

Hamlet of Tuktoyaktuk

Sewage Disposal Facilities Operation and Maintenance Plan

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Table of Contents

	Page
1. INTRODUCTION	1
1.1 Objective of Tuktoyaktuk's Sewage Disposal Facilities O&M Plan.....	1
1.2 Sewage Disposal Facility Site Description	1
1.3 Sewage Collection Service	2
1.4 Sewage Disposal Facility - Treatment Processes.....	2
1.5 Information Sources	2
1.6 Contact List	3
2. LAGOON OPERATIONAL REQUIREMENTS.....	4
2.1 Normal Operation of Sewage Disposal Facility.....	4
2.2 Normal Operation of Vacuum Trucks.....	4
2.3 Annual Discharge of Sewage Disposal Facility.....	6
2.4 Emergency Lagoon Discharge.....	6
2.5 Safety of Lagoon	7
2.6 Sewage Disposal Facility Checking	7
2.7 Sampling	8
2.8 Sample Reporting	9
2.9 Record Keeping and Reporting.....	10
2.10 Review.....	10
3. LAGOON MAINTENANCE REQUIREMENTS	10
3.1 Lagoon Inlet Structures	10
3.2 Lagoon Discharge Stream	11
3.3 Sludge Depths and Measurement.....	11
3.4 Lagoon Berms	12
3.5 Odour Problems, Weed and Insect Control	12
3.6 Fencing and Signs	13
3.7 Maintenance of Access Road	13
3.8 Surface Runoff Management	13

List of Figures

- Figure 1. Facility Location
- Figure 2. Sewage Disposal Schematic
- Figure 3. Facility Organization
- Figure 4. Facility Components
- Figure 5. Discharge Activity

Appendix

- Appendix A – Sample Record Keeping Documentation
- Appendix B – Lagoon Rehabilitation Drawings - Issued for Construction 2018-08-20

1. INTRODUCTION

The proper operation and maintenance of Hamlet of Tuktoyaktuk's sewage disposal facilities are important components of its overall municipal waste management system. It is universally recognized that inappropriate operation and maintenance (O & M) of a sewage disposal facility may cause the lagoon site to become a source of potential public health hazards and adverse environmental impacts.

1.1 Objective of Tuktoyaktuk's Sewage Disposal Facilities O&M Plan

The primary objective of the Hamlet of Tuktoyaktuk's sewage disposal facility O & M plan is to assist the lagoon site staff in the proper operation and maintenance of the site, to apply appropriate technology and procedures to treat and dispose of its municipal sanitary sewage in a manner to minimize the potential public health and environmental hazards from the site, and acceptable to Inuvialuit Water Board. However, the application of appropriate technology depends upon the geology, terrain and climate of the area, as well as the technical and financial capabilities of this Hamlet. In the case of Hamlet of Tuktoyaktuk the appropriate technology is a "natural retention lagoon with a seasonal discharge."

The following general requirements to minimize the potential public health and environmental (water pollution) hazards are addressed in this O & M plan:

1. To minimize environmental nuisances that can interfere with community life and development;
2. To minimize the possibility of polluting surface waters through retention and controlled discharge; and
3. To minimize public health impact through retention and controlled discharge.

1.2 Sewage Disposal Facility Site Description

The Hamlet of Tuktoyaktuk's sanitary sewage disposal facility retention site is a natural lake, 5.9 ha in area that has been modified with perimeter structures to provide a retention structure. The lagoon provides a 365-days retention period to treat the Hamlet's sanitary sewage.

The site is located approximately 5.8 km south of the Hamlet Office and approximately 3.9 km south of the Airport Terminal Building. The site is also 1.5 km southwest of the Reindeer Point Subdivision (**Figure 1. Facility Locations**).

The area surrounding the lagoon site is influenced by winds primarily from a northwesterly direction, and tides of 30 to 60 cm. The sewage lagoon is discharged in the early fall of each year to a saltwater inlet. The lagoon is 3.0 km southeast from the open-ocean and approximately 6.5 km from the ocean by way of the inlet, which varies in depth from 1 to 4 m.

The lagoon is required to meet the following effluent standards:

BOD ₅	120 mg/L
Total Suspended Solids	180 mg/L
Oil and Grease	5 mg/L
Faecal Coliforms	1x10 ⁴ CFU/100ml
pH	6 to 9

The sewage collection services within the community are contracted to a private contractor who operates vacuum trucks seven days a week.

The sewage disposal facility is estimated to have a capacity to serve a population of 1,900 depending upon the level of commercial and industrial activity that occurs in the future.

1.3 Sewage Collection Service

Sewage is collected daily using 2 – 14,320 L trucks operated by North Coast Supply Ltd., Box 24 Tuktoyaktuk, Shawn Lundrigan, (867-977-2154). During the week the trucks generally make a total of 10 loads per day, seven days per week @ 14,320 L per load, for a total annual volume of approximately 52 million L of sewage which is deposited in the lagoon.

1.4 Sewage Disposal Facility - Treatment Processes

The treatment process that best describes the Tuktoyaktuk sewage disposal facility is classified as a facultative lagoon (See **Figure 2. Sewage Disposal Schematic**). A facultative lagoon does not contain any supplemental aeration to provide treatment but relies on wind and algae to provide the necessary oxygen for treatment. A facultative lagoon possesses an aerobic zone near the surface of the lagoon which contains excess dissolved oxygen for biological processes; an anoxic zone which contains little oxygen near the middle depth of the lagoon; and an anaerobic zone which contains no oxygen near the bottom of the lagoon.

Disinfection of the treated wastewater is provided by the sun. The sun provides heat and ultraviolet radiation to disinfect the wastewater contained in the lagoon. The amount of disinfection will depend on how clear the water being treated is.

The term retention refers to how long the impoundment structure retains the water before being discharged. The Tuktoyaktuk lagoon has a retention period of 365 days prior to discharge into the Arctic Ocean. The retention provides the necessary time required for the biological processes to occur, particularly during the long, warm, sunny days of the short Arctic summer. The biological processes may function to some degree at low temperatures and without sunlight; however, the processes that treatment the sewage become very, very slow. During the summer the biological processes thrive with the sun, wind and long days.

1.5 Information Sources

The preparation of this O & M plan is based upon the following information sources:

1. Water License N7L3-0714 (Renewal) for the Incorporated Hamlet of Tuktoyaktuk Northwest Territories (Effective April 23, 2010 and expiring November 20, 2013) and

Water License N5L3-0714 for the Hamlet of Tuktoyaktuk (effective April 15, 2016 and expiring November 20, 2018).

2. Guidelines for the Planning, Design, Operation and Maintenance of Wastewater Sewage Lagoons in the Northwest Territories - Volume I: Planning and Design / Volume II: Operation and Maintenance, Department of Municipal and Community Affairs, and Government of the Northwest Territories, 1988.

1.6 Contact List

Primary and emergency contacts for issues concerning the Tuktoyaktuk Lagoon are:

Board: Inuvialuit Water Board
Box 2531
INUVIK, NT X0E 0T0

Executive Director
Mardy Semmler
(867) 678-8609
semmlerm@nwtwb.com

Science and Regulatory Coordinator
Bijaya Adhikari
(867) 678-8610
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Analyst: Taiga Environnemental Laboratory
Box 1500, 4601 – 52nd Avenue
YELLOWKNIFE, NT X1A 1L4
(867) 765-6645

Inspector; Philippe Thibert-Leduc, Water Resource Officer
Environment and Natural Resources
Government of the Northwest Territories
PO Box 2749
INUVIK, NT X0E 0T0
Tel: (867) 678-6676
Cell: (867) 678-0623
Fax: (867) 678-6699
Philippe_Thibert-Leduc@gov.nt.ca

Hamlet of Tuktoyaktuk: Senior Administration Officer: (867) 977-2286

Northwest Territories Spill Line: (867) 920-8130

2. LAGOON OPERATIONAL REQUIREMENTS

The Hamlet of Tuktoyaktuk's sewage disposal facility operational requirements will be those activities that must be done on a regular basis (daily, weekly, or yearly) to operate and maintain the lagoon.

The operation of the Hamlet of Tuktoyaktuk's sewage disposal facility has been divided into seven types of activities:

1. Normal Operation (daily);
2. Safety (daily);
3. Checking (weekly);
4. Sampling (yearly);
5. Reporting (yearly);
6. Record Keeping (daily/weekly); and
7. Review (yearly).

2.1 Normal Operation of Sewage Disposal Facility

The Hamlet of Tuktoyaktuk's sewage disposal facility system has four main components (See **Figure 3. Facility Organization** and **Figure 4. Facility Components**):

1. The inlet structure;
2. Retention pond;
3. Berm structure; and
4. Discharge stream.

The normal operation of the sewage disposal facility involves observing the inlet structure on a daily basis for any unusual situations. Observations should also be made of the lagoon surface and berm structures. Observations of any material floating and what the material may be should be taken if these are present.

An entry should be recorded every day on the Daily Operation Observations Record to either indicate that the operation is normal; whether something abnormal was observed; and whether any corrective steps had to be taken. If abnormal observations were noted, provide adequate details of the observations in the notes.

2.2 Normal Operation of Vacuum Trucks

Sewage hauling trucks require daily inspections and servicing to minimize potential impact of spills that may occur through leakage. Vacuum trucks can potentially expose the operator to dangerous atmospheres and confined spaces. Vacuum trucks should only be operated by personnel that have received safety training and are certified in safe truck handling and operations. Trucks shall be operated in strict accordance with manufacturer operations and maintenance plans.

and all applicable health and safety, environmental, and transportation Territorial Acts and Regulations.

Pre-Haul Inspection:

- Fully open and close all valves to ensure they are operating freely;
- Inspect all floats for liquid level indicators and verify they are functioning and working properly;
- Inspect rubber stoppers and scrubber shutoffs and verify they are in good condition and seated properly;
- Pressurize the tank to verify that dome gaskets are in good condition and seated tightly when domes are closed;
- Inspect all hoses, connections and fitting and verify that all are in good condition;
- Inspect and verify that all connections and other equipment are leak free and in good working order; and
- Conduct pre-inspection checklist for truck operation in accordance with truck manufacturer's instructions.

Hauling Procedures (Pickup and Discharge):

- Wear appropriate personal protective equipment (PPE) such as eye protection, face shields, gloves, aprons, and other PPE suitable to the conditions encountered when hauling septic wastes;
- Monitor pressure and vacuum gauges while in operation to verify proper operating conditions. Strictly follow manufacturer operations maintenance plans when conducting hauling activities;
- Place a 5 gallon pail underneath tank valves to catch any liquids when disconnecting hoses;
- Clean any spills that may have occurred during pumping activities;
- Ensure all hoses are drained back into the septic/holding tank to prevent spilling while the truck is mobile;
- Load and thoroughly secure all hoses, valves and equipment prior to moving truck;
- Ensure all septic tank lids are closed and secured; and
- Ensure all valves are closed and leak free prior to moving truck.

