2.0 DEVELOPMENT DESCRIPTION

2.1 Purpose and Context

Ocean health is declining due to pollution, oxygen depletion, rising sea temperatures, microplastics, ocean acidification, and wild catch pressure, all over the world. While this is going on, there is a need to feed a rapidly growing world population. The world population is expected to grow by two billion in the next three decades with a resulting need of 70 percent more food, according to the World Bank.

Just recently, global fish farming volumes surpassed global wild catch. According to the future outlook from the FAO/World Bank, world aquaculture production must double in the three next decades to meet demand for protein, as wild catch has not grown materially in the past two decades and with no outlook for growth in the coming decades.

The US is the largest western consumption market for seafood, while it is ranked as number 13 internationally in aquaculture. In 2017, the US seafood market grew by 7.4 percent, with shrimp and salmon as the highest growth products. Fifty percent of seafood imports into the US are farmed, according the National Oceanic and Atmospheric Administration (NOAA). In 2018, the US imported 330,000 metric tons of Atlantic Salmon, and the imports are expected to grow significantly in the years to come.

From a food security, environmental and consumer perspective we believe that local production of fresh product in the US is imperative. “Made in the USA” seafood products have high consumer acceptance, will reduce the seafood trade deficit and will provide full seafood traceability. Finally, local production of fresh seafood will always have a lower CO_2 footprint compared to airfreighted imports. We have estimated that the proposed farm in Belfast will reduce CO_2 equal to over 1.5 million barrels of oil every year, due to elimination of airfreight. One kilo of airfreighted seafood adds 8-12 kilos CO_2E when long-distance transport is involved.

The proposed Belfast facility is designated as the Nordic Aquafarms Flagship facility internationally due to its location and long-term development potential. The Belfast facility has been planned and engineered based on standardized modular designs for smolt and grow-out facilities. In addition, considerable local engineering has been completed to achieve infrastructure connectivity, local adaptation of the project, and to minimize impacts from development.

The standardized designs Nordic has developed in Europe are based on <u>one smolt</u> module supporting <u>three grow-out modules</u>. Combined these four modules make out one <u>production unit</u>. The proposed Belfast project consists of two such units, to be phased over time. These standardized units have undergone extensive development, engineering and verification over the past two years in our European organization.

The purpose of the project is to provide 33,000 metric tons per year of safe, high quality and sustainable seafood to the consumers in the northeast of the United States. This project is poised to become a significant new commercial driver for the mid-coast and state of Maine with local, regional and global benefits. Being at the forefront of the aquaculture industry expansion, Nordic is providing Maine with a unique position as an innovator and environmental leader in commercial fish production, propelling the iconic Maine seafood industry into the next generation and ensuring it remains a part of the Maine economy, culture and identity for generations to come.

2.2 Project Setting and Existing Facilities

The Nordic Aquafarm project is proposed to be located on the northwest side of Route 1 (Northport Avenue) in Belfast, Maine adjacent to the Belfast Reservoir Number One, as shown on the United States Geologic Survey (USGS) topographic map (**Attachment 1**). The project site consists of parcels owned by the Belfast Water District (BWD), Mathews Brothers and Sam Cassida. The development also includes easements to the northwest of the entire parcel to connect a sewer line to the existing Belfast city sewer on Northport Avenue, by way of Perkins Road, and an easement through the Eckrote parcel for the intake and outfall pipes. The primary access to the site will be off Route 1 at the current site access for the BWD. The proposed project is located within the Route 1 South Business Park district and is abutted to the north by the Mathews Brothers facility. The Residential II zone abuts the site to the north and east, with residential properties located directly north of the site and along Route 1. The General Purpose (GP) district is located to the north of the site and directly abuts Perkins Road. The Protection Rural District is located across the Little River to the west of the site. The existing BWD parcel adjacent to the Lower Reservoir (also called Reservoir Number One), contains approximately 14 acres that will be retained by the City of Belfast and kept undeveloped as resource protection. There is an existing trail system through this Shoreland Zone area and along the reservoir and Little River.

