



Department of Lands

GRANULAR RESOURCES

Quarry Development Plan

<Pit Location>

<Company>

<Date>



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SECTION 1: INTRODUCTION

1.1 Purpose

The Government of the Northwest Territories (GNWT) Department of Lands (Lands) has developed this template of a Quarry Development Plan (QDP) for the Northwest Territories to identify the information required to efficiently process quarry permit applications and to apply consistent standards to the design and operation of quarries.

A Quarry Development Plan is to describe the design and operation of the quarry from initial development through to final reclamation. A QDP is intended to be complementary, not duplicative, to the terms and conditions contained in regulatory authorizations (licences or permits).

1.2 Quarry Design

An optimal quarry design should minimize the area of disturbed land but also provide enough space to safely conduct all phases of development.

The GNWT – Lands “Blue Book” for Pits and Quarries should be referenced.

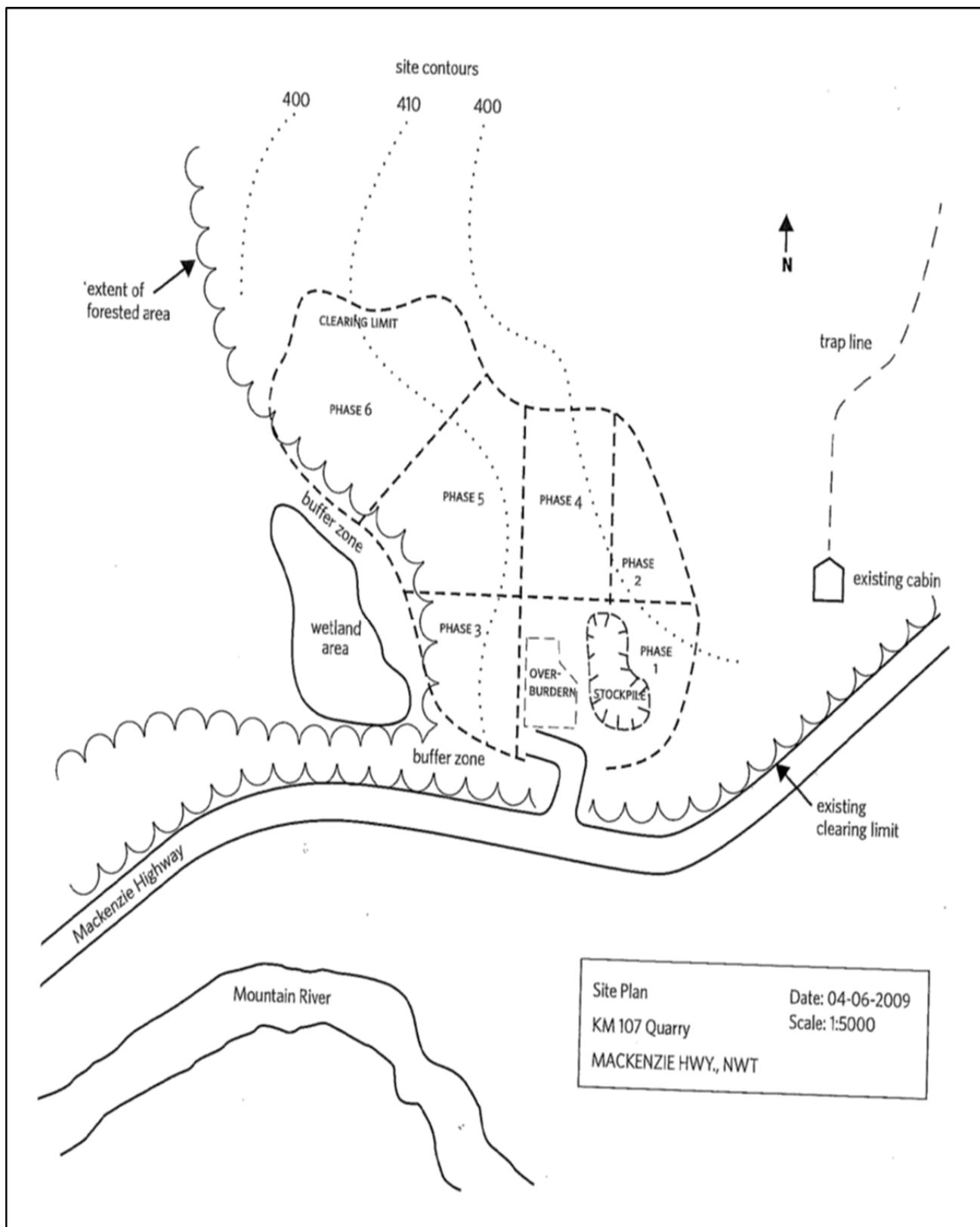


Figure 1
Environment and
Climate Change



SECTION 2: DESCRIPTION OF THE DEPOSIT

2.1 Relevant Reports and Associated Documents

This section will contain a list of all known documents relevant to the design and operation of the quarry. Information sources should be dated and properly referenced.

