Operations and Maintenance Plan

Cambridge Bay Soil and Water Treatment Facility

Kitikmeot Environmental Ltd.



OPERATIONS AND MAINTENANCE PLAN

FINAL

Cambridge Bay Soil and Water Treatment Facility
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EXECUTIVE SUMMARY

This Plan outlines how Kitikmeot Environmental Limited (KEL) operates and maintain the Cambridge Bay soil and water treatment facility (CBSWTF) in Cambridge Bay, Nunavut (the Hamlet). The facility is comprised of one bermed and lined area for soils contaminated with petroleum hydrocarbons (PHC), a lined water and snow retention/storage area and a lined and bermed hazardous waste storage area. Soil is treated by a mechanized process combined with the potential application of amendments to the soil to facilitate microbial activity to break down the pollutants. Once treated, soil is reused as alternate daily cover at the Hamlet's Landfill or re-purposed as permitted. Water is treated using an physical and chemical means. Once treated the water is used to increase moisture at the soil treatment facility or discharged as per requirements outlined within the issued water license. The waste storage area is used to temporarily store waste that requires containerization and/or shipment to an authorized location. Any soil or water that cannot be treated at the facility is transported to a licensed waste receiving facility for disposal.

REVISION HISTORY

DATE	DOCUMENT VERSION	SUMMARY OF CHANGES MADE	AUTHOR	APPROVER
June 2016	Ver. 1	Initial Draft	JF	
January 2017	Ver. 1	Initial Final Issue	JF	
December 2022	Ver.2.1	Ownership Change, Contacts & Date Updates	KHF	
March 2026	2.3	Section 1.0 operator contact info updated Section 3.7 Water treatment plant (Removed) Section 3.8 updated water monitoring program details Update Tables with relevant and applicable criteria Update references Document-wide: Remove mention of on-site storage tanks and water treatment plant	MG	

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1.0 INTRODUCTION

Kitikmeot Environmental Ltd. (KEL) operates a soil and water treatment facility located adjacent to the Hamlet of Cambridge Bay sewage lagoon (Appendix A).

Coordinates for the Facility are:

69^0 07' 40.52" N 105^0 02' 35.29"W

The site is accessible by road, from an access road off Natik Street.

Facility operations and maintenance contacts:

Corporate Office:

Kitikmeot Environmental Ltd.
30 Mitik Street
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The purpose and scope of this Plan is to outline the methodology for operating and maintaining the Cambridge Bay soil and water treatment facility (CBSWTF).

KEL manages operations responsibly and will comply with all licenses, permits and applicable territorial and federal laws and regulations related to Facility operations and maintenance. The following table lists regulations and guidelines applied to and referenced for facility operations.

1.1. Project Description

The purpose of this project is to continue to operate a permanent soil and water treatment facility in Cambridge Bay, Nunavut. Following bioremediation, treated soil meeting landfill criteria is reused as Alternative Daily Cover (ADC) at the town landfill or re-purposed. Soil not meeting reuse criteria is transported off site for disposal at a licenced facility. Water is treated physically (absorbent booms/pads) and/or chemically (flocculants and oxidants) and once treated is analyzed and discharged as per territorial regulations.

The Facility includes: one engineered cell consisting of three sub-cells: one cell 50 m x 40 m, for receipt, storage and treatment of petroleum hydrocarbon (PHC) -contaminated soil; one cell designed for storage of up to 170 m^3 of petroleum hydrocarbon-contaminated snow and water; one cell 19 m x 14 m designed for storage of hazardous waste awaiting shipment and; one small shed for storage of supplies, documentation and health and safety equipment (Appendix B).

2.0 ENVIRONMENTAL MANAGEMENT

The CBSWTF is located within the Hamlet limits on an existing lease adjacent to the Hamlet of Cambridge Bay sewage lagoon. Land disturbance as a result of the operation of the CBSWTF is minimal and does not significantly alter existing site conditions. Based on facility design, operating principles and monitoring plans, the environmental impacts associated with the CBSWTF are minimized.

Environmental impacts associated with soil biotreatment, water treatment and effluent discharge, as described below, are anticipated to be negligible based on facility design, implementation of mitigation measures and adherence to monitoring plans.

3.0 SOIL AND WATER TREATMENT FACILITY

The CBSWTF is designed to treat PHCs. Materials received at the site for treatment include PHC-contaminated soil and/or water and snow, from off-site sources including residential, commercial and industrial properties where a hydrocarbon spill or leak has occurred. Prior to receipt on-site, contaminated soil is characterized which includes sampling the material and submitting the samples to an accredited environmental lab. Soil meeting acceptance criteria (Table A1 and A2) is deposited into an engineered containment cell, at the CBSWTF where it will be remediated.

Once the remediation process has been given adequate time, soil is sampled and tested to confirm it meets discharge/beneficial reuse criteria (Table A1 and A2). Soil meeting reuse criteria is hauled as cover material at the Hamlet's landfill or re-purposed as permitted by the Nunavut Water Board.

