STATE OF MAINE
BOARD OF ENVIRONMENTAL PROTECTION

IN THE MATTER OF

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

PRE-FILED DIRECT TESTIMONY OF ANDREW DAVID JOHNSTON, P.E.
ATLANTIC RESOURCE CONSULTANTS, LLC

1. My name is Andrew David Johnston. I am a Professional Civil Engineer and Principal at Atlantic Resource Consultants, LLC (ARC). I hold a bachelor's degree in Civil Engineering from Brighton Polytechnic University in England and a master's degree in Coastal Zone Management from the University of Ulster. I have over twenty-five years of experience specializing in land development and water quality improvement projects. I have worked on the design and construction of large-scale public works projects to improve surface water quality throughout the south of England. I have served as both a design engineer and later as the head of the Site/Civil Department for an engineering company. I have been working in Maine for the last 15 years, and have planned, designed and permitted major infrastructure and land development projects in the healthcare, assisted living, education, commercial, residential, retail and industrial sectors. I am a registered professional engineer in the States of Maine, New Hampshire, New York, Connecticut, Massachusetts and Rhode Island and a Chartered Professional Engineer, Chartered Water and Environmental Manager, Chartered Environmentalist and Member of the Chartered Institution of Water and Environmental Management in the United Kingdom. I am also LEED certified. My professional experience and qualifications are further detailed by my curriculum vitae, which is included as Addendum A.

2. ARC was asked to assess the soil conditions and earthwork requirements for the proposed Nordic Aquafarms, Inc. (Nordic) facility in Belfast, Maine, and to design a soil erosion and sediment control plan that will protect both the site and downstream resources from potential detrimental sedimentation during construction. I am very familiar with the types of soils that were encountered during subsurface investigations at the project site, and the challenges associated with major earthwork construction in these conditions, having previously been involved in projects of a similar scale in comparable conditions.

3. In 2019, ARC was asked to design the Soil Erosion and Sediment Control Plan for the Nordic project in Belfast, Maine. The Soil Erosion and Sediment Control Plan, was

prepared under my direction and was included in Section 14 of the Site Location of Development Act application for the project, and is provided as Nordic Exhibit 16.

4. The purpose of the Soil Erosion and Sediment Control Plan is to define the measures that shall be utilized during construction, and until the site is stabilized, to prevent unreasonable erosion of soil or sediment beyond the project site, in accordance with MRSA 38 §420-C. MRSA 38 §420-C states that "A person who conducts, or causes to be conducted, an activity that involves filling, displacing or exposing soil or other earthen materials shall take measures to prevent unreasonable erosion of soil or sediment beyond the project site or into a protected natural resource as defined in section 480-B. Erosion control measures must be in place before the activity begins. Measures must remain in place and functional until the site is permanently stabilized. Adequate and timely temporary and permanent stabilization measures must be taken and the site must be maintained to prevent unreasonable erosion and sedimentation."

5. The Soil Erosion and Sediment Control Plan was developed for the Nordic project to meet local, State and Federal requirements and guidelines for erosion and sedimentation control and was prepared based on good engineering practice. Particular attention has been paid to construction sequencing and earthwork methodology due to the scale of the project and sensitivity of downstream resources. The plan utilizes the following key strategies:

- Proactive planning to divert water around the site and limit soil exposure to the maximum extent practical. This will minimize the potential for soil erosion;
- Design for capture, treatment and controlled discharge of water from the work area where this occurs; and
- Regular inspection, maintenance, evaluation and adaptation of protective measures to ensure protection is provided throughout the construction process.

Implementation of the plan will minimize the potential for soil erosion at the site and prevent sedimentation of downstream receiving waters and resources.

6**.** Optimizing the schedule and efficiency of major earthwork operations at the site is key to limiting the exposure of erodible native soil materials and hence minimizing the potential for soil erosion. ARC has worked with Nordic and construction team to develop a detailed, project specific schedule and phasing plans for the work that addresses this key item.

7. The construction will be broken into nine key phases in order to maintain a manageable work area. Within each phase, construction is broken into smaller sub-phases with specific Best Management Practices (BMPs) designed for each task. This will ensure that the major earthwork activities at the site are undertaken in a controlled manner with the minimum possible open area at any given time. An example Soil Erosion and Sediment Control phasing plan is included in Nordic Exhibit 16. This is Sheet CE112 from the drawing set included with the application and also shows the measures that will be implemented to divert flows around the work area, and the location of phase-specific BMPs that will be used to capture and treat any excess water from excavated areas during construction. A project-specific methodology has been developed to achieve rapid stabilization of excavated areas with granular borrow, such that the maximum area of exposed native soil material will be limited to 80,000 square feet at any given time. This will significantly reduce the potential for erosion of native soil materials. Underdrains installed in protective sand bedding will be used extensively throughout the site as excavation work progresses.

This will allow groundwater and surface water to be effectively filtered and drained from work areas by gravity, without the use of excessive pumping and filter bags. This will have the added benefit of maintaining groundwater base flows to the receiving channels that run through the site and continue downstream of the work area.

8. ARC has developed a range of Best Management Practices (BMPs) for the project including:

- Perimeter controls will be installed at the site as soon as areas work areas are accessible, providing immediate protection for downstream areas. Perimeter controls provide last line of defense around the site and serve to capture sediment prior to reaching downstream resources. These will include stabilized construction areas throughout the site – the locations will be adjusted as work phasing progresses. Perimeter silt fence will be used to capture any sediment in runoff draining towards the perimeter of the work area. These will be doubled, with haybales between the fence lines at locations immediately upslope of sensitive resources, and in critical areas of the site. Erosion control berms will also be used as perimeter controls where appropriate and in low risk areas of the site.
- Diversion BMPs will be installed to direct surface runoff and groundwater around the work area in advance of any major excavation work. This will prevent excess surface and groundwater from entering the work area and minimize contact of runoff and groundwater with exposed native soil materials, thus reducing the need for dewatering and capture and treatment of water from excavated areas. It will also allow for preservation of base flows from areas upstream of the project site, to downstream resources and receiving waters both during construction and after completion of the project. Diversion BMPs include runoff diversion trenches that will intercept surface and groundwater flow and convey clean water around the work area. Diversion culverts will be placed in the existing channels that run through the property before these are filled during earthwork activities. This will maintain groundwater flows in the channels and allow groundwater to continue to feed downstream resources. At all outlets from proposed diversion BMPs, riprap plunge pools will be installed to ensure that flows are discharged in a non-erosive manner. Additional BMPs will be installed to manage runoff and groundwater from work areas as these are required.
- Cover BMPs will be installed to achieve rapid, stable cover conditions and hence minimize exposure areas and timelines. The area of exposed native soil materials will be limited to 80,000 square feet at any given time. A specific earthwork methodology is proposed that will maximize the efficiency of the earthwork operations at the site and avoid the need for large stockpiles of excavated soil materials. Backfill operations under the building footprint areas will proceed immediately after subgrade elevation is reached in the initial part of the excavation (i.e. backfill with granular borrow will not be held back until the entire building footprint is prepared). Each excavation will commence with installation of the edge drain outlets and the sand covered edge drains. Excavation will then proceed from west to east, with backfill following immediately behind excavation to reduce exposure of native soils and achieve the most rapid possible stabilization of the excavated areas. This will allow the trucks used to export the unsuitable soil to return to the site with granular backfill for placement in the excavation. This proposed method of work will allow double-loading of trucks and will have the

additional benefit of reducing traffic volumes during earthwork import-export activities.

- Treatment BMPs have been designed to capture and treat runoff and groundwater from exposed work areas and dewatering activities. These include temporary sediment basins that have been designed to meet or exceed the design recommendations of USEPA NPDES Construction General Permit. The sediment basins drain through sand filters, bench drains and perforated risers. At each basin, the outlet can be controlled using a valve in the outlet structure. This will ensure that the basins can provide optimum settling conditions prior to discharge. Flocculants may be used to improve settling of suspended sediments from runoff prior to discharge via the filtering outlets, thus improving the performance of the sediment basins. If required, trials will be undertaken to determine the most suitable flocculant materials for use in the sediment basins.

Nordic Exhibit 16 includes Sheet CE-502 and Sheet CE-503 of the drawing set included in the application and shows examples of the BMPs mentioned in the text above.

9. Inspection and maintenance of soil erosion and sediment control measures is critical to maintaining the effectiveness of the soil erosion and sediment control plan throughout construction operations. All BMPs will be regularly inspected, reviewed and adapted as necessary to maintain effective protection of the site and downstream receiving waters until final stabilization of the site is achieved. ARC, in conjunction with Nordic, developed project-specific inspection and maintenance procedures that will be followed throughout the construction period to ensure that the project site and downstream resources are effectively protected until final stabilization of the site is achieved. Inspection reports and maintenance logs will be maintained on site and available for public review in accordance with applicable local, State and Federal regulations. Nordic Exhibit 17 is an example inspection log that will be used to record the weekly inspections undertaken by an erosion control inspector certified by the Maine DEP.

10. In Summary, ARC has developed an extensive Soil Erosion and Sediment Control Plan for the Nordic project under my personal direction, to meet or exceed all applicable local, State and Federal standards and guidelines. The plan includes detailed construction phasing plans, project-specific construction methods, and Best Management Practices that will minimize soil exposure, manage potential risks, and capture and treat runoff and dewatering discharge from the work area associated with the project. Implementation of the plan will minimize erosion of soil materials from the site and protect downstream resources and receiving waters from unreasonable sedimentation.

[INTENTIONALLY LEFT BLANK]

Dated 12/11,2019 By. _____

_____, _____

STATE OF Maine.
County of Cumberland, ss. Dec 11, 2019

Personally appeared the above-named Andrew Johnston and made oath as to the truth of the foregoing pre-filed testimony.

Before me,

Christine L. Wolfe.
Notary Public / Attorney at law

CHRISTINE L. WOLFE
NOTARY PUBLIC - MAINE
MY COMMISSION EXPIRES
4-6-2020

Andrew Johnston

PE, LEED AP, CEng, CEnv, MCIWEM

PRINCIPAL

Atlantic Resource Consultants
Engineering Strategies and Solutions

Andy has over 25 years' experience in site analysis, master planning, civil engineering design, permitting, and project management in the United States and the United Kingdom. He is adept at managing all stages of projects from concept to implementation. He has a proven record of accomplishment, both forming and managing teams of in-house staff and external consultants to ensure successful delivery of public and private projects across a wide range of market sectors. Recent work includes design, permitting and construction oversight for municipal infrastructure, commercial, institutional, healthcare and athletic projects throughout New England.

EDUCATION

M.S., Coastal Zone Management, University of Ulster, Coleraine, N. Ireland, 2013

B.S., Civil Engineering, Brighton Polytechnic University, Brighton, England, 1991

REGISTRATIONS

Professional Engineer Registrations:

- State of Connecticut
- Commonwealth of Massachusetts
- State of Maine
- State of New Hampshire
- State of New York
- State of Rhode Island
- Chartered Engineer, United Kingdom Engineering Council
- Chartered Water and Environmental Manager, United Kingdom Chartered Institution of Water and Environmental Management
- Chartered Environmentalist, United Kingdom Society for the Environment
- LEED Accredited Professional, USGBC

MEMBERSHIPS

Member, Water Environment Federation
Member Chartered Institution of Water and Environmental Management

PUBLICATIONS

Johnston, A, Slovinsky, P, Yates, K., Assessing the vulnerability of coastal infrastructure to sea level rise using multi-criteria analysis in Scarborough, ME. Ocean and Coastal Management 95, 176-188, 2014.

RECENT PROJECT EXPERIENCE

Gorham Road Phase 2 Design, Scarborough, Maine
Design of road re-construction, section upgrades, utility coordination and stormwater treatment for 3,800ft of municipal roadway.

Kate Furbish Elementary School, Brunswick, Maine
Site/civil design and permitting for a new 90,000sf elementary school at the site of the former Jordan Acres Elementary.

Waterboro Elementary School Site Improvements
Design and permitting of circulation, parking and stormwater improvements at elementary school site

Alfred Elementary School Site Improvements
Design and permitting of circulation, parking and stormwater improvements at elementary school site

Concord Gully Brook Watershed Management Plan Phase 2, Freeport, Maine
Design of stormwater BMPs, culvert replacement to improve water quality and morphology in an impaired urban stream

Route One Sewer Extension, Saco, Maine
Design of 1,900ft of gravity sewer extension from Cascade Road to the Scarborough town line along Rte 1.

Hospice of Southern Maine, Hospice Center Scarborough, Maine
Site analysis, site planning, design and permitting for a new administrative and educational center for HSM.

Crooked River School, Casco, Maine
Site/civil design and permitting for a building addition and site improvements at an existing school.

Waldo County General Hospital Addition and Site Improvements, Belfast, Maine
Site/civil design and permitting for an emergency room addition and 40,000sf parking lot expansion at an existing medical center.

Andrew Johnston
PE, LEED AP, CEng, CEnv, MCIWEM
PRINCIPAL

Atlantic Resource Consultants
Engineering Strategies and Solutions

Tri-Town Track and Field, Freeport, Maine
Site/civil design and permitting for a major redevelopment of the athletic facilities, including a new track, artificial turf field, spectator seating, sports lighting and utility infrastructure.

