Appendix I: Solid Waste Disposal Facilities
Operation and Maintenance Plan
Revised

DILLON CONSULTING

HAMLET OF PAULATUK

Solid Waste Disposal Facilities Operation and Maintenance Plan

Final Report

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1.0 Introduction

1.1 Purpose

The purpose of this plan is to assist the Hamlet of Paulatuk personnel with the operation and maintenance of their solid waste facility. The plan has been developed according to the requirements of the Inuvialuit Water Board and is based on the *Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories* (Duong and Kent, 1996).

This Operation and Maintenance Plan should act as the protocol reference in day-to-day facility operations. Therefore, it should be readily available for all facility staff at all times.

1.2 Site Setting

The Hamlet of Paulatuk is located at 69º21'N and 124º04'W, along the southern coast of Darnley Bay. The Hamlet is approximately 400 km air east from Inuvik and 855 km air northwest from Yellowknife. Located in an area of continuous permafrost, the Hamlet of Paulatuk is dominated by glacial till, and marine sands and silt. The daily mean temperature in July is 10.0°C while the daily mean temperature in January is -25.0°C, based on NWT Bureau of Statistics (2017) average monthly temperature data for 2006 – 2015. Average yearly rainfall is 92.9 mm and average yearly snowfall is 131.8 cm. The climate is characteristic subarctic.

The Hamlet has an airport, but no road access. Therefore, supplies are shipped in annually via barge or by plane. Figure 1 outlines the municipal boundaries Paulatuk.

1.3 Contact Information

The individuals responsible for the Operation and Maintenance of the Paulatuk Solid Waste Disposal Facilities are presented in Table 1:

Table 1: Contact Information

Name	Role	Phone
Aaron Ruben	Senior Administrative Officer	867-580-3531
James Green	Hamlet Foreman	867-580-3039

Figure 1: Municipal Boundaries of the Hamlet of Paulatuk

**Image retrieved from the Department of Municipal and Community Affairs, GNWT, July 2015*

2.0 Background

2.1 Site Location and General Operation

Paulatuk's solid waste disposal site (operational hours; Monday to Friday from 9:00 am – 5:00 pm) is located adjacent to the sewage lagoon, approximately 2 km southwest of the community. The solid waste disposal site has been in operation since 1989. The site features both a municipal solid waste and bulky waste disposal area. Municipal solid waste is stored in cells and covered with overburden as required. Bulky waste is stored on site and is sorted into various categories (batteries, barrels, appliances, etc.). There is an area of unsorted bulky waste that the Hamlet intends to sort as part of the upgrades to the site. Also, as part of planned upgrades, the Hamlet intends to develop a hazardous waste storage area. Appendix A shows the solid waste and sewage lagoon site plan.

Solid waste is collected from the community by a truck twice weekly, with increased pick-up as required during peak times of the year. Solid waste collection is not performed by contractors or sub-contractors, as the Hamlet itself performs these functions. The Hamlet currently has one solid waste collection truck in operation, with an estimated capacity of 3.5 m^3. There is only one public access road to the disposal site, however, public access to the site is unrestricted, as the gate is not secured after regular operating hours. Hamlet staff is on site 2-3 days per week during operational hours. Heavy equipment located at site, which are consistently maintained by hamlet staff, a 950 H Loader and a D6 H Dozer.

2.2 Population Projections and Waste Generation Rate

Population projections for the Hamlet of Paulatuk were obtained from the Northwest Territories Bureau of Statistics (2017). Population projections for the Hamlet of Paulatuk obtained from the Northwest Territories Bureau of Statistics (2017) indicate that the Hamlet will experience negative population growth after 2020. Population projection data is available to 2035. In accordance with MACA guidelines, a 0.5% increase in population projection is to be considered for all communities that are expected to experience negative population growth. Table 2 details cumulative waste for the Hamlet of Paulatuk under two conditions: at a per capita generation rate of 0.015 m^3/c/d (MACA standard) and at a rate of 0.0042 m^3/c/d (calculated based on historic fill data and on-site observations at the Hamlet solid waste disposal facility). Based on estimate waste generation calculations and using both the trench and area fill methods the Hamlet should be able to use the existing site for more than 10 years (2020).

$$V_{year} = 365VP_1(1+G) + 0.084VP_1^2(1+G)^{2n}$$

$$V_n = \frac{365VP_1}{\ln(1+G)}[(1+G)^{PH+1} - (1+G)] + \frac{0.084VP_1^2}{2\ln(1+G)}[(1+G)^{2PH+1} - (1+G)^2] + [365VP_1(1+G) + 0.084VP_1^2(1+G)^2]$$

Where:

V_{year} is the annual production of residential waste (m^3/year);
V_n is the residential volume produced in *n* years;
V is the average residential volume (m^3/person/day);
P_n is the population in the n^{th} year (P_1 = 1st year);
PH is the planning horizon in years (30 years); and
G is the growth rate (persons/year or decimal percent).

Table 2: Estimated Cumulative Municipal Solid Waste Generation Rates for Paulatuk

Year	Population Projection	Paulatuk – Cumulative Solid Waste at Year End – Compacted & Covered (m^3)	MACA – Cumulative Solid Waste at Year End – Compacted & Covered (m^3)
2016	327	436*	436*
2020	334	836	3,311
2025	342	1,239	6,989
2030	350	2,267	10,767
2035	359	3,322	14,647
2040	367	5,519	18,633

**Accumulated waste in municipal cell at end of 2016*

There is no mining or exploration activity nearby and there is no known unauthorized industrial dumping. Household wastes are generally placed in the active cell, and remain unburied. Some hazardous wastes are kept together in the maintenance garage, however some wastes including paint and vehicle batteries are disposed of at the solid waste facility. Vehicles disposed on site still currently contain their hazardous fluids. Bulky wastes are generally well sorted and there is a great variety in type and size. Animal carcasses are incinerated on an as-needed basis. There is no recycling at the facility.

There has not been a waste composition study done at the Paulatuk Solid Waste Facility. However, the *Guidelines for the Planning, Design, Operations and Maintenance of Modified Landfill Sites in the NWT* (Kent, Marshall, & Hawke, 2003) has provided a break-down of the typical waste composition for solid waste facilities in the NWT and it has been assumed that the Paulatuk Solid Waste Facility would have a similar composition, as shown in Table 3.

