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Diavik Water License Amendment Team Introduction

Jessica Kozian, Business Partner, HSE

Template #: DCON-029-1010 R8

Diavik Team

<u>In Person</u>

Jessica Kozian – Business Partner, HSE

Sean Sinclair – Environment Superintendent (Operational Considerations and Administrative Updates)

Gord Macdonald – Closure Manager (Closure Considerations)

Kofi Boa-Antwi – Regulatory Advisor

Johan Berge - Senior Geotechnical Engineer

Ricardo Quevedo - Senior Technical Hydrogeologist

Technical Experts - Golder

In Person

Shadi Dayyani - Water Quality Modeller

Jerry Vandenberg – Principal Environmental Chemist

Don Corley - Senior Hydrogeology Specialist

Rainie Sharpe - Senior Ecotoxicologist, Fish Biologist

Remote

John Cunning – Principal, Geotechnical Engineer

Karyn Gallant – Senior Rock Mechanics Engineer

Ashley Pakula – Geotechnical Engineer

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Diavik Water License Amendment Part A - Application Introduction

Sean Sinclair, Environment Superintendent

Template #: DCON-029-1010 R8

Purpose of the Proposal / Application

- To request an amendment to the Water Licence to permit the option of deposition of Processed Kimberlite (PK) material into Mine Workings (A418, A154, and A21 pits)
- **“Mine Workings”** means the underground and/or open pit area resulting from the development of an ore body.
- Clarity on additional information, conditions, approvals and timelines to incorporate into future Management Plans and Design Reports prior to final approval of PK deposition in Mine Workings
- To request administrative updates to the Water Licence

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Regulatory Approvals / Authorizations

Including but not limited to the following:

1. Canadian Environmental Assessment Agency
2. Environmental Agreement
3. Surface Leases
4. Fisheries Act Authorizations
5. Navigation Protection Act Approvals
6. Water Licence

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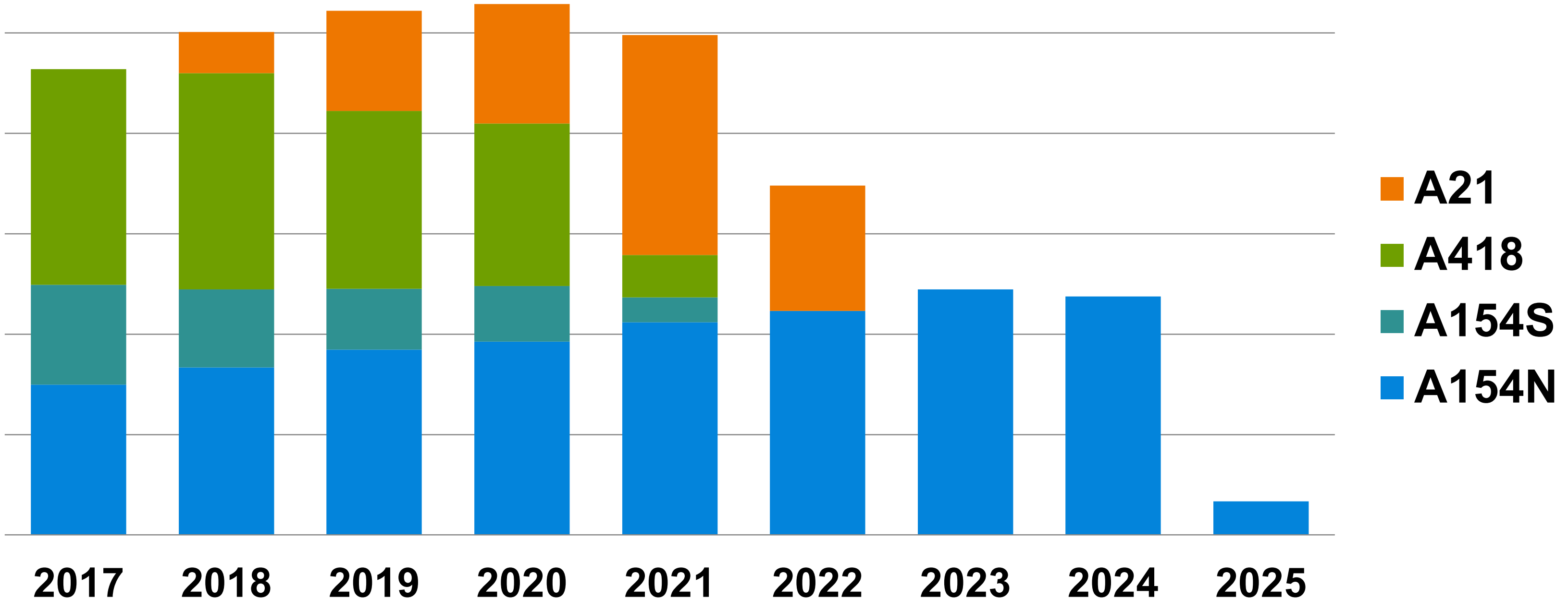
PK Production and Storage

- Based on the current mine plan, the PKC will be full in 2021 without additional dam raise beyond current approvals
- Underground mining of the A154S and A418 kimberlite pipes will be completed by 2022
- Underground mining of the A154N kimberlite pipe will be completed in 2025
- Open pit mining of the A21 kimberlite pipe will be completed by 2023



Current PK Storage

- Processed kimberlite is currently stored within the Processed Kimberlite Containment (PKC) Facility
- The PKC Facility is surrounded by a lined dam that DDMI has constructed and made higher over the years
- The amount of storage area left within the PKC will not fit the amount of processed kimberlite that will be produced during the remaining years of mining
- PKC dam expansion opportunities are limited by the size of East Island

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Benefits of the Deposition of PK to Mine Workings

- Improves health and safety related to operations and closure
- Reduces environmental risks related to PK storage
- Ensures certainty in PK storage capacity for the life-of-mine
- Enhances operational flexibility
- Reduces capital expenditures for the life-of-mine
- Reduces closure risks

Assessment of Potential Environmental Risks and Impacts

- Assessed the potential for adverse impacts to biotic and abiotic components, including water quality and fish and fish habitat
- Assessment based on robust data from site specific studies, literature review, and Traditional Knowledge
- Assessed operational, health and safety, and environmental risks, including the potential for accidents and malfunctions

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Assessment of Potential Environmental Risks and Impacts

- Applied credible assumptions where scientific uncertainty exists
- Applied conservatism and the precautionary approach
- Certainty and confidence in results informed by ongoing operations and on modelling
- Monitoring programs and adaptive management

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Assessment of Potential Environmental Risks and Impacts

- Committed to protecting the health and safety of workers and the environment in executing the proposal
- PK to Mine Workings not likely to have a significant adverse impact on the environment

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Stakeholder Engagement

- Proposed PK to Mine Workings informed by DDMI's ongoing engagement with stakeholders
- PK to Mine Workings addresses concerns regarding the long-term stability and environmental risks of the Processed Kimberlite Facility
- Engaged stakeholders on potential impacts, proposed mitigation measures, the acceptability of residual impacts, and how mitigation might be enhanced

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Stakeholder Support

- Broad support for the Proposal among our Participation Agreement partners and communities
- PK to Mine Workings not likely to be a cause of significant public concern

Alternatives Assessment / Options Analysis

Option	Key Advantages	Key Disadvantages
1. Traditional Dam Raise	• permitted • known approach	• high cost • footprint restrictions • new construction necessary • limited closure options
2. A418 Deposition with Current Dam Height	• lower cost • maximum use of existing storage capacity • no new dam construction • enhanced closure options	• license amendment • high risk of running out of PKC storage before A418 is available.
3. Additional On-Site Storage	• no new dam construction • lowest cost • enhanced use of existing facilities	• loss of original facility functionality • license amendment • site runoff risk • expanded closure footprint
4. PKC Dam Raise and A418 Deposition	• limits risk of running out of storage space • maximize use of existing storage capacity • enhanced closure options	• moderate cost • new dam construction necessary • license amendment

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Future Approvals Prior to Commencement

Management Plan Updates

- Processed Kimberlite Containment Plan: Processed Kimberlite Containment Facility and Mine Workings
- Water Management Plan and Water Balance
- Contingency Plan
- Waste Management Plan

Design Report

- Processed Kimberlite Containment in Mine Workings (includes Engineered drawings)

ENR stated support for DDMI's proposal that management plans not be required at this time but must be submitted and approved prior to the deposition of processed kimberlite into mine workings.

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Questions?

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Diavik Water License Amendment Part B - PK Deposition Considerations

Sean Sinclair, Environment Superintendent

Template #: DCON-029-1010 R8

PK Deposition Considerations

- Update Fine Processed Kimberlite (FPK) to Course Processed Kimberlite (CPK) ratio close to 87:13 (currently 45:55)
- FPK to Mine Workings (via pipeline)
- CPK to current PKC Facility (via truck) - hauling and dumping of CPK in the mine workings is not operationally practical

Summary of Potential Environmental Effects and Mitigation Measures

Potential Impacts	Mitigation(s)
Climate and Air Quality • Increased dust generation during pipeline construction • Decreased dust generation during operations due to fewer trucks hauling CPK • No significant adverse effects anticipated	• Dust control following established procedures. • Maximize transport of PK by pipeline, as feasible. • New pipeline alignment twinned with existing pipelines where possible.

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Summary of Potential Environmental Effects and Mitigation Measures

Potential Impacts	Mitigation(s)
Global Climate Change • Length of pipeline for PK deposition is longer, requiring more energy • Pipeline has net elevation loss, which requires less energy than the existing pipeline that gains elevation • Decreased vehicle emissions during operations due to fewer trucks hauling CPK • No significant increase in GHG emissions	• Optimize pipeline design to minimize operational energy requirements where feasible. • Maximize transport of PK by pipeline, as feasible.

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Summary of Potential Environmental Effects and Mitigation Measures

Potential Impacts	Mitigation(s)
Vegetation, Terrain and Permafrost • Loss of vegetation due to new pipeline construction • Soil degradation • Increased ground instability and permafrost degradation during pipeline construction and operation • No significant adverse effects anticipated	• New pipeline alignment twinned with existing pipelines, or placed in other developed areas, where possible. • New pipeline to be placed above ground • Erosion control to prevent and minimize soil degradation

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Summary of Potential Environmental Effects and Mitigation Measures

Potential Impacts	Mitigation(s)
Wildlife • Loss of wildlife habitat due to new pipeline construction • Increased potential for wildlife interaction/disruption near new pipeline • Potential improvement in post-closure surface conditions for wildlife if it proves feasible to move PK slimes (extra fine PK) to mine workings • No significant adverse effects anticipated	• New pipeline alignment twinned with existing pipelines where possible. • Pipeline construction and operation following established site methods. • Existing site procedures for wildlife reporting and ensuring wildlife have right-of-way will continue to be implemented. • Evaluate feasibility/practicality of moving slimes from the PKC Facility to mine workings to minimize potential post-closure impacts of the PKC Facility on wildlife.

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Summary of Potential Environmental Effects and Mitigation Measures

Potential Impacts	Mitigation(s)
Surface Water • Decrease in mine water discharge to Lac de Gras as mine working areas are filled with PK. • Potential change in mine and/or discharge water quality during operations. • Potential change in post-closure water quality in flooded mine areas. • Potential for reduced seepage from the PKC Facility post-closure, if a dry cover option proves feasible. • Potential for pipeline rupture and release of PK to the receiving environment. • No significant adverse effects anticipated.	• Optimize operational level of decant water, where practical, to manage seepage to other mine workings. • Bulkheads designed and constructed to prevent the flow of PK material or decant water into the A154 mine. • Reuse decant water via transfer to the Process Plant; alternatively transfer decant water to the North Inlet for treatment prior to discharge • Placement of a water cap atop the PK in mine workings at closure; depth of water cap to limit post-closure resuspension of PK. • Water circulation within the closure water cap to be optimized for water quality. • Pipeline alignment on upstream side of roads/berms to contain possible spills. • Evaluate feasibility/practicality of moving slimes from the PKC Facility to the mine workings to facilitate a dry-cover closure option for the PKC Facility, likely reducing potential post-closure seepage.

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Summary of Potential Environmental Effects and Mitigation Measures

Potential Impacts	Mitigation(s)
Groundwater • Decrease in groundwater inflows to mine workings as areas are filled with PK. • No significant adverse effects anticipated.	• Optimize operational level of decant water, where practical, to manage seepage to other mine workings. • Bulkheads designed and constructed to prevent the flow of PK material or decant water into the A154 mine. • Any seepage that may occur will be collected and transported to the Process Plant or the North Inlet.

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Summary of Potential Environmental Effects and Mitigation Measures

Potential Impacts	Mitigation(s)
Fish and Fish Habitat • A potential change in post-closure water quality in flooded mine areas could affect constructed fish habitat. • Potential for uptake of PK material by fish after closure. • No significant adverse effects anticipated	• Depth of closure water cap that limits post-closure resuspension of PK. • Optimize the post-closure elevation of the PK surface in mine workings to limit the potential for direct interaction with fish. • Water circulation within the closure water cap to be optimized for fish and fish habitat.

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Summary of Potential Environmental Effects and Mitigation Measures

Potential Impacts	Mitigation(s)
Socio-Economic • No identified changes to socio-economic impacts	• None

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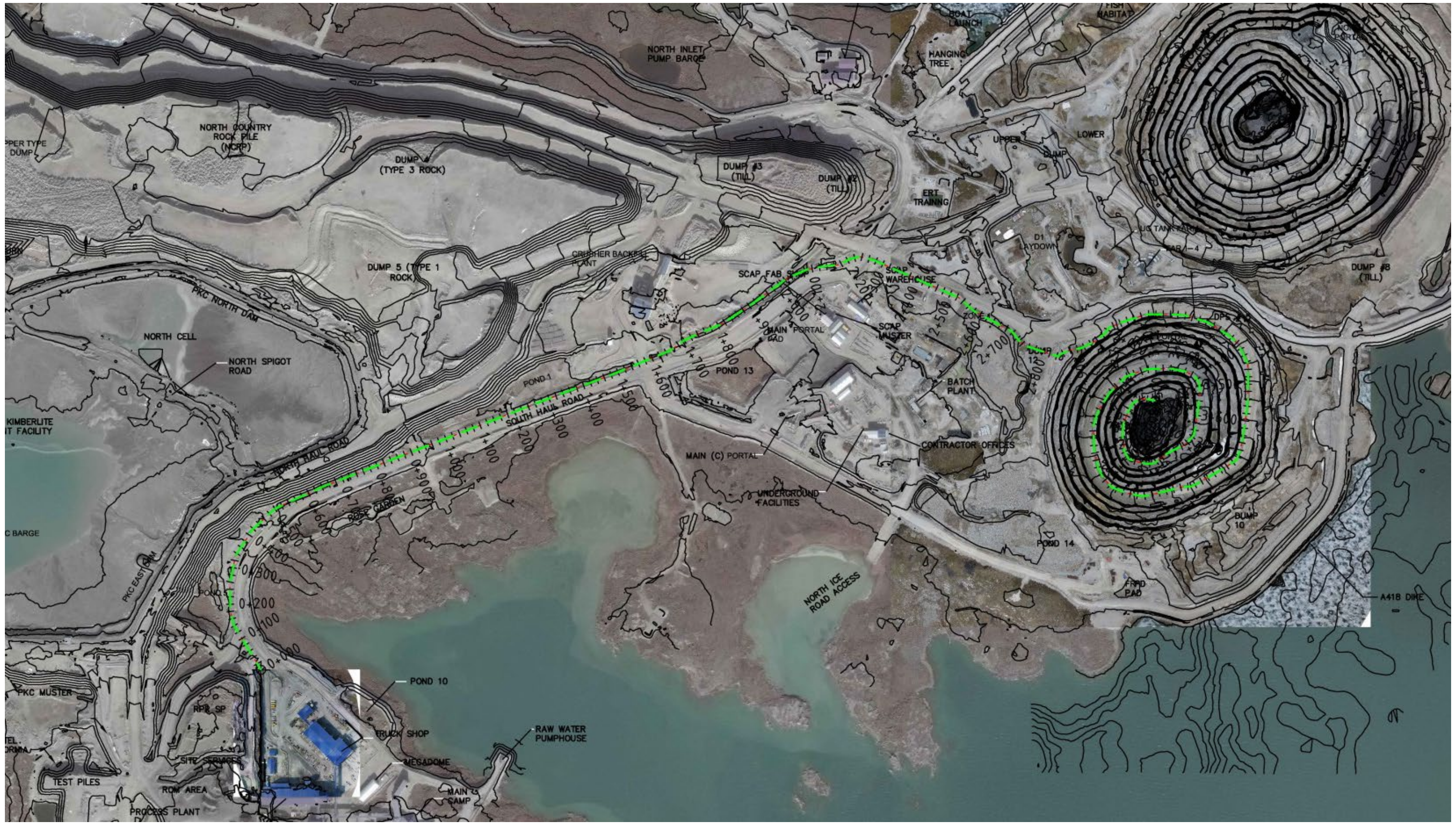
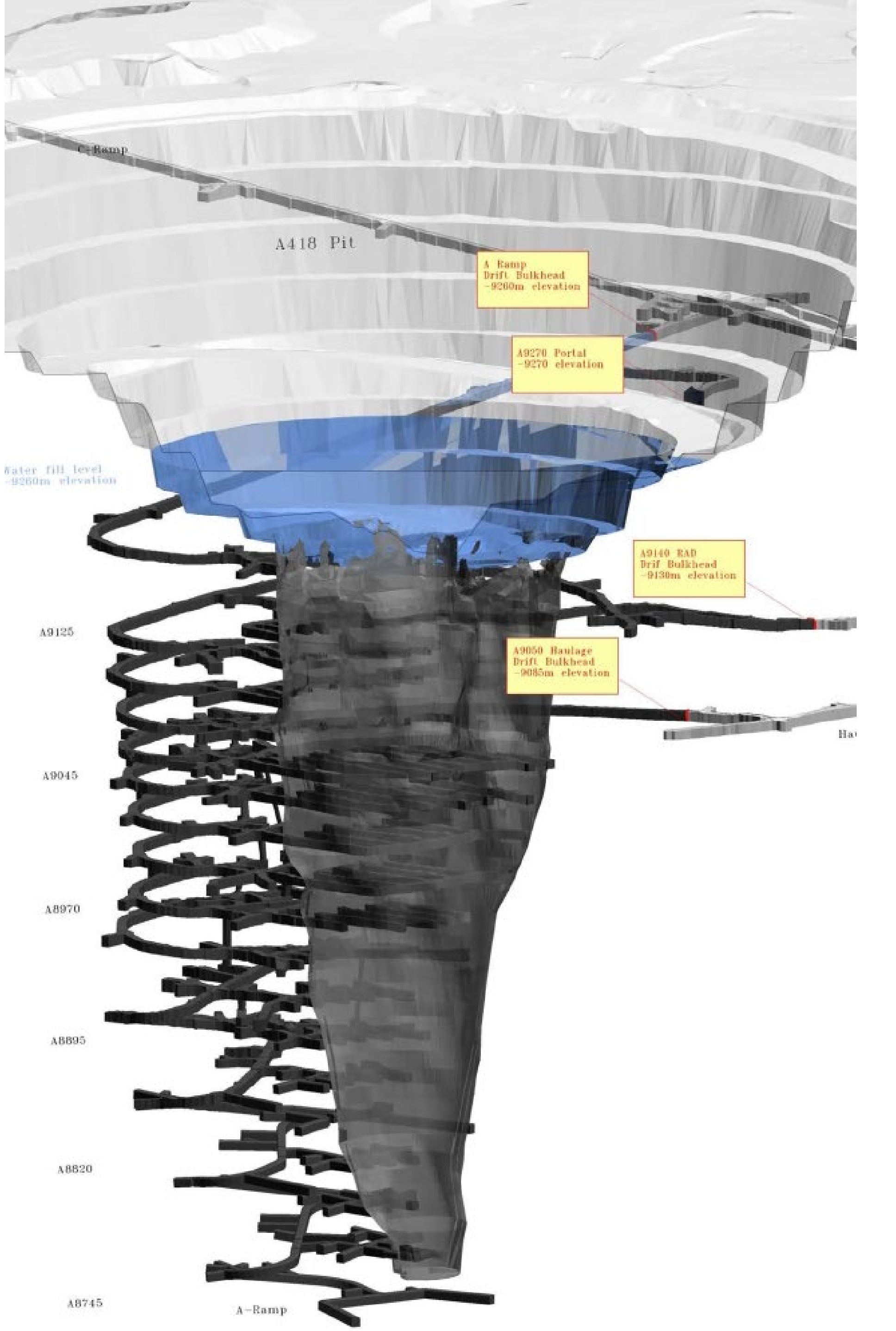
Conceptual Drawings for A418



Deposition strategy to be finalized and included in Processed Kimberlite Containment in Mine Workings Design Report



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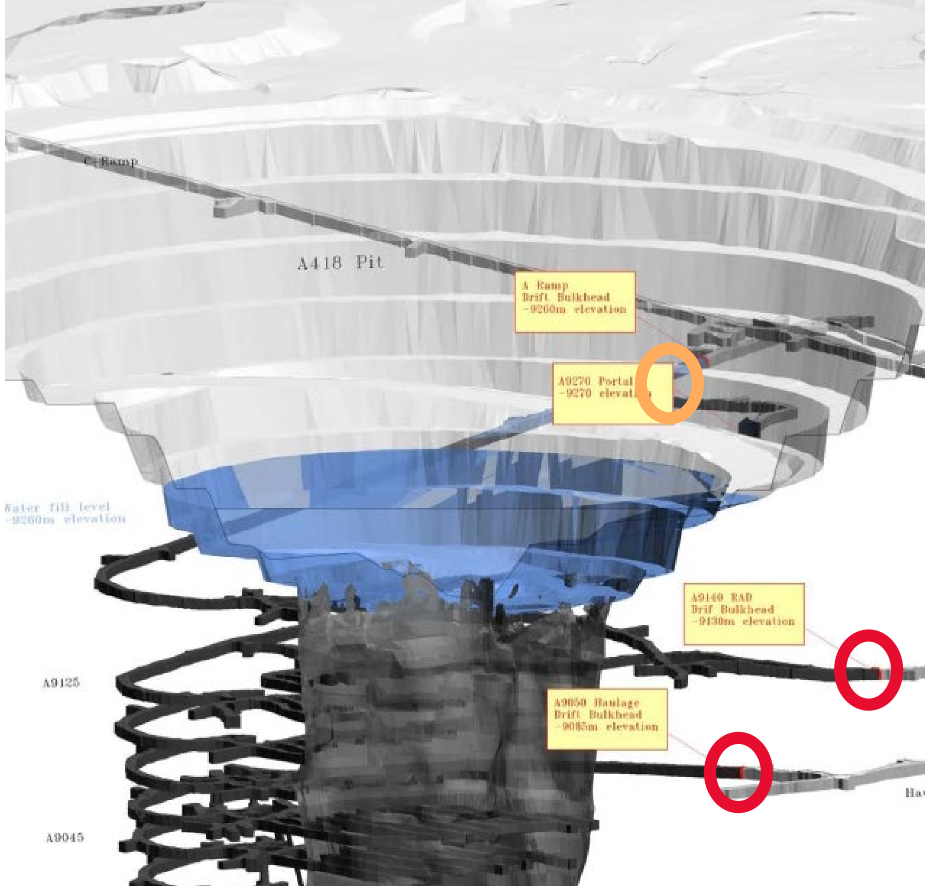
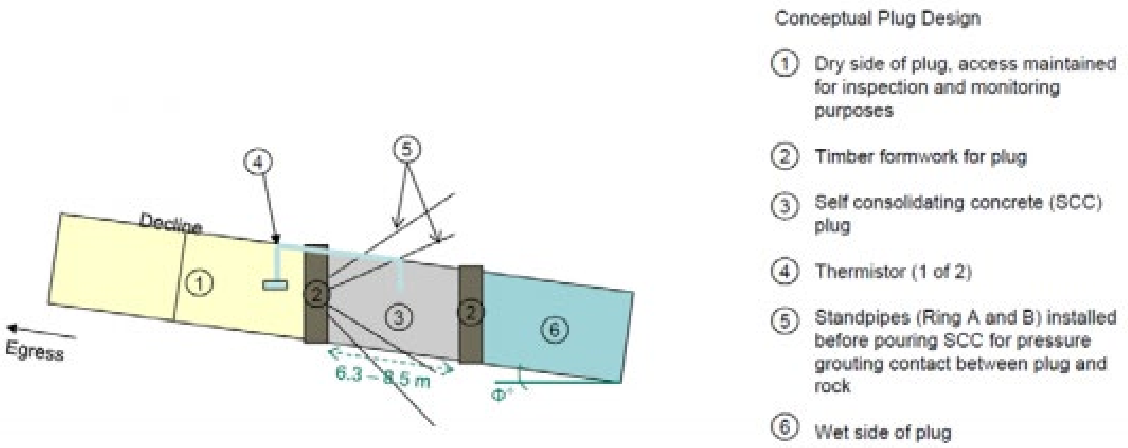
Bulkhead Construction

- 2 bulkheads to isolate A418 Mine Workings from A154N/S
- If the addition of PKC slimes to the A418 caused levels to rise above the 9270 portal, an additional bulkhead may be installed
- Contact grouting will be done around the bulkheads in an effort to prevent seepage
- Should these inflows within the rock mass be higher than 5 gpm, DDMI may conduct additional grouting to control the seepage
- Detailed design submitted as part of Processed Kimberlite Containment in Mine Workings Design Report





Fatal Flaw Assessments

1. Water inflow risks to mining and dewatering efforts in A154S and A154N

2. Geotechnical stability risks within A154S and A154N as a result of an increase in hydrostatic pressure from A418

With mitigation measures in place so that water pressures are maintained equal to or below existing values, the filling of the A418 void with FPK/water to 260 mASL does not pose a geotechnical fatal flaw

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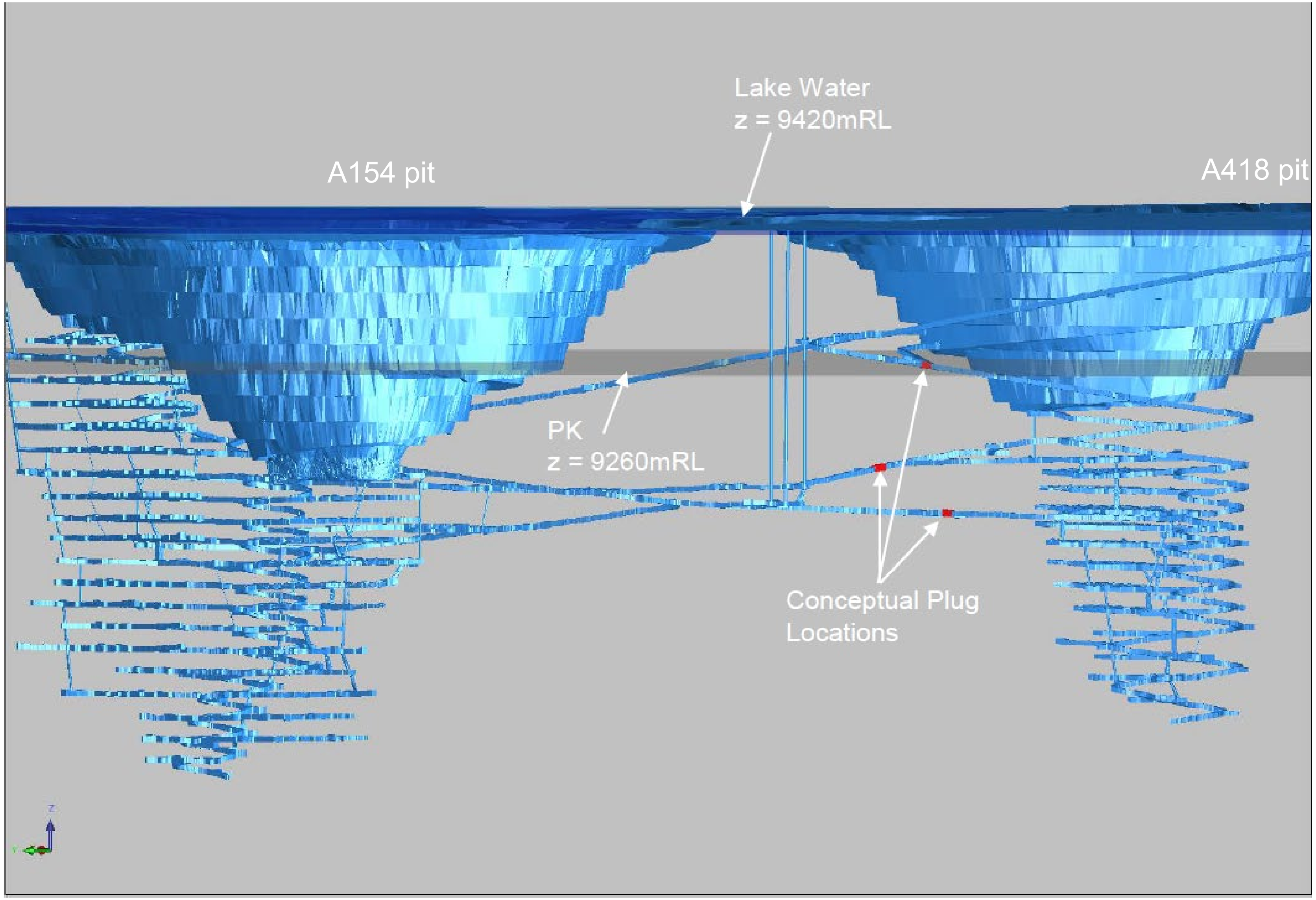
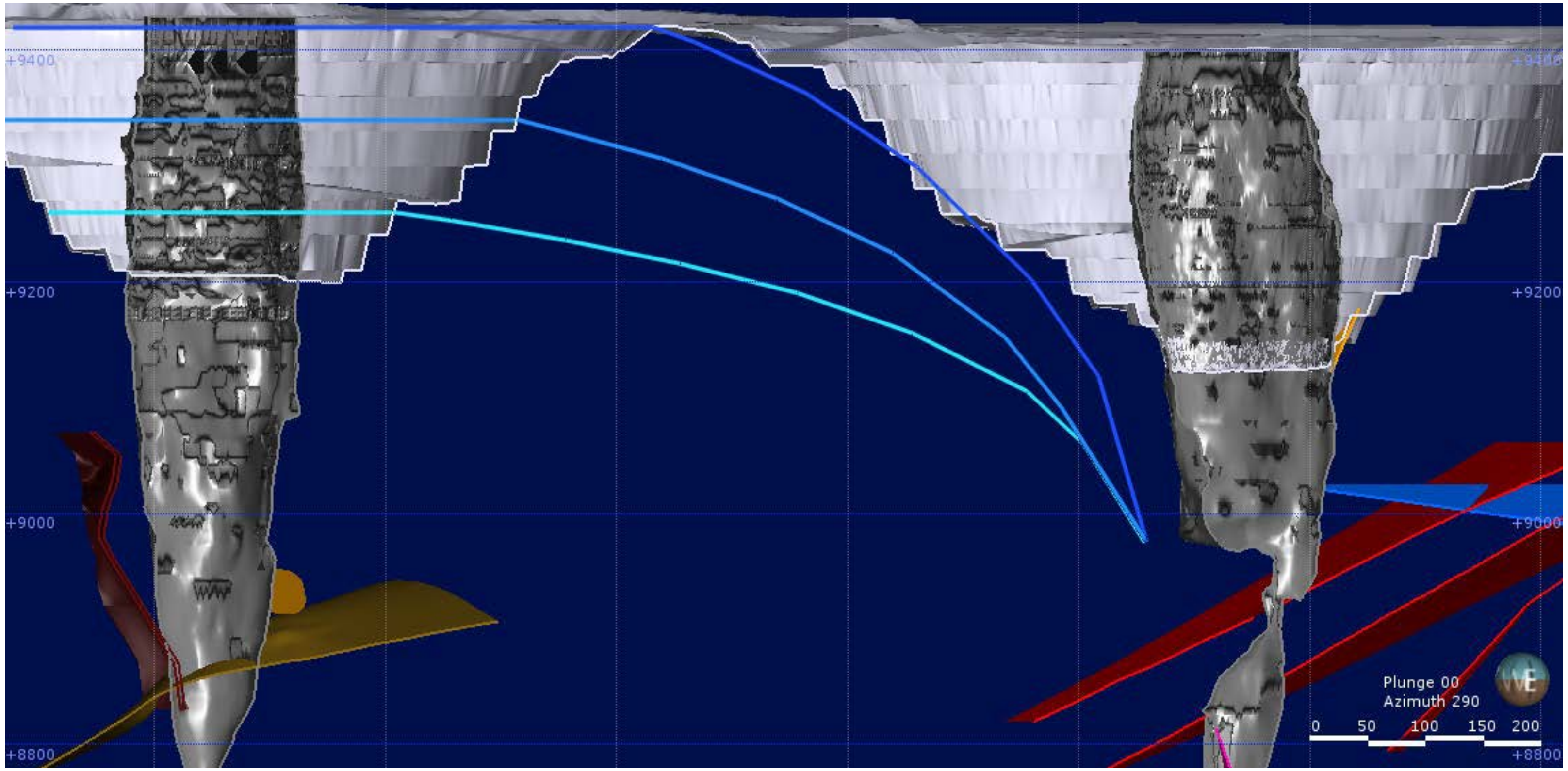
Conceptual Locations of Bulkheads



Predicted Water Table Southwest Wall A514 Pit

Conservative water table estimates in Southeast wall of A154 indicates that:

- With water elevation at 9260 mRL in the A418, water pressures are not expected to increase in the pit walls.
- With water elevation at 9340 mRL in the A418, water pressures may increase in the pit walls. Whether this increase poses a problem to the stability of the pit walls will depend on the actual pressure increase.
- With water elevation at 9420 mRL in the A418, water pressures may be significantly high and seepage zones may be present in the pit wall.



