Gahcho Kué Project

Environmental Impact Statement Overview Session

October 26, 2011

De Beers Canada

Gahcho Kué Project

EIR Process

October 26, 2011

Where we are and how we got here

Date	Procedural Step
2005 November	Application for Type A Water Licence and Land Use Permit
2006 January	MVEIRB Environment Assessment Initiated
2006 April	EA Issue Scoping
2006 June	Decision to proceed with an EIR
2007 October	EIS Terms of Reference Issued
2010 December	EIS Submission
2011 March	Panel Conformity Determination
2011 April	Panel's draft Workplan for EIR issued
2011 May	De Beers Conformity Response (2,4, 5)
2011 July	De Beers Conformity Response (1 and 3)
2011 July	Panel's Positive Conformity Determination
2011 July	Panel's Final Workplan for remainder of EIR
2011 August	Participant Funding Awarded by AANDC
2011 October	De Beers Project Description and EIS Workshop

De Beers Canada

Gahcho Kué Project

Air Quality

October 27, 2011

Air Quality Assessment

Outline:

- Introduction
  - ToR Requirements
  - Location in EIS
  - Findings
- Environmental Setting
- Air Quality Characterization
- Emission Criteria
- Air Quality Assessment
  - Emissions Estimation and Dispersion Modelling
  - Findings
  - Monitoring and Follow-up
- Summary

Air Quality Assessment - ToR

Key Terms of Reference Requirements:

- The EIS must address the issue of emissions from Gahcho Kué adding to pre-existing emissions.

- The EIS must provide air quality modeling for construction and operational phases including worst case scenarios.

- The EIS must further identify best available technologies and best management practices to be used.

AQ Assessment

Location in the EIS:

- Baseline – Annex B
- Assessment – Subject of Note (SON) 11.4

➢ Air Quality assessment data were provided to disciplines for addressing effects to wildlife, vegetation, water quality and human health

AQ Assessment

Assessment Findings:

- Emissions are determined to not have significant adverse effects to air quality although there will be change as a result of the Project
  - SO_2 emissions less than NWT Air Quality Standards
  - NO_X emissions are near guideline levels immediately outside the Project development area
  - $PM_{2.5}$ concentrations high outside of the development area
  - TSP concentrations are above NWT Air Quality Standards outside the development area
- Predictions for particulate matter highly conservative
  - Winter road dust emissions modelled on assumption of no natural mitigation (i.e., precipitation and snow accumulation on haul road)
  - Expected that actual concentrations will be lower than predicted, closer to concentrations measured at other diamond mines

AQ Assessment - Environment Setting

Baseline Meteorological and Air Quality Monitoring Data Sources:

- On-site meteorological data collected between 1998 and 2005
- Background PM, SO_2 and NO_2 data obtained from regional monitoring stations

AQ Assessment - Environment Setting

Air Quality Characterization:

- Existing sources of emissions in the Project area are primarily forest fires and wind-blown dust
- Closest source of other anthropogenic emissions is the De Beers Snap Lake Project, approximately 80 km northwest of the Project

Applicable Ambient Air Quality and Emissions Criteria

- Air Quality Criteria considered:
  - Northwest Territories Air Quality Standards
  - Canada-Wide Standards
  - National Ambient Air Quality Objectives

- Emission Criteria considered:
  - Low Sulphur Diesel Regulations
  - Non-road Diesel Engine Emission Standards
  - Canadian Council of Ministers of Environment (CCME) Emission Guidelines for Industrial Boilers and Heaters
  - Canada-Wide Standards for Dioxins and Furans

AQ Assessment - Emissions Estimation

- Sources of Emissions at the Project (Construction and Operation Phases):
  - Stationary point sources including diesel power generators, waste incinerator, auxiliary boiler and processing plant
  - Mobile combustion equipment including diesel haul trucks and other earth-moving equipment
  - Mining and material handling activities
  - Exposed Kennady Lake bed and other exposed surfaces
  - Winter access road traffic

- Other Non-Project Emission Sources:
  - De Beers Snap Lake Mine

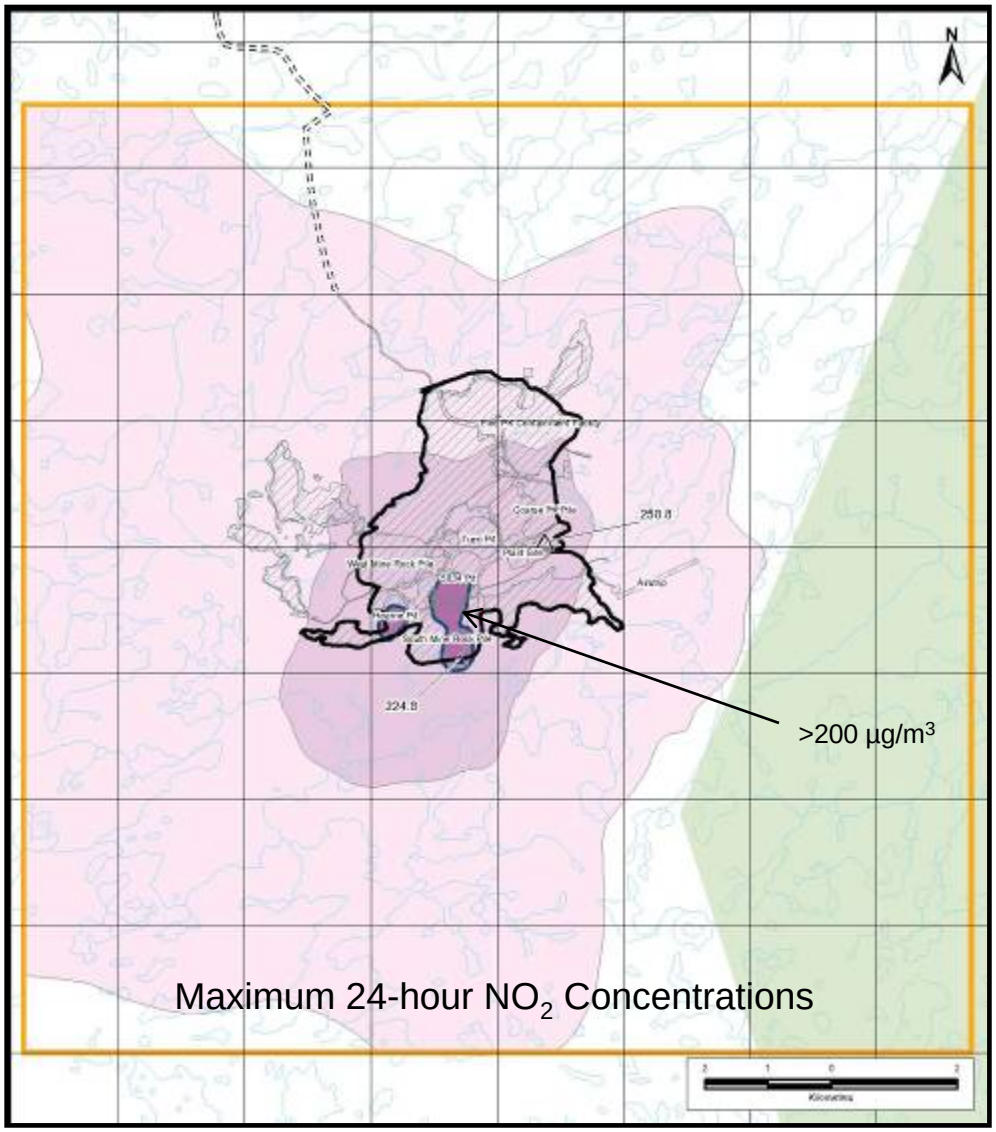
AQ Assessment - Emissions Estimation

- Estimation Methods
  - Mass Balance (i.e., waste rock, kimberlite, process kimberlite and fuel mass balance)
  - Engineering Estimates (e.g., design specifications for equipment)
  - Published Emission Factors

AQ Assessment - Dispersion Modelling

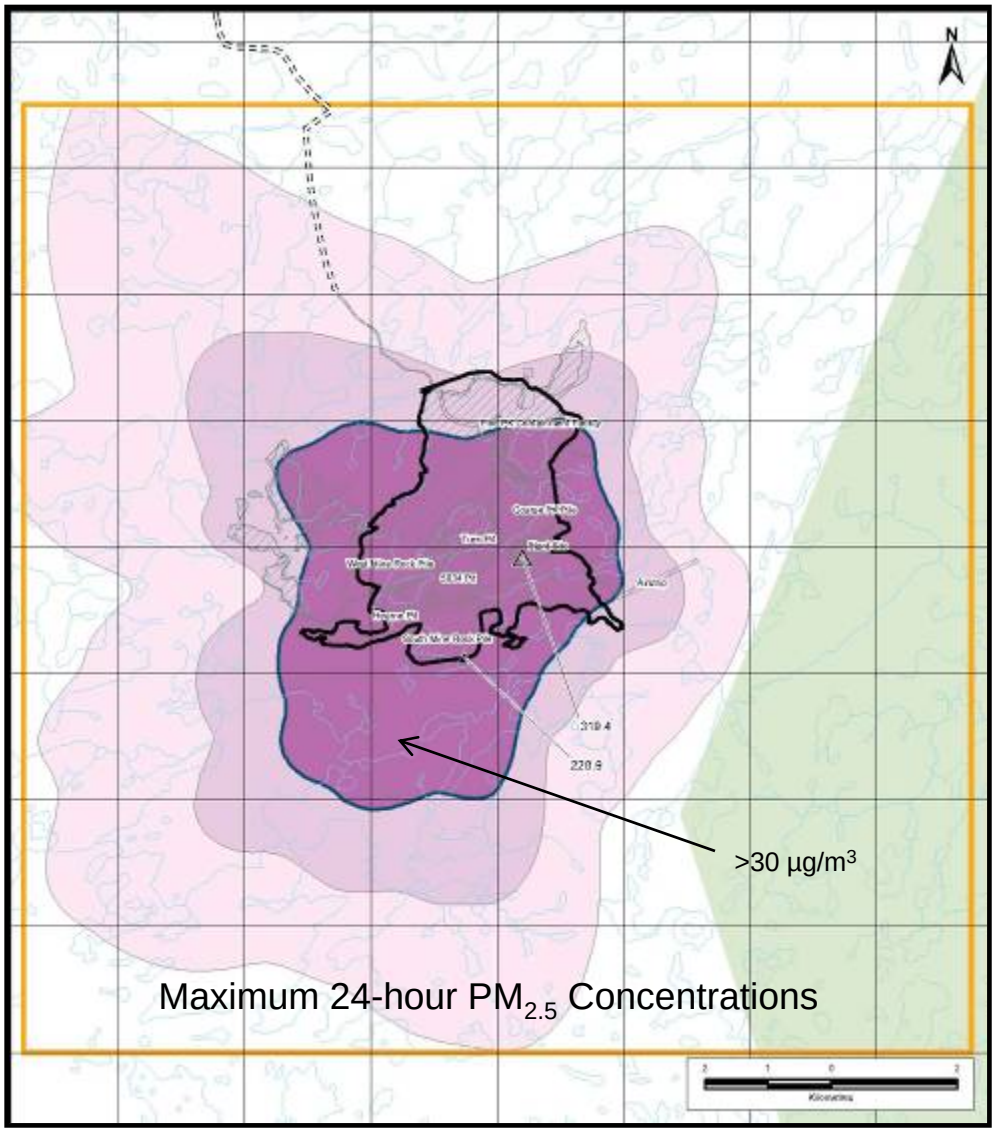
- Dispersion model provides both ground-level concentration and deposition rates
  - CALPUFF Version 6
  - Predicted ground-level concentrations for SO_2, NO_2, CO, $PM_{2.5}$, PM_{10}, TSP, VOCs, PAHs, metals, dioxins and furans
  - Predicted deposition rates for $PM_{2.5}$, PM_{10}, TSP, PAHs, and metals, including Potential Acid Input (PAI)

AQ Assessment – Emissions



- CO concentrations – low impact because all predictions well below applicable ambient air quality criteria.
- SO_2 concentrations – low impact due to use of low sulphur diesel at the Project.
- NO_X concentrations – low to moderate impact due to some predicted concentrations marginally exceeding NWT air quality standards immediately outside Project development area.

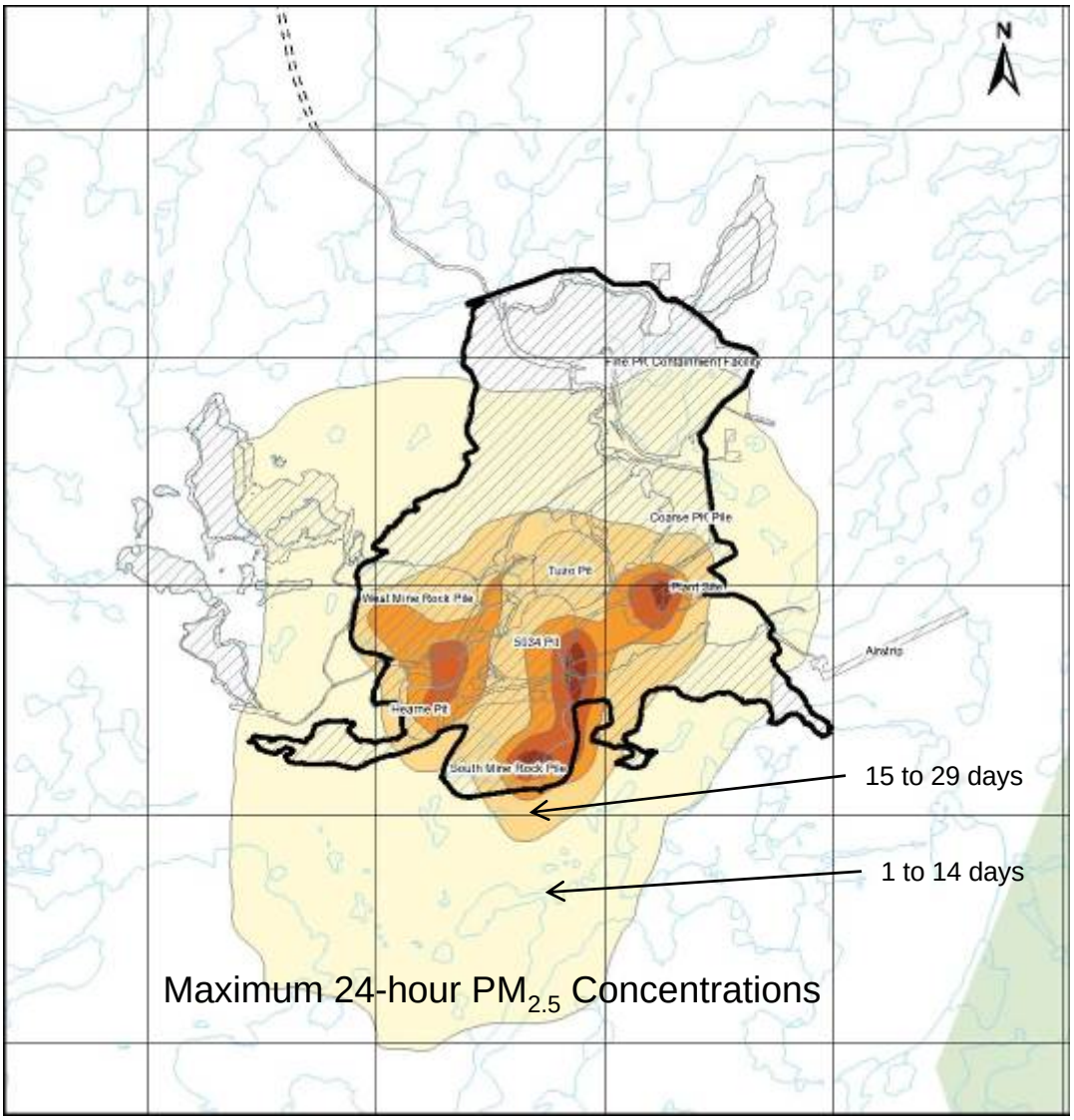
AQ Assessment Results – Deposition



- PM concentrations – high impact as some predicted PM concentrations immediately outside the development area are above the NWT air quality standard
  - ➢ $PM_{2.5}$ and TSP concentrations

- Substantial uncertainty and conservatism in the fugitive emission estimates
  - ➢ contributes to conservative estimates of metals deposition

AQ Assessment Results – Deposition



- No concentration above NWT air quality standard predicted beyond 3 km from development area boundary
- Majority of area with predicted concentrations above standard will experience 1 to 14 days of values over the standard.
- Only area adjacent to emission sources will experience more than 14 days of concentrations above standard.

AQ Assessment - Summary

- Emissions are determined to not have significant adverse effects to air quality although there will be change as a result of the Project
  - SO_2 emissions less than NWT Air Quality Standards
  - NO_X emissions are near guideline levels immediately outside the Project development area
  - $PM_{2.5}$ and TSP concentrations are above NWT air quality standards immediately outside the development area

- Predictions conservative
  - Predictions based on maximum production rate
  - On-going review of emissions and mitigation

- Ambient AQ and emissions monitoring will be conducted

De Beers
CANADA

Gahcho Kué Project

Noise

October 27, 2011

Noise Assessment

Outline:

- Introduction
  - ToR Requirements
  - Location in EIS
  - Findings
- Environmental Setting
  - Existing Soundscape
  - Benchmarks
- Noise Assessment
  - Methods Sources
  - Findings
- Summary

Noise Assessment

Terms of Reference:

- "…required to described the existing sources of noise in the project area", and "…present noise in terms of frequency, duration, decibel levels throughout the year"
- A noise assessment for the Project is required to evaluate noise and sensory impacts to wildlife

Location in the EIS:

- Baseline – Annex C
- Assessment - Appendix 7.II of Section 7 – Key Line of Inquiry - Caribou

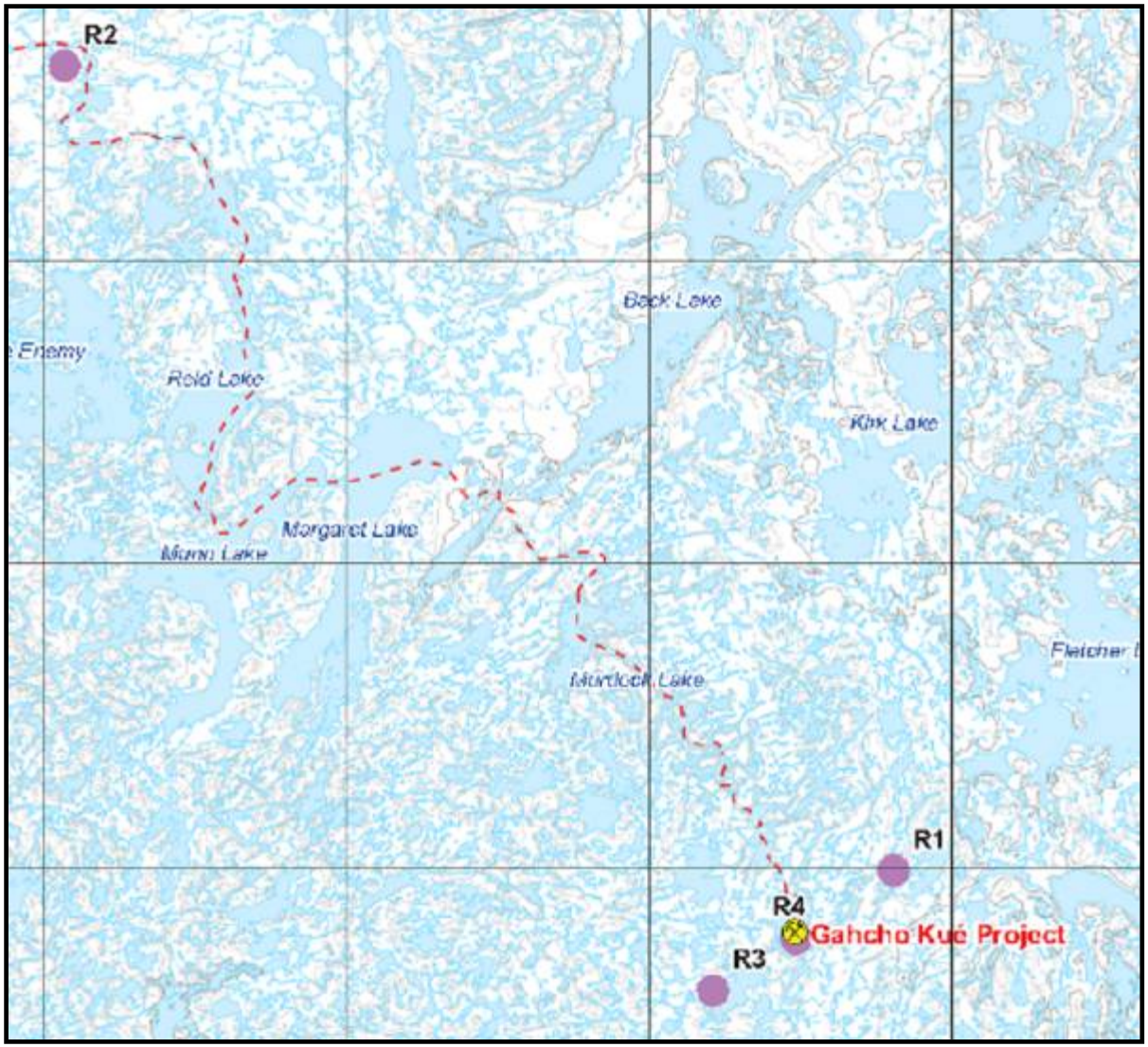
Noise Assessment

Assessment Findings:

- Noise will be generated by the Project, but expected levels are within most of the relevant benchmarks established for remote areas
  - Benchmarks exceeded within 1.5 km along the south side of the Project boundary
  - Benchmarks exceeded at the accommodations complex, but mitigation will be considered at the design stage

- Benchmarks selected for the Project – there are no regulatory requirements
- Predictions conservative

Existing Soundscape



The noise assessment identified three study areas:

- Operational Study Area
- Winter Access Road Study Area
- Aircraft Study Area

Existing Soundscape

Background Noise Levels:

- Data indicate low sound levels, with few existing sources
  - Ranging from a whisper (~15 dBA) to a busy office (~50 dBA)
  - Typical for summertime conditions in and around the Project area
- Slightly higher noise levels during daytime period, consistent with nature of noise in remote areas
- Noise levels slightly higher at R2, R3, and R4 locations

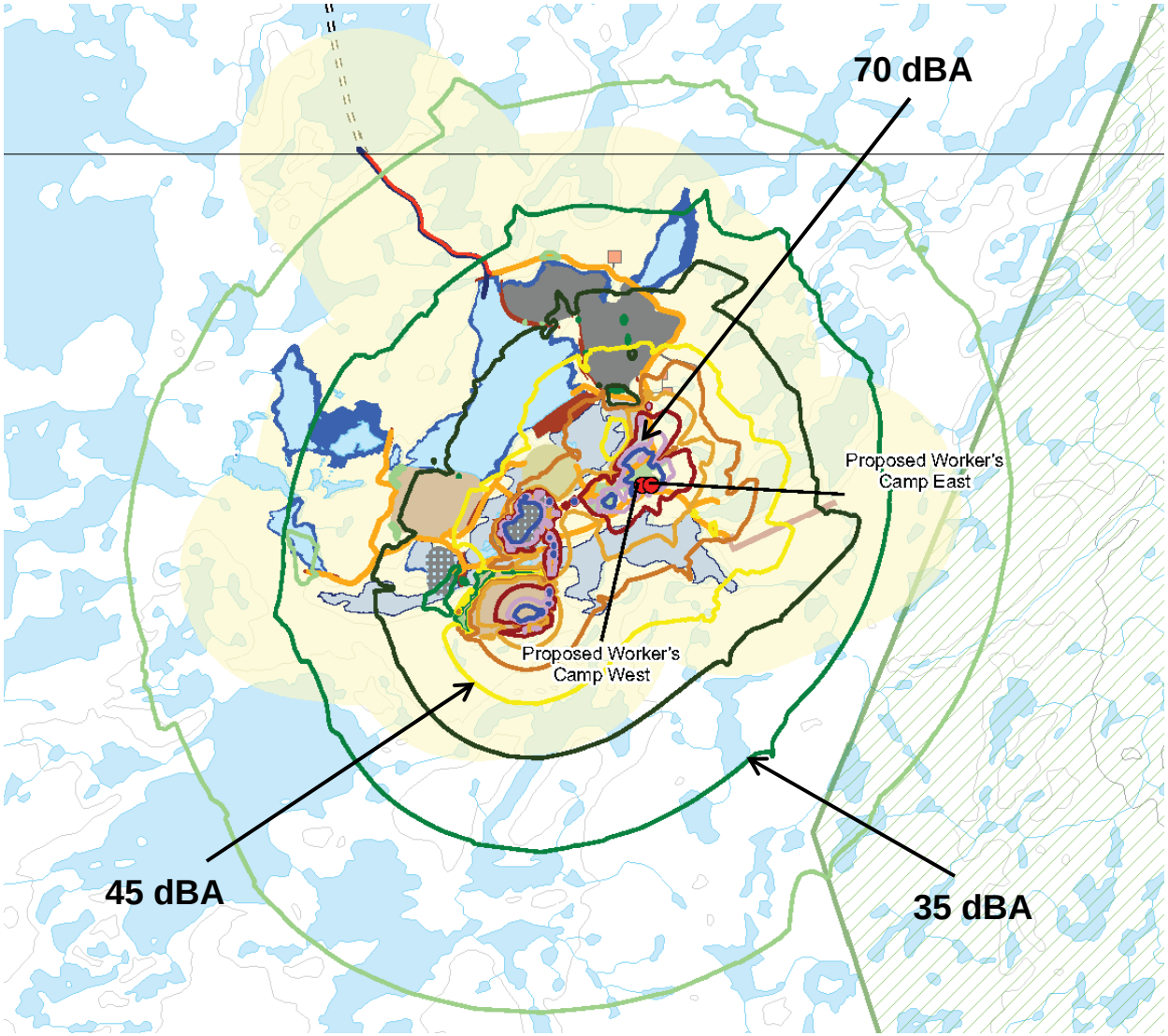
Assessment Methods

Evaluation of noise effects related to the operation of the Project:

- CadnaA noise emission model
  - Project Operations
  - Usage of the Winter Access Road
  - Aircraft

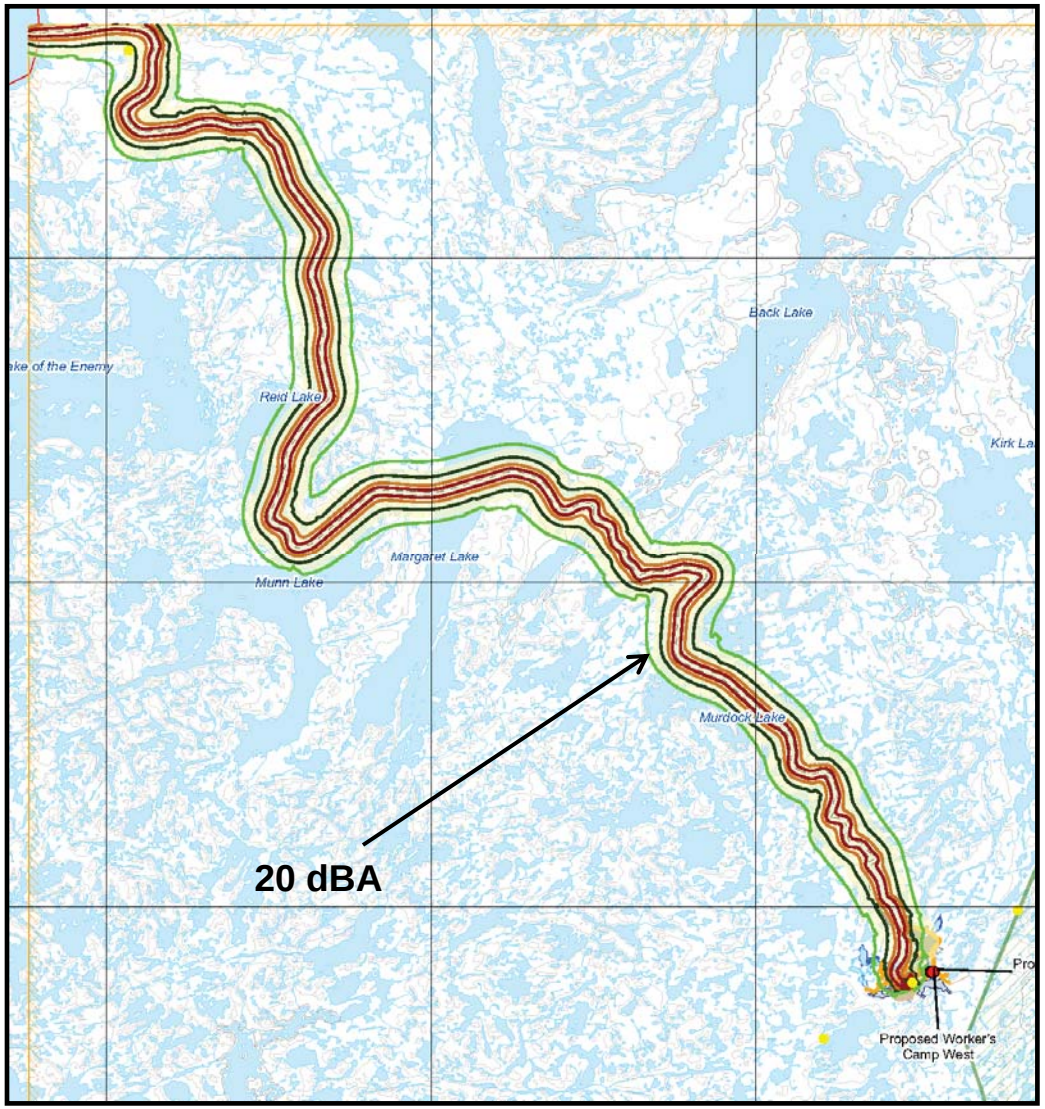
- Blasting analysis
  - Used conservative blasting charge quantities to compare vibration and airborne noise levels to benchmark

Assessment – Project Operations



- Peak noise emissions during operations limited to within 2.5 km of the Project
- Southern zone more notable due to proximity and frequency of mine fleet along haul route
- Noise emissions limited to period of construction and operations phases

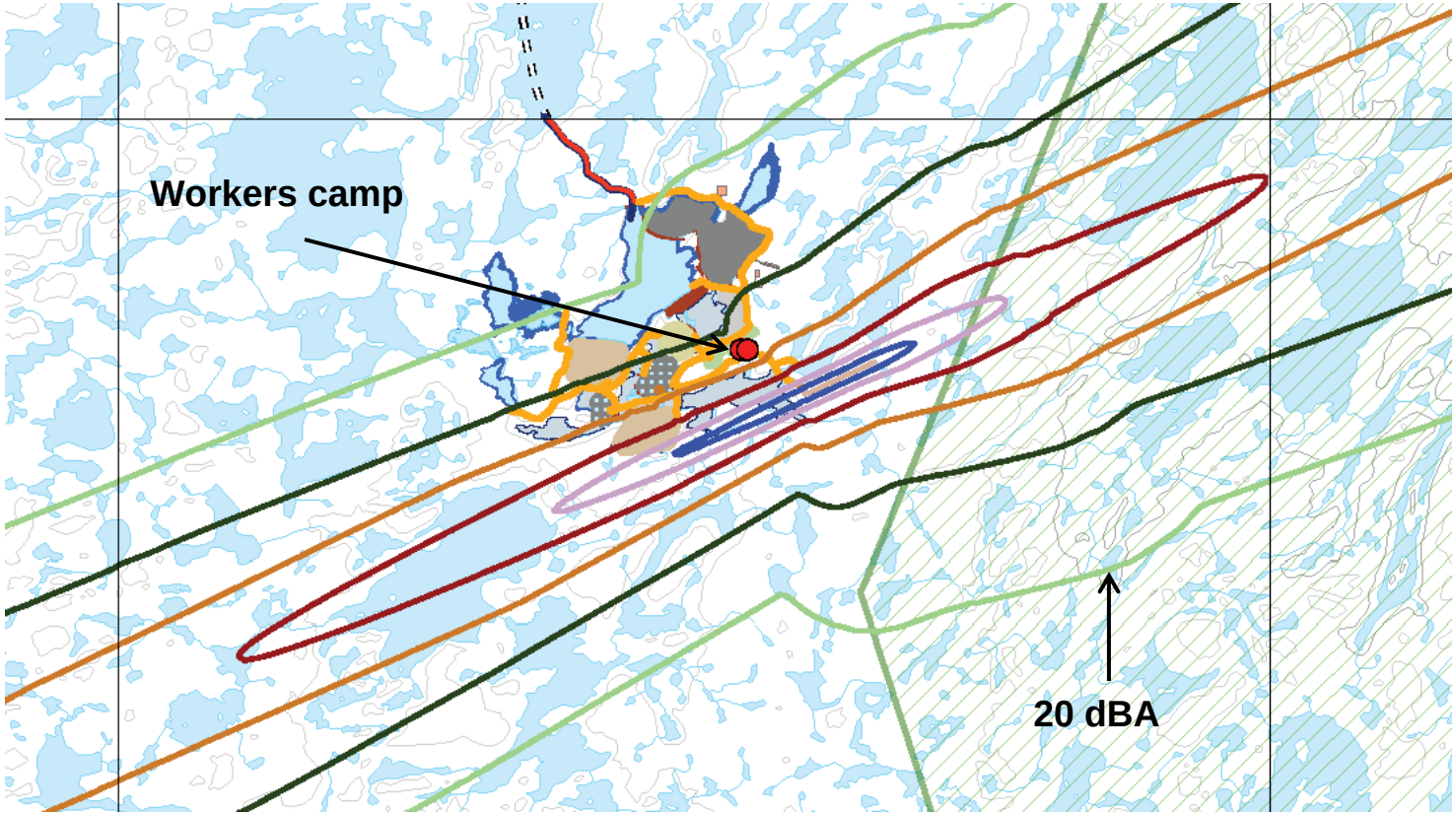
Assessment – Winter Access Road



- Road use by truck traffic will contribute to Project noise emissions
- Limited to late January to early April
- Peak noise emissions from truck traffic limited to within 1.5 km along the winter access road
- Road does not contribute cumulatively to overall Project noise emissions

Assessment – Aircraft Traffic

- Noise emissions from air traffic intermittent and infrequent
- Peak noise emissions associated with location of airstrip



Assessment - Blasting

- Blasting noise will extend away from the Project but will be short events
- Based on estimates for explosive loads and distances, the peak ground vibration and airborne noise levels will meet benchmarks
  - However, some ground and airborne vibration motion may be perceived at the accommodations complex

Noise Assessment - Summary

- Noise will be generated by the Project, but the expected levels are within most of the relevant benchmarks established for remote areas
  - Benchmarks exceeded within 1.5 km along the south side of the Project boundary
  - Benchmarks exceeded at the accommodations complex, but mitigation will be considered at the design stage

De Beers Canada

Gahcho Kué Project
Aquatics

October 27, 2011

Outline of Presentation

- Introduction
  - Terms of Reference
  - EIS Sections
  - Assessment Overview
- KLOI: Kennady Lake and Downstream Watersheds
  - Environmental Setting
    - Study areas
    - Summary of baseline studies and results by component
    - Current, ongoing and future work
  - EIS
    - Approach
    - Summary of methods and results by component
- SON: Great Slave Lake

EIS Sections Relevant to Aquatics

Section Number	Section Title
2	Project Alternatives
3	Project Description (Includes Appendix 3.II, Conceptual Compensation Plan)
8	**Key Line of Inquiry: Water Quality and Fish in Kennady Lake**
9	**Key Line of Inquiry: Downstream Water Effects**
10	**Key Line of Inquiry: Long-term Biophysical Effects, Closure, and Reclamation**
11.2	Subject of Note: Impacts on Great Slave Lake
11.6	Subject of Note: Permafrost, Groundwater, and Hydrogeology
13	Cumulative Effects Assessment
14	Summary and Conclusions
Annex G	Hydrogeology Baseline
Annex H / Addendum HH	Hydrology Baseline
Annex I / Addendum II	Water Quality Baseline
Annex J / Addendum JJ	Fisheries and Aquatic Resources Baseline

Introduction - TOR

- Based on the TOR, effects on aquatic resources are in two Key Lines of Inquiry:
  - Water quality and fish in Kennady Lake (Section 8)
  - Downstream water effects (Section 9)

"…detailed analysis of all impacts on fish abundance, health, and fitness for consumption including a comprehensive analysis of potential impacts on water quality…emphasis must be placed on the ability of the lake ecosystem, particularly fish and fish habitat, to recover ….

"…where the analysis of 'water quality and fish in Kennady Lake' identifies potential impacts or where uncertainty exists, the EIS must provide an evaluation of the potential downstream effects and extent of impact..."

Introduction – TOR

- Based on the TOR, effects on aquatic resources are also in one Subject of Note:
  - Impacts on Great Slave Lake (Section 11.2)

"…effects to Great Slave Lake…" and "…analysis of cumulative effects to the Lockhart and the Hoarfrost rivers…"

Introduction – Assessment Findings

The assessment predicts that the impacts of the project will not be environmentally significant for both KLOIs

- The EIS was based on multiple discipline assessments and multiple assessment approaches
  - Conforms with the TOR requirements

- The EIS was based on conservative assumptions
  - Thus impacts should be less than projected

