1 Environmental Protection Plan (EPP)

.1 The EPP will form part of the Contract. Carry out cleanup activities in conformance with the EPP.

.2 The EPP is a consolidation of the cleanup related environmental requirements from the various environmental protection and land use regulations of all relevant jurisdictions.

.3 Provide hydrocarbon and hazardous material spill contingency plan prior to starting work and conforming to requirements based on the *Northwest Territories Water Board's Guidelines for Contingency Planning, January 1987.*

.4 If there are any conflicts or discrepancies between the above requirements, the more stringent requirements shall take precedence. Advise the Engineer of any discrepancies in the above requirements applicable to the work.

2 References

.1 Comply with all applicable environmental laws, regulations and requirements of Federal, Territorial, and other regional authorities, and acquire and comply with such permits, approvals and authorizations as may be required.

.2 Ensure that all applicable legislation, regulations and guidelines are followed in carrying out the work. The following lists some of the key regulatory references:

.1 The Canadian Environmental Protection Act (CEPA).
.2 The Transportation of Dangerous Goods Act and Regulations.
.3 The Fisheries Act.
.4 The Arctic Waters Pollution Prevention Act and Regulations.
.5 The Migratory Birds Convention Act.
.6 The Canada Wildlife Act.
.7 The Canada Shipping Act.
.8 The Navigable Waters Protection Act.
.9 The Territorial Lands Act.
.10 The Territorial Land Use Regulations.
.11 The Territorial Quarrying Regulations.
.12 The Nunavut Waters Act and Regulations.
.13 Canada Labour Act and Regulations.
.14 Atomic Energy Control Act and Regulations.
.15 Explosives Act and Regulations.
.16 National Fire Code.
.17 The Explosives Use Act and Regulations (Nunavut).
.18 The Nunavut Wildlife Act.

.19 The Environmental Protection Act (Nunavut).
.20 Guidelines for the Management of Waste Antifreeze (NWT).
.21 Guidelines for the Management of Waste Asbestos (NWT).
.22 Guidelines for the Management of Waste Batteries (NWT).
.23 Guidelines for the Management of Waste Solvents (NWT).
.24 Guidelines for the Management of Waste Paint (NWT).
.25 Guidelines for the Management of Hazardous Wastes in the NWT.
.26 The Spill Contingency Planning and Reporting Regulations (Nunavut).
.27 The Northwest Territories Archaeological Sites Regulations (The NWT Act).
.28 The Fire Prevention Act (Nunavut).
.29 Safety Act: Occupational Health Regulations (Nunavut).
.30 Guidelines for Removal of Materials Containing Friable Asbestos.
.31 Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments.
.32 National Guidelines for the Landfilling of Hazardous Waste.
.33 Guidelines for Preparation of Hazardous Material Spill Contingency Plans.
.34 Code of Good Practice on Dump Closing or Conversion to Sanitary Landfills at Federal Establishments.
.35 Code of Practice for Used Oil Management in Canada.
.36 Canadian Environmental Quality Criteria for Contaminated Sites - Canadian Council of Ministers of the Environment.
.37 Guidelines for Municipal Type Wastewater Discharges (NWT).
.38 Canada Labour Act and Regulations.

.3 Comply with any operational and reporting requirements outlined in the Nunavut Final Agreement to be provided.

.4 Comply with the requirements of the Site Use Restrictions to be provided.

3 Submittals

.1 Submit all required Contractor submittals to satisfy environmental requirements directly to the responsible agency.

.2 Submit one complete copy of all submittals and agency approvals to the Engineer.

4 Wastewater Discharge Criteria

.1 Wash water, meltwater collection, rinse water resulting from the cleaning of fuel tanks and pipelines, and/or any other liquid effluent stream shall be released onto the ground at a location that is a minimum of 50 metres from natural drainage courses, and shall conform to the following guidelines:

Parameter	Maximum Allowable Level
pH	6 to 9
Oil and Grease	None Visible
Arsenic (total)	100 µg/L
Cadmium (dissolved)	10 µg/L
Chromium (total)	100 µg/L
Cobalt (dissolved)	50 µg/L
Copper (dissolved)	200 µg/L
Lead (dissolved)	50 µg/L
Mercury (total)	0.6 µg/L
Nickel (dissolved)	200 µg/L
PCB: discharge to barren area	50 µg/L
PCB: discharge to vegetated area	5 µg/L
Phenols	20 µg/L
Zinc (total)	1,000 µg/L

.2 Dispose of any liquid effluent not conforming to these guidelines as hazardous material as described in Section 02219.

5 Environmental Protection

.1 Provide 60 m of polypropylene silt fence (typical height of 0.9 m) and the necessary stakes for installation. (Layfield SF180 or equivalent). This shall be used as necessary to prevent sediment transport into water bodies.

.2 Provide 30 m of floating silt curtain (typical height of 2 m) including all necessary connection hardware and flotation. This shall be used as necessary to prevent sediment transport throughout water bodies.

.3 Provide 12 lineal metres of 200 mm diameter hydrophobic, sorbent booms. This shall be used as necessary to prevent the migration of hydrocarbons.

.4 The above materials become the property of the Owner at the completion of this Contract.

6 Measurement for Payment

.1 Include all direct costs for the supply and transport of the Environmental Protection Supplies including the silt fence, the floating silt curtain and the sorbent booms and all necessary stakes and connecting hardware in the lump sum price for Environmental Protection Supplies, Item B.01560-1, as indicated in Schedule B in the Tender Form.

.2 Work of this section other than that described in Clause .1 above, will not be measured. Include all costs in Schedule D - Balance of Project Complete in the Tender Form.

1 Description

.1 This section specifies general requirements for the supply and installation of all materials and equipment for incorporation in the permanent work.

2 General

.1 Use new material and equipment unless otherwise specified.

.2 Within 7 days of written request by Engineer, submit the following information for materials and equipment proposed for supply:

.1 name and address of manufacturer,
.2 trade name, model and catalogue number,
.3 performance, descriptive and test data,
.4 manufacturer's installation or application instructions,
.5 evidence of arrangements to procure.

.3 Provide material and equipment of specified design and quality, performing to published ratings and for which replacement parts are readily available.

.4 Use products of one manufacturer for material and equipment of same type or classification unless otherwise specified.

3 Manufacturers' Instructions

.1 Unless otherwise specified, comply with manufacturers' latest printed instructions for materials and installation methods.

.2 Notify Engineer in writing of any conflict between these specifications and manufacturers' instructions. Engineer will designate which document is to be followed.

4 Delivery and Storage

.1 Deliver, store and maintain packaged material and equipment with manufacturers' seals and labels intact.

.2 Prevent damage and soiling of material and equipment during delivery, handling and storage. Remove rejected material and equipment from site.

.3 Store material and equipment in accordance with suppliers' instructions. Keep materials identified as requiring heated indoor storage in such an environment until they can be stored or installed in the permanent facilities.