Approximately 2 acres of the BWD parcel is currently developed with an office building, a former filter house, two garage buildings, and associated driveways and parking amounting to 0.4 acres of existing impervious surface. Existing site conditions are presented in plan **CD101**; note that all civil site plans can be found in the accompanying engineering plan set and specifically referenced plans have also been included at the end of this section. A concrete dam controls the water level to the reservoir, and piping associated with the former use of the reservoir as the water supply for the City of Belfast still exists adjacent to the dam and the office building. Historically, the Site was undeveloped agricultural land until 1887 when the lower dam was built, creating the Lower Reservoir. Concurrently, a pump house was constructed to provide water to downtown Belfast. The two turbine pumps ran off hydroelectric power from the dam with a coal fired steam pump generator as backup. Site infrastructure expanded around 1915 when water treatment structures, in the form of a filter house and concrete settling basin, were installed. In 1919, the Belfast Water Company was purchased by the City of Belfast and incorporated as the quasi-municipal non-profit entity known to this day as the BWD.

Use of the Lower Reservoir as the main water supply for the City of Belfast continued until 1956 when a gravel supply well installed in the north end of Belfast became operational, relegating the Lower Reservoir supply and Site infrastructure to emergency backup use only. Status as a backup supply remained until 1980, at which time the Lower Reservoir water supply and infrastructure were permanently removed from service and piping connections were sealed. Since 1980, the original pump house was renovated for use by the BWD as office space and two garages were built for equipment storage and repair space.

The entry to the existing BWD facility also includes an open grassed area and septic leach field.

The site has primarily coniferous vegetation cover within isolated areas of deciduous vegetation and bedrock outcrops. The site slopes gently to the South and Southwest into the Little River/Reservoir Number One. The terrain steepens within the 250-foot Resource Protection District with fingers of rivulets, channels and ravines exiting into the reservoir. The reservoir is controlled by a dam located just west of Route 1 and outlets into Belfast Bay. The site's geological investigations are based on surficial geology mapping for the State of Maine and augmented by field investigation during the hydrogeological and geotechnical drilling conducted for this permit application. A wetlands delineation, vernal pool investigation and wildlife habitat/endangered species investigation were also conducted for the site.

The project will require both potable domestic water for drinking and fish cleaning, and both salt and fresh process water for salmon rearing. Domestic water is proposed to be supplied by the BWD municipal system. Based on the changing environmental needs of salmon through their life cycle, process water will include both freshwater and saltwater sources. Freshwater sources of process water are proposed to include an on-site groundwater extraction well network, on-site surface water withdrawal from Belfast Reservoir Number One, and additional off-site supply from the BWD. Saltwater is proposed to be obtained from Belfast Bay through a seawater intake and pipeline. Collectively, the project is anticipated to use approximately 1,205 gallons per minute (gpm) of freshwater from three sources- 500 gpm from Belfast Water District municipal supply, 455 gpm from significant ground water wells on site, and up to 250 gpm to be withdrawn from surface water at Reservoir No. 1. Refer to attachment 23 for a full analysis of freshwater usage. In addition, 3,925 gpm of saltwater will be utilized. All quantities reflect full operational capacity and will be reduced during earlier phases.

Processing wastewater will be discharged to Belfast Bay via an ocean discharge, the length and location of which is discussed in the Maine Pollution Discharge Elimination System (MEPDES) permit application submitted to the Maine Department of Environmental Protection (MEDEP) in October 2018. An amendment to the application was submitted May 17th along with other DEP permits (SLODA, NRPA, and Air emissions license).

Power currently enters the site from Route 1, runs to the Belfast Water District office building, and to the garage buildings. The proposed project also will have a power connection from the Route 1 transmission line. Substation and/or transmission line upgrades that may be required to support the facility at full build out will be the responsibility of Central Maine Power, the owner of the power grid.

The proposed development will be constructed in two phases. Phase 1 would consist of the following:

1. Module 1 Building – 112,223 SF
2. Module 2 Building – 112,223 SF
3. Module 3 Building – 112,223 SF
4. Smolt 1 Building – 53,947 SF
5. Water/Wastewater Treatment Plant – 20,056 SF
6. Processing Building – 24,096 SF
7. Central Utility Plant – 18,998 SF
8. Office/Maintenance Building – 8,936 SF
9. Gate House – 298 SF

Phase 2 consists of:

1. Module 4 Building – 112,223 SF

2. Module 5 Building – 112,223 SF

3. Module 6 Building – 112,223 SF

4. Smolt 2 Building – 53,947 SF

5. Visitor Center – 2,188 square foot (SF)

C-102 and **AP001** show the final site topography and building layout upon completion of Phase 2. Including required impervious access drives, parking areas and delivery areas, the total new impervious area at the Site will be 27.4 acres at full build-out.