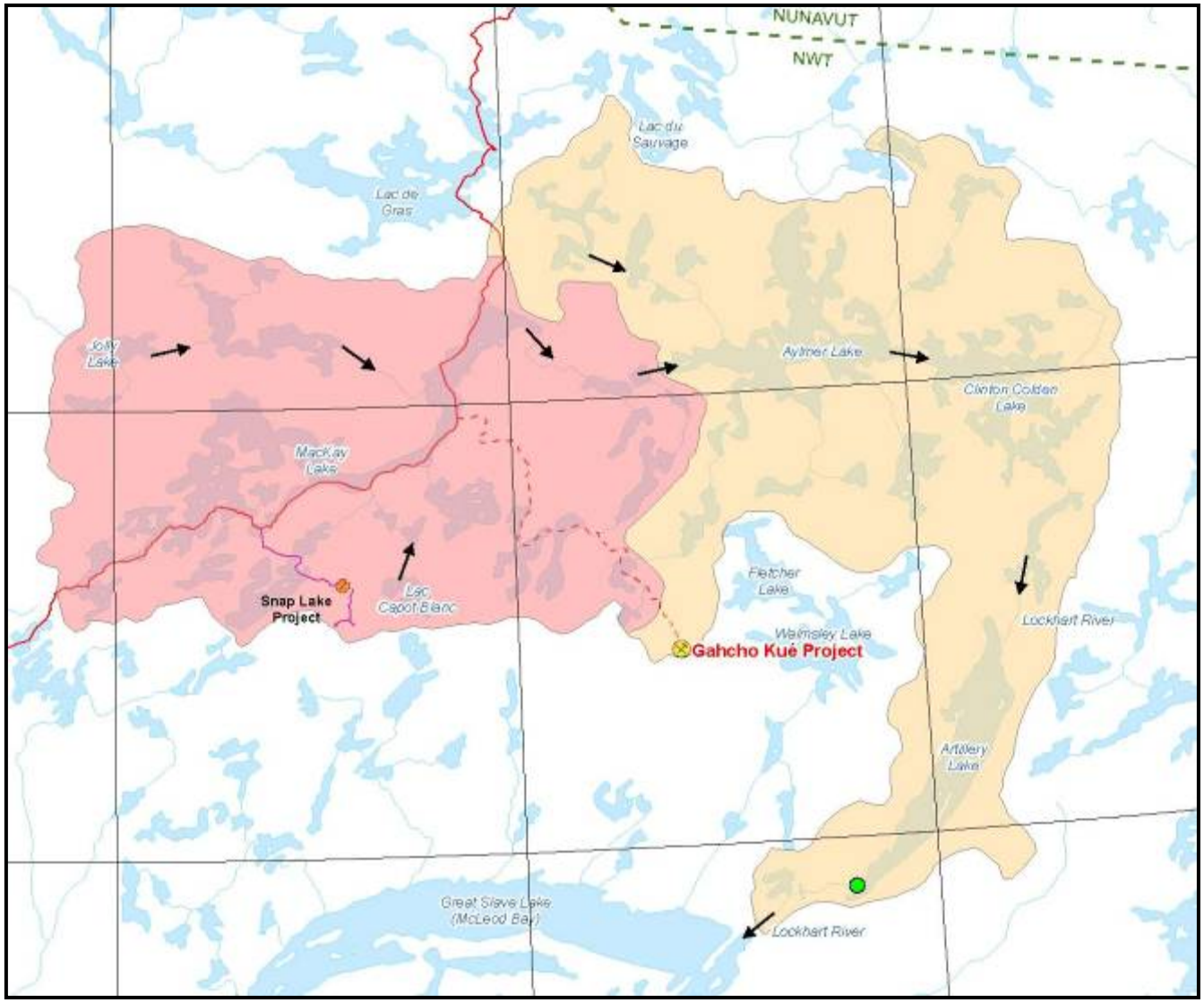
De Beers Canada

Aquatic Environmental Setting

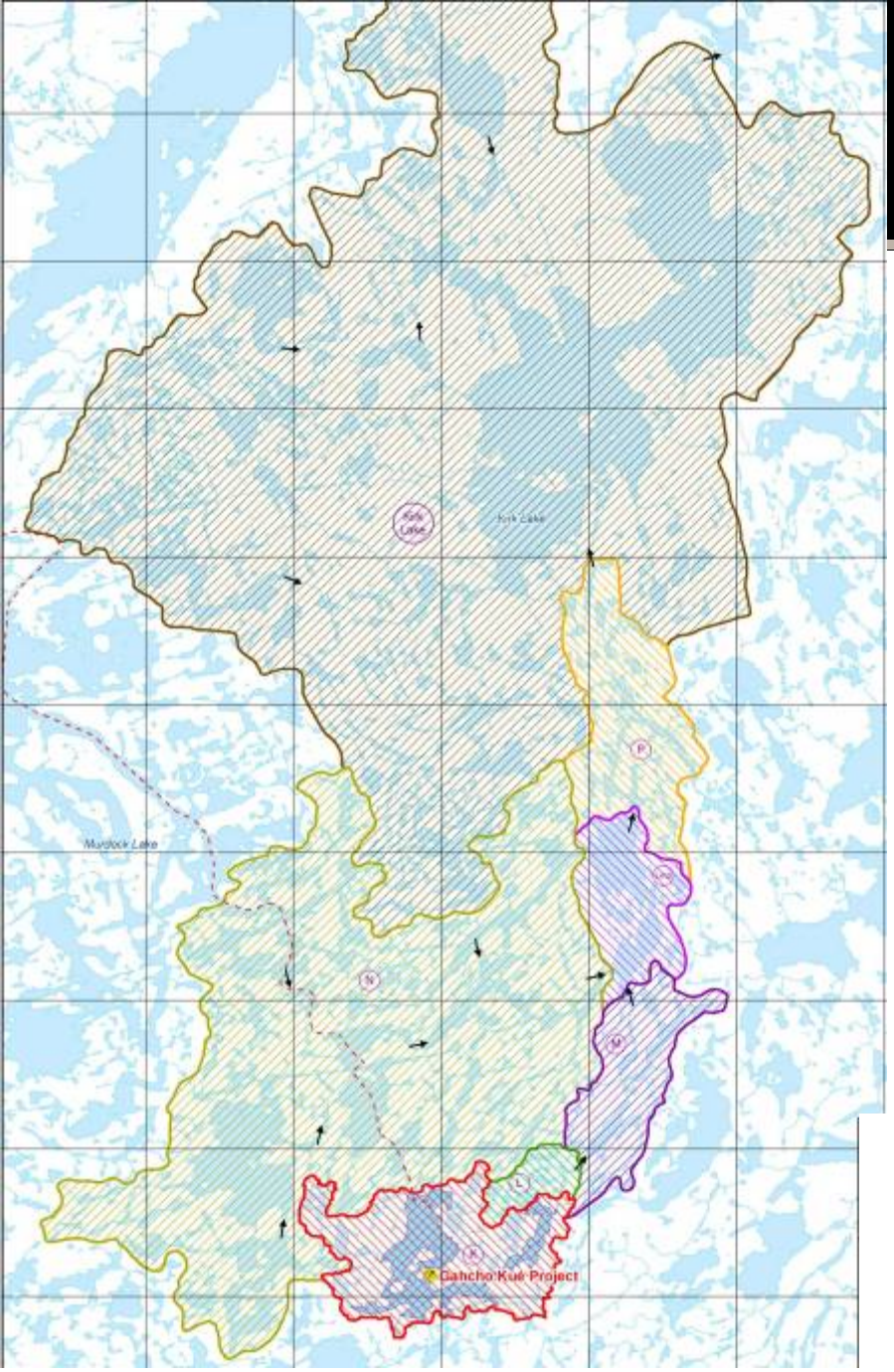
October 2011

Aquatics Regional Study Area

- Project located in watershed of Kennady Lake, a small headwater lake within Lockhart River system
- Lockhart River drains into the east arm of Great Slave Lake



Local Study Area



- Drainage direction from Kennady Lake is northward, passing through number of small watersheds before entering Aylmer Lake
- LSA for Kennady Lake and Watershed (Section 8) is drainage area to outlet of Kirk Lake
- LSA for Downstream Watershed (Section 9) is from outlet of Kennady Lake to outlet of Kirk Lake

De Beers
CANADA

Hydrogeology

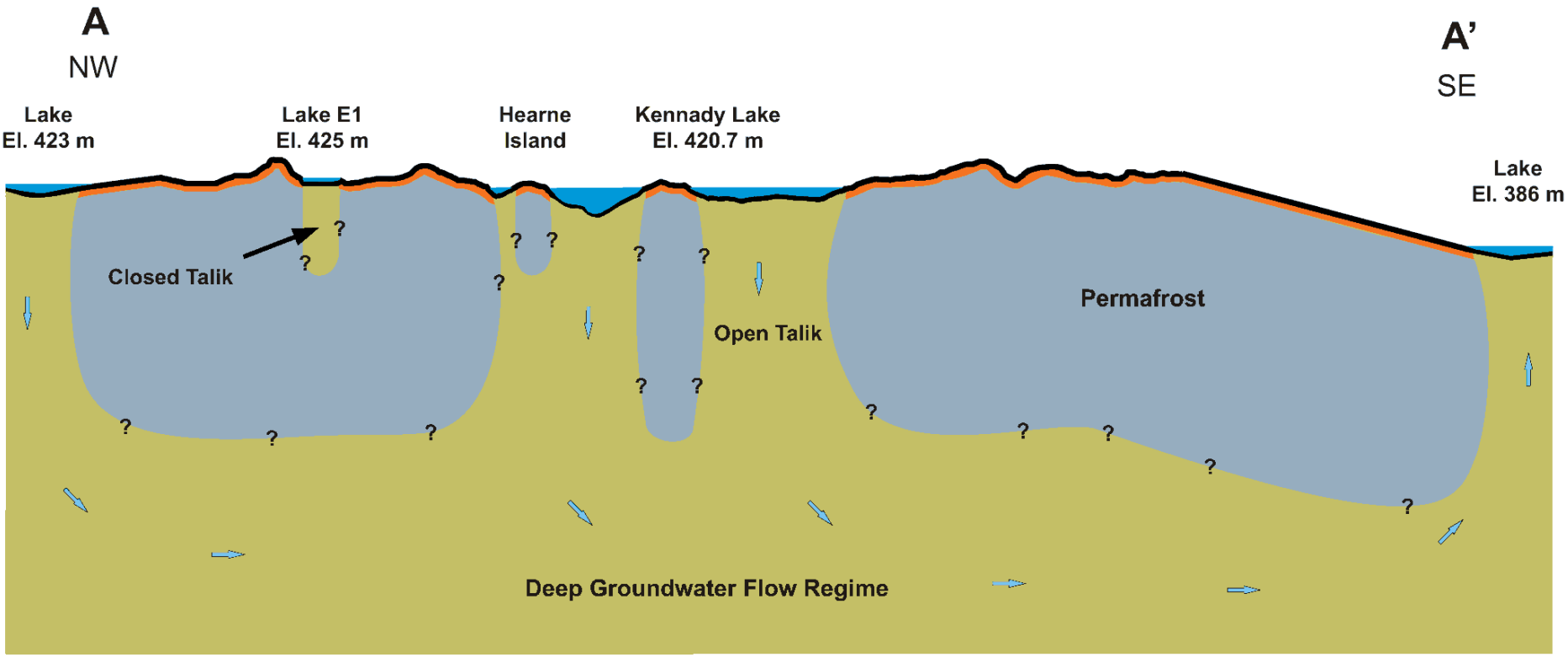
October 2011

Hydrogeology – Environment Setting

- A detailed evaluation of the hydrogeological environmental setting was conducted to establish natural conditions of the following:
  - Direction of groundwater flow
  - Hydraulic conductivity of hydrostratigraphic units
  - Groundwater quality

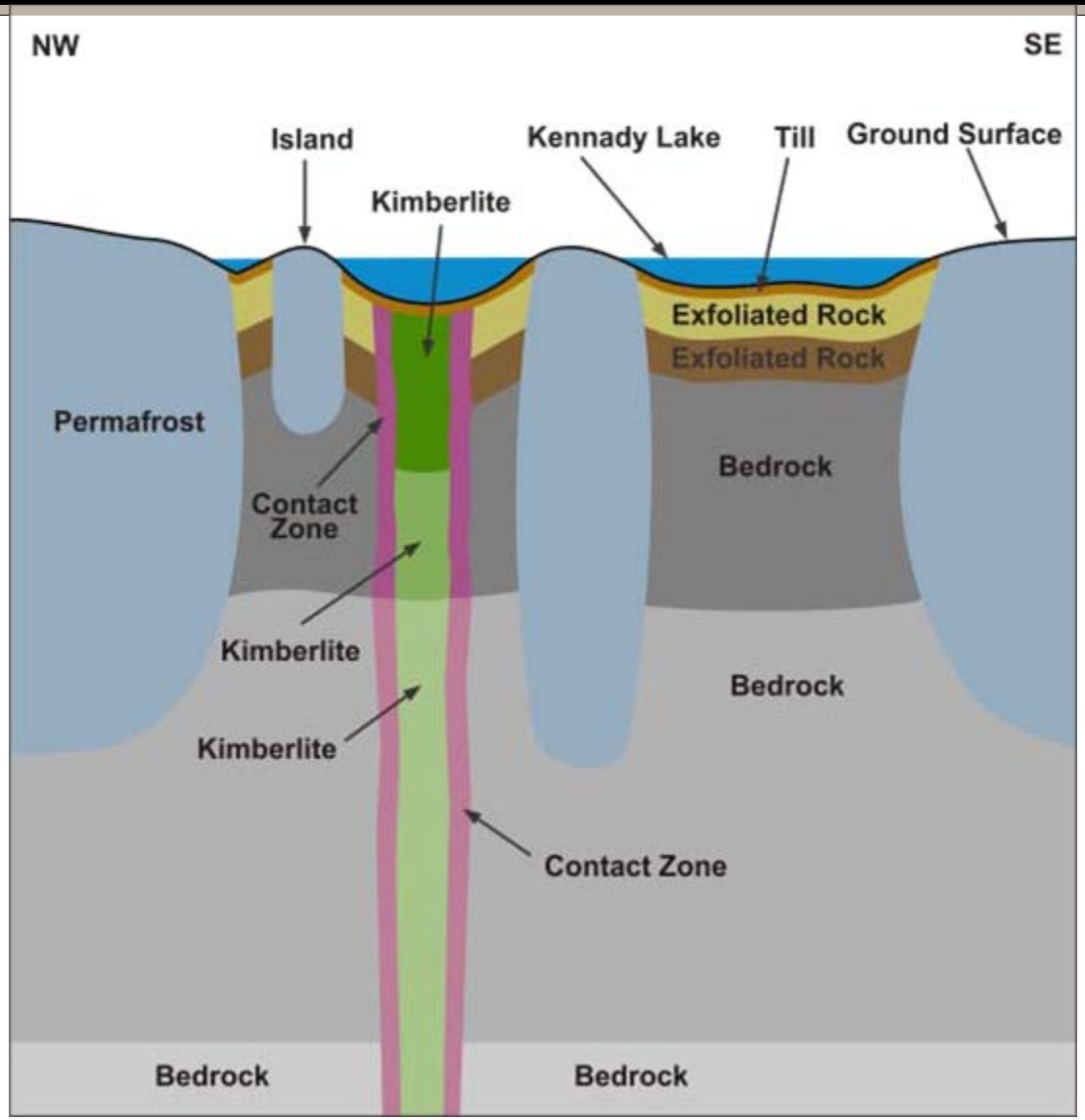
- Existing baseline studies formed the basis of hydrogeology environmental setting in Kennady Lake area:
  - Packer testing studies – 1996, 2004, 2005
  - Pressure profiling study – 2005
  - Geotechnical studies – 2004, 2005
  - Geothermal/permafrost study – 2004
  - Groundwater chemistry studies – 2004, 2005, 2011

Hydrogeology - Shallow and Deep Groundwater Flow Regimes



Hydrogeology - Hydrostratigraphy

- Comprises six hydrostratigraphic units:
  - Till
  - Shallow exfoliated rock
  - Deep competent rock
  - Kimberlite
  - Kimberlite contact zone
  - Enhanced permeability zones



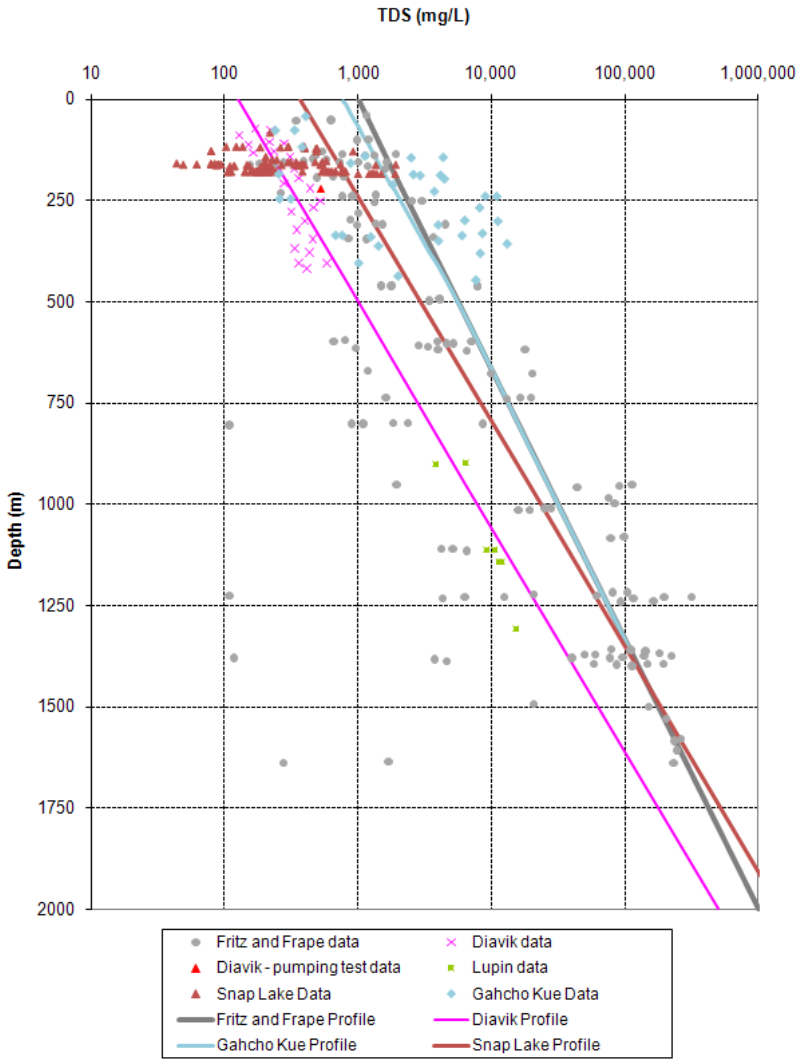
Groundwater Quality

Shallow Groundwater Quality

- Groundwater samples collected from monitoring wells in active layer were used to characterize chemistry of shallow groundwater; expected to be similar over most of LSA

Deep Groundwater Quality

- Quality of deeper groundwater determined using Project TDS profile established based on a best fit down to the maximum depth of site-specific data, then Fritz and Frappe Profile (most conservative) at greater depth
- Relationships of other water quality constituents that change with depth were correlated to TDS



De Beers
CANADA

Hydrology

Hydrology - Environmental Setting

- Hydrology baseline studies conducted in Kennady Lake area from 1996 to 2011
  - Climate data
  - Hydrometric data collection
  - Water level and discharge
  - Lake bathymetry
  - Stream and lake shoreline geomorphology data
  - Ice and winter flow information

- Additional regional data:
  - Environment Canada
  - Water Survey of Canada

Hydrology - Environmental Setting

Kennady Lake Watershed

- Within Kennady Lake watershed, lakes comprise more than 35% of the landscape
- Kennady Lake receives runoff from smaller tributary watersheds, each typically containing series of small lakes with interconnecting channels

Downstream Watersheds

- Drainage direction from Kennady Lake is northward, passing through a number of small watersheds before entering Aylmer Lake
- Upstream of Aylmer Lake, lakes comprise more than 25% of the landscape

Hydrology - Environmental Setting

- Larger channel beds are typically armoured with an inerodible bedrock or boulder layer
- Channels at outlets of smaller, headwater lakes may be poorly defined and flow through organic substrates

- Channel banks often consist of vegetated mats of organic material

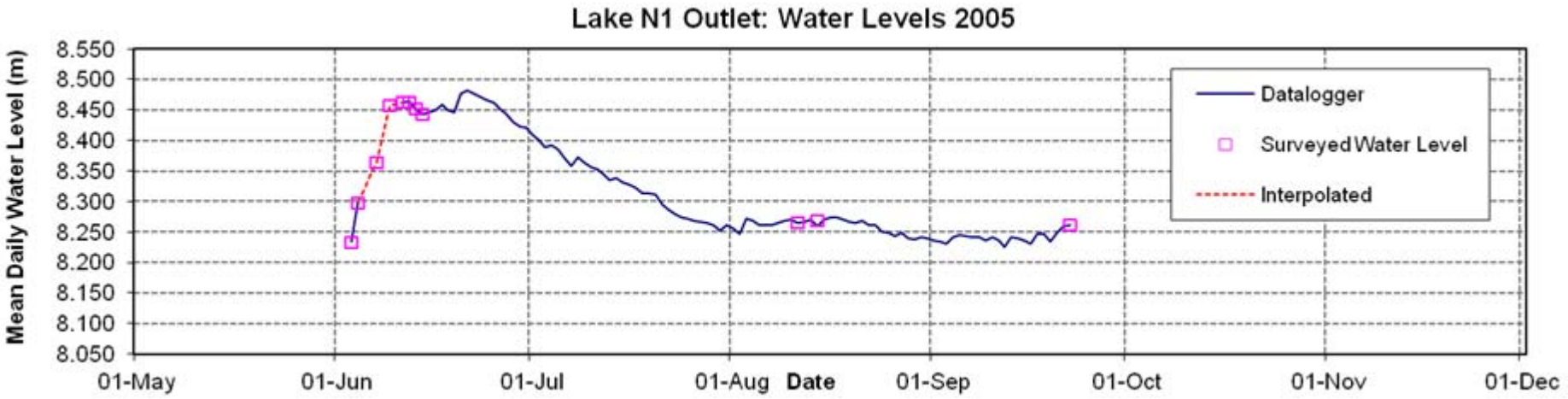
Hydrology - Environmental Setting

- During winter, when lakes are not frozen to bottom, ice thickness typically grows to about 1.8 m

- Small lake outlets are generally frozen to the bottom, though winter flow has been observed at larger ones like Lake N1, N11 and Kirk Lake

Hydrology - Environmental Setting

- Lake levels follow a predictable seasonal cycle:
  - Rapid spring rise occurs before loss of ice cover and before onset of discharge at lake outlet
  - Subsequent decline to lowest water levels typically in late August
  - Increase in water levels from late August into September, due to an increase in rainfall during late summer and early fall



De Beers
CANADA

Water and Sediment Quality

Water Quality - Environmental Setting

Existing Environment data for Water Quality and Sediment Quality collated from:

- Historic data sources
- Kennady Lake watershed
- LSA
- RSA

- Field surveys
- Kennady Lake watershed
- LSA

Water Quality - Environmental Setting

Field Programs

- Water quality surveys
  - 23 water quality sampling programs in LSA between 1995 and 2005, and 2010 and 2011
    - ➢ Emphasis on Kennady Lake watershed
  - Monitoring included:
    - ➢ Open water and under-ice conditions
    - ➢ Sampling for water chemistry data
    - ➢ Water column profile data
- Sediment quality surveys in Kennady Lake in 2004 and 2005, and 2010 and 2011
  - Sampling for sediment properties and chemistry

Water Quality - Environmental Setting

- Water quality is similar throughout Kennady Lake and other lakes in the LSA; seasonal variability is low
- Lakes exhibit seasonal physico-chemical characteristics
- Most lakes have low concentrations of total dissolved solids, alkalinity and hardness, and total suspended solids
- The lakes can be characterized as oligotrophic, and phosphorus-limited
- The lakes have low total organic carbon and dissolved organic carbon, but possess some colour
- Metal concentrations are generally low, but some metals (e.g., aluminum, cadmium, copper, iron and zinc) have been measured above aquatic life guideline concentrations