.4 Touch-up damaged factory finished surfaces to Engineer's satisfaction. Use primer or enamel to match original. Do not paint over name plates.

5 Conformance

.1 When material or equipment is specified by standard or performance specifications, upon request of Engineer, obtain from manufacturer an independent testing laboratory report, stating that material or equipment meets or exceeds specified requirements.

6 Measurement for Payment

.1 Work under this section will not be measured. Include all costs in Schedule D - Balance of Project Complete in the Tender Form.

1 Record Drawings

.1 Engineer will provide to Contractor, two sets of white prints for record drawing purposes.

.2 Maintain project record drawings and record accurately deviations from Contract documents on one set of prints.

.3 Record changes in red.

.4 Record the following information:

.1 Areal extent and depth of contaminated soil excavation.
.2 Location(s) used for the disposal of wastewater and contaminated soil.
.3 Field changes of dimension and detail.
.4 Changes made by Change Order or Field Order.

.5 At completion of project and prior to final inspection, neatly transfer notations to second set and submit both sets to Engineer.

.6 Reference survey coordinates and elevation to existing control points.

2 Manufacturers' Data Books

.1 Provide all manufacturers' data as specified in the relevant sections to the Engineer for distribution.

.2 Within 120 days of completion of the work, consolidate a set of approved product data in one document, and submit five copies to the Engineer.

3 Other Records

.1 At the completion of the work, or upon Engineer's request, submit all survey information.

.2 Within 90 days of completion of the work, submit the following to the Engineer:

.1 Copies of all documents and permits obtained by the Contractor.
.2 All survey information in electronic format.
.3 Any other pertinent information.

.3 Consolidate the above information in one document, and submit five copies to the Engineer.

4 Measurement for Payment

.1 Work of this section will not be measured for payment. Include all costs in Schedule D - Balance of Project Complete in the Tender Form.

1.0 GENERAL

1.1 Description

.1 This Section specifies the requirements for the excavation, collection, handling, on site transport and stockpiling of contaminated soils from the Beach Refuel Area at FOX-M Hall Beach.

1.2 Related Work

.1 Section 01560 - Environmental Protection.

.2 Section 02209 - Grading.

.3 Section 02219 – Debris Removal

.4 Section 02499 - Geomembranes.

1.3 Definitions

.1 Inorganic Elements: arsenic, cadmium, chromium, cobalt, copper, lead, mercury, nickel, and zinc.

.2 Contaminated Soil: Soils containing concentrations of any or all contaminants in concentrations greater than those listed below:

Lead	- 200 ppm
PCBs	- 1 ppm.
Arsenic	- 30 ppm
Cadmium	- 5 ppm
Chromium	- 250 ppm
Cobalt	- 50 ppm
Copper	- 100 ppm
Mercury	- 2 ppm
Nickel	- 100 ppm
Zinc	- 500 ppm

.3 Hazardous Contaminated Soil: Contaminated soil is classified as hazardous in accordance with the Transportation of Dangerous Goods Act and Regulations (including CEPA and leachable soil).

.4 CEPA Contaminated Soil: Soil containing concentrations of PCBs in excess of 50 parts per million. Materials contaminated with PCBs at concentration levels in excess of 50 parts per million (mg/kg) are legislated as hazardous materials. Storage, handling, and disposal of PCBs are regulated under the Canadian Environmental Protection Act and the Federal Transportation of Dangerous Goods Act. Comply with all applicable regulations.

.5 Petroleum Hydrocarbons: Hydrocarbon products described by laboratory analyses as lubricating oil and grease, fuel oil, diesel and/or gasoline.

.6 Hydrocarbon Contaminated Soil: Soil containing concentration of Total Petroleum Hydrocarbons (TPH) in excess of 2500 ppm.

.7 Free Product: The presence of a layer of liquid petroleum hydrocarbons in the subsurface.

.8 Clean Soil: Soil that has been sampled, analyzed, and determined to have contaminant concentrations below the contaminant levels specified in Clause 1.3.2 of this section and TPH less than 2500 ppm.

1.4 Qualifications and Personnel Protection

.1 Qualifications and Personnel Protection shall be in accordance with Clause 13 of Section 01005 – General Instructions.

.2 No separate pay item shall apply to the work practice requirements, including personnel protection, of this Section. Costs shall be included in the applicable payment items to which this Section applies.

1.5 Site Conditions

.1 The approximate locations of known service or utility lines and buried objects are as indicated on the Drawings. The Contractor shall ensure that services, not designated for demolition, are not damaged as a result of excavation work. The Contractor shall repair any services, utilities, or objects damaged by his actions at no cost to the Owner.

.2 Suspend operations whenever climatic conditions are unsatisfactory for excavating or regrading to conform with this Specification.

.3 After occurrence of heavy rains, do not operate equipment in designated areas until the material has dried sufficiently to prevent excessive rutting.

.4 The contractor is advised that groundwater may be present in any of the hydrocarbon contaminated areas during excavation and that free product may be encountered. **Advise engineer upon encountering free product.**

.5 Prior to the commencement of the work, remove debris, snow, ice and standing water from areas to be excavated and regraded.

1.6 Protection

.1 Prevent damage to benchmarks, existing buildings, surface and underground service and utility lines not designated for demolition, as well as to instrumentation excavations. Immediately repair or replace any damage to the above, at no cost to the Owner.

.2 Environmental protection measures shall be in accordance with the requirements specified in Section 01560 - Environmental Protection.

.3 The release of all water resulting from the dewatering of ponded contaminated soil areas and the decontamination of excavation equipment shall conform to the Wastewater Discharge Criteria outlined in Section 01560 - Environmental Protection.

.4 If free product is encountered, collect liquid and treat in a manner in accordance Section 01560 – Environmental Protection

1.7 Measurement for Payment

.1 The excavation of Contaminated Soil will be measured for payment by the cubic metre based on the product of the pre-determined surface area and the depth of excavation as indicated on the Drawings. Additional excavation of Contaminated Soil as directed by the Engineer will be measured by survey. Excavation of contaminated soil will be paid under Item A.02066-1 of the Schedule of Unit Prices.

.2 The scope of work for Payment Item A.02066-1 (Contaminated Soil Excavation – Beach Refuel Area) shall include:

.1 Excavation of contaminated soil as shown on the Drawings from the Beach Refuel Area and as directed by the Engineer.
.2 On-site transport to and disposal of the soil in the sewage lagoon.
.3 Supply, placement and compaction of Type 3 granular fill for backfill of the Contaminated Soil excavation.

.3 The excavation of clean soil overlying Hydrocarbon Contaminated Soil will be measured for payment as described in Section 02209 – Grading (unclassified excavation).

.4 The excavation of Hydrocarbon Contaminated Soil will be measured for payment by the cubic metre as determined by survey measurement, and paid under Item A.02066-2 of the Schedule of Unit Prices.