The topography of the site in the developed area is considered "rolling" but drops approximately 10 to 15 feet across the site. Stormwater control from both a quantity and quality standpoint, will require detention areas, water quality treatment facilities and erosion and sediment controls to prevent impact to the downslope Shoreland Zone area and the receiving water bodies.

2.3 Construction Plan

The proposed land-based aquaculture facility located in Belfast, Maine will be constructed in two major phases. The intent of the project phasing is to have a fully operational facility, albeit at a reduced capacity, at the conclusion of Phase 1, with the balance of the facility being constructed in Phase 2. This construction approach offers several distinct benefits, including but not limited to earlier facility startup, incorporation of Phase 1 learning into Phase 2 design, and allowing for system refinement and monitoring before full scale buildout. **CD101** shows the existing site prior to construction, and **C-102** shows the completed facility layout.

The facility is proposed to consist of 10 buildings at full buildout. Buildings 1 and 2 will contain the grow out modules, where the smolt will be raised to production size prior to being sent to processing. Both Building 1 and 2 will contain three grow-out modules, giving a total of three upon completion of Phase 1, and six after Phase 2. Building 3 consists of Smolt 1 and 2, Smolt 1 will be constructed first and will raise the salmon from egg to smolt for building 1; Smolt 2 will be constructed in the second phase and will perform the same function for building 2. Building 4, fish processing, will receive the salmon from the grow out modules and prepare them for market. Building 5 is the central utility plant (CUP) which contains the main heating and cooling equipment needed for process temperature control, along with backup generation for the entire facility. Building 6 will contain all the equipment needed to meet the facility's oxygen demands both through generation and storage. The administrative offices will be located in Building 7 and will contain all personnel not directly needed with the processing and support buildings. The water treatment plant, Building 8, will contain both the intake and discharge water treatment systems, both for the freshwater and saltwater sources. Building 9 consists of a small gatehouse just North of the visitor center that will control access to the main site. Building 10 will be the original BWD structure but will be renovated to serve as a visitor center for community and educational outreach.

Phase 1 focuses on the construction of the Smolt 1 facility, along with operational support facilities such as the seawater intake/discharge system, water treatment plant (WTP), CUP, oxygen generation, and administrative offices. Phase 1 construction will also include supporting infrastructure such as roadways, stormwater management systems, electrical switchyard, etc. Grow-out module construction will begin during Phase 1, with the goal of three modules completed and ready for operation by the completion of the phase. Construction of the gatehouse will also be included in this phase of development.

Phase 2 will begin after the completion of Phase 1 construction, commissioning, and start of operation. It will begin with an expansion of the overall area of impact, involving clearing of the Southwest corner of the site in preparation of construction of Building 2. Accordingly, the erosion control and stormwater measures will be expanded to accommodate this area, as will supporting infrastructure such as access roads. The main push of this phase will be the construction of Building 2, which contains the remaining three modules, but will also include the renovation of the existing BWD building for the visitor center.

The following sections outline the major and minor construction milestones throughout the project, broken up into sequential timeframes. A visual representation of this schedule is presented in **Appendix 2-A**. Site phasing plans **CE-110** through **CE-118** will be referenced in each corresponding section and can be found in the accompanying engineering plan set; specifically referenced plans can also be found at the end of this section. It should be noted that the start date for Phase 1 construction is set based on the assumed issuing of permits; delays in the permit application and review process could push this date back, along with all sequential timelines. The start of Phase 2 will occur after Phase 1 is completely operational and sufficient time has been allowed for design refinements and preconstruction.

2.3.1 Phase 1

During Phase 1 there will be two major construction efforts conducted concurrently: seawater access system construction and start of main facility buildout. All project phasing and progress within the site is aimed to allow for efficient and safe construction, and early facility start-up, while always minimizing disturbed areas.

<u>Seawater Access System</u>

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 two 30" diameter intake pipes and one 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 BWD 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. Plans and detail views of the proposed intake/discharge pipeline system are presented in **CS101-CS104**, **CS301**, **CS501-CS505** and **M-100**; note that all intake/discharge pipeline plans can be found in the accompanying engineering plan. The construction schedule for this seawater access system can be found in **Appendix 2-B**, note that this is a proposed timeline based on an assumed start of construction following the issuance of permits.

