June 12, 2015

Cindy Batista
Project Officer
Ministry of the Environment and Climate Change
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By E-mail

RE: Responses to Comments Provided on the Amended Environmental Impact Statement (EIS) / Final Environmental Assessment (EA) Report for the Côte Gold Project

Dear Ms. Batista,

IAMGOLD Corporation (IAMGOLD) has prepared the enclosed responses to comments provided on the Amended EIS / Final EA Report by the following agencies, organizations and individuals:

- Ministry of the Environment and Climate Change (MOECC) – Northern Region – Air Compliance;
- MOECC – Northern Region – Air Technical Support;
- MOECC – Environmental Approvals Branch – Wastewater;
- MOECC –Groundwater;
- Sanatana Resources;
- Sudbury & District Health Unit;
- Ministry of Northern Development and Mines (MNDM);
- Ministry of Tourism, Culture and Sport (MTCS) – Heritage;
- MTCS – Tourism;
- MOECC – Surface Water (two sets);
- MOECC – Environmental Approval Branch;
- Ministry of Transportation;
- MOECC – Northern Region – Hydrology;
- Ministry of Natural Resources and Forestry (MNRF) – Timmins;
- MOECC – Aboriginal Affairs; and

Responses have been informed by technical meetings where appropriate. All changes to the Amended EIS / Final EA Report have been addressed through errata, which are documented in the “Additional Information / Corrections to Amended EIS / Final EA Report” column, and updated excerpts are provided in the Errata section immediately following the comment / response table.

This response package is organized into the following sections for clarity:

- Comments / Response to Comments Table;
- Errata to the Amended EIS / Final EA Report;
- Supporting Tables and Figures; and
- Supporting Documents.

IAMGOLD looks forward to working with MOECC staff to support the completion of the provincial EA process.

Sincerely,

Steven Woolfenden
Manager, Corporate Environmental Assessments and Approvals
IAMGOLD Corporation

Table 1: Responses to Comments on the Amended EIS / Final EA Report

#	Agency / Organization	App Z Ref.	Comment	Response	Additional Information / Corrections to Amended EIS / Final EA Report	Change Location
F46	MOECC - Air	63	Response to Comment #63 Appendix F: Air Quality Technical Support Document Addendum included emission estimates (fugitive emissions from TMA) demonstrating minimal impact on overall concentrations of TSP, PM_{10}, $PM_{2.5}$ and therefore EA not amended. Impacts are deemed minimal assuming 85% control efficiency, which cannot be verified at this stage. Recommendation stands that rational / calculations be included at ECA stage and control efficiency be revisited at ECA/BMPP stage.	The rationale and calculations will be provided as part of the application for the Environmental Compliance Approval (ECA; Air & Noise).	None.	n/a
F47	MOECC - Air	64	Response to Comment #64 Ecosystem Topic: Air, Appendix F: Air Quality Technical Support Document Draft EA Comment: Construction Phase BMP (Best Management Practices) Plan Proponent states in Appendix Z of EA that one will be submitted as part of ECA package.	A BMP for both the construction phase and operations phase will be provided as part of the application for the ECA (Air & Noise).	None.	n/a
F48	MOECC - Air	65	Response to Comment #65 Ecosystem Topic: Air, Appendix F: Air Quality Technical Support Document Clarification provided in Appendix Z of EA that ore processing emissions were included but it is a wet process with no SPM emissions generated.	No response required.	None.	n/a
F49	MOECC - Air	66	Response to Comment #66 Ecosystem Topic: Air, Appendix F: Air Quality Technical Support Document Clarification provided in Appendix Z of EA that on-site traffic emissions are included.	No response required.	None.	n/a
F50	MOECC - Air	67	Response to Comment #67 Ecosystem Topic: Air, Appendix F: Air Quality Technical Support Document Clarification concerning diesel generator emission calculations was provided in Appendix Z of EA and the Addendum to Appendix F with statement that calculations will also be included at ECA stage.	The diesel generator emission calculations will be provided as part of the application for the ECA (Air & Noise).	None.	n/a
F51	MOECC - Air	68	Response to Comment #68 Ecosystem Topic: Air, Appendix F: Air Quality Technical Support Document Proponent provided justification of Control Efficiency at material loading and unloading in Appendix Z of EA Recommendation remains that detailed justification for CE be provided at ECA and BMP stage.	Detailed justification for particulate matter control efficiencies will be provided as part of the application for the ECA (Air & Noise).	None.	n/a
F52	MOECC - Air	69	Response to Comment #69 Ecosystem Topic: Air, Appendix F: Air Quality Technical Support Document Data quality for emission estimate not provided but proponent states in Addendum Z of EA that the use of Australian NPI data is standard. However, O.Reg. 419 requires a data quality rating for all emission estimates. Recommendation remains to include data quality rating.	A data quality rating will be provided for each emission estimate as part of the application for the ECA (Air & Noise).	None.	n/a

#	Agency / Organization	App Z Ref.	Comment	Response	Additional Information / Corrections to Amended EIS / Final EA Report	Change Location
F53	MOECC - Air	70	Response to Comment #70 Ecosystem Topic: Air, Appendix F: Air Quality Technical Support Document Proponent provided some justification of CE selected for on-site roadways in Addendum Z of EA. Recommendation remains that detailed justification for CE be provided at ECA and BMP stage.	Detailed justification for control efficiencies will be provided as part of the application for the ECA (Air & Noise).	None.	n/a
F54	MOECC - Air	71	Response to Comment #71 Ecosystem Topic: Air, Appendix F: Air Quality Technical Support Document CN destruction emission estimates missing mfg key data sheets and data quality estimate. Calculations still not clear and the SO_2 emission rate at this source shown in Table III-7 does not match emission rate in Source Summary Table. Recommendation remains that proponent provide all necessary documentation (i.e., calculations, mfg data sheets) to clearly demonstrate methodology of emission estimate calculation.	Supporting information for SO_2 emission rate estimates will be provided as part of the application for the ECA (Air & Noise).	None.	n/a
F55	MOECC - Air	72	Response to Comment #72 Ecosystem Topic: Air, Appendix F: Air Quality Technical Support Document Further justification provided regarding silt content and control efficiency of roadway fugitive emissions in Appendix Z of EA report. Recommendation remains that all assumptions (i.e., silt content) and Control Efficiencies be reviewed at ECA and BMP stage.	Assumptions and control efficiencies related to road dust emission estimates will be provided as part of the application for the ECA (Air & Noise).	None.	n/a

#	Agency / Organization	App Z Ref.	Comment	Response	Additional Information / Corrections to Amended EIS / Final EA Report	Change Location
F61	MOECC - Air Quality	116	Response to Comment #116 Addendum to Appendix F, pages 16-17. Baseline air quality was determined by the proponent based on either on-site measurements or published air quality data for the region using average or 90th percentile value. For example, TSP baseline concentration was determined based on the 90th percentile of on-site TSP measurements, while PM_{10} baseline was based on the average of the on-site PM_{10} measurements. Generally, suitable conservative estimates of background concentrations are required to assess the worst-case cumulative effect from all phases of project. In addition, the information on the description of establishment of the baseline concentration in Table 9a was incorrect for some compounds. 1) Review and revise the PM_{10} baseline concentration to make sure it is suitable conservative for the cumulative air quality assessment. 2) Review and revise the Reference for Baseline Concentration in Table 9a.	1) The on-site baseline monitoring provided a total of 16 valid samples for total suspended particulate (TSP) and metals, and 15 valid samples for Particulate Matter $(PM)_{10}$. The data was therefore very limited. The results were compared to available data for a monitoring station in Sudbury to establish a more reasonable baseline concentrations for the Côté Gold Project. Monitoring occurred only in the summer of 2013 and provided particulate data which was biased high compared to data sets which cover multiple, complete years for a number of reasons. Exploration activities and unmitigated roadways in the area of the monitoring station were also noted as potentially influencing the stations. Also, using only a summer data set provides a high bias to results; there are no measured concentrations for the winter months; months when particulate levels are low. Stations in Ontario have higher particulate concentrations in the summertime. As such, normal annual statistical methods and metrics are not appropriate for a limited data set. TSP For TSP, the 90th percentile of the on-site monitoring data (37 $\mu g/m^3$) was used as the baseline concentration, however it would have been more appropriate to use the mean concentration for TSP due to the limited sample size and the discussions above. A value of 21.4 $\mu g/m^3$ would have been more appropriate as a baseline level. As the higher number used is conservative, there are no changes to the final conclusions of the air quality EA PM_{10} The mean concentration of 13.9 $\mu g/m^3$ was considered to be a more reasonable estimate for the PM_{10} baseline concentration and consistent with MOECC stations when not influenced by major sources. 2) There is a minor errata to Table 4a of the Addendum (Page 16); for $PM_{2.5}$, the 24-hour average baseline concentration was determined using the average of 5 years of 90th percentile data at Sault Ste. Marie and Sudbury, and the annual average baseline concentration was determined using the average of 5 years of $PM_{2.5}$ data for these stations. These comments were transposed in the table. There are no changes to assessment results or to EA conclusions.	None.	n/a

#	Agency / Organization	App Z Ref.	Comment	Response	Additional Information / Corrections to Amended EIS / Final EA Report	Change Location
F62	MOECC - Air Quality	120	Response to Comment #120 EIS/EA report, Section 9.2, page 9-14, Section 11.2.1 Table 11-3, and Appendix F, Section 5.1 page 5-1, and pages 12-13 of Addendum to Appendix F. The final EA indicated that air quality effects from construction phase will be less, and of shorter duration compared to those from the operations phase. However, no air quality assessment was conducted for the construction phase. In response to the comment #120, a qualitative assessment was provided by comparing the level of activities during the construction and operation phases of the project. It is recommended that a worst-case scenario assessment during construction phase be conducted. The assessment should include NO_x, TSP, PM_{10} and $PM_{2.5}$ and compared with relevant applicable criteria.	A complete list of construction phase equipment, staging of construction or specific activities, location and schedules is not available at this stage of the Project. The aggregate pits and generators that will be used during construction have been considered in the assessment and are included in the equipment list and development of the maximum emission scenario. The air quality assessment prepared in support of the EA considered a conservative maximum emission scenario for the proposed Project that would result in the highest predicted air quality effects for all activities, years and phases of the Project. As detailed in Section 3.0 of the Addendum to Appendix F dated December 2014, the emissions associated with the construction phase were notably less than those of the operations phase, and therefore did not increase or change the emissions for the maximum emission scenario. This is supported by a quantitative comparison of material movements for the construction and operations phases which is provided in Section 3.0 of the Addendum (Table 7a). As such, the maximum emission scenario encompasses the construction activities. Though it will not be a requirement of the MOECC ECA, emissions from construction (site development) activities will be controlled and managed in the same way as emissions during operations. The Best Management Plan will cover all phases of site activities.	None.	n/a
F63	MOECC - Air Quality	121	Response to Comment #121 Appendix F, Section 5.2.3 and Addendum to Appendix F. In response to the comment # 121, a table with the cumulative air quality impacts at most effected sensitive receptor was provided in the Addendum, but no baseline levels were combined with modelled concentrations at the project site boundary, for example, in Table 5-2. Results for all pollutants with both modelled concentrations and background concentrations should be provided in a single table (e.g. Table 5-2) for cumulative assessment.	The baseline concentrations are provided in the Air Quality Technical Support Document (TSD; Appendix F), and additional discussion on how these baseline concentrations were developed and are provided in Section 4.0 of the Addendum to Appendix F. These baseline concentrations were considered in the effects assessment (Table 15a of the Addendum), and in the Air Quality TSD. The effects were thoroughly assessed based on best available site and engineering data for all phases of the Project available at the time of the assessment. The baseline data and modelled data are provided in the TSD. Reformatting of the tables or providing additional tables would not change any discussions of effects or conclusions.	None.	n/a
F64	MOECC - Air Quality	122	Response to Comment #122 EIS/EA report, Section 16.4 Table 16-1, and Appendix F, Section 7.0 page 7-1 and Table 7-1 As mentioned in the comment # 122, passive sampling will just provide approximations of long term exposure, but no information about acute short term impacts. The monitoring program will be used to demonstrate continued compliance with O.Reg 419/05 standards, for example for nitrogen oxides, as indicated in the final EA. Provide a justification in EA as to why the passive sampling can be used to demonstrate continued compliance with O. Reg. 419/05 standards, for example for nitrogen oxides.	Ambient monitoring (passive or otherwise) for NO_x cannot be used to demonstrate compliance with O.Reg. 419/05 standards as there are sources contributing NO_x emissions that are not included in an assessment of compliance with O.Reg. 419/05, such as mobile sources and background levels. As noted in Table 7-1 of the Côté Gold Project Air Quality TSD (Appendix F), the objective of passive ambient monitoring for NO_x is to track the monthly average NO_x as an indicator of the accuracy of the dispersion modelling predictions and of the NO_2 concentration in comparison with the Ontario Ambient Air Quality Criteria (AAQC). This would be achieved by comparing the measured NO_x concentrations with a screening level that will be established as part of the Ambient Air Quality Monitoring Plan prepared in consultation with the Ontario MOECC at the ECA stage. The screening level would be based upon Alberta's proposed Air Monitoring Directive and Ontario's AAQC for other averaging times.	None.	n/a

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F65	MOECC - EAB - Wastewater	—	Pursuant to your request, I am providing my review comments on the IAMGOLD's responses to the Ministry's comments outlined in the memo dated July 30, 2014 prepared by Fariha Pannu, M.Eng., P.Eng., Senior Wastewater Engineer, Approval Services Unit – Team 4, Environmental Approvals Branch. I have completed my review of the previously provided comments on the Environmental Impact Statement (EIS)/Draft Environmental Assessment (EA) Report and the IAMGOLD's responses to the comments focusing on the mandate of our unit under Section 53 of *Ontario Water Resources Act* (OWRA). The Proponent addressed all provided comments and committed to providing all requested information required to conduct a detailed engineering review in an Environmental Compliance Approval (ECA) application package. However, it is critical that the Proponent receives acceptance of the receiver-based, site-specific effluent discharge criteria, all discharge locations and all proposed surface water and groundwater monitoring programs from the Ministry's Technical Support Section, Northern Region, prior to submitting an ECA application. The accepted effluent discharge limits and monitoring requirements established with the Ministry do not exempt the applicant from fulfilling their obligations under O. Reg. 560/94 Effluent Monitoring and Effluent Limits – Metal Mining Sector or the federal Metal Mining Effluent Regulation.	It is acknowledged that IAMGOLD will obtain acceptance of discharge criteria, discharge locations and the proposed water quality monitoring program locations prior to submission of an ECA application. As detailed in the EA Commitments Table (Appendix Y), IAMGOLD is committed to meet the discharge limits as dictated by the federal Metal Mining Effluent Regulations (MMER) and O.Reg. 560/94 Effluent Monitoring and Effluent Limits – Metal Mining Sector.	None.	n/a

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F66	MOECC - EAB - Wastewater	—	In summary, the Proponent committed to providing in an Environmental Compliance Approval (ECA) application package the following information (but not necessarily limited to):
			• evidence of acceptance of receiver-based, site-specific effluent discharge criteria, all discharge locations and all proposed surface water and groundwater monitoring programs by the Ministry's Technical Support Section (Tech Support), Northern Region;
			• a design brief that presents details of the final design of the Sewage Works, including (but not necessarily limited to):
			  • description of the proposed project and associated sewage works;
			  • mine site hydrology and water management strategy (water balance, dewatering flow management);
			  • detailed description of the stormwater management works to service waste rock areas and potentially contaminated stormwater (geochemical characterization of waste rock);
			  • predictive models of surface and groundwater quality including the following: trace metal analysis, acid generating potential – Acid Base Accounting (ABA), metal leaching potential – Net Acid Generation (NAG), short term leach testing (lab test and/or pilot/scale testing results);
			  • Tailings management facility design including: volumetric capacity, spillway design, dam crest elevations clearly noting the Environmental Design Flow (EDF) and the Probable Maximum Flood (PMF);
			  • Ministry's Tech Support accepted effluent quality criteria (objectives, limits and monitoring requirements for surface and groundwater), along with comparison of effluent criteria and monitoring requirements with requirements under the federal Metal Mining Effluent Regulation (MMER), and Municipal/Industrial Strategy for Abatement (MISA) requirements;
			  • detailed description of the discharge treatment system and identification of process design parameters;
			  • detailed process design and sizing calculations for all major processes;
			  • hydraulic calculations for all process streams within sewage works;
			  • product information details of the type of explosive(s), boosters, igniters etc. to be used in the mine blasting operations to determine presence or absence of Dinitrotoluene (2, 4 Dinitrotoluene and 2, 6 Dinitrotoluene);
			  • overview of contingency planning measures for the proposed facilities in the event of emergencies and spills and/or berm/dyke failure, i.e. the Spill Contingency Plan and the Emergency Response Plan;
			  • design information for the proposed Effluent Treatment Plant for treatment of excess water from the proposed Polishing Pond to Bagsverd Creek if the plant was deemed necessary after the establishment of the effluent discharge criteria; and
			  • cooling water effluent stream(s) and treatment requirements;
			• record of consultation with aboriginal communities summarizing any technical or environmental issues noted as a result of the consultation efforts and how those issues have been addressed along with a list of contact persons (chief, council and other as appropriate) for each Aboriginal community including names, mailing address, e-mail, phone and fax;
			• proof of continued public and stakeholder consultation and engagement including Aboriginal groups;
			• evidence of filing of the mine's Closure Plan with Ministry of Northern Development & Mines and a copy of the Closure Plan. If closure plan would not be filed at the time of Sewage Works approval application, the status of closure plan development and record of consultation with aboriginal groups for the closure plan; and
			• clearances obtained from local municipalities and other regulatory agencies as applicable, e.g. municipal Source Water Protection consultation.
			It is expected that the above sewage works related issues will be addressed as part of the detailed pre-application consultation with the Ministry (including Environmental Approvals Branch, Sudbury Regional Office and Northern Region Technical Support Section).
				It is acknowledged that IAMGOLD will provide appropriate supporting information required by the MOECC for the ECA application.	None.	n/a

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F67	MOECC - Groundwater	75	Response to Comment #75 Appendix Z—Responses to Comments on the EIS/Draft EA Report, Page 12, Comment #75 While MOECC has concerns about the potential for acid generation, it appears as though the proportion of PAG material is low and mixing may be a suitable option for the mitigation of ARD. For mixing to be effective, it will require a comprehensive monitoring program, thorough mixing, and a robust contingency plan. Monitoring is required to ensure that the PAG material that is present at the site is appropriately identified with the intention of preventing large volumes of PAG material from being deposited in discrete areas without adequate mixing with non-PAG material. Extensive monitoring will be required during construction, operations, closure, and post-closure. Monitoring will include geochemical testing and groundwater monitoring. Information on how the PAG material, where it is identified, will be thoroughly mixed, will help to provide the MOECC with the information required to assess the potential impact of the undertaking. A robust contingency plan is required as a means to mitigate or remediate any potential effects that may be experienced if conditions are not as anticipated in the EA. This plan could include the separation of PAG material and appropriate cover to prevent ARD/ML if the need arises during operations. Please note that details of such a contingency will be required in the Closure Plan during the Provincial permitting phase, but discussion of an appropriate contingency should be provided prior to this phase (i.e., during the EA). IAMGOLD should provide in the EA: details of a comprehensive monitoring program that will identify PAG material prior to deposition; acknowledgement of the requirement of extensive groundwater monitoring across the site, specifically surrounding key mine features; details on how PAG material, where it is identified, will be thoroughly mixed with non-PAG material; and a contingency plan to appropriately address the remediation/mitigation measures that may be required if conditions that were not anticipated in the EA arise.	Based on the random distribution of potentially acid-generating (PAG) samples in the deposit, adequate mixing of the PAG materials to prevent formation of discrete PAG masses can be achieved by the normal mining procedure of dumping mine rock within the mine rock piles. The mixing of the isolated PAG materials with the significantly greater (~20 times) volume of acid consuming non-PAG rock will result in mine rock with an overall acid consuming character." As stated in the Addendum to the Geochemical Characterization Report (Appendix E), evidence from the Metal Leaching / Acid Rock Drainage (ARD) characterization study shows that the small percentage of PAG rock is well distributed throughout the volume of the Côté Gold Project waste rock volume, which is composed predominantly of high neutralization potential non-PAG rock. The waste rock with its high overall neutralization potential and correspondingly high neutralization potential ratio values will be non-acid generating. Relocation of this rock from the pit to the waste dump will not alter these proportions. No additional mitigation is required. The data do not suggest the requirement for a comprehensive monitoring program or thorough mixing of the mine rock.	None.	n/a
F68	MOECC - Groundwater	79	Response to Comment #79 Appendix Z—Responses to Comments on the EIS/Draft EA Report, Page 13, Comment #79 Since the expansion of the landfill, or an appropriate contingency, would have environmental impacts that are directly related to the proposed undertaking, it is the opinion of the Ministry of the Environment and Climate Change (MOECC) that the feasibility of the landfill expansion, and an appropriate contingency, are within the scope of the EA and further information is required. While a landfill design is not required at this time, the MOECC expects IAMGOLD to discuss the feasibility of the proposed waste disposal site expansion. We would like to know, in the EA, that there will be capacity enough for the life of the mine, and that a viable contingency exists in the event that an adequate landfill expansion is not possible. In the EA, discuss the feasibility of the proposed landfill expansion and provide a brief summary of an appropriate contingency in the event that an adequate landfill expansion is not possible.	The proposed expansion of the MNRF landfill was not included in the Terms of Reference (ToR) for inclusion in the EA. Through agreement with the MNRF, the proposed landfill expansion will be assessed and permitted by the MNRF. It is IAMGOLD's understanding that should the existing landfill be expanded, there will be adequate capacity for the Project and existing users. In the event that the existing landfill cannot be expanded, IAMGOLD will consider the other alternatives identified in Appendix U7, and initiate appropriate regulatory processes at that time.	None.	n/a
F69	MOECC - Groundwater	81	Response to Comment #81 Appendix Z—Responses to Comments on the EIS/Draft EA Report, Page 13, Comment #81 It is the opinion of the MOECC that the use of contact water for dust suppression in any area of the undertaking constitutes a direct discharge to the environment. Therefore, water meeting Provincial Water Quality Objectives (PWQO), or other approved site specific water quality objectives, should be used where necessary for dust suppression. In the EA, remove the reference to the use of mine water pond water for dust suppression purposes.	The collected runoff and seepage (i.e., contact water) that will report to the mine water pond will be regularly tested for quality. It is reasonable to use water from the mine water pond for the purposes of dust suppression in areas where the water will report to the open pit or mine rock area (MRA) collection ponds, as long as the quality of the water is determined to be suitable prior to use. If the quality of the water is determined to be not suitable through monitoring, then other dust suppression methods or an alternate source of water (i.e., fresh water) will be used for dust suppression.	None.	n/a

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F70	MOECC - Groundwater	83	Response to Comment #83 Appendix Z—Responses to Comments on the EIS/Draft EA Report, Page 13, Comment #83 It is the opinion of the MOECC that further work is required to show that the model presents an adequate representation of what can be expected. Calibration of the model to field measurements should be conducted to assess how well the model represents onsite conditions. It is understood that no model would provide an exact representation of site conditions and calibration errors will always exist. However, the results of the calibration would help to identify the limitations of the model with the intention of highlighting areas of uncertainty during the EA. These limitations would then be areas of focus as the model is refined for Provincial permitting and during the life of the undertaking. Including updating for the purposes of the EA and for Provincial permitting, the groundwater model should be updated on a regular frequency (e.g., every 3 years) during the life of the project, with details to be defined during the Provincial permitting phase. Beyond the calibration exercise discussed, the MOECC has concerns with the "secondary sensitivity analysis" that was conducted on the model. It appears as though the secondary sensitivity analysis is composed of one additional model simulation in which all hydraulic conductivities and the recharge are doubled. While a sensitivity analysis would help to characterize the bounds of the model, and the potential effects of the undertaking, the sensitivity analysis conducted does not appear adequate for the purposes of the EA. The second simulation may give insight into a potential upper limit for seepage rates across the site, including seepage into the pit, but it likely does not provide an upper limit to the anticipated zone of influence (ZOI). While increasing the simulated hydraulic conductivities would increase the anticipated ZOI, the doubling of the recharge rate would have the opposite effect. An adequate sensitivity analysis would provide the MOECC with the information needed to appropriately assess the effects of the undertaking. Additional model simulations are required to complete a sensitivity analysis and provide probable upper limits to seepage rates and the ZOI. Please note that a typical sensitivity analysis involves multiple simulations while varying only one input parameter between simulations. It is expected that such an analysis will be conducted for a range of input parameters to show the sensitivity of the model to each.While the quantities of seepage to various receivers was provided, figures showing particle tracking traces would be helpful in visualizing the fate of seepage. Based on the information provided, it appears as though seepage predictions may only include the seepage through or beneath dams. Please confirm that seepage from the base of the TMF and all ponds was also captured in the model predictions as this is required to assess the environmental effects of the undertaking. For the EA, conduct a model calibration and discuss the limitations of the model. Furthermore, additional simulations should be conducted to complete a model sensitivity analysis, with a discussion of probably upper limits to seepage rates and ZOI provided. Please provide figures that include particle tracking traces. Please confirm that seepage from the base of the TMF and all ponds was also captured in the model predictions.	Field observations and extensive test pit excavations showed that local topographic highs were generally comprised of a thin soil cover either directly overlying crystalline bedrock or with a thin mantle of till overlying bedrock. These local highs were bounded by swampy low lands generally underlain by peat and / or till. The presence of bedrock at surface over much of the Site and extensive till and or peat cover in low lying areas limits the amount of recharge to the underlying strata and accounts for the poor surface drainage observed at the site. Calibration of the groundwater flow model involves the adjustment of model inputs to achieve simulated groundwater flow conditions reasonably consistent with measured site-specific data. The calibration dataset consists of averaged water levels measured at on-site monitoring wells (Figure to Comment #F70-1). The original model parameters are found to produce an almost systemic bias towards positive residuals (simulated minus observed water levels), as illustrated in Figure to Comment #F70-2. Test simulations indicate that the reasons for this bias appear to be two-fold: 1) the original recharge rate of 50 mm/yr is likely too high given the low-permeability of surficial materials and the poorly-drained nature of the site; and 2) the presence of hillside seeps, which would act to depressurize upland areas, could be more broadly assigned in the model. The following model adjustments are implemented during the model calibration in order to produce satisfactory results: • The originally assigned groundwater recharge rate of 50 mm/yr is reduced from 50 mm/yr to 25 mm/yr. • Additional drain boundary condition cells are assigned along the flanks of select upland areas in order to allow for the presence of potential hillside seeps to depressurize areas of excessive head. The application of numerous drain cells accounted for groundwater discharge to the adjacent swampy lowlands as observed in the field. The results of the model calibration are presented on the attached Figure to Comment #F70-3. The calibration dataset goodness-of-fit is assessed using several common statistical indicators. The mean error and absolute mean error are 0.9 m and 1.5 m, respectively, indicating a slight bias towards over-prediction but with simulated values typically within 1.5 m of measured. The normalized root-mean-squared error is 6.9%, further suggesting a reasonable match has been achieved between the simulated and measured values. Simulations were then completed with this model to estimate mine water inflows and the extent of the zone of influence of the fully excavated pit with these results compared to the results presented in the Hydrogeology TSD (Appendix H). The halving of the recharge rate, from 50 mm/yr to 25 mm/yr provides a sensitivity analysis for this model. Predicted groundwater pit inflow updates are summarized in Table to Comment #F70 for the Construction and Operations phases (see attached). Aside from the construction phase of pit development, the simulated inflows are not materially different for the two modelling scenarios. (Response continued on next page)	See attached Figures to Comment #F70-1, F70-2, F70-3, and F70-4, and Table to Comment #F70.	n/a

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cont'd	MOECC - Groundwater	83	See above	Water table drawdown at the end of the Operations phase (relative to the end of the Construction phase) is shown on Figure 4. The extent of drawdown for the 25 mm infiltration model (solid line) is consistent with that seen for the 50 mm infiltration model (dashed line). In some areas, differences between the two drawdown cones are noted; however, the simulated water level change during the Operations phase is largely controlled by the perimeter lakes and not the change in groundwater recharge rate. The model provided in Appendix H was intended to provide an estimate of groundwater inflows and the extent of the zone of influence of the open pit suitable to support the EA. Adjustments to the model and the further simulations completed in response to MOECC comments have not produced results that are materially different with respect to the intended purpose of this model. As such, IAMGOLD is of the opinion that the model results as reported in the EA are suitable for the intended purpose. It is recognized that further analysis will be required to support applications for permits as will be required before this Project can be constructed. Also it recognized as indicated in the MOECC Comment #F70, that this model may need to be updated during operations to the extent that observed water levels and/or effects on surface water are greater than predicted. With respect to the comment on seepage, as part of the design of the tailings management facility (TMF), the effectiveness of the proposed seepage control measures was evaluated with a two dimensional (2D) seepage analysis for steady state condition using the SEPP/W module of the commercially available software package GeoStudio 2007. Details of this seepage modelling were provided in Attachment A of the Addendum to the Hydrogeology TSD (Appendix H).	see above	see above
F71	MOECC - Groundwater	84	Response to Comment #84 Appendix Z—Responses to Comments on the EIS/Draft EA Report, Page 13, Comment #83 Pending any significant changes based on hydrogeology model updating, the method used appears adequate to provide estimation. Some of the loading rates to the receivers noted in Table 20a of Appendix J—Water Quality TSD Addendum appear excessive and are an area of concern. However, the receiver effects assessment is deferred to Provincial and Federal surface water specialists. Further review of the effects to the receivers by Provincial and Federal surface water specialists is warranted.	The units for the seepage loading rates from the MRA listed in the Addendum to the Water Quality TSD (Appendix J), Table 20a are described erroneously as kg/d; the correct units are kg/year. The units for the seepage loading rates from the TMF (kg/d) are correct. This correction has also been communicated to other technical reviewers.	Please see attached erratum to Table 20a of the Addendum to Appendix J, which contains the correct units for seepage from the MRA.	Addendum to Appendix J, Table 20a

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F72	MOECC - Groundwater	92	Response to Comment #92 Appendix Z—Responses to Comments on the EIS/Draft EA Report, Page 13, Comment #92 This response is not adequate as IAMGOLD will be required to comply with Guideline B-7 (formerly Policy 15-08) titled "Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities," dated April 1994, as amended. In section 3.2.2—The potential use of groundwater in the vicinity, Guideline B-7 states, "where there is no current use being made of the groundwater, criteria shall be established on the basis of the potential reasonable use(s) of that water, based on the existing quality and quantity of groundwater and the current use(s) of groundwater in the general area." In section 3.3—Potential for Domestic Consumption, Guideline B-7 states, "the potential use of groundwater in Ontario will almost always be for domestic consumption." The MOECC considers that the potential use of groundwater in the vicinity of the undertaking is for domestic consumption. Therefore, it is expected in the EA that IAMGOLD make reference to all parameters related to Guideline B-7, both health related and non-health related as reference to baseline/background levels is essential for the assessment of Guideline B-7 compliance. All parameters relevant to Guideline B-7 are to be included in the assessment of groundwater quality in the EA. The default "reasonable use" of groundwater in Ontario will always be domestic use, unless pre-existing groundwater quality conditions preclude that use.	The only anticipated groundwater user in the vicinity of the site is IAMGOLD; groundwater is expected to discharge to surface water bodies and no groundwater migration from the site to other properties beyond the surface water bodies is predicted. IAMGOLD is committing to monitor groundwater quality, including all parameters relevant to Guideline B-7. The ongoing baseline groundwater monitoring program includes the analysis of parameters with an Aesthetic Objective under the Ontario Drinking Water Objective (chloride, copper, dissolved organic carbon, iron, manganese, sulphate, total dissolved solids and zinc). Should a Guideline B-7 compliance assessment be required during the permitting process, the baseline data may be compared to the Aesthetic Objective as part of Procedure B-7-1.	None.	n/a
F73	MOECC - Groundwater	93	Response to Comment #93 Appendix Z—Responses to Comments on the EIS/Draft EA Report, Page 13, Comment #93 It appears as though the first 20 weeks of humidity cell test (HCT) data is not incorporated into the water quality predictions. While it may be appropriate to model steady state loading rates without considering information associated with this "first flush", it is expected that the contaminant loading associated with this first flush will occur at the field scale. The first flush results must be considered in the EA when assessing effects to water quality associated with the undertaking to help the MOECC assess the true environmental effects of the project. In the EA, IAMGOLD should incorporate the first 20 weeks of HCT results into water quality predictions and discuss the effects that this change has on the loading rate and water quality predictions.	The loading rates from humidity cells associated with Weeks 0 to 20 can be influenced by pre-existing oxidation products that have built-up over time during storage of the rock core, which would inevitably get incorporated into the sample as part of the sample preparation process. Since the rock core collected for the Côté Gold Project was in storage for a long period of time prior to sample collection for the humidity cell test work, the flushing of the oxidation products that were pre-existing versus the oxidation products that are generated by the humidity cell test itself cannot be distinguished during the early stages of the test work. Because there is a high potential for some pre-existing oxidation products to be present in the rock core, there is a risk that using the early time humidity cell data would result in overestimating the mass loading rates since the rate of mass release would include the flushing of the oxidation products built-up prior to the test work. Therefore, by not incorporating the early time humidity cell data, the uncertainty associated with pre-existing oxidation products is removed from the water quality modelling. This is an additional reason for the selected approach for the water quality modelling, which was to conservatively account for the ultimate mine rock tonnages and ultimate open pit area at the site, and to incorporate humidity cell data that simulates the longer term, steady state conditions.	None.	n/a
F74	MOECC - Groundwater	96	Response to Comment #96 Appendix Z—Responses to Comments on the EIS/Draft EA Report, Page 13, Comment #96 While justification was provided, the MOECC still has concerns with the adjustment factors used. However, the MOECC will defer this topic to the experts on the Federal Review Team (EC/NRCan). The MOECC will defer this topic to the experts on the Federal Review Team (EC/NRCan).	The comment has been noted. No response is requested.	None.	n/a

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F75	MOECC - Groundwater	New	MOECC-GW01F, Chapter 9.0—Description of Project Effects, Page 9-28, §9.6.2.2—Operations Phase This section states that "…treated effluent is discharged to the environment in accordance with the Federal Metals Mining Effluent Regulations (MMER)." It will be required that any discharge associated with the site also comply with the associated Provincial environmental compliance approval (ECA). IAMGOLD must ensure that all references in the EA to effluent discharge regulations consider Provincial requirements as well as Federal.	IAMGOLD is aware that the Project will need to comply with provincial discharge requirements as described in Chapter 2 of the Amended EIS / Final EA report.	None.	n/a
F76	MOECC - Groundwater	New	MOECC-GW02F Appendix H—Hydrogeology Technical Support Document Addendum, Attachment A, Page 2/5, §3.1—Model Configuration, Attachment A, Appendix A, Figure A1—Typical Seepage Model Cross-Section The 15 mine rock storage ponds (MRSPs) are to be constructed as rockfill shell dams with an upstream geomembrane. It is apparent that the rockfill will be compacted waste rock. The proposed design has the waste rock fill comprising the downstream portion of the dams, potentially creating the conditions for ARD/ML depending on the characteristics of the material used. IAMGOLD shall conduct geochemical testing of all waste rock to be used as construction material that will not be adequately covered or submersed in perpetuity. All such material shall be shown to be chemically stable before placement.	Agreed. As described in Chapter 16, IAMGOLD is committed to sampling mine rock and to only use non-acid generating materials for construction purposes.	None.	n/a

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F77	Sanatana Resources	—	April 9, 2015 Ministry of the Environment and Climate Change Environmental Approvals Branch 2 St. Clair Avenue West, Floor 12A Toronto, ON M4V1L5 Attention: Cindy Batista, Project Officer Re: Notice of Submission - Amended Environmental Impact Statement (EIS)/Final Environmental Assessment (EA) Report for the Cote Gold Project Dear Ms. Batista: I am the President and Chief Executive Officer of Sanatana Resources Inc. ("Sanatana") and I write further to (i) the above-referenced matter and (ii) a letter from IAMGOLD Corporation ("IAMGOLD") to Sanatana dated February 9, 2015 with respect to same (the "February Letter"). For convenience, a copy of the February Letter is enclosed herewith. All capitalized terms used but not defined in this reponse letter have the meanings ascribed thereto in the February Letter. As you may know, in April 2013 Trelawney Mining and Exploration Inc. ("Trelawney"), a wholly-owned subsidary of IAMGOLD, filed an application with the Ontario Mining and Lands Commissioner (the "MLC") seeking propesed easements for surface rights over certain mining claims held by Sanatana (the "Watershed Property").1 Sanatana opposed Trelawney's easement application on a number of grounds. In the course of the proceedings before the MLC Trelawney allged that such easements were "required" in order to move forward with the Cote Gold Project. As further background, in November 2014 Trelawney withdrew its easement application on the first day of the hearing before the MLC. A copy of Sanatana's news release announcing the discontinuance of Trelawney's easement appliacation is enclosed for convenience. Santana's management has reviewed the Amended EIS/Final EA Report and notes that Trelawney's mine plan was not revised to reflect that Trelawney did not obtain the surface rights it was seeking through its easement application. Specifically, Santana's management understands that Trelawney's mine plan for the Cote Gold Project is still based on the assumption that surface rights overlapping the Watershed Property will be used. Given that the easement application has been discontinued and Sanatana has not otherwise agreed to the use of such surface rights by Trelawney, if Trelawney does not obtain easements in the future or if Sanatana does not otherwise consent to the use of the applicable surface rights by Trelawney, then Trelawney's mine plan may need to be amended to relect an amended surface area. Accordingly, Sanatana's management is of the veiw that it is premature to settle the Amended EIS/Final EA Report prior to finalizing the surface rights Trelawney has available to use for the COTE Gold Project. Said another way, is Trelawney is unable to secure the surface rights for which its mine plan is based then it is foreseeable that the mine plan (and environmental impact) may need to be amended. If you would like further information on the MLC easement application then please do not hesitate to contact me. Yours truly, Peter Miles President and Chief Executive Officer Sanatana Resources Inc. [1 Such mining claims are held pursuant to an option and joint venture agreement (the "Option and JV Agreement") between Sanatana and Trelawney Augen Acquisition Corp. ("TAAC"). TAAC is a wholly-owned subsidary of Trelawney and currently Sanatana and TAAC each hold 50% interest in such mining claims and Sanatana. Under the terms of the Option and JV Agreement Sanatana has the option to earn a additional 1% and if exercised, Sanatana will hold a 51% interest in sich mining claims and TAAC a 49% interest.]	The Project may overlap or changes access to some mining claims but will not limit the ability of adjacent mineral rights holders' to exercise exploration activities. IAMGOLD continues to be of the opinion that adjacent mineral rights holders, including the mineral claims held jointly with Sanatana Resources Inc., will not be impacted by Project development and operations.	None.	n/a

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F78	Sudbury & District Health Unit	—	The Sudbury & District Health Unit (SDHU) has reviewed the Final Environmental Assessment Report/Amended Environmental Impact Statement dated January, 2015, and acknowledges that many of the comments submitted by the SDHU on June 9, 2013, and August 19, 2014, in response to the draft Terms of Reference; as well as on July 11, 2014, in response to the Draft Environemtnal Assessment (EA)/Envireonmental Assessment Report/Amended Environemtnal Impact Statement. The Final Environmental Assessment Report/Amended Environmental Impact Statement states that "unacceptable health risks to human health receptors are not expected to occur as a result of the Project". This finding appears to be supported by the propsed control strategies for air, water and noise emissions outlined in the Final Environmental Impact Assessment Report/Amended Environmental Impact Statement. The SDHU Unit supports these actions but suggests ongoing modelling and monitoring to ensure that no exceedances occur which could adversly affact the local seasonal and permanent population.	We are pleased the Sudbury & District Health Unit supports the findings of the Amended EIS / Final EA Report. Please note that IAMGOLD has committed to on-going air monitoring of key health-related parameters during the construction and operation phases of the facility.	None.	n/a
F79	Sudbury & District Health Unit	—	The following comments are provided as these were not addressed in the Final Environmental Assessment Report/Amended Environmental Impact Statement: a) The Camps in Unorganized Territory, Regulation 554 R.R.O. 1990, made pursuant to the *Health Protection and Promotion Act*, sets out minimum requirements for the operation of camps in unorganized territory, and is enforced by local Boards of Health. A camp, as defined under the regulation, "means a camp in which buildings are used to accomodate five or more employees who are employed in mining work, lumbering work or any other labour work in territory without municipal organization" R.R.O. 1990, Reg. 554, s.1. The proposed accomodations as described in the Final Environmental Assessment Report/Amended Evnironmental Impact Statement to support the construction stages if the project, as well as the operation of the mine, will meet the definition of a camp under Regulation 554 R.R.O. 1990, The accommodations to support the development of the project, including the surveying and engineering stages, may also meet the definition of a camp under the regulation. Regulation 554 R.R.O, 1990 requires that every person who intends to operate a camp provide written notice to the Medical Officer of Health prior to the opening of the camp. We request that the appropriate person at IAMGOLD Corporation contact Burgess Hawkins, Manager, Environmental Health at 705.522.9200, ext.218 to further discuss the proposed camp. Please find included a copy of Regulation 554 R.R.O. 1990, as well as the SDHU Industrial Camps Form. b) Though the Final Environemtnal Assessment Report/Amended Environmental Impact Statement does provide basic information regarding the proposed sewage treatment system, the application process to the agency responsible for permitting the system is absent. Please note that if all of the facilities in the proposed project have a total sewage flow of 10,000 litres/day or more, the Ministry of the Environment and Climate Change will be responsible for permitting the system. If the total sewage flow is less than 10,000 litres/day the SDHU will be responsible for permitting the system. A completed sewage system application must be submitted to, and approved by, the permitting agency prior to intiation of construction.	The comment has been noted. IAMGOLD will take this advice into consideration when the Project moves forward into the permitting stage.	None	n/a
F80	MNDM	—	EA Reference: S.1.5 Just a note: this section lists 456 unpatented mining claims- any of these that will have mining activities occurring on them directly will be required to be brought to mining lease for surface and/or mining rights. The MNDM is aware IAMGOLD has started this process; it will have to be done prior to submission of the Mine Production Closure Plan.	Noted. IAMGOLD will seek mining leases for surface and/or mining rights for all land parcels which will include Project components.	None.	n/a
F81	MNDM	—	EA Reference: S. 5.15.3; 5.16; 5.16.1; 5.16.2 etc. There is not enough detail in these sections and they just summarize various closure activities that IAMGOLD will undertake. Without the actual draft CP within the EA document there are limits to the comments in regards to this. MNDM will have to address the CP requirements when the time comes that IAMGOLD chooses to move forward with the CP process.	IAMGOLD is of the opinion that the conceptual closure plan outlined in the EA adequately describes the activities, phases and commitments for closing out and rehabilitating the site for the purposes of an environmental assessment. It is noted that further details will be included in the Closure Plan, which IAMGOLD will submit for MNDM review and approval, prior to construction.	None.	n/a

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F82	MNDM	—	EA Reference: S.5.16.1 Refers to the rehabilitation measures at the 3 stages of closure – Temporary Suspension; State of Inactivity and Closure. Closure is not the final stage of rehabilitation – Close Out is the appropriate term here. Please see the definitions in Part VII of the *Mining Act* for 'closed out' and 'closure'.	The comment has been noted and will be considered in the preparation of the Closure Plan for the Project.	None.	n/a
F83	MNDM	—	EA Reference: S.5.16.1 There is a bracketed sentence in the final paragraph of this section – (with respect to site rehab. And infrastructure removal that would be undertaken within 2-5 years). That comes right after the list of the 3 stages of closure. It might be clearer to have this as its own sentence and this would be prior to those 3 stages or alongside one or another.	The comment has been noted and will be considered in the preparation of the Closure Plan for the Project.	The following erratum has been issued for Section 5.16.1, where the following sentence: "In accordance with the *Mining Act*, Regulation and Code, the first closure stage will encompass the three phases of active closure: Temporary Suspension; the state of Inactivity; and Closure (with respect to site rehabilitation and infrastructure removal that would be undertaken within approximately 2 to 5 years of shutdown of operations)." has been modified to: "In accordance with the *Mining Act*, Regulation and Code, the first closure stage will encompass the three phases of active closure: Temporary Suspension; the state of Inactivity; and Closure (Close Out). During the first closure stage rehabilitation and infrastructure removal is expected to be completed within approximately 2 to 5 years of shutdown of operations."	Section 5.16.1, page 5-41.
F84	MNDM	—	EA Reference: 5.16.2.1 Is it known yet to what depth the water will be once the pit is flooding during this first phase (or the final water elevation)? Will there be any vertical drops greater than 3 metres? Will there be at least one sloped entrance left or created to allow for an exit point? Is the boulder fence around the pit going to be left up once operations have ended and left as an interim protection around the pit while it fills?	The requested details are not currently available. However, this information will be considered in the preparation of the Closure Plan for the Project.	None.	n/a
F85	MNDM	—	EA Reference: S. 5.16.3 The Post closure I and II stages would still be considered to be prior to that final stage of 'close out' you described earlier. Just keep that in mind when doing the closure plan that you do not have 'post-closure' stages in the rehabilitation plan. The activities you have described in these stages will be required to occur pre-close out and therefore within the normal closure of the site. (The EA basically describe a state of inactivity in these stages).	The comment has been noted and will be considered in the preparation of the Closure Plan for the Project.	None.	n/a

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F86	MNDM	—	EA Reference: S. 9.2.2.3; 9.3.2.3; etc……9.11.2.3; 9.15.2.3… Same as above – for the CP your post closure phases will still be considered part of the closure phases used in the *Mining Act*. The wording in the EA can be as is. Just wanted to note this for the CP. Also for all the other sections	The comment has been noted and will be considered in the preparation of the Closure Plan for the Project.	None.	n/a
F87	MTCS - Cultural Heritage	—	6.5.3 Built Heritage It is suggested that the title of this section should also include cultural heritage landscapes, since they are discussed here as well. The level of description in this section is appropriate but may require some updates depending on the revisions to the Built Heritage and Cultural Heritage Landscape Assessment report (see comments above). This section would benefit from some additional clarification and information. Section 6.5.3.1 Methodology should include a summary of the methodology used in the Built Heritage and Cultural Heritage Landscape report. Also, it is not clear what is meant when the EA report says that "Preliminary investigations indicate that there is a cultural landscape…" and later "no built heritage resources other than the mining ruins have as-yet been identified…" (emphasis added). This language could imply that further study or information is required/forthcoming, or it may be intended to allow for scenarios where cultural heritage resources may come to light through public comments, or discovered during construction. MTCS suggests that this language is clarified.	Further discussions with the MTCS have occurred following the submission of the Amended EIS / Final EA Report. The Built Heritage and Cultural Heritage TSD (Appendix Q) has been revised to reflect provincial regulatory requirements, and is attached for information purposes.	See attached Built Heritage and Cultural Heritage Report.	n/a
F88	MTCS - Cultural Heritage	—	6.5.4 Archaeology *Marine Archaeology* In our review of the draft Terms of Reference, MTCS and IAMGOLD acknowledged that marine archaeological sites may be present at the project location and developed an approach to addressing marine archaeology. While acknowledgement of marine archaeological resources and this approach are reflected in Chapter 9, a description of the area's potential for marine archaeology is missing from Chapter 6 – Description of the Environment. *Archaeological Assessment reports* This section notes that Stage 1 and 2 Archaeological Assessment studies were undertaken in 2011 and 2012 and that Stage 3 Archaeological Assessment studies for 28 sites were to be undertaken during the 2013 fieldwork season. MTCS requests that this statement is updated to summarize what work was undertaken in 2013 and what, if any, additional work remains. The section should briefly describe what archaeological sites were identified. In order to understand project impacts on archaeological resources and mitigate these impacts, archaeological assessments must be completed by a licensed archaeologist and submitted to MTCS for review to ensure compliance with ministry requirements. As of the date of this letter MTCS has received a Stage 3 report for 10 archaeological sites associated with this project. This report is scheduled to be reviewed in May 2015. Once reviewed, ministry staff will provide the consultant archaeologist with a letter that comments on the report(s). If the report(s) complies with Ministry requirements including the Standards and Guidelines for Consultant Archaeologists (2011) the letter (copied to the approval authority and the proponent) informs the licensee that the report is accepted.	IAMGOLD has provided the requested information in a separate email to MTCS. Chapter 6 only describes baseline data that has been used to inform the impact assessment.	None.	n/a
F89	MTCS - Cultural Heritage	—	9.12 Built Heritage Similar to the comments on Chapter 6, the title of this section should also include cultural heritage landscapes and the section may require updates depending on the revisions to the Built Heritage and Cultural Heritage Landscape Assessment report (see comments above).	Further discussions with the MTCS have occurred following the submission of the Amended EIS / Final EA Report., The Built Heritage and Cultural Heritage TSD (Appendix Q) has been revised to reflect provincial regulatory requirements, and is attached for information purposes.	See attached Built Heritage and Cultural Heritage Report.	n/a

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F90	MTCS - Cultural Heritage	—	9.13 Archaeology Similar to Chapter 6, this section should be updated to summarize the findings and recommendations of the archaeological assessments conducted to date, including how impacts will be mitigated by avoidance or excavation.	IAMGOLD has provided the requested information in a separate email to MTCS.	None.	n/a
F91	MTCS - Cultural Heritage	—	Appendix Y - Commitments If there is the possibility that this project will require stage 4 archaeological assessment (excavation), a commitment regarding collections management should appear in this table. It is advised that the proponent commit to transferring the artifacts to an institution (in consultation with MTCS and the First Nation community, if appropriate).	As documented in Appendix Z, Comment #306, IAMGOLD has committed to transferring artifacts in accordance with MTCS protocols to the Mattagami First Nation after analysis has been completed, along with a community presentation.	None.	n/a
F92	MTCS - Cultural Heritage	—	*1) Are the data, analysis and conclusions in the EA satisfactory, i.e., are these relevant and substantiated?* While the proponent has undertaken the requisite studies to substantiate the environmental assessment, the studies are in draft form and have not yet been finalized. MTCS has yet to review the most recent drafts of these reports but does not anticipate significant issues. • The Built Heritage and Cultural Heritage Landscape Assessment should be revised based on comments provided by MTCS in October 2014. MTCS recently received and updated draft and will review and provide feedback on this report. • Stage 1-2 archaeological assessments are complete and have been accepted into the register. Stage 3 and 4 archaeological assessment reports have been submitted to the Ministry and are awaiting review for their compliance with the Standards and Guidelines for Consultant Archaeologists (2011) *2) Does the way in which the proponent intends to implement the undertaking comply with the ministry's legislative requirements?* Pending finalization of the above mentioned reports, the general approach taken by the proponent complies with legislative requirements. *3) Are the monitoring or contingency plans specified in the EA adequate?* Yes, again pending finalization of reports. *4) Did the proponent address comments provided by your agency in the preparation of the EA?* No, it appears our comments were not incorporated. *5) Has the proponent clearly indicated how compliance reporting regarding commitments in the EA related to your mandate will be fulfilled?* May not be applicable. There are no commitments regarding built heritage resources and cultural heritage landscapes. There are commitments for archaeology, and it is anticipated can be met through the archaeologist's licensing requirements rather than the EA. If stage 4 work is anticipated, a commitment regarding the transfer of the artifacts to an institution (in consultation with MTCS and the First Nation community, if appropriate) would be advised. This transfer would require an MTCS collection transfer form will be completed by the surrendering licensee and the institution accepting the materials, which would be one way of reporting on compliance.	Following discussions with the MTCS after submission of the Amended EIS / Final EA Report, the Built Heritage and Cultural Heritage TSD (Appendix Q) has been revised to reflect provincial regulatory requirements. This revised document has been attached for information purposes. An additional mitigation has been identified to remove resources (a barrel stove and remnants of a cross-cut saw) near the former Shannon Cabin. These resources will be documented in-situ and removed to a secure location. This new mitigation has been added to Table 10-3 and Appendix Y of the Amended EIS / Final EA Report.	See attached Built Heritage and Cultural Heritage Report. See attached errata to Table 10-3 and Appendix Y, Table 3 to include mitigation for heritage resources at the former Shannon Cabin.	Table 10-3, pg 10-53; Appendix Y, Table 3, pg 53.