Post Haul Procedures:

- Depressurize tank in accordance to vehicle manufacturer's operating procedures;
- Thoroughly wash exterior of the truck;
- Drain and wash the interior of the vacuum tank; and
- Winterize valves, pumps, and connections in accordance with manufacturer's instructions.

Report any spills in accordance with environmental acts and regulations.

2.3 Annual Discharge of Sewage Disposal Facility

The Tuktoyuktuk lagoon has sufficient capacity to provide a 365 day retention period before requiring discharge. Annually, the lagoon should be discharged by pumping treated effluent over the lagoon berm (See **Figure 5. Discharge Activity**). Effluent discharge should be done in the early fall before freeze up in order to provide the maximum treatment of the sewage.

Before starting the discharge, all sampling should be completed, analyzed and reported to the facility Inspector. Normally sampling is completed about two (2) weeks before the planned discharge to make sure that the lagoon can meet its effluent requirements. Sampling methods are described in Section 2.6 Sampling.

If the sampling shows that the lagoon contents meet the effluent requirements of the water license, then all notifications required should be given to the Inspector and public and lagoon discharge can begin.

If the sampling shows that the effluent will not meet the requirements of the water license, then the lagoon can be held longer to try to get additional treatment before discharging. If it looks like the effluent requirements will not be met before freeze up, an Emergency Lagoon Discharge from the Water Board should be requested from the Water Board to allow a discharge to take place. Document all request and responses and keep these with the lagoon records for review if required.

Ten (10) days before the annual discharge, the Inspector should be contacted to provide notice them of the intent to discharge. In addition, an appropriate notice will be given to the public and any other impacted party to advise them of the release of wastewater effluent from the sewage disposal facility.

2.4 Emergency Lagoon Discharge

Periodically an emergency discharge may be required in the event of capacity related issues or when adequate treatment cannot be obtained.

Capacity related issues will arise when a higher volume of spring runoff or rain water enters the lagoon, and a discharge is required before 365 days have passed. This reduces the amount of time available for treatment processes and may results in partially treated wastewater being discharged before it has a chance to meet the required effluent limits.

If the level of the lagoon approaches the 1 m freeboard and it becomes clear that an early discharge will be required, the Inspector should be notified and a request for an Emergency Lagoon Discharge should be made. The freeboard may be reduced if approval is obtained from a Geotechnical Engineer.

As directed by the Inspector, additional wastewater samples may need to be collected and analyzed before an Emergency Lagoon Discharge is authorized. Once the Emergency Lagoon Discharge has been approved, the lagoon can be pumped out. During the discharge, follow any sampling instructions provided by the Inspector.

Any Emergency Lagoon Discharges should be requested as soon as possible if it becomes apparent that effluent requirements cannot be met. All responsible authorities should be notified, including the public if instructed to do so.

During the discharge, measures should be taken to control the erosion at the discharge area.

2.5 Safety of Lagoon

It is important that the operator must ensure that all aspects of wastewater management are conducted in a safe manner. Wastewater contains a number of organisms that can potentially cause a person to become sick if they come in contact with the sewage.

General public and unauthorized access to the lagoon site should be prevented. This includes all forms of recreation activities. This is to ensure no possible contamination or infection of the public, with no protective awareness, from pathogenic microorganisms. However, the public may be allowed to access the RV discharge station.

The equipment, structures, and discharge pumping work areas should be kept clean. This reduces problems with footing and also makes it less likely that equipment will be damaged or broken by debris. Many injuries in the workplace are due to slipping or tripping.

All people should wear safety boots, gloves, face shields and other personal protective clothing or equipment when handling or working around sewage. This will reduce the chance of getting splashed in the event of a hose leak or rupture during effluent discharge. After work, before eating, and at other convenient times, wash your hands thoroughly.

Caution should be used when working with wastewater. If you get splashed accidentally with sanitary sewage, wash promptly with plenty of water. Treat all cuts and skin abrasions immediately to prevent any infection. Have appropriate access to life rings or personal floatation devices when working around open water.

All those working on the wastewater system should keep normal preventative health care vaccinations up to date. Check with a physician as to the recommended inoculations (usually includes typhoid and paratyphoid).

All operators should be given appropriate safety training prior to working around the lagoon.

2.6 Sewage Disposal Facility Checking

Once a week, all main components of the sewage disposal facility system should be inspected for damage or operational difficulties. The purpose of the detailed checking is to spot things that may lead to problems later and to record the conditions of the date checked. If problems are noted, make all necessary adjustments as soon as is possible to prevent further damage or operational restrictions.

It is anticipated that the storm surges, which influence the shoreline erosion at the landfill, may not be a serious concern for the lagoon because the lagoon is located over 6 kilometers inland from the ocean by a shallow channel.

Access Road and Truck Turnaround Area: Access roads and truck turn around areas should be checked for damage and repaired as soon as possible. This may require the placement of material that fills and repairs the road surface and prevents trucks from getting stuck.

Inlet Structure: The inlet structures and surrounding area should be examined for blockages, erosion, ice build-up, or other operational problems. Erosion may occur in the discharge area due to the pumping activities. Erosion protection should be placed before and during discharge if required. Any observed erosion should be recorded in operational logs and repaired as soon as is practical.

Retention Pond Wastewater Level: During open water periods, the water level should be observed and recorded. A freeboard of 1.0 m should be provided between the water level and the top of the berm at its lowest point.

Berm Condition: All visible parts of the lagoon berm should be observed and the condition noted. Any cracking, slumping, seepage or other visible damage should be recorded.

Wastewater Colour: The variations in colour can be an important indicator of lagoon performance. This may only be possible during open water periods.

Sewage Disposal Facility Colours and Indications:

Colour	Indication
Dark Green	Good High pH High dissolved oxygen (DO).
Dull Green to Yellow	Not very good pH dropping DO dropping Blue-green algae are becoming established.
Grey to Black	Very bad Lagoon anaerobic
Tan to Brown	Okay, if caused by a type of algae bloom Not good if due to silt or bank erosion.
Red or Pink	Presence of purple sulphur bacteria (anaerobic conditions) or presence of red algae (aerobic conditions).

If the colour of the lagoon is grey, black, yellow or other colours that indicate poor operation, the appropriate notifications should be given to the Inspector, Board and MACA Regional Office.

2.7 Sampling

The Municipal Services manager is responsible for the sampling, monitoring and reporting duties for the Surveillance Network Program.

The purpose of taking samples and carrying out tests on them is to obtain information on how well the lagoon is performing throughout the summer months and whether the lagoon contents can meet effluent requirements. Keep analytical results to document and provide support to reports.

There are six important parts to the process of sampling. These are:

1. Taking the sample at the time called for;
2. Using a properly cleaned container for the sample to be taken;
3. Careful collection of the sample from the correct location and doing any necessary field tests called for at that time;
4. Careful and correct labeling of the sample container and filling out a record sheet;
5. Use of proper testing procedures, where tests can be performed on site; and
6. Shipping of the sample in proper containers and expeditiously so that it arrives on time for the testing.

Sample Frequency: Four Samples will be taken on an annual basis prior to discharge or "decant" of the lagoon. These samples must be submitted to the Inspector in order to obtain approval for decant of the lagoon.

Sample Parameters: Samples will be taken and analyzed for pH, fecal coliforms, suspended solids, BOD₅, and Oil and Grease.

Sample Locations: Samples are normally required to be taken at the effluent discharge area (SNP 0714-2 – See **Figure 3. Facility Organization**). Occasionally, other samples may be collected as required by the conditions of the Water License.

Sample Collection: Normally, you will be required to collect all of the samples at the specified location above in supplied bottles; normally two bottles – one sterile bottle for fecal coliforms and the other bottle for the remaining parameters. This type of sampling is referred to as a grab sample as it is collected at one time from a specific location. The grab samples are collected by dipping a sample collector or the bottle into the flow stream. The samples should preferably be collected by rinsing sample bottles with the sample wastewater for a couple of times prior to final sample collection.

To take a representative effluent sample during the discharge, at a minimum a grab sample should be collected at the beginning, middle and end of the discharge. The grab samples are mixed in a clean bucket and the combined sample is placed in the sample jar and submitted for analysis.

Sample Containers: The sample containers can affect the sample test results. The type of material it is made of and the way it was cleaned are the most important factors. Most lagoon samples are collected in plastic bottles that have been well washed and rinsed about six times. If the samples are to be used for bacteria determination, then special sterilized bottles must be used. These must be handled carefully so that the sample is not contaminated.

Field Tests: Normally, the only test you may be required to carry out on the lagoon site is pH. The equipment for this is a pH litmus paper kit (with instructions included).

2.8 Sample Reporting

An annual report on the sample parameters will be submitted to Inuvialuit Water Board.

2.9 Record Keeping and Reporting

Record keeping and reporting is necessary to have information on what has happened. The use of accurate records reports is very important for the Hamlet, Inuvialuit Water Board and its supporting agencies, and to engineers that may need to work on the sewage disposal facility.

The records and reports must be detailed enough to allow evaluation of performance and to track the development of problems. The records and reports also give a good check on completed tasks, and those left to complete. The records and reports for the Tuktoyaktuk sewage disposal facility include:

1. Daily Inspections and Weekly Systems Checks Record prepared by Hamlet staff (See **Appendix A**);
2. Annual Sampling Report prepared by water sample testing laboratory; and
3. Annual Water License Report prepared by the Hamlet staff.

2.10 Review

A compilation of the sewage disposal facility operations and sampling of the lagoon will be prepared once a year as a summary of the operation and performance for the purpose of submitting an annual report to Inuvialuit Water Board and for the purpose of an operation management review by the Hamlet Administration.

3. LAGOON MAINTENANCE REQUIREMENTS

3.1 Lagoon Inlet Structures

The inlet structures enable the sewage disposal facility to function properly (See **Figure 4. Facility Components**). In addition, these structures require considerable attention to ensure that they operate properly and do not experience or cause any erosion.

The most important aspect of maintenance of inlet structures is that they must not freeze in a way that inhibits their operation. Another important problem is caused by sludge deposition near the inlet structure, which has to be cleared manually or by machinery at regular intervals, on need-basis.

The lagoon has a free fall wastewater discharge. The sewage disposal facility operator must be aware of the following locations of potential problems:

1. The support structure holding the pipe;
2. The foundation and wall of the support structure;
3. Potential of ice build-up; and
4. Potential of ice damage.

The metal and wood support structures should also be inspected for corrosion and related problems that may weaken the support structure.

3.2 Lagoon Discharge Stream

The discharge stream is a pump and pipe over the berm (See **Figure 4. Facility Components;** **Figure 5. Discharge Activity**). The pump and piping are used on an annual basis; therefore maintenance is required in advance of the annual discharge and as required during the discharge.

