STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JANET T. MILLS
GOVERNOR

GERALD D. REID
COMMISSIONER

October 9, 2019

VIA EMAIL ONLY

Ms. Elizabeth Ransom
Ransom Consulting, Inc.
400 Commercial Street, Suite 404
Portland, Maine 04101

RE: SITE LOCATION OF DEVELOPMENT ACT APPLICATION AND NATURAL RESOURCES PROTECTION ACT APPLICATION (DEP #L-28319-26-A-N/L-28319-TG-B-N/L-28319-4E-CN/L-28319-L6-D-N/L-28319-TW-E-N), WASTE DISCHARGE LICENSE(WDL)/ MAINE POLLUTANT DISCHARGE ELIMINATION SYSTEM (MEPDES) PERMIT APPLICATION (DEP #W009200-6F-A-N / MEPDES PERMIT # ME0002771), CHAPTER 115 MINOR AIR EMISSIONS APPLICATION (DEP #A-1146-71-AN), BELFAST/NORTHPORT, MAINE

Dear Ms. Ransom:

The Department staff continues its review of the Nordic Aquafarms, Inc. (Nordic) application and subsequent filings, including the August 8, 2019, August 14, 2019, and August 22, 2019 submissions. The Department has identified the following questions and requests additional information on the following items.

Natural Resources Protection Act (NRPA) application:

1. According to Plan Sheet CE502, the proposed runoff diversion trench contains an underdrain pipe that will intercept groundwater, in addition to surface runoff, from off-site properties and convey the captured groundwater and surface water into Stream 9. In the application it is unclear whether post-development groundwater from the project site is sufficient to sustain flows in the downstream portions of Streams 3, 5, and 6. Please explain the flows that will be maintained in the portions of these streams proposed to be wetted by the applicant and demonstrate there is water of sufficient quantity and quality to ensure this mitigation function as intended. Also, please provide and describe the baseline that you use to measure pre-development flows against post-development flows.

2. Please describe and quantify the impact associated with the road crossing over Stream 9 between Wetland 8 and Wetland 9. Please revise your alternatives analysis, minimization strategies, and compensation proposal to account for this impact.

3. Please state the projected amount of surface water and groundwater that will be discharged into Stream 9 from the proposed runoff diversion trench and whether this additional volume of water will affect the viability and persistence of the supplemental plantings in Restoration Areas 1 and 3, and the physical geomorphology of the stream channel and associated riparian area. Please demonstrate the capability of Stream 9 to successfully handle the additional flows from the proposed runoff diversion trench without adversely affecting the proposed stream compensation and without adversely modifying the physical characteristics of Stream 9 and its riparian area.

4. Describe how the methods and results of the Qualitative Habitat Evaluation Index address the reasonableness of proposed stream alterations and compensation at the project site.

5. Please describe how the proposed stream compensation replaces the macroinvertebrate habitat that will be lost as a result of proposed impacts to Streams 3, 5, and 6. Consideration should be given to developing a macroinvertebrate sampling methodology that will be implemented as part of baseline and post-restoration monitoring and reporting in Stream 9. Monitoring results should be both qualitative and quantitative in nature with a focus on species diversity and abundance.

6. Supplemental plantings are proposed in the riparian area of Stream 8 as shown in Restoration Area 4 of the proposed impact compensation plan. Based on information in the record and Department observations from previous site visits, this riparian area is established with existing vegetation, including several species of trees, shrubs, grasses, and groundcover. Additional plantings are not necessary in this area and will not provide an environmental lift to the functions and values of Stream 8 due to the existing establishment of vegetation in this area. For this reason, the Department recommends that the proposed plantings be removed from the stream compensation plan. Other methods of stream compensation should be considered and proposed.

7. Freshwater wetlands within 25 feet of streams are freshwater wetlands of special significance. Ch. 310, § 4(A)(8). The application materials submitted August 22, 2019, contain updated stream identification and wetland delineation information. Please provide a corresponding update of the wetlands of special significance present on the site; explain the proposed impact to these wetlands, if any; and discuss why any impacts are reasonable and no practicable alternative less damaging to the environment exists.

8. Please submit a plan that outlines the staging area where seawater pipeline segments will be stored prior to installation. If the segments will be stored at the primary project site, please describe how the segments will be transported across, and deposited into, the coastal wetland without disturbing salt marsh vegetation and the outlets of Streams 8 and 9c. If the pipeline segments will be brought to the site by barge from an off-site location, please provide this location and show the upland staging area on a plan.

9. Additional erosion and sedimentation control measures should be considered and implemented to prevent turbidity in the coastal wetland during construction. Such

measures include, but are not limited to, a system for monitoring and reporting turbidity during construction, use of a fully enclosed dredge bucket, limiting the hoist speed of the dredge bucket when operating in the water column, and use of a scow or a secondary containment system to prevent overflow of dredged materials.

10. All equipment working within the coastal wetland must operate from a barge or construction mats. If working from construction mats, these mats must be shown on a plan. Construction mats must also be removed from the coastal wetland when not in use.

11. Please describe how the work area within the coastal wetland will be stabilized and remain dry and uninterrupted between tide cycles.

12. Please overlay a construction sequencing plan with an overhead aerial imagery plan. Include the locations of all erosion and sedimentation control measures, excavation/trenching activities, and dredging activities.

