OPERATION AND MAINTENANCE PLAN
FOR
SOLID WASTE FACILITIES

DECEMBER 2017

(Revised)

HAMLET OF PANGNIRTUNG

BAFFIN REGION

NUNAVUT

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1.0 Introduction

The Hamlet of Pangnirtung has a population of approximately 1,592 people (2017) and is located on the eastern shore of Baffin Island (N66°08.82' and W65°42.07') within the Qikiqtani Region of Nunavut (Figure 1). Solid waste from the Hamlet is currently disposed of in a landfill located approximately 800 meters from the edge of the Hamlet. The existing solid waste site has been determined to be inappropriately sited due to ecological concerns, odour and windblown litter, poorly operated and maintained, and is nearing its life capacity.

During the inspection in 2006 of the solid waste facility in Pangnirtung, the INAC Inspector stated that: “This is of great concern as the buildup of sludge from years of use is now being exposed and flowing directly out into the environment”.

CGS hired Dillon Consulting Ltd in **2007** to conduct a complete comprehensive performance evaluation for the existing solid waste site. They evaluated the existing solid waste site and also identified a new solid waste site. The recommended new solid waste site was more than three km away from the community, and the proposed access road crosses two water courses where bridges are required to cross. During the planning process, Hamlet considered implementing short-term measures to improve overall waste management practices.

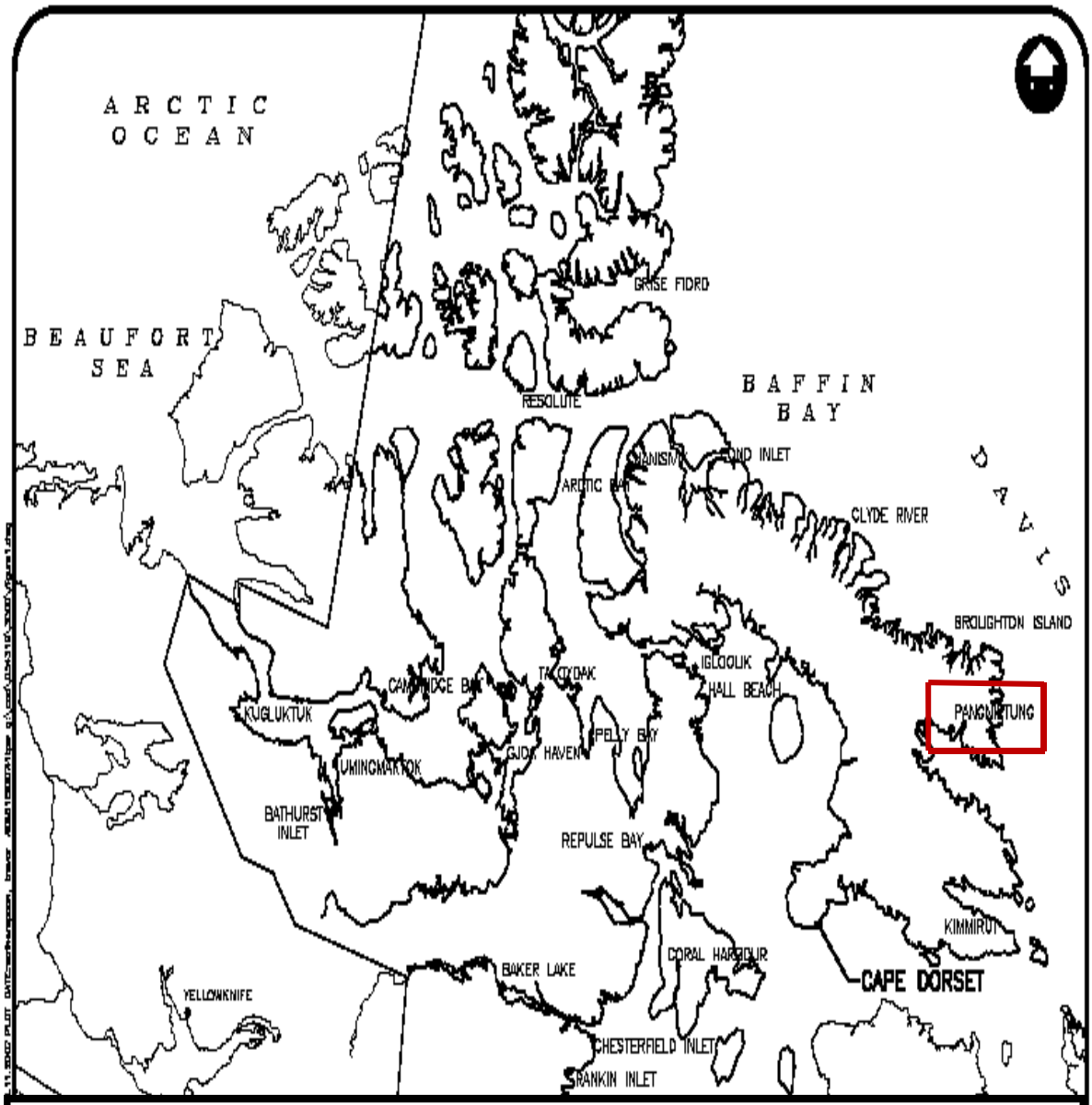
exp Services Inc. was retained in 2012 to conduct a study on the best practice of solid waste management for the Hamlet of Pangnirtung. By this time, CGS had accepted new guidelines for solid waste management for Nunavut and put this project on hold. Practically no physical work has been carried out since 2006 for the improvement of the waste management facility for this community. This project is still on hold awaiting further direction.

The local fish plant adopted a different strategy beginning in 2010 in managing their fish wastes as detailed in the letter attached in Appendix-F. They are exporting whole and frozen fish (turbot) to the Asian Market thereby eliminating any solid waste. The liquid wastes from the Fish plant are now being treated in the Community WWTP along with the Municipal Sewage. A smaller catch of Arctic Char results in approximately 1350 kg of solid waste annually.

The current landfill site is a rectangular land area (200m long and 65 m wide) enclosed with 3m high steel fence all around. About 30% of the land area is designated for fish and sludge waste management as shown in the Figure 2.

The Community is managing an independent metal dump site located just opposite to the land fill site and this site is not fenced.

Designs, drawings and O&M plans do not exist for these facilities. The Hamlet is expecting a new facility soon (tentatively in 2023) to manage the Community wastes satisfying the requirements of NWB. As soon as the new waste management facility is built and commissioned, the existing facilities will be decommissioned.



