Request IR-1:

The application notes the following related CIs pursuant to Section 11.2 of the Capital Expenditure Justification Criteria (CEJC):

- **2023 C0052498 POA - Ash Cell Capping 2023 - $3,698,493**
- **2026 TBD POA Ash Cell Capping 2026 - $2,420,000**
- **2027 TBD POA Ash Cell Capping 2027 - $TBD**

(a) Please provide a status of C0052498.

(b) Please provide a list of all active cells that require capping within the next five years, along with their current elevation limits and the estimated elevation limits projected until the Point Aconi (PA) unit's planned retirement in 2029/2030.

Response IR-1:

(a) C0052498 – POA Ash Cell Capping 2023 is complete.

(b) As of the current assessment, Cell 5 is the only active cell at the Point Aconi Residue Management Site (RMS) that will require capping within the next five years. The cell is actively receiving ash and based on survey data from March 2025, has approximately 500,000 m^3 of remaining capacity. However, the Point Aconi generation station is projected to produce 800,000 m^3 of ash by its planned retirement in 2029/2030, confirming that Cell 5 will exceed its capacity by approximately 300,000 m^3. Cell 5 is designed to reach a final elevation of 41.00 meters above sea level, with 1.00 meter reserved for permanent capping materials, resulting in an operational fill limit of 40.00 meters.

In addition to Cell 5, two inactive cells Cell 1 and Cell 4 will also require capping within the next five years. Cell 1 is currently under temporary capping and will require permanent

capping to meet closure requirements. Similarly, Cell 4 is identified on the general site layout as having a temporary cap, indicating that it too will require permanent closure measures within the same timeframe. These inactive cells are not expected to receive additional material and are not projected to change in elevation.

Request IR-2:

Please provide a copy of the PA Generating Station's approved industrial permit issued by the NS Department of Environment and Climate Change (Department).

Response IR-2:

Please refer to Attachment 1 for the approved industrial permit for the Point Aconi Generating Station, issued under Approval No. 2007-058666-07, effective June 27, 2025, and expiring June 30, 2026. This permit was issued pursuant to Part V of the *Environment Act*, S.N.S. 1994–95, c.1, s.1, and outlines the terms and conditions governing the operation, monitoring, and closure of the facility, including ash disposal and capping requirements.

NOVA SCOTIA

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APPROVAL

Province of Nova Scotia
Environment Act, S.N.S. 1994-95, c.1 s.1

APPROVAL HOLDER: NOVA SCOTIA POWER INCORPORATED

SITE PID: 15298243, 15301369, 15301393, 15302359, 15495195, 15513997, 15621097, 15621105, 15621113, 15621121, 15621139, 15634413, 15634421, 15866775, 15866783, 85076792

APPROVAL NO: 2007-058666-07

EXPIRY DATE: June 30, 2026

Pursuant to Part V of the Environment Act, S.N.S. 1994-95, c.1 s.1 as amended from time to time, approval is granted to the Approval Holder subject to the Terms and Conditions attached to and forming part of this Approval, for the following activity:

Industrial - Power Plant

Administrator: Malcolm MacNeil

Effective Date: June 27, 2025

The Minister's powers and responsibilities under the Act with respect to this Approval have been delegated to the Administrator named above. Therefore, any information or notifications required to be provided to the Minister under this Approval can be provided to the Administrator unless otherwise advised in writing.

TERMS AND CONDITIONS OF APPROVAL

Nova Scotia Department of Environment and Climate Change

Approval Holder: NOVA SCOTIA POWER INCORPORATED

Project: Point Aconi Generating Station

Site:

PID	Civic #	Street Name	Street Type	Community	County
15298243	1149	POINT ACONI	RD.	POINT ACONI	CAPE BRETON COUNTY
15301369					
15301393	1800	PRINCE MINE	RD.	POINT ACONI	CAPE BRETON COUNTY
15302359					
15495195	211	POINT ACONI	RD.	MILL CREEK	CAPE BRETON COUNTY
15513997					
15621097					
15621105					
15621113	1799	PRINCE MINE	RD.	POINT ACONI	CAPE BRETON COUNTY
15621121					
15621139					
15634413					
15634421					
15866775					
15866783					
85076792	80	STEPHENSON	LANE	BLACK ROCK	VICTORIA COUNTY

Approval No: 2007-058666-07

File No: 92100-30-SYD-2007-058666

Reference Documents

- Application submitted June 1, 2023 and attachments.
- Contents of NSE file no. 92100-30-[...]-2007-058666, all volumes.

- Additional Reference Documents as indicated in Appendix C of this Approval.
- Application submitted August 2, 2023 and attachments.

1. Definitions

a. Act means Environment Act. 1994-95, c.1, s.1, and includes, unless the context otherwise requires, the regulations made pursuant to the Act, as amended from time to time.

b. Administrator means a person appointed by the Minister for the purpose of this Act, and includes an acting administrator.

c. Approval means an Approval issued pursuant to this Act with respect to an activity.

d. Approval Holder(s) means Nova Scotia Power Incorporated (NSPI).

e. Continuous Emission Monitoring System (CEMS) means the total equipment required to sample, condition, analyze or measure and provide a permanent record of emissions or process parameters.

f. Coal Combustion Products (CCP) means either fly ash, bottom ash, or a blend of fly ash and bottom ash, produced at the Point Aconi Generating Station.

g. Dam means a barrier constructed for the retention of water, water containing any other substance, fluid waste, or tailings as defined by the Canadian Dam Association.

h. Department means the Nova Scotia Department of Environment and Climate Change, and the contact for the Department for this approval is:
Nova Scotia Department of Environment and Climate Change
Eastern Region, Sydney Office
1030 Upper Prince Street, Suite 2
Sydney, Nova Scotia B1P 5P6

Phone: (902) 563-2100
Fax: (902) 563-2387

i. Grab sample means an individual sample collected in less than thirty (30) minutes and which is representative of the substance sampled.

j. Industrial Effluent Treatment System means the industrial wastewater treatment plant and associated retention ponds, open channels or piping for directing flow to or from the industrial wastewater treatment plant.

k. Letter of Authorization means a letter, signed by an Administrator, granting permission to the Approval Holder to conduct a specific action or utilize a specific method, document or plan.

l. Minister means the Minister of Environment and Climate Change and includes any person delegated the authority of the Minister.

m. Net Energy Output means gross energy output minus unit service power requirements.

n. Opacity means the degree to which visible emissions obstruct the passage of light.

o. Relative Accuracy means the absolute mean difference between a series of concurrent measurements made by a continuous emission and monitoring system and an appropriate reference method plus the 2.5% error confidence internal coefficient, divided by the mean of the reference method measurements.

p. Routine Maintenance means work planned and performed on a routine basis to maintain and preserve the condition of the boiler units and associated pollution control equipment.

q. Sewage Treatment System means the lift station, primary and secondary sewage lagoons, chlorine contact chamber, and piping associated with directing flow to/from each component of the system.

r. Shut-down means the planned cessation of fossil fuel combustion at an electrical generating unit resulting in an inoperative state and no power generation for at least one (1) or more hours.

s. Site means the place where the designated activity and/or undertaking is occurring or may occur.

t. Site Professional has the same meaning as defined in the Contaminated Sites Regulations.

u. Source Testing Event means a phase of performance testing undertaken to determine the concentration and/or emission rate of air contaminants being released from the source to the atmosphere. The testing activities involve the site set-up and the actual testing. For each source the test consists of a preliminary survey, and at least three (3) repetitions of appropriate source testing methodologies.

v. Sponge Ball means natural biodegradable rubber ball, manufactured by Taprogge.

w. Start-up means the initiation of fossil fuel combustion at an electrical generating unit following one (1) or more hours of non-operation (i.e. no combustion).

x. Total Residual Chlorine (TRC) means the sum of free chlorine and combined chlorine, including inorganic chloramines.

y. Unit 1 for the purpose of this Approval, means the main generator and boiler combination at the Power Plant used to generate electricity.

z. 720 hour rolling average means for each air pollutant, the average of the consecutive hourly mean emission rates, determined for the preceding 720 hours of facility operation. Intervals of time where the emission rate is at or near zero, when the facility is not in operation, are not to be included in the calculation of rolling averages.

2. Scope

a. This Approval (the "Approval") relates to Nova Scotia Power Incorporated (the Approval Holder(s)) and their application and all documentation submitted to the Department prior to the issuance of this approval for the construction, operation and reclamation of a power plant situated at or near 1800 Prince Mine Road, Point Aconi, Cape Breton Regional Municipality in the Province of Nova (the "Site").

b. The Site shall not extend beyond the area as outlined in the application and supporting documentation.

3. General

a. The Approval Holder(s) shall conduct the activity in accordance with the Act and any standard adopted by the Department, as amended from time to time, to which this approval applies.

b. Nothing in this Approval relieves the Approval Holder(s) of the responsibility for obtaining and paying for all licenses, permits, approvals or authorizations necessary for carrying out the work authorized to be performed by this Approval which may be required by municipal by-laws or provincial or federal legislation. The Minister does not warrant that such licenses, permits, approvals or other authorizations will be issued.

c. No authority is granted by this Approval to enable the Approval Holder(s) to commence or continue the Designated Activity on lands which are not in the control or ownership of the Approval Holder(s). It is the responsibility of the Approval Holder(s) to ensure that such a contravention does not occur. The Approval Holder(s) shall provide, to the Department, proof of such control or ownership upon expiry of any relevant lease or agreement. Failure to retain said authorization may result in this Approval being cancelled or suspended.

d. Any request for renewal or extension of this Approval is to be made in writing, to the Department, at least ninety (90) days prior to the Approval expiry.

e. If the Minister cancels or suspends this Approval, the Approval Holder(s) remains subject to the penalty provisions of the Act and regulations

f. The Approval Holder(s) shall notify the Department prior to any proposed extensions or modifications. An amendment to this Approval may be required before implementing any extension or modifications.

g. The Approval Holder(s) shall immediately notify the Department of any incidents of non-compliance with this Approval.

h. The Approval Holder(s) shall bear all expenses incurred in carrying out the environmental monitoring required under the terms and conditions of this Approval.

i. Unless specified otherwise in this Approval, all samples required to be collected by this Approval shall be collected, preserved and analysed, by qualified personnel, in accordance with recognized industry standards and procedures.

j. Unless written authorization is received otherwise from the Minister, all samples required by this Approval shall be analysed by a laboratory that meets the requirements of the Department's Policy on Acceptable Certification of Laboratories as amended from time to time.

k. The Approval Holder(s) shall ensure that all pollution control equipment at the Site is maintained, operated and functional to ensure compliance with the Act, Regulations made pursuant to the Act, and the Terms and Conditions of this Approval.

l. The Approval Holder(s) shall ensure that this Approval, or a copy, is kept on Site at all times and that personnel directly involved in the designated activity are made fully aware of the terms and conditions which pertain to this Approval.

m. Upon any changes to the Registry of Joint Stock Companies information, the Approval Holder(s) shall provide a copy to the Department.

n. The Approval Holder(s) shall provide one hard copy and one electronic copy of all reports to the Department within the specified time frames as required in the following terms and conditions of this Approval.

4. Sound Levels

a. Sound levels originating from the Site shall not exceed the following one-hour equivalent sound levels (Leq) at the property line of each neighboring property owner:

- 65 dBA for the 12-hour period between 07:00 & 19:00 hours daily (Daytime)

- 60 dBA for the 4-hour period between 19:00 & 23:00 hours daily (Evening)

- 55 dBA for the 8-hour period between 23:00 & 07:00 hours daily (Nighttime)

A minimum of two continuous hours of data within one of the time periods above, is required for a representative sample.

b. Monitoring of sound levels shall be conducted at the request of the Department.

c. The location of the monitoring station(s) for sound levels shall be established by a Professional Engineer licensed to practice in the Province of Nova Scotia.

d. The Approval Holder(s) shall investigate all noise complaints received in relation to Site operations as per standard procedures developed through the Complaint Response section of this Approval.

e. The Approval Holder(s) shall carry out additional investigations and/or mitigation strategies at the request of the Department, where new information becomes available.

5. Tank and Pipeline Inspections

a. The Approval Holder(s) shall develop and maintain an Assessment Program for petroleum and dangerous goods storage tanks, pipelines, and systems to verify that the Facility is compliant with provincial Regulations and Standards.

b. The Quality Processes of the Assessment Program, as identified in the Reference Documents, shall contain, but not be limited to, type of inspection, inspection processes, inspection schedule, assessment activities, preventative maintenance activities, data collection and review processes, evaluation processes, corrective action planning and applicable Regulations and Standards.

c. The Quality Processes of the Assessment Program, and revisions of, must be deemed acceptable, in writing, by the Department, prior to implementation.

d. The Approval Holder(s) shall conduct the Quality Processes, once deemed acceptable by the Department.

e. The Approval Holder(s) shall provide a copy of the Quality Processes of the Assessment Program to the Department upon request.

f. The Assessment Program shall be conducted by a Professional Engineer licenced to practice by the Association of Professional Engineers of Nova Scotia (APENS).

g. The Assessment Program records shall be maintained by the Approval Holder(s).

h. Oil/water separators (OWS) at the Site shall be inspected, cleaned, and maintained to manufacturer's specifications, at a minimum, to ensure the equipment is in good working order.

i. Records of all inspections and repairs to the OWS shall be maintained by the Approval Holder(s).

j. Process operations shall minimize the quantity of petroleum products discharged to the oil/water separators.

6. Air Quality

a. The Approval Holder(s) shall ensure the facility, together with all fossil fuel or coal fired power generating stations owned or operated by Nova Scotia Power Incorporated and affiliated companies, are operated to ensure compliance with the annual emission allocations for substances contained within the Air Quality Regulations pursuant to the Act.

b. The Approval Holder(s) shall ensure that emissions from the facility do not contribute to an exceedance of the maximum permissible ground level concentrations specified in Schedule "A" of the Air Quality Regulations.

c. The Approval Holder(s) shall demonstrate compliance with Schedule "A" of the Air Quality Regulations through an ambient air monitoring and reporting program. The ambient air monitoring and reporting program shall include, but is not limited to:

   i. Ambient Air Monitoring;

   ii. Continuous Emission Monitoring (or equivalent technology approved by the Department);

   iii. Source Testing; and

   iv. Air Dispersion Modeling.

d. The Approval Holder(s) shall conduct an Air Dispersion Modelling Study (Study) and submit the completed report to the Department by December 31, 2019. This Study shall determine the impact of air emissions of particulate matter less than 10 micrometers in diameter and less than 2.5 micrometers in diameter (PM10 and PM2.5), and the air contaminants of Schedule "A" of the Air Quality Regulations.

e. The Air Dispersion Modelling Study shall, at minimum:

   i. Provide an estimate of the maximum ground level concentrations with frequency analysis at discrete receptor locations outside the boundaries of the facility for each of the air contaminants being emitted from the facility, during routine operations under the proposed operating conditions;

   ii. Evaluate emission sources at any stationary vent, stack and storage area at the facility that releases, or has the potential to release air contaminants to the environment;

   iii. Include emission source characterization comprised of:

      (a) The identification of stack and/or vent:
      - Heights above adjacent ground level;
      - Diameters;
      - Gas exit velocities; and
      - Gas temperatures.

(b) The measured, where available, mass emission rate of the source air contaminants for each emission source identified at the facility.

iv. Include evaluation of the existing ambient air monitoring network that utilizes the results from the air quality dispersion modelling component of the Study to determine whether additional ambient monitors are required and whether existing monitors are sited in appropriate locations. The results of this evaluation shall recommend the quantity and location of ambient air quality monitoring stations required to satisfy compliance with Schedule "A" of the Air Quality Regulations. If the results of this evaluation indicate that additional monitor(s) are required, the implementation schedule for the installation of such monitor(s), shall be submitted with the Study.

v. Include an overall summary of the air dispersion model predictions, the evaluation of the ambient network, and any associated actions or mitigation measures necessary to ensure compliance with Schedule "A" of the Air Quality regulations based on this study, and where necessary, timelines for completion of such actions, subject to the review and approval of the administrator.

f. The Air Dispersion Modelling Study shall also:

i. Utilize a multi-source model that is sensitive to the terrain and building downwash effects and is acceptable to the Department;

ii. Utilize inputs of the local topography, five (5) years of hourly MM5 processed meteorological data, measured emission rates of the emission source characterization component of the Study, and discrete receptor locations within a 25 (or greater) kilometer radius of the facility;

iii. Utilize a scenario that uses actual operating data from the facility for the occasion when the highest concentration of air contaminant at ground level would occur. The operating condition that corresponds to the maximum ground level concentration may occur when the facility is at the maximum production level or running at a lower level or when the process is in transition;

iv. Provide a description of the operating conditions of the significant sources that result in the maximum ground level concentration of a contaminant;

v. Provide an estimate of the maximum ground level concentrations for the averaging periods associated with the air contaminants in Schedule "A" of the Air Quality Regulations;

vi. Provide an estimate of the three (3) year average of the annual 99th percentile of the sulphur dioxide daily maximum 1- hour average concentrations and the arithmetic average over a single calendar year of all sulphur dioxide 1-hour average concentrations;

vii. Provide an estimate of the three (3) year average of the annual 98th percentile of the fine particulate matter less than 2.5 microns (PM2.5) daily 24-hour average concentrations and the three (3) year average of the PM2.5 annual average concentrations;

viii. Provide an estimate of the three (3) year average of the annual 98th percentile of the fine particulate matter less than 2.5 microns (PM2.5) daily 24-hour average concentrations and the three (3) year average of the PM2.5 annual average concentrations;

ix. Provide a frequency distribution analysis where modelling predicts exceedances to the Maximum Permissible Ground Level Concentration of air contaminants in Schedule "A" of the Air Quality Regulations;

x. Provide mapping identifying the receptors, the location, and magnitude of ground level concentrations; and

xi. Provide a comparison of results to the concentrations of contaminants listed in Schedule "A" of the Air Quality Regulations.

g. The Approval Holder(s) shall operate ambient air quality stations and monitors at the following locations:

i. Station Name: Point Aconi Lighthouse (PID 15298243);

ii. Station Name: Mill Creek (PID 15495195);

iii. Station Name: Black Rock (PID 85076792);

iv. Station Name: Millville (PID 15302359).

h. The Approval Holder(s) shall measure the following parameters at the Point Aconi Lighthouse, Mill Creek, Black Rock, and Millville ambient air quality stations:

i. Continuous monitoring of sulphur dioxide capable of reporting 1-hour and 24- hour rolling average concentration in parts per hundred million by volume; and

ii. Meteorological data: wind speed, wind direction.

i. The Approval Holder(s) shall conduct continuous monitoring of nitrogen oxides (excluding nitrous oxide) and collectively expressed as nitrogen dioxide at the Point Aconi Lighthouse and Millville ambient air quality stations, capable of reporting 1-hour rolling average concentration in parts per hundred million by volume.

j. The Approval Holder(s) shall conduct monitoring of total suspended particulate (TSP) at the at the Mill Creek, Black Rock, and Millville ambient air quality stations, capable of reporting 24-hour average concentration in micrograms per

cubic metre (µg/m3). TSP monitoring shall be conducted on the six-day National Air Pollution Surveillance (NAPS) High-Volume Schedule.

k. The Approval Holder(s) shall conduct an assessment of the ambient air quality stations identified in this Approval, to determine compliance with shelter requirements and probe siting criteria of Section 5.3 of the "National Air Pollution Surveillance Network Quality Assurance and Quality Control Guidelines", Report No. AAQD 2004-1, prepared by Environment Canada, dated December 1995. This assessment shall be completed and a report including recommendations for station modifications be submitted to the Department by December 1, 2018.

l. The shelter requirements and probe siting criteria of the ambient air quality stations identified in this Approval, shall comply with the requirements of the "National Air Pollution Surveillance Network Quality Assurance and Quality Control Guidelines" Report No. AAQD 2004-1, prepared by Environment Canada, dated December 1995, by December 1, 2019.

m. The Approval Holder(s) shall maintain the ambient air quality stations and monitors identified in this Approval, in accordance with the Nova Scotia Power Ambient Air Monitoring Quality Assurance Program, Version 8.5, as amended from time to time.

n. The Approval Holder(s) shall calibrate and maintain the meteorological equipment at all ambient air monitoring stations in accordance with the equipment manufacturer's requirements. Calibration, maintenance and recertification shall be completed in accordance with the Air Monitoring Quality Assurance Program as specified in this approval, and/or where data is determined or suspected to be inaccurate.

o. The Approval Holder(s) shall maintain records of ambient air quality station maintenance, monitor maintenance and calibrations conducted under this Approval.

p. If air quality monitoring results measured at the ambient air quality stations identified in this Approval demonstrate an exceedance of the maximum permissible ground level concentrations specified in Schedule "A" of the Air Quality Regulations, the Approval Holder(s) shall respond immediately to ameliorate ground level concentrations and notify the Department.

q. The Approval Holder(s) shall conduct an analysis associated with any exceedance of concentrations listed in Schedule "A" of the Air Quality Regulations as measured at any of the ambient air quality stations identified in this Approval and implement corrective action for any causes associated with plant operations.

7. Particulate Emissions (Dust)

a. The Approval Holder(s) shall ensure all vehicles used for the transportation of fuels stock and limestone are covered to avoid dusting along the delivery route.

b. The Approval Holder(s) shall ensure all vehicles used for the transportation of fly ash / bottom ash either to or from the Site be covered to avoid dusting along the transport route except for direct fly ash/bottom ash transport between the ash silo and the Residue Management Site.

c. The Approval Holder(s) shall ensure fugitive dust levels originating from the Site do not exceed the following limits at the boundaries of the Site:

(i) 120 micrograms/m3 in 24 hours;
(ii) 70 micrograms/m3 annual geometric mean

d. The Approval Holder(s) shall conduct a fugitive dust monitoring program as outlined in the document titled "Fugitive Dust Monitoring Plan", dated April 30, 2014, or a more recent version acceptable to the Department. Acceptance will be provided by the Department through a Letter of Authorization from an Administrator.

e. As per the Fugitive Dust Monitoring Plan, samples shall be collected seven days per week and analyzed on a weekly basis. Results shall be submitted to the department annually.

f. The Department may direct the Approval Holder(s) to take mitigative action to reduce the generation of fugitive dust as a result of either an exceedance of the fugitive dust limits identified in this Approval or complaints from neighboring property owners.

8. Surface Water

a. The Approval Holder(s) shall conduct analytical sampling of surface water locations as per the table titled "Surface Water Sampling Requirements", attached in Appendix A.

b. The Approval Holder(s) shall direct all surface water runoff from areas of the site not required to be diverted to the coal pile runoff pond for treatment in the wastewater treatment plant to one of the sedimentation ponds on site. Discharges from the sedimentation ponds shall be limited to 25 mg/L of total suspended solids (TSS). A minimum of two compliance samples shall be collected during each discharge event, one at the beginning and one at the end.

c. The Approval Holder(s) shall maintain records related to the surface water monitoring program(s) at the Site (as identified in the Surface Water Section of this Approval), and provide an annual report to the Department as per the reporting section of this Approval.

d. The Department reserves the right to require modifications including, but not limited to, monitoring locations, monitoring frequency, contaminants of concern, and surface water criteria.

e. Monitoring during construction: The Approval Holder(s) shall ensure that the following water quality limits are met in the water resource downstream of construction activities:

   i. Total Suspended Solids, Clear Flows (Normal Background Conditions):

      (a) Maximum increase of 25 mg/l from background levels for any short term exposure (24 hour or less);

      (b) Maximum average increase of 5 mg/l from background levels for longer term exposure (inputs lasting between 24 hours and 30 days);

   ii. Total Suspended Solids, High Flow (Spring Freshets and Storm Events):

      (a) Maximum increase of 25 mg/l from background levels at any time when background levels are between 25 mg/l and 250 mg/l;

      (b) Maximum increase of 10% over background levels when background is >250 mg/l;

   iii. Additional surface water monitoring may be required at the request of the Department.

f. No authority is granted by this Approval to enable the Approval Holder(s) to discharge surface water onto adjoining lands without the authorization of the affected landowner(s).

g. The Approval Holder(s) shall install and maintain erosion and sedimentation controls in line with industry best practices (e.g., Nova Scotia Environment Erosion and Sediment Control Handbook for Construction Sites) before work and as work progresses. The controls shall remain in place until areas disturbed by construction activities are stabilized so that the risk of release of sediment to a water resource has been mitigated.

h. The Approval Holder(s) shall immediately contact the Department should sulphide bearing material be encountered on the Site.

i. The Approval Holder(s) shall ensure that surface water runoff that may be impacted by petroleum hydrocarbons from the Site is collected and directed for necessary treatment prior to discharge from Site.

j. The Approval Holder(s) shall ensure that the following activities take place at a distance of a minimum of thirty (30) metres from a surface watercourse or wetland in an area such that a release will not enter a surface watercourse or wetland:

   i. fuel storage, refueling, and/or lubrication of equipment;

   ii. washing of machinery or equipment; and

iii. storage of equipment, excavated/stockpiled materials, and potential contaminants.

9. Groundwater

a. The Approval Holder(s) shall conduct analytical sampling of groundwater wells at the main plant site as per the table titled "Groundwater Sampling Requirements – Plant Site", attached in Appendix A. Sampling shall be conducted under the supervision of a Site Professional, to ensure the collection of representative groundwater samples from the Site using consistent and comparable field methodologies.

b. The Approval Holder(s) shall conduct analytical sampling of groundwater wells at the residue management site as per the table titled "Groundwater Sampling Requirements – Residue Management Site (RMS)", attached in Appendix A. Sampling shall be conducted under the supervision of a Site Professional, to ensure the collection of representative groundwater samples from the Site using consistent and comparable field methodologies.

c. During each groundwater sampling event, the Approval Holder(s) shall:

i. Ensure each monitoring well is assessed for its physical condition and integrity, and where necessary, repair or decommission the well within in accordance with requirements of the Contaminated Sites Regulations. A Monitoring Well Decommissioning Report shall be provided to the Department within 60 days of any monitoring well decommissioning; and

ii. Identify and record any wells included in the planned sampling program that could not be sampled with rationale.

d. The Approval Holder(s) shall maintain records related to the groundwater monitoring program(s) at the Site, and provide an annual report to the Department as per the reporting section of this Approval.

e. The Department reserves the right to require modifications to the groundwater monitoring program including, but not limited to, monitoring locations, monitoring frequency, contaminants of concern, and groundwater water criteria.

10. Solid Waste

<u>Ash Disposal Cell Construction and Maintenance</u>

a. The Approval Holder(s) shall ensure written authorization has been received from the Department prior to the commencement of construction of new ash disposal cells.

b. The Approval Holder(s) shall submit, to the Department, an erosion and sedimentation control plan, for review and acceptance, prior to new ash disposal cell construction.

c. The Approval Holder(s) shall implement the erosion and sedimentation control plan, once it has been deemed acceptable by the Department.

d. Ash disposal cell interim cover shall consist of native till or other material accepted, in writing, by the Department.

e. Ash disposal cell interim cover shall be applied to the cell, as necessary, to facilitate dust and leachate control.

f. The Approval Holder(s) shall submit a closure plan for an ash disposal cell a minimum of six (6) months prior to reaching disposal capacity. The closure plan shall be accepted, in writing, by the Department.

g. The Approval Holder(s) shall ensure the ash disposal cell is closed in accordance with the accepted closure plan.

h. The Approval Holder(s) shall ensure measures are in place to prevent damage to the closed cells once the cap has been established.

Coal Combustion Product

i. Coal Combustion Products (CCPs), including fly and bottom ash, shall be disposed of at the Point Aconi Residue Management Site unless otherwise sold or used for beneficial alternative use, as specified in this Approval.

j. If temporary stockpiling is required for CCPs to be used for beneficial alternative use, the Approval Holder(s) shall provide an updated Ash Management Plan. The updated Ash Management Plan shall be reviewed and accepted by the Department prior to stockpiling any CCPs.

k. Fly ash may be:

    i. Used in the manufacture of concrete, precast concrete products, or other cementitious products where the fly ash is an ingredient that is fully bound within the product and meets the applicable ASTM and/or CSA specification(s).

l. CCPs may be:

    i. Used for products or applications, if authorized by a Letter of Authorization.

    ii. Used for research and development (R&D), if authorized by a Letter of Authorization; or

    iii. Removed from the disposal location for beneficial alternative uses, if authorized by a Letter of Authorization.

m. The Approval Holder(s) shall provide the following information when requesting a Letter of Authorization under this approval:

    i. Detailed description of beneficial alternative use or R&D project;

ii. Estimate the amounts to be used and duration;

iii. An assessment of the composition of the CCP, potential exposures and receptors related to its use, and mitigation measures to be used to manage those risks, including a site or project specific risk assessment based on the proposed beneficial alternative use;

iv. Detailed sampling and reporting protocols; and

v. Details of any CCP blending, conditioning or processing required.

n. CCPs exported for any beneficial alternative use must meet the regulatory requirements of the importing province, state, region or country.

o. The Approval Holder(s) shall maintain records of the amount of CCPs sent for beneficial alternative use, and provide them to the Department upon request.

11. Contingency Plan

a. The Approval Holder(s) shall maintain and routinely update a Contingency Plan for the Site in accordance with the Departments Contingency Planning Guidelines dated May 10, 2016, as amended from time to time. The Contingency Plan shall be made available to the Department upon request.

b. The Approval Holder(s) shall ensure that all personnel are trained to address environmental emergencies in a manner consistent with the Facilities approved contingency plan and that the necessary equipment and materials are available at all times for such purpose.

c. A copy of the Contingency Plan is to be maintained onsite at all times.

12. Reporting

a. The Approval Holder(s) shall provide an annual report to the Department by March 31st of each year summarizing the following information collected during the previous calendar year of operations, as required by the terms and conditions of this Approval, including:

(i) Ash Management and Alternative Use reporting requirements;

(ii) Results of sewage treatment system monitoring, including:
a. Average daily volume discharged (for days where a discharge occurs).
b. Analytical results of cBOD5, TSS, E-Coli, and pH as required per discharge.
c. Results of Total Residual Chlorine analysis.

(iii) All complaints and responses/resolutions to each;

(iv) All incidents of non-compliance with the terms and conditions of this Approval and corrective actions taken; and,

(v) Summary of any updates to the Contingency Plan (as per the Contingency Plan Section of this Approval) over the previous year of operation, including the current revision number and date of review(s) and, if applicable, the dates of revision(s).

b. The Approval Holder(s) shall provide the following subject specific annual reports to the Department by March 31st of each year summarizing the following information collected during the previous calendar year of operations, as required by the terms and conditions of this Approval:

(i) Air Quality Summary Report (see Condition 9.c., for minimum reporting requirements).
(ii) Groundwater Summary Report (see Condition 9.e, for minimum reporting requirements).
(iii) Surface Water Summary Report (see Condition 9.g., for minimum reporting requirements).
(iv) Wastewater Effluent Summary Report (see Condition 9.i., for minimum reporting requirements).

c. The Approval Holder(s) shall submit to the Department an annual summary of the air quality monitoring program including, but not be limited to:

(i) A summary of any air quality related emergency and non-emergency incidents pursuant to the Environment Act, the Air Quality Regulations or this Approval, including the date and time of the incident(s);

(ii) A summary of any operational problems related to the continuous emission monitoring devices, environmental control equipment and/or the ambient air monitors, including the date and time of the incident(s) and action taken to resolve the issue;

(iii) A summary of the quality assured, quality controlled (QA/QC) ambient air quality data from the ambient air monitor(s) identifying the concentrations for each air contaminant for the associated averaging periods of Schedule "A" of the Air Quality Regulations, hourly average wind speed and wind direction, including the dates used to calculate the averages.

(iv) Summary of any complaints received from the public and how they were responded to by the Approval Holder, including the date and time of the incident;

(v) Summary of air emissions data recorded by CEMS and results of the QA/QC program including but not limited to:
-Minimum, hourly average and the maximum 720 hour rolling average of emissions in nanograms per Joule (ng/J) of energy input for nitrogen oxide (excluding nitrous oxides and collectively expressed as nitrogen dioxide) and sulphur dioxide;
- An annual summary of opacity results;
- Summaries of quarterly gas cylinder audits, (CEMS);

- Monitor availability;
- Data backfilling;
- Quarterly Relative Accuracy Audit (RAA) results;
- Annual Relative Accuracy Test Audit (RATA) reports; and,
- System recommendations and any corrective actions implemented.

(vi) Summary of results for the Fugitive dust monitoring program.

d. The Approval Holder(s) shall maintain electronic spreadsheets of the quality assured, quality controlled (QA/QC) ambient air quality data for each monitor, for a period of not less than 5 years. These spreadsheets shall be made available to the Department, upon request.

e. The Approval Holder(s) shall submit to the Department an annual summary of the groundwater monitoring program including, but not be limited to:

(i) A summary of any spill or release events that may have impacted soil and/or groundwater quality in the preceding calendar year;
(ii) A description of field methodologies, including sampling techniques;
(iii) A description of the groundwater monitoring network;
(iv) Well inspection results including details on integrity of the well cap / casing and a summary of monitoring well repairs / modifications;
(v) A description of the current groundwater monitoring program and recommendations for repairs, additions, subtractions and/or modifications;
(vi) Current static water elevation data in tabular format identifying significant fluctuations from historical trends of relevant monitoring locations;
(vii) Groundwater gradients and flow direction;
(viii) Current groundwater quality data including an analysis of spatial and temporal trends with comparison to applicable guidelines and historical (baseline) data in tabular format of relevant monitoring locations;
(ix) Laboratory certificates of analysis (digital format is acceptable); and
(x) The identification of any adverse impacts to groundwater as a result of site activities and associated recommendations.

f. The annual report for groundwater shall be prepared by or under the direction of a Professional Geoscientist or Professional Engineer licensed to practice in Nova Scotia by the Association of Professional Geoscientists of Nova Scotia (APGNS) or the Association of Professional Engineers of Nova Scotia (Engineers Nova Scotia).

g. The Approval Holder(s) shall submit to the Department an annual summary of the surface water / storm water sampling program including, but not be limited to:

(i) A review of field methodologies, including sampling techniques;
(ii) A review of the current monitoring program and recommendations for modifications, as applicable;
(iii) Current water quality data including an analysis of temporal trends as compared to historic data with comparison to applicable guidelines in tabular

format;
(iv) Laboratory certificates of analysis; and
(v) The identification of any adverse impacts to surface water / storm water as a result of site activities and associated recommendations, as applicable.

h. The annual report for surface water / storm water shall be prepared by or under the direction of a Professional Engineer licensed to practice in Nova Scotia by the Association of Professional Engineers of Nova Scotia (Engineers Nova Scotia).

i. The Approval Holder(s) shall submit to the Department an annual summary of the Wastewater Effluent monitoring program including, but not be limited to:

(i) Date, time, and volume of each batch of effluent discharged.
(ii) Results of total iron, total suspended solids (TSS), and pH analysis for each batch prior to discharge.
(iii) Results of weekly grab sample analysis of general chemistry, petroleum hydrocarbon (benzene, toluene, ethylbenzene, xylene, and total petroleum hydrocarbons), and metals parameters.
(iv) Description of all incidents of non-compliance with wastewater discharge limits established in this Approval and corrective actions taken.
(v) Summary of findings of the industrial effluent treatment system leak test.

13. Releases

a. Spills or releases shall be reported in accordance with the Act and the Environmental Emergency Regulations.

b. Spills or releases shall be cleaned up in accordance with the Act and the Contaminated Sites Regulations.

14. Rehabilitation Planning

a. One (1) year prior to decommissioning/closure of the Site or any part thereof, the Approval Holder(s) shall submit a detailed rehabilitation plan to the Department for review. The plan shall include but not be limited to, the management of all wastes and residual materials / contamination in accordance with the any provincial legislation including the Act, Regulations, Policies, Procedures, Guidelines or other agreements entered into by the Province which may impact rehabilitation, as well as a long-term monitoring plan for the site. The closure plan shall include the method and practices for the handling and disposal of all products and waste materials.

b. The Approval Holder(s) shall reclaim the Site within twelve (12) months of abandonment and in accordance with the latest rehabilitation plan submitted by the Approval Holder unless an alternate time frame is provided by the Department through a letter of authorization.

15. Complaint Response

a. The Approval Holder(s) shall have standard procedures to address complaints associated with the facility which shall include:

(i) An immediate investigation of the cause of the complaint and the undertaking of immediate and appropriate action, if necessary, to correct the problem.
(ii) A record or description of operations at the time of the complaint, including weather conditions, wind direction, plumes, units operating, etc.
(iii) A record of all complaints and documentation of the date, time, name, address and telephone number of the individual lodging the complaint. The record shall also state any cause of the complaint and the action taken to correct the problem.
(iv) All records related to complaint response shall be made available to the Department on request.

16. Records Maintenance

a. The Approval Holder(s) shall keep all chemical and physical analyses reports required under this Approval for a period of not less than ten (10) years, unless otherwise stated in this Approval.

b. The Approval Holder(s) shall keep all calibration and maintenance records for a period of not less than ten (10) years, unless otherwise stated in this Approval.

c. The Approval Holder(s) shall maintain all other data not mentioned under the Records Maintenance Section of this Approval for a period of not less than ten (10) years, unless otherwise stated in this Approval.

17. Fuel Specification

a. The Approval Holder(s) shall burn a combination of petroleum coke and coal as primary fuel for this facility.

b. The Approval Holder(s) may burn No. 2 and No. 6 fuel oil as secondary fuels at the facility. The sulphur content of the No. 2 or No. 6 fuel burned at the facility shall comply with the requirements of the Air Quality Regulations, as amended from time to time.

c. The Approval Holder(s) may burn fly ash originating from the Tufts Cove Generating Station at the facility in accordance with the Tufts Cove Fly Ash Management Procedure.

d. Any changes made to the Tufts Cove Fly Ash Management Procedure must be approved by the department

e. The Approval Holder(s) may use No. 2 fuel oil as an ignition fuel at the facility.

f. The Approval Holder(s) shall maintain fuel consumption records and Unit operational hours utilizing specific fuels, for a period of at least 2 years, to demonstrate compliance with fuel specification requirements. These records shall be available to the Department upon request.

g. Test burns of alternate fuels may be conducted under a Letter of Authorization on a case-by-case basis provided the following information has been submitted to the Department and deemed acceptable:

(i) Written notification of the intent to test the use of an alternate fuel identifying the type, volume, source and rate of consumption;
(ii) Analytical data identifying trace metals and/or contaminants in the proposed fuel;
(iii) Identification of potential air contaminants resulting from combustion of the fuel and the anticipated change to emissions for the proposed fuel combustion scenario;
(iv) Proposed feed rate and feed method;
(v) Identification of test methods proposed to confirm that air emissions are acceptable;
(vi) Identification of air quality standards proposed for comparison during testing; and
(vii) Proposed testing scenarios to demonstrate that testing will be conducted for the cases when the highest concentration of air contaminants would occur.

h. Should a Letter of Authorization be issued by the Department for a test burn of an alternate fuel, the Approval Holder(s) shall be required to submit:

(i) A schedule to conduct the test burn. The maximum duration of the test burn shall be 120 hours (unless otherwise approved in writing by the Department); and,

(ii) Submission of a Final Report outlining the results of the test burn. This report shall include, but not be limited to, the test methods and analytical results, air quality standards used, the feed rates, quantity and quality of fuel used, monitoring data from the CEMs and any other operational data deemed pertinent during the test burn, summary of any equipment problems or failures, and the overall effectiveness of the material as an alternate fuel.

18. Fuel and Petroleum Management

a. The Approval Holder(s) shall ensure that all petroleum storage systems and related infrastructure are constructed, operated and maintained in accordance with the Petroleum Management Regulations and the Nova Scotia Standards for the Construction and Installation of Petroleum Storage Tank Systems (1997 edition, as amended from time to time).

b. Oil inventory reconciliation will be accomplished as per the following measures:

(i) Visual inspections of tanks, tank yards, fuel lines and adjacent water bodies twice daily as part of site environmental checks;
(ii) Daily inventory measurement and recording;
(iii) Monthly reconciliation of daily measurements with respect to fuel consumption records; and,

(iv) Preventative maintenance checks on tanks and fuel lines as per Nova Scotia Power Thermal Plant Maintenance Practices (Revision 3, May 2011). Notwithstanding, the Approval Holder may complete preventative maintenance checks on tanks and fuel lines, in accordance with a revised version of Nova Scotia Power Thermal Plant Maintenance Practices, providing the Approval Holder has received a Letter of Authorization from an Administrator.

c. All tank level probes, leak detection probes or other electrical / mechanical devices installed as part of the overall leak detection system shall be maintained and calibrated at least annually or more frequently if prescribed by the manufacturer.

d. Any water retained within berms / dykes around petroleum storage tanks shall be assessed for the presence of any petroleum hydrocarbon prior to release by visual inspection or analysis. If the presence of petroleum hydrocarbons is anticipated or is confirmed by visual inspection (or analysis), the affected water shall be transferred to a system or facility approved for the treatment of petroleum-contaminated water. Results of analyses or visible observation shall be retained at the Site for a period of 2 years from the date of collection and will be available to the Department upon request.

e. Truck loading and unloading areas for petroleum products shall meet the requirements of the Petroleum Management Regulations and the Nova Scotia Standards for the Construction and Installation of Petroleum Storage Tanks Systems (1997 edition, as amended from time to time) for a bulk plant.

f. Any transfer of petroleum products to a third party from the Point Aconi Generating facility shall require an approval as a fuel oil facility issued under the Activities Designation Regulations.

19. Burning and Storage of Used Oil

a. The Approval Holder(s) may store or burn used oil on the Site for the purpose of used oil as an alternative fuel, conditional on compliance with the Used Oil Regulations, Petroleum Management Regulations and all terms and conditions of this Approval.

b. Storage or burning of used oil shall be limited to used oil generated from industrial operations at the facility. This Approval does not permit the receipt, storage or burning of used oil generated from off-site sources.

c. Prior to burning any used oil, it shall be verified through laboratory analyses that the used oil is not classified as "contaminated used oil" pursuant to Regulations under the Act. Contaminated used oil shall not be burned at the Site.

d. Laboratory certificates of analysis shall be available for any instances where used oil is transferred a Fuel Tank on site for use as a fuel. Laboratory certificates of analysis shall be maintained on-site for a period of at least 2 years following the burning of the used oil and shall be made available to the Department on request.

e. Any areas used for the transfer of used oil, either to or from approved storage tanks, shall have a concrete or impervious flooring which is sloped to an oil/water separator or other containment device capable of containing any spill.

f. The Approval Holder(s) shall submit a written report to the Department prior to January 31st of each year, detailing the volume of used oil burned during the previous year of operations and an estimated quantity of used oil in storage.