3.3 Sludge Depths and Measurement

Sludge will eventually accumulate within the lagoon which would result in decreased capacity within the lagoon and more frequent discharge events. The sludge needs to be periodically removed and disposed in the landfill. A Sludge Removal Plan is required for submission and approval prior to conducting a sludge removal program

At a minimum, once the lagoon cannot receive the entire year's sewage load and the sewage disposal facility needs to be pumped out more than once per year, a sludge sounding should be conducted in order to determine the sludge level within the lagoon. Sludge depth soundings can be conducted by consultants or contractors. If the community elects to conduct the sludge sounding themselves, the following methods can be used in order to determine sludge depths.

Summer sludge soundings are typically conducted from a boat equipped with a depth finder. Summer sludge soundings can be obtained by the following procedure:

- Measure and record water elevation in relation to a benchmark;
- Transect the surface of the lagoon taking sludge depth measurements at approximately 5-20 m intervals. Intervals should be reduced in areas where sludge buildup is occurring. Cover the entire lagoon surface area for a complete assessment;
- Using a GPS, record the location of the sludge depth sounding; and
- Calculate the sludge depth relative to the benchmark and submit reporting as required.

Sludge soundings can be conducted during the winter months when ice thickness will support the weight of a person and equipment. Winter sludge soundings can be obtained by the following procedure:

- Locate the benchmark elevation and measure ice surface height relative to the benchmark;
- Drill holes within the ice in a grid pattern and at a consistent interval spacing. Intervals can be between 5-30 meters depending on the level of accuracy that is desired. It is suspected that the majority of sludge buildup will occur near the truck discharge chute and a finer grid at this location would be desired. For areas that have little to no sludge buildup, the grid interval spacing may be increased;
- Depth sounding can be obtained using a Sludge Judge, survey rod, weighted submersible tape, or other measuring implement that can measure the sludge depth in relation to the ice surface;
- Record the hole location sludge depth. Measure hole locations using a survey tape or an accurate GPS unit; and
- Calculate the sludge depth relative to the benchmark and submit reporting as required.

3.4 Lagoon Berms

There are four main functions of lagoon berms:

1. To form part of a storage container for retention of the wastewater for treatment;
2. To form access to parts of the lagoon;
3. To allow variation in wastewater levels due to wastewater volume changes; and
4. To provide "freeboard".

The objective of the berm inspection is to assess the condition of the structure and inspect for leakage. Erosion of dikes is mainly caused by wave action and surface runoff. Regular monitoring and maintenance are required to control berm erosion.

Surface runoff must be prevented from entering the lagoon through diversion ditches around the berms. The ditches must be properly maintained to prevent blockage of drainage.

3.5 Odour Problems, Weed and Insect Control

Odour Problem: Under normal operating conditions, the lagoon will not cause serious odour problems. However, at certain times, severe odors may occur. The lagoon is located at a significant distance from the nearest house; therefore, odor problems would not normally be a concern.

The most troublesome conditions are:

1. Lagoon and storage lagoons in the period following ice break-up;
2. At the end of an extensive period of cloud cover (in spring to fall when there is no ice cover), resulting in reduced sunlight and therefore reduced algae activity and low oxygen production; and
3. Extensive floating sludge mats.

The operator of the lagoon has limited opportunities to do anything about these conditions.

For Item 1. This problem will normally be of short duration; also likely to occur annually.

For Item 2. "Hope" for sunshine soon.

For Item 3. Floating scum and algae mats need to be broken up and dispersed.

Weed Control: A number of surface weeds can develop in sewage disposal facility. The problem with these weeds is that they block out the sunlight that is needed by algae to produce dissolved oxygen. A second problem is that when the floating plants die, they begin to decompose using up oxygen which is needed by the wastewater bacteria.

The ways to control surface weeds are as follows:

1. Skimming (often difficult and requires repeating); and
2. Use of herbicides (approval is required for their use).

The removed weeds should be landfilled and buried, where possible, to prevent odor and insect problems.

Insect Control: Flies and mosquitoes create the most common insect problems in sewage disposal facility. Most mosquitoes breed in sheltered, calm water containing vegetation and floating materials to which the female can attach the eggs. The egg clusters are fragile and easily damaged by turbulent action caused by wind currents. Poor weed control and the accumulation of a scum layer will make insect problems worse. Puddles of water outside the lagoon will also harbour insects. Berm maintenance and the filling of potholes and puddles will reduce the opportunity for insect reproduction. In some cases, the use of insecticides may be necessary. Approval of the insecticide and the application procedure should be obtained through the supervisor.

Removal of Floating Materials: The floating materials must be removed on regular basis and whenever the weather conditions are favourable. This material should be disposed of at the landfill.

3.6 Fencing and Signs

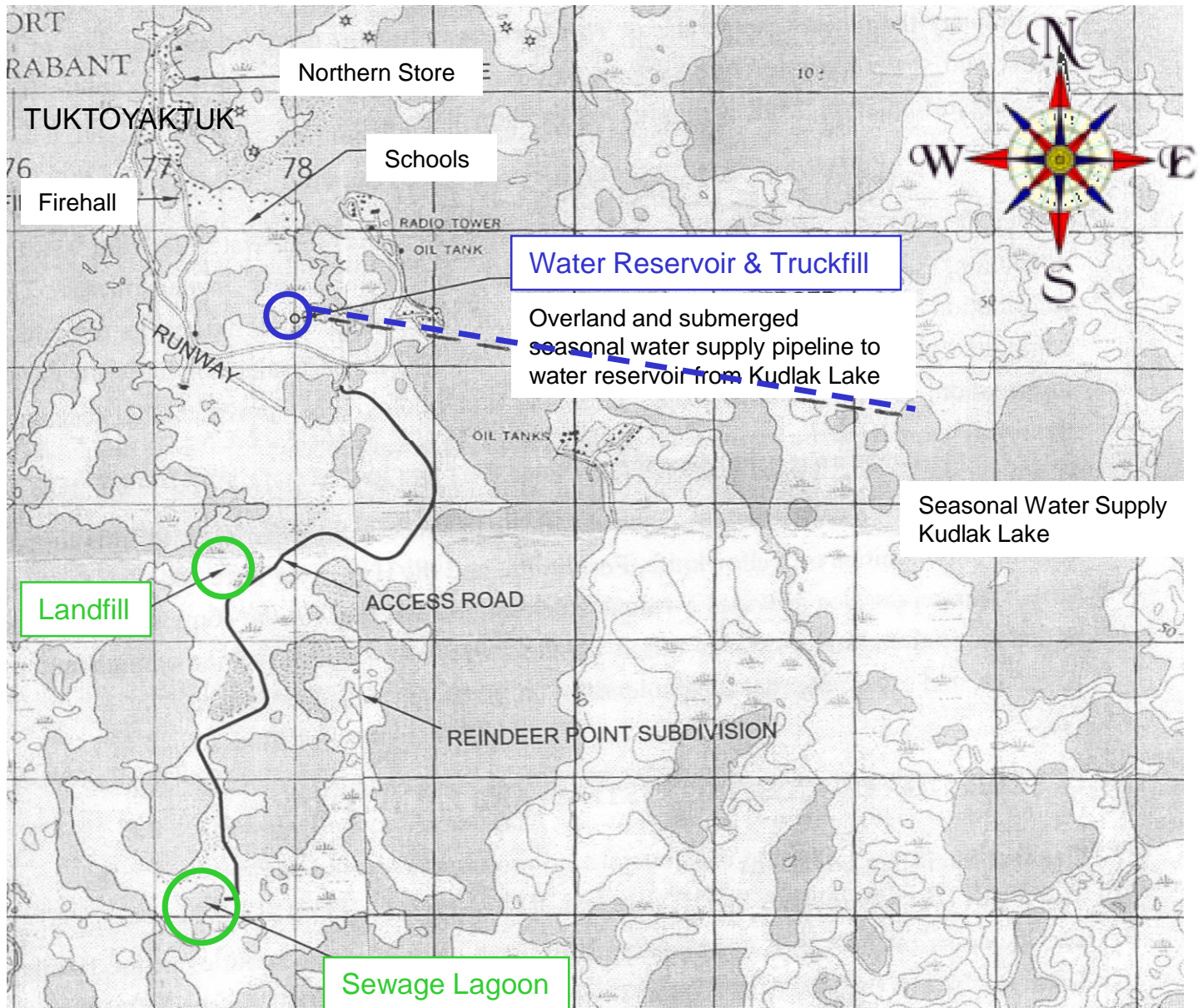
Bilingual warning signs are normally installed at regular intervals around the lagoon. Lost or damaged signs should be replaced.

3.7 Maintenance of Access Road

The access road was designed to be an all-weather road. Maintenance takes three basic forms: road shaping and smoothing, roadway filling, and snow removal. These activities follow normal community procedures.

