

# Gahcho Kué Project

## 2012 EIS Supplement – Project Overview



# Outline

- Overview of Project Description
- EIR Submissions
- Key Elements of the Supplemental Mitigation
- Structure of the 2012 EIS Supplement
- Key Findings

# Project Description Overview

- Proposed Project Location
- Kennady Lake and location of ore bodies
- Mining method
- Project duration
- Employment
- Waste management
- Water management
- Closure activities



# Northwest Territories

Gameti

Wekweeti

Ekati

Diavik

Snap Lake

**Gahcho Kué**

Whati

Behchokò

Ndilo/Dettah

Yellowknife

Lutsel K'e

Ft. Providence

Ft. Resolution

Hay River

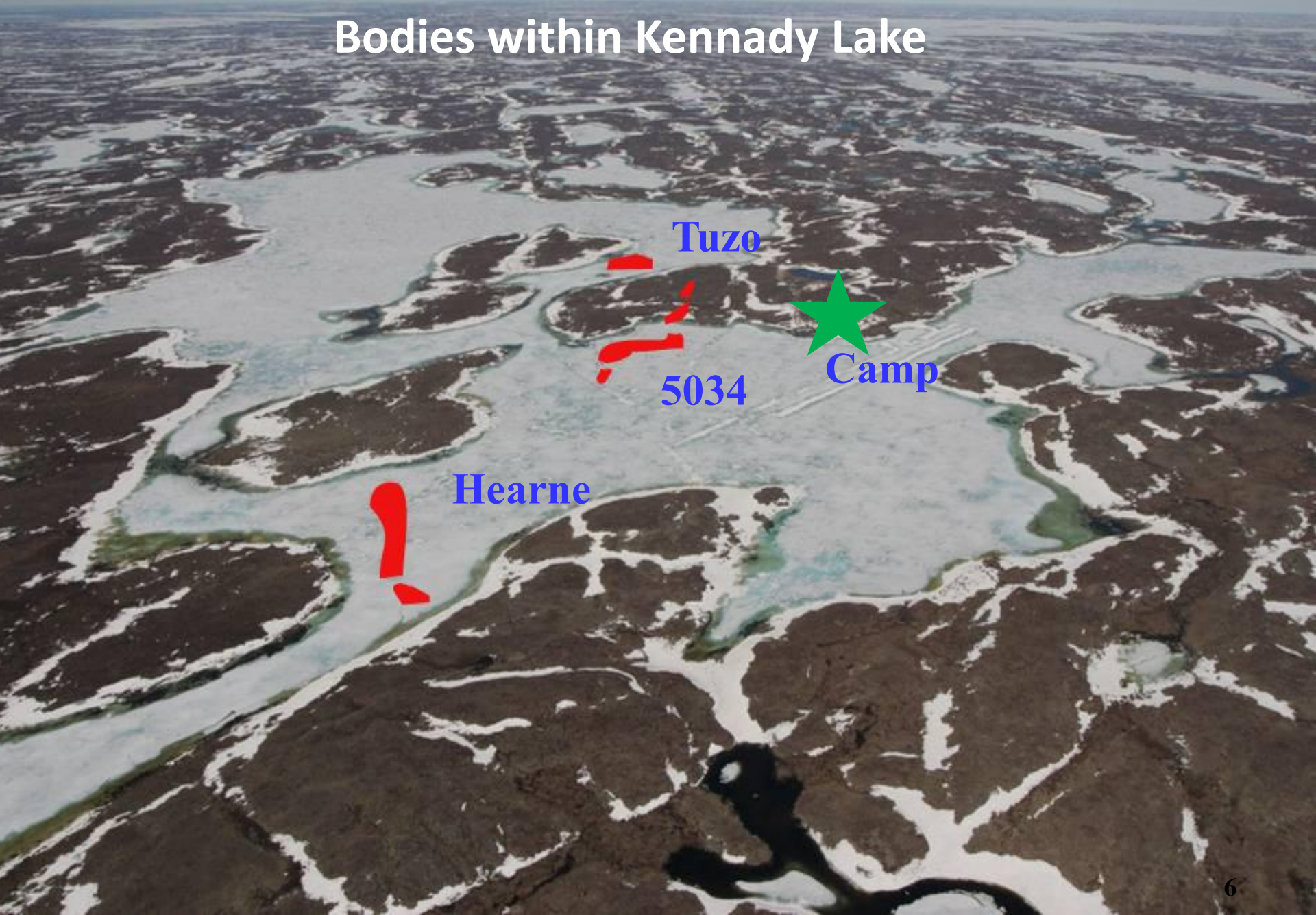
# Kennady Lake



At 870 hectares, or 8.7 Km<sup>2</sup>, Kennady Lake is about 1% of the size of Lac de Gras.



