STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JANET T. MILLS
GOVERNOR

GERALD D. REID
COMMISSIONER

MEMORANDUM

TO: Board of Environmental Protection

FROM: Staff, Bureau of Land Resources

RE: Introduction to Bureau of Land Resources Memos
Nordic Aquafarms, Inc. #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

DATE: May 13, 2020

Introduction. On May 17, 2019, Nordic Aquafarms, Inc. (Nordic) filed applications for Site Location of Development Law (Site Law) and Natural Resources Protection Act (NRPA) permits to construct a land-based, salmon aquaculture facility. The proposed facility would consist of a seawater access system, several buildings for fish production, a water treatment plant, an administrative office, and other associated structures and infrastructure.

Statutory and Regulatory References. The relevant statutes and rules with the standards governing Nordic's applications are: Site Law, 38 M.R.S. §§ 481–489-E; NRPA, 38 M.R.S. §§ 480-A–480-JJ; the Erosion and Sedimentation Control Law, 38 M.R.S. § 420-C; the Stormwater Management Law, 38 M.R.S. § 420-D; and Department rules, Chapters 310, 315, 335, 372, 373, 375, 376, 500, and 587.

Environmental Issues. To assist the Board in its review of the applications, staff of the Department's Bureau of Land Resources have prepared three memos that address key components of Nordic's proposal and the associated standards. Additional components of Nordic's project and additional review standards will need to be evaluated by the Board as part of its final decision-making process. The memos focus on:

- Proposed Groundwater and Surface Water Usage
- Proposed Impacts to Protected Natural Resources
- Proposed Seawater Access System (Pipeline)

Along with the discussion in the memos, staff offer potential conditions for the Board's consideration. If the Board determines Nordic's proposal does not meet the standards for obtaining a permit, conditions would be an unnecessary component of any final decision. Should the Board decide the applicable standards have been met, staff offer the possible conditions to aid the Board in its thinking about the types of requirements that could be included in a permit.

At the deliberation session, staff will be prepared to discuss these memos and, more broadly, to answer questions to assist the Board with its review of the project under Site Law and NRPA.

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MEMORANDUM

TO: Board of Environmental Protection

FROM: Staff, Bureau of Land Resources

RE: Nordic Aquafarms, Inc. – Proposed Groundwater & Surface Water Usage

DATE: May 13, 2020

Overview. As part of its land-based salmon aquaculture facility Nordic Aquafarms, Inc. (Nordic) proposes to withdraw freshwater from on-site groundwater wells, surface water from the Little River and public water from Belfast Water District (BWD). The project would also withdraw seawater from an intake pipe embedded in Belfast Bay. Intervenors expressed concern regarding water use at the site and potential effects on their private wells, salt water intrusion, and the stability of the Lower Dam which is adjacent to the site and the proposed location of an intake pipe. The Board heard oral testimony on this topic at its public hearing. The Board also observed the project site at its site visit on October 24, 2019 and February 10, 2020. This memorandum addresses Nordic's proposed use of ground and surface water use.

Nordic stated the overall baseline consumption need for the proposed project is approximately 1,000 gpm (gallons per minute). Freshwater is necessary to create an optimal saltwater mix for growth of salmon and necessary for potable drinking water, however, the primary intake of water would be seawater. The applicant stated that it designed a water use plan that gives them flexibility should the need to make operational adjustments become necessary and proposed the following water use for the project:

- Groundwater withdrawal, three on-site production wells for a total of 455 gpm
- Surface water withdrawal from Belfast Reservoir One (otherwise known as the lower reservoir), 70 gpm plus in-flows (maximum 250 gpm) (Little River)
- Contract with Belfast Water District to supply 500 gpm of drinking water, process water and other uses pulled from the Goose River aquifer
- Seawater intake 3,925 gpm

Freshwater supplied by BWD would primarily be used for domestic use and fish processing. With additional treatment, water supplied from BWD could be used in the grow tanks, however, it is not the applicant's preference. Freshwater from the proposed wells and surface water withdrawal would be used in the grow-out tanks, in greater quantities for the younger fish. Generally, as the fish age, they tolerate increased levels of salinity and more salt water is used in the tanks. Seawater would be drawn through two proposed intake pipes located approximately 6,400 feet from shore, elevated ten feet off the seafloor and including a one-inch mesh screen

over the ends of the pipe. Concerning water use, the applicant states that the project has been designed with flexibility to account for decreased fresh process water by increasing saltwater intake rates and increasing the salinity of the process water. Similarly, as discharge from the Little River into Belfast Reservoir Number One (lower reservoir) increases above baseflow, groundwater withdrawals can be slowed and more of the total process water can be supplied by surface water. This flexibility provides the operation leeway to allow for system maintenance (well maintenance or repairs) and hydrologic variability (decreased surface water inflows).

Nordic entered into an agreement with BWD to purchase 720,000 gallons per day or 500 gpm. The agreement requires Nordic to purchase a minimum of 100,000,000 gallons per year or make a payment in lieu of the minimum purchase. This water will be withdrawn from BWD's existing infrastructure in the Goose River aquifer. A 2018 A.E. Hodsdon Engineers report for Belfast Water District (referred to later as the 2018 capacity report) recommends that BWD bring one additional well, the Talbot well, which is in place but not currently operational, on line to meet the demands of the project.

Nordic submitted a site specific Hydrogeologic Investigation Report as Appendix 15-A of the application for the project site, which is located in the Little River aquifer. The report included a test well drilling program based on interpretation of a site-wide electrical resistivity survey, four separate aquifer pumping tests, and the development of a numerical groundwater flow model. The report identified potential sources of contamination in the vicinity of the site, which do not represent any significant threat to on site groundwater quality. It also presents data that can be interpreted as indicating salt water intrusion in the easternmost portion of the project area.

The project includes the construction of a pumping station and an Intake Water Treatment Plant (IWTP), both of which would be constructed during Phase 1. The IWTP has been designed with a total flow capacity of approximately 5,130 gallons per minute (gpm), divided into 3,925 gpm seawater and 1,205 gpm freshwater.

Nordic proposes a monitoring plan to evaluate conditions of local groundwater and surface water resources that may be impacted by the proposed development, groundwater extraction, and surface water withdrawal. ("Water Resources Monitoring Plan" prepared by Ransom Engineering dated April 16, 2019 (WRMP)). Annual reports would be provided to the Department, City of Belfast and Town of Northport. Reports for each year ending Dec 31 would be submitted by March 31 of the following year. NORDIC would also provide the Department, City of Belfast and Town of Northport with quarterly tracking reports that would also include the volume of water withdrawn, water elevations, and additional parameters at monitoring points identified in the Monitoring Plan. For the first three months of groundwater extraction and surface water withdrawal following both initial Phase 1 and Phase 2 operations, Nordic would submit interim monthly reports of pumping rates, precipitation, groundwater and surface water levels. The purpose of the interim report is to assess any adverse impacts on water resources indicated by monthly data and propose operational modifications if appropriate.

During the public hearing, Nordic stated that it has the ability to reduce its overall water demand if necessary.

Statutory and Regulatory Criteria. Key standards related to the proposed water use are:

- NRPA: 38 M.R.S. §§ 480-D(3) and (10)
- Site Law: 38 § 484(3); Ch. 375, §§ 7 and 8
- Ch. 587

Site Law and NRPA require that an applicant develop a project consistent with State environmental standards and the provisions of these laws.

Site Law states that the Department shall approve a proposal when if finds the statutory review standards in 38 M.R.S. § 484 are met. The most pertinent finding required finding when evaluating the applicant's proposed water use is that:

> 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, air quality, water quality or other natural resources in the municipality or in neighboring municipalities.
>
> . . .
>
> F. In making a determination under this subsection regarding a structure to facilitate withdrawal of groundwater, the department shall consider the effects of the proposed withdrawal on waters of the State, as defined by section 361-A, subsection 7; water-related natural resources; and existing uses, including, but not limited to, public or private wells, within the anticipated zone of contribution to the withdrawal. In making findings under this paragraph, the department shall consider both the direct effects of the proposed water withdrawal and its effects in combination with existing water withdrawals.

38 M.R.S. § 484(3).

NRPA establishes that the Department shall grant a permit when it finds that the applicant has demonstrated the proposed activity meets the standards set forth in 38 M.R.S. § 480-D. This section contains the following standards that are particularly pertinent to review of the water use proposed by the applicant:

> The activity will not unreasonably harm any significant wildlife habitat, freshwater wetland plant habitat, threatened or endangered plant habitat, aquatic or adjacent upland habitat, travel corridor, freshwater, estuarine or marine fisheries or other aquatic life. 38 M.R.S. § 480-D(3).
>
> If the proposed activity includes a significant groundwater well, the applicant must demonstrate that the activity will not have an undue unreasonable effect on waters of the State, as defined in section 361-A, subsection 7, water-related natural resources and existing uses, including, but not limited to, public or private wells within the anticipated zone of contribution to the withdrawal. In making findings under this subsection, the department shall consider both the direct

effects of the proposed withdrawal and its effects in combination with existing water withdrawals 38 M.R.S. § 480-D(10).

The Department's rules, in Chapter 375, §§ 7 and 8 elaborate on how a developer should address the Site Law criteria by the adequate provision for the protection of ground water quality and protection of groundwater quantity. The Department's rules, in Chapter 587, establish river and stream flows to protect natural aquatic life and other designated uses in Maine waters.

Issues Raised by Intervenors.

- Upstream Watch:
  - Saltwater intrusion
  - What's the contingency plan?
  - Upper dam is in poor condition and if fails it could affect the integrity of Lower Dam
- The Fish are Okay:
  - G. Flimlin, retired aquaculture teacher from Rutgers, closest abutter has reviewed project and sees no cause for alarm. Dirk Faegre testified that he is satisfied with Nordic's proposal to monitor his well and commitment to resolve unanticipated problems at the well in the future.
  - 2018 A.E. Hodsdon Engineers report for Belfast Water District (BWD) indicates adequate water supply for BWD to serve Nordic and its existing customers
- Northport Village Corporation:
  - Lower Dam is in poor condition with no plans for maintenance
  - Surface Water is contaminated (turbidity) and requires treatment (pre-filed testimony of B. Bryden)
  - Groundwater depends on recharge from precipitation that would be intercepted and rerouted by perimeter drains and stormwater management system.
  - Nordic has already experienced salt water intrusion into one of its wells and testified that existing wells would experience a drop of 10-14 feet in water level
- Lawrence Reichard
  - Nordic's other facilities are 1/5th the size of proposed facility, states that they don't know how much water they would use and that the company is not capable of running a facility of this size.
  - Climate Change would bring uncertainty
- Eleanor Daniels & Donna Broderick
  - Abutters concerned with water use (July 3, 2019 pre-filed testimony)

Discussion

Department staff reviewed the proposed project, including information received from the public, intervenors, and during the public hearing, in consideration of the above referenced statutes and rules.