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 directly on the seafloor. Construction techniques will be further explained in subsequent sections of this document. Sections to follow detail the phasing order of the intake/discharge system construction, corresponding to distances along the pipe route referenced in **CS101**.

Construction Approach

Schedule: Based on preliminary data available during permit application preparations, the seawater access system was planned to commence upon permit issuance in the fall of 2019. Assuming this start date, seawater construction will be complete by April 2020. The upland construction zones including the Route 1 crossing would occur in fall prior to the major holidays. The waterborne construction will occur in the November to April timeframe. This schedule is provided as a guide for scope durations. Start dates and other milestones are dependent on permit approvals and are subject to change.

Sequence: Further detailed subsurface exploration (borings) in both upland and tidal zones will be performed before construction start to better understand the soils and rock along the pipeline route. This information will be used to refine the 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.

Environmental: For this seawater access portion of the project, Cianbro's Corporate Environmental Manager will oversee the construction to ensure compliance with environmental requirements. Construction crews will be staffed with qualified craftspeople to install and maintain the environmental best management practices (BMPs); 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 where significant rain/snow is forecast, additional resources will be readied, and crews lined up to monitor and respond according to the event.

Route 1 Crossing (Station 2+00 to 2+70)

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 are site-specific concerns that make directional boring and/or jack and bore not well suited to this project. 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. It was also 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 in plan **BP-1**. 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.

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 commencing deep excavation. 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, significant 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 the site upon excavation. The blasted rock will be excavated and likely crushed 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 Maine Department of Transportation (MEDOT) as well as City of Belfast standards and reopened to normal traffic.

Route 1 to the New Pump Station Connection (Station 2+00 to 0+00)

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.

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.

Upland Easement – Eckrote Property (Station 2+70 to 6+00)

Summary: This upland zone of underground piping will extend approximately 330 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 (**Appendix 2-C, Photo 1**). 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. At approximately station 4+00 this 3-sided cofferdam will be installed to allow the pipe to make the transition from Elevation +10 to Elevation -8. Excavation of the cofferdam and trenching of the tidal zone along the route of the pipe is expected to be of a depth of 10 feet below existing grade. Excavated material will be placed adjacent to the trench and will be used for backfill of the trench once the pipe is installed. The Landowner easement provides for the Eckrote’s to participate with the final restoration design and appearance

Construction: This 330-foot zone will likely be done in two halves of approximately 165 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 165 feet of the pipes are installed and backfilled, the coffer/box structure will be jumped ahead for the next 165 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.

Intertidal – Mudflats (Station 6+00 to 13+50)

<u>Summary</u>: Beyond the coffer cell described above lies the mudflat zone extending approximately 750 feet from the shoreline and mean high water line to the mean low water line (**Appendix 2-C, Photo 2).** 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, which exhibits no sign of channeling or washing with the tide cycles. 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 proper tides during daytime hours and will "play" the tides 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 by the Float and Sink Method. The initial plan is to preassemble six lengths of pipe line at 1000 feet long and one at 300 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.

<u>Construction</u>: 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 intersect 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. Working simultaneously over several tides, the trench will take shape as far out as the low water line will permit. The excavated material will be side cast to the opposite side of the trench route from the staged pipes. Using several excavators, it is envisioned to take 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 preceding 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.

Submerged in Water and Buried in Trench (Station 13+50 to 36+00)

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 clam shell 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 to install the pipes in this zone. Turbidity curtain will be used surrounding the immediate excavation similar to dredging projects.

Construction: For all remaining waterborne construction activities, Contractor will be in regular contact 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. Floating 3-foot silt boom can be deployed to follow the excavation but must be of shallow depth to allow for tides and currents. 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. Once the pipe trench is backfilled, the remaining excess spoils will be loaded onto barges and sent to an upland disposal site. The seafloor topography will be smoothed to the original profile and once again verified by divers and video.

Exposed upon Seafloor (Station 36+00 to 42+00 to 69+00)

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.

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.

Intake Structures and Discharge Diffusers

Summary: The discharge pipe terminates with a diffuser and the intake pipes each have a support structure and screen, as depicted on the plans.

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.