.5 The scope of work for Payment Item A.02066-2 (Hydrocarbon Contaminated Soil – Beach Refuel Area) shall include:

.1 Excavation of Type B Hydrocarbon contaminated soil as shown on the Drawings from the Beach Refuel Area and as directed by the Engineer.
.2 Handling, on-site transport, and placement of the Hydrocarbon contaminated soil within the secure storage area.
.3 Supply, placement and compaction of Type 3 granular fill for backfill of the contaminated soil excavations.

.6 No extra payment shall be made for contaminated soil removed from beyond the specified limits of excavation, unless such removal has been specifically directed by the Engineer.

.7 The following activities are considered incidental to the work and will not be measured separately:

.1 Equipment decontamination including preparation and operation of the equipment decontamination area.
.2 Dewatering of ponded contaminated soil areas, as required.
.3 Provision of all necessary safety equipment and clothing.

Costs for these activities are to be included in the unit prices for the elements of work described in this Section.

.8 Include all direct costs for cleaning the tank for use in dewatering containment in the lump sum price for Tank Cleaning, Item B.02066-1, as indicated in Schedule B of the Tender Form.

.9 Include all direct costs for installing the necessary valves and fittings to allow use of the tank for decanting in the lump sum price for Tank Valves and Fittings, Item B.02066-2, as indicated in Schedule B of the Tender Form.

2.0 PRODUCTS

.1 Granular Fill in accordance with Section 02209 - Grading.

3.0 EXECUTION

3.1 Dewatering Containment Tank

.1 Clean existing 250,000 US Gal tank located at the north end of the Station POL pad.

.2 Install the necessary valves and fittings to allow filling of the tank with potentially contaminated water and to allow decanting (removal of water from a level about 1 m above the base).

3.2 Removal and Disposal of Contaminated Soil

.1 Excavate the contaminated soil to the limits defined on the Drawings. In contaminated soil areas containing boulders, remove all organic materials and fine grained materials from the boulders. The use of hand excavation tools may be necessary for this work.

.2 Suppress dust generated during excavation operations with a water spray. Prevent surface water from entering the excavated area.

.3 Dewater ponded contaminated soil areas, as required. The containment tank may be used for this purpose. Comply with the requirements of the Waste Water Discharge Criteria indicated in Section 01560 - Environmental Protection.

.4 Transport contaminated soil to the Sewage Lagoon in a manner such that no soil or liquid will be spilled during transport.

.5 Place contaminated soil in the sewage lagoon.

.6 Transport hydrocarbon contaminated soil from the Beach Refuel Area in a manner such that no soil or liquid will be spilled during transport to the secure storage area.

.7 Place hydrocarbon contaminated soil in the secure storage area in accordance with Section 02209 - Grading.

.8 Clean the excavating equipment including the bucket, tracks, etc., of soil lumps and particles, prior to utilizing elsewhere. Collect and dispose of the removed material in the appropriate on-site location. Take special precautions to mitigate the tracking of contaminated soil over the site area.

.9 Decontaminate the equipment used for the excavation of contaminated soil in accordance with Clause 3.2 before commencing contaminated soil excavation at another location.

.10 Replace excavated material with granular fill, compact and grade to match existing ground surface. Do not commence backfilling or regrading of the excavated contaminated soil areas until confirmatory testing has been completed by the Engineer, as described in Clause 3.4 and the requirement for possible additional contaminated soil excavation is determined.

.11 Do not operate equipment in contaminated soil areas that have been excavated until the Engineer has confirmed, based on the results of confirmatory testing, that no further excavation of contaminated soil in the area is required.

3.3 Equipment Decontamination

.1 Decontaminate equipment which comes into direct contact with the contaminated soils by steam cleaning or other means acceptable to the Engineer in a secure area capable of containing the waste generated by the washing operation.

.2 Collect and dispose of any contaminated soil that leaks, spills or otherwise leaves the piece of equipment during transport from the area of work to the decontamination area.

.3 Filter liquid waste resulting from the decontamination operation through an oil-absorbent material. The disposal requirements for the oil-absorbent material are dependent on the results of testing to be carried out by the Owner. If test results indicate:

- PCBs <2 ppm;
- Chlorine <1,000 ppm;
- Cadmium <2 ppm;
- Chromium <10 ppm; and
- Lead <100 ppm,

then incinerate the oil-absorbent material on-site. Package oil-absorbent material containing contaminants in excess of the above criteria in accordance with TDGA and dispose off-site at a licensed disposal facility.

.4 Dispose of liquid waste in accordance with the Wastewater Discharge Criteria outlined in Section 01560 - Environmental Protection.

.5 Treat any waste soil resulting from the decontamination procedure in accordance with the source of the material, and handle accordingly.

3.4 Confirmatory Testing

.1 Confirmatory testing will be carried out on contaminated and hydrocarbon contaminated soil areas at the Beach Refuel Area by the Owner.

.2 The actual location, frequency and method of testing will be determined by the Engineer.

.3 Soil sampling will be carried out around the perimeter of each contaminated soil area and at depth within the completed excavation area, immediately upon completion of excavation.

.4 It is anticipated that test results will be available within approximately 7 calendar days from the date that soil samples are transported from the site for laboratory analysis. No payment will be made to the Contractor for equipment transport or standby time during this investigation period.

.5 If the results of the investigation indicate the requirement for additional excavation, excavate to the depth and area limits established by the Engineer. Payment for additional excavation will be made in accordance to existing unit prices.

1.0 GENERAL

1.1 Description

.1 This Section specifies requirements for:

- .1 Grading of designated areas including granular borrow areas, depressions created by the removal of contaminated soil, and general site areas requiring regrading and reshaping;
- .2 Supply and placement of granular fill materials;
- .3 Development of a secure storage area for the storage of Hydrocarbon Contaminated Soils.
- .4 Installation of Temporary Monitoring Wells at the secure storage area.

1.2 Definitions

.1 Reshaping: The levelling and grading, to a maximum depth of 600 mm, of designated areas to blend in with the natural terrain and provide positive drainage. Reshaping does not require the supply and placement of additional granular fill material. Excavation of the terrain to a depth greater than 600 mm during reshaping operations shall be considered as unclassified excavation.

.2 Scarifying: The disturbance or loosening of a soil to a minimum depth of 30 cm to allow for compaction or aeration.

.3 Regrading: The supply and placement of granular fill in designated areas to blend in with the natural terrain and provide positive drainage.

.4 Unclassified Excavation: Excavation of materials of whatever nature encountered in the work as defined in Clause 1.5.1 of this section.

.5 Type 3 Granular Fill is granular fill used to backfill excavations at the Beach Refuel Area.

.6 Surficial Boulders: visible rocks with a nominal diameter of 300 mm or greater.

.7 Waste Materials: Excavated material unsuitable for use in work or surplus to requirements.

