

**To :** **Belfast Planning Board**  
**From:** **John Krueger, Northport, Maine**  
**Date:** **January 8, 2020**  
**RE:** **Site Location Issues with Nordic Application**

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Thank you for this opportunity to provide input on the Nordic application. Today's testimony compliments documents submitted to you a week ago. Should permitting authorities see fit to grant a permit, our goal is to assure that the best and strongest permit be provided. It benefits almost no one for a permitted facility to start up and fail. Up to this point primary scientific information and input has been limited to companies and individuals hired by the applicant. Information presented by third party scientific professionals has been limited and sometimes timed with a stop watch.

Nordic has had approximately two years to develop a permit, with significant time to collect information and provide it to permitting authorities. However, evaluation of the proposed site for natural resources and modeling of effects from one of the largest Concentrated Aquatic Animal Production sites in the world have been largely ignored. We know that state regulatory resources are very limited and that there has been pressure from the Norwegian ambassador to push this project forward. Within the past several weeks Upstream has submitted over 1000 pages of testimony to the BEP and Nordic's attorneys have sought to strike every word of the submittal. The DEP has ruled against their request to delete the testimony. Along with today's information, Upstream has provided copies of the testimonies that we have sent to the Board of Environmental Protection. There are additional written testimonies that Upstream will provide to the BEP in February and Upstream requests that these also be considered at that time.

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Belfast site location ordinances provide significant opportunities for the Planning Board (Sec. 90-42, Criteria for review by Planning Board, [Ord. No. 58-1997, 5.2, 7-17-1997]) The goal is to reduce risk to the city by requesting more clarity in the application and to determine if conditions for a permit are warranted.

Topics listed in Belfast Ordinances that concern Upstream include sections (10.) Financial and Technical Capability, (11.) Surface waters, (12.) Groundwater, (18.)

Solid Waste Management. (29.) Adequacy of waste disposal, and (30.) Additional Standards for development that may substantially affect the environment..

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Given the nature, size, risk, permanency and potential liability of the proposed project, it is essential that the area be protected from projects where short-term objectives may cause long-term damage to the natural resources. Best practices, standards, guidelines and diligence on risk are key tenants that the region should expect from environmental review of any project. Should none of those standards be met, or to the extent that standards do not exist, the burden falls to the permitting authority, unbiased by economics of hypothetical tax revenue, hypothetical jobs or political will. Instead, the uncertainty of the project must be weighed by the accuracy and surety of information for which it has based its technical decisions, and on the consequences should the project fail.

State guidance on Site Development and Location Chapter 373: FINANCIAL AND TECHNICAL CAPACITY STANDARDS OF THE SITE LOCATION OF DEVELOPMENT ACT, defines technical capability and that the permitting authority “may consider evidence regarding the developer's prior conduct as a measure of willingness and ability to meet all terms and conditions of approval established by the Department.”

The Nordic application from the start has been fraught with changes, a lack of clarity, and a lack of understanding of the Belfast bay and community. Upstream Watch has diligently directed its limited resources to following, analyzing and responding to Nordics’ submissions. Unfortunately, Nordic has continuously introduced changes and new material into its applications without providing much, if anything, in the way of notice and without amending its applications. This has left Upstream and everyone else, especially members of the public to wonder what to evaluate and when.

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#### **Let’s begin with the site location:**

The unsuitability of many characteristics of the proposed project location increases risk to the project’s success. If the untested size of the facility is not enough of an engineering challenge, the site itself presents many obstacles including:

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1. Lack of a sufficient deep water/current at the outfall. More specifically Nordic told us initially that the discharge would be at least a mile out into the deep fast-

moving currents. Instead they are now proposing 34 feet of a slowly circling eddy in which the effluent can't go anywhere. Nordic's scientist who evaluated the currents used a simplistic modeling program. Upstream has provided testimony from a Professor of Oceanography with the University of Maine with over 30 years of experience studying currents in Penobscot Bay with some 75 publications. He questions Nordic's evaluations finding them wrong on flow direction, flow rate, and dissolution capacity. We can't afford this big of a mistake.

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2. The choice of using a "green field" site instead of a "brown field" site is problematic. The Whole Ocean site has deep water historic records and an existing discharge pipe.

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3. Availability of ground water and likelihood that ground water use may impact water quantity and quality to neighborhood residents is crucial. We were told that there was plenty of water, now we learn that there is no sand and gravel aquifer. Instead there is fractured bedrock and limited groundwater. Data already collected from field tests demonstrates that there is measured saltwater intrusion and a lowering of the water table in the Belfast/Northport area. The process to initiate assessment and mitigation efforts is not properly addressed. To those negatively affected Nordic states: "If you have a problem with your well we will *work with you*". Not "we will drill you a new one". Not "we will hook you up to public water at our cost and pay your first 10 years of water bills for destroying your asset – your well". No promises at all. And once salt water gets into your well – you can't fix it.