20. Dangerous Goods/Waste Dangerous Goods

a. The Approval Holder(s) shall ensure that the facility is constructed, operated and maintained in accordance with the Dangerous Goods Management Regulations (as amended from time to time).

b. This Approval authorizes the Approval Holder(s) to store and handle Dangerous Goods at the Site.

c. The Approval Holder(s) shall maintain an up to date inventory of all Dangerous Goods handled or stored at the Site and be readily available upon request. The list of Dangerous Goods included in the supporting documentation of the Industrial Approval Application for Renewal dated May 31, 2017, shall be considered the list of authorized Dangerous Goods under this Approval.

d. The Approval Holder(s) shall maintain written standard procedures for the handling of Dangerous Goods (reviewed and updated on an annual basis). These standard procedures shall be readily available to all employees. A copy of these procedures shall be made available to the Department on request.

e. The Approval Holder(s) shall not accept Waste Dangerous Goods at the Site that the Approval Holder(s) did not produce.

f. The disposal of Waste Dangerous Goods, radioactive sources or contaminated used oil, shall be at a Site licensed or approved for the disposal of such Waste Dangerous Goods by the applicable regulatory agency having jurisdiction.

21. Sewage Treatment System

a. The day-to-day operations of the sewage treatment system shall be supervised directly by certified operators who hold the appropriate certification for a Class I Wastewater Treatment Facility.

b. Effluent discharged from the sewage treatment system shall comply with the following criteria:

(i) cBOD5 shall not exceed 25 mg/l.
(ii) TSS shall not exceed 25 mg/l.
(iii) E-Coli shall not exceed 1000/100 counts/mls.
(iv) pH 6.0 - 9.0.

c. The Approval Holder(s) shall sample the effluent discharge from the sewage treatment system for cBOD5, TSS, E-Coli and pH at the following frequency:

(i) A discharge duration of less than 30 consecutive days (excluding weekend and holiday shutdowns) – samples shall be collected once prior to discharge and once during discharge.

(ii) A discharge duration of more than 30 consecutive days (excluding weekend and holiday shutdowns) – samples shall be collected once prior to discharge and then once every 2 weeks. Compliance for a discharge of more than 30 consecutive days will be based on the average of all samples taken during discharge.

d. The Approval Holder(s) shall ensure that if chlorine is used in the sewage treatment system, total residual chlorine (TRC) must be measured daily at a minimum, where a discharge occurs.

e. Prior to January 1, 2021, the compliance limit for TRC shall be 1.5 mg/L based on a monthly average of samples where discharge occurs.

f. Beginning on January 1, 2021 and thereafter, the compliance limit for TRC shall be 0.02 mg/L based on each individual sample collected or continuous measurement.

g. The Approval Holder(s) shall record the average daily plant volume discharged, if a discharge has occurred.

h. The Approval Holder(s) shall maintain data collected in relation to sampling of the sewage treatment system conditions of this approval and provide a summary of results to the Department annually, as per the reporting section of this Approval.

i. Discharge from the lagoon is not permitted during the period from June 15 to September 15 each year.

j. The Approval Holder(s) shall ensure that an Operations Manual is prepared for the sewage treatment system and made available to an inspector upon request.

22. Dam Safety

a. The Approval Holder(s) shall manage and maintain all dam structures on Site in accordance with the Canadian Dam Association Guidelines and associated technical bulletins, as amended from time to time, under the supervision of a qualified professional engineer licensed to practice in the province of Nova Scotia by Engineers Nova Scotia.

23. Wastewater Management

a. All potentially contaminated wastewater, not including sewage, shall be directed to the industrial effluent treatment system for treatment. This includes but is not

limited to, coal pile runoff, the boiler water treatment system, floor drains, boiler blowdowns, boiler and turbine sumps, ash conditioning wastewater, chemical cleaning, backwashes, instrument drains, oily water separator, and building cleaning and wash downs.

b. The Approval Holder(s) shall ensure wastewater that may be impacted by petroleum hydrocarbons from the Site is collected and directed to an oil/water separator.

c. The Approval Holder(s) shall complete the following minimum monitoring and sampling requirements for discharge from the industrial effluent treatment system:

(i) Record the date, time, and volume of each batch of effluent discharged;

(ii) Analyze effluent for concentration of total iron and total suspended solids (TSS) for each batch after treatment and prior to discharge. Discharge shall not occur if the results exceed the limits specified in the Wastewater Discharge Limits table;

(iii) The Approval Holder(s) shall, at a minimum, analyze effluent from the cooling water outfall for pH on a daily basis during discharge. The compliance limit for pH is identified in the Wastewater Discharge Limits table;

(iv) At a minimum, a weekly grab sample of the effluent shall be submitted for independent laboratory analysis of general chemistry, and the parameters specified in the Wastewater Discharge Limits table. Samples shall be collected at least three (3) days after any other sample.

d. The Approval Holder(s) shall develop and maintain a quality control and assurance protocol for the parameters analyzed that are not submitted for independent testing and make it available to an inspector upon request. Flow monitoring and parameter testing equipment must be maintained and calibrated as per manufacturer's recommendations.

e. The Approval Holder(s) shall ensure all discharges from the Industrial Effluent Treatment System comply with the discharge limits identified in the Wastewater Discharge Limits table. Compliance will be based on a calculated monthly arithmetic average of samples collected.

f. The Approval Holder(s) shall not discharge from the industrial effluent treatment system if the cooling water system is not flowing within normal operating ranges.

g. The Approval Holder(s) shall provide the Department with written notification at least 60 days prior to conducting any chemical cleaning of boilers. The notification shall include:

(i) A description of the cleaning process;
(ii) Chemicals to be used;

(iii) Expected chemical composition of the wastewater; and
(iv) A plan to characterize the wastewater produced.

The Approval Holder(s) shall obtain a letter of authorization from an Administrator before conducting the chemical cleaning.

h. The Approval Holder(s) shall maintain data collected in relation to sampling of the industrial effluent treatment system conditions of this approval and provide a summary of results to the Department annually, as per the reporting section of this Approval.

i. The Approval Holder(s) shall ensure the industrial effluent treatment system ponds and associated underground piping (the system) is monitored and assessed for leakage, seepage or infiltration annually. Leak detection may be conducted either through an annual leak test of the ponds/lagoons associated with the effluent treatment system or through a network of groundwater monitoring wells (assessed by a Site Professional to be sufficient in number and location for leak detection of the effluent treatment system). Confirmation of findings shall be submitted to the Department annually as per the Reporting section of this Approval.

24. Wastewater Solids

a. All solids from the Sewage Treatment Facility shall be disposed of via a septage hauling company, or an alternative method acceptable to the Department. Acceptance of an alternative method will be provided by the Department through a Letter of Authorization from an Administrator.

b. All other wastewater solids generated at the Site shall be managed in accordance with a documented Standard Operating Procedure or Solids Management Plan to be submitted to the Department within 60 days of this Approval being issued. Acceptance of the Solids Management plan will be provided by the Department through a Letter of Authorization.

25. Dredging

a. The Approval Holder(s) shall provide the Department with written notification a minimum of 60 days prior to the commencement of any dredging related activities that involve land based disposal. Written notification shall include a Dredge Management Plan and the Approval Holder shall require a letter of Authorization from the Department prior to commencing any dredging related activities.

A Dredge Management Plan shall include the following information at a minimum:

(i) Disposal and/or treatment options analysis for the dredged material and the methodology used in the selection process of the proposed disposal option;
(ii) An assessment of the dredge material relative to the most recent applicable

environmental quality standards. Applicable environmental quality standards are subject to the selected disposal method.
(iii) An overview of the proposed dredging and disposal methodologies, including a plan to address dewatering, water management, sediment transport/control, odour, noise, material handling/transportation and long term management, where applicable.

26. Cooling Water Management

a. The Approval Holder(s) shall continuously monitor temperature at the condenser inlet and outlet for all units and record the maximum daily temperature at the condenser inlet and outlet for all units. This information shall be maintained onsite for a period of 2 years and made available to the Department on request.

b. During operation of the condenser tube cleaning system, the Approval Holder(s) shall keep the loss of sponge balls to the receiving environment to a minimum by creating, maintaining, and implementing a risk mitigation strategy. The risk mitigation strategy, shall incorporate preventative maintenance and inspection procedures including, but not limited to, the following operational requirements:

(i) The plant condenser backwash valves shall remain closed before the ball distribution system will start;
(ii) The ball distribution system shall be out of service before the condenser backwash valves can be opened;
(iii) An appropriate time interval shall be specified and applied before the strainer elements open, after the ball distribution pumps are de-activated; and,
(iv) The ball distribution pumps shall de-activate when the differential pressure across the strainers reaches the first high level alarm.

c. In the event of a significant sponge ball loss from the condenser tube system to the receiving environment, the Approval Holder(s) shall:

(i) Notify the Department as soon as possible during normal working hours;
(ii) Take immediate action to identify the cause of the loss of sponge balls; and,
(iii) Take immediate action to prevent any further losses.

d. The Approval Holder(s) shall ensure the once through cooling water system is operated, maintained and monitored in a manner that protects against adverse effects to fish and other aquatic life.

e. This approval does not authorize the use of chlorination to control biofouling in the cooling water system.

27. Circulating Fluidized Bed (CFB) Residue Management

a. The Approval Holder(s) shall complete a review of the "CFB Residue Management Operations Manual", dated December 2014 to ensure it conforms to minimum requirements of this Approval (Approval # 2007-058666-03). If revisions are necessary, revised copy of the operations manual shall be

submitted to the Department within 90 days of the issuing date of this Approval. In the interim, if there is a conflict between the operations manual and the conditions of this Approval, the conditions of this Approval will apply.

b. The Approval Holder(s) shall operate the CFB Residue Management Site in accordance with the "CFB Residue Management Operations Manual", dated December 2014, as amended from time to time. Amendments to the operations manual shall be reviewed and deemed acceptable to the Department. Acceptance will be provided by the Department through a Letter of Authorization from an Administrator.

c. The Approval Holder(s) shall obtain a letter of Authorization from an Administrator prior to the disposal of materials other than fly ash or bottom ash at the CFB Residue Management Site.

28. Air Emissions

a. The Approval Holder(s) shall limit the mean rate of discharge of particulate matter in flue gas emissions from Unit 1 to 160 milligrams per reference cubic meter of dry flue gas at standard reference conditions of 25 degrees Celsius (°C) and 101.3 kilopascals (kPa) corrected to three (3) percent (%) oxygen, as confirmed through source testing requirements identified in this Approval.

b. The Approval Holder(s) shall ensure opacity of stack emissions are maintained at or below 20 percent (%) except visible emissions may increase in opacity to 40 percent (%) for a maximum of six (6) minutes in the 60 minutes following any increase in opacity above 20 percent (%). Opacity shall be measured with continuous emission monitors (CEMS) and calculated as a six (6) minute arithmetic average of instantaneous observations.

c. The Approval Holder(s) shall report all opacity exceedances to the Department. Exceedances occurring during start-up, shut-down, and routine maintenance do not require reporting, if the Approval Holder has implemented a response plan, approved by the Department, through issuance of Letter of Authorization. The Department may require the Approval Holder to revise an approved plan, if as determined by the opinion of the Department, the plan does not effectively minimize the opacity of emissions.

d. The Approval Holder(s) shall undertake source testing at least once per calendar year, no closer than two months apart, to determine the emission rate and concentrations of particulate matter (including fine particulate PM10 and PM2.5), sulphur dioxide, nitrogen oxides, mercury and mercury compounds in the flue gas from each stack using the test methodologies identified below. Testing shall be conducted while the emission source is operating at normal operating conditions representative of annual generation. When conducting source testing to determine the emission rate of nitrogen oxides and sulphur dioxide, the emission source must be operating at greater than 50% maximum heat input if the unit did not operate in the previous two quarters.

i. Test Methods:

(a) Nitrogen Oxide - Environment Canada Reference Method for the Monitoring of Gaseous Emissions from Fossil Fuel-fired Boilers (EPS 1/RM/15);

(b) Sulphur Dioxide - Environment Canada Reference Method for the Monitoring of Gaseous Emissions from Fossil Fuel-fired Boilers (EPS 1/RM/15);

(c) Particulate Matter - Environment Canada Reference Methods for Source Testing: Measurement of Releases of Particulate from Stationary Sources (EPS 1/RM/8);

(d) Fine Particulate - USEPA Method 201a - Determination Of PM10 And PM2.5 Emissions From Stationary Sources (Constant Sampling Rate Procedure);

(e) Mercury - ASTM D6784-02 Standard Test Method for Elemental, Oxidized, Particulate-Bound and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario Hydro Method).

e. Test results associated with source testing conducted under this Approval for nitrogen oxide and sulphur dioxide, shall include the calculated emission rates for each pollutant reported in kilograms per hour, kilograms per megawatt-hour net energy output and concentrations in parts per million. All concentrations of gaseous pollutants are to be measured on a dry volume basis and the volumetric flow rate calculations based on actual oxygen levels in the flue gas. The final report shall also include the annual average load and the maximum heat input for the unit to confirm the operating conditions used for testing.

f. Test results associated with source testing conducted under this Approval for particulate matter and fine particulate matter shall include the calculated emission rate reported in kilograms per hour, kilograms per megawatt-hour net energy output and concentration of dry gas in milligrams per cubic meter at reference conditions of 25 degrees Celsius (°C), 101.3 kilopascals (kPa) and corrected to three (3) percent (%) oxygen. The final report shall also include the annual average load for the unit to confirm the operating conditions used for testing.

g. Test results associated with source testing conducted under this Approval for mercury and mercury compounds, shall include mercury emitted in gaseous form and mercury associated with particulate emissions. Total mercury, particulate bound, oxidized and elemental mercury shall each be reported separately. The report shall include calculated emission rates reported in grams per hour, grams per megawatt-hour net energy output and concentrations of dry gas in micrograms per cubic meter at reference conditions of 25 degrees Celsius (°C), 101.3 kilopascals (kPa), for each form. The emission rate, volumetric flow rate

and concentration calculations shall be based on actual oxygen levels in the flue gas. The final report shall also include the annual average load for the unit to confirm the operating conditions used for testing.

h. The Approval Holder shall operate and maintain a Continuous Emission Monitor System (CEMS) at a point downstream of the air pollution control equipment on the stack of Unit 1, to continuously measure and log the rates of release of sulphur dioxide and nitrogen oxides in the flue gas, at all times during which the facility is in operation. These CEMS shall be equipped with a hard copy recording device or with software to store historical data. Records of such measurements shall include the hourly and calculated 720 hour rolling average emission rate of sulphur dioxide and nitrogen oxides (expressed as nitrogen dioxide) in units of kilograms per hour and kilograms per megawatt-hour net energy output. Records shall be retained for a minimum of two (2) years and made available to the Department upon request.

i. The CEMS installed at a point downstream of the air pollution control equipment on the stack of Unit 1, shall be maintained, operated and evaluated in accordance with the "Protocols and Performance Specifications for Continuous Monitoring of Gaseous Emissions from Thermal Power Generation", EPS 1/PG/7(revised), December 2005, as amended from time to time, published by Environment Canada. Reference method testing conducted under PG-7 shall comply with:

    i. Nitrogen Oxide - Environment Canada Reference Method for the Monitoring of Gaseous Emissions from Fossil Fuel-fired Boilers (EPS 1/RM/15);

    ii. Sulphur Dioxide - Environment Canada Reference Method for the Monitoring of Gaseous Emissions from Fossil Fuel-fired Boilers (EPS 1/RM/15).

j. The Approval Holder(s) shall operate and maintain a CEMS at a point downstream of the air pollution control equipment on the stack of Unit 1, to continuously measure and log the opacity of flue gas emissions, at all times during which the facility is in operation. The CEMS shall be equipped with a hard copy recording device or with software to store historical data. The CEMS for opacity shall meet or exceed the requirements of Environment Canada publication EPS 1-AP-75-2, "Standard Reference Methods for Source Testing: Measurement of Opacity of Emissions from Stationary Sources". The Approval Holder(s) shall also ensure that such monitors undergo manual calibration and cleaning, in accordance with manufacturers specifications, at such frequency so as to ensure accurate measurement of opacity emissions. Records shall be retained for a period of two (2) years and made available to the Department upon request.

k. Each CEMS shall monitor and log data continuously. The data availability of the CEMS shall be at least 90% annually for the first full year of operation and 95% annually thereafter.

l. The Approval Holder(s) shall notify the Department of any failure of quality assurance/quality control testing of RATA testing of CEMS required under the EPS 1/PG/7, within 30 days of the completion of the test.

m. The Approval Holder(s) shall provide an annual report to the Department each year following the minimum reporting requirements outlined in the reporting section of this Approval.

n. The Approval Holder(s) shall submit a Pre-test Plan to the Department at least 30 days prior to the date of commencement of all source testing.

o. Within 90 days of completion of source testing, the Approval Holder(s) shall submit a final Source Testing Report to the Department. The final Source Testing Report shall also include pertinent operating information collected during testing and detailed readings from applicable CEMS.

APPENDIX A
TABLES

Surface Water Sampling Requirements

Sampling Requirements*	Sampling Frequency	Location	Identifier
General Chemistry, Total Metals, Petroleum Hydrocarbons	Quarterly***	Plant Site	Coal Pile Runoff Pond
General Chemistry, Total Metals	Quarterly***	Residue Management Site	CFB Leachate Tanks 2, 3 and 4; French Drains Cells 1 and 4; Ponds 7A, 7B and Haley's
General Chemistry, Total Metals	Annual**		Pond 2; Highway Culvert; and Round Pond

*A minimum list of parameters to be included for each of the listed sampling requirements is provided in Appendix B.

** Annual sampling frequency means once per calendar year. Annual sampling shall occur on consistent dates from year to year

***Quarterly sampling frequency means samples shall be collected four times per calendar year. Quarterly sampling shall occur within the following allotted timeframes: January-March; April-June; July-September; October-December. There shall be a minimum of 30 days between each quarterly sampling event.

Groundwater Sampling Requirements – Plant Site

Sampling Requirements*	Sampling Frequency	Well Identifier
General Chemistry (RCAp), Dissolved Metals, Petroleum Hydrocarbons (BTEX/TPH)	Annual**	PA1, PA4, PA5, PA13, PA14, PA15
Total Dissolved Solids (TDS), Chloride, Sulfate and pH	Quarterly***	PA13, PA14, PA15
Water Level (geodetic)	Six Times per Quarter	PA1, PA4, PA13, PA14, PA15
Water Level (geodetic)	Daily	PA5

*A minimum list of parameters to be included for each of the listed sampling requirements is provided in Appendix B.

** Annual sampling frequency means once per calendar year. Annual sampling shall occur on consistent dates from year to year

***Quarterly sampling frequency means samples shall be collected four times per calendar year. Quarterly sampling shall occur within the following allotted timeframes: January-March; April-June; July-September; October-December. There shall be a minimum of 30 days between each quarterly sampling event.

Groundwater Sampling Requirements – Residue Management Site

Sampling Requirements*	Sampling Frequency	Well Identifier
General Chemistry (RCAp), Dissolved Metals	Quarterly ***	PN6A/97, PN7A/92, PN7B/92, PN8B/97, PN18A, PN18B, PN18C, PN28A, PN28B, PN30A, PN30B, PN33A, PN33B, PN34, PN35A, PN35B, PN38A, PN38B, PN49A, PN49B, PN49C, PN50A, PN50B, PN51A, PN51B, PN52A, PN53A, PN55A, PN55B, PN56A, PN56B
General Chemistry (RCAp), Dissolved Metals	Annual**	PN29A, PN29B, PN47A, PN47B, PN48B, PN51C, PN52B, PN53B
Water Level (geodetic)	Annual**	PN47A, PN47B
Water Level (geodetic)	Nine Times per Quarter	PN6A/97, PN8B/97, PN28A, PN28B, PN29A, PN29B, PN30A, PN30B, PN33A, PN33B, PN34, PN35A, PN35B, PN38A, PN38B, PN48B, PN49C, PN50A, PN50B, PN55A, PN55B, PN56A, PN56B, PN55C, PN56C
Water Level (geodetic)	Twelve Times per Quarter	PN7A/92, PN7B/92, PN18A, PN18B, PN18C, PN49A, PN49B, PN51A, PN51B, PN51C, PN52A, PN52B, PN53A, PN53B

*A minimum list of parameters to be included for each of the listed sampling requirements is provided in Appendix B.

** Annual sampling frequency means once per calendar year. Annual sampling shall occur on consistent dates from year to year

***Quarterly sampling frequency means samples shall be collected four times per calendar year. Quarterly sampling shall occur within the following allotted timeframes: January-March;

April-June; July-September; October-December. There shall be a minimum of 30 days between each quarterly sampling event.

Wastewater Discharge Limits table

Parameter	Discharge Limit
pH	6.0 – 9.5
Total Suspended Solids	25 mg/L
Total Oil and Grease	15 mg/L
Arsenic	0.3 mg/L
Cadmium	0.003 mg/L
Chromium (total)	0.5 mg/L
Chromium (Hexavalent)	0.037 mg/L
Copper	0.05 mg/L
Iron	1.0 mg/L
Lead	0.05 mg/L
Mercury	*
Nickel	0.2 mg/L
Zinc	0.25 mg/L

*No discharge limit is specified for mercury. This parameter shall still be sampled, monitored and reported to detect any changes in trends.

APPENDIX B
MINIMUM LIST OF PARAMETERS FOR ANALYTICAL PACKAGES

Metals (See total vs dissolved metals notes below)	**General Chemistry**
Aluminum	pH
Antimony	Reactive Silica as SiO2
Arsenic	Chloride
Barium	Fluoride
Beryllium	Sulphate
Boron	Alkalinity
Cadmium	True Color
Chromium	Turbidity
Cobalt	Electrical Conductivity
Copper	Nitrate + Nitrite as N
Iron	Nitrate as N
Lead	Nitrite as N
Manganese	Ammonia as N
Mercury	Total Organic Carbon
Molybdenum	Ortho-Phosphate as P
Nickel	Dissolved Sodium
Selenium	Dissolved Potassium
Silver	Dissolved Calcium
Strontium	Dissolved Magnesium
Thallium	Dissolved Phosphorus
Tin	Bicarb. Alkalinity (as CaCO3)
Uranium	Carb. Alkalinity (as CaCO3)
Vanadium	Hydroxide
Zinc	Calculated TDS
*All groundwater samples shall be analyzed for "Dissolved Metals".	Hardness
**All Surface water / storm water samples shall be analyzed for "Total Metals"	Langelier Index (@ 20C)
Petroleum Hydrocarbons (PHC)	Langelier Index (@ 4C)
Benzene	Saturation pH (@ 20C)
Toluene	Saturation pH (@ 4C)
Ethylbenzene	Anion Sum
Xylenes	Cation Sum

Modified Total Petroleum Hydrocarbons (Gasoline, Fuel Oil, Lube Oil)	% Difference/ Ion Balance (NS)
	Total Suspended Solids (TSS) – **For Surface Water Samples Only**

APPENDIX C

REFERENCE DOCUMENTS

1) Letter: dated May 24, 2023, RE: Point Aconi Operating Approval Amendment Request (Approval No. 2007-058666-06), and attachments, and signed by Chad Graham.
2) Quality Processes: Assessment Program Documents: a) QP-G011, Petroleum Tanks >4000L Inspection and Integrity Program, Revision 1 dated 01 Feb 2021, as amended from time to time; b) QP-G039, Petroleum Piping Inspection and Integrity Program, Revision 0 dated 21 Dec 2020, as amended from time to time; c) QP-G030, Chemical Tank Inspection and Integrity Program, Revision 0 dated 17 Aug 2021, as amended from time to time; d) QP-G033, Chemical Piping Inspection and Integrity Program, Revision 3 dated 30 July 2021, as amended from time to time.
3) Ambient Air QAP: Nova Scotia Power Ambient Air Monitoring Quality Assurance Program, Version 8.5, revised November 2022.
4) Letter: dated July 31, 2023, RE: Point Aconi Operating Approval Amendment Request Approval 2007-058666-06 – Partial Capping of Landfill Cell no. 4, and attachments, and signed by Chad Graham.
5) Specification: Nova Scotia Power Incorporated Section 01 11 00 Permanent & Temporary Cap Cell 4 (Partial) 2023 SUMMARY OF WORK SYD-23000477-A0.
6) Specification: Nova Scotia Power Incorporated Section 01 14 00 Permanent & Temporary Cap Cell 4 (Partial) 2023 WORK RESTRICTIONS SYD-23000477-A0.
7) Specification: Nova Scotia Power Incorporated Section 01 35 43 Permanent & Temporary Cap Cell 4 (Partial) 2023 ENVIRONMENTAL PROCEDURES SYD-23000477-A0.
8) Specification: Nova Scotia Power Incorporated Section 31 05 16.01 Permanent & Temporary Cap Cell 4 (Partial) 2023 PERVIOUS FILL SYD-23000477-A0.
9) Specification: Nova Scotia Power Incorporated Section 31 05 16.03 Permanent & Temporary Cap Cell 4 (Partial) 2023 LOW PERMEABILITY FILL SYD-23000477-A0.
10) Specification: Nova Scotia Power Incorporated Section 31 23 33.02 Permanent & Temporary Cap Cell 4 (Partial) 2023 OPEN CUT EXCAVATION SYD-23000477-A0.
11) Specification: Nova Scotia Power Incorporated Section 31 32 18 Permanent & Temporary Cap Cell 4 (Partial) 2023 GEOSYNTHETIC CLAY LINER SYD-23000477-A0.
12) Specification: Nova Scotia Power Incorporated Section 31 32 19.16 Permanent & Temporary Cap Cell 4 (Partial) 2023 GEOTEXTILE SOIL STABILIZATION SYD-23000477-A0.
13) Specification: Nova Scotia Power Incorporated Section 32 92 19.16 Permanent & Temporary Cap Cell 4 (Partial) 2023 HYDROSEEDING SYD-23000477-A0.
14) Drawing: exp Services Inc., Nova Scotia Power Inc. Project No. SYD-23000477-A0, Point Aconi Generating Station, Permanent and Temporary Cap Cell 4 (Partial) 2023, Existing Conditions Plan, Dwg. No. A 089S0 1 242 00 143, Rev A, stamped 23Jun20 by G.J. Landry.
15) Drawing: exp Services Inc., Nova Scotia Power Inc. Project No. SYD-23000477-A0, Point Aconi Generating Station, Permanent and Temporary Cap Cell 4 (Partial) 2023, Proposed Cell 4 Capping Areas, Dwg. No. A 089S0 1 242 00 144, Rev A, stamped 23Jun20 by G.J. Landry.
16) Drawing: exp Services Inc., Nova Scotia Power Inc. Project No. SYD-23000477-A0, Point Aconi Generating Station, Permanent and Temporary Cap Cell 4 (Partial) 2023, Details, Dwg. No. A 089S0 1 242 00 147, Rev A, stamped 23Jun20 by G.J. Landry.

17) Drawing: exp Services Inc., Nova Scotia Power Inc. Project No. SYD-23000477-A0, Point Aconi Generating Station, Permanent and Temporary Cap Cell 4 (Partial) 2023, Sections and Details, Dwg. No. A 089S0 1 242 00 146, Rev A, stamped 23Jun20 by G.J. Landry.
18) Drawing: exp Services Inc., Nova Scotia Power Inc. Project No. SYD-23000477-A0, Point Aconi Generating Station, Permanent and Temporary Cap Cell 4 (Partial) 2023, Sections, Dwg. No. A 089S0 1 242 00 145, Rev A, stamped 23Jun20 by G.J. Landry.

Request IR-3:

Page 1 of the application states: "A cell is considered to have reached capacity when it meets any of its critical design or regulatory thresholds — including maximum volume, final elevation, permitted airspace, or environmental constraints. In the context of this project, the cell capacity was determined by the elevation limit, which is approximately 41 meters above sea level."

(a) Please provide a copy of the documented critical design and regulatory thresholds.

(b) Please provide a copy of the documentation confirming that Cell 2 has reached an elevation of 41 meters above sea level.

(c) Is Cell 2 currently at its maximum design/regulatory volume?

(i) If not, please explain why ash within Cell 2 cannot be moved around within the cell to take advantage of available volume while lowering the elevation of the cell below 41m above sea level.

Response IR-3:

(a) Please refer to Attachment 1 for NS Power's Point Aconi Capping Design 2024.

Please refer to Attachment 2 for the Point Aconi Circulating Fluidized Bed (CFB) Residue Operations Manual.

(b) Cell 2 reached its design capacity some time ago and was temporarily capped in accordance with approved procedures. The elevation limit of approximately 41 metres above sea level

was confirmed through survey data and engineering review. Please refer to Attachment 3 for documentation verifying this elevation.

(c) Yes, Cell 2 is currently at its maximum design and regulatory volume. The cell was filled to its permitted elevation and temporarily capped. Permanent capping activities are now underway, in accordance with the approved closure plan and under the oversight of EXP.

Part 1 - General

1.1 RELATED REQUIREMENTS

.1 Section 01 14 00 – Work Restrictions

.2 Section 01 35 29.06 – Health and Safety

.3 Section 01 35 43 – Environmental Procedures

1.2 WORK COVERED BY REQUEST FOR PROPOSAL (RFP) DOCUMENTS

.1 The Work proposed to be carried out under this RFP consists of the supply of all labour, materials, supervision, tools, services and equipment necessary for the construction of the Works as described in Section 3.1 below, as described in the Technical Specifications and as shown on the RFP Drawings.

1.3 WORK BY OTHERS (IF AWARD IS ISSUED)

.1 Co-operate with other Contractors in carrying out their respective Works and carry out instructions from Owner/Owner's Representative.

.2 Co-ordinate Work with that of other Contractors. If any part of Work under this Contract depends for its proper execution or result upon Work of another Contractor, report promptly to Owner/Engineer in writing, any defects which may interfere with proper execution of Work.

1.4 WORK SEQUENCE (IF AWARD IS ISSUED)

.1 No Work shall be undertaken at the construction Site until the Contractor's Environmental Management Control Plan has been submitted and approved by the Engineer, and its provisions implemented on the Site.

.2 No Work shall be undertaken at the construction Site until all of the Contractor's site personnel have completed Nova Scotia Power Incorporated's Site Orientation.

.3 Construct Work in stages to accommodate logical progression of Work and coordination of Site activities to avoid impacts to the construction schedule, Owner's operation and the general public.

.4 Work to be scheduled and constructed to allow for quality control and quality assurance to occur in a logical and efficient manner.

.5 Maintain fire access/control.

1.5 CONTRACTOR USE OF PREMISES (IF AWARD IS ISSUED)

.1 Unrestricted use of Contractor Site until Substantial Performance.

.2 Limit use of premises for Work to allow:

.1 Work by other Contractors.

.1 The Contractor is cautioned that ash handling and placement operations at the Site will continue throughout the construction

period. The Contractor shall conduct the Works in such a manner that the ash handling Contractor's personnel and equipment, used in ash placement, are not hindered in any manner. Any traffic control required on the access road will be the responsibility of the Contractor.

.3 Co-ordinate use of premises under direction of Owner/Engineer.

.4 Remove or alter existing Work to prevent injury or damage to portions of existing Work which remain.

.5 Repair or replace portions of existing Work which have been altered during construction operations to match existing or adjoining Work, as directed by Owner/Engineer.

.6 At completion of operations maintain condition of existing Work: equal to or better than that which existed before new Work started.

1.6 **OWNER OCCUPANCY**

.1 Owner will occupy premises during entire construction period for execution of normal operations.

.2 Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

1.7 **EXISTING SERVICES**

.1 Notify, Owner/Engineer and utility companies of intended interruption of services and obtain required permission.

.2 Provide alternative routes for personnel and vehicular traffic.

.3 Establish location and extent of service lines in area of Work before starting Work. Notify Owner/Engineer of findings.

.4 The Contractor is made aware that overhead cables and transformers may be energized during the construction period.

.5 Submit schedule to and obtain approval from Engineer for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

.6 Provide temporary services when directed by Owner/Engineer to maintain critical building and Owner's systems.

.7 Where unknown services are encountered, immediately advise Engineer and confirm findings in writing.

.8 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

.9 The Contractor shall safeguard all overhead and buried utilities, i.e, telephone, electrical conduits, culverts, electrical cables, water lines, service laterals, equipment, monitoring wells, buildings and all other existing plant facilities. Any damage done to these shall be repaired at the Contractor's expense and in a manner satisfactory to the Engineer.

.10 Record locations of maintained, re-routed and abandoned service lines.

1.8 **DOCUMENTS REQUIRED**

.1 Maintain at job site, one copy each document as follows, if an award is issued:

.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Reviewed Shop Drawings.
.5 List of Outstanding Shop Drawings.
.6 Change Orders.
.7 Other Modifications to Contract.
.8 Field Test Reports.
.9 Copy of Approved Work Schedule.
.10 Health and Safety Plan and Other Safety Related Documents.
.11 Other documents as specified.

Part 2 - Products

2.1 **NOT USED**

.1 Not used.

Part 3 - Execution

3.1 **WORK TO BE PERFORMED**

.1 The Work to be included in this RFP, but is not necessarily limited to, is the following:

.1 Design, supply, installation, operation and maintenance of environmental management measures for all aspects of the Works.

.2 Removal of the existing vegetation layer on Cell 2 to the extents of the new capping shown on the Issued for RFP Drawings followed by the re-grading of the existing ash/soil in order to prepare the surface for construction of an engineered cover system. Also associated with the re-grading is the removal of high and low spots to achieve the desired finish elevations. There are trees and shrubs on the area to be capped that will require the use of a root rake to ensure that all root systems are removed and disposed of prior to the placement of low permeable fill. Please note that any ash rework will require a minimum of 200 mm of low permeable soil cover between the ash and the Geosynthetic Clay Liner (GCL) so that there is no direct contact of the ash with the GCL.

.3 Construction of an engineered cover system, that ties into the existing engineered cover system, including a low permeable fill layer; a GCL; a drainage layer; geotextiles; topsoil layer for the area of the ash landfill site and erosion control blanket, as indicated on the Issued for RFP drawings as NSPI Capping Design 2024.

.4 Excavation work followed by the construction of anchor trenches for the GCL, the supply and installation of a GCL liner, gravels, geotextile, topsoil and erosion control blanket is also to be performed.

.5 Construction of a drainage swale to capture surface water from a portion of the previously constructed liner, as well as the newly capped area, is to be performed. Tying of this new drainage swale into the existing drainage swale that directs water flows into Pond 7B is also to be performed.

.6 Supply and placement of plywood protection over GCL along edge of GCL that will see extension of capped surfaces in the future.

.7 Water management during the execution of the Work.

.8 An application of hydroseeding to establish a vegetation cover over areas also noted to receive topsoil is to be performed. The supply and installation of an erosion control blanket on the side slopes over the area to be vegetated is also required to be performed.

.9 Travel of heavy equipment over previously constructed GCL capped areas is strictly forbidden.

.10 Areas outside of the area to receive the GCL that are impacted from construction activities performed in the execution of this Work are to be reinstated.

.11 Borrow and disposal areas are to be properly reshaped with maximum 2:1 (H:V) side slopes and disturbed areas vegetated prior to completion of the Work.

.12 Temporary storage of stripping material to be subsequently moved to area where common fill is to be removed.

.13 Contractor is required to engage consultant to perform quality control testing and reporting.

.14 There are some variations in the recording of the ground elevation between historical data and data obtained from the scan survey which is most likely associated with extensive vegetation growth in some areas. The variation could also be associated with slope slippages which are occurring in some areas of the site. Given some ground variations are anticipated it is essential that any major variations be reported before activities continue on site. Also, since the design was based on previously "Issued for Construction" drawings, as there are no "AS BUILT" drawings, there may be discrepancies as to where edges of previously capped surfaces exist.

.15 Upon completion of the GCL placement, contractor is to record "AS BUILT" data on termination points and turn over the data to NSPI so that said information can be provided on future capping projects.

END OF SECTION

Part 1 - General

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 – Summary of Work

.2 Section 01 35 29.06 – Health and Safety

.3 Section 01 35 43 – Environmental Procedures

1.2 ACCESS AND EGRESS

.1 The firm responding to this RFP shall be deemed to have inspected the Site and be satisfied as to the nature, extent and conditions of access provided and required on and about the Site.

.2 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

.3 The firm responding to this RFP shall also make good any damage or excessive wear and tear to the Owner’s access facilities if an award is issued.

.4 No separate payment shall be made for construction access.

1.3 USE OF SITE AND FACILITIES

.1 Execute Work with least possible interference or disturbance to normal use of premises. Make arrangements with Owner/Engineer to facilitate Work as stated.

.2 Maintain existing services to provide for personnel and vehicle access.

.3 If award is issued, the Contractor is to supply their own office and sanitary facilities for use by Contractor's personnel. Keep facilities clean.

.4 If award is issued, the Contractor is to be totally self-sufficient and limit all their activities to the area specific to the area to be capped under this Project.

1.4 EXISTING SERVICES

.1 Notify, Owner/Engineer and utility companies of intended interruption of services and obtain required permission.

.2 If an award is issued, the Contractor shall safeguard all overhead and buried utilities, i.e., telephone, electrical conduits, culverts, electrical cables, water lines, service laterals, equipment, monitoring wells, buildings and all other existing plant facilities. Any damage done to these shall be repaired at the Contractor’s expense and in a manner satisfactory to the Engineer.

.3 If an award is issued, the Contractor is made aware that overhead cables and transformers may be energized during the construction period.

1.5 SPECIAL REQUIREMENTS

.1 Abide by Noise regulations stipulated by the Authorities.

.2 Submit schedule for review.

.3 If an award is issued, the Contractor is to ensure that their personnel employed on-site become familiar with and obey Nova Scotia Power Incorporated's safety and security procedures and Federal/ Provincial regulations including noise, health and safety, fire and traffic regulations.

.4 Keep within limits of work and avenues of ingress and egress.

.5 Avoid being adjacent to ash hauling vehicles as hot ash can boil over and land on adjacent surfaces.

Part 2 - Products

2.1 **NOT USED**

.1 Not Used.

Part 3 - Execution

3.1 **NOT USED**

.1 Not Used.

END OF SECTION

1.0 INTRODUCTION

Nova Scotia Power Incorporated's Occupational Health and Safety Policy is as follows:

The occupational health and safety of people is more important than any business interest. For this reason, occupational health and safety is our Number One Priority.

To this end:

- *Nova Scotia Power Incorporated (NSPI) is committed to providing a healthy and safe work environment for all employees and Contractors employed on its Sites.*
- *NSPI endeavors to protect the general public against health and safety risks arising from its business activities.*
- *NSPI believes that all occupational injuries and illnesses are preventable. We will use every practicable combination of engineering and administrative controls and personal protective equipment to eliminate occupational exposures to the best of our ability. Workplace conditions will meet or exceed all applicable regulatory requirements.*
- *NSPI will comply with this Policy and review it annually in consultation with its Joint Occupational Health and Safety Committees.*
- *We at NSPI believe in and fully support the Internal Responsibility System of the Occupational Health and Safety Act. All employees accept responsibility for personal use of procedures and equipment provided for their protection and encouragement of same among co-workers and people working under their direction.*
- *All employees are responsible for the overall implementation of this policy.*

This document is intended to familiarize Contractors with NSPI expectations. **NSPI expects Contractors to work to the same safety standards as NSPI employees. Contractors are required to adhere to both Legislative and NSPI regulations, including, but not limited to:**

1. Nova Scotia Occupational Health & Safety Act
2. All Regulations pursuant to the Occupational Health & Safety Act
3. The Transportation of Dangerous Goods Act
4 National Safety Code (for Vehicles)
***5 Nova Scotia Power Safety Manual**
***6. Nova Scotia Power Construction Safety Handbook**
***7. Nova Scotia Power Contractor Environmental Requirements (if applicable)**
***8. Nova Scotia Power Contract Specifications**
***9. Nova Scotia Power Safe Work Methods/Practices (if applicable)**

***10. Local Nova Scotia Power Incorporated Safety Rules (if applicable)**

*The items marked with an asterisk will be made available for viewing to the Contractor during the Request for Proposal (RFP) period and copies will be issued to the successful Contractor upon award of the Work.

NOTE: Nova Scotia Power Incorporated insists on "zero tolerance" with regards to compliance with legislated acts and regulations.

2.0 HEALTH, SAFETY & ENVIRONMENT REQUIREMENTS

2.1 CERTIFICATION - Effective January 1, 1998, all construction firms responding to a RFP for construction projects with Nova Scotia Power Incorporated must submit a copy of a valid "Letter of Good Standing" indicating active participation toward achieving, or having achieved, a Certificate of Recognition issued jointly by the Nova Scotia Construction Safety Association and the Nova Scotia Labour and Workforce Development.

2.2 All Contractors will conduct a **Hazard/Risk Assessment** and use the assessment to develop a **Job Safety Plan**.

The Contractor shall submit his **Hazard/Risk Assessment** at the **time of responding to this RFP**. The Contractor shall also submit in writing the name and qualifications of an individual other than the Construction Superintendent who will be responsible for monitoring, maintenance and execution of all safety measures on-site during construction.

The subsequent analysis and Job Safety Plan is to be submitted to Nova Scotia Power Incorporated prior to Work commencing, normally at the pre-job meeting or start-up meeting. **See Appendix 1 for details.**

2.3 SUBCONTRACTORS

2.3.1 Only subcontractors approved by Nova Scotia Power Incorporated may work at the Work Site.

2.3.2 The Contractor is responsible for the safety of any subcontractors or other persons they bring on-site. This includes ensuring they have all required personal protective equipment and that they know and follow the requirements of this document.

2.4 Before an employee starts Work on-site, he/she must be provided with a review of the Hazard/Risk Assessment and Job Safety Plan. This review must be documented.

2.5 Before starting Work, each employee will be given a copy of the Nova Scotia Power Incorporated Construction Safety Handbook and given the time to read it. After reading the book, the tear out page is to be signed and given to the Nova Scotia Power Incorporated

Site Representative. Copies are available from Nova Scotia Power Incorporated.

2.6 At an agreed time each week, each Contractor will hold an internal Safety Meeting, involving all employees on-site. Minutes will be taken and a copy will be submitted to the Nova Scotia Power Incorporated Site Representative each week.

2.7 All Contractors shall post, or make available at the Work Site, minutes from their latest Joint Occupational Health and Safety Committee meeting. (Where there is no JOHSC, due to size, notes of the Safety Representative will be made available to the Nova Scotia Power Incorporated Representative.)

2.8 The Contractor shall ensure that all personnel working on the Work Site have been properly trained on the Work Place Hazardous Materials Information System (WHMIS) prior to arriving on-site. An up-to-date copy of all Material Safety Data Sheets (MSDSs) for controlled products used, must be posted or available at the Site and all hazardous materials must be properly labelled.

2.9 The Contractor is solely responsible for taking all safety precautions during construction and completion of Works. The Work Site must be kept clean and orderly at all times, with special attention at the end of each day and any time Work is temporarily suspended. The Contractor shall protect all construction materials, equipment and facilities from causing injury to persons at or near the Work Site or causing damage to existing properties.