13. Compensation for wetland impacts and stream impacts must be separated into two proposals, because the functions and values for these resources are different. According to the NRPA, 38 M.R.S. § 480(Z), Maine's In Lieu Fee (ILF) program is not an eligible method for compensation of impacts to streams. For this reason, a dollar value cannot be placed on proposed stream impacts and the square footage of on-site stream compensation cannot be used to reduce the ILF compensation formula for proposed freshwater wetland impacts. The ILF wetland compensation formula is:

    (Direct wetland impact/sq. ft. x (natural resource enhancement & restoration cost/sq. ft. + avg. assessed land valuation/sq. ft.)) x (resource multiplier)

    Based on the amount of proposed freshwater impacts as listed in the August 22, 2019 submission, the ILF calculation for freshwater wetland impacts, is:

    190,389 sf x ($3.61 + $0.09) x 1 = $704,439.30

    Please revise the proposed compensation fee amount accordingly. All compensation fee amounts could be reduced by decreasing the amount of impact to on-site natural resources.

14. In revised application submissions, the seawater access system is proposed to be suspended above the seabed. Please state the elevation that the pipelines will be suspended above the seabed and state the reasoning for grading and filling any depressions along the pipeline route. If any areas of seabed are to be filled and/or graded, please revise your alternatives analysis, minimization strategies, and compensation proposal to account for this impact.

Site Location of Development Act (Site Law) application:

1. In accordance with the Department's Financial and Technical Capacity Standards of the Site Law, Chapter 373, § (B)(3)(a), please submit a letter of commitment or intent to fund indicating the amount of funds intended to be provided to the applicant for at least the first three tranches of the proposed project.

2. Please submit sound level specifications for all outside sound-generating machinery and explain whether the resulting sound will comply with the corresponding Site Law standards. Will it be necessary to mitigate for the generation of noise from outside sound-generating machinery (e.g., cooling towers, generators, ventilation systems, etc.) by enclosing these noise sources?

3. Please submit sound level specifications for all outside sound-generating machinery.

4. Please provide a draft Spill Prevention Control and Countermeasures (SPCC) plan.

5. Please review and respond accordingly to the attached geology technical review memorandum dated September 17, 2019.

6. Please review and respond accordingly to the attached stormwater management technical review memorandum dated October 3, 2019.

These are the items that the Department has identified to date in reviewing the application materials associated with NRPA and Site Law. Thank you in advance for your review and responses to these questions.

Sincerely,

Kevin Martin
Compliance & Procedures Specialist
Maine Department of Environmental Protection

cc: Service List

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JANET T. MILLS
GOVERNOR

GERALD D. REID
COMMISSIONER

TECHNICAL REVIEW MEMORANDUM

Bureau of Land Resources

TO:	**Beth Callahan, Project Manager – Bureau of Land Resources**
FROM:	**Kerem Gungor, Environmental Engineer -- Bureau of Land Resources**
DATE:	**October 3, 2019**
RE:	**Nordic Aquafarms Inc., Land-based Aquaculture Facility, Belfast, L-28319-26-A-N**

I have reviewed the materials delivered to the Department in response to my technical review memorandum dated 6/25/19 by *Ransom Consulting* for the land-based aquaculture facility of *Nordic Aquafarms Inc* in Belfast.

APPLICANT: Nordic Aquafarms Inc.
DEP#: L-28319-26-A-N
City: Belfast
Agent who prepared the application: Elizabeth Ransom
Project description: Land-based Aquaculture Facility
Watershed (HUC12): Belfast Reservoir Number One-Little River & Goose Pond-Frontal Penobscot Bay
Resultant Impervious Area: 27.4 acres
Resultant Developed Area: 37.9 acres
Parcel area: 54 acres
Standards applicable to the project: Basic, general, flooding

A. Electronic Submittals:

The applicant provided the following portable document files (PDFs) for my review:

- *6-25-19 Tech memo responses FINAL (August 12, 2019).pdf*: 705-page document including
    - Ten-page memo by *Elizabeth M. Ransom, P.G. (Ransom Consulting Inc.)* dated 8/8/19 addressing my specific comments given in my memorandum dated 6/25/19,
    - Attachment A. Updated Erosion and Sediment Control Detail Drawings CE502-CE505:
        - CE502 thru CE505. Erosion & Sediment Control Details.
          The plan sheets were revised on 7/18/19, signed and sealed by *Andrew D. Johnston, P.E.*
    - Attachment B. Updated Gradings Plans CG102 & CG104:
        - CG102. Grading Plan Area B.
        - CG104. Grading Plan Area D.
          The plan sheets were revised 7/25/19, signed and sealed by *Mark G. Johnson, L.L.A.*