# Location of Kimberlites Ore Bodies within Kennady Lake



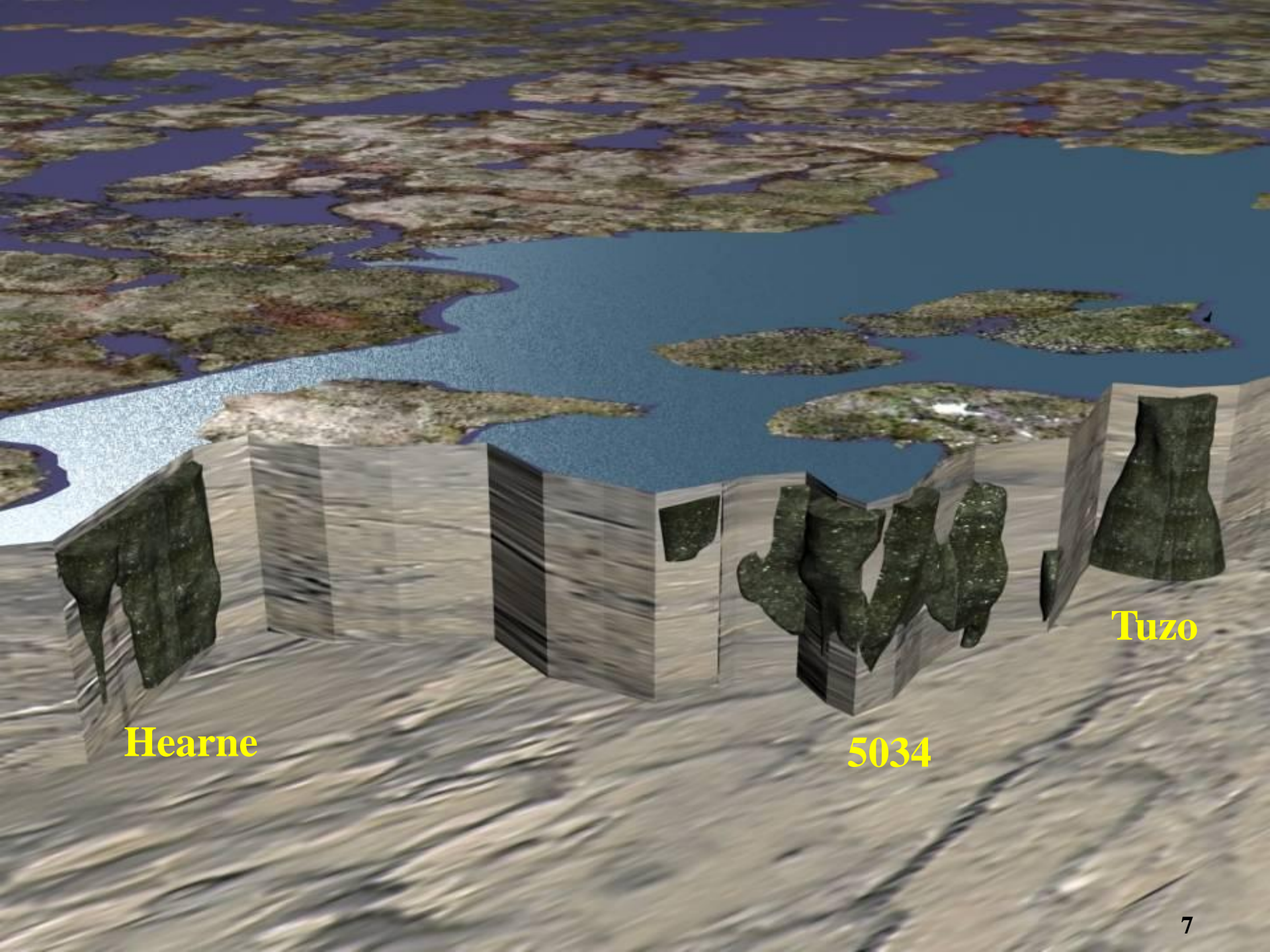
Tuzo

5034

Hearne

Camp





Hearne

5034

Tuzo

# Project Duration

## Construction Period (Yr -2 to -1)

- Dewatering and infrastructure construction

## Operational Period (Yr 1 to 11)

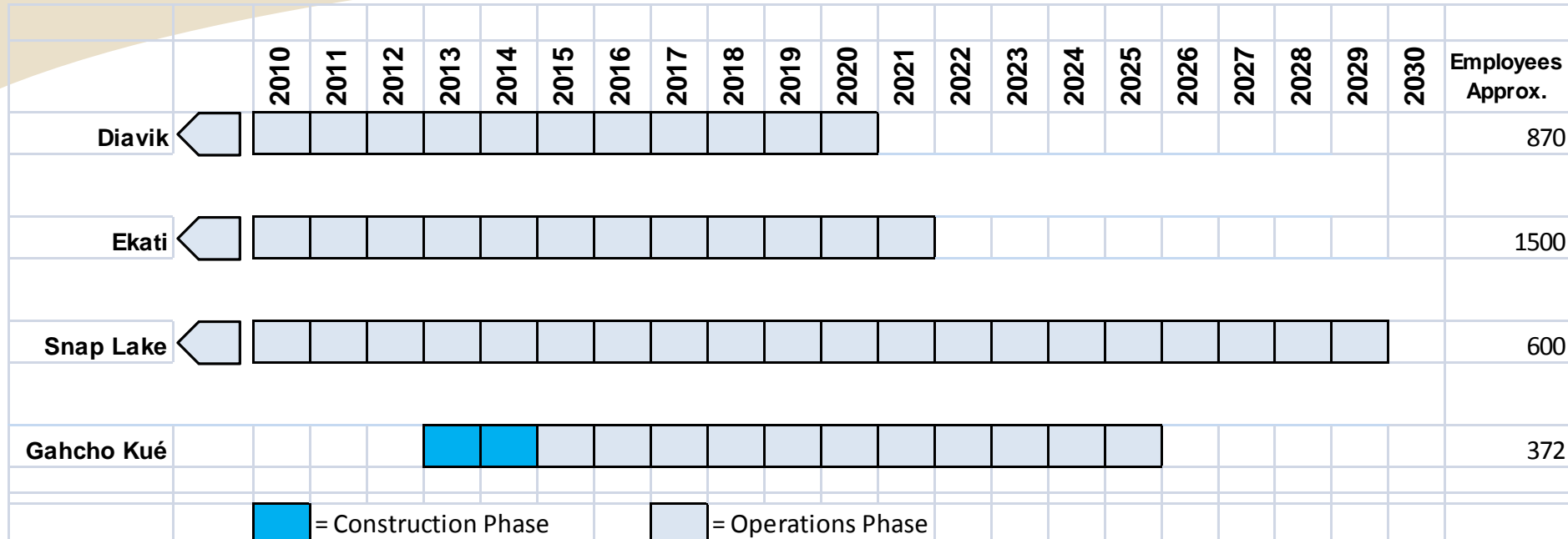
- Mining of kimberlite ore and processing
  - 5034 ore body first to be mined, followed by **Hearne in Yr 4**, and **Tuzo in Yr 5**
  - 5034 backfilled mine rock and fine PK starting in Yr 5
  - Hearne backfilled with fine PK starting in Yr 8
  - Where possible, progressive decommissioning and reclamation

## Closure Period (Yr 12+)

- Reclamation (to end of Yr 13)
  - Refilling Kennady Lake
  - Reclamation Monitoring
  - Removal of site infrastructure and disposal of materials on site or off site as appropriate
- Closure monitoring



# 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.

# 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



# Kimberlite Processing

- 3 Mt Kimberlite will be mechanically processed on site annually
