this subsection that is exempted from the requirement to obtain an air emission license may opt to apply for a license under this Chapter.

2. General Terms and Conditions of Applications and Licenses

A. Projects requiring multiple application submittals under this Chapter. If a source is applying simultaneously for the renewal of a source license and/or amendments under more than one section of this Chapter, the source may submit one application covering all required information for each relevant section.

B. Required application form and additional information. The application shall include an application form prescribed by the Department and additional information required by the Department, unless otherwise specified by this Chapter. The application may not omit information needed to determine the applicability of, or to impose, any requirement, or to evaluate the fee amount. An application for a Minor Modification or Major Modification need

supply only that information related to the proposed amendment. The application form and the additional required information shall include, but is not limited to, the following elements:

(1) Identifying information, including owner or operator name (legal name as registered with the Secretary of State), facility site name and physical site location, facility mailing address, responsible official's name, and name(s) with corresponding contact information for the facility manager/contact;

(2) Identification of the source's processes and products;

(3) Any insignificant activities which the source proposes to be qualified as substantially equivalent to the insignificant activities specified in Appendix B of this Chapter;

(4) The following emissions related information for units and activities that are not insignificant activities (the Department may waive the requirement to submit any or all of items (a)–(h) if the information required is deemed not pertinent to the application):

(a) All emissions of regulated pollutants;

(b) Any additional emissions-related information necessary to verify which requirements are applicable to the source or to calculate annual license fees;

(c) Identification and description of all points of emissions described in (a) and (b) above in sufficient detail to establish the source's applicability to any requirements;

(d) Emission rates in such terms as are necessary to establish compliance with applicable requirements and consistent with the applicable EPA standard reference test method and compliance consistent with the applicable emission limit;

(e) The following information to the extent it is needed to determine or regulate emissions: fuel types, fuel use, raw materials, production rates, and operating schedules;

(f) Identification and description of air pollution control equipment and compliance monitoring devices or activities;

(g) Limitations on source operations affecting emissions, or any work practice standards, where applicable, for all regulated pollutants;

(h) Calculations used as the basis for emissions-related information;

(5) Any other information that may be necessary to implement and enforce any requirements applicable to the source;

(6) If required by the Department, proposed monitoring, modeling, testing, record keeping and reporting protocols, the results of previously performed instack monitoring, and results of previously performed stack testing. This information shall not be used in the completeness determination of the application, unless the information is required as part of a New Source Review application;

(7) Results of meteorology or air quality monitoring if required by the Department, including an analysis of meteorological and topographical data necessary to evaluate the air quality impact pursuant to Section 7 of this Chapter. The information required pursuant to Section 7 of this Chapter shall not be used in the completeness determination of the application, unless the information is required as part of a New Source Review application; and

(8) If any regulated pollutant from an existing source has or will have a significant impact, a description of the factors used in the ambient air quality impact analysis pursuant to Section 7 of this Chapter. The information required pursuant to Section 7 of this Chapter shall not be used in the completeness determination of the application, unless the information is required as part of a New Source Review application.

C. Certification by Responsible Official. All application forms submitted to the Department shall contain a certification of truth, accuracy, and completeness with the signature and printed name of the responsible official (see Definitions, 06-096 CMR 100). The signatory sheet shall make the following certification:

"I certify under penalty of law that, based on information and belief formed after reasonable inquiry, I believe the information included in the attached document is true, complete, and accurate."

Upon becoming aware that he or she submitted incorrect information or failed to submit relevant facts, the responsible official must provide the Department with the supplementary facts or corrected information.

D. Public Notice of Intent to File. Any applicant for a renewal license, a new source license, any modification, or a license transfer must publish, within thirty (30) days prior to filing an application, a public notice of Intent to File at the applicant's expense. No public notice is required for a minor revision. This notice shall be published once in the public notice section of a newspaper of general circulation in the region in which the source would be located. In addition, a copy of the application shall be made available at the municipal office of the municipality(ies) where the source is located. A copy of the public notice from the paper (cut or copied from the newspaper in which it was printed) must be submitted with the application. The public notice of Intent to File must include the following information:

(1) Name, address and telephone number of the applicant;

(2) Citation of the statutes or rules under which the application is being processed;

(3) Location of the proposed action;

(4) Summary of the proposed action;

(5) Anticipated date for filing the application with the Department;

(6) A statement that public requests for either of the following must be submitted to the Department in writing no later than twenty (20) days after the application is accepted as complete for processing:

(a) for the Board of Environmental Protection to assume jurisdiction over the application; or

(b) for a public hearing on the application;

(7) A statement of the name, address and phone number of the Department contact person;

(8) A statement providing the local filing location where the application can be examined; and

(9) Any other information required by rule or law.

An applicant must publish a public notice of Intent to File for a resubmitted application that was originally returned and deemed incomplete by the Department.

NOTE: A Public Notice of Intent to File form is available from the Department.

After an application has been filed, if the Department determines that the applicant submits significant new or additional information or substantially modifies its application at any time after acceptance of the application as complete, the applicant shall provide additional notice to interested persons who have commented on that application. The Department may also require additional public notice and may extend the time to submit requests for a public hearing or for the Board to assume jurisdiction.

E. Application acceptability and completeness

(1) **General**. Within fifteen (15) working days of receipt of any application, the Department shall determine the completeness of an application and shall notify the applicant in writing of the official date on which the application was accepted as complete for processing; or return the application with the reasons why the application was not accepted as complete. If the Department does not make a determination regarding the acceptance or rejection of the application within fifteen (15) working days, the application shall be deemed accepted as complete for processing on the 16th day.

(2) **Criteria for completeness**. An application shall be deemed complete when all of the relevant information and other data required by the Department to evaluate the application and to allow the Department to begin processing the application are submitted. In addition, for completeness determination the certification by the Responsible Official and a copy of the public notice of Intent to File must be included as part of the application submittal.

For new source licenses the air emission license fee must be paid in full to meet the completeness criteria.

F. Application submittal. Applications must be filed with the Bureau of Air Quality, Department of Environmental Protection, 17 State House Station, Augusta, ME 04333-0017.

G. Authority to request additional information. The Department's determination that an application is accepted as complete for processing is not a review of the sufficiency of that information, and does not preclude the Department from requesting additional information. Additional information needed to process the license may be requested in writing by the Department and shall be provided by the applicant within the deadline specified by the Department.

If the applicant fails to submit the requested information by the deadline specified or as otherwise agreed in writing by the Department, the Department may deny the license. Thirty (30) days prior to denying the license, the Department shall provide written notice to the applicant including a list of the required information. A person may reapply at any time after the license is denied. The reapplication shall meet all requirements of a complete initial license application, including any required license fee.

H. Procedures for timely license processing and license denials

(1) The requirements of Title 38 MRSA §344 shall govern the processing of applications under this Chapter.

(2) Upon the denial of any license, the Department shall provide the applicant a written statement with the grounds of the denial.

I. Permit Shield. Compliance with the conditions of a license shall be deemed compliance with any state-enforceable requirements as of the date of license issuance, provided that:

(1) Such state-enforceable requirements are included and are specifically identified in the license; or

(2) The Department, in acting on the license application or revision, determines in writing that other state-enforceable requirements specifically identified are not applicable to the source, and the license includes the determination or a concise summary thereof.

However, in no case shall such a determination within the license be a permit shield from a federally enforceable requirement.

J. Operational Flexibility. The following changes are allowed without requiring a license amendment:

(1) Operational flexibility provided for in the license language;

(2) Off-permit changes that are not addressed in the license and are one of the following:

(a) The installation of an insignificant activity found in Appendix B of this Chapter. In no case shall insignificant activities be exempt from determining whether the source is a Part 70 source;

(b) The modification of an insignificant activity that still qualifies as an insignificant activity after the modification; and

(c) A change at the source for which the applicant has received written Departmental approval that the change does not require a license, license amendment, or other action under Sections 4, 5, or 6 of this Chapter.

K. Public and EPA Draft Notification. A public comment period shall be held on draft licenses for major modifications and new major sources as follows:

(1) **Public**. The applicant shall provide a copy of the draft license and the application, including any supporting documentation and any subsequent amendments to the application, to the municipal clerk of the municipality where the source is located, or, if the project is in an unorganized area, to the county commissioners. This material shall also be available at the Department's Augusta office. This material must be on file for public comment for thirty (30) calendar days.

(2) **EPA**. The Department shall provide a copy of the draft license to EPA. EPA shall have a thirty (30) day review period on the draft.

(3) **Draft Availability Notice**. The notice of Draft Availability shall be published, at the applicant's expense, once in the public notice section of a newspaper of general circulation in the region in which the source would be located. The Draft Availability notice shall include:

(a) the name, address and telephone number of the applicant;

(b) a citation of the statutes or rules under which the application is being processed;

(c) the location of the proposed action;

(d) a summary of the proposed action including the emissions change involved in any proposed license modification;

(e) a statement of the availability of the application and supporting documents and the Department's preliminary determination in the form of a draft license;

(f) a statement of the public's right to provide written public comment or to request a public meeting, with the mailing address of the Department; and

(g) for the purpose of a Major New Source Review draft license subject to this subsection, the date, place and time a public meeting may be held, if requested within 15 calendar days from the date upon which the notice is published. The date the public meeting is scheduled shall be no sooner than 30 days after the date the notice is published.

NOTE: A Draft Availability Notice form is available from the Department.

For a Major New Source Review draft license subject to this subsection, any person may request the Department in writing to hold a public meeting. The written request shall state the nature of the issues to be raised at a public meeting. If the Department's Augusta office receives a written request for a public meeting within fifteen (15) calendar days from the date upon which the notice is published which raises a material issue, a public meeting may be held on the date and time as scheduled in the public notice. Whenever the Department holds a public meeting, the duration of the public comment period may be extended to the close of the public meeting or extended to a later date announced at the public meeting.

The Department shall receive comment for at least thirty (30) days, beginning after the day on which the notice of the Draft Availability is published or after the day on which EPA received the draft, whichever is later.

The Department shall consider and keep records of all analyses and all written comments received during the public comment period, and all comments received at any public meeting or public hearing in making a final decision on the approvability of the draft license. The Department shall file all written comments for public inspection at the Department's Augusta office.

L. Effective date of a license. Unless otherwise indicated as a condition of the license, a license granted by the Department is effective when the Commissioner, or his or her designee, signs the license. A license granted by the Board of Environmental Protection (BEP) is effective when the BEP chair signs the license.

M. Term of a license. Each renewal or a new source air emission license issued to a minor source by the Department shall have a term of ten (10) years from the date of issuance.

NOTE: A license issued for a new major source or major modification shall not expire.

N. Expiration of a license. If a complete renewal application, as determined by the Department, is submitted prior to expiration, then pursuant to Title 5 MRSA §10002, all terms and conditions of the license shall remain in effect until the Department takes final action on the renewal of the license. The provisions of this subsection do not bar enforcement action pursuant to Title 5 MRSA §10004, Title 38 MRSA §349 or any other applicable statutes.

Failure to submit a timely and complete application prior to expiration of the license renders the license expired and the owner or operator is considered to be operating and maintaining an air emission source without a license from the Department, in violation of this Chapter.

For those sources that fail to submit a timely and complete application and continue to operate, the source shall submit a new application which will be processed as a renewal. These sources shall apply the BPT results of an analysis similar to subsection 4(A)(4)(d) of this Chapter in addition to any appropriate enforcement response for the operation of an air emission source without a license.

O. Source obligation. Approval to construct a new source or modification, or an exemption pursuant to subsection 1(C) of this Chapter shall not relieve any owner or operator of a source from the responsibility to comply fully with any requirements applicable to the source.

P. Public access to information and confidentiality. As a general rule, all information and data submitted in an application for a license shall be available upon request for public inspection and copying. Any exception to this general rule shall be governed by the provisions of the Freedom of Access Law, Title 1 MRSA §401 *et seq.*, as amended. Information for which the applicant seeks confidential status shall be conspicuously identified in a separate document and submitted to the Department for a determination that one or more of the criteria of Title 1 MRSA §402(3) with respect to the exemptions from the term, "public records," was met. Such information shall be stored separately in accordance with procedures developed by the Department. Public records include, but are not limited to, the following:

(1) Information concerning the nature and extent of the emissions of any regulated pollutant by a source; and

(2) Information submitted by the source with respect to the economic, environmental and energy impacts of various control options in the determination of the control technology requirements.

In the case where a source has submitted information to the Department under a claim of confidentiality, the Department may also require the source to submit a copy of such information directly to EPA.

At reasonable times and location the Department shall provide for the inspection of public records. Charges for copying shall reflect the costs to the Department and payment shall be made to the Maine Environmental Protection Fund.

Q. Inspections to verify information. Employees and authorized representatives of the Department shall be allowed safe access to the licensee's premises during business hours, or any time during which any emissions units are in operation, and at such other times as the Department deems necessary for the purpose of performing tests, collecting samples, conducting inspections, or examining and copying records relating to emissions.

R. Replacement of Air Pollution Control Systems. If a licensee is proposing to replace an existing air pollution control system or replacement of burner systems, the applicant must demonstrate to the Department that the new equipment will achieve BPT. The replacement may be proposed within the renewal application or as a Minor Revision and shall be treated consistent with the CAA and federal regulations.

S. Licensing of Hazardous Air Pollutants (HAPs) emissions. Pursuant to 38 MRSA Section 585-B, the Department may control HAPs by adopting emission limits, design, equipment, work practices or operational standards for activities emitting hazardous air pollutants if no ambient air quality standards have been established for those pollutants.

T. Computation of time period. "Days" are calendar days unless otherwise designated. "Working days" excludes Saturdays, Sundays, state holidays and state shutdown days. In computing any period of time prescribed or allowed by this Chapter, the last day of the period is to be included unless it is a Saturday, Sunday, state holiday, or state shutdown day in which event the period runs until the end of the next day which is not a Saturday, Sunday, state holiday, or state shutdown day. If a person is required to take some action within a prescribed period after service of notice or other paper and the notice or paper is served by mail, three (3) days shall be added to the prescribed period.

U. Pollution Control Projects. Pollution control projects shall be exempt from the requirements of this Chapter to the extent allowed under the Clean Air Act, as determined by the Department on a case-by-case basis. To be exempt, the applicant must demonstrate that the proposed pollution control project is consistent with and meets all requirements of applicable State and EPA rules, policies and guidelines which specifically address exemptions from New Source Review and Prevention of Significant Deterioration programs for pollution control projects.

3. Process for Renewal of a Minor Source License

A. Applicability. The following procedures shall be used for existing minor sources applying for the renewal of a license.

B. Schedule. If the applicant is applying for a renewal of a license, a complete application must be submitted prior to the expiration date of the existing license.

C. Public Notice of Intent to File. The applicant shall give Public Notice of Intent to File as stated in subsection 2(D) of this Chapter.

D. Required Application Information. For a renewal of a license, the applicant shall submit to the Department the information listed below:

(1) The application form and applicable information as specified in subsection 2(B) of this Chapter, containing all required information;

(2) A Best Practical Treatment (BPT) analysis as described below:

BPT. Emissions from existing sources undergoing renewal of a minor source license shall be deemed to be receiving best practical treatment if those emissions are being controlled by pollution control apparatus that has been approved by the Department and which was installed less than 15 years prior to the date of license application approval, or an acceptable best practical treatment analysis shows that those emissions are being controlled in a manner consistent with emission controls commonly used in sources of similar age and design in similar industries. BPT may require the use of additional instrumentation, operating practices, best management practices, fuel content requirements, good combustion techniques, automated process controls, upgrading of component parts, emissions testing, requirements for continuous emission monitors, maintenance programs for air pollution control equipment, or recordkeeping to demonstrate performance of air pollution control systems or other mitigating measures.

For emissions from existing sources for which BPT was determined less than 15 years prior to the date of license application acceptance by the Department, the applicant shall submit a summary of the pollution control apparatus for those emission sources.

If BPT was determined 15 years or more from the date of license application acceptance by the Department, the applicant must demonstrate that each emission unit is receiving BPT and such demonstration shall consider the emission limit for which the air pollution control system was designed, the emission limitations adopted by the Department and in effect at the time of submission of an application for renewal, as well as the reliability, age, and life expectancy of the air pollution control system.

For some existing sources, a simple certification attesting the source is meeting BPT may be submitted for Department approval.

BPT shall not require the use of a lower sulfur content fuel unless a lower sulfur fuel is required to comply with the applicable emissions standards or applicable ambient air quality standards.

BPT shall not force replacement of existing air pollution control equipment solely on the basis that more efficient or reliable air pollution control equipment is available at the time of renewal. However, BPT may require replacement with more efficient or reliable air pollution control equipment under the following conditions:

(a) The applicant is proposing replacement of the existing air pollution control equipment;

(b) Any emissions unit violates the applicable emission limitation;

(c) Additional reductions are necessary to achieve or maintain ambient air quality standards;

(d) The Department determines that previously uncontrolled emissions should be controlled in order to prevent an unreasonable risk to the environment or public health;

(e) The Department determines that previously controlled emissions should be controlled to a greater efficiency considering the toxicity of regulated pollutants; or

(f) Additional reductions are necessary to restore ambient increment even if that ambient increment was previously authorized to the owner or operator of an existing source.

(3) **Reasonably Available Control Technology**. The applicant for an existing source located in, or whose emissions of a federal nonattainment pollutant result in a significant impact to any federal nonattainment area, shall include a summary of the conditions the source complies with to meet RACT requirements.

(4) **Ambient Air Quality Impact Analysis.** If required by the Department pursuant to Section 7 of this Chapter, the applicant shall submit the results of any ambient air quality impact analyses.

(5) The certification of the responsible official pursuant to subsection 2(C) of this Chapter and a copy of the published Public Notice of Intent to File (cut or copied from the newspaper in which it was printed) pursuant to subsection 2(D) of this Chapter.

E. License Content. The Department may impose any appropriate and reasonable license conditions to ensure or maintain compliance with any requirements, emission limitations, ambient air quality standards, or regulations.

The following elements shall be included in the license:

(1) **Equipment Description and Emission Limitations**. The license shall contain terms and conditions with respect to emissions that the Department determines are sufficient to assure compliance with any applicable requirement and shall include the following:

(a) A list of all emission units that are subject to licensing pursuant to subsection 1(B) of this Chapter;

(b) Emission limitations, including those operational requirements and limitations that assure compliance with any requirement at the time of issuance of license; and

(c) A brief technical evaluation of the controls considered as BPT.

(2) **Compliance Assurance Requirements**. The license shall include the following compliance assurance elements:

(a) A description of all required monitoring and analysis procedures or test methods required under the requirements applicable to the source.

(b) A description of all recordkeeping requirements.

(c) A description of all reporting requirements.

(3) Licenses for portable sources shall include conditions that will assure compliance with all requirements applicable to the source at all authorized locations and the requirements of this Chapter, including requirements that the owner or operator notify the Department at least ten (10) days in advance of each change in location, unless the Department allows for a shorter notice.

(4) **Ambient Air Quality Impact Analysis**. The license shall include a section summarizing any required ambient air quality impact analysis.

(5) **Standard Conditions**. All licenses shall include and be subject to the following standard conditions:

(a) Employees and authorized representatives of the Department shall be allowed access to the licensee's premises during business hours, or any time during which any emissions units are in operation, and at such other times as the Department deems necessary for the purpose of performing tests, collecting samples, conducting inspections, or examining and copying records relating to emissions (reference Title 38 MRSA §347-C);

(b) The licensee shall acquire a new or amended air emission license prior to beginning actual construction of a modification, unless specifically provided for in Chapter 115;

(c) Approval to construct shall become invalid if the source has not commenced construction within eighteen (18) months after receipt of such approval or if construction is discontinued for a period of eighteen (18) months or more. The Department may extend this time period upon a satisfactory showing that an extension is justified, but may condition such extension upon a review of either the control technology analysis or the ambient air quality standards analysis, or both;

(d) The licensee shall establish and maintain a continuing program of best management practices for suppression of fugitive particulate matter during any period of construction, reconstruction, or operation which may result in fugitive dust, and shall submit a description of the program to the Department upon request;

(e) The licensee shall pay the annual air emission license fee to the Department, calculated pursuant to Title 38 MRSA §353.

(f) The license does not convey any property rights of any sort, or any exclusive privilege;

(g) The licensee shall maintain and operate all emission units, air pollution control and monitoring systems required by the air emission license in a manner consistent with good air pollution control practice for minimizing emissions;

(h) The licensee shall maintain sufficient records to accurately document compliance with emission standards and license conditions and shall maintain such records for a minimum of six (6) years. The records shall be submitted to the Department upon written request;

(i) The licensee shall comply with all terms and conditions of the air emission license. The filing of an appeal by the licensee, the notification of planned changes or anticipated noncompliance by the licensee, or the filing of an application by the licensee for the renewal of a license or amendment shall not stay any condition of the license.

(j) The licensee may not use as a defense in an enforcement action that the disruption, cessation, or reduction of licensed operations would have been necessary in order to maintain compliance with the conditions of the air emission license;

(k) In accordance with the Department's air emission compliance test protocol and 40 CFR Part 60 or other method approved or required by the Department, the licensee shall:

(i) perform stack testing to demonstrate compliance with the applicable emission standards under circumstances representative of the facility's normal process and operating conditions:

a. within sixty (60) calendar days of receipt of a notification to test from the Department or EPA, if visible emissions, equipment operating parameters, staff inspection, air monitoring or other cause indicate to the Department that equipment may be operating out of compliance with emission standards or license conditions; or

b. pursuant to any other requirement of this license to perform stack testing.

(ii) install or make provisions to install test ports that meet the criteria of 40 CFR Part 60, Appendix A, and test platforms, if necessary, and other accommodations necessary to allow emission testing; and

(iii) submit a written report to the Department within thirty (30) days from date of test completion.

(l) If the results of a stack test performed under circumstances representative of the facility's normal process and operating conditions indicate emissions in excess of the applicable standards, then:

(i) within thirty (30) days following receipt of the written test report by the Department, or another alternative timeframe approved by the Department, the licensee shall re-test the non-complying emission source under circumstances representative of the facility's normal process and operating conditions and in accordance with the Department's air emission compliance test protocol and 40 CFR Part 60 or other method approved or required by the Department;

(ii) the days of violation shall be presumed to include the date of stack test and each and every day of operation thereafter until compliance is demonstrated under normal and representative process and operating conditions, except to the extent that the facility

can prove to the satisfaction of the Department that there were intervening days during which no violation occurred or that the violation was not continuing in nature; and

(iii) the licensee may, upon the approval of the Department following the successful demonstration of compliance at alternative load conditions, operate under such alternative load conditions on an interim basis prior to a demonstration of compliance under normal and representative process and operating conditions.

(m) Notwithstanding any other provision in the State Implementation Plan approved by the EPA or Section 114(a) of the CAA, any credible evidence may be used for the purpose of establishing whether a person has violated or is in violation of any statute, regulation, or license requirement.

(n) The licensee shall maintain records of malfunctions, failures, downtime, and any other similar change in operation of air pollution control systems or the emissions unit itself that would affect emissions and that is not consistent with the terms and conditions of the air emission license. The licensee shall notify the Department within two (2) days or the next state working day, whichever is later, of such occasions where such changes result in an increase of emissions. The licensee shall report all excess emissions in the units of the applicable emission limitation; and

(o) Upon written request of the Department, the licensee shall establish and maintain such records, make such reports, install, use and maintain such monitoring equipment, sample such emissions (in accordance with such methods, at such locations, at such intervals, and in such manner as the Department shall prescribe), and provide other information as the Department may reasonably require to determine the licensee's compliance status.

(p) The licensee shall notify the Department within 48 hours and submit a report to the Department on a quarterly basis if a malfunction or breakdown in any component causes a violation of any emission standard (reference Title 38 MRSA §605-C).

F. Criteria for license approval. The Department shall grant the license if the following criteria are met:

(1) The Department has received a complete application for a license pursuant to this Chapter;

(2) The emissions will receive best practical treatment (BPT), including, but not limited to, the requirements specified in subsection 3(D)(2) of this Chapter;

(3) The emissions will not violate state standards adopted by the Department pursuant to Title 38 MRSA §585 or can be controlled so as not to violate the same;

(4) The emissions either alone or in conjunction with existing emissions will not violate or can be controlled so as not to violate applicable ambient air quality standards including, but not limited to, ambient increments as adopted by the Department pursuant to Title 38 MRSA §584; or for those sources locating within or significantly impacting a federal nonattainment area, the impact to ambient air quality standards is consistent with any plan demonstrating Reasonable Further Progress as defined in Section 171 of the CAA;

(5) The conditions of the license provide for compliance with all state requirements and the relevant requirements of this Chapter;

(6) The Department and applicant have complied with the public participation and review procedures for issuance of a license pursuant to subsection 2(D) of this Chapter;

(7) All control technology requirements, including, but not limited to, BPT, BACT, RACT, LAER, and other operating limitations for any emissions unit will be complied with;

(8) If the applicant proposes to change the emission limit upon which an air quality impact analysis was based, the applicant may be required to provide a new air quality impact analysis for the new emission limit; and

(9) If an air emission license renewal can be granted only if the licensee installs additional emissions controls or other mitigating measures, then the licensee may continue to emit pollutants from emission sources that will receive these controls or measures up to the same level allowed in its existing license as long as the additional emission controls or mitigating measures are fully operational as soon as practicable but in no case later than twenty-four (24) months after the Department issues the license renewal, except as provided in this subsection. After a demonstration by the licensee that it can not install and bring to full operation the required emission controls or mitigating measures within the twenty-four (24) month period, the Department may establish a later date for the installation and operation.

G. Joint Processing. A renewal license may incorporate a minor modification, minor revision or license transfer when being processed. However, the source must meet the processing requirements of each, as applicable.

H. Draft Notification. No public draft notification is required for a renewal.

4. New Source Review for New Sources and Modifications

If the applicant is applying for a Major or Minor Modification or a new major or minor source license, the license must be issued by the Department prior to beginning actual construction of the modification or the new source.

A. Process for Major Modification or New Major Source License

(1) **Applicability.** The following procedures shall be used for new major source licenses and Major Modifications, as defined in 06-096 CMR 100. These procedures incorporate New Source Review requirements pursuant to Title 1, Part C and Part D of the CAA.

(2) **Schedule**. An applicant who intends to construct a phased construction project in which the construction phases exceed 18 months or the period of the license, whichever is less, shall submit an application for a Major Modification for each future phase, including a new Best Available Control Technology (BACT) determination pursuant to subsection 4(A)(4)(d) of this Chapter.

(3) **Application Notification**

(a) The applicant shall publish a Public Notice of Intent to File as specified in subsection 2(D) of this Chapter.

(b) The applicant shall send by certified mail to all abutters, a copy of the notice of Intent to File.

(c) The applicant shall send a copy of the application, including any supporting documentation and any subsequent amendments to the application, to EPA Region I.

(d) The applicant and/or the Department shall notify and, if requested, provide a copy of the application to all Federal Land Managers listed in 06-096 CMR 100, and the Indian governing body of any reservation located within 50 km of any Major Modification or new Major source on or before the date the applicant provides public Notice of Intent to File, and provide at least a thirty (30) days public comment period.

NOTE: See Classification of Air Quality Control Regions, 06-096 CMR 114(1)(C) for a listing of federal lands which have been established as mandatory Class I areas. Check with the Department, Federal Land Manager or Indian governing body for the most current list of specific local and national modeling review contacts and addresses for the federal lands.

(4) **Required Application Information**. The applicant shall submit to the Department the information listed below:

(a) The application form as specified in subsection 2(B) of this Chapter that contains the required information;

(b) A description of the nature, location, plot plan, building dimensions, and any other information required by the Department;

(c) A schedule for construction of the Major Modification or the new major source;

(d) **Best Available Control Technology (BACT) Analysis**. The applicant must demonstrate that each emissions unit to be constructed, reconstructed or modified will receive BACT as defined in 06-096 CMR 100. BACT shall be applied to all regulated pollutants from new emission units, including fugitive as well as stack emissions. For modified emissions units, BACT shall be applied to the regulated pollutants that will be emitted in greater amounts as a result of the modification and BPT shall apply to other regulated pollutants from the modified unit(s). In selecting one of the control technology alternatives, the applicant should consider application of flue gas treatment, fuel treatment and processes, and techniques which are inherently low polluting and are economically feasible. In cases where technological or economic limitations on the application of measurement techniques would make the imposition of an emission limitation infeasible, a design, operating, equipment, or work practice standard may be provided by the source. The BACT analysis shall include the following steps:

(i) **Identify all potential control strategies**.

(ii) **Eliminate technically infeasible options.** The demonstration of technical infeasibility should be clearly documented and should show, based on physical, chemical and engineering principles, that the technical difficulties would preclude the successful use of the control option on the emission unit under review.

(iii) **Rank remaining control technologies by control effectiveness.** The ranking should include relevant information including:

(a) control effectiveness
(b) expected emission rate
(c) expected emission reduction
(d) energy impacts
(e) environmental impacts
(f) economic impacts

(iv) **Evaluate most effective controls and document results.** The evaluation should include case by case consideration of energy, environmental and economic impacts. If top option is not selected as BACT, the evaluation should consider the next most effective control option.

(v) **Select BACT.** BACT is the most effective option not rejected in Step (iv).

(e) **Lowest Achievable Emission Rate (LAER) Analysis.** The applicant with a significant emissions increase or a new major source with significant emissions of a federal nonattainment pollutant located in the geographical boundaries of a nonattainment area or the Ozone Transport Region, or whose emissions will significantly impact a nonattainment area, must demonstrate that LAER is being met for the federal nonattainment pollutant.

NOTE: LAER is required in areas EPA has designated as federal nonattainment or in areas Maine has designated as nonattainment but EPA has not yet taken final action. LAER is based on the State's applicability criteria in all cases, except where the Department has amended the attainment status from federal nonattainment to attainment pursuant to 06-096 CMR 114. In those cases where the Department has completed redesignation procedures from federal nonattainment to attainment, but for which EPA has not taken final action, EPA's applicability criteria in Sections 172(b)(6) and 173 of the CAA apply.

(f) **Innovative control technology waiver**

(i) **Conditions for approval.** If the facility is located in an attainment area, the applicant may request the Department to grant a waiver from any or all of the requirements for control technology and to approve a system of innovative control technology. The Department may grant a waiver for the implementation of innovative control technology under the following conditions:

(a) The proposed system of innovative control technology will not cause or contribute to an unreasonable risk to public health, welfare, or safety in its operation or function;

(b) The applicant agrees to achieve, by a date approved by the Department, a continuous emissions reduction rate greater than or equivalent to the rate that would have been required by BACT. The date of achievement shall be no later than four (4) years from the time of startup or seven (7) years from the issuance of the license.

(c) The modification or new source will meet the control technology requirements and Section 7 of this Chapter based on the emissions rate that the applicant would be required to meet on the date specified by the Department;

(d) The modification or new source will not, prior to the date specified by the Department in subsection 4(A)(4)(f)(i)(b):

(i) Cause or contribute to any violation of any applicable ambient air quality standard;

(ii) Impact any area where an applicable ambient increment is known to be violated;

(iii) Cause a significant impact in any PM_{10}, PM2.5, SO_2, or NO_2 nonattainment area; or

(iv) Cause or contribute to an adverse AQRV impact in any Class I area; and

(e) The applicant will meet all of the relevant requirements of this Chapter, including the requirements for public participation.

(ii) **Conditions for withdrawal**. The Department shall withdraw any approval to employ a system of innovative control technology under the following conditions:

(a) The proposed system of innovative control technology fails to achieve the continuous emissions reduction rate by the specified date;

(b) The proposed system of innovative control technology fails before the specified date, so as to contribute to an unreasonable risk to public health, welfare, or safety; or

(c) The Department decides at any time that the proposed system of innovative control technology is unlikely to achieve the continuous emissions reduction rate by the specified date, or will cause or contribute to an unreasonable risk to public health, welfare or safety.

(iii) **Extension of compliance deadline**. If the applicant fails to meet the continuous emissions reduction rate by the specified date, or if the Department's approval is withdrawn in accordance with subsection 4(A)(4)(f)(ii) of this Chapter, the Department may allow the applicant an additional period, not to exceed three (3)

years, to meet the requirement for the application of BACT through use of a demonstrated system of control.

(g) **Compliance Monitoring Methods**. All process control and compliance monitoring devices or activities, and any other emission reduction system planned by the owner or operator of a Major Modification or a new source license, and such other information required to accurately establish emission estimates, and to document future compliance; and

(h) **Growth Analysis**. The air quality impacts and the nature and extent of emissions from all general, commercial, residential, industrial, and other growth in the area affected by the Major Modification or the new major source license, including associated mobile sources, which has occurred since August 7, 1977 for sulfur dioxide (SO_2) and PM_{10}, since February 8, 1988 for NO_2, and since October 20, 2010 for PM2.5 pursuant to Section 7 of this Chapter. The growth analysis shall be performed only for those pollutants (SO_2, PM_{10}, PM2.5 and/or NO_2) for which the modification or new source was determined as major.

(i) **Title, Right or Interest**. Prior to acceptance of an application for processing for a new source license, the applicant shall demonstrate to the Department's satisfaction sufficient title, right or interest in all of the property which is proposed for development or use in accordance with the following provisions:

(i) When the applicant owns the property, a copy of the deed(s) to the property must be supplied;

(ii) When the applicant has a lease or easement on the property, a copy of the lease or easement must be supplied. The lease or easement must be of sufficient duration and terms, as determined by the Department, to license the proposed construction and reasonable use of the property, including reclamation, closure and post closure care, where required;

(iii) When the applicant has an option to buy or lease the property, a copy of the option agreement must be supplied. The option agreement must be sufficient, as determined by the Department, to give rights to title, or a leasehold or easement of sufficient duration and terms to permit the proposed construction and use of the property including closure and post closure care, where required;

(iv) When the applicant has eminent domain power over the property, evidence must be supplied as to the ability and intent to use the eminent domain power to acquire sufficient title, right or interest as determined by the Department; and

(v) When the applicant has either a valid preliminary permit or a notification of acceptance for filing of an application for a license from the Federal Energy Regulatory Commission for the site which is proposed for development or use, a copy of that permit or notification must be supplied.

(j) **Ambient Air Quality Impact Analysis**. If required by the Department pursuant to Section 7 of this Chapter, the applicant shall submit the results of ambient air quality

impact analyses, including an analysis of the impacts to Air Quality Related Values and impact on visibility if the Department determines that the source may affect ambient increments or Air Quality Related Values in any Class I area or integral vista to that Class I area. The analysis shall be performed pursuant to Section 7 of this Chapter. This analysis shall be used in the completeness determination of the application.

(k) The certification of the responsible official as specified in subsection 2(C) of this Chapter and a copy of the published Public Notice of Intent to File as specified in subsection 2(D) of this Chapter.

(5) **License Content**. The license content shall contain all of the relevant criteria as specified in subsection 3(E) of this Chapter.

(6) **Criteria for license approval**. The Department shall grant the license, if the following criteria are met:

(a) The Department has received a complete application for a license pursuant to this Chapter;

(b) The emissions will receive BACT and/or LAER, as applicable;

(c) The emissions will not violate state standards adopted by the Department pursuant to Title 38 MRSA §585 or can be controlled so as not to violate the same;

(d) The emissions either alone or in conjunction with existing emissions will not violate or can be controlled so as not to violate applicable ambient air quality standards including, but not limited to, ambient increments as adopted by the Department pursuant to Title 38 MRSA §584; or for those sources locating within or significantly impacting a federal nonattainment area, the impact to ambient air quality standards is consistent with any plan demonstrating Reasonable Further Progress as defined in Section 171 of the CAA;

(e) The conditions of the license provide for compliance with all state requirements and the relevant requirements of this Chapter;

(f) The Department and applicant have complied with the public participation and EPA notification and review procedures for issuance of a license pursuant to subsections 4(A)(3) and 4(A)(7) of this Chapter;

(g) The emissions will not have an adverse impact on Air Quality Related Values of any Class I area, including any integral vista for that Class I area;

(h) Pursuant to the requirements of Title I, Part D of the CAA, the Department shall not issue a license if the EPA has determined that implementation of the State Implementation Plan is inadequate for the federal nonattainment area in which the proposed source or modification will be constructed;

(i) With respect to any Major Modification or any new major source, which will emit significant emissions of a nonattainment pollutant, which seeks to locate in the geographical boundaries of a federal nonattainment area or the Ozone Transport Region,

or which will have a significant impact on a federal nonattainment area, the following conditions will be met:

(i) All sources owned or operated by the applicant (or by any entity controlling, controlled by, or under common control with such person) in this State are in compliance, or on an enforceable schedule for compliance, with all applicable emission limitations under the CAA including, but not limited to, the terms and conditions of any license, the applicable emission limitations and the ambient air quality standards;

(ii) The owner or operator has complied with the applicable provisions of Growth Offset Regulation, 06-096 CMR 113; and

(iii) The owner or operator has conducted an analysis of alternative sites, sizes, production processes, and environmental control techniques for such proposed source which demonstrates that benefits of the proposed source significantly outweigh the environmental and social costs imposed as a result of its location, construction, or modification.

(j) If an air emission license amendment can be granted only if the licensee installs additional emissions controls or other mitigating measures, then the licensee may continue to emit pollutants from emission sources that will receive these controls or measures up to the same level allowed in its existing license as long as the additional emission controls or mitigating measures are fully operational as soon as practicable but in no case later than twenty-four (24) months after the Department issues the license amendment, except as provided in this subsection. After a showing of the licensee that it can not install and bring to full operation the required emission controls or mitigating measures within the twenty-four (24) month period, the Department may establish a later date for the installation and operation.

(7) **Draft License Notification**

(a) A comment period of 30 days shall be held for the public and EPA on the draft license, as described in subsection 2(K) of this Chapter.

(b) Where the conditions of subsection 4(A)(3)(D) of this Chapter are applicable, the applicant shall send the appropriate Federal Land Manager or Indian governing body, if requested, on or before the date the applicant provides Notice of Draft Availability to the public, a copy of the draft license. The Department shall receive comment for at least thirty (30) days, beginning after the day on which the notice of the Draft Availability is published, or after the last day on which all of the persons in this section are mailed notice, whichever is later.

B. Process for a Plantwide Applicability Limit (PAL) at a Major Source

(1) **Applicability**. The following procedures shall be used for a PAL. These procedures incorporate state New Source Review requirements.

(2) **Public Notice of Intent to File**. The applicant shall publish a Public Notice of Intent to File as specified in subsection 2(D).

(3) **Required Application Information**. The applicant shall submit to the Department the information listed below, as applicable:

(a) The application form as specified in subsection 2(B) of this Chapter that contains the required information;

(b) A description of the nature of the process, location of the source, plot plan, building dimensions, and any other information required by the Department;

(c) For new emission units included in the PAL, Best Available Control Technology (BACT) analysis as described in subsection 4(A)(4)(d) of this Chapter;

(d) A list of all emission units at the source designated as small, significant or major based on their potential to emit. In addition, the owner of operator of the source shall indicate which, if any, Federal or State applicable requirements, emission limitations, or work practices apply to each unit, as applicable;

(e) Calculations of the baseline actual emissions (with supporting documentation). Baseline actual emissions are to include emissions associated not only with the normal operation of the unit, but also emissions associated with startup, shutdown, and malfunction, as applicable;

(f) The calculation procedures that the major stationary source owner or operator proposes to use to convert the monitoring system data to monthly emissions and annual emissions based on a 12-month rolling total for each month, as applicable;

(g) The certification of the responsible official as specified in subsection 2(C) of this Chapter and a copy of the published Public Notice of Intent to File as specified in subsection 2(D) of this Chapter; and

(h) Other information as specified in subsection 4(B)(10)(c) of this Chapter.

(4) **General requirements for establishing PALs**

(a) The Department may establish a PAL at a major stationary source, provided that at a minimum, the following requirements are met:

(i) The PAL shall impose an annual emission limitation in tons per year, that is enforceable as a practical matter, for the entire major stationary source. For each month during the PAL effective period after the first 12 months of establishing a PAL, the major stationary source owner or operator shall show that the sum of the monthly emissions from each emissions unit under the PAL for the previous 12 consecutive months is less than the PAL (a 12-month average, rolled monthly). For each month during the first 11 months from the PAL effective date, the major stationary source owner or operator shall show that the sum of the preceding monthly

emissions from the PAL effective date for each emissions unit under the PAL is less than the PAL.

(ii) The PAL shall be established in a PAL license that meets the public participation requirements in subsection 4(B)(5) of this Chapter.

(iii) The PAL license shall contain all the requirements of subsection 4(B)(7) of this Chapter and all relevant criteria as specified in subsection 3(E) of this Chapter.

(iv) The PAL shall include fugitive emissions, to the extent quantifiable, from all emissions units that emit or have the potential to emit the PAL pollutant at the major stationary source.

(v) Each PAL shall regulate emissions of only one pollutant.

(vi) Each PAL shall have a PAL effective period of 10 years.

(vii) The owner or operator of the major stationary source with a PAL shall comply with the monitoring, recordkeeping, and reporting requirements provided in subsection 4(B)(12) through (14) of this Chapter for each emissions unit under the PAL through the PAL effective period.

(b) At no time (during or after the PAL effective period) are emissions reductions of a PAL pollutant that occur during the PAL effective period creditable as decreases for purposes of offsets under 40 CFR Part §51.165(a)(3)(ii) unless the level of the PAL is reduced by the amount of such emissions reductions and such reductions would be creditable in the absence of the PAL.

(5) **Public participation requirements for PALs**. PALs for existing major stationary sources shall be established, renewed, or increased through a procedure that is consistent with subsection 4(A)(7) of this Chapter and other requirements of this section. This includes the requirement that the applicant provide the public with notice of the draft PAL license availability and at least a 30-day period for submittal of public comment. The Department must address all material comments before taking final action on the license.

(6) **Setting the 10-year actual emissions PAL level**

(a) Except as provided in subsection 4(B)(6)(b) of this Chapter, the plan shall provide that the actual emissions PAL level for a major stationary source shall be established as the sum of the baseline actual emissions of the PAL pollutant for each emissions unit at the source; plus an amount equal to the applicable significant emissions increase for the PAL pollutant. When establishing the actual emissions PAL level for a PAL pollutant, only one consecutive 24-month period must be used to determine the baseline actual emissions for all existing emissions units. However, a different consecutive 24-month period may be used for each different PAL pollutant. Emissions associated with units that were permanently shut down after this 24-month period must be subtracted from the PAL level. The Department shall specify a reduced PAL level(s) (in tons per year) in the PAL license to become effective on the future compliance date(s) of any applicable Federal or State regulatory requirement(s) that the Department is aware of prior to

issuance of the PAL license. For instance, if the source owner or operator will be required to reduce emissions from industrial boilers by half from baseline emissions of 60 ppm NO_X to a new rule limit of 30 ppm, then the license shall contain a future effective PAL level that is equal to the current PAL level reduced by half of the original baseline emissions of such unit(s).

(b) For newly constructed units (which do not include modifications to existing units) on which actual construction began after the 24-month period, in lieu of adding the baseline actual emissions as specified in subsection 4(B)(6)(a) of this Chapter, the emissions must be added to the PAL level in an amount equal to the potential to emit of the units.

(7) **Contents of the PAL license**. The PAL license must contain, at a minimum, the following information and all relevant criteria as specified in subsection 3(E) of this Chapter.

(a) The PAL pollutant and the applicable source-wide emission limitation in tons per year.

(b) The PAL license effective date and the expiration date of the PAL (PAL effective period).

(c) Specification that if a major stationary source owner or operator applies to renew a PAL in accordance with subsection 4(B)(10) of this Chapter before the end of the PAL effective period, then the PAL shall not expire at the end of the PAL effective period. It shall remain in effect until a revised PAL license is issued by the Department.

(d) A requirement that emission calculations for compliance purposes must include emissions from startups, shutdowns, and malfunctions.

(e) A requirement that, once the PAL expires, the major stationary source is subject to the requirements of subsection 4(B)(9) of this Chapter.

(f) The calculation procedures that the major stationary source owner or operator shall use to convert the monitoring system data to monthly emissions and annual emissions based on a 12-month rolling total as required by subsection 4(B)(13)(a) of this Chapter.

(g) A requirement that the major stationary source owner or operator monitor all emissions units in accordance with the provisions under subsection 4(B)(12) of this Chapter.

(h) A requirement to retain the records on site required under subsection 4(B)(13) of this Chapter. Such records may be retained in an electronic format.

(i) A requirement to submit the reports required under subsection 4(B)(14) of this Chapter by the required deadlines.

(j) Any other requirements that the Department deems necessary to implement and enforce the PAL.

(8) **PAL effective period and reopening of the PAL license**. The requirements in subsection 4(B)(8)(a) and (b) of this Chapter apply to actual emissions PALs.

(a) **PAL effective period**. The Department shall specify a PAL effective period of 10 years.

(b) **Reopening of the PAL license**

(i) During the PAL effective period, the Department must reopen the PAL license to:

(a) Correct typographical/calculation errors made in setting the PAL or reflect a more accurate determination of emissions used to establish the PAL;

(b) Reduce the PAL if the owner or operator of the major stationary source creates creditable emissions reductions for use as offsets under 40 CFR Part §51.165(a)(3)(ii); and

(c) Revise the PAL to reflect an increase in the PAL as provided under subsection 4(B)(11) of this Chapter.

(ii) The Department shall have discretion to reopen the PAL license for the following:

(a) Reduce the PAL to reflect newly applicable Federal requirements (for example, NSPS) with compliance dates after the PAL effective date;

(b) Reduce the PAL consistent with any other requirement, that is enforceable as a practical matter, and that the Department may impose on the major stationary source under the State Implementation Plan; and

(c) Reduce the PAL if the Department determines that a reduction is necessary to avoid causing or contributing to a NAAQS or PSD increment violation, or to an adverse impact on an air quality related value that has been identified for a Federal Class I area by a Federal Land Manager and for which information is available to the general public.

(iii) Except for the license reopening in subsection 4(B)(8)(b)(i)(a) of this Chapter for the correction of typographical/calculation errors that do not increase the PAL level, all other reopenings shall be carried out in accordance with the public participation requirements of subsection 4(B)(5) of this Chapter.

(9) **Expiration of a PAL**. Any PAL that is not renewed in accordance with the procedures in subsection 4(B)(10) of this Chapter shall expire at the end of the PAL effective period, and the requirements in subsection 4(B)(9)(a) through (e) of this Chapter shall apply.

(a) Each emissions unit (or each group of emissions units) that existed under the PAL shall comply with an allowable emission limitation under a revised license established according to the procedures in subsection 4(B)(9)(a)(i) and (ii) of this Chapter.

(i) Within the time frame specified for PAL renewals in subsection 4(B)(10)(b) of this Chapter, the major stationary source shall submit a proposed allowable emission limitation for each emissions unit (or each group of emissions units, if such a distribution is more appropriate as decided by the Department) by distributing the PAL allowable emissions for the major stationary source among each of the

emissions units that existed under the PAL. If the PAL had not yet been adjusted for an applicable requirement that became effective during the PAL effective period, as required under subsection 4(B)(10)(e) of this Chapter, such distribution shall be made as if the PAL had been adjusted.

(ii) The Department shall decide whether and how the PAL allowable emissions will be distributed and issue a revised license incorporating allowable limits for each emissions unit, or each group of emissions units, as the Department determines is appropriate.

(b) Each emissions unit(s) shall comply with the allowable emission limitation on a 12-month rolling basis. The Department may approve the use of monitoring systems (source testing, emission factors, etc.) other than CEMS, CERMS, PEMS, or CPMS to demonstrate compliance with the allowable emission limitation.

(c) Until the Department issues the revised license incorporating allowable limits for each emissions unit, or each group of emissions units, as required under subsection 4(B)(9)(a)(ii) of this Chapter, the source shall continue to comply with a source-wide, multi-unit emissions cap equivalent to the level of the PAL emission limitation.

(d) Any physical change or change in the method of operation at the major stationary source or GHG-only source will be subject to major NSR requirements if such change meets the definition of major modification defined in Definitions Regulation, 06-096 CMR 100.

(e) The major stationary source or GHG-only source owner or operator shall continue to comply with any State or Federal applicable requirements (BACT, RACT, NSPS, etc.) that may have applied either during the PAL effective period or prior to the PAL effective period except for those emission limitations that had been established pursuant to 40 CFR Part 52.21(r)(4), but were eliminated by the PAL in accordance with the provisions in 40 CFR Part 52.21(aa)(1)(ii)(c).

(10) **Renewal of a PAL**

(a) The Department shall follow the public participation requirements for PALS specified in subsection 4(B)(5) of this Chapter in approving any request to renew a PAL for a major stationary source, and shall provide both the proposed PAL level and a written rationale for the proposed PAL level to the public for review and comment. During such public review, any person may propose a PAL level for the source for consideration by the Department.

(b) **Application deadline**. A major stationary source owner or operator shall submit a timely application to the Department to request renewal of a PAL. A timely application is one that is submitted at least 6 months prior to, but not earlier than 18 months from, the date of license expiration. This deadline for application submittal is to ensure that the license will not expire before the license is renewed. If the owner or operator of a major stationary source submits a complete application to renew the PAL within this time period, then the PAL shall continue to be effective until the revised license with the renewed PAL is issued.

(c) **Application requirements.** The application to renew a PAL license shall contain the following information:

(i) The information required in subsection 4(B)(3)(d) through (f) of this Chapter.

(ii) A proposed PAL level.

(iii) The sum of the potential to emit of all emissions units under the PAL (with supporting documentation).

(iv) Any other information the owner or operator wishes the Department to consider in determining the appropriate level for renewing the PAL.

(d) **PAL adjustment.** In determining whether and how to adjust the PAL, the Department shall consider the options outlined in subsection 4(B)(10)(d)(i) and (ii) of this Chapter. However, in no case may any such adjustment fail to comply with subsection 4(B)(10)(d)(iii) of this Chapter.

(i) If the emissions level calculated in accordance with subsection 4(B)(6) of this Chapter is equal to or greater than 80 percent of the PAL level, the Department may renew the PAL at the same level without considering the factors set forth in subsection 4(B)(10)(d)(ii) of this Chapter; or

(ii) The Department may set the PAL at a level:

(a) Determined to be more representative of the source's baseline actual emissions;

(b) Determined to be more appropriate considering air quality needs, advances in control technology, anticipated economic growth in the area, desire to reward or encourage the source's voluntary emissions reductions; or

(c) Other factors as specifically identified by the Department.

(iii) Notwithstanding subsection 4(B)(10)(d)(i) and (ii) of this Chapter:

(a) If the potential to emit of the major stationary source is less than the PAL, the Department shall adjust the PAL to a level no greater than the potential to emit of the source; and

(b) The Department shall not approve a renewed PAL level higher than the current PAL, unless the major stationary source has complied with the provisions of subsection 4(B)(11) of this Chapter (increasing a PAL).

(e) If the compliance date for a State or Federal requirement that applies to the PAL source occurs during the PAL effective period, and if the Department has not already adjusted the PAL for such requirement, the PAL shall be adjusted at the time of PAL license renewal or Part 70 license renewal, whichever occurs first.

(11) **Increasing a PAL during the PAL effective period**

(a) The Department may increase a PAL emission limitation only if the major stationary source complies with the following provisions:

(i) The owner or operator of the major stationary source shall submit a complete application to request an increase in the PAL limit for a PAL major modification. Such application shall identify the emissions unit(s) contributing to the increase in emissions so as to cause the major stationary source's emissions to equal or exceed its PAL.

(ii) As part of this application, the major stationary source owner or operator shall demonstrate that the sum of the baseline actual emissions of the small PAL emissions units, plus the sum of the baseline actual emissions of the significant and major PAL emissions units assuming application of BACT equivalent controls, plus the sum of the allowable emissions of the new or modified emissions unit(s) exceeds the PAL. The level of control that would result from BACT equivalent controls on each significant or major PAL emissions unit shall be determined by conducting a new BACT analysis at the time the application is submitted, unless the emissions unit is currently required to comply with a BACT or LAER requirement that was established within the preceding 10 years. In such a case, the assumed control level for that emissions unit shall be equal to the level of BACT or LAER with which that emissions unit must currently comply.

(iii) The owner or operator obtains a major NSR license for all emissions unit(s) identified in subsection 4(B)(11)(a)(i) of this Chapter, regardless of the magnitude of the emissions increase resulting from them (that is, no significant levels apply). These emissions unit(s) shall comply with any emissions requirements resulting from the major NSR process (for example, BACT), even though they have also become subject to the PAL or continue to be subject to the PAL.

(iv) The PAL license shall require that the increased PAL level shall be effective on the day any emissions unit that is part of the PAL major modification becomes operational and begins to emit the PAL pollutant.

(b) The Department shall calculate the new PAL as the sum of the allowable emissions for each modified or new emissions unit, plus the sum of the baseline actual emissions of the significant and major PAL emissions units (assuming application of BACT equivalent controls as determined in accordance with subsection 4(B)(11)(a)(ii) of this Chapter), plus the sum of the baseline actual emissions of the small PAL emissions units.

(c) The PAL license shall be revised to reflect the increased PAL level pursuant to the public notice requirements of subsection 4(B)(5) of this Chapter.

(12) **Monitoring requirements for PALs**

(a) **General requirements**

(i) Each PAL license must contain enforceable requirements for the monitoring system that accurately determines plantwide emissions of the PAL pollutant in terms of mass per unit of time. Any monitoring system authorized for use in the PAL license must be based on sound science and meet generally acceptable scientific procedures for data quality and manipulation. Additionally, the information generated by such system must meet minimum legal requirements for admissibility in a judicial proceeding to enforce the PAL license.

(ii) The PAL monitoring system must employ one or more of the four general monitoring approaches meeting the minimum requirements set forth in subsection 4(B)(12)(b)(i) through (iv) of this Chapter and must be approved by the Department.

(iii) Notwithstanding subsection 4(B)(12)(a)(ii) of this Chapter, the applicant may also employ an alternative monitoring approach that meets subsection 4(B)(12)(a)(i) of this Chapter if approved by the Department.

(iv) Failure to use a monitoring system that meets the requirements of this section renders the PAL invalid.

(b) **Minimum performance requirements for approved monitoring approaches**. The following are acceptable general monitoring approaches when conducted in accordance with the minimum requirements in subsection 4(B)(12)(c) through (i) of this Chapter:

(i) Mass balance calculations for activities using coatings or solvents;

(ii) CEMS;

(iii) CPMS or PEMS; and

(iv) Emission factors.

(c) **Mass balance calculations**. An owner or operator using mass balance calculations to monitor PAL pollutant emissions from activities using coating or solvents shall meet the following requirements:

(i) Provide a demonstrated means of validating the published content of the PAL pollutant that is contained in or created by all materials used in or at the emissions unit;

(ii) Assume that the emissions unit emits all of the PAL pollutant that is contained in or created by any raw material or fuel used in or at the emissions unit, if it cannot otherwise be accounted for in the process; and

(iii) Where the vendor of a material or fuel, which is used in or at the emissions unit, publishes a range of pollutant content from such material, the owner or operator must use the highest value of the range to calculate the PAL pollutant emissions unless the

Department determines there is site-specific data or a site-specific monitoring program to support another content within the range.

(d) **CEMS**. An owner or operator using CEMS to monitor PAL pollutant emissions shall meet the following requirements:

(i) CEMS must comply with applicable Performance Specifications found in 40 CFR Part 60, appendix B; and

(ii) CEMS must sample, analyze and record data at least every 15 minutes while the emissions unit is operating.

(e) **CPMS or PEMS**. An owner or operator using CPMS or PEMS to monitor PAL pollutant emissions shall meet the following requirements:

(i) The CPMS or the PEMS must be based on current site-specific data demonstrating a correlation between the monitored parameter(s) and the PAL pollutant emissions across the range of operation of the emissions unit; and

(ii) Each CPMS or PEMS must sample, analyze, and record data at least every 15 minutes, or at another less frequent interval approved by the Department, while the emissions unit is operating.

(f) **Emission factors**. An owner or operator using emission factors to monitor PAL pollutant emissions shall meet the following requirements:

(i) All emission factors shall be adjusted, if appropriate, to account for the degree of uncertainty or limitations in the factors' development;

(ii) The emissions unit shall operate within the designated range of use for the emission factor, if applicable; and

(iii) If technically practicable, the owner or operator of a significant PAL emissions unit that relies on an emission factor to calculate PAL pollutant emissions shall conduct validation testing to determine a site-specific emission factor within 6 months of PAL license issuance, unless the Department determines that testing is not required.

(g) A source owner or operator must record and report maximum potential emissions without considering enforceable emission limitations or operational restrictions for an emissions unit during any period of time that there is no monitoring data, unless another method for determining emissions during such periods is specified in the PAL license.

(h) Notwithstanding the requirements in subsection 4(B)(12)(c) through (g) of this Chapter, where an owner or operator of an emissions unit cannot demonstrate a correlation between the monitored parameter(s) and the PAL pollutant emissions rate at all operating points of the emissions unit, the Department shall, at the time of license issuance:

(i) Establish default value(s) for determining compliance with the PAL based on the highest potential emissions reasonably estimated at such operating point(s); or

(ii) Determine that operation of the emissions unit during operating conditions when there is no correlation between monitored parameter(s) and the PAL pollutant emissions is a violation of the PAL.

(i) **Re-validation**. All data used to establish the PAL pollutant must be re-validated through performance testing or other scientifically valid means approved by the Department. Such testing must occur at least once every 5 years after issuance of the PAL.

(13) **Recordkeeping requirements**

(a) The PAL license shall require an owner or operator to retain a copy of all records necessary to determine compliance with any requirement of the PAL, including a determination of each emissions unit's 12-month rolling total emissions, for 5 years from the date of such record.

(b) The PAL license shall require an owner or operator to retain a copy of the following records for the duration of the PAL effective period plus 5 years:

(i) A copy of the PAL license application and any applications for revisions to the PAL; and

(ii) Each annual certification of compliance pursuant to Part 70 and the data relied on in certifying the compliance.

(14) **Reporting and notification requirements**. The owner or operator shall submit semi-annual monitoring reports and prompt deviation reports to the Department in accordance with the applicable Part 70 operating license program. The reports shall meet the following requirements:

(a) **Semi-annual report**. The semi-annual report shall be submitted to the Department within 30 days of the end of each reporting period. This report shall contain the following information:

(i) The identification of owner and operator and the license number.

(ii) Total annual emissions (tons/year) based on a 12-month rolling total for each month in the reporting period recorded pursuant to subsection 4(B)(13)(a) of this Chapter.

(iii) All data relied upon, including, but not limited to, any Quality Assurance or Quality Control data, in calculating the monthly and annual PAL pollutant emissions.

(iv) A list of any emissions units modified or added to the major stationary source during the preceding 6-month period.

(v) The number, duration, and cause of any deviations or monitoring malfunctions (other than the time associated with zero and span calibration checks), and any corrective action taken.

(vi) A notification of a shutdown of any monitoring system, whether the shutdown was permanent or temporary, the reason for the shutdown, the anticipated date that the monitoring system will be fully operational or replaced with another monitoring system, and whether the emissions unit monitored by the monitoring system continued to operate, and the calculation of the emissions of the pollutant or the number determined by method included in the license, as provided by subsection 4(B)(12)(g) of this Chapter.

(vii) A signed statement by the responsible official certifying the truth, accuracy, and completeness of the information provided in the report.

(b) **Deviation report**. The major stationary source owner or operator shall promptly submit reports of any deviations or exceedance of the PAL requirements, including periods where no monitoring is available. A report submitted pursuant to 40 CFR Part 70.6(a)(3)(iii)(B) shall satisfy this reporting requirement. The deviation reports shall be submitted within the time limits prescribed by the applicable program implementing 40 CFR Part 70.6(a)(3)(iii)(B). The reports shall contain the following information:

(i) The identification of owner and operator and the license number;

(ii) The PAL requirement that experienced the deviation or that was exceeded;

(iii) Emissions resulting from the deviation or the exceedance; and

(iv) A signed statement by the responsible official certifying the truth, accuracy, and completeness of the information provided in the report.

(c) **Re-validation results**. The owner or operator shall submit to the Department the results of any re-validation test or method within 3 months after completion of such test or method.

(15) If any provision of this section, or the application of such provision to any person or circumstance, is held invalid, the remainder of this section, or the application of such provision to persons or circumstances other than those as to which it is held invalid, shall not be affected thereby.

C. New Minor Source or Minor Modification Licensing Process

(1) **Applicability**. The following procedures shall be used for new minor source licenses and Minor Modifications. These procedures incorporate state New Source Review requirements.

(2) **Schedule**. An applicant who intends to construct a phased construction project in which the construction phases exceed 18 months or the period of the license, whichever is less, shall submit an application for a Minor Modification for each future phase, including a new Best Available Control Technology (BACT) determination.

(3) **Application Notification**. The applicant shall publish a Public Notice of Intent to File as specified in subsection 2(D) of this Chapter.

(4) **Required Application Information**. The applicant shall submit to the Department the information listed below, as applicable:

(a) The application form as specified in subsection 2(B) of this Chapter that contains the required information;

(b) A description of the nature of the process, location of the source, plot plan, building dimensions, and any other information required by the Department;

(c) A schedule for construction of the Minor Modification or new minor source;

(d) Best Available Control Technology (BACT) analysis as described above in subsection 4(A)(4)(d);

(e) If relevant, the innovative control technology waiver as specified above in subsection 4(A)(4)(f);

(f) All process control and compliance monitoring devices or activities, and any other emission reduction system planned by the owner or operator for a Minor Modification or new minor source and such other information required to accurately establish emission estimates, and to document future compliance;

(g) Title, Right or Interest demonstration for new sources as specified above in subsection 4(A)(4)(i);

(h) **Ambient Air Quality Impact Analysis**. The results of any ambient air quality impact analyses if required by the Department pursuant to Section 7 of this Chapter. This analysis shall be used in the completeness determination of the application; and

(i) The certification of the responsible official as specified in subsection 2(C) of this Chapter and a copy of the published Public Notice of Intent to File as specified in subsection 2(D) of this Chapter.

(5) **License Content**. The license content shall contain all of the relevant criteria as specified in subsection 3(E) of this Chapter.

(6) **Criteria for license approval**. The Department shall grant the license, if the following criteria are met:

(a) The Department has received a complete application for a license pursuant to this Chapter;

(b) The emissions will receive BACT;

(c) The emissions will not violate state standards adopted by the Department pursuant to Title 38 MRSA §585 or can be controlled so as not to violate the same;

(d) The emissions either alone or in conjunction with existing emissions will not violate or can be controlled so as not to violate ambient air quality standards including, but not limited to, ambient increments as adopted by the Department pursuant to Title 38 MRSA §584; or for

those sources locating within or significantly impacting a federal nonattainment area, the impact to ambient air quality standards is consistent with any plan demonstrating Reasonable Further Progress as defined in Section 171 of the CAA;

(e) The conditions of the license provide for compliance with all state requirements and the relevant requirements of this Chapter;

(f) The Department and applicant have complied with the public participation and review procedures for issuance of a license pursuant to subsection 4(C)(3) of this Chapter;

(g) If an air emission license amendment can be granted only if the licensee installs additional emissions controls or other mitigating measures, then the licensee may continue to emit pollutants from emission sources that will receive these controls or measures up to the same level allowed in its existing license as long as the additional emission controls or mitigating measures are fully operational as soon as practicable but in no case later than twenty-four (24) months after the Department issues the license amendment, except as provided in this subsection. After a showing of the licensee that it can not install and bring to full operation the required emission controls or mitigating measures within the twenty-four (24) month period, the Department may establish a later date for the installation and operation.

(7) **Joint Processing**. A minor modification can be processed with a renewal license provided all applicable requirements of subsection 4(C) are met.

(8) **Draft License Notification.** Draft notification is not required for a New Minor Source or Minor Modification.

D. HAP Emission Limitations

(1) For sources or units not covered by an applicable standard in Part 63, the HAP emission limitations proposed by the applicant shall:

(a) For sources that propose to construct a new or reconstruct an existing Part 70 HAP major source, be no less stringent than the emission control that is achieved in practice by the best controlled similar source.

(b) Include either a proposed relevant emission standard pursuant to Section 112(d) or Section 112(h) of the Clean Air Act or adopted presumptive MACT determination for the source category which includes the constructed or reconstructed major source. The MACT requirements applied to the constructed or reconstructed major sources shall reflect those MACT emission limitations and requirements of the proposed standard or presumptive MACT determination.

(2) For construction or reconstruction of a Part 70 HAP major source, compliance with a case-by-case MACT emission limitation determined by the Department must be achieved upon commencing operations.

5. Minor Revision Licensing Process

A. Applicability. Minor Revision procedures to modify a license may be used for:

(1) the correction of typographical errors;

(2) the identification of an administrative change;

(3) a change in monitoring and reporting requirements;

(4) a revision at a facility with a licensed emissions increase under four (4) tpy for any one regulated pollutant and under eight (8) tpy of total regulated pollutants, and is determined not to be a Major or Minor Modification by the Department and is subject to licensing as defined in this Chapter. On a case-by-case basis, revisions under this subsection shall be subject to BACT, and/or an ambient air quality analysis; or

(5) any other changes approved by the Department that meet the criteria of a minor revision.

B. Schedule. The applicant may request a Minor Revision at any time during the term of a license.

C. Public Notice of Intent to File. No application notification is required for the processing of a Minor Revision.

D. Required Application Information. For a Minor Revision, the application submission shall consist of a letter requesting the Minor Revision with the reason for the request, and any relevant information such as a description of the revision and any emission calculations and a BPT analysis for a change under subsection 5(A)(4) of this Chapter. The signatory sheet signed by a responsible official shall be included in the submittal.

E. License Content. A Minor Revision shall contain the following:

(1) A description of the revision and the reason for the request, and

(2) Terms and conditions that will assure compliance with any requirements applicable to the revision.

F. Criteria for license approval. The Minor Revision shall be granted if the Department determines that the revision meets the applicability criteria specified above in subsection 5(A) of this Chapter and will not violate any requirements applicable to the source.

G. Joint Processing. A minor revision may be incorporated when processing a renewal, a minor or major modification, or a license transfer. However, the source must still meet all requirements for processing a minor revision.

H. Draft License Notification. Draft notification is not required for a Minor Revision.

6. License Transfer

The following outlines the procedures for issuing a License Transfer:

A. Applicability. The transferee shall abide by all of the conditions of the license and is jointly or severally liable with the original licensee for any violation of the terms and conditions thereof pending determination on the application for approval of a transfer.

B. Schedule. An application for a License Transfer shall be submitted to the Department no later than two weeks after any transfer of property subject to a license.

C. Public Notice of Intent to File. The applicant shall publish a Public Notice of Intent to File as specified in subsection 2(D) of this Chapter.

D. Required Application Information

(1) Identifying new information, including company name and address (or plant name and address if different from the company name), owner's name, agent and telephone number, responsible official's name and address, telephone number and names of plant site manager or designated contact person;

(2) A letter including the following information:

(a) The full name and address of the new owner;

(b) The date of the official sale;

(c) A copy of the purchase agreement or deed showing transfer of ownership, or demonstration of title, right, or interest;

(d) A statement that there will be no increase in air emissions beyond that provided for in the existing license, either in quantity or type, without prior written permission from the Department; and

(e) A demonstration of technical capacity of the new owner and intent to:

(i) Comply with all conditions of the license, and

(ii) To satisfy all statutory criteria.

(3) The signatory sheet from a responsible official.

E. License Content. The License Transfer shall contain the following:

(1) Full name and address of new owner and the date of transfer of ownership;

(2) A statement that there will be no increase in air emissions beyond that provided for in the existing license, either in quantity or type, without prior written permission from the Department; and

(3) A statement describing the technical capacity of the new owner.

F. Criteria for license approval. Approval for a License Transfer shall be based on the acceptability of the information required in the application submittal.

G. Joint Processing. A license transfer may be incorporated when processing a renewal, a minor or major modification, or a minor revision.

H. Draft License Notification. Draft notification is not required for a License Transfer.

7. Ambient Air Quality Analysis

A. General requirement. It shall be the burden of any applicant to provide an affirmative demonstration that its emissions, in conjunction with all other sources, will not violate applicable ambient air quality standards, except that sources in nonattainment areas or which significantly impact a nonattainment area shall be required to demonstrate that the source's emissions are consistent with Reasonable Further Progress provisions of the State Implementation Plan. An applicant may use ambient air monitoring, modeling, or other assessment techniques as approved by the Department. New Source Review modeling required pursuant to subsection 7(C and D) of this Chapter shall be consistent with EPA regulations and guidelines or other requirements under the CAA. The analyses shall include relevant emissions units at the source, as determined by the Department, meteorological and topographical data necessary to estimate such impacts, and shall consider the impact of fugitive emissions, to the extent quantifiable, secondary emissions, and emissions from other existing sources including increases in mobile and area source emissions impacting the same area.

The level of analysis shall depend upon the size of the source, the regulated air pollutants emitted, existing air quality, proximity to Class I or nonattainment areas, or areas where increment has been substantially consumed. (For the purposes of this subsection, the Class I area shall include any conservation easements under the jurisdiction of an appropriate Federal Land Manager as of August 7, 1977.) The air quality impact analysis, in general, will not be required of the applicant for those regulated pollutants that are not listed under "significant emissions increase" in 06-096 CMR 100. The analysis shall be conducted in accordance with the provisions of subsection 7(E) of this Chapter, Prohibited Dispersion Techniques, 06-096 CMR 116 and Appendix W to 40 CFR Part 51 – Guideline on Air Quality Models.

Air quality modeling conducted as part of the licensing of a new source or modification in the United States is substantially governed by the Appendix W to 40 CFR Part 51 – Guideline on Air Quality Models. That modeling guidance was first promulgated in 1978 and by law, must be routinely updated by EPA. Thus, federal regulatory guidance on modeling and the list of acceptable models do change. The Department recognizes that air dispersion modeling guidance will be periodically updated, to reflect the latest federal guidance. To maintain an orderly licensing process in the State, applicants will be required to conform with those procedures and guidelines in effect at the time of Department approval of a written modeling protocol that meets all applicable requirements, and to complete modeling, as approved, and submit results within six (6) months of the date of approval of the protocol. If the protocol calls for collection of on-site meteorological data, then the starting date for the on-site data collection must be no later than 6 months after approval of the protocol and modeling results must be submitted within six (6) months of obtaining acceptable on-site meteorological monitoring data. Requests by the

applicant to modify the modeling protocol will require conformance with current applicable air dispersion modeling guidance.

(1) **Ambient Air Quality Monitoring Requirements**. Monitoring done by the owner or operator shall conform to the requirements of 40 CFR Part 58, Appendix B and the Department's Quality Assurance Plan (or other plan approved by the Department) during the operation of monitoring stations. It is recommended that a written protocol shall be developed by the owner or operator and the Department when a source is required to conduct either pre-construction or post-construction monitoring. The protocol shall, at a minimum, specify the monitoring sites, frequency of sampling, data recovery, pollutants, and monitoring method(s).

(2) **Air Quality Impact Modeling Requirements**

(a) All estimates of ambient concentrations required by an ambient or increment impact analysis shall be based on the relevant air quality models, data bases, and other requirements specified in the current Appendix W to 40 CFR Part 51 – Guideline on Air Quality Models, and in accordance with subsection 7(E) of this Chapter and 06-096 CMR 116. Fugitive emissions, to the extent quantifiable, shall be considered.

(b) All input, output and diagnostic files used in the final Class I and Class II ambient air quality standards and increment compliance modeling analyses and Class I AQRV and visibility modeling analyses shall be submitted to the Department on media approved by the Department.

(c) Where an air quality impact model specified in the Appendix W to 40 CFR Part 51 Guideline on Air Quality Models, is inappropriate, the model may be changed or another model substituted; such change or substitution shall be subject to public comment and the written approval of the Department and the Regional Administrator of the U. S. Environmental Protection Agency or his designee. Methods like those outlined in the Protocol for Determining the Best Performing Model (EPA-454/R-92-025) and the Interim Procedures for Evaluating Air Quality Models: Experience with Implementation (EPA-450/4-85-006) should be used to determine the comparability of air quality models.

B. Renewal of a Minor or Major Source License

(1) A previously submitted impact analysis shall be acceptable unless:

(a) It has been found to be deficient with respect to requirements set forth in subsection 7(A) of this Chapter;

(b) The impact analysis fails to reflect available information with respect to ambient air quality levels in the area, which, based upon the Department's expertise, may reasonably be expected to be significantly impacted by the source;

(c) The source emits a regulated pollutant for which an ambient air quality standard has been adopted and whose impact was not addressed in the original impact analysis;

(d) The renewal of the source is in conjunction with a Minor or Major Modification which requires a modeling analysis pursuant to subsection 7(C) or (D) of this Chapter; or

(e) There are changes in stack or building configurations or other factors, which are determined to significantly alter the dispersion characteristics of the source.

(2) Continuation of an ambient air monitoring or meteorological monitoring program shall be made on a case-by-case basis at the time of the renewal. It shall be the burden of the applicant to demonstrate the adequacy of existing data, its relationship to past, present, and future facility operating conditions, and the adequacy of other means to document continuing compliance.

(3) An existing source shall be exempt from an impact analysis with respect to a regulated pollutant whose allowable emissions, after the application of control technology requirements specified in Section 4 of this Chapter, do not exceed the following, unless the source is located in or near a Class I area or an area where the available air quality is limited, or other extenuating circumstances exist:

(a) 50 tons per year (tpy) for SO_2;

(b) 250 tpy for CO;

(c) 25 tpy for PM_{10};

(d) 15 tpy for PM2.5 direct emissions;

(e) 50 tpy for NO_x (measured as NO_2);

(f) 0.6 tpy for Lead (Pb); or

(g) 0.2 tpy of total Chromium.

C. New Minor Sources and Minor Modifications to Minor or Major Sources. This Section applies to any new Minor source or Minor Modification of a Minor or Major source.

(1) A new Minor source or an existing Minor or Major source that previously was not required to submit an air quality impact analysis for an air emissions license, but is undergoing a Minor Modification shall submit an air quality impact analysis for those regulated pollutants that the Minor or Major source emits or has the potential to emit at levels equal to or greater than the limits in subsection 7(B)(3) of this Chapter after the application of control technology requirements specified in this Chapter. The level of the air quality impact analysis and air quality monitoring shall be determined by the Department on a case-by-case basis considering:

(a) Air quality data available in or representative of the area;

(b) Good Engineering Practice stack height. A cavity and wake region modeling analysis may be required by the Department if a stack height is less than the formula Good Engineering Practice stack height.

(c) Similarity with other licensed sources in terms of size, emissions, and local topography;

(d) Location, including proximity to complex terrain, Class I areas, integral vistas, nonattainment areas or areas where increment has been substantially consumed; and

(e) The results of previous air quality analyses.

(2) The level of air quality analyses and air quality monitoring for any new Minor source, any Minor Modification to an existing Minor or Major source which emits or has the potential to emit regulated pollutants at a rate less than the emission levels in subsection 7(B)(3) of this Chapter or any Minor Modification to an existing Minor or Major source which emits or has the potential to emit regulated pollutants at a rate greater than the emission levels in subsection 7(B)(3) of this Chapter and has an air quality analysis incorporated into its existing air emission license shall be determined on a case-by-case basis considering:

(a) Air quality data available in or representative of the area;

(b) Good Engineering Practice stack height. An analysis may be required, even in cases resulting in no increases in emissions, if a stack height is less than Good Engineering Practice or if there are changes in stack or building configurations or other factors which are determined to alter the dispersion characteristics of the Minor or Major source.

(c) Similarity with other licensed sources in terms of size, emissions, and local topography;

(d) Location, including proximity to, complex terrain, Class I areas integral vistas, nonattainment areas or areas where increment has been substantially consumed; and

(e) The results of previous air quality analyses.

D. New Major Sources and Major Modifications. This Section applies to any new Major source or any Major Modification which emits or has the potential to emit a significant emissions increase of any regulated pollutant.

(1) **Pre-construction monitoring**

(a) For those pollutants for which there is an ambient air quality standard, the analysis shall consist of continuous air quality monitoring data gathered over a period of one year and shall represent the year preceding the application. If the Department determines that a complete and adequate analysis can be accomplished with monitoring data gathered over a period shorter than one year, the application may be deemed acceptable for processing based on the data gathered over that shorter period. The period shall not be less than 4 months. The applicant must demonstrate that such shorter period, or period other than the preceding year, is representative of ambient concentrations under the seasonal conditions expected to record the highest concentrations.

(b) For those pollutants for which no ambient air quality standard exists, the analysis shall contain such air quality monitoring data as the Department determines is necessary and feasible in light of methods available to monitor such pollutants.

(c) In areas where meteorological monitoring data are not available or the Department determines that the available data are inadequate or not representative, the new Major source or Major Modification shall be required to collect preconstruction meteorological data sufficient for air quality modeling, as defined in Meteorological Monitoring Guidance for Regulatory Modeling Applications (EPA-454/R-99-05). At least one year of data is required to be used in the modeling to support the application.

(d) A new Major source or Major Modification shall be exempt from the preconstruction monitoring requirements of this subsection if the emissions increase of a pollutant would cause, in every area, air quality impacts less than the following amounts:

(i) Carbon monoxide – 575 $\mu g/m^3$, 8-hr. average;

(ii) Nitrogen dioxide – 14 $\mu g/m^3$, annual average;

(iii) Sulfur dioxide – 13 $\mu g/m^3$, 24-hr. average;

(iv) Ozone – No *de minimis* air quality level is provided for ozone. Any Major sources having a net emissions increase of 100 tpy or more of Volatile Organic Compounds (excluding negligibly photochemically reactive VOC) shall conduct ambient air monitoring except that when such Major source satisfies the condition of 40 CFR Part 51, Appendix S, Section IV, postapproval monitoring data for ozone may be substituted for preconstruction data;

(v) Lead – 0.1 $\mu g/m^3$, 24-hr. average;

(vi) Mercury – 0.25 $\mu g/m^3$, 24-hr. average;

(vii) Beryllium – 0.0005 $\mu g/m^3$, 24-hr. average;

(viii) Fluorides – 0.25 $\mu g/m^3$, 24-hr. average;

(ix) Vinyl chloride – 15 $\mu g/m^3$, 24-hr. average;

(x) Total reduced sulfur – 10 $\mu g/m^3$, 1-hr. average;

(xi) Hydrogen sulfide – 0.04 $\mu g/m^3$, 1-hr. average;

(xii) Reduced sulfur compounds – 10 $\mu g/m^3$ 1-hr;

(xiii) Chromium – 0.02 $\mu g/m^3$, 24-hr. average;

(xiv) PM2.5 - 4 $\mu g/m^3$, 24-hr. average; and

(xv) PM_{10} – 10 $\mu g/m^3$, 24-hr. average.

(2) **Ambient air quality standards analysis**. An ambient air quality standards analysis shall be submitted which includes dispersion modeling for each pollutant for which there is an ambient standard (except nonmethane hydrocarbons). The analysis also shall include ambient air monitoring, meteorological and topographic data necessary to estimate such impact, as well as an analysis of the impact of all other sources in the area with actual emissions of 100 tpy or more of the same pollutant. At a minimum, this analysis shall include all such sources that emit more than 100 tpy of a given regulated pollutant located within the lesser of 10 km or the area, which, based upon the Department's expertise, may reasonably be expected to be significantly impacted by the new Major source or Major Modification. Conservative regional background concentrations for sources not explicitly included in the modeling analysis are available from the Department. If more refined background concentrations are necessary, the impact of sources not explicitly included in the modeling analysis shall be obtained through an analysis of ambient air quality data as outlined in the Department's guidelines for determination of background concentrations.

(3) **Ambient increment analysis**. An increment analysis shall be submitted for each pollutant for which there is an ambient increment standard. The analysis shall include meteorological and topographical data necessary to estimate such impacts, as well as an analysis of the air quality impacts and nature and extent of any or all general, commercial, residential, industrial and other growth, including increases in mobile source and area source emissions which has occurred since the baseline date, and therefore have consumed increment in the area where the new Major source or Major Modification will significantly impact. The analysis shall include emissions not included in baseline year emissions, even though an analysis may not have been previously required for those emissions. The Department will provide emissions data from other sources to the applicant for inclusion in the increment analysis. This analysis shall be conducted in accordance with the modeling provisions of this subsection.

(4) **Additional impact analysis**. The proposed new Major source or Major Modification shall provide an additional impact analysis of:

(a) The impairment to visibility, soils and vegetation that would occur as a result of the new Major source or Major Modification and general, commercial, residential, industrial and other growth associated with the new Major source or Major Modification, except that an analysis of the impact on vegetation having no significant commercial or recreational value is not required;

(b) The air quality impact projected for the area as a result of general commercial, residential, industrial and other growth associated with the facility or modification; and

(c) The impact, including visibility impairment, on any Class I area or integral vista (see 06-096 CMR 114(1)(C)(1)). This includes impacts of AQRVs, plume blight (for regions within a Class I area that are affected by plumes or layers that are viewed against a background (generally within 50 kilometers of the source)) and regional haze (for regions of a Class I area where visibility impairment from the source would cause a general alteration of the appearance of the scene (generally 50 kilometers or more away from the source or from the interaction of the emissions from multiple sources)) impacts that the Federal Land Manager and the Department agree should be assessed. (Consultation with the appropriate Federal Land Manager (potentially affected federal

lands are listed in 06-096 CMR 114) and the Department on these requirements and how to perform these analyses should begin prior to submittal of the initial modeling protocol.)

(5) **Post-construction monitoring**. The owner or operator, shall after construction of the new Major source or Major Modification, conduct such ambient monitoring or meteorological monitoring as the Department determines is necessary to determine the effect emissions from the new Major source or Major Modification may have, or are having, on air quality in any area.

A Major source or Major Modification shall be exempt from the requirements of this subsection if its emissions do not significantly impact a Class I area or an area where the increment is known to be violated or substantially consumed, and

(a) The allowable emissions increase will be temporary, not to exceed 2 years; and

(b) Any licensed portable source shall not increase, nor exceed, the allowable emissions and reasonable notice of not less than 10 working days prior to the relocation shall be given to the Department concerning its proposed location and probable duration of operation at the new location.

E. Modeling/data collection protocol. Any air quality dispersion modeling or data collection program shall be developed consistent with the following requirements:

(1) **Guidance**. All air quality dispersion modeling and meteorological data collection shall be conducted consistent with Section 7 of this Chapter and Appendix W to 40 CFR Part 51 – Guideline on Air Quality Models.

NOTE: For major sources and major modifications, the applicant should consult with the Department and Federal Land Managers (potentially affected federal lands are listed in 06-096 CMR 114) if Class I analyses are required, prior to submitting a modeling/data collection protocol. The applicant is responsible for obtaining the training necessary to perform the required air dispersion modeling and meteorological data collection.

(2) **Variance from guidance**. Upon an applicant's written request, the Department may grant a variance from any of the requirements set forth in Section 7 of this Chapter and Appendix W to 40 CFR Part 51 – Guideline on Air Quality Models, when the Department finds that the alternative proposed by the applicant will not significantly affect the accuracy of the modeling, and/or when data collection results or compliance with the requirements specified in Section 7 of this Chapter and Appendix W to 40 CFR Part 51 – Guideline on Air Quality Models is technically infeasible or economically unreasonable for the applicant. For any minor source subject to PSD review, the variance shall be subject to EPA review, written approval, and shall be subject to notice and opportunity for public comment pursuant to 40 CFR Parts 51.160 (f)(2) and 51.166 (1)(2).

(3) **Significant impact modeling protocol for SO_2, NO_2, CO, PM2.5 and PM_{10}**. Prior to undertaking significant impact modeling for SO_2, NO_2, CO, PM2.5 and PM_{10}, the applicant shall provide in writing to the Department, a description of the following factors that the

applicant proposes to use in the significant impact modeling demonstration (see Appendix W to 40 CFR Part 51 – Guideline on Air Quality Models for more specific guidance):

(a) Operating scenarios, emission units and emission rates in English and metric units;

(b) Regulated air pollutants;

(c) Model(s) and methodologies;

(d) Origin and period of meteorological data, including location of collection site relative to facility, meteorological parameters, instrument height, recovery rates, substitution techniques and QA/QC procedures;

(e) Receptor grid (listing of coordinates and elevations, topographic maps covering the receptor grid area map of receptors). A listing of all Digital Elevation Model (DEM) quadrangles used, and method(s) used to convert DEM data to the proposed receptor grid shall also be included. If DEM data is being used to create a rectangular receptor grid, then the elevation of each receptor point shall be the highest elevation within the grid cell. The grid cell is defined as an area enclosed by boundaries located half way to the nearest receptor in each direction;

(f) Any special (e.g., fenceline, air intake or flagpole) receptors;

(g) Identity of emission units and emissions which are included in baseline;

(h) A properly scaled plot plan of the proposed facility with clearly marked true north indicator, building heights and an accurate scale ruler. Also, show the location of the source on a map or aerial photograph of the area; and

NOTE: An original plot plan is preferred, but if a photocopy is submitted, care should be taken to make sure that the scale is not changed on any area of the plot.

(i) Building dimension and Good Engineering Practice (GEP) analysis techniques. For each stack, all buildings that are large enough and close enough to influence the stack should be considered in the GEP analysis.

As expeditiously as possible and within thirty (30) calendar days of receipt of this information, the Department shall notify the applicant in writing that such information is complete and acceptable for modeling or notify the applicant in writing of the reason(s) why the information is not complete. If the information is not complete, the Department shall clearly identify the changes or additional information that must be submitted to complete the protocol requirements.

4. **Submittal of significant impact modeling**

(a) Prior to undertaking the final air quality dispersion modeling demonstration, the applicant shall submit the following for review:

(i) Significant impact modeling results (If all modeled impacts of any regulated pollutant are below the significant impact levels for all averaging periods, then no further analysis is necessary for that pollutant);

(ii) Emissions data for regulated pollutants not in the significant impact modeling protocol;

(iii) A preliminary analysis of nearby sources that will not be included in the background concentration analysis;

NOTE: The Department is responsible for the final decision of off-site sources to be modeled. The Department will provide the applicant with a list of any additional sources that may have to be included in the final modeling analysis and the requisite model input data for these sources. This list will contain all data required for model input including source location(s), emission rates, stack parameters, and necessary building dimensions for the applicant to determine direction-specific building parameters.

(iv) **Background concentration data**. Conservative background values are available from the Department for all areas of the state. Should the applicant choose not to use the conservative background values supplied by the Department, the applicant shall be responsible for determining background values based on data normally supplied by and in consultation with the Department. For sources needing more refined background values, general guidance on determining background determinations based on monitoring data is provided in the most recent version of the Department's Guideline Document For Background Air Quality Determinations. Particular care must be taken when determining background values so that they do not implicitly include any impacts of the source(s) being modeled in order to avoid double counting; and

(v) **Processed meteorological data base (if required by the Department)**. The use of five (5) consecutive years of off-site National Weather Service (NWS) meteorological data (or other data equivalent or better in accuracy and detail to the NWS data) or at least 1 year of site specific data is the minimum requirement for modeling applications. If more than one (1) year (and up to five (5) years) of acceptable data is available, it shall be used in the air quality analysis. If there is a gap in data from a catastrophic incident or a persistent but subtle problem that evades detection, a two (2), three (3), four (4) or five (5) year on-site meteorological database acceptable for modeling purposes need not be compiled from two (2), three (3), four (4) or five (5) consecutive years or twenty-four (24), thirty-six (36), forty-eight (48) or sixty (60) consecutive months of data. If this is the case, then the applicant shall write to the Department requesting an exemption from the consecutive two (2), three (3), four (4) or five (5) year database requirement. If data requirements, source configurations or characteristics of the surrounding area change, the database may need to be updated after consultation with the Department. However, a requirement to collect a new database will neither preclude the applicant's ability to use the existing database in the interim data collection period nor require the applicant to redo any previously submitted analyses that used the original database.

(b) Within thirty (30) calendar days of receipt of this information, the Department shall notify the applicant of the following in writing:

(i) The submitted information is complete and acceptable for modeling or the reason(s) why the information is not complete. If the information is not complete, the Department shall clearly identify the changes or additional information that must be submitted to complete the protocol requirements; and

(ii) For each regulated pollutant for which there are significant impacts, the Department shall specify which operating scenarios and other nearby sources, if any, needs to be further modeled.

If the applicant requests in writing, information in the possession of the Department that is required for modeling (for example, emissions which are included in baseline emissions, background data or other emissions data from nearby sources), the Department shall attempt to provide such information to the applicant within thirty (30) calendar days.

(5) **Air quality dispersion modeling protocol.** If impacts from SO_2, NO_2, CO, PM2.5 and PM_{10} are above significance or if there are other regulated pollutants to be modeled, then the applicant must provide in writing to the Department, a description of the following factors (if different from previously submitted data) that the applicant proposes to use in the air quality dispersion modeling (see Appendix W to 40 CFR Part 51 – Guideline on Air Quality Models for more specific guidance):

(a) Operating scenarios, emission units and emissions in English and metric units (including other nearby sources, if necessary);

(b) Regulated air pollutants;

(c) Model(s) and methodologies;

(d) Origin and period of meteorological data, including location of collection site relative to facility, meteorological parameters, instrument height, recovery rates, substitution techniques and QA/QC procedures;

(e) Receptor grid (listing of coordinates and elevations, topographic maps covering the receptor grid area, map of receptors and if applicable, a listing of all Digital Elevation Model (DEM) quadrangles used and method(s) used to convert DEM data to the proposed receptor grid). If DEM data is being used to create a rectangular grid, then the elevation of each receptor shall be the highest within the grid cell. The grid cell is defined as an area enclosed by boundaries located half way to the nearest receptor in each direction;

(f) Any special (e.g., fenceline, air intake or flagpole) receptors;

(g) Identity of emissions which are included in baseline emissions;

(h) A properly scaled plot plan of the proposed facility with clearly marked true north indicator, building heights and an accurate scale ruler. Also, show the location of the source on a map of the area;

NOTE: An original plot plan is preferred but if a photocopy is submitted care should be taken to make sure that the scale is not changed on any area of the plot.

(i) Building dimension and Good Engineering Practice (GEP) analysis techniques. For each stack, all buildings that are large enough and close enough to influence the stack shall be considered in the GEP analysis using the most recent version of any EPA-approved Building Profile Input Program (BPIP) software package. The applicant shall submit all input and output files on media approved by the Department. All tiers of a building will be input as tiers of that building, not as separate buildings; and

(j) Background concentration data.

Within thirty (30) calendar days of receipt of this information, the Department shall notify the applicant in writing that such information is complete and acceptable for modeling or notify the applicant in writing of the reason(s) why the information is not complete. If the information is not complete, the Department shall clearly identify the changes or additional information that must be submitted to complete the protocol requirements.

When all submitted information is considered complete and acceptable for modeling, the applicant shall perform air quality dispersion modeling and submit for review the air quality dispersion modeling analysis as part of the final application submittal.

(6) **Presentation of final results**

Once compliance with ambient air quality standards, ambient increments and other limitations has been demonstrated through modeling, the applicant shall prepare a written report documenting the source being modeled, the modeling effort, and a compliance demonstration. The following outline indicates the information required in the written report and information required to be submitted on media approved by the Department.

(a) Introduction (briefly give an overview of the project, the analyses conducted, and the results);

(b) Site and surroundings (describe the topography, demography, air quality control region and compliance status (attainment/nonattainment); include a topographic map section showing the site and a properly scaled plot plan of the proposed facility; include rural/urban classification and simple/complex terrain determination), topography and land-use need to be described in sufficient detail to specify roughness length if roughness length is a required input for the modeling system used in the analysis;

(c) Source description (provide an overview of the source, describe the process(es) involved);

(d) Description of each emission unit at the source (describe the equipment/operations, emission controls, emission limits; list emissions and stack parameters for each emission unit in English and metric units);

(e) Screening modeling (describe the screening analyses performed):

(i) Modeling approach/model(s) used;

(ii) Model version used;

(iii) Model switch selections;

(iv) Source data (affected source and other nearby sources);

(v) Meteorological data; and Receptor data; and

(vii) Screening results

(f) Final compliance modeling analysis (describe in detail modeling performed and results):

(i) Modeling approach/model(s) used;

(ii) Model version used;

(iii) Model switch selections;

(iv) Source data (affected source and other nearby sources);

(v) **Meteorological data base**. The meteorological data base shall be submitted on media approved by the Department if the applicant processed the meteorological data base;

(vi) **Receptor data**. A map of the receptor grid shall be submitted. (If applicable, all DEM data used to create the receptor grid shall be submitted on media approved by the Department); and

(vii) **Modeling results**. All input files needed to duplicate the final compliance model runs and all final compliance model output and diagnostic files shall be submitted on media approved by the Department.

(g) **Compliance demonstration** (describe how the predicted concentrations comply with all applicable ambient air quality standards and ambient increments):

(i) Background determination (include table of values);

(ii) Compliance with ambient air quality standards; and

(iii) Compliance with Class II Prevention of Significant Deterioration (PSD) increments (if applicable).

(h) Class I area impact assessment (if required), (describe any analyses made for federal Class I areas):

(i) Basis for assessment;

(ii) Modeling approach/model(s) used;

(iii) Model version used;

(iv) Model switch selections;

(v) Class I areas affected;

(vi) Emissions and conditions of operating scenarios;

(vii) Meteorological data;

(viii) Receptor grid;

(ix) Computational grid;

(x) Air quality impacts (ambient air quality standards and ambient increments);

(xi) Visibility (plume blight assessment (for regions within a Class I area that are affected by plumes or layers that are viewed against a background (generally within 50 kilometers of the source)) and regional haze assessment (for regions of a Class I area where visibility impairment from the source would cause a general alteration of the appearance of the scene (generally 50 kilometers or more away from the source or from the interaction of the emissions from multiple sources)) and other assessments that the Federal Land Manager and the Department agree should be assessed; and

(xii) All input files needed to duplicate the final Class I analysis model runs and all final Class I analysis model output and diagnostic files shall be submitted on media approved by the Department.

NOTE: The Department recommends that any applicant likely to be required to conduct and submit an air quality dispersion modeling analysis meet once with the Department staff prior to submitting the information specified in subsection 7(E)(5) of this Chapter. A failure by the Department to notify or provide information to the applicant as specified in this subsection does not constitute an approval of the proposed protocol and/or modeling.

NOTE: If a source of NO_x is subject to both the Prevention of Significant Deterioration (PSD) and New Source Review (NSR) thresholds, the source shall comply with the nonattainment area NSR provisions for ozone as well as modeling requirements for the NO_2 National Ambient Air Quality Standard, NO_2 increment, and Class I areas analyses, etc.

STATUTORY AUTHORITY: 38 M.R.S.A. §§ 590, 585-A

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August 9, 1988

AMENDED:
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July 10, 1990
December 12, 1993
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October 28, 1995

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May 8, 1996

AMENDED:
October 6, 1996

NON-SUBSTANTIVE CORRECTIONS:
January 2, 1997 - added machine readable version of Appendix A.
February 18, 1997 - minor reformatting requested by the Department
May 9, 1997 - insertion of missing map, Figure 6.1 in Appendix A

AMENDED:
September 22, 2001 - includes repeal of Appendix A, for which see the companion filing 2001-405

NON-SUBSTANTIVE CORRECTION:
July 26, 2002 - Appendix B corrected from September 22, 2001 paper filing

AMENDED:
December 24, 2005 – filing 2005-500
August 4, 2008 - Section 1(C)(3) and (4), filing 2008-336
December 1, 2012 – filing 2012-337

(APA Office Note: Appendix A repealed by filing 2001-405 effective September 22, 2001.)

APPENDIX B
CHAPTER 115

INSIGNIFICANT ACTIVITIES

Insignificant Activities

A unit or activity may be considered insignificant, but may still be subject to applicable requirements.

A. Categorically Exempt

The following insignificant units and activities are exempt from being included on a Chapter 115 license application and Chapter 115 license:

1. Recreational fireplaces, including the use of barbecues, campfires and ceremonial fires.
2. Office activities.
3. Blue printing operations.
4. Paper trimmers/binders.
5. Personal care activities.
6. Flares used to indicate danger to the public.
7. Food preparation for human consumption including cafeterias, kitchen facilities and barbecues, located at a source for providing food service on the premises.
8. Materials and equipment used by, and activity related to operation of an infirmary, where the infirmary is not the source's business activity.
9. Comfort air conditioning or air cooling systems, not used to remove regulated pollutants from specific equipment (unless subject to Part 82).
10. Natural draft hoods, natural draft stacks, or natural draft ventilators for sanitary and storm drains.
11. Natural and forced air vents and stacks, for bathroom/toilet facilities.
12. Plant upkeep including routine housekeeping, preparation for and painting of structures or equipment, retarring roofs, applying insulation to buildings in accordance with applicable environmental and health and safety requirements and paving or stripping of parking lots.
13. Cleaning and sweeping of streets and paved surfaces.
14. Fugitives from application of sand in the winter months, where the sand is used for vehicle or pedestrian safety.
15. Repair and maintenance activities, not involving installation of an emissions unit and not increasing the potential to emit of regulated pollutants.
16. Routine repair of equipment using commercially available cleaners, lubricants, etc.
17. Lawn and landscaping activities.
18. Agricultural activities on a facility's property that are not subject to registration or new source review by the Department
19. Structural changes not having regulated pollutant emissions.
20. Portable drums and totes.
21. Internal combustion engines for propelling or powering a vehicle.
22. Vehicle exhaust from auto maintenance and repair shops. General vehicle maintenance including vehicle exhaust from repair facilities.
23. Mobile transport tanks on vehicles.
24. Fuel and exhaust emissions, from vehicles in parking lots.

25. Storage tanks, mixing, packaging, storage and handling activities, reservoirs and pumping and handling equipment of any size, limited to soaps, lubricants, hydraulic fluid, thermal oil, vegetable oil, grease, animal fat, aqueous salt solutions or other materials and processes, using appropriate lids and covers where there is no generation of objectionable odor or airborne particulate matter.
26. Pressurized storage of oxygen, nitrogen, carbon dioxide, or inert gases.
27. Sodium hydroxide storage tanks.
28. Vents from continuous emissions monitors and other analyzers.
29. Vents from rooms, buildings and enclosures (including elevator vents), that contain permitted emissions units or activities from which local ventilation, controls and separated exhaust are provided.
30. Manual wall or roof vents and powered wall or roof vents, used for temperature control of a building or structure.
31. Material, gas and chemical storage area vents, where closed containers are present.
32. CO_2 lasers, used only on metals and other materials, which do not emit HAPs in the process.
33. Acetylene, butane, and propane torches.
34. Manufacturing brazing, soldering and welding equipment and oxygen-hydrogen cutting torches, for use in cutting metal where in components of the metal do not generate significant HAPs or HAP precursors per Section C of Appendix B.
35. All manufacturing welding, including arc welding, where emissions of particulate matter are vented to a control device located and vented inside the building (not to include HAP or VOC emissions).
36. Metal finishing or cleaning using tumblers which do not emit VOCs or HAPs.
37. Metal casting molds and molten metal crucibles that do not contain potential VOCs or HAPs.
38. Metal or glass heat-treating, in absence of molten materials, VOCs, or HAPs.
39. Drop hammers or hydraulic presses for forging or metalworking.
40. Electrolytic deposition which do not produce HAPs.
41. Metal fume vapors from electrically heated foundry/forge operations wherein the components of the metal do not generate HAPs or HAP precursors. Electric arc furnaces are excluded from consideration for listing as insignificant.
42. Molten metal holding equipment and operations wherein the components of the metal do not generate HAPs or HAP precursors. Electric arc furnaces are excluded from consideration for listing as insignificant.
43. Mineral and metal working processes including squeezing processes (cold rolling, cold forging, extrusion, sizing, coining, peening, burnishing), blending processes, shearing processes (stamping, piercing, blanking), and drawing processes (bar and tube drawing, wire drawing, spinning).
44. Inspection equipment for metal products.
45. Die casting.
46. Machine tool coolant sumps, coolant recycling and processing tanks and equipment and water soluble machining coolant emissions from general machining operations which emit to the interior of the facility.
47. Conveying and storage of plastic pellets.
48. Plastic compression, injection, and transfer molding and extrusion, rotocasting, pultrusion, blowmolding, excluding acrylics, PVC, polystyrene and related copolymers and the use of plasticizer that emit no VOCs or HAPs. Only oxygen, carbon dioxide, nitrogen, air, or inert gas allowed as blowing agents.
49. Plastic pipe welding.
50. Wax melting and wax application equipment.

51. Ultraviolet curing processes that emit no VOCs or HAPs.
52. Hot melt adhesive application with no VOCs or HAPs in the adhesive formulation.
53. Laundering, dryers, extractors, tumblers for fabrics, using water solutions of bleach and/or detergents.
54. Portable steam cleaning units.
55. Steam sterilizers.
56. Sample gathering, preparation, management and sampling connections used exclusively to withdraw materials for laboratory analyses and testing.
57. Fire fighting and similar safety equipment used to train fire fighters excluding fire drill pits.
58. Carving, cutting, routing, turning, drilling, machining, sawing, surface grinding, sanding, planing, buffing, shot blasting, shot peening, sintering or polishing; Ceramics, glass, leather, metals, plastics, rubber, concrete, paper stock or wood, also including cotton roll grinding and groundwood pulping stone sharpening provided that:
    a. Activity is performed indoors; and
    b. No fugitive particulate emissions enter the environment.
59. Water blast cleaning and stripping operations that do not emit fugitive PM into the environment and do not create a nuisance.
60. Slaughterhouse equipment except rendering cookers.
61. Ozonation equipment.
62. Batch loading and unloading of solid phase catalysts.
63. Demineralization and oxygen scavenging (deaeration) of water.
64. Pulse capacitors.
65. Laser trimmers, using dust collection to prevent fugitive emissions that do not emit fugitive PM, VOCs or HAPs.
66. Plasma etcher and plasma spray unit, using dust collection to prevent fugitive emissions and using only oxygen, nitrogen, carbon dioxide, or inert gas that do not emit VOCs or HAPs.
67. Photographic process equipment by which an image is reproduced upon material sensitized to radiant energy, e.g., blueprint activity, photocopiers, mimeograph, telefax, photographic developing and microfiche.
68 Packaging equipment that does not use VOC or HAP containing adhesives.
69. Handling equipment and associated activities for glass and aluminum which is destined for recycling, not the re-fining process itself.
70. Hydraulic and hydrostatic testing equipment.
71. Batteries and battery charging.
72. Porcelain and vitreous enameling equipment.
73. Salt baths using nonvolatile salts and not used in operations which results in air emissions.
74. Shock chambers.
75. Wire strippers that do not emit PM, VOCs or HAPs.
76. Solar simulators.
77. Humidity and environmental chambers not using VOC or HAP gasses.
78. Steam vents and leaks.
79. Air compressors, pneumatically operated equipment, systems and hand tools and centrifuges used for compressing air and the related compressed air system.
80. Recovery boiler blow-down tank.
81. Demineralizer tanks.
82. Clean condensate tanks.
83. Alum tanks.
84. Broke beaters, repulpers, pulp and repulping tanks, stock chests and bulk pulp handling, process water and white water storage tanks not associated with requirements in 40 CFR Part 63.

85. Lime mud filtrate tanks, lime mud water, lime mud filter, lime grits washers, filters and handling.
86. Hydrogen peroxide tanks.
87. Smelt viewing ports.
88. Causticizers and white liquor clarifiers and storage tanks and associated pumping, piping, and handling.
89. Vacuum cleaning equipment and operations where the fugitive emissions are indoors.
90. Winders, slitters, calenders, supercalenders, and paper roll wrapping operations.
91. Debarking.
92. Wastewater treatment lagoon pond dredging, screw press vents and sludge dewatering and handling.
93. Polymer tanks and storage devices and associated pumping and handling equipment, used for solids dewatering and flocculation.
94. Oil filled circuit breakers, oil filled transformers and other equipment that is analogous to, but not considered to be, a tank.
95. Electric or steam-heated drying ovens and autoclaves that emit only water vapor.
96. Oven exhaust where the oven is used to dry water from parts.
97. Sewer manholes, junction boxes, sumps and lift stations associated with wastewater treatment systems not associated with requirements in 40 CFR Part 63.
98. Sanitary sewer and storm sewer manholes, vents and drains.
99. Water cooling towers processing exclusively noncontact cooling water to which a source does not add VOCs or HAPs in excess of the levels in Section C of Appendix B.
100. Emissions from water storage tanks in air emission control systems utilizing a wetting process.
101. Ventilating and exhaust systems for laboratory hoods used.
    a. By colleges, primary, or secondary schools used only for academic purposes.
    b. By hospitals and medical care facilities used for medical care purposes only.
    c. By pulp and paper mills; including pulp testing labs, paper testing labs, analytical labs, water treatment labs, and coating labs.
102. Chemical, metallurgical, or physical analytical laboratory operations or equipment including fume hoods and vacuum pumps.
103. Emissions from laboratory electric hot air drying ovens for oriented strand board quality testing.
104. Kilns or ventilating hoods for art or ceramic curricula at colleges, primary or secondary schools.
105. Abandoned stack that has not been capped off.
106. Machining coolants used in super abrasive machining operations.
107. Chip/bark piles and log storage yards where natural drying of wood occurs.
108. Ash and lime storage piles.
109. Emissions from town permitted open burning of wood or grass.
110. Emissions from log hot ponds.
111. Oriented strand board storage and handling.
112. Conveying of wood chips.
113. Log sawing.
114. Temporary air emission related activities which are granted approval from the Department.
115. Maintenance brazing, soldering and welding equipment and oxygen-hydrogen cutting torches, for use in cutting metal where in components of the metal do not generate significant HAPs or HAP precursors in excess of the threshold in Appendix B Section C of this Chapter.

B. Units and Activities defined as Insignificant based on Size or Production Rate

The following units and activities are insignificant based on size or production and shall be listed on the Chapter 115 license application, but may not be included in the Chapter 115 license.

1. Processes, individual emission units, facilities or activities with the potential to emit less than each of the following thresholds:
   a. one (1) ton per year of any single regulated criteria pollutant for any process;
   b. four (4) tons per year total regulated criteria pollutants for any process;
   c. one (1) ton per year total HAPS for any individual emission unit or activity; and
   d. the applicable quantity of HAPS for any facility and emission unit as specified in Section C of this Appendix.
2. Fuel burning equipment, including sludge dryers but excluding incinerators and stationary internal combustion engines, with a maximum design heat input of less than 1.0 MMBtu/hr. Note: Units may still be subject to the requirements of Chapters 101 and 103.
3. Stationary Internal Combustion Engines with a maximum design heat input of less than 0.5 MMBtu/hr. Note: Units may still be subject to the requirements of Chapters 101 and 103.
4. Temporary fuel burning equipment less than 10.0 MMBtu/hr heat input installed for maintenance shut-downs, not to be used for primary steam, heating or electrical generation needs, firing fuel less than 0.05% sulfur, and if rented or leased less than 4 weeks per unit per calendar year. Note: Units may still be subject to the requirements of Chapters 101 and 103.
5. Operation, loading and unloading of storage tanks and storage vessels, with lids or other appropriate closure and less than two hundred sixty gallon capacity (35 cubic feet), heated only to the minimum extent to avoid solidification if necessary with a vp up to 550 mm Hg at 21°C.
6. Operation, loading and unloading of storage tanks, not greater than one thousand one hundred gallon capacity with lids, vapor return, or other appropriate closure, maximum vp 550 mmHg at 21°C and is not subject to Part 63 requirements.
7. Operation, loading and unloading of VOC storage tanks (including petroleum storage tanks), ten thousand gallons capacity or less, with lids, vapor return or other appropriate closure, vp not greater than 80 mm Hg at 21°C and is not subject to Part 63 requirements.
8. Operation, loading and unloading storage of butane, propane, or liquefied petroleum gas (LPG) tanks having a capacity under forty thousand gallons.
9. Foundry sand molds, unheated and using binders with less than 0.25% free phenol by sand weight.
10. Parylene coaters using less than five hundred gallons of coating per year.
11. Coating, printing and silkscreening using less than 50 gallons per year (combined) of VOC or HAP containing coating.
12. Water cooling towers and ponds, not using chromium-based corrosion inhibitors, not used with barometric jets or condensers, not greater than ten thousand gpm, not in direct contact with gaseous or liquid process streams containing regulated air pollutants.
13. Batch solvent distillation, not greater than fifty-five gallons batch capacity.
14. Municipal and industrial water chlorination facilities of not greater than twenty million gallons per day capacity. The exemption does not apply to waste water treatment (see next item).
15. Municipal and industrial waste water chlorination facilities of not greater than one million gallons per day capacity.
16. Water and wastewater treatment units, provided the facility performs only the following function of disinfecting, softening, filtration, flocculation, stabilization, taste and odor control, clarification, carbonation, sedimentation, and neutralization.

17. Surface coating and painting processes which exclusively use non-refillable aerosol cans that emit less than 100 pounds of VOC per year.
18. Tanks, vessels, and pumping equipment, with lids or other appropriate closure for storage or dispensing of aqueous solutions of inorganic salts, bases and acids excluding:
    a. 99% or greater H_2SO_4 or H_3PO_4
    b. 70% or greater HNO_3
    c. 30% or greater HCl
    d. More than one liquid phase where the top phase is more than one percent VOC
19. Equipment used exclusively to pump, load, unload or store high boiling point organic material, material with initial boiling point (IBP) not less than 150°C or vp not more than 5 mm Hg at 21°C with lids or other appropriate closure.
20. Smokehouses under twenty square feet.
21. Milling and grinding activities, using paste-form compounds with less than one percent VOCs.
22. Cleaning and stripping activities and equipment, using solutions having less than one percent VOCs and HAPs by weight. On metallic substrates, acid solutions are not considered for listing as insignificant.
23. Storage and handling of water based lubricants for metal working where the organic content of the lubricant is less than ten percent.
24. Nondestructive inspection fluids and powders where the VOC content is less than 3.5 lb/gal and fugitive dust equipment is used provided no more than 50 gallons per year are used.
25. Salt cake mix tanks with TRS emissions less than 0.75lbs./hr.

C. Insignificant HAP Thresholds

A unit under Chapter 115, Appendix B, Section A 34 and 99 and Chapter 115, Appendix B Section B(1)(d) would be considered insignificant under the following thresholds.

Legend:
UR = Based on the unit risk value
DEF=1 = Used for carcinogens where no UR exists
Rfc = Based on reference concentration in IRIS

				Unit
	CAS#	Chemical Name	Basis	Total (lb/yr)
1	79345	1,1,2,2-TETRACHLOROETHANE	UR	60.00
2	79005	1,1,2-TRICHLOROETHANE	UR	200.00
3	57147	1,1-DIMETHYL HYDRAZINE	UR	1.60
4	120821	1,2,4-TRICHLOROBENZENE	CS	2000.00
5	96128	1,2-DIBROMO-3-CHLOROPROPANE	UR	1.60
6	122667	1,2-DIPHENYLHYDRAZINE	UR	18.00
7	106887	1,2-EPOXYBUTANE	DEF=1	2000.00
8	75558	1,2-PROPYLENIMINE (2-METHYL AZIRIDINE)	UR	0.60
9	189559	1,2:7,8-DIBENZOPYRENE	GWP	2.00
10	106990	1,3-BUTADIENE	UR	14.00
11	542756	1,3-DICHLOROPROPENE	DEF=1	200.00
12	1120714	1,3-PROPANE SULTONE	UR	6.00
13	106467	1,4-DICHLOROBENZENE(P)	UR	600.00
14	123911	1,4-DIOXANE (1,4-DIETHYLENEOXIDE)	UR	1200.00
15	540841	2,2,4 - TRIMETHYLPENTANE	DEF=5	2000.00
16	1746016	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	UR	0.00
17	584849	2,4 - TOLUENE DIISOCYANATE	ACUTE	200.00
18	88062	2,4,6-TRICHLOROPHENOL	UR	1200.00
19	94757	2,4-D, SALTS, ESTERS(2,4-DICHLOROPHENOXY ACETIC AC	CS	2000.00
20	51285	2,4-DINITROPHENOL	CS	2000.00

21	121142	2,4-DINITROTOLUENE	UR	4.00
22	95807	2,4-TOLUENE DIAMINE	UR	4.00
23	53963	2-ACETYLAMINOFLUORINE	UR	1.00
24	532274	2-CHLOROACETOPHENONE	RfC	1200.00
25	110805	2-ETHOXY ETHANOL	CAP-RfC	2000.00
26	108864	2-METHOXY ETHANOL	CAP-RfC	2000.00
27	79469	2-NITROPROPANE	DEF=1	200.00
28	119904	3,3'-DIMETHOXYBENZIDINE	UR	20.00
29	119937	3,3'-DIMETHYL BENZIDINE	UR	1.60
30	91941	3,3-DICHLOROBENZIDENE	UR	40.00
31	92933	4 - NITROBIPHENYL	DEF=1	2000.00
32	100027	4 - NITROPHENOL	DEF=5	2000.00
33	101144	4,4-METHYLENE BIS(2-CHLOROANILINE)	UR	40.00
34	534521	4,6-DINITRO-O-CRESOL, AND SALTS	ACUTE	200.00
35	57976	7,12-DIMETHYLBENZ(A)ANTHRACENE	GWP	2.00
36	75070	ACETALDEHYDE	UR	1800.00
37	75058	ACETONITRILE	RfC	2000.00
38	98862	ACETOPHENONE	CS	2000.00
39	107028	ACROLEIN	RfC	80.00
40	79061	ACRYLAMIDE	UR	4.00
41	79107	ACRYLIC ACID	RfC	1200.00
42	107131	ACRYLONITRILE	UR	60.00
43	107051	ALLYL CHLORIDE	DEF=1	200.00
44	62533	ANILINE	UR	200.00
45	88888810	ANTIMONY COMPOUNDS (EXCEPT THOSE SPECIFICALLY LIST	DEF=5	2000.00
46	7783702	ANTIMONY PENTAFLUORIDE	ACUTE	200.00
47	28300745	ANTIMONY POTASSIUM TARTRATE	CS	2000.00
48	1309644	ANTIMONY TRIOXIDE	DEF=1	200.00
49	1345046	ANTIMONY TRISULFIDE	CS	200.00
50	99999904	ARSENIC AND INORGANIC ARSENIC COMPOUNDS	UR	0.92
51	7784421	ARSINE	UR	1.00
52	1332214	ASBESTOS		0.00
53	56553	BENZ(A)ANTHRACENE	GWP	2.00
54	225514	BENZ(C)ACRIDINE	GWP	2.00
55	71432	BENZENE	UR	400.00
56	92875	BENZIDINE	UR	0.06
57	50328	BENZO(A)PYRENE	UR	2.00
58	205992	BENZO(B)FLUORANTHENE	GWP	2.00
59	98077	BENZOTRICHLORIDE	UR	12.00
60	100447	BENZYL CHLORIDE	ACUTE	200.00
61	7440417	BERYLLIUM COMPOUNDS (EXCEPT BERYLLIUM SALTS)	UR	1.60
62	88888804	BERYLLIUM SALTS		0.00
63	92524	BIPHENYL	CS	2000.00
64	117817	BIS(2-ETHYLHEXYL)PHTHALATE (DEHP)	UR	1000.00
65	542881	BIS(CHLOROMETHYL)ETHER	UR	0.06
66	75252	BROMOFORM	CAP-UR	2000.00
67	88888806	CADMIUM COMPOUNDS	UR	2.00
68	156627	CALCIUM CYANAMIDE	CS	2000.00
69	105602	CAPROLACTAM	CS	2000.00
70	133062	CAPTAN	CAP-UR	2000.00
71	63252	CARBARYL	CS	2000.00
72	75150	CARBON DISULFIDE	CS	2000.00
73	56235	CARBON TETRACHLORIDE	UR	280.00
74	463581	CARBONYL SULFIDE	DEF=5	2000.00
75	120809	CATECHOL	DEF=5	2000.00
76	57749	CHLORDANE	GWP	2.00
77	7782505	CHLORINE	ACUTE	200.00
78	79118	CHLOROACETIC ACID	ACUTE	200.00
79	108907	CHLOROBENZENE	CS	2000.00
80	510156	CHLOROBENZILATE	UR	80.00
81	67663	CHLOROFORM	UR	172.00
82	107302	CHLOROMETHYL METHYL ETHER	ACUTE	200.00
83	126998	CHLOROPRENE	DEF=1	2000.00

84	218019	CHRYSENE	GWP	2.00
85	7440484	COBALT AND COMPOUNDS (EXCEPT THOSE SPECIFICALLY LI	CS	200.00
86	10210681	COBALT CARBONYL	ACUTE	200.00
87	99999908	COKE OVEN EMISSIONS	UR	6.00
88	1319773	CRESOLS/CRESYLIC ACID (ISOMERS AND MIXTURE)	DEF=1	200.00
89	98828	CUMENE	CS	2000.00
90	88888812	CYANIDE COMPOUNDS (EXCEPT THOSE SPECIFICALLY LISTE	DEF=5	2000.00
91	72559	DDE (P,P'-DICHLORODIPHENYLDICHLOROETHYLENE)	GWP	2.00
92	53703	DIBENZ(AH)ANTHRACENE	GWP	2.00
93	132649	DIBENZOFURAN	DEF=5	2000.00
94	84742	DIBUTYLPHTHALATE	CS	2000.00
95	111444	DICHLOROETHYL ETHER (BIS(2-CHLOROETHYL)ETHER)	UR	12.00
96	62737	DICHLORVOS	UR	40.00
97	11422	DIETHANOLAMINE	DEF=5	2000.00
98	60117	DIMETHYL AMINOAZOBENZENE	DEF=1	200.00
99	79447	DIMETHYL CARBAMOYL CHLORIDE	CAP-UR	4.00
100	68122	DIMETHYL FORMAMIDE	DEF=1	2000.00
101	131113	DIMETHYL PHTHALATE	CS	2000.00
102	77781	DIMETHYL SULFATE	ACUTE	200.00
103	106898	EPICHLOROHYDRIN	RfC	2000.00
104	140885	ETHYL ACRYLATE	UR	200.00
105	100414	ETHYL BENZENE	CAP-RfC	2000.00
106	51796	ETHYL CARBAMATE (URETHANE)	UR	160.00
107	75003	ETHYL CHLORIDE	CAP-RfC	2000.00
108	106934	ETHYLENE DIBROMIDE (DIBROMOETHANE)	UR	20.00
109	107062	ETHYLENE DICHLORIDE (1,2-DICHLOROETHANE)	UR	152.00
110	107211	ETHYLENE GLYCOL	CS	2000.00
111	111762	ETHYLENE GLYCOL MONOBUTYL ETHER	CS	2000.00
112	151564	ETHYLENE IMINE (AZIRIDINE)	UR	6.00
113	75218	ETHYLENE OXIDE	ACUTE	20.00
114	96457	ETHYLENE THIOUREA	UR	120.00
115	75343	ETHYLIDENE DICHLORIDE (1,1-DICHLOROETHANE)	DEF=1	200.00
116	62207765	FLUOMINE	ACUTE	200.00
117	50000	FORMALDEHYDE	UR	1600.00
118	88888813	GLYCOL ETHERS (EXCEPT THOSE SPECIFICALLY LISTED)*	DEF=5	2000.00
119	76448	HEPTACHLOR	UR	4.00
120	118741	HEXACHLOROBENZENE	GWP	2.00
121	87683	HEXACHLOROBUTADIENE	UR	180.00
122	77474	HEXACHLOROCYCLOPENTADIENE	ACUTE	200.00
123	67721	HEXACHLOROETHANE	UR	1000.00
124	822060	HEXAMETHYLENE,-1, 6 -DIISOCYANATE	RfC	40.00
125	110543	HEXANE	CAP-RfC	2000.00
126	88888805	HEXAVALENT CHROMIUM COMPOUNDS	UR	0.36
127	302012	HYDRAZINE	UR	0.80
128	7647010	HYDROCHLORIC ACID	CAP-RfC	2000.00
129	7664393	HYDROGEN FLUORIDE	ACUTE	200.00
130	123319	HYDROQUINONE	DEF=1	2000.00
131	193395	INDENO(1,2,3-CD)PYRENE	GWP	2.00
132	78591	ISOPHORONE	CAP-UR	2000.00
133	88888808	LEAD AND COMPOUNDS (EXCEPT FOR THOSE SPECIFICALLY	GWP	20.00
134	58899	LINDANE (HEXACHLORCYCLOHEXANE, GAMMA)	GWP	2.00
135	108316	MALEIC ANHYDRIDE	CS	2000.00
136	7439965	MANGANESE AND COMPOUNDS	RfC	1600.00
137	748794	MERCURIC CHLORIDE	GWP	20.00
138	10045940	MERCURIC NITRATE	GWP	20.00
139	88888814	MERCURY COMPOUNDS (EXCEPT THOSE SPECIFICALLY LISTE	GWP	20.00
140	67561	METHANOL	CS	2000.00
141	72435	METHOXYCHLOR	CS	2000.00
142	74839	METHYL BROMIDE (BROMOMETHANE)	RfC	2000.00
143	74873	METHYL CHLORIDE (CHLOROMETHANE)	CAP-UR	2000.00
144	71556	METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE)	CS	2000.00
145	78933	METHYL ETHYL KETONE (2-BUTANONE)	CAP-RfC	2000.00
146	60344	METHYL HYDRAZINE	UR	12.00

147	74884	METHYL IODIDE (IODOMETHANE)	DEF=1	200.00
148	108101	METHYL ISOBUTYL KETONE	CS	2000.00
149	624839	METHYL ISOCYANATE	ACUTE	200.00
150	80626	METHYL METHACRYLATE	CS	2000.00
151	1634044	METHYL TERT-BUTYL ETHER	CAP-RfC	2000.00
152	12108133	METHYLCYCLOPENTADIENYL MANGANESE	ACUTE	200.00
153	75092	METHYLENE CHLORIDE (DICHLOROMETHANE)	CAP-UR	2000.00
154	101688	METHYLENE DIPHENYL DIISOCYANATE	CS	200.00
155	88888809	MINERAL FIBER COMPOUNDS		0.00
156	121697	N,N-DIMETHYLANILINE	CS	2000.00
157	684935	N-NITROSO-N-METHYLUREA	UR	0.04
158	62759	N-NITROSODIMETHYLAMINE	UR	0.20
159	91203	NAPHTHALENE	CS	2000.00
160	13463393	NICKEL CARBONYL	ACUTE	20.00
161	88888807	NICKEL COMPOUNDS (EXCEPT THOSE SPECIFICALLY LISTED	DEF=1	2000.00
162	12035722	NICKEL REFINERY DUST	UR	16.00
163	88888817	NICKEL SUBSULFIDE	UR	8.00
164	98953	NITROBENZENE	CS	2000.00
165	56382	PARATHION	ACUTE	200.00
166	82688	PENTACHLORONITROBENZENE (QUINTOBENZENE)	UR	60.00
167	87865	PENTACHLOROPHENOL	UR	140.00
168	108952	PHENOL	CS	200.00
169	62384	PHENYL MERCURIC ACETATE	GWP	20.00
170	75445	PHOSGENE	ACUTE	200.00
171	7803512	PHOSPHINE	DEF=5	2000.00
172	7723140	PHOSPHOROUS	ACUTE	200.00
173	85449	PHTHALIC ANHYDRIDE	DEF=5	2000.00
174	1336363	POLYCHLORINATED BIPHENYLS (AROCLORS)	UR	1.80
175	88888815	POLYCYCLIC ORGANIC MATTER (POM)	GWP	2.00
176	151508	POTASSIUM CYANIDE	ACUTE	200.00
177	123386	PROPIONALDEHYDE	DEF=5	2000.00
178	78875	PROPYLENE DICHLORIDE (1,2-DICHLOROPROPANE)	UR	200.00
179	75569	PROPYLENE OXIDE	UR	1000.00
180	91225	QUINOLINE	UR	1.20
181	106514	QUINONE	DEF=5	2000.00
182	99999918	RADIONUCLIDES (INCLUDING RADON)		0.00
183	7782492	SELENIUM AND COMPOUNDS (EXCEPT THOSE SPECIFICALLY	CS	200.00
184	7488564	SELENIUM SULFIDE (MONO AND DI)	CS	20.00
185	143339	SODIUM CYANIDE	ACUTE	200.00
186	100425	STYRENE	DEF=1	200.00
187	127184	TETRACHLOROETHYLENE (PERCHLOROETHYLENE)	CAP-UR	40.00
188	78002	TETRAETHYL LEAD	GWP	200.00
189	75741	TETRAMETHYL LEAD	GWP	200.00
190	7550450	TITANIUM TETRACHLORIDE	ACUTE	200.00
191	108883	TOLUENE	CAP-RfC	2000.00
192	8001352	TOXAPHENE (CHLORINATED CAMPHENE)	GWP	2.00
193	79016	TRICHLOROETHYLENE	CAP-UR	800.00
194	121448	TRIETHYLAMINE	CAP-RfC	2000.00
195	1582098	TRIFLURALIN	UR	1800.00
196	88888816	TRIVALENT CHROMIUM COMPOUNDS	DEF=5	8.00
197	108054	VINYL ACETATE	DEF=1	2000.00
198	593602	VINYL BROMIDE (BROMOETHENE)	UR	120.00
199	75014	VINYL CHLORIDE	UR	40.00
200	75354	VINYLIDENE CHLORIDE (1,1-DICHLOROETHYLENE)	UR	80.00
201	1330207	XYLENES (ISOMERS AND MIXTURE)	CS	2000.00
202	57578	BETA-PROPIOLACTONE	ACUTE	200.00
203	108394	M-CRESOL	DEF=1	200.00
204	108383	M-XYLENES	CS	2000.00
205	95487	O-CRESOL	DEF=1	200.00
206	95534	O-TOLUIDINE	DEF=1	800.00
207	95476	O-XYLENES	CS	2000.00
208	106445	P-CRESOL	DEF=1	200.00
209	106503	P-PHENYLENEDIAMINE	CS	2000.00

210	106423	P-XYLENES	CS	2000.00
211	101779	4,4'-METHYLENEDIANILINE	DEF=1	2000.00
212	92671	4-AMINOBIPHENYL	DEF=1	2000.00
213	96093	STYRENE OXIDE	DEF=1	2000.00
214	64675	DIETHYL SULFATE	DEF=1	2000.00
215	59892	N-NITROSOMORPHOLINE	DEF=1	2000.00
216	680319	HEXAMETHYLPHOSPHORAMIDE	RfC	20.00
217	60355	ACETAMIDE	DEF=1	2000.00
218	90040	O-ANISIDINE	DEF=1	2000.00
219	334883	DIAZOMETHANE	DEF=1	2000.00
220	95954	2,4,5-TRICHLOROPHENOL	DEF=1	2000.00
221	133904	CHLORAMBEN	DEF=1	2000.00
222	10025737	CHROMIC CHLORIDE	ACUTE	200.00
223	7783075	HYDROGEN SELENIDE	ACUTE	200.00
224	13410010	SODIUM SELENATE	ACUTE	200.00
225	10102188	SODIUM SELENITE	ACUTE	200.00
226	1306190	CADMIUM OXIDE	UR	20.00
227	114261	PROPOXUR (BAYGONE)	DEF=1	200.00

STATE OF MAINE

DEPARTMENT OF ENVIRONMENTAL PROTECTION

SITE LOCATION OF DEVELOPMENT

38 M.R.S.A. §§ 481-490

PERMIT APPLICATION

Bureau of Land and Water Quality

REVISED: October 2015

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PART I. GENERAL INSTRUCTIONS

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This document is to be used when applying for a permit pursuant to the Site Location of Development Law (Site Law), 38 M.R.S.A. §§ 481-490. The applicant for a metallic mineral mining or advanced exploration permit should contact the Mining Coordinator (822-6300).

