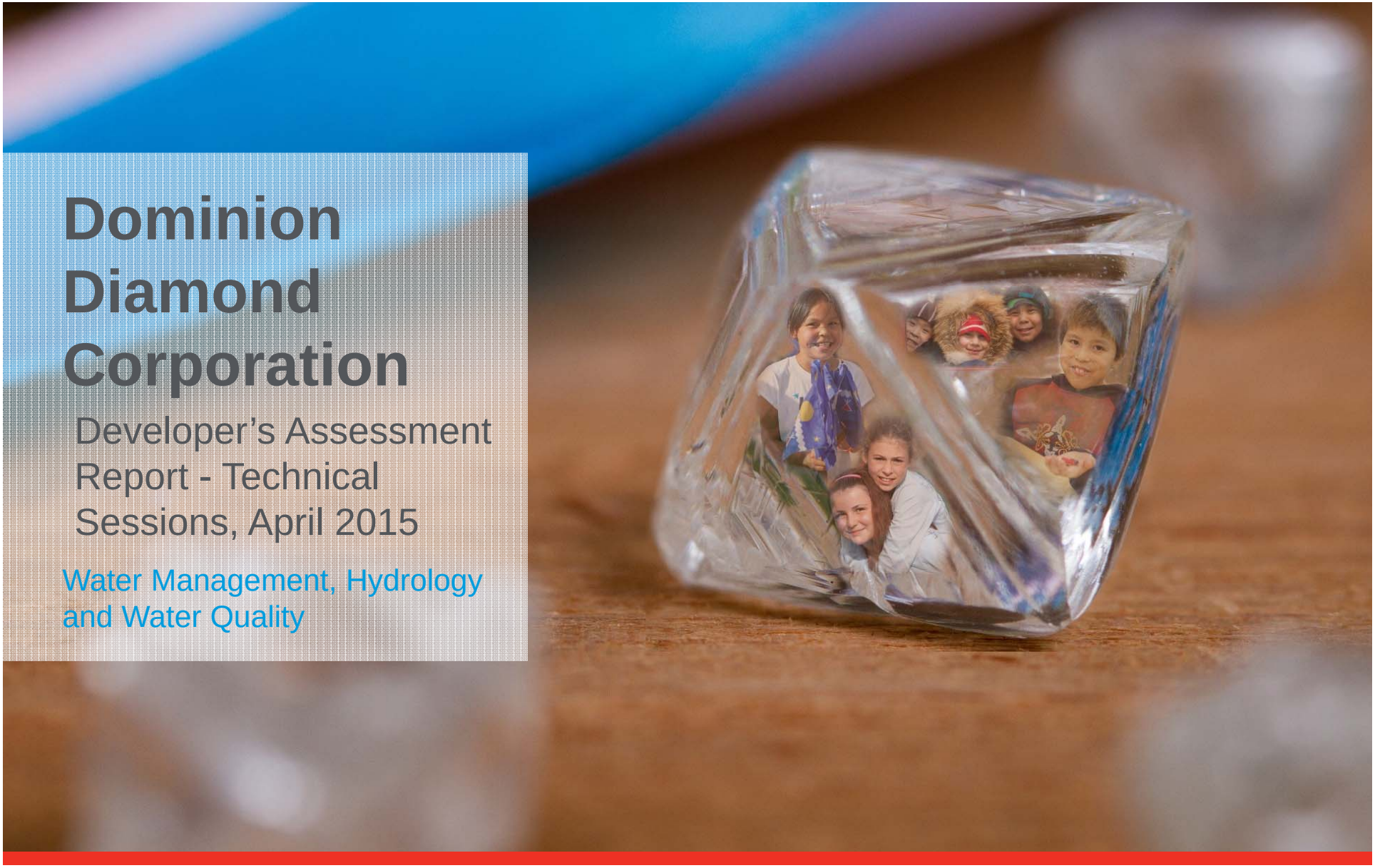
Dominion Diamond Corporation

Developer's Assessment Report - Technical Sessions, April 2015

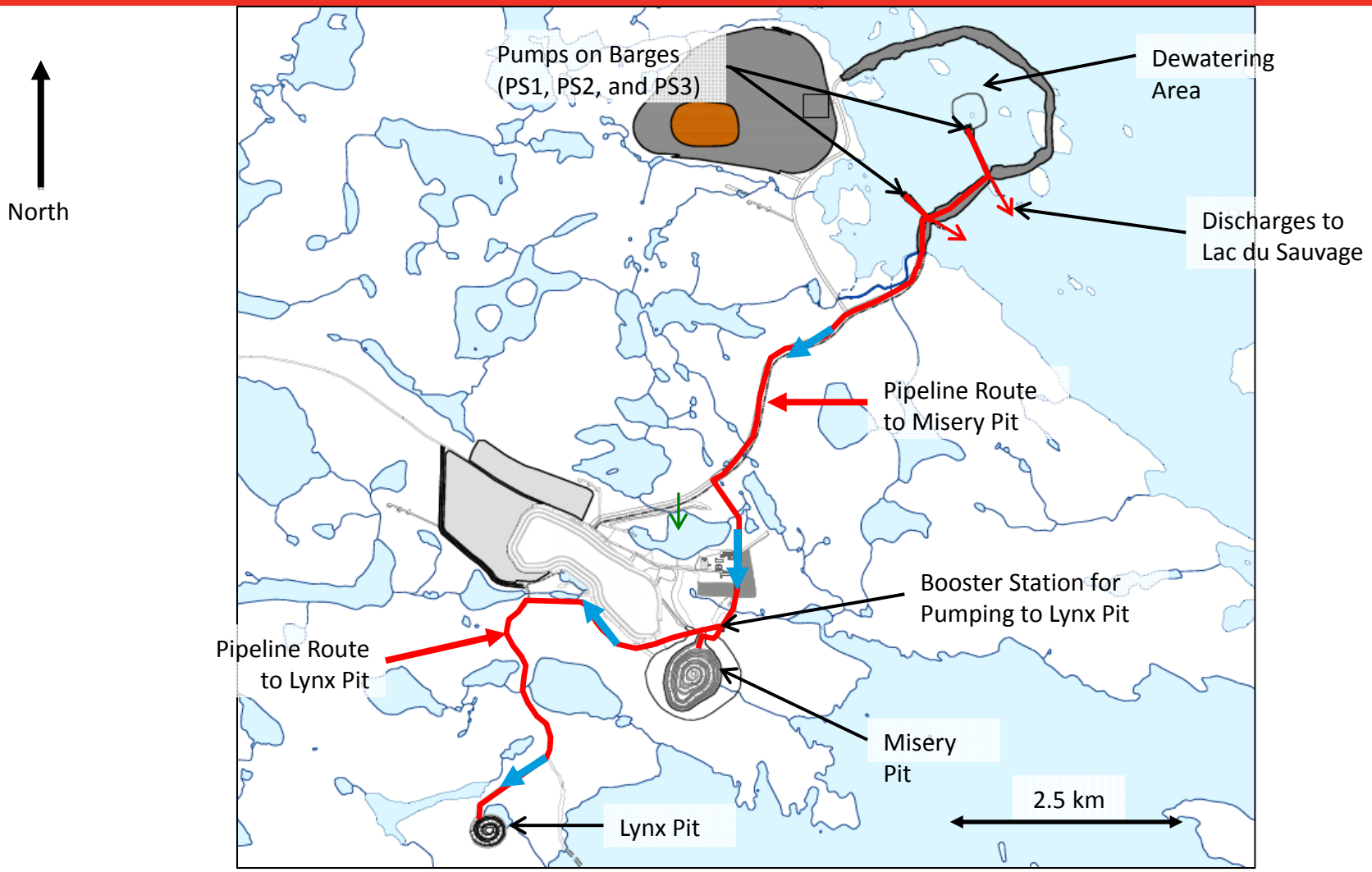
Water Management, Hydrology and Water Quality



Water Management Plan

- Jay Project Description/Engineering
  - Mine water management plan – additional information based on Information Requests