2.10 The Contractor shall set up and abide by safety, security, sanitary health and first aid regulations, which meet the approval of Nova Scotia Power Incorporated and any regulatory authorities that are applicable.

2.11 The Contractor shall ensure that the Nova Scotia Power Incorporated's No Smoking Policy is adhered to by all his/her personnel. Smoking is not permitted in Nova Scotia Power Incorporated vehicles or buildings.

2.12 The Contractor shall investigate all incidents causing personal injury, property damage or which had a high potential for causing an accident (this does not include minor first aid unless the incident had a high potential for more serious results).

2.13 The Contractor shall maintain accident and industrial illness records, including frequency and severity rates and provide them to the Nova Scotia Power Incorporated Representative monthly. Use the following formulas.

$$\text{Frequency} = \frac{\text{number of lost time incidents x 200,000}}{\text{actual hours worked}}$$

$$\text{Severity} = \frac{\text{number of days lost or charged x 200,000}}{\text{actual hours worked}}$$

2.14 The Contractor may be informed of Site specific safety requirements by the Nova Scotia Power Incorporated Representative.

3.0 CONTRACTOR SUPERVISION

3.1 Unless otherwise specified, the Contract includes the provision of adequate supervision, by the Contractor.

3.2 **On-Site Orientation Session**: The Contractor's supervisor will attend an on-site orientation session with Nova Scotia Power Incorporated Field Representatives, prior to or on the first day of Work. This may be part of the 'start up' meeting, if appropriate. Minutes will be taken by the Nova Scotia Power Incorporated Site Representative and copies will be distributed to the attendees. At this meeting the Nova Scotia Power Incorporated Field Representative will review the Contractor's Safety Requirements and Technical Specification. During this orientation the Nova Scotia Power Incorporated Field Representative will give an overview on how Nova Scotia Power Incorporated will rate the Contractor's performance including a review of what corrective process would be required if safety performance was unacceptable.

3.3 The Contractor supervisor is responsible for ensuring the employees at the Work Site are aware of Nova Scotia Power Incorporated requirements, before they start Work.

4.0 PERSONAL PROTECTIVE EQUIPMENT

The following is the minimum personal protective equipment required on all Nova Scotia Power Incorporated construction Sites. It includes eye protection, foot protection, head protection, hand protection, fall protection and other specific protective equipment. Additional protective equipment may be required, specific to the task.

Nova Scotia Power Incorporated and Contractor Supervision are expected to wear personal protective equipment to set the example. The Contractor supervisor is responsible to ensure his/her employees have the appropriate equipment, are trained in its use and use it properly.

4.1 Eye Protection

4.1.1 Eye protection is mandatory on all Nova Scotia Power Incorporated construction Sites. Minimum protection is provided by safety glasses with side shields.

4.1.2 Mono-goggles, or a face shield in combination with safety glasses, are mandatory when sawing, grinding, cutting and burning, cutting sheet metal and in areas where dust and debris are in the air.

4.1.3 Personnel working with chemicals must use a combination of safety glasses and full face shields for their protection.

4.1.4 Personnel with vision in only one eye must wear eye protection at all times when on Nova Scotia Power Incorporated property on business. The minimum protection would be plain safety glasses with side shields.

4.2 Foot Protection

4.2.1 All personnel must wear CSA, class 1, approved safety boots.

4.2.2 In addition, supervisors may exercise discretion in requiring personnel to wear extra protection for specific jobs. For example safety toe rubber boots for wet locations, or supplementary toe guard for hazards that may be specific to a job.

4.3 Head Protection

Every employee, visitor or delivery person must wear a CSA approved safety hat.

4.4 Hand Protection

Appropriate hand protection must be worn, according to the hazard; chemical, mechanical, physical, electrical or biological.

4.5 Fall Protection Equipment

Full body harnesses must be used where fall arrest is required. Safety belts are no longer acceptable as fall arrest protection but may be used as part of a fall prevention system.

4.6 Specialized Protective Equipment

Work situations may arise that require specialized protective equipment. Contractors are required to ensure workmen receive appropriate protective equipment such as breathing apparatus, personal monitoring equipment and special clothing identified as being necessary, at no additional cost to Nova Scotia Power Incorporated.

5.0 VEHICLES

5.1 All vehicles must be maintained in good, safe working order at all times.

5.2 The maximum speed limit on the construction Site is 30 km/h. Operators of vehicles must drive more slowly when weather conditions are not favourable.

5.3 All vehicles on-site are to have headlights on at all times when running.

5.4 Vehicles are to be "backed in" when they are being parked whenever possible.

5.5 Proper CSA approved motorcycle type helmets shall be worn when operating open All terrain vehicles and snowmobiles.

6.0 STAGING

6.1 The Contractor shall provide adequate staging as required for the Works.

6.2 Staging shall comply with the requirements of the Occupational Health and Safety Act and Construction Safety Regulations.

6.3 The Contractor shall ensure that all staging over 15 metres (50 feet) in height is designed and the Drawing stamped by a Professional Engineer registered in Nova Scotia.

7.0 LIFTING EQUIPMENT

7.1 All cranes including boom trucks shall be inspected and are to conform to CSA Z:150 codes. Hydraulic lifting devices shall be equipped with a fail safe system. An inspection report showing that all lifting equipment has been certified in the last year must be provided to the Owner's Representative on-site before that piece of equipment is used.

7.2 All mobile cranes, including boom trucks and excluding knuckle boom trucks, shall be equipped with anti blocking warning devices (high limit alarm). The crane operator shall be certified by Nova Scotia Labour and Workforce Development.

8.0 FALL PROTECTION

All Work will be conducted in accordance with applicable regulations as stated in the Fall Protection and Scaffolding Regulations (Province of Nova Scotia, January 1996) and Nova Scotia Power Safety Manual (1995 Edition). Anchor points, equipment to be used and a rescue plan shall be submitted to the Engineer for approval prior to Work beginning.

8.1 Personnel Qualifications

Only workers who have completed training course recognized by Nova Scotia Labour and Workforce Development on fall protection within the last 2 years are allowed to Work in areas were fall protection is necessary. The Engineer and Owner reserve the right to request a copy of the appropriate certification as verification that training is current.

9.0 INSPECTIONS AND AUDITS

9.1 A Nova Scotia Labour and Workforce Development inspector may make Site inspections. Deficiencies noted by the inspector will be rectified as soon as possible. Whenever possible, the Nova Scotia Power Incorporated Representative and a Representative of the Contractor will accompany the inspector on his/her inspections. A copy of the Inspector's report must be provided to the Nova Scotia Power Incorporated Representative.

9.2 The Nova Scotia Power Incorporated Site Representative will be inspecting the Site for safety deficiencies. The status of deficiencies will be reported to the Nova Scotia Power Incorporated Representative weekly. If deficiencies are not corrected by the Contractor or its subcontractors, Nova Scotia Power Incorporated reserves the right to correct the deficiencies and back charge the Contractor involved. Each Contractor is ultimately responsible for all subcontractor(s) working for them.

10.0 INCIDENT INVESTIGATION

10.1 Serious Injury or Fatality

10.1.1 In the event of a serious injury or fatality, the priority is the care of the victim(s).

10.1.2 Immediately after transport of any injured, the **area is to be secured and access restricted** to the Nova Scotia Power Incorporated Site Representative, Nova Scotia Power Incorporated Loss Control Consultant/Safety Officer, Contractor's Superintendent and Nova Scotia Labour and Workforce Development officials.

10.1.3 Serious incidents are to be **reported** to the Nova Scotia Power Incorporated Representative as soon as possible.

10.1.4 Responsibility for **notification of next of kin** of the Contractor's injured employees lies with the Contractor's superintendent (or delegate).

10.1.5 **The Nova Scotia Power Incorporated Representative** will report the incident to Nova Scotia Power Incorporated management and the Safety Officer / Loss Control Consultant for the area. The Nova Scotia Power Incorporated Claims Insurance Department (428-6208) will also be notified by Nova Scotia Power Incorporated.

10.2 Notification - of All Incidents

10.2.1 All Contractors are required, as a condition of Contract, to immediately report all incidents involving personal injury, property damage or electrical contact, to the Nova Scotia Power Incorporated Representative.

10.2.2 The Contractor is also responsible to report all injuries or medical treatments to Worker's Compensation, within 3 days.

10.3 Investigation Procedures - The following procedures are intended to be used when a Contractor is involved in a serious incident, which results in or, under slightly different circumstances, could have resulted in injury or property loss (i.e., high potential/near miss situations). The Nova Scotia Power Incorporated Representative will decide if an incident requires an incident investigation and inquiry.

10.3.1 The Nova Scotia Power Incorporated Representative will immediately advise the Contractor to convene an incident investigation and submit a report to Nova Scotia Power Incorporated within 24 hours.

10.3.2 The Nova Scotia Power Incorporated Representative will review the Contractor's report with other Nova Scotia Power Incorporated management and determine what further action is required. In most cases an inquiry will be held with the Contractor to review the details. The Nova Scotia Power Incorporated Representative will gather the appropriate people to conduct the inquiry.

10.3.3 The Contractor's investigation report will be reviewed at the inquiry and any additional information thought to be relevant to the incident will also be tabled for discussion.

10.3.4 Recommendations that are believed necessary to prevent a recurrence of the incident, will be tabled at the inquiry to ensure that all parties have a clear understanding of action which will be taken. This will include recommendations made in the Contractor's report and any additional recommendations decided at the inquiry.

10.3.5 An inquiry report will be prepared and circulated by the Nova Scotia Power Incorporated Representative to all inquiry participants, within 3 days of the meeting. Copies must be distributed to all inquiry participants, the Contractor (i.e., an official copy), to the Nova Scotia Power Incorporated management group affected by the incident, the Nova Scotia Power Incorporated Secretary and General Counsel and to the Loss Control Consultant/ Safety Officer.

10.3.6 The inquiry report will be distributed to Nova Scotia Power Incorporated bulletin boards. (The report may be the Contractor's original report, if it is found to be complete.)

11.0 SAFETY PERFORMANCE TRACKING AND CORRECTIVE PROCESS

11.1 If a Contractor's safety performance is not satisfactory or not in accordance with Nova Scotia Power Incorporated practices, the job may be shut down until the deficiency is removed, if deemed necessary by the Nova Scotia Power Incorporated Representative. Otherwise, the following procedure for correcting performance will be followed:

11.1.1 **On-Site Interview (Warning) -** Nova Scotia Power Incorporated local supervision and Contractor Supervision:

(a) List safety deficiencies, single significant event or series of less serious infractions.
(b) Provide specific corrective actions required and document.
(c) Acknowledgment by the Contractor and commitment to correct.
(d) Follow-up to confirm and document whether corrective actions are taken and safety performance is satisfactory.
(e) Copy of the 'On-Site Interview' will be forwarded to the Contractor's head office, by the Nova Scotia Power Incorporated Representative.

11.1.2 **Continued Unsatisfactory Performance** - written notice (to the Contractor's principal office)

(a) Define in detail the instances of continued unsatisfactory performance or failure to meet agreed corrective actions.
(b) Review commitment agreed to in the Site interview and which have not been met.
© Define specific improvements, which are required for the Contractor to attain an acceptable standard of safety performance. Including replacement of the supervisor(s) if necessary.
(d) Request an action plan from the Contractor, for raising safety performance to an acceptable level, to be submitted to and agreed to by Nova Scotia Power Incorporated within specified time period.
(e) Inform the Contractor of the consequences if the Contractor's performance continues to be substandard. These may include being removed from the Contract and removed from the bidder's list for future Contracts.
(f) Follow up and document.

11.1.3 **Further Unsatisfactory Performance** - high level interview (at the senior management level) to determine if the Contract will be allowed to continue and, if so, under what conditions. Where the Contract is allowed to continue under conditions, these conditions will be closely monitored to ensure they are complete.

11.1.4 **Contract Removal** - where the Contractor is unable or unwilling to meet the conditions agreed to the Nova Scotia Power Incorporated Representative will initiate removal of the Contractor from the Work and advise Manager of Purchasing

and Material Control to remove Contractor from the Nova Scotia Power Incorporated “Bidders List”. (See also Clause 11.0 Contractor Performance Evaluation of Section 01002).

APPENDIX 1
HAZARD/RISK ASSESSMENT AND JOB SAFETY PLAN

Development of a Hazard/Risk Assessment and Job Safety Plan

Hazard/Risk Assessment

By identifying hazards and risks, prior to Work commencing, a Job Safety Plan can be prepared. Following the Job Safety Plan can prevent injury, damage and ensure the job goes smoothly. The steps in the assessment are normally:

1. Identify the hazards involved in the environment the Work will be carried out; this includes physical environment such as space available, access, process lines, sources of energy, traffic, terrain, etc.

2. Identify the hazards involved in each of the tasks being performed as part of the job. This assessment must cover the overall job. Each major "sub-task" must also be assessed.

3. Analyse the risk involved with each of the identified hazards based on the severity of a potential incident and the likelihood of one happening. Note that hazards that may cause severe injury or damage must be considered **high risk**, even if they are unlikely to occur.

Job Safety Plan

The Job Safety Plan is a blue print for construction activity and will assist the constructor in scheduling, purchasing and supervising the construction. The steps normally include:

1. Develop controls to mitigate each of the identified hazards, applying more or less control, depending on the risk. The controls may include:

   (a) Engineering controls such as:
   - ➔ installing barriers
   - ➔ specialized tools and equipment
   - ➔ elimination of the source of the hazard

   (b) Administrative controls such as:
   - ➔ scheduling the job so that tasks are done at the least hazardous time
   - ➔ providing specialized training to those who will perform the task
   - ➔ using special procedures and codes of practice
   - ➔ providing for rest periods at regular intervals

   © Personal Protective Equipment such as:

➔ Hard hat	➔ Fall arrest harness	➔ Hearing protection
➔ Safety footwear	➔ Safety Glasses	➔ Fall Arrest System

2. Write a Job Safety Plan for the overall job and for each major "sub-task". Detail how the controls will be used to manage each identified hazard, to do the job safely.

3. Include your emergency response plan, should an incident happen, covering activities from the identification of the emergency to notification of Emergency Services, first aid for injured persons and other responses appropriate to the possible emergencies.

4. The plan includes all relevant policies, safe work practices, critical task procedures, company rules and the enforcement policy. Also include your observation/inspection process and enforcement policy.

Part 1 - General

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 – Summary of Work

.2 Section 01 14 00 – Work Restrictions

.3 Section 01 35 29.06 – Health and Safety

1.2 REFERENCE STANDARDS

.1 Canada Green Building Council (CaGBC)

.1 LEED Canada 2009 for Design and Construction-2010, LEED Canada 2009 for Design and Construction Leadership in Energy and Environmental Design Green Building Rating System Reference Guide

.2 U.S. Environmental Protection Agency (EPA)/Office of Water

.1 EPA 832/R-92-005-92, Storm Water Management for Construction Activities, Chapter 3.

.2 EPA General Construction Permit (GCP) - 2017.

1.3 DEFINITIONS

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit one copy of WHMIS SDS in accordance with Section 01 35 29.06 - Health and Safety.

.2 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review by Engineer.

.3 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.

.4 Address topics at level of detail commensurate with environmental issue and required construction task.

.5 Include in Environmental Protection Plan:

.1 Name of person responsible for ensuring adherence to Environmental Protection Plan.

.2 Name and qualifications of person responsible for manifesting hazardous waste to be removed from site.

.3 Name and qualifications of person responsible for training site personnel.

.4 Descriptions of environmental protection personnel training program.

.5 Erosion and Sediment Control (ESC) Plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with ESC Plan, Federal, Provincial and Municipal laws and regulations and EPA 832/R-92-005, Chapter 3.

.6 Drawings indicating locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.7 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.

.1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.

.8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.

.1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.

.9 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.

.12 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

1.5 FIRES

.1 Fires and burning of rubbish on-site are not permitted.

1.6 DRAINAGE

.1 Develop and submit ESC Plan identifying type and location of erosion and sediment controls provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with ESC Plan, Federal, Provincial, and Municipal laws and regulations EPA 832/R-92-005, Chapter 3.

.2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for ESC Plan.

.3 Provide temporary drainage and pumping required to keep excavations and site free from water.

.4 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.

.5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements and the Owner's regulatory compliance criteria.

1.7 MONITORING

.1 The water inlet point to the existing Lagoon will be the compliance monitoring point for water discharged from the Works. The regulatory limit for supended solids discharged from the Lagoon is 25 mg/L for a monthly average and 50 mg/L for any one grab sample. It is the Contractor's responsibility to ensure that any discharged water meets the required regulatory limits.

1.8 FLOCCULATION

.1 The Contractor shall be responsible to complete flocculation in the Lagoon as necessary. The methods for completing such flocculation should be included in the Contractor's Environmental Protection Plan and will be required to be complete the Works in accordance with the Contract Documents and regulatory authority requirements. As referenced in Section 1.7, the regulatory limit for suspended solids discharged from the Lagoon is 25 mg/L for a monthly average and 50 mg/L for any one grab sample.

1.9 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on-site and adjacent properties as indicated.

.2 Protect trees and shrubs adjacent to construction Work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m minimum.

.3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.

.1 Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Minimize stripping of topsoil and vegetation.

.5 Restrict tree removal to areas designated by Engineer.

1.10 WORK ADJACENT TO WATERWAYS

.1 Construction equipment to be operated on land only.

.2 Waterways to be kept free of excavated fill, waste material and debris.

1.11 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this Contract.

.2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.

.3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.12 **NOTIFICATION**

.1 Owner/Engineer will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection Plan.

.2 Contractor: after receipt of such notice, inform Owner/Engineer of proposed corrective action and take such action for approval by Owner/Engineer.

.1 Take action only after receipt of written approval by Owner/Engineer.

.3 Owner/Engineer will issue stop order of Work until satisfactory corrective action has been taken.

.4 No time extensions will be granted, or equitable adjustments allowed to Contractor for such suspensions.

Part 2 - Products

2.1 **NOT USED**

.1 Not Used.

Part 3 - Execution

3.1 **CLEANING**

.1 Leave Work area clean at end of each day.

.2 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

.3 Final Cleaning: upon completion remove Contractor facilities, rubbish, tools and equipment from site.

.4 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 - General

1.1 RELATED REQUIREMENTS

.1 Section 31 23 33.02 – Open Cut Excavation

.2 Section 31 05 16.03 – Low Permeability Fill

.3 Section 31 32 19.16 – Geotextile Soil Stabilization

1.2 MEASUREMENT PROCEDURES

.1 Type C-5 Clear Stone

.1 Measurement for supplying, placement and compaction of Type C-5 Clear Stone will be by the tonne placed within the limits specified for Type C-5 Clear Stone.

.2 Type C-3 Clear Stone

.1 Measurement for supplying, placement and compaction of Type C-3 Clear Stone will be by the tonne placed within the limits specified for Type C-3 Clear Stone.

.3 Type 1 Granular Material

.1 Measurement for supplying, placement and compaction of Type 1 granular material will be by the tonne placed within the limits specified for Type 1 granular material.

.4 Armour Stone

.1 Measurement for supplying and placement of armour stone in the construction of the 2 energy dissipation structures will not be performed as this will be a lump sum pay item.

.5 Weigh Scales

.1 The Contractor shall be responsible to provide truck weigh scales for weighing pervious fill material to be measured by the tonne. The weigh scales shall be approved, tested and certified by Industry Canada, Weights and Measures prior to use. Such scales may be subject to additional testing by Industry Canada, Weights and Measures as may be determined by the Engineer. A copy of scale certification will be provided to the Engineer 14 days prior to the supply of pervious fill to the Site.

.2 It is the Contractor's responsibility to operate and maintain the weigh scales in good working order. All costs related to the supply, installation, operating, testing, certification and maintenance of the weigh scales shall be included in the unit price for the materials to be weighed.

.3 The weigh scale truck slips shall show the gross and net (pay load) weights. A copy of the weigh scale truck slips shall be provided to the Engineer at the end of each day that weighed material is hauled to the Site. Failure to provide weigh slips will result in no payment for the material delivered.

1.3 PAYMENT

.1 Payment for pervious fill will include for all processing, transportation, weighing, placing and other measures specified to complete pervious fill.

.2 Payment for the Work of this Section will be made under the following items in the RFP table of Quantities and Prices:

.1 **Type C-5 - Clear Stone** will cover the supply, placement and compaction of Type C-5 Clear Stone.

.2 **Type C-3 - Clear Stone** will cover the supply, placement and compaction of Type C-3 Clear Stone.

.3 **Type 1 Granular Material** will cover the supply, placement and compaction of Type 1 Granular Material.

.4 **Armour Stone** will cover the supply and placement of Armour Stone at the 2 locations for the construction of the energy dissipation structures.

.5 **Quality Control** will cover all services of the Contractor's Quality Control Geotechnical Consultant required in accordance with the Specification for Quality Control. This item also includes the submittal of all written reporting.

1.4 REFERENCE STANDARDS

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM C117-17, Standard Test Method for Material Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C127-15, Standard Test Method for or Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.

.3 ASTM C131-20, Standard Test Method for Resistance to Degradation of Small size Coarse Aggregate by Abrasion and Impact in the Lost Angeles Machine.

.4 ASTM C136-19, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.5 ASTM D422-63(2007)e2, Standard Test Method for Particle-Size Analysis of Soils.

.6 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m^3).

.7 ASTM D1557-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN-m/m^3).

.8 ASTM D4318-17e1, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.9 ASTM D4791-19, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 Nova Scotia Transportation and Infrastructure Renewal (NSTIR)

.1 TM-1, Test Method for the Resistance of Coarse Aggregate to Degradation in the Micro Deval Apparatus.

.2 TM-3, Test Method for the Determination of Percent Fractured Particles in Processed Coarse Aggregate

.4 U.S. Environmental Protection Agency (EPA)/Office of Water

.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.5 **DEFINITIONS**

.1 Pervious fill shall consist of suitably graded granular materials, which shall be free-draining when compacted as specified. The Work of this Section includes all measures required for obtaining, processing, transporting, preparing foundations for, placing, controlling the moisture content of, and compacting pervious fill.

1.6 **EXTENT**

.1 The extent of pervious fill shall be as required to complete the Works in accordance with the Drawings and Technical Specifications.

.2 Pervious fill material will not be available at the Site.

1.7 **SUBMITTALS**

.1 Materials

.1 The Contractor shall, within 14 days after notification of acceptance of the Proposal, submit for the Engineer's approval the following:

.1 The source of the aggregate to be used for the various pervious fill material classifications of this Section.

.2 A sieve analysis of each classification of pervious fill of this Section together with a letter of certification by an approved testing and inspection agency, stating that the material meets the requirements of the Specification.

.3 Physical properties analysis of the source(s) of materials for the Work. These properties shall be consistent with Division 3, Section 2 Tables 3.2.2 and 3.2.3 of the Nova Scotia Transportation and Public Works Standard Specification for Highway Construction and Maintenance 2022 Version as available on the world wide web at http://www.gov.ns.ca/tran/publications.

Part 2 - Products

2.1 **MATERIALS**

.1 Pervious Fills – The pervious fills specified in this Section are classified as follows:

.1 Gravel/Clear Stone

.1 Gravel/clear stone shall consist of clean, hard, durable crushed angular screened rock; shall be obtained from approved sources; and shall be free from loam, roots, vegetable matter, shale, friable materials, frozen lumps or other unsuitable material. Rock from carbonate sources will not be suitable.

.2 All clear stone shall meet the following additional characteristics:

.1	Absorption	1.75% maximum (ASTM C127)
.2	LA Abrasion	40 % maximum loss (ASTM C131)
.3	Micro Deval	20% maximum loss (NSTIR)
.4	Specific Gravity	2.6 minimum
.5	Fracture Face	80% minimum (NSTIR)

.3 Materials that do not meet all the specified characteristics will not be acceptable for use.

.4 Gravel/Clear Stone shall be graded as follows:

.1 **Type C-5 Clear Stone**

Shall consist of clear stone from an approved source meeting the following grading limits based on a total sample.

.1	Passing 25 mm sieve	100%
.2	Passing 19 mm sieve	85 – 100%
.3	Passing 9.5 mm sieve	0 – 40%
.4	Passing 4.75 mm sieve	0 – 10%

.2 **Type C-3 Clear Stone**

Shall consist of clear stone from an approved source meeting the following grading limits based on a total sample.

.1	Passing 190 mm sieve	100%
.2	Passing 150 mm sieve	90-100%
.3	Passing 125 mm sieve	40-60%
.4	Passing 100 mm sieve	12-30%
.5	Passing 75 mm sieve	0-19%
.6	Passing 19 mm sieve	0-10%

.3 **Type 1 Granular Material**

Shall consist of crushed and screened pit gravel or crushed and screened rock from an approved source, with hard and durable stone particles, meeting the following grading limits.

.1	Passing 25 mm sieve	100%
.2	Passing 19 mm sieve	90-100%
.3	Passing 12.5 mm sieve	48-82%
.4	Passing 4.75 mm sieve	20-50%
.5	Passing 0.15 mm sieve	5-12%

.6 Passing 0.075 mm sieve 3-8%

.2 Armour Stone

.1 Armour stone shall consist of hard, durable, field or quarry stone, free from splits, seams or defects likely to impair its soundness during handling or by the actions of water and ice. Shale, slate, or rocks with thin foliations are not acceptable.

.2 All armour stone shall meet the following additional characteristics:

.1	Absorption	1.5% maximum (ASTM C127)
.2	LA Abrasion	35% maximum loss (ASTM C131)
.3	Specific Gravity	2.6 minimum

.3 Materials that do not meet all the specified characteristics will not be acceptable for use.

.4 Armour Stone shall be graded as follows

.1 **Armour Stone**

.1	Passing 450 mm size	100%
.2	Passing 400 mm size	0%

Part 3 - Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 PREPARATION

.1 Approval of areas to receive pervious fill shall be obtained immediately prior to commencing the placing of pervious fill in such areas.

3.3 PERFORMANCE

.1 Placing

.1 Pervious fill shall be placed and graded in approximately horizontal layers of uniform thickness. Unless otherwise specified, the thickness of layers after compaction shall not exceed 150 mm. Boulders having any dimension greater than two-thirds of the specified layer thickness after compaction, shall be removed prior to compaction.

.2 Pervious fill shall not be placed against structures until permission is obtained from the Engineer.

.3 Pervious fill shall be kept within 150 mm of the same elevation on both sides when placing adjacent to pipes or structures unless otherwise permitted by the Engineer.

.4 It is emphasized that Previous Fill shall not be placed in a frozen state, nor shall placed Pervious Fill be subjected to freezing conditions until backfilling is complete. No separate additional payment will be made for the costs of complying with these requirements.

.2 Degree of Compaction

.1 Unless directed otherwise by the Engineer, the density of pervious fill material shall be not less than 98% of the optimum dry density as determined by ASTM D698 (Standard Proctor). Where the use of clear stone is used compaction will be limited to visual review by the Engineer.

.2 If the specified compaction is not achieved initially, the pervious fill shall be compacted by additional passes of approved compaction equipment and/or by adjustment of the moisture content and the thickness of the layer until the specified density is obtained.

.3 When space will not permit the use of rollers, other types of approved vibratory equipment shall be used to compact pervious fill to the same degree as specified for compaction by rollers. Thinner lifts may be required to achieve the specified compacted effort.

.3 Compaction Equipment

.1 Each layer of pervious fill shall be compacted by not less than two complete passes of an approved vibratory roller, vibratory plate or mechanical tamper. The size, type and efficiency of the compactor used shall take into consideration the access available and the structures adjacent to the fill being compacted.

.2 The most efficient compactor, which will give the required degree of compaction and not endanger the structures adjacent to the fill being compacted, shall be used.

.3 The Contractor shall select the sizes and types of compaction equipment to be used and shall demonstrate on the Site that the equipment selected is capable of efficiently obtaining the specified degree of compaction.

.4 The types, sizes and efficiency of the compactors used shall be subject to the approval of the Engineer.

3.4 FIELD QUALITY CONTROL

.1 Quality Control by the Contractor’s Quality Control Geotechnical Consultant

.1 The Contractor will select samples of uncompacted fill intended for the Works and samples of compacted fill in the Works. Such samples shall be provided free of charge to the Owner.

.2 The Contractor's Quality Control Geotechnical Consultant will perform tests in the field and in the laboratory on samples of uncompacted and of compacted fill to determine if such materials meet the requirements of this Specification, and except as otherwise specified, such tests will be at the Contractor's expense. Copies of the Contractor's Quality Control Geotechnical Consultant's test reports will be supplied to the Engineer on request.

.3 The Engineer may at any time specify additional measures to be taken to ensure that the pervious fill will meet the requirements of this Specification.

.4 No separate payment will be made for additional measures taken unless the Contractor has given notice in writing to the Engineer of intent to claim for additional payment for such measures, and the results from laboratory tests on fill samples show that such additional measures were unnecessary. Payment for such Work will be made as Extra Work based on Equipment Rental Rates and Labour Rates provided by the Proponent.

.2 Additional Measures to Adjust Gradation

.1 In the case of fill that does not have the specified gradation, additional measures which may be specified to adjust the gradation include:

.1 Adjusting the method of processing for materials specified to be processed.

.3 Frequency of Testing by the Contractor's Quality Control Geotechnical Consultant

.1 At least one particle size analysis and standard proctor will be completed for each significant change in material being used for pervious fill.

.2 For all clear stone provided, the Contractor will complete at least one physical property test on the source materials per source. Due to the volume of material necessary to complete the Project, the Owner/Engineer understands that several source pits may be necessary to supply the Project. However, it is reasonable that a maximum of two source locations should suffice for the Project.

END OF SECTION

Part 1 - General

1.1 RELATED REQUIREMENTS

.1 Section 31 05 16.01 – Pervious Fill

.2 Section 31 05 16.03 – Low Permeability Fill

.3 Section 31 23 33.02 – Open Cut Excavation

.4 Section 31 32 19.16– Geotextile Soil Stabilization

1.2 MEASUREMENT PROCEDURES

.1 Common Fill

.1 Measurement for common fill will be the volume placed after stripping, if required, to increase the grade up to the design subgrade and for the construction of the new drainage swale. This measurement will include for all transportation (including import from other on-site locations), placing and measures required to complete the compaction of common fill measured under this Paragraph 1.2.1.1.

1.3 PAYMENT

.1 Payment for the Work of this Section will be made under the following items in the RFP table of Quantities and Prices:

.1 **Common Fill** will cover the retrieval, transport, placement and compaction of Common Fill. (The excavation and stockpiling of the common fill is included in the payments for Open Cut Excavation).

.2 **Quality Control** will cover all services of the Contractor's Quality Control Geotechnical Consultant required in accordance with the Specification for Quality Control. This item also includes the submittal of all written reporting.

1.4 REFERENCE STANDARDS

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM C117-17, Standard Test Method for Material Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C127-15, Standard Test Method for or Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.

.3 ASTM C131-20, Standard Test Method for Resistance to Degradation of Small size Coarse Aggregate by Abrasion and Impact in the Lost Angeles Machine.

.4 ASTM C136-19, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.5 ASTM D422-63(2007)e2, Standard Test Method for Particle-Size Analysis of Soils.

.6 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m^3).

.7 ASTM D1557-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN-m/m^3).

.8 ASTM D4318-17e1, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.9 ASTM D4791-19, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 U.S. Environmental Protection Agency (EPA)/Office of Water

.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.5 **DEFINITIONS**

.1 Common fill shall consist of otherwise unclassified random materials used as fill. The Work of this Section includes all measures required for obtaining, preparing foundations for, placing, controlling the moisture content of, and compacting common fill.

1.6 **EXTENT**

.1 Common fill is required for, but not necessarily limited to, the following locations.

.1 Shaping the pile to prepare for the liner system and the drainage ditch.

1.7 **JOB CONDITIONS**

.1 Placing Requirements

.1 Placing of common fill shall be suspended when, in the opinion of the Engineer, climatic conditions are unsatisfactory for placing fill to conform to this Specification.

.2 Common fill shall not be placed while either the material to be placed or the surface of material already in place is frozen.

.3 After the occurrence of heavy rains, equipment shall not be operated on the fill until the fill has dried sufficiently to prevent the occurrence of excessive rutting.

Part 2 - Products

2.1 **MATERIALS**

.1 Common Fill

.1 Common fill shall be any material approved by the Engineer selected from the excavation for the Works, and/or on site borrow area, which is to be used in reshaping the pile and new ditch construction and shall be free from loam, roots, vegetable matter or other unsuitable material.

.2 It is emphasized that frozen material will not be accepted as Common Fill. Should suitable material, as determined by the Engineer, be unobtainable on-site, such material as is acceptable to the Engineer for use as Common Fill shall be imported from off-site by the Contractor. The imported fill shall be paid for on a unit rate basis as negotiated with the Owner for this item.

Part 3 - Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 PERFORMANCE

.1 Placing

.1 Common fill shall be placed in continuous approximate horizontal layers of uniform thickness. Unless otherwise specified, the thickness of the layers shall not exceed 300 mm before compaction. Each layer shall be free of boulders and cobbles having a dimension greater than two-thirds of the uncompacted layer thickness.

.2 Common fill shall be kept within 150 mm of the same elevation on both sides when backfilling pipes and walls, unless otherwise permitted by the Engineer.

.3 Common fill shall not be placed against structures until the Engineer's permission has been obtained.

.4 It is emphasized that Common Fill shall not be placed in a frozen state, nor shall placed Common Fill be subjected to freezing conditions until backfilling operations are complete. No separate additional payment will be made for the costs of complying with these requirements.

.2 Degree of Compaction

.1 Unless directed otherwise by the Engineer, the density of common fill material shall be not less than 98% of the optimum dry density as determined by ASTM D698 (Standard Proctor).

.2 If the specified compaction is not achieved initially, the common fill shall be compacted by additional passes of approved compaction equipment and/or by adjustment of the moisture content and the thickness of the layer until the specified density is obtained.

.3 When space will not permit the use of rollers, other types of approved vibratory equipment shall be used to compact pervious fill to the same degree as specified for compaction by rollers. Thinner lifts may be required to achieve the specified compacted effort.

.3 Compaction Equipment

.1 Each layer of pervious fill shall be compacted by not less than two complete passes of an approved vibratory roller, vibratory plate or mechanical tamper. The size, type and efficiency of the compactor used shall take into consideration the access available and the structures adjacent to the fill being compacted.

.2 The most efficient compactor, which will give the required degree of compaction and not endanger the structures adjacent to the fill being compacted, shall be used.

.3 The Contractor shall select the sizes and types of compaction equipment to be used and shall demonstrate on the Site that the equipment selected is capable of efficiently obtaining the specified degree of compaction.

.4 The types, sizes and efficiency of the compactors used shall be subject to the approval of the Engineer.

3.3 FIELD QUALITY CONTROL

.1 Quality Control by the Contractor

.1 The Contractor will engage a certified Quality Control Geotechnical Consultant to perform tests in the field and in the laboratory on samples of uncompacted and of compacted Common Fill to determine if such materials meet the requirements of this Specification, and except as otherwise specified, such tests will be at the Contractor’s expense. Copies of the Contractor’s test reports will be supplied to the Engineer on request.

.2 The Engineer may at any time specify additional measures to be taken to ensure that the common fill will meet the requirements of this Specification.

.3 No separate payment will be made for additional measures taken unless the Contractor has given notice in writing to the Engineer of intent to claim for additional payment for such measures, and the results from laboratory tests on fill samples show that such additional measures were unnecessary. Payment for such Work will be made as Extra Work based on Equipment Rental Rates and Labour Rates provided by the Proponent.

.2 Additional Measures to Increase Density

.1 In the case of Common Fill that does not have the specified density, additional measures, which may be specified to increase the density include:

.1 Compacting with additional passes of the roller;

.2 Adjusting moisture content of the fill prior to recompacting; and

.3 Reducing the thickness of the layer prior to recompacting.

.3 Frequency of Testing by the Contractor

.1 Frequency of testing for density/moisture by nuclear densometer and grain size for Common Fill to be consistent with Low Permeability Fill (refer to Section 31 05 16.03 – Low Permeability Fill, Article 3.4.2).

.2 At least one particle size analysis and standard proctor will be completed for each significant change in material being used for common fill.

.4 Method of Testing by the Contractor

.1 The optimum dry density of common fill will be determined in accordance with the applicable ASTM and NSTIR Standards of Article 1.4 of this Section.

END OF SECTION

Part 1 - General

1.1 RELATED REQUIREMENTS

.1 Section 31 05 16.01 – Pervious Fill

.2 Section 31 05 16.02 – Common Fill

.3 Section 31 23 33.02 – Open Cut Excavation

.4 Section 31 32 19.16 – Geotextile Soil Stabilization

1.2 MEASUREMENT PROCEDURES

.1 Low Permeability Fill

.1 At the completion of the preparation of the subgrade foundation for the low permeability fill, the Contractor shall take and record longitudinal sections and cross-sections to determine the form and elevations of the foundation ground surface utilizing a GPS Survey System. A further series of sections shall be taken utilizing a GPS Survey System at the completion of low permeability fill placement. All such sections will be checked by the Engineer and mutually agreed upon between the Contractor and the Engineer and shall not thereafter be subject to dispute. Measurement for payment of low permeability fill will be the volume determined from the above initial and final sections for low permeability fill placed in accordance with the lines and grades as shown on the Drawings and as specified by the Engineer. This measurement will include for all necessary excavation, processing, hauling, foundation preparation, placing, compaction and all other measures specified to complete this Work.

.2 No measurement will be made for specified services performed by the Contractor's Quality Control Consultant. The Contractor shall enter a lump sum price under the appropriate pay item in the Table of Quantities and Prices.

1.3 PAYMENT

.1 Payment for the Work of this Section will be made under the following items in the RFP table of Quantities and Prices:

.1 **Low Permeable Fill** will cover the supply, processing, transportation, foundation preparation, placement and compaction of low permeability fill as specified.

.2 **Quality Control** will cover all services of the Contractor's Quality Control Geotechnical Consultant required in accordance with the Specification for Quality Control. This item also includes the submittal of all written reporting.

.2 No separate payment will be made for subgrade preparation including excavation, shaping, and compaction required prior to placement of the low permeability fill. This will be paid under Open Cut Excavation and Common Fill pay items.

1.4 REFERENCE STANDARDS

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM C117-17, Standard Test Method for Material Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C136-19, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D422-63(2007)e2, Standard Test Method for Particle-Size Analysis of Soils.

.4 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m^3).

.5 ASTM D1557-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN-m/m^3).

.6 ASTM D2216-19, Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.

.7 ASTM D4318-17e1, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.8 ASTM D5084-16a, Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.

.9 ASTM D6938-17ae1, Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 U.S. Environmental Protection Agency (EPA)/Office of Water

.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.5 DEFINITIONS

.1 Low Permeability Fill shall consist of a mixture of suitable soil materials which shall form an effective seepage barrier, having an in-place permeability of less than 1.0 X 10^{-6} cm/s when compacted as specified.

.2 The Work of this Section includes all measures required for obtaining, processing, transportation, preparing foundations, placing, controlling the moisture content of, compacting, and testing, a low permeability fill liner.

1.6 **EXTENT**

.1 Low Permeability Fill is required for, but not necessarily limited to the following areas.

.1 The NSPI Point Aconi Ash Management Capping Area as indicated on the Drawings.

1.7 **SOURCES OF MATERIAL**

.1 The Contractor shall be responsible to obtain a source of Low Permeability Fill material off-site from the NSPI Point Aconi Ash Management site. The Contractor shall provide the Engineer with geotechnical data sufficient to establish that their source of low permeability fill has the quality and quantity necessary to carry out the Works in accordance with the Specifications.

1.8 **SUBMITTALS**

.1 At the time of submitting this Proposal, the Contractor shall submit in writing the proposed source of the Low Permeability Fill for the Works.

.2 At the time of submitting this Proposal, the Contractor shall submit documentation that the geotechnical consultant company has agreed to perform Quality Control services for the Contractor as detailed in the Technical Specifications. The qualifications and experience of the geotechnical consultant company’s engineer and field technicians shall be submitted with the Proposal submissions for review and approval.

.3 At the time of submitting this Proposal, the Contractor shall submit in writing a detailed Quality Control Inspection and Test Program to directly monitor and control the quality of the Low Permeability Fill source, as referenced in Article 1.10of this Section.

.4 The Contractor shall, within 14 days after notification of acceptance of the Proposal, submit for the Engineer's approval a geotechnical engineering report providing sufficient investigation and testing data to establish that the proposed source of the Low Permeability Fill has the quality and quantity necessary to complete the Works in accordance with the Technical Specification.

.5 The Engineer's approval of the source does not relieve the Contractor of their responsibility to provide a suitable quality and quantity of low permeability fill for the Works.

1.9 **JOB CONDITIONS**

.1 Climate Restrictions

.1 Low Permeability Fill placement operations shall be suspended whenever, in the opinion of the Engineer, climatic conditions are unsatisfactory for placing fill to conform to this Specification. Examples of unsatisfactory conditions include, but are not limited to, frozen soil and excessively wet or dried soil.

.2 After the occurrence of heavy rains, equipment shall not be operated on the Low Permeable Fill until the fill has dried sufficiently to prevent the occurrence of excessive rutting.

.2 Protection

.1 Surfaces of Low Permeability Fill shall be kept crowned or sloped with grades not less than 3% so that the surface will drain freely.

.2 Immediately prior to the suspension of fill operations, the entire top surface of fill under construction shall be rolled with a rubber tired or steel drum roller so as to leave the area in a smooth, even condition for drainage. Suitable equipment shall be provided on Site at all times for this purpose.

.3 Unprotected fill areas shall be kept moist at all times to prevent desiccation and subsequent cracking until a protective geotextile or stone covering is applied.

.4 The Contractor shall plan the Work to minimize sediment laden discharge from the Work Site. Exposed areas of construction, including areas that have been stripped, under construction, complete, but not covered by a geotextile or pervious fill protective layer, or where fill is spread out for drying shall not exceed 3.0 hectares in total at any one time.

1.10 QUALITY CONTROL

.1 For the purpose of this Specification, Quality Control shall be defined as a planned system of inspections and tests carried out by the Contractor's Geotechnical Consultant to directly monitor and control the quality of the Low Permeability Fill Source.

.2 The Contractor shall submit a detailed Quality Control, Inspection and Test Program as part of the Proposal. This submission shall outline the related experience of the Contractor’s Geotechnical Consultant and their field technicians in carrying out inspection and testing on similar low permeability fill/liner projects.

.3 Quality Control of Low Permeability Fill material shall be based on, but not necessarily limited to, the following minimum procedures and criteria:

.1 The Contractor shall employ an independent geotechnical company that can supply the qualified personnel and equipment necessary to perform the required tests as defined in this Specification.

