TECHNICAL MEMORANDUM

DATE August 4, 2015 **PROJECT No.** 1419751-6200

TO Mr. Richard Bargery
Dominion Diamond Ekati Corporation

CC Mr. Elliot Holland, Ms. Claudine Lee, and Mr. Eric Denholm

FROM Christine Bieber, Mike Paget, Don Chorley, and John Faithful **EMAIL** Christine_Bieber@golder.com and Mike_Paget@golder.com

JAY PROJECT - KEY INPUTS AND OUTPUTS RELATED TO THE WATER MODELS

The Mackenzie Valley Environmental Impact Review Board (MVEIRB) has requested additional information that describe key inputs and outputs related to the groundwater models (Developer's Assessment Report [DAR] Appendix 8A and 8B; Dominion Diamond 2014), and the water balance and site wide water quality models (DAR Appendix 8E; Dominion Diamond 2014). The requested information is summarized in Tables 1 and 2, and detailed information is included in the supplementary tables as part of Appendix A.

Table 1 summarizes key input parameters to the groundwater model for the following scenarios:

- Lower Bound Scenario (Golder 2015a), which was provided as part of Dominion Diamond's Responses in Information Request (IR) Round 2;
- Reasonable Estimate Case (Golder 2015b), which as provided in the Water Modelling Compendium as part of Dominion Diamond's responses in IR Round 1;
- Environmental Assessment Conservative Scenario (DAR Section 8; Dominion Diamond 2014), which was provided in the DAR (note that this groundwater model scenario was not changed for the Updated Assessment Case that was later provided in the Water Modelling Compendium and, therefore, remains valid as the basis for the Environmental Assessment Review);

To provide additional context for the values selected for each scenario, the range of values that has been observed in hydraulic testing at the Jay Project (Project), data collected at nearby mines, and literature sources (where regional or site specific data was not available) is also given in the table. Additional justification for these ranges was previously provided in the IR Round 1 response DAR-GNWT-IR-6 (Dominion Diamond 2015). Although these ranges provide context for the values selected in the scenarios that have been carried forward in the assessments, it should be noted that these ranges are generally broader than what could be reasonably assumed at the Project on the scale of the mine. For example, the range in hydraulic conductivity of the weathered rock was derived from the range in hydraulic conductivities estimated from single-well response hydraulic tests in the weathered rock. The lower value in the range is given as 6×10^{-8} metres per second (m/s) based on one test; however, on the scale of the mine, which is much larger than the scale of a single hydraulic test, it is highly unlikely that the hydraulic conductivity of the uppermost weathered rock would be this low. Furthermore, only the most hydraulically significant parameters determined from the results of sensitivity

analysis (DAR Appendix 8A; Dominion Diamond 2014) were selected for variation in the three scenarios that have been put forward for assessment.

Table 2 provides a summary of outputs requested from the site water balance model, the site water quality model, and the groundwater model. To evaluate impacts of the Project on surface water quantity and quality in Lac du Sauvage and Lac de Gras, several interlinked models were developed. As no one model can be used to account for all of the processes that can influence water quality, independent models, interlinked at various nodes and times, were developed (Figure 1). This approach is documented in Mine Water and the Environment (Vandenberg et al. 2015) and is commensurate with other mine development applications in the Northwest Territories.

In the MVEIRB request, the proportions of groundwater that originate from specific hydrostratigraphic units were requested. Because the groundwater model is three-dimensional, groundwater originating from groundwater in storage within the overburden and bedrock units and water that flows through these units from Lac du Sauvage may pass through several hydrostratigraphic units before reporting to the pit. The proportion of groundwater inflow reporting to the open pit through the enhanced permeability zone (EPZ) has previously been estimated from the flow that reports to the pit along the intersection of the EPZ with the pit wall as the flow in this zone is predicted to be primarily along its alignment (DAR Appendix 8B; Dominion Diamond 2014); this included groundwater sourced from the lake and groundwater sourced from storage in the rock and lake bed sediments present prior to disturbance. In contrast, the overburden and weathered rock units are horizontal, and transmit water primarily from Lac du Sauvage to the underlying EPZ and competent bedrock. The proportion of groundwater inflow reporting to the open pit along the intersection of the weathered rock unit within the pit wall has been provided in Table 2; however, this value does not reflect the hydrogeologic significance of the shallow units. For a discussion of the hydrogeologic significance of the hydrostratigraphic units, refer to sensitivity analyses (DAR Appendix 8A, DAR-GNWT-IR-6 Part e; Dominion Diamond 2014, 2015).

