Northern Land Use Guidelines

Camp and Support Facilities

Northwest Territories Lands

Contents

Acknowledgements

The northern land use guidelines were originally developed and published by Aboriginal Affairs and Northern Development Canada in the 1980s and are comprised of land use guidelines on six topics, each in handbook format. The original guidelines were intended to help operators of small to medium-scale projects carry out activities in northern Canada in an environmentally sensitive manner. Since then, those handbooks, commonly called "The Blue Books," have been widely distributed and quoted. Their success is a tribute to the efforts of the original authors and contributors as well as those who contributed to the updates which followed.

This new series of northern land use guidelines is, in part, an update of the earlier series. Much of the information and many of the photographs presented in this series were obtained in consultation with land use administrators and resource managers in the Northwest Territories.

CHAPTER

1

Introduction

The Government of the Northwest Territories considers the balanced and sustainable management of land to be central to the future ecological, economic, cultural and political prosperity of the Northwest Territories (NWT). This series of guidelines is designed to assist proponents and operators when planning, assessing and undertaking various land use activities on Territorial and Commissioner's Land throughout the NWT. Activities on land under private ownership (e.g., Aboriginal or Inuit-owned land) and/or land under municipal responsibility require direction from the appropriate agency.

The guidelines include information on the mitigation of environmental issues when operating temporary camps for land use projects, the operation of roads and trails on public land in the NWT, techniques and best practices for the operation of pits and quarries, and assistance for the planning, undertaking and reclamation of seismic programs.

While these guidelines use the most up-to date information, they do not replace the applicable acts, ordinances, regulations and permit terms and conditions. It is the responsibility of the user to follow the current regulatory requirements of the Northwest Territories and it is recommended that users also utilize local research, traditional knowledge, engineering or other professional expertise specific to a proposal and advice from the appropriate regulatory agency.

figure 1a & 1b. Temporary camps range in size and type of support facilities required.

CHAPTER

2

Planning and Design

These guidelines describe the four phases of camp development, as outlined in Table 2–1, and best practices for development at each stage. The entire life cycle of a camp, from construction through operations and reclamation, should be considered before development begins. Proper planning saves time and money as a camp that is well planned prior to construction will minimize project delays and reduce the risk of adverse environmental impacts.

To minimize new land disturbance, proponents should assess the possibility of having a community-based operation or use an existing camp. Once a location is chosen, existing environmental, administrative, social and cultural information should be collected (Table 2–2). Information gaps can then be filled by conducting field investigations. A baseline environmental study will identify sensitive environmental conditions that may require special attention. Undisturbed site conditions can also be recorded for use during closure and reclamation. Baseline information can include soil, permafrost, vegetation, surface water and groundwater quality, and fish and wildlife habitat. All of this information will enable the proponent to provide a complete land use permit application to the appropriate land use regulator.

Table 2–1. Four phases of camp development.

1 planning and design →	2 camp construction →	3 operations and maintenance →	4 closure and reclamation
• Gather and analyze information • Select a site • Conduct a baseline study • Plan operations • Consider reclamation • Apply for a land use permit	• Plan construction • Carry out construction	• Implement maintenance programs • Conduct regular inspections • Identify and correct problems	• Prepare closure and reclamation plan • Progressive reclamation • Conduct closure and reclamation activities • Closure monitoring

2.1 Permitting

Most temporary camp developments require a land use permit from the appropriate land use regulator before activity can proceed. Permitting thresholds applicable to temporary camps include the number of person-days, the amount of fuel storage, building construction and clearing of land. Thresholds are listed in the Mackenzie Valley Land Use Regulations for the Mackenzie Valley and Territorial Land Use Regulations for the Inuvialuit Settlement Region and Nunavut.

Each land use regulator has specific requirements for permit applications. Generally, an application should include environmental background information, a description of the planned camp and the development schedule. The application should also explain how identified environmental impacts will be avoided or minimized during construction and operation of the camp.

Authorization for water use may be required from the appropriate regulatory board. Permitting thresholds for camp water use and deposition of waste are listed in Northwest Territories Waters Regulations.

Table 2–2. Information used for planning a temporary camp.

information category	information subcategories	sources
Environmental	• Topography and drainage • Surface vegetation • Sensitive landforms (e.g. pingos or eskers)	• Maps, aerial photos, satellite imagery • Northwest Territories Geoscience Office • Natural Resources Canada • Local Department of Lands office • Appropriate resource managers or regulatory boards • Local operators and residents
	• Water management	• Local Department of Lands office • Department of Environment and Natural Resources • Appropriate resource managers or regulatory boards
	• Timber/forestry	• Department of Environment and Natural Resources
	• Fish and wildlife habitat	• Fisheries and Oceans Canada • Environment Canada • Department of Environment and Natural Resources
Engineering	• Construction methods • Camp access: roads or trails	• Engineers • Field investigations • Department of Lands resource management officer
Archaeological/ cultural	• Location of archaeological sites and heritage resources • Traditional-use areas (e.g. berry-picking sites, traplines, cabins)	• Prince of Wales Northern Heritage Centre • Local Aboriginal Governments • Field investigations and local residents
Reclamation	• Reclamation standards	• Local Department of Lands office • Appropriate resource managers or regulatory boards • Department of Environment and Natural Resources

Camp water supply is also addressed in the *Public Health Act* of the Northwest Territories. The local Environmental Health Officer should be contacted to discuss water supply prior to camp development.

Other authorizations may be required depending on the scope and nature of camp development. The purpose of and responsible authority for authorizations that are commonly required for camp development are outlined in Table 2–3.

Table 2–3. Authorizations that may be required for camp development.

permit	purpose	responsible authorities
Land Use Permit	Use and occupation of the camp site	• Department of Lands (Inuvialuit Settlement Region) • Land and Water Boards (Mackenzie Valley) • Indian and Northern Affairs Canada (Nunavut)
Water Licence	Use of water or deposition of waste, for example, treatment of camp sewage	• Inuvialuit Water Board (Inuvialuit Settlement Region) • Land and Water Boards (Mackenzie Valley)
Fisheries Authorization	Work in fish-bearing waters, activities that may harm fish habitat	• Fisheries and Oceans Canada
Quarrying Permit	Obtain granular materials	• Department of Lands
Timber Permit	Clearing timber prior to camp construction	• Department of Environment and Natural Resources
Quarry Authorization/ Access Authorization	Access and work on Aboriginal private lands	• Aboriginal private landowners

2.2 Environmental Conditions

The location of a camp should be selected with care to avoid terrain that could lead to future problems. All camp structures, including fuel caches and greywater sumps, must be located at least 31 m from the high water mark of a water body to reduce the risk of impacting water quality.