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F93	MTCS - Tourism	—	*1. Are the data, analysis and conclusions in the EA satisfactory, i.e. are these relevant and substantiated?* *- Does the information in the EA cover relevant issues at an appropriate level of detail?* Generally yes from a tourism perspective. See Table 1 below for comments or questions on specific areas of concern. The EA reports 2010 tourism data for the Sudbury District and our Ministry now has 2011 and 2012 data available which is attached below in Table 1. *- Are you satisfied with the methods and techniques described in the EA to describe the environment, potential environmental effects and any mitigation measures necessary to reduce those effects?* See Table 1 below for comments or questions on specific areas of concern. *- Is the description of the net effects, or the advantages and disadvantages to the environment after mitigation is taken into consideration, adequate?* See Table 1 below for comments or questions on specific areas of concern. *2. Does the way in which the proponent intends to implement the undertaking comply with the ministry's or agency's legislative requirements?* Our Ministry does not have any tourism-related legislative requirements that are applicable to the undertaking. Any culture-related concerns may be brought forward separately by staff from the Culture side of our Ministry. *3. Are the monitoring and contingency plans specified by the proponent in the EA adequate?* See Table 1 for more detailed comments or questions. In some cases further work will be done as the EA is implemented to refine activities (e.g. final transmission line refinement). Until that work is completed it difficult to know whether monitoring or contingency plans may be adequate. In addition, local tourism businesses will be in the best position to determine how activities may impact their business operations and thus what type of monitoring/contingency work may be needed. *4. Did the proponent address comments provided by your agency in the preparation of the EA?* Not applicable since our Unit did not provide comments on the draft EA due to other work priorities and commitments. However, we were satisfied with how our Unit comments from our review of the EA Terms of Reference were addressed. *5. Has the proponent clearly indicated how compliance reporting regarding commitments in the EA related to your mandate will be fulfilled?* Our Ministry does not have tourism-related legislative requirements relating to this project that require compliance reporting to our Ministry. However, as in our response to question three above, additional information is still to be received on some aspects of the EA. For example, detailed information on bear hunting - licensed outfitters and harvest - is outstanding (see comment MTCS-7 in Table 1 below). In such cases, this question is somewhat premature. See Table 1 below for more specific comments.	Please see responses to individual comments and questions from Table 1 of the MTCS comments package below.	None.	n/a
F94	MTCS - Tourism	—	MTCS-1 Table 4-9; p. 4-39 Reference to developing a socio-economic/community management plan (in context of comments from Wabun Tribal Council). Sections 4.8 and 16.4 also reference such a plan and it appears the intention is for the plan to address the following: community health conditions, emergency services, demands on other community services and infrastructure and traditional land uses (as it relates to First Nations and Metis). Is it intended to be an Aboriginal focused plan or a broader plan that includes non-Aboriginal interests as well? Will it include tourism?	Socio-economic management planning is intended to encompass all potential Project-related socio-economic effects identified through the EA process and/or at later stages of the Project and will be inclusive of socio-economic effects on Aboriginal and non-Aboriginal populations. Socio-economic management will follow the same adaptive management approach as other management plans developed as part of the Project planning process.	None.	n/a

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F95	MTCS - Tourism	—	MTCS-2 Table 4-17; p. 4-63 No significant effects to BMAs anticipated – interested holders can apply for another BMA. Page 6-100 notes that the local study area overlaps with 13 BMAs and the regional study area overlaps with 29 BMAs. Has the proponent confirmed that MNRF is actively looking to provide compensatory area for all BMA holders in the local study area as appropriate?	The overlap with the proposed transmission line alignments constitute 1.31% or less of the total areas. IAMGOLD does not anticipate any significant effects to the use of these BMAs due to the limited overlap and no change in access. The overlap of proposed Project components with BMA GO-31-064 is 10.72%. Based on discussions with the MNRF in August 2013, there were five other BMAs available for allocation. The holder of BMA GO-31-064 may apply to the MNRF to obtain license for additional BMAs in the Timmins District to augment loss of access to the northern portion of GO-31-064. This information is provided in detail in the Land and Resource Use TSD (Appendix O).	None.	n/a
F96	MTCS - Tourism	—	MTCS-3 Table 4-17; p. 4-64 MNRF reference to effect of transmission line on tourism at Mesomikenda Lake. Company says line crossing will be optimized during feasibility studies. We recognize that optimizing of the line will occur in the future but does the proponent envision any tourism-related concerns at this time? In general, feasibility studies should be completed prior to a final EA being issued.	IAMGOLD has assessed all Project effects for all Project components, including the development of the transmission line.	None.	n/a
F97	MTCS - Tourism	—	MTCS-4 Section 4.7.2.4; p. 4-66 IAMGOLD is of the opinion that there are no outstanding issues for the purposes of the final EA. Yet, items such as 4-64 above won't be fully addressed until later in the process. How does the proponent currently know there won't be outstanding issues in the future?	IAMGOLD is of the opinion that effects of the Project, including on the human environment (Land and Resource Use and Visual Aesthetics) have been adequately assessed and consulted on for the purposes of the EA Report. In addition, IAMGOLD has committed to continued information sharing and consultation with stakeholders throughout all stages of the Project, where appropriate, to address future concerns related to the human environment.	None.	n/a
F98	MTCS - Tourism	—	MTCS-5 Section 4.8; p. 4-66 Identifies socio-economic/community plan to be developed with potentially affected Aboriginal groups. As per the comment on Table 4-9 above, is the plan only designed to address Aboriginal interests?	IAMGOLD is committed to ongoing consulting with a variety of stakeholders, including land and resource users from the communities of Gogama, Timmins and Sudbury throughout the life of the Project. Ongoing consultation with these communities and Aboriginal communities will be considered in the development and monitoring of a socio-economic/community management plan for the Project.	None.	n/a
F99	MTCS - Tourism	—	MTCS-6 Section 6.4.3; p. 6-49 to 6-64 Describes wildlife baseline data for the local and regional study areas. Why is there no information on large mammals like moose, bear in Section 6.4.3? Why is there no table similar to Table 6-23 in Section 6.4.6.2 that outlines observed mammals during field surveys along the proposed transmission line alignments (includes moose, bear, and deer). Also see pages 6-82, 6-83 and 6-87 for information on moose and bear in the proposed transmission line alignments.	IAMGOLD appreciates MTCS sharing Sudbury District tourism data for 2011 and 2012 and welcomes continued information sharing throughout the Project. Section 6.4.3 refers the reader to baseline studies presented in the Wildlife TSD (Appendix L) for results from large mammal surveys conducted around the proposed Project site.	None.	n/a

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F100	MTCS - Tourism	—	MTCS-7 Section 6.5.1.1; p. 6.115 This section notes that detailed information from MNRF on bear hunting (licensed outfitters and harvest), tripping and outfitters is outstanding. It also notes that discussions with land and resource users will continue and new information regarding capacity issues and baseline conditions will be shared in an addendum as it becomes available. When the information is received from MNRF how will it be incorporated into the project now that the EA has been submitted? Proposing to share information in an addendum is not the preferred avenue by which to bring that information forward. We suggest it should have been done before the EA was submitted. Our understanding is that the use of an addendum is designed more for unanticipated changes to the project.	To date, no additional information has been received. IAMGOLD is committed to ongoing dialogue with all Project stakeholders and should additional information become available, IAMGOLD will review and consider any potential effects, and develop and implement necessary mitigation measures, as appropriate.	None.	n/a
F101	MTCS - Tourism	—	MTCS-8 Table 6-25; p. 6-116 Lists Crown Land Use Policy Atlas (CLUPA) land use policy areas. Tourism is noted as a secondary use in the area that overlaps the project site. A map of the CLUPA land use areas would have been useful for reference purposes.	Due to the large amount of information that is presented and needs to be summarized in the EA, it is not possible to show all maps and figures in the main document. A figure of the Lists Crown Land Use Policy Atlas land use policy areas is included in the land use baseline as Figure 6 (Appendix I of Appendix O).	None.	n/a
F102	MTCS - Tourism	—	MTCS-9 Section 6.5.1.2; p. 6-119 Section on Tourism and Recreation. It would have been useful to provide a summary of the information shown in Figure 6-10 as it relates to resource-based tourism facilities. We acknowledge that page 6-120 lists a number of outfitters in the regional study area but it does not appear to be a complete list.	The list of tourism facilities noted on page 6-120 that provide accommodation (cottages and camps), hunting, fishing and other outdoor adventures services represents the facilities which were identified during the baseline data collection as part of the EA preparation process. At this point in time, IAMGOLD is confident in the amount of information that was available was adequate to develop the EA prediction of effects.	None.	n/a
F103	MTCS - Tourism	—	MTCS-10 Section 6.5.1.2; p. 6-120 References interviews conducted with a number of outfitters listed on page 6-120. It is positive that the operators were interviewed but the section doesn't indicate what types of questions were asked (e.g. whether the operators use the area of the project site) or provide a summary of the responses.	Resource-based tourism operators interviewed as part of the Project's socio-economic data collection efforts were asked a number of questions designed to obtain information about the location of their operations, bear and moose management areas, plant harvesting, clientele, and the nature of primary client activities. Records of the socio-economic interviews conducted for the Project are located within Appendix D-10d (Stakeholder Records - Correspondence Documents).	None.	n/a
F104	MTCS - Tourism	—	MTCS-11 Section 6.5.6.2; pp. 6-142-143 Quotes 2010 tourism data for Sudbury District. Our Ministry has updated data for 2011 and 2012 and it is attached below in case it is useful. Please note that due to changes in Statistics Canada's methodology, domestic data from 2011 onward is not comparable to previous years	IAMGOLD appreciates MTCS sharing Sudbury District tourism data for 2011 and 2012 and welcomes continued information sharing throughout the Project.	None.	n/a
F105	MTCS - Tourism	—	MTCS-12 Table 7-5; p. 7-8 Outlines criteria and indicators for Human Environment including some that are tourism-related. We are unclear regarding what is meant by "consistency with established and planned resource management objectives such as Bear Management Areas and Sustainable Forest Management units."	These indicators were developed with IAMGOLD and the MOECC during preparation of the Approved ToR.	None.	n/a

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F106	MTCS - Tourism	—	MTCS-13 Table 9-1; p. 9-4 Describes disciplines and related indicators Why are effects indicators for specific species only indicated for the transmission line corridor but not the project site?	Effects indicators were established by discipline leads to best reflect aspects of the environment with respect to their study area and Project component. Specific species along the transmission were established in indicators because of the potential for impacts to these species while the Project site requires the use of different indicators.	None.	n/a
F107	MTCS - Tourism	—	MTCS-14 Section 9.1.2.3; p. 9-12 Defines socio-economic regional study area. Figure 6-10 identifies tourism facilities in a wide area around the project. Several facilities are located to the NW of the project site but are not included in the local or regional study area. Why were they excluded? Has the proponent determined whether any of these facilities are accessed by plane from south of the project area where there could be potential visual concerns?	The local and regional study areas for land and resource use were determined using the local and regional study areas defined by the terrestrial or aquatic biology disciplines. The rationale for this determination is provided in the Land and Resource Use TSD (Appendix O; see Section 2.1 Spatial Boundaries, page 2-1). A regional study area was not identified for the visual aesthetics component as no ground level visual effects would occur beyond the local study area which is identified in the Visual Aesthetics TSD (Appendix S, see Section 3.1 Spatial Boundaries, page 3-1). Figure 5 in Appendix S illustrates modeled Project component visible areas in the local study area.	None.	n/a
F108	MTCS - Tourism	—	MTCS-15 Section 9.2.2.2; p. 9-15 Azure Lake (where a tourism facility is located) is included in several figures between 9-12 and 9-20 that map isopleths for several particulate and metal contaminants. Are there concerns about concentrations in the area around Azure Lake and potential air quality impacts?	Azure Lake is located outside of the Air Quality local study area and air quality parameters (e.g., TSP, $PM_{2.5}$, PM_{10}, etc.) will be below regulatory levels and AAQC at this location. Additionally, a human health risk assessment has been carried out, which concludes that the Project will not increase the risk to human health due to changes in air quality.	None.	n/a
F109	MTCS - Tourism	—	MTCS-16 Section 9.10.2.1; p. 9-60 This section concludes outfitters are not typically using areas overlapped by project and that the project will not limit use of area. Did this information come from interviews with resource-based tourism operators as referenced above in Section 6.5.1.2?	This information was gathered during interviews with land and resource users, including outfitters (as documented in the Land and Resource Use TSD), through conversations with area residents and with participants at open houses in Gogama, Sudbury and Timmins.	None.	n/a
F110	MTCS - Tourism	—	MTCS-17 Table 10-3; p. 10-41 Chart identifies a mitigation measure for loss of BMAs that MNRF has indicated the affected BMA holder can apply for additional BMA in Timmins District and the commitment is to discuss potential effects with MNRF and affected BMA holders. This is positive but may be predicated on how far potential new areas are from existing operations and BMAs. And if the human environment local study area overlaps with 13 BMAs (see earlier comment on p 4-63), can more be accommodated with replacement area if needed? Also, are the human environment study areas mapped in Figure 9-11?	The assignment of BMAs rests with MNRF and as such, IAMGOLD is not included in discussions between BMA holders and the MNRF with respect to how MNRF may address any potential requests by BMA holders regarding potential replacement areas. There are several figures that illustrate local and regional study areas for human environment aspects of the Project, including: Figure 9-9 Archaeology and Build Heritage Local and Regional Study Areas, Figure 9-10 Visual Aesthetics Local Study Area and Figure 9-11 Socio-Economics Local and Regional Study Areas. The non-traditional and traditional land and resource use aspects of the human environment followed the local and regional study areas provided through Figure 9-6 Site Terrestrial Biology Local and Regional Study Areas and Figure 9-8 Aquatic Biology Local and Regional Study Areas.	None.	n/a
F111	MTCS - Tourism	—	MTCS-18 Table 11-3, Table 11-4, Table 11-5; p. 11-29 (Construction phase), p. 11-49 (Operations phase), p. 11-67 (Closure phase) Under Hunting it notes that potential effects of project may include limiting use of BMAs but MNRF advises affected BMA holder can apply for additional BMA. Under reversibility it says effect is only partially reversible. Why are the effects only partially reversible in these sections but in the sections referenced in MTCS 19 below relating to BMAs the impacts are seen as fully reversible?	The detailed results are described in the Land and Resource Use TSD (Appendix O). As described in Appendix O, the Project is expected to overlap some BMA's and even though it is expected that most of these effects will be reversible, to be conservative, a level II reversibility was assigned. With regards to Cottages and Outfitters, outfitters are not expected to be affected by the Project and effects to cottagers will end once closure activities are finalized.	None.	n/a

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F112	MTCS - Tourism	—	MTCS-19 Table 11-3, Table 11-4, Table 11-5; p. 11-30 (Construction phase), p. 11-50 (Operations phase), p. 11-68 (Closure phase) Under Cottages and Outfitters it notes that potential effects on outfitters may include decrease in areas recommended to clientele (related to BMA effects) or perception that area is not pristine or natural which could detract clientele. The reversibility measure is "effect is fully reversible." Is the effect fully reversible if suitable compensating BMA is not made available by MNRF? In addition, if clients are detracted because of lesser perception of wilderness how can that be reversed until the project ends and area is fully restored to a more natural state?	Please see response to Comment #F111.	None.	n/a
F113	MTCS - Tourism	—	MTCS-20 Tables 11-3 & 11-4; Comment on Construction and Operations phases Why is there no specific consideration under "socio-economic" indicators of impacts to other sectors in the area such as tourism and forestry?	Forestry is assessed as a land use indicator and tourism is assessed through a variety of land use indicators in Tables 11-3, 11-4, and 11-5. These indicators have been approved by the Minister through the Approved ToR.	None.	n/a
F114	MTCS - Tourism	—	MTCS-21 Table 11-5; p. 11-71 Under "Labour Market" it speaks to reduced employment levels in the closure phase but that the "residual impact significance" is seen as "not significant." How can the closure of the mine not be considered significant? If the proponent believes the project will bring important economic benefits while operating then those need to be accounted for when jobs are lost.	As described in Table 10-1, IAMGOLD has committed to a variety of mitigation measures to be carried out during mine closure. For example, IAMGOLD will assist with training and transitioning the work force to future opportunities. In addition, IAMGOLD has designed the Project with an onsite camp, which will be removed at closure to minimize in-migration to local communities.	None.	n/a
F115	MTCS - Tourism	—	MTCS-22 Table 11-6; p. 11-85 Under "Labour Market" it speaks to employment levels in post-closure phase returning to baseline levels but that the "residual impact significance" is seen as "not significant." How can the loss of nearly all remaining jobs in the project not be significant? Again, if the proponent believes the project will bring important economic benefits while operating then those need to be accounted for when jobs are lost.	Please see response to Comment #F114.	None.	n/a
F116	MTCS - Tourism	—	MTCS-23 Section 16.4; p. 16-2 Aside from measures in Table 16-3, monitoring parameters, monitoring methods, frequency/timelines and location are to be determined in a Socio-Economic/Community Management Plan. Neither section 16.4 nor Table 16-3 say anything about how impacts to other commercial interests will be monitored (i.e. tourism). How will this be done?	The EA is designed to assess potential effects, and where these effects do occur, establish mitigation measures and monitoring to verify mitigation. As no mitigation is required for effects to tourism in general, no monitoring is required.	None.	n/a

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F117	MOECC - Surface Water	109, 678	Draft EA Comment #109 & 678 The assimilative capacity and mixing zone assessments presented in the EA do not provide sufficient information for MOECC to evaluate the magnitude and spatial extent of environmental effects from effluent discharge. The information provided does not clearly demonstrate that the preferred alternative minimizes the mixing zone size and potential aquatic environmental effects. This uncertainty is emphasized by the following contradictory excerpts from Appendix U5 page 7: (1) discharge to Bagsverd Creek would result in a smaller mixing zone; (2) Mesomikenda Lake has greater assimilative capacity. The EA (Appendix N) identifies potential for adverse impact to aquatic biota in the mixing zone, but defers development of mitigation measures to the provincial permitting stage following EA approval. Taking such an approach carries risk that the magnitude and spatial extent of environmental effects from effluent discharge might not be accurately portrayed by the EA, if assumptions in the EA about effluent discharge differ from provincial approvals. Evaluation of effluent discharge alternatives and impact mitigation should be revised taking into consideration MOECC review comments. Sufficient technical detail should be provided to support reviewer evaluation of the magnitude and spatial extent of the mixing zones and aquatic environmental effects of the various discharge scenarios. Scenarios should include treated effluent discharge with mitigation measures in place (e.g. optimum discharge point design, receiver-based effluent criteria).	To clarify the excerpts mentioned from Appendix U5 page 7, discharge to the downstream end of Bagsverd Creek would indeed result in a smaller mixing zone. The conceptual extent of the mixing zones assessed were illustrated in Figure 2-4 in Appendix J. Furthermore, Mesomikenda Lake does have a greater assimilative capacity during some times, but has less assimilative capacity during other times. For example, due to the controlled nature of the Mesomikenda Lake outflow to adjust lake storage, the outflow is stopped during some periods. During times when the outflow is stopped, the residence time in the mixing zone would increase considerably, mass would begin to accumulate in the mixing zone (rather than being flushed out), which results in a considerable decrease in the assimilative capacity of the receiver. A preliminary hydrodynamic analysis of the proposed mixing zone (lower basin of Neville Lake) has been completed in response to MOECC's request for more information on the mixing zone extent and magnitude of concentrations in the mixing zone. Details on the preliminary hydrodynamic analysis are discussed in the technical memorandum provided with these comment responses. The turbulent zone is predicted to extend to about 17 m from the treated effluent outfall. At the end of the turbulent zone, the treated effluent is diluted to within 0.01% of the density of the receiving lake waters and the concentrations of metals are very close to the predicted fully mixed concentrations for Neville Lake. These predicted concentrations in the mixing zone are protective of aquatic life - see results in the technical memorandum, the response to Comment F124, and the BLM report. Based on the results of the hydrodynamic analysis, a treated effluent outfall can be designed to minimize the mixing zone extent and mitigate significant aquatic environmental effects.	See attached memo on the Preliminary Hydrodynamic Analysis of the Proposed Treated Effluent Mixing Zone.	n/a

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F118	MOECC - Surface Water	110, 679	Draft EA Comment #110 & 679 (1) Defining baseline concentrations with the 95th percentile instead of the 75th percentile could change the Impact Magnitude Level in situation where predicted concentration is greater than water quality guideline but less than 95th percentile. (2) For some locations a site-specific background concentration can differ from the site-wide average value. This difference could potentially change the Impact Magnitude Level. (3) Use of the cyanide water quality guideline for non-salmonid waters as presented in WERF document is not accepted. The guiding principle behind the development of Ontario's PWQO differs from the US EPA's AWQC. Ontario takes a more protective approach (protect all species, at all life stages, for indefinite exposure periods) whereas the US EPA is less protective (protection of 95% of all species, allowing for some occasional upset). There are data that show invertebrates can be as sensitive to cyanide as cold water fish. (1) Include the 75th percentile to define background water quality. (2) Characterize baseline water quality according to individual sampling locations, not site-wide average. (3) Use the PWQO and CWQG for cyanide.	1) The parameters identified as having a 95th percentile baseline concentration greater than the water quality guideline are aluminum and iron. The concentrations that are predicted to be greater than the water quality guideline but less than the 95th percentile baseline concentration are as follows: • the maximum monthly average concentration of aluminum in Delaney Lake (0.10 mg/L), Unnamed Lake #1 (0.11 mg/L) and Bagsverd Creek (0.082 mg/L); and, • the maximum monthly average concentration of iron in Delaney Lake (0.37 mg/L) and Unnamed Lake #1 (0.38 mg/L). The predicted concentrations of aluminum do not account for attenuation (or mass loss) in the surface water system and incorporates the total mass that reports to the receivers. As a result, the concentrations that are calculated by the water quality model include mass in addition to the 'dissolved' mass. As such, comparing the predicted concentrations to the Provincial Water Quality Objectives (PWQO) and Canadian Water Quality Guidelines (CWQGs), which are applicable on the clay-free fractions, is conservative. In addition, it is important to note that the baseline concentrations of aluminum in Delaney Lake, Unnamed Lake #1 and Bagsverd Creek are up to 0.12 mg/L, 0.19 mg/L, and 0.13 mg/L, respectively; the maximum baseline concentrations that were measured are greater than the predicted maximum monthly average concentrations in all three cases. Therefore, because the predicted aluminum concentrations are within the range of baseline levels for those lakes, the conclusions of the effects assessment do not change despite the fact that the conservative comparisons show that the predictions are greater than the PWQO / CWQG for aluminum. The predicted maximum monthly iron concentrations are only greater than both the 75th percentile baseline concentration (0.21 mg/L) and the PWQO (0.3 mg/L) at Delaney Lake and Unnamed Lake #1 (same as for the 95th percentile concentrations); however, these predicted concentrations (0.37 and 0.38 mg/L, respectively) are only slightly greater than the PWQO. Additionally, the water quality model does not account for solubility controls on iron in the receiving environment and, as such, the predicted concentrations are considered to be conservative. In summary, the predicted iron concentrations are below the toxicity thresholds and protective of aquatic life (as described in the Aquatic Biology TSD; Appendix N) and no significant effects are predicted. While the 95th percentile baseline concentrations were used as comparators for predicted concentrations during the effects assessment for the EA, the 75th percentile concentrations will be used as an input to calculations for studies associated with the permitting process. When the time comes to apply for an ECA, following completion of the EA process, the requirements for deriving effluent criteria will follow Ontario MOECC guidance, including application of the 75th percentile to background receiving water quality. (Response continued below)	None.	n/a

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Cont'd	MOECC - Surface Water	110, 679	See above	2) A single set of upper baseline concentrations, rather than individual sets of baseline concentrations for each assessment location, were applied to provide a consistent evaluation between the assessment locations and to avoid discrepancies when determining the magnitude level (i.e., Level I, II or III). Using a single set of concentrations that represent the upper limit of baseline is conservative for the purpose of the magnitude assessment because, if a single concentration at a single water quality effect location was above the upper limit of baseline, then the overall magnitude of effect for water quality would be classified as a Level II; this approach is more conservative, and the conservative nature of the approach negates the uncertainty associated with using a single set of concentrations to represent the upper limit of baseline rather than lake-specific concentrations. Therefore, deriving the upper limit baseline concentrations for individual assessment locations would not change the outcome of the magnitude assessment, as a Level II magnitude was assigned for all Project phases and the Level III magnitude requires that the concentration be greater than both the 95th percentile concentration and the water quality guidelines, where applicable. The overall magnitude level for the water quality effects assessment was defined as a Level II based on some concentrations being greater than the 95th percentile concentrations but less than water quality guidelines. It is understood that the MOECC's concern is that there is potential for some parameters with predicted concentrations less than the 95th percentile concentrations but higher than the water quality guidelines; this is only the case for aluminum and iron. As noted above in response to (1), the iron and aluminum concentrations are only slightly above the water quality guidelines, below the toxicity thresholds, and protective of aquatic life (as described in Appendix N). Given that all other predicted concentrations are less than the water quality guidelines, with the exception of some parameters localized near the effluent discharge point in the mixing zone (which are also protective of aquatic life), the use of a single set versus individual sets of 95th percentile concentrations as part of the magnitude assessment has no influence on the outcome of the impact assessment. Figures were provided in the Addendum to the Water Quality TSD (Appendix J) which show the average concentrations and one standard deviation of selected parameters from the updated dataset of lakes across the Mollie River and Mesomikenda Lake Watersheds. The average baseline levels of many parameters do not differ considerably and changing the way baseline is characterized would not have a material change on the conclusions of the water quality effects assessment. 3) The water quality model was revised in response to previous reviewer comments. The results of the revised water quality model were compared to the free cyanide PWQO and CWQG, as presented in the Addendum to Appendix J. The predicted free cyanide concentrations are below the PWQO and CWQG for all months and all water bodies.	See above	See above
F119	MOECC - Surface Water	111, 680	Draft EA Comment #111 and 680 The EA assumes there will be no cyanide discharge from the polishing pond. Confirm whether or not the assumption of no cyanide in discharge from the polishing pond equates to an EA commitment for cyanide discharge Limit of zero in the future Environmental Compliance Approval (ECA). If not, the potential impact of cyanide in the treated effluent discharge at proposed ECA Limit should be evaluated as part of the EA.	While the engineering design and management plans will be in place such that no to negligible concentrations of cyanide should be transferred to the polishing pond, it cannot be guaranteed that upsets will not occur; therefore, for operating flexibility, a limit of zero cyanide from the polishing pond is not an EA commitment and will not be proposed for the future ECA. An appropriate discharge limit will be established in consultation with the MOECC during the permitting phase, with perhaps an "Objective" of PWQO, and well below the MMER and O.Reg. 560/94.	None.	n/a

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F120	MOECC - Surface Water	112, 681	Draft EA Comment #112 and 681 Not clear if baseline data for mercury in water and fish are or will be collected according to MOECC Northern Region guidance (draft document Nov. 2010). For example, include method detection limits for low-level mercury and fish tissue sample sizes. The potential for increased sulphate levels from mine effluent to influence mercury methylation was not addressed. Describe how baseline mercury data is being collected with reference to MOECC Northern Region guidance for baseline monitoring of mercury in water and fish tissue. Address whether or not increased sulphate levels from mine effluent could potentially influence mercury methylation.	MOECC Northern Region guidance for baseline monitoring of mercury in water and fish tissue was reviewed, and baseline monitoring for fish tissue is confirmed to be consistent with the methodology provided in the document. Northern pike were used as the large-bodied fish in most waterbodies, or walleye (fish sampled greater than 40 cm - see Table F.47 in the Addendum to the Aquatic Biology TSD; Appendix N). Juvenile yellow perch and forage fish were used as the small-bodied fish (typically between 50 and 70 mm with multiple composite samples collected per lake). Samples were collected above the lateral line for the large bodied fish. The small bodied fish were analyzed whole. Samples were placed in whirl pac bags - frozen and shipped to the laboratory on dry ice. Mercury was detected in all fish tissue samples analyzed with a MDL of 0.05 ug/g so there is no concern that concentrations were underestimated due to poor detection limits. The analysis was conducted by the Saskatchewan Research Council Laboratory in both 2012 and 2013. Saskatchewan Research Council Laboratory is a Canadian Association for Laboratory Accreditation certified lab. The mercury analysis was conducted by cold vapour atomic absorption method. If samples are below detection in the future, then alternative low-level mercury analysis can be conducted. Mercury in water was also analyzed via cold vapour atomic absorption to a detection limit of 0.01 µg/L in samples collected during August 2013 and beyond. Mine discharge will be at the outflow of Bagsverd Creek and not the areas to be flooded (therefore no pathway from flooded vegetation to methyl mercury production). The predicted maximum sulphate concentrations downstream will occur in the mixing zone and are less than 7 mg/L and only marginally above background. The receiving environment is expected to be well oxygenated during discharge and as such sulphate will remain in an oxidized state. Baseline fish tissue mercury was collected from all lakes assessed in the aquatic baseline studies. The methods and fish collected are described in Appendix N. As noted above, sulphate concentrations are predicted to be extremely low and the slight increase over background will occur in Bagsverd Creek where water level increases (i.e., flooding) are not planned, therefore, the potential for methyl mercury production is limited. Furthermore, receiving environments will remain oxic preventing the establishment of reducing conditions for sulphate.	None.	n/a
F121	MOECC - Surface Water	114, 683	Draft EA Comment #114 and 683 Insufficient detail was provided for complete review of the total phosphorus modeling and interpretation. There may be uncertainty or inaccuracy for some model input values (e.g. runoff, measured TP, % wetland, settling velocity, assumed phosphorus retention in soil) and it is not clear how closely the modeling and interpretation followed guidance provided in the Lakeshore Capacity Handbook . Provide for MOECC review the Lakeshore Capacity Model spreadsheet and low-level TP monitoring data.	A description of the Lakeshore Capacity Model inputs, assumptions and results is presented in the Addendum to the Water Quality TSD (Appendix J). The Lakeshore Capacity Model spreadsheet and low-level total phosphorus monitoring data will be provided for MOECC review. Upon follow-up review of the Lakeshore Capacity Model for the Mesomikenda Lake system, it was noted that the polishing pond average total phosphorous loading rate used in the previous version to generate results presented in the Addendum to the Water Quality TSD was overly conservative, as the assigned loading rate was not a true average during the ice-free period. The average total phosphorous loading rate during ice-free period of an average year is 403 kg/year (for the calculation, see "Polishing Pond Input Data" tab in the Lakeshore Capacity Model file). Using 403 kg/year as a loading rate input to the model results in predicted average total phosphorous concentrations of 17.8 µg/L and 12.2 µg/L for Neville Lake and Mesomikenda Lake, respectively, which are less than the lake-specific PWQOs. It is also important to remember that the polishing pond loading rates do not consider mass loss due to attenuation of phosphorous within the Project site. As such, the predicted average total phosphorous concentrations presented in the Addendum to Appendix J, and the updated predictions in this response, are conservative.	A copy of the Lakeshore Capacity Model Excel workbooks will be provided directly to the reviewer.	n/a

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F122	MOECC - Surface Water	684	Draft EA Comment #684 The response indicated that information on the design capacities of the ditching and ponds is currently unavailable. Indicate maximum runoff/flood value that will be managed, without discharge to the environment, by the ditching and ponds.	Upon review of Comment #684 (Appendix Z), Comment #F122 and Sections 5.5.1.1 and 5.10.5.1 of the EA, it appears the wording used in Section 5.5.1.1 is causing confusion. Section 5.10.5.1 more clearly describes the seepage collection ponds. The seepage collection ponds around the MRA and low-grade ore stockpile will be designed to collect and hold average annual precipitation to allow for pumping water to the mine water pond year round. The reference in Section 5.5.1.1 of the EA to pumping "under all climatic conditions" is with respect to pumping during typical seasons (spring, summer, fall and winter), and not a reference to various wet (and dry) return periods. As stated in the response to Comment #684 (Appendix Z), the design capacities of ditching and ponds, including the environmental design flood, cannot be confirmed until detailed design of the seepage collection ponds. IAMGOLD can state that the inflow design flood will be selected based on hazard potential and in accordance with Canadian Dam Association Dam Safety Guidelines (2007) and the Ministry of Natural Resources Classification and Inflow Design Flood Criteria (MNR, 2011). Detailed information of the seepage collection ponds for the TMF, Polishing Pond, MRA and Low-Grade Ore Stockpile will be made available to the MOECC and MNRF through the ECA and LRIA work permit applications that are intended to govern construction and operations of the seepage collection ponds. An erratum has been issued to replace the following sentence in Section 5.5.1.1, "The system will be designed to collect the average annual precipitation seepage and runoff, with storage capacity to allow for pumping water to the mine water pond and then to the ore processing plant and/or polishing pond under all climatic conditions.", with the following wording: "The system will be designed to collect the average annual precipitation seepage and runoff, with storage capacity to allow for pumping water to the mine water pond, and then to the ore processing plant and/or polishing pond, year-round."	An erratum has been issued to replace the following sentence in Section 5.5.1.1, "The system will be designed to collect the average annual precipitation seepage and runoff, with storage capacity to allow for pumping water to the mine water pond and then to the ore processing plant and/or polishing pond under all climatic conditions.", with the following wording: "The system will be designed to collect the average annual precipitation seepage and runoff, with storage capacity to allow for pumping water to the mine water pond, and then to the ore processing plant and/or polishing pond, year-round."	Section 5.5.1.1
F123	MOECC - Surface Water	685	Draft EA Comment #685 The response indicates that, except in the dam foundation, organics will be left in place in the TMF. The presence of organics can reduce dissolved oxygen and potentially either increase or decrease metal mobilization. Determine if organics and reduced dissolved oxygen in the TMA alter the EA predictions of TMA runoff and seepage impacts to surface water.	Groundwater in the TMF will move from the tailings and through or around the organics. Potential groundwater interactions with organic-rich zones can promote the formation of localized reducing conditions. If conditions are sufficiently reducing (i.e., sulphate reducing conditions), metals are anticipated to be attenuated via processes such as precipitation of metal sulphides. Metals are also expected to in part adsorb onto the surfaces of organic matter. Therefore, the presence of the organics at the bottom of the TMF would affect the groundwater quality by reducing concentrations and not increasing concentrations. The water quality model did not account for metal attenuation in the residual organics in the TMF and, as such, the predicted concentrations are conservative.	None.	n/a

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F124	MOECC - Surface Water	689	Draft EA Comment #689 Appendix J and N provided water quality prediction and evaluation, but the following concerns and information needs remain. Appendix J used the term mixing zone in manner that may not be consistent with how it is defined by province; a mixing zone boundary is characterized by PWQO's, but the document shows concentrations at mixing zone "outflow" that exceed PWQO's. Not clear what is meant by mixing zone "outflow". Map of mixing zones is conceptual (Figure 2-4 Water Quality TSD). Missing is information about the size and geographic extent (description, map) of mixing zone (i.e. area where PWOQ's exceeded) modeled for each scenario. Effects of season (e.g. thermal stratification) and weather (e.g. wind) on the mixing zones not addressed. Modeling does not include scenarios with mitigation in place. Model results given as dissolved concentrations, but dissolved concentrations are not directly comparable to PWQO's and CWQG's that are expressed as total concentrations. Also, not clear if background benchmark concentrations are total or dissolved. Appendix N evaluates potential toxicity in the mixing zone. Modeled results given as dissolved concentrations, but not total concentrations and as a result are not comparable to PWQO's and CWQG's expressed as total concentrations. The Magnitude Level Definitions (Table 2.1) use median concentrations, rather than some higher percentile, and may underestimate risk. Baseline concentrations used in the evaluation are up to May 2013 and need to be updated with more recent data. Some benchmark and toxicity reference values are not accepted by MOECC (e.g. cyanide, iron, plus others). Potential for toxicity in the mixing zone identified, but mitigation described as effluent treatment and amelioration by receiving water chemistry is deferred until after EA completion. As a consequence, the magnitude and spatial extent of potential aquatic environment effects may differ from EA description. Effluent discharge alternatives evaluation should be revised by addressing MOECC review comments.	The extent of the mixing zone is clearly defined as the lower basin in Neville Lake. This is a conceptual design and is appropriate for an EA, which is a planning document that is used to assess the potential for effects and identify aspects that require further optimization during the permitting and future design stages of the Project. See response to Comment 117 regarding the preliminary hydrodynamic analysis completed to provide more information on the mixing zone characteristics. The model results are generated using a combination of total and dissolved water quality inputs: surface water quality inputs were derived from total concentrations whereas groundwater quality inputs were derived from dissolved (filtered) concentrations. However, the model in effect simulates the concentrations as 'dissolved' because the model assumes that mass is conservatively transported through the surface water environment and mass loss through attenuation mechanisms is not accounted for in the receivers. This approach is conservative for two reasons: 1) the model does not account for any loss of mass (and therefore any associated decreases in concentrations) through mechanisms like adsorption to particle matter, precipitation of solids, and sedimentation processes; therefore, the model likely over estimates the concentrations of most metals; and 2) it is the dissolved fraction that represents the bioavailable portion of metals in the water column (Prothro 1993). Therefore, the use of dissolved concentrations lends itself to a more conservative evaluation of effects. The magnitude of assessment considered both median and maximum (ultimate) predicted concentrations. Should maximum concentrations have been predicted to exceed guidelines at any time during the mine life or under any flow scenario (wet, dry average year) then a level II impact would have been identified as part of the aquatic effects assessment. This is appropriately conservative to ensure that the effects to biota under all water chemistry was considered. A comparison of 2013 to 2014 baseline was provided in the Addendum to the Water Quality TSD (Appendix J) and demonstrated no change in water chemistry had occurred that would materially affect the predicted concentrations. In addition, water quality monitoring continues at the site which will allow for current baseline data in support of permit applications. In the Addendum to Appendix J, Golder re-modelled and used the PWQO/CWQG for cyanide as the benchmark. All concentrations were below the benchmark in the receiving environment. The benchmark for iron and some other substances were based on the baseline concentration as it was higher than the guideline. Baseline or background was calculated as the 95th percentile of background which is the accepted approach for development of background by Canadian Council of Ministers of the Environment (CCME; 2003). Ontario is a signatory to the CCME and since this EA is both a federal and provincial EA, the use of CCME approach should be satisfactory to both jurisdictions. The EA clearly identifies and accounts for some concentrations being elevated within the mixing zone. The individual substances are then discussed to provide clarity on the potential for effects to occur. See excerpt of report below: (Response continued below)	None.	n/a

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Cont'd	MOECC - Surface Water	689	See above	"Under average and dry year flow scenarios, maximum concentrations of some substances (aluminum, arsenic, calcium, cadmium, copper, iron, magnesium, total phosphorus, strontium, uranium, vanadium, zinc) are expected to exceed water quality benchmarks (background or guidelines) within the initial mixing zone in Bagsverd Creek (Table 4.3 and Appendix Tables A.4 and A.5). These conditions are expected to be short in duration (i.e., typically less than 4 days; Appendix Table B.2) and as such it is appropriate to consider short-term guidelines or acute toxicity thresholds (Table 4.7b; Appendix Table B.1). The predicted cadmium and uranium concentrations are below the short-term Canadian Water Quality Guidelines (CWQG) and as such no effects to aquatic life are expected (Table 4.7b). Calcium, magnesium and strontium which do not have water quality guidelines, are predicted to be less than established Toxicity Reference Values (TRV's; Table 4.7b). Aluminum, arsenic and vanadium are predicted to be above water quality guidelines but below TRVs (Table 4.7b). BLM modelling using copper and site specific water quality indicated that the predicted concentrations will be below toxicity thresholds (see BLM report). Iron concentrations will be lower than predicted due to precipitation within the polishing pond which was not incorporated into the modelling (assumed all in dissolved form). Zinc concentrations were likely overstated in baseline and as such the associated predicted values which incorporate baseline concentrations may be elevated as well. The mine has committed that if site specific water quality objectives cannot be developed that will allow for the protection of fish and aquatic life, then additional effluent treatment will be provided" In addition, the implications of predicted phosphorus concentrations were modelled using the Lakeshore Capacity Model (LCM) to predict future total phosphorus concentrations in Neville Lake (total phosphorus loading from the polishing pond; see Addendum for Appendix J). The results of the LCM support the conclusion that average total phosphorous concentrations in the mixing zone (lower basin of Neville Lake) are expected to be less than the lake-specific water quality guideline value for total phosphorous (as calculated using the LCM). Thus the EA is saying that while maximum concentrations may be above the benchmarks for short durations, our understanding of toxicity of these substances and other factors noted above would suggest that these effects will not be realized. Nevertheless, IAMGOLD has committed to install treatment should realized concentrations indicate it is needed to prevent significant adverse effects within the mixing zone. This provides a safeguard for the environment and is a commitment to additional mitigation within the EA not after the EA.	See above	See above
F125	MOECC - Surface Water	690	Draft EA Comment #690 Insufficient detail was provided for complete review of the total phosphorus modeling and interpretation. There may be uncertainty or inaccuracy in some lakeshore capacity model input values (e.g. runoff, measured TP, % wetland, settling velocity, assumed phosphorus retention in soil) and it is not clear how closely the modeling and interpretation followed guidance provided in the Lakeshore Capacity Handbook. Provide for MOECC review the Lakeshore Capacity Model spreadsheet and low-level TP monitoring data.	See response to Comment #F121.	See response to Comment #F121	n/a

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F126	MOECC - Surface Water	692	Draft EA Comment #692 Updated baseline statistical summary provided, but raw data tables were not updated. The narrow bay of Mesomikenda Lake is located between two monitoring stations (Neville Lake outlet and MESO-LS2) that differ in chemistry, so the narrow bay could also differ in chemistry. Update the raw data tables for surface water monitoring. Include the narrow bay of Mesomikenda Lake in the surface water quality monitoring program.	The water quality baseline report presents data up to May 2013, as there was a need to finalize the water quality baseline report prior to the initiation of the effects predictions for the EA. The data presented in the water quality baseline report is considered to be sufficient for the purposes of the EA; rationale for this is provided in the Addendum to the Water Quality TSD (Appendix J) that compares the original dataset with the updated dataset in response to the technical reviewer's comments. An updated version of the raw baseline dataset will be provided during the permitting phase of the Project as supporting documentation for the ECA application. The monitoring program going forward will include one station in the narrow bay of Mesomikenda Lake between the Neville Lake outlet and the Mesomikenda Lake station MESO-LS2. The updated dataset provided as part of permitting will include monitoring data from this station.	None.	n/a
F127	MOECC - EAS	560	Draft EA Comment #560 Section 1.3; p.1-6 Requested wording that permits and approvals cannot be issued until approval under the EAA is granted was not added to revised text. Upon review of EA, could not locate the above sentence in the report. Identify where this statement can be found in the EA report or add wording to the text to make it clear that permits and approvals can only be obtained after EA is approved.	The text in Section 1.3 of the EA was changed as per the previous response, which clearly states that "A preliminary schedule for the development of the Project has the construction phase commencing after completion of the coordinated Federal and Provincial EA process, and IAMGOLD has obtained the necessary approvals."	None.	n/a
F128	MOECC - EAS	561	Draft EA Comment #561 Section 1.3; p. 1-7 Can you please clarify what is meant by additional easements and land requirements are being considered? Are proposed project components (i.e. transmission line, access road) on land currently not owned by IAMGOLD Corporation? Are additional lands required in order to construct project? Provide additional information regarding land requirements for specific project components in the EA report.	One of the purposes of the individual EA is to consider the disposition of Crown land for the Project, including the transmission line. Figure 1-3 shows land tenure in the Project area. IAMGOLD is working with MNDM to secure leases pending the EA outcome. The majority of the Project will occur on land leased from the Crown. A portion of the transmission line routing near Timmins will be accessed through agreements with land owners.	None.	n/a
F129	MOECC - EAS	566	Draft EA Comment #566 Section 4.1; p. 4-1 Unable to locate specific text that states that consultation with potentially affected and interested stakeholders, Aboriginal communities and government agencies is a key requirement of the EAA. Please note that completion of an EA report does not automatically equate to conformance with the approved ToR and requirements of the EAA. MOECC review of the EA report will determine if the EA meets the approved ToR and the EAA. Identify where in the EA report consultation is a key requirement of the EAA and provide specific reference to what section of the Appendix D was revised to present key consultation activities. Clarify what in Appendix D has been revised to present key consultation activities. Appendix D has 11 sub-sections.	On p. 4-1, para. 2, it states "IAMGOLD is required to meet the requirements of both Federal and Provincial EA processes which includes the consultation of local stakeholders, government agencies and potentially affected Aboriginal communities". On p. 4-1, para. 4, it states "Project consultation and engagement activities have been undertaken and described herein under the direction of the Province of Ontario's relevant Codes of Practice, namely Consultation in Ontario's Environmental Assessment Process (January 2014) and Preparing and Reviewing Environmental Assessments in Ontario (January 2014)." This text emphasize that the EA report meets all key requirements (including consultation requirements) of the EAA. Appendix D was reorganized to more clearly present consultation activities based on discussions with the MOECC in August, 2014. Subsequently, Appendix D was organized to first provide a record of all consultation activities, and then was broken down by stakeholder group to show a complete record with the three main stakeholder groups discussed in Chapter 4.	None.	n/a

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F130	MOECC - EAS	573	Draft EA Comment #573 Section 4.3.1.9,;p. 4-17 Please explain why discussion about media engagement activity was removed from the EA report and appendices. Why is this activity not relevant for discussion in the EA report? Explain and revise EA report accordingly.	Based on a discussion with the MOECC in August of 2014, IAMGOLD determined it appropriate to only include correspondence and engagement in the record of consultation that was relevant to consultation specific to the EA Report. Given that this media activity was not considered a consultation activity for the EA process, the description of it was removed from Chapter 4.	None.	n/a
F131	MOECC - EAS	577	Draft EA Comment #577 Section 4.3.2.3; p. 4-21 Question about whether there was an open house in the winter of 2014 was not confirmed. Upon review of Section 4.4.4 it does not appear that there was an open house in Winter 2014? Clarify and provide an explanation as to why there was no open house in the winter of 2014.	There is a typographical error in Table 4-4. The dates in Table 4-4 should read February 27 and 28, 2013. No open houses were held in the winter of 2014. No open houses were requested by the communities at that time, and IAMGOLD determined it would be most appropriate to host community open houses during the public comment period on the EIS / Draft EA Report.	Please see the attached erratum to Table 4-4 which corrects the dates of open houses in Timmins and Sudbury.	Table 4-4, page 4-13
F132	MOECC - EAS	589	Draft EA Comment #589 Section 4.4.4.2; Draft EA p. 4-32 Why was this section removed from the EA report? Please explain.	Based on a discussion with the MOECC in August of 2014, and to provide a more fulsome list of concerns by stakeholder group, IAMGOLD replaced section 4.4.4.2, p. 4-32, of the EIS / Draft EA Report with the following tables in the Amended EIS / Final EA Report: Table 4-7; Table 4-9; Table 4-11; Table 4-13; Table 4-15; and Table 4-17.	None.	n/a
F133	MOECC - EAS	601	Draft EA Comment #601 Section 7.3.9; p. 7-24 The final EA report states that . . . watercourse realignment alternatives . . . are under investigation. Assessment of alternatives and confirmation of preferred option for proposed project components are to be finalized in the EA in order to assess and understand potential impacts and how to mitigate. Revise text to confirm that assessment of watercourse alternatives is complete.	The design may be optimized as engineering progresses. This optimization will not include any additional watercourse realignments, or material changes to locations of those proposed.	None	n/a
F134	MOECC - EAS	620	Draft EA Comment #620 The EA report still refers to the Minister of the Environment when it should be Minister of the Environment and Climate Change Ensure that all references to the Minister/Ministry of the Environment are changed to Minister/Ministry of the Environment and Climate Change.	References to the provincial 'Minister of the Environment' following mid 2014 should read "Minister of the Environment and Climate Change", while references to the "Minister of the Environment" prior to mid-2014 should remain unchanged. Errata been issued to correct references to the prior Minister title. Errata have been issued to correct references from the "Ministry of Environment" to "Ministry of the Environment and Climate Change".	IAMGOLD has issued errata which correct references from "Minister of the Environment" to "Minister of the Environment and Climate Change". IAMGOLD has issued errata which correct references from "Ministry of Environment" to "Ministry of the Environment and Climate Change".	Section 1.6, page 1-7 Section 1.7, page 1-10 Section 7.2.1.2, page 7-3 Section 4.4.6, page 4-16 Section 5.14.1., page 5-37 Section 10.2, page 10-40

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F135	MOECC - EAS	621	Draft EA Comment #621 The EA report still refers to the Ministry of Natural Resources when it should be the Ministry of Natural Resources and Forestry. Ensure that the EA report makes reference to the new ministry name throughout.	References to the "Ministry of Natural Resources" following mid 2014 should read "Ministry of Natural Resources and Forestry". Errata have been issued to correct references to the previous ministry name.	IAMGOLD has issued errata which correct references from "Ministry of Natural Resources" to "Ministry of Natural Resources and Forestry".	Section 6.5.1.3, page 6-122 Section 9.9.3, page 9-59 Section 10.2, page 10-22
F136	MOECC - EAS	—	Please not that all comments submitted on the draft EA report should be appended to Appendix Z, including comments made on ToR conformance.	The ToR concordance table provided by the MOECC was included in the Amended EIS / Final EA Report as Appendix C2.	None	n/a
F137	MOECC - EAS	—	ToR Section: 5.3.6; EA Section: 7.3.4.5 Commitment: Caro's acid and hydrogen peroxide treatment as well as the Combinox process will be further investigated and will be included in the assessment of alternatives. Comment: The EA report has been revised to state that these treatment methods were not assessed in the EA as these technologies failed to achieve treatment targets during preliminary testing and are therefore not currently considered appropriate for the Project. The ToR committed to assessing this alternative in the EA. Please provide details as to why this option was not feasible for further investigation. Provide additional details as to why this option was not feasible for further investigation in the EA.	As per Table 5-7 of the Approved ToR, SO_2 / Air and Hydrogen Peroxide treatment techniques were to be assessed in the EA. Both of these treatment technologies were assessed in Appendix U2.	None	n/a
F138	MOECC - EAS	—	ToR Section: 5.3.11; EA Section: 7.3.10.1 Commitment: Alternatives of operations phase accommodations includes off-site and/or on-site residences will be assessed in the EA. Comment: Where is the alternatives assessment for accommodations? Clarify whether an alternatives assessment for accommodations was assessed during the EA. Details of the alternative assessment should be documented in the EA report.	Throughout the early consultation phases of the Project, it became evident that an on-site accommodations complex was required to minimize effects on housing in the region. Off-site residence was therefore not considered in further detail in the alternatives assessment due to the associated anticipated negative effects on the local communities.	None	n/a
F139	MOECC - EAS	—	ToR Section: 5.3.13.2; EA Section: 7.3.13 Commitment: Hazardous solid, liquid waste and remediation hydrocarbon contaminated soils will be assessed during future engineering investigations and both of these alternatives will be assessed in the EA. Comment: The EA states that no one-site alternatives are considered acceptable for a number of reasons. What are those reasons? Details of why this alternative is not feasible should be described in the EA report. It is recommended that the EA report provide details as to why one-site alternatives were not assessed further.	As per Section 5.3.13.2 and Table 5-7 of the Approved ToR, no on-site alternatives are considered acceptable to IAMGOLD, and therefore have not been assessed in the Amended EIS / Final EA Report.	None	n/a

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F140	MOECC - EAS	—	Section 1.2; p. 1-3 The EA report states that non-hazardous domestic solid waste will likely be deposited in the existing nearby MNRF landfill. The EA report should confirm where non-hazardous waste will be deposited, in order to identify and understand what the project impacts will be and how these impacts will be mitigated. Confirmation where non-hazardous waste will be deposited is necessary to satisfy the EA. The alternatives assessment for waste disposal should be included as part of the EA.	IAMGOLD, through agreement with the MNRF, intends to use the Neville Township Landfill, which is owned by the MNRF, and is assessed in Section 7.3.12.3 and U7.	None.	n/a
F141	MOECC - EAS	—	Section 4.4.4 Table 4-4; p.4-13 The table states that there where open houses in February 27 and 28, of 2014. Confirm if these dates should be 2013? Please revise text accordingly.	This is a typographical error. The dates in Table 4-4 should read February 27 and 28, 2013. No open houses were held in the winter of 2014.	Please see the attached erratum to Table 4-4 which corrects the dates of open houses in Timmins and Sudbury.	Table 4-4, page 4-13
F142	MOECC - EAS	—	Section 4.5.3; p. 4-30 The EA report states that further discussion on the IBA will commence once the MNO provides IAMGOLD with their TK/TLU study. Is this study now complete? What are the findings? How do the findings impact the project and Aboriginal communities?	IAMGOLD received a copy of the Métis Nation of Ontario's (MNO) Draft Traditional Knowledge / Traditional Land Use (TK / TLU) study in March, 2015, following the submission of the Amended EIS / Final EA. It is still unclear to IAMGOLD whether the MNO will issue a Final version of the TK / TLU report for IAMGOLD's consideration. The findings of the report are aligned with the anticipated effects to the Métis community that IAMGOLD assessed in the EA report. The findings of the Draft TK / TLU report provided to IAMGOLD indicate that no changes to the Project or the effects assessment on potential impacts to Aboriginal communities is required.	None.	n/a
F143	MOECC - EAS	—	Section 4.5.2.8 Table 4-9; p. 4-35 The MNO raised concern about gaps pertaining to Métis traditional lands uses and prediction of effects. The proponent responded by saying that it is of the opinion that impacts on Aboriginal people have been adequately assessed within the EA. The proponent's response does not answer the comment made by MNO. How does the EA report respond to the concern that there is a gap pertaining to Metis traditional land uses and prediction of effects? Respond to the comment and make appropriate revisions to the EA report.	IAMGOLD is still of the opinion that the Amended EIS / Final EA has fully considered impacts on Aboriginal people (First Nations and Métis) within the effects assessment. IAMGOLD received a copy of the MNO's Draft TK / TLU study in March of 2015, following submission of the Amended EIS / Final EA. Upon review of this report, IAMGOLD is of the opinion that the information presented does not change the effects assessment or conclusion presented in the EA Report.	None.	n/a
F144	MOECC - EAS	—	Section: 4.5.2.9; p.4-40 The EA report states that IAMGOLD is of the opinion that for the purposes of the Amended EIS/Final EA, there are no outstanding issues or concerns. It is premature to make such a statement in advance of the comment periods for the EA report and Ministry Review, where potential concerns with the proposed undertaken may arise. Secondly, this assumes that IAMGOLD has adequately addressed all concerns raised during the draft EA comment period to the satisfaction of the government reviewers, Aboriginal communities and the public. Retract sentence/s in the EA report given that there are still outstanding concerns raised by government reviewers. Further, there are still opportunities for concerns to be raised on the EA report during the comment periods.	At the time of submitting the Amended EIS / Final EA, IAMGOLD was of the opinion that all concerns raised during the Draft EA Report comment period had been adequately addressed.	None.	n/a
F145	MOECC - EAS	—	Section: 4.6.2.1 Table 4-12; p.4-47 The EA report states that Table 4-12 provides an overview of meetings that occurred during preparation of the EA. The table only lists one meeting Clarify and confirm if this is correct or if table needs to be updated to reflect additional meetings. Revise EA report accordingly.	The information presented in Table 4-12 is correct. Between January 14, 2014 and September 30, 2014 only one meeting with local community stakeholders was held.	None.	n/a

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F146	MOECC - EAS	—	Section: 4.6.2.3; p.4-47 to 4-49 This table summarizes concerns raised by the public and other stakeholders but does not specify who raised the concern (i.e. local resident, outfitter). Clarify who raised the concern and revise the EA report accordingly.	IAMGOLD is unable to distinguish individual stakeholder comments and concerns as these were most often collected at public open houses. During these public open houses, unless self-identified, IAMGOLD did not ask individuals to classify themselves, and their relation to the Project based on their local land uses.	None.	n/a
F147	MOECC - EAS	—	Section: 5.8.1; p. 5-18 The EA report states that the project site is assessed from Highway 144 to the east via the Mesomikenda Lake access road, where the current IAMGOLD accommodation facilities and exploration office are located. Will the current accommodation facilities house the estimated 500 people that are expected to live on the premises during operation? Provide more details regarding accommodation for workers during construction and operation of the mine. Revise text accordingly.	The current exploration camp is not foreseen to be used for housing workers during the construction and operations phases of the Project. As described in Section 5.11.1, the accommodations complex will house workers for both the construction and operations phases.	None.	n/a
F148	MOECC - EAS	—	Section: 5.11.2; p. 5-30 The EA report states that at this stage, it is planned that Project waste will be disposed of by using the existing MNRF Neville Township Landfill. The EA states further that MNRF is conducting a capacity study to see if it meets project requirements and if based on this study, that the landfill will not be suitable for the project then an onsite landfill will be developed. Landfill alternatives and preferred option should be assessed and confirmed at the EA stage and documented in the EA report. Adding a proposed landfill to the project site is a change to the project description and change to the project site. Purpose of carrying out an individual EA is to avoid undertaking multiple Class EA projects. Proposed Project alternatives are to be finalized prior to submission of the final EA document. It is difficult to adequately assess proposed Project impacts and appropriate mitigation if alternatives are not finalized. Include a complete assessment of non-hazardous waste options for the project, confirmation of where waste will be deposited, potential impacts and mitigation proposed.	The rationale for not closely considering on-site alternatives is provided in Appendix U7 of the EA.	None.	n/a
F149	MOECC - EAS	—	Section: 7.2.2, Appendix U17; p. 7-11 This section describes three “alternatives to” the undertaking, including: proceed with the project as identified by IAMGOLD; delay the project until circumstances are more favourable, or cancel the project (i.e. do nothing). The table in Appendix U17 concludes that significance for the ‘do nothing’ alternative is “not applicable” for all criteria. However, these could be ranked as Level 1 (defined in section 7.2.2 as not at all (no potential environmental effects), which would allow a better comparison between the significance of doing nothing and implementing the project. The ToR section 5.2.1 states that “the assessment of alternatives will be carried out at a level sufficient to distinguish the relative merits of the different alternatives methods.” Further, the EA Code of Practice, section 4.2.2, indicates the do nothing alternative is a benchmark against the other alternatives. To achieve the ToR commitment and fulfill the Code of Practice guidance, the methodology for evaluating ‘alternatives to’ should be applicable for all the alternatives. Provide a revised table of the evaluation of ‘alternatives to’ found in Appendix U17 to ensure a complete evaluation of the alternatives are documented in the EA report including the “do nothing” alternative. Revise EA report accordingly to reflect changes to the appendix.	As recommended by the MOECC, Appendix U17 follows methodology used in the Rainy River Project EA for assessing alternative to the Project. Appendix U17 is required to follow a slightly different methodology than the other alternatives to reflect the needs of that assessment.	None.	n/a

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F150	MTO	—	Section 13.2.18.2 Design and Operations Safeguards (Page 13-24) Does the scope of the EA include impacts to the transportation route to the project site? This section would imply that it does. See comments two and three below. On page 13-25, bullet five, the meaning is not clear. Does heavy traffic refer to large vehicles, (i.e. oversize trucks)? Suggest describing the difference between a site haul road and a site access road. On page 13-25 bullets six and eight are not "Project site" impacts, buth rather address travel to the Project site.	The EA includes effects of transportation. Site haul roads are on-site roads that are mainly used for the purposes of hauling rock, e.g., mostly from the open pit to the MRA. 'Site Access Road' is the main access road as shown in Figure 1-2 of the Amended EIS / Final EA Report	None	n/a
F151	MTO	—	The document does not provide information about anticipated traffic volumes, frequency and the types of vehicles that will be using Highway 144. It also does not identify a location(s) for constructing access roads from existing roads/highways to the project site. At present MTO cannot determine the likelihood or nature of an impact - either to the safety of the travelling public or to the highway pavement and right of way. We are particularily interested in impacts during the construction phase when traffic volumes are likely to be higher. Without this information we do not think that the statement can be made that the Transportation Effect is "fully reversible" and "not significant" during construction particularily, but also during the operation and closure phases. MTO suggests that this information be included in the project scope.	Anticipated traffic volumes are provided in the Socio-Economic TSD (Appendix T) and are summarized in Section 9.15 of the EA report.	None.	n/a
F152	MTO	—	Cote Gold will have to obtain a permit from MTO to construct an access road from Highway 144 to the mine site. As part of that process MTO will require a Traffic Impact Study. In addition, if roadway improvements are required that impact the environment Cote Gold will requre *Ontario Environmental Assessment Act* approval of the proposed improvement, in accordance with MTO's "Class Environmental Assessment for Provincial Transportation Facilities". It would make sense to complete only one provincial EA process. This supports our suggestion that the Transportation indicator include information about access road location, traffic volumes, frequency and types.	The access road, as shown in Figure 1-2 already exists, as described in Section 5.8.1. It is not anticipated that the Project would require roadway improvements.	None.	n/a
F153	MOECC - Hydrology	—	The hydrological model used for impact prediction was not calibrated to a satisfactory level. Should further recalibration not improve the hydrological model, an alternative model is suggested in the attached table.	Please refer to response to Comment #F183.	None.	n/a
F154	MOECC - Hydrology	—	The wet and dry climatic conditions as defined in the study appeared to be incorrect. An alternative suggestion has been provided in this respect. For details please see the tables attached.	Please refer to response to Comment #F172.	None.	n/a