Camp Keyes Reutilization Master Plan
Site/civil design for security improvements and reorganization of the MEARNG Camp Keyes Base, Augusta.

MSSPA facility Improvements, Windham, Maine
Site/civil design and permitting for major improvements to the MSSPA facility.

OTHER SELECTED PROJECTS

Maine Correctional Center Feasibility Study, Windham, Maine
Feasibility study considering three site options for a major $190M consolidation of statewide correctional facilities.

MaineGeneral Alfond Center for Health Augusta, Maine
Site/civil engineering and permitting for a new 600,000sf regional hospital in Augusta, Maine, including infrastructure and utility extensions to the site.

Maine Veterans' Homes New Skilled Nursing Facilities, Augusta and Scarborough, Maine
Site analysis, site/civil engineering design and permitting for two new 150,000sf residential nursing care facilities.

Bangor International Airport Stormwater Improvements, Bangor, Maine
Design of stormwater improvements to treat residual deicing fluids and other airport related contaminants.

Massabesic High School Athletic Facility Improvements, Waterboro, Maine
Site/civil design and permitting for a major redevelopment of the athletic facilities, including a new track, artificial turf field, spectator seating, sports lighting and utility infrastructure.

Freeport High School Improvements, Freeport, Maine
Site/civil engineering design and permitting for a major new addition, circulation, parking and athletic field improvements.

Somerset County Jail, Madison, Maine
Site/civil engineering design and permitting for a new 200 bed jail facility and Sheriff's Department.

Lincoln County Courthouse, Wiscasset, Maine
Site/civil design for new circulation, parking and site improvements for the courthouse and Sheriff's office.

Merrimac County Courthouse Consolidation Study
Site analyses and concept site designs for consolidation planning for the court system in Merrimac County, NH

Athol Hospital Master Plan, Athol, Massachusetts
Feasibility study and schematic design for the addition of a new Medical Office Building, Emergency Department and parking improvements

Lyndon State College Athletic Facility Improvements, Lyndonville, Vermont
Site/civil engineering and permitting for improvements to the college athletic facilities including a new turf field, fieldhouse, utility, access and circulation infrastructure.

New Canaan School, New Canaan, Connecticut
Site/civil engineering design and permitting for major new athletic project including artificial turf fields, parking, circulation and utilities improvements.

Canterbury School Athletic Improvements, New Milford, Connecticut
Site/civil engineering design and permitting for major new athletic project including artificial turf fields, new track and the associated parking, circulation and utilities infrastructure.

Carnegie Harbor Village, Portsmouth, Rhode Island
Planning, site/civil engineering design and permitting for a $250M multi-phase residential resort development on a former Aluminum Plant site in Portsmouth, Rhode Island. The project included house lots, condominiums, apartments and a marina on a 100 acre+ brownfield site.

Orchard Course, Newport National Golf Club*, Middletown, Rhode Island
Provided engineering design, drainage and permitting services for an 18-hole championship golf course bisected by rural stream and wetland complex. Included detailed flood plain analysis of Little Creek.

SVF Foundation*, Newport, Rhode Island
Site/civil engineering and permitting for a rare breeds agricultural research facility on a 120-acre site.

14. SOIL EROSION AND SEDIMENTATION CONTROL

14.1. INTRODUCTION

Atlantic Resource Consultants (ARC) has been retained for the preparation of soil erosion and sediment control plans for a new aquaculture facility and the associated site improvements on a parcel of land at 285 Northport Avenue in the City of Belfast, Maine. The majority of the site is currently vacant and includes the former Belfast Water District intake and treatment building from Belfast Reservoir Number One, the former water supply source for the City of Belfast. The remainder of the site is largely undeveloped and consists of mature woodland and grass pasture. This site topography slopes in a generally southeasterly direction towards the reservoir and drains via several steep gullies. The majority of these drain into the reservoir, with the exception of the easternmost feature that drains, via a culvert under Route One directly to Penobscot Bay.

The project proposes development of the site to construct a land-based aquaculture facility that will include two large buildings, each consisting of three modules, two smaller Smolt Buildings, a Processing Building, a Central Utility Plant and several other smaller support services and utility buildings. Access roads, parking areas, utility services and stormwater BMPs will be constructed to serve the facility. The overall area of development at the site is approximately 38 acres.

The development will be constructed in two major phases, and these will be further divided into smaller sub-phases in order to effectively manage the construction process and minimize the soil erosion and sediment control risks associated with earthwork development projects of this scale.

A detailed soil erosion and sediment control plan has been developed to guide the management of major earthwork activities at the site. This plan includes a detailed breakdown of project phasing to minimize the exposure of erodible soils and to prevent significant sediment transport both within the site, and to downstream receiving waters. The project Soil Erosion and Sediment Control Plan is intended to be a live document and will be regularly reviewed and amended throughout the construction process to ensure the continued effectiveness of the Best Management Practices at the site, and the adequate protection of downstream resources.

14.2. EXISTING SITE CONDITIONS AND SOIL TYPES

The project site is located at 285 Northport Avenue in the City of Belfast, Maine. The current cover conditions at the site include the impervious paved, gravel and roof areas associated with the previous use. These are all adjacent to the Route One access driveway and encompass an area of approximately 3 acres that formed the Belfast Water District offices and equipment storage facility. The area of the site closest to Reservoir Number One is predominantly wooded, with some unmaintained woods roads providing informal trail access. The northern portion of the development site is currently grassed pasture and has been recently used as a hay field. The grassed area of the site is approximately 11 acres. The topography of the site slopes in a generally southwesterly direction towards the reservoir at an average gradient of between 2 and 3%. There are several steep gullies formed by drainageways that traverse the site. The westerly gullies drain to the reservoir, the easternmost drainageway discharges to a culvert under Route One, crossing the property to the south of the road, and discharging directly to the bay.

Predominant surface soil types at the site are identified as Boothbay and Swanville silt loams by the Natural Resource Conservation Service (NRCS) Web Soil Survey. The susceptibility of soils to erosion is indicated on a relative “K” scale of values over a range of 0.02 to 0.69. The “K” value is frequently used with the universal soil loss equation. The higher values are indicative of the more erodible soils. The K values of the mapped soils at the project site are as follows:

Soil Name	Soil Description	K Value
Boothbay	Silt loam	0.37
Swanville	Silt loam	0.28

Based on a review of the K values, the onsite soils in the area exhibit low to moderately susceptible to erosion after the cover material is stripped.

A more detailed geotechnical investigation of the site has been undertaken by Ransom Consulting, Inc. The explorations generally found glaciomarine silt and clay deposits overlying glacial till and bedrock. A soft, compressible glaciomarine silt and clay deposit was identified and this is likely to consolidate under loading from proposed site fills and building foundations. The current development plan includes removal and off-site disposal of this problematic soil layer. The material will be replaced with imported Granular Borrow material to form a stable and competent subgrade for the proposed improvements.

Natural resource mapping on the site was undertaken in 2018 by Normandeau Associates as part of the site investigations for this project. The mapping identified a number of freshwater wetlands and streams at the site. The natural resources are described in detail in the wetland delineation report that accompanies this submission.

14.3. EXISTING EROSION PROBLEMS

No significant existing erosion problems have been identified at the project site.

14.4. CRITICAL AREAS

The critical areas of the site include the freshwater wetland resources downstream of the construction work area. There are also a number of streams on the project site that fall under the Natural Resource Protection Act jurisdiction. These streams are intermittent and have been designated with the prefix “S” as shown on Figure 14.1 on the following page. Non-jurisdictional drainages are designated with the prefix “D”. Three streams extend off site and drain into the adjacent Reservoir One.

Following development of the site the lower reaches of these streams will have been cut off from the hydrological source which is primarily surface run off and groundwater discharge during seasonal high water tables.

To prevent these streams from drying up they will be fed by clean water from a series of foundation drains and bypass culverts that are intended to intercept groundwater from the site both during and post-construction. Riprap plunge pool outlets will be constructed at the discharge points of the new drains to dissipate flow velocities and allow non-erosive discharge to downstream receiving channels. The bypass culverts, foundation drains, and outlet locations are shown on the Soil Erosion and Sediment Control Phasing Plans (Sheets CE-111 to CE-118). In summary, the volume of water will be sufficient to maintain intermittent flows and the plunge pool outlet design will prevent erosion.

Critical resources downstream from the site include Belfast Reservoir Number One and Penobscot Bay.

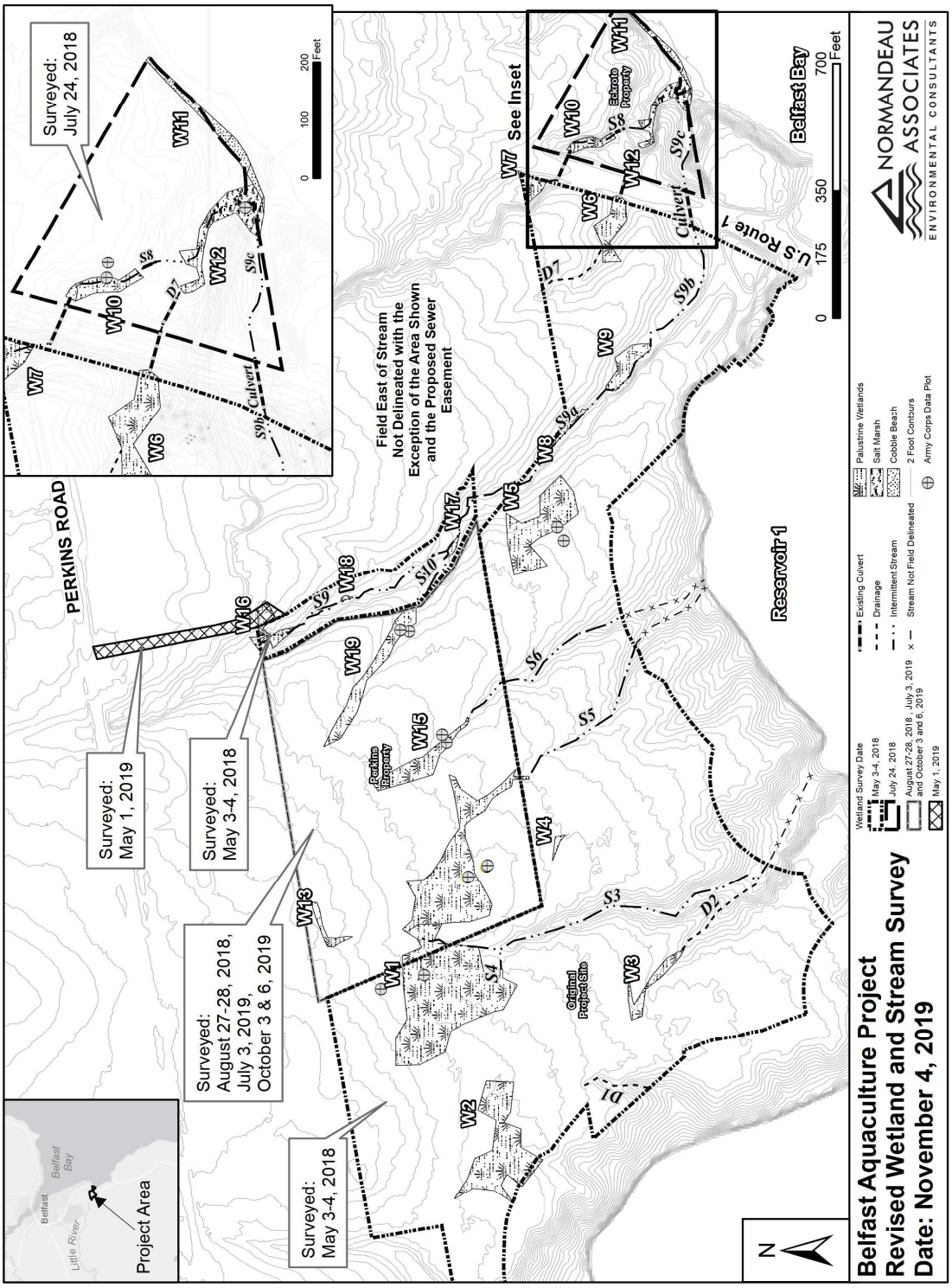
Belfast Aquaculture Project
Revised Wetland and Stream Survey
Date: November 4, 2019
NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS
PERKINS ROAD
Surveyed: May 1, 2019
Surveyed: May 3-4, 2018
Surveyed: August 27-28, 2018, July 3, 2019, October 3 & 6, 2019
Surveyed: May 3-4, 2018
Surveyed: July 24, 2018
See Inset
Field East of Stream Not Delineated with the Exception of the Area Shown and the Proposed Sewer Easement
Reservoir 1
Belfast Bay
U.S. Route 1
Culvert
Project Area
Belfast
Belfast Bay
Little River
Wetland Survey Date
May 3-4, 2018
July 24, 2018
August 27-28, 2018, July 3, 2019 and October 3 and 6, 2019
May 1, 2019
Existing Culvert
Drainage
Intermittent Stream
Stream Not Field Delineated
Palustrine Wetlands
Salt Marsh
Cobble Beach
2 Foot Contours
Army Corps Data Plot
Feet
N

FIGURE 14.1

14.5. SOIL EROSION AND SEDIMENTATION CONTROL PLAN AIMS AND OBJECTIVES

The primary goals of the Soil Erosion and Sediment Control Plan for the project are to avoid and minimize the potential for soil erosion to the maximum extent practical, and to prevent sediment transport to downstream areas, receiving waters and natural resources. Measures will also be taken to ensure sediment is not tracked onto adjacent streets and that stockpiles of controlled imported construction materials are protected from potential contamination by native soils and other deleterious matter. In order to achieve these aims it will be essential to minimize exposure of native soil materials during construction and to install, observe and maintain a range of Best Management Practices.