.2 The independent geotechnical company shall perform all required tests on the proposed borrow site for the low permeability fill material. The results of these tests shall be submitted to the Contractor and the Engineer for approval 14 days prior to the material being used for construction of the low permeability fill liner.

.3 The average results of any 10 consecutive density tests as defined in this Specification shall be equal to or greater than the specified density.

.4 Results of not more than two in any 10 consecutive density tests as defined in this Specification may be less than the specified density.

.5 Average of results of any 10 consecutive moisture content tests as defined in this Specification shall lie within the specified moisture content limits.

.6 Results of not more than two in any 10 consecutive moisture content tests as defined in this Specification may lie outside the specified moisture content limit.

.7 Permeability evaluated from results of tests as defined in this Specification shall be equal to or less than the specified permeability.

.8 Average of results of any 10 consecutive grain size tests as defined in this Specification shall be within the specified limits for grain size gradation.

.9 Average of results of any 10 consecutive Atterberg Limit tests as defined in this Specification shall be within the specified limits for liquid limit and plasticity index.

Part 2 - Products

2.1 MATERIALS

.1 Low Permeability Fill shall consist of suitable mixtures of clay, silt, sand and gravel obtained from the Contractor's approved source. The mixture shall have an in-place hydraulic conductivity of less than 1×10^{-6} cm/sec and be capable of supporting heavy earth moving equipment without producing excessive rutting when compacted as specified. In-situ and ex-situ testing of permeability must be completed to conform with the Quality Control Plan. Ex-situ testing must consist of representative samples. Reworked materials testing will not be considered acceptable by the Engineer.

.2 Highly plastic clay will not be accepted as Low Permeability Fill material.

.3 The maximum size of clods, or any cluster of particles bound in a fine grained matrix, shall be 50 mm.

.4 The Low Permeability Fill shall be free from all organic matter, or other unsuitable material as determined by the Engineer.

.5 Grain size of the Low Permeability Fill shall be determined in accordance with ASTM D422 and shall conform to the following:

.1	Maximum Particle Size:	50 mm
.2	Minimum Passing 4.75 mm sieve:	75% by dry weight
.3	Minimum Passing 0.075 mm sieve:	40% by dry weight

.6 The minimum Atterberg Limits of the Low Permeability Fill shall be determined in accordance with ASTM D4318 and shall conform to the following:

.1	Plastic Limit:	15%
.2	Liquid Limit:	22%
.3	Plastic Index:	5%

.4 Plasticity Index shall be above the "A" line as defined by the Unified Soil Classification System.

Part 3 - Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 PREPARATION

.1 Foundations

.1 The excavated surface, forming the foundation material, shall be prepared to accept the low permeability fill liner. Prior to placing the Low Permeability Fill, the graded and compacted surface of the foundation material shall be disced or scarified to a depth of 100 mm and shall have its moisture content brought to within the range specified for Low Permeability Fill and shall be compacted as specified for the Low Permeability Fill under Clause 3.3.4. Areas exhibiting unsatisfactory bearing shall be excavated and replaced with competent material and compacted as specified under Clause 3.3.4.

.2 Sides of stump holes, test pits and other cavities in foundation material shall be flattened to slopes not more than 4 to 1, horizontal to vertical, and all loose material, standing water, saturated soil, etc., shall be removed. Any measures which, in the opinion of Engineer, are necessary to ensure satisfactory bonding and homogeneity between fill lifts shall be taken.

.3 During the Work, whenever the surface of the Low Permeability Fill layer already in place becomes drier than the range specified in Clause 3.3.3 or too smooth to bond properly with the succeeding layer, or whenever fill placing operations resume after a suspension, the fill surface in place shall be disced or scarified to a depth of 100 mm, and shall be recompacted at the specified moisture content.

.4 The Engineer's approval of prepared foundations shall be obtained immediately before they are covered by permanent material.

3.3 PERFORMANCE

.1 Placing

.1 Low Permeability Fill shall be placed to the lines and grades as shown on the Drawings, as specified in the Technical Specification and as directed by the Engineer.

.2 Low Permeability Fill shall be placed in continuous layers of uniform thickness. Unless otherwise specified, the thickness of layers after compaction shall not exceed 200 mm.

.3 A heavy static load, kneading type compactor and a smooth vibratory drum or rubber tired compactor shall be used for this Work.

.4 The smooth vibratory drum or rubber tired compactor shall:

.1 weigh a minimum of 12 tonnes; and

.2 be a minimum width of 2.5 metres.

.5 On slopes, the Low Permeability Fill material shall be placed and compacted in lifts parallel to the fall of the slope. On top sections the fill material shall be placed and compacted in nearly horizontal lifts.

.6 Hauling equipment shall travel in a direction parallel to the fall of the slope and no roads or tracks shall be formed across it unless authorized by the Engineer. Vehicles and machines shall not follow each other in the same paths but shall spread their tracks over the surface of the fill.

.7 During compaction operations, turning of equipment shall be performed carefully to ensure uniform compaction.

.8 Openings through the embankment and the ends of any unfinished sections shall not be steeper than 4 to 1, horizontal to vertical.

.9 Prior to placing Low Permeability Fill material, all organic debris, foreign particles, or other underground material shall be removed from the foundation surface.

.10 Low Permeability Fill material shall be kept free from lenses, pockets, and layers of pervious material.

.11 Alternate trips of compactors shall be slightly different in length and shall overlap on successive trips by at least one-half of the width of the kneading type compactor.

.12 Compaction of crowned sections shall start at the bottom by rolling at the sides and proceed toward the center of the crowned section.

.13 After compaction of a lift is completed, the surface shall be smoothed using a rubber-tired or steel drum roller to provide protection against over moistening during a rainfall, and provide a smooth surface so that construction quality control tests can be made.

.14 Low permeability fill shall not be placed against structures until permission is obtained from the Engineer.

.2 Field Test Strip

.1 The Contractor shall construct a Low Permeability Fill field test strip prior to placement of the Low Permeability Fill. The test strip should be sized such that it has a width of at least four times the width of the compactor and a length equal to at least eight times the width of the compactor. The test strip is intended to be used to demonstrate and verify that the materials, equipment, placement methods and compaction intended to be utilized by the Contractor, results in placed low permeability fill meeting the performance requirements of this Technical Specification.

.2 As a minimum, the test strip physical parameters to be tested in the laboratory shall include grain size, moisture content, Atterberg Limits, moisture density relationships and hydraulic conductivity. Compacted in-situ density and permeability shall be measured on the test strip in the field.

.3 Placement of Low Permeability Fill shall not commence until the Contractor provides reporting on the test strip analysis and testing establishes, to the satisfaction of the Engineer, that satisfactory material, equipment, placement procedures and methods have been determined for the Work

.3 Moisture Control

.1 Moisture content at the time of compaction, throughout each layer of low permeability fill, shall be between 1 and 4% above the optimum Proctor moisture content as determined by ASTM D2216, unless otherwise specified by the Engineer.

.4 Degree of Compaction

.1 Low Permeability Fill, except as otherwise specified, shall be compacted to meet the following requirements.

.1 If the moisture content is 1 to 2% above the optimum Proctor value, compaction shall be to at least 100% of the optimum dry density as determined by ASTM D698 (Standard Proctor). If the moisture content exceeds +2% of the optimum value, compaction shall be to at least 95% of optimum dry density as determined by ASTM D698 (Standard Proctor).

.2 Each layer shall receive at least 10 complete passes of an approved compactor travelling at not more than 4.5 km/h. The Engineer will determine if additional compaction passes are needed.

.3 Layers shall be bonded to each other to form a single homogeneous low permeability mass of uniform density and moisture content.

.2 Where, in the opinion of the Engineer, the use of a larger compactor is not practicable, or a bond is required between fill and a structure, or there is a need to protect surfaces from damage, Low Permeability Fill shall be compacted using hand operated power tampers or other compaction equipment approved by the Engineer. Compaction shall be to the same degree as specified for the large compactors.

.3 Achievement of the specified compaction level shall not constitute acceptance of the low permeability fill liner construction. **Permeability testing shall govern final acceptance of the constructed low permeability fill liner.**

3.4 FIELD QUALITY CONTROL/ASSURANCE

.1 Quality Control by the Contractor

.1 The Contractor shall ensure the Geotechnical Consultant, noted under Article 1.10, is retained upon award of this Contract to monitor the Contractor's source of Low Permeability Fill to ensure it meets the project Specifications.

.2 Final acceptance of the Low Permeability Fill liner will be based on Quality Control testing.

.3 The Engineer may at any time specify additional measures to be taken to ensure that the Low Permeability Fill will meet the requirements of this Specification.

.4 No separate payment will be made for additional measures taken unless the Contractor has given notice in writing to the Engineer of intent to claim for additional payment for such measures, and the results from laboratory tests of fill samples show that such additional measures were unnecessary. Payment for such Work will be made as Extra Work based on Equipment Rental Rates and Labour Rates provided by the Proponent

.2 Frequency of Quality Control

.1 Testing shall be performed in accordance with the following minimum schedule:

Item	**Testing**	**Frequency**
Low Permeability Fill prior to placement	Grain Size	750 m^3 or minimum of one per day of placement
	Moisture Content	75 m^3
	Atterberg Limits (Liquid Limit and Plasticity Index)	750 m^3 or minimum of one per day of placement
	Specific Gravity	Once in first day of placement
	Moisture-Density Curve	1,500 m^3 or minimum of one every 3 days of placement
	Lab Hydraulic Conductivity (Remolded Samples)	Once at start of job, three test prior to placement.
In place Low Permeability Fill and test pads	Density/Moisture by Nuclear Densometer	Every 200 m^2 of exposed lift surface
	Moisture Content (oven dry)	30% of nuclear density test
	Atterberg Limits (Liquid Limit and Plasticity Index)	Two tests/hectare/lift (750 m^3)
	Specific Gravity	Two tests per lift
	Grain Size (to the 2-	1500 m^3 or a minimum

	micron particle size)	of one per week of placement
	Laboratory Permeability	Eight tests/lift - undisturbed Shelby sample per ASTM D5084

.3 Method of Testing

.1 The maximum density of Low Permeability Fill and the optimum water content for compaction will be determined in accordance with ASTM D698, Method D.

.2 Field density tests determined using the ASTM D2922 (Nuclear Method) will be correlated in the field.

.3 Particle size analysis will be performed in accordance with ASTM D422, ASTM D1140 and ASTM D4221 modified as required to suit the soil tested.

.4 Samples for hydraulic conductivity testing of the compacted fill shall be collected in thin walled Shelby tubes from the compacted fill and tested in the laboratory. Confining pressure during the permeability testing will be equal to the applicable surcharge load.

.5 In-situ permeability shall be determined by continuous testing of hydraulic conductivity by double ring infiltrometer apparatus (ASTM D3385), air entry infiltrometer apparatus and sealed single ring infiltrometer apparatus.

.4 Measures to Increase Density

.1 In the case of fill that does not have the specified density, additional measures, which may be specified to increase the density, include:

.1 Compacting with additional passes of the compactor;

.2 Adding ballast to compactor equipment to the maximum capacity specified by the compactor manufacturer;

.3 Adjusting moisture content of the fill prior to recompacting, provided it remains within the limits specified in Clause 3.3.3; and

.4 Reducing the thickness of the layer prior to recompacting.

.5 Measures to Lower Moisture Content

.1 In the case of fill which is too wet, additional measures which may be specified to lower the moisture content include:

.1 Aerating by discing, harrowing, scarifying or other suitable means to facilitate drying. This applies to compacted wet fill and to uncompacted wet fill spread on compacted fill; and

.2 Mixing wet fill with fill having a lower moisture content.

.6 Measures to Increase Moisture Content

.1 Moisture content shall be controlled in the stockpile or the automatic mixing plants prior to placement.

.2 In the case of fill that has dried due to weather, additional measures, which may be specified to raise the moisture content, include:

.1 Sprinkling with water by approved methods, the previously compacted layer immediately before placing and compacting the next layer; and

.2 Sprinkling with water the newly spread layer of fill and discing, harrowing or scarifying before compaction.

.7 Measures to Adjust Gradation

.1 In the case of fill that does not have the specified gradation, additional measures, which may be specified to adjust the gradation, include:

.1 Adjusting the method of processing, for materials specified to be processed; and

.2 Mixing new fill with the fill tested.

END OF SECTION

Part 1 - General

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 – Summary of Work

.2 Section 01 14 00 – Work Restrictions

.3 Section 01 35 29.06 – Health and Safety

.4 Section 01 35 43 – Environmental Procedures

1.2 MEASUREMENT PROCEDURES

.1 Original and Excavated Ground Surfaces.

.1 After removal of any trees/shrubs and the vegetation layer, including the use of a root rake to remove any root systems in the area to be capped, and before starting the excavation Work, the Contractor shall take and record longitudinal sections and cross-sections to determine the form and elevations of the ground surfaces. A further series of sections shall be taken at appropriate times to record the extent and depth of excavation. All such sections will be checked by the Engineer and mutually agreed upon between the Contractor and Engineer and shall not thereafter be subject to dispute. Such sections will be used to check compliance with this Specification and as the basis for measurement of excavation paid on a unit basis. Methods of measurement will be governed by this Specification.

.2 Open Cut Excavation (Class “A”)

.1 Measurement for open cut excavation paid on a unit basis will be the volume contained within the actual excavation lines and below ground surface recorded in accordance with Section 1.2.1.1 above, when the specified payment limits are not exceeded. When payment limits are exceeded, the measurement will be the volume contained within the specified excavation limits and the recorded ground surface.

.3 Stripping

.1 A separate measurement will be made for stripping the vegetation layer which is to also include the removal of any existing trees and shrubs. Stripping will also include the utilization of a root rake to remove any and all tree/shrub roots from the area identified to be capped. Payment for this Work will be the square metre over the total area to receive the engineered cap.

.4 Proof Rolling, Cleaning and Preparation of Excavation Surfaces

.1 Proof rolling, cleaning and preparation of excavation surfaces is considered incidental to the Work and will not be measured.

.5 Measurement for tie in to Existing Geosynthetic Clay Liner (GCL)

.1 There will be some work to excavate the vegetative layer, geotextile, drainage stone, and plywood (where located) on the existing capped area where the existing GCL is to be lapped with the new GCL to be installed under this Project. Measurement will be by the square metre.

1.3 PAYMENT

.1 Payment for the Work of this Section will be made under the following items in the Table of Quantities and Prices:

.1 **Class "A" Excavation** – Will cover open cut excavation, Class "A", including reshaping of the existing pile, compaction and the disposal of surplus/unsuitable materials in designated areas.

.2 **Stripping** – Will cover the removal and on-site disposal of any trees/shrubs and the vegetation layer, including roots, from the total area to receive the engineered cap.

.3 **Tie in to Existing GCL** – Will cover the excavation of the existing vegetative layer, geotextile, drainage layer, and plywood (where located) to expose the existing GCL and the preparation of the existing GCL to provide the lapping area for the new GCL product to be installed.

.2 No separate payment will be made for proof rolling, cleaning and preparation of excavation surfaces.

.3 The Contractor is responsible to establish an access road to the area to be capped and for the maintenance of the access road to the borrow and disposal areas as indicated by the Engineer. All access roads must be passable at all times with a non four-wheel drive pick-up truck safely. There will be not separate payment for this activity. Also the Contractor will be responsible to establish built up travel routes for heavy loads over placed GCL material to prevent damage to said materials. Lighter equipment that can distribute weight is to be utilized to spread materials.

1.4 REFERENCE STANDARDS

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM C117-17, Standard Test Method for Material Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C136-19, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D422-63(2007)e2, Standard Test Method for Particle-Size Analysis of Soils.

.4 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m^3).

.5 ASTM D1557-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN-m/m^3).

.6 ASTM D4318-17e1, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 U.S. Environmental Protection Agency (EPA)/Office of Water

.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.5 DEFINITIONS

.1 Open Cut Excavation shall consist of the excavation and removal of materials to accommodate the Works.

.2 Material from Open Cut Excavations shall be classified as follows:

.1 Class “A” material shall mean any material that does not require breaking with a hydraulic hammer for excavation but may require ripping.

1.6 SUBMITTALS

.1 Proposed Methods of Excavation

.1 The Contractor shall prepare and submit in writing a detailed plan of the proposed methods and sequence of excavation for the Engineer to review.

.2 The Engineer will advise the Contractor in writing of the Engineer’s comments regarding the plan. If the plan is rejected, a new plan in whole or in part shall be submitted by the Contractor. No excavation shall be carried out in an area for which the plan has not been approved by the Engineer.

.3 If, at any time in a specific area, a plan that has been previously accepted does not produce conditions in accordance with these Specifications, the Contractor shall submit a revised plan to the Engineer and modify the plan to the satisfaction of the Engineer, all at no additional cost to the Owner.

1.7 QUALITY CONTROL

.1 Allowable Tolerances

.1 All excavation shall be to the lines, grades and dimensions as specified on the Drawings and shall be to the approval of the Engineer. Such lines, grades and dimensions will be referred to hereafter as excavation limits.

.2 Excavation limits shall be considered payment limits unless otherwise specified.

.3 Excavation beyond the specified payment limits will not be measured, unless directed by the Engineer. If, according to the Engineer, fill or other approved material has to be placed in over excavated areas, or if other remedial measures are required due to unauthorized over excavation, no separate payment will be made for such Work.

1.8 **JOB CONDITIONS**

.1 Protection

.1 Stability of excavations shall be ensured by shoring excavations or excavating to acceptable slopes where necessary and by taking any other measures that may be required. Unless otherwise specified, no separate payment will be made for such Work.

.2 When excavating Class "A" material, all necessary precautions shall be taken to minimize excavating beyond the excavation limits and to preserve all material beyond the excavation limits in the soundest possible condition. All loose and shattered material and overhangs shall be removed.

.3 Excavation in the vicinity of existing infrastructure (including structures, piezometers, boreholes, cells, piping, manholes, etc.) shall be done with sufficient care and caution so as not to disturb or undermine the existing infrastructure or its foundation. Shoring shall be provided where required.

Part 2 - Products

2.1 **NOT USED**

Part 3 - Execution

3.1 **TEMPORARY EROSION AND SEDIMENTATION CONTROL**

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to [sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 **PERFORMANCE**

.1 Excavated Material

.1 Some of the material excavated from the Works shall be used as fill in the Works, while remaining fill may be stockpiled at designated stockpile locations or disposed of in the specified spoil areas to be determined on-site.

.2 Care is to be taken such that excavated temporary cover material is not contaminated with ash. All excavated material that contains ash is to be disposed of in the Cell 5 Ash Disposal area.

.2 Spoil Area

.1 The location and extent of on-site spoil areas will be as directed by the Engineer. The Contractor is responsible for the maintenance and installation of access roads to the area to be capped and to the borrow and disposal areas. All access roads must be passable at all times with half tonne truck.

.2 Access to the spoil area will be restricted until borrow operations are well underway which will than provide storage area for materials to be disposed. Depending on the work sequence that the Contractor establishes there may be a need to temporarily store disposal material until disposal room in the borrow area is available.

.3 All spoil piles shall be sloped so that the natural drainage of the surrounding area will not be restricted. Drainage depressions shall be avoided to prevent ponding. Spoil piles shall be left in a stable and neat condition with slopes not steeper than 2 to 1 (H:V).

.3 Excavation

.1 Excavation shall be carried out to accommodate the Works as shown on the Drawings and specified herein. When excavating, procedures and methods used shall be in accordance with the best modern practice, using methods and techniques, which will reduce over-excavation to a minimum beyond the lines and grades shown on the Drawings or as required by the Engineer, and which will preserve material beyond these lines and grades in the soundest possible condition.

.2 Shattering or splitting of rock or the opening up of seams in rock not to be excavated shall be avoided, and any shattered material beyond such lines shall be removed as directed by Engineer, at no additional cost to the Owner.

.3 In order to preserve the structural integrity of the excavations, it is the intent of this Specification that the Contractor's excavation methods be such as to produce as smooth and sound surfaces as possible, with a minimum of disturbance to material outside the excavation lines. All necessary precautions shall be taken to achieve this result.

.4 Immediately following excavation, or at any time during the Contract, all loose material which appears unsafe, or, in the opinion of the Engineer, endangers persons, the Work or property, shall be immediately scaled and removed from the excavation at no additional cost to the Owner.

.4 Dewatering of Excavations

.1 Excavations shall be maintained free from water during the course of the Works by suitable grading, ditching and pumping where necessary. Such Work shall be in accordance with the requirements of Section 01 35 43 - Environmental Procedures. No separate payment will be made for such Work.

.5 Proof Rolling

.1 Following stripping or excavation, areas to be left at grade or to receive fills shall be proof rolled by not less than two passes of an 8 to 10 tonne vibratory roller in the presence of the Engineer or his designate. No separate payment will be made for such Work.

.2 Soft areas shall be over excavated and replaced with suitably compacted fill as directed by the Engineer. Payment for such Work will be made as Extra Work based on Equipment Rental Rates and Labour Rates provided by the Proponent.

.6 Siltation Control

.1 Prior to commencing stripping of the Site, the Contractor shall ensure suitable siltation control measures are in place as well as all other requirements for environmental management control as specified in Section 01 35 43 - Environmental Procedures.

.2 Prior to commencing deliveries to the disposal areas, the Contractor shall ensure suitable siltation control measures are in place, as well as all other requirements for environmental management control as specified in Section 01 35 43 - Environmental Procedures.

END OF SECTION

Part 1 - General

1.1 RELATED REQUIREMENTS

.1 Section 31 05 16.01 – Pervious Fill

.2 Section 31 05 16.02 – Common Fill

.3 Section 31 05 16.03 – Low Permeability Fill

.4 Section 31 23 33.02 – Open Cut Excavation

.5 Section 31 32 19.16 – Geotextile Soil Stabilization

1.2 MEASUREMENT PROCEDURES

.1 Measurement for payment for the supply and installation of the GCL membrane shall be the number of square metres of material successfully installed to lines shown on the Drawings. Measurement will be measured along the actual surface for a true measure of the surface area. Allowances will be made for GCL used in anchor trenches. No allowance will be made for waste, seams, overlap or repairs. All other items required to install a complete system will be considered incidental and will not result in any additional compensation, including pressure treated plywood to be installed at the limits for the GCL membrane where future capping work will tie into.

1.3 PAYMENT

.1 Payment for the GCL membrane shall be made at the applicable unit price for the unit of measure stated in the Table of Quantities and Prices and shall include all costs for the supply and placement of the GCL membrane and pressure treated plywood in the areas shown on the Drawings.

1.4 REFERENCE STANDARDS

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM D792-20, Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.

.2 ASTM D4632-15, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

.3 ASTM D4643-17, Standard Test Method for Determination of Water Content of Soil and Rock by Microwave Oven Heating.

.4 ASTM D5084-16a, Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.

.5 ASTM D5261-10(2018), Standard Test Method for Measuring Mass per Unit Area of Geotextiles.

.6 ASTM D5321-21, Standard Test Method for Determining the Shear Strength of Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear.

.7 ASTM D5887-22, Standard Test Method for Measurement of Index Flux Through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter.

.8 ASTM D5889-18, Standard Practice for Quality Control of Geosynthetic Clay Liners.

.9 ASTM D5890-19, Standard Test Method for Swell Index of Clay Mineral Component of Geosynthetic Clay Liners.

.10 ASTM D5891-19, Standard Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners.

.11 ASTM D6243-20, Standard Test Method for Determining the Internal and Interface Shear Strength of Geosynthetic Clay Liner by the Direct Shear Method.

.12 ASTM D6496-20, Standard Test Method for Determining Average Bonding Peel Strength Between Top and Bottom Layers of Needle-Punched Geosynthetic Clay Liners.

.13 ASTM D6768-20, Standard Test Method for Tensile Strength of Geosynthetic Clay Liners.

1.5 DEFINITIONS

.1 Geosynthetic Clay Liner (GCL) – A factory manufactured hydraulic barrier consisting of granular sodium bentonite clay, sandwiched between, supported and encapsulated by two geotextiles, held together by needle punching.

.2 Sodium Bentonite – The high swelling clay component of GCL's consisting primarily of the mineral Montmorillonite.

.3 Needle Punching – A GCL manufacturing process whereby boards of barbed needles incorporate the staple fibres from nonwoven geotextile, through a sodium bentonite clay layer into the matrix of a second geotextile layer.

.4 Thermal Locking – A needle punching enhancement process utilizing heat to bond the needle punched fibres and more permanently lock them into the second geotextile to increase the internal shear strength characteristics.

.5 Minimum Average Roll Value (MARV) – The minimum average value of the material in a particular lot calculated as the mean of the tested values minimum two standard deviations providing a 95% confidence level.

1.6 SUBMITTALS

.1 Samples/Shop Drawings

.1 Submit to Owner copies of manufacturer's mill test data.

.2 Submit samples of GCL to the Owner at least 4 weeks prior to delivery.

.3 Submit to the Owner certificates, including test results, at least 4 weeks prior to delivery.

.4 Submit shop drawings to the Engineer for approval. Indicate installation layout, dimensions and details, including field seams and anchor trenches.

.5 If, at any time in a specific area, a plan that has been previously accepted does not produce conditions in accordance with these Specifications, the Contractor shall submit a revised plan to the Engineer and modify the plan to the satisfaction of the Engineer, all at no additional cost to the Owner.

1.7 SUPPLIER, INSTALLER AND PRODUCT

.1 Qualifications

.1 The GCL liner is to be purchased by the Contractor from a qualified geomembrane manufacturer.

.2 The GCL manufacturer shall have successfully produced at least 1,000,0000 square metres of needle punched GCL product.

.3 The GCL shall be installed by a qualified installer.

.1 The installer shall provide sufficient evidence of installation experience and competence with the specified GCL materials.

.2 Installers must satisfactorily provide the following information:

.1 Corporate background and information;

.2 Name and experience of proposed Site Manager; and

.3 Description of proposed deployment and seaming methods.

.4 The installation shall be performed under the direction of a single installation supervisor who shall remain on-site and be responsible throughout the liner installation for subgrade acceptance, liner layout, seaming and repairs and all other activities contracted by the Installer

1.8 QUALITY CONTROL

.1 For the purpose of this Specification, Quality Control is defined as a planned system of inspections and activities carried out to directly monitor and control the quality of Work.

.2 Quality Control certificates issued by the GCL manufacturer shall be forwarded to the Owner. The certifications shall be signed by the Quality Control Manager of the GCL manufacturer and shall include the following information:

.1 Shipment Packing List – A list indicating the rolls shipped on a particular truckload.

.2 Bill of Lading – The shipping documents for the truck used for the shipment.

.3 Letter of Certification – The letter indicating the material is in conformance with the physical properties specified.

.4 Physical Properties Sheet – The material Specification for the GCL supplied in accordance with this Specification.

.3 Manufacturer Quality Control Submittal

.1 Quality Control submittals shall be issued by the GCL manufacture and forwarded to the Owner for each lot of material. The submittals shall include the following information:

.1 Bentonite Manufacturer Certification – Bentonite manufacturer quality documentation for the particular lot of clay used in the production of the rolls delivered.

.2 Geotextile Manufacturer Certification – Geotextile manufacturer quality control documentation for the particular lots of geotextiles used in the production of the rolls delivered.

.3 GCL Manufacturer Tracking List – Cross referencing list delineating the corresponding geotextile and bentonite lots for the materials used in the production of the rolls delivered.

.4 Manufacturing Quality Control Data - The manufacturing quality control test data indicating the actual test values obtained when tested at the appropriate frequencies for the properties specified.

.4 The Owner's Engineer may engage a quality assurance inspector to conduct tests for quality control and/or to observe the installation to verify conformance with the Specifications.

.5 The Contractor shall assist and cooperate with the quality assurance inspector in the execution of his/her Work.

Part 2 - Products

2.1 MATERIALS

.1 Geosynthetic Clay Liner

.1 The GCL shall be manufactured by mechanically bonding the geotextiles using a needle punching process to enhance frictional and internal shear strength characteristics. In order to maintain these characteristics, no glues, adhesives or other non-mechanical bonding processes shall be used in lieu of the needle punch process. Their use to enhance the physical properties of the GCL is permitted.

.2 The minimum acceptable dimensions for the GCL panels shall be 4.7 metres wide and 45.5 metres long. Longer runs with a GCL panel width of 4.7 metres and 60 metres long will be accepted as a maximum.

.3 A minimum overlap guide-line and a construction match-line delineating the overlap zone shall be imprinted with non-toxic ink on both edges of the GCL panel to ensure the accuracy of the seam. These lines shall be used during Construction Quality Assurance (CQA) to ensure the minimum overlap is achieved. The minimum overlap guideline shall indicate where the edge of the panel must be placed in order to achieve a full 150 mm of bentonite loose powder overlap for each panel.

.4 The GCL product supplied to the project shall be in full accordance with the requirements of this section.

.5 Acceptable GCL's for this project include the Bentofix Thermal Lock CNSLE (which is polymer enhanced) and or any other needle punched GCL, which meet the requirements of this Specification.

.6 Prior to considering an alternative GCL material, the manufacturer/supplier shall submit certified test results and statements of quality from the proposed GCL supplier to the Owner, indicating without exception that the proposed GCL meets the requirements of this Specification. Submittals shall be delivered to the Owner a minimum of 5 business days in advance of the Proposal close date. No other manufacturing techniques shall be approved unless it can be suitably demonstrated that the GCL exhibits uniform shear strength characteristics across the entire width of the panel. Isolated sewn or stitched rows do not constitute uniform reinforcement for the purposes of this Specification.

.7 Physical properties: The GCL is to consist of a needle punched reinforced GCL comprised of a uniform layer of granular sodium bentonite encapsulated between a slit-film woven and a virgin staple fibre nonwoven geotextile. The needle punched fibres are thermally fused to the woven geotextile to enhance the reinforcing bond, and coated with a low permeability polypropylene membrane to lower the hydraulic conductivity.

.1 Bentonite Swell Index (ASTM D5890): minimum 24 ml/2g

.2 Bentonite Fluid Loss (ASTM D5891): maximum 18 ml

.3 Bentonite Mass Per Unit Area (ASTM D5993): minimum 3.66 kg/m^2

.4 Geotextile Mass/Unit Area Properties (ASTM D5261):

.1 Upper nonwoven geotextile - minimum 200 g/m^2 MARV

.2 Lower nonwoven geotextile - minimum 105 g/m^2 MARV

.5 Grab Strength (ASTM D4632): minimum 422 N MARV

.6 Grab Elongation (ASTM D4632): minimum 150% typical

.7 Peel Strength (ASTM D4632): minimum 93 N

.8 Permeability (ASTM D5084): maximum 1 x 10^{-10} cm/sec

.9 Internal Shear Strength (ASTM D6243): 24 kPa typical

.8 Granular bentonite used for sealing seams, penetrations, or repairs shall be the same granular bentonite as used in the production of the GCL itself.

.2 Delivery, Storage and Handling

.1 Storage of all GCL rolls shall be the responsibility of the installer or other designated party. All GCL rolls shall be stockpiled and maintained dry in a flat location away from high traffic areas, but sufficiently close to the active Work area to minimize handling.

.2 Delivery, storage and handling of the GCL shall be in accordance with ASTM D5888.

.3 During delivery and storage, protect the GCL from water, direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents. In addition, abide by any other requirement specified by the manufacturer pertaining to the delivery, storage and handling of GCL products.

.4 The GCL products are to be stored no more than three to four rolls high or limited to the height at which the handling apparatus may be safely handled by installation personnel. Stacks or tiers of rolls should be situated in a manner that prevents sliding or rolling by “choking” the bottom layer of rolls.

.5 Rolls shall not be stacked on uneven or discontinued surfaces in order to prevent bending, deformation, damage to the geomembranes or cause difficulty inserting the core pipe.

.6 An additional tarp or plastic sheet shall be used over the stacked rolls to provide extra protection for GCL material stored outdoors.

.7 Bagged bentonite material shall be stored and tarped next to GCL rolls unless other more protective measures are available. Bags shall be stored on pallets or other suitably dry surface, which will prevent undue pre-hydration.

.8 For needle punched GCLs, the presence of free-flowing water within the packaging shall require that roll to be set aside for further examination to ascertain the extent of damage, if any. Free-flowing water within the packaging of unreinforced GCLs shall be cause for rejection of that roll.

.3 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling.

.2 Remove from Site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging materials in appropriate on-site bins for recycling.

.4 Fold up metal banding, flatten and place in designated area for recycling.

Part 3 - Execution

3.1 INSTALLATION

.1 Maintain area of installation free of water and snow accumulations.

.2 The party responsible for unloading the GCL shall contact the manufacturer prior to shipment to determine the correct unloading methods and equipment if different from the pre-approved and specified methods.

.3 Surfaces of the existing GCL, that are to be lapped with new GCL for the new area to be capped, are to be thoroughly cleaned to ensure an acceptable bonding surface is achieved once the bentonite powder is applied. Surface to receive GCL geomembrane is to be reviewed, approved and signed off by Owner’s Engineer prior to placement of GCL.

.4 Repair excessively soft supporting materials as directed by Owner’s Engineer.

.5 The GCL membrane must be supported during handling to ensure worker safety and prevent damage to the liner. Under no circumstances should the rolls be dragged, lifted from one end, lifted with only the forks of a lift truck or pushed to the ground from the delivery vehicle.

.6 The Contractor's Quality Control inspector shall verify that proper handling equipment exists which does not pose any danger to installation personnel or risk of damage or deformation to the liner material itself. Suitable handling equipment is described below:

.1 Spreader Bar Assembly - A spreader bar assembly shall include both a core pipe or bar and a spreader bar beam. The core pipe shall be used to uniformly support the roll when inserted through the GCL core while the spreader bar beam will prevent chains or straps from chafing the roll edges.

.2 Stinger - A stinger is a rigid pipe or rod with one end directly connected to a forklift or other handling equipment. If a stinger is used, it should be fully inserted to its full length into the roll to prevent excessive bending of the roll when lifted.

.3 Roller Cradles - Roller cradles consist of two large diameter rollers spaced approximately 75 mm apart, which both support the GCL roll and allow it to freely unroll. The use of roller cradles shall be permitted if the rollers support the entire width of the GCL roll.

.4 Straps - Straps may be used to support the ends of spreader bars but are not recommended as the primary support mechanism. Straps may damage the GCL when wrapped around the roll and generally do not provide sufficient uniform support to prevent roll bending or deformation.

.7 Do not proceed with GCL placement and seaming when ambient temperatures are below minus 5 °C or above 40 °C, during precipitation, in presence of excessive moisture (eg. fog, dew), nor in presence of high winds.

.8 Side slopes are to be inspected and any sharp rocks (greater than 50 mm diameter), wood or debris present in the soil are to be removed prior to proof rolling in the presence of a Contractor's Quality Control inspector.

.9 Place and overlap panels in accordance with manufacturer's recommendations on graded surface in orientation and locations indicated. Minimize wrinkles, avoid scratches and crimps to GCL and avoid damage to supporting material.

.10 Protect installed GCL membrane from displacement, damage or deterioration before, during and after placement of material layers.

.11 Replace damaged, torn or permanently twisted liner panels to approval of Owner's Engineer. Remove rejected damaged panels from Site.

.12 All slope panels shall be installed parallel to the maximum slope, while panels installed in flat areas require no particular orientation.

.13 The GCL may be deployed on slopes by pulling the material from a suspended roll, or securing a roll end into an anchor trench and unrolling each panel as the handling equipment slowly moves backwards.

.14 Deployment on flat areas shall be conducted in the same manner as that for the slopes, however, care should be taken to minimize “dragging” the GCL. Slip-sheet may be used to facilitate positioning of the liner while ensuring the GCL is not damaged from underlying sources.

.15 Overlaps shall be a minimum of 300 mm, unless noted otherwise, and be free of wrinkles, folds or “fish-mouths”.

.16 The Contractor shall only install as much GCL that can be covered at the end of the day. No GCL shall be left exposed overnight. The exposed edge of the GCL shall be covered by a temporary tarpaulin or other such water-resistant sheeting until the next working day.

.17 The Contractor shall install pressure treated plywood directly over the GCL as shown on the Drawings at the limits of capping under this program where future capping work will tie in.

.18 The Contractor is required to provide survey data of the “AS BUILT” information to NSPI identifying the edges of the GCL upon completion of the GCL installation on the south and west side of the project area. This info will be identified on future expansion projects of the capping area.

3.2 SEAMING

.1 A 300 mm lap line and a 375 mm match line shall be imprinted on both edges of the upper geotextile component of the GCL to assist in installation overlap quality control. Lines shall be printed as continuous dashes in easily observable non-toxic ink.

.1 Overlap seams shall be a minimum of 300 mm, unless noted otherwise, on panel edges and 1000 mm on panel ends.

.2 Loose granular bentonite should be placed between panels at a rate of 0.40 kg/m of seam.

.2 Damage Repair

.1 Prior to cover material placement, damage to the GCL shall be identified and repaired by the installer. Damage is defined as any rips or tears in the geotextiles, delamination of geotextiles or a displaced panel.

.1 Rip and Tear Repair (Flat Surface) - Rips or tears may be repaired by completely exposing the affected area, removing all foreign objects or soil, and by then placing a patch cut from unused GCL over the damage (damaged material may be left in place), with a minimum overlap of 300 mm on all edges.

.2 Accessory bentonite should be placed between the patch edges and the repaired material at a rate of 0.40 kg/m of seam spread in a continuous 150 mm fillet.

.3 Rip and Tear (Slopes) - Damaged GCL material on slopes shall be repaired by the same procedures above, however, the edges of the patch should also be adhered to the repaired liner with an adhesive to keep the patch in position during the backfill or cover operations.

.4 Displaced Panels - Displaced panels shall be adjusted to the correct position and orientation. The adjusted panel shall then be inspected for any geotextile damage or bentonite loss. Damage shall be repaired by the above procedure.

.3 Premature Hydration

.1 If the GCL is prematurely hydrated, installer shall notify the Contractor's Quality Control inspector and the Engineer for a site specific determination as to whether the material is acceptable or if alternative measures must be taken to ensure the quality of the design, dependent upon the degree of damage.

.4 Cover Material

.1 The cover materials shall be compatible, as well as suitable, for use over the GCL, and placed in a manner appropriate to the particular subgrade. Regardless of the cover material, the uncovered edge of GCL panels shall be protected at the end of the work day with a waterproof sheet, which is secured adequately with ballast.

.2 Soil cover shall be placed with low ground pressure equipment. Care should be taken to avoid damaging the GCL by making sharp turns or pivots with equipment, as well as sudden starts or stops.

.3 Soils may be placed on the GCL by pushing with a track dozer or by carefully placing it with a loader or an excavator. The use of scrapers or pans directly over the GCL is strictly prohibited.

.4 A minimum thickness of 900 mm of cover shall be kept between heavy equipment and the GCL at all times, except when final grading. No heavy vehicles should be driven directly on the GCL until the proper thickness of cover has been placed.

.5 To prevent damage to the GCL, the initial lift(s) of soil cover shall not be compacted in excess of 85% of the Modified Proctor density or as specified by the Engineer.

.6 Slope Placement

.1 When covering GCL on sloped areas the cover soil should be pushed up slope to minimize tension on the GCL.

.5 Installation of overlying geotextile fabric is to be accomplished through the use of lightweight, rubber-tired equipment such as a four-wheel all-terrain vehicle (ATV) running on top of the drainage layer.

.6 Protect installed liner from displacement, damage or deterioration before, during and after placement of material layers.

.7 Anchor Trench

.1 An anchor trench shall be excavated by the earthwork Contractor or liner installer to the lines and grades shown on the Drawings at the top of slopes steeper than 7 horizontal to 1 vertical and along side slopes, where noted, due to the length of the slope to be covered being too long for deployment of a full GCL roll.

3.3 **CLEANING**

.1 Remove construction debris from Project Site and dispose of debris in an environmentally responsible and legal manner.

3.4 **PROTECTION**

.1 Do not permit vehicular traffic directly on the GCL membrane.

.2 Soil cover shall be placed with low ground pressure equipment. Care is to be taken to avoid damaging the GCL by making sharp turns or pivots with equipment as well as sudden starts and stops.

.3 Soils may be placed on the GCL by pushing with a wide track dozer or by carefully placing it with a loader or a back-hoe. The use of scrapers or pans directly over the GCL is strictly prohibited.

END OF SECTION

Part 1 - General

1.1 RELATED REQUIREMENTS

.1 Section 31 05 16.01 – Pervious Fill

.2 Section 31 05 16.02 – Common Fill

.3 Section 31 05 16.03 – Low Permeability Fill

.4 Section 31 23 33.02 – Open Cut Excavation

1.2 MEASUREMENT PROCEDURES

.1 Measurement for Type 1 Geotextile will be made, provided the surface to receive the Geotextile has been approved and the Geotextile that is supplied and installed is as detailed on the Drawings and in conformance with the Specifications. Measurement will be of the actual surface area. Allowance will be made for geotextile used in anchor trench. No allowances will be made for waste, seams, overlap or repairs.

.2 Measurement for Erosion Control Blanket will be made, provided the surface to receive the Erosion Control Blanket has been approved and the Erosion Control Blanket that is supplied and installed is as detailed on the Drawings and in conformance with the Specifications. Measurement will be of the actual surface area. No allowances will be made for waste, seams, overlap or repairs.

.3 No measurement will be made for silt fence. Payment for this item will be included as part of the Erosion and Sedimentation Controls pay item in Section 01 35 43 - Environmental Procedures.

1.3 PAYMENT

.1 Type 1 Geotextile

.1 Payment for Type 1 geotextile will be based on the measurement above multiplied by the unit rate for this item noted in the Table of Quantities and Prices and shall cover the supply and installation of the geotextile, including protection of same until Project completion.

.2 Erosion Control Blanket

.1 Payment for Erosion Control Blanket will be based on the measurement above multiplied by the unit rate for this item noted in the Table of Quantities and Prices and shall cover the supply and installation of the Erosion Control Blanket, including protection of same until Project completion.

1.4 REFERENCE STANDARDS

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM D792-20, Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.

.2 ASTM D3786-18, Standard Test Method for Bursting Strength of Textile Fabrics – Diaphragm Bursting Strength Tester Method.

.3 ASTM D4491-2, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

.4 ASTM D4595-17, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

.5 ASTM D4632-15, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

.6 ASTM D4716-22, Standard Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.

.7 ASTM D4751-21a, Standard Test Methods for Determining Apparent Opening Size of a Geotextile.

.8 ASTM D4873(2021), Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.

.9 ASTM D5199-12(2019), Standard Test Method for Measuring the Nominal Thickness of Geosynthetics.

.10 ASTM D5261-10(2018), Standard Test Method for Measuring Mass per Unit Area of Geotextiles.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-4.2 No. 11.2 (R2013), Textile Test Methods - Bursting Strength - Ball Burst Test.

.2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.

.1 No. 2, Methods of Testing Geosynthetics - Mass per Unit Area.