Table 3: Typical Landfill Waste Composition in the NWT

Type of Waste	Percentage by Weight
Food Wastes	20.3
Cardboard	9.8
Newsprint	2.4
Other Paper Products	14.8
Cans	4.4
Other Metal Products	6.2
Plastic, Rubber, Leather	14.0
Glass, Ceramics	5.7
Textiles	3.8
Wood	9.9
Diapers	3.8
Dirt	4.9
Total	100.0

**Details may not add to totals due to averaging and rounding*

3.0 Operational Procedures

3.1 Waste Disposal

The purpose of the solid waste facility is to take waste from the Hamlet of Paulatuk and dispose of it in a safe and environmentally conscious manner. The following sections describe what types of waste are acceptable and what types are unacceptable. Additionally, agreements should be set up for all waste accepted from parties external to the Hamlet of Paulatuk, such as contractors and industrial companies.

3.1.1 Acceptable Waste

The site operator will ensure that the solid waste site accepts only the materials that it has been designed to handle and that all waste is deposited in the designated areas. Any exceptions must be reviewed and approved by regulatory agencies.

The following items are acceptable for disposal at the solid waste site:

- Non-recyclable plastic, metal, and paper wastes; packaging; cardboard; newsprint; food; rubber; leather; glass; wood; from residential, commercial or industrial premises;
- Animal and vegetable (organic) waste material;
- Sweepings, clothing and textiles, and discarded household utensils;
- Furniture and major appliances;
- Non-salvageable metals;
- Contaminated soil and snow;
- Construction & Demolition wastes (provided the waste is not a hazardous or banned material);
- Vehicle hulks; and
- Tires.

3.1.2 Non-Accepted Waste

Wastes which present a danger at the solid waste facility, require special disposal techniques, or may interfere with the level of service to the public, are not acceptable for disposal. In some cases, wastes which are acceptable in small quantities may not be acceptable in large quantities from a single generator because they may cause the level of service to other users to deteriorate and cause handling problems at the site and increased environmental liability. To some extent, the acceptability of large quantity wastes must be at the site owner's discretion, depending on the ability to accommodate disposal without deterioration in the level of service. In cases where unacceptable wastes are identified, site staff will attempt to identify allowable management alternatives to material haulers.

All wastes which pose potential safety or environmental problems cannot be listed in their entirety. The site owner and site personnel in general must be wary of accepting wastes which could cause future operational problems and must watch for the inclusion of unacceptable wastes in regular loads of refuse.

The following items are not acceptable for disposal at the solid waste site:

- Pathogenic wastes;
- Radioactive wastes;
- Hazardous wastes;
- Asbestos;
- Batteries;
- Used oil; and
- Any other materials not listed as acceptable or conditionally acceptable with the approval of the senior administrative officer (SAO).

Of the above listed items, the following should be placed in temporary hazardous waste containment area of the solid waste facility for storage until they can be shipped off site for proper disposal:

- Hazardous wastes (e.g. pesticides, insecticides, oil-based paint, anti-freeze, small flammable or explosive containers, mercury thermometers and switches);
- Batteries; and
- Used oil (must be placed in approved storage containers and stored in the designated area for hazardous waste).

The solid waste facility should be divided into sections for disposal of different types of waste. Each section may then be divided into smaller sections depending on the intended use. The main sections that should be located in the solid waste site are:

- General Household Waste;
- Animal Carcasses;
- Bulky Wastes;
- Contaminated Soil and Snow;
- Hazardous Materials; and
- End of Life Vehicles.

3.1.3 General Household Waste

Currently, the area method of disposal is in use at the solid waste facility. Tipping fees are only applicable to household waste and are currently $ 115.00 per pickup.

Figure 2 describes the area method of disposal. Two cells are in use, to separate municipal domestic waste, and waste from the Hamlet's Northern Store.

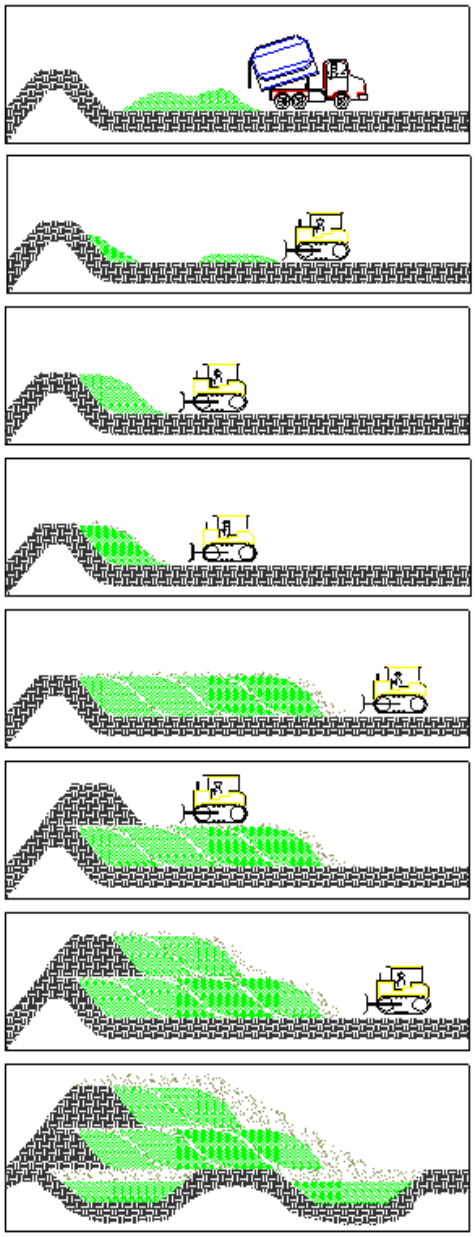

Figure 2: Area Method of Disposal

1. Build a 2 m high berm in the general household waste disposal area. Dump collected general household waste in front of berm.

2. Drive over garbage 3 to 5 times to compact. Work garbage up the berm a little at a time to pack it.

3. Alternate between dumping and packing garbage until packed garbage is 2 m high.

4. When finished compacting and piling garbage for the day, cover the pile immediately with a 300 mm thick layer of granular cover material and compact.

5. Continue to pile garbage against the berm covering the garbage pile at the end of every day. If during the day, the garbage pile reaches 3 m in width, cover with a 300 mm thick layer of granular material and continue packing garbage. Be sure to cover packed garbage at the end of the day.

