IAMGOLD

Appendix D Water Balance and Water Quality Effects Predictions

Côté Gold Project
Closure Plan
December 2018

Memorandum

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Company:	IAMGOLD Corporation		
cc:	Karen Besemann (Golder)	**Date:**	December 19, 2018
Subject:	**CÔTÉ GOLD PROJECT** **DRAFT ENVIRONMENTAL EFFECTS REVIEW REPORT**		
	UPDATED TECHNICAL MEMORANDUM: WATER QUALITY		

1.0 INTRODUCTION AND PROJECT OVERVIEW

The Côté Gold Project (the Project) is a pre-feasibility level gold project located in the Chester and Neville Townships, District of Sudbury, in northeastern Ontario, approximately 20 kilometres (km) southwest of Gogama, 130 km southwest of Timmins, and 200 km northwest of Sudbury. IAMGOLD Corporation (IAMGOLD) proposes to construct, operate and eventually rehabilitate a new open pit gold mine on the property. Following the receipt of the Environmental Assessment (EA) Decision for the Project, issued by the Federal Minister of Environment and Climate Change Canada in 2016, IAMGOLD are proposing to optimize the Project and an Environmental Effects Review (EER) is being prepared.

This updated technical memorandum has been prepared by Golder Associates and is one of a series of technical memoranda to support the EER for the Project. In addition to this memorandum, the following memoranda have been prepared and used to support the EER:

- Updated Air Quality Technical Memorandum;
- Updated Noise and Vibration Technical Memorandum;
- Updated Geochemistry and Geology Technical Memorandum;
- Updated Hydrogeology Technical Memorandum;
- Updated Hydrology and Climate Technical Memorandum;
- Updated Terrestrial Biology Technical Memorandum;
- Updated Aquatic Biology Technical Memorandum;
- Updated Human and Ecological Health Risk Technical Memorandum;
- Updated Land Use Technical Memorandum;

- Updated Traditional Land Use Technical Memorandum;
- Updated Built Heritage Technical Memorandum;
- Updated Archaeology Technical Memorandum;
- Updated Visual Aesthetics Technical Memorandum; and
- Updated Socio-Economic Technical Memorandum.

1.1 Water Quality

This Updated Technical Memorandum presents the predicted water quality effects associated with the Project incorporating the revised project description. The predicted water quality effects are based on results simulated using modified versions of the EA water quality models, which have been updated to reflect the reconfigured Project. The Project Site location is shown on Figure 1-1, and the optimized Project Site and layout is shown on Figure 1-2.

Modifications made to the water quality models to reflect the Project reconfiguration are as follows:

- Revisions to infrastructure footprints, such as the open pit, Tailings Management Facility (TMF), mine rock area (MRA), ore stockpiles, and the processing plant.
- Revisions to the mine plan, including mine rock and ore stockpile volumes.
- Addition of surface water features where infrastructure footprints extended into new areas of the watershed.
- Revisions to the baseline water quality inputs to reflect new or additional baseline data collected since the submission of the EA.
- Revisions to closure concepts.
- Incorporation of the updated water balance for each of the Project phases modelled as part of the water quality effects review.

Modifications to the water balance models, which were incorporated into the water quality models, are described in the Updated Hydrology Technical Memorandum.

2.0 METHODOLOGY

2.1 Spatial Boundaries

The Local Study Area (LSA) includes an area beyond the location of the physical works and activities within which effects have the potential to occur as a result of the Project. For water quality, the LSA is defined by lakes and watersheds in the vicinity and downstream of the Project infrastructure. The LSA boundary encompasses the lakes that are included as part of the water quality baseline and prediction of potential effects. As the water quality predictions are dependent on the flow of water, the Water Quality LSA is coincident with the Hydrology LSA. The water quality LSA is shown on Figure 2-1.

The LSA extends to the nearest watershed boundary beyond the proposed infrastructure, open pit, MRA and TMF. Due to the revised locaton of the TMF, the western boundary of the LSA was extended westward relative to the LSA presented in the EA. The LSA is bound by the following features:

- The Great Lakes/James Bay watershed divide along the south.
- The Moore Lake and Schist lake watershed divides to the west.
- Mesomikenda Lake to the east.
- The Somme River system to the north and northwest.

Consistent with the EA, regional effects to water quality are considered to be immaterial and a Regional Study Area (RSA) has not been defined for the water quality component of the EER.

2.2 Temporal Boundaries

The temporal boundaries of the EER remain as those provided in the EA, and will span all phases of the Project:

- Construction;
- Operations;
- Closure; and
- Post-closure.

2.3 Effects Assessment Indicators

The effects assessment indicators have not changed compared to the EA. The following effects assessment indicator was used in the EA and is still valid:

- Change in surface water quality.

For the purposes of the effects predictions for the water quality in the surface water receivers, the simulated concentrations of the above listed parameters are compared to the upper limit of existing conditions (95^{th} percentile baseline concentrations). It should be noted that the 95^{th} percentile baseline concentrations were updated to reflect the additional baseline data collected since submission of the EA.

The criteria used in the EER for the purposes of evaluating the water quality model results are the same Water Quality Guidelines that were used in the EA.

2.4 Prediction of Effects

The water quality effects predictions were completed using a modified GoldSim water quality model to estimate the water quality at key site components and potential changes to the water quality of the receiving and downstream environments. The approach to the modelled prediction of effects along with climate scenarios, is consistent with those applied in the EA.

Predicted effects on receiving environment surface water quality were modelled at the locations presented in Table 2-1. For each watershed, the locations on Table 2-1 below are ordered from upstream to downstream.

Table 2-1: Prediction of Water Quality Effects Locations.

Location	**Rationale for Selection**
Mollie River Watershed	
Moore Lake	Located adjacent to the TMF
Chester Lake	Located adjacent to the MRA, downstream of Moore Lake
Little Clam Lake	Located adjacent to the TMF
Clam Lake	Located adjacent to the TMF, downstream of Little Clam Lake
New Lake	Located adjacent to the MRA, downstream of Chester Lake (1)
Three Duck Lakes (upper)	Receiver of treated effluent (2), downstream of New Lake (1), downstream of Côté Pit Lake (3)
Three Duck Lakes (middle)	Located adjacent to the MRA, downstream of Three Duck Lakes (upper)
Three Duck Lakes (lower)	Located adjacent to the MRA, downstream of Three Duck Lake (middle)
Delaney Lake	Located adjacent to the MRA
Dividing Lake	Located downstream of Three Duck Lakes (lower) and Delaney Lake, most-downstream end of the Mollie River Watershed
Mesomikenda Lake Watershed	
Unnamed Lake #6 (Tributary to Schist Lake Outflow)	Located adjacent to the TMF
Bagsverd Lake (south)	Located adjacent to the TMF and Reclaim Pond
Bagsverd Lake	Located downstream of Schist Lake Mixed Outflow and Bagsverd Lake (south)
Neville Lake	Located downstream of Bagsverd Creek
Mesomikenda Lake (upper)	Located downstream of Neville Lake, most-downstream end of the Mesomikenda Lake Watershed

Notes:
(1) During operations phase and post-closure phase stage I only; during the post-closure phase (stage II) the realignment features are decommissioned and New Lake is reverted to a river system.
(2) During operations phase only.
(3) Downstream of Côté Pit Lake during post-closure phase stage II only.

3.0 PREDICTION OF EFFECTS

Consistent with the EA, the prediction of water quality effects was completed for the construction, operations, closure and post-closure phases of the Project using a combination of qualitative analyses and numerical modelling. The effects predictions for the construction phase were evaluated qualitatively, since the water quality concerns during this phase are largely related to earth works and the control of suspended sediment. A numerical model was used to estimate the water quality at key site components and potential changes to the quality of the receiving and downstream surface water environment during the operations phase. These water quality model results were also conservatively applied to the closure phase, as improvements to water quality due to closure work would be largely realized sometime after the start of the closure phase. The models were also used to predict water quality effects during stage I and II of the post-closure phase.

The predictions of potential effects for each Project phase, as determined by the qualitative analysis and numerical modelling, are presented in the following sections.

3.1 Construction Phase

During the construction phase, the Project activities will consist of the development of site infrastructure and associated facilities prior to initiation of open pit mining. Project components, such as the MRA or TMF, are therefore not expected to be developed sufficiently to influence site water quality. However, a key water quality consideration related to construction is erosion and transport of suspended solids into the adjacent surface water features due to earthwork and other activities that will disturb soil. The implementation of Best Management Practices (BMPs) for the control of erosion and sediment transport during construction will consist of: contingency planning, monitoring, erosion control measures, runoff management, sediment control measures, and maintenance. The BMPs for erosion and sediment control are therefore expected to mitigate releases of suspended solids to the adjacent surface water bodies and to limit potential changes to total suspended solids concentrations. Examples of BMPs for erosion and sediment control are listed in Section 4.0.

The BMPs for sediment and erosion control will continue to be used during the operations, closure and post-closure phases, as required. Overall, the water quality of the surface water receivers during the construction phase is expected to remain within the range of concentrations observed under existing conditions.

3.2 Operations Phase

3.2.1 Mollie River Watershed

The minimum and maximum monthly average concentrations taken from the results of average, 1:25-year dry and 1:25-year wet conditions for the locations in the Mollie River Watershed are compared to the 95th percentile baseline concentrations and Water Quality Guidelines in Appendix II.

Based on the predicted monthly average concentrations in the Mollie River Watershed during the operations phase, the key results are as follows:

- Concentrations of some parameters are predicted to be intermittently or continuously greater than the 95th percentile baseline concentrations in most lakes in the Mollie River Watershed, including Moore Lake, Clam Lake, Chester Lake, Three Duck Lakes, and Dividing Lake; the pararmeters that are intermittentily or continuously greater than the 95th percentile baseline concentrations include: ammonia (total), ammonia (un-ionized), antimony, barium, calcium, cobalt, molybdenum, nickel, nitrate, potassium, sodium, strontium, sulphate and vanadium.

- Concentrations of total and free cyanide are predicted to be intermittently or continuously greater than the 95th percentile baseline concentrations in all lakes in the Mollie River Watershed except Delaney Lake, which does not receive (or is not downstream of a lake that receives) seepage that bypasses the TMF seepage collection system. The concentrations of free cyanide are less than the Water Quality Guideline.

- During average and 1:25-wet year conditions, model predictions suggest that concentrations of arsenic in Three Duck Lakes (upper) and Three Duck Lakes (middle) will occur at concentrations that are less than the Water Quality Guideline. However, during the 1:25-dry year conditions, concentrations of arsenic are predicted to be intermittently greater than the Water Quality Guideline (i.e., 6 months of the 1:25-dry year in Three Duck Lakes [upper] and 3 months of the 1:25-dry year in Three Duck Lakes [middle]). The maximum predicted monthly average arsenic concentrations in Three Duck Lakes (upper) (0.0071 mg/L) and Three Duck Lakes (middle) (0.0058 mg/L) are only slightly higher than the Water Quality Guideline of 0.005 mg/L. The concentrations of arsenic in Three Duck Lakes (lower) are less than the Water Quality Guideline under all three climate conditions. For clarity, the minimum and maximum monthly average arsenic concentrations in Three Duck Lakes (upper/middle/lower) under the three modelled climate conditions are summarized in Table 3-1.

Table 3-1: Predicted Monthly Average Arsenic Concentrations in Three Duck Lakes (Upper, Middle, and Lower Basins).

Climate Condition	Three Duck Lakes (Upper)		Three Duck Lakes (Middle)		Three Duck Lakes (Lower)	
	Minimum Monthly Average Arsenic (mg/L)	Maximum Monthly Average Arsenic (mg/L)	Minimum Monthly Average Arsenic (mg/L)	Maximum Monthly Average Arsenic (mg/L)	Minimum Monthly Average Arsenic (mg/L)	Maximum Monthly Average Arsenic (mg/L)
Average	0.0027	0.0043	0.0029	0.0042	0.0034	0.0037
1:25-year Wet	0.0026	0.0041	0.0028	0.0039	0.0033	0.0037
1:25-Year Dry	0.0035	**0.0071**	0.0038	**0.0058**	0.0037	0.0042

Notes:
Bold shading indicates a predicted concentration greater than the Water Quality Guideline of 0.005 mg/L, which, for the purposes of the EER, is a compilation of the most recent of the Provincial Water Quality Objectives or Canadian Water Quality Guidelines (for arsenic, the most recent guideline is the Canadian Water Quaity Guideline).

- Concentrations of aluminum and iron are predicted to be intermittently or continuously greater than the Water Quality Guideline in most lakes in the Mollie River Watershed; noting that the 95th percentile baseline concentrations for these parameters are greater than Water Quality Guideline, and as such the predicted aluminum and iron concentrations in the lakes are less than the 95th percentile concentration.
- No other parameters that were modelled are predicted to be greater than the Water Quality Guidelines in the Mollie River Watershed.

3.2.2 Mesomikenda Lake Watershed

The minimum and maximum monthly average concentrations taken from the results of average, 1:25-year dry and 1:25-year wet conditions for the locations in the Mesomikenda Lake Watershed are compared to the 95th percentile baseline concentrations and Water Quality Guidelines in Appendix II.

Based on the predicted monthly average concentrations in the Mesomikenda Lake Watershed during the operations phase, the key results are as follows:

- Concentrations of some parameters are predicted to be intermittently or continuously greater than the 95th percentile baseline concentrations in most lakes in the Mesomikenda Lake Watershed, including Bagsverd Lake, Neville Lake and Mesomikenda Lake (upper basin); the pararmeters that are intermittentily or continuously greater than the 95th percentile baseline concentrations include: ammonia (un-ionized), antimony, cobalt, cyanide (total), molybdenum, nickel, nitrate, sulphate and vanadium.
- Concentrations of total cyanide are predicted to be intermittently or continuously greater than the 95th percentile baseline concentrations in all lakes in the Mesomikenda Lake Watershed (receiving or downstream of a lake that receives seepage that bypasses the TMF seepage collection). The concentrations of free cyanide are less than the Water Quality Guideline.
- Concentrations of aluminum are predicted to be intermittently or continuously greater than the Water Quality Guideline in most lakes in the Mesomikenda Lake Watershed; noting that the 95th percentile baseline concentrations for aluminum is greater than Water Quality Guideline, and as such, the predicted aluminum concentrations in the lakes are less than the 95th percentile baseline concentration.
- No other parameters are predicted to occur at concentrations greater than the Water Quality Guidelines in the Mesomikenda Lake Watershed.

3.3 Closure Phase

The closure phase will consist of decommissioning and rehabilitation works in accordance with the closure concept presented in the Project Description. Similar to the construction phase, a key water quality consideration related to closure is erosion and transport of suspended solids into the adjacent surface water features due to earthworks and other activities that will disturb soil. BMPs for control of erosion and sediment transport will be implemented during closure. These BMPs will minimize the potential for erosion and mitigate any potential increases to total suspended solids in the surface water receivers.

For the purposes of the water quality effects predictions for the closure phase, the water quality model results for the operations phase were applied to the closure phase. For the locations in the Mollie River watershed, applying the operations phase model results for the closure phase are conservative, as the treated effluent is no longer being discharged to the environment from the polishing pond. As the predicted effects to water quality dissipate, due to discharge of treated effluent, the water quality at the modelled locations in the Mollie River Watershed is expected to improve over time relative to the predictions for the operations phase. For the locations in the Mesomikenda Lake Watershed, applying the operations model results are reasonable, as the sources of mass load during the closure phase will not change considerably from operations.

3.4 Post-Closure Phase

3.4.1 Post-Closure Phase Stage I

The water quality model for the operations phase was modified to model the post-closure phase in accordance with the closure concept presented in the Project Description. During post-closure (stage I), realignment features remain in place and the water level in the open pit will rise in response to precipitation inputs, runoff, groundwater inflow and active pumping of the MRA, TMF and various seepage collection ponds. The end of the post-closure phase (stage I) is roughly delineated by the completion of the filling of the open pit (approximately 25 years after closure as described in the Updated Hydrology Technical Memorandum).

3.4.1.1 Mollie River Watershed

The minimum and maximum monthly average concentrations taken from the results of average, 1:25-year dry and 1:25-year wet conditions for the locations in the Mollie River Watershed are compared to the 95th percentile baseline concentrations and Water Quality Guidelines in Appendix II.

Based on the predicted monthly average concentrations in the Mollie River Watershed during the post-closure phase (stage I), the key results are as follows:

- Concentrations of some parameters are predicted to be intermittently or continuously greater than the 95th percentile baseline concentrations in most lakes in the Mollie River Watershed, including Moore Lake, Clam Lake, Chester Lake, Three Duck Lakes, and Dividing Lake; the pararmeters that are intermittentily or continuously greater than the 95th percentile baseline concentrations include: ammonia (total), ammonia (un-ionized), antimony, barium, calcium, cobalt, molybdenum, nickel, nitrate, potassium, sodium, strontium, sulphate and vanadium concentrations are predicted to be intermittently or continuously greater than the 95th percentile baseline concentrations.

- Concentrations of total and free cyanide are predicted to be intermittently or continuously greater than the 95th percentile baseline concentrations in most lakes in the Mollie River Watershed that receive or are downstream of a lake in the that receives seepage that bypasses the TMF seepage collection; noting that it is assumed that seepage from the TMF will continue to contain cyanide during this post-closure phase (stage I). The concentrations of free cyanide are less than the Water Quality Guideline.
- Concentrations of aluminum and iron are predicted to be intermittently or continuously greater than the Water Quality Guideline in most lakes in the Mollie River Watershed, noting that the 95th percentile baseline concentrations for these parameters are greater than Water Quality Guideline, and as such, the predicted aluminum and iron concentrations in the lakes are less than the 95th percentile baseline concentration.No other parameters are predicted to occur at concentrations greater than the Water Quality Guidelines in the Mollie River Watershed.

3.4.1.2 Mesomikenda Lake Watershed

The minimum and maximum monthly average concentrations taken from the results of average, 1:25-year dry and 1:25-year wet conditions for the locations in the Mesomikenda Lake Watershed are compared to the 95th percentile baseline concentrations and Water Quality Guidelines in Appendix II.

Based on the predicted monthly average concentrations in the Mesomikenda Lake Watershed during the post-closure phase (stage I), the key results are as follows:

- Concentrations of some parameters are predicted to be intermittently or continuously greater than the 95th percentile baseline concentrations in most lakes in the Mesomikenda Lake Watershed, including Bagsverd Lake, Neville Lake and Mesomikenda Lake (upper bas in); the pararmeters that are intermittentily or continuously greater than the 95th percentile baseline concentrations include: ammonia (un-ionized), antimony, cobalt, cyanide (total), molybdenum, nickel, nitrate, sulphate and vanadium concentrations are predicted to be intermittently or continuously greater than the 95th percentile baseline concentrations.
- Concentrations of total cyanide are predicted to be intermittently or continuously greater than the 95th percentile baseline concentrations in all lakes in the Mesomikenda Lake Watershed that receive or are downstream of a lake that receives seepage that bypasses the TMF seepage collection; noting that it is assumed that seepage from the TMF will continue to contain cyanide during this post-closure phase (stage I).

- Concentrations of aluminum are predicted to be intermittently or continuously greater than the Water Quality Guideline in most lakes in the Mesomikenda Lake Watershed, noting that the 95th percentile baseline concentration for aluminum is greater than Water Quality Guideline and as such, the predicted aluminum concentrations in the lakes are less than the 95th percentile baseline concentration.
- No other parameters are predicted to occur at concentrations greater than the Water Quality Guidelines in the Mesomikenda Lake Watershed.

3.4.2 Post-Closure Phase Stage II

The water quality model concept for the post-closure phase stage II is based on modifications to the stage I model, which account for the changes to the Project site hydrology and rehabilitation measures. In the post-closure phase (stage II), the water level will have recovered in the Côté Pit to an elevation sufficient to cause overflow (and reconnection) of the pit lake to the upper basin of Three Duck Lakes. The decommissioning of the realignment features will result in watersheds that more closely resemble those of existing conditions.

3.4.2.1 Mollie River Watershed

The minimum and maximum monthly average concentrations taken from the results of average, 1:25-year dry and 1:25-year wet conditions for the locations in the Mollie River Watershed are compared to the 95th percentile baseline concentrations and Water Quality Guidelines in Appendix II.

Based on the predicted monthly average concentrations in the Mollie River Watershed during the post-closure phase (stage II), the key results are as follows:

- Concentrations of some parameters are predicted to be intermittently or continuously greater than the 95th percentile baseline concentrations in most lakes in the Mollie River Watershed, including Moore Lake, Clam Lake, Chester Lake, and Three Duck Lakes; the pararmeters that are intermittentily or continuously greater than the 95th percentile baseline concentrations include: ammonia (un-ionized), antimony, barium, cobalt, molybdenum, nickel, nitrate, potassium, sodium, sulphate and vanadium concentrations are predicted to be intermittently or continuously greater than the 95th percentile baseline concentrations.
- Concentrations of aluminum and iron are predicted to be intermittently or continuously greater than the Water Quality Guideline in most lakes in the Mollie River Watershed, noting that the 95th percentile baseline concentrations for these parameters are greater than Water Quality Guideline and as such, the predicted aluminum and iron concentrations in the lakes are less than the 95th percentile baseline concentration.

- No other parameters are predicted to occur at concentrations greater than the Water Quality Guidelines at any locations in the Mollie River Watershed.

3.4.2.2 Mesomikenda Lake Watershed

The minimum and maximum monthly average concentrations taken from the results of average, 1:25-year dry and 1:25-year wet conditions for the locations in the Mesomikenda Lake Watershed are compared to the 95th percentile baseline concentrations and Water Quality Guidelines in Appendix II.