Mine Water Management – Dewatering Pumping and Pipelines



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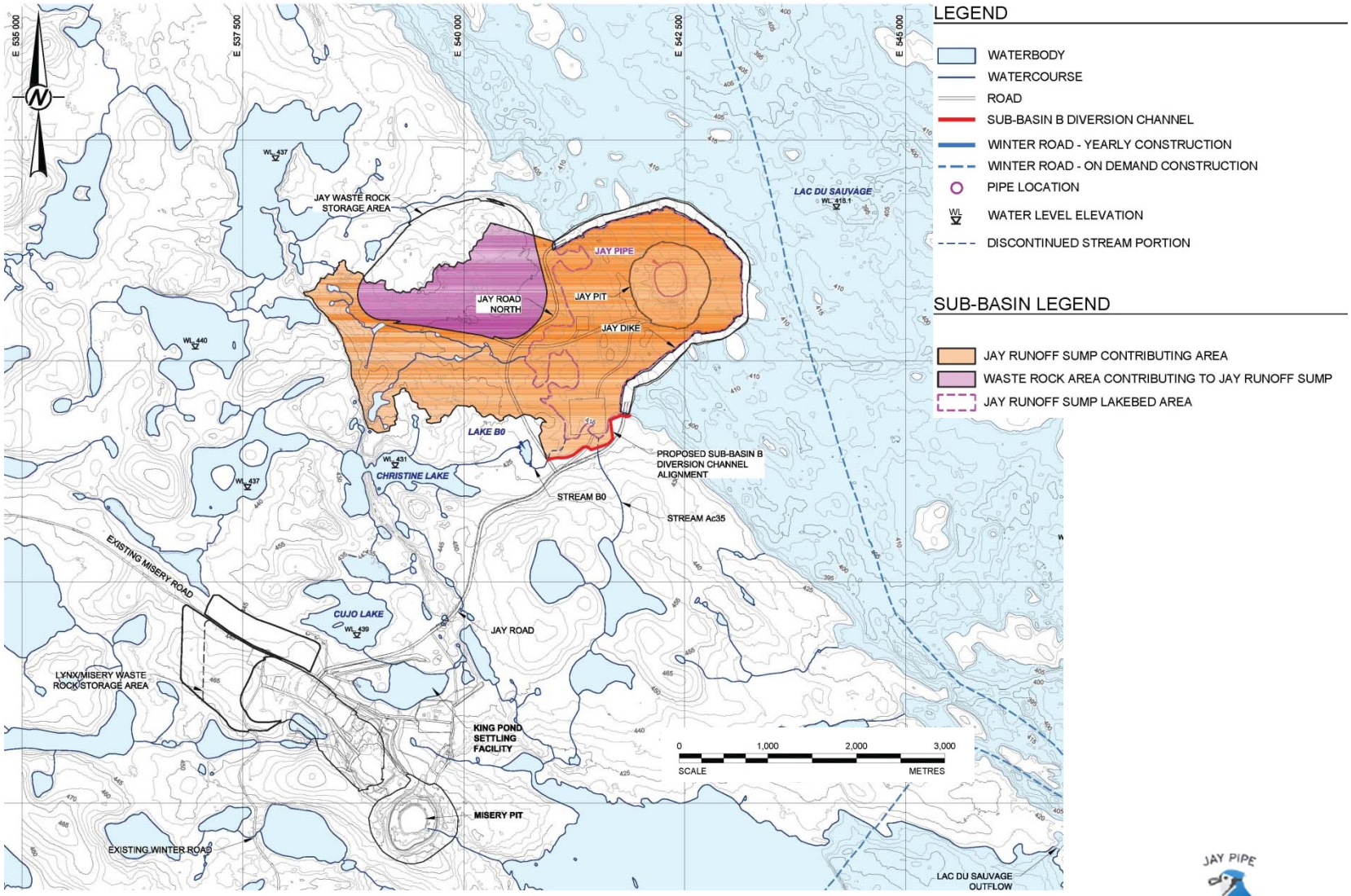
Mine Water Management – Surface Water Management



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Mine Water Management – Adaptive Management Strategies

Possible adaptive management strategies that would be considered:

- maintaining a storage contingency allowance in the existing King Pond
- maintaining the contingency storage in the Misery Pit (approximately 3 million m^3) throughout the operations stage for use as emergency minewater storage
- maintaining pumping and a pipeline between the Misery and Lynx pits throughout the operations stage to allow for lowering of the Lynx Pit water level to provide additional contingency minewater storage
- increasing storage capacity in the sumps to provide additional temporary capacity
- direct discharge to the environment from the Jay runoff sump if water is found to meet discharge criteria
- use of storage capacity available at the Ekati site
- treatment of parameters of concern prior to discharge to Lac du Sauvage

Hydrology and Water Quality Overview

- Hydrology
  - New Work since the DAR
  - Information Requests
    - Model calibration and uncertainties
    - Model input parameters
    - Ice Effect Modelling

- Water Quality
  - New work since the DAR
    - Model updates
  - Information Requests
    - Phosphorus predictions
    - Significance determination
    - Effects Study Area

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Hydrology - New Work Since the DAR

2014 Supplemental baseline collection:

- **Surveys** at Lakes Ab13, Ac35, Af1, D1, D3 (Counts Lake), Duchess Lake, E2, E381, F1, G4, G4A, G5, G6, G13, G474, H1, I1B, I2, I3 (Sterlet Lake), I100, J76, L1, Paul Lake
- **Continuous Seasonal Monitoring** at Lakes B0, C1, E1, E10 (Ursula Lake), G2, I1A, J1
- **Continuous Annual Monitoring** at Lac du Sauvage and Lac de Gras

2015 Supplemental baseline collection:

- **Coppermine River program** at Lac du Sauvage outlet, Lac de Gras outlet, Desteffany Lake inlet and outlet
- **Small Lake program** at Lakes J1, I1A, E1, E10, G2, C1, B0, Ac35, and C17

Lac de Gras Outlet, 26 May 2014

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Information Requests – Model Calibration and Uncertainties

Model calibration and uncertainties:

- The water balance model characterizes the hydrological regimes of waterbodies at the Project, including extreme wet and dry conditions and interannual variability.
- The model primarily used available long-term regional data for setup and calibration; additional short-term, site-specific data were used for calibration and validation.
- Uncertainty is present in many inputs, but results are consistent with available monitoring data and current water balance modelling at Ekati Mine.
- Uncertainty in the model results is not great enough to change the results of the Environmental Assessment.
- Uncertainty is considered in the design and planning for the Project; adaptive management strategies will be applied if hydrological conditions encountered are significantly different than predicted.
- Hydrometric programs continued in 2014 (Dominion Diamond 2015) and 2015, and it is expected that additional hydrometric data collected as part of the Jay Project will be incorporated into the final design of the water management plan and facilities.

Stream J1 Gauging, 19 September 2014

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Information Requests – Model Input Parameters

Can you comment on uncertainties in the baseline hydrological modelling (runoff coefficients; precipitation undercatch; lake outlet stage-discharge rating curves; lake stage-storage relationships)?

Runoff Coefficients *[ref GNWT IR 40]***:**

- Model runoff coefficients may seem high, but they are calibrated to long-term downstream hydrometric data.
- Snowmelt value may balance out uncertainty in sublimation and undercatch values.
- Values are consistent with current water balance modeling by others at Ekati.

Precipitation Undercatch *[ref GNWT IR 41]***:**

- Rainfall and snowfall undercatch may vary from month to month and year to year, but the modelling applied single values for each, over the entire period of record.
- Variability in undercatch can occur due to differences in instrumentation, exposure, wind, etc.
- Undercatch values are estimates and could be spatially variable throughout the Lac de Gras and Lac du Sauvage basins.
- To some extent, uncertainty in undercatch values is balanced by the calibrated runoff coefficient values.