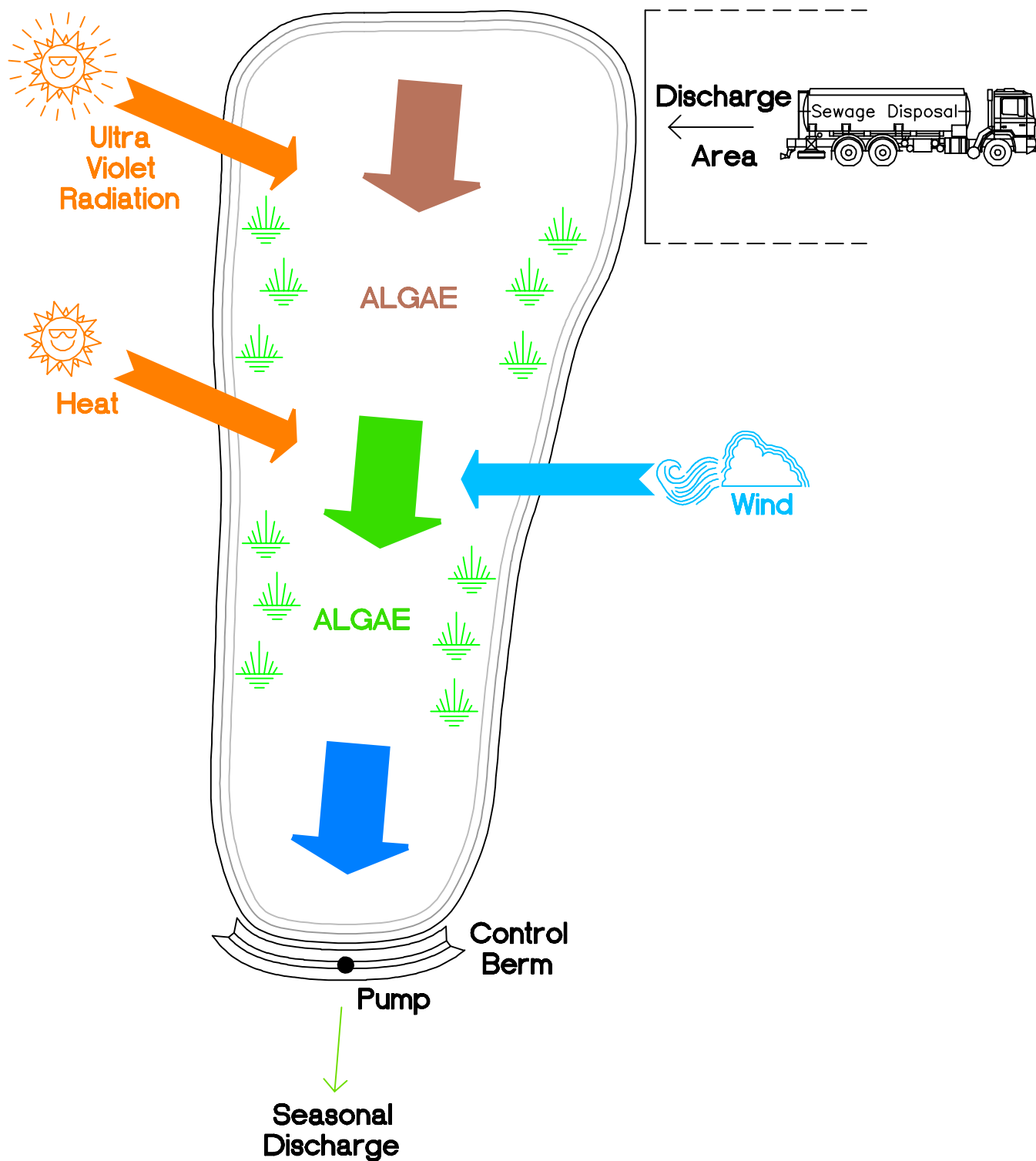
3.8 Surface Runoff Management

Drainage ditches and culverts near the sewage disposal facility should be checked, particularly in the early spring, to ensure that they are not blocked by ice. Any blockages should be cleared immediately to avoid surface runoff from entering the lagoon.



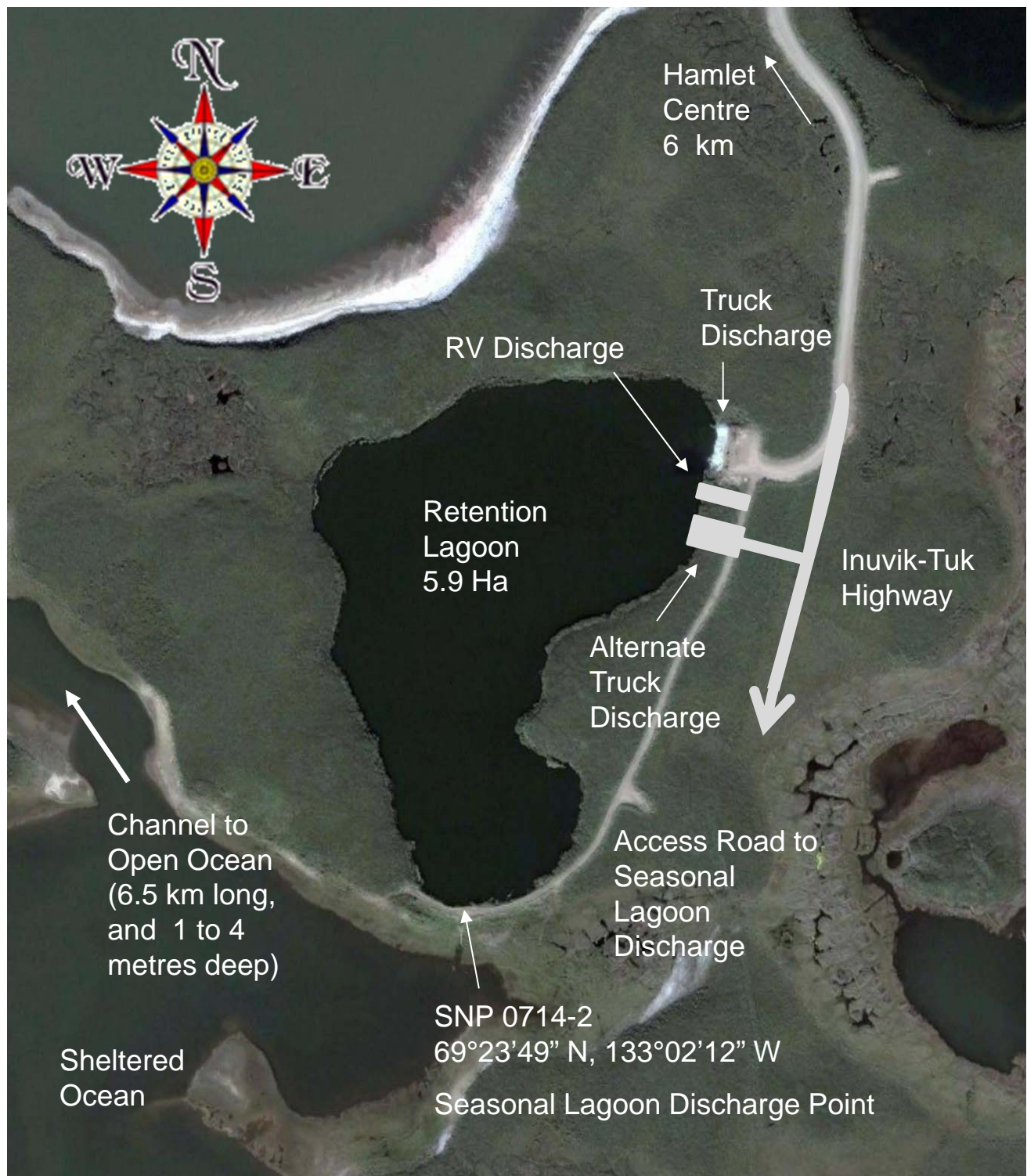
Hamlet of Tuktoyaktuk Sewage Treatment Operation and Maintenance

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Date: SEPTEMBER 30, 2005

Hamlet of Tuktoyaktuk, N.W.T.
Sewage Lagoon Operation and Maintenance Manual
SEWAGE TREATMENT SCHEMATIC



Base Image from GoogleEarthPro, © 2009 DigitalGlobe

Hamlet of Tuktoyaktuk Sewage Treatment Waste Operation and Maintenance

Figure 3. Facility Organization



Note: Inlet structure in this photo is being replaced in 2018.
See Appendix A for drawings of new inlet structures.



Hamlet of Tuktoyaktuk
Sewage Treatment Waste Operation and
Maintenance

AECOM

2005-09-28, revised 2018-09-20

Figure 4. Facility Components

Outlet of pumped
lagoon seasonal
discharge into ocean.



Photo Courtesy of IEG



Pumping system for seasonal
discharge into ocean.

Inlet of pumped lagoon
seasonal discharge into
ocean.



Hamlet of Tuktoyaktuk Sewage Treatment Waste Operation and Maintenance

Appendix A

Sample Record Keeping Documentation

Tuktoyaktuk Landfill Record Keeping

Daily Operation Observations for Month of _____, 20____.

Day	Lagoon Normal	Lagoon Not Normal	Observations	Action(s) required/taken if problems observed
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
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21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				

Weekly Inspections for Month of _____, 20____.

Week	Truck Discharge	Water Level	Berm	Water Colour	Observations
1					
2					
3					
4					
5					

Mark with a checkmark to confirm inspection.