.8 Borrow Material: Material obtained from approved areas and required for regrading requirements.

.9 Specific classifications of granular materials are described in Clause 2.1 of this Section.

.10 Maximum Dry Density is determined by the Standard Proctor Method in accordance with ASTM D698. It is applicable if less than 30% of the material is retained on the ASTM 19 mm sieve.

.11 Corrected maximum dry density is applicable if more than 30% of the material is retained on the ASTM 19 mm sieve. It is defined as:

.1 $$D = \frac{D1 \times D2}{(F1)(D2) + (F2)(D1)}$$

.2 Where:

D = corrected maximum dry density kg/m³

F1 = fraction (decimal) of total field sample passing ASTM 19.0 mm sieve

F2 = fraction (decimal) of total field sample retained on ASTM 19.0 mm sieve (equal to 1.00 - F1)

D1 = maximum dry density, kg/m³ of material passing ASTM 19.0 mm sieve determined in accordance with Method C of ASTM D698 or latest edition thereof.

D2 = bulk density, kg/m³ of material retained on ASTM 19.0 mm sieve, equal to 1000 G where G is bulk specific gravity (dry basis) of material when tested to ASTM C127-84, or latest edition thereof.

1.3 Site Conditions

.1 Suspend operations whenever climatic conditions are unsatisfactory for grading to conform with this Specification.

.2 Do not operate equipment in work areas until the material has dried sufficiently to prevent excessive rutting.

.3 Areas to be graded are to be free from debris and excessive snow, ice or standing water.

.4 The Contractor is advised that soft ground conditions may be prevalent at the site during periods of maximum thaw of the permafrost. Schedule and carry out work to minimize disturbance to permafrost soils.

1.4 Protection

.1 Prevent damage to benchmarks, existing buildings, surface or underground service or utility lines which are to remain. Immediately repair any damage to the above or replace the above in the event of damage, at no cost to the Owner.

.2 Protect all monitoring wells. Repair or replace, at no cost to the Owner, any monitoring wells damaged by the Contractor's operations.

.3 Protect archaeological sites from construction and construction traffic.

.4 Protect unanticipated archaeological resources encountered during construction, suspend all activities in that area and notify the Engineer immediately.

.5 Protect and do not disturb spawning beds and breeding grounds during construction.

.6 Environmental protection measures shall be in accordance with the requirements specified in Section 01560 - Environmental Protection.

1.5 Measurement For Payment

.1 Unclassified excavation for the following work items will be measured for payment by the cubic metre as determined by survey measurement and paid under Item A.02209-1 – Unclassified Excavation in the Schedule of Unit Prices.

.1 Excavation of clean cover soil over the hydrocarbon contaminated soil at the Beach Refuel Area.
.2 Excavation of the perimeter ditch at the secure storage area.
.3 Excavation of terrain to a depth greater than 600 mm during reshaping operations.
.4 Excavation as directed by the Engineer.

.2 The scope of work for Payment Item A.02209-1 – Unclassified Excavation shall include:

.1 Excavation of soil or granular material as directed on the Drawings, in these Specifications, or as directed by the Engineer.
.2 Temporary stockpiling of excavated material adjacent to the work area, as required.
.3 Re-use of granular material, including placement and compaction, as indicated in these Specifications or as directed by the Engineer. There will be no further payment for excavated material that is used as granular fill.

.3 The supply, placement and compaction of Type 3 granular fill for construction of the berms around the secure storage area will be measured for payment by the survey, and will be paid under Item A.02209-2 – Type 3 Granular Fill in the Schedule of Unit Prices in the Tender Form. Additional Type 3 granular fill requirements will be measured by truck box.

.4 The basis of measurement for the volume of granular fill for some regrading operations, will be by truck box measurement. The capacity of the gravel hauling vehicles will be measured by the Engineer. The measurements will be to the nearest 0.1 m^3 capacity, and the capacity once measured shall not be changed without the consent of the Engineer. The gravel shall be levelled, using a strike-off method, by the Contractor before measurement. No heaping or mounding of the load above the box level will be allowed. Once the capacities of the truck boxes have been established, the Engineer may, at his own discretion, determine the granular fill volume without enforcing the strike-off method. Truck boxes used in the haul of gravel shall be thoroughly cleaned when unloading.

.5 Excavation of test-pits for the installation of Temporary Monitoring Wells will be measured for payment by the number of Test-pits excavated, and paid under Item A.02209-3 of the Schedule of Unit Prices in the Tender Form.

.6 The scope of work for Item A.02209-3 – Test Pit Excavation shall include:

.1 Excavation of test pits to 1.5 metres depth or refusal on bedrock, whichever is encountered first.
.2 Installation of monitoring well within the test pit.
.3 Backfilling of the test pit following completion of installation.

.7 The supply and transport to the site of monitoring well supplies will be measured for payment by the number of monitoring well installations supplied, and paid under Item A.02209-4 of the Schedule of Unit Prices in the Tender Form.

.8 Reshaping of the secure storage area to provide a uniform surface will be measured for payment by the square metre as measured by survey and paid under Item A.02209-5 of the Schedule of Unit Prices in the Tender Form.

.9 The following work items will be incidental to the work described in this Section, and will not be measured separately:

.1 Stripping, stockpiling, and replacement or placement to a new location of organic matter from the borrow areas as directed by the engineer. Disposal of waste materials from the borrow areas.
.2 Mining, separating and stockpiling of borrow materials.
.3 Grading of borrow area upon completion.
.4 Loading, hauling and haul road construction, maintenance and rehabilitation.
.5 Water for compaction.
.6 Determination of granular material quantities for progress payment purposes.
.7 Drainage of wet areas prior to regrading operations.
.8 Regrading and/or reshaping of Contractor's laydown areas, including the supply, placement and compaction of granular fill.
.9 Provision of signage at the secure storage area.

.10 No measurement for payment will be made for:

.1 Rejected material.
.2 Surplus material
.3 Placement of granular fill beyond the limits and depths specified, unless specifically authorized by the Engineer.

.11 The unit price items, as described in Clauses 1.5.1, 1.5.3, 1.5.5, 1.5.7 and 1.5.8 above, shall include direct costs only. All indirect costs associated with the work described in Clauses 1.5.1, 1.5.3, 1.5.5, 1.5.7 and 1.5.8 above, including profit, supervision, overhead, etc., shall be included in Schedule D - Balance of Project Complete in the Tender Form.

2.0 PRODUCTS

2.1 Granular Materials

.1 Fill materials require the approval of the Engineer.

.2 Fill materials shall be pit-run or screened stone, gravel or sand consisting of hard durable particles free from clay lumps, cementation, organic material, snow, ice and other deleterious materials. It is anticipated that there will be no requirement for crushing of granular materials to satisfy gradation specifications. There is a requirement to select, blend and/or screen granular materials to satisfy gradation specifications.