The Facility also includes an engineered pond to accept PHC contaminated snow and water. Snow and water is profiled for acceptance either by analytical testing and/or MSDS sheet and be accompanied by a movement document prior to acceptance at the site. Runoff water from the soil treatment facility and contact water from the hazardous waste storage area will also be deposited into the water storage pond. Once snow melts, water from the storage pond is treated on-site then tested to analyze for the discharge guidelines (Table A3 and A4).

3.1. Facility Design

The facility has been designed to receive up to 3,000 m3 (Appendix B). The cell is 50 m by 40 m, surrounded

by a soil berm approximately 1.5 m tall with 2:1 side slopes measured from existing grade. The base of the cell is graded to a 1.0% slope on the long axis, away from the entrance ramps to control and direct interior drainage towards the water storage cell.

At least 0.2 m of soil fill <8mm in diameter, debris, and organics (protective fill) covers the base of the cell and the sides of the berm to protect the overlaying geomembrane against punctures. A Solmax 460ST 60 mm single textured high density polyethylene (HDPE) liner covers the cell floor, overlaps the crest of each berm, and is anchored into the side of the perimeter berms. A 16 oz non-woven geotextile overlays the geomembrane as a precaution against punctures and is anchored into the perimeter berms. Approximately 500 mm of fill free from debris and organics overlays the geotextile on the base of the cell, for torsion protection from turning vehicles. At least 300 mm of fill overlays the interior side slopes of the berms.

3.2. Biotreatment Facility Operation

All soil transported to site requires a waste profile including analytical testing and suitable movement documents prior to receipt on-site. An example of a typical waste profile form is included in Appendix E. If this information is absent or incomplete, or materials do not meet the acceptance criteria listed in Table A1 and A2, soil is not received into the Facility and will remain the responsibility of the generator. In some cases, such as spills and emergency response, soil may be accepted into the facility and samples collected after receipt. Department of Environment (DOE) and Crown Indigenous Relations and Northern Affairs Canada (CIRNAC) representatives is notified in this situation.

Once quality and quantity of soil are approved for receipt at site, soil is placed into a designated area of the cell and placed in biopiles in a fashion to facilitate segregation and ease of access for equipment or technical staff to complete required sampling and treatment campaigns. Soil is managed in biopiles with an average height of up to 3.0 m using an excavator or dozer. Once placed, each biopile is labelled with a unique identifier and documented. Each waste shipment is managed and treated separately. Efforts are made to avoid comingling of wastes and dilution of contaminated soils with cleaner soils.

Typically, one or two treatment events occur each year over the summer season. Treatment occurs using a track hoe by manual aeration using an excavator. Materials are churned and aerated by thorough mixing, blending and aeration while all unwanted debris is removed manually.

Treatment does not occur when the ambient air temperature is below 5^{o}C. The mean expected residency of soil undergoing bioremediation in the CBSWTF is one year however soils with recalcitrant contaminants may require longer treatment times.

There may be times throughout operations wherein it may be necessary to add amendments to the soil to promote effective and efficient breakdown of hydrocarbon constituents. Typical amendments include fertilizer to stimulate natural microflora activity, water to adjust moisture content, and lime to modify pH. In more extreme circumstances other soil conditioners such as surfactants can liberate hydrocarbon from soil particle adsorption to promote bioavailability, or peroxides to promote oxidation of chemical constituents. In the event that any of these are required, MSDS is provided, located in a small storage shed

on site and accessible to all workers. Any amendments are procured for immediate use; no long-term storage on site is expected. Over the short term, amendments are stored within appropriate containment in the locked shed on site. All soil amendment applications are conducted by KEL personnel experienced in waste facility management and operation.

Prior to commencement of operations for the year, KEL staff and contractors working at the CBSWTF are given an orientation on operations, safety and routine practices at the site.

3.3. Treated Soil Sampling

To assess the progress of remediation, a photoionization detector (PID) may be used or grab samples collected and tracer tests carried out during the first or second treatment campaign. Once it is determined that a remediation end point has likely been reached, formal soil sampling occurs to determine compliance with reuse criteria. Following the sampling protocol outlined below, along with avoiding comingling of soils between biopiles, efforts are made to ensure that confirmatory sampling is unbiased and representative, and contaminated soils are not diluted with cleaner soils.

Sampling involves establishing sample points in each biopile: one representative sample is collected for the volume of remediated soil specified in Table A5. Each representative sample collected is composed of three to five sub-samples. Each sub-sample is collected from five areas or 'cells' within each, wherein each of the five cells (CCME, 2016). Samples are collected by trained personnel using either handheld implements such as a hand auger or shovel or with the assistance of mechanical equipment such as an excavator.

Quality Assurance/Quality Control (QA/QC)

All samples are collected in laboratory prepared containers, stored in coolers with ice to maintain temperatures at or below 4^{o}C, transported and submitted to a Canadian Association Laboratory Accreditation (CALA) accredited laboratory for analysis of contaminants of concern. KEL follows appropriate chain of custody control mechanisms during transportation of samples to the laboratory.