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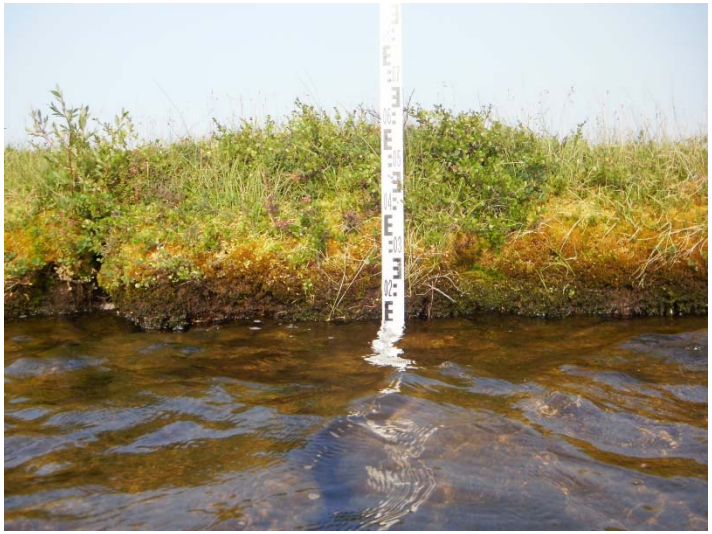
Information Requests – Model Input Parameters

Stage-Discharge Rating Curves *[ref GNWT IR 34; MVEIRB IR 54]*:

- Rating curves were based on long-term data where available (e.g., Lac de Gras, Desteffany Lake, Ursula Lake) and hydraulic modelling for other large basins (e.g., Lac du Sauvage, larger tributaries).
- Rating curves for lakes in smaller basins were based on regional relationships fitted to a weir equation. There is scatter in those relationships, but they are applied to smaller drainage areas to reduce the net effect of this uncertainty.



Lake I2 Shoreline, 17 August 2013

Lake Stage-Storage Relationships *[ref GNWT IR 33, 35, 36]*:

- Lake bathymetry was collected where needed for Project design or effects assessment.
- Lake storage was based on a "vertical wall" assumption, with spill elevations based on assumed values.
- Assumptions that "Live Storage" is proportional to lake water surface elevation above the spill elevation are valid due to typically small variation in lake water surface elevations (~0.5 m or less).
- "Dead Storage" is not relevant to the operation of the model.

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Information Requests – Ice Effect Modelling

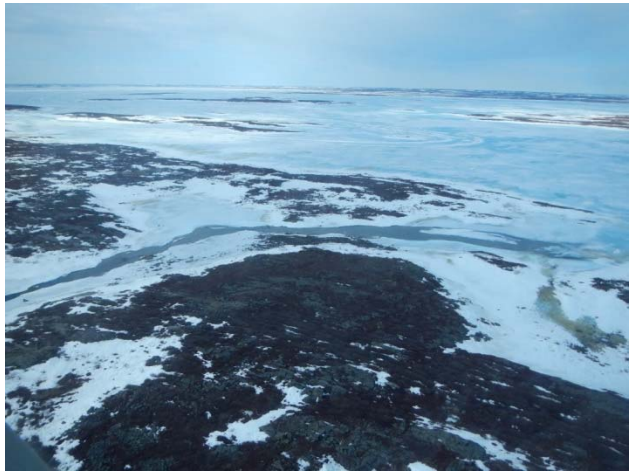
What data are available to support ice effect modelling? Is the modelling approach adequate? *[ref GNWT IR 38, 39; MVEIRB IR 64]*

Available data:

- Traditional Knowledge and field surveys indicate that large lake outlets (e.g., Lac de Gras, Lac du Sauvage, Duchess Lake, Desteffany Lake) typically do not freeze solid over winter, and may stay open due to deep (warm) water conveyance.
- Field surveys also indicated that smaller lakes (e.g., Lac du Sauvage tributaries) typically do freeze solid over winter.
- Modelled outlet freeze-up and break-up dates for the Jay Project baseline report are consistent with those reported in the Ekati 2012 AEMP.

Modelling Ice Effects

- The degree-day method provides an estimate of date of initiation and rate of outlet opening during freshet and outlet closing during freeze-up.
- Model sensitivity to assumptions is expected to be low.
- Current field programs include observations during ice-covered conditions.



Lac du Sauvage Outlet, 26 May 2014

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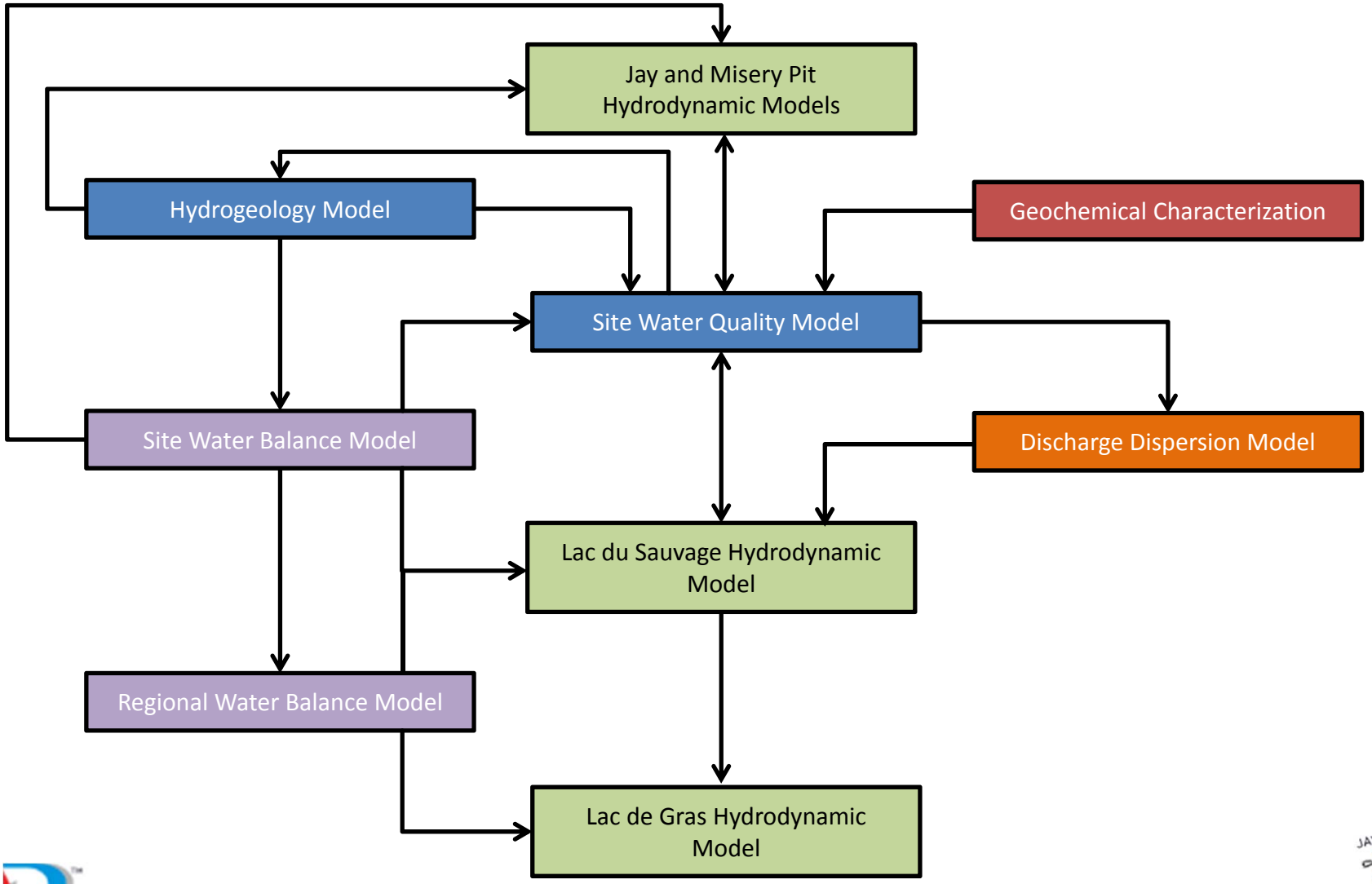
Water Quality – Modelling Assessment Overview