Hamlet of Pangnirtung

Figure 1: Location Map of Hamlet of Pangnirtung

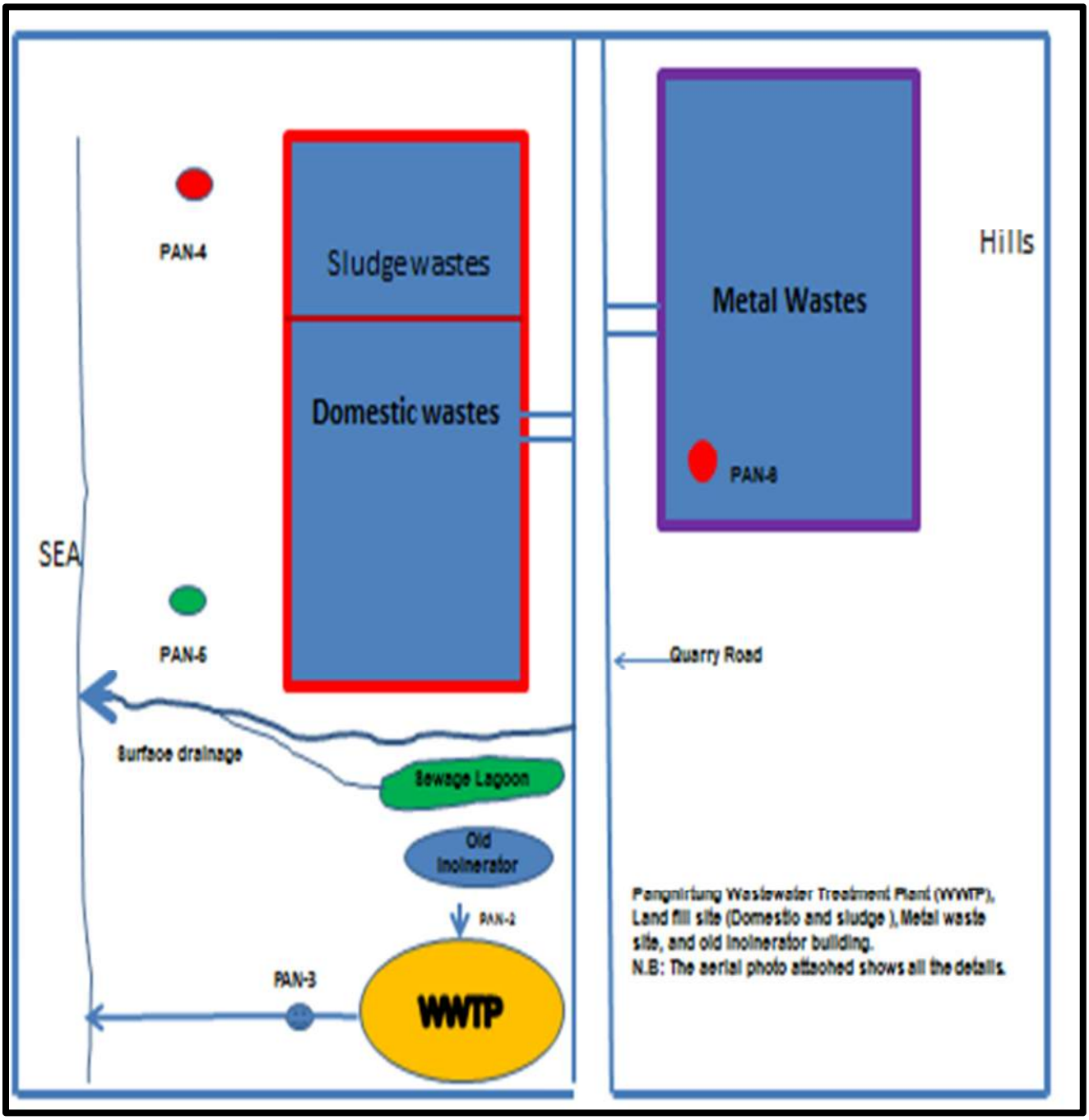


Figure 2: Location Plan of the Wastes facilities

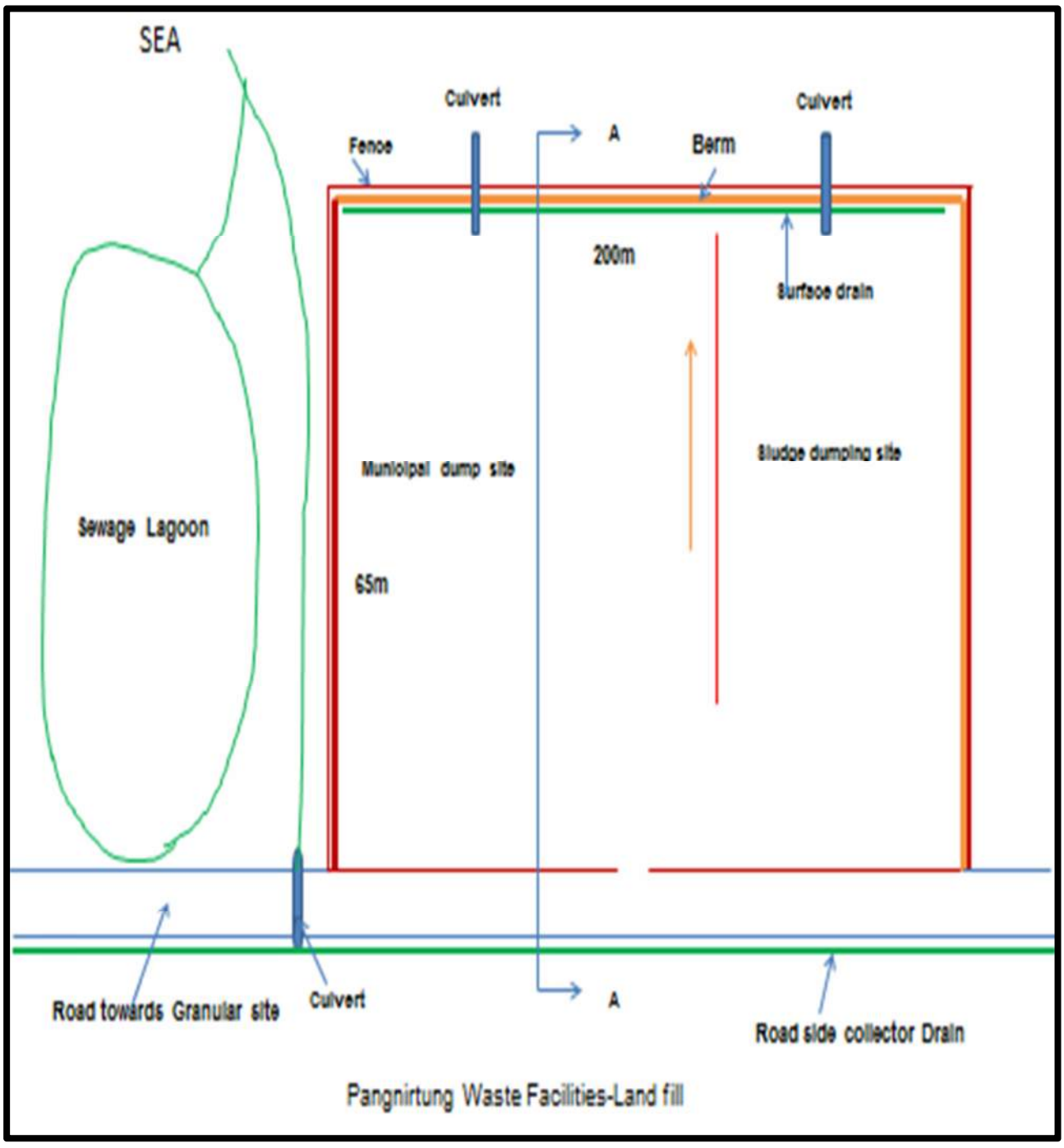


Figure 3: Site Plan Details of the Existing Landfill Facility

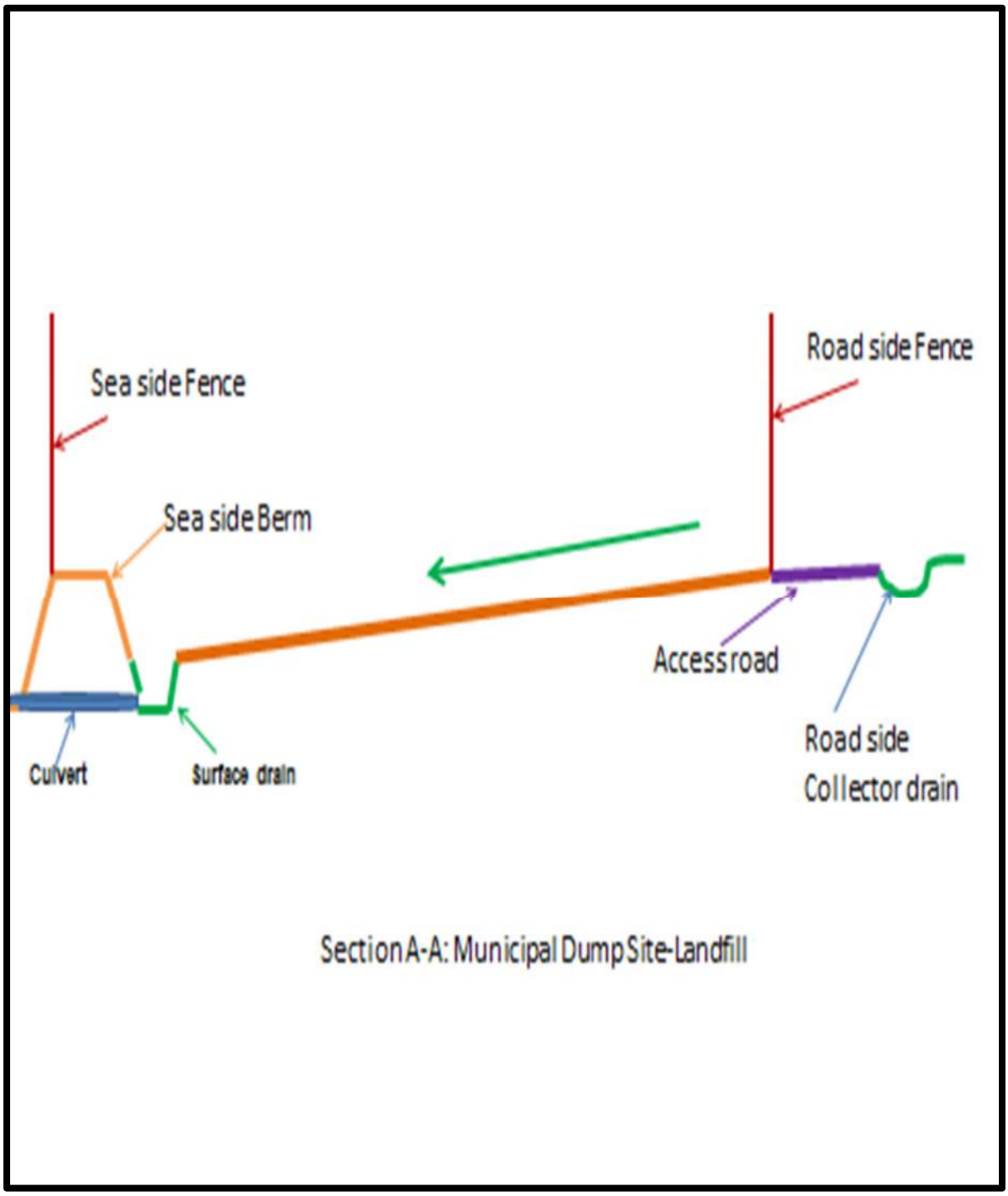


Figure 4: Cross Section of the Existing Landfill Facility

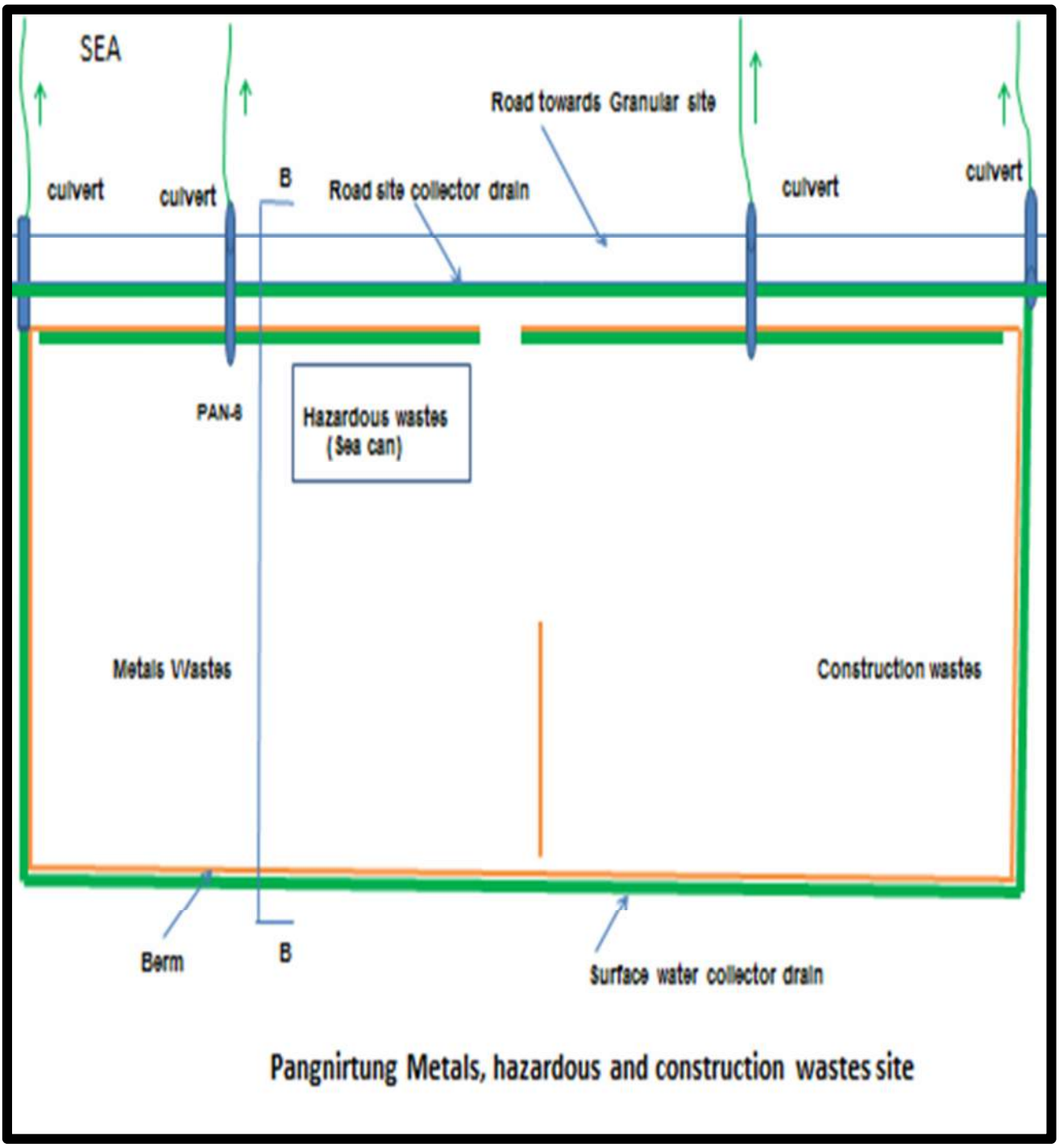


Figure 5: Site Plan of the Metal Dump facility

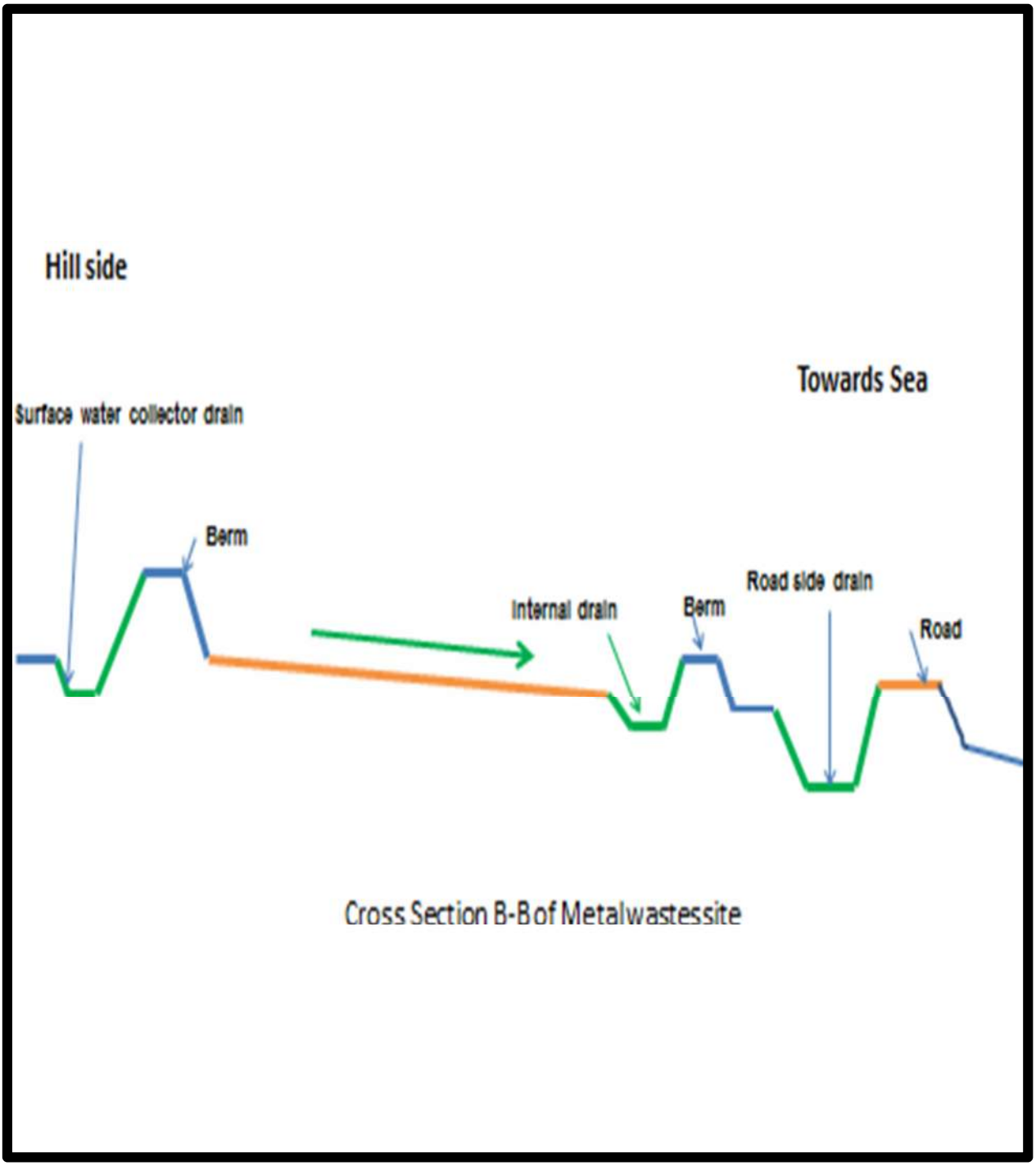


Figure 6: Cross Section of the Metal Dump Site

Monitoring Stations

Monitoring Program Station Numbers	Descriptions	Status
PAN-4	Run-off from Sludge Disposal Area	Quality, 3 times, annually
PAN-5	Run-off from the Solid Waste Disposal Facility	Quality, 3 times, annually
PAN-6	Run-off from Metal Storage Area	Quality,3 times, annually

The licensee shall sample at monitoring Program Stations PAN-4, PAN-5 and PAN-6 once at the beginning, middle and near the end of discharge/run-off observed. Samples shall be analyzed for the parameters as follows:

> Biochemical Oxygen Demand (BOD), pH, Total Suspended Solids (TSS, Nitrate-Nitrite, Chloride, Sodium, Magnesium, Total Hardness, Total Phenols, Total Arsenic, Total Cadmium, Total Copper, Faecal Coliforms, Conductivity, Oil and Grease (visual), Ammonia Nitrogen, Sulphate, Potassium, Calcium, Total Alkalinity, Total Manganese, Total Aluminum, Total Cobalt, Total Chromium, Total Iron, Total Mercury, Total Zinc, Total Lead, Total Nickel and Total Organic Carbon (TOC).