2.2 Location

Topographic maps for all areas of Canada are available freely for downloading¹. Topographic maps of the gravel source can be obtained from some past geotechnical reports for many gravel sources in the NWT. Maps, and/or satellite-imagery, is to be provided. The information provided will include an outline of the proposed quarry area with GPS coordinates.

Department of Lands ATLAS website is available to the public to access maps/imagery.

<https://www.maps.geomatics.gov.nt.ca/HTML5Viewer/index.html?viewer=ATLAS>

2.3 Surface Water and Hydrogeology

This information may require further field work. Furthermore, this section will include information about what water licenses, if any, must be obtained to conduct a quarry activity at this site based on existing hydrogeology characteristics.

Provide information on surface or subsurface water features in or near the proposed quarry area.

2.4 Test Hole Locations and Descriptions (Omit if a Land Use Permit is required)

Test hole locations and descriptions of the gravel source can be obtained from geotechnical investigations and reports. Additional field work may be needed to adequately define the quantity and quality of materials, and potential hazards to the development of the source. This section should include the coordinates of test holes, and descriptions of the areas where test holes were completed.

2.5 Summary of Test Hole Results (Omit if a Land Use Permit is required)

This section details the types, quantities and qualities of materials found within the quarry, based on test hole results. Geochemical results should be included here for determining where potentially acid generating (PAG) material which has acid rock drainage (ARD) potential is located. Information provided assists in assessing the site and determining quarry suitability. Proponents are to ensure this information is provided.



2.6 Depth of Overburden and Topsoil

This section describes the depth of overburden and topsoil at the material source. This information should also be available from geotechnical reports, but additional field work may be needed to adequately delineate these materials.

2.7 Ground Ice Content

This section details the type of ground ice that is present in permafrost areas, and its extent within the material gravel source. The type and amount of ground ice may have an impact on the seasons and locations of quarry operations or in the least provide for greater certainty of methods to be employed during the operations to ensure more efficient extraction activities. Areas of massive ground ice shall be avoided.

2.8 Highest and Best Use of Materials

This section is a description of the grades of material that can be found in the material gravel source, and what their best uses are for the pit designation. Therefore, each class of material within a deposit will have a designated end use which will maximize the efficient and responsible use of the deposit. This can also help prevent high grading, which is the use of higher quality materials that are required for a specific purpose. Information about the classes of material available within a source can be found in existing geotechnical reports.

2.9 Archaeology

This section outlines the archaeological potential of the land on which the quarry lies. An archaeological survey may be required by Conditions in a Land Use Permit (LUP). If no LUP is required, the Prince of Whales Northern Heritage Center must be contacted prior to issuance of the quarry permit.

2.10 Acid Rock Drainage (ARD) and Metal Leaching (ML)

Some quarries may contain minerals that contain metals and sulphur, these minerals when exposed to the natural environmental conditions can oxidize and eventually produce acid. This acid is then dispersed through runoff, streams or other watercourses it is called acid rock drainage. Acidic runoff can be harmful to the receiving environment.

Metal Leaching occurs when the acid produced causes metals to also leach from the minerals. This metal leaching is also dispersed through runoff, streams and other water courses causing adverse effects on the receiving environment.

This section must be completed when conducting quarry pre-development operations. Include what measures and testing regime are conducted to minimize disturbance of PAG site location. Quarry location should be considered carefully if PAG material is present and ultimately ARD/ML are anticipated.



Descriptions on steps to prevent ARD and ML should PAG minerals be encountered at the development site and the management of the ARD would be a matter to be addressed in the LUP.

If a LUP is **NOT** required a copy of the sampling plan and results are to be provided as a part of this plan. If a LUP is required **ONLY** the sampling plan is required for this section.