Figure 1 Jay Project – Conceptual Water Quality Model

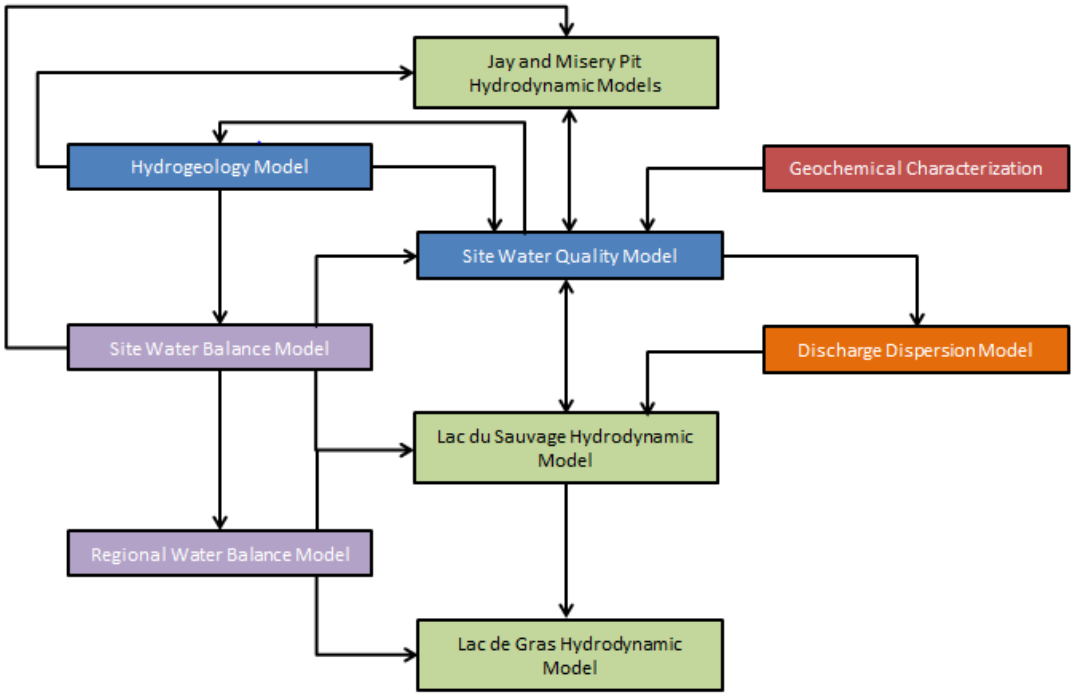

Table 1 Summary of Key Input Parameters

Input Parameters	Lower Bound Scenario[1]	Reasonable Estimate Case[2]	EA Conservative Scenario[3]	Range of Values from Testing and Literature[4]	
				Upper Value	Lower Value
Porosity of competent bedrock	0.001	0.001	0.001	0.023	0.001
Specific storage of competent bedrock	1×10^{-5}	1×10^{-5}	1×10^{-5}	1×10^{-5}	1×10^{-7}
Hydraulic Conductivities (including variations with depth if applicable)					
Hydraulic conductivity of weathered bedrock	4×10^{-6}	4×10^{-6}	4×10^{-6}	5×10^{-6}	6×10^{-8}
Hydraulic conductivity of competent bedrock	3×10^{-8} (30 to 300 m depth) 1×10^{-8} (below 300 m depth)	3×10^{-8} (30 to 300 m depth) 1×10^{-8} (below 300 m depth)	9×10^{-8} (30 to 300 m depth) 3×10^{-8} (below 300 m depth)	5×10^{-7}	2×10^{-10}
Hydraulic conductivity of EPZ	1×10^{-6} (25 to 400 m depth) 5×10^{-7} (400 to 750 m depth) 5×10^{-8} (750 to 1,000 m depth) 1×10^{-8} (below 1,000 m depth)	1×10^{-5} (25 to 400 m depth) 5×10^{-6} (400 to 750 m depth) 5×10^{-7} (750 to 1,000 m depth) 1×10^{-7} (below 1,000 m depth)	1×10^{-5} (25 to 400 m depth) 5×10^{-6} (400 to 750 m depth) 5×10^{-7} (750 to 1,000 m depth) 1×10^{-7} (below 1,000 m depth)	5×10^{-5}	9×10^{-7}

Table 1 Summary of Key Input Parameters

Input Parameters	Lower Bound Scenario[1]	Reasonable Estimate Case[2]	EA Conservative Scenario[3]	Range of Values from Testing and Literature[4]	
				Upper Value	Lower Value
EPZ extent/width	20 m wide Extending laterally and vertically over the entire model domain	60 m wide Extending laterally and vertically over the entire model domain	100 m wide to 750 m depth 60 m wide (below 750 m depth) Extending laterally and vertically over the entire model domain	Extending laterally and vertically over the entire model domain	Limited Extent

Notes:

(1) Source: Jay Project – Pit Lake Hydrodynamic Modelling – Lower Bound Scenario. Golder 2015b.

(2) Source: Jay Project - Compendium of Supplemental Water Quality Modelling. Golder 2015a.

(3) Source: DAR Section 8. Dominion Diamond 2014.

(4) The estimated range of values is based on hydraulic testing at the site where available. Where site data were not available, values were estimated from those found in literature at sites with similar geology or hydrogeologic setting. Further explanation is provided in DAR-GNWT-IR-6 (Dominion Diamond 2015).