2.0 Waste Production

2.1 Population Projection

Population estimates were generated using values provided in the Nunavut Bureau of Statistics report *Nunavut: Community Population Projections, 2017-2032.*

Table 1: Pangnirtung Population Estimates

Year	Population
2017	1592
2022	1695
2027	1805
2032	1922

2.2 Waste Generation

Solid waste generated in Pangnirtung includes municipal solid waste generated in the community, sewage sludge generated in the waste water treatment plant (WWTP) and fish waste generated at the fish plant.

Below are Dillon's projections of the sludge waste and solid waste (garbage) generation rates for the 15-year planning horizons. 2007 was used as the initial year for planning purposes. Actual waste generation measurements for the community are limited. Where possible, waste generation projections have been derived based on actual measurements. Standard reference information was used when site specific information was not available. Population projections were acquired from the Nunavut Bureau of Statistics.

Table 2: Pangnirtung Waste Categories

Waste Type	Source	Delivery Method
General waste	Residential, Commercial, Institutional	Waste Collection Public drop off
Scrap metal	Residential, Construction	Waste Collection Public drop off
White goods (appliances, etc.)	Residential, Construction	Public drop off
Fish processing offal	Fish Processing Plant	Delivered by the fish plant (approximately 1.5 to 2 m^3 per day during plant operation; total approx. 230 m^3/yr)
Sludge bags	Wastewater Treatment Plant	Delivered by the Hamlet

Note: The fish wastes management was as above until 2010. For several years, all fish wastes have since been exported to the International market. Very recently the plant authority missed that international market. Currently the fishermen clean the fish at the point of fishing and any wastes are thrown into the Ocean. At present, only during the month of August when there is a small Arctic Char fishery, they process the Char in the plant and dump about 1350 kg of fish wastes in the land fill site. This O&M manual will be updated in 2018 accommodating the mode of future operation of the Fish plant.

2.3 Sludge Handling and Disposal

The municipal wastewater is treated along with the process water from the fish plant in a mechanical treatment plant. The sludge produced in the plant is stored in filter bags and dump at the designated area of the Municipal land fill site.

The Pangnirtung WWTP has been upgraded with a passive sludge dewatering system using Geotubes™. The Geotube™ is essentially a large filter bag that retains the waste solids and allows water to pass through. A polymer injection system is used to add polymer to the waste sludge before it enters the Geotube™ and promote better solids separation. Waste sludge is pumped into the Geotube™ unit and the filtrate water is allowed to passively leach out of the bag into the filtrate collection sump. Water collected in the filtrate sump is returned to the pre-anoxic tank inlet using a submersible filtrate pump.

The Geotube™ dewatering bags for the Pangnirtung WWTP have been selected to fit into the bed of a dump trailer which is normally housed in the dewatering room. A capacitive sensor suspended over the dewatering trailer will detect when the Geotube™ bag is full. When the very first Geotube™ bag is being filled, some calibration of the height of the sensor will be required. The operator will have to carefully observe the filling of the first bag and when it is full, the sensor should be adjusted to the proper height. The sensor must be adjusted so that it is in contact with the center of the Geotube™ bag when the bag is full. Filtrate from the Geotube™ bag drains from the trailer to a nearby in-ground trench and sump (the trailer tailgate has to be propped open to allow the filtrate to drain). A submersible filtrate pump is used to pump filtrate from the sump back into the treatment process via the anoxic tank feed piping.

Once a Geotube™ bag has been completely filled and allowed to drain thoroughly, it must be removed from the treatment facility. The system has been designed so that the bags are filled in the bed of a hydraulic-actuated

dump trailer which is normally parked in the dewatering room. When a bag is ready to be removed, the trailer can be hauled to an approved disposal site where the bag can be dumped. The trailer is then returned to the treatment facility and a new bag is placed. Prior to removing the trailer and full Geotube™ bag from the dewatering room, the following steps must be taken:

1. Visually inspect the trailer and bag to ensure that all excess filtrate has drained from the bag and trailer.

2. Disconnect the feed hose on the top of the Geotube™ bag. Cap the bag fitting with the PVC cap provided with each bag. Further details can be found in the manufacturer's operation and maintenance manual.

3. Raise the full-bag detection sensor out of the way to avoid obstruction with the trailer as it is removed from the dewatering room.

4. Follow any additional recommendations from the manufacturer for disposal of the full Geotube™ bag. After a full bag has been disposed, the trailer is to be returned to the dewatering room. The following steps must be taken prior to resuming dewatering operations after disposal of a full bag:

    1. Place liner material and new Geotube™ in the dewatering trailer. Consult the manufacturer's operation and maintenance manual for additional details.

    2. Reconnect waste sludge feed hose to Geotube™ bag. Consult the manufacturer's operation and maintenance manual for additional details.

    3. Return full bag sensor to calibrated position.

    4. Follow any additional recommendations from the manufacturer for placement of a new Geotube™ bag and resuming dewatering operations. Table 3 summarizes the sludge generation rate estimates for the next 15 years in Pangnirtung.

Table 3: Projected Sludge Generation Rates

Year	Population	Sludge Generation Rate	Sludge Generation Rate
		m^3/day	m^3/year
2017	1592	0.86	314
2022	1695	0.98	358
2027	1805	1.04	380
2032	1922	1.15	420

Figure 7: Trailer for Sludge Disposal

Figure 8: Geo-tube in the Trailer Ready to Receive Sludge

Figure 9: Geo-tube with Sludge Dumping at the Landfill Site

Figure 10: Sludge Management in Pangnirtung in Winter

2.4 Solid Waste Generation

Solid waste generation information is required to estimate the solid waste disposal facility volume requirements. Detailed solid waste generation information for the Hamlet is not available. Waste generation was, therefore, estimated using average values documented in the Guidelines for the Planning, Design, Operations and Maintenance of Modified Landfill Sites in the NWT, April 2003 (NWT Landfill Guidelines). According to the NWT Landfill Guidelines, the average un-compacted residential solid waste volume is 0.015 m^3 /person/day and the estimated compaction rate is 3:1 in a landfill. This gives an estimate of 0.005 m^3 /person/day of landfill space required. Table 4 summarizes the un-compacted and compacted annual solid waste generation volume estimates for Pangnirtung.

Table 4: Annual Solid Waste Generation Summary

Year	Population	Uncompacted Municipal Solid Waste Generation Rate		Compacted Solid Waste Generation Rate	
		m^3/day	m^3/year	m^3/day	m^3/year
2017	1,592	23.88	8,176	7.96	2,905
2022	1,695	25.43	9,282	8.48	3,095
2027	1,805	27.10	9,882	9.03	3,296
2032	1,922	28.84	10,526	9.61	3,508

In addition, offal from the fish processing plant was disposed of at the solid waste disposal facility until 2010. Fish plant management estimated that the plant operated for approximately 115 days/year and that 1.5 to 2 m^3 of Fish waste was generated per day, or 230 m^3 per year. The GN and the fish plant were investigating alternative disposal methods for the fish waste (e.g., ocean dumping), which would remove the waste from the Hamlet's solid waste disposal stream. However alternative disposal arrangements are currently in place as described in the letter dated June 12, 2014 by the Production Manager of the Pangnirtung fish plant (attached in Appendix F).

Note: For several years, all fish wastes have since been exported to the International market. Very recently the plant authority missed that international market. Currently the fishermen clean the fish at the point of fishing and any wastes are thrown into the Ocean. At present, only during the month of August when there is a small Arctic Char fishery, they process the Char in the plant and dump about 1350 kg of fish wastes in the land fill site.

A summary of the total solid waste accumulation (compacted municipal solid waste and proposed sewage sludge volume) is provided in Table 5.

Table 5: Summary of Yearly Solid Waste Generation Volumes

Year	Population	Yearly Solid Waste Generation Volume (m^3/year Excluding Fish Wastes)
2017	1592	34,403
2022	1695	50,378
2027	1805	53,662
2032	1922	57,155

The landfill site has a capacity issue and incapable to accommodate such a huge volume of wastes on annual basis using the current practices of treatment.

2.5 Transportation of Wastes

The Hamlet of Pangnirtung operates one standard garbage truck for collection of MSW within the community and transfer to the solid waste facility. A front-end loader is used to haul metal objects such as old automobiles/fridges, etc., to the metal dump. The sludge bags from the WWTP are hauled by front-end loader three times per month to the landfill site. The access road from the Community connects both the Landfill site and Bulky metal site including the Wastewater Treatment Plant. This access is well maintained for all types of vehicular traffic throughout the year.

3.0 Site Personnel

The Hamlet Foreman has the overall responsibility of the solid waste disposal facility to ensure proper operation and maintenance is carried out, including compacting, burning, covering, inspections, sampling, and annual reporting to the NWB.

The Foreman is responsible for day-to-day operation and maintenance of the solid waste facility. Day-to-day activities include managing waste collection, proper segregation of waste, compacting and burning of waste, sampling leachate from the facility, completing inspections and other maintenance activities.

The Hamlet typically has one individual hired to operate the Garbage truck and collect waste from community buildings five days a week. This Waste Truck Driver is also responsible for ensuring collected waste is properly segregated, and refusing the collection of hazardous waste if present. If properly trained, this individual may also be required to operate heavy equipment within the solid waste disposal facility.

The WWTP has its own operators: one skilled operator and two helpers. They are responsible for the day-to-day operation of the plant, sludge bagging and disposal of the sludge bags to the land fill site in a timely manner. This Operator is also responsible for effluent sampling in the plant and also leachate sampling at the land fill site.

4.0 Health and Safety

The public and all personnel working within the solid waste disposal facility need to be made aware of potential health and safety hazards associated with working around municipal solid wastes and hazardous wastes. This is imperative so individuals make a conscious effort to perform all necessary safety procedures to protect themselves, their co-workers and family members at home. The requirements of the Nunavut *Safety Act* will be followed at all times. A site-specific safety plan must be developed by the Hamlet for the solid waste disposal facility and followed once developed. The site-specific safety plans outline all potential hazards, safe work practices, training requirements, equipment requirements (e.g., fire extinguishers, spill response kits, etc.), and emergency procedures. Public access to the solid waste disposal facility are restricted to specific areas and/or times to minimize potential hazards to the public. Public access to any hazardous waste storage always be restricted. Additional health and safety precautions for the public and site personnel will be taken during burning of MSW and accidental spills.

See **Section 9** of this O&M Manual for emergency response procedures in the event of a fire or spill at the solid waste disposal facility.

5.0 Municipal Solid Waste Disposal Area

5.1 Operations

5.1.1 Waste Segregation

The MSW disposal area is fully fenced and the Hamlet presently does not limit who disposes of waste and where. Proper waste segregation is imperative to the long-term operation of the facility as it helps ensure potential human health and environmental hazards are minimized, un-compactable wastes (e.g., bulky metal wastes) are kept out of the landfill, hazardous wastes are properly managed.

The MSW disposal area at Pangnirtung is used as a natural attenuation landfill. This means that the landfill is not lined and small amounts of contaminants can enter the surrounding environment to be naturally broken down. In this type of landfill, the rate that contaminants enter the environment is expected to occur at a rate such that contaminants can easily be broken down and the surrounding environment is not overwhelmed. Natural attenuation landfills also rely on permafrost aggrading into the covered waste cells of the landfill and eventually freezing them. However, as contaminants are able to freely enter the environment in this type of landfill, proper waste segregation is important to ensure harmful contaminants are kept out of the landfill.

Initial waste segregation should begin at the community's residences and other buildings, ensuring residents and business are familiar with acceptable wastes for the MSW disposal area. Household hazardous or bulky wastes are kept out of the landfill and Burn Area.

The Waste Truck Drivers are to be kept familiar with operational procedures for the MSW disposal area, acceptable wastes for burning and landfilling and proper waste segregation practices. Ultimately the Foreman is responsible to ensure proper waste segregation occurs.