Samples are collected and submitted for QA/QC purposes including collection of 10% blind duplicates, one field blank per day, and one travel blank per shipment. For each sample collection personnel use new latex or Nitrile gloves for collecting each sample and augers and shovels are washed with anionic, phosphate-free biodegradable detergent such as Alconox to avoid potential cross contamination. At the time of sampling, on-site activities and observations are documented including field testing results, soil pile stability, water levels in the ponds, and suspected leachate issues.

Upon receipt, the laboratory conducts internal QA/QC sampling. If results from either field or lab QA/QC analysis are considered significantly different, re-sampling will occur.

3.4. Soil Reuse and Disposal

Once remediated soil has been analyzed, it is classified as either meeting reuse criteria, requiring additional treatment or requiring off-site disposal. Soil suitable for industrial reuse has analytical results meeting the criteria outlined in Appendix A. Material meeting re-use criteria is used as cover material at the Hamlet's landfill or re-purposed as permitted.

Soil is removed from the cell using an excavator and dump truck and is hauled to the landfill working face. If it is determined that soil for which no acceptance analytical was collected is untreatable or unacceptable at the facility, it is managed in the same way as soil that needs to have final disposal at an alternate approved facility.

All materials removed from site is accompanied by appropriate movement documents. Volumes and soil sampling results is provided in annual reports distributed to DOE, CIRNAC and the Nunavut Water Board (NWB).

3.5. Maintenance

Site inspections include a visual inspection for erosion, subsidence, exposure of liner, leakage, wildlife disturbance and security breach. The Soil Treatment facility liner is inspected annually, after soil turning and soil removal. Any tears detected during visual inspection is repaired and documented immediately. Inspections are conducted by trained personnel. Inspection logs are maintained on site is provided upon request. An example of the inspection form can be found in Appendix D.

3.6. Water/Snow Storage Pond

The water storage area is 19m x 14m lined pond located in the corner of the treatment pad. An engineered pond is utilized to accept PHC-contaminated water and snow from off-site sources including residential, commercial and industrial properties where a PHC spill or leak has occurred. Snow and water transported to site requires confirmation of contaminants of concern from the spill source, MSDS and/or results of analytical testing and a suitable movement document prior to receipt on site. It is not anticipated that the facility will receive water or snow contaminated with anything other than PHCs. The capacity of the retention pond is anticipated to be 170m^3.

Water is transported to the CBSWTF using a dedicated pumper truck and disposal into the pond is done by hose. Snow that is delivered to the site is placed into the pond by dump truck or loader. Care is taken to ensure that snow does not spill over the berms of the pond. If required, an excavator is used to knock down larger piles and level out any snow that has been piled. Care is taken to ensure that any contaminated snow is not tracked out of the facility by scraping tracks clear of any contaminated snow that it contacted.

A vacuum truck is used onsite in the event that water levels are anticipated to increase beyond the storage capacity of the pond. Regularly scheduled site inspections during snow free months will monitor the water levels, exposure of liner, and retention pond volumes. Inspection logs are maintained onsite at all times.

When sufficient water is present in the retention pond, sample(s) are collected and assessed for parameters listed in Table A3 and analyzed for the parameters listed on Table A4. If the samples do not meet the guidelines, the water from the storage pond is treated with absorbent material to gather any free phase hydrocarbons that may be present. If no free phase hydrocarbons are present, chemical flocculants and/or oxidants may be added to the water to address the contaminant of concern exceeding the guideline. If treatment is successful, and once laboratory analytical results are received meeting the guidelines in Table A4, treated effluent is batch discharged to the ground surface through a dedicated hose wherein the water will flow overland to natural drainage. Analytical results and notification are reported to the NWB prior to the planned discharge. In the event that water does not meet discharge criteria it will undergo further treatment or be transported to a licensed off-site disposal location.

3.7. Active Layer Water Monitoring Program

Groundwater does not exists in a permafrost environment of Cambridge Bay. Instead, an "active layer" of thawed permafrost can exist when conditions permit. These conditions are usually found in the height of summer (early to mid-August) and are located in areas where direct sunlight and air temperature warms the ground sufficiently to thaw the subsurface permafrost to a degree that it flows. This can cause the ground surface to shift along the flow direction (thaw subsidence or thermokarst) which can destroy installed groundwater wells. For these reasons the monitoring of the soil and water treatment pad is conducted using drive points which are installed when the active layer is suspected to be present and removed after sampling. The monitoring will include annual monitoring and sampling of the active layer. Water samples from the active layer will be analyzed for the requirements in the monitoring parameters set out in Part K (Conditions Applying to Monitoring Program), Item 5 of the water licence. Field parameters listed in Table A3 will be recorded if water volumes allow and used along with lab analytical parameters to determine overall water quality. The Laboratory results of water analysis will be compared to the water monitoring guidelines in Table A4 and the site-specific criteria developed in consultation with the Nunavut Water Board.

Each drive point location will be assessed during each sampling event to determine if any significant subsidence has occurred from previous events. Each location will be flagged and measured from a fixed point to determine the subsidence. Photographs will be taken from each drive point location.

Drive points will be installed and if an active layer exists the samples will be drawn using a peristaltic pump and new, clean tubing. A water level meter will be used to determine if sufficient water is present in the active layer to sample. All equipment, including the drive points, will be cleaned with an anionic, phosphate-free biodegradable detergent such as Alconox.