Sediment Quality – Environmental Setting

- Sediments are mainly composed of sand (~70%), with low silt (~25%) and very low clay (~2%) content
- Low to moderate organic carbon content
- Concentrations of most metals in Kennady Lake bed sediments are below sediment quality guidelines, but arsenic, cadmium, chromium, copper and zinc have been measured above guideline concentrations

De Beers
CANADA

Fish and Aquatic Resources

Fisheries and Aquatic Resources – Environmental Setting

- Baseline fish and fish habitat studies conducted between 1996 and 2011
- Focused on Kennady Lake, adjacent watersheds and downstream watersheds
- Components:
  - Aquatic Habitat
  - Limnology
  - Lower Trophic Levels
  - Fish Communities

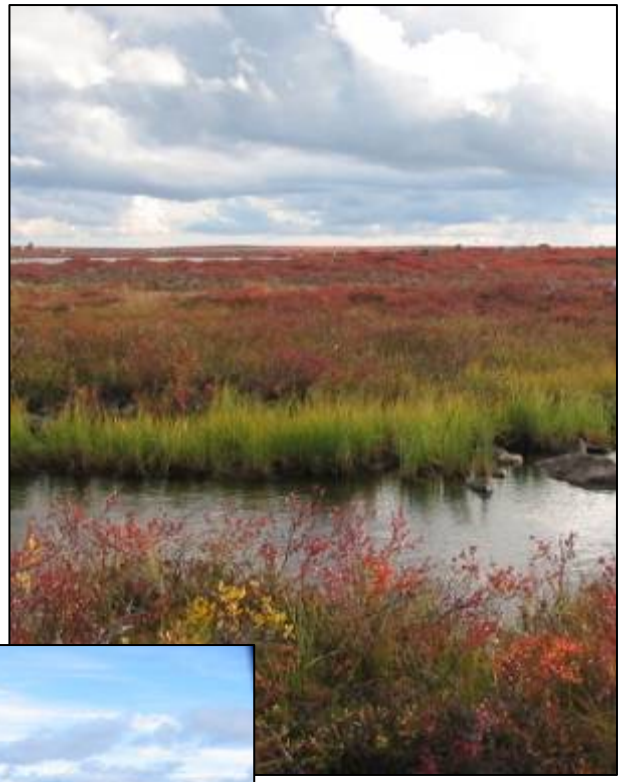
Fisheries and Aquatic Resources – Environmental Setting

Studies	Purpose	Years
Lake & Stream Habitat	Overwintering, Spawning potential	1996, 1999, 2000-2005, 2007, 2010, 2011
Limnology	Characterize water quality	1996, 1999, 2001-2005, 2007, 2010, 2011
Sediment	Baseline sediment toxicity	2004, 2005
Lower Trophic Levels	Characterize existing communities	1996, 2001-2005, 2007, 2011
Gill Netting	Large-bodied fish sampling	1996,1999, 2004, 2005, 2007, 2010
Minnow Trapping and Electrofishing	Small-bodied & young fish sampling, littoral habitat utilization	1996,1999, 2004, 2005, 2007, 2010, 2011
Fish Fences	Spawning movements	2000, 2004, 2005
Lake Sampling	Fish bearing status, species composition, abundance	1996, 2002, 2003-2005, 2007, 2010, 2011
Stream Utilization Surveys	Fish use, species, abundance	1996, 2000, 2004, 2005, 2007, 2010, 2011
Spawning Studies	Identify habitat and confirm use	1996, 2001, 2004
Radio Telemetry	Large-bodied fish movements	2004, 2005
Mark/recapture & Acoustics	Population estimates, movements	1996, 2000, 2001, 2004, 2010
Fish Tissue Sampling	Baseline metal concentrations	1996,1999, 2004, 2005, 2007, 2011

Fisheries and Aquatic Resources – Environmental Setting

Aquatic Habitat - Lakes

- Kennady Lake
  - Mean ~5 m and max depth ~20 m
  - Nearshore area mostly boulder/cobble with limited aquatic vegetation
  - Deeper offshore habitats mostly loose fine sediments



- Small lakes generally shallow depressions in tundra with low gradient shorelines and little vegetation; few offer overwintering habitat as they freeze to bottom

Fisheries and Aquatic Resources – Environmental Setting

Aquatic Habitat - Streams

- Majority of streams low gradient, boulder/cobble substrates with low-moderate fish habitat potential
- In spring, some streams provide habitat for grayling spawning and pike spawning migrations
- Flows reduced in summer with many streams becoming ephemeral and restricting large-bodied fish movement

Fisheries and Aquatic Resources – Environmental Setting

Lower Trophic Levels

- Phytoplankton, zooplankton and benthic invertebrate communities typical of sub-Arctic lakes on Canadian Shield with low abundance and high diversity

Fisheries and Aquatic Resources – Environmental Setting

Fish Investigations - Lakes

- Fish presence and distribution determined
  - Half of sampled lakes were non fish-bearing

➢ 8 fish species in Kennady Lake
  - Lake trout and round whitefish most abundant large-bodied species
  - Arctic grayling, northern pike, burbot also present
  - Forage fish include lake chub, ninespine stickleback and slimy sculpin

Fisheries and Aquatic Resources
Existing Environment

Fish Investigations - Streams

- Arctic grayling most abundant species captured in streams; other sport and forage fish captured

De Beers Canada

Assessment Approach

October 2011

Assessment Approach - Valued Components

- Water quality and fish identified as VCs
  - Water quality has both important ecological and human health value
  - Fish important to traditional and non-traditional land users, and link between potential effects to water quality and human health
    - Lake trout, Arctic grayling, and northern pike selected as valued fish species

Valued Components and Endpoints

Valued Component	Assessment Endpoint	Measurement Endpoints
• Water Quality • Fish (lake trout, Arctic grayling and northern pike)	• Suitability of Water Quality to Support a Viable Aquatic Ecosystem • Abundance and Persistence of Desired Population(s) of Lake Trout • Abundance and Persistence of Desired Population(s) of Arctic Grayling • Abundance and Persistence of Desired Population(s) of Northern Pike	• permafrost depth and distribution • groundwater quantity and quality • surface drainage, and stream flow • physical and chemical characteristics of water and sediment • fish habitat quantity, quality, availability and use • lower trophic level community structure and composition • fish numbers, movement, behaviour, survival and health • access to fish and wildlife • human health

De Beers
CANADA

Hydrogeology

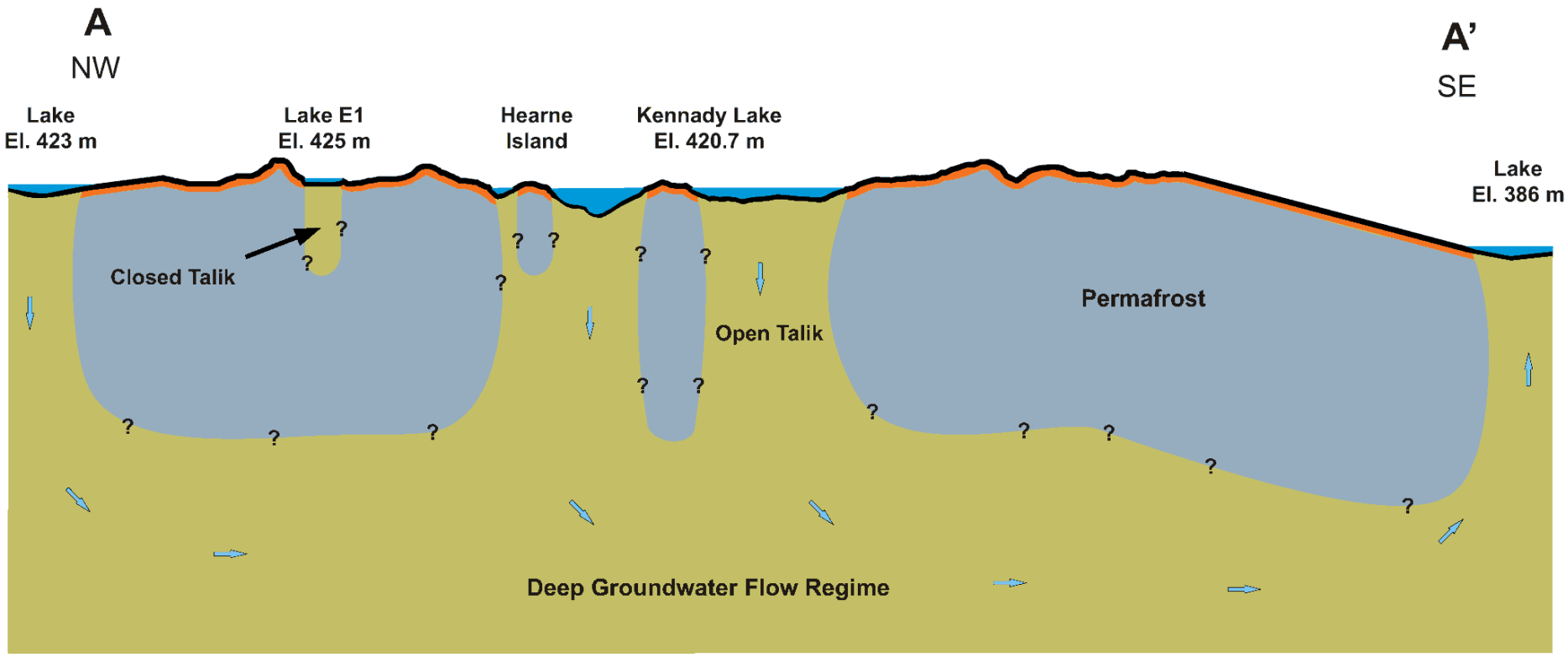
October 2011

Hydrogeology - Assessment Methods

- A groundwater quantity and quality model was developed using MODFLOW and MT3D to evaluate:
  - Effects to surrounding lake levels
  - Effects to surface water quality
- The groundwater model was designed to project the following:
  - Quantity of groundwater reporting to the pits during operations and post-closure
  - Projected concentrations of TDS in the groundwater inflow
  - Projected contribution from lake water

Hydrogeology - Conceptual Assessment Model

Groundwater Flow During Operations



Hydrogeology – Assessment Summary

- The Project will have negligible effects on groundwater quantity
  - No measureable differences in lake water volumes are projected
- Conservative assumptions were built into the model to provide high degree of confidence that effects on groundwater (quantity and quality), and surface water quality as a result of changes to the groundwater, have not been underestimated
  - i.e., upper bound values were selected for hydraulic conductivities
- The model is expected to produce higher groundwater inflows than actual groundwater flows to the open pits during mining
- Simulated groundwater inflow results and concentrations will be validated during operational monitoring

De Beers
CANADA

Hydrology

October 2011

Hydrology – Assessment Methods

Water Balance Model

- Model developed using GoldSim™ software

– Flows simulated on a daily based on long-term climate data from 1950 to 2005

- Kennady Lake watershed, downstream, and adjacent watersheds divided into sub-watersheds
- Water balance for each watershed considered the following:
  - Rainfall and snowmelt runoff
  - Inflow from upstream watersheds
  - Changes in lake storage
  - Lake evaporation
  - Outflow to downstream watersheds

Hydrology – Assessment Methods

- Water balance designed to model the effects of the Project during the following periods:
  - Construction, operations, refilling, and post-closure
- Evaluation focused on effects to the following key hydrological parameters:
  - Flows and water levels
  - Channel and bank stability

Hydrology – Assessment Findings

Construction Phase

No adverse impacts on channel or bank stability or erosion expected from watershed diversions and dewatering

<u>Diversions</u>

- Water levels and surface areas in diversion lakes increased
  - Erosion potential and sediment load minimized
  - Diversion channels designed to minimize erosion and maintain stability

Hydrology – Assessment Findings

Construction Phase

Dewatering

- Increases to flows and water levels from dewatering discharge
  - Area 8 and downstream watersheds
  - N watershed
- Discharges to Area 8 and Lake N11 managed to prevent downstream erosion and changes to channel stability
- Effects progressively reduced with increased distance downstream

Hydrology – Assessment Findings

Operations Phase

- No adverse impacts on channel or bank stability or erosion expected from watershed diversions
- Pumping from WMP to Lake N11 managed to prevent effects to channel stability
- Isolating Kennady Lake will reduce peak daily discharges and low flows through Stream K5 because of reduction in upstream storage and drainage area
- Effects are progressively reduced downstream as additional undisturbed watersheds contribute to runoff

Hydrology – Assessment Findings

Closure Phase

Refilling

- At closure, diverted watersheds restored, and pumping from Lake N11 will supplement refilling of Kennady Lake
- Flows at the outlet to Area 8 (Stream K5) are reduced similar to operations
- Diversion of water from Lake N11 will result in small reduction of flows and water levels downstream of Lake N11
- No effects on outlet channel or bank stability expected

Hydrology – Assessment Findings

Closure Phase

Post-Closure Period

- Post-closure flows will change for the Kennady Lake watershed
  - mean annual water yield will increase
  - surface area of Kennady Lake will be smaller (8.2 to 7.2 km^2)
- Natural restoration of lake shorelines and lake outlet channel regimes preserve stability and natural rates of erosion
- Downstream watersheds return to near baseline conditions, but will be affected by changes to the Kennady Lake watershed hydrological regime
- Hydrological regime of N watershed similar to baseline

De Beers Canada

Water Quality

October 2011

Water Quality – Assessment Methods

Project Air Emissions

- An air quality dispersion model was developed to project the following:
  - Mass loadings to Kennady Lake and lakes in downstream watersheds
  - The potential for lake acidification as a result of deposition of acidifying air emissions

Water Quality – Assessment Methods

Surface Water Quality Model

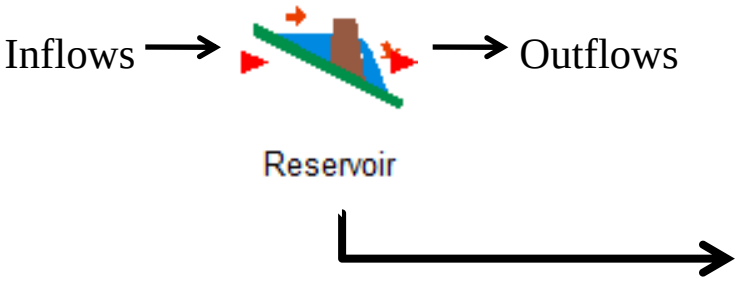
- Effects to surface water quality were evaluated using a conservative mass balance model developed in the GoldSim™ modeling package.
- Water qualities were projected for the following:
  - Kennady Lake
  - Downstream Watersheds
- In GoldSim™, inflow volumes to water bodies were assigned a water chemistry selected from baseline information or geochemical testing to account for loadings from natural areas, disturbed areas, mine rock runoff, fine and coarse PK runoff, and groundwater discharge

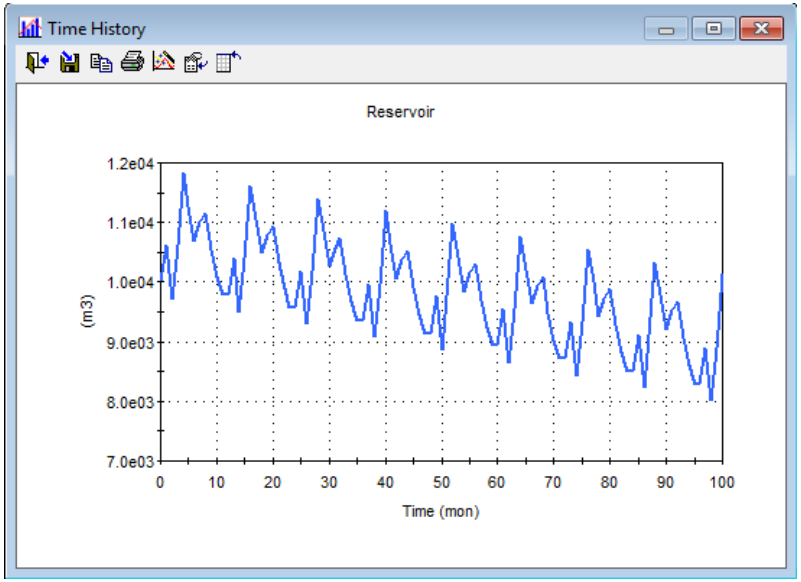
Water Quality – Assessment Methods

How is water quality calculated in GoldSim™?

GoldSim™ has elements designed to facilitate water quality modeling.

Reservoirs - Volumes





For illustrative purposes only

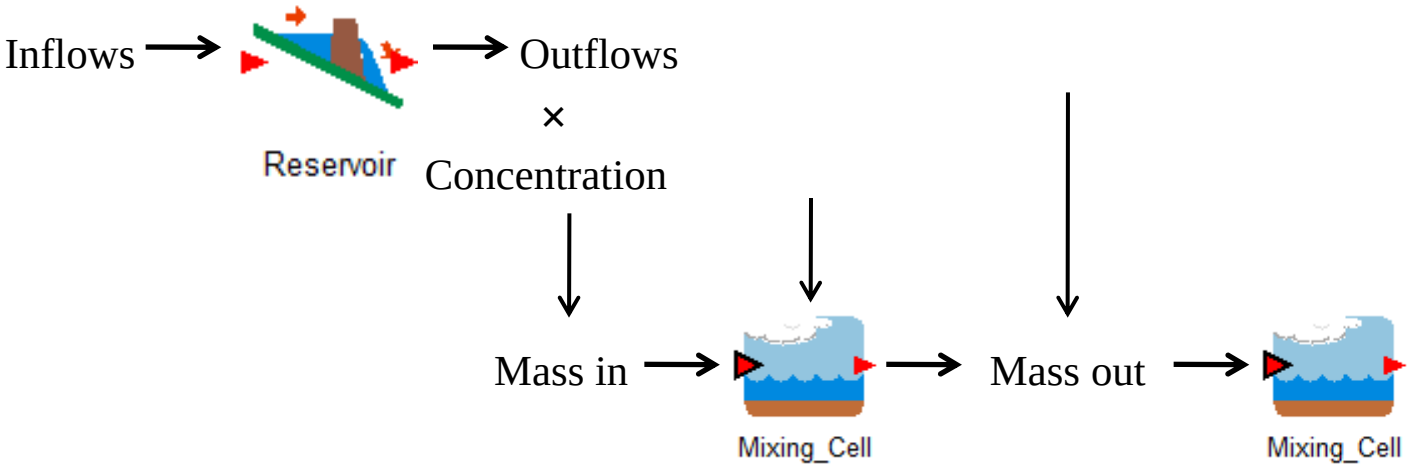
Reservoirs are used to track inflow and outflow rates to simulate the volume of a body of water.

Water Quality – Assessment Methods

How is water quality calculated in GoldSim™?

GoldSim™ has elements designed to facilitate water quality modeling.

Reservoirs - Volumes



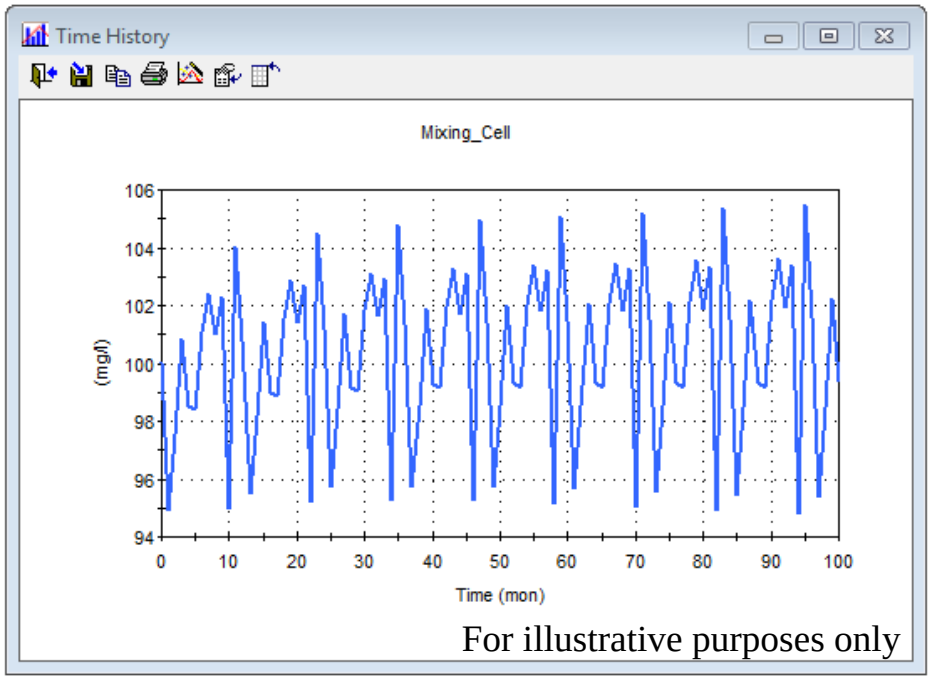
Cell Pathways – Water Quality

Cell pathways are used to track mass inflow and outflow rates to simulate the water quality of a body of water.