2.2.1 Area

Proponents should first consider sites in previously cleared areas and in natural clearings to minimize any new land disturbances.

The size of a camp and the area required to support it will be determined by the following:

- purpose of the camp;
- number of occupants and length of their stay;
- seasons during which the camp will operate; and,
- type of support facilities (e.g., fuel storage, airstrip, roads).

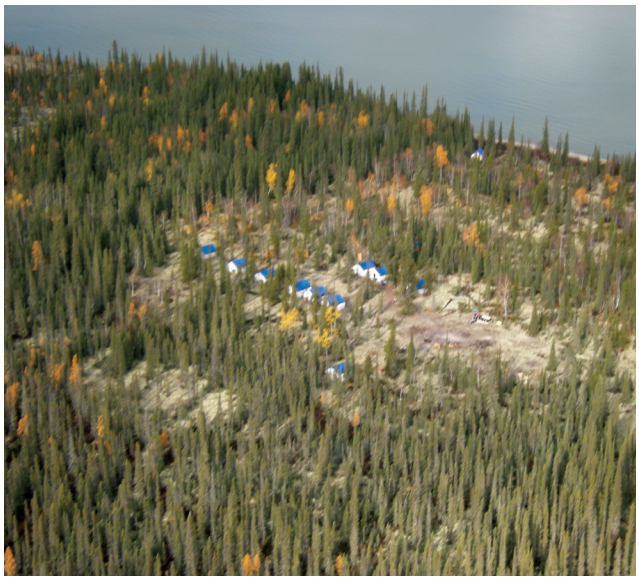
An increase in project activities may require camp expansion. To simplify future site changes, the chosen site should be large enough to accommodate expansion.

2.2.2 Durable Surface

Camps should be constructed on a durable surface, such as gravel or sand, that is consolidated and can withstand repeated, heavy use. This applies especially to camps operating during the summer, when a poorly located camp can erode and become very muddy. In more sensitive areas, elevated boardwalks can be built between camp facilities to reduce the impact of repeated use. Winter camp operations can be located on built-up snow pads and the site can be watered down to provide a durable base of ice.

2.2.3 Slope

A gently sloping site is preferable for camp construction and operations because surface water will easily drain from the site and vehicles will be able to access the site without rutting the surface. If a more steeply sloping site is chosen, slopes facing south or west may be preferable as they are usually warmer and drier.



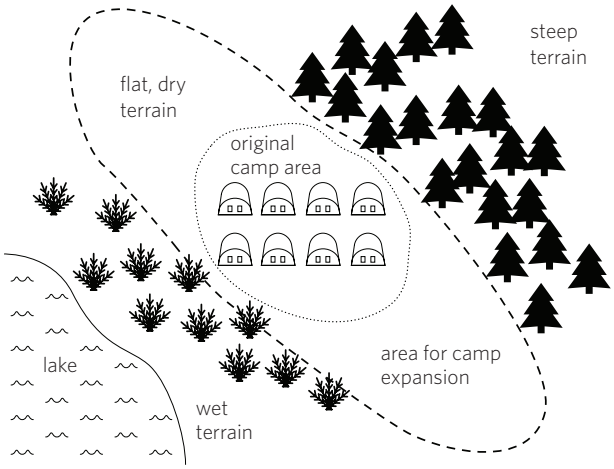


figure 2. (top) Camps should be located in existing clearings to minimize new land disturbance.

figure 3. (middle) Camps should be located where there is room for potential expansion.

figure 4. (bottom) Camps should be constructed on durable surface material.

2.2.4 Vegetation

Vegetation stabilizes the soil with its roots and reduces surface runoff by evapotranspiration through leaves. Removal of vegetation can lead to soil erosion and increased surface water flow. In permafrost terrain, removal or disturbance of vegetation that shades the ground can lead to ground thaw and subsidence.

Boardwalks built between camp buildings can reduce damage to vegetation on high-traffic footpaths. Heavily used footpaths can also be marked using stakes and flagging tape to ensure that impacts to vegetation are confined to a small area.

In the High Arctic, plants grow slowly and are slow to recover from disturbance. In this dry environment, camps should be located in areas with minimal ground cover.

Land use permits may include conditions for saving and stacking merchantable timber in forested areas. For more information on timber management, contact the Department of Environment and Natural Resources, Government of the Northwest Territories.

2.2.5 Permafrost

Permafrost underlies the ground throughout many areas of the Northwest Territories. Many areas of perennially frozen ground contain significant amounts of ground ice in the near surface. Disturbance of these areas should be avoided as the ground ice could melt and cause the ground to subside, potentially leading to soil erosion and instability of camp infrastructure. Areas of ground ice are not always identifiable from surface features, so field investigations should be conducted at the campsite to determine the extent and depth of permafrost and near-surface ground ice.

In general, the following areas should be avoided in permafrost terrain due to high near-surface ground ice content:

- patterned ground;
- fine-grained soils, particularly clays; and,
- sedge wetlands and peatlands.

figure 5. (top left) Surface disturbance can be reduced by building boardwalks between camp structures.

figure 6. (top right) The pathway is marked and streams are crossed by bridges to reduce impacts to vegetation and water.

figure 7. (bottom left) Avoid locating a camp on patterned ground.

figure 8. (bottom right) Probing for permafrost depths on a raised peatland.

Heat radiating from camp buildings may thaw permafrost, so all heated camp structures should be elevated above the ground surface to allow air circulation. Engineering advice should be obtained when establishing campsites in permafrost terrain.

2.2.6 Wind Exposure

Campsites should be planned so that there are no long stretches of recently cleared, fine-grained soils exposed to the wind as these soils are easily eroded. Natural clearings are more resistant to wind because ground cover and root systems are already well developed. Sites that are cleared by hand can be more wind resistant as tree roots may still be intact.

North of the treeline, camps should be located on high ground to avoid accumulation of wind-drifted snow. In the absence of obstacles such as trees, snow is blown into low-lying areas, so a camp located on low ground would require frequent snow removal.

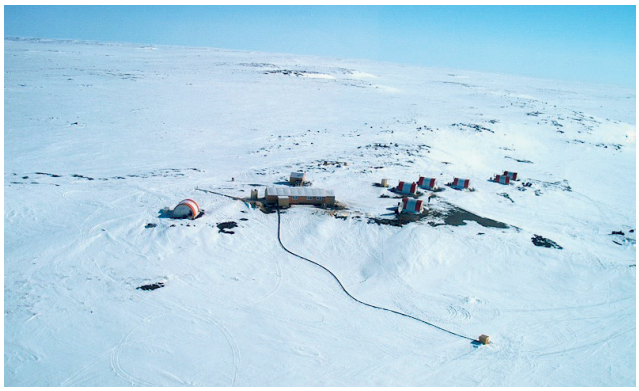


figure 9. On the tundra, camps located on high ground require less snow removal.