Deposition and Void Volume

Table 5: PK Storage Requirements

Year	Processed Kimberlite (tonnes)	CPK to PKC (tonnes)	FPK to PKC (tonnes)	FPK to A418 (tonnes)
2018	2,347,189	1,408,314	938,876	0
2019	2,442,204	1,465,322	976,882	0
2020	2,520,871	1,512,523	1,008,349	0
2021	2,557,358	1,534,415	1,022,943	0
2022	2,315,672	578,918	0	1,736,754
2023	1,797,158	449,290	0	1,347,869
2024	1,284,085	321,021	0	963,064
2025	181,819	45,455	0	136,364
Total	**15,446,357**	**7,315,257**	**3,947,049**	**4,184,051**

- 4.2 Mtonnes of FPK to A418 (remaining mine production) would have an elevation of ~245 mASL or about 170 m below lake level
- To increase PK storage to create a lakebed 50 m below surface an additional ~12 Mtonnes of PK would be required – there is no source of this much PK based on current mine plan

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PKC Slimes to Mine Workings

- Dry density of slimes in PKC Facility: 0.4t/m^3
- Time to remove 5 Mm^3 from PKC: 4 years
- The addition of 5 Mm^3 of slimes to A418 would have a lake bed elevation of 298 mASL or 117 m below lake level
- Detailed assessment planned for 2020
- Discussed further in the Closure Planning presentation

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Questions?

PIT LAKE WATER QUALITY MODELLING

A418, A154 & A21 PIT LAKES

16 January 2019

AGENDA

Objectives

Methods

Model Setup

Model Inputs

Model Scenarios

Model Assumption

Model Results

Conclusion

GOLDER

Objectives

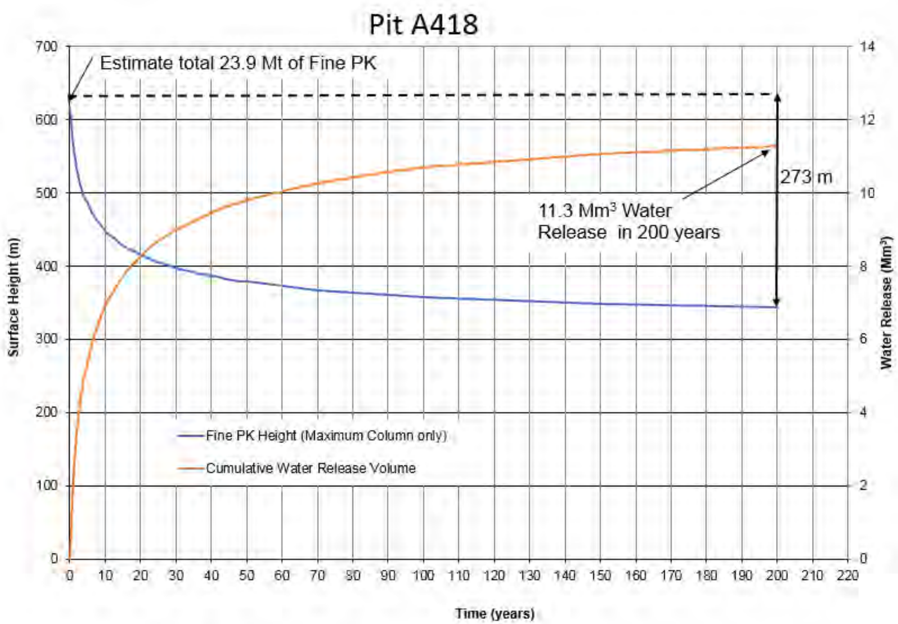
Understanding the influence of PK consolidation on pit lakes water quality

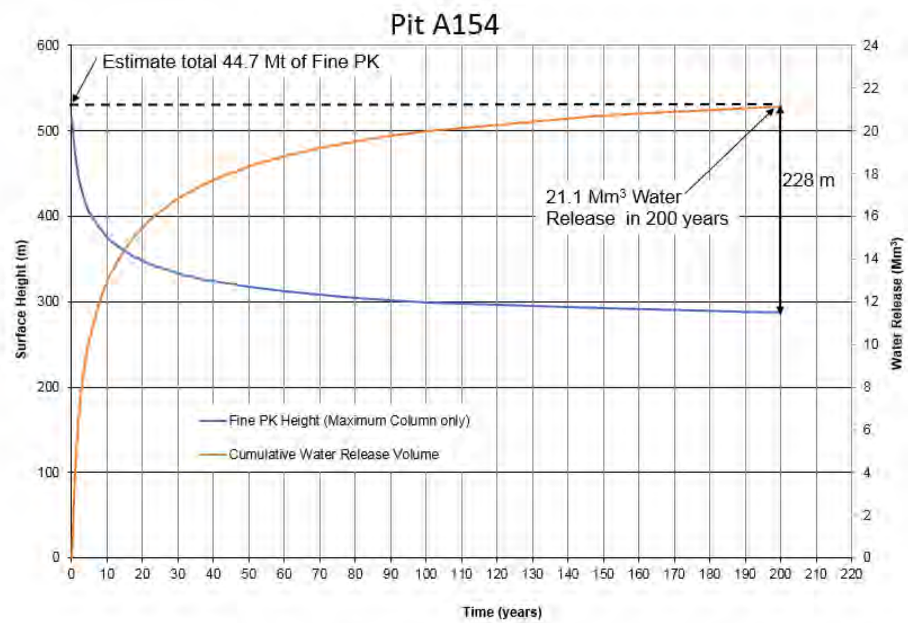
- Tasks required:
  - Whether the pit lakes water column will turn over or remain stratified
  - Long-term stability of stratification

Methods

CONSOLIDATION MODEL

- A conceptual consolidation model
- Solids component in the pits (deposited PK) was assumed to be a single layer from 20 m below the pit crest elevation to the bottom of the mined-out sub-level retreat





Methods

HYDRODYNAMIC MODEL

- CE-QUAL-W2: a two dimensional, laterally averaged, hydrodynamic, and water quality model
- Modelled constituents: TDS, temperature, a conservative, generic water quality constituent (tracer), and a generic settleable water quality constituent

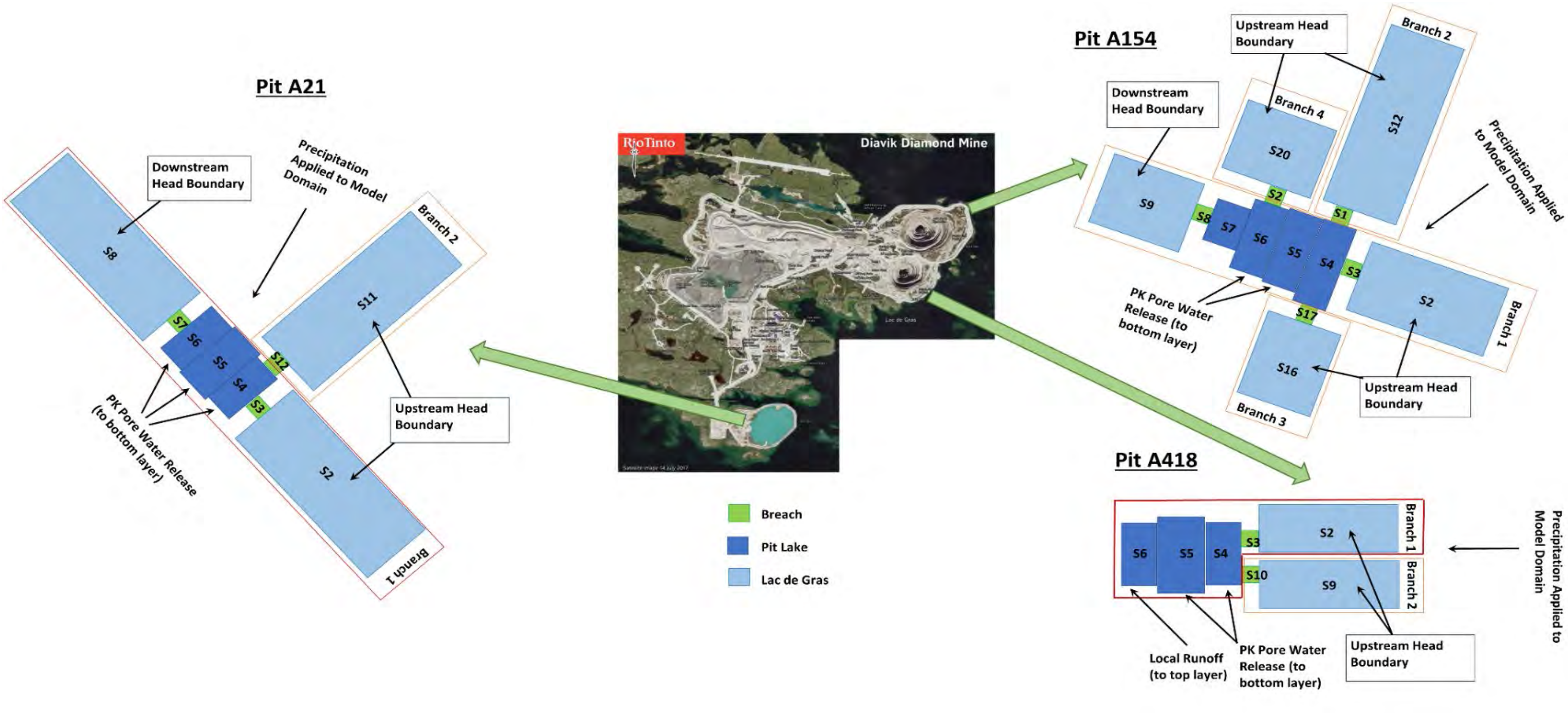
Methods

WATER QUALITY MODEL

- Predicted tracer concentrations used to estimate water quality
- Tracer concentration of 1 mg/L applied to pore water; Initialized to zero everywhere else in the model domain
- Tracer assumed to behave conservatively in the water column (not precipitating and settling)
- Mass-balance approach:
  - $C_{Pit} = C_{Tracer} * (C_{PK} - C_{LdG}) + C_{LdG}$
- Generic settleable constituent initialized to 1 mg/L everywhere in the model domain
- Modelled constituents: major ions, nutrients, and metals

Model Inputs

GEOMETRIC DATA- MODEL SEGMENTATION



a 2-D grid for each pit lake; small portion of Lac de Gras included in each model to account for circulation of water to and from the lake

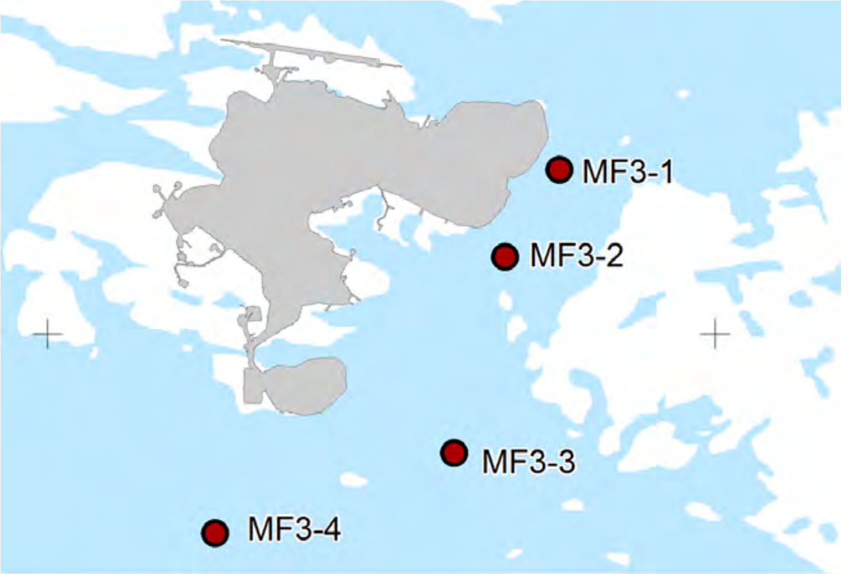
Model Inputs

GEOMETRIC DATA- MODEL SEGMENTATION

- Meteorological Data:
  - air temperature, dew point temperature, wind direction, wind speed and solar radiation
  - Diavik meteorological station (1999-2017); large gaps filled with data from Ekati site
- Hydrological Data:
  - inflow from Lac de Gras into the pit lakes through the breaches in the dike
  - direct precipitation on the lake
  - pore water released to the pit lake as a result of PK consolidation
  - local runoff from the mine area (A418 Pit Lake model)

Model Inputs

WATER QUALITY INPUTS



- Lac de Gras
  - average constituent concentration from Lac de Gras monitoring data collected between 2016 and 2018
  - sampling locations: MF3-1 and MF3-2 representing quality of inflows from Lac de Gras to the A418 and A154 pit lakes and MF3-3 and MF3-4 representing quality of inflows from Lac de Gras to the A21 Pit Lake
  - monitored temperature data from Snap Lake was used
- PK pore ware
  - average constituent concentration from water quality monitoring data collected in beach pore water samples

Model Scenarios

- Base Case Scenario: No PK
- Development Case Scenario: PK with 150 m fresh water cap
- Sensitivity scenarios:

1. PK with a 50 m freshwater cap
2. PK with a 20 m freshwater cap
3. Increasing width of breaches in the dikes (A418 Pit Lake)

Model Assumptions and Limitations

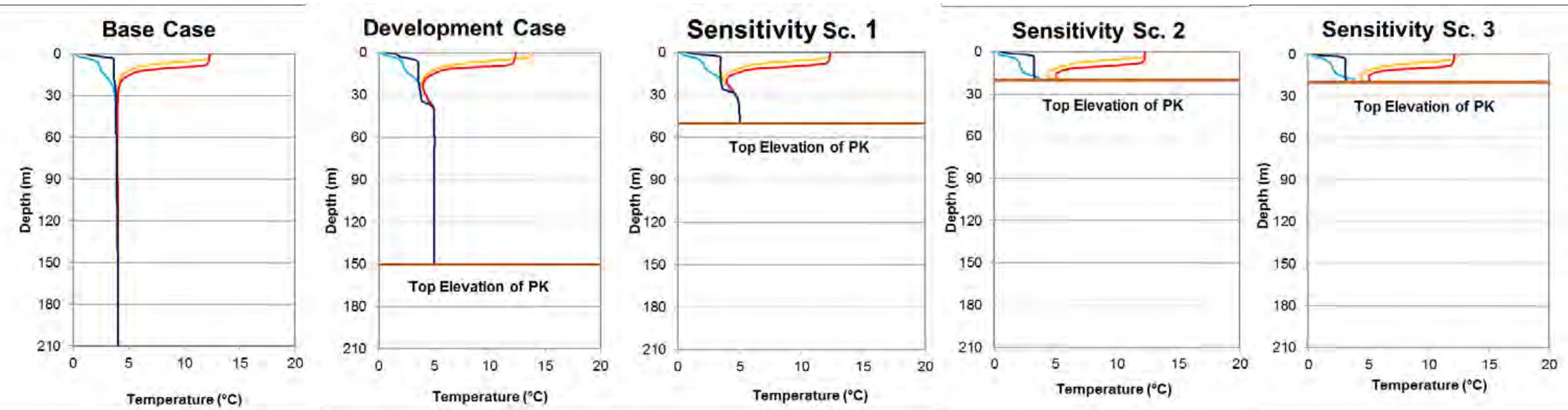
- No groundwater inflows
- No local runoff from mine area
- No wall rock runoff
- Static bathymetry
- PK consolidation curves
- Fully mixed during filling period
- Average water chemistry

Model Results

- Hydrodynamic results:
  - Water temperature
  - Total dissolved solids concentrations
  - Tracer and settleable constituent concentrations
- Water quality results:
  - Predicted daily time-series and maximum daily concentration
  - Impacts of unanticipated mixing

Model Results

HYDRODYNAMIC – TEMPERATURE – A418



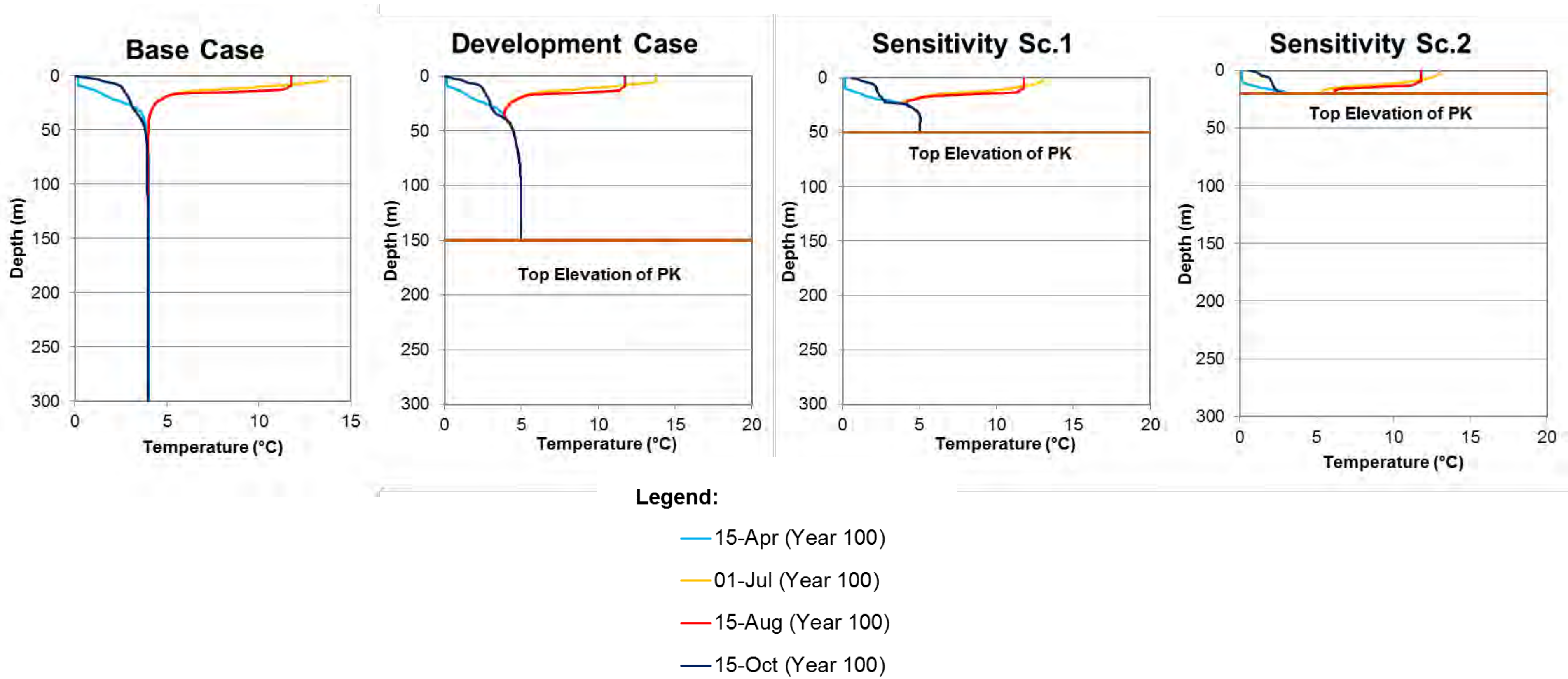
Legend:

- 15-Apr (Year 100)
- 01-Jul (Year 100)
- 15-Aug (Year 100)
- 15-Oct (Year 100)

GOLDER

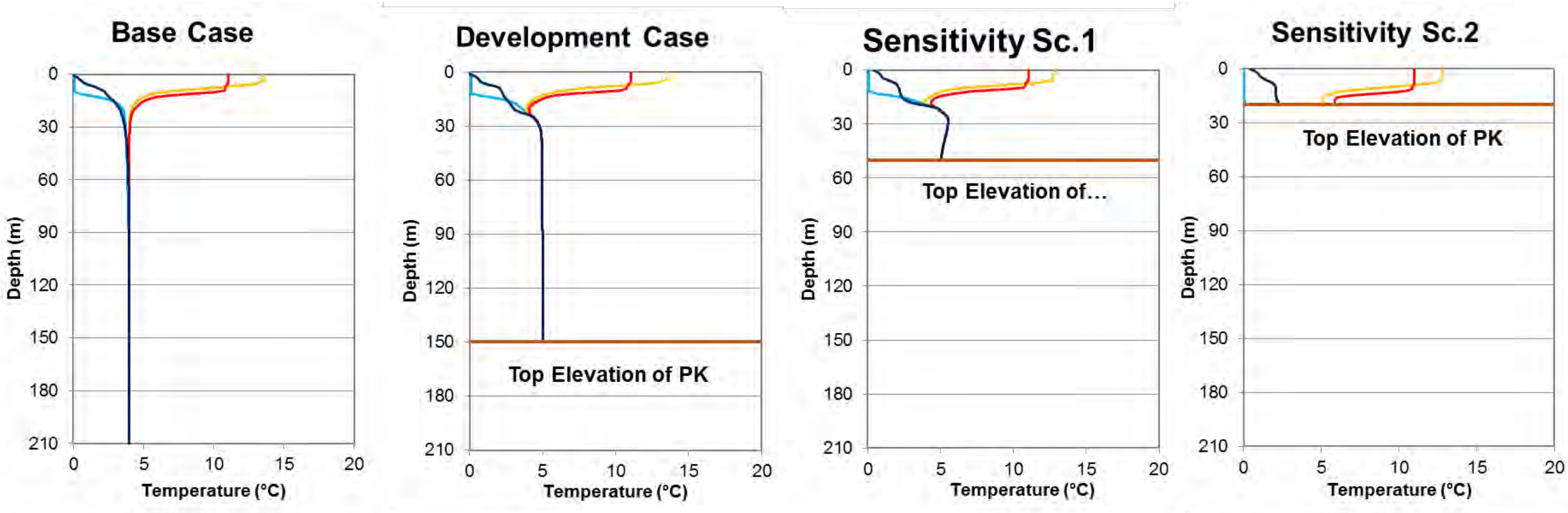
Model Results

HYDRODYNAMIC – TEMPERATURE – A154



Model Results

HYDRODYNAMIC – TEMPERATURE – A21

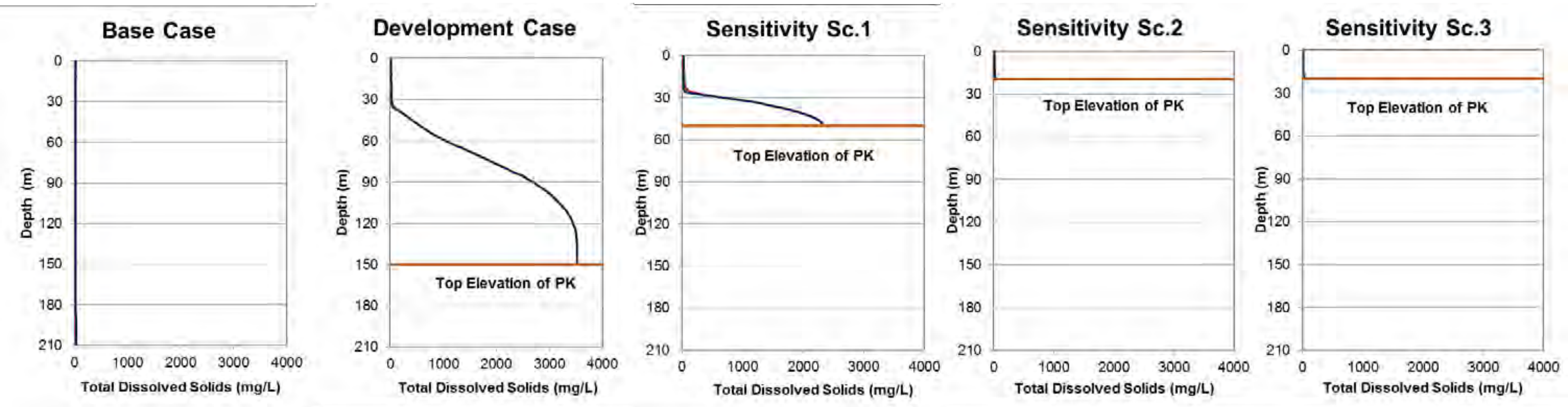


Legend:

- 15-Apr (Year 100)
- 01-Jul (Year 100)
- 15-Aug (Year 100)
- 15-Oct (Year 100)

Model Results

HYDRODYNAMIC – TDS – A418

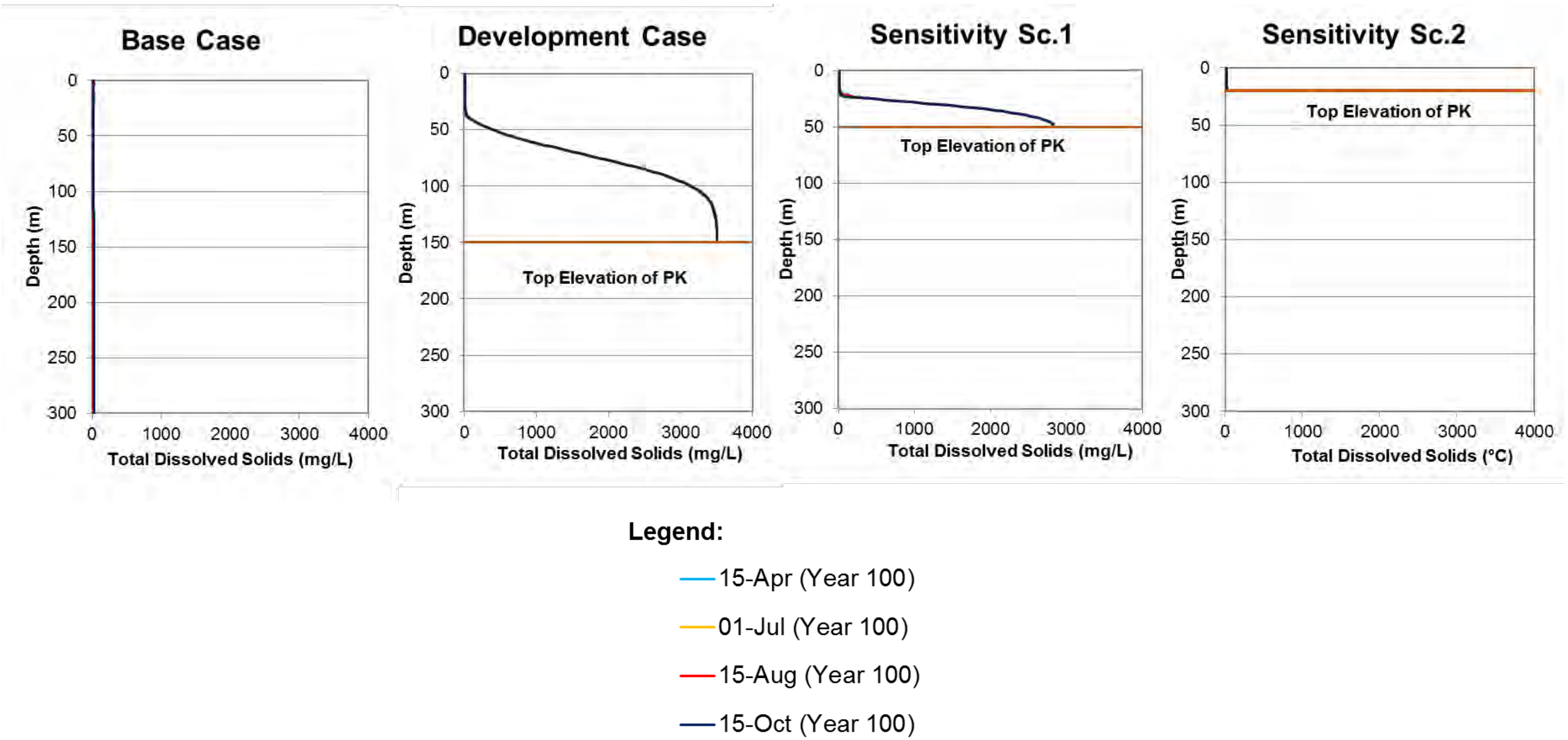


Legend:

- 15-Apr (Year 100)
- 01-Jul (Year 100)
- 15-Aug (Year 100)
- 15-Oct (Year 100)