Based on the predicted monthly average concentrations in the Mesomikenda Lake Watershed during the post-closure phase (stage II), the key results are as follows:

- Concentrations of some parameters are predicted to be intermittently or continuously greater than the 95th percentile baseline concentrations in most lakes in the Mesomikenda Lake Watershed, including Bagsverd Lake, Neville Lake and Mesomikenda Lake (upper bas in); the pararmeters that are intermittentily or continuously greater than the 95th percentile baseline concentrations include: ammonia (un-ionized), antimony, cobalt, molybdenum, nickel, nitrate, and vanadium.
- No other parameters are predicted to occur at concentrations greater than the Water Quality Guidelines in the Mesomikenda Lake Watershed.

4.0 MITIGATION MEASURES

Mitigation measures are means to prevent, reduce or control adverse environmental effects of a project, and include restitution for any damage to the environment caused by those effects through replacement, restoration, compensation or any other means.

Table 4-1 provides the mitigation measures applicable to the EER and indicates if the mitigation measures have changed or stayed the same from the EA.

Table 4-1: Mitigation Measures – Water Quality

Discipline	Project Phase	Issue / Concern / Interaction	Mitigation Measure	Description / Commitment	Standard	Comparison between EA and EER measures
Measures applicable to the EER						
Water Quality	Construction phase, operations phase, closure phase, and post-closure phase (stages I and II)	Discharge of total suspended solids due to soil erosion and transport of sediments from disturbed areas, and potential increases in total suspended solids concentrations within surface water receivers.	Best Management Practices (BMPs) and engineering designs to limit soil erosion and mobilization/transport of sediments from disturbed areas.	During construction, operations and closure phases, BMPs for erosion and sediment control include: design of physically stable mine rock and tailings storage facilities, the use of earthwork methods to minimize slope length and grade, ditching, sediment ponds/traps, channel and slope armouring, use of natural vegetation buffers, vegetation of disturbed soil, and runoff controls (i.e., sediment fencing and small check dams). During post-closure, erosion and sediment control would be focused on monitoring the success of closure activities.	Total suspended solids discharge limits: Metal Mining Effluent Regulations (MMER), and Ontario Regulation 560/94, Effluent Monitoring and Effluent Limits – Metal Mining Sector. Total suspended solids (and turbidity) water quality guidelines: Canadian Water Quality Guidelines for the Protection of Aquatic Life and Provincial Water Quality Objectives.	The mitigation measure has not changed from the EA.

Discipline	Project Phase	Issue / Concern / Interaction	Mitigation Measure	Description / Commitment	Standard	Comparison between EA and EER measures
Water Quality	Operations phase	Potential influence of process water and seepage/run off from TMF on receiving environment water quality.	Treatment of process water; construction and operation of engineered water management systems to collect runoff and seepage from the TMF; reclaim water returned (or recycled) to the process plant; use of liners on starter tailings dams to limit seepage losses during the early years of operations.	Process water will be treated at the ore processing plant for cyanide, cyanide destruction constituents, as required, prior to discharge into the TMF. Seepage and runoff will be collected at collection ponds around the perimeter of the TMF and pumped to the TMF reclaim pond. Water in the reclaim pond will be recycled back to the ore processing plant, with no water from the reclaim pond being discharged to the environment through the polishing pond under normal flow conditions.	Effluent discharge requirements under: Metal Mining Effluent Regulations (MMER), and Ontario Regulation 560/94, Effluent Monitoring and Effluent Limits – Metal Mining Sector. Water quality guidelines: Canadian Water Quality Guidelines for the Protection of Aquatic Life and Provincial Water Quality Objectives.	The mitigation measure has not changed from the EA.

Discipline	Project Phase	Issue / Concern / Interaction	Mitigation Measure	Description / Commitment	Standard	Comparison between EA and EER measures
Water Quality	Operations and closure phases	Potential influence of seepage/run off from MRA, low-grade stockpile and open pit on receiving environment water quality.	Construction and operation of engineered water management systems to collect runoff and seepage; monitoring and treatment of effluent, as required.	Open pit inflow and runoff will be collected in the open pit sump. Seepage and runoff from the MRA and from the low-grade stockpile will be collected in ponds. During the operations phase, water collected by these facilities will be pumped to the polishing pond. The excess water in the polishing pond, which will be monitored for water quality, is discharged to the environment.	Effluent discharge requirements under: Metal Mining Effluent Regulations (MMER), and Ontario Regulation 560/94, Effluent Monitoring and Effluent Limits – Metal Mining Sector. Water quality guidelines: Canadian Water Quality Guidelines for the Protection of Aquatic Life and Provincial Water Quality Objectives.	The mitigation measure has not changed from the EA.

Discipline	Project Phase	Issue / Concern / Interaction	Mitigation Measure	Description / Commitment	Standard	Comparison between EA and EER measures
Water Quality	Operations phase	Potential influence of explosives residuals in mine rock, low-grade ore and open pit on receiving environment water quality (i.e., ammonia and nitrate).	BMPs for explosives use.	Implementation of BMPs during blasting to reduce the blast waste rate and mass of residual explosives present in the open pit, mine rock, low-grade ore and dam construction material.	Water quality guidelines: Canadian Water Quality Guidelines for the Protection of Aquatic Life and Provincial Water Quality Objectives.	The mitigation measure has not changed from the EA.
Water Quality	Operations phase	Potential influence of sewage on receiving environment water quality.	Treatment of sewage.	Sewage will be treated to a quality that meets federal and provincial legislative requirements before discharge to the environment.	Effluent discharge requirements under: Wastewater Systems Effluent Regulations, and Ontario *Water Resources Act* (Section 53)	The mitigation measure has not changed from the EA.

Discipline	Project Phase	Issue / Concern / Interaction	Mitigation Measure	Description / Commitment	Standard	Comparison between EA and EER measures
Water Quality	Operations phase, closure phase, post-closure phase (stages I and II)	Potential impact of landfill leachate from solid domestic and industrial waste on groundwater quality.	Management of solid domestic and industrial waste in a permitted landfill, including the use of BMPs; monitoring of groundwater quality; remedial action, as required.	Solid domestic and industrial waste will be placed into a landfill that will be operated in accordance with federal and provincial legislative requirements, and BMPs, including mitigation, monitoring, remedial action, and closure plans, will be integrated into the operation and closure of the landfill.	Ontario Regulation 232/98	The mitigation measure has not changed from the EA.
Water Quality	Operations phase, closure phase, post-closure phase (stages I and II)	Acid rock drainage from the MRA potentially affecting effluent quality	Inclusion of PAG rock within the bulk of the MRA.	The inclusion of any PAG materials with the bulk of the waste will likely be an appropriate management method and segregation of any PAG materials does not appear to be necessary.	n/a	The mitigation measure has not changed from the EA.
Water Quality	Construction, operations and closure phases	Acid rock drainage from onsite roads	Use of non-acid generating materials for road construction purposes.	IAMGOLD will sample mine rock to ensure only non-acid generating materials are used for construction purposes.	n/a	The mitigation measure has not changed from the EA.

Discipline	Project Phase	Issue / Concern / Interaction	Mitigation Measure	Description / Commitment	Standard	Comparison between EA and EER measures
Water Quality	Post-closure phase (stage II)	Potential influence of seepage/run off from MRA and Côté Pit Lake on receiving environment water quality.	Monitoring and, if determined to be required, water collection and treatment.	Seepage and runoff from the MRA and water in the open pit will be monitored prior to post-closure phase (stage II). If the monitoring determines that the water quality is not suitable for discharge to the environment, then collection and treatment measures will be implemented accordingly.	Water quality guidelines: Canadian Water Quality Guidelines for the Protection of Aquatic Life and Provincial Water Quality Objectives.	The mitigation measure has not changed from the EA.

5.0 MANAGEMENT

The table below provides the monitoring measures applicable to the EER and indicates if the management measures have changed or stayed the same from the EA.

Table 5-1: Monitoring Measures – Water Quality

Discipline	Parameter	Monitoring Method	Standard	Frequency / Timeframe	Location	Comparison between EA and EER measures
Measures applicable to the EER						
Water Quality	Surface water quality samples will be analyzed for various general chemistry, metals, ions, nutrients, cyanide species, a radionuclide, organic parameters, and total and methyl mercury. The parameters suite may be reduced if it can be demonstrated that any of the tests are not applicable. Additional parameters may be considered depending on site-specific characteristics.	Surface water grab sample collection using in-field filtering and preservation, as required. Quality assurance /quality control samples such as blind duplicates, trip blanks, field blanks and filter blanks will be collected during each sampling event to represent a minimum of 10% of the samples.	Provincial Water Quality Objectives (PWQO) and Canadian Water Quality Guidelines (CWQG), with laboratory detection limits suitable for comparison to these guidelines. *Metal Mining Effluent Regulations* (MMER) and Ontario Regulation 560/94. Concentrations in mine-exposed areas will also be compared to baseline and	Sampling events will be conducted during all Project phases at a frequency sufficient to detect changes in water quality; the frequency will depend on the station location and will aim to capture a range of flow conditions, as required. The frequency of effluent monitoring will meet federal and provincial effluent discharge requirements.	Project site components: open pit sump, seepage collection ponds, mine water pond, reclaim pond, polishing pond and domestic sewage effluent outlets as appropriate to the mine phase. Surface water receivers: Moore Lake, Chester Lake, Little Clam Lake, Clam Lake, Three Duck Lakes (upper, middle and lower basins), Mollie River between Three Duck Lakes and Dividing Lake, Dividing Lake, Bagsverd Lake, Unnamed Lake #6, Schist Lake, Neville Lake, Mesomikenda Lake (upper basin) and downstream from the local study area (downstream from Mesomikenda Lake and Dividing Lake). Samples will also be collected in appropriate reference areas.	Surface water receivers to be monitored have been updated from the EA to reflect the EER project description.

Discipline	Parameter	Monitoring Method	Standard	Frequency / Timeframe	Location	Comparison between EA and EER measures
			reference area values.			
Water Quality	Groundwater quality samples will be analyzed for various general chemistry, major ions, metals nutrients, cyanide species and organic parameters. A complete parameter list is attached below. The parameters suite may be reduced if it can be demonstrated that any of the tests are not applicable. Additional parameters may be considered depending on site-specific characteristics.	Groundwater sample collection using pumping techniques and in-field filtering and preservation, as required. Quality assurance /quality control samples such as blind duplicates, trip blanks, field blanks and filter blanks will be collected during each sampling round.	Ontario Drinking Water Standards (ODWS**)**, PWQO and CWQG, with laboratory detection limits suitable for comparison to these guidelines. MMER and Ontario Regulation 560/94	Sampling events will be conducted during all Project phases at a frequency sufficient to detect changes in water quality; the frequency will therefore depend on the station location and will aim to capture a range of flow conditions, as required. The frequency of effluent monitoring will meet federal and provincial effluent discharge requirements.	Groundwater monitoring wells around the MRA, ore stockpiles, and TMF, polishing pond and landfill (if constructed).	The mitigation measure has not changed from the EA.

Discipline	Parameter	Monitoring Method	Standard	Frequency / Timeframe	Location	Comparison between EA and EER measures
Water Quality	Sediment quality samples will be analyzed for major ions, metals, nutrients (total nitrogen, total phosphorus), carbonate, organic carbon, sulphate, sulphide, particle size, total cyanide, total and methyl mercury. The parameters suite may be reduced if it can be demonstrated that any of the tests are not applicable. Additional parameters may be considered depending on site-specific characteristics.	Sampling method will be consistent with that described for the aquatic monitoring program (i.e., grab or core sample).	Ontario's Provincial Sediment Quality Objectives (PSQO) and the Canadian Sediment Quality Guidelines (CSQG). Concentrations in mine-exposed areas will also be compared to baseline and reference area values.	Sampling events will be conducted at a frequency sufficient to detect changes in sediment quality, and harmonized with the Environmental Effects Monitoring (EEM) as practicable.	Lakes where changes to water quality are expected. Harmonized with EEM as practicable.	The mitigation measure has not changed from the EA.

6.0 CONCLUSION

The revised water quality modelling has simulated wet, dry and average climate conditions and has incorporated the EER revised Project description. Potential effects to water quality during the construction and closure phases are discussed qualitatively, whereas potential effects to water quality were predicted using a numerical model for the operations and post-closure phases.

The key conclusions of the EER on water quality are as follows:

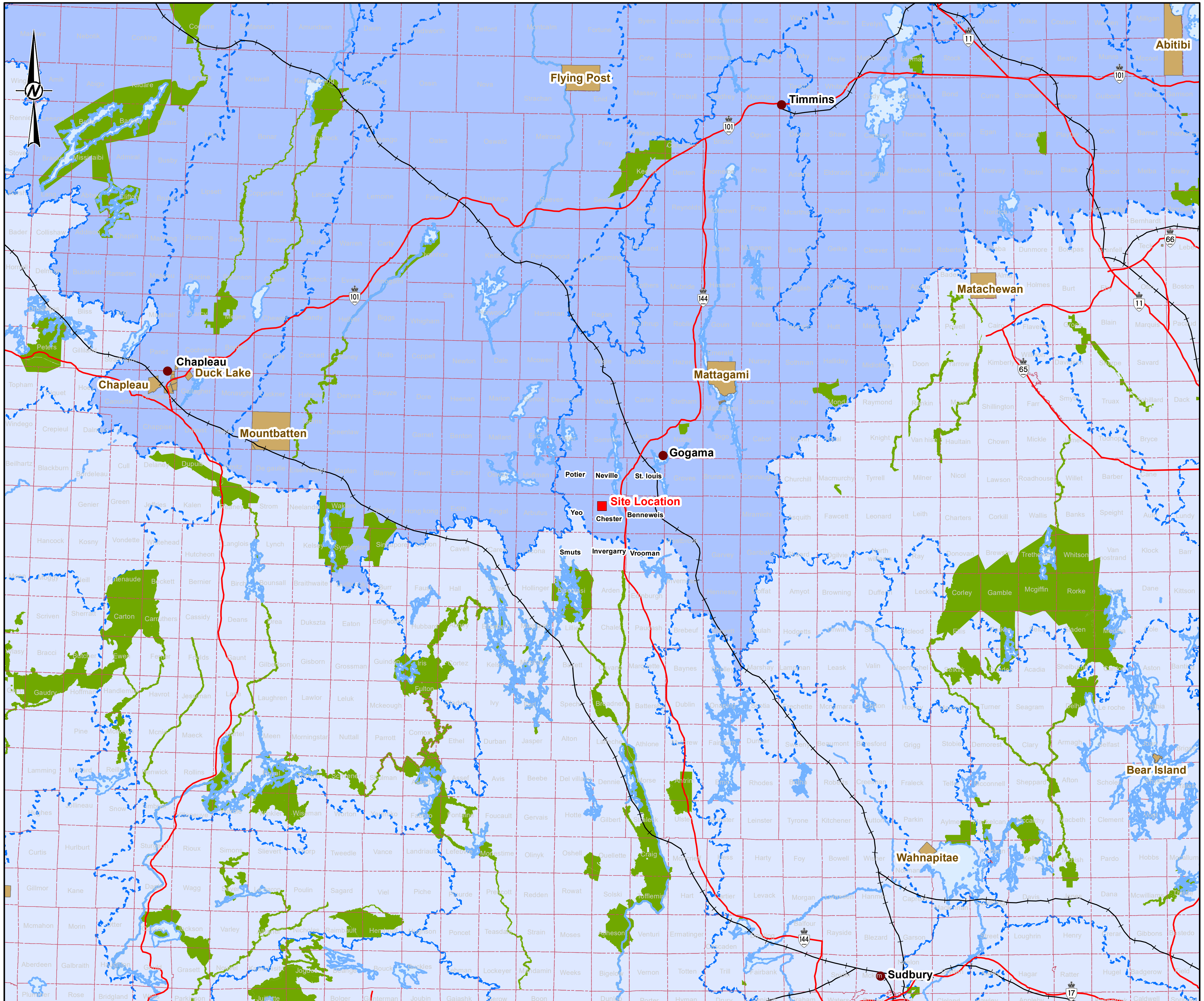
- During the construction phase, the Project components are not expected to be developed sufficiently to influence site water quality; therefore, with the implementation of BMPs for sediment and erosion control, the water quality of the modelled surface water receivers is expected to remain within the range of concentrations observed under existing conditions.
- During the operations, closure and post-closure phase (stage I), monthly average concentrations of some major ions, metals and cyanide are predicted to be continuously to intermittently greater than the 95^{th} percentile baseline concentrations in the Mollie River Watershed and Mesomikenda Lake Watershed.
- Monthly average concentrations during all Project phases, with the exception of arsenic in Three Duck Lakes (upper) and Three Duck Lakes (middle) under the 1:25-dry year climate condition only, are predicted to be below the Water Quality Guidelines. Although maximum monthly average arsenic concentrations are predicted to be greater than the Water Quality Guideline, any potential related effects are immaterial because the concentrations that are predicted to be greater than the Water Quality Guidelines are: 1) only slightly above the Water Quality Guideline, even at the highest predicted monthly average concentration; 2) limited to Three Duck Lakes (upper) and Three Duck Lakes (middle) and therefore limited in geographic extent; 3) limited to only the months of June through November in Three Duck Lakes (upper) and September through November in Three Duck Lakes (middle), and therefore limited in duration and not continuous; and 4) limited to the 1:25-year dry climate condition and therefore very limited in frequency.

The prediction of water quality effects was completed based on several inherent mitigation measures that have been included in the design of the Project. Monitoring programs pertinent to water quality will be implemented during the construction, operations, closure and post-closure phases of the Project. The purpose of the monitoring program is to confirm the results of the effects predictions presented herein, and to provide a basis for future decision making regarding the environmental management of the Project.

7.0 GLOSSARY AND ABBREVIATIONS

EA	Environmental Assessment
km	Kilometre
mg/L	milligrams per litre
MRA	Mine Rock Area
TMF	Tailings Management Facility

FIGURES

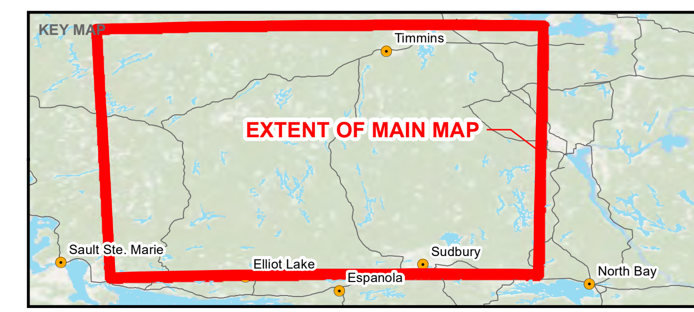


LEGEND

- Site Location
- Major Roads
- Railway
- Community
- First Nations Community
- Townships
- Provincial Park
- Waterbody

Primary Watersheds

- Hudson Bay
- Great Lakes



NOTES

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1789673/1000

REFERENCE

BASE DATA - ATLAS OF CANADA,
BASE IMAGERY - MICROSOFT BING ©2015 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.
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HTTPS://WWW.ONTARIO.CA/GOVERNMENT/OPEN-GOVERNMENT-LICENCE-ONTARIO
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COORDINATE SYSTEM: UTM ZONE 17 VERTICAL DATUM: CGVD28

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METRES

SCALE 1:1,000,000

CLIENT
IAMGOLD

IAMGOLD

PROJECT
ENVIRONMENTAL EFFECT REVIEW - HYDROLOGY
CÔTÉ GOLD PROJECT

TITLE
PROJECT LOCATION

CONSULTANT

GOLDER

YYYY-MM-DD	2018-12-19
PREPARED	RRD
DESIGN	--
REVIEW	SF
APPROVED	SK

PROJECT No.	CONTROL	Rev.	FIGURE
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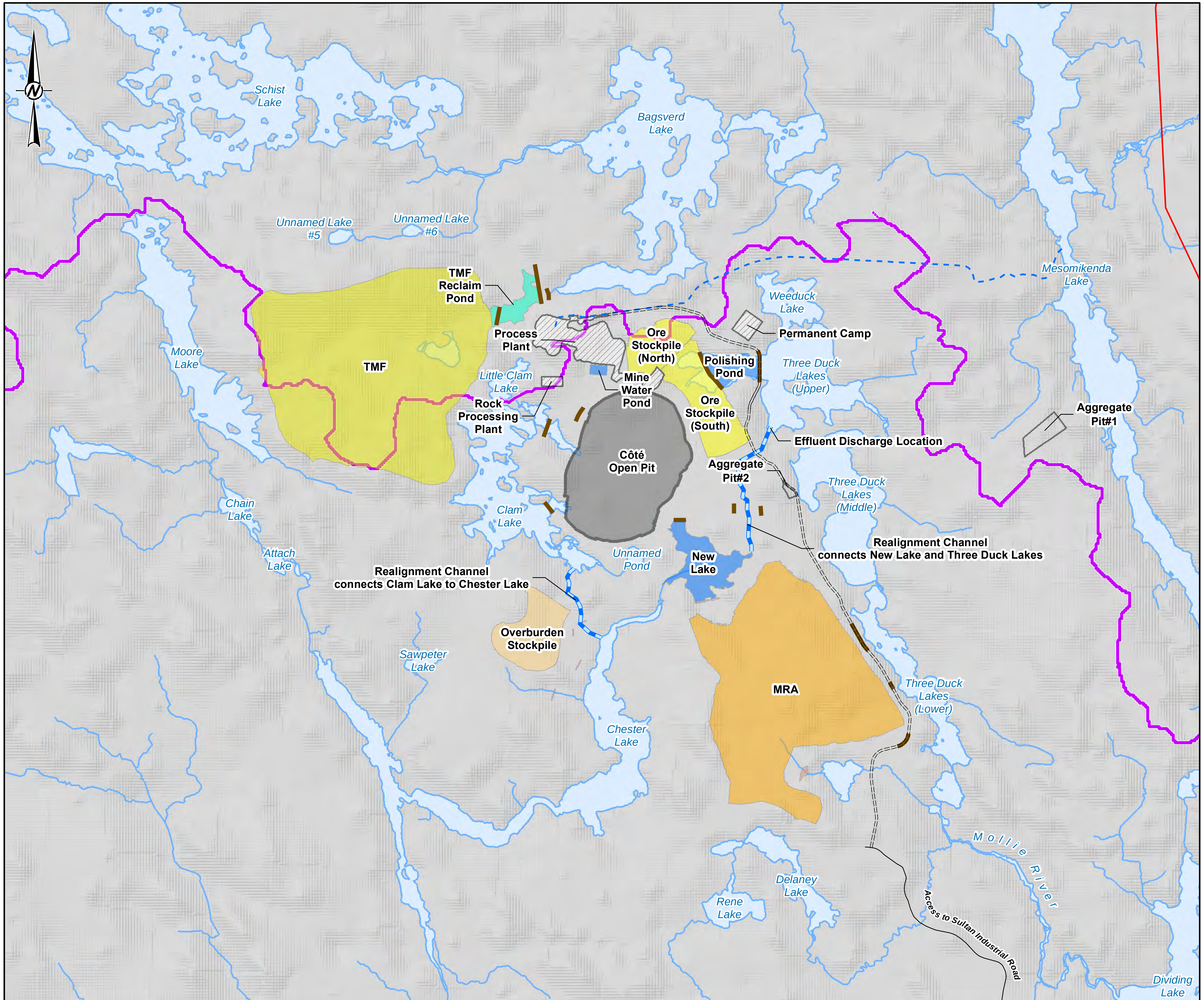