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Post-DAR WQ Modelling Updates

Model	Description
Updated Assessment Case	Updated Diavik discharge flows and modifications to Pit Lake Model Assumptions
No Jay Development Case	Updated Lac du Sauvage and Lac de Gras water quality predictions for a scenario that does not consider the development of the Jay Project
Reasonable Estimate Case	Model to provide a more likely but less conservative (i.e., expected) estimate of Project discharge water quality Less conservative than the DAR case
Desteffany Lake Model	Developed to address adequacy review comment (see Section 9.4 of the adequacy review) related to the extent of the assessment domain; the domain of the model was extended to the outlet of Desteffany Lake

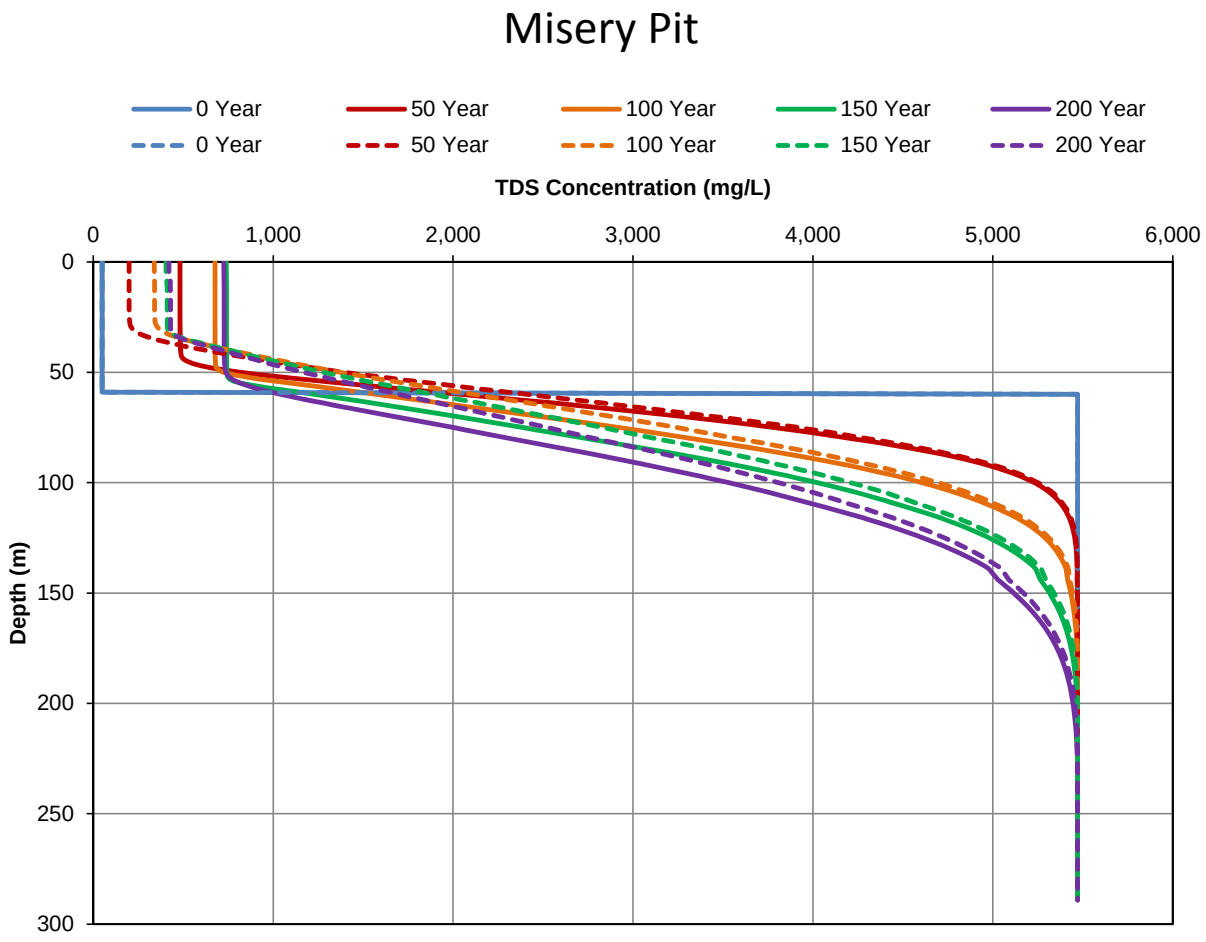
Updated WQ Modelling Assessment Case Inputs

- Flows provided in the Diavik Mine Water Management Plan Version 12(DDMI 2013) were used to represent the discharge quantity from Diavik to Lac de Gras
  - Updated to the Diavik Mine Water Management Plan Version 13 (DDMI 2014)
  - Includes flows for the development of A21 pit

- More conservative inputs were used in the Misery and Jay pit lake hydrodynamic models
  - Wind sheltering coefficient changed from 0.5 to 0.8
  - Dynamic shading coefficient changed from 0.7 to 1
  - Meteorological data updated from a 4-year to a 14-year record

Updated WQ Modelling Assessment Results

- Meromixis will form and remain stable in the long-term
- Pycnocline moves deeper in the updated assessment case
- Results in additional mixing of high TDS monimolimnion water, resulting in higher mixolimnion TDS concentrations



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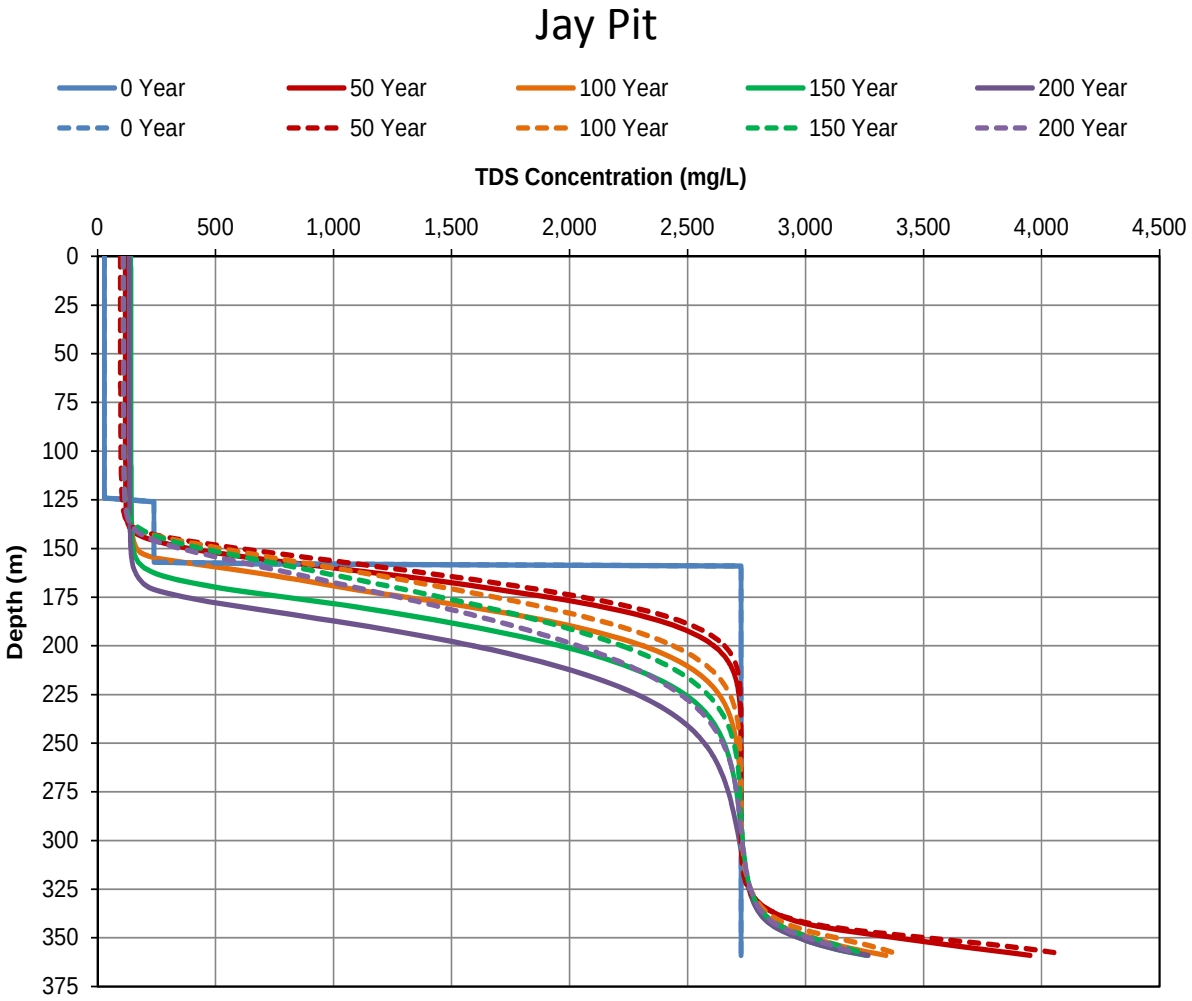
Updated WQ Modelling Assessment Results