A permit is required of anyone who may "construct or cause to be constructed or operate or cause to be operated or, in the case of a subdivision, sell or lease, offer for sale or lease or cause to be sold or leased, any development requiring approval under this article...." 38 M.R.S.A. § 483-A.

Section 1. Pre-submission. A pre-application meeting, public informational meeting and pre-submission meeting, as described in (A) through (C) of this section, are required for all new Site Law applications. Pre-applications meetings are recommended for all major amendments to Site Law projects. A In certain circumstances the department may waive the requirement for a pre-application or pre-submission meeting. The public informational meeting requirements may not be waived. See 06-096 CMR 2.6. Subsections D and E below apply to all developments.

A. Pre-application meeting. The purpose of the pre-application meeting is to help the applicant understand the application review process, identify particular areas of concern and exchange information before commitment to a final design. This meeting may lead to a substantial reduction in processing time. For information about arranging a pre-application meeting, contact the appropriate regional office. The address and telephone number of the Augusta office and the two regional offices are listed in Section 2(A).

B. Public informational meeting. An applicant intending to file an application that requires a pre-application meeting must hold a public informational meeting prior to filing that application. A local public hearing process may not be substituted for the public informational meeting. At least 10 days prior to the public informational meeting, notice of the informational meeting must be sent by certified mail to abutters and to the municipal office of the municipality(ies) where the project is located. At least 7 days prior to the informational meeting, notice must also be published once in a newspaper of general circulation in the area where the development is located. The notice must contain at least the following information:

(1) Name, address and telephone number of the applicant.
(2) Citation of the statutes or rules under which the application will be processed.
(3) Location and summary description of the activity.
(4) The date, time and place of the public informational meeting.

A certification signed by the applicant attesting that a notice was provided for a public informational meeting, and the meeting was held in accordance with Chapter 2, Section 13, including an estimate

of the number of attendees at the meeting, must be submitted with any application that requires a pre-application meeting pursuant to the Chapter 2 rules.

C. Pre-submission meeting. A pre-submission meeting allows the department and applicant to follow up on issues raised at the pre-application meeting and is required for all projects for which a pre-application meeting was held unless waived in writing by the department. The meeting is held when the application is ready for submission. Contact the project manager concerning scheduling.

D. Notice. Provide public notice of the application. Form B, the notice form, is included in Part III of this application. A copy of this form or one containing identical information must be used to notify abutters, municipal officials, and local newspapers. Submission requirements related to this notice requirement are contained in Part II, Section 25 of this application

(1) Newspaper. Publish the notice once in a newspaper circulated in the area where the development is located. The notice must appear in the newspaper within 30 days prior to filing a new or amendment application, or a resubmitted application returned as incomplete pursuant to Chapter 2.

(2). Abutting property owners. Provide a copy of the notice to the owners of abutting property. Their names and addresses can be obtained from town tax maps or local officials. Abutters must receive notice within 30 days prior to filing a new or amendment application, or a resubmitted application returned as incomplete pursuant to Chapter 2. For the purposes of this application, an abutting property owner means any person who owns property that is **BOTH** 1) adjoining and 2) within 1 mile of the delineated project boundary, including owners of property directly across a public or private right of way.

(3) Municipal or plantation office. Provide a copy of the public notice together with a duplicate of the entire application to the appropriate town clerk, city clerk or, if the development is in an unorganized area, to the appropriate plantation clerk or county clerk. The notice must be received within 30 days prior to filing a new or amendment application, or a resubmitted application returned as incomplete pursuant to Chapter 2.

E. Other

(1) Application notes. Direct questions concerning application requirements to the project manager or, if a project manager has not yet been assigned, to the Licensing Coordinator, Division of Land Resource Regulation (287-3901) for projects located in the northern, eastern and central regions or the Licensing Supervisor, Division of Land Resource Regulation (822-6300) for projects located in the southern region.

(a) Organization. Organize the application in the following manner.

(i). Use a completed copy of Form A, contained in Part III of this application, as the first and second pages of the application.

(ii). Place a completed copy of Form D, the Checklist, after the completed copy of Form A.

iii. Organize the submissions into sections as specified in Part II of this application, and identify each section with a tab. If a particular section is not applicable, provide a statement explaining why it is not; do not omit the section unless this application is being used for a project amendment and prior approval has been obtained from the project manager.

NOTE: If you have used a CD to complete this application, please submit one copy of the disk with your written copies.

(b). Plan, drawing and map specifications. Plans, drawings and maps may be combined as long as all details are clearly shown. Adhere to the following specifications, unless variations are specifically approved by the department prior to submission of the application:

(i) Sheet size 24" X 36".

(ii) For developments of less than 100 acres in total area use a scale of 1" = 100'; for developments of more than 100 acres but less that 250 acres in total area use a scale of 1" =200'; and for developments of 250 acres of more in total area, the required scale must be determined by the department.

(iii) Maximum vertical exaggeration of 5X.

(iv) Folded to fit 8 1/2" by 11" folders for ease in filing. **Do NOT submit large sets of folded, bound plans as they are too bulky to fit in the department's files. Plan sheets should be folded individually.**

(c) Professional assistance. For most developments requiring a permit, professional assistance is necessary to satisfactorily complete the application requirements. Appropriate professionals must prepare all plans, drawings and maps. All work performed by a professional engineer or other licensed professional must be dated, stamped and signed by the professional. As used in this document, a "certified geologist" or "certified soil scientist", is a professional licensed pursuant to 32 M.R.S.A. § 4901 et. seq. A "registered engineer" is a professional licensed pursuant to 32 M.R.S.A. § 1351 et. seq. A "licensed site evaluator" is a professional licensed under authority established by 22 M.R.S.A. § 42(3-A).

(d) NRPA application. If any activities require a permit under the Natural Resources Protection Act (NRPA), 38 M.R.S.A. §§ 480-A through 480-BB, complete and submit a copy of the appropriate NRPA application and its associated fee with the Site Law application.

(e) Retain a copy. Retain a copy of the application, as filed with the department, in order to facilitate communications with the department's staff during the review process.

(2) Source material

(a) Site Law. Site Location of Development Law, 38 M.R.S.A. §§ 481-490, with regulations 06-096 CMR 371-377. Available from the Bureau of Land and Water Quality (287-3901), or on the DEP website at http://www.maine.gov/dep/land/sitelaw/index.html.

(b). NRPA. Natural Resources Protection Act, 38 M.R.S.A. §§ 480-A through 480-BB, statute and application. Rules (separate handouts): 06-096 CMR 305 (Permit by Rule Standards); 310 (Wetlands and Waterbodies Protection); and 355 (Coastal Sand Dune Rules). Available from the Bureau of Land and Water Quality (287-3901) or on the DEP website at http://www.maine.gov/dep/land/nrpa/index.html.

(c). Solid waste. Solid Waste Management Rules, 06-096 CMR 400 et. seq. and Rules for Open Burning, 06-096 CMR 102. Chapters 400 et. seq. is available from the Bureau of Remediation and Waste Management (287-2651) or on the website at http://www.maine.gov/dep/rwm/rules/. Chapter 102 is available from the Bureau of Air Quality (287-2437) or on the DEP website at www.maine.gov/dep/air/regulations/docs/chap102final.doc.

(d) Drinking water rules. Rules Relating to Drinking Water, 10-144A CMR 231. Available from the Department of Health and Human Services, Division of Environmental Health (Drinking Water Program) (287-2070) or on the web at http://www.maine.gov/dhhs/eng/water/Templates/Rules/rules.htm.

(e) Hydrology. Soil Conservation Service's TR-55 publication entitled "Urban Hydrology for Small Watersheds" (June 1986); and TR-20 publication entitled "Computer Program for Project Formulation Hydrology" (May 1982).

(f) Phosphorus control. Phosphorus Control in Lake Watersheds: A Technical Guide to Evaluating New Development (revised 1992). Available from the Bureau of Land and Water Quality (287-3901).

(g) Stormwater Management For Maine: Best Management Practices (January 2006). Available from the Nonpoint Source Training and Resource Center, at the DEP office in Augusta (287-7726). Cost: $20.00 (subject to change).

h) Stormwater Management Law; and Chapter 502, Direct Watersheds of Lakes Most at Risk from new Development, and Urban Impaired Streams. Available from the Bureau of Land and Water Quality (287-3901) or on the DEP website at http://www.maine.gov/dep/land/stormwater/storm.html.

(i) Erosion and sedimentation control. Maine Erosion and Sedimentation Control Handbook for Construction: Best Management Practices (March 2003). Available from the Cumberland County Soil and Water Conservation District, 35 Main St., Windham, ME 04062, Phone:892-4700, Fax: 856-2796, or on the DEP website at http://www.maine.gov/dep/land/erosion/escbmps/index.htm.

(j) Blasting. U.S. Department of Interior Rules 30 CFR sections 816.61-68 and 817.610-68, and Blasting Guidance Manual, Office of Surface Mining, Reclamation and Enforcement, U.S. Department of Interior.

(k) Maine Construction General Permit. General Permit – Construction Activity, Maine Pollutant Discharge Elimination system (MPDES) with Basic Performance Standards Appendices. Available from the Bureau of Land and Water Quality (287-3901) or on the DEP website at http://www.maine.gov/dep/land/stormwater/construction.html.

Section 2. Submission

A. Fees. Attach the appropriate application fee to the original application. The current fee schedule can be obtained from any DEP Regional Office. Send the original application and 2 copies to the appropriate office listed below. To determine which office should receive the application, consult the map on the following page. Note: Applications for project sites located in the Northern Maine Region should be sent to the Bangor Regional Office.

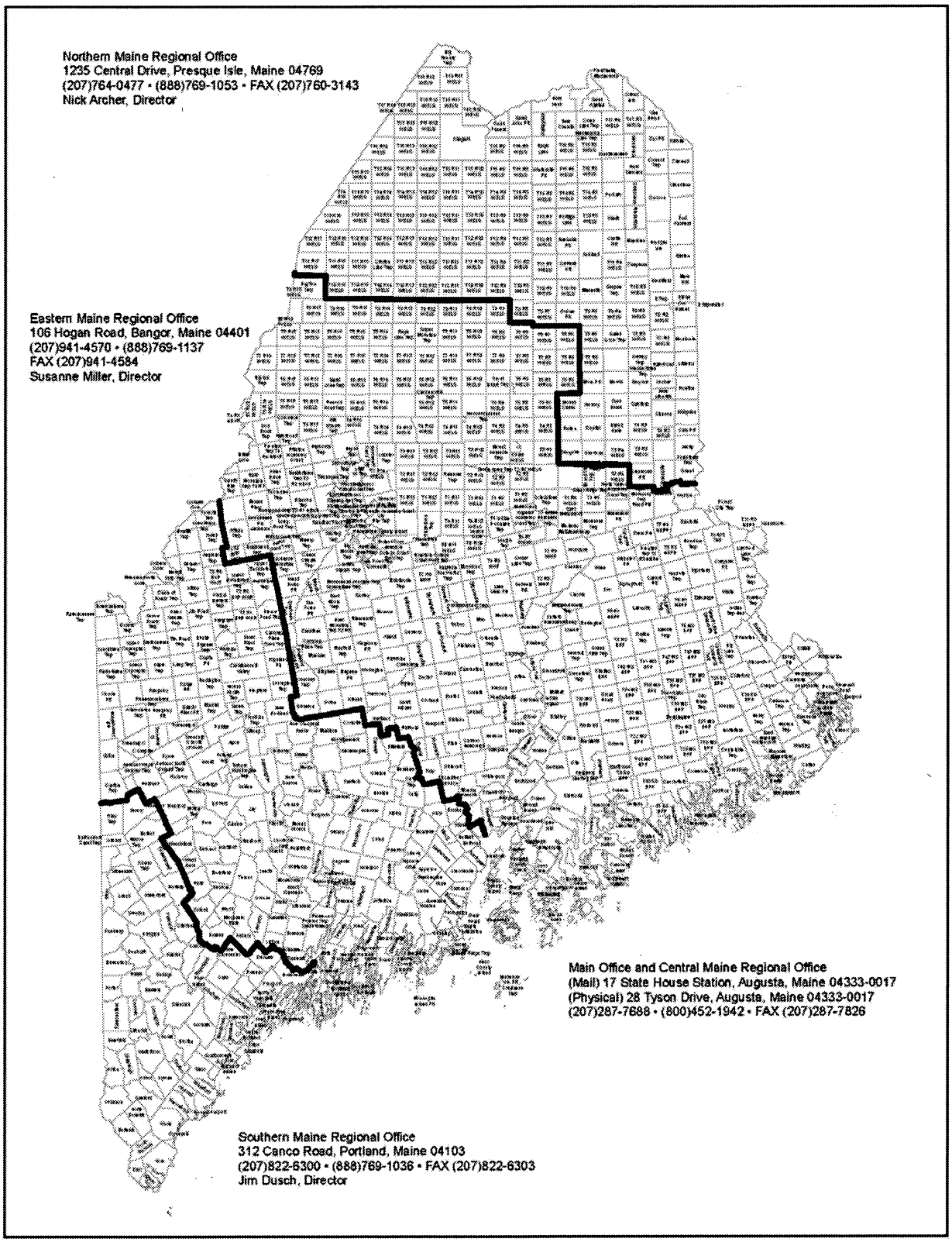
Augusta	Portland	Bangor
DEP-BLWQ	DEP	DEP
17 State House Station	312 Canco Rd.	106 Hogan Rd.
Augusta, ME 04333	Portland, ME 04103	Bangor, ME 04401
Phone: 207-287-3901	Phone: 207-822-6300	Phone: 207-941-4570
Fax: 207-287-7826	Fax: 207-822-6303	Fax: 207-941-4584

The department operates under a fee system established by the Legislature of the State of Maine. All fees must be paid at the time the application is submitted to the department. The fee schedule is changed every November 1 and can be found at http://www.state.me.us/dep/permits.htm#fees. Checks should be made payable to: Treasurer, State of Maine.

If claiming that a development qualifies as affordable housing, provide the number of bedrooms/dwelling unit and the not-to-exceed selling/renting price for each unit. This information should appear in Section 3 of the submitted application. See Part II, Section 3(B)(4) of this document.

B. Timing of submission. Submit the application well in advance of the date of construction or offering. The amount of time required for the application review process depends upon the scope of the activity and its environmental impacts, the quality of the application and the current workload of project managers and other staff. The project manager will provide an estimate of the likely processing time. The commissioner establishes processing timetables for each type of new permit or license issued by the department. See 38 M.R.S.A. § 344-B.

C. Correspondence and questions. Correspondence and questions concerning the application should be directed to the project manager. The assigned application number should be included in all correspondence.


Northern Maine Regional Office
1235 Central Drive, Presque Isle, Maine 04769
(207)764-0477 • (888)769-1053 • FAX (207)760-3143
Nick Archer, Director
Eastern Maine Regional Office
106 Hogan Road, Bangor, Maine 04401
(207)941-4570 • (888)769-1137
FAX (207)941-4584
Susanne Miller, Director
Main Office and Central Maine Regional Office
(Mail) 17 State House Station, Augusta, Maine 04333-0017
(Physical) 28 Tyson Drive, Augusta, Maine 04333-0017
(207)287-7688 • (800)452-1942 • FAX (207)287-7826
Southern Maine Regional Office
312 Canco Road, Portland, Maine 04103
(207)822-6300 • (888)769-1036 • FAX (207)822-6303
Jim Dusch, Director

Section 3. Processing

A. Acceptance review. Upon submission and payment of all applicable fees, the application is given a project number and assigned to a project manager. The project manager determines if the application is complete and acceptable for processing. Once this review is complete,

(1) The applicant will receive a notification, including the application number and the project manager's name, stating that the application is acceptable for processing; or

(2) The application will be returned with a letter stating that the application is not acceptable for processing as filed and identifying deficiencies in the application.

B. Application review. The project manager makes a recommendation for final action based upon his or her review of the application, including knowledge gained from any site visit(s) and comments received from department staff, other agencies or the public.

(1) If the application is determined acceptable for processing, the project manager may request additional copies for use by review agencies such as the Department of Inland Fisheries and Wildlife.

(2). Additional information may be requested. "Acceptance of an application as complete for review does not constitute a determination by the department on the sufficiency of that information and does not preclude the department from requesting additional information during processing." 38 M.R.S.A. § 344 (in part).

In review of an application, the burden is on the applicant to prove that the development will not have an adverse environmental impact. It is not up to the department to prove that a development will have an adverse environmental impact.

Section 4. Final action and appeal. Depending on the nature of the development, a final decision on the application may be made either by the Commissioner or the Board of Environmental Protection. A draft copy of the Findings of Fact and Order is made available, upon request, for review by all interested parties at least 5 working days prior to final action by the commissioner, or 15 working days prior to final action by the Board. Persons aggrieved by a decision may appeal the decision within 30 days following final action.

If an application is approved, a permit is issued and sent to the applicant. The applicant must become familiar with any conditions placed on the approved project. Failure to comply with conditions of approval may lead to action by the department's enforcement staff, including fines and revocation of the permit.

PART II. SUBMISSIONS

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The following sections describe general minimum submissions. Because of the site-specific nature of developments and potential impacts, additional information may be required, on a case-by-case basis, to determine whether the Standards for Development, 38 M.R.S.A. § 484, are met. ***If an applicant is seeking a planning permit for a development under 38 M.R.S.A § 485-A (1-C), the application must contain all the general minimum submissions unless individual sections require different submissions (indicated with bold and italics), specific to a planning permit, or the submissions have been waived by the department at the pre-application meeting.***

Section 1. Development description

A. Narrative. Provide the following.

(1) Objectives and details. A description of the overall objectives, development history and development details including, as appropriate, acreage of the parcel; number of lots; average lot size (sq. ft.) excluding undeveloped portions; and area (sq. ft.) of buildings, parking lots, roads, paved areas, wharves or areas to be stripped or graded and not revegetated. If the parcel will include a developed site and a retained area, indicate the acreage of the site to be developed.

(2) Existing facilities. A description of existing facilities, if any, together with dates of construction.

B. Topographic map. Provide a U.S.G.S. seven-and-one-half minute topographic map. Indicate the location of the development boundaries on the map and give quadrangle name(s). A clean photocopy is acceptable.

C. Construction plan. Provide a construction plan outlining the anticipated sequence of construction for the major aspects of the development, such as roads, retention basins, sewer lines, seeding or other erosion control measures and pollution abatement measures. Include the approximate dates for start and completion of construction. Take processing times into consideration in setting these dates.

D. Drawings. Provide drawings depicting the following.

(1). Development facilities. The location, function, ground area and floor area (if applicable) of all proposed construction and facilities. For each road, specify length and provide a typical cross section.

(2). Site work. The nature and extent of site work such as filling, grading, drainage or dredging.

(3). Existing facilities. The location, function, ground area and floor area (if applicable) of existing construction and facilities on the parcel.

(4). Topography. The pre- and post-development topography of the site using contour intervals of 2 feet or less. As determined by the department, minimum contour intervals of five feet may be acceptable in areas of sustained slopes of twenty percent or greater. The topographic drawing must include all previously existing construction, facilities and lot lines.

(a) Larger contours may be approved for large developments of 250 acres or more with relief greater than 200 feet within the developed area of the parcel.

(b) The department may require more detailed topographic maps in certain areas of concern, and in those areas where development or structures have been localized within smaller areas of a larger parcel. The department on a case-by-case basis determines the scale of these maps.

Additional plans and figures are required in support of other sections of the application and are described in those sections.

Section 2. Title, right or interest. Provide a complete copy of the deed or a current lease or purchase option as evidence of title, right or interest in the property.

Reference: Regulations for the Processing of Applications, 06-096 CMR 1.4(D).

Section 3. Financial capacity

A. Estimated costs. Specify the estimated total cost of the development and itemize the estimated major expenses, including the projected cost of measures taken to minimize or prevent adverse effects on the environment during construction and operation. The itemization of major costs may include, but not be limited to, the cost of the following activities: land purchase, roads, sewers, structures, water supply, erosion control, pollution abatement and landscaping.

B. Financing. Provide one of the following unless otherwise approved by the department.

(1) Letter of commitment to fund. A letter of commitment, acceptable to the department, from a financial institution, governmental agency, or other funding agency indicating a commitment to provide a specified amount of funds, and specifying how those funds will be used.

(2) Self-financing

(a) Annual report. The most recent corporate annual report indicating availability of liquid assets to finance the development, together with explanatory material interpreting the report; or

(b) Bank statement. Copies of bank statements or other evidence indicating availability of funds if the applicant will personally finance the development.

(3) Other. If funding is required, but a final commitment of all necessary money cannot be made until all approvals are received and other reasonable conditions are met, provide the following.

(a) Cash equity commitment. Cash equity commitment to the development sufficient to demonstrate the applicant's ability to go forward. The department will consider 20 percent equity of the total cost of a development as the normal equity commitment but reserves the right to lower or raise this amount if special circumstances of an individual development warrant it.

(b) Financial plan. Financial plan for the remaining financing.

(c) Letter. Letter acceptable to the department from an appropriate financial institution indicating an intention to provide financing subject to reasonable conditions of acceptance.

(4) Affordable housing information. If the development is to provide affordable housing, include in this section, for each unit or lot to be leased, rented or sold, the number of bedrooms per unit or lot and the not-to-be exceed rental/selling price of each unit/lot. Also include the median income in the county where the development is located, and data to substantiate that a person with that income could obtain a mortgage for a unit at that selling price.

Reference: Financial Capacity Standard of the Site Location Law, 06-096 CMR 373.1.

C. Certificate of Good Standing. If new applicant is a registered corporation, provide either a *Certificate of Good Standing* (available from the Secretary of State) or a statement signed by a corporate officer affirming that the corporation is in good standing.

Section 4. Technical ability. Describe the technical ability of the applicant and consultant(s) to undertake the development. Include the following information.

A. Prior experience. A statement of the applicant's prior experience and appropriate training relating to the nature of the development. Specify prior experience relating to developments that have received permits from the department.

B. Personnel. Resumes or similar documents detailing the experience and qualifications of full-time, permanent or temporary staff contracted with or employed by the applicant who will design, construct, and oversee development including the installation and maintenance of pollution control measures. These parties must be responsible for design and implementation. (This submission requirement does not apply to temporary workers employed by the applicant for the sole purpose of conducting the physical labor, or to the design of activities based on "off-the-shelf" or other standardized or non-copyrighted designs, or adaptations of designs by staff employed at other facilities owned by the applicant.)

References: Financial Capacity Standard of the Site Location Law (Technical Ability to Meet Air and Water Pollution Control Standards), 06-096 CMR 373.2 and Planning Permit, 06-096 CMR 380.

Section 5. Noise

A. Developments producing a minor noise impact. Provide a statement indicating whether the project falls into one of the following categories, or attesting to the minor nature of the anticipated sound impacts of the project, as applicable.

(1) Residential developments. The development is solely residential.

(2) Certain non-residential subdivisions. The development is a non-residential subdivision without structure(s), office building(s), storage building(s) or golf course(s).

(3) Schools and hospitals. The development is a school or hospital.

(4) Other developments. The development does not fall within sub-paragraphs (1)-(3), but the applicant seeks to have the development classified as one creating a minor sound impact. Provide the following.

(a) Type, source and location of noise. Description of type of noise generated, source(s) of noise and locations of noise sources.

(b) Uses, zoning and plans. Map and description of land uses, local zoning and comprehensive plans for area potentially affected by sounds from the development.

(c) Protected locations. Descriptions of any protected location near the development.

(d) Minor nature of impact. Statement attesting to minor nature of the anticipated sound impact of the development.

(e). Demonstration. Demonstration using estimates or examples that the sound from the development will be 5 dBA less than applicable noise limits, including those for quiet areas.

B. Developments potentially producing a major noise impact. Provide a full noise study prepared by a qualified professional including the following.

(1) Baseline

(a) Uses, zoning and plans. Maps and description of the land uses, local zoning and comprehensive plans for the area potentially affected by sounds from the development.

(b) Protected locations. Descriptions of the protected locations near the development.

(c) Quiet area. Evidence concerning whether or not the area surrounding the development is a quiet area.

(2) Noise generated by the development

(a) Type, source and location of noise. A description of all types of noise to be generated, sources of noise and locations of noise sources.

(b) Sound levels. A description of the daytime and nighttime sound levels expected at property lines and protected locations for all types of sound generated.

(c) Control measures. A description of proposed sound control measures, locations and expected performance.

(d) Comparison with regulatory limits. A comparison of expected sound levels with sound level limits in regulations.

(e) Comparison with local limits. A comparison of expected sound levels with any quantifiable noise standards of any affected municipality.

Note: See Section 20 if blasting is proposed.

Reference: No Adverse Environmental Effect Standard of the Site Location Law (Control of Noise), 096 CMR 375.10.

Section 6. Visual quality and scenic character. Provide a narrative describing the provisions to be made in designing the development to minimize the development's visual impact to the surrounding area. Include a description of what efforts will be made to preserve any existing elements of the site that contribute to the maintenance of scenic character. If the development impacts areas of significant scenic character, the department may require submittal of a Visual Impact Analysis prepared by a qualified professional.

Section 7. Wildlife and fisheries. Contact the appropriate regional office of the Department of Inland Fisheries and Wildlife for assistance in determining potential fisheries and wildlife habitat impacts that could result from the proposed development. Submit a plan to minimize the development's detrimental effect on wildlife and fisheries habitat located on or adjacent to the project site.

References: No Adverse Environmental Effect Standard of the Site Location of Development Law (Protection of Wildlife and Fisheries), 06-096 CMR 375.15 and Planning Permit 06-096 CMR 380.

Section 8. Historic sites. Submit information demonstrating that the proposed development will not adversely affect any historic sites, historic structures or archaeological sites. The Maine Historic Preservation Commission (287-2132) may be able to provide assistance in identifying these sites. The applicant must submit historical and archeological surveys if required by the department.

References: No Adverse Environmental Effect Standard of the Site Location Law (Preservation of Historic Sites), 06-096 CMR 375.11 and Planning Permit 06-096 CMR 380.

Section 9. Unusual natural areas. Submit information demonstrating that the proposed development will not adversely affect an unusual natural area. Include a description of appropriate buffers or other measures that will be taken to protect unusual natural areas located on the project site. The Natural Areas Program (287-8044) may be able to provide assistance in identifying these areas. The applicant must submit a survey for the presence of unusual natural areas if required by the department.

References: No Adverse Environmental Effect Standard of the Site Location of Development Law (Preservation of Unusual Natural Areas), 06-096 CMR 375.12 and Planning Permit 06-096 CMR 380.

Section 10. Buffers. Provide a narrative and drawing describing proposed buffer strips, including information on dimensions; clearing limits for natural buffers; planting specifications for new buffers; and identification of the person(s) (name, address and phone number) responsible for maintenance. State whether or not the buffers will be retained by the applicant. If the applicant will not retain buffers, provide evidence that the buffers will be protected in perpetuity. If planting is proposed, provide a schedule for completion of the planting using a time frame relative to the issuance of the permit.

Reference: No Adverse Environmental Effect Standard of the Site Location Law, (Buffer Strips), 06-096 CMR 375.9; (Protection of Wildlife and Fisheries), 06-096 CMR 375.15.

Section 11. Soils

A. Soil survey map and report. Provide a soil survey report prepared by a certified soil scientist, including a soil investigation narrative, a soil survey map of the site at the appropriate intensity, complete test pit logs and a soil condition summary sheet. Use copies of Forms E and F, Part III, for the soil logs and summary (these forms are available in fillable pdf format at: http://www.maine.gov/dep/land/sitelaw/index.html#form). Soil surveys must comply with the Maine Association of Professional Soil Scientists' Standards for Soil Surveys. The soil survey report and the soil survey map (except for U.S. Natural Resources Conservation Service soil survey maps, unless modified based on field verification – see subsection 11.B.5) must be signed, stamped, and dated by the certified soil scientist.

(1) Soil investigation narrative. Include a discussion of field investigation techniques, the soil conditions, and a description of the landforms investigated. Describe limitations of the soils with respect to the proposed development.

(2) Soil survey map. Include a delineation of soil mapping units, a soil legend identifying all map symbols used, identification of the intensity level of soil survey conducted, a note referencing the accompanying soil narrative report by title and date, a note referencing the standards by which the survey was conducted, and a light overlay of the development design.

B. Soil survey intensity level by development type. The Maine Association of Professional Soil Scientists has established several classes of soil mapping intensity levels. The intensity level at which various types of developments must be mapped is indicated in the following subsections. These standards are a minimum. The Department may request the preparation of a higher-intensity soil map or require a more-detailed hydric soil boundary delineation as conditions warrant.

(1) Class A (High Intensity) Soil Survey is required for.:

(a) Area(s) used for land application of wastewater. This mapping intensity is required for specific land area(s) within any development proposed to be used for surface disposal of effluent, wastewater or other wastes.

(b) Subdivisions with any lot less than 2 acres and where on-site subsurface wastewater disposal is proposed. A waiver from this mapping requirement to allow a Class C or D

survey may be granted, at the department's discretion, for the undeveloped portion of any individual lot greater than 5 acres and for the undeveloped areas of clustered subdivisions.

(2) Class B (High Intensity) Soil Survey is required for:

(a) Subdivisions with any lot less than 2 acres and on-site subsurface wastewater disposal is not proposed. A waiver from this mapping requirement to allow a Class C or D survey may be granted, at the department's discretion, for the undeveloped portion of any individual lot greater than 5 acres and for the undeveloped areas of clustered subdivisions.

(b) Condominiums. This mapping intensity is required for the land area of a condominium development that is to be disturbed during construction. Condominium developments include single or multi-family attached dwellings.

(c) Shopping centers or similar developments. This mapping intensity is required for shopping centers or similar commercial, industrial or institutional developments where large areas are to be utilized or disturbed.

(d) Energy facilities. This mapping intensity is required for electrical substations, switchyards, compressor stations, or the equivalent, including operation and maintenance buildings associated with transmission lines, power plants, wind-energy generation facilities, or comparable developments.

(3) Class C (Medium High-Intensity) Soil Survey is required for:

(a) Subdivisions with all lots greater than 2 acres and on-site subsurface wastewater disposal is proposed.

(b) Multi-use recreational developments. This mapping intensity is required for golf courses, ski areas and trails, campgrounds and other multi-use recreational developments where large areas are disturbed, reworked or landscaped.

(c) Development requiring hydrogeologic investigation. This mapping intensity is required for any development which the department has determined will require a hydrogeologic investigation.

(4) Special Soil Survey Requirements for Linear Projects. For linear projects or project components which are long but narrow that involve soil disturbance, such as road construction, fairway construction or trail construction, and that have little or no adjacent development, special soil survey requirements are necessary. Electric transmission lines or similar projects with minimal soil disturbance are not included in this subsection, although proposals for access roads and other construction related to such projects may be required to submit additional information under this subsection or subsection 11.B.2 above. Projects subject to this subsection must provide a site-specific soil survey in accordance with the following:

(a) Minimum soil information. The soil parent material, slope, soil texture, depth to dense till or bedrock (whichever is the shallowest), redoximorphic features, and soil wetness (drainage class and/or oxiaquic [oxygenated groundwater] conditions) must be identified. Soil mapping units are to be delineated at a Class A high-intensity level and soil inclusions which pose limitations to the proposed development must be described.

(b) Drainage, stormwater, and erosion control. Sufficient information to define drainage across the development corridor and to determine the appropriate type and location of stormwater management and erosion and sediment control measures must be provided.

(c) Ground control. Ground control must be identified and maintained by the use of GPS (to sub-meter accuracy) or following a surveyed path or baseline prepared by a qualified professional.

(d) Field investigation method. At a minimum, the proposed linear portions of the development are to be walked and conditions observed within the proposed development corridor (width where soil is to be disturbed and/or filled).

(e) Soil investigation and classification. In remote, difficult to access sites, soil survey information may be obtained by the use of a hand shovel, screw auger, or dutch auger. For more-accessible areas, deeper soil observations may be necessary to properly classify the soils. Soil map units are to be classified at the series level (or associations for closely related soils).

(f) Soil narrative. Provide a narrative pursuant to subsection 11.A.1 and describe assumptions made during field observations based upon the information obtained in the field.

(g) Existing roads. Site-specific soil survey information is not necessary to upgrade existing roads unless the upgrade will require work significantly outside of the existing road footprint.

[Note: These soil survey requirements are essentially equivalent to the Class L intensity soil survey (for linear projects) as described in the Maine Association of Professional Soil Scientists Standards for Soil Surveys.]

(5) Class D (Medium Intensity) Soil Survey. This mapping intensity is required for all other developments. Provide field-verification of U.S. Natural Resources Conservation Service county soil survey maps, including a soil investigation narrative pursuant to subsection 11.A.1, which includes a discussion of soil limitations with respect to the proposed development, and, if applicable, a revised soil map pursuant to subsection 11.A.2.

C. Geotechnical investigation. If proposed buildings, facilities, or infrastructure require a geotechnical investigation for their design and construction, or a geotechnical investigation is determined to be necessary by the department, provide a report of this investigation prepared and endorsed by a registered professional engineer and other licensed professionals, as appropriate. (For example, a Certified Soil Scientist must prepare soil identifications and descriptions, and a Certified Geologist must endorse interpretations of geologic conditions. This report should identify all major limitations to the development posed by existing soils and other surface and subsurface features of the site, and describe the techniques to be used to overcome these limitations. Depending on the nature of the proposed development, the requirement for a soil survey map and report may be waived if the department determines that the geotechnical report will provide sufficient information.

D. Hydric soils mapping. The limits of all hydric soils must be clearly identified on the soil survey map. Regardless of the mapping class required under Subsection A, all wetlands, of whatever size, must be mapped and shown on the site plans. Refer to the Natural Resources Protection Act Application for more information regarding wetlands mapping.

Reference: Soil Types and Erosion Standard of the Site Location Law (Suitable Soil Types and No Unreasonable Erosion, 096 CMR 376.

Section 12. Stormwater management (Flooding and General standards).

A. Narrative. Provide a narrative describing pre-development and post-development site conditions and the estimated effects of post-development site runoff on peak discharge rates, flooding and water quality. Identify the standards that the project must meet and which Best Management Practices (BMP's) are proposed to meet the standard. Include the following information in the narrative.

(1) Development location. The general location and orientation of the development within the watershed(s).

(2) Surface water on or abutting the site. All lakes, rivers, streams, brooks and wetlands on or abutting the site.

(3) Downstream ponds and lakes. All downstream ponds and lakes that may be affected by site runoff. Identify whether each affected pond or lake is in a watershed most at risk from development or a sensitive or threatened region or watershed.

(4) General topography. A description of whether the terrain is flat, gently rolling, hilly or steep.

(5) Flooding. A list of areas, buildings and facilities that historically flood or could be affected by site runoff. This includes off-site as well as on-site areas, buildings or facilities.

(6) Alterations to natural drainage ways. Any proposed changes in alignment and channel geometry.

(7) Alterations to land cover. A description of how the development will change the existing land covers.

(8) Modeling assumptions. Assumptions used to determine runoff curve numbers, times of concentration and travel times for each pre-development and post-development subwatershed. ***An applicant seeking a planning permit must clearly state in the narrative the maximum amount of impervious surface, regrading and altered cover type in each post-development subwatershed to be included under the planning permit.***

(9) Water quantity control. Change in peak runoff flow rates for the site and the methods, if any that will be used on the site to reduce any increases in peak flow rates, flooding extent or flooding frequency. ***An applicant seeking a planning permit need only state the maximum potential increase in runoff for the development. Discussion of the specific quantity control methods to be used on the site may be delayed until plans for development within specific subwatersheds are more complete.***

(10) Water quality treatment. A discussion of the stormwater quality treatment practices that will be used on the site to reduce the impacts of site runoff on downstream water quality. ***An applicant seeking a planning permit need only state which types of treatment facilities are suitable for the development and demonstrate that adequate land area will be set aside for their installation or, in the case of treatment buffers, their preservation. Discussion of the specific quality control methods to be used on the site may be delayed until plans for development within specific subwatersheds are more complete.***

(11) Offset credits. A discussion of any total suspended solids (TSS) offset credits or phosphorus offset credits that will be applied to the development.

(12) Compensation fees. A discussion of the use of a compensation fee to offset all or a portion of the phosphorus removal necessary to meet the site's phosphorus allocation.

(13) Development impacts. An overall assessment of the development's impacts on receiving waters, adjacent properties, downstream properties and downstream flow control structures.

B. Map. Provide the following maps.

(1) Topographic map. A United States Geological Survey seven-and-one-half minute topographic map showing the site boundaries. A clean photocopy of the relevant area is acceptable.

(2). Soils map. A Soil Conservation Service Medium Intensity Soil Survey Map showing the site boundaries. A clean photocopy of the relevant area is acceptable.

C. Drainage plans. Provide scaled site plans, one for the pre-development site and one for the post-development site, showing the following information, as applicable. ***An applicant seeking a planning permit may choose not to submit a post-development site plan. Post-development plans may be submitted when development plans for specific subwatersheds are more complete.***

(1) Contours. Contour intervals as specified in Part II, Section 1(D)(4).

(2) Plan elements. Legend, north arrow, title block, revisions block and areas for professional stamps.

(3) Land cover types and boundaries. Cover types as defined by the chosen stormwater model.

(4) Soil group boundaries. Boundaries of the hydrologic soil groups on the site.

(5). Stormwater quantity subwatershed boundaries. Drainage boundary of each stormwater quantity subwatershed on the site. For the purposes of stormwater quantity, a subwatershed is any area that has a unique time of concentration to a specific point of interest. Subwatersheds may not always be contained within the property boundary.

(6) Stormwater quality subwatershed boundaries. Drainage boundary of each stormwater quality subwatershed on the site. For the purposes of stormwater quality, a subwatershed is an area that drains to a specific stream, river or lake. It may be possible that the site will only have one stormwater quality subwatershed.

(7) Watershed analysis points. Analysis points used in the runoff model for determining the peak flow rates from the site.

(8) Hydrologic flow lines. Flow lines for determining times of concentration and travel times. For each flow line, indicate the flow type (sheet, shallow-concentrated or channel flow) and the flow length.

(9) Runoff storage areas. Areas (depressions, wetlands, ponds, etc.) functioning to detain, retain or infiltrate runoff.

(10) Roads and drives. State routes, town roads, private drives and unimproved roads on or bordering the site.

(11) Facilities. Buildings, parking lots and facilities.

(12) Drainage systems. Culverts, catch basins, storm sewers and outfalls.

(13) Natural and man-made drainage ways. Any streams, brooks, swales, road ditches and other open drainage channels.

(14). Wetlands. All on-site wetlands.

(15) Flooded Areas. All areas currently flooded due to runoff from the 2-year, 10-year and 25-year, 24-hour storms.

(16) Benchmark. The location of at least one permanent elevation benchmark on the site.

(17) Stormwater detention, retention and infiltration facilities. The location of each facility and the drainage boundary for the area draining to each facility.

(18) Stormwater treatment facilities. The location of each treatment measure and the drainage boundary for the area draining to each measure.

(19) Drainage easements. Boundaries of any on-site and off-site drainage easements that are designated as part of the stormwater management system.

D. Runoff analysis. Provide pre- and post-development stormwater analyses of the site, in accordance with acceptable engineering practice, as provided at Chapter 500.6(A)(3). At a minimum, the site runoff analyses must include the following information.

(1) Curve number computations. Computations for determining the curve number for each pre-development and post-development subwatershed.

(2) Time of concentration calculations. Calculations for determining the time of concentration for each pre-development and post-development subwatershed.

(3) Travel time calculations. Calculations used to determine the travel time through each pre-development and post-development subwatershed or identified reach.

(4) Peak discharge calculations. Calculations used to determine the peak discharge for each pre-development and post-development subwatershed, reach, and watershed reservoir for 24-hour storms of 2-year, 10-year and 25-year frequencies. ***An applicant seeking a planning permit need only determine the maximum potential runoff for the post-development conditions, not the actual increase in runoff.***

(5) Reservoir routing calculations. Provide the calculations used to route stormwater through any ponds, basins or other areas which store and release runoff. ***An applicant seeking a planning permit may choose to only submit reservoir routing calculations for existing storage areas. Calculations for needed detention ponds, infiltration basins or other post-development storage areas may be delayed until development plans for specific subwatersheds are more complete.***

E. Flooding standard submissions. Provide a stormwater quantity management plan for the site. The stormwater quantity management plan must provide for detention, retention or infiltration of stormwater from 24-hour storms of 2-year, 10-year and 25-year frequencies such that the peak flow of the stormwater from the developed site does not exceed the peak flow of stormwater from the site prior to construction of the project. Also, the project may not increase the peak flow of any receiving waters as the result of runoff from the site for 24-hour storms of 2-year, 10-year and 25-year frequencies. In municipalities with 100-year flood elevations, the site runoff may not adversely affect the designated 100-year flood elevation. See 06-096 CMR 375.4. ***An applicant seeking a planning permit may delay submission of the stormwater quantity control plan until the development plans for specific subwatersheds are more complete. Adequate stormwater quantity management must be provided for all specified development on the parcel. The department must approve the specific stormwater management measures for any subwatershed before any activity under the planning permit begins in that subwatershed.***

Details, designs, and specifications. Provide runoff curve number computations and time of concentration calculations for each subcatchment. Areas may qualify as subcatchments based on the characteristics of the site or the model used. Provide back-up calculations for direct entry data in computer models. The department will review all methods of determining subcatchments on a case-by-case basis. Provide a reach description and reach routing analysis for each drainage structure and provide pond descriptions and storage routing calculation for any stormwater management structure, detention pond and culvert backwater areas.

Acceptable stormwater methodologies and models include, but are not limited to, "TR-20 - Computer Program for Project Formulation - Hydrology," Second Edition, U.S. Department of Agriculture, Soil Conservation Service (March 1986); and "TR-55 - Urban Hydrology for Small Watersheds," Second Edition, U.S. Department of Agriculture, Soil Conservation Service (June 1986); "WIN TR-55 2003.00.24 Microcomputer Program," (January 12, 2003); and "HEC-HMS Flood Hydrology Package," U.S. Army Corps of Engineers (January 2001). Any methodology or model other than those listed must have prior approval from the department.

Reference. No Adverse Effect Standard of the Site Location Law (No Unreasonable Effect on Runoff/Infiltration Relationships), 06-096 375.3 and 375.4, Planning Permit, 06-096 CMR 380 and Chapters 500 and 502.

F. General Standards Submissions. Provide a stormwater quality treatment plan for the site. The stormwater quality treatment plan must meet the applicable standards in Chapter 500. ***An applicant seeking a planning permit may delay submission of the treatment plan until the specific plans for development within specific subwatersheds are more complete. Adequate stormwater quality treatment must be provided for all specified development on the parcel. The department must approve the specific stormwater management measures for any subwatershed before any activity under the planning permit begins in that subwatershed.***

(1) Narrative. A narrative describing site layout, and on-site and off-site watershed hydrology, including all new and existing buildings and facilities, which may be affected by the site runoff. Provide the total amount of impervious area, disturbed area, and developed area created by the project. Identify the surface water to which the project site drains.

(2). Drainage Plans. All topographic features, such as buildings and other facilities, drainageways, cover type, roads, drainage easements and subcatchment boundaries for pre-construction and post-construction conditions must be shown on a plan. Show all hydrologic flow lines and hydrologic soil groups boundaries on a plan and identify each subcatchment, reach, and pond consistent with the runoff model. For post-construction conditions, show all new stormwater management structures and changes to the hydrologic drainage patterns. Particular attention should be paid to the subwatersheds that drain to proposed stormwater management structures.

(3) Calculations. The stormwater runoff calculations for measures designed to meet general standards must be in accordance with acceptable engineering practice, including the following:

(a) Water volume. Calculations used to determine the water volume needed to be filtered, infiltrated, or detained based on the proposed site development must be provided.

(b) Buffer sizing. Buffers used for runoff control must be sized according to requirements described in Appendix F of Chapter 500, the Stormwater Management Rules.

NOTE: INCLUDE A SUMMARY OF THE CALCULATIONS IN A SPREADSHEET

(4) Details, designs, and specifications. Submit designs, construction details, and technical specifications for each stormwater management measure that will be constructed, installed, or managed on the site.

(a) Ponds. Submit a plan sheet having the following details and specifications for each stormwater management pond: a topographic plan view of the pond, a cross section of the pond embankment, a cross section and profile of the overflow spillway, test pit information, and specifications for constructing and stabilizing the pond's embankment. The peak storage depth required to meet the general standards must be shown on a cross section for each pond embankment. Submit a cross section of the gravel underdrain filter for any pond used to meet the standards. This cross section must specify the width and elevation of the pond bench, the thickness and gradation for the gravel drainage fill, and the diameter and material for the perforated underdrain pipe.

(b) Underdrained vegetated filters. Submit a plan sheet having the following details and specifications for each underdrained vegetated filter area: a plan view of the filter area, a cross section of the embankment for the filter area at the overflow spillway, a cross section and profile of the overflow spillway, a cross section of the underdrain filter, test pit information, and specifications for stabilizing the filter bed with sod. The cross section of the underdrain filter must specify the thickness and composition of the soil filter media, the thickness and gradation of the gravel drainage fill, and the diameter and material type for the perforated underdrain pipe.

(c) Infiltration. Submit a plan sheet showing the following details and specifications for each infiltration measure: a plan view of the infiltration structure, a cross section of the infiltration measure's runoff storage area, a cross section and profile of the structure's overflow spillway, and details and specifications for permanently stabilizing the infiltration area. The following information must be included, if required, as determined by the department and described below.

(i) Locations of any monitoring wells necessary for assessing the infiltration measure's performance or stormwater infiltration impacts on groundwater, surface irrigation sites, or subsurface wastewater disposal systems must be shown on the site plan.
(ii) Location of an existing or proposed surface irrigation site, waste disposal site, subsurface wastewater disposal system, or other facility that could be impacted by operation of the infiltration system must be shown on the site plan.
(iii) Location of any soil borings, test pits, or other explorations used to determine depth to groundwater, separation from bedrock, or other design information must be shown on the site plan.
(iv) Location of any water supply wells on-site or within 300 feet of the infiltration areas, zones of contribution for public water supply wells must be shown on the plan sheet.
(v) Location of storage for any petroleum products, pesticides, fertilizers, road salt, hazardous materials, or other materials with the potential to contaminate groundwater must be shown on the site plan.
(vi) Plans for management of any potential contaminants and soil sample analyses, such as a spill prevention, control, and countermeasure plan, must be submitted with appropriate supporting information.
(vii) Depth to the seasonal high groundwater table, depth to bedrock, and the thickness and composition of any liner used for restricting infiltration rates must be shown on the cross section view of the infiltration structure.

(d) Buffers. Submit a topographic site plan showing the location of each buffer on the site, showing the layout of any berm level spreaders used to spread flows into each buffer, identifying the soil type (certified by a soil scientist) and cover type within each buffer, and showing the land use and impervious and developed area draining to each buffer area. Provide a typical cross section for the berm level spreaders showing the geometry

of the berm, the geometry of the upstream storage area, and the specifications for the berm material. Submit information demonstrating that the inslope fill material will have slopes no steeper than 3:1. Submit documentation, in the form of draft convenants and restrictions, demonstrating that buffer area(s) will be maintained as buffer.

(5) Phosphorus removal. The phosphorus standard is described at Chapter 500.4(A)(2)(c). If required to meet this standard, submit the items as required under Subsection F (5), under Subsection F (6) and the following.

The department encourages the applicant to use the methods presented in the department manual *Phosphorus Control in Lake Watersheds: A Technical Guide to Evaluating New Development* for designing and implementing a phosphorus control plan. Other methods not yet accepted will be reviewed individually.

(a) Calculations for determining the site's allowable phosphorus export. Default per acre phosphorus allocations used in determining the allowable phosphorus export for most at risk watersheds are available from the Department's Division of Watershed Management (287-3901). The applicant may propose an alternative allocation for the watershed.

(b) Calculations for determining the post-development phosphorus export. The post-development export is based on the extent of the developed area, the cover-type(s) of the developed areas, the treatment measures employed to reduce the phosphorus content in the runoff and the export reduction from any phosphorus offset credits.

(c) Calculations for determining the compensation fee. For those developments whose post-development phosphorus export exceeds the allowable export, provide a calculation for the compensation fee. Determine the excess phosphorus export to be accounted for through compensation by subtracting the allowable phosphorus export from the post-project phosphorus export. Calculate the appropriate fee in accordance with Table 3 of Chapter 501 Stormwater Management Compensation Fees and Mitigation Credit, Section 3(C). If payment of a compensation fee is approved, the payment must be received prior to issuance of a department order.

(6) Responsible party for long-term maintenance. Provide a written plan for the protection and maintenance of the development's stormwater drainage system, stormwater treatment measures, roadways, parking areas, and permanent erosion controls.

G. Components of the maintenance plan. At a minimum, the inspection and maintenance plan must accomplish the following objectives.

(1) Identifies the person responsible for implementing the maintenance plan. Give the name, address, and telephone number of the person responsible for ensuring that maintenance is completed in a timely manner. If the name of the person is unknown, give the title of the person who will have the ultimate responsibility (e.g. the store manager, the homeowner association president, or the public works director).

(2) Specifies the transfer mechanism. State the specific conditions upon which the facilities will be transferred from the contractor(s) to the owner. If a homeowners association will assume the maintenance responsibilities, state the specific conditions upon which the responsibility or the facilities will be transferred from the owner to the association. If a municipality or municipal district will assume the maintenance responsibilities, state the specific conditions upon which the responsibilities or the facilities will be transferred from the developer to the municipal or district authority.

(3) Describes the facilities to be maintained. List the facilities to be maintained, including stormwater ponds, basins, ditches, catch basins, culverts, outlet protection, level spreaders, roadways, parking lots, buffers, and runoff treatment measures.

(4) Establishes the inspection and maintenance tasks. For each facility to be maintained list the maintenance tasks necessary for ensuring the stability and function of the structure.

(5) Identifies any deed covenants, restrictions, or easements on the site. Provide a descriptive list of any deed restrictions, covenants, or easements established for purposes of site drainage, runoff treatment, or facilities access. Provide a plan showing the location of each easement and each area under restriction or covenant.

(6) Provides a maintenance log. Include an example page of the BMP maintenance log that will be kept on-site.

(7) Supplies a copy of any contracts with third parties. If the site owner, operator, association, or municipal authority having maintenance responsibility will hire a third party to perform any maintenance, submit a copy of the completed contract with the third party.

H. Maintenance by a homeowner association. If a homeowner's association will be established for the maintenance of any commonly owned facilities or property, submit a charter meeting the following objectives in addition to those in section A above.

(1) Incorporates the association. Provide for the incorporation of the association.

(2) Establishes the association membership. Provide that each lot owner or lessee automatically becomes a member in the association.

(3) Establishes fee assessment. Empower the association to assess reasonable fees for the maintenance of all common facilities.

(4) Establishes lien system. Make an unpaid assessment a lien against a delinquent lot owner's or lessee's property.

(5) Subjects amendments to department approval. Provide a specific reference indicating that the development is subject to the terms and conditions of the department or board order, including the number of that order when obtained from the department. Provide that any section(s) of the homeowner's association documents related to departmental or board requirements cannot be amended or otherwise altered without specific prior approval by the department.

(6) Provides for a renewal of covenants and leases. Make any covenant or lease agreement automatically renewable at the end of its basic term.

I. Maintenance of facilities by a municipality or quasi-municipal district. If a municipality or municipal district will assume responsibility for all or part of the facilities maintenance, submit a municipally-approved plan that meets the following objectives in addition to those in section A above.

(1) Provides evidence of acceptance. Provide evidence that the municipal authority or district board will accept responsibility for facilities maintenance in accordance with department standards and permit conditions.

(2) Estimates annual expenditures. Provide an estimate of the annual cost to the municipality or district to perform the inspection and maintenance tasks.

J. General inspection and maintenance requirements. General maintenance requirements for drainage control and runoff treatment measures are listed below. Further information on the maintenance needs of stormwater management practices can be found in the Maine DEP's *Stormwater Management for Maine: Best Management Practices*.

(1) Drainage easements. The maintenance plan must include yearly inspections and maintenance to remove any obstructions to flow, to control or prevent vegetated growth that could obstruct flow, and to repair any erosion within the easement corridor.

(2) Ditches, culverts, and catch-basin systems. The maintenance plan must include yearly inspections and maintenance to remove any obstructions to flow, to remove any accumulated sediments within the structures, and to repair any erosion of channel linings, inlet protection, or outlet protection. Vegetated ditches must be mowed or otherwise maintained to control the growth of woody vegetation within the channel.

(3) Roadways and parking surfaces. If pavement sweeping will be done, the maintenance plan must state the frequency and general timing (e.g. early spring) of the sweeping operations.

(4) Stormwater detention and retention facilities. Every detention basin, pond, and infiltration basin built for the control or treatment of stormwater must have a maintenance plan developed by the design engineer. At a minimum, the maintenance plan must include the items listed below.

(a) Embankment inspection and maintenance. Provide a description of the yearly inspections of the impoundment embankments to identify excessive settlement, slope erosion, internal piping, and downstream swamping. Identify the actions to be taken if any problems are found. Provide a mowing plan to prevent the growth of woody vegetation on the embankment.

(b) Outlet inspection and clean out. Provide a description of the semi-annual inspection of the impoundment's outlet control structure to identify broken seals, obstructed orifices, plugged trash racks, and piping along the outlet barrel. Identify the actions to be taken if any problems are found. Provide for the removal and disposal of any sediments and debris within the control structure.

(c) Spillway maintenance. Provide a description of the yearly maintenance necessary for the impoundment's emergency spillway. This may include the mowing of vegetated spillways to control woody vegetation or the repair of riprap spillways.

(d) Sediment removal and disposal. Provide for the occasional removal and disposal of accumulated sediments within the impoundment and the impoundment's forebay (if any). The clean-out frequency ranges from five to twenty years, depending on the sediment load to the pond or basin.

(5) Runoff infiltration facilities. Every infiltration facility built for the control or treatment of stormwater must have a maintenance plan approved by the department. The maintenance plan must include the items listed below.

(a) Protection from sediments. Provide a plan for preventing the deposition of sediment into the basin. This includes a sediment control plan implemented during construction and a runoff pre-treatment plan implemented after construction. Describe how the construction sediment controls and pretreatment measures will be inspected and maintained to prevent excessive sediment reaching the infiltration area.

(b) Infiltration rehabilitation. Provide a plan for the periodic renewal of the infiltration capacity to prevent clogging. Rehabilitation is generally necessary every three to ten years depending on the soil conditions, infiltration surface treatment, and sediment load to the infiltration

measure. Generally, renewal is necessary if the basin fails to drain within 72 hours after a rainfall.

(c) Sediment removal and disposal. Provide for the occasional removal and disposal of accumulated sediments within the infiltration area. The clean-out frequency ranges from two to ten years, depending on the sediment load to the infiltration measure.

(d) Groundwater elevation monitoring. Provide for the observation of groundwater elevation below the infiltration area after every storm event exceeding one-half inch or more. These observations must be recorded in the maintenance log for the site.

(6) Proprietary treatment devices. Provide a maintenance plan and contract for the removal of accumulated sediments, oils, and debris within the device, the replacement of any absorptive filters, or both. The frequency of sediment clean out and filter replacements must be consistent with the unit's storage capacity and the estimated pollutant load from the contributing drainage area.

(7) Buffers. Provide a yearly inspection and maintenance plan to ensure the integrity and function of setback and treatment buffers on the site. Management of the buffer's vegetation must be consistent with the requirements in the deed restrictions for the buffers.

(8) Other practices and measures. Contact staff in the department's Division of Watershed Management for assistance in developing inspection and maintenance requirements for other drainage control and runoff treatment measures installed on the site. The maintenance needs for most measures may be found in the Maine DEP's *Stormwater Management for Maine: Best Management Practices*.

(9) Maintenance contract. Submit an executable contract with a third-party for the removal of accumulated sediments, oils, and debris within any proprietary devices and the replacement of any absorptive filters if these measures are part of a project's proposed stormwater management system. An applicant that has the personnel and equipment necessary to perform maintenance on any proprietary devices may submit a demonstration of capability in lieu of an executable contract with a third party. The frequency of sediment clean-out and filter replacements must be consistent with the unit's storage capacity and the estimated pollutant load from the contributing drainage area. This clean-out frequency is usually established by the manufacturer of the proprietary system when sizing the device for the project. The contract must state that a qualified professional will perform maintenance on stormwater management systems to maintain pollutant removal levels.

References: No Adverse Effect Standard of the Site Location Law (No Unreasonable Effect on Surface Water Quality) 06-096 CMR 375.6, Planning Permit, 06-096 CMR 380 and Chapters 500 and 502.

Section 13. Urban impaired stream submissions.

If required, the urban impaired stream standard applies in addition to the basic, general and flooding standards.

A. When the urban impaired stream standard must be met. If a project located within the direct watershed of urban impaired stream or stream segment listed in chapter 502 results in three acres or more of impervious area or 20 acres or more of developed area, requires review pursuant to the Site Law, or is a Site Law modification of any size as described in Section 16 of this chapter, the urban impaired stream standard must be met.

B. Description of the urban impaired stream standard. In addition to meeting the basic and general standards, a project in the direct watershed of an urban impaired stream must pay a compensation fee or mitigate project impacts by treating, reducing or eliminating an off-site or on-site pre-development impervious stormwater source as described in Section 6(A) of Chapter 500.

Compensation fees must be paid to the department's compensation fund or to an organization authorized by the department pursuant to the Stormwater Management Law, 38 M.R.S.A. § 420-D(11).

Section 14. Basic Standards submissions.

A. Narrative. Provide a narrative describing the site's erosion potential and the measures to be employed to control erosion and sedimentation during construction and after completion of the development. Describe the temporary and permanent erosion control methods to be employed on the site. ***An applicant seeking a planning permit need only identify those measures suitable for the site given the site's soils, topography, resources, hydrology and development schedule.***

B. Give the expected date by which final stabilization of the site will be complete. ***An applicant seeking a planning permit need only identify those stabilization measures suitable for the site and may omit the expected date of final stabilization.***

C. Show the locations of all roads, lot boundaries, buildings, parking lots, material stockpiles, existing and proposed culverts, drainage channels, catch basins, subsurface drainage pipes and storm drain outfalls. ***An applicant seeking a planning permit for a development may delay showing these specific locations on the plan until plans for development within specific areas of the parcel are more complete. The department must approve the specific erosion and sedimentation controls for any area of the parcel before any activity under the planning permit begins in that area.***

D. Show the location of all temporary and permanent erosion controls to be installed on the site. ***An applicant seeking a planning permit may delay showing these specific locations on the plan until plans for development within specific areas of the parcel are more complete. The department must approve the specific erosion and sedimentation controls for any area of the parcel before any activity under the planning permit begins in that area.***

E. Show the limits of the areas disturbed by construction. ***An applicant seeking a planning permit may delay showing these specific limits on the plan until plans for development within specific areas of the parcel are more complete. The department must approve the specific erosion and sedimentation controls for any area of the parcel before any activity under the planning permit begins in that area.***

F. Provide design drawings and specifications for the temporary and permanent erosion and sedimentation control measures to be used on the site. The drawings and details must be sufficiently detailed to allow a contractor unfamiliar with the controls to install and maintain them. The applicant is encouraged to choose appropriate measures for the site by utilizing the specifications and siting criteria in the Erosion *and Sediment Control Handbook for Construction: Best Management Practices* produced jointly by the Cumberland County Soil and Water Conservation District and the department. ***An applicant seeking a planning permit need only submit general designs and details. The submission of specific, engineered designs may be delayed until plans for development within specific areas of the parcel are more complete. The department must approve the specific erosion and sedimentation controls for any area of the parcel before any activity under the planning permit begins in that area.***

G. Provide calculations for sizing, spacing or stabilizing each erosion and sedimentation control measure. These calculations must include analyses for determining the peak runoff flow to a control, its storage volume and its outlet design. The applicant is encouraged to design controls for the site utilizing the design methods and specifications in the *Erosion and Sediment Control Handbook for Construction: Best Management Practices* produced jointly by the Cumberland County Soil and Water Conservation District and the department. ***An applicant seeking a planning permit may***

delay submitting these calculations until plans for development within specific areas of the parcel are more complete. The department must approve the specific erosion and sedimentation controls for any area of the parcel before any activity under the planning permit begins in that area.

At a minimum, the erosion and sedimentation control plan must include the following.

(1) Location plan. Submit a plan sheet or set of plans showing, at a minimum, the location of structures, disturbed land, pre-construction site topography, post-construction site topography, on-site or adjacent water resources, and all erosion and sediment control measures.

(2) Site details. Submit a plan sheet showing the following.

(a) Erosion and sedimentation control notes. Erosion and sedimentation control notes, must include, but not limited to, permanent stabilization measures, seeding and mulching rates, and a construction schedule with the proposed construction dates and timeframe for major earth moving and construction events.

(b) Construction and installation details. Construction and installation details for erosion and sedimentation control measure must include, but are not limited to, sedimentation barriers, ditch lining, rip rap, and culvert inlet and outlet designs.

NOTE: For guidance, see the Maine Erosion and Sediment Control BMP Manual.

(c) Inspection and maintenance plan. Submit a plan for the inspection and maintenance of the temporary and permanent erosion and sedimentation controls for the project site as described in Appendices A and B of Chapter 500, the Stormwater Management Rules. At a minimum, the inspection and maintenance plan must include the following:

(i) List of measures. Submit a list of the erosion control measure and stormwater management measures to be inspected and maintained (e.g., "parking lot catch basins").

(ii) Inspection and maintenance tasks. Submit a list of inspection and maintenance tasks specific to each erosion control measure or stormwater management measure (e.g., "remove accumulated sediment s in basin sumps"). Submit the specific qualifications of the person performing each task (e.g., "a professional professional engineer registered in the State of Maine will inspect the retention pond embankment").

(iii) Task frequency. Indicate the required frequency of each inspection and maintenance task (e.g., "accumulated sediments will be removed from all catch basins annually in early spring").

(d) Responsible parties. Submit the name, job title, employer, employer address, phone number, and current email contact information for the person responsible for ensuring that inspection and maintenance tasks are completed. Submit the names, job titles, employer addresses, phone number, and any current email contact information of the engineers or other design professionals who designed the erosion control measures and stormwater management measures for the site. Include suppliers of proprietary erosion control measures or proprietary stormwater management measures used on the site.

(e) Maintenance plan for detention basins or retention ponds. For each stormwater management pond or basin submit, at a minimum, an inspection and maintenance plan for the pond's embankments, outlet structure, and emergency spillway. Include as part of this plan provisions for the removal and disposal of accumulated sediments in the pond and the control of woody vegetation on the pond's embankments.

(f) Maintenance plan for infiltration structures. For each infiltration structure, submit, at a minimum, an inspection and maintenance plan for the structure's pretreatment measures, embankments, surface lining, and overflow spillway. Include as part of this plan provisions for the removal and disposal of accumulated sediments in the structure and for the rehabilitation of clogged surface linings.

(g) Maintenance plan for vegetated underdrained filters. For each vegetated underdrained filter, submit, at a minimum, an inspection and maintenance plan for the filter embankments, surface lining, underdrain piping, and overflow spillway. Include as part of this plan provisions for the removal and disposal of accumulated sediments in the structure, the rehabilitation of clogged surface linings, and the flushing of underdrain piping.

(h) Maintenance plan for stormwater buffers. At a minimum, submit a plan for inspecting and maintaining the integrity and function of the project's stormwater buffers. As part of this plan, include provisions for the inspection, maintenance, and, if necessary, reconstruction of any level spreaders or ditch turnouts used to spread runoff into the buffers. Include as part of this plan provisions for the frequent removal and disposal of accumulated sediments and debris in the level spreader and turnout bays, provisions for the inspection and repair of any eroded areas within the buffer, and provisions for the reestablishment of buffer vegetation destroyed by post-construction activities.

(i) Maintenance plan for manufactured stormwater treatment systems. For each manufactured system installed on the site, submit an inspection and maintenance plan for the system's inlet, treatment chamber(s), and outlet. The plan shall conform to the inspection and maintenance guidelines recommended by the manufacturer based on the estimated runoff and pollutant load expected to the system from the project. As part of this plan, include provisions for the frequent removal of accumulated sediments, debris, and contaminated waters from the system and, if applicable, provisions for the removal, disposal, and replacement of any clogged or spent filter media.

(j) Maintenance plan for ditches, culverts, and storm drains. Provide an inspection and maintenance plan for all stormwater conveyances to be built or installed on the site – including, but not limited to, ditches, swales, culverts, catch basins, and storm drain piping. As part of this plan, include provisions for the repair of eroded areas at the inlet, within, and at the outlet of each conveyance and include provisions for the frequent removal and disposal of accumulated sediments and debris at the inlet, within, and at the outlet of each conveyance.

(k) Housekeeping. Submit a plan to address spill prevention, groundwater protection, fugitive sediment and dust, debris and other materials, trench or foundation de-watering, or non-stormwater charges, as applicable to the specific site. Housekeeping requirements are described in Appendix C of Chapter 500.

Note: Third-party inspections. The department may require third-party inspections of the development's erosion and sedimentation controls during construction and immediately after final stabilization. In all cases, the third party inspection program, to be implemented by the applicant, must comply with the "Special Condition for Third Party Inspection Program" that will be incorporated as part of the department order issued for the development.

References: No Adverse Effect Standard of the Site Location Law (Erosion and Sedimentation Control), 06-096 CMR 375.5, Planning Permit, 06-096 CMR 380, and Financial Capacity Standard of the Site Location Law (Technical Ability to Meet Air and Water Pollution Control Standards), 06-096 CMR 373.2.

Section 15. Groundwater

A. Narrative and report. Include the following:

(1) Location and maps. Delineate project boundaries on copies of relevant sections of the following maps if available: Maine Geological Survey (MGS) Sand and Gravel Aquifer Map; MGS Surficial Geology map; and MGS Bedrock Geological map.

(2) Quantity. Estimate of the quantity of groundwater (gal/day) to be used, discharged or otherwise extracted by the development. If adverse impacts of groundwater withdrawal including, but not limited to salt water intrusion, reduction of groundwater availability to existing or proposed water supplies or protected natural resources, as defined at 38 M.R.S.A. § 480-B, or land subsidence have been or can be a problem, provide a report by a certified geologist addressing the potential effects of the development on groundwater quantity.

(3) Sources. Identification of all potential sources of contamination including, but not limited to wastewater, solid waste, hazardous materials, fuel, solvents or other chemicals handled, stored or disposed of on site. Normal household quantities of these substances need not be specifically listed. If a Phase I or Phase II environmental assessment has been required by a bank, insurance company or other financing agent include the results of this assessment.

(4) Measures to prevent degradation. Description of the measures to be taken to prevent the degradation of existing ground water quality. Summarize the design, construction, operational and monitoring (if proposed) specifications and procedures to be followed. Monitoring may be required in certain cases including, but not limited to developments that propose storage or disposal of liquid or solid waste, wastewater, or fuel, or infiltration of stormwater. Monitoring may also be required in cases where salt-water intrusion or other activities related to extraction of on-site groundwater may have an adverse impact on predevelopment water quality or quantity. Basic elements of a monitoring plan are outlined in subsection C below. This monitoring program must include monitoring of surface water quality, soils and other media if determined to be necessary by the department.

B. Groundwater protection plan. If a development will use or store petroleum products, pesticides, herbicides, fertilizer, road salt, solvents, acids or other materials with the potential to contaminate groundwater, provide a groundwater protection plan. The groundwater protection plan must include measures including, but not limited to: equipment design, operational procedures, preventive maintenance, construction techniques and materials, personnel training, spill response capabilities and spill prevention, control and countermeasures plans, alternative materials or processes, implementation of new technology, modification of facilities or equipment, best management practices, hazardous waste contingency plans, runoff or infiltration control systems and siting considerations. Specific exemptions for normal household quantities of these materials should be discussed at the pre-application meeting.

C. Monitoring plan. For a development required to monitor the quality and/or levels of surface water or groundwater, provide a water quality monitoring plan as a separate manual. This document must be prepared, signed and dated by a professional qualified in water chemistry interpretation and/or a certified geologist. The document must include the information listed below. If groundwater monitoring wells will be used, submit the information in subsection D.

(1) Monitoring points. Identification and summary of all monitoring points (e.g. monitoring wells, lysimeters, springs, etc.) to be used for measurement of water level or for water quality analysis. Monitoring points must have an assigned identification symbol (alpha/numeric) and, as appropriate, elevation referenced to an established permanent benchmark. Include a map showing all monitoring points.

(2) Monitoring frequency. Outline of the monitoring frequency at each monitoring point by the number of sampling/analysis events per year (e.g. quarterly, etc.) and by month (e.g. April, September, etc.).

(3) Background water quality/levels. Provision for obtaining adequate data on background water quality and/or levels and for using a statistically valid method for determining a significant increase in parameter concentrations (e.g. contamination levels, but not necessarily MCL's/MEG's). At a minimum, determination of background water quality or levels must consist of quarterly monitoring for 1 year.

(4) Monitoring parameters. List of parameters to be analyzed including references to the laboratory analysis methods to be utilized for each parameter, detection limits for each analysis method and the MCLs/MEGs for all applicable parameters. All monitoring must include field parameters (conductivity, temperature, pH and TDS), in addition to parameters specific to the monitoring program objectives.

(5) Monitoring personnel qualifications. Identification of the qualified personnel responsible for taking water level measurements and water quality analysis samples. The applicant or employee of the applicant should not do these tasks, but, if proposed, then subsection 6 below must be addressed.

(6) Proof of adequate training. Written certification from a qualified expert that the personnel conducting monitoring are or will be adequately trained to properly collect measurements and/or samples by approved methods and protocols.

(7) Monitoring equipment and methods. Description of the equipment and methods to be employed for water level measurement and/ or water quality analysis sample taking.

(8) Quality assurance/quality control and chain-of-custody protocols. Description of the quality assurance/quality control and chain-of-custody protocols to be followed for water quality sampling, preservation, storage, transport and laboratory analysis.

(9) Reporting requirements. Provision to submit all data and analyses to the department annually, or at another schedule required by the department. Annual reports should present data in a tabular format including data from previous monitoring. In the event contamination is detected, or operational problems which could lead to contamination occur, the department must be notified immediately. Reports must be signed and dated by the professional responsible for their preparation.

(10)Remedial action/mitigation plan. A provision that, if water levels or water quality monitoring results indicate adverse effects are occurring as a result of the project activity, then an evaluation will be made by a qualified professional and an appropriate remedial action and/or mitigation plan will be developed and submitted to the department for review and approval.

D. Monitoring well installation report. If an applicant is required to monitor groundwater level or quality, then locations, depths and construction details of monitoring wells or piezometers must be provided. Submit a report, endorsed by a certified geologist, containing a narrative which indicates the date each monitoring point was installed, the method of installation, the purpose and objectives of the monitoring network and a discussion on the basis for selection of monitoring well or piezometer locations and depths. Include the following information.

(1) Well location map. A map showing final groundwater monitoring well or piezometer locations with identification symbols (alpha or numeric) for each monitoring point, including the location of the benchmark (BM) used to determine well or piezometer elevations and ground surface elevations. Include notes describing the BM, its reference elevation, and the name, title and address of the party responsible for establishing the BM.

(2) Elevation data. Elevations (to the nearest tenth of a foot) of the following for each monitoring point: ground surface, top-of-casing (at the specific point on casing from which groundwater depth will be measured) and the top and bottom of the well/piezometer screen interval referenced to an identified BM. Elevations based on the NGVD of 1929 are preferable; however, an assumed datum may be used.

(3) Well installation/measurement data. Measurements (to the nearest tenth of a foot) of the following for each monitoring point: depth to bottom of borehole and well casing from ground surface and height above the ground surface of top-of-casing (i.e. pipe "stickup" height).

(4)Well construction details. Description of type and thickness of seals, texture of packing used around screened interval and diameter/specifications of well screen and casing.

(5) Borehole logs. Borehole logs annotated by a certified geologist if a well driller recorded original logs.

(6) Summary of groundwater depth measurements. Summary of depths and elevations measurements to phreatic or potentiometric groundwater surface.

(7) Hydrogeologic characteristics of subsurface strata. Hydraulic conductivity of subsurface strata and associated field data and calculations. Include estimated time-of-travel from potential contamination sources to each monitoring point.

(8) Well installation contract details. Copy of well/piezometer drilling and installation contract and specifications, if any.

(9) Schematic cross section. The information outlined in subsections 2 through 6 above should be included in schematic cross-section diagrams for each monitoring point installed.

(10). Monitoring point summary table. Include a summary table for all monitoring points, containing the monitoring point identification symbol, top-of-casing elevation, ground surface elevation and well/piezometer depth.

(11) Protective casing. Provide protective steel casings with locking caps or other measures to protect the wells (e.g. near high-traffic areas, bollards may be necessary to further protect monitoring points).

(12) On-site well identification. Permanent I.D. markings that include a tag inside the well cap and I.D. markings on the outside of the protective casing must be provided. A witness stake or flagging at each monitoring point or brightly painted casing should be considered so that monitoring points may be easily found, except in cases where vandalism is likely and subdued monitoring locations are more practical.

An applicant seeking a planning permit need only provide the maps required by Section 15(A) and a general statement indicating the approximate volume and nature of potential contaminants to be stored and used on-site. Specific details of the groundwater protection plan, groundwater monitoring plan and any potential discharges to groundwater may be delayed until plans for development are more complete.

Reference: No Adverse Environmental Effect Standard of the Site Location Law (No Unreasonable Adverse Effect on Surface Water Quality; No Unreasonable Adverse Effect on Ground Water Quality; No Unreasonable Adverse Effect on Ground Water Quantity), 06-096 CMR 375.6-8; and Planning Permit, 06-096 CMR 380.

Section 16. Water supply

A. Water supply method. Describe the method(s) by which drinking and process water will be supplied to the development.

(1) Individual wells. An individual well is a well serving a single-family residence, such as a house or mobile home, or providing less than 300 gallons per day to a facility of any other type. If the use of individual wells is proposed, provide evidence from a certified geologist or a well driller knowledgeable about the development vicinity that a sufficient and healthful water supply is likely to be available for the development.

(a) Support of findings by well driller. Support positive findings by a well driller with information including: number of wells established by the driller in the vicinity of the development; identification and locations of these wells on a site map such as a U.S.G.S. topographic map; the type and depths of the wells; the types and depths of soil and bedrock encountered at the well sites; water quality data from these wells (if available); and well yields. Supplement this information with data for the vicinity from the Maine Geological Survey (287-2801).

(b) Support of findings by geologist. Support positive findings by a certified geologist with a report which summarizes and interprets hydrogeologic data for the region, correlated to the project site, and including on-site hydrogeologic data, if available, including the Maine Geological Survey database. Include available well drilling and water quality/quantity data.

(2) Common well(s). A common well is an individual well or part of a group of wells providing water to more than one single-family dwelling, or to a facility requiring more than 300 gallons per day (gpd). If use of a common well or wells is proposed, provide the following:

(a) Hydrogeology report. A report from a certified geologist indicating a sufficient and healthful water supply is likely to be available to the development that includes: information as outlined in subsection A.1.b above, a map showing recommended location of the common well or wells, and a determination of the risk of adverse effects on any off-site wells or protected natural resources (as defined in 38 M.R.S.A. § 480-B) due to groundwater withdrawal.

(b) Engineering report. A report from a registered professional engineer that includes evidence indicating adequate provisions have or will be made for the proper long-term operation and maintenance of the water supply system, identification of the personnel responsible for that operation and maintenance, and design plans and detail sheets, as appropriate, for the water storage, treatment and distribution system.

(c) Well installation report. A report stating the name of the well driller, giving the date the well was installed and including a map showing the actual installed location. The report will also include the well depth, well drilling log (describing strata found), well construction details (casing type/diameter, casing length, screen depth/length, etc.) and an estimate of the well yield for each well. If the well is not installed at the time of application submission, indicate a schedule for providing this information after the well or wells are established.

(d) Long-term safe yield and zone-of-influence determination. If determined to be necessary by the department, submit a determination of the long-term safe yield of each well, including a prediction of operating levels and determination of the zone of influence and zone of capture for each well. Include any pump-test data and interpretation, monitoring data, proposed monitoring plan, or other information required by the department or the Department of Human Services' Drinking Water Program to assess these factors and the potential impact on existing wells and surface-water resources due to groundwater withdrawal.

(e) Public water supply. A public water supply has at least 15 service connections or will regularly serve an average of 25 individuals daily for at least 60 days per year. If the common well or wells meet this definition, provide the following, as required for preliminary and final approval of community and non-community (transient and non-transient) public water supply wells by the Department of Health and Human Services, Division of Environmental Health, Drinking Water Program (DHHS-DWP):

(i) Proposed well or wells. If a well(s) does not exist at the time of application submission, provide a copy of the application and attachments required for preliminary approval by DHHS-DWP and indicate a schedule for providing a copy of the application and attachments required for final DHHS-DWP approval.

(ii) Existing well or wells. If a well(s) is existing at the time of application submission, provide a copy of the application and attachments required for either after-the-fact approval by DHHS-DWP, or for preliminary and final approval, as applicable.

(3) Well construction in shallow-to-bedrock areas. For subdivisions where on-site water supply wells and subsurface wastewater disposal systems are proposed, include provisions for installing water supply wells with casing set and grouted a minimum of 20 feet below the solid bedrock surface in areas where bedrock is encountered at a depth of 10 feet or less.

(4) Additional information. If the department considers that a sufficient and healthful water supply may not be provided by on-site wells, the following may be required: potability tests of water from wells located in proximity to the site; establishment of one or more test wells on the site, pump tests of the well(s); and a report by a certified geologist indicating the yield and potability of water obtained from the well(s). A complete hydrogeologic assessment of groundwater quality and quantity may also be required.

(5) Off-site utility company or public agency. Provide a letter from the supplier demonstrating that a sufficient and healthful water supply exists and may be utilized by the development.

(6) Other sources. Describe any other sources of water supply and provide evidence of acceptable water quality and quantity.

B. Subsurface wastewater disposal. If water supply wells and subsurface wastewater disposal are to be handled on-site, and any proposed lots are less than 2 acres in size, identify the location of wells and footprints of on-site subsurface wastewater disposal fields at each lot. If water supply wells and subsurface wastewater disposal are to be handled on-site, demonstrate that there is sufficient room on each lot to locate water supply wells and on-site disposal systems, or make other provisions for water supply and wastewater disposal.

C. Total usage. Indicate the total anticipated water usage by the development (gallons/day).

For a planning permit, if water is supplied by an off-site utility, the applicant must submit a letter from the utility stating that it has adequate capacity to provide the maximum volume of water to be used by the facility at full build-out, presuming full build-out within the year following approval, through at least the next five years, given reasonably anticipated changes in demand on that utility from other sources during that time. If a construction schedule is established as a condition of the permit, an alternate demonstration of adequate capacity may be approved.

If water is to be supplied on site, an applicant seeking a planning permit need only provide an estimate of the maximum water usage by the development at full build-out, an indication of the availability of sufficient quality of potable water on site and a statement of whether or not

the on-site source will be a public water supply. Submission of specific information regarding the location, protection and potential impacts of water supplies may be delayed until plans for development are more complete.

Reference: Financial Capacity Standard of the Site Location Law (Adequate Provision for Securing and Maintaining Sufficient and Healthful Water Supplies), 06-096 CMR 373 and Planning Permit, 06-096 CMR 380.

Section 17. Wastewater disposal

A. On-site subsurface wastewater disposal systems. If sewage disposal will be by subsurface wastewater disposal systems, provide an on-site investigation report by a licensed site evaluator and, if required by subsection B, a certified geologist, including the following information as applicable. Note that only test pits are acceptable for reporting soil conditions for subsurface wastewater disposal, except as provided for in subsection A (4)(a).

(1) Site plan. A site plan showing site topography, project boundaries, and layout of the proposed development ; location of all subsurface explorations (test pits, borings, etc.) with corresponding numbers or other identifying alphanumeric code; any existing on-site water supply wells or existing off-site wells within 300 feet of the project boundaries, and proposed subsurface wastewater disposal field locations (i.e. footprints) including limits of fill extensions for disposal fields on slopes greater than 10%. Test pits must be located clearly within disposal field footprints. The site plan must also include an identification of the responsible licensed site evaluator, a note referencing the associated soil report by title and date, and an identification of subsurface exploration and disposal field footprint symbols utilized in the plan. Note that additional information may be required by subsection B (3)(b).

(2) Soil conditions summary table. Soil conditions summary table including all subsurface explorations, and indicating lot number, exploration identification symbol, soil profile/condition, depths to limiting factors, and identifying the test pits to be used for disposal field designs. Use copies of Form E, Part III. Borings and probes are acceptable only to address subsection A (4)(a).

(3) Logs of subsurface explorations. Logs of all subsurface explorations (test pits, borings, probes, etc.) evaluated in conducting any on-site investigation, signed and dated by a licensed site evaluator. Boring logs, if monitoring wells are required by subsection B, must be annotated by a certified geologist if a well driller initially recorded logs. Use copies of Form F, Part III for site evaluator test pit profile logs.

(4) Additional subsurface explorations. A sufficient number of test pits must be provided within the footprints of all proposed wastewater disposal fields to adequately document that disposal fields can be installed entirely on soils and slopes in compliance with the Subsurface Wastewater Disposal Rules (10-144A CMR 241). Provide additional subsurface exploration data for certain soil conditions or disposal field designs, as outlined by the following:

(a). Soil condition AIII (bedrock depth less than 24"). A minimum of 5 subsurface explorations: one test pit is to be centrally-located within disposal field footprints, plus a subsurface exploration at each disposal field corner which may consist of either a test pit, boring, or probe.

(b). Soil with profile 8 or 9-parent material (lacustrine/marine deposits). A minimum of 2 test pits: each test pit to be located near each end of disposal field footprints.

(c) Soil condition D (limiting factor depth less than 15"). A minimum of 2 test pits: each test pit to be located near each end of disposal field footprints.

(d) Disposal field length of 60 feet or longer. A minimum of 2 test pits: each test pit to be located near each end of disposal field footprints.

(5) 3-bedroom design. For proposed residential subdivisions, investigations of soil areas for suitability for subsurface wastewater disposal and delineation of disposal system footprints at each lot must consider that all proposed subsurface wastewater disposal systems will accommodate a wastewater flow volume generated by a 3-bedroom single family dwelling, as an assumed minimum, unless common or engineered systems are proposed.

(6) Larger disposal systems. If sewage disposal is to be provided by one or more systems serving 2 or more residences (e.g. common systems), or with design flow(s) greater than 500 gallons per day, provide the following additional information if determined to be necessary by the department. Note that approval by the Department of Health & Human Services' (DHHS) Division of Health Engineering is also required for engineered disposal systems (design flows of 2000 gallons or more per day), and that disposal of any wastewater other than normal domestic sanitary wastewater or the equivalent may require a waste discharge license from the Division of Water Resource Regulation. DHHS approval does not exempt a disposal system from the requirements of Subsection B of this section, or other water quality requirements determined to be applicable by the department.

(a) System design details. Provide design flow criteria, system sizing calculations and indicate system type (e.g. trench, bed, chambers, tubes, etc.), and other relevant information including materials specifications and installation details.

(b) Plan view. Plan view showing the layout of the system including limits of the disposal field and backfill extensions, piping network, chamber arrangements within each system (if applicable), septic tank(s), pump/dosing chamber(s) (if applicable), direction of ground surface slope, description/locations of benchmarks (elevation reference points), locations of control points for determining disposal field location on-site and identification/labeling of disposal system components.

(c) Cross-sections. Cross-sections of the proposed disposal field(s) showing details such as proposed elevations, fill depths, limits of backfill extensions, thickness/depth of disposal fields and identification/labeling of disposal system components.

(d) Test pit data. Provide sufficient test pit data to verify that adequate soils exist for the entire dimensions of the proposed disposal system. At a minimum, a licensed site evaluator must provide test pit profile data from each corner and a central point within the proposed field or fields. In addition, provide ground surface elevations, referenced to a benchmark or elevation reference point, at all test pits located within the disposal field footprint(s).

(e) Mounding analysis. For engineered systems, provide a mounding analysis by a registered professional engineer of the expected localized rise in the saturated zone in order to determine that an adequate vertical separation distance is specified in the system design between the bottom of the disposal field and any mounded water table.

B. Nitrate-nitrogen impact assessment

(1) When required. For all subsurface wastewater disposal systems proposed at the development, provide an assessment report by a certified geologist of the effect of nitrate-nitrogen (NO_3-N) on groundwater quality, demonstrating that the concentration of NO_3-N in

contaminant plumes from the on-site disposal systems will not exceed 10 mg/l at the downgradient project boundary, or at any existing/proposed water supply well located downgradient of the systems.

(a) Exemptions. The following subsurface wastewater disposal systems are exempt from a NO_3-N impact assessment requirement:

(i) Conventional disposal systems: Systems disposing of less than 300 gallons per day (gpd) of domestic wastewater (as defined in the Maine Subsurface Wastewater Disposal Rules, 10-144A CMR 241), if setbacks are maintained between disposal fields and downgradient project boundaries, or downgradient existing or proposed water supply wells, as determined by the soil profile and geologic conditions, according to the following table:

Distance to Downgradient Project Boundary or Wells	Soil Profile & Condition*	Geologic Conditions
300 feet or more	soil condition A	bedrock depth at 36 inches or less
300 feet or more	soil profiles 4, 5, or 6	ablation till and stratified drift
200 feet or more	all other suitable profiles	deep tills, marine, and lacustrine deposits

* As classified by Table 600.1 of the Maine Subsurface Wastewater Disposal Rules (10-144A CMR 241).

(ii) Denitrification systems. Acceptable setbacks between disposal fields and downgradient project boundaries, or existing or proposed water supply wells to be determined from research data showing efficiency of the system design in reducing total nitrogen in the wastewater.

(b) Special conditions and other exemptions. The department reserves the right to require a NO_3-N impact assessment for disposal systems described in subsection B.1.a above, if conditions warrant, as determined at a pre-application meeting. The department may exempt larger individual disposal systems, and common and engineered systems, from the NO_3-N assessment requirement, on a case-by-case basis, provided that compliance with the intent of this subsection can be demonstrated.

(2) Assumptions. Assumptions include but may not be limited to the following.

(a) Initial concentration. For conventional systems, assume that NO_3-N initially enters the groundwater at a concentration of 40 mg/l. For denitrification systems or conventional systems that include a denitrifying component or components, the initial NO_3-N concentration must be determined on a case-by-case basis from valid field test data provided by the designer and/or manufacturer of the proposed denitrification system.

(b) Background concentration. In lieu of on-site water quality analyses, assume a background groundwater NO_3-N concentration of 2.0 mg/l provided that the site is undeveloped and no adjacent development exists upgradient of the site, unless the department or the investigating geologist suspects that the background NO_3-N concentration in the groundwater is greater. Water quality data from off-site or on-site wells may be acceptable provided that the samples are determined by the department to be reasonably representative of shallow groundwater quality conditions at the site.

(c) Contribution from development. For residential developments with lawns, or other developments such as golf courses or recreational areas with large grassed areas, assume that the contribution of fertilizer to groundwater NO_3-N is 5% of nitrogen applied, based on an application rate of 0.45 pounds nitrogen per 100 square feet, with 6,000 to 15,000 square feet of applied area per lot in a residential development unless other application rates and areas apply.

(d). Mixing and dilution. If dilution by precipitation is assumed as part of the assessment, assume an average concentration of 0.5 mg/l for NO_3-N in precipitation. Use the tables below to determine the percentage of the annual precipitation available for dilution as a function of surficial geologic deposits or hydrologic soil groups.

(i) Recharge rates determined by surficial geology units

Surficial Geology unit	Average Annual Recharge Rate (percentage of annual precipitation)
ice-contact and outwash sand & gravel	40% to 50%
glaciomarine clay/silt	5% to 15%
thick silty lodgement till	5% to 15%
thick coarse-grained (granite-derived) till	15% to 40%
thin sandy till-like soil over bedrock	5% to 20%

(ii) Recharge rates determined by slope and hydrologic soil group

Slope (%)	Average Annual Recharge Rate (percentage of annual precipitation by hydrologic group)			
	A	B	C	D
0 to 8	43%	33%	21%	0%
8 to 15	35%	26%	19%	0%
15 to 25	27%	21%	17%	0%
> 25	21%	17%	14%	0%

Recharge rates for shallow upland soils underlain by fractured bedrock which are designated in hydrologic soil group D are determined according to geologic properties, rather than the hydrologic soil group.

Selection of the appropriate recharge rate at a site depends on factors such as the nature, density and duration of the post-development vegetative cover, the ground surface slope, the degree of ground surface roughness and the soil drainage class, in addition to the type of surficial deposit.

(e) Severe-drought scenario. In cases where the projected NO_3-N contaminant plume concentration at the development boundary is greater than or equal to 8.0 mg/l, analyze nitrate impact under a severe-drought scenario based on 60% of the average annual recharge. Contaminant plume concentrations may not exceed 10 mg/l at the property boundary under this scenario.

(f) Wastewater flow to subsurface wastewater disposal fields. Wastewater flow to subsurface wastewater disposal systems is based on the design flow criteria of the Subsurface Wastewater Disposal Rules, 101-144A CMR 241 unless water-use records for establishments (other than single family dwellings) are provided in accordance with those

rules. For single family dwellings, the NO_3-N impact assessment must be based on wastewater flow for 3-bedroom capacity as an assumed minimum.

(3) Assessment report minimum requirements

(a) Narrative and calculations. Provide a report evaluating all relevant hydrogeologic, geologic and soils information for the study area. Include previously published data; an explanation of the method(s) used to determine the impact of the disposal systems; the assumptions used and evidence supporting those assumptions; all calculations; background groundwater quality data if available; a summary of the results and conclusions; and a list of references used.

(b) Site plan. In addition to the information required by subsection A (1), show the following on the site plan.

(i) Optimum locations for all proposed water supply wells (if applicable). Well locations may be shown as areas rather than points, or well exclusion zones may be delineated.

(ii) 10 mg/l and 8 mg/l NO_3-N isocons at steady-state conditions, and when appropriate, the nitrate concentrations at the property boundary.

(iii) Groundwater contours and groundwater flow divides if on-site monitoring of groundwater depths is conducted.

(iv) Locations of any groundwater monitoring wells or other wells, and identifying symbols, if installed or used for the nitrate-nitrogen impact assessment.

(4) Denitrification systems. If denitrification systems are proposed, provide the following.

(a) Design plans and specifications. Design plans, including system layout, elevation, and cross-sections for the proposed systems, and specifications including wastewater design flow, treatment method and material specifications in addition to documents containing relevant theoretical considerations and applied research relevant to the system and a list of references used in completing the design.

(b) Installation information. Information demonstrating that the designer or manufacturer of the system, or other qualified and experienced professional acceptable to the department, will oversee installation.

(c) Monitoring plan. A groundwater and wastewater monitoring plan developed by a certified geologist to evaluate the performance of the system. Details to be provided in a monitoring plan are outlined in Section 15(C).

(d) Maintenance requirements. Identification of maintenance requirements for the system(s), and an operation and maintenance plan for the system(s). Provisions must be made to provide a copy of this plan to any homeowner with a denitrification system.

(e) Backup system. Demonstration that a suitable backup system can be installed in the event of a malfunction of the denitrification system. A reserve area with suitable soil conditions must be delineated on the plan and be reserved for replacement of the system. Soil profile data must be submitted to verify suitable soil conditions in the reserve area.

C. Municipal facility or utility company letter. If a municipal facility or utility company will provide sewage disposal, provide a letter from the municipal facility acknowledging that there is sufficient

collection and treatment capacity, and stating that the municipality agrees to accept the amount and nature of the wastewater flow from the development. The site plan must locate the proposed connection to the existing sewer system. If the project includes an extension of the existing sewer collection system, the plans and specifications regarding that extension must be included or be supplied at a later date. If the project includes a new pump station, the plans and specifications regarding that pump station must also be included or be supplied at a later date. A sewer extension involves the construction of a new sewer intended to pick up new lateral connections; reviews are required for both public and private extensions. A single discharge pipe from one building to an existing sewer is not considered a sewer extension. See 38 M.R.S.A. § 361.

D. Wastewater discharge information. If the development will discharge any liquid waste into any stream, river, pond, lake or other body of water including tidal waters, describe the type of discharge, volume of discharge and body of water affected.

A Wastewater Discharge License from the Bureau of Land and Water Quality, Division of Water Resource Regulation, may be required. For further information contact the Bureau of Land and Water Quality (287-3901).

E. Storage or treatment lagoons. If the development will include any lagoons, impoundments, ponds, or similar structures for storage, treatment, infiltration or other functions involving water or liquid waste other than solely stormwater, submit information describing the proposed design of these facilities, including but not limited to: a site plan showing the location of the proposed structure; cross-sections and relevant design details; depth to groundwater and groundwater flow direction in the vicinity of the proposed structure, proposed liner details and liner installation plan, if applicable; and a groundwater monitoring plan (see Sections 15.C and 15.D).

For a planning permit, if wastewater treatment is provided by an off-site utility, the applicant must submit a letter from the utility stating that it has adequate capacity to provide the maximum volume of wastewater to be generated by the facility at full build-out, presuming full build-out within the year following approval, through at least the next five years, given reasonably anticipated changes in demand on that utility from other sources during that time. If a construction schedule is established as a condition of the permit, an alternate demonstration of adequate capacity may be approved.

If on-site disposal of wastewater is proposed, an applicant seeking a planning permit need only provide an estimate of the maximum wastewater to be generated by the development at full build-out, an indication of the availability of sufficient soils for on-site wastewater disposal, and/or sufficient area for construction of wastewater treatment facilities, and a statement of whether or not a wastewater discharge license will be required. If the applicant anticipates that a wastewater discharge license will be required, and that discharge will be to a surface water body, the applicant must identify that surface water and provide information demonstrating that the maximum proposed discharge will not result in a violation of its classification. Submission of specific information regarding the location of wastewater treatment and disposal facilities and potential impacts of wastewater disposal may be delayed until plans for development are more complete.

Reference: No Adverse Environmental Effect Standard of the Site Location Law (No Unreasonable Adverse Effect on Surface Water Quality), 06-096 CMR 375.6 and Planning Permit, 06-096 CMR 380.

Section 18. Solid waste. List the types and estimated quantities (cu. yd.) of solid waste to be generated by the development. Types of waste may include, but not be limited to, stumps/grubbings, construction debris, demolition debris, household solid waste, industrial solid wastes, special wastes and hazardous wastes. Indicate the method of collection (e.g. private, municipal or commercial) and the location of the

solid waste disposal facility for each waste listed. If waste from the site is taken to a transfer station, identify the facility or facilities at which the waste is ultimately disposed.

A. Commercial solid waste facility. If intending to use a commercial solid waste facility, attach copies of contracts or commitment letters covering the hauling and disposal of the solid waste for at least one year following the date of the department order. Include the license number of any non-hazardous waste hauler.

For a planning permit, the applicant must submit a letter from the facility stating that it has adequate capacity to handle the maximum volume of solid waste to be sent to the facility at full build-out, presuming full build-out within the year following approval, through at least the next five years, given reasonably anticipated changes in demand on that facility from other sources during that time. If a construction schedule is established as a condition of the permit, an alternate demonstration of adequate capacity may be approved.

B. Off-site disposal of construction and/or demolition debris. If intending to dispose of construction and/or demolition debris off-site, attach copies of contracts or commitment letters covering the hauling and disposal of this debris for one year from the date of the department order. Include the license number of any non-hazardous waste hauler.

C. On-site disposal of woodwaste or land clearing debris. If any stumps, grubbings, or other wood waste or land clearing debris is to be disposed of on-site, the applicant must comply with 38 M.R.S.A. § 1301 et. seq. and all applicable sections of the Solid Waste Management Rules in effect at the time of the application. There are provisions within the Solid Waste Management Rules to exempt the processing of certain landclearing debris as described in 06-096 CMR 409.1.B.(3).

Delineate the disposal area on the site plan. Disclosure of the on-site disposal of construction debris, landclearing debris and burn area ash to future owners may be required under 02 CMR 330 Section 19 and may require notice within the property deed(s).

If wood wastes are to be burned on-site, show the burn area on the site plan and provide exclusion plans for materials prohibited from being burned (including chemically treated wood, plastics, vinyl, asphalt shingles, etc). On-site burning cannot create a nuisance condition and requires local fire permits. Provide plans for handling both unburned wood waste and woodash, including the name of the licensed or exempt solid waste facility that will be used for disposal of the ash and unburned materials and the name of the licensed or exempt transporter who will transport the materials to the proposed solid waste facility. If applicable, include evidence of capacity to accept the waste from an approved solid waste facility or a plan outlining the usage of these materials in landscaping and reclamation of the site. Include information on ash/topsoil mixing ratios and application rates. Any proposed open burning must comply with the Rules for Open Burning, 06-096 CMR 102.

For subdivisions, if waste is proposed for on-site burial on a particular lot, that lot must be conveyed with a deed restriction identifying the disposal area.

D. Special or Hazardous Waste. Certain developments may generate or require disposal of special or hazardous wastes, as defined at 06-096 CMR 400.1. Contact the Bureau of Remediation and Waste Management (287-2651) for information regarding the handling of these materials.

References: Financial Capacity Standard of the Site Location Law (Adequate Provision for Solid Waste Disposal), 06-096 CMR 373.3 and Planning Permit, 06-096 CMR 380.

Section 19. Flooding. Provide an explanation as to whether this development will or will not cause or increase flooding or cause an unreasonable flood hazard to any structure. Show the 100-year flood elevation on the site plan. If required by the department, provide a hydrological analysis showing that the

development will not adversely affect the 100-year flood elevation. If available, include a copy of the applicable Federal Emergency Management Agency (FEMA) flood zone map. Show the development's boundaries on this map.

An applicant seeking a planning permit should analyze the flooding potential based on the anticipated maximum build-out of the development parcel. The department may require further analyses of the flooding potential when the development plans for specific areas of the parcel are more complete.

Reference: Flooding Standard of the Site Location Law (No Unreasonable Effect on Runoff Infiltration Relationships), 096 CMR 375.4

Section 20. Blasting. If the development requires blasting of rock or other earth materials for road construction, foundations or any other purpose provide the following information.

A. Site plan. A site plan indicating proposed blast areas at the project site and locations of all off-site structures and wells not owned or controlled by the applicant within 2000 feet of any blast site unless a lesser distance is approved in writing by the department.

B. Report. A report prepared by a qualified professional that includes the following.

(1) Assessment. Assessment of the potential for adverse effects of blasting on protected natural resources and structures and wells not owned or controlled by the applicant considering, at a minimum, ground vibration, peak particle velocities, noise and airblast effects and on-site and off-site ground and surface water quality and quantity.

(2) Blasting plan. Provide a blasting plan which addresses methods to control adverse effects from ground vibration, airblast and flyrock; provides details on the proposed blast design, monitoring of blasts (as applicable), a blast schedule; and includes provisions for pre-blast surveys, signage, warnings, and access control during blast events in conformance with Title 38 MRSA § 490-Z (14).

Section 21. Air emissions. Provide a narrative identifying all point source and non-point source air emissions deriving from the development, including but not limited to stacks, unpaved roads or areas and vehicular traffic. For point sources, include a summary of emission components showing types and amounts of particulate matter (particles) and all gaseous components.

An Air Emissions License from the Bureau of Air Quality (Air Bureau) may be required. For further information contact the Air Bureau at 287-2437. If an Air Emission License is necessary, a Site Law permit may not be issued until the Air Emission License is obtained or the Air Bureau indicates, in writing, that it is likely to be obtained.

Reference: No Adverse Environmental Effect Standard of the Site Location Law (No Unreasonable Adverse Effect on Air Quality), 06-096 CMR 375.1.

Section 22. Odors. Identify the nature and potential sources of odors from the development, if the development will create any significant odors. Provide an estimate of areas affected and methods of control.

Reference: Financial Capacity Standard of the Site Location Law (Adequate Provision for the Control of Odors), 06-096 CMR 373.4.

Section 23. Water vapor. Provide a narrative identifying any potentially large scale water vapor emission from the development, such as that resulting from a processing plant or power generating

facility, which may cause a change in local climate. Identify all sources and amounts of such emissions associated with the development, and all abutting areas impacted by the water vapor emissions.

Reference: No Adverse Effect Standard of the Site Location Law (No Unreasonable Alteration of Climate), 06-096-CMR 375.2.

Section 24. Sunlight. Provide a statement concerning whether or not any structures will block access to direct sunlight for structures utilizing solar energy through active or passive systems.

Reference: No Adverse Environmental Effect Standard of the Site Location of Development Law (Access to Direct Sunlight), 06-096 CMR 375.13.

Section 25. Notices. Provide the following.

A. Evidence that notice has been sent. Complete and provide Forms B & C, located in Part III of this application.

C. List of abutters for purposes of notice. Provide a list of the names and addresses of the owners of abutting property.

[Supplemental Requirements for Wind Energy Developments Only]:

Section 26. Shadow flicker. As used in this section shadow flicker means alternating changes in light intensity caused by the moving wind turbine blades casting shadows on the ground and stationary objects, such as a window at a dwelling.

The applicant shall provide a description of the shadow flicker effect likely to result from the project, including but not necessarily limited to the following:

A. A detailed shadow flicker model of the wind energy development that demonstrates that the project has been designed to avoid unreasonable adverse shadow flicker effects. The shadow flicker model must utilize the WindPro software or other modeling software as approved by the Department. The model must be based on meteorological data gathered at the project site, or on data obtained from the National Oceanic and Atmosphere Administration (NOAA) weather station in Portland or Caribou, Maine. Include a description of the modeling approach, and all pertinent modeling assumptions used. If more than one model of turbine is proposed in the application, provide the shadow flicker analysis that would result in the greatest potential impacts.

B. A description of the number of the adjacent properties analyzed and the receptor locations on those analyzed properties.

C. Copies of any proposed shadow flicker easements or lease agreements with affected landowners.

D. A description of any proposed mitigation measures used to reduce potential impacts from shadow flicker, including vegetative buffers, fencing or other screening.

[Note: No flicker shadow will be cast when the sun is obscured by clouds/fog or when the turbine is not rotating. Shadow flicker is not the sun seen through a rotating wind turbine rotor nor what an individual might view moving through the shadows of a wind farm. The spatial relationships between a wind turbine and receptor, as well as wind direction, are key factors related to shadow flicker duration. At distances of greater than 1,000 feet between wind turbines and receptors, shadow flicker usually only occurs at sunrise or sunset when the cast shadows are sufficiently long. For situations where the rotor plane is in-line with the sun and receptor (as seen from the receptor), the cast shadows will be very narrow (blade thickness), of low intensity, and will move quickly past the

stationary receptor. When the rotor plane is perpendicular to the sun-receptor "view line", the cast shadow of the blades will move within a circle equal to the turbine rotor diameter.]

Section 27. Public Safety. Provide documentation in the form of a site plan and a certificate of design provided by the manufacturer of the generating facility that the proposed wind energy development has been designed to conform to applicable industry safety standards and that the proposed wind energy development will not present an unreasonable safety hazard to adjacent properties or adjacent property uses. Documentation of measures to protect public safety shall include, but not necessarily be limited to:

A. Design Safety Certification: Evidence that the turbine design meets acceptable safety standards; such evidence may include submission of certificates of design compliance obtained by the equipment manufacturers from Underwriters Laboratories, Det Norske Veritas, Germanishcer Llloyd Renewables Certification, or other similar certifying organizations.

B. Overspeed Control: Evidence from the manufacturer or a licensed professional engineer describing the design and function of overspeed control (i.e. aerodynamic overspeed controls such as variable pitch and mechanical brakes) and related safety mechanisms that are part of the turbine design.

C. Public Safety Related Setback: Evidence that the wind turbines have been sited with appropriate safety related setbacks from adjacent properties and adjacent existing uses. Such evidence shall include a site plan and applicable documentation as necessary to show that the proposed wind turbines have been sited in such a manner as to provide an appropriate minimum setback from the nearest property line. The recommended minimum setback is a distance of not less than the normal setback requirements for the local zoning classification as dictated by the local municipal zoning ordinance, or 1.5 times the maximum turbine blade height, whichever is greater. The setback distance must be measured to the edge of the wind turbine foundation closest to the property line.

   The recommended minimum setbacks do not apply if the applicant has obtained an easement or waiver of such setbacks from the affected landowner. Alternatively, the applicant may submit evidence (i.e. operating protocols, safety programs, recommendation of a licensed professional engineer with appropriate expertise and experience with wind turbines, or relevant manufacturer recommendations) that a reduced setback is appropriate.

D. Fire Safety: Evidence that reasonable measures will be taken to prevent or respond to a fire at the project, including but not necessarily limited to:
   (1) Information regarding proposed active or passive fire suppression systems, including lightning protection systems.
   (2) Operational and maintenance measures used to reduce fire risk.
   (3) Descriptions of how proposed turbines are designed to meet National Fire Protection Association (NFPA), Confederation of Fire Protection Associations in Europe (CFPA E), or other applicable national or international design codes or standards or recommended fire protection practices.
   (4) A fire protection or fire safety plan, addressing potential ignition sources, fire control procedures, anticipated fire hazards, and proposed fire protection equipment or systems.
   (5) Emergency communications and response protocols with local and state emergency response providers.

Section 28. Tangible Benefits. The applicant must provide a plan for establishing the environmental and economic improvements or benefits to the citizens of Maine attributable to the construction, operation and maintenance of the proposed wind energy development. The plan shall include, but is not limited to, the following:

A. The estimated number of both part-time and full-time jobs to be created statewide and in the host community or communities, as a result of the construction, operation and maintenance of the project. This shall include the number of construction-related employment opportunities, the operation and/or maintenance employment opportunities and the number of both part-time and full-time employment

opportunities in construction, operations and maintenance activities by trained, qualified and licensed workers pursuant to 32 M.R.S.A. chapter 17 and other applicable laws;

B. The estimated annual generation of wind energy from the project and projected impact on electrical rates in the host community or communities. The estimated annual generation of wind energy shall include information on estimated turbine capacity factors for the proposed project, proposed curtailment measures, and anticipated curtailment imposed by the grid operator;

C. The proposed property tax payments from the project and projected impact on property tax rates in the host community or communities;

D. The reduction in electrical rates among all classes of Maine ratepayers, directly attributable to and expected from the proposed wind energy project;

E. A plan for land or natural resource conservation;

F. The estimated type of and amounts of local purchases of materials from the construction, operation and maintenance of the project;

G. A plan for post-construction reporting to the Department of tangible benefits realized from the construction, operation and maintenance of this project;

H. Any other tangible benefits to be provided by the project; and

I. The community benefits package in accordance with 35-A M.R.S.A. §3454 subsection 2. For the purposes of this item numbered I, the information required may be submitted as an addendum to the permit application during the period in which the application is pending, however it must be submitted no later than 60 days following the application being accepted as complete for processing.

Section 29. Decommissioning Plan. As used in this section, "decommissioning" means the physical removal of all components of a project, including but not limited to wind turbines and associated foundations to a depth of 24 inches; as well as any structures, roads, cabling, electrical components, and any other associated facilities to the extent they are not otherwise in or proposed to be placed into productive use; the grading and re-seeding of all earth disturbed during construction and decommissioning; and restoration of any disturbed wetlands or critical wildlife habitat. The applicant may demonstrate that a particular component or group of components in a project are still in productive use, or may propose a productive use for any component or group of components in a project, and thereby avoid the need to decommission the particular component or components.

The applicant must provide a plan for decommissioning one or more turbines of the project. The decommissioning plan shall describe the decommissioning process and shall include but is not limited to the following:

A. A description of the trigger for implementing the decommissioning plan. There is a rebuttable presumption that decommissioning is required if no electricity is generated for a continuous period of twelve (12) months from one or more of the turbines. The applicant may rebut the presumption by providing evidence, such as a force majeure event that interrupts the generation of electricity, showing that although one or more turbines have not generated electricity for a continuous period of 12 months, the project has not been abandoned and should not be decommissioned.

B. A description of the anticipated operational life of the wind turbines.

C. A detailed estimate of costs for decommissioning the entire proposed project. The estimate of costs shall include removal and permanent stabilization of generating facilities and associated facilities, including, but not limited to, turbines, turbine foundations, meteorological towers and foundations, buildings, substations, electrical generator lead lines, electrical collector lines, and road infrastructure. This cost estimate shall be updated at least once every five years throughout the life of the project to account for price fluctuations. The cost estimate for decommissioning the entire proposed project shall also be reevaluated after any partial decommissioning of one or more turbines occurs. The estimate of costs shall include but is not limited to the following:

(1) Estimated costs for disassembly of project components;

(2) Estimated removal costs, including removal, transportation, recycling and disposal costs;

(3) Descriptions of any temporary construction measures, such as rewidening and restabilization of access roads for crane access, required as part of the partial or full decommissioning process;

(4) Descriptions of any scrap, salvage or resale values included in the analysis, including descriptions of how those values were determined; and

(5) Descriptions of project management and other ancillary costs associated with decommissioning.

D. Documentation of financial assurance demonstrating that the decommissioning costs will be fully funded prior to the start of construction. Financial assurance can be demonstrated in the form of a performance bond, surety bond, letter of credit, or other form of financial assurance acceptable to the Department.

E. Evidence of plans for any continued beneficial use of any components of the wind energy development. Include specific project components descriptions, including maps or plans of roads to be reused. [Note: The applicant may provide evidence of plans for continued beneficial use of any or all of the components of the wind energy development. Any changes to the approved decommissioning plan may be approved as a minor amendment to the Department license for the wind energy development.]

Section 30. Generating facility-Visual Quality and Scenic Character. The applicant must provide a Basic Assessment for all Scenic Resources of State or National Significance (SRSNS), as defined in the Wind Energy Act (WEA) (35-A M.R.S.A. § 3451), within eight miles of the generating facilities, and a Visual Impact Assessment for all SRSNSs within eight miles of the generating facilities for which the Department determines there is a potential for a significant adverse effect on scenic character.

Basic Assessment. Describe the components of the generating facilities and associated facilities visible from a SRSNS and identify any SRSNS within eight miles of the generating facilities. Also identify and provide descriptions of other scenic resources within 8 miles of the generating facilities that have the potential to be defined as SRSNS, such as conservation easements and outstanding natural and cultural resources. Describe each SRSNS identified in sufficient detail to provide a sense of their scenic value. Assess the visibility of the generating facilities and associated facilities from each SRSNS identified, based on the topographic viewshed for the highest point of each major project element. Describe potential views of the major project elements from each SRSNS for both leaf-on and leaf-off conditions, including assessments of visibility of both nacelles and blades, and nighttime visibility of aircraft lighting.

Visual Impact Assessment. Provide a Visual Impact Assessment (VIA), prepared by a professional experienced in the preparation of VIA's, which evaluates the impact of the project on any SRSNS located within 3 miles of a turbine, unless the Department determines that an evaluation is not required. The VIA must also evaluate the impacts to any SRSNS located between 3 and 8 miles of a turbine for which the Department has determined, based on the Basic Assessment described above, that there is a potential for a significant adverse effect. (Note: If the Department finds there is substantial evidence that a particular scenic resource is significant and that there is a potential for a significant adverse effect, a VIA will be required for that scenic resource.)

For each SRSNS for which a VIA is required, the VIA shall address, but not necessarily be limited to, the following:

A. Significance of Scenic Resources. Describe each SRSNS in sufficient detail to assess their significance in relation to scenic character. The descriptions should include, but not be limited to:

(1) Documentation establishing scenic character as a factor in the designation of the resource through any state or federally sponsored assessment.

(2) For lakes listed in the Maine's Finest Lakes study, or the Maine Wildland Lakes Assessment, the specific rating of the lake for scenic character, i.e. outstanding or significant.

B. Existing character of the surrounding area. Describe the existing scenic character of the area surrounding the project, with special attention to the area within 8 miles of the generating facilities, including but not limited to:

(1) The type and amount of manmade development, including but not limited to, roads, buildings and other structures, utility lines, communication towers, and nighttime lighting, that is in the viewshed from the SRSNS. Cutting and removal of trees for commercial logging/forestry management activities where the forest will be allowed to regenerate naturally or by silvaculture activities will not be considered development, but roads or other permanent structures related to such activities will be so considered.

(2) The natural character of the viewshed from the SRSNS, including vegetation and forest cover types, variations in topography or geology, prominent natural features (cliffs, mountains), or waterbodies. Cutting and removal of trees for commercial logging/forestry management activities where the forest will be allowed to regenerate naturally or by silvaculture activities will not be considered to detract from the scenic character of a forest for this evaluation, but roads or other permanent structures related to such activities may be considered to do so.

(3) The existing residential, recreational, or commercial/industrial uses that can be seen from the SRSNS, or that are present near the SRSNS, as determined by aerial photos or other relevant evidence.

C. Expectations of the Typical Viewer. The applicant must provide evidence to the Department that describes the expectations of the typical viewer. Included in this evidence must be a description of who the typical viewer is, the nature and duration of visits to each SRSNS, and which season or seasons the SRSNS receive the most use. User intercept surveys are not required, but if they are to be considered by the Department they should be conducted in the field with actual users of the SRSNS under consideration. User intercept survey results from other wind energy projects will be given little weight by the Department. The Department will also take into consideration written or oral testimony of actual users of the resource submitted directly to the Department.

D. Purpose and Context of the Proposed Project. Describe any context and purpose specific to the proposed project, including but not limited to:

(1) Data related to the magnitude and reliability of the wind resources at the project site and the potential energy output expected from the project as compared with alternative sites investigated by the applicant.

(2) The location of the project in relation to existing transmission lines, roads or other infrastructure and the effect on scenic impacts of such proximity.

E. Public Use and Enjoyment of the SRSNS. Describe the public uses of any SRSNS for which a VIA is required, including but not limited to:

(1) Evidence of the extent, nature and duration of passive recreation uses most likely to be impacted significantly, including but not limited to hiking, snowshoeing, Nordic skiing, fishing, non-motorized boating, vista appreciation from scenic viewpoints, and birding or other nature watching activities.

(2) Evidence of the extent, nature and duration of active recreation uses most likely to be impacted significantly, including but not limited to ATV-riding, snowmobiling, and motorized boating.

(3) Evidence of tourism related businesses or recreational clubs or organizations whose purpose or viability is related to the public use and enjoyment of the SRSNS.

(4) Evidence of the potential effect on the continued use and enjoyment of the SRSNS, including but not limited to public comments submitted by users of the SRSNS, either in writing or orally at Department public meetings held pursuant to 38 M.R.S.A. § 345-A(5) or Department public hearings held pursuant to Chapter 3. Because of the highly subjective nature of any assessment of potential effect, sworn testimony offered by users of the SRSNS will be given greater weight than data collected from user intercept surveys conducted by the applicant or others.

F. Scope and Scale of the Potential Effect. For each SRSNS for which a VIA is required, describe the scope and scale of the potential effect of views of the generating facilities on the SRSNS, including but not limited to issues related to the number and extent of turbines visible from the scenic resource, the distance from the SRSNS and the effect of prominent features of the development on the landscape. Provide photo simulations of potential views of the project from the SRSNS, including typical and worst-case views, describing the assumptions and methodologies for preparing the photo simulations. Describe the potential effect of the generating facility's presence on a typical user's continued use and enjoyment of the SRSNS.

G. Cumulative Impacts. The applicant must provide the following information:

(1) Identify any wind projects proposed by the applicant or other applicants which are existing, have been approved, or for which applications have been submitted, at the state or local level that would be within eight miles of any portion of any SRSNS within eight miles of the proposed project. These wind energy projects must include projects subject to the small scale certification statute (35-A M.R.S.A. §3456).

(2) Identify any projects which the applicant is currently investigating or planning within eight miles of any of the proposed project's SRSNS.

(3) Provide a detailed description of how construction of the proposed project will not cause unreasonable adverse effects to the scenic character of the proposed project's SRSNS, or scenic character related to cumulative impacts related to the existing, previously approved, applications under review, or planned wind energy projects.

Based on the information provided above, each SRSNS addressed in the VIA should be rated by the applicant for significance as high, medium or low. The applicant should also assess potential scenic impacts on each SRSNS addressed in the VIA as high, medium or low. The applicant shall describe how the proposed project's potential scenic impact will affect each of the addressed SRSNS, in light of the significance of each of the SRSNS. The applicant has the burden of proof of demonstrating that the proposed project will not cause an unreasonable adverse effect on scenic character or existing uses related to scenic character.