LEGEND

- Major Roads
- Roads
- Main Access Road
- Mollie River Watershed
- Waterbodies

Proposed Infrastructure

- Aggregate Pit
- Infrastructure
- Mine Rock Area (MRA)
- Open Pit
- Ore Stockpile
- Overburden Stockpile
- Polishing Pond
- Tailings Management Facility (TMF)
- TMF Reclaim Pond
- Water
- Dam
- Fresh Water Pipeline
- Realignment Channel

NOTES

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REFERENCE

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SCALE 1:40,000

CLIENT
IAMGOLD CORPORATION

PROJECT
ENVIRONMENTAL EFFECT REVIEW - WATER QUALITY
CÔTÉ GOLD PROJECT

TITLE
SITE PLAN

CONSULTANT		
GOLDER	YYYY-MM-DD	2018-12-19
	PREPARED	RRD
	DESIGN	--
	REVIEW	NK
	APPROVED	MRG

PROJECT No.	CONTROL	Rev.	FIGURE
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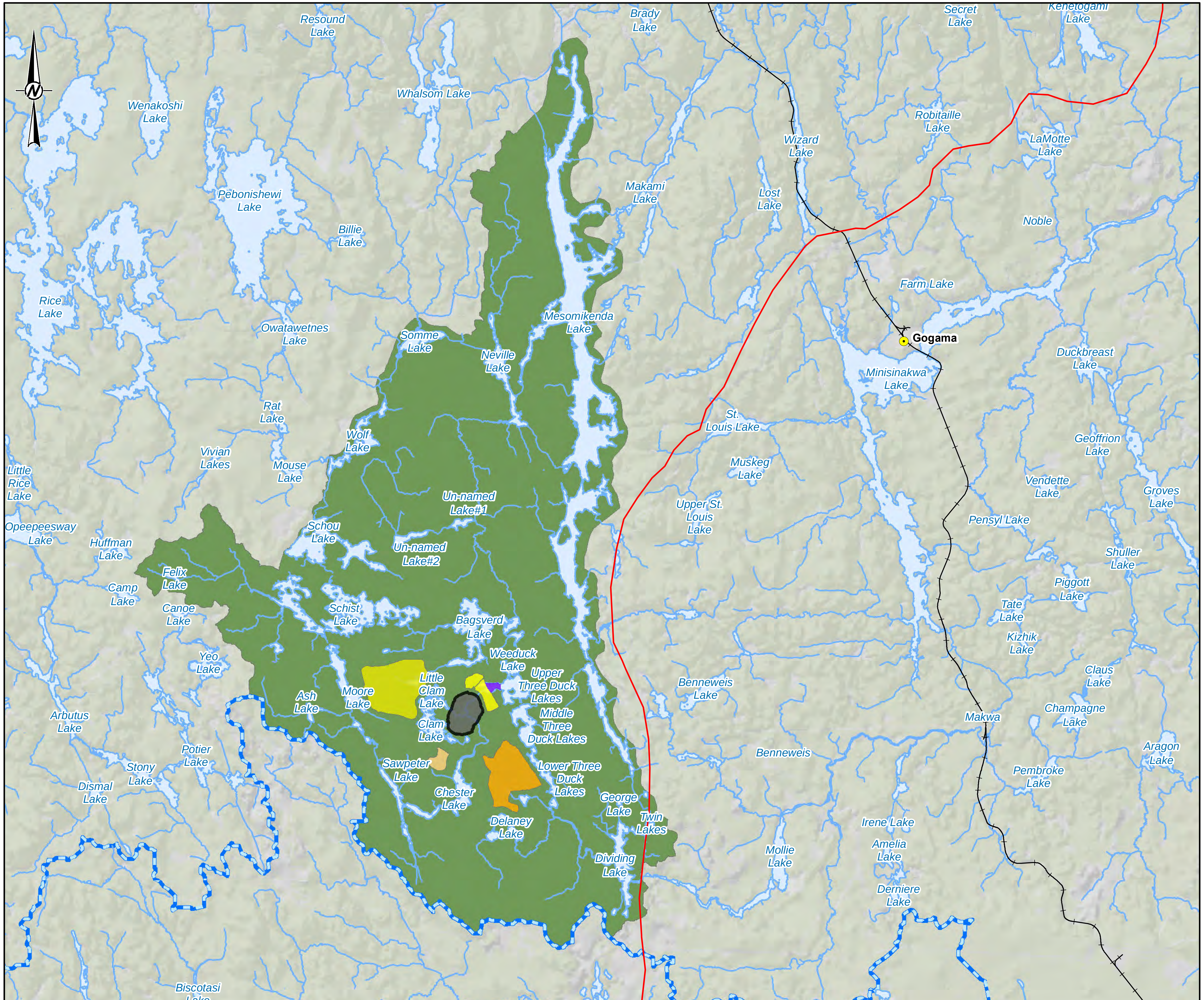

LEGEND

- Regional Communities
- Major Roads
- Railway
- Waterbodies
- Hydrogeology Local Study Area (LSA)
- Great Lakes / James Bay Watershed Divide

Proposed Infracture

- Mine Rock Area (MRA)
- Open Pit
- Ore Stockpile
- Overburden Stockpile
- Polishing Pond
- Tailings Management Facility (TMF)

NOTES

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1789673/2000

REFERENCE

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COORDINATE SYSTEM: UTM ZONE 17 VERTICAL DATUM: CGVD28

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METRES
SCALE 1:145,000

CLIENT
IAMGOLD CORPORATION

IAMGOLD

PROJECT
ENVIRONMENTAL EFFECT REVIEW - WATER QUALITY
CÔTÉ GOLD PROJECT

TITLE
WATER QUALITY LOCAL STUDY AREA

CONSULTANT

GOLDER

YYYY-MM-DD	2018-12-19
PREPARED	RRD
DESIGN	--
REVIEW	NK
APPROVED	MRG

PROJECT No.	CONTROL	Rev.	FIGURE
1789673	0003	0	2-1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:

APPENDIX I
EXECUTIVE SUMMARY

IAMGOLD

IAMGOLD Corporation (IAMGOLD) intends to develop and operate an open pit gold mine and associated facilities and infrastructure in northern Ontario approximately 20 kilometres (km) southwest of Gogama, 130 km southwest of Timmins, and 200 km northwest of Sudbury; this mining project is referred to as the Côté Gold Project (the Project). The landscape is characterized with an extensive tree cover and subdued topography, and is dominated by numerous lakes, streams and wetlands along with extensive bedrock outcrops; typical of northern Ontario. The area has experienced limited historical mining and current activities include forestry, mine exploration and some recreational activities.

Golder Associates completed a technical study in 2013 & 2014 of the potential water quality effects of the Project for the purposes of the Federal Amended Environmental Impact Statement and Provincial Environmental Assessment (EA) Report. Based on an evolving Project design, IAMGOLD has elected to evaluate changes in Project effects through an Environmental Effects Review. This Updated Technical Memorandum presents the predicted water quality effects associated with the Project incorporating the revised project description. The predicted water quality effects are based on results simulated using modified versions of the EA water quality models, which have been updated to reflect the reconfigured Project in accordance with the modified water balance described in the Updated Hydrology Technical Memorandum. Modifications made to the water quality models to reflect the Project reconfiguration are as follows:

- Revisions to infrastructure footprints, such as the open pit, Tailings Management Facility (TMF), mine rock area (MRA), ore stockpiles, and the processing plant.
- Revisions to the mine plan, including mine rock and ore stockpile volumes.
- Addition of surface water features where infrastructure footprints extended into new areas of the watershed.
- Revisions to the baseline water quality inputs to reflect new or additional baseline data collected since the submission of the EA.
- Revisions to closure concepts.
- Incorporation of the updated water balance for each of the Project phases modelled as part of the water quality effects review.

The effects assessment indicator for this discipline was selected as change in surface water quality. The potential change in surface water quality was predicted through the modification of the previously developed GoldSim water quality models.

The water quality Local Study Area (LSA) was defined by lakes and watersheds in the vicinity and downstream of the Project infrastructure. The LSA for hydrology is bound by the following features:

- The Great Lakes/James Bay watershed divide along the south.
- The Moore Lake and Schist lake watershed divides to the west.

- Mesomikenda Lake to the east.
- The Somme River system to the north and northwest.

The water quality effects predictions were completed using a modified GoldSim water quality model to estimate the water quality at key site components and potential changes to the water quality of the receiving and downstream environments during operations, closure and post-closure. The approach to the modelled prediction of effects, along with climate scenarios, is consistent with those applied in the EA. The criteria used in the EER for the purposes of evaluating the water quality model results are the same Water Quality Guidelines that were used in the EA.

During the operations, closure and post-closure phase (stage I), monthly average concentrations of some major ions, metals and cyanide are predicted to be continuously to intermittently greater than the 95th percentile baseline concentrations in the Mollie River Watershed and Mesomikenda Lake Watershed.

Monthly average concentrations during all Project phases, with the exception of arsenic in Three Duck Lakes (upper) and Three Duck Lakes (middle) under the 1:25-dry year climate condition only, are predicted to be below the Water Quality Guidelines. The maximum monthly average arsenic concentrations predicted to be greater than the Water Quality Guideline are only slightly above the Water Quality Guideline, limited in geographic extent, limited in duration, and not continuous and very limited in frequency; as such, the potential related effects are immaterial.

Several inherent mitigation measures have been included in the design of the Project, and have been considered in the prediction of effects. Further, monitoring and management measures have been developed to continue the collection of data required to assess changes in water quality during Project implementation (i.e., construction, operations, closure and post-closure).

IAMGOLD

APPENDIX II
WATER QUALITY MODEL RESULTS

Côté Gold Project
Draft Environmental Effects Review Report
UTM – Water Quality
December 2017
Project #209.40453

APPENDIX I
WATER QUALITY MODELING RESULTS: MONTHLY AVERAGE CONCENTRATIONS, OPERATIONS PHASE - MOLLIE RIVER WATERSHED
CÔTÉ GOLD PROJECT

Parameter	Units	95th Baseline Concentration	Water Quality Guidelines (1)	MOLLIE RIVER WATERSHED																			
				Moore Lake		Chester Lake		Little Clam Lake		Clam Lake		New Lake		Three Duck Lakes (Upper)		Three Duck Lakes (Middle)		Three Duck Lakes (Lower)		Delaney Lake		Dividing Lake	
				Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Aluminum	mg/L	0.14	0.075	0.10	0.11	0.073	0.11	0.094	0.14	0.096	0.12	0.066	0.10	0.057	0.087	0.059	0.078	0.065	0.071	0.059	0.12	0.067	0.069
Ammonia (Total)	mg/L	0.15	6.98	**0.34**	**0.40**	0.12	**0.21**	**0.19**	**0.33**	**0.22**	**0.31**	0.11	**0.20**	**0.27**	**0.89**	**0.30**	**0.76**	**0.41**	**0.56**	0.047	0.094	**0.31**	**0.40**
Ammonia (Un-ionized)	mg/L	0.0001	0.019	0.000022	**0.00092**	0.000010	**0.00039**	0.000016	**0.00065**	0.000016	**0.00067**	0.0000079	**0.00034**	**0.00018**	**0.0023**	**0.00021**	**0.0014**	**0.00019**	**0.0015**	0.0000053	**0.00016**	**0.00016**	**0.0011**
Antimony	mg/L	0.0005	0.02	**0.00077**	**0.00083**	**0.00062**	**0.00090**	**0.00078**	**0.0011**	**0.00079**	**0.0010**	**0.00057**	**0.00088**	**0.00096**	**0.0027**	**0.00103**	**0.0022**	**0.0012**	**0.0016**	**0.00054**	**0.0011**	**0.0011**	**0.0012**
Arsenic	mg/L	0.003	0.005	0.0021	0.0022	0.0018	0.0025	0.0022	**0.0031**	0.0022	0.0027	0.0016	0.0025	0.0026	***0.0071***	0.0028	***0.0058***	**0.0033**	**0.0042**	0.0016	**0.0030**	0.0030	**0.0032**
Barium	mg/L	0.007	1.0	**0.0073**	**0.0078**	0.0060	**0.0086**	**0.0075**	**0.011**	**0.0076**	**0.0094**	0.0055	**0.0085**	**0.0071**	**0.015**	**0.0071**	**0.013**	**0.0079**	**0.0096**	0.0052	**0.010**	**0.0075**	**0.0080**
Boron	mg/L	0.01	1.5	0.0071	0.0076	0.0059	0.0086	0.0074	**0.011**	0.0075	0.0092	0.0054	0.0084	0.0066	**0.011**	0.0064	0.010	0.0068	0.0078	0.0052	**0.010**	0.0067	0.0070
Cadmium	mg/L	0.00003	0.000047	0.000018	0.000019	0.000015	0.000022	0.000019	0.000027	0.000019	0.000023	0.000014	0.000021	0.000017	**0.000030**	0.000017	0.000026	0.000018	0.000021	0.000013	0.000026	0.000018	0.000018
Calcium	mg/L	11	-	11	**12**	8.6	**13**	11	**16**	11	**14**	8.0	**12**	**15**	**47**	**16**	**39**	**20**	**27**	7.3	**14**	**17**	**19**
Chloride	mg/L	4.8	120	1.7	1.8	1.2	1.8	1.6	2.3	1.6	2.1	1.1	1.8	1.5	2.8	1.5	2.4	1.6	1.9	1.0	2.0	1.5	1.6
Cobalt	mg/L	0.00025	0.0025	**0.00049**	**0.00054**	**0.00034**	**0.00052**	**0.00045**	**0.00066**	**0.00046**	**0.00059**	**0.00031**	**0.00050**	**0.00037**	**0.00061**	**0.00037**	**0.00052**	**0.00038**	**0.00044**	**0.00028**	**0.00054**	**0.00037**	**0.00039**
Copper	mg/L	0.003	0.005	**0.0039**	**0.0044**	0.0017	0.0029	0.0026	**0.0042**	0.0029	**0.0039**	0.0016	0.0028	0.0021	**0.0044**	0.0021	**0.0036**	0.0023	0.0028	0.0010	0.0020	0.0020	0.0022
Cyanide (Total) (2)	mg/L	0.001	-	**0.016**	**0.019**	**0.0045**	**0.0090**	**0.0082**	**0.015**	**0.0098**	**0.014**	**0.0041**	**0.0086**	**0.0022**	**0.0051**	**0.0023**	**0.0039**	**0.0030**	**0.0033**	-	-	**0.0025**	**0.0026**
Cyanide (Free) (2)	mg/L	0.001	0.0098	**0.0040**	**0.0047**	**0.0011**	**0.0023**	**0.0021**	**0.0036**	**0.0025**	**0.0035**	**0.0010**	**0.0022**	0.00052	**0.0013**	0.00057	0.00096	0.00073	0.00083	-	-	0.00061	0.00066
Iron	mg/L	0.49	0.3	0.31	0.33	0.25	0.36	0.31	0.45	0.31	0.39	0.22	0.35	0.21	0.27	0.21	0.24	0.22	0.23	0.21	0.41	0.22	0.23
Lead	mg/L	0.0005	0.003	0.00046	0.00050	0.00039	**0.00056**	0.00048	**0.00069**	0.00049	**0.00060**	0.00035	**0.00055**	0.00037	**0.00051**	0.00036	0.00045	0.00038	0.00041	0.00034	**0.00066**	0.00038	0.00040
Magnesium	mg/L	2.0	-	1.8	2.0	1.5	**2.2**	1.9	**2.7**	1.9	**2.4**	1.4	**2.1**	1.6	**2.8**	1.6	**2.4**	1.7	1.9	1.3	**2.6**	1.7	1.7
Manganese	mg/L	0.120	0.7	0.077	0.083	0.065	0.094	0.081	0.12	0.082	0.10	0.060	0.092	0.072	**0.12**	0.070	0.10	0.075	0.085	0.057	0.11	0.073	0.077
Molybdenum	mg/L	0.001	0.073	**0.0024**	**0.0027**	**0.0014**	**0.0022**	**0.0019**	**0.0029**	**0.0020**	**0.0026**	**0.0013**	**0.0021**	**0.0019**	**0.0064**	**0.0019**	**0.0052**	**0.0024**	**0.0033**	**0.0010**	**0.0020**	**0.0022**	**0.0024**
Nickel	mg/L	0.0015	0.025	**0.0022**	**0.0023**	**0.0018**	**0.0026**	**0.0023**	**0.0032**	**0.0023**	**0.0028**	**0.0016**	**0.0026**	**0.0017**	**0.0024**	**0.0017**	**0.0021**	**0.0018**	**0.0019**	**0.0016**	**0.0031**	**0.0018**	**0.0019**
Nitrate	mg/L	0.17	13	**0.48**	**0.51**	**0.41**	**0.58**	**0.50**	**0.72**	**0.51**	**0.63**	**0.38**	**0.71**	**1.0**	**3.5**	**1.1**	**3.0**	**1.6**	**2.2**	**0.36**	**0.70**	**1.3**	**1.6**
Phosphorus (Total)	mg/L	0.041	0.02	0.016	0.017	0.013	0.019	0.016	0.023	0.017	0.020	0.012	0.019	0.013	0.037	0.013	0.031	0.017	0.022	0.012	0.023	0.017	0.018
Potassium	mg/L	0.52	373	**1.1**	**1.2**	0.51	**0.84**	**0.75**	**1.18**	**0.81**	**1.1**	0.47	**0.81**	**0.87**	**2.7**	**0.95**	**2.2**	**1.2**	**1.5**	0.33	**0.65**	**1.0**	**1.1**
Sodium	mg/L	2.6	-	**15**	**18**	**4.4**	**8.7**	**7.9**	**14**	**9.4**	**13**	**3.9**	**8.3**	**2.8**	**5.3**	**2.9**	**4.2**	**3.2**	**3.6**	1.2	2.2	**2.7**	**2.9**
Strontium	mg/L	0.024	-	0.024	**0.026**	0.019	**0.027**	0.024	**0.034**	**0.024**	**0.030**	0.017	**0.027**	**0.029**	**0.081**	**0.031**	**0.066**	**0.037**	**0.047**	0.016	**0.031**	**0.032**	**0.035**
Sulphate	mg/L	4.1	218	**33**	**39**	**10**	**19**	**18**	**31**	**21**	**30**	**9.0**	**19**	**7.2**	**12**	**7.3**	**11**	**7.9**	**8.8**	2.9	**5.6**	**6.5**	**7.1**
Uranium	mg/L	0.002	0.015	0.0015	0.0016	0.0012	0.0017	0.0015	**0.0021**	0.0015	0.0019	0.00110	0.0017	0.0020	**0.0060**	**0.0022**	**0.0049**	**0.0026**	**0.0034**	0.0010	**0.0020**	**0.0023**	**0.0025**
Vanadium	mg/L	0.001	0.006	**0.0014**	**0.0015**	**0.0012**	**0.0017**	**0.0015**	**0.0021**	**0.0015**	**0.0018**	**0.00109**	**0.0017**	**0.0015**	**0.0031**	**0.0015**	**0.0026**	**0.0017**	**0.0020**	**0.0010**	**0.0020**	**0.0016**	**0.0017**
Zinc	mg/L	0.021	0.02	0.0080	0.0086	0.0068	0.0097	0.0084	0.012	0.0085	0.010	0.0062	0.010	0.0080	0.016	0.0080	0.013	0.0087	0.010	0.0059	0.012	0.0083	0.0088

Notes:
Minimum (Min) and maximum (Max) monthly average concentrations are in mg/L. The minimum and maximum monthly average concentrations are taken from the results of the average, 1:25-year dry and 1:25-year wet climate conditions.
Monthly average concentrations greater than the 95th percentile baseline concentrations are denoted in bold, and monthly average concentrations greater than the 95th percentile baseline concentration and Water Quality Guidelines are denoted in bold italics.
(1) Derived a single set of Water Quality Guidelines equal to the most recent of the PWQO or CWQG (or the BCMOE guideline for parameters without a PWQO or CWQG), with the exception of cyanide, which has a site-specific guideline.
(2) Total and free cyanide are not predicted for Delaney Lake, as it does not receive seepage from the Tailings Management Facility (TMF) or inflow from an upstream lake that receives TMF seepage.