- Ore will be crushed and screened through a staged process to separate diamonds
  - Fine and coarse processed kimberlite material will be generated for disposal
  - Fine PK associated with a slurry
- Process water will be sourced and recycled from the water management pond

# Waste Management

## Lake-bed sediment and overburden

- Approximately **6.5 Mt** removed
- Used for dykes and dams

## Mine rock

- Granite surrounding the kimberlite ore bodies
- Approximately **226 Mt** will be mined
  - **4 Mt** used in roads, dykes, berms and reclamation
  - **142 Mt** placed in two mine rock piles
  - **80 Mt** deposited in 5034 pit
- Potentially acid generating rock will be sequestered within the mine rock piles

## Processed kimberlite

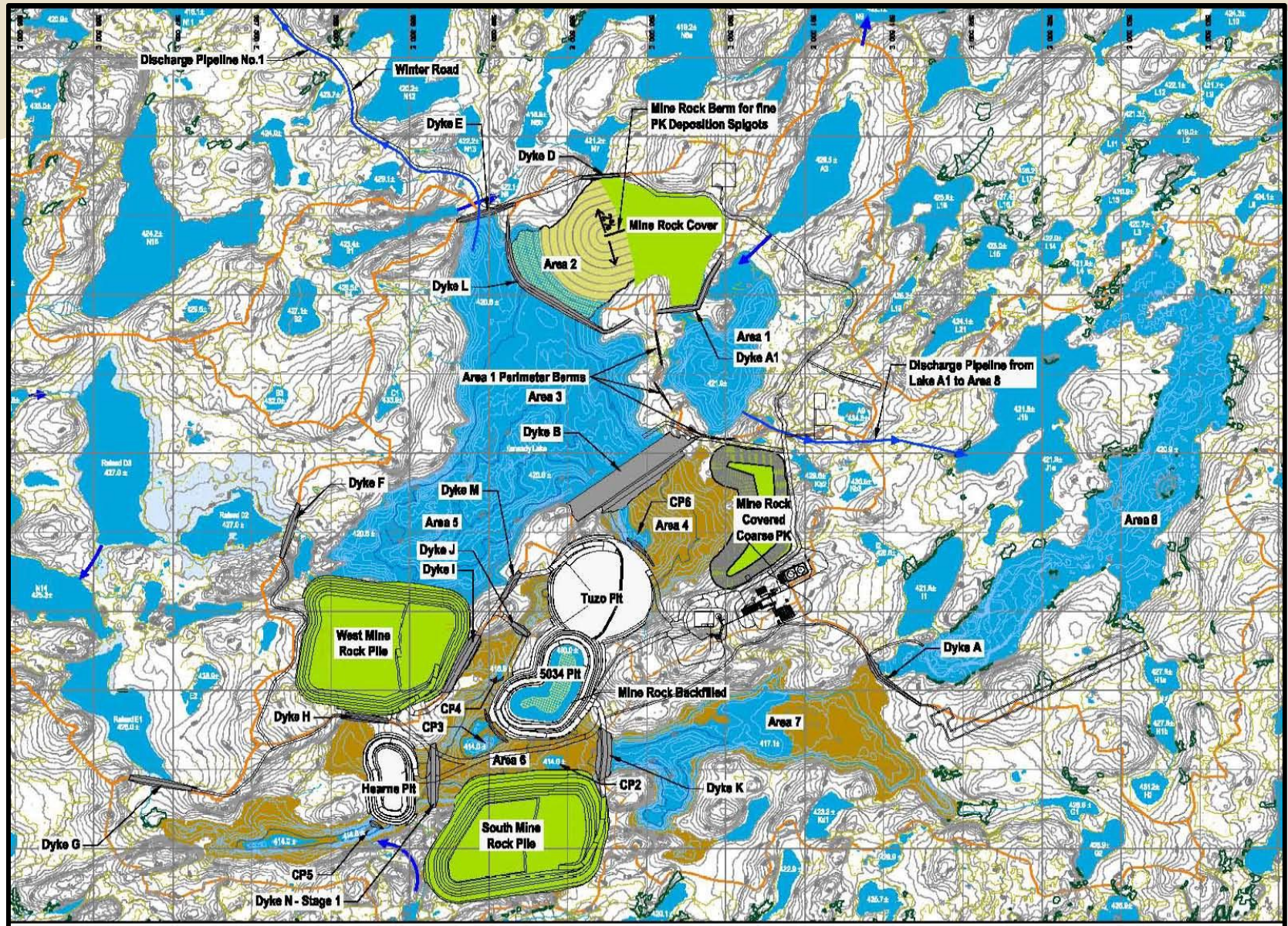
- **Fine PK** will be deposited in the Fine PKC Facility (3.3 Mt) and then 5034 (1.5 Mt) and Hearne (3 Mt) pits
- **Coarse PK** will be deposited in the Coarse PK pile (9.4 Mt) and in the West Mine Rock Pile (12.3 Mt), and also used in dyke and berm construction (1.8 Mt)