.2 No. 3, Methods of Testing Geosynthetics - Thickness of Geotextiles.

.3 No. 6.1, Methods of Testing Geotextiles and Geomembranes Under No Compressive Load.

.4 No. 7.3, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.

.5 No. 10, Methods of Testing Geotextiles and Geomembranes - Filtration Opening Size.

1.5 **DEFINITIONS**

.1 Geotextile is required for, but not necessarily limited to, the following areas:

.1 Geotextile Type 1

.1 Installed on top of drainage layer of clear stone as shown on the drawings.

.2 Erosion Control Blanket

.1 Installed on top of the topsoil layer as shown on the drawings.

.3 Silt Fencing

.1 Applied by Contractor as deemed necessary to serve as one of the preventative measures to be implemented to prevent discharge of water, from the construction site, that may have suspended solids which exceed discharge limits from the Work area.

1.6 **EXTENT**

.1 Geotextiles as described in this Section shall mean flexible needle punched non-woven polypropylene fibre fabric supplied, fabricated and installed as shown on the Drawings. Work of this Section includes all measures and materials required to complete the supply, fabrication, installation and testing of the geotextiles fabric including all anchorage and attachments.

1.7 **SUBMITTALS**

.1 Samples and Certificates

.1 The Contractor shall, within 14 days after notification of acceptance of the Proposal, submit for the Engineer's approval samples and certificates, including test results, demonstrating the Geotextile materials meet the requirements of this Section.

1.8 **DELIVERY, STORAGE AND HANDLING**

.1 During delivery and storage, protect geotextile from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

.2 Contractor is responsible for receiving, unloading and storage of geotextiles for use on this Project. Handle, store and protect geotextiles received in accordance with ASTM D4873.

1.9 **QUALITY CONTROL**

.1 Materials specified by manufacturer's name and classification shall be so identified by manufacturer. Materials submitted for use in the Works shall be clearly identified by the manufacturer who shall provide certification and test data by an approved testing agency to prove compliance with the appropriate Reference Specifications.

Part 2 - Products

2.1 **MATERIALS**

.1 Geotextile Type 1

.1 Non-woven synthetic fibre fabric, supplied in rolls.

.1 Width: 4.5 metres minimum.

.2 Length: 91.5 metres minimum.

.3 Composed of: minimum 85% by mass of polypropylene.

.2 Physical Properties

.1 Thickness: minimum 4.1 mm (ASTM D5199).

.2 Mass per unit area: minimum 540 g/m^2 (ASTM D5261).

.3 Tensile strength and elongation (in any physical direction): to ASTM D4632.

.1 Tensile strength: minimum 1640 N, wet condition.

.2 Elongation at break: minimum 50%.

.4 Mullen burst strength: minimum 5506 kPa (ASTM D3786).

.3 Hydraulic properties:

.1 Apparent opening size (AOS): 0.150 mm (ASTM D4751).

.2 Permittivity: 0.7 sec^{-1} (ASTM D4491).

.3 Permeability: minimum 0.31 cm/sec (ASTM D4491).

.4 Factory seams: sewn in accordance with manufacturers recommendations.

.5 Thread for sewn seams: equal or better resistant to chemical and biological degradation than Geotextile.

.4 The geotextile shall be supplied in rolls. All rolls shall be reviewed by the Engineer prior to use for damage.

.2 Erosion Control Blanket

.1 Erosion Control Blanket shall consist of 70 % straw and 30 % coconut fibres sandwiched between polypropylene netting. The straw and coconut fibres shall be evenly distributed throughout the blanket and shall meet the following specifications:

.1 Structure: organic.

.2 Material:

.1 70 % straw, 30 % coconut fibre.

.2 Top netting 8 mm x 8 mm.

.3 Bottom netting 16 mm x 20 mm.

.4 Polypropylene thread.

.3 Size: 2 m wide by 40 m long rolls approximately 530 mm in diameter.

.4 Thickness: Approximately 10 mm with a permissible variation of 3 mm.

.5 Weight: 0.266 kg/m^2, 21.3 kg per roll.

Part 3 - Execution

3.1 INSTALLATION

.1 Geotextile

.1 Place Geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with mounds of sand placed over various areas.

.2 Construct anchor trenches as required.

.3 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.

.4 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of Geotextile.

.5 Jointing:

.1 For lapped joints overlap each successive strip of Geotextile 1000 mm over previously laid strip.

.2 For sewn joints, join successive strips of Geotextiles by overlap sewings, use a minimum 150 mm lap.

.6 After installation, cover with overlying layer within 4 hours of placement.

.7 Replace damaged or deteriorated geotextile to approval of Owner's Engineer.

.2 Erosion Control Blanket

.1 Place Erosion Control Blanket material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with mounds of sand placed over various areas.

.2 Construct anchor trenches if required.

.3 Overlap each successive strip of Erosion Control Blanket 300 mm over previously laid strip.

.4 Join successive strips of Erosion Control Blanket by pinning as recommended by manufacturer.

.5 Replace damaged or deteriorated Erosion Control Blanket to approval of Engineer.

3.2 PROTECTION

.1 Protect geotextile material from displacement and damage until and during placement of additional material layers.

.2 Do not permit passage of any vehicle directly on geotextile without the Engineers approval.

.3 Stakes (wooden or other) that puncture through the fabric will not be acceptable to hold the geotextile in place.

END OF SECTION

Part 1 - General

1.1 RELATED REQUIREMENTS

.1 Section 01 35 43 – Environmental Procedures

.2 Section 31 05 16.02 – Common Fill

.3 Section 31 23 33.02 – Open Cut Excavation

.4 Section 31 32 19.16 – Geotextile Soil Stabilization

1.2 MEASUREMENT PROCEDURES

.1 Topsoil

.1 Measurement for amended Topsoil to encourage vegetative growth will be by the square metre.

.2 Hydroseeding

.1 Measurement for hydroseeding will be by the square metre.

1.3 PAYMENT

.1 Topsoil

.1 Payment for topsoil will cover the testing, retrieval and transport from stockpile area, placement, grading, introduction of 5% peatmoss, discing, rolling and removal of unacceptable material over the site area indicated on the drawings.

.2 Hydroseeding

.1 Payment for Work under this Section will cover the supply and placing of hydraulic seed mixture, including preparation, seed mix, mulch, erosion control agent, water and fertilizer, and maintenance until acceptance.

1.4 REFERENCE STANDARDS

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM D2974-20e1, Standard Test Methods for Determining the Water (Moisture) Content, Ash Content, and Organic Material of Peat and Other Organic Soils.

.2 ASTM D4972-19, Standard Test Methods for pH of Soils.

.2 Canadian General Standards Board (CGSB)

.1 CAN2-16.2-M Asphalts, Emulsified, Anionic Type, for Road Purposes.

1.5 DEFINITIONS

.1 Hydroseeding consists of supply and placing by hydraulic spray of lime, fertilizer, seed and accessories.

1.6 **EXTENT**

.1 The Contractor shall place topsoil and hydroseed on the entire capped surface of the Site in accordance with the Drawings and Specifications.

1.7 **SUBMITTALS**

.1 The Contractor shall, within 14 days prior to hydroseeding, submit for the Engineer's approval the name, location and certification of the hydroseeding company along with a list of a least four successful hydroseeding projects completed within the last 24 months.

1.8 **QUALITY CONTROL**

.1 Seed

.1 Seed shall be packaged and delivered in original containers showing:

.1 Analysis of seed mixture;
.2 Percentage of pure seed;
.3 Year of production;
.4 Net mass;
.5 Date when tagged and location;
.6 Percent of germination; and
.7 Name and address of distributor.

Part 2 - Products

2.1 **MATERIALS**

.1 Fertilizer (12-24-24)

.1 Complete commercial, specially blended for promoting root development of newly seeded areas.

.2 Lime (if necessary)

.1 Agricultural grade ground limestone containing total 85% carbonates and graded as follows:

Sieve Size	% Passing
1 mm	90
0.125 mm	50

.3 Seed

.1 Certified Canada #1 Grade to Government of Canada Seeds Regulations having minimum germination of 80% and minimum purity of 85%.

.2 Seed Mixture: Highway Mix containing the following:

.1 40% Creeping Red Fescue
.2 15% Timothy
.3 15% Fall Fescue

.4 10% Kentucky Blue Grass
.5 10% Alsike Clover
.6 5% Perenial Rye
.7 5% Red Top

.4 Mulch

.1 Straw mulch, free of weeds and other foreign materials, free of growth or germination inhibiting ingredients; manufactured in such a manner that after addition and agitation in slurry tanks with water, the material will become uniformly suspended to form a homogeneous slurry, which is sprayed over bare soil to quickly promote plant growth. Hydraulic straw mulch stabilizes soil, prevents wind and water erosion, and provides protection and warmth for seeds, helping them grow. Hydraulic straw mulch also controls weeds, reducing or eliminating the need for pesticides. Straw mulch quantities must be a minimum of 1200 lbs/acre.

.5 Erosion Control Agent

.1 Asphalt emulsion to CAN 2 - 16.2-M, Type 2. Erosion Control Agent quantities must be a minimum of 15 lbs/acre.

.6 Water

.1 Clean, fresh and free from impurities that inhibit plant growth.

.7 Topsoil

.1 Topsoil be retrieved from stockpile of on-site grubbing material excavated from storage pile that has been designated for use during the execution of this Project work. Contractor to conduct soil testing to determine amendments required to insure sustained vegetation growth.

Part 3 - Execution

3.1 PREPARATION

.1 Remove all debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials. Remove any subsoil that has been contaminated with oil, gasoline, calcium chloride or sodium chloride. Dispose of contaminated material off-site.

.2 Seed during local growth season when natural moisture is available to ensure germination and growth.

3.2 TOPSOIL

.1 Obtain the Engineer’s approval of Topsoil grade and depth before starting to seed.

.2 Spread Topsoil to a minimum settled depth of 200 mm over the total area to be seeded.

.3 Supply and place peatmoss to a value of at least 5% of the total topsoil volume to introduce inorganic material to the site material.

.4 Disc area to maximum penetration of 150 mm.

.5 Smooth surface.

.6 Place Topsoil during dry weather and on dry, unfrozen subgrade.

.7 Remove vegetative matter and foreign non-organic material from Topsoil while spreading.

3.3 HYDROSEEDING

.1 Measure all quantities of material by weight or by weight-calibrated volume measurement.

.2 Charge seeder with water, and while agitating, slowly add mulch, seed, lime and fertilizer until all components are thoroughly mixed.

.3 Add erosion control agent to seeder and mix thoroughly to complete seeding slurry.

.4 Slurry application per 100 square metres:

- .1 Seed – 1.5 kg
- .2 Lime – 8 kg
- .3 Fertilizer – 5 kg
- .4 Mulch – 10 kg
- .5 Erosion Control Agent – 3 kg
- .6 Water – Minimum 100 litre

.5 Apply slurry uniformly, blending into grassed areas.

.6 Apply additional applications of water to generate growth if a dry period is encountered and the condition is hampering the development process.

3.4 ACCEPTANCE

.1 Grassed areas will be accepted provided that:

- .1 Growth is properly established.
- .2 Area is free of bare and dead spots.
- .3 No surface soil is visible.

.2 Areas seeded in the fall will be accepted the following spring one month after start of growing season providing that acceptance conditions are fulfilled.

END OF SECTION



Point Aconi Generating Station CFB Residue Management Operations Manual

Nova Scotia POWER An Emera Company	**Title:** Point Aconi Generating Station CFB Residue Management Operations Manual
	Date: July 2021

Record of Revisions

Revisions	Date	Revised By
Rewritten to reflect current operations at RMS	2002-12-19	
Revised to reflect the addition of Cell 3	2005-04-25	
Revised to reflect the addition of Cell 3 stages 2 and 3 and current operation under new operating approval	2009-06-26	
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Updated document to reflect new Capitol Projects at the Residue Management Site	2018-01-17	
Updated to reflect Ash Diversion Strategy	2019-05-15	M. MacKnight
Updated approval numbers throughout. Updated solid waste section.	2020-10-21	S.Macaulay
Updated ash manual with current operations	2021-06-02	S. Lively
General Update	2021-06-24	SM/Lab Staff

Nova Scotia POWER An Emera Company	**Title:** Point Aconi Generating Station CFB Residue Management Operations Manual
	Date: July 2021

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1. Introduction

1.1 Purpose of Ash Management Manual

This manual provides an operational plan for the management of Circulating Fluidized Bed (CFB) residue from the Point Aconi Generating Station. It is intended to provide guidance and direction to Nova Scotia Power (NSPI) personnel, as well as to the residue management Contractor, who will operate and/or supervise the landfilling and ash diversion activities at the Point Aconi site.

Specifically, the manual will do the following:

- State the objectives of the CFB residue handling operations.
- Provide a detailed description of the equipment and facilities that are in place to enable truck loading, transportation, truck unloading and placement of CFB residue in, and removal from, the landfill at Point Aconi.
- Provide information on the quantity of CFB residue to be handled, treatment of ash at the generating station and landfill, objectives of storage, and ash diversion activities.
- Describe, in detail, the processes and procedures required to place and remove CFB residue in the landfill in a manner that will be acceptable from an engineering and environmental point of view.
- Describe water management strategies and establish sampling, inspection, and testing protocols intended to supplement environmental and ash diversion strategies.
- State the limitations and stipulations on the CFB residue handling operation imposed by environmental objectives and sound engineering, construction, and operational practices.
- Describe special conditions that may alter day-to-day operations at the landfill site and describe the processes and procedures that will be required to deal with these conditions.
- Provide information on the development and management strategy of the CFB Residue Management Site, placement and removal strategies.
- Describe landfill maintenance strategies, including CFB residue and facilities.
- Describe safety requirements and strategies related to CFB Residue Management Site.

1.2 Organization of Ash Management Plan

This manual is organized by topic and section to provide easy access to pertinent information. The sections are briefly described as follows:

- Introduction:
  Provides background information, describes the purpose and organization of the manual and gives supporting information on both the Point Aconi Generating Station and CFB Residue Management Site.

- Ash Design Criteria:
  Provides a summary of design criteria to which the CFB residue handling operation adheres, as well as information of relevant residue properties. This section is intended to aid in understanding the scope and control of the operations and states the objectives of the operation.

- Facilities:
  Provides an overview of the facilities at the CFB Residue Management Site (such as roads, ditching, ponds, drainage systems, and landfill liner).

- Operations:
  Defines the specific operations relative to the handling, placement, and removal of the residue at the landfill. This includes protocols for transport, placement, compaction, capping, and reclamation.

- Environmental Considerations:
  Overview of environmental regulations and permits relevant to the handling, storage, and reclamation of CFB residue. This section is also intended to establish protocols for planned inspection and sampling operations at Point Aconi site. These data points are intended to support objectives of the Ash Diversion project.

- Landfill Development:
  Intended to provide information on the management and future development of the CFB Residue Management Site. Section to incorporate changes to management strategies brought about by adoption of Ash Diversion.

- Maintenance:
  Provides scope of regular maintenance activities including those for facilities and the management of CFB residue.

- Safety:
  Provides information on safety protocols at the Point Aconi Site including Personal Protective Equipment (PPE) and emergency procedures.

- Security:
  Brief description of security measures at the Point Aconi Site.

1.3 Plant Background

The Point Aconi Generating Station consists of a 172 MW CFB combustion unit, which burns a blend of petroleum coke and offshore coal of varying sulfur contents (2-6.5% sulfur content). The CFB technology utilizes limestone as a sorbent to reduce sulfur dioxide (SO_2) emissions. The resulting combustion by-product (CFB residue) is a combination of bottom ash/fly ash, the sulfur capture product, calcium sulfate ($CaSO_4$), and other limestone-related materials; primarily, calcium oxide (CaO), with smaller amounts of calcium carbonate ($CaCO_3$).

The residue consists of bottom ash and fly ash, which have similar chemical properties, but different physical properties (particularly size and density). The established split between bottom ash and fly ash generation is 60:40 by weight.

The hydration of the residue is exothermic (gives off energy in the form of heat when contacted with water) and the fly ash can harden considerably. CFB residue from the Point Aconi station is mixed with water (conditioned) at the plant site, loaded into off road trucks and transported to the landfill site directly south of the generating station site (See Figure 1). The landfill site at Point Aconi is approximately 48.9 hectares in area. Separate silos for bottom ash (554MT) and fly ash (2218MT) are provided at the Plant Site. Typically, fly ash and bottom ash are loaded separately from each dedicated silo and mixed on the ground at the landfill.

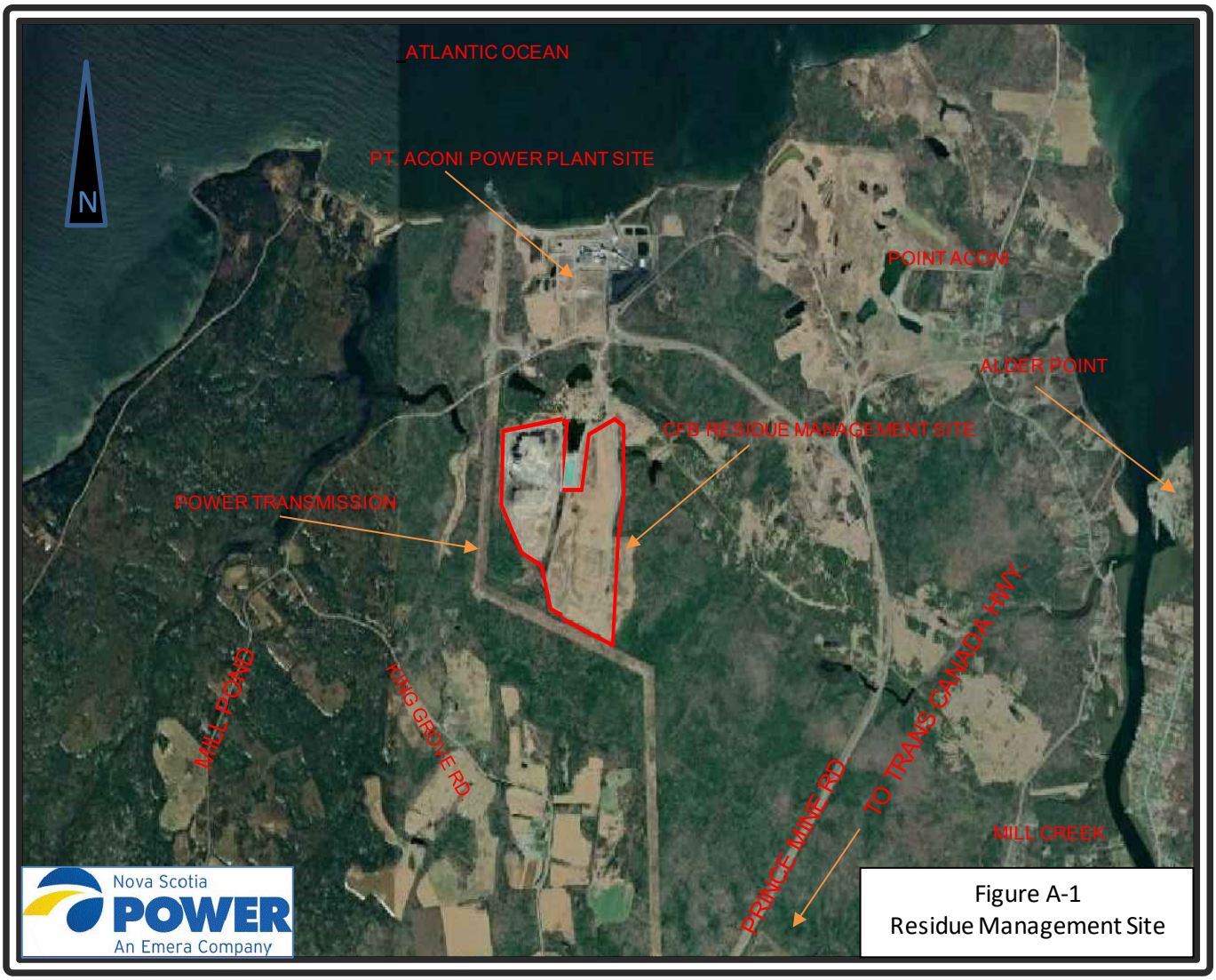


Figure 1: Point Aconi Generating Station and CFB Residue Management Site

1.4 Landfill Background

The first stage of landfill development received a quantity of CFB residue equivalent to approximately two to three years of the generating station residue at its design production rate. This first stage was referred to as the Initial Cell, but following the addition of new cells, is now referred to as Cell 1 (See Figure 2). The Initial Cell was closely monitored to provide pertinent information for refining landfill design, operations, and environmental monitoring. This Manual is, therefore, subject to periodic revision to reflect changes in operations that may become desirable as monitoring results become available.

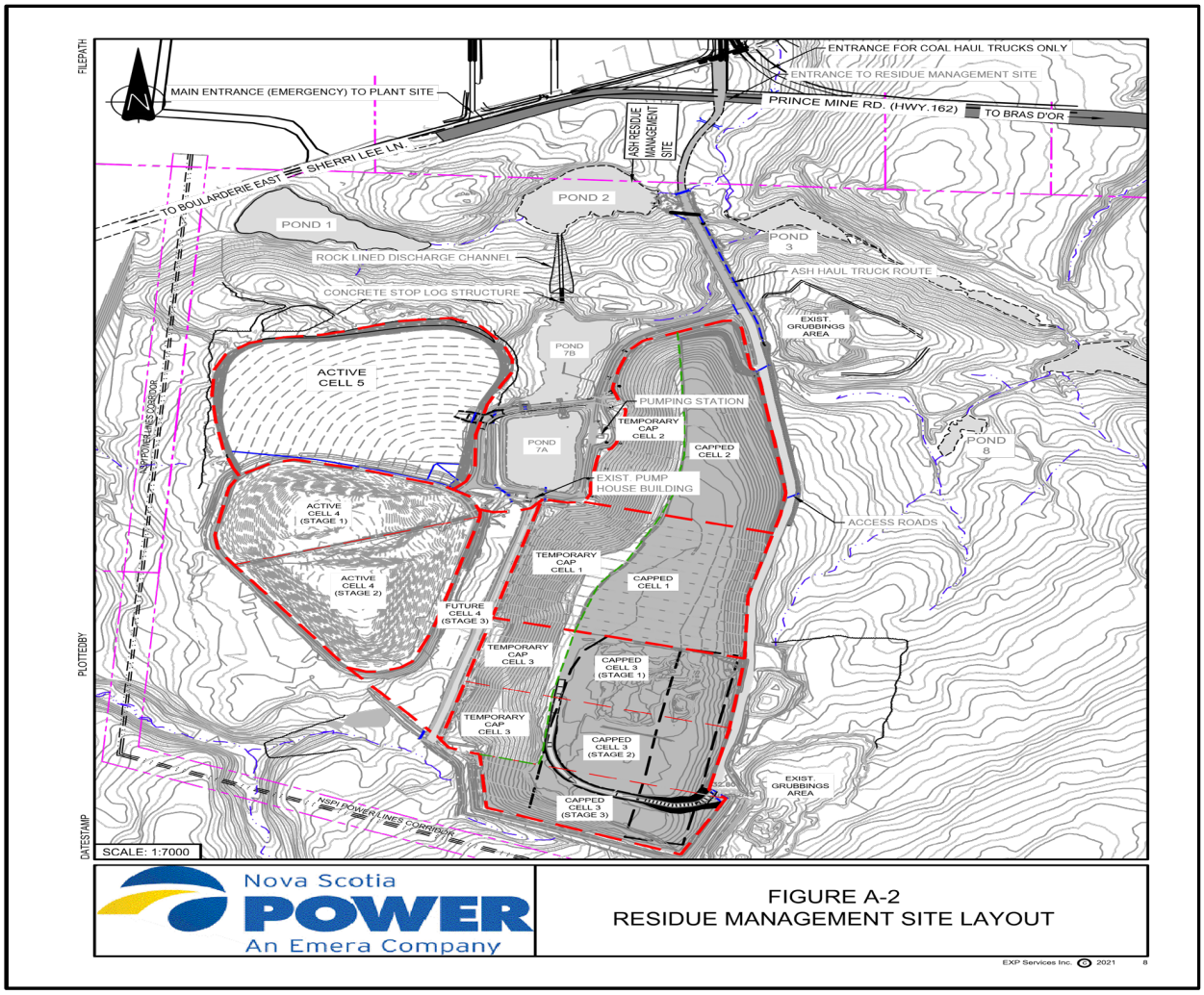


Figure 2: Point Aconi CFB Residue Management Site Layout

2. Ash Design Criteria

This section provides a summary of the design criteria to which the residue management operation adheres. It also defines the scope of the operation and its objectives and describes the plant site and landfill site facilities in place for handling the residue. Criteria for the reclamation of CFB residue in Ash Diversion is also summarized.

2.1 Residue Production Rates and Handling Rates

CFB residue production rates vary, depending on operating conditions in the combustor. Variations in the pet coke/coal and sorbent (limestone) properties also influence the amount of residue generated. The parameters listed in Table 1 form the basis for the calculation of the residue quantitates that were expected at Point Aconi. Based on these parameters, the estimated residue generation rates are shown in Table 2.

Table 1: Point Aconi Design Parameters for Calculating CFB Residue Production Rates

Generating Station Net Capacity	172 MW
Generating station average capacity factor	0.88
Electrical output/energy output (efficiency)	34%
Pet Coke Heating Value (low ash)	25,025 kJ/kg
Offshore coal Heating Value (med ash coal)	20,882 kJ/kg
	2-6.5%
	Sulfur content Pet Coke (low ash)
Calcium content of Limestone sorbent	Sulfur content of Offshore Coal (med ash coal)
Ash content of Pet Coke (low ash)	0-1%
Ash content of Offshore coal (med ash coal)	0-10%
Calcium to sulfur molar ratio in feed system for 90% sulfur dioxide capture	2.2:1.0
Sulfur dioxide capture in combustion system	90%

Table 2: Point Aconi CFB Residue Generation Estimates for Two Fuel Types. (1) Capacity Factor is 0.88, (2) Capacity Factor is 1.0.

Estimated Generation Rate	Low Sulfur Fuel Blend	High Sulfur Fuel Blend
Annually (1)	69,671 tonnes	238,914 tonnes
Annually (2)	1,525 tonnes	4,977 tonnes
Daily (2)	220 tonnes	711 tonnes

These tables reflect two possible sets of fuel characteristics available from blends of pet coke and coal. It can be expected that "low ash" blends will have less of an impact on the generation of ash than "high" ash blends. For the most part this is true, although given that pet coke is low in ash but high in sulfur, the generation rate of ash is highly dependent on the sulfur content of the combined fuel which requires additional limestone injection to maintain sulfur dioxide capture rates. The generation rates are based on an annual capacity factor of 0.88. The weekly rates and daily rates assume that the station is operating at a capacity factor of 1.0, that is, 24 hours a day, 7 days a week.

The station capacity factor of 0.88 was a design feature. The actual residue generation rate has varied due to increased or reduced station capacity factor in any year. The actual capacity factor has been lower than the design expectations. This is due to the increased capacity of renewables such as wind power. Table 2 shows the estimated hourly handling rate for residue from "low sulfur" and "high sulfur" fuels. This rate assumes that the station is operating at 100% capacity, 24 hours a day, 7 days a week, but that residue is only being transported and placed 8 hours a day, 5 days a week, and 4 hours on the weekend. This is the standard work week anticipated for residue management operations. Extensions of the standard work week may be required periodically under special circumstances.

Table 3 shows the actual capacity factor for the years 2017 to 2020, with corresponding cubic meters of residue produced for those years from ash volumes surveyed after placement. Historical capacity factors provided by the Asset Management Group were used to generate Table 3.

Table 3: Actual Capacity Factors and Residue Production Volumes for Point Aconi Generation Plant (2017-2020)

Year	2017	2018	2019	2020
Capacity Factor	0.74	0.72	0.65	0.67
Total Residue Produced (M3)	123,653	132,002	112,685	113,890

The quantity of residue that is trucked includes water which is added in the mixer/un-loaders at the Plant Site. Tables 2 and 3 present dry residue throughputs of the mixer/un-loaders. They do not include weight of the added water.

2.2 Residue Treatment

CFB residue is composed of calcium sulphate ($CaSO_4$), calcium oxide (CaO), calcium carbonate ($CaCO_3$), metallic oxides and coal ash compounds. When brought into contact with water, the $CaSO_4$ is converted to its hydrated form, $CaSO_4$. H_2O and the CaO is converted to $Ca(OH)_2$ in general. These reactions are exothermic, i.e., they give off energy in the form of heat. The addition of water, therefore, serves the purpose of hydrating the residue, satisfying the affinity of the anhydrous compounds for water and rendering them chemically stable.

The addition of water to the residue also assists in facilitating handling, especially in reducing dust generation during loading, transportation, unloading, working and placement.

There is also a requirement for water addition to control dust during residue placement and reclamation. Surfaces of the landfill and other travelled surfaces which dry out over time have the potential to become sources of fugitive dust. Periodic wetting of these surfaces is a requirement of routine landfill operations.

Water addition requirements at the silos are compiled on a monthly basis and are reported as part of the Point Aconi overall water usage documentation. Actual water addition rates vary depending on weather conditions and on variations in fuel and residue characteristics.

2.3 Objectives of Residue Placement

There are several objectives for residue placement and compaction. The greatest volume of material that can be placed per unit of area developed provides the maximum landfill volume utilization and economy. In addition to this general principle, optimizing the in-place density of CFB residue is desirable as a compact landfill is physically stable.

Adequate grading of the landfill promotes good runoff, thereby reducing infiltration. Proper placement and compaction of CFB residue will also reduce its hydraulic conductivity and therefore reduce leachate production. In addition to this, the volume and number of void spaces, which could provide preferential pathways for leachate migration, will be reduced.

For these reasons, CFB residue placement at Point Aconi is carried out in lifts. Compaction and moisture content measurement are made as part of a quality control program. Both working and completed areas are sloped to promote runoff. All sections

of the landfill are constructed to their finished grades and covered as quickly as is practicable to reduce exposed areas.

Details of the placement and compaction of residue are provided in Section 4 of the manual.

2.4 Landfill Site Parameters

The CFB residue management site, which is approximately 48.9 hectares, was sized to accommodate 30 years of estimated residue generation from Point Aconi. The site is being developed in cells and sub-cells called stages. The Initial Cell or Cell 1 is approximately 8.15 hectares in area and is designed to accommodate 500,000 m^3 of residue generation. Later cells have been developed to the North, South and West of Cell 1. Cell 2 was developed second and is located to the North of Cell 1. Cell 3 was developed upon completion of Cell 2 and is located to the South of Cell 1.

Cell 4 is located to the west of Cells 1 and 3. The first stage of Cell 4 (240,000 m^3) was constructed in 2011 and was put in service in July of 2012. The second stage of Cell 4 (680,000 m^3) was constructed in 2014 and was placed in service in October 2014. Cell 5 was constructed in 2018 and is located to the north of Cell 4. Cell 5 is the current active cell at the Residue Management Site and has a design capacity of approximately 900,000 cubic metres, which will provide a residue placement area for over six years.

The various areas associated with these Cells were shown in Figure 2. Side slopes should be graded no steeper than 4.0 horizontal to 1.0 vertical while the top of the fill area will be sloped to prevent ponding and provide positive drainage. See Figure 3 for a typical section through the ash disposal pile.

2.5 Objective of Ash Diversion

Ash reuse in the production of cement, concrete, and other building materials has been recognized as a possibility for Nova Scotia Power. A transition to higher use of renewable energy sources in North America has led to a decrease in the use of coal for power production and in the subsequent production of coal ash. As NSP intends to use thermal energy sources through 2040 and has considerable quantities of coal ash residue in dry storage, the sale and export of coal ash presents a significant opportunity for the company.

As a result, Coal Management Operations Manuals have been revised to reflect new strategies and procedures which respect the handling, storage, and treatment of coal

ash. These updates are intended to support the goals of the 2019 Ash Diversion Pilot Project and serve as a guide to future ash diversion undertakings.

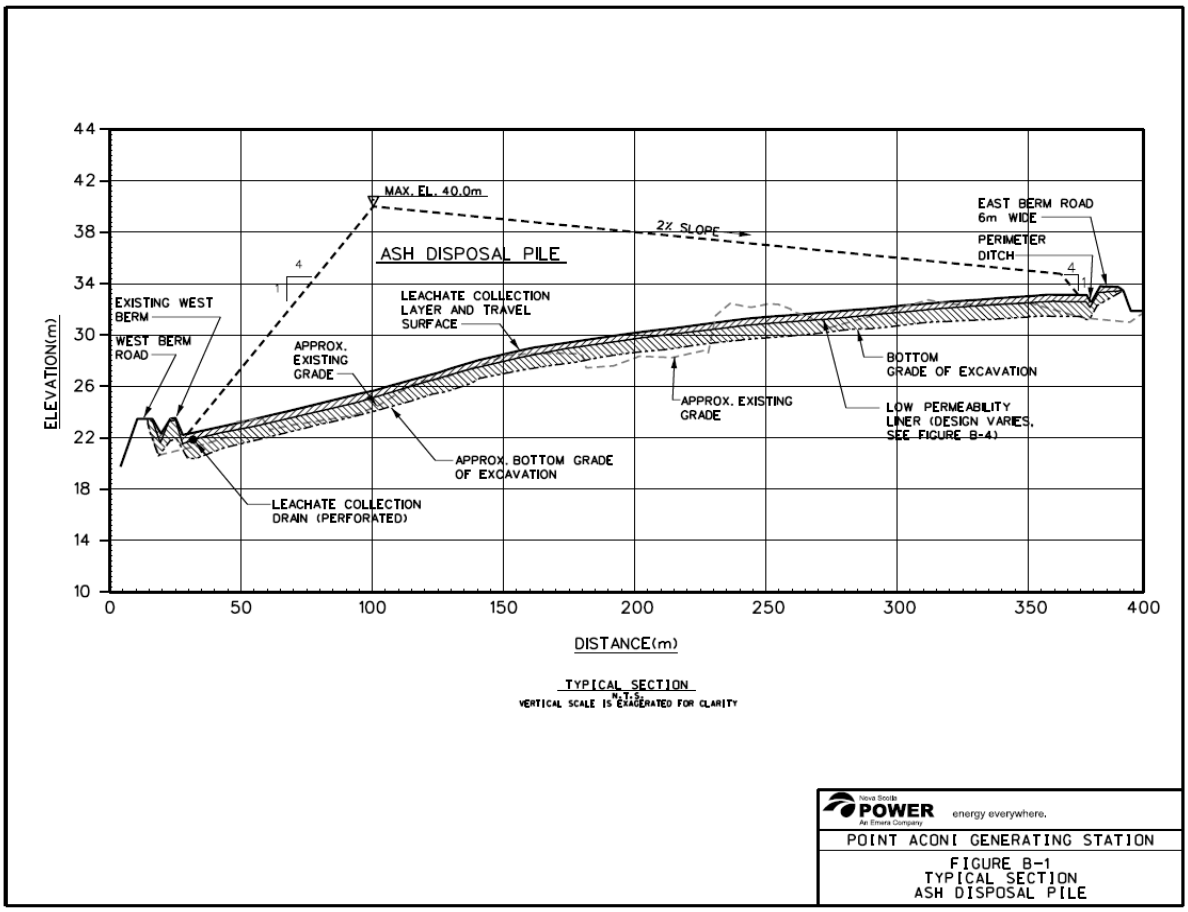


Figure 3: Point Aconi CFB Residue Management Site Typical Section

3. Facilities

3.1 Overview of Equipment and Facilities

Primary structures associated with the operation of the Point Aconi CFB Residue Management Site are described below.

Equipment selection is based on evaluation of the function to be performed. Basic functions to be performed are ash placement, grading, compaction and providing support functions such as road maintenance, snow removal, and ditch cleaning.

3.2 Silos, Unloading Spouts and Conditioners

Two residue storage silos are provided at the Point Aconi Generating Station. The larger silo has a capacity of 2218 tonne, and the smaller silo a capacity of 554 tonne. Normally, the larger silo will hold fly ash collected from the air heater and the bag house, while the smaller silo will accommodate ash taken from the combustor bed drains (bottom ash). The larger silo has a double truck-loading bay arrangement. The smaller silo has a single truck-loading bay.

Each silo has facilities which will allow the loading of conditioned residue (i.e., residue mixed with water). The larger silo has two mixer/un-loaders, (one over each truck bay) and one unloading spout. The smaller silo has one mixer/un-loader and one unloading spout. The mixer/un-loaders will allow dust free loading of dump trucks (and subsequent dust free unloading at the landfill site).

Water is added to the CFB residue at the time of loading to the trucks. Water addition rates are selected to provide dust-free unloading at the landfill site. However, the water plays a part in the completion of the hydration reactions.

Figure 4 shows a schematic of the silos and unloading facilities at the Point Aconi plant site.

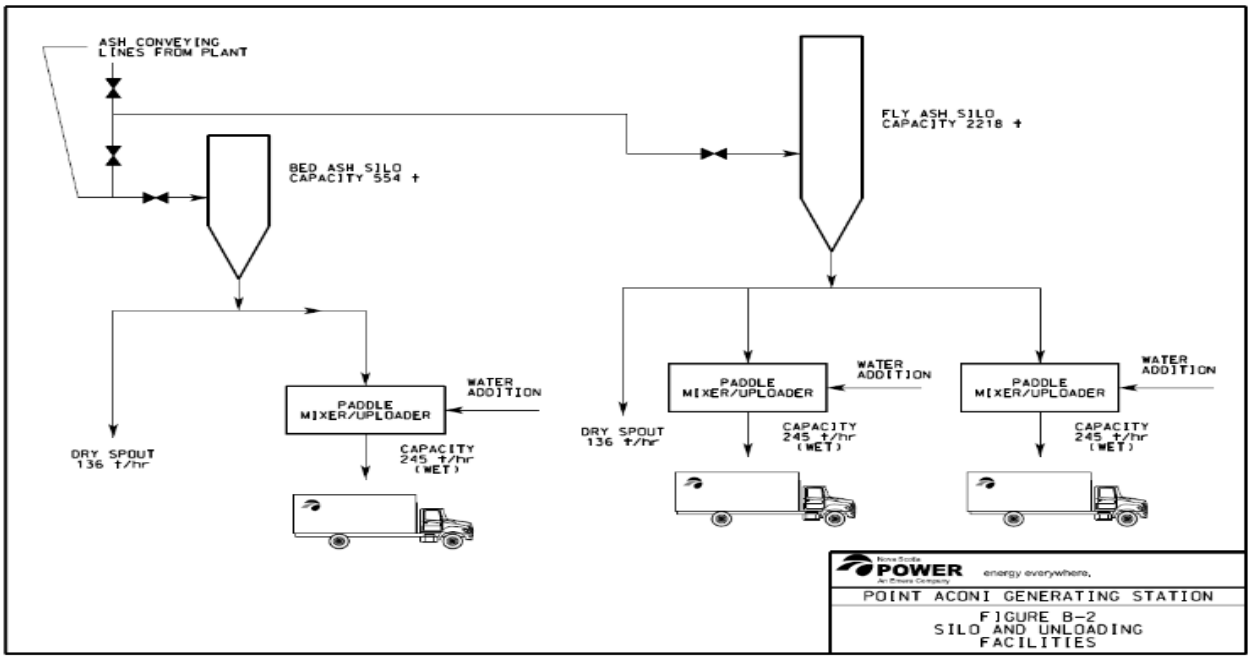


Figure 4: Schematic of Point Aconi Silos and Unloading Facilities

3.3 Roads

Transportation of CFB residue to the landfill site is by road in trucks. Figure 5 shows the access road layout. Trucks leaving the silo bays travel along plant site road G, cross Highway 162 and travel to the active landfill cell, Cell 5, along a 2 lane, unpaved, all-weather access road which also serves as access to runoff control ponds 7A and 7B. The distance from the silos to the current active cell is approximately 1.2 km.

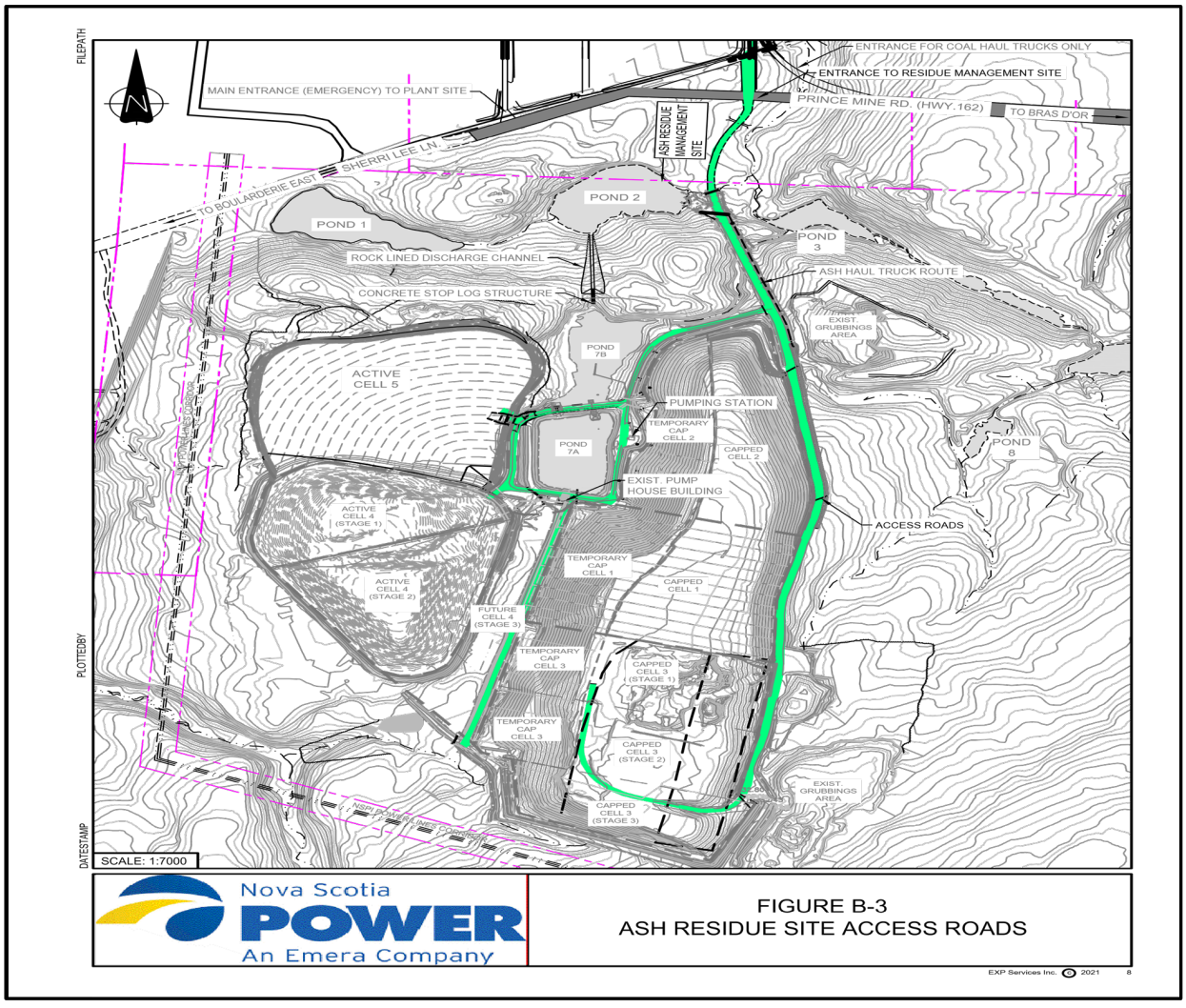


Figure 5: Point Aconi CFB Residue Management Site Access Road Layout

3.4 Ponds

Surface runoff and leachate overflow from the storage tanks are accommodated in surface runoff control ponds on the residue management site.