2.2.7 Wildlife Habitat

Construction and operation of temporary camps and support facilities have the potential to alter or damage wildlife habitat. Proponents should identify species at risk that could be encountered or affected by the development and consider potential adverse effects of the project on those species and their habitat. If species at risk are encountered, the primary mitigation measure is to avoid disturbing them and their habitat. To discuss issues related to species at risk and for further information, proponents should contact the Canadian Wildlife Service. Information on species at risk is also available on the Species at Risk Public Registry and through the Deparment of Environment and Natural Resources.

Proponents should also be aware of the presence of migratory birds in the development area. If migratory bird nests are present, the preferred mitigation measure is to clear the area during the nesting period. Information on migratory birds can be obtained from the Canadian Wildlife Service.

2.3 Social and Cultural Values

Social and cultural values should be considered when planning a camp. Local residents should be contacted to identify values, including the area's traditional and recreational usage and cultural significance.

2.3.1 Subsistence and Recreational Values

Community members, resource users and Aboriginal groups should be contacted early during the planning process to identify sites of particular cultural, subsistence or recreational importance in the area of interest. Existing uses can include traplines, cabins, hunting areas, canoe routes or tourism. Concerns can be addressed by the proponent in the choice of camp location and design. The land use permit may also contain specific conditions to protect and minimize disruption of existing interests.

The presence of a camp may detract from the scenic appeal of a landscape, especially in areas of high tourism or recreational value. Camps should be located and designed to minimize their visual impact. The preferred mitigation measure is to avoid highly valued areas; however, if avoidance is not possible, a visual barrier should be considered.

2.3.2 Archaeological Resources

Avoid archaeological and cultural sites when choosing a camp location. Information on documented sites can be obtained from the Prince of Wales Northern Heritage Centre. Aboriginal groups, communities and governments can also provide information on traditional-use areas. Field investigations should be conducted at the proposed location during the summer prior to camp construction to identify potential archaeological or cultural sites.

If an archaeological or cultural site is discovered at any stage of camp development, work in the area must be stopped immediately and the local Department of Lands resource management officer, territorial government and regulatory board must be notified. Artifacts suggesting the presence of an archaeological site include arrowheads, old encampments or buildings.

figure 10. Contact and engage stakeholders early during the planning process.

2.4 Access

Camp accessibility should be considered during the planning stage. Due to the remoteness of most northern camps, access is often by air. Chosen methods of access should be technically, environmentally and economically feasible.

2.4.1 Roads and Trails

Roads or trails can be used to access a camp. Environmental impacts should be minimized during road construction and operation.

2.4.2 Aircraft

Camps that are supported by fixed-wing aircraft can have airstrips located on land or use nearby water bodies. Where an airstrip is required on land, an existing airstrip or topographic feature capable of accommodating a plane should be utilized before constructing a new airstrip.

Camps that rely on helicopter support should be located in an open area that is large enough to build a helipad nearby.

2.4.3 Docks

For camps located near water bodies, a dock may be required for boat and float plane access. When deciding the location and design of a dock, refer to the Department of Fisheries and Oceans' Dock and Boathouse Construction Operational Statement.

figure 11. During winter, a nearby frozen lake provides air and road access to this camp.

figure 12. A dock should be located in a sheltered area with a gentle shore and adequate water depth for float planes and boats.

CHAPTER

3

Construction

Best construction practices can save time and money by minimizing future reclamation costs. Construction plans should address site-specific environmental, social and cultural conditions identified during the planning and design phase. Specific construction activities will vary according to the purpose, size and duration of the camp; terrain conditions; local weather conditions; and, permit requirements. The proponent is responsible for adhering to all permit and regulatory requirements during and following the construction phase.

3.1 Development Timing

A key component of successful camp construction is the proper timing of activities. Winter projects should be scheduled between the average dates of fall freeze-up and spring breakup for the region, allowing adequate time for annual variability.

figure 13. Deep rutting and soil erosion can occur if operations continue too late in the spring.

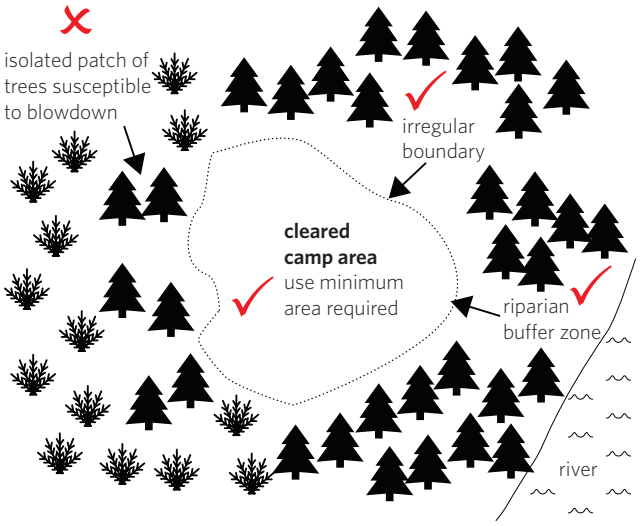
Sufficient time should be set aside for camp demobilization as serious environmental impacts can occur in late spring as the ground is thawing. Contact the local Department of Lands resource management officer for typical freeze-up and breakup dates.

3.2 Clearing

The objective of clearing is to remove vegetation to allow for camp construction without disturbing the ground surface. For small areas, hand clearing is an effective, low-impact method. Clearing can also be undertaken with a machine, such as a bulldozer, but care should be taken to avoid uprooting vegetation so that roots are left in place to prevent soil erosion. Bulldozers can be equipped with mushroom shoes or a smear blade to prevent tearing the surface organic layer. Camp area boundaries should be irregular and follow natural edges to reduce the risk of high winds blowing down isolated patches of trees.

Cleared brush should be disposed of in a manner that minimizes fire hazards and allows for wildlife movement. Acceptable brush disposal methods depend on the amount and type of vegetation cleared, and will be specified in the land use permit. Brush should not be disposed of in or near water bodies, or left leaning against standing timber.

Lopping and scattering is used when vegetation that was pushed down during clearing does not lie flat on the ground. Branches are removed and stems are cut into lengths so that the vegetation lies flat on the ground, enhancing decomposition.



