

Requirements for Public Waste Disposal Facilities

The *Solid Waste Regulations* under the *Environment Act* distinguish between sites used for the disposal of solid waste from the public and sites used for the disposal of commercial solid waste. Under the Regulations, a permit is required to operate a waste disposal facility for the disposal of solid waste generated by the public. If you are disposing of solid waste generated by your own commercial activity or operating a dump for commercial purposes, please consult the “Requirements for Commercial Dumps” guidance document instead.

This guidance document describes the requirements for siting, construction, monitoring, operation and closure of public waste disposal facilities to ensure that the risk to the environment and human health is minimized. Because there are many different scales of waste disposal operations in Yukon, public waste disposal facilities are separated into four categories:

- 1) **Transfer stations** – these are sites where waste is collected and consolidated, and then all waste is transferred offsite for final disposal.
- 2) **Modified transfer stations** – sites where municipal solid waste (e.g., domestic garbage, paper products, plastics, appliances, furniture, etc.) is collected, consolidated and transferred offsite for final disposal while construction and demolition (C&D) waste is landfilled onsite.
- 3) **Class 2 landfill** – municipal solid waste and C&D waste are buried onsite and the site serves a population of less than 13,000 people.
- 4) **Class 1 landfill** – municipal solid waste and C&D waste are buried onsite and the site serves 13,000 people or greater.

In case of any discrepancy or inconsistency between this fact sheet and the permit, the permit shall prevail.

Permit application and YESAA assessment

At the time permit application to construct a waste disposal facility is made, the applicant must submit a number of plans to support the application. These plans are related to the siting, construction and closure requirements for the facilities. The plans required at the time of application are:

- 1) **Solid Waste Management Plan** – this plan describes in detail the operations of the waste disposal facility over a 10-year planning horizon. Consult the [Solid Waste Management Plans guidance document](#) for further information. **A solid waste management plan is required for all waste disposal facilities.**
- 2) **Geotechnical Assessment** – this assessment, conducted by a qualified professional, examines the suitability of the site to be used as a waste disposal facility. The

assessment must consider bearing capacity, differential settlement, and slope stability during construction, operation, and post closure. **A geotechnical assessment is required for all modified transfer stations and landfills.**

- 3) **Hydrogeological Assessment** – this assessment, conducted by a qualified hydrogeologist, determines the depth to groundwater, groundwater flow direction, velocity, and gradient, the estimated groundwater travel time to nearby receptors, and baseline groundwater quality. The assessment should follow the applicable Contaminated Sites Regulations protocols, including [Protocol 7: Groundwater monitoring well installation, sampling & decommissioning](#) and [Protocol 10: Determining background groundwater quality](#). **A hydrogeological assessment must be conducted for all public waste disposal facilities with the exception of transfer stations.**
- 4) **Ground Temperature Monitoring Plan** – Monitoring of ground temperature is a way to determine impacts to permafrost. This plan must include ground temperature monitoring locations, frequency of monitoring, and monitoring methodology. **A ground temperature monitoring plan must be prepared for all modified transfer stations and landfills constructed on permafrost.**
- 5) **Natural Attenuation Assessment** – this assessment determines whether contaminants from the landfill leachate will naturally attenuate to the extent that all contaminants will be below the applicable standards in the *Contaminated Sites Regulation (CSR)* at the point of contact with all relevant receptors. The modelling must take into consideration the type of waste, the expected leachate quality, the underlying soil permeability and stratigraphy, the groundwater flow direction and velocity, and the distance to receptors. The assessment determines whether the stratigraphy and hydrogeology of the site is adequate for waste disposal. The modelling must be conducted by a qualified professional. **A natural attenuation assessment is required for all Class 2 landfills and some modified transfer stations, depending on the construction option chosen.**

Once a complete permit application is submitted (including all required supporting plans), the siting, construction, and design plan will be reviewed internally and/or externally. The cost of the external review of reports such as Hydrogeological Assessments are the responsibility of the proponent, as outlined in the [Technical Review guidance document](#).

Furthermore, an assessment under the *Yukon Environmental and Socio-economic Assessment Act (YESAA)* is required prior to constructing, operating, or making a significant modification to a public waste disposal facility. The assessment must be completed before a permit for the facility can be issued. Consult the [Yukon Environmental and Socio-economic Assessment Board](#) for further information.