Site Preparation and Initial Construction: 4 months

Summary: The current project timeline developed during permit application preparation indicates the start of site preparation and construction will occur during the fall of 2019, but the exact start date hinges on the permit review and issuing timeline. The schedule is provided to indicate overall scope durations, while the milestone dates are subject to change. As noted before the beginning of main site construction will occur simultaneously with the construction of the intake/discharge system. Site preparation will involve removal of trees and vegetation within and closely surrounding the building footprints, along with implementation of stormwater and erosion control barriers to mitigate any impact from construction to the surrounding environment. Construction will prioritize early process facilities, such as the smolt, and the necessary supporting structures (oxygen generation, central utility, and water treatment). Supporting sitework will also occur during this phase, allowing logistical access and support to the areas of construction.

Construction: The main facility buildout will begin with site preparation and initial clearing of the forested areas encompassed in the scope of Phase 1. **CE110** shows the overall site layout with the proposed building footprints for full buildout, with the shaded area indicating where clearing will occur. The area will include the footprint for building one, located in the Northwest corner of the site, along with the smolt building region; additional clearing will occur for a laydown area located in the Eastern side of the proposed building 2 footprint, as well as the access and area of the WTP. Clearing will extend beyond the building footprints themselves to allow for proper building setbacks, installation of stormwater systems, and access roads. A temporary access bridge will be erected across the stream leading to the WTP, and a main gravel access road will be constructed to a temporary gravel laydown area for clearing equipment and log storage. Note that cleared areas will not be grubbed until construction is about to commence to prevent erosion.

CE111 illustrates Phase 1A, which will proceed immediately following site clearing. During Phase 1A the overall area of impact for Phase 1 will undergo erosion and stormwater control measures, which are described in greater detail in Sections 12 and 14 of this application. This will include the installation of a silt fence around the perimeter of the area to prevent runoff during construction and protect the surrounding environment. A riprap perimeter along the North/Northwest edge of the site will be constructed for ground stabilization, along with a diversion trench to redirect stormwater runoff from the areas uphill of the site. Several plunge pools will be excavated for stormwater collection, the proposed locations of which are shown in the referenced drawing. A laydown area for equipment and materials will be grubbed and stabilized for use throughout construction, as will an area in the building 7 footprint area to be used for temporary site offices and storage. The newly cleared WTP footprint will be stabilized with a gravel pad in preparation for construction. Access to these areas will be provided by a newly paved access road running from the existing paved lot to the Northeast corner of the site; this access road will be gradually extended as construction proceeds through the site. Construction of Phase 1 is anticipated to start in late summer or early fall 2019, following permit approval.

Building construction begins during Phase 1B, which is shown in **CE112**. Construction begins with the Smolt and water treatment facilities, with the building footprints being over-excavated, stabilized, and prepped for foundations and slabs. The building footprints will be excavated to final depth and backfilled with suitable materials before foundation construction begins. Both the smolt and WTP will require significant excavation due to the subgrade plumbing and equipment. The depth of excavation for some of the buildings may require ledge removal, the method of which will be selected for minimal impact but may include controlled blasting if no means of lesser impact proves effective; further detail of this can be found in Section 20. Once excavation and backfill of the building footprint has been completed, installation of subgrade drainage and vapor barriers will occur to prevent water intrusion into the foundation. All process piping between the buildings, in addition to water supply, waste lines, and heating/cooling lines will be subgrade, and therefore as build construction proceeds there will also be extensive work installing the interconnecting pipelines between the facilities. The individual pipe sizes and schedules will be based on the particular application but, will all be installed through the digging of trenches and backfilling with proper material. As each building enters the foundation stage tie-in points for the various process and utility connections will be installed.

During this subphase there will also be additional sitework to prevent any runoff from the construction areas. Installation of culverts to bypass the construction area and digging of temporary sediment ponds will minimize the impact of the excavation and construction runoff. Access roads will be extended to encompass the Smolt and WTP footprints for conveyance of construction equipment.

Phase 1 Facility Construction: 8 months

Summary: Construction will begin to proceed across the site, beginning with the Smolt 1 facility and moving eastward to the Oxygen generation, CUP, and fish processing. Work will also proceed on the WTP in coordination with the construction of the intake and discharge pipeline system. Towards the end of this period module construction will begin, starting with the Westernmost portion of building 1. Significant envelope construction for the initial process and supporting facilities will be completed by the end of this period.