The GNWT – *Quarry Sampling and Testing Guidance for Identification of Acid Rock Drainage and Metal Leaching Potential.*

TEMPLATE



SECTION 3: SITE PREPARATION (omit sections 3.1 – 3.7 if a Land Use Permit is required)

3.1 Access

This section will detail how the granular material source will be accessed (i.e. ice road, winter road, barge, all weather road) and the seasonality of access. Furthermore, this section will detail how access to the source will be controlled (i.e. fences, berms, posted signs, etc.). Information about how right of ways will be constructed to and at the site will be included to ensure best environmental practice. Access throughout the pit need also be included in this section.

The GNWT - LANDS “Blue Book” for Access Roads and Trails should be consulted prior to the development of this section of the Quarry and Pit Development Plan.

3.2 Timber Removal

This section describes what timber can be removed from the site, and where the timber should be piled for burning or salvage. The proponent should consider consulting the local Environment and Natural Resources staff when removal of timber is contemplated.

3.3 Vegetation Retention

Vegetation retention will be detailed in this section if applicable to development of the site. If practical, some vegetation with top soil may be retained for site reclamation (ie. exposed beach ridges).

3.4 Clearing and Grubbing

Clearing and grubbing plans will be detailed in this section. The plans will include how best to minimize impacts to permafrost through these activities when operating in permafrost areas.

3.5 Salvage and Storage of Topsoil and Storage or Disposal of Overburden

All soil should be stripped from the area to be cleared and saved for the reclamation phase. Topsoil must be stockpiled or windrowed separately and not mixed with other materials.

Further description about the exact location of the topsoil stockpile will be included in this section.

During development of a quarry, the removal and storage of overburden is a necessary activity for access to underlying granular resources. This section will contain a detailed plan for the removal and storage of overburden.

Overburden that lies above the granular resource should be removed in a manner that does not reduce the stability of adjacent ground. It should be removed ahead of quarry operations to ensure that safety during removal is not compromised by proximity to the quarry wall, and that thawed material does not slump and flow over the quarry wall.



The overburden should be stored in a location that does not cover granular resources or interfere with operations. The overburden stockpile should allow melt water from ground ice to flow away from the quarry and provide convenient access during site restoration. Environmental impacts should also be considered when determining a storage location.

3.6 Brush Disposal

The disposal of brush accumulated during quarry development will be provided in this section. The information will focus on preferred methods including, but not limited to:

- using brush for erosion control and insulation;
- lopping and scattering cleared trees; and
- windrowing brush.

3.7 Scales, Buildings or other Facilities

This section will provide the types of facilities that may be required at the site (camps, trailers, fuel storage, weigh scales, crushers, screening equipment, washing equipment), and where these facilities should be placed in order to reduce potential environmental damage.

3.8 Topographic Survey for Future Volume Checks

This section will include the most recent topographic survey (as built) which will be used to estimate how much material has been extracted from the source during the permitted quarrying activity. If it is the first time that the proponent will be operating in the quarry, a survey may be required (per Inspector's direction) to provide a base-line survey. Upon completion of removal of the permitted volume, a post activity survey would then be required to verify the volume removed from the area. This section of the Quarry Development Plan will require updating each time quarry activity is completed at the gravel site.



SECTION 4: PIT OPERATION (Omit sections 4.1 – 4.9 if a Land Use Permit is required)

4.1 Sequence of Development, Extraction and Reclamation

A sequence of extraction is necessary in order to ensure that all marketable material is removed from one area of the gravel source before moving on to other areas. This plan is in place to prevent high-grading of material. This section of the document should include a map of the gravel source in which sections of the source are blocked off and labelled in terms of extraction sequence.

4.2 Limits on type of equipment, Fuel Storage and Fuel Spill Response

Quarries of different sizes and configurations require different equipment. The information in this section will be similar to that which would be included in a Land Use Permit application. This section will further detail what equipment will be used to conduct various activities at the site. The list of equipment will be based on environmental as well as logistical considerations.

Indicate all fuel types (e.g., diesel, gasoline, propane, etc.) and for each, list the number of containers, the capacity of containers to be used, and the maximum volume that will be on site at any one time

Indicate fuel transfer methods (e.g., pumps, gravity fed, etc.) to other tanks, vehicles, etc.

Please describe the plan for (1) containment of a fuel spill and (2) steps to be taken to clean up a fuel spill including disposal of contaminated soil.

4.3 Grades of the Pit Floor

In order to encourage positive drainage as well as stable quarry walls and permafrost preservation, a quarry will need to be graded appropriately. This section will detail the planned grades within the quarry and should include diagrams. Contained water is not acceptable in permafrost regions.

4.4 Erosion Prevention

This section should detail the various techniques that must be used at the site to prevent ground erosion, while ensuring remaining resources are not contaminated with fines and organics. Requirements for recontouring the pit after each operation will also be outlined here.