6. When there is no more space available, cover the entire garbage pile with an extra 300 mm thick layer of granular material. Compact and add more granular material until the top is level. Build a second berm on top of the garbage pile as shown.

7. Continue until no more space is available.

8. Pack a 600 mm thick layer of granular material over the entire pile and compact. Dome the top of the pile to allow runoff of excess water from rain and snow.

3.1.4 Animal Carcasses

Hamlet crews are responsible for incinerating animal carcasses on a daily basis. All animal carcasses are to be deposited in a marked pit within the fenced in area of the solid waste site. The pit will be clearly labelled and a gravel pile to use for cover material will be stockpiled beside it. Any carcass found within the solid waste site that has not been placed in the pit, will be removed and placed in the pit by Hamlet crews. Incinerated animal carcasses must be disposed of in designated animal pit and covered with fill material periodically to deter any wildlife and other nuisances. The pit should be maintained by the routine addition of the stockpiled material to prevent odours. When the stockpiled material has been used up, Hamlet crews will gather more granular material and stockpile it next to the pit. Carcasses must be incinerated/buried immediately as their odours will attract wildlife to the solid waste site. There is no perimeter fencing around the facility, therefore proper carcass management is crucial to mitigate risks of wildlife threats to Hamlet crews and the general public.

3.1.5 Bulky Waste

The bulky waste site is located at the solid waste facility and should be divided into separate areas for various types of waste. These areas might include:

- White Goods (Appliances);
- Vehicles (Snowmobiles, ATVs, Cars, Trucks);
- Tires;
- Waste Barrels;
- General Metals; and
- Wood Products.

3.1.5.1 White Goods (Appliances)

White goods are larger household appliances such as fridges, freezers, stoves, microwave ovens, washers, dryers and hot water heaters. These items will be placed in a separate pile so they can be collected and shipped south for reclamation purposes. These appliances may contain hazardous materials such as refrigerants, mercury switches, ballasts and capacitors all of which must be removed before the appliance can be stored in the non-hazardous waste area of the solid waste site. More details on removal and disposal of refrigerants, mercury switches, ballasts and capacitors are described in the Hazardous Waste Management Plan

3.1.5.2 Vehicles (Snowmobiles, ATVs, Cars, Trucks)

Prior to storing End-of-Life Vehicles (ELVs), the solid waste site must have a space dedicated to storing and inspecting vehicles when they arrive on site. Based on the National Code of Practice (2008), there is no requirement for this area to be paved. Once all hazardous materials have been removed, there must be an area designated for the storage of vehicle hulks. Hulks may be salvaged for useable or recyclable parts. Once the hulks have no more “salvage” value, they may be crushed and shipped south for recycling. Although Paulatuk does not have a crusher, there is a possibility for a crusher to rotate to the area for a designated period. Therefore, it is advisable that ELV’s be drained and stripped of their hazardous materials, so that they are ready for crushing well in advance (Figure 3).

All spills must be cleaned up and any contaminated soils and cleaning materials must be disposed of as hazardous waste, unless materials are tested and shown not to be hazardous. Vehicles should be checked for leaks as they arrive to prevent soil and water contamination in the vehicle storage area. Runoff from the storage area caused by precipitation (rain, snow, etc.) must not be contaminated (National Code of Practice, 2008). Methods to collect and treat runoff may be required. This may include obtaining regulatory approval for the facility from the applicable agencies.

All hazardous fluids must be removed from ELVs before storing at the solid waste site or crushing. If these materials are not removed, hazardous materials may be released thus contaminating the surrounding area and leaking further into the environment. To ensure safe removal of all hazardous items, the vehicle's battery should be removed first, followed by refrigerants (if present) and thirdly fuel. The order of removal thereafter is not significant. Hazardous items that must be removed include:

- Battery;
- Refrigerants;
- Gasoline or Diesel;
- Antifreeze;
- Brake Fluid;
- Engine Oil;
- Transmission Fluid;
- Power Steering Fluid;
- Differential Fluid (if present);
- Windshield Washer Fluid;
- Mercury Switches (found in ABS brakes, convenience lighting); and
- Lead (battery connectors, wheel weights).

Please refer to Hazardous Waste Management Plan for proper handling and storage techniques for the listed hazardous materials.

The space used for removing hazardous materials and dismantling vehicles should have a non-permeable base, such as concrete or poly liner, to provide an easy cleaning surface and to prevent spilled fluids from contaminating the environment. The space should be covered to protect it from the weather and to prevent spilled materials from being washed into the environment. The concrete pad should be high enough to prevent flooding during rainstorm events. An alternate for smaller/temporary locations is to undertake work outdoors in dry warm weather only upon an impermeable working surface. The constructed temporary vehicle fluid recovery area should consist of, for example, a protective sand layer/poly liner/sand layer covered with a plywood working surface. Absorbent materials should be on hand at all times to clean up any spills (Figure 4).

Hazardous fluids must be stored in proper containers and separated appropriately (Figure 5). These containers should be kept in the vehicle dismantling area, and stored on the concrete pad. This will provide easy access to the containers when draining fluids from vehicles. Storing in this area will also provide protection from the weather and a non-permeable surface to store the containers on. Fuels must be stored in a separate well-ventilated area of a building or outdoors protected from the weather (British Columbia Ministry of Environment, 2008). Contact Bill Ruben, Fire Chief, for specific instructions on the storage of fuels. Please refer to Hazardous Waste Management Plan for proper handling and storage techniques for each hazardous material.

Crushing of vehicles is intended to reduce the volume for shipping (Figure 6, Figure 7). Crushing may consist of flattening a vehicle hulk or logging. Logging a vehicle hulk consists of compressing the hulk into a rectangular cube (Figure 8). A crusher may be brought to site and operated by a third-party when quantity of hulks warrant. If so, the crushing area must be large enough to accommodate the crusher and also have a space designated for the storage of crushed vehicle hulks. According to the National Code of Practice (2008) and the British Columbia Ministry of Environment (2008), the following items should be completed in conjunction with crushing operations:

- All hazardous materials must be removed from the vehicles prior to crushing;
- Any spills must be cleaned up immediately and all contaminated soil and cleaning materials must be disposed of as hazardous waste (unless tested and shown otherwise);
- Any water resulting from the crushing operations should be treated through oil absorbent filters; and,
- Once the crusher has been removed from site, the site should be cleaned and debris removed to designated locations.