Appendix B

Lagoon Rehabilitation Drawings

Issued for Construction 2018-08-20

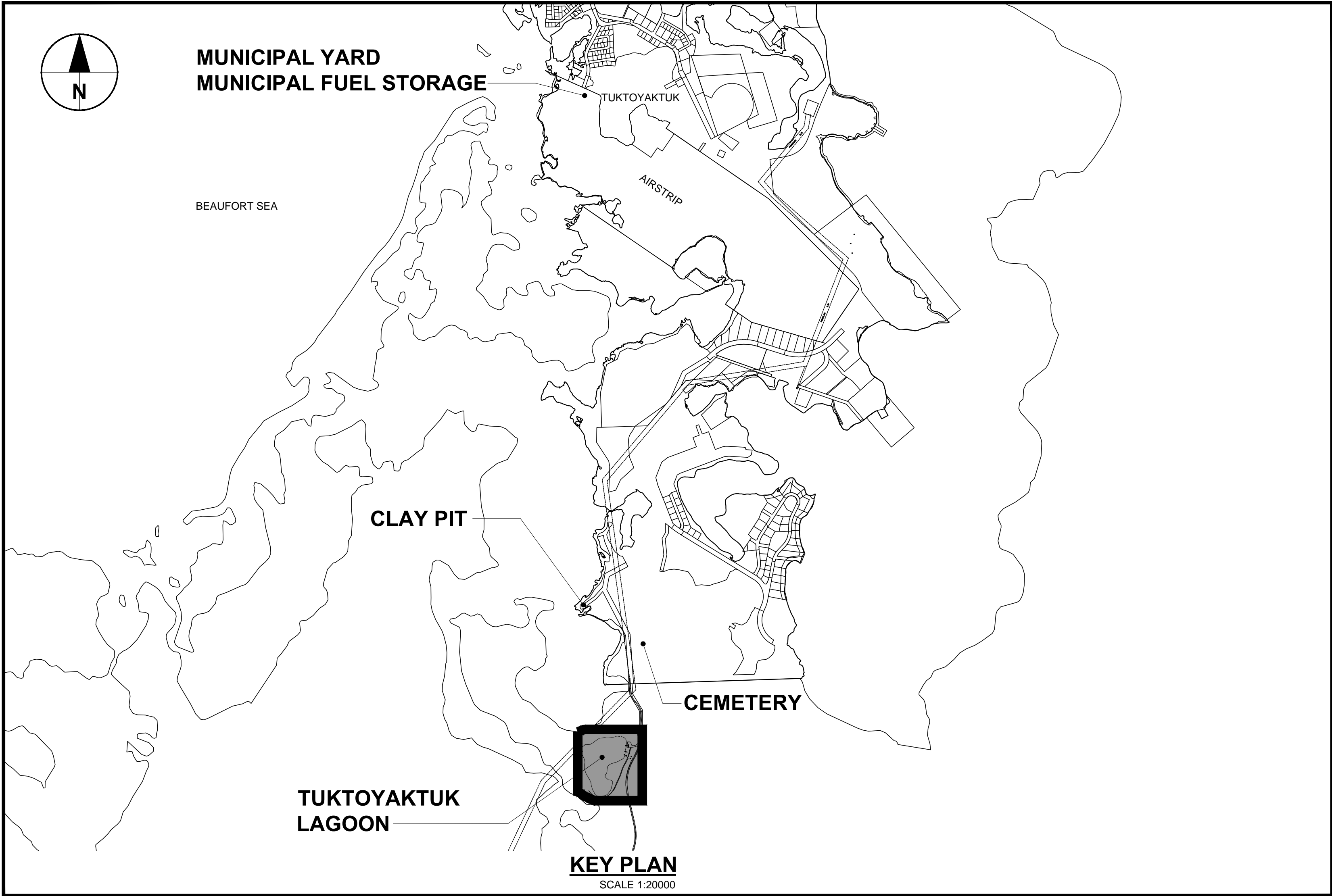
HAMLET OF TUKTOYAKTUK

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60568807

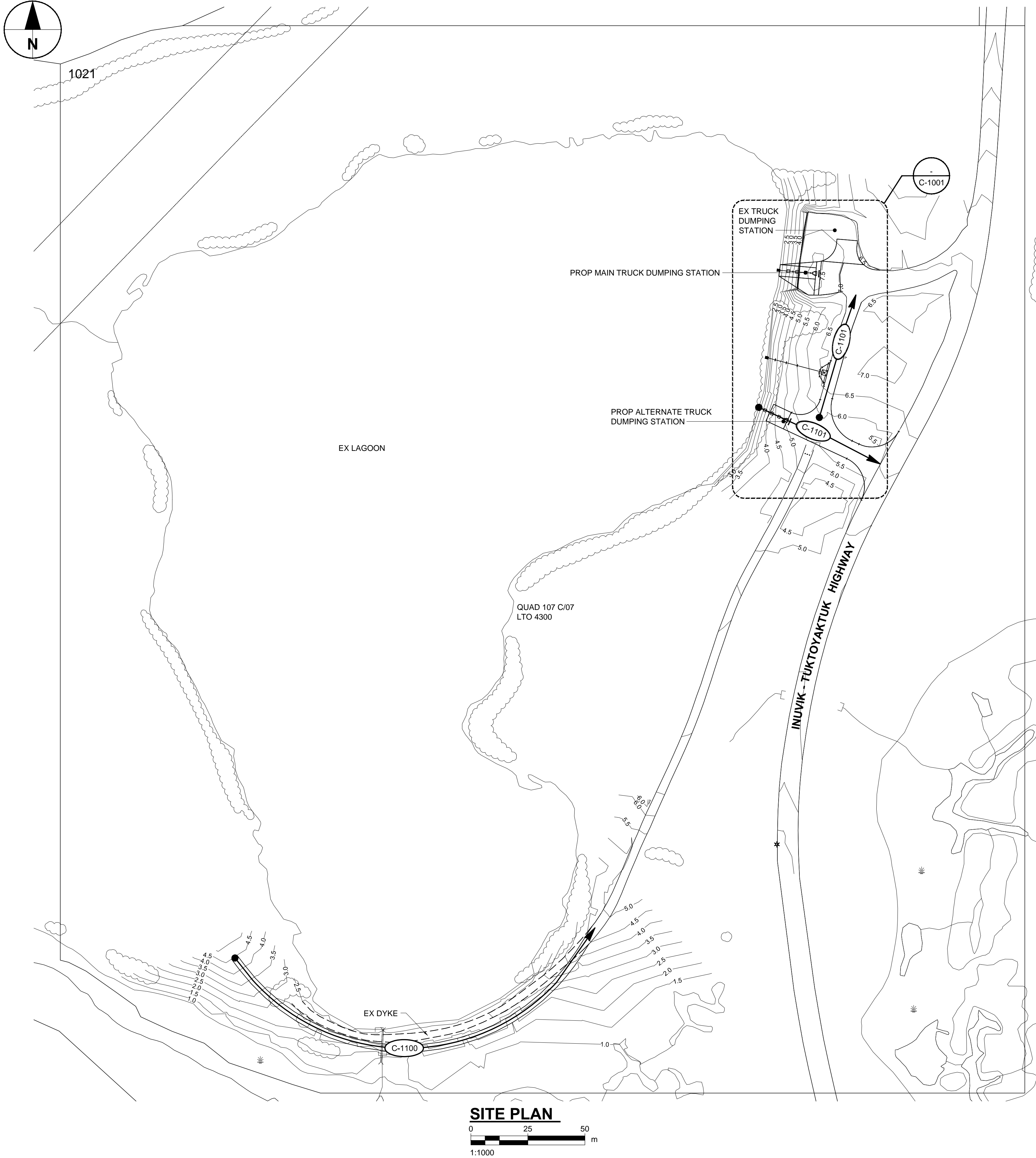
DRAWING LIST

SHEET NUMBER		DRAWING NAME
C-0000	Rev 1	COVER SHEET AND DRAWING LIST
C-1000	Rev 1	OVERALL PLAN - INDEX AND TOPOGRAPHY
C-1001	Rev 1	SITE PLAN
C-1100	Rev 1	PLAN AND PROFILE - DYKE - STATION 1+000 TO 1+200
C-1101	Rev 1	PLAN AND PROFILE - ACCESS ROAD AND RV DUMP STATION ACCESS
C-3000	Rev 1	SECTIONS (SHEET 1 OF 2)
C-3001	Rev 1	SECTIONS (SHEET 2 OF 2)
C-4000	Rev 1	DETAILS
C-4001	Rev 1	SEWAGE LAGOON DUMPING CHUTE DETAILS



HAMLET OF TUKTOYAKTUK
LAGOON REHABILITATION

2018-08-20
ISSUED FOR CONSTRUCTION



GENERAL NOTES:

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. CONTOURS DERIVED FROM DEC 2016 SURVEY AND ARE SHOWN IN 0.5 m INTERVALS.
3. ALL ELEVATIONS TO FINISHED GRADE UNLESS INDICATED OTHERWISE.

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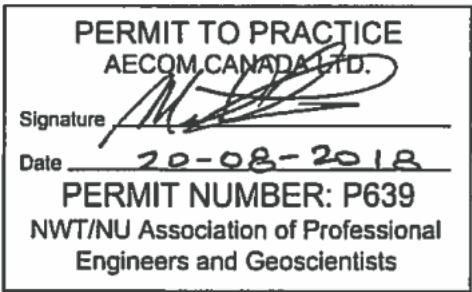
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1	2018-08-20	Issued For Construction
0	2018-06-22	Issued For Tender
I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER

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SHEET TITLE

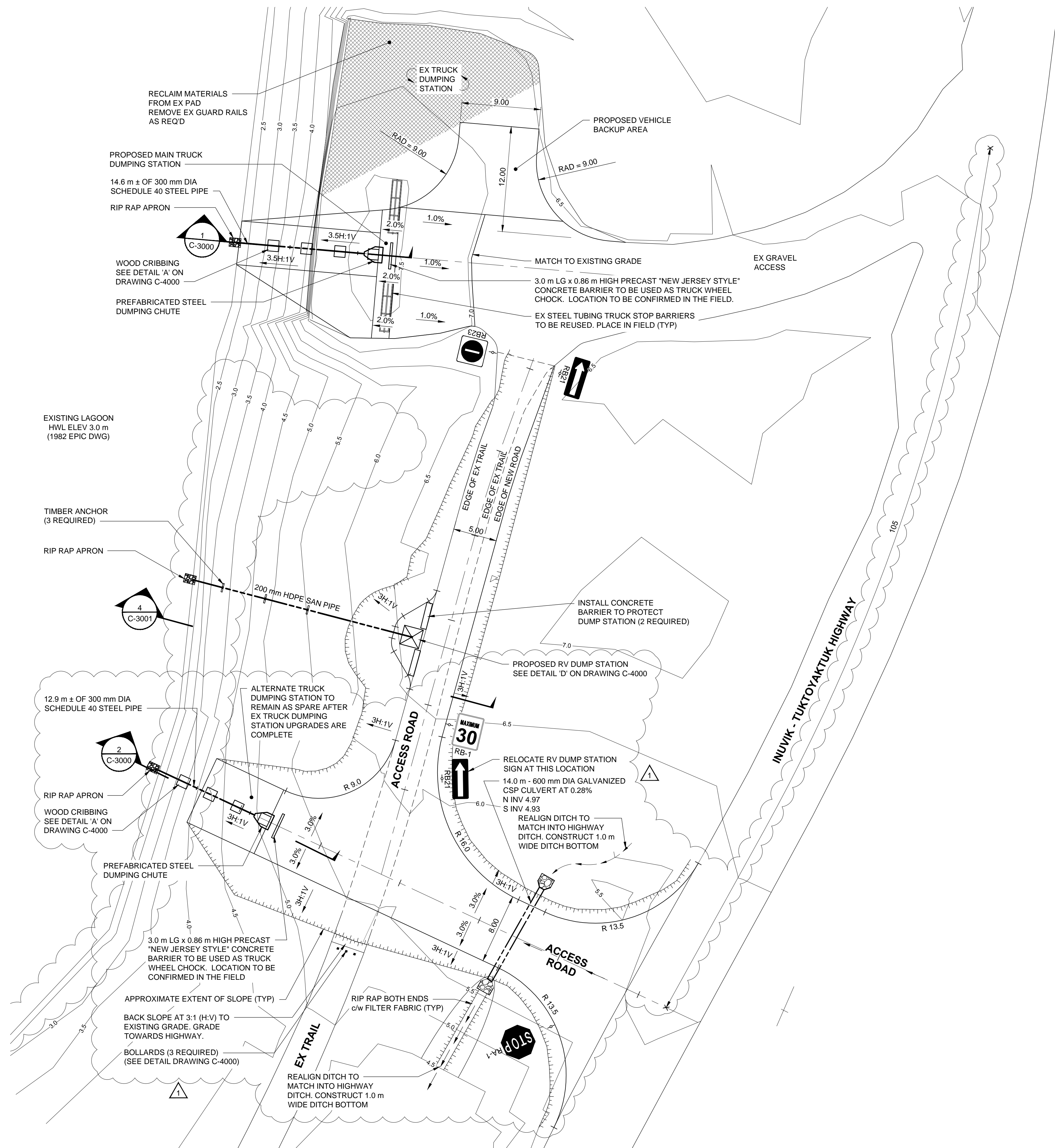
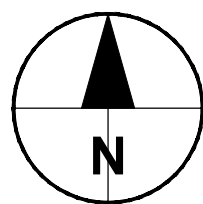
OVERALL PLAN
INDEX AND TOPOGRAPHY

