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
V.2.2
4300CBSTF

March 2022

TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

EXECUTIVE SUMMARY

This Plan outlines how KEL operates and maintain the soil and water treatment facility (SWTF) in Cambridge Bay, Nunavut (the Hamlet). The facility is comprised of one bermed and lined area for soils contaminated with petroleum hydrocarbons, 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 onsite water treatment plant and once treated 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	

For further information, please contact:

Kitikmeot Environmental Ltd.
regulatory@kblenv.com
780.452.7779

1.0 INTRODUCTION

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

Coordinates for the Facility are:

69º 07' 40.52" N 105º 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
Cambridge Bay, NU
X0B 0C0

Operator Contacts:

Dino Forlin
Director of Business Development
Kitikmeot Environmental Ltd.
dforlin@ginig.com
867.983.2200
Primary Contact

Katie Oliver
Environmental Consulting Manager
KBL Environmental Ltd.
koliver@kblenv.com
780.452.7779
780.893.3305 (cell)
Secondary Contact

The purpose and scope of this Plan is to outline the methodology for operating and maintaining the SWTF. The location drawing can be found in Appendix B and the design drawing of the facility in Appendix C.

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 SWTF 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 suitable facility. Water is treated using an onsite water treatment plant 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-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; one small package treatment plant to treat petroleum hydrocarbon-contaminated water; one or two above ground storage tank(s) (AST) for treated water storage; one small shed for storage of supplies, documentation and health and safety equipment.

2.0 ENVIRONMENTAL MANAGEMENT

The Facility 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 Facility is minimal and not greatly alter existing site condition. Based on facility design, operating principles and monitoring plan the environmental impacts associated with this facility is minimized.

3.0 SOIL AND WATER TREATMENT FACILITY

The Facility is designed to treat petroleum hydrocarbons. Materials received at the site for treatment include petroleum hydrocarbon-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 profiled which may include sampling and field testing to determine suitability for treatment. Soil meeting acceptance criteria is deposited into an engineered cell, operated as a Soil Treatment Facility.

Once the bioremediation process has been given adequate time, soil is sampled and tested to confirm it meets discharge/beneficial reuse criteria (as presented in Appendix A). Soil meeting reuse criteria is hauled as cover material at the Hamlet's landfill or re-purposed as permitted.

The Facility also includes an engineered pond to accept petroleum hydrocarbon 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 using an onsite water treatment plant and then tested to analyze for the discharge guidelines set forth in the license.

3.1. Facility Design

The facility has been designed to receive up to 3,000 m3 (a drawing of the Facility Plan and Section is provided in 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 (or equivalent) 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 Appendix A, 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 end-dumped 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 a hydraulic 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, two or three treatment events occur each year over the summer season. Treatment may occur using a track hoe equipped with an Allu bucket or by manual aeration using an excavator. Materials are quickly churned and aerated by thorough mixing, blending and aeration while all unwanted debris is removed manually. The final waste soil matrix is a finely processed material suitable for beneficial reuse.

Treatment does not occur when the ambient air temperature is below 5oC. The mean expected residency of soil undergoing bioremediation in the Soil Treatment facility 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 be accessible to all workers. Any amendments is procured for immediate use; no long term storage on site is expected. Over the short term, amendments is stored within appropriate containment in the locked shed on site. All soil amendment application, is 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 Facility is given an orientation on operations, safety and routine practices at the site.

3.3. 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; this is consistent with confirmatory sampling for soil removal from landfarms in Yukon Territory (Environment Yukon 2011) and confirmatory sampling of ex situ stockpiles in BC (BC Ministry of Environment 2009). Each representative sample collected is composed of five sub-samples. Each sub-sample is collected from one of five areas or 'cells' within each, wherein each of the five cells is equivalent to 20% of the soil volume specified in the sampling protocol found in Appendix A. Multiple specimens from within the cell can be collected for each sub-sample, reducing the "nugget effect" that can arise when small sample volumes are collected from a stock pile; this is consistent with BC's Technical Guidance on Contaminated Sites for Site Characterization and Confirmation Testing (BC Ministry of Environment 2009). Samples is 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 temperature-controlled coolers, transported and submitted to a Canadian Association for 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; 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 to avoid potential cross contamination. At the time of sampling, on-site activities and observations are documented including field testing results, soil pile stability or 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 analysed, 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 petroleum hydrocarbon-contaminated water and snow from off-site sources including residential, commercial and industrial properties where a petroleum hydrocarbon 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 petroleum hydrocarbons. The capacity of the retention pond is anticipated to be 170m^3.