Field parameters (pH, specific electrical conductivity (SEC), Temperature, and dissolved oxygen (DO)) will be measured and recorded using a portable multimeter along with field observations (e.g., weather conditions, water conditions) to be incorporated into the final report.

Active layer water samples will be collected from the drive point locations using dedicated sampling equipment and placed into clean laboratory-supplied sample containers.

An effort will be taken to avoid collecting any suspended solids in each sample which could alter the analytical results. Specific sampling requirements, including field filtering and preserving, will be reviewed

with the laboratory to ensure that all samples are collected using industry accepted sampling protocols in the field.

Field personnel will avoid cross-contamination when switching between monitoring well locations ensuring to wear new, clean, disposable gloves before collecting each sample.

Samples will also be taken from the receiving pond approximately 215 m downgradient of the Facility as well as from Cambridge Bay where the downgradient pond empties into the Arctic Ocean. These samples will be used to determine the background concentrations of the environmental receptor/receiving water bodies and used to derive future action levels.

Samples will be placed on ice and packaged for transportation and delivery to the laboratory for analysis. While in transport, the samples will be under a Chain of Custody that will be signed and received upon arrival at the laboratory. For the required analysis, samples will be submitted to a laboratory accredited by the Canadian Association for Laboratory Accreditation (CALA). The analyses will be performed per approved methods as recognized by CALA.

Additional samples will be collected and submitted to the laboratory for quality assurance and quality control (QA/QC). Water volume permitting, a blind field duplicate from one of the sample locations will be submitted under a different name and completed for the full suite of parameters to evaluate the precision of the laboratory.

A laboratory QA/QC program consisting of method blanks, spiked blanks and matrix spikes shall also be checked to ensure appropriate QA/QC results are obtained.

Results from the monitoring and sampling events are issued in the annual report along with accompanying laboratory certificates of analysis.

Corrective Actions
Corrective Actions shall be evaluated and/or implemented if one of the following occurs:

- Measurable (light non-aqueous phase liquid) LNAPL detected in any of the sample locations;
- An unplanned or accidental release of waste material (untreated soil or water) from the Facility; and
- Water concentrations of one or more of the monitored parameters exceeded Action Level.

Step 1

During Step 1 of Corrective Actions, the action level exceedance will be evaluated to determine the likelihood that it occurred from the Facility's operation. If the exceedance occurs from a contaminant present at the Facility, additional sampling shall occur to determine if it is due to natural variances or if the exceedance is a result of a release from the Facility.

If an Action Level exceedance is deemed anomalous based on subsequent sampling, then no further remedial action will be taken, and monitoring will continue annually as outlined in this Plan. If subsequent sampling indicates an exceedance resulting from Facility operations or an unauthorized release from the Facility, then Step 2 of Corrective Actions will be implemented.

As part of Step 1 Corrective Actions, operations and maintenance practices will be reviewed to determine

conditions that triggered the exceedance and to assess the probability that the exceedance is directly related to the operation of the Facility and not due to other factors which may have the ability to affect the general active layer in the area. The outcome of this assessment will be discussed with the inspector if it is believed an action level was triggered for a reason other than the Facility's day-to-day operations.

Step 2

If Step 1 indicates contaminants have been released from the Facility and persist in the environment. KEL will prepare a Remedial Action Plan (RAP) to investigate. The RAP will be submitted to the NWB for review, comment and approval. KEL will implement the RAP once it is approved. If necessary, KEL will implement immediate emergency actions to mitigate impacts while awaiting formal RAP approval.

The water monitoring program is part of the overall environmental protection KEL strives for. Sampling treated soil on site, maintaining the integrity of the lined Facility, continued site inspections, and the water monitoring program form the basis for environmental protection at the Facility. Results from sampling are reviewed and efforts are continuously being made to improve KELs stewardship to the environment. Unauthorized releases to the environment or exceedances of action levels will be used to modify Facility OMP to ensure protection of the environment and public.

3.8. Containment of Impacted Soil

Equipment working in and around the biotreatment pad presents a risk of spreading contaminated material from machinery tracks or tires as equipment is moving at the edges of the biotreatment pad or when soil is being handled for discharge. In addition, other conditions may also result in soil moving beyond the biotreatment pad such as unstable piles and inadequate soil berms. In order to minimize the spread of impacted soil, the following measure is implemented:

1. Operators of track mounted equipment working in the biotreatment pad is required to shovel/remove soil off the tracks prior to leaving the area.
2. Trucks delivering contaminated soil to the Facility is required to use a spotter or other indicator to ensure they are not back into the treatment pad further than necessary.
3. Soil piles and windrows should be stably built with piles at or near the angle of repose.
4. Soil berms should be high enough and at an adequate distance to prevent soil which has rolled off piles from leaving the biotreatment pad.
5. Any soil tracked or dropped outside the treatment cell is immediately scraped up and put back into the biotreatment pad.

