

Operation and Maintenance Plan
Final Version

SOIL AND WATER TREATMENT FACILITY
Yellowknife, Northwest Territories

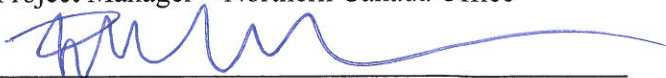
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1 SOIL AND WATER TREATMENT FACILITY

1.1 DESCRIPTION

The soil and water treatment facility of the City of Yellowknife has been designed to allow the city to manage all hydrocarbon contaminated water, snow, and soil arrivals at the municipal landfill. The treatment process helps to reach the objectives set out by the city water licence prior to disposal.

A figure showing the location of the treatment pad, the water lagoon, and the storage pad is presented at the end of this document.

1.2 WATER LICENCE

A Water Licence (MV2009L3-0007) has been issued to the City of Yellowknife by the Minister of Aboriginal Affairs and Northern Development Canada (AANDC) in accordance with the *Northwest Territories Waters Act* from 2010. The acceptable criteria for water and soil reception and disposal are defined in the water licence.

1.3 SOIL AND WATER RECEPTION

All arrivals of trucks carrying snow, water, and soil for the treatment facility are weighed on the city scale located at the entrance of the landfill in order to know the weight of their charge. Reception reports are sent once a month to the manager of the treatment facility in order to ensure an accurate record is kept of all activities.

Contaminated soil is placed on the storage pad adjacent to the treatment area. Contaminated water is discharged into the lagoon and, during the winter, contaminated snow is stored in a designated area on the treatment pad, so that it will be directed into the lagoon upon melting.

The treatment facility is able to treat approximately 3,400 metric tonnes of contaminated soil at one time. The storage pad has the additional capacity to store 3,000 metric tonnes. Skilled management of the site has allowed the treatment of up to 6,900 metric tonnes in one year. Currently, as in past years, soil is received at the site in varying amounts, but remains at an average of 3,675 metric tonnes/year. The storage capacity could be increased if necessary by expanding the storage area.

During the winter months (November to May), soil is received on the storage area only.

2 TREATMENT PROCESS

2.1 SOIL TREATMENT

When soil arrives at the facility, it is discharged on the storage pad. Once the treatment area has been prepared with aeration pipes and a plenum of gravel, the soil is then moved to the treatment pad and arranged in several lots. Each aeration pipe is connected to the main conduit, which in turn, is linked to a blower designed to promote air circulation through the soil pile and, when operating in vacuum mode, to recover volatile organic compounds present in the soil. To optimize the biodegradation process, amendments are added to the soil on the treatment pad and the soil is regularly turned.

2.2 SOIL TREATMENT CONTROL

Soil treatment control depends on the accurate monitoring of both current treatment conditions as well as the evolution of treatment. The monitored parameters are measured directly in the field or obtained by laboratory analysis and are measured regularly to allow for quick response time, should corrective actions be required.

2.2.1 Soil Controlled Parameters

Monitored parameters include air flowrate, soil humidity, and soil temperature. Verification of these parameters with adapted tools is required in order to make adjustments and modifications, or to maintain the system at a fully operational level.

2.3 LOT DIVISION AND SAMPLING

A lot represents a batch of soil on the treatment pad with similar contamination. A single lot generally consists of 100 to 200 m³ of soil. When soil quality of a lot reaches the water licence objectives, it is removed from the treatment pad and stockpiled for use as daily cover material for the landfill.

In order to measure the progress of soil treatment, each lot is sampled upon reception on the treatment pad and before each turning. This process allows for the evolution of the treatment to be monitored closely, allowing for suitable planning regarding the interventions on the soil.

The sampling process consists of collecting composite samples for each lot with the help of an excavator or a manual auger. All soil samples are kept in a cooler below 4°C, and then shipped by plane to AGAT Laboratories in Edmonton for analysis.

A quality assurance/quality control (QA/QC) program is performed by Biogenie on each sampling campaign and includes at least 10% field duplicates, as well as a field blank and travel blank. The analytical laboratory also performs quality control tests to ensure that no results are outside the acceptable limits.

The QA/QC program is completed in order to confirm that the sampling and analysis process is reliable.

Turning frequency will be dependent on the level of contamination of each lot, but is generally set between 4 to 6 weeks per turning.