Construction: The bulk of Phase 1 construction will occur within this time period. The cleared and prepped areas for the WTP and Smolt will be the initial focal points for envelope construction, with site preparation for the footprint of the oxygen generation, processing, and CUP occurring concurrently. As with the Smolt footprint, the newly grubbed area will undergo overexcavation and stabilization in preparation for foundation construction. **CE113** shows the site plan for Phase 1C. The buildings located in this newly excavated area will not require as deep of excavation as the Smolt or WTP facilities, however there will still be extensive process piping running between them and the rest of the buildings on site; like with the initial buildings this pipework will require the digging of trenches for installation, taking care not to disturb already installed piping or conflict with the stormwater management system. The foundation and slab of the Smolt facility will be poured, however only Smolt 1 will undergo envelope construction, with the adjoining Smolt 2 building being left for Phase 2. Construction will also proceed on the WTP, expanding from the intake pumping station to encompass the base slab along with all subgrade pluming and utilities. The stormwater and erosion management systems implemented in Phase 1B will remain effective and no additional temporary measures will be needed to mitigate site impact outside of the noted construction footprints for the duration of Phase 1.

CE114 shows Phase 1D, which features the ongoing construction of the Smolt 1 facility, along with the start of foundation construction of the oxygen generation and CUP facilities. Envelope construction will proceed for the CUP; however, the construction of the processing building will be deferred to towards the end of Phase 1. During Phase 1D over-excavation and footprint preparation will begin for the first grow out module, located in the Northwest corner of the site, along with access roadways to the area. Due to the size of the tanks contained within each module, significant excavation and backfill will be required prior to foundation construction. Phase 1E is displayed in **CE115**, during which a significant amount of the Smolt 1 building and equipment installation is completed, and foundation and envelope construction is in progress for module 1. Due to the nature of the existing soils on site and the mass of the modules, foundation footings will need to be constructed to ensure proper building stability and minimal settling during and post construction. Also, during this subphase the regions for the remaining two Northern modules is prepared for construction, and the access roadway is expanding to encompass the perimeter of building 1.

It should be noted that during this time period construction of the intake/discharge pipeline and pump station will be completed, as will the majority of the WTP building and equipment installation. The electrical switchyard and CUP buildings, along with oxygen generation will also be fully built, equipped, and ready for operation by the end of this period. It is also expected that during this subphase municipal sewer pipeline construction will begin. A trench will be dug from a general access point in the Northeast corner of the site and proceeding Northward through the Matthews Brothers property, for which an easement has been issued, to the Perkins Rd. As construction proceeds the sewer discharge line will be installed inside the trench and backfilled with suitable soils. Once Perkins Rd. is reached, the pipeline will proceed Eastward adjacent to the road before tying into the sewer main by Northport Avenue.

<u>Completion of Phase 1: 18 months</u>

<u>Summary:</u> The final push of Phase 1 construction will focus on completion and commissioning of the Smolt 1 facility in order to receive the first shipment of eggs, and startup of all supporting facilities to accommodate facility operation. Phase 1 will be considered fully operational once building 1 and fish processing are complete, along with the supporting facilities and administrative offices.

<u>Construction:</u> Construction of module 1 will be significantly underway at this point, and foundation and envelope construction will have begun for module 2 and module 3. Equipment installation for Smolt 1 is expected to be completed around Jan 2021, whereupon the facility is ready for the first egg delivery. Construction of the fish processing facility, administrative office building, and finishing structures such as gatehouses and fences will be completed by the conclusion of this phase, and main access roads to the finished structures will be paved. A variety of permanent stormwater management methods will be implemented to capture and redirect runoff from finished structures and solid surfaces. Further detail of these systems can be found in Section 12. The site will undergo significant landscaping and stabilization work during the completion of Phase 1, ensuring previously disturbed areas will not be problematic during the period of time between Phase 1 start up and operation and the commencement of Phase 2 construction.

2.3.2 Phase 2

Start of Phase 2: 15 months

Summary: The exact start date of Phase 2 will depend on the completion period of Phase 1 construction, and the period afterwards where facility startup, operation, and process optimization occurs. It is expected that the beginning of Phase 2 construction could occur as much as a year after Phase 1 completion to allow sufficient time for design improvements and preconstruction planning. Phase 2 facility buildout will encompass the remaining 3 modules contained in building 2, the visitor center, and the remaining sitework needed for stabilization, stormwater control, access roads, and visual buffers. Since Phase 2 construction will begin only after startup of Phase 1 facility operations a great degree of coordination will need to be engaged in between construction and production operations.