The primary methods included in the Soil Erosion and Sedimentation Control Plan to be implemented for this project are as follows:

- Construction Phasing - The major earthwork activities will be phased to minimize the area of potentially erodible native soils exposed at any given time. This will minimize the potential for soil erosion and runoff contamination during inclement weather conditions. It will also reduce the potential for sediment transport and result in manageable quantities of accumulation in treatment Best Management Practices. A detailed construction and Soil Erosion and Sediment Control Phasing Plan is included in Attachment A.
- Diversion of Run-on from Upstream Areas – Diversion measures will be installed at the beginning of construction to capture and divert surface runoff and groundwater around the work area, reducing the need for de-watering in excavation areas.
- Perimeter Controls – Perimeter sediment barriers will be installed downstream of all work areas to prevent the transport of sediment to receiving waters and natural resources. Stabilized construction entrances (wheel cleaning pads) will be installed at all site entrances to prevent tracking of sediments onto roadways.
- Temporary Cover Materials – The plan includes the installation of temporary cover materials in some areas to prevent erosion from occurring during construction.
- Rapid Stabilization of Excavated Areas – Cover materials including geotextile fabric and imported granular borrow will be placed over exposed native soils immediately after excavation and subgrade preparation to minimize the period of soil exposure.
- Stabilization of drainage outlets and channels to avoid rill and gully erosion.
- Inlet Protection – Silt sacks and coir logs will be installed to protect drainage inlets and conveyances from sediment contamination.
- On-site sediment barriers - On-site measures to capture sediment (hay bales, silt fence, etc.) before it is conveyed to sediment sumps.
- Temporary Sediment Basins and Sumps – Sediment capture and treatment BMPs will be installed to provide detention, storage and treatment of any sediment contaminated runoff generated at the site. Flocculants will be used, if found to be effective in removing suspended sediments from runoff in sediment traps and sediment basins.
- Permanent Measures – Stormwater BMPs, conveyances and stable permanent cover materials will be installed to provide long-term protection of the site and receiving waters.

14.6. DESCRIPTION AND LOCATION OF LIMITS OF ALL PROPOSED EARTH MOVEMENTS

The proposed project will require major earth moving at the site. The area of proposed development will cover approximately forty acres of the site in total. Substantial cuts and fills will be required to achieve the final grades for the development. Removal of the problematic compressible silt and clay deposits from beneath the proposed improvements will require large volumes of excavation, material export and import of replacement Granular Borrow materials to the site prior to construction of site improvements.

The texture and erodibility of the native overburden material poses an elevated risk of sediment transport. Therefore, these materials shall not be stored on site for a period of more than two weeks.

This obviously has major implications on the scope of earthwork required to prepare the site and on materials handling, haulage and disposal. It also presents a significant opportunity to rapidly stabilize the site at an earlier than normal stage of construction. The removal of fine-grained, native soil materials followed by immediate cover of exposed areas with imported granular borrow will effectively limit the potential for soil erosion and mobilization of fine sediments. Large areas of the site will be quickly stabilized, providing a sound working surface for construction

Careful phasing of the project will allow these activities to occur simultaneously, limiting the area of the site that is "open" (i.e. disturbed and not stabilized) at any given time. This will have the additional benefit of increasing the efficiency of materials haulage. Trucks exporting unsuitable materials from the site will be available to convey imported granular material as part of a round trip operation.

14.7. SOIL EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES

Construction Schedule

The primary and most proactive best management practice for soil erosion and sediment control at the site is careful planning and phasing of construction tasks. The major earthwork activities have been broken into manageable phases in order to efficiently accomplish the necessary work while minimizing the risks associated with exposure of native fine-grained soils. The installation of Best Management Practices is integrated into the individual phases to ensure that effective diversion, cover and perimeter control measures are in place to protect the work area, limit soil exposure times and prevent transport of sediment to downstream areas. Major earthwork phasing is described in the narrative and shown on the Earthwork and Soil Erosion and Sediment Control Phasing Plans included in **Attachment A**, and in the project plan set.

Temporary Erosion/Sedimentation Control Measures

As part of the site development, the Contractor will be obligated to implement the following erosion and sediment control devices. These devices shall be installed as indicated on the plans or as described within this report. For further reference on these devices, see the Maine Erosion and Sediment Control Best Management Practices (BMPs) Manual for Designers and Engineers, Maine DEP, October 2016.

1. Crushed stone stabilized construction entrances will be placed at any construction access points from adjacent streets, and at interior locations shown on the phasing plans. The locations of the construction entrances shown on the drawings should be considered illustrative and will need to be adjusted as appropriate and located at any area where there is the potential for tracking of mud and debris onto existing roads or streets. Stone stabilized construction entrances will require the stone to be removed and replaced, as it becomes covered or filled with mud and material tracked by vehicles exiting the site.
2. A Runoff Diversion Trench and upgradient silt fence barrier shall be installed at the northern side of the site prior to major earthmoving activities. The BMPs shall be installed in accordance with the details provided and are intended to divert surface runoff and groundwater around the construction area, minimizing the need for de-watering.
3. Bypass culverts will be installed in gullies and drainageways to intercept groundwater seeps, convey clean water through the construction area and maintain baseflow in downstream receiving channels.
4. Riprap plunge pool outlets shall be constructed at the end of bypass culverts and channels, to dissipate flow velocities and allow non-erosive discharge to downstream receiving channels.

5. Silt fence shall be installed down slope of any disturbed areas to trap runoff borne sediments. The silt fence shall be installed per the detail provided in the plan set and inspected immediately after each rainfall, and at least weekly in the absence of significant rainfall. The Contractor shall make repairs immediately if there are any signs of erosion or sedimentation below the fence line. If such erosion is observed, the Contractor shall take proactive action to identify the cause of the erosion and take action to avoid its reoccurrence. Proper placement of stakes and keying the bottom of the fabric into the ground is critical to the fence's effectiveness. If there are signs of undercutting at the center or the edges or impounding of large volumes of water behind the fence, the barrier shall be replaced with a stone check dam and measures taken to avoid the concentration of flows not intended to be directed to the silt fence. Wood chips from clearing can be used in front of the silt fence to provide an extra margin of safety and security for the silt fence. This practice is encouraged, provided the chips are removed when the fence is removed. Silt fencing with a maximum stake spacing of 6 feet should be used, unless the fence is supported by wire fence reinforcement of minimum 14 gauge and with a maximum mesh spacing of 6 inches, in which case stakes may be spaced a maximum of 10 feet apart. The bottom of the fence should be properly anchored a minimum of 6" per the plan detail and backfilled. Silt fence shall be installed along the downgradient side of construction work areas, with locations being adjusted along with the construction phasing areas. The Contractor may use erosion mix in place of single row silt fence barrier.
6. Twin rows of siltation fence with hay bales shall be installed at the foot of steep slopes and adjacent to protected natural resources (wetland areas).
7. Erosion Control Mix - Erosion control mix is a dense, processed mixture of intertwining shredded wood fragments and grit that will stabilize a site immediately without vegetation. This product may be used in place of silt fence to protect downstream areas not adjacent to natural resources. Erosion control mix consists primarily of organic material and may include: shredded bark, stump grindings, or partially composted wood products and shall be placed to form berms in accordance with the detail on the plan set. Care shall be taken to ensure berms are level and provide an even depth of protection throughout the length of the berm. The Contractor shall make repairs immediately if there are any signs of erosion or breaches in the berm, and supplement berms with additional material if settlement is observed.
8. Stone check dams, silt logs, or hay bale barriers will be installed at any evident concentrated flow discharge points during construction and earthwork operations.
9. All slopes steeper than 4:1 shall receive erosion control blankets, or temporary riprap stabilization. Where temporary riprap is used, slopes shall be stabilized with loam, seed and erosion control blanket, or sod when the riprap is removed for final stabilization. Slope stabilization fabric shall be a fully biodegradable double net, coir fiber blanket, anchored in accordance with manufacturers recommendations.
10. Areas of visible erosion and the temporary sediment sumps shall be stabilized with crushed stone. The size of the stone shall be determined by the Contractor's designated representative in consultation with the Owner.
11. Temporary sediment sumps and sediment basins will provide sedimentation control for stormwater runoff from disturbed areas during construction until stabilization has been achieved. The sides and floors of sediment basins shall be stabilized with geotextile fabric laid over prepared subgrade materials. Outlets shall be as shown on the construction drawings and shall include sand filters around all risers and outlet pipes.
12. Flocculants will be used to control turbidity in runoff entering the sediment basins and sumps, if found to be effective in doing so. Flocculant selection will be based on lab analysis of at least three samples of native soil materials. A copy of the lab reports shall be issued to Maine DEP for review and approval prior to use. Flocculants shall be used in accordance with manufacturer's instructions.

13. Dirtbags™ will be required to be on site and available for construction dewatering. The Contractor will be required to provide four Dirtbags™ with one prepared for operation prior to commencing any trenching operations.
14. Silt logs may be used in areas where sheet flow drains off impervious surfaces to spread and filter the flow. Silt logs should be anchored in accordance with manufacturer recommendations.

Special Measures for Summer Construction

The summer period is generally optimum for construction in Maine, but it is also the period when intense short duration storms are most common, making denuded areas very susceptible to erosion. Dust control needs to be the most stringent, and the potential to establish vegetation is often restricted by moisture deficit in the summer. During these periods, the Contractor must:

1. Implement a program to apply dust control measures on a daily basis except those days where precipitation is sufficient to suppress dust formation. This program shall extend to and include adjacent streets.
2. Spray any mulches with water after anchoring to dampen the soil and encourage early growth. Spraying may be required several times. Temporary seed may be required until the late summer seeding season.
3. Cover stockpiles of fine-grained materials, or excavated soils which are susceptible to erosion. To protect from the intense, short-duration storms which are more prevalent in the summer months.
4. Take additional steps when needed, including watering, or covering excavated materials to control fugitive dust emissions to minimize reductions in visibility and the airborne disbursement of fine-grained soils. This is particularly important given the potential presence of soil contaminants, and the proximity of along the adjacent streets and properties.
5. These measures may also be required in the spring and fall during the drier periods of these seasons.

Special Measures for Winter Construction

The winter construction season runs from November 1st through April 15th, however little or no vegetation growth can be anticipated after October 15th. Additional stabilization measures should be provided in the Fall (by November 15th) in preparation for winter conditions and permanent seeding should occur at least 45 days before the first killing frost. More frequent site inspections and BMP maintenance should be scheduled at the site towards the end of winter in preparation for the Spring thaw. The following additional winter measures should be taken:

- Overwinter Hay Mulch should be applied at double the normal rate (150 pounds per 1000 square feet or 3 tons/acre) and should be anchored with netting (peg and twine) or a tackifier to prevent mulch displacement before freezing conditions. No soil should be visible through the mulch. Hay mulch cannot be applied over snow.
- Dormant Seeding and Mulch should be applied at 3 times the specified amount after the first killing frost. All dormant seeding beds should be covered with overwinter mulch or an anchored erosion control blanket.
- Temporary vegetation should be applied by October 1st (to prepare for winter conditions) with winter rye at 3 pounds per 1000 square feet5 and mulched with anchored hay at 75 pounds per 1000 square feet or with erosion control blanket. If the rye fails to grow at least three inches and have 75% coverage by November 1st, the area should be stabilized for overwinter protection.
- Erosion control mix is the best overwinter cover, but is not recommended for slopes steeper than 1:1 or in areas with flowing water.
- Erosion Control Blankets should be used on slopes where hay would be disturbed by wind or water. The matting should be installed, anchored and stapled in accordance with the manufacturer's recommendations. Full contact between the blanket and the soil is critical for an effective erosion control cover.

- **Riprap** should be properly sized and installed to ensure long-term stability. In the winter, newly constructed ditches and channels should be stabilized with riprap. Widening of the channel may be required to accommodate placement of stones. Angular riprap is preferred to round stone.
- **Sod** may be used for late-season stabilization (after October 1st), but it is not recommended for slopes steeper than 3:1 or in areas with groundwater seeps. Follow the supplier's instructions.