Assessment Methods – Water Quality

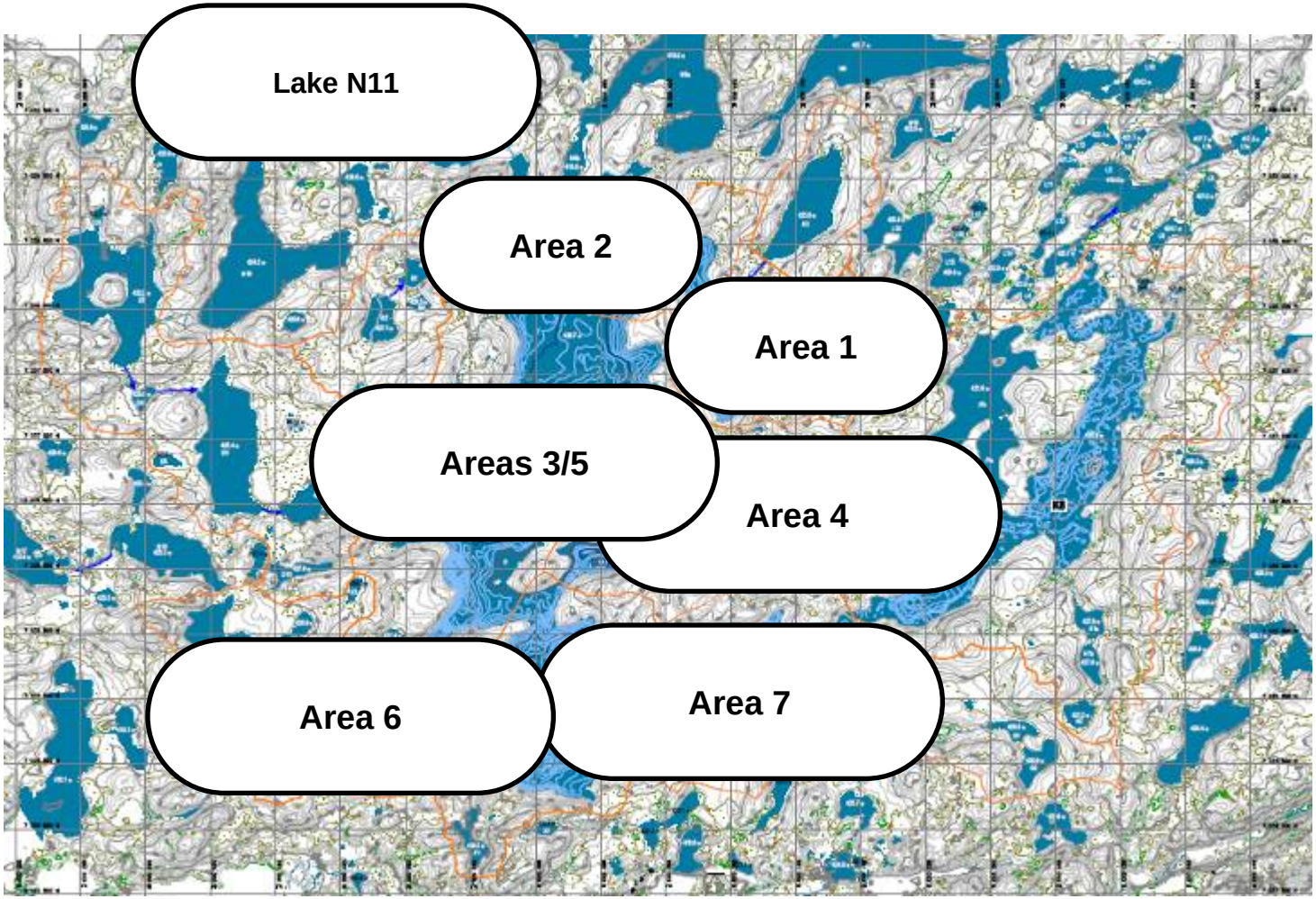
How is water quality calculated in GoldSim™?

GoldSim™ has elements designed to facilitate water quality modeling.

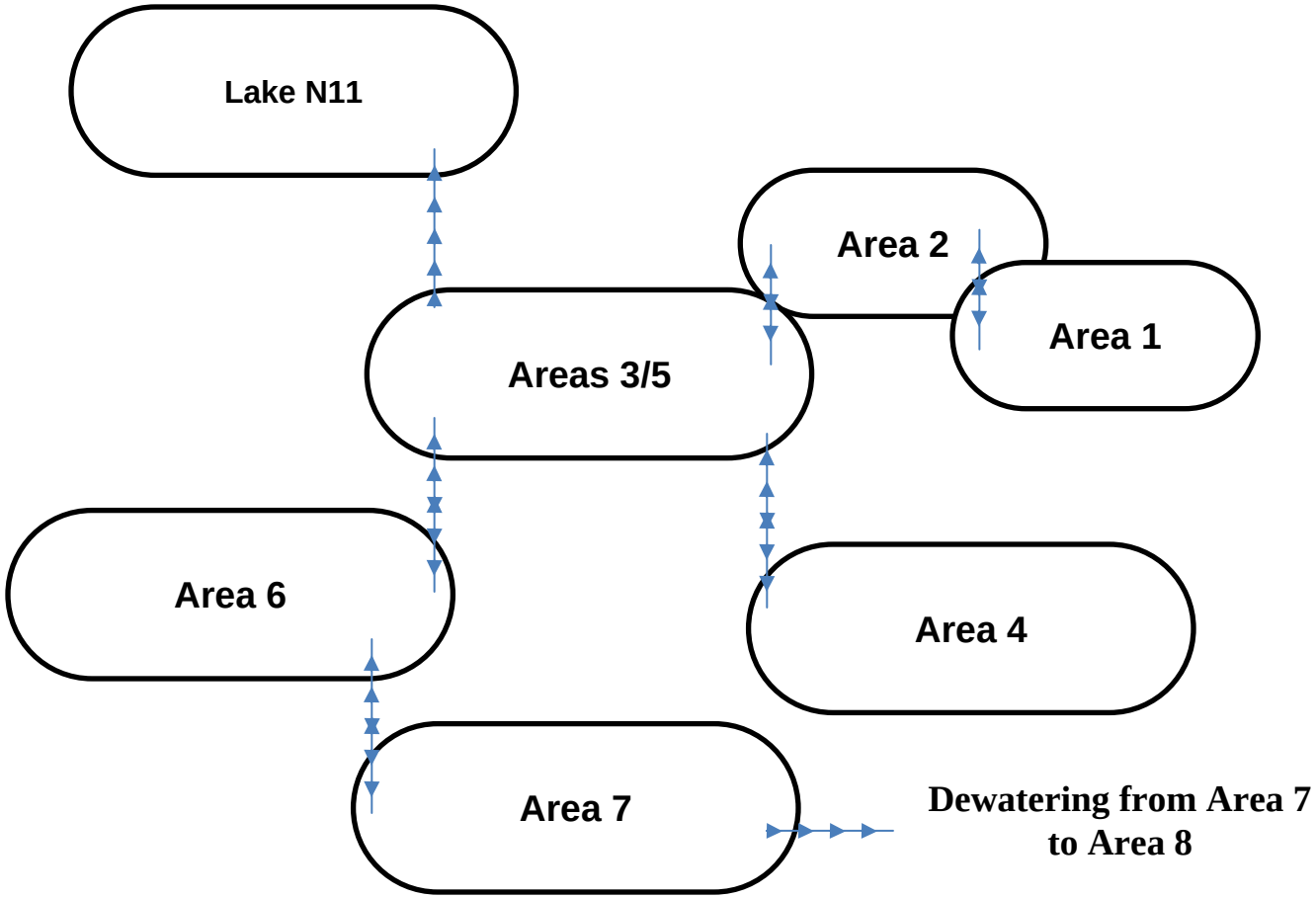


Cell pathways are used to track mass inflow and outflow rates to simulate the water quality of a body of water.

Water Quality – Assessment Methods

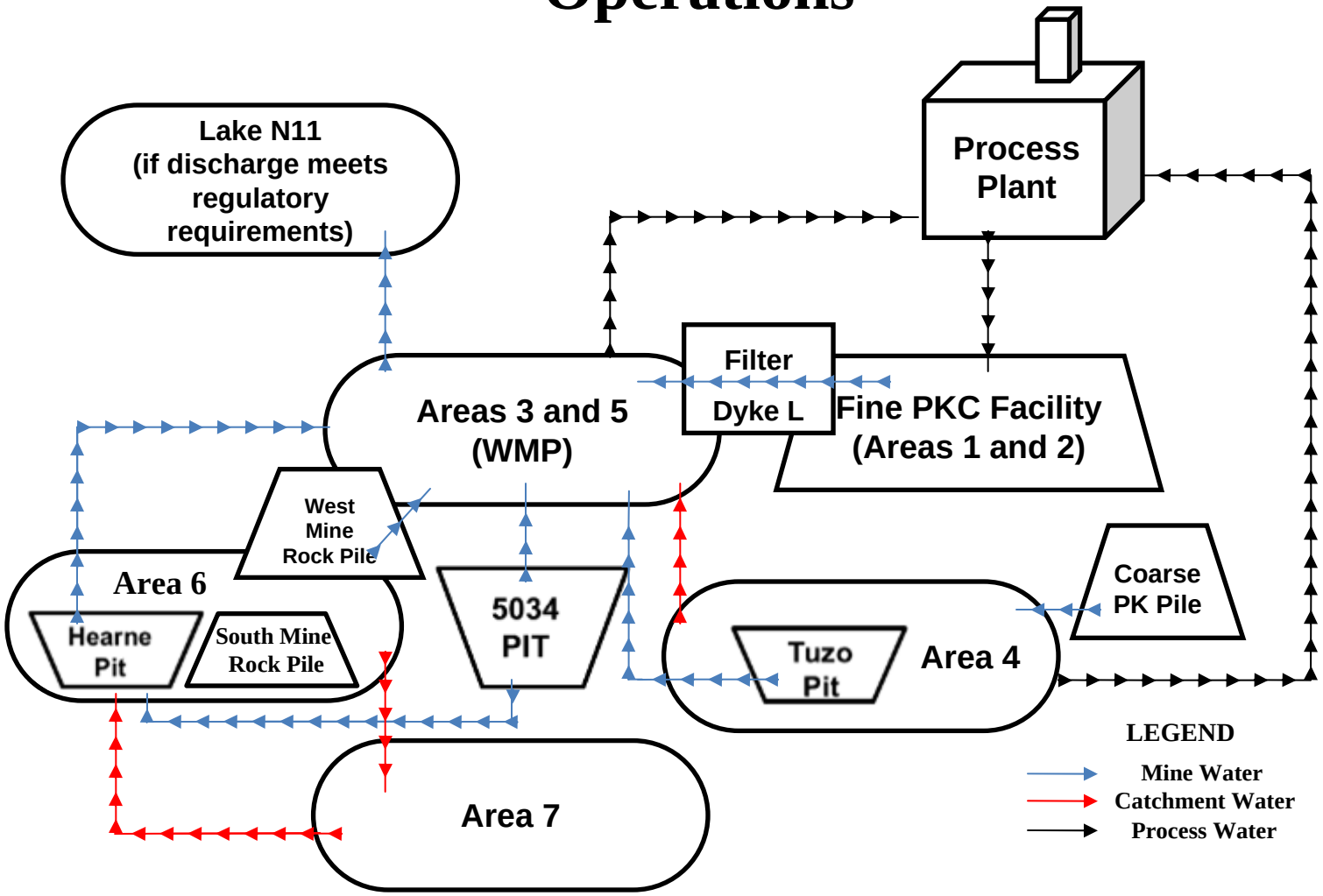


Construction



Water Quality – Assessment Methods

Operations

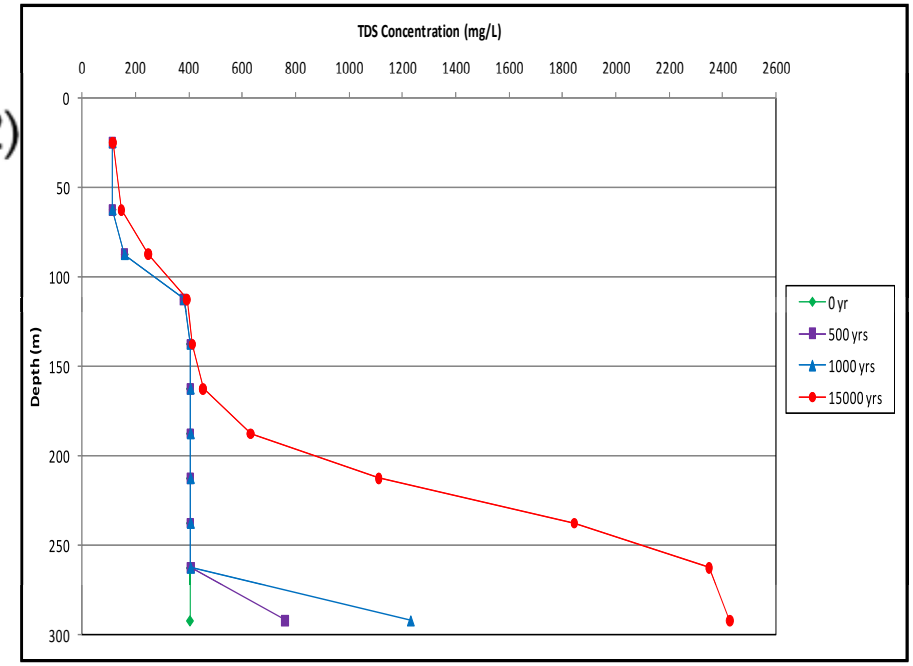


Water Quality – Assessment Methods

Tuzo Pit Stability

- Meromixis will develop as a consequence of the density gradient between high TDS bottom waters in the pit and the overlying low TDS water
- Pycnocline movement and stability were evaluated using:

- Hydrodynamic model (CE-QUAL-W2)
  - 100 years of closure
- Mass balance model
  - 15,000 years of closure



Water Quality – Assessment Methods

Tuzo Pit Stability

- Tuzo pit was incorporated into the GoldSim™ model as a Cell Pathway with a defined capacity

- As the pycnocline moves deeper with time, additional water stored in the Tuzo pit will mix with Kennady Lake

- The change in capacity resulting from pycnocline migration in Tuzo pit was included in the GoldSim™ model to account for release of deeper saline water stored in Tuzo during the closure period prior to stratification being established

Water Quality – Assessment Methods

Winter Oxygen Depletion Rate (WODR)

- A WODR model was developed to estimate DO depletion under ice conditions as a result of projected total phosphorus (TP) concentrations in Kennady Lake
- Used three approaches based on North American Lakes

Water Quality – Assessment Findings

Changes to Water Quality from Project Air Emissions

- Limited spatial and temporal extents of air emissions expected to result in negligible changes to water chemistry in lakes within the Kennady Lake watershed
- Projected net PAI values representing peak emissions were below critical loads for the 19 lakes studied
  - ➢ lake acidification not expected

Water Quality – Assessment Findings

Changes to Water Quality from Project Activities

- Several parameters are projected to increase in Kennady Lake and the downstream watershed lakes after closure
  - TDS, major ions, nutrients and metals
  - Projected concentrations decrease downstream in the watershed relative to Kennady Lake
- Metals projected to be higher than CCME Guidelines (Protection of Aquatic Life)
  - Kennady Lake: Cadmium (Cd), Chromium (Cr), Copper (Cu) and Iron (Fe)
  - Area 8: Cd and Cr
  - Lake N11: Cd and Cr
  - Lake 410: Cd
- Projected concentrations were evaluated as part of the Aquatic Health Assessment

Assessment Results – Water Quality

Changes to Winter Oxygen Depletion Rate (WODR)

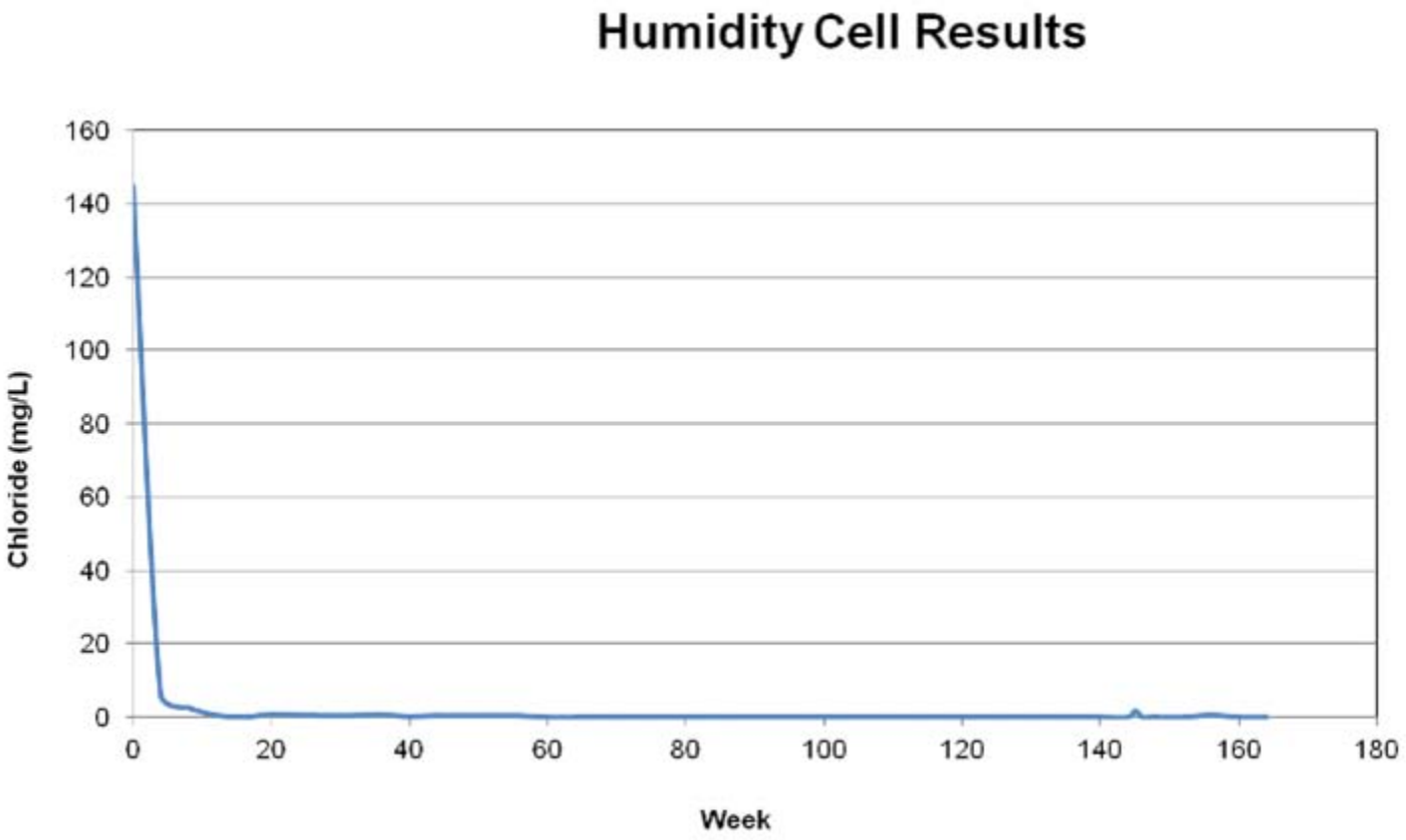
- Additional depletion of oxygen under ice after closure is expected in Kennady Lake
- Increased oxygen demands are likely to affect 22% of the water volume, mainly below 6 m depth
- The surface zone (78% volume) is expected to maintain sufficient oxygen concentrations to support cold-water aquatic life (>6.5 mg/L DO)

Water Quality – Assessment Methods

Uncertainty

- Water quality projections based on several inputs all of which have inherent variability and uncertainty
- Prediction uncertainty addressed by applying conservative assumptions in the model including:
  - Conservatism was applied in the groundwater inflow predictions
  - Conservatism was applied in selection of geochemical source terms
  - No consideration of mass retention as a result of permafrost development
  - No attenuation of mass due to geochemical or biological reactions
- On-going work to refine surface water quality projections

Water Quality – Assessment Methods



De Beers Canada

Aquatic Health

October 2011

Aquatic Health – Assessment Methods

- Predicted changes to water quality on aquatic health evaluated through two exposure pathways:

Direct Exposure

- Predicted water concentrations compared with chronic effects benchmarks (CEBs) to evaluate potential for aquatic health effects due to direct waterborne exposure

Indirect Effects

- Predicted tissue concentrations compared with toxicological benchmarks to evaluate potential for aquatic health effects related to tissue concentrations