The Waste Truck Driver are required to monitor the waste they collect from community buildings every day, collecting only that which is acceptable for disposal at the MSW disposal area. The Hamlet could provide a 'grace' day once or twice per year to collect residents' household hazardous and/or bulky metal waste. The Hamlet could also provide help to residents who have larger items to dispose of and have no means of transporting them to the correct disposal area. The MSW disposal area needs to be properly signed to inform operators and residents of the correct location to dispose of or store certain wastes. At a minimum, the MSW disposal area should have disposal/storage areas for:

- Domestic burnable waste (for burning and landfilling) – a selected Burn Area
- Domestic non-burnable waste (for landfilling)
- Treated wood and wood products
- Building/construction materials
- Bulk metal waste – a separate bulk metal waste disposal area
- Re-usable/recyclable material (i.e., salvage area)
- Household hazardous waste (i.e., drop-off hazardous waste disposal area).

Sea cans or constructed drum shelters can be used to store specific household hazardous wastes in a designated area before being shipped out of the community. Hazardous waste management is described in **Section 6.2**.

5.1.2 Burning

Once waste has been properly segregated, burnable waste is required to be burned at least once per week to keep the volume of waste manageable. Burning only occurs when winds are light and blowing away from the community. Table 6 outlines wastes acceptable for burning.

Table 6: Burnable and Non-Burnable Wastes

Burnable Wastes	Non-Burnable Wastes
Domestic Waste (e.g., paper products, paper board/cardboard packaging, etc.)	Non-wood building/construction materials (e.g., roofing materials, electrical wire, insulation, plastics, asbestos, etc.)
Non-treated wood (this may also be recyclable/ salvageable)	Treated wood (e.g., telephone poles, pilings, cribbing, foundation wood)
	Asphalt and asphalt products
	Tires
	Hazardous wastes
	Waste paint
	Fuel and lubricant containers
	Aerosol cans and other compressed gas containers (e.g., propane tanks)

The Hamlet presently burns garbage during summer almost every day. Hamlet personnel (e.g., Foreman and crew) typically carry out and control burning of waste at the MSW disposal area. Controlling the open burn is extremely important to reduce the risk of uncontrolled fire and hazards to the public, employees and the surrounding environment. Burning practices at the MSW disposal area include:

- Confirmation of weather forecasts prior to any burning. If heavy rain is or will be present, burning is required to be Postponed (burning during heavy rain events may result in poor or incomplete combustion and the potential to generate harmful contaminants).
- Confirmation of wind speed and direction prior to any burning. If loose debris can be carried by the wind, burning should be postponed.
- Obtaining a Permit to Burn through the Pangnirtung Fire Department.
- Burning in the selected Burn Area only and ensuring burning does not occur in landfill piles.
- Presence of an attendant during initial stages of the burn and periodic inspection of the burn once it has been established.
- Maintaining a minimum of 5 m buffer zone around the burning area and all ensuring attendants or personnel remain upwind of the burn area.
- Closing the MSW disposal facility to the public during burn events.
- Confirmation the MSW is no longer hot or burning prior to the addition of more waste, or covering with granular material. This can be accomplished by moving around the ash and remaining materials to ensure the Fire is out and material can cool.

5.1.3 Operational Procedure

The MSW disposal area requires daily, weekly and monthly operational procedures to ensure it continues to optimally function as the Hamlet's primary MSW disposal site, and potential public health and environmental hazards are minimized.

Specific information regarding waste segregation and burning were provided in the preceding section. Further information on hazardous waste management at the MSW disposal area is provided in Section 6.2. The following general procedures are to ensure proper operation of the MSW disposal area:

5.1.3.1 The Waste Truck Driver collects MSW from community buildings five times per week using the garbage truck. The MSW is then transported to the MSW disposal area.

5.1.3.2 The number of trips and estimated weight of every load transported to the MSW disposal area are required to be recorded in a log book or on a record form kept in the garbage truck (a Solid Waste Quantity Form is included in **Appendix C**). If waste is present at the MSW disposal area that has been brought by others, the Waste Truck Driver should make an estimate of the quantity and record this as well. Trip records are filed at the Hamlet Office daily. The SAO will include results in the Hamlet's Annual Report to the NWB.

5.1.3.3 At the MSW disposal area, waste from the garbage truck will be tipped into the cold Burn Area. Waste should not be tipped onto the Burn Area if a burn is occurring. An alternate tipping/burning area should be designated.

The Waste Truck Driver then completes an initial inspection of the waste pile to ensure it does not contain any non-burnable wastes (see Table 6). If it does, those specific wastes are required to be diverted to the appropriate disposal areas:

- Household waste is dumped out of the compactor truck in the selected Burn Area of the MSW disposal area. Waste is properly segregated into burnable and non-burnable waste.
- Any non-burnable, non-hazardous wastes are to be moved to the edge of the covered portion of the MSW Disposal area landfill (tipping face).

- Any materials requiring disposal in the bulk metal / hazardous waste disposal area are to be transported there.
- Hazardous waste materials need to be transported to their appropriate storage areas and properly stored.
- Reusable/recyclable materials (e.g., wood) are transported to a Salvage Area of the MSW disposal area. Salvaging of materials will only be supported in the designated Salvage Area due to public health and safety concerns.

5.1.3.4 Burning of combustible wastes are only to occur in the designated Burn Area(s). Burning should occur at least weekly to ensure materials are burned in manageable volumes. However, conditions for open burning depends on weather and burning is only to occur when winds are light and blowing away from the community. A permit to burn must be obtained from the Pangnirtung Fire Department before any burning occurs. The guideline for *Municipal Solid Wastes Suitable for Open Burning* from the GN Department of Environment (GN-DOE) can be found at their website (http://www.gov.nu.ca/env/environment.shtml).

5.1.3.5 After every burn, once the operator confirms the MSW to be cold and no longer burning, the CAT D6 bulldozer can be used to push the ash and remaining material to the landfill tipping face (presumably downslope, if the depression method for landfilling is used).

5.1.3.6 At least twice per month, the CAT D6 bulldozer pushes the collected MSW pile over the edge of the landfill tipping face and spreads out the MSW. The waste is to be worked upslope gradually, to a maximum 3:1 slope (e.g., 3 m long by 1 m tall). The CAT D6 bulldozer is to drive over the waste pile at least three to five times to ensure it is packed down and the 3:1 slope is achieved.

5.1.3.7 The act of burning (waste reduction) and compaction result in a manageable waste mound on the landfill tipping face that can be covered annually, or when waste volume requires covering. The waste mound is to be allowed to only reach two meters high. Annually, or once the waste mound is approximately three metres wide, the waste mound is to be covered with 0.3 m (12 in.) of granular material and packed down to form a covered waste cell.

NOTE: Cover material can be limited and hard to find in Pangnirtung. Though dry, sandy material is the preferred cover material for landfilling, sand, gravel and cobbles are also appropriate cover material. Landfilling operations can be made easier by stock piling cover materials close to the MSW disposal area.

5.1.3.8 Landfilling can continue beside and behind the covered waste cell until the landfilling area is full. Once the landfill site is full, the MSW disposal area must be closed out. To close out the site, cover with 0.6 m (24 in.) of granular material and pack. The cover is to be sloped to allow water to run off waste piles.

Figure 11: Open Garbage Burning in Pangnirtung Landfill Site

6.0 Bulk Metal / Hazardous Waste Storage Area

6.1 Bulk Metal Waste Management

Any bulk metal waste from the community is disposed of within the bulk metal / hazardous waste disposal area. Handling of bulk metal waste requires less operational activity than MSW (e.g., will not be burned or covered), however, proper waste segregation is still required and only specific bulk metal materials are disposed of. The following is a list of bulk metal materials acceptable for disposal within the bulk metal / hazardous waste disposal area:

- Large metal wastes (i.e., decommissioned fuel tanks, drums, towers, poles/posts, culverts, etc.)
- Tires
- Appliances
- Properly abandoned vehicles, snowmobiles, and all-terrain vehicles (ATVs):
    - *Properly abandoned* implies all vehicles have had their batteries removed and have been drained of fuel, oil, Antifreeze, transmission fluid, and other fluids; these wastes are to be properly stored in the hazardous waste storage area.
    - Vehicles can also contain ozone-depleting substances (ODS') in their air conditioning systems. These systems are to be properly decommissioned by a qualified technician/Operator.
    - Once vehicles have been properly abandoned, they are tagged to indicate they have been inspected and meet these criteria.

All bulk metal waste is to be segregated into separate disposal areas for the above listed items (e.g., a vehicle disposal area, an appliance disposal area, etc.). Eventually all bulk metal waste should be removed from the community through a back-haul program and properly disposed of at appropriate receivers. The Hamlet could work with other communities, the GN and a transportation company to establish a backhaul program to remove and dispose of bulk metal waste materials.

6.2 Hazardous Waste Management

Hazardous waste means any material no longer of use to the possessor whose chemical or biological properties have the potential to endanger personnel, material, or the environment if handled improperly. Such wastes contain one or more hazardous properties. Hazardous wastes come from a wide range of sources, including households, businesses of all types, and public services, such as health service, schools etc.

The Hazardous wastes include waste such as paint, waste fuel, mercury thermometers and switches from household appliances, capacitors and batteries, antifreeze, propane tanks, small flammable or explosive containers, etc. These items are required to be stored within a marked and separate area located at the solid waste site, until the wastes can be properly crated and shipped to an appropriate disposal facility. It is imperative that these wastes be kept separate from each other and that no mixing of these materials is to occur

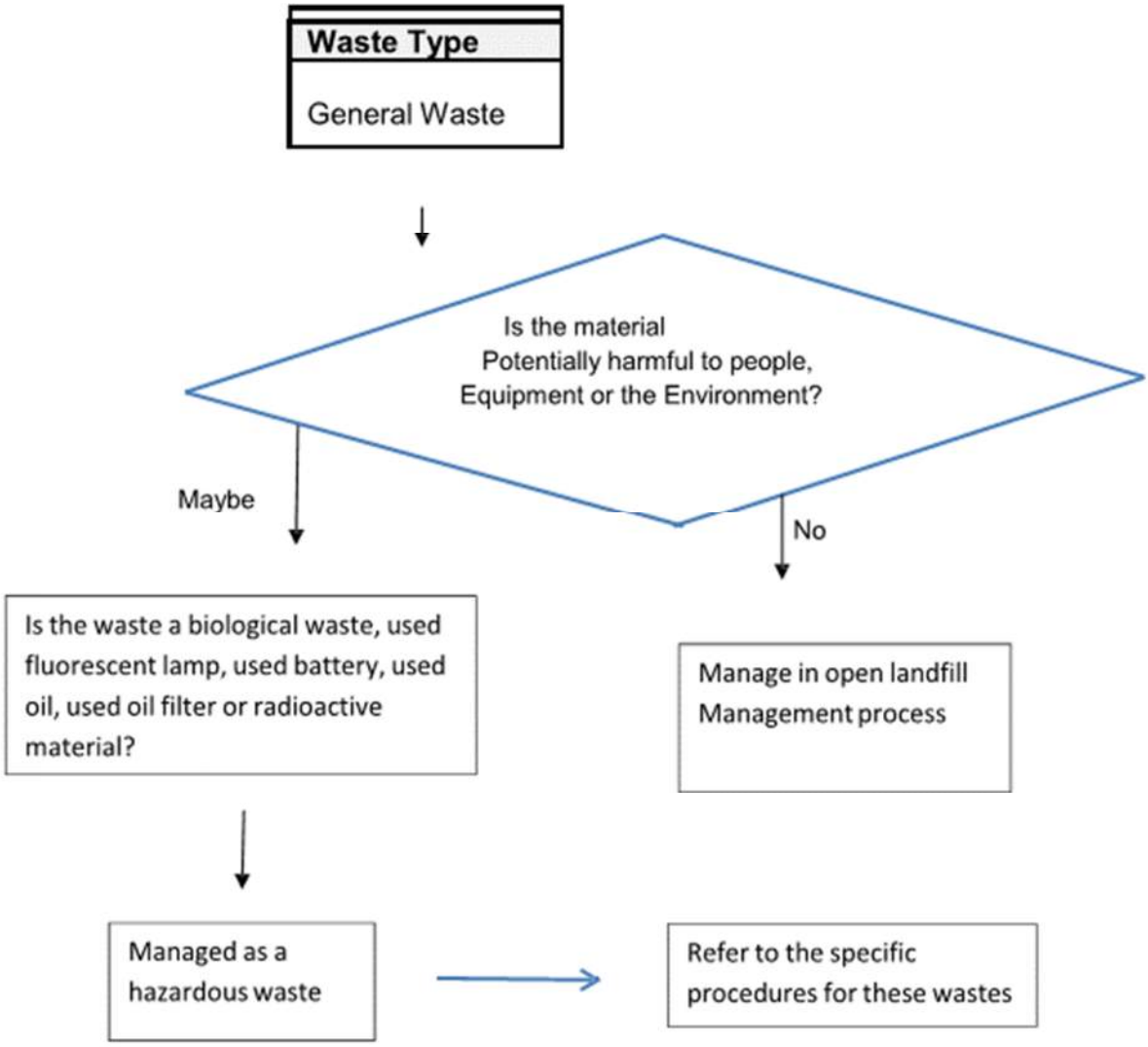


Figure 12: Identification of Hazardous Wastes

Hazardous wastes are those that are known to be dangerous due to their chemical, physical or biological properties, are no longer used for their original purpose, and are intended for recycling, treatment, disposal or storage (GNWT 1998, GN-DOE 2002). All hazardous wastes require special handling, storage and disposal methods to prevent human health and environmental exposure.