A brief Winter Construction Risk Analysis is included below:

Overwinter Construction Risk Analysis		
Subject	**Risk**	**Mitigation**
Increased precipitation with no vegetation uptake or evaporation	More surface runoff that can be directed to erosion control measures	Observation and frequent maintenance of BMPs, temporary dewatering deployment
Frozen Grounds	The soil loses it capacity to retain water and cause more surface runoff and potential erosion	Prompt cover and stabilization of exposed soils, maintenance of fill embankments and high traffic areas
Vegetative Ground Cover	Cannot be established outside of growing season.	Seed areas at least 45 days between first frost
Runoff Diversion	Snow or icing may clog diversion structures.	Observation, maintenance and clearing of snow from BMPs where practical
Sedimentation Basins	Can be overwhelmed by spring flows.	Install before ground is frozen, stabilize upstream areas prior to Spring thaw
Silt Fence	Difficult to install on frozen ground. Often fails during spring melt	Use erosion control mix berms if required during winter conditions
Erosion Control Blankets	Cannot be anchored on frozen ground	Install prior to frost, or replace with temporary riprap stabilization over winter
Hydro-seeding	Stabilizers are ineffective in cold temperatures	Install prior to winter
Vegetated Swales	Cannot be established outside of growing season	Establish and seed 45 days prior to first frost, stabilize with temporary riprap
Impervious Stabilization	Base gravel on driving/parking areas. Pavement cannot be installed in winter.	Install sacrificial surface where necessary, frequent winter maintenance of gravel surfaces
'Mud' Season	Spring thaw	Frequent preventative maintenance of BMPs, focus on stabilization prior to onset of thaw

Permanent Erosion Control Measures

The following permanent erosion control measures have been designed as part of the Erosion/Sedimentation Control Plan:

1. The drainage conveyance systems have been designed to intercept and convey the 25-year storm.
2. All areas disturbed during construction, but not subject to other restoration (paving, riprap, etc.), will be loamed, limed, fertilized, mulched, and seeded. Fabric netting, anchored with staples,

shall be placed over the mulch in areas where the finish grade slope is greater than 10 percent. Native topsoil shall be stockpiled and temporarily stabilized with seed and mulch and reused for final restoration when it is of sufficient quality.

3. Stormwater BMPs have been designed to capture, treat and discharge runoff from the developed areas of the site in a non-erosive manner to downstream receiving waters. Details of the Stormwater Management Plan are included in Section 12.
4. Catch basins shall be provided with sediment sumps for all outlet pipes that are 12" in diameter or greater or where winter sand use is contemplated. A sediment collection bag shall be installed in all basins.

Timing and Sequence of Erosion/Sedimentation Control Measures

The following general construction sequence shall be followed to ensure the effectiveness of soil erosion and sediment control measures. The detailed phasing plan and narrative should be referred to for the delineation of individual construction phases and descriptions of the associated BMPs and work methods. It is anticipated that project earthwork progress and phasing will be reviewed throughout the project as part of the overall construction schedule management for the project. Therefore, the following is intended for outline guidance only.

1. Install construction entrances.
2. Install safety and construction fence to secure the site for clearing and mobilization.
3. Install perimeter siltation fence and erosion control barriers. Particular attention shall be paid to areas upstream of protected natural resources and in the vicinity of the streams at the project site. Signs shall be erected periodically along these perimeter barriers indicating that the downstream areas are off limits to all construction activities.
4. Install diversion BMPs and stabilized outlet plunge pools to convey water from upstream areas around the project site.
5. Install temporary sediment basins and sumps as shown on the project plans and details.
6. Construct activities on the site to optimize the handling of materials and restrict the denuded areas to the time stipulated, as described in the project phasing plan.
7. Install granular borrow and pavement gravel materials to raise the site to the design subgrade elevation.
8. Construct stabilized pads for foundation and building construction.
9. Maintain erosion controls and stabilized areas throughout the construction period.
10. Install binder pavement.
11. Landscape (loam and seed).
12. Install surface pavements.
13. Install striping, signage, and miscellaneous site improvements.
14. Review the site improvements, identify punch list items and required revisions.
15. Remove any temporary erosion control measures.

The Contractor must maintain an accurate set of record drawings indicating the date when an area is first denuded, the date of temporary stabilization, and the date of final stabilization. On October 1 of any calendar year, the Contractor shall submit a detailed plan for stabilizing the site for the winter and a description of what activities are planned during the winter.

14.8. PERMIT REQUIREMENTS

This project will require review and approval by Federal, State and Local Regulatory Authorities. Permit approvals from these bodies may include specific conditions related to soil erosion and sediment control in addition to the standards described below. The Owner and Contractor will be responsible for review of, and adherence to any and all specific permit conditions applicable to the project, and these will become part of the Contract Documents for the project.

The scale and nature of the project will require coverage under the Maine Pollutant Discharge Elimination System (MPDES) General Permit - Construction Activity. The following procedures will be required to meet the minimum regulatory standards associated with this permit:

Preconstruction Conference

Prior to any construction at the site, representatives of the Contractor, the Project Engineer, the Owner, Regulatory Agency Representatives and the City of Belfast City Engineer shall meet to discuss the scheduling of the site construction and the designation of the responsible parties for implementing the plan. The Contractor shall be responsible for scheduling the meeting. Prior to the meeting, the Contractor will prepare a detailed schedule and a marked-up site plan indicating areas and components of the work and key dates showing date of disturbance and completion of the work. The Contractor shall conduct a meeting with employees and sub-contractors to review the erosion control plan, the construction techniques which will be employed to implement the plan and provide a list of attendees and items discussed at the meeting to the Owner. Three copies of the schedule, the Contractor's meeting minutes, and marked-up site plan shall be provided to the Owner.

Inspection of Soil Erosion and Sediment Control Measures

The CM shall prepare a list and designate by name, address and telephone number all individuals who will be responsible for implementation, inspection, and maintenance of all erosion control measures identified within this section and as contained in the Erosion and Sedimentation Control Plan of the contract drawings. Specific responsibilities of the inspector(s) will include:

- Execution of the Contractor/Subcontractor Certification contained in **Attachment C** by any and all parties responsible for erosion control measures on the site.
- A weekly certification stating compliance, any deviations, and corrective measures necessary to comply with the erosion control requirements of this section shall be prepared and signed by the inspector(s).

Inspection of the project work site shall include:

1. Identification of proper erosion control measure installation in accordance with the erosion control detail sheet or as specified in this section.
2. Determine whether each erosion control measure is properly operating. If not, identify damage to the control device and determine remedial measures.
3. Identify areas which appear vulnerable to erosion and determine additional erosion control measures which should be used to improve conditions.
4. Inspect areas of recent seeding to determine percent catch of grass. A minimum catch of 90 percent is required prior to removal of erosion control measures.
5. All erosion controls shall be removed within 30 days of permanent stabilization except for mulch and netting not detrimental to the project. Removals shall include but not be limited to all silt fence, hay bales, inlet protection, and stone check dams.
6. Accumulated silt/sediment should be removed when the depth of sediment reaches 50 percent of the barrier height. Accumulated silt/sediment should be removed from behind silt fencing when the depth of the sediment reaches 6 inches.
7. Silt sacks should be removed and replaced at least every three months and at any time where the weekly inspection reveals that siltation has significantly retarded the rate of flow through the silt sack.
8. If inspection of the site indicates a change should be made to the erosion control plan, to either improve effectiveness or correct a site-specific deficiency, the inspector shall immediately implement the corrective measure and notify the Owner of the change.

A summary of standard Erosion Control Inspections is given in the table below. It is anticipated that inspection and maintenance tasks will be adapted throughout the project to reflect field conditions and construction progress:

EROSION AND SEDIMENT CONTROL MEASURES AND ACTIVITY	INSPECTION FREQUENCY		
	Weekly	**Before & After a Storm**	**After Construction**
SEDIMENT BARRIERS			
Sediment barriers are installed prior to soil disturbances	X	X	
Silt fences are keyed in and tight	X	X	
Barriers are repaired and replaced as necessary	X	X	
Barriers are removed when the site is stabilized - Silt fence should be cut at the ground surface			X
TEMPORARY STABILIZATION			
Areas are stabilized if idle for 14 days or more	X	X	
Daily stabilization within 100 ft of a natural resource	X	X	
MULCH			
Seed and mulch within 7 days of final grading. Ground is not visible	X	X	
Erosion control mix is 4-6 inch thick	X	X	
Erosion control blankets or hay mulch are anchored	X	X	
VEGETATION			
Vegetation provides 90% soil cover	X		X
Loam or soil amendment were provided	X		X
New seeded areas are mulched and protected from vehicle, foot traffic and runoff	X	X	X
Areas that will remain unworked for more than 1 year are vegetated with grass	X		
SLOPES AND EMBANKMENTS			
Final graded slopes and embankments are stabilized	X	X	X
Diversions are provided for areas with rill erosion	X	X	X
Areas steeper than 2:1 are riprapped	X		
Stones are angular, durable and various in size	X		
Riprap is underlain with a gravel layer or filter fabric	X		
STORMWATER CHANNELS AND CULVERTS			
Ditches and swales are permanently stabilized– channels that will be riprapped have been over-excavated	X	X	X
Ditches are clear of obstructions, accumulated sediments or debris	X	X	X
Ditch lining/bottoms are free of erosion	X	X	X
Check dams are spaced correctly to slow flow velocity	X		
Underlying filter fabric or gravel is not visible	X	X	X
Culvert aprons and plunge pools are sized for expected flows volume and velocity	X		
Stones are angular, durable and various in size	X		
Culverts are sized to avoid upgradient flooding	X	X	
Culvert protection extends to the maximum flow elevation within the ditch	X	X	X
Culvert is embedded, not hanging	X	X	X

EROSION AND SEDIMENT CONTROL MEASURES AND ACTIVITY	INSPECTION FREQUENCY		
	Weekly	**Before & After a Storm**	**After Construction**
CATCH BASIN SYSTEMS			
Catch basins are built properly	X		
Accumulated sediments and debris are removed from sump, grate and collection area		X	X
Floating debris and floating oils are removed from trap			X
ROADWAYS AND PARKING SURFACES			
The gravel pad at the construction entrance is clear from sediments	X	X	
Roads are crowned		X	X
Cross drainage (culvert) is provided	X		
False ditches (from winter sand) are graded		X	X
BUFFERS			
Buffers are free of erosion or concentrated flows		X	X
The downgradient of spreaders and turnouts is stable		X	X
Level spreaders are on the contour			X
The number of spreaders and ditch turnouts is adequate for flow distribution		X	X
Any sediment accumulation is removed from within spreader or turnouts		X	X
STORMWATER BASINS AND TRAPS			
Embankments are free of settlement, slope erosion, internal piping, and downstream swamping		X	X
All flow control structure or orifices are operational and clear of debris or sediments		X	X
Any pre-treatment structure that collects sediment or hydrocarbons is clean or maintained		X	X
Vegetated filters and infiltration basins have adequate grass growth			X
Any impoundment or forebay is free of sediment		X	X
WINTER CONSTRUCTION (November 1st-April15th)			
Final graded areas are mulched daily at twice the normal rate with hay, and anchor (not on snow)	Daily		
A double row of sediment barrier is provided for all areas within 100 ft of a sensitive resource (use erosion control mix on frozen ground)	Daily		
Newly constructed ditches are riprapped	Daily		
Slopes greater than 8% are covered with an erosion control blanket or a 4-inch layer of erosion control mix	Daily		
HOUSEKEEPING PUNCH LIST			
All disturbed areas are permanently stabilized, and plantings are established (grass seeds have germinated with 90% vegetative cover)			X
All trash, sediments, debris or any solid waste have been removed from stormwater channels, catch basins, detention structures, discharge points, etc.			X
All ESC devices have been removed: (silt fence and posts, diversions and sediment structures, etc.)			X
All deliverables (certifications, survey information, as-built plans, reports, notice of termination (NOT), etc.) in accordance with all permit requirements have been submitted to town, Maine DEP, association, owner, etc.			X

Maintenance of Soil Erosion and Sediment Control Measures

The following general maintenance requirements shall apply to the installed erosion control BMPs. Additional maintenance may be required based on field conditions, or at the recommendation of the Project Engineer, Third Party Inspector, Owners Representative, or regulatory authorities:

1. Stabilized Construction Entrances - Stone stabilized construction entrances will require the stone to be removed and replaced, as it becomes covered or filled with mud and material tracked by vehicles exiting the site.
2. The surface of the Runoff Diversion Trench shall be inspected on a weekly basis and cleared of any accumulating surface debris that could reduce the capacity of the BMP to divert surface water. The outlets should be inspected to ensure that groundwater flows are being adequately conveyed around the construction area.
3. The upgradient (diversion) silt fence barrier shall be repaired or replaced immediately if any breaches are found, or there are signs of undercutting. Sediment and debris shall be removed from the upstream side of the barrier periodically. The downstream ends of the barrier should be checked for any erosion caused by concentrated flows running along the barrier. These areas should be repaired immediately with stone check dams to prevent further damage.
4. Inlets and outlets of bypass culverts shall be cleared of accumulating debris and any signs of erosion shall be repaired immediately with riprap.
5. Riprap plunge pool outlets shall be cleared of debris and monitored for sediment accumulation. If sediment reaches a depth of six inches, it shall be removed, and the plunge pool repaired or re-constructed.
6. Silt Fence Barriers - The Contractor shall make repairs immediately if there are any signs of erosion or sedimentation below the fence line. If such erosion is observed, the Contractor shall take proactive action to identify the cause of the erosion and take action to avoid its reoccurrence. If there are signs of undercutting at the center or the edges or impounding of large volumes of water behind the fence, the barrier shall be replaced with a stone check dam and measures taken to avoid the concentration of flows not intended to be directed to the silt fence.
7. Silt Fence Haybale Barriers – The Contractor shall maintain the silt fence as described above. Should the central haybale barrier deteriorate, or show signs of contamination, the material shall be removed and replaced.
8. Erosion Control Mix – The Contractor shall maintain erosion control berms to ensure they remain level and continue to provide an even depth of protection throughout the length of the berm. The Contractor shall make repairs immediately if there are any signs of erosion or breaches in the berm, and supplement berms with additional material if settlement is observed.
9. Stone check dams, silt logs, or hay bale barriers installed at concentrated flow discharge points shall be inspected and cleared of accumulated debris periodically. If sediment accumulation is observed, this shall be removed when it reaches a depth of not more than six inches.
10. Slopes stabilized with erosion control blankets, or temporary riprap stabilization shall be inspected and repaired if any signs of rill erosion or stone displacement are observed. Sloughing of slopes or evidence of slip, rotational or base failure shall be reported immediately to the project engineer for design of remedial actions.
11. Any open graded areas of visible erosion and the temporary sediment sumps shall be stabilized with crushed stone. The size of the stone shall be determined by the contractor's designated representative in consultation with the Owner.
12. Temporary sediment sumps and sediment basins shall be inspected on a weekly basis. Routine maintenance shall include the removal of debris around inlets and outlets, repair of any uneven areas on basin berms, repair of any observed rill erosion in embankments and replacement of bench and outlet control filter material when slow drainage is observed.