Aquatic Health – Assessment Findings

Kennady Lake Watershed

- Potential for adverse effects from dust and metals deposition during operations is low
- Changes to concentrations of all substances considered in the assessment predicted to result in negligible effects to aquatic health in Kennady Lake

Downstream Watershed

- Changes to concentrations of all substances considered in the assessment predicted to result in negligible effects to aquatic health in water bodies downstream of Kennady Lake

Fish and Fish Habitat

October 2011

Fish and Fish Habitat – Methods

- Area of fish habitat lost quantified using GIS (overlaying Project footprint over habitat classification maps)

- Review of data and results from other components
  - Changes to flows, water levels, shoreline erosion and sedimentation from hydrology
  - Changes in total suspended solids and winter oxygen demand from water quality
  - Changes in aquatic health from aquatic health component

- Qualitative assessments based on literature reviews, species life history, and knowledge

Fish and Fish Habitat - Assessment Findings

Construction

Changes to Fish Habitat from Project Footprint

- Affected habitat areas quantified
- Habitat compensation plan will create new fish habitat to offset predicted habitat losses (no net loss of fish habitat)
- Compensation options include:
  - Raising water levels in D-E-N lakes
  - Widening top bench of mine pits where extend onto land
  - Construction of habitat enhancement features

Fish and Fish Habitat - Assessment Findings

Construction

Watershed Diversions

- Dykes will interrupt movement of fish between Kennady Lake and upstream waterbodies
  - Diversion watersheds will support self-sustaining fish populations e.g., Arctic grayling, northern pike, burbot, forage fish
- Increases in lake levels will increase lake habitat area - benefit for fish residing in these lakes
- Watersheds will be reconnected at closure, allowing for fish migration

Fish and Fish Habitat - Assessment Findings

Construction

Dewatering

- Fish salvage to remove fish before and during dewatering
- No fish habitat within Kennady Lake during life of the mine
- Flows augmented in downstream (N, and L and M) watersheds in summer
  - Negligible effects on Arctic grayling spawning and rearing
  - May improve accessibility for some species
  - Small increases in lake water levels and areas may benefit fish through increased littoral area and summer rearing habitat

Fish and Fish Habitat - Assessment Findings

Operations

Dust Deposition

- Dust deposition localized and for short period after freshet
  - Fish can tolerate high concentrations for short periods
  - Low potential for adverse effects to aquatic health

Fish and Fish Habitat - Assessment Findings

Operations

Isolation of Area 8

- Fish community will continue to be present in Area 8
  - e.g., Arctic grayling, northern pike, burbot and forage fish
  - Existing shallow depths in Area 8 may limit overwintering habitat in isolated basin for species such as lake trout and round whitefish

Downstream Flows

- Flow reductions in L and M watershed during operations
  - Reduction in available habitat
  - Reduction in spring flows will negatively affect grayling spawning migrations and populations
  - However, flow mitigation plan being developed
- Flows also return to near baseline during post-closure

Fish and Fish Habitat - Assessment Findings

Closure (Post-closure Period)

Refilled Kennady Lake

- Increased nutrients will increase primary and secondary productivity in Kennady Lake
- Due to increases in food base, may also be increased growth and production in forage fish, as well as large-bodied fish species
- Kennady Lake is expected to retain DO during winter to support fish; however, may be reduction in availability or suitability of overwintering habitat for cold-water species

Fish and Fish Habitat - Assessment Findings

Closure (Post-closure)

Downstream Watershed

- Increased nutrients along gradient downstream in L and M watersheds which will increase primary and secondary productivity
- May be increased growth and production of forage fish, as well as large-bodied fish
- Potential for small changes in habitat availability or suitability, but not expected to affect fish populations or distribution

Recovery of Kennady Lake

- Aquatic ecosystem will develop after refilling and reconnection of basins
- Estimated time frame for recovery after refilling:
  - Phytoplankton community ~5 yrs
  - Zooplankton within 5 to 10 yrs
  - Benthic invertebrate community ~10 yrs
  - Forage fish initially, then large-bodied species
    - Northern pike ~50 to 60 yrs
    - Lake trout ~60 to 75 yrs

Recovery of Kennady Lake

- Fish community re-establishment dependent on species ability to re-colonize, habitat conditions, and how succession occurs
- Final fish community will consist of small-bodied forage fish community and large-bodied species (e.g., Arctic grayling, northern pike, burbot, round whitefish, lake trout)

De Beers Canada

Residual Impact Classification

October 2011

Residual Impact Classification

Residual impacts are considered "Not Significant"

Suitability of water to support viable and self-sustaining aquatic ecosystem

- Residual impacts are **not environmentally significant** for both KLOIs (Kennady Lake and Downstream Watershed)
- Water quality changes will result in negligible effects to aquatic health
- Projected increases in long-term P levels will not pose health risk to viable and self-sustaining aquatic ecosystem; lakes and streams may be more productive

Residual Impact Classification

Abundance and persistence of Arctic grayling, lake trout, and northern pike

- Residual impacts are **not environmentally significant** for both KLOIs (Kennady Lake and Downstream Watershed)
- VCs affected by loss of habitat in Kennady Lake during life of mine; however, self-sustaining populations will establish in refilled lake
- Reduced flows downstream during operations may affect habitat availability, suitability and movement of VCs between Area 8 and Lake 410
  - However, flow mitigation plan under development, and flows return to near baseline post-closure
- Nutrient enrichment may provide for improved productivity for fish, although may be some localized changes to habitat conditions

Summary

The projected impacts of the Project are considered to be not environmentally significant for both KLOIs

SON Great Slave Lake

- Incremental changes to Hoarfrost River, the Lockhart River and Great Slave Lake will not be measureable.
- The Project will not have a measurable contribution to cumulative effects.

- The deposition of air emissions is expected to have a negligible effect on water and sediment quality in regional waterbodies located more than 2 km away from the Project site
- Water releases and potential changes in surface water flow and/or quality within and downstream of Kennady Lake will have no effect on surface water flows, water levels or water quality outside of the LSA

October 27, 2011

Gahcho Kué Project
Conceptual Closure and Reclamation Plan

October 27, 2011

Outline

1. Objective of the Conceptual Closure and Reclamation Plan (the Plan)
2. Key concepts central to the Plan
3. Long and short-term objectives of the Plan
4. Commitments associated with the Plan
5. Overview of key activities and their schedule
6. Conceptual Closure and Reclamation Plan Summary

Objectives of the Plan

The **overall objectives** of the Plan for the Project are to:

- Minimize the lasting environmental impacts of operations to the extent practical
- Allow disturbed areas to return to productive fish and wildlife habitat as quickly as possible
- Achieve post-closure conditions that do not require maintenance

➢ The Plan is considered “conceptual” at this stage, and will be refined over time.

Key Concepts

Design for Closure:

- Closure and reclamation were considered during the selection of design alternatives
- As such, closure and reclamation planning has been considered as an element for all Project phases, including design

Progressive Reclamation:

- Reclamation is expected to begin and continue during operations
- Reclamation (during operations and at end of mining) will be consistent with the objectives outlined in the *Mine Site Reclamation Guidelines for the NWT*

Key Concepts

Incorporation of 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 the feedback received during the engagement process, De Beers identified community desires for reclamation
  - Example: restore Kennady Lake as quickly as possible
- The Plan was developed to address, to the extent possible, community desires 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

Long-term Objectives

Long-term Objectives of the Plan:

- Restore or replace the natural fish habitat that may have been lost, altered, or disturbed as a result of the Project
- Return the site to a state that is similar to other habitats in the same region that are not affected by the Project
- Create, to the extent practical, an aesthetically pleasing final landscape

Short-term Objectives

Short-term Objectives of the Plan:

- Reclaim areas during operations 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
- Cover ground to prevent soil drifting and dust production
- Maintain an environmentally safe site

C&R Plan – Commitments

- Use progressive 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
- Conduct reclamation trials throughout the life of the Project
- Liaise with other mine operators in the Canadian Arctic with respect to reclamation

Key Activities of the C&R Plan

Construction and Operations Phases:

- Salvage and stockpile soil, overburden, and lakebed sediments, to the extent practical, from areas of disturbance
- Create 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

Key Activities of the C&R Plan

Closure Phase:

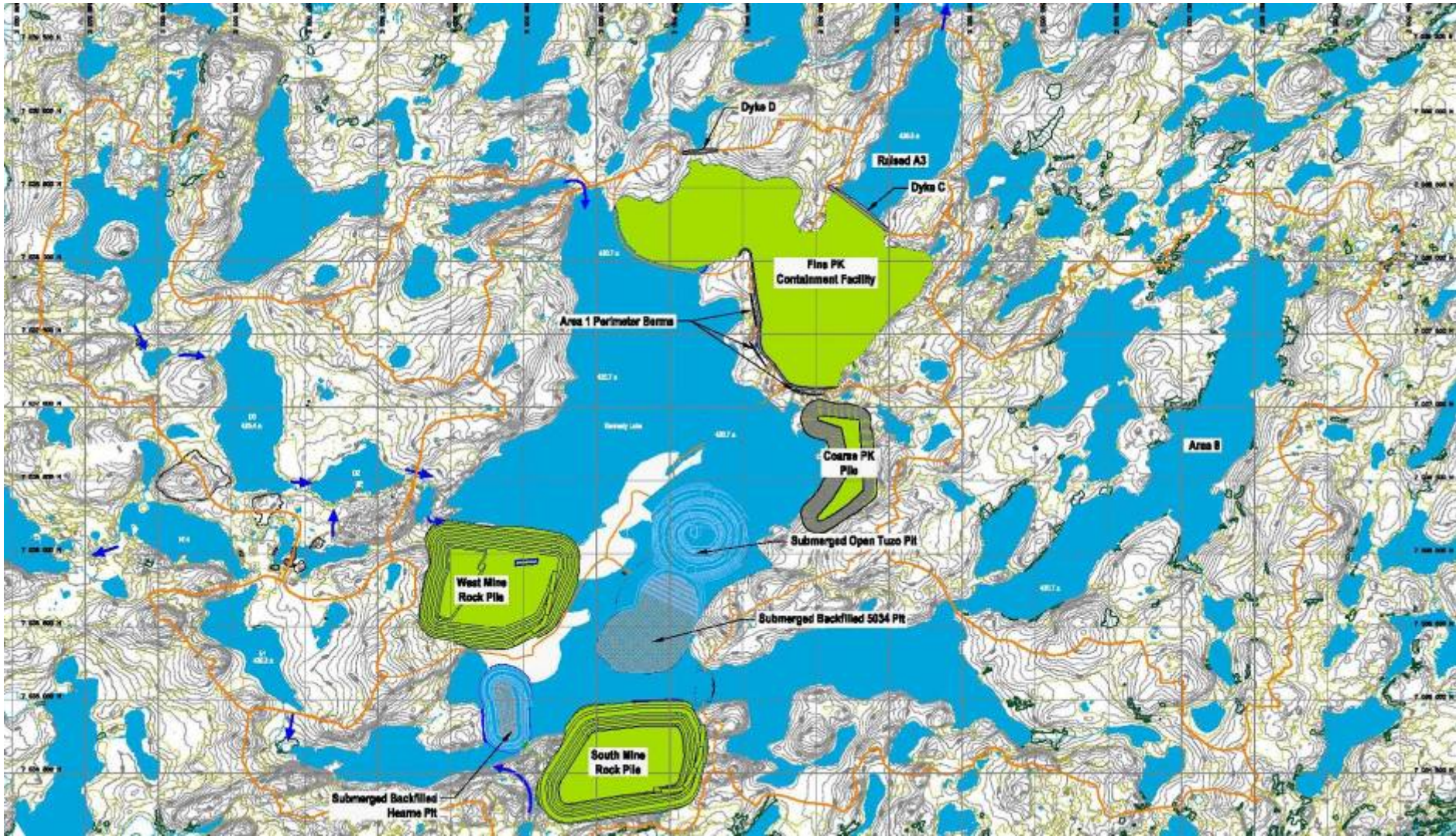
- Remove all potentially hazardous materials from site
- Dismantle and demolish all buildings and related structures and dispose of materials
- Remove all above-grade (i.e., above ground level) concrete footings and foundations and dispose of materials
- Construct additional fish compensation habitat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

Key Activities of the C&R Plan

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

Final Reclamation



C&R Plan - Schedule of Key Activities

Planned Schedule:

- Closure and reclamation activities will occur throughout the 11-year operational life of the Project
- Progressive 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 available at the time of reclamation, in accordance with the legal requirements at that time, to facilitate reclamation as quickly as possible.

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

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+

C&R Plan - Summary

- Closure and reclamation planning has been considered in all Project phases, including design
- Progressive reclamation is expected to begin and continue during operations, and be completed during the closure and reclamation phase of the Project
- The conceptual Plan includes long and short-term objectives and incorporates community feedback and traditional knowledge
- De Beers will use proven technology available at the time of reclamation, in accordance with the legal requirements at that time, to facilitate reclamation as quickly as possible

De Beers Canada

Gahcho Kué Project

Economic Impact Assessment

October 27, 2011

Introduction

- The economic impact assessment addresses concerns expressed regarding the long-term economic outlook of the NWT
- The information presented today can be found in the Economic Impact Report (Appendix 12.II)
- This presentation will provide information regarding
  - the current and future economic status of the NWT
  - the economic research methods and concepts
  - the economics of the Project; its planned expenditures on labour and capital
  - the direct, indirect, and induced effects of these initial expenditures
  - the added impacts on employment, labour market, and population
- A presentation on the socio-economic impacts will follow this presentation

De Beers
CANADA

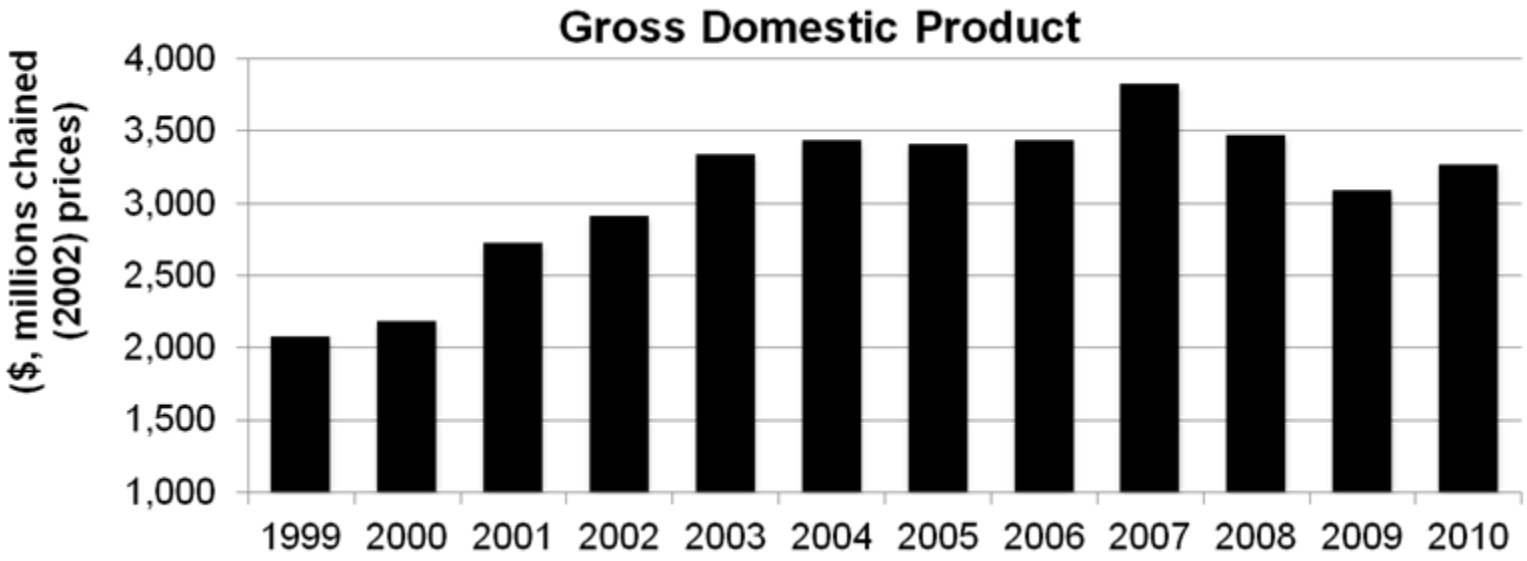
Gahcho Kué Project

Human Environment Setting

Brief Review of Current Economy

- The economy grew rapidly from 1999 to 2004, but has been relatively stable ever since
- Mining is and will remain the economic driver, representing over 30% of NWT's production (in direct impacts)
- Employment and income grew with the rise of the diamond industry and have remained relatively stable ever since
- The relative impacts have been the greatest amongst NWT's Aboriginal population
- The recession brought a decline in employment and recovery has been slow, employment levels are now (late 2011) returning to previous levels

Brief Review of Current Economy



- The NWT has been challenged with labour force retention, out-migration, some deruralisation is also occurring
- In the absence of some potential projects becoming reality in the next few years, NWT faces the threat of a declining economy and population and issues of sustainability

What's next for the Northwest Territories?

- Understanding the underlying economic future of the NWT is an important factor in assessing the Project's impacts
- Economic conditions have changed since the Gahcho Kué Project was first proposed
- Public and Private investment has been falling through a combination of the recession, reduced construction requirements at existing mines, reduced exploration, and a tighter fiscal position
  - Giant Mine
  - Gahcho Kué Diamond Mine
  - Prairie Creek, NICO, Yellowknife Gold, Thor Lake
  - Oil Exploration in the Beaufort Sea, Sahtu
  - Mackenzie Valley Pipeline and related gas fields

De Beers Canada

Gahcho Kué Project

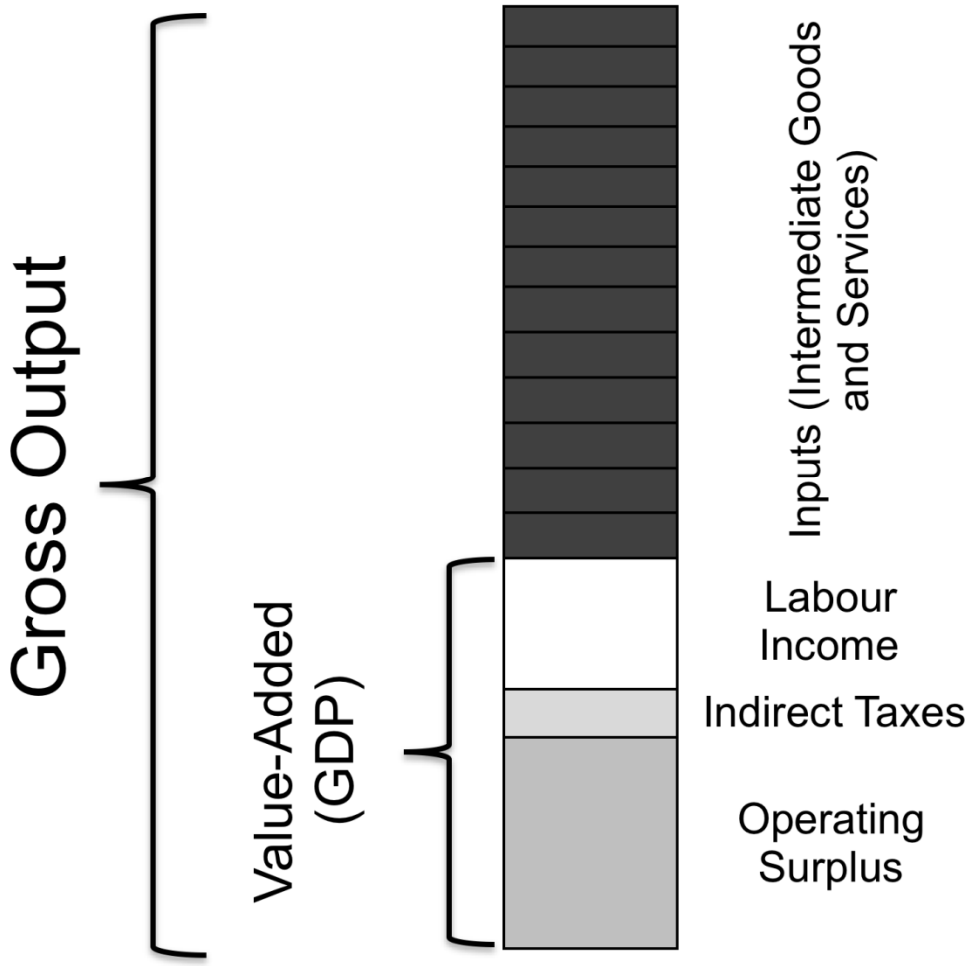
Economic Methods

Economic Impact Study Methods

- All expenditure figures based on the Project's engineering reports
- Models and Data from Statistics Canada, NWT Bureau of Statistics, and Impact Economics
- The study looks at the direct impacts of the Project's expenditures on gross output, GDP, labour income, employment and the indirect and induced impacts of business and labour participation
- Expenditures are analysed for the construction and operations separately