The *Environment Act* and Regulations may be viewed online at Yukon.ca, or at any Yukon Public Library, territorial agent, territorial representative or regional services office. You may purchase copies at the Inquiry Centre, Government of Yukon Administration Building, 2071 Second Avenue in Whitehorse, or by mail from the subscriptions clerk, Government of Yukon Queen's Printer, Box 2703, Whitehorse, Yukon, Y1A 2C6 (phone 867-667-5783 or toll free 1-800-661-0408 extension 5783).

Siting requirements

In order to reduce the environmental and human health risk of waste disposal, it is important that waste disposal facilities be constructed in a suitable location. Recognizing that many facilities in Yukon were established prior to the development of the *Solid Waste Regulations* and associated standards, the siting requirements described below only apply to new waste disposal facilities and do not apply to existing facilities.

The requirements described in this section apply to modified transfer stations and landfills. Please contact the Environmental Programs Branch for information on siting criteria for transfer stations.

Modified transfer stations and Class 1 and 2 landfills must be sited in a location that meets all of the following requirements:

1. The boundaries of the facility must be 300 m from the highest observed water level of any surface water body;
2. The boundaries of the facility must be 300 m from a drinking water well or the determined capture zone of a drinking water well;
3. The boundaries of the facility must be 500 m from a building used for human occupancy or the storage of food;
4. The boundaries of the facility must be 100 m from any public road allowance, railway, right-of-way, cemetery, highway, or thoroughfare;
5. The boundaries of the facility must not be within 100 m of an unstable area, such as a fault line or an area subject to slides or avalanches, or within any distance where an unstable area puts the facility at risk;
6. The boundaries of the facility must be 15 km from an airport or aerodrome unless the Airport Authority undertakes a risk evaluation;
7. The facility must not be located within a 100-year floodplain;
8. The location(s) where cells are to be constructed must have a slope of 6% or less;
9. Depth to groundwater at the site must not be shallower than 3 m below the elevation of the buried waste base; and
10. The facility must be located at least 100 km by road from the closest public waste disposal facility, unless that facility is a transfer station.

When applying for a new facility permit, all public waste disposal facilities must submit the application form and the following information to the Environmental Programs Branch for approval:

1. Siting plans, which must include:
 - a. A summary of the terrain within 1 km of the proposed facility - this is a general description of the topography and surface drainage patterns in the area;

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- b. A scaled map showing the location of drainage areas and surface water features as well as location and layout of the proposed waste facility.
2. A preliminary assessment of the surficial geology, including:
 - a. A description of predevelopment soil conditions;
 - b. Confirmation that the proposed facility location does not have surficial sand, gravel, or other coarse soils, or fractured bedrock within 3 metres below the ground surface.
3. A geotechnical assessment, which must be conducted by a qualified professional to determine the suitability of the site as a waste disposal facility. The assessment must consider bearing capacity, differential settlement, and slope stability during construction, operation, and after closure.
4. Information confirming that there will be a minimum buffer of vegetation on all sides of the facility, as follows:
 - a. For Class 1 landfills, a minimum 30 m buffer is required;
 - b. For Class 2 landfills, modified transfer stations and transfer stations, a minimum 15 m buffer is needed.
5. If a facility is to be constructed over permafrost, the applicant must demonstrate that no suitable alternative exists. Facilities sited on permafrost must be sited on thaw stable permafrost and designed to minimize ground thaw and facilitate redevelopment of permafrost after closure. Ground temperature monitoring must be undertaken to ensure that the surrounding ground is unaffected.

Construction requirements

It is important to construct the waste disposal areas of the facility, also known as landfill cells, properly to minimize the impact of landfill leachate on the environment. The construction requirements described below apply to new facilities and new cells constructed at existing facilities. The requirements do not apply to vertical expansion of existing cells (i.e., when new waste is landfilled on top of previously buried waste).

General facility construction requirements

At all facilities, berms and/or ditches must be constructed to prevent surface water from flowing onto or off the active portion of the facility, designed to accommodate a 1 in 25 year storm or snowmelt event, whichever is greater.