13. Anchoring of silt logs shall be checked on a weekly basis. These shall be removed and replaced when clogged with sediment.
14. Mulched areas shall be repaired when ground is visible through the mulch layer. Anchoring of erosion control blankets and hay mulch shall be repaired is any evidence of separation is observed.
15. Vegetated areas shall be over-seeded and stabilized where 90% cover is not achieved.

Reporting Requirements

In addition to the weekly certifications, the inspector(s) shall maintain written reports recording construction activities on site which include:

1. Dates when major grading activities occur in a particular areas of the site.
2. Dates when major construction activities cease in a particular area, either temporarily or permanently.
3. Dates when an area is stabilized.
4. Inspection of the project work site on a weekly basis and after each significant rainfall event (0.25 inch or more within any consecutive 24-hour period) during construction until permanent erosion control measures have been properly installed and the site has been stabilized.
5. A log (report) must be kept summarizing the scope of the inspection, name(s) and qualifications of the personnel making the inspection, the date(s) of the inspection, and major observations relating to operation of erosion and sedimentation controls and pollution prevention measures. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and location(s) where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken.

Record Keeping

1. All certifications, inspection forms, and written reports prepared by the inspector(s) shall be filed with the Owner, and the Permit File contained on the project site, and available for inspection and review upon request. All written certifications, inspection forms, and written reports must be filed within one (1) week of the inspection date.
2. Inspections Reports and Logs must be made accessible to regulatory agency staff and a copy must be provided upon request.
3. Copies of all reports must be kept on file and available upon request for a period of at least three years from the completion of permanent stabilization.

14.9. CONSTRUCTION PROCUREMENT AND ADMINISTRATION

The project will be constructed by a Construction Manager under contract to the Owner/Applicant. The Construction Manager will submit a detailed schedule for the completion of the work, broken into specific tasks, with anticipated milestones and completion dates, at the start of construction. The project schedule will be reviewed at regular bi-weekly project meetings, with updates and amendments to be recorded in the project file.

The work will be conducted in sections which will limit the amount of exposed area to those areas in which work is expected to be undertaken during the next 30 days. Exposed areas will be covered and stabilized as rapidly as practical. All areas will be permanently stabilized within 7 days of final grading and temporarily stabilized within 7 days of initial disturbance or before a predicted storm event of over ½" of rain. The area of denuded, non-stabilized construction shall be limited to the minimum area practicable. An area shall be considered to be denuded until the subbase gravel is installed in parking areas, or the areas of future loam and seed have been loamed, seeded, and mulched, or stabilized with erosion control blanket.

The Contractor must maintain an accurate set of record drawings indicating the date when an area is first denuded, the date of temporary stabilization, and the date of final stabilization. On October 1 of any calendar year, the Contractor shall submit a detailed plan for stabilizing the site for the winter and a description of what activities are planned during the winter.

The Contractor must install any added measures which may be necessary to control erosion/sedimentation and fugitive dust emissions from the site, with adjustments made dependent upon forecasted and actual site and weather conditions.

The Contractor has sole responsibility for complying with the erosion/sediment control report, including control of fugitive dust, and shall be responsible for any monetary penalties resulting from failure to comply with these standards.

Once construction has been completed, long-term maintenance of the stormwater management system will the responsibility of the applicant. Operations & Maintenance items with a list of maintenance requirements and frequency are listed at the end of Section 12 of the Maine DEP Permit Application.

Attachments

Attachment A – Soil Erosion and Sediment Control Phasing Plans and Narrative
Attachment B – Temporary Sediment Basin Sizing Calculations
Attachment C - Sample Erosion Control Compliance Certification and Inspection Forms

ATTACHMENT A

Major Earthwork Phasing Narrative & Soil Erosion and Sediment Control Phasing Plans

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PHASING OF MAJOR EARTHWORK ACTIVITIES

The following is intended to convey the phased progression of major earthwork activities from stripping and grubbing of areas of new development to stabilization of prepared subgrades. In the case of the building pads, subgrade will be formed in compacted Granular Borrow material that will be imported to replace the unsuitable native clay soils beneath the future structures. The roadways providing access to and from construction areas will be paved. Riprap stone will be used to provide temporary and permanent stabilization to slopes and storm drain outlets. The remaining laydown areas and pads will be brought to subgrade in stable granular gravel and crushed stone materials.

It should be noted that subgrade stabilization in the areas described below will not conclude the site/civil works in these areas. Subsequent earth moving activities will include foundation construction, building pad preparation, roadway and stormwater BMP construction, and final hardscaping and landscaping throughout the development area. However, all of these subsequent activities will take place on a stable, prepared granular surface. From the perspective of soil erosion and sediment control, the site will be considered stable once the excavation and exposure of native soils has been completed and stable cover material has been installed across the site.

The major earthwork activities will be divided into several phases to carefully manage the risk associated with exposure of native soils and to minimize the potential for soil erosion and sediment transport. The phases of work are described below and shown on the accompanying drawings.

SITE CLEARING

1. Site Layout -Upon receipt of all permit approvals and after holding pre-construction meetings with regulatory authorities and other stakeholders, the Phase 1 area of the project and tree clearing limits will be defined using stakes and fencing.
2. Site Clearing – Once the clearing limits have been established, clearly marked and approved by the Owner, the Phase 1 area will be cleared of major trees and vegetation. The clearing for Phase 1 may be undertaken in phases, as opposed to at one time, in order to minimize the cleared area to that needed for the next phase of construction.
3. A stabilized construction entrance will be installed at the end of the existing paved driveway to provide wheel cleaning for traffic exiting the site during this phase, and a stable, gravel laydown pad will be constructed on the existing cleared area at the edge of the woodland. Access to the interior of the site will be via existing woods roads. Additional stabilized haul roads will be established throughout the Phase 1 area as the work progresses, and perimeter erosion controls will be established as access becomes available to areas that have been logged.

PHASE 1A – SITE MOBILIZATION

1. Runoff Diversions – Prior to any grubbing or major earthwork, diversion BMPs will be installed around the upslope perimeter of the site. This will include silt fence barriers to direct surface runoff entering the site around the work area. A diversion trench will be constructed along the upper perimeter of the site to intercept additional surface water and groundwater at the upstream side of the project site. Underdrain piping will convey the intercepted flow around the work area before discharging, via outlet plunge pools to existing natural drainageways. Bypass culverts will also be installed in interior drainage channels that will be impacted during the initial work phases. These

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are designed to intercept internal surface water runoff and groundwater flow and divert it around the work area before draining, via stabilized outlet plunge pools into existing channels. The underdrain pipes in the diversion trenches and the bypass culverts installed in the drainage channels will remain in place at the end of construction. These will drain on-site groundwater to the headwaters of the natural drainageways that will remain in place after construction of the facility, providing baseflow to maintain these resources. Temporary access roads will be constructed to facilitate installation of the diversion BMPs and outlet plunge pools.

2. Establishment of site access, laydown area, offices and storage -
    a. Perimeter erosion controls will be installed in all downstream Phase 1A areas where these are not already installed during the tree clearing operations prior to any further work at the site.
    b. The major site improvement work will start with the establishment of a stable access road into the work area. The road will be constructed along the line of the permanent driveway and extend to the site office area before heading west through the site to the Phase 1 Building area.
    c. The site laydown area will be established in the southeast corner of the main site and will have an area of approximately 80,000sf. The area will be stripped and grubbed, graded and covered with a woven geotextile fabric. Panel drains will be places on the geotextile fabric to ensure that the area remains dry and stable. Granular Borrow will then be added to stabilize the area and bring it to grade.
    d. The site office and storage area is located at the northeast corner of the main site and has an area of approximately 15,000sf. Once the main laydown area is stabilized, this area will be stripped and grubbed, graded and covered with a woven geotextile and brought to grade in the same manner as the laydown area.
3. Installation of stabilized construction accesses for further phases of work – Two further stabilized construction accesses will be constructed at the entries to the work area at the west end of Phase 1A. These will protect the completed work area from tracked sediments originating from the Phase 1B work.
4. Phase 1A will also include the preparation of the building pad at the new Water and Wastewater Treatment Plant located towards the site entrance. A temporary crossing will be constructed over the intermittent stream to allow access to this area of the site without disturbing the existing channel. Construction of the permanent crossing will be undertaken in the low flow summer period between July 1st and September 1st. The drainage channel will be maintained through the crossing during construction of the arch culvert abutments. Sheet piling, or other stabilization measures will be used to confine the work area and protect the edges of the channel. Riprap stone scour protection will be installed at the edges of the channel to protect the structure from erosion. Construction of headwalls, wing walls and backfill material will then proceed after the arch structure is installed.
5. Pad preparation for the WTP/WWTP will require excavation of the existing topsoil and overburden materials and the construction of a stabilized working pad to allow access for construction equipment to work on the new building. The stabilized pad area at this location is approximately 35,000sf.

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PHASE 1B – CONSTRUCTION PHASE 1 – CENTRAL CORRIDOR WEST

1. Construction of Temporary Sediment Basins and Stabilized Outlets – The first phase of new construction will begin with the installation of temporary sediment basins at the locations of new stormwater BMPs at the west end of the Phase 1 construction area and along the southern perimeter of the work area. These are designed to receive runoff from exposed areas of the site and filter the water through sand bedding and underdrain backfill before allowing it to discharge to established downstream drainageways. These BMPs will be installed and stabilized prior to exposure of the upstream contributing work areas.
6. Additional bypass culverts will also be installed in interior drainage channels that will be impacted during the Phase 1B work. These are designed to intercept surface water runoff and groundwater flow around the work area and will discharge into stabilized outlet plunge pools before draining into existing natural drainage channels. These bypass culverts will remain in place after construction of the facility, providing groundwater baseflow to maintain these resources.
2. Construction of Phase 1B Access Roads – Access roads will be extended from the stabilized construction entrances installed in Phase 1A to the western work area. Temporary stabilized roads will be constructed and modified as work progresses from west to east. The roads will be completed once the building area is brought to subgrade elevation.
3. Construction of the new facility will require the excavation and removal of a significant layer of unsuitable compressible clay materials that have been identified beneath the building footprints. This material extends to an elevation of approximately 54 feet in this area of the site. This material is not suitable for re-use and will be excavated for disposal off site. As soon as subgrade elevations are established a layer of woven geotextile will be placed on the prepared subgrade and imported Granular Borrow will be placed in compacted lifts to the design subgrade.
    a. Excavation of unsuitable material and the stabilization with Granular Borrow will proceed from west to east starting in the area of the new Smolt Building. The western area will be stabilized and filled as the excavation proceeds to the east, minimizing the area of open exposed soils to less than 80,000sf at any given time.
    b. Edge drains will be installed at the foot of the excavation as it progresses. These will effectively drain the granular fill material to ensure that the surface of the construction area remains dry and stable. The underdrains will discharge, via a stabilized riprap outlet plunge pool to the downstream receiving channel.
    c. Foundation and building construction will commence at the western end of the site as the earthwork moves eastward. The establishment of stabilized subgrades for Phase 1B will end at the eastern end of the new Smolt Buildings. switch yard, just north of the laydown area.

PHASE 1C – CONSTRUCTION PHASE 1 - CENTRAL CORRIDOR EAST

1. Construction of Phase 1C will start once Phase 1B has been brought to subgrade with stable granular material.
2. Construction of Phase 1C Access Roads – Access roads will be constructed between the Smolt Buildings and Oxygen storage area. The roads will be completed once the building area is brought to subgrade elevation and will allow access around the eastern edge of the Smolt Buildings.
3. The Phase 1C Building pad preparation will start at the Oxygen Storage Area and proceed west to east across the site. As described in Phase 1B, above construction of new buildings will require the

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excavation and removal of a significant layer of unsuitable compressible clay materials. This material extends to an elevation of approximately 54 feet in this area of the site. This material is not suitable for re-use and will be excavated for disposal off site. As soon as subgrade elevations are established a layer of woven geotextile will be placed on the prepared subgrade and imported Granular Borrow will be placed in compacted lifts to the design subgrade.

a. Excavation of unsuitable material and the stabilization with Granular Borrow will proceed from west to east starting in the area of the new Smolt Building. The western area will be stabilized and filled as the excavation proceeds to the east, minimizing the area of open exposed soils to less than 80,000sf at any given time.
b. Edge drains will be installed at the foot of the excavation as it progresses. These will effectively drain the granular fill material to ensure that the surface of the construction area remains dry and stable. The underdrains will discharge, via a stabilized riprap outlet plunge pool to the downstream receiving channel.
c. Foundation and building construction will commence at the western end of the site as the earthwork moves eastward. The establishment of stabilized subgrades for Phase 1C will end at the eastern end of the new Switch Yard, just north of the laydown area.