The *Environmental Guideline for the General Management of Hazardous Waste* (GN-DOE 2002) provides information regarding the proper management of hazardous waste in Nunavut, and has the intent to establish a monitoring system for hazardous wastes, from generation to final disposal. From the *Guide*, the generator of any hazardous waste is ultimately responsible for ensuring it will be properly managed from is creation to its disposal (GN-DOE 2002). Generators typically use carriers to transport the hazardous waste to appropriate receivers for disposal. Both carriers and receivers need to be registered with GN Environmental Protection Service and follow specific regulations and training.

The bulk metal / hazardous waste storage area is currently used to store hazardous wastes from the community. This area is filled but not bermed or lined, and runoff from the facility presently flows into a "natural" sewage treatment wetland. If use of this area is to continue for storage of hazardous wastes, it is recommended that an engineered berm and liner system be installed as this will limit the amount of potentially hazardous leachate entering the surrounding environment.

Generally, any household items which have the following symbols are considered HHW:

Corrosive

Explosive

Flammable

Poison

The Pangnirtung solid waste disposal facility is only licensed to accept municipal wastes for disposal and shall only accept household hazardous wastes for storage. Industrial hazardous wastes shall not be accepted for storage or disposal at the Pangnirtung solid waste disposal facility. Industrial sources (generators) are responsible to manage their own hazardous wastes.

The following hazardous waste operations and maintenance procedures deal with household hazardous wastes (HHW) only. Typical HHW which may be found in Pangnirtung include:

- Pesticides and herbicides
- Oil filters
- Paint
- Antifreeze
- Solvents (e.g., paint cleaners)
- Propane tanks and cylinders
- Flammable liquids
- Aerosol cans (not empty)
- Empty contaminant containers (e.g., 205 L fuel drums)
- Fluorescent light tubes and compact fluorescent light bulbs
- Batteries (wet and dry cell)
- Fire extinguishers
- Used and waste fuel and oil
- Corrosive cleaners

There are certain items considered HHW that cannot be stored within the solid waste facility. These include:

- Ammunition, flares and explosives (including fireworks) – Contact the Pangnirtung RCMP for proper disposal.
- Prescriptions, medications and bio-hazardous wastes (includes syringes) – Dispose of these at the Health Care Centre.
- Reactive chemicals (e.g., ammonium nitrate) – Contact the GN-DOE Environmental Protection Services for disposal options.

Contaminated soil or snow from the Hamlet's own spill clean-up is the only non-HHW that should be accepted by the Hamlet for storage at the Hazardous Waste Storage Area. Contaminated soil or snow is to be stored in 205 L steel drums and shipped out of the community every year. Industry, businesses or individuals wishing to store contaminated soil at the Hazardous Waste Storage Area must contact the Hamlet Foreman to discuss storage options and fees for any contaminated soil or snow. The decision to accept contaminated soil or snow for storage from industrial, commercial or private sources rests with the Hamlet.

6.2.1 Operations

As the current bulk metal / hazardous waste storage area is used for HHW storage, this area needs to be properly signed as the "Hazardous Waste Storage Area". This area is fenced with a lockable gate and have appropriate storage options for expected HHW. Proper signage helps operators of the area properly store the wastes. Fencing around the area will allow only trained personnel access to the bulk metal / hazardous waste storage area and help minimize health and safety risks to the public from hazardous wastes and reduce the potential for vandalism.

The bulk metal / hazardous waste storage area is intended for storage only, not disposal. It is expected that hazardous wastes will be stored for up to five years. This should be sufficient time for the community to build up enough waste to make it economical for a back haul out of the community to a licensed waste receiver.

Additionally, the Hamlet is to create a site map of the solid waste disposal facility, detailing disposal and storage locations for various wastes. This site map is to be posted at the solid waste disposal facility, the Hamlet Garage and contained within the Spill Contingency Plan. All site personnel should be familiar with the layout and disposal/storage areas.

Collection

Since the entire solid waste disposal facility is generally accessible to the public, residents can come and drop off HHW throughout the year. However, the general public is to be restricted from having direct access to the bulk metal / hazardous waste storage area for health and safety reasons. If the Hamlet does not restrict access to the bulk metal / hazardous waste storage area (i.e., through a fence and locked gate), the public is to be discouraged from entering the bulk metal / hazardous waste storage area and a designated public drop-off area for HHW should be used. The public drop-off area is located within the MSW disposal area and tended to on a daily basis by the Foreman, Waste Truck Driver, or other designated and trained site personnel, to remove and properly store any deposited HHW into the bulk metal / hazardous waste storage area.

The Hamlet should also hold a 'grace' day for residents, helping them collect and drop off their HHW or bulky metal wastes. This grace day can be held once or twice per year (e.g., in spring and/or fall) and should be advertised in the community up to at least 30 days before the event. This grace day will encourage residents to drop off their HHW and bulky metals wastes, and the Hamlet should provide information pamphlets on HHW, waste disposal, segregation, and recycling. Like many community-based management programs, successful implementation comes from informed and concerned residents. Providing facts and figures supporting proper disposal, segregation and minimization of hazardous wastes will help sustain hazardous waste management in the community.

Storage

All HHW collected needs to be properly stored in sea cans to ensure any environmental and human health hazards are minimized. The GN-DOE provides information on proper storage of specific HHW; these include:

- **Antifreeze** – use original containers where possible, or bulk-store waste antifreeze into good condition 16 gauge or lower gauge steel or plastic 205 L drums.
- **Batteries** – bulk-store waste batteries into good condition 16 gauge or lower gauge steel or plastic 205 L drums, or other form of containment away from weather; wooden pallets are recommended to be used to keep batteries and containers off the ground during storage and transport.
- **Fluorescent light tubes/compact fluorescent light bulbs** – use original containers where possible and prevent breakage of light tubes/bulbs; keep away from weather.
- **Ozone Depleting Substances** (ODS') – do not landfill; wastes with ODS' (i.e., refrigerators and refrigeration equipment, vehicle air conditioners, ODS-containing fire extinguishers (typically purchased before 1997) are to be diverted to the bulk metal waste disposal area. The Hamlet can hire technicians to remove ODS' from stored equipment.
- **Paints** – use original containers where possible, or bulk-store compatible paints into good condition 16 gauge or lower gauge steel or plastic 205 L drums; do not mix different types of paint (i.e., alkyd and latex).
- **Solvents** – use original containers where possible, or bulk-store compatible waste solvents into good condition 16 gauge or lower gauge steel or plastic 205 L drums.

See the GN-DOE website (http://www.gov.nu.ca/env/environment.shtml) for further information on guidelines for storage and disposal of HHW.

As the Hamlet currently stores waste oil in drums at the bulk metal / hazardous waste storage area (if not burned within BLCS' waste oil burners, the site should be registered as a hazardous waste storage facility with the GN-DOE Environmental Protection Services (R. Eno, *pers. comm.*). Registering the facility will help the GN-DOE monitor and track hazardous wastes, and eventually improve handling and disposal in the territory. When developing and operating the bulk metal / hazardous waste storage area in Pangnirtung, several factors also need to be considered. From Phifer and McTigue Jr. (1988) and GN-DOE (2002), these are:

- **Regulatory Compliance**

  The GN-DOE *Environmental Guideline for the General Management of Hazardous Waste* and hazardous waste minimum storage volumes are to be considered when planning and operating the bulk metal/ hazardous waste storage area.

- **Compatibility**

  Compatibility of wastes and their storage containers, and wastes and nearby materials are to be considered. For example, some wastes need to be stored in specific containers to minimize the potential for corrosion and leaks (e.g., acids cannot be stored in steel drums due to corrosion; waste fuel should not be stored long-term in plastic drums). Additionally, not all wastes can be stored in the same area (e.g., flammable wastes near ignition sources).

- **Packaging**

  Storage of HHW in original containers is acceptable. Bulk storage of compatible HHW in 205 L 16 gauge or lower gauge steel or plastic drums is generally acceptable though may depend on the type of waste. All containers need to be in good condition and sealable. Contact the GN-DOE or a licensed waste carrier or receiver for advice on specific wastes. All storage containers also need to be properly labeled, following requirements of WHMIS or *Transportation of Dangerous Goods* regulations, if transport is planned.

- **Segregation**

  If some HHW can be recovered or recycled at a later time, the HHW is to be segregated and stored in a manner to allow this. The final destination of the HHW is considered during storage.

- **Ventilation**

  All HHW is to be properly ventilated to reduce buildup of potentially poisonous or noxious fumes. Most wastes should be stored outside in sheds or under roofs providing free air movement.

- **Climate**

  Not all HHW can be stored directly outside. Waste containers are to be stored with some overhead cover (e.g., roof or tarp) and on an impermeable base to prevent contact with rain, snow and direct sunlight. This also makes cleanup of spills and leaks easier and cheaper. Some communities utilize old sea cans for storage of some HHW.

- **Handling**

  All handlers of HHW will have proper training. At a minimum, all handlers require WHMIS (Workplace Hazardous Materials Information System) training.

- **Security**

  Certain security precautions may need to be taken to prevent theft, accidental discharge or harm to the public from collected HHW. Only persons authorized and trained to handle HHW are authorized to have access to the bulk metal / hazardous waste storage area.

6.2.2 Maintenance

General maintenance procedures for the bulk metal / hazardous waste storage area occur during daily operations at the solid waste disposal facility. These maintenance procedures involve ensuring proper segregation and storage of wastes, prompt cleaning and reporting of any leaks or spills, and general site tidiness. Inspections of the bulk metal / hazardous waste storage area is to occur with the weekly inspections of the entire solid waste disposal facility by the Foreman or other trained personnel (see Appendix-D).

6.2.3 Current Steps

Currently the Hamlet is planning to segregate wastes and retain hazardous wastes in the designated area. The initial attempt is to bring a second sea can to store all the batteries. The next step is to retain all the propane and waste oil drums on the wooden platform and isolate the area. This process is expected to be completed in 2018 and this O&M manual will be upgraded accordingly to submit to NWB along with the Hamlet's Annual Report of 2018.

7.0 Solid Waste Disposal Facility Maintenance

7.1 Inspections and Audits

Regular inspections of the solid waste disposal facility will provide the Foreman, SAO and other personnel with information on the effectiveness of waste segregation, burning, landfilling, signage, and any remedial activities. Inspections are an integral part of the maintenance procedures at the solid waste disposal facility as they identify any concerns and deficiencies, and recognize areas or items which need improvement, correction, repair, and/or replacement.

The Foreman, or trained personnel appointed by the Foreman, are required to complete weekly inspections of the MSW disposal facility and bulk metal / hazardous waste storage area; monthly or bi-monthly inspections by the Foreman could also be performed. Site Inspection Forms will be used to document the findings of the inspections and ensure basic items requiring weekly inspection and/or maintenance are examined. Site Inspection Forms will also document other relevant information, such as weather conditions, health and safety concerns, and follow-up on any incidents which may have occurred (e.g., accident, fires, flooding, spills, etc.) or deficiencies noted in previous inspections. The following factors will be inspected:

- Site equipment (including heavy equipment, signage, and any storage containers)
- Site infrastructure (including access road, truck pads, drainage systems, fencing, berms, landfill cover and erosion)
- Waste segregation
- Burn completion and proper burn practices
- Proper landfilling practices
- Health and safety concerns (public and personnel)
- Hazardous waste storage area.

The Site Inspection Forms are to be filed at the Hamlet Office and results reported to the SAO monthly. The SAO is required to include inspection results and maintenance activities in the Hamlet's Annual Report to the NWB. A Solid Waste Disposal Facility Inspection Form has been included in **Appendix D**.

Following year end, the Hamlet will undertake a review of the past year's inspection results and follow-ups to determine where improvements to the solid waste disposal facility operations and maintenance are required. These improvements are to be documented and the O&M Manual is updated accordingly.

7.2 Maintenance Activities

Specific maintenance activities are to be completed on portions of the solid waste disposal facility. This will help ensure the facility, including the MSW disposal area and bulk metal / hazardous waste storage area, remain in good condition, appropriate practices are followed, and human health, safety, and environmental hazards are minimized. The following maintenance activities are required periodically:

- Grading (in summer) or clearing snow (in winter) of all access roads and truck pads used for the solid waste disposal facilities
- Repair of drainage ditches from erosion
- Fence repair
- Repair or replacement of signage
- Litter, which has been wind carried to the surrounding area outside the MSW disposal area fence, is to be removed and deposited back in the MSW disposal area
- Litter, which has accumulated against the fence of the MSW disposal area, is to be removed and deposited back in the MSW disposal area
- Repair of the MSW disposal area landfill cover from erosion or settling.