4.5 Permafrost Degradation

This section must be completed when operating in permafrost soils. This section will contain information about how quarry operations will be carried out in order to avoid permafrost degradation. Permafrost degradation will reduce the availability of granular resources and increase the cost of pit development.

4.6 Local Water Management

This section should detail how water will be managed at the quarry site. Best practice for quarry sites is to minimize water inflow and control runoff.

Some considerations of this section should include:

- Diversion of surface water away from the development area, and the construction of channels and berms to do so
- Reduction of erosion at discharge points by discharging water onto rock material
- Minimization of water in the pit by directing it out by gravity or pumping

This section should also make mention of any other permits that would be required at this source from the appropriate Water Board for water discharge.

4.7 Grades of the Side Slopes/Benches

In order to maintain pit stability, and reduce the likelihood of slumping and sliding, a gravel pit should be contoured at an appropriate grade. A general benchmark grade is 2:1. This section should outline which grades will be in place at what parts of the pit and identify what the minimum grade for pit walls.

4.8 Storage Area for Coarse or Fine Rejects

During pit development, unusable materials are often encountered and as a result the plan is required to ensure orderly, and separate, storage of rejected materials. This section will define the exact locations of where rejects will be stored during quarry operations.

4.9 Storage Area for Finished Products

A separate area to store usable materials will be required in most pits. This section of the plan will detail the location of stockpiles, the maximum volume of materials to be stored in the stockpiles, and any permits required by the regulatory agency for stockpiling.



SECTION 5: PROCESSING

5.1 Processing Limits

Processing includes stockpiling, crushing, drilling, blasting, screening and washing. Each step requires space to carry out the operation (i.e., access to and room at the working face) and to stockpile the processed material.

Crushing and screening equipment and stockpiled material must be located in an easily accessible location within the quarry, i.e., accessible from the cut face and to the access road for haulage. The crusher should be situated on hard, well-drained ground as the area around it will be heavily used. Prevailing winds should be considered for dust control.

This section should set out where exactly the processing should take place during the various stages of pit development. This section could also discuss the rates of processing and the maximum volume of each material class to be removed or stockpiled.

5.2 Permits Required for Processing

This section of the Quarry Development Plan will detail any additional permits that are required for processing materials on site. Additional heavy equipment associated with crushing may require a different land use permit.

5.3 Screening Size Limits

Most quarries contain some materials which are either too large or too small for use. A complete Quarry Development Plan will detail what the maximum and minimum grain/rock sizes are in the project and how to treat and store rejected materials from screening. This section should focus on detailing materials which are of appropriate size and those which are not for use.

5.4 Crushing Size Limits

Quarries often contain materials which are too large for use without crushing. Similarly, crushing devices have a limit on the size of materials which can be processed in the device. This section will detail what size materials are appropriate for the crushing operations expected on site.



SECTION 6: RECLAMATION (Omit sections 6.1 – 6.8 if a Land Use Permit is required)

6.1 Desired future condition of the site

Having a closure plan prior to the development of a site helps operators and regulators to anticipate the scope of reclamation activities and post reclamation condition of the site. For most sites, the ideal future condition of the site would be to return it to its natural state, or as close as possible. For multi-user quarries, or for sites with a strong potential for multi-year operations, depleted areas should be restored, and active removal areas should be left in stable condition to minimize the risk of slope failure and granular material contamination.

Should the site not be reclaimed as required by the land owner, future permits shall not be issued.

6.2 Environmental Protection

The process of site reclamation must be ongoing and not relegated to the end of operations at the quarry. As a result, progressive reclamation must be employed as areas of the pit quarry become depleted and no longer used. All unused materials should be returned to the quarry, flattened and contoured at the time of final reclamation. Displaced and stored topsoil and overburden will also need to be returned and placed on top of any remaining quarry materials. Revegetation should be encouraged.

Reclamation and closure plans should include the management of any inadvertently exposed PAG material to minimize potential ARD and metal leaching.

This portion of the plan will detail not only progressive reclamation, but also final reclamation. Reducing environmental impacts should be the main focus of this section.

6.3 Aesthetics

This section of the Quarry Development Plan will focus on how the quarry site should look once it is reclaimed. This will include details on whether the site should blend into the existing landscape, and how this should be carried out.

6.4 Wildlife Habitat Enhancement

This section will outline if any provisions need to be made during reclamation to re-enhance wildlife habitat in the area. This may include a constructed route down into the quarry site and back out for migrating animals, or specific vegetation to encourage certain species back into the area.