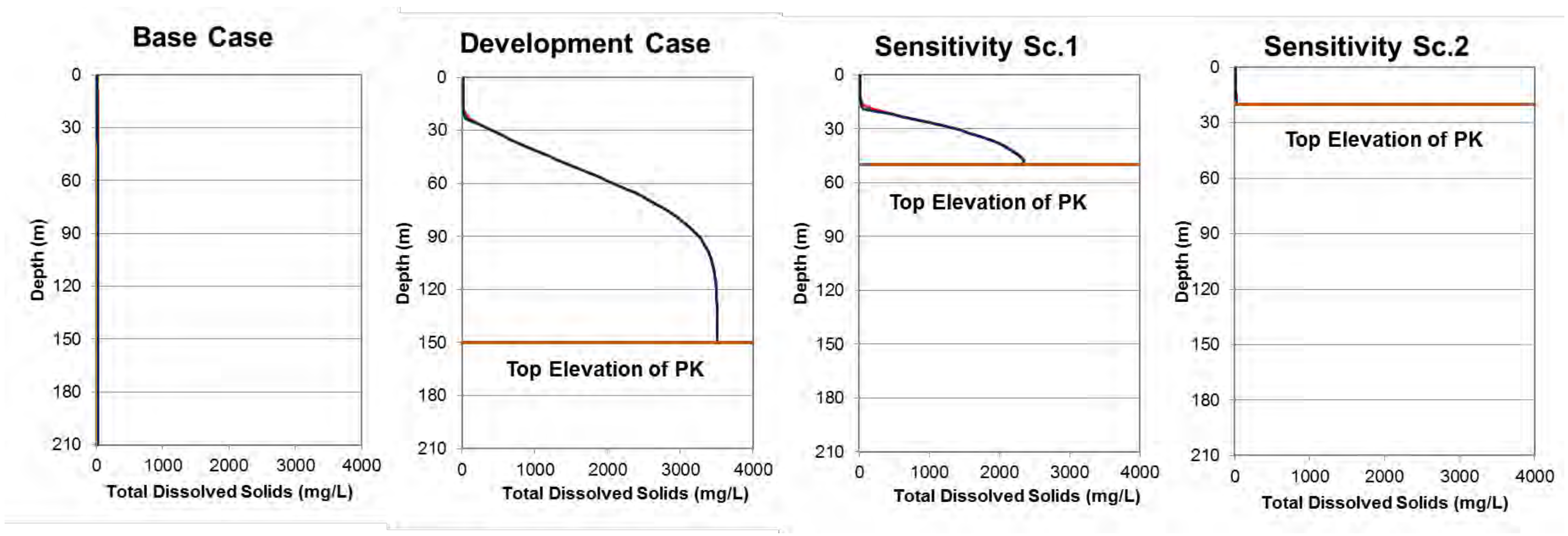
Model Results

HYDRODYNAMIC – TDS – A154



Model Results

HYDRODYNAMIC – TDS – A21



Legend:

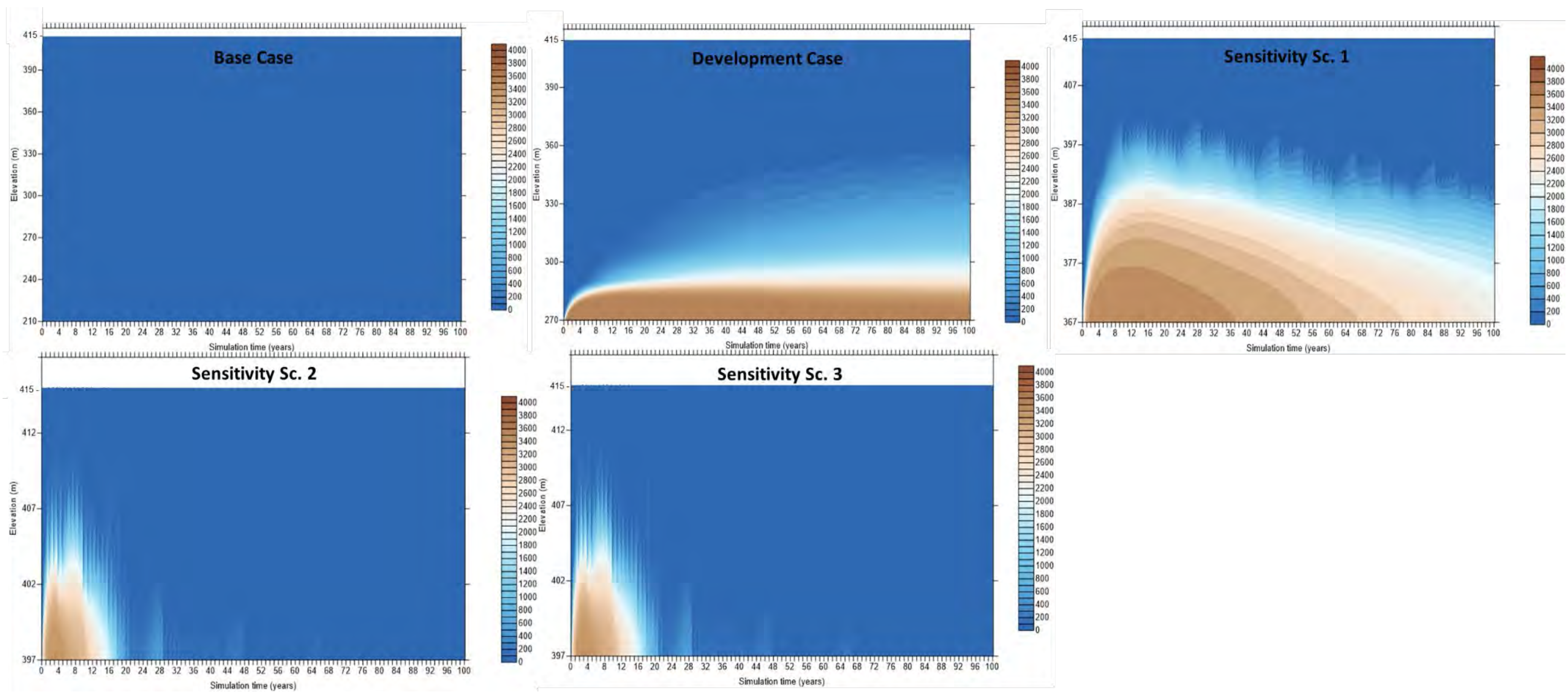
- 15-Apr (Year 100)
- 01-Jul (Year 100)
- 15-Aug (Year 100)
- 15-Oct (Year 100)

GOLDER

Model Results

HYDRODYNAMIC – A418 PIT LAKE

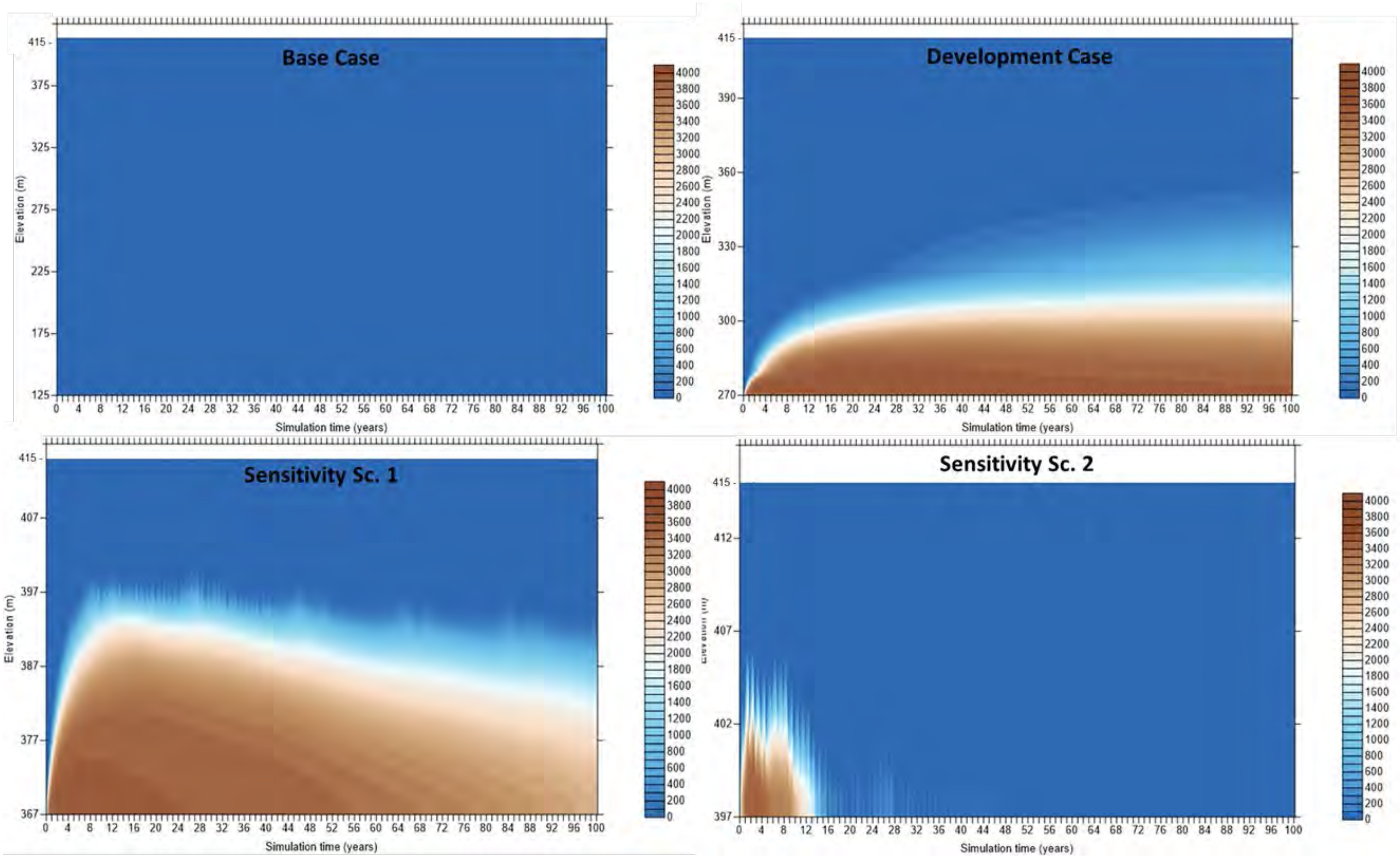
CONTOUR PLOTS OF PREDICTED TDS CONCENTRATIONS



Model Results

HYDRODYNAMIC – A154 PIT LAKE

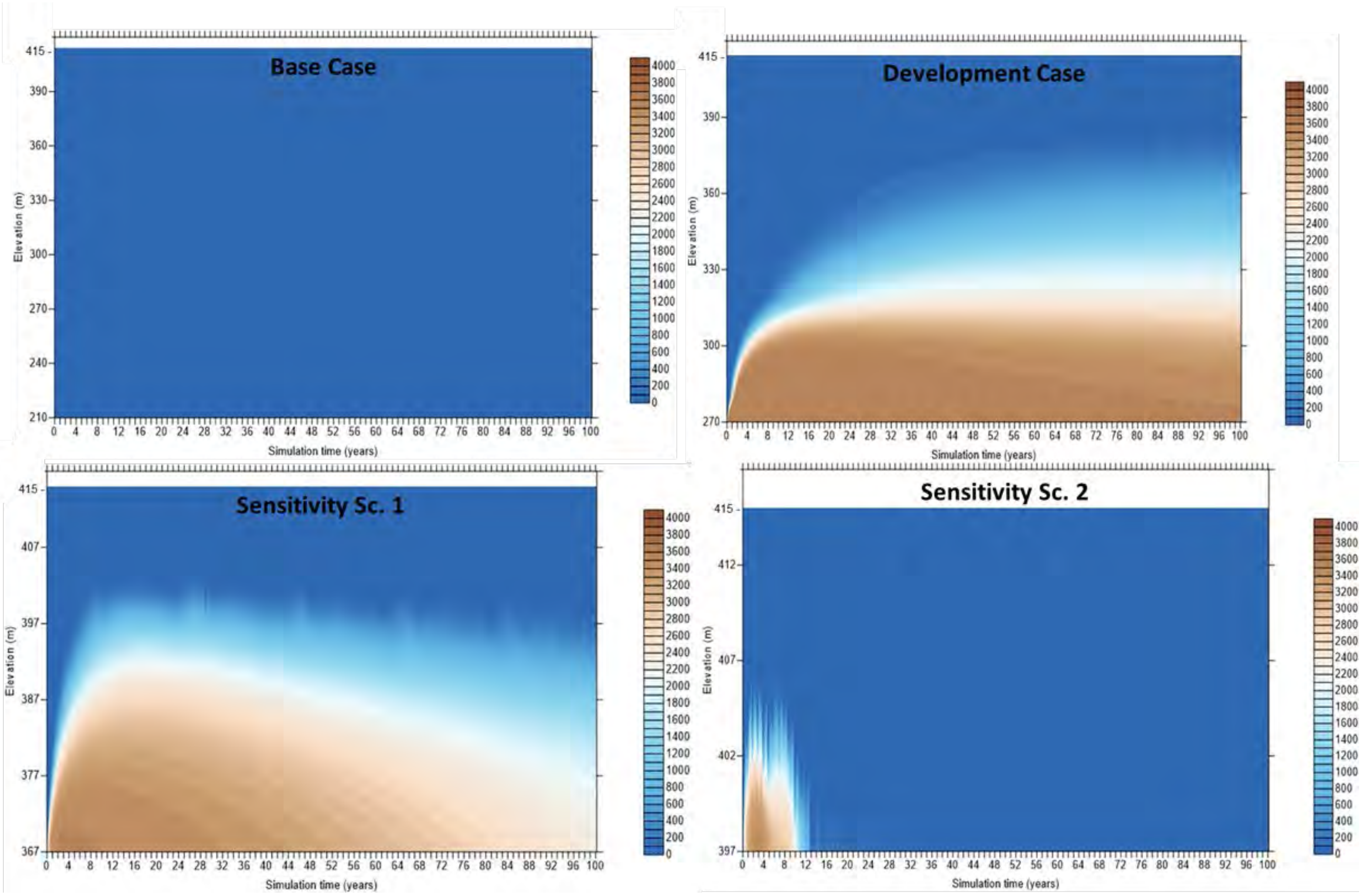
CONTOUR PLOTS OF PREDICTED TDS CONCENTRATIONS



Model Results

HYDRODYNAMIC – A21 PIT LAKE

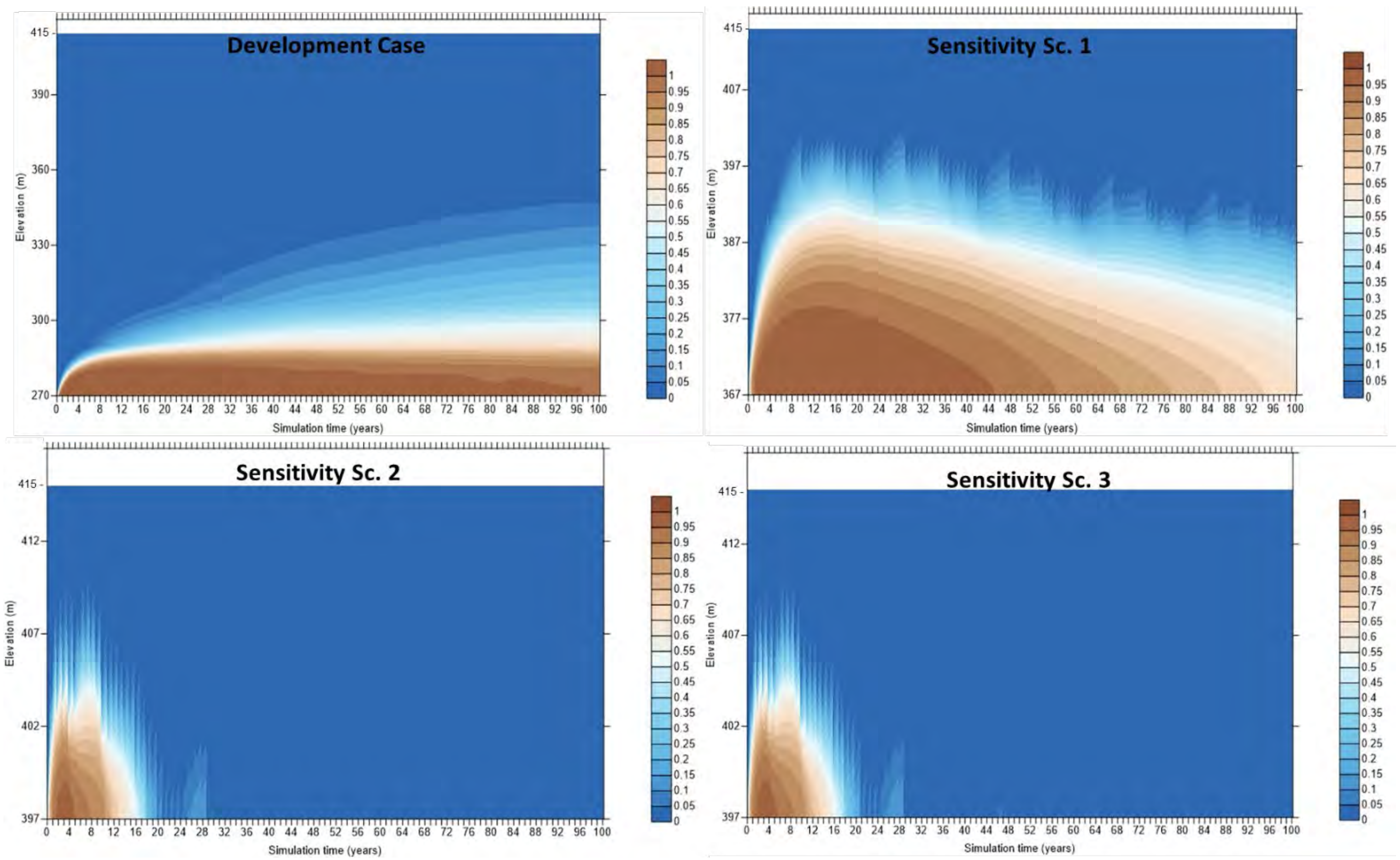
CONTOUR PLOTS OF PREDICTED TDS CONCENTRATIONS



Model Results

HYDRODYNAMIC – A418 PIT LAKE

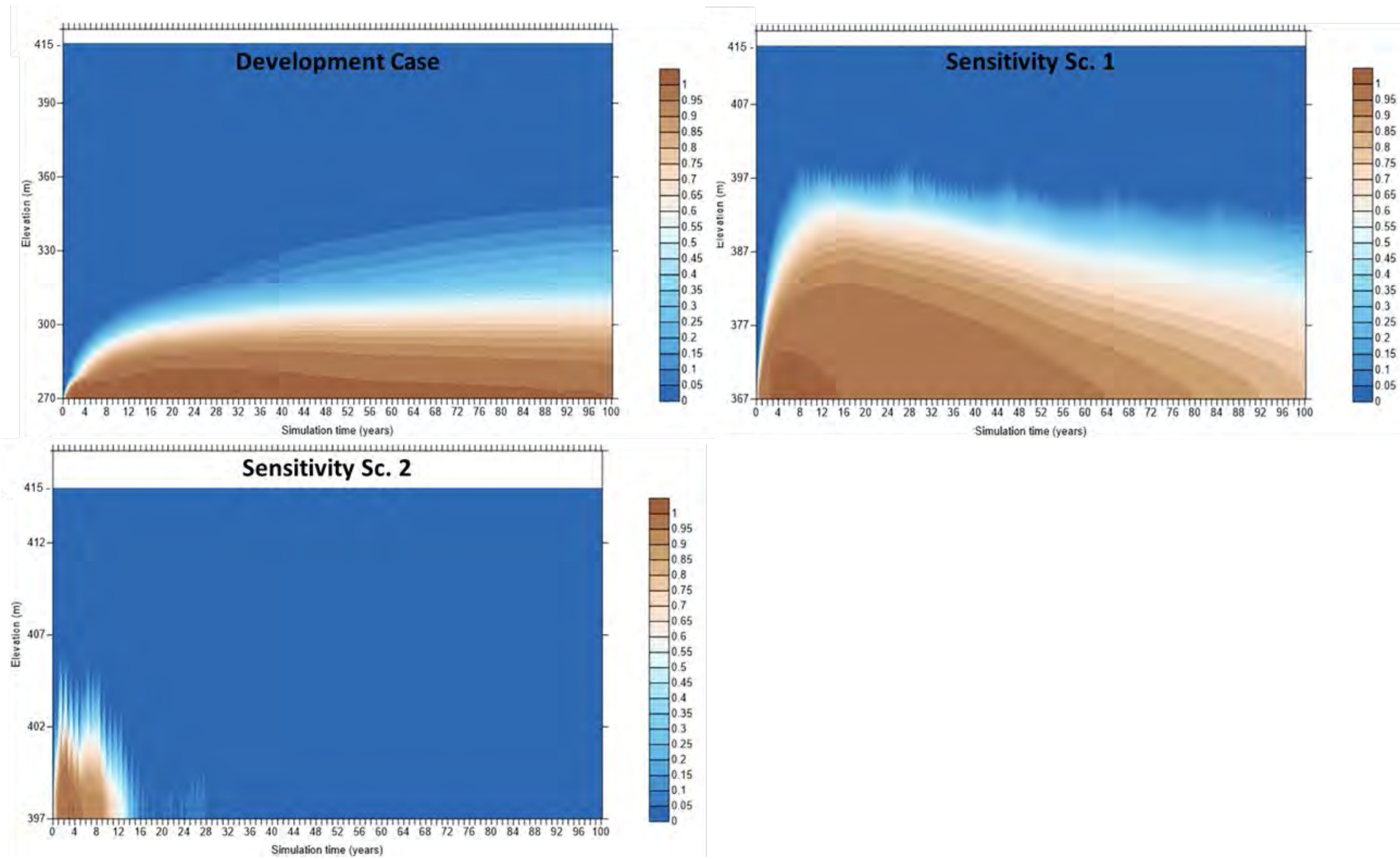
CONTOUR PLOTS OF PREDICTED TRACER CONCENTRATIONS



Model Results

HYDRODYNAMIC – A154 PIT LAKE

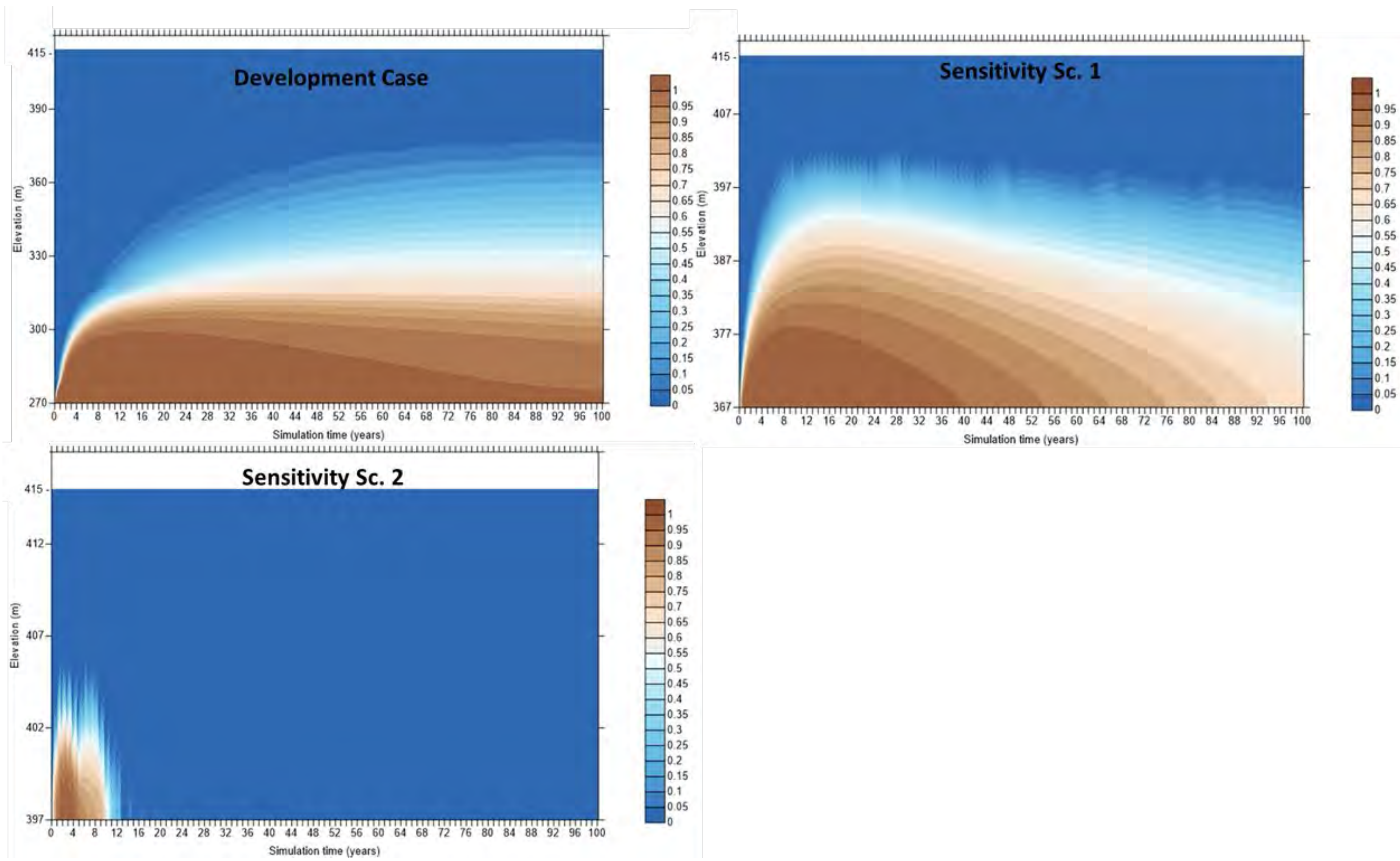
CONTOUR PLOTS OF PREDICTED TRACER CONCENTRATIONS



Model Results

HYDRODYNAMIC – A21 PIT LAKE

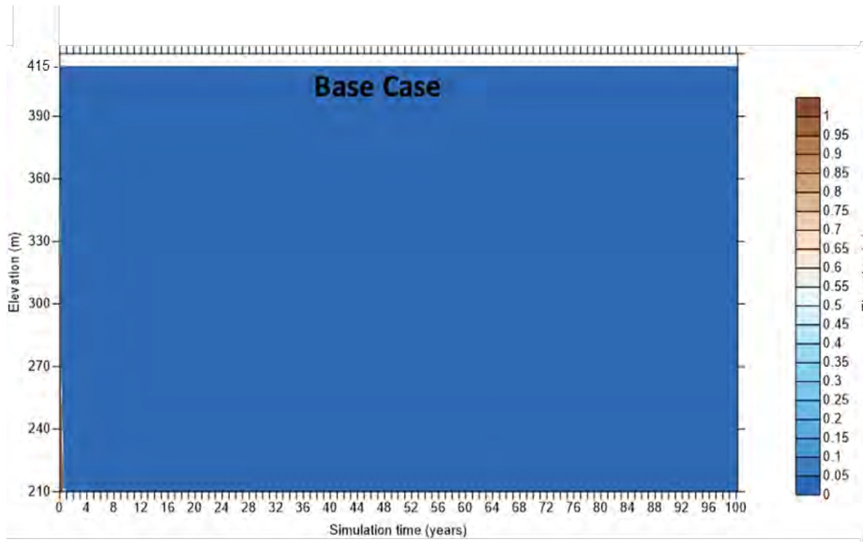
CONTOUR PLOTS OF PREDICTED TRACER CONCENTRATIONS

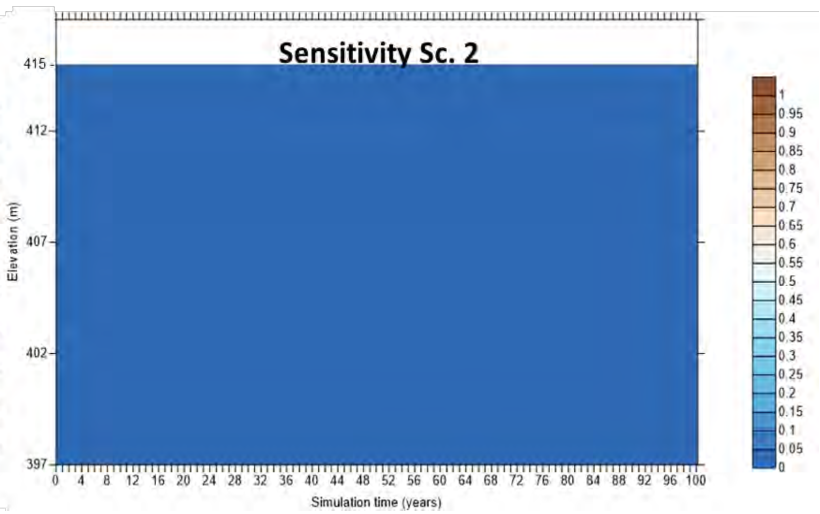


Model Results

HYDRODYNAMIC – A418, A154 AND A21 PIT LAKES

CONTOUR PLOTS OF PREDICTED SETTLEABLE CONSTITUENT CONCENTRATIONS





Model Results

WATER QUALITY- A418, A154 & A21

- Development Case and Sensitivity Scenario 1(stratified pit lake):
  - Concentrations of all water quality constituents in surface water are predicted to remain below the surface water quality benchmarks
- Sensitivity Scenario 2 (fully mixed pit lake):
  - Concentrations of all constituents in surface water are projected to remain below surface water quality benchmarks under all modelled scenarios, except for sulphate, nitrate as nitrogen and selenium in the A418 Pit Lake
  - Concentrations of these three constituents are predicted to exceed benchmarks several times during the first 25 years of the simulation period
  - Each exceedance is predicted to last for approximately 10 days