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- Attachment C. Updated Figure 10 – Subcatchments 3, 4 & 39
  - Figure 10. Subcatchments 3, 4 & 39. Dated March 2019.
- Attachment D. Updated Stormwater Systems Construction Detail Drawings CQ501-CQ503
  - CQ501 thru CQ503. Construction Details. Revised 7/26/19, unsealed.
- Attachment E. Grassed Underdrain Filter Orifice Sizing
- Attachment F. Subsurface Sand Filter Orifice Sizing
- Attachment G. Manmade Pervious Orifice Sizing
- Attachment H. Updated Surface Sand Filter Sizing Chart
- Attachment I. Updated Pre- and Post-development Watershed Plans CW 102 & CW104
  - CW-104. Post-development Watershed Plan – On-site Areas. Revised 7/26/19, unsealed.
  - CW-102. Pre-development Watershed Plan – On-site Areas. Revised 7/26/19, unsealed.
- Attachment J. Subcatchment Calculation Revisions
  - Hand-written hydrologic calculations dated 7/22/19
- Attachment K. Updated Pre-development HydroCAD Model
  - Updated pre-development model outputs printed on 7/25/19
- Attachment L. Updated Post-development HydroCAD Model
  - Updated post-development model outputs printed on 8/8/19
- Attachment M. Updated Stormwater Management Plan Narrative
- Attachment N. Pipe and Structure Table Revisions

STORMWATER MANAGEMENT

A. Basic Standards

Note: *As always, the applicant's erosion control plan is a good starting point for providing protection during construction. However, based on site and weather conditions during construction, additional erosion and sediment control measures may necessary to stop soil from leaving the site. In addition, other measures may be necessary for winter construction. All areas of instability and erosion must be repaired immediately during construction and need to be maintained until the site is fully stabilized or vegetation is established. Approval of this plan does not authorize discharges from the site.*

A.1. Surface Runoff & Groundwater Interception

The applicant proposes to intercept the upgradient (northerly) surface runoff and groundwater by building a runoff diversion trench shown in ESC-7 detail of Sheet CE502. Furthermore, the building pads will have underdrains as shown in ESC-3 detail of Sheet CE502. As the phased construction progresses, the intercepted water will be conveyed into the stream channels (S3 and S5 in Figure 14.1 of Appendix 14-A) via the bypass culverts shown in ESC-1 detail of Sheet CE502. The proposed system will have a dual function: (a) alleviating the dewatering needs -particularly for the building pads- during the construction, (b) mitigating the project's post-construction impact on the jurisdictional streams by providing baseflow into the unimpacted reaches of the streams. Details of the proposed system is given in Appendix 14-A.

Comments:

1. First Diversion Trench (Sheet CE111): This trench will not be connected to the edge drain/culvert bypass system as shown in the ESC phasing plans. The trench will intercept the surface runoff from approximately 8.5 acres of upgradient area (see south of Subcatchment 9 flow path in Sheet CW-102) which appears to shed into the streams S3, S5, and S6 under the existing/pre-development conditions. The intercepted flow (surface runoff + groundwater) will be discharged into an easterly plunge pool based on the underdrain invert elevations provided in Sheet CE111. I recommend the following:
    a. Connect the trench underdrain to a bypass culvert or bypass culverts so that the intercepted flow is conveyed southerly and contributes to the baseflow provided for the streams S3, S5, and S6 under the post-development condition,
    b. Eliminate the westerly and easterly outfalls of the trench underdrain shown in Sheet CE118. The outfalls may be necessary during the initial phases of the project; but, they need to be removed or deactivated post construction to simulate the pre-development site hydrology to the extent practicable and mitigating the project's hydrologic impact on the jurisdictional streams,
    c. Provide a flat-bottom basin over the diversion trench in lieu of the easterly sloped swale as shown in the grading plans (Sheets CG105 thru CG107). A basin will improve the interception of the upgradient surface runoff by the trench and its conveyance to the streams. The basin can be equipped with catch basins and similar outlet control structures to prevent overflow,
    d. Clarify how the top of the trench will be permanently stabilized post construction: will it be exposed as shown in Detail ESC-7 in Sheet CE502? The related grading plans (Sheets CG105 thru CG107) do not show any exposed rock surface associated with the diversion trench,
    e. Ensure that the phasing and grading plans are consistent on the trench.

2. Second Diversion Trench (Sheet CE112): Since this trench will be below the finished floor elevation of Building 1, will it have a minimum crushed stone reservoir depth of 6 ft as shown in Detail ESC-7 in Sheet CE502? A separate detail drawing for this trench is requested.

3. Bypass Culvert (Sheet CE502): Are perforated pipes necessary for the bypass culverts?

4. Please provide the approximate length of underdrain network that will drain into the plunge pools shown in Sheet CG102 and CG104 (CG104: the plunge pool will discharge into S3 stream; CG102: westerly plunge pool will discharge into S5 stream and easterly plunge pool will discharge into S6 stream). Assuming the underdrain length as a proxy for the flow, demonstrate that the post-development baseflows of the streams S3, S5, and S6 rank similarly with the pre-development flow ranking of the streams obtained from the pre-development hydrologic model results (Subcatchments S2, S3, and S4).

5. Building Excavation Dewatering: The applicant has provided a detailed response to my earlier comment (Comment #1 in my previous memo) on the building pad dewatering. Assuming an average (horizontal) hydraulic conductivity of 2.2×10^{-6} cm/s, the applicant estimated that the groundwater seepage into a 200' (W) x400' (L) x15' (D) excavation pit to be 0.02 cfs (Note: the phasing plan limits the "uncovered grubbed area at any given time" to 80,000 sf). The field

conditions can significantly deviate from this assumption and result in higher seepage due to the presence of highly conductive layers (see the shallow water levels observed in the soil borings B102, B105, B107, and B110 within Building 1 and 2 footprints). Therefore, a dewatering contingency plan is necessary particularly for the overburden removal operation during which there will be no edge drains in place. What if temporary sediment basins are overwhelmed by the dewatering? Will the sediment basin be decanted into an undisturbed, well vegetated temporary buffer area? If so, the temporary buffer areas that will be used for emergency dewatering need to be shown in the phasing plans.