#	Agency / Organization	App Z Ref.	Comment	Response	Additional Information / Corrections to Amended EIS / Final EA Report	Change Location
F155	MOECC - Hydrology	—	There is uncertainty in the groundwater modelling due to using what appears to be an unusually low recharge value of 50 mm/yr when regional values vary between 200 mm/yr to 500 mm/yr, and also not providing any calibration results of the model. Due to using a very low recharge rate, predicted groundwater contribution to surface water (baseflow) is significantly underestimated. It is strongly recommended that the groundwater modelling be revisited to confirm that predictions of impacts to surface water are accurate.	The values of 200 mm/yr to 500 mm/yr apply to annual surplus, or the amount of water available for groundwater recharge and stream runoff, not solely groundwater recharge. The proportion of surplus entering the saturated groundwater system as recharge is expected to be low relative to stream runoff for the following reasons: 1) the poorly drained (shallow water table) condition of the valley areas; 2) the low permeability of shallow materials, comprised of finer grained soils (peats, silts and clays) or exposed bedrock. The Project site is largely dominated by bedrock at surface or near surface. An extensive test pit program was conducted and showed that the local topographic highs were covered in a thin soil cover directly overlying crystalline bedrock. The overburden is restricted to generally narrow discontinuous valleys or troughs between bedrock highs, which can be observed in the cross-sections around the Open Pit shown in Figures 3.1 through 3.4 of the Hydrogeology TSD (Appendix H). These troughs were observed to be up to a maximum depth of 22 m and generally consists of organics (often peat) overlying fine grained morainal deposits (geomean K of 4.3E-06 m/s) and occasionally granular till and glaciofluvial deposits at depth (geomean K of 2E-05 m/s) beneath the fine grained morainal deposits. The underlying crystalline bedrock had a moderate permeability that decreases with depth. A total of 56 hydraulic conductivity tests were completed in the upper, weathered 10 m of bedrock and a geomean value of 1E-07 m/s was obtained. The hydraulic conductivity reduces quickly with depth, with a geomean of 4.5E-08 m/s for the 22 tests completed at depth intervals between 10 and 50 m below ground surface. Below a depth of 200 m, hydraulic conductivity values decreased to about 2E-10 m/s. A MOE publication (Singer and Cheng 2002) includes a discussion of recharge rates in northern Ontario and notes the long term mean annual groundwater recharge rate for the area is "estimated to range from 33.6 – 47.0 mm/yr" (page 5). Further, this report assesses recharge by soil type and indicates rates of 25 mm/yr or less for silt till, clay, peat and Precambrian rock with slightly higher rates of 50-75 mm/yr for sand to silty sand till (page 89). For the Moose River basin, in which the Côté Gold Project is located, the long term annual recharge was estimated as 45.5 – 57.9 mm/yr based on the percentage of various soil types present in the watershed (page 91). It should be noted that this estimate reflects the presence of a relative abundance of sand and gravel materials in this watershed; materials that are not present at the Côté Gold Project. Therefore, IAMGOLD is of opinion that the recharge rate considered in the groundwater flow model of 50 mm/yr is appropriate for the intended purpose and the predicted groundwater contribution to stream flow (baseflow) has not been significantly underestimated.	None.	n/a
F156	MOECC - Hydrology	—	A flow value of 7Q20 was considered for the receiving water to evaluate effects of the proposed effluent discharge on the environment. Unfortunately, this value is not acceptable to the ministry. Further discussions with ministry staff are required to confirm what the flow value should be for this project.	Please refer to response to Comment #F180.	None.	n/a
F157	MOECC - Hydrology	—	No protocols for winter time streamflow monitoring has been found in the report. Open water rating curves will not be applicable during winter period when there is ice on the rivers. For long term monitoring, a separate methodology must be developed for winter time (ice-period).	Please refer to response to Comment #F163	None.	n/a
F158	MOECC - Hydrology	—	Hydrology Comment 1; Appendix I The response is noted. No action is required.	The comment has been noted. No response is requested.	None.	n/a

#	Agency / Organization	App Z Ref.	Comment	Response	Additional Information / Corrections to Amended EIS / Final EA Report	Change Location
F159	MOECC - Hydrology	—	Hydrology Comment 2; Appendix I A pre-project hydrometric station shall be established now at a suitable location to gather water level and flow information for Unnamed Lake #1. This lake will receive diverted flow from Bagsverd lake, which is additional 40 square kilometres drainage area. This additional drainage area is multiple times bigger than the current drainage area of Unnamed Lake #1, which has potential to change the lake's hydrology. In the absence of pre-project water levels and flows, the impact on Unnamed Lake #1 could not be evaluated post-project. A hydrometric station shall be established now at a suitable location to gather water level and flow information for Unnamed Lake #1.	A hydrometric station was established at Unnamed Lake #2 outlet for the purposes described in the comment (designated as hydrometric station L2). We recognize that in the Figure 3, Figure 5 and Figure 8 of the Hydrological Modelling Report that Unnamed Lake #1 and Unnamed Lake #2 were inadvertently reversed. Errata have been prepared and the corrected figures are attached as Figures 3, Figure 5 and Figure 8.	See Errata to Comment #F159 which contains updated Figures 3, 5, and 8 from Appendix I, Attachment II.	Hydrology TSD (Appendix I), Attachment II (Hydrological Modelling Report), Figures 3, 5 and 8.
F160	MOECC - Hydrology	—	Hydrology Comment 3; Appendix I The response is satisfactory. This has been further verified during my field visit in the fall, in 2014. No action is required	The comment has been noted. No response is requested.	None.	n/a
F161	MOECC - Hydrology	—	Hydrology Comment 4; Appendix I Thanks for additional information. Please ensure quality data is being collected for Neville Lake as this information will be required for effluent dilution and dispersion study. Please include the station information in the main report on hydrology (Appendix I) to complete the documentation.	A preliminary information sheet for Neville Lake is attached as Sheet to Comment #F161. Data collection is ongoing to support future permitting efforts.	See Sheet to Comment #F161 which contains preliminary hydrology information on Neville Lake.	n/a
F162	MOECC - Hydrology	—	Hydrology Comment 5; Appendix I The response is noted No action is required	The comment has been noted. No response is requested.	None.	n/a
F163	MOECC - Hydrology	—	Hydrology Comment 6; Appendix I Though it has been planned for 'no winter effluent discharge', accurate winter time hydrometric information (pre and post project) shall be required to evaluate mine dewatering effects on the nearby surface water features. Winter time streamflow monitoring protocol has been developed for other mines in northern region to evaluate project's effects on surface waters in winter time. Open water rating curves will be not be applicable during winter period when there is ice on the rivers. For long term monitoring, a separate methodology must be developed for flow monitoring during winter time (ice-period). The separate methodology must be developed using the Water Survey of Canada Standards.	When ice conditions are safe to complete, field measurements under ice will be collected using the methodology described in Terzi, R.A. (1981) Hydrometric Field Manual - Measurement of Streamflow, Inland Waters Directorate, Water Resources Branch, Ottawa, Canada.	None.	n/a
F164	MOECC - Hydrology	—	Hydrology Comment 7; Appendix I The response is noted. Thanks for the commitment for ongoing hydrometric monitoring through different phases of the project. No action is required	The comment has been noted. No response is requested.	None.	n/a
F165	MOECC - Hydrology	—	Hydrology Comment 8; Appendix I The response is noted. It was previously suggested to IAMGOLD use an appropriate software for the management of hydrometric stations and their data, so that the data quality maintains an acceptable standard. IAMGOLD has been advised to use an appropriate software for the management of hydrometric stations and their data.	Comment noted. No response is requested.	None.	n/a

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F166	MOECC - Hydrology	—	Hydrology Comment 9; Appendix I The response is noted. Hydrometric map shall be updated by incorporating a table containing (i) stations' names, (ii) IDs, (iii) co-ordinates, and (iv) drainage areas.	Errata have been issued for Figure 9 and 10 of the Hydrology TSD (Appendix I), Attachment I.	See Errata to Comment #F166 which contains corrected Figures 9 and 10, from Appendix I, Attachment II.	Hydrology TSD (Appendix I), Attachment I (Hydrological Baseline Report), Figures 9 and 10.
F167	MOECC - Hydrology	—	Hydrology Comment 10; Appendix I The response is noted. In addition to bathymetric map, the requested information (mean and maximum depths of the lakes) can be produced in a tabular along with the surface areas of the lakes. Update the relevant table in the hydrology report containing lakes' names, surface area, mean, and maximum depths.	For reference, the requested Table is attached as Table to Comment #F167.	See Table to Comment #F167.	n/a
F168	MOECC - Hydrology	—	Hydrology Comment 11; Appendix I The response is noted. No action is required.	The comment has been noted. No response is requested.	None.	n/a
F169	MOECC - Hydrology	—	Hydrology Comment 12; Appendix I The response is noted. No action is required.	The comment has been noted. No response is requested.	None.	n/a
F170	MOECC - Hydrology	—	Hydrology Comment 13; Appendix I The response is noted. No action is required.	The comment has been noted. No response is requested.	None.	n/a
F171	MOECC - Hydrology	—	Hydrology Comment 14; Appendix I The response is noted. No action is required.	The comment has been noted. No response is requested.	None.	n/a

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F172	MOECC - Hydrology	—	Hydrology Comment 15; Appendix I The way 1:25 year wet and dry periods' total annul precipitation were estimated, appears to be incorrect. The frequency equation referred to in the response is normally used to estimate total annual precipitation of various return periods using frequency factors of the chosen distribution. There is no plus/minus option in the equation to estimate wet and dry periods' precipitation. It is therefore recommended to compare the calculated wet and dry years' values with the maximum and minimum total annual precipitation for the period of records (43 years in this case). If the values differ by more than 15%, please undertake reanalysis considering dry year is the year with the lowest annual precipitation and the wet year is the year corresponding to the highest annual precipitation for the period of records (1970-2012). It was further noted that due to consideration of 25 years' return period, the associated risk appeared to be 45% when the design life of the mine was considered to be 15 years. This risk appeared to be too high to accept an environmental impact assessment. An appropriate return period shall be selected by reducing the risk less than 15% and considering the duration of the project longer than 15 years (encompassing operational and closing phases of the mine), especially for the protection of the environment. It is strongly recommended that the proponent re-analyze the wet and dry climatic conditions to confirm if the wet and dry years' precipitations vary by more than 15% of the calculated 1:25 year wet and dry periods' precipitations. It is strongly recommended the proponent re-analyze considering higher return period to reduce the risk below 15%.	The comment with respect to the dry year analysis is acknowledged and has been further discussed with the reviewer. The attached memorandum further addresses this comment. With respect to the comment regarding the risk and return period; the 1:25-year recurrence interval was intended to provide wet and dry conditions representative of those that would require careful management during the operations phase (when freshwater removals would potentially be required) and that would likely occur during the closure phase when water quality monitoring and water management activities are continuing (such as pumping to the open pit). Under dry conditions, effluent is not expected to be released from the water management system. The potential consequence of the dry climate conditions occurring is greater during the closure phases, when closure measures are to be implemented (such as MRA cover and pumping of the MRA ponds to the open pit rather than to the polishing pond). We note that raising the recurrence interval to a level where 15% risk is achieved would result in simulating years where no observed analogue was available (e.g. for a design life of 15 years, risk level of 15%, a design recurrence of approximately 100 years would be required). For flood conditions, the on-site infrastructure will be subject to accommodate design conditions that are more severe than those simulated for the hydrological assessment. These design conditions will be commensurate with the risk level and design life of the features and will follow the provincial and federal guidance and guidelines as applicable (such as the *Lakes and Rivers Improvement Act* and/or the Canadian Dam Safety Guidelines).	See Memo to Comment #F172, which provides additional details on return periods.	n/a
F173	MOECC - Hydrology	—	Hydrology Comment 16; Appendix I The response is noted. Thanks. No action is required.	The comment has been noted. No response is requested.	None.	n/a
F174	MOECC - Hydrology	—	Hydrology Comment 17; Appendix I The response is noted. Thanks. No action is required.	The comment has been noted. No response is requested.	None.	n/a
F175	MOECC - Hydrology	—	Hydrology Comment 18; Appendix I The response is noted. Basin lag time is important for proper hydrologic modelling, and might have to be included if the calibration results are not satisfactory.	Comment acknowledged, see response to Comment #F183.	None.	n/a
F176	MOECC - Hydrology	—	Hydrology Comment 19; Appendix I The response is noted. Where a hydrologic conveyance system has lots of inter connectivity, routing plays a significant role for temporal and spatial traverses of sub-catchment hydrographs. This function might have to be included in the hydrologic modeling if the calibration results are not satisfactory.	Comment acknowledged, see response to Comment #F183.	None.	n/a
F177	MOECC - Hydrology	—	Hydrology Comment 20; Appendix I The response is noted. It is one of the parameters to be tuned for proper calibration of the model. For better calibration of the hydrologic model this parameter might have to be tuned.	Comment acknowledged, see response to Comment #F183.	None.	n/a

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<tr><th>#</th><th>Agency / Organization</th><th>App Z Ref.</th><th>Comment</th><th>Response</th><th>Additional Information / Corrections to Amended EIS / Final EA Report</th><th>Change Location</th></tr>
<tr><td>F178</td><td>MOECC - Hydrology</td><td>—</td><td>Hydrology Comment 21; Appendix I

The response is noted.

For better calibration, these parameters might have to be tuned further within acceptable range.</td><td>Comment acknowledged, see response to Comment #F183.</td><td>None.</td><td>n/a</td></tr>
<tr><td>F179</td><td>MOECC - Hydrology</td><td>—</td><td>Hydrology Comment 22; Appendix I

The response is noted.

No action is required.</td><td>The comment has been noted. No response is requested.</td><td>None.</td><td>n/a</td></tr>
<tr><td>F180</td><td>MOECC - Hydrology</td><td>—</td><td>Hydrology Comment 23; Appendix I

The regulation as stated for the station 04MD004 (Porcupine River at Hoyle) is minor, which would not influence long term characteristics of natural flow matrices.

There are a number of procedures available to extend the hydrologic time series.

In order to evaluate effects of the effluent discharge on the receiving environment, appropriate 7Q20 values acceptable to the ministry shall be used.</td><td>It is noted that taking in to consideration each of the stations provided in our previous response to Hydrology Comment 23, and other stations with sufficient data records and presented in Table to Comment #F180, that the median 7Q20 unit flow was 1.05 L/s/km^2, similar to the regional 7Q20 isoline for the Gogama/Timmins area of approximately 1.0 L/s/km^2 (CCL 1995). A regional 7Q20 isoline of 0.5 L/s/km^2 (which is similar to the site estimated value for the Porcupine River at Hoyle station of 0.65 L/s/km^2) is further to the north (CCL 1995).

The 7Q20 values were presented within the hydrological supporting documents but were not utilized in the predictions of change or in follow up information requests. Further review of 7Q20 values relevant to the Project site will be of more value for studies specific to design and/or permitting. At the time of permitting, it is expected that the Tatachikapika River station (04LA003) and at the Mollie River station (04LA006) will have improved available data records to better extrapolate low flow statistics. IAMGOLD will correspond with MOECC at this time for input related to data acceptability.</td><td>Please see Table to Comment #F180.</td><td>n/a</td></tr>
<tr><td>F181</td><td>MOECC - Hydrology</td><td>—</td><td>Hydrology Comment 24; Appendix I

The groundwater modelling using MODFLOW has been referred to by the consultant in connection with the response to this question. The referred modelling report has been reviewed by the ministry. As a result of this review, there is some uncertainty in the modelling in terms of model input such as the recharge value. For example, the recharge value in the region varies from 200 mm/yr to 500 mm/yr, whereas in the model that value was considered only 50 mm/yr.

When a recharge value greater than 50 mm/yr was used, excessive groundwater mounding was noted (25 m+ when recharge value of greater than 75 mm/yr).

This indicates that there is something incorrect in the model, that warrants further investigation. Recharge is the main input for a groundwater mode like precipitation for a rainfall-runoff model.

As a result of using very low recharge rate, groundwater contribution (baseflow) to the surrounding surface water features was significantly underestimated.

Due to the uncertainty in the groundwater modelling (use of unusually low recharge value), the predicted impact on the surrounding surface water features are uncertain as well.

Predictive groundwater model must be updated with reasonable inputs and an acceptable calibration simulation. No calibration information was found in the report on groundwater modelling. Does the model have the capacity of reproducing groundwater elevations observed in the groundwater monitoring wells installed at the site? Without a proper calibration of the model it is difficult to answer the above question, and confidence in the model results are low.</td><td>Please see responses to Comments #F155 and #F70.</td><td>None.</td><td>n/a</td></tr>
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#	Agency / Organization	App Z Ref.	Comment	Response	Additional Information / Corrections to Amended EIS / Final EA Report	Change Location
F182	MOECC - Hydrology	—	Hydrology Comment 25; Appendix I The response is noted. Thea accuracy of the seasonal prediction yet to be validated by an acceptable calibration of the hydrologic model	Comment noted, see response to Comment #F183.	None.	n/a
F183	MOECC - Hydrology	—	Hydrology Comment 26; Appendix I The response is noted. Cumulative discharge comparison alone does not provide adequate information on model performance. More work would be required to justify model's performance on predicting hydrology. Please upgrade the model incorporating the hydrological processes missing in the current model. Evaluate model performance by comparing at least the followings: (1) observed vs predicted hydrographs; (2) Coefficient of determination; and (3) Nash-Sutcliffe efficiency criteria. After further improvement and recalibration if the model does not perform well, switch to a standard hydrologic model commonly used and appropriate for this case such as HEC-HMS or HEC-GeoHMS.	Please refer to the attached memorandum which further discusses the hydrological model performance.	See Memo to Comment #F183, which provides additional details on the hydrological assessment of the Project.	n/a
F184	MOECC - Hydrology	—	Hydrology Comment 27; Appendix I The response is noted No action is required.	The comment has been noted. No response is requested.	None.	n/a
F185	MOECC - Hydrology	—	Hydrology Comment 28; Appendix I The response is noted. Thanks for the commitment. No action is required.	The comment has been noted. No response is requested.	None.	n/a

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F186	MNRF - Timmins	350	Comment #350; Appendix N, Section 4 and 6; Section 6.4.8 We are concerned that negative effects to the aquatic habitat where these two streams discharge into Mesomikenda Lake are not adequately accounted. The EA report states that the initial effluent mixing zone within the Neville-Mesomikenda Lake watershed are expected to have higher levels of several substances (aluminum, arsenic, calcium, cadmium, copper, iron, magnesium, total phosphorus, strontium, uranium, vanadium and zinc) which will exceed water quality benchmarks. These substances will flow into Mesomikenda Lake shortly thereafter. What are the anticipated effects to the Northern Pike spawning beds that will be receive mining effluent? Our concerns about the aquatic organisms in the stream are also not yet addressed. An analysis or accounting for the potential deleterious effects of the mining effluent on the pike spawning habitat should be provided, as well as accounting for other aquatic organisms in these inlet areas of Mesomikenda Lake.	The only tributary of Mesomikenda Lake that is downstream of mine discharge is the outlet of Neville Lake where concentrations are predicted to be less than benchmarks (guidelines or background). No substances are predicted to exceed background or water quality guidelines in Mesomikenda Lake see Tables 4.3 to 4.5 in the Aquatic Biology TSD (Appendix N). Under average and dry year flow scenarios, maximum concentrations of some substances (aluminum, arsenic, calcium, cadmium, copper, iron, magnesium, total phosphorus, strontium, uranium, vanadium, zinc) are expected to exceed water quality benchmarks (background or guidelines) within the initial mixing zone in Bagsverd Creek (Table 4.3 and Appendix Tables A.4 and A.5). These conditions are expected to be short in duration (i.e., typically less than 4 days; Appendix Table B.2) and as such it is appropriate to consider short-term guidelines or acute toxicity thresholds (Table 4.7b; Appendix Table B.1). The predicted cadmium and uranium concentrations are below the short-term Canadian Water Quality Guidelines (CWQG) and as such no effects to aquatic life are expected (Table 4.7b). Calcium, magnesium and strontium which do not have water quality guidelines, are predicted to be less than established TRV's (Table 4.7b). Aluminum, arsenic and vanadium are predicted to be above water quality guidelines but below TRVs (Table 4.7b). Biotic ligand modelling using copper and site specific water quality indicated that the predicted concentrations will be below toxicity thresholds (see Biotic Ligand Modelling report). Iron concentrations will be lower than predicted due to precipitation within the polishing pond which was not incorporated into the modelling (assumed all in dissolved form). Zinc concentrations were likely overstated in baseline and as such the associated predicted values which incorporate baseline concentrations may be elevated as well. IAMGOLD has committed that if site specific water quality objectives cannot be developed that will allow for the protection of fish and aquatic life and meet regulatory requirements, then additional effluent treatment will be provided. In addition, the implications of predicted phosphorus concentrations were modelled by the water quality team using the Lakeshore Capacity Model to predict future total phosphorus concentrations in Neville Lake (total phosphorus loading from the polishing pond; see Addendum to the Water Quality TSD; Appendix J). The results of the Lakeshore Capacity Model support the conclusion that average total phosphorous concentrations in the mixing zone (lower basin of Neville Lake) are expected to be less than the lake-specific water quality guideline value for total phosphorous (as calculated using the Lakeshore Capacity Model). The mixing zone in Neville Lake will incorporate the lower end of Neville Lake which provides spawning habitat for Northern Pike. Median concentrations will achieve benchmarks (background or guidelines) under all stages of mine development and all flow conditions. Only maximum concentrations which will be short in duration will exceed background or guidelines but these, as noted above, will be below short-term guidelines for the protection of aquatic life. Thus impact to pike spawning and egg incubation is not expected.	See attached report which includes biotic ligand modelling of Copper.	n/a
F187	MNRF - Timmins	351	Comment #351 No additional comment.	The comment has been noted. No response is requested.	None.	n/a

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F188	MNRF - Timmins	352	Comment #352; Chapter 10 and 11 We feel that more details are needed as per your planned fisheries compensation requirements for these lakes to ensure no loss of productive habitat related to commercial, aboriginal, or recreational fisheries, as per the *Fisheries Act* Section 35. A more detailed description of planned fisheries compensation measures that will ensure fisheries compensation requirements.	A detailed Fish Habitat Offsetting Plan has been provided to the Department of Fisheries and Oceans (DFO) and a copy is available for review.	The "Côté Gold *Fisheries Act* Support Document" has been attached for information purposes.	n/a
F189	MNRF - Timmins	353	Comment #353; Figure ES-2, Figure 2-5 of Appendix I We feel the pipeline alignment should be provided at this stage rather than during feasibility studies. A location map showing where the pipeline will be routed should be provided.	The design of the Project has not been advanced to a level that would allow IAMGOLD to provide this information at this point in time. IAMGOLD is of the opinion that this level of detail is not required as part of the EA process. In addition, it should be noted that environmental effects due to a discharge pipeline alignment does not have the potential to cause significant impacts and as such further detail is not warranted during the EA phase.	None.	n/a
F190	MNRF - Timmins	354	Comment #354; Chapter 5 We feel that a detailed description of how you will cross Bagsverd Creek should be provided at this stage. Documentation of planned structure design for the trussed bridge-type structure should be provided.	The design of the Project has not been advanced to a level that would allow IAMGOLD to provide this information at this point in time. IAMGOLD is of the opinion that this level of detail is not required as part of the EA process as the crossing of Bagsverd Creek will be a considered in both the channel realignment plans and detailed engineering of Project infrastructure. IAMGOLD is confident that a structure fully capable of mitigating potential effects on Bagsverd Creek is technically and economically achievable and will consult with MNRF during the future planning phases of the Project.	None.	n/a
F191	MNRF - Timmins	355	Comment #355 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F192	MNRF - Timmins	356	Comment #356; Addendum to appendix I; Page 6/9 How will regular long term monitoring of water levels in Mesomikenda Lake be conducted? Will there be any adaptive management implemented should water levels decrease more than the anticipated levels for the 1:25-year Dry Climate Condition scenario described in Table 4a of the addendum to appendix I?	Long-term water level monitoring in Mesomikenda Lake will be conducted through co-operation with Ontario Power Generation, who currently keep real-time lake elevation monitoring at the outflow dam. It is anticipated that should lake levels decrease below the normal operating range as a result of dry climate conditions, that further discussions will be initiated with stakeholders noted in the Mattagami River Water Management Plan.	None.	n/a
F193	MNRF - Timmins	357	Comment #357; Appendix J; Section 5.2.1 page 42 How many surface water quality monitoring stations on Mesomikenda Lake will be utilized during the construction and operation phase of the project, and how frequent will samples be taken? What is your plan for the long term monitoring of Mesomikenda Lake due to blasting and what will be your long term plan in case you discover any effect on the lake. Documentation of planned long-term water chemistry monitoring for Mesomikenda Lake, as well as an adaptive management plan that will be implemented should adverse effects become apparent.	During the construction and operations phases, surface water quality will initially be monitored for a variety of parameters at the existing Mesomikenda Lake monitoring stations shown in the Water Quality TSD (Appendix J), Figure 2-2: the outflow (MESO-OUT) and the water column profile locations (MESO-LS2, MESO-LS4, MESO-LS5, MESO-LS7). Samples will be collected at a frequency sufficient to detect changes in water quality under a range of flow conditions, depending on the sample location. The monitoring program will be reviewed pending the final Project configuration and monitoring locations may be added or moved, and the frequency may be adjusted, to reflect the site changes. In response to MOECC comments, IAMGOLD has added an additional monitoring station in the narrow bay of Mesomikenda Lake between the Neville Lake outlet and the Mesomikenda Lake station MESO-LS2. The commitments, including discussion on adaptive management, are presented in the EA Commitments Table (Appendix Y).	None.	n/a
F194	MNRF - Timmins	358	Comment #358; Appendix I; Table 4-3 Please elaborate on the modeling that was utilized to determine that changes in flow to Mollie River are projected conservatively at no more than 4%.	The modelling utilized was a soil moisture water balance simulation constructed in GoldSim. Details of the model inputs, assumptions and processes are provided in Attachment II of the Hydrology TSD (Appendix I).	None.	n/a
F195	MNRF - Timmins	359	Comment #359 No additional comment.	The comment has been noted. No response is requested.	None.	n/a

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F196	MNRF - Timmins	360	Comment #360 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F197	MNRF - Timmins	361	Comment #361 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F198	MNRF - Timmins	362	Comment #362 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F199	MNRF - Timmins	363	Comment #363; Appendix J Cyanide concentration is predicted to reach levels close to the quoted Site-Specific-Criterion (SSC) of 0.0098 mg/L in Unnamed Lake #1 and Bagsverd Creek under the 1:25-year dry condition, table A5-ii. What management measures will be implemented should cyanide levels increase beyond the SSC?	The water quality model was revised in response to comments received from the reviewer on the EIS / Draft EA. The predicted free cyanide concentrations are below the water quality guidelines for all months and all water bodies; see the Addendum to the Water Quality TSD (Appendix J). As detailed in the EA Commitments Table (Appendix Y), IAMGOLD has committed to a water quality monitoring program including groundwater monitoring wells around the TMF. Mitigation measures to reduce the potential influence of seepage from the TMF on the receiving environment include the treatment of process water, the collection of runoff and seepage, the recycling of reclaim water and the use of liners on starter tailings dams to limit seepage losses during the early years of operations.	None.	n/a
F200	MNRF - Timmins	364	Comment #364; ES-13, 3rd paragraph Please ensure that all dam monitoring in the post-closure phase is outlined in detail in the closure plan.	Agreed. This information will be provided in the Closure Plan.	None.	n/a
F201	MNRF - Timmins	365	Comment #365 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F202	MNRF - Timmins	366	Comment #366 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F203	MNRF - Timmins	367	Comment #367 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F204	MNRF - Timmins	368	Comment #368; Appendix I, Section 2.3.1, Page 2-4 Please clarify: was the Boreal Ecological Land Classification applied to classify the ~ 170 vegetation community polygons that were visited? Or were Forest Ecosystem Classification ecosite codes, as obtained through FRI mapping, confirmed in the field and later translated to Boreal ELC codes? Please provide clarification of how the FEC and Boreal ELC were applied to classify vegetation communities.	Forest Ecosystem Classification ecosite codes, as obtained through FRI mapping, were confirmed in the field and later translated to Boreal ELC codes.	None.	n/a
F205	MNRF - Timmins	369	Comment #369; Appendix N, Table 3.2 Burbot is present in Mollie river; Table 3.2 should reflect this. This is a species of concern. Amend Table 3.2 in appendix N to show the presence of Burbot.	Table 3.2 lists the fish captured during the baseline surveys and burbot was not collected in the Mollie River despite extensive boat electrofishing conducted throughout the reach upstream of Côté Lake. Burbot was found in Côté Lake and Clam Lake and indicated on Table 3.1.	None.	n/a
F206	MNRF - Timmins	370	Comment #370 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F207	MNRF - Timmins	371	Comment #371 No additional comment.	The comment has been noted. No response is requested.	None.	n/a

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F208	MNRF - Timmins	372	Comment #372 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F209	MNRF - Timmins	373	Comment #373 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F210	MNRF - Timmins	374	Comment #374 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F211	MNRF - Timmins	375	Comment #375 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F212	MNRF - Timmins	376	Comment #376; Executive Summary, Page ES-37, 1st Paragraph To elaborate on Waste Management, the MNRF is currently in a partnership agreement with IAMGOLD for the management responsibilities of this Waste Disposal Facility. The District will be responsible for working towards the required studies for the expansion of this facility. A specific date has not yet been determined when these required studies will be initiated.	IAMGOLD appreciated this clarification and feedback.	None.	n/a
F213	MNRF - Timmins	377	Comment #377; Appendix N Response acknowledged. Our concerns should be addressed in *Fisheries Act* Authorizations.	The comment has been noted. No response is requested.	None.	n/a
F214	MNRF - Timmins	378	Comment #378; Section 9.10.2.1, Page 9-61; Appendix O Details regarding the usability of canoe route connections (on water and across land/portages) within the whole footprint and study area (including transmission line which will cross other portions of the 4M canoe route) need to be addressed during all phases of the project - construction, operation, mine closure. Also, there are currently no controlled access lakes within the subject lands. Is IAMGOLD planning on controlling access to Duck Lake, Weeduck Lake, Bagsverd Lake and Bagsverd Creek? Please provide options being considered for new portages/connections for the canoe route. Please also explain further what is meant by “controlled-access lakes” and how IAMGOLD is going to accommodate public use of this recreational value.	The Project requires a dam to separate Bagsverd Lake, into Bagsverd Lake and the South Arm of Bagsverd Lake in order to route Mollie River flows around the open pit. A new portage will be required to access between the South Arm of Bagsverd Lake and Bagsverd Lake. The portage route will be selected with potential canoe route users such that it allows for effective portage between the waterbodies, and avoids interference with Project construction and operations. Other portages may be required, and if so, will be selected using the same criteria. Regular operations of the Côté Gold Project may result in occasional excursions of the AAQC for nitrogen oxides and particulate along several waterbodies adjacent to the Project. These contaminants originate principally from materials handling and haulage. Excursions above the AAQC are expected to be infrequent and transient in nature and are not expected to pose an unacceptable risk to people who travel through these areas. However, with prolonged exposure, those with pre-existing respiratory conditions may experience enhanced symptoms. As a precaution, it will be recommended that travel through this area be restricted limiting the duration of stay to 24 hours or less. Controlled-access lakes are expected to include Chester Lake, Clam Lake, East Clam Lake, Little Clam Lake, West Beaver Pond, Bagsverd Lake, South Arm of Bagsverd Lake, Bagsverd Pond, Weeduck Lake and Three Duck Lakes. Controlled access lakes will remain fully open to navigation, including use as part of the 4M Canoe Route. Land access including camp sites will be controlled. Camp sites will be removed if overprinted by mine infrastructure, and as a precaution to prevent prolonged exposure to air with potential excursions above the AAQC.	None.	n/a

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F215	MNRF - Timmins	379	Comment #379; Chapter 11, pages 11-17 and 11-22 We are concerned about the use of the decision tree on page 11-17 to determine residual effects/impact of significance for the loss of aquatic habitat and loss of wetlands. For instance, a level I magnitude for loss of aquatic habitat seems low considering the Mollie River and Bagsverd Creek realignments, and the loss of Cote Lake, Beaver Pond, Unnamed pond, Clam Creek, and parts of Clam Lake an Upper Three Duck Lake, as well as changes in flow to many of the other surrounding water bodies. The reversibility was categorized as "effect is partially reversible", which then resulted in a residual impact significance of "Not Significant" for the loss of aquatic habitat and loss of wetland areas. Please note that assigning the reversibility to "Effect is partially reversible" should not necessarily mean the residual impact is not significant.	IAMGOLD agrees with the statement, that even if an effect is considered reversible this does not necessarily mean an impact is not significant. The decision tree has been developed, in part, to clearly demonstrate that only the combination of all factors allows the determination of impact significance. The decision tree also includes scenarios where, although the impact is considered reversible, the impact is still considered significant. Note that specific to the loss of aquatic habitat the impact is considered insignificant with mitigation, i.e., compensation, in place.	None.	n/a
F216	MNRF - Timmins	380	Comment #380; Sec. 5.16.3 & 5.16.4, Page 5-46 & 5-47 The level of detail describing the post-closure activities is inadequate to sufficiently determine environmental impacts and remediation measures that will be implemented. More comprehensive documentation describing the Post-Closure Phase Stage I and Post-Closure Phase Stage II should be provided.	All EA disciplines consider effects during the various post-closure phases and describe them in the relevant level of detail.	None.	n/a
F217	MNRF - Timmins	381	Comment #381 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F218	MNRF - Timmins	382	Comment #382 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F219	MNRF - Timmins	383	Comment #383; Appendix K, Section 4.2, page 45 There is need to address the compensation for other non-fisheries species that depend on the wetland features that will be adversely affected. Will IAMGOLD not be compensating for the loss of amphibians, reptiles and birds (ie. non-fish species) destroyed during operations?	As noted in the EA, IAMGOLD is committed to developing an offsetting program using a natural channel design approach. This method considers a range of factors in planning the configuration and characteristics of the channel realignment works. IAMGOLD expects the new channel corridors and wetted areas to provide high quality habitat for fish and non-fish species.	None.	n/a
F220	MNRF - Timmins	384	Comment #384 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F221	MNRF - Timmins	385	Comment #385 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F222	MNRF - Timmins	386	Comment #386 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F223	MNRF - Timmins	387	Comment #387 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F224	MNRF - Timmins	388	Comment #388; Section 6-53 The amphibian survey was conducted using Central Ontario protocol survey dates. The project location is north of the 47th parallel, which constitutes the northern area for the March Monitoring Program; thus, surveys were conducted too early and could have underestimated amphibian species and abundance. The proponent should ensure proper survey timeframes are followed in future assessments.	IAMGOLD notes that the amphibian monitoring program was developed in consultation with MNRF staff during the planning of the field programs. IAMGOLD is confident that the surveys completed adequately characterize and assess the potential environmental effects on amphibian species.	None.	n/a
F225	MNRF - Timmins	389	Comment #389 No additional comment.	The comment has been noted. No response is requested.	None.	n/a

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F226	MNRF - Timmins	390	Comment #390 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F227	MNRF - Timmins	391	Comment #391 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F228	MNRF - Timmins	392	Comment #392 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F229	MNRF - Timmins	393	Comment #393 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F230	MNRF - Timmins	394	Comment #394 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F231	MNRF - Timmins	395	Comment #395 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F232	MNRF - Timmins	396	Comment #396 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F233	MNRF - Timmins	397	Comment #397 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F234	MNRF - Timmins	398	Comment #398 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F235	MNRF - Timmins	399	Comment #399 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F236	MNRF - Timmins	400	Comment #400 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F237	MNRF - Timmins	401	Comment #401 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F238	MNRF - Timmins	402	Comment #402 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F239	MNRF - Timmins	403	Comment #403 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F240	MNRF - Timmins	404	Comment #404 No additional comment.	The comment has been noted. No response is requested.	None.	n/a

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F241	MNRF - Timmins	405	Comment #405; Chapter 10, Page 10-18, 10-19 When and how frequent will the proposed aquatic habitat compensation plan be reviewed to ensure the predicted effects to the lotic and lentic habitat are realized?	This is the mandate of DFO and pursuant to the *Fisheries Act* amendments of 2012, conditions are enforceable requirements of the *Fisheries Act* Authorization. A monitoring program framework was included in the offsetting plan that included monitoring every year for the first three years following commissioning and then every three year thereafter for three monitoring events. It is recognized that a more detailed monitoring program will be required when the FAA application is submitted.	The "Côté Gold *Fisheries Act* Support Document" has been attached for information purposes.	n/a
F242	MNRF - Timmins	406	Comment #406; Section 6.4.8.1; Appendix N Was the MNRF Bathymetric Automated Survey System utilized to derive the bathymetry maps? If not, please explain which bathymetric survey methodology was used.	For bathymetric surveys, point data (depth, latitude, longitude) was collected using datalogging depth sounders equipped with GPS. Point data collected was processed using Geographic Information Systems (GIS) and the Inverse Distance Weighting method of interpolation to create water depth contours. At Mesomikenda Lake, printed bathymetric mapping provided by MNRF was digitized manually.	None.	n/a
F243	MNRF - Timmins	407	Comment #407; Chapter 5 Hydro line construction and maintenance vehicles will need an access corridor that may be required to cross area watercourses similar to what Hydro One uses on its transmission corridors. In this regard, the proponent needs to be aware that any proposed water crossings need to be constructed in accordance with the *Public Lands Act* and/or the Crown Bridge Management Guidelines. Permits meeting specific design criteria may be required at the time that the corridor final design is known.	The comment has been noted. IAMGOLD will take this advice into consideration when the Project moves forward into the permitting stage.	None.	n/a
F244	MNRF - Timmins	408	Comment #408 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F245	MNRF - Timmins	409	Comment #409; Section 5.12, Page 5-31 Response noted. Please ensure that it is followed through as mentioned.	The comment has been noted. No response is requested.	None.	n/a
F246	MNRF - Timmins	410	Comment #410 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F247	MNRF - Timmins	411	Comment #411 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F248	MNRF - Timmins	412	Comment #412 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F249	MNRF - Timmins	413	Comment #413 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F250	MNRF - Timmins	414	Comment #414 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F251	MNRF - Timmins	415	Comment #415 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F252	MNRF - Timmins	416	Comment #416 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F253	MNRF - Timmins	417	Comment #417 No additional comment.	The comment has been noted. No response is requested.	None.	n/a

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F254	MNRF - Timmins	418	Comment #418 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F255	MNRF - Timmins	419	Comment #419; Appendix K Response has been noted. Ensure that these values are avoided by incorporating the value locations and descriptions in appropriate stick nest/values maps for avoidance during construction activities.	Agreed. Maps and co-ordinates for the stick nest values discussed in Comment #419 will be provided to construction crews and any such nests will be avoided, to the extent practicable.	None.	n/a
F256	MNRF - Timmins	420	Comment #420; Section 5.12, Page 5-31 The proponent has indicated that the transmission line crossing at Mesomikenda Lake will be optimized during feasibility studies when questioned about the location of the water crossing at Mesomikenda Lake. Assessment of alternatives for the project need to be finalized in the EA document. This is used to adequately assess potential impacts and mitigation. MNRF requests more information in light of the proponents desire to address this issue during feasibility studies.	The assessment of alternatives addressed two different transmission line alignments at a macro scale consistent with the MOECC EA branches objectives for Individual EAs. Once the Project moves into the feasibility studies, IAMGOLD expects some minor optimization may occur within the established corridor to accommodate ground level interactions. As noted, this will include consideration of the Mesomikenda Lake crossing location with respect to the location of the Mesomikenda Lake boat ramp. IAMGOLD is confident that minor changes to the alignment will not alter the conclusions of the assessment and will only serve to mitigate potential effects.	None.	n/a
F257	MNRF - Timmins	421	Comment #421; Section 5.12, Page 5-31 The proponent has indicated that the transmission line crossing at Mesomikenda Lake will be optimized during feasibility studies when asked if the 230Kv line could be buried. Assessment of alternatives for the project need to be finalized in the EA documents. This is used to adequately assess potential impacts and mitigation. MNRF requests more information in light of the proponents desire to address this issue during feasibility studies.	The assessment of alternatives addressed different transmission line alignments. The use of underwater cables is not currently considered for the crossing of Mesomikenda Lake. As noted previously, IAMGOLD is willing to consider minor changes to optimize the 230kv line. These changes will be considered during the he feasibility studies and IAMGOLD will consult with MNRF on any changes which may further reduce or mitigate environmental effects of the transmission line corridor.	None.	n/a
F258	MNRF - Timmins	422	Comment #422 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F259	MNRF - Timmins	423	Comment #423 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F260	MNRF - Timmins	424	Comment #424 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F261	MNRF - Timmins	425	Comment #425 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F262	MNRF - Timmins	426	Comment #426 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F263	MNRF - Timmins	427	Comment #427 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F264	MNRF - Timmins	428	Comment #428 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F265	MNRF - Timmins	429	Comment #429 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F266	MNRF - Timmins	430	Comment #430 No additional comment.	The comment has been noted. No response is requested.	None.	n/a

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F267	MNRF - Timmins	622	Comment #622 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F268	MNRF - Timmins	623	Comment #623 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F269	MNRF - Timmins	624	Comment #624 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F270	MNRF - Timmins	625	Comment #625 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F271	MNRF - Timmins	626	Comment #626 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F272	MNRF - Timmins	627	Comment #627 No additional comment.	The comment has been noted. No response is requested.	None.	n/a
F273	MOECC - Surface Water	682	The response provides little technical detail. It also assumes that effluent will be discharged to Bagsverd Creek and that effluent dilution will be 16:1. Provide detailed explanation of how effluent density, dilution, and mixing were determined. In addition to Bagsverd Creek, evaluate potential for meromixis if effluent discharge occurs directly into Neville Lake or Mesomikenda Lake.	A preliminary hydrodynamic analysis of the mixing zone (lower basin of Neville Lake) has been completed in response to MOECC's request for more information on the mixing zone extent and magnitude of concentrations in the mixing zone. Details on effluent density, dilution, size of the turbulent zone are discussed in the technical memorandum provided with these comment responses. Because the dilution is sufficient to bring the treated effluent to within 0.01% of the density of the receiving surface lake waters within approximately 17 m of the outfall for a range of flow and temperature conditions, a sinking density plume that follows the lakebed to the bottom of the nearest basin is not expected to form and meromixis is not expected to occur as a result of treated effluent discharge into the lower basin of Neville Lake.	None.	n/a
F274	MOECC - Surface Water	686	The response assumes that mine rock will be accurately classified as suitable for construction purposes. It does not address the potential situation that mine rock used for construction might be erroneously classified or segregated and becomes a source of contamination to surface water. Discuss contingency plan in the event that mine rock used for construction (e.g. roads) becomes a source of contamination to surface water.	Based on all geochemical testing to date, ongoing work and IAMGOLD's commitment to continued testing, IAMGOLD does not anticipate any scenario where management of mine rock used for construction purposes will become a source of contamination to surface water.	None.	n/a

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F275	MOECC - Surface Water	697	Pieters and Lawrence (2014) in their study of pit lakes noted that varying degrees of vertical transport can occur and they listed factors that potentially oppose meromixis. One of those is restoration of diverted creek flow, something that is planned for Cote pit at closure. If vertical transport of contaminants from the monimolimnion occurs, the chemistry of shallow pit water may be degraded and be unsuitable for direct discharge to environment. Discuss contingency plan in event that vertical transport of contaminants from the monimolimnion causes shallow pit water chemistry to not meet water quality guidelines and regulatory requirements for direct discharge to environment.	The Pieters and Lawrence (2014) paper was referenced to illustrate that meromixis occurs in lakes that are shallower than the Côté open pit, which will be approximately 550 m deep and considerably deeper than those in Pieters and Lawrence (2014). While Pieters and Lawrence (2014) noted the potential for vertical transport to be affected by the restoration of diverted creek flow after planned closure measures are implemented, the pit lakes referenced (the Faro and Grum pit lakes of the Faro Mine in the Yukon) are shallower than the Côté pit and the material at the Faro Mine is acid generating with high salinity levels. The salinity of the runoff entering the Faro pit lakes is higher than the pit lake itself, thereby promoting mixing during some times. Reinstating the flow to the Côté pit from Clam Lake is not expected to result in the addition of water that varies significantly in salinity from that of the mixolimnion and is not expected to affect the meromictic status of the lake. As detailed in the EA Commitments Table (Appendix Y), IAMGOLD has committed to monitor the water quality of the pit water during post-closure phase, which allows for decades of monitoring to understand the mixing characteristics of the pit lake. If it is determined through monitoring programs that there is potential for vertical transport of constituents to cause the shallow pit water chemistry to not meet water quality guidelines, then IAMGOLD will consider alternate options, including maintaining some realignments to keep the flooded open pit segregated from the Mollie River system and/or treatment, as required.	None.	n/a
F452	MOECC - Aboriginal Affairs	312	Appendix P The documentation seems to identify a discrepancy in understanding on what the purpose or intent of the TEK/TLU completed was, and ,was not, and how it could or should be used. Wabun Tribal Council indicates that the TEK/TLU was an information gathering exercise and not an issues scoping study, impact pathway analysis or impacts assessment. The TEK was not designed to gather comments, concerns or other information about potential effects. The proponent responded – "The TEK-TLU was intended to determine if traditional resources and land use will be affected by the Project and identify ways to protect or mitigate the resources or sites. It was also intended to provide information about traditional ecological or environmental information to assist in the identification of effects on biophysical resources in the regional study area. There is also a difference in the definition of the regional study area when compared to the study areas used by the Proponent for analysis of impact purposes. Proponent needs to provide clarification on whether the TEK/TLU was used as the only measure of use by Aboriginal communities and determining potential impacts on that use? In addition, provide clarification on how treaty rights in general associated with the geography, were incorporated into the analysis?	a) IAMGOLD used a number of activities to gain a better understanding of historical and current Aboriginal land use. The TK / TLU was considered an important component of this data collection as it was completed by a First Nation consultant selected by Wabun Tribal Council. IAMGOLD valued the information presented in the TK / TLU study because of how it was collected, who it was collected by, and because it was approved by community leadership and the Wabun Tribal Council. In addition to supporting the TK / TLU study, IAMGOLD also used the following measures: applied additional EA team expertise (e.g. placing importance on the Eagle's nest which was not identified in the TK / TLU study but is understood as significant to Ojibwe culture); gathered information through archaeological studies to understand historical land use, and through consultation on the archaeological work; gathered information through consultation at public open houses, youth and elder workshops, Chief and Council meetings, making comment forms available and having a Project email where people can provide comments/concerns related to land use; through review and consideration of comments on Draft EA and technical sessions with Aboriginal review team, and; employing a full-time community relations liaison on-site. For more information on how effects on Traditional land use were determined, please see the Traditional Land and Resource Use TSD (Appendix P). Please see Section 4.5 for details on Aboriginal consultation and engagement. b) Treaty rights are described in Appendix D-1 (RoC). Some of this information has been included in Section 3.3 of the EA.	None.	n/a

#	Agency / Organization	App Z Ref.	Comment	Response	Additional Information / Corrections to Amended EIS / Final EA Report	Change Location
F453	MOECC - Aboriginal Affairs	—	Appendix P, Section 3.1 The document states "The construction of Project components is predicted to overlap with some traditional hunting areas, as described above. It is not expected that this will impeded the ability to carry out traditional hunting activities in the area (p.3-3). No lakes overprinted by the Project have been identified as popular fishing lakes. Therefore, no traditional fishing area losses will be incurred due to Protect construction (p;3-4), The Project footprint does not overlap any sensitive area lakes identified in the TEK study (P3-4)" Wabun Tribal council has indicated that this oversimplifies the interrelationships between project components, the biophysical environment and Aboriginal traditional land use. "The footprint area is not an accurate reflection of the area that will no longer be available for traditional uses, considering additional areas around and between the actual project footprint that will be unusable or unused due to issues of safety, air quality, noise and other ongoing impacts of the proposed project. This "effective" footprint will be larger than the physical footprint of the infrastructure." Figure 1 -2 Chapter 5, Section 5.1 pg. 5-1. In response, the Proponent indicated " the project will not limit the ability to carry out traditional activities in the area. Studies conducted as per EA process have shown no traditional land and resource use within the Project footprint…" (however does not reference Aboriginal and/or Treaty rights) However, on Table ES-4 Impact Assessment Matrix for the operational phases, Page ES-77, Final EA Report traditional hunting and fishing is identified as having the potential to be effected during the operations phase including changes in access to and from the area, changes in abundance and distribution. The suggested mitigations is to limit fishing by project personal and acknowledges the project may affect a small number of water bodies but does not limit the ability to fish. It does not mitigate how these changes in access and abundance/distribution impact Aboriginal and Treaty rights and how these impacts could be impacted. The Proponent references Chapter 11 in response, no additional areas outside the project footprint would likely be rendered unavailable for traditional uses. However, some areas around the Project footprint may require controlled access and traditional uses may continue depend on project activities in the area. Were these restriction included in the analysis of potential impacts to Aboriginal and Treaty rights? This information seems to conflict. Provide clarification on how this project does not limit the ability or impact the Aboriginal or treaty right to fish (e.g Cote Lake) and on additional potential impacts to fishing and hunting rights associated with this project? Reconcile other sections of the documentation to reflect consistent messaging on impacts to Aboriginal and treaty rights in addition to traditional use. Provide documentation on how treaty rights were incorporated into your analysis of "no traditional fishing area loses or other resource use within the project footprint" therefore no impact on Aboriginal and Treaty rights. The response should also include if the project area is put to visible and incompatible use including for example current existing access restrictions, project footprint area is already fenced off etc.	The detailed analysis of effects provided in Appendix P, demonstrates that there will be none to very limited effects on traditional hunting and fishing in the local study area, and therefore the EA assigns a level II magnitude for this effect, i.e., the project overlaps with portions of traditional hunting areas, but does not limit the ability to carry out hunting activities. In combination with the other impact assessment criteria and applying the impact assessment methodology described in Chapter 11, particularly Graphic 11-1, the impact is considered to be not significant. A clearer understanding of this methodology should assist the reviewer in clarifying how IAMGOLD is able to recognize that there will be some effect, and has conservatively assigned the effect a Level II magnitude, but it still able to determine that the overall impact on the ability to carry out traditional activities in the area is not significant.	None.	n/a

#	Agency / Organization	App Z Ref.	Comment	Response	Additional Information / Corrections to Amended EIS / Final EA Report	Change Location
F454	MOECC - Aboriginal Affairs	—	Section 4.5.2, p. 4-28; Appendix D9-b Wabun TC email Sept 6, 2013" The Chiefs and Councils, as well as the membership have maintained that the impacts from this Project will be felt well beyond the immediate project area and will be cumulative. " Proponent Response – interesting in hearing more and cumulative effects are addressed in Chapter 14. • Pg. 4-36 Wabun again raised the concerns of potential water quality effects on water quality outside of study area. • Proponent response – indicated that effects in the regional study area were not modelled because there are no effects on water quality expected beyond the local study area. Cumulative effects should have also considered the past mines or larger exploration projects in the area in addition to forestry activities. Reference in issue description of 320 … "During a recent information session in MFN members raised concerns about the extent of existing development in the territory and that there are limits to the amount of development that can be tolerated before cumulative effects become too extreme. " Revisit cumulative effects assessment to consider this project in relation to other projects in the area (i.e. past mines, exploration projects, forestry) including past, present and future project. Provide additional details and make appropriate changes in the EA report to better address concerns being raised about cumulative impacts assessment and cumulative impacts beyond the immediate project area.	No other industrial scale mining has been carried out in the Project area. Therefore there are no known historic effects on the physical and biological environment in this area. The area has a history of forestry and Chapter 14 does consider past and future forestry activities. The cumulative effects analysis for forestry operations focussed on the biological regional study area as this was deemed to be the proper geographic extent for potential cumulative effects resulting from forestry operations. Forestry operations have been commonplace in the region within the recent past and this is reflected by the forest structure as many forest communities within the biological regional study area are second-growth forests. At present logging operations emulate natural disturbance patterns, such that the forest communities have adapted to disturbance from logging and subsequent succession. Given this natural adaptation, forestry operations are not anticipated to result in noticeable cumulative environmental effects with the Project. Considering the information above IAMGOLD feels that the temporal boundaries for the cumulative effects assessment have been appropriately defined for the EA.	None.	n/a
F455	MOECC - Aboriginal Affairs	—	Appendix D9-b Brunswick House commented "we have experienced problems with Detour Gold like highways being shut down during construction and stuff – this makes You realize with a project such as this, you have a project footprint, a water footprint and a footprint of externalities. It is important for us to consider the impact to all of these." The Proponent responded back specific to the effects of the project on traffic and surrounding communities are considered in the socio economic prediction of effects with no changes incorporated in draft EIS/EAR. No response to the other identified issues was found in the document. Provide clarification and a response to the concerns regarding the multiple footprints and how they may relate to each other including cumulative impacts?	The methodology described and applied in the EA is designed in such a way that each technical discipline studied in the EA considers the baseline information collected for other disciplines in their effects assessment. In other words, the concept and consideration of 'multiple footprints' is inherently built-in to the effects prediction for each discipline. For example, the air quality effects assessment looks at emissions and regulatory limits against baseline - this information is then passed on to other disciplines, etc… so the interrelation between potential effects in different disciplines and their interaction are inherent in our impact assessment methodology. Baselines studies would reflect any already existing effects from other activities occurring within the Project area. The methodology for the prediction of Project effects is described in Section 9-1.	None.	n/a
F456	MOECC - Aboriginal Affairs	—	Appendix D9-b At a Mattagami Open House a member indicated– " The poster requested that our information about the land and our uses be specific to the IMG Project area. I would like to inform you, that we cannot provide information in the format you are requesting because we use the land beyond the perimeter of the IMG property. I would also like to note as a mother, and as a woman, that we have a responsibility to the water =- without water we would not survive. ….I am requesting that a full ceremony take place at cote Lake immediately…" This supports the concerns relayed by Wabun Tribal Council and First Nation Chiefs on how the TEK/TLU was utilized and the identification of the study areas as they relate to the study areas identified for the project. Proponent did acknowledge and responded to the request for a water ceremony. Provide information as to what the geographic differences are between each of the studies regional and local study areas in relation to the area delineated in the TEK/TLU and provide some level of analysis on the differences and what impact they may have or not on the study area. Was the study area identified in the TEK/TLU considered as geography for studies related to the project? Why or Why not? Please revise the EA report accordingly.	The regional study area and local study area used for the TK / TLU can be found in Appendix P (Traditional Land and Resource Use TSD) and are described in Section 2.1, page 2-1. IAMGOLD funded Wabun Tribal Council to hire a consultant to conduct the TK / TLU study. IAMGOLD / AMEC provided interview questions and a list of deliverables to Wabun Tribal Council for use by the selected Study contractor. The TK / TLU study report deliverables included a request for information about how the study area was determined as well as background methodology, results and geospatial data. However, IAMGOLD did not receive a rationale for the selected study area.	None.	n/a

#	Agency / Organization	App Z Ref.	Comment	Response	Additional Information / Corrections to Amended EIS / Final EA Report	Change Location
F457	MOECC - Aboriginal Affairs	—	Appendix D9-b The document states "The construction of Project components is predicted to overlap with some traditional hunting areas, as described above. It is not expected that this will impeded the ability to carry out traditional hunting activities in the area (p.3-3). No lakes overprinted by the Project have been identified as popular fishing lakes. Therefore, no traditional fishing area losses will be incurred due to Protect construction (p;3-4), The Project footprint does not overlap any sensitive area lakes identified in the TEK study (P3-4)" On Table ES-4 Impact Assessment Matrix for the operational phases, Page ES-77, Final EA Report traditional hunting and fishing is identified as having the potential to be effected during the operations phase including changes in access to and from the area, changes in abundance and distribution. The suggested mitigations is to limit fishing by project personal and acknowledges the project may affect a small number of water bodies but does not limit the ability to fish. This information seem to conflict. Can you provide clarification on how this does not limit the ability or impact the treaty right to fish (e.g Cote Lake) and on additional potential impacts to fishing and hunting treaty rights associated with this project? Please reconcile other sections of the documentation to reflect consistent messaging on impacts to Aboriginal and treaty rights in addition to traditional use. Wabun TC – "The footprint area is not an accurate reflection of the area that will no longer be available for traditional uses, considering additional areas around and between the actual project footprint that will be unusable or unused due to issues of safety, air quality, noise and other ongoing impacts of the proposed project. This "effective" footprint will be larger than the physical footprint of the infrastructure." Figure 1 -2 Chapter 5, Section 5.1 pg. 5-1. Also, Wabun TC email Sept 6, 2013" The Chiefs and Councils, as well as the membership have maintained that the impacts from this Project will be felt well beyond the immediate project area and will be cumulative. " (Page 4 -28, Amended EIS, FEA report 4.5.2) Also in the responses to comments from Aboriginal Groups on the EIS/Draft EA Report, page 69 in reference to issue description 320 - "During a recent information session in MFN members raised concerns about the extent of existing development in the territory and that there are limits to the amount of development that can be tolerated before cumulative effects become too extreme. "The Proponent reference Chapter 11 in response, no additional areas outside the project footprint would likely be rendered unavailable for traditional uses. However, some areas around the Project footprint may require controlled access and traditional uses may continue depend on project activities in the area. This comment relates to cumulative impact, the size and identification of the study areas and to comments above where the documentation references "No impact to traditional use." Re-evaluation of potential impacts on traditional use and Aboriginal and treaty rights is required to confirm that there are no impacts to the Aboriginal community's rights and traditional use as a result of the proposed project including impacts to areas outside of the Project footprint however linked with project impacts.	A detailed analysis of effects on traditional land use is provided in the Traditional Land and Resource Use TSD (Appendix P). This analysis combines information provided in the TK / TLU study, experience of IAMGOLD's EA Team, and comments received through the stakeholder and Aboriginal consultation process (documented in Appendix Z). The impact matrices use this information to determine whether these effects have the potential to be significant. To be conservative, a Level II magnitude for effects on hunting and fishing, which assumes a small amount of disturbance, has been selected. The impact assessment concludes that even with conservatively assigned Level II for of magnitude and extent, no significant impact on traditional hunting and fishing are anticipated. Please see Section 9-1 for a detailed description of the methodology used for the prediction of effects and Section 11-1 for the detailed methodology used for the impact assessment. See also response to Comment #F452. In addition, effects on other disciplines (e.g., air quality), were used to predict effects in the study area specifically identified for the Traditional Land and Resource Use TSD (Appendix P). See also response to Comment #F453.	None.	n/a

#	Agency / Organization	App Z Ref.	Comment	Response	Additional Information / Corrections to Amended EIS / Final EA Report	Change Location
F458	MOECC - Aboriginal Affairs	—	Wabun Tribal Council – "A regional study area was not defined in the EA for water quality, only a local study area. …. Project effects have not been adequately assessed as potential impacts outside of the local study area have not been assessed"… Proponent response indicated no significant water quality effects are expected beyond the local study area however they did revises water quality monitoring commitments to add monitoring downstream of local study area. Also page 64, concern with discrepancy of the terrestrial biology regional study is not consistent with the TEK TLU study for the regional study area map. The proponent responded the TK study areas were based on FN knowledge of the area and the study area was selected for the TLU baseline and effects assessment reflect the area where effects can be predicted. Only those pieces of geography that could potentially be affected by the project to focus baseline data collection. Provide further clarification and documentation on the differences in understanding between the First Nation Communities and the Proponent as to the intent and use of information collected in the TEK/TLU studies, the identification of the regional study areas and analysis of the differences in geography from that of the study areas used by the Proponent and the area identified in the TEK report. Clarify if the potential downstream monitoring area and studies relative to terrestrial biology regional study falls within the area identified in the TEK/TLU and how the concern of a regional study area not being defined in the EA for water quality and terrestrial biology was addressed including the adequacy of assessment of potential impacts to water regionally. Provide clarification on, was the TEK/TLU used as the only measure of use by Aboriginal communities and potential impact on that use in the project footprint.	See responses to Comments #F456, F452, and F457.	None.	n/a
F459	MOECC - Aboriginal Affairs	—	Appendix D-6 The majority of comment sheets from the open houses (Timmins, Gogama and Sudbury) are not from aboriginal peoples but are from cottage owners, residents of Gogama (as per comments) or contractors. Difficult to determine if any comments are related to or can be related to Aboriginal consultation. Were any comment sheets collected at the FN Community meetings and if so replace them with the public open house comment forms in Aboriginal consultation record of Appendix D?	All comment forms received at open houses were recorded in Appendix D. If Aboriginal community members choose to attend an open house in Sudbury, Gogama or Timmins, it is assumed they are a member of the general public unless they self-identify as being a member of a local Aboriginal community.	None.	n/a

#	Agency / Organization	App Z Ref.	Comment	Response	Additional Information / Corrections to Amended EIS / Final EA Report	Change Location
F460	MOECC - Aboriginal Affairs	—	Appendix D-9; RoC p.465, 14 of 54; Table 4-1 “Let’s Talk” Community Newsletters Mtg 07/08/14 Wabun Tribal Council Chiefs of FPFN and MFN each noted that irrespective of the scientific environmental assessment completed, they believe that given the size of the projects s footprint on the environment, the Project has significant environmental impacts. Was additional information shared with the Tribal council and Communities in response to their concerns of significant environmental impacts including sharing any mitigation attempts? Proponent responded that their understanding of the significance of the Project would be provided to the Agency vis a vis comments submitted by Wabun’s Technical Reviewer on the report. It would appear that Aboriginal consultation initiatives stopped or were completed in June/July of 2014. I.e. There was no Fall Newsletter issued and/or not provided in the documentation. Nor were there any Fact Sheets provided past June 2014. Was there any dialogue with the Aboriginal communities and/or their representatives as a follow up to comments provided on the Draft EA Report and how these may have been addressed in the final EA report The consultation record stops in June /July 2014 although it is understood that the Final EIS/EA Reports were shared with the Aboriginal communities and their representatives or Technical Reviewers. Was there any update discussions or meetings with the Aboriginal communities on the final EA report. In addition, if the project moves forward to permitting and approval stages, the Ministry will need to consider whether additional consultation is required based on any additional information provided through the application process regarding environmental impacts. Please provide any additional comments, meetings, reviews or concerns received after the final EA report was shared.	The RoC details all consultation activities that occur up until September 30, 2014. See Chapter 4 of the Final EA Report and Appendix D.	None.	n/a

#	Agency / Organization	App Z Ref.	Comment	Response	Additional Information / Corrections to Amended EIS / Final EA Report	Change Location
F461	MOECC - Aboriginal Affairs	—	Summary of Recommendations: AAB recommends that the proponent: 1. Update Table 4-7 in Final EA Report Chapter 4 to better reflect a summary of key issues and concerns identified by the Aboriginal communities as documented in Appendix D-9 Including any proposed mitigation and rationale. For example : • Mattagami FN raised issues on realignment and success rates of realignments. Mattagami also identified seepage on 06/26/14 and the challenges using the TEK/TLU study focusing only on the project area. • Brunswick House First Nation had identified concerns with the Bagsverd Creek realignment in meetings on June 5, 2014 with water flow, how it may hurt, harm or enhance aquatic species in the area. • Flying Post also identified cyanide leaching and seeping of water and ground water issues in a meeting on Feb. 13, 2013. Cumulative effects on wildlife considering other projects in the area (10/09/13) and ammonia as an issue at all mines sites on the same date. • The Metis Nation of Ontario identified several additional concerns that have not been documented in table 4-7 but are identified in Appendix D, Table D-9c. including for example, cyanide and greenhouse gas. 2. Ensure that the MOECC is provided with timely updates on the status of agreement discussions with First Nation Communities and with the Metis Nation of Ontario. Please include an update on the status of the TEK/TLU study with the Metis Nation. 3. Provide further documentation to support assumptions that TEK/TLU studies prepared by the Aboriginal Communities will be similar to those studies conducted by Metis. Documentation should also respond to the Metis Nation of Ontario comment (06/27/14): "Currently your Environmental Impact Study is void of descriptions of any impact to the Metis and suggest there are not residual effects, but IAMGOLD does not know the impacts to the Metis until we can identify impacts (TEK/TLU), we need to assume that these impacts are significant." 4. Provide documentation and/or copies of any technical reviews of the Final Environmental Report completed by or submitted by, the First Nations or Aboriginal Communities and/or their representatives including if appropriate the Proponents response to any issues or concerns raised. In addition, was any further consultation planned with the Aboriginal communities including but not limited to a review on the Proponent response to Aboriginal technical review comments submitted on the draft EA report in late July and presentations of the Final EA documentation or project updates since July 2014. 5. Provide further clarification and documentation on the differences in understanding between the First Nation Communities and the Proponent as to the intent and use of information collected in the TEK/TLU studies, the identification of the regional study areas and analysis of the differences in geography from that of the study areas used by the Proponent and the area identified in the TEK report. Provide clarification on, was the TEK/TLU used as the only measure of use by Aboriginal communities and potential impact on that use in the project footprint. 6. Provide clarification on how Aboriginal and/or Treaty rights associated with this geography were incorporated in the impact analysis both within the context of the TEK/TLU study and on the geography in general. Specifically how they were used to identify potential impacts to fishing and hunting rights in the area (water, access), how these were considered in impact assessments and any mitigative measures specific to the potential impact on the rights.	1) IAMGOLD exercised professional judgement in determining what the summary of key Aboriginal concerns were. For the sake of efficiency, IAMGOLD summarized issue specific concerns (e.g. realignments) and classified them as water and hydrology concerns. A list of all issues raised through Aboriginal consultation can be found in the RoC (Appendix D). 2) IAMGOLD has shared with the MOECC the status of Aboriginal agreement negotiations. Both negotiations with Flying Post First Nation and Mattagami First Nation, and the MNO, respectively are ongoing. Details of the negotiations are considered confidential, as agreed upon by all parties involved. IAMGOLD received a Draft TEK/TLU study from the MNO in March of 2015. 3) IAMGOLD is confident that it has adequately considered Aboriginal land use in the EA Report. IAMGOLD will continue to work the MNO to identify how best to consider information provided vis-à-vis the Draft TEK/TLU, however, IAMGOLD opinion remains that the information provided in the MNO's Draft TEK/TLU does not change the effects assessment and impact assessment presented in the EA Report. 4) Details of engagement with Aboriginal communities up to September 30, 2014 can be found in the RoC (Appendix D). The MOECC has received the requested comments from Aboriginal technical reviewers since the submission of these comments. 5) Please see response to Comment #F456. 6) Please see response to Comment #F452.	None.	n/a

Notes:
[a] Original comment provided following cutoff date for inclusion in the Amended EIS / Final EA Report. Comment numbering reflects that used in response to the comments, which was issued separately.