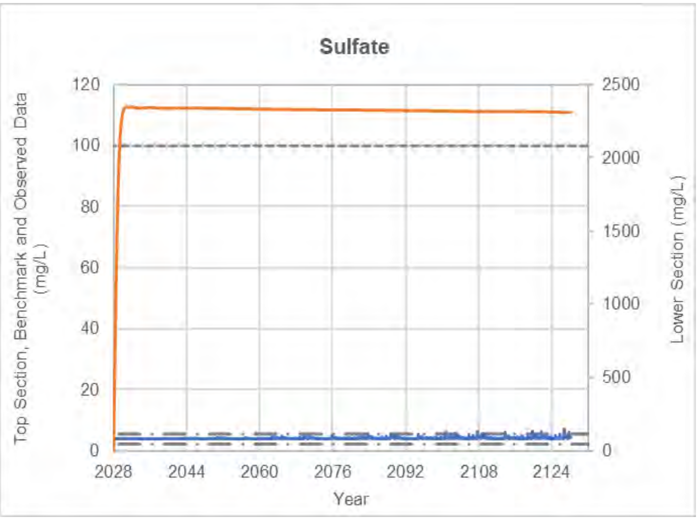
Model Results

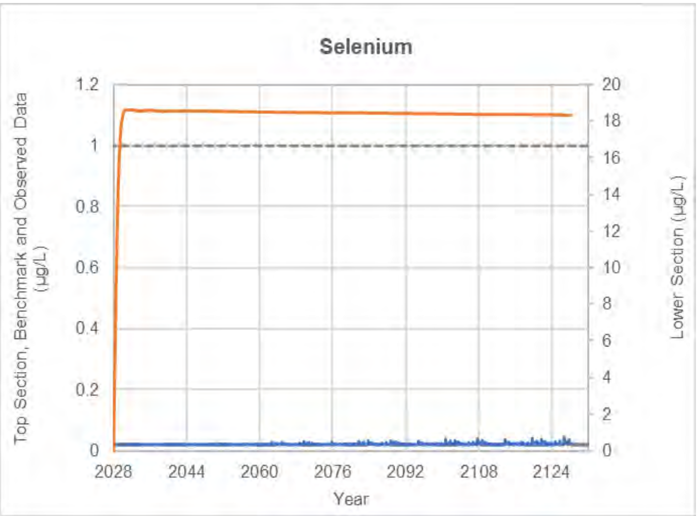
MODELLED WATER QUALITY CONSTITUENTS

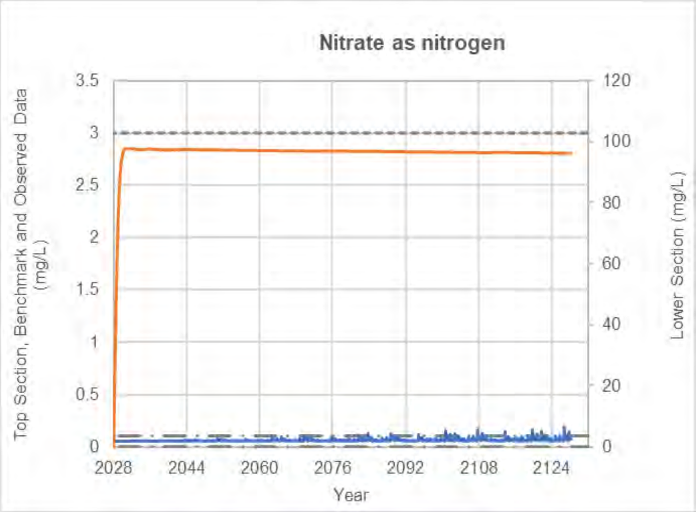
- 37 water quality constituents were modelled
- Model predictions are presented here for sulphate, nitrate and selenium:
  - They represent major ions, nutrients and metals
  - They are predicted to exceed benchmarks (in one scenario in A418)

Model Results

WATER QUALITY – A418 (DEVELOPMENT CASE – 150M CAP)





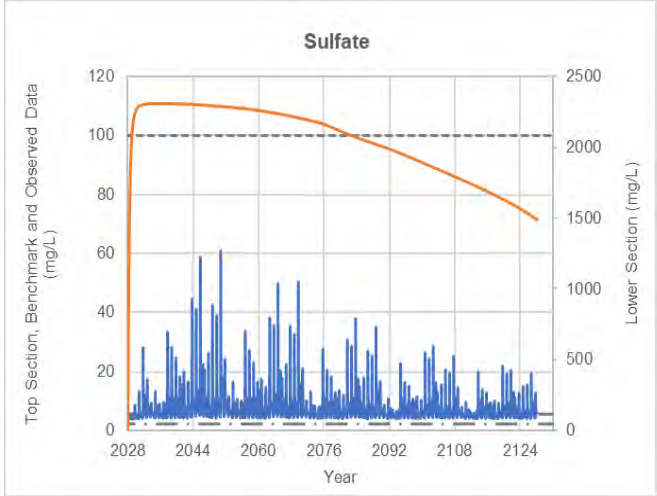


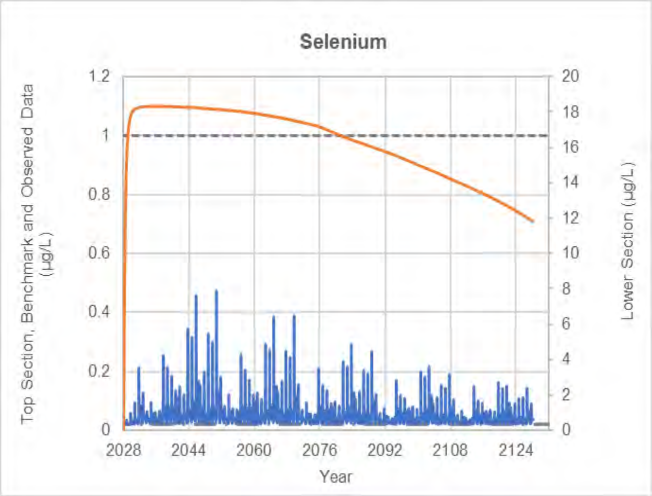
Legend:

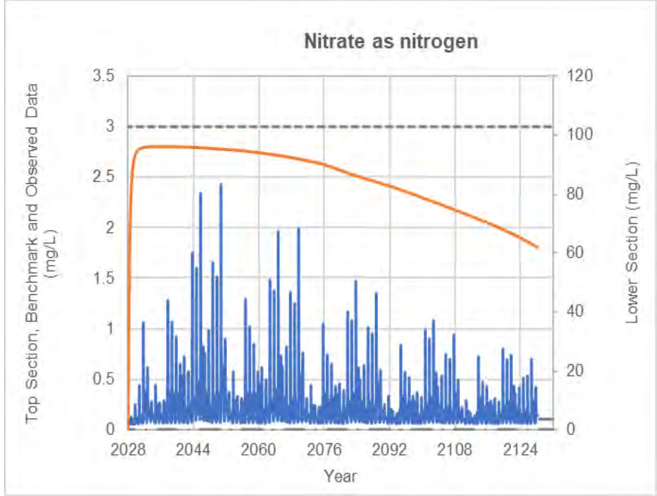
- Top Section (411-416 masl)
- Lower Section (266-290 masl)
- Benchmark
- Range of Observed Data (2017-2018)

Model Results

WATER QUALITY – A418 (SENSITIVITY SCENARIO 1 – 50M CAP)





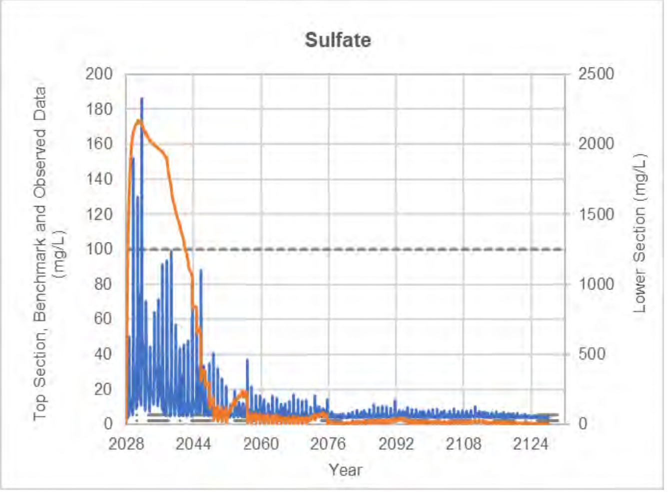


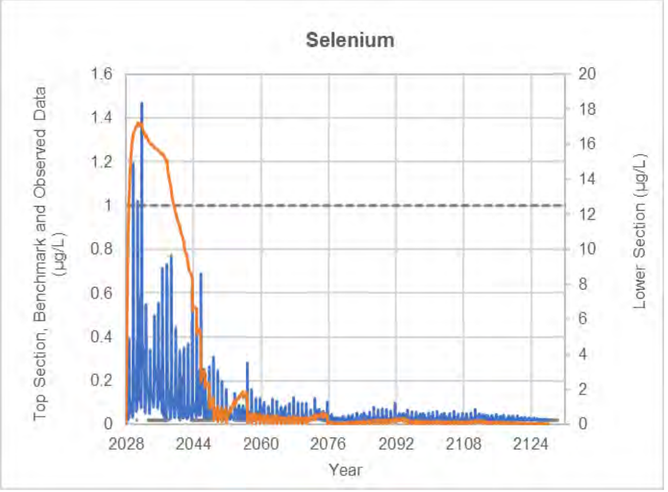
Legend:

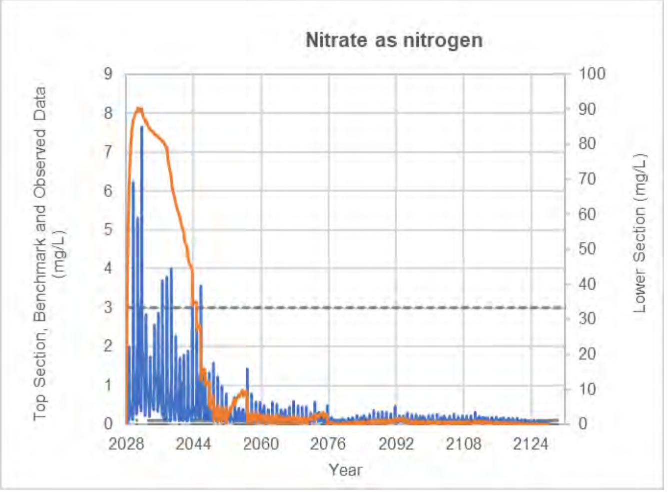
- Top Section (411-416 masl)
- Lower Section (366-370 masl)
- Benchmark
- Range of Observed Data (2017-2018)

Model Results

WATER QUALITY – A418 (SENSITIVITY SCENARIO 2 – 20M CAP)







Legend:

Top Section (411-416 masl)

Lower Section (396-400 masl)

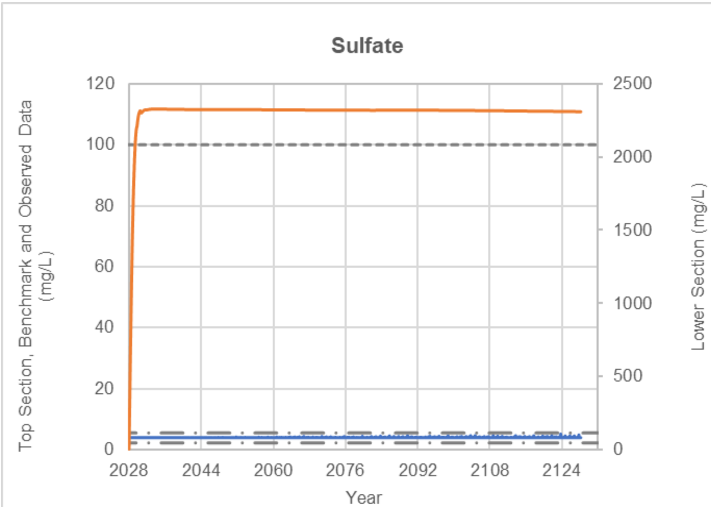
Benchmark

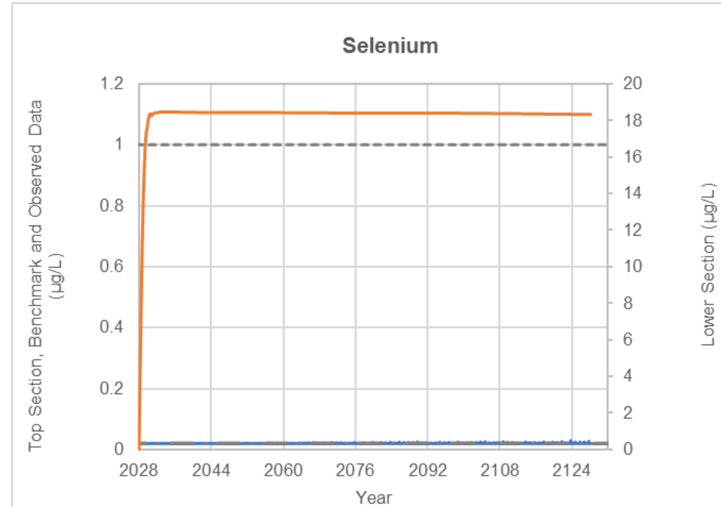
Range of Observed Data (2017-2018)

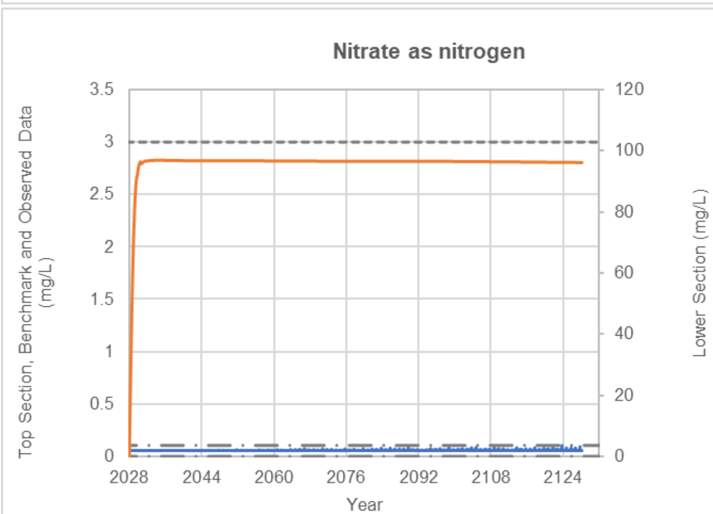
GOLDER

Model Results

WATER QUALITY – A154 (DEVELOPMENT CASE – 150M CAP)







Legend:

Top Section (411-416 masl)

Lower Section (266-290 masl)

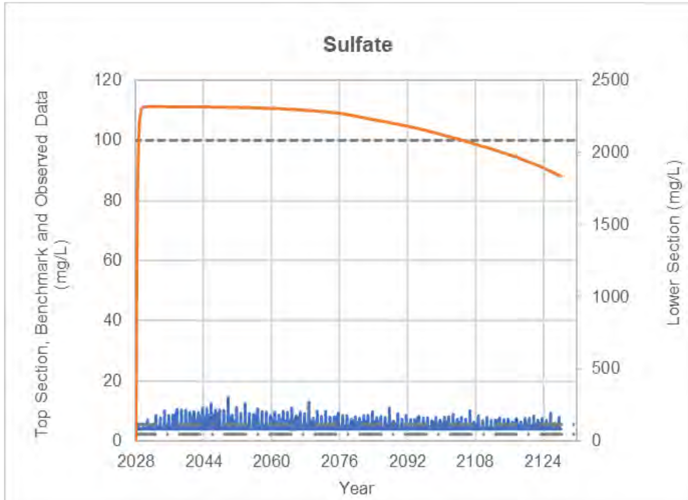
Benchmark

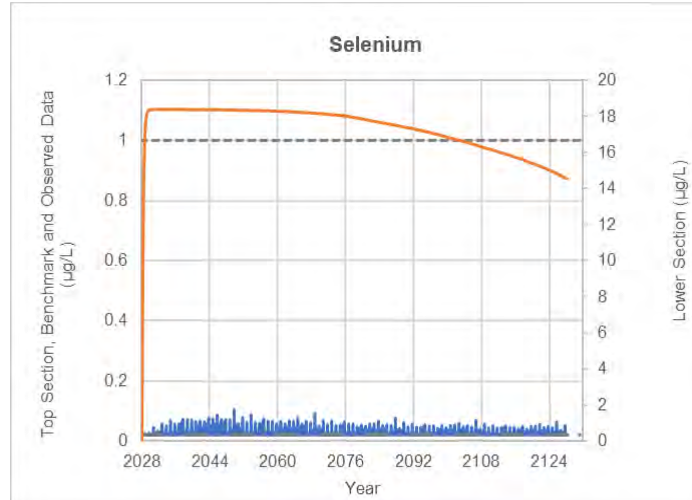
Range of Observed Data (2017-2018)

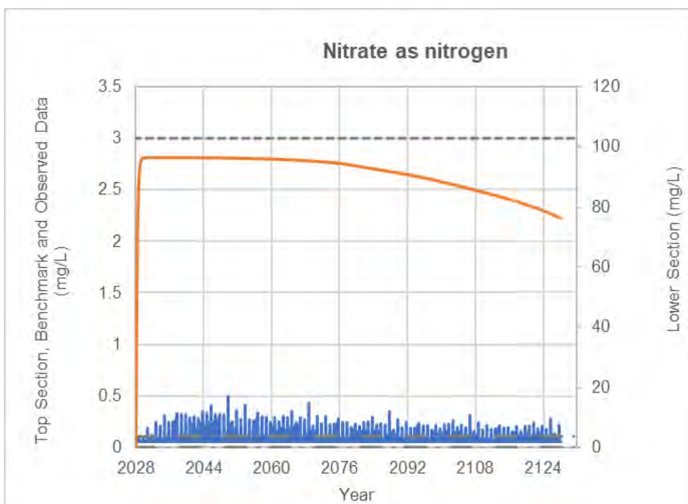
GOLDER

Model Results

WATER QUALITY – A154 (SENSITIVITY SCENARIO 1 – 50M CAP)







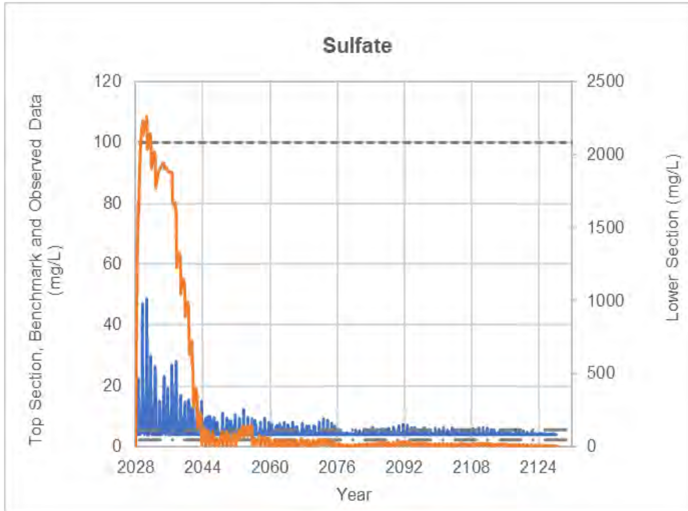
Legend:

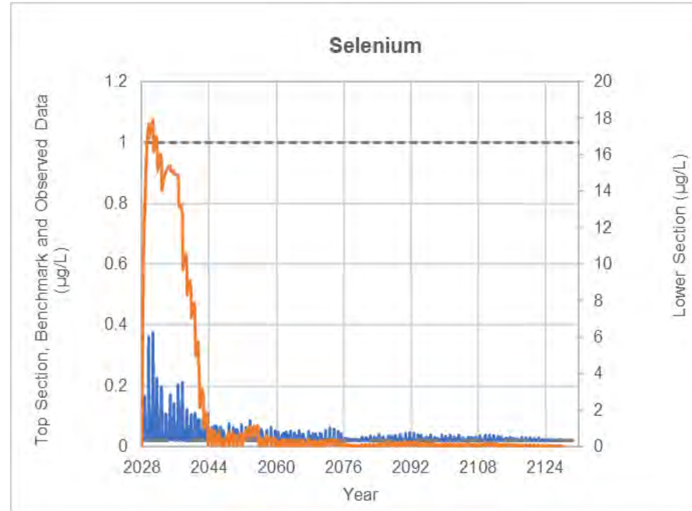
- Top Section (411-416 masl)
- Lower Section (266-290 masl)
- Benchmark
- Range of Observed Data (2017-2018)

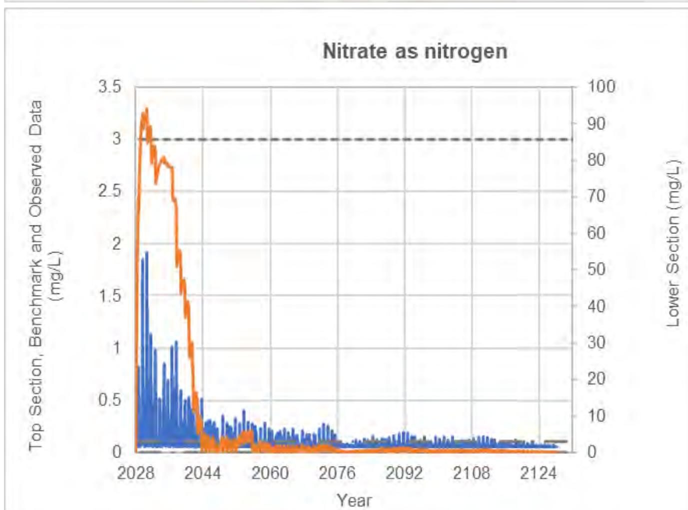
GOLDER

Model Results

WATER QUALITY – A154 (SENSITIVITY SCENARIO 2 – 20M CAP)





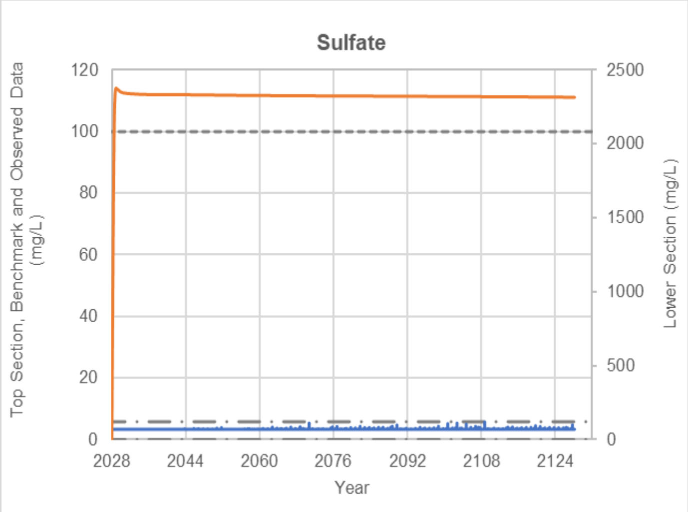


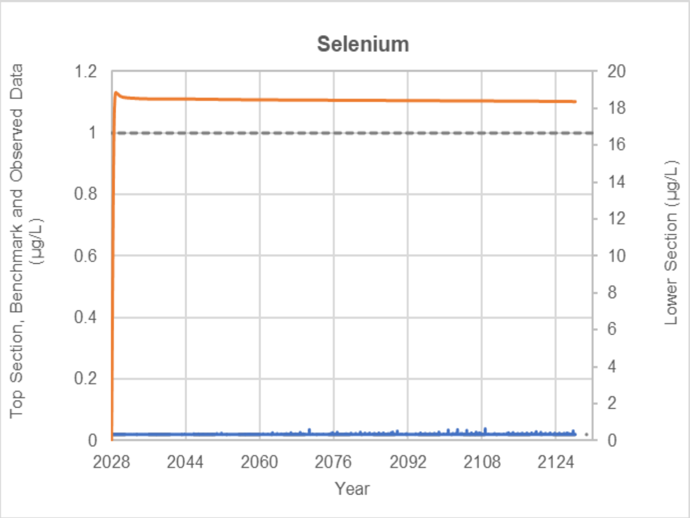
Legend:

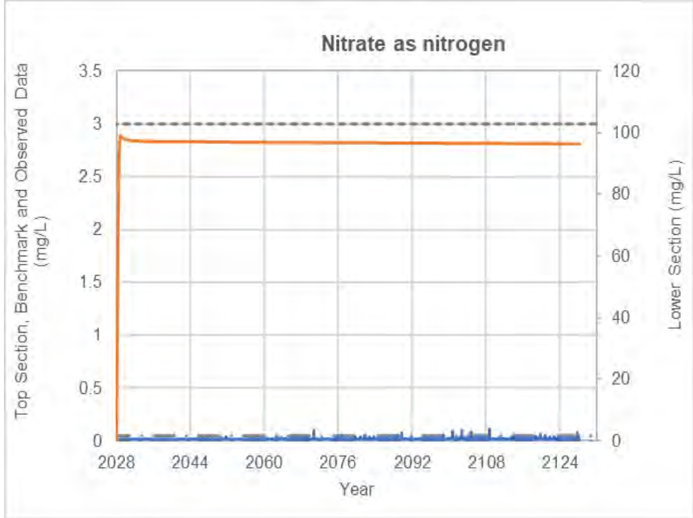
- Top Section (411-416 masl)
- Lower Section (266-290 masl)
- Benchmark
- Range of Observed Data (2017-2018)

Model Results

WATER QUALITY – A21 (DEVELOPMENT CASE – 150M CAP)







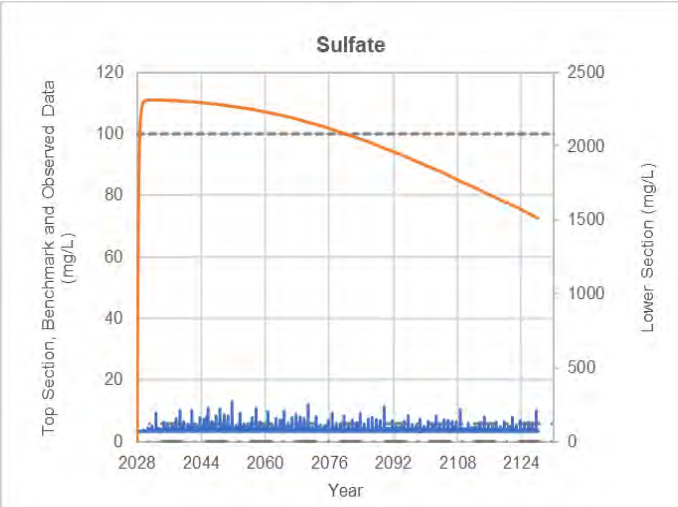
Legend:

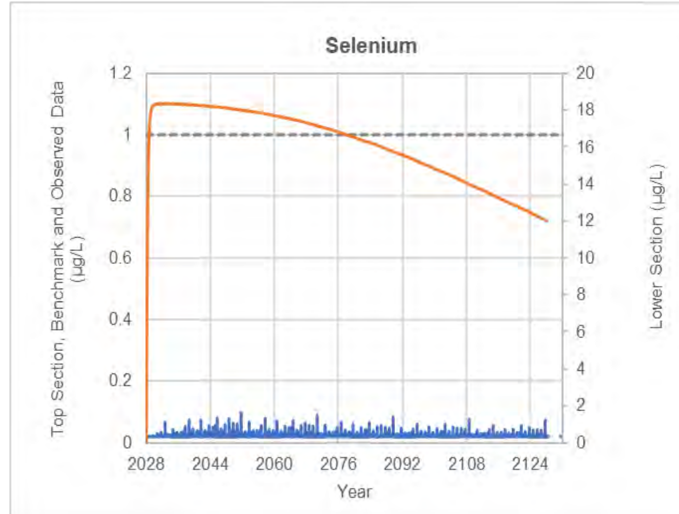
- Top Section (411-416 masl)
- Lower Section (266-290 masl)
- Benchmark
- Range of Observed Data (2017-2018)

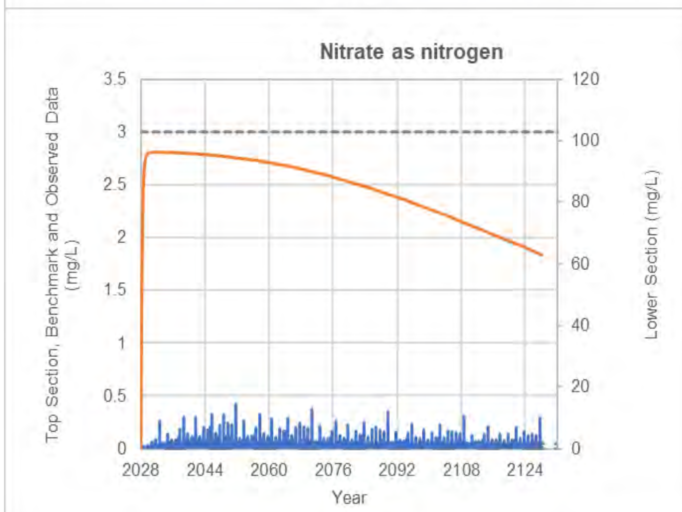
GOLDER

Model Results

WATER QUALITY – A21 (SENSITIVITY SCENARIO 1 – 50M CAP)







Legend:

Top Section (411-416 masl)

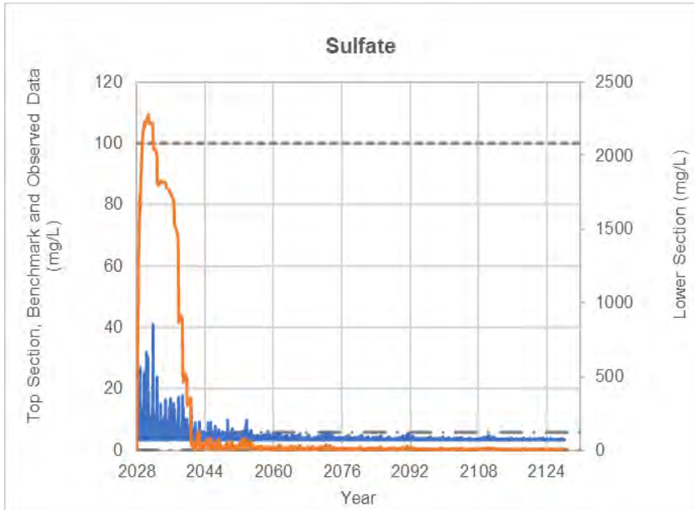
Lower Section (366-370 masl)

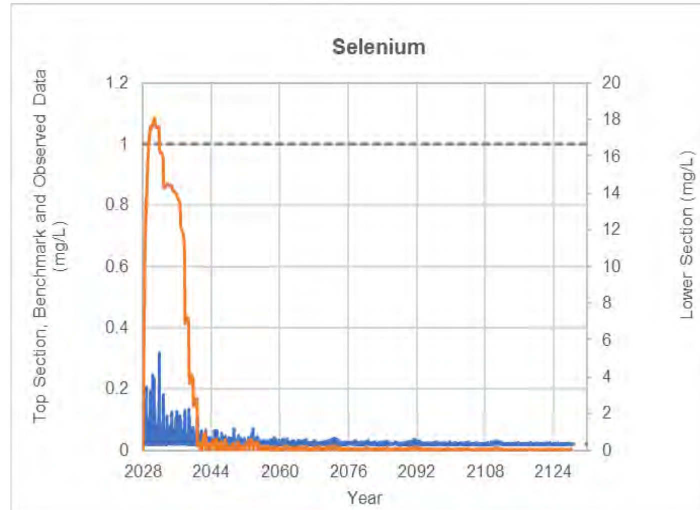
Benchmark

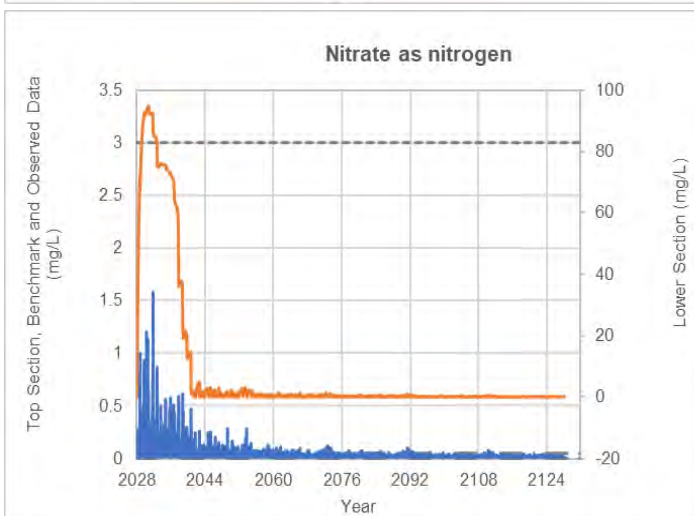
Range of Observed Data (2017-2018)

Model Results

WATER QUALITY – A21 (SENSITIVITY SCENARIO 2 – 20M CAP)







Legend:

Top Section (411-416 masl)

Lower Section (396-400 masl)

Benchmark

Range of Observed Data (2017-2018)

Unanticipated Mixing

A “WHAT IF” SCENARIO

- Assessed by estimating the timeseries of TDS and tracer concentrations, under the assumption of fully mixed conditions
- This approach was further modified in response to IRs (EMAB-6) which will be discussed later

Conclusions

- In the Base Case scenario (no PK) the lake was predicted to fully overturn at least once per year.
- Under scenarios that include PK with 150-m and 50-m freshwater cap thickness, all three of the pit lakes are predicted to stratify over the simulation period.
- Under scenarios that included PK with a 20-m freshwater cap, model results indicated that all three the pit lakes will start to turn over at around 10 to 25 years post closure.

