



Gahcho Kué Project - DeBeers Team	
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Project Descriptions- Sections
Volume 1
➤ Plain Language Summary
➤ Section 1 – Introduction
➤ Section 2 – Project Alternatives
➤ Section 3 – Project Description

Presentation Outline

- Gahcho Kué Project Overview
 - *Alternatives*
- Surface Footprint/Infrastructure
- Water Management Plan
- Conceptual Reclamation and Closure

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Gahcho Kué Project

Project Overview



Project Overview

- Project Overview
 - ❖ Project Description - General
 - ❖ Site History
 - ❖ Location
 - ❖ Kimberlite Deposits
 - ❖ Mining Method
 - ❖ Mining Sequencing
 - ❖ Employment
 - ❖ Project Timelines

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Project Overview

➤ The proposed Gahcho Kué Project:

- ❖ **Open Pit Diamond Mine**, to access three diamond bearing kimberlite deposits (5034, Hearne, Tuzo)
- ❖ **Located at Kennady Lake** - 280 km NE of Yellowknife
- ❖ **Vertical pipes** located under Kennady Lake
- ❖ To safely access the deposits under the lake, **proposing to dewater** Kennady Lake

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Site History

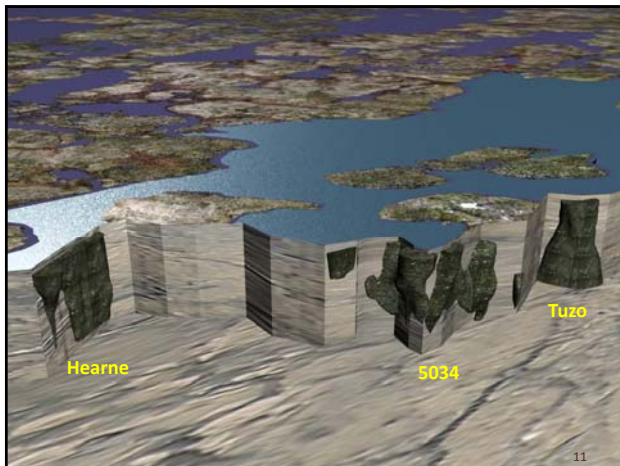
- ❖ 1992 Exploration initiated by Mountain Province Diamonds & Camphor Ventures
- ❖ 1995 Diamond-bearing kimberlite 5034 confirmed at site
- ❖ 1997 De Beers and Mountain Province Diamonds establish Joint Venture
- ❖ 1997 5034 Pit defined
- ❖ 1997 Hearne Pit and Tuzo Pit located
- ❖ 1999 Bulk Sampling Program
- ❖ 2001-02 Bulk Sampling
- ❖ 2004-08 Core Drilling Programs
- ❖ 2009-10 Feasibility Study
- ❖ 2011 Tuzo Deep Drilling Program

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Mining Method-Alternatives

- The three ore bodies in Kennady Lake will be mined using open pit mining methods

➤ *Alternative Considered*

- ❖ **Underground mining alternative** considered but not selected

➤ **Challenges**

- ❖ Safety concerns
- ❖ Water Management (managing inflows to the mine)
- ❖ Technically challenging (maintain sufficient layer of competent, water-tight rock between mine workings and overlying lake)
- ❖ Economically less favourable (capital and operating costs, ore sterilization)

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Mining Sequence and Extraction Rates - Alternatives

- Kimberlite pipes will be **mined in the sequence** (5034, Hearne, Tuzo)
- **Alternative Considered**
 - **Parallel mining** considered but not selected
 - ❖ More complex operation
 - ❖ Larger footprint (mine pits not available for storage)
 - ❖ Economically less favourable (capital and operating costs)
 - The **maximum sustainable extraction rate of 3.0 Mt/y**
 - ❖ most ideal alternative from a financial, as well as environmental and technical perspective (reduce amount of groundwater to be managed)
 - ❖ Faster rate would result in no pits available for backfilling
 - ❖ Slower rate would be uneconomical

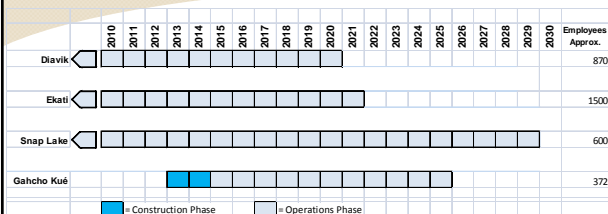
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Employment

- Peak of nearly **700** Full Time Employees during construction
 - ❖ Includes on-site and off-site employees
 - ❖ Camp capacity of 432 persons (or 216 double occupancy rooms)
- **372** Full Time Employees during operations (11 years)
- **100** or less Full Time Employees during closure & reclamation
- Although smaller than Ekati and Diavik, the proposed Gahcho Kué is an important project for the NWT's economic sustainability

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Operating Life - Existing Diamond Mines



- Proposed mines such as the Gahcho Kué Project may provide for sustained employment in the region due to proposed timeline.

