KEL
Kitnuna Environmental LTD.

Environmental Protection Plan

Cambridge Bay Soil and Water Treatment Facility

June 2016

DRAFT

Plain Language Summary

This Plan outlines what KEL will do to protect the environment during operation of the soil and water treatment facility (SWTF). Before starting operations, KEL will assess baseline conditions as required, and will collect samples of soil and groundwater in the footprint of the treatment facility to measure existing conditions. If the conditions facilitate, monitoring wells will be installed to monitor shallow groundwater during operations. While the SWTF is in operation, groundwater will be sampled once annually to ensure that no impacts are present. When it is time to close the facility, KEL will sample the soil again to confirm there are no ongoing impacts to soil quality, along with final groundwater monitoring and sampling.

Conformity Table

Date	Document Version	Summary of Changes Made	Author	Approver
June 2016	Ver. 1	-	JF	

Table of Contents

Appendices

1. Introduction

a. Company Name, Project Location & Effective Date

Kitnuna Environmental Ltd.
Corporate office:
#10 Omilik Road
P.O. Box 92
Cambridge Bay, Nunavut
X0B 0C0
Project location:
69° 07' 40.52"N 105° 02' 35.29"W

Cambridge Bay, NU

Project waste management contacts include:

Barrie Ferguson
Operations Manager, Kitnuna Environmental Ltd.
bferguson@kitnuna.ca
(867) 983-5188

Joshua Foster
Project Manager, Kitnuna Environmental Ltd.
jfoster@kblenv.com
(780) 271-4560

Kitnuna Environmental Ltd. (KEL) are proposing to develop and operate a soil and water treatment facility (the Facility) in Cambridge Bay, NU. The proposed Facility will be located adjacent to the Hamlet of Cambridge Bay sewage lagoon. KEL will provide the expertise to manage the facility design, comply with the Nunavut Water Board (NWB) approval requirements, keep the facility in compliance and manage treatment operations. Kitnuna will provide the Facility land and contracting services to construct as well as provide necessary equipment to treat contaminated soil and water. Coordinates for the Facility are:

69° 07' 40.52"N 105° 02' 35.29"W

The site is accessible by road, from an access road off of Natik Street. The effective date for this *Environmental Protection Plan* (the Plan) is the start of construction of the facility, anticipated to be in summer of 2016. The Plan will be effective for the duration of the lease and the life of the facility, a period of five (5) years.

2. Environmental Policy

Our commitment to the protection of the environment needs to be demonstrated in how we conduct our day-to-day business operations. The highest standards of care are to be taken by all employees to minimize the environmental impact of all operations. The company management team has the responsibility to take a leadership role and develop policies and procedures that minimize environmental effects. Employees have the responsibility to bring to the attention of their immediate supervisor those procedures and incidents which may impair the environment. Our policy is to:

1) Comply with all applicable government regulations.
2) Consider the environmental effects of our operations.
3) Provide staff with all the necessary information, training and equipment.
4) Develop processes, policies and procedures that minimize the occurrence and consequences of environmental incidents.

Our corporate environmental goal is to minimize the environmental impact of our operations.

3. Purpose & Scope

The purpose of this Plan is to describe environmental baseline conditions and outline monitoring activities that will occur to ensure that impacts to the aquatic and terrestrial environment associated with Facility operation are avoided. The scope of this Plan includes operation and maintenance of the Facility.

KEL will manage the program operations responsibly and will comply with all licenses, permits and applicable territorial and federal laws and regulations related to waste management specific to Facility operation.

a. Project Description

The purpose of this project is to construct and operate a permanent SWTF in Cambridge Bay, NU. The site of the proposed facility is located at 69^{o} 07’ 40.52”N 105^{o} 02’ 35.29”W and is currently vacant. The proposed permanent facility will include construction of an engineered cell to receive petroleum hydrocarbon-contaminated snow and water. Water will be treated on site by a package treatment plant. Treated water will be stored in a tank until it is confirmed that the water meets discharge criteria, after which it will be reused on site or released to the surrounding environment. Following bioremediation, treated soil meeting license criteria will beneficially reused off site at the Hamlet landfill or as otherwise permitted. Soil and water not meeting discharge/reuse criteria will be transported off site for disposal at a suitable facility. The facility will also include an area of the treatment pad designated for storage of hazardous wastes awaiting transportation to authorized facilities.

The permanent facility, as illustrated in Appendix A, will include 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 19m x 14m 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.

The proposed permanent facility is intended to operate for a duration of five (5) years commencing in summer of 2016, after which it is anticipated that the agreement with the Hamlet will be reviewed.