2.4 WATER TREATMENT

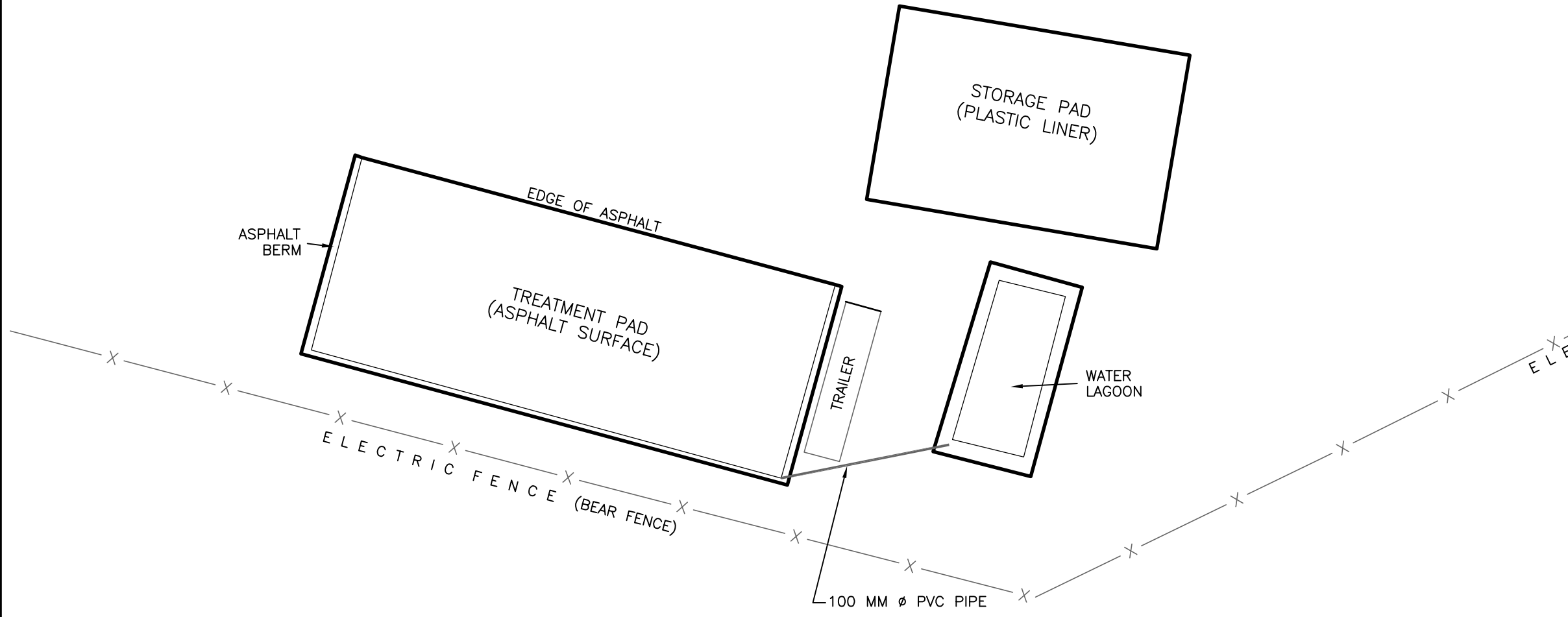
Considering that the treatment pad base is made of asphalt, the storage pad base is made of sealed geomembrane, and that proper slopes have been implemented, all the leachate generated from the contaminated soil is redirected by gravity to pipes which are connected to the lagoon. Contaminated water receptions are discharged by trucks directly into the lagoon.

The frequency of the water treatment operations depends on the water volume of the lagoon. The water passes through the treatment unit and is directed to one of the two 63,000 liter holding tanks on the site. Water samples are collected from the tanks in bottles provided by an accredited analytical laboratory, then sent for analysis to validate if the water quality is within the applicable water criteria established in the City Water licence document. The water samples are collected at a minimum frequency of one sample per tank (i.e. approximately 1/50,000 liters). The water is discharged into the environment when all parameters fall within the acceptable water criteria limits of the Water Licence. Authorisation is given prior to each discharge by AANDC. The effluent discharge area has been approved within the existing Water Licence. The water can also be used to irrigate the soil on the treatment pad if needed.

3 ANNUAL REPORT

An annual report is submitted to the water board. This report details all the treatment objectives, and the soil and water treatment operations, including the volume received and treated during the year. All analysis results corresponding to the treatment process are also included in the report.

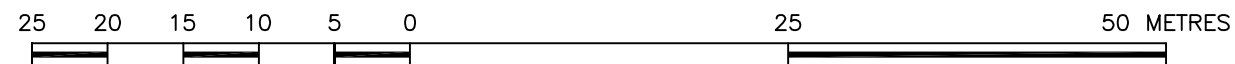
YELLOWKNIFE LANDFILL SITE



NOTE:

COORDINATES ARE UTM NAD83, ZONE 11 (SAS-TOWER GPS REFERENCE STATION)
 DISTANCES ARE EXPRESSED IN METRES OR DECIMALS THEREOF.

SCALE 1 : 500



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1	AS BUILT	2011-09-22	M.A.G.	R.G.	P.G.
NO.	VERSION	DATE	BY	VERIF.	APPR.



PROJECT:
YELLOWKNIFE SOIL TREATMENT FACILITY

TITLE:
**AS-BUILT DRAWING
 YELLOWKNIFE (NT)**

SITE REMEDIATION SOLUTIONS

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