6.5 Water Diversion or Protection

This section should detail how drainage at the quarry site should be managed for reclamation purposes. The list below is of practices which should be required for reclamation.

The proponent should:

- re-establish natural drainage where surface water was diverted away from the development area. Where original channels have been altered, new ones should be constructed to handle all flow without eroding adjacent material;
- remove culverts and replace them with erosion resistant material in a stable swale configuration;
- diversion ditches should be breached and runoff allowed to flow along the pre-development channels, where possible;
- reduce erosion at discharge points by discharging water onto durable rock material;
- pumps and piping for any fresh water supply should be removed. Care should be taken to avoid disturbance of sensitive aquatic habitat at lake shores;
- positive drainage must be established to prevent ponding; and
- settlement ponds may need to be constructed to encourage settlement of particulates in runoff.

6.6 Sloping/Benching

This section should include specific information about how the site should be sloped or benched and recontoured following quarry operations. The text below includes general principles regarding landscaping the site during reclamation.

The land should be shaped to create a stable landform that blends in with its surroundings. If the land use operation extends over a period of time, landscaping should be progressive. Gentle slopes and rounded shapes are visually preferable to straight lines.

In bedrock material that resists erosion, vertical cliffs without sloping may be acceptable. However, the quarry may have to be benched depending of the height of the quarry wall.

Overburden that was removed from the pit and stockpiles should be used to landscape the site upon progressive reclamation or project completion. It is unacceptable to leave overburden piled adjacent to the pit.

6.7 Permafrost Stabilization

This section should detail how permafrost stabilization will be ensured during pit restoration. The remediation plan for doing so will depend on the specific site. Below are some general rules for permafrost stabilization in soils with different amounts of excess ice.



The behavior of permafrost when thawing depends on the amount of excess ice which is present. Excess ice is expressed as a percentage of the thickness of ice in the total thickness of a sample. Soils with less than 5% excess ice are generally not thaw unstable and can be simply revegetated after slopes are trimmed to a stable angle, such as 2H:1V or flatter.

Soils with moderate excess ice, 5% to 20%, will release excess water and experience minor slumping or settling upon thawing. These soils should be stabilized by providing some insulation. This may consist of ice poor granular soil placed at least 30 cm thick over the affected area. Slopes should be trimmed to 3H:1V before placing the insulating layer.

Soils with significant excess ice, greater than 20%, are prone to slumping and ongoing thawing. Where this occurs in fine grained soils such as silts or clays the excess water plus any precipitation will continually wash away the soil particles which prevent a build-up of a new insulating later. These fine-grained soils can be easily washed into streams or lakes and destroy aquatic habitat.

Stabilization may involve use of geo-textiles and special construction methods. A geotechnical engineer should be consulted in these cases, especially where slopes are involved.

In all permafrost stabilization, it should be anticipated that thawing and settlement will continue until a new permafrost regime is established. Allowance for settlement should be made. The design of reclamation measures should allow for this and incorporate features to prevent ponds from forming which could delay or prevent the establishing of stable conditions.

In general, exploration trenches in frozen ground should be backfilled, or at a minimum, sufficient backfill should be placed to provide a new insulating layer over the permafrost.

Any trees which are standing at the crest of cut slopes, such as in trenches, quarries or roads, should be cut down so that any settlement which results from thawing will be uniform and toppling trees do not expose more permafrost.

Where pits have been excavated for granular materials, a depression in the topography may result. Natural flooding may create an end-pit lake that will cause permafrost to thaw and ongoing degradation of the land surface.

Ideally, proper drainage should prevent the formation of an end-pit lake. If flooding in ice-rich ground is inevitable, however, the extent of damage to the surrounding area should be forecast and monitored. Stabilizing such an area could take a long time.



6.8 Vegetation

This section will outline if any revegetation is required, and if so, what improvements will be required to encourage revegetation. The publication “Guidelines for Reclamation/Revegetation in the Yukon” can serve as a guide for determining which native plants are in the area, the seed mixture required, and the fertilizer mix for the site. Information may also be available from the Aurora Research Institute in Inuvik, regarding the various vegetation types and sources of seed that may be available for local plant varieties in the Mackenzie Delta area. All sites should be scarified.

For information on pits and quarries in the Northwest Territories, please refer to the [Northern Land Use Guidelines – Pits and Quarries](#).