Construction: At the outset of Phase 2 construction will focus on the Smolt 2 building, located immediately adjacent to Smolt 1; the footprint for this building was prepped and stabilized during Phase 1, however the envelope construction and equipment installation was left for Phase 2. Also during this period, construction will begin on module 4, located in the Southwest corner of the site. It should be noted that prior to construction of module 4 the areas comprising of its footprint and extending East to the laydown area will need to be cleared, as is shown in the shaded region in **CE116**. Since Phase 2 involves the expansion of the facility footprint South of Phase 1, the silt fence will be extended to encompass the newly cleared area. An expansion of the stormwater control system will also be necessary to control and mitigate runoff during construction in the expanded site. **CE117** shows the construction footprint of Phase 2A, along with the layout of the extended stormwater system. Much of the temporary basins and plunge pools used during Phase 1 construction will be removed and replaced with culverts to redirect runoff flow. New temporary plunge pools and a sediment pond will be dug down grade from the construction area and tied into the existing stormwater system. Also, during this Phase access driveways will be constructed along the perimeter of the area where modules 4-6 will be located.

Construction of building 2 will proceed similarly to building 1, with the construction beginning in the West and moving East, minimizing the area of grubbed and unstable soil at any one time. As the footprint of each module is excavated to depth and backfilled connection trenches for the various process and utility piping will be dug and lines will be run to tie in points for each building. It is critical to note that as Phase 2 construction proceeds, the Phase 1 facility will be fully operational. Construction of the remaining buildings will need to take into consideration regular operational traffic flows, as well as avoidance of interruption of active process and utility lines required for current facility operation. Careful Phase 2 preconstruction planning will be required to ensure any impact to Phase 1 operation is minimized or negated.

Full Build-out: 12 months

Summary: The completion of Phase 2 will align with the full construction and commissioning of Building 2, putting the remaining 3 modules into operation. Following this the remaining sitework needed for site stabilization, stormwater management, and natural resource improvements will be completed. At this point the facility will be considered fully constructed and operational and will shift from the construction phase to monitoring and maintenance to ensure continued and efficient operation.

Construction: The final push of the project will mainly focus on the construction of modules 4-6, along with expanding the supporting utilities and equipment needed to make them operational. **CE118** presents the proposed Phase 2B, wherein significant progress has been made on the construction of modules 4 and 5, and the laydown area has been excavated and prepped for construction of the final module. The existing BWD building by the lower dam will be renovated and turned into a visitor center, however the construction impact of this will be minimal and not affect the surrounding environment. Referring again to **C-102** the fully built facility plan is shown. At this point all temporary sediment basins, plunge pools, and other non-permanent stormwater control measures will be either replaced with another permanent system (i.e. culverts to redirect runoff) or re-excavated and incorporated into the permanent stormwater management system. Note that careful cleanup of construction debris and equipment will occur at the end of this time period as the final construction efforts wrap up and facility commissioning is completed.

2.4 Engineering Drawings

Site civil and intake/discharge pipeline engineering drawings for the project are included in the accompanying engineering plan set. Individual plans are referenced throughout the permit sections to follow. Plans include overview, layout, grading, utilities, landscaping, erosion and sediment control, sewer extension and ocean pipeline design drawings. Many of the figures referenced within this section can also be found in the plan set.

2.4.1 Civil Plans

The following table presents the Civil Plan Index for the development, which will be referenced throughout the permit application.

<u>Plan Index</u>

C-001 SITE NOTES & LEGENDS

C-101 SITE MAP
C-102 SITE CONTEXT PLAN

CD101 EXISTING CONDITIONS & REMOVALS PLAN

CE001 EROSION & SEDIMENT CONTROL NOTES

CE1XX are ARC drawings
CE110 SOIL EROSION & SEDIMENT CONTROL PHASING PLAN-1, PHASE 1 SITE CLEARING
CE111 SOIL EROSION & SEDIMENT CONTROL PHASING PLAN-2, PHASE 1A
CE112 SOIL EROSION & SEDIMENT CONTROL PHASING PLAN-3, PHASE 1B
CE113 SOIL EROSION & SEDIMENT CONTROL PHASING PLAN-4, PHASE 1C
CE114 SOIL EROSION & SEDIMENT CONTROL PHASING PLAN-5, PHASE 1D
CE115 SOIL EROSION & SEDIMENT CONTROL PHASING PLAN-6, PHASE 1E
CE116 SOIL EROSION & SEDIMENT CONTROL PHASING PLAN-7, PHASE 2 SITE CLEARING
CE117 SOIL EROSION & SEDIMENT CONTROL PHASING PLAN-8, PHASE 2A
CE118 SOIL EROSION & SEDIMENT CONTROL PHASING PLAN-9, PHASE 2B