Dr. John Hopeck, Division of Environmental Assessment, wrote two memos (September 17, 2019 and January 14, 2020 revised January 27, 2020):

- Dr. Hopeck provided a number of technical comments regarding the proposed monitoring plan. During construction, he recommended the applicant collect background data regarding groundwater level and quality and measurement of those data no less often than monthly for deep unpumped wells, although more frequent measurement would be appropriate for shallow overburdened wells and water supply wells; drinking water wells and shallow groundwater wells are likely to show more rapid fluctuations in water levels and should be monitored more frequently; surface water levels may vary rapidly and should be monitored in near-real time. Shorter reporting intervals between collection of groundwater level data would be necessary during the period ramping up to full production and for some time after, depending on the amount and rate of groundwater withdrawal. Dr. Hopeck indicates that it may be appropriate to reduce data collection and reporting frequency at some or all monitoring points if groundwater usage by the project stabilizes at some level less than anticipated full production volume, provided that the Department determines that data collected to that point show no unreasonable impact or threats of impact on groundwater or surface water quality and quantity. Any production increases beyond this lower rate would then require approval by the Department and would trigger the return to the original monitoring plan.

- The applicant agreed to install new overburden monitoring wells as pairs of shallow and deep wells with shallow wells screened in the silty overburden and deeper wells extending to and below the overburden/weathered rock transition. The applicant also proposes to install shallow and deep piezometers in the vicinity of wetland W7. Dr. Hopeck noted these should be installed as close to possible to a wetland monitoring tract. The location of these piezometers and wetland tract location should be shown in the revised monitoring plan to be submitted for review and approval. Pressure transducers and automated data loggers should be used unless an acceptable alternative is demonstrated. Water levels in shallow piezometers could be expected to fluctuate relatively rapidly, so that monthly monitoring would not be sufficient to assess the range of normal conditions during the background monitoring phase, although quarterly data reporting should be acceptable during the background data collection phase. Automated data collection would allow frequent measurements sufficient to assess conditions before and during operation of the pumping well. If the rate of variation in the wetland piezometers is shown to be relatively slow during operation of the facility, the applicant may apply to reduce the measurement frequency.

- The relevant section of the Little River channel presents certain problems for collection of accurate flow data at some times of year and under certain flow conditions. However, instrumentation can be installed to obtain real-time and continuous data during most of the year at a measured cross section, particularly since the bedrock channel minimizes the risk of major changes in channel cross-section, and an appropriate location for such measurement should be defined as part of the background monitoring plan. Monthly or even weekly stage measurements are not adequate to accurately assess pumping impacts on surface water systems, which are subject to rapid changes due to precipitation and other factors, or to capture the possible range of flow conditions, although monthly download frequency may be acceptable during non-pumping periods, provided that data

storage is sufficient to allow automated data collection at a frequency acceptable to the Department.

- The applicant has agreed to record intake data daily "on a source-specific basis." Such usage prior to operational-level usage can be reported to the Department monthly, but more frequent reporting and possibly a more detailed breakdown to identify peak usage times could be required at some point if the Department finds such information useful in interpreting streamflow, stage, or groundwater elevation data.

- Dr. Hopeck recommends that the applicant utilize an on-site weather station or a weather station controlled by the applicant, within the Little River watershed and near the areas potentially impacted by the development.

- The applicant agreed with Department that it is necessary to establish warning levels that are "indicative of conditions trending toward a potential adverse impact, as opposed to being confirmation of occurrence," and that these levels must be defined by analysis of the baseline data and approved by the Department.

- BWD draws its water from the Goose River sand and gravel aquifer and, according to the applicant, BWD monitors water quantity and quality of the Goose River aquifer. The applicant stated that this information would be provided to the Department along with additional information regarding flows and flow measurement locations. However, this information has not been submitted to the Department to date. Dr. Hopeck requests this information, along with a determination of minimum flows required in the Goose River to maintain flows consistent with Department requirements, prior to the start of construction. The information is required to define the operational standard for review and approval sufficiently far in advance of the operational phase for adequate background data to be obtained and for effective performance standards and warning and action levels to be determined. A monitoring plan similar to the one required for the Little River and its associated aquifer should be required for the Goose River and its associated aquifer. The monitoring plan should include equipment setup at a measured cross section of the river where reliable data can be collected to relate water depth to flow; a data logger recording water depth at frequent intervals and some other system to function during ice and very high flow conditions, unless the Department determines that data collection during predictable spring high flows is not required; piezometers to record water levels in the aquifer near the river and pumping well(s); and daily usage data from the pumping well(s). Dr. Hopeck recommends including a Special Condition to resolve this matter.

- Dr. Hopeck further recommends implementation of a monitoring plan to assess project impacts on existing groundwater and surface waters. Possible impacts include salt water intrusion and lower water levels in wells, and reduced groundwater discharge to wetlands and surface waters, including induced recharge from the Little River and Goose River. Impacts of groundwater withdrawal on streams and wetlands near the project site are expected to relate largely to the extent to which they receive groundwater discharge from the weathered bedrock or deeper fractured bedrock aquifer, and the extent to which the overlying marine sediments isolate these resources from groundwater in the bedrock.

> Although some elements of a monitoring plan have been agreed on, a final monitoring plan has not been submitted for review and approval. The applicant has agreed with the Department that it is necessary to establish, as part of the monitoring plan, warning levels that are "indicative of conditions trending toward a potential adverse impact, as opposed to being confirmation of occurrence," and that these levels must be defined by analysis of the baseline data and approved by the Department. The monitoring plan must be finalized as soon as possible so that sufficient background data can be collected to characterize pre-operation conditions and to allow for determination of warning and action levels at each monitoring location; any changes to this plan, once approved, will require Department approval prior to implementation. Dr. Hopeck recommends a Special Condition requiring review and approval of this plan prior to construction.

Rob Mohlar, an engineer in the Division of Environmental Assessment, reviewed the application and determined that the proposed surface water usage from the lower reservoir of the Little River was developed to comply with Chapter 587. (R. Mohlar email to B. Callahan July 30, 2019)

Based on current BWD operations, the Department expects that the public water supply system within the Goose River aquifer is being operated in compliance with Chapter 587, however, no information has been provided to date. The issue is relevant to this project because Nordic proposes to utilize water from BWD in its operations, enough water to require an additional ground water well to be put into service as recommended by the 2018 capacity analysis conducted by A.E. Hodsdon Engineers. Nordic's use will increase the amount of water withdrawn from the Goose River aquifer which may impact surface or groundwater in the Goose River aquifer. The extent of the potential impact is unclear. The 2018 capacity analysis submitted by the applicant explicitly states that this increased use will result in induced recharge from the Goose River to the aquifer, and consequently lower flows in the Goose River. Additional information prior to operation by Nordic is required to evaluate the potential impacts.

In order to ensure the Standards of both the Site Law and the NRPA are met, the Board may elect to consider requiring as a condition the submission of monitoring plans for both the Little River and Goose River, along with the associated aquifers, as recommended by Dr. Hopeck. The Board could require that monitoring plans must be reviewed and approved by the Department prior to implementation. The Board also could require collection of background data during project construction to the extent practicable. Submission of regular monitoring reports also could be required s as recommended by Dr. Hopeck. Any future changes to the monitoring plan would then have to be reviewed and approved by the Department.

Possible conditions are included at the end of this memo to assist the Board in its review of the project and with its deliberations.

There are no regulations that govern the amount of seawater that can be withdrawn other than §480-D(3), which considers the potential to unreasonably harm estuarine or marine fisheries or other aquatic life. Staff's review indicates because of the volume of seawater, the location and configuration of the intake pipes, the proposed seawater withdrawal would not unreasonably harm estuarine or marine fisheries, or other aquatic life.

Post-hearing Briefs. In a letter dated February 25, 2020, Kristin Racine, on behalf of Northport Village and Upstream Watch, argues that the Board should require a revised monitoring plan prior to issuance of any license.

Nordic responded in its post-hearing brief, that it proposes to submit an addendum to its WRMP that will propose alert and action levels in appropriate locations (private water supply wells, key surface water and groundwater points, etc.) and consider the baseline data collected, groundwater model predictions and appropriate thresholds. It will also include remedial actions Nordic can undertake in the event that adverse impact is observed to be imminent or occurring. Nordic continues to state that the implementation of its proposed WRMP will ensure that the significant groundwater well network would avoid unreasonable adverse impacts.

Nordic also stated that the surface water withdrawal from the Little River would primarily operate as run-of-river withdrawal, except that in the absence of inflow to the lower reservoir, a withdrawal of 70 gpm is allowed. It argues that because the Little River does not continue below the lower dam, up to 100% of the inflows into the lower reservoir could be withdrawn and the project would still meet Chapter 587. The estimated 250 gpm surface water withdrawal is based on 5% of the duration flow (a 5% chance that stream flows will be 250 gpm or less in any given year). Based on the estimated mean annual flow of the Little River, most of the year, the inflow to the lower reservoir will exceed the total freshwater demand for the project at full build-out.

Potential Conditions

Should the Board find all the review standards have been met and issue a permit for the project, possible conditions the Board may wish to consider include:

1. Prior to the start of construction, the applicant shall submit for review and approval a specific monitoring program for the Little River aquifer identifying the instrumentation to be installed at specific locations by specific dates, and the proposed monitoring parameters and frequencies at each location. The monitoring plan shall include all the monitoring components the applicant has agreed to include to date, as well as information detailing the location and depths of the proposed overburden monitoring wells; the installation of shallow and deep piezometers in the vicinity of wetland W7; a monitoring tract must be established in wetland W7; information regarding instrumentation to be installed in the relevant section of the Little River to obtain real-time and continuous flow data, during most of the year; a plan to utilize an on-site weather station or a weather station controlled by the applicant, within the Little River watershed and near the areas potentially impacted by the development, and weather station data shall be included in monitoring reports. The monitoring program shall propose warning levels that are indicative of conditions trending toward a potential adverse impact and that these levels must be defined by analysis of the baseline data as well as remedial actions. Any future changes to the monitoring plans must be pre-approved by the Department prior to implementation.

2. During construction, the applicant shall collect background data regarding groundwater level and quality, and report those results to the Department no less

often than monthly; drinking water wells and shallow groundwater wells are likely to show more rapid fluctuations in water levels and should be monitored more frequently; surface water levels may vary rapidly and should be monitored in near-real time. Details of the background data collection monitoring and reporting shall be proposed in the monitoring plan to be submitted by the applicant and approved by the Department prior to the start of construction.

3. Prior to project construction, the applicant shall submit information establishing background data regarding water quantity and quality of the Goose River and its associated sand and gravel aquifer including information regarding river flows and flow measurement locations. Monitoring requirements for the Goose River and the associated aquifer are similar to those required for the Little River and its associated aquifer. The monitoring plan shall include equipment setup at a measured cross section of the river where reliable data can be collected to relate water depth to flow; a data logger recording water depth at frequent intervals and some other system to function during ice and very high flow conditions, unless the Department determines that data collection during predictable spring high flows is not required; piezometers to record water levels in the aquifer near the river and pumping well(s); and daily usage data from the pumping well(s).

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MEMORANDUM

TO: Board of Environmental Protection

FROM: Staff, Bureau of Land Resources

RE: Nordic Aquafarms, Inc. – Proposed Impacts to Protected Natural Resources

DATE: May 13, 2020

Overview. On May 17, 2019, Nordic Aquafarms, Inc. (Nordic) filed an application for a Site Location of Development Act (Site Law) permit and an application for a Natural Resources Protection Act (NRPA) permit to construct a land-based salmon aquaculture facility. As part of its project, Nordic proposes to permanently and temporarily alter freshwater wetlands, coastal wetlands, and NRPA-jurisdictional streams. The amount of impact to these protected resources evolved during the Department's review of the project as a result of design changes, revised wetland delineations, and shifting wetland and stream boundaries – several areas initially identified as wetland drainages were later determined to be streams as defined in NRPA, 38 M.R.S. §§ 480-B(9).