SHEET NUMBER

C-1000

Rev 1

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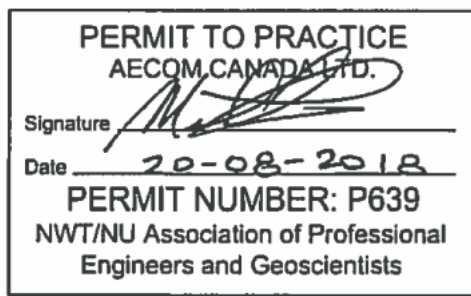
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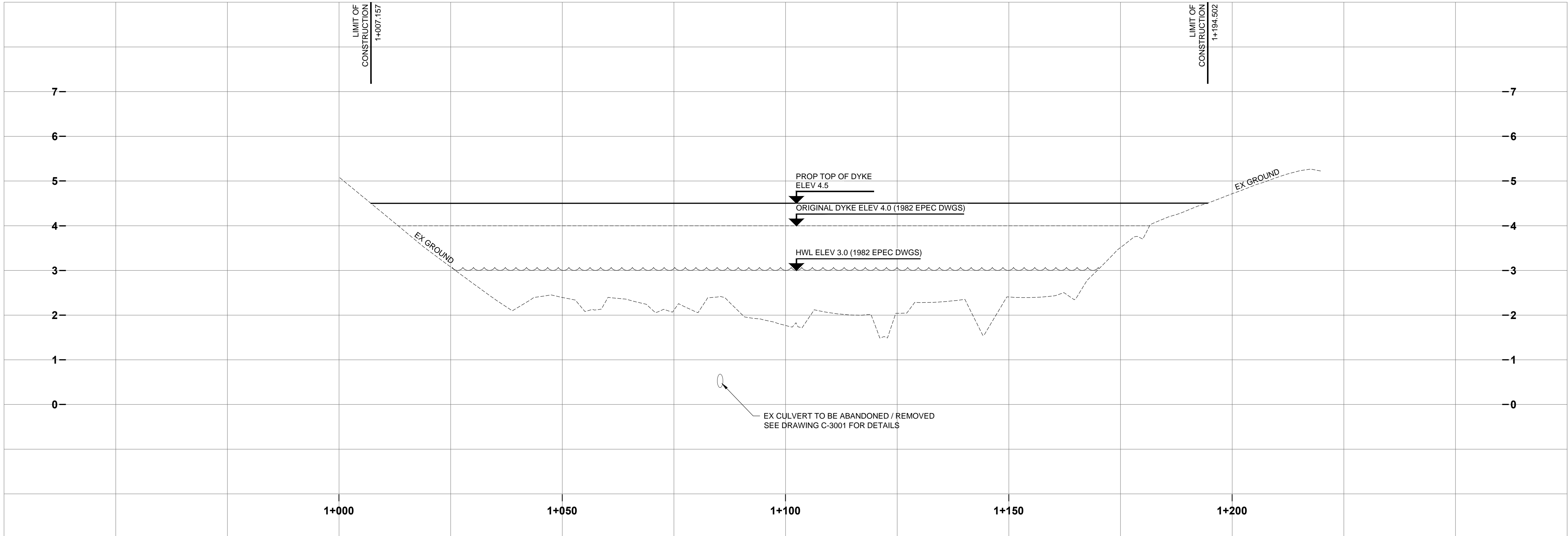
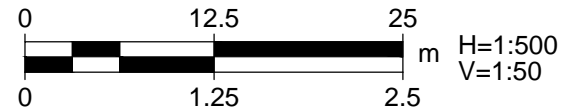
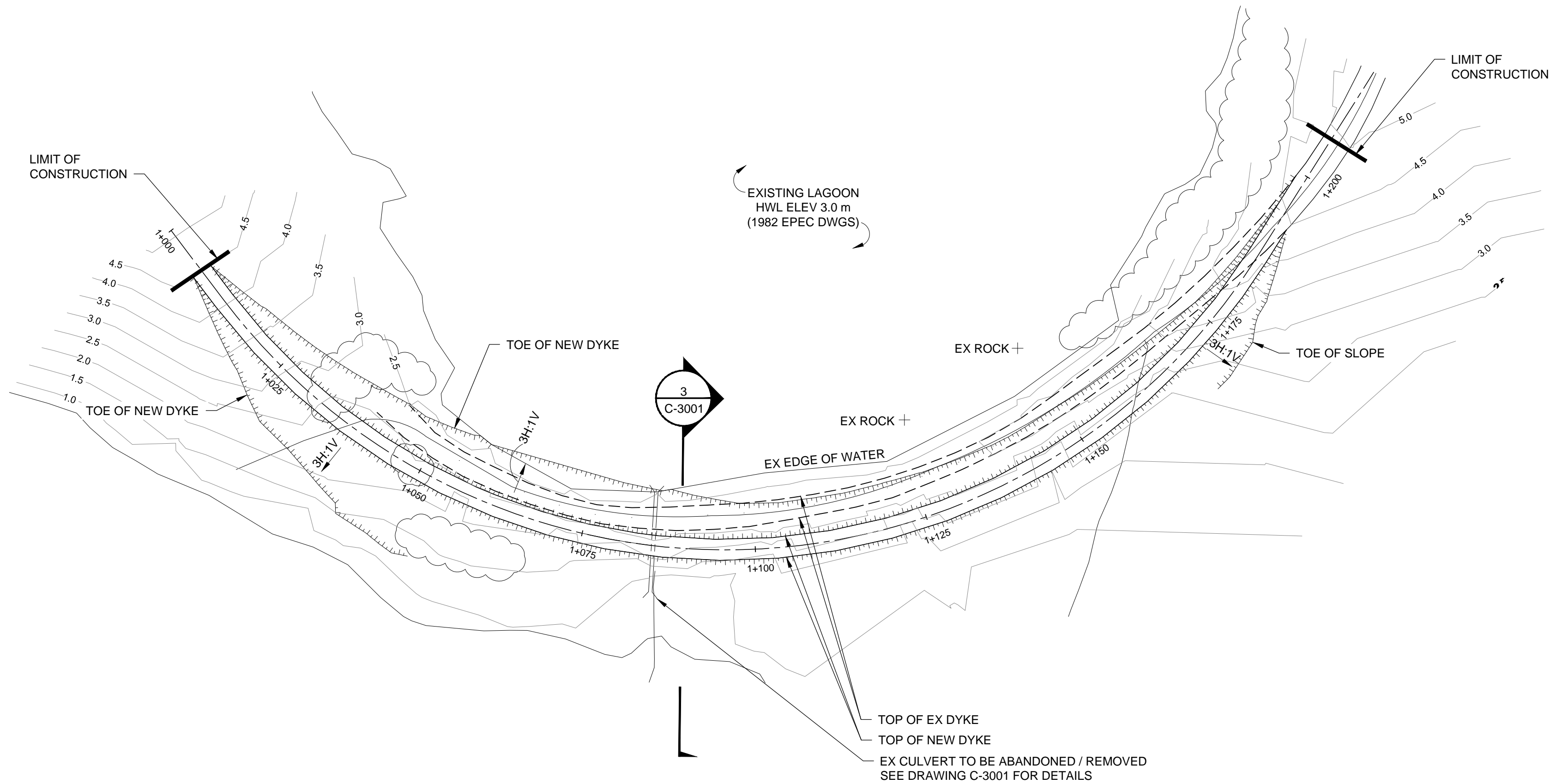
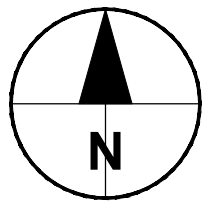
SITE PLAN

SHEET NUMBER

C-1001

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PROJECT

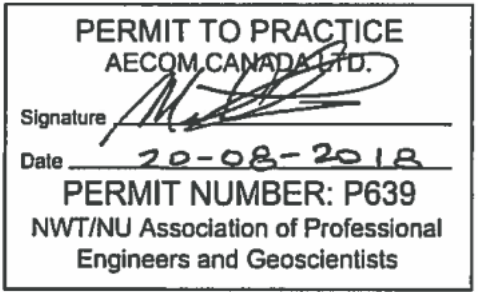
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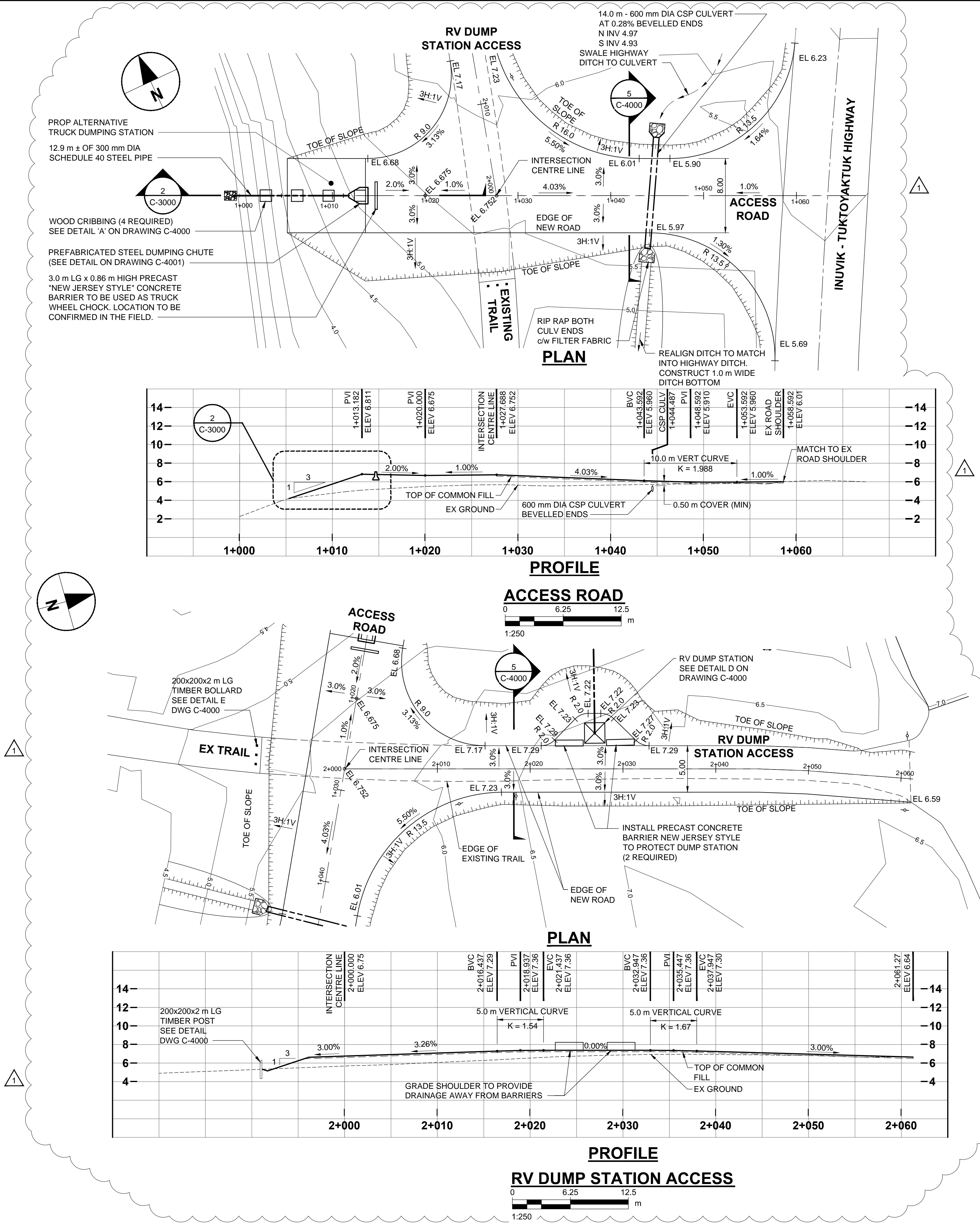
PLAN AND PROFILE
DYKE
STATION 1+000 TO 1+200

SHEET NUMBER

C-1100

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- ALL ELEVATIONS TO FINISHED GRADE UNLESS INDICATED OTHERWISE.
- ALL DIMENSIONS SHOWN THUS XXX: SHALL REQUIRE CONSULTANT APPROVAL.
- ALL SIDE SLOPES SHALL BE 3:1 UNLESS INDICATED OTHERWISE.