Hamlet crews will be responsible for checking vehicle hulks stored at the solid waste site to ensure all batteries and fluids are removed. If they are not, Hamlet crews will remove hazardous components following the proper procedures and order described above.

Once per year, Hamlet crews are to remove pieces from the vehicle storage pile that are no longer useful or recyclable. These pieces can then be crushed and placed in the appropriate waste piles.

3.1.5.3 Tires

Tires are not considered to be hazardous waste and so may be stored in a designated area of the bulky waste site. However, they are flammable and burning of tires produces heavy toxic smoke which poses a serious health hazard to residents of the Hamlet. Care must be taken to prevent fires within the bulky waste site. Burying of tires is not necessary. Solid waste sites that have buried tires in the past have found that through natural processes (such as freezing and thawing of the ground) tires have resurfaced (Murray, Depository Services Program, Government of Canada, 2002). Once the amount of used tires in the solid waste site becomes unmanageable, they should be shipped to a southern facility equipped to recycle old tires.

3.1.5.4 Waste Barrels

Waste barrels are to be cleaned and crushed before they can be placed in the crushed barrel pile. Barrels that previously contained hazardous materials (fuel, oil, etc.) must be cleaned by one of the following methods: solvent rinsing, steam cleaning or high pressure rinsing with the use of the appropriate cleaning solvents. This may be completed by contracting a commercial cleaning company (Environmental Protection Division, Environment and Natural Resources, 2008). Prior to cleaning the barrels, liquids held within the barrels must be identified by appropriate testing methods. Hazardous liquids must be stored in appropriate storage containers in the designated hazardous waste area of the solid waste facility and crated to be shipped out appropriately.

3.1.5.5 Waste Metal

All other metal debris is to be placed within a general metals storage area. Metal scraps no longer useful for recycling purposes may be compacted and buried as per the area method. Useful metal material may be placed in this area separate from the non-useful metal material to facilitate the reuse of useful materials.

3.1.5.6 Wood Products

Scrap wood products will be placed in the designated area at the solid waste facility. Residents will be encouraged to deposit wood products they do not want in this area for recycling and reuse by others. Any wood products found within the solid waste site that are not placed in the appropriate pile will be removed promptly by Hamlet crews and placed in the wood products area.

3.1.6 Site Records

Site records of all hazardous materials collected and stored at the solid waste facilities must be completed and kept at the Hamlet office as well as the Hamlet garage. According to Duong and Kent (1996), the following items must be recorded in the site records:

- Dates of hazardous waste collection;
- Date, description, volume and generator of wastes placed in the compound;
- Method of storage;
- Name of carrier removing wastes from the compound; and
- Copies of the forms for Transport of Dangerous Goods from persons removing wastes from site.

An example record sheet is included in Hazardous Waste Management Plan

3.1.7 Safety Procedures

Hazardous wastes may be dangerous and it is imperative that appropriate safety and handling procedures are followed for each type of waste. For information regarding the safe handling and disposal practices

please refer to the Environment and Climate Change, Government of Northwest Territories website http://www.enr.gov.nt.ca/sites/enr/files/guidelines/general_management.pdf.[1]

3.2 Signage

The solid waste facility must have a sign posted at the entrance to inform the public of the location of the solid waste site. This sign must have the following information:

- Site name;
- Materials/wastes accepted for disposal and recycling;
- Materials/wastes banned from the site; and
- Penalties.

Signs identifying the locations of all waste management piles should be posted in the solid waste facility. These signs will be erected by Hamlet personnel in the appropriate areas.

3.3 Waste Inspection

The checking of waste entering the facility is crucial to the safe and correct operation of the solid waste site. The site operator should carry out random checks of the waste entering the facility and random waste inspections in the disposal area. The following methods are employed to minimize the quantity of unacceptable waste which is disposed at the site and to direct the waste hauler to the correct disposal area:

- Site operators will be watchful for unacceptable or potentially hazardous wastes during unloading;
- When personnel encounters suspect waste in the disposal area, landfilling shall cease until the material is segregated and appropriate action is taken;
- The site operator will inform the hauler that a random check is to be performed. If the hauler refuses, the vehicle will not be permitted entry to the site, and will be selected for a check on its next visit. The site operator will record as much information as possible about haulers who refuse a random check; and
- The selected hauler will be directed to an area near the active waste disposal area that is separate from all other incoming waste. Prior to dumping, the driver of the inspected vehicle will confirm the absence of unacceptable materials. An inspector (the site operator or a delegate) will examine the load for hazardous or unacceptable wastes. Completion and results of the inspections shall also be noted in the daily checklist.

3.4 Handling Unacceptable Waste

Unacceptable wastes may be classified as non-hazardous, potentially hazardous or unacceptable, and, depending on the time of discovery, may or may not be associated with a known hauler. Once a waste is suspected to be hazardous or unacceptable, the onus is on the hauler to demonstrate otherwise, or

[1] Last accessed September 1, 2017

remove the waste, at their expense. Repeat deliverers of unacceptable or hazardous wastes may be banned from the site at the discretion of and for a period determined by the SAO.

The site attendant will notify the SAO of anyone dumping unacceptable or rejected waste at the solid waste site. The report shall contain the following information:

- Vehicle licence number;
- Type of vehicle;
- Date and time of incident;
- Name of offender, if possible; and
- Material dumped, or rejected.

3.5 Site Personnel Duties and Responsibilities

3.5.1 Staff Duties

Senior Administrative Officer (SAO)

The Hamlet SAO is responsible for the overall operation of the solid waste facility. The daily operation and maintenance of the solid waste facility is the responsibility of the public works foreman. Two or three people are employed by the Hamlet to operate the garbage collection vehicle.