Abbreviations and Acronyms

(Applies to Response column only)

AAQC	Ambient Air Quality Criteria
ARD	Acid Rock Drainage
CCME	Canadian Council of Ministers of the Environment
CWQG	Canadian Water Quality Guidelines
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment
ECA	Environmental Compliance Approval
EIS	Environmental Impact Statement
IAMGOLD	IAMGOLD Corporation
MMER	Metal Mining Effluent Regulations
MNDM	Ministry of Northern Development and Mines
MNO	Métis Nation of Ontario
MNRF	Ministry of Natural Resources and Forestry
MOECC	Ministry of the Environment and Climate Change
MRA	Mine Rock Area
MTCS	Ministry of Tourism, Culture and Sport
PAG	Potentially Acid Generating
PM	Particulate Matter
PWQO	Provincial Water Quality Objectives
TK / TLU	Traditional Knowledge / Traditional Land Use
TMF	Tailings Management Facility
ToR	Terms of Reference
TRV	Toxicity Reference Value
TSD	Technical Support Document
TSP	Total Suspended Particulate

ERRATA

Erratum to Comment #F71

TABLE 20a
PREDICTED LOADS FROM SEEPAGE FROM TAILINGS MANAGEMENT FACILITY AND MINE ROCK AREA UNDER AVERAGE CLIMATIC CONDITION
CÔTÉ GOLD PROJECT

Parameter	Total Seepage Load from Tailings Management Facility (kg/day)	Total Seepage Load from Mine Rock Area (kg/year)
Aluminum	0.14	28
Ammonia (total)	1.9	251
Antimony	0.00033	2.47
Arsenic	0.00015	7.3
Barium	0.0025	8.8
Borin	0.0014	5.8
Cadmium	0.00000014	0.015
Calcium	9.9	46965
Chloride	2.3	1986
Cobalt	0.00085	0.33
Copper	0.017	3.5
Cyanide (total)	0.14	N/A
Cyanide (free)	0.036	N/A
Iron	0.20	15
Lead	0.000061	0.11
Magnesium	0.51	969
Manganese	0.0042	61.0
Molybdenum	0.0072	3.0
Nickel	0.00035	0.68
Nitrate	0.029	862
Phosphorus (total)	0.00096	104
Potassium	4.2	3063
Sodium	94	830
Strontium	0.018	76
Sulphate	204	3596
Uranium	0.00052	5.8
Vanadium	0.00019	2.6
Zinc	0.00089	9.9

Notes:
N/A - not applicable.

Erratum to Comment #F92

Discipline	Project Phase	Potential Issue / Concern / Interaction	Mitigation Measure	Description / Commitment	Standard
Socio-Economic	Construction; operations; closure	Transportation – effects on highway infrastructure	Transport oversized loads in parts.	Transport oversized loads in parts to the mine site, if possible, to limit load stress on highway surfaces and obstruction of other traffic.	MTO – *Highway Traffic Act* O.Reg., 413/05
Socio-Economic	Construction; operations; closure	Transportation – potential for wildlife-vehicular accidents	Report wildlife sightings on highways.	Report wildlife sightings on highways to inform workers and identify areas where wildlife is persistently present.	n/a
Built Heritage / Cultural Heritage	Construction	Displacement or disruption of heritage resources at the former Shannon Cabin	Document and remove heritage resources at the former Shannon Cabin.	In-situ documentation of heritage resources at the former Shannon cabin and remove resources to a secure location.	MTCS – *Ontario Heritage Act,* O.Reg., 9/06

Discipline	Project Phase	Potential Issue / Concern / Interaction	Mitigation Measure	Description / Commitment	Standard
Socio-Economic	Construction; operations; closure	Transportation – conflicts with other traffic	Schedule shuttle bus travel.	Schedule shuttle bus travel at off-peak travel times to avoid traffic conflicts with other commuters, school buses and recreation traffic.	n/a
Socio-Economic	Construction; operations; closure	Transportation – traffic volumes at peak travel times	Schedule shifts to limit the number of daily shuttle buses.	Schedule shifts so that not all construction workers travel off-site on the same days, and thereby limiting the number of daily shuttle buses.	n/a
Socio-Economic	Construction; operations; closure	Transportation – effects on highway infrastructure	Ensure heavy load sizing and seasonal load restrictions.	Ensure heavy loads are sized appropriately and that truck traffic observes seasonal load restrictions.	MTO – *Highway Traffic Act* O.Reg., 413/05
Socio-Economic	Construction; operations; closure	Transportation – effects on highway infrastructure	Transport oversized loads in parts.	Transport oversized loads in parts to the mine site, if possible, to limit load stress on highway surfaces and obstruction of other traffic.	MTO – *Highway Traffic Act* O.Reg., 413/05
Socio-Economic	Construction; operations; closure	Transportation – potential for wildlife-vehicular accidents	Report wildlife sightings on highways.	Report wildlife sightings on highways to inform workers and identify areas where wildlife is persistently present.	n/a
Built Heritage / Cultural Heritage	Construction	Displacement or disruption of heritage resources at the former Shannon Cabin	Document and remove heritage resources at the former Shannon Cabin.	In-situ documentation of heritage resources at the former Shannon cabin and remove resources to a secure location.	MTCS – *Ontario Heritage Act,* O.Reg., 9/06

Erratum to Comment #F122

Côté Gold Project
Responses to Comments on the Amended EIS / Final EA Report
June 2015
Project #TC121522

Based on these criteria, surface locations for potential separate stockpiles were selected (see Figure 1-2 for selected locations). It is anticipated that final stockpile heights could be up to a maximum of 150 m depending on the stockpile footprint and other factors.

5.5.1 Mine Rock Area

5.5.1.1 Mine Rock

Project development is expected to generate approximately 850 Mt of mine rock, and mine rock stockpiles will be located in the designated MRA covering an estimated total area of 400 ha (4.0 km^2) with an ultimate elevation of 490 masl. Based on the current design, approximately 40 Mt of mine rock is expected to be used in various Project site construction activities, mainly for the TMF dam and road maintenance/construction.

The MRA will be developed over the life of the Project, with a final overall slope of approximately 2.6 m horizontal width to 1 m vertical height (2.6H:1V). The stockpile layout will include 10 m tall benches with inter-bench slopes at 1.3H:1V and 12.75 m wide mid-slope benches. Overburden present in the proposed MRA area has an average thickness of 9.3 m, with the greatest thickness of 22.6 m observed on the western shore of Middle Three Duck Lakes, similar to overburden conditions of the open pit area.

The stability of the MRA stockpiles will meet or exceed the following minimum safety factors:

- long-term static loading conditions Factor of Safety (FS) = 1.5;
- short-term at end of construction FS = 1.3; and
- pseudo-static FS = 1.0.

Ditching and seepage collections ponds will be placed around the MRA to capture runoff and seepage for water management and monitoring of runoff quality. The collected water will be directed through the collection ponds placed around the MRA towards the mine water pond. The system will be designed to collect the average annual precipitation seepage and runoff, with storage capacity to allow for pumping water to the mine water pond, and then to the ore processing plant and/or polishing pond, year-round.

In general, the rock analysed to date is considered primarily not acid-generating (92%; see Appendix E). Further testing is currently being completed in order to better characterize the rock acid-generating potential. Upon closure, mine rock stockpile drainage will be directed to flow by gravity into the open pit, as needed, to facilitate open pit flooding and be managed as part of the open pit catchment area water management program.

5.5.1.2 Overburden

Overburden will include topsoil, peat and any organic materials encountered during the initial stripping for mine development. Overburden stockpiles will be located within the MRA in the northern section, as these will be managed separately to provide overburden for closure

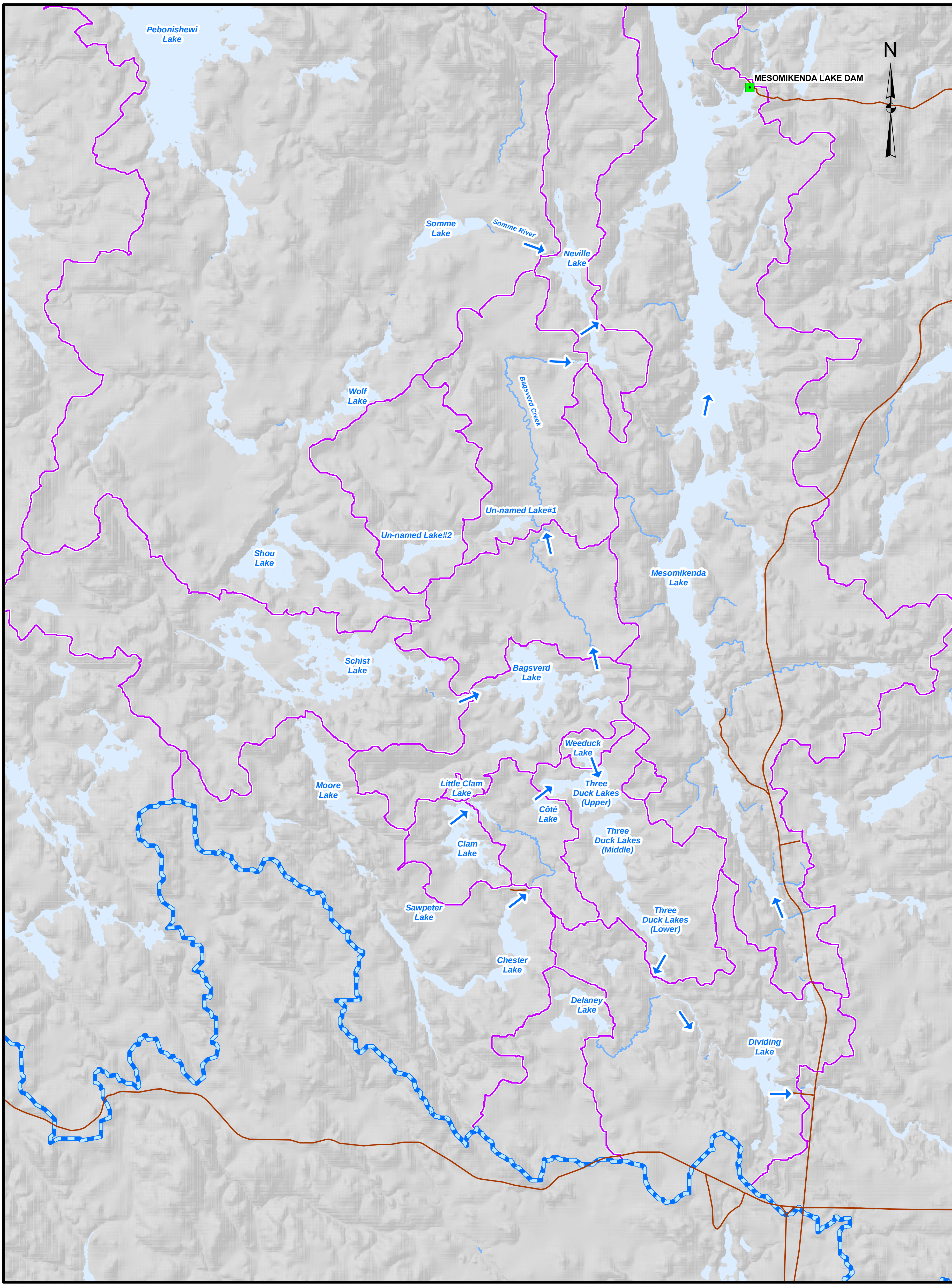
Erratum to Comments #F131 and #F141

Côté Gold Project
Responses to Comments on the Amended EIS / Final EA Report
June 2015
Project #TC121522

Date	Location	Purpose	Number of Attendees
February 27, 2013	Gogama	• Project overview, including planning and approvals schedule • Closure concepts • Summary of Baseline Study findings and effects predictions for physical and biological environment disciplines • Summary of Baseline Study findings, effects predictions and proposed mitigation measures for human environment disciplines	56
February 28, 2013	Sudbury	• Project overview, including planning and approvals schedule • Closure concepts • Summary of Baseline Study findings and effects predictions for physical and biological environment disciplines • Summary of Baseline Study findings, effects predictions and proposed mitigation measures for human environment disciplines	50
April 25, 2013	Mattagami First Nation	• Overview of archeology work being conducted in the Project footprint • Introduced the Traditional Knowledge / Traditional Land Use Study	9
May 21, 2013	Sudbury	• Project overview, including planning and approvals schedule • Closure concepts • Summary of Baseline Study findings and effects predictions for physical and biological environment disciplines • Summary of Baseline Study findings, effects predictions and proposed mitigation measures for human environment disciplines	15
May 22, 2013	Gogama	• Project overview, including planning and approvals schedule • Closure concepts • Summary of Baseline Study findings and effects predictions for physical and biological environment disciplines • Summary of Baseline Study findings, effects predictions and proposed mitigation measures for human environment disciplines	26

Erratum to Comment #F159

Côté Gold Project
Responses to Comments on the Amended EIS / Final EA Report
June 2015
Project #TC121522



LEGEND

- Dams (OPG)
- James Bay / Great Lakes Watershed Divide
- Existing Watersheds
- Waterbodies
- Waterflow
- Creek / River
- Wooded Areas

4,000 0 4,000

SCALE 1:90,000 METRES

REFERENCE

Base Data - MNR NRVIS, CANMAP v2008.4
Produced by Golder Associates Ltd under licence from Ontario Ministry of Natural Resources, © Queens Printer 2013
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17

PROJECT

IAMGOLD

HYDROLOGICAL MODELLING REPORT
CÔTÉ GOLD PROJECT

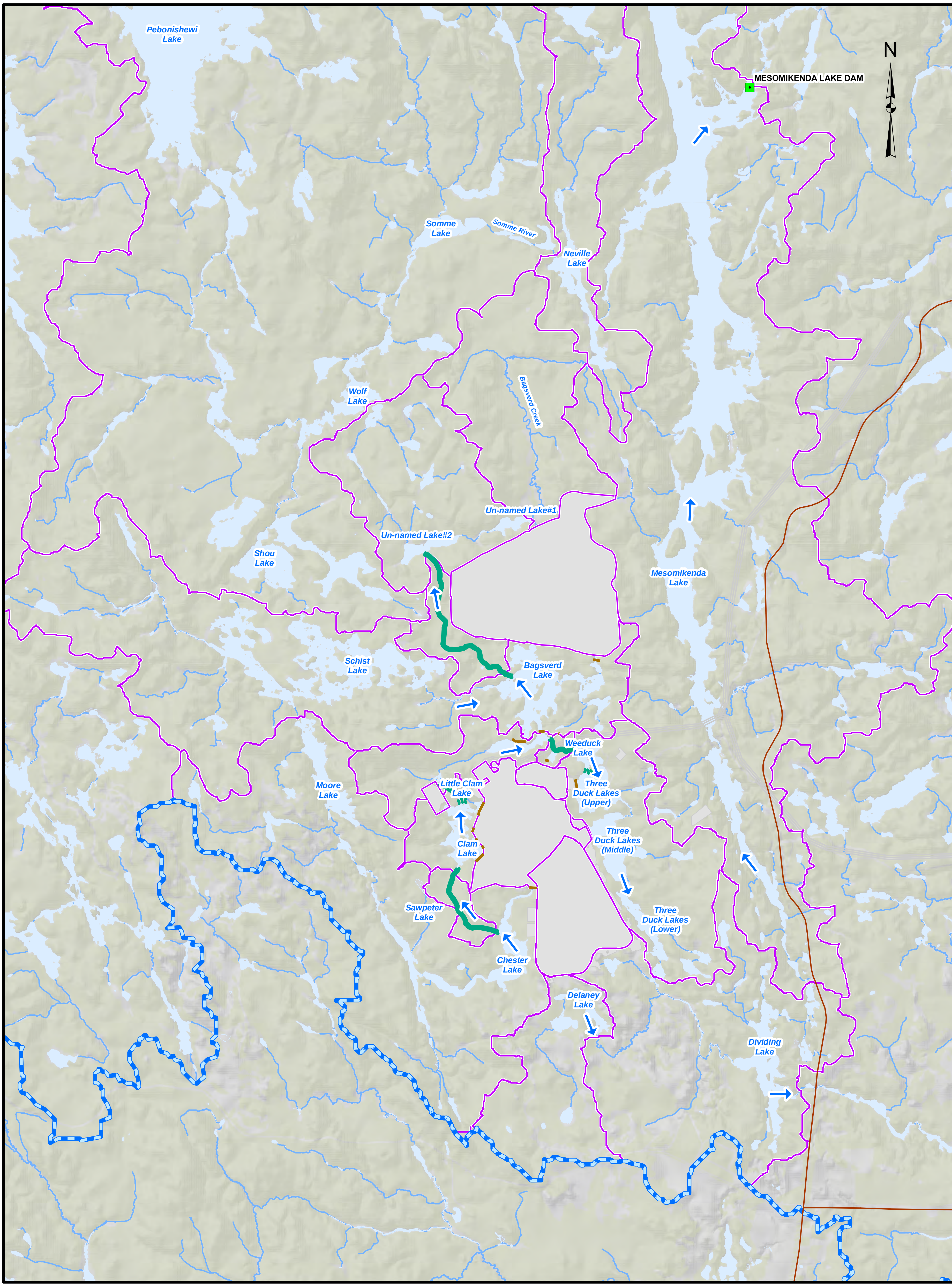
TITLE

Existing Conditions Watersheds

Golder Associates
Sudbury, Ontario

PROJECT No. 13-1192-0021			SCALE AS SHOWN	REV. 1
DESIGN	RRD	Feb. 2013	FIGURE: 3	
GIS	RRD	May 2014		
CHECK	SF	May 2015		
REVIEW	SK	May 2015		

Path: A:_Clients\IAMGOLD\Cote Lake\99_PROJ\1400877\40_PROD\CS-Water Resources\1400877-0001-CS-0012.mxd



LEGEND

Dams (OPG)	Creek / River
Watercourse Realignment	Waterbodies
Dam	Wooded Areas
Major Roads	
James Bay / Great Lakes Watershed Divide	
Infrastructure Watersheds	
Infrastructure	
Waterflow	

4,000 0 4,000

SCALE 1:90,000 METRES

REFERENCE

Base Data - MNR NRVIS, CANMAP v2008.4
Produced by Golder Associates Ltd under licence from Ontario Ministry of Natural Resources, © Queens Printer 2013

Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17

PROJECT

IAMGOLD

HYDROLOGICAL MODELLING REPORT
CÔTÉ GOLD PROJECT

TITLE

Operations Phase
Post-Closure Phase Stage I
Watersheds

Golder Associates
Sudbury, Ontario

PROJECT No. 13-1192-0021			SCALE AS SHOWN	REV. 1
DESIGN	RRD	Feb. 2013	FIGURE: 5	
GIS	RRD	May 2015		
CHECK	SF	May 2015		
REVIEW	SK	May 2015		

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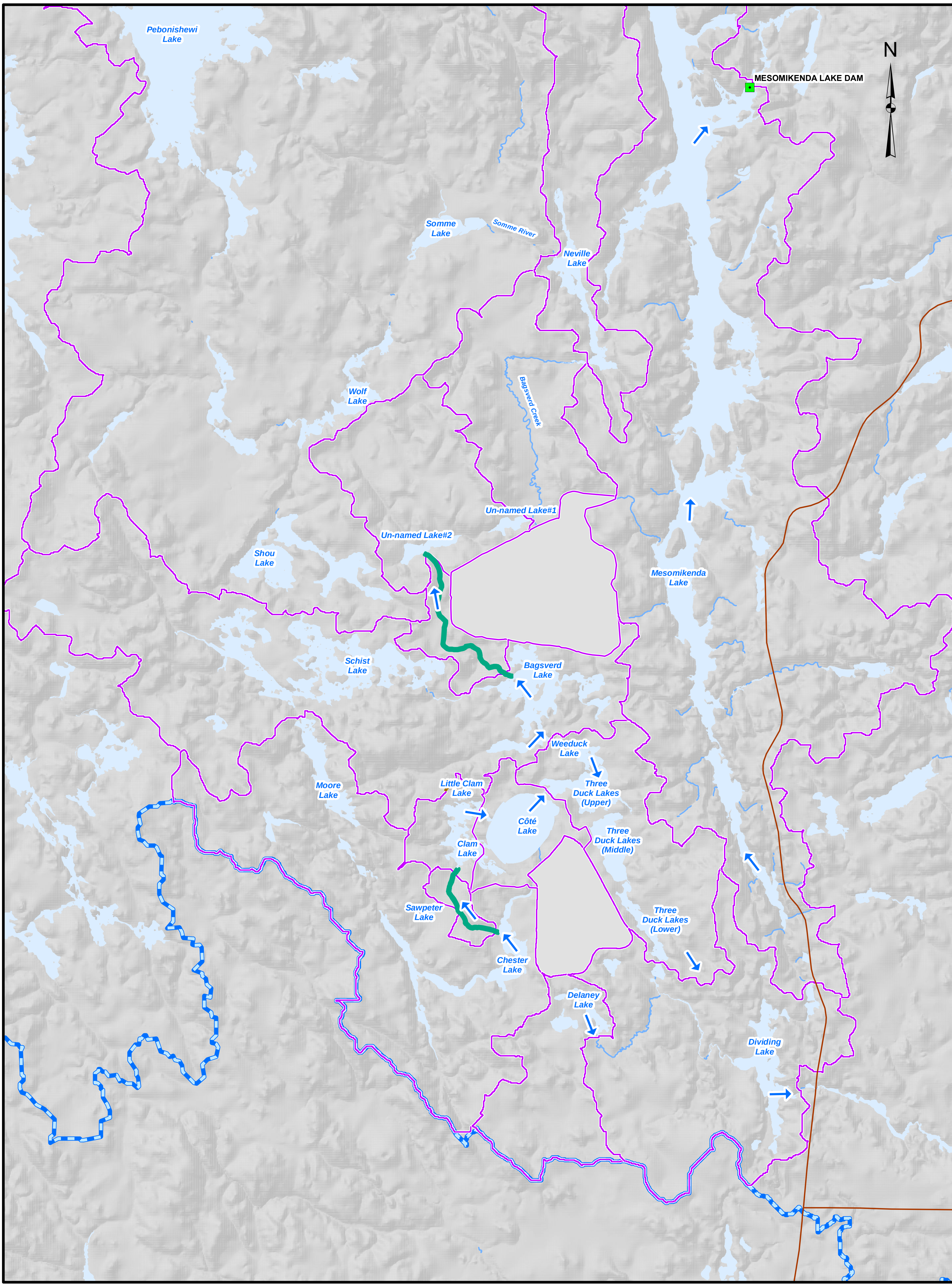


LEGEND

- Dams (OPG)
- Closure_Dams
- Watercourse Realignment
- Major Roads
- Watersheds
- Waterflow
- James Bay / Great Lakes Watershed Divide
- Infrastructure
- Waterbodies
- Creek / River
- Wooded Areas

4,000 0 4,000

SCALE 1:90,000 METRES

REFERENCE

Base Data - MNR NRVIS, CANMAP v2008.4
Produced by Golder Associates Ltd under licence from Ontario Ministry of Natural Resources,

Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17

PROJECT

IAMGOLD

HYDROLOGICAL MODELLING REPORT
CÔTÉ GOLD PROJECT

TITLE

Post-Closure Phase Stage II Watersheds

Golder Associates
Sudbury, Ontario

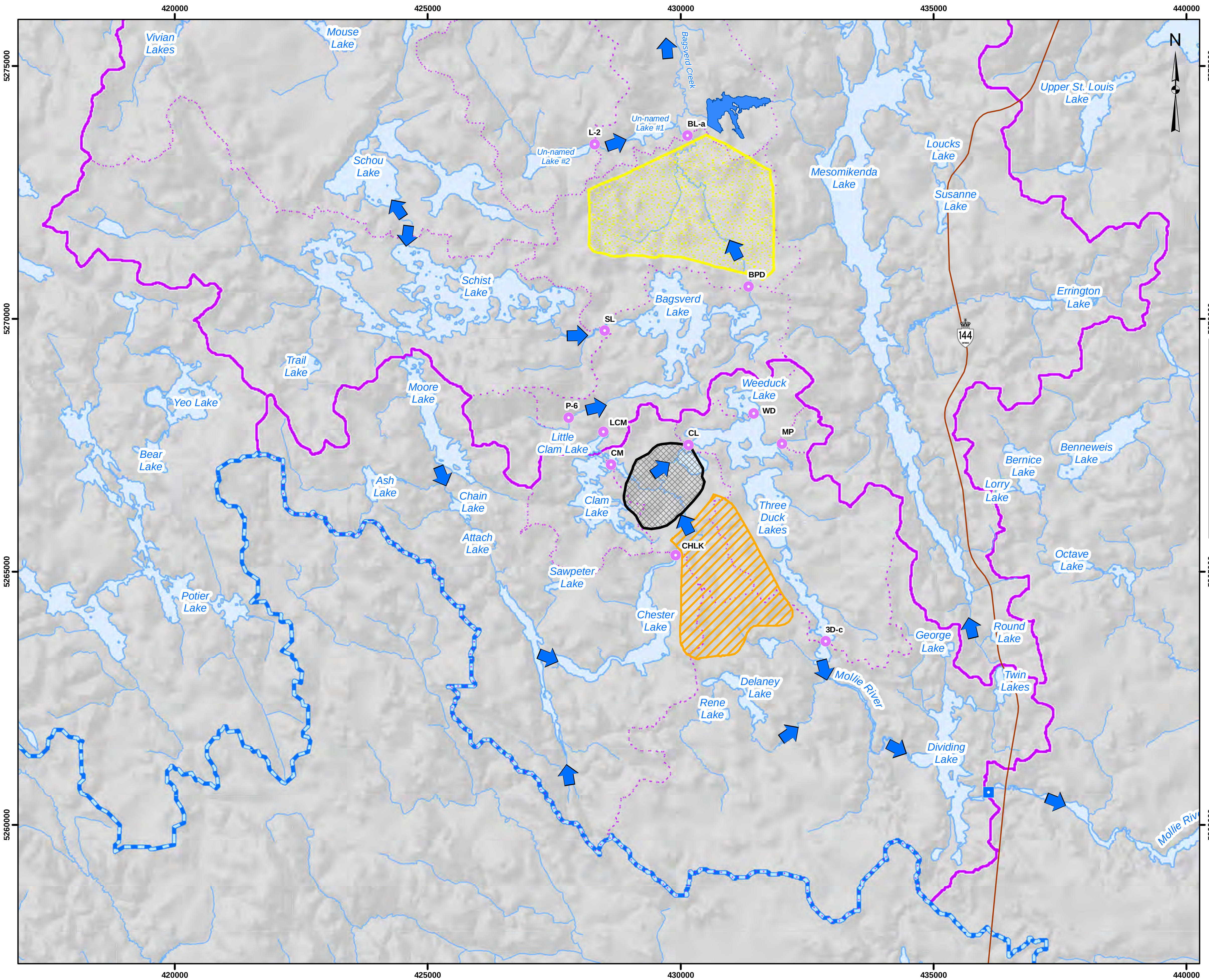
PROJECT No. 13-1192-0021		
DESIGN	RRD	Feb. 2013
GIS	RRD	May 2014
CHECK	SF	May 2015
REVIEW	SK	May 2015

SCALE AS SHOWN REV. 1

FIGURE: 8

Path: A:_Clients\IAMGOLD\Cote Lake\99_PROJ\1400877\40_PROD\CS-Water Resources\1400877-0001-CS-0011.mxd

Erratum to Comment #F166



LEGEND

- Major Road
- Local Hydrology Monitoring Station
- Regional Hydrological Monitoring Location
- Polishing Pond
- Mine Rock Area (MRA)
- Open Pit
- Tailings Management Facility (TMF)
- Sub-Watersheds
- Watershed Boundary
- Arctic/Atlantic Watershed Divide

Site ID	Location Description	Northing (NAD83 Zone 17N)	Easting (NAD83 Zone 17N)	Upstream Drainage Area (km^2)
P-6	West Beaver Pond Outflow	5268056	427783	2
LCM	Little Clam Lake Outflow	5267779	428484	0.3
CHLK	Chester Lake Outflow	5265373	429883	33
CL	Côté Lake Outflow	5267486	430164	43
MP	Mill Pond Outflow	5267531	431992	1
CM	Clam Lake Outflow	5267121	428624	4
WD	Weeduck Lake Outflow	5268135	431442	1
3D-C	Three Duck Lakes Outflow	5263621	432867	54

REFERENCE

Open Pit Shell provided by IAMGOLD, May 2013
Base Data - MNR NRVIS, CANMAP v2008.4
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2013
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17

2,000 0 2,000
SCALE 1:75,000 METRES

PROJECT
IAMGOLD CÔTÉ GOLD PROJECT

TITLE
Local Watersheds (Southern Portion)

Golder Associates
Sudbury, Ontario

PROJECT No. 13-1192-0021			SCALE AS SHOWN	REV. 1
DESIGN	RRD	Dec. 2012		
GIS	RRD	May 2015		
CHECK	SK	May 2015		
REVIEW	KAB	May 2015		

FIGURE: 9

Path: Z:\Projects\2013\13-1192-0021\GIS\MXDs\Reporting\Hydrology\Figure9_LocalWatershedSouth.mxd

It should be noted that revegetation will be a key aspect of the rehabilitation measures. This will occur through seeding and hand-planting of seedlings of indigenous plant species, as appropriate, to initiate colonization by those plant species. Investigations may be carried out to determine if the overburden may require any enhancement to facilitate revegetation, and to evaluate the possibility of establishing specific wildlife habitats following closure.

5.16.1 Components to be Closed

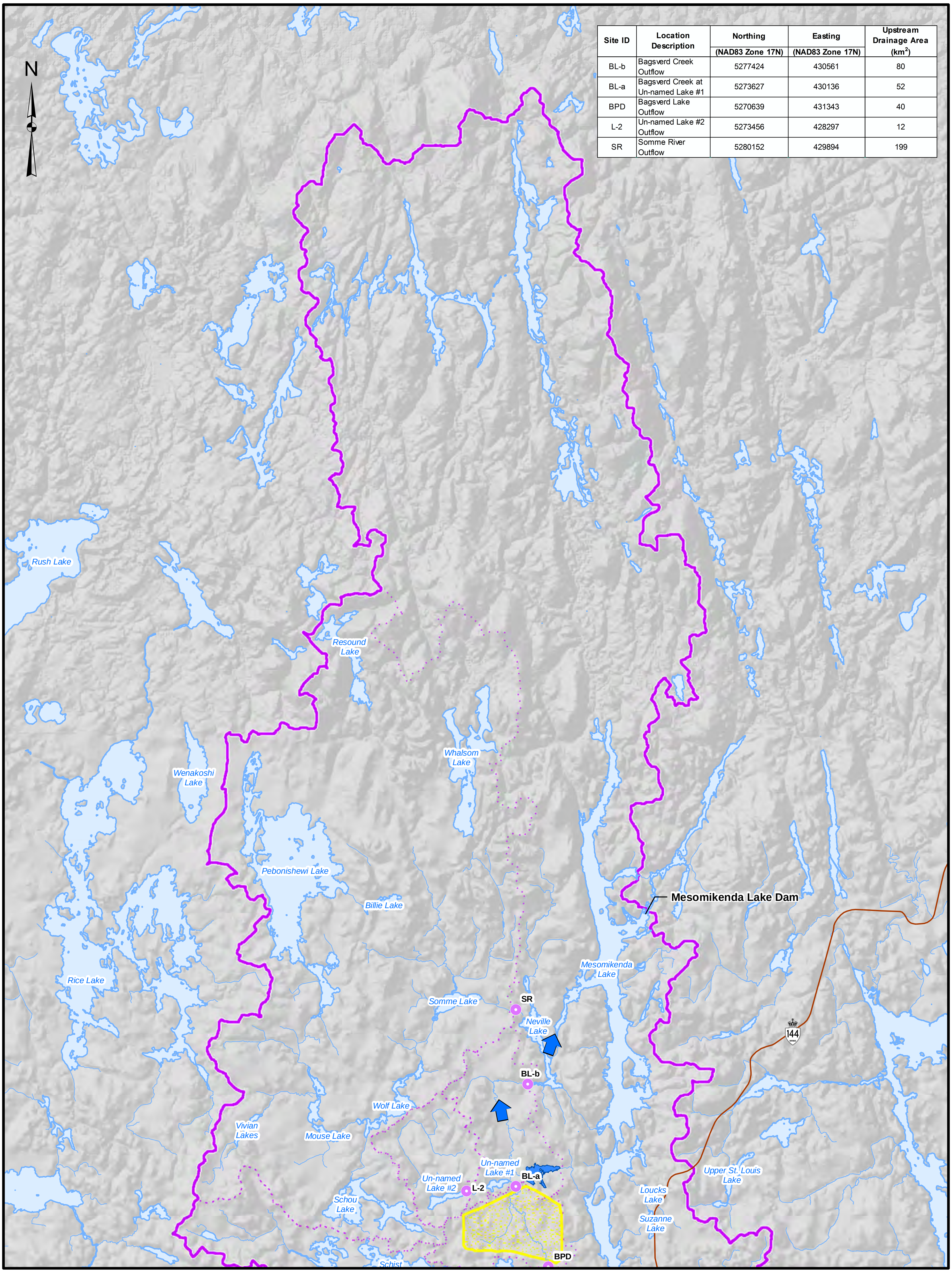
A conceptual layout of the Project site at the end of operations is provided in Figure 5-3. The Project components and associated infrastructure that will require closure include:

- open pit (including related perimeter dams) and associated dewatering infrastructure;
- MRA and associated ditching, seepage collection ponds, and piping/pumping equipment;
- low-grade ore stockpile and associated seepage collection ponds;
- TMF, reclaim pond and associated seepage collection ponds;
- aggregate pits;
- ore processing plant buildings and infrastructure (including machinery);
- accommodation complex and related facilities;
- petroleum products, chemicals and explosives;
- on-site roads, pipelines and power lines;
- general site drainage and water management structures;
- watercourse realignments; and
- waste management facilities.

The Côté Gold Project will be closed and rehabilitated in three stages: closure, post-closure stage I, and post-closure stage II. In accordance with the Mining Act, Regulation and Code, the first closure stage will encompass the three phases of active closure: Temporary Suspension; the state of Inactivity; and Closure (Close Out). During the first closure stage rehabilitation and infrastructure removal is expected to be completed within approximately 2 to 5 years of shutdown of operations. Post-closure stage I covers the period during which the open pit is rehabilitating (flooding), while stage II signifies the time period when the pit has flooded and most of the natural watercourse drainage patterns can be re-established. The conceptual plans for these three stages are briefly described in the following sections.

5.16.2 Closure Phase

The primary objective of the closure phase is to rehabilitate the Project site area to as near a productive and natural state as practical. All infrastructure is to be removed (unless otherwise stipulated, based on agreements with the respective authorities and local communities) and the



Site ID	Location Description	Northing (NAD83 Zone 17N)	Easting (NAD83 Zone 17N)	Upstream Drainage Area (km^2)
BL-b	Bagsverd Creek Outflow	5277424	430561	80
BL-a	Bagsverd Creek at Un-named Lake #1	5273627	430136	52
BPD	Bagsverd Lake Outflow	5270639	431343	40
L-2	Un-named Lake #2 Outflow	5273456	428297	12
SR	Somme River Outflow	5280152	429894	199

LEGEND

- Major Road
- Local Hydrology Monitoring Station
- Polishing Pond
- Tailings Management Facility (TMF)
- Watershed Boundary
- Sub-Watersheds

REFERENCE

Open Pit Shell provided by IAMGOLD, May 2013
Base Data - MNR NRVIS, CANMAP v2008.4
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2012
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17

5,000 0 5,000
SCALE 1:145,000 METRES

PROJECT
IAMGOLD
CÔTÉ GOLD PROJECT

TITLE
Local Watersheds (Northern Portion)

Golder Associates
Sudbury, Ontario

PROJECT No.13-1192-0021		
DESIGN	RRD	Dec. 2012
GIS	RRD	May 2015
CHECK	SK	May 2015
REVIEW	KAB	May 2015

SCALE AS SHOWN
REV. 1

FIGURE: 10

Z:\Projects\2013\13-1192-0021\GIS\MXDs\Reporting\Hydrology\Figure10_LocalWatershedNorthPotrait.mxd

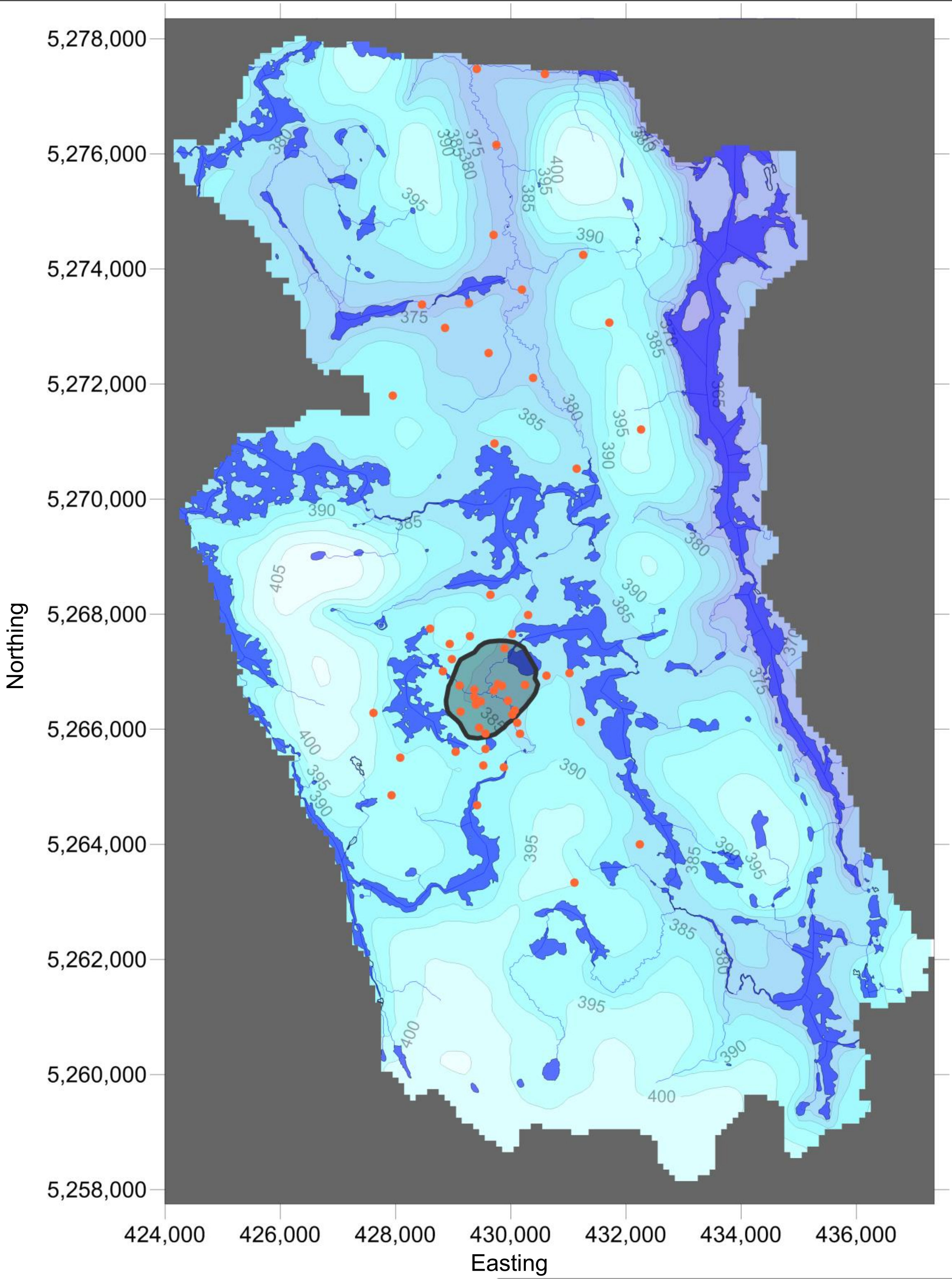
Erratum to Comment #F183

Côté Gold Project
Responses to Comments on the Amended EIS / Final EA Report
June 2015
Project #TC121522

SUPPORTING TABLES AND FIGURES

Côté Gold Project
Responses to Comments on the Amended EIS / Final EA Report
June 2015
Project #TC121522

Figures and Table to Comment #F70



Observation Well

Lakes

Conceptual Pit Outline

Rivers

Simulated Groundwater Elevation
5m Contour Interval

PROJECT

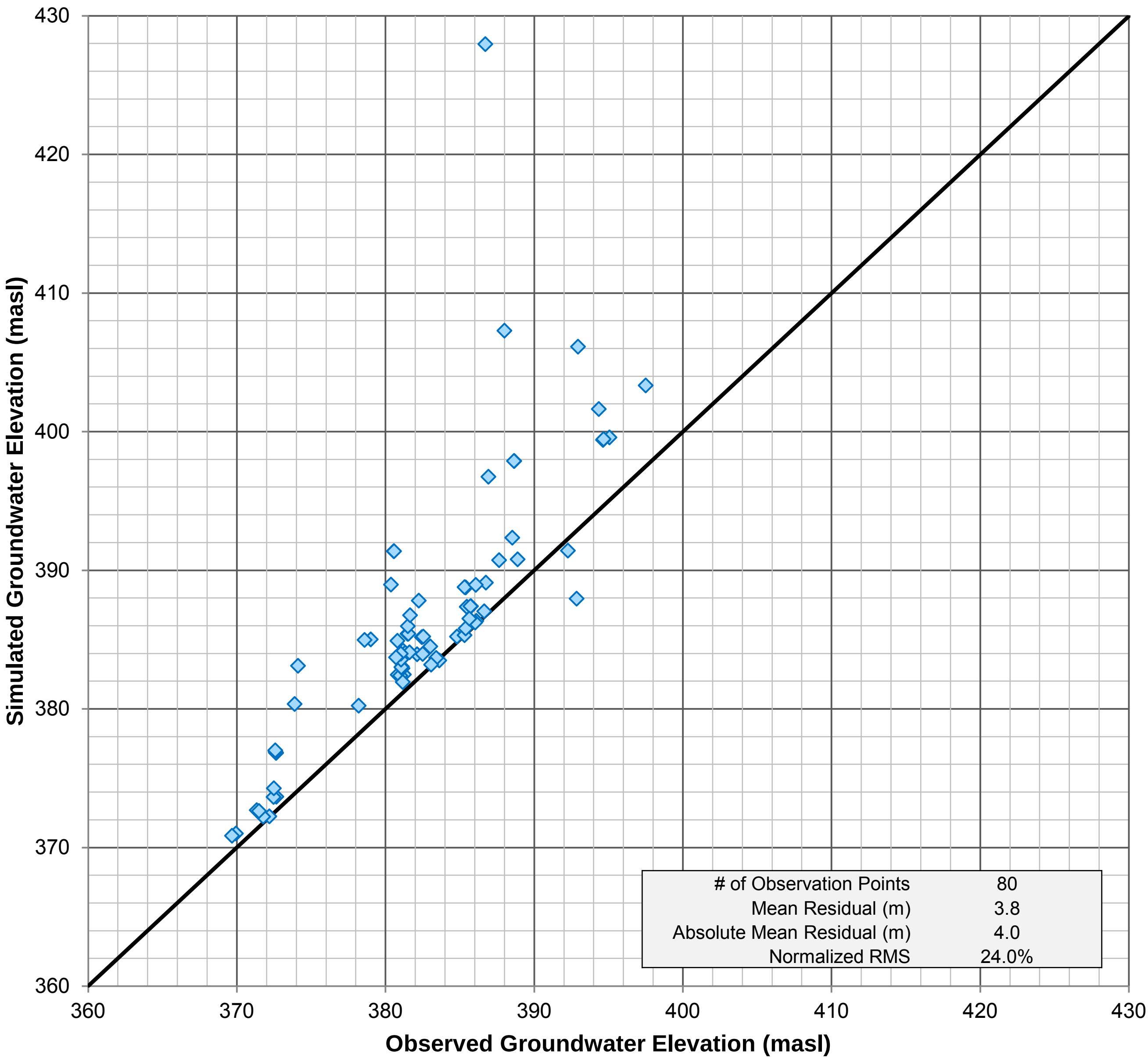
IAMGOLD Côté Gold Project

TITLE

SIMULATED GROUNDWATER ELEVATIONS
CURRENT AVERAGE CONDITIONS
(STEADY-STATE)

Golder Associates

PROJECT		1402173	FILE No.	
DESIGN	JER	2015/05	SCALE AS SHOWN	REV.
CADD	JER	2015/05	F70-1	
CHECK				
REVIEW				



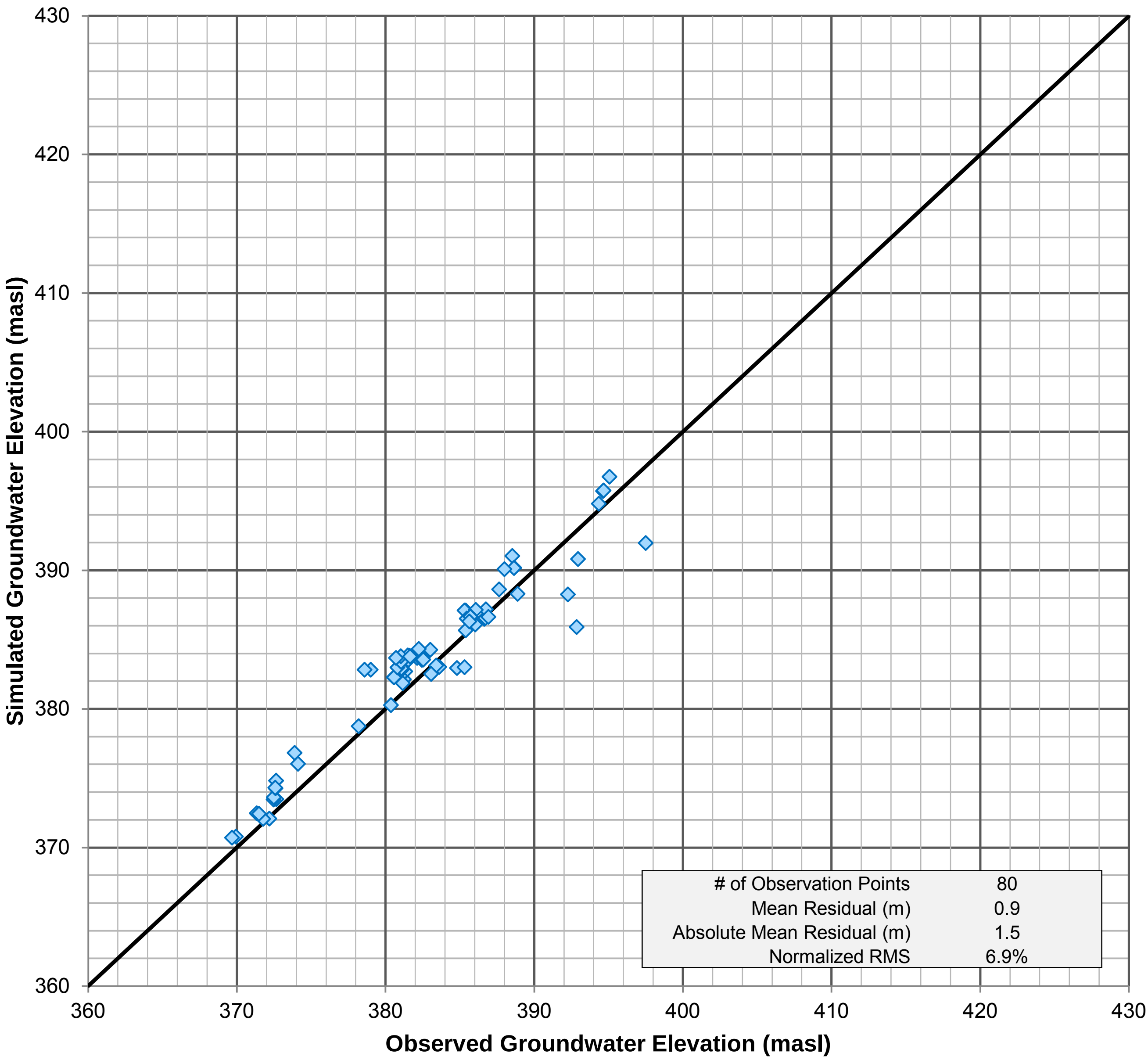
Note:

1. Residual calculated as simulated minus observed groundwater elevation.

PROJECT	IAMGOLD Côté Gold Project
TITLE	COMPARISON OF SIMULATED AND OBSERVED GROUNDWATER ELEVATIONS – ORIGINAL MODEL PARAMETERS - STEADY-STATE CALIBRATION