.3 Type 3 Granular Fill: Type 3 Granular Fill is select material from excavation, approved by the Engineer, generally consisting of pit-run gravel or sand in unfrozen state and free from rocks greater than 200 mm, waste or other deleterious material.

.4 Materials classified as unsuitable will include:

.1 Non-uniform material of widely varying moisture density characteristics.
.2 Soils with moisture content exceeding optimum moisture by 5% or more.
.3 Soils containing organic material, snow, ice or other deleterious material.

2.2 Liner Materials

.1 Geomembrane as per Section 02499 - Geomembranes.

.2 Geotextiles as per Section 02498 – Geotextiles

2.3 Monitoring Well Installations

.1 Each monitoring well installation shall consist of the following:
.1 50 mm (nominal diameter) Schedule 40 solid PVC pipe, threaded one end – 1 metre length.
.2 50 mm (nominal diameter) Schedule 40 slotted PVC pipe, threaded one end to match solid pipe thread – 1 metre length.
.3 Two 50 mm diameter watertight end cap (top and bottom)
.4 Filter sock.
.5 150 mm (nominal diameter) painted steel protective casing with a locking cap.

3.0 EXECUTION

3.1 Site Preparation

.1 Unless specifically indicated on the Drawings, do not remove existing topsoil or organic materials from embankment construction areas other than exposed surface boulders over 300 mm in diameter that are located in areas to receive granular fill. Dispose of boulders by placing on embankment side slopes.

.2 Borrow Excavation:

.1 Obtain from potential borrow areas shown on Drawings, or provide from approved sources, all required fill material.

.2 The existing airstrip, apron, and taxiway area at the FOX-M site is not to be used as a granular material borrow source.

.3 Advise Engineer of selected borrow areas seven days in advance of excavation operations for appropriate testing to be performed.

.4 Notify Engineer whenever unsuitable materials are encountered in borrow areas.

.5 Stripping, stockpiling and replacement or placement to a new location of organic material and stripping and disposal of waste material found when excavating existing granular fills to be as directed by the Engineer.

.6 Final grading of borrow area upon completion to be tidy, in a well drained condition, free of standing water to the satisfaction of the Engineer.

.7 Upon completion of final grading, leave all slopes in a stable condition and spread all stripped organics.

.8 Transport aggregate from borrow areas to the work areas via existing access routes where available. Maintain and provide for dust control on the access route between the borrow area and the work areas.

3.2 Protection of Existing Utilities

.1 Pay for all costs of repairs or replacement of buried culverts, utilities or surface utilities that are to remain and which were damaged by the Contractor's work.

3.3 Placement and Compaction of Granular Fill Material

.1 Haul granular fill material from borrow sites to designated areas.

.2 Place granular fill material as directed by the Engineer.

.3 Do not place granular fill on snow, surface ice or appreciable organics.

.4 Maintain natural drainage patterns, unless otherwise directed, and fill depressions to avoid any ponding of water adjacent to embankments.

.5 All fill material shall be placed in an unfrozen state. Fill material to be free from debris, snow and ice. Do not place granular fill if the outside air temperature is below 0°C, unless otherwise directed by the Engineer.

.6 Maintain a crowned surface during construction to ensure ready runoff of surface water. Do not place material in free standing water. Drain low areas, before placing material.

.7 Do not dump fill material over the side slopes of berms.

.8 Place and compact fill material in horizontal lifts.

.9 Cease construction at any sign of movement or bulging in the embankments to allow assessment by the Engineer.

.10 For fill depths greater than 500 mm, place granular material in lifts not exceeding 250 mm in loose thickness. For fill depths greater than 200 mm and less than 500 mm, place material in two lifts of equal depth. For fill depths less than 200 mm, place material in one lift.

.11 Compact Type 3 granular fill material to 95 percent of Maximum Dry Density in accordance with ASTM D698. The method for determining the maximum dry density will be established by the Engineer.

.12 Compaction equipment must be capable of obtaining required densities uniformly in materials on project. .

.13 Apply water as necessary during compaction to obtain specified density. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected.

.14 Shape finished surface to required cross-section and grade, or as directed by the Engineer.

3.4 Excavating

.1 Lay out work in detail from control points in areas of excavation. Advise Engineer sufficiently in advance of excavation operations to enable original ground cross-sections to be surveyed and verified.

.2 Excavate areas as directed by the Engineer.

.3 Keep excavations free of water while work is in progress. Protect open excavations against flooding and damage due to surface run-off. Dispose of water in a manner not detrimental to work completed or under construction.

.4 Dispose of excavated material at approved locations. Do not obstruct flow of surface drainage or natural watercourses.

.5 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.6 Notify Engineer when bottom of excavation is reached. Obtain Engineer's approval of completed excavation.

.7 Hand trim, make firm, and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

3.5 Backfilling

.1 For backfilling operations, use compaction equipment capable of obtaining required densities in materials on project.

.2 Do not proceed with backfilling operations until Engineer has inspected and approved excavation.

.3 Areas to be backfilled are to be free from debris, snow, ice and water.

.4 Place specified backfill material in uniform horizontal layers in depths as indicated in Clause 3.3.10 of this Section up to grades indicated. Compact each layer before placing succeeding layer.

.5 No trenches or excavations are to be left open during the winter unless directed by the Engineer.

3.6 Hydrocarbon Secure Storage Area Construction

.1 Construct the secure storage area in the area designated by the Engineer. The potential location is shown on the Drawings. The secure storage area shall be located:

.1 At least 100 metres from the ocean.
.2 To provide for the convenient access of equipment.
.3 In an area that is relatively free of boulders and is generally level.
.4 To not interfere with the operations of the NWS site.

.2 Provide for access to the secure storage area to facilitate entrance and exit of equipment and trucks from the area during operation.

.3 Reshape the secure storage area to provide a uniform surface. Excavate a perimeter drainage ditch around the secure storage area as shown on Sketch 103 or as directed by the Engineer.

.4 Utilize excavated material to construct perimeter berms around the secure storage area. The berms shall be a minimum of 1.0 metres in height with side slopes not to exceed 3H:1V.

.5 Install monitoring wells at locations as directed by the Engineer, as per Clause 3.7 of this section.

.6 Place hydrocarbon contaminated soil in the secure storage area, spreading in a layer not to exceed 400 mm in thickness. Grade contaminated soil to provide a uniform thickness over the secure storage area.

.7 Clean grading equipment including bucket, tracks, etc. of soil lumps, and particles prior to mobilizing out of the secure storage area. Collect and dispose of the removed material in the secure storage area. Take special precautions to mitigate against the tracking of contaminated soil out of the secure storage area.

.8 Decontaminate equipment used for the excavation of hydrocarbon contaminated soils in accordance with Clause 3.2 of Section 02066 – Contaminated Soils.

.9 Signage

.1 Provide and erect signage at access points to the secure storage area. Signage shall be visible from all sides of these areas. The English version of the sign shall read.