Water is transported to town 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.

An above ground storage tank (AST) or 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 is maintained onsite at all times.

As water levels increase in the retention pond, samples is collected and analyzed for the parameters listed on Table A3 in Appendix A. If the samples do not meet the guidelines, the water from the storage pond is treated using an onsite water treatment plant and transferred to a storage tank onsite. Once results are received and meet the guidelines set forth by the issued license, the water is discharged to surface. Analytical results and notification is reported to the DOE and CIRNAC prior to the planned discharge. In the event that water does not meet discharge criteria it will undergo further treatment or be transported to an authorized disposal location.

3.7. Water Treatment Plant

The mobile water treatment plant consists of a series of inline bag filters designed to remove sediment and suspended solids. Following the filter bag train, effluent enters the bottom of treatment vessels which contain granular activated carbon and an organoclay. Water treatment is designed to occur in a manner to promote contact between the effluent and the media, enhancing treatment success. Treated water would be stored in ASTs and sampled for comparison against the parameters outlined in the license. Performance of the treatment system is dependent on the contaminant. Organic contaminants are likely to be removed easily from the water. Inorganic constituents have been successfully removed by activated carbon and organoclay filtration, however less reliably so. Sampling prior to, and after discharge is required in order to determine treatment efficacy. Additional media may be obtained for treatment of specific contaminants of concern. Once it is confirmed that water meets the guidelines set forth by GN and NWB in the license, representatives from DOE and CIRNAC is provided with analytical water quality results. 10 days prior to discharge, disposal or reuse of water from the ASTs or retention pond notice of intent to discharge is given.

Once it is confirmed that water meets the applicable guidelines, it is discharged to surface in a manner which follows natural site drainage and avoids erosion. Treated effluent is batch discharged to the ground surface through a dedicated hose wherein the water will flow overland to natural drainage. If it is determined that erosion is occurring, a splash pad is constructed using riprap. The details and design is discussed with stakeholders prior to construction. All discharged water and groundwater will respect Section 36(3) of the Fisheries Act (EC, 1985) year round, ensuring that at “no person shall deposit of deleterious substance of any type in water frequented by fish”. Discharging is documented and submitted in the annual report.

Treated effluent water meeting discharge criteria (detailed in the Water Licence and in Table A4) is either beneficially reused or discharged to the environment. Depending on conditions on the biotreatment pad, treated effluent can be applied to the soil lifts to aid in bioremediation and promote dust suppression. Remaining treated effluent is released to the environment adjacent to the Facility. It is expected that discharge from the WTP will occur between July 1 and Sept 30. Discharge volumes will not exceed 10 m^3/day; given reuse options, typical discharge volumes are expected to be much less.

Depending on conditions on the biotreatment pad, treated effluent not meeting discharge criteria can be applied to the soil lifts to aid in bioremediation and promote dust suppression. Material requiring disposal, including untreated water, soil that could not be treated, spent filter media, and spent spill response

materials is disposed of at approved waste facility locations.

3.8. Water Monitoring Program

In addition to visual inspections, a groundwater monitoring program (GMP) is in effect to detect any changes in groundwater quality. The GMP will include annual monitoring and sampling of the groundwater wells. Groundwater wells is analyzed and compared to the Federal Interim Groundwater Quality Guidelines (Environment Canada, 2012) and the monitoring parameters set out in Part K (Conditions Applying to Monitoring Program), Item 5 of the water licence.

Each monitoring well will be assessed during each groundwater sampling event to determine its overall state and condition. Any issues will be noted, and if necessary, repairs will be completed.

Monitoring wells will be measured for depth and the depth to groundwater from the top of the well casing using an interface probe. Measurements will be taken before any purging or sampling, and the interface probe will be cleaned with a solution such as Alconox after measuring each well.

Before sample collection, wells will be purged to remove stagnant water. This will be completed by removing three well volumes of water from the well to ensure that representative groundwater has entered the well casing. The volume of water purged will be recorded and reported in the annual report. Purging will be completed using dedicated equipment such as bailers, polyethylene tubing or low flow bladder pump with tubing.