6. Soil Stockpiles: The applicant has stated that major on-site stockpiling of soils is not anticipated. If the trucks haul the overburden off site and bring the granular borrow in round trips (see page 14-5 in Appendix 14-A), there will be a need for stockpiling approximately 50,000 cy of granular borrow until the building excavation reaches the subgrade elevation which may take more than two months (see the phasing summary table in Appendix 14-A). The earth movement logistics warrant more discussion and clarification: Is it more likely that the overburden and granular borrow hauling will be done in round trips? Or will the trucks haul in the granular borrow after the overburden removal is complete? The second alternative is preferable since it will minimize the need for soil stockpiling on site.

   a. Due to its texture and erodibility, on-site overburden stockpiling needs to be clearly restricted in the ESC plan by inserting the following statement where applicable: *"The overburden shall not be stored on site more than two weeks"*.
   b. Soil stockpiling areas need to be shown in the phasing plans if the earth hauling will be performed in round trips.

7. Please amend the ESC plan with the response, including the table, provided for Comment 8.a in my previous memo.

8. Please provide a detail of the temporary structure which will divert the peripheral surface runoff away from the building pad excavation.

9. Flocculant Use: The applicant's concern in regard to flocculants' effectiveness for construction site turbidity control in Maine is noted. Success of flocculation largely depends on the flocculant selection and proper application. I recommend a trial run to determine the effectiveness of powder and solid block flocculants for turbidity control during Phase 1B of the project (particularly during the major earthwork/overburden removal stage). Flocculant selection must be based on the lab analyses (e.g., jar testing) performed on at least three representative (i.e., native silty) soil samples. A copy of the lab reports must be submitted to the Department for its review and feedback. The selected flocculants need to be applied per the manufacturer's instructions and in consultation with the Department. If the flocculant use does not result in noticeable improvement in the turbidity control, the applicant may elect not to use flocculants in the subsequent phases of the construction. Please amend the ESC plan accordingly.

B. General Standards

The applicant proposes to use the following structural treatment measures to comply with the standards: (a) grassed underdrained soil filters, (b) subsurface sand filters, (c) pervious pavers, and (d) green roofs.

Comments:

10. The post-development subcatchments 23, 25, and 31 discharge into "Belfast Reservoir One" as shown in Sheet CW-104. In order to eliminate the phosphorus export from the developed areas of these subcatchments into the reservoir, please:
    a. Delineate the grassed areas within Subcatchments 25 and 31 in Sheets LP102, LP103, and LP104 and provide the following note for the delineated areas:
    "These grassed areas shall not be mowed than more than twice a year and maintained as meadow. No phosphorus containing fertilizer shall be used in these areas except for establishing grass cover on bare soil.",
    b. Revise the stormwater drainageway proposed for Subcatchment 23 and direct the subcatchment's entire runoff into the closed drainage system which ultimately discharges into the coastal wetland from the existing clarifier (PT10 shown in Sheet CW-104).

Appendix A. Stormwater Treatment Calculations: Comment #11 is related to Appendix A.

11. GSF #1B: The actual surface area of the filter appears to be smaller than 773 sf, which is used in the calculations. Please review.

Appendix B. Post Construction Stormwater Management: Comment #12 thru #15 are related to Appendix B.

12. The surface runoff will mostly sheet flow into the proposed GUSFs. Therefore, the finished grades must be consistent with the treatment areas shown in the figures enclosed with the appendix. Please:
    a. Provide more spot elevations and arrows indicating the slope and the flow direction in the grading plans,
    b. Please provide the following note in a plan sheet where applicable:
    "The contractor shall be instructed by the inspecting engineer to ensure that the as-built drainage areas of the grassed underdrained soil filters will be as shown in the revised figures given in Section 12 Appendix B of the permit application."

13. Figure 2: Subcatchment 1B includes areas westerly from GSF 1B which will not be treated by the filter. Please revise the figure. Also, CB-16 rim elevation needs to be 66.90 ft.

14. Figure 4: CB-17 and CB-18 rim elevation needs to be corrected: both elevations need to be 62.0 ft.

15. Figure 6: Will the purple area be treated by GSF15? If so, the treatment area is approximately 9,000 sf. Based on the calculations provided in Appendix A, the filter basin may not have adequate water quality volume for the proposed treatment area. Please review the design and revise it if necessary. Also, Building #7 north of GSF15 will not have a green roof; however, the treatment tables indicate that it will have green roof? SSF43 was mistakenly labeled as SSF13. Please revise.

16. Sheet CG101: The 12" storm drain daylighting into GSF24 at the invert elevation of 39.24 ft (P85 in Appendix B) is not clearly shown in this grading plan.

17. Sheet CQ-501 & CQ-502: Please provide information on the subgrade of each grassed underdrained soil filter, subsurface sand filter, and pervious pavers: will it be granular borrow or native soil? Specifically, placing the subsurface sand filters over the granular borrow may help with infiltrating the treated roof runoff which may help with mitigating the hydrologic impact of the project on the jurisdictional streams.

Subsurface Sand Filters: Comment #18 thru #20.