3.9. Hazardous Waste Storage Area

A portion of the bermed and lined soil treatment pad is used for the storage of hazardous waste containers (drums, bags etc.) that are awaiting transportation to authorized facilities. These types of waste could include fuels, oils, solvents and glycols which require consolidation, containerization and temporary storage onsite while awaiting shipment to authorized facilities. Used water treatment media or used spill response items may also be stored at this location awaiting final disposal.

4.0 DOCUMENTATION AND REPORTING

A daily log of activities is kept detailing personnel onsite, activities undertaken, weather conditions and water pond freeboard. Inspections are conducted and documented. An annual report is submitted to the Nunavut Water Board (NWB) and all stakeholders in accordance with the terms and conditions of the license approval and permits assigned to the Facility. In conjunction with annual reporting, this Plan is to be reviewed annually and updated as needed to maintain compliance. Analytical test results, as required under the anticipated water license, are submitted to DOE and CIRNAC in a timely manner. A copy of all licenses and permits is maintained on site.

5.0 SAFETY AND EMERGENCY RESPONSE

The operations at the facility will involve the use of heavy equipment to process the soil stored for treatment and for the movement of soil into and out of the treatment pad. The soils handled at site have varying levels of PHC contamination.

All operations is performed in conjunction with KEL Health and Safety Programs and applicable regulations and standards. All personnel on site are required to wear basic personal protective equipment: hard hat, high visibility vest or striping, safety footwear. Other PPE requirements are specific to the tasks undertaken by the employees on site. Refer to the KEL Health and Safety Manual (which is available on site).

Emergency Contact Information for the Cambridge Bay Soil Treatment Facility:

Police 867-983-1111

Fire 867-983-2222

Ambulance 867-983-2531

KEL 867-983-7500

Hamlet of Cambridge Bay 867-983-4650

Department of Environment 867-975-7700

5.1. Fire and Prevention Control

The purpose of this plan in to provide information to KEL employees and contractors in the event that a fire occurs at or near the facility. Specifically, the plan establishes who is responsible for various aspects of the fire control procedure.

DO NOT PANIC, the greatest danger lies not in fighting the fire, but in the panic that arises from a fire. Spend a few minutes getting a grip of the situation. Go through the steps of notifying the appropriate authorities and follow the basic steps in the fire control plan.

1. Notify any other nearby employees.
2. Notify the site manager immediately. Follow site manager's instructions.
3. Notify the fire department. Tell them the location and type of fire and whether it looks like it will spread out of the immediate area.
4. Notify surrounding property owners, particularly if it appears that the fire could spread beyond the facility.
5. When the fire department arrives, follow their instructions.
6. Do not fight the fire alone.
7. Do not place yourself or others in danger while fighting the fire.

5.2. Spill Response Plan

For the purpose of this plan, a spill is the accidental or purposeful discharge of a liquid waste (listed herein) or contaminated soil in a location or manner that will allow it being washed, carried, or flow into a natural or man-made watercourse that could potentially result in active layer or surface water contamination now or in the future.

Most potential spill sources will only be present during normal facility working hours. As a result, adequate personnel and equipment is available to respond to any spill-related emergency. With equipment at the facility, it is possible to respond immediately to the site of any spill for necessary spill containment and cleanup. The immediate requirement is to construct temporary earth berms around the spill area to control and allow implement cleanup measures as directed by the Site Manager and the Hazardous Materials Response Team (if applicable).

The facility is operated in conjunction with KEL's Spill Contingency Plan (KEL 2017) along with KEL's Waste Management Plan (KEL 2017). The Spill Contingency Plan addresses spills of:

1. Fuel and oils from operating equipment.
2. Soils contaminated with PHCs.
3. Liquids from the storage pond.

6.0 TRAINING

Personnel managing waste are certified in Workplace Hazardous Material Information System (WHMIS) and Transportation of Dangerous Goods (TDG). Any waste shipment requiring a Federal Movement Document (FMD) will need to have FMD filled out by an individual holding a valid certificate in TDG. Personnel responsible for operation and maintenance of the SWTF will receive training in the principles of soil treatment along with safe operating procedures.

7.0 FACILITY CLOSURE

Final closure of the facility will involve the decommissioning of the lined bioremediation cell, the lined water pond and the removing of all fencing and security installations associated with the site. The used liners is disposed of at the hamlet landfill and the site is regraded back to natural drainage. Long term monitoring will continue once the facility has been decommissioned and prior to any future use for the land. No long-term effects are anticipated following facility decommissioning.

8.0 REFERENCES

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TABLES

Table A1. Acceptance and Re-Use criteria for Petroleum Hydrocarbons to be met prior to industrial use of treated contaminated soils

PHC Reuse Criteria	ADC Fine-Grained Soil (mg/kg)	ADC Coarse-Grained Soil (mg/kg)	Facility Acceptance Criteria (mg/kg)
Benzene	0.03	0.0068	N/A
Toluene	0.37	0.08	N/A
Ethylbenzene	0.082	0.018	N/A
Xylenes	11	2.4	N/A
Ethylene Glycol	960	960	12500
PHC (F1)	320	320	12500
PHC (F2)	260	260	10000
PHC (F3)	2500	1700	5000
PHC (F4)	6600	3300	7500

* If testing for particle size is not completed to determine if the soil is Coarse or Fine – grained, soil must be treated to achieve the Coarse-grained soil criteria

Source:
Government of Nunavut's Environmental Guidelines for the Management of Contaminated Sites.