## General waste

- Domestic, industrial, hazardous materials, and sewage



# Waste Management





# Water Management

## Key Objectives

- **Dewater Kennady Lake to the maximum extent possible** to safely access and mine the ore bodies
- Utilize **passive treatment in the controlled area** and **discharge water when the water quality meets discharge requirement**
- Utilize **available containment volumes within the controlled area for water management as required**, e.g., the mined-out pits for water storage
- **Minimize environmental impacts** to adjacent and downstream waters during construction, operations, and closure phases of the Project
- **Re-establish a flow regime and self-sustaining ecosystem** in the refilled Kennady Lake after closure



# Construction (Year -1)



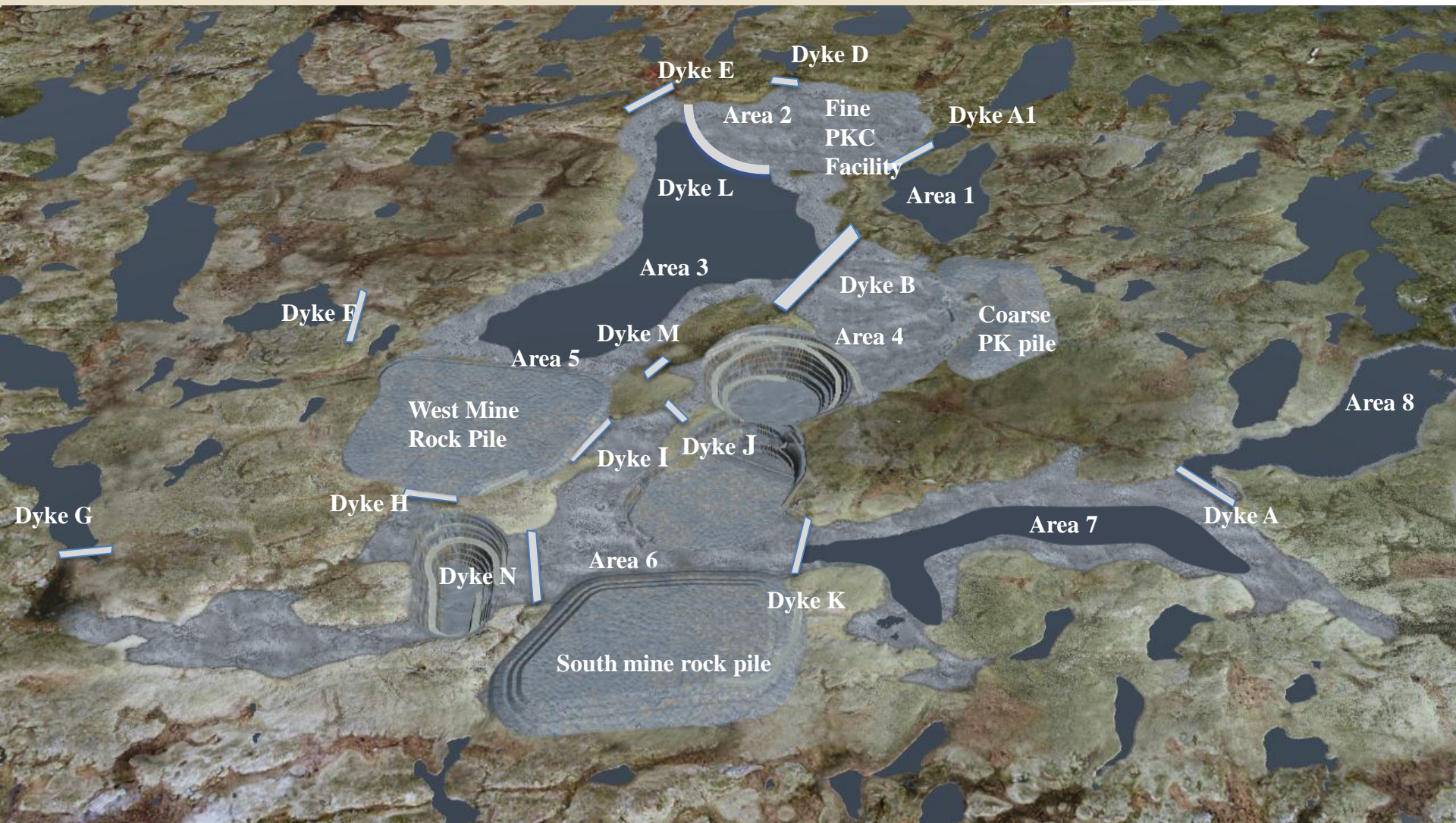


# Construction (Year -2)



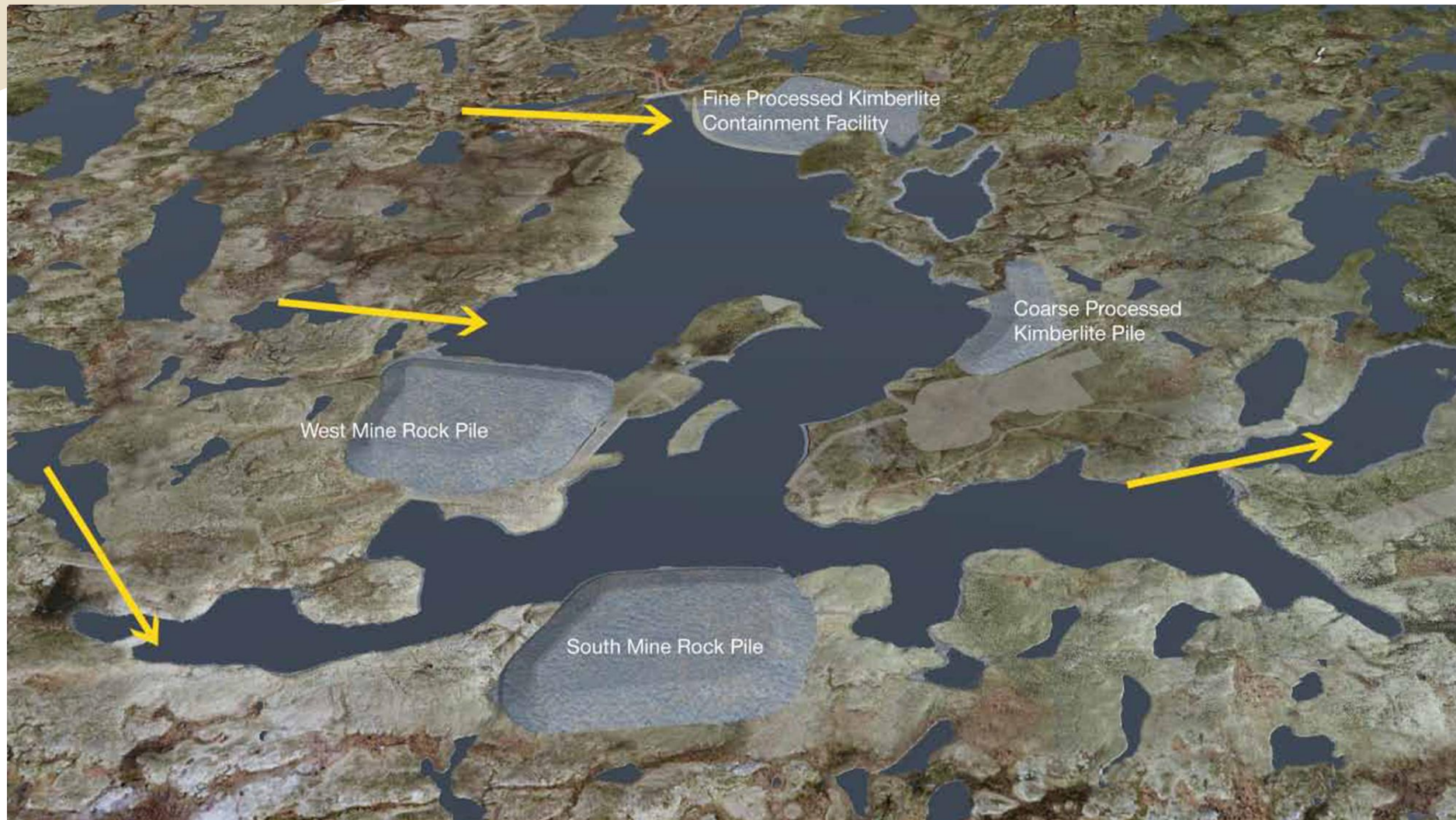


# Operation (Year 1-11)





# Closure (Year 12-20+)



# Closure Activities

## Closure Phase:

- **Remove all** potentially hazardous materials from site
- **Construct additional fish** compensation habitat/enhancement structures near Kennady Lake
- **Refill Kennady Lake** using natural runoff supplemented by water drawn from Lake N11
- 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