Golder Associates

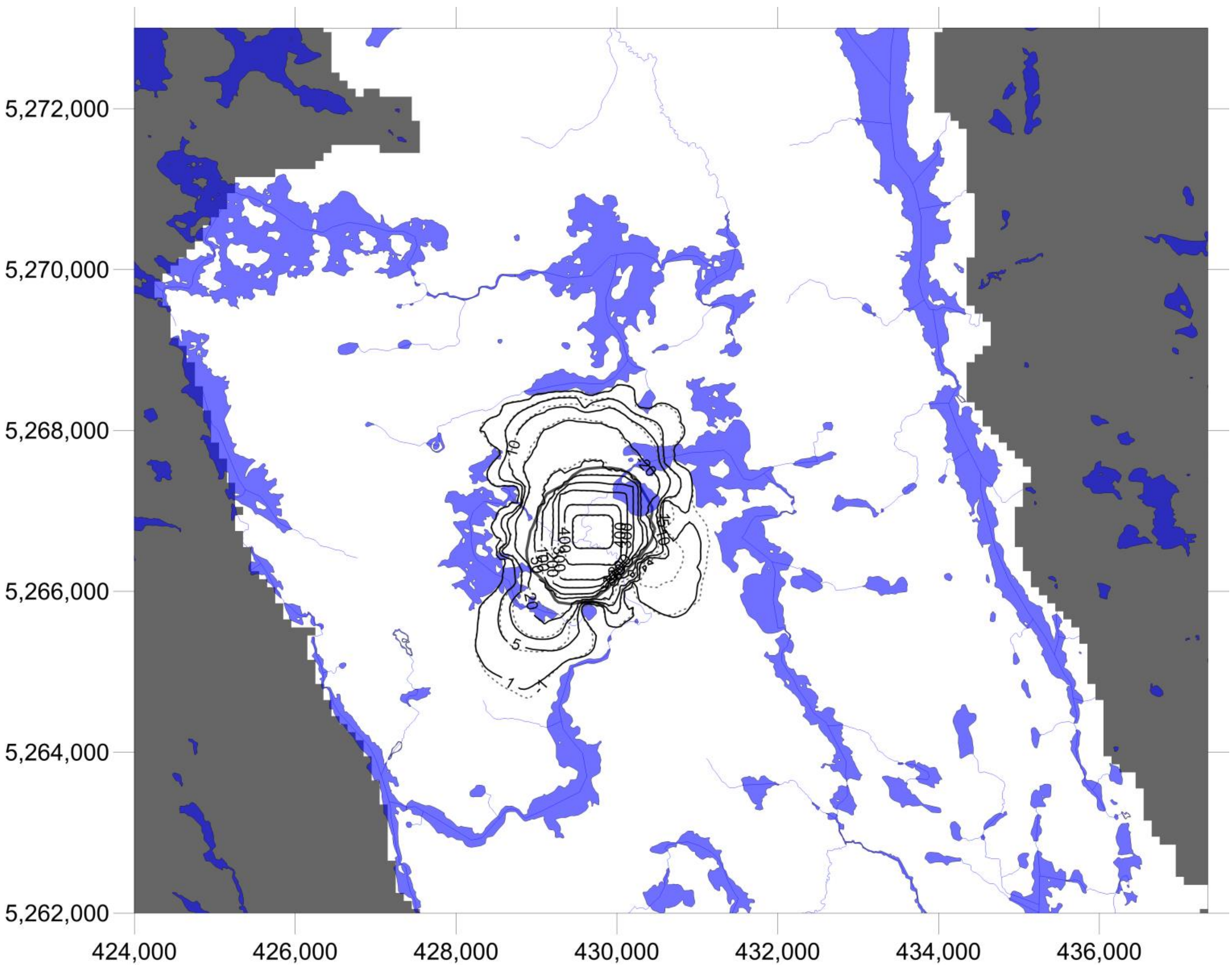
PROJECT		1402173	FILE No.	
DESIGN	JER	2015/05	SCALE AS SHOWN	REV.
CADD	JER	2015/05	F70-2	
CHECK				
REVIEW				



Note:

1. Residual calculated as simulated minus observed groundwater elevation.

PROJECT	IAMGOLD Côté Gold Project				
TITLE	COMPARISON OF SIMULATED AND OBSERVED GROUNDWATER ELEVATIONS – UPDATED MODEL PARAMETERS - STEADY-STATE CALIBRATION				
Golder Associates	PROJECT		1402173	FILE No.	
	DESIGN	JER	2015/05	SCALE AS SHOWN	REV.
	CADD	JER	2015/05	F70-3	
	CHECK				
	REVIEW				



Lakes

Conceptual Pit Outline

Rivers

Simulated Groundwater Drawdown - 2015

Simulated Groundwater Drawdown - 2013

PROJECT	IAMGOLD Côté Gold Project
TITLE	SIMULATED GROUNDWATER LEVEL CHANGE FROM CONSTRUCTION TO OPERATIONS PHASE, ULTIMATE PIT (m)

Golder Associates

PROJECT		1402173	FILE No.	
DESIGN	JER	2015/05	SCALE AS SHOWN	REV.
CADD	JER	2015/05	F70-4	
CHECK				
REVIEW				

Table to Comment #F70: Predicted Open Pit Groundwater Inflows Over Life of Mine

Phase (Years)	Approximate Greatest Pit Depth (m)	Pit Inflow (50 mm/yr infiltration) (m^3/day)	Pit Inflow (25 mm/yr infiltration) (m^3/day)
Existing	-	-	-
Construction	-	200	90
Operations	30	1,100	1,100
Operations	80	2,000	2,000
Operations	140	2,140	2,130
Operations	220	2,180	2,160
Operations	350	2,200	2,200
Operations	550	2,210	2,210

Note:
m – metre
m^3/day – cubic metres per day

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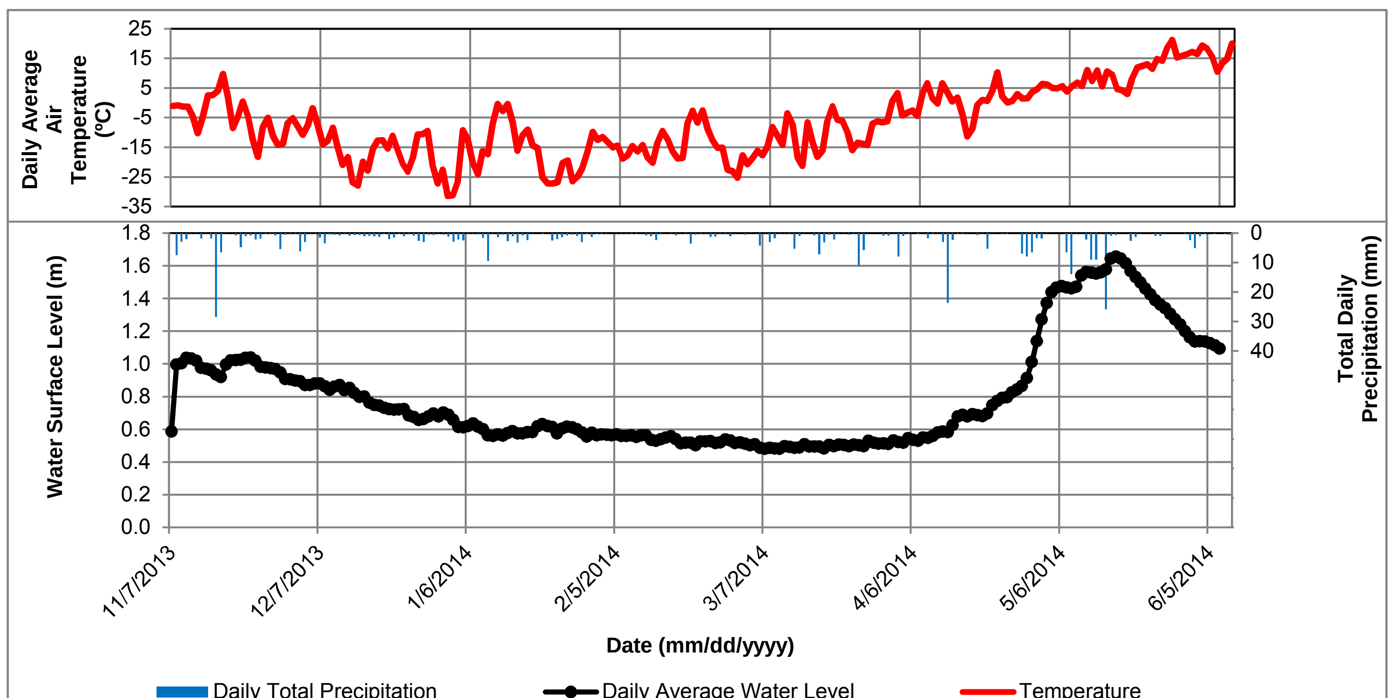
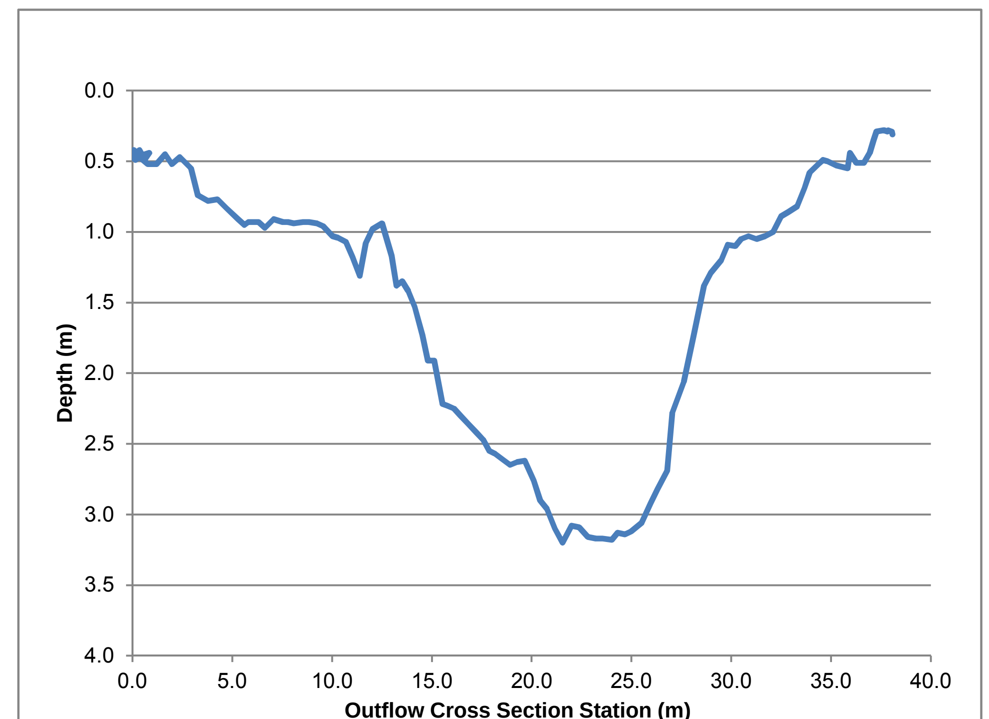
Sheet to Comment #F161

Neville Lake Outflow Upstream - May 2014

Neville Lake Outflow Downstream - August 2014

Note: Monitoring at the Neville station is ongoing and only preliminary data is presented.





Watercourse Name:	Neville Lake	Station Description	The Neville monitoring station is located on the western shore of Neville Lake across from the lake outlet. Discharge through the lake is dominated by upstream inflows from Bagsverd Creek (80 km^2) and the Somme River (199 km^2).
UTM Coordinates:	431212 E 5278277 N		
Staff Guage Elevation:	n/a		
Golder Associates		Equipment Installed	A pressure transducer was installed along the western shore across from the lake outlet in November 2013. The discharge measurements are conducted within the outlet channel.

Neville Lake (NL)

PROJECT:	1400877	DATE:	May-15	IAMGOLD Côté Gold	SHEET #F161

Table to Comment #F167

Table to Comment #F167: Lake Characteristics

Watershed	Lake Name	Surface Area (ha)	Maximum Depth (m)	Average Depth (m)
Mesomikenda Lake	Bagsverd Lake	215	9.0	2.9
	Little Clam Lake	7	6.0	1.8
	Mesomikenda Lake	1705	68.0	24.0
	Neville Lake	108	11.4	3.1
Mollie River	Chester Lake	98	15.0	3.2
	Clam Lake	80	10.5	4.1
	Côté Lake	18	4.0	2.1
	Delaney Lake	27	3.0	1.3
	Dividing Lake	129	40.0	6.0
	Three Duck Lakes	201	7.5	2.3
	Weeduck Lake	22	10.0	3.6

Note:
Lake characteristics as available via water quality profiles, bathymetric surveys and/or available mapping.

Table to Comment #F180

Table to Comment #F180: 7Q20 Unit Flow Characteristics

Site ID	Station Description	Period of Record[1]	Regulation as per WSC database	Watershed Area (km^2)	7Q20 unit Flow ($L/s/km^2$)
02JC008	Blanche River above Englehart	1968 - 2010	Natural	1782	1.27
04MD004	Porcupine River at Hoyle	1977 - 2013	Natural[2]	408	0.65
04LC002	Ivanhoe River at Foleyet	2001 - 2013	Natural	1641	1.12
04LA003	Tatchikapika River near Timmins	2005 - 2013	Natural	872	0.53
02CF012	Junction Creek below Kelly Lake	1977 - 2011	Natural[3]	199	1.80
02CF007	Whitson River at Chelmsford	1960 - 2011	Natural	278	0.97
Median					1.05

Notes:
[1] Period of record available at the time of the analysis.
[2] Noted that discharge is continuously affected by beaver activity and a control dam at tailings (mine) dump site.
[3] Urban station and potentially influenced by regulated inflows from upstream mining activities.

n:\active\2014\1190 sudbury\1192\1400877 iamgold ea follow-up gogama\reporting\responses to regulators\may 2015\hydrology\1400877 tables 7q and lake areas - sent 15may27.docx

SUPPORTING DOCUMENTS

IAMGOLD

amec foster wheeler

Build Heritage and Cultural Heritage Report

(See Comments #F87, F89 and F92)

CÔTÉ GOLD PROJECT
ENVIRONMENTAL ASSESSMENT REPORT
TECHNICAL SUPPORT DOCUMENT:
BUILT HERITAGE AND CULTURAL HERITAGE LANDSCAPE ASSESSMENT

Submitted to:
IAMGOLD Corporation
401 Bay Street, Suite 3200
Toronto, Ontario
M5H 2Y4

and

Submitted to:
THE ONTARIO MINISTRY OF TOURISM, CULTURE AND SPORT
401 Bay Street, Suite 1700
Toronto, Ontario
M7A 0A7

Submitted by:
AMEC Environment & Infrastructure,
a division of AMEC Americas Limited
160 Traders Blvd., Suite 110
Mississauga, Ontario
L4Z 3K7

May 2015

TZ12023.7008

TABLE OF CONTENTS

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GLOSSARY AND ABBREVIATIONS

Aboriginal	In the context of the Côté Gold Project, includes both First Nations and Métis people
the Agency	Canadian Environmental Assessment Agency
asl	above sea level
CEAA, 2012	Canadian Environmental Assessment Act, 2012
CMT	Culturally Modified Tree
CNR	Canadian National Railway
EA	Environmental Assessment
FN	First Nation(s)
ha	hectare(s)
km	kilometre(s)
kV	kilovolts(s)
MNDM	Ministry of Northern Development and Mines
MNR	Ministry of Natural Resources
MOE	Ministry of the Environment
MTCS	Ministry of Tourism, Culture and Sport
MW	megawatt(s)
OHA	Ontario Heritage Act
tpd	tonnes of ore per day
TSD	Technical Support Document

EXECUTIVE SUMMARY

The Côté Gold Project (the Project) is an advanced stage gold exploration project located in Chester and Neville Townships, District of Sudbury, northeastern Ontario, approximately 20 km southwest of Gogama, 130 km southwest of Timmins, and 200 km northwest of Sudbury (see Appendix I - Figure 1). IAMGOLD proposes to rehabilitate, construct and eventually operate a new open pit gold mine on the property.

The need to identify, evaluate, manage and conserve Ontario's heritage is acknowledged as a basic component of environmental assessment and municipal planning in Ontario. The analysis of cultural heritage resources in the study area addresses those above-ground, person-made heritage resources 40 years of age and older. The application of this rolling 40-year principle is an accepted federal and provincial practice for the preliminary identification of cultural heritage resources that may be of heritage value or interest. However, its application does not imply that all built heritage resources or cultural heritage landscapes that are over 40 years old are worthy of the same levels of protection or preservation.

Cultural heritage resources may be affected by Project development and its associated construction activities in many ways. The effects may include displacement (i.e. removal, demolition), or disruption, as a result of the introduction of physical, visual or atmospheric elements that are not in keeping with the character of the cultural heritage resources or their settings.

The Ministry of Tourism, Culture and Sport (MTCS) describes heritage buildings and structures, cultural heritage landscapes and archaeological resources as cultural heritage resources. Since cultural heritage resources may be affected adversely by both public and private land development, it is incumbent upon planning and approval authorities to consider heritage resources when making planning decisions.

Built heritage consists of individual, person-made or modified buildings or structures including, but not limited to: residences; industrial, institutional, religious, agricultural and commercial buildings; bridges; and monuments. Examples of cultural heritage landscapes are: historic settlements, farm complexes, waterscapes, roadscapes, and railways. These landscapes emphasize the interrelationship between people and the natural environment and convey information about the processes and activities that have shaped a community. Cultural heritage landscapes were not always purposely designed, but may have evolved organically. Some are 'continuing landscapes', which maintain historic land use patterns and continue to evolve, while others are 'relict landscapes', where the evolutionary process has come to an end but important landscape or built heritage resources from its historic use are still visible.

This report provides an assessment of the value or interest of cultural heritage resources in and adjacent to the Project area in accordance with the requirements of the *Environmental*

Assessment Act, Ontario Regulation 9/06 made under the *Ontario Heritage Act* (as amended in 2005), and the guidelines presented in the Ontario MTCS's *Ontario Heritage Tool Kit*. In addition, AMEC has noted potential impacts to each of the identified cultural heritage resources and has presented appropriate mitigation recommendations.

For the purposes of this built heritage and cultural heritage landscape assessment AMEC undertook the following tasks:

- Identification of major historical themes and activities of the study area in the Townships of Chester and Neville through historical research and a review of topographic and historic mapping.
- Review of the survey of lands within and adjacent to the proposed Project site as conducted by Dr. John Pollock of Woodland Heritage Services Limited, for a report entitled Côté Gold Project, Draft Environmental Assessment Report Technical Support Document, Archaeological Resource Assessment of the IAMGOLD Côté Project area, Chester, Yeo and Neville Townships, Subbury District, Ontario, submitted in draft to IAMGOLD Corportation, September 27, 2013. Further telephone and email communication with Dr. Pollock occurred in September and October 2013.
- Identification of cultural heritage landscapes and built heritage resources within the study area through the analysis of major historical themes and activities, historic mapping and consultation with Dr. Pollock.
- Identification of proposed changes in the study area and the consequent risks to significant built heritage and cultural heritage landscapes.
- Formulation of mitigation recommendations.

Twelve cultural heritage landscapes and nineteen built heritage resources were identified within the study area. Among the cultural heritage landscapes are: five remnants of Culturally Modified Trees (CMT) that served as Aboriginal and early Euro-Canadian trail markers; and seven remains of early trail systems, reflected today in open corridors through wooded areas. Build heritage resources include structural remains and implements related to early mining activities (see Appendix A – Figure 3, and Appendix B). Built heritage components are movable items such as barrels and wagon hubs, etc. These components could be documented in-situ and then removed to a secure location as needed. All of the heritage resources listed in Table 5-1 are considered to have cultural heritage value or interest.

As shown in Appendix A, Figure 3 the only impacts that will occur are on the resources near what was once the Shannon Cabin as shown in photographs 13 and 14. These two resources consist of remnants of a barrel stove and the remnants of a cross-cut saw. These two resources should be documented in-situ and removed to a secure location.

No other mitigation measures have been recommended as the planned Project activities will not impact or threaten these features. If future development is to occur in the immediate vicinity of these features, measures should be taken to advoid and protect them. If this is not possible within the development plan, these features should be thoroughly documented prior to their disturbance or removal.

PROJECT PERSONNEL

Project Director:	Linda Axford, Amec
Field Supervisor/Photographer:	Dr. John Pollock, Woodland Heritage Services Limited
Report Preparation:	Linda Axford, Amec
Graphics:	Robin Latour, Amec
Report Reviewer:	Shaun Austin, Amec

1.0 INTRODUCTION AND PROJECT OVERVIEW

The Côté Gold Project (the Project) is an advanced stage gold exploration project located in Chester and Neville Townships, District of Sudbury, northeastern Ontario, approximately 20 km southwest of Gogama, 130 km southwest of Timmins, and 200 km northwest of Sudbury (see Appendix A - Figure 1). IAMGOLD proposes to rehabilitate, construct and eventually operate a new open pit gold mine on the property.

This technical support document (TSD) has been prepared by AMEC and is one of a series of technical reports to support the environmental assessment (EA) for the Project.

The Côté Gold Project is expected to provide benefits to both the local area and the wider region by creating permanent employment opportunites for a large number of people. Approximately 1,200 people will be required during site construction and approximately 500 full time permanent positions will be available during operations. Northeastern Ontario has a long history of leadership in mining (see Appendix A - Figure 2), and the region's economic strategy aims to develop the area as a hub for mining services and technologies that can be applied on a global scale (Canadian Chamber of Commerce, 2013). The development of the Project will help support this strategy through a period of economic uncertainty which has seen a slow-down in exploration and development in the mining sector (HRSDC, 2013).

The undertaking, encompassing approximately 6,700 ha, is defined as the construction and development of a gold Project and associated facilites to produce doré bars for sale. To the extent practicable, the preliminary site layout proposes to place the required Project-related facilities in close proximity to the open pit (see Appendix A - Figure 3). Open pit mining operations will occur at a rate of approximately 60,000 tpd. Overburden, rock and low grade ore extracted from the open pit will be stored in nearby stockpiles. Project operations will be supported by the development of an explosives manufacturing and storage facility. Initial construction power will be provided by the existing connection to the Provincial electrical grid, supported by diesel power generator(s) (less than 5 MW required). Permanent power will be provided through a dedicated connection to a 230 kV transmission line, originating from a substation located within the City of Timmins.

Mineral exploration at the Côté Gold Project site has been carried out since about 1900 by various companies and government agencies and has continued sporadicaly to the present time. More concerted mineral exploration efforts were conducted in the early 1940's and from the early 1970's to about 1990.

The major proposed Project components are expected to include:

- open pit;
- ore processing plant;

- maintenance garage, fuel and lube facility, warehouse and administration complex;
- construction and operations accommodations complex;
- explosives manufacturing and storage facility;
- various stockpiles (overburden, low-grade ore and mine rock);
- aggregate extraction with crushing and screening plants;
- tailings management facility (TMF);
- on-site access roads and pipelines, power infrastructure and fuel storage facilities;
- potable and process water treatment facilities;
- domestic and industrial solid waste handling facilities;
- water management facilities and drainage works, including watercourse realignment; and
- transmission line and related infrastructure.

The approximate duration of the key Côté Gold Project phases are as follows:

- construction: 2 years;
- operations: 15 years; and
- closure: 2 years.

2.0 ENVIRONMENTAL ASSESSMENT REQUIREMENTS AND CULTURAL HERITAGE RESOURCES

2.1 Federal and Provincial Environmental Assessments

The Province of Ontario does not require assessment of mining projects in their entirety. Several individual aspects of the Côté Gold Project were, however, anticipated to require compliance with Provincial EA standards, including:

- the construction and operation of a 230 kV transmission line approximately 160 km in length (subject to an individual EA for a Permanent Power Supply);
- temporary diesel generation of between one and five MW of power (subject to a Class EA per the Electricity Projects Regulation, Ontario Regulation 116/01); and
- disposition of Crown resources, potentially related to Crown lands (such as work on streambeds/shorelands) and potential effects on species at risk (SAR) (Class EA for Ministry of Natural Resources (MNR) Resource Stewardship and Facility Development Projects) for both the Project site and the transmission line; and
- the development of a landfilling site or dump with a total waste disposal volume of more than 40,000 cubic metres (per Ontario Regulation 101/07 for Waste Management Projects).

An EA is a process to determine and manage the environmental effects of proposed projects before they are carried out. It identifies potential enviromental effects and proposes measures to mitigate adverse environmental effcts. The EA predicts whether there will be significant adverse environmental effects after mitigation measures are implemented. An EA includes a follow-up program to verify the accuracy of the EA and the effectiveness of the mitigation measures.

Federal and Provincial EAs in Ontario may be coordinated so that a single EA meets the legal requirements of both jurisdictions. The Ontario MOE leads this process in Ontario pursuant to the *Environmental Assessment Act*. Federally, the Canadian Environmental Assessment Agency (the Agency) leads this process pursuant to the *Canadian Environmental Assessment Act, 2012* (CEAA 2012).

Rather than meeting individual Provincial EA requirements to allow issuance of approvals to construct, IAMGOLD has entered into a Voluntary Agreement to compete a single coordinated Provincial EA process to meet these (or other) Provincial EA needs, and avoid the need and associated time for undertaking multiple Provincial EA processes. The EA will be completed in accordance with Section 6.1(2) of the Ontario *Environmental Assessment Act*; and will consider the whole Côté Gold Project rather than just those aspects having Provinical EA requirements.

This technical support document is one of a series of technical reports to support the EA for the Project.

2.2 Heritage Assessments as part of an Environmental Assessment

The need to identify, evaluate, manage and conserve Ontario's heritage is acknowledged as a basic component of environmental assessment and municipal planning in Ontario. The analysis of cultural heritage resources in the study area addresses those above-ground, person-made heritage resources 40 years of age and older. The application of this rolling 40-year principle is an accepted federal and provincial practice for the preliminary identification of cultural heritage resources that may be of heritage value or interest. However, its application does not imply that all built heritage resources or cultural heritage landscapes that are over 40 years old are worthy of the same levels of protection or preservation.

The analysis throughout the study process addresses Subsection 1(c) of the *Environmental Assessment Act*, which defines "*environment" as:*

> *"...cultural conditions that influence the life of humans or a community";* as well as, *"any building, structure, machine or other device or thing made by humans".*

Cultural heritage resources may be affected by Project development and its associated construction activities in many ways. The effects may include displacement (i.e., removal, demolition), or disruption, as a result of the introduction of physical, visual, audible or atmospheric elements that are not in keeping with the character of the cultural heritage resources or their settings.

2.3 Administration of Ontario Cultural Heritage Resources

The MTCS is responsible for the administration of the *Ontario Heritage Act*. The OHA provides the framework for provincial and municipal responsibilities and powers in the conservation of cultural heritage resources. The OHA gives MTCS the responsibility for the conservation, protection and preservation of Ontario's culture heritage resources. Section 2 of the OHA charges the Minister with the responsibility to:

> "...*determine policies, priorities and programs for the conservation, protection and preservation of the heritage of Ontario".*

MTCS describes heritage buildings and structures, cultural heritage landscapes and archaeological resources as cultural heritage resources. Since cultural heritage resources may be affected adversely by both public and private land development, it is incumbent upon planning and approval authorities to consider heritage resources when making planning decisions.

Built heritage consists of individual, person-made or modified buildings or structures including, but not limited to: residences; industrial, institutional, religious, agricultural and commercial buildings; bridges; and monuments. Examples of cultural heritage landscapes are: historic settlements, farm complexes, waterscapes, roadscapes, and railways. These landscapes emphasize the interrelationship between people and the natural environment and convey information about the processes and activities that have shaped a community. Cultural heritage landscapes were not always purposely designed, but may have evolved organically. Some are ‘continuing landscapes’, which maintain historic land use patterns and continue to evolve, while others are ‘relict landscapes’, where the evolutionary process has come to an end but important landscape or built heritage resources from its historic use are still visible.

This report provides an assessment of the value or interest of cultural heritage resources in and adjacent to the Project area in accordance with the requirements of the *Environmental Assessment Act*, Ontario Regulation 9/06 made under the *Ontario Heritage Act* (as amended in 2005), and the guidelines presented in the Ontario MTCS’s *Ontario Heritage Tool Kit*. In addition, AMEC has noted potential impacts to each of the identified cultural heritage resources and has presented appropriate mitigation recommendations.

3.0 METHODOLOGY

3.1 Spatial Boundaries

The Côté Gold Project is an advanced stage gold exploration project located in Chester and Neville Townships, District of Sudbury, northeastern Ontario, approximately 20 km southwest of Gogama, 130 km southwest of Timmins, and 200 km northwest of Sudbury (see Appendix A - Figure 1).

This Project area, which is characterized by gently rolling hills, forests, lakes and rivers, is located within the subwatersheds of the Mollie River and the Mesomikenda River. The Mollie River drains directly into Minisinakwa Lake, while Neville Lake drains into Mesomikenda Lake, the Makawi River and Minisinakwa Lake. From Minisinakwa Lake, water flows to the Minisinakwa River, Mattagami Lake and the Mattagami River, which flows northward through the City of Timmins. The Mattagami River (part of the Arctic watershed), flows northward and meets with the Moose River prior to discharging into James Bay.

A number of lakes are encompassed within the Côté Gold Project area, including Chester Lake, Clam Lake, Côté Lake, and Three Duck Lakes (see Appendix A - Figure 2). Small tributaries and water systems drain from the general site area into the Mollie River, including Clam Creek, an unnamed pond, and Mill Pond. The open water reach of the river, between Chester Lake and Côté Lake ranges in width from 5 to 20 m, with a depth of 1 to 2 m, and is bordered by a flooded grassy marsh, interspersed with dead coniferous trees. Numerous stands of planted Jack Pine occur adjacent to the marsh, and there is visible evidence of recent logging activities.

The Project area encompasses a moderately hilly mixed forest of birch, pine, poplar and spruce, along with bogs, fens and lakes commonly less than 10 m deep. Topographic elevations range from 375 to 425 m above sea level, averaging approximately 400 m above sea level near the Project site. Upland sections contain a veneer of glacial till over bedrock, or exposed bedrock, typical of the Canadian Shield. The thickest topsoils are found in the low-lying areas between the hills.

The Project area is accessible by Highway 144 to the east via the Mesomikenda Lake access road. Highway 144 connects with Sudbury in the south, Gogama, and Timmins in the north. Gogama is situated near the Canadian National Railway line and is connected to the electrical grid. Road access the site is planned, although the route has not yet been defined. This access route is not expected to have any major water crossings. The intercontinental watershed divide is located more than 3.5 km south of the proposed open pit location.

No First Nation reserve lands overlap the site. The closest reserve, Mattagami 71, is located approximately 40 km to the north (see Appendix A - Figure 1).

Current land use in the area consists of recreational activities by locals and tourists, including fishing, camping and hunting. The area is also used extensively for the sustainable harvesting of timber. There is no active agricultural use in the Project area. The majority of the land within and surrounding the site is classified under the Canada Land Inventory as having little to no capacity for arable agriculture or permanent pasture (Agriculture and Agri-Food Canada, 2011). Historically, small farms existed near Gogama to support the Canadian National Railway (CNR) worker camps. The lands directly associated with the Côté Gold Project do not appear to be currently used for a particular purpose other than as a resource extraction area and recreation area.

3.2 Temporal Boundaries

The temporal boundaries of the EA will span all phases of the Project:

- construction;
- operations;
- closure; and
- post-closure.

3.3 Selection of Effects Assessment Factors

The effects assessment factors selected for the Built Heritage and Cultural heritage landscapes are presented below:

- destruction of any, or part of any, built heritage resources, cultural heritage landscapes, heritage attributes or features;
- alteration that is not sympathetic to, or is incompatible with, the historic fabric and appearance of cultural heritage resources;
- shadows created that alter the appearance of a built heritage resource, cultural heritage landscape, or heritage attribute, or that change the viability of a natural feature or plantings, such as a garden;
- isolation of a built heritage resource or heritage attribute from its surrounding environment, context or a significant contextual relationship;
- direct or indirect obstruction of significant views or vistas within, from, or of, built heritage resources or cultural heritage landscapes; and
- a change in land use such as rezoning a battlefield from open space to residential use, allowing new development or site alteration to fill in the formerly open spaces.

The rationale for selection of these factors is presented below:

- municipal, provincial and federal registers of properties of cultural heritage value, non-governmental heritage organizations, municipal heritage committees;

- cultural heritage evaluation report, and heritage impact assessment; and
- the MTCS's Standards and Guidelines for the Conservation of Provincial Heritage Properties (2011).

3.4 Prediction of Effects

For the purposes of this built heritage and cultural heritage landscape assessment AMEC undertook the following tasks:

- Identification of major historical themes and activities of the study area in the Townships of Chester and Neville through historical research and a review of topographic and historic mapping.
- Review of the survey of lands within and adjacent to the proposed Project site as conducted by Dr. John Pollock of Woodland Heritage Services Limited, for a report entitled Côté Gold Project, Draft Environmental Assessment Report Technical Support Document, Archaeological Resource Assessment of the IAMGOLD Côté Project area, Chester, Yeo and Neville Townships, Subbury District, Ontario, submitted in draft to IAMGOLD Corportation, September 27, 2013. Further telephone and email communication with Dr. Pollock occurred in September and October 2013.
- Identification of cultural heritage landscapes and built heritage resources within the study area through the analysis of major historical themes and activities, historic mapping and consultation with Dr. Pollock.
- Identification of proposed changes in the study area and the consequent risks to significant built heritage and cultural heritage landscapes.
- Formulation of mitigation recommendations.

3.5 Identification of Heritage Resources

Consultation with the Planning Department for the Greater City of Sudbury confirmed that they only deal with the City of Greater Sudbury and that the Province administers that area through MTCS. Upon emailing a map of the project area to MTCS staff along with the Gogama Heritage Museum, it was discovered that none of the identified cultural heritage resources listed in Table 5-1 have been designated under Part IV of the *Ontario Heritage Act.* There were also no provincial heritage properties under part III.1 of the *Ontario Heritage Act* as the entire project area is privately owned. In addition, there are no road bridges listed in the *Ontario Heritage Bridge Guideline* and no identified *Ontario Heritage Trust* easement properties or federally recognized properties within or adjacent to the study area.

4.0 HISTORICAL SUMMARY

4.1 History of the District of Sudbury

Starting in 1858, districts were created in Northern Ontario for the delivery of judicial and provincial government services (Archives of Ontario, 2013). As populations grew, new districts were created and boundaries changed. The Sudbury District, in Northeastern Ontario was created in 1894 from townships of eastern Algoma District and west Nipissing District. The overwhelming majority of the district (about 92%) is unincorporated and part of the Unorganized North Sudbury District. With the exception of Chapleau, all of the district's incorporated municipalities are found in the area immediately surrounding the City of Greater Sudbury to the west, east and south. North of the Greater Sudbury area, the district is sparsely populated; between Sudbury and Chapleau, only unincorporated settlements, ghost towns and small First Nations reserves are found.

4.2 History of Gogama

Gogama is the closest community to the study area. Gogama is an Ojibway word meaning "jumping fish", likely in reference to the many fish that abound the waters of Lake Miniskawa. A Hudson's Bay Company trading post was established in the area in the early 18th century. The Canadian Northern Railway (now the CNR) was extended through this area between 1911 and 1914. Gogama was first settled in 1917 by Arthur L'Abbé. The post office was opened shortly after in 1919. Gogama has relied heavily on the forestry industry although tourism is starting to benefit the hamlet as well (Gogama, 2013).

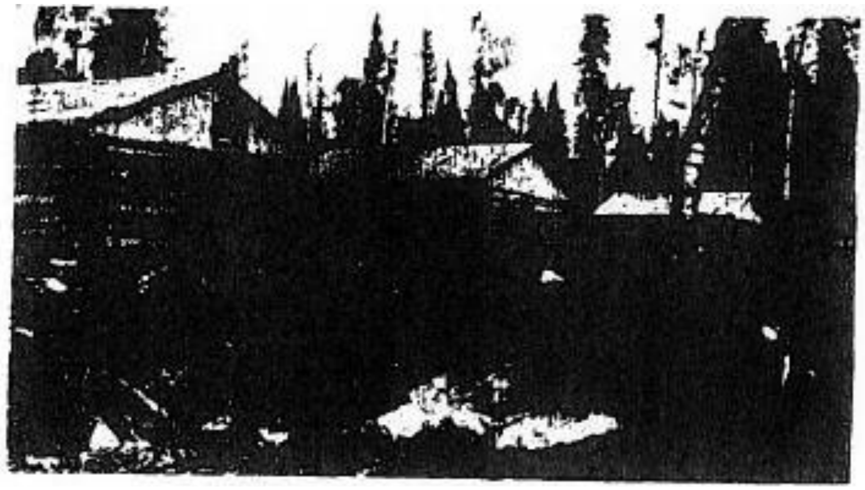
4.3 History of Mining in the Study Area

In 1932, H. C. Laird wrote in the *Geology of the Three Ducks Area* for the Ontario Department of Mines that:

> *In the summer of 1930, a spectacular discovery of native gold on the east shore of Three Ducks Lake, Chester Township, District of Sudbury, aroused new interest in an area that had seen prospecting in a quiet way at different times over a period of thirty years. This discovery, followed by others on the same lakes, caused an influx of prospectors during the summer of 1931, with the result that about 250 claims were staked along a favourable belt of rocks between Mesomikendo Lake and Schist Lake...The principal gold discoveries occur(red) in Chester Township which lies about 13 miles in a straight line southwest of Gogama, on the Canadian National Railway, and about 80 miles northwest of Sudbury (Laird, 1932).*

Early prospecting near the study area commenced around 1900 with the first claim staked in 1908 by J.A. Shannon and Charles Côté. In 1930 Alfred Gosselin found a large gold showing on the eastern shore of Three Duck Lakes (see Appendix A - Figure 2). This led to further activity through the entire area. In the *Geology of the Three Ducks Area,* Laird mentions Gosselin's south mining camp at Mesomikendo (see Photograph 4-1; Laird, 1932).

Photograph 4-1: The Gosselin Camp. Three Ducks Syndicate. Three Duck Lakes (Laird, 1932)



Mining camps from the early 1900's were crudely constructed of logs without thought for long-term habitation (see Photograph 4-2). Accordingly, early mining sites provide only occasional ruins.

Photograph 4-2: Typical 1930's Mining Camp Log Cabin (Department of Mines, 1932)

Claims were usually reached by canoe through the lakes, rivers and streams, with overland travel by means of portage routes already established by local First Nation groups in the summer and by “winter roads” in the winter. Winter roads were temporary roads carved out of ice and snow (see Photograph 4-3). These roads are generally built in areas where construction of year round roads is expensive due to the many river crossings and the presence of boggy muskeg land. When frozen in winter these roads are more economical then full year roads.

Photograph 4-3: Typical Winter Transportation to 1930’s Mining Camps (Ice Roads of Canada, 2013)

5.0 DESCRIPTION OF IDENTIFIED CULTURAL HERITAGE RESOURCE

Dr. John Pollock undertook a survey of the study area as part of an Archaeological Resource Assessment of the IAMGOLD Côté Gold Project in 2012. While doing the archaeological survey of the study area he also identified areas where runis of early 1930's prospecting or mining camps or habitations were present (see Table 5-1). The age of the initial Euro-Canadian settlement means that these habitations only remain as ruins. Adhering to the MTCS Standards and Guidelines for Consultant Archaeologists, Dr. Pollock identified not only archaeological resources but also built heritage and cultural heritage landscape resources (see Table 5-1). The property was surveyed when weather and lighting conditions permitted good visibility of land features. A GPS was used according to the requirements (set out in section 2.1.5 of the Standards and Guidelines for Consultant Archaeologists) to record the locations of diagnotic artifacts and all fixed reference landmarks. All field activities and conditions were mapped and photo-documented (see Appendix B). From Dr. Pollocks findings twelve cultural heritage landscapes and nineteen built heritage resources were examined. All thirty-one resources are briefly described and their value or interest, potential impact and mitigation suggestions are referenced in Table 5-1.

The province sets out criteria to aid in the evaluation of cultural heritage resources through Ontario Regulation 9/06 made under the *Ontario Heritage Act*. A property must meet one or more of the following criteria to be considered significant:

1. The property has design value or physical value because it,

   i. Is a rare, unique, representative or early example of a style, type, expression, material or construction method,

   ii. Displays a high degree of craftsmanship or artistic merit, or

   iii. Demonstrates a high degree of technical or scientific achievement.

2. The property has historical value or associative value because it,

   i. Has direct associations with a theme, event, belief, person, activity, organization or institution that is significant to a community,

   ii. Yields, or has the potential to yield, information that contributes to an understanding of a community or culture, or

   iii. Demonstrates or reflects the work or ideas of an architect, artist, builder, designer or theorist who is significant to a community.

3. The property has contextual value because it,

i. Is important in defining, maintaining or supporting the character of an area,

ii. Is physically, functionally, visually or historically linked to its surroundings, or

iii. Is a landmark.

Resources within the study area have been assessed on a preliminary basis against the above criteria to determine whether they have any cultural heritage value or interest that could deem the property significant. They have also been considered in terms of potential project impacts and mitigation measures. As shown in Appendix A, Figure 3 the only impacts are on the resources are photographs 13 and 14. These two built heritage components/artifacts consist of remnants of a barrel stove and the remnants of a cross-cut saw. These two resources should be documented in-situ and removed to a secure location. No other mitigations are recommended.

Photographs of all thirty-one identified Heritage Resources are documented in Appendix 2 and are located in Appendix 1, Figure 3.

Table 5-1: Cultural Heritage Landscapes and Built Heritage Resources in Study Area

Photo	Resource Category	Location	Brief Description	Value or Interest	Potential Impacts	Mitigation Recommended
1	CHL	Trail Marker	The remnant of a square stump that served as a marker of what had been a portage route.	-Yields or has the potential to yield, information that contributes to an understanding of a community or culture. -Is physically, functionally, visually or historically linked to its surroundings. -Is a landmark.	none	none

Photo	Resource Category	Location	Brief Description	Value or Interest	Potential Impacts	Mitigation Recommended
2	CHL	Trail Marker	The remnant of a Culturally Modified Tree with a blaze marking at what had been a portage route.	-Yields or has the potential to yield, information that contributes to an understanding of a community or culture. -Is physically, functionally, visually or historically linked to its surroundings. -Is a landmark.	none	none
3	CHL	Portage Route along Three Duck Lakes	A landing location for what had been a portage route.	-Yields or has the potential to yield, information that contributes to an understanding of a community or culture. -Is physically, functionally, visually or historically linked to its surroundings. -Is a landmark.	none	none
4	CHL	Portage Route from the middle Three Duck Lakes to the pond to the east.	A clearing in a wooded area of what had been a portage route.	-Yields or has the potential to yield, information that contributes to an understanding of a community or culture. -Is physically, functionally, visually or historically linked to its surroundings. -Is a landmark.	none	none

Photo	Resource Category	Location	Brief Description	Value or Interest	Potential Impacts	Mitigation Recommended
5	CHL	Portage Route	A clearing in a wooded area of what had been a portage route.	-Yields or has the potential to yield, information that contributes to an understanding of a community or culture. -Is physically, functionally, visually or historically linked to its surroundings. -Is a landmark.	none	none
6	CHL	Portage Route	A clearing in a wooded area of what had been a portage route.	-Yields or has the potential to yield, information that contributes to an understanding of a community or culture. -Is physically, functionally, visually or historically linked to its surroundings. -Is a landmark.	none	none
7	CHL	Portage Route	An approach to a clearing at the edge of a lake that marked what had been a portage route.	-Yields or has the potential to yield, information that contributes to an understanding of a community or culture. -Is physically, functionally, visually or historically linked to its surroundings. -Is a landmark.	none	none

Photo	Resource Category	Location	Brief Description	Value or Interest	Potential Impacts	Mitigation Recommended
8	CHL	Portage Route	The remnant of a Culturally Modified Tree with a blaze marking at what had been a portage route.	-Yields or has the potential to yield, information that contributes to an understanding of a community or culture. -Is physically, functionally, visually or historically linked to its surroundings. -Is a landmark.	none	none
9	CHL	Portage Route	An approach to a clearing at the edge of a lake that marked what had been a portage route.	-Yields or has the potential to yield, information that contributes to an understanding of a community or culture. -Is physically, functionally, visually or historically linked to its surroundings. -Is a landmark.	none	none
10	CHL	Portage Route from Bagsverd to Three Duck Lakes	The remnant of a Culturally Modified Tree with a blaze marking at what had been a portage route.	-Yields or has the potential to yield, information that contributes to an understanding of a community or culture. -Is physically, functionally, visually or historically linked to its surroundings. -Is a landmark.	none	none

Photo	Re-source Cate-gory	Location	Brief Description	Value or Interest	Poten-tial Impacts	Miti-gation Recom-mended
11	CHL	Portage Route from Bagsverd to Three Duck Lakes	The remnant of a Culturally Modified Tree with a blaze marking at what had been a portage route.	-Yields or has the potential to yield, information that contributes to an understanding of a community or culture. -Is physically, functionally, visually or historically linked to its surroundings. -Is a landmark.	none	none
12	CHL	Portage Route	A clearing in a wooded area of what had been a portage route.	-Yields or has the potential to yield, information that contributes to an understanding of a community or culture. -Is physically, functionally, visually or historically linked to its surroundings. -Is a landmark.	none	none
13	BH com-ponent/ artifact	Shannon Cabin Site	The remnants of a barrel stove.	-Has direct associations with a theme, event, belief, person, activity,organization or institution that is significant to a community. -Is physically, functionally, visually or historically linked to its surroundings.	Yes (see Appen-dix A, Figure 3)	Docu-mented in-situ and removed to a secure location

Photo	Resource Category	Location	Brief Description	Value or Interest	Potential Impacts	Mitigation Recommended
14	BH component/ artifact	Shannon Cabin Site	The remnants of a cross cut-saw.	-Has direct associations with a theme, event, belief, person, activity,organization or institution that is significant to a community. -Is physically, functionally, visually or historically linked to its surroundings.	Yes (see Appendix A, Figure 3)	Documented in-situ and removed to a secure location
15	BH	Clam Lake, Gold Mining Company Site	Cabin ruins.	-Has direct associations with a theme, event, belief, person, activity,organization or institution that is significant to a community. -Is physically, functionally, visually or historically linked to its surroundings.	none	none
16	BH	Clam Lake, Gold Mining Company Site	Cabin ruins.	-Has direct associations with a theme, event, belief, person, activity,organization or institution that is significant to a community. -Is physically, functionally, visually or historically linked to its surroundings.	none	none

Photo	Resource Category	Location	Brief Description	Value or Interest	Potential Impacts	Mitigation Recommended
17	BH	Headframe Point site	Ruins of the hoist room foundation.	-Has direct associations with a theme, event, belief, person, activity,organization or institution that is significant to a community. -Is physically, functionally, visually or historically linked to its surroundings.	none	none
18	BH	Young-Shannon Mine, near Côté Lake	Ruins of the former mill site.	-Has direct associations with a theme, event, belief, person, activity,organization or institution that is significant to a community. -Is physically, functionally, visually or historically linked to its surroundings.	none	none
19	BH	Young-Shannon Mine, near Côté Lake	Ruins of the corner of the mill.	-Has direct associations with a theme, event, belief, person, activity,organization or institution that is significant to a community. -Is physically, functionally, visually or historically linked to its surroundings.	none	none

Photo	Resource Category	Location	Brief Description	Value or Interest	Potential Impacts	Mitigation Recommended
20	BH component/ artifact	Young-Shannon Mine, near Côté Lake	Remnants of part of a steam engine that once powered the mill.	-Has direct associations with a theme, event, belief, person, activity,organization or institution that is significant to a community. -Is physically, functionally, visually or historically linked to its surroundings.	none	none
21	BH	Gosselin Mining Site	Ruins of a row boat.	-Has direct associations with a theme, event, belief, person, activity,organization or institution that is significant to a community. -Is physically, functionally, visually or historically linked to its surroundings.	none	none
22	BH component/ artifact	Gosselin Mining Site	Remnants of a wagon hub.	-Has direct associations with a theme, event, belief, person, activity,organization or institution that is significant to a community. -Is physically, functionally, visually or historically linked to its surroundings.	none	none

Photo	Resource Category	Location	Brief Description	Value or Interest	Potential Impacts	Mitigation Recommended
23	BH component/ artifact	Gosselin Mining Site	A large rusted barrel.	-Has direct associations with a theme, event, belief, person, activity,organization or institution that is significant to a community. -Is physically, functionally, visually or historically linked to its surroundings.	none	none
24	BH	Gosselin Mining Site	The cookery ruins.	-Has direct associations with a theme, event, belief, person, activity,organization or institution that is significant to a community. -Is physically, functionally, visually or historically linked to its surroundings.	none	none
25	BH	Gosselin Mining Site	The cookery ruins.	-Has direct associations with a theme, event, belief, person, activity,organization or institution that is significant to a community. -Is physically, functionally, visually or historically linked to its surroundings.	none	none

Photo	Resource Category	Location	Brief Description	Value or Interest	Potential Impacts	Mitigation Recommended
26	BH	Gosselin Mining Site	The bunkhouse ruins.	-Has direct associations with a theme, event, belief, person, activity,organization or institution that is significant to a community. -Is physically, functionally, visually or historically linked to its surroundings.	none	none
27	BH	Gosselin Mining Site	The wall ruins of the bunkhouse.	-Has direct associations with a theme, event, belief, person, activity,organization or institution that is significant to a community. -Is physically, functionally, visually or historically linked to its surroundings.	none	none
28	BH	Gosselin Mining Site	The remains of the bunkhouse door.	-Has direct associations with a theme, event, belief, person, activity,organization or institution that is significant to a community. -Is physically, functionally, visually or historically linked to its surroundings.	none	none

Photo	Resource Category	Location	Brief Description	Value or Interest	Potential Impacts	Mitigation Recommended
29	BH	Gosselin Mining Site	The remains of a window.	-Has direct associations with a theme, event, belief, person, activity,organization or institution that is significant to a community. -Is physically, functionally, visually or historically linked to its surroundings.	none	none
30	BH	Gosselin Mining Site	Ruins of the privy/ outhouse.	-Has direct associations with a theme, event, belief, person, activity,organization or institution that is significant to a community. -Is physically, functionally, visually or historically linked to its surroundings.	none	none
31	BH	Cryderman Site	Ruins of a small building.	-Has direct associations with a theme, event, belief, person, activity,organization or institution that is significant to a community. -Is physically, functionally, visually or historically linked to its surroundings.	none	none

Notes:
*CHL: Cultural Heritage Landscape
**BH: Built Heritage

6.0 CONCLUSIONS

Twelve cultural heritage landscapes and nineteen built heritage resources were identified within the study area. Among the cultural heritage landscapes are: five remnants of Culturally Modified Trees (CMT) that served as Aboriginal and early Euro-Canadian trail markers; and seven remains of early trail systems, reflected today in open corridors through wooded areas. Build heritage resources include structural remains and implements related to early mining activities (see Appendix A – Figure 3, and Appendix B). Built heritage components are movable items such as barrels and wagon hubs, etc. These components could be documented in-situ and then removed to a secure location as needed. All of the heritage resources listed in Table 5-1 are considered to have cultural heritage value or interest.

7.0 RECOMMENDATIONS

Mitigation is the process of causing lessening or negating anticipated adverse impacts to cultural heritage resources. It may include such actions as avoidance, monitoring, protection, relocation, documentation, salvage, remedial landscaping, etc., and may be a temporary or permanent action.

As shown in Appendix A, Figure 3 the only impacts that will occur are on the resources near what was once the Shannon Cabin as shown in photographs 13 and 14. These two resources consist of remnants of a barrel stove and the remnants of a cross-cut saw. These two resources should be documented in-situ and removed to a secure location.

No other mitigation measures have been recommended as the planned Project activities will not impact or threaten the heritage features due to their distance from the heritage resources. However, should any indirect or unintended impacts occur general mitigation measures should be taken such as:

- Construction lay down areas and haul routes for the Project should be placed to avoid identified built heritage resources or cultural heritage landscapes; and,
- Every effort should be made to reduce vibration impacts to built heritage resources identified in this report.

If future development is to occur in the immediate vicinity of these features, measures should be taken to avoid and protect them. In order of preference, these would include:

- Impacts should be avoided and project components and construction activities should be distanced from heritage resources;
- Mitigation should occur through changes in design, or alternative development approaches;
- Sympathetic alterations should occur that respects the heritage attributes of the cultural heritage resource;
- Layout or component design alternatives that could minimize visual intrusions;

- Separation distances or compatible visual barriers should be used that are specified to avoid or reduce visual impact to the identified heritage resource;
- Introduction of sympathetic plantings, materials and features;
- Where no in-situ conservation option is feasible, moving and/or relocating a built heritage resource; and/or interpretation and commemoration (where relevant);
- If heritage attributes are to be removed or the heritage resource is to be demolished, the heritage assessment report must include the rationale for removal and the process for documenting of existing conditions (e.g., photographs, measured drawings and salvage materials)

8.0 ASSESSOR QUALIFICATIONS

This report was prepared and reviewed by the undersigned, employees of AMEC, Environment & Infrastructure. AMEC is one of North America’s leading engineering firms, with more than 50 years of experience in the earth and environmental consulting industry. The qualifications of the assessors involved in the preparation of this report are provided in Appendix C.

9.0 CLOSURE

This report was prepared for the exclusive use of the IAMGOLD Corporation and is intended to provide a Built Heritage and Cultural Heritage Landscape assessment of the properity located in Chester and Neville Townships, District of Sudbury, northeastern Ontario, approximately 20 km southwest of Gogama, 130 km southwest of Timmins, and 200 km northwest of Sudbury, Ontario. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third party. Should additional parties require reliance on this report, written authorization from AMEC will be required. With respect to third parties, AMEC has no liability or responsibility for losses of any kind whatsoever, including direct or consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

The report is based on data and information collected during the background study and property inspection conducted by AMEC. It is based solely on a review of historical information and data obtained by AMEC as described in this report. Except as otherwise maybe specified, AMEC disclaims any obligation to update this report for events taking place, or with respect to information that becomes available to AMEC after the time during which Amec Foster Wheeler conducted the built heritage/cultural heritage landscape assessment.

In evaluating the study area, AMEC has relied in good faith on information provided by other individuals noted in this report. AMEC has assumed that the information provided is factual and accurate. AMEC accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

AMEC makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and change. Such interpretations and regulatory changes should be reviewed with legal counsel.

This report is also subject to the further Standard Limitations contained in Appendix D.

We trust that the information presented in this report meets your current requirements. Should you have any questions, or concerns, please do not hesitate to contact the undersigned.

Respectfully Submitted,

Amec Foster Wheeler
Environment & Infrastructure,

Prepared by,	Reviewed by,
Linda Axford Senior Heritage Specialist	Shaun Austin, Ph.D. Associate Archaeologist (P141)

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Ontario Regulation 9/06 made under the *Ontario Heritage Act, R.S.O. 1990, c.O.18, Criteria for Determining Cultural Heritage Value or Interest, January 2006.*

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Contacts

Frank Dieterman, Manager, Heritage Projects Infrastructure Ontario, October 1, 2013.

Amy Didrikson, Heritage Planner, Ministry of Tourism, Culture and Sport, September 27, 2013.

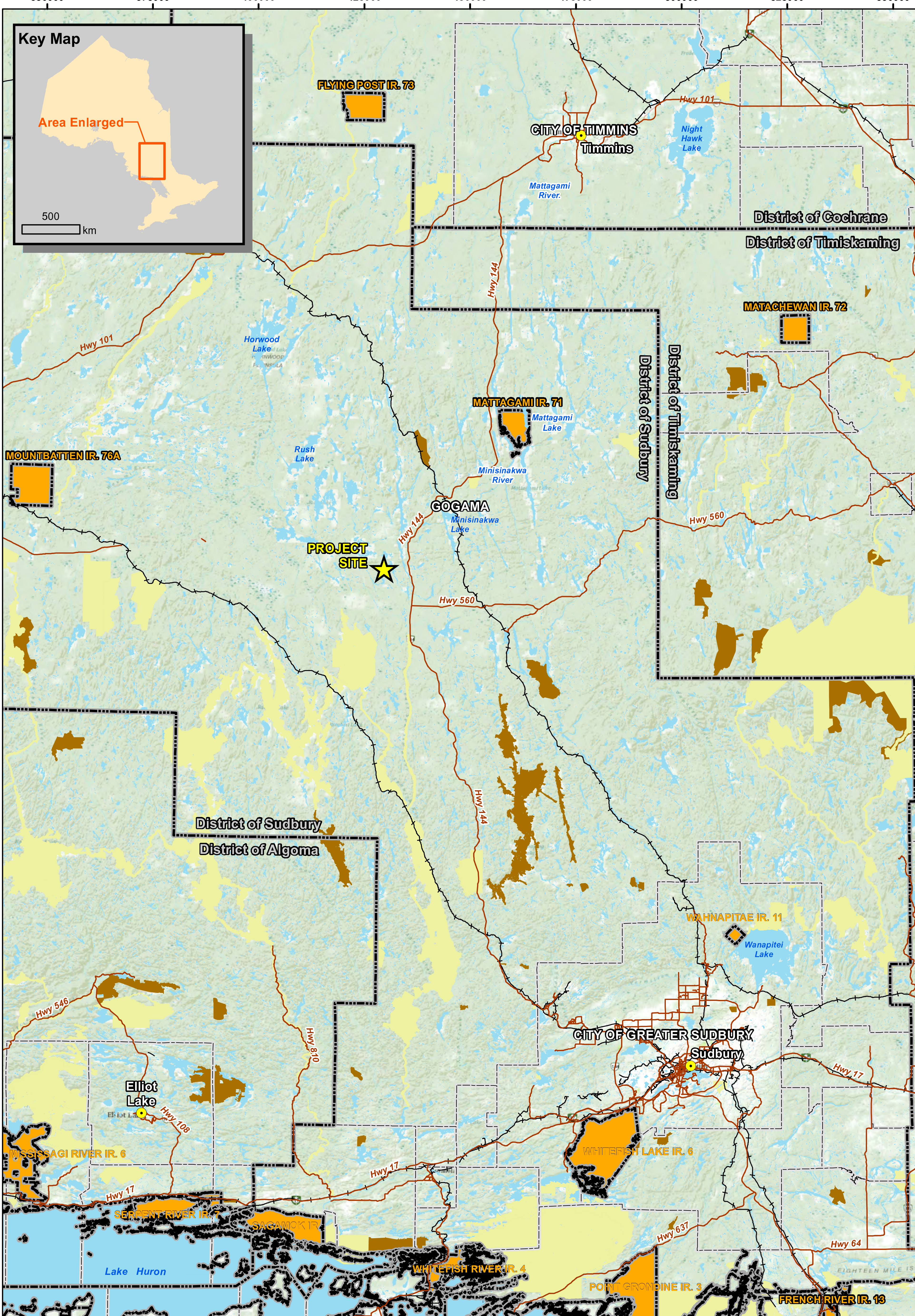
Kris Longston, Senior Planner, Community and Strategic Planning, City of Greater Sudbury.