Cell construction

At the time of cell construction, all organic overburden removed from the cell location must be stockpiled and retained for the life of the cell to be used for revegetation during closure of the cell. Waste cells at modified transfer stations and landfills must be constructed such that there is either:

- a. A minimum separation of 3 m between the base of the cell and the highest observed groundwater elevation; OR

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- b. A minimum separation of 1.2 m between the base of the cell and the highest observed groundwater elevation with a 2 m thick layer of soil with a maximum hydraulic conductivity of 1×10^{-6} cm/s below the entire base of the cell.

The remaining construction requirements vary depending on the type of facility:

Class 2 landfills

Class 2 landfills must meet one of the following two construction options:

1. Demonstrate that contaminants from landfill will naturally attenuate via Natural Attenuation Assessment. OR
2. Comply with the construction requirements for a Class 1 landfill.

Class 1 landfills

In addition to the general requirements noted above, all new Class 1 landfills must meet all of the following requirements:

1. Each Class 1 facility must use one of the following bottom liner systems:
 - a. A compacted soil liner with a maximum hydraulic conductivity of 1×10^{-7} cm/s and a minimum thickness of 1 metre;
 - b. A composite liner consisting of a compacted soil liner with a maximum hydraulic conductivity of 1×10^{-7} cm/s and a minimum thickness of 60 cm, overlaid by an impermeable flexible membrane liner with a minimum thickness of 60 mil (1.5 mm); or
 - c. A double liner system consisting of two impermeable flexible membrane liner layers, each with a minimum thickness of 60 mil (1.5 mm). (This system will be permitted only in areas where low-permeability soil is unavailable.)
2. All Class 1 facilities must have a leachate collection system installed above the bottom liner system:
 - a. The leachate collection layer must have a minimum permeability of 1×10^{-3} cm/s and must be of an appropriate thickness and design, with perforated piping as needed to facilitate the movement of leachate to a collection point. Where the facility is constructed with a double liner, a leachate collection system must be installed above each liner.
 - b. A protective geotextile must be placed immediately above the bottom liner and again immediately above the leachate collection layer.
 - c. A protective cushion layer with a minimum thickness of 30 cm must be placed above the geotextile and below the liner to protect the leachate collection system from damage.
 - d. The facility must be constructed with approximately a 2% slope towards the leachate collection point to facilitate drainage.

Monitoring requirements

Environmental monitoring is essential to demonstrate adequate landfill performance, to detect potential adverse impacts from the facility operation, and to inform remedial actions when necessary.

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The types of environmental monitoring required depend on the type of facility and the method of waste disposal.

All Class 1 and Class 2 landfills and modified transfer stations must conduct regular groundwater and surface water quality monitoring. Water quality monitoring may also be required for modified transfer stations, depending on the construction option chosen. Results from the water quality monitoring program will be interpreted in the context of Contaminated Sites Regulation (CSR) [Protocol 13: Adaptive Management](#).

If a facility operates an incinerator, as defined in the Air Emissions Regulations, periodic emissions monitoring is required. Open burning of waste is prohibited in the public solid waste facilities.

Groundwater quality monitoring

When groundwater quality monitoring is required, a minimum of one groundwater monitoring well must be installed upgradient of the facility and a minimum of two groundwater monitoring wells installed downgradient of the landfilling areas. Additional downgradient wells may be required if two wells are not sufficient to monitor impacts from all landfilling areas at the facility. The wells must be installed in locations and at depths that yield samples representative of the shallowest aquifer upgradient and downgradient of the facility. Downgradient wells shall be positioned between the landfilling areas and downgradient receptors, where possible.

Groundwater quality monitoring of all active wells at the facility must occur twice annually, generally, in spring and fall, to coincide with maximum and minimum groundwater table elevation.

All groundwater samples must be analyzed for parameters in the field and in the lab as listed in the permit. Typically, these parameters are:

- Field parameters: temperature, specific conductance, oxidation-reduction potential, dissolved oxygen, and pH
- Major ions (Calcium, Magnesium, Sodium, Potassium, Chloride, Sulphate, Nitrate Nitrogen, Nitrite Nitrogen, Phosphate)
- Dissolved metals
- Hardness, alkalinity, carbonate, bicarbonate
- pH, specific conductance
- Total dissolved solids
- Ammonia
- Dissolved organic carbon
- Chemical oxygen demand
- Volatile organic compounds
- $LEPH_W$
- EPH_{W10-19}
- VH_{W6-10}
- VPH_W
- BTEX
- PAHs

Groundwater monitoring wells should be installed, developed, sampled, and decommissioned as per Contaminated Sites Regulation [Protocol 7: Groundwater Monitoring Well Installation, Sampling & Decommissioning](#).