7.3 Fence and Signs

The landfill site is fully fenced (the metal dump is unfenced). A high fence prevents the migration of windblown debris out of the MSW disposal area. Maintenance activities are to be performed on the fence around the solid waste disposal facility and on signage within the solid waste disposal facility to ensure they remain in good condition. Signage is posted on the fence and additional signage is to be considered where necessary. Maintenance activities of the fence and signs include:

- Weekly inspection of the fence around the solid waste disposal facility to remove any windblown material which has accumulated; this can be performed by the Waste Truck Driver(s) and/or Foreman to reduce loading on the fence and improve site aesthetics.
- Monthly inspection of the fence around the solid waste disposal facility to ensure the chain-link is in good condition, fence posts are stable (e.g., no evidence of frost heave), gates are in good working condition, and snow drifts are removed.
- Monthly inspection of signage to ensure it is still present and readable. (Two metallic signs were installed at stations PAN-4 and PAN-5 adjacent to the land fill site for leachate sampling.)

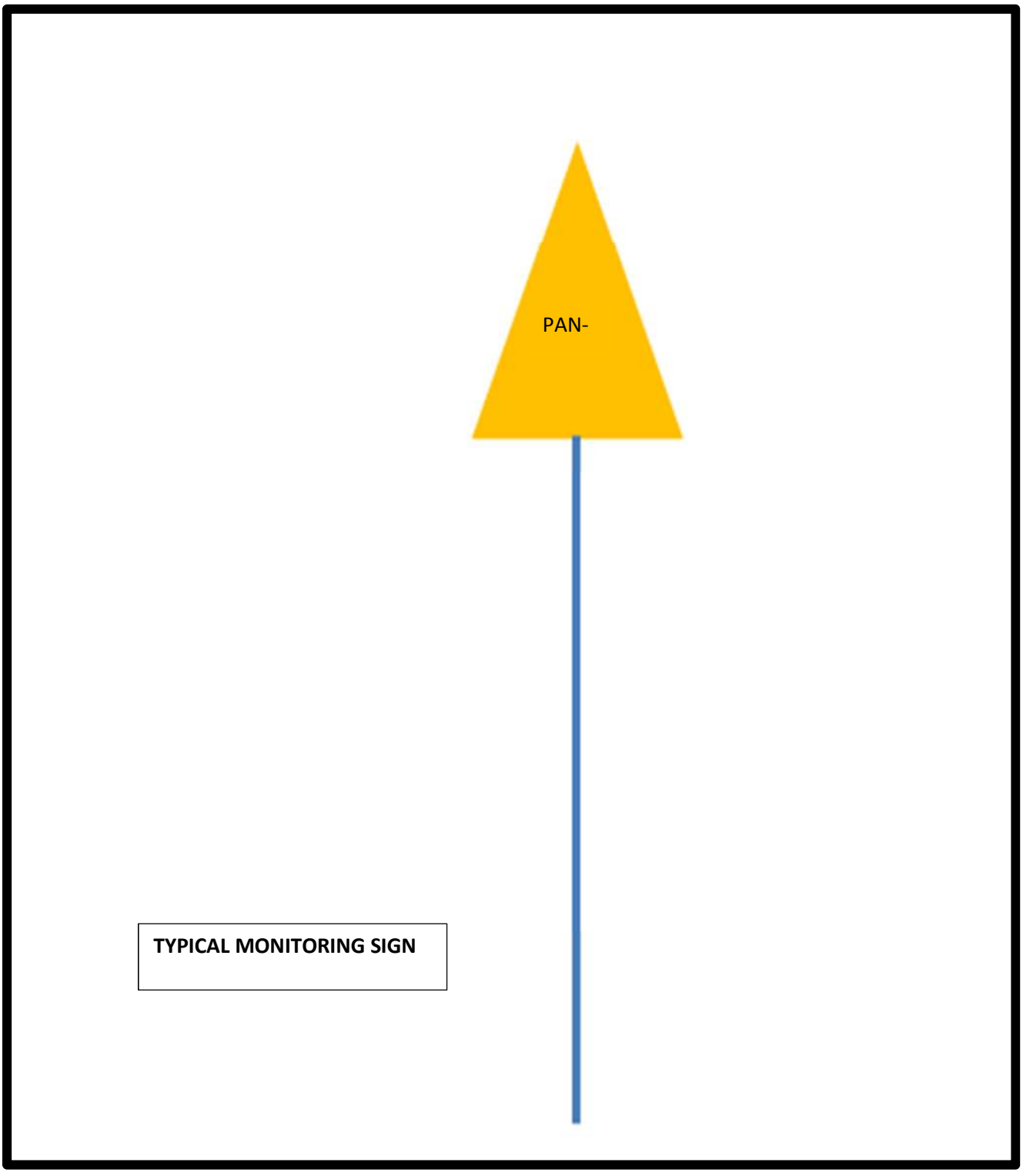


Figure 13: Typical Monitoring Sign

8.0 Drainage Management Plan

8.1 General

The solid waste site and the metals dump site are located at the base of a large hill (refer to Figure X). The slope in the area is in the order of XX% and it runs through the two sites to the shore line. The slope is intersected by a road (running northeast – southwest) with the solid waste site on the downslope side and the metals dump on the upslope side.

Currently, drainage is controlled by a drainage ditch along the upslope side of the road, a collection drain around the metals dump and numerous culverts crossing the road.

8.2 Drainage Infrastructure – Metals Dump Site

The collection drain around the metals dump (a non-engineered, grandfathered site) consists of a ditch and a berm along the northeast, southeast and southwest sides. This ditch is to prevent runoff from the adjacent hill (flowing in a northwest direction) from crossing through the metals dump. Any runoff would be diverted to the drainage ditch along the road.

The slope within the metals dump site is towards the southwest end. Any runoff collected is directed to the roadside ditching. Runoff is then directed across the road, via several corrugated steel culverts, to flow overland to the northwest toward the fjord. A sampling site (PAN-6) is located at the southwest end in the northwest corner.

8.3 Drainage Infrastructure – Solid Waste Site

The solid waste site (a non-engineered, grandfathered site) is operated in two (2) sections: domestic wastes and sludge wastes. Any runoff/leachate from within each section is directed through the containment berms, via corrugated steel culverts, to flow overland to the northwest toward the fjord. A sampling site (PAN-4) is located downslope from the sludge waste section; a second sampling site (PAN-5) is located downslope of the domestic waste section.

8.4 Maintenance

Maintenance of the drainage components will consist of cleaning the ditches and culverts on an as-needed basis. The ditches are to be cleaned using a back-hoe or excavator. Culvert cleaning will be by hose in the summer and using a steam system in the colder months to unfreeze the culverts.

9.0 Quality Control and Quality Assurance (QA/QC): Monitoring and Sampling

9.1 Monitoring Requirement

Table 7: Monitoring Stations

Monitoring Station	Description	Frequency
PAN-4	Leachate sampling from sludge dumping area of the land fill site	Three times: at the beginning, at the middle and near the end of the season when flow is observed.
PAN-5	Leachate sampling from domestic waste dumping area	Three times: at the beginning, at the middle and near the end of the season when flow is observed.
PAN-6	Run-off from the metal storage area	Three times: at the beginning, at the middle and near the end of the season when flow is observed.

Monitoring programs are carried out to help ensure all systems are functioning correctly as they provide important Feedback to the operators, helping them track progress of the system and providing warning or notice when issues arise. Monitoring programs also ensure any requirements or guidelines for water quantity and/or quality are being met; these requirements are typically provided in the community's water license. Monitoring programs form an integral part of the O&M process for all facilities and it is important to ensure they are being completed successfully. The Monitoring Program outlined in the Hamlet's Water License requires that monitoring stations be located downstream of the solid waste disposal facility. The solid waste disposal facility monitoring stations will provide water quality information to operators and regulators and help assess the leachate quality leaving the solid waste disposal facility and entering the sewage treatment. Leachate quality data will also help assess leachate treatment performance of the sewage treatment wetland and provide an indication of waste segregation success. A description and the location of these stations are provided in Table 7.

The leachate at the PAN-4, PAN-5 and PAN-6 sampling stations are to be sampled annually when flow is present (as indicated in Table 7). All samples taken from these stations will be analyzed for:

- Biochemical Oxygen Demand (BOD_5)
- Total Metals (including aluminum, arsenic, cadmium, cobalt, chromium, copper, iron, lead, nickel, manganese, mercury and zinc)
- Total Alkalinity
- Total Suspended Solids (TSS)
- Conductivity
- Total Organic Carbon (TOC)
- Fecal Coliforms
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Ammonia Nitrogen
- Nitrate-Nitrite

- Anions and Cations (including calcium, chloride, magnesium, potassium, sodium and sulphate)
- Total Hardness
- pH
- Total Phenols
- Oil and Grease (visual)
- Total Petroleum Hydrocarbons (TPHs)
- Benzene, Toluene, Ethyl benzene and Xylene (BTEX)

9.2 Sampling Procedures

As mentioned above, collection of the leachate at stations PAN-4 and PAN-5 is required three times annually during periods of flow. Water samples will be taken by the Foreman, or other trained personnel appointed by the Hamlet Foreman, and sent to Caduceon Environmental Lab in Ottawa, ON for analyses.

Guidelines for the collection of leachate samples from downstream of the solid waste disposal facility are found in **Appendix A**. The sample collection procedures are carried out for all sampling within or downstream of the solid waste facilities to ensure the correct sample bottles are obtained, proper sampling procedures are completed, and contamination of the samples is minimized.

The Hamlet will follow the proper QA/QC protocol for sampling, shipping and testing.

9.3 Record Keeping

Records of activities, inspections, and sampling at the solid waste disposal facility are to be retained. These records are to be stored at the Hamlet office and kept by the Foreman and SAO. These records will assist with the planning of annual operations and maintenance of the solid waste disposal facility, as well as assess how successful facility practices (e.g., waste segregation, HHW storage, etc.) are operating.

Every year by March 31st, the Hamlet is required to submit an Annual Report to the NWB. The Annual Report provides the NWB with information pertaining to the results of the Monitoring Program, quantities of solid waste disposed, summaries of any modifications, major maintenance work, and spills. Therefore, at a minimum, the following records are required:

- Number of trips the garbage truck makes per day;
- Quantity (weight) of MSW disposed of per day (tallied for monthly and annual quantities);
- Quantity (weight and/or volume) and types of HHW stored at the bulk metal / hazardous waste storage area;
- Dates any leachate sampling has been completed;
- Results from any leachate sampling;
- Dates and description of any maintenance activities (including inspections) carried out on the disposal Facilities by Hamlet personnel or other Inspectors;
- Dates and descriptions of any modifications and/or major maintenance work, and abandonment and restoration work carried out on the disposal facilities, including on associated structures, facilities and equipment (e.g., old waste oil pit, compactor truck, CAT bulldozer, grader, etc.); and,
- Dates, description and clean-up activities of any spills (fuel, oil, hazardous waste, etc.) related to the MSW disposal area, or bulk metal / hazardous waste storage area.

10.0 Emergency Response

10.1 Surface Fires

If site personnel discover a surface fire in the solid waste disposal facility, the Hamlet of Pangnirtung Fire Department will be called immediately and informed of the situation.

Pangnirtung FIRE DEPARTMENT: (867) 473-4422

In the event of an uncontrolled fire during routine burning of MSW, the Fire Department will be contacted and be required to assess the danger of the burn. Depending on the burn severity, the Fire Department may assume control of the MSW disposal area. The MSW disposal area is normally closed to the public during any controlled open burn of MSW and will remain closed if a burn becomes uncontrolled, until the Fire Department has deemed the site safe. If site personnel discover a small surface fire, fire extinguishers located at the solid waste disposal facility or in site vehicles can be used to manage small fires. Covering a fire with soil by hand or using the CAT D6 bulldozer may also be used. However, **site personnel should not attempt to fight a fire if it cannot be done safely**.

The cause of any surface fires will be investigated and necessary steps taken to prevent an uncontrolled surface fire from recurring. The fire incident and all response measures are to be documented on the weekly Solid Waste Disposal Facility Inspection Form (**Appendix D**), and reported to the Hamlet Foreman and Hamlet SAO.

10.2 Subsurface Fires

If a subsurface fire is suspected within the MSW disposal area, the Pangnirtung Fire Department will be called and informed of the situation. The solid waste disposal facility is to be closed to the public whenever a subsurface fire is suspected.

The Fire Department is to go to site to determine if a subsurface fire is present and to assess the danger of the fire. The Fire Department may assume control of the solid waste disposal facility if the subsurface fire is deemed an emergency. Hamlet personnel are not to excavate a suspected subsurface as the fire may quickly get worse when exposed to more oxygen, may release toxic or poisonous fumes, or may have caused underground voids causing an unstable surface prone to collapse. The Fire Department should manage the suppression of any subsurface fires.

The cause of any subsurface fires will be investigated and necessary steps taken to prevent a subsurface fire from recurring. The fire incident and all response measures are required to be documented on the weekly Solid Waste Disposal Facility Inspection Form (**Appendix D**), and reported to the Hamlet Foreman and Hamlet SAO.