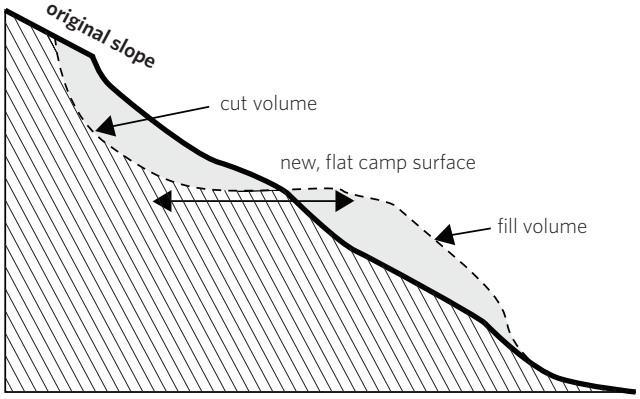


figure 14. (top) Examples of clearing techniques.

figure 15. (middle) Clearing brush with a skidder blade.

figure 16. (bottom) Cut-and-fill technique for grading a sloped campsite.

Windrowing and compaction involves piling cut brush into long rows to the side of the clearing and compacting the piles using heavy equipment to increase decomposition. Windrows should be placed at least five metres away from standing timber to reduce the risk of fire. Breaks of approximately 10 m wide should be left in the windrow at approximately 300 m intervals to allow wildlife passage.

Brush can also be disposed of by mulching with a wood chipper or a brush cutter. Resulting wood chips can be scattered on the ground, decomposing more rapidly than windrowed brush. This method reduces the risk of fire to a greater degree than windrowing.

Brush can also be completely disposed of by burning. Brush piles should be placed in the middle of the clearing to minimize the risk of fire spreading to surrounding vegetation. Set fires must be monitored at all times. Burning should not be conducted in permafrost terrain with high ground ice content as it could cause ground subsidence.

3.3 Site Grading

When there is no suitable flat terrain, the camp area may require site grading. However, site grading should be avoided in permafrost terrain to prevent ground melting and subsidence. In permafrost terrain, fill from another area may be required to create a flat building site.

Before any site excavation, organic topsoil should be stripped from the surface and stockpiled separately for later reclamation use. Material should be stored well away from water bodies to protect aquatic life. In addition:

- leave a setback of 31 m between the clearing and a water body;
- use sediment and erosion-control measures during and after construction to prevent entry of sediment into water;
- retain as much riparian vegetation as possible; and,
- stabilize stockpiled materials to prevent erosion.

On a slope, a cut-and-fill technique can be used to create a flat site. Materials are excavated from the top of a slope to be used as fill lower on the slope. However, since the excavated materials are highly susceptible to erosion, this technique should only be used if there are no other options, and should

never be used in permafrost terrain to avoid ground thaw and subsidence. Erosion-control measures should be placed on both the cut and fill areas immediately after excavation.

For winter-only camp operations, the preferred site-grading method is to level the camp surface with snow. The site can then be watered down to provide a durable base of ice.

3.4 Drainage Control

Controlling surface water drainage on the campsite will reduce soil erosion and sedimentation into streams. Drainage control is particularly important at campsites that have been graded because natural drainage patterns have been disturbed.

Drainage control options depend on the size of the site and the amount of surface runoff. The simplest method to control drainage is to construct the camp area on a gradient so that water runs away from the camp and into the surrounding terrain. Structures to slow surface runoff, such as sediment curtains or straw bales, can be used for areas with high surface runoff.

Regular maintenance is required to ensure drainage control structures remain effective. For example, trapped sediment should be regularly removed and properly disposed of to ensure that the structure continues to effectively filter sediment.

figure 17. Sediment curtains used for drainage control at the edge of a clearing.

CHAPTER

4

Operations and Maintenance

Operating maintenance and monitoring procedures should be developed during the planning phase. The proponent is responsible for ensuring that these procedures meet applicable regulatory requirements. Procedures should be reviewed and, if necessary, revised before the camp is commissioned to reflect changes that may have occurred during construction.

Maintenance should be performed on camp infrastructure on both a routine and an as-needed basis. For example, a weekly schedule to remove water from fuel containment areas can be established to maintain their storage capacity, but in the event of a large precipitation event these areas should be emptied immediately. Camp infrastructure should also be monitored on a regular basis to identify problems at an early stage before there is an environmental impact. For example, daily inspections of heating fuel drums and fittings can prevent a spill.

Problems identified while using, maintaining or inspecting the camp should be promptly addressed. An action plan for correcting problems and monitoring outcomes should be developed and implemented. For example, if solid food wastes that attract wildlife are often found in the greywater sump, filters can be installed on kitchen drains, and a monitoring schedule can be developed to determine the success of the filters in removing the solid wastes.

4.1 Fuel and Hazardous Materials

Fuel and hazardous materials have the potential to cause environmental damage at campsites if spilled. In addition to hydrocarbon-based fuels, common hazardous materials at a campsite include explosives, fertilizer, reagents for chemical analyses and glycol antifreeze. Proper storage and handling techniques reduce the risks associated with having these materials on-site.

4.1.1 Fuel and Hazardous Material Storage

On Federal Crown Land, storage of petroleum products in tanks with a capacity greater than 230 L and associated piping and equipment is regulated by Environment Canada's Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations. The purpose of these regulations is to reduce the risk of contaminating soil and groundwater due to spills and leaks of petroleum products from storage tank systems. Land use permit and water licence conditions also address fuel storage location and handling.

Location

Fuel and hazardous materials must be stored on land at least 100 m above the high-water mark to reduce the risk of fuel spills into water unless expressly authorized in the land use permit or in writing by the Department of Lands resource management officer. Fuel caches should be located on flat, stable terrain, or in a natural depression, away from slopes leading to water bodies. During

figure 18. Secondary containment structures can also be used for fuel drum storage.

camp construction, temporary storage of mobile fuel facilities on frozen water bodies may be allowed by the appropriate land use regulator.

The location and content of all fuel caches must be reported in writing to the land use regulator as soon as they are established. This also includes small fuel caches of more than 410 L (two barrels of fuel) but less than 4000 L, which do not require a land use permit. The notification should include the cache location, a description of the fuel, when the fuel will be used and when the empty barrels will be removed.

Some materials are incompatible for storage with others. Operators should maintain a current inventory of the types and quantities of fuels and hazardous materials on-site, and understand how these materials may interact. Incompatible materials should be stored in separate areas (e.g., acids and bases, or flammable and oxidizing materials). Explosives should be stored separately from all other materials. To promote employee awareness of fuel and hazardous materials, a map should be posted within the camp depicting storage locations and their contents.

Secondary Containment

Secondary containment refers to any impermeable storage structure surrounding fuel containers that has the capacity to contain the fuel in the event of a spill. Secondary containment is required for stationary fuel containers with a capacity greater than 230 L. The capacity of the secondary containment structure should be 10 percent greater than the capacity of the largest fuel container within it. Double-walled fuel tanks provide secondary containment. Engineered bermed structures are another method of containment. Berms should be of sufficient height or depth to contain the wave resulting from a major breach of a large container. Large secondary containment areas may require an oil/water separator. If possible, tanks in fuel storage areas should be elevated so that leaks can easily be spotted.