Figure 6 shows the location of the ponds described in this sub-section.

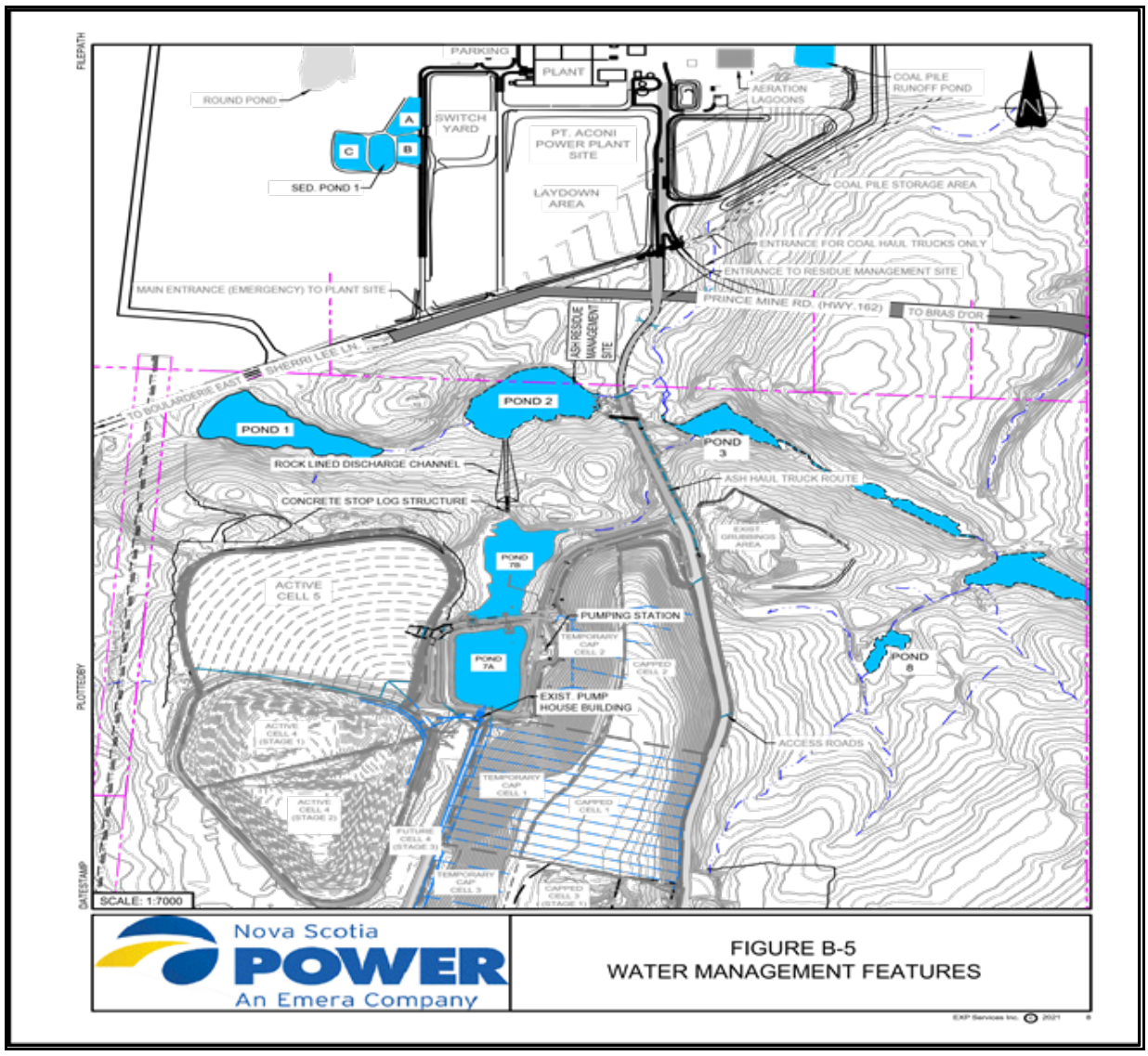


Figure 6: Point Aconi CFB Residue Management Site Pond Layout

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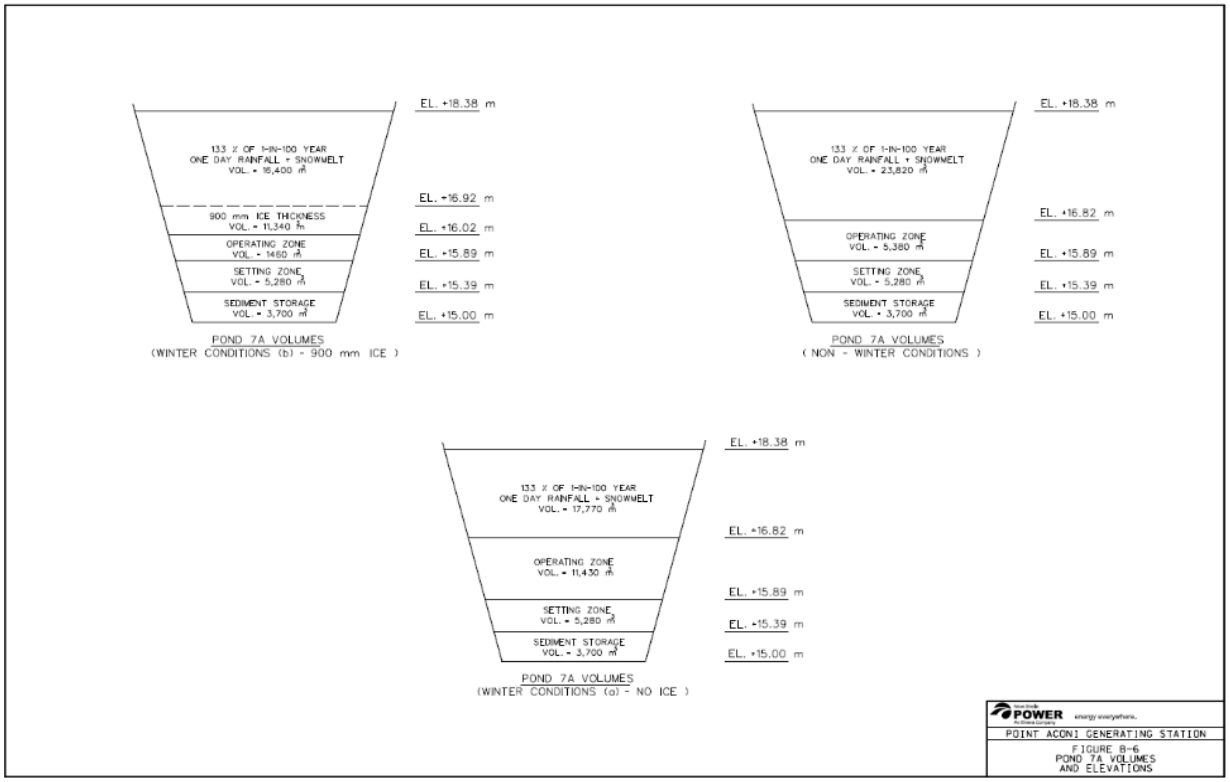


Figure 7: Point Aconi CFB Residue Management Site Access Road Layout

Figure 7 shows the design water levels and volumes for Pond 7A.

Specifically, runoff which has contacted residue (RCW) and leachate flow from the leachate storage tanks, are directed to Pond 7A. This pond is lined with a composite liner consisting of 500mm of native till with a coefficient of permeability, K = 1 x 10^{-6} cm/s overlain by a 60 mil HDPE geomembrane. The liner is protected by a 1.0 metre layer of common fill which is overlain by 500mm of pervious fill. There is an access ramp to the bottom of the pond to allow for periodic excavation of accumulated settled solids. These excavated solids are placed back on the landfill. The bottom of the pond is at elevation +15.0 m above mean sea level (amsl) and the overflow elevation is at + 18.38 m amsl. The overflow consists of two new 300 mm dia. reinforced concrete culverts installed under the newly upgraded access road for Cell 4. There is also a concrete headwall discharge structure with valve openings at different elevations however this structure has never been used to discharge water from Pond 7A to Pond 7B. The valves on this discharge structure are always kept locked shut.

Immediately downstream from Pond 7A is Pond 7B, which is an unlined pond. Pond 7B has a concrete double culvert flow control structure which normally maintains the water level at + 16.0 m amsl. Outflow from Pond 7B can be controlled by means of removable stop-logs in the double culvert overflow. All non-contacted water from the landfill sub-watershed is diverted into Pond 7B and serves as a source of non-contacted water for landfill activities and dust suppression on the site roads.

Water is withdrawn from Pond 7B for filling water trucks via a pump house adjacent to the ponds. Water can also be pumped from these ponds to the plant site via HDPE pipeline. Pond 2 is equipped with a submersible pump for level control and discharges to the ocean. It also has a downstream platform for water quality sampling as part of the compliance requirements of the operating permit.

3.5 Pumping Stations

The primary pumping station adjacent to Ponds 7A and 7B contains three submersible pumps. The piping is configured to allow water trucks to be filled from either Pond 7A or Pond 7B, or to allow water to be pumped from Pond 7A to the Plant site. The pumping station is an underground concrete structure with access via a manhole cover. Filling of water trucks is through an overhead flexible hose mounted on a structural steel gantry. To avoid mixing 7A water in 7B and subsequent release to the environment, water cannot be pumped from 7A to 7B.

A second pumping station was built to the South of Pond 7A as part of the Cell 4 Construction project and now handles leachate from Cell 4 and Cell 5. This pump house, which is built on top of the existing Cell 1 leachate collection tank, contains three pumps and two mixers and its primary purpose is to pump leachate and RCW from the Cell 4/Cell 5 area into Pond 7A.

3.6 Water Truck

Water for dust control at the Point Aconi CFB Residue Management Site is delivered by a water truck. This truck is owned by NSPI and operated by the Ash Contractor.

The truck has a combination of water delivery features including fan-tail spray nozzles, pavement flushing nozzles, and water cannons. Truck spraying features are activated and controlled from the truck cab. Water truck operators remotely open their fill hatches and to activate the pumps in the pumping station by radio controls when filling from Pond 7B.

3.7 Drainage System

The landfill is graded to facilitate the passing of ash contacted water to the leachate collection system and Pond 7A. Drainage systems have been built into the cells to pass water which has infiltrated the landfill to a leachate collection system. This is a gravity fed system which has been constructed under each of the cells. The contents of these leachate collection tanks are directed to Pond 7A.

All non ash contacted water is directed to Pond 7B and Pond 2.

3.8 Landfill Liner

The entire landfill site, as well as Pond 7A is lined with the equivalent of 1 meter of material with a hydraulic conductivity (K) equal to 1 x 10^{-6} cm/s. In Cell 1 and in Pond 7A, this is provided by a composite liner consisting of a 500mm thick layer of compacted native till, with K = 1 x 10^{-6} cm/s, overlain by a 60 mil HDPE geomembrane.

The liner in Cell 1 was overlain with a granular leachate collection layer. This layer consists of a network of 150mm diameter perforated pipes in a continuous layer of clear stone, 150mm thick continuous over the entire Initial Cell area. Water, which infiltrates through the residue (that is, leachate), will flow through the granular layer and eventually flow into a leachate collection tank on its way to Pond 7A.

The leachate collection system, as described, was part of the initial cell design. The monitoring program of the initial cell produced information that was used in the design of succeeding cells. As a result, the leachate collection system was altered in subsequent cell designs by eliminating the piping system located within the leachate collection layer and by increasing the depth of the clear stone granular layer from 150 mm to a minimum of 250 mm. A plan of the sections through the liner and leachate collection system for Cells 1, 2 and 3 and Cell 4 are shown in Figure 8.

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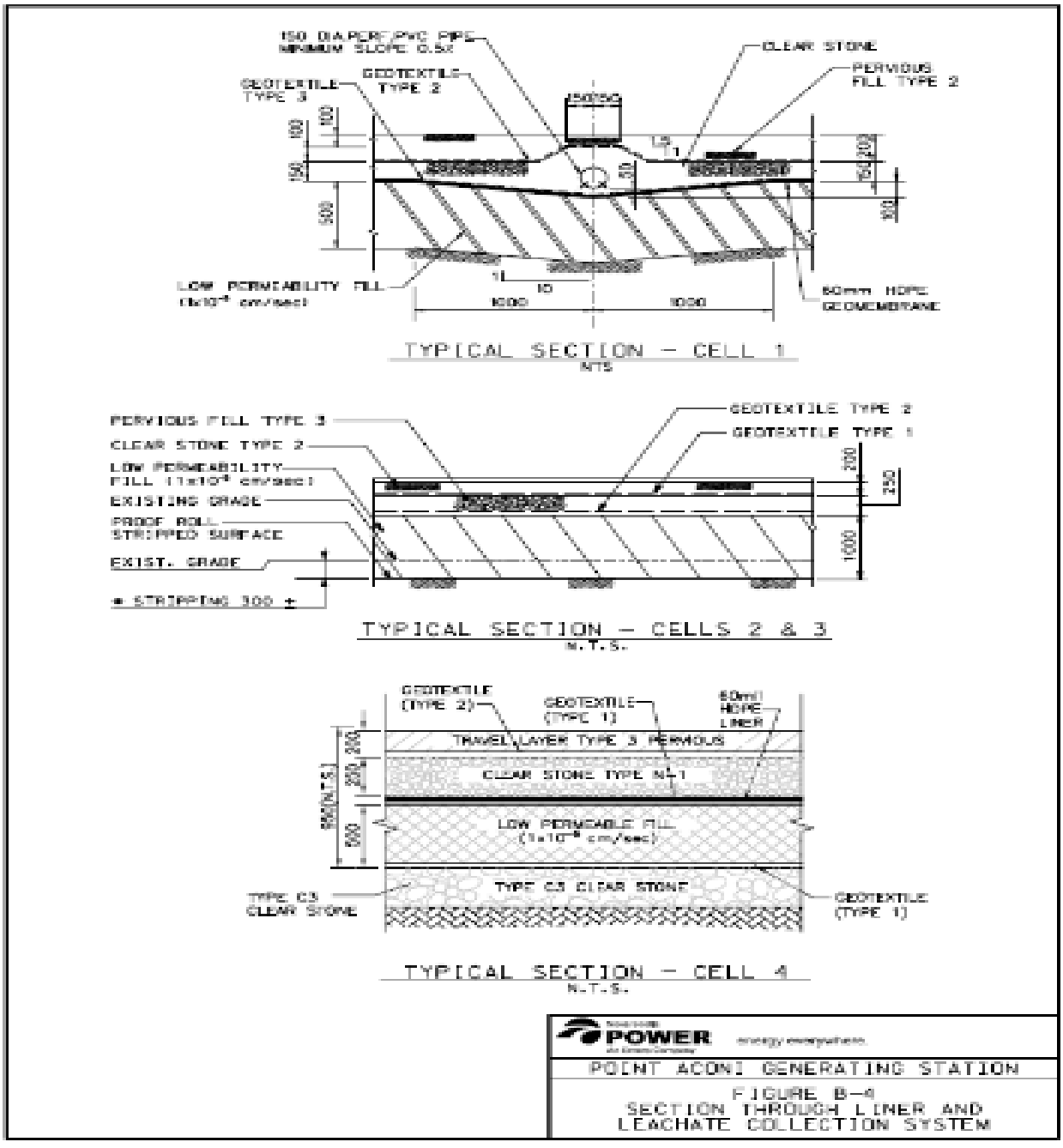


Figure 8: Point Aconi CFB Residue Management Site Landfill Liner and Leachate Collection System

3.9 Other Contractor Supplied Equipment

The residue handling Contractor is responsible for providing the remainder of the equipment and facilities required for satisfactory operation of the landfill. They are described as follows:

- Amenities:
  The Contractor is responsible for providing the required amenities for equipment operators at the plant site. This includes portable sanitary facilities, first aid facilities, fire protection facilities and drinking water facilities. There are no potable water supply or sewage facilities for the Contractor's staff at the Residue Management Site.

- Trucks:
  The Contractor will be responsible for providing a suitable fleet of trucks with operators for hauling CFB residue to the landfill. Tailgates must close tightly enough to prevent loss of conditioned ash during transportation.

- Levelling Equipment:
  CFB residue dumped from trucks will be levelled into lifts of uniform thickness. The Contractor is responsible for providing a motor grader or other suitable equipment for grading. This equipment will be used for mixing bottom ash and fly ash on the ground at the landfill and mixing any water added by the water trucks.

- Compaction Equipment:
  Adequate compaction and final moisture content of the CFB residue will be enforced by a quality control program (forthcoming in this document) at the landfill administered by NSPI. The Contractor is responsible for providing a heavy roller, with a suitably trained operator, for the purpose of compacting the ash residue.

- Equipment Servicing and Refuelling:
  Minor mobile equipment servicing, and repair is completed on-site. If equipment is to be refuelled on site, the Contractor will be responsible for providing the required environmental protection measures to do this. At a minimum, refuelling should be restricted to one location only and drip pans should be provided to collect spills. Suitable materials for spill clean-up should be kept at this location.

- Personal Protective Equipment:
  The Contractor is responsible for providing all members of the work crew with the necessary personal protective equipment.

- Storage of Dangerous Goods:
  Materials classified as dangerous goods will not be permitted or stored on the landfill site without approval of the landfill site supervisor and NSPI. Storage of dangerous goods, when approved, must be in accordance with the Dangerous Goods and Hazardous Wastes Management Act. If these goods are for the Contractor's use, the Contractor will be responsible for providing adequate storage in accordance with the Act.

4. Operations

This Section defines the operations relative to the handling of residue on a day-to-day basis. Special operations related to special circumstances are addressed in Section 9 of the manual.

4.1 Ash Conditioning and Storage

CFB residue is stored in silos at the Point Aconi Generating Station until enough residue has been produced to transport to the CFB Residue Management Site. Ash is transported via off road truck.

CFB residue leaves the silo through two unloader/conditioners controlled by the NSPI silo operator. The residue will be mixed with the amount of water required to maximize the compaction density of the residue and to eliminate fugitive dust during hauling and placement. The amount of water added is expected to be about 10% by weight.

4.2 Loading of Trucks at the Plant Site

Trucks are loaded from the silo mixer/unloaders at the plant site. There are two loading bays under the fly ash silo and there is one loading bay under the bottom ash silo. Trucks must back into the loading bays since they are not designed as drive-through facilities. The silo operator will control the water and residue addition rate in the mixer/unloaders.

The load out operator directs filling of trucks, movement of trucks and remotely operates mixers by remote pendants. The level of fullness of the truck box will be determined visually based on a known loading time. Adjustments to timing are made as required.

Some movement of the truck (i.e., back and forth) may be required to equalize the load in the truck box. The level of residue in the truck boxes is limited to the top of the truck box to prohibit spillage. The load out operator is also responsible for the general cleanliness of the loading area and is required to wash off any spilled ash from the area into a grated concrete trench designed for that purpose.

Truck drivers are advised that the freshly conditioned residue in the truck box will likely get very hot. Caution should be exercised by personnel, when in proximity to the truck box to avoid burns from hot surfaces.

Truck drivers are advised that there may be considerable amount of steam given off by the freshly conditioned residue and, on occasion, there may be fugitive dusting during truck loading due to the reactive nature of the residue under certain operating conditions in the plant. Drivers are required to wear personal protective equipment, as described in the NSPI health and safety protocol, during the truck loading operation.

Prior to leaving the silo loading bay, truck tailgates must be checked and sealed to prevent any leakage of residue or water.

4.3 Transportation to the Landfill Site

Trucks travel south along plant site road G only and through the plant site access gate to a stop sign at the intersection with Highway 162. They then cross Highway 162, with caution, and proceed along the main landfill site access road to the active area of the landfill. Trucks proceed to the active face of fill by travelling over previously placed CFB residue. After dumping, trucks return to the access road. The truck routes being used to place residue on the current active cells Cell 4 and Cell 5 is shown in Figure 9

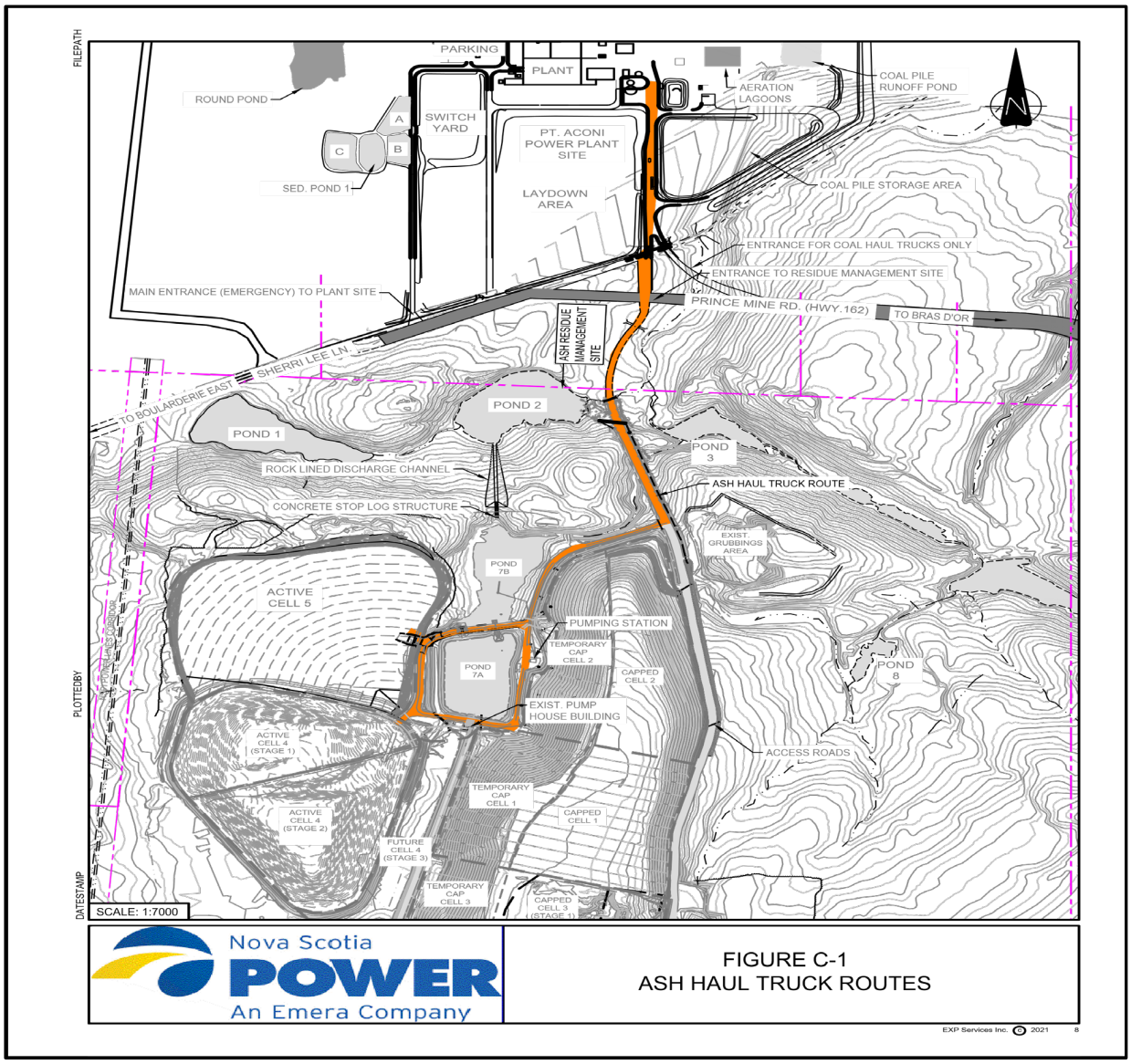


Figure 9: Point Aconi CFB Residue Management Site Ash Haul Truck Routes

4.4 Unloading at the Active Site

Unloading at the active site may be accompanied by water addition, if required, and available at the time of dumping. This will be done by a water truck, primarily for controlling possible fugitive dusting from dry pockets of residue. Steaming may still be occurring during unloading. Personal protective equipment as described in the NSPI protocol for handling of CFB residue will be required for personnel present around the active site during unloading. Trucks leaving the active site after unloading should be

empty; any residue which sticks in the truck box during unloading should be washed out immediately. Residue left in the truck box will tend to harden up over time. The water truck is used to flush out the truck boxes.

4.5 Placement of Ash

Fly and bottom ash transported to the CFB Residue Management Site is placed in the active cell areas by a grader. The ash is placed by end-dumping and spreading to the lower (depression) areas to establish a surface from which the fill can be raised.

Residue dumped in piles by the haul trucks is spread into lifts and the separate fly ash and bottom ash piles mixed as thoroughly as is practicable in these lifts. Lift thickness should not exceed 300mm (un-compacted thickness). Water is sometimes added to the residue during the spreading/mixing operation to complete hydration, to control dusting and to optimize moisture content in preparation for compaction.

Compaction effort used on the ash residue is critical. Ash will be placed in 150mm layers but will vary in accordance with practical experience. This will be achieved by end dumping the ash and spreading with the grader to achieve the desired thickness. A vibratory roller will then be used to achieve a minimum 90% standard proctor dry density. Samples of residue will be sent to a testing laboratory on a quarterly basis to establish the moisture-density relationship (Proctor curve). The results of this testing will guide the continuing operation.

Bonding of the residue lifts is one of the objectives of placement. This bonding will be achieved using the following procedure. Compaction of the residue should be accompanied by water addition as required to achieve a moisture content slightly wetter than optimal. This water addition will be done by the water truck. Water addition rates for this operation will be determined from operational experience and the results of the quality control program (moisture density testing).

All compacted surfaces of the residue should be sloped to promote runoff (from 1 to 3 percent grade). Side slopes of the residue pile will be constructed at grades of 4 horizontal to 1 vertical. Proper compaction of the side slopes, as previously described for the residue lifts, is critical for stability. A gradient of at least 4% will be maintained on the top surface of the residue when practical to promote runoff. Completed cells will be capped with an engineered cap and hydro seeded.

Snow, ice removal, salting and sanding of site roads are the responsibility of the ash contractor. Areas of previously placed residue which contain frost should be scarified prior to placing new lifts. This procedure should be effective in eliminating significant ice lensing. Residue should not be placed on existing residue surfaces which are spongy or soft due to excessive moisture. Measures which may be taken to reduce moisture of in-place residue or of residue being placed are outlined later in this subsection.

4.6 Daily Operations

Daily areas of activity will be variable depending upon the amount of residue delivered to the landfill site. Based on a daily residue production rate of 645 tonne and allowing for a working area of 15m, the average daily working area is anticipated to be in the range of 300 m^2. This is based on a daily height of approximately 1.5m.

Each lift is positively sloped at 1 to 3% to promote drainage. All drainage will be directed towards the leachate collection system.

Interim surfaces of placed and compacted CFB residue are maintained as required for stability and erosion protection. The landfill site supervisor determines which areas are suitable for vehicle traffic and which should be avoided.

4.7 Landfill Targets

4.7.1 Final Grades

The final elevation of the initial cell is at approximately +40.0m above mean sea level (amsl). This is approximately 20.0m, plus or minus, above access road elevation. Access to the pile is via engineered designed ramps constructed during cell development. The maximum permissible grade on these ramps is 10% to allow proper water truck and haul truck operation.

At final elevation, temporary or permanent capping will be completed.

4.7.2 Quality Control

Quality control testing on the compacted residue will consist of field testing of density and moisture content using a nuclear density meter. Quality control testing will be performed by NSPI or a designated testing company engaged by NSPI. One density test and one moisture content determination are defined as the average of 10 readings taken with the nuclear density meter. Testing will be more frequent if results taken indicate that operational adjustments need to be made. Testing at Point Aconi is completed monthly during operation.

4.7.3 Quality Assurance

The quality of density and moisture content readings obtained using a nuclear density meter is only dependable if the instrument is used properly and is calibrated for the material in which it is being used. To assure the quality of these readings, the instrument is calibrated in the manner, and at the frequency, recommended by the manufacturer (normally each use). The instrument operator must also be properly trained in the use of the instrument.

4.8 Permanent Cap Design

The placement of the new permanent caps, that was started in 2012 and completed in 2016, was designed by an external engineering consultant and is similar to a permanent cap placed at other NSPI ash sites. The permanent capping completed to date, covers approximately 200,000 m^2. Figure 10 shows the extent of the permanent caps installed and other current activities at the Residue Management Site.

The permanent cover consists of 200 mm of low permeability fill, a layer of geosynthetic clay liner, 150 mm of clear drainage stone, geotextile blanket, 200 mm of topsoil material, hydro seeding and an erosion control blanket to control sediment erosion. See Figure 11 for typical sections through the permanent cap being installed.

Prior to the placement of the permanent cap the grades and slopes of the cell areas need to be verified and brought back to their original configuration to maintain original design parameters.

NSPI will notify NSE of the completion of a disposal cell, prior to capping. This notification shall include the schedule and timeline for capping the cell.

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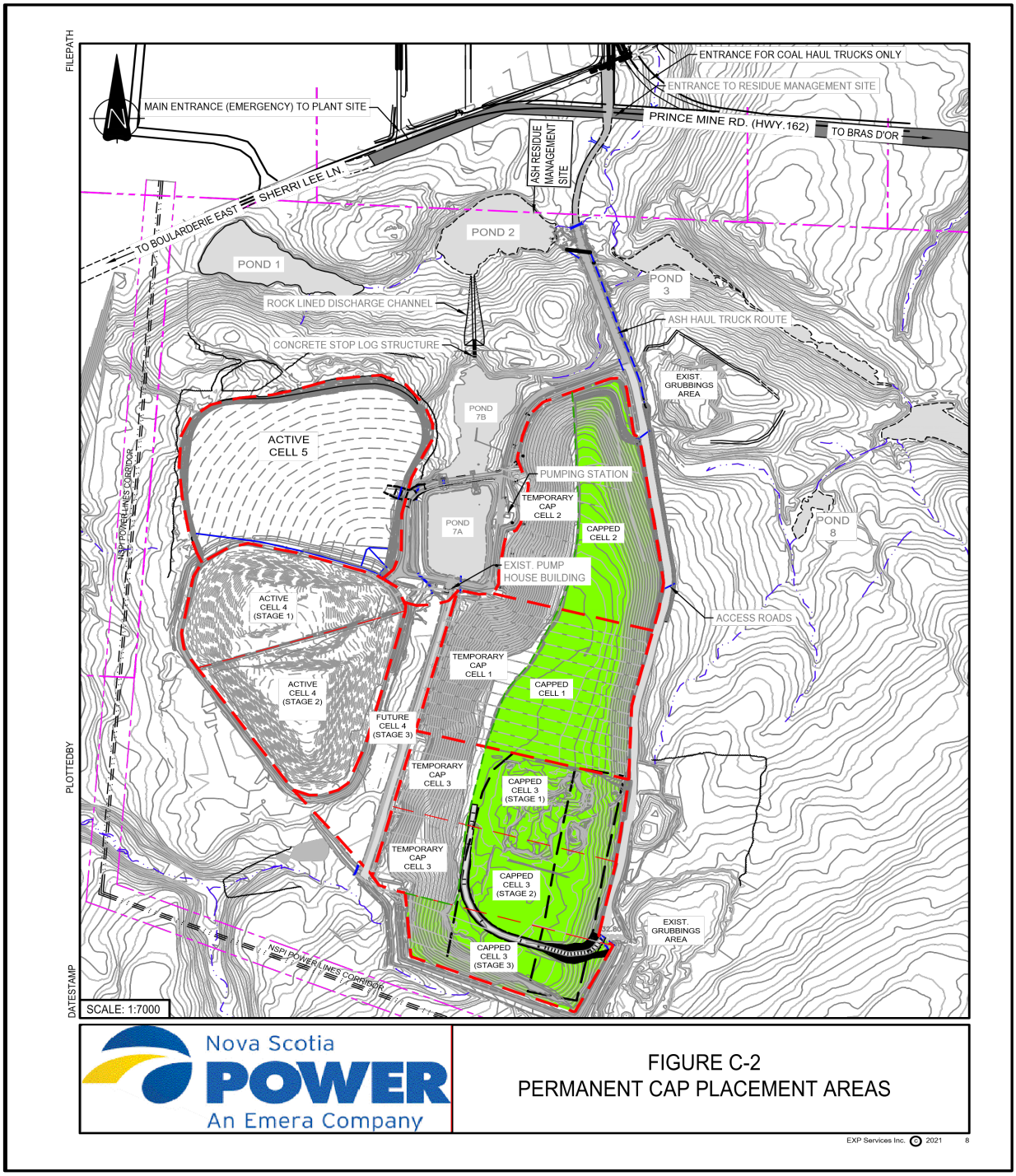


Figure 10: Point Aconi CFB Residue Management Site Permanent Cap Placement Areas

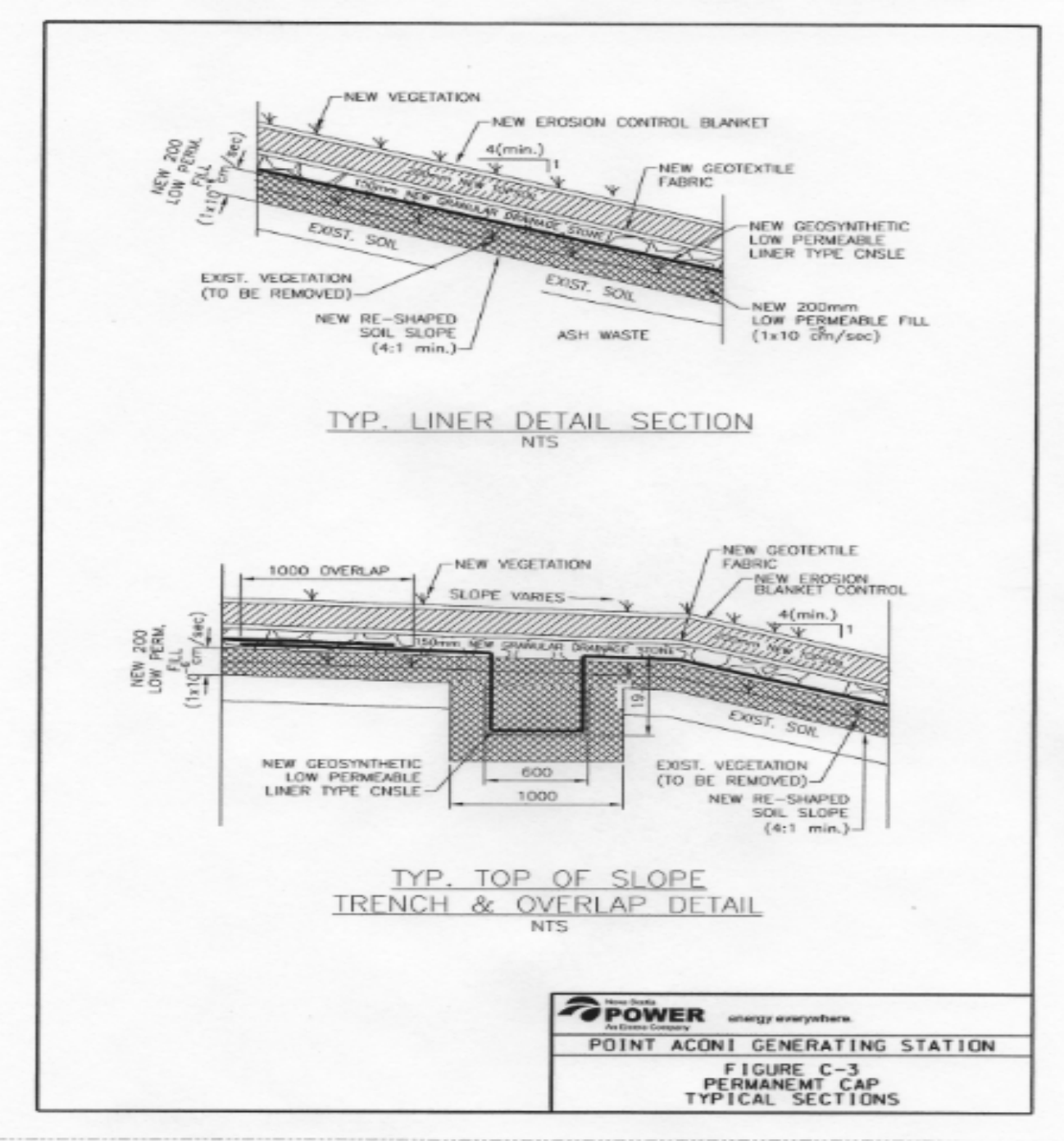


Figure 11: Point Aconi CFB Residue Management Site Permanent Cap Typical Sections

4.9 Ash Reclamation

Ash recovery from uncapped cells for offsite use may occur. This will require excavation of existing ash and trucking to an offsite location. Capping material will be removed as needed. Ash will normally contain 10-20% moisture and dust issues are not anticipated. In the event risk of dusting is evident, water trucks will be used for control. NSPI will ensure ash being harvested for transport to a local shipping location is not free draining. Any ash in a slurry form will be removed from the working site and allowed to dry back to the typical 10-20% range before shipping. All ash will be removed from truck bodies, bumpers and wheels with mechanical means or spray water prior to travelling on public highways. All trucks will be tarped to secure loads and prevent spills.

4.10 Ash Excavation

Landfill areas to be excavated are to be inspected in accordance with Section 6.8.3 of this Manual before any removal from the ash site. Ash samples are also required to be taken at removal areas according to the guidelines provided in Section 6.9.3.

Approval to remove ash from the landfill site will be given to the ash contractor when conditions are determined to be safe and reasonable, and when compositional testing has been successfully performed and results are deemed to be adequate (i.e. ash composition is suitable for export and customer requirements).

Removal will be accomplished using equipment provided by the contractor. There are three primary objectives of ash removal. These are to remove the ash in a manner which limits or eliminates dusting risk as much as possible, to prevent any contamination of the ash with till or cover materials, and to limit the removal of ash to only that area of the landfill identified for excavation (i.e. directed or marked for removal by NSPI staff).

Contractors are to limit the area of exposed ash (i.e. area of removed cover) to prevent dusting as much as practical. Exposed surface-ash will dry out and become prone to dusting. Removal of cap and cover must therefore only be done when the Contractor is prepared for excavation and wind conditions are deemed to be low enough for ash removal. Site water trucks will also be used to spray surface-ash and prevent excess drying.

Capping materials are to be carefully removed so as not to disturb the landfilled ash, or inadvertently mix ash and cover materials. Export ash composition must remain within tolerance of test results. Mixing of ash, either by mixture with till and foreign materials, or

with ash excavated outside the area identified for excavation must therefore be prevented.

4.11 Ash Benefaction

A key parameter for the use of ash in concrete and cement industries is carbon content. CFB residue produced at Point Aconi is typically higher in carbon content than desirable. Post processing prior to export is therefore required.

Processing, or benefaction, will be carried out by third-party contractors at Point Aconi. Compositional testing will reveal the initial carbon content of the ash residue. Benefaction will lower the carbon content, which will be screened again. In the event that benefaction processes prove insufficient, additional carbon extraction techniques will be used until carbon content falls to the desired level.

4.12 Environmental Controls

4.12.1 Mud Tracking

The access roads from the Generating Station to the CFB Residue Management Site are a combination of paved and granular surfaced roads. Prevention of tracking mud and dirt onto paved and public roads will be accomplished by implementing the following practices:

- The route from the working face of the landfill to the paved and public road is long enough to facilitate removal of mud from vehicle tires.
- Grading of site access road as required.
- Site ditches will be maintained to ensure proper drainage.

4.12.2 Water Conditioning

Water for use in controlling dust, in completing hydration, and in optimizing moisture content to optimize density, comes from a variety of sources. This water is referred to as conditioning water.

Detailed descriptions of the operation and management of the facilities at each of the sources is provided in Section 5 of the manual. Water is delivered to the active landfill site and to areas requiring dust control in the plant's water truck.

For this reason, records associated with the use of conditioning water are kept during operation.

4.12.3 Dust Control

The control of fugitive dusting at the landfill site is a matter of prime importance. Total Suspended Particulate (TSP) limits at the NSPI property boundary have been set by the Operating Approval stipulations and are as follows:

- 120 micrograms/m^3 in 24 hours
- 70 micrograms/m^3 annual geometric mean

One high-volume air sampler (Hi-Vol) has been strategically positioned near the landfill site to monitor ambient air quality. This Hi-Vol is situated near the site boundary in a direction relative to the prevailing winds and the area of activity at the residue management site. The intent is to monitor any fugitive dust generated by activities on the residue management site. The Hi-Vol is part of an overall fugitive dust monitoring program for the operations at Point Aconi.

A water truck is used during unloading, spreading and compacting of the residue whenever possible to, among other objectives, dampen the material to reduce dusting. During certain weather events, operations may be stopped if dust control using a water truck is not effective, at the discretion of NSPI.

Watering of residue surfaces or roadway surfaces which have dried out and are sources of dusting is done as required.

Daily inspections of all areas which are potential sources of dust are done by both Contractor and NSPI staff. The water truck will be dispatched to these areas when necessary.

Spillage of residue from trucks onto roadways must be promptly cleaned up. Daily inspections of roadways to determine the need for clean-up or wetting of the surfaces is undertaken by both Contractor and NSPI staff.

Persistent problems with dusting on roadways may have to be dealt with by methods other than wetting. The use of surfactants or chemical binders will not, however, be permitted without permission of NSPI and the Nova Scotia Department of the Environment (NSE). Complaints about fugitive dust will be investigated promptly by plant site staff.

4.12.4 Noise Control

All vehicles working at, and travelling to, the landfill site must be fitted with standard muffling devices. Muffling devices must be repaired or replaced as necessary to maintain their effectiveness.

The natural vegetation buffer zones between the landfill and the NSPI property boundary will also aid in noise abatement. No tree removal will be permitted within these zones without NSPI approval.