EA = Environmental Assessment; EPZ = enhanced permeability zone; DAR = Developer's Assessment Report; m = metre.

Table 2: Summary of Key Output Results

Summary of Key Outputs	Lower Bound Scenario	Reasonable Estimate Case	EA Conservative Scenario
Water Quantity			
Total Inflows into Misery Pit over LOM (Mm^3)(1)	41.80	65.37	83.39
Proportion of total inflows from surface water (%)	71%	45%	35%
Proportion of total inflows from groundwater (%)	29%	55%	65%
Proportion of groundwater reporting through the EPZ and kimberlite (%)	30 to 40%	65 to 75%	70 to 80%
Proportion of groundwater reporting through the weathered bedrock and overburden (%)	35 to 40%	15 to 20%	5 to 10%
Proportion of groundwater reporting through the bedrock (%)	25 to 30%	10 to 15%	15 to 20%
Water Quality			
Proportion of groundwater inflows originating from storage (%)	73%	59%	55%
Proportion of groundwater inflows originating from surface water (%)	27%	41%	45%
Peak TDS concentration in Misery Pit (mg/L)(2)	5,131	7,096	7,371
Peak TDS concentration of discharge water to Lac du Sauvage during life of mine (mg/L)	202	1,150	2,925
Peak TDS concentration of overflow from Misery Pit post-closure (mg/L)(3)	210	613	743[4]

Notes:

(1) Detailed year by year values are available in Appendix A. The Misery Pit has been modelled under the assumption that is is not fully mixed; therefore, these TDS concentrations represent the bottom layer of the pit only. Concentrations in the uppermost layer are predicted to be lower.

(2) Peak TDS concentration of water pumped from Jay Pit to the bottom of Misery Pit.

(3) Result obtained from the hydrodynamic Misery Pit model.

(4) Result shown is for the Updated Assessment Case.

EA = Environmental Assessment; DAR = Developer's Assessment Report; EPZ = enhanced permeability zone; TDS = total dissolved solids; LOM = life of mine; m = metre; Mm^3 = million cubic metres; mg/L = milligrams per litre; % = percent.

References

Dominion Diamond (Dominion Diamond Ekati Corporation). 2014. Developer's Assessment Report for the Jay Project. Prepared by Golder Associates Ltd., October 2014. Yellowknife, NWT, Canada.

Dominion Diamond. 2015. Jay Project Developer's Assessment Report – Round 1 Information Request Responses. Submitted to Mackenzie Valley Environmental Impact Review Board, April 2015. Yellowknife, NWT, Canada.

Golder (Golder Associates Ltd.). 2015a. Jay Project – Pit Lake Hydrodynamic Modelling – Lower Bound Scenario. Submitted to Mackenzie Valley Environmental Impact Review Board. July 2015. Yellowknife, NWT, Canada.

Golder. 2015b. Jay Project - Compendium of Supplemental Water Quality Modelling. Submitted to Mackenzie Valley Environmental Impact Review Board. April 2015. Yellowknife, NWT, Canada.

Vandenberg J, Herrell MK, Faithful J, Snow AM, LaCrampe J, Bieber C, Dayanni S, Chisholm V. 2015. Multiple Modeling Approach for the Aquatic Effects Assessment of a Proposed Northern Diamond Mine Development. Mine Water and the Environment. DOI 10.1007/s10230-015-0337-5.

Closure

We trust this memorandum satisfies your current requirements. Should you have any questions or require any additional information, please do not hesitate to contact the undersigned.

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APPENDIX A
Supplementary Tables

Table A1: Annual Summary Results

DAR Model Results

Reference Flow ID's	Flow ID Contibuting	Dewatering	Stripping	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total LOM
	Total Misery Inflows (Million m^3)[(a)]	3.85	5.00	6.10	5.50	6.02	6.57	7.40	7.89	8.00	8.37	8.75	9.93	83.39
S1,S2,S3,S4	Total Groundwater (Million m^3)	0.96	0.98	2.82	3.46	3.91	4.42	5.23	5.73	5.84	6.20	6.59	7.77	53.91
S1, S2, S3	Lake Groundwater (Million m^3)	0.96	0.03	0.04	0.54	1.14	1.64	2.19	2.75	3.15	3.58	3.89	4.31	24.24
S4	Connate Groundwater (Million m^3)	0.00	0.95	2.78	2.91	2.77	2.77	3.04	2.97	2.69	2.62	2.70	3.46	29.67
R3,R4, R4 WRSA, R5	Total Freshwater (Million m^3)	2.90	4.02	3.28	2.05	2.10	2.16	2.16	2.16	2.16	2.16	2.16	2.16	29.48
	Percentage Total Groundwater (%)	25%	20%	46%	63%	65%	67%	71%	73%	73%	74%	75%	78%	65%
	Percentage Total Freshwater (%)	75%	80%	54%	37%	35%	33%	29%	27%	27%	26%	25%	22%	35%
	Connate Groundwater percentage (%)	0%	97%	99%	84%	71%	63%	58%	52%	46%	42%	41%	44%	55%
	Lake Groundwater percentage (%)	100%	3%	1%	16%	29%	37%	42%	48%	54%	58%	59%	56%	45%