To reduce the chance of spillage, tanks with fill and dispense pipes located on the top of the tank are preferable. Valves and fittings for fuel storage tanks are often sources of leaks and should also be located within a containment area. For small fuel containers, such as drums, secondary containment is a relatively low-cost option to reduce the risk of a spill. Fuel drums used for heating camp tents should be elevated on stands and drip trays should be placed under the fittings and valves.

4.1.2 Fuel and Hazardous Material Handling

All fuel and hazardous material containers, full or empty, should be handled with care to avoid spills.

Fuel transfer areas should be stocked with adequate spill-response supplies. An impermeable liner can be placed under the fuel transfer area to confine contamination in the event of a spill. A common cause of spills is a lack of attention during fuel transfer. The transfer of fuel should always be closely supervised by trained personnel. Larger operations can designate an employee to conduct

refuelling and oversee care of the fuel transfer area. When not in use, fuel nozzles should be placed in containers to prevent drips.

Fuel drums should be kept sealed to prevent fuel from leaking. Caches with multiple fuel drums should be spaced in rows to allow for leak inspections. Fuel drums should be stored on their side with bungs at the 9 and 3 o'clock positions to prevent leakage. Drums should be raised above the ground surface to prevent rust if they are to be stored for longer than six months. All drums must be clearly marked with the operator's name so that they are easy to identify.

Fuel and hazardous material storage areas and fuel lines should be clearly marked with signs or flagging to avoid accidental breaks and punctures. These areas should be kept clear of debris and snow to facilitate routine inspections for leaks. Valves should be clearly marked so that it is apparent which valve opens which fuel tank or fuel line.

Monitoring is a critical aspect of handling and storing fuel and hazardous materials. Camp personnel should be designated to monitor storage and use of hazardous materials and to routinely inspect storage containers, containment areas, drip trays, valves and conveyance lines for leaks and punctures. Inspection records should note the occurrence of and response to leaks or spills.

Snow and water should be regularly removed from secondary containment areas and drip trays to ensure that capacity is maintained. Accumulated snow or water should first be checked for fuel contamination and contaminated material should be appropriately disposed of.

4.1.3 Storage of Empty Drums

All unused fuel and empty fuel and hazardous material containers must be removed from the campsite and properly disposed of when the operation is complete. Empty fuel drums can be collected on-site until there are enough to back-haul. Caps should be replaced on the empty drums in case there is remnant fuel within them. Costs for container removal can be reduced by progressively back-hauling drums on return trips of supply trucks or aircraft.

figure 19. This fuel storage area is well marked with pylons, and drums are stored on their side and well spaced to allow for leak inspection, but snow should be cleared to facilitate leak inspection.

4.2 Waste Management

Appropriate waste storage and disposal can lower environmental risk, minimize wildlife attractants and reduce reclamation costs through progressive removal of wastes from the site. Failure to properly dispose of waste is a common reason why land use permits remain open after site demobilization, requiring a subsequent trip by the operator to clean up the site.

Waste management practices vary depending upon waste characteristics and available facilities. Proponents should develop a waste management plan based on the following hierarchy of preferred waste management methods:

1. Source reduction
2. Reuse or recycle
3. Disposal

Source reduction involves eliminating or reducing the volume of waste generated by a camp through the use of alternative products, methods or processes. Proponents should always consider source reduction first, when planning camp operations, to reduce the amount of waste generated at the site. The following sections outline waste disposal options.

4.2.1 Solid Waste

Solid waste disposal will be specified in the land use permit. Solid waste management options include:

- incineration;
- temporary storage and removal to an appropriate facility; and,
- burial on-site (only if approved by the land use regulator, in an area that is not underlain by permafrost).

Solid waste management streams for combustible and non-combustible wastes are shown in Table 4–1.

Combustible wastes primarily include kitchen wastes and packaging that are suitable for disposal by burning. To prevent wildlife attractants and health hazards, food wastes should be stored in odour-proof containers and incinerated on a daily basis. Non-combustible wastes include materials that can negatively affect air quality if burned, such as plastics, and materials that cannot be disposed of by burning, such as metals. These wastes should be separated, organized and stored on-site for eventual

Table 4–1. Solid waste management streams.

solid waste management streams

1. **Separate combustible and non-combustible solid wastes**
   Note that plastics, styrofoam, and rubber should not be burned to protect air quality

combustible wastes

2. **Store combustible solid wastes in odour proof secure containers**
   Wastes should be stored to avoid attracting wildlife
3. **Incinerate combustible wastes daily**
   Incinerator residue should be removed from site or disposed of at an approved area on-site

non-combustible wastes

2. **Separate non-combustible solid wastes and store on-site**
   Wastes should be organized in containers with secure lids
3. **Progressively remove non-combustible solid wastes from site throughout operations**
   Make use of empty trucks or aircraft to back-haul wastes

4. **All wastes should be removed from the site at closure**
   Collect and remove wastes from the entire camp area

figure 20. A fuel-fired incinerator with a bin nearby to store non-combustible wastes.

figure 21. Temporarily stored wastes sorted into secure, labelled containers.

removal and disposal off-site.

Incineration

To promote complete combustion of wastes, a proper incinerator should be used following Environment Canada's Technical Document for Batch Waste Incineration. This document guides owners and operators of batch waste incinerators regarding proper system selection, operation, maintenance and record keeping to assist them in meeting Canada-wide standards for dioxins, furans and mercury, and reducing releases of other toxic substances.

Incinerator residue, such as ash, remaining after burning is complete should be regularly removed and properly disposed of off-site.

Open-pit burning may be used to dispose of inert cardboard and wood waste.

Temporary Storage and Removal

All wastes that are not incinerated must be removed from the campsite. Wastes that are temporarily stored on-site should be kept in secure containers at least 31 m away from a water body. Some non-combustible materials can be crushed to reduce their volume.

Stored wastes should be back-hauled on the return leg of supply trips for reuse, recycling or disposal at an approved facility.

Burial

In special cases on-site burial of non-combustible material, such as scrap metal, may be approved by the land use regulator. Burial is not an option in permafrost terrain due to the difficulty of excavation, likelihood of subsidence if ground ice is present and probability of frost-jacking heaving wastes back to the surface. Expert advice should be obtained if an on-site waste disposal facility is planned.

4.2.2 Sewage and Greywater

Sewage refers to toilet wastes, and greywater refers to water from washing and kitchen facilities. Sewage is more likely to contain pathogens, but all waste water should be stored and treated well away from the water supply.

