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PROTECTING OUR ARCTIC ENVIRONMENT

CLOSURE AND RECLAMATION PLAN

PPD BAKER LAKE LANDFARM

April 23, 2026

Nunatta Environmental Services Project 25-29

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1 INTRODUCTION

1.1 Background

PPD is responsible for the purchase, transportation, storage and distribution of all petroleum products in Nunavut. PPD's headquarters is in Rankin Inlet, where it also maintains the tank farm and other fuel infrastructure.

After a spill at the Baker Lake Tank Farm in 2021, Nunatta and others excavated and segregated impacted soil in a lined containment cell south of the Tank Farm. Since the time of the spill, some soil has been bioremediated and is ready for re-use, but it is likely that some soil remains impacted with petroleum hydrocarbons.

1.2 The Landfarm

The proposed landfarm is located northwest of the hamlet of Baker Lake, in the Kivalliq Region of Nunavut. The geographical coordinates of the site are

Latitude	Longitude
64.321680° N	96.092068°W

The landfarm will be constructed from gravel and sand with an impermeable membrane that limits the transmission of impacts from the landfarm to the surrounding area. The plan is for the landfarm to accept only soil contaminated with hydrocarbons in which the primary petroleum is fuel oil and/or diesel fuel and/or gasoline.

The Atlas of Canada topographic map identifies two creeks between the site and the Hamlet of Baker Lake, and Baker Lake to the south. The closest creek is 1.8 km from the site, and Baker Lake is more than 1.5 km to the southeast.

2 PRINCIPLES AND OBJECTIVES

2.1 Principles

PPD's general principles[1] for site closure are as follows:

- The restored site should be **physically stable**. This means that it will not erode, subside or otherwise move from its final location under naturally occurring circumstances, even extreme or disruptive forces like floods.
- The restored site should be **chemically stable**. This means that any material used for reclamation that remains on site does not adversely affect human health or the environment.
- **Active care** is not required. Post-restoration sampling of one year is anticipated, after which PPD does not expect that any additional active measures should be required.
- The restored site should be **ready for future use**, consistent with the adjacent properties.

2.2 Objectives

The objectives of this plan are as follows:

- All landfarm contents are removed from the site, through achievement of Treatment Objectives or disposal to another site;
- Berm materials meet site guidelines and are re-used for grading or are disposed of at another site;
- Geomembrane, fencing and other materials are removed from the site;
- The site is re-graded to a slope that is consistent with the surrounding topography;
- Site monitoring is completed; and
- Remaining monitoring infrastructure (i.e., monitoring wells) is decommissioned.

[1] Adapted from the Mackenzie Valley Land and Water Board's Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories. While mineral exploration and mine sites are typically much larger than the landfarm, the principles are relevant.

3 PROJECT DESCRIPTION

The landfarm decommissioning and site restoration project will be undertaken at PPD's discretion, or at the direction of a Regulatory Authority.

3.1 Disposal of Landfarm Contents

Formerly impacted soils in the landfarm will be disposed of in accordance with territorial requirements. This means that soils leaving the landfarm will meet reuse criteria for soils as indicated in Nunavut and Federal guidelines.

The site re-use guidelines were determined from the Environmental Guideline for the Management of Contaminated Sites (EGMCS) developed by the Nunavut Department of Environment (DOE).[2] The EGMCS focuses on the management of petroleum hydrocarbon (PHC) contaminated soil, because "[m]ost contaminated sites in Nunavut are the result of petroleum hydrocarbon spills (i.e., gasoline, jet fuel, diesel, bunker fuel)."

The EGMCS incorporates values for contaminants developed by the Canadian Council of Ministers of the Environment (CCME) that "may be adopted de facto as the site-specific remediation criteria and incorporated directly into the Remedial Action Plan or modified within certain limits," according to the Guideline. As a result, Nunatta has referred directly to the CCME source guidelines for this assessment.

Relevant soil guidelines for the site can be found in the following CCME sources:

- Canada-Wide Standards (CWS) for Petroleum Hydrocarbons (PHC) in Soil (CWS-PHC); and
- Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (CSQG).

Both guidelines contain numerical limits intended to maintain, improve or protect environmental quality and human health at contaminated sites. The limits come from models and are adjustable based on certain site characteristics, including land use, soil grain size, and whether groundwater is used as a source of drinking water. The guidelines are derived using toxicological data and aesthetic considerations.

For re-use, soils will meet target values for destination sites. For example, if soils are to be re-used as road base in Baker Lake, they will meet commercial land use guidelines. Soils will be sampled for relevant contaminants including:

- Petroleum hydrocarbons;

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[2] Government of Nunavut Department of Environment. Environmental Guideline for the Management of Contaminated Sites. 2014.

- Benzene, toluene, ethylbenzene, and xylenes;
- Polycyclic aromatic hydrocarbons; and
- Lead.

Soil that does not meet the Treatment Objectives will be disposed of off-site in accordance with Nunavut and federal Acts and Regulations.

3.2 Berm Sampling

PPD will collect soil samples from the material that was used to construct the berms. Soil samples will be collected as composites from the berm material.

Sampling frequency will be based on the number laid out in Ontario Regulation 153/04, *Records of Site Condition* for stockpile sampling.