Department staff visited the project site on several occasions to assess on-site natural resources. The Board also observed the locations of on-site natural resources at its site visits on October 24, 2019 and February 10, 2020.

The following table summarizes the proposed impacts:

Resource Type	Permanent Alteration	Temporary Alteration	Total
Freshwater Wetlands	192,070 square feet	3,960 square feet	196,030 square feet
Coastal Wetlands	6,703 square feet	638,580 square feet	645,283 square feet
Streams	1,917 linear feet	120 linear feet	2,037 linear feet

This memo focuses on evaluation of the potential impacts of the project on protected natural resources as defined in NRPA.

Statutory and Regulatory Criteria. Key standards related to review of the impact of the project on protected natural resources are:

- NRPA: 38 M.R.S. § 480-D(1), (3), (4), and (5); Ch. 310
- Site Law: 38 M.R.S. § 484(3); Ch. 375, §§ 3, 6, and 15

Site Law and NRPA require that an applicant develop a project consistent with State environmental standards and the provisions of these laws and accompanying rules.

While what qualifies as a protected natural resource is defined in NRPA and this act focuses on protecting these resources, the Department also considers these same impacts, along with impacts beyond those covered by NRPA, as part of its Site Law review.[1] The evaluation of the potential impacts of the project on resources not regulated by NRPA is outside the scope of this memo.

NRPA establishes that the Department shall grant a permit when it finds that the applicant has demonstrated the proposed activity meets the standards set forth in 38 M.R.S. § 480-D. This section contains the following standards that are particularly pertinent to review of the wetland and stream impacts proposed by the applicant:

> The activity will not unreasonably harm any significant wildlife habitat, freshwater wetland plant habitat, threatened or endangered plant habitat, aquatic or adjacent upland habitat, travel corridor, freshwater, estuarine or marine fisheries or other aquatic life. 38 M.R.S. § 480-D(3).
>
> The activity will not unreasonably interfere with the natural flow of any surface or subsurface waters. 38 M.R.S. § 480-D(4).
>
> The activity will not violate any state water quality law, including those governing the classification of the State's waters. 38 M.R.S. § 480-D(5).

The Wetlands and Waterbodies Protection Rules, 06-096 C.M.R. ch. 310 (last amended November 11, 2018), interpret and elaborate on the NRPA criteria for obtaining a permit. Pursuant to the General Standards found within Chapter 310, § 5, applicants must meet the following standards, Avoidance, Minimal Alteration, Compensation, and No Unreasonable Impacts:

> Avoidance. . . . The applicant shall provide an analysis of alternatives . . . in order to demonstrate that a practicable alternative does not exist. Ch. 310, § 5(A).
>
> Minimal Alteration. The amount of wetland to be altered must be kept to the minimum amount necessary. Ch. 310, § 5(B).

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[1] The key Site Law standards that overlap with the NRPA, are Ch. 375, § 3 (no unreasonable alteration of natural drainage ways), § 6 (no unreasonable adverse effect on surface water quality), and § 15 (protection of wildlife and fisheries); they are not addressed individually in this memo.

> Compensation. Compensation is the off-setting of a lost wetland function with a function of equal or greater value. The goal of compensation is to achieve no net loss of wetland functions and values. Every case where compensation may be applied is unique due to differences in wetland type and geographic location. For this reason, the method, location and amount of compensation work necessary is variable. Ch. 310, § 5(C).
>
> No Unreasonable Impact. Even if a project has no practicable alternative and the applicant has minimized the proposed alteration as much as possible, the application will be denied if the activity will have an unreasonable impact on the wetland. "Unreasonable impact" means that one or more of the standards of the Natural Resources Protection Act, 38 M.R.S. §480(D), will not be met. Ch. 310, § 5(D)(1).

Issues Raised by Interveners. The topic of proposed impacts to protected natural resources is not a primary concern for Intervenors. In its pre-filed testimony, Upstream Watch declined to submit testimony specific to the alternative analysis, and streams and wetlands impacts, but reserved the right to cross examine and to offer rebuttal testimony. Upstream Watch then submitted rebuttal testimony stating concerns that insufficient time was devoted to the documentation of non-wetland biological species at the site.

Discussion

Department staff reviewed the proposed project, including information received from the public, intervenors, and during the public hearing, in consideration of the above referenced statutes and rules.

Avoidance. The applicant submitted an avoidance and minimization analysis for the proposed project completed by Ransom Consulting, Inc. The stated purpose of the project is to provide 33,000 metric tons of high quality and sustainable seafood to consumers in the Northeastern United States (US) per year. A tenet of the project purpose is to reduce the carbon emissions and transportation costs associated with importing farmed Atlantic Salmon to the Northeastern US. The production of 33,000 metric tons of salmon per year is necessary to be financially viable when considering the construction and operational expenses of the facility, as well as the need to sell the final product at a competitive price in the market.

After limiting the site selection to the Northeastern US, the applicant used geospatial desktop analysis of coastal land extending from Washington D.C. to the Canadian border to initially identify potential sites. Ideally, the facility would be located in close proximity to major cities in the Northeastern US, including Portland, Boston, New York City or Philadelphia, as these cities have existing infrastructure capable of transporting the final product. This analysis, as well as the need for clean and cold fresh and salt water, aided the applicant's determination that the most suitable location for the facility would be located within the State of Maine. After narrowing down the site selection to the most suitable sites, the applicant considered 10 criteria for the final site selection including - availability of property, access to clean and cold seawater, attractive

workplace location, buildable lot size, available road and utility infrastructure, effluent impacts to local waterbody, construction impact to natural resources, lack of adverse pre-existing environmental conditions, ground conditions favorable to construction and access to abundant freshwater resources.

Minimization. The applicant considered various layouts of the facility in an effort to minimize impacts to protected resources and maximize the use of upland areas, while still fulfilling the purpose of the project. The applicant considered four different facility layouts for the facility at the project site including:

- Option 1: Six modules occupying 39 acres
- Option 2: Three modules occupying 39 acres
- Option 3: Six modules occupying 54 acres
- Option 4: Five Modules occupying 54 acres

The applicant has selected option 3 - six modules on 54 acres. With additional land available, as compared to option 1 and 2, the development can be situated in a location that avoids impacting Stream 9 and associated floodplain and fringe wetlands, located on the eastern side of the property. Additionally, the larger project site allows the final developed area to have more moderate slopes and larger buffer areas from the Lower Reservoir and abutting property boundaries. The applicant did not select option 1 because that option would have resulted in greater impacts to the above-mentioned resource on the eastern side of the property and presented additional design and engineering challenges associated with fitting critical infrastructure on the site. The applicant did not select option 2 or option 4 primarily because they were found to be financial unfeasible from a business perspective – the scale of production would not be sufficient to meet the purpose of the project.

The applicant considered three different pipeline layouts to access the bay, in an effort to minimize environmental impacts:

- Option 1: Little River Route
- Option 2: Eckrote Property Route
- Option 3: Tozier Road Route

The applicant selected option 2, the Eckrote Property Route. Option 2 entails constructing a pipeline system that accesses the bay by crossing through a 40-foot wide construction easement located on the Eckrote property. This route will result in temporary stream, freshwater wetland and coastal wetland impacts. Option 1 would entail trenching the pipeline system within the channel of Little River to provide access to the bay. This option would result in substantial environmental impacts as the Little River channel and banks would require permanent stabilization measures following construction. Option 3 would entail routing sections of the pipeline system across a steep coastal bluff as well as along an existing drainage way with steep side slopes. This route would also require permanent stabilization measures following construction. Both option 1 and 3 were not selected because of the environmental impacts resulting from trenching and permanently stabilizing protected resources and steep slopes

adjacent to protected resources. Additionally, the applicant was further restricted to selecting Option 2 as the other options required obtaining multiple easements to gain access to the bay.

During the Department's review of the project, the applicant further minimized coastal wetland impacts by redesigning the pipeline system to be suspended off the seabed and anchored by concrete footers rather than resting on the seabed. This design change reduced the permanent impact to the coastal wetland from 144,000 square feet to the currently proposed impact of 6,703 square feet.

Compensation. The compensation package, shown in the table below, would satisfy Ch. 310, § 5(C) and would be consistent with compensation packages previously approved by the Department.

Resource Type	Impact Amount	Compensation Method	Total
Freshwater Wetlands	192,070 square feet	In-Lieu-Fee (ILF)	$710,659.00
Coastal Wetlands	6,703 square feet	ILF	$49,602.20
Streams	1,917 linear feet	Preservation, Enhancement	2,164 linear foot stream buffer 65.5 linear feet of stream enhancement

Streams-

The applicant proposes to permanently fill portions of Streams 3, 5 and 6 and the entirety of Stream 4. During the Department's review, Stream 4 was re-evaluated by the applicant and was determined to be a stream rather than a wetland drainage. Stream 4 is a tributary of Stream 3 and is 54 feet in length. All impacted streams flow into the Lower Reservoir and have intermittent flow regimes. (Attachment B of November 5, 2019 Nordic Response to Review Comments, titled Wetland and Stream Review, and dated November 4, 2019.)

The project was reviewed by the Department's Bureau of Water Quality (BWQ). In its review, the BWQ raised concerns that, as the project was initially proposed, the filling of the upper reaches of Streams 3, 5 and 6 would reduce the amount of flow in the remaining downstream reaches of those streams. In response to these comments, the applicant designed a conveyance system, that would capture surface runoff and shallow groundwater from a diversion trench upgradient of the impacted stream reaches, and outlet the collected water into streams 3, 5 and 6 to maintain instream flow below the filled portions of those streams. As proposed, this under-drained conveyance system would maintain existing flow paths of the impacted streams and upgradient contributing areas. This conveyance system would be integral to maintaining existing natural water flow, water quality and aquatic habitat at the project site. Because of the importance of this system, staff have drafted possible conditions the Board may wish to consider as a safe guard to ensure compliance with relevant standards if the Board finds all the approval standards have been satisfied. The conveyance system is shown on the included attachments,

"Soil Erosion & Sediment Control Phasing Plan-2 Phase 1A" and "Soil Erosion & Sediment Control Phasing Plan-2 Phase 2A" both dated October 25, 2019.

At the request of the Department, the applicant conducted stream habitat assessments for onsite streams on July 19, 2019 utilizing "Methods for Assessing Habitat in Flowing Waters: Using the Qualitative Habitat Evaluation Index (QHEI)". The QHEI evaluates and scores the quality of stream habitat 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. The score for each of the six parameters is totaled to give a cumulative score representative of the quality of the stream habitat. Cumulative scores greater than 70 are considered "excellent" and scores of less 30 are considered "very poor". S9 was divided into three sampling reaches given the segmented habitat conditions within the stream. The applicant also conducted surveys for aquatic macroinvertebrates while conducting the QHEI surveys.

Table 2. QHEI scores for on-site streams.