- Meromixis will form and remain stable in the long-term
- Mixolimnion concentrations similar to DAR
- Pycnocline moves deeper in the updated assessment case
- Results in a deeper freshwater cap



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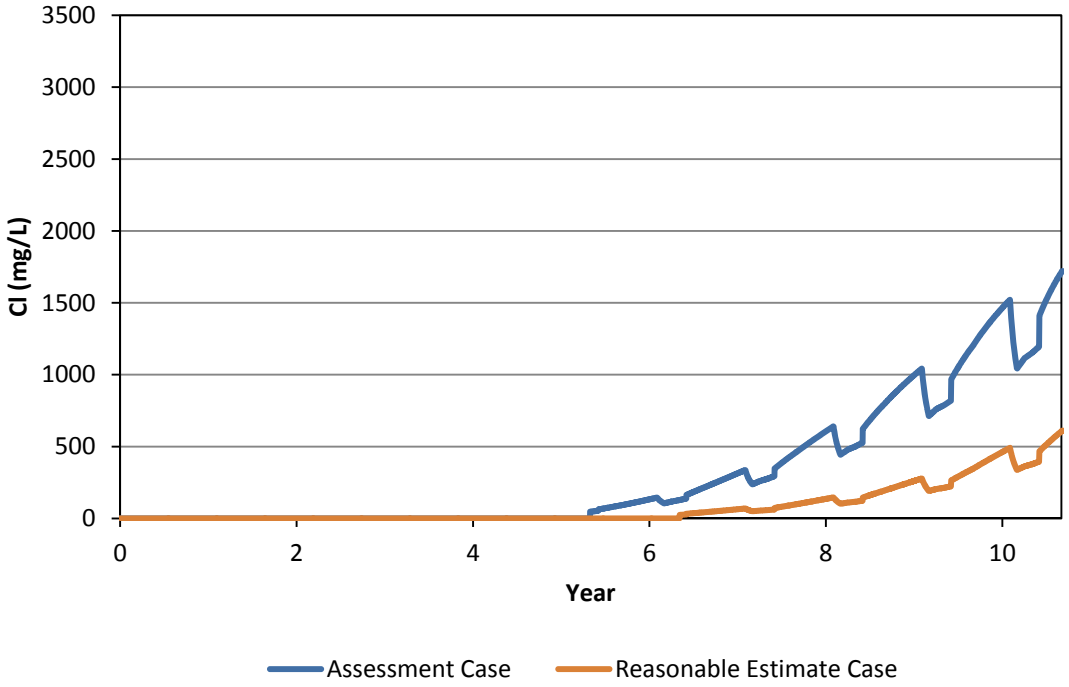
Reasonable Estimate WQ Modelling Case Results



- Reduced groundwater inflows to Jay Pit result in:
  - lower total dissolved solids load being pumped to Misery Pit
  - an additional year of storage before discharge to Lac du Sauvage being required
- Results in lower discharge constituent concentrations to Lac du Sauvage

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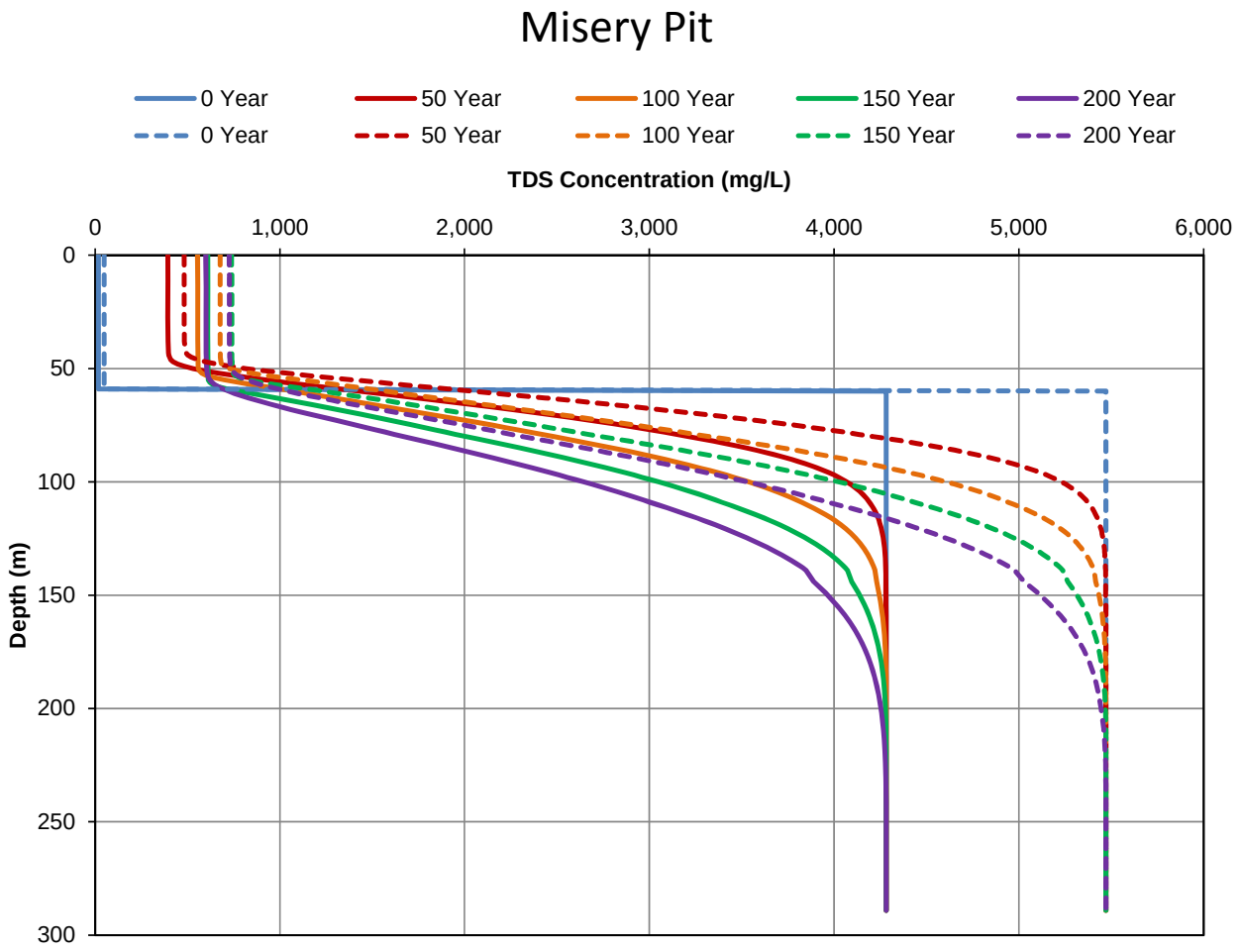
Reasonable Estimate WQ Modelling Case Results