Surface water quality monitoring

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Surface water samples must be collected twice a year from all downgradient surface water bodies within 1 km of the facility that may be impacted by the facility, as indicated in the hydrogeological assessment or as directed by an environmental protection analyst. Where appropriate, samples should also be collected upgradient of the facility for comparative purposes. Samples should be collected at the same time as the groundwater monitoring program to the extent possible.

Surface water samples must be analyzed for the parameters listed in the permit. Typically, these are the same as listed above for groundwater, substituting total metals for dissolved metals, removing volatile organic compounds, and adding biochemical oxygen demand.

Ground temperature monitoring

Ground temperature monitoring must be conducted at modified transfer stations and landfills constructed over permafrost. This involves installing thermistors in appropriate monitoring wells and collecting regular temperature data, at minimum, twice a year.

Leachate quality monitoring

Sampling of leachate will be required for any facility with a leachate collection system. Contact the Environmental Programs Branch for additional information.

Landfill gas monitoring

Monitoring for landfill gas may be required at a Class 1 landfill depending on the potential for landfill gas generation. Contact the Environmental Programs Branch for additional information.

Operating requirements

The permit issued to the operator of the facility stipulates the day-to-day operating requirements for the facility. Typical requirements are included below.

Security and fencing

All putrescible waste storage and disposal areas are required to be located within an electric exclusion fences and gates to prevent dangerous wildlife entering the encompassed area of the site. The fence needs to be electrified during prescribed times of the year, typically between March and November. All gates need to be closed and secured when not in use by authorized personnel. Please refer to the [electric fencing guidance document](#) for information on installation and operation.

Cover material

1. Any exposed waste placed in the cell shall be covered with soil or other comparable material to a depth of 0.1 metres after every 0.5 metres of solid waste is deposited. This requirement does not apply between November 15 and April 15 if local source of cover material is not available.
2. The alternate cover option may include using rigid steel plate systems to cover the waste temporarily, such as overnight.
3. Snow is not an acceptable cover material.

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Asbestos disposal

Asbestos is allowed to be accepted for disposal at a public solid waste facility. If asbestos is to be accepted, it should be buried in a segregated area of the facility where personnel do not regularly work. Furthermore, the asbestos should be covered immediately after burial. This will reduce the risk of inhalation of harmful asbestos fibres. Asbestos that is unbound or fibrous should be contained and saturated with water prior to burial.

Drainage

Promote surface water drainage away from the waste to reduce leachate formation. The stormwater can be diverted using trenches, culverts, berms, retention ponds, and surface grading. Clear snow from the waste cell to reduce amount of snowmelt contributing to leachate.

Burning and Incineration

In accordance with the 2009 Yukon Solid Waste Action Plan, public waste disposal facilities are not allowed to open burn solid waste. However, burning of untreated brush and wood products, which are not considered solid waste under the *Solid Waste Regulations*, is allowed. Untreated brush and wood products include natural brush from land clearing activities (e.g., brush, branches) and clean wood. Clean wood is defined as wood that does not contain paint, stain, chemicals or glue, such as felled trees, lumber and pallets. Clean wood does not include engineered wood products such as plywood, particle board, oriented strand board, and cardboard.

Requests for waste incineration or open burning may be considered by the branch in special circumstances. Such requests will be evaluated with respect to the environmental impacts and specific situation.

Record keeping

The landfill operator is required to keep records at the site. The records may include information on the type and amount of the waste placed in the waste cells, intermediate cover placement, any open burning and incineration, construction, maintenance and repair of any landfill component, electric fencing, and waste cell closure.

Closure requirements

Throughout the lifetime of the facility old landfill cells will be closed and new cells constructed. It is recommended that facilities pursue a “progressive closure” approach, in which small areas of cells are filled with waste and closed, and then waste disposal operations move to the next portion of the cell. This helps to reduce the amount of leachate generated by the landfill. It also helps to spread the costs of cell closure over time. Eventually, once the facility has reached its capacity for waste disposal or is no longer needed, the entire facility must be properly closed.