(a) Excludes Icemelt

Resonable Case Model Results

Reference Flow ID's	Flow ID Contibuting	Dewatering	Stripping	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total LOM
	Total Misery Inflows (Million m^3)[(a)]	3.85	4.90	5.42	4.41	4.70	5.08	5.60	5.88	5.92	6.10	6.34	7.16	65.37
S1,S2,S3,S4	Total Groundwater (Million m^3)	0.96	0.94	2.16	2.36	2.60	2.92	3.44	3.72	3.76	3.94	4.17	5.00	35.97
S1, S2, S3	Lake Groundwater (Million m^3)	0.96	0.03	0.04	0.33	0.72	1.02	1.35	1.73	1.88	2.02	2.21	2.41	14.69
S4	Connate Groundwater (Million m^3)	0.00	0.91	2.13	2.04	1.88	1.90	2.09	1.99	1.88	1.92	1.97	2.58	21.28
R3,R4, R4 WRSA, R5	Total Freshwater (Million m^3)	2.90	3.96	3.26	2.05	2.10	2.16	2.16	2.16	2.16	2.16	2.16	2.16	29.40
	Percentage Total Groundwater (%)	25%	19%	40%	54%	55%	57%	61%	63%	63%	65%	66%	70%	55%
	Percentage Total Freshwater (%)	75%	81%	60%	46%	45%	43%	39%	37%	37%	35%	34%	30%	45%
	Connate Groundwater percentage (%)	0%	96%	98%	86%	72%	65%	61%	53%	50%	49%	47%	52%	59%
	Lake Groundwater percentage (%)	100%	4%	2%	14%	28%	35%	39%	47%	50%	51%	53%	48%	41%

(a) Excludes Icemelt

Lower Bound Model Results

Reference Flow ID's	Flow ID Contibuting	Dewatering	Stripping	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total LOM
	Total Misery Inflows (Million m^3)[(a)]	4.01	4.80	4.49	2.96	3.05	3.14	3.22	3.15	3.15	3.18	3.30	3.37	41.80
S1,S2,S3,S4	Total Groundwater (Million m^3)	0.62	1.02	1.29	0.91	0.95	0.99	1.06	0.99	0.99	1.02	1.13	1.20	12.17
S1, S2, S3	Lake Groundwater (Million m^3)	0.62	0.17	0.00	0.04	0.07	0.15	0.22	0.26	0.33	0.36	0.47	0.57	3.25
S4	Connate Groundwater (Million m^3)	0.00	0.86	1.29	0.87	0.88	0.84	0.84	0.73	0.66	0.66	0.66	0.64	8.92
R3,R4, R4 WRSA, R5	Total Freshwater (Million m^3)	3.39	3.77	3.20	2.04	2.10	2.16	2.16	2.16	2.16	2.16	2.16	2.16	29.63
	Percentage Total Groundwater (%)	15%	21%	29%	31%	31%	31%	33%	31%	31%	32%	34%	36%	29%
	Percentage Total Freshwater (%)	85%	79%	71%	69%	69%	69%	67%	69%	69%	68%	66%	64%	71%
	Connate Groundwater percentage (%)	0%	83%	100%	96%	92%	85%	79%	74%	67%	64%	59%	53%	73%
	Lake Groundwater percentage (%)	100%	17%	0%	4%	8%	15%	21%	26%	33%	36%	41%	47%	27%

(a) Excludes Icemelt

Table A2: DAR Water Balance Model Summary

Flow Description	Flow Component (Figure 1)	Dewatering		Stripping		Year 1 - 2020		Year 2 - 2021		Year 3 - 2022		Year 4 - 2023		Year 5 - 2024		Year 6 -2025		Year 7 - 2026		Year 8 - 2027		Year 9 - 2028		Year 10 - 2029	
Jay Pit Reservoir		**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**
R3 Runoff	R3	0		0		198,872		200,476		200,476		200,476		200,682		200,476		200,477		200,476		200,682		200,476	
S4 Groundwater	S4	0		946,400		2,784,400		2,911,600		2,771,844		2,773,976		3,037,100		2,974,170		2,685,000		2,622,700		2,701,610		3,457,370	
S3 Groundwater from Lac Du Sauvage	S3	0		0		36,500		544,600		1,141,956		1,641,129		2,194,500		2,754,928		3,154,697		3,581,310		3,885,380		4,313,830	
S5 from Jay Runoff Sump	S5	0		0		0		0		0		0		0		0		0		0		0		0	
P5 Pump Misery to Jay Pit	P5	0		0		0		0		0		0		0		0		0		0		0		0	
O2 Overflow Jay Runoff Sump to Mine Inflows Sump	O2	0		0		0		0		0		0		0		0		0		0		0		0	
P8 From Lac du Sauvage	P8	0		0		0		0		0		0		0		0		0		0		0		0	
Jay Pit Ice Melt	Ice Melt	0		0		0		0		0		0		0		0		0		0		0		0	
E3 Evaporation	E3		0		0		645		645		645		645		645		645		645		645		645		645
S5 Jay Pit to Groundwater	S5		0		0		0		0		0		0		0		0		0		0		0		0
P4 Mine Inflow Sump to Misery	P4		0		946,400		3,019,127		3,656,031		4,113,632		4,614,930		5,431,640		5,928,930		6,039,530		6,403,830		6,787,040		7,971,030
Jay Pit Ice Freeze	Ice Freeze		0		0		0		0		0		0		0		0		0		0		0		0
Sub-Total		0	0	946,400	946,400	3,019,772	3,019,772	3,656,676	3,656,676	4,114,276	4,114,277	4,615,581	4,615,575	5,432,282	5,432,285	5,929,574	5,929,575	6,040,174	6,040,175	6,404,486	6,404,475	6,787,672	6,787,685	7,971,676	7,971,675
Change in Storage		0		0		0		0		-1		6		-3		-1		-1		11		-13		1	