Small Mobile Camps

Small mobile camps that remain at a site for no more than a few days may be permitted to disperse sewage and greywater over land. Overland dispersal is permitted in permafrost terrain because there is a greater environmental risk from excavating sumps than from spreading small volumes of waste water over land.

Small Stationary Camps

Camps that stay in the same place for more than a few days require wastewater treatment or storage. Sewage may be treated and disposed of on-site, placed in a pit privy or stored in a holding tank for future removal from the site by pump truck. Greywater can be stored and treated in a sump, or stored in a tank for future removal from the site by truck.

In small camps, chemical, incinerating or composting toilets can be used for sewage treatment as they can render the sewage pathogen-free, and reduce the volume of waste. However, once treated, the remaining waste, such as ash, must be removed from camp.

Pit privies can be used to dispose of sewage and provide slow treatment. In permafrost terrain, excavation of pit privies may cause the surrounding ground to thaw and subside. To prevent health problems, privies should be located downslope and downwind from the camp in deep, stable, fine-grained soil. They should also be downstream of the water intake, and at least 31 m away from a water body. Privies should be large enough to hold all of the sewage from the camp and should be covered for health reasons. The shape of the privy depends on the camp layout. For example, in a trailer camp the pit could be long and narrow to service several trailers. To control sewage pathogens, pits can be periodically treated with lime. When full, pits should be covered with at least 30 cm of compacted soil.

Greywater should not be discharged directly next to or into a water body. Instead, greywater can be stored in an excavated sump that will allow for slow infiltration into the soil. The sump should be located at least 31 m away from a water body. Coarse gravel can be placed in the bottom of the sump to provide filtration, and supports can be built on the sides to prevent slumping. The sump should have adequate capacity to store expected greywater volumes, and should be located in mineral soil. Operators should inspect the greywater sump regularly and remove food particles that may attract wildlife. When full, greywater sumps should be covered with enough material to allow for future ground settlement.

Large Stationary Camps

In larger camps with greater volumes of wastewater, a portable sewage treatment system or an engineered sewage lagoon can be used to treat sewage and greywater. Proponents should seek expert engineering advice before siting or installing these systems, as an approval by the appropriate licensing board.

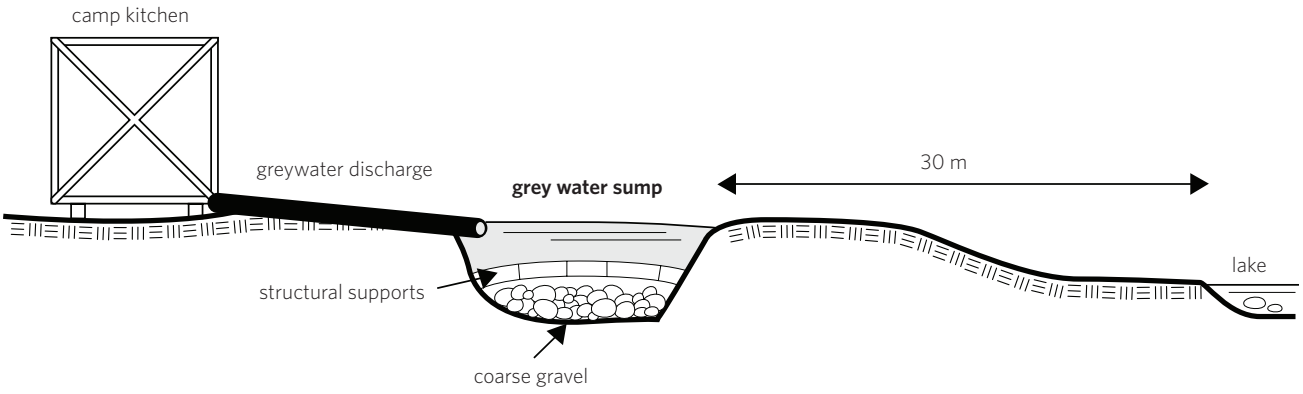


figure 22. A properly excavated greywater sump.

4.3 Water Supply

Camps require a freshwater intake for domestic water use. The amount of water drawn should not be harmful to fish or fish habitat. Water intakes should be screened to prevent fish from being drawn in. For further information, consult the Department of Fisheries and Oceans' Freshwater Intake End-of-Pipe Fish Screen Guideline. To avoid excessive drawdown during the winter, consult the Department of Fisheries and Oceans Protocol for Winter Water Withdrawal from Ice-covered Waterbodies in the Northwest Territories and Nunavut.

A water pump is often located next to the water source. Fuel should not be stored near water pumps to reduce the risk of a fuel spill into the water. Drip trays should be used underneath the pump to catch fuel drips.

4.4 Temporary Closure

Some camps are seasonal in nature. Equipment may be left on-site for the next season if properly stored and approved in the land use permit. Equipment should be protected from weather damage, vandalism and wildlife by storing it in a secure, inaccessible location. An on-site, weather-tight building, such as a grain bin, is recommended for storage at seasonal camps.

All wastes should be removed when the camp is temporarily closed. Tents and other structures should be taken down and stored, but tent frames can remain standing. Perishable food should be removed from the site and non-perishable items can be stored in a weather-tight, wildlife-proof building. Fuel drums should be resealed and stored in the fuel storage area. Fittings on heating fuel drums should be removed, the bungs resealed and drums angled so that water does not collect against the bungs.

4.5 Storage Authorization

In some cases, storage authorization may be obtained from the appropriate land use regulator to retain materials such as buildings, equipment and fuel drums at the campsite after the operating land use permit has expired. Such authorization is typically issued if the operator requires the equipment for a future land use operation in the area.

figure 23. A large stationary camp with a sewage lagoon for wastewater treatment.

figure 24. At this seasonal camp, tents will be removed and stored in the weather-tight grain bin.

CHAPTER

5

Spills

Spills are unpermitted or accidental discharges of a contaminant or waste into the receiving environment and can involve hydrocarbons or other hazardous materials. Spills of reportable quantities must be reported immediately to the 24-hour spill line at 867-920-8130 according to the Government of the Northwest Territories *Spill Contingency Planning and Reporting Regulations*.

Meeting the requirements of the *Fisheries Act* is mandatory, irrespective of any other regulatory or permitting system. Section 36(3) of the *Fisheries Act* specifies that unless authorized by federal regulation, "no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance, or any other deleterious substance that results from the deposit of the deleterious substance, may enter any such water." The legal definition of "deleterious substance" provided in Section 34(1) of the *Fisheries Act*, in conjunction with Court rulings, provides a very broad interpretation of deleterious and includes any substance with a potentially harmful chemical, physical or biological effect on fish or fish habitat.