PHASE 1D – CONSTRUCTION PHASE 1 - MODULE 1-3 AREA WEST

1. Construction of Phase 1D will start once Phase 1C has been brought to subgrade with stable granular material.
2. Construction of Phase 1D Access Roads – Access roads will be constructed around the western end of the Phase 1 Module Building, and along the northern side of the building, proceeding from west to east. The roads will be completed once the building area is brought to subgrade elevation and will allow access around the perimeter of the Module 1 Building.
3. Phase 1D building pad construction will proceed in a similar manner to the Central Corridor work, from west to east in the area of the new Grow Module Buildings. Similar to Phase 1B and 1C, this area of new construction will require the excavation and removal of a significant layer of unsuitable compressible clay materials that have been identified beneath the building footprints. This material extends to an elevation of approximately 54 feet in this area of the site. This material is not suitable for re-use and will be excavated for disposal off site. As soon as subgrade elevations are established a layer of woven geotextile will be placed on the prepared subgrade and imported Granular Borrow will be placed in compacted lifts to the design subgrade.
    a. Excavation of unsuitable material and the stabilization with Granular Borrow will proceed from west to east starting in the area of the Module 1. The western area will be stabilized and filled as the excavation proceeds to the east, minimizing the area of open exposed soils to less than 80,000sf at any given time.
    b. Edge drains will be installed at the foot of the excavation as it progresses. These will effectively drain the granular fill material to ensure that the surface of the construction area remains dry and stable. The underdrains will connect to the previously installed diversion culvert, which drains, via a stabilized riprap outlet plunge pool to the downstream receiving channel.
    c. Foundation and building construction will commence at the western end of the site as the earthwork moves eastward. The establishment of stabilized subgrades for Phase 1D will end approximately half way along the Phase 1 Grow Module Building.

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PHASE 1E – CONSTRUCTION PHASE 1 - MODULE 1-3 AREA EAST

1. Construction of Phase 1E will start once Phase 1D has been brought to subgrade with stable granular material.
2. Construction of Phase 1E Access Roads – Access roads will be constructed around the remainder of the northern side of the Phase 1 Module Building, proceeding from west to east. The roads will be completed once the building area is brought to subgrade elevation and will allow access around the entire perimeter of the Module 1 Building.
3. Phase 1E building pad construction will proceed in a similar manner to the previous work at the site. The unsuitable clay material extends to an elevation of approximately 54 feet in this area of the site. This material is not suitable for re-use and will be excavated for disposal off site. As soon as subgrade elevations are established a layer of woven geotextile will be placed on the prepared subgrade and imported Granular Borrow will be placed in compacted lifts to the design subgrade.
    a. Excavation of unsuitable material and the stabilization with Granular Borrow will proceed from west to east starting at the end of the Phase 1D area. The western area will be stabilized and filled as the excavation proceeds to the east, minimizing the area of open exposed soils to less than 80,000sf at any given time.
    b. Edge drains will be installed at the foot of the excavation as it progresses. These will effectively drain the granular fill material to ensure that the surface of the construction area remains dry and stable. The underdrains will connect to the previously installed diversion culvert, which drains, via a stabilized riprap outlet plunge pool to the downstream receiving channel.
    c. Foundation and building construction will commence at the western end of the Phase 1E area as the earthwork moves eastward. The establishment of stabilized subgrades for Phase 1E will end at the eastern end of the Phase 1 Grow Module Building.

PHASE 1 FINISH

1. Upon completion of the major earthwork activities associated with Phase 1 of the project, the interior finishes and landscaping will be installed. It is anticipated that this work will progress with the completion of the remaining building work, so that installed finishes are not damaged by any ongoing construction.
2. Once the final finishes and landscaping is installed and the Phase 1 area of the site is permanently stabilized, the temporary erosion control measures, including perimeter controls will be removed. Portions of the perimeter controls downstream of the Phase 2 work area will remain in place pending the start of that phase of work.
3. Temporary sediment basins will be removed and permanent stormwater BMPs will be installed as construction progresses and the upstream contributing areas are stabilized.

PHASE 2 SITE CLEARING

1. Construction of Phase 2 will start once Phase 1 construction is complete and the site has been completely stabilized.
2. Site Layout - After holding the required Phase 2 pre-construction meetings, the Phase 2 area of the project and tree clearing limits will be defined using stakes and fencing.
3. Site Clearing – Once the clearing limits have been established, clearly marked and approved by the Owner, the Phase 2 area will be cleared of major trees and vegetation.

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4. A stabilized construction entrance will be installed at the intersection of the main driveway with the southern roadway leading to the Phase 2 area, to provide wheel cleaning for traffic exiting the site during this phase. Access to the interior of the site will be via existing woods roads. Additional stabilized haul roads will be established throughout the Phase 2 area as the work progresses.
5. Perimeter Erosion Controls – The Phase 2 perimeter erosion controls will be installed at the downstream side of the site as the clearing progresses. This will connect to the previously installed Phase 1 perimeter controls, where these remain.

PHASE 2A – CONSTRUCTION PHASE 2 - MODULE 4-6 AREA WEST

1. Construction of Phase 2A will start once the phase 2 clearing is complete and access is available to the work area.
2. Bypass Culverts – New riprap stone outlet plunge pools will be constructed in the natural drainageways immediately downstream of the Phase 2 work area. The phase 1 plunge pools will be removed and the bypass culverts installed in the drainageways during the first phase of the project will be extended through the Phase 2 construction area to outlet to the newly installed underdrains.
3. Temporary Sediment Basin – Sediment basin 4 will be installed prior to exposure of the upstream contributing work areas. This is designed to receive runoff from exposed areas of the site and filter the water through sand bedding and underdrain backfill before allowing it to discharge to established downstream drainageways.
4. Construction of Phase 2 Access Roads – Access roads will be constructed around the western end and southern side of the Phase 2 Module Building, proceeding from west to east. The roads will be completed once the building area is brought to subgrade elevation and will allow access around the perimeter of the Module 2 Building.
5. Phase 2A building pad construction will proceed in a similar manner to the Central Corridor work, from west to east in the area of the new Grow Module Buildings. Similar to previous phases of construction, the areas of new construction will require the excavation and removal of a significant layer of unsuitable compressible clay materials that have been identified beneath the building footprints. This material extends to an elevation of approximately 43 feet in this area of the site. This material is not suitable for re-use and will be excavated for disposal off site. As soon as subgrade elevations are established a layer of woven geotextile will be placed on the prepared subgrade and imported Granular Borrow will be placed in compacted lifts to the design subgrade.
    a. Excavation of unsuitable material and the stabilization with Granular Borrow will proceed from west to east starting in the area of the Module 4 and proceeding into Module 5. The western area will be stabilized and filled as the excavation proceeds to the east, minimizing the area of open exposed soils to less than 80,000sf at any given time.
6. Foundation and building construction will commence at the western end of the site as the earthwork moves eastward. The establishment of stabilized subgrades for Phase 2A will end approximately half way along the Phase 2 Grow Module Building.

PHASE 2B – CONSTRUCTION PHASE 2 - MODULE 4-6 AREA EAST

1. Construction of Phase 2B will start once Phase 2A construction is complete and stabilized.
2. Building pad preparation for the southern module buildings will proceed eastwards from the end of Phase 2A, and across the site that was temporarily stabilized as a construction laydown area.

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As soon as subgrade elevations are established a layer of woven geotextile will be placed on the prepared subgrade and imported Granular Borrow will be placed in compacted lifts to the design subgrade.

   a. Excavation of unsuitable material and the stabilization with Granular Borrow will proceed from west to east starting in the area of the Module 5 and proceeding into Module 6. The western area will be stabilized and filled as the excavation proceeds to the east, minimizing the area of open exposed soils to less than 80,000sf at any given time.

3. Foundation and building construction will commence at the western end of the site as the earthwork moves eastward. The establishment of stabilized subgrades for Phase 2B will end at the eastern end of the Phase 2 Grow Module Building, and will complete the major earthwork activities associated with the construction of the facility. Once the site is fully stabilized, the perimeter erosion control BMPs will be removed and the surrounding areas will be permanently stabilized.

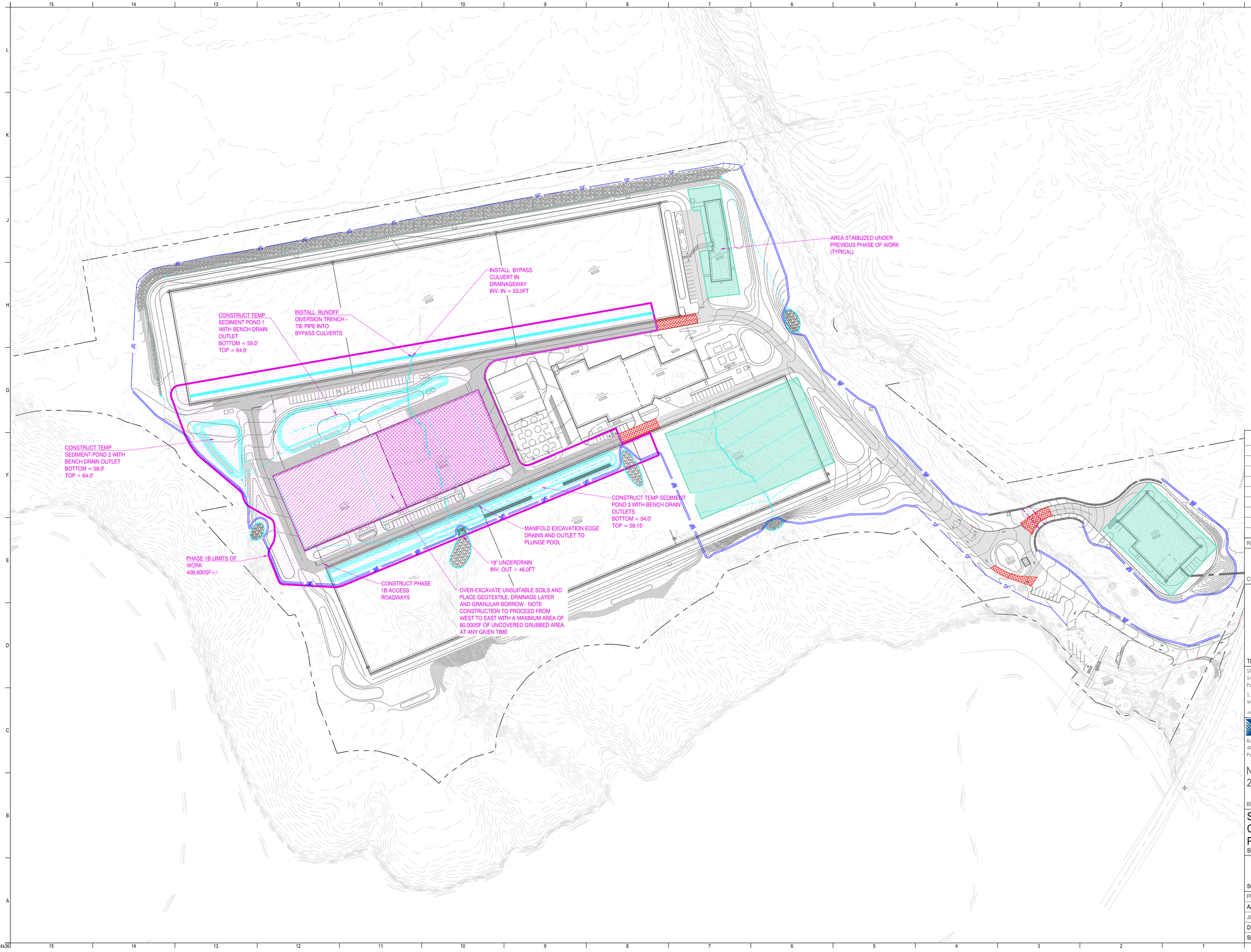
PHASE 2 FINISH

1. Upon completion of the major earthwork activities associated with Phase 2 of the project, the interior finishes and landscaping will be installed. It is anticipated that this work will progress with the completion of the remaining building work, so that installed finishes are not damaged by any ongoing construction.
2. Once the final finishes and landscaping is installed and the site is permanently stabilized, the temporary erosion control measures, including perimeter controls will be removed.
3. The final temporary sediment basin will be removed and permanent stormwater system will be installed as construction progresses and the upstream contributing areas are stabilized.
4. Stormwater BMPs and other critical elements of the site infrastructure will be maintained by the Owner in accordance with local, State and federal standards and permit conditions.