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Project Timeline

- **Construction Period** (Yr -2 to -1): Dewatering and infrastructure construction
- **Operational period** (Yr 1 to 11): kimberlite mining and processing
 - ❖ 5034 ore body first to be mined, followed by Hearne in Yr 4, and Tuzo in Yr 5;
 - ❖ 5034 backfilled with mine rock starting in Yr 5;
 - ❖ Hearne backfilled with fine PK starting in Yr 8
 - ❖ Where possible, progressive decommissioning and reclamation

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Project Timeline

- **Closure** within 2 yrs after mining (end of Yr 13)
 - ❖ Removal of site infrastructure and disposal of materials on site or off site as appropriate
 - ❖ Refilling Kennady Lake and Reclamation Monitoring
- **Post Closure**
 - ❖ Monitoring

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Questions?

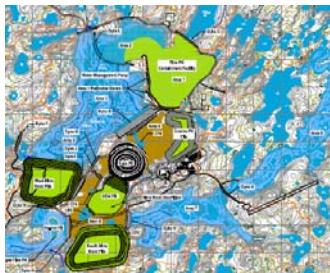


Project Infrastructure



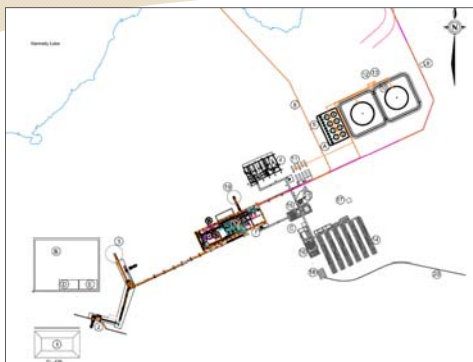
Surface Footprint

- Key objective of minimizing project footprint
 - 1235 ha
- Footprint features:
 - Mine pits
 - Camp and process plant
 - Water Management Pond
 - Dykes, diversion channels
 - Coarse PK, Fine PKC Facility
 - Mine Rock Piles
 - Airstrip



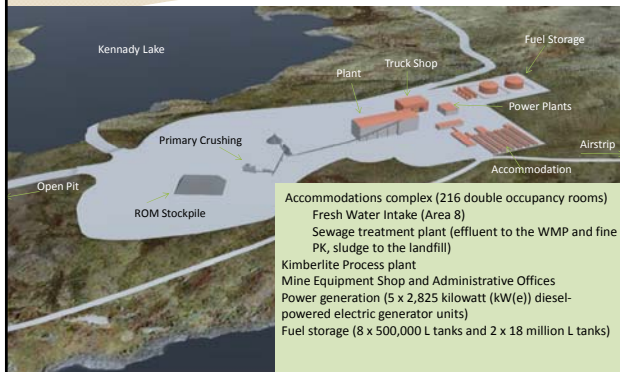
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Site Layout



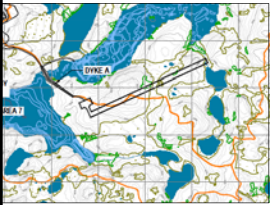
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Site Layout



Access Infrastructure

- Airstrip (45m x 1620m)
- Winter access road (120 km starting at km 271 of the Tibbitt-to-Contwoyto road)



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Waste Management Facilities

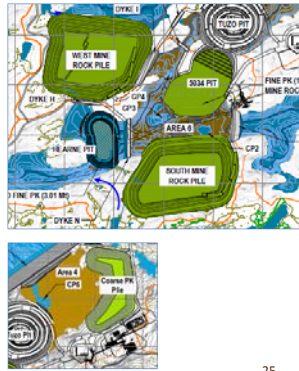
- On-site waste management areas will be used to contain and store wastes:
 - Landfill for inert solid wastes
 - Landfarm for petroleum-contaminated soils (constructed as required)
 - Incinerators for combustible waste and waste oil
 - A sewage treatment plant
 - Hazardous waste shipped off site to approved facility



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Mine Waste Products

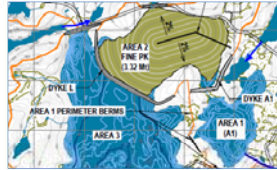
- The Project will generate mine rock, coarse PK, and fine PK rejects
- Mine rock stored adjacent to Area 5 (West Mine Rock Pile) and Area 6 (South Mine Rock Pile), and 5034 Pit
- Mine rock also used as capping material to reclaim Coarse PK and Fine PK storage facilities
- Coarse PK Pile on land beside process facility (Area 4).