APPENDIX I
WATER QUALITY MODELING RESULTS: MONTHLY AVERAGE CONCENTRATIONS, OPERATIONS PHASE - MESOMIKENDA LAKE WATERSHED CÔTÉ GOLD PROJECT

Parameter	Units	95th Baseline Concentration	Water Quality Guidelines (1)	MESOMIKENDA LAKE WATERSHED									
				Unnamed Lake #6 (Tributary to Schist Lake Outflow)		Bagsverd Lake (South)		Bagsverd Lake		Neville Lake		Mesomikenda Lake (Upper Basin)	
				Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Aluminum	mg/L	0.14	0.075	0.062	0.081	0.079	0.12	0.080	0.10	0.071	0.087	0.061	0.065
Ammonia (Total)	mg/L	0.15	6.98	0.11	**0.37**	0.07	0.11	0.12	**0.17**	0.062	0.073	0.051	0.055
Ammonia (Un-ionized)	mg/L	0.0001	0.019	0.000018	**0.00080**	0.0000058	**0.00023**	0.0000086	**0.00036**	0.0000043	**0.00017**	0.0000033	**0.00013**
Antimony	mg/L	0.0005	0.02	**0.00053**	**0.00057**	**0.00071**	**0.0010**	**0.00069**	**0.00089**	**0.00064**	**0.00078**	**0.00055**	**0.00058**
Arsenic	mg/L	0.003	0.005	0.0015	0.0015	0.0020	0.0030	0.0020	0.0025	0.0018	0.0023	0.0016	0.0017
Barium	mg/L	0.007	1.0	0.0051	0.0054	0.0068	**0.010**	0.0066	**0.0085**	0.0061	**0.0075**	0.0053	0.0056
Boron	mg/L	0.01	1.5	0.0050	0.0052	0.0068	0.0098	0.0066	0.0084	0.0061	0.0075	0.0053	0.0056
Cadmium	mg/L	0.00003	0.000047	0.000013	0.000013	0.000018	0.000025	0.000017	0.000022	0.000016	0.000020	0.000014	0.000014
Calcium	mg/L	11	-	7.4	8.6	10	**14**	9.5	**12**	8.7	11	7.5	7.9
Chloride	mg/L	4.8	120	1.1	1.4	1.3	2.0	1.4	1.8	1.2	1.5	1.0	1.1
Cobalt	mg/L	0.00025	0.0025	**0.00030**	**0.00041**	**0.00037**	**0.00054**	**0.00038**	**0.00049**	**0.00033**	**0.00041**	**0.00029**	**0.00030**
Copper	mg/L	0.003	0.005	0.0016	**0.0039**	0.0015	0.0022	0.0019	0.0025	0.0013	0.0015	0.0011	0.0012
Cyanide (Total)	mg/L	0.001	-	**0.0045**	**0.018**	**0.0019**	**0.0029**	**0.0047**	**0.0065**	**0.0015**	**0.0022**	**0.0013**	**0.0014**
Cyanide (Free)	mg/L	0.001	0.0098	**0.0011**	**0.0046**	0.00049	0.00078	**0.0012**	**0.0016**	0.00039	0.00055	0.00032	0.00034
Iron	mg/L	0.49	0.3	0.21	0.23	0.28	0.40	0.27	0.35	0.25	0.31	0.22	0.23
Lead	mg/L	0.0005	0.003	0.00033	0.00033	0.00045	**0.00065**	0.00043	**0.00055**	0.00040	0.00049	0.00035	0.00037
Magnesium	mg/L	2.0	-	1.3	1.3	1.7	**2.5**	1.7	**2.2**	1.6	1.9	1.3	1.4
Manganese	mg/L	0.120	0.7	0.055	0.055	0.075	0.11	0.073	0.093	0.068	0.083	0.059	0.062
Molybdenum	mg/L	0.001	0.073	**0.0012**	**0.0022**	**0.0014**	**0.0020**	**0.0015**	**0.0020**	**0.0012**	**0.0015**	**0.0011**	**0.0011**
Nickel	mg/L	0.0015	0.025	**0.0015**	**0.0016**	**0.0021**	**0.0030**	**0.0020**	**0.0026**	**0.0019**	**0.0023**	**0.0016**	**0.0017**
Nitrate	mg/L	0.17	13	**0.34**	**0.34**	**0.47**	**0.68**	**0.45**	**0.58**	**0.42**	**0.52**	**0.36**	**0.38**
Phosphorus (Total)	mg/L	0.041	0.02	0.011	0.011	0.015	0.022	0.015	0.019	0.014	0.017	0.012	0.013
Potassium	mg/L	0.52	373	0.46	**1.0**	0.46	**0.68**	**0.56**	**0.73**	0.42	0.49	0.34	0.36
Sodium	mg/L	2.6	-	**4.4**	**17**	2.1	**3.3**	**4.6**	**6.3**	1.6	2.2	1.3	1.4
Strontium	mg/L	0.024	-	0.016	0.018	0.021	**0.031**	0.021	**0.027**	0.019	0.023	0.016	0.017
Sulphate	mg/L	4.1	218	**9.9**	**38**	**5.0**	**7.8**	**10**	**14**	4.1	**5.3**	3.3	3.6
Uranium	mg/L	0.002	0.015	0.0010	0.0011	0.0014	0.0020	0.0013	0.0017	0.0012	0.0015	0.0011	0.0011
Vanadium	mg/L	0.001	0.006	**0.0010**	**0.0010**	**0.0014**	**0.0020**	**0.0013**	**0.0017**	**0.0012**	**0.0015**	**0.0011**	**0.0011**
Zinc	mg/L	0.021	0.02	0.0057	0.0058	0.0078	0.011	0.0075	0.010	0.0070	0.0086	0.0060	0.0064

Notes:

Minimum (Min) and maximum (Max) monthly average concentrations are in mg/L. The minimum and maximum monthly average concentrations are taken from the results of the average, 1:25-year dry and 1:25-year wet climate conditions.

Monthly average concentrations greater than the 95th percentile baseline concentrations are denoted in bold, and monthly average concentrations greater than the 95th percentile baseline concentration and Water Quality Guidelines are denoted in bold italics.

(1) Derived a single set of Water Quality Guidelines equal to the most recent of the PWQO or CWQG (or the BCMOE guideline for parameters without a PWQO or CWQG), with the exception of cyanide, which has a site-specific guideline.

APPENDIX I

WATER QUALITY MODELING RESULTS: MONTHLY AVERAGE CONCENTRATIONS, POST CLOSURE PHASE STAGE I - MOLLIE RIVER WATERSHED

CÔTÉ GOLD PROJECT

Parameter	Units	95^{th} Baseline Concentration	Water Quality Guidelines (1)	MOLLIE RIVER WATERSHED																			
				Moore Lake		Chester Lake		Little Clam Lake		Clam Lake		New Lake		Three Duck Lakes (Upper)		Three Duck Lakes (Middle)		Three Duck Lakes (Lower)		Delaney Lake		Dividing Lake	
				Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Aluminum	mg/L	0.14	0.075	0.10	0.11	0.072	0.10	0.094	0.14	0.089	0.11	0.065	0.10	0.067	0.089	0.067	0.083	0.069	0.072	0.059	0.12	0.069	0.072
Ammonia (Total)	mg/L	0.15	6.98	**0.34**	**0.40**	0.11	**0.20**	**0.19**	**0.33**	**0.19**	**0.26**	0.10	**0.19**	0.10	**0.15**	0.10	0.13	0.10	0.10	0.047	0.091	0.081	0.087
Ammonia (Un-ionized)	mg/L	0.0001	0.019	0.000022	**0.00092**	0.0000092	**0.00037**	0.000016	**0.00065**	0.000014	**0.00057**	0.0000072	**0.00032**	0.0000072	**0.0003**	0.0000066	**0.0003**	0.0000062	**0.0002**	0.0000043	**0.00015**	0.0000053	**0.00021**
Antimony	mg/L	0.0005	0.02	**0.00077**	**0.00083**	**0.00062**	**0.00088**	**0.00078**	**0.0011**	**0.00074**	**0.00091**	**0.00057**	**0.00086**	**0.00059**	**0.00078**	**0.00058**	**0.00073**	**0.00061**	**0.00065**	**0.00054**	**0.0011**	**0.00063**	**0.00066**
Arsenic	mg/L	0.003	0.005	0.0021	0.0022	0.0018	0.0025	0.0022	**0.0031**	0.0021	0.0025	0.0016	0.0024	0.0017	0.0022	0.0017	0.0021	0.0017	0.0018	0.0016	**0.0030**	0.0018	0.0019
Barium	mg/L	0.007	1.0	**0.0073**	**0.0078**	0.0059	**0.0084**	**0.0075**	**0.011**	**0.0071**	**0.0087**	0.0054	**0.0082**	0.0056	**0.0074**	0.0056	0.0069	0.0058	0.0061	0.0052	**0.010**	0.0059	0.0061
Boron	mg/L	0.01	1.5	0.0071	0.0076	0.0059	0.0083	0.0074	**0.011**	0.0070	0.009	0.0054	0.0081	0.0055	0.007	0.0055	0.007	0.0058	0.0060	0.0052	**0.010**	0.0059	0.0061
Cadmium	mg/L	0.00003	0.000047	0.000018	0.000019	0.000015	0.000021	0.000019	0.000027	0.000018	0.000022	0.000014	0.000021	0.000014	0.000019	0.000014	0.000018	0.000015	0.000016	0.000013	0.000026	0.000015	0.000016
Calcium	mg/L	11	-	11	**12**	8.5	**12**	11	**16**	10	**13**	7.9	**12**	8.1	11	8.0	10	8.5	9.0	7.3	**14**	8.6	9.1
Chloride	mg/L	4.8	120	1.7	1.8	1.2	1.8	1.6	2.3	1.5	1.9	1.12	1.7	1.1	1.5	1.1	1.4	1.2	1.2	1.0	2.0	1.2	1.2
Cobalt	mg/L	0.00025	0.0025	**0.00049**	**0.00054**	**0.00034**	**0.00050**	**0.00045**	**0.00066**	**0.00043**	**0.00054**	**0.00031**	**0.00048**	**0.00032**	**0.00043**	**0.00032**	**0.00039**	**0.00033**	**0.00034**	**0.00028**	**0.00054**	**0.00033**	**0.00034**
Copper	mg/L	0.003	0.005	**0.0039**	**0.0044**	0.0017	0.0028	0.0026	**0.0042**	0.0025	**0.0034**	0.0016	0.0027	0.0016	0.0022	0.0015	0.0020	0.0016	0.0017	0.0010	0.0020	0.0015	0.0015
Cyanide (Total) (2)	mg/L	0.001	-	**0.016**	**0.019**	**0.0044**	**0.0083**	**0.0082**	**0.015**	**0.0082**	**0.012**	**0.0039**	**0.0079**	**0.0039**	**0.0060**	**0.0037**	**0.0050**	**0.0035**	**0.0038**	-	-	**0.0027**	**0.0030**
Cyanide (Free) (2)	mg/L	0.001	0.0098	**0.0040**	**0.0047**	**0.00109**	**0.0021**	**0.0021**	**0.0036**	**0.0021**	**0.0029**	0.00098	**0.00198**	0.000980	**0.00150**	0.00093	**0.00126**	0.00088	0.00096	-	-	0.00068	0.00074
Iron	mg/L	0.49	0.3	0.31	0.33	0.24	0.35	0.31	0.45	0.29	0.36	0.22	0.34	0.23	0.30	0.23	0.28	0.24	0.25	0.21	0.41	0.24	0.25
Lead	mg/L	0.0005	0.003	0.00046	0.00050	0.00039	**0.00054**	0.00048	**0.00069**	0.00046	**0.00056**	0.00035	**0.00053**	0.00036	0.00048	0.00036	0.00045	0.00038	0.00039	0.00034	**0.00066**	0.00038	0.00040
Magnesium	mg/L	2.0	-	1.8	2.0	1.5	**2.1**	1.9	**2.7**	1.8	**2.2**	1.4	**2.1**	1.4	1.9	1.4	1.7	1.5	1.5	1.3	**2.6**	1.5	1.5
Manganese	mg/L	0.120	0.7	0.077	0.083	0.065	0.091	0.081	0.12	0.077	0.09	0.059	0.089	0.061	0.08	0.061	0.08	0.064	0.067	0.057	0.11	0.065	0.067
Molybdenum	mg/L	0.001	0.073	**0.0024**	**0.0027**	**0.0014**	**0.0021**	**0.0019**	**0.0029**	**0.0018**	**0.0024**	**0.0013**	**0.0020**	**0.0013**	**0.0017**	**0.0013**	**0.0016**	**0.0013**	**0.0014**	**0.0010**	**0.0020**	**0.0013**	**0.0013**
Nickel	mg/L	0.0015	0.025	**0.0022**	**0.0023**	**0.0018**	**0.0025**	**0.0023**	**0.0032**	**0.0021**	**0.0026**	**0.0016**	**0.0025**	**0.0017**	**0.0022**	**0.0017**	**0.0021**	**0.0018**	**0.0018**	**0.0016**	**0.0031**	**0.0018**	**0.0018**
Nitrate	mg/L	0.17	13	**0.48**	**0.51**	**0.40**	**0.57**	**0.50**	**0.72**	**0.48**	**0.58**	**0.37**	**0.55**	**0.38**	**0.50**	**0.38**	**0.46**	**0.39**	**0.41**	**0.35**	**0.69**	**0.40**	**0.41**
Phosphorus (Total)	mg/L	0.041	0.02	0.016	0.017	0.013	0.019	0.016	0.023	0.016	0.019	0.012	0.018	0.013	0.017	0.012	0.016	0.013	0.014	0.012	0.023	0.014	0.014
Potassium	mg/L	0.52	373	**1.1**	**1.2**	0.50	**0.80**	**0.75**	**1.2**	**0.72**	**1.0**	0.46	**0.77**	0.47	**0.66**	0.46	**0.60**	0.48	0.51	0.33	**0.65**	0.45	0.48
Sodium	mg/L	2.6	-	**15**	**18**	**4.3**	**8.0**	**7.9**	**14**	**7.9**	**11**	**3.8**	**7.6**	**3.8**	**5.8**	**3.6**	**4.9**	**3.5**	**3.7**	1.2	2.2	**2.7**	**3.0**
Strontium	mg/L	0.024	-	0.024	**0.026**	0.019	**0.027**	0.024	**0.034**	0.023	**0.028**	0.017	**0.026**	0.018	0.023	0.018	0.022	0.018	0.019	0.016	**0.031**	0.019	0.020
Sulphate	mg/L	4.1	218	**33**	**39**	**9.7**	**18**	**18**	**31**	**18**	**25**	**8.7**	**17**	**8.7**	**13**	**8.3**	**11**	**8.0**	**8.6**	2.9	**5.6**	**6.4**	**6.9**
Uranium	mg/L	0.002	0.015	0.0015	0.0016	0.0012	0.0017	0.0015	**0.0021**	0.0014	0.0017	0.00109	0.0016	0.0011	0.0015	0.0011	0.0014	0.0012	0.0013	0.0010	**0.0020**	0.0012	0.0013
Vanadium	mg/L	0.001	0.006	**0.0014**	**0.0015**	**0.0012**	**0.0017**	**0.0015**	**0.0021**	**0.0014**	**0.0017**	**0.00108**	**0.0016**	**0.0011**	**0.0015**	**0.0011**	**0.0014**	**0.0012**	**0.0012**	**0.0010**	**0.0020**	**0.0012**	**0.0012**
Zinc	mg/L	0.021	0.02	0.0080	0.0086	0.0067	0.0094	0.0084	0.012	0.0079	0.010	0.0061	0.0092	0.0063	0.0084	0.0063	0.0078	0.0066	0.0069	0.0059	0.011	0.0067	0.0069

Notes:

Minimum (Min) and maximum (Max) monthly average concentrations are in mg/L. The minimum and maximum monthly average concentrations are taken from the results of the average, 1:25-year dry and 1:25-year wet climate conditions.

Monthly average concentrations greater than the 95th percentile baseline concentrations are denoted in bold, and monthly average concentrations greater than the 95th percentile baseline concentration and Water Quality Guidelines are denoted in bold italics.

(1) Derived a single set of Water Quality Guidelines equal to the most recent of the PWQO or CWQG (or the BCMOE guideline for parameters without a PWQO or CWQG), with the exception of cyanide, which has a site-specific guideline.

(2) Total and free cyanide are not predicted for Delaney Lake, as it does not receive seepage from the Tailings Management Facility (TMF) or inflow from an upstream lake that receives TMF seepage.

APPENDIX I

WATER QUALITY MODELING RESULTS: MONTHLY AVERAGE CONCENTRATIONS, POST-CLOSURE PHASE STAGE I - MESOMIKENDA LAKE WATERSHED

CÔTÉ GOLD PROJECT

Parameter	Units	95th Baseline Concentration	Water Quality Guidelines (1)	MESOMIKENDA LAKE WATERSHED									
				Unnamed Lake #6 (Tributary to Schist Lake Outflow)		Bagsverd Lake (South)		Bagsverd Lake		Neville Lake		Mesomikenda Lake (Upper Basin)	
				Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Aluminum	mg/L	0.14	0.075	0.062	0.081	0.074	0.10	0.080	0.10	0.071	0.087	0.061	0.065
Ammonia (Total)	mg/L	0.15	6.98	0.11	**0.37**	0.062	0.091	0.12	**0.17**	0.062	0.073	0.051	0.055
Ammonia (Un-ionized)	mg/L	0.0001	0.019	0.000018	**0.00080**	0.0000047	**0.00019**	0.000009	**0.00036**	0.000004	**0.00017**	0.0000033	**0.00013**
Antimony	mg/L	0.0005	0.02	**0.00053**	**0.00057**	**0.00066**	**0.0009**	**0.00069**	**0.00089**	**0.00064**	**0.00078**	**0.00055**	**0.00058**
Arsenic	mg/L	0.003	0.005	0.0015	0.0015	0.0019	0.0027	0.0020	0.0025	0.0018	0.0023	0.0016	0.0017
Barium	mg/L	0.007	1.0	0.0051	0.0054	0.0064	**0.0091**	0.0066	**0.0085**	0.0061	**0.0075**	0.0053	0.0056
Boron	mg/L	0.01	1.5	0.0050	0.0052	0.0064	0.0091	0.0066	0.0084	0.0061	0.0075	0.0053	0.0056
Cadmium	mg/L	0.00003	0.000047	0.000013	0.000013	0.000017	0.000023	0.000017	0.000022	0.000016	0.000020	0.000014	0.000014
Calcium	mg/L	11	-	7.4	8.6	9.0	**13**	9.5	**12**	8.7	11	7.5	7.9
Chloride	mg/L	4.8	120	1.1	1.4	1.3	1.8	1.4	1.8	1.2	1.5	1.0	1.1
Cobalt	mg/L	0.00025	0.0025	**0.00030**	**0.00041**	**0.00035**	**0.00049**	**0.00038**	**0.00049**	**0.00033**	**0.00041**	**0.00029**	**0.00030**
Copper	mg/L	0.003	0.005	0.0016	**0.0039**	0.0013	0.0019	0.0019	0.0025	0.0013	0.0015	0.0011	0.0012
Cyanide (Total)	mg/L	0.001	-	**0.0045**	**0.018**	**0.0015**	**0.0022**	**0.0047**	**0.0065**	**0.0015**	**0.0022**	**0.0013**	**0.0014**
Cyanide (Free)	mg/L	0.001	0.0098	**0.0011**	**0.0046**	0.00039	0.00058	**0.0012**	**0.0016**	0.00039	0.00055	0.00032	0.00034
Iron	mg/L	0.49	0.3	0.21	0.23	0.26	0.37	0.27	0.35	0.25	0.31	0.22	0.23
Lead	mg/L	0.0005	0.003	0.00033	0.00033	0.00042	**0.00059**	0.00043	**0.00055**	0.00040	0.00049	0.00035	0.00037
Magnesium	mg/L	2.0	-	1.3	1.3	1.6	**2.3**	1.7	**2.2**	1.6	1.9	1.3	1.4
Manganese	mg/L	0.120	0.7	0.055	0.055	0.071	0.10	0.073	0.093	0.068	0.083	0.059	0.062
Molybdenum	mg/L	0.001	0.073	**0.0012**	**0.0022**	**0.0013**	**0.0018**	**0.0015**	**0.0020**	**0.0012**	**0.0015**	**0.0011**	**0.0011**
Nickel	mg/L	0.0015	0.025	**0.0015**	**0.0016**	**0.0020**	**0.0028**	**0.0020**	**0.0026**	**0.0019**	**0.0023**	**0.0016**	**0.0017**
Nitrate	mg/L	0.17	13	**0.34**	**0.34**	**0.44**	**0.62**	**0.45**	**0.58**	**0.42**	**0.52**	**0.36**	**0.38**
Phosphorus (Total)	mg/L	0.041	0.02	0.011	0.011	0.014	0.020	0.015	0.019	0.014	0.017	0.012	0.013
Potassium	mg/L	0.52	373	0.46	**1.0**	0.42	**0.60**	**0.56**	**0.73**	0.42	0.49	0.34	0.36
Sodium	mg/L	2.6	-	**4.4**	**17**	1.6	2.5	**4.6**	**6.3**	1.6	2.2	1.3	1.4
Strontium	mg/L	0.024	-	0.016	0.018	0.020	**0.028**	0.021	**0.027**	0.019	0.023	0.016	0.017
Sulphate	mg/L	4.1	218	**9.9**	**38**	4.0	**6.0**	**10**	**14**	4.0	**5.3**	3.3	3.6
Uranium	mg/L	0.002	0.015	0.0010	0.0011	0.0013	0.0018	0.0013	0.0017	0.0012	0.0015	0.0011	0.0011
Vanadium	mg/L	0.001	0.006	**0.0010**	**0.0010**	**0.0013**	**0.0018**	**0.0013**	**0.0017**	**0.0012**	**0.0015**	**0.0011**	**0.0011**
Zinc	mg/L	0.021	0.02	0.0057	0.0058	0.0073	0.010	0.0075	0.010	0.0070	0.0086	0.0060	0.0064

Notes:

Minimum (Min) and maximum (Max) monthly average concentrations are in mg/L. The minimum and maximum monthly average concentrations are taken from the results of the average, 1:25-year dry and 1:25-year wet climate conditions.