Conclusions (cont'd)

- In all modelled scenarios with different thickness of freshwater cap, for all three pit lakes (A418, A154 and A21), concentrations of modelled constituents in the top layers are predicted to remain below surface water quality benchmarks during the simulation period, except for A418 pit under the assumption of 20 m fresh water cap.
- Results of the sensitivity scenarios indicated that, under the modelling assumptions, a water cap of approximately 50 m or more would be necessary to isolate PK pore water from the surface.
- Results show that the change in the breach size is not predicted to affect the mixing conditions in the Pit Lake.

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Diavik Water License Amendment Part C. Pit Water Quality at Closure/Post-Closure

2 - Comment Responses

January 16-17, 2019

Document Control #: CLSR-011-0608 FINAL
Template #: DCON-029-1010 R8

Additional Modelling Information – Comment Responses

1. 2010 modelling results vs 2018 modelling results
2. Consolidation and Pore water quality
3. Future Submissions
4. Summary of conservativeness/confidence

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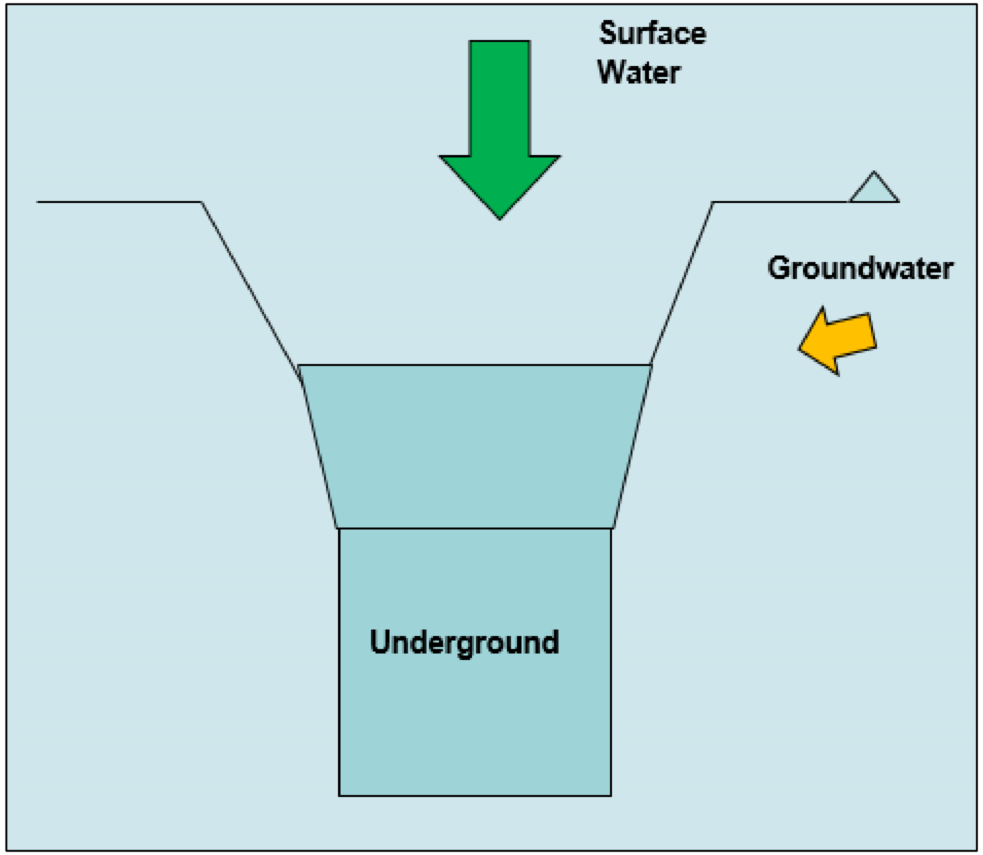
1. 2010 vs 2018 modelling

Groundwater Inputs - 2010 study



2010 Study examined groundwater inflow and effects under different filling scenarios

Base case – simultaneous filling of A154 pit over on open water season by groundwater and water pumped from Lac de Gras.

- Groundwater Inflow rates based on measured values and varied linearly will elevation from 28,500 m^3/day at bottom of pit to 0 m^3/day when fully flooded. Highest inflow only represents about 8% of water pumped from Lac de Gras.
- TDS concentrations of 375 mg/L based on observed data (Note: TDS has reduced since 2010)

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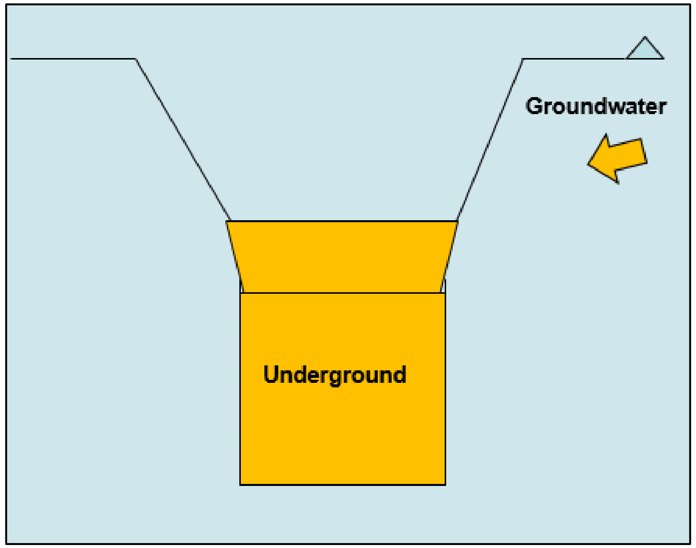
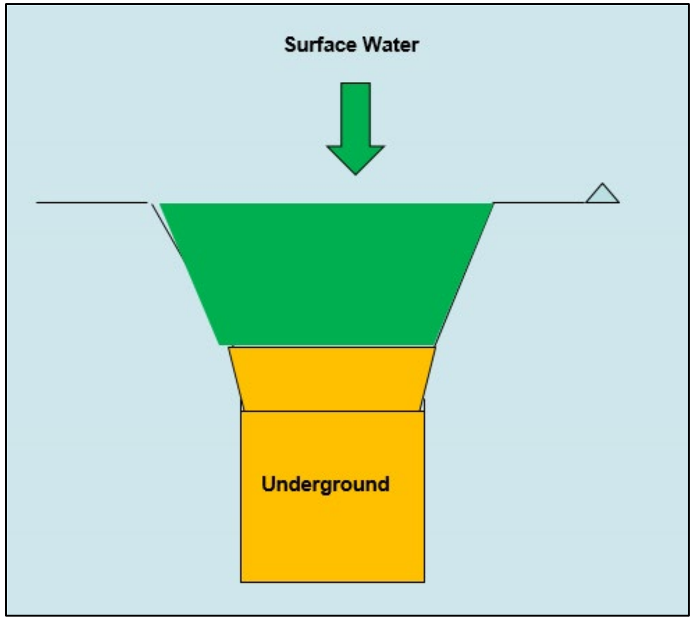
2010 study (continued)





Other sensitivities that considered natural inflow of groundwater to a specified level prior to placing pumping water from Lac de Gras.

- Groundwater inflow only to until fill up to different elevations in the open pit.
- Lake level about 416 m elevation. Scenarios:
    - 195 m elevation
    - 295 m elevation
    - 411 m elevation

2010 Conclusions

Fully mixed or stratified highly dependent on filling schedule

- Simultaneous filling of groundwater and water pumped from Lac de Gras resulted in fully mixed with concentration depending on length of time
- For base case scenario resulted in TDS in pit lake approximately 20 mg/L (assumed concentration in Lac de Gras was 18.5 mg/L)
- Filling pit with groundwater first resulted in stratified pit lake
- Simultaneous filling and a prior filling by groundwater before surface water could be viewed as two end members

Groundwater Inputs – 2018 study

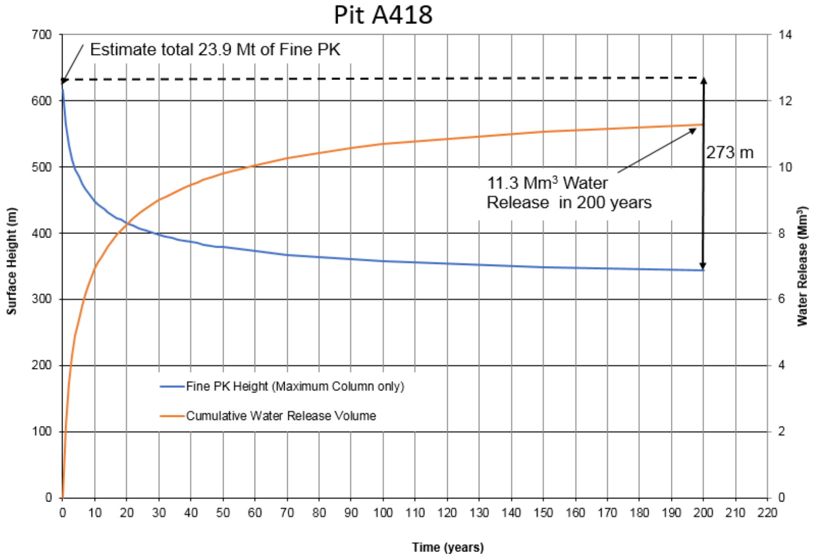
- Considered the effects of placement of PK in mine workings compared to no placement of PK
- In 2018 it was assumed that the pits would be filled instantaneously with water pumped from Lac de Gras
- Did not include groundwater inflow during filling and the reasons are:
  - Assess the effects of PK consolidation and pore water chemistry in isolation from effects of groundwater flow
  - Total groundwater inflow under a rapid fill scenario is small as shown by the 2010 work

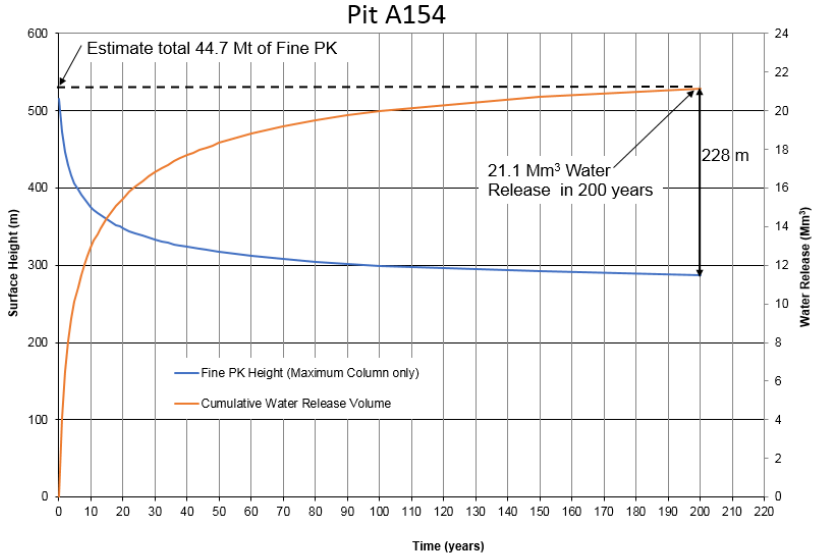
Conclusions - 2010 and 2018 together

- Without PK groundwater inflow prior to flooding is an important determinant of stratification
- With PK it is likely less important as the porewater acts as determinant of stratification
- Even with PK deposition allowing a period of groundwater inflow before flooding is a potential mitigation to enhance stratification – if required
- Filling option will be considered in future detailed modelling

2. PK Consolidation and pore water quality

- Current modelling based on assumptions:
  - maximum possible PK deposition – *for example A418 - 23.9Mt vs current concept of 4.1Mt*
  - average pore water chemistry from PKC
  - theoretical consolidation
- Specific Investigations are underway with the University of Alberta
  - consolidation properties and released pore water chemistry
  - two PK materials a) slimes; b) 50:50 A21:A154N
- Acknowledge uncertainty and importance around this model input – *see also sensitivity analysis results*





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3. Future Submissions – planned submissions and schedule

Studies & Reports Schedule	Complete	2019		2020		2021		2022		2023		2024		2025
		H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1
Pit Lake Water Quality Modelling - Preliminary[1]	■													
Pit Lake Water Quality Modelling - PK to Mine Working			■	■										
Pit Lake Water Quality Modelling - Slimes to Mine Working					■									
PK Laboratory Consolidation Testing		■												
Hydrogeological and Geotechnical Fatal Flaw Assessment - PK to Mine Working	■				■									
Hydrogeological and Geotechnical Assessment - PK to Mine Working			■											
Mine Working Bulkhead Concept Review	■		■											
Processed Kimberlite Containment in Mine Working Design Report[2]				■										
Processed Kimberlite Facility Management Plan - Update for PK to Mine Working[2]						■								
Water Management Plan & Water Balance - Update for PK to Mine Working[2]						■								
Contingency Plan - Update for PK to Mine Working[2]						■								
Waste Management Plan - Update for PK to Mine Working[2]						■								
Slimes Removal from PKC - Feasibility Assessment				■										
PKC Closure Options Assessment - Dry Cover vs Wet Cover					■									
Closure and Reclamation Plan[2]								■						
Operations PK to Mine Working								■	■	■	■	■	■	■

Note:

1. Assessment complete and findings summarized in Amendment Application. No formal report prepared for distribution.
2. Studies & Reports proposed as submission requiring WLWB approval.

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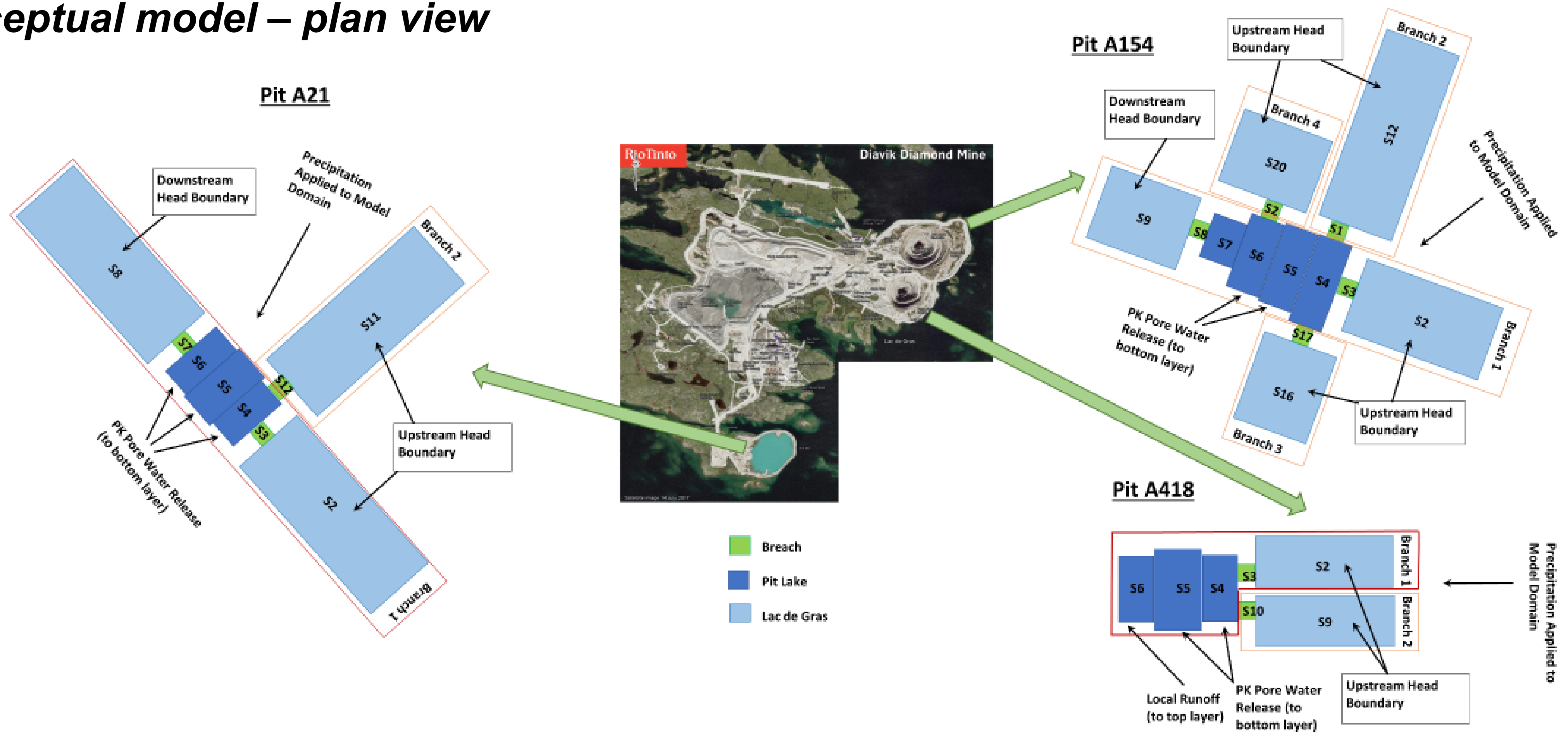
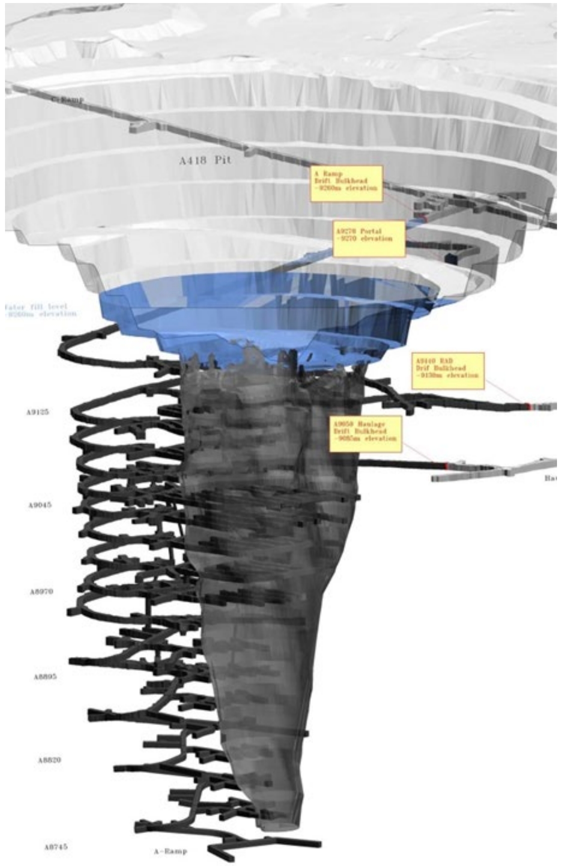
4. Summary of conservativeness/confidence

Conceptual model – plan view

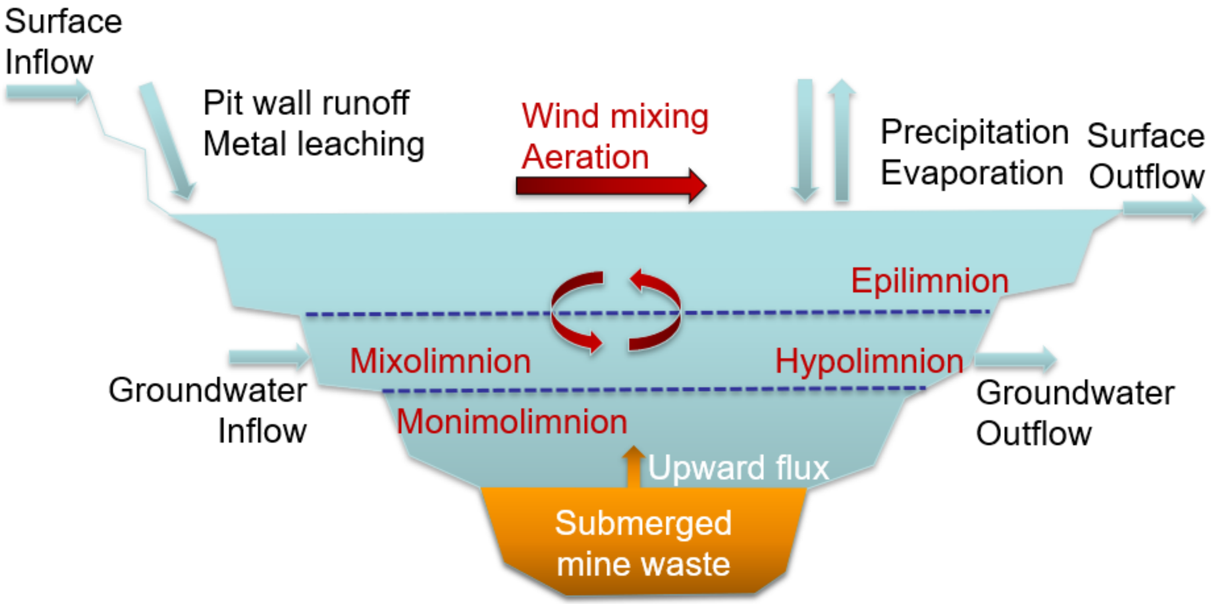


Summary of conservativeness/confidence

Conceptual model – side view



Conceptual model – process-based



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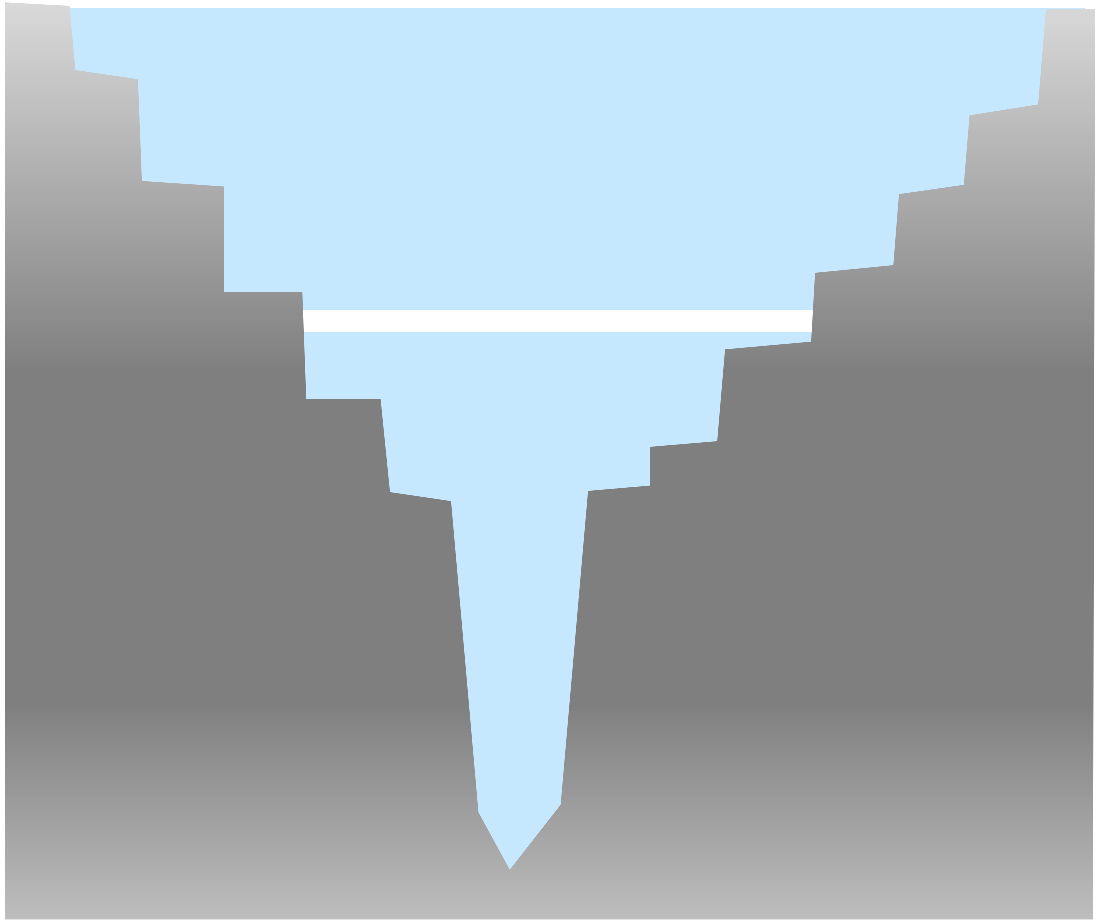
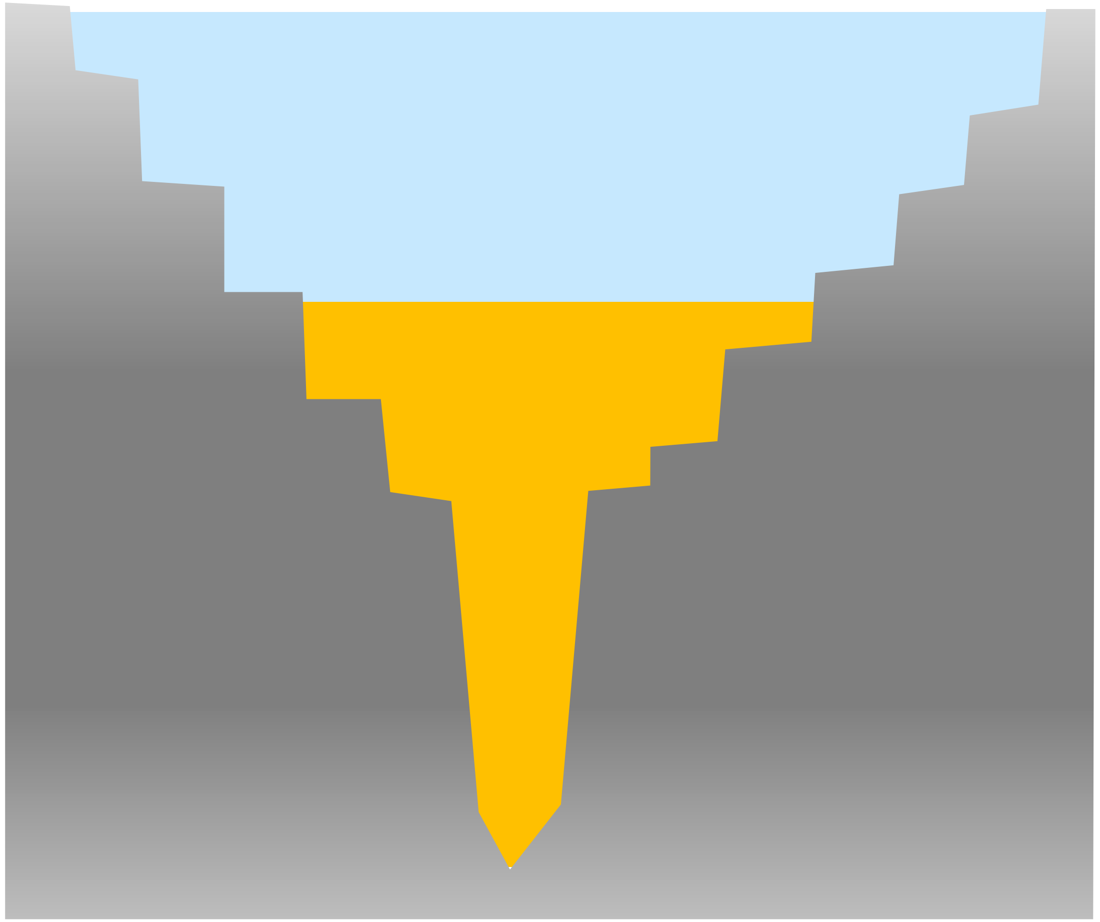
Pore Water Expression

…conservativeness/confidence

Conceptual model – consolidation & pore water release over time



As conceptualized



As modelled

Summary of Conservative Assumptions

- Static bathymetry
- Upward displacement of pore water
- Longer open water seasons
- High consolidation rates
- PK pore water at detection limits
- No biological uptake

Summary of conservativeness/confidence

- The factors that drive hydrodynamic processes in pit lakes is well understood
- The processes being modeled are based on fundamental processes (momentum, mass balance) that are well represented in models
- Mitigation options, such as depth of water cover, adjusting the filling rate or breach width, are available if required
- Two limitations of the present model make the mixing likely to be overestimated:
  - Addition of pore water to static bottom layer
  - Static bathymetry that does not form a deep pocket

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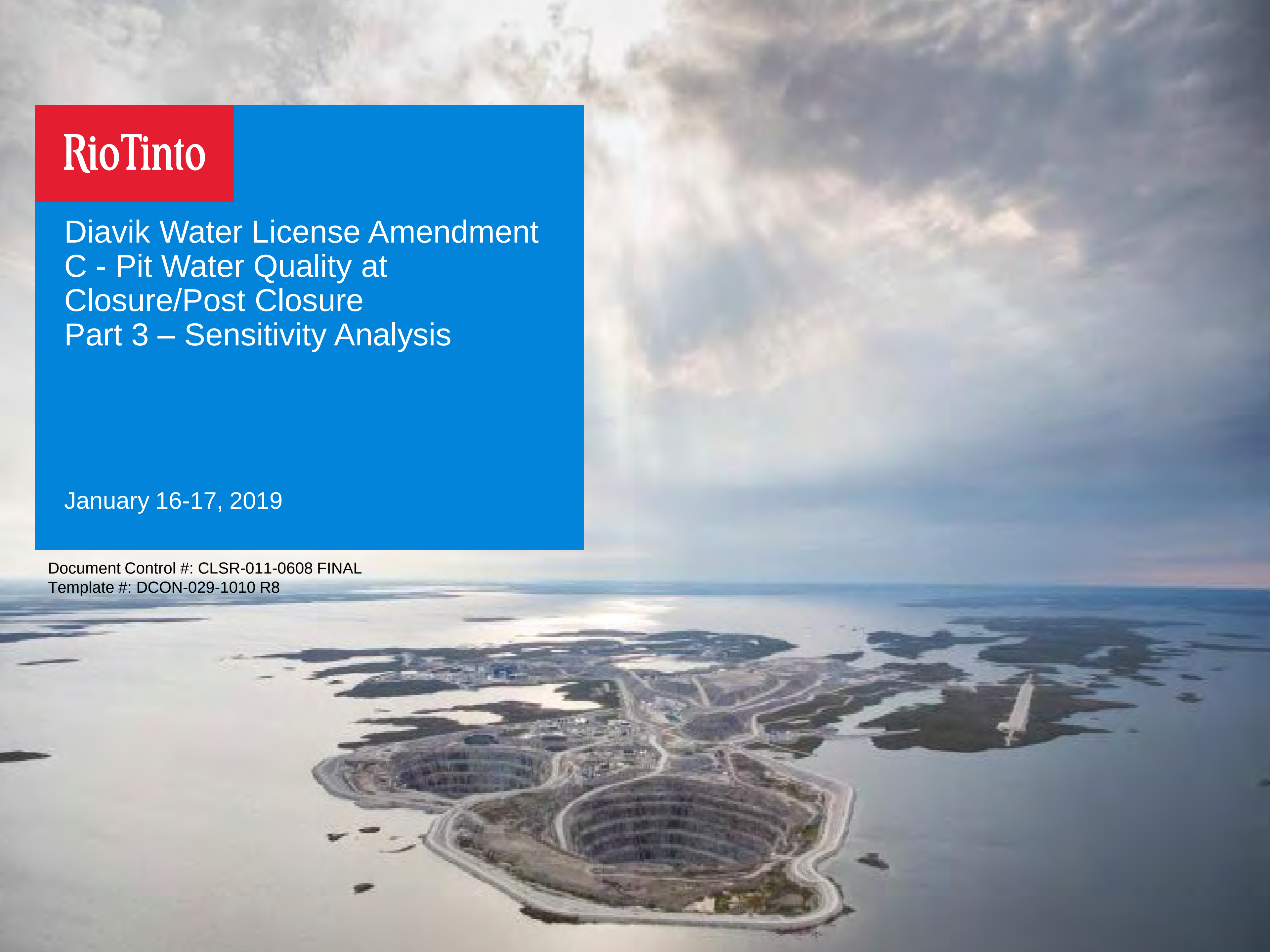

Diavik Water License Amendment C - Pit Water Quality at Closure/Post Closure Part 3 – Sensitivity Analysis

January 16-17, 2019

Document Control #: CLSR-011-0608 FINAL
Template #: DCON-029-1010 R8

Sensitivity Analysis – DDMI Learnings

- The amount of wind required to de-stratify pit lake is beyond any plausible condition (S-4d).
- Pit lake remains stratified at pore water quality as low as 350 mg/L TDS (S-7d).
- Pit lake remains stratified at 25% of consolidation inflow rate (S-6a)
- Surface water quality is not affected by pore water quality as high as 6000 mg/L TDS due to strong meromixis (S-7a).
- Over the range of conditions tested water quality predictions are generally not sensitive to:
  - Local runoff (S-2).
  - Initial conditions – concurrent groundwater inflow during filling (S-9), 5m decant water (S-8a), and rock wall leaching (S-9b).
  - Climate change scenario – temperature (S-5).
  - Sediment temperature (S-1).
  - Sheltering Coefficient (S-3).
  - Maximum vertical eddy viscosity (S-10)
- Overall the sensitivity analysis increases level of confidence in the results.