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Process Rejects

- Fine PK (Processed Kimberlite)
 - Crushed and Ground Kimberlite
 - 25% of Ore
 - 0.25 mm minus
 - (Fine Sand, Silt and Clay)
 - Piped Slurry Disposal
- Stored in Fine PK Facility - 3.3 million tonnes
 - maximum elevation 429 m (8 m above final lake level)
- 5034 Pit - 1.5 million tonnes
 - >120 m depth below lake final level
- Hearne Pit - 3.0 million tonnes
 - >100 m depth below lake final level



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Project Update



Project Update

• Conformity Response

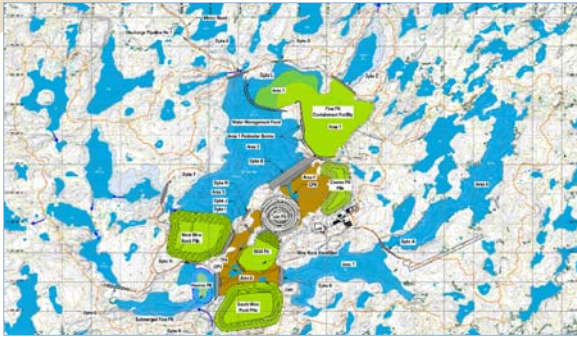
- On July 15th, conformity responses to phosphorus and permafrost was submitted to the Gahcho Kué Panel
 - Chapters 8, 9 and 10 resubmitted with assessment of the effects of nutrients completed
- On July 26th, the Panel determined that the EIS met Conformity

• Alternatives Analysis

- On going geochemistry work identified the potential for elevated P levels during post closure
- To mitigate the potential impact additional options for the disposal of fine PK were assessed
- Takes into account supplemental mitigation for the Fine PKC Facility

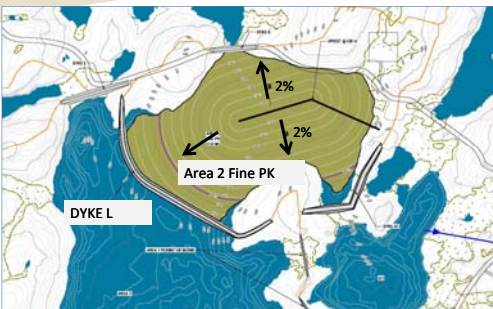
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EIS Project Footprint (for comparison)



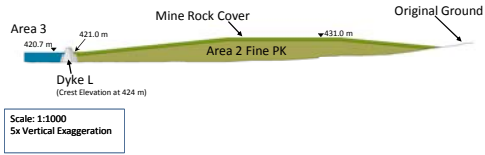
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Area 2 Fine PK



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Area 2 Fine PK Cross Section



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Water Management Plan



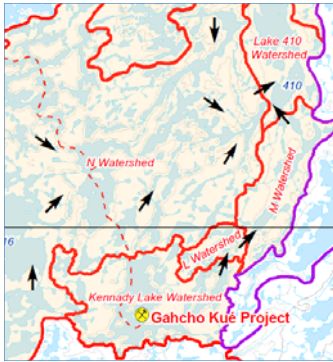
Water Management Plan - Timeline

- Construction – Years -2 to -1
 - Dewatering
 - Monitoring
 - Establishment of the Controlled Area
 - Infrastructure to transfer water between basins, pits and the WMP
- Operations – Years 1 to 11
 - Establishment of WMP
 - Monitoring
 - Operational discharge
 - Water management within the Controlled Area
- Closure (refilling) – Years 12 to 20
 - Refilling Kennady Lake – natural and supplemental inflows
 - Monitoring
- Closure (post-closure) – Years 20+
 - Recovery of Kennady Lake
 - Monitoring
 - Reconnection with downstream lakes upon meeting regulatory requirements

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Kennady Lake Direction of Flow

- Headwater Lake, Lower Lockhart River Watershed
- Natural flow north to Lake 410
- Water diverted to N11 also flows to Lake 410
- Flow returns to background levels at Lake 410 during dewatering



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Kennady Lake



At 870 hectares, or 8.7 Km², Kennady Lake is about 1% of the size of Lac de Gras.