Stream ID	QHEI Score
S3	36
S5	35
S6	38
S8	38.5
S9a	39
S9b	17
S9c	42
S10	32

The highest scoring reach of streams on the site were Stream 9c, Stream 9a and Stream 8 with a QHEI scores of 42, 39 and 38.5 respectively. The lowest scoring reach onsite was Stream 9b, with a score of 17. This reach of stream 9 has been channelized and is lacking native riparian vegetation. All other streams on site, including the stream with proposed impacts, scored within a range of 32 and 38.5. This range of scores, 32 to 38.5, fall within the "poor" ranking according to the QHEI scoring system. An assessment for Stream 4 was not conducted by the applicant, because the re-evaluation of this stream occurred subsequent to the QHEI surveys. Given that the physical characteristics of Stream 4 are similar to all other on-site streams and in consideration of its location near Streams 3, 5, and 6, it is reasonable to conclude that the QHEI score of Stream 4 would be similar to those of Streams 3, 5, and 6.

The streams with proposed impacts are of low quality primarily due to their intermittent flow regimes and silty substrate. During the QHEI surveys, mosquito larvae were the only macroinvertebrate observed in the impacted streams although Department staff visited the site previously on May 17, 2019 and observed species indicative of higher water quality and stream habitat quality including mayflies, caddisflies and stoneflies. The impacted streams do not have characteristics favorable to providing fish habitat given the intermittent flow regime and silty substrate.

Although all streams onsite are of low quality, the proposed project has avoided permanently impacting reaches of relatively higher quality streams present at the site. To compensate for the

proposed stream impacts, the applicant has proposed to establish a deed restricted buffer along Stream 9. The buffer totals 2,164 linear feet and varies in width from 75 feet to 150 feet. The applicant proposes to enhance the buffer with native plantings. The enhancements within the buffer are expected to improve instream cover, bank stabilization and channel morphology of Stream 9, which will provide higher quality macroinvertebrate habitat. The applicant further proposes to restore or enhance a total of 65.5 linear feet of Streams 3, 5, 6 and 8. Restoration and enhancement measures include culvert removal and replacements and bank stabilization measures. These areas of restoration are located in reaches of streams off the project site.

Wetlands-

The applicant proposes to permanently impact forested, scrub shrub and emergent freshwater wetlands as a result of constructing the proposed aquaculture facility. Permanent freshwater wetland impacts total 192,070 square feet. The principle functions of these wetlands include floodflow alteration, sediment/shoreline stabilization, production export and wildlife habitat. The applicant would need to compensate for these impacts via payment to the in-lieu-fee program in the amount of $710,659.00.

The applicant is seeking to use the 75-foot riparian buffer area adjacent to Stream 9, to offset in-lieu-fee payments for freshwater wetlands. Because the buffer area only contains patches of wetlands, and because any future disturbance to the wetlands within the buffer area will be protected by the stream buffer itself, and therefore not at risk of development, Department staff determined this buffer should not be used to offset in-lieu-fee payments required to compensate for proposed freshwater wetland impacts. The applicant's proposed in-lieu-fee payment, including the buffer on Stream 9 to reduce the cost, totals $563,864.28 rather than $710,659.00 as calculated by Department staff and shown in the compensation table above. The applicants proposed an in-lieu-fee payment which also includes an error in calculation. In calculating the proposed in-lieu-fee payment for freshwater wetlands impacts, the applicant mistakenly used a cost multiplier of two for certain impacted wetlands on the site.

The applicant proposes to permanently alter unconsolidated subtidal coastal wetland. The permanent coastal wetland impacts total 6,703 square feet. The applicant proposes to compensate for these impacts via payment to the in-lieu-fee program in the amount of $49,602.20.

Potential Conditions

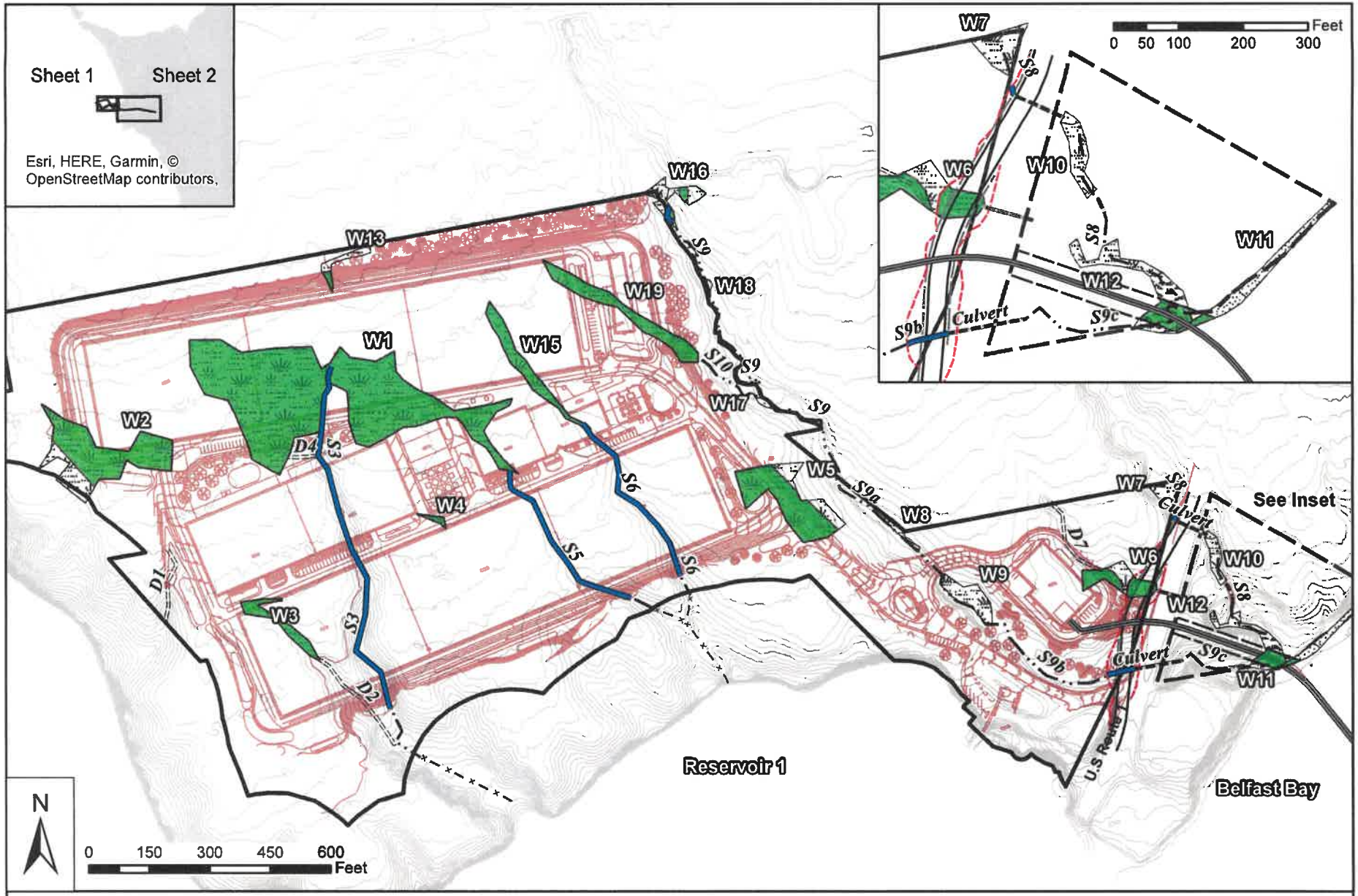
Should the Board find all the review standards have been met and issue a permit for the project, possible conditions the Board may wish to consider include:

1. Within six months of the completion of Phase 1 of the proposed project, the applicant shall submit a report to the Department for review demonstrating that the proposed conveyance system is functioning as intended and is capable of maintaining instream flow in the downstream reaches of streams 3, 5 and 6. Within six months of completion of full build-out of the proposed project, the applicant shall submit to the Department for review an updated report demonstrating that the conveyance system is functioning as

intended and is capable of maintaining instream flow in the downstream reaches of Streams 3, 5 and 6.

2. The applicant shall develop and submit a finalized plan for continuous in-situ monitoring of instream flows in the downstream reaches of streams 3, 5 and 6 following construction. Monitoring shall take place within six months of the completion of Phase 1 of the project until five years following the full build-out of the proposed project. During the monitoring period, the applicant shall submit collected instream flow data to the Department for review every six months. If the Department determines the conveyance system is not appropriately maintaining instream flow in the downstream reaches of Stream 3, 5 and 6, the applicant shall develop a plan to make the corrections and/or design changes necessary to maintain instream flow in Stream 3, 5 and 6. Monitoring equipment, locations, and methodology must be determined in consultation with the Department.

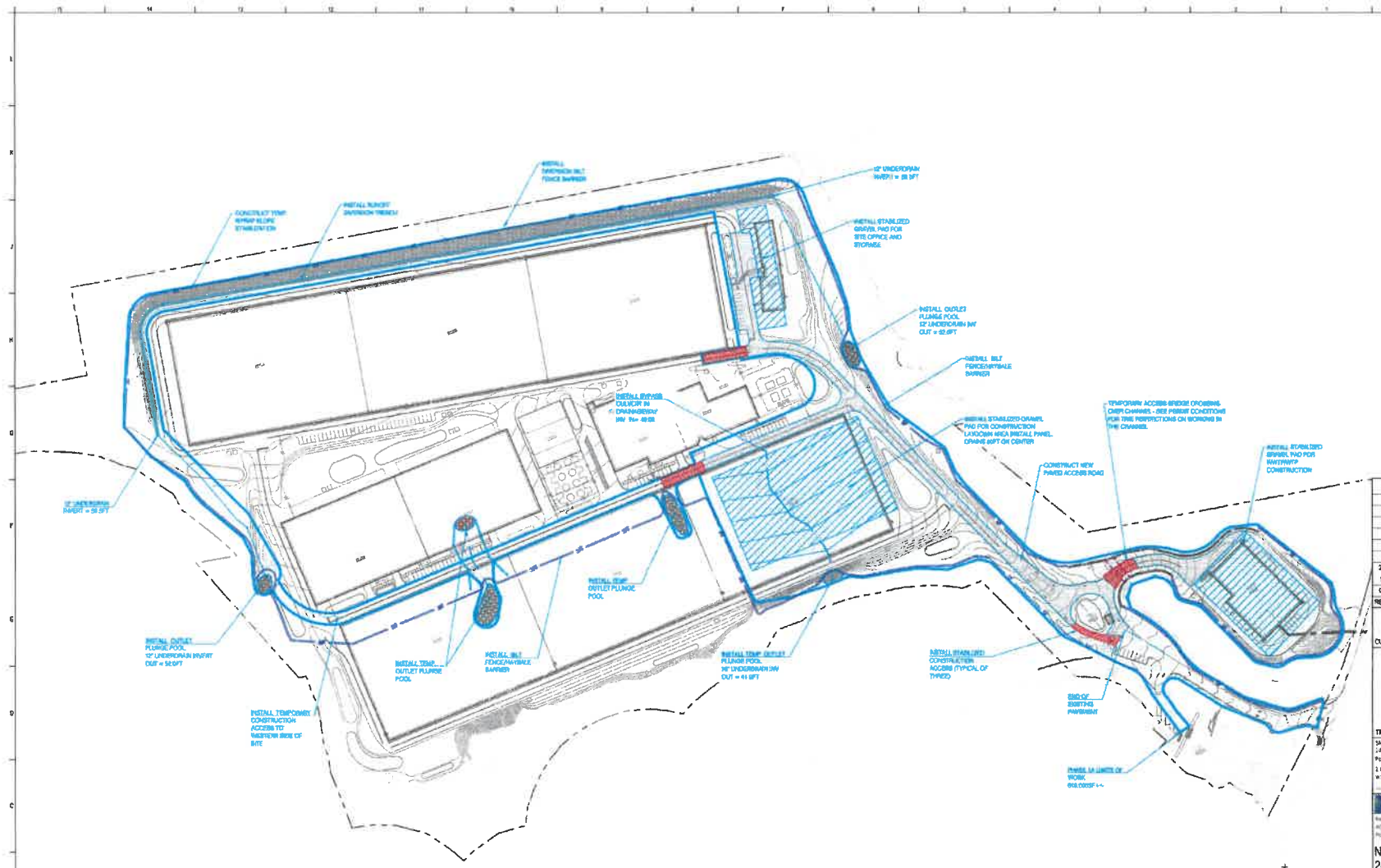
3. Prior to the start of construction, the applicant shall conduct additional baseline macroinvertebrate and QHEI stream habitat surveys within Stream 9 and the downstream reaches of Streams 3, 5, 6, and submit the reported data to the Department. The applicant shall continue to conduct these surveys on an annual basis until five years following the full build-out of the proposed project to ensure the functions of those reaches are maintained in Streams 3, 5, and 6 and improved in Stream 9. Prior to December 31 of each year, the applicant shall submit annual monitoring reports to the Department. Monitoring reports shall include QHEI survey data, observed macroinvertebrates, photographic documentation and a narrative of the observed condition of the subject streams. Surveys and annual reports shall be performed by a qualified professional. The surveys shall take place during an appropriate and consistent time each year, as determined in conjunction with the Department. If the Department determines the physical and biological characteristics of Streams 3, 5, and 6 are not equal to or better than their existing condition, the applicant shall submit a plan for enhancing these characteristics or compensating for the impacts. If the Department determines the physical and biological characteristic of Stream 9 are not equal to or better than characteristics lost due to the proposed project, the applicant shall submit a plan for enhancing these characteristics or compensating for the impacts. Sampling equipment, locations, and methodology must be determined in consultation with the Department.