Section 5.1 of the *Migratory Birds Convention Act* prohibits persons from depositing substances harmful to migratory birds in waters or areas frequented by migratory birds or in a place from which the substance may enter such waters or such an area.

5.1 Spill Contingency Plan

There are Spill Contingency Plan requirements through the permitting and licencing processes with the Land and Water Board regulatory processes. There are also Spill Contingency Plan requirements are listed in the *Spill Contingency Planning and Reporting Regulations* under the *Environmental Protection Act* for Commissioner's Lands and municipal lands. Fuel storage tanks located on Territorial Lands are currently regulated under the *Petroleum and Allied Petroleum Products Storage Tanks Regulations on Federal Lands Regulations*.

A spill contingency plan must be in place during all phases of the operation as per land use permit conditions and must be submitted with the land use permit application. Unexpected spill events do occur and a plan will help operators respond to them quickly and effectively. The spill contingency plan should be implemented immediately after a spill event. The plan outlines a logical order of how operators should respond to a spill, resources available on-site for spill response, and agencies and individuals who need to be notified. All project personnel should be aware of and understand the plan so that they can respond effectively to a spill. A spill contingency plan template is provided in Aboriginal Affairs and Northern Development Canada's *Guidelines for Spill Contingency Planning*.

5.2 Spill Prevention

Hydrocarbon spills from equipment are a major source of environmental damage and are often preventable. Appropriate spill response equipment should be in place during all stages of the operation, but precautions can be taken to minimize the risk of spills. Equipment should be properly maintained and in good working condition to minimize potential leaks from hydraulic hoses and other working components. Drip trays should be placed under parked vehicles, including snowmobiles and all-terrain vehicles, to catch hydrocarbon drips. Fuel storage and equipment should be inspected daily for spills or leaks. A member of the project team should be responsible for carrying out these inspections and documenting the results.

A common cause of spills is a lack of attention during fuel transfer. Fuel transfer areas should be stocked with adequate spill response supplies. Spill pads or drip trays can be used in the fuel transfer area to confine contamination in the event of a spill. The transfer of fuel should always be closely supervised by trained personnel. Larger operations can designate an employee to conduct refuelling and care for the fuel transfer area. Fuel nozzles should be contained when not in use to prevent drips, and non-drip nozzles can be used. Refuelling should occur away from the ordinary high-water mark of any water body or any natural drainage that leads to a water body.

5.3 Spill Response

Spill response includes stopping, containing, reporting and recovering a spill. Adequate spill response supplies should be available on-site that can be used to contain the spill. Once the spill has been contained and reported, photographs should be taken of the spill area, the extent of the spill should be delineated and a clean-up strategy should be developed. Ensure that there is never an ignition source in the vicinity of spilled flammable products.

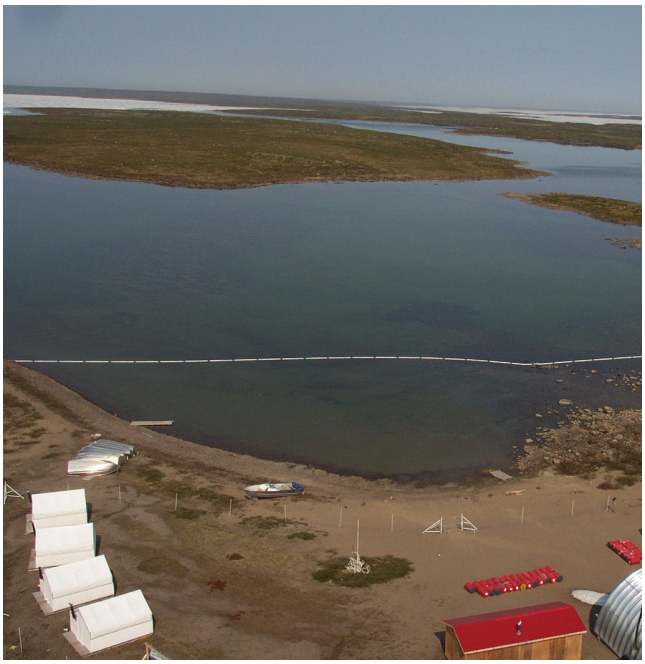


figure 25. A spill-response kit should include absorbent booms to contain spills on water.

CHAPTER

6

Closure and Reclamation

When a camp is no longer required, it must be closed and reclaimed according to the closure and reclamation plan approved by the land use regulator or as directed in the land use permit. Operators should allocate sufficient time and resources to reclamation activities while equipment and personnel are still on-site during regular operations. Returning to the site to address problems after demobilization is complete can be costly and time consuming. Progressive cleanup during camp operation is the most efficient approach to reclamation.

Land use permits require a final land use plan within 60 days after completion of the land use operation or expiration of the land use permit. The final land use plan should describe the land used, any deviations from conditions specified in the initial land use permit application, details of any fuel or chemical spills and a description of the spill cleanup measures employed.

A closure and reclamation plan is also a common land use permit requirement and at a minimum should include:

- site conditions prior to development;
- environmentally sensitive areas;
- reclamation goal(s);
- equipment and methods to be used;
- reclamation waste management practices;
- monitoring activities to assess the success of reclamation measures; and,
- contingencies if reclamation measures are unsuccessful.

6.1 Reclamation Goals

Reclamation goals provide direction for the closure and reclamation plan, and help in determining the methods and equipment needed to achieve final closure. Specific reclamation requirements may be outlined in the land use permit. Common reclamation goals include:

- Returning the site to a condition comparable to that which existed before camp development. Baseline information collected during the planning phase can be used to determine pre-development conditions.
- Reclaiming the site to a state suitable for some other land use (e.g., wildlife habitat, airstrip or equipment storage area).

Reclamation goals are a key component of the closure and reclamation plan and will require approval of the appropriate regulators. They should be discussed with all stakeholders, including community members and Aboriginal groups.

6.2 Reclamation Activities

6.2.1 Complete Removal

Camp closure requires removal of all material that was brought on-site, including structures and equipment. In addition, all garbage must be removed. Final cleanup should be conducted during the summer when surface debris is visible.

Areas contaminated by fuel or chemical spills must be completely cleaned up and contaminated soils properly disposed of.

6.2.2 Landscape Reconstruction

At sites where the topography has been changed to develop the camp area, it may be necessary to re-establish the original contours, especially if slopes have been excavated and drainage control structures have been used to control surface runoff. The goal of landscape reconstruction is to create a stable, maintenance-free site. This can be accomplished by recontouring the site to restore natural drainage patterns. If recontouring is not feasible, a stable drainage control system can be constructed to prevent surface water from eroding the site. Water collection and diversion structures, such as ditches, water bars and check dams, can be used.