CAUTION: HYDROCARBON CONTAMINATED SOIL STORAGE AREA AUTHORIZED PERSONNEL ONLY.

Post a similar sign in the language of the local dialect.

.2 All lettering shall conform to CAN-Z321-77 or latest edition thereof. All lettering shall be black, not less than 100 mm high, with a 25 mm wide stroke on a white background.

3.7 Installation of Monitoring Wells

.1 Advise Engineer in advance of the test-pit program to install monitoring wells, to allow for inspection.

.2 Install monitoring wells at the locations as directed by the Engineer.

.3 Excavate test-pits to 1.5 metres depth or bedrock, whichever is encountered first.

.4 Connect a 1 metre slotted PVC pipe to 1 m solid PVC pipe and place end caps at each end.

.5 Centre monitoring well in test-pit and backfill around test-pit using excavated material; taking care not to damage monitoring well.

3.8 Finishing and Tolerances

.1 All areas to be covered with granular material shall be uniform without projections or depressions exceeding 100 mm in 3 m.

.2 Granular fill surfaces to be within 100 mm of design elevations but not uniformly high or low.

.3 Maintain finished surfaces in a condition in accordance with this Section until succeeding material is applied or until acceptance.

1.0 GENERAL

1.1 Description

.1 This Section specifies the requirements for the excavation, demolition, sorting, handling, transport, and stockpiling of debris from the Beach Refuel Area.

.2 It is anticipated that the majority of debris consists of non-hazardous wastes including scrap metal, wood, barrels, tanks and trailers.

1.2 Related Work

.1 Section 01560 - Environmental Protection.

.2 Section 02066 – Contaminated Soils

.3 Section 02209 - Grading.

1.3 Definitions

.1 Known Debris: Scattered visible debris stockpiled in the Beach Refuel Area, or visible, partially embedded debris within one metre of the existing ground surface, consisting of hazardous and non-hazardous material that has been identified on the Drawings as debris to be removed.

.2 Hazardous Waste Materials: Waste Materials that are designated as hazardous under Territorial or Federal Legislation or as Dangerous Goods under the TDGA or CEPA. For purposes of this section, the following items will be designated as "hazardous":

.1 Asbestos
.2 Batteries
.3 Solvents
.4 PCB Containing Oils
.5 Petroleum Distillates
.6 Tank Sludge
.7 Soils containing PCBs at concentrations in excess of 50 parts per million
.8 Material identified to be hazardous as the result of testing
.9 Miscellaneous Hazardous Materials defined as those materials not classified as 1 to 8 above but suspected to fall under the definition of Hazardous Wastes and Materials as stated in Clause 1.3.2 of this section.

.3 Non-Hazardous Waste Materials. Waste materials that are not designated as hazardous under Territorial or Federal legislation.

.4 "Processing" refers to the sampling, testing, packaging, and containerization of hazardous materials.

.5 "Packaging Container" refers to the type of container necessary to contain the hazardous material placed in it, as required by the TDGA.

.6 "Shipping Container" refers to the container into which the "packaging containers" are placed for purposes of shipping to a disposal facility.

.7 "Hazardous Waste Storage Area" refers to the designated area at the Retrograde Storage Area or as directed by the Engineer, for the temporary storage of containerized hazardous waste materials.

1.4 Regulatory Agencies

.1 Environment Canada
.2 Transport Canada
.3 Fisheries and Oceans Canada
.4 Department of Indian and Northern Affairs
.5 Government of Nunavut
.6 Government of Northwest Territories
.7 Canada Coast Guard

1.5 Qualifications and Personnel Protection

.1 Qualifications and personnel protection shall be in accordance with Clause 13 of Section 01005 – General Instructions.

1.6 Protection

.1 Environmental Protection shall be in accordance with the requirements of Section 01560 – Environmental Protection and the Environmental Protection Plan.

1.7 Measurement for Payment

.1 The excavation and removal of buried debris within the hydrocarbon contaminated soil excavation area will be measured for payment by the cubic metre of debris as excavated and placed in a truck-box, and paid under Item A.02219-1 of the Schedule of Unit Prices. The method of measurement by truck box shall be as described in Clause 1.7.9 of this Section.

.2 The scope of work for Payment Item A.02219-1, Buried Debris Removal – Beach Refuel Area shall include:

.1 Excavation of all buried debris material from the designated area to the limits indicated on the Drawing or as directed by the Engineer.
.2 Transport of excavated debris to the Retrograde Storage Area for Material Processing.

.3 Sorting and extraction of Hazardous Materials. If possible, segregate excavated materials into stockpiles of similar material type components.

.4 Stockpiling of non-hazardous debris in an orderly fashion to facilitate removal by others.

.3 Include all direct costs for the removal, handling, transport, and stockpiling of an existing debris pile at the Beach Refuel Area, including a barge, and hydro poles, to the Retrograde Storage Area, in the lump sum price for Known Debris Removal – Item B.02219-1, as indicated in Schedule B, Schedule of Lump Sum Items in the Tender Form.

.4 Include all direct costs for the demolition, removal, transport and stockpiling of the Beach Master's Shed in the lump sum price for Demolition – Beach Master's Shed – Item B.02219-2, as indicated in Schedule B, Schedule of Lump Sum Items in the Tender Form.

.5 Payment for all items described in Clauses 1.7.1 to 1.7.4 above, shall include direct costs only. Include all indirect costs with the work described in Clauses 1.7.1 to 1.7.4 above including supervision, overhead, profit, etc. in Schedule D – Balance of Project Complete in the Tender Form.

.6 Costs for the following work items will be paid under the Unknown Hazardous Waste Material - Prime Cost Allowance, Item C.02219-1 in the Tender Form.

.1 Sorting, and classification of unknown hazardous debris for disposal requirements.

.2 Supply and transport to the site of packaging containers for unknown hazardous waste materials.

.3 On-site transport of unknown hazardous waste materials following their confirmation as hazardous waste materials.

.4 Containerization and transport of unknown hazardous waste materials to the on-site Retrograde Storage Area or to a storage area directed by the Engineer.

.7 The Unknown Hazardous Waste Material - Prime Cost Allowance will be adjusted to actual costs as certified by the Engineer. Actual costs will include:

.1 Costs for the supply and transport of containers to the site.

.2 Equipment and labour costs for the containerization and transportation of unknown hazardous waste materials to the Retrograde Storage Area.

.8 Grading associated with removal of debris will be measured for payment as indicated in Section 02209 – Grading.

.9 The capacity of hauling vehicles for the transport of debris, as required for measurement, will be determined by the Engineer. The measurements will be to the nearest 0.1 m^3 capacity, and the capacity of the vehicle once measured shall not be changed without the consent of the Engineer. **Debris shall be placed so as to minimize voids.** No mounding of the load above the box level will be allowed. Truck boxes used in the haul of debris shall be thoroughly emptied when unloading.