Table A2. Acceptance and Re-Use criteria for Metals to be met prior to industrial use of treated contaminated soils

Parameter	Units	Metals in Soil (mg/kg)	Facility Acceptance Criteria (mg/kg)
Antimony	mg/kg	40	40
Arsenic	mg/kg	12	12
Barium	mg/kg	2000	2000
Beryllium	mg/kg	8	8
Cadmium	mg/kg	22	22
Chromium (total)	mg/kg	87	87
Chromium, hexavalent (Cr(VI))	mg/kg	1.4	1.4
Cobalt	mg/kg	300	300
Copper	mg/kg	91	91
Lead	mg/kg	600	600
Mercury	mg/kg	50	50
Molybdenum	mg/kg	40	40
Nickel	mg/kg	50	50
Selenium	mg/kg	2.9	2.9
Silver	mg/kg	40	40
Thallium	mg/kg	1	1
Tin	mg/kg	300	300
Uranium	mg/kg	300	300
Vanadium	mg/kg	130	130
Zinc	mg/kg	360	360

Sources:
Government of Nunavut's Environmental Guidelines for the Management of Contaminated Sites.



Table A3: Field Parameters to be measured with water quality meter at time of sampling in the field.

Parameters
pH
Electrical conductivity (EC)
Total suspended solids (TSS)
Temperature (°C)
Visual assessment for hydrocarbon sheen

Sources:
GN Department of Environment Environmental Guideline for Industrial Waste Discharges

Table A4. Treated Water and Water Monitoring Guidelines

Parameters	Units	Site-Specific Guidelines
Hydrocarbons/Phenols/PAHs		
Benzene	mg/L	0.110[2]
Toluene	mg/L	0.0215[2]
Ethylbenzene	mg/L	0.025[2]
Xylenes		-
EPH		-
LEPH		-
Total phenol		-
Ethylene Glycol		-
General Water Quality		
Alkalinity		-
Chloride		-
Hardness		-
Nitrate	mg/L	1500[1]
Nitrite		-
Salinity	PSU (ppt)	No more than 10% of natural concentration of receptor at that time and depth.

Table A4. Treated Water and Water Monitoring Guidelines

Parameters	Units	Site-Specific Guidelines
Total Metals		
Arsenic (As)	mg/L	0.0125[2]
Beryllium (Be)		-
Boron (B)		-
Cadmium (Cd)	mg/L	0.00012[2]
Chromium (Trivalent)	mg/L	0.056[2]
Cobalt (Co)		-
Copper (Cu)		-
Lead (Pb)		-
Mercury (Hg), Total	mg/L	0.000016[2]
Molybdenum (Mo)		-
Nickel (Ni)		-
Selenium (Se)		-
Silver (Ag)	mg/L	0.0075[1]
Zinc (Zn)		-

- Parameters without guidelines indicated by "-"

Canadian Council of Ministers of Environment Water Quality Guidelines for the Protection of Aquatic Life Marine Environment, as amended, 2026 short-term[1] and long-term[2] data.

Where long term data is used for site specific guidelines these concentrations will be used to derive action levels based on 3 years of monitoring.

Where no guideline exists, parameter is analyzed for ongoing trend analysis for development of action levels

APPENDIX A

General Location of Soil and Water Treatment Facility



LOCATION PLAN

Source: ESRI

N

390 195 0 390

Meters

KBL

Scale:	1:24000
Date:	2020-08-07
File #:	4300
Drawn By:	DLS
Designed By:	DLS
Reviewed By:	KO

KBL Environmental LTD.