There is no separate bypass manifold which will convey the inflow into the StormTech SC740 chambers when the isolator row capacity is exceeded, or when the isolator row is clogged with sediment. Since the subsurface sand filters will exclusively treat the roof runoff that will contain significantly less sediment load as compared to other impervious surfaces like driveways or parking areas, the design is acceptable.

18. Larger scale plan view drawings of the proposed subsurface sand filter systems need to be provided. Isolator rows, distribution manifolds, inlet, outlet control structures and maintenance manholes need to be shown instead of the typical "Pretreatment Row – Plan View" presented in Sheet CQ-502. Also, please have the pretreatment row designs reviewed by the StormTech representatives and provide their approval letter per Condition #9 stated in the Department's approval letter dated 7/29/16:
https://www.maine.gov/dep/land/stormwater/stormwaterbmps/manufactured-systems/stormtech%20isolator%20row%20august%202016.pdf

19. SSF 36: Please check the "underdrain elevation (F)" and "underdrain from SSF pipe elevation" in "SSF Outlet Manhole" and make sure the underdrain system has positive drainage.

20. SSF 36 and SSF 40: Please reduce the inlet control structure weir elevations such that they are equal to "Elevation C + 3 ft" which is the top elevation of the StormTech SC740 chambers/isolator rows.

Manmade Pervious Pavers: Comment #21 thru #25.

21. Please revise "Manmade Pervious Pavers-Plan View" detail given in CQ-501 so that run-on flow paths and width of pervious pavers for each of the proposed manmade pervious paver (MPP) strip are clearly presented. A table including the paver width, run-on length of each MPP needs to be presented with the detail drawing.

22. MPP14: The grading proposed in Sheet CG103 does not appear to be consistent with the treatment area shown for MPP14 in Appendix B Figure 5. There appears to be an island between the easterly impervious pavement and the pervious paver strip; the island will not let the surface runoff shed into the pervious paver strip. The grading needs to be revised and spot elevations need to be provided.

23. MPP19: Spot elevations and slope directions need to be shown in Sheet CG104 to ensure that the pervious strip can treat entire Subcatchment 19 shown in Appendix B Figure 5.

24. MPP22: The surface area measured in Sheet CG102 is approximately 2,800 sf, which is less than the surface area used in Appendix A Sheet #20 (i.e., 3,240 sf).

25. MPP30: HydroCAD pond (Pond mpp30) (Page 414 & 415 of the revised post-development HydroCAD model outputs) has an R-Tank configuration different from the other manmade pervious paver ponds since the applicant aimed to provide additional storage volume for the 25-yr storm peak flow attenuation. Please provide the plan and profile view drawings of the proposed R-Tank system.

Vegetated Roofs:

26. Sheet CQ-503: The applicant proposes to use pregrown modular vegetated roof systems (i.e., Firestone SkyScape Vegetative Roof Systems). The "Vegetated Roof Cross-section" detail needs to be revised to reflect the proposed modular system. Also, my understanding is that the applicant proposes to use two different types of modules (Semi-intensive & Intensive; see Appendix A page #38 & page #34) for the proposed vegetated roofs. Types, specifications, and total number of the modules to be used for each individual vegetated roof needs to be presented in a tabular format in this plan sheet.

27. Please review the water storage volume figure used in the sizing calculations. As far as I understand, the "estimated module water storage volume" is reported as 0.20 cf/sf for the semi-intensive module and 0.26 cf/sf for the intensive module in the manufacturer's document presented as Sheet 38 in Appendix A. Both semi-intensive and intensive modules have a surface area of 2.08 sf. Therefore, total estimated water storage volume of a semi-intensive module becomes 2.08 sf x 0.20 cf/sf = 0.416 cf and the same figure for an intensive module becomes 2.08 sf x 0.26 cf/sf = 0.541 cf. Please review the sizing calculations and revise the design if necessary.

28. Subcatchment 15 (GSF15 & GR15): The treatment area breakdown needs to be clarified. Is GR15 proposed as a self-treating surface which receives no runoff from other developed areas? Also, will GSF15 treat 3,184 sf of grass/landscaped area or 4,184 sf of grass/landscaped area? Please revise Figures 6 & 7 in Appendix B by clearly delineating the green roof area. Similar clarifications (e.g., callouts, marking) are necessary in Sheet CG107.

29. Subcatchment 28 (GR28): "Table 1: Stormwater Treatment" states that GR28 will treat 1,407 and 2,429 sf of impervious and landscaped area, respectively. It is unclear which building within Subcatchment 28 will have a vegetated roof. Will the existing building redeveloped into a visitor center (Building 10 shown in Sheet CP101) which will have GR28? The extent of redevelopment and new development proposed for Subcatchment 28 needs to be clearly stated in the stormwater management plan and appropriate callouts need to be given in the layout and grading plans (Sheets CP101 and CG101).

30. Subcatchment 33 (GR33): The "Vegetated Roof" table presented in Appendix A (page #34) shows that the "semi-intensive" modules with water storage volume of 0.2 cf/sf will be used for GR33 whereas GR33 sizing calculations presented in Sheet #31 & #33 indicate that the "intensive"

modules with water storage volume of 0.26 cf/sf will be used in GR33. Please review Appendix A and make necessary revisions.