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



REV	DESCRIPTION	DATE
2	PER MDEP REVIEW COMMENTS	10-25-19
1	PER MDEP REVIEW COMMENTS	7-18-19
0	ISSUED FOR PERMIT	5-14-19

ISSUED FOR PERMIT
5-14-19
CURRENT ISSUE STATUS:

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NORDIC AQUAFARMS
285 NORTHPORT AVENUE
BELFAST, MAINE

SOIL EROSION & SEDIMENT CONTROL PHASING PLAN -2
PHASE 1A

SHEET TITLE:

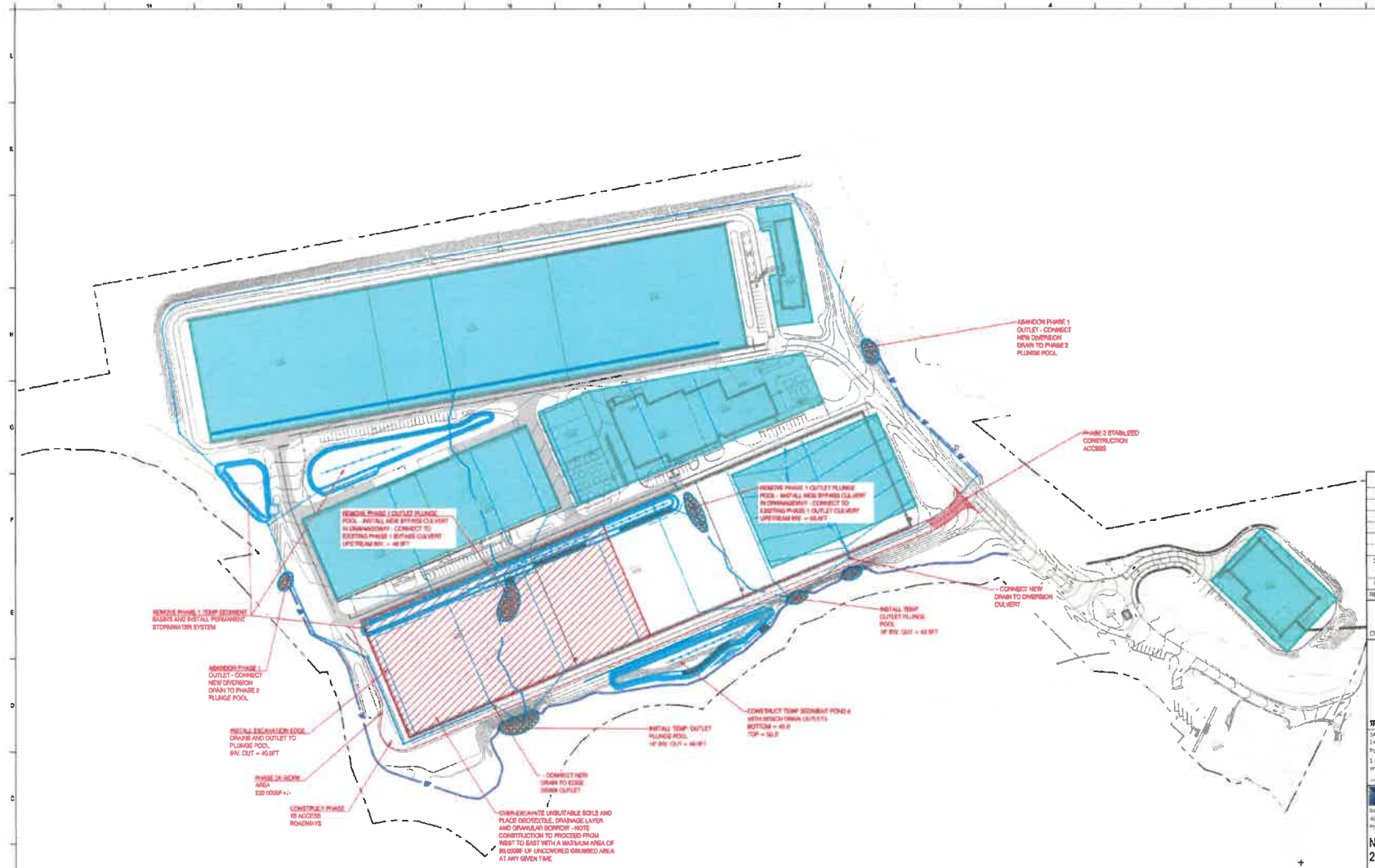
0 30' 60' 120' 240'

SCALE: AS SHOWN

PROJECT MANAGER:	ADB	PROJECT NO:	19075
AVE OF RECORD:			
JOB CAPTAIN:	SP		CE111
DRAWN BY:	AJ		
SMRT FILE:	CE111-19075	SHEET No.	

NOT FOR CONSTRUCTION

030



031

REV	DESCRIPTION	DATE
2	PER MDEP REVIEW COMMENTS	10-25-19
1	PER MDEP REVIEW COMMENTS	7 16 19
0	ISSUED FOR PERMIT	5-14-19

ISSUED FOR PERMIT
5-14-19
CURRENT ISSUE STATUS.

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NORDIC AQUAFARMS
285 NORTHPORT AVENUE
BELFAST, MAINE

SOIL EROSION & SEDIMENT CONTROL PHASING PLAN -8 PHASE 2A
SHEET TITLE:

0 30' 100' 200' 300'
SCALE: AS SHOWN

PROJECT MANAGER:	ADB	PROJECT NO	18078
AVE OF RECORD			
JOB CAPTAIN	SP		
DRAWN BY:	AJ		
SMRT FILE:	CE117-18078	SHEET No.	

CE117

NOT FOR CONSTRUCTION

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JANET T. MILLS
GOVERNOR

GERALD D. REID
COMMISSIONER

MEMORANDUM

TO: Board of Environmental Protection

FROM: Staff, Bureau of Land Resources

RE: Nordic Aquafarms, Inc. – Proposed Seawater Access System (Pipeline)

DATE: May 13, 2020

Overview. The aquaculture facility proposed by Nordic Aquafarms, Inc. (Nordic) is comprised of several components, one of which is a proposed seawater access system (also known as the "pipeline"). The pipeline would consist of one 36-inch diameter wastewater discharge outfall pipe and two 30-inch diameter seawater intake pipes. The pipeline would run from a common building at the proposed upland project site, across U.S. Route 1, through a 40-foot wide upland construction easement area (known as the Eckrote property) for a length of 230 feet, and then extend into the intertidal and subtidal areas of the coastal wetland. From the highest annual tide (HAT) line, the outfall pipe would extend approximately 3,700 linear feet into the coastal wetland, and the intake pipes would extend approximately 6,400 linear feet into the coastal wetland. For approximately the first 2,700 feet below the HAT line, the pipeline would be buried beneath the seabed substrate. The remaining 3,700 feet would be exposed above the seabed, elevated approximately 12 inches above the substrate, and anchored by concrete footers spaced at 15-foot intervals.

Construction of the proposed pipeline would occur within a 100-foot wide construction area along the length of the proposed route. Within the upper and mid intertidal areas of the coastal wetland, a 30-foot wide trench would be excavated to bury the pipeline. Nordic proposes to work from construction mats in small sections at low tide. Within the lower intertidal area, construction of the trench would continue using a barge-mounted crane with a closed dredge bucket for a distance of approximately 1,250 feet. The remaining in-water work within the subtidal area of the coastal wetland would occur by installing temporary guide piles and tethering pipeline segments to the piles while floating in the water. The pipeline segments would then be sunk and anchored in place onto the seabed. All in-water work would be conducted between November 1 and April 1 of a given calendar year. (Attachment A. Construction Details, August 14, 2019.)

Intervenors expressed concern regarding construction of the pipeline within the coastal wetland and the Board heard oral testimony on this topic at its public hearing. The Board also observed the proposed pipeline location at its site visits on October 24, 2019, and February 10, 2020. This memorandum addresses the pipeline portion of the project and the applicable review standards.

Statutory and Regulatory Criteria. Key standards related to the proposed pipeline are:

- NRPA: 38 M.R.S. § 480-D(3), (5), and (9); Ch. 310
- Site Law: 38 M.R.S. § 484(3), (4-A), and (6); Ch. 375, §§ 5, 6, 15, and 16
- Erosion and Sedimentation Control Law: 38 M.R.S. § 420-C

The intake and discharge pipes proposed by Nordic would be located in a coastal wetland, which is defined as a protected natural resource under NRPA, § 480-B(8). Dredging, removing or displacing soil, and any construction of a permanent structure in a protected natural resource are among the types of activities that require a NRPA permit. The NPRA standards are contained in Section 480-D. While all of these standards must be satisfied for an applicant to be issued a permit, three are most relevant to review of the proposed pipeline. Section 480-D provides that the Department shall grant a permit when it finds that the applicant has demonstrated that the proposed activity meets the following standards, among others:

> 3. Harm to habitats; fisheries. The activity will not unreasonably harm any significant wildlife habitat, freshwater wetland plant habitat, threatened or endangered plant habitat, aquatic or adjacent upland habitat, travel corridor, freshwater, estuarine or marine fisheries or other aquatic life.
>
> 5. Lower water quality. The activity will not violate any state water quality law, including those governing the classification of the State's waters.
>
> 9. Dredging. If the proposed activity involves dredging, dredged spoils disposal or transporting dredged spoils by water, the applicant must demonstrate that the transportation route minimizes adverse impacts on the fishing industry and that the disposal site is geologically suitable. The Commissioner of Marine Resources shall provide the department with an assessment of the impacts on the fishing industry of a proposed dredging operation in the coastal wetlands. . . .