- Meromixis will form and remain stable in the long-term
- Pycnocline elevation is similar between updated assessment and reasonable estimate cases but constituent concentrations in the monimolimnion and mixolimnion are lower in the reasonable estimate case



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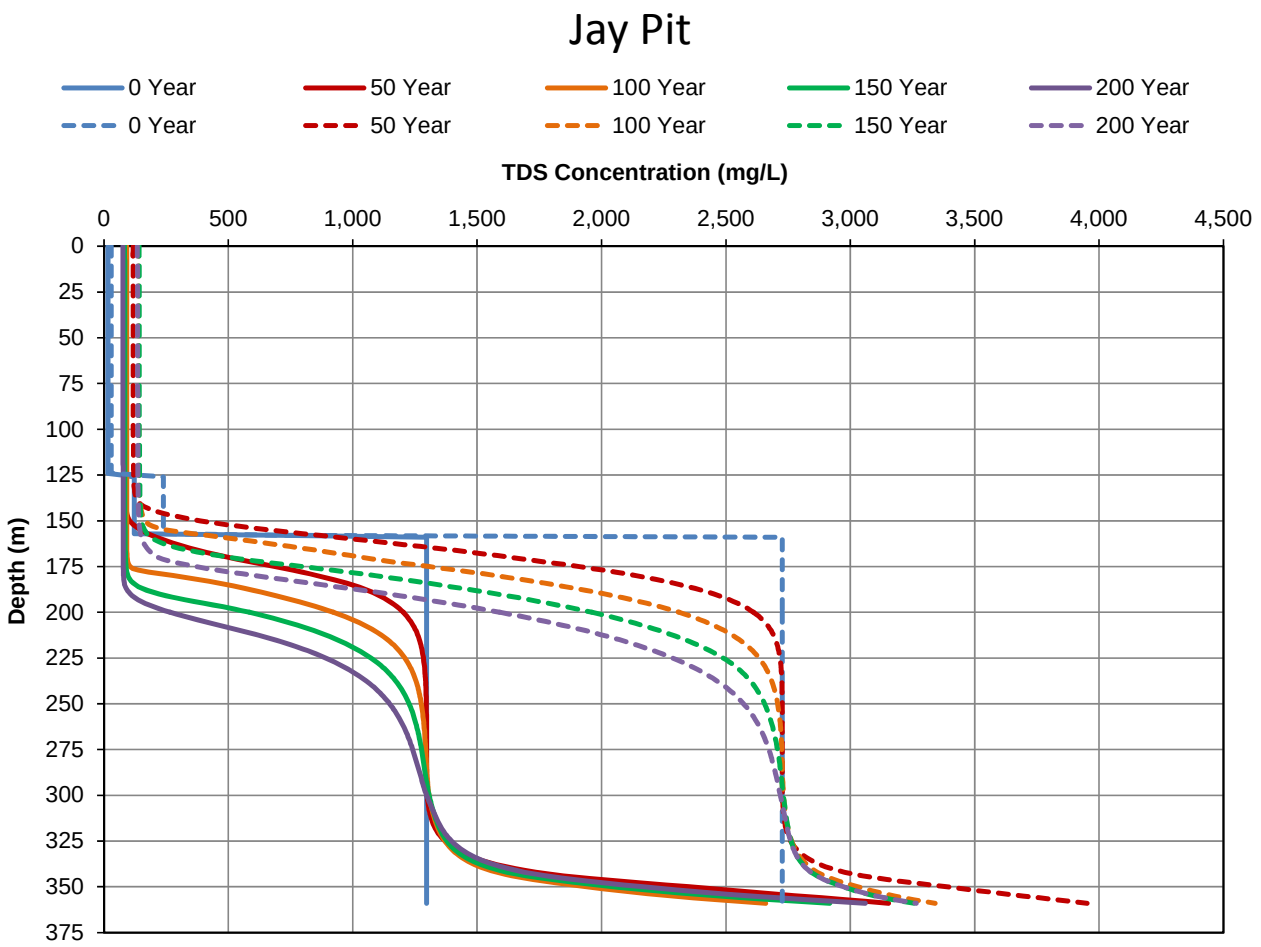
Reasonable Estimate WQ Modelling Case Results

- Meromixis will form and remain stable in the long-term
- Monimolimnion concentrations are lower
- Pycnocline moves deeper in the updated assessment case resulting in a deeper freshwater cap
- Mixolimnion concentrations are similar between cases



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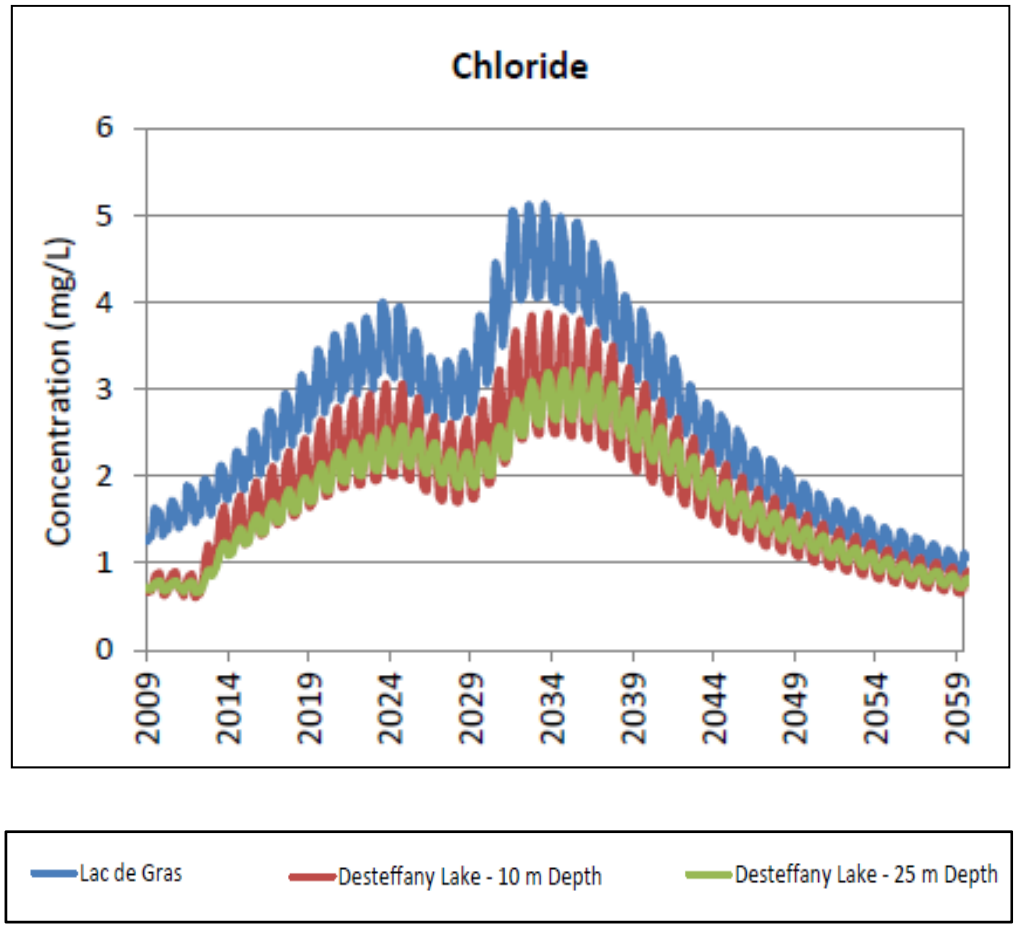
Desteffany Lake WQ Model Results

- Additional assimilative capacity is available between the outlets of Lac de Gras and Desteffany Lake
- Increases at the outlet of Lac de Gras are also projected to increase constituent concentrations in Desteffany Lake
- No significant adverse impacts to surface water quality are expected in Desteffany Lake