TEMPLATE



GLOSSARY

Agreement for sale:	means an agreement to sell Commissioner's land to a person applying to purchase such land; (Commissioners Land Regulations)
Application:	means an application referred to in section 10, unless the context requires otherwise; (Commissioners Land Regulations)
Authorized agent	means a person recommended and designated under section 3; (Commissioners Land Regulations)
Archaeological	means any tangible evidence of human activity that is more than artifact: 50 years old, in respect of which an unbroken chain of possession cannot be demonstrated
Archaeological site:	means a site where an archaeological artifact is found
Acid Rock:	Outflow of acidic water or water high in dissolved metals drainage/from areas where the earth has been disturbed, such as metal leaching: mines. Acid rock drainage or metal leaching also occurs naturally within some environments as part of the rock weathering process.
Acid Rock Drainage:	At mine sites, natural weathering rates are typically accelerated by and/or metal increasing the surface area of rock exposed to water and oxygen as leaching a result of ground disturbance. Essentially, the disturbed rock is exposed to differing environmental conditions. This can result in Acid Rock Drainage (ARD) and/or Metal Leaching (ML) and the release of contaminants to the environment.
	ARD is a general term applied to any acidic leachate, seepage, or drainage arising from the weathering of undisturbed or excavated geological materials containing sulphide minerals or their weathering products. Weathering reactions can also increase the solubility of elements in rocks and soil, and lead to increased metal leaching.
	ML means the mobilization of metals into solution from rocks and soil under neutral, acidic, or alkaline conditions.
Angle of Repose:	Maximum angle at which a slope can remain stable.



Armour	Stones or broken rock of larger size than rip rap that are placed on stone an embankment as erosion control and protection.
Active Layer:	the layer of ground in permafrost, which thaws each summer and refreezes each fall; acts as insulation that keeps the underlying permafrost frozen.
Blend:	A type of granular material, usually within the sand sizes containing over 10% fines, which is used in the processing of select grade materials to improve grain-size gradation and compaction.
Borehole:	A small diameter hole drilled from the soil surface to collect soil samples.
Buffer strip:	An area of land that is left untouched to provide a natural barrier between a development and an adjacent area. Buffers can be used to protect important ecosystem components such as wildlife habitat or water bodies, or they can be used to provide a visual barrier between the development and an area of human use.
Carving stone:	means serpentinite, argillite or soapstone that is suitable for carving; (Quarry Regulations)
Common Grade:	Normally refers to naturally occurring pitrun within an identified borrow source that can be used for various types of construction such as rip-rap, general fill, structural fill or embankment, or for use in the processing select grades.
Commercial or Industrial use:	means use of Commissioner's land that is not primarily <ul style="list-style-type: none">(a) recreational use,(b) residential use, or(c) governmental use; (Commissioners Land Regulations)
Concrete Aggregate:	Granular material that meets the specifications for the production of cement (clean, hard, free of „fines“ or contaminates).
Construction	includes rock, gravel, sand, marl, clay, earth, silt, pumice, volcanic Material: ash and materials derived therefrom or occurring as a constituent part thereof used in construction and maintenance of public roads and other public works; (Gwich'in Comprehensive Land Claim: Volume 1)



Deposit of waste:	means a deposit of waste in any waters in the Mackenzie Valley or in any other place under conditions in which the waste, or any other waste that results from the deposit of that waste, may enter any waters in the Mackenzie Valley. (MVLUR)
Director:	means the Director of Lands Administration for the Department of Lands; (Commissioners Land Regulations)
Dog leg:	A sharp change in the direction of a road that is designed to conceal it from view for aesthetic purposes.
Dust skirt:	A sheet that surrounds the outlet of a crusher to contain and minimize dust emissions.
Exfiltration:	The removal of water from an area by percolation or absorption into the surrounding soil. Used to remove sediment from water.
Fines:	Very fine particles such as silts and clays, which can pass through a standard No. 200 sieve. Normally, material that consists of over 15 % fines is undesirable for construction but a lower limit of 5 % or less is acceptable to aid in compaction.
Granular Extraction:	The physical act of removing pit run material from the undisturbed ground, as part of developing a granular deposit forming a borrow pit.
Granular Materials:	Often used to describe sands and gravels but technically granular materials include natural sizing from silts to sand, gravel, and cobbles to boulders. Include: limestone, granite, slate, marble, gypsum, marl, gravel, loam, sand, clay, volcanic ash and stone, but do not include minerals; (Commissioners Land Regulations)
Ground-truth	The physical act of acquiring information on the ground to Reconnaissance: assess or prove geotechnical assumptions, especially with respect to determining the suitability of an identified granular deposit for future development.
In-Situ:	Refers to the natural, undisturbed position and characteristics of granular materials in which they were originally formed or deposited.