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Water Management Strategy

- Key elements of the Water Management Plan:
 - Dewatering Kennady Lake for safe ore access, mine construction and operation
 - Dykes
 - Establishes a water control area, within which all mining and waste management activity is confined.
 - Water Management Pond (WMP) to manage contact water
 - Refilling Kennady Lake as quickly as possible to allow recovery of ecosystem

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Water Management Areas – Dykes and Other Infrastructure



Note: map to be revised

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WMP Summary

- Designed with Environmental Protection in mind:
 - Project approach is to minimize the footprint
 - All mine operations managed within the Kennady Lake watershed
 - Controlled Area established to maintain segregation of clean water away from the site and managed contact water within the site
 - Project is designed to minimize refilling time for Kennady Lake, and promote aquatic ecosystem recovery

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Questions



Gahcho Kué Project

Conceptual Closure and Reclamation Plan



C&R Outline

- **Goals and Objectives** of the Conceptual Closure and Reclamation Plan (the Plan)
- **Key concepts** central to the Plan
- **Commitments** associated with the Plan
- **Overview of key activities and schedule**
- Conceptual Closure and Reclamation Plan **Summary**

Goals of the C&R (The Plan)

- The **overall Goals** of the Conceptual C&R Plan includes:
 - ❖ **Minimize the environmental impacts** of operations to the extent practical
 - ❖ **Re-establish productive fish and wildlife habitat** as quickly as possible
 - ❖ **Create self-sustaining ecosystems**
 - ❖ **Achieve post-closure conditions** that do not require maintenance
- The C&R Plan is considered “**conceptual**” at this stage, and will be refined over time.

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Long-term Objectives

Long-term Objectives of the conceptual C&R Plan:

- ❖ **Re-establish the natural fish habitat** that maybe lost, altered, or disturbed as a result of the Project
- ❖ **Return site conditions to self-sustaining ecosystems** typical in the region
- ❖ **Create**, to the extent practical, **final landforms that integrate into the natural landscape**

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Short-term Objectives

Short-term Objectives of the Plan:

- ❖ **Reclaim areas as soon as possible** once they are no longer required
- ❖ **Minimize the risk of erosion/sediment** loss from on-site runoff
- ❖ **Stabilize slopes** to maintain safe working conditions and to aid reclamation activities
- ❖ **Restore natural drainage**, where possible
- ❖ **Establish ground cover** to limit soil erosion and dust production
- ❖ **Maintain** an environmentally safe site

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Key Concepts Community and Traditional Knowledge

➤ Community Feedback and Traditional Knowledge

- ❖ Beginning with the earliest phases of exploration at Kennady Lake, De Beers initiated and maintained contact with the various communities near the Project
- ❖ Based on feedback received during the engagement process, De Beers identified community inputs for reclamation
 - Example: restore Kennady Lake as quickly as possible
- ❖ The Plan was developed to address, to the extent possible, community inputs for reclamation
 - Example: pumping water from Lake N11 during refilling will reduce the time required to fill Kennady Lake from 20 years to 8 or 9 years

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Key Concepts-Design

➤ Design for Closure:

- ❖ Reclamation and Closure were considered in all Project Phases including the design alternative assessments

➤ Progressive or Ongoing Reclamation:

- ❖ Reclamation is expected to begin as soon as possible
- ❖ Reclamation practices will be consistent with the objectives outlined in the *Mine Site Reclamation Guidelines for the NWT* (<http://www.aadnc-aandc.gc.ca/eng/1100100024558>)

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Conceptual C&R Plan – Commitments

- ❖ Use progressive or **ongoing reclamation to minimize** the total amount of area disturbed by the Project activities at any one time
- ❖ **Recover as much soil** as practical for use in reclamation activities
- ❖ **Develop a fish habitat compensation plan** that meets the “no-net-loss” guiding principle established by Fisheries and Oceans Canada
- ❖ **Undertake reclamation trials** throughout the life of the Project
- ❖ **Liaise with other mine operators** in the Canadian Arctic – to share reclamation information/research to apply proven practices

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Key Activities Construction and Operation

➤ Construction and Operations Phases:

- ❖ **Separate** salvage and stockpile soil, overburden, and lakebed sediments, to the extent practical, from disturbance areas
- ❖ **Establish new or expanded** fish habitat areas during construction and operations phases
- ❖ **Progressively reclaim** parts of the Fine Processed Kimberlite Containment (PKC) Facility
- ❖ **Progressively reclaim portions** of the South and West Mine Rock, and Coarse PK Piles
- ❖ **Progressively backfill** the 5034 and Hearne Pits

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Key Activities Closure

➤ Closure Phase:

- ❖ **Remove all potentially** hazardous materials from site
- ❖ **Dismantle and demolish** all buildings and related structures and dispose of materials
- ❖ **Remove all above-grade** (i.e., above ground level) concrete footings and foundations and dispose of materials
- ❖ **Construct additional fish compensation** habitat near Kennady Lake
- ❖ **Construct additional fish habitat** enhancements structures
- ❖ **Refill Kennady Lake** using natural runoff supplemented by water drawn from Lake N11

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Key Activities Closure (cont'd)

➤ Closure Phase:

- ❖ Cut channels in Dykes B, K, and N to begin filling the areas around Tuzo Pit and 5034 Pit and allow for lowering of all dykes below final planned lake elevation
- ❖ Upon refilling the lake and achieving appropriate water quality, breach and/or partially remove Dyke A to connect the reclaimed portions of Kennady Lake with Area 8
- ❖ Monitor conditions over time
 - Adjust the Plan if and where necessary
 - apply adaptive management and newer proven methods as available
 - Comply with the legal requirements for closure and reclamation in effect at the end of operations

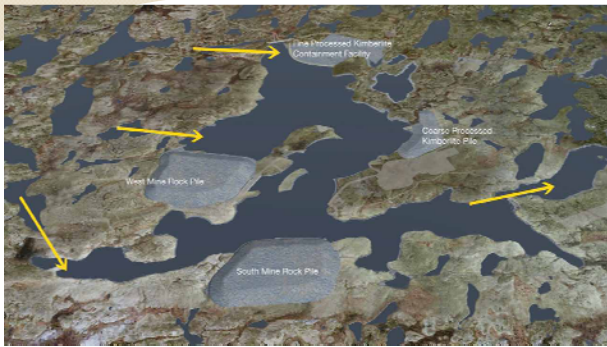
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Final Reclamation



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Final Reclamation



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C&R Plan - Schedule of Key Activities

➤ Planned Schedule:

- ❖ Closure and reclamation activities will occur throughout the 11-year operational life of the Project
- ❖ Reclamation will begin as soon as possible
 - begins in Year 3 at the Fine PKC Facility
 - extends after mine closure
 - final demobilization from site in Year 19+
- ❖ De Beers will use **proven technology and practices** to reclaim as quickly as possible.

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C&R Plan - Schedule of Key Activities

Operations Phase

Activity / Milestone	Year
Begin progressive reclamation of Fine PKC Facility	3
Begin progressive reclamation of South Mine Rock Pile	5
Begin progressive reclamation of West Mine Rock Pile	7
Begin progressive reclamation of the 5034 Pit	5
Begin progressive reclamation of the Hearne Pit	7
Begin progressive reclamation of Coarse PK Pile	6
Finish mining in the Tuzo Pit	11
Breach Dykes B, K, and N	11
Decommission explosives storage and manufacturing facilities	11
Complete construction of fish habitat compensation works	11

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C&R Plan - Schedule of Key Activities

Closure Phase:

Activity / Milestone	Year
Start to decommission processing plant and service shop	12
Complete decommissioning of processing plant and maintenance complex	12
Decommission main power plant	12
Remove main fuel storage tanks	12
Remove permanent accommodation complex	13
Achieve interim closure status	13
Reclaim site roads not required for reclamation monitoring	13
Breach Dyke A	19+
Complete the refilling of Kennady Lake	19+
Final demobilization from site	19+
Monitor post-closure conditions in Kennady Lake	20+

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C&R Plan - Summary

- **Closure and reclamation planning has been considered in all Project phases**, including design and alternatives assessment
- Progressive or **Ongoing reclamation is expected to begin and continue during construction/operations**, and be completed during the closure and reclamation phase of the Project
- The **conceptual C&R Plan includes long and short-term objectives** and will continue to **incorporates community feedback and traditional knowledge**
- De Beers will use **proven technology and proven practices** to facilitate reclamation as quickly as possible

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