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PIT LAKE WATER QUALITY MODELLING

SENSITIVITY ANALYSIS

16 January 2019

Objectives

- Assess sensitivity of the hydrodynamic model results to changes in model input values
- Characterize how uncertainty in the model inputs could affect model results

Sensitivity Analysis Scenarios

1. PK/sediment temperature
2. Local runoff from mine area
3. Wind sheltering coefficient
4. Wind speed
5. Air temperature
6. Consolidation rate – PK pore water release rate
7. PK pore water chemistry
8. Pit lake Initial condition
9. Groundwater inflows
10. Vertical eddy viscosity

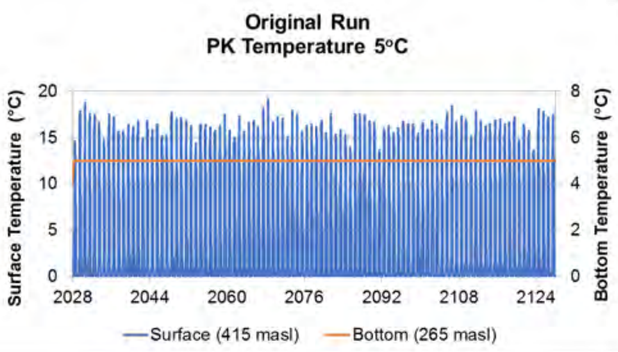
Further details in response to EMAB-14

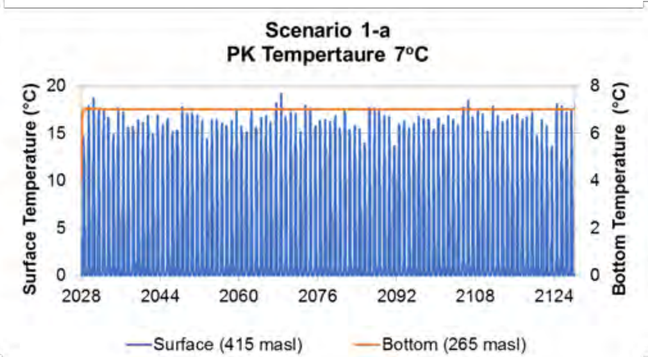
Methods

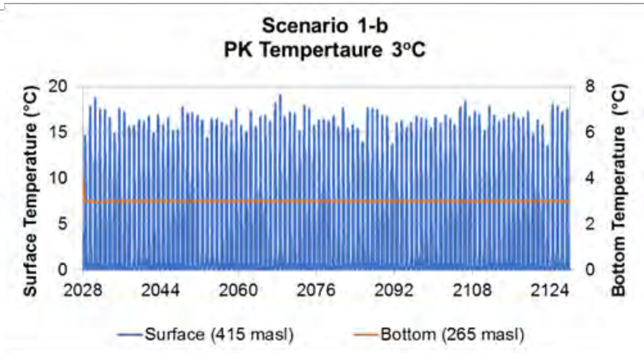
- The sensitivity scenarios were performed for the A418 - Development Case
  - One lake was tested to keep the number of model runs manageable
- A sensitivity analysis was completed by changing one model input per simulation
  - Coefficient or time series of input data
  - No other model input was changed

Scenario 1 - PK/Sediment Temperature

WATER TEMPERATURE







Layer	Simulation Year	Original Run	Scenario 1-a	Scenario 1-b
Top	20	3.6	3.6	3.6
	100	4.0	4.0	4.0
Bottom	20	5.0	7.0	3.0
	100	5.0	7.0	3.0

- Bottom parcel of water will essentially replicate what the temp of sediment is over time
- PK temperature is not expected to change surface water temperature

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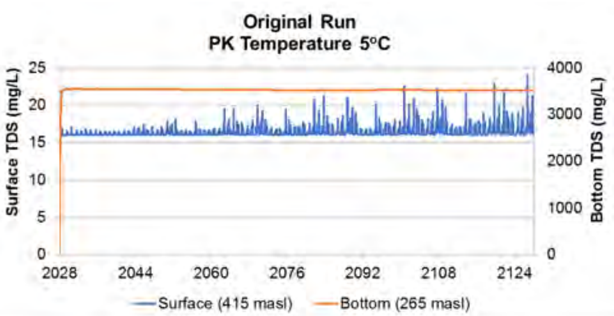
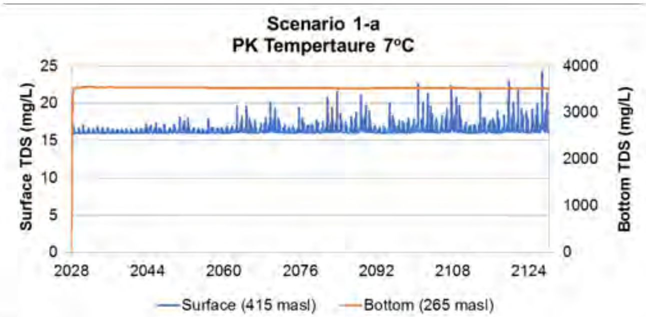
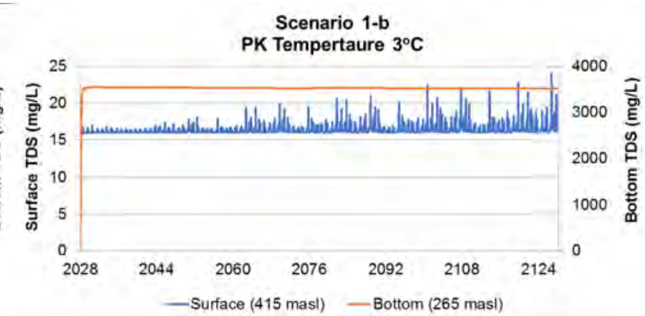
Scenario 1 - PK/Sediment Temperature

TDS CONCENTRATIONS





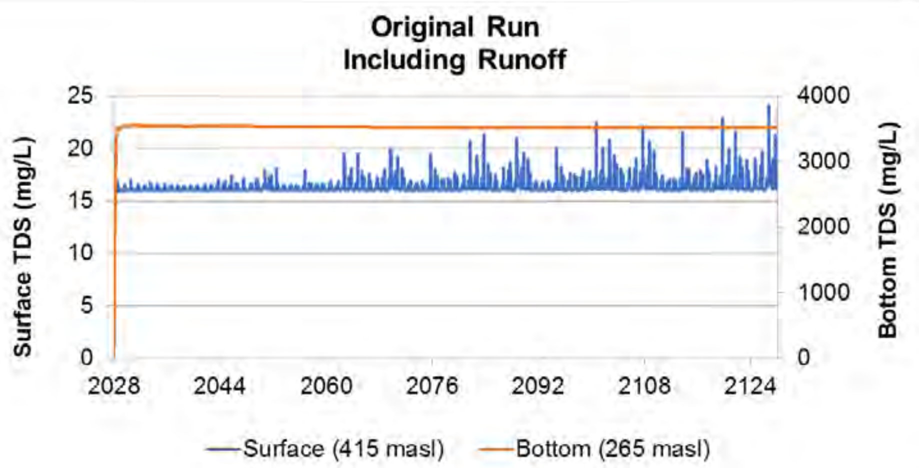


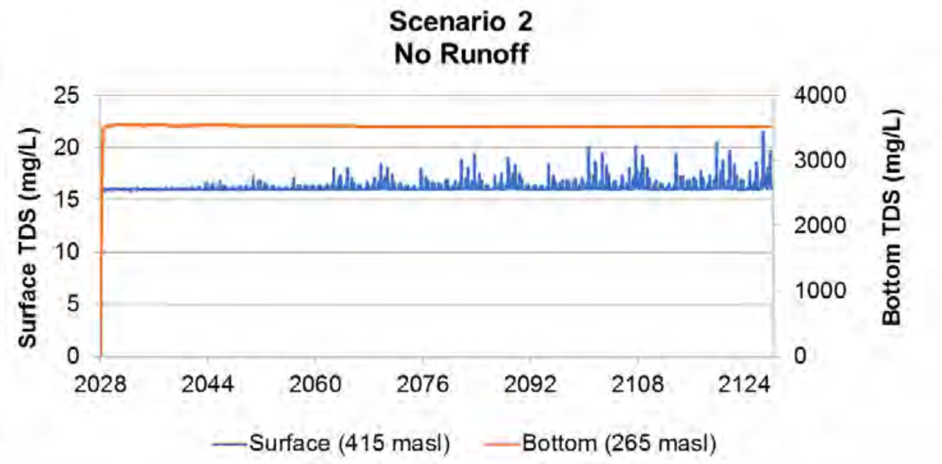
Layer	Simulation Year	Original Run	Scenario 1-a	Scenario 1-b
Top	20	16	16	16
	100	17	17	17
Bottom	20	3540	3541	3541
	100	3521	3521	3522

- PK temperature is not expected to change quality of surface waters

Scenario 2 - Local Runoff From Mine Area

TDS CONCENTRATIONS

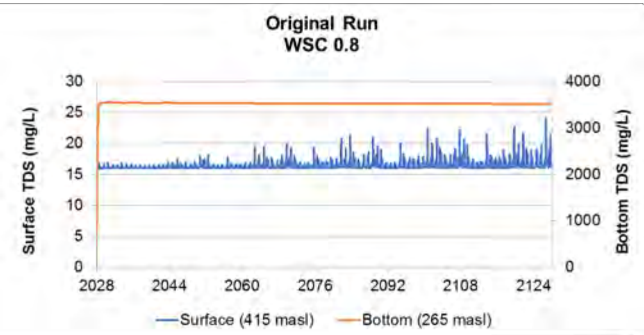


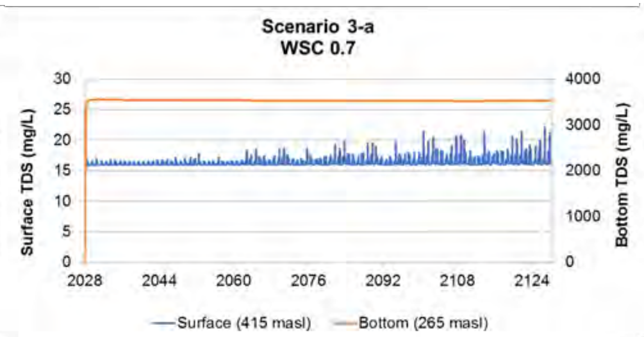


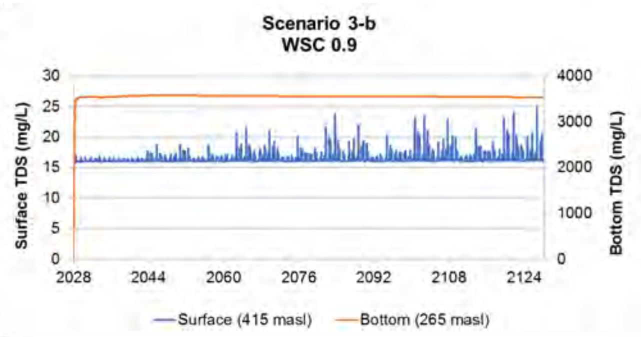
Layer	Simulation Year	Original Run	Scenario 2
Top	20	16	16
	100	17	17
Bottom	20	3540	3542
	100	3521	3521

Scenario 3 - Wind Sheltering Coefficient

TDS CONCENTRATIONS







Layer	Simulation Year	Original Run	Scenario 3-a	Scenario 3-b
Top	20	16	16	16
	100	17	17	17
Bottom	20	3540	3544	3574
	100	3521	3522	3534

- WSC is not expected to change pit lake water quality predictions

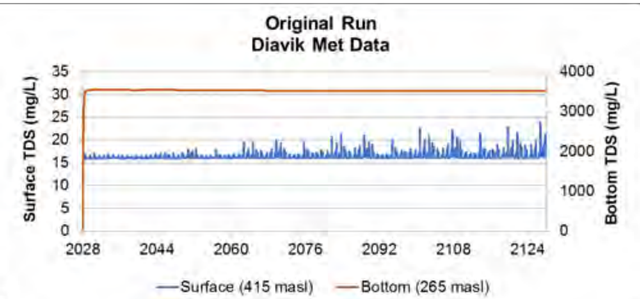
Scenario 4 - Wind Speed

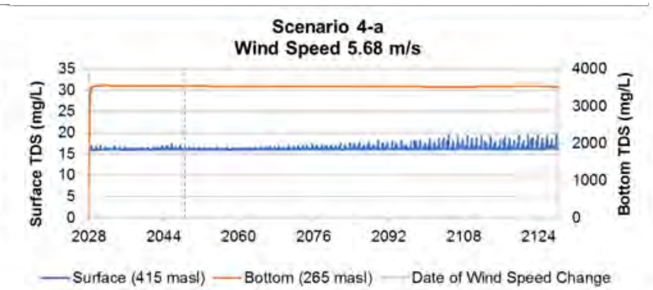
- Assess sensitivity of the lake to turn over under extreme wind conditions
- Original wind speed time series from Diavik on-site met data (1999-2017)
- Maximum observed windspeed = 22.7 m/s
- Constant wind speed applied for 80 years (from Year 20 to Year 100)

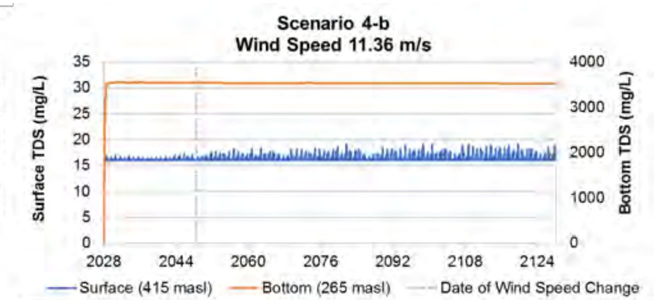
Scenario	Percent of Maximum Observed Value	Wind speed (m/s)
4a	25%	5.7
4b	50%	11.4
4c	75%	17.0
4d	100%	22.7

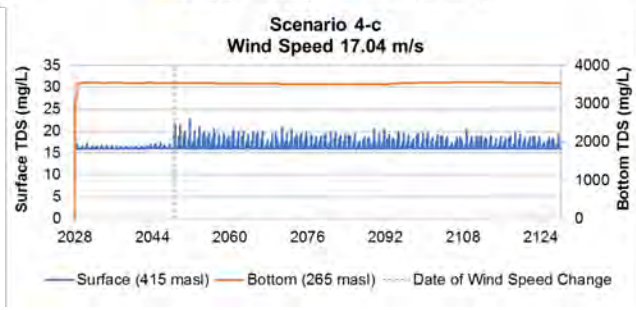
Scenario 4 - Wind Speed

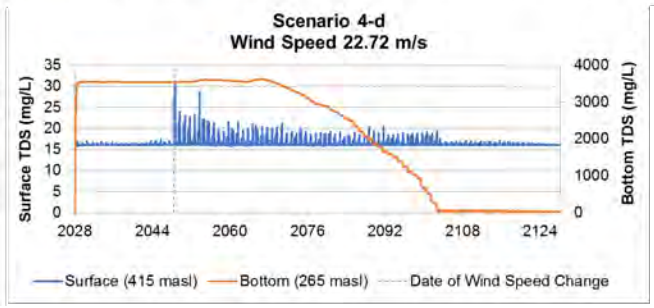
TDS CONCENTRATIONS











Layer	Simulation Year	Original Run	Scenario 4-a	Scenario 4-b	Scenario 4-c	Scenario 4-d
Top	20	16	16	16	16	16
	100	17	17	16	16	16
Bottom	20	3540	3540	3540	3540	3540
	100	3521	3521	3511	3534	23

- The amount of wind mixing required to turn over the lakes is beyond any plausible condition

Scenario 5 - Air Temperature

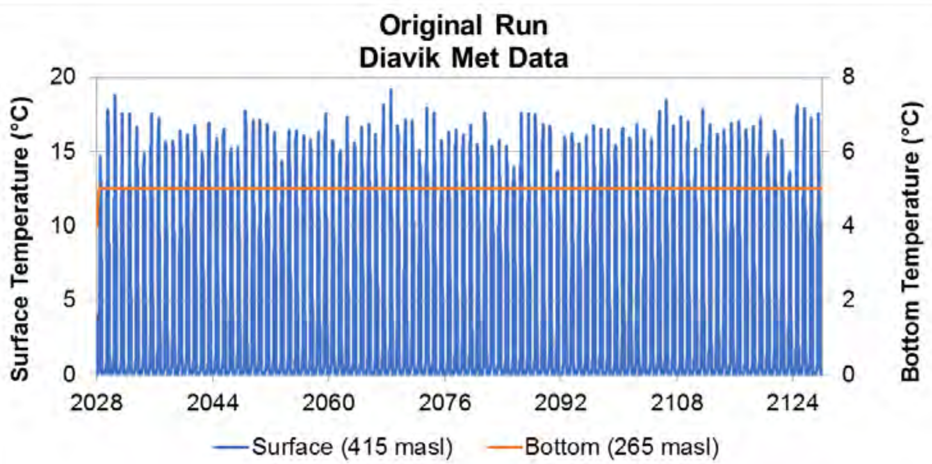
- Assess sensitivity of the model predictions to the potential future changes in the climate
- Original air temperature: Diavik on-site met data
- Annual temperature increase rate was applied to the original time series (Tetra Tech 2017)

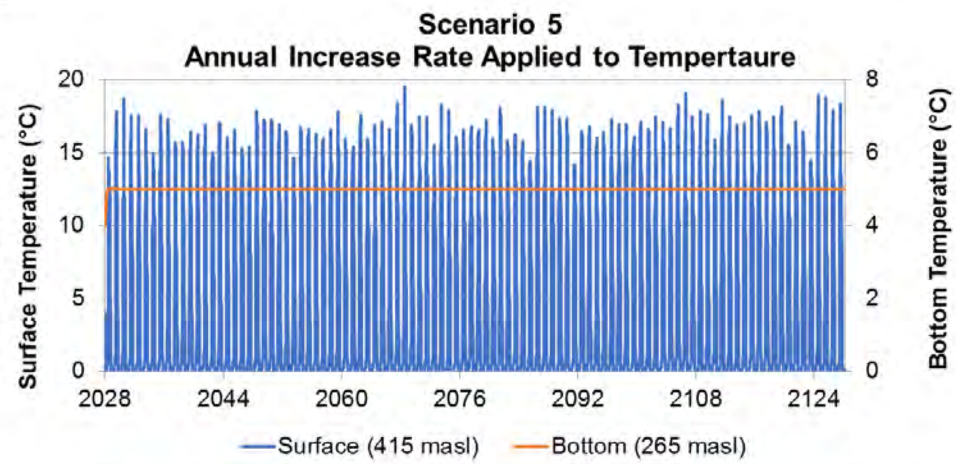
Month	Annual Warming Rate (°C/yr)
January	0.086
February	0.086
March	0.052
April	0.052
May	0.052
June	0.023
July	0.023
August	0.023
September	0.054
October	0.054
November	0.054
December	0.086

Tetra Tech 2017. Thermal Evaluation of Type III Rock Closure Cover at North Country Rock Pile, Daivik Diamond Mine, NT, Canada. Submitted to Diavik Diamond Mines Inc. on September 27, 2017.

Scenario 5 - Air Temperature

WATER TEMPERATURE





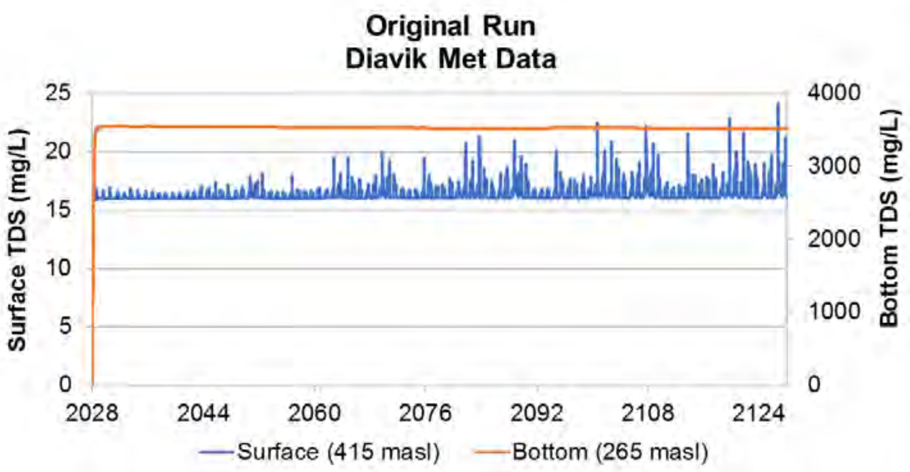
Layer	Simulation Year	Original Run	Scenario 5
Top	20	3.6	3.7
	100	4.0	4.4
Bottom	20	5.0	5.0
	100	5.0	5.0

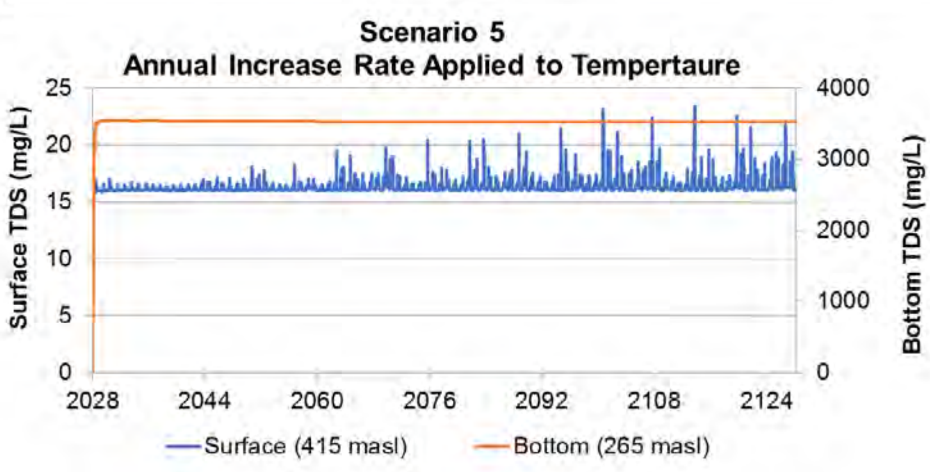
- Increase in the air temperature under the predicted future climate is not expected to change pit lake water temperature predictions

GOLDER

Scenario 5 - Air Temperature

TDS CONCENTRATIONS



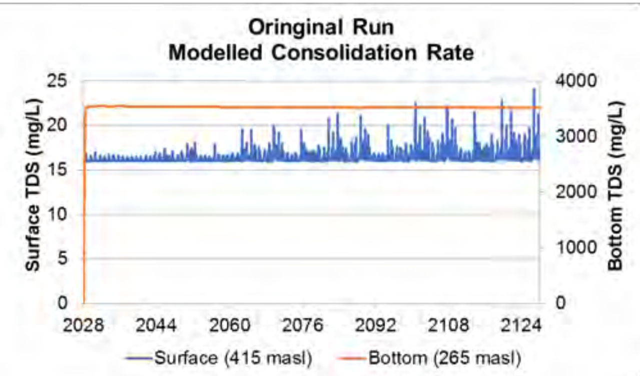


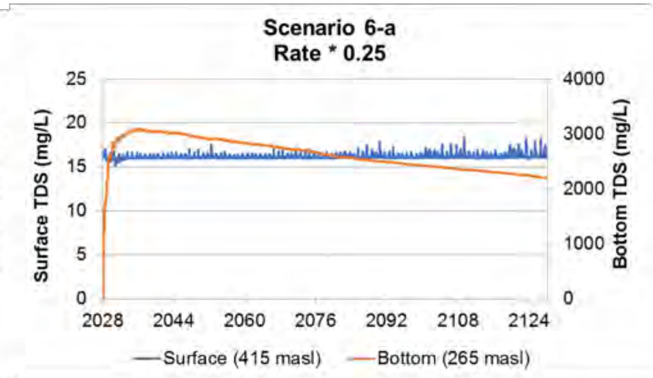
Layer	Simulation Year	Original Run	Scenario 5
Top	20	16	16
	100	17	17
Bottom	20	3540	3540
	100	3521	3522

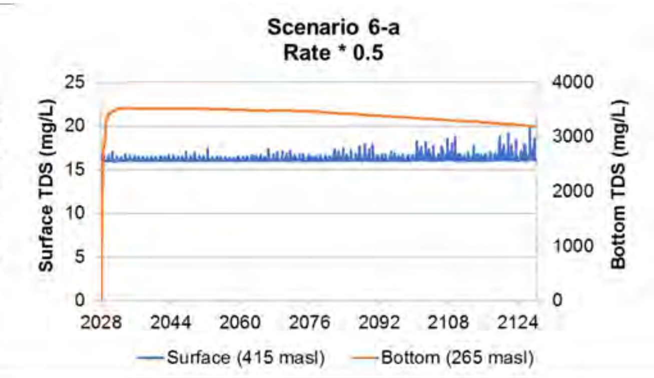
- Increase in the air temperature under the predicted future climate is not expected to change pit lake water quality predictions

Scenario 6 - Consolidation Rate

TDS CONCENTRATION





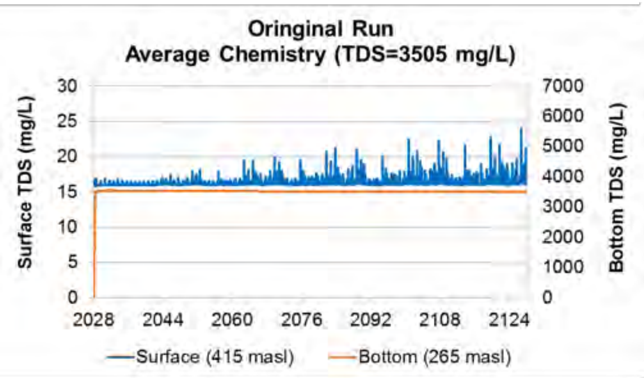


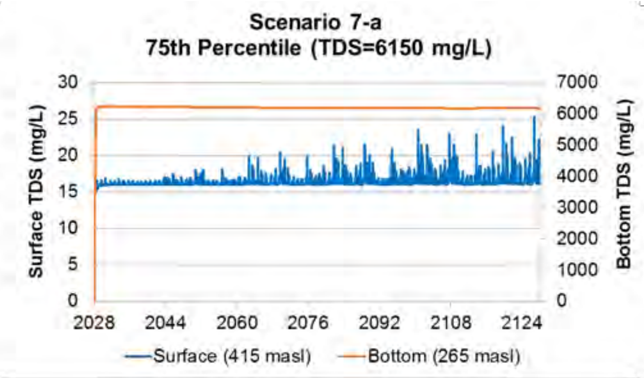
Layer	Simulation Year	Original Run	Scenario 6-a	Scenario 6-b
Top	20	16	16	16
	100	17	16	16
Bottom	20	3540	2974	3516
	100	3521	2203	3191

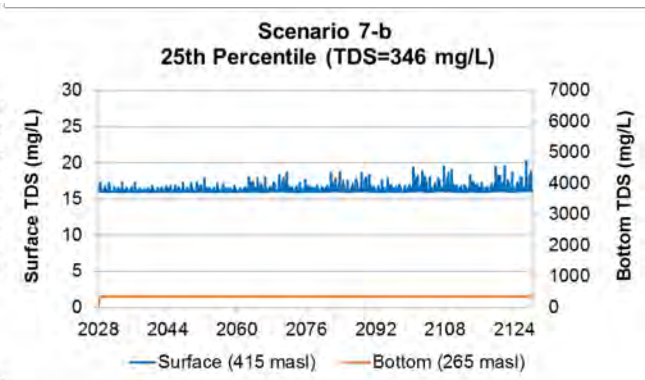
- Pit lake is predicted to remain stratified at 25% of modelled consolidation rate

Scenario 7 - PK Pore Water Chemistry

TDS CONCENTRATION







Layer	Simulation Year	Original Run	Scenario 7-a	Scenario 7-b
Top	20	16	16	16
	100	17	17	16
Bottom	20	3540	6224	352
	100	3521	6182	361

- No measurable effect to lake water expected from higher PK pore water concentrations because of strong meromixis
- Pit lake remains stratified at pore water TDS as low as 350 mg/L