Granular resources: Materials ranging from silts to sands, gravel and cobbles that can be used for a wide variety of construction purposes.

Ground-ice: A general term referring to all types of ice contained in freezing and frozen ground. Ground ice occurs in pores, cavities, voids or other openings in soil or rock and includes massive ice. It may occur as lenses, wedges, veins, sheets, seams, irregular masses, or as individual crystals or coatings on mineral or organic particles.

GPR: Ground Penetrating Radar is a technique used to delineate subsurface features by passing electromagnetic energy into the ground and back to a receiving antenna.

Interburden: Waste material encountered within the granular resource.

Land agent: means a person designated under subsection 4(2); (Commissioners Land Regulations)

Land agent: means a land agent as defined in the Northwest Territories Lands Regulations; (Quarry Regulations)

Lease: means a lease of Commissioner's land, but does not include a disposal of timber rights; (Commissioners Land Regulations)

Littoral: The shoreline area of streams, rivers and lakes.

Loam: means soil containing a mixture of sand, silt, clay and decomposed plant matter; (Quarry Regulations)

Material: means carving stone, loam or any naturally occurring inorganic substance used in construction, including gravel, sand, stone, limestone, granite, slate, marble, gypsum, shale, clay, marl and volcanic ash; (Quarry Regulations)

Mine: includes

- (a) a place where the ground is mechanically disturbed or an excavation is made to explore for or to produce minerals, other than a place where persons use only hand tools to explore for minerals;
- (b) machinery, equipment and material used in connection with a mine;
- (c) buildings and shelters used in connection with a mine, other than bunkhouses, cook houses and related residential facilities;



- (d) a place where mining activities such as exploratory drilling, excavation, processing, concentrating, storage, waste disposal and work associated with mine site reclamation are carried out;
- (e) a mine under construction; and
- (f) a closed mine; (*Mine Health and Safety Act*)

Minerals: includes naturally occurring minerals and mineral bearing substances, placer minerals, coal, rock, limestone, clay, earth, sand and gravel; (*Mine Health and Safety Act*)

means precious and base metals and other non-living, naturally occurring substances whether solid, liquid or gaseous, and includes coal, and oil and gas; (*Gwich'in Comprehensive Land Claim: Volume 1*)

Major Projects Resources Development Plan: A proponent's plan for selection, investigation, development, Granular closure and reclamation of several or many pits and quarries associated with a major project, whether entirely on Territorial lands or partially on Territorial lands. The plan should indicate what factors the proponent has considered in site selection, or rejection of sites, and plans for additional investigation to confirm that the sites contain the quantity and quality of material needed to meet the requirements of the project, and how the proponent would implement and modify this plan to accommodate changes that might occur during the course of the project. It is intended that this broad project-wide plan would be supplemented by specific Quarry Development Plans for individual sites. This plan should also demonstrate how it complies with any overarching regional Granular Resource Management Plan as well as any specific Quarry Management Plans, established by the Territorial or other affected land owners within the vicinity of the major project.

Overburden: Rock or soil of little or no value that is located above the desired granular deposit and must be removed prior to quarrying.

Ordinary High Water Mark: of a body of water means the limit or edge of its bed and, in case of non-tidal waters, it may be called "the bank" or "the limit of the bank"; (*Gwich'in Comprehensive Land Claim: Volume 1*)

Permafrost: Ground that is frozen for at least two consecutive years. Continuous permafrost is defined as an area where at least 90% of the land area is underlain by permafrost, while in discontinuous permafrost, between 10 to 90% of the land is underlain by permafrost.