4.12.5 Solid Waste

Periodically, solid wastes other than CFB residue will be disposed of at the landfill site. These materials include ditching material (including ash, coal, soil and rock), organic silt from the CW intake system, old refractory, spent ion exchange resins and occasionally sludge from the wastewater treatment basins. If sludge disposal is to occur, a sludge management plan must be submitted to the department for review. Before disposal of any other wastes not identified in this section can occur, a written request must be submitted to Nova Scotia Environment (NSE) for approval. This submission should include a description of the type of solid waste and its estimated quantity. The submission should include the reason why this waste is to be disposed of in the landfill as well as the likely impacts, if any, of such placement, on the existing CFB residue and/or management practices.

5. Water Management

5.1 Water Management Strategy

Water management at Point Aconi is an important aspect of plant operations. The CFB residue management site is managed to re-use water for hydrating, compaction and for dust control, to the greatest extent practicable. Non-contacted surface runoff water is typically used. The water withdrawal permit for the well field supply is adequate for plant operations and for residue handling operations, but careful management of peak demand is required.

5.2 Water Resources

The sources of water for landfill site activities are listed below:

- Pond 7B - unlined runoff collection pond for non-contacted runoff
- Pond 2 - unlined existing pond for non-contacted runoff

Figure 12 shows a schematic of these sources and their normal operating levels

Water for residue conditioning at the plant site silos will come from plant process water supply and could also potentially come from the coal pile runoff pond (CPRP), WWTP Basin A and Basin B.

Water for completion of hydration of dust control, and for compaction of residue at the landfill site will come from Pond 7B or from Pond 2, in that order of preference. Use of

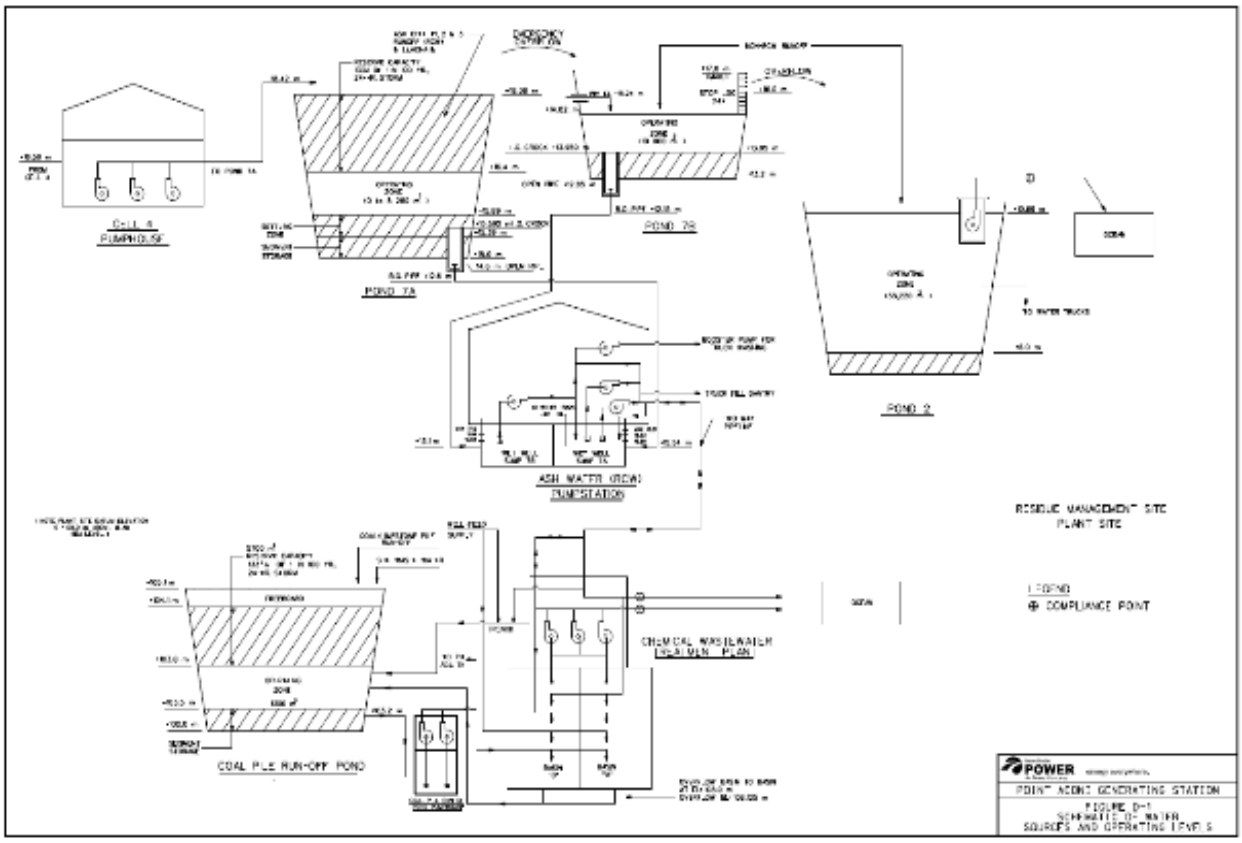


Figure 12: Point Aconi CFB Residue Management Site Water Resources and Normal Operating Levels

water from Pond 2 for landfilling activities is expected to be a rare occurrence. If Pond 2 water is required, the pond can be drawn down to an elevation +6.0m amsl.

It is important to reiterate that the freshwater withdrawal rate from the well field supply is regulated by permit. Wellfield water withdrawal will be monitored against operating approval conditions.

5.3 Discharged Water Quality Objectives

The quality objectives for discharged water that must be met include the limits on specific parameters as outlined in the current operating approval. These objectives are listed in Table 4.

Table 4: Water Quality Parameters

Water Quality Parameter	Objective Level
pH	6.0 - 9.5 units
Total Iron	</=1.0 mg/L
Total Chromium	</=0.50 mg/L
Hexavelent Chromium	</=0.037 mg/L
Total Copper	</=0.05 mg/L
Total Nickel	</=0.2 mg/L
Total Zinc	</=0.25 mg/L
Total Suspended Solids	</=25.0 mg/L
Oil and Grease	</=15.0 mg/L

The effluent discharge parameter (pH) will be monitored at the CW outfall. Documentation of the monitoring will be maintained as per the conditions outlined in the operating approval.

5.4 Leachate Management

Leachate from the Cell 1 collection system was stored in a buried concrete tank. The tank is 6.0m x 6.0m x 4.5m deep and has a capacity of 144 m^3 (allowing 0.5m of freeboard). Overflow from the tank was directed to Pond 7A.

As part of the Cell 4 project, the original leachate storage tank used for Cell 1 was converted into a pump house for use in pumping RCW water and leachate from the lower areas of Cell 4 into Pond 7A. Observations of leachate volumes flowing into the Cell 1 leachate tank had indicated the flow into the tank had stopped and was no longer necessary for that purpose.

Cell 2 is located adjacent to the north edge of Cell 1. The construction of Cell 2 is similar to that of Cell 1, with the exception of the dimension of the low permeability fill layer and the exclusion of the HDPE liner. The Cell 2 low permeability fill layer was increased to 1.0 metre in thickness.

A leachate collection system covers the entire area of cell 2. This is sufficient to collect the leachate from Cell 2 and direct it to a separate underground leachate collection tank.

There is no leachate pump in the Cell 2 leachate tank. The system is designed for leachate to overflow into Pond 7A by gravity. Surface Runoff from Cell 2 is also directed to pond 7A.

Cell 3 is located adjacent to the south edge of the Initial Cell. Construction of the Cell 3 liner is very similar to that of Cell 2. A new underground concrete tank was built for this Cell to collect and divert all leachate and RCW surface runoff towards Pond 7A. There is no leachate pump in the Cell 3 leachate collection tank.

Cell 4, Stage 1 was put into operation in July of 2012. The liner in this cell is similar to that of Cell 1 in that it consists of 500 mm of low permeability fill with an HDPE geomembrane on top. The leachate collection system is similar to that of Cells 2 and 3 and consists of a 250 mm layer of clear stone granular material. All leachate and RCW surface runoff is directed to a new pump house, built upon the original Cell 1 Leachate tank, which pumps this water into Pond 7A.

Cell 4, Stage 2 was put into operation in October of 2014. The liner and operation of this cell is identical to the first stage of Cell 4 and consists of 500 mm of low permeability fill with an HDPE geomembrane on top. The leachate collection system consists of a 250 mm layer of clear stone granular material. All leachate and RCW surface runoff is directed to the new pump house built for the first stage of Cell 4 and pumps this water into Pond 7A.

Cell 5 was put into operation in September of 2018. The liner for this cell is identical to that used for Cell 4. All leachate and RCW surface runoff from this cell will be directed towards the pump house constructed for Cell 4 and eventually to Pond 7A.

5.5 Water Truck Operations

Movement of water from the ponds to the areas where it is required will be in the water truck. The truck has several features to allow different water delivery modes for different operations.

Water truck travel on the landfill site access roads will be directionally controlled to prevent conflicts with residue haul truck traffic.

A curtain of water may be required during residue unloading to avoid dusting; this can best be provided by the fan-tail nozzles which have a considerable range. During mixing, spreading and compaction, the fan-tail nozzles can also be used, either from a distance or by trucks driving over the residue surface. The water cannon, because of its range and positional variability could be used for wetting large areas quickly in a dust control mode.

6. Monitoring and Inspections

6.1 Groundwater Monitoring

Monitoring of ground water levels and quality will be performed by NSPI personnel. The Point Aconi Groundwater Monitoring Program is designed to collect data on groundwater head levels and chemistry at both the Plant Site and the Point Aconi Disposal Site.

Piezometers have been constructed for use in monitoring the CFB Residue Management Site. They are located as shown in Figure 13. Generating Station Piezometer locations are shown in Figure 14.

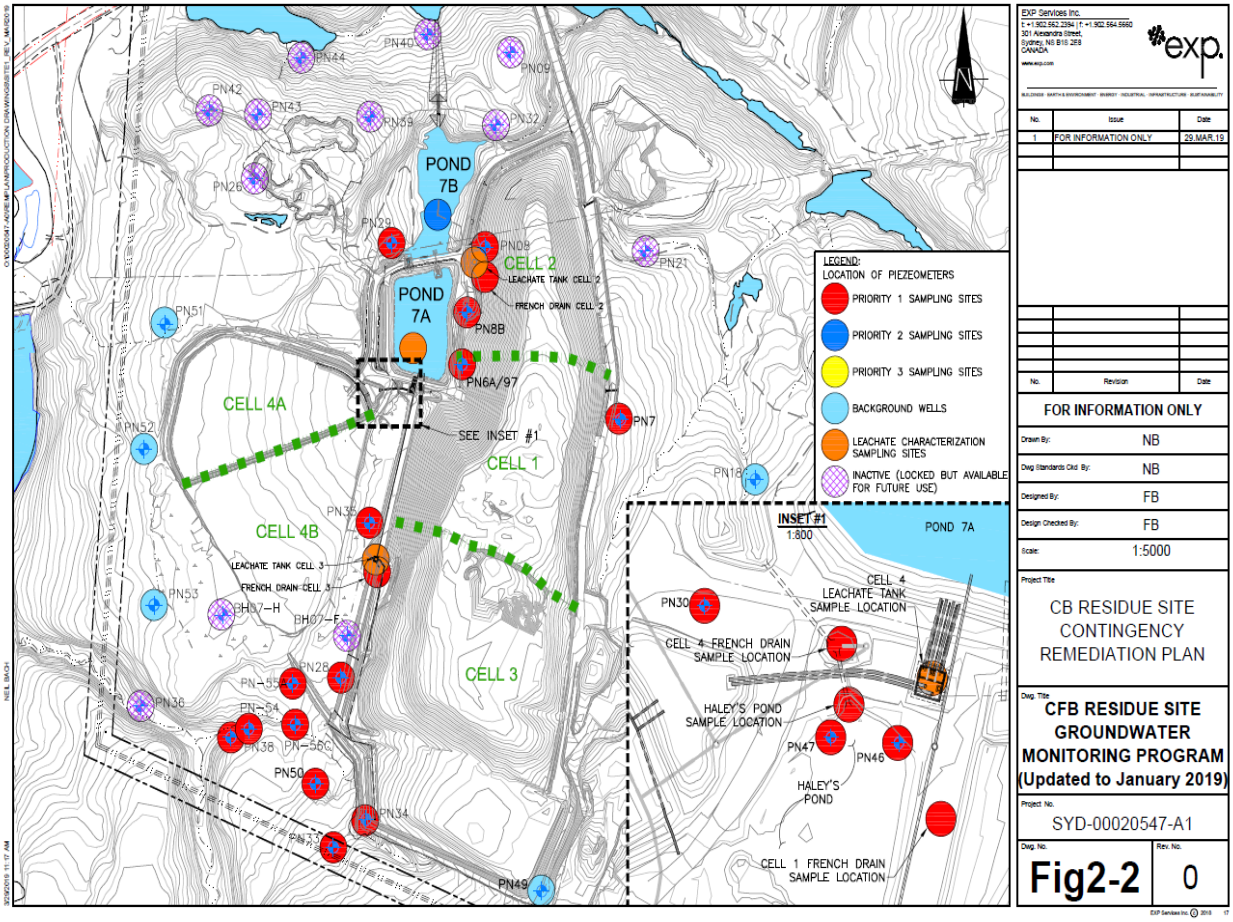


Figure 13: Point Aconi CFB Residue Management Site Piezometer Locations

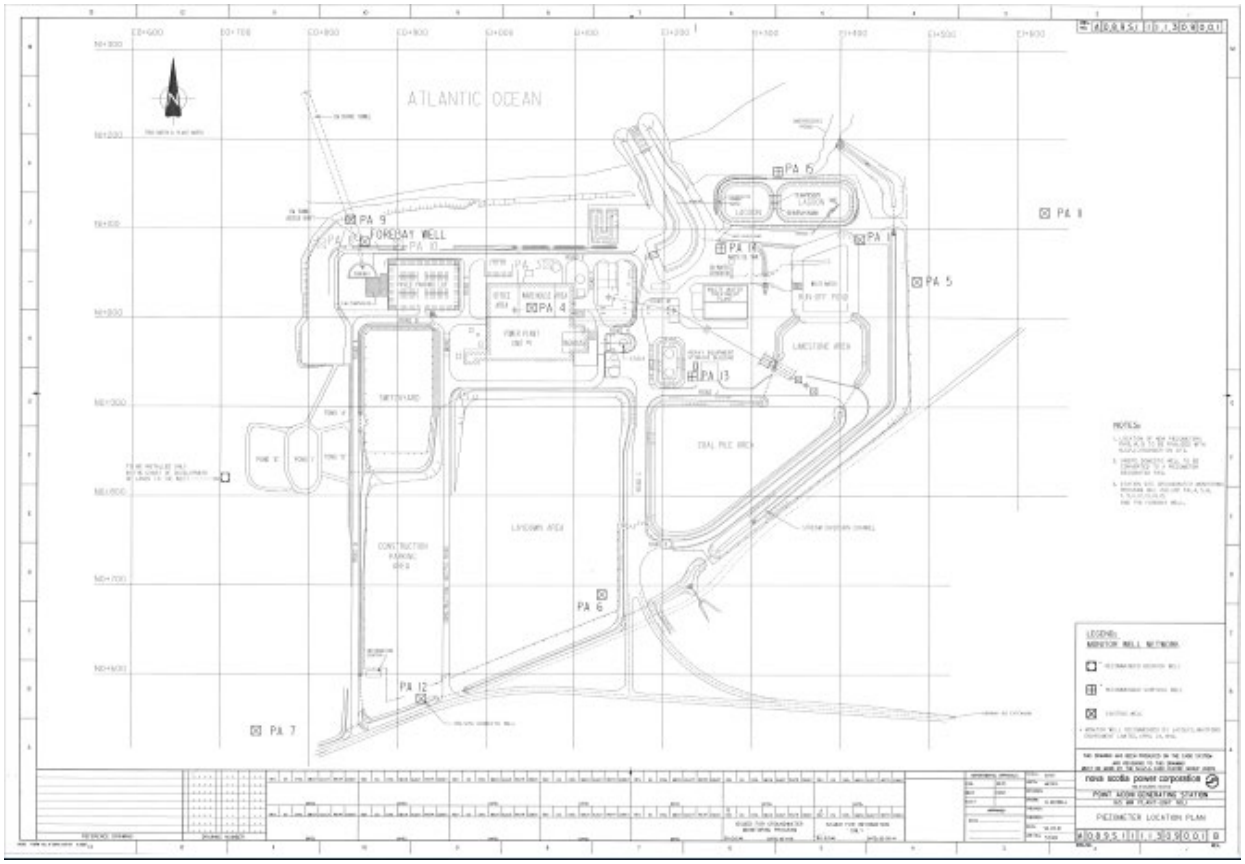


Figure 14: Point Aconi Generating Station Piezometer Locations

Analysis will include the requirements from the Operating Approval.

A Groundwater Summary Report will be submitted annually to NSE and will include information on spills, releases, sampling techniques, monitoring networks, well inspections, groundwater data, laboratory certificates, and other information specified in the current thermal operating approval.

6.2 Groundwater Protection

Pond 7A is lined with a composite liner consisting of 500mm of native till with a HDPE geomembrane. The liner is protected by a 1.0 metre layer of common fill which is overlain by 500mm of pervious fill.

Infiltration control is important in preventing excess water from leaching soluble mater from the ash into the ground water in large quantities. By maintaining well graded surfaces and slopes and eliminating depressions which could pond water, the runoff is increased, and infiltration decreased.

6.3 Surface Water Monitoring

Surface water sampling will be conducted as per the conditions outlined in the operating approval. Surface water sample locations are presented on Figure 15.

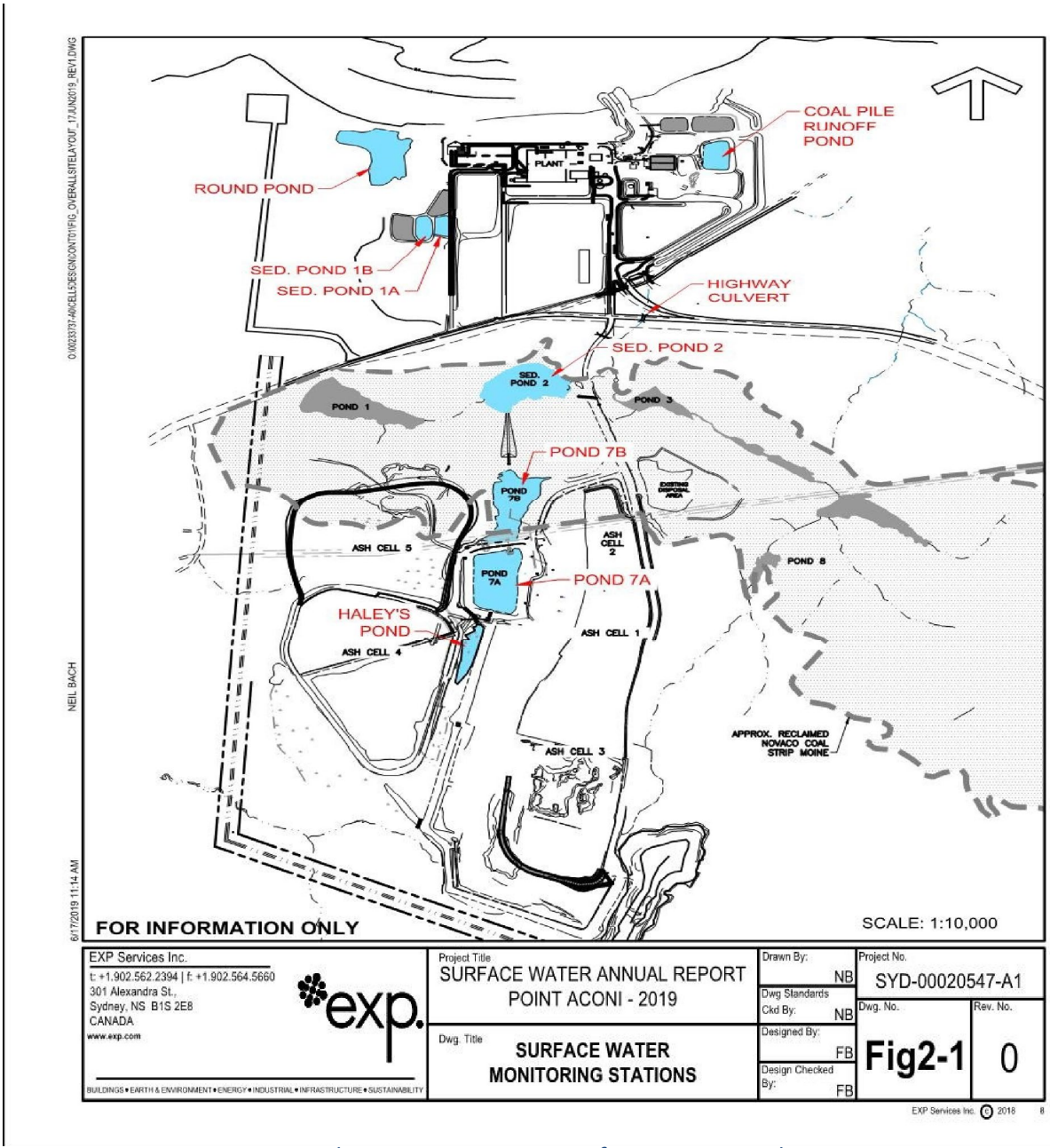


Figure 15: Point Aconi CFB Residue Management Site Surface Water Sampling Locations

6.4 Noise Monitoring

Sound levels originating from the Site will not exceed the following one-hour equivalent sound levels at the property line of each neighbouring property owner:

- 65 dBA for the 12-hour period between 07:00 & 19:00 hours daily (Daytime)
- 60 dBA for the 4-hour period between 19:00 & 23:00 hours daily (Evening)
- 55 dBA for the 8-hour period between 23:00 & 07:00 hours daily (Nighttime)

Monitoring of sound levels will be conducted at the request of the Nova Scotia Department of Environment.

The location of the monitoring station(s) for sound levels will be established by a Professional Engineer licensed to practice in the Province of Nova Scotia.

6.5 Geotechnical Properties

The confirmation of geotechnical properties of the landfill is required on an occasional basis and will be conducted at a minimum prior to the start of the development of a new ash cell area. This may include but is not limited to the following:

- Ash analysis of fly ash and bottom ash.
- Grain size analysis of FA (fly ash) and BA (Bottom Ash)
- Specific gravity of FA and BA
- Moisture density relationship
- On-site compaction tests
- Minimum density
- Swelling Characteristics
- Consolidated drained triaxial test.
- Unconsolidated undrained triaxial test
- Consolidated test
- Permeability test of FA and BA

6.6 Reclaimed Tonnage

A system for maintaining records of incoming ash will consist of a truck count each day, which records the cubic meters of ash delivered to the ash site. A survey conducted quarterly will aid in reconciling ash hauled to landfill. Both wet and calculated dry tonnage values will be maintained.

If required, tonnage of ash harvesting from the site will be recorded electronically and provided as required to aid in sales management, in surveys, and calculation of site life span.

6.7 Development Monitoring

Disposal area development will be monitored and recorded to assess the progress of site development and compare with available capacity, generation calculations performed during landfill design. The type of records that will be maintained may include:

- volumes of any clean fill brought to the site from off-site sources.
- estimates of quantities of combined intermediate and final cover used; and
- cell elevations and area consumed.

6.8 Inspection Plan

Inspections of the Point Aconi CFB Residue Management Site serve two main purposes. Firstly, inspections are intended to ensure that policies and procedures put in place by this manual are being followed at the landfill site. Secondly, inspections are carried out to identify possible problems with landfilled ash (i.e. erosion, leaching) and to mitigate risks to the environment and stability of the landfill brought about by these factors.

6.8.1 Frequency and Schedule Inspections

Regular landfill site inspections are to occur on a monthly frequency. These inspections may be carried out by NSPI staff over a series of days, but each inspection item must be evaluated within one month of the previous inspection.

Inspector(s) are to follow and complete the Point Aconi Site Inspection Check Sheet and submit this form, with notes, following each inspection. Action items which require immediate action are to be reported on as soon as they have been identified by the Inspector(s).

The Inspection Check Sheet is attached in Appendix B of this Manual.

6.8.2 General Inspection Tasks

Point Aconi CFB Residue Management Site features which require inspection are:

- Active Ash Disposal Area:
  - The active site should be evaluated for contamination, debris, and proper and complete compaction.
  - Covering of placed ash will be checked to confirm adequate coverage and the minimization of exposed ash.

- Finished Landfill Areas:
  - Capped and covered landfilled areas should be checked for evidence of surface damage and erosion.
  - Sloping of landfilled ash will be evaluated.
  - The general condition of berms will be evaluated.
  - Ditches will be checked for blockage, excessive vegetation, excess ash, etc.

- Ponds:
  - The sedimentation ponds will be evaluated for general condition, water level, blockages, contaminants, etc.

- Security Features:
  - Fencing, locks, gates, and signage will all be checked for general condition.

- Site Structures:
  - Roadways to be checked for condition.
  - Discharge Structure will be checked to ensure it is locked, the amount of sediment built up at the gate is not excessive, and it is in good working order.

- Natural Considerations:
  - The ash site will be checked for signs of the presence of wildlife.
  - Vegetation concerns (i.e. presence of saplings on berms, in ditches, interference with road access/visibility) will be evaluated.

- Equipment:
  - Site pumping stations will be inspected for regular operation and general condition.

6.8.3 Reclamation Inspection Tasks

Prior to excavation of landfilled ash residue, several inspection tasks are required. Landfilled areas proposed to be excavated (having been identified by prior sampling) are to be checked for features which will ease removal activities and ensure the safety of operators. These include:

- Accessibility to the Contractor, NSPI staff, and equipment.
- The presence of other landfilled materials, which may compromise the quality of ash removed from the site (i.e. coal, sludge).
- The stability of the landfilled ash to be removed and in the removal area (presence of depressions, uncapped/uncovered areas, degraded slopes, loose ash)
- Damage to the landfilled area (erosion, leachate, surface scouring).

These features are required to be inspected, documented and reported. A Site Reclamation Check Sheet will be developed prior to any ash removal at the Point Aconi Site.

The Check Sheet will be reviewed by an NSPI engineer to ensure excavation activities are safe and appropriate. Further inspection, or clarification of inspected features, will be carried out as required.

6.9 Beneficiation Sampling Plan

As ash customers require the compositional data, the Point Aconi CFB Residue Management Site will be subject to a general sampling program. The aim of this initiative will be to provide a compositional map of the Disposal Site. This will aid NSPI engineers as they determine which areas of the landfill to excavate. This will also be used to better understand the quality of the ash stored at Point Aconi and to provide quality information to ash diversion customers.

Sampling will also be carried out whenever excavation is to occur, whenever loads are taken from the Point Aconi CFB Residue Management Site, and at the point of export (aboard the shipping vessels).

Sampling done prior to excavation will be done to confirm the findings of prior screening and to identify the exact area of the landfill to be excavated. Ash samples will be taken from the proposed area and sent for compositional analysis. With both the results of compositional testing and inspection, the site engineer will determine whether excavation is to be approved.

During excavation, samples will be taken from every truck load of ash removed from the landfill. These samples will also be sent for compositional testing (including screening for moisture content). The results of this testing will later be tied back to the truck load from which the samples were taken.

Finally, it is a requirement of ASTM 618, that ship-loaded ash must be sampled to confirm composition and final moisture content before transportation. This will be carried out on behalf of NSPI by third-party contractors who will sample the loaded ash and send these samples to the lab for compositional testing.

6.9.1 General Sampling Plan

Sampling will be carried out by NSPI staff at Point Aconi to provide a compositional map of the CFB Residue Management Site. Accordingly, ash sampling must be done with a suitable frequency, or density, to provide an accurate view of the ash composition available at the site. The samples will therefore be taken in a grid, spanning the entire Point Aconi Site. Using GPS, these samples will be tied to their corresponding location in the landfill. The lab results and the GPS coordinates will then be used to create an ash map for Point Aconi.

6.9.2 Sampling Prior to Excavation

When an area of the landfill has been identified for excavation, NSPI staff will take additional samples to verify the compositional makeup of the landfilled ash. As the general sampling program will have provided compositional data for ash stored near the excavation point, sampling done prior to excavation will be done as a means of confirmation and to determine if there are anomalous pockets of ash in the area.

6.9.3 Excavation Sampling

During excavation, samples are to be taken from every truck load of ash removed from the site. These samples are to be representative of truck loads and the area of the landfill from which the loads originate. As such, the samples will be taken from the excavation area non-randomly. NSPI staff taking samples will be sure to take them from different regions of the uncovered area to be excavated. This will ensure that the excavated area has been adequately profiled in terms of composition.

The performing of moisture testing will be completed to determine the amount of pre-shipping processing the ash will require. The desired water content is approximately 10% by-weight. As landfilled as has been conditioned (by water) the ash removed from landfill should exceed the 10% target. This ash will therefore require benefaction or treatment to bring water content down to a desirable level. A common means of lowering water content will be to mix conditioned ash with drier, fresh ash, from the Station silo via pugmill.

Ash content must also be known, particularly with respect to carbon content, to determine the degree of benefaction required before ash may be delivered to customers. The carbon content of Pt Aconi ash will be, in most cases, higher than customer specification. The residue will therefore be treated by benefaction to lower the carbon content. Benefaction will be completed by third-party contractor.

NSPI staff will use GPS to record the excavation and sample location. This, and compositional data, will be linked to specific truck loads taken from the site.

6.9.4 Export Ash Sampling

ASTM 618 requires sampling of ship-loaded (export) ash as this will be the final point of NSPI possession before product is supplied to customers. This sampling is to be completed by third-party contractor. It serves as a form of quality control for customers as well as a record NSPI may refer to as evidence for supplied versus delivered ash quality and composition.

Another important aspect of this testing is to determine the final moisture content of the ash before it is transferred to the customer. As customers will purchase ash on a by-mass basis and water content is expected to fluctuate during transport to customers, moisture testing is the only means of establishing if the correct quality of ash has been loaded and supplied.

6.10 Compliance and Monitoring

6.10.1 Permits

Construction and operation of the CFB Residue Management Site at Point Aconi is subject to the terms and stipulations outlined in the current Operating Approval for this site.

The approval and stipulations reflect commitments made by NSPI in submissions to NSE for CFB Residue Management. These documents detail the environmental objectives for the residue management operation.

6.10.2 Water Compliance

The compliance point for ocean discharge of surplus water from Pond 7A will be at the plant WWTP or at the CW Outfall. Residue contacted water is pumped to the Wastewater Treatment Plant (WWTP) for batch treatment or continuous discharge. The discharge flow is subject to continuous monitoring for pH, turbidity and conductivity. The continuous monitors are part of the WWTP instrumentation and detection of parameters which are out of compliance will trigger an automatic shutdown of the discharge process. CW Outfall compliance point will be for pH only all other parameters must be met at the WWTP.

The compliance point during emergency overflow of Pond 7A water through Pond 7B will be at the outlet of Pond 2. Monitoring will be done by manual sampling and analysis. All samples will be tested and analysed for pH and TSS.

Monitoring wells are to be assessed for physical condition and integrity, and where necessary, repair or decommission the well within in accordance with requirements of the Contaminated Sites Regulations. A Monitoring Well Decommissioning Report will be provided to the Department within 60 days of any monitoring well decommissioning.

Analytical sampling will be conducted at groundwater wells at the main plant site and residue management site. This will be conducted under the supervision of a Site Professional, to ensure the collection of representative groundwater samples from the Site using consistent and comparable field methodologies.

6.11 Record Keeping and Reporting

NSPI will keep all chemical and physical analyses reports per the requirements of the current operating Approval.

NSPI will also maintain all other data not mentioned in the records maintenance section of the approval for a period of ten (10) years.

6.11.1 Water Management Records

Water management records are kept for several purposes. They serve as a planning and predictive tool by NSPI to enhance water management operations on an on-going basis. They provide NSPI with feedback on landfill performance; the quantity and quality of leachate and RCW give some indication of how well the landfill objectives are being met. Finally, some records are submitted to NSE to demonstrate compliance with other terms and conditions of the operating permit.

Records of water usage for landfilling activities consist of logs prepared by the water truck operators. These logs are filled in on a load-by-load basis. The log entries record the date, the time, the source of the load (i.e., Pond 7B or Pond 2) and the destination of the load (i.e., active landfilling, inactive section of the landfill, road-wetting on the landfill site, or dust control at the plant site).

The quantity of water discharged to the environment from Pond 7A is recorded on an event-by-event basis. Ocean discharges are metered automatically by the instrumentation in the WWTP facility.

Water levels in each of the water sources (i.e., Pond 7A, Pond 7B) are recorded regularly by reading the elevation of the water in the pump house.

6.11.2 Reporting

Annual reports will be provided to NSE, by March 31st of each year. Requirements of the annual reports are summarized in the current operating approval.

Spills or releases will be reported to Nova Scotia Environment in accordance with the Nova Scotia Environment Act and the Environmental Emergency Regulations, if required.

Spills or releases will be cleaned up in accordance with the Nova Scotia Environment Act and the Contaminated Sites Regulations.

7. Landfill Development

7.1 Planned Growth

Placement of residue in the Cell 5 began in September 2018. The cell is to be constructed in lifts, starting at the lowest ground elevations. Filling will progress uphill. Temporary berms, constructed of CFB residue, can be constructed to divert runoff around areas which are being filled as the construction of Cell 5 continues.

7.2 Placement Methodology

The Point Aconi Ash Management Site will continue to be developed in accordance with the procedures previously outlined for the placement of CFB residue.

Currently there is a limited market for CFB residue, though there are secondary uses.

Placement of CFB residue, in the Point Aconi Disposal Site, should therefore be done with awareness to the possible reclamation of residue in the future. Efforts should be made to limit all contamination of the residue while placing and capping at the disposal site. Temporary cap should be placed over landfilled ash as soon as practicable to avoid contamination, dusting, and loss of residue.

7.3 Reclamation Strategy

Ash placement in the Point Aconi CFB Residue Management Site is intended to be done by the Ash Contractor knowing reclamation is to follow. It should be recognized that ash reclamation poses risk to environment and operator health and safety. Ash placement and reclamation procedures will therefore be completed in accordance with the following ash reclamation strategy:

- While cells are under construction, efforts will be made by the contractor to prevent the mixing of ash types, as well as the contamination of ash from other sources at the disposal site.
- The placement of temporary and permanent cap will be completed, as previously described, as quickly as possible following the placement of ash.
- Prior to removal of ash from the Site, a plan will be made to direct extraction activities.
- While ash is being reclaimed from the Site, efforts will be made to limit and eliminate dusting and leaching threats (conditioning of ash, use of wind breaks, avoidance of operating during weather events and in poor conditions).
- Water sourced from the sediment pond will be used to condition uncovered areas as soon as the cap has been removed.
- During movement of ash, Site water trucks will be used to provide a spray barrier to prevent dusting and the unintentional spreading of ash.
- Reasonable efforts will be made to avoid disturbance of nearby cells.
- If damage to nearby and unaffected cells occurs as a result of ash reclamation activities, this will be reported immediately, and steps will be taken to either repair damage or mitigate contamination, leaching, and dusting.
- Trucks will be weighed prior to leaving the Point Aconi CFB Residue Management Site.

8. Maintenance

8.1 Maintenance Overview

Inspection of the landfill site is required each working day for purpose of identifying areas or facilities in need of maintenance. Responsibility for the inspections lie with the NSPI staff. Except for major operations, remedial measures will be undertaken by the residue handling Contractor. Specific items or areas to be inspected are as follows:

8.2 Roads

The landfill site access roads will be maintained for smooth traffic flow. All site roads grading and repairs is the responsibility of the Ash Contractor. Should pot-holes occur, or edges give way, the affected area should be repaired promptly. The road shoulders should be maintained in good condition. All culverts under the roads should be kept clear of siltation and debris. Erosion gullies inside slopes should be stabilized. Roadway ditches should be kept clear of debris and area of erosion in ditches should be stabilized. This work is to be done by the Contractor at the direction of NSPI.

8.3 Active CFB Residue Landfill

All berms and ditches should be maintained to prevent erosion. Areas of erosion or slumping should be stabilized.

The active landfill itself is inspected regularly for erosion gullies; grading and compaction of affected areas should be undertaken promptly. Side slopes, particularly those at final (finished) grades, should be inspected for erosion and slope failure. Slope failure areas should be redressed, graded and compacted. Major or recurring slope failure should be visually inspected by a qualified engineer to determine the cause(s) of such failure and to make specific recommendations to correct the situation permanently. The recommended remedial measures should be carried out promptly.

Accumulated solids in the leachate collection tanks and Pond 7A should be removed on a regular basis. These solids will be disposed of in the landfill.

8.4 Linear and Leachate Collection System Protection Layer

Exposed areas of the gravel protection layer, which overlies both the leachate collection system and the liner, should be inspected for rutting or damage and affected areas should be repaired promptly.

8.5 Excessive Sediment and Pond Maintenance

Pond 7A should be drawn down and accumulated solids excavated as required to maintain adequate water storage volume. Excavated sediment is placed in the active landfill cell. Damage to the liner protection layer in the pond is repaired before refilling. Side slopes on the pond berms must be maintained to prevent erosion damage and/or

slumping. The headwall structure and discharge valves should be inspected annually for signs of leakage and repairs affected promptly.

The discharge structure on Pond 7B should be inspected annually for signs for leakage and repairs affected promptly. The channel between the Pond 7B discharge point and Pond 2 should be inspected annually for signs of erosion and stabilized as required.

8.6 Finished Areas of the Landfill

Areas of the landfill which have been covered and vegetated should be inspected for stability. Areas where vegetation is sparse or missing should be vegetated. Areas of erosion should be stabilized.

8.7 General Site Maintenance

Other facilities at the landfill site will require periodic maintenance. The responsibility for these inspections lies with the NSPI staff. They will also be responsible for assigning the responsibility for maintenance/repair to the appropriate party. The facilities that will require maintenance are as follows:

- Pumping Station:
  Regular maintenance on the pumps and controls at the pumping station should be done in accordance with, and at the frequency recommended by, the manufacturer's instructions. Accumulated solids in wet wells should be removed as required. These will be disposed of on the landfill.

- Leachate Collection System:
  Accumulated solids in the leachate collection tanks should be removed on a regular basis. These solids will be disposed of on the landfill.

In general, maintenance activity at the landfill site is undertaken in a pro-active, preventative manner.

9. Safety

9.1 Safety Overview

The CFB residue management operations are required to comply with relevant Federal, Provincial, Municipal or local laws and regulations regarding the employment of labour or relating to the preservation of public health and safety. Operations will also comply with NSPI Contractor Safety Program.

Adequate health and safety arrangements are to be provided for all personnel in conformance with the Nova Scotia Occupational Health and Safety Act. All safety,

security, sanitary, health and first aid regulations which NSPI has in effect or is required to put into effect at the Site are to be followed. To meet these requirements, the disposal site Contractor and the Point Aconi operations staff should review the requirements annually to check current compliance.

CFB residue, while different from the coal ash handled elsewhere by NSPI, is composed of materials being handled commonly in other industries. Specifically, the calcium-based products are similar to those present in agricultural lime, in gypsum and in Portland cement. Accordingly, NSPI has developed an appropriate health and safety protocol which will be enforced for all personnel involved in handling the residue. The residue handling Contractor is required to read this document and provide the required personal protective equipment for personnel involved in these operations.

9.2 Personnel and PPE

Contractors working at the ash site are required to complete and follow NSPI Contractor Safety Program.

The personal safety equipment referenced in the health and safety protocol is intended to supplement the standard safety equipment required for NSPI power plant personnel. All personnel are required to wear hard hats, safety glasses and safety boots while on the plant site and the landfill site. All visitors to both sites should be required to wear all the recommended personal safety equipment during landfilling operations.

During loading of the haul trucks and transportation of the residue to the landfill, the residue may attain temperatures as high as 120°C (i.e., at, or above, the boiling point of water). The result may be a considerable amount of steam generation. The surfaces of the truck boxes will become hot. Personnel working in proximity to the trucks should exercise care and caution.

The landfill site will be managed in a safe manner. The following items are of importance:

- Barricades and danger signs on dams, overflow structures and steep slopes are required for the protection and safety of the workers.
- Attention is to be paid to safe operating procedures when working on/or near slopes.
- The Site is to be left in a safe condition at the end of each working day and any time work is suspended.

9.3 Emergency Procedures

9.3.1 Extreme Weather

The most frequent impact on residue landfilling operations will likely be caused by adverse weather conditions. The following text outlines procedures for implementation in response to these conditions.

- Windy Weather Conditions:
  Sustained winds of up to 50 km/hr will occur frequently at Point Aconi It is anticipated that the residue will be sufficiently moist during unloading that dusting will not be a problem in these conditions. Winds in excess of 50 km/hr may cause operational problems, depending on wind direction and the extent to which shielding from the wind is afforded by completed sections of the landfill or by trees. In the event that wind speed and direction are such that use of water trucks to control dusting is not effective, residue landfilling operations should be suspended. The decision to curtail activity or to work extra time in anticipation of inclement weather will be made by the NSPI landfill site supervisor.

- Wet Weather Conditions:
  Because of the landfill objectives (i.e., a dense, compact landfill, sloped for positive drainage) wet weather is not expected to have a serious impact on landfilling activities. If, however, the residue surface becomes too saturated to allow safe travel, the affinity of the residue for water can be beneficial. Water addition during unloading at the landfill can be reduced so that the residue being placed in saturated areas will tend to stabilize the surface by taking up the excess water. Unloading in this manner should be done very carefully to prevent fugitive dusting. The other impact of wet weather is the effect on water addition rates at the landfill site. The fine-tuning of water addition rates for all weather conditions will be based on operational experience.

- Snow:
  All snow which has accumulated on surfaces where residue is to be placed should be removed prior to placement of residue. The Contractor has the responsibility to clear site of snow and ice prior to placement of residue. Snow removed from the active landfill area should be placed on an area which is lined, and which will drain to Pond 7A. Snow accumulations on all access roads are to be ploughed promptly by Contractor. Work stoppages or delays caused by impassable road conditions will be compensated by working extra hours at Contractors expense and as directed by site supervision.

- Cold Weather Conditions:
  Cold weather will primarily affect water handling at the landfill site. The winter

operation of the water trucks was discussed previously.

9.3.2 Equipment Malfunction

CFB residue handling facilities at the silos at the plant site have been designed to provide an adequate level of operational redundancy. For this reason, minor equipment malfunction will not significantly affect residue handling.

The availability of two silos with cross-over capability to store either fly ash or bottom ash will allow mixed storage in either silo should blockage of either silo occur. Malfunction of any one of the conditioners can be compensated for by using the other two conditioners.