Field parameters (pH, EC, Temperature, DO) will be analyzed using a portable multimeter and recorded in the field along with field notes (e.g., weather conditions, water conditions) to be incorporated into the final report. Any visual observations (sediment, sheen, etc.) will also be noted and recorded.

Following purging and collecting field parameters, groundwater samples will be collected from the monitoring wells using dedicated sampling equipment and placed into 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 correctly in the field.

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

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). 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 is 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 LNAPL detected in any of the groundwater monitoring wells;
- An unplanned or accidental release of waste material (untreated soil or water) from the Facility; and
- Groundwater 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 the trend of the exceedance. If an unplanned release of waste material occurs, samples will be collected to determine if any impacts have been caused to the groundwater. Based on the nature of the unplanned release, sample quantity and follow-up needs will be determined and provided to the Inspector.

If an Action Level exceedance is deemed anomalous based on subsequent sampling, then no further remedial action will be taken, and monitoring will continue biannually as outlined in this Plan. If subsequent sampling indicates a stable or increasing trend, 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 groundwater 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 it is believed that exceedances occur from operations of the Facility and subsequent sampling during Step 1 indicates that concentrations are stable or increasing, then KBL will prepare a Remedial Action Plan (RAP) to investigate the impacts or LNAPL detection further. The RAP will be submitted to the MVLWB for review, comment and approval. KEL will implement the RAP once it is approved. If necessary, KEL will implement immediate actions to help mitigate impacts while awaiting a formal RAP

3.9. Wind Erosion Mitigation

Strong winds can carry soil from stockpiles to areas outside the soil storage area. A contingency plan is required to mitigate soil erosion and the potential spread of contaminants. The main factors influencing wind erosion from soil stockpiles are the threshold wind speed, stockpile contents and surrounding conditions.

Wind erosion can be effectively controlled through maintaining moisture content within soil piles.

Moisture is also an important factor in the bioremediation process therefore it is necessary to maintain adequate moisture content for microbial activity. Wind erosion control through moisture control is satisfied by topical applications of water from the retention pond. As required, water from the pond is sprayed over the soil stockpiles at a rate sufficient enough to minimize erosion by wind and minimal enough so as not to create ponding within the storage area.

If wind conditions are such that substantial dust is created during soil handling and treatment, activities is shut down until conditions stabilize. Where possible, operations may shift to another area within the facility that is more sheltered.

To ensure that snow in the water/snow storage pond is not susceptible to being wind swept, a snow fence is erected surrounding the pond. This will serve to decrease the effects of wind on the pond and its contents, along with serving as a barrier to people and animals.

3.10. 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.

3.11. 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 plant 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 petroleum hydrocarbon 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 manger immediately. Follow his 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 groundwater 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 petroleum hydrocarbons.
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

Transportation of Dangerous Goods Regulations. SOR/2012-245

BC Ministry of the Environment. 2009. Technical Guidance on Contaminated Sites, Site Characterization and Confirmation Testing.

Canadian Council for the Ministers of the Environment (CCME). 2014. Canadian Environmental Quality Guidelines, Water Quality Guidelines for the Protection of Aquatic Life. Accessed on Jan 31, 2014.

Environment Canada (EC). 2012. Federal Interim Groundwater Quality Guidelines.

Environment Yukon. 2001. Protocol 11 – Sampling Procedures for Land Treatment Facilities.

Government of Nunavut (GN). 2014. Environmental Guidelines for the Management of Contaminated Sites. Department of Environment.

Crown Indigenous Relations and Northern Affairs Canada (CIRNAC). 2007. Guidelines for Spill Contingency Planning

Kitikemeot Environmental Ltd. (KEL) 2022. Cambridge Bay Soil and Water Treatment Facility, Emergency Response Plan.

Kitikemeot Environmental Ltd. (KEL) 2022. Cambridge Bay Soil and Water Treatment Facility, Spill Contingency Plan.

Kitikemeot Environmental Ltd. (KEL) 2022. Cambridge Bay Soil and Water Treatment Facility, Waste Management Plan.

Science Applications International Corporation (SAIC). 2006. Federal Guidelines for Landfarming Petroleum Hydrocarbon Contaminated Soils. Presented to Contaminated Sites Division and Emergencies Engineering Technologies Office (EETO), Environmental Technology Centre, Environment Canada.