Cambridge Bay
Soil Treatment Facility



N

30 15 0 30

Meters

SITE MAP

Source: ESRI

KBL

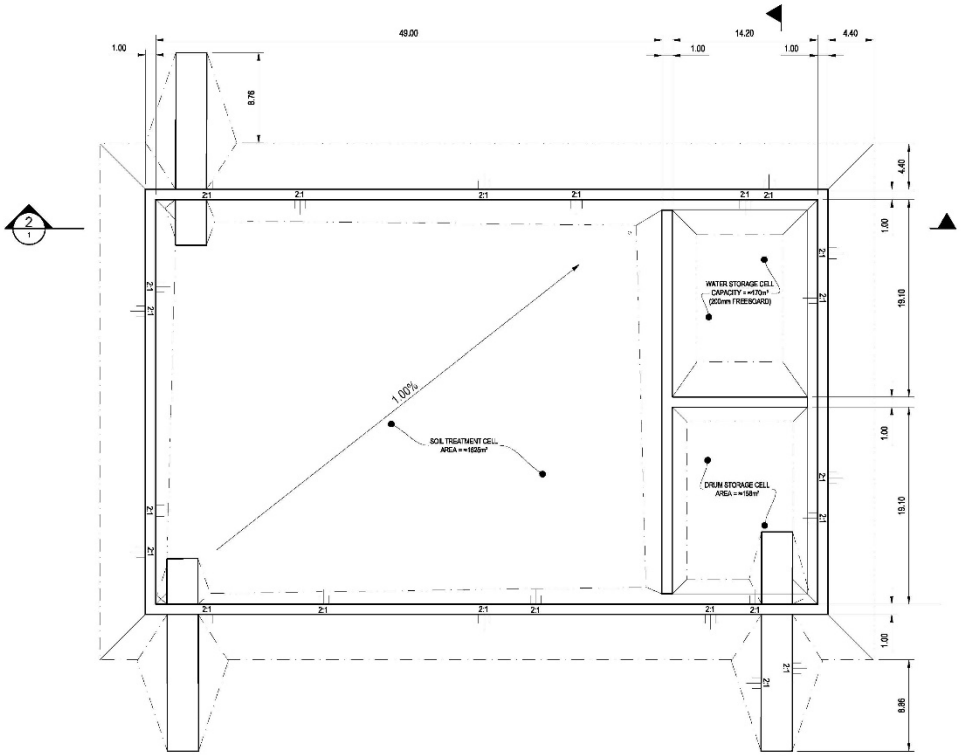
Scale:	1:1500
Date:	2020-08-07
File #:	4300
Drawn By:	DLS
Designed By:	DLS
Reviewed By:	KO

KBL Environmental LTD.

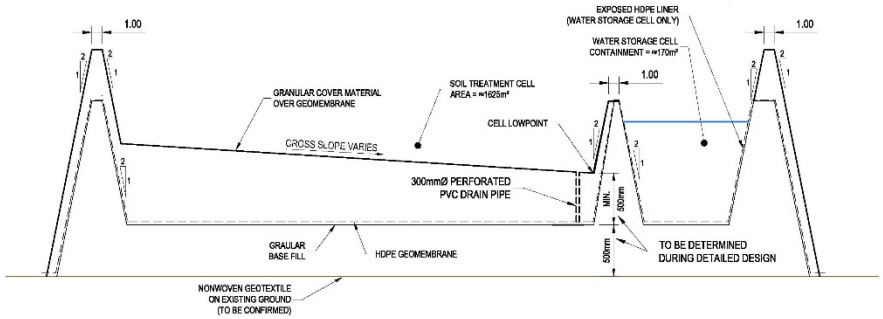
Cambridge Bay
Soil Treatment Facility

APPENDIX B

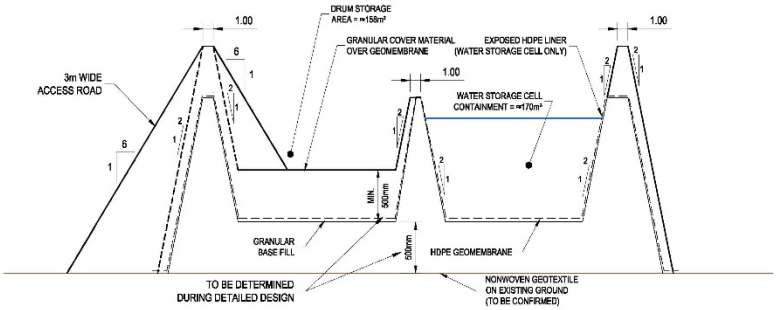
Facility Design Drawing



1 PLAN
1:250



2 SECTION
1:250h 1:25v



3 SECTION
1:250h 1:25v

NOTES:

1. FIGURE IS IN SUPPORT OF KBL'S, APPLICATION FOR A DEVELOPMENT PLAN FOR A SOIL TREATMENT FACILITY IN CAMBRIDGE BAY, NU.
2. FIGURES PRESENT GENERAL LAYOUTS AND CONCEPTUAL DESIGNS. FINAL DESIGNS AND CONSTRUCTION WILL DEPEND ON FIELD CONDITIONS AND LOCALLY AVAILABLE CONSTRUCTION MATERIALS.
3. SCALES AND DIMENSIONS ARE APPROXIMATE.
4. EXISTING GRADE IS ASSUMED TO BE FLAT AND LEVEL. ACTUAL CONFIGURATION WILL MAKE USE OF ADVANTAGEOUS NATURAL SLOPE ORIENTATIONS.
5. BERM HEIGHT MAY BE INCREASED TO ACCOMMODATE FIELD CONDITIONS.
6. GEOMEMBRANE INSTALLATION QUALITY CONTROL AND QUALITY ASSURANCE SHALL BE CONDUCTED THROUGHOUT INSTALLATION ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
7. BERMS AND BASE SHALL BE COMPACTED TO 98% STANDARD PROCTOR DENSITY IN LIFTS OF UP TO 300 MILLIMETRES.
8. PERMAFROST INSULATION LAYER AND GRADING FILL IS TO BE GRADED AND PROOF ROLLED WITH SMOOTH DRUM ROLLER OR SMOOTH PLATE PRIOR TO PLACEMENT OF GEOTEXTILE AND GEOMEMBRANE.
9. BERM SLOPES TO BE CONFIRMED DURING DETAILED DESIGN.
10. MINIMUM DEPTH OF BASE FILL ABOVE EXISTING GROUND TO BE CONFIRMED DURING DETAILED DESIGN.