The SAO reports directly to the Mayor and is responsible for the following:

- Supervising Hamlet crews;
- Maintaining liaisons with clients (Private sector generators & Government agencies), suppliers, and the Inuvialuit Water Board; and
- The Hamlet SAO shall:
    - Perform operations at the facility in accordance with the Solid Waste Disposal Facilities Operation & Maintenance Plan (latest approved version), applicable engineering drawings, the operating permit issued by the Inuvialuit Water Board;
    - Ensure that only acceptable wastes, as indicated on the approved list for disposal, are permitted at the site in consultation with regulatory agencies;
    - Prepare facility operating budgets and undertake staffing selections, and or contractors;
    - Communicate as required with regulatory agencies, including the forwarding of monitoring results;
    - Deal directly with the public, responding to disposal requests;
    - Coordinate site visits;
    - Maintain the environmental monitoring/sampling program;
    - Ensure that contractor receives required training;
    - Ensure that the site is maintained and operated in a clean and safe manner at all times, including regular collection of litter and compliance with Northwest Territories Safety Act and Regulations; and
    - Coordinate the preparation of landfill areas for operation, and identifying the requirement for the establishment of surface water control measures.

Site Operator

The site operator is responsible for general site operation and maintenance requirements at the facility.

The site operator reports directly to the SAO and is responsible for the following:

- Supervising full-time and part-time assistants; and
- The Site Operator shall:
    - Perform operations at the facility in accordance with the Landfill Operations & Maintenance Plan (latest approved version), applicable engineering drawings, and the operating permit issued by the Inuvialuit Water Board;
    - In consultation with the site owner, ensure that only acceptable wastes, as indicated on the approved list for disposal, are permitted at the site;
    - Prepare regularly scheduled reports (daily, weekly, monthly, annually) on progress and planning at the site;
    - Conduct sampling, monitoring, and reporting duties related to the water licence Surveillance Network Program surface water sampling;
    - Provide overall direction for daily site activities;
    - Conduct work in accordance with the Northwest Territories Safety Act and Regulations;
    - Be responsible for the operations and maintenance of the site machinery;
    - Make recommendations to the SAO for major and minor repair work required for site equipment as well as replacement of same;
    - Ensure that the site is maintained and operated in a clean and safe manner at all times, including regular collection of litter;
    - Ensure that solid waste is compacted and covered in accordance with the Landfill Operations & Maintenance Plan, burning of garbage is not allowed;
    - Coordinate snow removal and general maintenance for the access roads within the site and other areas as necessary;
    - Operate and maintain the surface water control structures and other site infrastructure;
    - Undertake site security checks, reporting any noted issues to the SAO;
    - Inspect the site access road on a regular basis to recover any accumulation of garbage or other debris;
    - In consultation with the SAO, maintain the completed portions of the landfill;
    - Ensure that adequate signage and traffic control devices are in place in coordination with the SAO;
    - Perform all duties related to the identification and recording of incoming vehicles, and inspection of incoming waste;
    - Answer incoming telephone calls and requests for information, directing such requests as required; and
    - Perform such other related duties as may be assigned from time to time by the SAO.

Site Assistants

The site assistants are responsible for tasks assigned to them by the site operator. These positions would typically address both ongoing and periodic general site operation and maintenance requirements.

The site assistants report directly to the site operator and are responsible for the following:

- Perform duties as assigned by the site operator; and
- Conduct work in accordance with the Northwest Territories Safety Act and Regulations.

3.5.2 Personnel Training

The Hamlet is responsible for the training of staff. Solid waste facility staff should be trained to perform his or her job in a safe and environmentally responsible manner, in accordance with applicable regulations.

Given the nature of activities at the site, the SAO and site operator will serve as the facility's health and safety representative, and health and safety issues will be discussed as part of site meetings. All personnel should be familiar with and abide by the Northwest Territories Safety Act and Regulations.

A review of this Operation and Maintenance Plan will be a prerequisite for any employee/contractor before being declared eligible for work at the solid waste site.

The contractor is required to comply with all laws and regulations affecting the execution of the work at the site, including all applicable Federal, Territorial and local laws and regulations pertaining to socio-economic and environmental matters.

4.0 Maintenance Procedures

Proper maintenance of a solid waste site is crucial to ensuring the efficient operation of all the components. Activities can be divided into two categories: storage/collection maintenance and site maintenance.

4.1 Maintenance and Inspection of Solid Waste Facility

Many aspects of the solid waste facility need to be inspected and maintained on a regular basis. Table 4 shows which activities these are, and how often these inspections and maintenance activities should be performed.

Table 4: Frequency of Inspection/Maintenance Activities at Sewage Treatment Facility

Inspection and Maintenance	Frequency
Inspection of dams, dykes, berms and drainage courses and their maintenance	Monthly
Inspection, grading and reshaping of access road	Monthly
SNP Sampling	Once annually during periods of run-off

4.2 Storage Maintenance

As the first step in the waste collection process, residential and commercial storage containers should be adequately maintained. The following points should be considered:

- Private burning of wastes within the Hamlet boundaries should be discouraged as the smoke and fire hazards generally outweigh any benefit from reducing the volume of waste;
- Garbage containers should be covered to prevent windblown debris from littering the community and to prevent animals from getting into the garbage; and
- Bulky wastes should not be left in residential areas for long periods due to aesthetic and safety concerns.

4.3 Collection Maintenance

The waste collection vehicle should be maintained in good operating condition to ensure the collection service is not interrupted for extended periods. Other maintenance considerations include the following:

- The collection vehicle should be equipped with a shovel to clean up accidental spills during collection; and
- The collection vehicle should be cleaned periodically.

4.4 Equipment Maintenance

Regular vehicle maintenance is to be performed on all Hamlet-owned equipment. This should include but is not limited to regular:

- Oil changes;
- Fluid changes;
- Checking of tire pressure;
- Greasing;
- Brake pad replacement;
- Cleaning; and
- Periodic maintenance requirements as set out by the equipment manufacturer.

4.5 Building

The solid waste site operator building (Hamlet operation garage and garage where the garbage truck is stored) should be inspected regularly by the operator to observe signs of building deterioration or problems with heating, roof, etc. Any problems should be immediately reported to the SAO.

4.6 Fencing

Fencing is currently in place across the north end of the solid waste facility. Fencing must be regularly inspected and repairs must be completed as necessary to ensure that it remains in good condition.

4.7 Access Road Maintenance

Basic road maintenance is to be conducted as follows:

- At least twice per year, the road is to be graded to smooth and reshape the surface; and
- During the winter, snow is to be removed to ensure unrestricted access to the site for the garbage collection vehicles.