NORDIC AQUAFARMS SOIL EROSION AND SEDIMENT CONTROL PHASING SUMMARY

PHASE	PRIMARY TASKS	PREMANENTLY STABILIZED AREA - START OF PHASE	TOTAL WORK AREA	MAXIMUM OPEN AREA -GRUBBED AND NOT STABILIZED	SESC BMPS	AREA OF NEW ROADS	AREA OF NEW PADS	OTHER STABILIZED AREAS	PERMANENTLY STABILIZED AREA - END OF PHASE	ANTICIPATED TIMELINE
PHASE 1 CLEARING	Site Layout - Layout Phase 1 Limits of Work and tree clearing limits Installation of Stabilized Access Installation of Perimeter Erosion Controls Site Clearing – Logging and Clearing of Vegetation	**22,000**	**795,000**	**0**	Stabilized Construction Entrances Stabilized Haul Roads Stabilized Laydown Area Temporary Stream Crossing	**0**	**0**	**0**	**26,000**	**2-4 weeks**
PHASE 1A	Installation of Additional Perimeter Erosion Controls Construction of Runoff Diversions and Bypass Culverts Establishment of site access, laydown area, offices and storage -	**26,000**	**610,000**	**80,000**	Stabilized Cosntruction Entrances Silt Fence Silt fence/haybale barrier Erosion berms Temporary riprap slope stabilization Diversion trench Outlet plunge pools Bypass culverts Stabilized gravel pads	**51,000**	**130,000**	**60,000**	**267,000**	**6-8 weeks**
PHASE 1B	Construction of Temporary Sediment Basins and Stabilized Outlets Construction of Phase 1B Access Roads Excavation of unsuitable soils and subgrade preparation Pad and foundation preparation -Smolt Building	**267,000**	**408,600**	**80,000**	Temporary sediment basins Bench drain outlets Diversion trench Bypass culverts Building pad stabilization	**260,600**	**104,200**	**60,000**	**691,800**	**8-10 weeks**
PHASE 1C	Construction of Phase 1C Access Roads Excavation of unsuitable soils and subgrade preparation - Pad and foundation prep. - Oxygen Storage, Process, CUP, Switch Yard	**691,800**	**143,600**	**80,000**	Building pad stabilization	**0**	**108,000**	**30,000**	**829,800**	**4-6 weeks**
PHASE 1D	Construction of Phase 1D Access Roads Excavation of unsuitable soils and subgrade preparation - Pad and foundation preparation - Phase 1 Module Buildings West	**829,800**	**199,200**	**80,000**	Building pad stabilization	**26,200**	**150,000**	**15,000**	**1,021,000**	**5-6 weeks**
PHASE 1E	Construction of Phase 1E Access Roads Excavation of unsuitable soils and subgrade preparation - Pad and foundation preparation - Phase 1 Module Buildings East	**1,021,000**	**214,500**	**80,000**	Building pad stabilization	**18,500**	**180,000**	**15,000**	**1,234,500**	**5-6 weeks**
PHASE 1 FINISH	Landscaping, hardscaping and finish surface work in interior areas of Phase 1 work area, filling of temporary ponds, final stormwater BMPs	**1,234,500**	**160,000**	**0**	None	**0**	**0**	**85,000**	**1,319,500**	**4-6 weeks**
PHASE 2 CLEARING	Site Layout - Layout Phase 2 Limits of Work and tree clearing limits Installation of Perimeter Erosion Controls Connect Perimeter Erosion Controls to remaining Phase 1 BMPs Site Clearing – Logging and Clearing of Vegetation	**1,319,500**	**290,000**	**0**	Silt fence/haybale barrier Stabilized Haul Roads Stabilized Laydown Area (in place)	**0**	**0**	**0**	**1,319,500**	**2-4 weeks**
PHASE 2A	Construction of Phase 2A Access Roads Pad and foundation preparation - Phase 2 Module Buildings West	**1,319,500**	**220,000**	**80,000**	Temporary sediment basin Building pad stabilization Bypass culverts	**44,000**	**161,000**	**15,000**	**1,539,500**	**5-6 weeks**
PHASE 2B	Construction of Phase 2B Access Roads Pad and foundation preparation - Phase 2 Module Buildings East	**1,539,500**	**195,500**	**80,000**	Building pad stabilization	**0**	**90,000**	**25,000**	**1,654,500**	**5-6 weeks**

NOTE: AREAS ASSOCIATED WITH EACH PHASE ARE APPROXIMATE AND INTENDED TO GIVE AN OVERVIEW OF THE CONSTRUCTION PHASING



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

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

TRUE NORTH:

STATE OF MAINE
ANDREW D. JOHNSTON
NO. 9994
10/25/19
LICENSED PROFESSIONAL ENGINEER

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NORDIC AQUAFARMS
285 NORTHPORT AVENUE

BELFAST, MAINE

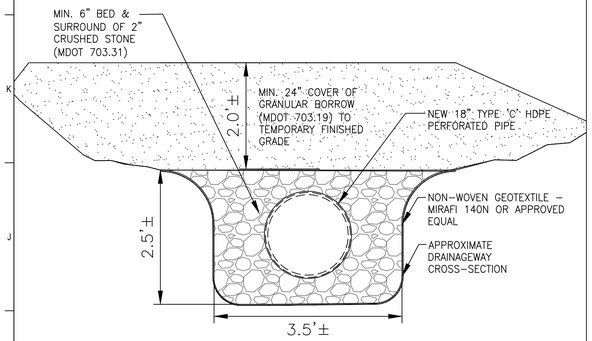
SOIL EROSION & SEDIMENT CONTROL PHASING PLAN -3 PHASE 1B
SHEET TITLE:

0 50' 100' 200' 300'
SCALE: AS SHOWN

PROJECT MANAGER:	ADB	PROJECT NO:	18076
A/E OF RECORD:			
JOB CAPTAIN:	SP		
DRAWN BY:	AJ		
SMRT FILE:	CE112-18076	SHEET No.	CE112

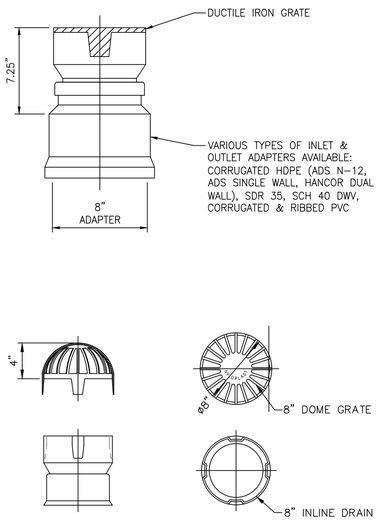
NOT FOR CONSTRUCTION

24x36



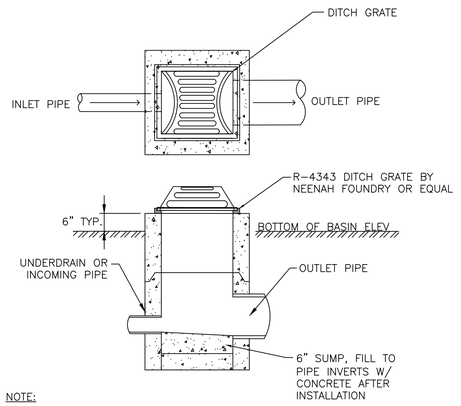
ESC-1 BYPASS CULVERT

NOT TO SCALE



ESC-4 IN-LINE DRAIN INLET

NOT TO SCALE

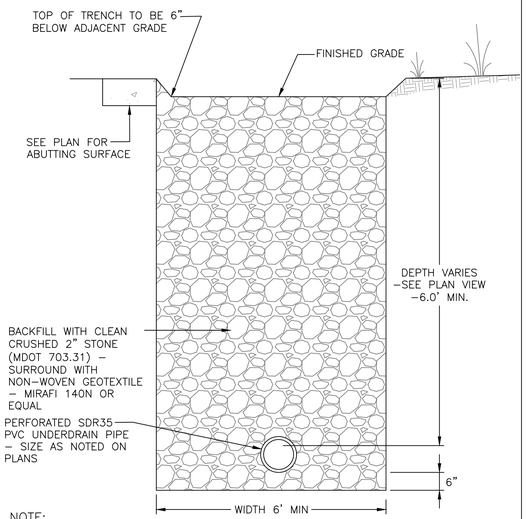


NOTE:

INVERT & RIM ELEVATIONS & PIPE GEOMETRY VARY PER OUTLET STRUCTURE. REFER TO DRAINAGE STRUCTURE TABLE

ESC-6 TYPE 'F DITCH GRATE CATCH BASIN

NOT TO SCALE

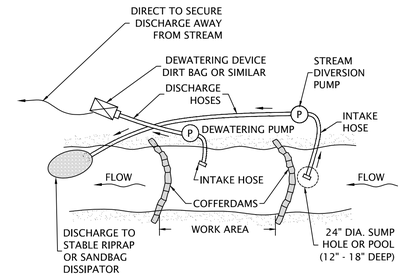


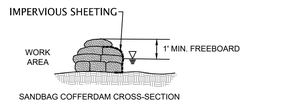
NOTE:

BRACING AND SHEETING OR OTHER TRENCH PROTECTION TO BE PROVIDED TO MEET APPLICABLE STATE AND O.S.H.A. SAFETY STANDARDS. ALL SUCH TRENCH PROTECTION TO BE THE RESPONSIBILITY OF THE CONTRACTOR.

ESC-7 RUNOFF DIVERSION TRENCH

NOT TO SCALE

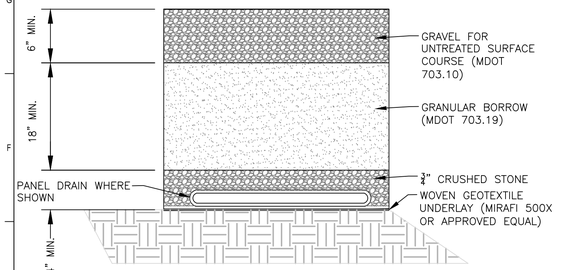




A TEMPORARY STREAM DIVERSION FOR A SHORT DURATION CONSTRUCTION PROJECT PROVIDES A DRY WORKING ENVIRONMENT WHILE MAINTAINING THE STREAM FLOW. A MORE PERMANENT AND ENGINEERED STRUCTURE WILL BE NEEDED FOR CROSSINGS OVER LARGE STREAM OR FOR A LONG CONSTRUCTION PERIOD (GREATER THAN 3 MONTHS). WEATHER REPORTS NEED TO BE MONITORED DAILY TO PREPARE THE PROJECT FOR ANTICIPATED STORM EVENTS. WORK WITH AN ENGINEER FOR DESIGN AND CONSTRUCTION GUIDANCE.

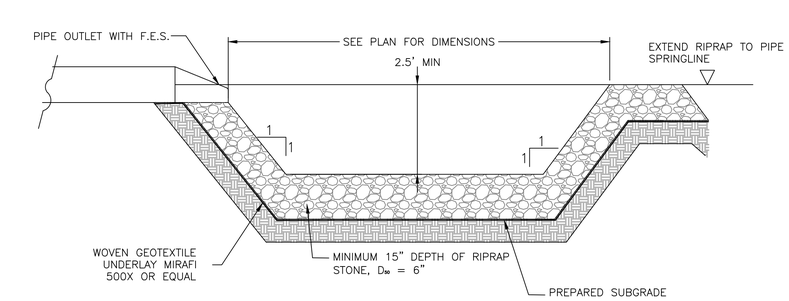
ESC-9 TEMPORARY STREAM DIVERSION

NOT TO SCALE



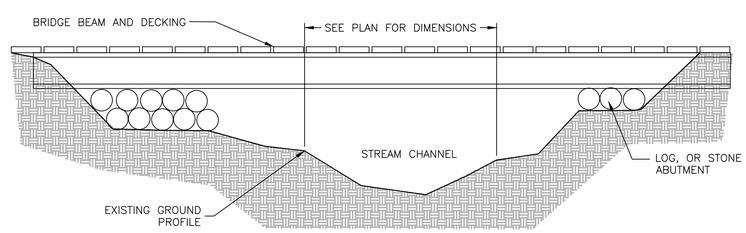
ESC-2 STABILIZED LAYDOWN PAD

NOT TO SCALE



ESC-5 RIPRAP PLUNGE POOL OUTLET

NOT TO SCALE

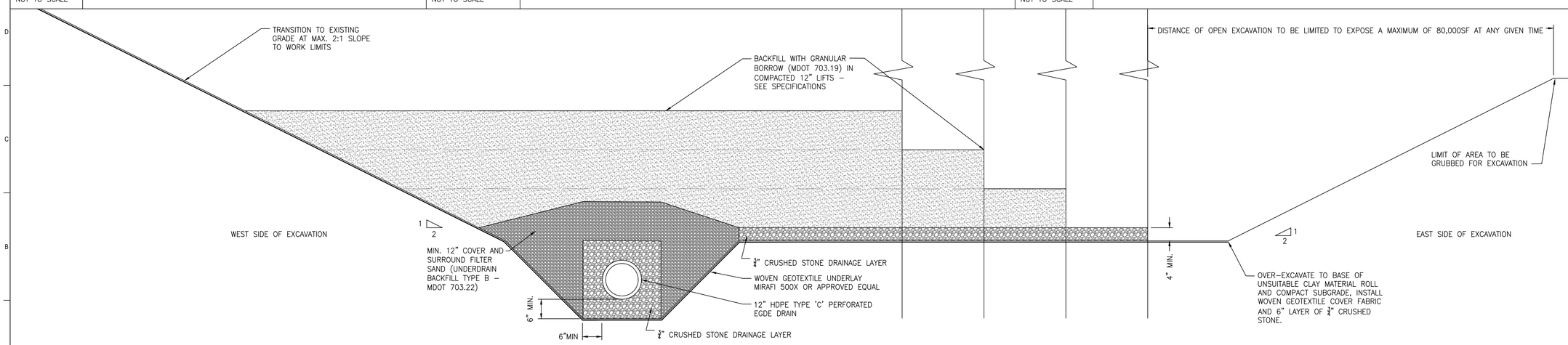


NOTE:

THIS IS A DELEGATED DESIGN ITEM. THE CONTRACTOR SHALL PRODUCE AND SUBMIT STAMPED ENGINEERING DESIGN DRAWINGS,, BASED ON FIELD CONDITIONS, FOR REVIEW PRIOR TO INSTALLATION.