4. Environmental Setting

Cambridge Bay, including the Facility, is situated within the Northern Arctic ecozone (NAE 2008). In this ecoregion, the landscape predominantly consists of low rolling plains covered with soil and rock debris left by glaciers. Many coastlines are characterized by wide flat plains with perennially frozen ground (permafrost). Mean annual temperatures range from -30 to -35°C in winter and from 5°C to 10°C in summer. Mean annual precipitation is 100-200 mm, with snow potentially falling during any month. Much of the region is devoid of plants, with the exception of some coastal lowlands and nutrient rich sheltered valleys. Muskox, Caribou, Arctic Fox and Polar Bear are the three dominant large mammals in the area, with the Collared Lemming being the only small mammal. Birds including Snowy Owl, Snow Geese, Canada Geese, and Horned Larks are also common to the region (NAE 2008).

5. Environmental Effects

a. Heritage Resources

The Facility is proposed for construction and operation in an existing industrial area. No land clearing will occur nor will any new disturbance to the surrounding lands. The Facility is expected to have no impacts on heritage resources in the project area, as shown by results from a site data requisite sent to Government of Nunavut Department of Culture and Heritage (Appendix C)

b. Terrestrial Environment

The Facility is proposed for construction and operation in an existing industrial area. No land clearing will occur nor will any disturbance to the surrounding lands. Any waste generated on site will be managed in accordance with the *Cambridge Bay Soil and Water Treatment Facility Waste Management Plan* (KEL 201), including appropriate containment and disposal, thus minimizing the potential to attract wildlife. Accordingly, the Facility is expected to have no impacts on vegetation or terrestrial wildlife in the vicinity of the project area.

As described in Appendix B, baseline soil and groundwater sampling program is planned to occur prior to Facility operation to document existing surficial material quality. The existing and planned facility

both possess an engineered liner (refer to the *Cambridge Bay Treatment Facility Operations and Management Plan* (KEL 2016) for a detailed description). Routine liner and facility inspections, and in the event of a tear, immediate liner repair, will occur. At the time of closure or lease transfer, soil sampling will occur to document surficial material quality and to confirm that there are no existing or ongoing impacts from the Facility on soil quality. Accordingly, impacts to soil quality in the project area are considered to be negligible.

c. Aquatic Environment

Treated effluent from the water treatment plant which meets discharge criteria (refer to *Cambridge Bay Treatment Facility Operations and Management Plan* (KEL 2016) for criteria) will be discharged to the environment, following exhaustion of effluent reuse opportunities. Treated effluent will be batch discharged to the ground surface through a dedicated hose wherein the water will flow overland to natural drainage.

Prior to beginning operations, shallow groundwater wells will be installed to monitor quantity and quality of groundwater in the area of the planned SWTF. During operations, groundwater will be sampled once annually to ensure no changes occur to groundwater quality. Locations of groundwater wells will be determined prior to construction of the SWTF.

d. Air and Noise

Operation of the bioremediation pad such that remediation is efficient and effective involves maintaining a certain degree of soil moisture during the frost-free portion of the year. Maintaining this moisture content in the soil also serves to suppress dust and avoid migration of soil off site as dust. Accordingly, impacts to air quality as well as impacts to terrestrial vegetation adjacent to the site resulting from dust deposition are considered negligible.

The Facility is proposed for construction and operation in an existing industrial area. The main activities occurring at the site, bioremediation, are largely passive. Any activities that may generate noise such as tilling soil and pumping effluent will be periodic during summer months, of short duration, will occur during daytime hours and will be lower in volume and frequency than other activities that concurrently occur in the industrial area. The Facility is expected to have negligible impacts on ambient noise levels in the project area.

6. Baseline Sampling Program

Refer to Appendix B for the proposed baseline soil and groundwater sampling program.

7. Documentation and Reporting

If required, an annual report will be submitted to GN Department of Environment (DOE) 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. A copy of all licenses and permits will be maintained on site.

8. References

Anderson, John et al. *Northern Arctic Ecozone (NAE)* Ecological Framework of Canada (2008). April 8, 2016 <ecozones.ca>