C. Flooding Standard

Comments:

31. This comment is related to Comment #1 provided in this memo:

Based on my analysis of the existing elevation contours and drainageways, the area south of the flow path shown within the pre-development Subcatchment 9 appears to drain into the pre-development Subcatchments 2, 3, and 4 (Sheet CW-102). Subcatchments 2, 3, 4, and 9 of the pre-development model need to be revised to reflect this drainage pattern. The post-development model will also need to be revised per Comment #1: the upgradient surface runoff captured by the northerly interceptor needs to be routed to the southerly analysis point of PT5. The flow due to the groundwater intercepted by the underdrain system can be disregarded in the post-development model.

32. Please provide the technical references justifying the curve number value (i.e., 61) selected for the vegetated roofs.

33. Subsurface Sand Filter Ponds: The post-development model results show that the "secondary outflow" device (i.e., the weirs) in the inlet control structure (ICS) ponds are triggered by the relatively small one-inch storm which results in significant amount of flow bypassing the subsurface sand filter pond. Please review and revise the ICS and subsurface sand filter ponds in the post-development model.

34. "Table 6 – Pipe Capacity":

- **a.** What is the rationale behind providing the "energy grade line (EGL)" in the table? The EGL is the sum of velocity head, pressure head, and elevation head. Since the stormwater drains will have open channel flow, it would be more appropriate to use the hydraulic grade line (HGL), which is essentially equal to the elevation head for open channel flow, for the storm drain capacity analysis,
- **b.** 10-yr 24-h peak flows in multiple pipes exceed their full-flow capacity. Please explain why the diameters of these pipes were not increased to increase the full-flow capacity,
- **c.** "10-yr EGL" values exceed the flood elevations of CB-16, DMH-59, and DMH-23 which indicate potential flooding around these structures for the 10-yr storm. Please address.

REVIEW MEMORANDUM

September 17, 2019

To: Beth Callahan, Project Manager, Bureau of Land Resources
From: John Hopeck, Ph.D., Division of Environmental Assessment

Re: Nordic Aquafarms, Belfast

1) Monitoring Program

a) The applicant proposes in the water monitoring plan to download data on water level and conductivity quarterly, except following significant changes in the facility, "such as the start of Phase 1 and Phase 2 operations" in which case the data will be downloaded monthly. This frequency may not be sufficient to assess and allow responses to changes in water level or quantity, particularly for conductivity, and if the applicant intends to maintain relatively consistent fresh water quality. Many operators of large groundwater withdrawals in the state assess water level and water quality in near real-time. Reporting of these data to the Department should occur no less often than monthly during initial operation of the facility and after significant changes in water usage, although there should be a provision for more frequent reporting in the event that monitoring results suggest possible impacts on surface waters or offsite water supplies, or drawdowns significantly exceed those predicted by the model.

b) Data obtained during the pump tests suggest that the fine-grained overburden sediments may effectively separate some surface waters from connection with the bedrock aquifer. However, in part because the shallow wells installed during the pump test could not be developed, the quality of their connection to the surficial aquifer is not clear. The applicant proposes installation of three overburden monitoring wells (monitoring plan section 2.2.4) for measurement of water level and quality. It is not clear from the information if the intent is for these wells to be screened entirely within the fine sediment of the overburden or if they will extend to the apparently more permeable zone near the bedrock – overburden contact. It may be that this zone is important for maintenance of baseflow to larger streams in the area, and the pump test data indicate that this zone may be affected by pumping of the bedrock aquifer. Consequently, the proposed monthly data collection may not be sufficient to assess the impact of significant drawdown in the bedrock aquifer on head in this zone and possibly also on baseflow.

c) The applicant is proposing to install six piezometers "to monitor overburden groundwater levels at shallow…and deep…intervals" (Section 2.2.5). From Figure 3, these wells are not the same as the three overburden wells described in Section 2.2.4. The applicant also proposes wetland monitoring (Section 2.2.8) at wetlands W7 and W9. Figure 3 shows a nested pair of piezometers associated with wetland W9, but only the single proposed piezometer P5 in the area of wetland W7; shallow and deep piezometers should be located as close as possible to any wetland monitoring tract. Since the nested pair PZ-1S and PZ-1D would be eliminated by the proposed construction, they should be replaced by a nested pair in or adjacent to wetland W7. As noted in other cases previously, the

proposed monthly measurement rate may not allow adequate assessment of changing groundwater conditions, particularly during significant changes in pumping rate or drought conditions.

d) According to Section 2.2.6, the applicant proposes measurement of river stage at three staff gauges (SG-2, SG-3, and SG-4), as well as at an additional location on the Little River (SG-Mid). The first three locations are to be monitored by pressure transducer when conditions permit, with data to be downloaded quarterly, and data to be collected monthly when transducers cannot be deployed. Data at station SG-Mid are proposed to be measured monthly with the applicant conducting a "feasibility assessment…regarding the installation of a remote monitoring system to measure stage in the Little River in real-time." Because surface water conditions are much more subject to rapid variation than groundwater conditions under most circumstances, quarterly data collection and monthly manual measurement of stage are not likely to identify long-term trends than can be masked by transient flow conditions; collection of data and comparison to relevant standards will need to be done more frequently. The Department has required surface water level and flow monitoring at several facilities conducting large-volume groundwater extraction; the applicant may wish to confer with staff at those facilities regarding experience with near real-time data collection, ice conditions, and other issues with stream monitoring.