[Note: The requirements of the WEA and this section govern the visual and scenic impacts of the "generating facilities" as defined in the WEA and therefore the requirements of the Site Law and the application requirements in "Section 6. Visual Quality and Scenic Character" do not apply to these generating facilities. The WEA defines "associated facilities" as elements of a wind energy development other than its generating facilities that are necessary to the proper operation and maintenance of the wind energy development, including but not limited to buildings, access roads, generator lead lines and substations. If the Department determines that due to the scope, scale, location or other characteristics of the associated facilities the proposed project may result in unreasonably adverse visual impacts, the Department may elect to review those associated facilities under the standards of the Site Law. The Department may make this determination in the pre-application process, or within the first 30 days after the application has been accepted for processing, and the applicant may be required to submit additional information related to the visual impacts of these associated facilities. If the Department does not make this determination within this time frame the associated facilities will be assessed under the provisions of the WEA and should be included in the VIA required under this section.]

PART III. FORMS

Form A: Application Page; applicant and preparer certification
Form B: Notice
Form C: Notice certification
Form D: Checklist
Form E: Soil test pit log summary
Form F: Soil description and classification
Form G: Soil and Water Conservation District Optional Review
Form H: Suggested language for buffer deed restrictions
Form I: Suggested language for conservation easements
Form J: Contractor Certification
Form K: MCGP Notice of Termination

Department of Environmental Protection
Bureau of Land & Water Quality
17 State House Station
Augusta, Maine 04333
Telephone: 207-287-3901

FOR DEP USE
ATS # _____
L-_____
Total Fees: _____
Date: Received _____

FORM A PAGE 1

SITE LOCATION OF DEVELOPMENT PERMIT APPLICATION 38 M.R.SA. §§481-490

PLEASE TYPE OR PRINT IN *INK ONLY*

This application is for: (CHECK THE ONE THAT APPLIES)	☐ 20 acre development ☐ Planning Permit ☐ Metallic Mining	☐ Marine Oil Terminal ☐ Structure ☐ Subdivision	☐ Major Amendment ☐ Minor Amendment

1. Name of Applicant:		6. Name of Agent (if applicable):	
2. Applicant's Mailing Address:		7. Agent's Mailing Address:	
3. Applicant's Daytime Phone #:		8. Agent's Daytime Phone # :	
4. Applicant's Fax # (if available):		9. Agent's Fax # (if available):	
5. Applicant's *e-mail address* (REQUIRED -license will be sent via: e-mail):		10. Agent's *e-mail address* (REQUIRED - license will be sent via e-mail):	

PROJECT INFORMATION

11. Name of Development:							
12. Map and Lot #'s:	Map #:	Lot #:	13. Deed Reference #'s:		Book #:		Page #:
14. Location of Project City/Town:			15. County:		16. UTM Northing		17. UTM Easting
18. Brief Description of Project including total parcel size:							

19. Type of Direct Watershed: (Check all that apply)	☐ Lake not most at risk ☐ Lake most at risk ☐ Lake most at risk, severely blooming	☐ River, stream or brook ☐ Urban impaired stream ☐ Freshwater wetland	☐ Coastal wetland ☐ Wellhead or public water
20. Name of Waterbody Project Site drains to:			

21. Amount of Developed Area:	Total acres:	Existing Developed area:____acres	New Developed area:____acres
22. Amount of Impervious Area:	Total acres:	Existing Impervious areas____acres	New Impervious area:____acres

23. Development started prior to obtaining a license?:	☐ Yes ☐ No				
24. .Development or any portion of the site subject to enforcement action?	☐ Yes ☐ No	If yes, name of enforcement staff involved?			
25. Common scheme of development?:	☐ Yes ☐ No	26. Title, Right or Interest:	☐ own ☐ lease	☐ purchase option ☐ written agreement	
27. Natural Resources Protection Act permit required?:	☐ Yes ☐ No	If yes:	☐ PBR	☐ Tier 1 ☐ Tier 2	☐ Full Permit
28. Existing DEP Permit number (if applicable):					
29. Names of DEP staff person(s) present at the pre-application meeting:					
30. Does agent have an interest in project? If yes, what is the interest?	☐ Yes ☐ No				

CERTIFICATIONS AND SIGNATURES LOCATED ON PAGE 2

IMPORTANT: IF THE SIGNATURE BELOW IS NOT THE APPLICANT'S SIGNATURE, ATTACH LETTER OF AGENT AUTHORIZATION SIGNED BY THE APPLICANT.

By signing below the applicant (or authorized agent), certifies that he or she has read and understood the following :

CERTIFICATIONS / SIGNATURES

"I certify under penalty of law that I have personally examined the information submitted in this document and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the information is true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment. I authorize the Department to enter the property that is the subject of this application, at reasonable hours, including buildings, structures or conveyances on the property, to determine the accuracy of any information provided herein.

Further, I hereby authorize the DEP to send me an electronically signed decision on the license I am applying for with this application by emailing the decision to the electronic address located on the front page of this application (see #5 for the applicant and #10 for the agent)"..

Signed:_____ **Title**_____ **Date:**_____

Notice of Intent to Comply with Maine Construction General Permit	**With this Site Law application form and my signature, I am filing notice of my intent to carry out work which meets the requirements of the Maine Construction General Permit (MCGP). I have read and will comply with all of the MCGP standards.** **If this form is not being signed by the landowner or lessee of the property, attach documentation showing authorization to sign.** **Signed**_____ **Date:**_____

NOTE: You must file a MCGP Notice of Termination (Form K) within 20 days of completing permanent stabilization of the project site.

CERTIFICATION

The person responsible for preparing this application and/or attaching pertinent site and design information hereto, by signing below, certifies that the application for development approval is complete and accurate to the best of his/her knowledge.

Signature: _____

Name (print): _____

Date: _____

Re/Cert/Lic No.: _____

Engineer _____

Geologist_____

Soil Scientist_____

Land Surveyor _____

Site Evaluator _____

Active Member of the Maine Bar _____

Professional Landscape Architect _____

Other_____

FORM B

PUBLIC NOTICE:
NOTICE OF INTENT TO FILE

Please take notice that

_____

(*Name, Address and Phone # of Applicant*)

_____

is intending to file a Site Location of Development Act permit application with the Maine Department of Environmental Protection pursuant to the provisions of 38 M.R.S.A. §§ 481 thru 490 on or about

_____

(Anticipated Filing Date)

The application is for

_____

(Description of the Project)

_____

at the following location:

_____

(*Project Location*)

A request for a public hearing or a request that the Board of Environmental Protection assume jurisdiction over this application must be received by the Department in writing, no later than 20 days after the application is found by the Department to be complete and is accepted for processing. A public hearing may or may not be held at the discretion of the Commissioner or Board of Environmental Protection. Public comment on the application will be accepted throughout the processing of the application.

For Federally licensed, permitted, or funded activities in the Coastal Zone, review of this application shall also constitute the State's consistency review in accordance with the Maine Coastal Program pursuant to Section 307 of the federal Coastal Zone Management Act, 16 U.S.C. § 1456. (Delete if not applicable.)

The application will be filed for public inspection at the Department of Environmental Protection's office in (*Portland, Augusta or Bangor*)(circle one) during normal working hours. A copy of the application may also be seen at the municipal offices in _____, Maine.

(*Town*)

Written public comments may be sent to the regional office in Portland, Augusta, or Bangor where the application is filed for public inspection:

MDEP, Central Maine Regional Office, 17 State House Station, Augusta, Maine 04333
MDEP, Southern Maine Regional Office, 312 Canco Road, Portland, Maine 04103
MDEP, Eastern Maine Regional Office, 106 Hogan Road, Bangor, Maine 04401

FORM C

PUBLIC NOTICE FILING AND CERTIFICATION

The DEP Rules, Chapter 2, require an applicant to provide public notice for all Site Location projects with the exception of minor revisions and condition compliance applications. In the notice, the applicant must describe the proposed activity and where it is located. **"Abutter"** for the purposes of the notice provision means any person who owns property that is BOTH (1) adjoining and (2) within one mile of the delineated project boundary, including owners of property directly across a public or private right of way.

1. **Newspaper:** You must publish the Notice of Intent to File in a newspaper circulated in the area where the activity is located. The notice must appear in the newspaper within 30 days prior to the filing of the application with the Department. You may use the attached Notice of Intent to File form, or one containing identical information, for newspaper publication and certified mailing.

2. **Abutting Property Owners:** You must send a copy of the Notice of Intent to File by certified mail to the owners of the property abutting the activity. Their names and addresses can be obtained from the town tax maps or local officials. They must receive notice within 30 days prior to the filing of the application with the Department.

3. **Municipal Office:** You must send a copy of the Notice of Intent to File and a **duplicate of the entire application** to the Municipal Office.

ATTACH a list of the names and addresses of the owners of abutting property.

CERTIFICATION

By signing below, the applicant or authorized agent certifies that:

1. A Notice of Intent to File was published in a newspaper circulated in the area where the project site is located within 30 days prior to filing the application;
2. A certified mailing of the Notice of Intent to File was sent to all abutters within 30 days of the filing of the application;
3. A certified mailing of the Notice of Intent to File, and a duplicate copy of the application was sent to the town office of the municipality in which the project is located; and
4. Provided notice of, if required, and held a public informational meeting in accordance with Chapter 2, Rules Concerning the Processing of Applications, Section 14, prior to filing the application. Notice of the meeting was sent by certified mail to abutters and to the town office of the municipality in which the project is located at least ten days prior to the meeting. Notice of the meeting was also published once in a newspaper circulated in the area where the project site is located at least seven days prior to the meeting.

The Public Informational Meeting was held on _____.
Date

Approximately _____ members of the public attended the Public Informational Meeting.

_____ _____
Signature of Applicant or Authorized Agent Date

FORM D

SUBMISSIONS CHECKLIST

If a provision is not applicable, put "NA"

Section 1. Development description

A. Narrative

____ 1. Objectives and details

____ 2. Existing facilities (with dates of construction)

B. Topographic map

____ 1. Location of development boundaries

____ 2. Quadrangle name

C. Construction plan

____ 1. Outline of construction sequence (major aspects)

2. Dates

D. Drawings

____ 1. Development facilities

____ a. Location, function and ground area

____ b. Length/cross-sections for roads

____ 2. Site work (nature and extent)

____ 3. Existing facilities (location, function ground area and floor area)

4. Topography

____ a. Pre- and post-development (contours 2 ft or less)

____ b. Previous construction, facilities and lot lines

____ **Section 2. Title, right or interest** (copy of document)

Section 3. Financial capacity

____ A. Estimated costs

B. Financing

____ 1. Letter of commitment to fund

2. Self-financing

____ a. Annual report

____ b. Bank statement

3. Other

____ a. Cash equity commitment

____ b. Financial plan

____ c. Letter

____ 4. Affordable housing information

Section 4. Technical ability (description)

____ A. Prior experience (statement)

____ B. Personnel (documents)

Section 5. Noise

____ A. Developments producing a minor noise impact (statement)

____ 1. Residential developments

____ 2. Certain non-residential subdivisions

____ 3. Schools and hospitals

____ 4. Other developments

____ a. Type, source and location of noise

____ b. Uses, zoning and plans

____ c. Protected locations

____ d. Minor nature of impact

e. Demonstration

B. Developments producing a major noise impact (full noise study)
1. Baseline
a. Uses, zoning and plans
b. Protected locations
c. Quiet area
2. Noise generated by the development
a. Type, source and location of noise
b. Sound levels
c. Control measures
d. Comparison with regulatory limits
e. Comparison with local limits

Section 6. Visual quality and scenic character(narrative, description, visual impact analysis)

Section 7. Wildlife and fisheries (narrative)

Section 8. Historic sites (narrative)

Section 9. Unusual natural areas (narrative)

Section 10. Buffers

A. Site plan and narrative

Section 11. Soils

A. Soil survey map and report
1. Soil investigation narrative
2. Soil survey map

B. Soil survey intensity level by development type
1. Class A (High Intensity) Soil Survey
2. Class B (High Intensity) Soil Survey
3. Class C (Medium High-Intensity) Soil Survey
4. Class D (Medium Intensity) Soil Survey

C. Geotechnical Investigation

D. Hydric soils mapping

Section 12. Stormwater management

A. Narrative
1. Development location
2. Surface water on or abutting the site
3. Downstream ponds and lakes
4. General topography
5. Flooding
6. Alterations to natural drainage ways
7. Alterations to land cover
8. Modeling assumptions
9. Basic standard
10. Flooding standard
11. General standard
12. Parcel size
13. Developed area
14. Disturbed area
15. Impervious area

B. Maps
1. U.S.G.S. map with site boundaries
2. S.C.S. soils map with site boundaries

C. Drainage Plans (a pre-development plan and a post-development plan)

1. Contours
2. Plan elements
3. Land cover types and boundaries
4. Soil group boundaries
5. Stormwater quantity subwatershed boundaries
6. Stormwater quality subwatershed boundaries
7. Watershed analysis points
8. Hydrologic flow lines (w/flow types and flow lengths labeled)
9. Runoff storage areas
10. Roads and drives
11. Buildings, parking lots, and other facilities
12. Drainage system layout for storm drains, catch basins, and culverts
13. Natural and man-made open drainage channels
14. Wetlands
15. Flooded areas
16. Benchmark
17. Stormwater detention, retention, and infiltration facilities
18. Stormwater treatment facilities
19. Drainage easements
20. Identify reaches, ponds, and subwatersheds matching stormwater model
21. Buffers

D. Runoff analysis (pre-development and post development)
   1. Curve number computations
   2. Time of concentration calculations
   3. Travel time calculations
   4. Peak discharge calculations
   5. Reservoir routing calculations

E. Flooding Standard
   1. Variance submissions (if applicable)
      a. Submissions for discharge to the ocean, great pond, or major river
         i. Map
         ii. Drainage plan
         iii. Drainage system design
         iv. Outfall design
         v. Easements
      b. Insignificant increase
         i. Downstream impacts

      c. Submissions for discharge to a public stormwater system
         i. Letter of permission
         ii. Proof of capacity
         ii. Outfall analysis and design (pictures)
   2. Sizing of storm drains and culverts
   3. Stormwater ponds and basins
      a. Impoundment sizing calculations
      b. Inlet calculations
      c. Outlet calculations
      d. Emergency spillway calculations
      e. Subsurface investigation report
      f. Embankment specifications
      g. Embankment seepage controls
      h. Outlet seepage controls
      i. Detail sheet
      j. Basin cross sections
      k. Basin plan sheet
   4. Infiltration systems
      a. Well locations map
      b. Sand and gravel aquifer map
      c. Subsurface investigation report with test pit or boring logs

d. Permeability analysis
e. Infiltration structure design
f. Pollutant generation and transport analysis
g. Monitoring and operations plan
   i. Locations of storage points of potential contaminants
   ii. Locations of observation wells and infiltration monitoring plan
   iii. Groundwater quality monitoring plan

5. Drainage easement declarations.

F. Stormwater quality treatment plan peak discharge calculations

1. Basic stabilization plan
   a. Ditches, swales, and other open channel stabilization
   b. Culvert and storm-drain outfall stabilization
   c. Earthen slope and embankment stabilization
   d. Disturbed area stabilization
   e. Gravel roads and drives stabilization

2. General Standard
   a. Calculations for sizing BMP
   b. Impervious area calculation
   c. Developed area calculation
   d. Summary spreadsheet of calculations

3. Phosphorus control plan
   a. Calculations for the site's allowable phosphorus export
   b. Calculations for determining the developed site's phosphorus export
   c. Calculations for determining any phosphorus compensation fees

4. Offset Credits
   a. Urban impaired stream
      Offset credit calculation
   b. Phosphorus credit determination
      i. Location map
      ii. Scaled plan
      iii. Title and right
      iv. Demolition plan
      v. Vegetation plan
      vi. Offset credit calculation
      vii. Calculation for the new allowable export

5. Runoff treatment measures
   a. structural measures
      i. Design drawings and specifications
      ii. Design calculations
      iii. Maintenance plan
      iv. TSS removal or phosphorus treatment factor determinations
      v. Stabilization plan
   b. Vegetated buffers
      i. Soil survey
      ii. Buffer plan
      iii. Turnout and level spreader designs
      iv. Deed restrictions

6. Control plan for thermal impacts to coldwater fisheries
7. Control plan for other pollutants
8. Engineering inspection of stormwater management facilities

G. Maintenance of common facilities or property

1. Components of the maintenance plan
   A. Maintenance of facilities by owner or operator
      1. Site owner or operator (name legally responsible party)
      2. Contact person responsible for maintenance
      3. Transfer mechanism

4. List of facilities to be maintained
5. List of inspection and maintenance tasks for each facility
6. Identifications of any deed covenants, easements, or restrictions
7. Sample maintenance log
8. Copies of any third-party maintenance contracts

B. Maintenance of facilities by homeowner's association
1. Incorporation documents for the association
2. Membership criteria
3. Association officer responsible for maintenance
4. Establishment of fee assessment for maintenance work
5. Establishment of lien system
6. Reference to department order(s) in association charter
7. Transfer mechanism from developer to association
8. List of facilities to be maintained
9. Identification of any deed covenants, easements, or restrictions
10. Renewal of covenants and leases
11. List of inspection and maintenance tasks for each facility
12. Sample maintenance log
13. Copies of any third-party maintenance contracts

C. Maintenance of facilities by municipality or municipal district
1. Identification of the municipal department or utility district
2. Contact person responsible for maintenance
3. Evidence of acceptance of maintenance responsibility
4. Transfer mechanism from developer
5. List of facilities to be maintained
6. List of inspection and maintenance tasks for each facility
7. Identifications of any deed covenants, easements, or restrictions
8. Sample maintenance log

2. General inspection and maintenance requirements
a. Drainage easements
b. Ditches, culverts, and catch-basin systems
c. Roadways and parking surfaces
d. Stormwater detention and retention facilities
1. Embankment inspection and maintenance
2. Outlet inspection and clean-out
3. Spillway maintenance
4. Sediment removal and disposal
e. Stormwater infiltration facilities
1. Sediment protection plan
2. Infiltration rehabilitation plan
3. Sediment removal and disposal
4. Groundwater monitoring plan
f. Proprietary treatment devices
g. Buffers
h. Other practices and measures

Section 13. Urban Impaired Stream Submissions

1. Off-site credits
2. Compensation fees (Urban Impaired Stream/Phosphorus)
3. Development impacts

Section 14. Basic Standards

A. Narrative
1. Soil types
2. Existing erosion problems
3. Critical areas
4. Protected natural resources
5. Erosion control measures

6. Site stabilization

B. Implementation schedule

C. Erosion and sediment control plan
   1. Pre-development and post-development contours
   2. Plan scale and elements
   3. Land cover types and boundaries
   4. Existing erosion problems
   5. Critical areas
   6. Protected natural resources
   7. Locations (general)
   8. Locations of controls
   9. Disturbed areas
   10. Stabilized construction entrance

D. Details and specifications (for both temporary and permanent measures)

E. Design calculations

F. Stabilization plan
   1. Temporary seeding
   2. Permanent seeding
   3. Sodding
   4. Temporary mulching
   5. Permanent mulching

G. Winter construction plan
   1. Dormant seeding
   2. Winter mulching

H. Third-party inspections
   1. Inspector's name, address, and telephone number
   2. Inspector's qualifications
   3. Inspection schedule
   4. Contractor contact
   5. Reporting protocol

Section 15. Groundwater

A. Narrative
   1. Location and maps
   2. Quantity
   3. Sources
   4. Measures to prevent degradation

B. Groundwater protection plan

C. Monitoring plan
   1. Monitoring points
   2. Monitoring frequency
   3. Background conditions
   4. Monitoring parameters
   5. Personnel qualifications
   6. Proof of training
   7. Equipment and methods
   8. Quality assurance/quality control
   9. Reporting requirements
   10. Remedial action plan

D. Monitoring well installation report
   1. Well location map
   2. Elevation data
   3. Well installation data
   4. Well construction details
   5. Borehole logs
   6. Summary of depth measurements
   7. Characteristics of subsurface strata
   8. Well installation contract

9. Schematic cross-sections
10. Monitoring point summary table
11. Protective casing
12. On-site well identification

Section 16. Water supply

A. Water supply method
   1. Individual wells (evidence of sufficient/healthful supply)
      a. Support of findings by well drillers
      b. Support of findings by geologist
   2. Common well(s) (reports)
      a. Hydrogeology report
      b. Engineering report
      c. Well installation report
      d. Long-term safe yield and zone of influence determination
      e. Public water supply
         i. Proposed well or wells
         ii. Existing well or wells
         iii. Water quality analysis
   3. Well construction in shallow-to-bedrock areas
   4. Additional information
   5. Off-site utility company or public agency
   6. Other sources

B. Subsurface wastewater disposal systems (locations of systems and wells)

C. Total usage (statement re: total anticipated water usage)

Section 17. Wastewater disposal

A. On-site subsurface wastewater disposal systems (investigation results)
   1. Site plan
   2. Soil conditions summary table
   3. Logs of subsurface explorations
   4. Additional test pits, borings or probes
      a. Soil conditions A
      b. Soils with Profiles 8 and 9 parent material
      c. Soil conditions D
      d. Disposal field length 60 feet or greater
   5. 3-bedroom design
   6. Larger disposal systems
      a. System design details
      b. Plan view
      c. Cross sections
      d. Test pit data
      e. Mounding analysis

B. Nitrate-nitrogen impact assessment

1. When required
   a. Exempted____
      i. Conventional systems meeting certain setbacks
      ii. Denitrification systems
   b. Special conditions and other exemptions
   2. Assumptions
      a. Initial concentration
      b. Background concentration
      c. Contribution from development
      d. Mixing and dilution
      e. Severe-drought scenario
      f. Wastewater flow to subsurface wastewater disposal fields

3. Assessment report minimum requirements
    a. Narrative and calculations
    b. Site plan
        i. Well locations
        ii. 10 mg/l and 8 mg/l isocons
        iii. Groundwater contours and groundwater flow divides
    c. References
4. Denitrification systems
    a. Design plans and specifications
    b. Installation information
    c. Monitoring plan
    d. Maintenance
    e. Backup system

D. Municipal facility or utility company letter

E. Storage or treatment lagoons

Section 18. Solid waste (list: type, quantity, method of collection and location)

A. Commercial solid waste facility (final disposal location)

B. Off-site disposal of construction/demolition debris (final disposal location)

C. On-site disposal of woodwaste/land clearing debris
1. Applicability of rules (evidence re: applicability of rules)
2. Burning of wood wastes
    a. Delineation on site plan
    b. Plans for handling unburned woodwaste and woodash
    c. Evidence of capacity to accept waste (approved facility)
    d. Usage of materials
    e. Data on mixing ratios and application rates

D. Special or Hazardous Waste

Section 19. Flooding

A. Explanation of flooding impact

B. Site plan showing 100-year flood elevation

C. Hydrology analysis

D. FEMA flood zone map with site boundaries

Section 20. Blasting

A. Site Plan or map

B. Report
1. Assessment
2. Blasting plan

Section 21. Air emissions (narrative and summary)

A. Point and non-point sources identified

B. Emission components (point sources)

Section 22. Odors

A. Identification of nature/source

B. Estimate of areas affected

C. Methods of control)

Section 23. Water vapor (narrative)

Section 24. Sunlight (statement and drawing, if required)

Section 25. Notices

A. Evidence that notice sent

B. List of abutters for purposes of notice

Supplemental requirements for Wind Energy Developments only:

Section 26. Shadow flicker

____ A. A copy of the Windpro Analysis and associated narrative

Section 27. Public Safety

____ A. Design safety certifications or other documents attesting to the safety of the wind turbine equipment.
____ B. Evidence pertaining to overspeed controls
____ C. Site plan documenting safety setbacks zones for each wind turbine
____ D. Other documents as necessary to demonstrate safety considerations

Section 28. Tangible Benefits

____ A. Narrative demonstration of tangible benefits

Section 29. Decommissioning

____ A. Description of implementation trigger for decommissioning
____ B. Description of extent of decommissioning
____ C. Itemization of total cost to complete decommissioning
____ D. Demonstration of financial assurance for completeness of decommissioning plan

Section 30. Generating Facility-visual Quality and Scenic Character

____ A. (narrative, description, visual impact analysis)

SOIL CONDITIONS SUMMARY TABLE

SUMMARY LOG OF SUBSURFACE EXPLORATIONS AT PROJECT SITES

Project Name:	Applicant Name:	Project Location (municipality):

Lot No.	Exploration Symbol *(TP 1, B 2, etc.)*	✘ if at SSWD Field	Description of subsurface materials by: ● Soil profile/condition *(if by S.E.)*, ● Soil series name *(if by C.S.S.)*, or by ● Geologic unit *(if by C.G.)*	Depths to *(inches)*:				Ground Surface Slope (%)	Ground Surface Elevation
				Redoximorphic Features	Bedrock	Hydraulically Restrictive Layer	Limit of Exploration		
		☐							
		☐							
		☐				

FORM F Rev. 07/11a

SOIL PROFILE / CLASSIFICATION INFORMATION

DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT PROJECT SITES

Project Name:	Applicant Name:	Project Location (municipality):

Exploration Symbol # _____ ☐ Test Pit ☐ Boring ☐ Probe

_____ " Organic horizon thickness Ground surface elev. _____

_____ " Depth of exploration or to refusal

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Redox Features
0				
10				
20				
30				
40				
50				
60				

Soil Details by S.E. ▸▸ S.S. ▸▸

Soil Classification	Slope	Limiting Factor	Hydrologic
Profile _____ Condition _____	Percent _____	_____ " Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock	
Soil Series/Phase Name:		☐ Hydric ☐ Non-hydric	Soil Group _____

Exploration Symbol # _____ ☐ Test Pit ☐ Boring ☐ Probe

_____ " Organic horizon thickness Ground surface elev. _____

_____ " Depth of exploration or to refusal

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Redox Features
0				
10				
20				
30				
40				
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60				

Soil Details by S.E. ▸▸ S.S. ▸▸

Soil Classification	Slope	Limiting Factor	Hydrologic
Profile _____ Condition _____	Percent _____	_____ " Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock	
Soil Series/Phase Name:		☐ Hydric ☐ Non-hydric	Soil Group _____

Exploration Symbol # _____ ☐ Test Pit ☐ Boring ☐ Probe

_____ " Organic horizon thickness Ground surface elev. _____

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Depth below mineral soil surface (inches)	Texture	Consistency	Color	Redox Features
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30				
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60				

Soil Details by S.E. ▸▸ S.S. ▸▸

Soil Classification	Slope	Limiting Factor	Hydrologic
Profile _____ Condition _____	Percent _____	_____ " Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock	
Soil Series/Phase Name:		☐ Hydric ☐ Non-hydric	Soil Group _____

Exploration Symbol # _____ ☐ Test Pit ☐ Boring ☐ Probe

_____ " Organic horizon thickness Ground surface elev. _____

_____ " Depth of exploration or to refusal

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Redox Features
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20				
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Soil Details by S.E. ▸▸ S.S. ▸▸

Soil Classification	Slope	Limiting Factor	Hydrologic
Profile _____ Condition _____	Percent _____	_____ " Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock	
Soil Series/Phase Name:		☐ Hydric ☐ Non-hydric	Soil Group _____

INVESTIGATOR INFORMATION AND SIGNATURE

Signature	Date
Name Printed	Cert/Lic/Reg. #

Title ☐ Licensed Site Evaluator ☐ Certified Soil Scientist ☐ Certified Geologist ☐ Professional Engineer

affix professional seal

FORM G 02/02

SOIL AND WATER CONSERVATION DISTRICT OPTIONAL REVIEW

Date: _____

Applicant's name: _____

Address: _____

Project name: _____

Project location: _____

As part of my DEP application, pursuant to the Site Location of Development Law (Site Law) 38 M.R.S.A. § § 481-490, I request that the Conservation District indicated below review (a) Erosion and Sedimentation Control submissions and (b) Stormwater Management submissions. I will enter into an agreement with the District for their review services.

Check one:

____ Androscoggin Valley SWCD

____ Cumberland County SWCD

____ Oxford County SWCD

____ York County SWCD

_____
Signature of Applicant

Forms H1-3 SUGGESTED TEMPLATES FOR STORMWATER BUFFER DEED RESTRICTIONS. With some minor revisions the H-1 (Forested buffer, no disturbance) template may be used to protect undisturbed stream buffers.

Forested buffer, No disturbance FORM H-1 04/06

DECLARATION OF RESTRICTIONS (Forested Buffer, No Disturbance)

THIS DECLARATION OF RESTRICTIONS is made this _____day of _____ , 20___, by _____, _____,
(Name) (Street Address)
_____, _____County, Maine, _____ , (herein referred to as the
(City or Town) (County) (Zip Code)
"Declarant", pursuant to a permit received from the Maine Department of Environmental Protection under the Site Location of Development Act, to preserve a buffer area on a parcel of land near _____, _____ .
(Road Name) (Known Feature and/or Town)

WHEREAS, the Declarant holds title to certain real property situated in _____, Maine
(Town)
described in a deed from _____to _____, dated
(Name) (Name of Declarant)
_____, 20____, and recorded in Book ____ Page ____ at the _____County Registry of Deeds, herein referred to as the "property"; and

WHEREAS, Declarant desires to place certain restrictions, under the terms and conditions herein, over a portion of said real property (hereinafter referred to as the "Restricted Buffer") described as follows: (Note: Insert description of restricted buffer location here)

WHEREAS, pursuant to the Site Location of Development Act, 38 M.R.S.A. §§ 481-490, and Department Rules for stormwater management, Chapter 500, promulgated by the Maine Board of Environmental Protection, Declarant has agreed to impose certain restrictions on the Restricted Buffer Area as more particularly set forth herein and has agreed that these restrictions may be enforced by the Maine Department of Environmental Protection or any successor (hereinafter the "MDEP"),

NOW, THEREFORE, the Declarant hereby declares that the Restricted Buffer Area is and shall forever be held, transferred, sold, conveyed, occupied and maintained subject to the conditions and restrictions set forth herein. The Restrictions shall run with the Restricted Buffer Area and shall be binding on all parties

having any right, title or interest in and to the Restricted Buffer Area, or any portion thereof, and their heirs, personal representatives, successors, and assigns. Any present or future owner or occupant of the Restricted Buffer Area or any portion thereof, by the acceptance of a deed of conveyance of all or part of the Covenant Area or an instrument conveying any interest therein, whether or not the deed or instrument shall so express, shall be deemed to have accepted the Restricted Buffer Area subject to the Restrictions and shall agree to be bound by, to comply with and to be subject to each and every one of the Restrictions hereinafter set forth.

1. Restrictions on Restricted Buffer Area. Unless the owner of the Restricted Buffer Area, or any successors or assigns, obtains the prior written approval of the MDEP, the Restricted Buffer Area must remain undeveloped in perpetuity. To maintain the ability of the Restricted Buffer Area to filter and absorb stormwater, and to maintain compliance with the Site Location of Development Act and the permit issued thereunder to the Declarant, the use of the Restricted Buffer Area is hereinafter limited as follows.

a. No soil, loam, peat, sand, gravel, concrete, rock or other mineral substance, refuse, trash, vehicle bodies or parts, rubbish, debris, junk waste, pollutants or other fill material will be placed, stored or dumped on the Restricted Buffer Area, nor shall the topography of the area be altered or manipulated in any way;

b. No trees may be cut or sprayed with biocides except for the normal maintenance of dead, windblown or damaged trees and for pruning of tree branches below a height of 12 feet provided two thirds of the tree's canopy is maintained;

c. No undergrowth, ground cover vegetation, leaf litter, organic duff layer or mineral soil may be disturbed except that one winding path, that is no wider than six feet and that does not provide a downhill channel for runoff, is allowed through the area;

d. No building or other temporary or permanent structure may be constructed, placed or permitted to remain on the Restricted Buffer Area, except for a sign, utility pole or fence;

e. No trucks, cars, dirt bikes, ATVs, bulldozers, backhoes, or other motorized vehicles or mechanical equipment may be permitted on the Restricted Buffer Area;

f. Any level lip spreader directing flow to the Restricted Buffer Area must be regularly inspected and adequately maintained to preserve the function of the level spreader.

Any activity on or use of the Restricted Buffer Area inconsistent with the purpose of these Restrictions is prohibited. Any future alterations or changes in use of the Restricted Buffer Area must receive prior approval in writing from the MDEP. The MDEP may approve such alterations and changes in use if such alterations and uses do not impede the stormwater control and treatment capability of the Restricted Buffer Area or if adequate and appropriate alternative means of stormwater control and treatment are provided.

2. Enforcement. The MDEP may enforce any of the Restrictions set forth in Section 1 above.

3. Binding Effect. The restrictions set forth herein shall be binding on any present or future owner of the Restricted Buffer Area. If the Restricted Buffer Area is at any time owned by more than one owner, each owner shall be bound by the foregoing restrictions to the extent that any of the Restricted Buffer Area is included within such owner's property.

4. Amendment. Any provision contained in this Declaration may be amended or revoked only by the recording of a written instrument or instruments specifying the amendment or the revocation signed by the owner or owners of the Restricted Buffer Area and by the MDEP.

5. Effective Provisions of Declaration. Each provision of this Declaration, and any agreement, promise, covenant and undertaking to comply with each provision of this Declaration, shall be deemed a land use restriction running with the land as a burden and upon the title to the Restricted Buffer Area.

6. Severability. Invalidity or unenforceability of any provision of this Declaration in whole or in part shall not affect the validity or enforceability of any other provision or any valid and enforceable part of a provision of this Declaration.

7. Governing Law. This Declaration shall be governed by and interpreted in accordance with the laws of the State of Maine.

_____

(Name)

STATE OF MAINE, _____ County, dated _____, 20__.
(County)

Personally appeared before me the above named _____, who swore to the truth of the foregoing to the best of (his/her) knowledge, information and belief and acknowledged the foregoing instrument to be (his/her) free act and deed.

_____

Notary Public

1. Forested buffer, limited disturbance

DECLARATION OF RESTRICTIONS (Forested Buffer, Limited Disturbance)

THIS DECLARATION OF RESTRICTIONS is made this _____day of _____, 20___, by _____ (Name), _____ (Street Address), _____ (City or Town), _____ (County) County, Maine, _____ (Zip Code), (herein referred to as the "Declarant"), pursuant to a permit received from the Maine Department of Environmental Protection under the Site Location of Development Act to preserve a buffer area on a parcel of land near _____ (Road Name), _____ (Known Feature and/or Town).

WHEREAS, the Declarant holds title to certain real property situated in _____ (Town), Maine described in a deed from _____ (Name) to _____ (Name of Declarant) dated _____, 20___, and recorded in Book ____ Page ____ at the _____County Registry of Deeds, herein referred to as the "property"; and

WHEREAS, Declarant desires to place certain restrictions, under the terms and conditions herein, over a portion of said real property (hereinafter referred to as the "Restricted Buffer") described as follows: (Note: Insert description of restricted buffer area location here)

WHEREAS, pursuant to the Site Location of Development Act, 38 M.R.S.A. §§ 481-490, and Department Rules for stormwater management, Chapter 500, promulgated by the Maine Board of Environmental Protection, Declarant has agreed to impose certain restrictions on the Restricted Buffer Area as more particularly set forth herein and has agreed that these restrictions may be enforced by the Maine Department of Environmental Protection or any successor (hereinafter the "MDEP"),

NOW, THEREFORE, the Declarant hereby declares that the Restricted Buffer Area is and shall forever be held, transferred, sold, conveyed, occupied and maintained subject to the conditions and restrictions set forth herein. The Restrictions shall run with the Restricted Buffer Area and shall be binding on all parties having any right, title or interest in and to the Restricted Buffer Area, or any portion thereof, and their heirs, personal representatives, successors, and assigns. Any present or future owner or occupant of the Restricted Buffer Area or any portion thereof, by the acceptance of a deed of conveyance of all or part of the Covenant Area or an instrument conveying any interest therein, whether or not the deed or instrument shall so express, shall be deemed to have accepted the Restricted Buffer Area subject to the Restrictions and shall agree to be bound by, to comply with and to be subject to each and every one of the Restrictions hereinafter set forth.

1. Restrictions on Restricted Buffer Area. Unless the owner of the Restricted Buffer Area, or any successors or assigns, obtains the prior written approval of the MDEP, the Restricted Buffer Area must remain undeveloped in perpetuity. To maintain the ability of the Restricted Buffer Area to filter and

absorb stormwater, and to maintain compliance with the Site Location of Development Act and the permit issued thereunder to the Declarant, the use of the Restricted Buffer Area is hereinafter limited as follows.

a. No soil, loam, peat, sand, gravel, concrete, rock or other mineral substance, refuse, trash, vehicle bodies or parts, rubbish, debris, junk waste, pollutants or other fill material may be placed, stored or dumped on the Restricted Buffer Area, nor may the topography of the area be altered or manipulated in any way;

b. Any removal of trees or other vegetation within the Restricted Buffer Area must be limited to the following:

(i) No purposefully cleared openings may be created and an evenly distributed stand of trees and other vegetation must be maintained. An "evenly distributed stand of trees " is defined as maintaining a minimum rating score of 24 points in any 25 foot by 50 foot square (2500 square feet) area, as determined by the following rating scheme:

Diameter of tree at 4½ feet above ground level	Points
2 - 4 inches	1
4 - 8 inches	2
8 - 12 inches	4
>12 inches	8

Where existing trees and other vegetation result in a rating score less than 24 points, no trees may be cut or sprayed with biocides except for the normal maintenance of dead, windblown or damaged trees and for pruning of tree branches below a height of 12 feet provided two thirds of the tree's canopy is maintained;

(ii) No undergrowth, ground cover vegetation, leaf litter, organic duff layer or mineral soil may be disturbed except that one winding path, that is no wider than six feet and that does not provide a downhill channel for runoff, is allowed through the area;

c. No building or other temporary or permanent structure may be constructed, placed or permitted to remain on the Restricted Buffer Area, except for a sign, utility pole or fence;

d. No trucks, cars, dirt bikes, ATVs, bulldozers, backhoes, or other motorized vehicles or mechanical equipment may be permitted on the Restricted Buffer Area;

e. Any level lip spreader directing flow to the Restricted Buffer Area must be regularly inspected and adequately maintained to preserve the function of the level spreader.

Any activity on or use of the Restricted Buffer Area inconsistent with the purpose of these Restrictions is prohibited. Any future alterations or changes in use of the Restricted Buffer Area must receive prior approval in writing from the MDEP. The MDEP may approve such alterations and changes in use if such alterations and uses do not impede the stormwater control and treatment capability of the Restricted Buffer Area or if adequate and appropriate alternative means of stormwater control and treatment are provided.

2. Enforcement. The MDEP may enforce any of the Restrictions set forth in Section 1 above.

3. Binding Effect. The restrictions set forth herein shall be binding on any present or future owner of the Restricted Buffer Area. If the Restricted Buffer Area is at any time owned by more than one owner, each owner shall be bound by the foregoing restrictions to the extent that any of the Restricted Buffer Area is included within such owner's property.

4. Amendment. Any provision contained in this Declaration may be amended or revoked only by the recording of a written instrument or instruments specifying the amendment or the revocation signed by the owner or owners of the Restricted Buffer Area and by the MDEP.

5. Effective Provisions of Declaration. Each provision of this Declaration, and any agreement, promise, covenant and undertaking to comply with each provision of this Declaration, shall be deemed a land use restriction running with the land as a burden and upon the title to the Restricted Buffer Area.

6. Severability. Invalidity or unenforceability of any provision of this Declaration in whole or in part shall not affect the validity or enforceability of any other provision or any valid and enforceable part of a provision of this Declaration.

7. Governing Law. This Declaration shall be governed by and interpreted in accordance with the laws of the State of Maine.

(Name)

_____

STATE OF MAINE

_____ County, _____, 20__.
(County) (Date)

Personally appeared before me the above named _____, who swore to the truth of the foregoing to the best of (his/her) knowledge, information and belief and acknowledged the foregoing instrument to be (his/her) free act and deed.

_____

Notary Public

_____

DECLARATION OF RESTRICTIONS (Non-Wooded Meadow Buffer)

THIS DECLARATION OF RESTRICTIONS is made this _____day of _____, 20___, by _____ (Name), _____ (Street Address), _____ (City or Town), _____ (County) County, Maine, _____ (Zip Code), (herein referred to as the "Declarant"), pursuant to a permit received from the Maine Department of Environmental Protection under the Site Location of Development Act, to preserve a buffer area on a parcel of land near _____ (Road Name), _____ (known feature and/or town).

WHEREAS, the Declarant holds title to certain real property situated in _____ (Town), Maine described in a deed from _____ (Name) to _____ (Name of Declarant), dated _____, 20____, and recorded in Book ____ Page ____ at the _____County Registry of Deeds, herein referred to as the "property"; and

WHEREAS, Declarant desires to place certain restrictions, under the terms and conditions herein, over a portion of said real property (hereinafter referred to as the "Restricted Buffer") described as follows: Note: Insert description of restricted buffer location here)

WHEREAS, pursuant to the Site Location of Development Act, 38 M.R.S.A. §§ 481-490 and Department Rules for stormwater management (Chapter 500) promulgated by the Maine Board of Environmental Protection, Declarant has agreed to impose certain restrictions on the Restricted Buffer Area as more particularly set forth herein and has agreed that these restrictions may be enforced by the Maine Department of Environmental Protection or any successor (hereinafter the "MDEP"),

NOW, THEREFORE, the Declarant hereby declares that the Restricted Buffer Area is and shall forever be held, transferred, sold, conveyed, occupied and maintained subject to the conditions and restrictions set forth herein. The Restrictions shall run with the Restricted Buffer Area and shall be binding on all parties having any right, title or interest in and to the Restricted Buffer Area, or any portion thereof, and their heirs, personal representatives, successors, and assigns. Any present or future owner or occupant of the Restricted Buffer Area or any portion thereof, by the acceptance of a deed of conveyance of all or part of the Covenant Area or an instrument conveying any interest therein, whether or not the deed or instrument shall so express, shall be deemed to have accepted the Restricted Buffer Area subject to the Restrictions and shall agree to be bound by, to comply with and to be subject to each and every one of the Restrictions hereinafter set forth.

1. Restrictions on Restricted Buffer Area. Unless the owner of the Restricted Buffer Area, or any successors or assigns, obtains the prior written approval of the MDEP, the Restricted Buffer Area must remain undeveloped in perpetuity. To maintain the ability of the Restricted Buffer Area to filter and absorb stormwater, and to maintain compliance with the Site Location of Development Act and the permit issued thereunder to the Declarant, the use of the Restricted Buffer Area is hereinafter limited as follows.

a. No soil, loam, peat, sand, gravel, concrete, rock or other mineral substance, refuse, trash, vehicle bodies or parts, rubbish, debris, junk waste, pollutants or other fill material will be placed, stored or dumped on the Restricted Buffer Area, nor may the topography or the natural mineral soil of the area be altered or manipulated in any way;

b. A dense cover of grassy vegetation must be maintained over the Restricted Buffer Area, except that shrubs, trees and other woody vegetation may also be planted or allowed to grow in the area. The Restricted Buffer Area may not be maintained as a lawn or used as a pasture. If vegetation in the Restricted Buffer Area is mowed, it may be mown no more than two times per year.

c. No building or other temporary or permanent structure may be constructed, placed or permitted to remain on the Restricted Buffer Area, except for a sign, utility pole or fence;

d. No trucks, cars, dirt bikes, ATVs, bulldozers, backhoes, or other motorized vehicles or mechanical equipment may be permitted on the Restricted Buffer Area, except for vehicles used in mowing;

e. Any level lip spreader directing flow to the Restricted Buffer Area must be regularly inspected and adequately maintained to preserve the function of the level spreader.

Any activity on or use of the Restricted Buffer Area inconsistent with the purpose of these Restrictions is prohibited. Any future alterations or changes in use of the Restricted Buffer Area must receive prior approval in writing from the MDEP. The MDEP may approve such alterations and changes in use if such alterations and uses do not impede the stormwater control and treatment capability of the Restricted Buffer Area or if adequate and appropriate alternative means of stormwater control and treatment are provided.

2. Enforcement. The MDEP may enforce any of the Restrictions set forth in Section 1 above.

3. Binding Effect. The restrictions set forth herein shall be binding on any present or future owner of the Restricted Buffer Area. If the Restricted Buffer Area is at any time owned by more than one owner, each owner shall be bound by the foregoing restrictions to the extent that any of the Restricted Buffer Area is included within such owner's property.

4. Amendment. Any provision contained in this Declaration may be amended or revoked only by the recording of a written instrument or instruments specifying the amendment or the revocation signed by the owner or owners of the Restricted Buffer Area and by the MDEP.

5. Effective Provisions of Declaration. Each provision of this Declaration, and any agreement, promise, covenant and undertaking to comply with each provision of this Declaration, shall be deemed a land use restriction running with the land as a burden and upon the title to the Restricted Buffer Area.

6. Severability. Invalidity or unenforceability of any provision of this Declaration in whole or in part shall not affect the validity or enforceability of any other provision or any valid and enforceable part of a provision of this Declaration.

7. Governing Law. This Declaration shall be governed by and interpreted in accordance with the laws of the State of Maine.

_____
(NAME)

STATE OF MAINE, _____, County, dated _____, 20__ .
(County)

Personally appeared before me the above named _____, who swore to the truth of the foregoing to the best of (his/her) knowledge, information and belief and acknowledged the foregoing instrument to be (his/her) free act and deed.

_____
Notary Public

_____

DEED OF CONSERVATION EASEMENT Form I

THIS GRANT DEED OF CONSERVATION EASEMENT is made this____day of _____ , 20 _by _____, of the Town of _____ , _____County, Maine, (hereinafter referred to as the "Grantor"), [in favor of _____ **or** the Town of _____, Maine] (hereinafter referred to as the "Holder") and The State of Maine by and through its Department of Environmental Protection, (hereinafter referred to as the "Third Party").

WITNESSETH

WHEREAS this Indenture is created pursuant to Title 33, Maine Revised Statutes, Sections 476 through 479-B, inclusive, as amended; and

WHEREAS the Grantor holds title to certain real property situated in _____, Maine (hereinafter referred to as the "Property") described [in a recorded deed **or** on a recorded plan] at the_____ County Registry of Deeds; and further described [as follows: **or** in exhibit A attached hereto.]

WHEREAS the Property remains in a substantially undisturbed natural state and has significant aesthetic and ecological value, in particular, [here describe the conservation purposes of the easement] ; and

WHEREAS, the Grantor and the Holder, recognizing the value of the Protected Property as described above, have the common purpose of conserving the natural values of the Property by the conveyance of a Conservation Easement over the Property, which easement shall benefit, protect and conserve the natural values of the Property, conserve and protect the indigenous animal and plant populations, and prevent the use or development of the Property for any purpose or in any manner that would conflict with its natural, scenic condition; and

WHEREAS the Third Party will receive Third Party Rights of Enforcement under this Deed;

NOW, THEREFORE, in consideration of the foregoing and the covenants, terms, conditions, and restrictions herein contained, the Grantor hereby GRANTS to the Holder, its successors and assigns, as an absolute and unconditional gift, forever and in perpetuity, with Warranty Covenants, a Conservation Easement in gross over the Property as set forth herein (the "Conservation Easement"); and to the Third Party, its successors and assigns, as an absolute and unconditional gift, forever and in perpetuity, rights of enforcement hereunder.

I. PURPOSE: It is the purpose of this Easement to assure that the Property will be retained forever in its natural undeveloped condition and to prevent any use of the Protected Property that will significantly impair or interfere with the conservation values of the Property. Grantors intend that this Easement will confine the use of the Property to such activities as are consistent with the purpose of this Easement.

2. RIGHTS OF HOLDER: To accomplish the purpose of this Easement the following rights are conveyed to the Holder by this easement:

a. the right to preserve and protect the conservation values of the Property;

b. the right to enter and inspect the Property over other lands of the Grantor at any reasonable time and in any reasonable manner provided that the time and manner of such entry does not unreasonably interfere with the uses of the Property permitted hereunder or the quiet enjoyment of other lands of Grantor, and to enforce by proceedings at law or in equity the covenants hereinafter set forth, including the right to require restoration of the Property to its condition prior to any breach hereof; and

c. the right to prevent any activity on or use of the Property that is inconsistent with the purpose of this Easement and to require the restoration of such areas or features of the Property that may be damaged by any inconsistent activity or use, pursuant to paragraph 6.

3. USE OF THE PROPERTY: The Property shall be used for limited recreational and conservation purposes only. No commercial, industrial, quarrying or mining activities shall be permitted on the Property. No structures or facilities of any kind whatsoever shall be constructed on the Property, except walking paths designed in keeping with the natural scenic quality of the Property. No motor vehicles of any kind, including recreational vehicles, all-terrain vehicles motorcycles, dirt bikes and snowmobiles shall be permitted on the Property, except in emergency and when necessary to accomplish the rights reserved by Grantor and Holder, their successors and assigns. No filling, paving, dumping, excavation or other alteration shall be made to the surface of the Property other than that caused by the forces of nature. Any activity on or use of the Property inconsistent with the purposes of this Easement is prohibited.

4. RESERVED RIGHTS: Grantors reserve to themselves, and to their personal representatives, heirs, successors, and assigns, all rights accruing from their ownership of the Property, including the right to engage in, or permit or invite others to engage in, all uses of the Property that are not expressly prohibited herein and are not inconsistent with the purpose of this Easement. Without limiting the generality of the foregoing, the following rights are expressly reserved:

a. The right of the Grantors, their guests, employees and invitees, to use the Property for recreational purposes which may include hiking, picnicking, bird watching, camping, tenting and any other use that is not expressly prohibited above or destructive to the natural values to be conserved herein.

b. The right to advertise the Property for sale or rent and to convey the Property, always subject to the terms of this Conservation Easement.

5. CUTTING OF TIMBER AND VEGETATION: The destruction or removal of standing timber, plants, shrubs or other vegetation shall not be permitted, except however, there are retained in the Grantor the following rights:

a. The right to clear and restore forest cover and other vegetation that is damaged or destroyed by the forces of nature, such as fire or disease and, with the prior written approval of the Holder and the Third Party, when necessary to prevent the spread of disease.

b. The right to clear and restore forest cover and other vegetation, in the event of an emergency, when necessary to prevent the spread of fire.

c. The right to gather, use or remove dead wood.

6. RIGHTS OF THE THIRD PARTY: The Grantors hereby grant to the Third Party the same inspection and enforcement rights as are granted to the Holder under this easement. However the Parties hereto intend that the Holder shall be primarily responsible for the enforcement of this Easement, and that the Third Party will assume such responsibility only if the Holder shall fail to enforce it. If the Third Party shall determine that the Holder is failing in such enforcement, the Third Party may give notice of such failure to the Holder and the Grantors, and if such failure is not corrected within a reasonable time thereafter, the Third Party may exercise, in its own name and for its own account, all the rights of enforcement granted the Holder under this Easement.

The Third Party shall also have reasonable access to any and all records of the Holder relevant to the Protected Property.

7. CONSTRUCTION: If uncertainty should arise in the interpretation of these restrictions, judgment should be made in favor of conserving the Property in its natural, open, and scenic condition.

The Grantor agrees to bear all costs and responsibility of operation, upkeep, and maintenance of the Property and to pay any and all real property taxes and assessments levied by competent authority on the Property and does hereby relieve, indemnify and hold harmless the Holder therefrom.

The Grantor has provided the Holder with sufficient information to determine the condition of the Property as of the effective date hereof and has certified that such information is an accurate representation of the same.

8. SUCCESSORS: The covenants, terms, conditions, and restrictions of this Easement shall be binding upon, and inure to the benefit of, the parties hereto and their respective personal representatives, heirs, successors, and assigns and shall continue as a servitude running in perpetuity with the Property.

9. TERMINATION OF RIGHTS AND OBLIGATIONS: A party's rights and obligations under this Easement terminate upon transfer of the party's interest in the Easement or Property, except that liability for acts or omissions occurring prior to transfer shall survive transfer.

TO HAVE AND TO HOLD the said Conservation Easement unto the said Holder and its successors and assigns forever and the said Third Party Rights unto the said Third Party and its successors and assigns forever.

GRANTOR'S SIGNATURE

IN WITNESS WHEREOF, the said grantor, _____ has hereunto set his/her hand and seal this _____day of _____, 20__ .

_____

By:

NOTARIZATION OF GRANTOR'S SIGNATURE

HOLDER'S ACCEPTANCE

The above and foregoing Conservation Easement was authorized to be accepted by _____, Holder as aforesaid, and the said Holder does hereby accept the foregoing Conservation Easement, by and through _____, its, hereunto duly authorized, this ____day of _____, 20__.

_____

By:
Its:

NOTARIZATION OF GRANTOR'S SIGNATURE

THIRD PARTY ENFORCER ACCEPTANCE

The third party rights of enforcement granted under the above and foregoing Conservation Easement, pursuant to Title 33 M.R.S.A Section 476 et seq., were authorized to be accepted by the State of Maine Department of Environmental Protection by _____, its Director of the Bureau of Land & Water Quality, hereunto duly authorized and the said _____ does hereby accept the foregoing Conservation Easement this_____day of _____, 20___.

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

By: _____
Its: Director, Bureau of Land & Water Quality

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Land and Water Quality
17 State House Station
Augusta, Maine 04333-0017

FORM J

CERTIFICATION – SITE LOCATION OF DEVELOPMENT LAW

(To be completed and sent to the DEP after the contractor and any subcontractors have been shown a copy of the approval with conditions by the developer, and the owner and each contractor and subcontractor have certified, on this form provided by the department, that the approval and conditions have been received and read, and the work will be carried out in accordance with the approval and conditions.)

Name of Applicant: _____

Town where project located: _____

Type of project: _____

Permit number: _____

Work done by a contractor or subcontractor pursuant to an approval under the Site Location of Development Act (Site Law) may not begin before the contractor and any subcontractors have been shown a copy of the approval with conditions by the developer, and the owner and each contractor and subcontractor have certified, on this form provided by the department, that the approval and conditions have been received and read, and the work will be carried out in accordance with the approval and conditions. Completed certifications forms must be forwarded to the department.

This certification form must be completed and mailed to Department of Environmental Protection, Bureau of Land and Water Quality, 17 State House Station, Augusta, Maine 04333 or to the project manager at the appropriate office prior to start of construction. Separate forms may be submitted for each person, or persons may be listed on a single form. List the name, address, phone number, of each person signing the form.

I certify that I have personally received and read the approval and conditions described below, and that the work will be carried out in accordance with the approval and conditions.

Owner (Applicant) Name (typed or printed), address, and phone number :	
Signature:	

Contractor Name (typed or printed), address, and phone number:	
Signature:	

Subcontractor Name (typed or printed), address, and phone number:	

NOTICE OF TERMINATION
for use with CONSTRUCTION GENERAL PERMIT

FORM K 04/06

PLEASE TYPE OR PRINT IN *BLACK INK ONLY*

Name of Applicant (Owner):		**Applicant Mailing Address:**			
Town/City:		**State:**		**Zip Code:**	
Daytime phone: (with area code)		**E Mail, if available:**			
Name of Agent:		**Agent Phone #:**		**Permit number (if known):**	
Project Location: (Town/City):		**UTM Northing: (if known)**		**UTM Easting: (if known**	
Map #:		**Lot #:**		**County:**	
Name of waterbody(ies) to which the disturbed area drains, or name of municipality if area drains to an MS4:					
Name/description of project					

I am filing notice of my Notice of Termination indicating that permanent stabilization has been completed or, if the project was a common plan of development or sale, that the requirements of the Construction General Permit at Part IV(B)(2) have been completed. . have attached all the required submittals. *Notification forms cannot be accepted without the necessary attachments.*

- ❑ ALL: Photographs showing the completed project and affected area, except as provided in Part IV(B)(3)(c) of the MCGP.
- ❑ IF this form is not being signed by the landowner or lessee of the property, attach documentation showing authorization to sign; OR
- ❑ Check here to reference documentation showing authorization to sign that was submitted with the Notice of Intent if the documentation showing authorization to sign applies and is still current.

I authorize staff of the Departments of Environmental Protection to access the project site for the purpose of determining compliance with the general permit.

Signature of Applicant:		**Date:**	

Retain your records. The permittee is required to retain copies of any forms, submissions, reports, or other materials required by this general permit for a period of at least three years from the completion of permanent stabilization.

OFFICE USE ONLY						Staff		Staff			
NOI #		FP		Date		Acc. Date		Def. Date		After Photos	

21.0 AIR EMISSIONS

Nordic Aquafarms plans to construct a central utilities plant that will provide electrical and heating to its proposed aquaculture facility. The proposed fuel burning equipment is regulated by Maine Department of Environmental Protection Chapter 115. Plant electrical needs will mainly be supplied by the local utility; however, Nordic Aquafarms will supplement this with a 14 MW reciprocating engine bank, consisting of Eight 2-MW Diesel Engines (one will serve as a back-up). Potential combustion related air emissions will be limited by fuel usage caps to ensure that potential emissions remain below the "major" source thresholds.

The proposed engine sets that will each meet manufacturer mandated Tier 4 standards using state-of-the-art air pollution controls, which include Selective Catalytic Reduction, Oxidation Catalyst, and a Particulate Filter. The proposed boilers will be small package units fueled by inherently clean burning propane gas.

An application for a New "Minor" Source Air Emission License has been prepared and is included as **Appendix 21-A**.

Additionally, Nordic Aquafarms will be subject to Standard Condition 4, which addresses ongoing fugitive dust. This condition is written into every Chapter 115 license issued by the Bureau of Air Quality. Included as **Appendix 21-B** is a fugitive dust standard operating practice (SOP) developed to comply with this standard.

APPENDIX 21-A

Chapter 115 Air Emission License Application

APPENDIX 21-B

Fugitive Dust Standard Operating Practice



CHAPTER 115 MINOR NEW SOURCE LICENSE APPLICATION

Nordic Aquafarms Inc

May 2019



MainelyEnvironmental.com
60 Pineland Dr., Suite 310
New Gloucester, ME 04260
207-671-7387

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FIGURES

Figure 1: Recirculation Aquaculture System Tank

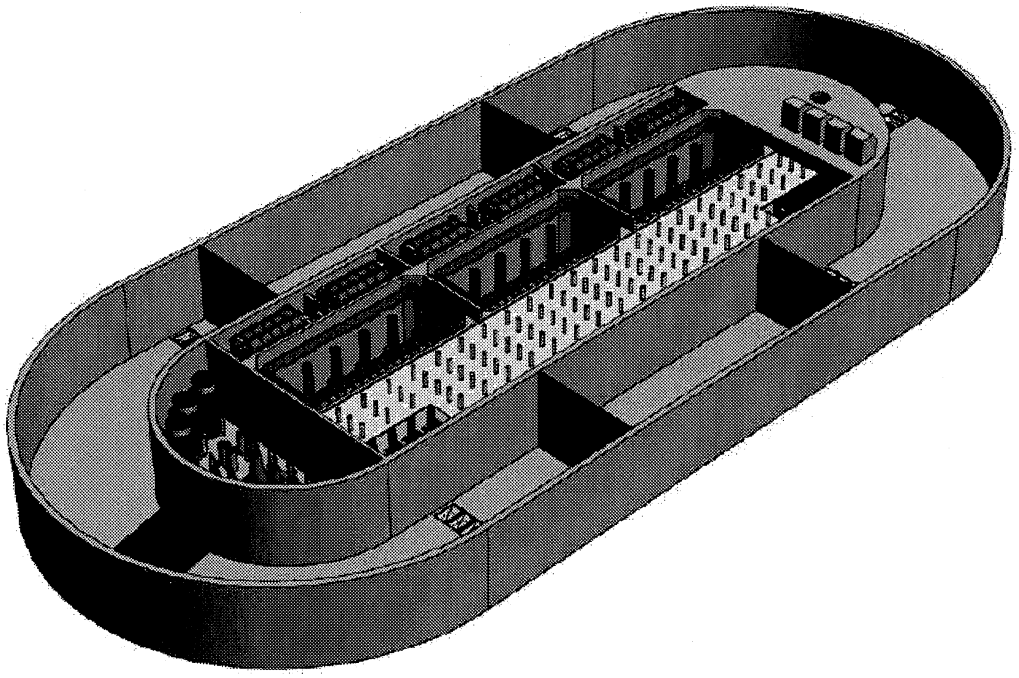
APPENDICES

Appendix A: Maine DEP Chapter 140 Forms
Appendix B: Public Notice and Cover Letters to Town of Belfast
Appendix C: Site Plan
Appendix D: Title, Right, & Interest

1. INTRODUCTION

Nordic Aquafarms Inc is proposing to construct a land-based salmon aquaculture farm on a 54-acre parcel located at 285 Northport Ave in Belfast, Maine. The facility will be an end-to-end operation, from eggs to market size salmon, using Recirculation Aquaculture System (RAS) tank technology for maintaining optimal water quality for fish production. Ultimately the plant will be designed to produce up to 33,000 tons per year of salmon. Provided in Figure 1 is a depiction of the RAS technology followed by a brief description.

Figure 1: Recirculation Aquaculture System Tank



The RAS includes mechanically forced cleaning and degassing/aeration to replace carbon dioxide with oxygen vital for fish health and growth. The RAS module's water circulation, cleaning, degassing, and aeration systems require electricity to operate. Plant electrical needs will mainly be supplied by the local utility; however, Nordic Aquafarms will supplement this with a 14 MW reciprocating engine bank. Facility building and process heating will be provided by electrical heaters. Licensable air emission units include the diesel engines identified in Section 1.2. Potential emissions will be limited by an annual fuel usage limit to ensure that potential emission remain below the "major" source thresholds. Accordingly, this application constitutes a Chapter 115 Minor New Source.

1.1 Report Organization

A description of the licensable equipment is provided in Section 1-2 followed by the construction schedule in Section 1-3. Section 2 identifies the project emission and licensing classification. Section 3 includes the required Best Available Control Technology analysis.

The required Maine DEP application forms, including the certification of a responsible official, are included in Appendix A. A copy of the Public Notice, run in the Bangor Daily News, is included in Appendix B. Copies of the return receipt from notification to the abutters can be found in the SLODA application filed concurrently with this application. Appendix C includes a Site Plan, and Title/Right/Interest is included in Appendix D.

1.2 Regulated Equipment Description

Nordic Aquafarms is planning to install Eight 2-MW reciprocating diesel engine sets. The power plant will be designed to generate 14 MWs of electricity using seven of the eight engines. The eighth engine will be installed as a back-up. Diesel fuel usage will be limited to 900,000 gallons annually.

Regulated fuel burning equipment details are included in Tables 1-1 below.

Table 1-1: Fuel Burning Equipment

Equipment ID	Make/Model	Maximum Design Capacity	Electrical Generating Capacity	Fuel Type (Sulfur Content)	Maximum Hourly Fuel Usage	Control Equipment
		[MMBtu/hr]		[-]	[gal]	[-]
Engines #1 - #8	Caterpillar 3516C Tier 4F **or equivalent**	19.53	2 MW	Diesel, 15 ppm sulfur	139.5	SCR, Oxidation Catalyst, & Particulate Filter

1.3 Construction Schedule

This schedule will commence upon final receipt of all necessary permits and approvals for the project.

1. Construction start within 1-3 months of completion of permitting. Initial construction efforts will include infrastructure connection to site, sitework, the Smolt 1 facility and waste water treatment plant, and supporting facilities and utilities
2. Construction start of grow-out modules will occur within approximately 6 months of the beginning of development. The total period for construction of the first 3 modules and fish processing is projected to be about 24 months.
3. Timeline for Phase 2 expansion (Smolt 2 and remaining 3 grow-out modules), will be decided once Phase 1 development is complete and sufficient time has been allocated for operational startup and optimization


MAINELY
ENVIRONMENTAL

2. PROJECT CLASSIFICATION

2.1 Overview

This application qualifies as a New Source Review (NSR) Chapter 115 Minor New Source. As discussed in Section 1 of this application, Nordic Aquafarms is proposing to limit its fuel usage for the eight diesel engines so that potential emissions will remain below the major source and air dispersion modeling thresholds. Provided in the tables below are proposed short term emission rates for each of the proposed fuel burning sources and the corresponding potential emissions. Table 2-1 includes emissions for the eight engines and Table 2-2 includes facility wide emissions and the corresponding major source and modeling thresholds.

2.2 Equipment and Project Emissions

Nordic Aquafarms is proposing to install Eight 2-MW diesel engines with a total annual diesel fuel limit of 900,000 gallons. The engines are subject to 40 CFR Part 60 Subpart IIII and as such must meet the applicable Tier 4 manufacturer emission standards which are identified in 40 CFR 1039.101 and described in Section 2.3. Table 2-1 includes a summary of the diesel engine equipment specifications, proposed fuel cap, and the proposed emission limits.

Table 2-2 includes a summary of facility wide total emissions as compared to the modeling and major source thresholds. Total facility wide emissions are below the applicable modeling and major source thresholds.

Table 2-1: Proposed Engines #1 - 8 Specifications and Emissions

Proposed Engines #1-8 Specifications and Emissions

Generator Make & Model:	Caterpillar 3516C Tier 4F (Or Equivalent)
Fuel Type:	Diesel
Max Fuel Consumption (gal/hr):	139.5
Max Heat Input (MMBtu/hr):	19.53
Engine Power (kW):	2,000
Proposed Fuel Limit (gal):	900,000

Pollutant	Tier 4 Emission Limit (g/kw-hr)	Emission Factor (lb/MMBtu)	Proposed Limit (lb/hr)	PTE (TPY)
NOx	3.5	0.79	**15.4**	49.8
PM**	0.1	**0.02**	**0.4**	1.4
*PM_{10} & $PM_{2.5}$		0.03	**0.6**	1.9
CO	3.5	0.79	**15.4**	49.8
VOC	0.19	0.04	**0.8**	2.7
*SO_2		0.00	**0.03**	0.1
*CO_2e		165	3,222.5	10,395.0

*AP-42 Emission Factors
**Alternate FEL standard may apply.See 40 CFR 1039.101 (d)(2)
Note: Proposed Limits are highlighted.

Table 2-2: Facility Wide Annual Potential To Emit (TPY) & Regulatory Thresholds

Pollutant	Engines 1 - 8 PTE	Modeling Threshold	Major Source Threshold	Major/Minor Designation
NOx	49.8	50	100	**Minor**
PM	1.4	n/a	100	**Minor**
PM_{10} & $PM_{2.5}$	1.9	25/15	100	**Minor**
CO	49.8	250	100	**Minor**
VOC	2.7	n/a	50	**Minor**
SO_2	0.1	50.0	100	**Minor**
CO_2e	10395.0	-	-	-

2.3 Regulatory Overview - Engines

2.3.1 Engine NESHAP & NSPS Applicability

The Engines at Nordic Aquafarms are Non-Emergency Compression Ignition (CI) New Stationary Engines Located at Area Source of Hazardous Air Pollutants (HAP), constructed on or after June 12, 2006 and are subject to 40 CFR part 60, subpart IIII (Standards of Performance for Stationary Compression Ignition Internal Combustion Engines).

Provided below is a summary overview of the applicable Requirements of 40 CFR part 60, subpart IIII for Nordic Aquafarms' proposed engines.

Emission Standards: 60.4201(a)

Stationary CI internal combustion engine manufacturers must certify their 2007 model year and later non-emergency stationary CI ICE with a maximum engine power less than or equal to 2,237 kilowatt (KW) (3,000 horsepower (HP)) and a displacement of less than 10 liters per cylinder to the certification emission standards for new nonroad CI engines in 40 CFR 89.112, 40 CFR 89.113, 40 CFR 1039.101, 40 CFR 1039.102, 40 CFR 1039.104, 40 CFR 1039.105, 40 CFR 1039.107, and 40 CFR 1039.115, as applicable, for all pollutants, for the same model year and maximum engine power. Table 3-1 includes the applicable pollutant standards.

Table 3-1: NSPS Subpart IIII Engine Manufacturer Emission Standards

Pollutant	Tier 4 Emission Limit (g/kw-hr)
NOx*	3.5
PM*	0.1
CO	3.5
VOC	0.19

*Alternate FEL standard may apply. See 40 CFR 1039.101 (d)(2)

Fuel Requirements: 60.4207(b)

Owners and operators of stationary CI ICE subject to this subpart with a displacement of less than 30 liters per cylinder that use diesel fuel must purchase diesel fuel that meets the requirements of 40 CFR 80.510(b) for nonroad diesel fuel. (i.e., 15 ppm maximum)

Monitoring Requirements: § 60.4209(b)

Owners or operators of a stationary CI internal combustion engine equipped with a diesel particulate filter necessary to comply with the emission standards in § 60.4204 must be fitted with a backpressure monitor that notifies the owner or operator when the high backpressure limit of the engine is approached.

Compliance Requirements: §60.4204, 60.4211(a) & (c), 60.4206

Owners and operators of stationary CI ICE must operate and maintain stationary CI ICE that achieve the emission standards as required in §60.4204 over the entire life of the engine.

If you are an owner or operator you must:

(1) Operate and maintain the stationary CI internal combustion engine and control device according to the manufacturer's emission-related written instructions; and

(2) Change only those emission-related settings that are permitted by the manufacturer.

Notification, Reporting, and Recordkeeping: §§60.1 & 60.4214 (b) & (c)

The General Provisions of CFR part 60.1 apply to Nordic Aquafarms proposed engines.

For CI internal combustion engines equipped with a diesel particulate filter, the owner or operator must keep records of any corrective action taken after the backpressure monitor has notified the owner or operator that the high backpressure limit of the engine is approached.

2.3.2 State DEP Regulations

The proposed Engines are subject to visible emission, particulate matter, and fuel sulfur and limits established in Maine Department of Environmental Protection Regulation Chapters 101, 103, and 106, respectively.

.

Chapter 101 - Visible Emissions

Stationary internal combustion engines manufactured after the year 2000 are subject to an opacity limit of 20 percent on a six (6) minute block average basis, except for no more than two (2) six (6) minute block averages in a 3-hour period. See Ch. 101 § (2)(B)(1)(d).

Chapter 103 - Particulate Emission Standard

The proposed engines are subject to the 0.12 lb/MMBtu particulate matter (PM) emission limit. See Ch. 103 § (2)(B)(1)(a).

Chapter 106 – Fuel Sulfur Standard

Beginning January 1, 2018, sources must limit fuel sulfur contents to 0.0015% by weight (ultra-low sulfur diesel - ULSD).

3. BEST AVAILABLE CONTROL TECHNOLOGY

3.1 Overview

The proposed installation of Eight 2-MW diesel fired engine sets represents a minor new source in accordance with Maine DEP Chapter 115 regulations. As such Nordic Aquafarms must demonstrate that the emissions from the proposed air emission units will receive Best Available Control Technology (BACT) as defined in Maine DEP Chapter 100 regulations. See Maine DEP Regulation Chapter 115 § 4(A)(4)(d). BACT is defined as:

> An emission limitation (including a visible emissions standard) based on the maximum degree of reduction for each pollutant emitted from or which results from the new or modified emissions unit which the Department on a case by case basis, taking into account energy, environmental and economic impacts and other costs, determines is achievable for such emissions unit through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combination techniques for control of each pollutant. In no event shall application of BACT result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR Part 60 and 61 or any applicable emission standard established by the Department. If the Department determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emission standard infeasible, a design, equipment, work practice, operational standard or combination thereof may be prescribed instead to satisfy the requirement for the application of BACT. Such standard shall, to the degree possible, set forth the emission reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results. (Maine DEP Regulation Chapter 100 § 18)

The proposed engine sets have the potential to emit the following criteria air pollutants: Volatile organic compounds (VOCs), particulate matter (PM/PM_{10}/$PM_{2.5}$), nitrous oxides (NOx), carbon monoxide (CO), and sulfur dioxide (SO_2). The BACT review prepared for the proposed Engines has been prepared in accordance with the Northeast States for Coordinated Air Use Management (NESCAUM) BACT Guideline. There are five key steps in the BACT Procedure:

1. Identify all control technologies applicable to the process;
2. Eliminate technically infeasible options;
3. Rank remaining control technologies by control effectiveness;
4. Evaluate technically feasible control alternatives (energy, environmental, and economic impacts) if a control technology less effective than the top option is proposed as BACT; and
5. Select BACT in consideration of energy, environmental, and economic impacts.

Provided in the following sections is a detailed BACT analysis for the proposed emission units.

3.2 Control of Air Pollutants from Generator #1-8

The air pollution control options available for generators of this size include the installation of add-on pollution control devices, the use of clean fuels, and good combustion practices. The technologies listed in Table 3-1 are determined to be potentially available control technologies for emissions from diesel engines. The technologies are listed by order of effectiveness and described in greater detail in following subsections.

Table 3-1: Control Technology Options for Diesel Engines

Pollutant	Control Technology
NOx	• Add-On Controls (i.e., Selective Catalytic Reduction) • Combustion Control Technologies
$PM/PM_{10}/PM_{2.5}$	• Add-On Controls (i.e., particulate filter) • Combustion Control Technologies
CO	• Oxidation Catalyst • Combustion Control Technologies
VOCs	• Oxidation Catalyst • Combustion Control Technologies
SO_2	• Low Sulfur Fuel

The non-emergency engines proposed for Nordic Aquafarms are subject to 40 C.F.R. 60 Subpart IIII. New non-emergency engines must meet stringent emission standards which require state-of-the-art pollution controls to meet applicable NOx, PM, CO, and VOC emission manufacturing standards. Fuel sulfur content rules require the use of 15 ppm sulfur fuel, thereby almost eliminating SO_2 emissions. Provided in the following paragraphs is a description of the top-level pollution control selected (essentially mandated by rule) for each pollutant.

3.2.1 Control of Nitrogen Oxides (NOx)

NO_x emission may be created through the conversion and release of nitrogen bound in the fuel (i.e., Fuel NOx) and/or by the thermal combustion process (i.e. Thermal NOx).

Fuel NO_x is produced from the reaction of fuel-bound nitrogen compounds with oxygen and is typically in very small quantities in clean diesel fuel. Low nitrogen content diesel releases minimal fuel NOx and is not a focus of controls as compared to thermal NOx.

Thermal NO_x is the primary mechanism of NO_x formation from diesel fuel oil combustion. Thermal NO_x arises from reaction of nitrogen (N_2) and oxygen (O_2) molecules in the combustion of air and is formed at elevated temperatures and pressures and increases with combustion temperature.

Control technologies for NO_x emissions from diesel fired engines may include: 1. add-on controls such as Selective Catalytic Reduction (SCR); 2. combustion control techniques (i.e., injection timing retard, air/fuel ratio optimization, cooled intake air); and 3. combustion of clean fuels.

Nordic Aquafarms has selected non-emergency engines that comply with EPA's Tier 4 emission standards for 40 CFR Part 60 N.S.P.S. Subpart IIII Engines.

Each engine will be fitted with a SCR catalyst, Ammonia Oxidation Catalyst (AMOX) and the Pump Electronics Tank Unit (PETU). These systems use a small amount of Diesel Exhaust Fluid (DEF) to convert NOx emissions in the exhaust into nitrogen and water. DEF is a solution of urea dissolved in deionized water to produce a concentration that is about 1/3 urea and 2/3 water.

In order to ensure sufficient NOx reduction, a small amount of excess DEF is injected into the exhaust stream. This excess DEF may pass through the SCR catalyst as ammonia. To prevent excess ammonia from entering the atmosphere, the exhaust gas flows through an Ammonia Oxidation Catalyst where the ammonia reacts with oxygen in the presence of this catalyst to form nitrogen and water.

Each Engine will meet the manufacturer mandated Tier 4 NOx standards using state of the art pollution controls, which include SCR, AMOX, and DEF. Each engine will meet a limit of 15.4 lb/hr. The proposed state of the art controls and NOx limit meet BACT.

3.2.2 Control of Particulate Matter ($PM/PM_{10}/PM_{2.5}$)

PM from fuel combustion is formed from non-combustible material in the fuel and from incomplete combustion. Potential control technologies for PM emissions from diesel engines include: 1. Add-on control (i.e., filter); and 2. good combustion practices.

Nordic Aquafarms has selected to control $PM/PM_{10}/PM_{2.5}$ emission from each of the engine sets using a Diesel Particulate Filter (DPF). A DPF traps particulate matter that's carried in the exhaust stream, preventing it from being released into the atmosphere. Inside the DPF, particulate matter, sometimes referred to as "soot," is trapped until it is oxidized during regeneration.

Nordic Aquafarms will meet BACT for the engines by fitting them with top level particulate controls and meeting limits of 0.4 and 0.6 lb/hr (includes filterable plus condensable) for PM and $PM_{10}/PM_{2.5}$, respectively.

3.2.3 Control of Carbon Monoxide (CO) & Volatile Organic Compounds (VOCs)

Carbon monoxide (CO) and Volatile Organic Compound (VOC) emissions result from incomplete combustion of fuels. CO/VOC emissions result when there is insufficient residence time or oxygen available to complete the final step in oxidation.

Potential control technologies for CO and VOC emissions from diesel fired engines include: 1. Add-on controls such as Catalytic Oxidation; and 2. Combustion Control Techniques (i.e., fuel injection timing, air to fuel ratios, cooled intake air, etc.).

Nordic Aquafarms has selected a Tier 4 compliant non-emergency engines which use start-of-the-art Diesel Oxidation Catalysts (DOC). The DOC is the top level of control available and uses a chemical process to reduce hydrocarbons and carbon monoxide in the exhaust stream.

Use of the DOC control technology and limits of 15.4 and 0.8 lb/hr, for CO and VOC, respectively, meet BACT.

3.2.4 Control of Sulfur Dioxide (SO2)

Nordic Aquafarms will use ultra-low sulfur diesel (ULSD) with a sulfur content less than or equal to 15 ppm. Burning ULSD fuel represents BACT.

3.3 BACT Summary

Nordic Aquafarms is proposing to install engine sets that will each meet manufacturer mandated Tier 4 standards using state-of-the-art air pollution controls, which include Selective Catalytic Reduction, Oxidation Catalysts, and Particulate Filters. Provided in Table 3-3 is a summary of the proposed lb/hr BACT emission limits.

Table 3-3: Proposed BACT Limits

Pollutant	Engines 1-8 [lb/hr]
NOx	15.4
PM	0.4
PM_{10} & $PM_{2.5}$	0.6
CO	15.4
VOC	0.8
SO_2	0.03

APPENDIX A: MAINE DEP CHAPTER 140 FORMS

APPENDIX B: PUBLIC NOTICE AND COVER LETTERS TO TOWN OF BELFAST

APPENDIX C: SITE PLAN

APPENDIX D: TITLE, RIGHT, & INTEREST

MainelyEnvironmental.com
60 Pineland Dr., Suite 310
New Gloucester, ME 04260
207-671-7387

	A-L-0006
Form No.	
Effective Date	12/2005
Revision No.	10
Last Revision Date	2/1/16
	Page 1 of 12

CHAPTER 115
AIR EMISSION LICENSE APPLICATION FORM

State of Maine
Department of Environmental Protection
Bureau of Air Quality
17 State House Station
Augusta, Maine 04333-0017
Phone: (207) 287-7688 Fax: (207) 287-7641

Section A: FACILITY INFORMATION

Owner or Operator (*Legal name as registered with the Secretary of State*):

Nordic Aquafarms, Inc.

Facility Site Name: Nordic Aquafarms

Facility Site Address (*Physical, no post office boxes*): 285 Northport Ave

City/Town: Belfast Zip Code: 04915 County: Waldo

Facility Description: Nordic Aquafarms is proposing to construct a salmon farm in Belfast, Me.

Application Description: A New Minor Source Application for the construction and operation of Eight 2-MW electrical generating diesel engines.

Current License #: TBD

Check When Done:

All Sources

X	Application Completed
X	Copy Sent to Town (date sent: on or about 5/7/19)
X	Public Notice Published paper name & date: Bangor Daily 4/25/19
X	Enclosed Public Notice Tear Sheet
X	Signed Signatory Form (Section K)

Additional Requirements for New Sources

	Schedule for construction or installation of equipment
	Title, Right, or Interest (e.g. copy of deed or lease)
	Check for Fee

Additional Requirements for New Major Sources and Major Modifications

	Notify Abutting Landowners

For Department Use

Application #: A- _____ - _____ - _____ - _____

App Track #: _____

Facility Contact:

Name: Erik Heim Title: Chief Executive Officer
Company: Nordic Aquafarms, Inc.
Mailing Address: 511 Congress St.

City/Town: Portland State: ME Zip Code: 04101
Phone: (207) 323-4911 Fax:
e-mail: erik.heim@nordicaquafarms.com

Application Contact:

Name: Steven Whipple Title: Consultant
Company: Mainely Environmental LLC
Mailing Address: 60 Pineland Dr., Suite 310

City/Town: New Gloucester State: ME Zip Code: 04260
Phone: (207) 671-3787 Fax:
e-mail: swhipple@mainelyenvironmental.com

Billing Contact:

Name: Brenda Chandler Title: Chief Financial Officer
Company: Nordic Aquafarms, Inc.
Mailing Address: 511 Congress St.

City/Town: Portland State: ME Zip Code: 04101
Phone: (207) 415-7237 Fax:
e-mail: blc@nordicaquafarms.com

Chapter 115 Air Emission License Application
State of Maine DEP - Bureau of Air Quality

Section B1: STATIONARY FUEL BURNING EQUIPMENT (NA)

(List equipment such as boilers, hot water heaters, etc.)

Emission Unit ID	Type of Equipment (boiler, water heater, etc.)	Maximum Design Capacity	Maximum Firing Rate	Fuel Type	% Sulfur	Date of Manufacture	Date of Installation	Stack #

Section B2: INTERNAL COMBUSTION ENGINES

(List equipment such as generators, diesel drive units, fire pumps, etc. Do not list wheeled mobile equipment such as loaders, backhoes, trucks, etc.)

Emission Unit ID	Serial Number	Maximum Design Heat Input Capacity (MMBtu/hr)	Maximum Output Capacity (kW or Hp)	Maximum Firing Rate	Fuel Type	% Sulfur	Date of Manf	Date of Installation	Portable	Stationary	Spark Ignition Engines Only			
											2-Stroke	4-Stroke	Rich Burn	Lean Burn
#1-#8	*Caterpillar 3516C Tier 4F (OR EQUIVALENT)*	*19.53*	*2000*	*139.5 gal/hr*	*diesel*	*15 ppm*	*2019*	*2019*		*X*				

Does your facility participate in a Demand Response program in which the generator(s) may be operated for more than 15 hours per calendar year?
☐ yes **X** no

If yes, what units? _____

Control Equipment for Fuel Burning Equipment
If applicable, indicate the types of required/operated add-on pollution control equipment, including baghouses, cyclones/multiclones, SCR, SNCR, etc.

Emission Unit	Type of Control	Pollutant Controlled	Control Efficiency
Engines #1-8	SCR, Cat Oxidizer & Particulate Filter	NOx, CO, VOC, and PM	NSPS IIII - EPA Tier 4

Monitors for Fuel Burning Equipment:
If applicable, indicate types of required/operated monitors, including Continuous Emission Monitors (CEM), Continuous Opacity Monitors (COM), parameter monitors for operational purposes, etc.

Emission Unit	Type of Monitor	Data Measured

Section C: INCINERATORS *(NA)*

	Incinerator Unit 1	Incinerator Unit 2
Incinerator Type (medical waste, municipal, etc.)		
Waste Type		
Make (Shenandoah, Crawford, etc.)		
Model Number		
Date of Manufacture		
Date of Installation		
Number of Chambers		
Max. Initial Charge	lb	lb
Max. Design Combustion Rate	lb/hr	lb/hr
Heat Recovery? (Yes or No)		
Retention Time of Exhaust Gases	seconds	seconds
Automatic Feeder? (Yes or No)		
Temperature Range Primary	to °F	to °F
Secondary	to °F	to °F
Auxiliary Burner - Primary Chamber max. rating (MMBtu/hr)		
type of fuel used		
Auxiliary Burner - Secondary Chamber max. rating (MMBtu/hr)		
type of fuel used		
Annual Waste Combusted for _____(yr)		
Pollution Control Equipment (if any)		
Stack Number		
Monitors (ie - temperature recorder)		

Section D: PROCESS EQUIPMENT *(NA)*

Emission Unit ID	Type of Equipment	Maximum Raw Material Process Rate (name and rate)	Maximum Finished Material Process Rate (name and rate)	Date of Manufacture	Date of Installation	Stack #	Control Device

Solvent Cleaners
(Also known as Parts Washers and/or Solvent Degreasers) ***(NA)***

Emission Unit ID	Capacity (gallons)	Solvent Used	Solvent % VOC
Degreaser #1 (Example)	*15 (Example)*	*Kerosene (Example)*	*100% (Example)*

PROCESS EQUIPMENT (section D cont'd)

Chemical Usage *(NA)*

Note: Complete this section for any chemicals integral to your process, for example, a cementing process for outersoles, dyes, surface coating, printing, cleaning, etc. Attach additional pages or MSDS sheets as needed.

Process	Chemical substance used in process	Actual Usage (gal or lb for yr ____)	Hazardous chemical(s) in substance	Percent VOC[1] (%)	Percent HAP[2] (%)	Total VOC emitted (lb/year)	Total HAP emitted (lb/year)

[1] Volatile Organic Compounds
[2] Hazardous Air Pollutants

Describe method of record keeping (ie. monthly calculations from purchase records, flow monitors on solvent tanks, etc.)

Describe methods used to calculate VOC/HAP emitted (ie – test results, if control equipment was taken into account; if conditions exist where solvents remain in the substrate rather than complete volatilization, etc.)

Section E: STACK DATA

Stack #	Height Above Ground (ft)	Inside Diameter (ft)	Exit Temperature °F	Exhaust Flow Rate (ft^3/s) [indicate actual or standard]
Generators #1-8	45	TBD	490	15,000 (ACFM)

Section F: ANNUAL FACILITY FUEL USE

Total Fuel Consumption by Month for: ____ (year)

	Fuel type: Diesel	Fuel type: __	Fuel type: _____
	Avg % sulfur (oil) 15 ppm Avg % moisture (wood) ___ (circle one: gal, tons, scf)	Avg % sulfur (oil) ___ Avg % moisture (wood) _____ (circle one: gal, tons, scf)	Avg % sulfur (oil) _____ Avg % moisture (wood) _____ (circle one: gal, tons, scf)
January	_____	_____	_____
February	_____	_____	_____
March	_____	_____	_____
April	_____	_____	_____
May	_____	_____	_____
June	_____	_____	_____
July	_____	_____	_____
August	_____	_____	_____
September	_____	_____	_____
October	_____	_____	_____
November	_____	_____	_____
December	_____	_____	_____
Total	_____	_____	_____
Proposed Annual Limits	**900,000 gal**	_____	_____

Section G: LIQUID ORGANIC MATERIAL STORAGE

Tank #	TBD*					
Capacity (gallons)						
Materials Stored						
Reid Vapor Pressure (RVP)						
Annual Throughput						
Above or Below Ground?						
Tank Type (floating or fixed, riveted or bolted, etc.)						
Physical Description – year installed						
Physical Description – color						
Dimensions - height (ft)						
Dimensions - Diameter (ft)						
Construction Material						
Control Device						

*Likely a 25,000 gallon diesel fuel tank.

Section H: MISCELLANEOUS

Note: Use this section to describe any equipment, activities, or other air emission sources that did not fit in any of the above categories. Include descriptions of the associated emissions. Attach additional pages if necessary.

Section I: BPT/BACT AND OTHER ATTACHMENTS

BPT/BACT Analysis:

For a license renewal for existing equipment, the applicant is required to submit a Best Practical Treatment (BPT) analysis to the Department. A BPT analysis establishes what equipment or requirements are appropriate for control or reduction of emissions of regulated pollutants to the lowest possible level considering the existing state of technology, the effectiveness of available alternatives, and the economic feasibility.

For a new license or the addition of new equipment to an existing license, the applicant is required to submit a Best Available Control Technology (BACT) analysis. A BACT analysis is a top-down approach to selecting air emission controls. It is done on a case-by-case basis and develops emission limits based on the maximum degree of reduction for each pollutant emitted taking into account economic, environmental and energy impacts.

I certify that, to the best of my knowledge, the control equipment, fuel limitations, and process constraints outlined in this application represent BPT / BACT for the equipment and processes listed.

OR

X I have attached a separate BPT / BACT analysis to this application.

Other Attachments:

Please list any other attachments included with this application.

Application Report Attached (with BACT) &
Appendix A: Maine DEP Chapter 140 Forms
Appendix B: Public Notice
Appendix C: Site Plan
Appendix D: Title, Right, & Interest

Section J: APPLICABLE RULES

Please indicate any rules you believe may be applicable to your facility by checking the associated box.

	Citation	Title
X	06-096 CMR 101	Visible Emissions
X	06-096 CMR 103	Fuel Burning Equipment Particulate Emission Standard
	06-096 CMR 104	Incinerator Particulate Emission Standard
	06-096 CMR 105	General Process Source particulate Emission Standard
X	06-096 CMR 106	Low Sulfur Fuel Regulation
	06-096 CMR 111	Petroleum Liquid Storage Vapor Control
	06-096 CMR 112	Bulk Terminal Petroleum Liquid Transfer Requirements
	06-096 CMR 117	Source Surveillance
	6-096 CMR 118	Gasoline Dispensing Facilities Vapor Control
	06-096 CMR 121	Emission Limitations and Emission Testing of Resource Recovery Facilities
	06-096 CMR 123	Paper Coating Regulation
	06-096 CMR 124	Total Reduced Sulfur Control from Kraft Mills
	06-096 CMR 125	Perchloroethylene Dry Cleaner Regulation
	06-096 CMR 126	Capture Efficiency Test Proceedures
	06-096 CMR 129	Surface Coating Facilities
	06-096 CMR 130	Solvent Degreasers
	06-096 CMR 131	Cutback Asphalt and Emulsified Asphalt
	06-096 CMR 132	Graphic Arts – Rotogravure and Flexography
	06-096 CMR 133	Petroleum Liquids Transfer Vapor Recovery at Bulk Gasoline Plants
	06-096 CMR 134	Reasonably Available Control Technology for Facilities That Emit Volatile Organic Compounds
	06-096 CMR 137	Emission Statements
	06-096 CMR 138	Reasonably Available Control Technology for Facilities That Emit Nitrogen Oxides
	06-096 CMR 140	Part 70 Air Emission License Regulations
	06-096 CMR 145	NOx Control Program
	06-096 CMR 153	Mobile Equipment Repair and Refinishing
	06-096 CMR 159	Control of Volatile Organic Compounds from Adhesives and Sealants
	06-096 CMR 161	Graphic Arts – Offset Lithography and Letterpress Printing
X	40 CFR Part 60	New Source Performance Standards (NSPS) (please list Subpart(s): Subpart IIII)
	40 CFR Part 63	
	Other (list)	
	Other (list)	

Section K:SIGNATORY REQUIREMENT

Each application submitted to the Department must include the following certification signed by a Responsible Official*:

"I certify under penalty of law that, based on information and belief formed after reasonable inquiry, I believe the information included in the attached document is true, complete, and accurate."

Responsible Official Signature	Date
Erik Heim	President
Responsible Official (Printed or Typed)	Title

* A Responsible Official is defined by MEDEP Rule, Chapter 100 as:

A. For a corporation: a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit and either:

(1) The facilities employ more than 250 persons or have gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars); or

(2) The delegation of authority to such representatives is approved in advance by the permitting authority;

B. For a partnership or sole proprietorship: a general partner or the proprietor, respectively;

C. For a municipality, State, Federal, or other public agency: Either a principal executive officer or ranking elected official. For the purposes of this part, a principal executive officer of a Federal agency includes the chief executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., a Regional Administrator of EPA).

§590. Licensing

1. License required. After ambient air quality standards and emission standards have been established within a region, the board may by rule provide that a person may not operate, maintain or modify in that region any air contamination source or emit any air contaminants in that region without an air emission license from the department. An incinerator may not be used to dispose of solid waste without a license from the department, except an incinerator with a primary chamber volume no greater than 133 cubic feet or 1,000 gallons that burn only wood waste as defined in Title 12, section 9324, subsection 7-A and painted and unpainted wood from construction and demolition debris.
[PL 2001, c. 626, §16 (AMD).]

2. Applications. Applications for air emission licenses must be made in a form prescribed by the commissioner and contain the information related to the proposed air contamination source and emission of air contaminants required by rule of the board. All hearings under this section must be held in a municipality within the region where the proposed emission is to be located. At this hearing, the department shall solicit and receive testimony concerning the nature of the proposed emissions; their effect on existing ambient air quality standards within the region; the availability and effectiveness of air pollution control apparatus designed to maintain the emission for which a license is sought at the levels required by law; and the expense of purchasing and installing this apparatus. The department shall grant the license and may impose appropriate and reasonable conditions as necessary to secure compliance with ambient air quality standards if the department finds that the proposed emission will:

A. Receive the best practical treatment; [PL 1991, c. 658, §1 (NEW).]

B. Not violate or be controlled so as not to violate applicable emission standards; and [PL 1991, c. 658, §1 (NEW).]

C. Either alone or in conjunction with existing emissions, not violate or be controlled so as not to violate applicable ambient air quality standards. [PL 1991, c. 658, §1 (NEW).]

[PL 1991, c. 658, §1 (NEW).]

3. Best practical treatment. Emissions from existing sources undergoing license renewal are receiving best practical treatment if those emissions are being controlled by an air pollution control apparatus installed less than 15 years prior to the date of license application approval or an accepted best practical treatment analysis shows that those emissions are being controlled in a manner consistent with emission controls commonly used in sources of similar age and design in similar industries, unless:

A. The applicant is proposing replacement of the existing air pollution control apparatus; [PL 1991, c. 658, §1 (NEW).]

B. Additional reductions are necessary to achieve or maintain ambient air quality standards; [PL 1991, c. 658, §1 (NEW).]

C. The department determines that emissions of air contaminants for which an ambient air quality standard has not been adopted pose an unreasonable risk to the environment or public health; or [PL 1991, c. 658, §1 (NEW).]

D. Additional reductions are necessary to restore ambient air quality increments, even if the applicant has been previously authorized to use that increment. [PL 1991, c. 658, §1 (NEW).]

The department may at the time of the license renewal require additional instrumentation; operating practices; automated process controls; replacement of component parts; emission testing, including requirements for continuous emission monitors; equipment maintenance programs; or record keeping to increase the efficiency of existing air pollution control apparatus or other pollution mitigating measures.
[PL 1991, c. 658, §1 (NEW).]

4. Low sulfur fuel. Best practical treatment does not include the use of fuel with a lower sulfur content than that specified in section 603-A unless a lower sulfur fuel is required to comply with applicable emission standards or applicable ambient air quality standards.
[PL 1991, c. 658, §1 (NEW).]

5. License conditions for start-up, shutdown and malfunctions. In making license decisions and conditions, the department shall consider the extent to which operation of the licensed facility requires an allowance for excess emissions during cold start-ups and shutdowns of the facility as long as that facility is operated to minimize emissions and is otherwise subject to applicable standards. When the applicant demonstrates to the department that, consistent with best practical treatment requirements and other applicable standards, infrequent emissions are unavoidable during these periods, the department shall establish appropriate license allowances and conditions.
[PL 1993, c. 232, §3 (AMD).]

6. Installation period. If an air emission license renewal or amendment can be granted only if the licensee installs additional emission controls or other mitigating measures, then the licensee may continue to emit pollutants from air contaminant sources that will receive these controls or measures up to the same level allowed in its existing air emission license as long as the additional emission controls or mitigating measures are fully operational as soon as practicable but in no case later than 24 months after the department issues the license renewal or amendment, except as provided in this subsection. After a showing by the licensee that it can not install and bring to full operation required emission controls or mitigating measures within the 24-month period, the department may establish a later date for the installation and operation.
[PL 1991, c. 658, §1 (NEW).]

7. Compliance with federal law. The department has the authority to deny an air emission license for a new or modified major emitting source when it determines that the source will not comply with the requirements imposed pursuant to the Federal Clean Air Act, Title 1, Part C, subpart 2, as amended, related to the impairment of visibility in mandatory Class 1 federal areas.
[PL 1991, c. 658, §1 (NEW).]

SECTION HISTORY

PL 1969, c. 474, §1 (NEW). PL 1971, c. 462, §5 (AMD). PL 1971, c. 618, §12 (AMD). PL 1975, c. 282, §4 (AMD). PL 1979, c. 381, §§12-14 (AMD). PL 1985, c. 745, §§1,2 (AMD). PL 1989, c. 890, §§A40,B164 (AMD). PL 1991, c. 384, §§10,11 (AMD). PL 1991, c. 384, §16 (AFF). PL 1991, c. 483, §3 (AMD). PL 1991, c. 658, §1 (RPR). PL 1993, c. 232, §3 (AMD). PL 2001, c. 626, §16 (AMD).

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RANSOM
Consulting, Inc.

Consulting
Engineers
and Scientists

August 14, 2019 Project 171.05027

Mr. Kevin Martin
Compliance & Procedures Specialist
Maine Department of Environmental Protection
112 Canco Road
Portland, Maine 04103

RE: Additional Information Regarding
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Dear Mr. Martin:

The following letter and attachments provide additional information for the applications referenced above, that based on conversations with Maine Department of Environmental Protection (ME DEP) staff or based on previous correspondence from ME DEP, may be useful in review of the applications.

This information is grouped by Site Law application section and has been formatted as a question/response document for clarity.

1. Project Description - Section 1.3.1, page 5. Specify greater detail on pipeline construction methods. Will there be dewatering? How will work be conducted in tide cycle? Will equipment be on mats? What are the winter SESC methods and construction methods compared to other seasons?

Detailed pipeline construction methods are described in **Attachment A**. As noted in the attached description, dewatering may be needed between Stations 2+70 to 5+00. Dewatering is not anticipated from Station 5+00 to 13+50 (the intertidal area). The intertidal area will be constructed during low tide as described on **Attachment A**.

SESC measures are described in **Attachment A**. Note that although pipeline construction is planned for the November to April timeframe, Cianbro will not work from boats and/or barges during severe wind and/or precipitation events.

2. Project Description - In Figure BP-1, can stationing be added so the figure is more similar to CS101?

A revised figure BP-1 with stationing is in **Attachment B**.

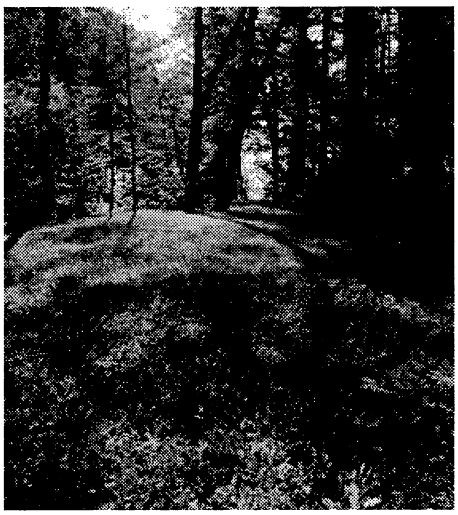
3. Project Description - Section 1.3.1, page 8. Is there a tree clearing plan? What is the square footage of tree removal for the pipeline?

Pease International Tradeport, 112 Corporate Drive, Portsmouth, New Hampshire 03801, Tel (603) 436-1490, Fax (603) 436-6037
400 Commercial Street, Suite 404, Portland, Maine 04101, Tel (207) 772-2891
12 Kent Way, Suite 100, Byfield, Massachusetts 01922-1221, Tel (978) 465-1822
60 Valley Street, Building F, Suite 106, Providence, Rhode Island 02909, Tel (401) 433-2160
2127 Hamilton Avenue, Hamilton, New Jersey 08619, Tel (609) 584-0090

www.ransomenv.com

Mr. Kevin Martin
Maine Department of Environmental Protection

Clearing necessary for construction of the pipeline through the Eckrote property will be limited to a 40-foot wide construction easement that runs from Route 1 (approximate Station 2+70) to the intertidal zone (approximate Station 5+00). This results in an overall cleared area of 9,200 square feet. However, some of this route is already cleared due to an existing berm that leads to the shed near Station 4+50 (see image below), which will limit the number of trees that will need to be cut.



4. For TRI, can Exhibit A be submitted in color?

Exhibit A in color is in **Attachment C**.

5. For TRI, page 15 is missing from the January 30, 2018 Options and Purchase Agreement.

A complete version of the Options and Purchase Agreement, dated January 30, 2018, is in **Attachment D**.

6. For TRI, have extensions been taken for the agreements? When? I think a table will help answer these questions.

Yes, extensions have been taken for the real estate agreements, and the Cassida and Eckrote agreement updates were submitted with the applications. A copy of the Belfast Water District extension agreement, which was executed on July 25, 2019, is in **Attachment E**.

7. For TRI, please explain which stream is being referred to in Section 3.3 of the original lease agreement.

The stream referenced in Section 3.3 of the lease agreement is S8.

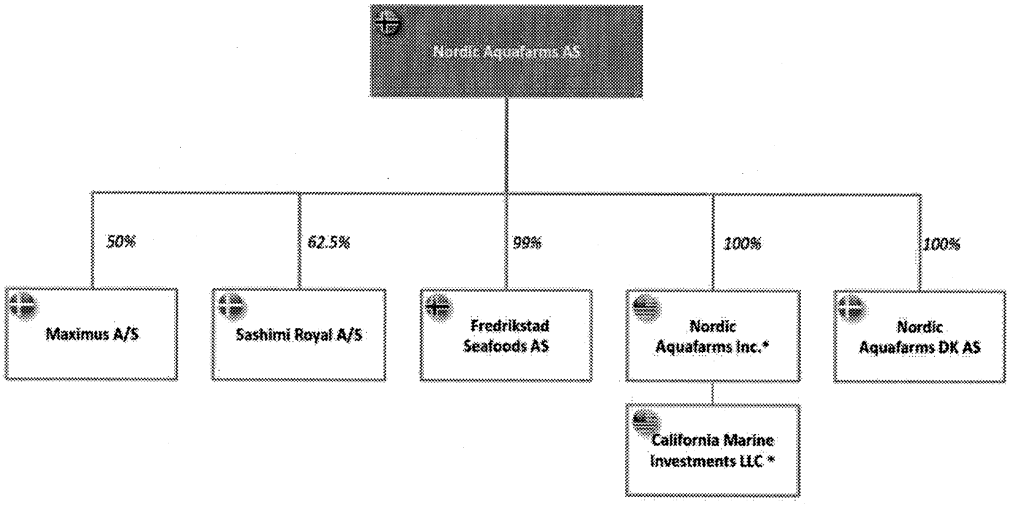
8. Financial – Explain the relationship between Nordic, Inc., Nordic DK, and Nordic AS.

Nordic Aquafarms, AS is a Norwegian private company formed in 2014 having organization number 814 603032 and location Gamle Fredrikstad, Norway. Currently there are 20 shareholders of the 25,270,758 shares outstanding, raising of NOK 520,111,916 (USD 63,661,189 fx USD/NOK 8,17) for the company. See shareholders discussion in **Appendix 3-A** of the SLODA application.

The U.S. entity, Nordic Aquafarms, Inc is a wholly owned subsidiary of Nordic Aquafarms, AS. Nordic Aquafarms DK AS, one of our Danish entities, is also a wholly owned subsidiary of Nordic Aquafarms, AS. Thus the U.S. and Danish entities are sister subsidiaries of the parent, Nordic Aquafarms, AS. See full organization structure below displaying the reporting relationships and percentage ownership.

Mr. Kevin Martin
Maine Department of Environmental Protection

Legal structure



Nordic Aquafarms AS, as parent company, is the head company, responsible for raising capital performing corporate functions, administration and governance over the entire ownership. Nordic Aquafarms DK AS employs our design engineers for the company who are predominantly engaged in the design and engineering effort for RAS technology that will be implemented in the Belfast (and California) project. While this Danish engineering team is providing the design, they will also participate in the equipment and infrastructure installation, process qualification and start-up of the RAS.

9. Financial – Provide estimated ranges of funding percentages from equity capital, debt, and cash flow from operations (i.e., 30% equity, 40% debt, and 30% cash flow). App 3A provides general descriptions of the three funding sources but estimate percentages from each of these categories would be useful.

The funding will be a mix of equity, debt and cashflow. Cashflow is included in this estimate as construction is planned over several phases, a portion of which will become operational during the life of the project and contribute in the later phases.

The Board of Nordic Aquafarms, AS resolved to permit, build and operate a U.S. based RAS operation. Everyday this financial commitment is demonstrated by employment and pursuing permitting in the U.S. The investors expect to provide a significant portion of the required capital. Prudently however, final funding is subject to final permits and resolution of any type of appeal. Additionally, several U.S. banks have approached Nordic Aquafarms, Inc. as well as continued financing interest in the Nordics.

At this time estimated split of sources of funding for the project is shown in the below matrix.

Mr. Kevin Martin
Maine Department of Environmental Protection

Estimated Funding by Source	Equity	Debt	CF	Total
Project Phase 1 Mix	70%	30%		
Project Phase 2 Mix		80%	20%	
Total Project Combined	40%	50%	10%	100%

For more discussion on timing of sources over the course of the project see **Financial Capacity 3.0** in the Site Law application.

10. Financial – The BDO Audit Report in App 3D notes that there are attached lists for 1) shares issued and 2) cash raised. Please submit a copy of those files.

The BDO audit shown in **Appendix 3-D** confirmed the share-count and funds raised. The schedule referred to by BDO appeared in **Appendix 3-A** and is shown below.

#	Shares issued	Cash raised	Time	Comment
1	150 000	3 672	nov.14	
2	187 425	183 525	dec.14	
3	59 875	58 629	dec.14	
4	170 375	0	dec.14	new equity from contributions in kind (shares in Fredrikstad Seafoods)
5	500 000	489 596	jan.15	
6	425 001	416 158	mar.15	
7	537 499	526 315	mai.15	
8	858 121	840 265	sep.15	
9	2 000 000	1 958 384	feb.16	
10	266 667	489 597	may.16	
11	335 052	795 595	aug.16	
12	5 154 640	12 239 904	dec.16	
13	4 128 866	9 804 162	jun.17	
14	416 667	1 223 991	jun.17	
15	2 000 000	6 119 951	dec.17	
16	4 739 295	16 242 382	may.18	
17	3 341 275	12 269 064	dec.18	
Total	25 270 758	63 661 189		

11. Technical Capability – Please submit the information for the selected construction manager.

Gilbane Building Co. has been retained to provide Construction Management services throughout the design and construction phases of the project. This will include procurement and management of all construction subcontracts for the upland site. Gilbane Building Company is a family-owned, global, comprehensive construction and facilities-related solutions firm. With 145 years of experience, and more than 45 offices worldwide, their 2,900+ multidisciplinary professionals are capable of executing multiple, geographically dispersed projects, performing over 500 concurrent projects – each adhering to Gilbane's commitment to safety and quality. Founded in 1873 and incorporated in 1908, Rhode Island based Gilbane Building

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Maine Department of Environmental Protection

Company is a privately-held, family-owned corporation and a wholly-owned subsidiary of Gilbane, Inc. As a family operated company, the leadership and vision of the fourth and fifth generation of Gilbane family members has built the company into one of the world's leading construction management firms. Gilbane has recently been ranked #5 in the country for Manufacturing Building projects by Engineering News Record.

The office responsible for this project will be Gilbane's Northern New England district office which delivers a full range of preconstruction and construction services to institutional, public and commercial clients in Maine, New Hampshire, and Vermont. As one of the largest providers of construction services in Northern New England, they bring a depth of national experience blended with a local presence. Just as important are their long-standing, established relationships with subcontractors, suppliers, and local officials, allowing us to expedite construction services throughout the region. Other projects delivered by Gilbane in the region include 18 projects in Belfast for Bank of America, Concord Hospital East and North wing additions, New Hampshire Correctional Facility for Women (designed by SMRT, Inc), and several significant higher education projects.

The Gilbane team will be led by Project Executive Shawn Shelley. Shawn has over 29 years of experience in the construction industry and 6 years of experience in architecture. Having built more than $490M and 650,000 sq .ft. of manufacturing and process facilities, he is one of Gilbane's most experienced industrial process builders and has managed some of Gilbane's most technically complex projects. Shawn will be involved with this project from kick-off through final closeout and will participate in all critical design phase meetings, establishment of site logistics, and communication with stakeholders. He has experience with several large scale phased site preparation projects including mass excavation, soil erosion containment, and management of environmentally sensitive sites. Shawn also serves on the University of Maine Industrial Advisory Board for construction management students and is a past recipient of the U. Maine's Francis Crowe Society award.

In addition to Shawn's leadership, Gilbane will also be leveraging the experience of their regional Environmental Manager Mark Winslow. Mark directs Gilbane's environmental solutions division and brings nearly 30 years of in-depth experience to the team in industrial hygiene and environmental compliance. In his role, Mark provides environmental support for various Gilbane projects located within the New England area. This support consists of work scope development, bid scope review, peer review, estimating, exposure analysis protocols, regulatory compliance, and more. Mark will visit the site regularly and will be available for review of critical tasks such as SESC establishment, major storm event review, and other environmentally sensitive activities.

12. *Noise – Confirm that no Northport requirements apply to the project.*

As indicated in the Acentech Noise Impact Assessment provided as part of the Site Law application materials, noise levels will be at or below 35 dBA at the Belfast/Northport line. This noise level is expected to comply with Northport requirements for noise.

13. *Noise – Are there any permanent noise-producing features on the north side of Building 1?*

Mr. Kevin Martin
Maine Department of Environmental Protection

Most permanent noise producing features are located inside the buildings, and the building layout has been developed so that outdoor noise producing features (such as diesel generators) are located between Buildings 1 and 2 so that noise impacts are minimized. Some permanent noise producing features (building exhausts) are in roof top penthouses stepped greater than 90 feet inward from the northern edge of Building 1.

14. Noise – Please confirm that sounds from the WTP are included in the noise model results.

Yes, sounds from the WTP are included in the noise model results.

15. Visual – Provide drawings of all building elevations with colors and building materials identified. How do the buildings fit with the existing surroundings?

Building architectural elevation drawings are in **Attachment F**. The proposed development visually is largely self-contained within the site with the exception of selected views from U.S. Route 1/Northport Avenue southbound (approaching the site from Belfast) and Perkins Road looking south between existing residences. Please refer to the Visual Assessment report included with the Site Law application for detailed description and images.

16. Visual – How far out was the viewshed analysis conducted? out to 1 mile? Did it cover both NRPA and SLODA scenic requirements? More detail on surrounding areas is required.

The visual assessment (VA) was conducted to distance limits determined by field reconnaissance in conjunction with GIS and other mapping resources of the surrounding area to determine potential locations from which the proposed development could be viewed.

The following are approximate plan (not along ground) distances from photo point to closest building surface, as shown on **Attachment G**:

a. from Perkins Road to B1: 570 ft
b. from US1 (near church)
    - to B7: 1500 ft
    - To B2 1350 ft
c. from Belfast trails to B2: 350ft
d. from Northport trails: 1000 ft
e. from US1 to B8: 200 ft
f. from ocean
    - to B8: 1500 ft
    - to B2: 2300 ft

The VA was performed in accordance with Chapter 375 and Chapter 315 and intended to meet both SLODA and NRPA requirements. Note that APPENDIX A: MDEP VISUAL EVALUATION FIELD SURVEY CHECKLIST (Natural Resources Protection Act, 38 M.R.S.A. §§ 480 A - Z) submitted with the application was completed and establishes "Distances Between the Proposed Visibility Activity and Resource (in miles).

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Maine Department of Environmental Protection

As submitted in the VA for the proposed development, two areas that could be considered public viewing areas within 2,000 feet were assessed and include the McLellan-Poor Preserve in Northport and the Little River Community Trail in Belfast. The report concludes that there would be no unreasonable adverse impact to these areas.

The proposed development is located in the southern portion of the City of Belfast. Approaching the site from the north along U.S. Route 1 / Northport Avenue one passes through an area given to mixed residential, institutional, light industrial, and commercial development. The existing development varies in size (residential to large light industrial), setback from the traveled way (40 feet for residences to 135 feet to the neighboring Little River Church to 280 feet to the light industrial building northeast of the site), contrast (scale and color), and spatial dominance. With respect to contrast and spatial dominance (as defined in Chapter 315) the area north of the site can then be characterized as being relatively open with low-density mixed development (structures). Approaching from the south, the development pattern is more residential with the occasional commercial structure and predominantly wooded.

As described in the VA report, the existing site is largely wooded with the exception of a portion in the northeast which has been logged and is somewhat open to view from southbound Rt. 1 over the prevailing mixed-use development broken by occasional breaks of trees, notably at or near the project property line, and similarly from Perkins Road between residential structures. As further described in the VA report, the bulk of the proposed development will be screened from view by established vegetation contained largely within land under local municipal control and that retained by the neighboring preserve. New plantings will reinforce this buffer in areas currently open to further the screen.

As demonstrated in the VA report's visual model simulations, the proposed development will not create an unreasonable adverse impact on the public viewing areas. Further, to the extent it will be viewable from existing traveled ways, it will not be incompatible with existing development in the area, will not be viewed as overly contrasting in scale, and will be subdominant to the surrounding landscape composition due to relatively low building height, topographic position, and surrounding existing vegetation.

17. *Visual – Provide a lighting detail plan. Is the north side of Building 1 all downward lighting?*

Please refer to the site electrical plans in **Attachment H** showing photometric information for proposed site lighting and the revised site electrical narrative. Lighting on both the north side of Building 1 and south side of Building 2 (the outer perimeter of the buildings with the most potential exposure) comprises full cut-off shielded luminaires. They are for security/emergency purposes, will be triggered by motion sensors, and therefore off most of the time.

18. *Visual – It would be helpful on Figure 1 in plan view showed the locations and directions of the section profiles drawn in Figures 10 and 11.*

Please see Figure 1a in **Attachment I**.

Mr. Kevin Martin
Maine Department of Environmental Protection

19. Visual – Are the photos A through D on Figure 1 January and leaf off conditions? Is the proposed building visible from Photo E?

Photos A through F were taken in October 2018. The intent of Figure 18, View at Trail to Target (safety green vest placed 100 feet from shoreline) is that the combination of vegetation density (intervening trunks/branches/foliage) and mix (evergreen/deciduous) with width of preserved vegetative buffer area (260 feet minimum plus additional landscape area) would obscure views to the proposed development. Refer also to the section/line of site views in Figures 10 and 11.

20. Visual – What are the views from the ocean? Can you see the buildings?

Please see Figure 19 Penobscot Bay View (Elevation 10' +/-) and Figure 20 Penobscot Bay View (Elevation 48' +/-) in **Attachment J**. These views are computer modeled simulations developed in similar fashion to those shown previously and demonstrate that the proposed development can't be seen until observer is approximately 48' above water.

21. Buffers – Provide the tree cutting plan for the bypass on LP101.

A revised plan LP101 is in **Attachment K**, which shows areas of tree removal and restoration.

22. Flooding – Are there additional impacts to Stream 9 from the additional flow due to stormwater? Specify why or why not.

Additional impacts to Stream 9 from the additional flow due to stormwater are not anticipated. The stormwater contributing to Stream 9 is being stored in subsurface tanks and discharged using an outlet control structure to maintain flows in the stream at or below existing conditions prior to discharge.

Please contact me with any questions or comments.

Sincerely,

RANSOM CONSULTING, INC.

Digitally signed by Elizabeth M. Ransom, P.G.
Date: 2019.08.15 14:05:28 -04'00'

Elizabeth M. Ransom, P.G.
Senior Project Manager

EMR:jar

ATTACHMENT A

Construction Details

Additional Information Regarding
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Nordic Aquafarms
Seawater Access System – Construction Narrative (rev. 7-17-19)

Table of Contents:

1. Seawater Access System Description
2. Construction Approach
3. Route 1 Crossing (Station 2+00 to 2+70)
4. Route 1 to the New Pump Station Connection (Station 2+00 to 0+00)
5. Upland Easement – Eckrote Property (Station 2+70 to 5+00)
6. Intertidal – Mudflats (Station 5+00 to 13+50)
7. Submerged in Water and Buried in Trench (Station 13+50 to 36+00)
8. Exposed upon Seafloor (Station 36+00 to 42+00 to 69+00)
9. Intake Structures and Discharge Diffusers
10. Attachments

1. **Seawater Access System Description**:
   The seawater access system functions to draw seawater into the pump station and to discharge treated water from the waste water treatment plant (WWTP), which are housed in a common building along with the water treatment plant (WTP). Seawater access piping includes 2 - 30" diameter intake pipes and 1- 36" diameter discharge outfall pipe. These pipes will be a very durable high density polyethylene (HDPE) with a 3" wall thickness, predominantly side by side in a common trench within the buried zone as well as the exposed portion upon the seafloor. This configuration will begin at the Nordic pump station/water treatment building at the former Belfast Water District property and be routed underground beneath US Route 1 and proceed through a local upland easement path to the shoreline and out through the intertidal and submerged water zones to the pipe end points. The two intake pipes will extend several thousand feet beyond the discharge pipe termination point. The intake ends will have support structures and screens and the discharge will have a diffuser end. This construction plan is based on the system as shown and detailed on the Woodard and Curran "Issued for Permit - Draft" drawings dated 05-02-19. Further planning and detailing of this plan will follow when the final design is complete.

   Construction will involve trench excavation and backfill, blasting of non-digable rock as encountered, excavation and backfill along the intertidal mudflats and submerged sea bottom, and placing pipes exposed and anchored along the seafloor. Techniques will be further explained in subsequent sections of this document.

2. **Construction Approach**:
   a. Schedule: The seawater access system will commence upon Agency permit issuance anticipated approximately late summer/early fall 2019 and be complete by April 2020. The upland construction zones including the Route 1 crossing will occur in warmer fall weather prior to the major holidays. The waterborne construction will occur in the November to April timeframe.

   b. Sequence: Further detailed subsurface exploration (borings) in both upland and tidal zones will be performed before final design and construction start to better understand the soils and rock. This information will be used for the final design and to determine the best/least impactful construction methods. Installation will begin with the upland underground piping, starting with the portion directly beneath Route 1. Then the pipes from Route 1 to the new pump station building to the west and the pipes from Route 1 to the east toward the seashore will follow simultaneously. Lastly, the intertidal (mudflats) and submerged piping will be constructed during the late fall and winter season.

   c. Environmental: For this seawater access portion of the project, Cianbro's Corporate Environmental Manager will oversee the construction to ensure full compliance with all environmental requirements. Construction crews will be staffed with qualified craftspeople to install and maintain the environmental BMP's; plus one team member will be dedicated to daily inspections and reporting of environmental conditions. The responsible erosion control personnel will check equipment and erosion control

measures continuously. In predicted weather events whereby excessive rain/snow is forecast, additional resources will be readied and crews lined up to monitor and respond according to the event.

3. **Route 1 Crossing (Station 2+00 to 2+70)**:
   a. Summary: The new pipes to be installed beneath Route 1 will be approximately 25' to 30' feet below the existing pavement and require a substantially large path, approximately 70' in length in an east west direction. Based on preliminary subsurface explorations, bedrock is present and rock removal will be necessary to achieve the proper pipe profiles. Landowner and neighborhood access, space constraints, size and depth of the jacking and receiving pits, and potential wetlands impacts highlight numerous concerns whereby directional boring and/or jack and bore are not well suited to this situation. Additionally, micro-tunneling was explored, which requires a 30' space between the pipes, high jacking forces in the bedrock and much space for this equipment-intensive operation and was thus ruled out. Therefore diverting traffic and performing an engineered deep excavation is viewed as the most predictable, stable and least impactful approach. The excavation will be limited to the route and length necessary to cross directly beneath Route 1 which eliminates the need for temporary jacking and receiving pits. A temporary traffic bypass will be designed and constructed as depicted on the attached map. This two-lane bypass will divert all traffic flow to the west of the current roadway onto the Applicant's property to allow installation of the buried pipes beneath Route 1. The crossing will be effective to stub the pipes beyond the Route 1 limits so that once Route 1 is re-established to its original configuration, the pipe installations can continue safely in either direction. The bypass will be a detour roadway construction with engineered lane widths, curvature radii and road base, pavement and markings. Once the pipes are installed, Route 1 will be restored in kind and this bypass removed to enable further pipe installation to the pump station.

   b. Construction: Prior to the bypass installation, environmental controls, dewatering, and stabilization of the nearby existing wetlands and topography will be engineered and installed. Ditches and sediment traps will be maintained and ground water from the excavation be pumped to sediment bags or settlement ponds. The new temporary road base will be fully installed, paved and marked prior to any deep excavation commencing. The bypass will include barriers and signage to slow and control the traffic flow plus intermittent construction crossing to handle import and export of materials incidental to the construction.

      Installation of the Route 1 crossing will begin with drilling and blasting of the deep rock followed by pavement removal and a temporary plunge/sediment pool within the pavement removal zone for any water to be pumped from the deep excavation. An initial cut will excavate the surface to bench down to a lower elevation. Then a stacked trench box or temporary sheet pile stabilized structure will be installed and maintained to provide for safe deep access. Deeper sump holes within the excavation will collect ground water for pumping into sediment bags or pools and pumping will remain continuous with perforated sump pits and well suited pumps for this application. Due to

the confined nature of this excavation, excessive storm events like rain or snow do not present much additional effort beyond adding a pump and sediment bags. This trench box/sheeting structure will extend down to stable bedrock and be tied back to soil anchors and/or temporary pilings in order to provide for the maximum clearance within the structure to place the large pipes. The excavated materials found to be suitable for future backfill will be stockpiled within the bypass area as much as possible to reduce exporting across traffic, but unsuitable materials will be removed from this tight site upon excavation. The blasted rock will be excavated and likely crushed in this zone for use as backfill for the new road base. The new HDPE pipes will be placed and bedded, then backfilled to subgrade whereby the Route 1 roadway will be reconstructed to MaineDOT standards and reopened to normal traffic.