2.0 PRODUCTS

2.1 Materials

.1 Hazardous Waste Packaging Containers: For packaging and containerization requirements of Hazardous Waste Materials, all requirements of the TDG Act and Regulations must be met. Assume that transport of the waste from the FOX-M site to licensed southern disposal facilities by others will be by ground, sea or air transportation, or any combination of these.

3.0 EXECUTION

3.1 Removal and Sorting

.1 Do NOT commence removal of debris until an area has been prepared at the Retrograde Storage Area to receive the excavated debris. Baseline sampling of the area will be completed by the Engineer.

.2 Examine the area(s) to assess the material type and nature of the debris.

.3 Proceed with the collection and removal of debris if, based on the visual assessment, the debris is determined to be non-hazardous.

.4 Continually monitor the operation to identify potentially hazardous material.

.5 Immediately suspend the operation if suspected hazardous material or debris is identified and allow visual confirmation of the nature of the material or debris to be established.

.6 Completely remove partially buried debris unless otherwise indicated on the Drawings or directed by the Engineer.

.7 Advise the Engineer of any stained soils encountered during debris removal operations. If authorized by the Engineer, excavate stained and contaminated soil areas, identified during debris removal operations, in accordance with the requirements of Section 02066 - Contaminated Soil. Testing for classification will be carried out and paid for by the Engineer.

.8 For excavation of buried debris, have available a full range of cleanup and protective equipment at the site of debris removal to contain and cleanup spills, and protect personnel as required.

.9 Collect melt /ground water from the excavation. Testing of meltwater will be carried out and paid for by the Owner. Discharge of groundwater shall conform to the Wastewater Discharge Criteria described in Section 01560 – Environmental Protection. Dispose of any liquid not conforming to these guidelines as hazardous waste material in accordance with the requirements of this Section.

.10 Avoid releasing hazardous materials into the environment during the handling of hazardous waste materials.

.11 Invoke the approved emergency response plan and take the appropriate action in the event of a spill or other emergency situation.

.12 Advise the Engineer of any barrels containing product encountered during debris removal operations. Testing for classification will be carried out and paid for by the Owner. Based on the results of the testing, dispose of barrel contents as directed by the Engineer.

3.3 Demolition

.1 Structures are to be demolished to the top of foundation level, unless otherwise directed by the Engineer.

.2 Remove or completely cut-off hydro poles at 300 mm below ground level.

.3 Demolish to minimize dusting. Keep dusty material wetted with water only.

3.3 Stockpiling

.1 Cut demolition and large debris materials in such shapes and sizes to minimize voids, when landfilled by others.

.2 Stockpile non-hazardous debris at the Retrograde Storage Area in an orderly fashion to facilitate removal by others.

.3 Containerize and/or dispose of any hazardous and suspected hazardous waste material, including barrels and barrel contents, in accordance with this section.

3.3 Grading

.1 Following collection and removal of debris, regrade or reshape as directed by the Engineer.

1.0 GENERAL

1.1 Description

.1 This section specifies the requirements for the supply and installation of geomembrane liner to be installed to separate clean soil from the remaining contaminated soil located beneath the supports for the refuelling pipelines.

1.2 Related Work

.1 Section 02066 – Contaminated Soils

.2 Section 02209 - Grading

.3 Section 02498 – Geotextiles

1.3 References

.1 ASTM D4545-86 Standard Practice for Determining the Integrity of Factory Seams Used in Joining Manufactured Flexible Sheet Geomembranes.

.2 ASTM D4437-84 Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes.

.3 ASTM D3083-76 (1980), Standard Specifications for Flexible Poly (Vinyl Chloride) Plastic Sheeting for Pond, Canal, and Reservoir Lining.

.4 National Sanitation Foundation Listing Services, Standard Number 54 - Flexible Membrane Liners (NSF-54).

1.4 Manufacturer's Certification and Warranty

.1 The geomembrane manufacturer shall be listed by the National Sanitation Foundation (NSF) as having met NSF Standard Number 54, Flexible Membrane Liners, and shall have at least two years of continuous experience in the manufacture of PVC geomembrane rolls and/or experience totalling 400,000 square metres of manufactured PVC geomembrane.

.2 Provide to the Engineer, prior to shipment of materials to the site, the following:

.1 Name of the manufacturer and information on the manufacturer's factory size, equipment, personnel, number of shifts per day and capacity per shift.

.2 Manufacturer's quality control program and manual, or descriptive documentation.

.3 List of material properties and liner samples.

.4 A signed manufacturing certification that the materials to be shipped to the site have test values for each property listed in Table 02499-1 (at the end of this Section) that meet or exceed the property values specified for that material. These certificates shall be signed by the Product Manager or Quality Control Manager of the geomembrane manufacturer.

.5 Resume of the qualifications of the Installation Supervisor and Master Seamer to be assigned to the project.

.3 Provide a written warranty against defects or deficiencies in the quality of the liner material supplied.

1.5 Geomembrane Installer

.1 The geomembrane shall be pre-fabricated by the Manufacturer.

1.6 Geomembrane Acceptance

.1 Retain ownership and responsibility for the geomembrane until acceptance by the Owner.

.2 The geomembrane liner shall be accepted by the Owner when all of the following conditions are met:

.1 Installation of the entire liner is finished.

.2 Certification as described in this section and including record drawings, is provided by the Contractor to the Engineer.

1.7 Measurement For Payment

.1 The supply of PVC Arctic Liner Geomembrane as per these specifications, will be paid under Item B.02499-1 Geomembrane Supply as indicated in Schedule B, Schedule of Lump Sum Pay Items in the Tender Form.

.2 The PVC Arctic Liner is to be installed in a width of approximately 1 metre to separate remaining hydrocarbon contaminated soils below the refuel lines from clean backfill material. The quantity of geomembrane to be supplied is 500 square metres.

.3 The scope of work for Payment Item B.02499-1 shall include the supply and transport of geomembrane to the site work areas.

.4 Include all direct costs for the installation of geomembrane, including all labour, materials, tools and supervision in the unit price –Geomembrane Installation - in Schedule A.

.5 Include all indirect costs associated with the work components identified in this section in the related Balance of Project Complete Pay Item in the appropriate Schedule in the Tender Form.

.6 For each work element included in this Section, identify the estimated equipment and manpower requirements in the Contract Work Breakdown Structure.

2.0 PRODUCTS

2.1 Materials

2.1.1 PVC Arctic Liner Geomembrane

.1 The physical properties of the PVC geomembrane shall be in accordance with NSF-54 where applicable. Material properties specified in Table 02499-1 at the end of this Section shall supersede those listed in NSF-54.

.2 The PVC geomembrane shall be oil resistant and formulated from resin incorporating a flexible modifier providing good low temperature performance to enable installation at cold temperatures.

.3 The geomembrane shall incorporate a fabric reinforced sheet (scrim).