Economic Concepts

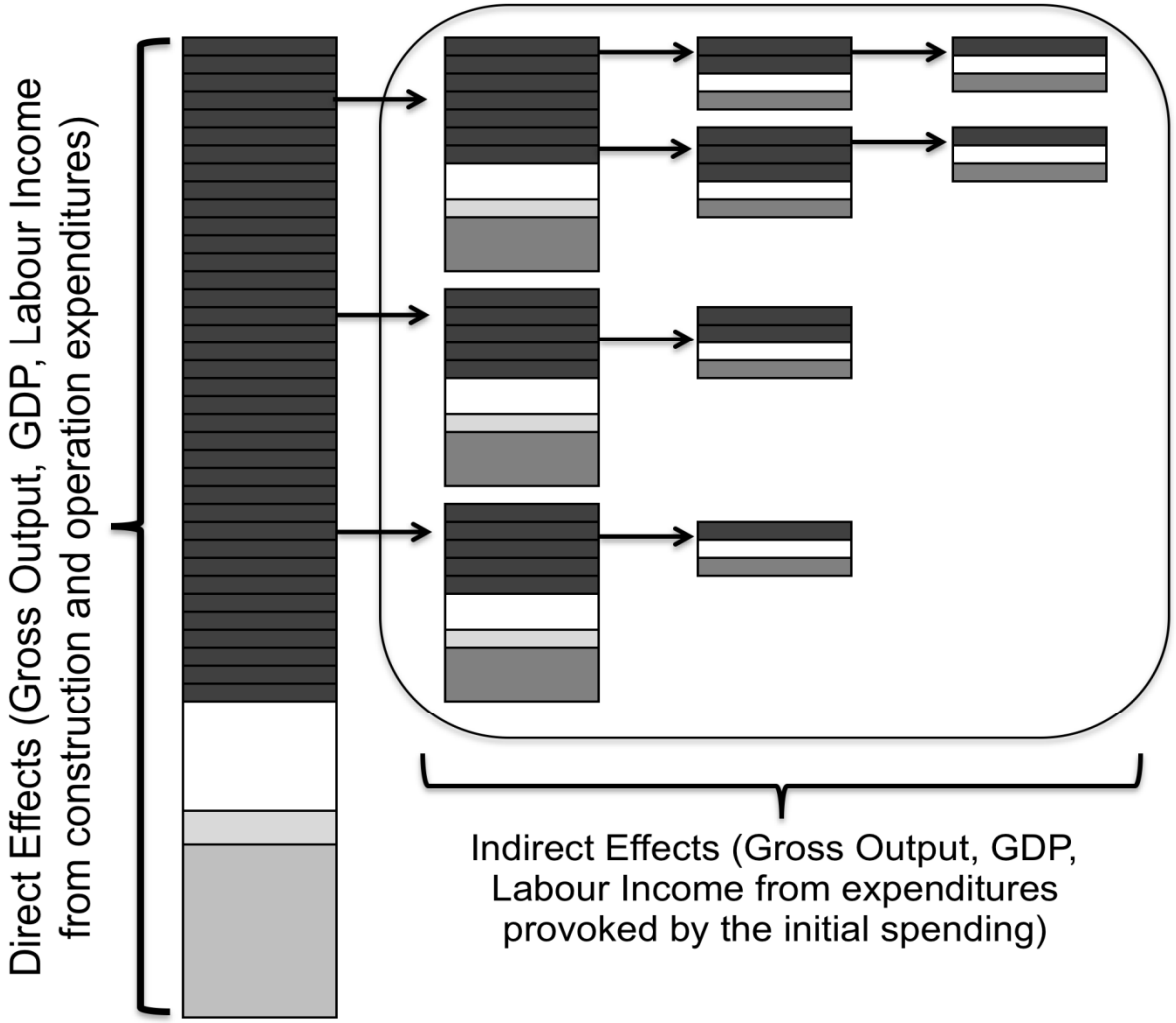
- The Economic Impact Report examines the effects on gross output, gross domestic product, labour income, and employment that are created by the Project's expenditures



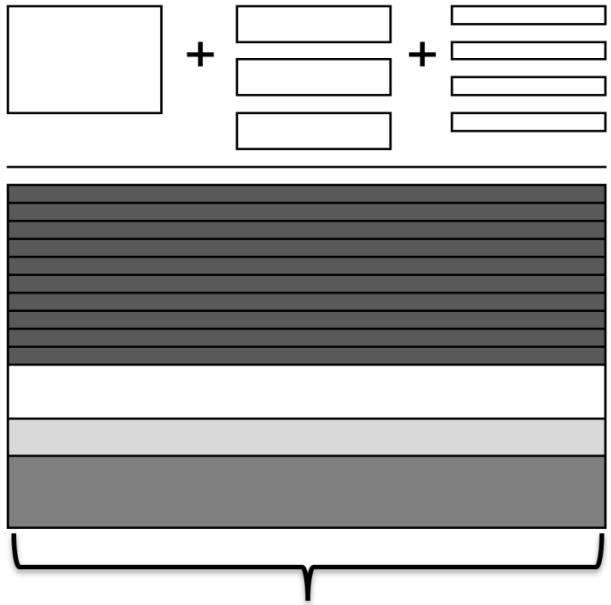
Input-Output Modeling Concepts

- We are interested in the full economic impact of the initial expenditures
- The initial expenditures provoke additional spending
- To assess the full impact, we follow the money; that is, we look to see where the money goes after the initial expenditure is made
  - Some of the money is used by the business sector to replenish inventories
  - Some of the money is used by consumers to purchase goods and services
- We divide the impacts of each expenditure into categories: direct, indirect, and induced effects

Direct, Indirect, and Induced Effects



The Labour Income from direct and indirect effects is spent on goods and services.



Induced Effects (Gross Output, GDP, Labour Income from consumer expenditures)

De Beers Canada

Gahcho Kué Project

Economic Impacts

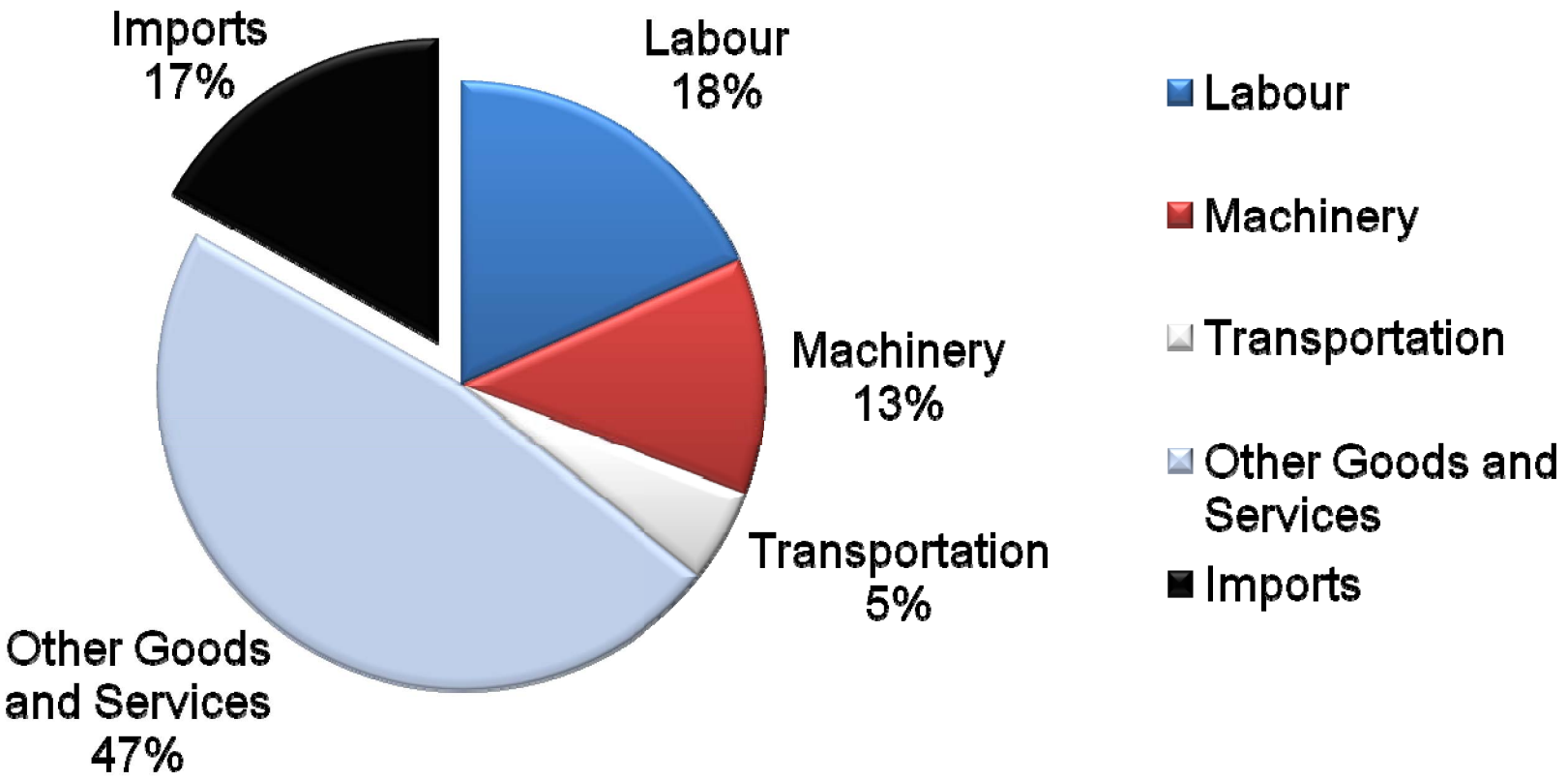
Project Overview: Economic Perspective

- Gahcho Kué Project is not on the same scale as the Ekati or Diavik Diamond mines, but is an important Project for the territory's economy because of its timing and its design (open pit rather than underground)
- The Gahcho Kué Project will bring employment, income, and business to the NWT economy.
- It was also bring some stability at a time when other mines are nearing the initial downsizing of their operations.

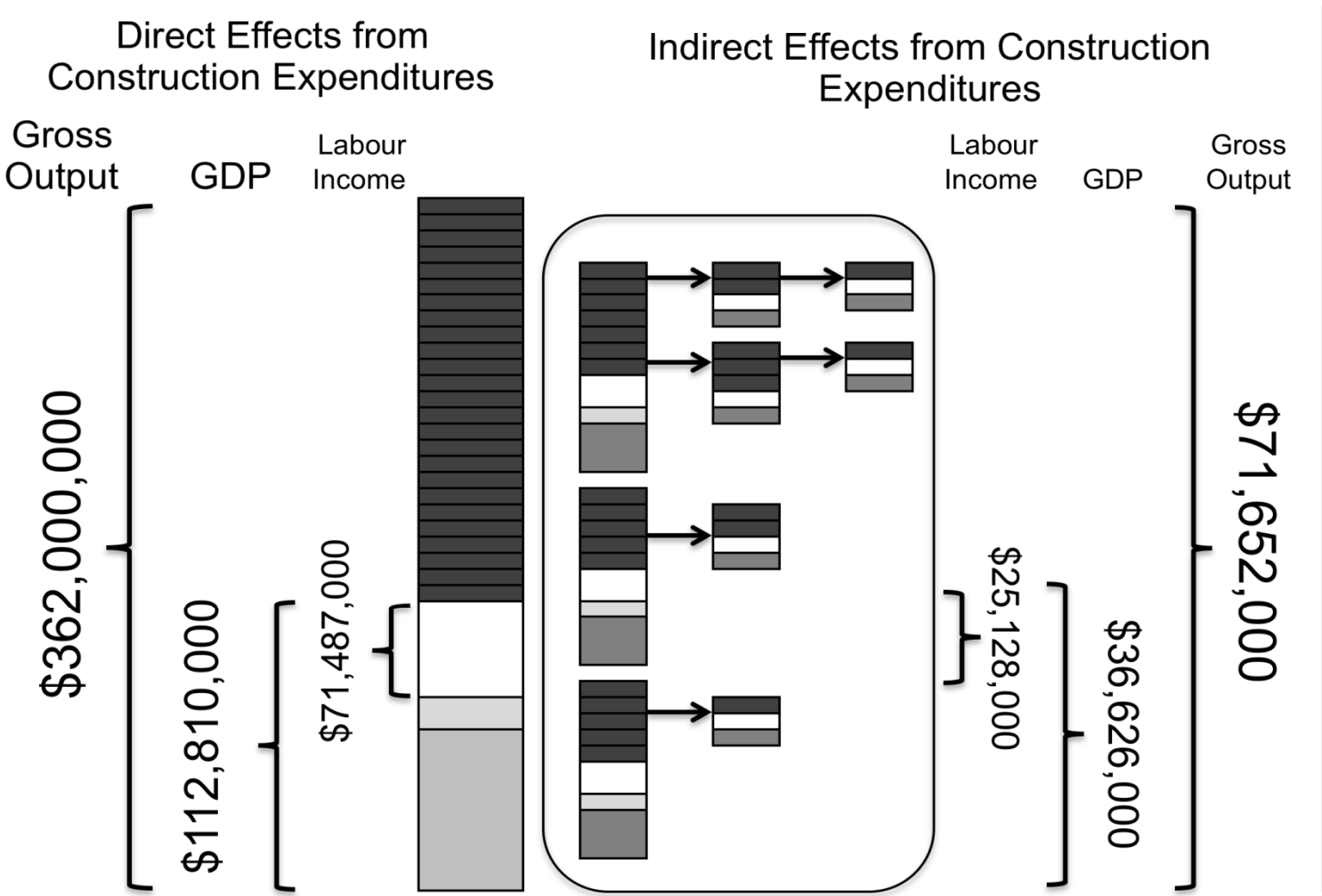
Construction Phase Economic Impacts

Construction Phase

- Construction Cost was estimated to equal $535 million
- Labour requirements equal 490 and 600 in year's one and two
- How much will go to NWT businesses and labour?



Direct and Indirect Effects of Construction



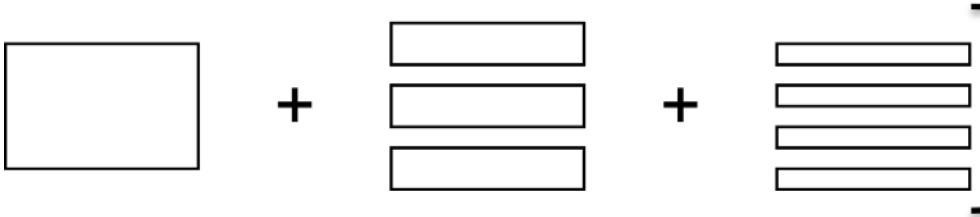
Labour Income and Employment for the NWT

- The assumed participation rate was based on the NWT labour participation at the Snap Lake Diamond Mine

Construction	
NWT Employment Record for Snap Lake Construction (2005 to 2007)	26.5%
Predicted Labour Income for Construction in the NWT	$96,615,000
Predicted FTE Jobs Created in the NWT	1,327
Predicted NWT Labour Income during Construction	
NWT Labour Income	$25,603,000
Predicted NWT Employment (# FTE Jobs)	352

Induced Impacts from Construction Phase

Induced Effects (GDP and Labour Income generated from the expenditures on consumer goods and services)



$25,603,000

Subtract direct taxes, savings, and imports — $12,162,000

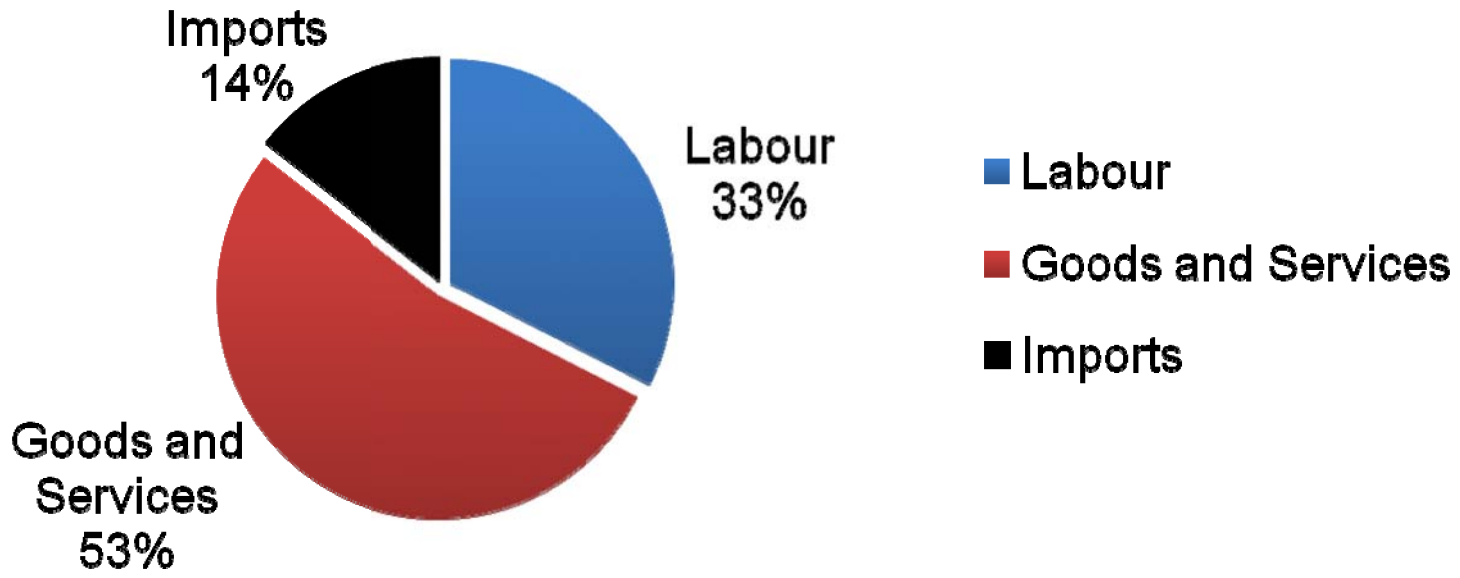
Income spent on consumer goods and services — $13,441,000

The labour income generated by the consumer activity will create an additional 35 FTE jobs in the NWT

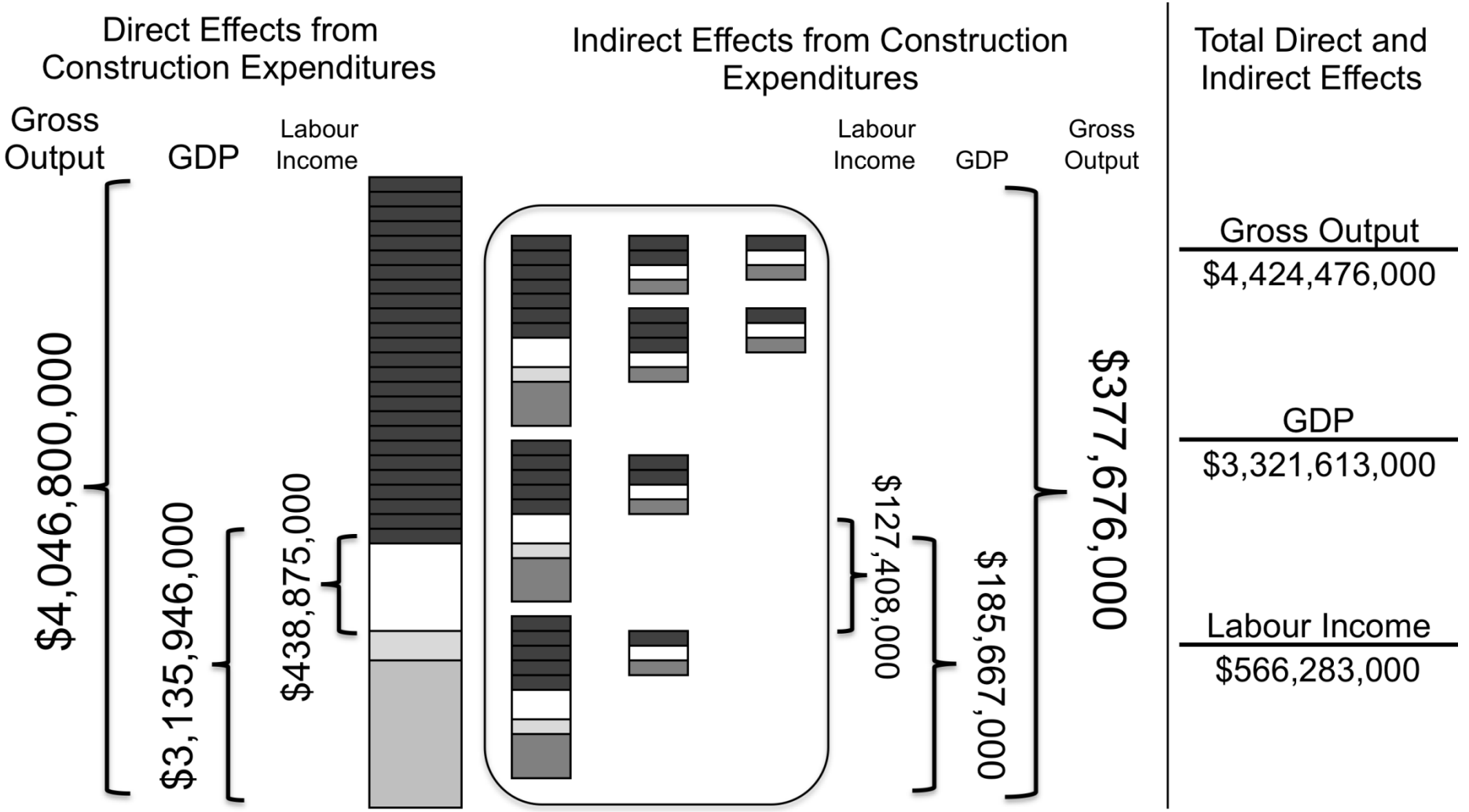
Operations Phase Economic Impacts

Operations Phase

- The mine is expected to operate for 11 years
- In that time, it will spend $1.3 billion on labour and capital
  - $438.8 million on direct labour
  - $910.8 million on goods and services
  - $195 million will be used to purchase imports