# Gahcho Kué Project 2012 EIS Supplement

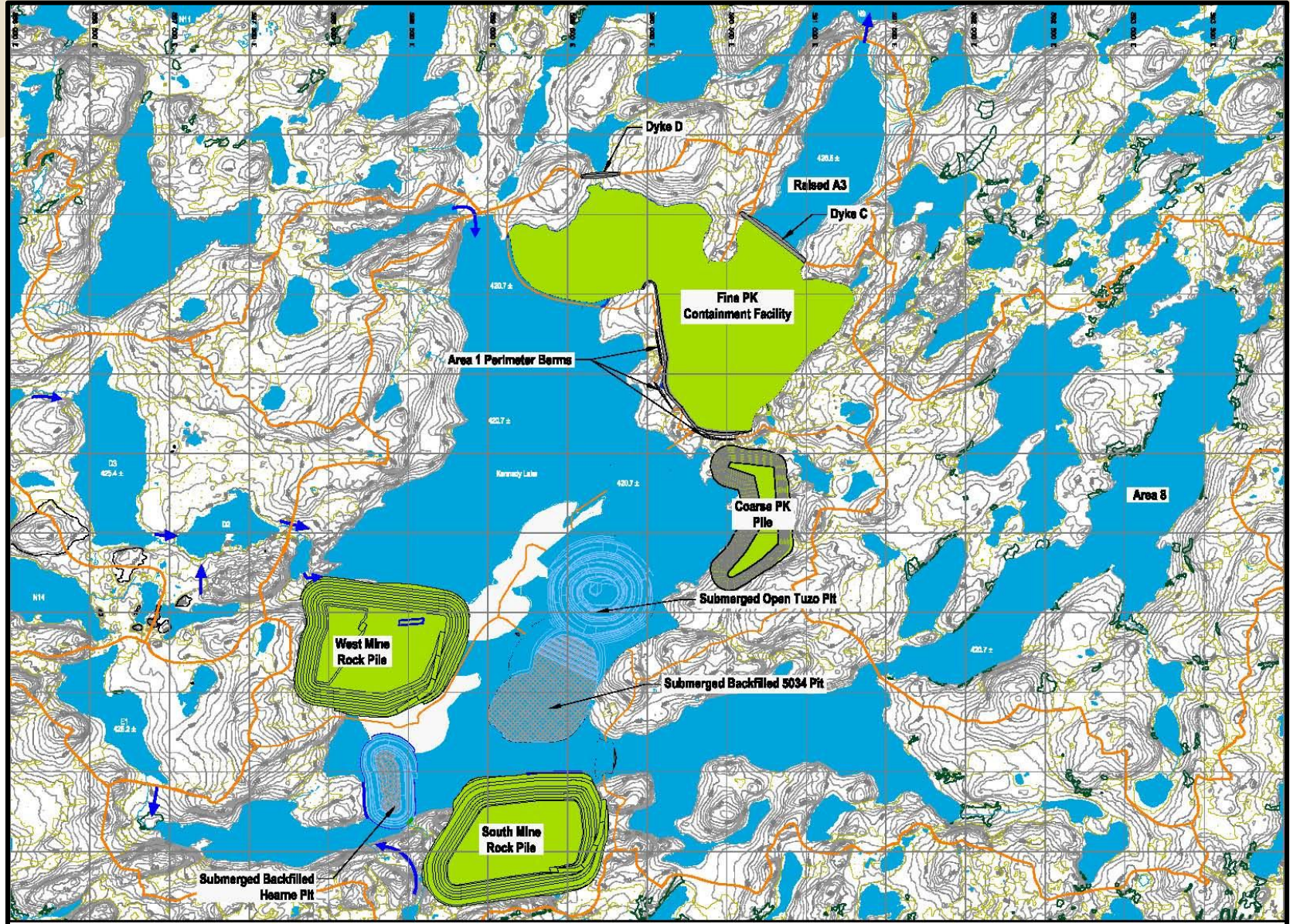




# EIR Submissions to MVEIRB

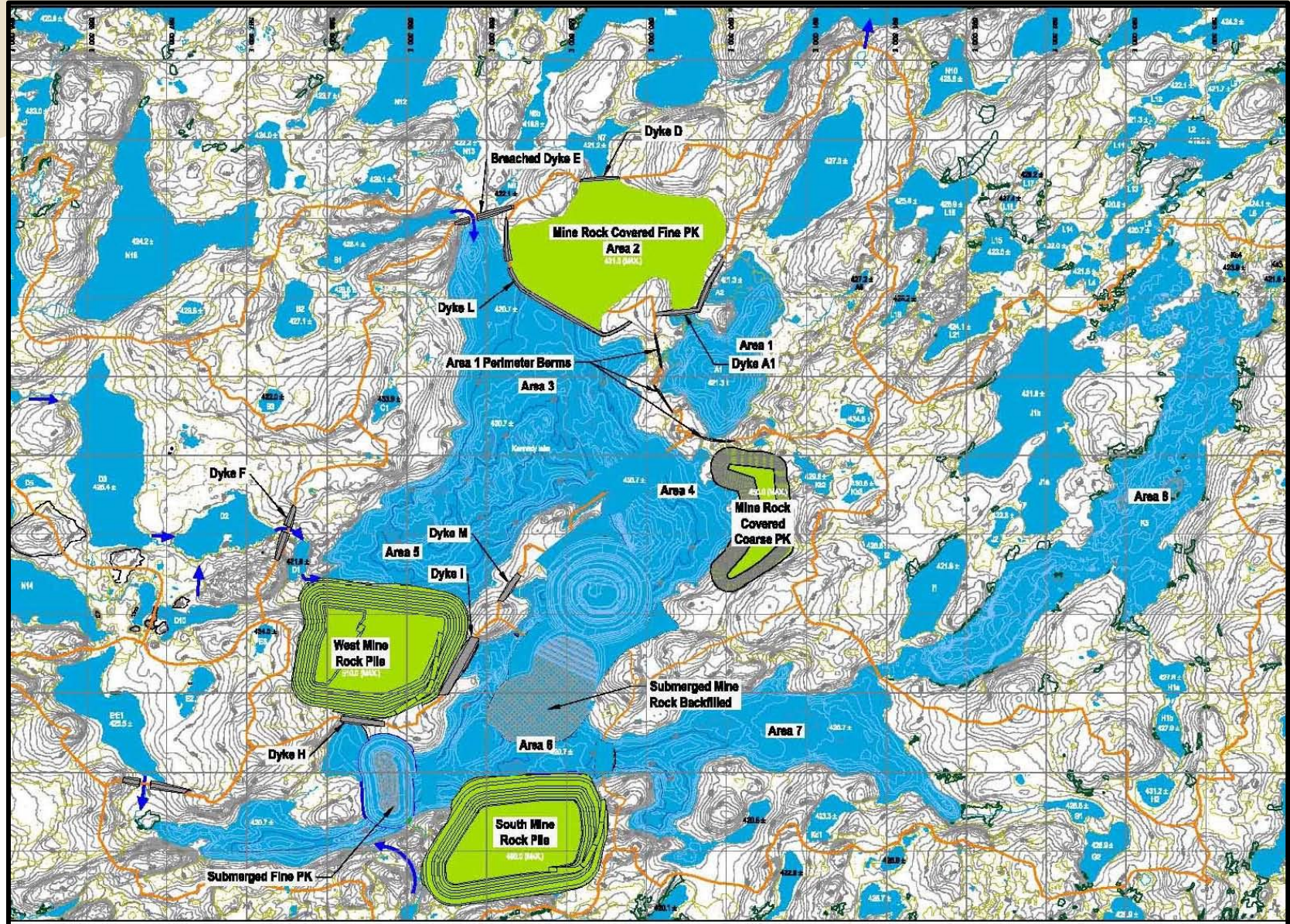
- EIS submitted to MVEIRB on December 23, 2010
- 2011 EIS Update submitted on July 15, 2011
  - Included revisions to Sections 8, 9, and 10
  - Identified the need for supplemental mitigation to address potential increases of phosphorus in Kennady Lake related to the long-term storage of PK
- 2012 EIS Supplement submitted on April 23, 2012
  - Describes the supplemental mitigation of the Fine PKC Facility
  - Assesses the effects of the supplemental mitigation on the aquatic and terrestrial environments, and any other components potentially affected
- IR Response Round 1 submitted - March 30 to April 6, 2012
- Supplemental monitoring documentation also submitted March 20 to May 1, 2012

# Reclamation – 2010 EIS





# Reclamation – 2012 EIS Supplement





# Supplemental Mitigation

## Key Changes to Mine Plan:

- The area of the Fine PKC Facility reduced by 83 ha
- Fine PKC Facility no longer covers Lakes A1 and A2
- The A watershed is diverted during operations
  - Lake A1 diverted to Area 8 (via Lake J1b)
  - Lake A3 no longer permanently diverted to N watershed
- Fine PK deposited in 5034 and Hearne pits
- West Mine Rock Pile height increases by 24 m, but base area remains the same



# EIS Supplement

- Purpose
  - describe the supplemental mitigation of the Fine Processed Kimberlite Containment (PKC) Facility; and
  - assess the effects of this mitigation on the aquatic and terrestrial environments, and any other components potentially affected by these changes