Chapter 310, § 5, elaborates on the NRPA standards and guides the Department in its determination of whether a project's impacts would be unreasonable.[1]

Site Law ensures that a development fits harmoniously into the existing natural environment and does not adversely affect water quality or other natural resources. 38 M.R.S. § 484(3). Site Law standards also address erosion and sedimentation control, 38 M.R.S. § 484(4-A) and infrastructure, including the provision made by a developer to dispose of special waste (e.g., dredge spoils), 38 M.R.S. § 484(6). The Department's rules, in Chapter 375, §§ 5, 6, 15, and 16, elaborate on how an applicant should address the Site Law criteria by making adequate provision for controlling erosion and sedimentation, protecting surface water quality, protecting wildlife and fisheries habitat, and disposal of solid waste, respectively.

[1]Discussion of Chapter 310, § 5 and the selection of the pipeline route is included in a separate memo discussing potential impacts to protected natural resources.

The Erosion and Sedimentation Control Law, 38 M.R.S. § 420-C, requires a person displacing or exposing soil to "take measures to prevent unreasonable erosion of soil or sediment beyond the project site or into a protected natural resource."

Issues Raised by Intervenors. Intervenors provided oral testimony, written testimony, and written comment regarding the proposed seawater access system. Among other things, Intervenors expressed concern about:

- Sampling techniques used to conduct and analyze the composition of the marine substrate
- Exposure of mercury within the water column as a result of excavation within the lower intertidal area
- Turbidity within the water column during construction of the pipeline
- Potential adverse effects to fisheries and the fishing industry due to mercury exposure and turbidity
- Potential interruption of fishing activities and loss of fishing gear due to transportation of excess excavated material

Discussion

Water Quality and Erosion and Sedimentation Control (38 M.R.S. §§ 420-C, 480-D(5), and 484(3) and (4-A); Ch. 375, §§ 5 and 6).

There are two primary ways in which the pipeline could impact water quality, through the discharge of wastewater and from construction of the proposed project. Nordic has applied for a Maine Waste Discharge License and a Maine Pollutant Discharge Elimination System Permit (DEP #W009200-6F-A-N/MEPDES Permit # ME0002771), and it is through that permitting process that the Department typically evaluates potential water quality impacts of a discharge such as the one proposed by the applicant.

With regard to construction, the excavation of the trench for the pipeline and installation of the pipeline has the potential to cause sedimentation. Suspension and subsequent deposition of sediment can have an impact and the extent of any such impact can be influenced by the composition of the sediment, including any contaminants it may contain.

Nordic collected two depth composite samples (known as Sample B3 and Sample A6/A7) of marine sediment for initial characterization of the substrate's composition, with mercury being one of several parameters that were analyzed. The sample locations are proximate to, but not exactly along, the proposed pipeline route. Nordic applied the "rule of 20" technique in its testing and analysis and stated that the sample sizes, locations, and parameters used in its sediment analysis are common protocols for representative sampling and are adequate for indicating potential impacts from construction activities. The "rule of 20" is a commonly applied sampling technique in which a sample is mixed or diluted with a volume of extraction fluid that equals 20 times the weight of the sample. If the total concentration of a particular analyte, such as mercury, is less than 20 times the upper toxicity limit, then the waste is considered to be non-hazardous for that analyte.

Results of Nordic's analysis indicates that the sediment in the two samples was non-hazardous and below the 20 times toxicity limit. In specific regard to mercury, the concentration level in Sample B3 was determined to be 267 n/g and the concentration level in Sample A6/A7 was determined to be less than 103 ng/g, which is less than the laboratory reporting limit. (Section 18 of the Site Law application.)

Intervenors expressed concern that any disturbance of marine sediment due to construction of the proposed pipeline would introduce mercury into the water column and adversely affect the water quality of Belfast Bay. Intervenors assert that the sampling locations, sizes, and techniques applied by Nordic to analyze the marine sediment at the project site were not sufficient for determining mercury contamination levels. Intervenors requested that Nordic conduct additional sediment testing and analyses along the proposed pipeline route.

The Penobscot River Mercury Study (PRMS), has been referenced by Nordic and intervenors often during the course of the Board's review. The PRMS is a report of mercury contamination levels and trends within the Penobscot River system and recommends possible targets and procedures for remedial action. The study indicates that background mercury concentrations within marine sediments in the same geographic area as the proposed pipeline ranged between 30 and 150 ng/g, with an average of approximately 55 ng/g. By comparison, the historic discharge of mercury into the Penobscot River at its source of contamination in Orrington, Maine resulted in a mercury level of about 800 ng/g. (Bodaly, R.A., 2013.)

Nordic compared the results of Sample B3 and Sample A6/A7 against the results of other tested sample sites from within the Penobscot River system described in the PRMS. Nordic concluded that the mercury levels in Sample B3 and Sample A6/A7 were equivalent to the concentration levels of mercury in the lower reaches of the Penobscot River system and below the concentration levels of mercury in the upper reaches of the Penobscot River system.

The Department's Bureau of Remediation and Waste Management (BRWM) reviewed Nordic's sampling methodology and the results of Nordic's sediment analysis. BRWM commented that Nordic's use of the "rule of 20" is an acceptable method to gain a baseline depiction of the composition of the substrate within the project area. BRWM's comments also indicated their agreement with Nordic's collected mercury data and Nordic's comparison of the data against existing mercury levels described in the PRMS. BRWM further commented that no remedial sediment removal within the project area was recommended by the PRMS as part of the overall remediation plan for the Penobscot Bay area. BRWM indicated in its comments that the removal and upland disposal of excess excavated material from construction of the proposed pipeline is likely to result in an overall reduction in the amount of mercury contaminated sediment in the coastal wetland. (BRWM review comments, dated November 8, 2019.)

If the Board determines that more sampling would be appropriate as an added precaution in regard to potential exposure of mercury in the water column, this could be undertaken consistent with the provisions that the Department commonly applies towards waste characterization for solid wastes in accordance with Chapter 405 of Department rules. A possible condition offered to aid the Board is described below.

Nordic acknowledges that disturbance of marine sediments would expose and mix sediment at varying depths during construction. For this reason, Nordic proposes to implement a number of erosion and sedimentation control measures to prevent an unreasonable amount of temporary sedimentation within the coastal wetland. These measures include, but are not limited to, working in small sections at low tide, operating equipment from construction mats, installation of a coffer dam and turbidity curtain, use of a closed dredge bucket, limiting the hoist speed of the dredge bucket within the water column, and visual monitoring of the work area.

Intervenors expressed concern that construction of the proposed pipeline would result in an unreasonable amount of turbidity within the water column and that Nordic's proposed erosion and sedimentation control measures are not adequate for preventing sedimentation within the coastal wetland.

Department staff reviewed Nordic's proposal for installation of the pipeline, comments provided by BRWM, and concerns presented by intervenors. The erosion and sedimentation control measures proposed by Nordic are based on best management practices, several of which are outlined in the *Maine Erosion and Sediment Control Best Management Practices (BMPs) Manual for Designers and Engineers*, which was developed by the Department. BMPs described in the manual are measures that have been determined to be an effective means of preventing or minimizing non-point source pollution to maintain or achieve water quality goals.

As an added safeguard to assure that adequate erosion and sedimentation control measures would be implemented and that water quality of Belfast Bay is not unreasonably impacted, the Board may wish to consider requiring Nordic retain a third party inspector to specifically monitor all aspects of installation of the proposed pipeline, including disturbance, excavation, and removal of soils from within the coastal wetland during the duration of construction. A possible condition is included below to aid the Board in its thinking.

Wildlife and Fisheries (38 M.R.S. §§ 480-D(3), 484(3); Ch. 375, § 15).

Nordic's Natural Resources Report, dated May 8, 2019, characterizes the coastal wetland substrate to be comprised of salt marsh vegetation in the upper intertidal area transitioning to cobbles and mudflats. Mobile finfish and other migrating organisms such as winter flounder, rainbow smelt, and herring species are likely to exist in the project area. Softshell clams and American lobster are also known to be present in the area. Nordic's report notes a low abundance of benthic organisms. The proposed pipeline is not sited within an area designated for commercial shellfish harvesting. (Appendix 12-A of the NRPA application.)

Intervenors expressed concern in their testimony that any disturbance of marine sediment due to construction of the proposed pipeline would introduce mercury into the water column and adversely affect existing fisheries in Belfast Bay and the local fishing industry.

The Maine Department of Marine Resources (DMR) reviewed the proposed project and held a public hearing in accordance with 38 M.R.S. § 480-D(9). The public hearing was held to accept and consider public comments about the proposed excavation activities at the project site and its

potential impacts to fisheries and the fishing industry in the general area. At this hearing, intervenors provided testimony regarding potential adverse effects on local fisheries and the fishing industry from turbidity and exposure of mercury as a result of pipeline. DMR provided initial comments about the proposed pipeline, dated January 30, 2020, and updated those comments following its public hearing in an addendum, dated April 7, 2020. DMR confirmed that the proposed pipeline would not be located within an open shellfish harvesting area as designated by DMR pursuant to 12 M.R.S. § 6172, and that limited shellfish resources are present within the coastal wetland along the pipeline route.

Lobster fishing activity occurs within Belfast Bay. DMR stated that, during the construction window proposed by Nordic and at depth along the pipeline, lobsters would not be present in the area due to the natural migration to deeper offshore locations during this time. Further, DMR anticipates that the pipeline's physical structure and location above the seabed should have minimal impact to the movement of lobsters. DMR further commented that other fisheries, including Atlantic Salmon, Atlantic Sturgeon, and Short-nose Sturgeon, would not be present during the proposed construction window given typical migration behavior patterns for these species.

DMR stated that the proposed pipeline is located within an area open for scallop harvesting. However, scallop landings or harvest activities are not common in the general Belfast Bay area, and the area is not considered a natural spawning area for scallops.

DMR concluded that, based on Nordic's proposed erosion and sedimentation plan and proposed in-water construction window, the proposed pipeline should not result in adverse impacts to marine resources, recreation, navigation, or riparian access.

Transportation and Disposal of Dredged Material (38 M.R.S. §§ 480-D(9) and 484(3); Ch. 375, § 16).

As referenced above, Nordic proposes to excavate a trench for a distance of approximately 1,250 linear feet within the coastal wetland. Approximately 36,000 cubic yards of marine sediment would be excavated from this area (Appendix C of the NRPA application). Of this estimated volume, approximately 15,000 cy of excess material may be generated by installation of the proposed pipeline. Excess spoils would be placed in a containment structure and transported to an upland location for disposal at Waste Management Disposal Services of Maine (Crossroads Landfill) or Juniper Ridge Landfill. Based on comments provided to the Department by DMR, Nordic stated at DMR's public hearing that excess spoil material would be hauled by barge to Mack Point, located in the Town of Searsport, prior to transportation of materials to a landfill.