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4. Poor construction clay site soils that require significant excavation mean 14,000-15,000 full size trailers to remove and replace clay soils in Phase One alone. Is there anywhere else in Belfast with such a poor construction site? The Nordic construction in Fredrickstadt already has construction problems due to site suitability.

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5. The dependency on fragile dams to contain necessary surface water is an enormous unresolved issue. Belfast owns the two dams, both of which are badly in need of repair. The Army Corps of Engineers has designed the upper dam as a High Hazard.
6. Research on ownership (TRI) on the land needed for the discharge pipe shows that Nordic was aware of the ownership problems early on and has sought to hide these issues.
7. There is a lack of adequate assessment of natural resources on the site and to the ocean systems receiving discharge. Nordic has had 2 years to perform such evaluation, something that should have taken place before an application was filed.
8. The site is located at a bend in Route 1, making traffic issues a concern.

One favorable quality of the site is a city government willing to risk the environment (including changing a resource protection zone to an industrial zone) for potential tax benefits. Note that Bucksport will allow TIFFs to reduce Whole Ocean taxes.

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**In addition to unsuitability with the site, the permit application keeps changing.**

1. The location and construction of the discharge pipe still is under review and new designs were apparently provided without any public input.
2. Solar panels are on, then they are off, then back on again.
3. Diesel generators are introduced as a "few for backup", then they are going to be used for daily operation but with no fixed schedule that NAF will commit to.
4. Stack heights and number of stacks are changing and that effects the facility operational impact. The current permit height is now 65'; eight of them, with new visual impacts,; this is not final yet.
5. Input water was going to be wells, then wells and city water, now wells and city water and surface water, with no operational explanation of how they are going to manage that. Their designers/operators have no experience in this and it is very tricky to do especially in "real-time" at a rate of 7.7 million gallons a day.
6. This is not a complete site review as the design is still incomplete, does their site plan at this point even show where the fish food is going to be stored. What will the feed be? Where specifically will wastes be taken?

7. The Board of Environmental Protection also provides evidence of continual changes to the permit application. Ransom prepared the following list of “what is revised and what is new” in the November 4, 2019 submittal:

Natural Resources Protection Act (NRPA) application: Nine revisions and clarification of existing application material.

Site Location of Development Act (Site Law) Application: Six revisions and clarification of existing application material.

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### **Other Technical Capability Issues:**

1. There are no Maine water-based effluent standards at this time to evaluate harm to the bay. Should we put our faith in their technology without any objective criteria for what our bay can handle in discharge parameters? To properly determine water quality based effluent limits one needs to assess the fauna and flora of the receiving waters. A complete technical assessment of the bay’s aquatic ecosystem has not been done, including temperature, background nutrients and stratification, and plant and wildlife.
2. There is evidence that technical current models used by Nordic are inaccurate so they cannot properly address risks to the bay and shoreline. Better 3-D modeling and collection of data that takes into account winds, currents, and stratification zones is needed. More complete modeling suggests strongly that Nordic may be 180 degrees off in current modeling.
3. While the applicant can pay a fee and destroy wetlands then protect a wetland in another town, there is still a need to assess the ecological damage to the area. Technical details regarding monitoring of the effluent discharge are incomplete.
4. An enforceable concentration based standard is necessary. As an example could all the nitrogen discharge come as a single slug, rather than in 7.7 million gallons of discharge? Should there be limits on the concentration variations in the discharge? Remember that 98% compared to 99% removal is a factor of two.
5. Monitoring to Assure that Best Practices meet water quality needs requires experience operating the Moving Bed Biofilm Reactor and the Hollow Membrane Bio Reactor treatment systems and disinfection treatment of virus

and disease. Many questions on these operations exist. Many issues are listed in the BEP testimony.

In addition, **Nofitech** has studied production losses at Norwegian RAS plants and isolated the risk areas which are:

- Design errors and operating errors
- Dead zones, thresholds, hooks and tight pipe angles  
Too low water flow
- Stagnant water or sludge, which creates gas

<https://salmonbusiness.com/pitfalls-for-salmon-farming-in-ras-plants/>

6. Upstream believes that there is more to learn and understand about virus and bacteria risks. Choosing a discharge site with such shallow waters and with so little understanding of the ecosystem makes this concern more of an issue. Nordic's attorneys have asked the BEP to disallow any testimony on virus and bacterial concerns.
7. The applicant has failed to demonstrate the technical barriers associated with the feed variations. Different feeds may require different growing conditions and different treatment conditions. Failure to properly manage growing and treatment and storage of feed and of waste can be serious to NAF and the community. There is no evidence that technical experience with all the ramifications associated with feed can be demonstrated until a source of feed is identified and analyzed. A testing of feed parameters should be provided.
8. Technical ability to respond to the event of an unpredicted contaminant outflow in storm water or effluent has not been defined. Extra storage tanks and the number of treatment systems are options undefined.