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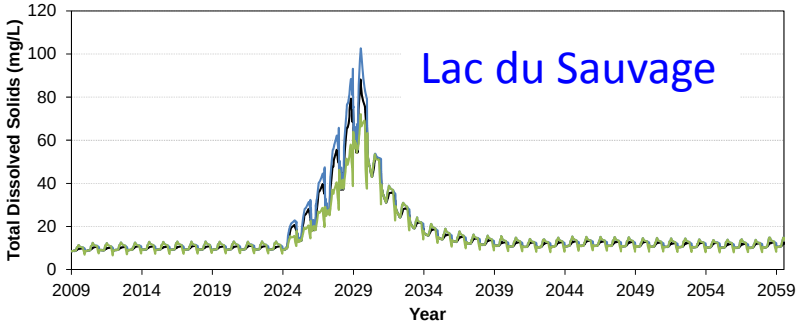
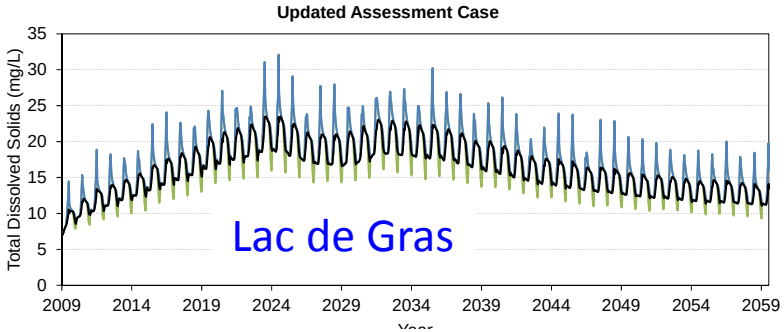
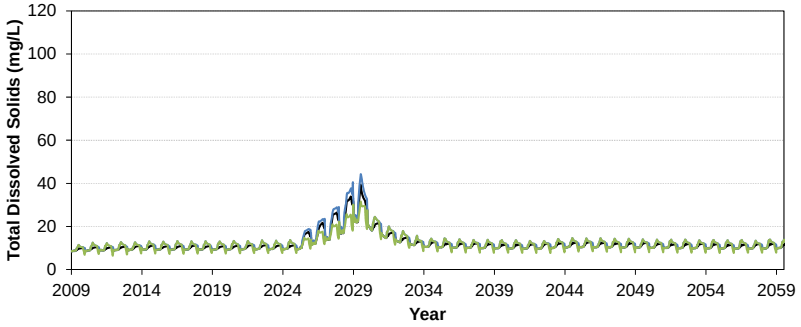
Post-DAR WQ Modelling Update Summary

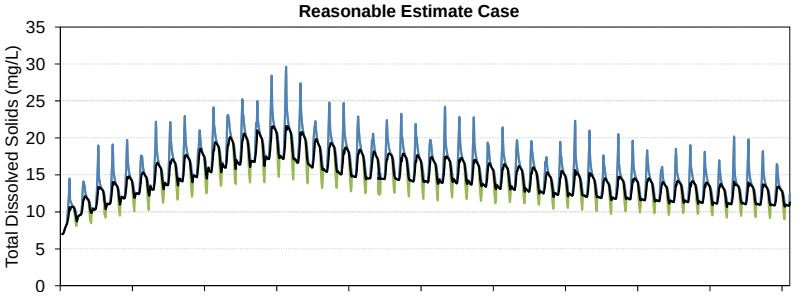


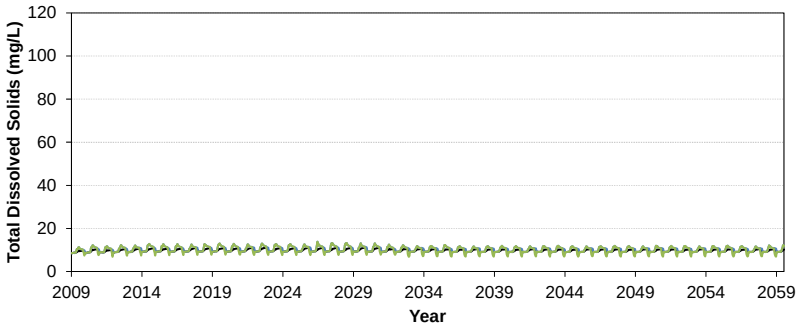
- Updated Assessment Case



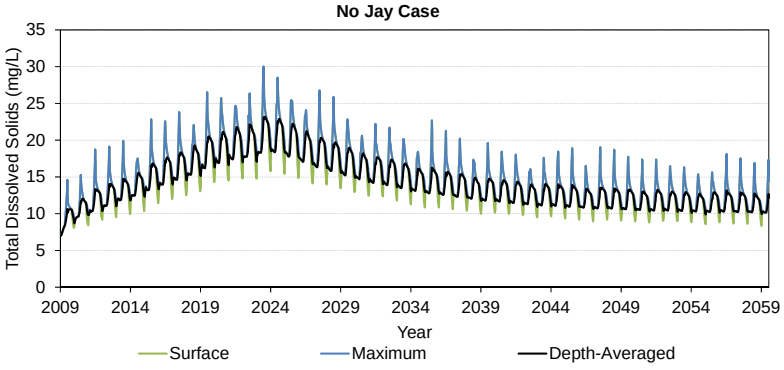


- Reasonable Estimate Case





- No Jay Project Case



Depth-Averaged Maximum Surface

TDS Concentrations

Water Quality – Information Requests - Phosphorus

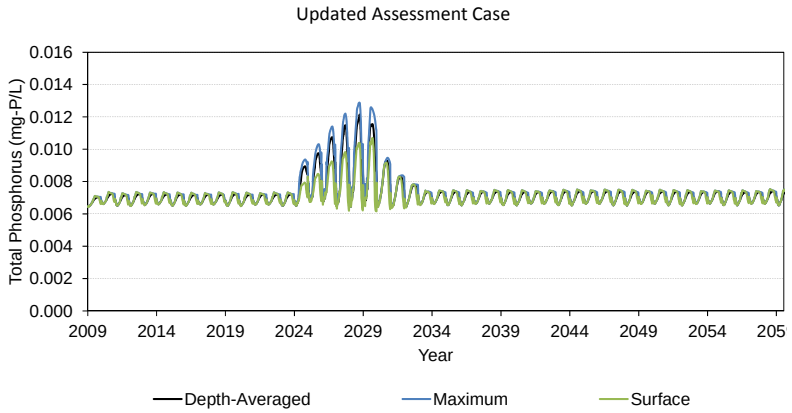
The WQ modelling project changes to P concentrations in Lac du Sauvage due to Misery Pit discharges

- Small increases in productivity, but no adverse environmental effects. Lac du Sauvage will remain oligotrophic to slightly mesotrophic
- Plankton and benthic invertebrate biomass likely to increase but a defined change in composition not expected; projected effects to DO not expected
- Effects peak in final year discharge, and concentrations decline over the following 3 to 5 years

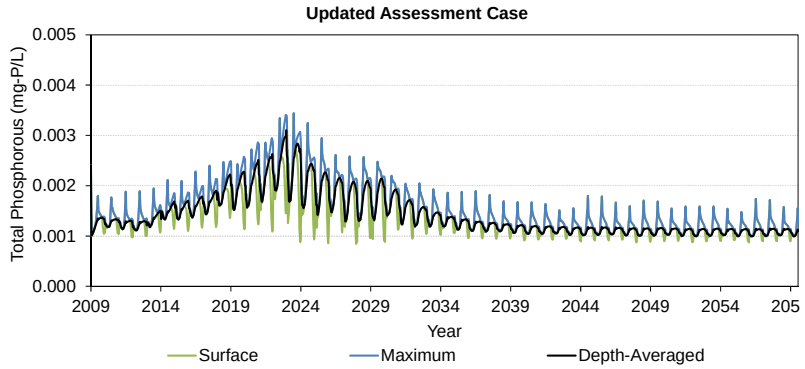
One of the more conservative constituents carried into the WQ modelling:

- Limited to no site-specific P data for groundwater quality when DAR commenced, so regional data used – 0.4 mg/L as the groundwater input source term for DAR Update and Reasonable Estimate modelling cases
- Site specific Westbay data collected in Apr and Sep October 2014 – P data range = 0.022 to 0.056 mg/L