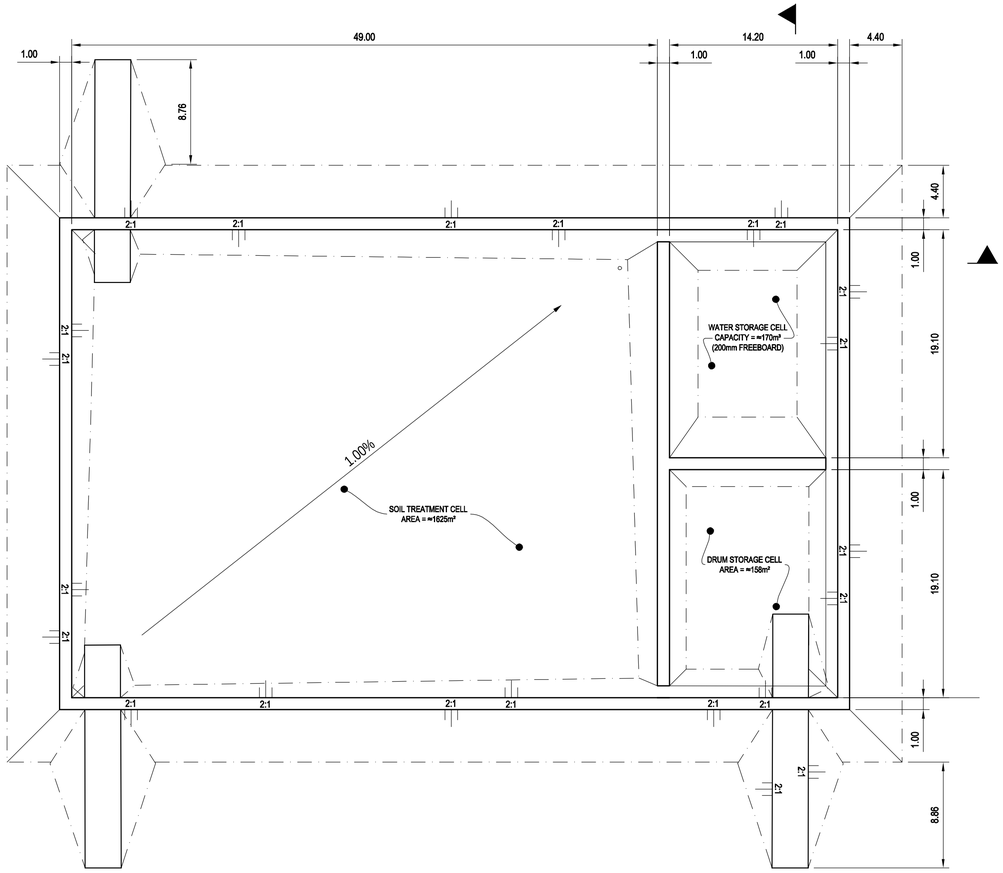
Kitnuna Environmental Ltd. (KEL). 2016. Cambridge Bay Soil and Water Treatment Waste Management Plan.

Kitnuna Environmental Ltd. (KEL). 2016 Cambridge Bay Soil and Water Treatment Facility Operation and Maintenance Plan.

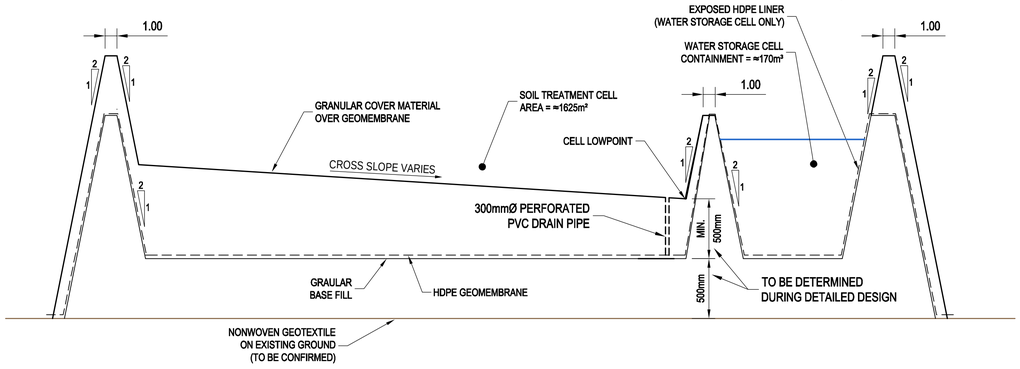
Appendices

Appendix A

Site Plan and Section



1 PLAN
1:250



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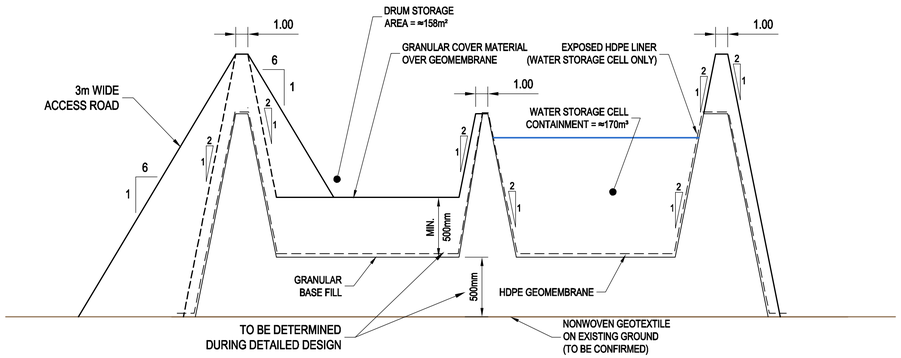