REDUCED

Conditions of Use

Verify elevations and/or dimensions on drawing prior to use. Report any discrepancies to Dillon Consulting Limited.

Do not scale dimensions from drawing.

Do not modify drawing, re-use it, or use it for purposes other than those intended at the time of its preparation without prior written permission from Dillon Consulting Limited.

NOT FOR CONSTRUCTION

DILLON CONSULTING

No.	Issued/Revised	Date	By
01	ISSUED FOR CLIENT REVIEW	04.13.2018	KB

DESIGN	KB
DRAWN	TPW
CHECKED	KB
APPROVED	KB
DATE	APRIL 2018
SCALE	AS NOTED

KBL SOIL TREATMENT FACILITY - CONCEPTUAL DESIGN
CAMBRIDGE BAY, NUNAVUT

SITE PLAN AND SECTION

PROJECT NO. 15-2230-1000

SHEET NO. 1

APPENDIX C

Appendix Title

KBL Environmental LTD.

C2: Inspection Checklist

Cambridge Bay Treatment Facility

Date (MM/DD/YY): _____ Time: _____

Inspector: _____ Weather: _____

Current activities on site: _____

Discharging to sump? _____ Freeboard in Sump _____

Water in Cell? _____ Freeboard in Water Cell _____

Soil on Pad? _____ If yes, fill out page 2 (x) _____

Treated water tank in use? _____ # of TW tanks _____

Review Maintenance Log (Y/N) Outstanding work order (Y/N)

Site Conditions		OK (x or N/A)	Needs Attention (x)	Entered into Maintenance Log (Y/N, Initial)	Comment *additonal comments on Page 2
Access	Gate in working order				
	Signage visible				
Spill Kit	On site				
	Lid secured				
	Contents checked				
Storage Shed	Locked				
	PPE available				
	Trash pump in containment				
	Pump fuel in containment				
	Soil amendments in containment				
	Binder 1 available				
	Binder 2 available				
	Binder 3 available				
	Sample kit contents checked				
Wildlife	Observed on site				
	Damage to facility				
Facility Grounds	Evidence of spills				
	Rutting				
	Ice				
Soil Pad	Berm stability				
	Liner visible				
	Ramp 1 stability				
	Ramp 2 stability				
	Drainage system working				
	Dust control				
Water Cell	Berm stability				
	Liner visible				
	Filter cloth on pump intake				
	Tarp intact & secure				
WTP	Flow meter working				
	System function				
Sump	Stability				

*placing an X in a shaded box requires entry into Maintenance Log and follow-up.

Office Back-up: Date (DD/MM/YY) Initial _____

KBL Environmental LTD.

C2: Inspection Checklist

Cambridge Bay Treatment Facility

Soil Currently on Pad

Job #	Status						Job Marker in Place		Biopile Erosion	
	Loading/ unloading	Remediat'n underway	Tilling	Dust Supress'n	Amending	Sampling	Y	N	Y	N

**placing an X in a shaded box requires entry into Maintenance Log and follow-up.*

Comments

Office Back-up: Date (DD/MM/YY) Initial _____

APPENDIX D

Waste Profile Form

KBL Environmental LTD.

Waste Profile Form

Section A: General Information

Customer Name: _____ **Contact:** _____

Address: _____ **City / Town:** _____ **Province:** _____

Postal Code: _____ **Phone:** _____ **Fax:** _____

Cell Number: _____ **Email Address:** _____

Generator Site Location: _____

Billing:

Bill to the address above ☐ **If there is an alternate billing address please provide the information below:**

PO# / AFE or Job#: _____ **Bill to:** _____

Bill to Address: _____ **City:** _____ **Prov:** _____ **Postal Code:** _____

Acct. Contact: _____ **Phone Number:** _____ **Fax Number:** _____

Section B: Waste Description

Description: _____ **Source:** _____

Quantity: _____ ☐ Tonne ☐ Pail ☐ Drum ☐ m^3 **Lab ID #s:** _____

Section G: Certification

I hereby certify that to the best of my knowledge the information contained above is accurate and contains no willful or deliberate omissions. The sample for which the analytical data was provided is representative of the waste and was collected and preserved in a manner consistent with accepted technical standards. The waste described is not hazardous according to EUB or AENV regulations. If it is determined that the waste stream does not conform to this profile, KBL Environmental Services Ltd. reserves the right to re-profile the waste, reject the waste or surcharge the quoted disposal price.

Authorized Signature: _____ **Print:** _____

Title: _____ **Date:** _____

Section H: KBL Environmental Internal Use

Profile Approval: Yes ☐ No ☐ **Project #:** _____

	HAY RIVER	HIGH LEVEL	YELLOWKNIFE	CAMBRIDGE BAY	OTHER:
Facility Destination:	☐	☐	☐	☐	☐

Approval Number: _____ **KBL Representative:** _____

Date: _____ **Landfill Representative:** _____

Acceptance Conditions:

A. **ADC:** ☐ **Credit Approval:** ☐

B. **Treatment:** ☐

C. **Disposal:** ☐