Monthly average concentrations greater than the 95th percentile baseline concentrations are denoted in bold, and monthly average concentrations greater than the 95th percentile baseline concentration and Water Quality Guidelines are denoted in bold italics.

(1) Derived a single set of Water Quality Guidelines equal to the most recent of the PWQO or CWQG (or the BCMOE guideline for parameters without a PWQO or CWQG), with the exception of cyanide, which has a site-specific guideline.

APPENDIX I

WATER QUALITY MODELING RESULTS: MONTHLY AVERAGE CONCENTRATIONS, POST-CLOSURE PHASE STAGE II - MOLLIE RIVER WATERSHED

CÔTÉ GOLD PROJECT

Parameter	Units	95^{th} Baseline Concentration	Water Quality Guidelines (1)	MOLLIE RIVER WATERSHED																			
				Moore Lake		Chester Lake		Little Clam Lake		Clam Lake		Côté Lake (Pit Lake)		Three Duck Lakes (Upper)		Three Duck Lakes (Middle)		Three Duck Lakes (Lower)		Delaney Lake		Dividing Lake	
				Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Aluminum	mg/L	0.14	0.075	0.091	0.10	0.066	0.085	0.089	0.13	0.086	0.11	0.072	0.074	0.072	0.094	0.071	0.081	0.072	0.076	0.059	0.12	0.070	0.073
Ammonia (Total)	mg/L	0.15	6.98	0.063	0.067	0.050	0.064	0.066	0.094	0.063	0.077	0.055	0.057	0.055	0.072	0.055	0.062	0.055	0.058	0.047	0.091	0.054	0.056
Ammonia (Un-ionized)	mg/L	0.0001	0.019	0.0000040	**0.00016**	0.0000036	**0.00014**	0.0000050	**0.00019**	0.0000044	**0.00017**	0.0000035	**0.00014**	0.0000040	**0.00016**	0.0000037	**0.00014**	0.0000035	**0.00014**	0.0000043	**0.00015**	0.0000035	**0.00014**
Antimony	mg/L	0.0005	0.02	**0.00076**	**0.00081**	**0.00058**	**0.00075**	**0.00078**	**0.0011**	**0.00074**	**0.00091**	**0.00065**	**0.00067**	**0.00065**	**0.00084**	**0.00064**	**0.00073**	**0.00065**	**0.00069**	**0.00054**	**0.0010**	**0.00064**	**0.00067**
Arsenic	mg/L	0.003	0.005	0.0021	0.0022	0.0017	0.0021	0.0022	**0.0031**	0.0021	0.0026	0.0019	0.0019	0.0019	0.0024	0.0018	0.0021	0.0019	0.0020	0.0015	**0.0030**	0.0018	0.0019
Barium	mg/L	0.007	1.0	**0.0072**	**0.0077**	0.0056	**0.0071**	**0.0074**	**0.011**	**0.0071**	**0.0087**	0.0062	0.0063	0.0062	**0.0080**	0.0061	0.0069	0.0062	0.0065	0.0052	**0.010**	0.0061	0.0063
Boron	mg/L	0.01	1.5	0.0071	0.0076	0.0055	0.0071	0.0074	**0.010**	0.0071	0.009	0.0061	0.0063	0.0061	0.008	0.0061	0.007	0.0061	0.0065	0.0052	**0.010**	0.0060	0.0063
Cadmium	mg/L	0.00003	0.000047	0.000018	0.000019	0.000014	0.000018	0.000019	0.000027	0.000018	0.000022	0.000016	0.000016	0.000016	0.000021	0.000016	0.000018	0.000016	0.000017	0.000013	0.000026	0.000016	0.000016
Calcium	mg/L	11	-	**12**	**13**	8.1	10.6	11	**16**	11	**13**	9.1	9.4	9.1	**12**	8.9	10	9.0	9.6	7.3	**14**	8.9	9.3
Chloride	mg/L	4.8	120	1.5	1.6	1.1	1.4	1.5	2.2	1.4	1.8	1.2	1.3	1.2	1.6	1.2	1.4	1.2	1.3	1.0	2.0	1.2	1.3
Cobalt	mg/L	0.00025	0.0025	**0.00044**	**0.00047**	**0.00031**	**0.00040**	**0.00042**	**0.00061**	**0.00041**	**0.00050**	**0.00034**	**0.00035**	**0.00034**	**0.00044**	**0.00034**	**0.00038**	**0.00034**	**0.00036**	**0.00028**	**0.00054**	**0.00033**	**0.00034**
Copper	mg/L	0.003	0.005	0.0026	0.0029	0.0013	0.0018	0.0020	**0.0031**	0.0020	0.0026	0.0015	0.0015	0.0014	0.0019	0.0014	0.0016	0.0014	0.0015	0.0010	0.0020	0.0013	0.0014
Cyanide (Total) (2)	mg/L	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (Free) (2)	mg/L	0.001	0.0098	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	mg/L	0.49	0.3	0.30	0.32	0.23	0.29	0.30	0.43	0.29	0.36	0.25	0.26	0.25	0.33	0.25	0.28	0.25	0.26	0.21	0.41	0.24	0.26
Lead	mg/L	0.0005	0.003	0.00046	0.00049	0.00036	0.00046	0.00048	**0.00068**	0.00046	**0.00056**	0.00040	0.00041	0.00040	**0.00052**	0.00040	0.00045	0.00040	0.00042	0.00034	**0.00066**	0.00039	0.00041
Magnesium	mg/L	2.0	-	1.8	2.0	1.4	1.8	1.9	**2.7**	1.8	**2.2**	1.6	1.6	1.6	**2.0**	1.5	1.8	1.6	1.7	1.3	**2.6**	1.5	1.6
Manganese	mg/L	0.120	0.7	0.077	0.083	0.061	0.078	0.081	0.12	0.078	0.09	0.068	0.070	0.068	0.09	0.067	0.08	0.068	0.072	0.057	0.11	0.067	0.070
Molybdenum	mg/L	0.001	0.073	**0.0020**	**0.0022**	**0.0012**	**0.0016**	**0.0017**	**0.0025**	**0.0017**	**0.0021**	**0.0013**	**0.0014**	**0.0013**	**0.0017**	**0.0013**	**0.0015**	**0.0013**	**0.0014**	**0.0010**	**0.0020**	**0.0012**	**0.0013**
Nickel	mg/L	0.0015	0.025	**0.0022**	**0.0023**	**0.0017**	**0.0022**	**0.0022**	**0.0032**	**0.0022**	**0.0026**	**0.0019**	**0.0019**	**0.0019**	**0.0024**	**0.0019**	**0.0021**	**0.0019**	**0.0020**	**0.0016**	**0.0031**	**0.0018**	**0.0019**
Nitrate	mg/L	0.17	13	**0.48**	**0.51**	**0.38**	**0.48**	**0.50**	**0.71**	**0.48**	**0.59**	**0.42**	**0.43**	**0.42**	**0.55**	**0.42**	**0.47**	**0.42**	**0.44**	**0.35**	**0.69**	**0.41**	**0.43**
Phosphorus (Total)	mg/L	0.041	0.02	0.016	0.017	0.012	0.016	0.016	0.023	0.016	0.019	0.014	0.014	0.014	0.018	0.014	0.02	0.014	0.015	0.012	0.023	0.013	0.014
Potassium	mg/L	0.52	373	**0.79**	**0.88**	0.41	**0.57**	**0.63**	**0.96**	**0.61**	**0.8**	0.46	0.48	0.45	**0.59**	0.45	**0.52**	0.45	0.48	0.33	**0.65**	0.43	0.45
Sodium	mg/L	2.6	-	**8.5**	**9.9**	2.4	**3.9**	**4.8**	**8.2**	**4.9**	**6.8**	**2.7**	**2.8**	2.5	**3.3**	2.4	**2.9**	2.4	2.6	1.2	2.2	2.0	2.2
Strontium	mg/L	0.024	-	**0.024**	**0.026**	0.018	0.023	0.024	**0.034**	0.023	**0.028**	0.020	0.020	0.019	**0.025**	0.019	0.022	0.019	0.021	0.016	**0.031**	0.019	0.020
Sulphate	mg/L	4.1	218	**20**	**23**	**5.9**	**9.4**	**12**	**20**	**12**	**16**	**6.5**	**6.8**	**6.1**	**8.1**	**5.9**	**7.0**	**5.8**	**6.2**	2.9	**5.6**	**4.9**	**5.3**
Uranium	mg/L	0.002	0.015	0.0014	0.0015	0.0011	0.0014	0.0015	**0.0021**	0.0014	0.0017	0.00124	0.0013	0.0012	0.0016	0.0012	0.0014	0.0012	0.0013	0.0010	**0.0020**	0.0012	0.0013
Vanadium	mg/L	0.001	0.006	**0.0014**	**0.0015**	**0.0011**	**0.0014**	**0.0015**	**0.0021**	**0.0014**	**0.0017**	**0.00123**	**0.0013**	**0.0012**	**0.0016**	**0.0012**	**0.0014**	**0.0012**	**0.0013**	**0.0010**	**0.0020**	**0.0012**	**0.0013**
Zinc	mg/L	0.021	0.02	0.0080	0.0086	0.0063	0.0081	0.0084	0.012	0.0080	0.010	0.0070	0.0072	0.0070	0.0091	0.0069	0.0079	0.0070	0.0074	0.0059	0.011	0.0069	0.0072

Notes:

Minimum (Min) and maximum (Max) monthly average concentrations are in mg/L. The minimum and maximum monthly average concentrations are taken from the results of the average, 1:25-year dry and 1:25-year wet climate conditions.

Monthly average concentrations greater than the 95th percentile baseline concentrations are denoted in bold, and monthly average concentrations greater than the 95th percentile baseline concentration and Water Quality Guidelines are denoted in bold italics.

(1) Derived a single set of Water Quality Guidelines equal to the most recent of the PWQO or CWQG (or the BCMOE guideline for parameters without a PWQO or CWQG), with the exception of cyanide, which has a site-specific guideline.

(2) Total and free cyanide are not predicted for Mollie River Watershed locations during post-closure phase stage II, as there is assumed not to be a source of cyanide to this system decades after closure of the Project site.

APPENDIX I
WATER QUALITY MODELING RESULTS: MONTHLY AVERAGE CONCENTRATIONS, POST-CLOSURE PHASE STAGE II - MESOMIKENDA LAKE WATERSHED
CÔTÉ GOLD PROJECT

Parameter	Units	95th Baseline Concentration	Water Quality Guidelines (1)	MESOMIKENDA LAKE WATERSHED									
				Unnamed Lake #5 (Tributary to Schist Lake Outflow)		Bagsverd Lake (South)		Bagsverd Lake		Neville Lake		Mesomikenda Lake (Upper Basin)	
				Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Aluminum	mg/L	0.14	0.075	0.060	0.071	0.064	0.086	0.077	0.10	0.071	0.087	0.061	0.065
Ammonia (Total)	mg/L	0.15	6.98	0.044	0.045	0.050	0.067	0.058	0.075	0.055	0.068	0.048	0.051
Ammonia (Un-ionized)	mg/L	0.0001	0.019	0.0000028	**0.00011**	0.0000037	**0.00015**	0.0000042	**0.00016**	0.0000040	**0.00016**	0.0000031	**0.00012**
Antimony	mg/L	0.0005	0.02	**0.00053**	**0.00056**	**0.00058**	**0.00077**	**0.00068**	**0.00087**	**0.00064**	**0.00078**	**0.00055**	**0.00058**
Arsenic	mg/L	0.003	0.005	0.0015	0.0015	0.0017	0.0022	0.0019	0.0025	0.0018	0.0023	0.0016	0.0017
Barium	mg/L	0.007	1.0	0.0051	0.0053	0.0056	**0.0074**	0.0065	**0.0084**	0.0061	**0.0075**	0.0053	0.0056
Boron	mg/L	0.01	1.5	0.0050	0.0051	0.0056	0.0074	0.0065	0.0083	0.0061	0.0075	0.0053	0.0056
Cadmium	mg/L	0.00003	0.000047	0.000013	0.000013	0.000014	0.000019	0.000017	0.000021	0.000016	0.000020	0.000014	0.000014
Calcium	mg/L	11	-	7.6	9.7	7.8	10	9.6	**12**	8.7	11	7.5	7.9
Chloride	mg/L	4.8	120	1.0	1.2	1.1	1.5	1.3	1.7	1.2	1.5	1.0	1.1
Cobalt	mg/L	0.00025	0.0025	**0.00028**	**0.00035**	**0.00030**	**0.00040**	**0.00036**	**0.00047**	**0.00033**	**0.00041**	**0.00029**	**0.00030**
Copper	mg/L	0.003	0.005	0.0013	0.0026	0.0011	0.0015	0.0016	0.0020	0.0013	0.0015	0.0011	0.0011
Cyanide (Total) (2)	mg/L	0.001	-	-	-	-	-	-	-	-	-	-	-
Cyanide (Free) (2)	mg/L	0.001	0.0098	-	-	-	-	-	-	-	-	-	-
Iron	mg/L	0.49	0.3	0.21	0.22	0.23	0.30	0.27	0.34	0.25	0.31	0.22	0.23
Lead	mg/L	0.0005	0.003	0.00033	0.00033	0.00037	0.00049	0.00043	**0.00055**	0.00040	0.00049	0.00035	0.00037
Magnesium	mg/L	2.0	-	1.3	1.3	1.4	1.9	1.7	**2.1**	1.6	1.9	1.3	1.4
Manganese	mg/L	0.120	0.7	0.055	0.055	0.062	0.082	0.072	0.092	0.068	0.083	0.059	0.062
Molybdenum	mg/L	0.001	0.073	**0.0011**	**0.0017**	**0.0011**	**0.0015**	**0.0014**	**0.0018**	**0.0012**	**0.0015**	**0.0010**	**0.0011**
Nickel	mg/L	0.0015	0.025	**0.0015**	**0.0016**	**0.0017**	**0.0023**	**0.0020**	**0.0025**	**0.0019**	**0.0023**	**0.0016**	**0.0017**
Nitrate	mg/L	0.17	13	**0.34**	**0.34**	**0.38**	**0.51**	**0.44**	**0.57**	**0.42**	**0.52**	**0.36**	**0.38**
Phosphorus (Total)	mg/L	0.041	0.02	0.011	0.011	0.013	0.017	0.015	0.019	0.014	0.017	0.012	0.013
Potassium	mg/L	0.52	373	0.41	**0.77**	0.36	0.48	0.49	**0.64**	0.40	0.48	0.34	0.36
Sodium	mg/L	2.6	-	**2.9**	**10**	1.3	1.8	**3.0**	**4.0**	1.5	1.8	1.3	1.3
Strontium	mg/L	0.024	-	0.016	0.019	0.017	0.023	0.021	**0.026**	0.019	0.023	0.016	0.017
Sulphate	mg/L	4.1	218	**6.9**	**24**	3.2	**4.4**	**7.1**	**10**	3.8	**4.5**	3.1	3.4
Uranium	mg/L	0.002	0.015	0.0010	0.0011	0.0011	0.0015	0.0013	0.0017	0.0012	0.0015	0.0011	0.0011
Vanadium	mg/L	0.001	0.006	**0.0010**	**0.0010**	**0.0011**	**0.0015**	**0.0013**	**0.0017**	**0.0012**	**0.0015**	**0.0011**	**0.0011**
Zinc	mg/L	0.021	0.02	0.0057	0.0058	0.0063	0.0085	0.0074	0.009	0.0070	0.0086	0.0060	0.0064

Notes:

Minimum (Min) and maximum (Max) monthly average concentrations are in mg/L. The minimum and maximum monthly average concentrations are taken from the results of the average, 1:25-year dry and 1:25-year wet climate conditions.

Monthly average concentrations greater than the 95th percentile baseline concentrations are denoted in bold, and monthly average concentrations greater than the 95th percentile baseline concentration and Water Quality Guidelines are denoted in bold italics.

(1) Derived a single set of Water Quality Guidelines equal to the most recent of the PWQO or CWQG (or the BCMOE guideline for parameters without a PWQO or CWQG), with the exception of cyanide, which has a site-specific guideline.

(2) Total and free cyanide are not predicted for Mesomikenda Lake Watershed locations during post-closure phase stage II, as there is assumed not to be a source of cyanide to this system decades after closure of the Project site.

Memorandum

To:	Steve Woolfenden	From:	Steve Kaufman, Karen Besemann
Company:	IAMGOLD Corporation		Golder Associates Ltd.
cc:	Stephan Theben (SLR Consulting)	Date:	December 19, 2018
Subject:	CÔTÉ GOLD PROJECT ENVIRONMENTAL EFFECTS REVIEW REPORT		
	UPDATED TECHNICAL MEMORANDUM: HYDROLOGY AND CLIMATE		

1.0 INTRODUCTION AND PROJECT OVERVIEW

The Côté Gold Project (the Project) is a pre-feasibility level gold project located in the Chester and Yeo Townships, District of Sudbury, in northeastern Ontario, approximately 20 kilometres (km) southwest of Gogama, 130 km southwest of Timmins, and 200 km northwest of Sudbury. IAMGOLD Corporation (IAMGOLD) proposes to construct, operate and eventually rehabilitate a new open pit gold mine on the property. Following the receipt of the Environmental Assessment (EA) Decision for the Project, issued by the Federal Minister of Environment and Climate Change Canada in 2016, IAMGOLD are proposing to optimize the Project and an Environmental Effects Review (EER) is being prepared. The optimized project is referred to as 'the Project'

This updated technical memorandum has been prepared by Golder Associates and is one of a series of technical memoranda to support the EER for the Project. In addition to this memorandum, the following memoranda have been prepared and used to support the EER:

- Updated Geochemical Characterization
- Updated Technical Memorandum: Noise and Vibration
- Updated Technical Memorandum: Hydrogeology
- Updated Technical Memorandum: Air Quality
- Updated Technical Memorandum: Water Quality
- Updated Technical Memorandum: Terrestrial Biology
- Updated Technical Memorandum: Aquatic Biology
- Updated Technical Memorandum: Land and Resource Use
- Updated Technical Memorandum: Traditional Land Use

- Updated Technical Memorandum: Human and Ecological Health Risk
- Updated Technical Memorandum: Visual Aesthetics
- Updated Technical Memorandum: Socio-Economic
- Updated Technical Memorandum: Archaeology and Built Heritage

1.1 Hydrology and Climate

Golder Associates completed a technical study in 2013 of the potential hydrological and climate effects of the Project for the purposes of the Federal Amended Environmental Impact Statement and Provincial Environmental Assessment Report (hereafter referred to as the 'EA'). In order to directly compare potential changes to the hydrological system to the EA, the climate, lake and river information as previously reported was not substantially altered to those inputs and assumptions as described in the Project EA Report Technical Document: Hydrology (Golder 2013).

Based on an evolving Project design, IAMGOLD has elected to evaluate changes in Project effects through an EER. This Memorandum outlines the updates to the hydrology and climate predictions related to the optimization of the Project which incorporates the revised footprint of the Project and to compare and contrast the previous effects assessment on the water quantity in the subject watersheds. Changes to the conceptual and numerical model of the hydrological system were limited to:

- Additions of watersheds where infrastructure footprints overprinted new areas.
- Revisions to existing and/or addition of watersheds to accommodate changes to infrastructure footprints such as the Open Pit, Tailings Management Facility (TMF), Mine Rock Area (MRA), ore and overburden Stockpiles, and the ore processing plant.
- Revisions to surface water flow pathways to account for changes in the channel re-alignment strategy.
- Revisions to operational (process and site) water flow rates and directions.
- Revisions to closure concepts.

Changes to watershed areas and infrastructure footprints are further detailed herein; revisions to seepage flows are discussed in the Updated Hydrogeology Technical Memorandum.

1.2 Hydrological and Climatological Setting

The Project site is located at the headwaters of the Mattagami River system, just north of the watershed divide that separates the James Bay watershed from the Great Lakes watershed (Figure 1-1). Downstream of the Project site, the Mattagami River flows for approximately 420 km to a confluence with Moose River, which subsequently flows to James Bay. The

Mattagami River is a managed river system that includes approximately 18 dams and power generating stations that fall under the Mattagami River Water Management Plan.