Either of the two failure modes described above (i.e., silo blockage or conditioner malfunction) will result in a reduced rate of residue handling. Depending on the demand on the unit, extended hours may be required to remove the residue being produced. Longer workdays (i.e., more than 8 hours) and/or an extended work week (i.e., more than 5 days) may be required to effectively handle the residue production rate.

9.3.3 Spills

Fly ash spillage which may occur during loading or hauling will be picked up by front end loader and placed at the ash landfill site. Spillage from the Contractor's vehicles is the responsibility of the Contractor.

10. Security

In keeping with the standard practice for industrial sites, NSPI has posted signs warning the general public not to trespass on the landfill site. The NSPI plant staff is responsible for maintaining these signs.

General security of the construction and haulage equipment will be the responsibility of the residue handling Contractor.

11. Operating Permits

Operating Approval #2007-058666-06 (subject to revision) acknowledges the continued operation of the Point Aconi Ash Management Site for CFB residue disposal.

Appendix A: Health & Safety

1. **O.H. & S. Act Requirements**
   - A minimum of one (1) No. 2 first aid kit shall be available on site and accessible at all times.
   - Ready access shall be provided to lunch, clean up and toilet facilities.
   - Copies of material safety data sheets for all chemicals used at the ash site (including the ash residue) shall be readily available on site.
   - A portable eye wash facility shall be available on site at all times.
   - All safety personal protective equipment to be provided by Ash Contractor.

2. **NSP Requirements**
   - All equipment at site to be C.B. equipped.
   - A risk assessment will be used to ensure that personnel have familiarized themselves with site health and safety requirements prior to commencing any work.
   - All contractor personnel will abide by all applicable sections of the latest edition of the Nova Scotia Power safety manual, copies of which will be provided upon award of contacts.

3. **Loading & Transportation**

   During loading of the haul trucks and transportation of the residue to the landfill, the residue will attain temperatures in the range of 100°C to 120°C (i.e., at, or above, the boiling point of water). The result will be a considerable amount of steam generation in which ash dust will be entrained. The surfaces of the truck boxes will become hot. Personnel working in close proximity to the trucks should exercise care and caution. Personnel loading the trucks should be equipped with:
   - Proper respiratory equipment
   - Goggles or glasses with side shields
   - Skin coverage (i.e. coveralls, gloves)
   - Eyewash facilities

Personal safety equipment references above are intended to supplement standard safety equipment required for NSPI power plant personnel. All personnel will be required to wear hard hats and safety boots while on the plant site and the landfill site. All visitors to both sites will also be required to wear all the recommended personal safety equipment.

4. **Operation of Site**

   The landfill site must be managed in a safe manner. The following items are of particular importance:
   - Barricades, danger signs and other precautions on dams, overflow structures and steep slopes are required for the protection and safety of the workers and general public.

- Particular attention is to be paid to safe operating procedures when working on/or near slopes.
- The site is to be left in a safe condition at the end of each working day and at all times when the work is temporarily suspended.

5. Compacting/Site Management

Personnel working on the ash pile may be exposed to dust generated due to movement on the surface. Particular attention should be paid to the operators of heavy equipment. If air-conditioned cabs are not available, respiratory protection should be provided for when conditions warrant its use (i.e. half face respirator fitted with HEPA filter cartridges).

Appendix B: Point Aconi Site Inspection Check Sheet

NOVA SCOTIA POWER INC.

POINT ACONI GENERATING STATION

CFB Residue Management Site Inspection Sheet

Date: _____ Inspected by: _____

Area Inspected	Good	Needs Work	Comments/WO#
Pumphouse #1			
Cell #4 Pumphouse			
Leachate Tank #2			
Leachate Tank #3			
Leachate Tank #4			
Haul Road			
Haul Road Culverts			
Haul Road Ditches			
Haul Road Gate			
Pond 7A			
Pond 7B			
Pond 2			
Cell 4 Under Liner Drain			
Cell 5 Drain			
Cells 1,2,3 Cap			
Cell 3 Temporary Cap			
Cell 4			
Cell 5			

Items to Inspect:

- Active Ash Disposal Area:
  - The active site should be evaluated for contamination, debris, and proper and complete compaction.
  - Covering of placed ash will be checked to confirm adequate coverage and the minimization of exposed ash.

- Finished Landfill Areas:
  - Capped and covered landfilled areas should be checked for evidence of surface damage and erosion.
  - Sloping of landfilled ash will be evaluated.
  - The general condition of berms will be evaluated.
  - Ditches will be checked for blockage, excessive vegetation, excess ash, etc.

- Ponds:
  - The sedimentation ponds will be evaluated for general condition, water level, blockages, contaminants, etc.

- Security Features:
  - Fencing, locks, gates, and signage will all be checked for general condition.

- Site Structures:
  - Roadways to be checked for condition.
  - Discharge Structure will be checked to ensure it is locked, the amount of sediment built up at the gate is not excessive, and it is in good working order.

- Natural Considerations:
  - The ash site will be checked for signs of the presence of wildlife.
  - Vegetation concerns (i.e. presence of saplings on berms, in ditches, interference with road access/visibility) will be evaluated.

- Equipment:
  - Site pumping stations will be inspected for regular operation and general condition.

Jan 21,2025 12:33pm

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N

POND 7A

TO CELL 4&5

TRAFFIC FLOW

FLOW

UP

EXIST. 1000mmø CONC. CULVERT

ABANDONED CONC. WASH PADS

EXIST. 900mmø CONC. CULVERT

EXIST. 250mmø PIPES

EXIST. PUMPING STATION BLDG.

GUARDRAIL

EXIST. WATER GANTRY HOSELOCATIONS

EXIST. CELL 2 LEACHATE COLLECTION TANK

EXIST. 600mmø CONC. CULVERT

WET AREA

ROCKS

EXIST. SWALE

UNCAPPED CELL AREA WITH LOW VEGETATION

DRAINAGE RILL INTO EXPOSED ASH

EXISTING TOP SLOPE

EXISTING DRAINAGE DITCH

APPROX. EXIST. GCL LINER EXTENTS

MINOR SLOPE FAILURE AREA

EXISTING CAPPED ASH CELL 2 AREA

EXISTING TOP WEST SLOPE

EXISTING BOTTOM (TOE) CAPPED SLOPE

NOTE:

1. SURVEY INFORMATION SHOWN IS IN METERS(m) GEODETIC AND IS IN REFERENCE TO THE ATS77 COORDINATE SYSTEM

REFERENCE DRAWINGS

DWG.NO.

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301 Alexandra Street
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exp.

Project No: SYD-22013578-A0

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REQUEST FOR PROPOSAL

A						
REV	DS	CIVIL	MECH	ELECT	INSTR	CONST

REQUEST FOR PROPOSAL

BY:exp. Services Inc. DATE: 21.JAN.25

ENGINEERS SEAL

REGISTERED PROFESSIONAL ENGINEER — PROVINCE OF NOVA SCOTIA — DATE 25 Jan 21 — G.J. Landry 5233

DEPARTMENTAL APPROVALS

APPROVED

DATE . . . . . .

SCALE	1:500
UNITS	METRIC
DESIGNED	GL
DRAWN	CH
CHECKED	GL
CHECKED	CH/GL
DATE	21.JAN.25
W.O.	

SYSTEM–
SOFTWARE–
VERSION–

Nova Scotia Power Inc.
Halifax, Nova Scotia, Canada

POINT ACONI GENERATING STATION

CELL 2 (PARTIAL WEST SLOPE) CAPPING 2022

EXISTING CONDITIONS PLAN

DWG.NO. A 0,8,9,S,0 1 2,4,2 0,0 1,3,9 REV. A

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Jan 21,2025 12:33pm

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N

NEW DITCH (TOE SLOPE)
NEW DITCH (TOP BERM)
NEW DITCH
C 141
E 142
A 141
B 141
D 141
F 142

APPROX. 16,050m² PROPOSED CAPPING AREA LIMIT LINE

PROPOSED 16,050m2 CAPPED ASH CELL 2 AREA

EXISTING TOP SLOPE

APPROX. 16,050m² PROPOSED EAST CAPPING AREA LIMIT LINE (1m OVERLAP)

INFILL MINOR SLOPE FAILURE AREA

APPROX. 16,050m² PROPOSED NORTH CAPPING AREA LIMIT LINE (1m OVERLAP)

APPROX. 16,050m² PROPOSED EAST CAPPING AREA LIMIT LINE (1m OVERLAP)

APPROX. EXIST. GCL LINER EXTENTS

TO CELL 4&5

POND 7A

EXIST. 1000mmø CONC. CULVERT

ABANDONED CONC. WASH PADS

EXIST. PUMPING STATION BLDG.

EXIST. WATER GANTRY HOSELOCATIONS

EXIST. CELL 2 LEACHATE COLLECTION TANK

EXIST. SWALE

TRAFFIC FLOW

FLOW

NEW DITCH GRADE BREAK

NOTE:

1. SURVEY INFORMATION SHOWN IS IN METERS(m) GEODETIC AND IS IN REFERENCE TO THE ATS77 COORDINATE SYSTEM

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Project No: SYD-22013578-A0

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DATE . . . . . .

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DATE	21.JAN.25
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Nova Scotia Power Inc.
Halifax, Nova Scotia, Canada

POINT ACONI GENERATING STATION
CELL 2 (PARTIAL WEST SLOPE) CAPPING 2022

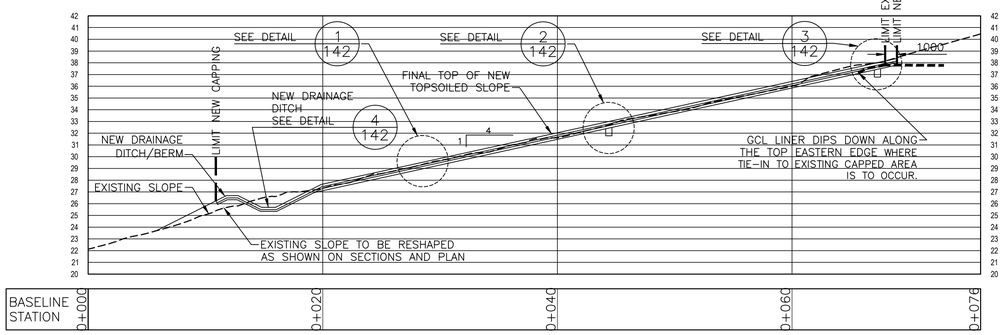
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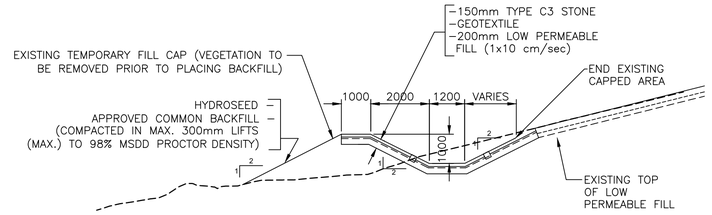
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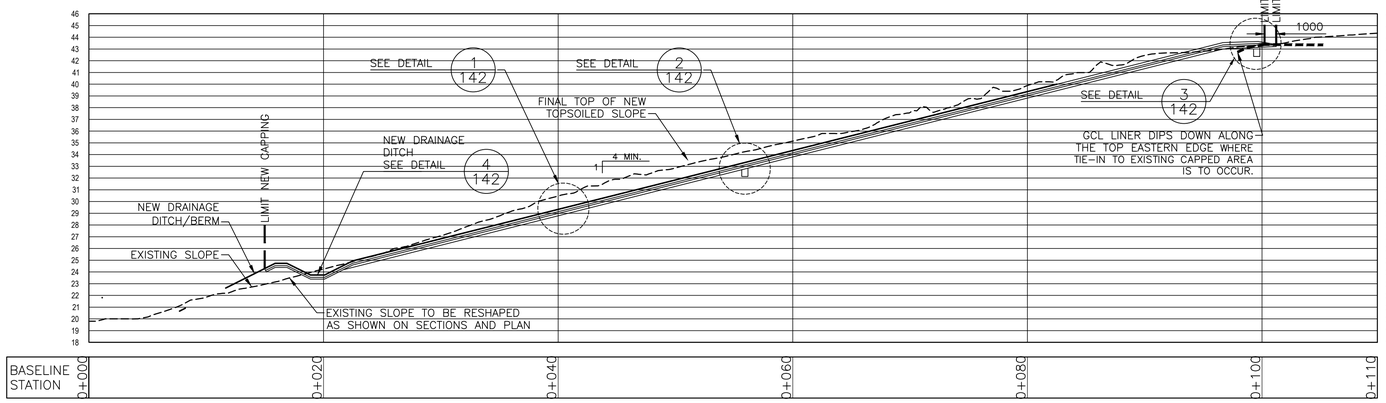
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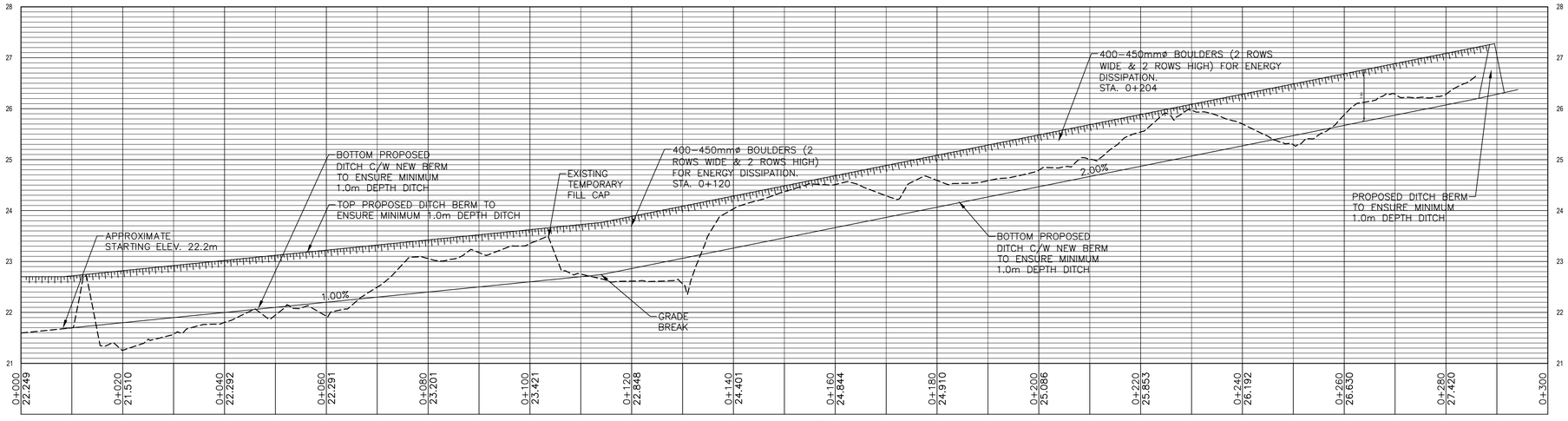
SECTION THROUGH WEST SLOPE D 141

SCALE: 1:100



SECTION THROUGH WEST SLOPE B 141

SCALE: 1:250



SECTION ALONG DITCH C 141

SCALE: 1:250 HOR.
1:25 VERT.

REFERENCE DRAWINGS

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REQUEST FOR PROPOSAL

BY:exp. Services Inc. DATE: 21.JAN.25

ENGINEERS SEAL

REGISTERED PROFESSIONAL ENGINEER · PROVINCE OF NOVA SCOTIA ·
DATE 25 Jan 21
Greg Lindsay
G.J. Lindsay
5233

DEPARTMENTAL APPROVALS

APPROVED

DATE

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DATE 21.JAN.25
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Nova Scotia Power Inc.
Halifax, Nova Scotia, Canada

POINT ACONI GENERATING STATION
CELL 2 (PARTIAL WEST SLOPE) CAPPING 2024

SECTIONS

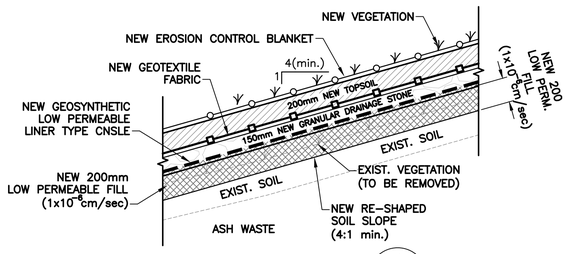
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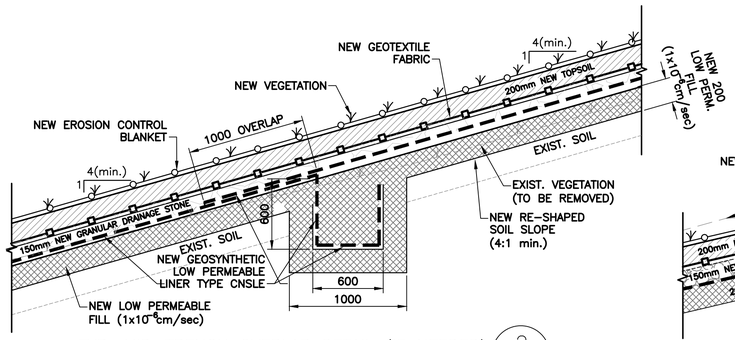
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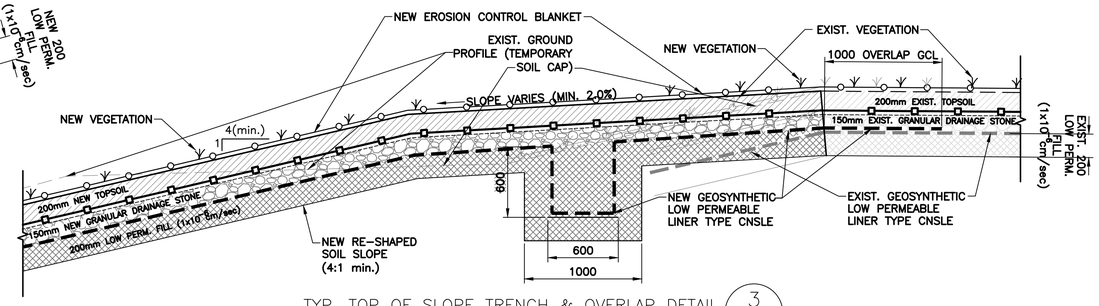


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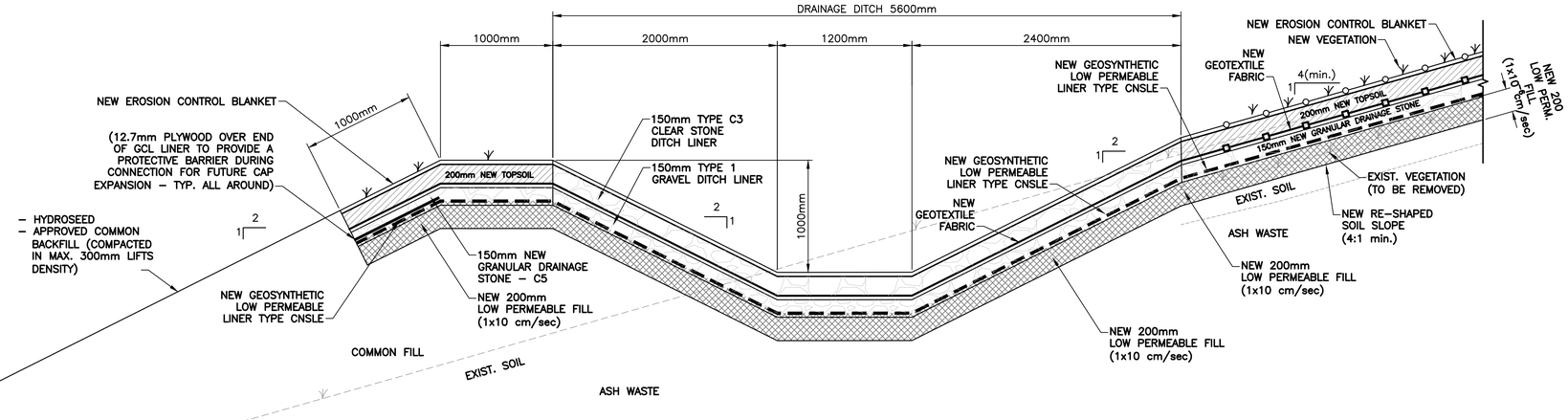


TYP. MID-TRENCH OVERLAP DETAIL (IF NEEDED) 2/142
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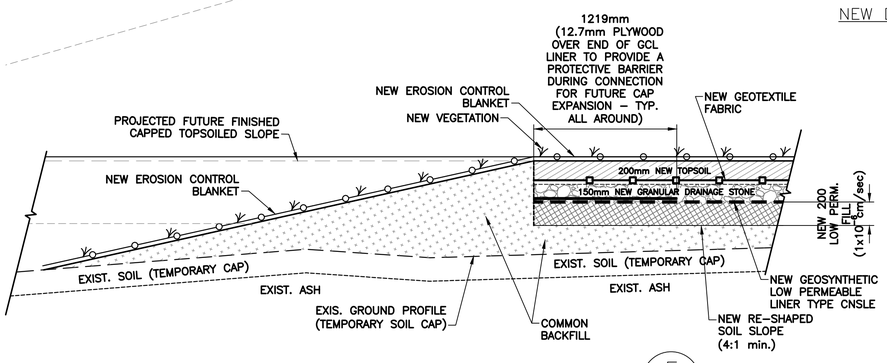
NOTE:
CONTRACTOR TO AVOID CONTAMINATING NEW MATERIALS WITH EXISTING ASH PRODUCTS. A 200mm BARRIER OF LOW PERMEABLE FILL MUST BE MAINTAINED AT ALL TIMES BETWEEN THE ASH PRODUCTS AND THE LINER TYPE CNSLE.



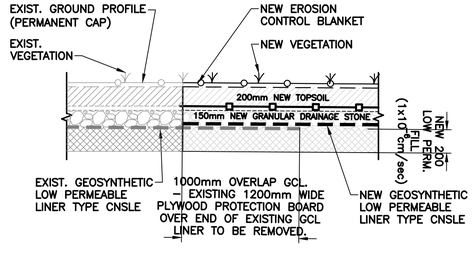
TYP. TOP OF SLOPE TRENCH & OVERLAP DETAIL 3/142
SCALE: 1:25



NEW DRAINAGE DITCH 4/142
SCALE: 1:25



TYP. CAP TERMINATION IN FILL SITUATION E/142
SCALE: 1:25



TYP. LINER DETAIL SECTION WHERE NEW AND EXISTING CAP MEET F/142
SCALE: 1:25

REFERENCE DRAWINGS

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Project No: SYD-22013578-A0

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A						

REQUEST FOR PROPOSAL

BY:exp. Services Inc. DATE: 21.JAN.25

ENGINEERS SEAL

REGISTERED PROFESSIONAL ENGINEER · PROVINCE OF NOVA SCOTIA
DATE 25 Jan 21
G.J. Landry
5233

DEPARTMENTAL APPROVALS

APPROVED

DATE . . . . . .

. . . . . .

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DESIGNED	GL
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DATE	21.JAN.25
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SYSTEM–
SOFTWARE–
VERSION–

Nova Scotia Power Inc.
Halifax, Nova Scotia, Canada

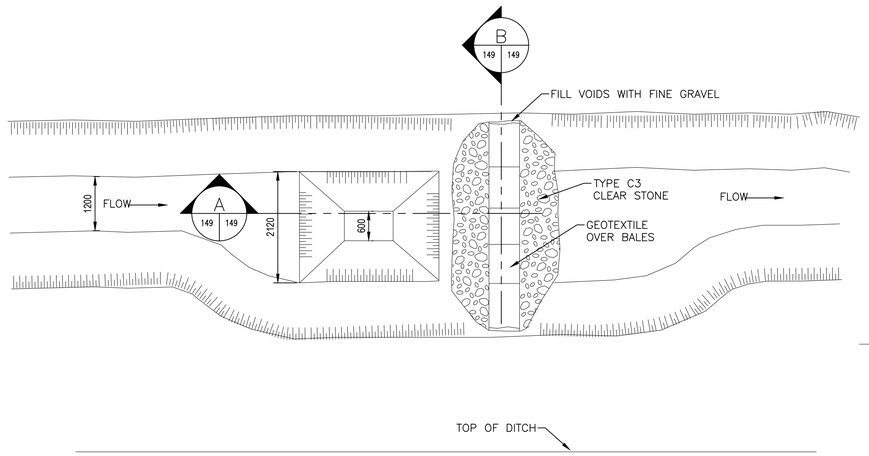
POINT ACONI GENERATING STATION
CELL 2 (PARTIAL WEST SLOPE) CAPPING 2022

SECTIONS & DETAILS

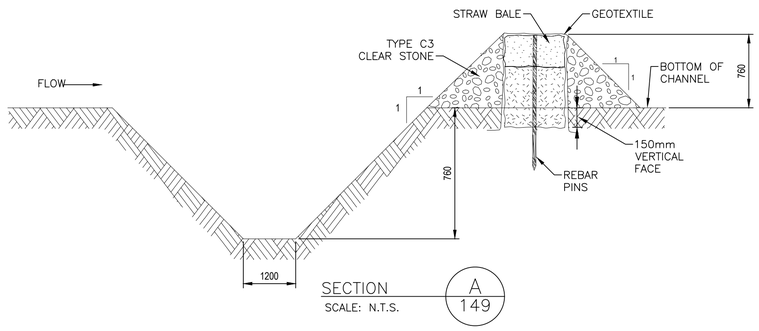
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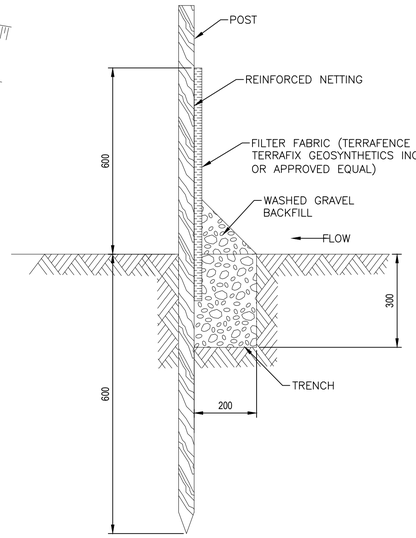
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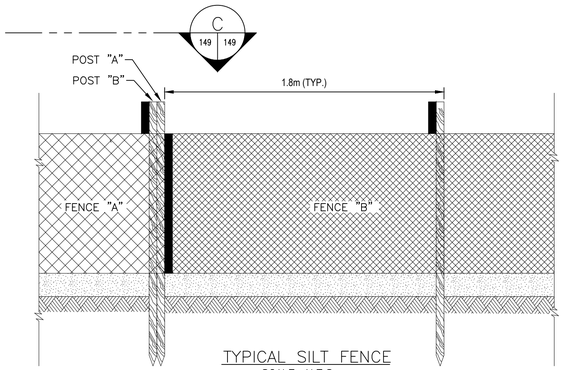
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SCALE: N.T.S.



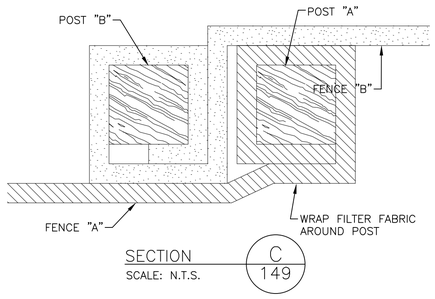
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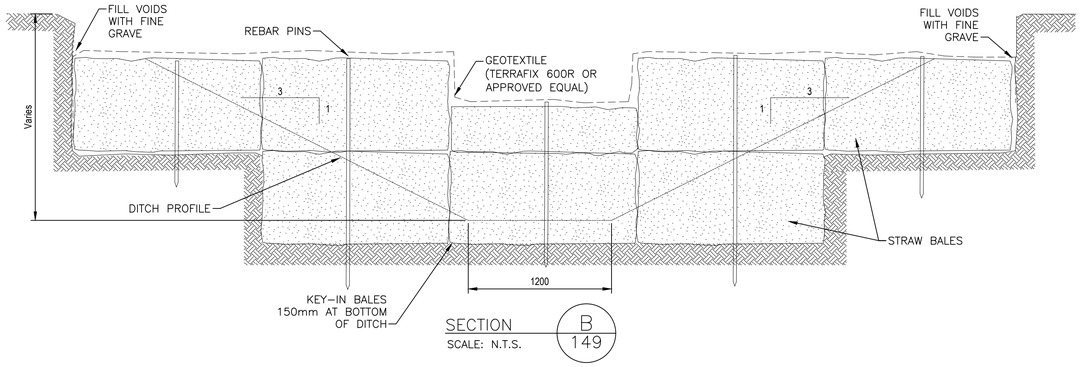
TYPICAL SECTION OF FILTER FABRIC SILT FENCE
SCALE: N.T.S.



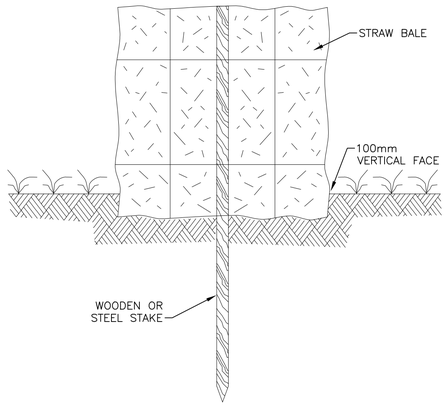
TYPICAL SILT FENCE
SCALE: N.T.S.



SECTION C 149
SCALE: N.T.S.



SECTION B 149
SCALE: N.T.S.



ALTERNATIVE TO FABRIC SILT FENCE
TYPICAL STRAW BALE
SCALE: N.T.S.

REFERENCE DRAWINGS

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REQUEST FOR PROPOSAL

A REV	DS	CIVIL	MECH	ELECT	INSTR	CONST

REQUEST FOR PROPOSAL

BY:exp. Services Inc. DATE: 21.JAN.25

ENGINEERS SEAL

REGISTERED PROFESSIONAL ENGINEER · PROVINCE OF NOVA SCOTIA · DATE 25 Jan 21 · G.J. Landry · 5233

DEPARTMENTAL APPROVALS

APPROVED

DATE

SCALE AS SHOWN
UNITS METRIC
DESIGNED GL
DRAWN CH
CHECKED GL
CHECKED CH/GL
DATE 21.JAN.25
W.O.

SYSTEM–
SOFTWARE–
VERSION–

Nova Scotia Power Inc.
Halifax, Nova Scotia, Canada

POINT ACONI GENERATING STATION
CELL 2 (PARTIAL WEST SLOPE) CAPPING 2022
SUGGESTED MINIMUM ENVIRONMENTAL CONTROLS DETAILS

DWG.NO. A089S0124200149 REV. A

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Jan 21,2025 12:34pm

Request IR-4:

Page 1 of the application states: "The capping will also reduce the volume of wastewater generated at the ash disposal site by limiting the infiltration of precipitation into the ash cells. The project scope includes construction work on the Cell 2 Interceptor Ditch to divert water not contacted by ash away from the ash management area and treatment ponds, therefore reducing the operational demands on the wastewater treatment system."

(a) Please provide an estimate of the annual operations costs savings at the wastewater treatment system as a result of completing the proposed project.

(b) Where will the Cell 2 Interceptor Ditch divert the water that is not contacted by ash and where will that water ultimately discharge?

Response IR-4:

(a) The primary benefit of the proposed capping and interceptor ditch project is operational efficiency and enhanced environmental protection, rather than direct cost savings. By limiting precipitation infiltration into the ash cells, the capping decreases the volume of wastewater generated, and in turn, lowers the risk of non-compliant discharges during heavy rain fall events. Additionally, the Cell 2 Interceptor Ditch diverts non-contact water away from the ash management area and treatment ponds, reducing the hydraulic load on the wastewater treatment system and minimizing the risk of overflow at Pond 7A. While the project is primarily focused on reducing environmental risk and improving efficiency, it may also yield indirect cost savings through reduced pumping and treatment demands.

(b) The Cell 2 Interceptor Ditch is designed to divert non-contact surface runoff away from the ash management area and Pond 7A, which is designated for ash-contacted water and leachate.

Instead, this diverted water is routed to Pond 7B, an unlined runoff collection pond. Pond 7B serves as a reservoir for non-contact water used in site operations such as dust suppression and residue conditioning. Ultimately, water from Pond 7B may be:

- Used on-site for operational purposes (e.g., water truck filling); or
- Discharged through a controlled outlet to Pond 2, which has a downstream platform for water quality sampling and discharges to the ocean. These discharges must comply with regulatory requirements under the Industrial Operating Approval No. 2007-058666-07.

Request IR-5:

Page 2 of the application states: "Following installation, surface runoff from the capped area will be monitored in accordance with the Department's regulatory standards. Upon verification that water quality meets the applicable discharge criteria, runoff will be directed away from the wastewater collection system, thereby reducing the hydraulic load on the site's treatment infrastructure."

(a) Please describe the work involved to verify that surface runoff water quality meets applicable discharge criteria.

(b) Please describe the work involved to direct runoff away from the wastewater collection system when it is confirmed that water quality meets applicable discharge criteria.

(i) Is the cost of this work included in the $2,530,405 estimate? If not, please explain.

(c) What are the consequences if the surface runoff water quality does not meet applicable discharge criteria?

(i) What entity will be responsible for paying any costs associated with these consequences?

Response IR-5:

(a) As outlined in the Point Aconi (POA) Generating Station's Industrial Approval (IA) to Operate (Approval No. 2007-058666-07), confirmatory samples are collected prior to discharge and submitted to a third-party accredited laboratory for analysis. The laboratory results are reviewed to confirm that the discharge water quality meets the applicable

regulatory criteria specified in the POA IA *Wastewater Discharge Limits* table. This table includes discharge limits for select parameters, including pH, total suspended solids (TSS), total oil and grease, and select metals (i.e., arsenic, cadmium, chromium (total and hexavalent) copper, iron, lead, mercury, nickel and zinc). Please note that no discharge limit is specified for mercury; however, the parameter is sampled, monitored and reported to detect any changes in trends.

Additionally, as outlined in the POA IA, NS Power is required to complete Surface Water, Groundwater, and Wastewater Monitoring Programs for the Plant Site and Residue Management Site (RMS), under the direction of a third-party Site Professional (EXP).

The surface water monitoring program includes monitoring surface water chemistry and suspended sediment. To date, data and analyses have been compiled in annual summary reports submitted to NSECC. These reports include:

- A review of field methodologies, including sampling techniques and Standard Operating Procedures (SOPs);
- A review of the current monitoring program and recommendations for modifications, as applicable;
- Current water quality data, including an analysis of temporal trends compared to historical data, with comparisons to applicable regulatory guidelines in tabular format. Pertinent figures are provided for both the Plant Site and RMS;
- Laboratory certificates of analysis, provided in the Annual Groundwater Report; and
- Identification of any adverse impacts to surface/storm water, along with associated recommendations, provided in the Annual Surface Water Report.

The Annual Surface Water Report is the primary mechanism for verifying that surface runoff water quality meets applicable discharge criteria. It includes:

- A review and interpretation of water quality from surface water stations at both the Plant and RMS, including runoff ponds (e.g., Hailey's Pond, Ponds 2/7A/7B). Water chemistry and indicator parameters are reviewed to confirm compliance with the criteria outlined in the POA Industrial Approval;
- Details on the design storm, construction, and operation of the surface water treatment systems, as included in the Environmental Impact Assessment and accepted by NSECC;
- Sampling results and analysis of leachate tanks and French drains, considered groundwater components, discussed in detail in the Annual Groundwater Report.
- Groundwater-stream interaction analysis for Hailey's Pond and Pond 7A/B, with groundwater components discussed in the Annual Groundwater Report; and
- Background surface water quality data to help distinguish potential site-related impacts from broader environmental influences. In 2023, a new background station was established at Point Aconi Brook, where it crosses St. James Road, to support this objective.

(b) Following confirmation that surface runoff water quality meets the applicable discharge criteria, runoff is managed through an engineered design developed and overseen by EXP. The design incorporates site-specific features such as engineered caps and diversion ditches to ensure that clean runoff is directed away from the wastewater collection system and toward appropriate receiving water bodies. These measures are constructed to prevent interaction between clean water and ash-contact water, thereby maintaining compliance with environmental protection requirements. Construction oversight ensures that all design specifications and mitigation measures are properly implemented during site activities.

Further details referencing the Point Aconi CFB Residue Operations Manual (NSEB IR-3 Attachment 2) are provided below:

- Interceptor Ditch and Grading (Section 3.7 – Drainage System): Engineered ditches and site grading are used to divert clean runoff from areas such as Cell 2, preventing entry into the ash management or leachate systems.
- Routing to Non-Contact Ponds (Reference: Sections 3.4 and 5.2 – Ponds and Water Resources): Non-contact water is directed to Pond 7B and Pond 2, which are designated for clean runoff and operational reuse.
- Flow Control Infrastructure (Reference: Section 3.4 – Ponds): Pond 7B includes a culvert and stop-log system to manage discharge to Pond 2, which has a submersible pump and sampling platform for controlled release.
- Pumping and Water Truck Operations (Reference: Section 3.5 – Pumping Stations): Water trucks draw from Pond 7B for dust control and conditioning, reducing demand on freshwater sources.
- Monitoring and Compliance (Reference: Section 6.10.2 – Water Compliance): Discharges from Pond 2 are manually sampled and analyzed for pH and TSS to ensure compliance with regulatory limits.

These activities are managed internally by NS Power and are not itemized as separate components within the project's capital estimate of $2,530,405. Instead, they are considered part of the site's ongoing operational procedures and are therefore accounted for under operating costs, not capital expenditures.

(c) Consequences are outlined in NSEB IR-3 Attachment 2 (Point Aconi CFB Residue Operations Manual (July 2021) Section 6.10.2: *Water Compliance*)*:*

- Non-compliant discharge triggers automatic shutdown of WWTP discharge.
- Manual sampling and analysis required during emergency overflow events.
- Spills or releases must be reported to Nova Scotia Environment and Climate change (NSECC) per the *Nova Scotia Environment Act* and *Environmental Emergency Regulations*.

(i) NS Power is responsible for the costs associated with: monitoring and compliance infrastructure (e.g., WWTP instrumentation, sampling programs), corrective actions and remediation in the event of non-compliance, and reporting and regulatory engagement.

Request IR-6:

Page 2 of the application states: "Other cells within the Residue Management Site (RMS) remain active and continue to receive ash material throughout the construction season."

(a) Please confirm that the other cells within the RMS have sufficient available capacity to accommodate ash/residuals that is expected to be produced by the PA generating station up until its planned retirement in 2029/2030.

(i) If not confirmed, please describe NS Power's contingency plan, and related cost estimate, to handle any excess ash/residuals produced by the station in advance of its retirement.

Response IR-6:

(a) Based on survey data of the active cell(s) from March 2025, it was confirmed that there is approximately 500,000m^3 of ash capacity remaining. The projected volume of ash expected to be produced by the Point Aconi Generation Station through to its planned retirement in 2029/2030 is approximately 800,000 m^3. These projections are based on current generation forecasts, which are subject to change and are routinely updated. The latest projections indicate that the active cell will not accommodate the full volume of ash, resulting in an estimated shortfall of 300,000m^3.

To address this, NS Power has engaged EXP to complete a Preliminary Engineering (PE) study regarding a new cell expansion. The proposed expansion would increase the Ash Management Site by an additional 500,000m^3. This provides an additional 200,000m^3 of contingency to handle any excess ash/residual products by the station in advance of its retirement. Preliminary assessments have confirmed that there is sufficient space, and it is feasible to expand the site by an additional 500,000m^3. The PE study will provide clarity on the best option to proceed, as well as provide budget numbers for this cell expansion.

Request IR-7:

Page 2 of the application states: "A liner-style cap has been selected as the most cost-effective and technically suitable solution for the permanent closure of the cell."

(a) Please confirm that the proposed liner will be constructed of clay.

(i) If not confirmed, please describe the type of liner proposed for the project.

(b) Please identify the other types of liners considered by NS Power for the project and provide the estimated capital cost for each.

Response IR-7:

(a) Not confirmed.

(i) The proposed liner for the Point Aconi capping project will not be constructed entirely of clay. Due to the limited availability of suitable clay material in the local area, a composite liner system has been selected. This system consists of a partial clay layer (low permeability fill) overlain by a geosynthetic clay liner (GCL). This design has been approved by Nova Scotia Environment and Climate Change (NSECC).

(b) NS Power considered alternative liner types during project planning; however, since the composite system of partial clay and geosynthetic clay liner (GCL) has been approved by Nova Scotia Environment and Climate Change (NSECC), no further alternatives are being assessed at this time. A full clay liner was not considered a viable option due to its lack of local availability. In addition to being more practical, geosynthetic liners offer several advantages such as low permeability, uniform quality and reduced susceptibility to compaction related inconsistencies.

Request IR-8:

With respect to cap design, Page 2 of the application states that, "this design is consistent with the approach previously accepted by the Nova Scotia Department of Environment and Climate Change for earlier cell capping projects".

(a) Please confirm that the cost of obtaining all required acceptances, approvals, licenses, etc., from the Department and any other regulatory authorities for this project are included in the $2,530,405 estimate.

(i) If not, please explain.

Response IR-8:

(a) Not confirmed.

(i) The cost of obtaining all required acceptances, approvals, licenses, etc., from the Department and other regulatory authorities is not included as a separate, itemized component within the $2,530,405 capital estimate. These activities are managed internally by NS Power as part of the broader Industrial Approval process and are accounted for under operating costs, not capital expenditures.

Request IR-9:

With regard to all third-party costs on Page 3 of the application, including those in Attachment 1.

(a) Please confirm whether the noted pricing is based on actual, competitive, tendered prices for the current project.

(b) Please itemize and explain any third-party costs that will not be based on a competitive procurement process and how NS Power can justify these costs to ratepayers.

Response IR-9:

(a) Confirmed.

(b) All third-party costs associated with this project are subject to NS Power's competitive procurement process. As such, there are no third-party costs that fall outside of this framework. This ensures all expenditures are market-tested, transparent, and justifiable to ratepayers in alignment with our procurement policies and regulatory obligations.

Request IR-10:

Please provide a table similar to that on Page 3 of the application showing the breakdown of the original budget of $3,225,440 compared to the new estimate of $2,530,405.

Response IR-10:

Due to the cyber incident continuing to affect portions of NS Power's IT system, it is not possible for NS Power to provide an account level variance analysis to the 2025 ACE Plan budget. NS Power's IT team is continuing to work to bring affected portions of the IT system back online, but data required to fully respond to the foregoing question is not expected to be recovered.

Request IR-11:

Assuming the project is approved by the Board and the full project cost is included in NS Power's rate base once placed into service, please identify the rate base dollar amount associated with the project that NS Power expects to transfer to the DDA upon retirement of the POA generating facility in 2029/30.

Response IR-11:

NS Power forecasts a remaining net book value of approximately $2.28 million to be transferred to the DDA associated with this investment upon retirement of the POA generating facility in December 2029.