Diked Area		Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)
R4 Runoff	R4	1,537,265		10,187		1,739,559		1,292,333		1,287,244		1,287,244		1,288,665		1,287,241		1,287,242		1,287,240		1,288,650		1,287,250	
R4 Waste Rock Runoff	R4 WSRA	0		0		17,308		386,756		447,691		503,005		505,445		504,912		504,912		504,913		505,444		504,913	
S1 Groundwater from Lac Du Sauvage	S1	135,900		900		0		0		0		0		0		0		0		0		0		0	
S2 Groundwater	S2	820,800		32,700		300		0		0		0		0		0		0		0		0		0	
P8 From Lac du Sauvage	P8	0		0		0		0		0		0		0		0		0		0		0		0	
Ice Melt	Ice Melt	0		0		1,175,647		0		0		0		0		0		0		0		0		0	
E4 Evaporation	E4		622,183		994		22,949		7,005		7,005		7,005		7,021		7,005		7,005		7,005		7,019		7,005
S5 Seepage to Groundwater	S5		0		0		0		0		0		0		0		0		0		0		0		0		0
S6 Seepage to Groundwater	S6		0		0		0		0		0		0		0		0		0		0		0		0		0
O2 Overflow Jay Runoff Sump to Mine Inflows Sump	O2		0		0		0		0		0		0		0		0		0		0		0		0		0
P1 Pumping to Lac du Sauvage	P1		14,976,000		0		0		0		0		0		0		0		0		0		0		0		0
P2 Pumping to Lynx Pit	P2		4,992,000		0		0		0		0		0		0		0		0		0		0		0		0
P3 Pumping to Misery Pit	P3		3,744,000		4,054,233		2,909,867		1,672,080		1,727,930		1,783,240		1,787,090		1,785,150		1,785,150		1,785,150		1,787,080		1,785,150
O3 Overflow to Lac du Sauvage	O3		0		0		0		0		0		0		0		0		0		0		0		0		0
Ice Freeze	Ice Freeze		0		1,175,647		0		0		0		0		0		0		0		0		0		0		0
Sub-Total		2,493,965	24,334,183	43,787	5,230,874	2,932,814	2,932,816	1,679,089	1,679,085	1,734,935	1,734,935	1,790,249	1,790,245	1,794,110	1,794,111	1,792,153	1,792,155	1,792,154	1,792,155	1,792,153	1,792,155	1,794,094	1,794,099	1,792,163	1,792,155
Change in Storage		-21,840,218		-5,187,087		-2		4		0		4		-1		-2		-1		-2		-5		8	

Misery Pit		Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)	Inflows (m^3)	Outflows (m^3)
R5 Runoff	R5	110,479		893		172,608		173,669		174,718		175,672		176,806		177,059		177,059		177,061		177,249		177,071	
P4 Mine Inflow Sump to Misery	P4	0		946,400		3,019,127		3,656,031		4,113,632		4,614,930		5,431,640		5,928,930		6,039,530		6,403,830		6,787,040		7,971,030	
P3 Pumped from Jay Runoff Sump	P3	3,744,000		4,054,233		2,909,867		1,672,080		1,727,930		1,783,240		1,787,090		1,785,150		1,785,150		1,785,150		1,787,080		1,785,150	
P7 Pumped from Lac du Sauvage	P7	0		0		0		0		0		0		0		0		0		0		0		0	
Ice Melt	Ice Melt	0		0		122,301		241,780		296,594		352,510		400,944		463,715		464,245		464,358		464,736		465,114	
E5 Evaporation	E5		2,430		81		41,264		51,906		61,529		70,836		79,817		82,638		82,645		82,672		82,703		82,816
P6 Pumped to Lac Du Sauvage	P6		0		0		0		0		0		0		2,142,944		7,802,901		7,917,895		8,279,370		8,664,660		9,837,230
P6 Overflow to Lac de Gras	Overflow		0		0		0		0		0		0		0		0		0		0		0		0
P5 Pumped to Jay Pit	P5		0		0		0		0		0		0		0		0		0		0		0		0
Ice Accumulation	Ice Accumulation		0		122,301		241,780		296,594		352,510		400,944		463,715		464,245		464,358		464,736		465,114		466,361
Sub-Total		3,854,479	2,430	5,001,526	122,382	6,223,903	283,044	5,743,560	348,500	6,312,874	414,039	6,926,352	471,780	7,796,480	2,686,476	8,354,854	8,349,784	8,465,984	8,464,898	8,830,399	8,826,779	9,216,105	9,212,477	10,398,365	10,386,407
Change in Storage		3,852,049		4,879,144		5,940,859		5,395,060		5,898,835		6,454,572		5,110,004		5,070		1,086		3,621		3,628		11,958	