Natural revegetation of the site should be encouraged to control soil erosion. This can be accomplished by spreading organic topsoil, stored during site construction, over the surface. The topsoil will provide a natural seed bank and a growth medium. A rough surface is preferable to a smooth surface to catch seeds and provide sites for growth. In non-permafrost areas, a simple way to create a rough surface is to run over the site with a tracked vehicle such as a bulldozer.

To assist erosion control as vegetation naturally re-establishes, mulched vegetation can be spread over the site, or a soil binder can be sprayed on the surface. Windrowed brush from the initial site clearing can also be spread over the site and compacted with a bulldozer to control erosion.

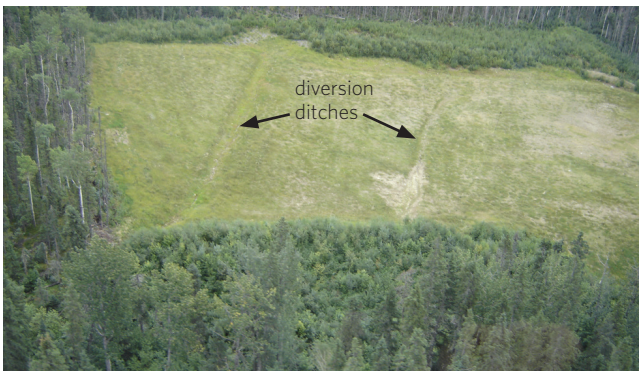


figure 26. (top) A properly reclaimed campsite with all materials removed. Core sample boxes may remain in place.

figure 27. (middle) Reclaimed sites should be stable and maintenance free. This site will require better drainage control structures to avoid further erosion.

figure 28. (bottom) Water diversion ditches can be used to control surface runoff across a site.

figure 29. Spreading and compacting brush over the site can control erosion and catch seeds.

figure 30. Willow plugs can be planted to control erosion in sensitive areas such as riparian zones.

6.2.3 Revegetation

Assisted revegetation may be required in erosion-prone areas, such as steep slopes, where recontouring and natural revegetation cannot control erosion in the short term. Revegetation can include seeding of grass or legume species, planting trees or shrubs, and using fertilizer.

Where seeding is required, native seed mixes are preferred to reduce the risk of introducing invasive species. Prior to using any seed mixes or fertilizers, or for more information on appropriate seed mixes and fertilizers, contact the local Department of Lands resource management officer and obtain advice from revegetation specialists.

If seeding is carried out during the winter and the site is located on level terrain, seeds and fertilizer can be distributed directly onto the snow cover and in most cases will successfully germinate. In other cases, it may be necessary to return to the area during the spring for seeding.

High Arctic and high altitude sites are very difficult to revegetate. Minimizing the extent of disturbance is the best mitigation approach.

6.2.4 Access

Airstrips should be reclaimed unless otherwise directed in the land use permit. All materials, including portable beacons and fuel barrels, must be removed.

Requirements for reclamation of roads are outlined in the land use permit. Primary reclamation activities include removing all materials, establishing erosion control and restricting access.

Docks should be removed from the site at closure. Ease of removal should be considered when a dock is constructed as docks that are well anchored may be difficult to remove.

6.3 Reclamation Monitoring

Monitoring may be required for several years after reclamation activities have been completed to assess whether reclamation objectives have been met. Reclamation monitoring should answer the following questions:

- Have erosion-control measures been successful?
- Is water being successfully controlled on the site?
- Has vegetation been re-established to predicted levels?

If monitoring demonstrates that some reclamation techniques have been unsuccessful, additional reclamation work may be required. When the Department of Lands resource management officer is satisfied that the site is stable and reclamation objectives have been met, the land use permit will be recommended to the local land use regulator for closure.

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Glossary

Berm

Low earth mound constructed in the path of flowing water to divert its direction.

Binder

Substance that encourages the adherence of soil particles, such as a chemical mat.

Cut and fill

Construction practice in which earth materials are excavated from part of an area and used as fill in adjacent areas.

Drip tray

A containment structure designed to catch fuel drips beneath fittings, valves or fuel transfer nozzles.

Evapotranspiration

Water lost from the soil by direct evaporation and transpiration from the surfaces of plants.

Greywater

Wastewater originating from kitchen or washing facilities.

Ground ice

Ice present in ground materials. It dominates the geotechnical properties of the material and can cause terrain instability if it melts.

High-water mark

A mark or line indicating the highest level reached by a body of water.

Peatland

Poorly drained organic terrain characterized by a high water table and the presence of permafrost.

Permafrost

Ground frozen for at least two consecutive years. Continuous permafrost is defined as an area where at least 90 percent of the land area is underlain by permafrost. Discontinuous permafrost is defined as an area where 10 to 90 percent of the land area is underlain by permafrost.

Pit privy

An excavated pit designed for storage and slow release of sewage.

Riparian

Area of land adjacent to a stream, river, lake or wetland containing vegetation that, due to the presence of water, is distinctly different from the vegetation of adjacent upland areas.

Secondary containment

A structure designed to contain hazardous materials if the primary containment, such as a fuel tank, fails.

Sewage

Toilet wastes.

Sewage lagoon

A body of water designed to contain and treat sewage.

Source reduction

Reduction or elimination of the volume of waste generated by using alternative methods or processes.

Subsidence

Ground surface settlement.

Sump

An excavated pit designed to contain waste.

Treeline

The zone above which trees do not grow. Occurs at high latitudes and high altitudes.

Appendix A:
Department of Lands Regional Contacts

YELLOWKNIFE HEADQUARTERS

4923 – 52nd St.
1st Floor Gallery Building
P.O. Box 1320
Yellowknife, NT X1A 2L9
telephone: 867-765-6727 or
toll Free: 1-888-NWT-LAND (1-888-698-5263)
fax: 867-765-5667
email: Lands@gov.nt.ca

BEAUFORT-DELTA REGION

86 Duck Lake Road
Bag Service #1
Inuvik, NT X0E 0T0
telephone: 867-777-8900
fax: 867-777-2090

SAHTU REGION

31 Mackenzie Drive
Northern Cartrols Building
P.O. Box 126
Norman Wells, NT X0E 0V0
telephone: 867-587-7200
fax: 867-587-2928

DEHCHO REGION

Regional Education Centre
2nd Floor
P.O. Box 150
Fort Simpson, NT X0E 0N0
telephone: 867-695-2626
fax: 867-695-2615

NORTH SLAVE REGION

140 Bristol Avenue
16 Yellowknife Airport (mailing)
Yellowknife, NT X1A 3T2
telephone: 867-765-6653
fax: 867-873-9754

SOUTH SLAVE REGION

Fort Smith Office
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Evergreen Building
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Fort Smith, NT X0E 0P0
telephone: 867-872-4343
fax: 867-872-3472

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