4.8 Compaction and Cover of Wastes

The *Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites* (Kent et al., 2003) state that the recommended compaction rate for a modified landfill is 3:1. This is the minimum expected for compaction when following recommended compaction practices. These compaction rates are achieved by working a bulldozer or other heavy equipment over the waste 3 to 5 times (Kent et al., 2003). This should be done once per week, or in combination with the collection frequency.

These guidelines also state that waste should be covered to limit migration of litter around the site and off-site. The cover material is generalized as 100 mm between cells, 300 mm on the surface of cell and 600 mm as part of the close out. Where readily available, clay is preferred as the capping material (Kent et al., 2003).

4.9 Runoff and Drainage Control

According to the *Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites* (Kent et al., 2003), there should be on-going inspection and maintenance of the drainage pathways to ensure there is minimal off-site migration of runoff from the facility.

4.10 Nuisance Control

4.10.1 Litter Control

Litter can be a significant problem at municipal solid waste sites. Litter control is best accomplished by a combination of proper disposal operations, litter retaining fences, and a litter picking program. A clean, litter-free appearance will be maintained at the site at all times, not only for public relations, but also for efficient operation of the solid waste site. Poor litter control attracts unwanted scavengers and contributes to surface drainage problems by blocking ditches and culverts.

In summary, litter control measures shall include:

- Regular covering of wastes in the active disposal area;
- Litter collection fencing located around the active fill area to catch blowing litter;
- A litter collection schedule shall be directed by the site operator, in accordance with the water licence, Part D, Item 6;
- Litter on fencing, on site roadways, in ditches and adjacent properties shall be monitored and collected twice annually (spring and fall); and
- Where possible, vegetation can be used as a screen to block wind.

4.10.2 Odour Control

Odours will be controlled at the facility by implementation of the following daily measures:

- Cover material shall be applied at the active disposal area a minimum of once per year, recommended monthly; and
- Routine site inspections to identify and eliminate localized surface water ponding and/or surface water drainage problems.

4.10.3 Bird and Wildlife Control

Solid waste disposal facilities attract birds and wildlife due to the availability of food. The solid waste site operators should make a daily note of how many birds and other wildlife species are in and around the solid waste site. The intent of this is to keep a general record of bird and wildlife populations and to determine whether the number of birds and wildlife in and around the solid waste site is increasing or decreasing. Control measures to minimize the presence of birds and wildlife shall include:

- Covering of compacted waste as described by Section 4.10.2;
- Collecting litter; and
- If this does not seem to minimize the amount of birds and wildlife in the area then a noise device such as propane cannons, bear bangers, and screamers may be required to discourage birds and wildlife from approaching/entering the site.

4.11 Indiscriminate Dumping

Waste will be disposed at designated areas at the facility (bulky waste, wood products, tires, metals etc.) only. When indiscriminately dumped materials are discovered, they will be immediately relocated to the appropriate designated area.

4.12 Fire Maintenance

There is to be **no** burning of waste at any time in the solid waste facility, aside from incineration of permissible items. Animal carcasses, paper products, paperboard packaging, and untreated wood must only be burned in designated locations and must be monitored constantly during burning operations. There are no fire protection measures in place to prevent separate waste areas that must not be burned (e.g. hazardous wastes, tires) from catching fire.

5.0 Surveillance Network Program

As per the conditions set out in the Hamlet's water licence, runoff from the solid waste facility must be monitored annually when run-off is observed. The following sections describe in detail how the program must be completed.

5.1 Program Description

As required by the water licence (N7L3-1619) there are two sample locations associated with the solid waste facility (Table 5). Samples should be taken once per year when runoff is observed; however, the Inuvialuit Water Board may request that further sampling be completed. Sampling locations should be marked on-site with signs stating the numbering code of the location**. Appendix B** shows the location for Stations 1619-5 and 1619-6, the two solid waste disposal facility SNP stations.

Table 5: SNP Solid Waste Facility Sampling Stations

Sampling Station	Description	Coordinates	Sample Parameters
Station Number 1619-5	To monitor the runoff from Solid Waste Disposal Facilities	69°20'25.00"N 124° 6'35.35"W	• Total Mercury (Hg) • Total Chromium (Cr) • Total Iron (Fe) • Total Zinc (Zn) • Total Copper (Cu) • Total Nickel (Ni) • Total Cadmium (Cd) • Total Lead (Pb) • Total Cobalt (Co) • Total Manganese (Mn) • Benzene • Toluene • Ethylbenzene • Xylene • Total Petroleum Hydrocarbons • Total Suspended Solids (TSS) • pH • Hardness (as CaCO3)
Station Number 1619-6	To monitor run-off from existing Solid Waste Disposal Facilities before entering Old Water Lake	69°20'25.68"N 124° 6'13.73"W	

In addition to annual sampling, Station Number 1619-5 and 1619-6 must be inspected monthly during periods of flow for any visible presence of an oil or grease sheen. If either is detected, it must be reported, and a grab sample collected and analyzed for oil and grease.

All sampling, sample preservation and analysis is to be performed in accordance with methods approved by the GNWT ECC Taiga Environmental Laboratory (i.e. Analyst). All analysis must be completed in a Canadian Association of Environmental Analytical Laboratories (CAEAL) Certified Laboratory.

5.1.1 Record of Sampling Events

It is the responsibility of the Hamlet to file an Annual Report to the Inuvialuit Water Board by April 30th following the reported year. Laboratory sample reports must be attached to the Annual Report.

5.2 Sample Collection and Analysis

Please contact the lab you will be sending samples to for instructions on collecting water samples.

Once the lab has received the samples, they will begin processing them. A report stating all results as well as the detection limits will be produced and sent to the Hamlet office. The report will also state any problems that may have occurred during analysis of the samples. Detailed sample collection steps are provided in the *Hamlet of Paulatuk Sewage Disposal Facilities Operation and Maintenance Plan.*

6.0 Site Records

Copies of records pertaining to operation and maintenance of the solid waste facility should be kept at both the Hamlet office and the Hamlet's solid waste site operations building. Information that must be included in these records (as per *Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Facilities in the Northwest Territories*, Duong and Kent, 1996) includes the following:

- Volumes of any effluent discharged to the environment through an accidental spill;
- Estimated volume of waste collected and the generator of the waste (eg. Residential) (both monthly and annually);
- Details of any maintenance undertaken at site;
- Record sheets;
- Visits by regulatory authorities;
- Copies of sampling and analysis reports of runoff from the solid waste facility;
- Copies of annual reports submitted to the Inuvialuit Water Board;
- Copy of the Hamlet's water licence;
- Copies of all plans pertaining to the operation and maintenance of the solid waste facility (i.e. Operation and Maintenance Plan, QA/QC Plan, Spill Contingency Plan, Abandonment and Restoration Plan); and
- Copies of spill reports and related regulations.