4. **Route 1 to the New Pump Station Connection (Station 2+00 to 0+00)**:
   a. Summary: Once the temporary bypass lane is removed, the installation of approximately 200 feet of new piping from the westerly stub end at Route 1 to the new pump station building can commence (along with construction in an easterly direction through the local landowner easement described below). The pump station foundation will be in place at this time with pipes stubs through the foundation wall in which to connect. The 36-inch discharge pipe will be at a much higher elevation than the two 30-inch intake pipes throughout this zone and across Route 1. The three pipes gradually converge to a side-by-side configuration near the shoreline approximately 600 feet from the pump station. Once pipes are complete and backfilled, the surface area between Route 1 and the new pump station will be graded, restored and vegetated.

   b. Construction: This 200-foot zone will be an "open cut" excavation by benching down and sloping the sides back for a safe and workable site except closest to Route 1 and the new pump station which will both need trench boxes or sheeting for safety and to prevent undermining. Erosion and sediment controls to divert runoff to strategically placed settling ponds and temporary sediment bags will be used to pump water from the ponds and excavations. Clearing and grubbing will begin this zone and stockpiles at the site will be surrounded with cutoff ditches and stabilized with seed and mulch. Then line drilling and blasting of any non-digable rock will be followed by excavation. Stockpiling spoils adjacent to the trench will decrease construction interface with the traveling public, but unsuitable and unwanted material will be exported with dump trucks. During excavation, sumps will be maintained to collect groundwater that will be pumped to sediment bags and/or pools. Meanwhile, the three new HDPE pipes will be prefabricated to length nearby to expedite installation immediately upon a completed excavation. These tough pipes can be prebuilt full length in this zone and pulled into the hole for mating to the stub ends which will speed the construction and minimize the earthen disturbance. Once the deeper intake pipes are installed, the trench will be backfilled up to the discharge pipe elevation. The discharge pipe will then proceed in the same manner. Backfill will bury the pipes completely between Route 1 and the new pump station within the new water treatment building. Finally, the surface area will be graded and planted with final erosion controls as designed.

5. **Upland Easement – Eckrote Property (Station 2+70 to 5+00):**
    a. Summary: This upland zone of underground piping will extend approximately 230 feet from the easterly Route 1 new pipe stub ends to the shoreline at approximately the high tide line. The piping will leave the Route 1 crossing which is also located at the Eckrote (Landowner) driveway curb cut and will continue at a roughly 90-degree angle from Route 1 through an apparent existing old access road toward the shoreline. This access road is raised ("horseback") and was likely constructed on a filled embankment long ago. It is bordered to the north and south by low wetland areas. We plan to remove the necessary trees and lower this horseback elevation several feet prior to beginning construction to decrease the current erosion of the existing steep banks during the construction period. Although the intake pipes at Route 1 are quite deep, the new piping only requires 5 feet of backfill cover. Therefore, the trench depth is significantly reduced near the shoreline at this lower elevation. Excavation through most of this zone will require trench boxes or sheeting in order to remain within the narrow 40-foot easement. This entire zone will require sheeting for the deeper westerly portion and trench boxes and/or sheeting for the shallower excavation toward the seashore. Additionally, a three-sided sheet pile cofferdam will be necessary at the existing stream/shoreline interface to cross that area with the least impact, continue the stream flow and to provide a dry space for mating the pipes that extends out to the bay. The Landowner easement provides for the Eckrotes to participate with the final restoration design and appearance within jurisdictional regulation.



Upland route looking east over the "horseback" roadway zone at the Eckrote property

b. Construction: This 230-foot zone will likely be done in two halves of approximately 115 feet each due to the need for some working space. Construction will begin closest to Route 1 and extend half the length to the shoreline enabling use of that remaining area to place materials. Some trees will be cleared to begin this zone and the old shed that sits on the edge of a slope will be removed as directed by the landowner. The erosion and sediment controls to divert runoff and handle water will installed to suit the next step which will need to be altered to suit the final excavated condition. Then the existing grade will be cut to a lower elevation followed by the application of stabilization fabric to cover the entire newly sloped surroundings that will be maintained for the entire construction duration until permanent seeding can be done the next growing season. Silt fence, ditching and sediment bags will be installed for this stage. Next, line drilling and blasting of any non-digable rock that exists will occur before any further excavation to utilize the existing soils as blast cover. Sheeting and tiebacks or stacked trench boxes will be installed and excavation will occur within this stabilized space. Stockpiling spoils adjacent to the trench is not practical so most excavated spoils will be trucked away, sorted and stockpiled for return and reuse later as backfill in this same trench. During excavation, sumps will be maintained to collect groundwater that will be pumped to sediment bags, as there is no space for sediment pools. A temporary power service will be installed to provide pump power and pumps will be monitored during

work shifts and off hours. Back up pumps will be on the site and ready for use if necessary. The HDPE pipes will be prefabricated nearby to the proper length and pulled in for mating to the stub end at Route 1. The easterly end of the trench and coffer/box structure will remain open for mating pipes in the next zone.

Once the first 115 feet of the pipes are installed and backfilled, the coffer/box structure will be jumped ahead for the next 115 feet to the shoreline that will repeat in the same manner. A three-sided coffer cell at the stream/high tide intersection will be installed to provide dry space for pipe mating below tide and allow the stream to remain flowing.

Once the pipes are installed and backfilled, the coffer structures will be removed and the surface area will be graded and planted with final designed erosion controls and as agreed with the landowner.

6. **Intertidal – Mudflats (Station 5+00 to 13+50):**
   a. Summary: Beyond the coffer cell described above lies the mudflat zone extending approximately 850 feet from the shoreline and mean high water line to the mean low water line. There are no docks, moorings or structures nearby and this flat is closed to clamming and shell fishing. Existing bathymetric survey information of the proposed intake/outfall pipeline route is the current basis for planning and executing this pipe installation. Rock outcroppings and boulders dot the area of this flat and fairly stable surface. The pipe trench will be less than 10 feet deep in this zone leaving the pipes buried in approximately 5 feet of cover. It is anticipated that bedrock is below the proposed trench requiring no blasting but if bedrock or large boulders are encountered, small concise and controlled blasting will occur. The construction will be timed to coincide with the low tide cycle during daytime hours for access and construction activities in this zone. Due to the flat and stable surface, it is envisioned that open-cut trenching and side casting the material is the quickest and least impactful method to install the pipes in this zone. The excavated trench is expected to be approximately 12 feet to 15 feet wide at the bottom with mildly sloped sides making the trench width at the top (mudflat level) approximately 30 feet wide. The trench will be over-excavated to allow for in-washing of material during several tide cycles while the pipes are being placed and backfilled. Pipe installation within the mudflat zone is expected to take 2 to 3 weeks to complete. All tidal and intertidal pipe will be installed utilizing a Float and Sink Method. The initial plan is to preassemble six lengths of pipe line at 1000 feet long and one at 400 feet long for the intertidal and offshore runs. Blank flanges will be installed at each end of the three pipes in a run. The outboard flanges of each run will have valves and air pressure monitoring to aid in submerging the pipe. The pipe section will be floated to the mudflat location during a high tide cycle, anchored and allowed to rest/float as the trench is constructed.

   b. Construction: The intake and discharge pipes will be prefabricated in appropriate lengths at another location, floated and towed to the site and temporarily moored alongside the trench route. The pipes will ride the tides and set on the mudflat during low tide for a short period while the trench is prepared. The alignment and location will be established with simple grade stakes and offsets. Several excavators will be staged at

the upland easement area and will crawl directly on the mudflats to dig the trench as tides allow. Temporary wood crane mats will be used to bridge over the stream outlet at the shoreline to maintain stream flow and provide for excavator passage. An excavator will begin at the shoreline following the outgoing tide and as the tide goes, additional excavators will crawl into place to dig the trench, primarily working in the dry. Excavators will be walked back out from the area as the tide cycle returns. Working simultaneously over several tides, the trench will take shape as far out as the low water line will permit. Multiple excavators will allow the trench to be constructed in sections simultaneously, reducing the overall work time within the mudflat. The excavated material will be side cast to the opposite side of the trench route from the staged pipes. The width of temporary impacts through this zone is estimated to be approximately 100 feet, including excavator travel, side cast, and pipe laydown. Floating silt boom will be used to contain the work area during tide cycles. Through the use of multiple excavators, it is envisioned to take only a few days for the trench to be ready for pipe installation. The pipe will be positioned into the trench on an outgoing tide and joined to the receding pipe at the 3-sided coffer at the shoreline. Then the pipes will be backfilled with the excavators shaping the trench surface to the original mudflat line. Then the excess soil, rocks and boulders will be removed and disposed of, leaving the mudflat in the same profile appearance as originally found. The most seaward pipe ends will protrude up out of the trench and float to enable attaching the next length of pipe which means the outward portion of the trench will be backfilled later once this piece is joined and submerged with the next piece of piping beyond. This will be located in the vicinity of the mean low water line to suit excavation with the tides in that the flat terrain provides little time at low tide to do much work. In the event ledge is encountered before the desired trench depth is achieved it will be profiled and submitted for evaluation. Ledge removal will be accomplished with a hoe ram or an excavator with a ripper tooth or a qualified blasting contractor with experience in underwater ledge removal.

7. **Submerged in Water and Buried in Trench (Station 13+50 to 36+00):**
   a. Summary: The excavation equipment in this area will be barge-mounted and will continue trenching and pipe installation in the same manner until the water becomes too deep. At that point, excavators will be replaced by a barge-mounted crane with a clamshell bucket. In these submerged zones the trench will be over-excavated to account for wash-in between tide cycles. The trench bottom will be approximately 8 feet to 10 feet deep and 16 feet wide with mildly sloped sides to suit the soils encountered. Approximately 30,000 cubic yards of material will be handled (side cast and replaced within the trench with some removed for disposal) to install the pipes in this zone. Turbidity curtain will be used surrounding the barge or immediate work area as appropriate to tides, currents and depth of water. The impact corridor width in this zone will be approximately 100 feet to accommodate dredging and placement of side cast material.

   b. Construction: For all remaining waterborne construction activities, Contractor will be in regular contact with the mariner community, local Harbor Master and the US Coast Guard. The trench and pipe alignment will be established and maintained with

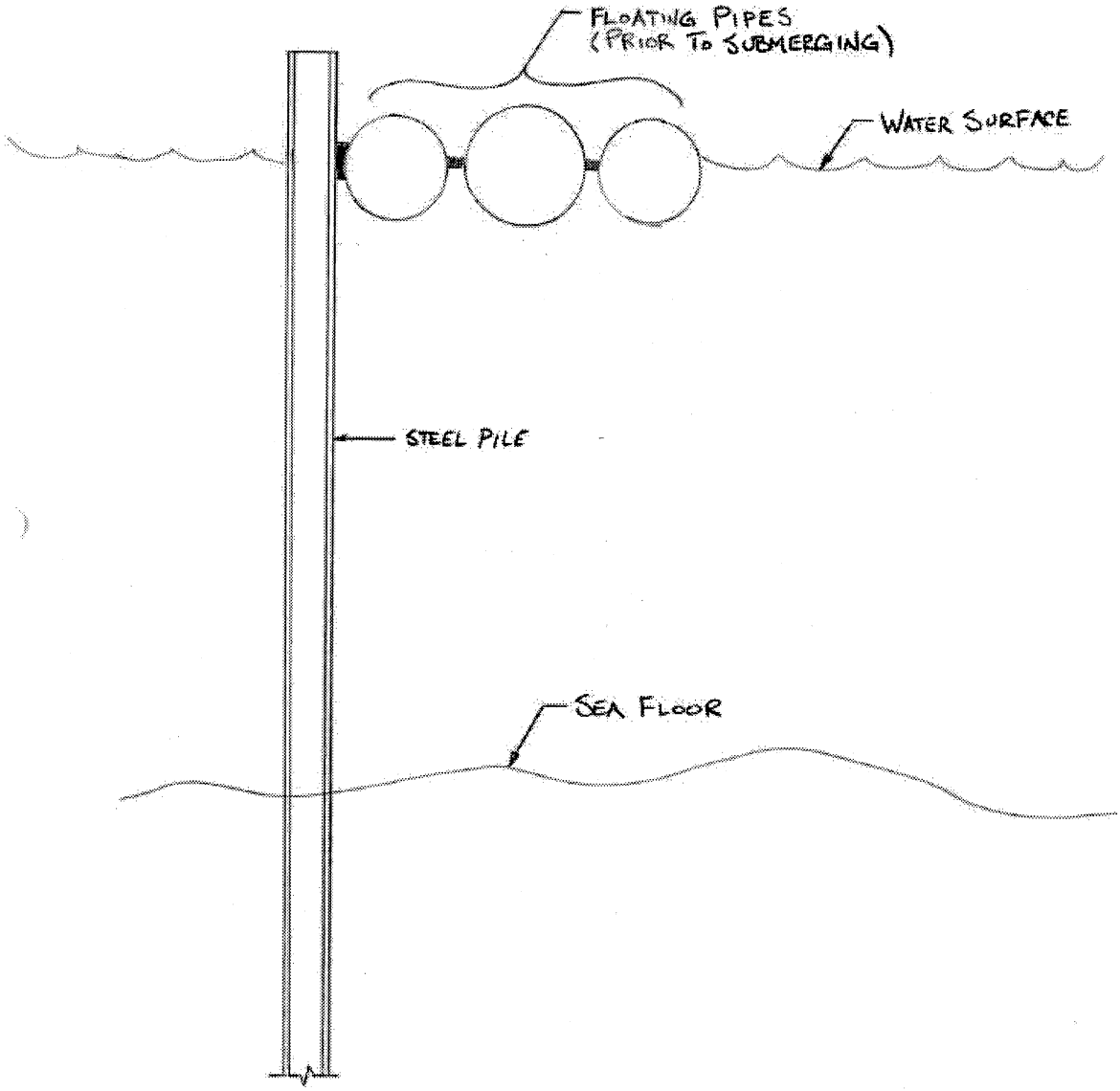
"Dredgepack" surveying alignment system, a software specifically designed for this type of construction. Temporary H-pilings will also be used for tethering the floating pipes that await installation and the floating siltation boom which will surround the excavation. These piles will be driven as necessary to facilitate the alignment of the pipeline. It is anticipated that individual piles will be driven at approximately 150-200 feet on center throughout the subtidal zone. This will result in approximately 30 to 40 total piles. Construction will be staged to facilitate 1500-2000 foot segments of pipeline at once. As the pipeline advances, previously installed piles will be pulled, jumped ahead, and re-driven in the next segment. A floating turbidity/siltation curtain will be placed appropriately to contain siltation from underwater excavation activity. The curtain will be of appropriate length to protect the work area and will be anchored against tidal flow. Preassembled pipes with the concrete ballast blocks will be floated in next to the barges and readied for installation when the trench is prepared. Excavators on barges will dig the trench and side cast the material in the same manner as stated above to approximately Station 26+00 at which time crane and clamshell will complete the remaining 1000 feet of trench. All the excavation barges will be equipped with mooring spuds to hold position in the currents, winds and tide flows. The HDPE pipes will be joined and sunk to the trench bottom by means of controlled flooding of the air filled floating pipes. The leading end will always "tail" up to the surface for future adjoining of subsequent lengths in the dry. Once the pipes are positioned in the trench, divers will verify proper alignment and installation criteria before backfilling. Backfill operations will be similar to the excavation operations. Excavators and/or cranes with clamshells will retrieve the side cast spoils and will backfill the material into the trench to cover the pipes. Divers will verify and provide video documentation that the backfill is adequate but not above the original seafloor profile. The seafloor will be restored to its approximate original elevation to avoid a visible berm or hump above the pipeline. Excess spoils will be loaded onto a barge by excavator or clam bucket. Once on the barge, the spoils will naturally drain water off the edges. Silt fabric will be utilized around the perimeter of the barge to contain and capture the fines while dewatering. The barges will then be transported to a pier or bulkhead where the spoils will be loaded onto sealed dump trucks by loader or excavator. If the spoils are too saturated to be handled, sawdust will be mixed in prior to loading onto the dump trucks. The dump trucks will then deliver the spoils to an approved upland disposal site.

CIANBRO

ENGINEERING BACKUP SHEET

Project NORDIC AQUAFARMS - BELFAST Date _____ Sheet _____ _____

Subject SEAWATER ACCESS - GUIDE PILES Job No. _____ Initials _____



CONCEPTUAL GUIDE PILE DETAIL
NOT TO SCALE

Conceptual Guide Pile

8. **Exposed upon Seafloor (Station 36+00 to 42+00 to 69+00):**
    a. Summary: In this final zone the three seawater access system pipes will be positioned directly on seafloor. The discharge pipe will veer off and terminate at approximately Station 42+00 while the two intake pipes will extend further to station 69+00. All work will be performed from floating spud barges, push boats and smaller watercraft. The impact corridor width in this zone will be equal to the width of the final pipeline configuration, including concrete ballast blocks and/or pipeline armament.

    b. Construction:
    The pipes once again will be preassembled in the concrete ballast blocks, floated to the site and tethered to temporary pilings and anchors as necessary. Floating silt booms will not be necessary in this zone. Divers will survey the piping route to identify obstacles or depressions that may affect the pipes from properly setting on the sea bottom. Those obstacles and depressions will be corrected and/ or removed and the pipes floated into place and submerged in a controlled "sink" by filling the pipes with water. Divers will again verify and video the final condition.

9. **Intake Structures and Discharge Diffusers:**
    a. Summary: The discharge pipe terminates with a diffuser and the intake pipes each have a support structure and screen, as depicted on the plans.

    b. Construction: Spud barges will be positioned on location and divers will survey the existing bottom so obstacles can be removed and the seafloor can be prepared to accept the final portions of piping. The discharge diffusers will be mated to the discharge pipe and will be sunk with the last leg of pipe. The intake structures will be crane-set and divers will likely install a final insert pipe to join the pipe ends to the intake structure piping. Divers will survey and video the final configuration of these end points.

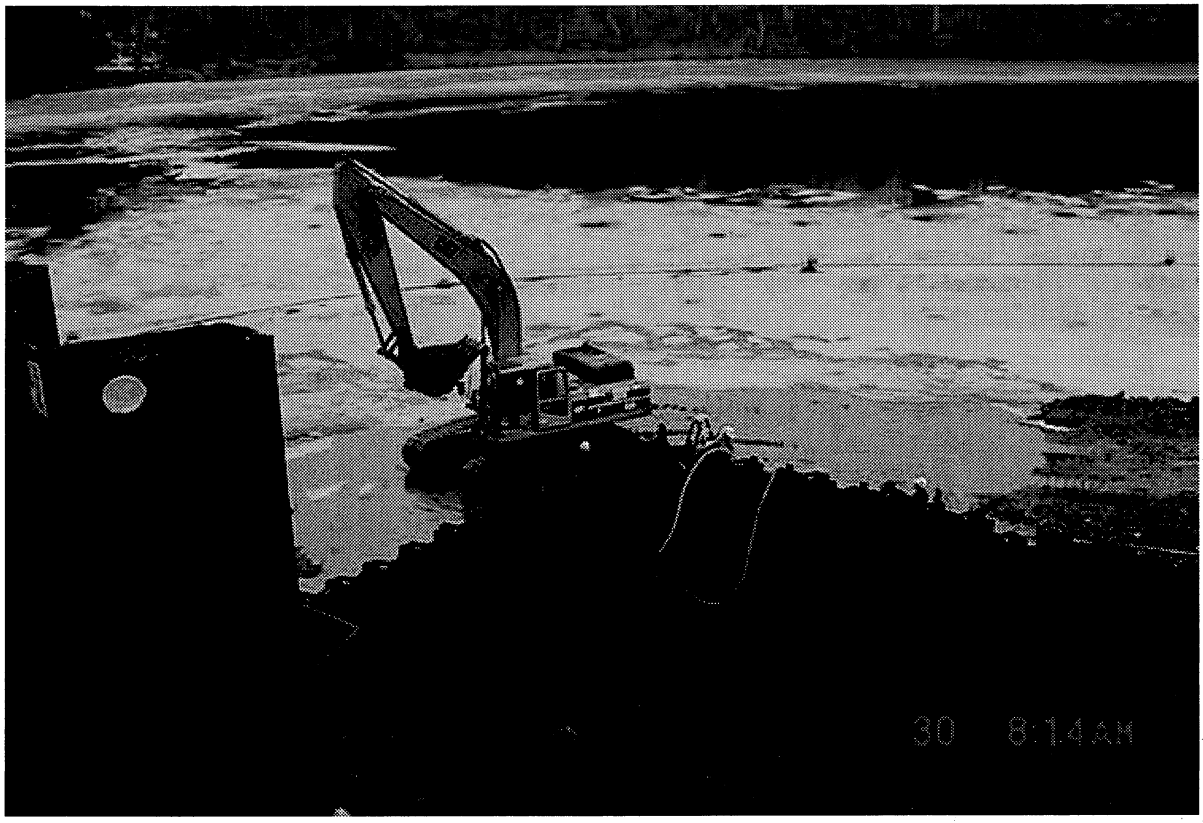
10. **Attachments:**
    a. Route 1 Bypass: A plan view map depicts the approximate size and location of the temporary bypass to accommodate traffic during installation of piping beneath Route 1.

    b. Progress Plans: Plans by Woodard and Curran "Issued for Permit - Draft" drawings dated 05-02-19 are based on engineering to suit the intake and discharge needs specific to this project. This plan set includes the piping route with stationing, dimensions, details and sections of the pipe configuration zones as well as erosion and sediment controls with dewatering considerations. The pipe diameters shown are preliminary, but will not increase in size. These drawings will be used in coordination with plans detailing the Water Treatment Building which will house the pump station to which these pipes will connect.

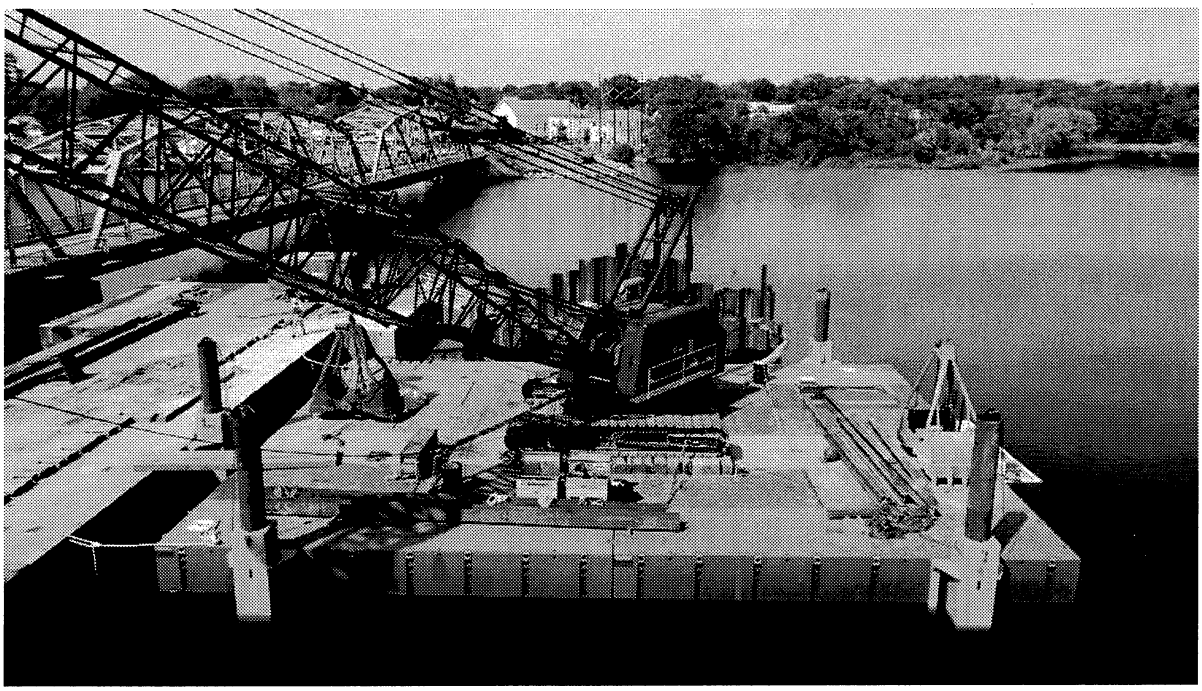
c. Schedule: The attached simple timeline depicts the anticipated sequence and timeframes for each leg of the seawater access system. The waterborne activities are planned to be within the winter season as typically permitted.



Example of a narrow sheet pile structure with struts to suit this type of work.



Example of a shoreline coffer cell and excavator on the mudflats.

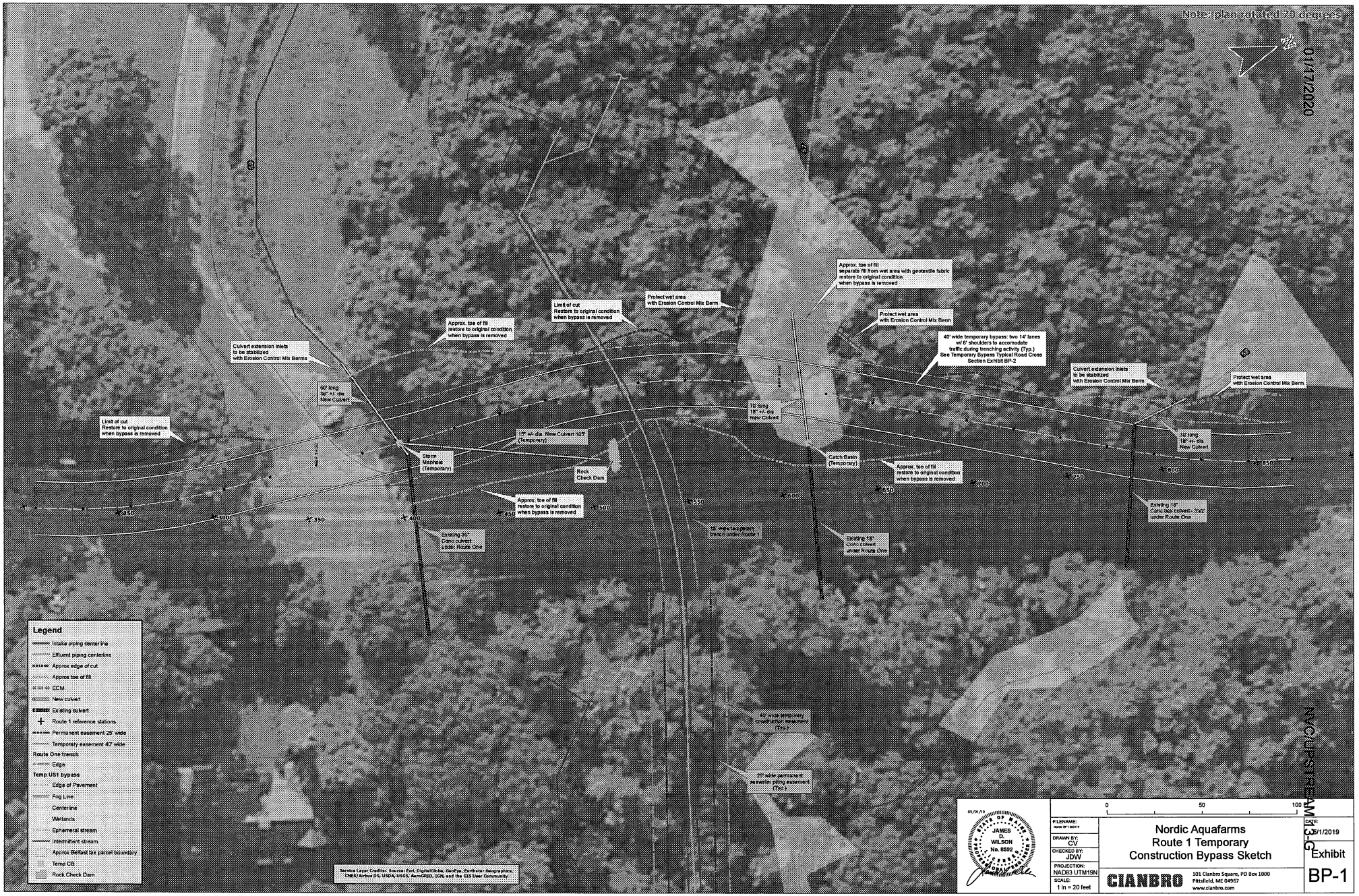


Example of a spud barge with crane, clamshell suited for this work.

ATTACHMENT B

Revised Drawing BP-1

Additional Information Regarding
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N


Note: plan rotated 70 degrees
01/17/2020
Approx. toe of fill separate fill from wet area with geotextile fabric restore to original condition when bypass is removed
Protect wet area with Erosion Control Mix Berm
Limit of cut Restore to original condition when bypass is removed
Protect wet area with Erosion Control Mix Berm
Approx. toe of fill restore to original condition when bypass is removed
40' wide temporary bypass: two 14' lanes w/ 6' shoulders to accomodate traffic during trenching activity (Typ.) See Temporary Bypass Typical Road Cross Section Exhibit BP-2
Culvert extension inlets to be stabilized with Erosion Control Mix Berms
Culvert extension inlets to be stabilized with Erosion Control Mix Berm
Protect wet area with Erosion Control Mix Berm
60' long 18" +/- dia. New Culvert
72' long 18" +/- dia New Culvert
Limit of cut Restore to original condition when bypass is removed
19" +/- dia. New Culvert 105' (Temporary)
39' long 18" +/- dia. New Culvert
Storm Manhole (Temporary)
Catch Basin (Temporary)
Rock Check Dam
Approx. toe of fill restore to original condition when bypass is removed
Approx. toe of fill restore to original condition when bypass is removed
Existing 18" Cmp culvert - 330' under Route One
Existing 35" Cmp culvert under Route One
12' wide temporary construction easement (Typ.)
Existing 18" Cmp culvert under Route One
12' wide temporary construction easement (Typ.)
25' wide permanent easement piping easement (Typ.)
Legend
Intake piping centerline
Effluent piping centerline
Approx edge of cut
Approx toe of fill
ECM
New culvert
Existing culvert
Route 1 reference stations
Permanent easement 25' wide
Temporary easement 40' wide
Route One trench
Edge
Temp US1 bypass
Edge of Pavement
Fog Line
Centerline
Wetlands
Ephemeral stream
Intermittent stream
Approx Belfast tax parcel boundary
Temp CB
Rock Check Dam
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
JAMES D. WILSON No. 8592
0 50 100
FILENAME: nordic BP1 BSTR
DRAWN BY: CV
CHECKED BY: JDW
PROJECTION: NAD83 UTM19N
SCALE: 1 in = 20 feet
Nordic Aquafarms
Route 1 Temporary
Construction Bypass Sketch
CIANBRO
101 Cianbro Square, PO Box 1000
Pittsfield, ME 04967
www.cianbro.com
DATE: 5/1/2019
Exhibit
BP-1
NAVIGUPSTREAM

ATTACHMENT C

Eckrote Signed Agreement Including Color Exhibit A

Additional Information Regarding
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

EASEMENT PURCHASE AND SALE AGREEMENT

This Easement Purchase and Sale Agreement (this "Agreement"), dated as of this 6th day of August, 2018, is by and between **RICHARD AND JANET ECKROTE**, 42 Grandview Avenue, Lincoln Park, New Jersey 07035 (the "Seller"), and **NORDIC AQUAFARMS, INC.**, a Delaware corporation having an address of c/o Nordic Aquafarms AS, Oraveien 2, 1630 Gml Fredrikstad, Norway (the "Buyer").

RECITALS

A. Seller is the owner of approximately 2.78 acres of land located at 282 Northport Avenue, Belfast, Maine, identified on the City of Belfast Tax Map 29 as Lot 36, and the building and improvements thereon, and all rights and interests appurtenant thereto (the "Premises").

B. Seller desires to sell and Buyer desires to purchase a perpetual, subsurface easement (the "Easement") under a portion of the Premises for the purpose of constructing, maintaining, owning and operating water pipes and related equipment (the "Utilities") on the terms and subject to the conditions set forth herein. The portion of the Premises that will be burdened by the Easement is referred to herein as the "Easement Area."

C. Accordingly, for the consideration hereinafter named, and for other good and valuable consideration, receipt and sufficiency of which is hereby acknowledged, the parties do hereby agree as follows:

AGREEMENT

1. Purchase Price. Buyer shall pay to Seller the sum of [redacted], as follows:

a. $[redacted] as security for Buyer's performance hereunder (together with all interest earned thereon, the "**Deposit**") within three (3) business days after the full execution of this Agreement to Seller's counsel, Lee Woodward, Jr. ("**Escrow Agent**"), who shall deposit it in a federally insured interest-bearing money market account and disburse it according to the terms of this Agreement. The Deposit shall be non-refundable to Buyer, except in the event of Seller's default hereunder, and shall be applied in reduction of the Purchase Price payable at the Closing or as otherwise provided under this Agreement.

b. $[redacted] cash proceeds on the Closing Date, in lawful currency of the United States of America in immediately available funds by certified funds or by wire transfer to an account or accounts designated by Seller.

c. In addition to the foregoing cash consideration, Buyer shall, at Buyer's expense, perform the various improvements listed in Section 3(b) below.

In addition to the Deposit, within three (3) business days after the full execution of this Agreement, Buyer shall also pay to Seller (or directly to Lee Woodward, Jr., for Seller's benefit), the sum of [redacted] as reimbursement for legal fees incurred by Seller in connection with the transaction memorialized by this Agreement.

2. Closing. The Closing shall occur on August 16, 2019 or such earlier date as shall be mutually agreed by the parties hereto (the "Closing Date"), at Law Offices of Lee Woodward Jr., 56 Main Street, Belfast, Maine 04915, or such other location as mutually agreed by the parties. Buyer shall have the right to accelerate the Closing to an earlier date upon not less than ten (10) business days prior written notice to Seller.

3. Grant of Easement. (a) Easement Agreement. Seller shall convey the Easement to Buyer or its nominee or designee pursuant to mutually acceptable, commercially reasonable easement agreement (the "Easement Agreement") containing usual and customary terms for perpetual, subsurface utility easements, which shall include, without limitation, the right of Buyer and its contractors and agents to access the Premises with men, equipment and machinery, as reasonably necessary for the initial installation of the Utilities and related construction activities, (x) provided Buyer shall communicate with Seller and coordinate Buyer's activities so as to avoid unreasonable interference with Seller's use of the Premises (particularly to the extent any activities are undertaken during summer months when Seller and its guests or invitees are using the Premises); and (y) subject to Buyer's obligation to restore any portions of the Premises disturbed by such construction and to perform the improvements set forth in Section 3(b) below. The Easement Agreement shall convey a good and clear record and marketable title to the Easement, insurable on the current ALTA Standard Owners Form at standard rates, with standard printed exceptions for parties in possession and mechanics' liens deleted, free from all mortgages and monetary liens and all other encumbrances prohibiting or making unfeasible Buyer's use of the Easement for its intended purposes, and shall be in proper form for recording and shall be duly executed, acknowledged and delivered by Seller at the Closing. Seller shall obtain any third party consents that may be required to grant the Easement to Buyer, such as the consent of any mortgage lender. Buyer's counsel shall prepare the Easement Agreement for review and comment by Seller and Seller's counsel.

(b) Improvements to Seller's Premises. Buyer covenants to perform the following improvements to the Premises, at Buyer's cost and expense, either after the Closing and contemporaneously with Buyer's construction activities or during Buyer's diligence activities as Buyer deems expedient:

a. Install a new underground water pipe running from Route 1 along the Premises' existing drive way to the existing camp building on the Premises.

b. Install a new underground electrical conduit running from Route 1 along the Premises' existing drive way to the existing camp building on the Premises.

c. Unearth and "reset" the two (2) existing drainage pipes under the existing driveway on the Premises.

d. Remove the large oak tree overhanging the camp and thin out dead trees in the pine grove in the northwest part of the Premises.

e. Place large, excavated stones to strengthen existing retaining walls, to the extent feasible and practicable.

f. Dismantle the boathouse on the Premises and, upon Seller's request, and to the extent feasible and practicable, salvage old barn boards from the boathouse. In the event Seller elects to retain any salvaged barn boards, Seller shall be responsible to removing such boards from the Premises, and/or storing and securing such boards on Premises ty from Buyer, and acceptance of such boards by Seller shall be deemed a waiver of any claims against Buyer related thereto.

g. Perform test bores in front of the garage on the Premises to determine the feasibility of installing a basement or septic system is feasible. Any reports produced in connection therewith shall be promptly delivered to Seller.

h. Plant a reasonable amount of shrubbery on the new easement area after the installation and related work is complete.

i. Add fresh gravel at the driveway entrance when the Buyer's construction is complete.

Notwithstanding anything to the contrary, if any of the foregoing improvements to be performed by Buyer for the benefit of Seller requires any governmental or regulatory approvals (including, without limitation, those related to work upon or impacting any wetlands), Seller shall be responsible for obtaining any such approval, at Seller's cost and expense. Seller and Buyer shall communicate, cooperate and coordinate so as to cause such work to be performed expeditiously and efficiently without interfering with Seller's use of the Premises or the pursuit of Buyer's installation of the Utilities in the Easement Area to facilitate Buyer's Project and/or Buyer's Project more generally.

4. Location of Easement Area. A drawing of the proposed location of the permanent Easement Area and a temporary construction easement area is attached hereto as Exhibit A. Seller and Buyer acknowledge and agree that the final location of the Easement Area (and corresponding temporary construction easement area) may be subject to adjustment based on the result of Buyer's inspections and to Buyer's receipt of all applicable governmental and regulatory approvals necessary for Buyer's use of the Easement for its intended purposes, provided Buyer agrees that the Easement Area shall be located to the south of the old barn and existing driveway entrance. If Buyer determines that it is impractical or not feasible to locate the Easement south of the old barn and existing driveway entrance, and the parties are unable to agree on another, mutually acceptable location, this Agreement shall terminate and the Deposit shall be retained by Seller.

5. Buyer's Inspections.

a. Seller acknowledges the Buyer intends to conduct certain investigations of the Premises to determine the suitability for Buyer's purposes, including title searches; obtaining a survey; geotechnical, environmental and hydrogeological tests (including geotechnical borings, sampling, and drilling); and determining the compliance of the Easement Area with all applicable laws, rules, codes and regulations. Buyer and Buyer's agents and contractors shall have the rights to enter onto the Premises with vehicles, equipment and machinery to conduct such inspections as Buyer deems appropriate, including for Buyer's engineering inspection(s), site evaluations, and such other inspections and investigations as Buyer deems appropriate.

b. Buyer shall provide reasonable notice of any such entry and coordinate the same with Seller so as to schedule its testing activities to the extent practical and feasible for times Seller and its invitees or guests are not using the Premises, and in all cases to avoid unreasonable interference with the use of the Premises by Seller, and its invitees or guests.

c. In conducting any inspections, Buyer and its agents and representatives: (i) (together with the equipment or machinery of any such party) shall have a license to access the Premises at all reasonable times for the purpose of conducting such inspections; (ii) not unreasonably interfere with Seller's use of the Premises and endeavor to schedule its testing activities for times Seller and its invites and guest are not using the Premises; (iii) comply with all applicable laws; (iv) promptly pay when due the costs of all inspections and tests, (v) not permit any liens to attach to the Premises by reason of the exercise of its rights hereunder; and (vi) promptly repair any damage to the Premises not resulting from the actions of Seller or its invitees or guests, and restore any areas disturbed resulting directly from any such inspections, investigations or tests substantially to their condition prior to the performance of such due diligence.

d. In order to facilitate Buyer's due diligence, Seller will promptly upon Buyer's request therefor, supply Buyer with any and all information relating to the Premises (including, without limitation, title information, surveys, environmental reports, engineering studies, tax bills, legal notices, permits, approvals and such other information as Buyer may reasonably request) in Seller's possession or under Seller's control.

e. Except as arising from Seller's negligence, gross negligence, or willful misconduct or any matter arising from the mere discovery of a pre-existing condition at the Premises, Buyer hereby agrees to indemnify and hold Seller harmless from, all third-party claims, liabilities, damages, losses, costs, expenses (including, without limitation, reasonable attorneys' fees), actions, and causes of action arising out of personal injury and/or property damage directly caused by any entry onto the Premises by, or any inspections or tests performed by Buyer, its agents, independent contractors, servants and/or employees.

f. Buyer shall obtain and maintain, at its expense: (i) statutory Worker's Compensation and Employers Liability Insurance with available limits of not less than $1,000,000.00, which insurance must contain a waiver of subrogation; (ii) Commercial General Liability coverage with available limits of not less than $2,000,000.00 in combined single limits for bodily injury and property damage and covering the contractual liabilities assumed under this Agreement; (iii) business automobile liability insurance with available limits of not less than $1,000,000 combined single limit for bodily injury and/or property damage per occurrence; and (iv) such other insurance as Seller may reasonably require. Such policy(s) shall provide primary (and not merely contributory coverage) to Seller. Buyer shall provide Seller with evidence of such insurance policies upon the request of Seller.

6. Conditions to Closing

a. Buyer's Conditions to Closing. Without limiting any other conditions to Buyer's obligations to close set forth in this Agreement, the obligations of Buyer under this Agreement are subject to the satisfaction at or before the time of Closing of each of the following conditions (any of which may be waived in whole or in part by Buyer, in writing, at or prior to Closing):

i. There shall be no final judgment materially affecting the ability of Seller to perform its obligations rendered against Seller, or if, within thirty (30) days after entry thereof, such judgment shall have been discharged or execution thereof stayed, or if, within thirty (30) days after the expiration of any such stay, such judgment shall have been discharged.

ii. Seller shall have performed, observed and complied with all material covenants and agreements required by this Agreement to be performed by Seller at or prior to Closing.

iii. Buyer shall have obtained all permits necessary or desirable for the development and operation of the land-based aquaculture facility that Buyer intends to construct across the public right-of-way from the Premises (the "Project"), and Buyer shall have determined, in its sole discretion, that the Easement Area is suitable for use in connection with the Project.

If any of Buyer's foregoing conditions is not fully satisfied on or before the Closing Date, Buyer shall have the option to either (x) terminate this Agreement by notice to Seller, in which event this Agreement shall terminate and all obligations of the parties hereto shall cease without further recourse or remedy of the parties hereunder, and the Deposit shall be retained by Seller, or (y) waive such condition and proceed to consummate the transaction contemplated hereby in accordance with the provisions of this Agreement. Notwithstanding the foregoing, in the event that the failure to satisfy any condition precedent to Closing is caused by a breach by Seller of its obligations set forth in this

Agreement, Seller shall be deemed to be in default hereunder, in which event the provisions of Section 9 below shall apply.

b. Seller's Conditions to Closing. Without limiting any other conditions to Seller's obligations to close set forth in this Agreement, the obligations of Seller under this Agreement are subject to the satisfaction at the time of the Closing of each of the following conditions (any of which may be waived in whole or in part by Seller at or prior to Closing):

i. There shall be no final judgment materially affecting the ability of Buyer to perform its obligations rendered against Buyer, or if, within thirty (30) days after entry thereof, such judgment shall have been discharged or execution thereof stayed, or if, within thirty (30) days after the expiration of any such stay, such judgment shall have been discharged.

ii. Buyer shall have performed, observed and complied with all material covenants and agreements required by this Agreement to be performed by Buyer at or prior to Closing.

If any of Seller's foregoing conditions is not fully satisfied on or before the Closing Date, Seller shall have the option to either (x) terminate this Agreement by notice to Buyer, in which event the Deposit shall be retained by Seller, and this Agreement shall terminate and all obligations of the parties hereto shall cease without further recourse or remedy of the parties hereunder, or (y) waive such condition and proceed to consummate the transaction contemplated hereby in accordance with the provisions of this Agreement. Notwithstanding the foregoing, in the event that the failure to satisfy any condition precedent to Closing is caused by a breach by Buyer of its obligations set forth in this Agreement, Buyer shall be deemed to be in default hereunder, in which event the provisions of Section 10 below shall apply.

c. Closing Costs. Each of Seller and Buyer shall be responsible for their own legal expenses incurred in connection with this Agreement. Seller and Buyer agree to allocate closing costs as follows:

i. Transfer/conveyance taxes (if applicable) shall be divided evenly between Seller and Buyer.

ii. Buyer's title insurance expenses and premiums shall be paid by Buyer.

iii. If applicable, the cost of an update to the most recent survey of the Easement Area or of a new survey and any related surveyor's certificate shall be paid by Buyer.

iv. The cost of preparation and recordation of any releases and termination statements as may be required in connection with the title policy described in Section 3 hereof shall be paid by Seller.

v. The cost of preparation of the Easement Agreement shall be paid by Buyer.

vi. The costs of performing Closing and of any escrow charges shall be paid by Buyer.

d. Condition of Premises at Closing and Closing Inspection. At Closing, but without limiting any of the other conditions to Closing hereunder, full possession of the Easement Area, free of all tenants and occupants and of all personal property located on Easement Area and owned by Seller is to be delivered to Buyer at the Closing, the Premises to be then in the same condition as on the date hereof, reasonable use and wear excepted. Buyer and its agents, employees, representatives or independent contractors shall be entitled to an inspection of the Easement Area prior to the Closing in order to determine whether the condition thereof complies with the terms of this Section.

7. Entire Agreement Herein. The parties understand and agree that their entire agreement is contained herein, and that no warranties, guarantees, statements, or representations shall be valid or binding on either party unless set forth in this Agreement. It is further understood and agreed that all prior understandings and agreements heretofore had between the parties are merged in this Agreement which alone fully and completely expresses their agreement and that the same is entered into after full investigation, neither party relying on any statement or representation not embodied in this Agreement. This Agreement may be changed, modified, altered or terminated only by a written agreement signed by the parties hereto.

8. Condemnation. If all or a material part of the Easement Area is taken by condemnation, eminent domain or by agreement in lieu thereof, or any proceeding to acquire, take or condemn all or part of the Premises is threatened or commenced, Buyer may either terminate this Agreement (in which event Buyer shall be entitled to a return of the Deposit), or purchase the Easement Area (as may be relocated or adjusted pursuant the mutual agreement of Buyer and Seller) in accordance with the terms hereof, without reduction in the Purchase Price, together with an assignment of Seller's rights to any award paid or payable by or on behalf of the condemning authority. Otherwise Buyer shall complete the transaction and shall receive an assignment of Seller's rights to the award therefor at Closing. If Seller has received payments from the condemning authority and if Buyer elects to purchase the Easement Area, Seller shall credit the amount of said payments against the Purchase Price at the Closing. For the purposes hereof, a part of the Premises shall be deemed "material" if in Buyer's judgment the taking thereof would adversely affect the Easement Area's usefulness with respect to the Project and/or the Buyer's ability to pursue the Project.

9. Maintenance; New Leases or Agreements, Etc. Between the date hereof and the Closing:

a. Seller shall maintain the Easement Area in at least the same condition as the same is in at the date hereof, reasonable wear and tear and the consequences of any taking by eminent domain excepted. Seller shall maintain insurance on the Premises as currently insured.

b. Seller shall not enter into any lease, license or other occupancy agreement of all or any part of the Easement Area or any other agreement affecting the Easement Area, without Buyer's prior written consent (which Buyer may withhold in its sole and absolute discretion).

c. Seller shall not make any commitments or representations to any governmental authorities, any adjoining property owners, and civic association or interest groups concerning the Easement Area to this Agreement that would be binding upon Buyer in any manner.

d. Seller shall promptly deliver to Buyer copies of any notices or other correspondence it receives from any governmental authorities regarding the Premises.

10. Default; Remedies. Either party shall be in default hereunder if they fail to fulfill their obligations as set forth in this Agreement.

a. In the event of a material default by Seller hereunder, Buyer shall have the right to exercise any one of the following as its sole and exclusive remedies:

i. terminate this Agreement by written notice to Seller, in which event the Deposit shall be returned to Buyer, and all obligations of the parties under this Agreement shall terminate;

ii. seek specific performance of this Agreement; or

iii. waive the default and proceed to consummate the transaction contemplated hereby in accordance with the provisions of this Agreement.

b. In the event of a material default by Buyer hereunder, Seller shall have the right to terminate this Agreement by written notice to Buyer, in which event the Deposit shall paid to Seller as its sole remedy, at law or in equity, and all obligations of the parties under this Agreement shall terminate.

11. Continuation of Representations, Indemnifications and Covenants. All provisions, covenants, representations, warranties, indemnifications and covenants of the parties contained herein are intended to be and shall remain true and correct as of the time of Closing.

12. Recording. It is agreed hereby that this Agreement shall not be filed for recording with the Register of Deeds for the County of Waldo or with any other governmental body but that a memorandum of this Agreement may be recorded at any party's request.

13. Notices. Any notice or communication which may be or is required to be given pursuant to the terms of this Agreement shall be in writing (from either a party hereto or its counsel) and shall be sent to the respective party at the address set forth in the first paragraph of this Agreement, by hand delivery, by postage prepaid certified mail, return receipt requested, by a nationally recognized overnight courier service that provides tracing and proof of receipt of items mailed, or to such other address as either party may designate by notice similarly sent. Notices shall be effective upon receipt or attempted delivery if delivery is refused or the party no longer receives deliveries at said address and no new address has been given to the other party pursuant to this paragraph. A copy of any notice to Buyer shall also be simultaneously sent to Mintz, Levin, Cohn, Ferris, Glovsky & Popeo, P.C., One Financial Center, Boston, Massachusetts 02111, Attention: Daniel O. Gaquin, Esq. A copy of any notice to Seller shall also be simultaneously sent to Lee Woodward, Jr., Esquire, 56 Main Street, Belfast, ME 04915. Notices by any party may be sent by such party's counsel.

14. Broker. Each party represents hereby to the other that it dealt with no broker in the consummation of this Agreement and each party shall indemnify and save the other harmless from and against any claim arising from the breach of such representation by the indemnifying party. The provisions of this Section shall survive the Closing or, if applicable, the termination of this Agreement.

15. Captions. The captions in this Agreement are inserted only for the purpose of convenient reference and in no way define, limit or prescribe the scope or intent of this Agreement or any part hereof.

16. Successors and Assigns.

a. This Agreement shall be binding upon the parties hereto and their respective successors and assigns.

b. Buyer may not assign this Agreement and the rights or benefits hereof, except that Buyer may assign this Agreement, without Seller's consent, to an entity that directly or indirectly controls, is controlled by or is under common control with Buyer or any institutional investor partner of Buyer. The term "control" means the power to direct the management of such entity through voting rights, ownership or contractual obligations.

17. Governing Law. The laws of the State of Maine shall govern the validity, construction, enforcement and interpretation of this Agreement.

18. Title Matters. Any matter or practice arising under or relating to this Agreement which is the subject of a title standard or practice standard of the Maine State Bar Association shall be governed by such standard to the extent applicable.

19. Multiple Counterparts. This Agreement may be executed in any number of

identical counterparts. If so executed, each of such counterparts shall constitute this Agreement. In proving this Agreement, it shall not be necessary to produce or account for more than one such counterpart.

[Remainder of page intentionally left blank]

IN WITNESS WHEREOF, the parties hereto have executed this Easement Purchase and Sale Agreement as an instrument under seal as of the day and year first written above.

SELLER

8/6/18

RICHARD ECKROTE

Janet Eckrote 8/6/18

JANET ECKROTE

BUYER

NORDIC AQUAFARMS, INC.

By_____
Name
Title

IN WITNESS WHEREOF, the parties hereto have executed this Easement Purchase and Sale Agreement as an instrument under seal as of the day and year first written above.

SELLER:

8/6/18

RICHARD ECKROTE

Janet Eckrote 8/6/18

JANET ECKROTE

BUYER:

NORDIC AQUAFARMS, INC.

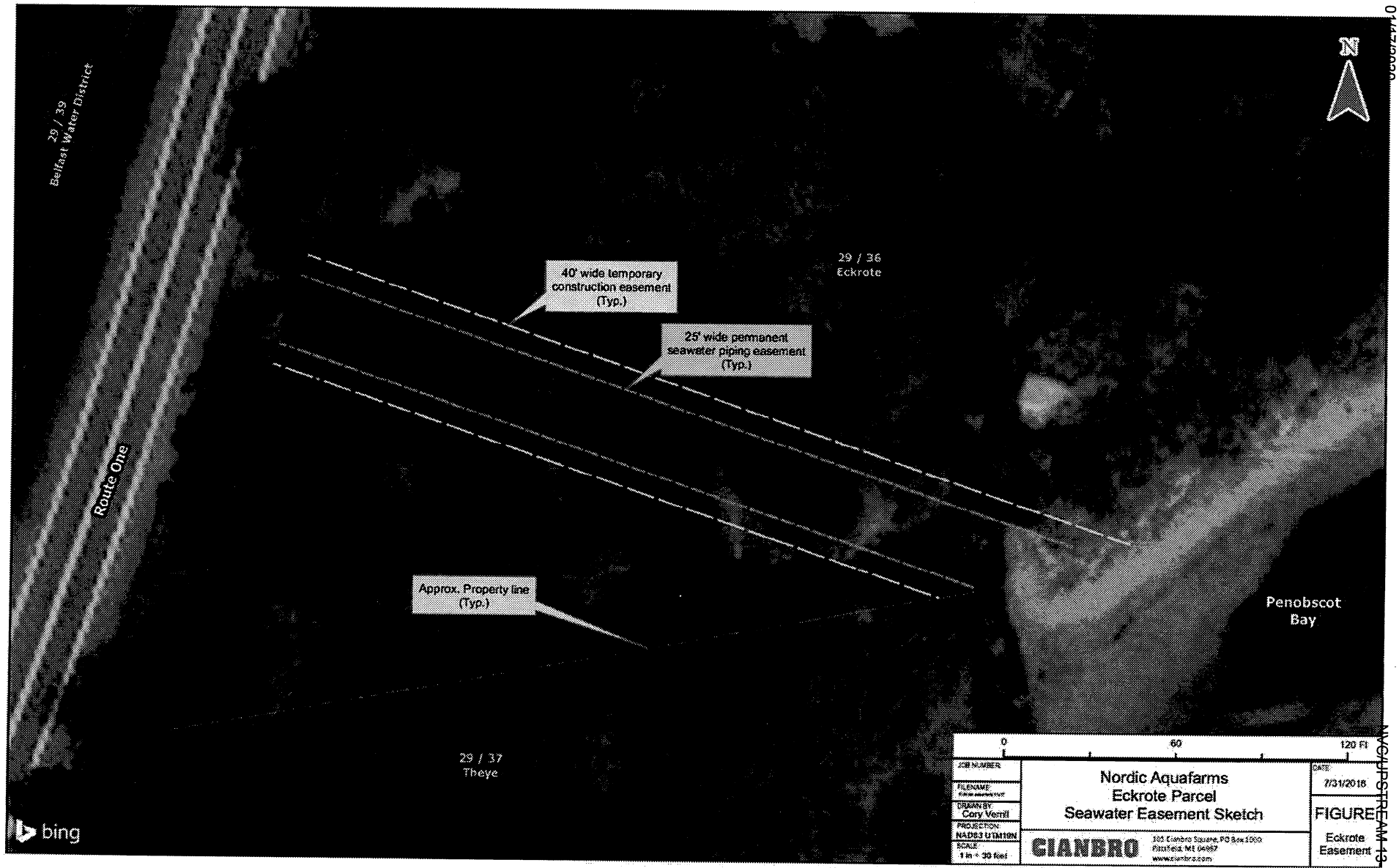
By:

Name: Erich Heim

Title: CEO

Exhibit A

Proposed Easement Area



NWC/UPSTREAM 43-G

Exhibit 1a
Eckrote Easement Amendment

NORDIC AQUAFARMS
SUSTAINABLE AQUACULTURE

March 3, 2019

Richard & Janet Eckrote
42 Grandview Ave.
Lincoln Park, NJ 07035

Re: Rights in Easement

Dear Mr. & Mrs. Eckrote:

This letter will follow up on the Easement Purchase and Sale Agreement you signed with Nordic Aquafarms, Inc. on August 6, 2018 (the "P&S"). As you know, the P&S discusses the location of where the easement is allowed, and includes an overhead map of the easement over the dry land, landward of the high tide line (the "upland").

The P&S discusses the location of the easement in the upland, carefully discussing the easement in relation to the driveway entrance and the old barn. These limits on the easement area were specifically detailed in the P&S because the placement of the easement in the upland was important to you, and Nordic Aquafarms was happy to accommodate those desires in the upland.

The P&S is clear that as long as Nordic Aquafarms avoids the driveway and the barn as agreed in the P&S, Nordic Aquafarms could build and site its pipes and related equipment anywhere in the wet sand ("intertidal zone") and within US Route 1 adjacent to or within your upland property (so long as the limits on impacts such as to your driveway are respected). You intended a broad easement over your property, including any rights you have to US Route 1 and the intertidal zone such that Nordic Aquafarms can build and site its pipes anywhere in those areas where you have rights.

You are also hereby amending provision 2. Closing to allow for closing "by January 1, 2020 or such other date as shall be mutually agreed by the parties hereto." This new language will replace the existing language of provision 2. Closing, which states "on August 16, 2019 or such earlier date as shall be mutually agreed by the parties hereto."

By signing the acknowledgement on the accompanying page, this letter clarifies that the easement area delineated in the P&S includes the entirety of your rights in the intertidal zone and US Route 1 and amends the Closing Date.

Thank you for your cooperation.

Sincerely,

Erik Heim
Nordic Aquafarms, Inc.

Encl. (acknowledgement page)

Ed Cotter
Nordic Aquafarms, Inc.

Encl. (acknowledgement page)

ACKNOWLEDGEMENT

I have read the letter from Ed Cotter of Nordic Aquafarms, Inc. dated **[insert]**, and agree:

Dated: 2/20/19

Richard Eckrote

Dated: 2-28-19

Janet Eckrote

ATTACHMENT D

Complete Options and Purchase Agreement, dated January 30, 2018

Additional Information Regarding
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

OPTIONS AND PURCHASE AGREEMENT

This Options and Purchase Agreement, dated as of this 30 day of January, 2018, is by and between the **BELFAST WATER DISTRICT**, a quasi-municipal, consumer-owned water utility district having an address of 285 Northport Avenue, Belfast, Maine 04915 (the "Seller"), **NORDIC AQUAFARMS, INC.**, a Delaware corporation having an address of c/o Nordic Aquafarms AS, Øraveien 2, 1630 Gml Fredrikstad, Norway (the "NAF"), and the **CITY OF BELFAST**, a municipal corporation having an address of 131 Church Street, Belfast, Maine 04915 (the "City").

TERMS AND CONDITIONS:

1. Property Descriptions.

a. Premises. Seller owns the land depicted on Exhibit A hereto as the "Realty" together with any improvements thereon and appurtenances thereto, located in Belfast, Maine, containing approximately 18 acres, such land being a portion of the land identified on the City of Belfast Tax Map 29 as Lot 39 and specifically excluding the Lower Dam (hereinafter defined) (the "Realty"). Seller also owns the land located in Belfast, together with any improvements thereon and appurtenances thereto, northerly of the Cassida Property (as such term is defined in the Evaluation Agreement by and between the parties dated substantially herewith (the "Evaluation Agreement")) and easterly of the Waterfront Parcel (hereinafter defined), such land being depicted on Exhibit A in yellow dots above the lot marked "Cassida Property" and is marked "Additional Parcel", such land being a portion of the land identified on the City of Belfast Tax Map 29 as Lot 39 and containing approximately 12 acres (the "Additional Parcel"). The Realty and Additional Parcel, together with all right, title and interest of Seller in and to any land lying in the bed of any street, road, avenue, lane or other way (opened or proposed) adjacent to or abutting or adjoining such premises, together with all rights, privileges, rights of way and easements appurtenant to such premises, and all other appurtenances and rights associated with the property, including subterranean rights, air rights, water rights, riparian and littoral rights, rights in submerged lands, all sewer and utility rights allocated to the Realty and all rights and entitlements to the development of the Property is hereinafter referred to as the "Real Property"). All buildings, fixtures and other improvements located thereon is hereinafter referred to as the "Improvements", and, together with the Real Property, the "Premises".

b. Lower Dam. Seller owns the dam structure located on the southeasterly portion of the Realty, which dam separates Belfast Reservoir Number One on Little River from Belfast Bay, and all appurtenances, rights, privileges and easements pertaining thereto including any flowage rights and access over the remaining land of Seller (the "Lower Dam").

c. Waterfront Parcel. Seller owns (i) the portion of City of Belfast Tax Map 29, Lot 39 which runs along the northerly shore of Little River, such land being depicted on Exhibit A as inside the red lines which are outside of the yellow lines and marked

"Waterfront Parcel", (ii) the entirety of the Town of Northport Tax Map U1, Lot 6, which lot runs along the southerly shore of Little River between the Northport/Belfast town line and Route 1, (iii) the entirety of the City of Belfast Tax Map 4, Lot 23-C, which lot runs along the southwesterly shore of Little River northerly of the Northport/Belfast town line being approximately 3 acres, and Seller may have (iv) right, title and interest over the land (Tax Map 4, Lot 10) owned by a third-party for access to "Perkins Road" running from the northerly bound of the BWD premises on Lot 29, Map 39 to said Perkins Road (collectively (i) to (iv), with all appurtenances, rights, privileges and easements pertaining thereto, the "Waterfront Parcel").

2. Options; Terms; Purchase Prices. Seller hereby grants to NAF the following options to purchase (collectively, the "Options", and individually, an "Option"):

a. Premises Option. NAF shall have an option to purchase the Premises for twelve (12) months from the date hereof, provided, however, NAF shall have the right to extend this Option for an additional six (6) months by giving written notice of and payment for the extension to Seller on or before three hundred thirty (330) days from the date hereof (the "Premises Option"). At NAF's election, on the Closing Date (as hereinafter defined) for the Premises Option, assuming Seller has the legal right to do so, Seller shall also grant to NAF an easement(s) appurtenant to the Premises over both the land owned by a third-party and the Waterfront Parcel for access to "Perkins Road," a public right-of-way existing generally to the north of the Premises, which easement(s) shall be in a location and upon dimensions as NAF and the City may mutually agree. The total purchase price for the Premises is ONE MILLION FIFTY NINE THOUSAND and 00/100 Dollars ($1,059,000.00) (being NINE HUNDRED SEVENTY FIVE THOUSAND and 00/100 Dollars ($975,000.00) for the Realty and EIGHTY FOUR THOUSAND and 00/100 Dollars ($84,000.00) for the Additional Parcel) (the "Premises Purchase Price").

b. Lower Dam Option. NAF shall have an option to purchase the Lower Dam for a term ending on the earlier to occur of the following: two (2) years from the date of Closing on the Premises or, if NAF does not exercise its Premises Option, upon the expiration of the Premises Option (the "Lower Dam Option"). The total purchase price for the Lower Dam shall be ONE and 00/100 Dollars ($1.00) (the "Lower Dam Purchase Price").

3. Waterfront Parcel Agreement. Seller agrees to sell and the City agrees to buy, upon the terms and conditions hereinafter set forth and upon NAF closing on the purchase of the Premises, the Waterfront Parcel subject to easements necessary for the infrastructure related to NAF's land-based aquaculture facility on the Premises and related improvements project (the "Project") so long as such easements do not unreasonably interfere with the nature path located on the Waterfront Parcel. At the City's election, assuming Seller has the legal right to do so, Seller shall also grant to the City an easement(s) appurtenant to the Waterfront Parcel over the land owned by a third-party for access to "Perkins Road," a public right-of-way existing generally to the north of the Premises, which easement(s) shall be in a location and upon dimensions as NAF and the City may mutually agree. The total purchase price for the Waterfront Parcel shall be up to ONE HUNDRED THOUSAND and 00/100 Dollars ($100,000.00) in the sole

discretion of BWD (the "Waterfront Parcel Purchase Price"). It shall be a condition to the Premises Option Closing that the City is contemporaneously purchasing the Waterfront Parcel from Seller on the terms and conditions herein. It shall be a condition precedent to the closing on the Waterfront Parcel that NAF is contemporaneously purchasing the Premises from Seller on the terms and conditions herein. The City agrees that the use of the Waterfront Parcel shall be restricted to conservation and passive recreation uses, subject to easements necessary for the Project as aforesaid.

4. Option Consideration. For the Options, NAF shall pay to Seller an option consideration of THIRTY THOUSAND DOLLARS and 00/100 ($30,000.00) at the time of execution of this Agreement for the initial option term. If NAF decides to extend its option for any property for the additional six (6) months set forth above then NAF shall pay to Seller an additional option consideration of FIFTEEN THOUSAND DOLLARS and 00/100 ($15,000.00) (collectively, together with interest earned thereon, if any, the "Options Consideration"). The Options Consideration shall be deemed paid to Seller when delivered to NAF's attorney described in Section 15 below ("Escrow Agent"). The Options Consideration shall be deposited in a federally insured interest-bearing bank account and disbursed according to the terms of this Agreement.

If NAF (a) does not exercise an Option or (b) fails to close on a purchase once it has exercised the Option for it, in either case due to a reason other than (y) a default by NAF or Seller as described below or (z) a failure to fulfill the title condition precedent described in Section 5b below, then all Options Consideration paid to Seller shall be retained by Seller, as liquidated damages and Seller's sole and exclusive remedy for any such breach. Further, if Seller, having the right, terminates the Evaluation Agreement pursuant to Sections 2A or 2B thereof, then all Options Consideration paid to Seller shall be returned to NAF. If NAF exercises an Option, the relevant Options Consideration shall be applied to the Purchase Price (hereinafter defined), as set forth below.

5. Exercise of Option/Purchase and Sale Agreement. NAF shall exercise its Options, if at all, as to the Premises or the Lower Dam at any time during the relevant Option term by delivering written notice to Seller of its intent to do so (the "Notice of Election to Purchase"). Upon any exercise of an Option as aforesaid, the following terms and provisions shall apply to conveyance of the relevant property:

a. Purchase Price. The Premises Purchase Price, Lower Dam Purchase Price and Waterfront Parcel Purchase Price are individually each referred to as a "Purchase Price" hereinafter and shall be paid as follows:

i. Premises. Subject to any adjustments and prorations hereafter described, at the Closing NAF shall pay the Premises Purchase Price to Seller or its agent as follows:

1. NAF shall receive a credit for all Options Consideration paid to Seller; and

2. NAF shall pay the balance to Seller in lawful currency of the

United States of America in immediately available funds by wire transfer to an account designated by Seller in writing.

ii. Lower Dam. Subject to any adjustments and prorations hereafter described, at the Closing NAF shall pay the Lower Dam Purchase Price of ONE and 00/100 Dollar ($1.00) to Seller in immediately available funds by wire transfer to an account designated by Seller in writing.

iii. Waterfront Parcel. Subject to any adjustments and prorations hereafter described, at the Closing the City shall pay the Waterfront Parcel Purchase Price to Seller or its agent in lawful currency of the United States of America in immediately available funds by wire transfer to an account designated by Seller in writing.

b. Deed. The relevant property shall be conveyed by Seller in fee simple absolute, by a good and sufficient quitclaim deed with covenant in accordance with the Short Form Deeds Act, 33 M.R.S.A. §761, *et seq.* (each a "Deed"), running to NAF or the City, as applicable, or their nominee or designee in accordance with Section 17 below. A Deed shall convey a good and clear record and marketable title to the Premises or Waterfront Parcel, as applicable, insurable on the current ALTA Standard Owners Form at standard rates, with standard printed exceptions for parties in possession and mechanics' liens deleted, free from all mortgages and monetary liens and all other encumbrances except: (i) those matters listed on Exhibit B attached hereto, and (ii) any matters created by or suffered by the relevant buyer. A Deed shall convey title to the Lower Dam, free from all mortgages and monetary liens and all other encumbrances except: (i) those matters listed on Exhibit B attached hereto, and (ii) any matters created by or suffered by NAF. Each Deed shall be in proper form for recording and shall be duly executed, acknowledged and delivered by Seller at the Closing.

It shall be a condition precedent to all Closings that the relevant buyer has obtained a title commitment in form and substance acceptable to it, with such endorsements as it may require, and if it is unable to obtain such a title commitment, NAF may, at its option, (i) rescind the Notice of Election to Purchase as though the Notice of Election to Purchase had not been delivered, or (ii) extend the sixty (60) day time period provided for the Option Closing by no more than sixty (60) days in order to obtain such title commitment.

c. Closing. Unless extended pursuant to the terms of this Agreement, the closing of the transactions contemplated hereunder (each individually a "Closing" occurring on a "Closing Date") shall take place as follows:

i. Premises Closing Date. The Closing of the Premises shall occur at 10:00 a.m. on the thirtieth (30th) day following the receipt by Seller of the Notice of Election to Purchase the Premises, or such earlier date as may be mutually agreed upon by the parties (such date, as the same may be extended pursuant to the terms of this Agreement, the "Premises Closing Date").

ii. Waterfront Parcel Closing Date. The Closing of the Waterfront Parcel shall occur on the same day and immediately after the closing on the Premises (such date, as the same may be extended pursuant to the terms of this Agreement, the "Waterfront Parcel Closing Date").

iii. Lower Dam Closing. The Closing of the Lower Dam shall occur at 10:00 a.m. on the thirtieth (30th) day following the receipt by Seller of the Notice of Election to Purchase the Lower Dam or such earlier date as may be mutually agreed upon by the parties (such date, as the same may be extended pursuant to the terms of this Agreement, the "Lower Dam Closing Date").

Each Closing shall occur at the offices of the City's attorney described in Section 15 below. If a Closing Date shall fall on a Saturday, Sunday or legal holiday, the Closing Date shall automatically be extended to the next business day. The Closing may be conducted in the customary manner of an escrow closing by the parties making delivery of all closing documents and funds to the Title Company on or prior to the Closing Date, and in such event the attendance of the parties at Closing shall not be required. Time is of the essence in this Agreement.

Each Closing shall not be deemed to be completed until all documents and payments as aforesaid have been properly delivered (and recorded where appropriate) to the satisfaction of all parties.

Seller may, at the relevant Closing, use the relevant Purchase Price, or any portion thereof, to clear the title of any and all encumbrances or interests provided that all such instruments so procured are recorded simultaneously with the delivery of the relevant Deed.

d. Seller Closing Deliverables. At each Closing, Seller shall deliver the following documents, reasonably satisfactory in form and substance to the relevant buyer, properly executed and acknowledged as required:

i. A Deed;

ii. Evidence reasonably satisfactory to NAF and to the Title Company or the City and its attorney of Seller's authority and the authority of the signatory on behalf of Seller to convey the relevant property pursuant to this Agreement;

iii. As to the Premises and Waterfront Parcel, affidavits sufficient for the Title Company orNAF's or the City's attorney to delete any exceptions for parties in possession and mechanics' or materialmen's liens from the owner's title insurance policy (the "Title Insurance");

iv. Such other instruments as the relevant buyer may reasonably request consistent with the terms of this Agreement, so long as said documents do not create any new or continuing obligations on behalf of Seller.

e. Buyer Closing Deliverables. At each Closing, the relevant buyer shall deliver, or cause to be delivered, the following payment and documents, reasonably satisfactory in form and substance to Seller, properly executed and acknowledged as required:

i. The relevant Purchase Price, as adjusted in accordance with the terms hereof;

ii. A closing statement setting forth the Purchase Price and the closing adjustments and prorations as further described below (the "Closing Statement");

iii. The Federal and State of Maine tax certificate and disclosures; and

iv. Such other instruments as Seller may reasonably request consistent with the terms of this Agreement.

f. NAF's Conditions to Closing. Without limiting any other conditions to NAF's obligations to close set forth in this Agreement, the obligations of NAF under this Agreement are subject to the satisfaction at the time of each Closing of each of the following conditions (any of which may be waived in whole or in part by NAF at or prior to Closing):

i. There shall be no final judgment materially affecting the ability of Seller to perform its obligations rendered against Seller, or if, within thirty (30) days after entry thereof, such judgment shall have been discharged or execution thereof stayed, or if, within thirty (30) days after the expiration of any such stay, such judgment shall have been discharged.

ii. All of the representations by Seller set forth in this Agreement or any Exhibit attached hereto shall be true and correct in all material respects. With respect to any representation made to the best of Seller's knowledge, the condition to Closing shall be not only that such representation still be true to the best of Seller's knowledge, but that the specific fact or condition that was the subject of the representation also be true.

iii. Seller shall have performed, observed and complied with all material covenants and agreements required by this Agreement to be performed by Seller at or prior to Closing.

iv. Subject to the provisions of Sections 5(k) and 7 hereof, the physical and environmental condition of the Premises shall not have changed

adversely after the date hereof, reasonable wear and tear and acts caused by NAF excepted.

If any of NAF's foregoing conditions is not fully satisfied on or before the Closing Date and it is susceptible to cure by Seller, Seller shall use reasonable efforts to satisfy such condition, in which event Seller shall have a period not exceeding thirty (30) days after the Closing Date to satisfy such condition, and the Closing Date shall be extended accordingly. If (despite Seller's reasonable efforts to cure where applicable), any such condition is not fully satisfied on or before the extended Closing Date, NAF shall have the option to either (x) terminate this Agreement by notice to Seller, in which event this Agreement shall terminate and all obligations of the parties hereto shall cease without further recourse or remedy of the parties hereunder, except for those obligations which are stated herein to survive the termination of this Agreement and the Options Consideration paid to Seller shall be returned to NAF forthwith, (y) waive such condition and proceed to consummate the transaction contemplated hereby in accordance with the provisions of this Agreement, or (z) if any such condition is susceptible of being cured by NAF, then NAF shall have the right, but not the obligation, to take such actions and incur such costs and expenses as necessary to satisfy such condition and any and all costs and expenses incurred by NAF shall be deducted from the relevant Purchase Price at Closing. Notwithstanding the foregoing, in the event that the failure to satisfy any condition precedent to Closing is caused by a breach by Seller of its obligations set forth in this Agreement, Seller shall be deemed to be in default hereunder, in which event the foregoing cure period and NAF's option shall not be applicable and the provisions of Section 12 below shall apply.

g. The City's Conditions to Closing. Without limiting any other conditions to the City's obligations to close set forth in this Agreement, the obligations of the City under this Agreement are subject to the satisfaction at the time of the Closing on the Waterfront Parcel of each of the following conditions (any of which may be waived in whole or in part by the City at or prior to Closing):

i. There shall be no final judgment materially affecting the ability of Seller to perform its obligations rendered against Seller, or if, within thirty (30) days after entry thereof, such judgment shall have been discharged or execution thereof stayed, or if, within thirty (30) days after the expiration of any such stay, such judgment shall have been discharged.

ii. All of the representations by Seller set forth in this Agreement or any Exhibit attached hereto shall be true and correct in all material respects. With respect to any representation made to the best of Seller's knowledge, the condition to Closing shall be not only that such representation still be true to the best of Seller's knowledge, but that the specific fact or condition that was the subject of the representation also be true.

iii. Seller shall have performed, observed and complied with all material covenants and agreements required by this Agreement to be performed by Seller at or prior to Closing.

iv. Subject to the provisions of Sections 5(k) and 7 hereof, the physical and environmental condition of the Premises shall not have changed adversely after the date hereof, reasonable wear and tear and acts caused by the City excepted.

If any of the City's foregoing conditions is not fully satisfied on or before the Closing Date and it is susceptible to cure by Seller, Seller shall use reasonable efforts to satisfy such condition, in which event Seller shall have a period not exceeding thirty (30) days after the Closing Date to satisfy such condition, and the Closing Date shall be extended accordingly. If (despite Seller's reasonable efforts to cure where applicable), any such condition is not fully satisfied on or before the extended Closing Date, the City shall have the option to either (x) terminate this Agreement by notice to Seller, in which event this Agreement shall terminate and all obligations of the parties hereto shall cease without further recourse or remedy of the parties hereunder, except for those obligations which are stated herein to survive the termination of this Agreement, (y) waive such condition and proceed to consummate the transaction contemplated hereby in accordance with the provisions of this Agreement, or (z) if any such condition is susceptible of being cured by the City, then the City shall have the right, but not the obligation, to take such actions and incur such costs and expenses as necessary to satisfy such condition and any and all costs and expenses incurred by the City shall be deducted from the Waterfront Parcel Purchase Price at Closing. Notwithstanding the foregoing, in the event that the failure to satisfy any condition precedent to Closing is caused by a breach by Seller of its obligations set forth in this Agreement, Seller shall be deemed to be in default hereunder, in which event the foregoing cure period and the City's option shall not be applicable and the provisions of Section 12 below shall apply.

h. Seller's Conditions to Closing. Without limiting any other conditions to Seller's obligations to close set forth in this Agreement, the obligations of Seller under this Agreement are subject to the satisfaction at the time of each Closing of each of the following conditions (any of which may be waived in whole or in part by Seller at or prior to Closing):

i. NAF and Seller shall have entered into a water supply agreement pursuant to which NAF will have the right to purchase, and Seller will commit to supply to NAF, water for use in connection with the Project (the "Water Supply Agreement").

ii. NAF and Seller shall enter into a license agreement pursuant to which Seller shall have the irrevocable right to occupy the office and garage facilities existing on the Realty as of the date hereof for a period ending on the

earlier to occur of the following: (y) on the first (1st) anniversary of the Premises Closing Date, or (z) Seller is able to move its offices, equipment and vehicles into and provide services to the public from its new headquarters and associated operations facilities (the "License Agreement"), such agreement to be on commercially reasonable terms mutually agreeable to NAF and Seller and to (a) provide that Seller pay taxes, utilities and other occupancy costs and expenses but no license or rental fee, and (b) include a holdover penalty/damages provision.

iii. Seller has acquired an MPUC Order/Opinion, subject to and in accordance with Section 2A of the Evaluation Agreement.

iv. As to the Premises Closing, the City shall be contemporaneously closing on the purchase of the Waterfront Parcel.

If any of Seller's foregoing conditions is not fully satisfied on or before a Closing Date, Seller shall have the option to either (y) terminate this Agreement by notice to the other parties, in which event this Agreement shall terminate and the Options Consideration shall be retained by Seller (unless the failure of condition results from a breach or default of Seller, in which event the Options Consideration shall be returned to NAF forthwith) and all obligations of the parties hereto shall cease without further recourse or remedy of the parties hereunder, except for those obligations which are stated herein to survive the termination of this Agreement, or (z) waive such condition and proceed to consummate the transaction contemplated hereby in accordance with the provisions of this Agreement.

i. Apportionment of Taxes and Other Charges. All normal and customarily proratable items, including, without limitation, real estate taxes and assessments (if applicable), utility bills (except as hereinafter provided) and collected rents and other income (if any), shall be prorated as of a relevant Closing Date, Seller being charged and credited for all of the same relating to the period up to the Closing Date and the relevant buyer being charged and credited for all of the same relating to the period on and after the Closing Date. If the amount of any such item is not known at the time of the delivery of the relevant Deed, such item shall be apportioned on the basis of the comparable period of the prior year or a current estimate, with a reapportionment within ninety (90) days of the Closing Date or as soon thereafter as the amount of the item is actually determined. Final readings and final billings for utilities will be made if possible as of the Closing Date, in which event no proration shall be made at the Closing with respect to utility bills. Otherwise a proration shall be made based upon the parties' reasonable good faith estimate, and a readjustment made within thirty (30) days after Closing or such later date as shall be necessary so that such readjustment may be based upon actual bills for such utilities. Seller shall be entitled to receive a return of all deposits presently in effect with the utility providers, and the relevant buyer shall be obligated to make its own arrangements for deposits with the utility providers. The provisions of this Section shall survive the Closing for a period of twelve (12) months, and in the event of any error in performing the prorations contemplated by this Agreement or if information becomes available subsequent to the Closing indicating that the prorations performed at Closing

were not accurate, the parties hereto shall be obligated to re-prorate the closing adjustments to correct such errors and to reflect such new information. A detailed statement shall setting forth the manner of computation of the aforesaid pro-ration adjustments shall be included on the Closing Statement.

j. Closing Costs. Each of Seller and the relevant buyer shall be responsible for preparing such documents as it is obligated to deliver pursuant to Sections 5d and 5e hereof and for its own legal expenses. Seller and the relevant buyer agree to allocate closing costs as follows:

i. Transfer/conveyance taxes (if applicable) shall be divided evenly between Seller and the relevant buyer.

ii. A buyer's title insurance expenses and premiums shall be paid by that buyer.

iii. The cost of an update to the most recent survey of the Premises or of a new survey and any related surveyor's certificate shall be paid by NAF.

iv. The cost of preparation and recordation of any releases and termination statements required to clear title to the Premises shall be paid by Seller.

v. The cost of preparation of each Deed shall be paid by Seller.

vi. The costs of performing each Closing and drafting any other closing documents not described in Sections 5d and 5e hereof, and any escrow charges shall be paid by the relevant buyer.

k. Condition of Premises at Closing and Closing Inspection. At a Closing, but without limiting any of the other conditions to Closing hereunder and except as may be provided in the License Agreement, full possession of the relevant property, free of all tenants and occupants and of all personal property located on the relevant property and owned by Seller is to be delivered to the relevant buyer at the Closing, the relevant property to be then in the same condition as on the date hereof, reasonable use and wear excepted, and excepting the removal of any buildings and/or fixtures by Seller; provided such removal does not create and unsafe condition, nuisance or other violation of law. NAF and the City and their agents, employees, representatives or independent contractors shall be entitled to an inspection of the relevant property prior to the Closing in order to determine whether the condition thereof complies with the terms of this Section.

6. Entire Agreement Herein. The parties understand and agree that their entire agreement is contained herein, in the Water Supply Agreement and Evaluation Agreement that no warranties, guarantees, statements, or representations shall be valid or binding on a party unless set forth in this Agreement. It is further understood and agreed that all prior understandings and agreements heretofore had between the parties are merged in this Agreement

which alone fully and completely expresses their agreement and that the same is entered into after full investigation, neither party relying on any statement or representation not embodied in this Agreement. This Agreement may be changed, modified, altered or terminated only by a written agreement signed by the parties hereto.

7. Condemnation. If all or a material part of the Realty or Additional Parcel is taken by condemnation, eminent domain or by agreement in lieu thereof, or any proceeding to acquire, take or condemn all or part of the Realty or Additional Parcel is threatened or commenced, NAF may either terminate this Agreement (in which event NAF shall be entitled to a return of the Options Consideration paid to Seller), or purchase the Realty or Additional Parcel in accordance with the terms hereof, without reduction in the relevant Purchase Price, together with an assignment of Seller's rights to any award paid or payable by or on behalf of the condemning authority. Otherwise NAF shall complete the transaction and shall receive an assignment of Seller's rights to the award therefor at Closing. If Seller has received payments from the condemning authority and if NAF elects to purchase the Realty or Additional Parcel, Seller shall credit the amount of said payments against the relevant Purchase Price at the Closing. For the purposes hereof, a part of the Realty or Additional Parcel shall be deemed "material" if in NAF's judgment the taking thereof would adversely affect NAF's ability to pursue the proposed Project as such term is defined in the Evaluation Agreement.

8. Representations of Seller. In order to induce the buyers to enter into this Agreement and to consummate the purchase of the Premises, Seller hereby represents to each as of the date of this Agreement and as of each Closing Date that the following representations of Seller are true and correct in all material respects:

a. Seller has the power and authority to enter into this Agreement and complete the transactions contemplated herein, all action necessary to authorize the execution and delivery of this Agreement has occurred, the individual executing this Agreement and all documents to be executed by Seller are duly authorized, and this Agreement and all such documents that are to be executed by Seller and delivered to the relevant buyer at the relevant Closing are duly authorized, executed and delivered by Seller and enforceable against Seller in accordance with its terms.

b. There are no leases, licenses or other forms of occupancy agreements affecting the Premises or Waterfront Parcel or any maintenance, management or other contracts affecting either of these that will survive the Closing.

c. There is not now pending nor, to Seller's best knowledge, has there been threatened, any action, suit or proceeding against or affecting the Premises or Waterfront Parcel or Seller with respect thereto, whether before or by any federal or state court, commission, regulatory body, administrative agency or other governmental body, domestic or foreign, or otherwise.

d. Seller has not received notice of any pending or threatened proceeding for a taking or condemnation of the Premises or Waterfront Parcel.

e. Seller has not received notice of any assessment for public improvements applicable to the Premises or Waterfront Parcel.

f. Seller has not received notice of any proposal for or pending moratorium, rezoning, overlay, or other change to the land use classification or restrictions affecting the Premises or Waterfront Parcel.

g. Seller's rights, title and interest in and to and ownership of the Premises or Waterfront Parcel and all portions thereof and rights appurtenant thereto have never been challenged or questioned.

9. Representations of Buyer. NAF and the City hereby represent and warrant to Seller as of the date hereof and as of each Closing Date that the following representations of it are true and correct in all material respects:

a. It has the power and authority to enter into this Agreement and complete the transactions contemplated herein, all action necessary to authorize the execution and delivery of this Agreement has occurred, the individual executing this Agreement and all documents to be executed by it are duly authorized, and this Agreement and all such documents that are to be executed by it and delivered to Seller at the Closing are duly authorized, executed and delivered by it and enforceable against it in accordance with its terms.

b. There are no proceedings pending or, to its knowledge, threatened against it in any court or before any governmental authority or any tribunal which, if adversely determined, would have a material adverse effect on its ability to purchase the relevant property or to carry out its obligations under this Agreement, the Water Supply Agreement (as to NAF only), or the Evaluation Agreement.

10. Maintenance; New Leases or Agreements, Etc. Between the date hereof and the Closing:

a. Seller shall maintain all of its property subject to this Agreement in at least the same condition as the same is in at the date hereof, reasonable wear and tear and the consequences of any taking by eminent domain excepted. Seller shall maintain insurance on the Premises as currently insured.

b. Seller shall not enter into any lease, license or other occupancy agreement of all or any part of its property subject to this Agreement or any other agreement affecting such property without the relevant buyer's prior written consent (which the relevant buyer may withhold in its sole and absolute discretion).

c. Seller shall not make any commitments or representations to any other Governmental Authorities, any adjoining property owners, and civic association or interest groups concerning its property subject to this Agreement that would be binding upon the relevant buyer in any manner.

d. Seller shall promptly deliver to the relevant buyer copies of any notices or other correspondence it receives from any other Governmental Authorities (as such terms is defined in the Evaluation Agreement) regarding its property subject to this Agreement.

11. Broker. Each party represents hereby to the other that it dealt with no broker in the consummation of this Agreement and each party shall indemnify and save the other harmless from and against any claim arising from the breach of such representation by the indemnifying party. The provisions of this Section shall survive the Closing or, if applicable, the termination of this Agreement.

12. Default; Remedies. Either party shall be in default hereunder if they fail to fulfill its obligations as set forth in this Agreement, Water Supply Agreement or Evaluation Agreement.

a. In the event of a material default by Seller hereunder, then the relevant buyer shall deliver to Seller a written notice of such material breach, which notice shall set forth complete information describing the nature of the material breach. In the case of a non-monetary default, Seller shall use its reasonable efforts to cure any such breach, default or failure and in such event the Closing Date shall be extended by a written notice from Seller to the other parties for a period of up to thirty (30) days as specified in said notice. If, despite Seller's reasonable efforts, Seller fails to cure any such breach, default or failure on or before the extended Closing Date, each buyer shall have the right to exercise any one of the following remedies:

i. terminate this Agreement by written notice to Seller, in which event the Options Consideration paid to Seller for all purchases that have not yet closed shall be paid (or repaid, as the case may be) to NAF, and (except for those obligations which are stated herein to survive the termination of this Agreement) all obligations of the parties under this Agreement shall terminate; provided, however, if such default is as a result of a willful breach by Seller, in addition to a return of the Option Consideration, NAF and the City shall each be entitled to immediate payment from Seller of all reasonable out of pocket costs incurred by that party in connection with this Agreement and the Project (including under and pursuant to the Evaluation Agreement); or

ii. seek specific performance of this Agreement; or

iii. if any default by Seller is susceptible of being cured by NAF or the City, then NAF and the City shall have the right, but not the obligation, to take such actions and incur such costs and expenses as necessary to cure such default and any and all costs and expenses incurred by it shall be deducted from the relevant Purchase Price at the Closing; or

iv. waive the default and proceed to consummate the transaction contemplated hereby in accordance with the provisions of this Agreement.

The foregoing remedies shall be NAF's and the City's sole and exclusive remedies and each waives consequential damages against Seller, except in the event of fraud or intentional default by Seller.

b. In the event of a material default by NAF or the City hereunder, then Seller shall deliver to the other parties a written notice of such material breach, which notice shall set forth complete information describing the nature of the material breach. In the case of a non-monetary default, the defaulting party shall use its reasonable efforts to cure any such breach, default or failure and in such event the Closing Date shall be extended by a written notice from the defaulting party to Seller for a period of up to thirty (30) days as specified in said notice. If, despite the defaulting party's reasonable efforts, the defaulting party fails to cure any such breach, default or failure on or before the extended Closing Date, Seller shall have the right to exercise any one of the following remedies: terminate this Agreement by written notice to the other parties, in which event the Options Consideration paid to Seller for all purchases that have not yet closed shall be given to Seller as its sole remedy, at law or in equity, and (except for those obligations which are stated herein to survive the termination of this Agreement) all obligations of the parties under this Agreement shall terminate; provided, however, if such default is as a result of a willful breach by NAF or the City, in addition to retaining the Option Consideration, Seller shall each be entitled to immediate payment from the breaching party of all reasonable out of pocket costs incurred by Seller after the date the applicable Option was exercised pursuant to a Notice of Election to Purchase.

i

13. Continuation and Survival of Representations, Indemnifications and Covenants. All provisions, covenants, representations, warranties, indemnifications and covenants of the parties contained herein or made in writing pursuant to this Agreement are intended to be and shall remain true and correct as of the time of Closing, shall be deemed to be material, shall survive the execution and delivery of this Agreement, and shall survive the Closing (unless and to the extent otherwise provided herein).

14. Recording. It is agreed hereby that this Agreement shall not be filed for recording with the Register of Deeds for the County of Waldo or with any other governmental body but that a memorandum of this Agreement may be recorded at any party's request.

15. Notices. Any notice or communication which may be or is required to be given pursuant to the terms of this Agreement shall be in writing (from either a party hereto or its counsel) and shall be sent to the respective party at the address set forth in the first paragraph of this Agreement, by hand delivery, by postage prepaid certified mail, return receipt requested, by a nationally recognized overnight courier service that provides tracing and proof of receipt of items mailed, or to such other address as either party may designate by notice similarly sent. Notices shall be effective upon receipt or attempted delivery if delivery is refused or the party no longer receives deliveries at said address and no new address has been given to the other party pursuant to this paragraph. A copy of any notice to NAF shall also be simultaneously sent to Mintz, Levin, Cohn, Ferris, Glovsky & Popeo, P.C., One Financial Center, Boston, Massachusetts 02111, Attention: Daniel O. Gaquin, Esq. A copy of any notice to the City shall

also be simultaneously sent to Kelly & Associates, LLC, 96 High Street, Belfast, Maine 04915, Attention: William Kelly, Esq. A copy of any notice to Seller shall also be simultaneously sent to Eaton Peabody, 80 Exchange Street, Bangor, Maine 04402, Attention: Sarah L. Reinhart, Esq. Notices by any party may be sent by such party's counsel.

16. Captions. The captions in this Agreement are inserted only for the purpose of convenient reference and in no way define, limit or prescribe the scope or intent of this Agreement or any part hereof.

17. Successors and Assigns.

a. This Agreement shall be binding upon the parties hereto and their respective successors and assigns.

b. NAF may not assign this Agreement and the rights or benefits hereof, except that NAF may assign this Agreement, without Seller's consent, to an entity that directly or indirectly controls, is controlled by or is under common control with NAF or any institutional investor partner of NAF which entity was also assigned and did assume the Evaluation Agreement and Water Supply Agreement. The term "control" means the power to direct the management of such entity through voting rights, ownership or contractual obligations.

c. The City may not assign this Agreement but may assign title to a land trust of independent trustees or directors for the Waterfront Parcel after closing, so long as the Waterfront Parcel shall be used exclusively for municipal and/or public use and benefit.

18. Governing Law. The laws of the State of Maine shall govern the validity, construction, enforcement and interpretation of this Agreement.

19. Title Matters. Any matter or practice arising under or relating to this Agreement which is the subject of a title standard or practice standard of the Maine State Bar Association shall be governed by such standard to the extent applicable.

20. Multiple Counterparts. This Agreement may be executed in any number of identical counterparts. If so executed, each of such counterparts shall constitute this Agreement. In proving this Agreement, it shall not be necessary to produce or account for more than one such counterpart.

21. Post-Closing Obligations. After the Closing, the parties shall cooperate with one another at reasonable times and on reasonable conditions and shall execute and deliver such instruments and documents as may be necessary in order fully to carry out the intent and purposes of the transactions contemplated hereby. Except for such instruments and documents as the parties were originally obligated to deliver by the terms of this Agreement, such cooperation shall be without additional cost or liability.

22. Entire Agreement. This Agreement supersedes all prior agreements and

understandings between the parties, including those contained in any letter of intent and any extensions or modifications thereof, and represents the full and complete understanding of the parties hereto in conjunction with the Water Supply Agreement or in the Evaluation Agreement. It being the intent of the parties that all obligations of the parties are contained only in this Agreement, and the entire agreement of the parties is fully set forth herein.

IN WITNESS WHEREOF, the parties hereto have executed this Options and Purchase Agreement as an instrument under seal as of the day and year first written above.

SELLER:

BELFAST WATER DISTRICT

By: _____
Name: Keith Pooler
Title: Superintendent
Hereunto Duly Authorized

BUYERS:

NORDIC AQUAFARMS, INC.

By: _____
Name: Erik Heim
Title: President
Hereunto Duly Authorized

CITY OF BELFAST

By: _____
Name: Joseph Slocum
Title: City Manager
Hereunto Duly Authorized

EXHIBIT B

PERMITTED ENCUMBRANCES

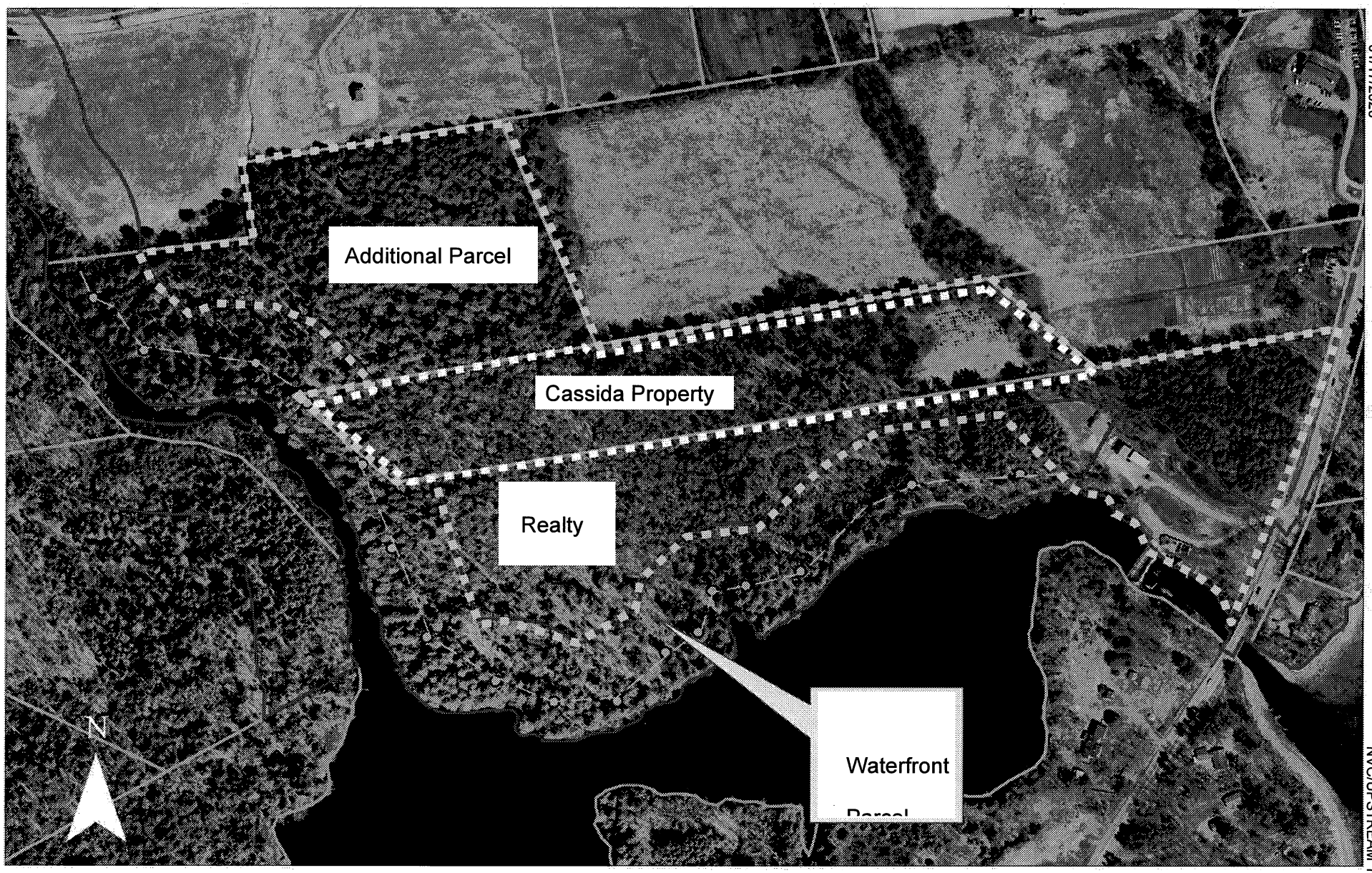
1. meter vault

2. water supply line for Northport Village Corporation

3. access and utility easements benefiting Seller's remaining land including the Additional Parcel and Lower Dam

EXHIBIT A

Additional Parcel
Cassida Property
Realty
Waterfront Parcel
N
200 100 0 200 400 600 800 Feet
District Land - @ 30 Acres
Cassida Land - @ 14 Acres (white dash)
Total Land - @ 44 Acres (yellow dash)
Red Line - Shoreland Zone - 250' from HAT
Green Line - 100' Structure Setback in Resource Protection Shoreland Zone



01/17/2020

EXHIBIT A

NVC/UPSTREAM 13-G

District Land - @ 30 Acres
Cassida Land - @ 14 Acres (white dash)
Total Land - @ 44 Acres (yellow dash)

Red Line - Shoreland Zone - 250' from HAT
Green Line - 100' Structure Setback in Resource Protection Shoreland Zone

ATTACHMENT E

Belfast Water District Extension Agreement, dated July 25, 2019

Additional Information Regarding
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

NORDIC AQUAFARMS
SUSTAINABLE AQUACULTURE

July 25, 2019

BY FEDERAL EXPRESS

Belfast Water District
285 Northport Avenue
Belfast, ME 04915

Re: Extension of Option and Evaluation Periods

Dear Sir or Madam,

Reference is hereby made to (i) that certain Options and Purchase Agreement (the "O&P Agreement") dated January 30, 2019 between the Belfast Water District (the "BWD"), the City of Belfast (the "City") and Nordic Aquafarms, Inc ("NAF"); and (ii) that certain Evaluation Agreement (the "Evaluation Agreement") dated January 30, 2018 between the BWD, the City and NAF, each concerning certain land owned by the BWD adjacent to the Northport Avenue in Belfast, Maine; and as amended in the Amendment to Evaluation Agreement and Options and Purchase Agreement on April 15, 2019.

NAF wishes to exercise its right to extend the term of the Premises Option for an additional six (6) months.

In consideration of the option, payment of FIFTEEN THOUSAND DOLLARS AND 00/100 ($15,000) is made in accordance with paragraph 1 of the Amendment of Evaluation Agreement and O&P Agreement.

Please contact me if you have any questions.

Sincerely,

Erik Heim, President
Nordic Aquafarms, Inc

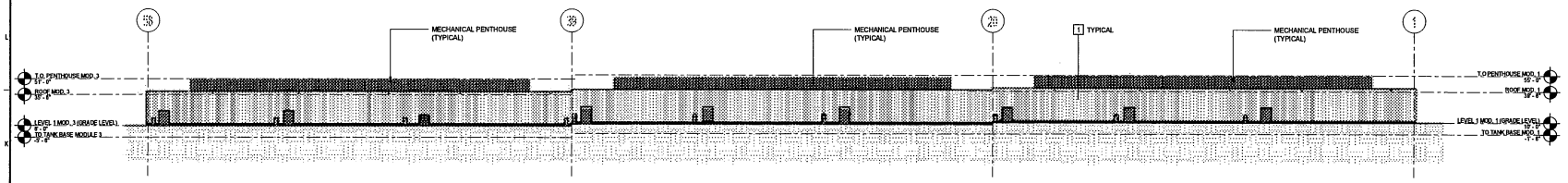
By Federal Express:
City of Belfast
131 Church St
Belfast, ME 04915

By Email and Federal Express:
Kelly & Associates, LLC
96 High Street
Belfast, ME 04915
Attn: William Kelly, Esq.
Email: bkelly11@bluestreakme.com

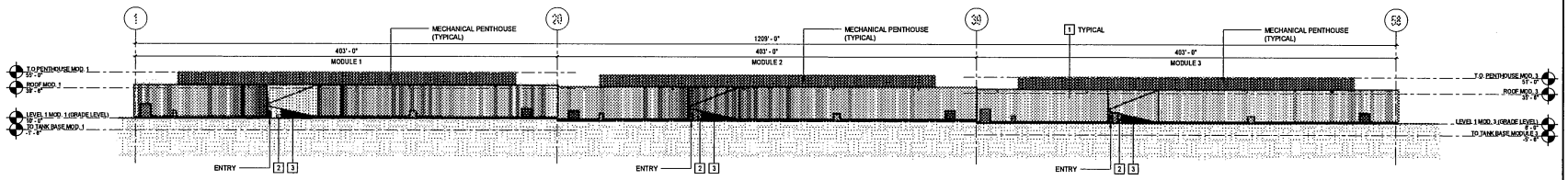
ATTACHMENT F

Building Architectural Elevation Drawings

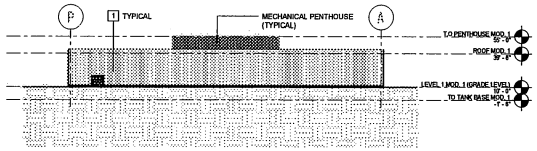
Additional Information Regarding
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N



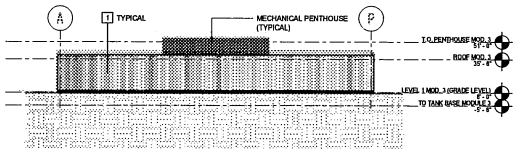
BUILDING 1 NORTH ELEVATION J1
1" = 50'-0"



BUILDING 1 SOUTH ELEVATION G1
1" = 50'-0"



BUILDING 1 WEST ELEVATION E6
1" = 50'-0"



BUILDING 1 EAST ELEVATION E1
1" = 50'-0"

KEYED NOTES:

1. INSULATED METAL PANELS (MULTIPLE COLORS AND RANDOM DISTRIBUTION)
2. ALUMINUM STOREFRONT
3. CONCRETE MASONRY VENEER
4. WOOD-LOOK PHENOLIC PANELS
5. DECORATIVE METAL TILES
6. UNITIZED FIELD STONE VENEER
7. TEMPERED GLASS GUARDRAIL
8. GRANITE RETAINING WALL

01/17/2020

REV	DESCRIPTION	DATE
	ISSUE FOR PERMIT	

CURRENT ISSUE STATUS:

PROJECT NORTH:

SMRT Architects and Engineers
144 Fore Street/P.O. Box 618
Portland, Maine 04104
ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY

RANSOM
Ransom Consulting Engineers and Scientists
400 Commercial Street, Suite 400
Portland, Maine 04101

NORDIC AQUAFARMS
285 NORTHPORT AVENUE
BELFAST, MAINE

NVC/UPSTREAM 13-G

BUILDING 1 - EXTERIOR ELEVATIONS
SHEET TITLE:

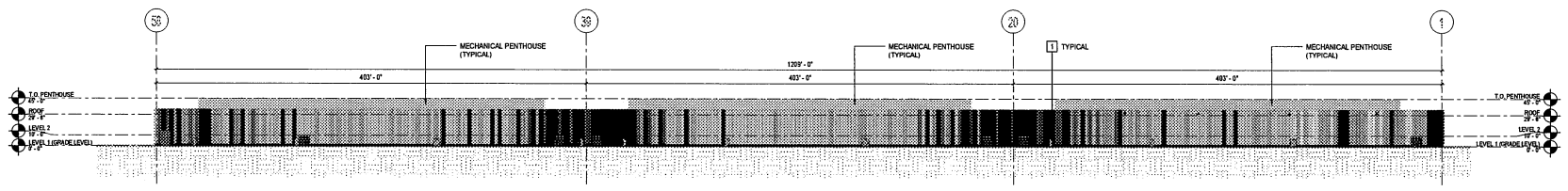
0" 1/4" 1/2" 1" 2" 3"
SCALE: AS NOTED

PROJECT MANAGER:	ADB	PROJECT NO:	18076-00
A/E OF RECORD:	Checker		
JOB CAPTAIN:	FSP		
DRAWN BY:	Author	SHEET No.	01AE200
SMRT FILE:	01AE200-18076-00		

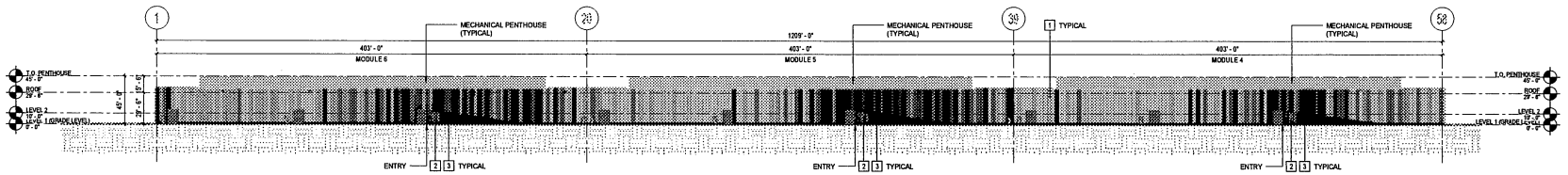
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NOT FOR CONSTRUCTION

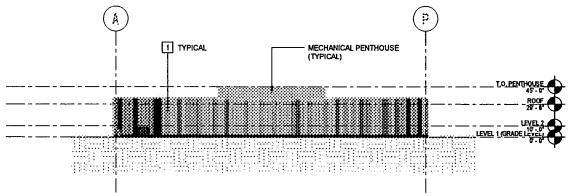
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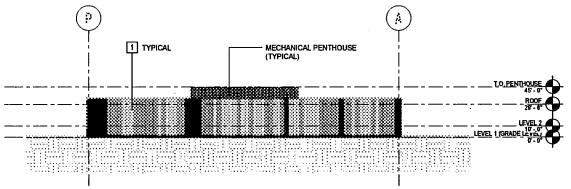
BUILDING 2 SOUTH ELEVATION (D1)
1" = 50'-0"



BUILDING 2 NORTH ELEVATION (G1)
1" = 50'-0"



BUILDING 2 EAST ELEVATION (E7)
1" = 50'-0"



BUILDING 2 WEST ELEVATION (E1)
1" = 50'-0"

KEYED NOTES:

1. INSULATED METAL PANELS (MULTIPLE COLORS AND RANDOM DISTRIBUTION)
2. ALUMINUM STOREFRONT
3. CONCRETE MASONRY VENEER
4. WOOD-LOOK PHENOLIC PANELS
5. DECORATIVE METAL TILES
6. UNITIZED FIELD STONE VENEER
7. TEMPERED GLASS GUARDRAIL
8. GRANITE RETAINING WALL

01/17/2020

REV	DESCRIPTION	DATE

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Portland, Maine 04104
ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY

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Ransom Consulting Engineers and Scientists
400 Commercial Street, Suite 400
Portland, Maine 04101

NORDIC AQUAFARMS
285 NORTHPORT AVENUE
BELFAST, MAINE

NVC/UPSTREAM 13-G

BUILDING 2 - EXTERIOR ELEVATIONS

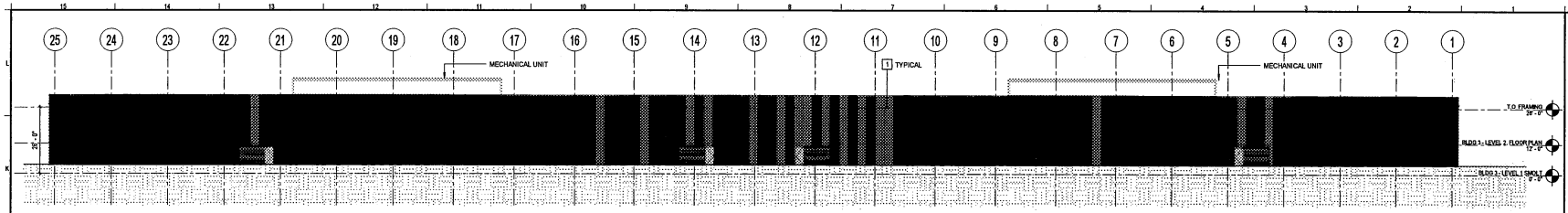
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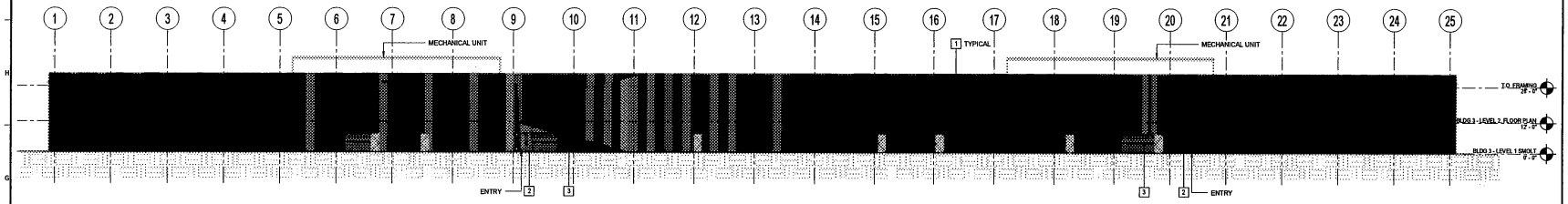
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A/E OF RECORD:	Checker		
JOB CAPTAIN:	FSP		02AE200
DRAWN BY:	NR		
SMRT FILE:	02AE200-18076-00	SHEET No.	

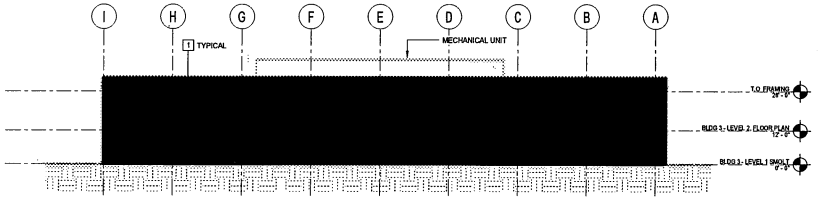
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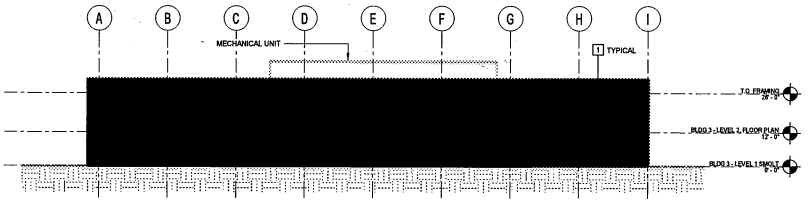
BUILDING 3 NORTH ELEVATION J1
1" = 20'-0"



BUILDING 3 SOUTH ELEVATION F1
1" = 20'-0"



BUILDING 3 EAST ELEVATION D8
1" = 20'-0"



BUILDING 3 EAST ELEVATION D1
1" = 20'-0"

KEYED NOTES:

1. INSULATED METAL PANELS (MULTIPLE COLORS AND RANDOM DISTRIBUTION)
2. ALUMINUM STOREFRONT
3. CONCRETE MASONRY VENEER
4. WOOD-LOOK PHENOLIC PANELS
5. DECORATIVE METAL TILES
6. UNTITIZED FIELD STONE VENEER
7. TEMPERED GLASS GUARDRAIL
8. GRANITE RETAINING WALL

01/17/2020

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Portland, Maine 04101

NORDIC AQUAFARMS
285 NORTHPORT AVENUE
BELFAST, MAINE

NVC/UPSTREAM 13-G

BUILDING 3 - EXTERIOR ELEVATIONS

SHEET TITLE:

0" 1/4" 1/2" 1" 2"

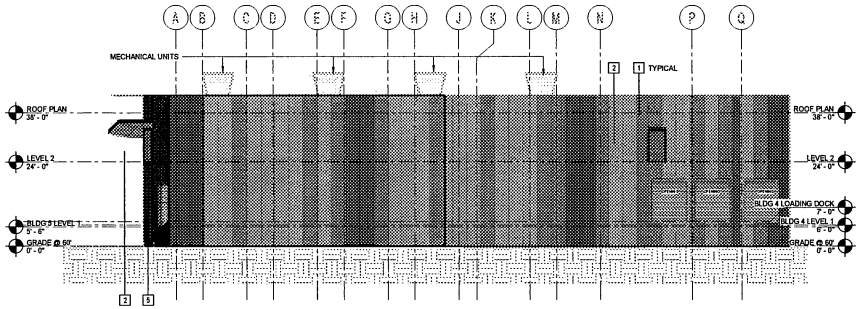
SCALE: AS NOTED

PROJECT MANAGER:	ADB	PROJECT NO:	18076-00
A/E OF RECORD:	Checker		
JOB CAPTAIN:	FSP		
DRAWN BY:	Author		03AE200
SMRT FILE:	03AE200-18076-00	SHEET No.	

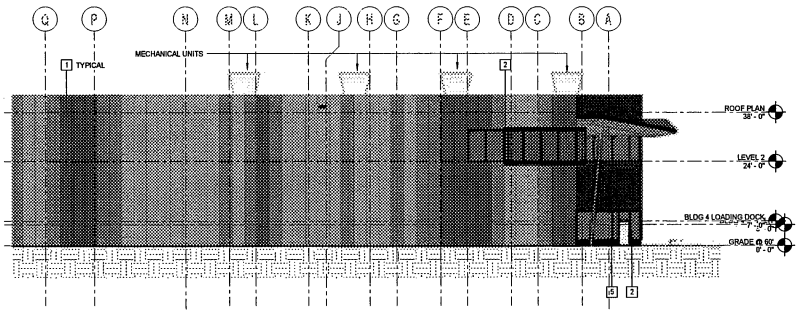
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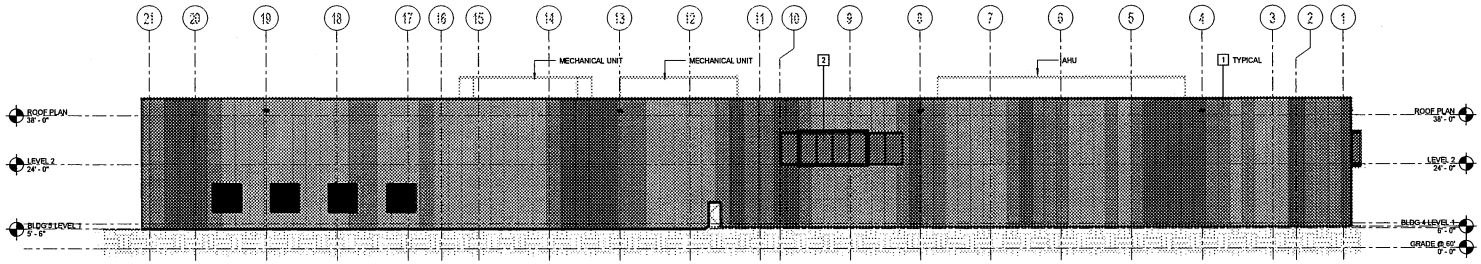
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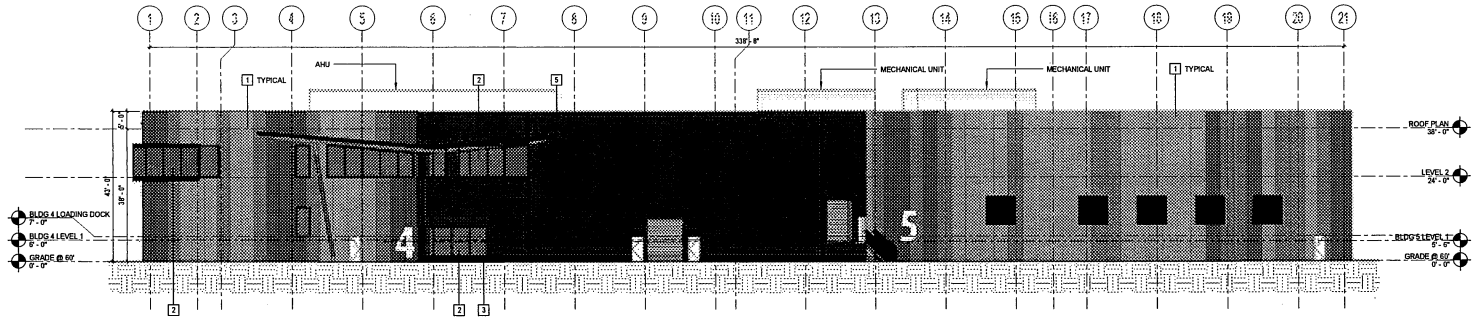
BUILDING 4 & 5, EAST ELEVATION (H9)
1/16" = 1'-0"



BUILDING 4 & 5, WEST ELEVATION (H1)
1/16" = 1'-0"



BUILDING 4 & 5, NORTH ELEVATION (D1)
1/16" = 1'-0"



BUILDING 4 & 5, SOUTH ELEVATION (A1)
1/16" = 1'-0"

KEYED NOTES:

1. INSULATED METAL PANELS (MULTIPLE COLORS AND RANDOM DISTRIBUTION)
2. ALUMINUM STOREFRONT
3. CONCRETE MASONRY VENEER
4. WOOD-LOOK PHENOLIC PANELS
5. DECORATIVE METAL TILES
6. UNITIZED FIELD STONE VENEER
7. TEMPERED GLASS GUARDRAIL
8. GRANITE RETAINING WALL

01/17/2020

REV	DESCRIPTION	DATE

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BELFAST, MAINE

NVC/UPSTREAM 13-G

BUILDING 4 & 5 - EXTERIOR ELEVATIONS

SHEET TITLE:

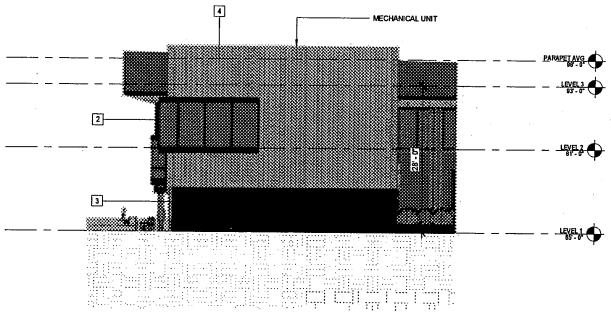
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SCALE: AS NOTED

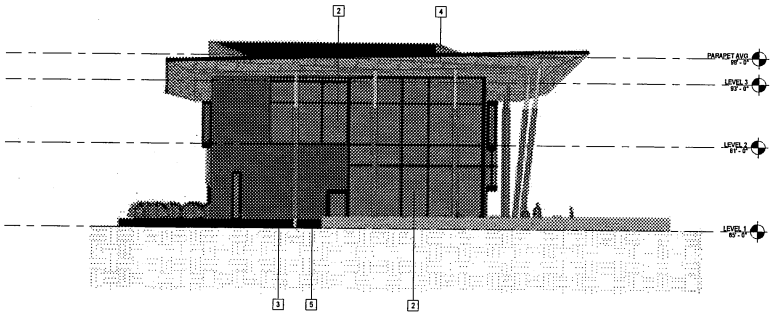
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A/E OF RECORD:	Checker		
JOB CAPTAIN:	FSP		
DRAWN BY:	Author		
SMRT FILE:	04AE200-18076-00	SHEET No.	