A number of lakes, connected by relatively short streams, are present in the vicinity of the Project site (Figure 1-2). The Mollie River, fed by Chester and Clam Lakes to the west, flows eastward through the open pit footprint and connects Côté Lake to the Three Duck Lakes system. To the north of the open pit footprint, Bagsverd Lake drains northward through Bagsverd Creek and eventually discharges into Mesomikenda Lake to the east. Other than Mesomikenda Lake, which is greater than 50 m deep in some locations, lakes are typically shallow (<10 m average depth) with bedrock-lined shorelines.

Active regional climate monitoring locations are located in the vicinity of the Project Site in Timmins (north of the Project site), Chapleau (northwest of the Project site), Sudbury (south of the Project site), and North Bay (southeast of the Project site). Based on information collected at these locations, the climate of the Project site is characterized by cold winters (-10˚C to -35˚C) and warm summers (10˚C to 35˚C). Mean annual precipitation for the region is approximately 800 mm to 900 mm, of which approximately 30 to 40% falls as snow (EC 2013). Mean annual evaporation is in the range of 400 mm to 600 mm (MNR 1984). In 2012, a climate monitoring station was installed at the project site and collects data on precipitation, air temperature, and wind and will supplement information collected from the longer term regional climate stations.

2.0 METHODOLOGY

2.1 Spatial Boundaries

2.1.1 Local Study Area

The Local Study Area (LSA) is comprised of an area beyond the location of the physical works and activities within which effects may occur as a result of the Project. For hydrology, the LSA is defined by lakes and watersheds in the vicinity and downstream of the Project infrastructure.

The hydrology LSA extends to the nearest watershed boundary beyond the proposed infrastructure, open pit, MRA and TMF. The LSA is bound by the following features:

- The Great Lakes/James Bay watershed divide along the south
- The Moore Lake and Schist lake watershed divides to the west
- Mesomikenda Lake to the east
- The Somme River system to the north and northwest

The hydrology LSA is shown on Figure 2-1 and is increased to the west when compared to the EA as a result of the revised footprint of the TMF.

2.1.2 Regional Study Area

The Regional Study Area (RSA) for hydrology was extended downstream of the Project to the confluence of the Mollie River and the Mesomikenda Lake outflow. These waterways both ultimately discharge to Minisinakwa Lake near the community of Gogama and subsequently to the Mattagami River. The Mattagami River is a controlled river system with approximately 18 dams along its length which provide flood control and power generation. A Water Survey of Canada water level gauge exists at Minisinakwa Lake Dam, and the total watershed area upstream of this monitoring point was defined as the RSA. The hydrology RSA is shown in Figure 2-2.

2.2 Temporal Boundaries

The temporal boundaries of the EER remain as those provided in the EA, and will span all phases of the Project:

- Construction
- Operations
- Closure
- Post-closure

2.3 Effects Assessment Indicators

The effects assessment indicators have not changed compared to the EA. The effects assessment indicators previously used and still applicable include:

- Change in surface water flow

2.4 Prediction of Effects

The potential change in surface water flow was predicted through the modification of the previously developed GoldSim hydrological model. The model was revised to incorporate:

- Watersheds (natural or influenced by infrastructure components)
- Seepage pathways through constructed features such as the TMF and MRA
- The reconfigured watercourse realignments

Model simulations were completed for the current hydrological regime (the Existing Conditions; Figure 2-3) and these results were subsequently compared to simulated surface water flow produced during the Construction, Operations, Closure and Post-closure phases.

Model results were presented for an average annual precipitation climate condition, as well as 1:25-year wet and 1:10-year dry annual precipitation climate conditions. These climate conditions were considered representative of the range of annual climate conditions that may be encountered at the Project site for the life of the mine (approximately 15 years). As per EA correspondence and response documents, the climate from the1:10-year dry year was not substantially different from the statistical 1:25-year dry year and as such the dry year from the EA was carried to this analysis in order to directly compare results from the EA and EER.

2.5 Construction Phase

Changes to surface water flow during the Construction Phase will be limited to those associated with the development of the watercourse realignments. The construction of these features will facilitate the lowering of water levels in Côté Lake for open pit development. However, these features will be designed to manage expected and severe flow events and as such are not assessed separately from the potential effects that could arise during the Operations Phase.

2.6 Operations Phase

Predicted changes to surface water flows were estimated with the Project footprint at its maximum extent (i.e., full development). Watersheds delineated for the Operations Phase of the Project are displayed on Figure 2-4.

2.6.1 Change in Surface Water Flow

With the planned water management concepts (for on-site water management and realignments) incorporated into the water balance model, estimated change (%) from Existing Conditions in average annual surface water flow are presented in Table 2-1. Estimated magnitude of surface water flow changes are provided in Appendix II.

Table 2-1: Simulated Change in Surface Water Flow – Operations Phase

Watershed	Location	Percent Change from Existing Conditions (average annual surface water flow)			Influence
		Wet Climate Condition	Average Climate Condition	Dry Climate Condition	
Mollie River	Moore Lake	-7	-7	-7	Watershed Reconfiguration (TMF Development)
Mollie River	Chain Lake	-3	-3	-3	Upstream Watershed Reconfiguration
Mollie River	Attach Lake	-3	-3	-2	Upstream Watershed Reconfiguration
Mollie River	Ash Lake	0	0	0	n/a
Mollie River	Sawpeter Lake	-2	-2	-2	Watershed Reconfiguration (TMF Development)
Mollie River	Chester Lake	0	+1	-3	Upstream Watershed Reconfiguration
Mollie River	Little Clam Lake	-13	-16	-13	Watershed Reconfiguration (TMF Development)
Mollie River	Clam Lake	-11	-5	-7	Watershed Reconfiguration (TMF Development)
Mollie River	Weeduck Lake	0	0	-2	Watershed Reconfiguration (Processing Plant Development)
Mollie River	Three Duck Lakes (Upper)	+11	+10	+13	Connection to Realignment and Treated Effluent Outflow
Mollie River	Three Duck Lakes (Lower)	+6	+6	+9	Upstream Connection to Realignment and Treated Effluent Outflow
Mollie River	Delaney Lake	0	0	0	Watershed Reconfiguration (MRA Development)
Mollie River	Dividing Lake	+2	+2	+4	Upstream Connection to Realignment and Treated Effluent Outflow

Watershed	Location	Percent Change from Existing Conditions (average annual surface water flow)			Influence
		Wet Climate Condition	Average Climate Condition	Dry Climate Condition	
Mesomikenda Lake	Bagsverd Lake	-10	-10	-12	Watershed Reconfiguration (TMF Development)
Mesomikenda Lake	Schist Lake	+1	0	+1	Watershed Reconfiguration (TMF Development)
Mesomikenda Lake	Bagsverd Creek Outflow	-5	-5	-6	Upstream Watershed Reconfiguration
Mesomikenda Lake	Mesomikenda Lake	-1	-1	-1	Upstream Watershed Reconfiguration

Changes in surface water flow were influenced primarily by two factors; i) the reconfiguration (addition or removal) of watershed area through the development of realignment channels, realignment dams and/or infrastructure (e.g., TMF, MRA, open pit) footprints and/or ii) the connection of waterways to realignment channels and treated effluent discharge from the Polishing Pond.

For each climate scenario, the predicted change to average annual surface water flow was typically less than 10% through the Project site watersheds. Estimated decreases in surface water flow of greater than 10% were typically associated with localized change to project infrastructure footprints (e.g., Little Clam Lake, Bagsverd Lake and Clam Lake). Increases to surface water flow through the Three Duck Lakes system (up to 13%) was primarily due to treated effluent discharge.

For the Operations Phase, predicted change to annual average surface water flow was less than 5% by the flow outlets of the LSA at Mesomikenda Lake and Dividing Lake.

2.7 Post-Closure Stage I Phase

At the Post-closure Stage I Phase, realignment features remain in place and water level in the Côté open pit will rise in response to precipitation inputs, runoff, groundwater inflow and active pumping of the MRA, TMF and various seepage collection ponds. The end of the Post-closure Stage I Phase is roughly delineated by the completion of the filling of the Côté open pit. During this phase, no treated effluent is planned to be discharged to upper basin of Three Duck Lakes.

2.7.1 Surface Water Flow

With the incorporation of the planned water management concepts (for on-site water management and watercourse realignments) incorporated into the water balance model, estimated change (%) from Existing Conditions in average annual surface water flow are presented in Table 2-2. Predicted magnitude change of annual average discharge estimates are provided in Attachment I.

Table 2-2: Simulated Change in Surface Water Flow – Post-Closure Stage I Phase

Watershed	Location	Percent Change from Existing Conditions			Influence
		Wet Climate Condition	Average Climate Condition	Dry Climate Condition	
Mollie River	Moore Lake	-7	-7	-7	Watershed Reconfiguration (TMF Development)
Mollie River	Chain Lake	-3	-3	-3	Upstream Watershed Reconfiguration
Mollie River	Attach Lake	-3	-3	-2	Upstream Watershed Reconfiguration
Mollie River	Ash Lake	0	0	0	n/a
Mollie River	Sawpeter Lake	-2	-2	-2	Watershed Reconfiguration (TMF Development)
Mollie River	Chester Lake	+6	+5	+2	Upstream Watershed Reconfiguration
Mollie River	Little Clam Lake	-13	-16	-13	Watershed Reconfiguration (TMF Development)
Mollie River	Clam Lake	+14	+8	+18	Watershed Reconfiguration (TMF Development)
Mollie River	Weeduck Lake	0	0	-2	Watershed Reconfiguration (Processing Plant Development)
Mollie River	Three Duck Lakes (Upper)	-13	-14	-15	Connection to Realignment and Decommissioned Treated Effluent Outflow
Mollie River	Three Duck Lakes (Lower)	-14	-14	-14	Upstream Connection to Realignment and Decommissioned Treated Effluent Outflow
Mollie River	Delaney Lake	-1	-1	-1	Watershed Reconfiguration (MRA Development)
Mollie River	Dividing Lake	-10	-11	-11	Upstream Connection to Realignment and Decommissioned Treated Effluent Outflow

Watershed	Location	Percent Change from Existing Conditions			Influence
		Wet Climate Condition	Average Climate Condition	Dry Climate Condition	
Mesomikenda Lake	Bagsverd Lake	-9	-9	-11	Watershed Reconfiguration (TMF Development)
Mesomikenda Lake	Schist Lake	+1	+1	+1	Watershed Reconfiguration (TMF Development)
Mesomikenda Lake	Bagsverd Creek Outflow	-4	-5	-5	Upstream Watershed Reconfiguration
Mesomikenda Lake	Mesomikenda Lake	-1	-1	-1	Upstream Watershed Reconfiguration

In general, changes to surface water flow for the Post-closure Stage I Phase were predicted to be similar to the operations phase, a result of the realignment features remaining in place and active management of the MRA collection ponds to flood the open pit. Surface water flow decreases of up to 15% were predicted through the Three Duck Lakes, a result of the cessation of effluent discharge in the upper basin while the open pit is filling.

2.8 Post-Closure Phase

In the Post-closure Stage II Phase, water level will have recovered in the Côté Pit to an elevation sufficient to cause overflow (and reconnection) of the Pit Lake to the upper basin of Three Duck Lakes. With acceptable water quality, the various collection ponds will overflow to local surface water bodies and no active pumping is planned to occur on the site. The decommissioning of the realignment features will result in watersheds that more closely resemble those of existing conditions.

2.8.1 Surface Water Flow

Estimated average annual surface water flow changes in the Post-closure Stage II Phase from Existing Conditions are presented in Table 2-3. Predicted magnitude change of annual average surface water flow are provided in Appendix II.

Table 3: Simulated Change in Surface Water Flow – Post-Closure Stage II Phase

Watershed	Location	Percent Change from Existing Conditions (average annual surface water flow)			Influence
		Wet Climate Condition	Average Climate Condition	Dry Climate Condition	
Mollie River	Moore Lake	-7	-7	-7	Watershed Reconfiguration (TMF Development)
Mollie River	Chain Lake	-3	-3	-3	Upstream Watershed Reconfiguration
Mollie River	Attach Lake	-3	-3	-2	Upstream Watershed Reconfiguration
Mollie River	Ash Lake	0	0	0	n/a
Mollie River	Sawpeter Lake	-2	-2	-2	Watershed Reconfiguration (TMF Development)
Mollie River	Chester Lake	-2	-2	-1	Upstream Watershed Reconfiguration
Mollie River	Little Clam Lake	-13	-12	-13	Watershed Reconfiguration (TMF Development)
Mollie River	Clam Lake	+10	+5	+13	Watershed Reconfiguration (TMF Development)
Mollie River	Weeduck Lake	0	0	-2	Watershed Reconfiguration (Processing Plant Development)
Mollie River	Three Duck Lakes (Upper)	+5	+4	+5	Connection to Cote Lake Outflow
Mollie River	Three Duck Lakes (Lower)	+3	+3	+5	Connection to Cote Lake Outflow
Mollie River	Delaney Lake	0	0	0	Watershed Reconfiguration (MRA Development)
Mollie River	Dividing Lake	+3	+3	+4	Upstream Connection to Realignment and Treated Effluent Outflow
Mesomikenda Lake	Bagsverd Lake	-5	-5	-6	Watershed Reconfiguration (TMF Development)

Watershed	Location	Percent Change from Existing Conditions (average annual surface water flow)			Influence
		Wet Climate Condition	Average Climate Condition	Dry Climate Condition	
Mesomikenda Lake	Schist Lake	+1	+1	+1	Watershed Reconfiguration (TMF Development)
Mesomikenda Lake	Bagsverd Creek Outflow	-2	-3	-3	Upstream Watershed Reconfiguration
Mesomikenda Lake	Mesomikenda Lake	0	0	0	Upstream Watershed Reconfiguration

For the simulated climate conditions, surface water flow changes in Post-closure were estimated to be 10% or less compared to Existing Conditions, suggesting a long-term return to the natural flow regime at the Project site. Greater than 10% surface water flow changes are predicted at Clam Lake and Little Clam Lake and are a result of watershed area change and seepage at the rehabilitated TMF and rehabilitation and resulting runoff from the rehabilitated Overburden Stockpile area.

2.9 Other Predicted Effects

While not considered as an EA indicator, an estimate of the time to flood the Côté open pit was completed. This provided an approximate timeline for the period between the Post-closure Stage I Phase and the Post-closure Stage II Phase.

The assessment considered runoff to, and precipitation on, the open pit as well as groundwater inflow and is strongly influenced by the water management strategy to pump collection ponds at the MRA, TMF and other collection facilities to the open pit. With these water budget components considered, the open pit will flood in approximately 25 years.

3.0 MITIGATION MEASURES

Mitigation measures are means to prevent, reduce or control adverse environmental effects of a project, and include restitution for any damage to the environment caused by those effects through replacement, restoration, compensation or any other means.

The prediction of surface water flow effects was completed based on several inherent mitigation measures that have been included in the design of the Project. These include:

- Engineered facilities will be constructed to store mine rock (MRA), ore and tailings (TMF).
- Engineered water management systems will be constructed to collect runoff and seepage from the MRA, ore stockpiles, TMF, and Overburden Stockpile during the Operations Phase and the Post-closure Stage I Phase.
- Engineered realignment channels will be constructed to convey the range of flows that can be reasonably expected over the projected life of mine or life of realignment feature as applicable.
- Erosion and sediment control measures will be constructed to promote settling of sediments and mitigate the migration of suspended solids into nearby surface water features.

Table 3-1 provides the mitigation measures applicable to the EER and indicates if the mitigation measures have changed or stayed the same from the EA.

Table 3-1: Mitigation Measures – Hydrology and Climate

Discipline	Project Phase	Issue / Concern / Interaction	Mitigation Measure	Description / Commitment	Standard	Comparison between EA and EER measures
Hydrology and Climate	Operations through to post-closure	Realignment of surface water flows.	Realignment channels and dams.	Realignment channels and dams will be designed to convey the range of flows and water levels reasonably expected over the Project life. Realignment dams will be constructed to allow excavation of the open pit and construction of the TMF.	*Lakes and Rivers Improvement Act*, (LRIA), *Fisheries Act, Navigation Protection Act*	The mitigation measure has not changed from the EA.

4.0 MANAGEMENT

Table 4-1 below provides the monitoring measures applicable to the EER and indicates if the management measures have changed or stayed the same from the EA.

In instances where measures are no longer applicable, they have been removed with reasons provided.

Table 4-1: Monitoring Measures – Hydrology and Climate

Discipline	Parameter	Monitoring Method	Standard	Frequency / Timeframe	Location	Comparison between EA and EER measures
Hydrology and Climate	Surface water level (lakes and streams)	Automatic water level recorder (transducer) along with manual staff gauge measurements.	Good Industry Practice	Construction through closure phases. Water level transducers will be set to record on a half-hourly basis. Manual staff gauge measurements will occur quarterly and will be surveyed to a geodetic datum annually.	Selected existing locations*, additional new stations in waterways and realignments surrounding the infrastructure footprint.	The monitoring measure has not changed from the EA
Hydrology and Climate	Streamflow (lake outflows and streams)	Standard velocity-area stream current methodology.	Environment Canada (1981) Hydrometric Field Manual – Measurement of Streamflow	Construction through closure phases. Initially quarterly, frequency may be reduced as natural variability is addressed.	Selected existing locations*, additional new stations in waterways and realignments surrounding the infrastructure footprint.	The monitoring measure has not changed from the EA

Discipline	Parameter	Monitoring Method	Standard	Frequency / Timeframe	Location	Comparison between EA and EER measures
Hydrology and Climate	Meteorological parameters including air temperature, relative humidity, wind speed, wind direction, solar radiation and total precipitation.	Meteorological sampling equipment located on 10 m tower.	Environment Canada (1992) Atmospheric Environment Service (AES) Guidelines for Co-operative Climatological Autostations	Construction through closure phases. Parameters will be recorded on an hourly-time interval, data downloaded quarterly.	Continue sampling at the current location.	The monitoring measure has not changed from the EA
Hydrology and Climate	Water usage from freshwater sources	Flow meter capable of recording instantaneous and total daily volume.	Ontario *Water Resources Act* (Section 34)	Operations phase Daily	Mesomikenda Lake or other freshwater source.	The monitoring measure has not changed from the EA
Hydrology and Climate	Discharge to the environment	Flow meter or calibrated flow conveyance feature capable of providing instantaneous and total daily volume.	Ontario *Water Resources Act* (Section 53)	Operations phase Daily	Polishing pond outlet.	The monitoring measure has not changed from the EA
Hydrology and Climate	Water transfer	Flow meter capable of recording instantaneous and total daily volume.	Good Industry Practice	Operations phase Daily	MRA collection ponds, mine water pond, reclaim pond, polishing pond.	The monitoring measure has not changed from the EA

Discipline	Parameter	Monitoring Method	Standard	Frequency / Timeframe	Location	Comparison between EA and EER measures
Hydrology and Climate	Reservoir Water Levels	Manual staff gauges or automatic water level sensors.	Good Industry Practice	Operations phase Monthly	MRA collection ponds, mine water pond, reclaim pond, polishing pond.	The monitoring measure has not changed from the EA
Hydrology and Climate	Environment Canada Mollie River Streamflow station	Desktop review using available records from Environment Canada.	Good Industry Practice	Construction through closure phases. Monthly review, annual summary.	Mollie River Streamflow gauging station	The monitoring measure has not changed from the EA
Hydrology and Climate	Water Levels at Ontario Power Generation (OPG) Mesomikenda Lake Dam	Desktop review using available records from OPG.	Good Industry Practice	Construction through closure phases. Annual review and summary.	Mesomikenda Lake dam	The monitoring measure has not changed from the EA

Discipline	Parameter	Monitoring Method	Standard	Frequency / Timeframe	Location	Comparison between EA and EER measures
Hydrology and Climate	In-stream Characteristics	Water samples for total suspended solids will be manually sampled and submitted for laboratory analysis. Measurement of stream cross sections for channel geometry. Installation of erosion pin in stream bank and disturbance rods in streambed for sediment erosion / accumulation. Aerial or photographic analysis to assess stream meander.	Good Industry Practice	Construction to closure phases. Twice annually, during the spring melt and low flow conditions, to be initiated prior to realignment construction.	Reach of Bagsverd Creek downstream of Un-named Lake #1 and upstream of Neville Lake.	Monitoring measure no longer applicable. Potential effects on Bagsverd Creek mitigated by project footprint reconfiguration.

* Existing locations may require upgrades or improvements for long term monitoring

5.0 CONCLUSION

The Project will potentially affect the hydrological environment principally through the: construction of the excavation of an open pit mine and the development of the waste and material storage areas. These changes to watershed areas will be partially offset by the construction of realignment channels that are intended to maintain flow paths and flow magnitudes similar to those currently observed.

The revised hydrological modelling has simulated wet, dry and average climate conditions and has incorporated the revised Project footprint over the course of the Operations and Post-Closure phases of the project. The magnitude of surface water flow change for each of the project phases was typically less than 10% change from existing flows and limited in spatial extent.

Mitigation measures and management through monitoring of water usage will further confirm the ongoing stability of the hydrological system as the Project advances.