Berm material meeting guidelines for re-use at the site will be used for grading. Berm material that does not meet guidelines will be transported off-site with any landfarm contents that do not meet the Treatment Objectives.

The site re-use guidelines will also be determined from the EGMCS as noted above.

For the restoration site, PPD will use the following site characteristics.

- Land use: industrial, based on the proposed use of the site as a landfarm.
- Soil grain size: coarse, based on field observations, and
- Groundwater: not used as a source of drinking water in Baker Lake.

As a result, the site restoration criteria are as follows:

Table 1: Site Restoration Criteria

Analyte	Concentration (mg/kg)
Benzene	2.8
Toluene	250
Ethylbenzene	300
Xylenes	160
PHC F1	320
PHC F2	260
PHC F3	1,700

Analyte	Concentration (mg/kg)
PHC F4	3,300
Lead	600

3.3 Water Sampling and Disposal

PPD will dispose of any remaining water in the landfarm in accordance with its standard procedures. For this project, PPD will not dispose of water on land that exceeds CCME water quality guidelines for the protection of aquatic life.

Where water concentrations are above CCME freshwater aquatic life guidelines or other relevant guideline (see below), PPD will filter and treat the water before disposal. Typically, this process will include a sand filter and activated carbon. Water will be re-tested for hydrocarbons and when acceptable levels are reached, PPD will consult with the Nunavut Department of Environment and/or Water Board representatives at Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) at least 15 days in advance to obtain permission for on-land disposal.

Table 2: Landfarm Water Guidelines

Analyte	Concentration (µg/L)
Benzene	370
Toluene	2
Ethylbenzene	90
Xylenes	30
PHC F1	150
PHC F2	110
Lead	1

These criteria are obtained from CCME Water Quality Guidelines (benzene, toluene, ethylbenzene) or Alberta's Environmental Quality Guidelines for Alberta Surface Waters (all others).

Environment and Climate Change Canada has developed a hazard index approach for benzene, toluene, ethylbenzene and xylenes (BTEX) contaminants that will also be considered when disposing of water. (ECCC, 2024).

Wastewater above the criteria will be treated on site until it meets the criteria or containerized for off-site disposal.

No other surface water sampling is planned for the site before decommissioning.

3.4 Groundwater Sampling

Four groundwater wells are planned to be installed during the construction of the landfarm.

Previous experience indicates that monitoring wells are likely to remain frozen until very late in the season in Baker Lake. As a result, a single post-decommissioning round of sampling is planned for late summer. The monitoring round will include water samples collected from each well.

Analytical results will be compared to guideline values as shown in Table 3 for contaminants of concern, i.e., PHCs, BTEX and lead.

Table 3: Groundwater Guidelines

Analyte	Concentration (µg/L)
Benzene	690
Toluene	8.3
Ethylbenzene	11,000
Xylenes	18,000
PHC F1	9,100
PHC F2	1,300
Lead	1 (see note below)

The Table 3 guidelines are obtained from the Federal Interim Groundwater Quality Guidelines for commercial/industrial sites (Table 3 from FCSAP, 2016 stipulating coarse soils). While these guidelines are useful for assessing risks to human health and the environment, any changes over time will be more useful in assessing landfarm performance.

Because acceptable concentrations of lead in water vary with hardness, the conservative approach is taken here to address potential risks. That is, the lowest guideline value is selected.

Where groundwater sampling indicates results below guidelines, decommissioning will proceed.

If groundwater sampling finds elevated results, groundwater will be further investigated. The investigation may include advancing test pits and/or monitoring wells to characterize and delineate impacts.

Remedial measures to address impacts, including monitored natural attenuation, should be developed if exceedances of groundwater guidelines are observed at the time of site closure.

3.5 Infrastructure Disposal

PPD will remove any other materials required for construction of the landfarm from the site. This includes fences, posts, and the geomembrane liner.

These materials will be cleaned on site and re-used elsewhere if possible. Where the materials cannot be re-used, they will be disposed of in accordance with relevant Acts and Regulations.

Monitoring wells will be left in place until confirmation sampling indicates the absence of impacts. When impacts are absent, wells will be removed in accordance with industry best practices.

3.6 Site Grading

After the removal of landfarm material and any berm material above site guidelines, the site will be re-graded.

Any additional material required for site grading will be similar to existing site materials and obtained from a local source.

Berm material and any imported aggregate will be placed in lifts and compacted. The site will be graded so that water drains away from the road and matches the topography of adjacent properties.

4 POST-RESTORATION MONITORING

After restoration is complete, PPD will return to the restored site in the summer of the following year. PPD will collect soil and water samples to assess the success of the restoration program.

4.1 Soil Sampling

PPD will collect four composite soil samples from the area where the landfarm was previously located.

The soil samples will be analyzed for the same components as identified in the berm re-use guidelines.

4.2 Abandonment of Other Infrastructure

After monitoring is complete, PPD will abandon any remaining infrastructure around the former landfarm.

5 REPORTING

PPD will submit a report within six months of the closure of the landfarm. This report will include a description of the closure activities, photos of the activities, relevant drawings, laboratory analytical results, and other information that describes the closure.

After post-restoration monitoring is complete, PPD will submit a report on the monitoring program. The report will describe the program and summarize analytical results. Any deviations from the methods outlined in this plan will be identified. The report will be submitted within six months of the completion of the monitoring program.

FIGURE