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9. Prior Conduct is Important. To date, the only project that they can point to in Fredrickstadt was brought up operationally using a RAS 2020 system. They are still making changes as they haven't gotten their freshwater filtration system working well, and while they are pouring concrete for their D shaped tanks, that is a long way from having a functional operational Phase 2 that is producing fish. The company IAA who was supposed to do this for them went bankrupt.
10. We should request a full operational "check point" review of the Fredrickstad facility complete with source water and effluent management. If they are serious responsible operators there should be no problem in going over that system design so that it can be evaluated and compared to what they are currently proposing here in Belfast.

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11. Nordic is not using the Best Available Technology. Upstream understands that for many regulators the use of Best Available Technology may eliminate any requirements to set actual pollution limits and instead rely totally on the industrial RAS “machine” to assure compliance. Better technologies exist and are being designed in the US, Canada, and the Middle East (these are ZERO DISCHARGE). Aquamaof Aquaculture, Superior Fresh and Sustainable Blue use these.

Maine’s Department of Marine Resources has recognized and anticipated ZERO LIQUID DISCHARGE in their new application forms.

<https://www.maine.gov/dmr/aquaculture/documents/LBAApp2019.pdf>

The state of the art is no longer partially open RAS, due to the very serious environmental issues that arise from discharging warm, nitrogen and pathogen laden effluent into the public waterways. Closed RAS systems are where the industry, and investors, are headed.

Zero Liquid Discharge is already in use for growing out Atlantic Salmon in salt water.

Sustainable Blue has been growing and shipping their salmon to restaurants and distributors in Canada. This past November, Forbes held an investors conference in New York, 400 participants were fed salmon provided by Sustainable Blue and Atlantic Sapphire and declared it delicious. Forbes message to investors, Closed Land Based RAS is where the industry is headed. Atlantic Sapphire has their own patented injection well technologies that they utilize to grow-out salt water salmon with zero discharge into the ocean or aquifers.

<https://www.forbes.com/sites/monteburke/2019/11/14/the-future-appears-bright-for-land-based-closed-containment-atlantic-salmon-aquaculture/#2a7445925303>

<https://sustainableblue.com/>

<https://atlanticsapphire.com/>

Superior Fresh has been utilizing aquaponics for raising Atlantic Salmon to accomplish zero effluent discharge. They have been marketing it successfully for

several years in the Mid-West and recently were the first US facility to win the coveted Best Aquaculture Practice (BAP) certification by the Global Aquaculture Alliance. (GAA). While they use a minimal amount of salt in their grow-out water for general fish health, blind taste tests have shown that their salmon is just as flavorful as those grown in more concentrated brine.

<https://www.superiorfresh.com/>

Another example of the move to Zero Liquid Discharge (ZLD) is AquaMaof. AquaMaof a highly successful company with a long track record and multiple sites raising fish for market worldwide. They have multiple sites that raise Atlantic Salmon in brine water using and licensing their proprietary Minimal Liquid Discharge (MLD) system. Their Zero Liquid Discharge effort is underway. ***If you have seen the Exxon bio-fuel ads featuring micro-algae tanks, you will get the idea. According to their chief technology officer depending on the type of algae used you can harvest it to produce high Omega3 fish food and bio-fuels. Different algae are used for processing fresh or brine water. AquaMaof will be licensing their ZLD technology for new systems construction.***

<https://aquamaof.com/technology/>

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It's good that permit conditions exist, but a promise to do something someday is not good enough. Nordic has not demonstrated credibility that deserves trust. Once they start to build, no one will stop them if they go back on their promises – including the Planning Board when they violate the Planning Board's own permit conditions. Too many issues still need to be resolved, that should have been resolved months ago.

It appears that Maine is now on the radar internationally as a place to build land based Concentrated Aquatic Animal Production industries. We are seen as having unlimited water and few if any outflow standards. Belfast has a unique opportunity to set a high bar for protecting our environment in times of many predictions of environmental degradation.

Brief Resume:

- BS/MS Massachusetts Institute of Technology in Chemical Engineering
- Past Director of Licensing & Enforcement and Past Director of Field Services at Maine DEP
- Retired Director of the DHS Health and Environmental Testing Laboratory (HETL)
- Retired Consultant for the Association of Public Health Laboratories, with numerous publications on Biomonitoring, Laboratory Data Interoperability.
- Retired Consultant for EPA Emergency Response Laboratory Network, through Computer Science Corporation