e) The applicant proposes to monitor water usage at both the production wells (Section 2.2.1) and the surface water intake (Section 2.2.6). Both sections state that rate and volume measurements "will be recorded…on a monthly basis." Water intake data from all sources, including the water utility, should be recorded no less often than daily, both to allow better correlation with any variation seen in water levels or surface water flows, and also to provide more accurate timing of changes in withdrawal rate that may require more time to appear in slower-responding systems, particularly groundwater.

f) Changes to the monitoring program, such as proposed on page 6 of the plan, will require specific approval from the Department, based on its review of all data collected to that point and other available information. The potential change described on this page should not be included in the permit at this point, although the permit can note that, other than any changes necessary to address required replacement of monitoring locations due to damage or voluntary withdrawal of a homeowner from the program, or changes required by the Department to address specific issues, if any, that arise during operation, the approved monitoring program should continue for at least two years of groundwater extraction at full capacity.

g) The applicant proposes to use offsite data to determine precipitation amounts and other conditions in the watershed; an onsite station for collection of precipitation and other weather and climatic data should be established and in operation prior to occupancy of the facility.

h) The applicant proposes performance criteria and warning levels in Section 3.0 of the

monitoring plan. However, in the absence of adequate background data or well construction information on the domestic wells in the proposed program, it is not appropriate to set specific criteria at this time. The Department also notes that, in general, depending on the amount and date of precipitation, the extent and depth of snow cover and timing of snow melt, and other factors, a month-to-month comparison of water levels for comparing wells in pre- and post-development conditions, as suggested on page 10 of the proposed monitoring plan, may not be the most suitable approach in all cases, and the Department will employ appropriate flexibility in making a determination that the monitoring data suggests that an unreasonable adverse impact has or could reasonably occur. Moreover, the warning levels proposed in Section 3.2 are generally ones at which a significant adverse impact on the affected resource or water supply well will have occurred, and the proposed response to this impact is generation of a report including the activities identified on page 12, but no specific action to mitigate the observed impact. Given the long proposed times between data collection, issues with which are described above, this could lead to an extended period of adverse impact. The monitoring plan should be revised to address issues identified above and this revised plan should propose warning levels which would identify the potential for adverse impact as well as measures to be implemented in order to prevent that impact. Such measures could include, but are not limited to, increased frequency of monitoring, reduced extraction of water from one or more sources, provision of alternate water supplies, and changes in production schedule. Correct setting of such warning levels requires sufficient pre-pumping data, and the applicant should begin collecting these data regarding seasonal variation in water level, domestic well construction, and other relevant information, and should include all such data in the revised monitoring plan, together with a justification for all proposed warning levels.

2) Blasting

a) The cover letter describing the blast plan assessment for this project is somewhat incomplete regarding the Department ground vibration standards. The standard of 1.25 in/sec applies only to certain distances and for blasts designed with a specific scaled distance value, as described in Table 1 of 38 MRS §490-Z(14)(K). The ground vibration standard of USBM RI 8507, Appendix B, Figure B-1 shows variable particle velocities depending on the frequency, and varies from 2.00 in/sec to slightly less than 0.2 in/sec at very low frequencies; the applicant has agreed in the "Blast Vibration & Air-Blast" section of the plan to comply with that standard. Note also that the language regarding air overpressure limits in this section of the proposed plan can be read to limit the developer to a total of four blasts; 38 MRS §490-Z(14)(H) reduces the air overpressure limit based on the number of blasts per day, so that the 123 dB limit applies to cases of four or more blasts per day.

b) Note that Section 7.2 of the geotechnical survey report recommends a pre-blast survey radius of 500 feet, which is not consistent with Site Location requirements or with the submitted blast plan; unless a lower pre-blast survey radius, based on a reduction of charge weight per delay as outlined in 38 MRS §490-Z(14), is requested and approved by the Department, the larger pre-blast survey radius of 2000 feet is required.

3) Geotechnical Survey

a) No log or location is provided for any boring B303, and the listing of explorations in Section 3.0 of the geotechnical report suggests that this exploration may have been intentionally omitted or not performed. This should be clarified.
b) The exploration logs note soft clays in several explorations, apparently associated with areas of locally lower bedrock elevation. The report correctly observes (Section 5.0, p. 8) that potential consolidation of these soils under the anticipated structural loading and other factors require "excavation and replacement of the …soils with compacted structural fill, and/or design of the buildings to bear at elevations corresponding to suitable bearing soils." (Note that any dewatering required during excavation of such unsuitable soils or placement of structural fill is likely to contain a large fraction of fines.) Section 2.2 of the geotechnical report states that the "structural loads, tolerable settlement amounts, and grading and drainage plans were not finalized when this report was prepared", although some preliminary values appear to have provided (p.3). It is not known if final values for these parameters have been provided to the geotechnical engineer. Although the proposed remedial actions would likely be similar or identical, any changes to the design, addenda to the geotechnical report, or similar information that may be based on final values for these and other design parameters must be submitted for review and approval.