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	5	5	N/A
Toluene	0.8	0.8	N/A
Ethylbenzene	20	20	N/A
Xylenes	20	20	N/A
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

Sources:
1: CCME's Canada-Wide Standards for Petroleum Hydrocarbons in Soil
2: 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	CCME Industrial Guidelines for 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
Boron	mg/kg	N/A	N/A
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	89	89
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:
1: CCME's Canada-Wide Standards for Petroleum Hydrocarbons in Soil
2: Government of Nunavut's Environmental Guidelines for the Management of Contaminated Sites.

Table A3: Discharge Criteria for Water as per Government of Nunavut (Department of Environment)

Parameter	Maximum Concentration of any grab sample (mg/L)
Total Extractable Hydrocarbons (TEH)*	15 and no visible sheen
Total Lead	0.05[1]
Benzene	0.37[2]
Toluene	0.002[3]
Ethylbenzene	0.09[3]

Sources:
1: B.C. Reg. 168/94: Petroleum Storage and Distribution Facilities Storm Water Regulation
2: GN Department of Environment Environmental Guideline for Industrial Waste Discharges
3: CCME Water Quality Guidelines for the Protection of Aquatic Life

Table A4. Treated Water Discharge Guidelines

Parameters	Units	Site-Specific Guidelines
Benzene	mg/L	0.37
Toluene	mg/L	0.002
Ethylbenzene	mg/L	0.09
Xylenes	mg/L	0.03
F1 (C6-C10)	mg/L	0.15
F2 (C10-C16)	mg/L	0.11
F3 (C16-C34)	mg/L	-
F4 (C34-C50)	mg/L	-
Aluminum (Al)	mg/L	0.005-0.1[a]
Arsenic (As)	mg/L	0.005
Beryllium (Be)	mg/L	-
Boron (B)	mg/L	1.5
Cadmium (Cd)	mg/L	0.00009
Chromium, Hexavalent (Cr6)	mg/L	0.001
Chromium, Trivalent (Cr3)	mg/L	0.0089
Cobalt (Co)	mg/L	0.0025
Copper (Cu)	mg/L	0.002-0.004[b]
Iron (Fe)	mg/L	0.3

Table A4. Treated Water Discharge Guidelines

Parameters	Units	Site-Specific Guidelines
Lead (Pb)	mg/L	0.001-0.007[b]
Manganese (Mn)	mg/L	-
Mercury (Hg), Total	mg/L	0.000026
Molybdenum (Mo)	mg/L	0.073
Nickel (Ni)	mg/L	0.025-0.15[b]
Phosphorus (P)	mg/L	Calculation
Selenium (Se)	mg/L	0.001
Silver (Ag)	mg/L	0.00025
Strontium (Sr)	mg/L	-
Vanadium (V)	mg/L	-
Zinc (Zn)	mg/L	0.03

- Parameters without guidelines indicated by "-"