7.0 Health and Safety

7.1 Worker and Public Safety

Employers must ensure that their employees are trained in safe work practices for the facility. This may include but not be limited to special handling and storage requirements of hazardous materials, WHMIS, first aid, emergency procedures, etc. Employers must also provide employees with the necessary personal protective equipment (PPE) to complete their jobs in a safe manner. PPE and safety items that should be maintained onsite include:

- Approved safety boots for solid waste facilities;
- Eye goggles;
- Gloves;
- Eye wash station;
- First aid kit;
- Fire extinguisher as approved by the Fire Marshal; and
- Work coveralls.

The following safety procedures should be obeyed in order to minimize health risks to personnel working in and around solid waste facilities:

- Equipment is to be kept clean;
- Protective clothing such as gloves, eye goggles and boots should be worn at all times;
- Work clothes must be kept in a designated change room and employees are to change into them when they arrive for work. Work clothes must **not** be worn home. The Hamlet's Public Works and Services maintenance garage should be equipped with laundry facilities to wash work coveralls onsite;
- Hands to be washed frequently; as a minimum before eating and after work; and
- Personnel should receive appropriate vaccinations and ensure they are kept up-to-date. Please contact the Department of Health for a list of the appropriate vaccinations.

Public safety must also be taken into consideration when operating a solid waste facility. All hazardous items must be kept in a secure location and away from public access. At the completion of each day, the site should be secured to prevent access.

7.2 Environmental Health and Safety

With the collection and storage of hazardous materials onsite, there is the potential for environmental contamination to occur. The following best practices should be used in order to mitigate potential spills and contamination (National Code of Practice, 2008 and British Columbia Ministry of Environment, 2008):

- Store all hazardous materials in approved containers with securely fitting lids;
- All containers holding hazardous materials should be placed within a secondary containment area;
- Remove gasoline and diesel outside of the dismantling area in a well-ventilated area;
- Drip pans must be used at all times to catch fluids dripping from vehicles and to prevent spills;
- The dismantling area should have an adequate roof and concrete floor pad for easy clean-up of spills and to prevent soil contamination. An alternate for smaller/temporary locations is to undertake work outdoors in dry warm weather only upon an impermeable working surface. The constructed temporary vehicle fluid recovery area should consist of, for example, a protective sand layer/poly liner/sand layer covered with a plywood working surface;
- Ensure water runoff does not flow through areas containing hazardous wastes;
- Spill kits must be available onsite;
- Ensure there is lime or bicarbonate of soda on hand to neutralize spilled battery acid; and
- Dispose of all used spill clean-up material as hazardous wastes.

In order to follow the above best practices, the following equipment should be kept on hand (Minnesota Pollution Control Agency, 2002):

- Fire extinguishers should be available in all facility buildings. Please contact the Fire Marshal for specific type of fire extinguisher and code requirements;
- Safety equipment such as rubber or latex gloves and safety glasses;
- Absorbent materials such as rags, towels, sawdust, etc.;
- Containers to hold spilled waste and used absorbent materials;
- Shovels and/or scoops; and
- Industrial spill clean-up products tailored for the clean-up of oils and solvents may want to be used. This will be dependent on the operation of the facility and will have to be determined whether purchase of these items is warranted.

8.0 Site Access Control

8.1 Contact Numbers

Those responsible for overseeing the operation and maintenance of the solid waste site are Aaron Ruben (SAO) and James Green (Hamlet Foreman). Their contact numbers can be found in Section 1.3 of this plan.

8.2 Site Access

Currently, access to the solid waste facility is uncontrolled. There is partial perimeter fencing at the north end of the facility, equipped with an entrance gate. The gate is not locked to control access hours, but is able to be locked if this is deemed necessary by the Hamlet.

9.0 Emergency Response

The Hamlet must be able to respond efficiently and effectively to all possible emergencies that may be encountered in the operation of the Hamlet's facilities. These include, but are not limited to fuel, chemical and wastewater spills as well as fires. Due to the nature of the Hamlet's facilities, burning or spillage of unknown or hazardous materials may occur. Only personnel who are properly trained to deal with these situations should respond to such emergencies.

Personnel must familiarize themselves with the emergency preparedness plans before an accident or emergency occurs. Copies of these plans must be kept in all sewage and solid waste disposal vehicles as well as in all common work areas. The following sections list contact numbers and outline procedures to follow in the event of an emergency.

9.1 Emergency Contact Numbers

The following is a list of contact numbers in the case of an emergency:

Fire Department:	(867) 580-2222
RCMP Detachment:	(867) 580-1111
24 Hour Spill Response Line:	(867) 920-8130

9.2 Fire Response Plan

The Hamlet fire department is responsible for creating a contingency plan to deal with fires in the Hamlet. As burning of waste may produce harmful gases, special precautions should be taken when responding to fires in and around the solid waste facility. In the event of an uncontrolled fire in the Hamlet, the following steps should be taken:

- Immediately evacuate the area and go to the Hamlet's meeting place;
- Keep everyone including Hamlet personnel up-wind from the source; and
- Contact the Hamlet Fire Department at (867) 580-2222.

9.3 Bear Safety

Solid waste facilities are an attractant for a number of wildlife species, especially bears. For this reason, it is imperative that all personnel working in and around the solid waste site be properly trained in bear safety. For information on polar bear safety please refer to the Parks Canada document *Safety in Polar Bear Country* from the website: https://www.pc.gc.ca/en/pn-np/mb/wapusk/securite-safety/ours-bear.[2]

[2] Last accessed September 1, 2017

For information on black bear and grizzly bear safety please refer to the Department of Environment and Climate Change, Government of the Northwest Territories website: https://www.gov.nt.ca/ecc/en/services/wildlife-safety-and-emergencies/safety-bear-country.[3]

The local ECC representative is Bobby Ruben, 867-580-3021.