- Document retains the primary structure of the 2010 EIS
  - Chapters match the layout of the EIS
  - Key Lines of Inquiry and Subjects of Note

# 2012 EIS Supplement - Outline

Section from the 2010 EIS	Updated in 2011	Updated in 2012	Nature of Update in 2012
1 Introduction	no	yes	Section was simplified
2 Project Alternatives	no	yes	Relevant EIS summary information and updates provided
3 Project Description	no	yes	A “word-for-word” update of the 2010 EIS (De Beers 2010) Section 3, with revisions highlighted in yellow
4 Community, Regulatory, and Public Engagement	no	no	-
5 Traditional Knowledge	no	yes	Minor wording changes provided
6 Assessment Approach	no	yes	Section was summarized
7 Key Line of Inquiry: Caribou	no	yes	Relevant EIS summary information and updates provided
8 Key Line of Inquiry: Water Quality and Fish in Kennady Lake	yes	yes	Relevant EIS summary information and updates provided
9 Key Line of Inquiry: Downstream Water Effects	yes	yes	Relevant EIS summary information and updates provided
10 Key Line of Inquiry: Long-term Biophysical Effects, Closure and Reclamation	yes	yes	Relevant EIS summary information and updates provided
11 Biophysical Subjects of Note	no	yes/no	Updates were made to the following Biophysical Subjects of Note: Section 11.5 Mine Rock and Processed Kimberlite Storage Section 11.7 Vegetation Section 11.10 Carnivore Mortality Section 11.11 Other Ungulates Section 11.12 Species at Risk and Birds
12 Socio-economic Impact Assessment	no	no	-
13 Cumulative Effects	no	yes	Relevant EIS summary information and updates provided
14 Summary and Conclusions	no	yes	Relevant EIS Supplement summary information and updates to conclusions provided