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Cell closure

Cells that are no longer being used for the disposal of solid waste must be properly capped and contoured. The cover material needs to be compacted to a final depth of 0.6 m with a maximum hydraulic conductivity of 1×10^{-6} cm/s when compacted to 95% of Standard Proctor. The surface of the cell must be contoured (smoothed over), which helps direct surface water away from the buried waste, protecting the cap from erosion and minimizing the infiltration of water into the cell.

Alternatively, a geomembrane can be used as a cover material. Prior to placement of the geomembrane, the waste must be covered with a minimum of 300 mm of fill material. The geomembrane liner must be a low-density polyethylene (LDPE) flexible membrane with a minimum thickness of 40 mil (40 thousandths of an inch). After placement of the liner, a layer of soil with a minimum thickness of 450 mm must be placed over the liner to facilitate the drainage of water away from the landfill cell. The liner system must be installed by a qualified person in accordance with the manufacturer's specifications for the liner.

After placement of the cover material, berms, ditches or other measures must be constructed to divert surface water from flowing over the closed cell. Once capped and contoured, the area must be left in a condition conducive to re-vegetation. This requires providing adequate natural seed or rootstock (such as by replacing the organic overburden that was removed and stockpiled during construction) and providing an adequate topsoil layer. It is recommended that a minimum of 150 mm of topsoil be used to assist with revegetation.

In accordance with the permit issued to the facility, the permit holder must make the branch aware of the closure of all cells. This notification must include photos of the cell before and after closure, details about the cover material used including its permeability and final thickness, a description of the efforts made towards revegetation, and a description of the means to ensure that surface water is diverted away from the closed cell.

If any issues are observed with the closed cell, such as ponding water on top of the cell, erosion of cover material, uneven settling of the cover material, or protruding waste, these issues must be immediately resolved to limit the impact of the buried waste on human and environmental health.

Facility closure

A permit holder must submit a closure plan to the branch and apply for an amendment to their permit prior to proceeding with closure of the facility. Before the permit can be amended to allow for closure, the facility must undergo another YESAA assessment for closure of the facility. Consult [YESAB](#) for further information on the assessment process.

The closure plan must include the following information:

- a. Information about the closure of any cells that was not previously reported to the branch;
- b. The intended final disposition of any wastes stored aboveground at the site (e.g., burial in a cell, transfer to another facility for burial, recycling, etc.);

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- c. Procedures for notifying the public about closure of the facility and providing information on other facilities that are available to them;
- d. A description of the intended final use of the site and how this use will be promoted;
- e. Methods to be used to restrict access to the site to discourage continued use of the site as a waste disposal site and plans for removing waste that is deposited at the site following closure;
- f. A proposed monitoring plan to observe and remedy any issues with the cell cover covers following closure, such as erosion, ponding water, or uneven settlement, for a period of at least 25 years following closure;
- g. A proposed monitoring plan for groundwater, surface water, and landfill gas, as appropriate, for a period of at least 25 years following closure;
- h. A plan for the continued collection, sampling, and removal of leachate, as appropriate, for a period of at least 25 years following closure; and
- i. The estimated cost to carry out the closure and post-closure activities and how this cost will be covered.

The permittee may proceed with closure activities once the branch has approved the closure plan. Following completion of the closure activities, the permittee must submit a follow-up report to the branch confirming that the site was closed in accordance with the approved closure plan. The follow up report must include a final site plan showing the locations of all closed cells and photos of the closed site. Once the follow-up report has been approved by the branch, the facility will enter the post-closure period in which regular inspections and environmental monitoring is required for a minimum period of 25 years.

Conversion to a transfer station

In some cases, the permit holder may choose to convert an existing modified transfer station or landfill into a transfer station. Once a report documenting the closure of all cells at the facility is submitted to and approved by the branch, in accordance with the “cell closure” requirements described above, the facility will enter the minimum 25-year environmental monitoring period. Prior to closure of the transfer station, the permit holder must submit a closure plan as described above.

For more information on the *Environment Act*, please contact:

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