During the course of the Board's review and at DMR's public hearing, intervenors expressed concern in regard to potential disruption to local fishing activities and loss of fishing gear due to transportation of excess excavated material.

BRWM reviewed Nordic's proposal to dispose excess excavated material. BRWM commented that Nordic's proposed method to excavate and dispose of excess marine sediment would not result in an unreasonable adverse effect on the natural environment or public health based on the

results of Nordic's sediment analysis and substrate assessment. (BRWM review comments, dated November 8, 2019.)

As stated above, DMR reviewed the proposed project and held a public hearing. DMR's comments summarize Nordic's construction methods and sequencing, the excess material disposal method, public concerns, and potential impacts to marine resources and industry.

In its April 7, 2020 comments, DMR recommended several measures to minimize adverse effects on the local fishing industry as follows:

- To ensure awareness of the location of the proposed pipeline and to reduce the risk of potential fishing gear entanglement and loss, Nordic should mark the location of the proposed pipeline for navigational safety in accordance with the United States Coast Guard's marking requirements.

- To minimize disruption to fishing activities, approximately 30 days prior to the start of construction of the proposed pipeline, Nordic should conduct public outreach by means of written notice to the local Lobster Zone Council in coordination with DMR, who would assist with email notification to all Lobster Zone D Council members. Notice should include specific nautical bearings of the proposed haul route and width for the safe travel of the barge to avoid entanglement with fishing gear. The notice should include the anchorage point for the barge at either the proposed construction site or at a safe docking location off Mack Point. The barge transporting the excess spoil material to Mack Point should be equipped with a Vessel Monitoring System (VMS) to track its transit activity along the proposed haul route. Nordic should also provide a detailed mechanism by which area fishermen may seek compensation for lost gear should the barge deviate from the specified haul route.

Department staff reviewed Nordic's proposal for installation of the pipeline, comments provided by BRWM and DMR, and concerns presented by intervenors and the public. As a precaution to assure that excavation and disposal activities associated with construction of the proposed pipeline do not disrupt local commercial fishing activities nor result in the loss of fishing gear, the Board may wish to consider requiring Nordic to adopt the recommendations described in DMR's addendum to review comments, dated April 7, 2020. These measures could be required by the Board in the form of permit conditions. Possible conditions are offered below to aid the Board in its review.

Potential Conditions

Should the Board find all the review standards have been met and issue a permit for the project, possible conditions the Board may wish to consider include:

1. Prior to the start of construction, the applicant shall provide a site plan and narrative to the Department for review which describes the upland location and techniques that will be implemented for dewatering of excavated soils associated with installation of the proposed seawater assess system.

2. Prior to the start of construction, the applicant shall retain the services of a third party inspector to monitor installation of the proposed seawater access system, disturbance, excavation, and removal of soils from within the coastal wetland, transportation of excavated soils from the coastal wetland to an upland location, and dewatering of excavated soils in an upland location. Inspections must occur continuously and daily until all in-water work is completed. Inspector selection, reporting responsibilities, and other duties, as assigned by the Department, shall occur in accordance with the Department's Third Party Inspection Program.

3. Prior to the start of construction, the applicant shall conduct further sampling and analyses of the marine sediments along the proposed pipeline route. A sufficient number of samples, as determined using Chapter 9 of *Test Methods for Evaluating Solid Wastes*, USEPA, SW-846, 3rd Edition, 2013, shall be taken along the horizontal route and vertical depth of the proposed pipeline to adequately characterize the excavated spoils for disposal at the upland location. Totals analyses of the excavated spoils may be under taken in accordance with the provisions of Appendix D of 06-096 C.M.R. ch. 405 to determine whether the dredge spoils may be hazardous by reason of the Toxicity Characteristic. The sampling results shall be submitted to the Department for review. If the total result divided by the dilution factor is equal to or greater than the Toxicity Characteristic Leaching Procedure (TCLP) regulatory limit for any parameter, then the waste may be determined to be, but is not necessarily, a hazardous waste. In this case, full TCLP testing for the parameter in question must be completed by the applicant to enable a final determination about whether the spoils are a hazardous waste. If hazardous, the applicant shall submit to the Department for review and approval an updated erosion and sedimentation control plan, a revised transportation and disposal plan for excess spoil material, and an updated construction method and sequencing plan that reflects the nature of the full TCLP testing results.

4. The applicant shall mark the location of the proposed pipeline for navigational safety in accordance with the United States Coast Guard's marking requirements.

5. Approximately 30 days prior to the start of construction of the proposed pipeline, the applicant shall conduct public outreach by means of written notice to the local Lobster Zone Council in coordination with the Maine Department of Marine Resources (DMR). Notice must include specific nautical bearings of the proposed haul route and width for the safe travel of any transportation barge towing excess spoil material from the project site to avoid entanglement with fishing gear. The notice shall also include the anchorage point for the barge at either the proposed construction site or at a safe docking location off Mack Point. Any vessel transporting excess spoil material to Mack Point shall be equipped with a Vessel Monitoring System (VMS) to track its transit activity along the proposed haul route.

6. Prior to the start of construction of the proposed pipeline, the applicant shall provide to the Department for review a detailed mechanism by which local fishermen may

seek compensation for lost fishing gear if a vessel transporting excess spoil material from the project site deviates from the applicant's specified haul route.

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**:
   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.

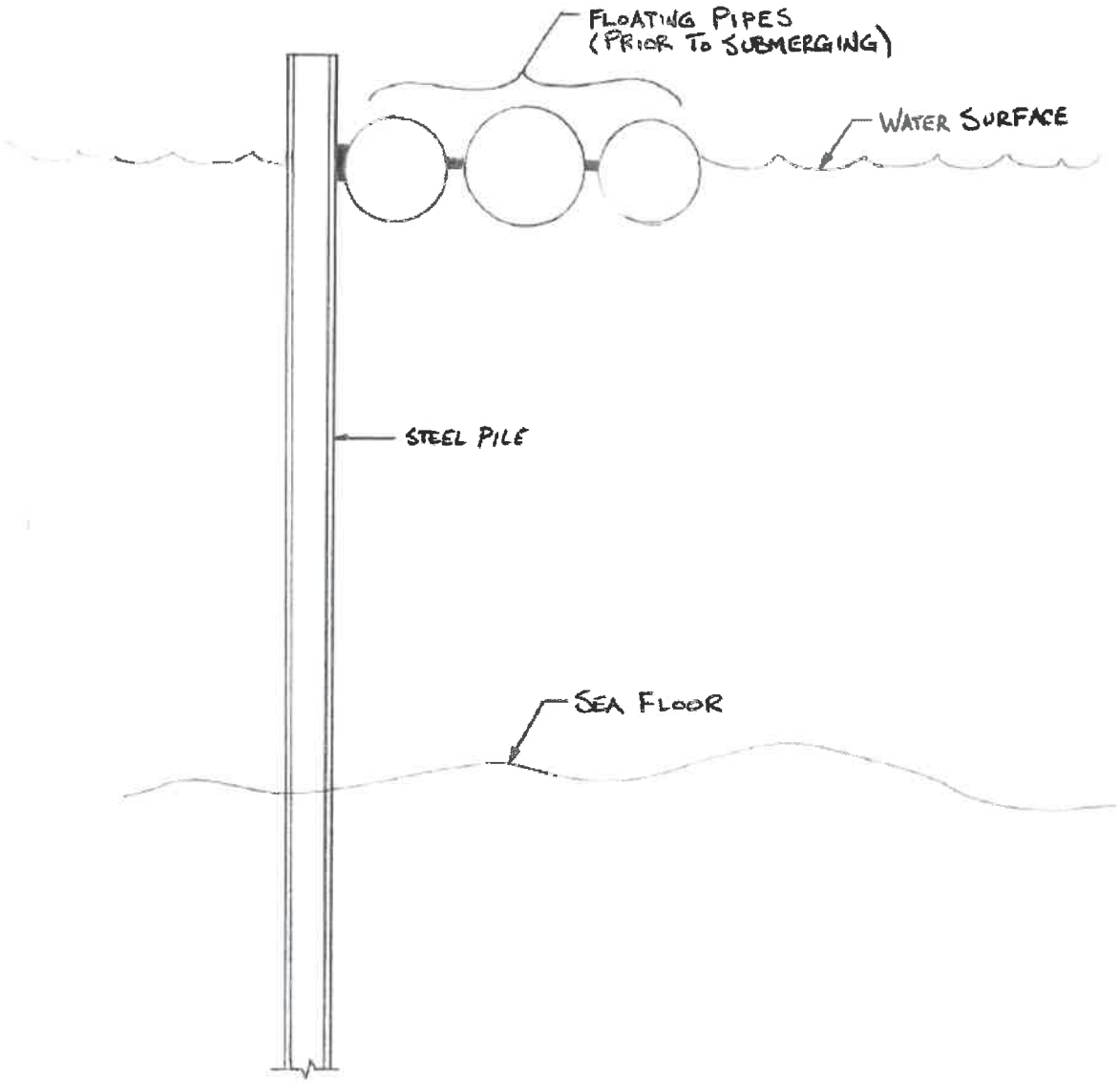
    b. Construction: For all remaining waterborne construction activities, Contractor will be in regular contact with the mariner community, local Harbor Master and the US Coast Guard. The trench and pipe alignment will be established and maintained with

"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.

APPENDIX C: APPLICATION FOR A NATURAL RESOURCES PROTECTION ACT PERMIT

SUPPLEMENTAL INFORMATION FOR DREDGING ACTIVITIES IN A COASTAL WETLAND, GREAT POND, RIVER, STREAM OR BROOK

(Discard this part if dredging is not proposed as part of your activity.)

The DEP and the Corps strongly recommend that applicants schedule a pre-application meeting prior to submitting an application for dredging.

Volume to be dredged:	36,000 cu. yds.		
Sq. ft. to be dredged: i	108,000 sq. ft.		

Max. depth of dredging below existing grade:	10 feet
Type of material (example: sand, silt, clay, gravel. etc.) to be Dredged:	cobble, sand, marine sediment
Describe what erosion and sediment control measures will be used during the dredging operation. (attach separate sheet if necessary):	See Attachment 1.A, page 4-6; Attachment 1.B-2; and Attachment 8 The following will be employed as to prevent erosion: geotextile fabric covering exposed soils, Silt fence, ditching and sediment bags and sumps with sediment pumps An existing horseback elevation will also be lowered as part of the pipe installation which will help mitigate existing erosion.
Describe how and where the dredge spoils will be dewatered (attach separate sheet if necessary): **Show dewatering location and erosion control measures on activity drawings.**	Trenches will be excavated along the route where the pipeline is to be buried, then backfilled and restored following pipe installation. The excess spoils will be loaded and dewatered on barges adjacent to the pipeline route. The spoils will then be transferred to dump trucks and delivered to an upland disposal site. If necessary, sawdust will be mixed into the spoils on the barges to stiffen the mix prior to loading into dump trucks. See Attachment 1.B-1 CE001, CE110-CE118, and CE501-CE504; Attachment 1.B-2; Attachment 7, Appendix 7-C
What equipment will be used for the dredge?	Excavator

Disposal Location: (Check one)	**Upland disposal:** ❑ On site ☒ Landfill ❑ Other_____	**Ocean disposal:** Federal Disposal Site ❑ Arundel ❑ Portland ❑ Rockland ❑ Other_____

(pink)

MEMORANDUM

TO: Beth Callahan, Project Manager, Bureau of Land Resources
FROM: Mike Parker, Project Manager, Bureau of Remediation and Waste Management
DATE: November 8, 2019
RE: Review of Nordic Aquafarms, Inc. Application

I have completed my review of the information Nordic Aquafarms submitted in Section 18 of the Site Location of Development application for its' proposed salmon aquaculture facility. The applicant has identified the types and quantities of wastes that will be produced during the construction and operation of the proposed facility and submitted commitment letters from facilities that could receive the wastes. My detailed comments on the information are listed below.