a pH-dependent parameter

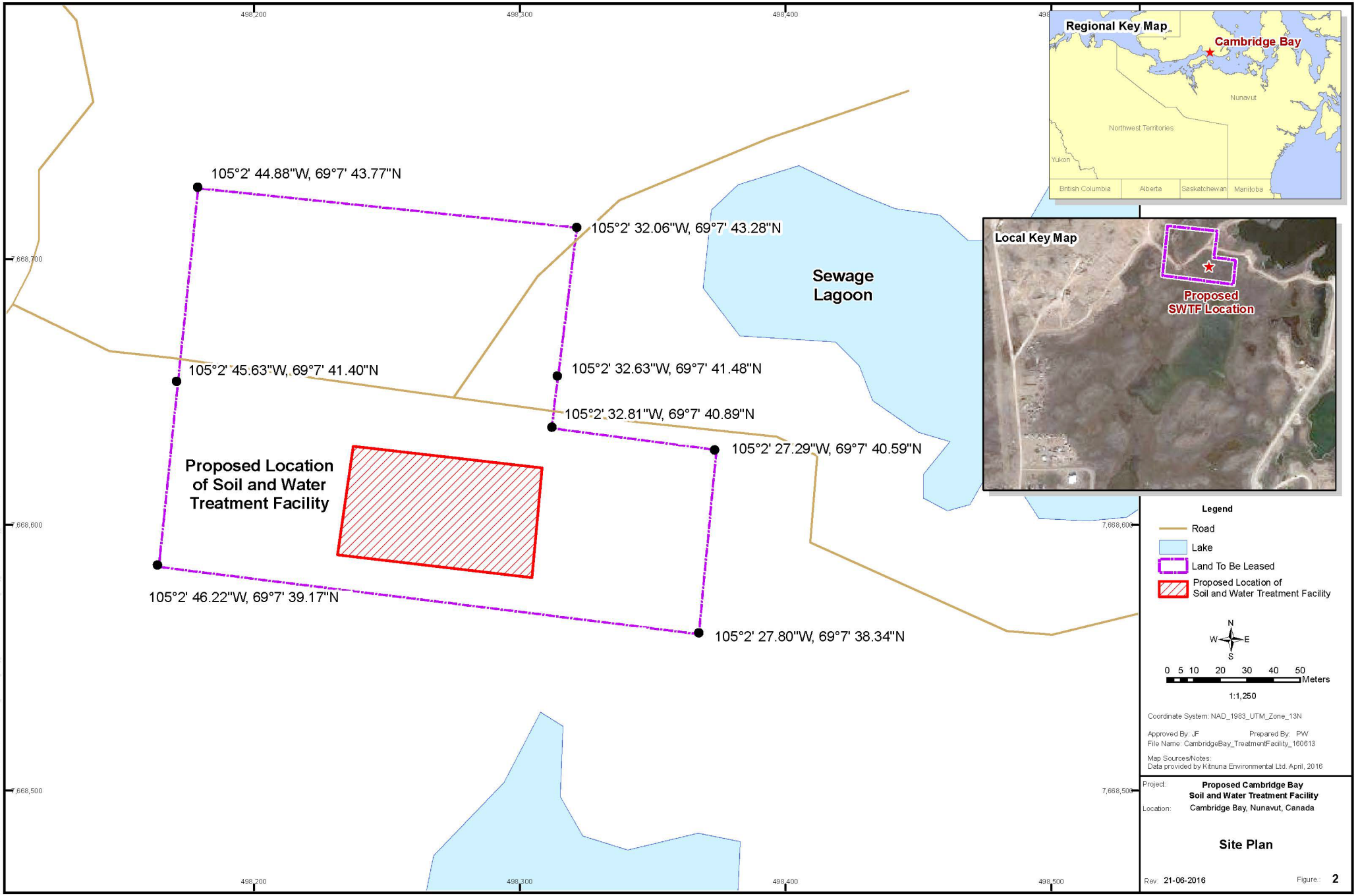
b hardness-dependent parameter

- Canadian Environmental Quality Guidelines,Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CCME CWQGs; CCME, 1999)