04AE200

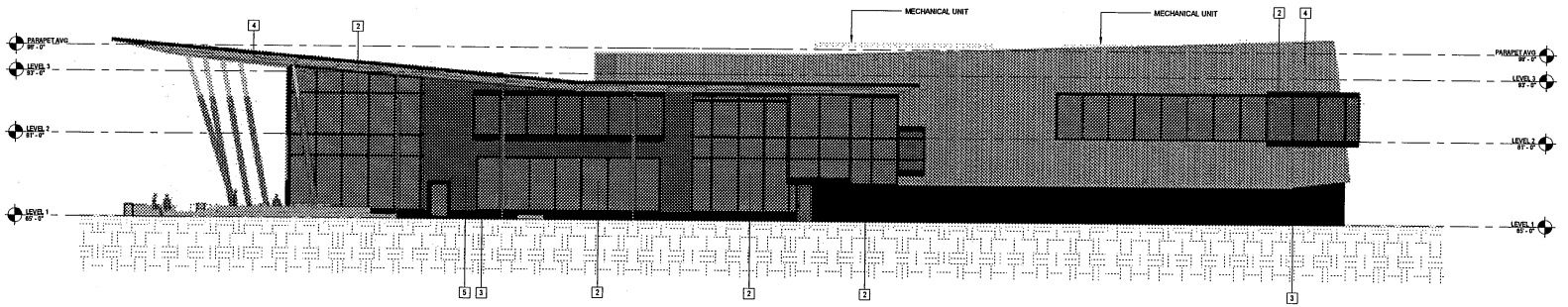
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BUILDING 7 NORTH ELEVATION D9
3/32" = 1'-0"

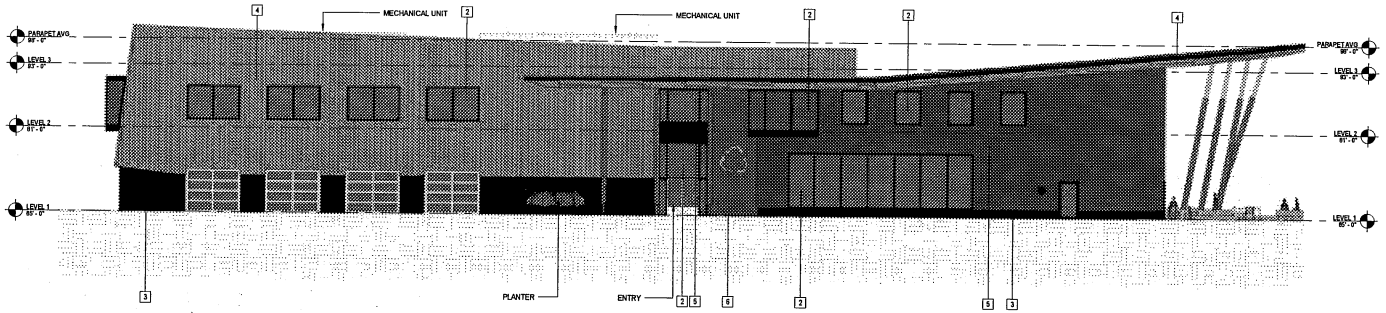


BUILDING 7 SOUTH ELEVATION H1
3/32" = 1'-0"



BUILDING 7 EAST ELEVATION 2 D8
3/32" = 1'-0"

BUILDING 7 EAST ELEVATION D1
3/32" = 1'-0"



BUILDING 7 WEST ELEVATION A6
3/32" = 1'-0"

BUILDING 7 WEST 2 ELEVATION A1
3/32" = 1'-0"

KEYED NOTES:

1. INSULATED METAL PANELS (MULTIPLE COLORS AND RANDOM DISTRIBUTION)
2. ALUMINUM STOREFRONT
3. CONCRETE MASONRY VENEER
4. WOOD-LOOK PHENOLIC PANELS
5. DECORATIVE METAL TILES
6. UNITIZED FIELD STONE VENEER
7. TEMPERED GLASS GUARDRAIL
8. GRANITE RETAINING WALL

01/17/2020

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NVC/UPSTREAM 1 SG

BUILDING 7 - EXTERIOR ELEVATIONS

SHEET TITLE:

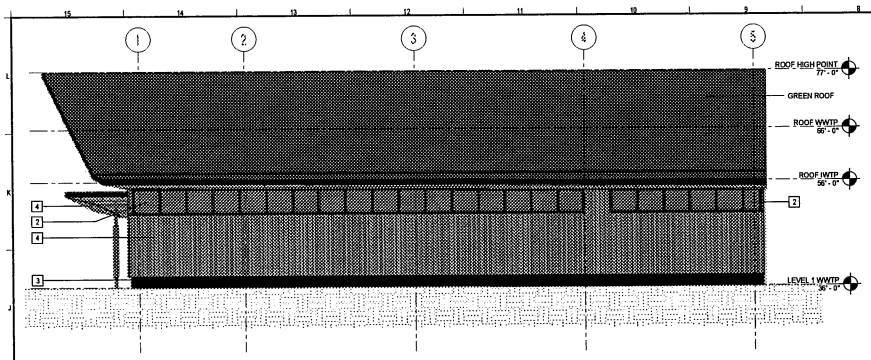
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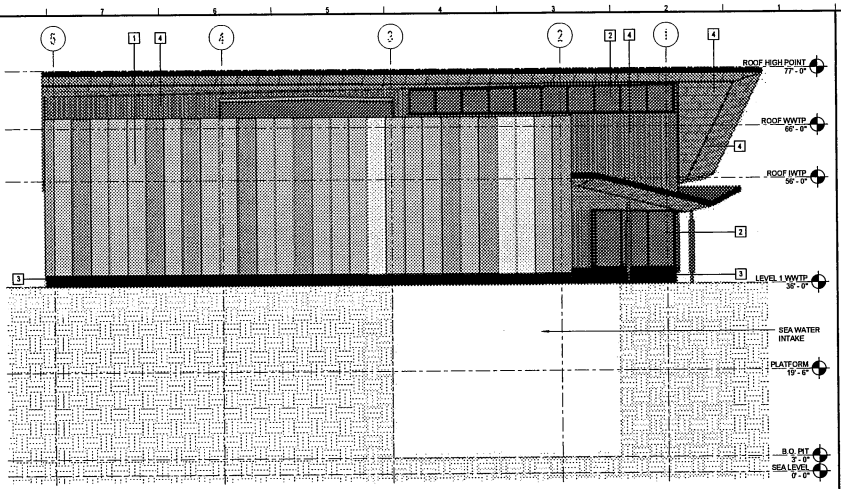
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JOB CAPTAIN:		07AE200	
DRAWN BY:	Author		
SMRT FILE:	07AE200-Project Number	SHEET No.	Current sheet no.

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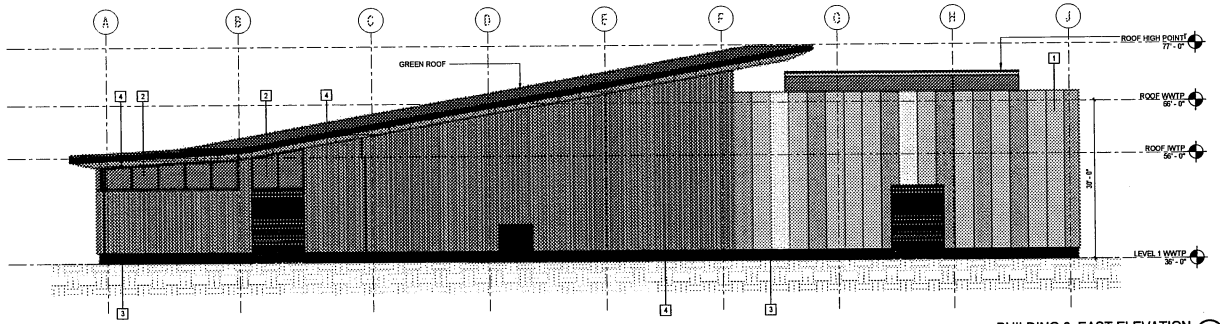
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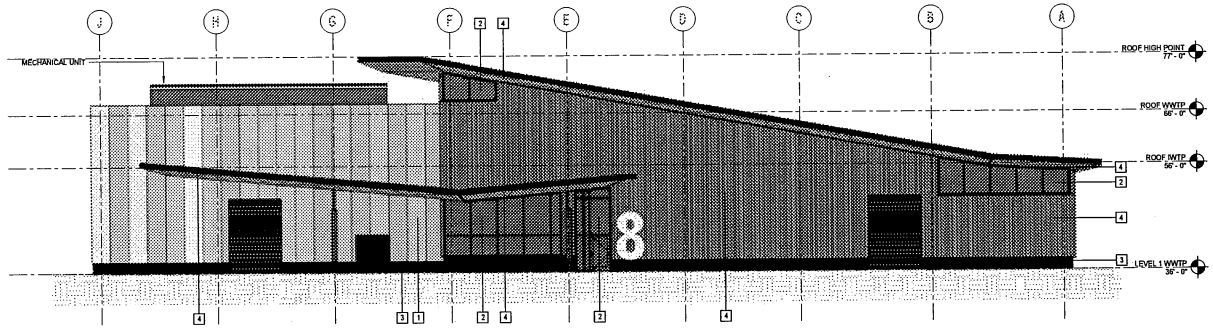
BUILDING 8, SOUTH ELEVATION G8
3/32" = 1'-0"



BUILDING 8, NORTH ELEVATION G1
3/32" = 1'-0"



BUILDING 8, EAST ELEVATION D5
3/32" = 1'-0"



BUILDING 8, WEST ELEVATION A5
3/32" = 1'-0"

KEYED NOTES:

1. INSULATED METAL PANELS (MULTIPLE COLORS AND RANDOM DISTRIBUTION)
2. ALUMINUM STOREFRONT
3. CONCRETE MASONRY VENEER
4. WOOD-LOOK PHENOLIC PANELS
5. DECORATIVE METAL TILES
6. UNITIZED FIELD STONE VENEER
7. TEMPERED GLASS GUARDRAIL
8. GRANITE RETAINING WALL

01/17/2020

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Portland, Maine 04101

NORDIC AQUAFARMS
285 NORTHPORT AVENUE
BELFAST, MAINE

NVC/UPSTREAM 13-G

BUILDING 8, EXTERIOR ELEVATIONS

SHEET TITLE:

0" 1/4" 1/2" 1" 2" 3"

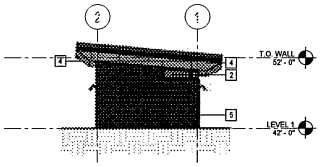
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JOB CAPTAIN:	XXX		08AE200
DRAWN BY:	Author		
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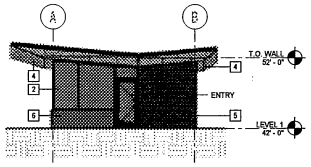
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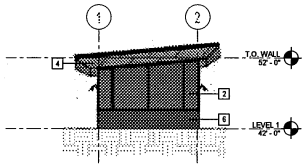
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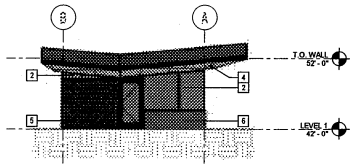
NORTH ELEVATION J13
1/8" = 1'-0"



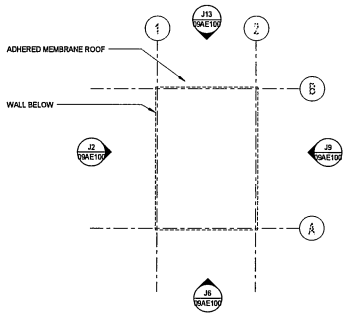
EAST ELEVATION J9
1/8" = 1'-0"



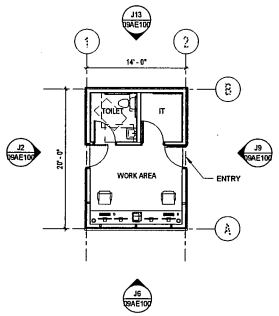
SOUTH ELEVATION J6
1/8" = 1'-0"



WEST ELEVATION J2
1/8" = 1'-0"



ROOF PLAN A8
1/8" = 1'-0"



LEVEL 1 FLOOR PLAN A1
1/8" = 1'-0"

KEYED NOTES:

1. INSULATED METAL PANELS (MULTIPLE COLORS AND RANDOM DISTRIBUTION)
2. ALUMINUM STOREFRONT
3. CONCRETE MASONRY VENEER
4. WOOD-LOOK PHENOLIC PANELS
5. DECORATIVE METAL TILES
6. UNITIZED FIELD STONE VENEER
7. TEMPERED GLASS GUARDRAIL
8. GRANITE RETAINING WALL

01/17/2020

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NORDIC AQUAFARMS
285 NORTHPORT AVENUE
BELFAST, MAINE

NVC/UPSTREAM 13-G

BUILDING 9 - FLOOR PLAN, ELEVATIONS, AND ROOF PLAN

SHEET TITLE:

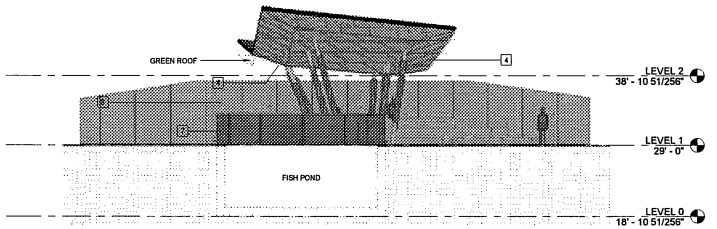
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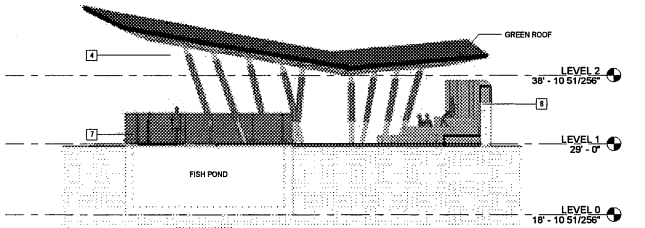
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SMRT FILE:	09AE100-18076	SHEET No.	

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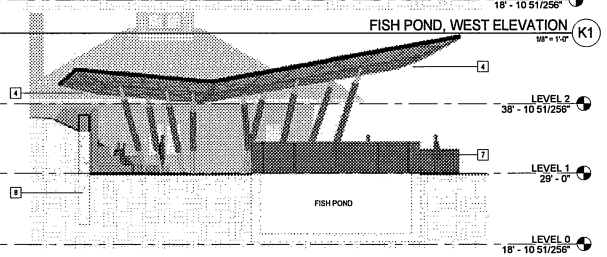
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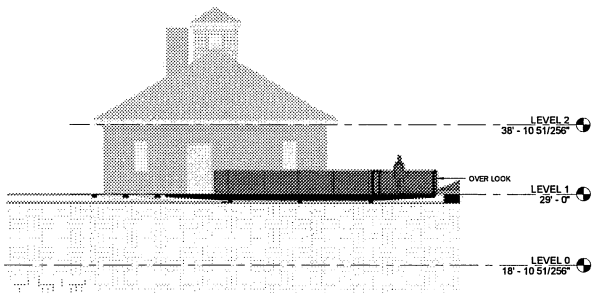
FISH POND, NORTH ELEVATION (N7)
1/8" = 1'-0"



FISH POND, WEST ELEVATION (K1)
1/8" = 1'-0"



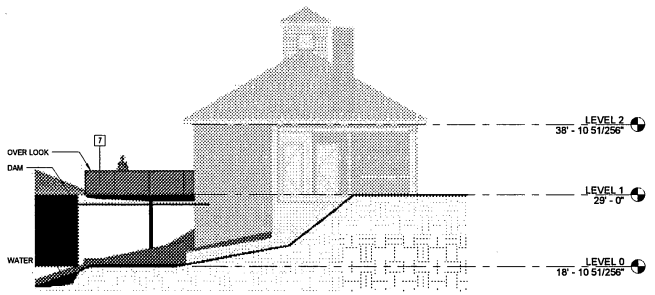
FISH POND, EAST ELEVATION (H1)
1/8" = 1'-0"



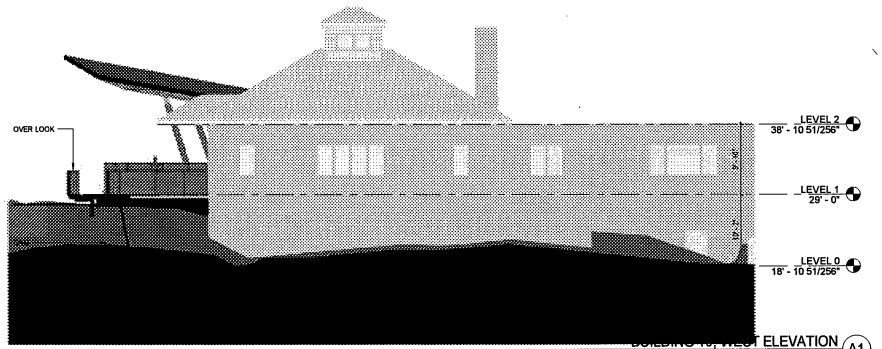
BUILDING 10, NORTH ELEVATION (D9)
1/8" = 1'-0"



BUILDING 10, EAST ELEVATION (D1)
1/8" = 1'-0"



BUILDING 10, SOUTH ELEVATION (A9)
1/8" = 1'-0"



BUILDING 10, WEST ELEVATION (A1)
1/8" = 1'-0"

KEYED NOTES:

1. INSULATED METAL PANELS (MULTIPLE COLORS AND RANDOM DISTRIBUTION)
2. ALUMINUM STOREFRONT
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NORDIC AQUAFARMS
285 NORTHPORT AVENUE
BELFAST, MAINE

NVC/UPSTREAM 1 OF 6

BUILDING 10 & FISH POND - EXTERIOR ELEVATIONS

SHEET TITLE:

0" 1/4" 1/2" 1" 2" 3"

SCALE: AS NOTED

PROJECT MANAGER:	PROJECT NO: Project Number
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JOB CAPTAIN:	
DRAWN BY: Author	SHEET No.
SMRT FILE: 10AE200-Project Number	Current project sheet no.

NOT FOR CONSTRUCTION

ATTACHMENT G

Plan Distances from Photo Points

Additional Information Regarding
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N



APPROXIMATE VIEW POINT DISTANCES

01/17/2020

NV/CL/PSTREAM 13-C

1" = 150'

SMRT Project No. 18076

Nordic Aquafarms
Belfast, Maine
12 August 2019

ATTACHMENT H

Electrical Plans and Narrative

Additional Information Regarding
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Ransom Consulting, Inc.
Project 171.05027.008

LIGHTING

- 2x4 FIXTURE — Ab — ASSOCIATED CONTROL DEVICE — FIXTURE TYPE (SEE LIGHT FIXTURE SCHEDULE)
- 1x4 FIXTURE
- 2x2 FIXTURE
- FIXTURE WIRED TO UNSWITCHED NORMAL CIRCUIT
- FIXTURE WIRED TO UNSWITCHED EMERGENCY CIRCUIT
- FIXTURE WIRED TO SWITCHED EMERGENCY CIRCUIT
- DOWN LIGHT
- INDUSTRIAL STRIP
- WALL MOUNTED FIXTURES
- TRACK LIGHTING
- POLE MOUNTED SITE LIGHTING FIXTURE — ab — FIXTURE TYPE (SEE LIGHT FIXTURE SCHEDULE)
- FLOOD LIGHT
- WALL WASH LIGHT FIXTURE
- EXIT SIGN, CEILING MOUNTED ARROW INDICATES EGRESS DIRECTION SHADING INDICATES SIGN FACE
- EXIT SIGN, WALL MOUNTED SHADING INDICATES SIGN FACE
- DUAL HEAD EMERGENCY LIGHT BATTERY PACK — TD - TIME DELAY RESET
- REMOTE EMERGENCY LIGHTING HEAD
- WALL PACK — WP
- S3 — 3-WAY TOGGLE SWITCH
- Sa — SINGLE POLE TOGGLE SWITCH — INDICATES CONTROLLED FIXTURE
- S4 — 4-WAY TOGGLE SWITCH
- SII — DUAL LEVEL SWITCHING
- SD — DIMMER SWITCH. INCANDESCENT OR FLUORESCENT AS REQUIRED.
- SP — TOGGLE SWITCH WITH PILOT LIGHT
- ST — TIMER SWITCH, SPRING WOUND
- SDT — SINGLE POLE DOUBLE THROW TOGGLE SWITCH, CENTER POSITION OFF
- SWP — WEATHER PROOF
- SXP — EXPLOSION PROOF
- Sos — OCCUPANCY SENSOR SWITCH
- UNSWITCHED CONTINUATION OF BRANCH CIRCUIT
- HOME RUN
- OCCUPANCY SENSOR — x — x INDICATES CONTROLLED FIXTURE — INDICATES AIMING DIRECTION
- OSR — OCCUPANCY SENSOR RELAY
- DS x — DAYLIGHT SENSOR — LIGHTS CONTROLLED BY SENSOR

ONE LINE DIAGRAM

- 52 — MEDIUM VOLTAGE DRAWOUT CIRCUIT BREAKER
- AF / AT / EO — LOW VOLTAGE DRAWOUT CIRCUIT BREAKER — AF - AMP FRAME — AT - AMP TRIP — EO - ELECTICALLY OPERATED
- MOLDED CASE CIRCUIT BREAKER
- ST — ST - SHUNT TRIP — GF - GROUND FAULT — EO - ELECTRICALLY OPERATED
- DISCONNECT, ISOLATION OR SAFETY SWITCH
- FUSED CUTOUT
- FUSED LOAD BREAK SWITCH
- MEDIUM VOLTAGE MOTOR STARTER
- 1 — MAGNETIC MOTOR STARTER. NUMERAL INDICATES NEMA SIZE — FVNR UNLESS OTHERWISE NOTED. — FVR - FULL VOLTAGE REVERSING — RVAT - REDUCING VOLTAGE AUTO TRANSFORMER — 2S - TWO SPEED
- CAPACITOR
- VFD — VARIABLE FREQUENCY DRIVE
- LT / OA — POWER TRANSFORMER — OA - LIQUID TYPE SELF COOLED — AA - DRY TYPE SELF COOLED — FA - FAN COOLED — CONNECTION
- 5 — MOTOR, NUMBER INDICATES HORSEPOWER
- G — GENERATOR
- N / R / L — ATS — ATS - AUTOMATIC TRANSFER SWITCH — MTS - MANUAL TRANSFER SWITCH
- A — METER — A - AMMETER — V - VOLTMETER — W - WATTMETER
- DPM — DIGITAL POWER METER
- AS — METER TRANSFER SWITCH — AS - AMMETER SWITCH — VS - VOLTMETER SWITCH
- TVSS — TRANSIENT VOLTAGE SURGE SUPPRESSOR
- LA — LIGHTNING ARRESTOR
- K — KEY INTERLOCK
- FUSE
- DRAWOUT DEVICE
- GROUND
- GF — GROUND FAULT

GROUNDING

- GROUND ROD
- EXOTHERMIC WELD CONNECTION
- BOLTED CONNECTION
- G — BARE COPPER CONDUCTOR RUN EXPOSED
- G — BARE COPPER CONDUCTOR EMBEDDED IN CONCRETE OR BURIED

LINE TYPES

- EXISTING
- NEW
- DEMOLITION

ABBREVIATIONS

AAMP	AMPERE	LA	LIGHTNING ARRESTER
AFF	ABOVE FINISHED FLOOR	LTG	LIGHTING
AFG	ABOVE FINISHED GRADE	MC	METAL CLAD
AHJ	AUTHORITY HAVING JURISDICTION	MCB	MAIN CIRCUIT BREAKER
AIC	AMPERE INTERRUPTING CAPACITY	MFR	MANUFACTURER
AWG	AMERICAN WIRE GAUGE	MI	MINERAL INSULATED
BFG	BELOW FINISHED GRADE	MLO	MAIN LUG ONLY
BOS	BOTTOM OF STEEL	MTD	MOUNTED
C	CONDUIT, CONDUCTOR	MV	MEDIUM VOLTAGE
CATV	CABLE TELEVISION	NC	NORMALLY CLOSED
CB	CIRCUIT BREAKER	NEC	NATIONAL ELECTRICAL CODE
CCTV	CLOSED CIRCUIT TELEVISION	NEG	NEGATIVE
CPT	CONTROL POWER TRANSFORMER	NEUT	NEUTRAL
CT	CURRENT TRANSFORMER	NIC	NOT IN CONTRACT
CU	COPPER	NO	NORMALLY OPEN
DACT	DIGITAL ALARM COMMUNICATOR TRANSMITTER	NTS	NOT TO SCALE
		PF	POWER FACTOR
DB	DIRECT BURIED	PH	PHASE
DISC	DISCONNECT	PVC	POLYVINYL CHLORIDE
DN	DOWN	RGS	RIGID STEEL CONDUIT
EMT	ELECTRICAL METALLIC TUBING	RSC	RIGID STEEL CONDUIT
EWC	ELECTRIC WATER COOLER	RTD	RESISTANCE TEMPERATURE DETECTOR
FAA	FIRE ALARM ANNUNCIATOR	SN	SOLID NEUTRAL
FACP	FIRE ALARM CONTROL PANEL	STP	SHIELDED TWISTED PAIR
FBO	FURNISHED BY OTHERS	STT	SHIELDED TWISTED TRIPLET
FU	FUSE	SWBD	SWITCHBOARD
FWE	FURNISHED WITH EQUIPMENT	SWGR	SWITCHGEAR
GEN	GENERATOR	TOS	TOP OF STEEL
GFCI	GROUND FAULT CIRCUIT BREAKER	TP	TAMPER PROOF
GND	GROUND	TRANSF	TRANSFORMER
HP	HORSEPOWER	TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSER
HTR	HEATER	UNO	UNLESS NOTED OTHERWISE
IG	ISOLATED GROUND	V	VOLT
IMC	INTERMEDIATE METAL CONDUIT	VA	VOLT-AMPERE
K	KILO	VAR	VOLT-AMPERE REACTIVE
KCMIL	THOUSAND CIRCULAR MILS	WM	WATT METER
KV	KILOVOLT	WP	WEATHER PROOF
KVA	KILOVOLT-AMPERE	XFMR	TRANSFORMER
KVAR	KILOVOLT-AMPERE REACTIVE	XP	EXPLOSION PROOF
KW	KILOWATT		
KWH	KILOWATT-HOUR		

GENERAL NOTES:

1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH NFPA-70, NATIONAL ELECTRICAL CODE (NEC).
2. ALL PENETRATIONS THROUGH FLOORS, RATED WALLS AND PARTITIONS SHALL BE SEALED WITH UL APPROVED FIRE SEALANT MATERIAL TO MAINTAIN THE RATING OF SEPARATION.
3. AN EQUIPMENT GROUNDING CONDUCTOR SHALL BE INSTALLED WITH EVERY FEEDER AND BRANCH CIRCUIT.
4. LIGHTING TOGGLE SWITCHES SHALL BE COMMERCIAL SPECIFICATION GRADE 277 VOLT, SIDE WIRED AND PROVIDED WITH GROUNDING SCREW. LEVITON, PASS AND SEYMOUR OR APPROVED EQUAL. COORDINATE COLOR WITH ARCHITECT.
5. ALL WIRING SHALL BE 600V, COPPER WITH THHN/THWN INSULATION. SERVICE ENTRANCE CONDUCTORS SHALL HAVE XHHW INSULATION.

EXTERIOR LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	MODEL NUMBER	MOUNTING	LAMP	LUMEN	WATTAGE	VOLTAGE	NOTES
WP3A	WALL MOUNTED, FULL CUT OFF LED AREA LIGHT WITH TYPE 3 DISTRIBUTION	KIM LIGHTING	ALT1-54L-120-3K7-3-UNV	WALL MOUNT 20' AFG	3000K LED	13000	120	277V	
WP4A	WALL MOUNTED, FULL CUT OFF LED AREA LIGHT WITH TYPE 4 DISTRIBUTION	KIM LIGHTING	ALT1-54L-120-3K7-4W-UNV	WALL MOUNT 20' AFG	3000K LED	13000	120	277V	
WP4B	WALL MOUNTED, FULL CUT OFF LED WALL PACK WITH TYPE 4 DISTRIBUTION	BEACON LIGHTING	TRV-D 24NB-55 3K T4 UNV	WALL MOUNT 12' AFG	3000K LED	5500	55	277V	
WP4C	WALL MOUNTED, FULL CUT OFF LED WALL PACK WITH TYPE 4 DISTRIBUTION	BEACON LIGHTING	TRV-D 24NB-27 3K T4 UNV	WALL MOUNT 16' AFG	3000K LED	3000	27	277V	
PL3A	POLE MOUNTED, FULL CUT OFF LED AREA LIGHT WITH TYPE 3 DISTRIBUTION	KIM LIGHTING	ALT1-54L-120-3K7-3-UNV	POLE MOUNT 20' AFG	3000K LED	13000	120	277V	
PL4A	POLE MOUNTED, FULL CUT OFF LED AREA LIGHT WITH TYPE 4 DISTRIBUTION	KIM LIGHTING	ALT1-54L-120-3K7-4W-UNV	POLE MOUNT 20' AFG	3000K LED	13000	120	277V	
PL5A	POLE MOUNTED, FULL CUT OFF LED AREA LIGHT WITH TYPE 5 DISTRIBUTION	KIM LIGHTING	ALT1-54L-120-3K7-5-UNV	POLE MOUNT 20' AFG	3000K LED	13000	120	277V	
PT4A	POST TOP, FULL CUT OFF LED AREA LIGHT WITH TYPE 4 DISTRIBUTION	KIM LIGHTING	UR20-24L-65-3K7-4W-UNV	POLE MOUNT 16' AFG	3000K LED	7000	65	277V	
BL4A	LED BOLLARD LIGHT WITH TYPE ASYMMETRIC DISTRIBUTION	KIM LIGHTING	GEM1 27L 3K UV	BOLLARD 3' AFG	3000K LED	1750	31	277V	

GENERAL NOTE

1. ALL GENERAL NOTES, SYMBOL LISTS, AND DETAILS ARE TO BE CONSIDERED AS APPLICABLE TO ALL ELECTRICAL DRAWINGS FOR THIS PROJECT. SYMBOLS AND ABBREVIATIONS SHOWN ON THIS SHEET ARE FOR REFERENCE ONLY AND DO NOT INDICATE THEIR INCORPORATION IN THE DESIGN.

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144 Fore Street/P.O. BOX 618
Portland, Maine 04104
1.877.700.7678
www.smrtinc.com
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400 Commercial Street, Suite 400
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ELECTRICAL LEGEND AND GENERAL NOTES

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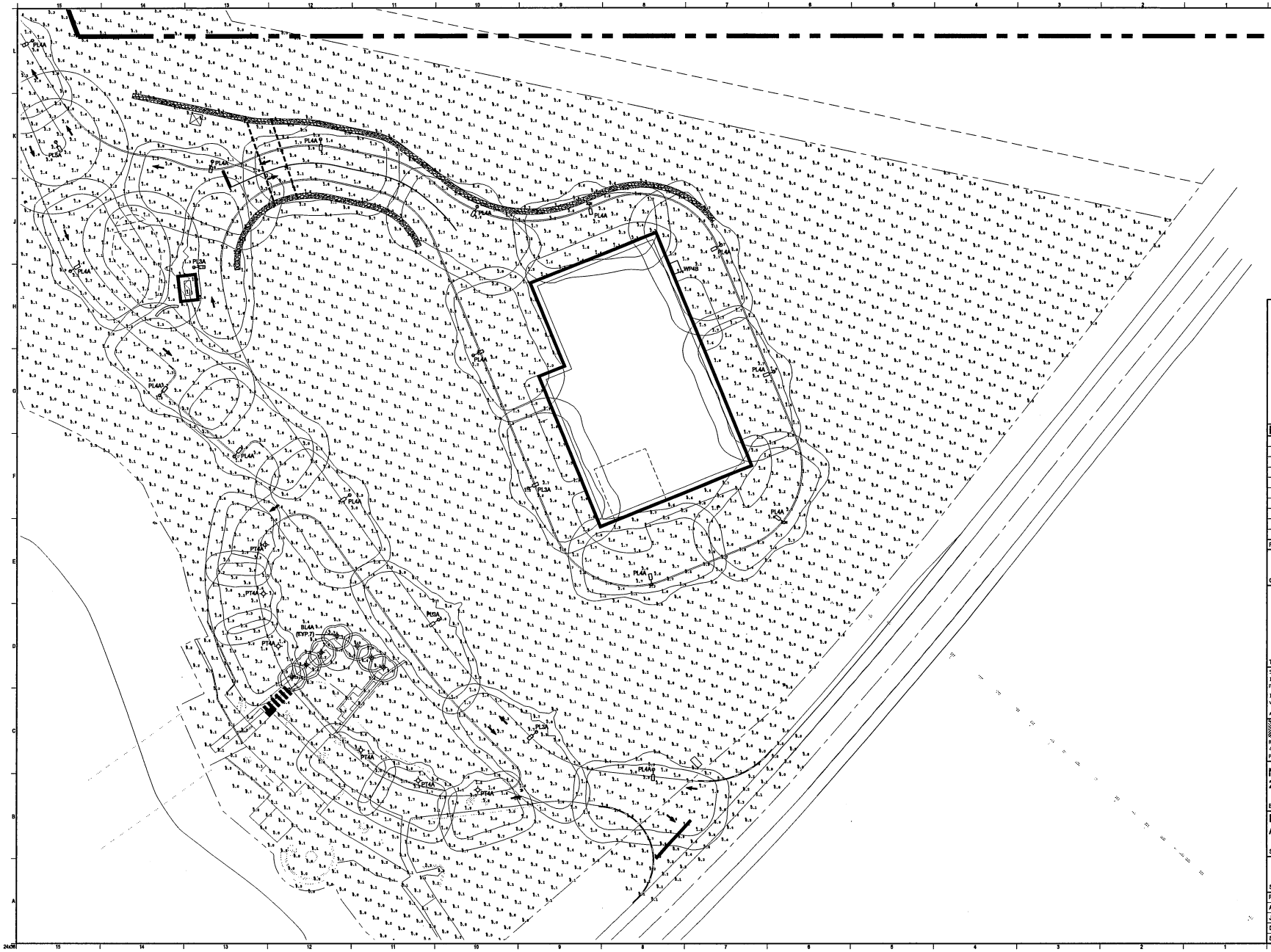
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JOB CAPTAIN:	SP		E-001
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ELECTRICAL SITE PLAN
AREA A

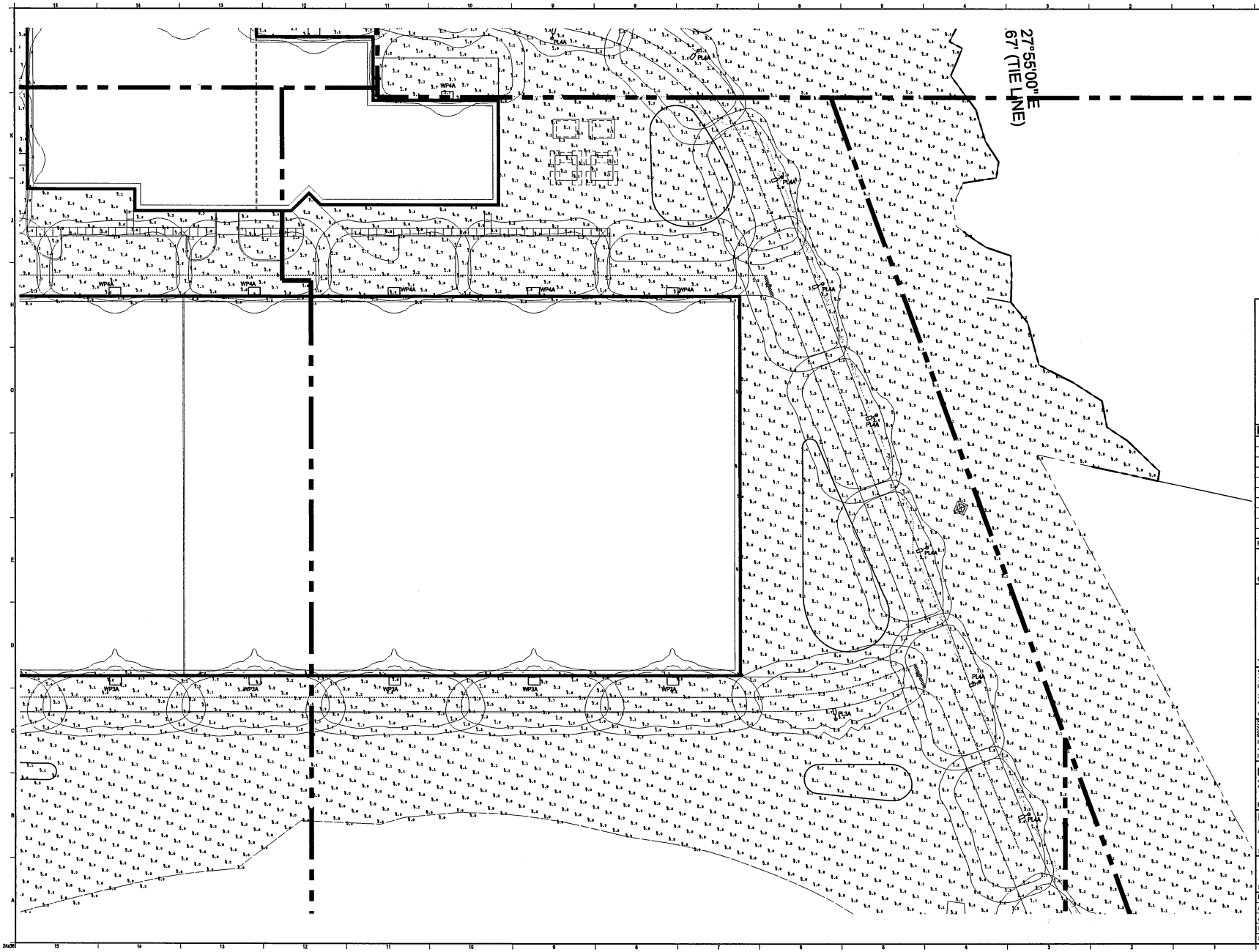
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400 Commercial Street, Suite 400
Portland, Maine 04101

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ELECTRICAL SITE PLAN
AREA B

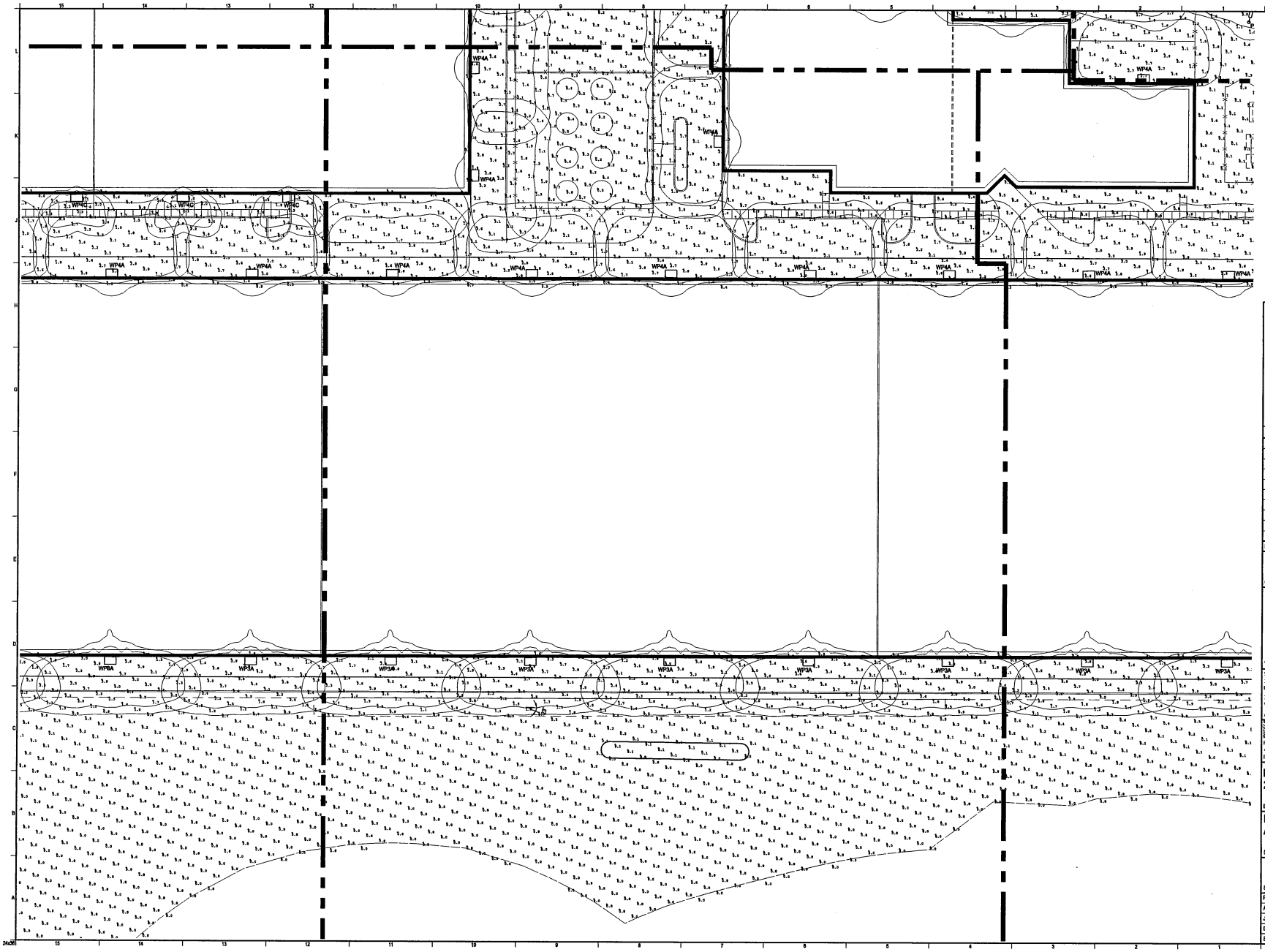
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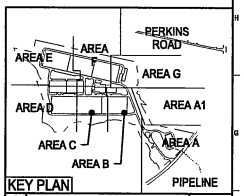
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1.877.700.7678
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ELECTRICAL SITE PLAN
AREA C

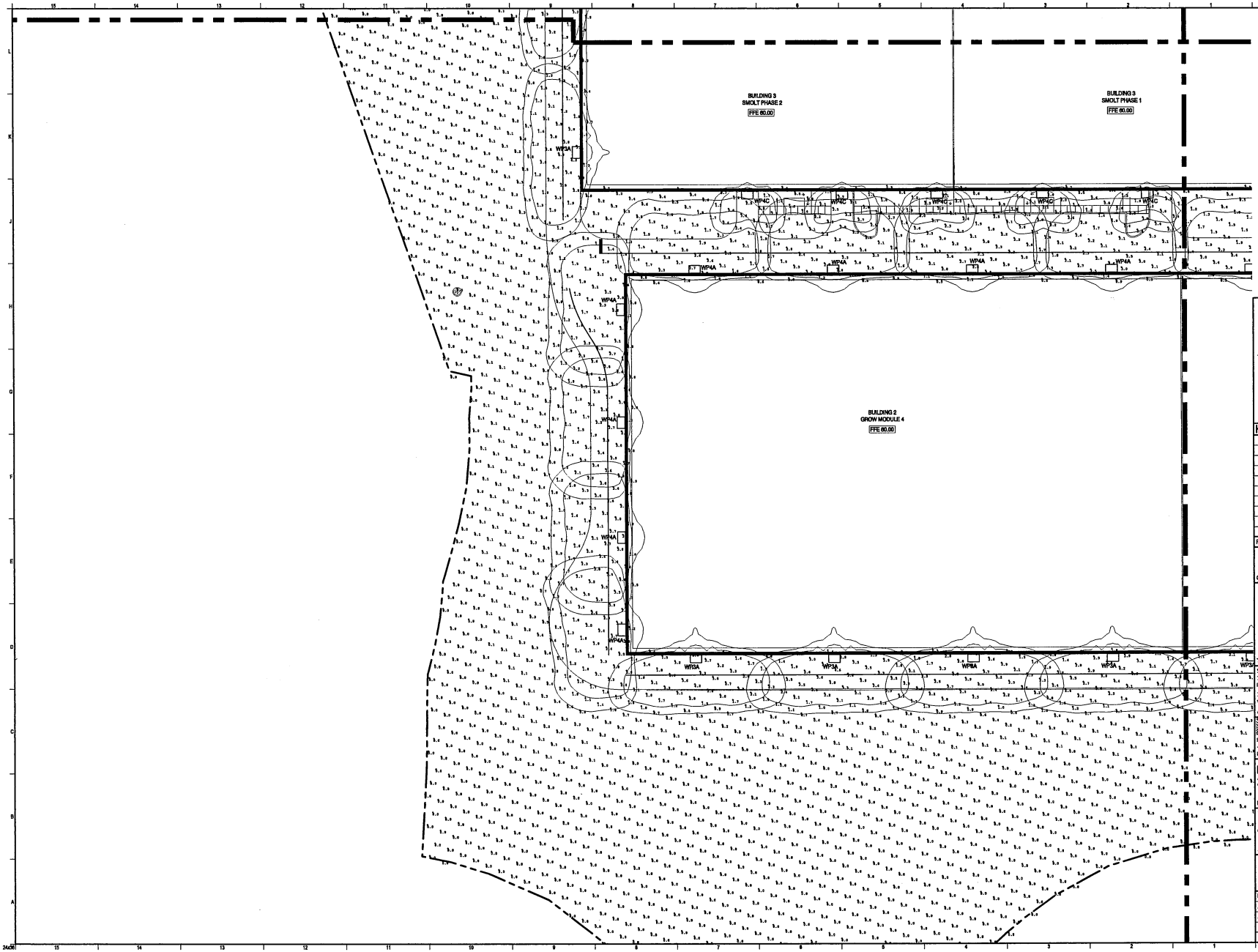
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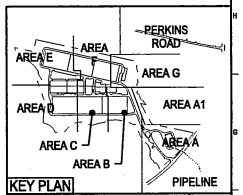
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ELECTRICAL SITE PLAN
AREA D

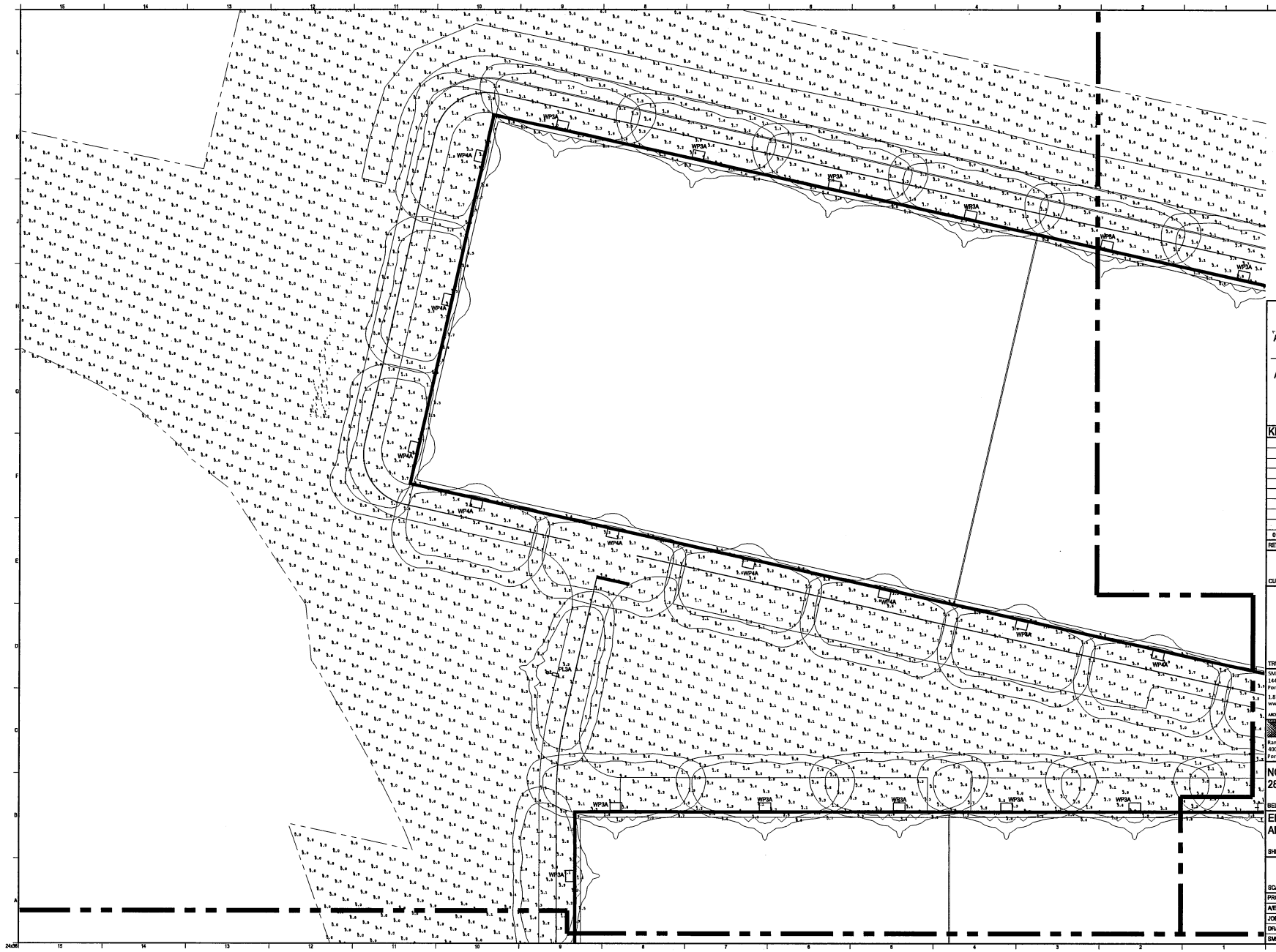
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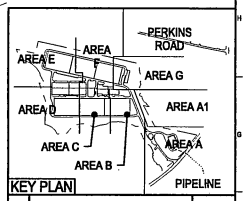
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ELECTRICAL SITE PLAN
AREA E

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SCALE: 1" = 30'

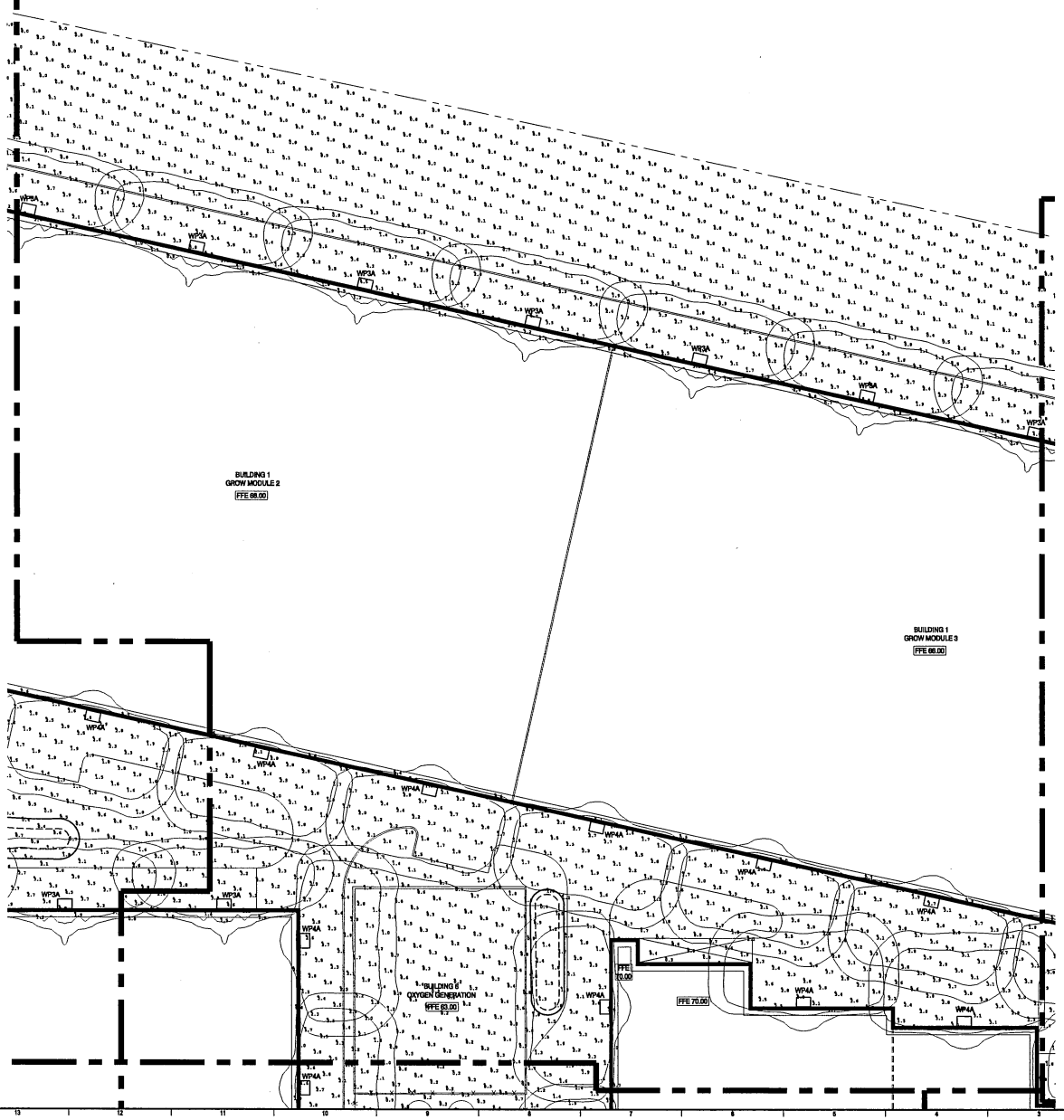
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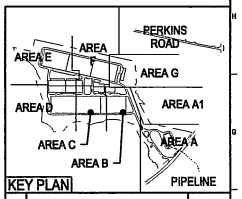
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ELECTRICAL SITE PLAN
AREA F

SHEET TITLE:

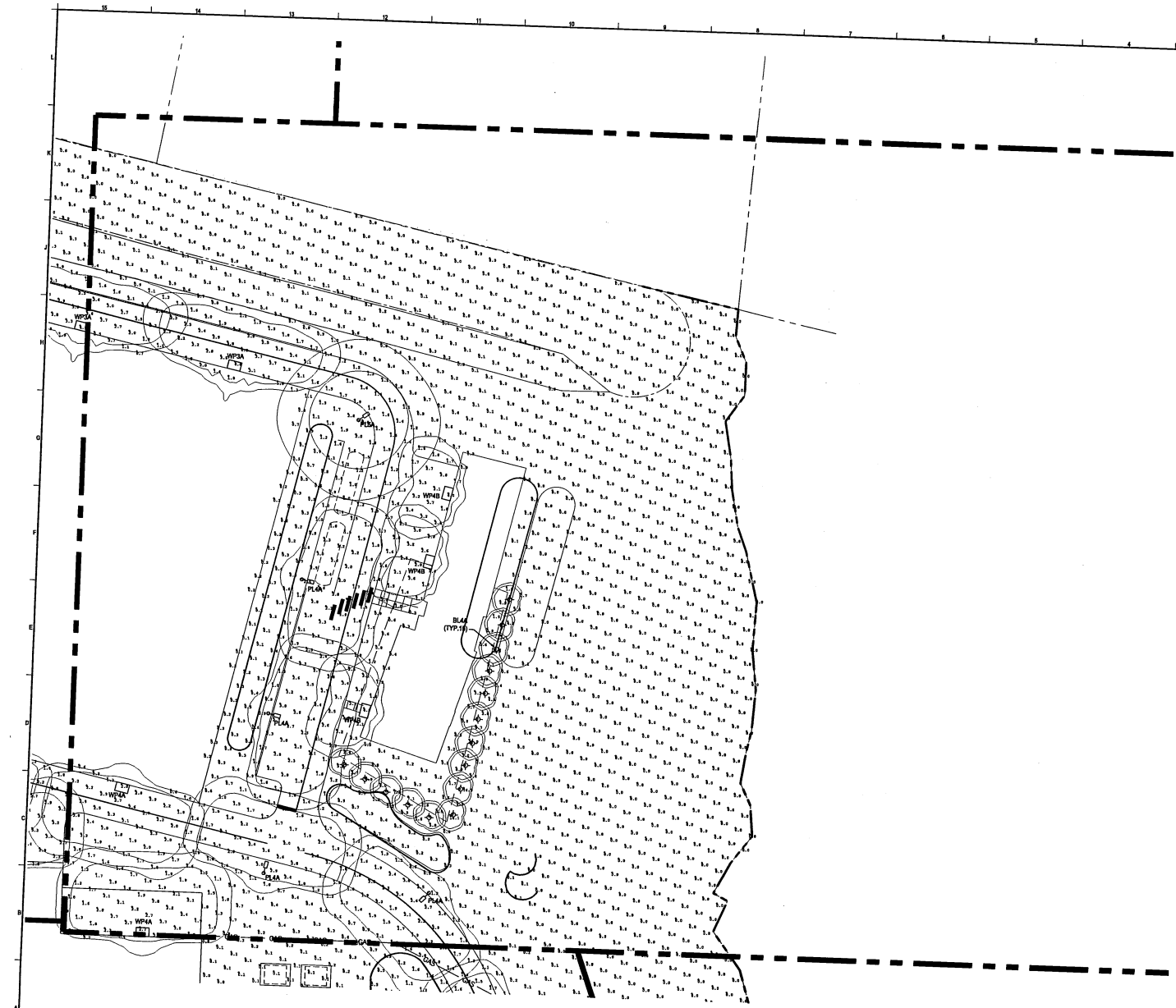
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ES106

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WP3A
WP3A
PLA1
WP4B
WP4B
PLA1
BL4A (TYP.16)
WP4B
WP4A
WP4A
PLA1
PLA1
PLA1

Electrical General:
Electrical systems for all new spaces will be designed in accordance with the following Codes and standards:

- NFPA 70 (National Electrical Code), 2017 Edition
- NFPA 101 (Life Safety Code)
- International Building Code (IBC), 2009 edition.
- International Energy Conservation Code (IECC), 2012 edition.
- Maine Uniform Building and Energy Code (MUBEC)
- ASHRAE Standard 90.1-2010 Energy Standard for Buildings Except Low-Rise Residential Buildings.

Exterior Lighting and Controls:
All new fixtures shall utilize LED technology with a color temperature of 3000K and shall be full-cutoff type as defined by IESNA, in order to minimize light pollution into the night sky.

Lighting along the entrance drive into the campus (near the Visitor's Center) shall be provided via post-top style mounted pole light fixtures. Fixtures shall be mounted roughly 16'-0" AFG and shall utilize Type IV distribution. Lighting shall be controlled via a site-wide lighting control system with main controller location to be determined during detailed design. Lighting control system shall be utilized to provide astronomical clock on/off operation and to allow for schedule overrides to be programmed. Post-top fixtures shall be provided with integrated motion sensors to allow fixtures to dim to 10% between the hours of 10pm-5am until motion is sensed. Once motion is sensed during the setback hours, the fixtures will rise to 100% output for 15 minutes and then they shall dim back to 10% output.

Also located near the Visitor's Center, the walkway surrounding the salmon pond feature will be illuminated utilizing 3'H bollards. This will allows for low lighting levels along the pathway with minimal impact to the overall lighting provided by the general fixtures. Bollard lights shall be connected to the site-wide lighting control system and shall be scheduled on and off to coordinate with operational hours.

General site lighting along interior roadways shall be provided via pole mounted area style fixtures. Fixtures shall be mounted at 20'-0" AFG with Type III, Type IV, and Type V distribution patterns as required to adequately illuminate the drives and intersections. Controls for all roadway fixtures shall be via site-wide lighting control system as described above. As with the post-top fixtures, roadway lights shall have integrated occupancy sensors to allow for setback during nighttime hours.

Roadways and parking lots located between buildings shall be illuminated via building mounted area style light fixtures. Fixtures shall be mounted at ~~16'-0"~~ **20' 0"** AFG with Type IV distribution patterns as required to adequately illuminate individual spaces as well as the associated roadways. Controls for all building mounted fixtures interior to the site shall be via site-wide lighting control system as described above. As with the pole mounted fixtures, building lights shall have integrated occupancy sensors to allow for setback during nighttime hours.

Along the north and west sides of Building 1, south and west sides of Building 2 and west side of Building 3, building mounted area style fixtures shall be mounted at ~~12' 0"~~ **20' 0"**AFF to illuminate the access drive around buildings. Fixtures along these facades shall be provided with embedded motion sensors so that fixtures will remain off during nighttime hours until motion is sensed.

In addition to roadway and parking lot lighting, Building 7 shall have bollard lighting is accent the concrete walkway and plaza to the entrance of the building. Bollard lights will be 3'-0" AFG and shall be controlled via the site-wide lighting control system. As with the bollards located near the Visitor's Center, operation is expected to be schedule on/off only.

ATTACHMENT I

Revised Figure 1 Showing Section Profiles

Additional Information Regarding
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Figure 1a

04/17/2020



Nordic Aquafarms
Belfast, Maine

LOCUS MAP - OFF-SITE

NVC/UPSTREAM 1

Plan Project No. 18076

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ATTACHMENT J

Visual Impact Analysis Views from Penobscot Bay

Additional Information Regarding
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Ransom Consulting, Inc.
Project 171.05027.008

Figure 19



PENOBSCOT BAY VIEW
(ELEVATION 10' +/-)

Nordic Aquafarms
Belfast, Maine

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NVC/UPSTREAM

09/17/2020

Figure 26



PENOBSCOT BAY VIEW
(ELEVATION 48' +/-)

Nordic Aquafarms
Belfast, Maine

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NVC/UPSTREAM

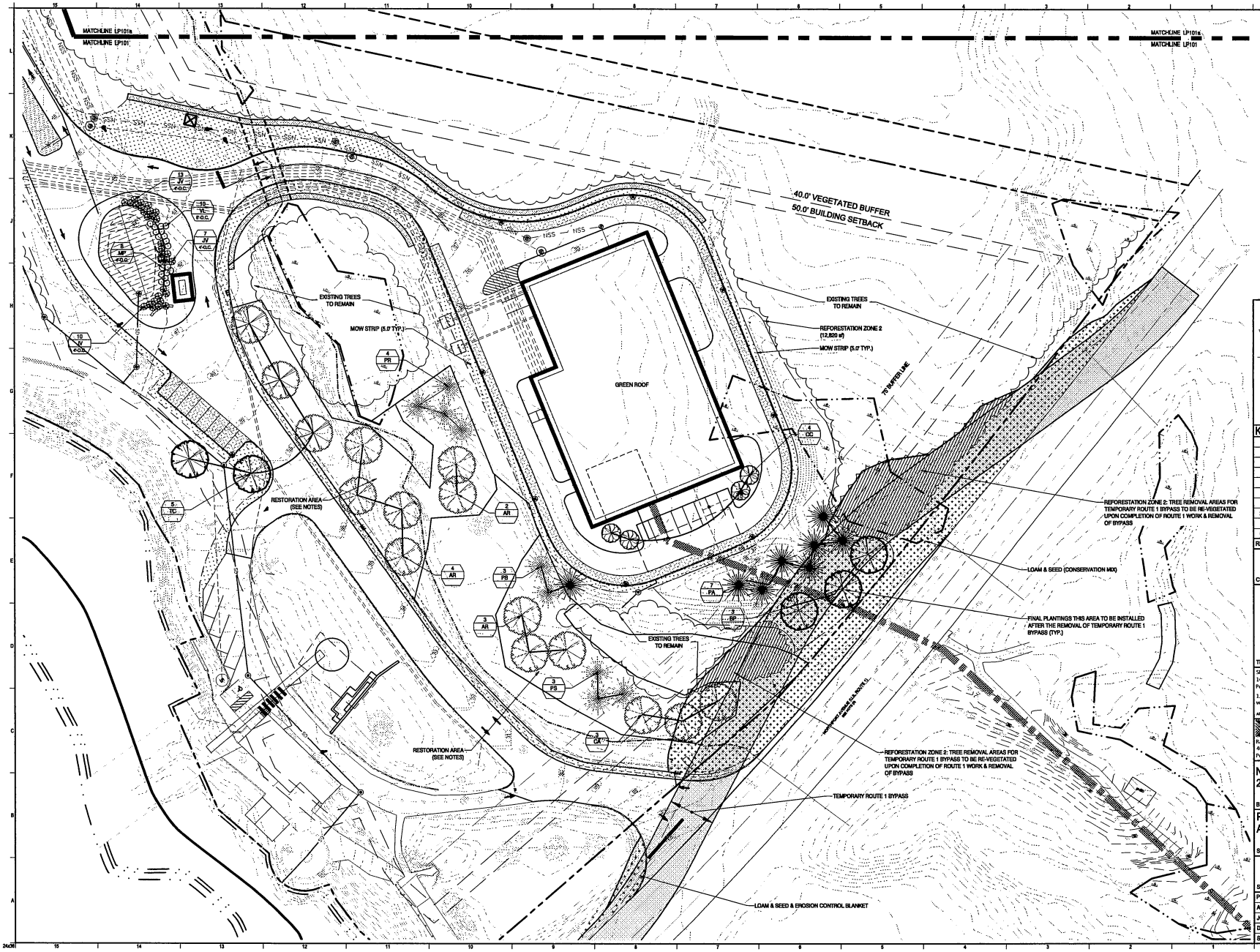
6/17/2020

ATTACHMENT K

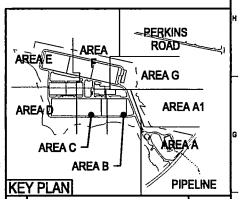
Revised Plan LP101

Additional Information Regarding
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Ransom Consulting, Inc.
Project 171.05027.008



01/17/2020



KEY PLAN

REV	DESCRIPTION	DATE
2	RESPONSE TO ADDITIONAL DEP QUESTIONS	7-25-19
1	REISSUED FOR PERMIT	7-03-19
0	ISSUED FOR PERMIT	5-14-19

RESPONSE TO DEP
7-25-19

CURRENT ISSUE STATUS:

TRUE NORTH:

MARK O. JOHNSON
7-25-19

SMRT Architects and Engineers
144 Fore Street/P.O. BOX 618
Portland, Maine 04104
1.877.700.7678
www.smrtinc.com

ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY

RANSOM
Ransom Consulting Engineers and Scientists
400 Commercial Street, Suite 400
Portland, Maine 04101

NORDIC AQUAFARMS
285 NORTHPORT AVENUE
BELFAST, MAINE

NVC/UPSTREAM 13-G

PLANTING PLAN
AREA A

SHEET TITLE:

0 15' 30' 60' 90'
SCALE: 1" = 30'

PROJECT MANAGER:	ADB	PROJECT NO:	19076
A/E OF RECORD:	MGJ		
JOB CAPTAIN:	SP		
DRAWN BY:	WSM		
SMRT FILE:	LP101-19076	SHEET No.	LP101

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NVC/UPSTREAm 13-H

RANSOM
Consulting, Inc.

Consulting
Engineers
and Scientists

November 19, 2019

Project 171.05028.008

Ms. Jane Gilbert, P.E.
Air Licensing Unit Manager
Maine Department of Environmental Protection
Bureau of Air Quality
17 State House Station
August, ME 04333-0017

RE: Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Dear Ms. Gilbert:

This letter is prepared in response to the November 8, 2019 email request for additional clarification related to the Chapter 115 air emission license for the above-referenced project. For clarity, each comment from that letter has been copied below and italicized and responses are in regular text.

Following up on yesterday's Board meeting, and pursuant to Chapter 3, sections 5(D) and 16(A)(1) of the Department's rules, Department staff requests that the Applicant provide the following information related to its application for a Chapter 115 air emission license:

1. A complete listing of all stationary fuel burning equipment to be installed on-site, including the type of equipment, maximum rated heat input capacity of each unit, and the type and quantity of fuel burned in each unit.

All stationary heaters will be electric and will not emit air pollutants. Nordic understands that we mention in the SLODA application that there could be propane heaters, but our intention now is to only install electric heaters other than the eight diesel engines. Heat pumps, using excess heat from the fish farm water, will provide the majority of process and space heating.

2. Unique identification of each stack and which unit or units exhaust through it, and maximum volumetric flow rate and exhaust temperature from each stack.

There will be eight identical stacks installed to serve the eight engines. Provided below are the stack parameters requested along with updated short term and annual emission rates for the engines. Caterpillar has provided us with refined emission factors. This detail documents significantly lower NOx emissions.

Pease International Tradeport, 112 Corporate Drive, Portsmouth, New Hampshire 03801, Tel (603) 436-1490, Fax (603) 436-6037
400 Commercial Street, Suite 404, Portland, Maine 04101, Tel (207) 772-2891
12 Kent Way, Suite 100, Byfield, Massachusetts 01922-1221, Tel (978) 465-1822
60 Valley Street, Building F, Suite 106, Providence, Rhode Island 02909, Tel (401) 433-2160
2127 Hamilton Avenue, Hamilton, New Jersey 08619, Tel (609) 584-0090

www.ransomenv.com

Ms. Jane Gilbert, P.E.
Maine Department of Environmental Protection

Proposed Engines #1-8 Specifications and Emissions				
Generator Make & Model:		Caterpillar 3516C Tier 4F (or equivalent)		
Fuel Type:		Diesel		
Max Fuel Consumption (gal/hr):		142.2		
Max Heat Input (MMBtu/hr):		19.91		
Engine Power (kW):		2,050		
BHP		3,004		
Stack Parameters:	Elevation AGL (ft)	67.5		
	Diameter ID (inches)	16		
	Flow (ACFM)	16,586		
	Temperateure (F)	375		
Proposed Fuel Limit (gal):		900,000		

Pollutant	Emission Factor (g/kw-hr)	Emission Factor (lb/MMBtu)	Proposed Limit (lb/hr)	PTE (TPY)
NOx	0.92	0.21	4.2	13.4
PM	0.037	0.01	0.2	0.5
*PM_{10} & $PM_{2.5}$		0.02	0.3	1.0
CO	3.5	0.81	16.1	51.0
VOC	0.19	0.04	0.9	2.8
*SO_2		0.00	0.03	0.1

*AP-42 Emission Factors

Note: Proposed Limits are highlighted.

3. *The height above ground level and inside diameter of each stack.*

At the time when Nordic submitted the original air application we calculated and proposed reasonable stack heights based on estimated building dimensions. Based on revised engineering drawings with higher building tier heights we are now proposing to construct stacks each with a height of 67.5' above ground level (AGL), which is 1.5 times the height of the tallest surrounding buildings. Each engine will have its own 16" ID stack but the stacks will be arranged in four sets of two as shown on the site drawing included.

4. *A scaled plot plan schematic of the facility that shows the following:*

a. the location of all stacks, buildings, and other structures (e.g., tanks, towers, etc.);
b. the base elevation and height above ground level for each stack, building, and other structure;
c. a north arrow;
d. an accurate scale ruler;
e. the facility property boundary; and
f. any areas likely to be fenced surrounding the facility.

A scaled plot plan schematic which shows each of these items is attached as Attachment A.

Ms. Jane Gilbert, P.E.
Maine Department of Environmental Protection

Please contact me with any questions or comments.

Sincerely,

RANSOM CONSULTING, INC.

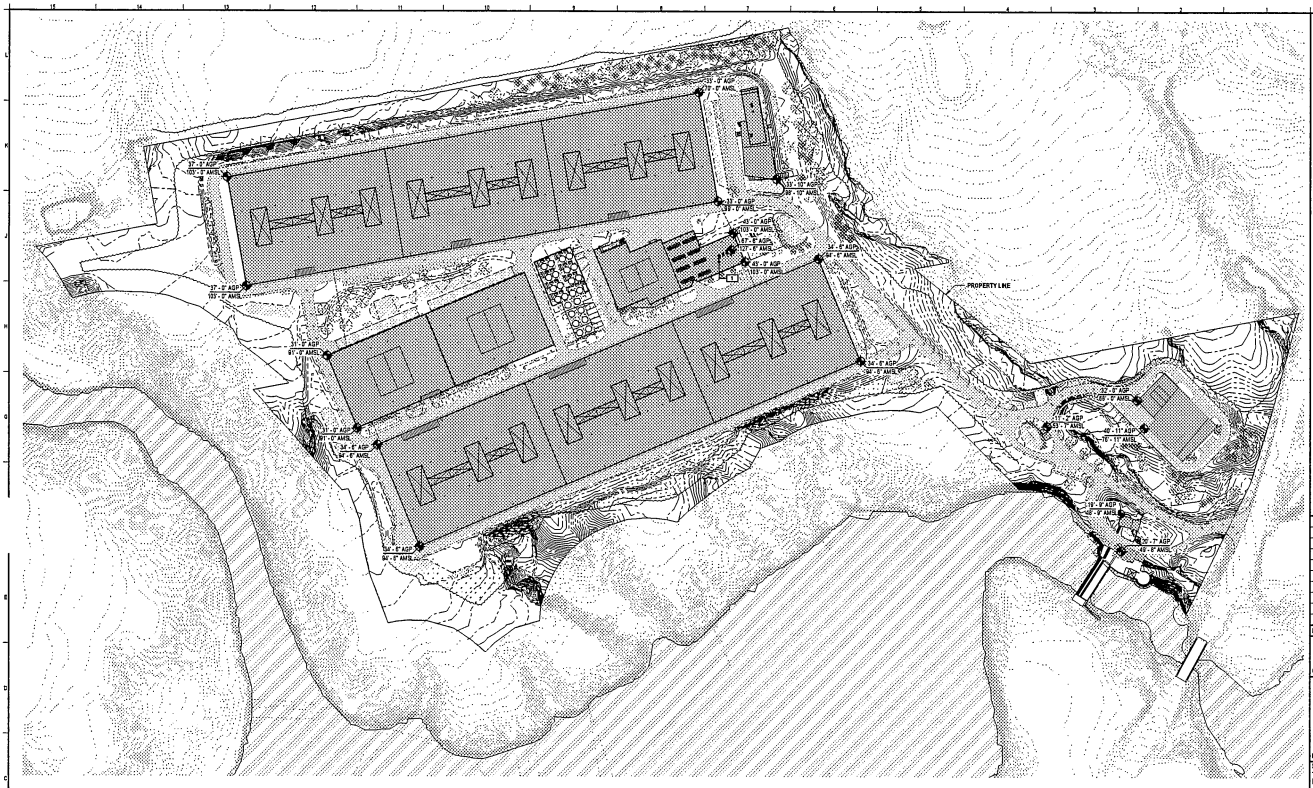
Elizabeth M. Ransom, P.G.
Senior Project Manager

EMR:jar
Attachment

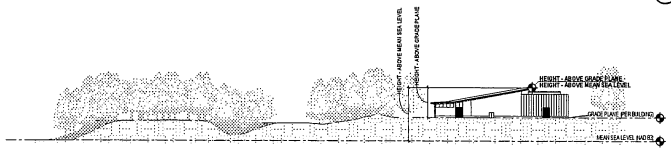
ATTACHMENT A

Plot Plan Schematic

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N



EMISSION STUDY - SITE ROOF PLAN (1)
1" = 120'-0"



KEYNOTE LEGEND

1 LOCATION OF GENERATOR EXHAUST STACKS. A GROUP OF 2 STACKS EACH. PROVIDES THE 8 PROJECT GENERATORS. STACKS ARE SEPARATED BY APPROXIMATELY 10FT.

REV	DESCRIPTION	DATE

ISSUED FOR PERMIT
05/14/2019

CURRENT ISSUE STATUS:

PROJECT AUTH:
SMRF Architects and Engineers
144 Fore Street /P.O. Box 618
Portland, Maine 04104

ARCHITECTS | ENGINEERS | PLANNERS | INTERIORS | DESIGN

NORDIC AQUAFARMS
285 NORTHPORT AVENUE

BELFAST, MAINE

EMISSION STUDY PLAN

SHEET TITLE:

3" 1'-6" 0" 1' 2' 3'

SCALE: AS NOTED

PROJECT MANAGER:	ADS	PROJECT NO:	18076-00
A/E OF RECORD:	Checker		
JOB CAPTAIN:	FSP		
DRAWN BY:	Author		
SHEET FILE:	AP005-18076-00	SHEET No.	AP005

NOT FOR CONSTRUCTION

PERFORMANCE DATA[DM9368]

Performance Number: DM9368 **Change Level: 01**

SALES MODEL:	3516C	**COMBUSTION:**	DI
BRAND:	CAT	**ENGINE SPEED (RPM):**	1,800
ENGINE POWER (BHP):	2,944	**HERTZ:**	60
GEN POWER WITH FAN (EKW):	2,000.0	**FAN POWER (HP):**	130.1
COMPRESSION RATIO:	14	**ASPIRATION:**	TA
RATING LEVEL:	STANDBY	**AFTERCOOLER TYPE:**	ATAAC
PUMP QUANTITY:	1	**AFTERCOOLER CIRCUIT TYPE:**	JW+OC, ATAAC
FUEL TYPE:	DIESEL	**INLET MANIFOLD AIR TEMP (F):**	113
MANIFOLD TYPE:	DRY	**JACKET WATER TEMP (F):**	210.2
GOVERNOR TYPE:	ADEM4	**TURBO CONFIGURATION:**	PARALLEL
ELECTRONICS TYPE:	ADEM4	**TURBO QUANTITY:**	4
CAMSHAFT TYPE:	STANDARD	**TURBOCHARGER MODEL:**	GTB6041BN-48T-1.04
IGNITION TYPE:	CI	**CERTIFICATION YEAR:**	2011
INJECTOR TYPE:	EUI	**FUEL RATE (RATED RPM) NO LOAD (GAL/HR):**	16.4
REF EXH STACK DIAMETER (IN):	12	**PISTON SPD @ RATED ENG SPD (FT/MIN):**	2,539.4

INDUSTRY	SUBINDUSTRY	APPLICATION
OIL AND GAS	LAND PRODUCTION	PACKAGED GENSET
ELECTRIC POWER	STANDARD	PACKAGED GENSET

General Performance Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP
EKW	%	BHP	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
2,000.0	100	2,941	272	0.332	139.5	58.4	111.7	1,205.6	49.7	920.6
1,800.0	90	2,660	246	0.333	126.4	51.5	108.2	1,174.8	44.3	908.7
1,600.0	80	2,382	220	0.335	114.0	45.0	105.5	1,144.7	39.3	898.3
1,500.0	75	2,243	207	0.338	108.3	42.3	104.5	1,129.9	37.1	892.2
1,400.0	70	2,104	194	0.341	102.6	39.6	103.7	1,115.1	35.1	885.3
1,200.0	60	1,828	169	0.348	90.8	33.8	101.5	1,082.7	30.8	867.5
1,000.0	50	1,552	143	0.354	78.5	27.6	99.2	1,039.6	26.3	841.5
800.0	40	1,282	118	0.361	66.2	21.6	98.9	981.8	22.0	808.3
600.0	30	1,010	93	0.374	54.0	16.1	97.6	904.1	18.1	759.6
500.0	25	872	81	0.385	47.9	13.5	96.3	853.7	16.3	723.0
400.0	20	731	67	0.399	41.6	11.1	94.9	791.6	14.5	673.0
200.0	10	438	40	0.455	28.4	6.2	91.7	630.7	11.0	531.5

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
EKW	%	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
2,000.0	100	2,941	63	370.2	6,097.7	16,301.3	26,599.0	27,575.8	5,806.5	5,297.4
1,800.0	90	2,660	56	346.1	5,660.9	14,926.0	24,582.5	25,468.0	5,363.1	4,900.5
1,600.0	80	2,382	49	322.4	5,234.1	13,626.0	22,639.9	23,438.1	4,933.5	4,514.8
1,500.0	75	2,243	46	311.8	5,056.2	13,081.3	21,839.0	22,597.2	4,757.5	4,358.3
1,400.0	70	2,104	43	301.1	4,882.3	12,547.1	21,061.2	21,779.8	4,586.7	4,206.5
1,200.0	60	1,828	37	276.7	4,500.8	11,363.7	19,357.3	19,993.3	4,209.7	3,870.7
1,000.0	50	1,552	31	248.9	4,080.3	10,053.1	17,494.9	18,044.3	3,798.7	3,503.4
800.0	40	1,282	24	220.0	3,648.0	8,724.5	15,655.6	16,119.6	3,383.2	3,131.9
600.0	30	1,010	18	191.5	3,260.2	7,457.1	13,913.7	14,292.1	3,007.1	2,798.1
500.0	25	872	16	177.6	3,086.0	6,839.3	13,166.0	13,501.6	2,843.2	2,654.9
400.0	20	731	13	163.5	2,914.4	6,185.8	12,427.8	12,719.3	2,685.1	2,518.0
200.0	10	438	8	135.0	2,580.5	4,776.4	10,987.0	11,186.4	2,369.4	2,245.9

Heat Rejection Data

HEAT REJECTION TO ATMOSPHERE SHOWN HERE IS ENGINE ONLY. CEM HEAT REJECTION TO ATMOSPHERE SHOWN IN THE SUPPLEMENTARY DATA IS THE ADDITIONAL HEAT REJECTED TO ATMOSPHERE FROM THE CEM. THIS ADDITIONAL HEAT IS INCLUDED IN THE HEAT REJECTION TO EXH AND EXH RECOVERY SHOWN HERE AND WOULD NEED TO BE DEDUCTED FROM THE EXH AND EXH RECOVERY VALUES WHEN SIZING EXHAUST RECOVERY HEAT EQUIPMENT.

PERFORMANCE DATA[DM9368]

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHUAST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
2,000.0	100	2,941	40,104	8,584	117,743	66,835	15,945	27,713	124,739	299,359	318,893
1,800.0	90	2,660	37,348	8,264	106,994	60,337	14,448	23,519	112,812	271,264	288,965
1,600.0	80	2,382	34,738	7,949	97,012	54,418	13,028	19,817	100,998	244,606	260,566
1,500.0	75	2,243	33,635	7,808	92,688	51,834	12,375	18,256	95,121	232,347	247,508
1,400.0	70	2,104	32,549	7,664	88,414	49,269	11,728	16,765	89,226	220,198	234,566
1,200.0	60	1,828	30,165	7,326	78,933	43,615	10,380	13,695	77,505	194,893	207,610
1,000.0	50	1,552	27,455	6,929	68,522	37,263	8,969	10,519	65,823	168,397	179,386
800.0	40	1,282	24,651	6,522	58,151	30,909	7,568	7,691	54,383	142,091	151,362
600.0	30	1,010	21,599	6,020	47,794	24,352	6,175	5,268	42,840	115,931	123,495
500.0	25	872	19,985	5,705	42,506	20,859	5,475	4,261	36,971	102,794	109,501
400.0	20	731	18,381	5,400	36,887	16,909	4,756	3,348	30,983	89,289	95,115
200.0	10	438	15,142	4,792	24,623	8,226	3,252	1,832	18,564	61,054	65,038

Sound Data

SOUND DATA REPRESENTATIVE OF NOISE PRODUCED BY THE "ENGINE AND CEM" AS A UNIT WITHOUT A MUFFLER INSTALLED

EXHAUST: Sound Power (1/3 Octave Frequencies)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	OVERALL SOUND	100 HZ	125 HZ	160 HZ	200 HZ	250 HZ	315 HZ	400 HZ	500 HZ	630 HZ
EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
2,000.0	100	2,941	97.8	68.7	75.2	74.3	82.8	87.5	87.1	84.5	88.6	88.2
1,800.0	90	2,660	95.8	67.9	74.7	72.8	80.9	85.7	85.4	83.1	86.6	86.1
1,600.0	80	2,382	94.0	67.4	74.6	71.3	79.2	84.1	84.0	82.4	85.0	84.3
1,500.0	75	2,243	93.2	67.2	74.7	70.6	78.4	83.4	83.5	82.1	84.2	83.4
1,400.0	70	2,104	92.3	67.0	74.7	69.8	77.5	82.7	82.8	81.8	83.4	82.5
1,200.0	60	1,828	90.7	66.6	74.9	68.3	75.7	81.2	81.5	81.3	81.8	80.8
1,000.0	50	1,552	89.4	64.9	75.8	67.5	74.6	79.5	79.8	80.5	80.4	79.6
800.0	40	1,282	88.0	65.1	75.5	65.7	72.7	78.2	78.9	80.2	78.9	77.6
600.0	30	1,010	86.6	64.6	75.5	64.9	70.8	76.6	77.4	79.4	77.3	75.9
500.0	25	872	86.2	62.8	76.3	65.9	70.4	75.4	75.9	78.6	76.4	75.6
400.0	20	731	85.9	60.9	77.1	67.0	70.1	74.4	74.5	77.8	75.5	75.5
200.0	10	438	85.8	60.5	77.3	67.2	70.0	74.2	74.2	77.6	75.3	75.5

EXHAUST: Sound Power (1/3 Octave Frequencies)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	1000 HZ	1250 HZ	1600 HZ	2000 HZ	2500 HZ	3150 HZ	4000 HZ	5000 HZ	6300 HZ	8000 HZ
EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
2,000.0	100	2,941	90.3	85.2	82.8	79.8	77.1	73.8	69.3	63.6	63.3	55.1
1,800.0	90	2,660	87.9	82.9	80.7	77.9	75.4	72.0	67.7	62.3	62.1	55.2
1,600.0	80	2,382	85.5	80.4	78.5	76.3	74.0	70.6	66.5	61.7	61.7	55.6
1,500.0	75	2,243	84.3	79.1	77.4	75.6	73.3	70.0	66.0	61.5	61.6	56.0
1,400.0	70	2,104	83.1	77.9	76.3	74.9	72.6	69.3	65.5	61.3	61.5	56.3
1,200.0	60	1,828	80.7	75.5	74.1	73.5	71.2	67.9	64.5	60.9	61.3	57.0
1,000.0	50	1,552	79.5	74.8	73.0	73.1	70.8	67.4	63.5	60.8	61.4	55.0
800.0	40	1,282	76.6	71.5	70.3	71.3	69.0	65.7	62.5	60.2	61.1	56.8
600.0	30	1,010	74.2	69.3	68.4	69.9	67.7	64.5	61.7	59.8	60.8	57.3
500.0	25	872	74.5	70.6	69.2	70.2	68.2	65.0	61.6	59.9	60.9	54.2
400.0	20	731	75.0	72.2	70.2	70.8	68.9	65.6	61.5	60.1	61.0	51.2
200.0	10	438	75.1	72.5	70.4	70.9	69.0	65.7	61.5	60.1	61.0	50.5

Sound Data (Continued)

MECHANICAL: Sound Power (1/3 Octave Frequencies)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	OVERALL SOUND	100 HZ	125 HZ	160 HZ	200 HZ	250 HZ	315 HZ	400 HZ	500 HZ	630 HZ
EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
2,000.0	100	2,941	123.0	89.3	107.2	96.2	99.4	100.3	102.8	101.0	105.5	106.8
1,800.0	90	2,660	122.2	88.6	106.6	95.4	98.5	99.4	102.5	100.9	105.4	106.5
1,600.0	80	2,382	121.4	88.1	106.0	94.6	97.5	98.5	102.0	100.9	104.7	106.1

PERFORMANCE DATA[DM9368]

1,500.0	75	2,243	121.1	88.0	105.7	94.1	97.0	98.1	101.8	100.8	104.2	106.0
1,400.0	70	2,104	120.8	87.8	105.4	93.5	96.3	97.5	101.4	100.5	103.8	105.9
1,200.0	60	1,828	120.3	87.7	104.7	92.0	94.5	96.2	100.4	99.7	103.4	106.1
1,000.0	50	1,552	119.9	87.8	104.3	91.0	93.7	95.8	99.7	101.4	103.4	106.2
800.0	40	1,282	119.5	87.9	103.9	90.9	93.3	95.6	98.5	101.6	103.9	106.0
600.0	30	1,010	119.3	87.6	103.4	90.9	93.6	95.3	97.8	100.6	105.1	106.1
500.0	25	872	119.1	87.1	103.3	90.5	94.3	95.2	98.2	100.3	105.9	106.6
400.0	20	731	119.0	86.5	103.1	90.2	94.9	95.0	98.8	100.2	106.6	107.1
200.0	10	438	119.0	85.8	102.4	90.0	94.7	95.5	99.2	101.4	106.4	107.7

MECHANICAL: Sound Power (1/3 Octave Frequencies)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	1000 HZ	1250 HZ	1600 HZ	2000 HZ	2500 HZ	3150 HZ	4000 HZ	5000 HZ	6300 HZ	8000 HZ
EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
2,000.0	100	2,941	112.2	113.0	111.8	111.5	110.6	110.0	109.1	108.6	107.3	106.4
1,800.0	90	2,660	112.1	112.5	111.3	111.2	110.3	109.7	108.8	108.3	106.8	106.2
1,600.0	80	2,382	111.8	111.9	110.9	110.7	109.8	109.2	108.2	107.8	106.2	106.4
1,500.0	75	2,243	111.6	111.6	110.7	110.3	109.6	109.0	107.9	107.5	105.9	106.8
1,400.0	70	2,104	111.4	111.3	110.5	109.9	109.4	108.7	107.5	107.2	105.7	108.0
1,200.0	60	1,828	111.1	110.8	110.3	109.5	109.0	108.2	106.9	106.6	105.4	111.2
1,000.0	50	1,552	110.9	110.7	110.0	109.4	108.8	108.1	106.5	106.2	105.2	109.7
800.0	40	1,282	110.9	110.6	109.5	109.1	108.7	107.7	106.0	105.9	107.0	105.7
600.0	30	1,010	110.8	110.2	108.8	108.8	108.4	107.3	105.4	105.6	107.7	101.8
500.0	25	872	110.7	109.9	108.6	108.7	108.3	107.0	105.1	105.7	106.0	100.6
400.0	20	731	110.7	109.7	108.4	108.6	108.2	106.8	104.8	105.7	104.0	99.7
200.0	10	438	110.3	109.8	108.1	108.4	108.1	106.8	105.7	104.9	102.0	98.7

Emissions Data

EMISSIONS VALUES ARE TAILPIPE OUT WITH AFTERTREATMENT. VALUES SHOWN AS ZERO MAY BE GREATER THAN ZERO BUT WERE BELOW THE DETECTION LEVEL OF THE EQUIPMENT USED AT TIME OF MEASUREMENT.

CATERPILLAR EMISSIONS CERTIFIED ENGINES TESTED WITHIN EPA SPECIFIED TEST CONDITIONS, AND USING TITLE 40 CFR PART 1065 TEST PROTOCOL, MEET THE NEW SOURCE ERFORMANCE STANDARDS. POTENTIAL SITE VARIATION DATA ACCOUNT FOR PRODUCTION ENGINE AND SYSTEM VARIABILITY IN ADDITION TO MEASUREMENT VARIABILITY FOR TYPICAL FIELD TEST METHODS AS DESCRIBED IN DM1176. THIS DATA ASSUMES SITE CORRECTIONS FOR AMBIENT HUMIDITY TO 75 GRAINS, AND STANDARD CONDITIONS OF 25 C (77 F) AIR TO TURBO TEMPERATURE AND 152.4 M (500 FT) ALTITUDE. GUIDANCE ON HUMIDITY CORRECTION METHODS ARE AVAILABLE IN TITLE 40 CFR SECTION 1065.670. FOR APPLICATIONS WITH GEOGRAPHIC OR AMBIENT CONDITIONS BEYOND THESE PUBLISHED VALUES, CONSULT CATERPILLAR (APPLICATION SUPPORT CENTER) FOR ADDITIONAL VARIABILITY INFORMATION.

RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITH FAN		EKW	2,000.0	1,500.0	1,000.0	500.0	200.0
PERCENT LOAD		%	100	75	50	25	10
ENGINE POWER		BHP	2,941	2,243	1,552	872	438
TOTAL NOX (AS NO2)		G/HR	1,840	1,228	741	446	909
TOTAL CO		G/HR	367	251	165	103	98
TOTAL HC		G/HR	94	108	102	81	102
PART MATTER		G/HR	89.4	66.2	63.3	55.9	28.0
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	277.1	239.5	201.3	212.2	871.9
TOTAL CO	(CORR 5% O2)	MG/NM3	58.0	51.5	46.6	48.2	86.7
TOTAL HC	(CORR 5% O2)	MG/NM3	12.9	19.3	25.0	33.1	80.2
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	135	117	98	103	425
TOTAL CO	(CORR 5% O2)	PPM	46	41	37	39	69
TOTAL HC	(CORR 5% O2)	PPM	24	36	47	62	150
TOTAL NOX (AS NO2)		G/HP-HR	0.63	0.55	0.48	0.51	2.08
TOTAL CO		G/HP-HR	0.13	0.11	0.11	0.12	0.23
TOTAL HC		G/HP-HR	0.03	0.05	0.07	0.09	0.23
PART MATTER		G/HP-HR	0.03	0.03	0.04	0.06	0.06
TOTAL NOX (AS NO2)		LB/HR	4.06	2.71	1.63	0.98	2.00
TOTAL CO		LB/HR	0.81	0.55	0.36	0.23	0.22
TOTAL HC		LB/HR	0.21	0.24	0.22	0.18	0.23
PART MATTER		LB/HR	0.20	0.15	0.14	0.12	0.06

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN		EKW	2,000.0	1,500.0	1,000.0	500.0	200.0
PERCENT LOAD		%	100	75	50	25	10
ENGINE POWER		BHP	2,941	2,243	1,552	872	438
TOTAL NOX (AS NO2)		G/HR	1,150	767	463	279	568
TOTAL CO		G/HR	72	49	32	20	19

PERFORMANCE DATA[DM9368]

TOTAL HC		G/HR	21	24	23	18	23
TOTAL CO2		KG/HR	1,441	1,111	805	490	293
PART MATTER		G/HR	34.4	25.5	24.4	21.5	10.8
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	173.2	149.7	125.8	132.6	544.9
TOTAL CO	(CORR 5% O2)	MG/NM3	11.4	10.1	9.1	9.5	17.0
TOTAL HC	(CORR 5% O2)	MG/NM3	2.9	4.3	5.5	7.4	17.8
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	84	73	61	65	265
TOTAL CO	(CORR 5% O2)	PPM	9	8	7	8	14
TOTAL HC	(CORR 5% O2)	PPM	5	8	10	14	33
FORMALDEHYDE	(CORR 15% O2)	PPM	0.02	0.02	0.02	0.05	0.25
ACROLEIN	(CORR 15% O2)	PPM	0.00	0.00	0.00	0.00	0.00
ACETALDEHYDE	(CORR 15% O2)	PPM	0.00	0.00	0.00	0.00	0.01
METHANOL	(CORR 15% O2)	PPM	0.00	0.00	0.00	0.00	0.03
TOTAL NOX (AS NO2)		G/HP-HR	0.39	0.34	0.30	0.32	1.30
TOTAL CO		G/HP-HR	0.02	0.02	0.02	0.02	0.04
TOTAL HC		G/HP-HR	0.01	0.01	0.01	0.02	0.05
PART MATTER		G/HP-HR	0.01	0.01	0.02	0.02	0.02
TOTAL NOX (AS NO2)		LB/HR	2.54	1.69	1.02	0.61	1.25
TOTAL CO		LB/HR	0.16	0.11	0.07	0.04	0.04
TOTAL HC		LB/HR	0.05	0.05	0.05	0.04	0.05
TOTAL CO2		LB/HR	3,178	2,450	1,775	1,080	645
PART MATTER		LB/HR	0.08	0.06	0.05	0.05	0.02
OXYGEN IN EXH		%	9.6	10.3	11.4	13.2	15.5
DRY SMOKE OPACITY		%	0.4	0.4	0.8	1.4	0.9
BOSCH SMOKE NUMBER			0.18	0.20	0.32	0.49	0.34

Regulatory Information

EPA TIER 4 FINAL		2015 - —		
Locality	**Agency**	**Regulation**	**Tier/Stage**	**Max Limits - G/BKW - HR**
U.S. (INCL CALIF)	EPA	NON-ROAD GENSET	TIER 4 FINAL	CO: 3.5 NOx: 0.67 HC: 0.19 PM: 0.03

EPA TIER 4 INTERIM		2011 - 2014		
Locality	**Agency**	**Regulation**	**Tier/Stage**	**Max Limits - G/BKW - HR**
U.S. (INCL CALIF)	EPA	NON-ROAD GENSET	TIER 4 INTERIM	CO: 3.5 NOx: 0.67 HC: 0.4 PM: 0.10

EPA NON-EMERGENCY STATIONARY GENSET		2015 - —		
Locality	**Agency**	**Regulation**	**Tier/Stage**	**Max Limits - G/BKW - HR**
U.S. (INCL CALIF)	EPA	STATIONARY	NON-EMERGENCY STATIONARY GENSET	CO: 3.5 NOx: 0.67 HC: 0.19 PM: 0.03

Altitude Derate Data

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	30	40	50	60	70	80	90	100	110	120	130	140	NORMAL
ALTITUDE (FT)													
0	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944
1,000	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944
2,000	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944
3,000	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944
4,000	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944
5,000	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944
6,000	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,935	2,885	2,837	2,944
7,000	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,926	2,874	2,825	2,777	2,730	2,944
8,000	2,944	2,944	2,944	2,944	2,944	2,919	2,866	2,815	2,766	2,718	2,672	2,627	2,944
9,000	2,944	2,944	2,944	2,916	2,861	2,808	2,757	2,708	2,660	2,614	2,570	2,527	2,944
10,000	2,944	2,916	2,859	2,804	2,751	2,700	2,651	2,604	2,558	2,514	2,471	2,430	2,853
11,000	2,861	2,804	2,749	2,696	2,645	2,596	2,549	2,503	2,459	2,417	2,376	2,336	2,762
12,000	2,750	2,695	2,642	2,591	2,542	2,495	2,449	2,406	2,363	2,323	2,283	2,245	2,673
13,000	2,642	2,589	2,539	2,490	2,443	2,397	2,354	2,312	2,271	2,232	2,194	2,157	2,587
14,000	2,539	2,488	2,439	2,392	2,347	2,303	2,262	2,221	2,182	2,144	2,108	2,073	2,504
15,000	2,439	2,390	2,343	2,298	2,255	2,213	2,173	2,134	2,096	2,060	2,025	1,991	2,423

Cross Reference

PERFORMANCE DATA[DM9368]

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
3704798	LL6338	3709874	GS538	-	SCJ00001	
3704981	GG0624	3994250	GS718	-	DD700001	
3704981	GG0624	5075758	GS538	-	SCJ01000	
4581574	LL6763	5157722	PG238	-	LY600001	

Supplementary Data

Type	Classification	Performance Number
AFTERTREATMENT	SCR	DM8842

Performance Parameter Reference

Parameters Reference:DM9600-10
PERFORMANCE DEFINITIONS

PERFORMANCE DEFINITIONS DM9600
APPLICATION:
Engine performance tolerance values below are representative of a typical production engine tested in a calibrated dynamometer test cell at SAE J1995 standard reference conditions. Caterpillar maintains ISO9001:2000 certified quality management systems for engine test Facilities to assure accurate calibration of test equipment. Engine test data is corrected in accordance with SAE J1995. Additional reference material SAE J1228, J1349, ISO 8665, 3046-1:2002E, 3046-3:1989, 1585, 2534, 2288, and 9249 may apply in part or are similar to SAE J1995. Special engine rating request (SERR) test data shall be noted.
PERFORMANCE PARAMETER TOLERANCE FACTORS:
Power +/- 3%
Torque +/- 3%
Exhaust stack temperature +/- 8%
Inlet airflow +/- 5%
Intake manifold pressure-gage +/- 10%
Exhaust flow +/- 6%
Specific fuel consumption +/- 3%
Fuel rate +/- 5%
Specific DEF consumption +/- 3%
DEF rate +/- 5%
Heat rejection +/- 5%
Heat rejection exhaust only +/- 10%
Heat rejection CEM only +/- 10%
Heat Rejection values based on using treated water.
Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.
On C7 - C18 engines, at speeds of 1100 RPM and under these values are provided for reference only, and may not meet the tolerance listed.
These values do not apply to C280/3600. For these models, see the tolerances listed below.
C280/3600 HEAT REJECTION TOLERANCE FACTORS:
Heat rejection +/- 10%
Heat rejection to Atmosphere +/- 50%
Heat rejection to Lube Oil +/- 20%
Heat rejection to Aftercooler +/- 5%
TEST CELL TRANSDUCER TOLERANCE FACTORS:
Torque +/- 0.5%
Speed +/- 0.2%
Fuel flow +/- 1.0%
Temperature +/- 2.0 C degrees
Intake manifold pressure +/- 0.1 kPa
OBSERVED ENGINE PERFORMANCE IS CORRECTED TO SAE J1995 REFERENCE AIR AND FUEL CONDITIONS.
REFERENCE ATMOSPHERIC INLET AIR
FOR 3500 ENGINES AND SMALLER
SAE J1228 AUG2002 for marine engines, and J1995 JAN2014 for other engines, reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity at the stated aftercooler water temp, or inlet manifold temp.
FOR 3600 ENGINES

PERFORMANCE DATA[DM9368]

Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JANJAN2014 reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity and 150M altitude at the stated aftercooler water temperature.

MEASUREMENT LOCATION FOR INLET AIR TEMPERATURE

Location for air temperature measurement air cleaner inlet at stabilized operating conditions.

REFERENCE EXHAUST STACK DIAMETER

The Reference Exhaust Stack Diameter published with this dataset is only used for the calculation of Smoke Opacity values displayed in this dataset. This value does not necessarily represent the actual stack diameter of the engine due to the variety of exhaust stack adapter options available. Consult the price list, engine order or general dimension drawings for the actual stack diameter size ordered or options available.

REFERENCE FUEL

DIESEL

Reference fuel is #2 distillate diesel with a 35API gravity;
A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 29 deg C (84.2 deg F), where the density is 838.9 G/Liter (7.001 Lbs/Gal).

GAS

Reference natural gas fuel has a lower heating value of 33.74 KJ/L (905 BTU/CU Ft). Low BTU ratings are based on 18.64 KJ/L (500 BTU/CU FT) lower heating value gas. Propane ratings are based on 87.56 KJ/L (2350 BTU/CU Ft) lower heating value gas.

ENGINE POWER (NET) IS THE CORRECTED FLYWHEEL POWER (GROSS) LESS EXTERNAL AUXILIARY LOAD

Engine corrected gross output includes the power required to drive standard equipment; lube oil, scavenge lube oil, fuel transfer, common rail fuel, separate circuit aftercooler and jacket water pumps. Engine net power available for the external (flywheel) load is calculated by subtracting the sum of auxiliary load from the corrected gross flywheel out put power. Typical auxiliary loads are radiator cooling fans, hydraulic pumps, air compressors and battery charging alternators. For Tier 4 ratings additional Parasitic losses would also include Intake, and Exhaust Restrictions.

ALTITUDE CAPABILITY

Altitude capability is the maximum altitude above sea level at standard temperature and standard pressure at which the engine could develop full rated output power on the current performance data set.

Standard temperature values versus altitude could be seen on TM2001.

When viewing the altitude capability chart the ambient temperature is the inlet air temp at the compressor inlet.

Engines with ADEM MEUI and HEUI fuel systems operating at conditions above the defined altitude capability derate for atmospheric pressure and temperature conditions outside the values defined, see TM2001.

Mechanical governor controlled unit injector engines require a setting change for operation at conditions above the altitude defined on the engine performance sheet. See your Caterpillar technical representative for non standard ratings.

REGULATIONS AND PRODUCT COMPLIANCE

TMI Emissions information is presented at 'nominal' and 'Potential Site Variation' values for standard ratings. No tolerances are applied to the emissions data. These values are subject to change at any time. The controlling federal and local emission requirements need to be verified by your Caterpillar technical representative.

Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

EMISSIONS DEFINITIONS:
Emissions : DM1176

HEAT REJECTION DEFINITIONS:
Diesel Circuit Type and HHV Balance : DM9500

HIGH DISPLACEMENT (HD) DEFINITIONS:
3500: EM1500

RATING DEFINITIONS:
Agriculture : TM6008
Fire Pump : TM6009
Generator Set : TM6035
Generator (Gas) : TM6041
Industrial Diesel : TM6010
Industrial (Gas) : TM6040
Irrigation : TM5749
Locomotive : TM6037
Marine Auxiliary : TM6036
Marine Prop (Except 3600) : TM5747
Marine Prop (3600 only) : TM5748
MSHA : TM6042
Oil Field (Petroleum) : TM6011
Off-Highway Truck : TM6039
On-Highway Truck : TM6038

SOUND DEFINITIONS:

PERFORMANCE DATA[DM9368]

Sound Power : DM8702
Sound Pressure : TM7080
Date Released : 7/7/15

Cat® 3516C
Diesel Generator Sets

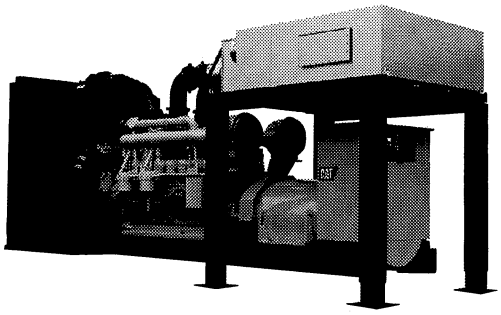


Image shown may not reflect actual configuration

Bore – mm (in)	170 (6.69)
Stroke – mm (in)	215 (8.46)
Displacement – L (in^3)	78 (4764.73)
Compression Ratio	14.7:1
Aspiration	TA
Fuel System	EUI
Governor Type	ADEM™ A3

Standby 60 Hz ekW (kVA)	Mission Critical 60 Hz ekW (kVA)	Prime 60 Hz ekW (kVA)	Emissions Performance
2000 (2500)	2000 (2500)	1825 (2281)	U.S. EPA Tier 4 Final

Standard Features

Cat® Diesel Engine
- Meets U.S. EPA Tier 4 Final emission standards
- Reliable performance proven in thousands of applications worldwide

Generator Set Package
- Accepts 100% block load in one step and meets other NFPA 110 loading requirements
- Conforms to ISO 8528-5 G3 load acceptance requirements
- Reliability verified through torsional vibration, fuel consumption, oil consumption, transient performance, and endurance testing

Alternators
- Superior motor starting capability minimizes need for oversizing generator
- Designed to match performance and output characteristics of Cat diesel engines

Cooling System
- Cooling systems available to operate in ambient temperatures up to 50°C (122°F)
- Tested to ensure proper generator set cooling

Clean Emissions Module
- Diesel oxidation catalyst for particulate matter (PM) and hydrocarbon (HC) control
- Selective catalytic reduction (SCR) for nitrogen oxides (NOx) control
- Integrated electronics for monitoring, protection, and closed loop NOx control

EMCP 4 Control Panels
- User-friendly interface and navigation
- Scalable system to meet a wide range of installation requirements
- Expansion modules and site specific programming for specific customer requirements

Warranty
- 24 months/1000-hour warranty for standby and mission critical ratings
- 12 months/unlimited hour warranty for prime and continuous ratings
- Extended service protection is available to provide extended coverage options

Worldwide Product Support
- Cat dealers have over 1,800 dealer branch stores operating in 200 countries
- Your local Cat dealer provides extensive post-sale support, including maintenance and repair agreements

Financing
- Caterpillar offers an array of financial products to help you succeed through financial service excellence
- Options include loans, finance lease, operating lease, working capital, and revolving line of credit
- Contact your local Cat dealer for availability in your region

Optional Equipment

Engine

Air Cleaner
- ❑ Single element
- ❑ Dual element

Muffler
- ❑ Industrial grade (12 dB)

Starting
- ❑ Standard batteries
- ❑ Oversized batteries
- ❑ Standard electric starter(s)
- ❑ Heavy duty electric starter(s)
- ❑ Air starter(s)
- ❑ Jacket water heater

Alternator

Output voltage
- ❑ 480V ❑ 6600V
- ❑ 600V ❑ 6900V
- ❑ 2400V ❑ 12470V
- ❑ 4160V ❑ 13200V
- ❑ 6300V ❑ 13800V

Temperature Rise (over 40°C ambient)
- ❑ 150°C
- ❑ 125°C/130°C
- ❑ 105°C
- ❑ 80°C

Winding type
- ❑ Random wound
- ❑ Form wound

Excitation
- ❑ Self excited
- ❑ Internal excitation (IE)
- ❑ Permanent magnet (PM)

Attachments
- ❑ Anti-condensation heater
- ❑ Stator and bearing temperature monitoring and protection

Power Termination

Type
- ❑ Bus bar
- ❑ Circuit breaker
- ❑ 1600A ❑ 2000A
- ❑ 2500A ❑ 3000A
- ❑ 3200A ❑ 4000A
- ❑ 5000A
- ❑ UL ❑ IEC
- ❑ 3-pole ❑ 4-pole
- ❑ Manually operated
- ❑ Electrically operated

Trip Unit
- ❑ LSI ❑ LSI-G
- ❑ LSIG-P

Control System

Controller
- ❑ EMCP 4.3
- ❑ EMCP 4.4

Attachments
- ❑ Local annunciator module
- ❑ Remote annunciator module
- ❑ Expansion I/O module
- ❑ Remote monitoring software

Charging

- ❑ Battery charger – 10A
- ❑ Battery charger – 20A
- ❑ Battery charger – 35A

Vibration Isolators

- ❑ Rubber
- ❑ Spring
- ❑ Seismic rated

Cat Connect

Connectivity
- ❑ Ethernet
- ❑ Cellular
- ❑ Satellite

Extended Service Options

Terms
- ❑ 2 year (prime)
- ❑ 3 year
- ❑ 5 year
- ❑ 10 year

Coverage
- ❑ Silver
- ❑ Gold
- ❑ Platinum
- ❑ Platinum Plus

Ancillary Equipment

- ❑ Automatic transfer switch (ATS)
- ❑ Uninterruptible power supply (UPS)
- ❑ Paralleling switchgear
- ❑ Paralleling controls

Certifications

- ❑ IBC seismic certification
- ❑ OSHPD pre-approval

Note: *Some options may not be available on all models. Certifications may not be available with all model configurations. Consult factory for availability.*

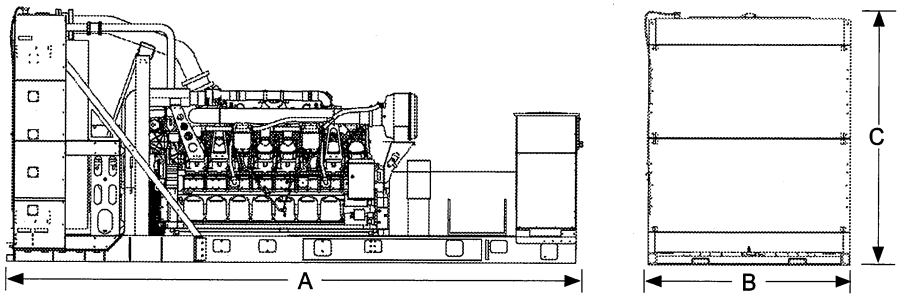
3516C Diesel Generator Sets
Electric Power

Package Performance

Performance	Standby		Mission Critical		Prime	
Frequency	60 Hz		60 Hz		60 Hz	
Gen set power rating with fan	2000 ekW		2000 ekW		1825 ekW	
Gen set power rating with fan @ 0.8 power factor	2500 kVA		2500 kVA		2281 kVA	
Emissions	Tier 4 Final		Tier 4 Final		Tier 4 Final	
Performance number	DM9368-01		DM9300-01		DM9369-01	
Fuel Consumption						
100% load with fan – L/hr (gal/hr)	528.0	(139.5)	528.0	(139.5)	484.6	(128.8)
75% load with fan – L/hr (gal/hr)	409.8	(108.3)	409.8	(108.3)	382.2	(101.0)
50% load with fan – L/hr (gal/hr)	297.0	(78.5)	297.0	(78.5)	277.8	(73.4)
25% load with fan – L/hr (gal/hr)	181.3	(47.9)	181.3	(47.9)	172.7	(45.6)
Diesel Exhaust Fluid (DEF) Consumption						
100% load with fan – L/hr (gal/hr)	38.2	(10.1)	38.2	(10.1)	33.7	(8.9)
75% load with fan – L/hr (gal/hr)	25.0	(6.6)	25.0	(6.6)	21.2	(5.6)
50% load with fan – L/hr (gal/hr)	13.2	(3.5)	13.2	(3.5)	12.1	(3.2)
25% load with fan – L/hr (gal/hr)	6.1	(1.6)	6.1	(1.6)	5.7	(1.5)
Cooling System						
Radiator air flow restriction (system) – kPa (in. water)	0.12	(0.48)	0.12	(0.48)	0.12	(0.48)
Radiator air flow – m^3/min (cfm)	2661.0	(93972)	2661.0	(93972)	2661.0	(93972)
Engine coolant capacity – L (gal)	233.0	(61.6)	233.0	(61.6)	233.0	(61.6)
Radiator coolant capacity – L (gal)	238.5	(63.0)	238.5	(63.0)	238.5	(63.0)
Total coolant capacity – L (gal)	471.5	(124.6)	471.5	(124.6)	471.5	(124.6)
Inlet Air						
Combustion air inlet flow rate – m^3/min (cfm)	172.7	(6097.7)	172.7	(6097.7)	161.9	(5716.6)
Exhaust System						
Exhaust stack gas temperature – °C (°F)	493.7	(920.6)	493.7	(920.6)	487.8	(910.0)
Exhaust gas flow rate – m^3/min (cfm)	461.7	(16301.3)	461.7	(16301.3)	427.5	(15095.5)
Exhaust system backpressure (maximum allowable) – kPa (in. water)	6.0	(24.0)	6.0	(24.0)	6.0	(24.0)
CEM outlet temperature – °C (°F)	476.9	(890.5)	476.9	(890.5)	469.4	(876.9)
Heat Rejection						
Heat rejection to jacket water – kW (Btu/min)	705	(40104)	705	(40104)	663	(37690)
Heat rejection to exhaust (total) – kW (Btu/min)	2070	(117743)	2070	(117743)	1905	(108311)
Heat rejection to aftercooler – kW (Btu/min)	487	(27713)	487	(27713)	422	(24018)
Heat rejection to atmosphere from engine – kW (Btu/min)	151	(8584)	151	(8584)	146	(8304)
Heat rejection to atmosphere from CEM – kW (Btu/min)	85	(4826)	85	(4826)	86	(4886)
Heat rejection from alternator – kW (Btu/min)	96	(5482)	96	(5482)	86	(4891)

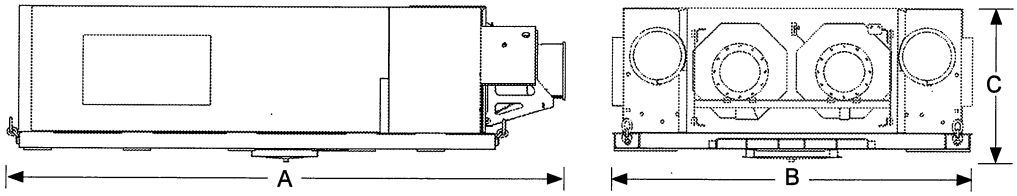
3516C Diesel Generator Sets
Electric Power

Weights and Dimensions



Dim "A" mm (in)	Dim "B" mm (in)	Dim "C" mm (in)	Dry Weight kg (lb)
6796.6 (267.6)	2378.7 (93.7)	2964.8 (116.7)	16 874 (37,200)

Note: *For reference only. Do not use for installation design. Contact your local Cat dealer for precise weights and dimensions.*



Dim "A" mm (in)	Dim "B" mm (in)	Dim "C" mm (in)	Dry Weight kg (lb)
3446.3 (135.7)	1537.3 (60.5)	895.1 (35.2)	2064 (4550)

Ratings Definitions

Standby
Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby power rating. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

Mission Critical
Output available with varying load for the duration of the interruption of the normal source power. Average power output is 85% of the mission critical power rating. Typical peak demand up to 100% of rated power for up to 5% of the operating time. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

Prime
Output available with varying load for an unlimited time. Average power output is 70% of the prime power rating. Typical peak demand is 100% of prime rated ekW with 10% overload capability for emergency use for a maximum of 1 hour in 12. Overload operation cannot exceed 25 hours per year.

Applicable Codes and Standards
AS 1359, CSA C22.2 No. 100-04, UL 142, UL 489, UL 869, UL 2200, NFPA37, NFPA70, NFPA99, NFPA110, IBC, IEC 60034-1, ISO 3046, ISO 8528, NEMA MG1-22, NEMA MG1-33, 2014/35/EU, 2006/42/EC, 2014/30/EU.

Note: Codes may not be available in all model configurations. Please consult your local Cat dealer for availability.

Data Center Applications
Tier III/Tier IV compliant per Uptime Institute requirements. ANSI/TIA-942 compliant for Rated-1 through Rated-4 data centers.

Fuel Rates
Fuel rates are based on fuel oil of 35° API [16°C (60°F)] gravity having an LHV of 42,780 kJ/kg (18,390 Btu/lb) when used at 29°C (85°F) and weighing 838.9 g/liter (7.001 lbs/U.S. gal.)

www.cat.com/electricpower

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Materials and specifications are subject to change without notice.
The International System of Units (SI) is used in this publication.

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Exhibit 13-K

MEMORANDUM

To: File

From: Kevin J. Ostrowski, Senior Meteorologist, Maine DEP

Date: December 18, 2019

Re: Nordic Aquafarms, Inc., Belfast and Northport

Chapter 115 Minor Source Air Emission License Application # A-1146-71-A-N

Background

Nordic Aquafarms, Inc. (Nordic) applied to the Maine Department of Environmental Protection (DEP or Department) for Site Location of Development Act (Site Law), Natural Resources Protection Act (NRPA), Maine Pollutant Discharge Elimination System (MEPDES)/Waste Discharge License (WDL) and Chapter 115 Minor Source Air Emissions licenses to construct and operate a Recirculating Aquaculture System (RAS) facility in Belfast and Northport, Maine for the rearing and processing of Atlantic salmon. DEP accepted Nordic's applications as complete for processing on June 13, 2019, and the Board assumed licensing jurisdiction over the applications and voted to hold a hearing on the applications at its June 20, 2019 meeting.

Nordic's proposed project would be located on an approximately 54-acre site in Belfast, with pipelines extending into neighboring Northport. The proposed project would raise and process up to approximately 33,000 metric tons per year of Atlantic salmon. As part of its proposed project, Nordic has applied for a Chapter 115 Minor Source Air Emission License for the installation of eight distillate fuel-fired generators, the specifications of which are listed below. Following review of comments submitted by Intervenor Upstream Watch/Northport Village Corporation, DEP staff recommended, and the Board voted on November 7, 2019, to include the air emissions application among the issues to be examined at the hearing. Additionally, although the emissions as quantified by the applicant would not normally require an air dispersion modeling analysis pursuant to Chapter 115 § 7 of the DEP's rules, staff decided to conduct dispersion modeling to estimate ambient air concentrations from the operation of the proposed stationary

fuel-burning equipment as part of its evaluation of Nordic's license application and provide that information to the Board and the parties.

The inputs and results of the staff's dispersion modeling are set forth below.

1.0 INTRODUCTION

The dispersion modeling analysis was performed to assist the DEP in determining whether emissions from the operation of Nordic's fuel-burning equipment would cause or contribute to violations of National Ambient Air Quality Standards (NAAQS) for SO_2, PM_{10}, $PM_{2.5}$, NO_2 or CO or to Class II increment standards for SO_2, PM_{10}, $PM_{2.5}$ or NO_2.

All modeling was performed in accordance with all applicable requirements of DEP Bureau of Air Quality (DEP-BAQ) and the United States Environmental Protection Agency (USEPA).

The following is a summary of the assumptions, methodologies and results of the analysis:

2.0 MODEL AND OPTION SELECTION

The AERMOD refined dispersion model with its associated pre-processors was used to predict ambient air concentrations in the modeling domain surrounding the proposed Nordic facility.

The following versions were used:

- AERMOD (version 19191)
- AERMET (version 19191)
- AERMAP (version 18081)
- AERSURFACE (version 13016)

The AERMOD analysis accounted for the potential of building wake and cavity effects on emissions from all modeled stacks.

Due to the terrain variations over the modeling domain, the 'elevated terrain' setting was chosen.

Since the proposed Nordic facility is not located near any significant population center, the 'rural' dispersion option was chosen.

2.1 PHYSICAL STACK AND EMISSIONS DATA

All AERMOD data inputs for Nordic were developed by DEP-BAQ from information derived from Nordic's license applications and, from Nordic's responses to subsequent requests for information by DEP staff, including data submitted by Elizabeth Ransom to Jane Gilbert (DEP-BAQ) via e-mail dated November 19, 2019.

Nordic's air license application states: "Nordic Aquafarms is planning to install eight 2-MegaWatt (MW) diesel engine sets. The power plant will be designed to generate 14 MWs of electricity using seven of the eight engines. The eighth engine will be designed as a back-up." The AERMOD analysis was set up to estimate impacts associated with the simultaneous operation of seven engines.

The seven engines were conservatively modeled at their maximum design heat input rate for 8,760 hours per year.

AERMOD point-source parameters for Nordic can be found in Tables 1 & 2:

TABLE 1: PHYSICAL STACK DATA

Stacks	Stack Base Elevation (m)	Stack Height (m)	GEP Stack Height (m)	Stack Diameter (m)	UTM Easting NAD83 (m)	UTM Northing NAD83 (m)
Engine Stack 1	18.28	20.57	32.77	0.41	500542	4915990
Engine Stack 2	18.28	20.57	32.77	0.41	500541	4915990
Engine Stack 3	18.28	20.57	32.77	0.41	500545	4915990
Engine Stack 4	18.28	20.57	32.77	0.41	500545	4915991
Engine Stack 5	18.28	20.57	32.77	0.41	500548	4915992
Engine Stack 6	18.28	20.57	32.77	0.41	500548	4915993
Engine Stack 7	18.28	20.57	32.77	0.41	500551	4915993
Engine Stack 8	18.28	20.57	32.77	0.41	500551	4915994

TABLE 2: STACK EMISSION DATA

Stacks	Averaging Periods	SO_2 (g/s)	PM_{10} (g/s)	$PM_{2.5}$ (g/s)	NO_x (g/s)	CO (g/s)	Stack Temp (K)	Stack Velocity (m/s)
Engine Stacks 1 - 8	All	0.53	0.0038	0.0038	0.004	2.03	463.71	60.64

2.3 MODELING DOMAIN AND RECEPTOR GRID

As illustrated in Figures 1 and 2, a two-tiered nested 10 x 10-kilometer Cartesian receptor grid was utilized in the AERMOD analysis. The receptor grid contained a total of approximately 7,700 receptors and was centered near the location of Nordic's proposed stacks, comprised of the following receptor spacings:

- 20-meter spacing out to 750 meters
- 200-meter spacing out to 5000 metes

All receptors within Nordic's property line were removed from the analysis as they are not considered ambient air.