CONSTRUCTION NOTES:

- ALL FASTENING BOLTS, WASHERS AND NUTS SHALL BE 304 STAINLESS STEEL OR APPROVED EQUAL.
- ALL ANCHOR BOLTS SHALL BE HEX HEAD TYPE. BOLTS AND WASHERS SHALL BE ZINC PLATED.

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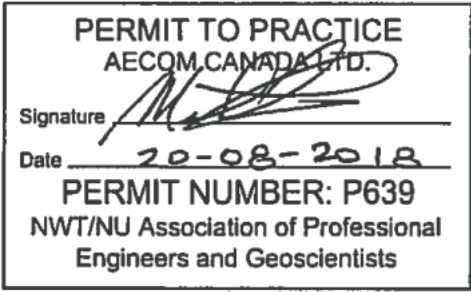
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SHEET TITLE

PLAN AND PROFILE
ACCESS ROAD AND
RV DUMP STATION ACCESS

SHEET NUMBER

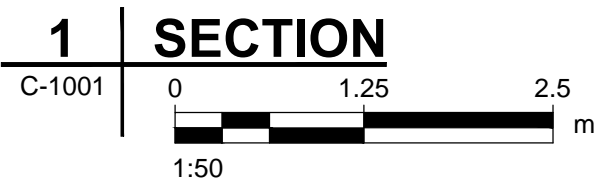
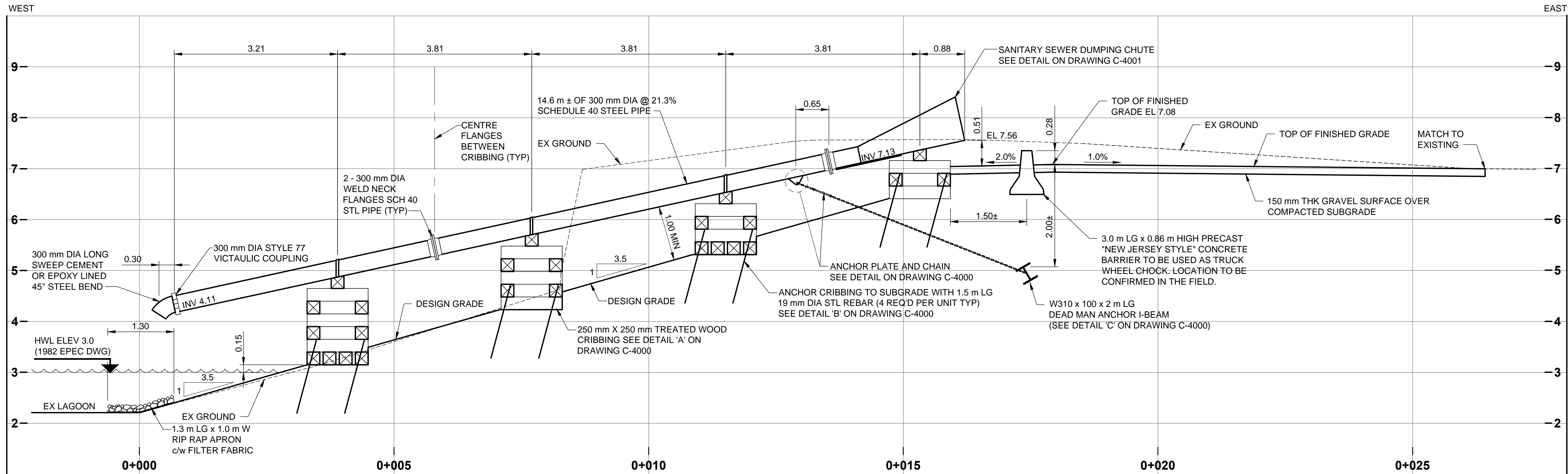
C-1101

Rev 1

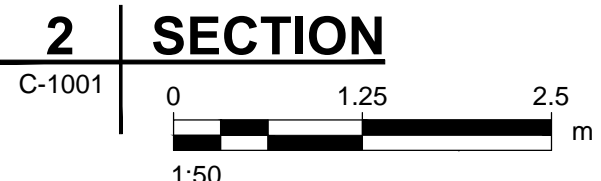
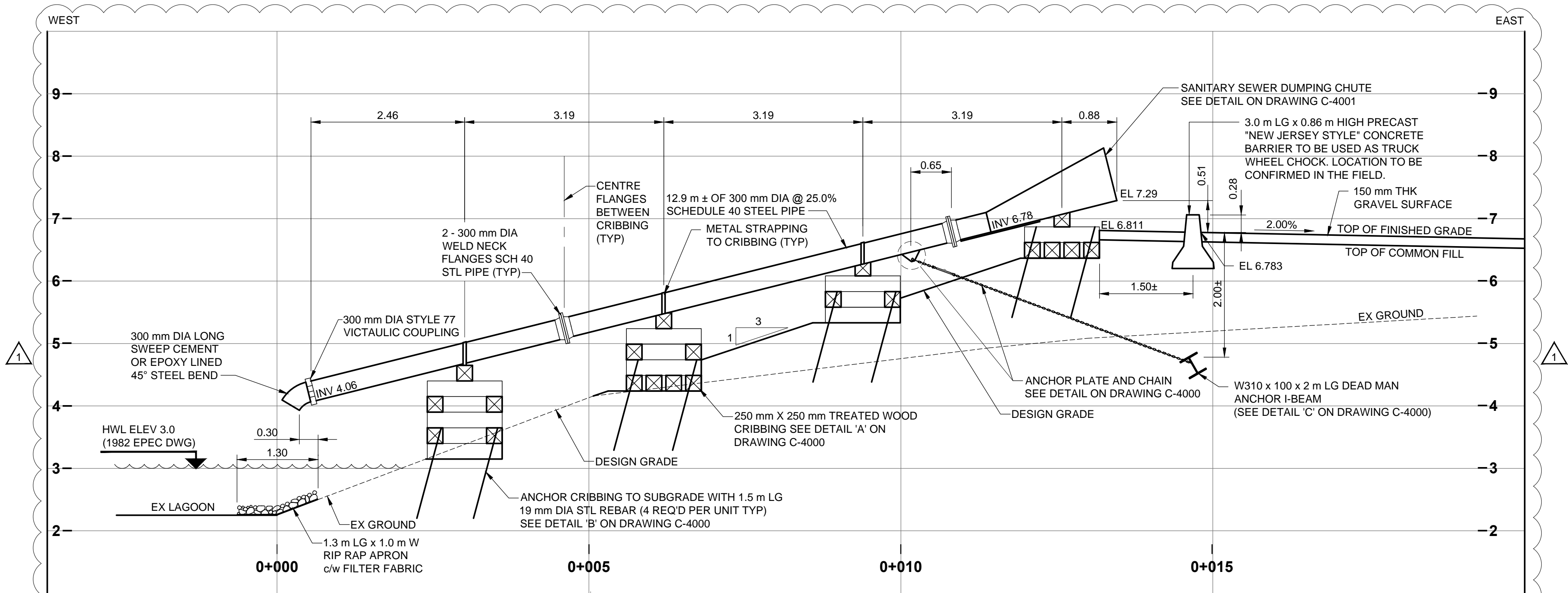
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MAIN DUMPING STATION