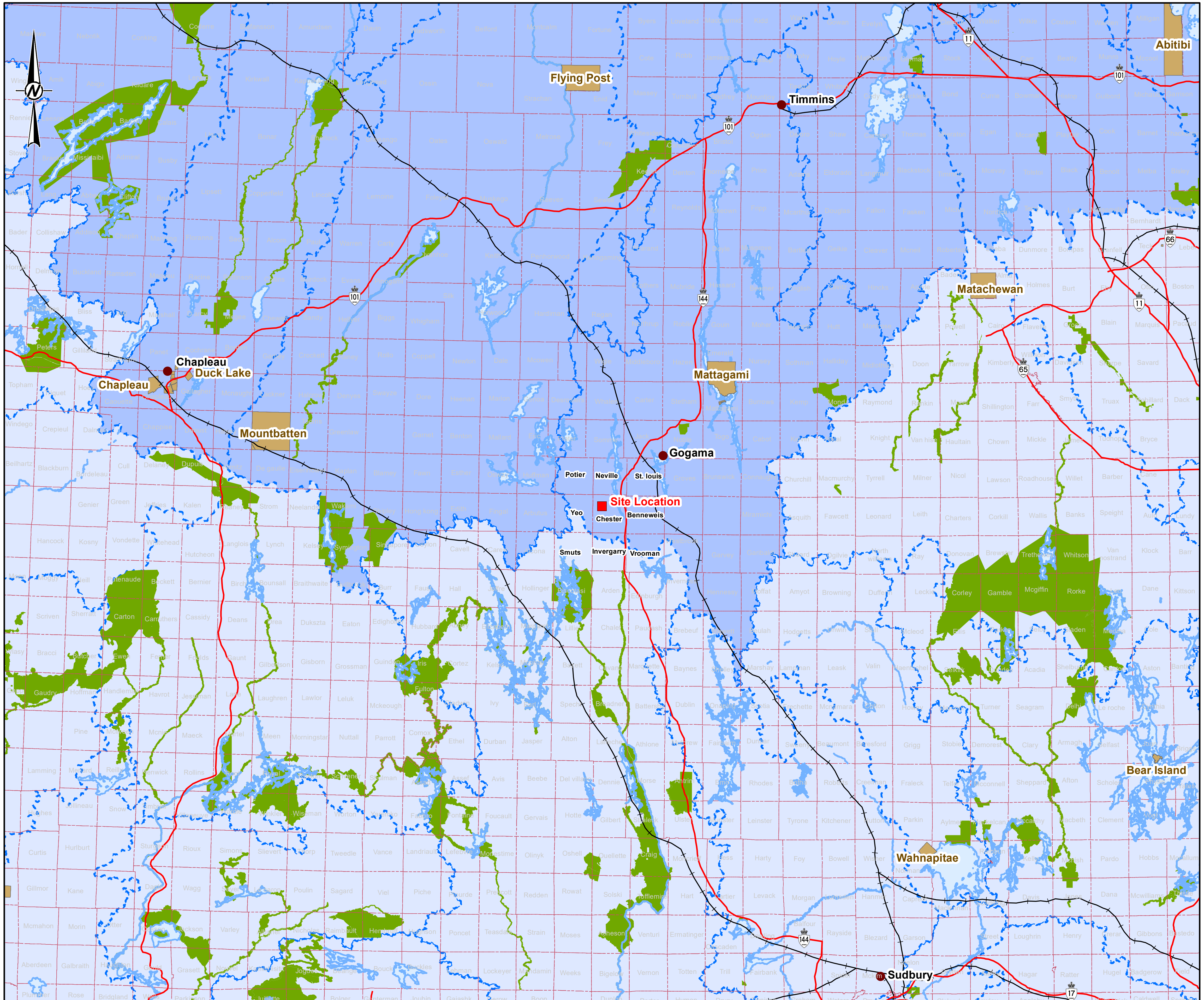
6.0 REFERENCES

Golder Associates (Golder) 2014. Côté Gold Project, Environmental Assessment Report, Technical Support Document: Hydrology Version R2, Project: 13-1192-0021.

7.0 GLOSSARY AND ABBREVIATIONS

EA	Environmental Assessment
EER	Environmental Effects Review
ha	hectare
km	kilometre
LSA	Local Study Area
m	metre
mm	millimetre
MNR	Ministry of Natural Resources
MRA	Mine Rock Areas
RSA	Regional Study Area
TMF	Tailings Management Facility
°C	degrees Celsius

FIGURES

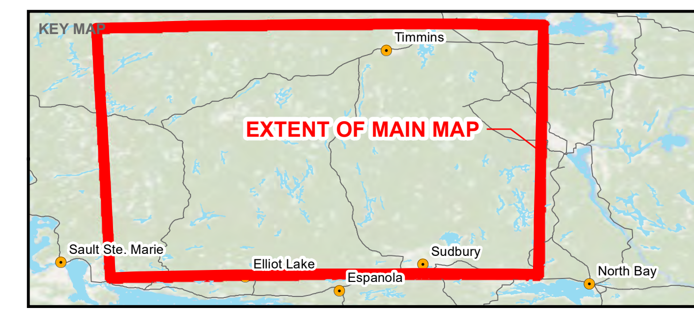


LEGEND

- Site Location
- Major Roads
- Railway
- Community
- First Nations Community
- Townships
- Provincial Park
- Waterbody

Primary Watersheds

- Hudson Bay
- Great Lakes



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CLIENT
IAMGOLD

IAMGOLD

PROJECT
ENVIRONMENTAL EFFECT REVIEW - HYDROLOGY
CÔTÉ GOLD PROJECT

TITLE
PROJECT LOCATION

CONSULTANT

GOLDER

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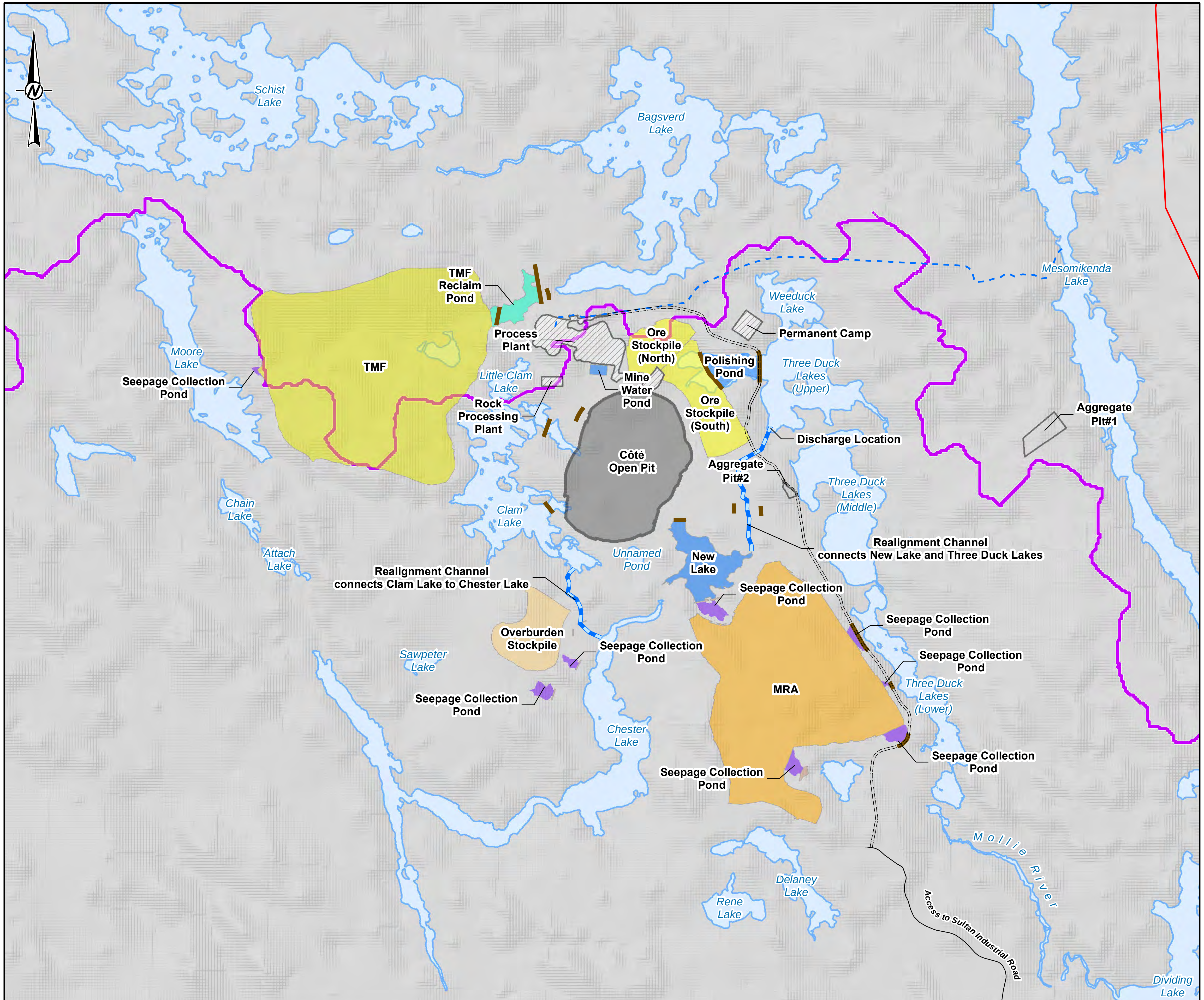

LEGEND

- Major Roads
- Roads
- Main Access Road
- Mollie River Watershed
- Waterbodies

Proposed Infrastructure

- Aggregate Pit
- Dam
- Infrastructure
- Mine Rock Area (MRA)
- Open Pit
- Ore Stockpile
- Overburden Stockpile
- Polishing Pond
- Seepage Collection Pond
- Tailings Management Facility (TMF)
- TMF Reclaim Pond
- Water
- Dam
- Fresh Water Pipeline
- Realignment Channel

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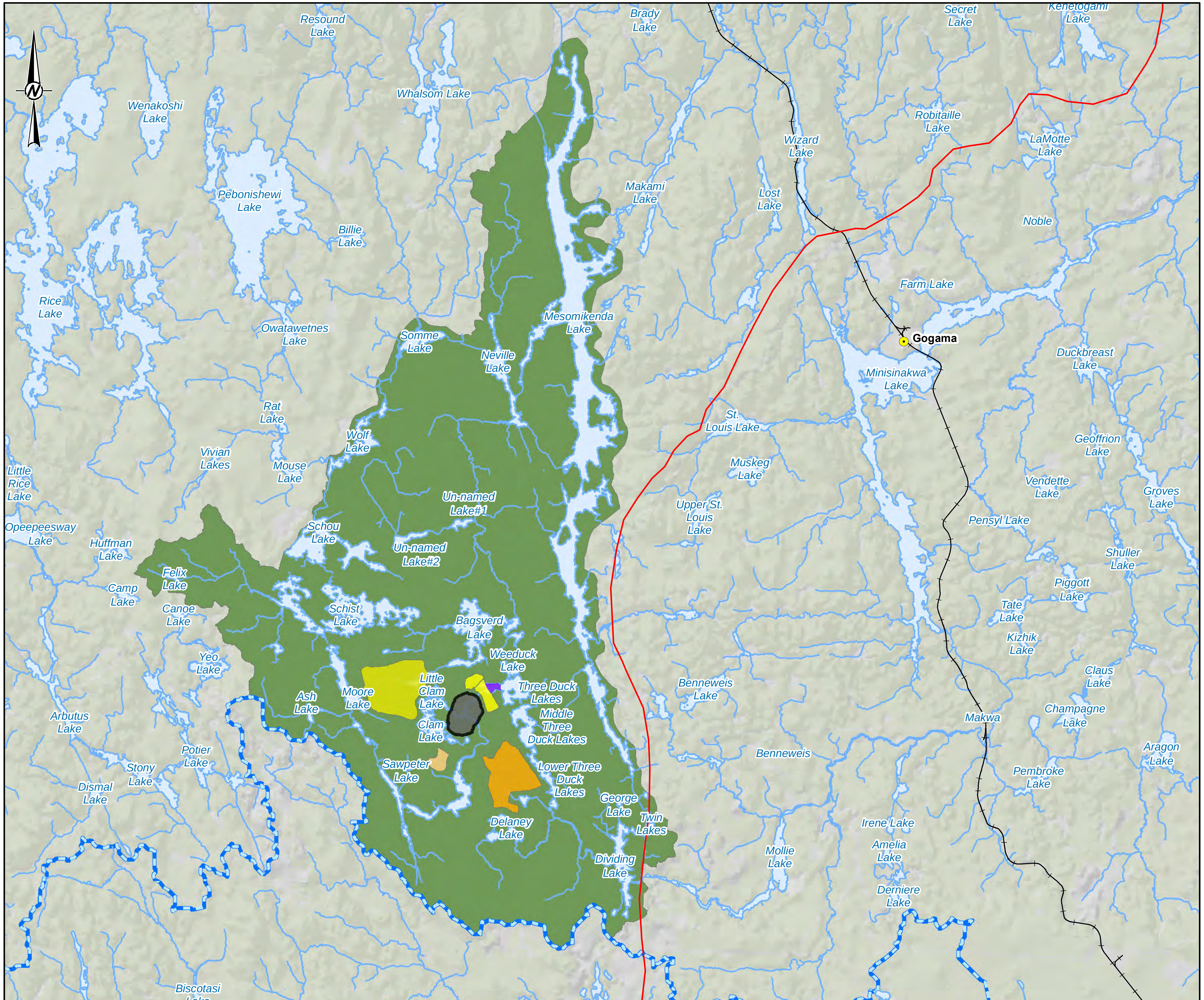

LEGEND

- Regional Communities
- Major Roads
- Railway
- Waterbodies
- Hydrogeology Local Study Area (LSA)
- Great Lakes / James Bay Watershed Divide

Proposed Infracture

- Mine Rock Area (MRA)
- Open Pit
- Ore Stockpile
- Overburden Stockpile
- Polishing Pond
- Tailings Management Facility (TMF)

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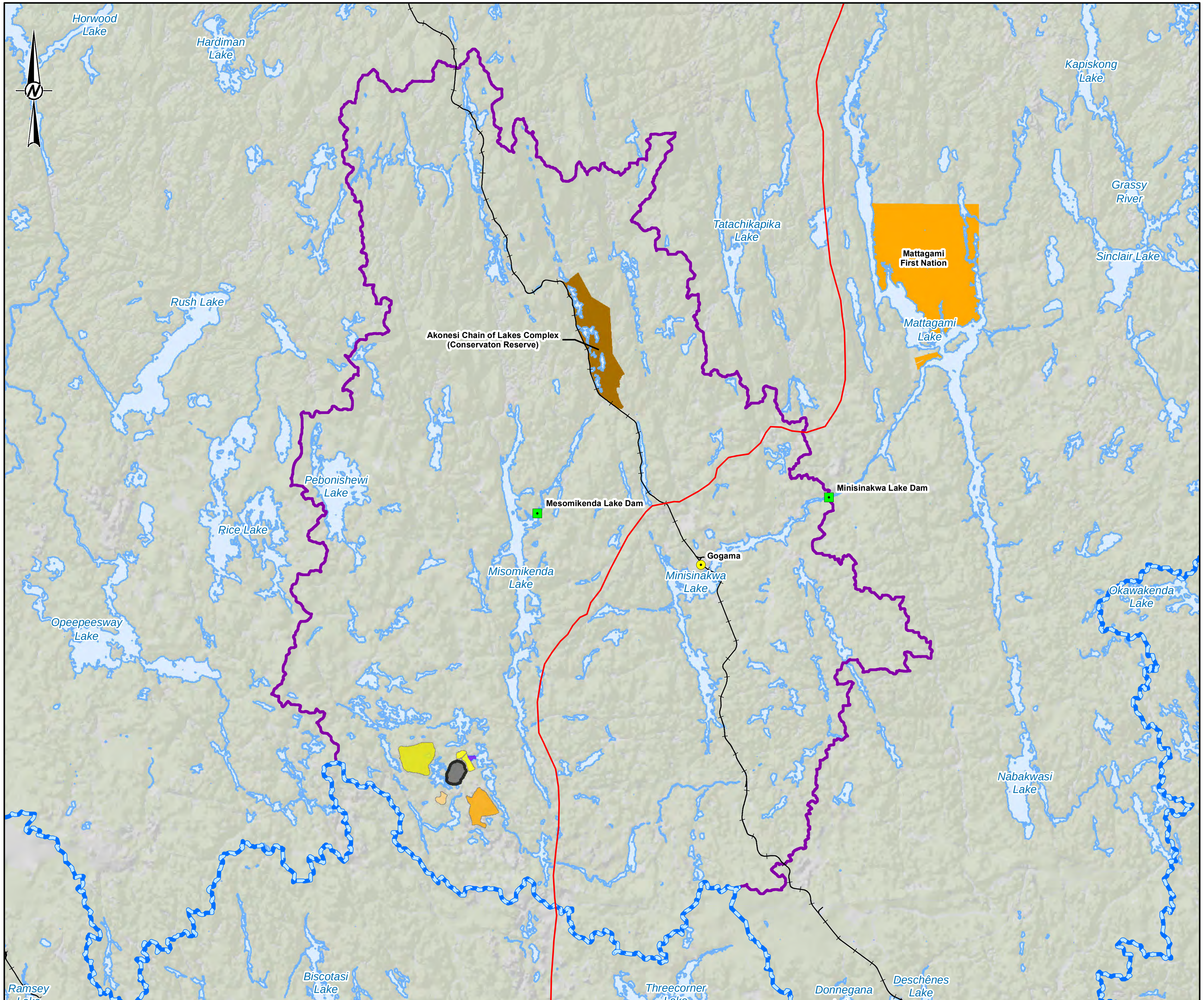

LEGEND

- Regional Communities
- First Nation Reserve
- Major Roads
- Railway
- Dams
- Conservation Reserve (Regulated)
- Waterbodies
- Great Lakes / James Bay Watershed Divide

Proposed Infrastructure

- Mine Rock Area (MRA)
- Open Pit
- Ore Stockpile
- Overburden Stockpile
- Polishing Pond
- Tailings Management Facility (TMF)

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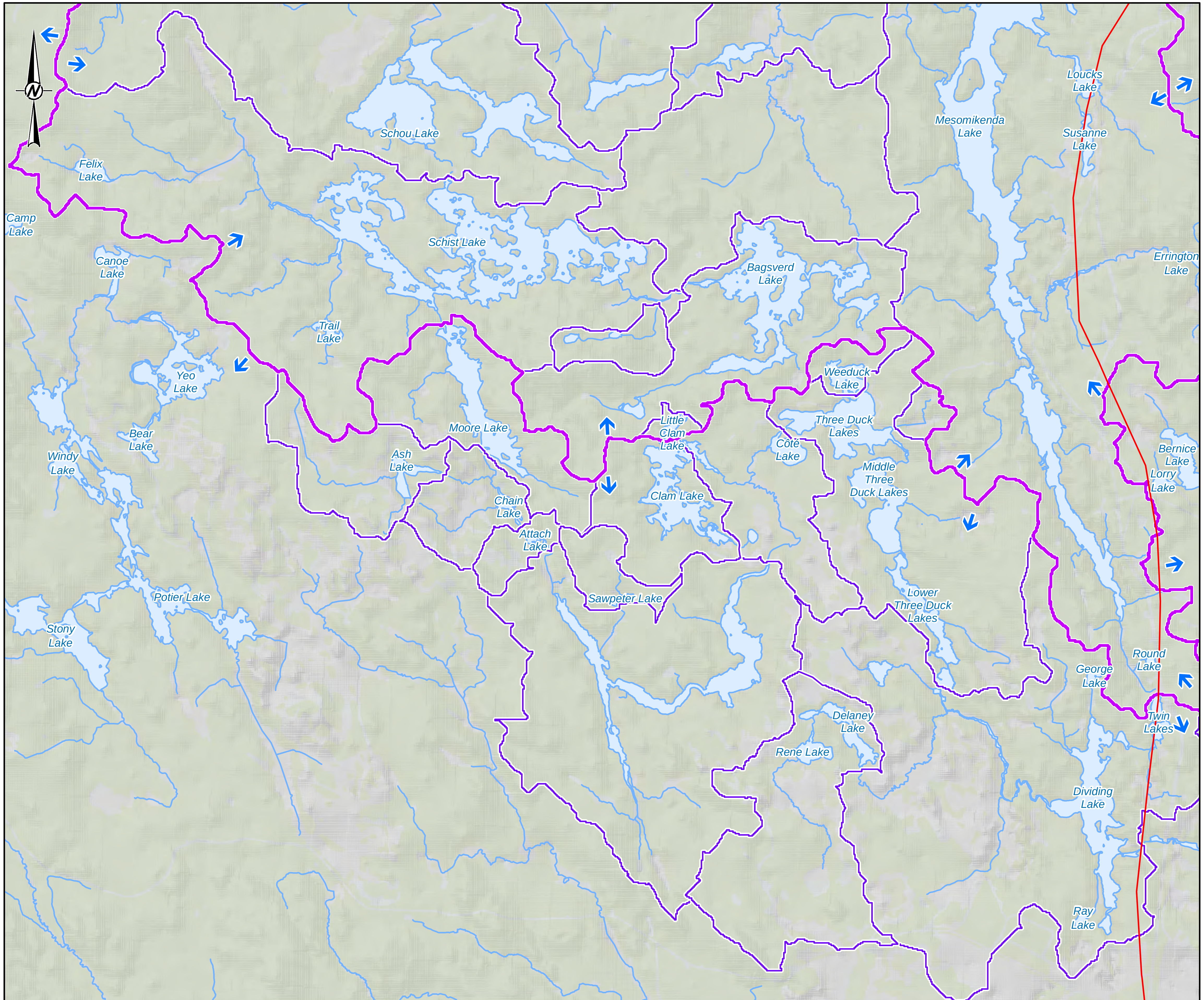