11.0 Spill Contingency Plan

The intent of this Spill Contingency Plan (SCP) is to provide a guide to operators and other Hamlet personnel in the event of an accidental release of fuel or other hazardous liquids at the solid waste facilities in Pangnirtung. The SCP is planned to be protective of the local environment and public and personnel health and safety. At these sites, there may be situations that arise that are beyond the scope of this SCP. In these situations, all activities at the site are to stop until a revised procedure or SCP is prepared, reflecting the changing conditions at the site.

All persons involved with operations at the solid waste facilities are to read and be familiar with this SCP. To be effective, it is important that all personnel are familiar with their responsibilities and steps to take in the event of a spill. Personnel do not read the SCP for the first time during an emergency.

11.1 Site Descriptions

The solid waste facilities have been described in the preceding sections of this O&M Manual. The sites are shown on Figure 2.

11.2 Regulations

Under Section 34 of the *Environmental Protection Act*, the Nunavut Consolidation of Spill Contingency Planning and Reporting Regulations was enabled by the Commissioner in 1998. In the Spill Contingency Planning and Reporting Regulations, a SCP is required to include the following:

- The name and address of the owner or person in charge, management or control of the site(s).
- The name, job title and 24-hour telephone number for the person(s) responsible for activating the Contingency Plan.
- A description of the facility(ies) including location, size, type and amount of contaminants normally stored on the site(s), and site map(s).
- The steps to be taken to report, contain, clean up and dispose of a contaminant in the case of a spill.
- The means by which the contingency plan is activated.
- An inventory and location of the response and clean-up equipment available to implement the plan.
- A description of the training required and provided to employees who respond to a spill.
- The date the plan was prepared.

11.3 Contacts and Regulatory Authorities

The SAO has overall responsibility of Hamlet solid waste facilities. The Foreman manages the facilities and is responsible for initiating the Spill Contingency Plan. The Foreman is to be contacted when a spill occurs at the solid waste facilities. Contact information as follows.

Distribution List:

This plan and most recent revisions will be distributed to:

Ralph Ruediger	Director, Community Development, GN-CGS Ph.: 867 645 8156
Bhabesh Roy	Municipal Planning Engineer, GN- CGS Ph.: 867 899 7314
Ron Ladd	Senior Administrative Officer Ph.: 867 473 8953
Jonathan Mesher	Inspector, AANDC Ph.: 867 975 4517
Karen Kharatyan	Manager of Licensing, Nunavut Water Board Ph.: 867 360 6338

Every time a spill is identified at the solid waste facilities, the Foreman is to be contacted as soon as possible. The 24-hour Emergency Spill Report Line is to be contacted in the event any quantity of contaminant is spilled.

24-HOUR EMERGENCY SPILL REPORT LINE: (867) 920-8130

Any person reporting a spill is required to give as much information as possible; however, reporting of a spill should not be delayed if all of the necessary information is not known. Additional information can be provided later. From the Consolidation of Spill Contingency Planning and Reporting Regulations (1998), as much of the following information should be reported during the initial spill report:

- Date and time of spill
- Location of spill
- Direction spill is moving
- Name and phone number of a contact person close to the location of the spill
- Type of contaminant spilled and quantity
- Cause of spill
- Whether spill is continuing or has stopped
- Description of existing contaminant
- Action taken to contain, recover, clean up, and dispose of spilled contaminant
- Name, address and phone number of person reporting the spill
- Name of owner or person in charge, management or control of contaminants at the time of the spill

Other regulatory agencies which have a legislated (vested) interest in the event of a spill are summarized in Section 11.11 below. These authorities do not need to be immediately contacted if a spill occurs; however, they may be involved in follow-up or additional clean-up activities.

11.4 Potential Contaminants

At the date of this SCP, the Hamlet of Pangnirtung had not completed a waste inventory and exact types and quantities of contaminants are unknown. However, the following contaminants are anticipated to be found at the facilities, and may be involved in a spill:

- Gasoline
- Lubricating oils
- Diesel fuel
- Antifreeze and other coolants
- Hydraulic oil
- Sewage
- Motor oil
- Batteries

At the solid waste facilities, spills may result from any of the following occurrences:

- Leaks or ruptures of fuel storage tanks
- Valve or line failure in systems, vehicles or heavy equipment
- Heat expansion due to overfilling or improper storage
- Improper storage of contaminants

- Vehicular accidents
- Spill during transfer of contaminant
- Vandalism

11.5 Spill Response Procedures

The following steps outline the general spill response procedures for reporting, containing, cleaning up and disposing of materials in the event of hydrocarbon (e.g., fuel, oil, etc.) and other waste spill, or sewage spill.

11.6 Hydrocarbon Spills

Three procedures for hydrocarbon spills have been developed depending on the media on which the spill has occurred. The following sections outline procedures for hydrocarbon or other waste spills occurring on land (soil, gravel, sand, rock and vegetation), water, or snow/ice.

Spills on Land

1. Once a spill is identified, all sources of ignition turned off (e.g., no smoking, shut off engines).
2. The spilled material (e.g., gasoline, diesel, antifreeze, etc.) is to be identified, if possible.
3. The affected area is secured, ensuring the area is safe for entry and does not represent a threat to human health and safety of the spill responders. Public access of the area should be restricted.
4. If possible, identify where the spill is coming from (the source). Determine if the spill is still occurring (i.e., still leaking) or if the spill has stopped. If the spill has not stopped, determine if it is safe to stop or control the spill (e.g., plug hole, close valve, upright container), or contain the spill (e.g., place a container or tarp with built up edges under the spill source to contain the spill).
5. If the spill is too large to be controlled with the spill materials at hand, contact the Foreman and report the spill immediately.
6. If the spill is small enough to be controlled with the materials at hand, prevent spilled contaminants from spreading or entering waterways by using sorbent (oil-absorbing) materials or a soil dyke down slope from the spill. This is especially the case with liquid contaminants (e.g., gasoline, diesel). If some contaminant has entered a waterway, follow procedures in the next section (***Spills on Water***) to contain and clean-up the contaminant in the water.
7. Once the spill has been controlled and further spreading prevented, contact the Foreman and report the spill.
8. If possible with spill response materials at hand, clean up the remaining spilled contaminant and store contaminated materials in a secure container for disposal. Do not flush the affected area with water.
9. If possible, remove any contained liquid by pumping into secure drums.
10. If needed, assist the Foreman by providing details to complete the Nunavut Spill Report Form with as much information as possible. This form is included in **Appendix B.**
11. The Foreman will contact the **24-Hour Emergency Spill Report Line (Phone: (867) 920-8130)** to report the spill as soon as possible and obtain additional advice.
12. The Foreman will fax the completed Nunavut Spill Report Form to the **24-Hour Emergency Spill Report Line (Fax: (867) 873-6924)**.

Spills in Water

1. Once a spill is identified, all sources of ignition turned off (e.g., no smoking, shut off engines).
2. The spilled material (e.g., gasoline, diesel, antifreeze, etc.) is to be identified, if possible.
3. The affected area(s) are secured, ensuring the area is safe for entry and does not represent a threat to Human health and safety of the spill responders. Public access of the area is to be restricted.
4. If possible, identify where the spill is coming from (the source). Determine if the spill is still occurring (i.e., still leaking) or if the spillage has stopped. If the spill has not stopped, determine if it is safe to stop or control the Spill (e.g., plug hole, close valve, upright container).
5. If the spill is too large to be controlled with the spill materials at hand, contact the Foreman and report the spill (hot line) immediately.
6. If the spill is small enough to be controlled with the materials at hand, use sorbent (oil absorbing) booms to contain the spill for recovery. Place sorbent sheets on the water within the boomed area to help contain the spill. For narrow waterways, place one or more sorbent booms across the waterway, downstream of the spill location, and anchor the booms on each bank.
7. Once the spill has been controlled and further spreading prevented, contact the Foreman and report the spill.
8. If possible with the spill response materials at hand, clean up the remaining spilled contaminant within the boomed area. Store contaminated materials in a secure container for disposal.
9. If needed, assist the Foreman by providing details to complete the Nunavut Spill Report Form with as much information as possible. This form is included in **Appendix B** of this O&M Manual.
10. The Foreman will contact the **24-Hour Emergency Spill Report Line (Phone: (867) 920-8130)** to report the Spill as soon as possible and obtain additional advice.
11. The Foreman will fax the completed Nunavut Spill Report Form to the **24-Hour Emergency Spill Report Line (Fax: (867) 873-6924)**.

Spills on Snow/Ice

1. Once a spill is identified, all sources of ignition turned off (e.g., no smoking, shut off engines).
2. The spilled material (e.g., gasoline, diesel, antifreeze, etc.) is to be identified, if possible.
3. The affected area(s) are secured, ensuring the area is safe for entry and does not represent a threat to human Health and safety of the spill responders. Public access of the area is to be restricted.
4. If possible, identify where the spill is coming from (the source). Determine if the spill is still occurring (i.e., still leaking) or if the spillage has stopped. If the spill has not stopped, determine if it is safe to stop or control the spill (e.g., plug hole, close valve, upright container).
5. If the spill is too large to be controlled with the spill materials at hand, contact the Foreman and report the spill immediately (see Section 6.2.3 above for contact information), particularly since a spill occurring on snow or ice presents the potential for immediate access of contaminants into waterways.
6. If the spill is small enough to be controlled with the spill response materials at hand, prevent spilled contaminants from spreading or entering waterways by using sorbent materials or a snow/soil dyke down slope from the spill. This is especially the case with liquid contaminants (e.g., gasoline, diesel).
7. Once the spill has been controlled and further spreading prevented, the Foreman will provide a report.

8. If possible with the spill response materials at hand, clean up the remaining spilled contaminant and store contaminated materials in a secure container for disposal. Impacted snow should also be stored in drums for disposal.

9. If needed, assist the Foreman by providing details to complete the Nunavut Spill Report Form with as much information as possible. This form is included in **Appendix B** of this O&M Manual.

10. The Foreman will contact the **24-Hour Emergency Spill Report Line (Phone: (867) 920-8130**) to report the spill as soon as possible and obtain additional advice.

11. The Foreman will fax the completed Nunavut Spill Report Form to the **24-Hour Emergency Spill Report Line (Fax: (867) 873-6924)**.

Additional Spill Delineation or Monitoring

In the event of a large spill or a spill in which not all of the spilled contaminant can be readily cleaned up with materials at hand (as described above), delineation of the affected area may be required. This would include subsurface investigation of the area (i.e., digging test pits, soil sampling, installation of monitoring wells) to determine how large and how deep the contaminant affected the subsurface soil and/or groundwater (horizontal and vertical extent of the spill). The delineation would result in the development of an appropriate remediation plan for the affected area. In this case, a qualified environmental consultant should be retained to provide advice on how to proceed with delineation and remediation of a large spill.

11.7 Spill Kit and Training Requirements

The following sections outline the recommended minimum requirements for contents and number of spill kits that are to be kept available at the water, sewage and solid waste facilities. Personnel training requirements are also provided.

11.8 Spill Kit Contents

Each spill kit is mandated to be regularly inspected to ensure it always contains the following, at a minimum (in part from INAC [2007]):

- 1 – 205 L open top steel drum with lid, bolting ring and gasket (spill kit container)
- 4 – 12.5 cm x 3 m (5 in. X 10 ft.) sorbent booms
- 10 kg bag of sorbent particulate
- 1 roll duct tape
- 1 field notebook and pencil
- 1 pick-axe
- 4 Tyveks® splash suits
- 4 pairs of splash protective goggles
- 10 disposable large 5 mil polyethylene bags (dimensions 65 cm x 100 cm) with ties
- 100 sheets (1 bail) of 50 cm x 50 cm sorbent sheets
- 2 large (5 m x 5 m) plastic tarps
- 1 utility knife
- 1 rake

- 3 spark-proof shovels
- 4 pairs chemical resistant gloves
- Instruction binder, including Spill Contingency Plan

The entire spill kit contents, with the exception of the spark-proof shovels, can be stored within the 205 L steel drum. The drum is to be sealed securely to protect the spill kit contents though should always be accessible without the use of tools (i.e., finger tight bolt ring). The drum's bolt ring should be inspected regularly during facility inspections to ensure it turns freely and is lubricated.

Extra spill response materials should also be available for use, in addition to the spill kit contents. These include:

- 10 – 205 L open top steel drum with lid, bolting ring and gasket
- 2 spark-proof shovels
- 50 disposable large 5 mil polyethylene bags (dimensions 65 cm x 100 cm)
- 10 – 12.5 cm x 3 m (5 in. X 10 ft.) sorbent booms
- 5 – 10 kg bags of sorbent particulate
- 500 sheets (5 bales) of 50 cm x 50 cm sorbent sheets
- 2 Tiveks ® splash suits
- 2 pairs of chemical resistant gloves
- 2 pairs of splash protective goggles

11.9 Spill Kit Locations

At least one spill kit is required to be clearly marked and present at the solid waste disposal facility (within the facility).

