

Abandonment and Restoration Plan

Introduction

Proper closure and rehabilitation of a quarry is important for public health and safety, as well as the environment. Key elements in a responsible closure plan include:

- Slope stabilization (topography restoration);
- Replacing soil;
- Promoting re-vegetation; and
- Removal of waste

The development of a plan for the closure of a quarry, an Abandonment and Restoration Plan, is critical in achieving the goal of a responsible closure. Developing the Abandonment and Restoration Plan at the beginning of a quarry's operations makes the implementation of the plan easier and more effective. The early development of the quarry's Abandonment and Restoration Plan allows for progressive rehabilitation to be an ongoing component of the operation of the quarry. Some of the benefits of this include:

- Waste can be removed as it is created eliminating a major cleanup at the time of closure;
- Extraction can be planned to make topography restoration less complicated;
- Topsoil can be properly stockpiled for use in future re-vegetation;
- Tundra can be properly stockpiled or transplanted for use in future re-vegetation; and
- Unsuitable or oversized material can be segregated and stored for future use in the restoration.

Operational waste is considered any waste generated during the operation of the quarry. It includes materials not naturally found in the area such as trash, recycling, machine parts, and packing material. It also includes material naturally found in the area but has been displaced or generated as part of the operation. An example of these materials would be stockpiles of topsoil, unsuitable material, or oversized material. All non-naturally occurring material should be removed from the site. This should be an ongoing part of the operation but should also be part of the final rehabilitation. Naturally occurring materials should not be left in stockpiles; these materials should be utilized in topography recovery.

Topography recovery is primarily defined as slope stabilization. Slope stabilization is required to ensure the abandoned quarry is left in a safe, stable condition. This includes ensuring slopes are not prone to movement, and are also resistant to erosion. Topography recovery typically will include the use of the operational waste (unsuitable or oversized) material to establish slopes that are stable, and the encouragement of re-vegetation through spreading a layer of topsoil (if available) on the slope. If sufficient material is not available from the operational waste, material may have to be imported to complete the topography recovery.

The success of re-vegetation is commonly dependent on the topsoil replacement. Soil type, thickness, moisture content, chemical composition and nutrient levels all play a part in determining the success of the re-vegetation program. Typically, native topsoil is best to reestablish native vegetation as it has suitable characteristics for the native plants. If topsoil is present in arctic climates it generally is very shallow, and soils are typically nutrient poor. Local vegetation has adapted to these soil conditions; moreover, re-vegetation is typically a long term goal. There has been limited success with the transplanting of tundra; however, this practice has generally been implemented on smaller scale applications. The use of transplanting tundra also creates a separate area of unstable soils which may prone to erosion. Therefore, unless the tundra is generated as part of the operation or from a separate endeavor this practice is not suitable for re-vegetation of a quarry. Topography recovery through slope stabilization is the major component to the Abandonment and Restoration Plan for a quarry in an arctic environment.

Progressive and final rehabilitation should consider future potential land uses after closure. If a specific land use is identified, the Abandonment and Restoration Plan should facilitate this use. If no future land use is identified the Abandonment and Restoration Plan should allow, or not impede, similar land uses that occurred prior to the operation of the quarry.

Background

Rehabilitation of the Northwest Iqaluit Granular Deposit (NIGD) will consist of both a progressive (ongoing) and final rehabilitation (abandonment) to be completed at the end of the quarry's life cycle. Organic material will be required to be stripped in advance of commencing extraction at the new quarry. Organic material will be stockpiled on site for use in both progressive and final rehabilitation. As well, depleted areas inside the quarry will be graded to ensure drainage is maintained and no ponding exists at the end of the quarry's lifecycle. The City of Iqaluit intends to lease individual lots to contractors, who in turn will be responsible for the abandonment and restoration of their own lots.

Progressive Rehabilitation

Progressive rehabilitation will be the first stage of the Abandonment and Restoration Plan for the NIGD, and will begin within 12 (twelve) months of an area being depleted. Progressive rehabilitation will include:

- Stabilizing all slopes to a maximum slope of 1 (one) horizontal unit to 1 (one) vertical unit or less. Oversized or unsuitable material may be used to stabilize slopes in this scenario.
- Organic material stockpiled on site from the stripping operations shall be spread on the stabilized slopes to promote re-vegetation.
- Depleted areas will be graded to ensure drainage is maintained and no ponding exists.
- All structures, e.g. culverts, sheds etc., installed for the extraction operation shall be removed.
- All waste material to be removed.

Final Rehabilitation

Final rehabilitation will be the final stage of the Abandonment and Restoration Plan for the NIGD, and will begin within 12 (twelve) months of the closing of the quarry. Final rehabilitation will include:

- Stabilizing all slopes to a maximum slope of 1 (one) horizontal unit to 1 (one) vertical unit or less. Oversized or unsuitable material may be used to stabilize slopes in this scenario.
- Organic material stockpiled on site from the stripping operations shall be spread on the stabilized slopes to promote re-vegetation.
- Depleted areas will be graded to ensure drainage is maintained and no ponding exists.
- All temporary roads will be removed or blocked.
- All drainage structures to be removed.
- Access road to be removed or blocked.
- Silt protection to be removed.
- All waste material to be removed.