[3] Last accessed November 7, 2025

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Figures

Figure 3: Vehicle Ready for Dismantling

Figure 4: Absorbent Material Placed over Spilled Vehicle Fluids

Figure 5: Example of Plastic Totes Used for Collection of Vehicle Fluids - Not Used for Gasoline

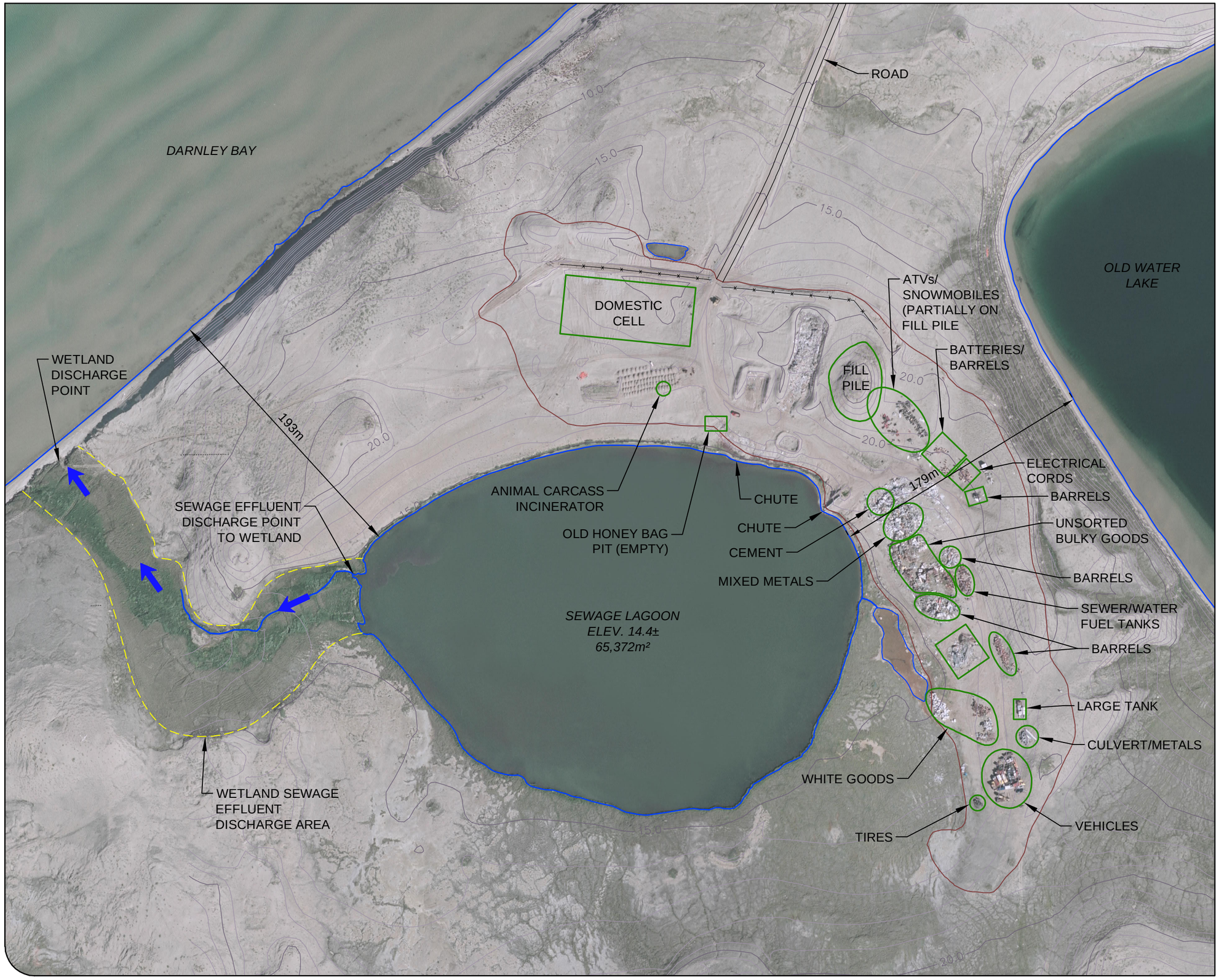
Figure 6: Vehicle Hulks Ready to be Crushed

Figure 7: Vehicle Crusher in Operation

Figure 8: Example of "Logged" Metal

Appendix A

Sewage and Solid Waste Site Plan



GOVERNMENT OF THE NWT

PAULATUK WATER LICENCE RENEWAL

SEWAGE TREATMENT SYSTEM AND SOLID WASTE DISPOSAL AREA

Figure 2

- SOLID WASTE FACILITY
- ROADS
- FENCE
- DRAINAGE PATHS
- WETLAND AREA
- LANDFILL FEATURES
- FLOW DIRECTION

50m 40 30 20 10 0 25 50 75 100m

SCALE 1:2,500

N W E S

MAP/DRAWING INFORMATION
2009 Cadastral information supplied by Commisioners Land Administration, ATLAS online. Paulatuk (2007) photo came from the Department of Municipal and Community Affairs. Locations and Features are Approximate.

CREATED BY: CLB
CHECKED BY: TLR
MAP PROJECTION: NAD83 UTM Zone 10N

File Location:
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June, 03, 2020 3:12 PM

DILLON CONSULTING

PROJECT: 202937
STATUS: Issued for Review
DATE: June 2020

Appendix B

SNP Sampling Locations

PAULATUK
SEWAGE AND SOLID WASTE SITE ASSESSMENT

SOLID WASTE FACILITY
SURVEILLANCE NETWORK PROGRAM
LOCATIONS

- BUILDING FOOTPRINT
- ROADS
- SOLID WASTE FACILITY
- DRAINAGE PATHS
- SNP LOCATIONS

SCALE 1:12,000

0 0.1 0.2 0.4 km

N W E S

MAP DRAWING INFORMATION:
DATA PROVIDED BY GNWT AND DILLON CONSULTING

MAP CREATED BY: PH
MAP CHECKED BY: MH
MAP PROJECTION: NAD 1983 UTM Zone 10N

DILLON CONSULTING

PROJECT: 176028
STATUS: DRAFT
DATE: 2017-09-06

FILE LOCATION: G:\GIS\176028 Paulatuk Sewage and Solid Waste\mxd\Solid Waste Facility - SNP Monitoring Locations.mxd