Where no guideline exists, parameter is analyzed for ongoing trend analysis

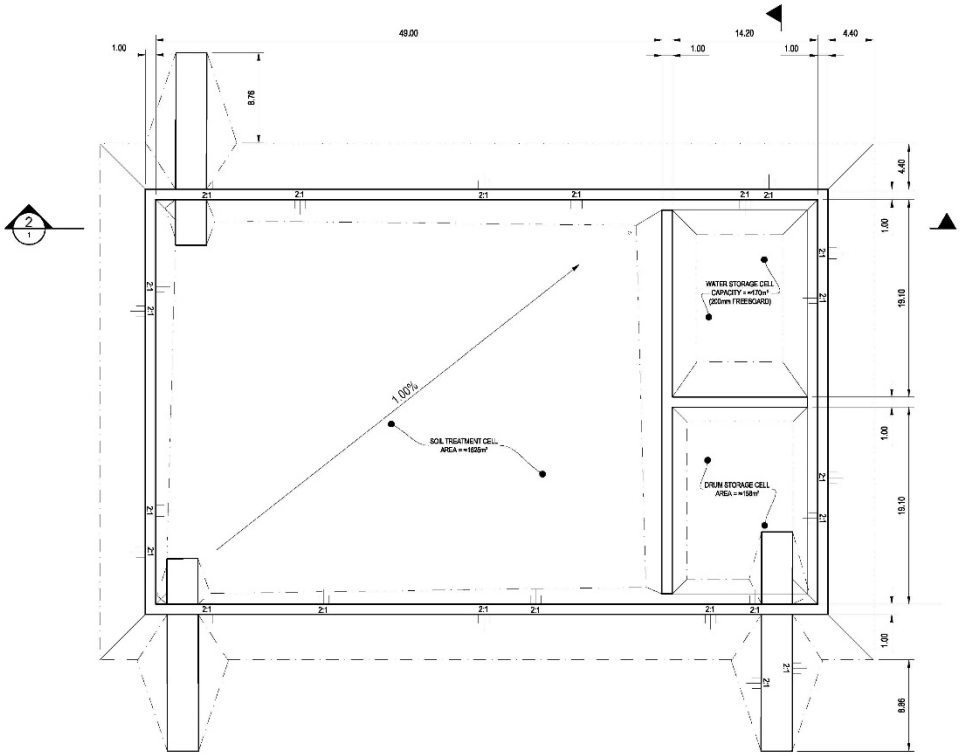
APPENDIX A

General Location of Soil and Water Treatment Facility

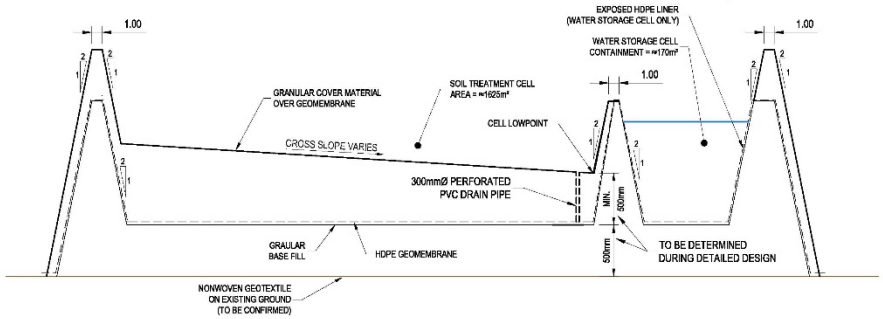

498,200
498,300
498,400
498,500
7,668,700
7,668,600
7,668,500
105°2' 44.88"W, 69°7' 43.77"N
105°2' 32.06"W, 69°7' 43.28"N
105°2' 45.63"W, 69°7' 41.40"N
105°2' 32.63"W, 69°7' 41.48"N
105°2' 32.81"W, 69°7' 40.89"N
105°2' 27.29"W, 69°7' 40.59"N
105°2' 46.22"W, 69°7' 39.17"N
105°2' 27.80"W, 69°7' 38.34"N
Sewage Lagoon
Proposed Location of Soil and Water Treatment Facility
Regional Key Map
Cambridge Bay
Nunavut
Northwest Territories
Yukon
British Columbia
Alberta
Saskatchewan
Manitoba
Local Key Map
Proposed SWTF Location
Legend
Road
Lake
Land To Be Leased
Proposed Location of Soil and Water Treatment Facility
N
W
E
S
0 5 10 20 30 40 50
Meters
1:1,250
Coordinate System: NAD_1983_UTM_Zone_13N
Approved By: JF
Prepared By: PW
File Name: CambridgeBay_TreatmentFacility_160613
Map Sources/Notes:
Data provided by Kitnuna Environmental Ltd. April, 2016
Project: Proposed Cambridge Bay Soil and Water Treatment Facility
Location: Cambridge Bay, Nunavut, Canada
Site Plan
Rev: 21-06-2016
Figure: 2

APPENDIX B

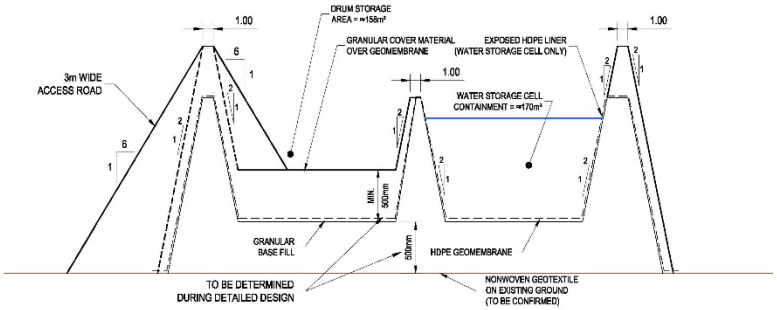
Facility Design Drawing



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

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:** ☐