CE501 EROSION & SEDIMENT CONTROL DETAILS
CE502 EROSION & SEDIMENT CONTROL DETAILS
CE503 EROSION & SEDIMENT CONTROL DETAILS
CE504 EROSION & SEDIMENT CONTROL DETAILS

CP101 SITE LAYOUT PLAN – AREA A
CP102 SITE LAYOUT PLAN – AREA B
CP103 SITE LAYOUT PLAN – AREA C
CP104 SITE LAYOUT PLAN – AREA D

CP105 SITE LAYOUT PLAN – AREA E
CP106 SITE LAYOUT PLAN – AREA F
CP107 SITE LAYOUT PLAN – AREA G

CP501 SITE LAYOUT DETAILS
CP502 SITE LAYOUT DETAILS

CG101 GRADING PLAN – AREA A
CG102 GRADING PLAN – AREA B
CG103 GRADING PLAN – AREA C
CG104 GRADING PLAN – AREA D
CG105 GRADING PLAN – AREA E
CG106 GRADING PLAN – AREA F
CG107 GRADING PLAN – AREA G

CG201 CULVERT CROSSING
CG501 GRADING DETAILS

CU100 UTILITY CONTEXT PLAN
CU101 UTILITY PLAN – AREA A
CU102 UTILITY PLAN – AREA B
CU103 UTILITY PLAN – AREA C
CU104 UTILITY PLAN – AREA D
CU105 UTILITY PLAN – AREA E
CU106 UTILITY PLAN – AREA F
CU107 UTILITY PLAN – AREA G
CU108 UTILITY PLAN – AREA H
CU109 SANITARY SEWER CONNECTION PLAN

CU301 UTILITY SECTIONS
CU302 UTILITY SECTIONS
CU303 UTILITY SECTIONS
CU304 SEWER FORCE MAIN PROFILE

CU501 SANITARY SEWER UTILITY DETAILS
CU502 WATER UTILITY DETAILS
CU503 ELECTRICAL, FUEL, & GAS UTILITY DETAILS
CU504 FISH PIPING UTILITY DETAILS
CU505 UTILITY DETAILS
CU601 UTILITY SCHEDULES

LP101 PLANTING PLAN – AREA A
LP101A PLANTING PLAN – AREA A1
LP102 PLANTING PLAN – AREA B
LP103 PLANTING PLAN – AREA C
LP104 PLANTING PLAN – AREA D
LP105 PLANTING PLAN – AREA E
LP106 PLANTING PLAN – AREA F
LP107 PLANTING PLAN – AREA G

LP501 PLANTING DETAILS & SCHEDULE

2.4.2 Intake/Discharge Construction Plans

The following list presents the construction plan set provided for development of the intake and discharge pipeline system for the proposed development.

<u>Plan Index</u>

CS101 – INTAKE/DISCHARGE PIPING PLAN & PROFILE
CS102 – ECKROTE EASEMENT PLAN & PROFILE
CS103 – CULVERT REPLACEMENT PLAN
CS104 – EROSION CONTROL PLAN
CS301 – CROSS SECTIONS
CS501 – CIVIL DETAILS-1
CS502 – CIVIL DETAILS-2
CS503 – CIVIL DETAILS-3
CS504 – CIVIL DETAILS-4
CS505 – CIVIL DETAILS-5

M-100 – PUMP STATION PLAN AND SECTIONS

BP-1 – ROUTE 1 TEMPORARY CONSTRUCTION BYPASS SKETCH
BP-2 – ROUTE 1 TEMPORARY/CONSTRUCTION BYPASS DETAILS

APPENDIX 2-A

Development Construction Schedule

APPENDIX 2-B

Seawater Access System Construction Schedule

Ransom Consulting, Inc.

APPENDIX 2-C

Seawater Access System Photo Log

Ransom Consulting, Inc.