11.10 Required Training

To ensure the SCP is carried out effectively, the following actions should occur:

- The SCP is to be reviewed annually to ensure it is still up-to-date for current conditions.
- When required, the SCP is to be revised to reflect current conditions.
- The SCP is to be distributed to, and read by, all personnel who work at the Hamlet's solid waste facilities.
- Personnel at these facilities are to be familiar with the location of all HHW and other potentially hazardous materials, and their associated Material Safety Data Sheets (MSDS).
- Personnel at these facilities are required to be trained to read and use MSDS, and have their WHMIS training, at a minimum.
- Personnel will receive proper spill response training to learn and understand the techniques and Materials used to contain, clean up and remediate spills. Trained personnel will be aware of the importance of first response in reducing the impact of spills with respect to protecting human health and safety, the Environment and property.

11.11 Off-site Resources

The following resources are available for assistance if needed:

Territorial 24-Hour Spill Line	(867) 920-8130
Aboriginal and Northern Affair Canada (AANDC)	(867) 669-2761
GN – Emergency Measures Officer	(888) 624-4043
Pangnirtung Health Centre	(867) 473-8977
RCMP (Pangnirtung)	(867) 473-1111
Environment Canada (Emergency) Yellowknife	(867) 669-4725
GN Environmental Health Office	(867) 975-4817
First Air Cargo	(867) 473-8960 or 1-800-267-1247

11.12 Record Keeping

Records of any spills, spill response activities, follow-up inspections, monitoring, and any additional remedial work must be kept. These records are to be stored at the Hamlet office and kept by the SAO. These records will assist with the annual review of the SCP, operations and maintenance practices at all facilities, and spill response requirements.

Every year by March 31st, the Hamlet is required to submit an Annual Report to the NWB. The Hamlet is required to provide a list of all spills and a summary of follow-up action taken for each spill. Therefore, at a minimum, the following records are required to be kept:

- Reports of all spills and spill reports submitted to the 24-Hour Emergency Spill Report Line;
- Types and quantities of spill contaminants;
- All spill follow-up activities;
- Inspections of spill kit contents and replacement records for any items; and,
- Records of spill response training for all Hamlet spill responder personnel.

12.0 References

- *Operation and Maintenance Manual for Water, Sewage and Solid Waste Facilities of Baker Lake, Nunavut* prepared by Stantec, 2011.

- *Comprehensive Feasibility Study of Waste Management of the Hamlet of Pangnirtung* by Dillon Consulting Ltd, 2007.

- *Guidelines for the Preparation of an Operations and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories*, Duong and Kent, 1996.

APPENDIX A

GUIDELINES FOR WATER, WASTEWATER AND LEACHATE SAMPLING AND TESTING

Guidelines for Water, Wastewater and Leachate Sampling
Baffin Communities

Drinking water:

Monthly Sampling: (Bacteria analysis)

1. Collect five samples (**200 mL each**) from five different locations and send to Iqaluit Health Lab though your local health center. One of the five samples should be raw water sample.
    - Once in a month if population is less than 1000.
    - Twice in a month if population is in between 1000 to 2000.

Iqaluit Lab for all Baffin Communities.

Environmental Health Department
Health and Social Services, Baffin
P.O.Box 1000, Station 1046
Iqaluit, NU, X0A 0HO

Annual Sampling: (Chemical Analysis)

1. Send samples to Ottawa Lab (All Baffin Communities) once a year for Chemical Analysis.
   Caduceon Environmental Laboratories (Attention: Gord Murphy)
   2378 Holly Lane
   Ottawa, ON K1V 7P1
   Tel: 613-526-0123
   Fax: 613 526 1244

Precautions of Sampling:

1. Be careful not to let the mouth of the bottle or lid touch anything including sampler's fingers.
2. Do not overfill the bottle or rinse out
3. Fill the bottle to the 200mL line from water tap, valve or water truck delivery hose nozzle. When sampling from a water tap, remove screen, aerator or other attachment from tap and allow the cold water to run for 2-3 minutes before collecting. Do not dip into the filled water truck tank to take a sample.
4. Ensure each bottle label information is filled for:
    - Date and time sample was taken
    - Sample point location
    - Sampler's name
5. Persons' name and contact address where to send sample Test results and invoice.
6. Samples must arrive at the Labs, either Iqaluit or Ottawa, within 24 hrs. from the time of sampling.

Wastewater:

1. Collect five treated samples from the first point of discharge of Sewage (end of pipe).
2. Collect Five raw samples directly from the truck discharge

Leachate:

1. Collect five leachate samples from the landfill site.

Sample bottle specifications for Wastewater and Leachate:

Five samples should be taken from a point in five different bottles:

Bottle 1: **500 mL**
Bottle 2: **100 mL**
Bottle 3: **1000 mL**
Bottle 4: **250 mL**

All the wastewater and Leachate samples will be sent to Ottawa Lab.

Caduceon Environmental Laboratories (Attention: Gord Murphy)
2378 Holly Lane
Ottawa, ON K1V 7P1
Tel: 613-526-0123
Fax: 613 526 1244

Precautions of sampling:

1. Use hand gloves.
2. Ensure each bottle level information is filled:
   - Date and time sample taken
   - Location with GPS coordinates
   - Sampler's name
3. Include person's name and contact information where to send sample Test Results and invoice.
4. Samples must arrive at Ottawa Lab within 24 hours from the time of sampling.

APPENDIX B

SPILL REPORTING FORM

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR	REPORT TIME	☐ ORIGINAL SPILL REPORT, OR UPDATE #	REPORT NUMBER
B	OCCURRENCE DATE: MONTH – DAY – YEAR	OCCURRENCE TIME	☑ THE ORIGINAL SPILL REPORT	-

C	LAND USE PERMIT NUMBER (IF APPLICABLE)	WATER LICENCE NUMBER (IF APPLICABLE)
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM THE NAMED LOCATION	REGION ☐ NWT ☐ NUNAVUT ☐ ADJACENT JURISDICTION OR
E	LATITUDE DEGREES MINUTES SECONDS	LONGITUDE DEGREES MINUTES SECONDS

F	RESPONSIBLE PARTY OR VESSEL NAME	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION	
G	ANY CONTRACTOR INVOLVED	CONTRACTOR ADDRESS OR OFFICE LOCATION	
H	PRODUCT SPILLED	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER
	SECOND PRODUCT SPILLED (IF APPLICABLE)	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER
I	SPILL SOURCE	SPILL CAUSE	AREA OF CONTAMINATION IN SQUARE METRES
J	FACTORS AFFECTING SPILL OR RECOVERY	DESCRIBE ANY ASSISTANCE REQUIRED	HAZARDS TO PERSONS, PROPERTY OR ENVIRONMENT
K	ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS		

L	REPORTED TO SPILL LINE BY	POSITION	EMPLOYER	LOCATION CALLING FROM	TELEPHONE
M	ANY ALTERNATE CONTACT	POSITION	EMPLOYER	ALTERNATE CONTACT LOCATION	ALTERNATE TELEPHONE

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION **Station operator**	EMPLOYER	LOCATION CALLED **Yellowknife, NT**	REPORT LINE NUMBER **(867) 920-8130**

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC	SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN	FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐	☐	☐ ☐ ☐ ☐
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

APPENDIX C

MONTHLY MUNICIPAL SOLID WASTE QUANTITY FORM

Hamlet of Pangnirtung

Monthly Municipal Solid Waste Quantity Form

Date: _______________ Month: __________________ Year: _____________

Date	Monthly Loads by Hamlet	Estimated Quantity for Hamlet (m^3)	Estimated quantity by others (m^3)	Total (m^3)	Activities completed	Staff initials

APPENDIX D

MONTHLY SOLID WASTE DISPOSAL FACILITY INSPECTION FORM

Hamlet of Pangnirtung

Monthly Municipal Solid Waste Disposal Facility Inspection

Form Date: _____ **Inspector:** _____ **Air Temperature:** _____

Issues	Yes	No	Description	Action taken	Refer to: Yes	Refer to: NO
Health and safety						
Access Road						
Signs						
Litter						
Fence						
Waste Segregation						
Burning						
Wildlife						
Odour						
Equipment						

APPENDIX E

CUMULATIVE WASTE PRODUCTION: DOMESTIC, SLUDGE AND FISH WASTES

Hamlet of Pangnirtung - Detailed Solid Waste Calculations

Year	Population	Estimated. SW Volume, Uncompacted (m^3/day)	Estimated SW Mass (tonnes/day)	Estimated SW Volume Compacted (m^3/day)	Current Estimated Sludge Generation Rate (m3/day)	Proposed Sludge Generation Rate (m^3/day)	Combined Uncompacted SW and Sludge (m^3/day)	Combined Uncompacted SW and Sludge (tonnes/day)	Compacted SW, Current Sludge and Fish Waste (m^3/year)	Cumulative (m^3)	Compacted SW, Proposed Sludge and Fish Waste (m^3/year)	Cumulative (m^3)
2000	1506	22.59	4.52	7.53	0.64	0.87	23.23	4.65	3211		3295	
2001	1539	23.09	4.62	7.70	0.65	0.89	23.74	4.75	3276		3362	
2002	1575	23.63	4.73	7.88	0.67	0.91	24.29	4.86	3348		3436	
2003	1613	24.20	4.84	8.07	0.68	0.93	24.88	4.98	3423		3513	
2004	1651	24.77	4.95	8.26	0.70	0.95	25.46	5.09	3498		3590	
2005	1687	25.31	5.06	8.44	0.71	0.97	26.02	5.20	3569		3663	
2006	1722	25.83	5.17	8.61	0.73	0.99	26.56	5.31	3639		3735	
2007	1756	26.34	5.27	8.78	0.74	1.01	27.08	5.42	3706	3706	3804	3804
2008	1792	26.88	5.38	8.96	0.76	1.03	27.64	5.53	3777	7483	3877	7681
2009	1831	27.47	5.49	9.16	0.77	1.05	28.24	5.65	3854	11337	3957	11638
2010	1870	28.05	5.61	9.35	0.79	1.08	28.84	5.77	3931	15269	4036	15673
2011	1905	28.58	5.72	9.53	0.81	1.10	29.38	5.88	4001	19269	4107	19781
2012	1955	29.33	5.87	9.78	0.83	1.13	30.15	6.03	4100	23369	4209	23989
2013	1995	29.93	5.99	9.98	0.84	1.15	30.77	6.15	4179	27548	4290	28280
2014	2032	30.48	6.10	10.16	0.86	1.17	31.34	6.27	4252	31800	4366	32645
2015	2074	31.11	6.22	10.37	0.88	1.19	31.99	6.40	4335	36135	4451	37096
2016	2117	31.76	6.35	10.59	0.90	1.22	32.65	6.53	4420	40556	4539	41635
2017	2160	32.40	6.48	10.80	0.91	1.24	33.31	6.66	4505	45061	4626	46261
2018	2202	33.03	6.61	11.01	0.93	1.27	33.96	6.79	4589	49650	4712	50973
2019	2243	33.65	6.73	11.22	0.95	1.29	34.59	6.92	4670	54320	4795	55768
2020	2280	34.20	6.84	11.40	0.96	1.31	35.16	7.03	4743	59063	4870	60638
2021	2323	34.84	6.97	11.61	0.98	1.34	35.82	7.16	4828	63890	4957	65596
2022	2366	35.50	7.10	11.83	1.00	1.36	36.50	7.30	4914	68804	5046	70642
2023	2411	36.16	7.23	12.05	1.02	1.39	37.18	7.44	5002	73806	5136	75778
2024	2456	36.84	7.37	12.28	1.04	1.41	37.88	7.58	5091	78897	5228	81007
2025	2502	37.53	7.51	12.51	1.06	1.44	38.59	7.72	5183	84080	5322	86329

Assumptions: Uncompacted Waste Generation rate: 0.015 m^3/person/day
Compaction Rate: 3:1
Waste Volume: 0.005 m^3/person/day
Fish waste generation: 230 m^3/year

APPENDIX F

FISH WASTE MANAGEMENT

To whom it may concern:

Up until 2010, Pangnirtung Fisheries processed offshore turbot to obtain fillets for the American market, which resulted in approximately 40% of the total processed weight going to the land fill in a form of bones, skin and trimmed waste.

Since 2010, we have focused on inshore turbot only for the purpose of supplying the Asian market with whole, headless, tailless, and gutless fish. In doing so we have stopped producing fillets and eliminated fish waste to the landfill.

The fish we process now is gutted, blood line removed and bob tailed by the fishermen at point of harvest. After the fish is delivered to us, we clean the belly cavity to wash away any remaining blood or internal remnants and then remove the head.

The fish is then mastered and sold as bulk, head off, gutted, and tail removed product.

The only part of the fish removed at the plant is the head, which we grade, master and sell.

The waste water from our operation consist of water used to clean the fish before we process it and water used to clean the plant at the end of the shift. This water is stored in a waste tank that is pumped out regularly by the Hamlet vehicle.

Once the waste is removed from our premises, we cannot verify how it is disposed of.

Signed: _____ Date: June 12/14

Gordon Duffett
Production Manager
Pangnirtung Fisheries Ltd
P.O. Box 185
Pangnirtung, Nu
X0A 0R0
Phone: (867) 473-8322
Fax: (867) 473-8323
e-mail: gduffett@qiniq.com