Lac du Sauvage - TP



Lac de Gras - TP



IRs - EC-19, IEMA-15, MVEIRB-26, and MVEIRB-61

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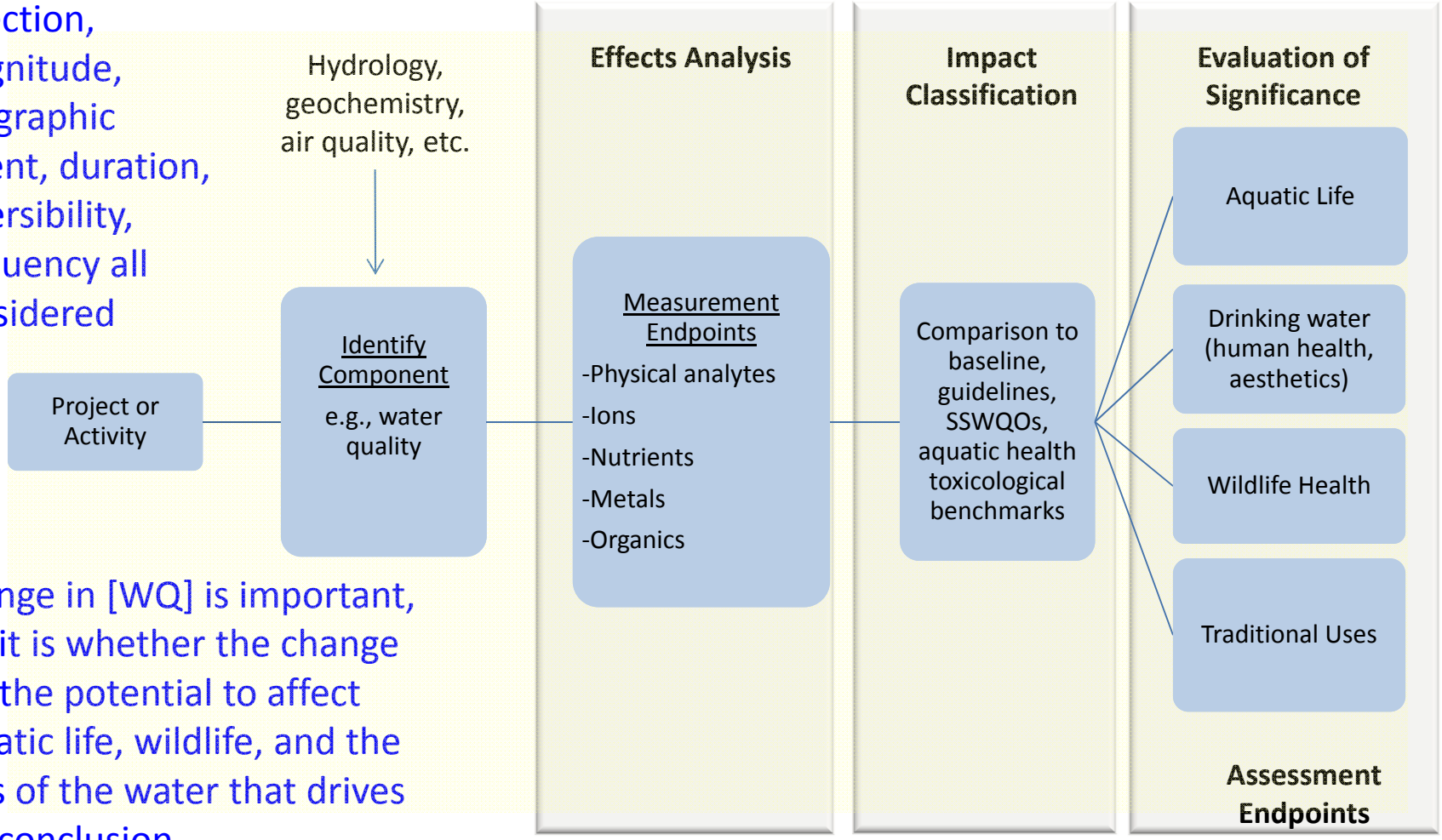
Significance in the Water Quality Assessment

- Direction, magnitude, geographic extent, duration, reversibility, frequency all considered



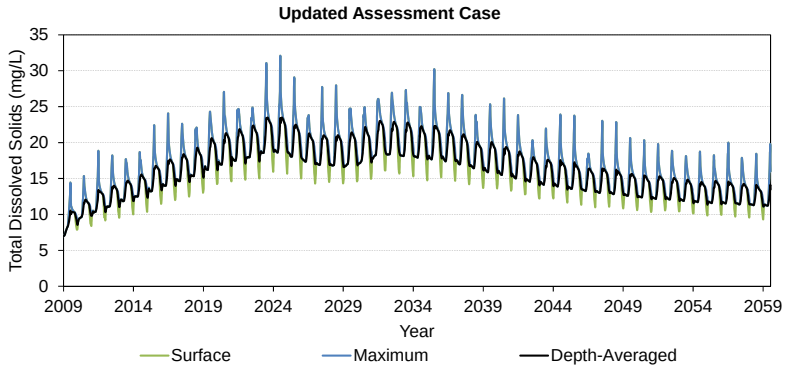
- Change in [WQ] is important, but it is whether the change has the potential to affect aquatic life, wildlife, and the uses of the water that drives the conclusion

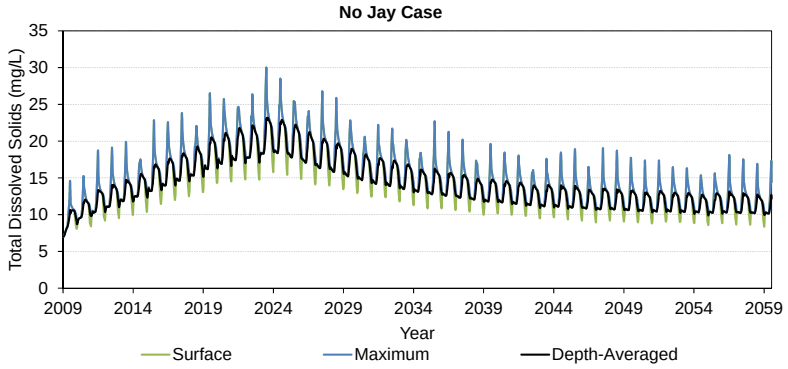
IRs – DAR-MVEIRB-IR-18, MVEIRB-19, and MVEIRB-6

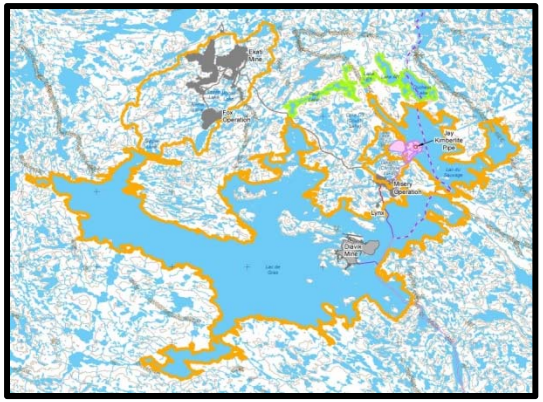
Effects Study Area for Water Quality

- WQ modelling and the DAR suggested small changes in WQ may extend beyond Lac de Gras and into Desteffany Lake
  - This is supported by the post-DAR supplemental modelling
- The No Jay Case modelling also suggests that peak WQ conditions at the Lac de Gras outlet are similar to the Jay Case
  - The key difference is that the Jay Project extends the change condition
- However, the difference in WQ constituent concentrations at the Lac de Gras outlet between the Base Case and Assessment Case is small, with negligible potential for aquatic effects
  - The Effects Study Area is therefore considered reasonable for the assessment

Lac de Gras – LDG-P6 – LdG outlet - TDS







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IRs - EC-10 and MVEIRB-20

Questions?