3 SECTION
1:250h 1:25v

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 FOR	DATE	BY
01	ISSUED FOR CLIENT REVIEW	04.13.2016	KB

DESIGN	REVIEWED BY
KB	KB
DRAWN	CHECKED BY
TPW	KB
DATE	
APRIL 2016	
SCALE	
AS NOTED	

KBL SOIL TREATMENT FACILITY - CONCEPTUAL DESIGN
CAMBRIDGE BAY, NUNAVUT

PROJECT NO. 15-2230-1000

SHEET NO. 1

SITE PLAN AND SECTION

FILENAME: C:\PROJECTWISE\WORKING DIRECTORY\ACTIVE\141TPW\00128322\15223O-02-SITE-CON-SITE PLAN.DWG PLOTTED BY: WOTHERSPOON, TREVOR
PLOT DATE: 2016-04-13 @ 11:32:58 AM PLOT SCALE: 1:1 PLOT STYLE: DILLON-STANDARD.CTB

Appendix B: Baseline Sampling Program

Baseline Soil Sample Locations	Analysis Parameters
Beneath each quadrant of Cell	BTEX F1-F4, Total Metals
Upgradient of Cell	
Downgradient of Cell	

Baseline Groundwater Sample Locations	Analysis Parameters
To Be Determined Prior to Construction	BTEX F1-F4, Total Metals, Total Extractable Hydrocarbons (TEH), Total Lead

Appendix C: Department of Culture and Heritage Letter

Building Nunavut Together
Nunavuliuqatigiingniq
Bâtir le Nunavut ensemble

Nunavut

April 18, 2016

Joshua Foster
Kitnuna Environment Ltd.
PO Box 92, 10 Omilik Road
Cambridge Bay, Nunavut X0B 0C0

Site Data Licence: Cambridge Bay Soil and Water Treatment Facility

Dear Mr. Foster:

As requested, enclosed please find a summary of the archaeological sites within your area of investigation. Please be reminded that this data is not to be shared with anyone other than those identified in the application you submitted on April 14, 2016 and that all copies of this data must be destroyed by April 18, 2017. Written confirmation of the destruction of this data must be sent to the Government of Nunavut.

Details of Request:
Provide location of archaeological sites within the project footprint.

The Nunavut Site Data base indicates that there are no recorded sites for that location.

Sincerely,

S. deBlois
Territorial Archaeologist

P.O. Box 310
Igloolik, NU X0A 0L0

C.P. 310
Igloolik, NU X0A 0L0

Tel. (867) 934-2044
Fax: (867) 934-2047

Appendix D: Site Location

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

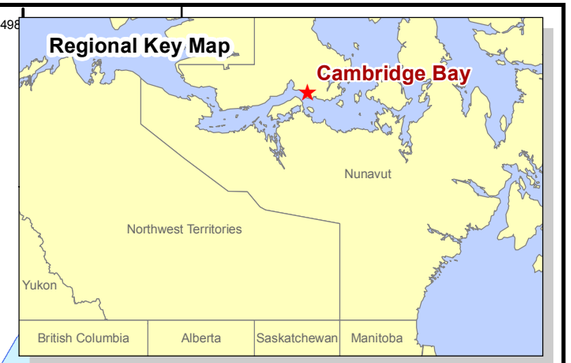
105°2' 27.29"W, 69°7' 40.59"N

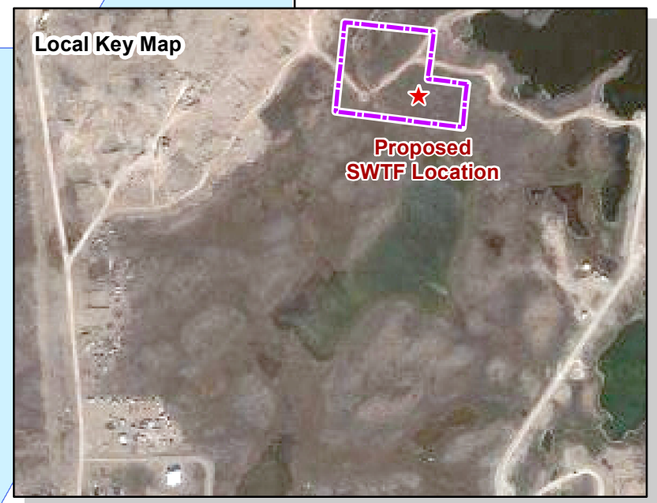
105°2' 46.22"W, 69°7' 39.17"N

105°2' 27.80"W, 69°7' 38.34"N

Proposed Location of Soil and Water Treatment Facility

Sewage Lagoon





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**

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