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FIGURE 1: EXTENT OF 200 METER RECEPTOR GRID

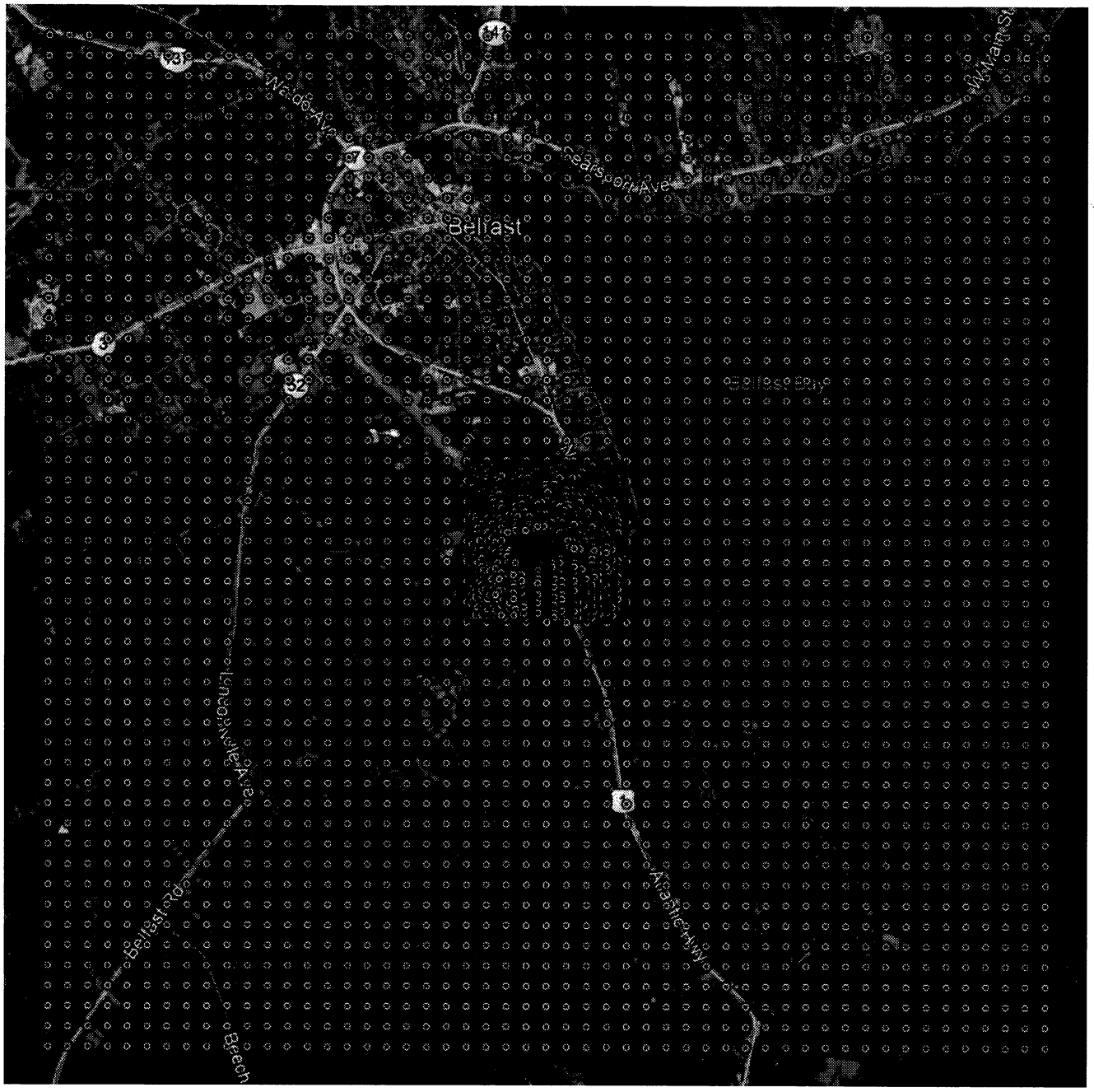


FIGURE 2: EXTENT OF 20 METER RECEPTOR GRID



2.4 TERRAIN DATA

Receptor elevations and corresponding receptor height scales (h_c) were generated by the AERMAP terrain pre-processor using terrain data acquired from the United States Geological Survey's (USGS) National Elevation Dataset (NED).

2.5 METEOROLOGICAL DATA

A valid five-year hourly meteorological database was used in the AERMOD modeling analysis. The monitored parameters and their associated heights, as found in Table 3, were collected at the Verso Bucksport meteorological multi-level monitoring site during the five-year period January 1, 1988 to December 31, 1992.

TABLE 3: METEOROLOGICAL DATA PARAMETERS

Parameter	Sensor Heights
Wind Speed	10 & 100 meters
Wind Direction	10 & 100 meters
Standard Deviation of Horizontal Wind Direction (Sigma Θ)	10 & 100 meters
Standard Deviation of Vertical Wind Direction (Sigma W)	10 & 100 meters
Temperature	10 & 100 meters

Surface data collected at the Bangor National Weather Service (NWS) site were substituted for any missing data in the primary surface dataset. All other missing data were interpolated or coded as missing, per USEPA guidance. In addition, hourly Bangor NWS data, from the same time period, were also used to supplement the primary surface dataset for the required variables that were not explicitly collected at the Verso Bucksport monitoring site.

The surface data was combined with concurrent hourly cloud cover and upper-air data obtained from the Portland NWS. Missing cloud cover and/or upper-air data values were interpolated or coded as missing, per USEPA guidance.

Both the surface and upper-air meteorological data were concurrently processed using the AERMET meteorological pre-processor.

AERMET also requires that site-specific surface characteristics around the meteorological and application sites be evaluated. Accordingly, the site surface characteristics values for albedo (r), surface roughness (z_o) and Bowen Ratio (B_o) were calculated using USEPA's AERSURFACE program for each of the twelve 30-degree sectors.

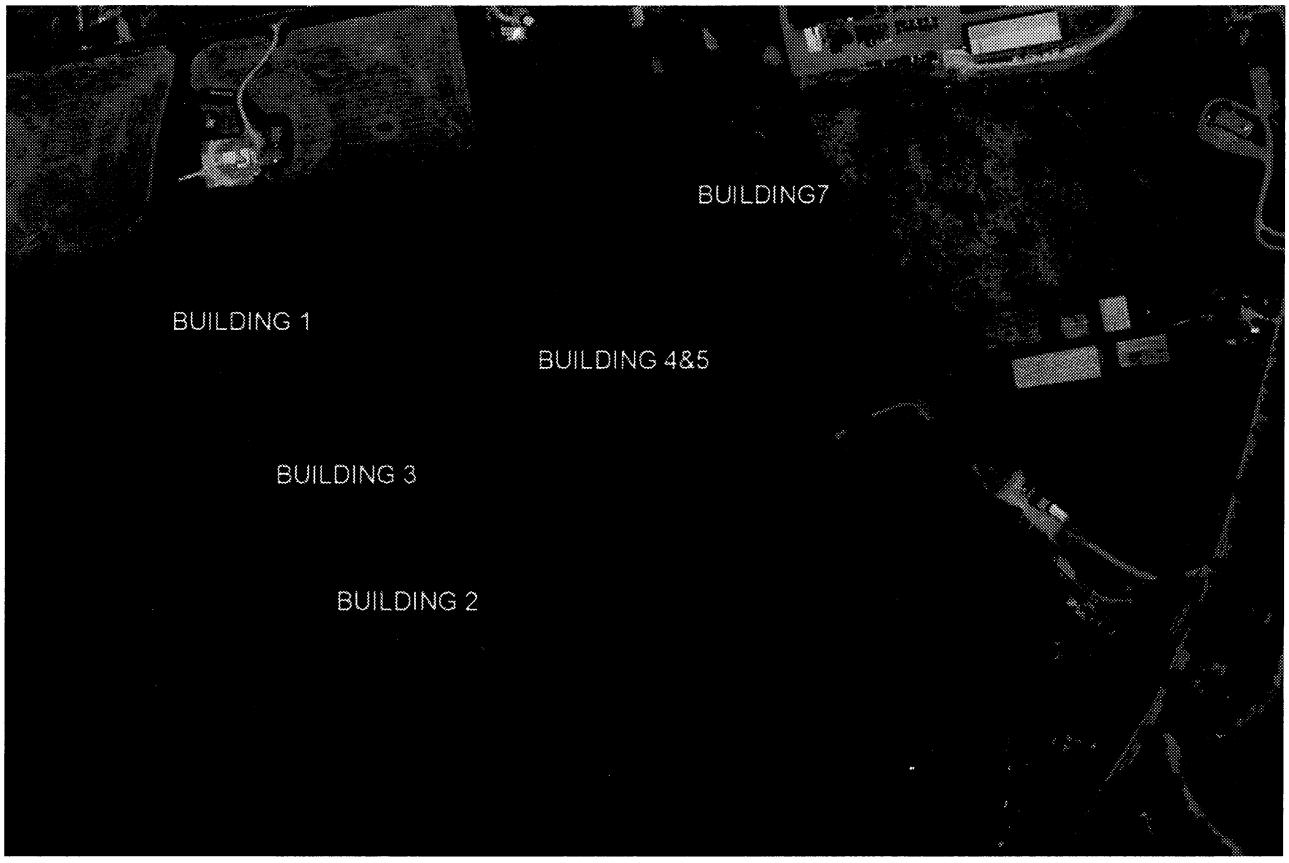
Per USEPA guidance, the surface roughness values were calculated within a one-kilometer radius of the monitoring site, while values of albedo and Bowen ratio were developed over a 10 x 10 kilometer region, centered over the monitoring site.

The seasonal categories for AERSURFACE were assigned in accordance with DEP modeling guidance.

2.6 BUILDING RELATED DATA

Buildings at the proposed Nordic facility, as illustrated in Figure 3, were input into USEPA's Building Profile Input Program with Plume Rise Model Enhancement (BPIP-PRIME) to determine any downwash effects from these structures. The dimensional building data was developed and input into BPIP-PRIME from plot plans and other site drawings on file at DEP-BAQ.

FIGURE 3: NORDIC BUILDINGS



2.7 POLLUTANT CONVERSION METHODS / OTHER ASSUMPTIONS

For the purpose of determining maximum predicted NO_2 and $PM_{10}/PM_{2.5}$ impacts, the following assumptions were used:

- NO_X emissions were assumed to convert to NO_2 using USEPA's Tier II Ambient Ratio Method (ARM2) minimum and maximum ratios of 0.5 and 0.9, respectively;
- $PM_{2.5}$ emissions were conservatively modeled as being equivalent to PM_{10} emissions.

2.8 AMBIENT BACKGROUND CONCENTRATIONS

Background concentrations, as found in Table 4, used in the analysis were derived from representative rural background data for use in the Midcoast Maine region.

TABLE 4: AMBIENT BACKGROUND CONCENTRATIONS

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)	Monitoring Site, Year(s)
SO_2	1-hour	15	Kennebec County, 2016-2018
	3-hour	2	Acadia National Park, 2018
$PM_{10}/PM_{2.5}$	24-hour	15	Kennebec County, 2016-2018
	Annual	6	
NO_2	1-hour	39	Presque Isle, 2016/2017
	Annual	4	
CO	1-hour	460	Hancock County, 2018
	8-hour	460	

3.0 MAXIMUM PREDICTED IMPACTS

The maximum predicted AERMOD impacts, which were explicitly normalized to the form of their respective NAAQS, were added with the conservative rural background values to obtain a final maximum concentration to compare against the NAAQS, as shown in Table 5.

TABLE 5: MAXIMUM PREDICTED IMPACTS (NAAQS COMPARISON)

Pollutant	Averaging Period	Max Impact ($\mu g/m^3$)	Receptor UTM E (m)	Receptor UTM N (m)	Receptor Elevation (m)	Back-Ground ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
SO_2	1-hour	1.81	500570	4915810	14.71	15	16.81	196
	3-hour	1.63	500450	4915790	16.02	2	3.63	1,300
PM_{10}	24-hour	6.19	500470	4916150	21.26	15	21.19	150
	Annual	1.47	500490	4916150	21.22	6	7.47	50
$PM_{2.5}$	24-hour	6.19	500470	4916150	21.26	15	21.19	35
	Annual	1.47	500490	4916150	21.22	6	7.47	12
NO_2	1-hour	123.34	500550	4915810	13.84	39	162.34	188
	Annual	16.95	500490	4916150	21.22	4	20.95	100
CO	1-hour	1135.74	500570	4915810	14.71	460	1595.74	40,000
	8-hour	574.62	500490	4916150	21.22	460	1034.62	10,000

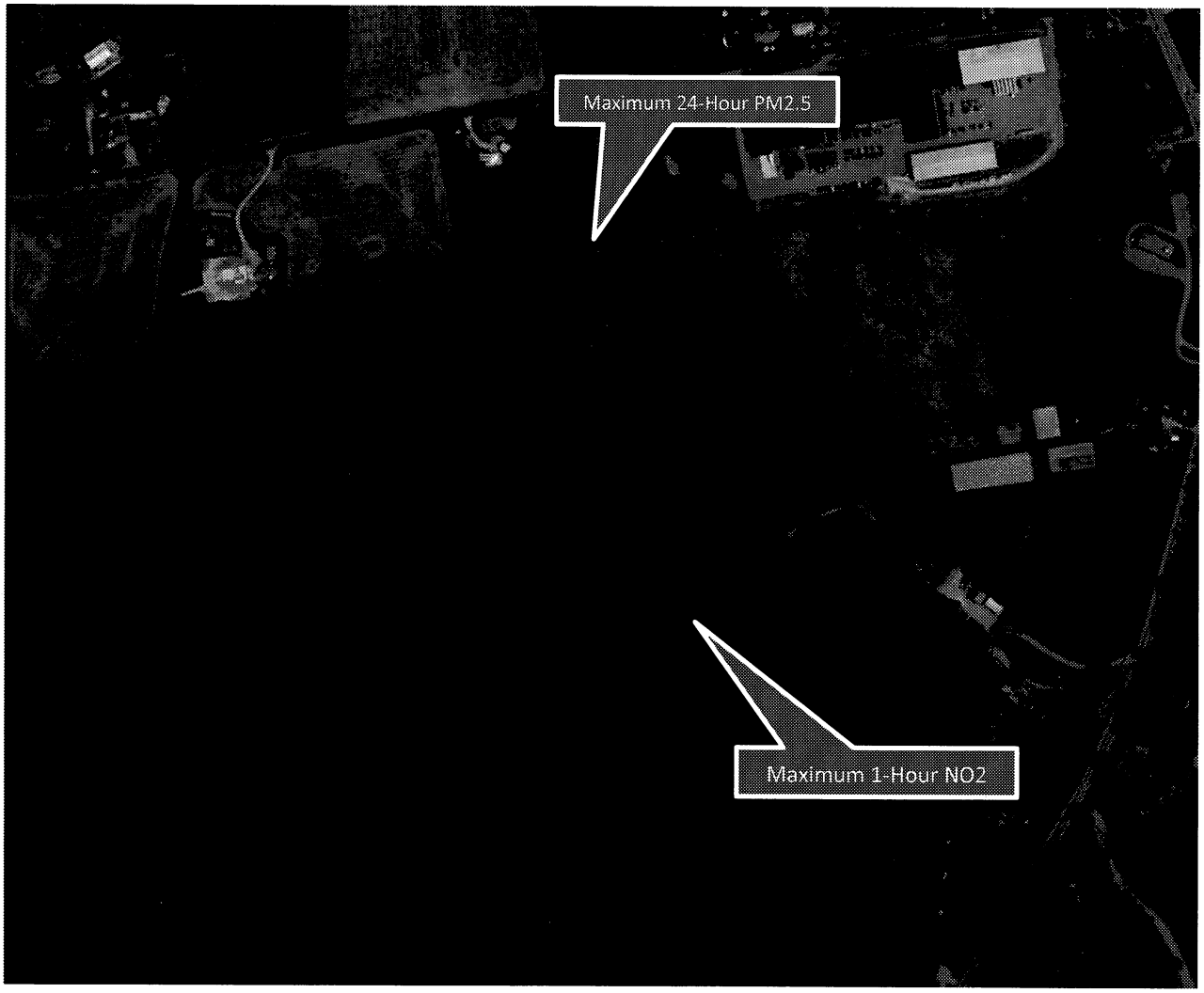
The maximum predicted AERMOD impacts, which were explicitly normalized to the form of their respective Class II increment standard, are shown in Table 6.

TABLE 6: MAXIMUM PREDICTED CLASS II IMPACTS (INCREMENT COMPARISON)

Pollutant	Averaging Period	Max Impact ($\mu g/m^3$)	Receptor UTM E (km)	Receptor UTM N (km)	Receptor Elevation (m)	Class II Increment ($\mu g/m^3$)
SO_2	3-hour	1.63	500450	4915790	16.02	512
	24-hour	0.88	500490	4916150	21.22	91
	Annual	0.15	500490	4916150	21.22	20
PM_{10}	24-hour	6.19	500470	4916150	21.26	30
	Annual	1.47	500490	4916150	21.22	17
$PM_{2.5}$	24-hour	8.34	500490	4916150	21.22	9
	Annual	1.47	500490	4916150	21.22	4
NO_2	Annual	16.95	500490	4916150	21.22	25

For the two pollutants/averaging periods whose modeled impacts were closest to their respective NAAQS and Class II increment standards, Figure 4 shows the locations of the maximum NO_2 (1-Hour averaging period) and $PM_{2.5}$ (24-Hour averaging period) predicted concentrations.

FIGURE 4: LOCATION OF MAXIMUM 1 HOUR NO2 IMPACT



All data, site drawings and other information used in developing the AERMOD input and output modeling files can be made available for review to interested parties at the DEP-BAQ offices located in Augusta.

	Pollutant	Average	Group	Rank	Conc/Dep	East (X)
5 YEARS	NO2	8TH-HIGHEST MAX DAILY 1-HR	ALL	1ST	140.55	500570
	NO2	8TH-HIGHEST MAX DAILY 1-HR	7STACKS	1ST	123.34	500550
	NO2	8TH-HIGHEST MAX DAILY 1-HR	4STACKS	1ST	72.74	500550
1988	NO2	ANNUAL	ALL	1ST	19.28	500490
	NO2	ANNUAL	7STACKS	1ST	16.95	500490
	NO2	ANNUAL	4STACKS	1ST	9.83	500490
1989	NO2	ANNUAL	ALL	1ST	18.19	500490
	NO2	ANNUAL	7STACKS	1ST	16.00	500490
	NO2	ANNUAL	4STACKS	1ST	9.32	500490
1990	NO2	ANNUAL	ALL	1ST	18.66	500470
	NO2	ANNUAL	7STACKS	1ST	16.40	500470
	NO2	ANNUAL	4STACKS	1ST	9.52	500470
1991	NO2	ANNUAL	ALL	1ST	16.13	500470
	NO2	ANNUAL	7STACKS	1ST	14.16	500470
	NO2	ANNUAL	4STACKS	1ST	8.23	500450
1992	NO2	ANNUAL	ALL	1ST	17.24	500450
	NO2	ANNUAL	7STACKS	1ST	15.15	500450
	NO2	ANNUAL	4STACKS	1ST	8.80	500450

North (Y)	Elev
4915810	14.71
4915810	13.84
4915810	13.84
4916150	21.22
4916150	21.22
4916150	21.22
4916150	21.22
4916150	21.22
4916150	21.22
4916150	21.26
4916150	21.26
4916150	21.26
4916150	21.26
4916150	21.26
4916150	21.55
4916150	21.55
4916150	21.55
4916150	21.55

State Plans to Address Emissions During Startup, Shutdown and Malfunction: Final Action on Response to Petition for Rulemaking, Restatement of Policy, Findings of Inadequacy and Call for Revisions

Fact Sheet

Action

- On May 22, 2015, the U.S. Environmental Protection Agency (EPA) issued a final action to ensure states have plans in place that are fully consistent with the Clean Air Act and recent court decisions concerning startup, shutdown and malfunction (SSM) operations. Air pollution emitted during these periods may adversely affect the health of people in neighboring and downwind communities.

- This action responds to a petition for rulemaking filed by the Sierra Club by addressing outdated provisions in State Implementation Plans (SIPs), improving national consistency and providing clarity for the treatment of emissions that occur during startup, shutdown and malfunction (SSM).

- This final action specifically:
    1. responds to the Sierra Club Petition;
    2. clarifies the EPA's SSM Policy to assure consistency with the Clean Air Act and recent court decisions; and
    3. finalizes the Administrator's findings that the SSM provisions in the SIPs of 36 states (applicable in 45 statewide and local jurisdictions and no tribal areas) do not meet the requirements of the Clean Air Act (CAA) and accordingly issues a "SIP call" for each of those states.

- In issuing the SIP call action, the EPA directs the affected states to correct specific SSM provisions in their SIPs. The Clean Air Act allows a maximum of 18 months from the issuance of the final action to submit a SIP revision. The SIP submission deadline for each of the 36 states subject to the SIP call action is November 22, 2016.

- A list at the end of this fact sheet shows the EPA's final action for each of the 41 states whose SIPs were reviewed by the EPA as part of this action—39 states identified in the Petition and 2 states identified by the EPA independently.

Background

- The CAA (section 110(k)(5)) provides a mechanism commonly called a "SIP call" for correcting state implementation plans that the Administrator finds to be substantially inadequate to meet CAA requirements.

- Exemptions from emission limits during periods of startup, shutdown and malfunction exist in a number of state rules, some of which were adopted and approved into SIPs by the EPA many years ago.

- Recent court decisions have held that under the CAA, such exemptions are not allowed in SIPs. Other court decisions have remanded similar exemptions in National Emissions Standards for Hazardous Air Pollutants (NESHAP), which the EPA is also correcting in separate actions.

- On February 12, 2013, the EPA proposed to:
  - deny the request in the Petition that EPA prohibit affirmative defenses in SIPs.
  - grant the Petitioner's claim for 36 of the 39 states identified in the Petition, by proposing to determine that these 36 states have approved SIPs that include one or more SSM provision that is inconsistent with the CAA. EPA proposed a "SIP Call" for each of those 36 states.
  - deny the request in the Petition that EPA discontinue reliance on interpretive letters from states to clarify any potential ambiguity in the state's SIP submission.

- Subsequent to the February 2013 proposal, on April 18, 2014, the U.S. Court of Appeals for the D.C. Circuit issued its decision in *NRDC v. EPA*, 749 F.3d 1055 (D.C. Cir. 2014). The court evaluated the legal validity of an affirmative defense provision in the EPA's NESHAP for the manufacturers of Portland cement. In the court's opinion, affirmative defense provisions in the EPA's own regulations cannot be applicable to violations of CAA requirements. The EPA extended the logic of the court's decision to SIP provisions and revised its SSM policy on approvability of affirmative defense provisions in SIPs.

- The EPA issued a supplemental proposal in September 2014 to reflect the court's opinion that affirmative defense provisions cannot be applicable to violations of CAA requirements. In the supplemental proposal, the EPA revised what it proposed in February 2013 with respect to affirmative defense provisions and it proposed SIP calls for affirmative defense provisions in additional states.

For More Information

- To download a copy of this notice, go to the EPA's website at: http://www.epa.gov/airquality/urbanair/sipstatus/

- Today's final action and other background information are also available either electronically at http://www.regulations.gov, which is the EPA's electronic public docket and comment system, or in hardcopy at the EPA Docket Center's Public Reading Room.

- The Public Reading Room is located at EPA Headquarters, room number 3334 in the William Jefferson Clinton West Building, 1301 Constitution Avenue, NW, Washington, D.C. Hours of operation are 8:30 a.m. to 4:30 p.m. eastern standard time, Monday through Friday, excluding federal holidays.

- Visitors are required to show photographic identification, pass through a metal detector, and sign the EPA visitor log. All visitor materials will be processed through an X-ray machine as well. Visitors will be provided a badge that must be visible at all times.

- Materials for this final action can be accessed using Docket ID No. EPA-HQ-OAR-2012-0322.

- For more information on the final action, contact either Lisa Sutton at (919) 541-3450 or email at sutton.lisa@epa.gov or Geoffrey L. Wilcox at (202) 564-5601 or email at wilcox.geoffrey@epa.gov.

List of EPA's Final Actions for All Affected States

State	EPA's Final Action on Petition, to Grant or Deny, in Whole or in Part	Does EPA's final action include a SIP call for SSM provisions?
Alabama	Grant	Yes
Alaska	Grant	Yes
Arizona	Partially grant, partially deny	Yes (for State and Maricopa County, not for Pima County)
Arkansas	Grant	Yes
California	*Not applicable*	Yes (for Eastern Kern APCD, Imperial APCD and San Joaquin Valley Unified APCD)
Colorado	Grant	Yes
Delaware	Grant	Yes
District of Columbia	Partially grant, partially deny	Yes
Florida	Grant	Yes
Georgia	Grant	Yes
Idaho	Deny	No
Illinois	Grant	Yes
Indiana	Grant	Yes
Iowa	Partially grant, partially deny	Yes
Kansas	Grant	Yes
Kentucky	Partially grant, partially deny	Yes (for State, not for Jefferson County)
Louisiana	Grant	Yes
Maine	Grant	Yes
Michigan	Grant	Yes
Minnesota	Grant	Yes
Mississippi	Grant	Yes
Missouri	Partially grant, partially deny	Yes
Montana	Grant	Yes
Nebraska	Deny	No (for State and Lincoln-Lancaster)
New Hampshire	Deny	No
New Jersey	Partially grant, partially deny	Yes
New Mexico	Grant	Yes (for State and Albuquerque-Bernalillo County)
North Carolina	Grant	Yes (for State and Forsyth County)
North Dakota	Partially grant, partially deny	Yes
Ohio	Partially grant, partially deny	Yes
Oklahoma	Grant	Yes
Oregon	Deny	No
Rhode Island	Grant	Yes
South Carolina	Partially grant, partially deny	Yes
South Dakota	Grant	Yes

State	EPA's Final Action on Petition, to Grant or Deny, in Whole or in Part	Does EPA's final action include a SIP call for SSM provisions?
Tennessee	Grant	Yes (for State, Knox County and Shelby County)
Texas	*Not applicable*	Yes
Virginia	Grant	Yes
Washington	Grant	Yes (for State, Energy Facility Site Evaluation Council and Southwest Clean Air Agency)
West Virginia	Grant	Yes
Wyoming	Deny	No
41 states	**Grant or partially grant: 34 states**	**SIP call: 36 states**

01/17/2020 NVC/UPSTREAM 13-N

Air and Radiation

http://epa.gov/air/criteria.html
Last updated on Tuesday, October 21, 2014

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National Ambient Air Quality Standards (NAAQS)

The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards (40 CFR part 50) for pollutants considered harmful to public health and the environment. The Clean Air Act identifies two types of national ambient air quality standards. ***Primary standards*** provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. ***Secondary standards*** provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

EPA has set National Ambient Air Quality Standards for six principal pollutants, which are called "criteria" pollutants. They are listed below. Units of measure for the standards are parts per million (ppm) by volume, parts per billion (ppb) by volume, and micrograms per cubic meter of air ($\mu g/m^3$).

Pollutant [final rule cite]		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide [76 FR 54294, Aug 31, 2011]		primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead [73 FR 66964, Nov 12, 2008]		primary and secondary	Rolling 3 month average	0.15 $\mu g/m^3$ (1)	Not to be exceeded
Nitrogen Dioxide [75 FR 6474, Feb 9, 2010] [61 FR 52852, Oct 8, 1996]		primary	1-hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	Annual	53 ppb (2)	Annual Mean
Ozone [73 FR 16436, Mar 27, 2008]		primary and secondary	8-hour	0.075 ppm (3)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution Dec 14, 2012	$PM_{2.5}$	primary	Annual	12 $\mu g/m^3$	annual mean, averaged over 3 years
		secondary	Annual	15 $\mu g/m^3$	annual mean, averaged over 3 years
		primary and secondary	24-hour	35 $\mu g/m^3$	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24-hour	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010] [38 FR 25678, Sept 14, 1973]		primary	1-hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

as of October 2011

(1) Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

(2) The official level of the annual NO2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

(3) Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, EPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.

(4) Final rule signed June 2, 2010. The 1971 annual and 24-hour SO2 standards were revoked in that same rulemaking.

However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

See historical tables of NAAQS standards

* Carbon Monoxide
* Lead
* Nitrogen Dioxide
* Ozone
* Particle Pollution
* Sulfur Dioxide

Menu of Control Measures for NAAQS Implementation

The Menu of Control Measures (MCM) provides state, local and tribal air agencies with the existing emission reduction measures as well as relevant information concerning the efficiency and cost effectiveness of the measures. State, local and tribal agencies will be able to use this information in developing emission reduction strategies, plans and programs to assure they attain and maintain the National Ambient Air Quality Standards (NAAQS). The MCM is a living document that can be updated with newly available or more current data as it becomes available.

* Menu of Control Measures (PDF) (66pp, 999k)
* Menu of Control Measures (Excel) (480k)



Exhibit 13-O
Modeled 1-Hour NO2 Impacts

TECH environmental

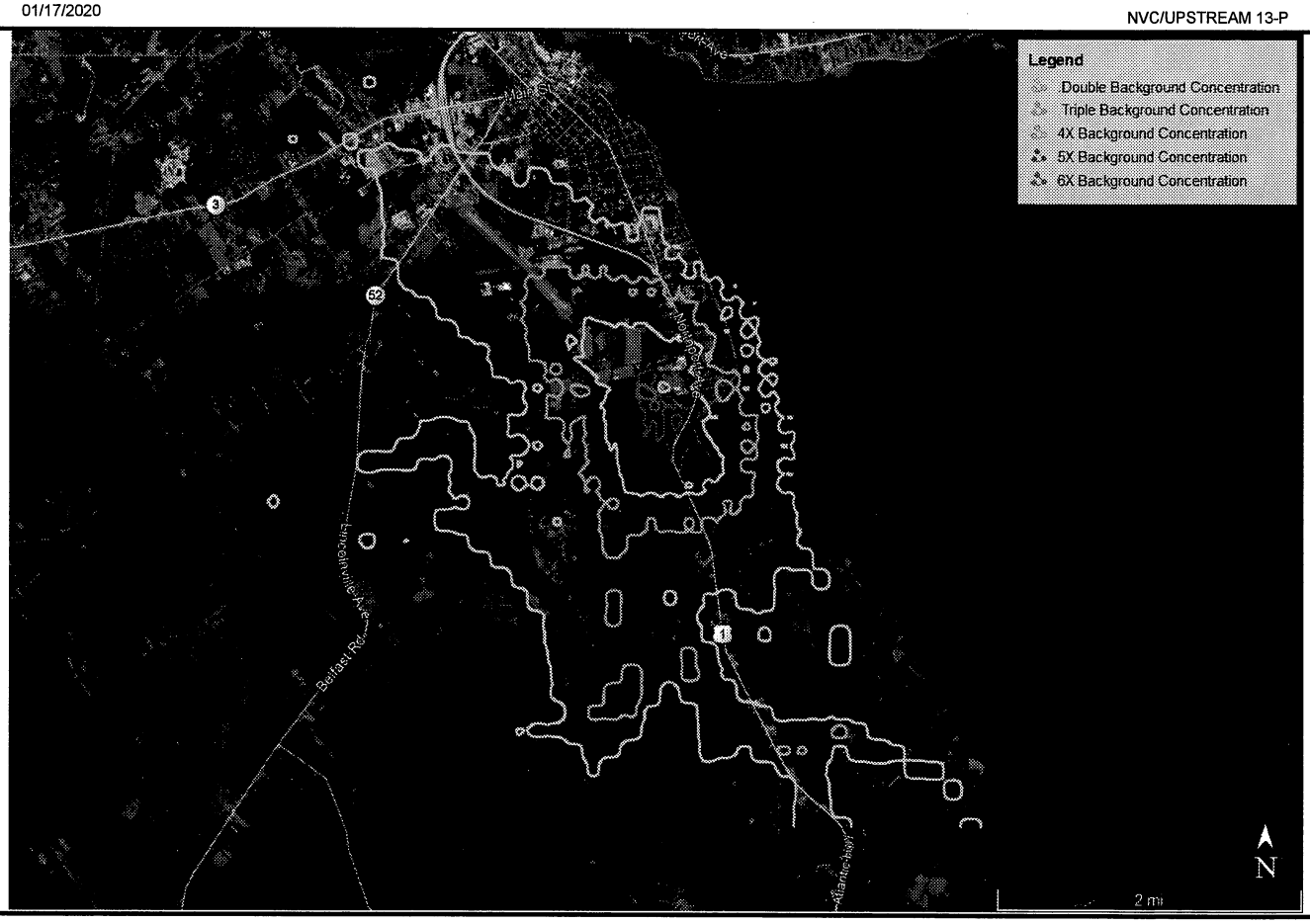


Exhibit 13-P
Modeled 1-Hour NO2 Concentrations over Background

TECH environmental

RANSOM
Consulting, Inc.

Consulting
Engineers
and Scientists

November 4, 2019 Project 171.05027.008

Mr. Kevin Martin
Compliance & Procedures Specialist
Maine Department of Environmental Protection
17 State House Station
Augusta, Maine 04333-0017

RE: Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Dear Mr. Martin:

This letter provides responses to the Department of Environmental Protection (DEP) letter from Kevin Martin to Elizabeth Ransom dated October 9, 2019. For clarity, each comment from that letter has been copied below and italicized. Responses are in regular text, and on the attached plans and figures as referenced below.

Natural Resources Protection Act (NRPA) application

1. According to Plan Sheet CE502, the proposed runoff diversion trench contains an underdrain pipe that will intercept groundwater, in addition to surface runoff, from off-site properties and convey the captured groundwater and surface water into Stream 9. In the application it is unclear whether post-development groundwater from the project site is sufficient to sustain flows in the downstream portions of Streams 3, 5, and 6. Please explain the flows that will be maintained in the portions of these streams proposed to be wetted by the applicant and demonstrate there is water of sufficient quantity and quality to ensure this mitigation function as intended. Also, please provide and describe the baseline that you use to measure pre-development flows against post-development flows.

The proposed diversion trench has been redesigned as shown on our response to Question 1 of the October 3, 2019 Technical Memorandum from Karem Gungor to Beth Callahan of DEP. Nordic has initiated collection of stream velocity measurements at the southern side of the proposed development for Streams 3, 5, and 6. Nordic proposes installing a weir in each stream (3, 5, and 6) near the southern property line for the development so that continuous measurements of discharge (or absence of discharge) can be developed for pre- and post- development conditions. Nordic will install a transducer at each of the weirs so that near-continuous data can be developed.

2. Please describe and quantify the impact associated with the road crossing over Stream 9 between Wetland 8 and Wetland 9. Please revise your alternatives analysis, minimization strategies, and compensation proposal to account for this impact.

Pease International Tradeport, 112 Corporate Drive, Portsmouth, New Hampshire 03801, Tel (603) 436-1490, Fax (603) 436-6037
400 Commercial Street, Suite 404, Portland, Maine 04101, Tel (207) 772-2891
12 Kent Way, Suite 100, Byfield, Massachusetts 01922-1221, Tel (978) 465-1822
60 Valley Street, Building F, Suite 106, Providence, Rhode Island 02909, Tel (401) 433-2160
2127 Hamilton Avenue, Hamilton, New Jersey 08619, Tel (609) 584-0090

www.ransomenv.com

As noted in Nordic's August 22, 2019 response to DEP's July 3, 2019 comment letter, the culvert crossing at S9 located between wetlands W8 and W9 will be constructed using a natural open bottom culvert in order to avoid impacts to the streambed and allow it to continue to naturally manage floodflow during storm events. This will maintain the floodflow alteration function of S9, previously identified during the Functions and Values Assessment. Additionally, the use of the open bottom culvert will maintain the natural substrate of the streambed, and not negatively impact the substrate value. Additionally, by utilizing a wide culvert span and maintaining existing, natural flows, this culvert crossing will not have a negative impact on the streams channel morphology, bank erosion or pool/glide and riffle/run quality. The crossing will be placed at greater than 1.2 times bankfull width and will have no temporary or permanent impacts to Wetlands 8 and 9.

3. Please state the projected amount of surface water and groundwater that will be discharged into Stream 9 from the proposed runoff diversion trench and whether this additional volume of water will affect the viability and persistence of the supplemental plantings in Restoration Areas 1 and 3, and the physical geomorphology of the stream channel and associated riparian area. Please demonstrate the capability of Stream 9 to successfully handle the additional flows from the proposed runoff diversion trench without adversely affecting the proposed stream compensation and without adversely modifying the physical characteristics of Stream 9 and its riparian area.

The size of the drainage area for Stream 9 has not appreciably changed between pre- and post-development conditions. As noted in our response to the June 25, 2019 Technical Memorandum from Karem Gungor to Beth Callahan of DEP, the diversion of the offsite stormwater to PT6 provides little increase in flow at that analysis point due to additional off-site area being drained to that location. The channel being used for diversion is being constructed at a slope of 0.005 feet per foot and will be utilizing stone check dams. There will not be appreciable erosion caused by the channel. In addition, it should be noted that while there is minimal increase in flow to analysis point 6 due to the additional area draining to that location, there is less area contributing further downstream in Stream 9. Comparison of pre- and post- development flows at PT 9 illustrate this point. The geomorphic characteristics of the stream can reasonably be expected to be developed based on the 2-year storm flow through the stream. Given that 2-year storm flow through Stream 9 is essentially unchanged from pre- to post-development conditions, the geomorphic characteristics of the stream are also not expected to change beyond how they would be changing naturally.

4. Describe how the methods and results of the Qualitative Habitat Evaluation Index address the reasonableness of proposed stream alterations and compensation at the project site.

The Qualitative Habitat Evaluation Index (QHEI) was identified as a qualitative means to evaluate on-site streams that could be impacted or enhanced as a part of the project. This method is more comprehensive than an Index of Biotic Integrity (IBI), an Invertebrate Community Index (ICI), or a Headwater Habitat Evaluation Index (HHEI) which does not include a biological survey.

The QHEI uses a qualitative scoring method with six separate categories and a possible total score of 100. Field data sheets are used to score properties including substrate, instream cover, channel morphology, bank erosion and riparian zone, pool and riffle run quality, and

gradient/drainage area. Qualitatively, scores less than 30 can be thought of as corresponding to an IBI rating of very poor. Scores less than 50 can be thought of as corresponding to an IBI value of poor.

As noted in the QHEI, the overall quality of the streams onsite is poor, and the existing streams have limited or no potential to achieve higher aquatic biological functions. Using the QHEI method, the highest scoring reach of stream on the site was Stream 9c, with a score of 42, followed by Stream 8 with a score of 38.5. Although still a low score (corresponding to an IBI rating of poor), S9c scored higher than other site streams because of improved channel morphology and riffle run characteristics. The lowest scoring reach of stream was Stream 9b, which has historically been channelized with significant removal of riparian vegetation. It is currently a narrow open swale with mowed grass leading up to the edge of either stream bank. This section of stream received a very poor score (17/100) due to poor substrate, instream cover, channel morphology, bank erosion, and riffle run scores.

The proposed on-site compensation, which includes restoration plantings along all sections of Stream 9 as well as replacement of a culverted driveway crossing on S8 and another culverted driveway crossing on D7, is expected to significantly improve the scores for the full length of Stream 9. Specifically, S9a will see immediate improvement to instream cover and bank erosion/riparian zone scores through the planned planting of riparian vegetation and deeded protection of up to 75 feet wide adjacent to the stream bank. Substrate, channel morphology, and riffle/run scores would also be expected to improve over time. S9b will show substantial improvement through the restoration of this section, as instream cover, which is currently sparse, will be vastly improved, as will the riparian zone. Improvements to D7 and S8 through the replacement of a currently hung set of three culverts and a hung single culvert with open bottom aluminum arches will provide not only improved stream characteristics to D7 and S8, but also to S9c, as the three streams join at the coastal wetland and increasing the connectivity and improving the instream cover is expected to result in improved water quality and increased macroinvertebrate diversity. These improvements are expected to also provide connection to downstream fish habitat along the lower reaches of S8 and S9.

Although Streams 3, 5 and 6 will be altered on the project site, Nordic proposes to maintain flows in the remaining portions of these streams as indicated in our response to Question 1 above. Nordic also proposes compensation and improvements to the lower portions of these streams as shown on the impact compensation plan in Attachment A. Specifically, this includes removing unnecessary piping from Streams 5 and 6, providing bank stabilization, and creating improved trail crossings and stream bottoms along the Little River trail. Similar improvements are planned for Stream 3, where bank stabilization, slope stabilization, and other compensation measures are planned. With the projects described, Nordic proposes 225.5 linear feet (lf) of stream restoration measures, broken down as follows:

S3 Western Bank:

- New plank bridge raised off stream bed, lengthened to span banks (32 lf of stream protection)

- providing bank stabilization with stone steps (5 lf)

S3 Eastern side:

- Bank stabilization at base of steps (3 lf)

S5:

- Replace rock in stream bed with new arch bridge and use rock to create riffle/pool complex (18.5 lf of stream restoration)
- Concrete and aluminum culvert removal (40 lf stream restoration)

S6:

- Replace rock in stream bed with new arch bridge and use rock to create riffle/pool complex (13 lf of stream restoration)
- Concrete culvert removal (24.5 lf stream restoration)
- Bank stabilization (7 lf)

D7:

- Replace hung culvert with arch culvert (65 lf)
- Restore stream bed (80 lf)
- Restore plunge pool below arch (15 lf)

5. Please describe how the proposed stream compensation replaces the macroinvertebrate habitat that will be lost as a result of proposed impacts to Streams 3, 5, and 6. Consideration should be given to developing a macroinvertebrate sampling methodology that will be implemented as part of baseline and post-restoration monitoring and reporting in Stream 9. Monitoring results should be both qualitative and quantitative in nature with a focus on species diversity and abundance.

The QHEI documents that existing Streams 3, 5, and 6 have low invertebrate abundance and diversity, likely at least in part, due to the current intermittent nature of the streams and the lack of deep pools. Restoration of Streams 3, 5, 6 and 9 and the changed drainage profile of the site is expected to improve instream cover, bank erosion and riparian zone, and riffle-run characteristics of Stream 9, thus providing more consistent macroinvertebrate habitat.

As noted in the Water Resources Monitoring Plan submitted as part of the Site Location of Development Application that accompanied the NRPA application, Nordic proposes to monitor NRPA jurisdictional streams located on-Site. These streams will be monitored for aquatic macroinvertebrates in the late spring to early fall. Following a baseline assessment to be conducted preconstruction, NRPA jurisdictional streams containing documented aquatic

macroinvertebrates will be monitored for aquatic macroinvertebrates on an annual basis for the duration. This investigation will be conducted in accordance with general methods described in the NRPA Identification Guide for Rivers, Streams, and Brooks[1] and EPA guidance document Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition[2].

Please refer to the Water Resources Monitoring Plan for additional details regarding monitoring of the restoration of Stream 9 and additional proposed site wetland biomonitoring.

6. Supplemental plantings are proposed in the riparian area of Stream 8 as shown in Restoration Area 4 of the proposed impact compensation plan. Based on information in the record and Department observations from previous site visits, this riparian area is established with existing vegetation, including several species of trees, shrubs, grasses, and groundcover. Additional plantings are not necessary in this area and will not provide an environmental lift to the functions and values of Stream 8 due to the existing establishment of vegetation in this area. For this reason, the Department recommends that the proposed plantings be removed from the stream compensation plan. Other methods of stream compensation should be considered and proposed.

The supplemental plantings proposed in the riparian areas of Stream 8 are meant to revegetate the areas disturbed during the replacement of the culvert. The project is committed to stabilizing all disturbed areas with native vegetation that provides wildlife value. However, it is understood that the plantings in this area are not acceptable to the DEP as part of the overall impact compensation, only the culvert replacement itself as it provides for improved aquatic passage.

The proposed plantings have been removed from the Impact Compensation Plan, and a revised plan is attached as Attachment A.

Based on the above comment from DEP, Nordic has considered additional methods of stream compensation for the proposed project. As identified in the QHEI, Streams 3, 5, and 6 are currently of low function and value, with limited or no potential to achieve higher aquatic biological functions on their own. In addition, historical anthropogenic impacts are visible along sections of these streams both onsite and within the 250-foot shoreland zone that will be retained by the City of Belfast as part of the proposed project. These impacts include placement of fill materials such as corrugated steel and concrete pipes, stone and soil fill, and vegetative debris from logging operations. Nordic proposes to remove fill and restore and stabilize banks and riparian vegetation along the portions of Streams 3, 5, and 6 that will remain following

[1] Danielson, T. J. 2018. *Natural Resource Protection Act (NRPA) Streams, Rivers, and Brooks.* Maine Department of Environmental Protection, Augusta, ME.

[2] Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

construction of the proposed project. This additional compensation is shown on the Attachment A.

7. Freshwater wetlands within 25 feet of streams are freshwater wetlands of special significance. Ch. 310, § 4(A)(8). The application materials submitted August 22, 2019, contain updated stream identification and wetland delineation information. Please provide a corresponding update of the wetlands of special significance present on the site; explain the proposed impact to these wetlands, if any; and discuss why any impacts are reasonable and no practicable alternative less damaging to the environment exists.

Please see the attached memo and figures from Normandeau Associates updating the stream identification and providing enlarge detail plans denoting the presence of wetlands of special significance on the site (Attachment B). Square footage of impacts to these specific freshwater wetlands are shown on the figures accompanying the Normandeau memo. Because the project is a water dependent use, Chapter 310 of the DEP's rules requires submission of an Alternatives Analysis. The Alternatives Analysis submitted with the NRPA application provides extensive detail regarding the water dependent nature of the use and the absence of a practicable alternative.

8. Please submit a plan that outlines the staging area where seawater pipeline segments will be stored prior to installation. If the segments will be stored at the primary project site, please describe how the segments will be transported across, and deposited into, the coastal wetland without disturbing salt marsh vegetation and the outlets of Streams 8 and 9c. If the pipeline segments will be brought to the site by barge from an off-site location, please provide this location and show the upland staging area on a plan.

Construction materials for the seawater piping in the upland zones (Station 0+00 to 5+00) will be stored and staged in the eastern portion of the Building 2 footprint shown on sheet CE112 submitted with the application. Approximately 80,000 square feet of onsite space is available for staging during early construction stages. Materials will be transported by loader or other equipment appropriate for the size and weight of the materials being transferred. Materials needed for construction on the Eckrote property will be transported across Route 1 at the pipeline crossing location. All activities on the Eckrote property will remain within the designated 40-foot wide construction easement.

Access to the intertidal zone from the Eckrote property will be through the 40-foot construction easement. Once beyond Station 5+00, equipment will operate on construction mats. Work within the intertidal zone will be limited to the 100-foot maximum impact corridor width. Piping and other materials needed for construction within the intertidal and subtidal zones will be delivered by barge during appropriate tide cycles. An existing permitted facility, intended for similar types of work/use, will be utilized for offsite staging. An example of such facility is Cianbro's Eastern Manufacturing Facility located on the edge of the Penobscot River in Brewer, Maine (see Figure 1). Similar, nearby permitted alternatives will be evaluated prior to construction.



Figure 1 – Offsite Staging Area; Cianbro's Eastern Manufacturing Facility in Brewer, ME

9. Additional erosion and sedimentation control measures should be considered and implemented to prevent turbidity in the coastal wetland during construction. Such measures include, but are not limited to, a system for monitoring and reporting turbidity during construction, use of a fully enclosed dredge bucket, limiting the hoist speed of the dredge bucket when operating in the water column, and use of a scow or a secondary containment system to prevent overflow of dredged materials.

Construction mats will be utilized by equipment to minimize impacts to the coastal wetland. These mats will start at the convergence of the Eckrote property with Streams 8, 9c, and the salt marsh/intertidal zone and will extend along the pipeline route to the low water line. See Sheets CS-104, CS-105, CS-503, and CS-504 for additional erosion and sedimentation control measures.

Methods to limit turbidity generation during work will include the following operational control measures:

1. Turbidity barriers/curtains will be utilized as applicable to water depth and tide cycle around the work area.
2. Work will be sequenced to allow major excavation to occur during a low tide cycle thereby minimizing the excavation area exposed to the water column.

3. When excavation activity occurs in areas where excavated materials will be pulled through the water column; a closed dredge bucket or similar tool will be utilized to contain the sediments. In addition, crews will be instructed to minimize hoist speeds and overall disturbance of the sediments. In general, excavation and backfill work is to be completed during a low tide cycle to minimize exposure of sediments and dredging activity to the water column.
4. A turbidity monitoring program will be established with a plan submitted to DEP for review prior to construction start. The program will include visual monitoring at the site of activity and a metered monitoring program with NTU readings taken around the work zone to assure turbidity generated from the work does not impact background water quality standards. Locations of metered monitoring and suggested action levels to implement additional turbidity controls at the point of activity will be included in the plan.

10. All equipment working within the coastal wetland must operate from a barge or construction mats. If working from construction mats, these mats must be shown on a plan. Construction mats must also be removed from the coastal wetland when not in use.

Within the intertidal zone (Station 5+00 to 13+50), 16 to 20-foot wide construction mats will be utilized by equipment to minimize impacts to the coastal wetland and will be removed once no longer needed. These mats will start at the convergence of the Eckrote property with Streams 8, 9c, and the salt marsh/intertidal zone and will extend along the pipeline route to the edge of the low water line. Mats will be weighted down or anchored to remain in-place during high tide cycles. Mats will be utilized throughout the duration of construction in this zone. See Sheets CS-104 and CS-105 for location of construction mats.

Mats will be positioned at the streams to limit impacts and facilitate implementation of the project wetland/stream restoration plan.

11. Please describe how the work area within the coastal wetland will be stabilized and remain dry and uninterrupted between tide cycles.

In order to minimize impacts to the coastal wetland, the piping in the intertidal zone will be installed in 20 to 100-foot segments during low tide cycles. This will involve the following steps:

1. Excavate an appropriately sized trench for the length of pipes to be installed using excavators supported by construction mats;
2. Place excavated material on a jack-up barge, grounded-out barge, or other containment structure (positioned during high tide) adjacent to the trench and within the 100-foot wide impact corridor;
3. Set the pipe assembly (including two intake lines and one discharge line connected by concrete collars) into the trench;
4. Mechanically connect flanges at the pipe ends to the flanges of the previously installed pipes; this work will be done within a trench box to support the trench and protect construction personnel;

5. Backfill the trench using the previously excavated material and dispose of excess soil at a designated off-site, upland location.

12. Please overlay a construction sequencing plan with an overhead aerial imagery plan. Include the locations of all erosion and sedimentation control measures, excavation/trenching activities, and dredging activities.

Please see Sheets CS-104 and CS-105, Attachment C.

13. Compensation for wetland impacts and stream impacts must be separated into two proposals, because the functions and values for these resources are different. According to the NRPA, 38 M.R.S. § 480(Z), Maine's In Lieu Fee (ILF) program is not an eligible method for compensation of impacts to streams. For this reason, a dollar value cannot be placed on proposed stream impacts and the square footage of on-site stream compensation cannot be used to reduce the ILF compensation formula for proposed freshwater wetland impacts. The ILF wetland compensation formula is:

(Direct wetland impact/sq. ft. x (natural resource enhancement & restoration cost/sq. ft. + avg. assessed land valuation/sq. ft.)) x (resource multiplier)

Based on the amount of proposed freshwater impacts as listed in the August 22, 2019 submission, the ILF calculation for freshwater wetland impacts, is:

190,389 sf x ($3.61 + $0.09) x 1 = $704,439.30

Please revise the proposed compensation fee amount accordingly. All compensation fee amounts could be reduced by decreasing the amount of impact to on-site natural resources.

In-Lieu- Fee

To compensate for wetland impacts the project will pay into the in-lieu-fee program as calculated below using the following formula:

(Direct wetland impact/sq. ft. x (natural resource enhancement & restoration cost/sq. ft. + avg. assessed land valuation/sq. ft.)) x (resource multiplier)

Impacts to freshwater wetlands are being partially mitigated via permittee-responsible on-site compensation through the stabilization of slopes and stream bed protection at S3, S5, S6 and drainage D7 (1,723.50 sq ft) and riparian buffer restoration of S9 (91,065 sq ft). The permittee-responsible on-site compensation includes:

S9:
Riparian buffer restoration (91,065 sq. ft)
S3 Western Bank:
- Native plantings after bridge replacement (160 sq. ft)
- Revegetation with native plantings (297 sq. ft)

S3 Eastern side:

- Stone steps along steeply sloped trail (195 sq. ft)
- Slope stabilization with native plantings (390 sq. ft)

S5:

- 166.5 sq ft of stream bed protection with a new bridge

S6:

- 325 sq ft of stream bed protection with a new bridge)
- Revegetation with native plantings on either side of bank (100 sq. ft)

D7:

- Stabilize slopes at plunge pool with native plantings (90 sq ft)

The permittee-responsible on-site compensation totals 92,688.50 sq ft which offsets the calculated fee payment at a 1:2 ratio (92,688.50/2= 46,344.25). The enhancement and restoration cost for Waldo County is $3.61 per sq.ft. and the average assessed land value is $0.09 per sq.ft. The resource multiplier for wetlands of special significance that are permanently impacted is 2. All other permanently impacted resources are set at a multiplier of 1. All temporary impacts are to be restored in place and are not included in fee calculations.

Permanent Freshwater Wetland impacts that are not WOSS:

((185,400 -46,344.25x ($3.61 + 0.09)) x 1 = $514,506.28

Permanent Freshwater WOSS impacts:

((6,670 x ($3.61 + 0.09)) x 2 = $49,358.00

Permanent Coastal (subtidal) impacts:

((6,703 x ($3.61 + 0.09)) x 2 = $49,602.20

Total Compensation $613,466.48

Table 1. Freshwater Wetlands Impact Table

Wetland ID	[1]Cowardin Class	[2]Total Temporary Impacts (SF)	Total Permanent Impacts (SF)	Impact Total (SF)	Impacts to WOSS (SF)	Impact Characterization
W1	PFO	0	116,033	116,033	6,454	Direct, Fill
W2	PFO	0	24,612	24,612		Direct, Fill
W3	PFO	0	5,057	5,057		Direct, Fill
W4	PFO	0	692	692		Direct, Fill
W5	PSS	0	18,672	18,672		Direct, Fill
W6	PFO	2,716	3,120	5,835		Direct, Fill
W13	PEM	0	556	556		Direct, Fill
W15	PEM	0	10,643	10,643	216	Direct, Fill
W16	PSS	1,245	0	1,245	621	Direct, Excavation
W19	PEM	0	12,685	12,685		Direct, Fill
Totals	PFO	2,716	149,513	152,229	6,454	
	PSS	1,245	18,672	19,917	621	
	PEM	0	23,884	23,884	216	
Grand Total	**All**	**3,960**	**192,070**	**196,030**	**7,291**	

1 Cowardin Class: PSS = Palustrine Scrub-Shrub; PFO = Palustrine Forested; PEM = Palustrine Emergent

2 All temporary impacts will be restored in-place.

14. In revised application submissions, the seawater access system is proposed to be suspended above the seabed. Please state the elevation that the pipelines will be suspended above the seabed and state the reasoning for grading and filling any depressions along the pipeline route. If any areas of seabed are to be filled and/or graded, please revise your alternatives analysis, minimization strategies, and compensation proposal to account for this impact.

Where the seawater access piping is not buried (32+00 to 69+00) the revised anchoring design was developed to minimize the disturbance to the seafloor. Impacts will be limited to the footprints of the concrete collars that support the pipes and the area of the side anchors, as opposed to stone fill or mattresses that would otherwise cover the pipes and surrounding sea floor for the entire exposed length. The pipes will be suspended approximately 12 inches above the sea floor to allow most aquatic species to travel beneath. In the event that boulders, steep depressions, or other significant anomalies are discovered along the pipeline route, minor grading or removal could be necessary. However, based on the bathymetry, dive videos, and other data collected at the site, the bottom appears to be soft, smooth, and at a relatively constant grade. Therefore, corrections to the bottom are not anticipated.

Site Location of Development Act (Site Law) Application:

1. In accordance with the Department's Financial and Technical Capacity Standards of the Site Law, Chapter 373, § (B)(3)(a), please submit a letter of commitment or intent to fund indicating the amount of funds intended to be provided to the applicant for at least the first three tranches of the proposed project.

A letter of intent to fund is included in Attachment D.

2. Please submit sound level specifications for all outside sound-generating machinery and explain whether the resulting sound will comply with the corresponding Site Law standards. Will it be necessary to mitigate for the generation of noise from outside sound-generating machinery (e.g., cooling towers, generators, ventilation systems, etc.) by enclosing these noise sources?

Our analysis indicates that the regulated equipment of the facility during routine operation will produce sound levels that satisfy the noise level limits contained in Chapter 375.10 of Maine's Site Location of Development Law Regulations. Acentech Report No. 0480r3 (April 2019) and supplemental Table 2 (Revised; July 2019) summarizes our analysis and model results. The sound model was based on project-supplied information, which identified the ventilation systems, generator system, building construction, attenuators, and equipment layout. The 180 sources in the sound model cover primarily air inlet fans, air outlet fans, and open vents for the various tank buildings with attenuators as necessary to provide a typical sound power level for each individual source of 60 to 65 dBA. Dynamic insertion loss values for these attenuators range from 0 to 29 dBA. The additional sources modeled include the central utility plant (CUP) building, which houses the heating/cooling units and generators. The average sound level at the indoor perimeter of the CUP was estimated to be 85 dBA based on industry experience. The planned heating building will be constructed of sheet steel and 190mm mineral fiber insulation or of a comparable design, which should provide a sound transmission loss (TL) of 29 dB in the 250 Hz octave band and greater TL at higher frequencies. The engine generator units, which if not treated, would produce substantially greater sound than all other facility equipment. Therefore, the generator units will be installed in a building with concrete for the east and south walls and with the above steel/mineral wool wall construction for the other surfaces. In addition, a critical grade silencer will be installed on each engine exhaust and the building vents will be suitably treated. The rooftop of the CUP will house air-cooled condenser units rated for a 3-foot sound pressure of 75 dBA, and a 30-foot rating of 64 dBA. In order to mitigate the noise emitted by these units, the CUP is located centrally within the site. This locates it at least 500 feet from the site boundary, and surrounds it with the larger module buildings, which act as an additional barrier to sound transmittance. Based on the aforementioned equipment specifications, layouts, and site conditions, the sound model provided in the original application shows that the operation of the proposed facility will adhere to the sound laws and regulations put forth in the Maine Site Location of Development Act.

3. Please submit sound level specifications for all outside sound-generating machinery.

Please see above answer to Question 2 for response.

4. Please provide a draft Spill Prevention Control and Countermeasures (SPCC) plan.

Please see Attachment E for the draft hazardous materials Spill Prevention Control and Countermeasures (SPCC) plan.

In accordance with United States Environmental Protection Agency (EPA) Chapter 40 of the Code of Federal Regulations Part 112 (40 CFR 112), facilities must prepare and implement an Oil SPCC plan for any site that could reasonably be expected to discharge oil into or upon navigable waters or adjoining shorelines; and, meet one of the following conditions:

Please see Attachment E for the draft hazardous materials Spill Prevention Control and Countermeasures (SPCC) plan.

In accordance with United States Environmental Protection Agency (EPA) Chapter 40 of the Code of Federal Regulations Part 112 (40 CFR 112), facilities must prepare and implement an Oil SPCC plan for any site that could reasonably be expected to discharge oil into or upon navigable waters or adjoining shorelines; and, meet one of the following conditions:

1. Above-ground oil storage capacity exceeds 1,320 gallons; or

2. Underground oil storage capacity exceeds 42,000 gallons, unless the underground tanks are subject to all of the technical requirements of 40 CFR 280 or a state program approved under 40 CFR 281 (Maine Department of Environmental Protection [MEDEP], Chapter 691 – Rules for Underground Storage Facilities).

As defined by 40 CFR Part 112, the term "oil" includes all grades of motor oil, hydraulic oil, lube oil, fuel oil, gasoline and diesel, automatic transmission fluid, waste oil, and transformer mineral oil. The definition of oil also includes non-petroleum oils such as animal or vegetable oils and synthetic oils. The proposed Nordic Aquafarms facility may also meet the criteria requiring an Oil SPCC plan, which will be provided prior to site construction and operations when additional information regarding quantities and specific locations of onsite storage are available.

5. Please review and respond accordingly to the attached geology technical review memorandum dated September 17, 2019.

Please see Attachment F for responses to the geology technical review memorandum dated September 17, 2019.

6. Please review and respond accordingly to the attached stormwater management technical review memorandum dated October 3, 2019.

Responses to the October 3, 2019 stormwater management technical review memorandum are in Attachment G.

Please contact me with any questions or comments.

Sincerely,

RANSOM CONSULTING, INC.

Elizabeth M. Ransom, P.G.
Senior Project Manager

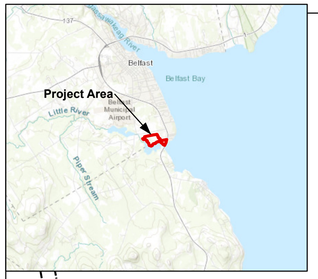
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ATTACHMENT A

Impact Compensation Plan

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Ransom Consulting, Inc.
Project 171.05027.008



Restore in Place Specifications

Sewer Force Main

1. All excavated material will be side cast within the construction easement
2. Install Force Main
3. Backfill to original grade using side cast material
4. Restore stream channel and wetlands to original elevations, slope and substrate
5. Hydroseed disturbed area using New England Wetland Mix or equivalent at manufacturers specifications

Rte 1 By-Pass

1. A temporary adequately sized culvert will be placed along the stream channel
2. Once the intake and discharge pipes are installed all temporary areas will be removed and restored to original grades
3. The weltand area will be restored to original grade and hyroseeded with New England wet mix or equivalent at manufacturers specifications
4. Restore stream channel to original elevations, slope and substrate

Herbaceous Species	Indicator Status	Planting Specification/Number of Stems: Restoration Area 1	Restoration Area 2	Restoration Area 3
Onoclea sensibilis /Sensitive Fern	FACW			60
Acorus americana /Sweetflag)	OBL			60
Aster novae-angliae /New England Aster)	FACW-			60
New England Conservation/Wildlife Mix	See Sheet 4			See Sheet 4
Shrub Species				
Cornus racemosa /Gray Dogwood	FAC		10	
Hamamelis virginiana /Witch Hazel	FAC-		10	
Alnus incana /Speckled Alder	FACW+		10	
Cornus alternifolia /Alternate-leaved dogwood	UPL	6	13	3
Tree Species				
Pinus strobus /White pine	FACU	6		6
Acer Rubrum /Red maple	FAC	6		9
Acer saccharum/Sugar maple	UPL	2		
Picea rubens /Red spruce	FACU	3		4
Fagus grandifolia /American beech	FACU	6		
Carpus caroliniana /American hornbeam	FAC	6		
Acer negundo /Boxelder	FAC+	6		
Populus tremuliodes /Quaking Aspen	FACU	6		
Tsuga Canadensis/Eastern Hemlock	FACU	2		3

Impact Compensation Plan Specifications		
Plant Type	Stock	Planting Specification
Trees	4'-6'	64 sq. ft. on center
Shrubs	3'-4'	16 sq.ft. on center
Herbaceous	2" plugs	2 sq.ft. on center
Ferns	1 gal. pot	2 sq.ft. on center

*Indicator Code	Indicator Status	Comment
OBL	Obligate Wetland	Almost always occur in wetlands (>99%)
FACW	Facultative Wetland	Usually occur in wetlands, but may occur in non-wetlands (67-99%)
FAC	Facultative	Occur in wetlands and non-wetlands (34-66%)
FACU	Facultative Upland	Usually occur in non-wetlands, but may occur in wetlands (1-33%)
UPL	Obligate Upland	Almost never occur in wetlands (<1%)

* For planting details see Sheet 4

W1 W2 W3 W4 W5 W6 W7 W8 W9 W10 W11 W12 W13 W15 W16 W17 W18 W19

S1 S2 S3 S4 S5 S6 S7 S8 S9

AREA 1 AREA 2 AREA 3 AREA 4

Restore in place areas for sewer force main

Restore in place areas for Route 1 By-Pass

Restore in place areas for Route 1 By-Pass

-Restore stream bed using existing stone to create riffles/pools, revegatate both sides of bank

-Install arched bridge
-Restore streambed
-Remove 40 concrete and aluminum pipe

Western Side: improve bridge and stabilize banks with plantings

Eastern Side: install steps along steep slope, stabilize stream banks revegatate along steps and stream bank

Replace hung culverts with arch.

Culvert

Replace the single driveway culvert with arch and stabilize/ revegatate above arch and plunge pool below arch

Restore in place areas for Intake and Discharge Pipe Installation

Restore in place areas for Intake and Discharge Pipe Installation

Intake and Discharge Pipes

1. All excavated material will be side cast within the construction easement
2. Excavated material will preserved for backfill keeping salt marsh root mat intact and cobble beah substrate separate from subsurface soils
3. Protect root mat from exposure, drying, freezing
4. Install intake and discharge pipes
5. Once the intake and discharge pipes are installed, carefully backfill using preserved side cast materials
6. Ensure the root mat and cobble beach backfill material are set a original grade
7. Stablize root mat with wooden stakes at least 3 feet longer in depth than the root zone

N

0 40 80 160 240 Feet

Belfast Aquaculture Project
Impact Compensation Plan
Date: November 4, 2019

Species

- Alternate-leaved Dogwood
- American Beech
- American Hornbeam
- Boxelder
- Eastern Hemlock
- Gray Dogwood
- New England Aster
- Quacking Aspen
- Red Maple
- Red Spruce
- Sensitive Fern
- Speckled Alder
- Sugar Maple
- Sweetflag
- White Pine
- Witch Hazel
- Conservation Wildlife Mix
- New England Wet Mix

- Sewer Easement
- Stream Impact

Regime

- Existing Culvert
- Drainage
- Intermittent Stream
- Stream Not Field Delineated

- Easement Centerline
- Permanent Easement 25' Wide
- Temporary Easement 40' Wide
- Project Area
- Other Belfast Parcels

- Palustrine Wetlands
- Salt Marsh
- Cobble Beach
- Riparian Restoration Area

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

ATTACHMENT B

Normandeau Memorandum

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Ransom Consulting, Inc.
Project 171.05027.008

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

Memorandum

Monday, November 04, 2019

TO: Elizabeth Ransom, Ransom Consulting

FROM: Adele Fiorillo, PWS, NHCWS

SUBJECT: Wetland and Stream Review, October 3 and 6, 2019

The Department of Environmental Protection (DEP) requested an updated assessment of drainages and streams under the Natural Resource Protection Act (NRPA). A Normandeau wetland scientist reviewed the site and extended the stream designation in three locations converting D3, D5 and D6 to S3, S5 and S6 in July of 2019. This requested change resulted in streams intersecting with wetlands with the potential to create Wetlands of Special Significance (WOSS), by definition, for W1, W15 and W19, in addition to the previously identified WOSS.

It is important that the project move forward in a manner that reflects the natural resources based on consensus between wetland scientists and the DEP. To that end, Normandeau revisited the site on October 3, 2019 to update the assessment and a peer review was completed on October 6, 2019 by Broadwater Environmental, LLC (BE, LLC). The results of both site reviews are outlined in this memo.

During the July 2019 review W15 was expanded and W19 was added in conjunction with the conversion of drainages D3, D5, and D6 to streams S3, S5 and S6. The property on which these wetlands are located is predominately vegetated with grasses (see tree line on Figure 1). Subsequent reviews did not change the wetland boundary of W19.

There were changes to W1 at its intersection with S5 following the October delineation but no other boundary adjustment were made at this location. W1 now extends further into the tree line at S5 (Figure 2, Photo 1), shortening the stream due to vegetation cover and no evidence of scouring. W1 vegetation characteristics in the area of S5 include the dominant species *Calamagrostis canadensis* (bluejoint grass, 85%) and a mix of 20% facultative upland plant species and 35% upland plant species. Soils in W1 are poorly drained silt loam and somewhat poorly drained silt loam in the stream.

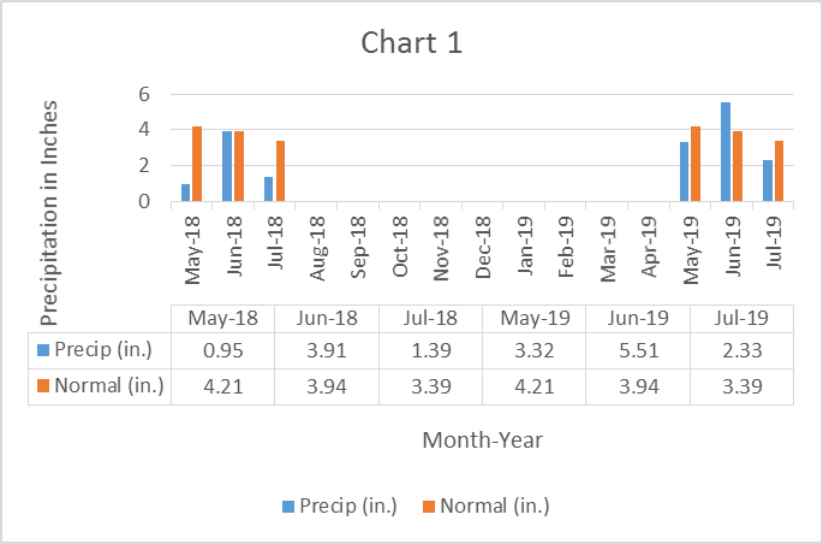
On October 6, 2019 BE,LLC walked the boundaries of W15 and the stream connection of S6 and the stream connections of W1 to S3 and D4. Most flags depicting the wetland boundary were still present in W15. Overall, the existing boundaries were generally accurate with 5 minor adjustments to flag locations in W15 (Figure 3). W15 has similar vegetation characteristic as the herbaceous areas of W1. This wetland consists of 40% meadow foxtail (*Alopecurus pratensis*, obligate) and 30% bluejoint (facultative). Other non-dominant herbaceous species include buttercup (*Ranunculus acris*, facultative) and bedstraw (*Galium mollugo*, upland). Once the

wetland enters into the treeline it connects with S6. Soils are somewhat poorly drained silt loam in the wetland and predominate within the stream channel as well.

W1 is connected to S3 by hydric soils and a stream channel. BE, LLC found hydric soils within the wetland portion of the drainage that discharges to S3. Therefore, the drainage designated as D4 was determined to be a regulated stream from existing flag NAI S4-2, down to S3. This is evidenced by sediment scour and accumulation (Photo 2). Above this flag (i.e., to the northwest), the "channel" was almost completely vegetated (Photo 3) and is an intermittent drainage that is a wetland but not a regulated stream. Figure 1 shows the upper portion of S4 interpreted to be wetland and the lower portions converted from D4 to S4.

Meadow foxtail is native to Europe and Asia and naturalized and common in the northeast United States. This grass species has a wide range of tolerance to soil moisture but avoids waterlogged soils. Bluejoint is a native grass that occurs in wetlands and disturbed sites. The seeds can remain viable for years and can quickly germinate when conditions are right but cannot germinate during dry periods.

It is important to note that in grasslands, particularly with the species present on this site, seasonal variations in rainfall during the spring months can result in significant expansion and contraction of areal coverage. Chart 1 shows a comparison of precipitation during the spring/early summer months of 2018 and 2019. The marked increase in rainfall in 2019, 7.69 inches greater than the same three months in 2018, likely resulted in the increase of areal coverage of bluejoint in W15 between 2018 and 2019. Bluejoint also tolerates a wide range of wetness in the soils and is even found in moderately well drained soils, hence the facultative designation. Species characteristics and seasonal variations in rainfall explain the observed differences between wetland boundaries between 2018 and 2019. The soil type, vegetation and disturbed nature of the wetlands made for a challenging boundary determination. Normandeau and peer review delineation are in agreement and confirm the accuracy of the revised boundaries shown on the attached figures.

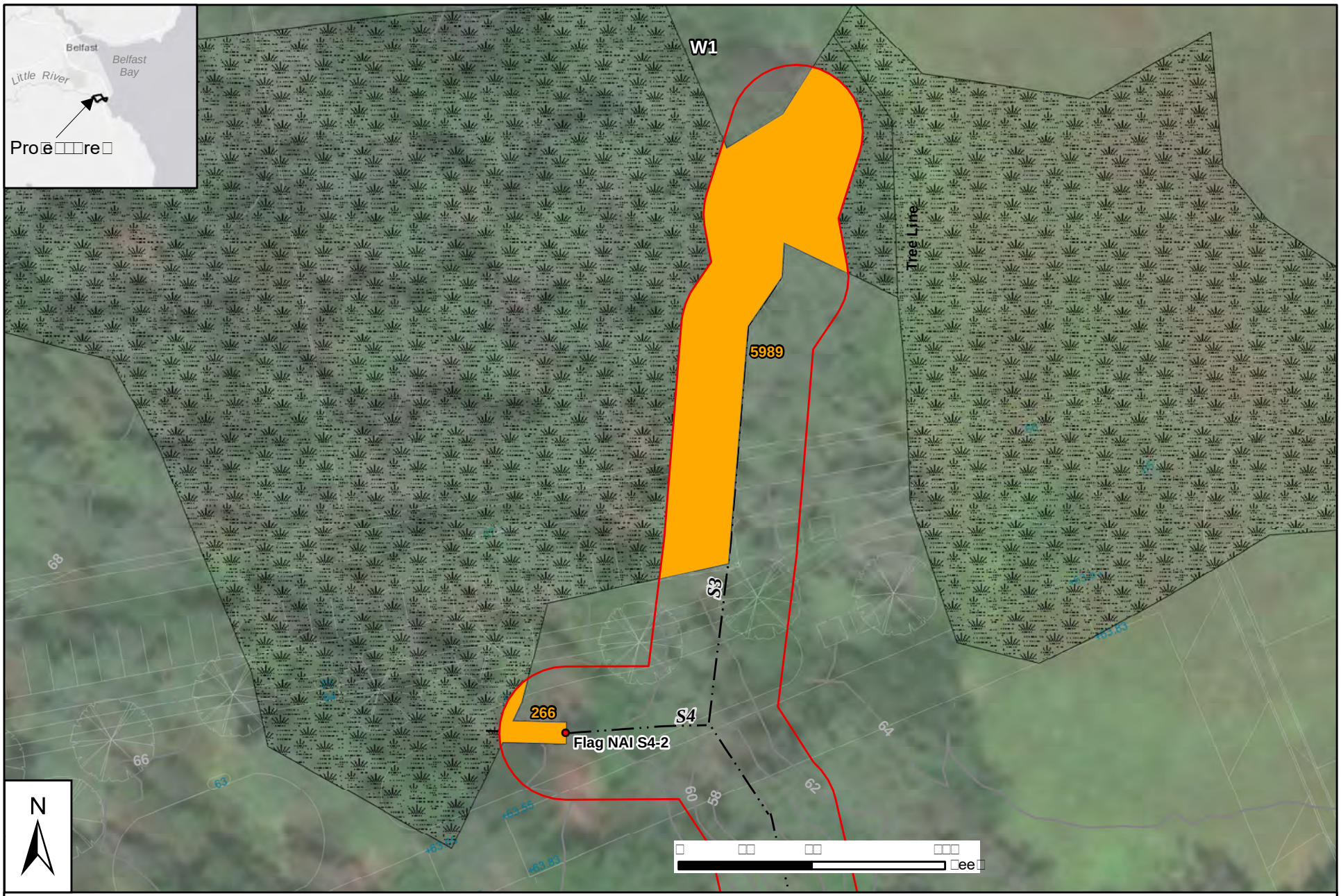


	May-18	Jun-18	Jul-18	May-19	Jun-19	Jul-19
Precip (in.)	0.95	3.91	1.39	3.32	5.51	2.33
Normal (in.)	4.21	3.94	3.39	4.21	3.94	3.39

As shown in Figures 1, 2 and 3 there are portions of W1 and W15 that fall under the definition of a WOSS solely by virtue of being within 25 feet of a NRPA regulated intermittent stream (Chapter 310, Section 4.A.(8)). There are other WOSS located on the project site, as identified in previous submittals to the DEP, and shown in Figure 4. However, the definition of WOSS in this case does not result in the accurate description of site conditions. Wetlands W1 and W15 WOSS are in no way special or significant and the streams that are associated with them are marginal as well. The silt loam soils in the area are conducive to erosion. The project site slopes from north to south and at the general location of a topographical break the slope steepens and collects surface run off sufficiently enough to erode the surface creating channels. There is every indication that these channels convey stormwater runoff and represent intermittent surface flows. Although the grasses are native they are indicative of disturbed sites and the wooded portions of W1 have been disturbed by logging and have a significant presence of facultative upland and facultative species including buckthorn (*Alnus frangula*), an invasive shrub species.

In summary, the wetlands marginally meet the criteria for wetlands, are vegetated with disturbance indicators along with observed disturbances and the intermittent streams exist as the result of conveyance of stormwater runoff. Changes in wetland boundaries and stream extent are indicative of site conditions as confirmed during recent Normandeau and peer review. The WOSS designation is by definition and is not indicative of site conditions.

I expect that the information in this memo is helpful in describing the circumstances relative to the determination of wetlands, streams and the characterization of same when considering impacts to WOSS.



Belfast Aquaculture Project
WOSS Impacts
Date: October 3rd and 6th, 2019

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

Figure 1



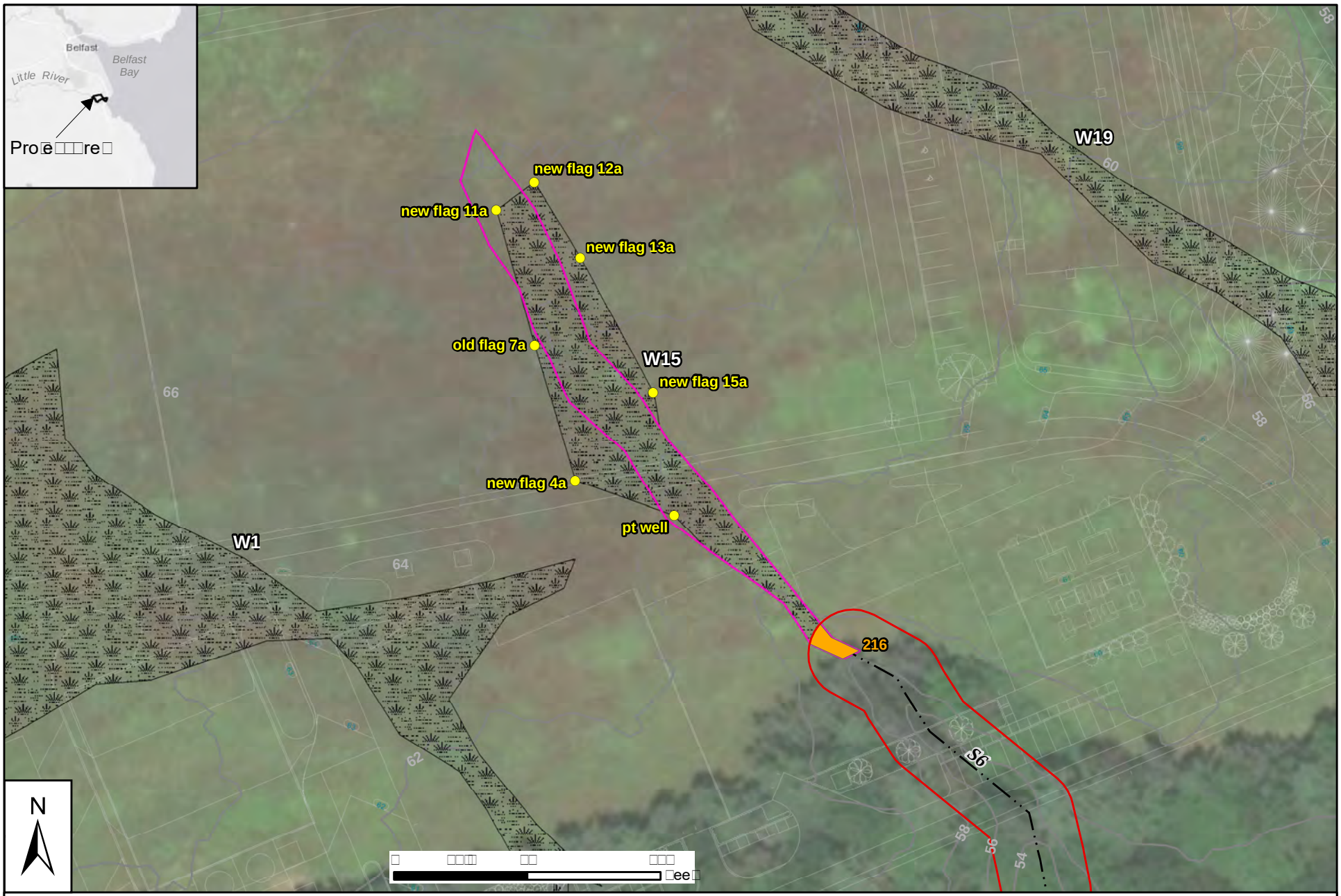
Belfast Aquaculture Project
WOSS Impacts
Date: October 3rd and 6th, 2019

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

Figure 2

Photo 1 – Area of previous conversion from D5 to S5 that is now part of W1 and no longer characterized as stream or drainage due to vegetated cover and lack of a defined channel. Taken October 3, 2019





Belfast Aquaculture Project
WOSS Impacts
Date: October 3rd and 6th, 2019

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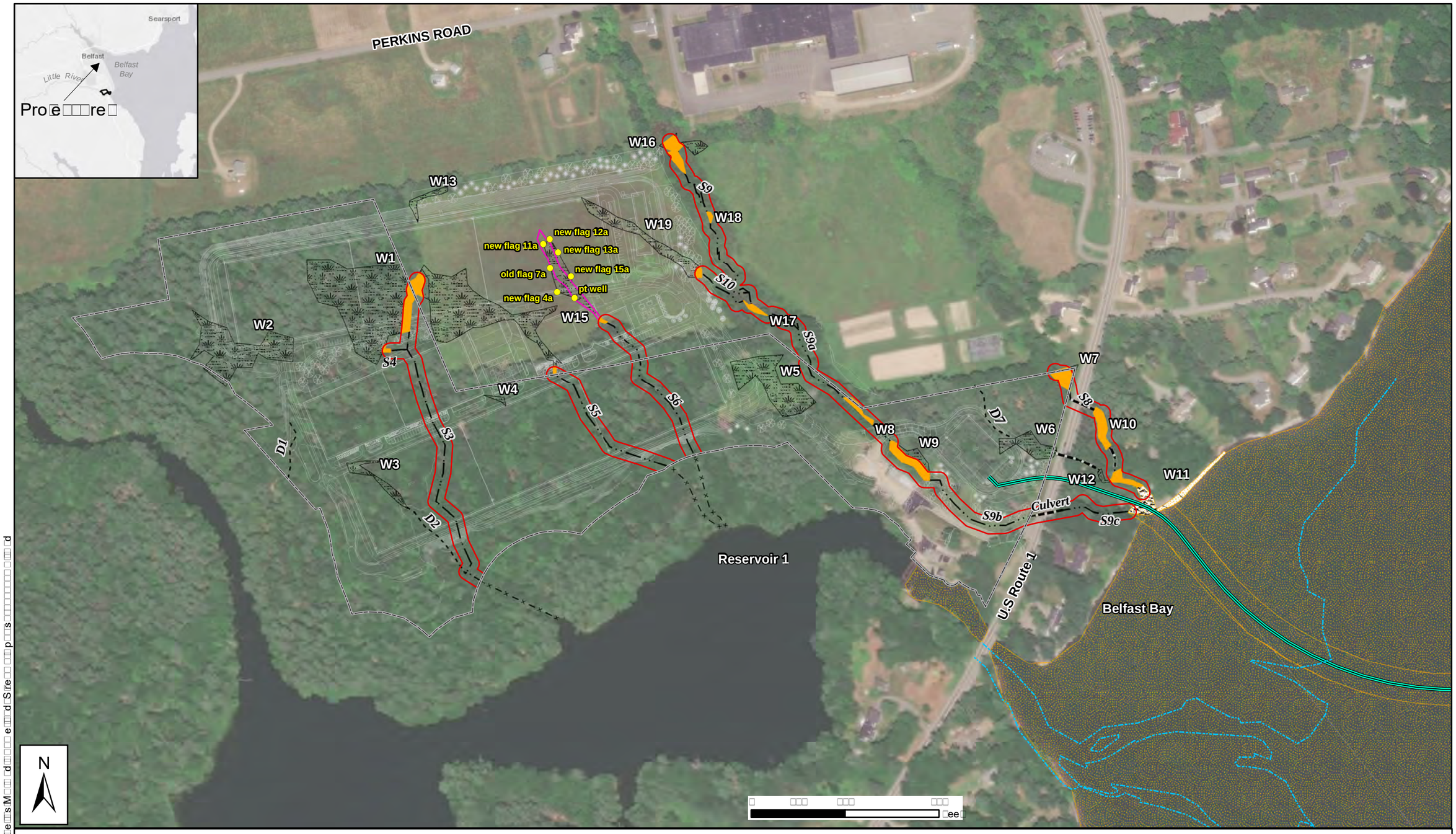
Figure 3

Photo 2 – The Stream portion of S4, formally D4. Taken October 6, 2019.



Photo 3 – The vegetated portion of S4. This is interpreted to be wetland, not stream. Taken October 6, 2019.





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Belfast Aquaculture Project
Wetlands of Special Significance
Date: October 3 & 6, 2019

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NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

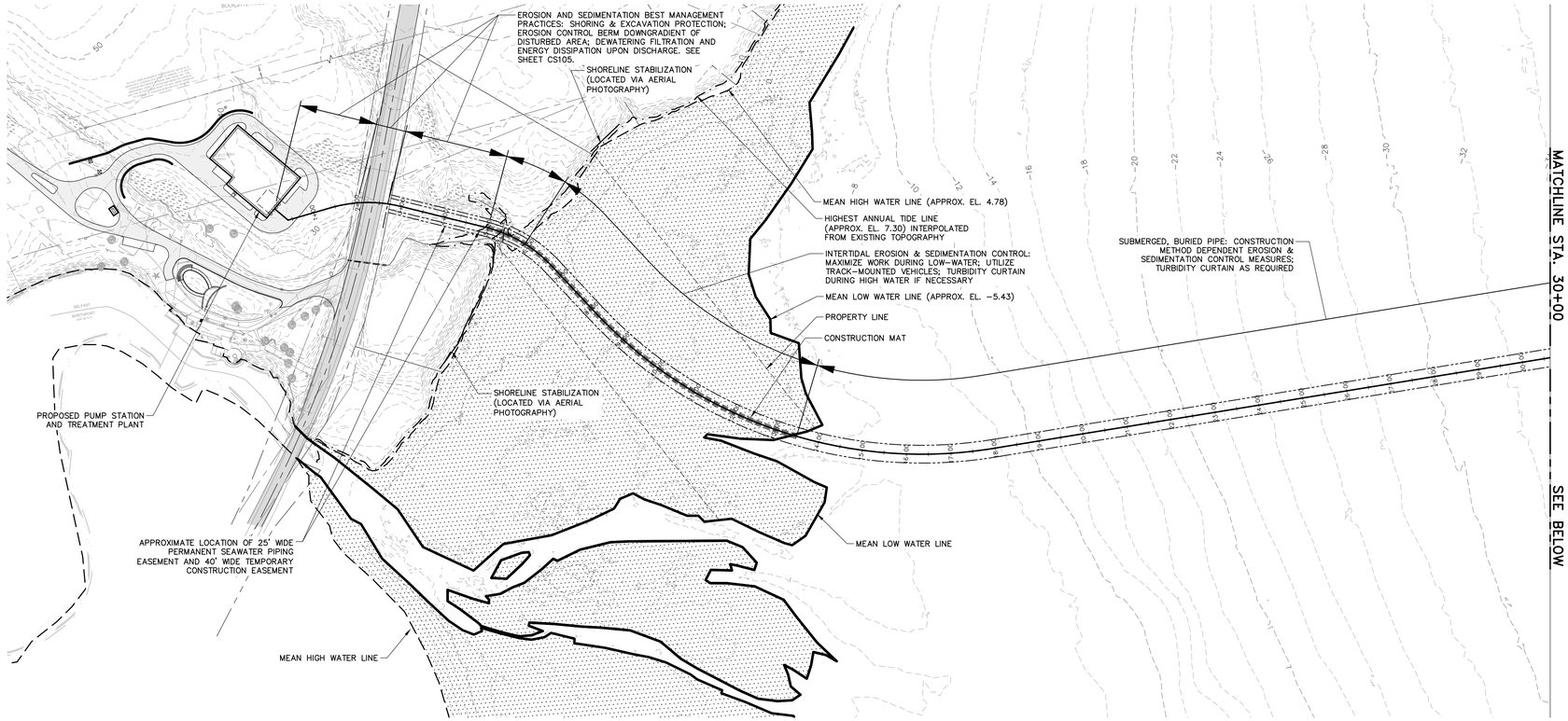
Figure 4

ATTACHMENT C

Erosion Control Construction Sequencing Plans

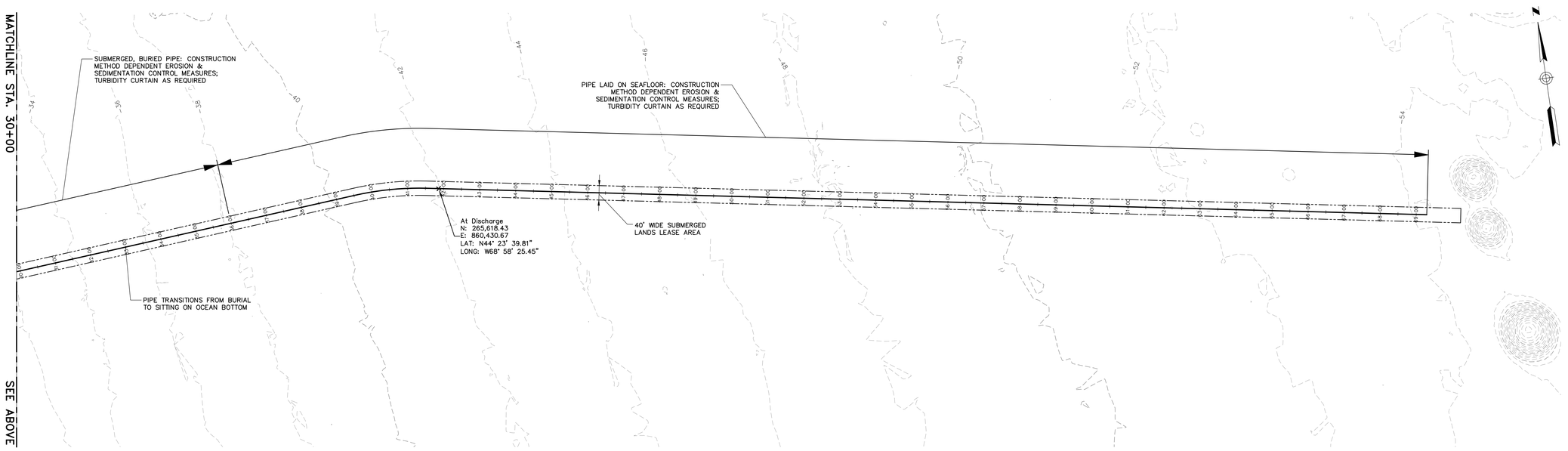
Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Ransom Consulting, Inc.
Project 171.05027.008



PLAN

SCALE: 1" = 150'



PLAN

SCALE: 1" = 150'

PLAN REFERENCES:

1. BOUNDARY & TOPOGRAPHIC SURVEY DATED 4-2-2018 BY GOOD DEEDS INC., 109 MAIN STREET, BELFAST, ME 04915, (207) 338-5743
2. 2 FOOT LIDAR CONTOURS OBTAINED FROM THE MAINE OFFICE OF GIS. https://www.maine.gov/megis/
3. BATHYMETRY DATA PROVIDED BY NORMANDEAU ASSOCIATES, ENVIRONMENTAL CONSULTANTS IN OCTOBER 2018.
4. LITTORAL ZONE & INTERTIDAL ZONE SURVEY IS BASED ON A PLAN BY GARTLEY & DORSKY ENGINEERING SURVEYING, 59 UNION STREET, UNIT 1, P.O. BOX 1031 CAMDEN, ME 04843-1031, DATED NOVEMBER 14, 2018.
5. VERTICAL DATUM IS REFERENCED TO NAVD88 (FEET).

NOTES:

- PROPOSED FEATURES ARE APPROXIMATE IN LOCATION AND SCALE.
- PIPE ALIGNMENT IS SETBACK GREATER THAN 25 FEET FROM LITTORAL SIDELINES.
- ANCHORING LOCATIONS ARE SCHEMATIC ONLY. REFER TO ANCHORING DETAILS FOR ANCHOR DIMENSIONS AND SPACING.
- SINGLE PIPE ROUTE SHOWN FOR CLARITY; SYSTEM CONSISTS OF TWO NOMINAL 30" INTAKE PIPES AND ONE NOMINAL 36" DISCHARGE PIPE.

RANSOM Consulting Engineers and Scientists
WOODARD & CURRAN
41 Hutchins Drive
Portland, Maine 04102
800.426.4262 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

REV	DESCRIPTION	DATE

REVISED FOR PERMIT
10-29-19

CURRENT ISSUE STATUS:

TRUE NORTH:

STATE OF MAINE — JAMES D. WILSON — No. 8592 — REGISTERED PROFESSIONAL ENGINEER

SMRT Architects and Engineers
144 Fore Street, PO Box 618
Portland, Maine 04104
ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY
SMRT

NORDIC AQUAFARMS

BELFAST, MAINE

EROSION CONTROL PLAN

300' 0 300' 600'

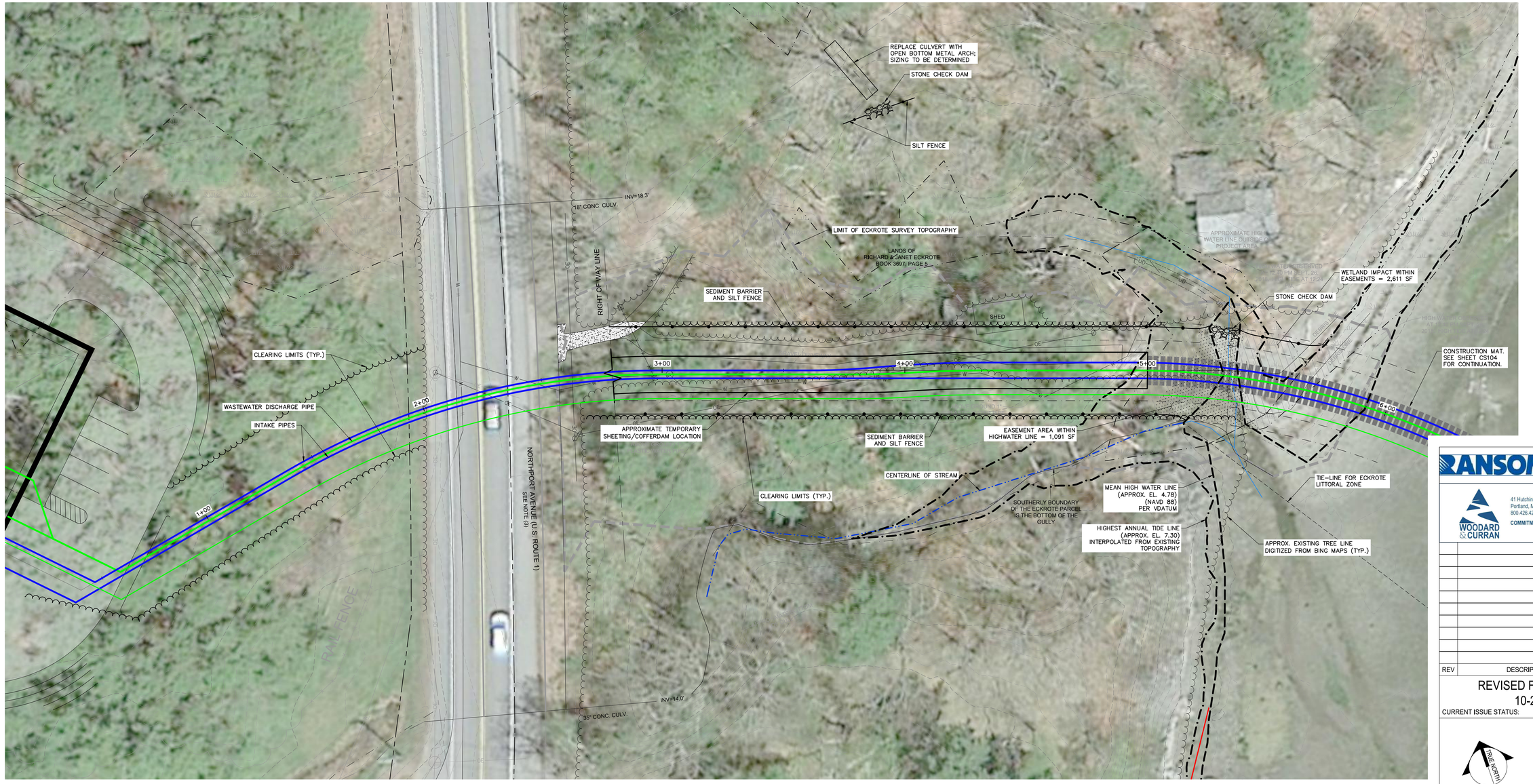
BAR SCALE
1" = 300'
CHECK GRAPHIC SCALE BEFORE USING

PROJECT MANAGER:	PROJECT NO: 18076
JOB CAPTAIN:	CS104

©COPYRIGHT 2018 SMRT INC.

NOT FOR CONSTRUCTION

24x36
\\woodardcurran.net\shared\Projects\02317714.00 Cianbro - Maine Aquaculture\vgc\Drawings\Civil\02317714.00-CS104.dwg, Oct 25, 2019 - 4:28pm JEVERETT



PLAN

SCALE: 1" = 20'

CONSTRUCTION SEQUENCING NOTES:

0+00 – 2+00 (SECOND PHASE OF CONSTRUCTION)

DESCRIPTION/LOCATION: TREATMENT BUILDING TO US ROUTE 1.

METHOD OF CONSTRUCTION: OPEN CUT.

METHOD OF SHORING: N/A

EXCAVATED SOILS MANAGEMENT: SOILS TRUCKED TO ONSITE STOCKPILE FOR REUSE AS TRENCH BACKFILL. BLASTED LEDGE TO BE CRUSHED AND USED FOR PIPE BEDDING MATERIAL AND OTHER ONSITE USES.

DEWATERING: PUMPED TO SETTLEMENT POOLS AND/OR SEDIMENT BAGS.

SEDIMENTATION & EROSION CONTROL: SILT FENCE AND EROSION CONTROL BERM DOWN GRADIENT OF ALL EXCAVATION. CONTINUED BMP MEASURES FOR ONSITE STOCKPILE.

2+00 – 2+70 (FIRST PHASE OF CONSTRUCTION)

DESCRIPTION/LOCATION: US ROUTE 1. REQUIRES COORDINATION AND CONSTRUCTION OF TEMPORARY BYPASS OF US ROUTE 1 TRAVELED WAYS (SEE EXHIBIT BP–1).

METHOD OF CONSTRUCTION: BRACED EXCAVATION.

METHOD OF SHORING: STACKED TRENCH BOXES AND/OR TEMPORARY SHEET PILES.

EXCAVATED SOILS MANAGEMENT: SOILS TRUCKED TO ONSITE STOCKPILE FOR REUSE AS TRENCH BACKFILL. BLASTED LEDGE TO BE CRUSHED AND USED FOR PIPE BEDDING MATERIAL AND OTHER ONSITE USES.

DEWATERING: PUMPED TO SETTLEMENT POOLS AND/OR SEDIMENT BAGS.

SEDIMENTATION & EROSION CONTROL: SILT FENCE AND EROSION CONTROL BERM DOWN GRADIENT OF ALL EXCAVATION AND TO PROTECT EXISTING WETLANDS. BMP MEASURES FOR ONSITE STOCKPILE. TEMPORARY DRAINAGE STRUCTURES WITH SEDIMENT TRAPS AND BERMS.

2+70 – 5+00 (THIRD PHASE OF CONSTRUCTION)

DESCRIPTION/LOCATION: ECKROTE PROPERTY EASEMENT FROM US ROUTE 1 TO HIGH TIDE LINE (INTERTIDAL ZONE)

METHOD OF CONSTRUCTION: BRACED EXCAVATION.

METHOD OF SHORING: STACKED TRENCH BOXES AND/OR TEMPORARY SHEET PILES.

EXCAVATED SOILS MANAGEMENT: SOILS TRUCKED TO ONSITE STOCKPILE FOR REUSE AS TRENCH BACKFILL. BLASTED LEDGE TO BE CRUSHED AND USED FOR PIPE BEDDING MATERIAL AND OTHER ONSITE USES.

DEWATERING: PUMPED TO SETTLEMENT POOLS AND/OR SEDIMENT BAGS.

SEDIMENTATION & EROSION CONTROL: SILT FENCE AND EROSION CONTROL BERM ALONG CUTTING LIMITS OF EASEMENT. CONTINUED BMP MEASURES FOR ONSITE STOCKPILE.

5+00 – 13+50 (FOURTH PHASE OF CONSTRUCTION)

DESCRIPTION/LOCATION: INTERTIDAL ZONE

METHOD OF CONSTRUCTION: MUST BE COORDINATED WITH THE TIDES. EXCAVATION OF TRENCH WILL BE OPEN CUT AND EXCAVATED MATERIAL WILL BE TEMPORARILY STOCKPILED ON A BARGE STATIONED DURING HIGH TIDES TO BE ALONG THE WORK. SHORT SEGMENTS OF FLANGED PIPE (20–100 LF) WILL BE ADVANCED AS THE TRENCH IS PREPARED WITH THE CONNECTIONS BETWEEN PIPE BOLTED TOGETHER PRIOR TO BACKFILL FROM THE BARGE MATERIALS. EXCESS MATERIALS WILL BE MOVED BY BARGE TO A LOCATION WHERE IT CAN BE UNLOADED TO TRUCKS AND DISPOSED OF AT A LICENSED LANDFILL FACILITY.

METHOD OF SHORING: TRENCH BOX.

EXCAVATED SOILS MANAGEMENT: TEMPORARY STORAGE OF ALL EXCAVATED MATERIAL ON ADJACENT BARGE DURING THE WORK. TRENCH WILL BE BACKFILLED FROM BARGE MATERIALS. EXCESS MATERIALS WILL PERIODICALLY BE MOVED BY BARGE TO A LOCATION WHERE IT CAN BE UNLOADED TO TRUCKS AND DISPOSED OF AT A LICENSED LANDFILL FACILITY.

DEWATERING: PUMPED TO SETTLEMENT POOLS AND/OR SEDIMENT BAGS IF POSSIBLE. IF NOT, BOLTED CONNECTIONS WILL BE MADE BY DIVERS AND THERE WILL BE NO DEWATERING.

SEDIMENTATION & EROSION CONTROL: TURBIDITY CURTAIN ON BARGE. UTILIZE 16–TO–20 FOOT WIDE CRANE MATS FOR EXCAVATOR OPERATIONS.

13+50 – 36+00 (FIFTH PHASE OF CONSTRUCTION)

DESCRIPTION/LOCATION: SUBMERGED BURIED SEGMENT.

METHOD OF CONSTRUCTION: ALL EQUIPMENT AND MATERIALS ARRIVE AT SITE VIA BARGE. EXCAVATION OF TRENCH WILL BE OPEN CUT AND EXCAVATED MATERIAL WILL SIDE CAST ADJACENT TO THE TRENCH. LONGER SECTIONS OF WELDED JOINT PIPE BE UTILIZED. JOINTS WILL BE WELDED ON THE BARGES AND ENDS TEMPORARILY CAPPED. PRECAST ANCHORS WILL BE ATTACHED, AND THE PIPE WILL BE FLOATED TO A LOCATION ABOVE THE PREPARED TRENCH. AIR WILL BE RELEASED FROM THE PIPE TO ALLOW IT TO SETTLE IN PLACE. EXCESS MATERIALS WILL BE MOVED BY BARGE TO A LOCATION WHERE IT CAN BE UNLOADED TO TRUCKS AND DISPOSED OF AT A LICENSED LANDFILL FACILITY.

METHOD OF SHORING: N/A

EXCAVATED SOILS MANAGEMENT: TRENCH WILL BE BACKFILLED WITH PREVIOUSLY EXCAVATED MATERIAL. EXCESS MATERIALS WILL PERIODICALLY BE MOVED BY BARGE TO A LOCATION WHERE IT CAN BE UNLOADED TO TRUCKS AND DISPOSED OF AT A LICENSED LANDFILL FACILITY.

DEWATERING: N/A

SEDIMENTATION & EROSION CONTROL: TURBIDITY CURTAIN ON BARGES.

36+00 – 69+00 (SIXTH PHASE OF CONSTRUCTION)

DESCRIPTION/LOCATION: SUBMERGED SEGMENT ON SEAFLOOR.

METHOD OF CONSTRUCTION: ALL EQUIPMENT AND MATERIALS ARRIVE AT SITE VIA BARGE. THERE IS NO EXCAVATION OF MATERIALS FOR THIS PHASE OF CONSTRUCTION. LONG SECTIONS OF WELDED JOINT PIPE BE UTILIZED. JOINTS WILL BE WELDED ON THE BARGES AND ENDS TEMPORARILY CAPPED. PRECAST ANCHORS WILL BE ATTACHED, AND THE PIPE WILL BE FLOATED TO A LOCATION ABOVE THE INTENDED PIPE ROUTE WHERE TEMPORARY WOOD PILES WILL ALIGN THE PIPES. AIR WILL BE RELEASED FROM THE PIPE TO ALLOW IT TO SETTLE IN PLACE. NO SOIL EXCAVATION OR PLACEMENT OF NEW SOILS IS ANTICIPATED DURING THIS PHASE OF WORK.

METHOD OF SHORING: N/A

EXCAVATED SOILS MANAGEMENT: N/A

DEWATERING: N/A

SEDIMENTATION & EROSION CONTROL: N/A.

RANSOM Consulting Engineers and Scientists

WOODARD & CURRAN
41 Hutchins Drive
Portland, Maine 04102
800.426.4262 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

REV	DESCRIPTION	DATE

REVISED FOR PERMIT
10-29-19

CURRENT ISSUE STATUS:

TRUE NORTH:

JAMES D. WILSON No. 8592 STATE OF MAINE REGISTERED PROFESSIONAL ENGINEER

SMRT Architects and Engineers
144 Fore Street, PO Box 618
Portland, Maine 04104
ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY
SMRT

NORDIC AQUAFARMS

BELFAST, MAINE

EROSION CONTROL CONSTRUCTION SEQUENCING PLAN

20' 0 20' 40'

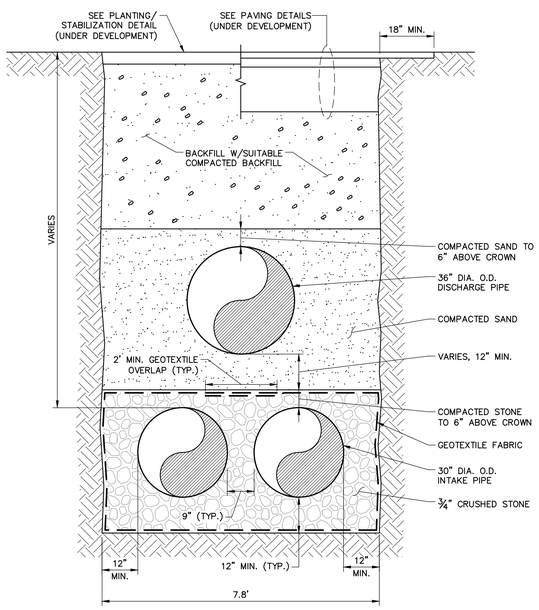
BAR SCALE
1" = 20'
CHECK GRAPHIC SCALE BEFORE USING

PROJECT MANAGER:	PROJECT NO: 18076
JOB CAPTAIN:	CS105

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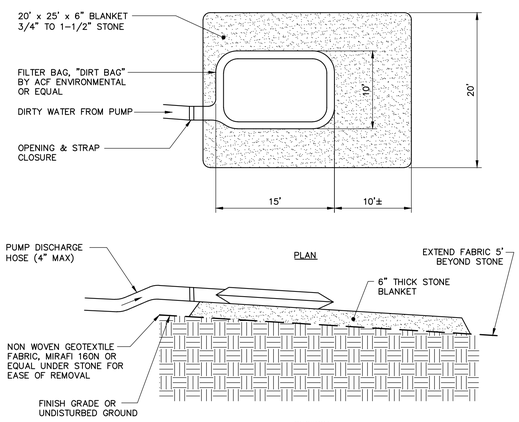
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24x36



8 / CS503 BURIED 3–PIPE TRENCH DETAIL (LAND)

SCALE: 1" = 2'

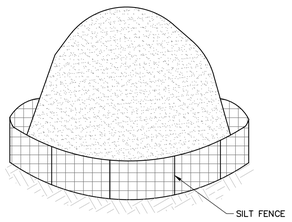


DEWATERING NOTES

1. LOCATE DISCHARGE SITE ON FLAT UPLAND AREAS AS FAR AWAY AS POSSIBLE FROM STREAMS, WETLANDS, OTHER RESOURCES AND POINTS OF CONCENTRATED FLOW.
2. DISCHARGE NOT PERMITTED WITHIN 200' OF A STREAM OR 100' OF A WETLAND.
3. DOWNGRADIENT RECEIVING AREA MUST BE WELL VEGETATED OR OTHERWISE STABLE FROM EROSION, I.E. FOREST FLOOR OR COARSE GRAVEL/STONE.
4. NEVER DISCHARGE TO AREAS THAT ARE BARE OR NEWLY VEGETATED.
5. DIRT BAG MATERIAL BASED ON PARTICLE SIZE IN DIRTY WATER, I.E., FOR COARSE PARTICLES A WOVEN MATERIAL; FOR SILTS/CLAYS A NON–WOVEN MATERIAL.
6. DO NOT OVER PRESSURIZE DIRT BAG OR USE BEYOND CAPACITY.
7. CHANNELS DUG FOR DISCHARGING WATER FROM THE EXCAVATED AREA NEED TO BE STABLE. IF FLOW VELOCITIES CAUSE EROSION WITHIN THE CHANNEL THEN A DITCH LINING SHOULD BE USED.
8. BUCKETED WATER SHOULD BE DISCHARGED IN A STABLE MANNER TO THE SEDIMENT REMOVAL AREA. A SPLASH PAD OF RIPRAP UNDERLAIN WITH GEOTEXTILE MAY BE NECESSARY TO PREVENT SCOURING OF SOIL.
9. DEWATERING IN PERIODS OF INTENSE, HEAVY RAIN, WHEN THE INFILTRATIVE CAPACITY OF THE SOIL IS EXCEEDED, SHOULD BE AVOIDED.
10. INSTALL DIVERSION DITCHES OR BERMS TO MINIMIZE THE AMOUNT OF CLEAN STORMWATER RUNOFF ALLOWED INTO THE EXCAVATED AREA.
11. DURING THE ACTIVE DEWATERING PROCESS, INSPECTION OF THE DEWATERING FACILITY SHOULD BE REVIEWED FREQUENTLY. SPECIAL ATTENTION SHOULD BE PAID TO THE BUFFER AREA FOR ANY SIGN OF EROSION AND CONCENTRATION OF FLOW THAT MAY COMPROMISE THE BUFFER AREA. OBSERVE WHERE POSSIBLE THE VISUAL QUALITY OF THE EFFLUENT AND DETERMINE IF ADDITIONAL TREATMENT CAN BE PROVIDED.
12. EROSION CONTROL REQUIRED AROUND DEWATERING DISCHARGE SEDIMENT CONTROL DEVICE.

9 / CS503 DEWATERING DISCHARGE SEDIMENT CONTROL DEVICE

SCALE: NOT TO SCALE

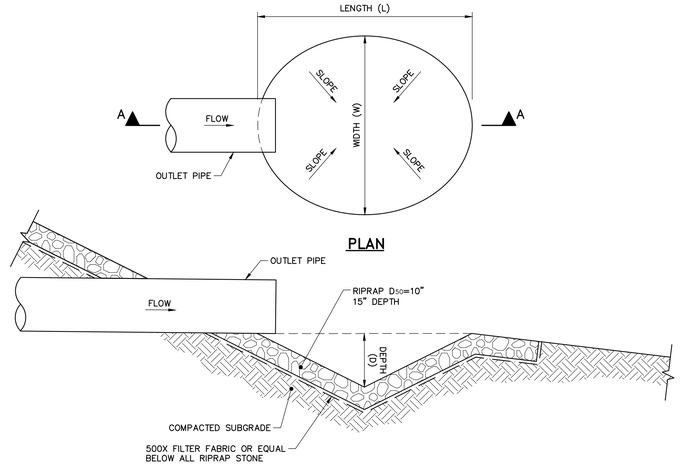


NOTES:

1. STOCKPILES SHALL BE SURROUNDED BY SILT FENCE.
2. STOCKPILES SHALL HAVE A MAXIMUM 2:1 (H:V) SIDE SLOPE.
3. REPAIR OR REPLACE DAMAGED SILT FENCE DUE TO CONSTRUCTION ACTIVITIES OR STOCKPILE MITIGATION.
4. STOCKPILE SHALL BE LOCATED IN AREAS AS SHOWN ON THE DRAWINGS OR APPROVED BY THE ENGINEER.

11 / CS503 TEMPORARY UPLAND SOIL STOCKPILE

SCALE: NOT TO SCALE

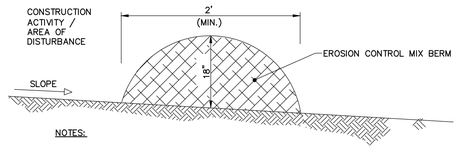


SECTION A–A

PLUNGE POOL DIMENSIONS								
	REQUIRED				PROVIDED			
PIPE SIZE	(L)	(W)	(D)	SLOPE	(L)	(W)	(D)	SLOPE
36"	12'	6'	3'	2:1	28'	22'	3'	3:1
30"	10'	5'	2.5'	2:1	24'	18'	2.5'	3:1

10 / CS503 RIPRAP PLUNGE POOL

SCALE: NOT TO SCALE



NOTES:

Erosion Control Mix Berms

Erosion control mix can be manufactured on or off the project site. It must consist primarily of organic material and may include: shredded bark, stump grindings, composted bark, or acceptable manufactured products. Wood and bark chips, ground construction debris or reprocessed wood products will not be acceptable as the organic component of the mix.

Composition

Erosion control mix shall contain a well–graded mixture of particle sizes and may contain rocks less than 4" in diameter. Erosion control mix must be free of refuse, physical contaminants, and material toxic to plant growth. The mix composition shall meet the following standards:

- The organic matter content shall be between 80 and 100%, dry weight basis.
- Particle size by weight shall be 100 % passing a 6" screen and a minimum of 70%, maximum of 85%, passing a 0.75" screen.
- The organic portion needs to be fibrous and elongated.
- Large portions of silts, clays or fine sands are not acceptable in the mix.
- Soluble salts content shall be < 4.0 mmhos/cm.
- The pH should fall between 5.0 and 8.0.

12 / CS503 SEDIMENT BARRIER – EROSION CONTROL MIX BERM

SCALE: NOT TO SCALE

RANSOM Consulting Engineers and Scientists
WOODARD & CURRAN
41 Hutchins Drive
Portland, Maine 04102
800.426.4262 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

REV	DESCRIPTION	DATE
	REVISED FOR PERMIT 10-29-19	

CURRENT ISSUE STATUS:

STATE OF MAINE JAMES D. WILSON No. 8592 REGISTERED PROFESSIONAL ENGINEER

TRUE NORTH:

SMRT Architects and Engineers
144 Fore Street, PO Box 618
Portland, Maine 04104
ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY
SMRT

NORDIC AQUAFARMS

BELFAST, MAINE

CIVIL DETAILS - 3

PROJECT MANAGER:

PROJECT NO: 18076

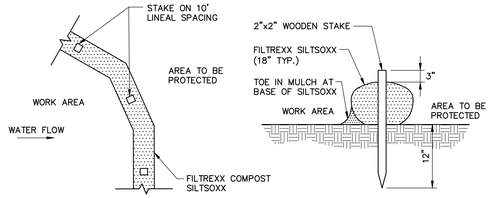
JOB CAPTAIN:

CS503

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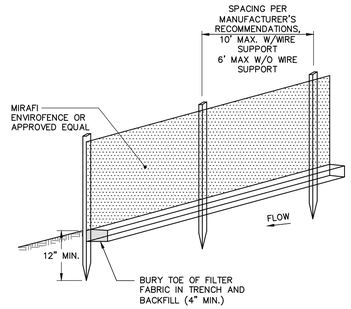
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PLAN VIEW SECTION VIEW

13 CS504 **SILTATION BARRIER – SILTSOXX**

SCALE: NOT TO SCALE



NOTES:

- INSTALL FABRIC ON UPHILL SIDE OF SUPPORT POSTS
- INSTALL SILT FENCE ACROSS SLOPES
- SILT FENCE SHALL NOT BE USED IN DRAINAGE WAYS

MAINTENANCE: INSPECT FOR TEARS IN THE FABRIC OR DAMAGE TO SUPPORTS. REPAIR AS NECESSARY. REMOVE ACCUMULATED SEDIMENT WHEN IT REACHES A DEPTH OF SIX–INCHES OR LESS.

REMOVAL: WHEN UPSLOPE AREAS ARE STABILIZED, THE STRUCTURE AND ANY ACCUMULATED SEDIMENT WILL BE REMOVED.

14 CS504 **SILTATION BARRIER – SILTATION FENCE DETAIL**

SCALE: NOT TO SCALE

EROSION AND SEDIMENT CONTROL NOTES

Temporary Erosion Control

Contractor shall prepare and submit a soil erosion and water pollution control plan to engineer in accordance with section 656.

Measure	Dates For Use	Timing, Activity, and Location
Sedimentation Barrier	ALL	Before soil disturbance, install downhill of areas to be disturbed and around material stockpiles.
Up–slope Diversion	ALL	Before soil disturbance, install uphill of areas to be disturbed and material stockpiles.
Catch Basin Protection	ALL	Before soil or pavement disturbance, install ACF Environmental, Inc. High Flow Siltsack, Siltsaver Inlet Filter. or equal, installed per manufacturer's requirements.
Dust Control	ALL	During dry weather, apply water and calcium chloride to control dust.
Temporary Seeding	April 15 to Oct. 1	Soil stockpiles that are not covered and disturbed areas that will not be disturbed again within 14 days. If grass growth provides less than 95% soil coverage by Nov. 1, apply mulch and anchor with erosion control blanket.
Mulch	April 15 to Sept. 15	On all areas of exposed soil apply 100–150 lbs (2.5 bales) per 1,000 sq ft. by mechanical blower.
Winter Mulch	Sept. 16 to Oct. 31	On all areas of exposed soil apply 150 to 170 lbs. mulch (4 bales) per 1,000 sq. ft. by mechanical blower. Erosion control blanket may be used as a substitute for winter mulch.
	Nov. 1 to April 14	On all areas of exposed soil, apply 150 to 170 lbs. mulch (4 bales) per 1,000 sq. ft. and anchor with netting at the end of each working day. Erosion control blanket may be used as a substitute for winter mulch.
Inspections	Until site is permanently stabilized	Inspect the erosion and sedimentation control measures daily, and maintain and repair as necessary.

Permanent Erosion Control:

Measure	Dates For Use	Timing, Activity, and Location
Pavement – Base Course – Final Course	When no frost is in ground	Install only in areas shown on the plan, shortly after pavement base is brought to final grade. Install near completion of project.
Permanent Seeding	April 15 to Sept. 15	On final grade areas, within 7 days of grade preparation, prepare topsoil, followed by seed and mulch application.
Dormant Seeding	Sept. 16 to April 15	On final grade areas, with prepared topsoil. Apply seed at double the specified rate on bare soil, and follow with an application of winter mulch.
Ground Cover, Trees, Shrubs	April 15 to Nov. 1	Install with final landscaping.
Permanent Mulch	ALL	Install with final landscaping.

Inspections:

Regular inspections of all erosion and sedimentation controls shall be made at least weekly and prior to and following storm events. Minimum inspections shall be made as listed in the table below.

Inspected Item	Look For
Mulched Surfaces	Thin mulch or inadequate application. Wind movement.
Seeded Surfaces	Poor seed germination. Loss of mulch. Development of rivulets.
Sediment Barrier	Sediment build–up to one half the height of the barrier. Undermining of the barrier. Supporting stakes loose, toppled, or unmarked. Breaks in barrier.
Perimeter Diversion	Discharge is to stabilized area. Erosion or breaks in barrier. Supporting stakes loose, toppled or unmarked.
Catch Basin Protection	Sediment build–up and structure blockages. Slow flow/Ponding water. Breaks in fabric or voids in barrier.
Dewatering Filter	Breaks in fabric or supporting structure. Slow flow, indicating high sediment build–up.
Construction Entrance	Sedimentation of roadways. Off–site dust complaints.

EROSION AND SEDIMENTATION CONTROL NOTES

TEMPORARY EROSION CONTROL MEASURES MAY INCLUDE THE USE OF STABILIZED CONSTRUCTION ENTRANCES, HYDRAULIC MULCH, HAY AND STRAW MULCH, EROSION CONTROL BLANKET, TURF REINFORCED MATTING, RIPRAP AND TEMPORARY SEEDING. TEMPORARY SEDIMENT CONTROL MEASURES INCLUDE THE USE OF SILT FENCE, EROSION CONTROL MIX BERMS, PLUNGE POOLS, CHECK DAMS, SEDIMENT TRAPS, CATCHBASIN SEDIMENT COLLECTION BAGS AND GEOTEXTILE FILTER BAGS. PERMANENT MEASURES INCLUDE THE USE OF RIPRAP AT EXPOSED STORMDRAIN AND CULVERT INLETS AND OUTLETS, ARMORED SWALES AND SLOPES AND PERMANENT VEGETATION.

GENERAL

A. THE PROJECT SHALL CONFORM WITH THE STANDARDS OF THE NRPA PERMIT AND ACOE GENERAL PERMIT.

B. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE CONSTRUCTED AND MAINTAINED IN ACCORDANCE WITH THE MAINE EROSION AND SEDIMENT CONTROL BMPS HANDBOOK PUBLISHED BY THE MAINE DEP UNLESS OTHERWISE NOTED IN THESE PLANS. HTTP://MAINE.GOV/DEP/BLWQ/DOCSTAND/ESCBMPS/

C. ANY ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES DEEMED NECESSARY BY THE OWNER'S REPRESENTATIVE, DEPARTMENT OF ENVIRONMENTAL PROTECTION, AND/OR MUNICIPAL OFFICIALS SHALL BE INSTALLED BY THE CONTRACTOR.

D. THE CONTRACTOR IS RESPONSIBLE FOR ALL FINES RESULTING FROM EROSION OR SEDIMENTATION FROM THE SITE TO SURROUNDING PROPERTIES, WATER BODIES, OR WETLANDS AS A RESULT OF THIS PROJECT.