ALTERNATE DUMPING STATION



PROJECT

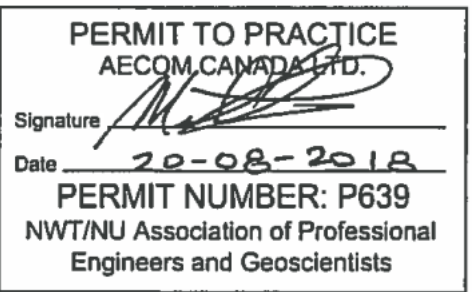
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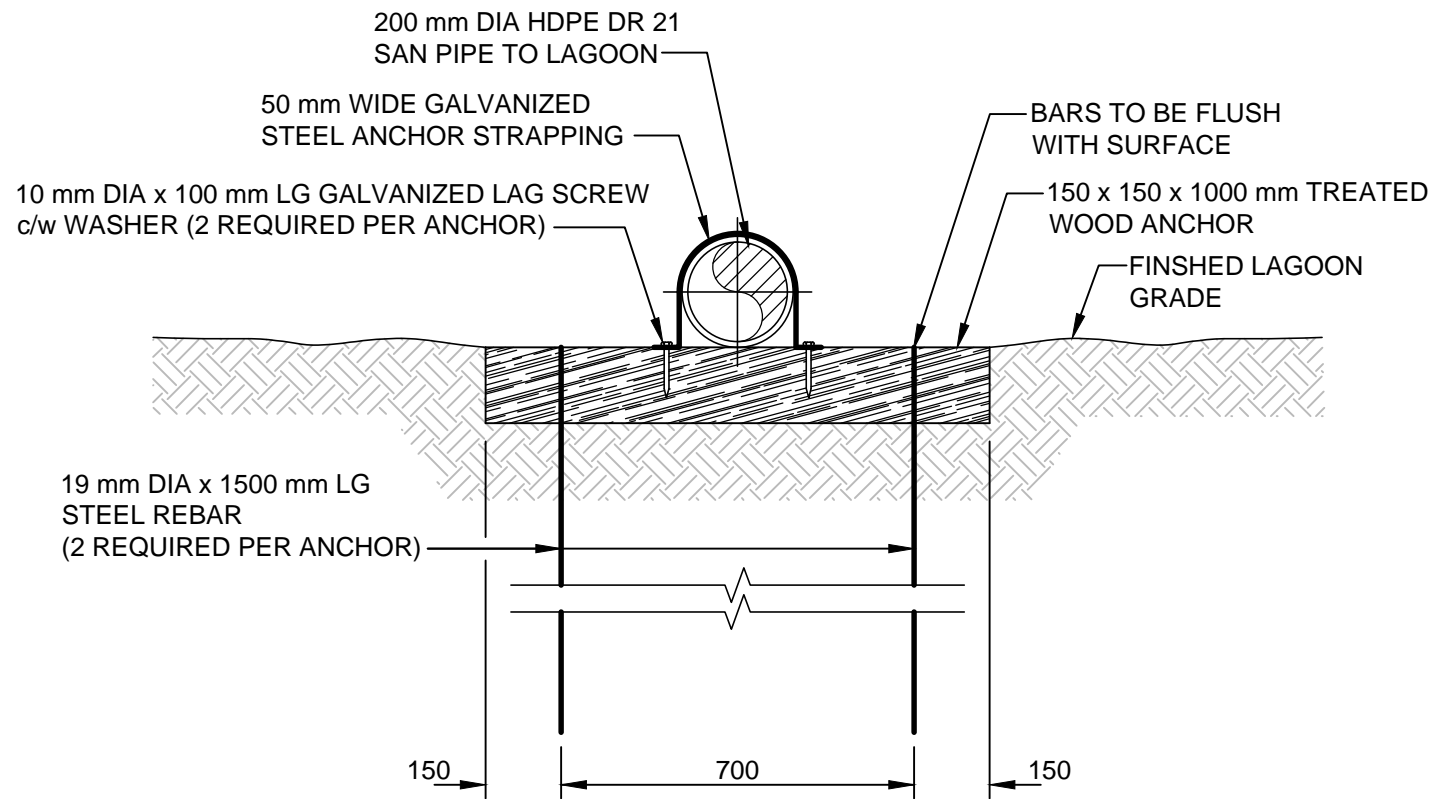
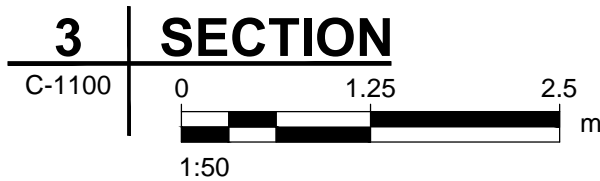
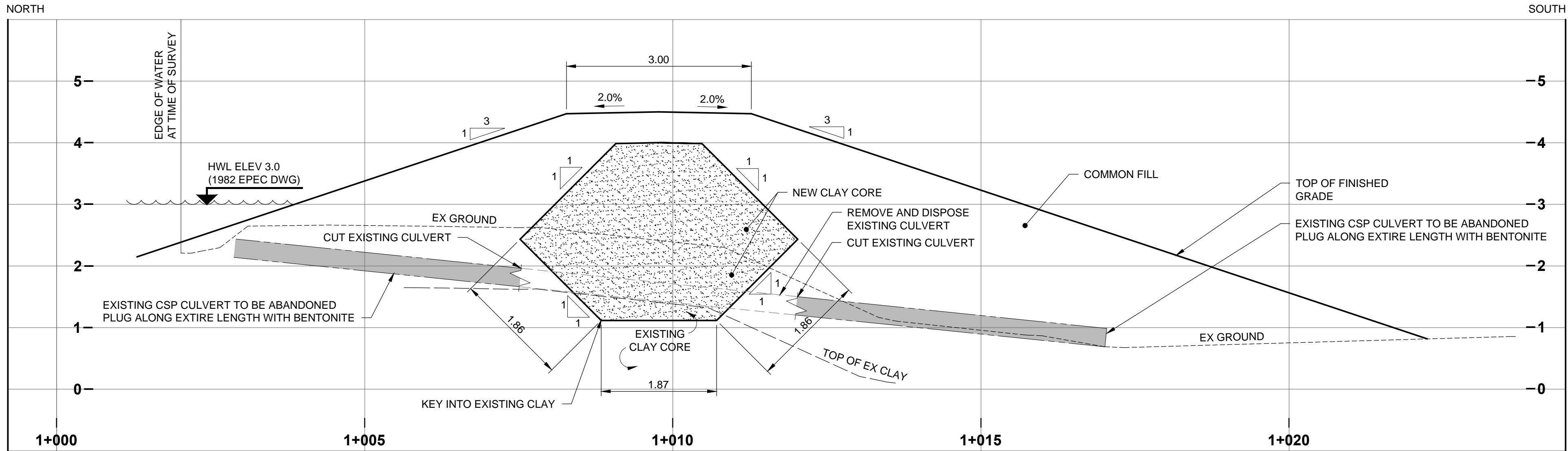
SECTIONS
(SHEET 1 OF 2)

SHEET NUMBER

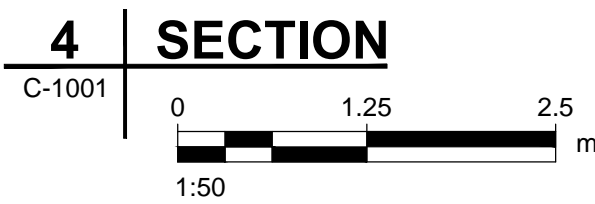
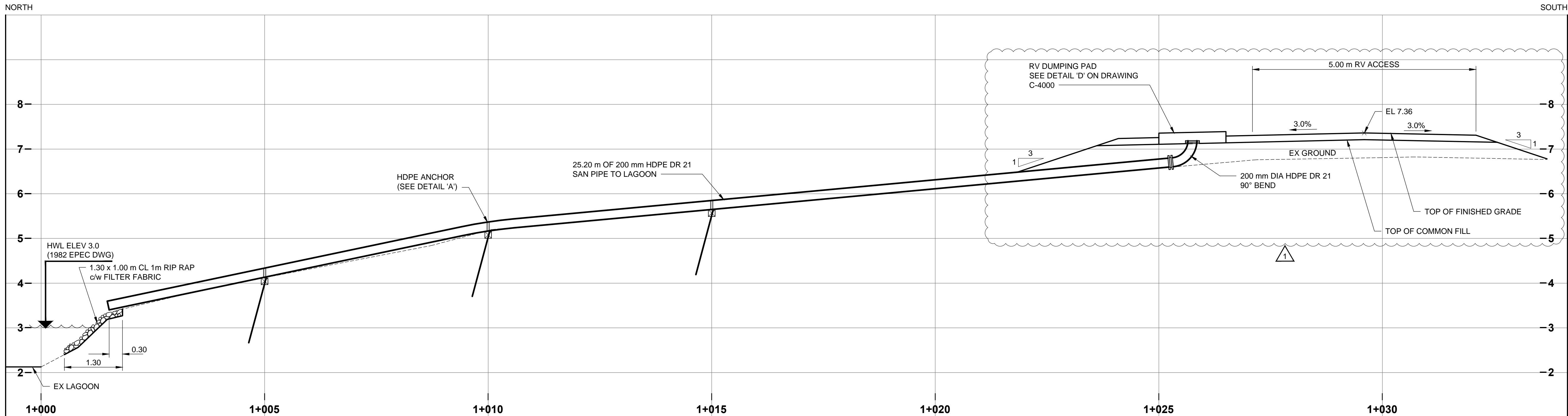
C-3000

Rev 1

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A | HDPE ANCHOR DETAIL
SCALE 1:15



GENERAL NOTES:

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CONSTRUCTION NOTES:

- RIP RAP SHALL BE CLASS 1m ROCK MATERIAL OR BAGGED.
 - 1.1 - NOMINAL MASS 7 Kg
 - 1.2 - NOMINAL DIAMETER 175 mm
 - 1.3 - MASS / SIZE (Kg / mm) DISTRIBUTION

NONE GREATER THAN	40 / 300
20% - 50%	10 / 200
50% - 80%	7 / 175
100% GREATER THAN	3 / 125

 - 1.4 MINIMUM DURABILITY UNDER: 52
- BAGGED RIP RAP (ABOVE HWL)
 - 2.1 - 370 mm x 685 mm x 285 mm BURLAP WITH APPROXIMATE CAPACITY OF 0.30 cu.m
 - 2.2 - CEMENT: TYPE MS
 - 2.3 - BURLAP BAGS FILLED TO 70% CAPACITY.
 - 2.4 - SECURELY SOW OR STAPLE TO FORM STRAIGHT EDGE CLOSURE.
 - 2.5 - BAGS TO BE OF SURFACE STRAIGHT TO PERMIT LIFTING BY THE TOP CORNER WHEN FILLED.
 - 2.6 - PREPARE BASE AND PLACE NON-WOVEN FILTER FABRIC.
 - 2.7 - UTILIZE STAGGERED PATTERN BETWEEN ROWS.
 - 2.8 - KEEP SACKS MOIST FOR 24 HOURS AFTER PLACEMENT.
- FILTER FABRIC SHALL BE NON-WOVEN AMECO 4551 OR APPROVED EQUAL.

WOOD CRIBBING CONNECTION:

- PRE-DRILL WOOD TIMBERS TO ACCEPT 19 mm ANCHOR BOLTS TO MANUFACTURER'S RECOMMENDATIONS.
- EVENLY STAGGER HOLE PATTERNS.
- INSTALL 19 mm x 600 mm GALVANIZED LAG BOLTS c/w 19 mm GALVANIZED OGEE STYLE WASHER.
LAG BOLT SHANK TO EXTEND FOR THE COMPLETE DEPTH OF THE TOP TIMBER SECTION.
- COUNTER SINK DRILL HOLE TO SO THE BOLT HEAD AND WASHER WILL BE FLUSH WITH THE WOOD SURFACE.
- PAINT ALL EXPOSED SURFACES WITH WOOD PRESERVATIVE.

WOOD CRIBBING STRUCTURE ANCHORING:

- PRE-DRILL WOOD TIMBER BASE AT FOUR LOCATIONS AS INDICATED ON THE DRAWINGS.
- INSTALL 19M REBAR TO THE MINIMUM DEPTH OF 1.5 METRES OR TO REFUSAL, WHICHEVER IS GREATER.
- REBAR EXTENSION ABOVE WOOD BASE TO BE 250 mm.

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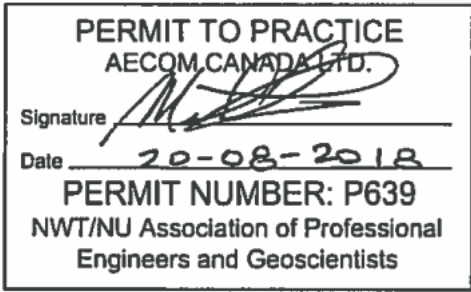
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SHEET TITLE

SECTIONS
(SHEET 2 OF 2)

SHEET NUMBER

C-3001

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