LEGEND

- Major Roads
- Waterbodies
- Waterflow Direction
- Existing Watersheds

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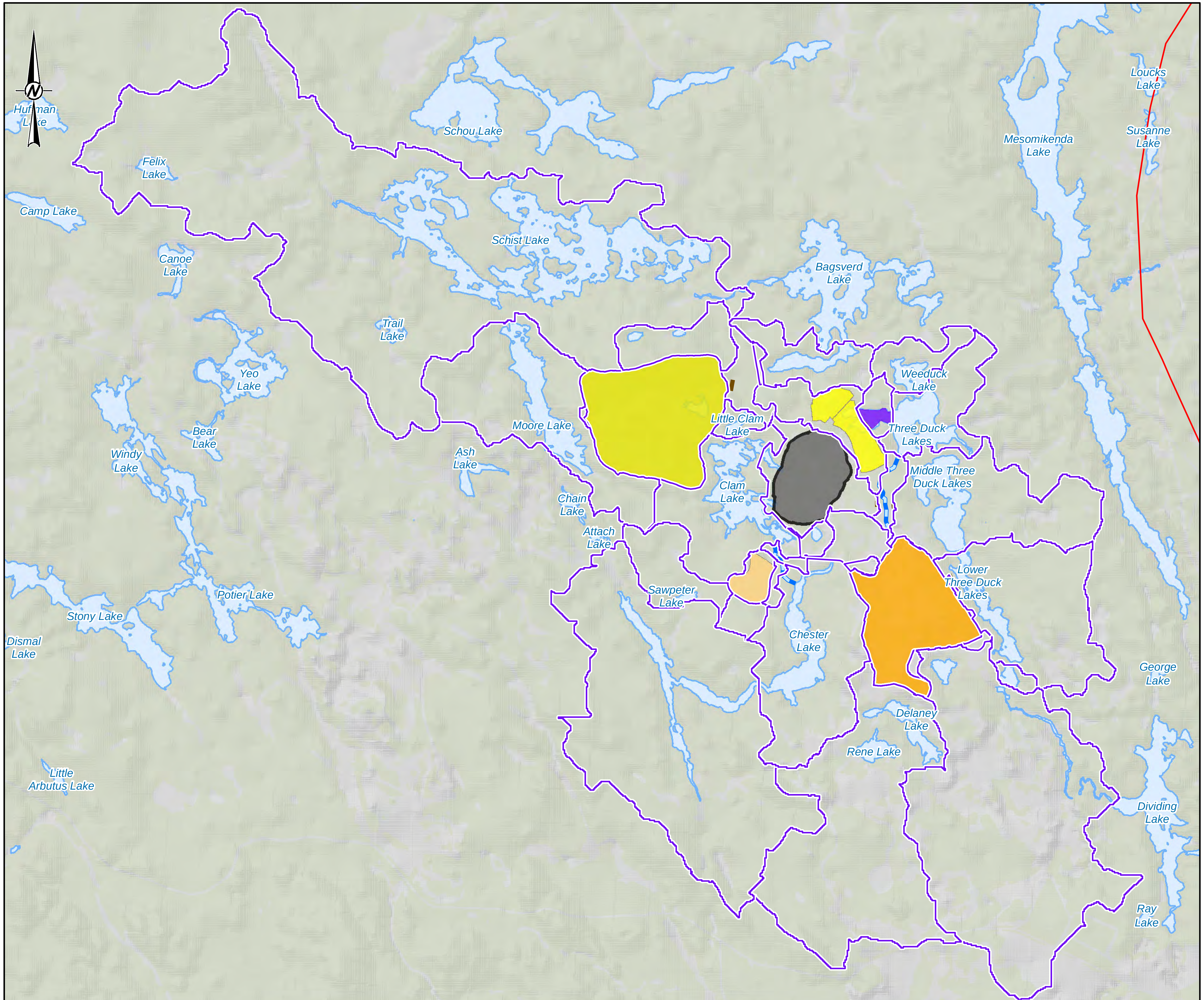

LEGEND

- Major Roads
- Waterbody
- Operational Phase Watersheds

Proposed Infrastructure

- Mine Rock Area (MRA)
- Open Pit
- Ore Stockpile
- Overburden Stockpile
- Polishing Pond
- Tailings Management Facility (TMF)
- Realignment Channel
- Dam

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APPENDIX I
EXECUTIVE SUMMARY

IAMGOLD Corporation (IAMGOLD) intends to develop and operate an open pit gold mine and associated facilities and infrastructure in northern Ontario approximately 20 kilometres (km) southwest of Gogama, 130 km southwest of Timmins, and 200 km northwest of Sudbury; this mining project is referred to as the Côté Gold Project (the Project). The landscape is characterized with an extensive tree cover and subdued topography, and is dominated by numerous lakes, streams and wetlands along with extensive bedrock outcrops; typical of northern Ontario. The area has experienced limited historical mining and current activities include forestry, mine exploration and some recreational activities.

Golder Associates completed a technical study in 2013 & 2014 of the potential hydrological and climate effects of the Project for the purposes of the Federal Amended Environmental Impact Statement and Provincial Environmental Assessment Report (hereafter referred to as the 'EA'). In order to directly compare potential changes to the hydrological system to the EA, the climate, lake and river information as previously reported was not substantially altered to those inputs and assumptions as described in the Project EA Report Technical Document: Hydrology (Golder 2013).

Based on an evolving Project design, IAMGOLD has elected to evaluate changes in Project effects through an EER. This Memorandum outlines the updates to the hydrology and climate predictions related to the optimization of the Project which incorporates the revised footprint of the Project and to compare and contrast the previous effects assessment on the water quantity in the subject watersheds. Changes to the conceptual and numerical model of the hydrological system were limited to:

- Additions of watersheds where infrastructure footprints overprinted new areas.
- Revisions to existing and/or addition of watersheds to accommodate changes to infrastructure footprints such as the Open Pit, Tailings Management Facility (TMF), Mine Rock Area (MRA), ore and overburden Stockpiles, and the ore processing plant.
- Revisions to surface water flow pathways to account for changes in the channel re-alignment strategy.
- Revisions to operational (process and site) water flow rates and directions.
- Revisions to closure concepts.

The effects assessment indicator for this discipline was selected as change in surface water flow. The potential change in surface water flow was predicted through the modification of the previously developed GoldSim hydrological model.

The hydrology Local Study Area (LSA) was defined by lakes and watersheds in the vicinity and downstream of the Project infrastructure. The LSA for hydrology is bound by the following features:

- The Great Lakes/James Bay watershed divide along the south.
- The Moore Lake and Schist lake watershed divides to the west.

- Mesomikenda Lake to the east.
- The Somme River system to the north and northwest.

The Regional Study Area (RSA) for hydrology extended the LSA boundary to the downstream confluence of the Mollie River and the Mesomikenda Lake outflow.

Hydrological modelling has been updated and revised to assess the potential change to surface water flow as a result of the project during Operations, Closure and Post-Closure. These simulated surface water flows were compared to the existing conditions at the Project site for an average, wet and dry year.

In general, the potential changes to surface water flows were influenced by two factors; i) the reconfiguration (addition or removal) of watershed area through the development of realignment channels, realignment dams and/or infrastructure footprints such as the Tailings Management Facility and/or ii) the connection of waterways to realignment channels and treated effluent discharge from the Polishing Pond.

Annual changes to surface water flow were simulated to be generally in the 5 to 10% range during Operations, Closure and Post-closure; with up to ±16% change in limited hydrological extent, such as cases where watershed reconfiguration at headwater lakes occurred or process water inflows are planned.

Several inherent mitigation measures have been included in the design of the Project and have been considered in the prediction of effects. Further, monitoring and management measures have been developed to continue the collection of data required to assess changes in groundwater levels prior to and during Project implementation (i.e., Construction, Operations, Closure, and Post-closure).

IAMGOLD

APPENDIX II
SIMULATED SURFACE WATER FLOW CHANGE
HYDROLOGICAL MODEL OUTPUT

APPENDIX II
SIMULATED SURFACE WATER FLOW CHANGE

SUMMARY OUTPUT - CÔTÉ GOLD - OPERATIONS PHASE
AVERAGE YEAR MODELLED SURFACE WATER FLOW

		SURFACE WATER FLOW (average annual, m^3/day)			
Watershed	Waterbody Name	Existing Conditions	Operations Phase	Change (%)	Change (%, EA)
Mollie River	Moore Lake	4,730	4,420	-7	n/a
Mollie River	Chain Lake	9,910	9,580	-3	n/a
Mollie River	Attach Lake	10,800	10,480	-3	n/a
Mollie River	Ash Lake	3,190	3,190	0	n/a
Mollie River	Sawpeter Lake	1,230	1,200	-2	n/a
Mollie River	Chester Lake	29,910	30,310	1	-2
Mollie River	Little Clam Lake	250	210	-16	>100
Mollie River	Clam Lake	3,420	3,240	-5	>100
Mollie River	Weeduck Lake	770	770	0	>100
Mollie River	Three Duck Lake (Upper)	40,920	45,110	10	n/a
Mollie River	Three Duck Lakes (Lower)	48,590	51,650	6	-4
Mollie River	Delaney Lake	7,560	7,540	0	0
Mollie River	Dividing Lake	78,490	80,160	2	-4
Mesomikenda	Bagsverd Lake	34,360	30,960	-10	-13
Mesomikenda	Schist Lake	23,750	23,860	0	0
Mesomikenda	Bagsverd Creek	68,800	65,390	-5	-20
Mesomikenda	Mesomikenda Lake	500,870	497,690	-1	-2
n/a indicates location not previously assessed due to site configuration					

WET YEAR MODELLED SURFACE WATER FLOW

		SURFACE WATER FLOW (average annual, m^3/day)			
Watershed	Waterbody Name	Existing Conditions	Operations Phase	Change (%)	Change (%, EA)
Mollie River	Moore Lake	5,560	5,150	-7	n/a
Mollie River	Chain Lake	12,080	11,730	-3	n/a
Mollie River	Attach Lake	13,230	12,890	-3	n/a
Mollie River	Ash Lake	3,900	3,900	0	n/a
Mollie River	Sawpeter Lake	1,520	1,490	-2	n/a
Mollie River	Chester Lake	37,750	37,930	0	-3
Mollie River	Little Clam Lake	320	280	-13	>100
Mollie River	Clam Lake	4,050	3,610	-11	>100
Mollie River	Weeduck Lake	810	810	0	>100
Mollie River	Three Duck Lake (Upper)	51,740	57,230	11	n/a
Mollie River	Three Duck Lakes (Lower)	62,130	65,780	6	-3
Mollie River	Delaney Lake	8,690	8,670	0	0
Mollie River	Dividing Lake	100,310	102,180	2	-3
Mesomikenda	Bagsverd Lake	42,600	38,390	-10	-14
Mesomikenda	Schist Lake	28,560	28,760	1	0
Mesomikenda	Bagsverd Creek	85,830	81,640	-5	-19
Mesomikenda	Mesomikenda Lake	617,490	613,890	-1	-2
n/a indicates location not previously assessed due to site configuration					

DRY YEAR MODELLED SURFACE WATER FLOW

		SURFACE WATER FLOW (average annual, m^3/day)			
Watershed	Waterbody Name	Existing Conditions	Operations Phase	Change (%)	Change (%, EA)
Mollie River	Moore Lake	2,830	2,620	-7	n/a
Mollie River	Chain Lake	6,690	6,510	-3	n/a
Mollie River	Attach Lake	7,390	7,220	-2	n/a
Mollie River	Ash Lake	2,190	2,190	0	n/a
Mollie River	Sawpeter Lake	930	910	-2	n/a
Mollie River	Chester Lake	22,510	21,930	-3	-2
Mollie River	Little Clam Lake	160	140	-13	>100
Mollie River	Clam Lake	2,160	2,010	-7	>100
Mollie River	Weeduck Lake	470	460	-2	>100
Mollie River	Three Duck Lake (Upper)	30,010	33,800	13	n/a
Mollie River	Three Duck Lakes (Lower)	35,390	38,690	9	-2
Mollie River	Delaney Lake	4,780	4,760	0	0
Mollie River	Dividing Lake	57,260	59,490	4	-3
Mesomikenda	Bagsverd Lake	22,950	20,140	-12	-16
Mesomikenda	Schist Lake	15,350	15,490	1	0
Mesomikenda	Bagsverd Creek	49,530	46,750	-6	-21
Mesomikenda	Mesomikenda Lake	360,850	358,590	-1	-3
n/a indicates location not previously assessed due to site configuration					

SUMMARY OUTPUT - CÔTÉ GOLD - POST-CLOSURE STAGE I PHASE

AVERAGE YEAR MODELLED SURFACE WATER FLOW

		SURFACE WATER FLOW (average annual, m^3/day)			
Watershed	Waterbody Name	Existing Conditions	Closure Phase	Change (%)	Change (%, EA)
Mollie River	Moore Lake	4,730	4,420	-7	n/a
Mollie River	Chain Lake	9,910	9,580	-3	n/a
Mollie River	Attach Lake	10,800	10,480	-3	n/a
Mollie River	Ash Lake	3,190	3,190	0	n/a
Mollie River	Sawpeter Lake	1,230	1,200	-2	n/a
Mollie River	Chester Lake	29,910	31,410	5	-2
Mollie River	Little Clam Lake	250	210	-16	>100
Mollie River	Clam Lake	3,420	3,680	8	>100
Mollie River	Weeduck Lake	770	770	0	>100
Mollie River	Three Duck Lake (Upper)	40,920	35,250	-14	n/a
Mollie River	Three Duck Lakes (Lower)	48,590	41,700	-14	-4
Mollie River	Delaney Lake	7,560	7,510	-1	0
Mollie River	Dividing Lake	78,490	70,170	-11	-4
Mesomikenda	Bagsverd Lake	34,360	31,230	-9	-13
Mesomikenda	Schist Lake	23,750	23,880	1	0
Mesomikenda	Bagsverd Creek	68,800	65,660	-5	-20
Mesomikenda	Mesomikenda Lake	500,870	497,890	-1	-2

n/a indicates location not previously assessed due to site configuration

WET YEAR MODELLED SURFACE WATER FLOW

		SURFACE WATER FLOW (average annual, m^3/day)			
Watershed	Waterbody Name	Existing Conditions	Closure Phase	Change (%)	Change (%, EA)
Mollie River	Moore Lake	5,560	5,150	-7	n/a
Mollie River	Chain Lake	12,080	11,730	-3	n/a
Mollie River	Attach Lake	13,230	12,890	-3	n/a
Mollie River	Ash Lake	3,900	3,900	0	n/a
Mollie River	Sawpeter Lake	1,520	1,490	-2	n/a
Mollie River	Chester Lake	37,750	39,890	6	-3
Mollie River	Little Clam Lake	320	280	-13	>100
Mollie River	Clam Lake	4,050	4,630	14	>100
Mollie River	Weeduck Lake	810	810	0	>100
Mollie River	Three Duck Lake (Upper)	51,740	45,010	-13	n/a
Mollie River	Three Duck Lakes (Lower)	62,130	53,490	-14	-3
Mollie River	Delaney Lake	8,690	8,620	-1	0
Mollie River	Dividing Lake	100,310	89,830	-10	-3
Mesomikenda	Bagsverd Lake	42,600	38,790	-9	-14
Mesomikenda	Schist Lake	28,560	28,760	1	0
Mesomikenda	Bagsverd Creek	85,830	82,040	-4	-19
Mesomikenda	Mesomikenda Lake	617,490	614,280	-1	-2

n/a indicates location not previously assessed due to site configuration

DRY YEAR MODELLED SURFACE WATER FLOW

		SURFACE WATER FLOW (average annual, m^3/day)			
Watershed	Waterbody Name	Existing Conditions	Closure Phase	Change (%)	Change (%, EA)
Mollie River	Moore Lake	2,830	2,620	-7	n/a
Mollie River	Chain Lake	6,690	6,510	-3	n/a
Mollie River	Attach Lake	7,390	7,220	-2	n/a
Mollie River	Ash Lake	2,190	2,190	0	n/a
Mollie River	Sawpeter Lake	930	910	-2	n/a
Mollie River	Chester Lake	22,510	23,040	2	-2
Mollie River	Little Clam Lake	160	140	-13	>100
Mollie River	Clam Lake	2,160	2,550	18	>100
Mollie River	Weeduck Lake	470	460	-2	>100
Mollie River	Three Duck Lake (Upper)	30,010	25,510	-15	n/a
Mollie River	Three Duck Lakes (Lower)	35,390	30,320	-14	-2
Mollie River	Delaney Lake	4,780	4,740	-1	0
Mollie River	Dividing Lake	57,260	51,090	-11	-3
Mesomikenda	Bagsverd Lake	22,950	20,360	-11	-16
Mesomikenda	Schist Lake	15,350	15,490	1	0
Mesomikenda	Bagsverd Creek	49,530	46,970	-5	-21
Mesomikenda	Mesomikenda Lake	360,850	358,790	-1	-3

n/a indicates location not previously assessed due to site configuration

SUMMARY OUTPUT - CÔTÉ GOLD - POST-CLOSURE STAGE II PHASE
AVERAGE YEAR MODELLED SURFACE WATER FLOW

		SURFACE WATER FLOW (average annual, m^3/day)			
Watershed	Waterbody Name	Existing Conditions	Post Closure Phase	Change (%)	Change (%, EA)
Mollie River	Moore Lake	4,730	4,420	-7	n/a
Mollie River	Chain Lake	9,910	9,580	-3	n/a
Mollie River	Attach Lake	10,800	10,480	-3	n/a
Mollie River	Ash Lake	3,190	3,190	0	n/a
Mollie River	Sawpeter Lake	1,230	1,200	-2	n/a
Mollie River	Chester Lake	29,910	29,450	-2	-2
Mollie River	Little Clam Lake	250	220	-12	>100
Mollie River	Clam Lake	3,420	3,590	5	>100
Mollie River	Weeduck Lake	770	770	0	>100
Mollie River	Three Duck Lake (Upper)	40,920	42,730	4	n/a
Mollie River	Three Duck Lakes (Lower)	48,590	49,950	3	-4
Mollie River	Delaney Lake	7,560	7,540	0	0
Mollie River	Dividing Lake	78,490	80,520	3	-4
Mesomikenda	Bagsverd Lake	34,360	32,580	-5	-13
Mesomikenda	Schist Lake	23,750	23,880	1	0
Mesomikenda	Bagsverd Creek	68,800	67,020	-3	-20
Mesomikenda	Mesomikenda Lake	500,870	499,200	0	-2

n/a indicates location not previously assessed due to site configuration

WET YEAR MODELLED SURFACE WATER FLOW

		SURFACE WATER FLOW (average annual, m^3/day)			
Watershed	Waterbody Name	Existing Conditions	Post Closure Phase	Change (%)	Change (%, EA)
Mollie River	Moore Lake	5,560	5,150	-7	n/a
Mollie River	Chain Lake	12,080	11,730	-3	n/a
Mollie River	Attach Lake	13,230	12,890	-3	n/a
Mollie River	Ash Lake	3,900	3,900	0	n/a
Mollie River	Sawpeter Lake	1,520	1,490	-2	n/a
Mollie River	Chester Lake	37,750	37,040	-2	-3
Mollie River	Little Clam Lake	320	280	-13	>100
Mollie River	Clam Lake	4,050	4,440	10	>100
Mollie River	Weeduck Lake	810	810	0	>100
Mollie River	Three Duck Lake (Upper)	51,740	54,340	5	n/a
Mollie River	Three Duck Lakes (Lower)	62,130	63,960	3	-3
Mollie River	Delaney Lake	8,690	8,680	0	0
Mollie River	Dividing Lake	100,310	103,100	3	-3
Mesomikenda	Bagsverd Lake	42,600	40,460	-5	-14
Mesomikenda	Schist Lake	28,560	28,760	1	0
Mesomikenda	Bagsverd Creek	85,830	83,710	-2	-19
Mesomikenda	Mesomikenda Lake	617,490	615,950	0	-2

n/a indicates location not previously assessed due to site configuration

DRY YEAR MODELLED SURFACE WATER FLOW

		SURFACE WATER FLOW (average annual, m^3/day)			
Watershed	Waterbody Name	Existing Conditions	Post Closure Phase	Change (%)	Change (%, EA)
Mollie River	Moore Lake	2,830	2,620	-7	n/a
Mollie River	Chain Lake	6,690	6,510	-3	n/a
Mollie River	Attach Lake	7,390	7,220	-2	n/a
Mollie River	Ash Lake	2,190	2,190	0	n/a
Mollie River	Sawpeter Lake	930	910	-2	n/a
Mollie River	Chester Lake	22,510	22,230	-1	-2
Mollie River	Little Clam Lake	160	140	-13	>100
Mollie River	Clam Lake	2,160	2,450	13	>100
Mollie River	Weeduck Lake	470	460	-2	>100
Mollie River	Three Duck Lake (Upper)	30,010	31,560	5	n/a
Mollie River	Three Duck Lakes (Lower)	35,390	37,030	5	-2
Mollie River	Delaney Lake	4,780	4,770	0	0
Mollie River	Dividing Lake	57,260	59,540	4	-3
Mesomikenda	Bagsverd Lake	22,950	21,500	-6	-16
Mesomikenda	Schist Lake	15,350	15,490	1	0
Mesomikenda	Bagsverd Creek	49,530	48,110	-3	-21
Mesomikenda	Mesomikenda Lake	360,850	359,840	0	-3

n/a indicates location not previously assessed due to site configuration