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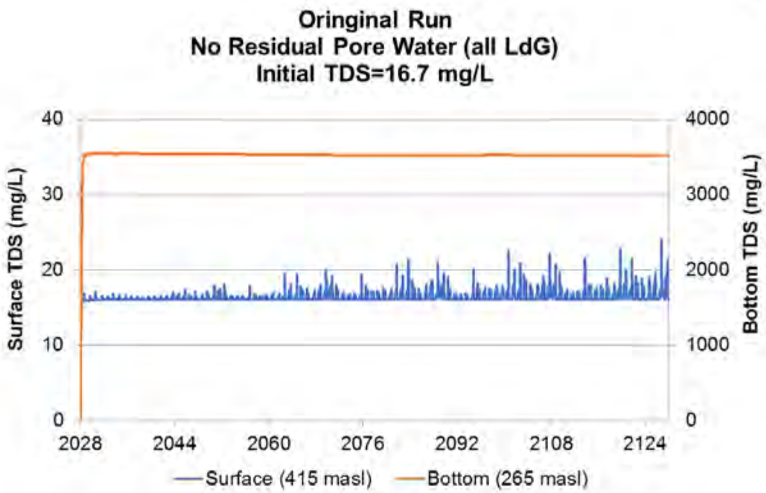
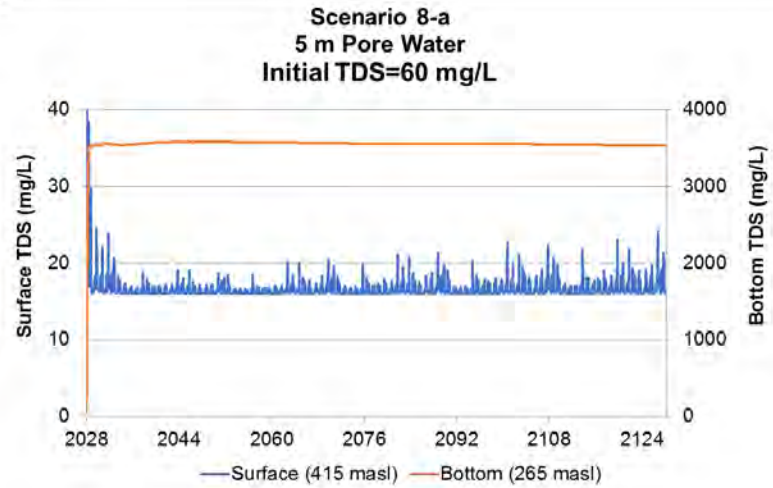
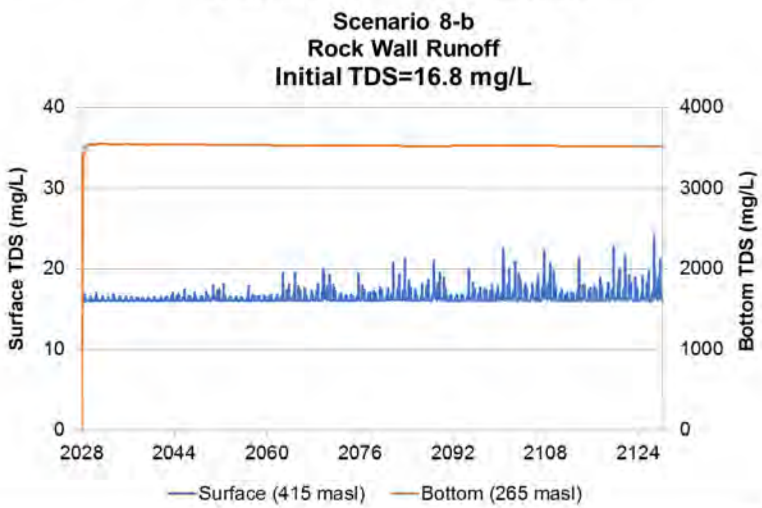
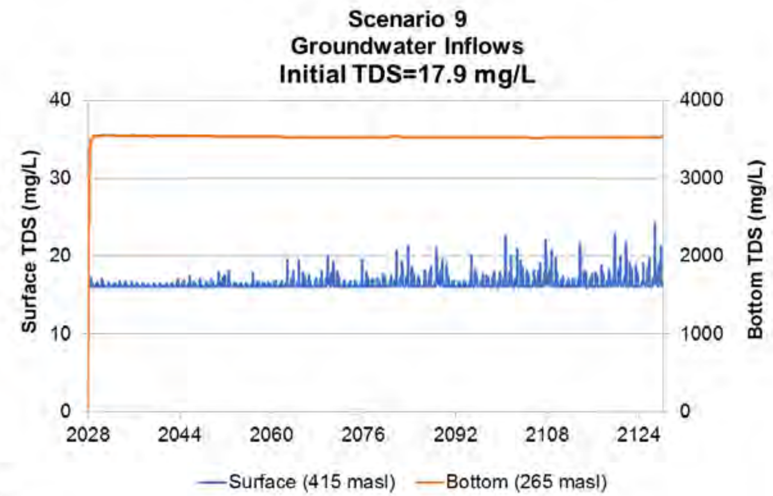
Scenarios 8 & 9 - Pit Lake Initial Condition

TDS CONCENTRATION









Scenarios 8 & 9 - Pit Lake Initial Condition

TDS CONCENTRATION

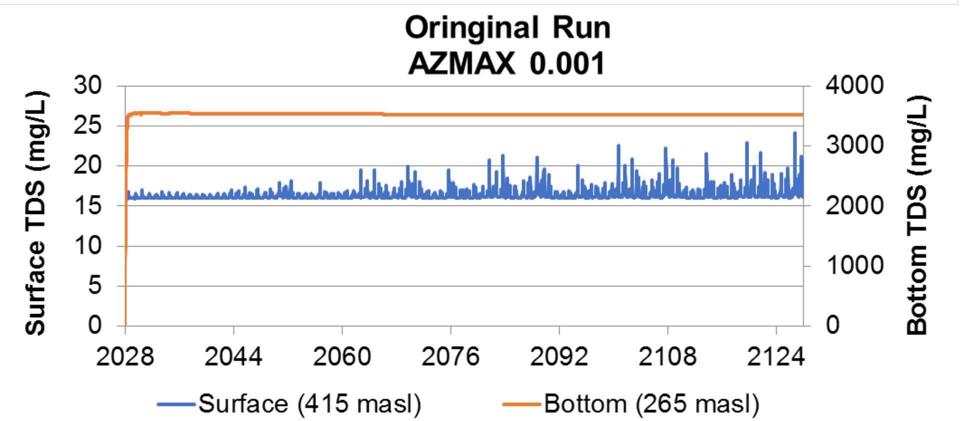
Layer	Simulation Year	Original Run	Scenario 8-a	Scenario 8-b	Scenario 9
Top	20	16	16	16	16
	100	17	17	17	17
Bottom	20	3540	3577	3540	3540
	100	3521	3536	3521	3522

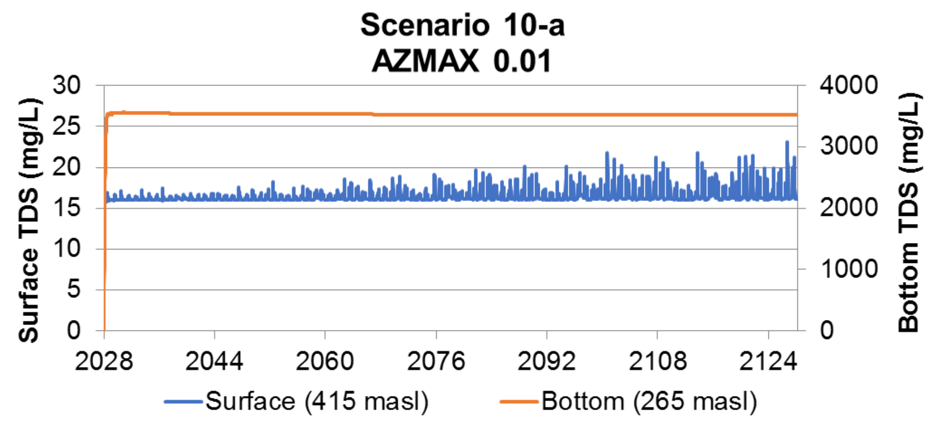
- Water quality predictions are not sensitive to the tested initial conditions

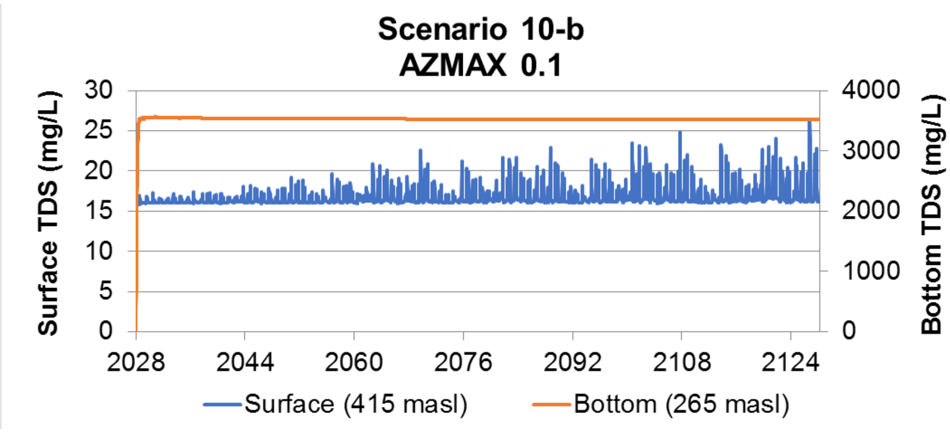
GOLDER

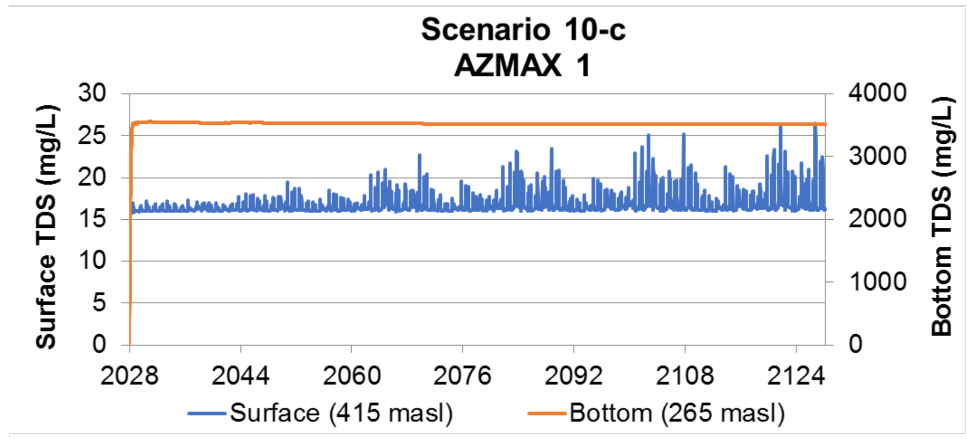
Scenario 10 – Maximum Vertical Eddy Viscosity

TDS CONCENTRATION









Scenario 10 – Maximum Vertical Eddy Viscosity

TDS CONCENTRATION

Layer	Simulation Year	Original Run	Scenario 10-a	Scenario 10-b	Scenario 10-c
Top	20	16	16	16	16
	100	17	17	17	17
Bottom	20	3540	3543	3541	3540
	100	3521	3522	3518	3520

- Water quality predictions are not sensitive to the tested range of AZMAX values

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Diavik Water License Amendment Part 4. Impacts to Fish and Fish Habitat

January 16-17, 2019

Document Control #: CLSR-011-0608 FINAL
Template #: DCON-029-1010 R8

Additional Information – Comment Responses

1. Fish use of pit lake habitat
2. Unlikely de-stratification event – water chemistry and fish
3. Unlikely de-stratification event – DO and fish

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Fish use of Pit Lake Habitat

- Four key fish habitat zones identified in the pit lakes: the inside edge of the dike (0-2m), reclaimed shoreline, the pit shelf (3-5m), and the pelagic zone
  - 0-2m = spawning habitat for Slimy Sculpin, foraging and rearing habitat for other species (new shoreline)
  - 3-5m = shallow foraging and rearing habitat for most species of fish present in Lac de Gras
  - Surface water is expected to remain above AEMP chronic effects benchmarks

Photo courtesy of Paul Vecsei

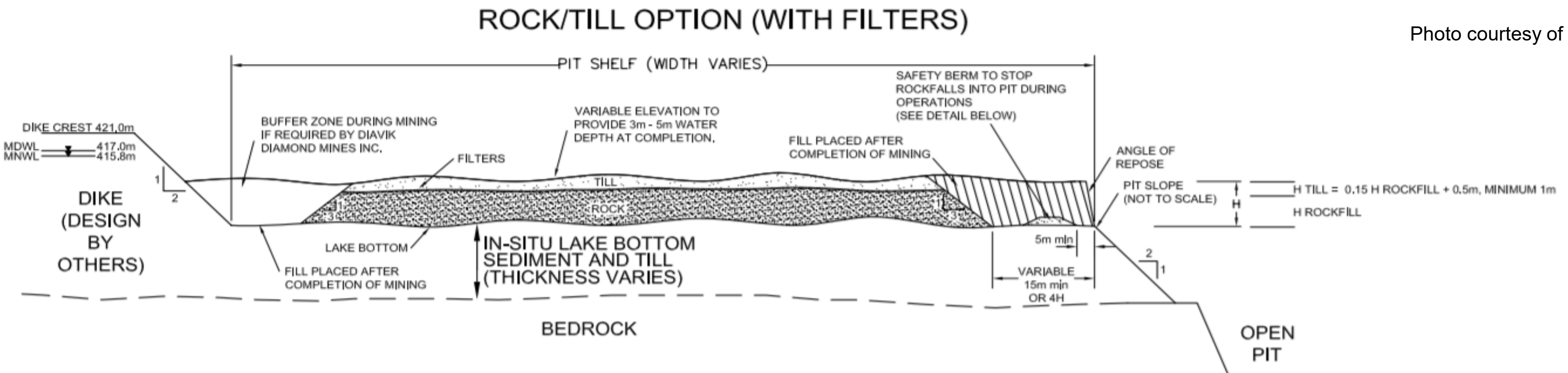
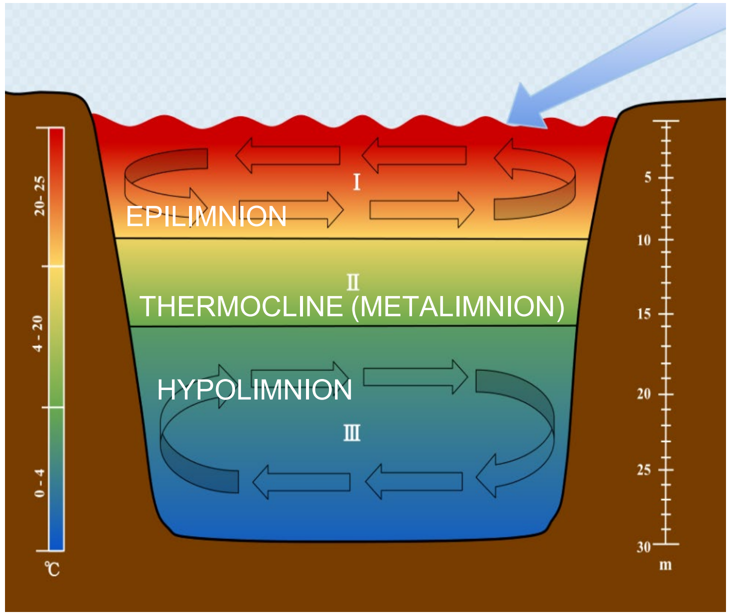


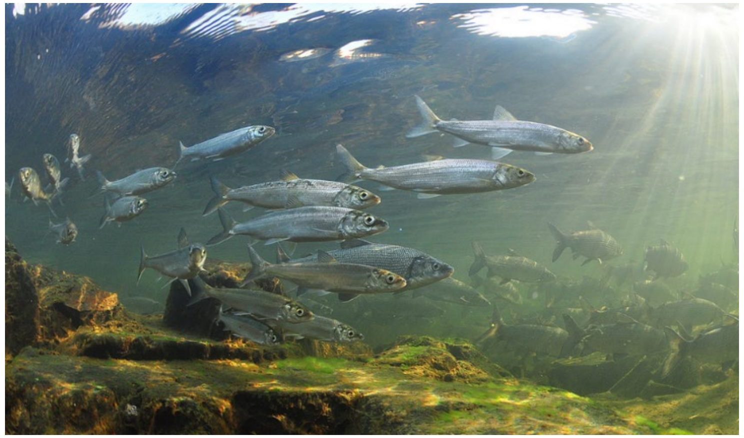
Image from "Fish Habitat Design for the Pit Shelf Areas at the Diavik Diamond Mine (March 2003) or Fish Habitat Design for the A418 Pit Shelf Area at the Diavik Diamond Mine (December 2008)

Fish use of Pit Lake Habitat

- Large bodied fish (i.e., Lake Trout, Lake Whitefish, Cisco) expected to use pelagic zone as thermal refuge
  - Thermocline located approximately 5 to 15m below the surface
  - Large bodied fish are not expected to reside at depths greater than 40m
  - Fish not expected to use deeper pelagic habitat; no expected adverse effects to fish



https://en.wikipedia.org/wiki/Thermocline#/media/File:Lake_Stratification_(11).svg



All fish photos courtesy of Paul Vecsei

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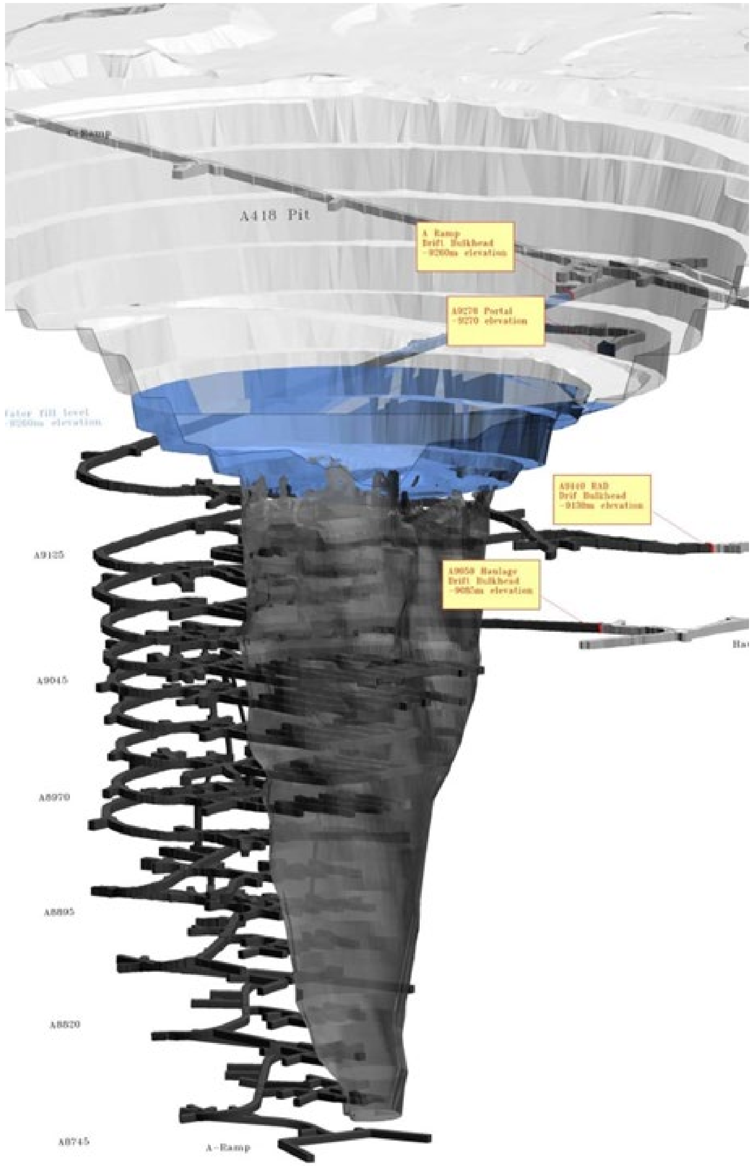
Unlikely Destratification Event – Surface Water Chemistry

- Assumed a significant pit wall failure with enough energy to fully mix 150m deep water column
- Modelled for A418 pit lake under development scenario (150m water cap), 100-year simulation period
  - Assumed pit fully mixes at Year 100 in mid-October (just before freeze-up)



Unlikely Destratification Event – Surface Water Chemistry

Table 1: Predicted Maximum Daily Concentrations in the Surface Water (Top Section) of A418 Pit Lake for the Development Case Scenario over 100-year Period after Closure

Parameters	Unit	AEMP benchmark	Acute Water Quality Guideline	Maximum Concentration in the Surface Water of A418 Pit (Development Scenario)
Calcium	mg/L	-	-	75
Chloride	mg/L	120	-	55
Fluoride	mg/L	0.12	-	0.071
Magnesium	mg/L	-	-	146
Potassium	mg/L	-	-	59
Sodium	mg/L	52	-	**57**
Sulfate	mg/L	100	-	**817**
Nitrite as nitrogen	mg/L	0.06	0.60[a]	**0.15**
Nitrate as nitrogen	mg/L	3	33	**34**
Phosphate, Ortho	mg/L	-	-	0.022
Phosphorus	mg/L	-	-	0.025
Aluminum	μg/L	87	-	58
Antimony	μg/L	33	-	1.9
Arsenic	μg/L	5	-	1.2
Barium	μg/L	1000	-	160
Beryllium	μg/L	-	-	0.1
Boron	μg/L	1500	-	22
Cadmium	μg/L	0.1	2.80[b,c]	**0.33**
Cobalt	μg/L	-	-	2.0
Copper	μg/L	2	40	**3.4**
Iron	μg/L	300	-	85
Lead	μg/L	1	-	0.31
Lithium	μg/L	-	-	2.7
Manganese	μg/L	-	-	31
Molybdenum	μg/L	73	2,000	**178**
Nickel	μg/L	25	6,545[b]	**67**
Selenium	μg/L	1	44[d]	**6.5**
Silicon	μg/L	2100	-	1037
Silver	μg/L	0.1	3.0	**0.15**
Strontium	μg/L	30000	-	2381
Sulfur	μg/L	-	-	276604
Thallium	μg/L	0.8	-	0.23
Tin	μg/L	73	-	2.6
Titanium	μg/L	-	-	0.96
Uranium	μg/L	15	-	0.47
Vanadium	μg/L	-	-	0.72
Zinc	μg/L	30	126[c,e]	**123**

- Surface water quality unlikely to pose a risk to early life stages of fish even under the full mixing event scenario (i.e., 150m water cap, 100-year period prior to a mid-October mixing event)

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Unlikely Destratification Event – Deeper Water Chemistry

- Under same model scenario (150m water cap, 100-year scenario with mid-October mixing event), AEMP benchmark exceedances expected at:
  - Year 0: 145 m depth
  - Year 100: 39 m depth

- Direct toxicity testing has been done with PK pore water (dissolved metal fraction)
  - No toxicity response in fish (variable toxicity response in benthic invertebrates in close proximity to PK sediment)

Table 1. AEMP Benchmark Exceedances by Year in Pit Lake A418 - Development Case

Parameter	Depth (m)	
	Year 0	Year 100
Chloride	145	95
Fluoride	145	95
Sodium	145	63
Sulfate	145	40
Nitrite as nitrogen	145	51
Nitrate as nitrogen	145	39
Aluminum	145	77
Cadmium	145	47
Copper	145	53
Molybdenum	145	51
Nickel	145	49
Selenium	145	42
Silicon	145	95
Silver	145	58
Zinc	145	45

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Unlikely Destratification Event – Dissolved Oxygen

- Shallow water: no DO depletions anticipated in the surface water
- Intermediate/deep water: zone between 30-120m would likely have fluctuating DO concentrations (not quantified)
- Waters near PK interface are anticipated to have low DO/experience anoxic conditions
  - No biota expected to inhabit the interface with the PK
- Fish which may be in the pelagic zone would be expected to move (i.e., practice avoidance behavior) in the event of a turnover event that reduced DO in the pelagic zone
  - If fish unable to exit pits for any reason, mortalities could occur
- DO WQG for protection of aquatic life in cold water: 9.5 mg/L for early life stages, 6.5 mg/L for other life stages
  - Lac de Gras naturally experiences DO gradients with low DO levels within 1 to 2 m of the bottom of the lake (2 to 4 mg/L) as documented in baseline studies

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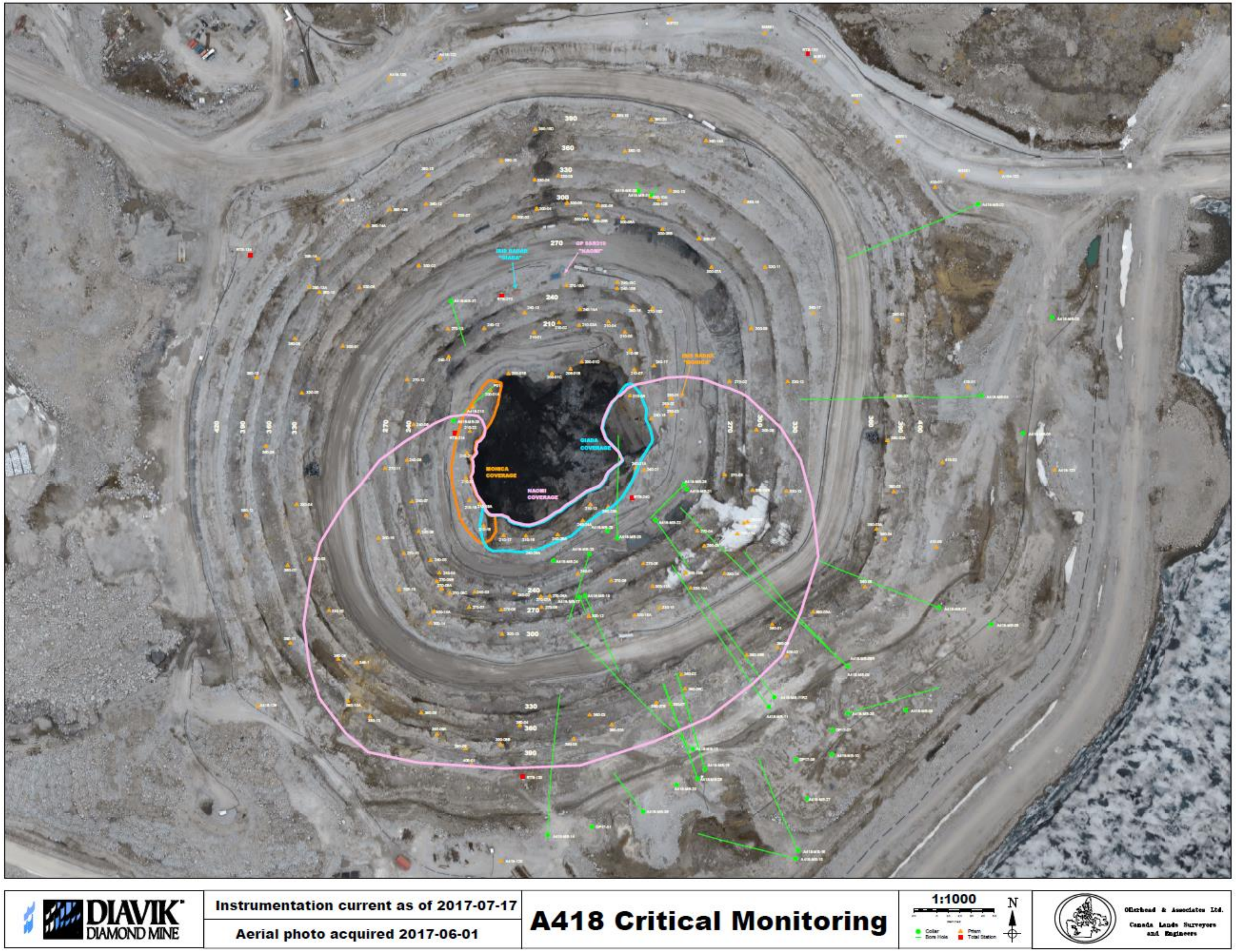
Diavik Water License Amendment Part D-2 - PK Deposition Considerations

Geotechnical Aspects

Johan Bergé, Senior Geotechnical Engineer

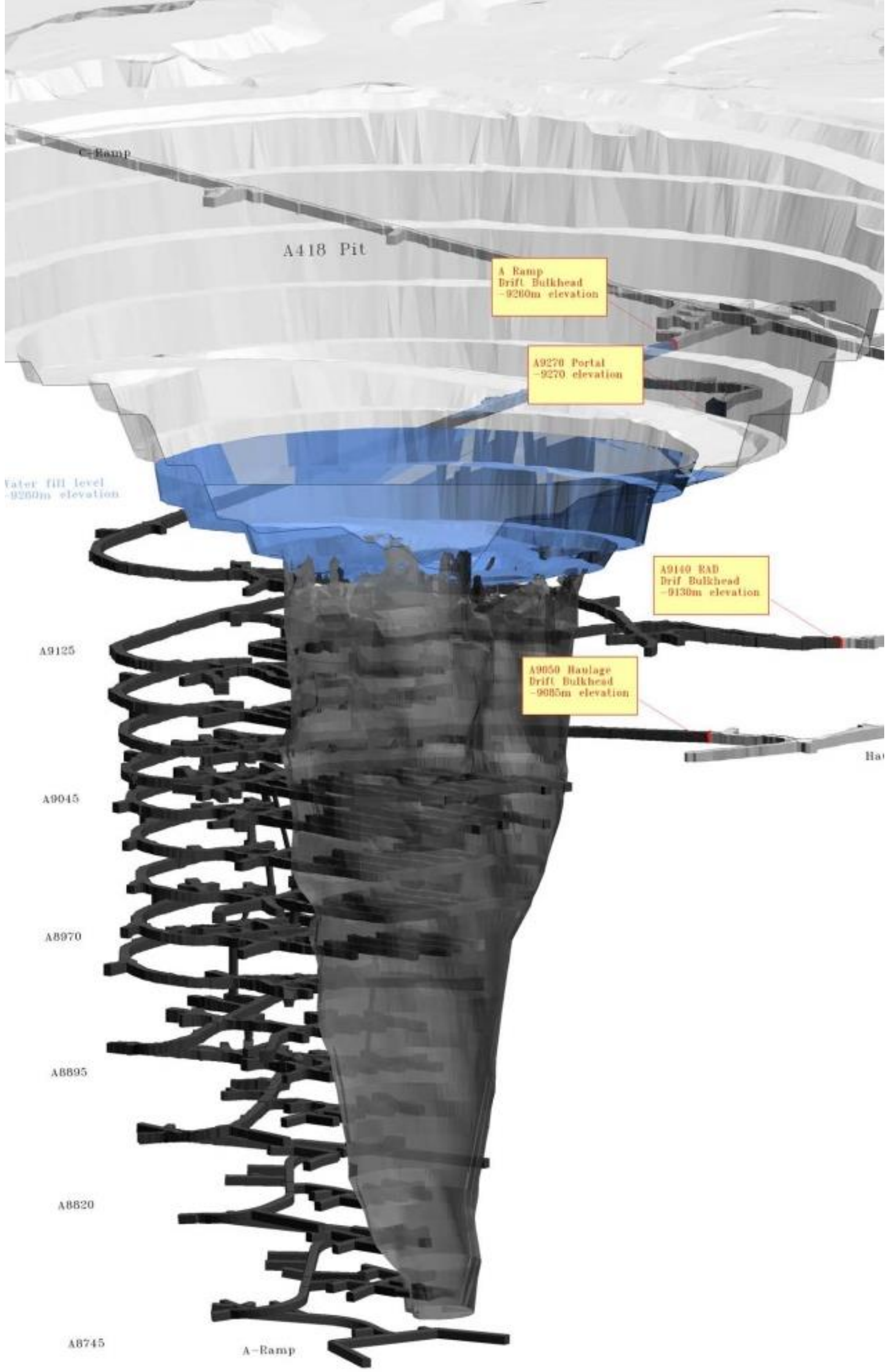
Template #: DCON-029-1010 R8

Geotechnical Critical Monitoring in the A418 pit



PK Filled A418 Pit

- Theoretical factor of safety driven by pore water pressures in pit walls and predominantly structural in SLR
- Factor of Safety expected to increase in SLR with PK deposition
- Factor of Safety expected to increase in pit walls with flooding