ESC-8 TEMPORARY BRIDGE SCHEMATIC

NOT TO SCALE



ESC-3 OVER-EXCAVATION AND STABILIZATION OF BUILDING PAD

NOT TO SCALE

NOT TO SCALE

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

ISSUED FOR PERMIT
5-14-19

CURRENT ISSUE STATUS:

TRUE NORTH:

STATE OF MAINE
ANDREW D. JOHNSTON
NO. 9994
9-18-19
LICENSED
PROFESSIONAL ENGINEER

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NORDIC AQUAFARMS
285 NORTHPORT AVENUE

BELFAST, MAINE

EROSION & SEDIMENT CONTROL DETAILS

SHEET TITLE:

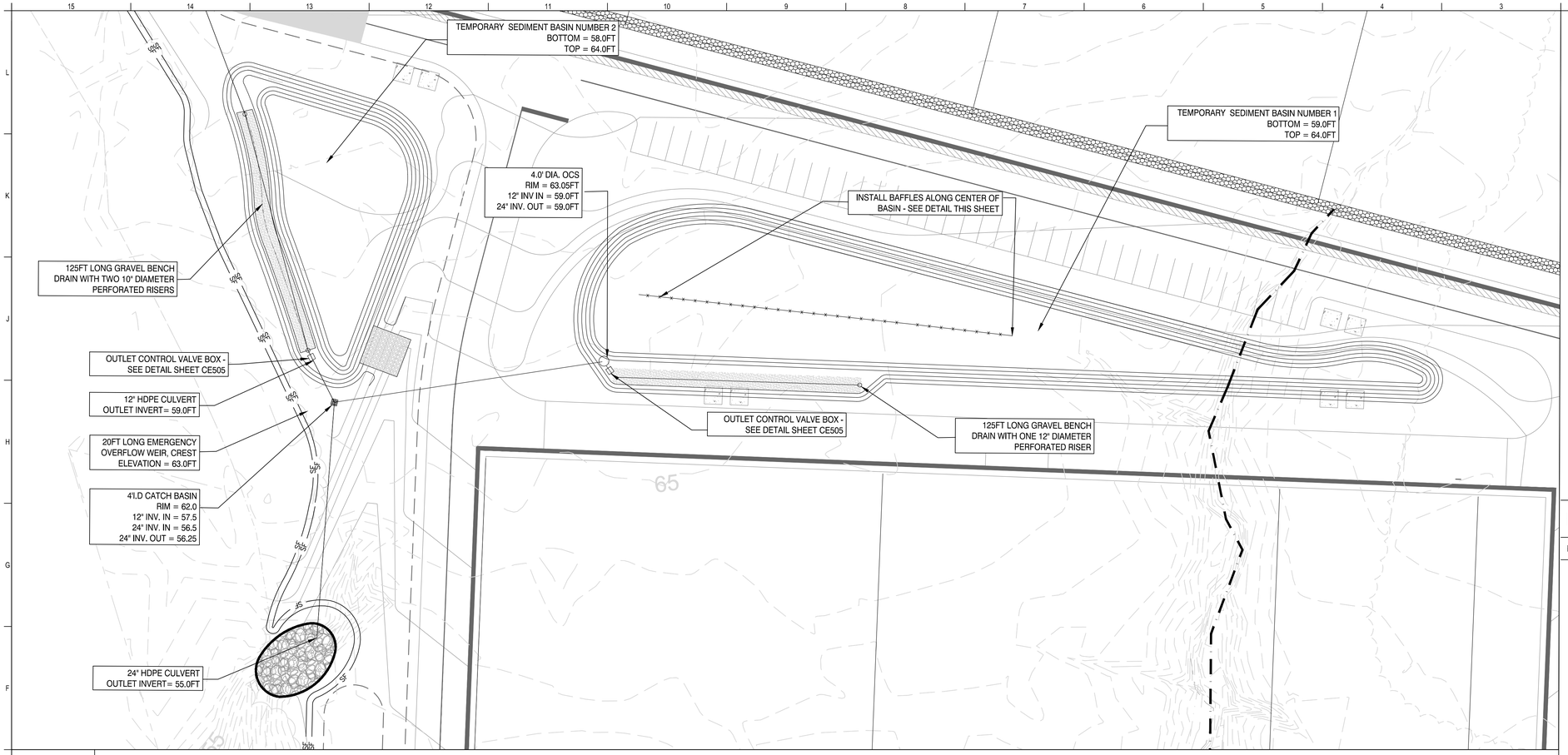
0 1/2" 1" 2" 3"

SCALE: AS SHOWN

PROJECT MANAGER:	ADB	PROJECT NO:	18076
A/E OF RECORD:			
JOB CAPTAIN:	SP		
DRAWN BY:	WSM		
SMRT FILE:	CE501-18076	SHEET No.	CE502

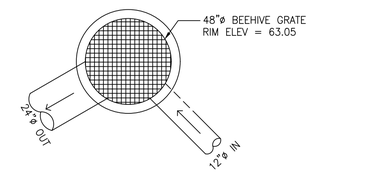
NOT FOR CONSTRUCTION

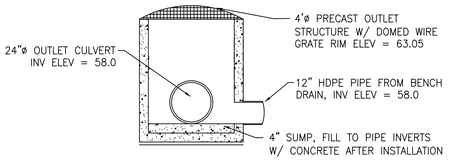
24x36



ESC–10 | SEDIMENT BASIN 1 AND SEDIMENT BASIN 2 PLAN VIEW

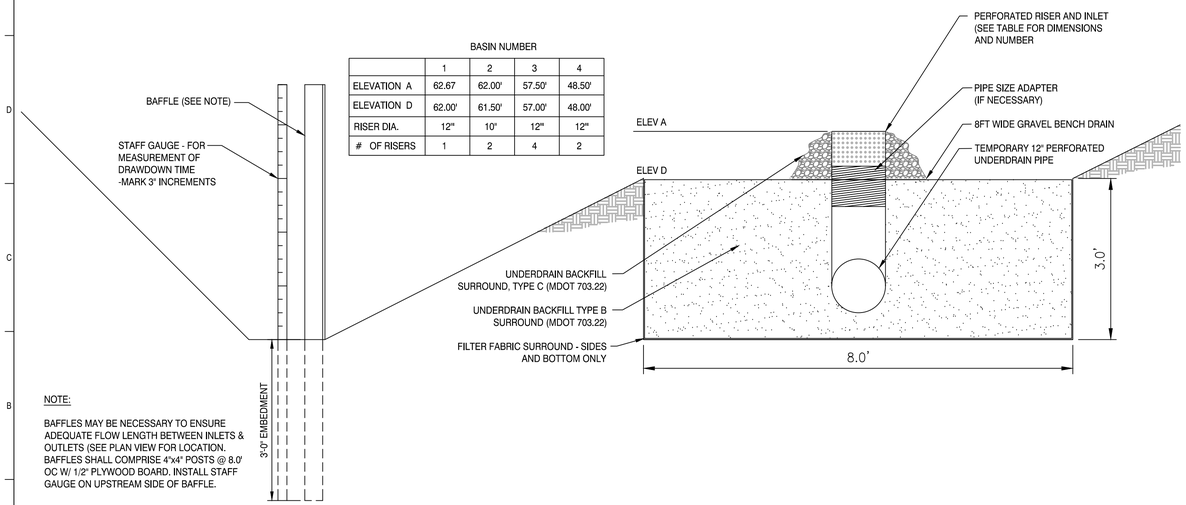
1"=30'





ESC–12 | SEDIMENT BASIN OUTLET CONTROL STRUCTURE

NOT TO SCALE



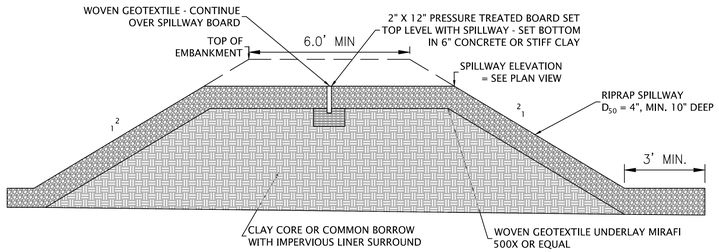
	1	2	3	4
ELEVATION A	62.67	62.00'	57.50'	48.50'
ELEVATION D	62.00'	61.50'	57.00'	48.00'
RISER DIA.	12"	10"	12"	12"
# OF RISERS	1	2	4	2

NOTE:

BAFFLES MAY BE NECESSARY TO ENSURE ADEQUATE FLOW LENGTH BETWEEN INLETS & OUTLETS (SEE PLAN VIEW FOR LOCATION. BAFFLES SHALL COMPRISE 4'x4" POSTS @ 8.0' OC W/ 1/2" PLYWOOD BOARD. INSTALL STAFF GAUGE ON UPSTREAM SIDE OF BAFFLE.

ESC–11 | SEDIMENT BASIN GRAVEL BENCH DRAIN OUTLET

NOT TO SCALE



ESC–13 | SEDIMENT BASIN EMERGENCY OVERFLOW WEIR

NOT TO SCALE

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

ISSUED FOR PERMIT
5-14-19

CURRENT ISSUE STATUS:

TRUE NORTH:

STATE OF MAINE
ANDREW D JOHNSTON
NO. 9994
7-18-19
LICENSED
PROFESSIONAL ENGINEER

SMRT Architects and Engineers
144 Fore Street
Portland, Maine 04104
1.877.700.7678
www.smrtinc.com
ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY

RANSOM Consulting Engineers and Scientists
Ransom Consulting Engineers and Scientists
400 Commercial Street, Suite 400
Portland, Maine 04101

NORDIC AQUAFARMS
285 NORTHPORT AVENUE

BELFAST, MAINE

EROSION & SEDIMENT CONTROL DETAILS

SHEET TITLE:

0 1/2" 1" 2" 3"

SCALE: AS SHOWN

PROJECT MANAGER:	ADB	PROJECT NO:	18076
A/E OF RECORD:			
JOB CAPTAIN:	SP	CE503	
DRAWN BY:	WSM		
SMRT FILE:	CE501-18076	SHEET No.	

NOT FOR CONSTRUCTION

24x36

Soil Erosion and Sedimentation Control
WEEKLY INSPECTION REPORT

Sheet ___ of ___

Project Name:_____
File No._____

Inspection Date:_____ Time:_____ Inspected by:_____

STAGE OF CONSTRUCTION

___ Pre-Construction Conference ___ Rough Grading ___ Finish Grading
___ Clearing and Grubbing ___ Building Construction ___ Final Stabilization

==========

INSPECTION CHECKLIST

Yes	No	NA	
[ ]	[ ]	[ ]	Have Soil Erosion and Sediment Control BMPs been installed in accordance with the plans and/or specifications?
[ ]	[ ]	[ ]	Are SESC measures operating effectively?
[ ]	[ ]	[ ]	Have all SESC control repairs and sediment removal been performed?
[ ]	[ ]	[ ]	Are properties and waterways downstream from development adequately protected from erosion and sediment deposition
[ ]	[ ]	[ ]	Are soil and mud kept off public roadways at intersections with site access roads?
[ ]	[ ]	[ ]	Have all exposed areas requiring temporary or permanent stabilization been stabilized?
[ ]	[ ]	[ ]	Are soil stock piles adequately stabilized with seeding and/or sediment trapping measures?
[ ]	[ ]	[ ]	Is there evidence of scouring velocities in runoff from construction areas?
[ ]	[ ]	[ ]	Are sediment basins installed and operating where needed?
[ ]	[ ]	[ ]	Are finished cut and fill slopes adequately stabilized?
[ ]	[ ]	[ ]	Are on-site channels, inlets and outlets adequately stabilized?
[ ]	[ ]	[ ]	Do all operational storm sewer inlets have adequate inlet protection?
[ ]	[ ]	[ ]	Are storm water conveyance channels adequately stabilized with channel lining and/or outlet protection?
[ ]	[ ]	[ ]	Are utility trenches stabilized properly?
[ ]	[ ]	[ ]	Is there evidence of siltation, or sediment transport in receiving waterways?
[ ]	[ ]	[ ]	Have all temporary control structures that are no longer needed been removed?

==========

Report Date_____ Sheet of

Comments:_____

_____

_____

_____

_____

_____

_____

Verbal/Written notification given to:

Name	Organisation	Email Address	Sent
Andrew Johnston	ARC	andyj@arc-maine.com	
	NAF		
	Maine DEP		
	City of Belfast		

Report by: _____Date:_____