E. THE CONTRACTOR SHALL MINIMIZE DISTURBANCE TO THE SITE WHENEVER POSSIBLE WHILE ALLOWING PROPER SITE DEVELOPMENT.

F. CONSTRUCTION STAGING SHALL BE CONDUCTED IN A WAY TO MINIMIZE THE POTENTIAL FOR STORMWATER RUN–ON TO DISTURBED AREAS.

G. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR/REPLACEMENT/MAINTENANCE OF ALL EROSION CONTROL MEASURES UNTIL ALL DISTURBED AREAS ARE STABILIZED TO THE SATISFACTION OF THE ABOVE PERSONNEL. DESCRIPTIONS OF PERMANENT STABILIZATION FOR VARIOUS COVER TYPES FOLLOWS:

i. FOR SEEDED AREAS, PERMANENT STABILIZATION MEANS THAT 90% OF THE DISTURBED AREA IS COVERED WITH REASONABLY THICK UNIFORM STAND OF PERMANENT GRASS SPECIES, FREE FROM SIZABLE THIN OR BARE SPOTS.
ii. FOR SODDED AREAS, PERMANENT STABILIZATION MEANS THAT COMPLETE BINDING OF THE SOD ROOTS INTO THE UNDERLYING SOIL WITH NO SLUMPING OF THE SOD OR DIE OFF.
iii. FOR MULCHED AREAS, PERMANENT STABILIZATION MEANS TOTAL COVERAGE OF THE EXPOSED AREA WITH AN APPROVED MULCH MATERIAL.
iv. FOR AREAS STABILIZED WITH RIPRAP, PERMANENT STABILIZATION MEANS THAT SLOPES STABILIZED WITH RIPRAP HAVE AN APPROPRIATE BACKING OF A WELL–GRADED GRAVEL OR APPROVED GEOTEXTILE. STONE MUST BE SIZED APPROPRIATELY AND IN ACCORDANCE WITH SECTION E–6 OF THE MAINE EROSION AND SEDIMENT CONTROL BMP MANUAL.
v. FOR PAVED AREAS, PERMANENT STABILIZATION MEANS THE PLACEMENT OF THE ASPHALT BINDER COURSE.
vi. FOR OPEN CHANNELS, LEVEL SPREADERS, ENGINEERED BUFFERS OR OTHER DESIGNED STORMWATER CONVEYANCE STRUCTURE, PERMANENT STABILIZATION MEANS THE CHANNELIZED AREA(S) IS STABILIZED WITH MATURE VEGETATION AT LEAST THREE INCHES IN HEIGHT, WITH APPROVED RIPRAP, OR WITH OTHER NON–EROSIVE LINING CAPABLE OF WITHSTANDING THE ANTICIPATED FLOW VELOCITIES AND FLOW DEPTHS WITHOUT RELIANCE ON CHECK DAMS TO SLOW FLOW. THERE SHALL BE NO EVIDENCE OF SLUMPING, UNDERCUTTING OR DOWNCUTTING OF THE DESIGNED CHANNEL.

H. IF THE AREA WILL REMAIN UNWORKED FOR MORE THAN ONE YEAR OR HAS BEEN BROUGHT TO FINAL GRADE, AND WILL NOT BE BUILT ON, THEN IMMEDIATELY PROVIDE PERMANENT STABILIZATION USING VEGETATION THROUGH PLANTING, SEEDING, SOD OR THROUGH THE USE OF PERMANENT MULCH OR RIPRAP. IF USING VEGETATION FOR STABILIZATION, SELECT THE PROPER VEGETATION FOR THE LIGHT, MOISTURE, AND SOIL CONDITIONS. AMEND AREAS OF DISTURBED, OVERLY–COMPACTED SUBSOIL WITH TOPSOIL OR COMPOST AND LIGHTLY TILL 2–3" OF SOIL AMENDMENTS INTO THE TOP 8" OF SOIL.

I. PROTECT ALL SEEDED AREAS WITH MULCH OR EROSION CONTROL BLANKET IN AREAS OF SHEET OR CONCENTRATED FLOWS. MULCH ALL AREAS SO THAT SOIL IS NOT VISIBLE THROUGH THE MULCH REGARDLESS OF THE APPLICATION RATE. SCHEDULE SEEDING OR SODDING TO AVOID FAILURE DUE TO SUMMER DROUGHT AND FALL FROST. NEWLY SEEDED AREAS SHOULD BE PROTECTED FROM VEHICLE TRAFFIC, PEDESTRIAN TRAFFIC AND CONCENTRATED RUNOFF UNTIL THE VEGETATION IS WELL ESTABLISHED. AREAS MUST BE REWORKED AND RESTABILIZED IF GERMINATION IS SPARSE OR SURFACE EROSION IS EVIDENT.

J. DITCH LININGS AND RIPRAP INLET AND OUTLET PROTECTION SHALL BE INSTALLED WITHIN 48 HOURS OF COMPLETING THE GRADING OF THAT SECTION OF DITCH OR INSTALLATION OF THE CULVERT.

K. EROSION CONTROL BLANKET SHALL BE INSTALLED ON ALL PERMANENT SLOPES STEEPER THAN 3:1, IN THE BASE OF DITCHES AND ANY DISTURBED AREAS WITHIN 100 FEET OF A PROTECTED NATURAL RESOURCE (WETLANDS AND WATER RESOURCES). EROSION CONTROL BLANKET SHALL BE NORTH AMERICAN GREEN S150BN OR APPROVED EQUAL. EROSION CONTROL BLANKET SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

L. THE CONTRACTOR IS RESPONSIBLE FOR REMOVAL OF ALL TEMPORARY EROSION CONTROL MEASURE UPON STABILIZATION OF PROJECT AREA & COST SHALL BE INCIDENTAL TO CONTRACT.

WINTER CONDITIONS

A. WINTER CONSTRUCTION IS CONSTRUCTION ACTIVITY PERFORMED DURING THE PERIOD FROM NOVEMBER 1 THROUGH APRIL 1. IF AREAS WITHIN THE CONSTRUCTION AREA ARE NOT STABILIZED WITH TEMPORARY OR PERMANENT MEASURES OUTLINED ABOVE BY NOVEMBER 15 THEN THE SITE MUST BE PROTECTED WITH ADDITIONAL STABILIZATION MEASURES THAT ARE SPECIFIC TO WINTER CONDITIONS.

GOOD HOUSEKEEPING AND POLLUTION PREVENTION

A. SPILL PREVENTION CONTROLS MUST BE USED TO PREVENT POLLUTANTS FROM BEING DISCHARGED FROM MATERIALS ON SITE, INCLUDING STORAGE PRACTICES TO MINIMIZE EXPOSURE OF THE MATERIALS TO STORMWATER RUNOFF AND APPROPRIATE SPILL PREVENTION, CONTAINMENT AND RESPONSE PLANNING AND IMPLEMENTATION.

B. DURING CONSTRUCTION, PETROLEUM PRODUCTS AND OTHER HAZARDOUS MATERIALS WITH THE POTENTIAL TO CONTAMINATE GROUND OR SURFACE WATERS MAY NOT BE STORED OR HANDLED IN AREAS OF THE SITE DRAINING TO INFILTRATION AREAS. AN "INFILTRATION AREA" IS ANY ARE OF THE SITE THAT BY DESIGN, OR AS A RESULTS OF SOIL AND TOPOGRAPHY, ACCUMULATES RUNOFF THAT INFILTRATES IN THE SOIL. DIKES, BERMS, SUMPS AND OTHER FORMS OF TEMPORARY SECONDARY CONTAINMENT THAT PREVENT DISCHARGE TO GROUNDWATER MAY BE USED TO ISOLATE PORTIONS OF THE SITE FOR THE PURPOSES OF STORAGE AND HANDLING OF THESE MATERIALS.

C. LOCATE ALL MATERIAL STOCKPILES WITH CONSIDERATION FOR STORMWATER DRAINAGE PATTERNS AND INFRASTRUCTURE.

D. TAKE ALL REASONABLE MEASURES TO MINIMIZE DUST RESULTING FROM THE PROJECT. OIL MAY NOT BE USED FOR DUST CONTROL.

E. LOCATE ALL LITTER, CONSTRUCTION DEBRIS AND CONSTRUCTION CHEMICALS WITH CONSIDERATION FOR STORMWATER DRAINAGE PATTERNS AND INFRASTRUCTURE.

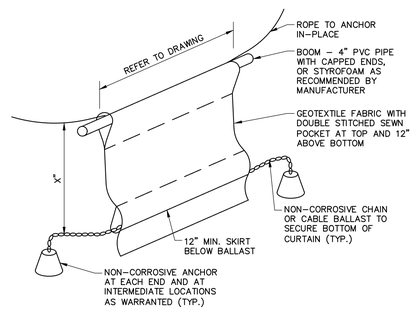
F. TRENCH OR FOUNDATION DE–WATERING MUST BE SPREAD THROUGH SUFFICIENT NATURAL BUFFERS THAT HAVE CAPACITY TO INFILTRATE THE PUMPED WATER OR SHOULD BE PUMPED TO DESIGNED CONSTRUCTION DEWATERING DEVICES AS DESCRIBED IN THE MAINE EROSION AND SEDIMENT CONTROL BMPS HANDBOOK.

G. SEDIMENTS AND SOIL MATERIALS SHOULD BE SWEPT FROM PAVED SURFACES AT THE END OF EACH WORKDAY OR PRIOR TO RAIN EVENTS, WHENEVER POSSIBLE.

INSPECTION AND MAINTENANCE

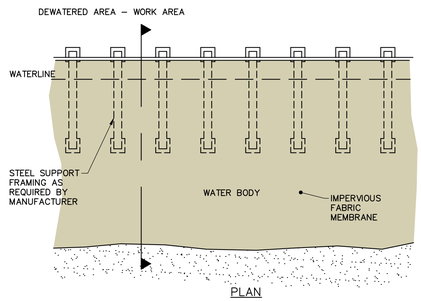
A. A PERSON WITH KNOWLEDGE OF EROSION AND STORMWATER CONTROLS, INCLUDING THE STANDARDS IN THE MAINE CONSTRUCTION GENERAL PERMIT, THE MAINE EROSION AND SEDIMENT CONTROL BMPS HANDBOOK OR ANY MUNICIPAL REQUIREMENTS MUST CONDUCT THE INSPECTION. THIS PERSON MUST BE IDENTIFIED IN THE INSPECTION LOG. IF ADDITIONAL BMPS OR MODIFICATIONS TO BMPS ARE NECESSARY, THE MODIFICATIONS MUST BE IMPLEMENTED WITH 7 CALENDAR DAYS OR PRIOR TO ANY PRECIPITATION EVENT. ALL MEASURES MUST BE MAINTAINED IN EFFECTIVE OPERATING CONDITION UNTIL AREAS ARE PERMANENTLY STABILIZED.

B. AN INSPECTION AND MAINTENANCE LOG MUST BE KEPT BY THE CONTRACTOR, SUMMARIZING THE SCOPE OF THE INSPECTION, DATE, AND MAJOR OBSERVATIONS RELATING TO THE OPERATION OF EROSION AND SEDIMENT CONTROL BMPS, MATERIAL STORAGE AREAS, AND VEHICLE ACCESS POINTS TO THE CONSTRUCTION AREA. THE INSPECTION LOG SHOULD BE DELIVERED TO THE PROPERTY OWNER OR RESPONSIBLE CONTRACTING ENTITY UPON COMPLETION OF THE PROJECT.

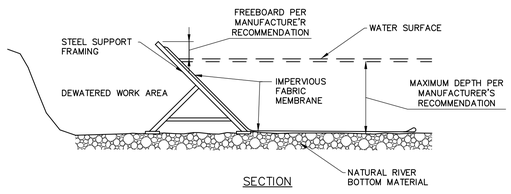


15 CS504 **TURBIDITY CURTAIN**

SCALE: NOT TO SCALE



PLAN



SECTION

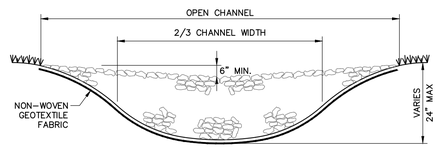
NOTE:

COFFERDAM DETAIL SHOWN FOR REFERENCE PURPOSES. CONTRACTOR SHALL PROVIDE DESIGN OF TEMPORARY COFFERDAMS, STAMPED BY A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF MAINE.

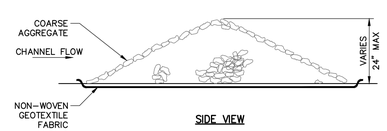
16 CS504 **TEMPORARY FRAME & FABRIC COFFERDAM DETAIL**

SCALE: NOT TO SCALE

TO BE INSTALLED AROUND WORK AREA IN ACCORDANCE WITH CONTRACTOR'S WORK PLAN



FRONT VIEW



SIDE VIEW

NOTES:

1. CHECK DAMS SHALL BE SPACED SO THE TOP OF DOWNGRADIENT CHECK DAM AND BOTTOM OF THE UPGRADIENT CHECK DAM SHALL BE AT THE SAME ELEVATION.
2. REPLACE OR REPAIR CHECK DAM WITHIN TWENTY–FOUR (24) HOURS OF OBSERVED FAILURE.
3. MAXIMUM SLOPE IS 2:1.

17 CS504 **STONE CHECK DAM**

SCALE: NOT TO SCALE

ANSOM Consulting Engineers and Scientists
WOODARD & CURRAN
41 Hutchins Drive
Portland, Maine 04102
800.426.4262 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

REV	DESCRIPTION	DATE

REVISED FOR PERMIT
10-29-19

CURRENT ISSUE STATUS:

STATE OF MAINE JAMES D. WILSON No. 8592 REGISTERED PROFESSIONAL ENGINEER

TRUE NORTH:

SMRT Architects and Engineers
144 Fore Street, PO Box 618
Portland, Maine 04104
ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY
SMRT

NORDIC AQUAFARMS

BELFAST, MAINE

CIVIL DETAILS - 4

PROJECT MANAGER:

PROJECT NO: 18076

JOB CAPTAIN:

CS504

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NOT FOR CONSTRUCTION

24x36

ATTACHMENT D

Letter of Intent to Fund

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Ransom Consulting, Inc.
Project 171.05027.008

Nordic Aquafarms AS
Att: CEO Bernt Olav Røttingsnes
Øraveien 2,
1630 Gamle Fredrikstad

Oslo, 1 November 2019

Background

Carnegie Investment Bank ("Carnegie") has been requested by Nordic Aquafarms ("NAF") to provide a statement regarding our view on availability of funds to secure financing of NAF's contemplated aquafarm in Belfast, Maine, as a combination of debt (through Direct Lending) and new equity.

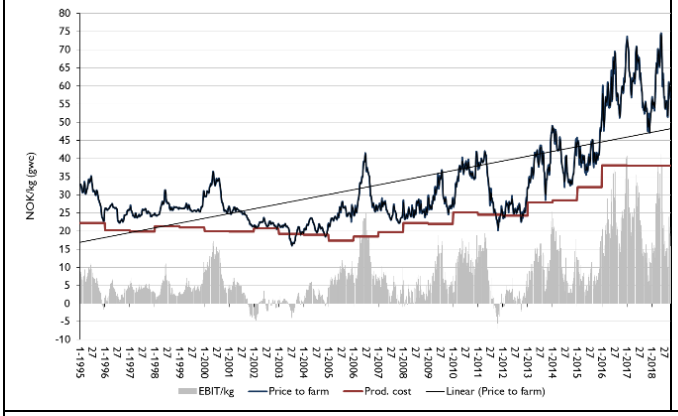
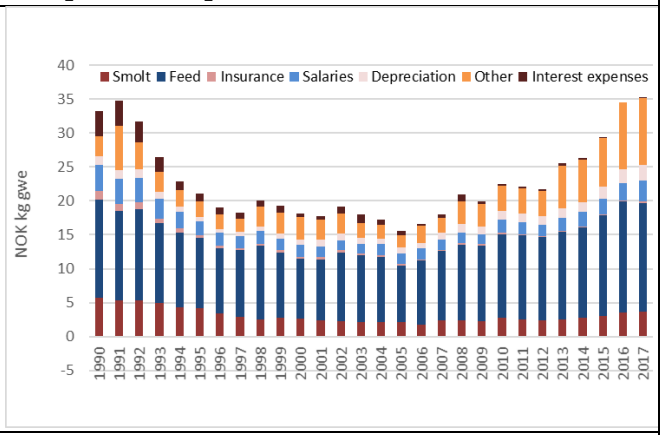
Carnegie is a leading investment bank in the Nordic region with substantial experience in raising capital primarily to companies based in the Nordics. Our Norwegian franchise has paid particular attention to industries with strong roots in Norway, hereunder seafood and aquaculture, and over the past decades we have raised billions of USD, primarily in equity to finance growth and M&A within the seafood industry. We have raised capital both to listed and unlisted companies and advised in transactions related to several segments of the seafood industry (catch, aquaculture, services, equipment, etc.). Our list of credentials is long and includes also a large number of major seafood companies based in the Nordics hereunder Mowi (Marine Harvest), Cermaq, Grieg Seafood, Bakkafrost, Norway Royal Salmon, Copeinca (Peruvian fishmeal company), EWOS and many more.

Carnegie was also advising Nordic Aquafarms in the successful NOK 100 million (~USD 12m) private placement of equity to fund the completion of the land-based facility of its subsidiary Fredrikstad Seafoods in Norway in December 2018. In the preparation and marketing of this transaction, we not only gained substantial insights in the financials related to the expansion plans for NAF in Maine, but also investors' view on the attractiveness of such investment relative to other projects.

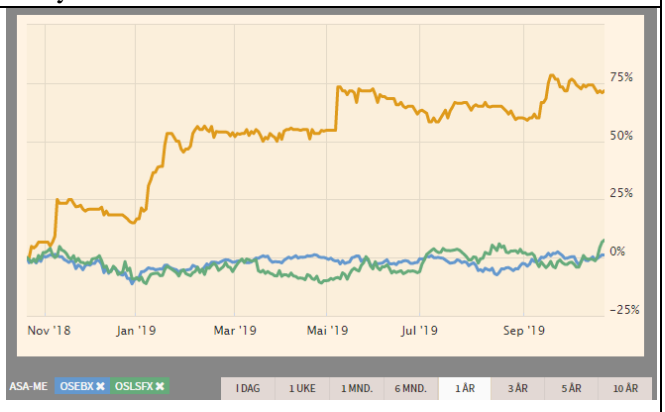
In recent years, on the back of raising salmon prices and increased profitability, salmon farming has outperformed other industries in the stock market and gained increased interest and attention within the financial industry and the investor community, both within equity and debt. Land-based salmon farming is benefitting from the strong sentiment for aquaculture related shares in general, but also driven by higher production cost in traditional ocean-based salmon farming, increased focus on sustainability with consumers and technological improvements related to land-based fish farming (RAS).

The graphs below illustrate the underlying price, cost and profitability for Atlantic salmon seen from a Norwegian perspective. Norway represents more than 50% of global production of Atlantic salmon, which in 2018 amounted to some 2.2m tonnes (gwe[1]), so production in Norway is key also when assessing the global salmon industry.

[1] Gutted Weight Equivalent (84% of live weight, 90% of whole fish equivalent)

Atlantic Salmon **Price, cost and profitability**	**Composition of production cost**
	
Source: Statistics Norway, Norwegian Directorate of Fisheries, Carnegie	

Furthermore, the company Atlantic Sapphire ("ASA") has paved the way for other land-based projects by raising substantial amounts in equity over the last years (some USD 265 million), listing the shares in 2018 and subsequently seeing a substantial increase in market valuation (currently some USD 800 million).

Share price development **Oslo Stock Exchange Benchmark Index (OSEBX) vs. the Seafood Index (OSLSFX) last 5 years**	**Atlantic Sapphire (ASA-ME) vs the Oslo Benchmark Index (OSEBX) and the Seafood Index (OSLSFX) last year**
	
Source: Oslo Stock Exchange	

Based on the above, we therefore see strong investor interest for aquaculture related investments.

Supportive arguments regarding the funding of NAF Maine

With the investment in Belfast, Maine, we believe that Nordic Aquafarms will position itself as the second largest land-based salmon farming company in the world, after Atlantic Sapphire. When it comes to in-

house know-how and engineering capabilities, NAF has a very capable team which was further strengthened after the additions from Inter Aqua Advance in 2018.

NAFs land-based facility in Denmark that produces Yellowtail Kingfish has been in operation for more than two years and has for the past year been harvesting and selling fish on a regular basis.

NAF completed the construction of the first module of its Norwegian land-based facility in Q1 2019, and the facility in Fredrikstad went into operation with the release of the first smolt in Q2. The operations have been performing according to plan since.

The US expansion will therefore benefit greatly from the experiences gained, both during the construction phase as well as operationally, from the plants in Denmark and Norway. Furthermore, the company can leverage its existing experience base among key employees who have a strong track-record in fish farming and facility design.

NAF expects positive cash flow from the Norwegian operations already from 2020/2021, and we expect that the capital markets will increase its confidence in land-based investments further when NAF can show further proof of concept.

Moreover, in discussions with investors, investments in land-based are more attractive near the end-market consumers, as it increases the relative competitive advantages. The US is of particular interest as the market is large, land-based supply is not subject to expensive air freight for Fresh salmon (cost ~US 1.50 kg), and the CO2 footprint is also substantially better. In sum, profitability and investor return is expected to be better in the US than for similar investments in Norway or other production regions which will have to rely on traditional freight pattern (air freight in particular).

Moreover, traditional ocean-based aquaculture is facing a number of challenges, not least in Canada, which should further benefit land-based projects in the US. We therefore expect investor interest for such projects to continue to be high and with NAF as one of the most attractive investment objects internationally in this segment.

The NAF Maine investment case and the contemplated transaction

The planned NAF plant in Belfast, Maine, is designed to produce approximately 30,000 tonnes of salmon. The total projected investment is expected be approximately USD 500 million. The build-up will most probably be split into 2 phases and we assume that the first phase will carry a somewhat larger share of the total investment, due to planning and infrastructure. Nevertheless, our calculations based on investments relative to prospective profitability are supportive for the case.

Production cost within land-based is expected to be in the USD 4.0 – 5.0 per kg range, and prices for salmon is expected to stay high due to limited production growth in traditional farming and continued demand growth. Land-based locally produced salmon is expected to have a premium pricing relative to the

traditionally produced salmon due to lower time to market and sustainability. According to the industry source UrnerBarry, the average salmon price in North East US was USD 8.6 per kg in 2018.

A salmon price assumption of ~USD 8.0 per kg (i.e. 7% lower than 2018 commodity price) yields an estimated payback of ~6 years for NAF Maine, while a price of USD 9 per kg gives a payback of ~4 years. We expect investors to find this attractive. Nordics Aquafarms' business model further contemplates new projects in other parts of the US and thereby adding scale and growth prospects to the overall project and further enhancing the attractiveness with investors.

The company is planning for a phased development of the project and the equity/debt ratio is expected to change with overall de-risking of the project. As the equity portion might be higher in the earlier stages, we expect a debt portion of USD 80-120 million in phase 1 as a realistic scenario. The company is targeting a longer-term equity/debt ratio of ca 50/50. In our view, such a capital structure will be a good fit with the market for Direct Lenders/Private Debt Funds. Direct lending is a form of financing where large specialized funds take the role as lender on a sole basis, or in a tight group, to either a project or a company. The risk appetite for such investors is higher than for traditional banks and the Direct Lending instrument offers more flexibility than in the High-Yield Bond market.

On the back of previous experience, we therefore believe that there will be a substantial number of lenders willing to consider this financing. The primary attraction from a financing perspective are limited market risk, strong owners, considerable asset value and positive Environmental, Social and Governance ("ESG") aspects.

Carnegie has a strong position in this market and has secured debt financing for several other projects with similar attributes as NAFs project in Maine. Provided that the company can demonstrate the operational, commercial and engineering feasibility of the project and a high probability of receiving the necessary permits, we are confident that NAF will be able to secure financing on satisfactory terms and conditions to cover the construction financing and other required capital for the project to reach commercial operation. Once these project details are addressed and confirmed, we would take the project to market and enter into discussions and clarifications with potential direct lenders with the aim to close a financing deal for the project shortly after.

Finally, NAF has already managed to build a strong shareholder base, including some of the strongest private investment companies/family offices in Norway, which is an important asset in any transaction. In combination with the secured debt commitments discussed above, we are also confident that the required equity for the project will fall into place in a subsequent transaction.

Risk factors

Financing of companies always entails risk. There is risk related to the development of the capital markets in general, risk related to changes in market prices and risk related to the biological performance of the fish. For Nordic Aquafarms, there are also risks related to land-based specific factors, not least related to more specific biological challenges in RAS. Such risk is expected to gradually decrease through a successful development of Nordic Aquafarms operations in Fredrikstad in Norway. The risk factors above are not

meant to represent an exhaustive list, but rather to illustrate some of the most important risk factors seen from the perspective of securing funds to NAF Maine.

Conclusion

Based on our analysis of the aquaculture industry along with the current strong investor sentiment for salmon farming in general and land-based salmon farming in particular, we are of the opinion that Nordic Aquafarms will be well positioned to secure the required funding through issuance of debt through Direct Lending in combination with a placement of new equity towards institutional investors in the Nordic- as well as in International markets.

Yours sincerely,

Carnegie AS



Frank Heimland

Head of seafood - Investment Banking

Important notice:

This note has been prepared by Carnegie for the sole use by the recipient in the view of providing comfort regarding the company's ability to secure financing for the expansion plan in Belfast, Maine. This note contains only a preliminary discussion of the project and necessitates further investigation. The information herein is based on public available information and information from NAF. Although the information is believed to be accurate, no representation or warranty is made by Carnegie regarding the accuracy and completeness of the information, estimates, statements and assumptions contained herein and no liability of any form relating to the contents of this document shall be assumed by Carnegie.

ATTACHMENT E

Draft Hazardous Materials Spill Prevention Control and Countermeasures (SPCC) Plan

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Ransom Consulting, Inc.
Project 171.05027.008

DRAFT
HAZARDOUS MATTER SPILL PREVENTION, CONTROL, AND CLEAN-UP (SPCC) PLAN
NORDIC AQUAFARMS, INC.
BELFAST, MAINE

Prepared for:

Nordic Aquafarms, Inc.
165 High Street
Belfast, Maine

Prepared by:

Ransom Consulting, Inc.
400 Commercial Street
Portland, Maine 04101
207.772.2891

Project 171.05027.008
October 31, 2019

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APPENDICES

- Appendix A: Plan Review and Certification Log
- Appendix B: List of Chemicals and Safety Data Sheets
- Appendix C: Monthly AST Inspection Report Form and Inspection Records
- Appendix D: Spill Notification Form and Spill Records

MANAGEMENT APPROVAL

Nordic Aquafarms is committed to the prevention of discharges of hazardous materials to navigable waters or the environment; and will maintain the standards for spill prevention control and clean-up through periodic review, updating, and implementation of this Spill Prevention Control and Clean-up (SPCC) Plan. Nordic Aquafarms will provide the manpower, equipment and materials required to expeditiously prevent, control, and clean up hazardous materials that may be harmful to human health or the environment.

Authorized Facility Representative: _____

Signature: _____

Title: _____ Date: _____

MANAGEMENT REVIEW

A review and evaluation of this SPCC Plan will be conducted periodically, and Nordic Aquafarms will amend the SPCC Plan as necessary to include more effective prevention and control technologies, if those technologies will significantly reduce the likelihood of a spill event from the facility.

This SPCC Plan will also be amended as necessary after a change in the facility design, construction, operation, or maintenance occurs which materially affects the facility's potential for the discharge of hazardous materials.

Any technical amendment to the SPCC Plan shall be certified by a Professional Engineer. Revisions which are incorporated into the body of this SPCC Plan shall be indicated on the Plan Review and Certification Log included in Appendix A, along with the date, the reason for the change, the findings and pages requiring revision, and the reviewer's name and signature.

Review Dates	Signature	Amendment Required? (If "yes", see Appendix A)

1.0 INTRODUCTION AND SITE DESCRIPTION

1.1 Purpose

The purpose of this Hazardous Matter SPCC plan is to outline procedures that may prevent spills from occurring, and to perform safe, efficient and timely response in the event of a spill or leak (both referred to as "spills" herein). A hazardous matter SPCC plan must contain the information listed in Maine Hazardous Matter Law, 38 MRSA §1318-C.

"Hazardous matter" refers to substances that have been identified by the Maine Department of Environmental Protection (MEDEP) as posing a danger to people or the environment when spilled/released. Over 400 substances have been identified as hazardous matter by the MEDEP under Chapter 800 of the MEDEP rules.

1.2 General Site Description

Nordic Aquafarms is currently developing a fish processing facility on the northwest side of Route 1 (Northport Avenue) in Belfast, Maine, adjacent to the Belfast Reservoir Number One. Please refer to the appended Figure 1 - Site Location Map, to view the general location of the Site on a 7.5-minute topographic quadrangle. This facility will rear Atlantic salmon from the egg life stage to market-size fish weighing 10-12 pounds. At full production, the facility will be able to produce 66 million pounds of fish per year. ***It should be noted that at the time of the issuance of this DRAFT SPCC Plan, no construction has occurred on-site; as such, the descriptions, procedures, and figures contained herein are considered DRAFT/FOR PERMITTING and will be revised upon construction completion***.

The salmon growing operation is done indoors and therefore requires a fair number of buildings to perform that function. Buildings proposed on-site consist of: Building 1 – Consists of 3 grow modules constructed in succession; Building 2 – Consists of 3 grow modules constructed in succession; Building 3 – Smolt Building; Building 4 – Fish Processing Facility; Building 5 – Central Utility Plan; Building 6 – Oxygen generation; Building 7 – Office/Maintenance Building; Building 8 – Water/Wastewater Treatment Building; and Building 9 – Gate House. The buildings are arranged such that operations central to the needs of the fish growing process will be performed in the middle of the complex, while the larger fish grow module buildings are on the exterior. Water and wastewater treatment will be closer to Route 1 to facilitate intake and discharge of seawater. The building complex will be supported by paved access drives surrounding the facility and between buildings. Efforts were made to group buildings adjacent to one another to minimize the amount of pavement. Please refer to the appended Figure 2 – Site Plan for a view of the proposed Site buildings and infrastructure; and Figure 3 – Tank and Process Piping Plan for a view of interior hazardous material infrastructure.

Currently (i.e. UNDEVELOPED), the site has primarily coniferous vegetation cover within isolated areas of deciduous vegetation and bedrock outcrops. The site slopes gently to the South and Southwest into the Little River/Reservoir Number One. The terrain steepens within the 250-foot Resource Protection District with fingers of notable rivulets, channels and ravines out letting to the reservoir. The reservoir is controlled by a dam located just west of Route 1 and outlets into Belfast Bay.

A 50-foot building setback exists around the perimeter of the property, 40 feet of which will remain a naturally vegetated buffer yard. A 250-foot wide buffer area between the southern property line and Belfast Reservoir Number One will be maintained by the City of Belfast.

1.3 Hazardous Matter and Substances

As part of the fish processing activities, Nordic Aquafarms will maintain many different chemicals and hazardous materials on-Site, including cleaners/detergents, disinfectants/sanitizers, therapeutants, and chemicals for water and wastewater treatment. See Appendix B for a full list of chemicals which will be stored, maintained, and used on-Site, as well as the Safety Data Sheet (SDS) for each chemical. Appendix B also contains information on the approximate usage rates and storage volumes which are anticipated by Nordic Aquafarms. It should be noted that not all of the chemicals proposed for use by Nordic Aquafarms are listed on the federal list of 400 hazardous substances (40 CFR 302.4); chemicals which are not as "hazardous substances" by the MEDEP and Environmental Protection Agency will be stored, maintained, and used in accordance with best management practices and the procedures outlined in this plan.

The following table presents a list of chemicals which are proposed for use and storage onsite, their anticipated storage quantities, and the associated federal "Reportable Quantity" for each.

Chemical Name	**Hazardous Material Component**	**Estimated Quantity Stored On-Site**	**Reportable Quantity**
Aqualife® Multipurpose Cleaner	Sodium Hydroxide (1-5%)	385 gallons	1,000 lbs (116 gallons)
Gil Save®	Sodium Hydroxide (7- 9%), Sodium Hypochlorite (3-4%)	110 gallons	100 lbs (11 gallons)
Gil Super CIP®	Sodium Hydroxide (49%)	495 gallons	1,000 lbs (79 gallons)
Bleach	Sodium hypochlorite (8%)	530 gallons	100 lbs (11 gallons)
Zep FS Formula 12167® Chlorinated Disinfectant Germicide	Sodium Hypochlorite (5-10%), Sodium Hydroxide (1-3%)	330 gallons	100 lbs (12 gallons)
Parasite-S, Formalin-F, and Formacide-B	Formaldehyde (37%)	110 gallons	100 lbs (9 gallons)
Formic Acid	Formic Acid (85%)	1585 gallons	5,000 lbs (491 gallons)

Under 38 MRSA §1318-B, any a hazardous matter spill which exceeds the reportable quantity for that particular hazardous matter must be reported to the State Police and MEDEP (i.e. if there is a release of bleach which exceeds 11 gallons, it must be reported).

1.4 Containment and Diversionary Structures

While it is the Facility's goal not to have any discharges, should a discharge occur, appropriate containment and/or diversionary structures or equipment will be provided at the Facility to prevent a discharge. Where secondary containment is utilized, the entire system, including walls and floor, should be constructed so that any discharge from a primary containment system, such as a tank or pipe, will not escape the containment system before cleanup occurs.

The exact configuration and location of chemical storage tanks, containment structures, piping, fill ports, and diversionary structures has not yet been determined. This DRAFT SPCC plan will be updated once the facility has been constructed to include descriptions and details for containment and diversionary structures.

1.5 Discharge Detection Devices

As stated previously, the exact configuration and location of chemical storage tanks and associated infrastructure has not yet been determined. This DRAFT SPCC plan will be updated once the facility has been constructed to include descriptions and details for discharge detection devices/alarms.

2.0 POTENTIAL RECEPTORS AND MIGRATION POTENTIAL

2.1 Potential Receptors

Atlantic Resource Consultants prepared a Soil Erosion and Sedimentation Control Plan, in which, they described the Critical Areas of the Site as follows:

> *The critical areas of the site include the freshwater wetland resources downstream of the construction work area. There are also a number of streams on the project site that fall under the Natural Resource Protection Act jurisdiction. These streams are intermittent and have been designated with the prefix "S" as shown on [Figure 2A of this DRAFT SPCC Plan]. Non-jurisdictional drainages are designated with the prefix "D". Three streams extend off site and drain into the adjacent Reservoir One.*
>
> *Critical resources downstream from the site include Belfast Reservoir Number One and Penobscot Bay.*

2.2 Release Potential

The exact configuration and location of chemical storage tanks and associated infrastructure has not yet been determined. This DRAFT SPCC plan will be updated once the facility has been constructed.

However, as is typical for aboveground storage tanks (ASTs), there is potential for chemical release associated with the following (it should be noted that these are examples, and are not intended to constitute an inclusive list): leaking/improper connections between a chemical delivery truck and the AST fill ports; AST overfills; leaks around fittings/bends in the product piping; catastrophic tank failure (unlikely); leaking/improper use and transport of chemicals between AST and application point; and user/employee error.

2.3 Release Mitigation and Protection

The potential releases will be mitigated through the use and application of containment and diversionary structures, discharge detection measures, and proper work practices. In general, releases which occur inside buildings will be contained within secondary containment structures, the building walls, and interior drainage systems. Spills which occur outside have the potential to travel overland to stormwater diversion and collection systems throughout the Site. As stated previously, once final construction has occurred, Nordic Aquafarms will evaluate specific release pathways which may be present on-Site (both interior and exterior) and will develop mitigation methods, as appropriate.

2.4 Containment, Treatment, and Removal Plans

This Section will be updated as necessary as part of facility startup.

3.0 PROCEDURES

3.1 Spill Prevention Measures

Facility personnel will be trained to implement spill prevention practices. Site personnel shall use common sense and rely on spill prevention practices at all times to minimize the potential for a release of hazardous matter. For example, the following "common sense" practices are recommended:

1. Spill prevention during chemical deliveries (offloading) will be the primary responsibility of the chemical supplier until the product is safely in the ASTs. However, Facility personnel shall ensure the supplier is familiar with Facility procedures, and shall oversee delivery operations;

2. Hazardous material infrastructure (ASTs, piping, etc.) shall be protected from damage by moving equipment via bollards, proper storage, and best management practices; and

3. Loading and unloading of chemicals shall be attended at all times.

Specific spill prevention measures for Facility operations will be determined once the facility is constructed and operations have begun. This DRAFT SPCC Plan will be updated at that time.

3.2 Inspection, Maintenance, and Testing Procedures

Nordic Aquafarms personnel shall perform testing, inspection, and maintenance of all chemical tanks, containers, and associated infrastructure (piping, containment, etc.) to keep it performing in an efficient and environmentally sound manner. The exact type and extent of testing and inspections will be determined upon startup of the facility; however, the following best management practices will be performed at a minimum.

Nordic Aquafarms personnel shall periodically observe the ASTs during operating hours. The ASTs and associated piping shall be inspected monthly, and the results shall be recorded on the Monthly AST Inspection Report Form, as included in Appendix C. The results of these inspections will also be maintained in Appendix C. Spill response kits kept onsite shall also be checked during the monthly AST inspection, and restocked as necessary.

The monthly inspection reports shall be kept for at least three years in a file maintained by the Facility Manager. Inspections of the tanks include observations of the exterior of the tank for signs of deterioration or spills (leaks), observations of the tank foundation and supports for signs of instability, and observations of the vent, fill and discharge pipes for signs of poor connection, that could cause a spill. In addition to these monthly inspections, the facility will periodically verify the integrity of each tank in accordance with an industry standard inspection procedure. The frequency of such testing will be as specified by the selected industry standard procedure.

As part of the monthly inspections, Nordic Aquafarms personnel will record the volume in the tanks via the tank level gauges and will reconcile this reading with the volume being delivered to the Facility, and the amount used in onsite operations.

All tank and piping problems shall be immediately reported to the Facility Manager. Visible spills (leaks) shall be repaired or replaced as soon as possible to prevent the potential for a major spill from the source. This is especially important for sources located outside containment structures.

3.3 Training

Nordic Aquafarms shall provide annual SPCC spill training for personnel involved with handling hazardous materials. The exact agenda for this training shall be determined upon system startup, but may include the following training topics:

1. Rules and regulations pertaining to the use and storage of hazardous materials;
2. A detailed review of this SPCC plan;
3. Inspection, operation, maintenance, and testing procedures;
4. Spill response and cleanup;
5. Spill notification and record keeping;
6. Spill prevention practices;
7. A review of any spill events which have occurred since the last training date and the effectiveness of the response; and
8. A discussion of any new technologies which may be useful in preventing or detecting spills.

The annual SPCC training shall be documented to include the instructor's name, course outline, date and duration of training, attendant's names and signatures, and corrective action list for areas in need of improvement, if any. This information shall be filed and maintained for at least 3 years. A Certificate of Training shall be presented to each employee that has completed the training.

4.0 EMERGENCY RESPONSE AND NOTIFICATION

Emergency response actions are dependent on exact locations and configurations of hazardous material storage; as such, these procedures can only be finalized once construction is complete and operations have been started. This DRAFT SPCC Plan will be revised to reflect emergency response procedures at that time; however, standard/best management practices such as those outlined below, will be followed.

4.1 Qualifications of Employee Responders

A list of on-Site emergency coordinators, contact information, and qualifications will be provided in the updated SPCC Plan.

4.2 Emergency Response

Depending on the volume and characteristics of the material released, a spill response is either classified as a "Minor Spill Response" or "Major Spill Response".

4.2.1 Minor Spill Response

A "Minor Spill Response" is defined as one that poses no significant harm to human health or the environment. These spills generally will involve less than 5 gallons of hazardous material and can be cleaned up by Site personnel. Other characteristics of a minor spill include the following: the spilled material is easily stopped or controlled at the time of the spill; the spill is localized; the spilled material is not likely to reach surface water or groundwater; there is little danger to human health; and there is little danger of fire or explosion. In the event of a minor spill the following guidelines shall apply:

1. Stop the source if the spill is ongoing.
2. Immediately notify the Facility Manager.
3. Under the direction of a senior on-site person, contain and clean the spill with spill response materials and equipment.
4. Place spill debris in properly labeled waste containers.
5. Complete the Spill Notification Form (Appendix D).

4.2.2 Minor Spill Cleanup Procedures

All containment and cleanup operations will be in accordance with safe work practices and under direction of the Facility Manager. Facility personnel shall utilize personal protective clothing and equipment. Cleanup procedures should only be conducted once the spill has been contained and the leaks have been repaired. Cleanup measures should include the following:

1. Cleanup crews may use appropriate sorbent materials. On impermeable surfaces (pavement, concrete), this will include placing sorbent materials over the spill and preventing overland migration. On permeable surfaces (gravel, grass), this will include removing the affected material around the spill site until all visible traces are removed.

2. All spill and cleanup materials, including protective clothing, if contaminated, will be placed in impervious bags, buckets or drums.

3. Drums/buckets/containers should be filled with sufficient absorbent material to eliminate liquids and free product. To keep drums to a management weight, they will be filled no more than half full.

4. Drums/buckets/containers will be covered with the appropriate lid and labeled for contents, hazard identification, and date. These materials shall be removed from Site by a licensed waste transporter.

4.2.3 Major Spill Response

A "Major Spill Response" is defined as one involving a spill that cannot be safely controlled or cleaned up. Characteristics include the following: the spill is large enough to spread beyond the immediate spill area; the spilled material enters surface water or groundwater (regardless of spill size); the spill requires special training and equipment to cleanup; the spilled material is dangerous to human health; and/or there is a danger of fire or explosion. In the event of a spill emergency, the following guidelines shall apply:

1. Stop the source if the spill is ongoing (only if safe to do so).

2. Immediately notify the Facility Manager.

3. Immediately evacuate the spill site and move a safe distance away from the spill.

4. The Facility Manager shall call for medical assistance if necessary (no worker shall engage in rescue operations unless they have been properly trained and equipped).

5. The Facility Manager shall call the appropriate response personnel. (To be determined).

6. The Facility Manager shall call the Maine Department of Environmental Protection (1-800-482-0777). If the spill reaches groundwater and/or surface water (excluding stormwater detention systems), the Facility Manager shall also contact the National Response Center (1-800-424-8802).

7. Complete a Spill Notification Form (located in Appendix D). Document the telephone calls and notifications on this form.

4.2.4 Major Spill Cleanup Procedures

Facility personnel will NOT conduct cleanup operations in the event of a major spill. Facility employees should immediately contact emergency response services (Company and Contact Information to be determined).

Descriptions, capabilities, and locations of emergency response equipment shall be determined upon startup of operations; this DRAFT SPCC Plan will be updated at that time.

4.3 Evacuation Procedures

Excavation procedures have yet to be determined; these will be outlined in the updated SPCC Plan, along with contact information and routes to the nearest hospital.

4.4 Notification

After making the appropriate phone calls and the spill is contained, a Spill Notification Form, included in Appendix D, shall be completed and submitted to a Facilities Manager. The Spill Notification Form includes a checklist to document the proper notification of state and federal agencies. The form shall be filed and maintained as long as Nordic Aquafarms owns and/or operates this Facility.

Under 38 MRSA §1318-B, any a hazardous matter spill which exceeds the reportable quantity for that particular hazardous matter must be reported to the State Police and MEDEP.

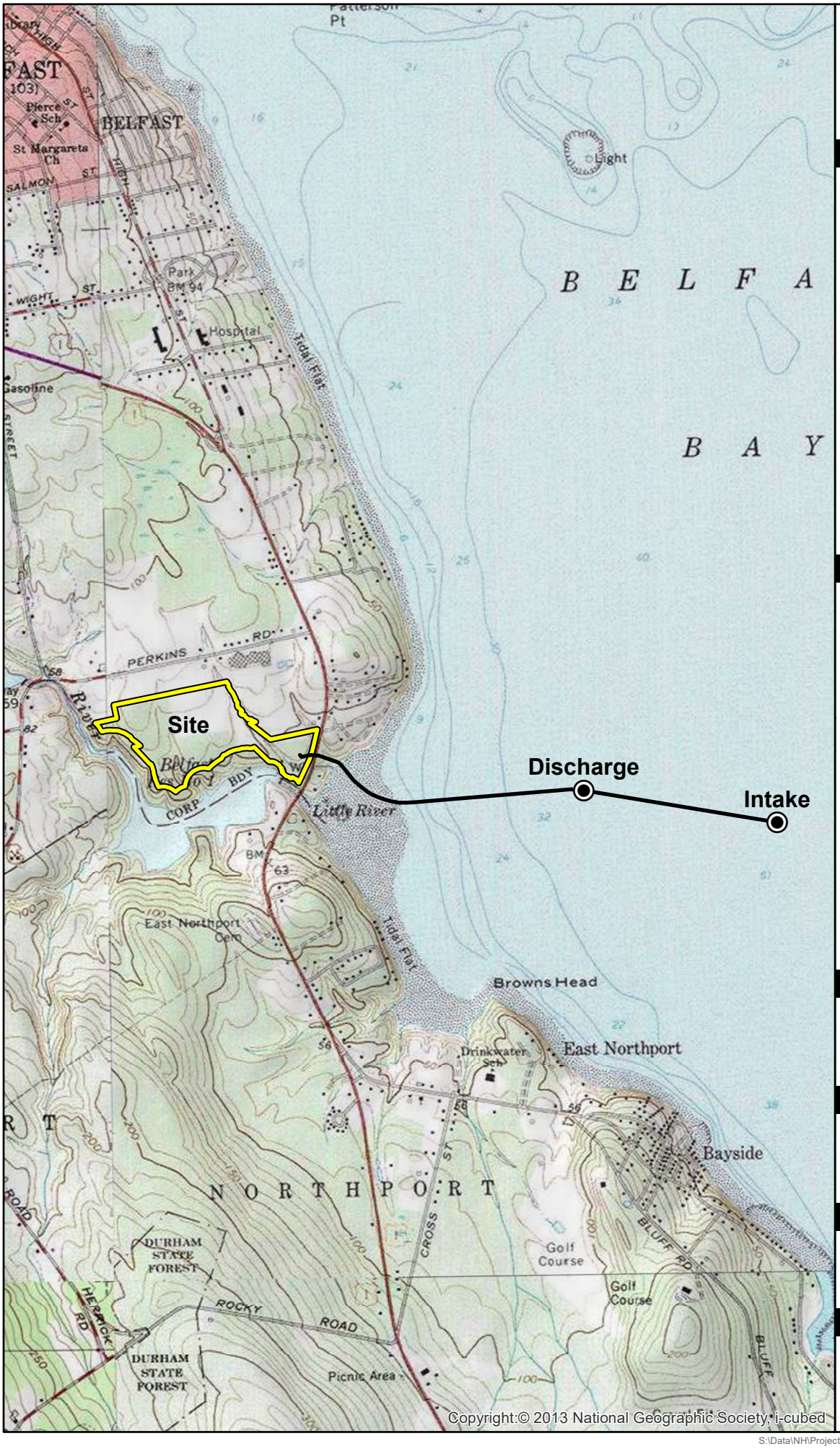
This section will be updated with Facility-specific contact information prior to start-up of operations.

4.5 Written Reports

This section will be updated.

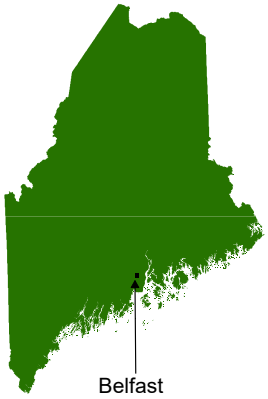
4.6 Record Keeping

This section will be updated.



RANSOM
Consulting Engineers and Scientists

Regional Locator Map



Legend

Site Boundary

Ocean Pipelines

Notes

1. Data Source: USGS National Map Seamless Server, 24K
2. USGS Quad: 7.5 Minute Searsport & Belfast 1976 (revised 1979)
3. Latitude: 44° 23' 43" N
   Longitude: 68° 59' 39" W
   UTM Northing: 4915777 mN
   UTM Easting: 500444 mE

Scale and Orientation

0 1,000 2,000

1 inch = 2,000 feet

Prepared For

Nordic Aquafarms, Inc.
159 High Street
Belfast, Maine

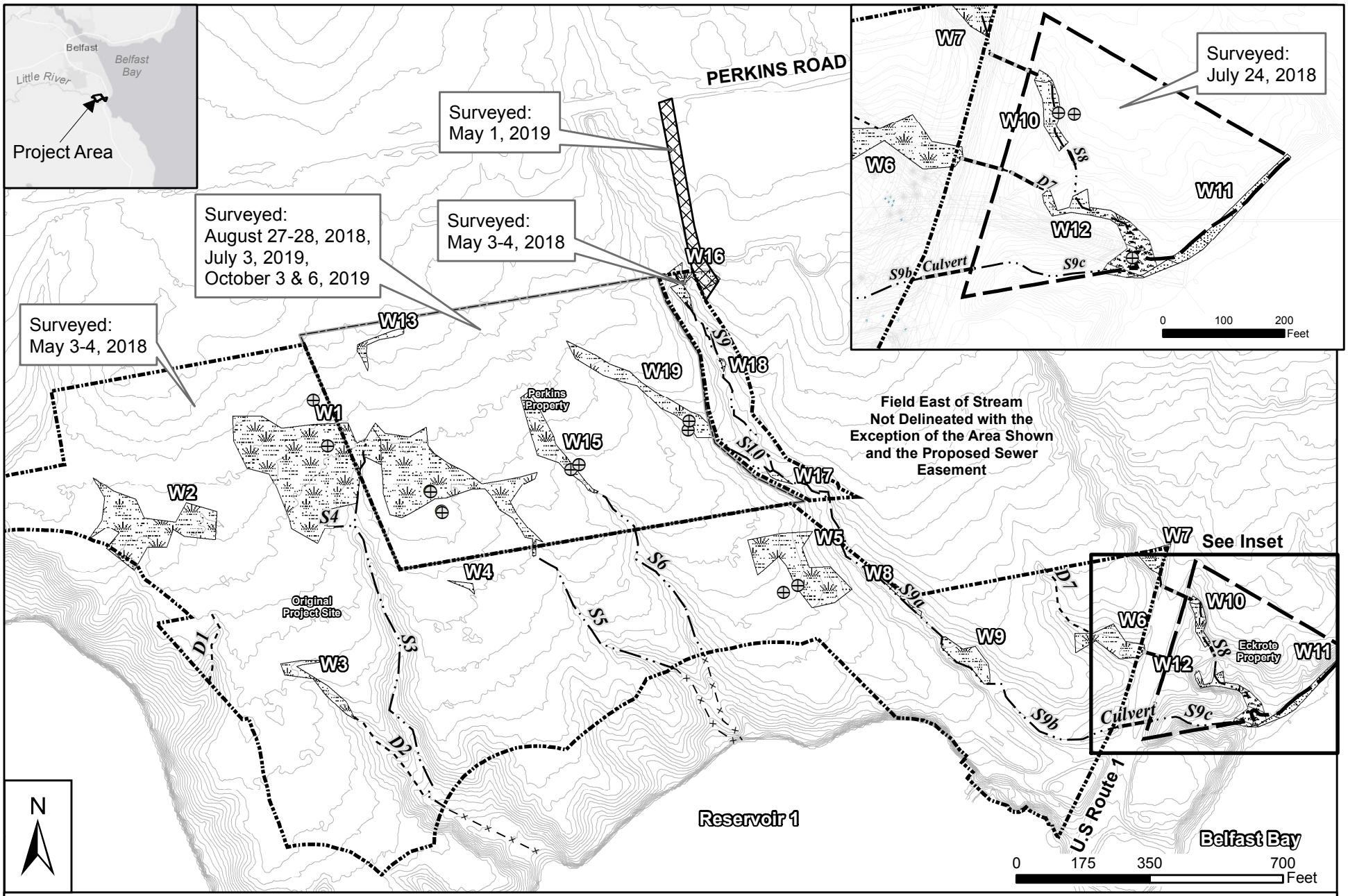
Site Address

Proposed Aquaculture Facility
285 Northport Avenue
Belfast, Maine

171.05027 | Apr 2019

Proposed Site Location Map

S:\Data\NH\Project\171_05027\Maps\location_map.mxd



Belfast Aquaculture Project
Revised Wetland and Stream Survey
Date: November 4, 2019

Wetland Survey Date
- May 3-4, 2018
- July 24. 2018
- August 27-28, 2018 , July 3, 2019 and October 3 and 6, 2019
- May 1, 2019

- Existing Culvert
- Drainage
- Intermittent Stream
- Stream Not Field Delineated

- Palustrine Wetlands
- Salt Marsh
- Cobble Beach
- 2 Foot Contours
- Army Corps Data Plot

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

APPENDIX A

Plan Review and Certification Log

Hazardous Matter Spill Prevention, Control, and Clean-Up (SPCC) Plan
Nordic Aquafarms
Belfast, Maine

PLAN REVIEW AND CERTIFICATION LOG

Date	Reason For Review	Findings/Revised Pages	Reviewer's Name and Title	Signature/ Registration No.

At a minimum, this SPCC Plan shall be reviewed and evaluated by the Owner as necessary, and in the event of the following:

- There is a change in facility design, construction, operation, or maintenance that significantly affects the potential for release;
- The SPCC Plan fails in an emergency;
- The local, state, or federal regulations change concerning SPCC reporting; or
- More effective technology becomes available.

If no amendments are required, by signature above, the Owner certifies to the following, "I have completed review and evaluation of the Facility SPCC Plan on the date noted and will not amend the SPCC Plan as a result." If amendments are required, the revised SPCC Plan shall be implemented within 6 months of any such change.

APPENDIX B

List of Chemicals and Safety Data Sheets

Hazardous Matter Spill Prevention, Control, and Clean-Up (SPCC) Plan
Nordic Aquafarms
Belfast, Maine

Chemicals for the Fish Farm

Note: Annual usage estimates represent approximate quantity required given a product is the only one used for this application. The quantities needed will be dependent on the site-specific conditions experienced which are difficult to establish prior to operations and are indicated as estimates only. Likely a fraction of the estimated annual use of each of these products will be used. All products listed will be used according to label.

Cleaners

Detergents

Aqualife® Multipurpose Cleaner. A biodegradable, nonhazardous cleaner that is designed specifically for use in fish hatcheries, aquaculture facilities, fish & food processing plants, & agricultural farms. Active ingredients: sodium hydroxide (1-5%), the product is phosphate free, contains no volatile organic compounds and is NSF certified for use in food processing facilities. Used according to the label at dilutions of 1:20. Approximate annual use: 2232 gallons/year (8449 l/year).

- Storage: 385 gallons (appox. 9 week supply)
    - 7 x 55-gallon drums

Gil Save®. High-foaming chlorinated, alkaline, liquid detergent, Gil Save is designed for foam and high pressure spray cleaning of meat and poultry plants, breweries, dairies and canneries. It is a complete product containing alkalis, water conditioners, chlorine and high-foaming wetting agents. Gil Save is an effective cleaner of food processing equipment by removing fatty and protein soils, pectin, mold, yeast and organic greases. Active ingredients: sodium hydroxide (7-9%), sodium hypochlorite (3-4%). Use according to label at concentrations of 0.2-3% (¼-4 oz/gal). Approximate annual use: 678 gallons/year (2567 l/year).

- Storage: 110 gallons (appox. 8 week supply)
    - 2 x 55-gallon drums

Clean in Place (CIP)

Gil Super CIP®. A heavy-duty, chelated-liquid caustic cleaner for use in CIP, boil-out, soak, spray clean and atomization cleaning systems, Gil Super CIP is formulated to remove protein, fatty and carbonized soils typically found in dairy and food processing. Active ingredients: sodium hydroxide (49%). Used according to label at 0.1-3% (1/8-4 oz/gal). Approx. annual use: 5840 gallons/year (22107 l/year).

- Storage: 495 gallons (appox. 9 week supply)
    - 9 x 55-gallon drums
    - 2 x 265-gallon IBC totes

- Specialized storage tank

Gil Hydrox®. A concentrated organic, liquid acid cleaner, Gil Hydrox rapidly removes milk/beer stone, alkaline/hard water film and stains/protein build-up from dairy and food processing equipment. It is specially formulated for use in CIP, spray and acid rinse operations. Active ingredients: glycolic acid (29-31%). Used according to label at 0.3-1.5% (½-2 oz/gal). Approx. annual use: 5840 gallons/year (22107 l/year).

- Storage: 495 gallons (appox. 9 week supply)
  - 9 x 55-gallon drums
  - 2 x 265-gallon IBC totes
  - Specialized storage tank

Two Clean in Places (CIP), a caustic based, and an acid based, are used in interchangeably to prevent the accumulation of residue. The volume of 5,840 reflects the conservatively estimated sum of usage for these two products each year. The storage volume reflects the supply of the respective product.

Disinfectants/Sanitizers

Bleach. Active ingredient: sodium hypochlorite (8%) in concentrated form. Typically used at 100-1000 ppm for general cleaning/disinfection. Approximate annual use: 1500 gallons/year (5700 l/year).

- 530 gallons (appox. 18 week supply)
  - 2 x 1000 L IBC total
  - 9 x 55-gallon drums
  - Specialized storage tank

Ozone. Ozone can be dissolved into water to provide an aqueous ozone solution that is stable, safe, easy to control, leaves no residue and has been granted GRAS approval by both the USDA and FDA for direct contact with food. This water containing ozone can replace chlorine as an antimicrobial agent or be used to supplement existing water rinses and achieve improved antimicrobial intervention. This is now a common application to sanitize fillet machines, cutting tables, knives, and all equipment that may be used in the seafood processing areas. Approximate annual use: TBD. Concentration in discharge = 0 ppm

- Ozone is not stored on site. Ozone is continuously generated and degraded to oxygen through its application as a water treatment component. This is common practice in commercial aquaculture.

Virkon® Aquatic. A powerful cleaning and disinfecting solution with efficacy against fish viruses, bacteria, fungi, and molds. Virkon® Aquatic is EPA registered (except in California where registration is pending) for the disinfection of environmental surfaces associated with aquaculture**.** Active ingredient: Potassium monopersulfate (21.4%). Used in accordance with label as a general cleaner and in footbaths. Working solution strengths normally range from 0.5% - 2.0%. Approx. annual use: 1100 lbs/year (500 kg/year).

- 200 lbs (appox. 9 week supply)
    - 20 x 10 lb tubs

Zep FS Formula 12167® Chlorinated Disinfectant and Germicide. A liquid chlorine sanitizer and deodorant for use in all types of food-handling establishments. Authorized as no rinse sanitizer for equipment. Provides deodorizing activity by destroying bacteria which generate many disagreeable odors. Can also be used to sanitize commercial laundry. Active ingredients: Sodium hypochlorite (5-10%) and sodium hydroxide (1-3%). Used according to label, effective at concentrations as low as 0.3% (1 oz/ 2 gallons). USDA applicable and EPA and Maine registered. Approx. annual use: 1980 gallons/year (7495 l/year).

- 330 gallons (appox. 9 week supply)
    - 6 x 55-gallon drums

Therapeutants

Compounds Potentially Used:

Note: the quantities needed will be dependent on the site-specific conditions experienced which are difficult to establish prior to operations and so are indicated as estimates only. All products listed will be used according to label use or a licensed veterinarian's prescription.

Parasite-S, Formalin-F, and Formacide-B. (Formalin). Active ingredient 37% formaldehyde. Used periodically according to the label if needed to alleviate fish health issues due to *saprolegniasis*, external protozoa and monogenetic trematodes. Typical dose rates from 25 ppm to 1,000 ppm. Approximate annual use: 925 gallons/year (3500 l/year).

- 110 gallons (appox. 6 week supply)
    - 2 x 55-gallon drums

Finquel® or Tricane-S. (Tricaine methanesulfonate). Used periodically in accordance with the label to reduce stress on the fish when handling small numbers for examination. Typical dose rates of 15-330 mg/L. Approximate annual use: 1.1 lbs/year (500 g/year).

- 2.2 pounds (appox. 2 year supply)

    - 1 x 1-kilogram container

Halamid® Aqua. (Chloramine-T). Active ingredients N-chloro, p-toluenesulfonamide and sodium salt trihydrate. Used periodically according to the label if needed to alleviate fish health issues due to bacterial gill disease. Typical dose range 12-20 ppm. Approximate annual use: 1100 lbs/year (500 kg/year).

- 220 pounds (appox. 10 week supply)
    - 4 x 55-pound drums

Ovadine® (PVP Iodine). A buffered 1% Iodine solution (Iodophor) specifically formulated for use in disinfecting fish eggs. It contains a 10% Povidone-Iodine (PVP Iodine) complex, which provides 1% available iodine. Used according to the label at dose rates of 50 -100 ppm as available iodine solution. Estimated usage: 160 gallons/year (600 l/year).

- 55 gallons (appox. 18 week supply)
    - 1 x 55-pound drums

<u>Compounds Rarely Used Only in Emergency Situations:</u>

The following agents will not be stored on site unless prescribed by a veterinarian

Praziquantel. Considered as 100% active. Can be used if fish are suffering from trematode/cestode infections. Typical dose ranges from 5-200 ppm depending on length of standing bath treatment. Used as needed/intermittent or emergency use only, according to label use or as prescribed by a licensed veterinarian. Approx. annual use: 0 lbs/year (0 kg/year).

Potassium permanganate. Considered as 97% active. Can be used if fish are suffering from certain parasites and fungal infections in younger fish life-stages. Typical dose range 1.5-2.5 ppm. Used as needed/intermittent or emergency use only, according to label use or as prescribed by a licensed veterinarian. Approx. annual use: 0 lbs/year (0 kg/year).

Terramycin® 200. (oxytetracycline dehydrate, 44% active): Can be used as an in-feed treatment (maximum of 0.08 g active oxytetracycline/kg fish/day) if fish are suffering from certain bacterial infections. Used as needed/intermittent or emergency use only, according to label use or as prescribed by a licensed veterinarian. Approx. annual use: 0 lbs/year (0 kg/year).

Aquaflor®. (florfenicol; 50% active). Can be used as an in-feed treatment (maximum of 15 mg/kg fish/day) if fish are suffering from certain bacterial infections. Used as needed/intermittent or emergency use only, according to label use or as prescribed by a licensed veterinarian. Approx. annual use: 0 lbs/year (0 kg/year).

Romet® 30/Romet® TC. (sulfadimethoxine/ormetoprim, 30% active or 20% active, respectively). Can be used as an in-feed treatment (maximum of 50 mg/kg fish/day) if fish are suffering from certain bacterial infections. Used as needed/intermittent or emergency use only, according to label use or as prescribed by a licensed veterinarian. Approx. annual use: 0 lbs/year (0 kg/year).

Waste Water Treatment

Formic Acid (85%). Used for pH correction of fish processing water prior to disinfection with sodium hypochlorite. Approx. annual use: 18200 gallons/year (69000 l/year).

- 1585 gallons (appox. 4 week supply)
    - 6 x 1000-liter IBC containers
    - Specialized storage tanks

Bleach. Active ingredient: sodium hypochlorite (15%). Used to disinfect water used in fish processing. Applied at concentration of 50 mg/l. Estimated discharge concentration: 0.4 mg/l. Approx. annual use: 14800 gallons/year (56000 l/year).

- 528 gallons (appox. 2 week supply)
    - 2 x 1000-liter IBC containers
    - Specialized storage tanks

MicroC® 2000. (1.1 million mg/l COD). A non-hazardous, green chemical developed specifically for use as an electron donor / carbon source for wastewater denitrification applications. It is used as supplemental carbon source in wastewater treatment plants to stimulate denitrification processes. Approx. annual use: 1.0 million gallons/year (3.8 million l/year).

- 40,000 gallons (appox. 2 week supply)
    - 4 x 10,000-gallon tanks

APPENDIX C

Monthly AST Inspection Report Form and Inspection Records

Hazardous Matter Spill Prevention, Control, and Clean-Up (SPCC) Plan
Nordic Aquafarms
Belfast, Maine

SUGGESTED MONTHLY ABOVEGROUND STORAGE TANK INSPECTION CHECKLIST

This inspection form is intended to assist the owners/operators of aboveground storage tank facilities on what items to inspect and conditions to look for when performing monthly inspections. Because each aboveground storage tank facility is different, some of the elements contained on the form, below, may not apply; in these cases, the facility owner should enter "N/A" in the comment section of the form.

Item	Item Observed?		Comments	Proposed Corrective Action
Leaks/Staining Observed (Tanks)	Yes ☐	No ☐		
Leaks/Staining Observed (Secondary Containment Structure)	Yes ☐	No ☐		
Leaks/Staining Observed (Aboveground Piping Inside Building Walls)	Yes ☐	No ☐		
Leaks/Staining Observed (Aboveground Piping Outside Building Walls)	Yes ☐	No ☐		
Leaks/Staining Observed (Fill Lines and Ports)	Yes ☐	No ☐		
Leaks/Staining Observed (Ground Surface around Tanks/Piping)	Yes ☐	No ☐		
Is product present in secondary containment structure?	Yes ☐	No ☐		
Are all drains, ports and valves closed and secured in tank area?	Yes ☐	No ☐		
Any evidence of tampering?	Yes ☐	No ☐		
Odor noted?	Yes ☐	No ☐		
Vent lines clear?	Yes ☐	No ☐		
High level alarm intact?	Yes ☐	No ☐		
Overfill alarm intact?	Yes ☐	No ☐		
Spill kits available and intact?	Yes ☐	No ☐		
Leak detection monitoring intact?	Yes ☐	No ☐		
Fire suppresion system intact?	Yes ☐	No ☐		
Other conditions?	Yes ☐	No ☐		
Tank level guage consistant with previous reading/oil deliveries/vehicle fueling?	Yes ☐	No ☐		

Signature **Date**

APPENDIX D

Spill Notification Form and Spill Records

Hazardous Matter Spill Prevention, Control, and Clean-Up (SPCC) Plan
Nordic Aquafarms
Belfast, Maine

SPILL NOTIFICATION FORM

Part A: Basic Spill Data	
Type of Spilled Substance:	**Notification Person:**
Quantity Released:	**Spill Date and Time:**
Location of Spill:	**Discovery Date and Time:**
	Spill Duration:
Weather Conditions:	**Release To**: ☐air ☐ pavement/concrete ☐ soil/gravel/grass ☐ vicinity of onsite well ☐ secondary containment ☐other_____
Describe Incident:	
Cleanup Activities Conducted by Employee:	**Facility Name & Location:**
Owner / Company Name:	**Telephone:**
If injuries occurred: **Name, Address, Phone of Injured individual:** **Nature of Injury:** **Insurance Information:**	

Part B: Notification Checklist		
	Notification Date and Time	**Name of Person that Received Call**
Release of Petroleum Product (Any Amount):		
Nordic Aquafarms		
Maine Department of Environmental Protection 1-800-482-0777		
Release Reaches Groundwater or Surface Water:		
National Response Center 1-800-424-8802		

This form shall be filed by the Facility and maintained as long as Nordic Aquafarms owns and/or operates the facility.

ATTACHMENT F

Responses to Geology Technical Review Memorandum dated September 17, 2019

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Ransom Consulting, Inc.
Project 171.05027.008

RANSOM
Consulting
Engineers
and Scientists

112 Corporate Drive, Portsmouth, New Hampshire 03801, Tel 603.436.1490, Fax 603.436.6037
Byfield, Massachusetts □ Portland, Maine □ Hamilton, New Jersey □ Providence, Rhode Island
www.ransomenv.com

Memo

Date:	November 4, 2019
To:	Beth Callahan, Project Manager, Maine Department of Environmental Protection John Hopeck, Ph.D., Division of Environmental Assessment, Maine Department of Environmental Protection
From:	Elizabeth M. Ransom, P.G. Ransom Consulting, Inc.
Subject:	Nordic Aquafarms, Inc., Land-based Aquaculture Facility, Belfast, Maine L-28319-26-A-N, Review Comments
Project No.:	171.05027

This memo provides responses to the Technical Review Memorandum from John Hopeck to Beth Callahan dated September 17, 2019. For clarity, the entire comment from the technical memorandum has been copied below and italicized. Responses are in regular text, and on the attached plans and figures as referenced below.

1. Monitoring Program

a. The applicant proposes in the water monitoring plan to download data on water level and conductivity quarterly, except following significant changes in the facility, "such as the start of Phase 1 and Phase 2 operations" in which case the data will be downloaded monthly. This frequency may not be sufficient to assess and allow responses to changes in water level or quantity, particularly for conductivity, and if the applicant intends to maintain relatively consistent fresh water quality. Many operators of large groundwater withdrawals in the state assess water level and water quality in near real-time. Reporting of these data to the Department should occur no less often than monthly during initial operation of the facility and after significant changes in water usage, although there should be a provision for more frequent reporting in the event that monitoring results suggest possible impacts on surface waters or offsite water supplies, or drawdowns significantly exceed those predicted by the model.

It is important to consider the planned schedule of events that is anticipated to occur prior to initiation of freshwater withdrawals. This schedule includes approximately two years of site work and construction, during which monitoring would be conducted. Additionally, following construction, facility operations will be scaled in phases, the first of which will require a small fraction of the freshwater volume reflected in the submitted permit application. Thus, Nordic views the submitted Water Resource Monitoring Plan (WRMP) as being currently focused on refining the existing understanding of baseline/pre-pumping conditions, as there is ample opportunity (i.e., several years) to do so before rates of withdrawal approach those conservatively reflected in the analyses presented in the permit application, including the numerical groundwater modeling work. Furthermore, Nordic views the WRMP as being adaptable – information gathered

through initial and future monitoring can and should be used to improve the quality and efficiency of the plan, when and where possible.

However, to proactively address potential future monitoring needs reflected by comments presented herein, Nordic is prepared to make significant alterations to the proposed WRMP. These modifications include:

1. Where practical for on-Site locations, Nordic will install pressure transducers or similar automated data logging equipment (i.e., including conductivity-capable transducers) and establish a networked monitoring system. Data gathered through this system will be centrally compiled in an electronic format that will be remotely accessible, provide significant flexibility and support near-immediate assessment, if necessary.

2. For off-Site monitoring locations, manual monthly data downloads and reporting will occur during initial operations and following significant changes in water usage (e.g., scaling to Phase 2). Nordic proposes that the monthly download and reporting frequency continue for a minimum of 12 months under generally static water use conditions. Should such a period elapse without significant changes in water use or deviation from anticipated conditions, a frequency reduction may be proposed (e.g., reducing from monthly to quarterly download and reporting frequency). Implementation of a reduced data download and reporting frequency would require DEP approval. Alternatively, frequency increases will be proposed should significant deviations from anticipated conditions be observed during reporting.

3. Modified techniques and frequencies associated with monitoring flow conditions within the reach of the Little River occurring between the Upper and Lower Reservoirs. Ultimately, Nordic intends to establish relationships that would allow flows (and changes relative to anticipated flows) to be inferred through near real-time monitoring of stage. These modifications are discussed in more detail below within the response to Item 1.D.

4. Provide measures for collecting daily intake rate data on a source-specific basis. This modification is discussed in more detail below within the response to Item 1.E.

b. Data obtained during the pump tests suggest that the fine-grained overburden sediments may effectively separate some surface waters from connection with the bedrock aquifer. However, in part because the shallow wells installed during the pump test could not be developed, the quality of their connection to the surficial aquifer is not clear. The applicant proposes installation of three overburden monitoring wells (monitoring plan section 2.2.4) for measurement of water level and quality. It is not clear from the information if the intent is for these wells to be screened entirely within the fine sediment of the overburden or if they will extend to the apparently more permeable zone near the bedrock - overburden contact. It may be that this zone is important for maintenance of baseflow to larger streams in the area, and the pump test data indicate that this zone may be affected by pumping of the bedrock aquifer. Consequently, the proposed monthly data collection may not be sufficient to assess the impact of significant drawdown in the bedrock aquifer on head in this zone and possibly also on baseflow.

The proposed overburden monitoring wells identified as OVB-101, OVB-102, and OVB-103 within the WRMP will be constructed as shallow and deep overburden pairings. The shallow wells within each pairing will be constructed with screens spanning the position of the water table based on observations made during boring advancements (i.e., likely within clay-and-silt glaciomarine deposits). The deeper wells within each pairing will be constructed with well screens spanning the transition zone between unconsolidated overburden deposits and the underlying weathered bedrock, as supported by observations made during boring advancement. This approach will support assessment of shallow/perched groundwater quality, as well as water quality and potential hydraulic responses within the more transmissive overburden/weathered bedrock transition zone.

Note the following relative to these proposed monitoring wells:

1. In certain locations and under certain seasonal conditions, groundwater may reside below the local vertical position of the overburden/weathered bedrock transition zone, limiting the practicality of installing wells in the manner described above.

2. It may be impractical to use common techniques to collect groundwater samples from shallow monitoring wells completed in the silt-and-clay deposits due to very low recharge rates.

As referenced within the response to Item 1.A, where possible and practical, these wells will be equipped with pressure transducers, which will be incorporated into the networked monitoring system.

c. The applicant is proposing to install six piezometers "to monitor overburden groundwater levels at shallow ... and deep ...intervals" (Section 2.2.5). From Figure 3, these wells are not the same as the three overburden wells described in Section 2.2.4. The applicant also proposes wetland monitoring (Section 2.2.8) at wetlands W7 and W9. Figure 3 shows a nested pair of piezometers associated with wetland W9, but only the single proposed piezometer P5 in the area of wetland W7; shallow and deep piezometers should be located as close as possible to any wetland monitoring tract. Since the nested pair PZ-1 S and PZ-1 D would be eliminated by the proposed construction, they should be replaced by a nested pair in or adjacent to wetland W7. As noted in other cases previously, the proposed monthly measurement rate may not allow adequate assessment of changing groundwater conditions, particularly during significant changes in pumping rate or drought conditions.

Shallow and deep piezometers will be installed in the vicinity of wetland W7 (i.e., PZ-5S and PZ-5D). As referenced within the response to Item 1.A, where possible and practical, these piezometers will be equipped with pressure transducers, which will be incorporated into the networked monitoring system.

d. According to Section 2.2.6, the applicant proposes measurement of river stage at three staff gauges (SG-2, SG-3, and SG-4), as well as at an additional location on the Little River (SG-Mid). The first three locations are to be monitored by pressure transducer when conditions permit, with data to be downloaded quarterly, and data to be collected monthly when transducers cannot be deployed. Data at station SG-Mid are proposed to be measured monthly with the applicant conducting a "feasibility assessment ... regarding the installation of a remote monitoring system to measure stage in the Little River in real-time." Because surface water conditions are much

more subject to rapid variation than groundwater conditions under most circumstances, quarterly data collection and monthly manual measurement of stage are not likely to identify long-term trends than can be masked by transient flow conditions; collection of data and comparison to relevant standards will need to be done more frequently. The Department has required surface water level and flow monitoring at several facilities conducting large-volume groundwater extraction; the applicant may wish to confer with staff at those facilities regarding experience with near real-time data collection, ice conditions, and other issues with stream monitoring.

Relative to flow monitoring at location SG-Mid, consideration should be given to challenges presented by the steeply banked, rocky channel through which the Little River flows within the subject reach. These challenges limit the feasibility of regularly and safely producing reliable flow data from this location at a high (e.g., near real-time) temporal frequency. Additional consideration should be given to findings derived from aquifer testing conducted as part of hydrogeologic investigation activities, including observations of hydraulic responses within private supply wells located west of the river stemming from test well withdrawals (i.e., indicating limited connectivity between the local bedrock aquifer and the subject reach of the Little River). Thus, while the importance of collecting flow data is recognized, there is reasonable justification for developing a flexible plan that selectively targets lower flow conditions.

Based on this perspective, Nordic proposes to initially use the condition at a nearby USGS gaging station (USGS 01037380, Ducktrap River near Lincolnville, Maine) as an indicator for the need for higher frequency flow measurements. While conditions at this gage reside above the 10 percent duration flow condition (based on annual flow statistics), collection of flow data at SG-Mid will be conducted at a normal, monthly interval, if safe and practical. Should flows at the indicator gage fall below this threshold, the frequency of flow data collection at SG-Mid will be temporarily increased to weekly, if safe and practical, until flows at the indicator station recover.

To supplement these activities, a stilling well outfitted with a pressure transducer (or similar apparatus) will be established to measure the stage of the Little River in the vicinity of the SG-Mid section. Flow measurements gathered through initial monitoring and recorded stages will be used to develop a stage-discharge relationship. An assessment of the correlation between flows within the Little River and the Ducktrap River at the USGS gaging station will also be conducted.

Additionally, while transducers are deployed, data download frequency will be monthly for locations SG-2, SG-3, and SG-4. During pre-pumping periods where transducers cannot be reliably deployed, manual measurements of stage at monthly intervals are believed to be adequate, as such periods are likely to coincide with generally wetter, winter-season conditions.

The actions described above are intended to support refinement of the WRMP, particularly the methods used to monitor and assess flow conditions within the Little River and reservoirs, as the facility matures beyond construction and into phases associated with active withdrawals.

e. The applicant proposes to monitor water usage at both the production wells (Section 2.2.1) and the surface water intake (Section 2.2.6). Both sections state that rate and volume

measurements "will be recorded ... on a monthly basis." Water intake data from all sources, including the water utility, should be recorded no less often than daily, both to allow better correlation with any variation seen in water levels or surface water flows, and also to provide more accurate timing of changes in withdrawal rate that may require more time to appear in slower-responding systems, particularly groundwater.

> Intake rate data will be recorded on a source-specific basis at a daily frequency. Initially, these data will be reported on a monthly basis prior to operations and associated withdrawals.

f. Changes to the monitoring program, such as proposed on page 6 of the plan, will require specific approval from the Department, based on its review of all data collected to that point and other available information. The potential change described on this page should not be included in the permit at this point, although the permit can note that, other than any changes necessary to address required replacement of monitoring locations due to damage or voluntary withdrawal of a homeowner from the program, or changes required by the Department to address specific issues, if any, that arise during operation, the approved monitoring program should continue for at least two years of groundwater extraction at full capacity.

> Nordic acknowledges this comment and understands that other than any changes necessary to address required replacement of monitoring locations due to damage or voluntary withdrawal of a homeowner from the program, or changes required by the Department to address specific issues, if any, that arise during operation, the approved monitoring program should continue for at least two years of groundwater extraction at full capacity.

g. The applicant proposes to use offsite data to determine precipitation amounts and other conditions in the watershed; an onsite station for collection of precipitation and other weather and climatic data should be established and in operation prior to occupancy of the facility.

> The National Weather Service (NWS) COOP station located in Belfast provides weather condition information, including precipitation and air temperature data, measured daily (historical data of this type available since approximately 1948). This station is located only approximately 3.1 miles to the north of the Site. A comparison of monthly statistical descriptors for the Belfast station and other nearby stations (e.g., Belmont, Maine and Bangor, Maine) based on precipitation records for the last three complete calendar years (2016 through 2018) does not suggest significant local variability. Thus, Nordic considers the Belfast station to be a reliable source of weather condition information for the Site vicinity.

h. The applicant proposes performance criteria and warning levels in Section 3.0 of the monitoring plan. However, in the absence of adequate background data or well construction information on the domestic wells in the proposed program, it is not appropriate to set specific criteria at this time. The Department also notes that, in general, depending on the amount and date of precipitation, the extent and depth of snow cover and timing of snow melt, and other factors, a month-to-month comparison of water levels for comparing wells in pre- and post-development conditions, as suggested on page 10 of the proposed monitoring plan, may not be the most suitable approach in all cases, and the Department will employ appropriate flexibility in making a determination that the monitoring data suggests that an unreasonable adverse impact has or could reasonably occur. Moreover, the warning levels proposed in Section 3.2 are

generally ones at which a significant adverse impact on the affected resource or water supply well will have occurred, and the proposed response to this impact is generation of a report including the activities identified on page 12, but no specific action to mitigate the observed impact. Given the long proposed times between data collection, issues with which are described above, this could lead to an extended period of adverse impact. The monitoring plan should be revised to address issues identified above and this revised plan should propose warning levels which would identify the potential for adverse impact as well as measures to be implemented in order to prevent that impact. Such measures could include, but are not limited to, increased frequency of monitoring, reduced extraction of water from one or more sources, provision of alternate water supplies, and changes in production schedule. Correct setting of such warning levels requires sufficient pre-pumping data, and the applicant should begin collecting these data regarding seasonal variation in water level, domestic well construction, and other relevant information, and should include all such data in the revised monitoring plan, together with a justification for all proposed warning levels.

Collection of baseline/pre-pumping data and information will commence following permit approval. As noted, these data and this information will be needed to refine proposed warning levels. Nordic anticipates that an addendum to the WRMP, subject to DEP review and approval, will be issued to establish specific warning levels prior to commencing operations requiring active withdrawals. The refined warning levels are anticipated to be appropriately indicative of conditions trending toward a potential adverse impact, as opposed to being confirmation of occurrence.

Refining warning levels, as described above, is anticipated to address DEP's comment pertaining to proposed responses. That is, a first phase of conditions and mitigation options assessment supplemented by the options presented in Section 3.3 (Action Plan) is generally appropriate. Nordic acknowledges that operational changes, including reduced withdrawals and/or redistribution of sourcing, would also be considered; thus, the language presented in Section 3.3 of the WRMP should be interpreted as: "Nordic acknowledges that under extreme scenarios this remedial action plan may require the installation of a water treatment system, alteration of an existing well and/or pump system, drilling of a new water supply well, new connection to the public water supply system, or operational changes should adverse impacts to water quantity or quality be documented".

2. Blasting

a. The cover letter describing the blast plan assessment for this project is somewhat incomplete regarding the Department ground vibration standards. The standard of 1.25 in/sec applies only to certain distances and for blasts designed with a specific scaled distance value, as described in Table 1 of38 MRS §490-Z(14)(K). The ground vibration standard of USBM RI 8507, Appendix B, Figure B-1 shows variable particle velocities depending on the :frequency, and varies from 2.00 in/sec to slightly less than 0.2 in/sec at very low frequencies; the applicant has agreed in the "Blast Vibration & Air-Blast" section of the plan to comply with that standard. Note also that the language regarding air overpressure limits in this section of the proposed plan can be read to limit the developer to a total of four blasts; 38 MRS §490-Z(14)(H) reduces the air overpressure limit based on the number of blasts per day, so that the 123 dB limit applies to cases of four or more blasts per day.

38 MRS §490-Z 14. I. states that the limits in Table 1 of Paragraph K and the "Bureau of Mines Report of Investigations 8507," Appendix B, Figure B-1 both must not be exceeded. We plan to

use seismic monitoring at the nearest off-site location for the project. Our plan is stating that we will use the "Bureau of Mines Report of Investigations 8507," Appendix B, Figure B-1 limits and we will not exceed the maximum peak particle velocities based on the distances listed in Table 1 of Paragraph K for blasting.

In the standard from the State on air blast from 38 MRS §490-Z 14. G: This statute limits us to 4 blasts per day and paragraph H limits us to the decibel levels that we provided. It was not our intent to limit the total number of blasts on the project to 4, while the plan may be read that way. The intent of our plan was to match the statute and limit us to 4 blasts daily at the lowering decibel levels provided.

b. Note that Section 7.2 of the geotechnical survey report recommends a pre-blast survey radius of 500 feet, which is not consistent with Site Location requirements or with the submitted blast plan; unless a lower pre-blast survey radius, based on a reduction of charge weight per delay as outlined in 38 MRS §490-2(14), is requested and approved by the Department, the larger pre-blast survey radius of 2000 feet is required.

As noted in our response to a. above, the project plans for blasting to adhere to 38 MRS *§490-2(14).*

3. Geotechnical Survey

a. No log or location is provided for any boring B303, and the listing of explorations in Section 3.0 of the geotechnical report suggests that this exploration may have been intentionally omitted or not performed. This should be clarified.

This boring was not performed.

b. The exploration logs note soft clays in several explorations, apparently associated with areas of locally lower bedrock elevation. The report correctly observes (Section 5.0, p. 8) that potential consolidation of these soils under the anticipated structural loading and other factors require "excavation and replacement of the ... soils with compacted structural fill, and/or design of the buildings to bear at elevations corresponding to suitable bearing soils." (Note that any dewatering required during excavation of such unsuitable soils or placement of structural fill is likely to contain a large fraction of fines.) Section 2.2 of the geotechnical report states that the "structural loads, tolerable settlement amounts, and grading and drainage plans were not finalized when this report was prepared", although some preliminary values appear to have provided (p.3). It is not known if final values for these parameters have been provided to the geotechnical engineer. Although the proposed remedial actions would likely be similar or identical, any changes to the design, addenda to the geotechnical report, or similar information that may be based on final values for these and other design parameters must be submitted for review and approval.

At this time, no additional design parameters have been provided to the geotechnical engineer for consideration, nor have any additional geotechnical evaluations been conducted.

4. Groundwater

a. Section 15.4 of the application states that "the construction contractor will be required to provide a site-specific Spill Prevention, Control, and Countermeasures Plan ... to be submitted to the MEDEP prior

to construction." The order should specifically state that this plan should be submitted for review and approval prior to construction. This section also states that, prior to operation, "an operational SPCC plan will be developed by Nordic and submitted to the MEDEP for review"; any order should also specifically state that this plan must be reviewed and approved by the Department prior to the start operations at the facility.

Nordic understands and agrees that the construction contractor will be required to provide a site-specific SPCC Plan for review and approval by the DEP prior to construction, and that a site-specific SPCC plan for operations will also be submitted to the DEP for review and approval prior to operations. A draft hazardous materials SPCC plan has been included with this submittal.

b. Part IV(C) (p. 6) of the Public Utilities Commission order approving transfer off land from the water district to the applicant refers to "environmental due diligence" and "environmental tests" to be performed on the property. Results of any such tests should be provided to the Department for review, since these could affect construction requirements, erosion control measures, and discharge of water from excavations or underdrains if any significant risks to human health or the environment were identified. Department staff have noted some cement pipe with fibrous material, possibly asbestos - cement pipe, in areas that would be excavated as part of the proposed project; if these or other tests identify or have identified this to be asbestos-containing material, the applicant would need to address measures for removal and proper disposal prior to construction.

The results of groundwater testing performed at the site were included as part of the hydrogeologic study included in Section 15 of the Site Location of Development application. No such risks to human health or the environment are anticipated based on these results, as compounds detected were primarily at or below background and/or applicable standards. Three soil samples collected for polynuclear aromatic hydrocarbons (PAHs) in a former coal storage area behind the existing Belfast Water district office exceeded MEDEP standards for commercial workers. A copy of the laboratory results for these soil samples is attached as Attachment A. No impacts to soil were identified from hazardous building materials (i.e., lead-based paint, asbestos, PCBs) identified in the existing site buildings.

5. Water Supply

a. The applicant has provided information from a series of pump tests and detailed hydrogeologic modeling of the regional groundwater system. In general, this information is sufficient to demonstrate that the specified volume of water can be obtained from the bedrock aquifer, although substantial drawdown in that aquifer will result; the long-term consequences of this extraction on water level and water quality are somewhat beyond the scope of the model, although it does suggest some possibility of induced salt-water intrusion, reduced baseflow, and increase in the volume of the larger bedrock aquifer contributing to this watershed (with the consequent minor reduction in volume of that aquifer contributing to adjacent watersheds). The monitoring program, modified as discussed above, is intended to address specific issues associated with possible adverse effects of this withdrawal and to include measures to mitigate or prevent any such adverse effects. The model is generally consistent with the findings of the exploratory borings in the vicinity of the proposed project, that the overburden consists largely of the fine-grained sediments of the Presumpscot Formation, which overlay a somewhat discontinuous till unit of varying thickness. These units overly an apparently relatively thick zone of weathered bedrock above more competent bedrock. Data from monitoring conducted during the pump tests, as indicated in the discussion of the monitoring program above, suggest that water levels in this weathered zone and, to some extent, the overlying till may respond to groundwater withdrawal from the bedrock aquifer to a much greater extent than water levels in the overlying Presumpscot Formation.

Consequently, there could be substantially greater potential for induced recharge or reduced baseflow to affect surface water resources located on or obtaining water from the till and/or fractured bedrock than would exist for those resources that may be in whole or part supported by the Presumpscot Formation. Assessment of the watershed by Department staff indicates that, within the area of greatest impact from the proposed groundwater withdrawal, only the reach of the Little River between the Upper Reservoir and the Lower Reservoir lies substantially within bedrock or weathered bedrock. This may impact the amount of baseflow to this reach and could possibly result in some measurable volume of induced recharge. The water balance calculations related to withdrawals from the Lower Reservoir presented in Section 15 appear to assume non-pumping conditions in determination of the baseflow contribution to this reach, and the model cross sections do not, at least at the scale shown in Figures 6a and 6b of the technical memorandum, clearly indicate whether riverbed conductance along this reach is determined using values for the bedrock and fractured bedrock or through the till or Presumpscot Formation, which could have the effect of muting any induced recharge or reduction in baseflow due to the significant drawdown in the bedrock (See Figures 14a – c of the technical memorandum), possibly leading to an underestimate of the change in stream leakage outflow shown in Figure 15 and described in the memorandum. Any measurable effect of such changes should be determined by the operational monitoring plan, if this plan is revised to allow a greater degree of precision and the facility becomes operational; to this end, a minimum flow and suitable warning level above this flow should be established for this reach as a performance standard, as generally indicated in discussion of the proposed monitoring program. To the extent practical, however, the applicant should incorporate an estimate of this loss in a revised water budget for the Lower Reservoir as part of this application.

As noted above in the response Item 1.D, significant effort will be dedicated to refining the current understanding of flow conditions within the Little River. Initially, this work will focus on baseline/pre-pumping conditions. Like Item 1.H., the refined baseline/pre-pumping understanding is needed in order to appropriately establish a minimum flow criterion and an associated warning level. Nordic anticipates that an addendum to the WRMP detailing these items, subject to DEP review and approval, will be issued to prior to commencing operations requiring active withdrawals.

The water budget presented as part of the submitted application is consistent with current assessments of the system, including the hydrogeologic investigation findings referenced in response to Item 1.D.

b. The applicant is proposing to obtain a significant component of freshwater from the Belfast Water District. Part IV(F)(l) (p. 12) of the Public Utilities Commission Order approving the land transfer notes that there are "no specific contractual curtailment provisions in the water supply agreement … during the first 6 years", under drought conditions or other circumstances, but that the utility states that it would apply "its general authority to curtail or reduce water sales .. .in the case of a drought or other water supply emergency." Maintenance of necessary environmental flows in the Goose River during drought conditions, however, is not the subject of this order and is not discussed in it. The 2018 capacity evaluation conducted for the utility notes (p. 8) that "a large portion of the water derived from the Goose River Aquifer is from induced infiltration" although data collected by the utility from a location downstream of the wells suggests that "at current pumping rates, the wells are not deriving much water from induced recharge" since these data also show that "under most circumstances … flow in the Goose River is greater downstream of the wells than it is at the dam." This report further notes, however, that "this might not be the case as pumping is increased from this aquifer in the future." It is not surprising to find that a system such as the Goose River and associated aquifer shows exchange of water in both directions between groundwater and surface water, under either natural or pumping conditions. However, these flow data are not provided in the capacity evaluation or the application, and the

measurements techniques are not described. It is not clear that flows have been measured under pumping conditions within the immediate area of influence from the wells, and minimum required environmental flows from that area are also not known. The applicant recommends in Section 15 that the existing additional municipal well be brought online to support the increased water use, and this should have the effect of distributing the increased stress across a longer reach of the river – aquifer system in the vicinity of the pumping wells. However, existing data regarding flows and flow measurement locations in the Goose River should be provided for review, and minimum flows consistent with Department requirements should be identified and maintained in the affected reach.

The Belfast Water District currently monitors both water quantity and water quality in the Goose River aquifer. Nordic and the BWD will obtain additional information regarding flows and flow measurement locations prior to initiation of the project and provide this information to ME DEP for review.

ATTACHMENT A

Laboratory Analysis Report

Nordic Aquafarms, Inc., Land-based Aquaculture Facility, Belfast, Maine
L-28319-26-A-N, Review Comments

JOB: L1812057 REPORT STYLE: Data Usability Report
0010: Alpha Analytical Report Cover Page - OK
0015: Sample Cross Reference Summary - OK
0060: Case Narrative - OK
0100: Volatiles Cover Page - OK
0110: Volatiles Sample Results - OK
0120: Volatiles Method Blank Report - OK
0130: Volatiles LCS Report - OK
0180: Semivolatiles Cover Page - OK
0190: Semivolatiles Sample Results - OK
0200: Semivolatiles Method Blank Report - OK
0210: Semivolatiles LCS Report - OK
0900: Pesticides Cover Page - OK
0910: Pesticides Sample Results - OK
0920: Pesticides Method Blank Report - OK
0930: Pesticides LCS Report - OK
1005: Metals Sample Results - OK
1010: Metals Method Blank Report - OK
1020: Metals LCS Report - OK
1040: Metals Matrix Spike Report - OK
1050: Metals Duplicate Report - OK
1180: Inorganics Cover Page - OK
1200: Wet Chemistry Sample Results - OK
1210: Wet Chemistry Method Blank Report - OK
1220: Wet Chemistry LCS Report - OK
1250: Wet Chemistry Duplicate Report - OK
5100: Sample Receipt & Container Information Report - OK
5200: Glossary - OK
5400: References - OK

ANALYTICAL REPORT

Lab Number:	L1812057
Client:	Ransom Consulting, Inc. 400 Commercial Street Suite 404 Portland, ME 04101-4660
ATTN:	Brian Pettingill
Phone:	(207) 772-2891
Project Name:	BELFAST WATER DISTRICT
Project Number:	171.05027.003
Report Date:	04/13/18

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), NJ NELAP (MA935), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-14-00197).

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1812057-01	GWW-101	WATER	BELFAST, ME	04/05/18 08:15	04/06/18
L1812057-02	GWW-101	WATER	BELFAST, ME	04/05/18 08:15	04/06/18
L1812057-03	GWW-103	WATER	BELFAST, ME	04/05/18 08:45	04/06/18
L1812057-04	GWW-103	WATER	BELFAST, ME	04/05/18 08:45	04/06/18
L1812057-05	SS-1	SOIL	BELFAST, ME	04/05/18 09:15	04/06/18
L1812057-06	SS-2	SOIL	BELFAST, ME	04/05/18 11:30	04/06/18
L1812057-07	GWW-101	WATER	BELFAST, ME	04/04/18 08:30	04/06/18
L1812057-08	GWW-103	WATER	BELFAST, ME	04/04/18 09:15	04/06/18
L1812057-09	TRIP BLANK	WATER	BELFAST, ME	04/04/18 00:00	04/06/18

Project Name:	BELFAST WATER DISTRICT	**Lab Number:**	L1812057
Project Number:	171.05027.003	**Report Date:**	04/13/18

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

Project Name:	BELFAST WATER DISTRICT	**Lab Number:**	L1812057
Project Number:	171.05027.003	**Report Date:**	04/13/18

Case Narrative (continued)

Report Submission

April 13, 2018: This is a preliminary report.

Sample Receipt

L1812057-06 and -07: The analysis of Pesticides was performed at the client's request.

Semivolatile Organics

The WG1104633-2/-3 LCS/LCSD recoveries, associated with L1812057-01 and -03, are below the acceptance criteria for benzidine (9%/6%); however, it has been identified as a "difficult" analyte. The results of the associated samples are reported.

Total Metals

The WG1105166-1 Method Blank, associated with L1812057-01 and -03, has a concentration above the reporting limit for iron. Since the associated sample concentrations are greater than 10x the blank concentration for this analyte, no corrective action is required.

The WG1105166-2 LCS recovery, associated with L1812057-01 and -03, is above the acceptance criteria for selenium (123%); however, the associated samples are non-detect to the RL for this target analyte. The results of the original analysis are reported.

The WG1105073-3 MS recovery for sulfur (20%), performed on L1812057-03, does not apply because the sample concentration is greater than four times the spike amount added.

Phosphorus, Soluble

The samples were field filtered; a filter blank was not received.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Kelly Stenstrom

Title: Technical Director/Representative Date: 04/13/18

ORGANICS

VOLATILES

Project Name: BELFAST WATER DISTRICT **Lab Number:** L1812057

Project Number: 171.05027.003 **Report Date:** 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-01
Client ID: GWW-101
Sample Location: BELFAST, ME

Date Collected: 04/05/18 08:15
Date Received: 04/06/18
Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 04/11/18 21:21
Analyst: NLK

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	3.0	--	1
1,1-Dichloroethane	ND		ug/l	0.75	--	1
Chloroform	ND		ug/l	0.75	--	1
Carbon tetrachloride	ND		ug/l	0.50	--	1
1,2-Dichloropropane	ND		ug/l	1.0	--	1
Dibromochloromethane	ND		ug/l	0.50	--	1
1,1,2-Trichloroethane	ND		ug/l	0.75	--	1
Tetrachloroethene	ND		ug/l	0.50	--	1
Chlorobenzene	ND		ug/l	0.50	--	1
Trichlorofluoromethane	ND		ug/l	1.0	--	1
1,2-Dichloroethane	ND		ug/l	0.50	--	1
1,1,1-Trichloroethane	ND		ug/l	0.50	--	1
Bromodichloromethane	ND		ug/l	0.50	--	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	--	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	--	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	--	1
1,1-Dichloropropene	ND		ug/l	1.0	--	1
Bromoform	ND		ug/l	1.0	--	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	--	1
Benzene	ND		ug/l	0.50	--	1
Toluene	ND		ug/l	0.75	--	1
Ethylbenzene	ND		ug/l	0.50	--	1
Chloromethane	ND		ug/l	2.0	--	1
Bromomethane	ND		ug/l	1.0	--	1
Vinyl chloride	ND		ug/l	0.20	--	1
Chloroethane	ND		ug/l	1.0	--	1
1,1-Dichloroethene	ND		ug/l	0.50	--	1
trans-1,2-Dichloroethene	ND		ug/l	0.75	--	1

Project Name: BELFAST WATER DISTRICT **Lab Number:** L1812057

Project Number: 171.05027.003 **Report Date:** 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-01 Date Collected: 04/05/18 08:15

Client ID: GWW-101 Date Received: 04/06/18

Sample Location: BELFAST, ME Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2-Dichloroethene, Total	ND		ug/l	0.50	--	1
Trichloroethene	ND		ug/l	0.50	--	1
1,2-Dichlorobenzene	ND		ug/l	1.0	--	1
1,3-Dichlorobenzene	ND		ug/l	1.0	--	1
1,4-Dichlorobenzene	ND		ug/l	1.0	--	1
Methyl tert butyl ether	ND		ug/l	1.0	--	1
p/m-Xylene	ND		ug/l	1.0	--	1
o-Xylene	ND		ug/l	1.0	--	1
Xylenes, Total	ND		ug/l	1.0	--	1
cis-1,2-Dichloroethene	ND		ug/l	0.50	--	1
Dibromomethane	ND		ug/l	1.0	--	1
1,4-Dichlorobutane	ND		ug/l	5.0	--	1
1,2,3-Trichloropropane	ND		ug/l	1.0	--	1
Styrene	ND		ug/l	1.0	--	1
Dichlorodifluoromethane	ND		ug/l	2.0	--	1
Acetone	ND		ug/l	5.0	--	1
Carbon disulfide	ND		ug/l	1.0	--	1
2-Butanone	ND		ug/l	5.0	--	1
Vinyl acetate	ND		ug/l	5.0	--	1
4-Methyl-2-pentanone	ND		ug/l	5.0	--	1
2-Hexanone	ND		ug/l	5.0	--	1
Ethyl methacrylate	ND		ug/l	5.0	--	1
Acrylonitrile	ND		ug/l	5.0	--	1
Bromochloromethane	ND		ug/l	1.0	--	1
Tetrahydrofuran	ND		ug/l	2.0	--	1
2,2-Dichloropropane	ND		ug/l	1.0	--	1
1,2-Dibromoethane	ND		ug/l	1.0	--	1
1,3-Dichloropropane	ND		ug/l	1.0	--	1
1,1,1,2-Tetrachloroethane	ND		ug/l	0.50	--	1
Bromobenzene	ND		ug/l	1.0	--	1
n-Butylbenzene	ND		ug/l	0.50	--	1
sec-Butylbenzene	ND		ug/l	0.50	--	1
tert-Butylbenzene	ND		ug/l	1.0	--	1
o-Chlorotoluene	ND		ug/l	1.0	--	1
p-Chlorotoluene	ND		ug/l	1.0	--	1
1,2-Dibromo-3-chloropropane	ND		ug/l	1.0	--	1
Hexachlorobutadiene	ND		ug/l	0.50	--	1

Project Name: BELFAST WATER DISTRICT **Lab Number:** L1812057

Project Number: 171.05027.003 **Report Date:** 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-01 Date Collected: 04/05/18 08:15

Client ID: GWW-101 Date Received: 04/06/18

Sample Location: BELFAST, ME Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Isopropylbenzene	ND		ug/l	0.50	--	1
p-Isopropyltoluene	ND		ug/l	0.50	--	1
Naphthalene	ND		ug/l	1.0	--	1
n-Propylbenzene	ND		ug/l	0.50	--	1
1,2,3-Trichlorobenzene	ND		ug/l	1.0	--	1
1,2,4-Trichlorobenzene	ND		ug/l	1.0	--	1
1,3,5-Trimethylbenzene	ND		ug/l	1.0	--	1
1,2,4-Trimethylbenzene	ND		ug/l	1.0	--	1
trans-1,4-Dichloro-2-butene	ND		ug/l	2.5	--	1
Ethyl ether	ND		ug/l	1.0	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	104		70-130
Toluene-d8	103		70-130
4-Bromofluorobenzene	101		70-130
Dibromofluoromethane	92		70-130

Project Name: BELFAST WATER DISTRICT
Lab Number: L1812057
Project Number: 171.05027.003
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-03
Client ID: GWW-103
Sample Location: BELFAST, ME

Date Collected: 04/05/18 08:45
Date Received: 04/06/18
Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 04/11/18 21:49
Analyst: NLK

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	3.0	--	1
1,1-Dichloroethane	ND		ug/l	0.75	--	1
Chloroform	ND		ug/l	0.75	--	1
Carbon tetrachloride	ND		ug/l	0.50	--	1
1,2-Dichloropropane	ND		ug/l	1.0	--	1
Dibromochloromethane	ND		ug/l	0.50	--	1
1,1,2-Trichloroethane	ND		ug/l	0.75	--	1
Tetrachloroethene	ND		ug/l	0.50	--	1
Chlorobenzene	ND		ug/l	0.50	--	1
Trichlorofluoromethane	ND		ug/l	1.0	--	1
1,2-Dichloroethane	ND		ug/l	0.50	--	1
1,1,1-Trichloroethane	ND		ug/l	0.50	--	1
Bromodichloromethane	ND		ug/l	0.50	--	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	--	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	--	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	--	1
1,1-Dichloropropene	ND		ug/l	1.0	--	1
Bromoform	ND		ug/l	1.0	--	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	--	1
Benzene	ND		ug/l	0.50	--	1
Toluene	ND		ug/l	0.75	--	1
Ethylbenzene	ND		ug/l	0.50	--	1
Chloromethane	ND		ug/l	2.0	--	1
Bromomethane	ND		ug/l	1.0	--	1
Vinyl chloride	ND		ug/l	0.20	--	1
Chloroethane	ND		ug/l	1.0	--	1
1,1-Dichloroethene	ND		ug/l	0.50	--	1
trans-1,2-Dichloroethene	ND		ug/l	0.75	--	1

Project Name: BELFAST WATER DISTRICT **Lab Number:** L1812057

Project Number: 171.05027.003 **Report Date:** 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-03 Date Collected: 04/05/18 08:45

Client ID: GWW-103 Date Received: 04/06/18

Sample Location: BELFAST, ME Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2-Dichloroethene, Total	ND		ug/l	0.50	--	1
Trichloroethene	ND		ug/l	0.50	--	1
1,2-Dichlorobenzene	ND		ug/l	1.0	--	1
1,3-Dichlorobenzene	ND		ug/l	1.0	--	1
1,4-Dichlorobenzene	ND		ug/l	1.0	--	1
Methyl tert butyl ether	ND		ug/l	1.0	--	1
p/m-Xylene	ND		ug/l	1.0	--	1
o-Xylene	ND		ug/l	1.0	--	1
Xylenes, Total	ND		ug/l	1.0	--	1
cis-1,2-Dichloroethene	ND		ug/l	0.50	--	1
Dibromomethane	ND		ug/l	1.0	--	1
1,4-Dichlorobutane	ND		ug/l	5.0	--	1
1,2,3-Trichloropropane	ND		ug/l	1.0	--	1
Styrene	ND		ug/l	1.0	--	1
Dichlorodifluoromethane	ND		ug/l	2.0	--	1
Acetone	ND		ug/l	5.0	--	1
Carbon disulfide	ND		ug/l	1.0	--	1
2-Butanone	ND		ug/l	5.0	--	1
Vinyl acetate	ND		ug/l	5.0	--	1
4-Methyl-2-pentanone	ND		ug/l	5.0	--	1
2-Hexanone	ND		ug/l	5.0	--	1
Ethyl methacrylate	ND		ug/l	5.0	--	1
Acrylonitrile	ND		ug/l	5.0	--	1
Bromochloromethane	ND		ug/l	1.0	--	1
Tetrahydrofuran	ND		ug/l	2.0	--	1
2,2-Dichloropropane	ND		ug/l	1.0	--	1
1,2-Dibromoethane	ND		ug/l	1.0	--	1
1,3-Dichloropropane	ND		ug/l	1.0	--	1
1,1,1,2-Tetrachloroethane	ND		ug/l	0.50	--	1
Bromobenzene	ND		ug/l	1.0	--	1
n-Butylbenzene	ND		ug/l	0.50	--	1
sec-Butylbenzene	ND		ug/l	0.50	--	1
tert-Butylbenzene	ND		ug/l	1.0	--	1
o-Chlorotoluene	ND		ug/l	1.0	--	1
p-Chlorotoluene	ND		ug/l	1.0	--	1
1,2-Dibromo-3-chloropropane	ND		ug/l	1.0	--	1
Hexachlorobutadiene	ND		ug/l	0.50	--	1

Project Name: BELFAST WATER DISTRICT **Lab Number:** L1812057

Project Number: 171.05027.003 **Report Date:** 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-03 Date Collected: 04/05/18 08:45

Client ID: GWW-103 Date Received: 04/06/18

Sample Location: BELFAST, ME Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Isopropylbenzene	ND		ug/l	0.50	--	1
p-Isopropyltoluene	ND		ug/l	0.50	--	1
Naphthalene	ND		ug/l	1.0	--	1
n-Propylbenzene	ND		ug/l	0.50	--	1
1,2,3-Trichlorobenzene	ND		ug/l	1.0	--	1
1,2,4-Trichlorobenzene	ND		ug/l	1.0	--	1
1,3,5-Trimethylbenzene	ND		ug/l	1.0	--	1
1,2,4-Trimethylbenzene	ND		ug/l	1.0	--	1
trans-1,4-Dichloro-2-butene	ND		ug/l	2.5	--	1
Ethyl ether	ND		ug/l	1.0	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	104		70-130
Toluene-d8	103		70-130
4-Bromofluorobenzene	102		70-130
Dibromofluoromethane	94		70-130

Project Name: BELFAST WATER DISTRICT **Lab Number:** L1812057

Project Number: 171.05027.003 **Report Date:** 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-05
Client ID: SS-1
Sample Location: BELFAST, ME

Date Collected: 04/05/18 09:15
Date Received: 04/06/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260C
Analytical Date: 04/11/18 09:26
Analyst: JC
Percent Solids: 78%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS-5035 - Westborough Lab						
Methylene chloride	ND		ug/kg	14	--	1
1,1-Dichloroethane	ND		ug/kg	2.1	--	1
Chloroform	ND		ug/kg	2.1	--	1
Carbon tetrachloride	ND		ug/kg	1.4	--	1
1,2-Dichloropropane	ND		ug/kg	5.0	--	1
Dibromochloromethane	ND		ug/kg	1.4	--	1
1,1,2-Trichloroethane	ND		ug/kg	2.1	--	1
Tetrachloroethene	ND		ug/kg	1.4	--	1
Chlorobenzene	ND		ug/kg	1.4	--	1
Trichlorofluoromethane	ND		ug/kg	7.1	--	1
1,2-Dichloroethane	ND		ug/kg	1.4	--	1
1,1,1-Trichloroethane	ND		ug/kg	1.4	--	1
Bromodichloromethane	ND		ug/kg	1.4	--	1
trans-1,3-Dichloropropene	ND		ug/kg	1.4	--	1
cis-1,3-Dichloropropene	ND		ug/kg	1.4	--	1
1,3-Dichloropropene, Total	ND		ug/kg	1.4	--	1
1,1-Dichloropropene	ND		ug/kg	7.1	--	1
Bromoform	ND		ug/kg	5.7	--	1
1,1,2,2-Tetrachloroethane	ND		ug/kg	1.4	--	1
Benzene	ND		ug/kg	1.4	--	1
Toluene	ND		ug/kg	2.1	--	1
Ethylbenzene	ND		ug/kg	1.4	--	1
Chloromethane	ND		ug/kg	7.1	--	1
Bromomethane	ND		ug/kg	2.8	--	1
Vinyl chloride	ND		ug/kg	2.8	--	1
Chloroethane	ND		ug/kg	2.8	--	1
1,1-Dichloroethene	ND		ug/kg	1.4	--	1
trans-1,2-Dichloroethene	ND		ug/kg	2.1	--	1

Project Name: BELFAST WATER DISTRICT **Lab Number:** L1812057

Project Number: 171.05027.003 **Report Date:** 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-05 Date Collected: 04/05/18 09:15

Client ID: SS-1 Date Received: 04/06/18

Sample Location: BELFAST, ME Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS-5035 - Westborough Lab						
Trichloroethene	ND		ug/kg	1.4	--	1
1,2-Dichlorobenzene	ND		ug/kg	7.1	--	1
1,3-Dichlorobenzene	ND		ug/kg	7.1	--	1
1,4-Dichlorobenzene	ND		ug/kg	7.1	--	1
Methyl tert butyl ether	ND		ug/kg	2.8	--	1
p/m-Xylene	ND		ug/kg	2.8	--	1
o-Xylene	ND		ug/kg	2.8	--	1
Xylenes, Total	ND		ug/kg	2.8	--	1
cis-1,2-Dichloroethene	ND		ug/kg	1.4	--	1
1,2-Dichloroethene, Total	ND		ug/kg	1.4	--	1
Dibromomethane	ND		ug/kg	14	--	1
1,4-Dichlorobutane	ND		ug/kg	14	--	1
1,2,3-Trichloropropane	ND		ug/kg	14	--	1
Styrene	ND		ug/kg	2.8	--	1
Dichlorodifluoromethane	ND		ug/kg	14	--	1
Acetone	ND		ug/kg	51	--	1
Carbon disulfide	ND		ug/kg	14	--	1
2-Butanone	ND		ug/kg	14	--	1
Vinyl acetate	ND		ug/kg	14	--	1
4-Methyl-2-pentanone	ND		ug/kg	14	--	1
2-Hexanone	ND		ug/kg	14	--	1
Ethyl methacrylate	ND		ug/kg	14	--	1
Acrylonitrile	ND		ug/kg	5.7	--	1
Bromochloromethane	ND		ug/kg	7.1	--	1
Tetrahydrofuran	ND		ug/kg	28	--	1
2,2-Dichloropropane	ND		ug/kg	7.1	--	1
1,2-Dibromoethane	ND		ug/kg	5.7	--	1
1,3-Dichloropropane	ND		ug/kg	7.1	--	1
1,1,1,2-Tetrachloroethane	ND		ug/kg	1.4	--	1
Bromobenzene	ND		ug/kg	7.1	--	1
n-Butylbenzene	ND		ug/kg	1.4	--	1
sec-Butylbenzene	ND		ug/kg	1.4	--	1
tert-Butylbenzene	ND		ug/kg	7.1	--	1
o-Chlorotoluene	ND		ug/kg	7.1	--	1
p-Chlorotoluene	ND		ug/kg	7.1	--	1
1,2-Dibromo-3-chloropropane	ND		ug/kg	7.1	--	1
Hexachlorobutadiene	ND		ug/kg	7.1	--	1

Project Name: BELFAST WATER DISTRICT **Lab Number:** L1812057

Project Number: 171.05027.003 **Report Date:** 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-05 Date Collected: 04/05/18 09:15

Client ID: SS-1 Date Received: 04/06/18

Sample Location: BELFAST, ME Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS-5035 - Westborough Lab						
Isopropylbenzene	ND		ug/kg	1.4	--	1
p-Isopropyltoluene	ND		ug/kg	1.4	--	1
Naphthalene	ND		ug/kg	7.1	--	1
n-Propylbenzene	ND		ug/kg	1.4	--	1
1,2,3-Trichlorobenzene	ND		ug/kg	7.1	--	1
1,2,4-Trichlorobenzene	ND		ug/kg	7.1	--	1
1,3,5-Trimethylbenzene	ND		ug/kg	7.1	--	1
1,2,4-Trimethylbenzene	ND		ug/kg	7.1	--	1
trans-1,4-Dichloro-2-butene	ND		ug/kg	7.1	--	1
Ethyl ether	ND		ug/kg	7.1	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	96		70-130
Toluene-d8	91		70-130
4-Bromofluorobenzene	82		70-130
Dibromofluoromethane	110		70-130

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 04/11/18 09:00
Analyst: JC

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS-5035 - Westborough Lab for sample(s): 05 Batch: WG1105519-5					
Methylene chloride	ND		ug/kg	10	--
1,1-Dichloroethane	ND		ug/kg	1.5	--
Chloroform	ND		ug/kg	1.5	--
Carbon tetrachloride	ND		ug/kg	1.0	--
1,2-Dichloropropane	ND		ug/kg	3.5	--
Dibromochloromethane	ND		ug/kg	1.0	--
1,1,2-Trichloroethane	ND		ug/kg	1.5	--
2-Chloroethylvinyl ether	ND		ug/kg	20	--
Tetrachloroethene	ND		ug/kg	1.0	--
Chlorobenzene	ND		ug/kg	1.0	--
Trichlorofluoromethane	ND		ug/kg	5.0	--
1,2-Dichloroethane	ND		ug/kg	1.0	--
1,1,1-Trichloroethane	ND		ug/kg	1.0	--
Bromodichloromethane	ND		ug/kg	1.0	--
trans-1,3-Dichloropropene	ND		ug/kg	1.0	--
cis-1,3-Dichloropropene	ND		ug/kg	1.0	--
1,3-Dichloropropene, Total	ND		ug/kg	1.0	--
1,1-Dichloropropene	ND		ug/kg	5.0	--
Bromoform	ND		ug/kg	4.0	--
1,1,2,2-Tetrachloroethane	ND		ug/kg	1.0	--
Benzene	ND		ug/kg	1.0	--
Toluene	ND		ug/kg	1.5	--
Ethylbenzene	ND		ug/kg	1.0	--
Chloromethane	ND		ug/kg	5.0	--
Bromomethane	ND		ug/kg	2.0	--
Vinyl chloride	ND		ug/kg	2.0	--
Chloroethane	ND		ug/kg	2.0	--
1,1-Dichloroethene	ND		ug/kg	1.0	--
trans-1,2-Dichloroethene	ND		ug/kg	1.5	--

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 04/11/18 09:00
Analyst: JC

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS-5035 - Westborough Lab for sample(s): 05 Batch: WG1105519-5					
Trichloroethene	ND		ug/kg	1.0	--
1,2-Dichlorobenzene	ND		ug/kg	5.0	--
1,3-Dichlorobenzene	ND		ug/kg	5.0	--
1,4-Dichlorobenzene	ND		ug/kg	5.0	--
Methyl tert butyl ether	ND		ug/kg	2.0	--
p/m-Xylene	ND		ug/kg	2.0	--
o-Xylene	ND		ug/kg	2.0	--
Xylenes, Total	ND		ug/kg	2.0	--
cis-1,2-Dichloroethene	ND		ug/kg	1.0	--
1,2-Dichloroethene, Total	ND		ug/kg	1.0	--
Dibromomethane	ND		ug/kg	10	--
1,4-Dichlorobutane	ND		ug/kg	10	--
1,2,3-Trichloropropane	ND		ug/kg	10	--
Styrene	ND		ug/kg	2.0	--
Dichlorodifluoromethane	ND		ug/kg	10	--
Acetone	ND		ug/kg	36	--
Carbon disulfide	ND		ug/kg	10	--
2-Butanone	ND		ug/kg	10	--
Vinyl acetate	ND		ug/kg	10	--
4-Methyl-2-pentanone	ND		ug/kg	10	--
2-Hexanone	ND		ug/kg	10	--
Ethyl methacrylate	ND		ug/kg	10	--
Acrolein	ND		ug/kg	25	--
Acrylonitrile	ND		ug/kg	4.0	--
Bromochloromethane	ND		ug/kg	5.0	--
Tetrahydrofuran	ND		ug/kg	20	--
2,2-Dichloropropane	ND		ug/kg	5.0	--
1,2-Dibromoethane	ND		ug/kg	4.0	--
1,3-Dichloropropane	ND		ug/kg	5.0	--

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 04/11/18 09:00
Analyst: JC

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS-5035 - Westborough Lab for sample(s): 05 Batch: WG1105519-5					
1,1,1,2-Tetrachloroethane	ND		ug/kg	1.0	--
Bromobenzene	ND		ug/kg	5.0	--
n-Butylbenzene	ND		ug/kg	1.0	--
sec-Butylbenzene	ND		ug/kg	1.0	--
tert-Butylbenzene	ND		ug/kg	5.0	--
1,3,5-Trichlorobenzene	ND		ug/kg	4.0	--
o-Chlorotoluene	ND		ug/kg	5.0	--
p-Chlorotoluene	ND		ug/kg	5.0	--
1,2-Dibromo-3-chloropropane	ND		ug/kg	5.0	--
Hexachlorobutadiene	ND		ug/kg	5.0	--
Isopropylbenzene	ND		ug/kg	1.0	--
p-Isopropyltoluene	ND		ug/kg	1.0	--
Naphthalene	ND		ug/kg	5.0	--
n-Propylbenzene	ND		ug/kg	1.0	--
1,2,3-Trichlorobenzene	ND		ug/kg	5.0	--
1,2,4-Trichlorobenzene	ND		ug/kg	5.0	--
1,3,5-Trimethylbenzene	ND		ug/kg	5.0	--
1,2,4-Trimethylbenzene	ND		ug/kg	5.0	--
trans-1,4-Dichloro-2-butene	ND		ug/kg	5.0	--
Ethyl ether	ND		ug/kg	5.0	--
Methyl Acetate	ND		ug/kg	20	--
Ethyl Acetate	ND		ug/kg	20	--
Isopropyl Ether	ND		ug/kg	4.0	--
Cyclohexane	ND		ug/kg	20	--
Tert-Butyl Alcohol	ND		ug/kg	100	--
Ethyl-Tert-Butyl-Ether	ND		ug/kg	4.0	--
Tertiary-Amyl Methyl Ether	ND		ug/kg	4.0	--
1,4-Dioxane	ND		ug/kg	40	--
Methyl cyclohexane	ND		ug/kg	4.0	--

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 04/11/18 09:00
Analyst: JC

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS-5035 - Westborough Lab for sample(s): 05 Batch: WG1105519-5					
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND		ug/kg	20	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	87		70-130
Toluene-d8	91		70-130
4-Bromofluorobenzene	81		70-130
Dibromofluoromethane	105		70-130

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 04/11/18 19:58
Analyst: AD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01,03 Batch: WG1105890-5					
Methylene chloride	ND		ug/l	3.0	--
1,1-Dichloroethane	ND		ug/l	0.75	--
Chloroform	ND		ug/l	0.75	--
Carbon tetrachloride	ND		ug/l	0.50	--
1,2-Dichloropropane	ND		ug/l	1.0	--
Dibromochloromethane	ND		ug/l	0.50	--
1,1,2-Trichloroethane	ND		ug/l	0.75	--
2-Chloroethylvinyl ether	ND		ug/l	10	--
Tetrachloroethene	ND		ug/l	0.50	--
Chlorobenzene	ND		ug/l	0.50	--
Trichlorofluoromethane	ND		ug/l	1.0	--
1,2-Dichloroethane	ND		ug/l	0.50	--
1,1,1-Trichloroethane	ND		ug/l	0.50	--
Bromodichloromethane	ND		ug/l	0.50	--
trans-1,3-Dichloropropene	ND		ug/l	0.50	--
cis-1,3-Dichloropropene	ND		ug/l	0.50	--
1,3-Dichloropropene, Total	ND		ug/l	0.50	--
1,1-Dichloropropene	ND		ug/l	1.0	--
Bromoform	ND		ug/l	1.0	--
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	--
Benzene	ND		ug/l	0.50	--
Toluene	ND		ug/l	0.75	--
Ethylbenzene	ND		ug/l	0.50	--
Chloromethane	ND		ug/l	2.0	--
Bromomethane	ND		ug/l	1.0	--
Vinyl chloride	ND		ug/l	0.20	--
Chloroethane	ND		ug/l	1.0	--
1,1-Dichloroethene	ND		ug/l	0.50	--
trans-1,2-Dichloroethene	ND		ug/l	0.75	--

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 04/11/18 19:58
Analyst: AD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01,03 Batch: WG1105890-5					
1,2-Dichloroethene, Total	ND		ug/l	0.50	--
Trichloroethene	ND		ug/l	0.50	--
1,2-Dichlorobenzene	ND		ug/l	1.0	--
1,3-Dichlorobenzene	ND		ug/l	1.0	--
1,4-Dichlorobenzene	ND		ug/l	1.0	--
Methyl tert butyl ether	ND		ug/l	1.0	--
p/m-Xylene	ND		ug/l	1.0	--
o-Xylene	ND		ug/l	1.0	--
Xylenes, Total	ND		ug/l	1.0	--
cis-1,2-Dichloroethene	ND		ug/l	0.50	--
Dibromomethane	ND		ug/l	1.0	--
1,4-Dichlorobutane	ND		ug/l	5.0	--
Iodomethane	ND		ug/l	5.0	--
1,2,3-Trichloropropane	ND		ug/l	1.0	--
Styrene	ND		ug/l	1.0	--
Dichlorodifluoromethane	ND		ug/l	2.0	--
Acetone	ND		ug/l	5.0	--
Carbon disulfide	ND		ug/l	1.0	--
2-Butanone	ND		ug/l	5.0	--
Vinyl acetate	ND		ug/l	5.0	--
4-Methyl-2-pentanone	ND		ug/l	5.0	--
2-Hexanone	ND		ug/l	5.0	--
Ethyl methacrylate	ND		ug/l	5.0	--
Acrolein	ND		ug/l	5.0	--
Acrylonitrile	ND		ug/l	5.0	--
Bromochloromethane	ND		ug/l	1.0	--
Tetrahydrofuran	ND		ug/l	2.0	--
2,2-Dichloropropane	ND		ug/l	1.0	--
1,2-Dibromoethane	ND		ug/l	1.0	--