A. Wastes Generated During Construction

Approximately 30 acres of forested area will be cleared within the proposed area of development, with an estimated volume of 1,146 cords of marketable timber. Timber will be sold or otherwise used as firewood by Comprehensive Land Technologies, Inc. or donated to the Waldo County Woodshed, which provides free firewood for people in need in the Waldo County. Other land-clearing debris, including brush, stumps, soil and rock, will be used on site for erosion control or disposed of off-site through Waste Management Disposal Services of Maine or Casella Organics.

Comment: *The applicant and its' contractors should take note that the Maine Forest Service has prohibited the transport of pine species with bark, under certain conditions, to Aroostook and Washington County to prevent the spread of the pine shoot beetle.*

The applicant also expects to generate construction and demolition debris as well as small amounts of special wastes, including asbestos insulation and roofing and soils contaminated with polycyclic aromatic hydrocarbons (PAHs). Casella Organics and Waste Management Disposal Services of Maine were identified as disposal locations for these wastes.

Comment: *With the exception of the of the PAH-contaminated soils, both Casella and Waste Management may dispose of the above-listed wastes without further review and approval. Disposal of the PAH-contaminated soils will require the disposal facility to file a Special Waste Disposal application with the Department prior to disposal of this waste.*

Construction and installation of the intake and discharge water pipes into Penobscot Bay will generate approximately 15,000 cubic yards of dredge spoils. The applicant collected 2 samples of the sediments for initial characterization. The samples were analyzed for total metals, volatiles and semi-volatiles, pesticides, herbicides, PCBs, ignitability, sulfide and cyanide reactivity, total solids, pH and free liquids. Nine analytes were detected above the reporting limits, including acetone, carbon disulfide, fluoranthene,

pyrene, arsenic, barium, chromium, lead and mercury. Arsenic, barium, chromium, lead and mercury have upper limits for toxicity that determine if the waste is non-hazardous or hazardous. Federal and state regulations allow generators to apply the "rule of 20", whereby if the total concentration of an analyte is less than 20 times the upper toxicity limit, it may be assumed that the waste is non-hazardous for that analyte for initial characterization. None of the analytes with upper toxicity limits exceeded the 20 times limits and.in some cases, were well below the 20 times limit.

Given the historic discharge of mercury into the Penobscot River from the chlor-alkali facility located in Orrington, Maine, the applicant analyzed the mercury levels in the sediments that would be excavated during the installation of the intake and discharge water pipes. The mercury levels in the two samples were 267 ng/g and less than 103 ng/g. In a study of the marine sediments in the same geographic area, mercury concentrations ranged from 30 to 150 ng/g, with an average of 55 ng/g (Bodaly, R. A., 2013. Background Concentrations of Mercury in Central Maine Estuaries: Penobscot River Mercury Study, Chapter 17).

The applicant proposes disposing of the dredged material at either the Waste Management Disposal Services of Maine or Juniper Ridge landfills.

Comments: *The use of the "rule of 20" is acceptable for characterizing the dredged material. Both the Waste Management and Juniper Ridge landfills are already permitted for and have the capacity to accept the dredged material. Staff note that both landfills require the dredged material be sampled and analyzed for TCLP metals, volatiles, semi-volatiles, herbicides and pesticides, total PCBs and sulfide reactivity at a rate of one sample for every 250 tons of waste generated. However, using totals and the "rule of 20" is acceptable for both the landfills in lieu of TCLP. Using a density of 1,300 pounds per cubic yard, this will result in approximately 40 samples of the dredge material being analyzed. Staff are confident that none of the parameters will exceed the applicable upper toxicity limits.*

Staff's review of the mercury data collected by the applicant and the existing data regarding mercury levels in the sediments of Penobscot Bay show that the mercury levels are similar to and within the expected range of values, as compared to previous studies. In addition to the 2013 data, staff also reviewed the data gathered during Phase I of the Penobscot River Mercury Study (Bodaly, R. A., et al. 2008. Phase I of the Study: 2006 – 2007.) Offshore sediment samples were collected along transect lines traversing west to east and analyzed for total mercury. Total mercury concentrations for Transect 2, located north of the proposed dredge, ranged from 192 to 321 ng/g, with a mean of 256.1. Total mercury concentrations for Transect 3, located south of the proposed dredge, ranged from 80.5 to 213 ng/g, with a mean of 137.8. No removal of the sediments located in the area of the proposed Nordic Farms dredge was recommended as part of the overall plan for remediation of the Penobscot Bay area in conjunction with the Penobscot River Mercury Study. Staff recognize that there will be a limited resuspension of mercury-containing sediments during the excavation of trench for the intake and discharge pipes. However, this will be limited in duration and extent and the

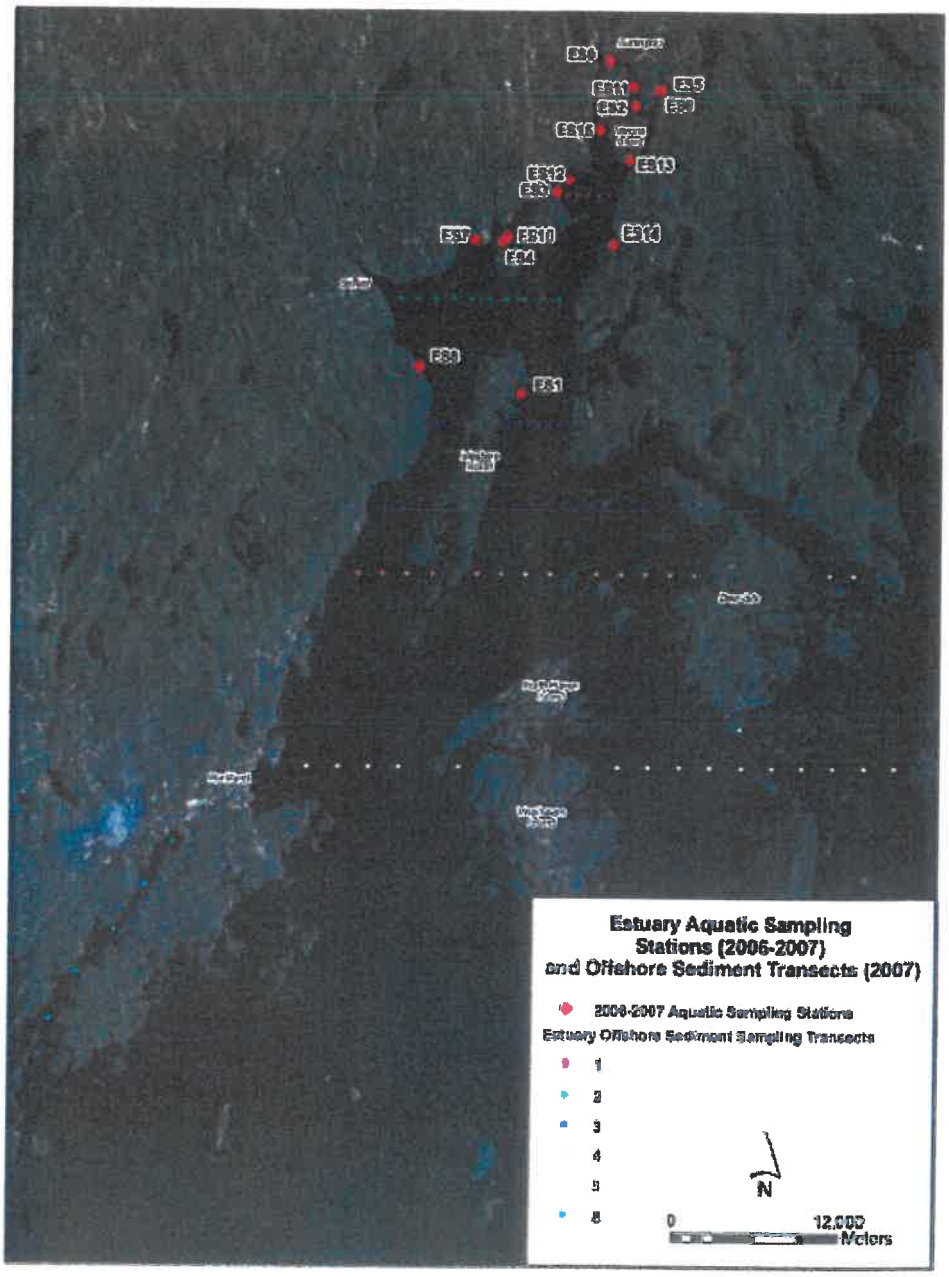


Figure 6. Map of Estuary (ES) aquatic sampling sites, 2006-2007. Also shown are the locations of sampling transects and sites in the estuary sampled for offshore surficial sediments in August 2007. Transects 1-5 are in the Penobscot estuary; Transect 8 is in the St. George estuary.

removal and upland disposal of the dredged material will result in an overall reduction in the amount of mercury-contaminated sediments in Penobscot Bay.

Staff also compared the mercury levels in the sediments to the 2018 Maine Remedial Action Guidelines (RAGs). The RAGs are used to establish clean-up standards for remediation sites. The most conservative risk-based clean up standard for mercury is the 1,800 ng/g under a leaching to groundwater scenario. The residential clean-up standard is 3,100 ng/g. Finally, a review of the clean-up standard for remediation of the sediments in the Penobscot River associated with the chlor-alkali facility is 2,200 ng/g. It is staffs' conclusion that the excavation and upland disposal of the dredge material associated with the Nordic Farms intake and discharge pipes poses no risk to human health or the environment.

B. Wastes Generated During Operations

The applicant has submitted estimates of the types and quantities of waste that will be generated during the operation of the proposed facility. These include filtrate from the onsite wastewater treatment plant, salmon processing solids (heads, guts, racks and mortalities), municipal solid waste from the offices, universal waste and recyclables. Several composting and disposal companies have provided letters of commitment to accept the identified wastes. These include Waste Management Disposal Services of Maine, Casella Organics, Agri-Cycle Energy, Channel Fish Company, Coast of Maine Organic Products and Compost Maine. In addition, the applicant is seeking approval from the Maine Department of Marine Resources to use the salmon processing wastes as lobster bait.

Comments: *Staff reviewed the estimates of the types and quantities of wastes that will be generated and find the list to be complete and accurate. Apart from Compost Maine, all the proposed facilities are licensed to accept these wastes and have the capacity to process or dispose of them properly. Compost Maine is not built or operating, nor have staff evaluated the companies composting operation for compliance with the applicable regulations. Staff encourage the applicant to reuse and recycle as many of the proposed wastes as possible. Composting and using the fish wastes as bait is preferable to landfilling. Finally, staff comment that transport of non-hazardous wastes in Maine must be conducted by transporters that are licensed to do so under Chapter 411 of the Maine Non-Hazardous Waste Transporter Rules.*

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