# 2012 EIS Supplement - Outline

Appendices from the 2010 EIS/2011 EIS Update	Updated in 2012	Appendix Number within the 2012 EIS Supplement
<b>Section 8</b>		
	new	Appendix 8.I Hydrology Assessment Update
Appendix 8.I Water Quality Model Report	yes	Appendix 8.II
Appendix 8.II Metal Leaching and Acid/Alkaline Rock Drainage Report	yes	Appendix 8.III
Appendix 8.III Time Series Plots	yes	Appendix 8.IV
Appendix 8.IV Aquatic Health: Derivation of Chronic Effects Benchmarks	yes	Appendix 8.VI
Appendix 8.V Empirical Dissolved Oxygen Modelling	yes	Appendix 8.V Dissolved Oxygen and Nutrient Model Report
<b>Section 9</b>		
Appendix 9.I Time Series Plots	yes	Appendix 9.II
	new	Appendix 9.I Hydrology Assessment Update
	new	Appendix 9.III Aquatic Health
<b>Section 11</b>		
Appendix 11.7.I Geology, Terrain, and Soils	yes	Updated information presented in Section 11.7.3 of this supplement



# Key Findings - Terrestrial

## Section 7 – KLOI: Caribou

- Supplemental mitigation results in a smaller area of disturbed habitat in the LSA than assessed in the 2010 EIS
  - Disturbed habitat reduced by 82.6 ha
    - From 1,235.4 ha to 1,152.8 ha
  - Impacts on the abundance and distribution of caribou from direct changes to habitat remain unchanged from 2010 EIS
  - No significant effects

# Key Findings - Terrestrial

Based on the reduction of the Project footprint by 82.6 ha, conclusions remain unchanged from the 2010 EIS:

- Section 11.7 – Vegetation
  - No significant adverse effects are predicted to vegetation ecosystems and listed plant species, or to the continued opportunities for the use of traditional plants
- Section 11.10 – Carnivore Mortality
- Section 11.11 – Ungulates
- Section 11.12 – Species at Risk and Birds
  - No significant effects are predicted to the abundance or distribution of species assessed within these Subjects of Note, or to the continued opportunities for traditional and non-traditional use of these species

# Key Findings - Aquatics

Sections 8, 9, and 10 – KLOI: Water Quality and Fish in Kennady Lake, Downstream Water Effects, and Long-term Biophysical Effects, Closure and Reclamation

- Based on the reduction of the Fine PKC Facility by 82.6 ha, conclusions remain unchanged from the 2011 EIS:
  - Sources of phosphorus concentrations to Kennady Lake lower than projected in the 2011 EIS Update
    - Supplemental geochemistry testing
- Hydrology
  - No changes to assessment of flows and water levels
- Water Quality
  - Kennady Lake returns to oligotrophic conditions
  - Maximum concentrations of fewer metals are projected to be higher than CCME water quality guidelines (copper and cadmium)



# Key Findings - Aquatics

- Aquatic Health
  - Conclusions of the aquatic health assessment remain unchanged
  - Copper is only SOPC in Kennady Lake above a CEB; however, potential for adverse effects to aquatic organisms in Kennady Lake is considered low
- Fish and Fish Habitat
  - Lower trophic communities will be more productive than baseline, but remain consistent with oligotrophic conditions
  - Because of increased food base, may also increase growth and production of forage and large-bodied fish
  - Overwintering habitat will be suitable in the refilled Kennady Lake during post-closure for all fish species currently in the lake
  - The fish species assemblage within Kennady Lake will be similar baseline

# Key Findings - Aquatics

- Recovery of Kennady Lake
    - Timeline for recovery unchanged (functional aquatic ecosystem within 5 years including presence of fish species, and steady state conditions within 65 years)
    - Refilled Kennady Lake will return to oligotrophic conditions, but as a result of increased nutrients, more productive than baseline
  - Impacts on
    - the suitability of water within the Kennady Lake watershed and downstream water bodies to support a viable and self-sustaining aquatic ecosystem, and
    - the abundance of Arctic grayling, lake trout, and northern pike
- Remain unchanged from 2011 EIS
- No significant effects are predicted



# Summary

- Supplemental mitigation
  - Smaller Fine PKC Facility
  - Modified mine rock and PK management
- Disturbed habitat area reduced within the LSA
- Reduced phosphorus concentrations in Kennady Lake
  - Returns to oligotrophic condition
  - Increased productivity
  - Sufficient overwintering habitat
- Assessment conclusions for terrestrial and aquatic environments remain unchanged from the 2010 and 2011 EIS



# Gancho Kué Project Questions?

November 28-December 2, 2011