Table A3: Reasonable Case Water Balance Model Summary

Flow Description	Flow Component (Figure 1)	Dewatering		Stripping		Year 1 - 2020		Year 2 - 2021		Year 3 - 2022		Year 4 - 2023		Year 5 - 2024		Year 6 -2025		Year 7 - 2026		Year 8 - 2027		Year 9 - 2028		Year 10 - 2029	
Jay Pit Reservoir		**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**
R3 Runoff	R3	0		0		198,872		200,476		200,476		200,476		200,682		200,476		200,476		200,476		200,683		200,476	
S4 Groundwater	S4	0		910,000		2,127,000		2,038,600		1,877,792		1,897,928		2,085,700		1,990,590		1,880,060		1,919,420		1,965,310		2,584,670	
S3 Groundwater from Lac Du Sauvage	S3	0		0		36,400		326,000		718,536		1,020,344		1,352,400		1,730,561		1,878,944		2,021,683		2,206,002		2,412,940	
S5 from Jay Runoff Sump	S5	0		0		0		0		0		0		0		0		0		0		0		0	
P5 Pump Misery to Jay Pit	P5	0		0		0		0		0		0		0		0		0		0		0		0	
O2 Overflow Jay Runoff Sump to Mine Inflows Sump	O2	0		0		0		0		0		0		0		0		0		0		0		0	
P8 From Lac du Sauvage	P8	0		0		0		0		0		0		0		0		0		0		0		0	
Jay Pit Ice Melt	Ice Melt	0		0		0		0		0		0		0		0		0		0		0		0	
E3 Evaporation	E3		0		0		645		645		645		645		645		645		645		645		645		645
S5 Jay Pit to Groundwater	S5		0		0		0		0		0		0		0		0		0		0		0		0
P4 Mine Inflow Sump to Misery	P4		0		910,000		2,361,627		2,564,432		2,796,159		3,118,102		3,638,140		3,920,980		3,958,830		4,140,940		4,371,350		5,197,450
Jay Pit Ice Freeze	Ice Freeze		0		0		0		0		0		0		0		0		0		0		0		0
Sub-Total		0	0	910,000	910,000	2,362,272	2,362,272	2,565,076	2,565,077	2,796,804	2,796,804	3,118,748	3,118,747	3,638,782	3,638,785	3,921,627	3,921,625	3,959,480	3,959,475	4,141,579	4,141,585	4,371,995	4,371,995	5,198,086	5,198,095
Change in Storage		0		0		0		-1		0		1		-2		2		5		-6		0		-9	
Diked Area		**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**
R4 Runoff	R4	1,537,265		10,187		1,739,559		1,292,333		1,287,244		1,287,244		1,288,665		1,287,241		1,287,242		1,287,240		1,288,650		1,287,250	
R4 Waste Rock Runoff	R4 WRSA	0		0		17,308		386,756		447,691		503,005		505,445		504,912		504,912		504,913		505,444		504,913	
S1 Groundwater from Lac Du Sauvage	S1	135,900		900		0		0		0		0		0		0		0		0		0		0	
S2 Groundwater	S2	820,800		32,700		300		0		0		0		0		0		0		0		0		0	
P8 From Lac du Sauvage	P8	0		0		0		0		0		0		0		0		0		0		0		0	
Ice Melt	Ice Melt	0		0		1,175,647		0		0		0		0		0		0		0		0		0	
E4 Evaporation	E4		622,183		994		22,949		7,005		7,005		7,005		7,021		7,005		7,005		7,005		7,019		7,005
S5 Seepage to Groundwater	S5		0		0		0		0		0		0		0		0		0		0		0		0