September 24, 2013.

John Pollock, Woodland Heritage Services Limited, September 26, 27, 30 and October 10, 2013.

Gerry Talbot, Gogama Heritage Museum, October 2, 2013.

Appendix A
FIGURES



Path: C:\AMEC - Robin\Work in progress\Linda\Gold mine\Fig1 Project Location.pdf "Author, ken brookes, modified robin latour"

LEGEND

- Project Site Location
- Regional Communities
- Major Roads
- Railway
- Lower Tier Municipality Boundary
- Upper Tier Municipality Boundary
- First Nation Reserve
- Conservation Reserve (Regulated)
- Provincial Park
- Wooded Area
- Waterbody / Large Watercourse

NOTES:
- All base data on this map was extacted from Land Information Ontario, MNDMF, OBM Ontario Digital Geospatial Database and Ontario Road Network Database.

- Map has been modified from GIS for illustrative purposes.

Datum: NAD83
Projection: UTM Zone 17N

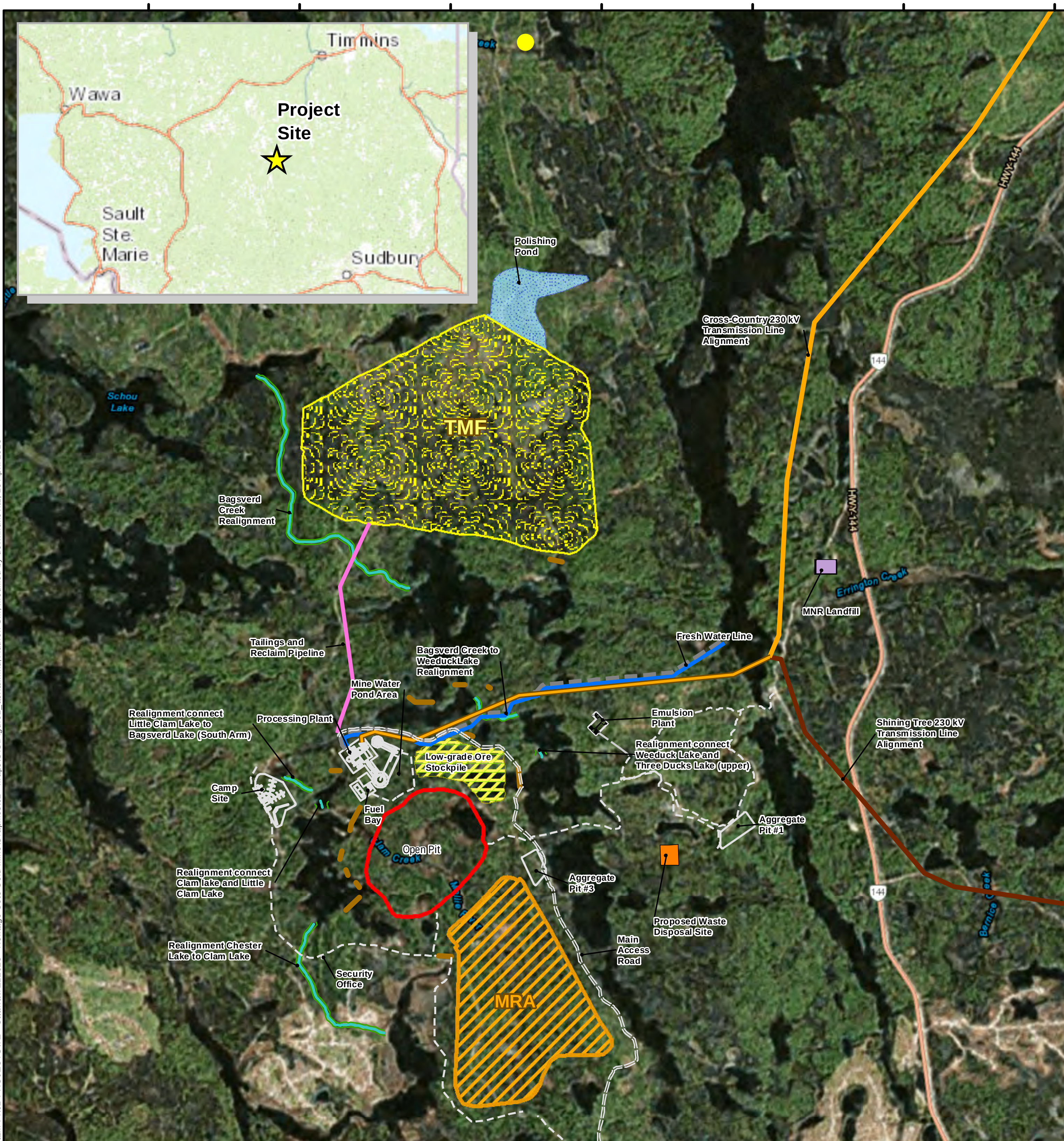
0 12.5 25 50 75 100 Kilometres

IAMGOLD CORPORATION amec

CÔTÉ GOLD PROJECT

Project Location

PROJECT Nº: TZ12023	**FIGURE: 1**
SCALE: 1:850,000	Date: May 2015



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LEGEND

- Open Pit
- Potential Discharge Locations
- Facilities
- Dam
- Main Access Road
- Access Road
- Cross-Country 230 kV Transmission Line Alignment
- Shining Tree 230 kV Transmission Line Alignment
- Tailings and Reclaim Pipeline
- Fresh Water
- Watercourse Realignment
- Polishing Pond
- Low-grade Ore Stockpile
- Proposed Mine Rock Area (MRA)
- Proposed Tailings Management Facility (TMF)
- Proposed Landfill
- MNR Landfill

0 1 2 3 4 5 Kilometres

NOTES:
- Aerial Imagery streamed from ESRI ArcGIS Online, 1999.
- TMF and subwatershed provided by Golder Associates.
- Watercourse realignment and proposed lake area provided by Calder Engineering.
- Surface infrastructure, open pit, landfill, MRA and transmission lines provided by IAMGOLD.

Datum: NAD83
Projection: UTM Zone 17N

N W E S

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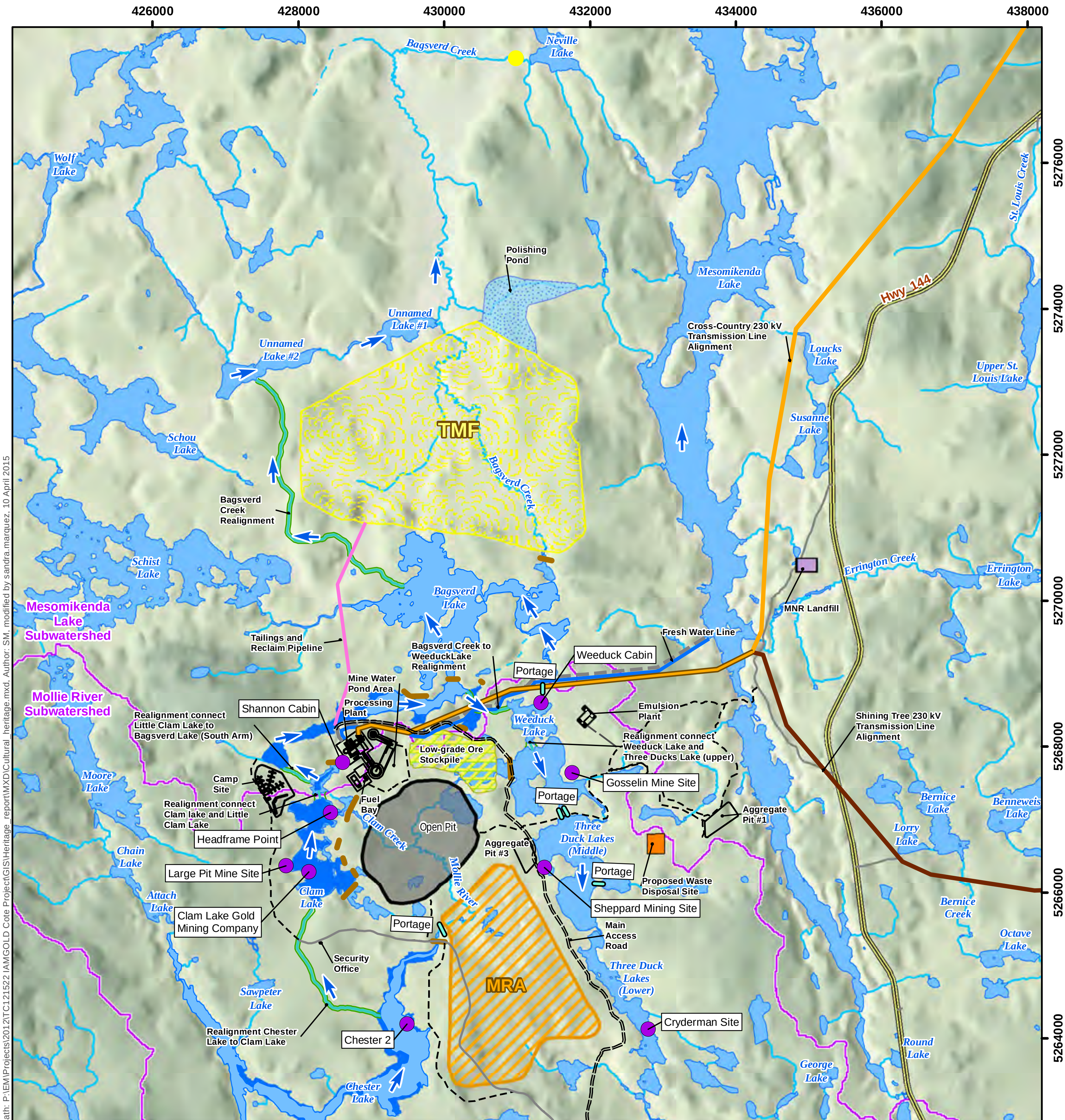
CÔTE GOLD PROJECT

Location of Site with Aerial Imagery

PROJECT N°: TC121522	**FIGURE: 2**
SCALE:1:70,000	DATE: May, 2015



LEGEND

- Built Heritage Resources
- Cultural Heritage Landscape
- Existing Intermittent Watercourse
- Existing Permanent Watercourse
- Existing Waterbodies
- Highway
- Local Road
- Subwatershed Boundary
- Wooded Area
- Open Pit
- Potential Discharge Locations
- Facilities
- Dam
- Main Access Road
- Access Road
- Cross-Country 230 kV Transmission Line Alignment
- Shining Tree 230 kV Transmission Line Alignment
- Tailings and Reclaim Pipeline
- Fresh Water
- Watercourse Realignment
- Proposed Water Flow Direction
- Proposed Lake Area
- Polishing Pond
- Low-grade Ore Stockpile
- Proposed Mine Rock Area (MRA)
- Proposed Tailings Management Facility (TMF)
- Proposed Landfill
- MNR Landfill

0 1 2 3 4 5 Kilometres

NOTES:
- Ontario base data extracted from Land Information Ontario (MNR)
- TMF and subwatershed provided by Golder Associates.
- Watercourse realignment and proposed lake area provided by Calder Engineering.
- Surface infrastructure, open pit, landfill, MRA and transmission lines provided by IAMGOLD.

Datum: NAD83
Projection: UTM Zone 17N

N W E S

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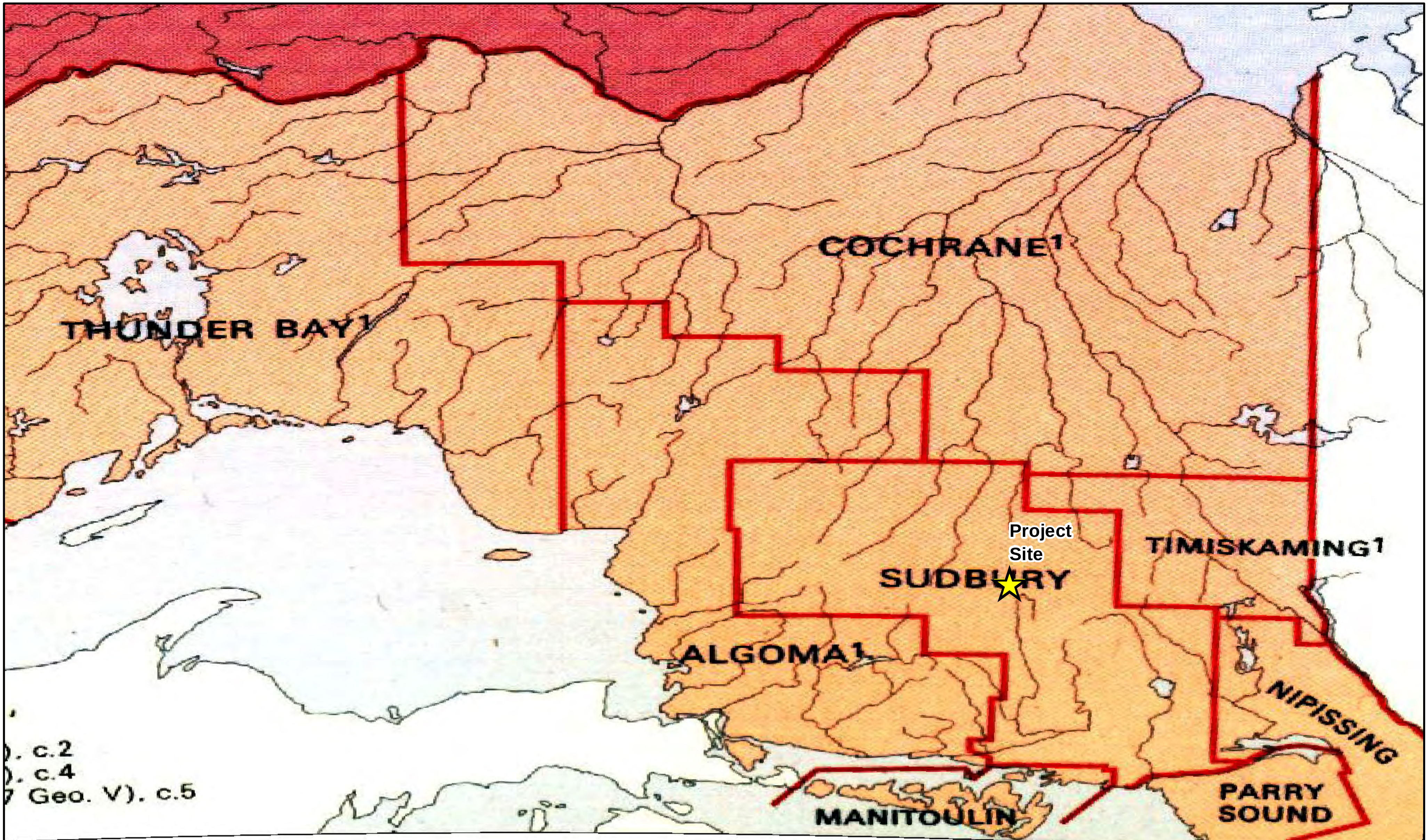
CÔTE GOLD PROJECT

Cultural Heritage Resources

PROJECT N^{o}: TZ12023	FIGURE: 3
SCALE:1:70,000	DATE: May, 2015

Path: P:\01-PROJECTS\TZ - Ottawa\TZ12023 - Heritage Cote Gold Mine\Graphics\02 - Maps\GIS\Figure4_Historic.mxd, Author: SM, modified by devin.funovitz, 13 April 2015



LEGEND

★ Site Location

NOTES:
Map scanned from the Economic Atlas of Ontario, W. G. Dean, Edito; G. J. Mathews, Cartographer.Printed 1969 by University of Toronto Press for the Government of Ontario.

Geographic Coordinate System: North American 1983 CSRS

0 100 200 300 400 500
Kilometres

N W E S

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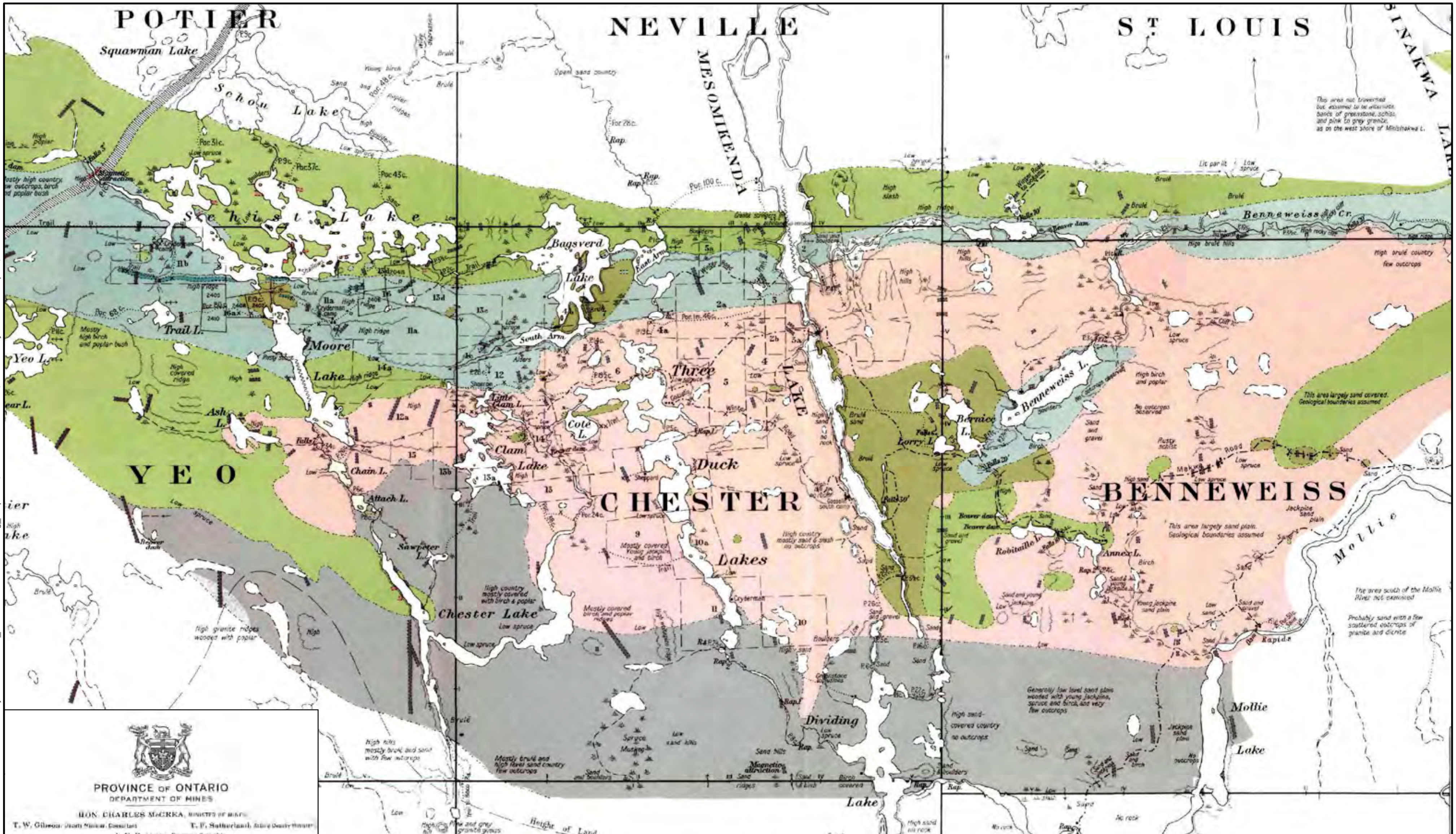
CÔTÉ GOLD PROJECT

Districts of Northern Ontario - 1927 Showing Site Location

PROJECT N^{o}: TC121522	**FIGURE: 4**
SCALE:1:4,500,000	DATE: May, 2015



LEGEND

PRE-CAMBRIAN

Keweenawan

Olivine diabase.

Matachewan*

Diabase dikes.

Algoman

Dikes of quartz-feldspar porphyry, feldspar porphyry, aplite porphyry.

Younger granite with diorite, granodiorite, alaskite facies; lamprophyre dikes, basic inclusions; gold-bearing quartz veins.

Older granite: pink to grey varieties with porphyritic, gneissic and lit-par-lit phases.

Granite-diorite complex, diorite breccia. The diorite may be pre-Algoman in age.

Pre-Algoman (Haileyburian?)

Diorite, quartz-diorite.

Timiskaming

Iron formation.

Sediments: schistose conglomerate, greywacke, arkose, quartzite, argillite, sericite schist, mica-hornblende schist.

Keewatin

Volcanics, schistose lavas basic to intermediate in composition, pillow lava, pyroclastics.

*This may include some dikes of Keweenawan age.

Symbols

85°
Strike and dip of schistosity.

Strike of vertical schistosity.

Geological boundary, defined.

Geological boundary, assumed.

Glacial striae.

Fault.

Hill.

Muskeg.

Kettle lake.

Trail or portage.

Wagon or winter road.

Cabin.

Prospect showing.

Old prospect shaft.

Key Groups of Claims

Lawrence.
Beaver-Bathna.
A. Brennan.
H. J. Brenner.
Labbé.
Three Ducks Syndicate.
Laflamme.
Sheppard.
Collins.
James Crydarman.
Russell Crydarman.
Chester Shannon Syndicate.
Shannon.
Young.
Coté.
Hopkins.
Porcupine Hedle Mines.

NOTES:

SOURCES OF INFORMATION

Township outlines from plans of the Ontario Department of Surveys.

Woman River Sheet, Map No. 2314 of the Geological Survey of Canada, by R. C. Emmons and E. Thomson, 1929, and also some unpublished map material.

Geology and additional topography by H. C. Laird.

Drawn for photo-lithography by J. F. Jameson.

Datum: NAD83
Projection: UTM Zone 17N

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IAMGOLD CORPORATION

amec

CÔTÉ GOLD PROJECT

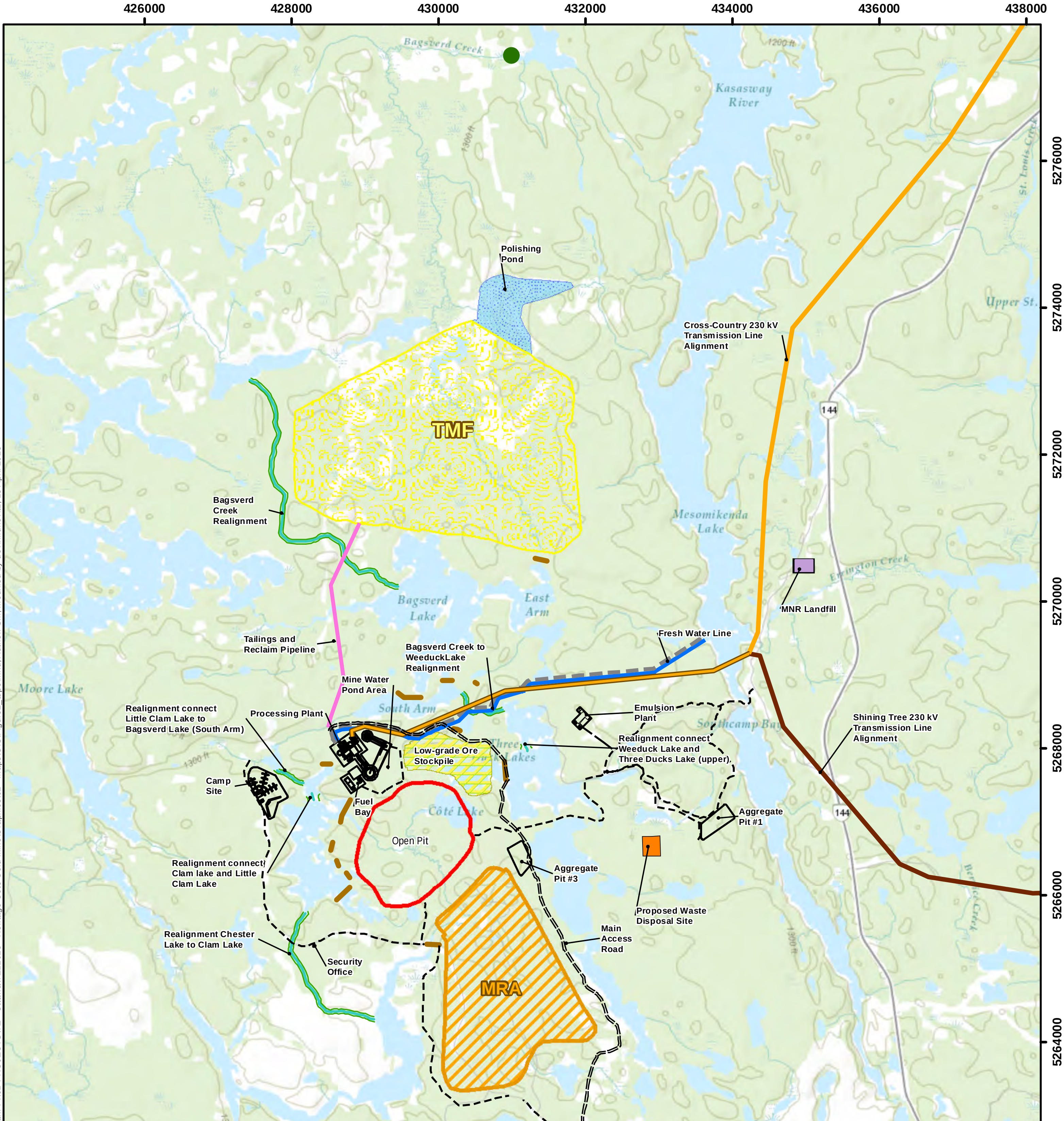
1932 Mining Map of the Three Duck Lakes Area

PROJECT Nº: TC121522

FIGURE: 5

SCALE: Not to scale

DATE: May 2015



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LEGEND

- Open Pit
- Potential Discharge Locations
- Facilities
- Dam
- Main Access Road
- Access Road
- Cross-Country 230 kV Transmission Line Alignment
- Shining Tree 230 kV Transmission Line Alignment
- Tailings and Reclaim Pipeline
- Fresh Water
- Watercourse Realignment
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- Low-grade Ore Stockpile
- Proposed Mine Rock Area (MRA)
- Proposed Tailings Management Facility (TMF)
- Proposed Landfill
- MNR Landfill

0 1 2 3 4 5 Kilometres

NOTES:
- Topography streamed from ESRI ArcGIS Online, 2015..
- TMF and subwatershed provided by Golder Associates.
- Watercourse realignment and proposed lake area provided by Calder Engineering.
- Surface infrastructure, open pit, landfill, MRA and transmission lines provided by IAMGOLD.

Datum: NAD83
Projection: UTM Zone 17N

N W E S

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CÔTE GOLD PROJECT

Location of Site with Topography

PROJECT N°: TC121522	**FIGURE: 6**
SCALE:1:70,000	DATE: May, 2015

Appendix B
PHOTOGRAPHS

APPENDIX II - PHOTOGRAPHIC RECORD

PROJECT NO. TZ12023

PROJECT Côté Gold Project, IAMGOLD

LOCATION Chester, Yeo and Neville Townships

ENCLOSURE 1

PHOTOGRAPH	1

Description

Cultural Heritage Landscape. Photograph 447 of the remnant of a square stump that served as a marker of what had been a portage route, located at the mouth of the Upper Three Duck Lakes and the Middle Three Duck Lakes.

PHOTOGRAPH	2

Description

Cultural Heritage Landscape. Photograph 444 of the remnant of a Culturally Modified Tree with a blaze marking at what had been a portage route, located at the mouth of the Upper Three Duck Lakes and the Middle Three Duck Lakes.

APPENDIX II - PHOTOGRAPHIC RECORD

PROJECT NO. **TZ12023**

PROJECT **Côté Gold Project, IAMGOLD**

LOCATION **Chester, Yeo and Neville Townships**

ENCLOSURE 2

PHOTOGRAPH	**3**

Description

Cultural Heritage Landscape. Photograph 445 of the old portage landing along the Three Duck Lakes.

PHOTOGRAPH	**4**

Description

Cultural Heritage Landscape. Photograph 694 of a clearing in a wooded area of what had been a portage route, from the middle Three Duck Lakes to the pond to the east.

APPENDIX II - PHOTOGRAPHIC RECORD

PROJECT NO. TZ12023

PROJECT Côté Gold Project, IAMGOLD

LOCATION Chester, Yeo and Neville Townships

ENCLOSURE 3

PHOTOGRAPH	5

Description

Cultural Heritage Landscape. Photograph 686 of the portage , located on the middle Three Duck Lakes going to a pond to the east.

PHOTOGRAPH	6

Description

Cultural Heritage Landscape. Photograph 709 of the portage located on the middle Three Duck Lakes going to a pond to the east.

APPENDIX II - PHOTOGRAPHIC RECORD

PROJECT NO. TZ12023

PROJECT Côté Gold Project, IAMGOLD

LOCATION Chester, Yeo and Neville Townships

ENCLOSURE 4

PHOTOGRAPH	7

Description

Cultural Heritage Landscape. Photograph 529 of an approach to a clearing at the edge of a lake that marked what had been a portage route, located along Mesomikenda Lake.

PHOTOGRAPH	8

Description

Cultural Heritage Landscape. Photograph 532 of the remnant of a Culturally Modified Tree with a blaze marking at what had been a portage route, located along Mesomikenda Lake.

APPENDIX II - PHOTOGRAPHIC RECORD

PROJECT NO. TZ12023

PROJECT Côté Gold Project, IAMGOLD

LOCATION Chester, Yeo and Neville Townships

ENCLOSURE 5

PHOTOGRAPH	9

Description

Cultural Heritage Landscape. Photograph 533 of the landing, located along Mesomikenda Lake.

PHOTOGRAPH	10

Description

Cultural Heritage Landscape. Photograph 567 of the remnant of a Culturally Modified Tree with a blaze marking at what had been a portage route at the Bagsverd Lake to Three Duck Lakes portage.

APPENDIX II - PHOTOGRAPHIC RECORD

PROJECT NO. **TZ12023**

PROJECT **Côté Gold Project, IAMGOLD**

LOCATION **Chester, Yeo and Neville Townships**

ENCLOSURE 6

PHOTOGRAPH	**11**

Description

Cultural Heritage Landscape. Photograph 569 of the remnant of a Culturally Modified Tree with a blaze marking at what had been a portage route at the Bagsverd to Three Duck Lakes portage.

PHOTOGRAPH	**12**

Description

Cultural Heritage Landscape. Photograph 572 of a clearing in a wooded area of what had been a portage route, located along the Three Duck Lakes.

APPENDIX II - PHOTOGRAPHIC RECORD

PROJECT NO. **TZ12023**

PROJECT **Côté Gold Project, IAMGOLD**

LOCATION **Chester, Yeo and Neville Townships**

ENCLOSURE 7

PHOTOGRAPH	**13**

Description

Built Heritage. Photograph 814 of the remnants of a barrel stove at the Shannon cabin.

PHOTOGRAPH	**14**

Description

Built Heritage. Photograph 823 of the remnants of a cross cut saw at the Shannon cabin.

APPENDIX II - PHOTOGRAPHIC RECORD

PROJECT NO. TZ12023

PROJECT Côté Gold Project, IAMGOLD

LOCATION Chester, Yeo and Neville Townships

ENCLOSURE 8

PHOTOGRAPH	15

Description

Built Heritage. Photograph 796 of the cabin ruins at Clam Lake Gold Mining Company site.

PHOTOGRAPH	16

Description

Built Heritage. Photograph 798 of the cabin ruins at Clam Lake Gold Mining Company site.

APPENDIX II - PHOTOGRAPHIC RECORD

PROJECT NO. TZ12023

PROJECT Côté Gold Project, IAMGOLD

LOCATION Chester, Yeo and Neville Townships

ENCLOSURE 9

PHOTOGRAPH	17

Description

Built Heritage. Photograph 375 of the ruins of the hoist room foundation remains at Headframe Point site.

PHOTOGRAPH	18

Description

Built Heritage. Photograph 017. Ruins of former mill site at the Young-Shannon Mine, near the Côté Lake.

APPENDIX II - PHOTOGRAPHIC RECORD

PROJECT NO. TZ12023

PROJECT Côté Gold Project, IAMGOLD

LOCATION Chester, Yeo and Neville Townships

ENCLOSURE 10

PHOTOGRAPH	19

Description

Built Heritage. Photograph 063 of the corner of the ruins of the Young-Shannon mill, near the Côté Lake.

PHOTOGRAPH	20

Description

Built Heritage. Photograph 079 of remnants of part of a steam engine that once powered the mill, located near the Côté Lake.

APPENDIX II - PHOTOGRAPHIC RECORD

PROJECT NO. TZ12023

PROJECT Côté Gold Project, IAMGOLD

LOCATION Chester, Yeo and Neville Townships

ENCLOSURE 11

PHOTOGRAPH	21

Description

Built Heritage. Photograph 304 of a row boat (York or Pointer style), at the Gosselin Mining Site.

PHOTOGRAPH	22

Description

Built Heritage. Photograph 309 of a wagon hub, at the Gosselin Mining Site.

APPENDIX II - PHOTOGRAPHIC RECORD

PROJECT NO. **TZ12023**

PROJECT **Côté Gold Project, IAMGOLD**

LOCATION **Chester, Yeo and Neville Townships**

ENCLOSURE 12

PHOTOGRAPH	**23**

Description

Built Heritage. Photograph 310 of a barrel found at the Gosselin Mining Site.

PHOTOGRAPH	**24**

Description

Built Heritage. Photograph 184 of the cookery ruins, located at the Gosselin Mining Site.

APPENDIX II - PHOTOGRAPHIC RECORD

PROJECT NO. TZ12023

PROJECT Côté Gold Project, IAMGOLD

LOCATION Chester, Yeo and Neville Townships

ENCLOSURE 13

PHOTOGRAPH	25

Description

Built Heritage. Photograph 192 of the cookery, located at the Gosselin Mining Site.

PHOTOGRAPH	26

Description

Built Heritage. Photograph 202 of the bunkhouse ruins located at the Gosselin Mining Site.

APPENDIX II - PHOTOGRAPHIC RECORD

PROJECT NO. TZ12023

PROJECT Côté Gold Project, IAMGOLD

LOCATION Chester, Yeo and Neville Townships

ENCLOSURE 14

PHOTOGRAPH	27

Description

Built Heritage. Photograph 218 of the wall ruins of the bunkhouse, located at Gosselin Mining Site.

PHOTOGRAPH	28

Description

Built Heritage. Photograph 255 of the remains of the bunkhouse door, located at the Gosselin Mining Site.

APPENDIX II - PHOTOGRAPHIC RECORD

PROJECT NO.	**TZ12023**
PROJECT	**Côté Gold Project, IAMGOLD**
LOCATION	**Chester, Yeo and Neville Townships**

ENCLOSURE 15

PHOTOGRAPH	**29**

Description

Built Heritage. Photograph 267 of a former window, located at Gosselin Mining Site.

PHOTOGRAPH	**30**

Description

Built Heritage. Photograph 280 of ruins of the privy/outhouse, located at Gosselin Mining Site.

APPENDIX II - PHOTOGRAPHIC RECORD

PROJECT NO.	**TZ12023**
PROJECT	**Côté Gold Project, IAMGOLD**
LOCATION	**Chester, Yeo and Neville Townships**

ENCLOSURE 16

PHOTOGRAPH	**31**

Description

Built Heritage. Photograph 546 of the Cryderman Site. Within this site, there were two buildings one cabin and one possible a dynamite shed.

Appendix C
ASSESSOR QUALIFICATIONS

Linda Axford, MLA, Senior Heritage Specialist - Ms. Axford has been working in heritage planning since 2001. She has conducted historical background research, field surveys, analysis of built heritage and cultural landscapes and report writing. She has worked in municipal government and is very knowledgeable about federal and provincial planning policy as it relates to heritage. She holds a Masters degree in Landscape Architecture, an Honours Bachelor of Arts in History and is a member of the Canadian Association of Heritage Professionals (CAHP).

Shaun Austin, Ph.D., Associate Archaeologist, Role: QA/QC Review – Dr. Austin is the Leader of AMEC's cultural heritage resources group and is based in the Hamilton Office. He has been working in Canadian archaeology and heritage since 1976 and as an archaeological and heritage consultant in Ontario since 1987. He is a dedicated cultural heritage consultant with repeated success guiding projects through to completion to the satisfaction of the development proponent, First Nations and cultural heritage community stakeholder groups. His areas of interest and expertise include pre-contact Aboriginal lithics and ceramics. Dr. Austin holds a **Professional Archaeology License** (**P141**) issued by the Ontario Ministry of Tourism, Culture and Sport, is MTO RAQs certified in Archaeology/Heritage and is a member of the Ontario Association of Professional Archaeologists.

John Pollock, PH.D., Principal of Woodland Heritage Services Limited, Role: Field Supervisor/Photographer - Dr. Pollock is a consulting archaeologist and holds a current consulting archaeology license from the Ontario Ministry of Tourism, Culture and Sports. He has more than thirty-five years of experience and is a well-known specialist in archaeological and cultural heritage research and assessments. He has undertaken major studies for the Ministry of Natural Resources and the Ministry of Transportation and more than 800 Stage 1 to 4 archaeological assessments for many clients in the mining, forestry and land development sectors as well as large and small hydro development projects. He has also worked for many municipal governments and can assist with the heritage planning and development component of municipal plans. As well, he has extensive experience in working with First Nations communities and TK consulting. Besides his archaeological experience, Dr. Pollock is very familiar with the resource industries and communities of Northern Ontario.

Appendix D
STANDARD LIMITATIONS

LIMITATIONS

1. The work performed in the preparation of this report and the conclusion presented are subject to the following:

   (a) The Standard Terms and Conditions which form a part of our Professional Services Contract;

   (b) The Scope of Services;

   (c) Time and Budgetary limitations as described in our Contract; and,

   (d) The Limitations stated herein.

2. No other warranties or representations, either expressed or implied, are made as to the professional services provided under the terms of our Contract, or the conclusions presented.

3. The conclusions presented in this report were based, in part, on visual observations of the study area. Our conclusions cannot and are not extended to include those portions of the study area which were not reasonably available, in AMEC's opinion, for direct observation.

4. Heritage resources encountered at the study area were assessed, within the limitations set out above, having due regard for applicable heritage regulations as of the date of the inspection.

5. The utilization of AMEC's services during the implementation of any further heritage assessment work recommended will allow AMEC to observe compliance with the conclusions and recommendations contained in the report. AMEC's involvement will also allow for changes to be made as necessary to suit field conditions as they are encountered.

6. This report is for the sole use of the parties to whom it is addressed unless expressly stated otherwise in the report or contract. Any use which any third party makes of the report, in whole or in part, or any reliance thereon, or decisions made based on any information of conclusions in the report, is the sole responsibility of such third party. AMEC accepts no responsibility whatsoever for damages or loss of any nature or kind suffered by any such third party as a result of actions taken or not taken or decisions made in reliance on the report or anything set out therein.

7. This report is not to be given over to any third party for any purpose whatsoever without the written permission of AMEC.

Preliminary Hydrodynamic Analysis of the Proposed Treated Effluent Mixing Zone

(See Comment #F117)

TECHNICAL MEMORANDUM

DATE June 2, 2015 **PROJECT No.** 1400877 (8000)

TO Steve Wolfenden
IAMGOLD Corporation

FROM Gerard Van Arkel **EMAIL** gvanarkel@golder.com

PRELIMINARY HYDRODYNAMIC ANALYSIS OF THE PROPOSED TREATED EFFLUENT MIXING ZONE, CÔTÉ GOLD PROJECT

1.0 INTRODUCTION

In comments provided to IAMGOLD Corporation (IAMGOLD) on the Environmental Assessment for the Côté Gold Project, the Ministry of the Environment and Climate Change (MOECC) has requested additional information on the magnitude and spatial extent of potential effects from treated effluent discharge within the proposed mixing zone. IAMGOLD has retained Golder Associates Ltd. (Golder) to complete a preliminary hydrodynamic analysis of the proposed mixing zone. This analysis provides further information on the mixing characteristics of the lower basin of Neville Lake, which is the extent of the proposed mixing zone.

The purpose of this technical memorandum is to provide information that resulted from the preliminary hydrodynamic analysis that demonstrates that the selected treated effluent discharge can be designed to: i) limit the size of the turbulent zone to an area localized around the outfall, and ii) assimilate the treated effluent into Neville Lake to produce mixed concentrations that are protective of aquatic life within the mixing zone.

2.0 BACKGROUND

This section outlines some information that is relevant to the preliminary hydrodynamic analysis. Please see other baseline reports for additional background information.

2.1 Proposed Mixing Zone Bathymetry

The local bathymetry of the lower basin of Neville Lake is shown in Figure 1. Bagsverd Creek inflow from the west is shown as the blue arrow. Generally, the lake is shallow (1-2 m) deep at the outlet of the Bagsverd Creek, with the bottom falling away gently for 150 m towards the middle portion of the lake, at which point the slope drops away more steeply to a depth of approximately 8 m.

2.2 Field Visit on July 7, 2014 – General Observations

A field visit to Neville Lake was made by a Water Resources Engineer on July 7, 2014. During the field visit, the following observations were made:

- Low water level conditions were observed at the time of the field visit, with Bagsverd Creek following a winding route through wetland at the entrance to the lake. The depth of the channel was typically about 2 m and the width of the channel was typically about 3 m. Many sections of the channel were choked with weeds.
- Several apparently abandoned beaver dams were noted along Bagsverd Creek outlet, including one at the entrance to Neville Lake. The beaver dam at the mouth of the creek is expected to dissipate energy from the creek flow and as a result the creek flow is not expected to influence the lake currents during low flow periods.Exposed rocks were noted in Neville Lake, located to the east of the Bagsverd Creek outlet (location shown on Figure 1). Based on discussions with the site representative, the lake level was at least 1 m lower than in the spring.
- The average velocity of Bagsverd Creek discharging into Neville Lake was estimated to be less than 0.05 m/s (5 cm/s).

2.3 Drogue Study

A drogue study was undertaken in the southern portion of Neville Lake on July 7, 2014. The GPS-equipped drogues were designed to drift with near-surface currents. The following points outline the conditions and setup of the drogue study:

- Weather conditions: Air temperature approximately 15ºC, partly cloudy with light winds from W or NW. Water temperature was 19.7ºC.
- Two drogue releases (with two individual drogue units in each release) were carried out between 9:00 AM and 11:00 AM from the area east of the Bagsverd Creek discharge into Neville Lake.
- Shallow drogues with a depth of approximately 30 cm were used in the study since the water depths in the release area were expected to be less than 2 m.
- The accuracy of the GPS units used on the drogues is likely on order of ±3 m.

The results of the drogue study are shown in

Table 1, and the drogue tracks during the study are shown on Figure 1. Notable results of the study include:

- Average current speeds were estimated to be 0.013 m/s and 0.019 m/s (e.g. less than 2 cm/s).
- More separation and random movement between the drogues was observed for first release.
- During the second release, a more uniform path was observed when compared to the first release.
- Current directions appear to be consistent with wind direction.

3.0 HYDRODYNAMIC ANALYSIS APPROACH

The water budget model for the Côté Gold Project, as presented in Appendix I of the EA, was used as a basis for establishing discharge flow conditions to Neville Lake. The water budget model uses historical years of climate data to estimate water quantity and quality at key locations. Based on the historical record, three baseline climate-year scenarios were extracted from the water budget model results for the average and wet year; these are the flow conditions when effluent release is expected to occur.

The water budget model results for these years were used to establish the following mixing zone scenarios that were evaluated using the hydrodynamic analysis:

- An average year August condition with continuous discharge;
- An average year October condition with continuous discharge;
- An average year October condition with intermittent discharge;
- A wet year August condition with continuous discharge; and
- A wet year October condition with continuous discharge.

The intermittent scenario (i.e., an average year October condition with intermittent discharge) was evaluated to acknowledge that average treated effluent discharge rates in October are below the design flow rate for the proposed outfall (assumed to be 0.1 m^3/s in Section 4.1) and that the performance of the outfall may be reduced. However, the expected performance of the outfall can be improved by temporarily storing treated effluent to maintain a flow rate similar to the design flow.

The Cornell Mixing Zone Expert System (CORMIX) model was used to estimate the performance of the proposed outfall for the selected scenarios. CORMIX is a U.S. EPA-approved software system for predicting water quality in mixing zones resulting from continuous point source discharges. The CORMIX system is unique among environmental simulation models because of its data-driven approach to simulation model selection.

3.1 Average and Wet Year Conditions

The expected ambient and effluent conditions for the Average and Wet years were based on the following:

- Water budget model results (Table 2).
- The water level and current velocity in Neville Lake is assumed to be the same for all scenarios.
- The treated effluent temperature and Neville Lake water temperatures (near surface) were based on climate data used to represent average conditions and a wet year (with an approximate 25-year return period) in previous hydrological studies (Golder 2013).
- Neville Lake water temperatures (bottom) were based on field measurement values (see Appendix J, Attachment I).
- Neville Lake was assumed to be thermally stratified from mid June to the end of October.
- Water quality inputs to the hydrodynamic analysis (e.g., total dissolved solids concentrations in the treated effluent) were based on water quality modelling results.

- The TDS concentrations in the surface layer were assumed to reflect mixed conditions, while the bottom water TDS concentrations were assumed to remain constant during the summer stratified period.
- The density of the receiving water and treated effluent was estimated based on temperature and TDS concentrations (Cole and Wells, 2008), with results shown in Table 3 and Table 4, respectively.
- The analysis considered June to October, typically the driest months within the predicted treated effluent release period.
- Currents measured during the drogue study (approximately 0.015 m/s) were assumed to be representative of the summer period.
- As shown in Table 3, the treated effluent is denser than the surface and lighter than the bottom during the summer months. If the effluent were released with minimal mixing, the effluent plume would eventually equilibrate at some depth depending on conditions (a depth of approximately 2.5 m as shown in Figure 2). However, since the outfall is expected to provide more mixing, the summer plume is expected to remain near the surface.
- In October the treated effluent temperature is expected to decrease faster than the lake water temperature. As a result, the effluent could potentially form a sinking plume. This can be avoided by configuring the outfall to induce adequate initial mixing and maintain a minimum effluent flow rate.

The five scenarios that were considered as part of the hydrodynamic analyses are summarized in Table 5.

4.0 OUTFALL DESIGN AND PERFORMANCE

4.1 Conceptual Outfall Design

The proposed location of the treated effluent outfall is shown on Figure 1. This location was selected for the following reasons:

- A minimum depth of 2 m should for ice protection and providing enough water volume for mixing;
- The outfall should be positioned at least 0.5 m off the bottom to avoid re-suspension of sediments by the exit velocity of the effluent
- The discharge could be directed slightly upward to promote mixing of the treated effluent without forming a surface disturbance;
- The treated effluent could be directed away from shallow areas; and,
- To optimize mixing effects from the ambient currents that occur further from the shoreline and marshy areas.

The following points outline the conceptual design of the treated effluent outfall:

- A design flow of 0.1 m^3/s.
- A single port discharge with a diameter of 150 mm (6”).
- The total water depth is 2 m and the outfall is positioned 0.5 m off the bottom.

- The outfall is located approximately 25 m from the south shore of Neville Lake.
- The outfall is pointed to the 22.5º north of due east to direct the treated effluent away from the shoreline.
- The outfall is pointed slightly upward by 15º from horizontal.

4.2 Predicted Outfall Performance

The near-field (turbulent mixing zone) performance of the outfall was predicted using CORMIX. The results are summarized in Table 6 and presented in Figure 5. The following points provide a summary of the modelling results:

- The turbulent mixing zone was found to be approximately 17 m across all five scenarios. At the end of the turbulent mixing zone, the plume becomes vertically mixed through the entire water column.
- The width of the plume at the turbulent mixing zone is approximately 4 m.
- The dilution at the end of the turbulent mixing zone is between 16.2 (Wet Year, Autumn) and 16.9 (Average Year, Autumn, Continuous).
- Most of the dilution (approximately 80%) occurs within the first 5 m of the discharge plume, where most of the effluent energy is dissipated.
- In the Summer cases, the density of the plume at the end of the turbulent mixing zone is expected to be similar (less than 0.01% difference) to the ambient surface density of the lake and lower than the ambient bottom density and is therefore not expected to form a sinking density plume that follows the lakebed to the bottom of the nearest basin.
- In the Autumn cases, the density of the plume at the end of the turbulent mixing zone is expected to be similar (less than 0.01% difference) to the mixed ambient lake water density and is therefore not expected form a sinking density plume.

4.3 Metals Dilution

The dilution results from CORMIX were also used to estimate dilution of other parameters in the mixing zone, specifically dissolved aluminum, arsenic, copper, and iron. Modelling for these parameters is included in the water quality model for both the polishing pond and Neville Lake. The modeled average monthly concentrations for these parameters (corresponding to the scenarios that are discussed above) were used in conjunction with the dilution value in Table 6 to estimate concentrations at the end of the turbulent mixing zone.

Results from the dilution comparison are shown in Table 7. The concentrations after the turbulent mixing zone are generally shown as being close (within 0.001 mg/L) to the Neville Lake outlet concentrations that were predicted using the water quality model that assumed fully mixed conditions within the mixing zone. The exception to this pattern is iron, where the predicted concentration in the treated effluent is slightly lower than the modeled fully mixed Neville Lake concentrations.

5.0 SUMMARY AND CONCLUSIONS

Neville Lake is a typical Canadian Shield basin with short residence times in spring and long residence times in summer and winter. Monitoring results suggest the lake is stratified (with a warm upper layer and cool lower layer) in summer and expected to be well mixed in autumn.

The treated effluent water density from the proposed polishing pond is slightly higher than the density of waters in Neville Lake, requiring an outfall design that encourages mixing and dilution. A 150 mm discharge into the shallow area of Neville Lake east of the Bagsverd Creek outlet is expected to provide dilution sufficient to bring the treated effluent to within 0.01% of the density of the receiving surface lake waters within approximately 17 m of the discharge for a range of flow and temperature conditions (i.e. stratified summer and well-mixed autumn conditions during average and wet years). Therefore, in both the summer and autumn cases, a sinking density plume that follows the lakebed to the bottom of the nearest basin is *not* expected to form and fully-mixed conditions can be achieved over a short distance from the outfall.

A comparison of metals dilution based on the fully mixed water quality model results and hydrodynamic model (CORMIX) results suggests that concentrations of aluminum, arsenic, copper, and iron are very close to the modeled fully mixed Neville Lake concentrations by the end of the turbulent mixing zone (i.e., 17 m from the outfall).

Gerard J. Van Arkel, M.Eng., P.Eng.
Associate, Senior Water Resources Engineer

CD/GVA/mp/ms;emam

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References

Cole, T.M. and S.A. Wells, 2008, CE-QUAL-W2: A Two-Dimensional, Laterally Averaged, Hydrodynamic and Water Quality Model, Version 3.6., Users Manual. A report prepared for the U.S. Army Corps of Engineers, Washington, DC 20214-1000.

Fischer H B, List E J, Koh R C Y, Imberger J, Brooks N H. 1979. Mixing in Inland and Coastal Waters, Academic Press

Table 1: Summary of Drogue Study

	Release 1	Release 2
Number of Drogues	2	2
Water Depth at Release	1.4 m	2.0 m
Release Time	9:15 AM	10:08 AM
Duration	45 minutes	45 minutes
Average Distance Travelled	35 m	53 m
Average Speed	0.013 m/s	0.019 m/s
Direction of Travel	SE	SSE

Table 2: Monthly Average Flow Rates for May through October

Month	Treated Effluent Discharge (m^3/s)		Bagsverd Creek (m^3/s)	
	Average Year	Wet Year	Average Year	Wet Year
June	0.064	0.228	0.766	0.575
July	0.140	0.223	0.139	0.206
August	0.097	0.092	0.066	0.082
September	0.103	0.138	0.062	0.064
October	0.064	0.173	0.136	1.160

Table 3: Estimated Monthly Average Receiving Lake Properties

Month	Neville Lake – Surface (Average Year)			Neville Lake – Surface (Wet Year)			Neville Lake – Bottom (Average and Wet Year)		
	Temperature (ºC)	Total Dissolved Solids (mg/L)	Density (kg/m^3)	Temperature (ºC)	Total Dissolved Solids (mg/L)	Density (kg/m^3)	Temperature (ºC)	Total Dissolved Solids (mg/L)	Density (kg/m^3)
June	17.8	58.4	998.7012	15.7	58.4	999.0691	5.0	58.4	1000.0387
July	17.3	67.7	998.8002	18.8	67.7	998.5175	7.0	58.4	999.9758
August	16.7	74.9	998.9184	18.2	74.9	998.6489	7.0	58.4	999.9758
September	15.1	78.2	999.1670	11.6	78.2	999.6360	7.0	58.4	999.9758
October	10.3	67.9	999.7503	5.1	67.9	1000.0440	4.0	67.9	1000.0548

Table 4: Estimated Monthly Average Treated Effluent Properties

Month	Average Year			Wet Year		
	Temperature (ºC)	TDS (mg/L)	Density (kg/m³)	Temperature (ºC)	TDS (mg/L)	Density (kg/m³)
June	17.8	301.3	998.8880	15.7	227.2	999.1998
July	17.3	230.4	998.9256	18.8	200.8	998.6196
August	16.7	187.8	999.0055	18.2	163.1	998.7167
September	15.1	177.2	999.2437	11.6	158.7	999.6991
October	10.3	187.6	999.8445	5.1	195.8	1000.1468

Table 5: Summary of Selected Modelling Scenarios for Average Year

	Average Year			Wet Year	
	Summer Continuous (August)	Autumn Continuous (October)	Autumn Intermittent (October)	Summer Continuous (August)	Autumn Continuous (October)
Ambient Conditions at Surface[1]					
Water Temperature (ºC)	16.7	10.3	10.3	18.2	5.1
Total Dissolved Solids (mg/L)	74.9	67.9	67.9	74.9	67.9
Density (kg/m³)	998.9184	999.7503	999.7503	998.6489	1000.0440
Current Speed and Direction	0.015 m/s to East[2]				
Treated Effluent Conditions[1]					
Water Temperature (ºC)	16.7	10.3	10.3	18.2	5.1
Total Dissolved Solids (mg/L)	187.8	187.6	187.6	163.1	195.8
Density (kg/m³)	999.0055	999.8445	999.8445	998.7167	1000.1468
Density Difference (kg/m³)	0.0871	0.0942	0.0942	0.0678	0.1028
Flow (m³/s)	0.097	0.064	0.100	0.092	0.173
Exit Velocity (m/s)[3]	5.492	3.629	5.659	5.186	9.814

Notes:
1. See Section 2.1 for development of ambient and treated effluent properties.
2. As measured on July 8, 2014
3. Based on outlet diameter of 150 mm.