4) Groundwater

a) Section 15.4 of the application states that "the construction contractor will be required to provide a site-specific Spill Prevention, Control, and Countermeasures Plan…to be submitted to the MEDEP prior to construction." The order should specifically state that this plan should be submitted for review and approval prior to construction. This section also states that, prior to operation, "an operational SPCC plan will be developed by Nordic and submitted to the MEDEP for review"; any order should also specifically state that this plan must be reviewed and approved by the Department prior to the start operations at the facility.
b) Part IV(C) (p. 6) of the Public Utilities Commission order approving transfer of land from the water district to the applicant refers to "environmental due diligence" and "environmental tests" to be performed on the property. Results of any such tests should be provided to the Department for review, since these could affect construction requirements, erosion control measures, and discharge of water from excavations or underdrains if any significant risks to human health or the environment were identified. Department staff have noted some cement pipe with fibrous material, possibly asbestos – cement pipe, in areas that would be excavated as part of the proposed project; if these or other tests identify or have identified this to be asbestos-containing material, the applicant would need to address measures for removal and proper disposal prior to construction.

5) Water Supply

a) The applicant has provided information from a series of pump tests and detailed hydrogeologic modeling of the regional groundwater system. In general, this information

is sufficient to demonstrate that the specified volume of water can be obtained from the bedrock aquifer, although substantial drawdown in that aquifer will result; the long-term consequences of this extraction on water level and water quality are somewhat beyond the scope of the model, although it does suggest some possibility of induced salt-water intrusion, reduced baseflow, and increase in the volume of the larger bedrock aquifer contributing to this watershed (with the consequent minor reduction in volume of that aquifer contributing to adjacent watersheds). The monitoring program, modified as discussed above, is intended to address specific issues associated with possible adverse effects of this withdrawal and to include measures to mitigate or prevent any such adverse effects. The model is generally consistent with the findings of the exploratory borings in the vicinity of the proposed project, that the overburden consists largely of the fine-grained sediments of the Presumpscot Formation, which overlay a somewhat discontinuous till unit of varying thickness. These units overly an apparently relatively thick zone of weathered bedrock above more competent bedrock. Data from monitoring conducted during the pump tests, as indicated in the discussion of the monitoring program above, suggest that water levels in this weathered zone and, to some extent, the overlying till may respond to groundwater withdrawal from the bedrock aquifer to a much greater extent than water levels in the overlying Presumpscot Formation. Consequently, there could be substantially greater potential for induced recharge or reduced baseflow to affect surface water resources located on or obtaining water from the till and/or fractured bedrock than would exist for those resources that may be in whole or part supported by the Presumpscot Formation. Assessment of the watershed by Department staff indicates that, within the area of greatest impact from the proposed groundwater withdrawal, only the reach of the Little River between the Upper Reservoir and the Lower Reservoir lies substantially within bedrock or weathered bedrock. This may impact the amount of baseflow to this reach, and could possibly result in some measurable volume of induced recharge. The water balance calculations related to withdrawals from the Lower Reservoir presented in Section 15 appear to assume non-pumping conditions in determination of the baseflow contribution to this reach, and the model cross sections do not, at least at the scale shown in Figures 6a and 6b of the technical memorandum, clearly indicate whether riverbed conductance along this reach is determined using values for the bedrock and fractured bedrock or through the till or Presumpscot Formation, which could have the effect of muting any induced recharge or reduction in baseflow due to the significant drawdown in the bedrock (See Figures 14a – c of the technical memorandum), possibly leading to an underestimate of the change in stream leakage outflow shown in Figure 15 and described in the memorandum. Any measurable effect of such changes should be determined by the operational monitoring plan, if this plan is revised to allow a greater degree of precision and the facility becomes operational; to this end, a minimum flow and suitable warning level above this flow should be established for this reach as a performance standard, as generally indicated in discussion of the proposed monitoring program. To the extent practical, however, the applicant should incorporate an estimate of this loss in a revised water budget for the Lower Reservoir as part of this application.

b) The applicant is proposing to obtain a significant component of freshwater from the Belfast Water District. Part IV(F)(1) (p. 12) of the Public Utilities Commission Order approving the land transfer notes that there are "no specific contractual curtailment

provisions in the water supply agreement…during the first 6 years", under drought conditions or other circumstances, but that the utility states that it would apply "its general authority to curtail or reduce water sales…in the case of a drought or other water supply emergency." Maintenance of necessary environmental flows in the Goose River during drought conditions, however, is not the subject of this order and is not discussed in it. The 2018 capacity evaluation conducted for the utility notes (p. 8) that "a large portion of the water derived from the Goose River Aquifer is from induced infiltration" although data collected by the utility from a location downstream of the wells suggests that "at current pumping rates, the wells are not deriving much water from induced recharge" since these data also show that "under most circumstances…flow in the Goose River is greater downstream of the wells than it is at the dam." This report further notes, however, that "this might not be the case as pumping is increased from this aquifer in the future." It is not surprising to find that a system such as the Goose River and associated aquifer shows exchange of water in both directions between groundwater and surface water, under either natural or pumping conditions. However, these flow data are not provided in the capacity evaluation or the application, and the measurements techniques are not described. It is not clear that flows have been measured under pumping conditions within the immediate area of influence from the wells, and minimum required environmental flows from that area are also not known. The applicant recommends in Section 15 that the existing additional municipal well be brought online to support the increased water use, and this should have the effect of distributing the increased stress across a longer reach of the river – aquifer system in the vicinity of the pumping wells. However, existing data regarding flows and flow measurement locations in the Goose River should be provided for review, and minimum flows consistent with Department requirements should be identified and maintained in the affected reach.