S6 Seepage to Groundwater	S6		0		0		0		0		0		0		0		0		0		0		0		0
O2 Overflow Jay Runoff Sump to Mine Inflows Sump	O2		0		0		0		0		0		0		0		0		0		0		0		0
P1 Pumping to Lac du Sauvage	P1		14,976,000		0		0		0		0		0		0		0		0		0		0		0
P2 Pumping to Lynx Pit	P2		4,992,000		0		0		0		0		0		0		0		0		0		0		0
P3 Pumping to Misery Pit	P3		3,744,000		4,054,233		2,909,867		1,672,080		1,727,930		1,783,240		1,787,090		1,785,150		1,785,150		1,785,150		1,787,080		1,785,150
O3 Overflow to Lac du Sauvage	O3		0		0		0		0		0		0		0		0		0		0		0		0
Ice Freeze	Ice Freeze		0		1,175,647		0		0		0		0		0		0		0		0		0		0
Sub-Total		2,493,965	24,334,183	43,787	5,230,874	2,932,814	2,932,816	1,679,089	1,679,085	1,734,935	1,734,935	1,790,249	1,790,245	1,794,110	1,794,111	1,792,153	1,792,155	1,792,154	1,792,155	1,792,153	1,792,155	1,794,094	1,794,099	1,792,163	1,792,155
Change in Storage		-21,840,218		-5,187,087		-2		4		0		4		-1		-2		-1		-2		-5		8	
Misery Pit		**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**
R5 Runoff	R5	110,479		893		172,500		173,441		174,182		174,919		176,054		176,643		177,048		177,049		177,235		177,055	
P4 Mine Inflow Sump to Misery	P4	0		910,000		2,361,627		2,564,432		2,796,159		3,118,102		3,638,140		3,920,980		3,958,830		4,140,940		4,371,350		5,197,450	
P3 Pumped from Jay Runoff Sump	P3	3,744,000		3,992,926		2,886,614		1,672,090		1,727,940		1,783,260		1,787,070		1,785,150		1,785,150		1,785,150		1,787,080		1,785,150	
P7 Pumped from Lac du Sauvage	P7	0		0		0		0		0		0		0		0		0		0		0		0	
Ice Melt	Ice Melt	0		0		122,301		241,780		286,127		340,141		390,650		412,687		462,166		462,203		462,392		462,619	
E5 Evaporation	E5		2,430		81		40,499		50,292		57,204		63,317		72,086		79,865		82,521		82,530		82,541		82,590
P6 Pumped to Lac Du Sauvage	P6		0		0		0		0		0		0		0		1,503,993		5,838,104		6,018,613		6,250,720		7,067,860
P6 Overflow to Lac de Gras	Overflow		0		0		0		0		0		0		0		0		0		0		0		0
P5 Pumped to Jay Pit	P5		0		0		0		0		0		0		0		0		0		0		0		0
Ice Accumulation	Ice Accumulation		0		122,301		241,780		286,127		340,141		390,650		412,687		462,166		462,203		462,392		462,619		463,488
Sub-Total		3,854,479	2,430	4,903,819	122,382	5,543,042	282,279	4,651,743	336,418	4,984,407	397,345	5,416,422	453,966	5,991,914	484,773	6,295,460	2,046,024	6,383,194	6,382,828	6,565,342	6,563,535	6,798,057	6,795,880	7,622,274	7,613,938
Change in Storage		3,852,049		4,781,437		5,260,763		4,315,324		4,587,063		4,962,456		5,507,141		4,249,435		366		1,807		2,177		8,336	