Table 6: Predicted Treated Effluent Outfall Performance

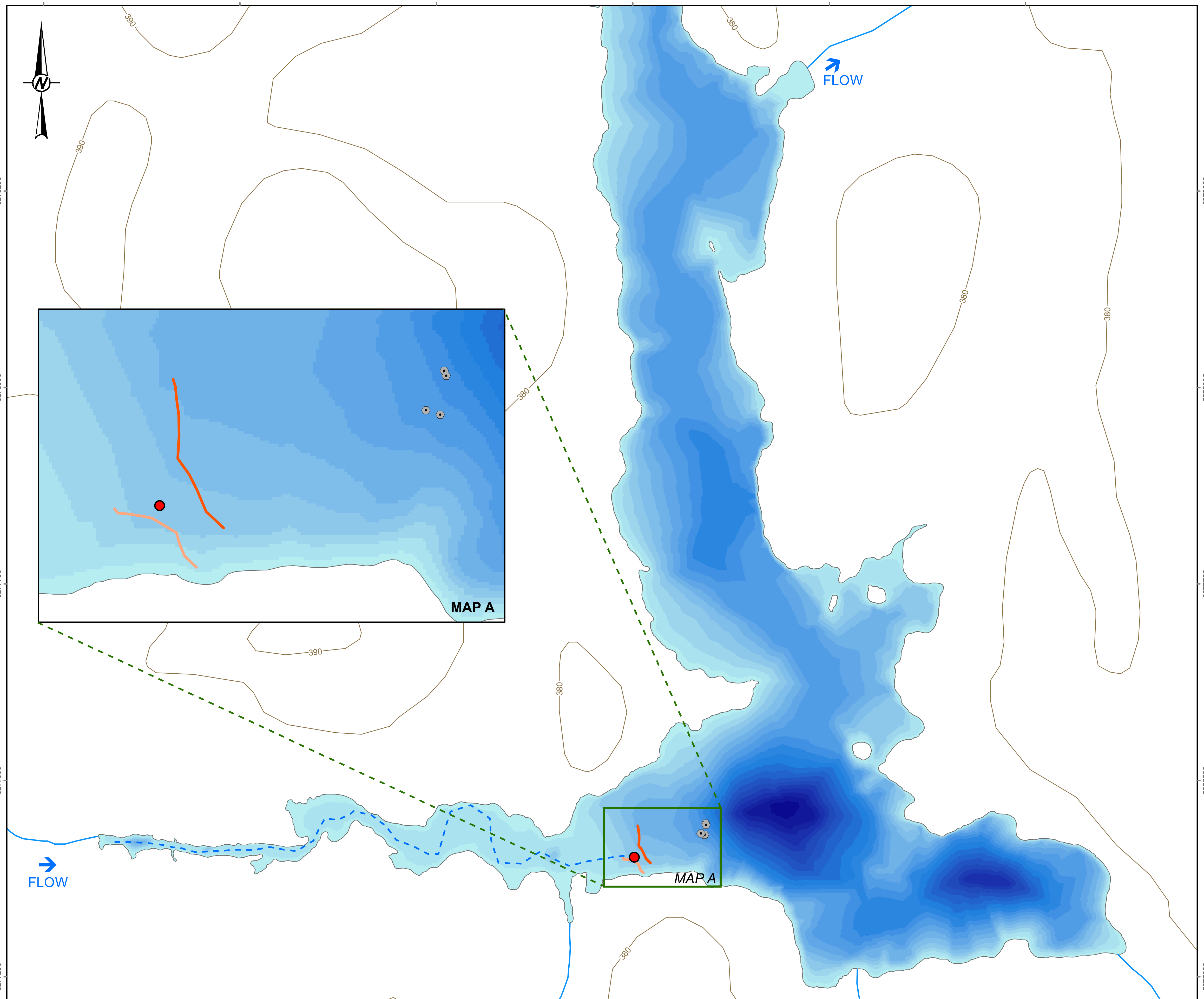
	Average Year			Wet Year	
	Summer Continuous (August)	Autumn Continuous (October)	Autumn Intermittent (October)	Summer Continuous (August)	Autumn Continuous (October)
Scenario Summary					
Ambient Density (kg/m³) Surface	998.9184	999.7503[2]	999.7503[2]	998.6489	1000.0440[2]
Ambient Density (kg/m³) Bottom	999.9758			999.9758	
Effluent Density (kg/m³)	999.0055	999.8445	999.8445	998.7167	1000.1468
Density Difference (kg/m³)	0.0871	0.0942	0.0942	0.0678	0.1028
Flow (m³/s)	0.097	0.064	0.100	0.092	0.173
Exit Velocity (m/s)[1]	5.492	3.629	5.659	5.186	9.814
Modelling Results for End of Turbulent Mixing Zone					
Length (m)	17	17	17	17	17
Depth (m)	2	2	2	2	2
Width (m)	4	4	4	4	4
Dilution	16.5	16.9	16.5	16.5	16.2
Flow Within Plume (m³/s)	1.601	1.084	1.650	1.512	2.810
Plume Velocity (m/s)	0.200	0.135	0.206	0.189	0.351
Total Dissolved Solids (mg/L)	81.7	75.0	75.2	80.2	75.8
Temperature (ºC)	16.7	10.3	10.3	18.2	5.1
Plume Density (kg/m³)	998.9237	999.7558	999.7560	998.6530	1000.0503
Density Difference Surface (kg/m³)	0.0053	0.0056[2]	0.0057[2]	0.0041	0.0063[2]
Density Difference Bottom (kg/m³)	-1.0521			-1.3228	

Notes:

1. Based on outlet diameter of 150 mm.
2. Assumed vertically mixed through entire depth of water column.

Table 7: Predicted Metals Dilution

		Concentration (mg/L)				
		Average Year			Wet Year	
		Summer Continuous (August)	Autumn Continuous (October)	Autumn Intermittent (October)	Summer Continuous (August)	Autumn Continuous (October)
	Dilution	16.5	16.9	16.5	16.5	16.2
Aluminum (mg/L)	Treated Effluent	0.085	0.085	0.085	0.074	0.090
	End of Turbulent Mixing Zone	0.056	0.057	0.057	0.055	0.056
	Neville Lake Outlet	0.054	0.055	0.055	0.053	0.054
Arsenic (mg/L)	Treated Effluent	0.020	0.020	0.020	0.017	0.021
	End of Turbulent Mixing Zone	0.005	0.005	0.005	0.005	0.005
	Neville Lake Outlet	0.004	0.004	0.004	0.004	0.004
Copper (mg/L)	Treated Effluent	0.010	0.010	0.010	0.008	0.010
	End of Turbulent Mixing Zone	0.003	0.003	0.003	0.003	0.003
	Neville Lake Outlet	0.002	0.002	0.002	0.002	0.002
Iron (mg/L)	Treated Effluent	0.105	0.106	0.106	0.101	0.107
	End of Turbulent Mixing Zone	0.169	0.174	0.174	0.169	0.174
	Neville Lake Outlet	0.173	0.178	0.178	0.173	0.178



Legend

Proposed Treated Effluent Discharge Location

Contours

Exposed Rocks

Channel Centerline for Bagsverd Creek

Drogue

Release 1

Release 2

Water Depth (m)

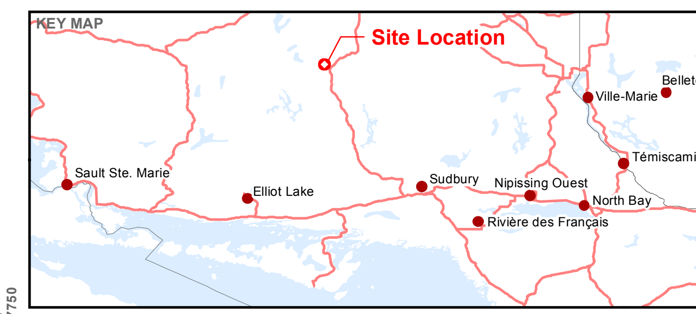
0

-2.78

-5.6

-8.3

-11.1



NOTES

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1400877

REFERENCE

CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE – ONTARIO.
HTTPS://WWW.ONTARIO.CA/GOVERNMENT/OPEN-GOVERNMENT-LICENCE-ONTARIO
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83
COORDINATE SYSTEM: UTM ZONE 18 VERTICAL DATUM: CGVD28

0 50 100 200
METRES

SCALE 1:5,000

CLIENT
IAMGOLD CORPORATION

PROJECT
CÔTÉ GOLD PROJECT

TITLE
LOWER NEVILLE LAKE BATHYMETRY AND DROGUE TRACKS

CONSULTANT

Golder Associates

YYYY-MM-DD	2015-06-02
PREPARED	RRD
DESIGN	RRD
REVIEW	GV
APPROVED	MRG

PROJECT No.	PHASE	Rev.	FIGURE
1400877	8000	A	1

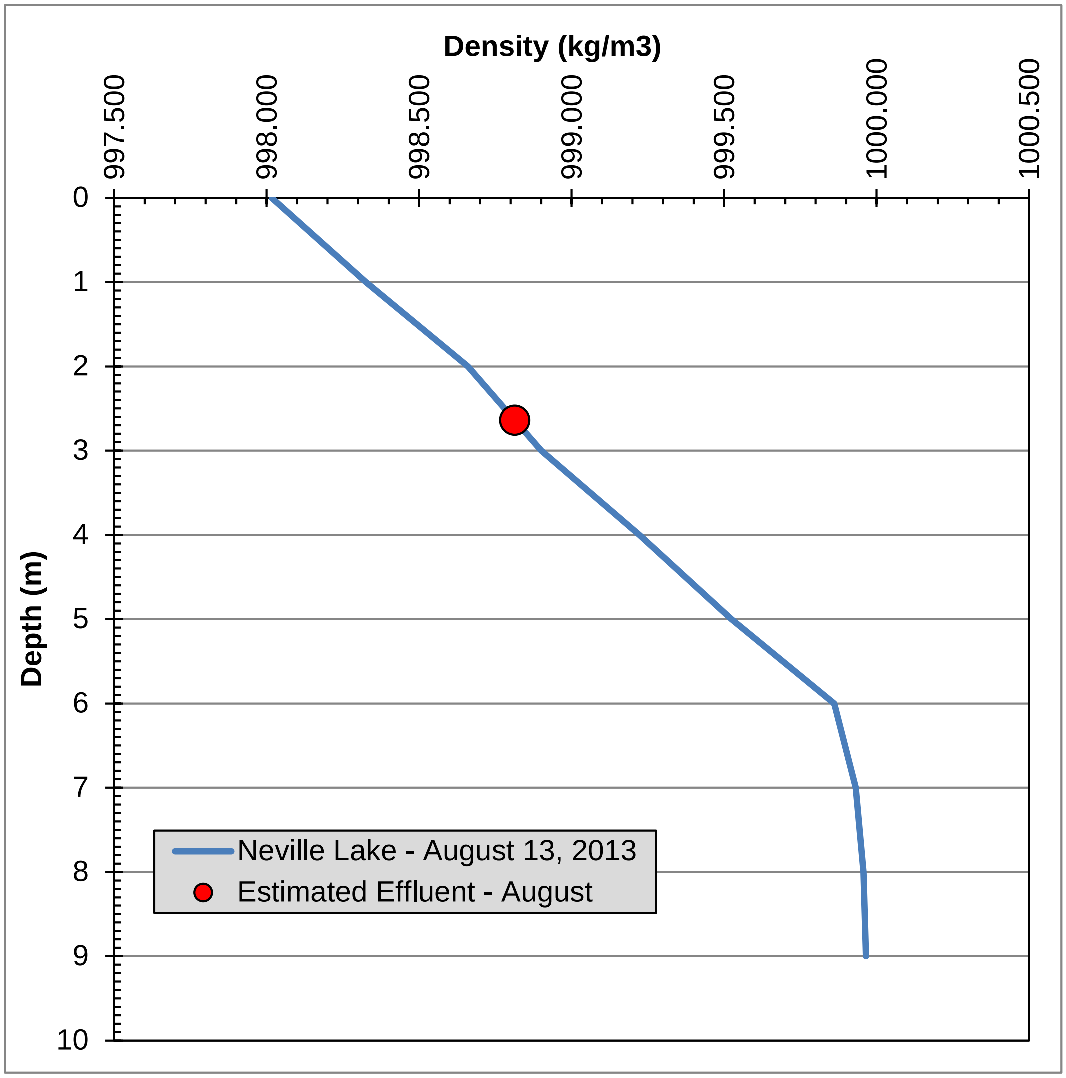


Figure 2: Estimated Density Profile in Neville Lake for August 2013

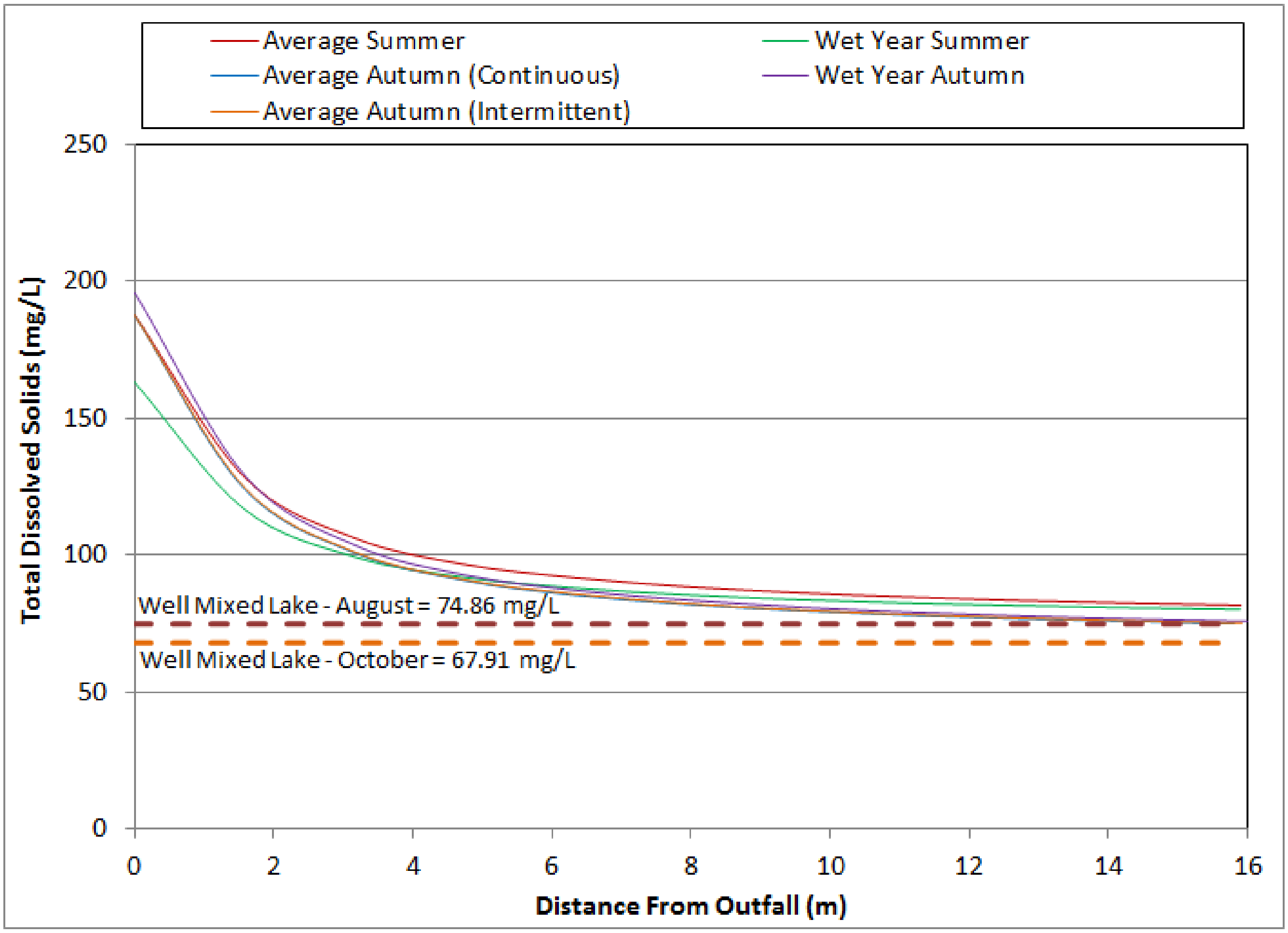


Figure 3: Estimated Total Dissolved Solids in Turbulent Mixing Zone

Return Period Review

(See Comment #F172)

MEMORANDUM

TO	Steven Woolfenden, IAMGOLD Corporation	**DATE**	May 27, 2015
FROM	Steve Kaufman Kevin MacKenzie	**PROJECT No.**	1400877

COMMENT RESPONSE - RETURN PERIOD REVIEW
MEMO TO COMMENT #F172 - ONTARIO MINISTRY OF THE ENVIRONMENT AND CLIMATE CHANGE
IAMGOLD CORPORATION

Introduction

The following memorandum was provided to further address Comment #F172, provided by the Ontario Ministry of the Environment and Climate Change (MOECC) in May 2015.

Precipitation Data

Precipitation data used in the predictions of change were developed using a reciprocal-distance approach, specifically the inverse-distance-squared method (Chin 2006) and the regional Environment Canada climate monitoring stations at North Bay, Sudbury, Timmins and Chapleau. From these stations, a 43-year precipitation record was developed for the Côté Gold site (1970-2012; Table 1).

Table 1: Total Annual Precipitation

Year	**1970**	**1971**	**1972**	**1973**	**1974**	**1975**	**1976**	**1977**	**1978**	**1979**	**1980**
Total Depth (mm)	917	854	926	869	892	833	839	920	915	933	801
Year	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**
Total Depth (mm)	759	862	931	825	853	799	709	958	813	1003	877
Year	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Total Depth (mm)	820	669	818	908	931	740	825	940	738	915	893
Year	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**--**
Total Depth (mm)	928	868	734	915	882	1011	899	594	732	712	--

Frequency Distribution

The Log Pearson III frequency distribution was selected to analyse the precipitation data as per the formula (U.S. Department of the Interior 1982):

$$Log\ Q = \bar{X} + KS \qquad (1)$$

Where *Log Q* is the base 10 logarithm of the total annual precipitation, $\bar{X}$ is the mean logarithm of the sample set, *S* is the standard deviation of the sample set and *K* is a factor that is a function of the skew coefficient and exceedance probability. The curve fit for the Log Pearson III distribution of the climate data is provided in Figure 1. The R^2 statistic for this distribution was calculated at 0.98.

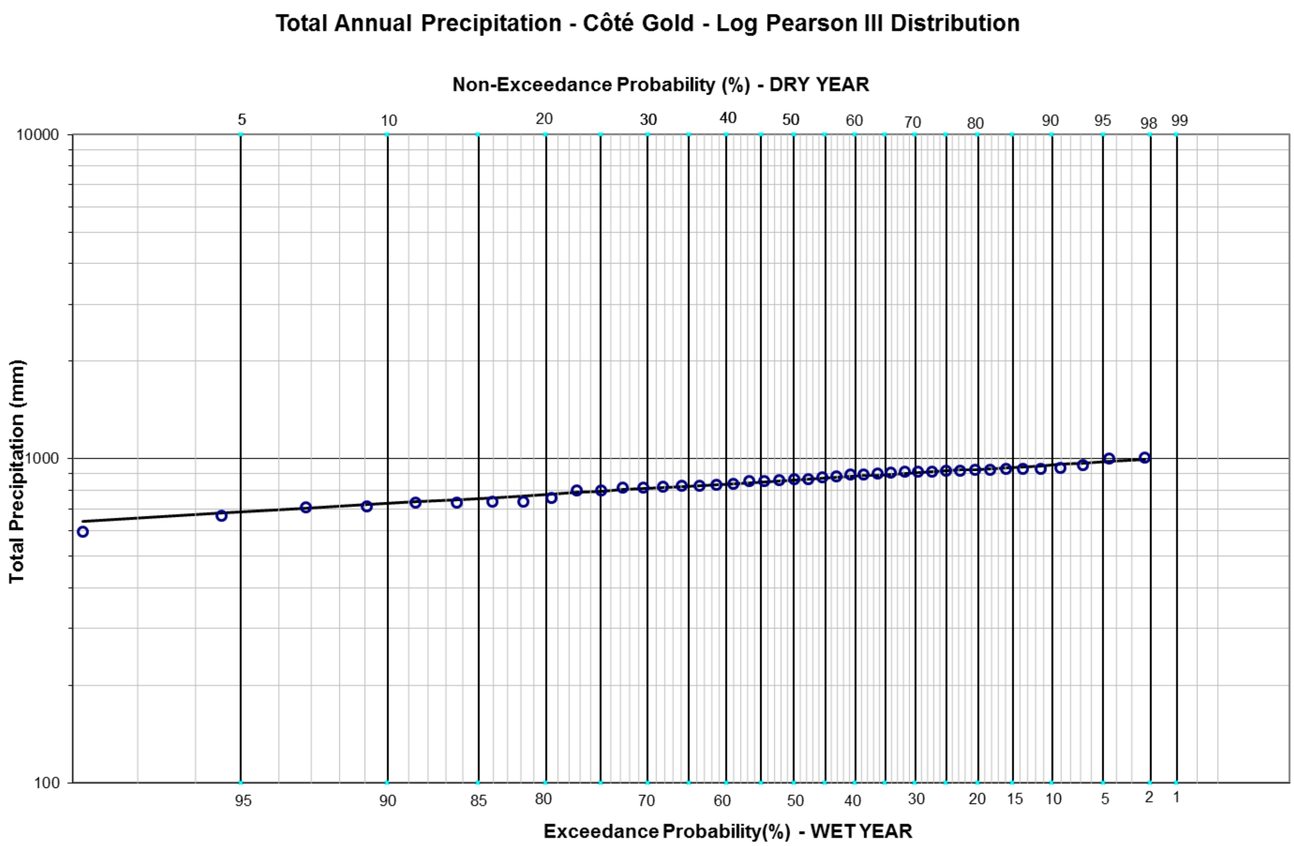


Figure 1: Total Annual Precipitation Exceedance and Non-Exceedance Probabilities

From this distribution, an annual precipitation series from the available record was selected based on the specified return period. A 1:25-year dry period has an exceedance probability of 96%, or a non-exceedance probability of 4% (Figure 1). The selected dry year completed for the initial analysis was 2005, with a total precipitation depth of 734 mm (Table 1). This corresponds to an annual exceedance probably of approximately 86%, or about a 1:10-year dry period. The corrected annual series for a 1:25-year dry year is best represented by 1993, which had an annual total precipitation of 669 mm (Table 1). This correction is displayed on Figure 2. Note that this correction does not affect the previously selected annual values representing the average annual or 1:25-year wet year climate conditions.

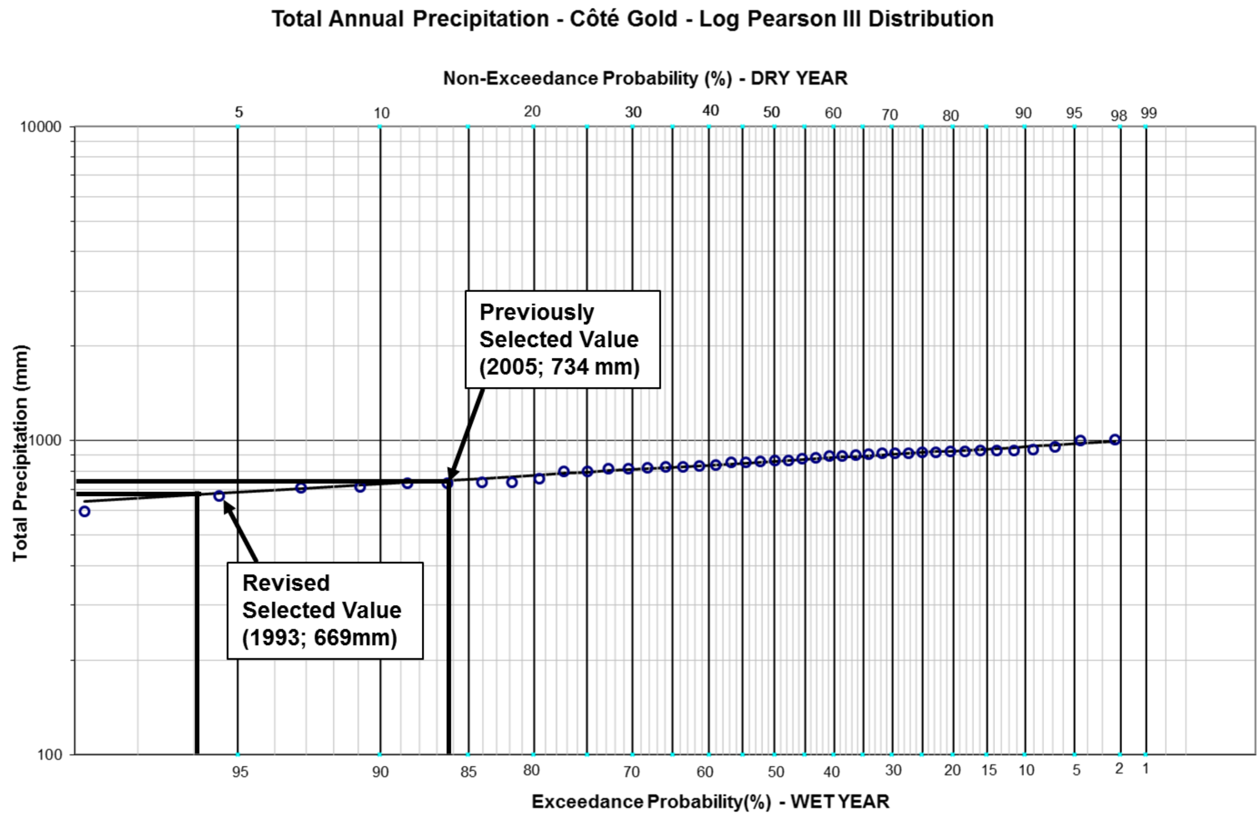


Figure 2: Selected Dry Year Annual Total Precipitation

The difference between these annual precipitation series is approximately 9%. However, as the precipitation amounts were aligned with monthly climate records, it is expected that the intra-annual variation in precipitation patterns will also influence the response of the hydrological system. For the subject years of 2005 (734 mm) and 1993 (669 mm), a monthly graph of total precipitation input is displayed on Figure 3.

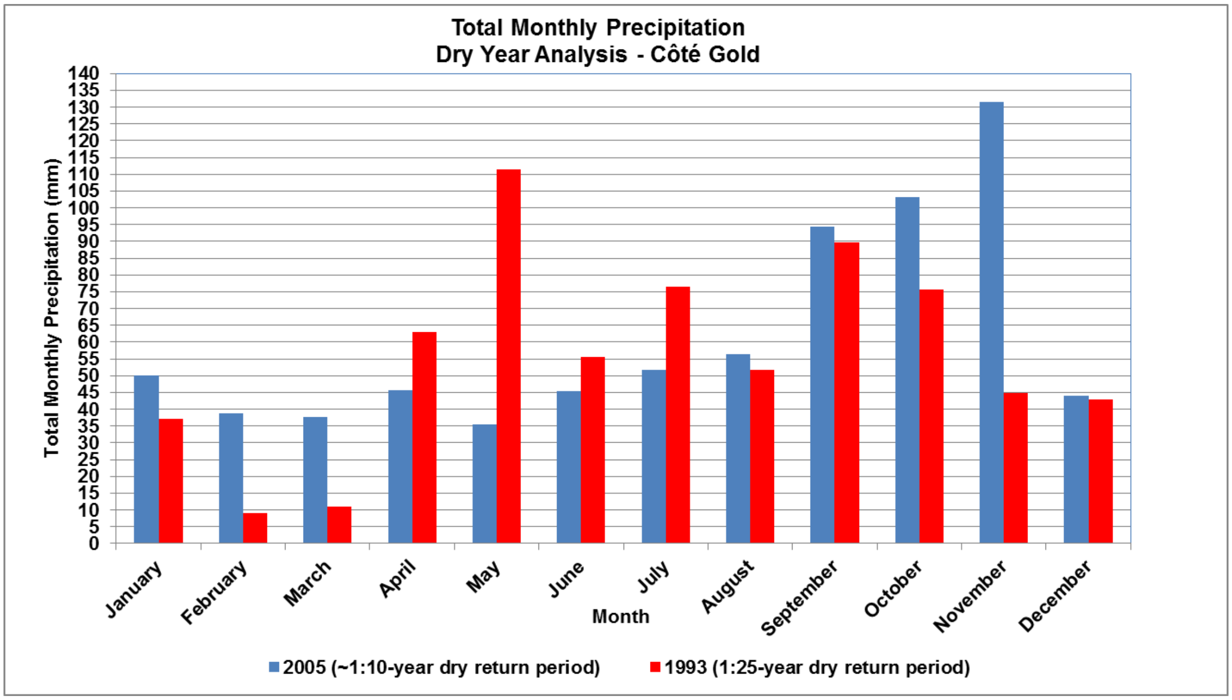


Figure 3: Monthly Distributions, Dry Year Analysis

From this chart, it is notable that monthly total precipitation in the selected dry year (2005) was less than, or similar (within 5 mm) to the revised year (1993) for the months of May through September. This is when precipitation can be expected to occur as rainfall and when low flow conditions typically dominate at the site. The data series shows that the majority of the difference between the years of 2005 and 1993 occurs in November, with a difference of approximately 90 mm of precipitation in this month. Although no effluent release is predicted during dry year conditions, the applied November precipitation is outside of the targeted time frame for this operational discharge to occur.

We can therefore conclude that despite the correction of the selection of the dry year to a lower annual total precipitation value, that the selected annual series was similar in total magnitude (<10% difference) and was sufficiently conservative during typically low flow periods to allow for assessment of the hydrological system under drier than normal conditions.

References

Chin. D.A. (2006). Water Resources Engineering, Second Edition. Pearson Prentice Hall, New Jersey, 962 pp.

U.S. Department of the Interior, Geological Survey (1982). Flood Flow Frequency Bulleting #17B of the hydrology Subcommittee.

Hydrological Assessment

(See Comment #F183)

MEMORANDUM

TO Steven Woolfenden, IAMGOLD Corporation **DATE** May 27, 2015

FROM Steve Kaufman
Kevin Mackenzie **PROJECT No.** 1400877

COMMENT RESPONSE
COMMENT F183 – ONTARIO MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE
IAMGOLD CORPORATION

Introduction

This memorandum is to further support the response to Comment F183 provided by the Ontario Ministry of Environment and Climate Change (MOECC) with respect to the hydrological assessment completed for the Côté Gold project.

Discussion

The Côté Gold water balance model was developed in a GoldSim platform, an object oriented and customizable modelling package commonly used for water resources, hydrological and water quality modelling purposes. The model was developed using a soil moisture water balance approach (e.g. Holmes and Robertson 1958). In this respect, the model uses climate inputs (synthesized for the Côté Gold project site from regional climate locations) to fill storage elements (soil and water) and subsequently simulate a water surplus that is available as runoff through watersheds. The soil moisture water balance approach is commonly used in preliminary and pre-feasibility engineering studies and is also used by Environment Canada in the development of water surplus and water deficit calculations for various soil water holding capacities (WHCs), which define the amount of moisture that can be held within a soil type prior to simulated surface water pooling and/or runoff.

Model output was compared to the Mollie River Water Survey of Canada (WSC) hydrometric station (ID 04LA006) for the overlapping period of simulated and observed streamflow values (2008 – 2012). In the original project documents (Golder 2013), the daily water surplus values were summed to annual and/or monthly totals for use in the subsequent predictions of change. Although the model was intended to be used for monthly or annual predictions of change, we present daily output values for clarity herein. A comparison of the observed and simulated hydrographs is provided in Figure 1, along with the calculated coefficient of determination (R^2) and Nash-Sutcliffe Coefficient (R^2_{NS}; Dingman 2002) to illustrate the model verification. Detailed calibration to daily flow values was not considered necessary for the purposes of the predictions of change and will be further addressed during engineering design and permitting of specific parts of the proposed water handling works.

On the simulated daily time step, the model provides a reasonable fit to the timing and duration of the spring freshet and response to rainfall events following dry periods. The model tends to over-predict peak spring flow and under-predict the typical low flow (baseflow) periods of the summer months. This is an expected result of the soil moisture water balance method, which does not account for surface water detention beyond the soil moisture storage reservoirs. Rather, surplus water reached the receiving water body within the same time step that it was generated and was not routed through other surface water pathways such as wetlands, interflow or surface depression storages. This was recognized during model development; the over-prediction during the peak runoff in the spring and the under-prediction of discharge during dry months was considered a conservative modelling approach for the following reasons:

- the overall range of flows tested was wider than the corresponding observed values, further testing the storage and flow conveyance availability of the hydrological system;
- the increased modelled peak runoff in the spring months simulated conditions leading to increased flows through the conveyance features such as re-alignment channels, testing the preliminary dimensions and water elevations of those features; and
- the simulated periods of lower flow would result in less surplus water available for assimilation in the water quality effects predictions. This would further test the resiliency of the system under dry conditions.

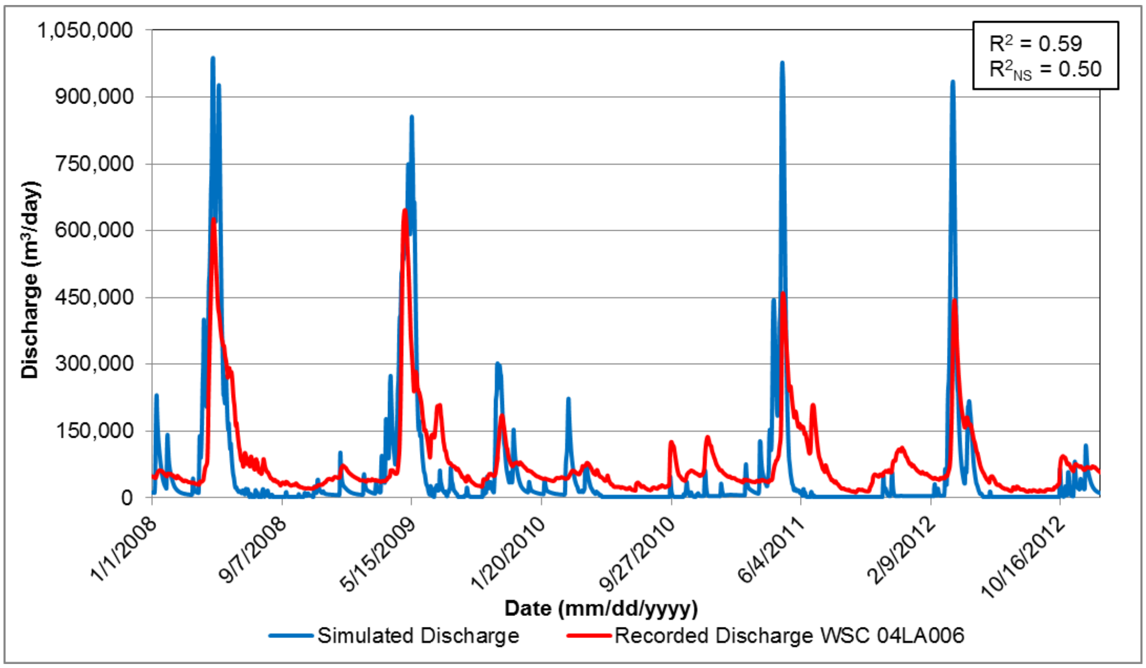


Figure 1: Observed vs Simulated Daily Average Discharge, Mollie River at Dividing Lake Outflow

From this daily record, the R^2 (with a range of 0 to 1) was 0.59 and the R^2_{NS} (with a range of – ∞ to 1) was 0.50. These values suggest that the model is generally predictive of the natural system. The statistics are influenced by the above noted conservative principles applied in the modelling, and we also note the recorded low slope of the receding limb following spring runoff in 2011 that was not reflected in the model. Given the objectives and model set up, the results of the model are considered an adequate predictor with statistical tests in this range. With the applied conservatisms, the simulated monthly discharges provide a similar pattern to the daily record.

We therefore conclude that further calibration or verification of the existing model would not influence the results provided in the hydrological effects assessment. As mentioned above, detailed calibration to daily flow values will be further addressed on an as-required basis during engineering design and permitting of specific parts of the proposed water handling works.

References

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Holmes, E.M. and G.W. Robertson, 1959. A modulated soil moisture budget. Monthly Weather Review, March 1959, pp. 101-106.

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Biotic Ligand Modelling of Copper in the Proposed Effluent Mixing Zone

(See Comment #F186)

Côté Gold Project
Responses to Comments on the Amended EIS / Final EA Report
June 2015
Project #TC121522

4 December 2014

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Re: Biotic Ligand Modelling of Copper in the Proposed Effluent Mixing Zone, Côté Gold, Ontario.

Dear Mr. Woolfenden,

Minnow Environmental Inc. is pleased to provide a brief summary of the biotic ligand model (BLM) and the model results that evaluated site-specific acute toxicity thresholds for copper in the proposed effluent mixing zone in Bagsverd Creek, Côté Lake.

Introduction

The release of effluent into Bagsverd Creek was modelled using Goldsim for an average year, a one in twenty-five wet year and a one in twenty-five dry year (Golder 2014) in both the mixing zone and the downstream receiving environment. Within the mixing zone effluent copper concentrations have been predicted to occasionally exceed the PWQO of 5.0 µg/L (with a hardness of greater than 20 mg/L $CaCO_3$; MOEE 1994) during an average year and a dry year.

While concentrations within an approved mixing zone may exceed PWQO, conditions will not be permitted that are acutely lethal to aquatic life (MOE 2014). Thus Minnow has undertaken speciation modelling of predicted copper concentrations to determine if these concentrations would be expected to exceed acute toxicity thresholds for aquatic organisms.

Copper toxicity in water is dominated by its chemical form, typically inorganic copper and the free ion (Cu^{2+}) are the most toxic forms although copper speciation in the water column is often dominated by copper-organic complexes that are generally not bioavailable (Stumm and Morgan 1996). As such, the purpose of this study was to use a biotic ligand model software tool to model copper speciation during predicted periods of elevated copper and to evaluate site-specific acute toxicity values for copper in the effluent mixing zone under Goldsim-predicted water quality conditions.

Biotic Ligand Model Selection

The widely available biotic ligand model software tools are HydroQual, and BioMet. Hydroqual calculates an acute toxicity threshold based on US EPA standards (US EPA 2003), while BioMet calculates a chronic toxicity threshold, and has only been developed using European aqueous environmental data.

Hydroqual

The BLM Hydroqual software tool was written and is maintained by HydroQual. It uses an acute toxicity endpoint, LA_{50} (i.e., the lethal accumulation of copper on the biotic ligand that results in 50% mortality during an acute exposure) and calculates the total dissolved concentration of copper that will result in 50% mortality of the exposed population. Toxicity data is based on comprehensive studies of fathead minnows (*Pimephales promelas*) and rainbow trout (*Oncorhynchus mykiss*). The model considers the free ion, Cu^{2+}, to be the only toxic species (chemical form) of copper. As Cu^{2+} is the important copper species, competition by Ca^{2+} at the biotic ligand receptor site has a strong influence on the final calculated acute toxicity threshold. Hydroqual data inputs include major ions (calcium, magnesium, sodium, potassium, sulphate, and chloride), pH, and dissolved organic carbon (DOC) concentrations. The Hydroqual BLM incorporates earlier equilibria models (CHESS- chemical equilibria of soils and solutions and WHAM -Windermere Humic Aqueous Model) which allow modelling of chemical and electrostatic interactions of organic molecules and use humic acids as the model organic molecules. If the humic acid (HA) component of the DOC is unknown, a 10% HA content of DOC is assumed.

The acute toxicity output for Hydroqual is the Final Acute Value (FAV), a concentration of copper that is an estimate of the 5^{th} percentile of a sensitivity distribution represented by average LC_{50}'s and EC_{50}'s of the tested genera,(i.e., a hypothetical genus that is more sensitive than 95% of the tested genera). The criterion maximum concentration (CMC) is calculated as half the FAV, and is presented in order to provide a safety factor for effect concentrations.

BioMet (ver 2.3)

BioMet is a “user-friendly” software tool designed for use in Europe only (BioMet.net accessed November 2014). BioMet requires three input parameters (pH, DOC and Ca^{2+} concentrations) and compares these conditions to a database of simulations. The BioMet database is based on 15,000 simulations, run using Hydroqual, to which input data are compared. The minimum HC_5 value (hazardous concentration at 5% of the exposed population, assuming a lognormal species sensitivity distribution) from two simulations with parameter concentrations closest to the environmental input parameters is then reported as the HC_5. Other parameters that have moderate to low influence the bioavailability of copper are considered calculable from the three input parameters (e.g., Mg, Na, alkalinity, dissolved inorganic carbon, Fe, and Al). Parameters that have little or no influence on copper bioavailability (temperature, K, SO_4^{2-}, Cl^-) are assumed to have values at a worst case scenario. The concentration of bioavailable copper is also calculated and could potentially be compared to an appropriate toxicity endpoint other than the HC_5.

An Environment Quality Standard (EQS) is reported on the basis of chronic exposure HC_5 values taken from ecotoxicological data reported from the United Kingdom, the Netherlands, France, and Austria. The EQS is the concentration of bioavailable copper which is protective of aquatic life, using the HC_5 endpoint, on the basis of the extent and taxonomic diversity of the ecotoxicological database.

The BLM software tool selected for this study

The study uses the Hydroqual BLM software tool because it is deemed a more appropriate tool for the objective of the study. The BioMet tool provides a chronic criterion which is not an appropriate threshold for a mixing zone and the nature of the short duration of the predicted elevated concentrations. The BioMet tool data used to derive the HC_5 are based on European ecosystems which may not be applicable to Canadian aquatic environments. The BioMet software tool uses Hydroqual to calculate copper speciation and compare the input parameters to the closest study with similar and known copper HC_5 (chronic) values. Hydroqual calculates a final acute value for the input parameters directly, and uses several more relevant input parameters (including alkalinity, group one and group two cations and the major anions; sulphate and chloride) allowing for a more accurate site-specific evaluation. Hydroqual also allows a greater range for input parameters pH and calcium compared to BioMet. (Other Hydroqual input parameters cannot be compared to BioMet input ranges, because BioMet is based on pH, calcium and DOC only).

The two standards are provided by Hydroqual, the final acute value (FAV), and the criterion maximum concentration (CMC). The FAV represents an acute lethality threshold and the CMC represents the FAV with a 100% safety factor (the CMC is half the FAV) to lower the toxicological response endpoint. Predicted water concentrations above the PWQO are expected to occur over a 1 to 5 day period within the mixing zone. Given the short exposure duration of concentrations above the PWQO and the objective of preventing acute toxicity with the mixing zone, the FAV provides a reasonable criteria for copper concentrations within the mixing zone. Concentrations have been compared to both the FAV and CMC although for the purpose of this study the CMC represents a very conservative criterion.

Model Development

Predicted concentration data for the required Hydroqual input parameters were provided by Golder Associates (Mike Gunsinger, Natalie Korczak, pers comm.) and are included in Appendix Table A.1. These input data included updated predictions for seepage and effluent chemistry on the basis of recent geochemical testing results.

Hydroqual input parameters were pH, temperature, copper, DOC, with an assumed percent humic acid of 10% (conservative), calcium, magnesium, sodium, potassium, chloride, sulphate, and alkalinity. Input concentrations for copper, DOC, calcium, magnesium, sodium, potassium, and sulphate were based on modelled values provided through Goldsim (Golder). Assumptions were made for the remaining parameters and were as follows. The average water temperature during ice-free months (April to October 2012) when effluent discharge is proposed was 11.5°C (Golder 2013). Therefore, a slightly conservative temperature of 10°C was used as the input which is also the lower bound for the Hydroqual model. A reasonable and conservative estimate of 16 mg/L as $CaCO_3$ for alkalinity was provided by Golder Associates (Mike Gunsinger pers comm.). The minimum allowable pH in effluent is 6.5 (PWQO; MOE 1994). A sensitivity analysis was undertaken using the same input parameters but with pH ranging from 6.5 to 7.3 in increments of 0.1.

In a dry year, two events, each that lasted one day only, were predicted to occur with copper elevated above the PWQO guideline (Appendix Table A.2; Minnow 2014). These two events both occurred after a period of no-flow, and the resulting Goldsim-predicted peak in concentration is an artefact of how Goldsim adjusts to the changes in flow on a daily basis when the Goldsim model was calibrated on a monthly basis. In an average year, five events that lasted four days or longer (i.e., longer than the 4-day acute exposure period; Environment Canada 1990) were predicted to have copper concentrations that exceeded water quality benchmarks in the effluent mixing zone in Bagsverd Creek during operations (Minnow 2014). These events were predicted to occurr in July, August, September or October. For both types of year (average and dry) instantaneous data was used for in the model.

Results

Copper Speciation Distribution

Speciation distribution for all scenarios, run using instantaneous data showed that in all cases but one, 98.5 to 100% of the total dissolved copper was complexed by organic ligands, even when DOC concentrations were comparatively low. In a dry year, days that preceded elevated copper, typically had little to no flow; under these conditions, DOC and copper concentrations would also be low resulting, potentially, in only 40% of copper being organically bound, however the total dissolved copper concentrations would also be well below the FAV and CMC.

A pH sensitivity analysis showed that with increasing pH, complexation by organics increased, and the concentration of bioavailable copper decreased. Inorganic species of copper such as copper carbonate and the copper-hydroxyl cation (CuOH) (i.e., those associated with copper toxicity) were four orders of magnitude lower in concentration compared to the concentration of organically bound copper.

Dry Year Results

All BLM-modelled dry year conditions were found not to exceed the final acute value (FAV) and were also below the CMC. The maximum dry year elevated copper concentration was 15.4 µg/L, while the criterion maximum concentration, for pH 6.5 and 6.6, was 104 and 124 µg/L respectively, as the DOC was also increased when copper increased under this flow regime.

Average Year Results

When modelled under conditions of pH 6.5, there were several events when the total dissolved copper concentration exceeded the CMC (Table 1). These events were predicted to occur (based on Goldsim modelling) during the late ice-free period (July, August and September). There were no occurrences when the copper concentration exceeded the final acute value under any conditions. The maximum number of consecutive days where copper exceeded the CMC was three, which is lower than the four-day acute toxicity exposure period for fish. As pH increased there became fewer events where the CMC was exceeded, to pH 6.9 where no events exceeded the CMC (Figure 1).

Figure 1 displays the three major controlling variables for copper toxicity (copper, DOC, and pH) relative to the Acute Toxicity Unit (ATU). When the ATU is equal to one, the copper concentration is equal to the criterion maximum concentration (CMC) (i.e., half the FAV). Figure 1 indicates that when the non-stoichiometric concentration ratio of DOC to copper is one or greater, copper should not be toxic even at pH 6.5 as it is always less than the CMC. It also shows that at pH 6.8 all data but for one day are less than the CMC (and not acutely toxic).

Conclusions and Recommendations

Conclusions

The Ministry of the Environment can allow a mixing zone where concentrations are greater than the PWQO in the receiving environment but the concentrations within the mixing zone must remain below acute toxicity thresholds for aquatic life (MOE 2014). The final acute value is based on lethal toxicity end points and is protective against acute toxicity for 95% of the tested genera (US EPA 2003). No copper concentrations (in an average or dry year) exceeded the final acute value calculated by the Hydroqual Biotic Ligand Model.

At pH 6.5 there were several events in an average year where the criterion maximum concentration was exceeded, although there were no occurrences in a dry year. These events were typically during periods of lower DOC concentrations, and slightly higher in copper concentrations. Increasing the pH lead to a decrease in the number of events where the copper concentration exceeded the CMC; by pH 6.9 there were no copper concentrations that exceeded the CMC. The longest occurrence for any event was three days, a length of time shorter than the acute exposure period for fish. The major controlling variables for copper toxicity at the biotic ligand, were copper and DOC concentration, and pH.

In a dry year, there were no occurrences where the copper concentration exceeded the final acute value or the criterion maximum threshold.

Recommendations

On the basis of the pH sensitivity analysis a pH 6.8 or greater is recommended in the final effluent to decrease the potential for acute copper toxicity in the mixing zone.

Other conditions that lead to copper toxicity are low concentrations of DOC, which is likely associated with the mixing ratio of natural water to effluent water in the mixing zone.

If you have any questions regarding the information presented here do not hesitate to contact me.

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Table 1: Biotic ligand model results for average year events, where the copper concentration exceeded the critical maximum concentration, at pH 6.5 and 6.6.

Event	Duration (day)	pH	Critical Maximum Concentration (CMC)	Final Acute Value (FAV)	Predicted Total Cu Concentration (μg/L)[a]	DOC (mg/L)
1	1	6.5	7.34	14.69	**10.0**	6.32
	2		6.59	13.19	**10.5**	5.57
	3		6.44	12.88	**10.3**	5.46
1	1	6.6	8.69	17.39	**10.0**	6.32
	2		7.79	15.58	**10.5**	5.57
	3		7.61	15.21	**10.3**	5.46
2	1	6.5	5.66	11.32	**9.7**	4.89
2	1	6.6	6.69	13.39	**9.7**	4.89
3	1	6.5	7.49	14.98	**8.3**	6.85
3	1	6.6	8.88	17.76	8.3	6.85
4	1	6.5	6.52	13.04	**8.8**	5.84
4	1	6.6	7.73	15.45	**8.8**	5.84
5	1	6.5	6.89	13.79	**8.2**	6.33
5	1	6.6	8.18	16.36	**8.2**	6.33
6	1	6.5	6.07	12.13	**8.5**	5.49
	2		6.44	12.89	**8.3**	5.88
	3		7.15	14.30	**8.0**	6.62
6	1	6.6	7.19	14.38	**8.5**	5.49
	2		7.64	15.28	**8.3**	5.88
	3		8.48	16.97	8.0	6.62
7	1	6.5	7.40	14.80	**8.0**	6.87
7	1	6.6	8.79	17.57	8.0	6.87

[a] Predicted copper concentrations are bolded if they are greater than the CMC.

Predicted copper concentrations are shaded if they are greater than the FAV.

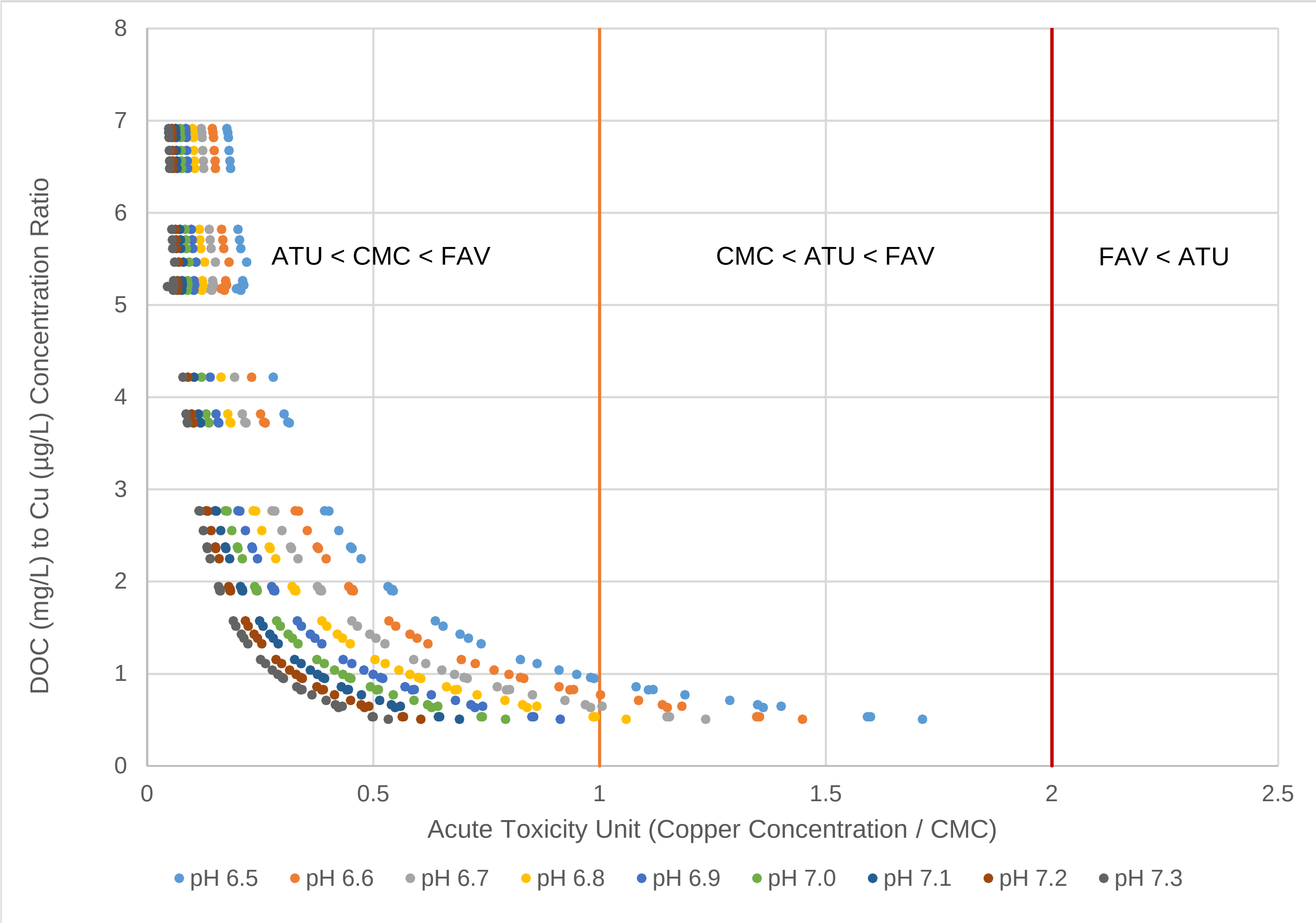

Figure 1: Goldsim-modelled water quality for average and dry years, summarized using the three major controlling variables (Cu, DOC, and pH) for events where copper concentrations are above the PWQO, showing the concentration ratio of DOC to copper that becomes greater than the criterion maximum concentration (CMC; half the final acute value) under varying pH conditions. ATU is the acute toxicity units where ATU = [Cu] / CMC. FAV is the final acute value where FAV/2 = CMC.

APPENDIX A

SUPPORTING DATA

Table A.1: The Goldsim-predicted water quality data (provided by Golder Associates) for Bagsverd Creek (the mixing zone) for average and dry years used for modelling with Hydroqual (the BLM).