Direct and Indirect Effects from Operations



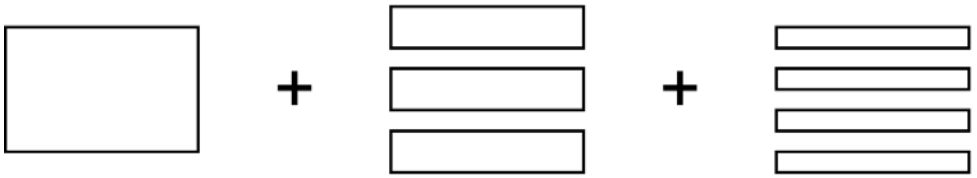
NWT's Share of Labour Income & Employment

- It was assumed that NWT's workforce participation would match that of Snap Lake

Labour Income and Employment from Operations		
Employment Record for Snap Lake Operations (2008 to 2009)	37.6%	
Predicted Labour Income from Operations	$566,283,000	
Total FTE Jobs Created from Operations	6,089	
Predicted NWT Labour Income and Employment Impacts during Operations		
	Total	**Annual Average**
Total NWT Labour Income	$212,922,000	$19,357,000
Total NWT Employment (# FTE Jobs)	2,289	208

Induced Impacts from Operations Phase

Induced Effects (GDP and Labour Income generated from the expenditures on consumer goods and services)



$212,922,000

Subtract direct taxes, savings, and imports	$100,602,000
Income spent on consumer goods and services	$112,320,000

The labour income generated by the consumer activity will create an additional 289 FTE jobs in the NWT

Tax Revenue Impacts from Diamond Production

- The diamond production and business activities result in direct and indirect taxes for government
- The largest impact is through direct taxation

Direct Taxes: Operations	**Total**
Federal Personal Income Tax	$25,116,000
Territorial Personal Income Tax	11,680,000
EI, WC, and CPP	16,558,000
Federal Corporate Tax	310,310,000
Territorial Corporate Tax	187,819,000
Mining Tax	240,508,000
Total	$791,991,000

Estimated Impact on Federal Transfers (Territorial Formula Financing Agreement)

- Calculating the precise amount of reduction in transfer is difficult because the eligible revenues are determined using the Territory's revenue capacity, not its actual revenues.
- Assuming these two revenue streams were equal, the total revenue implication for the GNWT would be $73.5 million with the two-year lag applied.
- This total comes from the 30% EDI applied to the change in tracked revenues of $244.2 million assuming actual revenues and revenue capacity are identical.
- Under the current financial arrangements, the GNWT does not receive any portion of the mining tax

De Beers
CANADA

Economic Impacts of Closure and Reclamation

Summary of Closure

- De Beers plans to perform reclamation work throughout the project's operation phase. Closure work needed beyond 2025 will be lake refilling and water monitoring activities.
- During operations, $17.5 million will be spent on labour and capital in conducting this reclamation work.
- From 2026 to 2034, De Beers will spend $7.5 million as a part of its closure phase.
- Staffing will consist of 9 people who will combine for 68 weeks of work each year
- Wages for this staff will equal $188,000 annually. We expect this labour requirement will be filled by NWT residents.
- Added business demand and induced consumer activities will be accounted for through changes in productivity
- The effects from the $7.5 million expenditure on GDP when spread over the nine-year closure phase will be less than 0.01% of the economy.

De Beers Canada

Demographics and Labour

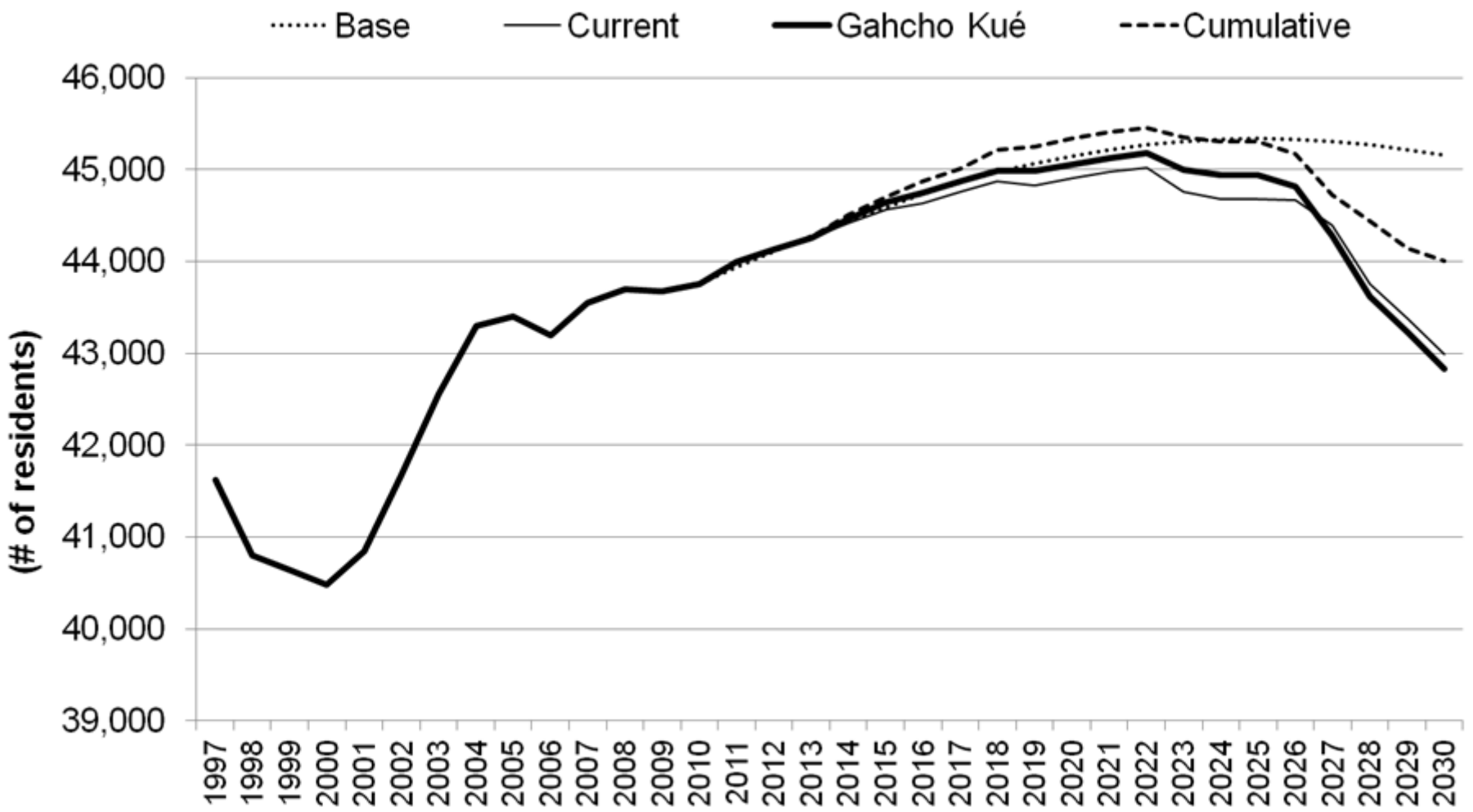
Demographics and Labour

- This section of the presentation will introduce four scenarios for demographic and labour force conditions
  - This is not a forecast, but rather the impacts associated with specific scenarios
- Scenario One: Base Case
  - Current conditions assuming no changes (a steady state)
- Scenario Two: Current
  - Scenario One *plus* changes in the operating status of the existing diamond mines (i.e. Closures)
- Scenario Three: Gahcho Kué Project
  - *Add* the Gahcho Kué Project to the current scenario
- Scenario Four: Cumulative
  - *add* additional NWT resource projects (NICO and Canadian Zinc)

Labour Force Results (unemployment rate)

Unemployment Rate			
	Scenario Two	Scenario Three	Scenario Four
2005	5.0%	5.0%	5.0%
2010	7.3%	7.3%	7.3%
2015	8.8%	7.6%	6.6%
2020	9.9%	8.3%	6.8%
2025	11.6%	10.6%	9.2%
2030	13.5%	13.6%	12.7%

All Population Projections



De Beers
CANADA

Questions

De Beers Canada

Gahcho Kué Project

Socio-Economic Setting and Assessment

October 27, 2011

Presentation Outline

- Introduction
- Terms of Reference Requirements
- Socio-Economic Study Area
- Socio-Economic Elements of Project
- Socio-Economic Setting
- Pathways and Potential Effects
- Socio-Economic Assessment
- Social Management and Monitoring
- Wrap-Up and Questions

Introduction

- Information pertinent to the Socio-Economic Baseline and Assessment can be found in Section 12 of the EIS
- Section 4 contains information from community engagement

Terms of Reference (TOR)

- Terms of Reference was developed through scoping consultations with potentially affected communities and other interested parties

Socio-Economic KLOI and SON

- 3 Key Lines of Inquiry (KLOI):
  - Long term social, cultural, and economic effects
  - Family and community cohesion
  - Social disparity within and between communities
- 6 Subjects of Note (SON):
  - Employment, training, and economic development
  - Demands on infrastructure
  - Tourism potential and wilderness character
  - Proposed National Park
  - Culture, heritage and archaeology
  - Aboriginal rights and community engagement

Socio-Economic KLOI and SON

- 11 Other Issues
  - employment
  - education
  - training
  - income and expenses
  - cultural/population health
  - community capacity
  - heritage resources
  - labour force
  - government capacity
  - northern business
  - sustainable economy.

Socio-Economic Study Area

- Proposed Local Study Area (LSA) consists of the following communities (population) as identified in the TOR:

North Slave Administrative Region

- Łutselk'e (312)
- Detah (257)
- N'dilo (513*)
- Behchokò (2,026)
- Gamètì (295)
- Wekweètì (137)
- Whatì (497)
- Yellowknife (19,711)

South Slave Administrative Region

- Hay River (3,724)
- Hay River Reserve (325)
- Enterprise (108)
- Fort Providence (759)
- Fort Resolution (506)
- Fort Smith (2,466)

*2006 data since not available in 2009

- The Regional Study Area (RSA) is the NWT

Socio-Economic Elements of the Project

- Project Schedule
  - Construction (2013-2015)
  - Operations (2015-2025)
  - Closure & reclamation (2025-2027)
- Employment
  - Employment during construction
  - Employment during operations
  - Procurement
- On-site facilities and services
  - Camp accommodations
  - 24 hour medical services
- Site access will be via a winter road and fly in-out rotation

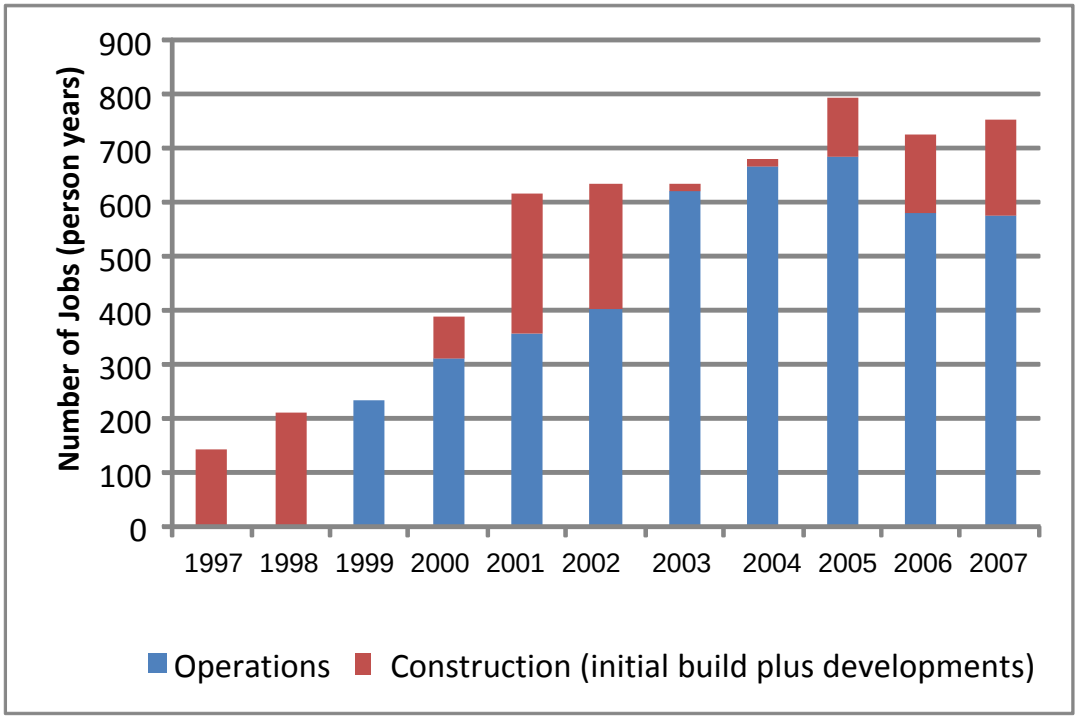
Socio-Economic Setting – Key Findings

- The global recession led to mine layoffs in 2008-09, but economy is slowly recovering. Unemployment rate was 5-6% between 2005 and 2008 but rose to 7.3% in 2010
- Population and labour market characteristics have changed somewhat since 2006, but employment is relatively stable. Labour force participation rate was 73% in 2010
- Education and skills are improving—graduation rates improving-31% in 1986 to 51% in 2006
- Increase in Aboriginal businesses and expansion of existing businesses; employment rates for Aboriginal people are growing

Socio-Economic Setting – Key Findings

- Diamond mining has had a positive impact on Aboriginal employment over the past decade

Aboriginal Employment at the Northwest Territories Diamond Mines, 1997 to 2007



Source: Impact Economics 2008.

Socio-Economic Setting-Key Findings

- Incomes are rising-an average 16% between 2002 and 2006 in NWT generally. Gains made in some North and South Slave region communities were over 20%
- Between 1996 and 2006 the % of families in NWT earning less than 25K went from 25% to 14%
- Increasing income disparity until 2000 and then trending toward more equal distribution
- The NWT experienced a modest population growth rate of 4.3% over a 10-year period (2000-09), but expected to slow. Out-migration greater than in-migration; labour retention an issue

Socio-Economic Setting – Key Findings

- Increases in crime and homelessness (primarily in Yellowknife)- the overall crime rate in NWT increased by 46% between 2000 and 2006; some attribute the increase to increased disposable income
- Shelter use was higher in 2005 than in 1999—attributed to employment growth attracting people from smaller communities
- Improved infrastructure and services (road improvements, airport improvements, broadband internet services, schools)

Socio-Economic Setting – Key Findings

- Traditional cultural environment is changing
  - Decline in aboriginal language use as primary language (% of 15 and older who could speak an Aboriginal language fell from 59% in 1984 to 38% by 2009 (GNWT Dept. of Education, Culture and Employment 2004)
- Greater access to culturally appropriate education and training including bilingual programs, credit courses in languages, programming that incorporates traditional knowledge
- There has been important gains made in social conditions in the communities affected by the diamond industry
- These gains require continued economic growth to be sustained
- The primary issues facing communities concern social inclusion and sustainability

Pathways and Potential Effects

Society, Health and Culture

- Need for income support may continue to decline
- Education and training related to trades and careers will increase
- Increased incomes may affect lifestyle choices and mobility
- Demand may increase for social, financial, and protective services due to unhealthy lifestyle choices by some individuals
- Social disparity may increase between individuals and between communities
- Community volunteers may be reduced

Pathways and Potential Effects

Employment, Economy and Opportunity

- Work and procurement opportunities will increase disposable incomes
- Tax base will increase
- GDP will increase (will increase opportunities for employment and procurement)
- Workforce and procurement needs will increase employment for Aboriginal and northern residents
- Labour force capacity will grow through employment, procurement and training opportunities

Pathways and Potential Effects

Society, Health and Culture (continued)

- Generational conflicts may occur relating to differing views about the Project and how it fits with community culture
- Permanent changes to landscape features will occur
- Traditional language use may decline
- Involvement in traditional activities (hunting, trapping, fishing, cultural events) may be affected
- Archaeological sites may be disturbed or destroyed

Pathways and Potential Effects

Infrastructure, Services and Tourism

- Demand on infrastructure (mainly airports and roads) will increase
- Availability of wildlife (including fish) for harvesting may change
- Tourist enjoyment of the proposed East Arm National Park may be affected
- Sense of wilderness character may be affected

Mitigation Strategies – Environmental Design

Employment, Economy and Opportunity

- Maximize local and Aboriginal Employment (preferential hiring policies)
- Training programs, literacy programs

Society, Health and Culture

- Promote female participation in the workforce
- Rotation allows for participation in harvesting
- Promote safety and healthy lifestyles
- Incorporate traditional culture at site (celebrations, recreation, foods)

Infrastructure and Services

- Minimize effects to local infrastructure and services (transport to site)

Assessment Methodology

- Project effects on Socio-Economic KLOIs and SONs were assessed qualitatively
- The qualitative information used in the Socio-Economic analysis was gathered through the following methods:
  - Project scoping meetings
  - Community visits
  - Literature synthesis
  - Review and application of documented similar situations
  - Business interviews
  - Expert subject matter interviews

Assessment Conclusion-Labour Force

The Project will contribute to the growth of a skilled local labour force

- De Beers will work with community agencies so that literacy programs will be linked to other kinds of upgrading, such as training programs aimed at improving qualifications towards employment
- De Beers will offer scholarships for industry-related studies
- De Beers will continue to sponsor apprenticeship and trades programs, including those for women, thereby encouraging the growth of a skilled labour force in this demographic

Assessment Conclusions –Social Disparity

Social disparity:

- The Project is expected to reduce barriers to labour force participation by building capacity; broad recruitment from many communities and transportation addressed
- The Project is expected to increase women's participation through training and recruitment focus (builds capacity)
- Not expected to change the existing environment much due to short timeframe (no acceleration of change)
- Because of the Project's time horizon, which is relatively short term, population effects (in-migration) are not expected (inflation)
- Issues of social disparity are not unique to the NWT, and there is no panacea solution that will 'fix' social disparity or inequities

Social Management and Monitoring

- De Beers will extend its Project monitoring and reporting system from its Snap Lake Project . Socio-Economic Agreement from Snap Lake applies
- Compliance Monitoring – De Beers will monitor for compliance with EIA commitments
- Effectiveness Monitoring – De Beers will monitor the effectiveness of mitigation strategies, policies and commitments
- Adaptive Management – De Beers will employ an adaptive management approach in order to adjust, if needed, programs and policies. Dialogue with communities of interest

Conclusions

- Project extends employment and procurement beyond the planned closure of other projects and contributes to sustained economic development in the region—employment, incomes, businesses and a well trained workforce
- The Project will extend its procedures and measures taken at Snap Lake to maximize the participation of nearby communities in employment and business opportunities- capacity in small communities maintained
- While there is no direct mitigation for issues related to social disparity, De Beers will extend CSR initiatives broadly so as to extend benefits to those who are not employed at the Project
- De Beers supports programming and initiatives that validate and maintain important elements of Aboriginal culture.

De Beers
CANADA

Wrap-Up and Questions