Table A4: Lower Bound Water Balance Model Summary

Flow Description	Flow Component (Figure 1)	Dewatering		Stripping		Year 1 - 2020		Year 2 - 2021		Year 3 - 2022		Year 4 - 2023		Year 5 - 2024		Year 6 -2025		Year 7 - 2026		Year 8 - 2027		Year 9 - 2028		Year 10 - 2029	
Jay Pit Reservoir		**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**
R3 Runoff	R3	0		0		198,872		200,476		200,476		200,476		200,683		200,476		200,476		200,476		200,683		200,476	
S4 Groundwater	S4	0		855,400		1,286,900		874,700		878,400		839,600		841,800		730,300		657,200		657,000		663,910		635,174	
S3 Groundwater from Lac Du Sauvage	S3	0		0		0		36,200		72,900		145,600		219,200		255,300		328,100		364,800		470,104		568,852	
S5 from Jay Runoff Sump	S5	0		0		0		0		0		0		0		0		0		0		0		0	
P5 Pump Misery to Jay Pit	P5	0		0		0		0		0		0		0		0		0		0		0		0	
O2 Overflow Jay Runoff Sump to Mine Inflows Sump	O2	0		0		0		0		0		0		0		0		0		0		0		0	
P8 From Lac du Sauvage	P8	0		0		0		0		0		0		0		0		0		0		0		0	
Jay Pit Ice Melt	Ice Melt	0		0		0		0		0		0		0		0		0		0		0		0	
E3 Evaporation	E3		0		0		645		645		645		645		645		645		645		645		645		645
S5 Jay Pit to Groundwater	S5		0		0		0		0		0		0		0		0		0		0		0		0
P4 Mine Inflow Sump to Misery	P4		0		855,400		1,485,127		1,110,732		1,151,131		1,185,031		1,261,038		1,185,431		1,185,131		1,221,629		1,334,050		1,403,860
Jay Pit Ice Freeze	Ice Freeze		0		0		0		0		0		0		0		0		0		0		0		0
Sub-Total		0	0	855,400	855,400	1,485,772	1,485,772	1,111,376	1,111,377	1,151,776	1,151,776	1,185,676	1,185,676	1,261,683	1,261,683	1,186,076	1,186,076	1,185,776	1,185,776	1,222,276	1,222,274	1,334,697	1,334,695	1,404,502	1,404,505
Change in Storage		0		0		0		-1		0		0		0		0		0		2		2		-3	
Diked Area		**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**
R4 Runoff	R4	1,531,811		10,114		1,738,205		1,292,331		1,287,242		1,287,261		1,288,647		1,287,244		1,287,245		1,287,240		1,288,670		1,287,240	
R4 Waste Rock Runoff	R4 WSRA	0		0		17,307		386,756		447,691		503,005		505,445		504,912		504,912		504,912		505,445		504,912	
S1 Groundwater from Lac Du Sauvage	S1	498,300		168,600		3,600		0		0		0		0		0		0		0		0		0	
S2 Groundwater	S2	121,600		800		0		0		0		0		0		0		0		0		0		0	
P8 From Lac du Sauvage	P8	0		0		0		0		0		0		0		0		0		0		0		0	
Ice Melt	Ice Melt	0		0		1,091,131		0		0		0		0		0		0		0		0		0	
E4 Evaporation	E4		615,501		944		21,637		6,999		7,005		7,009		7,018		7,005		7,001		7,005		7,022		7,005
S5 Seepage to Groundwater	S5		0		0		0		0		0		0		0		0		0		0		0		0
S6 Seepage to Groundwater	S6		0		0		0		0		0		0		0		0		0		0		0		0
O2 Overflow Jay Runoff Sump to Mine Inflows Sump	O2		0		0		0		0		0		0		0		0		0		0		0		0
P1 Pumping to Lac du Sauvage	P1		14,820,000		0		0		0		0		0		0		0		0		0		0		0
P2 Pumping to Lynx Pit	P2		4,992,000		0		0		0		0		0		0		0		0		0		0		0
P3 Pumping to Misery Pit	P3		3,900,000		3,938,955		2,828,605		1,672,090		1,727,930		1,783,250		1,787,080		1,785,150		1,785,150		1,785,150		1,787,090		1,785,150
O3 Overflow to Lac du Sauvage	O3		0		0		0		0		0		0		0		0		0		0		0		0
Ice Freeze	Ice Freeze		0		1,091,131		0		0		0		0		0		0		0		0		0		0
Sub-Total		2,151,711	24,327,501	179,514	5,031,030	2,850,243	2,850,242	1,679,087	1,679,089	1,734,933	1,734,935	1,790,266	1,790,259	1,794,092	1,794,098	1,792,156	1,792,155	1,792,157	1,792,151	1,792,152	1,792,155	1,794,115	1,794,112	1,792,152	1,792,155
Change in Storage		-22,175,790		-4,851,516		2		-2		-2		8		-6		1		6		-3		3		-3	
Misery Pit		**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**	**Inflows (m^3)**	**Outflows (m^3)**
R5 Runoff	R5	110,490		894		172,406		173,015		173,660		174,128		174,938		175,087		175,765		176,038		176,734		177,039	
P4 Mine Inflow Sump to Misery	P4	0		855,400		1,485,127		1,110,732		1,151,131		1,185,031		1,261,038		1,185,431		1,185,131		1,221,629		1,334,050		1,403,860	
P3 Pumped from Jay Runoff Sump	P3	3,900,000		3,938,955		2,828,605		1,672,090		1,727,930		1,783,250		1,787,080		1,785,150		1,785,150		1,785,150		1,787,090		1,785,150	
P7 Pumped from Lac du Sauvage	P7	0		0		0		0		0		0		0		0		0		0		0		0	
Ice Melt	Ice Melt	0		0		122,301		241,780		276,196		296,594		332,954		352,510		390,650		400,944		412,687		454,255	
E5 Evaporation	E5		2,503		85		39,689		46,265		51,748		56,546		61,807		64,966		71,228		73,619		78,802		82,439
P6 Pumped to Lac Du Sauvage	P6		0		0		0		0		0		0		0		0		0		0		0		3,224,424
P6 Overflow to Lac de Gras	Overflow		0		0		0		0		0		0		0		0		0		0		0		0
P5 Pumped to Jay Pit	P5		0		0		0		0		0		0		0		0		0		0		0		0
Ice Accumulation	Ice Accumulation		0		122,301		241,780		276,196		296,594		332,954		352,510		390,650		400,944		412,687		454,255		459,557
Sub-Total		4,010,490	2,503	4,795,249	122,386	4,608,439	281,468	3,197,617	322,461	3,328,916	348,342	3,439,003	389,500	3,556,011	414,317	3,498,178	455,616	3,536,696	472,172	3,583,761	486,306	3,710,561	533,057	3,820,304	3,766,420
Change in Storage		4,007,987		4,672,863		4,326,970		2,875,156		2,980,574		3,049,503		3,141,693		3,042,561		3,064,524		3,097,455		3,177,504		53,884	