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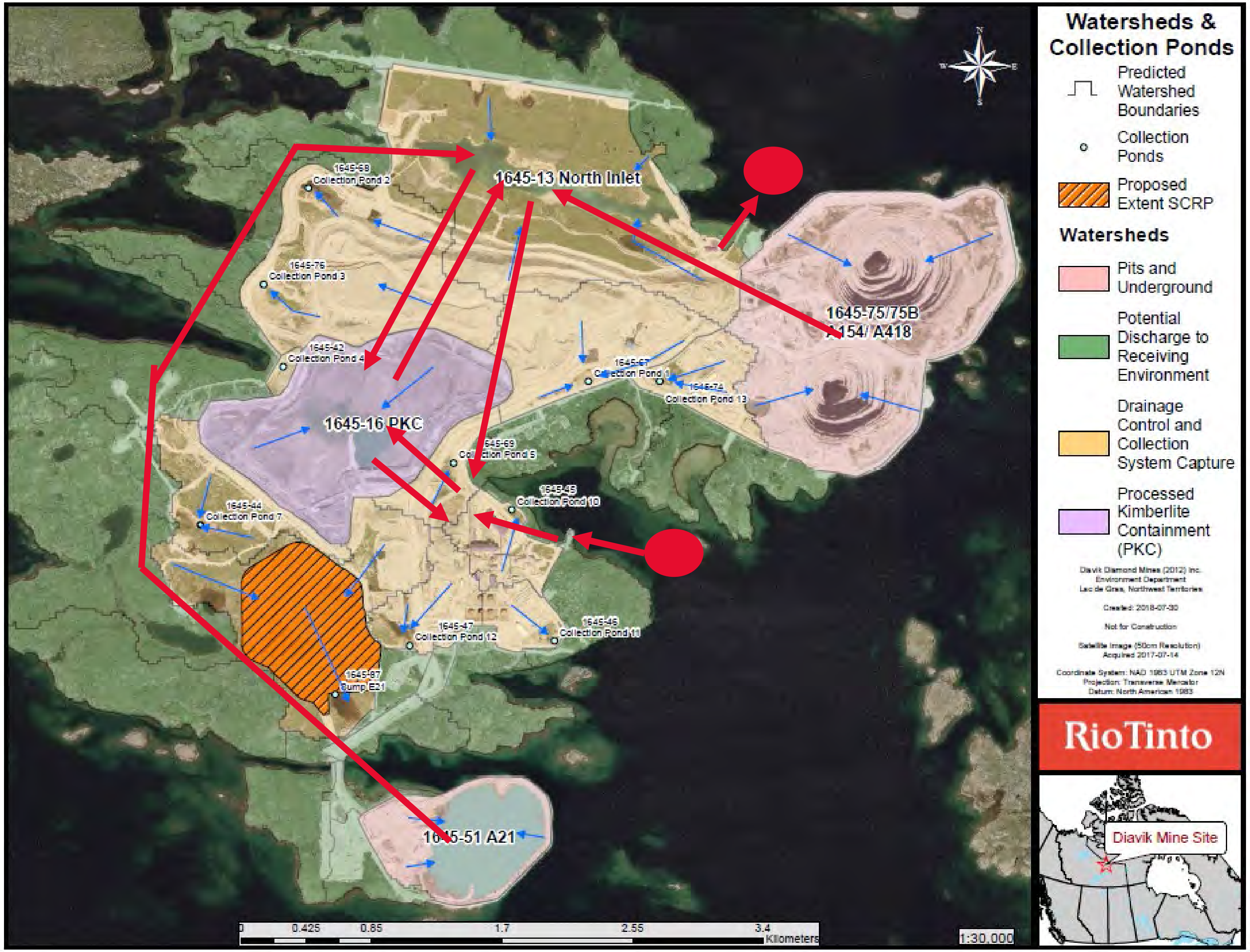
Diavik Water License Amendment Part E - Site Water Quality and Management

Sean Sinclair, Environment Superintendent

Template #: DCON-029-1010 R8

Site Water Management



Site Water Balance

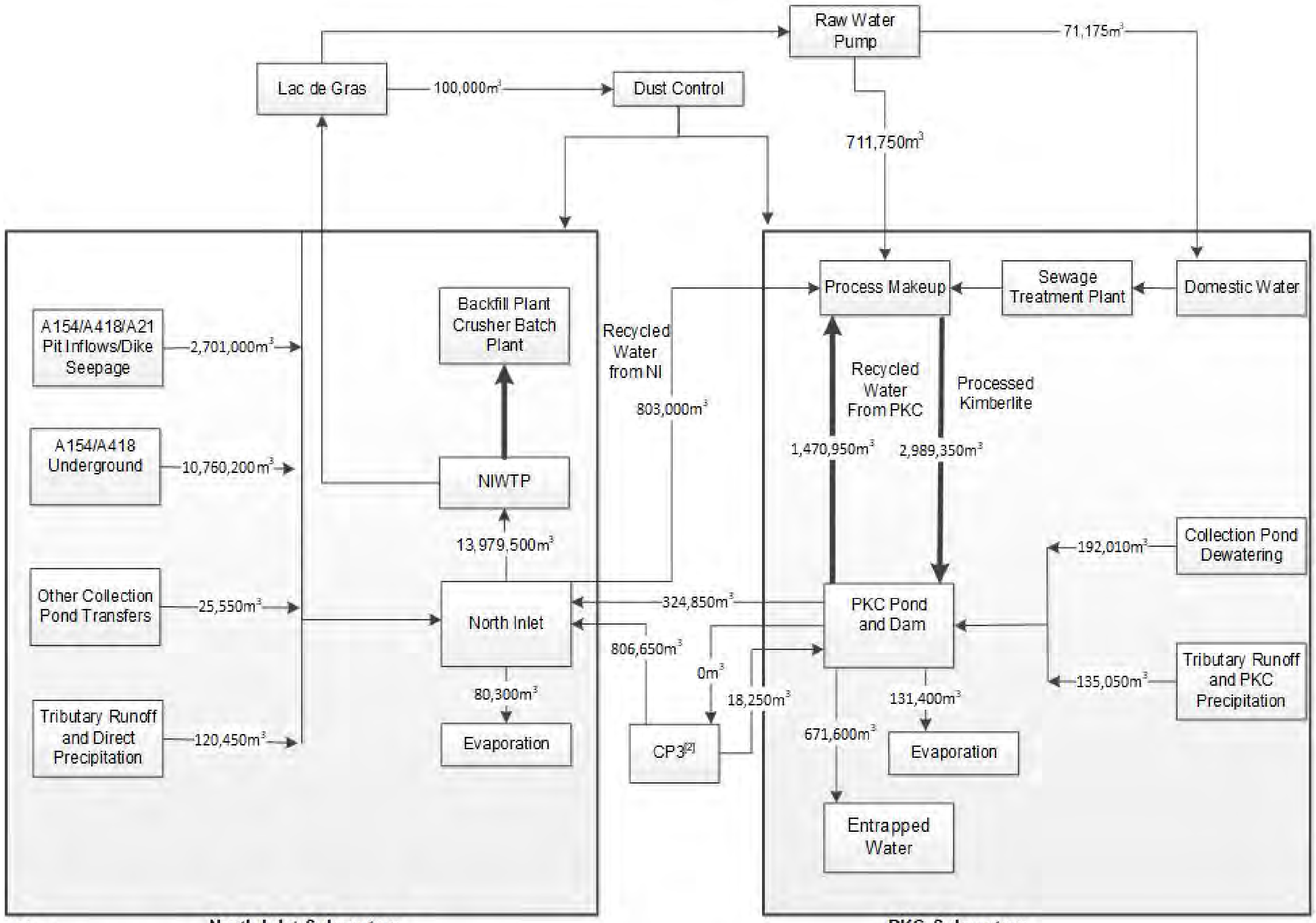
Current Proportions:

- Mine dewatering = ~85%
- Fresh Water Used from LDG= ~5%
- Site runoff / water collection = ~10%

Changes:

- Modest proportional decrease in mine dewatering
- Increase in North Inlet water recycling while establishing decant pond in Mine Working
- GW inflow of 0.8 Mm^3/yr to Mine Working decant pond available for use in Process Plant

Flow Proportions Based on 2017 Model Tables



Note:
[1] Values based on 2017 tables.
[2] Collection Pond 3 (CP3) also has inflows from runoff and direct precipitation that are not shown.
[3] Pit Inflows/Dike Seepage includes A21 pool dewatering.

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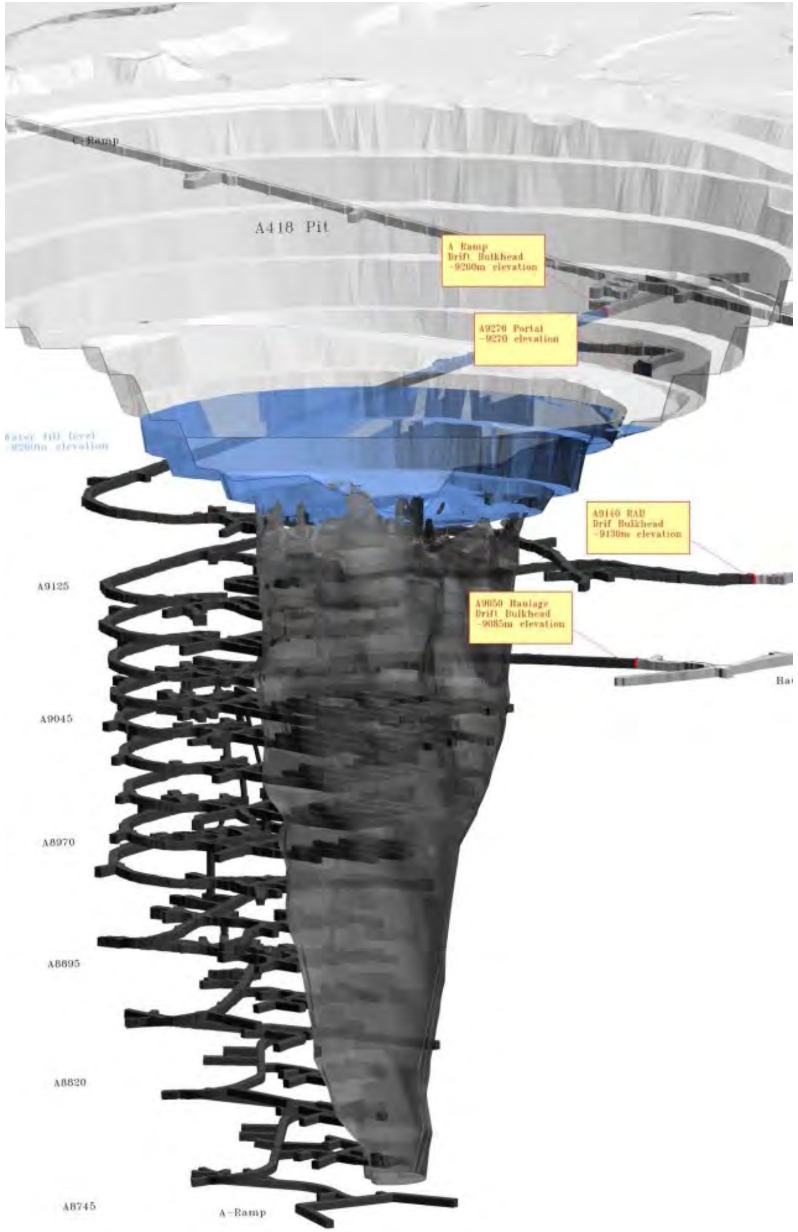
Decant Strategy

- The specific decant reclaim strategy will be finalized in the Processed Kimberlite Containment in Mine Workings Design Report with water balance considerations addressed in the updated Water Management Plan.
- Expectation is that reclaim from Mine Workings will not commence until deposition is sufficient to allow safe access to install reclaim barge in pit
- In interim, sufficient reclaim water available from North Inlet



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PKC Pond Management

- PKC Closure Options Assessment - Dry Cover vs. Wet Cover to be completed in 2020
- PKC slimes removal feasibility assessment to be completed in 2020
- CPK placement continues in PKC facility
- FPK slurry (with process water) deposited in Mine Workings
- Water levels in the PKC Facility will be managed by deploying pumps to transfer water as needed

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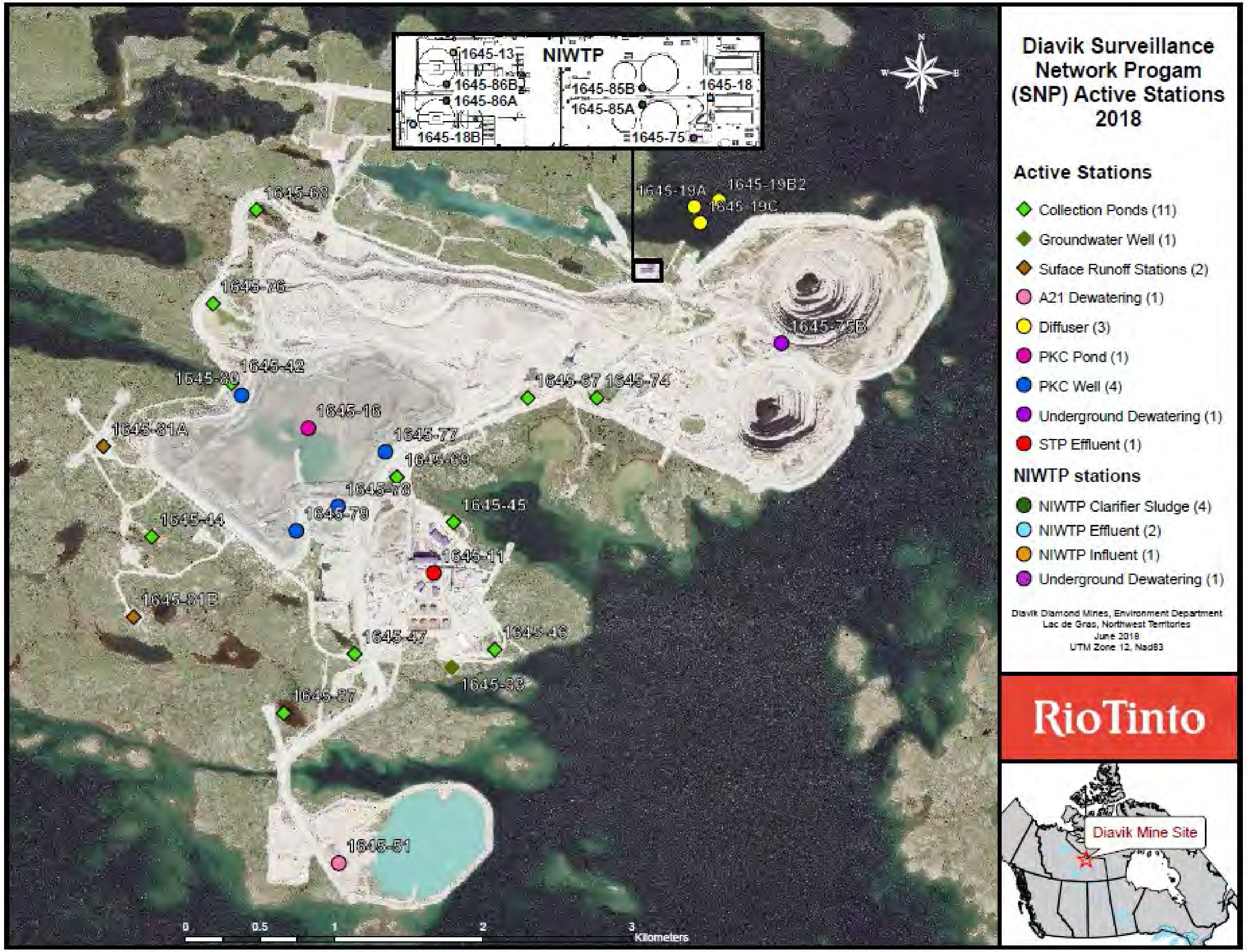
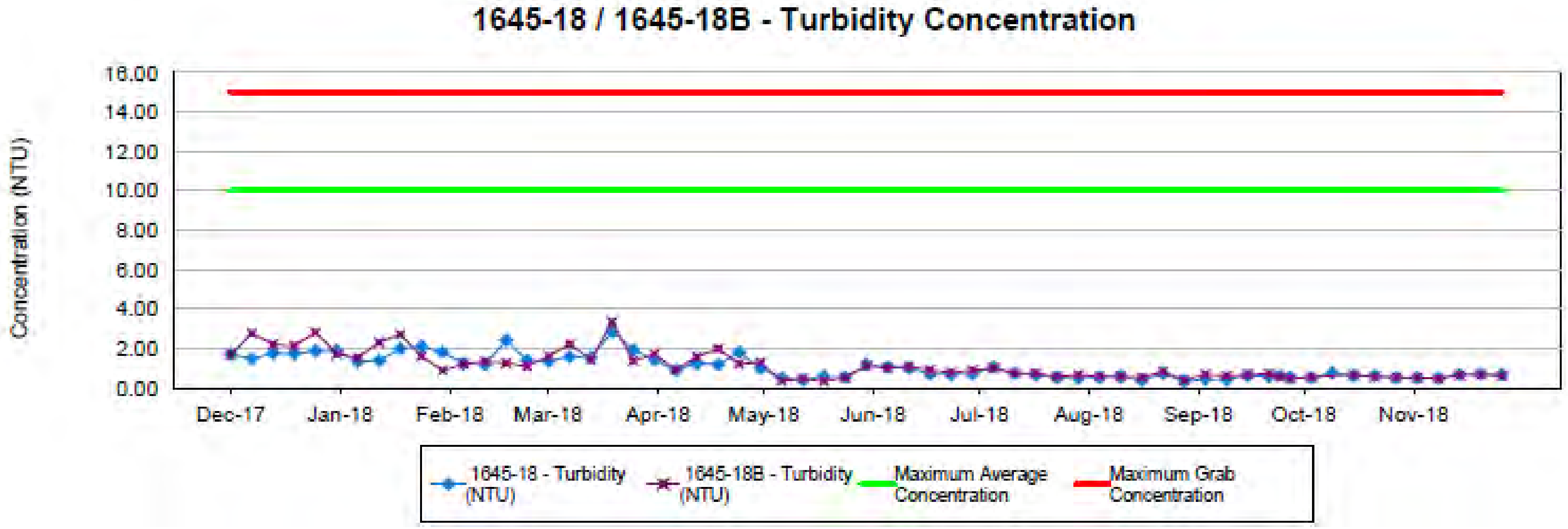
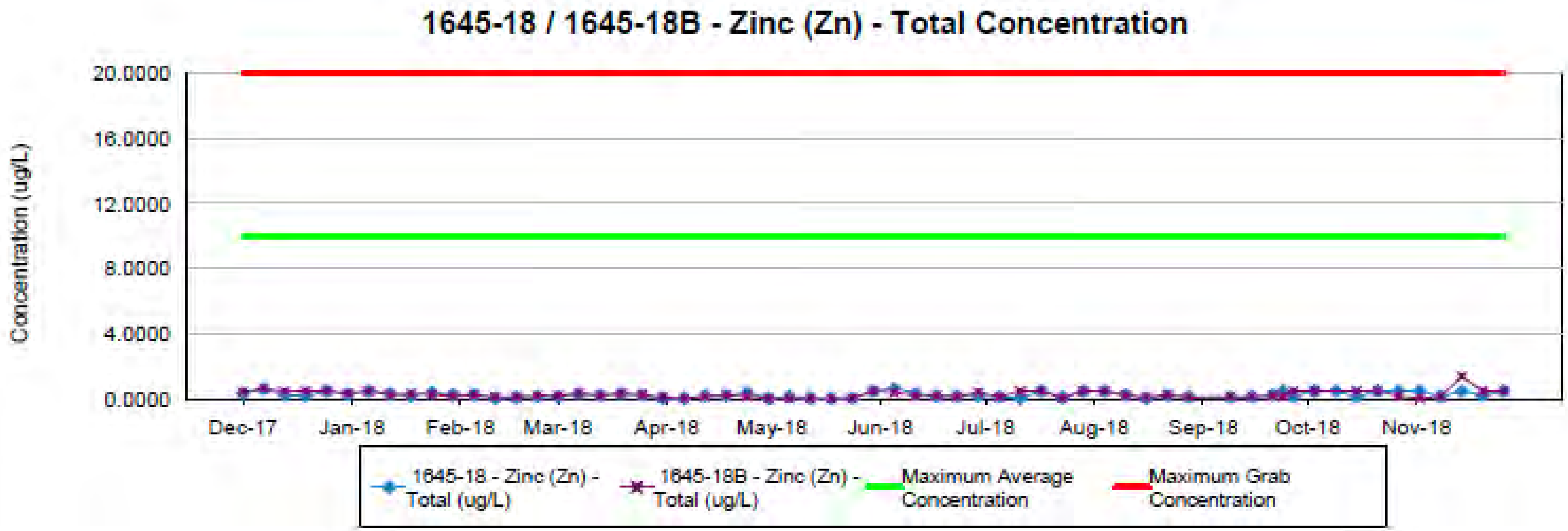
On Site Water Quality Monitoring

- Addition of SNP station at mine working used for PK deposition
- Sample bi-weekly from decant pipeline during operations
- PKC and UG dewatering stations will remain active
- Closure monitoring discussed during Closure Planning section



Current Discharge Water Quality



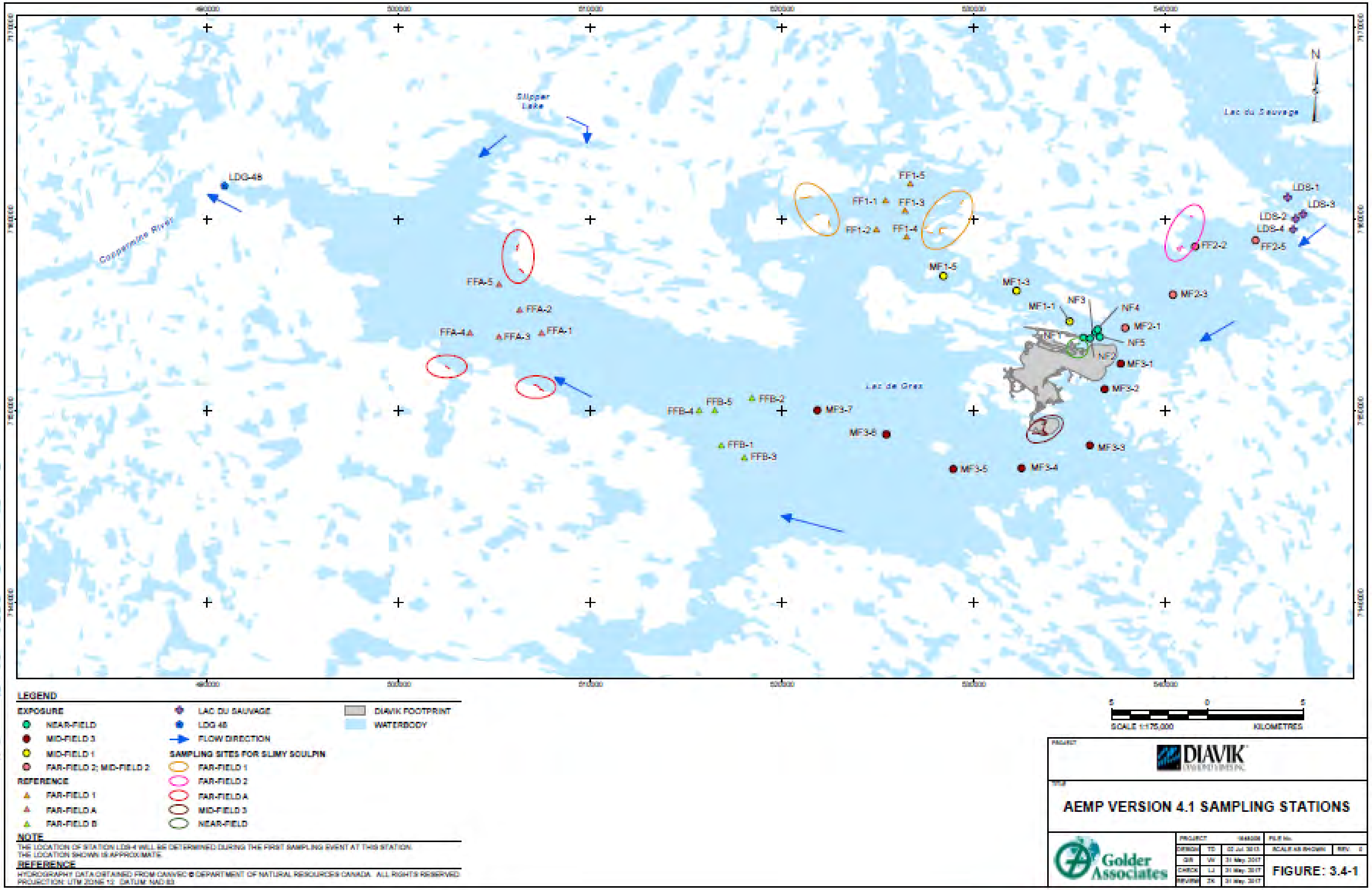


- Current discharge is significantly below EQC for all parameters
- Minor decrease of UG dewatering may result in a slight increase in effluent discharge concentration depending on parameter
- No significant change to chemical loading to LDG is expected
- Impact will be considered in WMP and Water Balance Updates

Off Site Water Quality Monitoring

- No changes to AEMP Design Plan are expected during Operations

Component	Variable	Action Level
Water Quality	Total dissolved solids, calculated	2
	Turbidity – lab	1
	Calcium	1
	Chloride	2
	Potassium	1
	Sodium	2
	Sulphate	2
	Ammonia	(b)
	Nitrate	2
	Aluminum	1
	Antimony	2
	Chromium	1
	Copper	1
	Lead	(b)
	Molybdenum	2
	Silicon	1
	Strontium	2
	Tin	(b)
	Uranium	2
Eutrophication Indicators	Chlorophyl a	2



Questions?

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Diavik Water License Amendment
F. Closure Planning

January 16-17, 2019

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Closure Planning – PK to Mine Workings

- The preferred closure option for the open-pit and underground workings remains as described in ICRP V3.2 and approved by WLWB and DFO – construction of fish habitat.
- Analysis to date does not indicate that PK deposition would preclude construction of fish habitat.
- Closure aspects of PK to Mine Workings will be considered during the engineering design phase and will be included in the *Processed Kimberlite Containment in Mine Workings Design Report.* (see WLWB-26 and Attachment #10).
- If this WL Amendment is approved it would also enable consideration of slimes removal from the PKC and deposition to the mine workings with an associated reconsideration of a dry final landscape for the PKC rather than the currently approved landscape with a surface pond. This potential change to the CRP would be considered in 2020 and submitted as part of a revised CRP in 2022 (see WLWB-26 and Attachment #10)

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Diavik Water License Amendment - Administrative Updates

Sean Sinclair, Environment Superintendent

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Expiry Date of Licence

- Update from October 18, 2023 to October 18 2025
- The proposed revisions to this document include an updated expiry date for the License to reflect a change to the end of commercial production to 2025 and align with Final Closure and Reclamation Plan submission requirements in Part K.
- This change was suggested by GNWT-ENR during the engagement meeting on the Licence amendment.
- EMAB and GNWT support term extension – no concerns from other parties

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Update Pit Definitions – Mine Workings

- Mine Working designated as an Engineered Structure if used as a disposal basin for Processed Kimberlite.
- Should a Mine Working be used for the disposal of PK (i.e. Engineered Structure) a Mine Workings Design Report (including drawings stamped by a Geotechnical Engineer and/or Engineering Geologist) will be required.

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Definitions Relating to Water

- **Decant Water** is surplus water that pools above the settled Processed Kimberlite solids and is available for pumping to the Process Plant or the North Inlet.
- **Minewater** means water that accumulates in any underground workings or open pits.
- **Process wastewater**: The PKC Plan only covers process waste or wastewater deposition in the PKC Facility or Mine Workings. If other waste streams are deposited in the PKC Facility the deposition is managed through approvals under the relevant management plan, e.g. Waste Management Plan.

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Discharge

- DDMI does not believe that EQC should apply to surface runoff and collection ponds, provided that these waters are contained within project infrastructure and are not discharged to the Receiving Environment
- Given the possible longer term of the License and its application to closure activities, it is important to retain flexibility in relation to collection pond management. DDMI suggests that SNP amendments and/or Water Management Plan updates are the appropriate methods of managing collection pond discharge.
- Recognizing that certain parameters may naturally be elevated in runoff due to regional background levels, e.g. zinc, DDMI would support amending Part H Item 28 to read, "...unless it can be demonstrated that a pH outside this range, or EQC parameter exceedances, were not caused by mine activities."

Engineered Structures

- Updated to clarify which items are engineered structures and thus require a Design Report (including drawings stamped by a Geotechnical Engineer and/or Engineering Geologist)
- Non-engineered structures, such as temporary sumps, drainage channels and staging ponds, are most often required in response to a weather event or another unforeseen circumstance, the size and location of which may be dynamic, and only exist for a very short period of time (eg. spring freshet). Adding a license condition requiring the submission of a construction plan /design for every sump, drainage channel or staging pond would impede successful water management during freshet or large precipitation events.
- Clarified that 'Modifications' are carried out on Engineered Structures

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Ponded Water in PKC

- Given the timing of this Amendment, there is no value in including new information about ponded water in the PKC in the text of the License Amendment. Additionally, there will be an approximately 100 m width berm of CPK between the Phase 6 Dam and the PKC Pond by the time this Amendment process is complete, thereby omitting the possibility of water accumulation against the Phase 6 Dam.

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Management Plan Updates

- DDMI is requesting support for the concept of PK deposition in Mine Workings, the regulatory mechanism to permit the option and clarity on additional information, conditions, approvals and timelines required.
- ENR supports DDMI's proposal that management plans not be required at this time but must be submitted and approved prior to the deposition of processed kimberlite into mine workings.

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AEMP

- DDMI considers Action Levels 1 through 4 to be low-level exceedances and Action Levels above Level 4 have not occurred.
- Action Level exceedances are identified when compiling the Annual AEMP Report, DDMI's approach to highlight any exceedance in the cover letter of the Annual AEMP Report (i.e. March 31st of the year following the occurrence) should be retained.
- This approach aligns with the WLWB’s draft Guideline (2018) which states in Section 3.3 that for low action level exceedances, "proponents may report and describe the exceedance in the AEMP Annual Report."

Questions?