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 04/11/18 19:58
Analyst: AD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01,03 Batch: WG1105890-5					
1,3-Dichloropropane	ND		ug/l	1.0	--
1,1,1,2-Tetrachloroethane	ND		ug/l	0.50	--
Bromobenzene	ND		ug/l	1.0	--
n-Butylbenzene	ND		ug/l	0.50	--
sec-Butylbenzene	ND		ug/l	0.50	--
tert-Butylbenzene	ND		ug/l	1.0	--
o-Chlorotoluene	ND		ug/l	1.0	--
p-Chlorotoluene	ND		ug/l	1.0	--
1,2-Dibromo-3-chloropropane	ND		ug/l	1.0	--
Hexachlorobutadiene	ND		ug/l	0.50	--
Isopropylbenzene	ND		ug/l	0.50	--
p-Isopropyltoluene	ND		ug/l	0.50	--
Naphthalene	ND		ug/l	1.0	--
n-Propylbenzene	ND		ug/l	0.50	--
1,2,3-Trichlorobenzene	ND		ug/l	1.0	--
1,2,4-Trichlorobenzene	ND		ug/l	1.0	--
1,3,5-Trimethylbenzene	ND		ug/l	1.0	--
1,3,5-Trichlorobenzene	ND		ug/l	1.0	--
1,2,4-Trimethylbenzene	ND		ug/l	1.0	--
trans-1,4-Dichloro-2-butene	ND		ug/l	2.5	--
Halothane	ND		ug/l	2.5	--
Ethyl ether	ND		ug/l	1.0	--
Methyl Acetate	ND		ug/l	10	--
Ethyl Acetate	ND		ug/l	10	--
Isopropyl Ether	ND		ug/l	1.0	--
Cyclohexane	ND		ug/l	10	--
Tert-Butyl Alcohol	ND		ug/l	10	--
Ethyl-Tert-Butyl-Ether	ND		ug/l	1.0	--
Tertiary-Amyl Methyl Ether	ND		ug/l	1.0	--

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 04/11/18 19:58
Analyst: AD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01,03 Batch: WG1105890-5					
1,4-Dioxane	ND		ug/l	250	--
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND		ug/l	10	--
Methyl cyclohexane	ND		ug/l	10	--
p-Diethylbenzene	ND		ug/l	2.0	--
4-Ethyltoluene	ND		ug/l	2.0	--
1,2,4,5-Tetramethylbenzene	ND		ug/l	2.0	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	103		70-130
Toluene-d8	102		70-130
4-Bromofluorobenzene	104		70-130
Dibromofluoromethane	95		70-130

Lab Control Sample Analysis
Batch Quality Control

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS-5035 - Westborough Lab Associated sample(s): 05 Batch: WG1105519-3 WG1105519-4								
Methylene chloride	92		92		70-130	0		30
1,1-Dichloroethane	96		94		70-130	2		30
Chloroform	83		81		70-130	2		30
Carbon tetrachloride	88		83		70-130	6		30
1,2-Dichloropropane	106		104		70-130	2		30
Dibromochloromethane	80		83		70-130	4		30
1,1,2-Trichloroethane	83		83		70-130	0		30
2-Chloroethylvinyl ether	87		85		70-130	2		30
Tetrachloroethene	98		93		70-130	5		30
Chlorobenzene	92		89		70-130	3		30
Trichlorofluoromethane	80		76		70-139	5		30
1,2-Dichloroethane	84		82		70-130	2		30
1,1,1-Trichloroethane	80		76		70-130	5		30
Bromodichloromethane	83		83		70-130	0		30
trans-1,3-Dichloropropene	71		70		70-130	1		30
cis-1,3-Dichloropropene	92		90		70-130	2		30
1,1-Dichloropropene	84		79		70-130	6		30
Bromoform	75		77		70-130	3		30
1,1,2,2-Tetrachloroethane	84		86		70-130	2		30
Benzene	90		86		70-130	5		30
Toluene	82		79		70-130	4		30
Ethylbenzene	78		75		70-130	4		30
Chloromethane	107		104		52-130	3		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS-5035 - Westborough Lab Associated sample(s): 05 Batch: WG1105519-3 WG1105519-4								
Bromomethane	94		93		57-147	1		30
Vinyl chloride	99		93		67-130	6		30
Chloroethane	92		90		50-151	2		30
1,1-Dichloroethene	91		84		65-135	8		30
trans-1,2-Dichloroethene	91		87		70-130	4		30
Trichloroethene	86		82		70-130	5		30
1,2-Dichlorobenzene	96		97		70-130	1		30
1,3-Dichlorobenzene	95		96		70-130	1		30
1,4-Dichlorobenzene	94		96		70-130	2		30
Methyl tert butyl ether	83		83		66-130	0		30
p/m-Xylene	94		90		70-130	4		30
o-Xylene	93		90		70-130	3		30
cis-1,2-Dichloroethene	93		90		70-130	3		30
Dibromomethane	91		92		70-130	1		30
1,4-Dichlorobutane	91		93		70-130	2		30
1,2,3-Trichloropropane	74		75		68-130	1		30
Styrene	94		92		70-130	2		30
Dichlorodifluoromethane	62		58		30-146	7		30
Acetone	**154**	Q	**151**	Q	54-140	2		30
Carbon disulfide	90		84		59-130	7		30
2-Butanone	114		109		70-130	4		30
Vinyl acetate	100		97		70-130	3		30
4-Methyl-2-pentanone	85		80		70-130	6		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS-5035 - Westborough Lab Associated sample(s): 05 Batch: WG1105519-3 WG1105519-4								
2-Hexanone	79		81		70-130	3		30
Ethyl methacrylate	**68**	Q	**67**	Q	70-130	1		30
Acrolein	108		110		70-130	2		30
Acrylonitrile	104		106		70-130	2		30
Bromochloromethane	112		112		70-130	0		30
Tetrahydrofuran	108		110		66-130	2		30
2,2-Dichloropropane	87		82		70-130	6		30
1,2-Dibromoethane	90		90		70-130	0		30
1,3-Dichloropropane	81		80		69-130	1		30
1,1,1,2-Tetrachloroethane	90		88		70-130	2		30
Bromobenzene	87		88		70-130	1		30
n-Butylbenzene	77		75		70-130	3		30
sec-Butylbenzene	84		83		70-130	1		30
tert-Butylbenzene	84		82		70-130	2		30
1,3,5-Trichlorobenzene	96		96		70-139	0		30
o-Chlorotoluene	75		74		70-130	1		30
p-Chlorotoluene	74		75		70-130	1		30
1,2-Dibromo-3-chloropropane	82		84		68-130	2		30
Hexachlorobutadiene	82		81		67-130	1		30
Isopropylbenzene	81		79		70-130	3		30
p-Isopropyltoluene	87		84		70-130	4		30
Naphthalene	86		87		70-130	1		30
n-Propylbenzene	75		74		70-130	1		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS-5035 - Westborough Lab Associated sample(s): 05 Batch: WG1105519-3 WG1105519-4								
1,2,3-Trichlorobenzene	95		97		70-130	2		30
1,2,4-Trichlorobenzene	93		94		70-130	1		30
1,3,5-Trimethylbenzene	83		82		70-130	1		30
1,2,4-Trimethylbenzene	85		84		70-130	1		30
trans-1,4-Dichloro-2-butene	76		72		70-130	5		30
Ethyl ether	85		86		67-130	1		30
Methyl Acetate	100		98		65-130	2		30
Ethyl Acetate	94		92		70-130	2		30
Isopropyl Ether	101		101		66-130	0		30
Cyclohexane	105		98		70-130	7		30
Tert-Butyl Alcohol	87		87		70-130	0		30
Ethyl-Tert-Butyl-Ether	96		96		70-130	0		30
Tertiary-Amyl Methyl Ether	86		85		70-130	1		30
1,4-Dioxane	133		132		65-136	1		30
Methyl cyclohexane	90		82		70-130	9		30
1,1,2-Trichloro-1,2,2-Trifluoroethane	92		86		70-130	7		30

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	87		87		70-130
Toluene-d8	90		91		70-130
4-Bromofluorobenzene	82		81		70-130
Dibromofluoromethane	107		107		70-130

Lab Control Sample Analysis
Batch Quality Control

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01,03 Batch: WG1105890-3 WG1105890-4								
Methylene chloride	100		100		70-130	0		20
1,1-Dichloroethane	110		110		70-130	0		20
Chloroform	97		99		70-130	2		20
Carbon tetrachloride	86		89		63-132	3		20
1,2-Dichloropropane	110		110		70-130	0		20
Dibromochloromethane	91		92		63-130	1		20
1,1,2-Trichloroethane	110		110		70-130	0		20
2-Chloroethylvinyl ether	90		90		70-130	0		20
Tetrachloroethene	86		89		70-130	3		20
Chlorobenzene	96		98		75-130	2		25
Trichlorofluoromethane	91		96		62-150	5		20
1,2-Dichloroethane	100		100		70-130	0		20
1,1,1-Trichloroethane	91		95		67-130	4		20
Bromodichloromethane	93		94		67-130	1		20
trans-1,3-Dichloropropene	100		100		70-130	0		20
cis-1,3-Dichloropropene	99		100		70-130	1		20
1,1-Dichloropropene	97		100		70-130	3		20
Bromoform	87		87		54-136	0		20
1,1,2,2-Tetrachloroethane	110		110		67-130	0		20
Benzene	94		97		70-130	3		25
Toluene	98		100		70-130	2		25
Ethylbenzene	97		100		70-130	3		20
Chloromethane	120		130		64-130	8		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: BELFAST WATER DISTRICT

Project Number: 171.05027.003

Lab Number: L1812057

Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01,03 Batch: WG1105890-3 WG1105890-4								
Bromomethane	73		78		39-139	7		20
Vinyl chloride	110		120		55-140	9		20
Chloroethane	110		120		55-138	9		20
1,1-Dichloroethene	93		96		61-145	3		25
trans-1,2-Dichloroethene	94		99		70-130	5		20
Trichloroethene	88		91		70-130	3		25
1,2-Dichlorobenzene	93		96		70-130	3		20
1,3-Dichlorobenzene	94		96		70-130	2		20
1,4-Dichlorobenzene	94		96		70-130	2		20
Methyl tert butyl ether	100		100		63-130	0		20
p/m-Xylene	95		100		70-130	5		20
o-Xylene	95		100		70-130	5		20
cis-1,2-Dichloroethene	94		96		70-130	2		20
Dibromomethane	93		94		70-130	1		20
1,4-Dichlorobutane	120		120		70-130	0		20
Iodomethane	**37**	Q	**42**	Q	70-130	13		20
1,2,3-Trichloropropane	110		110		64-130	0		20
Styrene	125		130		70-130	4		20
Dichlorodifluoromethane	110		110		36-147	0		20
Acetone	96		100		58-148	4		20
Carbon disulfide	100		100		51-130	0		20
2-Butanone	120		120		63-138	0		20
Vinyl acetate	110		110		70-130	0		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: BELFAST WATER DISTRICT

Project Number: 171.05027.003

Lab Number: L1812057

Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01,03 Batch: WG1105890-3 WG1105890-4								
4-Methyl-2-pentanone	110		110		59-130	0		20
2-Hexanone	110		110		57-130	0		20
Ethyl methacrylate	94		93		70-130	1		20
Acrolein	**280**	Q	**280**	Q	70-130	0		20
Acrylonitrile	110		120		70-130	9		20
Bromochloromethane	90		91		70-130	1		20
Tetrahydrofuran	130		130		58-130	0		20
2,2-Dichloropropane	100		100		63-133	0		20
1,2-Dibromoethane	98		96		70-130	2		20
1,3-Dichloropropane	110		110		70-130	0		20
1,1,1,2-Tetrachloroethane	92		94		64-130	2		20
Bromobenzene	90		94		70-130	4		20
n-Butylbenzene	100		110		53-136	10		20
sec-Butylbenzene	99		100		70-130	1		20
tert-Butylbenzene	95		100		70-130	5		20
o-Chlorotoluene	100		100		70-130	0		20
p-Chlorotoluene	100		100		70-130	0		20
1,2-Dibromo-3-chloropropane	90		90		41-144	0		20
Hexachlorobutadiene	66		71		63-130	7		20
Isopropylbenzene	99		100		70-130	1		20
p-Isopropyltoluene	97		100		70-130	3		20
Naphthalene	91		91		70-130	0		20
n-Propylbenzene	100		110		69-130	10		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: BELFAST WATER DISTRICT

Project Number: 171.05027.003

Lab Number: L1812057

Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01,03 Batch: WG1105890-3 WG1105890-4								
1,2,3-Trichlorobenzene	80		82		70-130	2		20
1,2,4-Trichlorobenzene	81		83		70-130	2		20
1,3,5-Trimethylbenzene	99		100		64-130	1		20
1,3,5-Trichlorobenzene	83		85		70-130	2		20
1,2,4-Trimethylbenzene	90		95		70-130	5		20
trans-1,4-Dichloro-2-butene	110		100		70-130	10		20
Halothane	84		87		70-130	4		20
Ethyl ether	110		110		59-134	0		20
Methyl Acetate	**140**	Q	130		70-130	7		20
Ethyl Acetate	120		120		70-130	0		20
Isopropyl Ether	120		120		70-130	0		20
Cyclohexane	110		120		70-130	9		20
Tert-Butyl Alcohol	86		92		70-130	7		20
Ethyl-Tert-Butyl-Ether	110		110		70-130	0		20
Tertiary-Amyl Methyl Ether	99		100		66-130	1		20
1,4-Dioxane	**48**	Q	60		56-162	**22**	Q	20
1,1,2-Trichloro-1,2,2-Trifluoroethane	93		99		70-130	6		20
Methyl cyclohexane	94		100		70-130	6		20
p-Diethylbenzene	95		98		70-130	3		20
4-Ethyltoluene	100		100		70-130	0		20
1,2,4,5-Tetramethylbenzene	90		93		70-130	3		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: BELFAST WATER DISTRICT

Project Number: 171.05027.003

Lab Number: L1812057

Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01,03 Batch: WG1105890-3 WG1105890-4								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	103		102		70-130
Toluene-d8	102		102		70-130
4-Bromofluorobenzene	102		101		70-130
Dibromofluoromethane	93		94		70-130

SEMIVOLATILES

Project Name: BELFAST WATER DISTRICT
Lab Number: L1812057
Project Number: 171.05027.003
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-01
Client ID: GWW-101
Sample Location: BELFAST, ME

Sample Depth:
Matrix: Water
Analytical Method: 1,8270D
Analytical Date: 04/10/18 16:30
Analyst: EK

Date Collected: 04/05/18 08:15
Date Received: 04/06/18
Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Extraction Method: EPA 3510C
Extraction Date: 04/08/18 23:42

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
Benzidine	ND		ug/l	20	--	1
1,2,4-Trichlorobenzene	ND		ug/l	5.0	--	1
Bis(2-chloroethyl)ether	ND		ug/l	2.0	--	1
1,2-Dichlorobenzene	ND		ug/l	2.0	--	1
1,3-Dichlorobenzene	ND		ug/l	2.0	--	1
1,4-Dichlorobenzene	ND		ug/l	2.0	--	1
3,3'-Dichlorobenzidine	ND		ug/l	5.0	--	1
2,4-Dinitrotoluene	ND		ug/l	5.0	--	1
2,6-Dinitrotoluene	ND		ug/l	5.0	--	1
Azobenzene	ND		ug/l	2.0	--	1
4-Chlorophenyl phenyl ether	ND		ug/l	2.0	--	1
4-Bromophenyl phenyl ether	ND		ug/l	2.0	--	1
Bis(2-chloroisopropyl)ether	ND		ug/l	2.0	--	1
Bis(2-chloroethoxy)methane	ND		ug/l	5.0	--	1
Hexachlorocyclopentadiene	ND		ug/l	20	--	1
Isophorone	ND		ug/l	5.0	--	1
Nitrobenzene	ND		ug/l	2.0	--	1
NDPA/DPA	ND		ug/l	2.0	--	1
n-Nitrosodi-n-propylamine	ND		ug/l	5.0	--	1
Bis(2-ethylhexyl)phthalate	ND		ug/l	3.0	--	1
Butyl benzyl phthalate	ND		ug/l	5.0	--	1
Di-n-butylphthalate	ND		ug/l	5.0	--	1
Di-n-octylphthalate	ND		ug/l	5.0	--	1
Diethyl phthalate	ND		ug/l	5.0	--	1
Dimethyl phthalate	ND		ug/l	5.0	--	1
Biphenyl	ND		ug/l	2.0	--	1
Aniline	ND		ug/l	2.0	--	1
4-Chloroaniline	ND		ug/l	5.0	--	1

Project Name: BELFAST WATER DISTRICT **Lab Number:** L1812057

Project Number: 171.05027.003 **Report Date:** 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-01 Date Collected: 04/05/18 08:15

Client ID: GWW-101 Date Received: 04/06/18

Sample Location: BELFAST, ME Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
2-Nitroaniline	ND		ug/l	5.0	--	1
3-Nitroaniline	ND		ug/l	5.0	--	1
4-Nitroaniline	ND		ug/l	5.0	--	1
Dibenzofuran	ND		ug/l	2.0	--	1
n-Nitrosodimethylamine	ND		ug/l	2.0	--	1
2,4,6-Trichlorophenol	ND		ug/l	5.0	--	1
p-Chloro-m-cresol	ND		ug/l	2.0	--	1
2-Chlorophenol	ND		ug/l	2.0	--	1
2,4-Dichlorophenol	ND		ug/l	5.0	--	1
2,4-Dimethylphenol	ND		ug/l	5.0	--	1
2-Nitrophenol	ND		ug/l	10	--	1
4-Nitrophenol	ND		ug/l	10	--	1
2,4-Dinitrophenol	ND		ug/l	20	--	1
4,6-Dinitro-o-cresol	ND		ug/l	10	--	1
Phenol	ND		ug/l	5.0	--	1
2-Methylphenol	ND		ug/l	5.0	--	1
3-Methylphenol/4-Methylphenol	ND		ug/l	5.0	--	1
2,4,5-Trichlorophenol	ND		ug/l	5.0	--	1
Benzoic Acid	ND		ug/l	50	--	1
Benzyl Alcohol	ND		ug/l	2.0	--	1
Carbazole	ND		ug/l	2.0	--	1
Pyridine	ND		ug/l	3.5	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	68		21-120
Phenol-d6	47		10-120
Nitrobenzene-d5	84		23-120
2-Fluorobiphenyl	85		15-120
2,4,6-Tribromophenol	97		10-120
4-Terphenyl-d14	91		41-149

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-01
Client ID: GWW-101
Sample Location: BELFAST, ME

Sample Depth:
Matrix: Water
Analytical Method: 1,8270D-SIM
Analytical Date: 04/10/18 17:23
Analyst: CB

Date Collected: 04/05/18 08:15
Date Received: 04/06/18
Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Extraction Method: EPA 3510C
Extraction Date: 04/09/18 07:16

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS-SIM - Westborough Lab						
Acenaphthene	ND		ug/l	0.10	--	1
2-Chloronaphthalene	ND		ug/l	0.20	--	1
Fluoranthene	ND		ug/l	0.10	--	1
Hexachlorobutadiene	ND		ug/l	0.50	--	1
Naphthalene	ND		ug/l	0.10	--	1
Benzo(a)anthracene	ND		ug/l	0.10	--	1
Benzo(a)pyrene	ND		ug/l	0.10	--	1
Benzo(b)fluoranthene	ND		ug/l	0.10	--	1
Benzo(k)fluoranthene	ND		ug/l	0.10	--	1
Chrysene	ND		ug/l	0.10	--	1
Acenaphthylene	ND		ug/l	0.10	--	1
Anthracene	ND		ug/l	0.10	--	1
Benzo(ghi)perylene	ND		ug/l	0.10	--	1
Fluorene	ND		ug/l	0.10	--	1
Phenanthrene	ND		ug/l	0.10	--	1
Dibenzo(a,h)anthracene	ND		ug/l	0.10	--	1
Indeno(1,2,3-cd)pyrene	ND		ug/l	0.10	--	1
Pyrene	ND		ug/l	0.10	--	1
1-Methylnaphthalene	ND		ug/l	0.10	--	1
2-Methylnaphthalene	0.13		ug/l	0.10	--	1
Pentachlorophenol	ND		ug/l	0.80	--	1
Hexachlorobenzene	ND		ug/l	0.80	--	1
Hexachloroethane	ND		ug/l	0.80	--	1

Project Name: BELFAST WATER DISTRICT **Lab Number:** L1812057

Project Number: 171.05027.003 **Report Date:** 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-01
Client ID: GWW-101
Sample Location: BELFAST, ME

Date Collected: 04/05/18 08:15
Date Received: 04/06/18
Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS-SIM - Westborough Lab						

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	57		21-120
Phenol-d6	40		10-120
Nitrobenzene-d5	77		23-120
2-Fluorobiphenyl	89		15-120
2,4,6-Tribromophenol	73		10-120
4-Terphenyl-d14	96		41-149

Project Name: BELFAST WATER DISTRICT
Lab Number: L1812057
Project Number: 171.05027.003
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-03
Client ID: GWW-103
Sample Location: BELFAST, ME

Sample Depth:
Matrix: Water
Analytical Method: 1,8270D
Analytical Date: 04/10/18 18:39
Analyst: EK

Date Collected: 04/05/18 08:45
Date Received: 04/06/18
Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Extraction Method: EPA 3510C
Extraction Date: 04/08/18 23:42

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
Benzidine	ND		ug/l	20	--	1
1,2,4-Trichlorobenzene	ND		ug/l	5.0	--	1
Bis(2-chloroethyl)ether	ND		ug/l	2.0	--	1
1,2-Dichlorobenzene	ND		ug/l	2.0	--	1
1,3-Dichlorobenzene	ND		ug/l	2.0	--	1
1,4-Dichlorobenzene	ND		ug/l	2.0	--	1
3,3'-Dichlorobenzidine	ND		ug/l	5.0	--	1
2,4-Dinitrotoluene	ND		ug/l	5.0	--	1
2,6-Dinitrotoluene	ND		ug/l	5.0	--	1
Azobenzene	ND		ug/l	2.0	--	1
4-Chlorophenyl phenyl ether	ND		ug/l	2.0	--	1
4-Bromophenyl phenyl ether	ND		ug/l	2.0	--	1
Bis(2-chloroisopropyl)ether	ND		ug/l	2.0	--	1
Bis(2-chloroethoxy)methane	ND		ug/l	5.0	--	1
Hexachlorocyclopentadiene	ND		ug/l	20	--	1
Isophorone	ND		ug/l	5.0	--	1
Nitrobenzene	ND		ug/l	2.0	--	1
NDPA/DPA	ND		ug/l	2.0	--	1
n-Nitrosodi-n-propylamine	ND		ug/l	5.0	--	1
Bis(2-ethylhexyl)phthalate	ND		ug/l	3.0	--	1
Butyl benzyl phthalate	ND		ug/l	5.0	--	1
Di-n-butylphthalate	ND		ug/l	5.0	--	1
Di-n-octylphthalate	ND		ug/l	5.0	--	1
Diethyl phthalate	ND		ug/l	5.0	--	1
Dimethyl phthalate	ND		ug/l	5.0	--	1
Biphenyl	ND		ug/l	2.0	--	1
Aniline	ND		ug/l	2.0	--	1
4-Chloroaniline	ND		ug/l	5.0	--	1

Project Name: BELFAST WATER DISTRICT **Lab Number:** L1812057

Project Number: 171.05027.003 **Report Date:** 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-03 Date Collected: 04/05/18 08:45

Client ID: GWW-103 Date Received: 04/06/18

Sample Location: BELFAST, ME Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
2-Nitroaniline	ND		ug/l	5.0	--	1
3-Nitroaniline	ND		ug/l	5.0	--	1
4-Nitroaniline	ND		ug/l	5.0	--	1
Dibenzofuran	ND		ug/l	2.0	--	1
n-Nitrosodimethylamine	ND		ug/l	2.0	--	1
2,4,6-Trichlorophenol	ND		ug/l	5.0	--	1
p-Chloro-m-cresol	ND		ug/l	2.0	--	1
2-Chlorophenol	ND		ug/l	2.0	--	1
2,4-Dichlorophenol	ND		ug/l	5.0	--	1
2,4-Dimethylphenol	ND		ug/l	5.0	--	1
2-Nitrophenol	ND		ug/l	10	--	1
4-Nitrophenol	ND		ug/l	10	--	1
2,4-Dinitrophenol	ND		ug/l	20	--	1
4,6-Dinitro-o-cresol	ND		ug/l	10	--	1
Phenol	ND		ug/l	5.0	--	1
2-Methylphenol	ND		ug/l	5.0	--	1
3-Methylphenol/4-Methylphenol	ND		ug/l	5.0	--	1
2,4,5-Trichlorophenol	ND		ug/l	5.0	--	1
Benzoic Acid	ND		ug/l	50	--	1
Benzyl Alcohol	ND		ug/l	2.0	--	1
Carbazole	ND		ug/l	2.0	--	1
Pyridine	ND		ug/l	3.5	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	67		21-120
Phenol-d6	48		10-120
Nitrobenzene-d5	90		23-120
2-Fluorobiphenyl	86		15-120
2,4,6-Tribromophenol	97		10-120
4-Terphenyl-d14	91		41-149

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-03
Client ID: GWW-103
Sample Location: BELFAST, ME

Sample Depth:
Matrix: Water
Analytical Method: 1,8270D-SIM
Analytical Date: 04/10/18 17:48
Analyst: CB

Date Collected: 04/05/18 08:45
Date Received: 04/06/18
Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Extraction Method: EPA 3510C
Extraction Date: 04/09/18 07:16

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS-SIM - Westborough Lab						
Acenaphthene	ND		ug/l	0.10	--	1
2-Chloronaphthalene	ND		ug/l	0.20	--	1
Fluoranthene	ND		ug/l	0.10	--	1
Hexachlorobutadiene	ND		ug/l	0.50	--	1
Naphthalene	ND		ug/l	0.10	--	1
Benzo(a)anthracene	ND		ug/l	0.10	--	1
Benzo(a)pyrene	ND		ug/l	0.10	--	1
Benzo(b)fluoranthene	ND		ug/l	0.10	--	1
Benzo(k)fluoranthene	ND		ug/l	0.10	--	1
Chrysene	ND		ug/l	0.10	--	1
Acenaphthylene	ND		ug/l	0.10	--	1
Anthracene	ND		ug/l	0.10	--	1
Benzo(ghi)perylene	ND		ug/l	0.10	--	1
Fluorene	ND		ug/l	0.10	--	1
Phenanthrene	ND		ug/l	0.10	--	1
Dibenzo(a,h)anthracene	ND		ug/l	0.10	--	1
Indeno(1,2,3-cd)pyrene	ND		ug/l	0.10	--	1
Pyrene	ND		ug/l	0.10	--	1
1-Methylnaphthalene	ND		ug/l	0.10	--	1
2-Methylnaphthalene	ND		ug/l	0.10	--	1
Pentachlorophenol	ND		ug/l	0.80	--	1
Hexachlorobenzene	ND		ug/l	0.80	--	1
Hexachloroethane	ND		ug/l	0.80	--	1

Project Name: BELFAST WATER DISTRICT **Lab Number:** L1812057

Project Number: 171.05027.003 **Report Date:** 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-03 Date Collected: 04/05/18 08:45

Client ID: GWW-103 Date Received: 04/06/18

Sample Location: BELFAST, ME Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS-SIM - Westborough Lab						

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	54		21-120
Phenol-d6	42		10-120
Nitrobenzene-d5	78		23-120
2-Fluorobiphenyl	81		15-120
2,4,6-Tribromophenol	64		10-120
4-Terphenyl-d14	121		41-149

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-05
Client ID: SS-1
Sample Location: BELFAST, ME

Date Collected: 04/05/18 09:15
Date Received: 04/06/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8270D
Analytical Date: 04/12/18 02:11
Analyst: CB
Percent Solids: 78%

Extraction Method: EPA 3546
Extraction Date: 04/08/18 01:29

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
Acenaphthene	ND		ug/kg	170	--	1
Benzidine	ND		ug/kg	700	--	1
1,2,4-Trichlorobenzene	ND		ug/kg	210	--	1
Hexachlorobenzene	ND		ug/kg	130	--	1
Bis(2-chloroethyl)ether	ND		ug/kg	190	--	1
2-Chloronaphthalene	ND		ug/kg	210	--	1
1,2-Dichlorobenzene	ND		ug/kg	210	--	1
1,3-Dichlorobenzene	ND		ug/kg	210	--	1
1,4-Dichlorobenzene	ND		ug/kg	210	--	1
3,3'-Dichlorobenzidine	ND		ug/kg	210	--	1
2,4-Dinitrotoluene	ND		ug/kg	210	--	1
2,6-Dinitrotoluene	ND		ug/kg	210	--	1
Azobenzene	ND		ug/kg	210	--	1
Fluoranthene	330		ug/kg	130	--	1
4-Chlorophenyl phenyl ether	ND		ug/kg	210	--	1
4-Bromophenyl phenyl ether	ND		ug/kg	210	--	1
Bis(2-chloroisopropyl)ether	ND		ug/kg	260	--	1
Bis(2-chloroethoxy)methane	ND		ug/kg	230	--	1
Hexachlorobutadiene	ND		ug/kg	210	--	1
Hexachlorocyclopentadiene	ND		ug/kg	610	--	1
Hexachloroethane	ND		ug/kg	170	--	1
Isophorone	ND		ug/kg	190	--	1
Naphthalene	ND		ug/kg	210	--	1
Nitrobenzene	ND		ug/kg	190	--	1
NDPA/DPA	ND		ug/kg	170	--	1
n-Nitrosodi-n-propylamine	ND		ug/kg	210	--	1
Bis(2-ethylhexyl)phthalate	ND		ug/kg	210	--	1
Butyl benzyl phthalate	ND		ug/kg	210	--	1

Project Name: BELFAST WATER DISTRICT **Lab Number:** L1812057

Project Number: 171.05027.003 **Report Date:** 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-05 Date Collected: 04/05/18 09:15

Client ID: SS-1 Date Received: 04/06/18

Sample Location: BELFAST, ME Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
Di-n-butylphthalate	ND		ug/kg	210	--	1
Di-n-octylphthalate	ND		ug/kg	210	--	1
Diethyl phthalate	ND		ug/kg	210	--	1
Dimethyl phthalate	ND		ug/kg	210	--	1
Benzo(a)anthracene	240		ug/kg	130	--	1
Benzo(a)pyrene	230		ug/kg	170	--	1
Benzo(b)fluoranthene	340		ug/kg	130	--	1
Benzo(k)fluoranthene	ND		ug/kg	130	--	1
Chrysene	250		ug/kg	130	--	1
Acenaphthylene	ND		ug/kg	170	--	1
Anthracene	ND		ug/kg	130	--	1
Benzo(ghi)perylene	ND		ug/kg	170	--	1
Fluorene	ND		ug/kg	210	--	1
Phenanthrene	ND		ug/kg	130	--	1
Dibenzo(a,h)anthracene	ND		ug/kg	130	--	1
Indeno(1,2,3-cd)pyrene	ND		ug/kg	170	--	1
Pyrene	320		ug/kg	130	--	1
Aniline	ND		ug/kg	260	--	1
4-Chloroaniline	ND		ug/kg	210	--	1
1-Methylnaphthalene	ND		ug/kg	210	--	1
2-Nitroaniline	ND		ug/kg	210	--	1
3-Nitroaniline	ND		ug/kg	210	--	1
4-Nitroaniline	ND		ug/kg	210	--	1
Dibenzofuran	ND		ug/kg	210	--	1
2-Methylnaphthalene	ND		ug/kg	260	--	1
n-Nitrosodimethylamine	ND		ug/kg	430	--	1
2,4,6-Trichlorophenol	ND		ug/kg	130	--	1
p-Chloro-m-cresol	ND		ug/kg	210	--	1
2-Chlorophenol	ND		ug/kg	210	--	1
2,4-Dichlorophenol	ND		ug/kg	190	--	1
2,4-Dimethylphenol	ND		ug/kg	210	--	1
2-Nitrophenol	ND		ug/kg	460	--	1
4-Nitrophenol	ND		ug/kg	300	--	1
2,4-Dinitrophenol	ND		ug/kg	1000	--	1
4,6-Dinitro-o-cresol	ND		ug/kg	550	--	1
Pentachlorophenol	ND		ug/kg	170	--	1
Phenol	ND		ug/kg	210	--	1

Project Name: BELFAST WATER DISTRICT **Lab Number:** L1812057

Project Number: 171.05027.003 **Report Date:** 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-05 Date Collected: 04/05/18 09:15

Client ID: SS-1 Date Received: 04/06/18

Sample Location: BELFAST, ME Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
2-Methylphenol	ND		ug/kg	210	--	1
3-Methylphenol/4-Methylphenol	ND		ug/kg	310	--	1
2,4,5-Trichlorophenol	ND		ug/kg	210	--	1
Benzoic Acid	ND		ug/kg	690	--	1
Benzyl Alcohol	ND		ug/kg	210	--	1
Carbazole	ND		ug/kg	210	--	1
Pyridine	ND		ug/kg	230	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	36		25-120
Phenol-d6	50		10-120
Nitrobenzene-d5	99		23-120
2-Fluorobiphenyl	84		30-120
2,4,6-Tribromophenol	88		10-136
4-Terphenyl-d14	71		18-120

Project Name: BELFAST WATER DISTRICT
Lab Number: L1812057
Project Number: 171.05027.003
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-06
Client ID: SS-2
Sample Location: BELFAST, ME

Date Collected: 04/05/18 11:30
Date Received: 04/06/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8270D
Analytical Date: 04/12/18 08:44
Analyst: TT
Percent Solids: 73%

Extraction Method: EPA 3546
Extraction Date: 04/11/18 14:53

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
Acenaphthene	12000	E	ug/kg	180	--	1
2-Chloronaphthalene	ND		ug/kg	220	--	1
Fluoranthene	78000	E	ug/kg	140	--	1
Naphthalene	9900	E	ug/kg	220	--	1
Benzo(a)anthracene	57000	E	ug/kg	140	--	1
Benzo(a)pyrene	48000	E	ug/kg	180	--	1
Benzo(b)fluoranthene	76000	E	ug/kg	140	--	1
Benzo(k)fluoranthene	11000	E	ug/kg	140	--	1
Chrysene	34000	E	ug/kg	140	--	1
Acenaphthylene	1100		ug/kg	180	--	1
Anthracene	22000	E	ug/kg	140	--	1
Benzo(ghi)perylene	28000	E	ug/kg	180	--	1
Fluorene	15000	E	ug/kg	220	--	1
Phenanthrene	66000	E	ug/kg	140	--	1
Dibenzo(a,h)anthracene	6300		ug/kg	140	--	1
Indeno(1,2,3-cd)pyrene	35000	E	ug/kg	180	--	1
Pyrene	61000	E	ug/kg	140	--	1
1-Methylnaphthalene	3200		ug/kg	220	--	1
2-Methylnaphthalene	4100		ug/kg	270	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Nitrobenzene-d5	95		23-120
2-Fluorobiphenyl	72		30-120
4-Terphenyl-d14	56		18-120

Project Name: BELFAST WATER DISTRICT
Lab Number: L1812057
Project Number: 171.05027.003
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-06 D
Client ID: SS-2
Sample Location: BELFAST, ME

Date Collected: 04/05/18 11:30
Date Received: 04/06/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8270D
Analytical Date: 04/13/18 04:51
Analyst: PS
Percent Solids: 73%

Extraction Method: EPA 3546
Extraction Date: 04/11/18 14:53

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
Acenaphthene	10000		ug/kg	3600	--	20
Fluoranthene	90000		ug/kg	2700	--	20
Naphthalene	8200		ug/kg	4500	--	20
Benzo(a)anthracene	45000		ug/kg	2700	--	20
Benzo(a)pyrene	35000		ug/kg	3600	--	20
Benzo(b)fluoranthene	50000		ug/kg	2700	--	20
Benzo(k)fluoranthene	15000		ug/kg	2700	--	20
Chrysene	41000		ug/kg	2700	--	20
Anthracene	23000		ug/kg	2700	--	20
Benzo(ghi)perylene	20000		ug/kg	3600	--	20
Fluorene	14000		ug/kg	4500	--	20
Phenanthrene	82000		ug/kg	2700	--	20
Indeno(1,2,3-cd)pyrene	24000		ug/kg	3600	--	20
Pyrene	70000		ug/kg	2700	--	20

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D
Analytical Date: 04/10/18 15:07
Analyst: CB

Extraction Method: EPA 3546
Extraction Date: 04/08/18 01:14

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 05 Batch: WG1104559-1					
Acenaphthene	ND		ug/kg	130	--
Benzidine	ND		ug/kg	540	--
1,2,4-Trichlorobenzene	ND		ug/kg	160	--
Hexachlorobenzene	ND		ug/kg	98	--
Bis(2-chloroethyl)ether	ND		ug/kg	150	--
2-Chloronaphthalene	ND		ug/kg	160	--
1,2-Dichlorobenzene	ND		ug/kg	160	--
1,3-Dichlorobenzene	ND		ug/kg	160	--
1,4-Dichlorobenzene	ND		ug/kg	160	--
3,3'-Dichlorobenzidine	ND		ug/kg	160	--
2,4-Dinitrotoluene	ND		ug/kg	160	--
2,6-Dinitrotoluene	ND		ug/kg	160	--
Azobenzene	ND		ug/kg	160	--
Fluoranthene	ND		ug/kg	98	--
4-Chlorophenyl phenyl ether	ND		ug/kg	160	--
4-Bromophenyl phenyl ether	ND		ug/kg	160	--
Bis(2-chloroisopropyl)ether	ND		ug/kg	200	--
Bis(2-chloroethoxy)methane	ND		ug/kg	180	--
Hexachlorobutadiene	ND		ug/kg	160	--
Hexachlorocyclopentadiene	ND		ug/kg	470	--
Hexachloroethane	ND		ug/kg	130	--
Isophorone	ND		ug/kg	150	--
Naphthalene	ND		ug/kg	160	--
Nitrobenzene	ND		ug/kg	150	--
NDPA/DPA	ND		ug/kg	130	--
n-Nitrosodi-n-propylamine	ND		ug/kg	160	--
Bis(2-ethylhexyl)phthalate	ND		ug/kg	160	--
Butyl benzyl phthalate	ND		ug/kg	160	--
Di-n-butylphthalate	ND		ug/kg	160	--

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D
Analytical Date: 04/10/18 15:07
Analyst: CB

Extraction Method: EPA 3546
Extraction Date: 04/08/18 01:14

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 05 Batch: WG1104559-1					
Di-n-octylphthalate	ND		ug/kg	160	--
Diethyl phthalate	ND		ug/kg	160	--
Dimethyl phthalate	ND		ug/kg	160	--
Benzo(a)anthracene	ND		ug/kg	98	--
Benzo(a)pyrene	ND		ug/kg	130	--
Benzo(b)fluoranthene	ND		ug/kg	98	--
Benzo(k)fluoranthene	ND		ug/kg	98	--
Chrysene	ND		ug/kg	98	--
Acenaphthylene	ND		ug/kg	130	--
Anthracene	ND		ug/kg	98	--
Benzo(ghi)perylene	ND		ug/kg	130	--
Fluorene	ND		ug/kg	160	--
Phenanthrene	ND		ug/kg	98	--
Dibenzo(a,h)anthracene	ND		ug/kg	98	--
Indeno(1,2,3-cd)pyrene	ND		ug/kg	130	--
Pyrene	ND		ug/kg	98	--
Biphenyl	ND		ug/kg	370	--
Aniline	ND		ug/kg	200	--
4-Chloroaniline	ND		ug/kg	160	--
1-Methylnaphthalene	ND		ug/kg	160	--
2-Nitroaniline	ND		ug/kg	160	--
3-Nitroaniline	ND		ug/kg	160	--
4-Nitroaniline	ND		ug/kg	160	--
Dibenzofuran	ND		ug/kg	160	--
2-Methylnaphthalene	ND		ug/kg	200	--
n-Nitrosodimethylamine	ND		ug/kg	330	--
2,4,6-Trichlorophenol	ND		ug/kg	98	--
p-Chloro-m-cresol	ND		ug/kg	160	--
2-Chlorophenol	ND		ug/kg	160	--

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D
Analytical Date: 04/10/18 15:07
Analyst: CB

Extraction Method: EPA 3546
Extraction Date: 04/08/18 01:14

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 05 Batch: WG1104559-1					
2,4-Dichlorophenol	ND		ug/kg	150	--
2,4-Dimethylphenol	ND		ug/kg	160	--
2-Nitrophenol	ND		ug/kg	350	--
4-Nitrophenol	ND		ug/kg	230	--
2,4-Dinitrophenol	ND		ug/kg	780	--
4,6-Dinitro-o-cresol	ND		ug/kg	420	--
Pentachlorophenol	ND		ug/kg	130	--
Phenol	ND		ug/kg	160	--
2-Methylphenol	ND		ug/kg	160	--
3-Methylphenol/4-Methylphenol	ND		ug/kg	240	--
2,4,5-Trichlorophenol	ND		ug/kg	160	--
Benzoic Acid	ND		ug/kg	530	--
Benzyl Alcohol	ND		ug/kg	160	--
Carbazole	ND		ug/kg	160	--
Pyridine	ND		ug/kg	180	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	96		25-120
Phenol-d6	105		10-120
Nitrobenzene-d5	87		23-120
2-Fluorobiphenyl	86		30-120
2,4,6-Tribromophenol	100		10-136
4-Terphenyl-d14	93		18-120

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D
Analytical Date: 04/10/18 15:12
Analyst: EK

Extraction Method: EPA 3510C
Extraction Date: 04/08/18 23:42

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01,03 Batch: WG1104633-1					
Acenaphthene	ND		ug/l	2.0	--
Benzidine	ND		ug/l	20	--
1,2,4-Trichlorobenzene	ND		ug/l	5.0	--
Hexachlorobenzene	ND		ug/l	2.0	--
Bis(2-chloroethyl)ether	ND		ug/l	2.0	--
2-Chloronaphthalene	ND		ug/l	2.0	--
1,2-Dichlorobenzene	ND		ug/l	2.0	--
1,3-Dichlorobenzene	ND		ug/l	2.0	--
1,4-Dichlorobenzene	ND		ug/l	2.0	--
3,3'-Dichlorobenzidine	ND		ug/l	5.0	--
2,4-Dinitrotoluene	ND		ug/l	5.0	--
2,6-Dinitrotoluene	ND		ug/l	5.0	--
Azobenzene	ND		ug/l	2.0	--
Fluoranthene	ND		ug/l	2.0	--
4-Chlorophenyl phenyl ether	ND		ug/l	2.0	--
4-Bromophenyl phenyl ether	ND		ug/l	2.0	--
Bis(2-chloroisopropyl)ether	ND		ug/l	2.0	--
Bis(2-chloroethoxy)methane	ND		ug/l	5.0	--
Hexachlorobutadiene	ND		ug/l	2.0	--
Hexachlorocyclopentadiene	ND		ug/l	20	--
Hexachloroethane	ND		ug/l	2.0	--
Isophorone	ND		ug/l	5.0	--
Naphthalene	ND		ug/l	2.0	--
Nitrobenzene	ND		ug/l	2.0	--
NDPA/DPA	ND		ug/l	2.0	--
n-Nitrosodi-n-propylamine	ND		ug/l	5.0	--
Bis(2-ethylhexyl)phthalate	ND		ug/l	3.0	--
Butyl benzyl phthalate	ND		ug/l	5.0	--
Di-n-butylphthalate	ND		ug/l	5.0	--

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D
Analytical Date: 04/10/18 15:12
Analyst: EK

Extraction Method: EPA 3510C
Extraction Date: 04/08/18 23:42

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01,03 Batch: WG1104633-1					
Di-n-octylphthalate	ND		ug/l	5.0	--
Diethyl phthalate	ND		ug/l	5.0	--
Dimethyl phthalate	ND		ug/l	5.0	--
Benzo(a)anthracene	ND		ug/l	2.0	--
Benzo(a)pyrene	ND		ug/l	2.0	--
Benzo(b)fluoranthene	ND		ug/l	2.0	--
Benzo(k)fluoranthene	ND		ug/l	2.0	--
Chrysene	ND		ug/l	2.0	--
Acenaphthylene	ND		ug/l	2.0	--
Anthracene	ND		ug/l	2.0	--
Benzo(ghi)perylene	ND		ug/l	2.0	--
Fluorene	ND		ug/l	2.0	--
Phenanthrene	ND		ug/l	2.0	--
Dibenzo(a,h)anthracene	ND		ug/l	2.0	--
Indeno(1,2,3-cd)pyrene	ND		ug/l	2.0	--
Pyrene	ND		ug/l	2.0	--
Biphenyl	ND		ug/l	2.0	--
Aniline	ND		ug/l	2.0	--
4-Chloroaniline	ND		ug/l	5.0	--
1-Methylnaphthalene	ND		ug/l	2.0	--
2-Nitroaniline	ND		ug/l	5.0	--
3-Nitroaniline	ND		ug/l	5.0	--
4-Nitroaniline	ND		ug/l	5.0	--
Dibenzofuran	ND		ug/l	2.0	--
2-Methylnaphthalene	ND		ug/l	2.0	--
n-Nitrosodimethylamine	ND		ug/l	2.0	--
2,4,6-Trichlorophenol	ND		ug/l	5.0	--
p-Chloro-m-cresol	ND		ug/l	2.0	--
2-Chlorophenol	ND		ug/l	2.0	--

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D
Analytical Date: 04/10/18 15:12
Analyst: EK

Extraction Method: EPA 3510C
Extraction Date: 04/08/18 23:42

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01,03 Batch: WG1104633-1					
2,4-Dichlorophenol	ND		ug/l	5.0	--
2,4-Dimethylphenol	ND		ug/l	5.0	--
2-Nitrophenol	ND		ug/l	10	--
4-Nitrophenol	ND		ug/l	10	--
2,4-Dinitrophenol	ND		ug/l	20	--
4,6-Dinitro-o-cresol	ND		ug/l	10	--
Pentachlorophenol	ND		ug/l	10	--
Phenol	ND		ug/l	5.0	--
2-Methylphenol	ND		ug/l	5.0	--
3-Methylphenol/4-Methylphenol	ND		ug/l	5.0	--
2,4,5-Trichlorophenol	ND		ug/l	5.0	--
Benzoic Acid	ND		ug/l	50	--
Benzyl Alcohol	ND		ug/l	2.0	--
Carbazole	ND		ug/l	2.0	--
Pyridine	ND		ug/l	3.5	--
Tentatively Identified Compounds					
No Tentatively Identified Compounds	ND		ug/l		

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D
Analytical Date: 04/10/18 15:12
Analyst: EK

Extraction Method: EPA 3510C
Extraction Date: 04/08/18 23:42

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01,03 Batch: WG1104633-1					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	54		21-120
Phenol-d6	40		10-120
Nitrobenzene-d5	68		23-120
2-Fluorobiphenyl	72		15-120
2,4,6-Tribromophenol	83		10-120
4-Terphenyl-d14	84		41-149

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D-SIM
Analytical Date: 04/10/18 09:56
Analyst: CB

Extraction Method: EPA 3510C
Extraction Date: 04/08/18 23:49

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01,03 Batch: WG1104635-1					
Acenaphthene	ND		ug/l	0.10	--
2-Chloronaphthalene	ND		ug/l	0.20	--
Fluoranthene	ND		ug/l	0.10	--
Hexachlorobutadiene	ND		ug/l	0.50	--
Naphthalene	ND		ug/l	0.10	--
Benzo(a)anthracene	ND		ug/l	0.10	--
Benzo(a)pyrene	ND		ug/l	0.10	--
Benzo(b)fluoranthene	ND		ug/l	0.10	--
Benzo(k)fluoranthene	ND		ug/l	0.10	--
Chrysene	ND		ug/l	0.10	--
Acenaphthylene	ND		ug/l	0.10	--
Anthracene	ND		ug/l	0.10	--
Benzo(ghi)perylene	ND		ug/l	0.10	--
Fluorene	ND		ug/l	0.10	--
Phenanthrene	ND		ug/l	0.10	--
Dibenzo(a,h)anthracene	ND		ug/l	0.10	--
Indeno(1,2,3-cd)pyrene	ND		ug/l	0.10	--
Pyrene	ND		ug/l	0.10	--
1-Methylnaphthalene	ND		ug/l	0.10	--
2-Methylnaphthalene	ND		ug/l	0.10	--
Pentachlorophenol	ND		ug/l	0.80	--
Hexachlorobenzene	ND		ug/l	0.80	--
Hexachloroethane	ND		ug/l	0.80	--

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D-SIM
Analytical Date: 04/10/18 09:56
Analyst: CB

Extraction Method: EPA 3510C
Extraction Date: 04/08/18 23:49

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01,03 Batch: WG1104635-1					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	45		21-120
Phenol-d6	35		10-120
Nitrobenzene-d5	64		23-120
2-Fluorobiphenyl	68		15-120
2,4,6-Tribromophenol	64		10-120
4-Terphenyl-d14	82		41-149

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D
Analytical Date: 04/11/18 22:56
Analyst: TT

Extraction Method: EPA 3546
Extraction Date: 04/10/18 17:49

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 06 Batch: WG1105283-1					
Acenaphthene	ND		ug/kg	130	--
2-Chloronaphthalene	ND		ug/kg	160	--
Fluoranthene	ND		ug/kg	97	--
Naphthalene	ND		ug/kg	160	--
Benzo(a)anthracene	ND		ug/kg	97	--
Benzo(a)pyrene	ND		ug/kg	130	--
Benzo(b)fluoranthene	ND		ug/kg	97	--
Benzo(k)fluoranthene	ND		ug/kg	97	--
Chrysene	ND		ug/kg	97	--
Acenaphthylene	ND		ug/kg	130	--
Anthracene	ND		ug/kg	97	--
Benzo(ghi)perylene	ND		ug/kg	130	--
Fluorene	ND		ug/kg	160	--
Phenanthrene	ND		ug/kg	97	--
Dibenzo(a,h)anthracene	ND		ug/kg	97	--
Indeno(1,2,3-cd)pyrene	ND		ug/kg	130	--
Pyrene	ND		ug/kg	97	--
1-Methylnaphthalene	ND		ug/kg	160	--
2-Methylnaphthalene	ND		ug/kg	190	--
Tentatively Identified Compounds					
No Tentatively Identified Compounds	ND		ug/kg		

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D
Analytical Date: 04/11/18 22:56
Analyst: TT

Extraction Method: EPA 3546
Extraction Date: 04/10/18 17:49

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 06 Batch: WG1105283-1					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Nitrobenzene-d5	72		23-120
2-Fluorobiphenyl	71		30-120
4-Terphenyl-d14	76		18-120

Lab Control Sample Analysis
Batch Quality Control

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 05 Batch: WG1104559-2 WG1104559-3								
Acenaphthene	96		99		31-137	3		50
Benzidine	21		23		10-66	9		50
1,2,4-Trichlorobenzene	96		97		38-107	1		50
Hexachlorobenzene	96		102		40-140	6		50
Bis(2-chloroethyl)ether	88		94		40-140	7		50
2-Chloronaphthalene	99		102		40-140	3		50
1,2-Dichlorobenzene	91		94		40-140	3		50
1,3-Dichlorobenzene	91		94		40-140	3		50
1,4-Dichlorobenzene	91		94		28-104	3		50
3,3'-Dichlorobenzidine	61		70		40-140	14		50
2,4-Dinitrotoluene	104		109		40-132	5		50
2,6-Dinitrotoluene	108		106		40-140	2		50
Azobenzene	122		130		40-140	6		50
Fluoranthene	100		104		40-140	4		50
4-Chlorophenyl phenyl ether	94		100		40-140	6		50
4-Bromophenyl phenyl ether	99		103		40-140	4		50
Bis(2-chloroisopropyl)ether	105		106		40-140	1		50
Bis(2-chloroethoxy)methane	99		96		40-117	3		50
Hexachlorobutadiene	101		108		40-140	7		50
Hexachlorocyclopentadiene	81		77		40-140	5		50
Hexachloroethane	102		105		40-140	3		50
Isophorone	99		98		40-140	1		50
Naphthalene	96		94		40-140	2		50

Lab Control Sample Analysis

Batch Quality Control

Project Name: BELFAST WATER DISTRICT

Project Number: 171.05027.003

Lab Number: L1812057

Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 05 Batch: WG1104559-2 WG1104559-3								
Nitrobenzene	102		102		40-140	0		50
NDPA/DPA	100		105		36-157	5		50
n-Nitrosodi-n-propylamine	103		103		32-121	0		50
Bis(2-ethylhexyl)phthalate	112		120		40-140	7		50
Butyl benzyl phthalate	112		119		40-140	6		50
Di-n-butylphthalate	108		112		40-140	4		50
Di-n-octylphthalate	109		117		40-140	7		50
Diethyl phthalate	104		108		40-140	4		50
Dimethyl phthalate	103		100		40-140	3		50
Benzo(a)anthracene	100		107		40-140	7		50
Benzo(a)pyrene	103		111		40-140	7		50
Benzo(b)fluoranthene	103		110		40-140	7		50
Benzo(k)fluoranthene	99		109		40-140	10		50
Chrysene	100		105		40-140	5		50
Acenaphthylene	102		102		40-140	0		50
Anthracene	100		103		40-140	3		50
Benzo(ghi)perylene	103		110		40-140	7		50
Fluorene	100		103		40-140	3		50
Phenanthrene	100		103		40-140	3		50
Dibenzo(a,h)anthracene	101		107		40-140	6		50
Indeno(1,2,3-cd)pyrene	106		113		40-140	6		50
Pyrene	98		101		35-142	3		50
Biphenyl	100		102		54-104	2		50

Lab Control Sample Analysis

Batch Quality Control

Project Name: BELFAST WATER DISTRICT

Project Number: 171.05027.003

Lab Number: L1812057

Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 05 Batch: WG1104559-2 WG1104559-3								
Aniline	56		56		40-140	0		50
4-Chloroaniline	104		99		40-140	5		50
1-Methylnaphthalene	108		107		26-130	1		50
2-Nitroaniline	109		106		47-134	3		50
3-Nitroaniline	56		58		26-129	4		50
4-Nitroaniline	90		94		41-125	4		50
Dibenzofuran	97		101		40-140	4		50
2-Methylnaphthalene	95		95		40-140	0		50
n-Nitrosodimethylamine	98		92		22-100	6		50
2,4,6-Trichlorophenol	105		104		30-130	1		50
p-Chloro-m-cresol	**114**	Q	**110**	Q	26-103	4		50
2-Chlorophenol	101		**103**	Q	25-102	2		50
2,4-Dichlorophenol	113		111		30-130	2		50
2,4-Dimethylphenol	111		105		30-130	6		50
2-Nitrophenol	105		108		30-130	3		50
4-Nitrophenol	111		**119**	Q	11-114	7		50
2,4-Dinitrophenol	87		90		4-130	3		50
4,6-Dinitro-o-cresol	105		116		10-130	10		50
Pentachlorophenol	89		94		17-109	5		50
Phenol	**98**	Q	**98**	Q	26-90	0		50
2-Methylphenol	106		109		30-130.	3		50
3-Methylphenol/4-Methylphenol	112		112		30-130	0		50
2,4,5-Trichlorophenol	119		115		30-130	3		50

Lab Control Sample Analysis

Batch Quality Control

Project Name: BELFAST WATER DISTRICT

Project Number: 171.05027.003

Lab Number: L1812057

Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 05 Batch: WG1104559-2 WG1104559-3								
Benzoic Acid	60		54		10-110	11		50
Benzyl Alcohol	111		109		40-140	2		50
Carbazole	101		104		54-128	3		50
Pyridine	80		80		10-93	0		50

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2-Fluorophenol	96		100		25-120
Phenol-d6	105		107		10-120
Nitrobenzene-d5	87		89		23-120
2-Fluorobiphenyl	88		89		30-120
2,4,6-Tribromophenol	100		110		10-136
4-Terphenyl-d14	87		90		18-120

Lab Control Sample Analysis
Batch Quality Control

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 01,03 Batch: WG1104633-2 WG1104633-3								
Acenaphthene	85		78		37-111	9		30
Benzidine	**9**	Q	**6**	Q	10-75	**40**	Q	30
1,2,4-Trichlorobenzene	76		69		39-98	10		30
Hexachlorobenzene	96		90		40-140	6		30
Bis(2-chloroethyl)ether	93		83		40-140	11		30
2-Chloronaphthalene	82		76		40-140	8		30
1,2-Dichlorobenzene	73		64		40-140	13		30
1,3-Dichlorobenzene	70		61		40-140	14		30
1,4-Dichlorobenzene	70		62		36-97	12		30
3,3'-Dichlorobenzidine	63		65		40-140	3		30
2,4-Dinitrotoluene	98		92		48-143	6		30
2,6-Dinitrotoluene	110		104		40-140	6		30
Azobenzene	103		96		40-140	7		30
Fluoranthene	92		86		40-140	7		30
4-Chlorophenyl phenyl ether	88		81		40-140	8		30
4-Bromophenyl phenyl ether	86		80		40-140	7		30
Bis(2-chloroisopropyl)ether	97		87		40-140	11		30
Bis(2-chloroethoxy)methane	98		91		40-140	7		30
Hexachlorobutadiene	68		61		40-140	11		30
Hexachlorocyclopentadiene	51		48		40-140	6		30
Hexachloroethane	73		65		40-140	12		30
Isophorone	110		102		40-140	8		30
Naphthalene	76		69		40-140	10		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 01,03 Batch: WG1104633-2 WG1104633-3								
Nitrobenzene	98		90		40-140	9		30
NDPA/DPA	90		84		40-140	7		30
n-Nitrosodi-n-propylamine	107		99		29-132	8		30
Bis(2-ethylhexyl)phthalate	106		99		40-140	7		30
Butyl benzyl phthalate	102		96		40-140	6		30
Di-n-butylphthalate	95		90		40-140	5		30
Di-n-octylphthalate	98		92		40-140	6		30
Diethyl phthalate	96		90		40-140	6		30
Dimethyl phthalate	96		93		40-140	3		30
Benzo(a)anthracene	94		88		40-140	7		30
Benzo(a)pyrene	96		89		40-140	8		30
Benzo(b)fluoranthene	95		88		40-140	8		30
Benzo(k)fluoranthene	95		89		40-140	7		30
Chrysene	96		89		40-140	8		30
Acenaphthylene	90		84		45-123	7		30
Anthracene	88		84		40-140	5		30
Benzo(ghi)perylene	98		93		40-140	5		30
Fluorene	89		82		40-140	8		30
Phenanthrene	87		82		40-140	6		30
Dibenzo(a,h)anthracene	95		91		40-140	4		30
Indeno(1,2,3-cd)pyrene	98		92		40-140	6		30
Pyrene	90		86		26-127	5		30
Biphenyl	83		77		40-140	8		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: BELFAST WATER DISTRICT

Project Number: 171.05027.003

Lab Number: L1812057

Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 01,03 Batch: WG1104633-2 WG1104633-3								
Aniline	**39**	Q	**33**	Q	40-140	17		30
4-Chloroaniline	86		70		40-140	21		30
1-Methylnaphthalene	87		80		41-103	8		30
2-Nitroaniline	99		94		52-143	5		30
3-Nitroaniline	50		48		25-145	4		30
4-Nitroaniline	78		79		51-143	1		30
Dibenzofuran	86		79		40-140	8		30
2-Methylnaphthalene	77		71		40-140	8		30
n-Nitrosodimethylamine	62		52		22-74	18		30
2,4,6-Trichlorophenol	95		91		30-130	4		30
p-Chloro-m-cresol	**98**	Q	94		23-97	4		30
2-Chlorophenol	89		79		27-123	12		30
2,4-Dichlorophenol	96		87		30-130	10		30
2,4-Dimethylphenol	88		76		30-130	15		30
2-Nitrophenol	100		89		30-130	12		30
4-Nitrophenol	62		60		10-80	3		30
2,4-Dinitrophenol	72		70		20-130	3		30
4,6-Dinitro-o-cresol	94		92		20-164	2		30
Pentachlorophenol	74		70		9-103	6		30
Phenol	49		43		12-110	13		30
2-Methylphenol	87		80		30-130	8		30
3-Methylphenol/4-Methylphenol	90		82		30-130	9		30
2,4,5-Trichlorophenol	100		97		30-130	3		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: BELFAST WATER DISTRICT

Project Number: 171.05027.003

Lab Number: L1812057

Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 01,03 Batch: WG1104633-2 WG1104633-3								
Benzoic Acid	28		22		10-164	24		30
Benzyl Alcohol	82		74		26-116	10		30
Carbazole	89		84		55-144	6		30
Pyridine	46		32		10-66	**36**	Q	30

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2-Fluorophenol	73		64		21-120
Phenol-d6	59		52		10-120
Nitrobenzene-d5	101		89		23-120
2-Fluorobiphenyl	90		84		15-120
2,4,6-Tribromophenol	117		107		10-120
4-Terphenyl-d14	94		87		41-149

Lab Control Sample Analysis
Batch Quality Control

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS-SIM - Westborough Lab Associated sample(s): 01,03 Batch: WG1104635-2 WG1104635-3								
Acenaphthene	76		85		40-140	11		40
2-Chloronaphthalene	72		81		40-140	12		40
Fluoranthene	82		73		40-140	12		40
Hexachlorobutadiene	58		63		40-140	8		40
Naphthalene	71		78		40-140	9		40
Benzo(a)anthracene	75		83		40-140	10		40
Benzo(a)pyrene	76		85		40-140	11		40
Benzo(b)fluoranthene	81		92		40-140	13		40
Benzo(k)fluoranthene	72		81		40-140	12		40
Chrysene	73		80		40-140	9		40
Acenaphthylene	70		78		40-140	11		40
Anthracene	79		85		40-140	7		40
Benzo(ghi)perylene	78		76		40-140	3		40
Fluorene	82		89		40-140	8		40
Phenanthrene	77		84		40-140	9		40
Dibenzo(a,h)anthracene	80		78		40-140	3		40
Indeno(1,2,3-cd)pyrene	79		76		40-140	4		40
Pyrene	78		86		40-140	10		40
1-Methylnaphthalene	69		77		40-140	11		40
2-Methylnaphthalene	70		80		40-140	13		40
Pentachlorophenol	98		104		40-140	6		40
Hexachlorobenzene	70		77		40-140	10		40
Hexachloroethane	59		64		40-140	8		40

Lab Control Sample Analysis

Batch Quality Control

Project Name: BELFAST WATER DISTRICT

Project Number: 171.05027.003

Lab Number: L1812057

Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS-SIM - Westborough Lab Associated sample(s): 01,03 Batch: WG1104635-2 WG1104635-3								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2-Fluorophenol	51		62		21-120
Phenol-d6	38		44		10-120
Nitrobenzene-d5	69		75		23-120
2-Fluorobiphenyl	73		79		15-120
2,4,6-Tribromophenol	63		76		10-120
4-Terphenyl-d14	80		88		41-149

Lab Control Sample Analysis
Batch Quality Control

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 06 Batch: WG1105283-2 WG1105283-3								
Acenaphthene	69		67		31-137	3		50
2-Chloronaphthalene	71		69		40-140	3		50
Fluoranthene	68		66		40-140	3		50
Naphthalene	67		67		40-140	0		50
Benzo(a)anthracene	72		70		40-140	3		50
Benzo(a)pyrene	73		71		40-140	3		50
Benzo(b)fluoranthene	72		70		40-140	3		50
Benzo(k)fluoranthene	69		68		40-140	1		50
Chrysene	71		70		40-140	1		50
Acenaphthylene	76		75		40-140	1		50
Anthracene	67		67		40-140	0		50
Benzo(ghi)perylene	72		72		40-140	0		50
Fluorene	69		67		40-140	3		50
Phenanthrene	66		65		40-140	2		50
Dibenzo(a,h)anthracene	71		71		40-140	0		50
Indeno(1,2,3-cd)pyrene	74		72		40-140	3		50
Pyrene	67		66		35-142	2		50
1-Methylnaphthalene	77		77		26-130	0		50
2-Methylnaphthalene	71		69		40-140	3		50

Lab Control Sample Analysis

Batch Quality Control

Project Name: BELFAST WATER DISTRICT

Project Number: 171.05027.003

Lab Number: L1812057

Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 06 Batch: WG1105283-2 WG1105283-3								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Nitrobenzene-d5	72		71		23-120
2-Fluorobiphenyl	65		64		30-120
4-Terphenyl-d14	64		61		18-120

PESTICIDES

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-07
Client ID: GWW-101
Sample Location: BELFAST, ME

Sample Depth:
Matrix: Water
Analytical Method: 1,8081B
Analytical Date: 04/12/18 08:08
Analyst: SL

Date Collected: 04/04/18 08:30
Date Received: 04/06/18
Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Extraction Method: EPA 3510C
Extraction Date: 04/11/18 00:31

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Pesticides by GC - Westborough Lab							
Delta-BHC	ND		ug/l	0.020	--	1	A
Lindane	ND		ug/l	0.020	--	1	A
Alpha-BHC	ND		ug/l	0.020	--	1	A
Beta-BHC	ND		ug/l	0.020	--	1	A
Heptachlor	ND		ug/l	0.020	--	1	A
Aldrin	ND		ug/l	0.020	--	1	A
Heptachlor epoxide	ND		ug/l	0.020	--	1	A
Endrin	ND		ug/l	0.040	--	1	A
Endrin aldehyde	ND		ug/l	0.040	--	1	A
Endrin ketone	ND		ug/l	0.040	--	1	A
Dieldrin	ND		ug/l	0.040	--	1	A
4,4'-DDE	ND		ug/l	0.040	--	1	A
4,4'-DDD	ND		ug/l	0.040	--	1	A
4,4'-DDT	ND		ug/l	0.040	--	1	A
Endosulfan I	ND		ug/l	0.020	--	1	A
Endosulfan II	ND		ug/l	0.040	--	1	A
Endosulfan sulfate	ND		ug/l	0.040	--	1	A
Methoxychlor	ND		ug/l	0.200	--	1	A
Toxaphene	ND		ug/l	0.200	--	1	A
Chlordane	ND		ug/l	0.200	--	1	A
cis-Chlordane	ND		ug/l	0.020	--	1	A
trans-Chlordane	ND		ug/l	0.020	--	1	A

Project Name: BELFAST WATER DISTRICT **Lab Number:** L1812057

Project Number: 171.05027.003 **Report Date:** 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-07
Client ID: GWW-101
Sample Location: BELFAST, ME

Date Collected: 04/04/18 08:30
Date Received: 04/06/18
Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Pesticides by GC - Westborough Lab							

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	136		30-150	A
Decachlorobiphenyl	117		30-150	A
2,4,5,6-Tetrachloro-m-xylene	133		30-150	B
Decachlorobiphenyl	124		30-150	B

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8081B
Analytical Date: 04/12/18 07:29
Analyst: SL

Extraction Method: EPA 3510C
Extraction Date: 04/11/18 00:31

Parameter	Result	Qualifier	Units	RL	MDL	Column
Pesticides by GC - Westborough Lab for sample(s): 07 Batch: WG1105367-1						
Delta-BHC	ND		ug/l	0.020	--	A
Lindane	ND		ug/l	0.020	--	A
Alpha-BHC	ND		ug/l	0.020	--	A
Beta-BHC	ND		ug/l	0.020	--	A
Heptachlor	ND		ug/l	0.020	--	A
Aldrin	ND		ug/l	0.020	--	A
Heptachlor epoxide	ND		ug/l	0.020	--	A
Endrin	ND		ug/l	0.040	--	A
Endrin aldehyde	ND		ug/l	0.040	--	A
Endrin ketone	ND		ug/l	0.040	--	A
Dieldrin	ND		ug/l	0.040	--	A
4,4'-DDE	ND		ug/l	0.040	--	A
4,4'-DDD	ND		ug/l	0.040	--	A
4,4'-DDT	ND		ug/l	0.040	--	A
Endosulfan I	ND		ug/l	0.020	--	A
Endosulfan II	ND		ug/l	0.040	--	A
Endosulfan sulfate	ND		ug/l	0.040	--	A
Methoxychlor	ND		ug/l	0.200	--	A
Toxaphene	ND		ug/l	0.200	--	A
Chlordane	ND		ug/l	0.200	--	A
cis-Chlordane	ND		ug/l	0.020	--	A
trans-Chlordane	ND		ug/l	0.020	--	A

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8081B
Analytical Date: 04/12/18 07:29
Analyst: SL

Extraction Method: EPA 3510C
Extraction Date: 04/11/18 00:31

Parameter	Result	Qualifier	Units	RL	MDL	Column
Pesticides by GC - Westborough Lab for sample(s): 07 Batch: WG1105367-1						

Surrogate	%Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	116		30-150	A
Decachlorobiphenyl	98		30-150	A
2,4,5,6-Tetrachloro-m-xylene	113		30-150	B
Decachlorobiphenyl	108		30-150	B

Lab Control Sample Analysis

Batch Quality Control

Project Name: BELFAST WATER DISTRICT

Project Number: 171.05027.003

Lab Number: L1812057

Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Pesticides by GC - Westborough Lab Associated sample(s): 07 Batch: WG1105367-2 WG1105367-3									
Delta-BHC	147		147		30-150	0		20	A
Lindane	132		131		30-150	1		20	A
Alpha-BHC	145		144		30-150	1		20	A
Beta-BHC	122		122		30-150	0		20	A
Heptachlor	124		123		30-150	1		20	A
Aldrin	126		125		30-150	1		20	A
Heptachlor epoxide	123		123		30-150	0		20	A
Endrin	123		124		30-150	1		20	A
Endrin aldehyde	121		124		30-150	2		20	A
Endrin ketone	130		132		30-150	2		20	A
Dieldrin	132		133		30-150	1		20	A
4,4'-DDE	134		135		30-150	1		20	A
4,4'-DDD	128		130		30-150	2		20	A
4,4'-DDT	129		130		30-150	1		20	A
Endosulfan I	125		126		30-150	1		20	A
Endosulfan II	125		126		30-150	1		20	A
Endosulfan sulfate	131		134		30-150	2		20	A
Methoxychlor	116		120		30-150	3		20	A
cis-Chlordane	109		110		30-150	1		20	A
trans-Chlordane	123		123		30-150	0		20	A

Lab Control Sample Analysis

Batch Quality Control

Project Name: BELFAST WATER DISTRICT

Project Number: 171.05027.003

Lab Number: L1812057

Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Pesticides by GC - Westborough Lab Associated sample(s): 07 Batch: WG1105367-2 WG1105367-3								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	134		130		30-150	A
Decachlorobiphenyl	105		110		30-150	A
2,4,5,6-Tetrachloro-m-xylene	128		127		30-150	B
Decachlorobiphenyl	106		115		30-150	B

METALS

Project Name: BELFAST WATER DISTRICT
Lab Number: L1812057
Project Number: 171.05027.003
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-01
Client ID: GWW-101
Sample Location: BELFAST, ME
Sample Depth:
Matrix: Water

Date Collected: 04/05/18 08:15
Date Received: 04/06/18
Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Aluminum, Total	ND		mg/l	0.100	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Antimony, Total	ND		mg/l	0.00400	--	1	04/09/18 15:30	04/10/18 10:18	EPA 3005A	1,6020A	AM
Arsenic, Total	0.007		mg/l	0.005	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Barium, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Beryllium, Total	ND		mg/l	0.00050	--	1	04/09/18 15:30	04/10/18 10:18	EPA 3005A	1,6020A	AM
Boron, Total	ND		mg/l	0.030	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Cadmium, Total	ND		mg/l	0.00020	--	1	04/09/18 15:30	04/10/18 10:18	EPA 3005A	1,6020A	AM
Calcium, Total	10.8		mg/l	0.100	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Chromium, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Cobalt, Total	ND		mg/l	0.020	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Copper, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Iron, Total	3.20		mg/l	0.050	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Lead, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Magnesium, Total	4.72		mg/l	0.100	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Manganese, Total	0.035		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Mercury, Total	ND		mg/l	0.00020	--	1	04/09/18 11:15	04/10/18 20:33	EPA 7470A	1,7470A	EA
Molybdenum, Total	ND		mg/l	0.050	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Nickel, Total	ND		mg/l	0.025	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Potassium, Total	ND		mg/l	2.50	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Selenium, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Silicon, Total	11.4		mg/l	0.500	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Silver, Total	ND		mg/l	0.007	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Sodium, Total	12.6		mg/l	2.00	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Strontium, Total	0.048		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Sulfur, Total	4.51		mg/l	0.250	--	1	04/10/18 12:55	04/10/18 19:29	EPA 3015A	1,6010C	AB
Thallium, Total	ND		mg/l	0.00050	--	1	04/09/18 15:30	04/10/18 10:18	EPA 3005A	1,6020A	AM
Titanium, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Vanadium, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Zinc, Total	ND		mg/l	0.050	--	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC

Project Name: BELFAST WATER DISTRICT
Lab Number: L1812057
Project Number: 171.05027.003
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-01
Client ID: GWW-101
Sample Location: BELFAST, ME
Sample Depth:
Matrix: Water

Date Collected: 04/05/18 08:15
Date Received: 04/06/18
Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	46.5		mg/l	0.660	NA	1	04/09/18 15:30	04/11/18 19:00	EPA 3005A	1,6010C	LC
Dissolved Metals - Mansfield Lab											
Aluminum, Dissolved	ND		mg/l	0.100	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Antimony, Dissolved	ND		mg/l	0.00400	--	1	04/09/18 14:20	04/10/18 11:18	EPA 3005A	1,6020A	AM
Arsenic, Dissolved	0.008		mg/l	0.005	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Barium, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Beryllium, Dissolved	ND		mg/l	0.00050	--	1	04/09/18 14:20	04/10/18 11:18	EPA 3005A	1,6020A	AM
Boron, Dissolved	ND		mg/l	0.030	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Cadmium, Dissolved	ND		mg/l	0.00020	--	1	04/09/18 14:20	04/10/18 11:18	EPA 3005A	1,6020A	AM
Calcium, Dissolved	10.1		mg/l	0.100	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Chromium, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Cobalt, Dissolved	ND		mg/l	0.020	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Copper, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Iron, Dissolved	3.00		mg/l	0.050	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Lead, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Magnesium, Dissolved	4.20		mg/l	0.100	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Manganese, Dissolved	0.033		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Mercury, Dissolved	ND		mg/l	0.00020	--	1	04/11/18 12:20	04/11/18 17:34	EPA 7470A	1,7470A	MG
Molybdenum, Dissolved	ND		mg/l	0.050	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Nickel, Dissolved	ND		mg/l	0.025	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Potassium, Dissolved	ND		mg/l	2.50	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Selenium, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Silicon, Dissolved	10.7		mg/l	0.500	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Silver, Dissolved	ND		mg/l	0.007	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Sodium, Dissolved	12.1		mg/l	2.00	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Strontium, Dissolved	0.051		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Thallium, Dissolved	ND		mg/l	0.00050	--	1	04/09/18 14:20	04/10/18 11:18	EPA 3005A	1,6020A	AM

Project Name: BELFAST WATER DISTRICT
Lab Number: L1812057
Project Number: 171.05027.003
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-01
Client ID: GWW-101
Sample Location: BELFAST, ME
Sample Depth:
Matrix: Water

Date Collected: 04/05/18 08:15
Date Received: 04/06/18
Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Titanium, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Vanadium, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC
Zinc, Dissolved	ND		mg/l	0.050	--	1	04/09/18 14:20	04/10/18 09:55	EPA 3005A	1,6010C	LC

Project Name: BELFAST WATER DISTRICT
Lab Number: L1812057
Project Number: 171.05027.003
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-03
Client ID: GWW-103
Sample Location: BELFAST, ME
Sample Depth:
Matrix: Water

Date Collected: 04/05/18 08:45
Date Received: 04/06/18
Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Aluminum, Total	ND		mg/l	0.100	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Antimony, Total	ND		mg/l	0.00400	--	1	04/09/18 15:30	04/10/18 10:22	EPA 3005A	1,6020A	AM
Arsenic, Total	0.005		mg/l	0.005	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Barium, Total	0.023		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Beryllium, Total	ND		mg/l	0.00050	--	1	04/09/18 15:30	04/10/18 10:22	EPA 3005A	1,6020A	AM
Boron, Total	0.087		mg/l	0.030	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Cadmium, Total	ND		mg/l	0.00020	--	1	04/09/18 15:30	04/10/18 10:22	EPA 3005A	1,6020A	AM
Calcium, Total	21.0		mg/l	0.100	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Chromium, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Cobalt, Total	ND		mg/l	0.020	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Copper, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Iron, Total	1.51		mg/l	0.050	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Lead, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Magnesium, Total	10.2		mg/l	0.100	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Manganese, Total	0.029		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Mercury, Total	ND		mg/l	0.00020	--	1	04/09/18 11:15	04/10/18 20:35	EPA 7470A	1,7470A	EA
Molybdenum, Total	ND		mg/l	0.050	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Nickel, Total	ND		mg/l	0.025	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Potassium, Total	6.58		mg/l	2.50	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Selenium, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Silicon, Total	9.04		mg/l	0.500	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Silver, Total	ND		mg/l	0.007	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Sodium, Total	135		mg/l	2.00	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Strontium, Total	0.195		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Sulfur, Total	23.2		mg/l	0.250	--	1	04/10/18 12:55	04/10/18 18:43	EPA 3015A	1,6010C	AB
Thallium, Total	ND		mg/l	0.00050	--	1	04/09/18 15:30	04/10/18 10:22	EPA 3005A	1,6020A	AM
Titanium, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Vanadium, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Zinc, Total	0.059		mg/l	0.050	--	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC

Project Name: BELFAST WATER DISTRICT
Lab Number: L1812057
Project Number: 171.05027.003
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-03
Client ID: GWW-103
Sample Location: BELFAST, ME
Sample Depth:
Matrix: Water

Date Collected: 04/05/18 08:45
Date Received: 04/06/18
Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	94.5		mg/l	0.660	NA	1	04/09/18 15:30	04/11/18 19:05	EPA 3005A	1,6010C	LC
Dissolved Metals - Mansfield Lab											
Aluminum, Dissolved	ND		mg/l	0.100	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Antimony, Dissolved	ND		mg/l	0.00400	--	1	04/09/18 14:20	04/10/18 11:22	EPA 3005A	1,6020A	AM
Arsenic, Dissolved	ND		mg/l	0.005	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Barium, Dissolved	0.026		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Beryllium, Dissolved	ND		mg/l	0.00050	--	1	04/09/18 14:20	04/10/18 11:22	EPA 3005A	1,6020A	AM
Boron, Dissolved	0.081		mg/l	0.030	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Cadmium, Dissolved	ND		mg/l	0.00020	--	1	04/09/18 14:20	04/10/18 11:22	EPA 3005A	1,6020A	AM
Calcium, Dissolved	20.5		mg/l	0.100	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Chromium, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Cobalt, Dissolved	ND		mg/l	0.020	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Copper, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Iron, Dissolved	1.45		mg/l	0.050	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Lead, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Magnesium, Dissolved	9.36		mg/l	0.100	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Manganese, Dissolved	0.030		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Mercury, Dissolved	ND		mg/l	0.00020	--	1	04/11/18 12:20	04/11/18 17:39	EPA 7470A	1,7470A	MG
Molybdenum, Dissolved	ND		mg/l	0.050	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Nickel, Dissolved	ND		mg/l	0.025	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Potassium, Dissolved	6.25		mg/l	2.50	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Selenium, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Silicon, Dissolved	8.65		mg/l	0.500	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Silver, Dissolved	ND		mg/l	0.007	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Sodium, Dissolved	134		mg/l	2.00	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Strontium, Dissolved	0.218		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Thallium, Dissolved	ND		mg/l	0.00050	--	1	04/09/18 14:20	04/10/18 11:22	EPA 3005A	1,6020A	AM

Project Name: BELFAST WATER DISTRICT
Lab Number: L1812057
Project Number: 171.05027.003
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-03
Client ID: GWW-103
Sample Location: BELFAST, ME
Sample Depth:
Matrix: Water

Date Collected: 04/05/18 08:45
Date Received: 04/06/18
Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Titanium, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Vanadium, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC
Zinc, Dissolved	0.055		mg/l	0.050	--	1	04/09/18 14:20	04/10/18 11:14	EPA 3005A	1,6010C	LC

Project Name: BELFAST WATER DISTRICT
Lab Number: L1812057
Project Number: 171.05027.003
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-05
Client ID: SS-1
Sample Location: BELFAST, ME
Date Collected: 04/05/18 09:15
Date Received: 04/06/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Percent Solids: 78%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/kg	2.48	--	1	04/07/18 07:20	04/07/18 13:18	EPA 3050B	1,6010C	PE
Arsenic, Total	13.9		mg/kg	0.496	--	1	04/07/18 07:20	04/07/18 13:18	EPA 3050B	1,6010C	PE
Beryllium, Total	0.293		mg/kg	0.248	--	1	04/07/18 07:20	04/07/18 13:18	EPA 3050B	1,6010C	PE
Cadmium, Total	0.700		mg/kg	0.496	--	1	04/07/18 07:20	04/07/18 13:18	EPA 3050B	1,6010C	PE
Chromium, Total	15.7		mg/kg	0.496	--	1	04/07/18 07:20	04/07/18 13:18	EPA 3050B	1,6010C	PE
Copper, Total	36.3		mg/kg	0.496	--	1	04/07/18 07:20	04/07/18 13:18	EPA 3050B	1,6010C	PE
Lead, Total	263		mg/kg	2.48	--	1	04/07/18 07:20	04/07/18 13:18	EPA 3050B	1,6010C	PE
Mercury, Total	0.204		mg/kg	0.081	--	1	04/07/18 09:00	04/09/18 16:04	EPA 7471B	1,7471B	EA
Nickel, Total	22.8		mg/kg	1.24	--	1	04/07/18 07:20	04/07/18 13:18	EPA 3050B	1,6010C	PE
Selenium, Total	4.29		mg/kg	0.992	--	1	04/07/18 07:20	04/07/18 13:18	EPA 3050B	1,6010C	PE
Silver, Total	ND		mg/kg	0.496	--	1	04/07/18 07:20	04/07/18 13:18	EPA 3050B	1,6010C	PE
Thallium, Total	11.8		mg/kg	0.992	--	1	04/07/18 07:20	04/07/18 13:18	EPA 3050B	1,6010C	PE
Zinc, Total	66.5		mg/kg	2.48	--	1	04/07/18 07:20	04/07/18 13:18	EPA 3050B	1,6010C	PE

Project Name: BELFAST WATER DISTRICT **Lab Number:** L1812057

Project Number: 171.05027.003 **Report Date:** 04/13/18

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 05 Batch: WG1104409-1										
Antimony, Total	ND		mg/kg	2.00	--	1	04/07/18 07:20	04/07/18 11:34	1,6010C	PE
Arsenic, Total	ND		mg/kg	0.400	--	1	04/07/18 07:20	04/07/18 11:34	1,6010C	PE
Beryllium, Total	ND		mg/kg	0.200	--	1	04/07/18 07:20	04/07/18 11:34	1,6010C	PE
Cadmium, Total	ND		mg/kg	0.400	--	1	04/07/18 07:20	04/07/18 11:34	1,6010C	PE
Chromium, Total	ND		mg/kg	0.400	--	1	04/07/18 07:20	04/07/18 11:34	1,6010C	PE
Copper, Total	ND		mg/kg	0.400	--	1	04/07/18 07:20	04/07/18 11:34	1,6010C	PE
Lead, Total	ND		mg/kg	2.00	--	1	04/07/18 07:20	04/07/18 11:34	1,6010C	PE
Nickel, Total	ND		mg/kg	1.00	--	1	04/07/18 07:20	04/07/18 11:34	1,6010C	PE
Selenium, Total	ND		mg/kg	0.800	--	1	04/07/18 07:20	04/07/18 11:34	1,6010C	PE
Silver, Total	ND		mg/kg	0.400	--	1	04/07/18 07:20	04/07/18 11:34	1,6010C	PE
Thallium, Total	ND		mg/kg	0.800	--	1	04/07/18 07:20	04/07/18 11:34	1,6010C	PE
Zinc, Total	ND		mg/kg	2.00	--	1	04/07/18 07:20	04/07/18 11:34	1,6010C	PE

Prep Information

Digestion Method: EPA 3050B

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 05 Batch: WG1104410-1										
Mercury, Total	ND		mg/kg	0.083	--	1	04/07/18 09:00	04/09/18 15:27	1,7471B	EA

Prep Information

Digestion Method: EPA 7471B

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01,03 Batch: WG1104756-1										
Mercury, Total	ND		mg/l	0.00020	--	1	04/09/18 11:15	04/10/18 20:11	1,7470A	EA

Project Name: BELFAST WATER DISTRICT **Lab Number:** L1812057

Project Number: 171.05027.003 **Report Date:** 04/13/18

Method Blank Analysis
Batch Quality Control

Prep Information

Digestion Method: EPA 7470A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01,03 Batch: WG1104824-1										
Aluminum, Dissolved	ND		mg/l	0.100	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Arsenic, Dissolved	ND		mg/l	0.005	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Barium, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Boron, Dissolved	ND		mg/l	0.030	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Calcium, Dissolved	ND		mg/l	0.100	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Chromium, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Cobalt, Dissolved	ND		mg/l	0.020	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Copper, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Iron, Dissolved	ND		mg/l	0.050	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Lead, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Magnesium, Dissolved	ND		mg/l	0.100	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Manganese, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Molybdenum, Dissolved	ND		mg/l	0.050	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Nickel, Dissolved	ND		mg/l	0.025	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Potassium, Dissolved	ND		mg/l	2.50	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Selenium, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Silicon, Dissolved	ND		mg/l	0.500	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Silver, Dissolved	ND		mg/l	0.007	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Sodium, Dissolved	ND		mg/l	2.00	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Strontium, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Titanium, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Vanadium, Dissolved	ND		mg/l	0.010	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC
Zinc, Dissolved	ND		mg/l	0.050	--	1	04/09/18 14:20	04/10/18 09:46	1,6010C	LC

Prep Information

Digestion Method: EPA 3005A

Project Name: BELFAST WATER DISTRICT **Lab Number:** L1812057

Project Number: 171.05027.003 **Report Date:** 04/13/18

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01,03 Batch: WG1104839-1										
Antimony, Dissolved	ND		mg/l	0.00400	--	1	04/09/18 14:20	04/10/18 10:54	1,6020A	AM
Beryllium, Dissolved	ND		mg/l	0.00050	--	1	04/09/18 14:20	04/10/18 10:54	1,6020A	AM
Cadmium, Dissolved	ND		mg/l	0.00020	--	1	04/09/18 14:20	04/10/18 10:54	1,6020A	AM
Thallium, Dissolved	ND		mg/l	0.00050	--	1	04/09/18 14:20	04/10/18 10:54	1,6020A	AM

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01,03 Batch: WG1104843-1										
Antimony, Total	ND		mg/l	0.00400	--	1	04/09/18 15:30	04/10/18 09:17	1,6020A	AM
Beryllium, Total	ND		mg/l	0.00050	--	1	04/09/18 15:30	04/10/18 09:17	1,6020A	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	04/09/18 15:30	04/10/18 09:17	1,6020A	AM
Thallium, Total	ND		mg/l	0.00050	--	1	04/09/18 15:30	04/10/18 09:17	1,6020A	AM

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01,03 Batch: WG1105073-1										
Sulfur, Total	ND		mg/l	0.250	--	1	04/10/18 12:55	04/10/18 18:39	1,6010C	AB

Prep Information

Digestion Method: EPA 3015A

Project Name: BELFAST WATER DISTRICT **Lab Number:** L1812057

Project Number: 171.05027.003 **Report Date:** 04/13/18

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01,03 Batch: WG1105166-1										
Aluminum, Total	ND		mg/l	0.100	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Arsenic, Total	ND		mg/l	0.005	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Barium, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Boron, Total	ND		mg/l	0.030	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Calcium, Total	ND		mg/l	0.100	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Chromium, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Cobalt, Total	ND		mg/l	0.020	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Copper, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Iron, Total	0.081		mg/l	0.050	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Lead, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Magnesium, Total	ND		mg/l	0.100	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Manganese, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Molybdenum, Total	ND		mg/l	0.050	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Nickel, Total	ND		mg/l	0.025	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Potassium, Total	ND		mg/l	2.50	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Selenium, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Silicon, Total	ND		mg/l	0.500	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Silver, Total	ND		mg/l	0.007	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Sodium, Total	ND		mg/l	2.00	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Strontium, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Titanium, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Vanadium, Total	ND		mg/l	0.010	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC
Zinc, Total	ND		mg/l	0.050	--	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Hardness by SM 2340B - Mansfield Lab for sample(s): 01,03 Batch: WG1105166-1										
Hardness	ND		mg/l	0.660	NA	1	04/09/18 15:30	04/11/18 17:50	1,6010C	LC

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01,03 Batch: WG1105586-1										
Mercury, Dissolved	ND		mg/l	0.00020	--	1	04/11/18 12:20	04/11/18 17:30	1,7470A	MG

Prep Information

Digestion Method: EPA 7470A

Lab Control Sample Analysis

Batch Quality Control

Project Name: BELFAST WATER DISTRICT

Project Number: 171.05027.003

Lab Number: L1812057

Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 05 Batch: WG1104409-2 SRM Lot Number: D098-540								
Antimony, Total	140		-		6-194	-		
Arsenic, Total	93		-		83-117	-		
Beryllium, Total	87		-		83-117	-		
Cadmium, Total	90		-		82-117	-		
Chromium, Total	89		-		83-119	-		
Copper, Total	89		-		84-116	-		
Lead, Total	85		-		82-117	-		
Nickel, Total	88		-		82-117	-		
Selenium, Total	92		-		78-121	-		
Silver, Total	97		-		80-120	-		
Thallium, Total	89		-		80-119	-		
Zinc, Total	87		-		81-119	-		
Total Metals - Mansfield Lab Associated sample(s): 05 Batch: WG1104410-2 SRM Lot Number: D098-540								
Mercury, Total	115		-		50-149	-		
Total Metals - Mansfield Lab Associated sample(s): 01,03 Batch: WG1104756-2								
Mercury, Total	90		-		80-120	-		

Lab Control Sample Analysis

Batch Quality Control

Project Name: BELFAST WATER DISTRICT

Project Number: 171.05027.003

Lab Number: L1812057

Report Date: 04/13/18

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01,03 Batch: WG1104824-2					
Aluminum, Dissolved	104	-	80-120	-	
Arsenic, Dissolved	106	-	80-120	-	
Barium, Dissolved	98	-	80-120	-	
Boron, Dissolved	103	-	80-120	-	
Calcium, Dissolved	100	-	80-120	-	
Chromium, Dissolved	102	-	80-120	-	
Cobalt, Dissolved	95	-	80-120	-	
Copper, Dissolved	99	-	80-120	-	
Iron, Dissolved	101	-	80-120	-	
Lead, Dissolved	101	-	80-120	-	
Magnesium, Dissolved	95	-	80-120	-	
Manganese, Dissolved	99	-	80-120	-	
Molybdenum, Dissolved	94	-	80-120	-	
Nickel, Dissolved	96	-	80-120	-	
Potassium, Dissolved	95	-	80-120	-	
Selenium, Dissolved	112	-	80-120	-	
Silicon, Dissolved	105	-	80-120	-	
Silver, Dissolved	100	-	80-120	-	
Sodium, Dissolved	101	-	80-120	-	
Strontium, Dissolved	104	-	80-120	-	
Titanium, Dissolved	99	-	80-120	-	

Lab Control Sample Analysis

Batch Quality Control

Project Name: BELFAST WATER DISTRICT

Project Number: 171.05027.003

Lab Number: L1812057

Report Date: 04/13/18

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01,03 Batch: WG1104824-2					
Vanadium, Dissolved	103	-	80-120	-	
Zinc, Dissolved	100	-	80-120	-	
Dissolved Metals - Mansfield Lab Associated sample(s): 01,03 Batch: WG1104839-2					
Antimony, Dissolved	99	-	80-120	-	
Beryllium, Dissolved	105	-	80-120	-	
Cadmium, Dissolved	108	-	80-120	-	
Thallium, Dissolved	99	-	80-120	-	
Total Metals - Mansfield Lab Associated sample(s): 01,03 Batch: WG1104843-2					
Antimony, Total	108	-	80-120	-	
Beryllium, Total	107	-	80-120	-	
Cadmium, Total	112	-	80-120	-	
Thallium, Total	104	-	80-120	-	
Total Metals - Mansfield Lab Associated sample(s): 01,03 Batch: WG1105073-2					
Sulfur, Total	115	-	80-120	-	

Lab Control Sample Analysis

Batch Quality Control

Project Name: BELFAST WATER DISTRICT

Project Number: 171.05027.003

Lab Number: L1812057

Report Date: 04/13/18

Parameter	LCS %Recovery		LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01,03 Batch: WG1105166-2						
Aluminum, Total	114		-	80-120	-	
Arsenic, Total	115		-	80-120	-	
Barium, Total	102		-	80-120	-	
Boron, Total	110		-	80-120	-	
Calcium, Total	109		-	80-120	-	
Chromium, Total	106		-	80-120	-	
Cobalt, Total	104		-	80-120	-	
Copper, Total	102		-	80-120	-	
Iron, Total	111		-	80-120	-	
Lead, Total	98		-	80-120	-	
Magnesium, Total	108		-	80-120	-	
Manganese, Total	104		-	80-120	-	
Molybdenum, Total	90		-	80-120	-	
Nickel, Total	104		-	80-120	-	
Potassium, Total	104		-	80-120	-	
Selenium, Total	**123**	Q	-	80-120	-	
Silicon, Total	84		-	80-120	-	
Silver, Total	107		-	80-120	-	
Sodium, Total	107		-	80-120	-	
Strontium, Total	100		-	80-120	-	
Titanium, Total	104		-	80-120	-	

Lab Control Sample Analysis

Batch Quality Control

Project Name: BELFAST WATER DISTRICT

Project Number: 171.05027.003

Lab Number: L1812057

Report Date: 04/13/18

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01,03 Batch: WG1105166-2					
Vanadium, Total	105	-	80-120	-	
Zinc, Total	109	-	80-120	-	
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01,03 Batch: WG1105166-2					
Hardness	108	-	80-120	-	
Dissolved Metals - Mansfield Lab Associated sample(s): 01,03 Batch: WG1105586-2					
Mercury, Dissolved	102	-	80-120	-	

Matrix Spike Analysis
Batch Quality Control

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01,03 QC Batch ID: WG1104824-3 QC Sample: L1812057-01 Client ID: GWW-101												
Aluminum, Dissolved	ND	2	2.12	106		-	-		75-125	-		20
Arsenic, Dissolved	0.008	0.12	0.132	103		-	-		75-125	-		20
Barium, Dissolved	ND	2	1.97	98		-	-		75-125	-		20
Boron, Dissolved	ND	1	1.05	105		-	-		75-125	-		20
Calcium, Dissolved	10.1	10	19.8	97		-	-		75-125	-		20
Chromium, Dissolved	ND	0.2	0.204	102		-	-		75-125	-		20
Cobalt, Dissolved	ND	0.5	0.476	95		-	-		75-125	-		20
Copper, Dissolved	ND	0.25	0.252	101		-	-		75-125	-		20
Iron, Dissolved	3.00	1	3.95	95		-	-		75-125	-		20
Lead, Dissolved	ND	0.51	0.514	101		-	-		75-125	-		20
Magnesium, Dissolved	4.20	10	13.6	94		-	-		75-125	-		20
Manganese, Dissolved	0.033	0.5	0.526	98		-	-		75-125	-		20
Molybdenum, Dissolved	ND	1	0.940	94		-	-		75-125	-		20
Nickel, Dissolved	ND	0.5	0.477	95		-	-		75-125	-		20
Potassium, Dissolved	ND	10	11.6	116		-	-		75-125	-		20
Selenium, Dissolved	ND	0.12	0.131	109		-	-		75-125	-		20
Silicon, Dissolved	10.7	1	11.5	80		-	-		75-125	-		20
Silver, Dissolved	ND	0.05	0.050	100		-	-		75-125	-		20
Sodium, Dissolved	12.1	10	22.0	99		-	-		75-125	-		20
Strontium, Dissolved	0.051	1	1.09	104		-	-		75-125	-		20
Titanium, Dissolved	ND	1	0.991	99		-	-		75-125	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

Parameter	Native Sample	MS Added	MS Found	MS %Recovery		MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01,03 QC Batch ID: WG1104824-3 QC Sample: L1812057-01 Client ID: GWW-101										
Vanadium, Dissolved	ND	0.5	0.519	104		-	-	75-125	-	20
Zinc, Dissolved	ND	0.5	0.532	106		-	-	75-125	-	20
Dissolved Metals - Mansfield Lab Associated sample(s): 01,03 QC Batch ID: WG1104839-3 QC Sample: L1812057-01 Client ID: GWW-101										
Antimony, Dissolved	ND	0.5	0.5680	114		-	-	75-125	-	20
Beryllium, Dissolved	ND	0.05	0.05356	107		-	-	75-125	-	20
Cadmium, Dissolved	ND	0.051	0.05627	110		-	-	75-125	-	20
Thallium, Dissolved	ND	0.12	0.1210	101		-	-	75-125	-	20
Total Metals - Mansfield Lab Associated sample(s): 01,03 QC Batch ID: WG1105073-3 QC Sample: L1812057-03 Client ID: GWW-103										
Sulfur, Total	23.2	0.5	23.3	**20**	Q	-	-	75-125	-	20
Dissolved Metals - Mansfield Lab Associated sample(s): 01,03 QC Batch ID: WG1105586-3 QC Sample: L1812057-01 Client ID: GWW-101										
Mercury, Dissolved	ND	0.005	0.00480	96		-	-	75-125	-	20

Lab Duplicate Analysis
Batch Quality Control

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01,03 QC Batch ID: WG1104824-4 QC Sample: L1812057-01 Client ID: GWW-101						
Aluminum, Dissolved	ND	ND	mg/l	NC		20
Arsenic, Dissolved	0.008	0.008	mg/l	2		20
Barium, Dissolved	ND	ND	mg/l	NC		20
Boron, Dissolved	ND	ND	mg/l	NC		20
Calcium, Dissolved	10.1	10.1	mg/l	0		20
Chromium, Dissolved	ND	ND	mg/l	NC		20
Cobalt, Dissolved	ND	ND	mg/l	NC		20
Copper, Dissolved	ND	ND	mg/l	NC		20
Iron, Dissolved	3.00	3.01	mg/l	0		20
Lead, Dissolved	ND	ND	mg/l	NC		20
Magnesium, Dissolved	4.20	4.25	mg/l	1		20
Manganese, Dissolved	0.033	0.034	mg/l	2		20
Molybdenum, Dissolved	ND	ND	mg/l	NC		20
Nickel, Dissolved	ND	ND	mg/l	NC		20
Potassium, Dissolved	ND	ND	mg/l	NC		20
Selenium, Dissolved	ND	ND	mg/l	NC		20
Silicon, Dissolved	10.7	10.7	mg/l	0		20
Silver, Dissolved	ND	ND	mg/l	NC		20
Sodium, Dissolved	12.1	12.1	mg/l	0		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01,03 QC Batch ID: WG1104824-4 QC Sample: L1812057-01 Client ID: GWW-101					
Strontium, Dissolved	0.051	0.051	mg/l	0	20
Titanium, Dissolved	ND	ND	mg/l	NC	20
Vanadium, Dissolved	ND	ND	mg/l	NC	20
Zinc, Dissolved	ND	ND	mg/l	NC	20
Dissolved Metals - Mansfield Lab Associated sample(s): 01,03 QC Batch ID: WG1104839-4 QC Sample: L1812057-01 Client ID: GWW-101					
Antimony, Dissolved	ND	ND	mg/l	NC	20
Beryllium, Dissolved	ND	ND	mg/l	NC	20
Cadmium, Dissolved	ND	ND	mg/l	NC	20
Thallium, Dissolved	ND	ND	mg/l	NC	20
Total Metals - Mansfield Lab Associated sample(s): 01,03 QC Batch ID: WG1105073-4 QC Sample: L1812057-03 Client ID: GWW-103					
Sulfur, Total	23.2	23.2	mg/l	0	20
Dissolved Metals - Mansfield Lab Associated sample(s): 01,03 QC Batch ID: WG1105586-4 QC Sample: L1812057-01 Client ID: GWW-101					
Mercury, Dissolved	ND	ND	mg/l	NC	20

INORGANICS
&
MISCELLANEOUS

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-01
Client ID: GWW-101
Sample Location: BELFAST, ME
Sample Depth:
Matrix: Water

Date Collected: 04/05/18 08:15
Date Received: 04/06/18
Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
UV Absorbance @ 254nm	0.023		Abs/cm	0.005	NA	1	-	04/07/18 06:10	121,5910B	GD
Alkalinity, Total	54.9		mg CaCO3/L	2.00	NA	1	-	04/10/18 09:33	121,2320B	BR
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	04/09/18 13:45	121,2540D	DW
Phosphorus, Total	0.122		mg/l	0.010	--	1	04/09/18 12:40	04/10/18 09:37	121,4500P-E	SD
Phosphorus, Soluble	0.125		mg/l	0.010	--	1	04/11/18 11:45	04/12/18 11:10	121,4500P-E	SD

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-03
Client ID: GWW-103
Sample Location: BELFAST, ME
Sample Depth:
Matrix: Water

Date Collected: 04/05/18 08:45
Date Received: 04/06/18
Field Prep: Field Filtered (Dissolved Metals & Phosphorus)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
UV Absorbance @ 254nm	0.011		Abs/cm	0.005	NA	1	-	04/07/18 06:10	121,5910B	GD
Alkalinity, Total	116.		mg CaCO3/L	2.00	NA	1	-	04/10/18 09:33	121,2320B	BR
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	04/09/18 13:45	121,2540D	DW
Phosphorus, Total	0.048		mg/l	0.010	--	1	04/09/18 12:40	04/10/18 09:38	121,4500P-E	SD
Phosphorus, Soluble	0.049		mg/l	0.010	--	1	04/11/18 11:45	04/12/18 11:11	121,4500P-E	SD

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-05
Client ID: SS-1
Sample Location: BELFAST, ME

Date Collected: 04/05/18 09:15
Date Received: 04/06/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	78.1		%	0.100	NA	1	-	04/07/18 13:53	121,2540G	RI

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

SAMPLE RESULTS

Lab ID: L1812057-06
Client ID: SS-2
Sample Location: BELFAST, ME

Date Collected: 04/05/18 11:30
Date Received: 04/06/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	73.2		%	0.100	NA	1	-	04/11/18 11:10	121,2540G	RI

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003
Lab Number: L1812057
Report Date: 04/13/18

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01,03 Batch: WG1104402-1										
UV Absorbance @ 254nm	ND		Abs/cm	0.005	NA	1	-	04/07/18 06:10	121,5910B	GD
General Chemistry - Westborough Lab for sample(s): 01,03 Batch: WG1104700-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	04/09/18 13:45	121,2540D	DW
General Chemistry - Westborough Lab for sample(s): 01,03 Batch: WG1104782-1										
Phosphorus, Total	ND		mg/l	0.010	--	1	04/09/18 12:40	04/10/18 09:11	121,4500P-E	SD
General Chemistry - Westborough Lab for sample(s): 01,03 Batch: WG1105083-1										
Alkalinity, Total	ND		mg CaCO3/L	2.00	NA	1	-	04/10/18 09:33	121,2320B	BR
General Chemistry - Westborough Lab for sample(s): 01,03 Batch: WG1105479-1										
Phosphorus, Soluble	ND		mg/l	0.010	--	1	04/11/18 11:45	04/12/18 10:58	121,4500P-E	SD

Lab Control Sample Analysis

Batch Quality Control

Project Name: BELFAST WATER DISTRICT

Project Number: 171.05027.003

Lab Number: L1812057

Report Date: 04/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01,03 Batch: WG1104402-2								
UV Absorbance @ 254nm	100		-			-		
General Chemistry - Westborough Lab Associated sample(s): 01,03 Batch: WG1104782-2								
Phosphorus, Total	99		-		80-120	-		
General Chemistry - Westborough Lab Associated sample(s): 01,03 Batch: WG1105083-2								
Alkalinity, Total	103		-		90-110	-		10
General Chemistry - Westborough Lab Associated sample(s): 01,03 Batch: WG1105479-2								
Phosphorus, Soluble	102		-		80-120	-		

Lab Duplicate Analysis
Batch Quality Control

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01,03 QC Batch ID: WG1104402-3 QC Sample: L1812057-03 Client ID: GWW-103						
UV Absorbance @ 254nm	0.011	0.010	Abs/cm	10		
General Chemistry - Westborough Lab Associated sample(s): 05 QC Batch ID: WG1104512-1 QC Sample: L1812057-05 Client ID: SS-1						
Solids, Total	78.1	79.0	%	1		20

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent
B	Absent
C	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1812057-01A	Vial HCl preserved	A	NA		2.8	Y	Absent		ME-8260(14)
L1812057-01B	Vial HCl preserved	A	NA		2.8	Y	Absent		ME-8260(14)
L1812057-01C	Vial HCl preserved	A	NA		2.8	Y	Absent		ME-8260(14)
L1812057-01D	Plastic 250ml unpreserved/No Headspace	A	NA		2.8	Y	Absent		ALK-T-2320(14)
L1812057-01E	Plastic 250ml H2SO4 preserved	A	<2	<2	2.8	Y	Absent		SPHOS-4500(28)
L1812057-01F	Plastic 250ml H2SO4 preserved	A	<2	<2	2.8	Y	Absent		TPHOS-4500(28)
L1812057-01G	Plastic 250ml HNO3 preserved	A	<2	<2	2.8	Y	Absent		B-SI(180),PB-SI(180),FE-SI(180),BA-SI(180),BE-6020S(180),TI-SI(180),AG-SI(180),AS-SI(180),CU-SI(180),MN-SI(180),NA-SI(180),NI-SI(180),AL-SI(180),CO-SI(180),SI-SI(180),SR-SI(180),TL-6020S(180),CR-SI(180),K-SI(180),MG-SI(180),MO-SI(180),SB-6020S(180),CA-SI(180),CD-6020S(180),HG-S(28),SE-SI(180),V-SI(180),ZN-SI(180)
L1812057-01H	Plastic 250ml HNO3 preserved	A	<2	<2	2.8	Y	Absent		TL-6020T(180),AS-TI(180),BA-TI(180),AG-TI(180),SI-TI(180),AL-TI(180),B-TI(180),CR-TI(180),MO-TI(180),NI-TI(180),S-TI(180),BE-6020T(180),CU-TI(180),PB-TI(180),SE-TI(180),TI-TI(180),ZN-TI(180),CO-TI(180),SB-6020T(180),V-TI(180),CD-6020T(180),FE-TI(180),HG-T(28),MG-TI(180),MN-TI(180),SR-TI(180),CA-TI(180),HARDT(180),K-TI(180),NA-TI(180)
L1812057-01I	Amber 500ml unpreserved	A	7	7	2.8	Y	Absent		UV-254(2)
L1812057-01J	Plastic 950ml unpreserved	A	7	7	2.8	Y	Absent		TSS-2540(7)
L1812057-01K	Amber 1000ml unpreserved	A	7	7	2.8	Y	Absent		8270TCL(7),8270TCL-SIM(7)
L1812057-01L	Amber 1000ml unpreserved	A	7	7	2.8	Y	Absent		8270TCL(7),8270TCL-SIM(7)
L1812057-02A	Plastic 250ml unpreserved/No Headspace	A	NA		2.8	Y	Absent		HOLD-WETCHEM()

*Values in parentheses indicate holding time in days

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1812057-03A	Vial HCl preserved	A	NA		2.8	Y	Absent		ME-8260(14)
L1812057-03B	Vial HCl preserved	A	NA		2.8	Y	Absent		ME-8260(14)
L1812057-03C	Vial HCl preserved	A	NA		2.8	Y	Absent		ME-8260(14)
L1812057-03D	Plastic 250ml unpreserved/No Headspace	A	NA		2.8	Y	Absent		ALK-T-2320(14)
L1812057-03E	Plastic 250ml H2SO4 preserved	A	<2	<2	2.8	Y	Absent		SPHOS-4500(28)
L1812057-03F	Plastic 250ml H2SO4 preserved	A	<2	<2	2.8	Y	Absent		TPHOS-4500(28)
L1812057-03G	Plastic 250ml HNO3 preserved	A	<2	<2	2.8	Y	Absent		B-SI(180),PB-SI(180),FE-SI(180),BA-SI(180),BE-6020S(180),TI-SI(180),AG-SI(180),AS-SI(180),CU-SI(180),MN-SI(180),NA-SI(180),NI-SI(180),AL-SI(180),CO-SI(180),SI-SI(180),SR-SI(180),TL-6020S(180),CR-SI(180),K-SI(180),MG-SI(180),MO-SI(180),SB-6020S(180),CA-SI(180),CD-6020S(180),HG-S(28),SE-SI(180),V-SI(180),ZN-SI(180)
L1812057-03H	Plastic 250ml HNO3 preserved	A	<2	<2	2.8	Y	Absent		TL-6020T(180),AS-TI(180),BA-TI(180),AG-TI(180),SI-TI(180),AL-TI(180),B-TI(180),CR-TI(180),MO-TI(180),NI-TI(180),S-TI(180),BE-6020T(180),CU-TI(180),PB-TI(180),SE-TI(180),TI-TI(180),ZN-TI(180),CO-TI(180),SB-6020T(180),V-TI(180),CD-6020T(180),FE-TI(180),HG-T(28),MG-TI(180),MN-TI(180),SR-TI(180),CA-TI(180),HARDT(180),K-TI(180),NA-TI(180)
L1812057-03I	Amber 500ml unpreserved	A	7	7	2.8	Y	Absent		UV-254(2)
L1812057-03J	Plastic 950ml unpreserved	A	7	7	2.8	Y	Absent		TSS-2540(7)
L1812057-03K	Amber 1000ml unpreserved	A	7	7	2.8	Y	Absent		8270TCL(7),8270TCL-SIM(7)
L1812057-03L	Amber 1000ml unpreserved	A	7	7	2.8	Y	Absent		8270TCL(7),8270TCL-SIM(7)
L1812057-04A	Plastic 250ml unpreserved/No Headspace	A	NA		2.8	Y	Absent		HOLD-WETCHEM()
L1812057-05A	Vial MeOH preserved	C	NA		4.2	Y	Absent		8260HLW(14)
L1812057-05B	Vial water preserved	C	NA		4.2	Y	Absent	06-APR-18 12:00	8260HLW(14)
L1812057-05C	Vial water preserved	C	NA		4.2	Y	Absent	06-APR-18 12:00	8260HLW(14)
L1812057-05D	Plastic 2oz unpreserved for TS	C	NA		4.2	Y	Absent		ME-TS-2540(7)
L1812057-05E	Metals Only-Glass 60mL/2oz unpreserved	C	NA		4.2	Y	Absent		BE-TI(180),AS-TI(180),AG-TI(180),CR-TI(180),NI-TI(180),TL-TI(180),CU-TI(180),PB-TI(180),SB-TI(180),SE-TI(180),ZN-TI(180),HG-T(28),CD-TI(180)
L1812057-05F	Glass 250ml/8oz unpreserved	C	NA		4.2	Y	Absent		8270TCL(14)

*Values in parentheses indicate holding time in days

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1812057-06A	Vial MeOH preserved	C	NA		4.2	Y	Absent		HOLD-8260HLW(14)
L1812057-06B	Vial water preserved	C	NA		4.2	Y	Absent	06-APR-18 12:00	HOLD-8260HLW(14)
L1812057-06C	Vial water preserved	C	NA		4.2	Y	Absent	06-APR-18 12:00	HOLD-8260HLW(14)
L1812057-06D	Plastic 2oz unpreserved for TS	C	NA		4.2	Y	Absent		HOLD-WETCHEM(),ME-TS-2540(7)
L1812057-06E	Glass 60mL/2oz unpreserved	C	NA		4.2	Y	Absent		HOLD-METAL(180)
L1812057-06F	Glass 250ml/8oz unpreserved	C	NA		4.2	Y	Absent		8270TCL-PAH(14)
L1812057-07A	Vial HCl preserved	B	NA		2.4	Y	Absent		HOLD-8260(14)
L1812057-07B	Vial HCl preserved	B	NA		2.4	Y	Absent		HOLD-8260(14)
L1812057-07C	Vial HCl preserved	B	NA		2.4	Y	Absent		HOLD-8260(14)
L1812057-07D	Plastic 250ml unpreserved/No Headspace	B	NA		2.4	Y	Absent		HOLD-WETCHEM()
L1812057-07E	Plastic 250ml unpreserved/No Headspace	B	NA		2.4	Y	Absent		HOLD-WETCHEM()
L1812057-07F	Plastic 250ml H2SO4 preserved	B	<2	<2	2.4	Y	Absent		HOLD-WETCHEM()
L1812057-07G	Plastic 250ml H2SO4 preserved	B	<2	<2	2.4	Y	Absent		HOLD-WETCHEM()
L1812057-07H	Plastic 250ml HNO3 preserved	B	<2	<2	2.4	Y	Absent		HOLD-METAL-DISSOLVED(180)
L1812057-07I	Plastic 250ml HNO3 preserved	B	<2	<2	2.4	Y	Absent		HOLD-METAL-TOTAL(180)
L1812057-07J	Amber 500ml unpreserved	B	7	7	2.4	Y	Absent		HOLD-WETCHEM(),PEST-8081(7)
L1812057-07K	Plastic 950ml unpreserved	B	7	7	2.4	Y	Absent		HOLD-WETCHEM()
L1812057-07L	Amber 1000ml unpreserved	B	7	7	2.4	Y	Absent		HOLD-8270(7)
L1812057-07M	Amber 1000ml unpreserved	B	7	7	2.4	Y	Absent		HOLD-8270(7)
L1812057-08A	Vial HCl preserved	B	NA		2.4	Y	Absent		HOLD-8260(14)
L1812057-08B	Vial HCl preserved	B	NA		2.4	Y	Absent		HOLD-8260(14)
L1812057-08C	Vial HCl preserved	B	NA		2.4	Y	Absent		HOLD-8260(14)
L1812057-08D	Plastic 250ml unpreserved/No Headspace	B	NA		2.4	Y	Absent		HOLD-WETCHEM()
L1812057-08E	Plastic 250ml unpreserved/No Headspace	B	NA		2.4	Y	Absent		HOLD-WETCHEM()
L1812057-08F	Plastic 250ml H2SO4 preserved	B	<2	<2	2.4	Y	Absent		HOLD-WETCHEM()
L1812057-08G	Plastic 250ml H2SO4 preserved	B	<2	<2	2.4	Y	Absent		HOLD-WETCHEM()
L1812057-08H	Plastic 250ml HNO3 preserved	B	<2	<2	2.4	Y	Absent		HOLD-METAL-DISSOLVED(180)
L1812057-08I	Plastic 250ml HNO3 preserved	B	<2	<2	2.4	Y	Absent		HOLD-METAL-TOTAL(180)

*Values in parentheses indicate holding time in days

Project Name: BELFAST WATER DISTRICT
Project Number: 171.05027.003

Lab Number: L1812057
Report Date: 04/13/18

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1812057-08J	Amber 500ml unpreserved	B	7	7	2.4	Y	Absent		HOLD-WETCHEM()
L1812057-08K	Plastic 950ml unpreserved	B	7	7	2.4	Y	Absent		HOLD-WETCHEM()
L1812057-08L	Amber 1000ml unpreserved	B	7	7	2.4	Y	Absent		HOLD-8270(7)
L1812057-08M	Amber 1000ml unpreserved	B	7	7	2.4	Y	Absent		HOLD-8270(7)
L1812057-09A	Vial HCl preserved	B	NA		2.4	Y	Absent		HOLD-8260(14)
L1812057-09B	Vial HCl preserved	B	NA		2.4	Y	Absent		HOLD-8260(14)
L1812057-09C	Vial HCl preserved	A	NA		2.8	Y	Absent		HOLD-8260(14)
L1812057-09D	Vial HCl preserved	A	NA		2.8	Y	Absent		HOLD-8260(14)

*Values in parentheses indicate holding time in days

Project Name:	BELFAST WATER DISTRICT	**Lab Number:**	L1812057
Project Number:	171.05027.003	**Report Date:**	04/13/18

GLOSSARY

Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

1	- The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A	- Spectra identified as "Aldol Condensation Product".
B	- The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related

Report Format: Data Usability Report

Project Name:	BELFAST WATER DISTRICT	**Lab Number:**	L1812057
Project Number:	171.05027.003	**Report Date:**	04/13/18

Data Qualifiers

projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the reporting limit (RL) for the sample.

Report Format: Data Usability Report

Project Name:	BELFAST WATER DISTRICT	**Lab Number:**	L1812057
Project Number:	171.05027.003	**Report Date:**	04/13/18

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, EPA 351.1, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D.**
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Be, Cd, Cr, Cu, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

3 coolers

CHAIN OF CUSTODY

PAGE 1 OF 1

ALPHA ANALYTICAL
8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Date Rec'd in Lab: 4/6/18

ALPHA Job #: L1812057

Client Information

Client: Ransom Consulting Inc.
Address: 112 Corporate Drive, Portsmouth, NH 03801
Phone: 603-436-1490
Email: elizabeth.ransom@ransomenv.com
cc: drew.fuchs@ransomenv.com

Project Information

Project Name: Belfast Water District
Project Location: Belfast, ME
Project #: 171.05027.003
Project Manager: Elizabeth Ransom
ALPHA Quote #:

Turn-Around Time

☑ Standard ☐ RUSH (only confirmed if pre-approved!)
Date Due:

Report Information - Data Deliverables

☒ ADEx ☒ EMAIL

Billing Information

☐ Same as Client info PO #: 10754

Regulatory Requirements & Project Information Requirements

☐ Yes ☐ No MA MCP Analytical Methods ☐ Yes ☑ No CT RCP Analytical Methods
☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
☐ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets)
☐ Yes ☐ No NPDES RGP
☐ Other State /Fed Program _____ Criteria _____

Additional Project Information:
1. Dissolved metals & dissolved phosphorus were field filtered.
2. low level VOC samples for SS-1 & SS-2 were frozen 4/6/18@12:00.

ANALYSIS: VOC: ☒ 8260 ☐ 624 ☐ 524.2 | SVOC: ☒ ABN ☒ PAH 8270 | TAL Metals (Total & Dissolved) | Phosphorus (Total & Dissolved) | TPH: ☐ Quant Only ☐ Fingerprint | Total Sulfur | Boron, Molybdenum, Silicon, Strontium (Total & Dissolved) | Alkalinity & Hardness | Total Suspended Solids | UV Absorbance | Total PP13 Metals | Color/Turbidity/Dissolved CO2

SAMPLE INFO: Filtration ☒ Field ☐ Lab to do; Preservation ☐ Lab to do

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	VOC	SVOC	PAH	TAL Metals	Phosphorus	TPH	Total Sulfur	Boron, Molybdenum, Silicon, Strontium	Alkalinity & Hardness	Total Suspended Solids	UV Absorbance	Total PP13 Metals	Color/Turbidity/Dissolved CO2	Sample Comments	TOTAL # BOTTLES
12057-01	GWW-101 DAF 4/6/18	4/5/18	8:15	GW	DAF	X	X	X	X		X		X	X	X	X			Field filtered dissolved metals + Phos	11
-02	[redacted] GWW-101	4/5/18	8:15	GW	DAF												X		HOLD	2
-03	GWW-103	4/5/18	8:45	GW	DAF	X	X	X	X		X		X	X	X	X			Field filtered dissolved metals + Phos	11
-04	GWW-103	4/5/18	8:45	GW	DAF												X		HOLD	2
-05	SS-1	4/5/18	9:15	Soil	DAF	X	X									X			low level VOCs frozen 4/6/18@12:00	6
	[redacted] DAF 4/6/18																			
-06	SS-2	4/5/18	11:30	Soil	DAF														HOLD ALL	6 frozen DAF
-07	GWW-101	4/4/18	8:30	GW	DAF														HOLD ALL	13
-08	GWW-103	4/4/18	9:15	GW	DAF														HOLD ALL	13
-09	Trip Blank					X													HOLD	2

Container Type	V	A	P	P	P		P		P	P	P	P	A	P/A	
Preservative	B/F	A	C	D	C		C		C	A	A	A	N	A	

Container Type: P= Plastic, A= Amber glass, V= Vial, G= Glass, B= Bacteria cup, C= Cube, O= Other, E= Encore, D= BOD Bottle

Preservative: A= None, B= HCl, C= HNO_3, D= H_2SO_4, E= NaOH, F= MeOH, G= $NaHSO_4$, H= $Na_2S_2O_3$, I= Ascorbic Acid, J= NH_4Cl, K= Zn Acetate, O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	4/6/18 16:30	[signature]	4/6/18 16:[illegible]
[signature] AAL	4/6/18	[signature] AAL	4/6/18 1750
[signature]	4/6/18 1930	[signature]	4/6/18 1932

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)

ATTACHMENT G

Responses to Stormwater Management Technical Review Memorandum

Response to Review Comments
Nordic Aquafarms Inc., Land-based Aquaculture Facility
Belfast, Maine
L-28319-26-A-N

Ransom Consulting, Inc.
Project 171.05027.008

TECH environmental
FOCUSED KNOWLEDGE. REAL SOLUTIONS.

Sound Pressure Level Sound Data for a 1,500 ekW Exhaust	Octave Band (dB)									Broadband (dBA)	Source
Caterpillar3512 ENGINE	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz		
from 15 meters away	88	88	105	99	90	89	89	89	86	97	Gen Set Package Performance Data [DM8260] 12/4/09

Sound Data for Commercial Grade Silencer	Octave Band (dB)									Source
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
	10	14	23	28	22	17	15	15	16	GT A201-2100 Silencer