Permit:	means a valid and subsisting permit issued under these regulations; (Quarry Regulations)
Permittee:	means the holder of a permit; (Quarry Regulations)
Pit or Quarry Operation:	means any activity at a pit or quarry associated with the development of the site, including the extraction, processing, stockpiling, or removal of materials from the site, rehabilitation of the site, and any works in connection with the site involving machinery, plant, building, vessels, and premises; (Regulations Governing the Management and Operation of Pits and Quarries on Yukon Lands)
Potentially Acid Generating (PAG)	Sulphur rich rock that when exposed to air and water can oxidize by surface weathering and form acid which can then leach metals.
Quarry Development Plan	A plan generally drafted by the developer or contractor intending to work a specific quarry site. A plan must be developed that outlines the entire project life cycle of the pit or quarry, including site conditions and design, planned operations and reclamation. The size and duration of the operation will determine the scope and level of detail required in the plan. At a minimum, the plan must include a 1:50000 scale site map showing the proposed layout of the operation, including the area of identified granular resources and proposed quarrying, existing access or clearing, the proposed overburden storage area, blasting locations and other infrastructure such as camps. In addition, a description of proposed mitigation measures to address all identified environmental concerns must be included.
Pitrun:	Raw, extracted, granular materials accessed directly from a naturally occurring source/deposit. The term is generic and not associated with material gradation or quality.
Poorly Graded:	The granular borrow source material has an excess of some particle sizes, a shortage or lack of others, or has nearly all particles the same size. This type of material is less stable than well graded materials and should not be used in projects where load bearing or structural support is required. It is suitable for backfill, berm construction or landscaping.
Progressive	Actions that can be taken during operations before permanent Reclamation: closure to take advantage of cost and operating efficiencies by using the resources available from ongoing operations. It enhances



environmental protection and shortens the timeframe for achieving the reclamation objectives.

Quarry:	means any work or undertaking in which granular materials are removed from the ground or the land by any method, and includes all ways, works, machinery, plant, buildings and premises belonging to or used in connection with the quarry; (Commissioners Land Regulations)
Quarry:	means a pit, excavation or place made by any means for the purpose of removing construction material or a site identified for such purposes, and includes works, machinery, plants and buildings below or above ground belonging to or used in connection with a quarry; (Gwich'in Comprehensive Land Claim: Volume 1)
Rip-rap	An erosion-resistant ground cover of large, loose, angular stones used to stabilize slopes and protect soil from the erosive forces of runoff.
Riparian:	An area of land adjacent to a stream, river, lake or wetland that contains vegetation that, due to the presence of water, is distinctly different from the vegetation of adjacent upland areas.
Select Grade:	Material that has been processed from raw pitrun to specific, well-graded granular sizes required for a specific use i.e. 50 mm minus, 20 mm minus, etc. Specialized equipment is needed: grizzly screener, power screener, or crusher to process the pitrun material. Material often referred to as „crushed“ or „screened“ once processed.
Slumping/ Solufluction:	A type of landslide owing to the downward slipping of a mass of debris/material into an irregular shaped pile at the bottom of an incline; often occurs along borrow pit walls if not sloped/contoured correctly (can be slow moving or sudden).
Specified	means any of carving stone, flint, limestone, marble, gypsum, Substances: shale, slate, clay, sand, gravel, construction stone, sodium chloride, volcanic ash, earth, soil, diatomaceous earth, ochre, marl and peat; (Gwich'in Comprehensive Land Claim: Volume 1)
Stockpiling:	means the storage of overburden or topsoil, or the storage of extracted or processed materials within the pit or quarry site; (Regulations Governing the Management and Operation of Pits and Quarries on Yukon Lands)



Surveyor: means a Canada Lands Surveyor or a person who is entitled to survey lands in a province under the laws of the province; (*Canada Lands Surveyors Act*)

Surveyor General: means a person who is a Canada Lands Surveyor and is appointed as Surveyor General in the manner authorized by law or a person authorized by the Minister to carry out the duties of the Surveyor General; (*Canada Lands Surveyors Act*)

Thermokarst: The undulating, irregular, surface topography due to differential thaw settlement or caving of the ground because of the melting of ground ice.

Well Graded: An important material engineering term indicating that the granular deposit has an equal amount of each gravel and sand size and little or no „fines“. These deposits are referred to as „clean“ and are excellent quality materials for construction purposes, especially where load bearing or structural support is required.

Waters: means any inland waters, whether in a liquid or frozen state, on or below the surface of land. (MVLUR)

Water body: means

- (a) a lake, stream, river, creek, pond, pool, swamp, marsh, channel, gulley, coulee, draw, estuary or other similar body that normally contains fresh or salt water, and
- (b) any Canadian waters as defined in subsection 35(1) of the Interpretation Act (Canada) that are within the Northwest Territories; (Commissioners Land Regulations)

Water Body: means an inland water body in a liquid or frozen state, including the portion of a reservoir and a wetland below its high-water mark, but does not include a sewage or waste treatment lagoon, dugout or mine tailings pond; (MVRMA – Exemption List Regulations)

Watercourse: means a natural watercourse, body of water or water supply, whether usually containing water or not, and includes groundwater, springs, swamps and gulches; (Waters Regulations)

Windrow: Method of placing materials such that they are in long, continuous rows.