.4 The PVC geomembrane shall be capable of being heat sealed or solvent welded for making field splices, seams and repairs.

2.2 Manufacturing Quality Control

.1 Provide certification from the geomembrane manufacturer prior to shipment to site that the geomembrane supplied for this project is in conformance with the Specification.

.2 Provide certification from the geomembrane manufacturer prior to shipment to site that sampling and testing of the material, in accordance with NSF-54 and/or ASTM D3083 have been carried out. At minimum, the geomembrane manufacturer shall perform the applicable tests every 8,000 square metres to assure conformance with the values listed in Table 02499-1 at the end of this Section or where applicable, in NSF-54.

.3 Factory fabricated seams are to be visually inspected along their entire length.

.4 Provide certification from the geomembrane manufacturer prior to shipment to site that sampling and testing of factory fabricated seams used in the joining of the geomembrane, in accordance with NSF-54 have been carried out.

2.3 Shipping, Handling and Storage

.1 The shipping of the geomembrane shall conform to the requirements of the geomembrane manufacturer, but in any event shall be carried out in a manner which shall protect the material from damage in transit. Place a protective cover on each package to protect the material against damage during shipping, handling and storage.

.2 Move the geomembrane about the site in a manner that will not damage the material.

.3 Store the geomembrane on site in a secure location that will minimize the potential for damage due to the proximity of working equipment, vandalism, etc. In some cases, geomembrane can be marshalled at various locations to minimize transit distances and delays during deployment.

.4 Store the geomembrane on site in a location that maintains the material at a temperature greater than +10 degrees Celsius.

3.0 EXECUTION

3.1 Defects and Repairs

.1 Inspect all seams and non-seam areas of the installed geomembrane for defects, holes, blisters, undispersed raw materials and any sign of contamination by foreign matter. Brush, blow, or wash the geomembrane surface, if required for inspection. The Engineer shall decide if cleaning of the geomembrane is needed to facilitate inspection. This inspection shall be done immediately after placement of the liner.

3.2 Deployment

.1 Ensure that:

.1 No equipment or tools damage the geomembrane by handling, trafficking or other means.
.2 The method used to unroll the panels does not cause scratches or crimps in the geomembrane.
.3 The method used to place the geomembrane minimizes wrinkles.
.4 Slack for thermal contraction is well distributed, and in accordance with the manufacturer's recommendations.
.5 All defects are marked and documented for repairs. Defects are defined as any abnormalities that affect the physical properties of the geomembrane material. Replace or repair damaged geomembrane areas at the discretion of the Engineer.

.2 Install PVC Arctic Liner Geomembrane on both sides of the refuel lines in a width of approximately 1 metre to cover the full depth of excavation in order to separate hydrocarbon contaminated soil not excavated beneath the refuel lines from clean backfill material.

3.3 Cover Material

.1 Avoid undue stress on the liner at all times.

.2 Remove all rocks, stones, roots, or other debris that could cause damage to the liner.

.3 Avoid movements with equipment that could pinch and tear the liner.

.4 Report any damage to the Engineer immediately and perform repairs without needless delay.

TABLE 02499-1
GEOMEMBRANE MATERIAL PROPERTY VALUES

Property	Method	Minimum Requirement
Thickness (Nominal)	ASTM D1593	0.95 mm
Thickness (Minimum)	ASTM D1593	0.91 mm
Tensile Strength (MD)	ASTM D751	800 N
Tear Strength (MD)	ASTM D751	98 N
Low Temperature	ASTM D2136	-30°C
Heat Bonded Seam Strength	NSF-54 (ASTM D4545)	17 kN/m
Heat Bonded Peel Adhesion	NSF-54 (ASTM D4545)	3.4 kN/m
Dimensional Stability, Maximum Change	ASTM D1204 100°C, 60 min.	-2.5%
Water Extraction, Maximum	ASTM D3083 100°C, 7 days	-1.5%
Volatile Loss, Maximum	ASTM D1203 110°C, 7 days	2%
Oil Resistance - NSF Full Test	7 days/23°C (ASTM D471)	Pass
Weather Resistance, 1000 hr	W-O-M	Pass

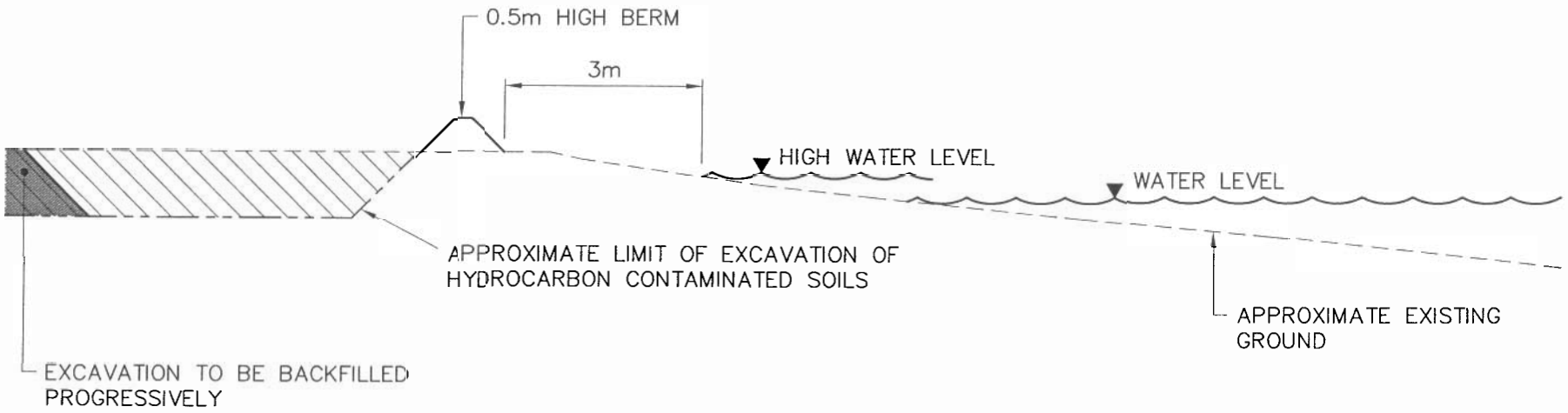
Note:
1. Perform applicable tests every 8,000 square metres.
2. Perform destructive and non-destructive tests of factory fabricated seams every 900 square metres.

APPENDIX A
SITE PHOTOGRAPHS: DEMOLITION, DEBRIS

APPENDIX B
DRAWINGS

APPENDIX C
ENVIRONMENTAL PROTECTION PLAN

DOS NAME: FM-SK103.DWG CAE - 02/07/17



National Defence / Défense nationale

DEW LINE CLEAN UP

FOX-M HALL BEACH

ACUTE ISSUES CLEAN UP

JULY, 2002

HYDROCARBON CONTAMINATED SOIL EXCAVATION NEAR OCEAN

SKETCH 103

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