Year Type	Date	[DOC] [mg/L]	[Ca] [mg/L]	[Mg] [mg/L]	[K] [mg/L]	[Na] [mg/L]	[Cl] [mg/L]	[Sulphate] [mg/L]	[Cu] [mg/L]
Average Year	1-Jun-71	12.27	7.92	1.44	0.43	2.40	0.79	6.11	0.0013
	2-Jun-71	12.30	7.94	1.44	0.43	2.43	0.79	6.18	0.0014
	3-Jun-71	12.34	7.97	1.44	0.43	2.46	0.80	6.25	0.0014
	4-Jun-71	12.38	7.99	1.45	0.44	2.50	0.80	6.33	0.0014
	5-Jun-71	12.40	8.01	1.45	0.44	2.53	0.80	6.39	0.0014
	6-Jun-71	12.43	8.03	1.45	0.44	2.55	0.80	6.45	0.0014
	7-Jun-71	12.47	8.06	1.46	0.44	2.58	0.81	6.51	0.0014
	8-Jun-71	12.49	8.07	1.46	0.44	2.60	0.81	6.56	0.0014
	9-Jun-71	12.50	8.08	1.46	0.44	2.62	0.81	6.61	0.0014
	10-Jun-71	12.52	8.10	1.47	0.45	2.66	0.81	6.68	0.0014
	11-Jun-71	10.82	58.54	2.45	3.69	3.21	2.88	9.88	0.0050
	12-Jun-71	12.59	8.15	1.47	0.45	2.72	0.82	6.83	0.0014
	13-Jun-71	12.64	8.18	1.48	0.45	2.76	0.82	6.92	0.0014
	14-Jun-71	12.69	8.22	1.49	0.46	2.81	0.83	7.03	0.0015
	15-Jun-71	12.75	8.27	1.49	0.46	2.87	0.83	7.16	0.0015
	16-Jun-71	12.82	8.32	1.50	0.47	2.92	0.84	7.28	0.0015
	17-Jun-71	12.89	8.37	1.51	0.47	2.99	0.84	7.42	0.0015
	18-Jun-71	12.97	8.42	1.52	0.48	3.05	0.85	7.58	0.0015
	19-Jun-71	13.06	8.49	1.53	0.48	3.13	0.86	7.75	0.0015
	20-Jun-71	13.14	8.55	1.54	0.49	3.21	0.86	7.92	0.0016
	21-Jun-71	11.52	47.44	2.28	2.99	3.49	2.44	10.08	0.0043
	22-Jun-71	10.09	80.65	2.90	5.12	3.73	3.79	11.89	0.0066
	23-Jun-71	10.38	73.31	2.76	4.65	3.69	3.49	11.54	0.0061
	24-Jun-71	11.50	47.97	2.29	3.02	3.58	2.46	10.28	0.0043
	25-Jun-71	9.64	89.10	3.05	5.66	3.83	4.13	12.45	0.0072
	26-Jun-71	13.31	8.68	1.56	0.50	3.46	0.88	8.47	0.0016
	27-Jun-71	13.36	8.72	1.57	0.51	3.52	0.88	8.62	0.0016
	28-Jun-71	13.44	8.78	1.58	0.51	3.62	0.89	8.84	0.0017
	29-Jun-71	13.59	8.88	1.60	0.52	3.75	0.90	9.13	0.0017
	30-Jun-71	5.94	161.09	4.36	10.29	4.14	7.02	15.97	0.0122
	1-Jul-71	10.07	76.74	2.82	4.87	3.85	3.63	12.01	0.0064
	2-Jul-71	11.28	52.42	2.38	3.31	3.75	2.65	10.84	0.0047
	3-Jul-71	11.84	41.85	2.19	2.63	3.75	2.22	10.44	0.0039
	4-Jul-71	12.09	38.53	2.14	2.42	3.83	2.09	10.47	0.0037
	5-Jul-71	12.05	41.24	2.20	2.60	3.95	2.21	10.83	0.0039
	6-Jul-71	12.01	43.88	2.25	2.77	4.08	2.32	11.23	0.0042
	7-Jul-71	14.12	9.27	1.66	0.56	4.30	0.95	10.35	0.0018
	8-Jul-71	7.94	115.06	3.51	7.34	4.13	5.16	14.13	0.0090
	9-Jul-71	13.09	30.06	2.04	1.90	4.52	1.79	11.65	0.0033
	10-Jul-71	14.44	9.52	1.70	0.59	4.75	0.98	11.36	0.0019
	11-Jul-71	14.51	9.58	1.71	0.60	4.92	0.99	11.72	0.0020
	12-Jul-71	14.58	9.64	1.72	0.61	5.10	0.99	12.13	0.0020
	13-Jul-71	14.69	9.73	1.73	0.62	5.28	1.00	12.51	0.0020
	14-Jul-71	11.59	57.03	2.53	3.64	4.85	2.87	13.44	0.0052
	15-Jul-71	9.06	94.80	3.16	6.05	4.51	4.36	14.16	0.0077
	16-Jul-71	8.58	101.62	3.27	6.48	4.46	4.63	14.32	0.0082
	17-Jul-71	14.95	9.93	1.76	0.64	5.60	1.03	13.24	0.0021
	18-Jul-71	14.99	9.97	1.77	0.65	5.74	1.03	13.54	0.0022
	19-Jul-71	15.11	10.07	1.78	0.66	5.94	1.05	13.99	0.0022
	20-Jul-71	15.21	10.14	1.80	0.67	6.12	1.06	14.37	0.0022
	21-Jul-71	6.32	129.80	3.72	8.28	4.12	5.72	14.69	0.0100
	22-Jul-71	5.57	137.49	3.83	8.77	3.89	6.02	14.49	0.0105
	23-Jul-71	5.46	135.62	3.78	8.64	3.76	5.93	14.13	0.0103
	24-Jul-71	10.72	63.74	2.61	4.06	4.51	3.12	12.95	0.0056
	25-Jul-71	13.01	32.97	2.11	2.09	4.75	1.91	12.28	0.0035
	26-Jul-71	10.63	64.90	2.63	4.13	4.40	3.16	12.77	0.0056
	27-Jul-71	12.15	45.71	2.33	2.91	4.68	2.41	12.64	0.0044
	28-Jul-71	5.65	127.26	3.61	8.10	3.61	5.58	13.47	0.0097
	29-Jul-71	11.22	54.89	2.45	3.49	4.38	2.76	12.34	0.0050
	30-Jul-71	13.16	30.22	2.06	1.91	4.64	1.80	11.93	0.0033
	31-Jul-71	13.10	31.94	2.10	2.02	4.69	1.87	12.11	0.0035
	1-Aug-71	10.76	61.62	2.57	3.92	4.40	3.03	12.65	0.0054
	2-Aug-71	8.15	93.41	3.06	5.94	4.00	4.26	13.00	0.0075
	3-Aug-71	13.35	32.50	2.14	2.07	5.06	1.91	12.96	0.0036
	4-Aug-71	14.51	19.92	1.96	1.27	5.44	1.43	13.29	0.0028
	5-Aug-71	15.42	11.14	1.84	0.72	5.84	1.10	13.83	0.0023
	6-Aug-71	15.72	10.47	1.86	0.69	6.18	1.09	14.54	0.0023
	7-Aug-71	16.02	10.70	1.89	0.71	6.58	1.12	15.44	0.0024
	8-Aug-71	16.40	10.99	1.94	0.75	7.07	1.15	16.53	0.0025
	9-Aug-71	16.85	11.33	2.00	0.78	7.65	1.19	17.81	0.0026
	10-Aug-71	4.89	127.86	3.57	8.14	3.42	5.58	13.10	0.0097
	11-Aug-71	8.54	90.14	3.04	5.75	4.66	4.15	14.33	0.0074
	12-Aug-71	6.85	105.33	3.24	6.71	4.05	4.71	13.58	0.0083
	13-Aug-71	11.09	63.10	2.65	4.05	5.55	3.12	15.21	0.0057
	14-Aug-71	5.84	113.64	3.34	7.23	3.66	5.02	13.05	0.0088
	15-Aug-71	11.69	55.33	2.53	3.55	5.64	2.82	15.12	0.0052
	16-Aug-71	14.17	31.39	2.20	2.04	6.50	1.92	16.06	0.0038
	17-Aug-71	15.85	16.68	2.02	1.12	7.20	1.37	17.02	0.0029
	18-Aug-71	16.69	11.24	1.98	0.78	7.70	1.18	17.90	0.0026
	19-Aug-71	5.62	114.53	3.34	7.29	3.58	5.05	12.93	0.0088
	20-Aug-71	10.33	70.70	2.76	4.53	5.35	3.41	15.09	0.0062
	21-Aug-71	13.98	37.89	2.34	2.46	6.81	2.19	17.01	0.0043
	22-Aug-71	10.51	69.65	2.76	4.46	5.55	3.38	15.48	0.0062
	23-Aug-71	12.76	49.26	2.50	3.19	6.56	2.62	16.90	0.0050
	24-Aug-71	14.89	29.82	2.24	1.97	7.58	1.90	18.37	0.0039
	25-Aug-71	12.35	52.45	2.53	3.39	6.60	2.74	17.11	0.0052
	26-Aug-71	10.06	72.84	2.79	4.67	5.66	3.50	15.85	0.0064
	27-Aug-71	9.14	80.86	2.90	5.18	5.29	3.79	15.35	0.0069
	28-Aug-71	7.79	92.59	3.04	5.91	4.68	4.23	14.48	0.0075
	29-Aug-71	9.56	77.71	2.87	4.98	5.55	3.68	15.80	0.0067
	30-Aug-71	6.33	104.23	3.18	6.64	4.01	4.65	13.46	0.0082
	31-Aug-71	12.49	52.33	2.55	3.40	7.00	2.75	17.98	0.0053
	1-Sep-71	17.46	11.91	2.08	0.88	9.55	1.27	21.98	0.0030

Table A.1: The Goldsim-predicted water quality data (provided by Golder Associates) for Bagsverd Creek (the mixing zone) for average and dry years used for modelling with Hydroqual (the BLM).

Year Type	Date	[DOC] [mg/L]	[Ca] [mg/L]	[Mg] [mg/L]	[K] [mg/L]	[Na] [mg/L]	[Cl] [mg/L]	[Sulphate] [mg/L]	[Cu] [mg/L]
Average Year	2-Sep-71	17.69	12.09	2.10	0.90	9.85	1.30	22.65	0.0031
	3-Sep-71	17.96	12.28	2.14	0.92	10.06	1.32	23.10	0.0032
	4-Sep-71	11.41	64.00	2.73	4.13	6.66	3.19	17.71	0.0060
	5-Sep-71	5.49	109.64	3.24	6.97	3.63	4.84	12.85	0.0085
	6-Sep-71	5.88	106.34	3.20	6.76	3.80	4.72	13.10	0.0083
	7-Sep-71	6.62	100.95	3.14	6.43	4.16	4.52	13.67	0.0080
	8-Sep-71	8.20	89.17	3.01	5.70	4.94	4.10	14.93	0.0074
	9-Sep-71	13.83	46.10	2.54	3.02	7.77	2.55	19.44	0.0050
	10-Sep-71	6.87	99.91	3.14	6.37	4.33	4.49	13.99	0.0080
	11-Sep-71	10.00	75.93	2.87	4.88	5.91	3.63	16.51	0.0066
	12-Sep-71	14.54	40.82	2.48	2.69	8.26	2.36	20.29	0.0047
	13-Sep-71	18.22	12.46	2.17	0.94	10.26	1.34	23.57	0.0032
	14-Sep-71	18.30	12.53	2.18	0.95	10.45	1.35	23.99	0.0033
	15-Sep-71	18.36	12.58	2.19	0.95	10.59	1.35	24.29	0.0033
	16-Sep-71	18.30	12.55	2.18	0.95	10.61	1.35	24.32	0.0033
	17-Sep-71	18.25	12.52	2.17	0.95	10.66	1.35	24.42	0.0033
	18-Sep-71	18.22	12.51	2.17	0.96	10.72	1.35	24.55	0.0033
	19-Sep-71	18.08	12.41	2.15	0.95	10.59	1.34	24.26	0.0033
	20-Sep-71	17.49	11.95	2.08	0.89	9.72	1.28	22.35	0.0031
	21-Sep-71	7.00	97.28	3.09	6.19	4.21	4.38	13.64	0.0078
	22-Sep-71	10.90	62.91	2.65	4.04	5.71	3.11	15.57	0.0057
	23-Sep-71	5.76	108.57	3.23	6.90	3.54	4.80	12.62	0.0084
	24-Sep-71	11.82	52.91	2.49	3.38	5.44	2.72	14.59	0.0050
	25-Sep-71	14.11	31.65	2.21	2.03	5.94	1.92	14.87	0.0037
	26-Sep-71	15.15	22.84	2.10	1.47	6.15	1.59	15.00	0.0031
	27-Sep-71	15.70	18.66	2.05	1.21	6.32	1.43	15.20	0.0029
	28-Sep-71	7.11	97.40	3.10	6.19	3.82	4.39	12.80	0.0077
	29-Sep-71	13.13	42.62	2.37	2.72	5.54	2.33	14.43	0.0043
	30-Sep-71	14.76	28.13	2.19	1.81	6.03	1.79	14.95	0.0035
	3-Oct-71	7.37	96.43	3.10	6.13	4.00	4.36	13.15	0.0077
	4-Oct-71	7.53	95.00	3.08	6.04	4.04	4.30	13.20	0.0076
	5-Oct-71	7.29	97.08	3.10	6.17	3.95	4.38	13.06	0.0077
	6-Oct-71	9.14	79.77	2.87	5.08	4.47	3.73	13.53	0.0066
Dry Year	21-Jul-05	2.59E-05	1.64E-05	3.02E-06	7.78E-07	2.25E-06	1.60E-06	6.81E-06	2.33E-09
	22-Jul-05	1.74E-06	1.10E-06	2.02E-07	5.22E-08	1.51E-07	1.07E-07	4.57E-07	1.56E-10
	23-Jul-05	2.39E-04	1.51E-04	2.78E-05	7.17E-06	2.07E-05	1.47E-05	6.27E-05	2.15E-08
	24-Jul-05	4.13E-04	2.62E-04	4.80E-05	1.24E-05	3.58E-05	2.55E-05	1.08E-04	3.71E-08
	25-Jul-05	2.66E-05	1.69E-05	3.10E-06	7.98E-07	2.31E-06	1.64E-06	6.98E-06	2.39E-09
	26-Jul-05	0.00212	0.00134	0.00025	6.35E-05	0.000184	0.000131	0.000556	1.90E-07
	27-Jul-05	0.000142	9.00E-05	1.65E-05	4.26E-06	1.23E-05	8.77E-06	3.73E-05	1.28E-08
	28-Jul-05	30.01	20.83	3.59	1.67	19.74	2.27	44.96	0.00581
	29-Jul-05	21.05	14.59	2.51	1.16	13.64	1.59	31.10	0.00404
	30-Jul-05	20.92	14.50	2.50	1.15	13.58	1.58	30.95	0.00401
	31-Jul-05	20.86	14.45	2.49	1.15	13.52	1.57	30.82	0.00400
	1-Aug-05	20.91	14.49	2.50	1.15	13.52	1.58	30.82	0.00400
	2-Aug-05	7.35	5.09	0.88	0.41	4.78	0.55	10.90	0.0014
	3-Aug-05	0.000625	0.000396	7.27E-05	1.88E-05	5.43E-05	3.86E-05	0.00016	5.62E-08
	4-Aug-05	0.00448	0.00284	0.000522	0.000135	0.000389	0.000277	0.00118	4.03E-07
	7-Sep-05	6.39E-06	4.05E-06	7.44E-07	1.92E-07	5.55E-07	3.95E-07	1.68E-06	5.75E-10
	8-Sep-05	6.55E-17	4.15E-17	7.62E-18	1.97E-18	5.69E-18	4.04E-18	1.72E-17	5.89E-21
	9-Sep-05	6.70E-28	4.25E-28	7.80E-29	2.01E-29	5.82E-29	4.14E-29	1.76E-28	6.02E-32
	10-Sep-05	0	0	0	0	0	0	0	0
	11-Sep-05	0	0	0	0	0	0	0	0
	12-Sep-05	0	0	0	0	0	0	0	0
	13-Sep-05	0.00020899	0.00013245	2.43E-05	6.27E-06	1.82E-05	1.29E-05	5.49E-05	1.88E-08
	14-Sep-05	80.07	55.51	9.56	4.43	52.21	6.05	118.97	0.01541
	15-Sep-05	25.29	17.52	3.02	1.39	16.37	1.91	37.32	0.00485
	16-Sep-05	25.27	17.52	3.02	1.40	16.44	1.91	37.46	0.00486
	17-Sep-05	25.42	17.63	3.04	1.41	16.61	1.92	37.85	0.00490
	18-Sep-05	25.45	17.64	3.04	1.41	16.57	1.92	37.76	0.00489
	19-Sep-05	24.12	16.65	2.88	1.31	15.07	1.81	34.41	0.00452
	20-Sep-05	22.62	15.55	2.70	1.20	13.53	1.68	30.97	0.00413
	21-Sep-05	22.45	15.43	2.68	1.19	13.41	1.67	30.71	0.00410

Table A.2: Number of days concentrations predicted to exceed water quality benchmarks in the effluent mixing zone in Bagsverd Creek during operations.

Parameter	Number of days greater than water quality benchmark	Duration of concentration higher than benchmarks
Average Condition		
Copper	45	2 days (June 22-23) 1 day (Jun 25) 2 days (Jun 30-Jul 1) 1 day (Jul 8) 2 days (Jul 15-Jul16) 4 days (Jul 21-Jul 24) 1 day (Jul 26) 1 day (Jul 28) 2 days (Aug 1-Aug 2) 5 days (Aug 10-14) 2 days (Aug 19-20) 1 day (Aug 22) 5 days (Aug 26 - Aug 30) 5 days (Sep 4 - Sep 8) 2 days (Sep 10-Sep 11) 3 days (Sep 21-Sep 23) 1 day (Sep 28) 4 days (Oct 3 - Oct 6) 1 day (Oct 8)
Dry Condition		
Copper	1	1 day (July 28) 1 day (Sep 14)

Fisheries Act Authorization Support Document

(See Comments #F188 and #F241)

Côté Gold Project
Responses to Comments on the Amended EIS / Final EA Report
June 2015
Project #TC121522

CÔTÉ GOLD
FISHERIES ACT AUTHORIZATION
SUPPORT DOCUMENT

Report Prepared For:
IAMGOLD Corporation

Prepared By:
Minnow Environmental Inc.
Georgetown, ON

March 2015

CÔTÉ GOLD
FISHERIES ACT AUTHORIZATION
SUPPORT DOCUMENT

Prepared for:

IAMGOLD Corporation

Prepared by:

Minnow Environmental Inc.

for **Kim Connors, M.Sc.**
Project Manager

Cynthia Russel, B.Sc.
Project Principal

March 2015

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1.0 INTRODUCTION

1.1 Project Background

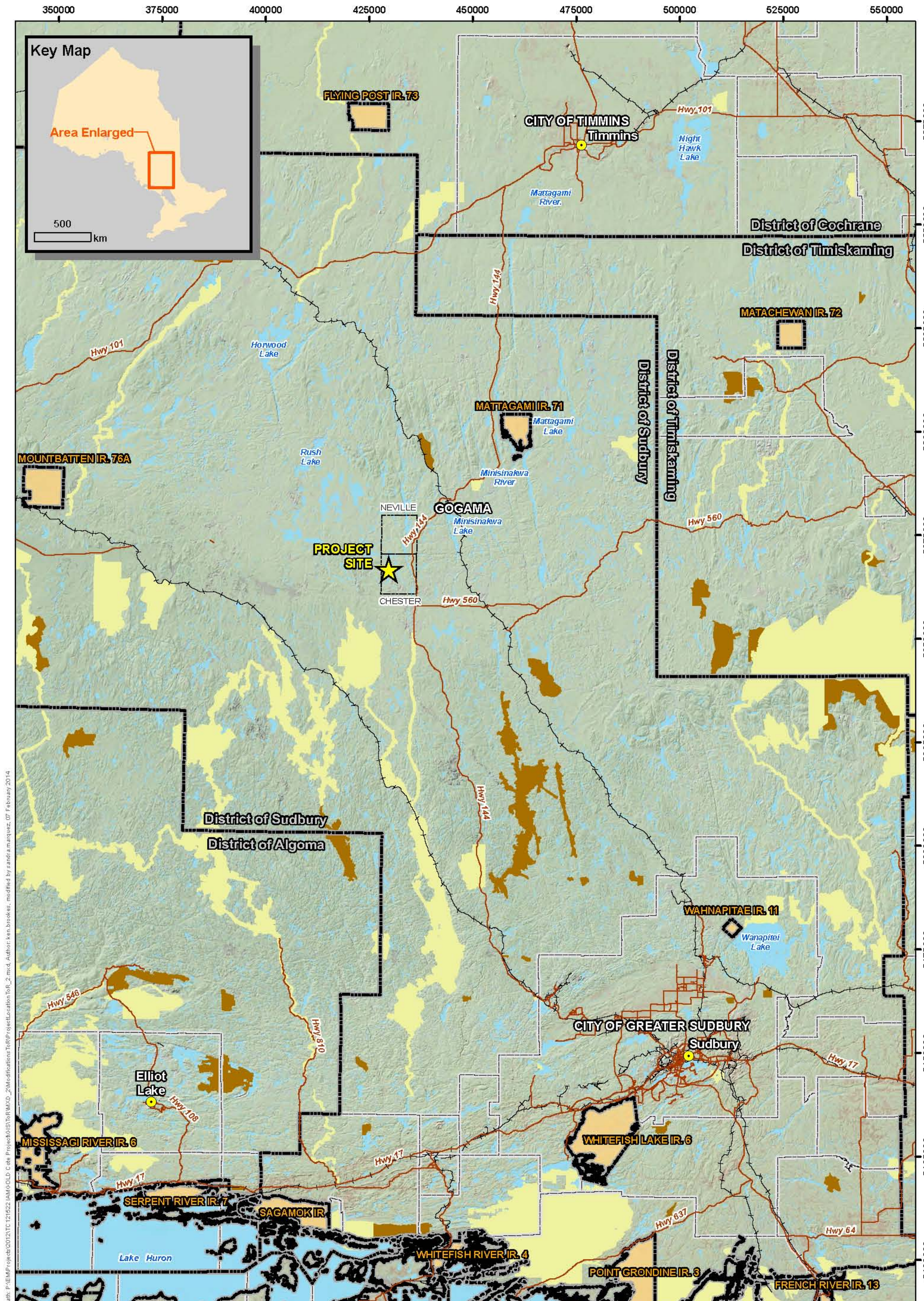
IAMGOLD Corporation (IAMGOLD) is planning to develop the Côté Gold Project (the Project) located approximately 20 kilometres (km) southwest of Gogama, 130 km southwest of Timmins, and 200 km northwest of Sudbury (Figure 1.1). The proposed site layout places the required mine-related facilities in close proximity to the open pit, to the extent practicable (Figure 1.2). The site plan will be refined further as a result of ongoing consultation activities, land purchase agreements and engineering studies.

As part of the proposed development of the Project, several water features will be fully or partially overprinted. To accommodate the open pit and Mine Rock Area (MRA), Côté Lake, the Mollie River, and several small tributaries and ponds will be lost. The Mollie River will be realigned, flowing around the north side of the open pit. This work will include:

- Redirection of flow from Chester Lake to Clam Lake via a new channel,
- A reduction in the water levels of Clam Lake, East Clam Lake and Little Clam Lake to allow water from Chester Lake to flow to Clam Lake and then north towards Bagsverd Lake,
- The construction of connecting channels between Little Clam Lake and the South Arm of Bagsverd Lake to direct the flow north and around the open pit,
- An increase in water level in the South Arm of Bagsverd Lake,
- The construction of connecting channels between the South Arm of Bagsverd Lake and Weeduck Lake to direct the water back into the Mollie River watershed, and
- The construction of a channel between Weeduck Lake and Upper Three Duck Lake to allow the Mollie River to resume its original watershed configuration.

To accommodate the Tailings Management Facility (TMF) Bagsverd Creek will be realigned to flow west of and around the TMF discharging into Unnamed Lake #2, prior to reconnecting to the original watercourse downstream of Unnamed Lake #1 (Figure 1.2).

Dams will be constructed as required to manage water levels and flow directions, and channels will be created to link these habitats (Figure 1.2). Following site closure and the filling of the open pit, the majority of watersheds and waterbodies will be returned to their original state,



LEGEND

- Project Site Location
- Regional Communities
- Major Roads
- Railway
- Lower Tier Municipality Boundary
- Upper Tier Municipality Boundary
- First Nation Reserve
- Conservation Reserve (Regulated)
- Provincial Park
- Wooded Area
- Waterbody / Large Watercourse

NOTES:
- Base data on this map was extracted from Land Information Ontario, MNDM, OBM Ontario Digital Geospatial Database and Ontario Road Network Database.

Datum: NAD83
Projection: UTM Zone 17N

0 12.5 25 50 75 100 Kilometres

IAMGOLD CORPORATION | amec

CÔTÉ GOLD PROJECT

Project Location

PROJECT Nº: TC121522	FIGURE: 1.1
SCALE: 1:850,000	DATE: February 2014

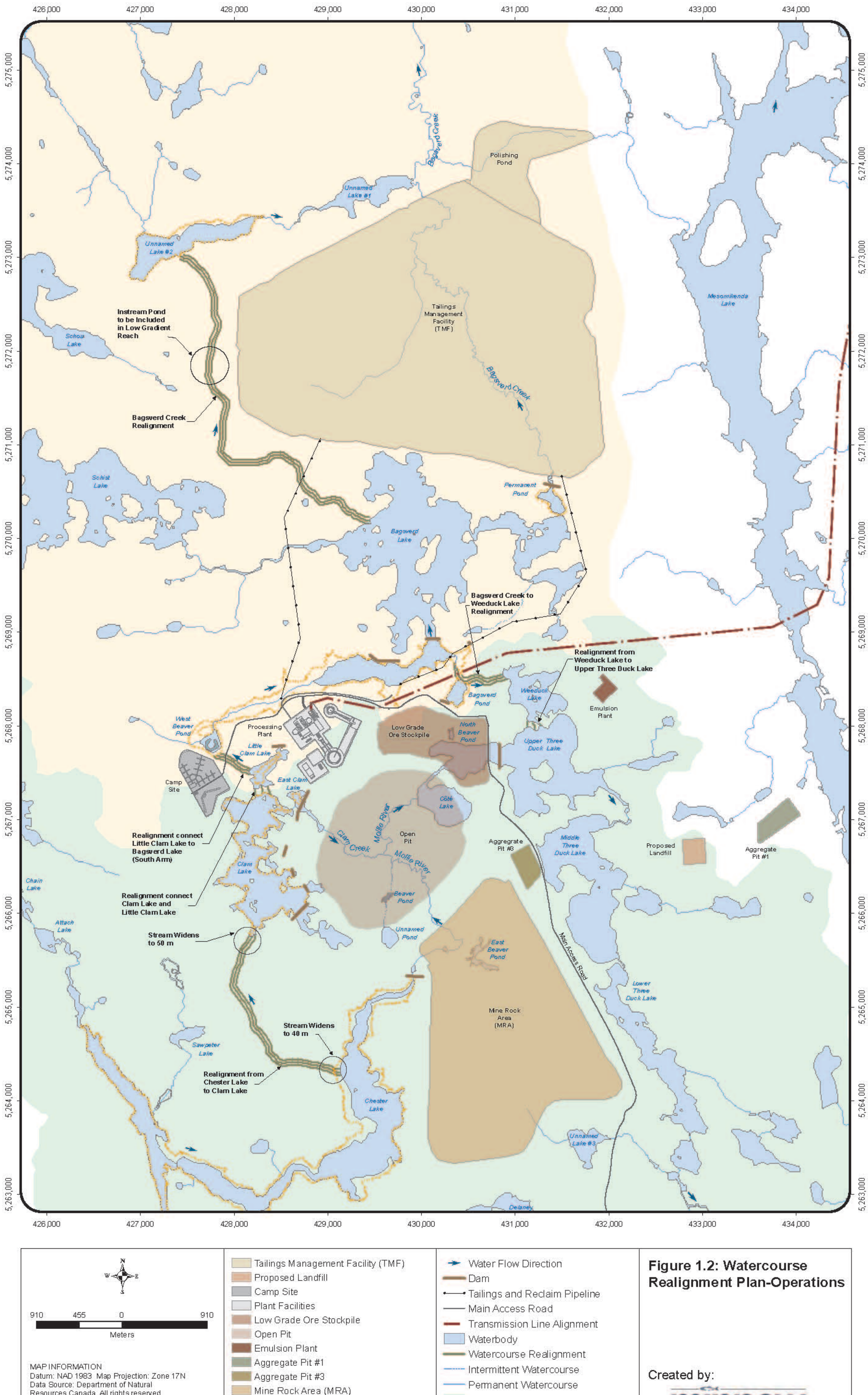


Figure 1.2: Watercourse Realignment Plan-Operations

with the exception of the channel connecting Chester Lake to Clam Lake and the Bagsverd Creek realignment, which will remain in perpetuity (Figure 1.3).

The removal of Côté Lake, a portion of Bagsverd Creek and other smaller water bodies will result in a loss of fish habitat within these areas. IAMGOLD has developed a habitat offsetting plan, described herein, to ensure no serious harm to fish and no loss of productive fish habitat as a result of the proposed undertaking. These offsetting measures will require approval from the Department of Fisheries and Oceans (DFO) in the form of a *Fisheries Act* Authorization (FAA). The intent of this report is to provide an assessment of the proposed habitat changes and their implications to fish productivity to support an FAA application. It is understood that detailed design drawings and detailed mitigation and monitoring plans will be required prior to construction.

1.2 Approach

In 2012, the *Fisheries Act* was amended to strengthen the DFO's ability to manage the sustainability and productivity of Canada's commercial, recreational and aboriginal (CRA) fisheries. The requirements under the act are described in the policy, entitled Fisheries Productivity Investment Policy: A Proponent's Guide to Offsetting (the Policy; DFO 2013). The policy indicates that if there is likely to be serious harm to fish after the application of avoidance and mitigation measures, then a proponent must develop a plan to offset the residual serious harm.

The avoidance and mitigation of effects to the fishery has and will be an integral part of the design and engineering of the Project, but as noted above, the project is anticipated to permanently alter or destroy some existing fish habitat. As such, it is anticipated that an FAA will be required and there is potential that a MMER Schedule 2 Amendment may also be required. To obtain these approvals, IAMGOLD has developed a habitat "offsetting plan," pursuant to the Section 3.1 of the Policy, that will counterbalance unavoidable serious harm to fish and, where possible, improve the productivity of the existing fishery.

The proposed offsetting plan has been developed to comply with the Policy; ensuring sustainable productive capacity of the fish communities and habitats associated with the Project. This will be accomplished in two ways; first, by reducing the number of fish harmed and the duration and spatial extent of fish habitat being affected, and second, to develop an "in-kind" approach to offsetting that will be incorporated into the channel realignment plan, such that habitat that is destroyed or permanently altered is replaced by similar quantity and quality of habitat, with consideration of uncertainty and time lags. As noted within the Policy, by

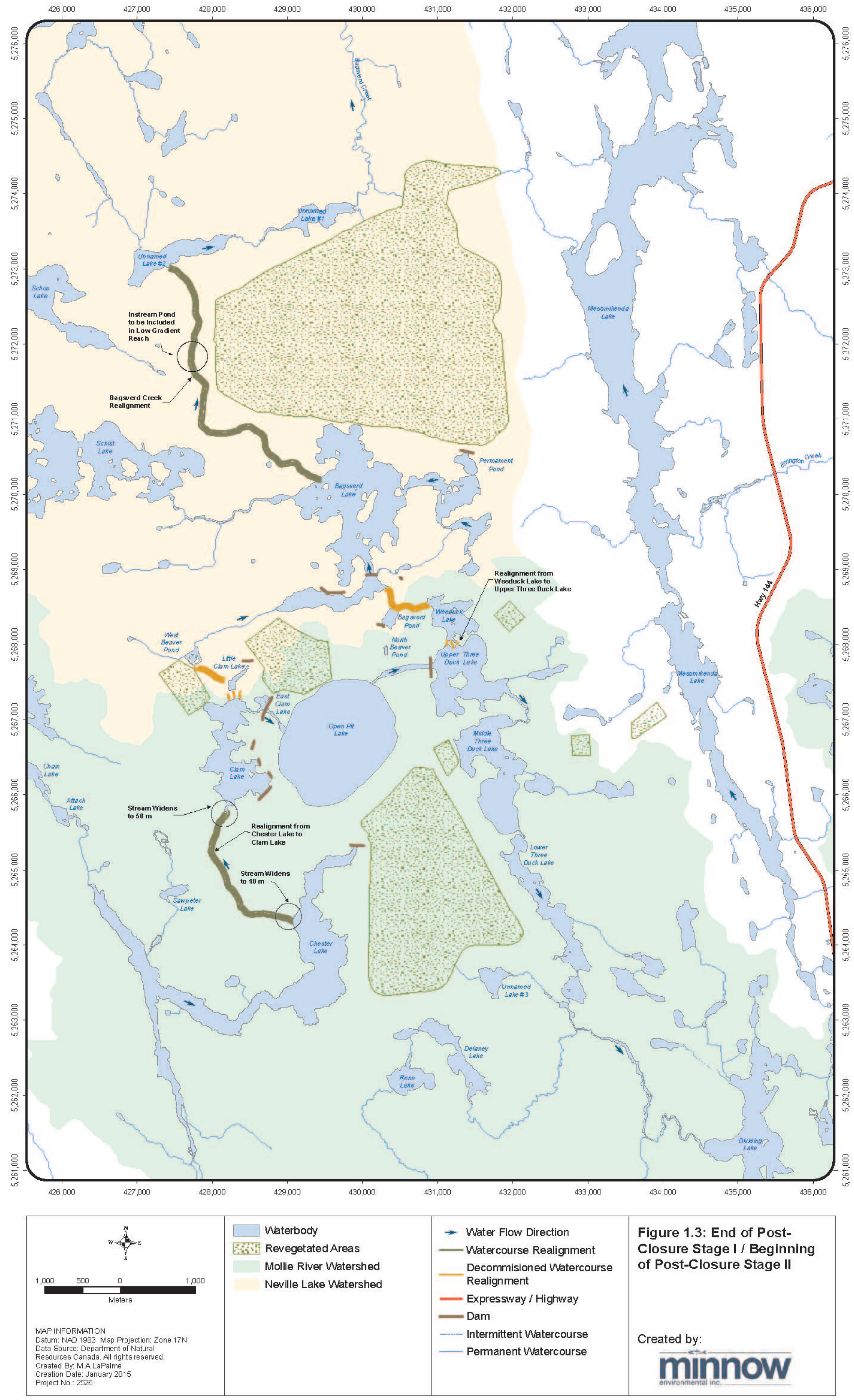


Figure 1.3: End of Post-Closure Stage I / Beginning of Post-Closure Stage II

MAP INFORMATION
Datum: NAD 1983 Map Projection: Zone 17N
Data Source: Department of Natural Resources Canada. All rights reserved.
Created By: M.A.LaPalme
Creation Date: January 2015
Project No.: 2526

Created by:
minnow environmental inc.

developing in-kind habitat and balancing the losses to fish and fish habitat caused by the Project, the benefits that result from offsetting measures can be a straight-forward calculation.

In order to assess the predicted loss of fish habitat associated with the Côté Gold Project relative to the planned habitat to be created through the offsetting plan, IAMGOLD has developed an assessment approach, in concert with DFO, to allow for the current and post development fish productivity to be quantified. A habitat units approach was employed as a surrogate for fish productivity which incorporated the habitat quality and quantity of pre and post development conditions such that the net change in productive fish capacity could be considered. The balance of habitat losses versus gains were considered together with other factors that can influence fish productivity (i.e., connectivity) to provide for an overall assessment of change in fish productivity associated with the proposed undertaking. Furthermore, the proposed offsetting plan incorporates abotic and biotic features which have been incorporated to minimize lag times and promote fish productivity.

1.3 Objective

The objective of this report is to document and assess the harm to fish habitat as a surrogate to assessing changes in fish productivity that may occur as a result of the Project. The document also supports a future Application for Authorization under Paragraph 35(2) (b) of the *Fisheries Act* and outlines the offsetting plan that may also apply to Metal Mining Effluent Regulation Schedule II amendments, if required. This report clearly documents the quality and quantity of habitat to be lost versus gained and considers the implications to fish productivity for five key fish species within the two affected watersheds as guided by and agreed upon with DFO. (Mollie River and Neville Lake; Figure 1.2).

1.4 Report Organization

The methods followed for the habitat evaluation are presented in Section 2.0. Descriptions of the habitat evaluation including the description and quantification of losses and gains associated with the Project are presented in Section 3.0. Section 4.0 discusses methods to be used to avoid lag times. Section 5.0 presents the overall net change in habitat, and Section 6.0 provides recommendations for future monitoring. Finally, all references cited throughout the report are listed in Section 7.0.

2.0 METHODS

The overall objective in assessing the changes that will result from the Project is to determine the net change in productivity within the affected watersheds. Since the direct measure and prediction of fish productivity is difficult, habitat, which can more readily be quantified in terms of quality and quantity, has been used as a surrogate for fish productivity. A Habitat Evaluation Procedure (HEP) was used to assess habitat losses and gains for the project. This approach has be developed in concert with DFO[1] and used successfully in support of other similar projects. Generally, the approach accounts for habitat quality and quality on a habitat units basis (quality x quantity = a habitat unit value) before and after development so that the net change in habitat units (productivity) may be determined.

The evaluation of existing habitat quality and quantity is based on an extensive assessment of fish habitat and fish community composition conducted in 2012 and 2013 (aquatic baseline studies) which incorporated spring, summer and fall surveys thorough out the affected watersheds (Mollie River and Neville Lake). The Aquatic Baseline Report (Minnow 2014) provides habitat mapping and fish community composition for each waterbody potentially affected by the Project watercourse realignments. This information was used to assess the current habitat quality relative to habitat suitability indices or literature sources. Habitat quantity was confirmed through GIS mapping, bathymetry maps and field verification. Future habitat quantity was based on conceptual engineering design plans provided by Calder Engineering which have been incorporated into this report. Habitat quality was based on habitat features such as depth, vegetation and substrate in lakes and gradient, depth, vegetation and substrate in stream/rivers relative to habitat suitability indices or literature sources. The assessment methods used to evaluate current and future habitat quantity and quality are described below.

2.1 Fish Species Considered in Assessment

The fish communities within stream and lake habitats of the study area were generally dominated by northern pike (*Esox lucius*) and yellow perch (*Perca flavenscens*) (Table 2.1). Walleye (*Sander vitreus*), white sucker (*Catostomus commersonii*) and lake whitefish (*Coregonus clupeaformis*) were also common and varied in abundance depending on lake habitat. Smallmouth bass (*Micropterus dolomieu*) and burbot (*Lota lota*) were only present in a few lakes, but were found in both watersheds that will be affected (Table 2.1). In addition to these species, fifteen small-bodied species were also identified. No endangered, threatened

[1] The methods to be used for the assessment of habitat change for this Project were provided to DFO for review in July 2014 and accepted and finalized in October 2014.

Table 2.1: Summary of fish species presence/absence in Côté Gold area lake and stream habitat[a].

		Mollie River Watershed															Neville Lake Watershed											
Size	Species	Chester Lake	East Beaver Pond	Unnamed Pond	Beaver Pond	Clam Lake	Cote Lake	North Beaver Pond	Weeduck Lake	Three Duck Lakes			Unnamed Lake #3	Delaney Lake	Mollie River	Clam Creek[c]	Schist Lake	West Beaver Pond	Little Clam Lake	Bagsverd Pond	Bagsverd Lake	Unnamed Lakes		Neville Lake	Bagsverd Creek (Lower)	Bagsverd Creek (Upper)	Unnamed Stream to Bagsverd Creek	Mesomikenda Lake
										Upper	Middle	Lower										#2	#1					
Large-bodied Fish Species	Burbot *Lota lota*					✔	✔																		✔	✔		
	Lake trout *Salvelinus namaycush*																											✔
	Lake whitefish *Coregonus clupeaformis*	✔					✔		✔	✔	✔	✔					✔				✔			✔				✔
	Northern pike *Esox lucius*	✔		✔		✔	✔		✔	✔	✔	✔	✔	✔	✔		✔		✔		✔	✔	✔	✔	✔	✔	✔	✔
	Smallmouth bass *Micropterus dolomieu*					✔					✔ [b]													✔				
	Walleye *Sander vitreus*						✔			✔	✔	✔					✔				✔	✔	✔	✔				✔
	White sucker *Catostomus commersonii*	✔		✔			✔		✔	✔	✔	✔		✔	✔		✔	✔		✔	✔	✔	✔	✔	✔	✔		✔
	Yellow perch *Perca flavescens*	✔		✔		✔	✔		✔	✔	✔	✔	✔	✔	✔		✔		✔		✔	✔	✔	✔	✔	✔		✔
Small-bodied Fish Species	Blacknose shiner *Notropis heterolepis*	✔				✔	✔		✔	✔	✔	✔			✔		✔		✔		✔	✔	✔	✔				✔
	Brook stickleback *Culaea inconstans*																											✔
	Central mudminnow *Umbra limi*																	✔		✔			✔			✔		
	Common shiner *Luxilus cornutus*										✔																	
	Fathead minnow *Pimephales promelas*		✔		✔													✔		✔	✔							
	Finescale dace *Chrosomus neogaeus*		✔		✔			✔									✔	✔		✔								
	Longnose dace *Rhinichthys cataractae*																								✔	✔		
	Golden shiner *Notemigonus crysoleucas*	✔				✔	✔		✔				✔	✔	✔		✔	✔	✔		✔		✔	✔	✔	✔	✔	✔
	Iowa Darter *Etheostoma exile*	✔		✔	✔	✔			✔	✔	✔	✔	✔		✔		✔	✔	✔	✔	✔	✔	✔		✔			✔
	Johnny darter *Etheostoma nigrum*					✔																						
	Northern redbelly dace *Chrosomus eos*		✔		✔			✔										✔		✔							✔	
	Pearl dace *Margariscus nachtriebi*				✔													✔										
	Sculpin sp. *Cottus bairdii* *Cottus cognatus*								✔			✔											✔					
	Spottail shiner *Notropis hudsonius*	✔				✔			✔	✔	✔						✔				✔	✔		✔				✔
	Trout-perch *Percopsis omiscomaycus*	✔																										✔

[a] This table reflects fish species absence/presence in the current configurations of the Mollie River and Neville Lake watersheds.

[b] AMEC 2011.

[c] Minnow trapping was conducted in Clam Creek in 2013, but no fish were caught after 40.03 trap hours.

or special concern fish species (COSEWIC 2013) were captured during baseline studies (Minnow 2014 and Amec 2011).

Based the existing fish community composition, the habitat assessment was conducted for five key sport fish; northern pike, yellow perch, lake whitefish, walleye, and smallmouth bass. The habitat requirements of these five species represent the range of conditions required to support all fish species found within the affected areas. Thus the assessed fish serve as surrogates for the expected changes in productivity of all fish species found in the affected waterbodies. It is assumed that all fish species and life stages being evaluated have equal weighting and therefore were not ranked (i.e., no fish species or life history stage was considered more important than others). Since, the loss of habitat and the offsetting habitat being proposed are to be similar, the goal is to maintain or enhance the productivity of the fish community as a whole and not any particular species found within the project area.

2.2 Habitat Evaluation Procedure

Ultimately, the Project will result in the alteration of fish habitat which has the potential to affect the CRA fishery, and therefore an accounting of habitat losses relative to the proposed increases in habitat is required. A Habitat Evaluation Procedure (HEP) was used to assess habitat losses and gains for the project (Terrel et.al., 1982). This approach calculates a habitat unit by multiplying the habitat quality for each species by the spatial area of the habitat type affected (e.g., m^2). This was calculated for all the habitat that will be lost as well as the habitat gained (created or enhanced) through offsetting. These habitat units were used to calculate the expected net change in habitat attributed to the Project.

The following outlines the general approach used to calculate habitat units.

1. **Habitat Quantity** – The quantity of stream and lake habitat was predicted before and after development as areal coverage (i.e., per m^2).
2. **Habitat Quality** – Habitat quality was assessed for five key species and four life history stages. A habitat suitability score was assigned for each species and life history stage.
3. **Habitat Units –** Habitat units were calculated using the numeric quality of habitat multiplied by the quantity of habitat before and after development to assess the net change in habitat.

Both the quantity and quality of fish habitat for each species and each life history stage was incorporated into the habitat units assessment such that the resulting metric accounts for both quantity and quality of all habitat types lost and gained, and therefore is a reasonable substitute for the net change in productive capacity.

The HEP developed by the US Fish and Wildlife Service (1981) follows:

Habitat Units = (HSI) x (Area of available habitat)

Where HSI (Habitat Suitability Index) is defined as a numerical index that represents the capacity of a given habitat to support a selected fish species, and the area of available habitat is defined as the total area of all habitat types used by the evaluation species (US Fish and Wildlife Service 1981).

HSI = Study area habitat conditions/Optimum habitat conditions

Where HSI can have a minimum value of 0.0 and a maximum value of 1.0, representing unsuitable and optimal habitat, respectively. This can also be applied to word rankings where habitat can be rated by word descriptors such as “excellent”, “good”, “average” or “poor”. If these descriptors are clearly defined, they can be converted to a numerical ranking with the following equation:

HSI = Output Rank for the area of interest / 4

The numerical ranking used for the following habitat quality descriptors were:

Word Ranking	**Numerical Ranking**	**HSI Value**
Excellent	4	1.00
Good	3	0.75
Average	2	0.50
Poor	1	0.25
None	0	0.00

2.2.1 Habitat Quantity

The quantity of stream and lake habitat were measured separately. Lake habitat was measured (quantified) for three habitat areas within each lake based surface areas (m^2). These areas corresponded to depths of 0-2 m, 2 m to the end of the littoral zone[2], and the end of the littoral zone to maximum depth of the lake (limnetic zone). The littoral zone was divided into two different areas to account for overwintering habitat (i.e., areas less than 2 m in depth would not provide good overwintering habitat) and/or the potential for spawning habitat (i.e.,

[2] Littoral zone is the interface between the land of the drainage basin and the open water of lakes and some streams. It is defined as the euphotic zone (two times the Secchi depth) and represents the depth at which sunlight penetrates to the sediment and allows aquatic vegetation to grow.

northern pike spawning generally occurs in less than 2 m). Streams were classified into low, medium and high gradient areas, as well as, permanently flowing versus intermittent[3]. The area of the stream was calculated by multiplying stream width and length (m^2) for each gradient type.

To calculate habitat quantity, the spatial area of each habitat type affected by the Project was calculated using both Geographic Information System (GIS) and reconnaissance data collected in baseline surveys. Reference water level data was used for all streams and lakes in order to standardize comparisons among locations[4]. Average stream channel widths were determined using aerial photographs and reconnaissance data (for smaller streams). Intermittent streams were given a stream width of 0.5 m which is very conservative since some of these streams had sections of undefined channel for various lengths. Stream channel lengths were rounded up to the nearest 10 m. Similarly, the spatial area of each habitat type to be created was also calculated either in GIS or Computer-Aided Design (CAD) after conceptual design drawings[5]. Proposed waterbody or watercourse habitat sizes were based on conceptual design drawings.

2.2.2 Habitat Quality

Fish habitat quality (HSI value) for each species was based on habitat requirements found in key literature sources and existing habitat suitability models to document optimal habitat for all life stages of each species. Published information on habitat suitability for the assessed fish species was taken from sources including Inskip (1982), Edwards et. al., (1983), McMahon et.al., (1984), Scott and Crossman (1998), Coker et al. (2001), Craig (1996), Holmes et al. (2010), and United States Fish and Wildlife Service Habitat Suitability Indices (e.g., Krieger et al. 1983, Twomey et al. 1984). The habitat characteristics required for each life history stage is provided for each species (Appendix A) and formed the basis for numerical ranking of habitat quality. Existing fish habitat quality was based on habitat observed in baseline studies (AMEC 2011, Minnow 2014) and characterized using standard protocols (Dodge et.al., 1989). The quality of habitat associated with the proposed offsetting plan was based on the characteristics of the habitat to be created (i.e., gradient, substrate, vegetation, depth) and the habitat requirements established for each species (Appendix A). Based on expert knowledge and the local conditions of the study area, a HSI value was applied to each habitat type (lakes and

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[3] Intermittent streams were defined as streams with flow that occurs at certain times of the year, only when groundwater levels are adequate, but may cease entirely in low water years or be reduced to a series of separated pools.

[4] Lake areas may vary from those reported in the baseline report (Minnow 2014) due to seasonal differences between sampling events.

[5] Spatial area of habitat created is based on current conceptual design.

streams) that will be lost, altered or created by the Project for each fish species and life stage assumed to utilize the habitat.

For each habitat area, habitat suitability (quality) was assessed for four life stages of the key species:

- spawning and incubation,
- juvenile rearing,
- adult foraging, and
- overwintering (all life stages).

Habitat characteristics for each habitat area were then evaluated relative to habitat preferences to estimate a suitability score between 0 (unsuitable/none) and 1 (excellent) for each life stage of each species. Both aquatic and riparian habitat was noted during reconnaissance surveys and was considered when evaluating specific life stages for each species (e.g., anticipating habitat conditions in the spring when water levels are higher and northern pike spawn). Habitat types were ranked equally so that no single habitat type was considered more important than another.

2.2.3 Calculation of Habitat Units Lost and Gained

Habitat units lost and gained were calculated by multiplying life stage-specific habitat quality ratings for each habitat type (e.g., low gradient stream) by the area (m^2) of the habitat before and after mine development. Total habitat units were then calculated as the sum of all life-stage specific habitat units existing (before) and the sum of all life-stage specific habitat units enhanced or created (after).

Habitat within each area affected by the project is described briefly (detailed descriptions are presented in Minnow 2014), focussing on the habitat requirements for each life stage of the five key species. While portions of existing habitat may present excellent or poor habitat for the species assessed, the value assigned to the habitat unit is based on the proportion of habitat quality within the habitat unit as a whole (i.e. a small portion of the littoral zone is excellent spawning habitat but the rest of the habitat is average, the assigned quality may be good). Also, though a species may not be found within a waterbody, habitat was evaluated based on the potential for that species to live within the waterbody. Discussion focusses on habitat losses and gains separately.

2.3 Lag Times

Lag times, the period between the construction of habitat and its ability to functionally support the fishery, have been considered in the habitat offsetting plan (Minns 2006 and DFO 2013). Measures to reduce lags times have been described as well as the expected outcome of each measure incorporated.

2.4 Quantifying Net Change

The change in habitat units for each species and life stage was summarized for both stream and lake habitat. The quantified change in habitat units was considered to be a measure of expected changed to fish productivity. The net change in habitat units was also considered in light of other factors which may influence fish productivity, including habitat connectivity and type (i.e. stream versus lake habitat).

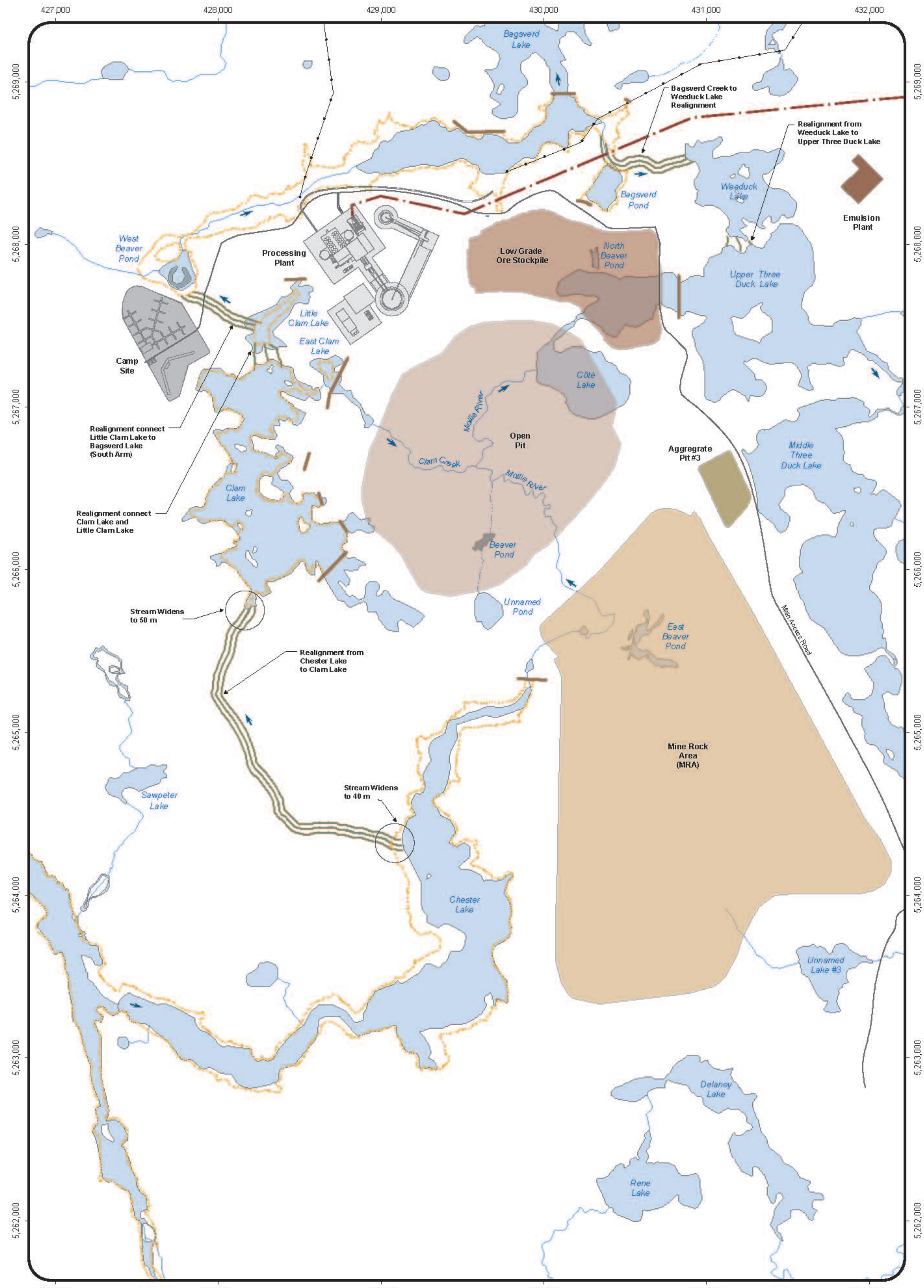
3.0 EXPECTED HABITAT LOSSES AND PROPOSED OFFSETTING PLAN

As part of the proposed Project, several water features will be fully or partially overprinted. These include Côté Lake, portions of Upper Three Duck Lake, Clam Lake, the Mollie River/Chester Lake system, and Bagsverd Creek. The Mollie River will be realigned to accommodate the development of the open pit such that it will flow into Clam Lake which will flow north through Little Clam Lake and the South Arm of Bagsverd Lake, and then be redirected east into Weeduck Lake and into Upper Three Duck Lake, where it will resume its original watershed configuration (Figure 3.1). Dams will be constructed as required to manage water levels and flow directions. Following operations and pit filling (expected to take approximately 50 years) most of the smaller watercourse realignments will be removed and the watersheds will be returned to their original configuration. However, a dam on Chester Lake and a connecting channel to Clam Lake will remain in perpetuity. In order to accommodate the development of the Tailings Management Facility (TMF), Bagsverd Creek will be realigned to flow around the TMF to the west and connect to Unnamed Lake #2, where it will flow east into Unnamed Lake #1, and then reconnect to its original watershed configuration flowing north to Neville Lake (Figure 3.2). This watercourse realignment will be permanent and will remain in perpetuity.

A description of the loss of existing habitat and expected habitat gains associated with the offsetting plan are provided in Sections 3.1 and 3.2 respectively. The description of existing habitat is based on information compiled during aquatic baseline surveys (Minnow 2014 and Amec 2011). The quality of this habitat has been based on the habitat suitability indices and literature sources for each life stage assessed (Appendix A). The quantity of habitat is based on GIS mapping, bathymetry maps and field verification. The habitat quality, quantity and resulting habitat units of the existing habitat to be lost is provided in Appendix B (Tables B.1 to B.12). Similarly, the habitat to be developed for the offsetting plan has been accounted for in Appendix B (Table B.1 to B.12) based conceptual engineering drawings and anticipated habitat conditions relative to the habitat requirements for the various life history stages of the key fish species (Appendix A).

3.1 Habitat Losses

Fish habitat will be lost as part of the Côté Gold Project, specifically associated with the open pit, the mine rock area (MRA), and the tailings management facility (TMF) (Table 3.1). Habitat losses discussed below are generally grouped by the construction activity resulting in the



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MAP INFORMATION
Datum: NAD 1983 Map Projection: Zone 17N
Data Source: Department of Natural Resources Canada. All rights reserved.
Created By: M.A.LaPalme
Creation Date: January 2015
Project No.: 2526

- Proposed Lake Area
- Aggregate Pit #3
- Mine Rock Area (MRA)
- Camp Site
- Plant Facilities
- Low Grade Ore Stockpile
- Open Pit
- Emulsion Plant
- Waterbody
- Wetland

- Dam
- Watercourse Realignment
- Tailings and Reclaim Pipeline
- Main Access Road
- Transmission Line Alignment
- Intermittent Watercourse
- Permanent Watercourse
- Water Flow Direction

Figure 3.1: Realignments Around the Open Pit and Mine Rock Area

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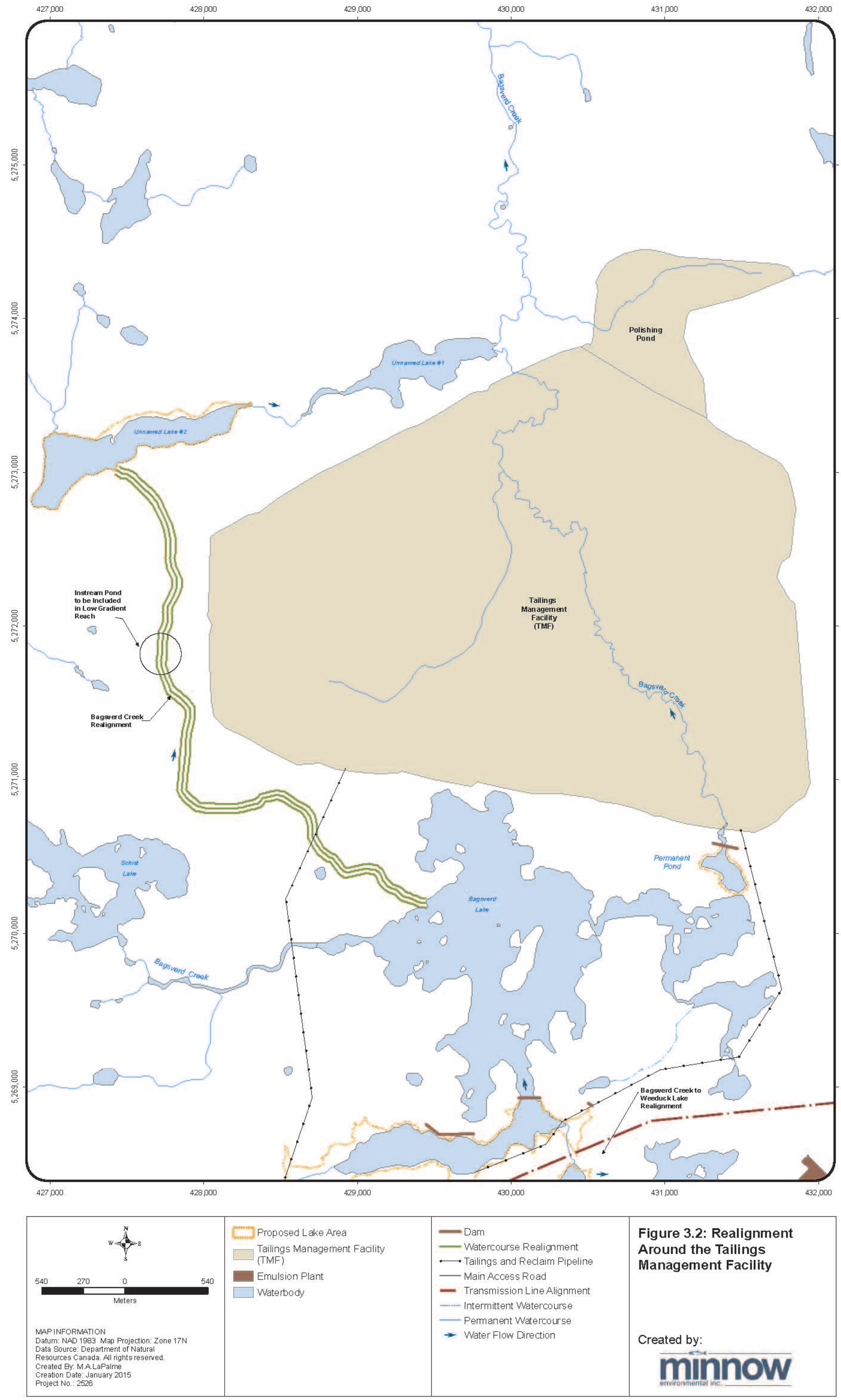


Figure 3.2: Realignment Around the Tailings Management Facility

Table 3.1. Summary of waterbodies affected by the Project.

Location of Impact	Habitat Losses	Habitat Alterations	Habitat Gains
Open Pit / Mine Rock Area	Unnamed Pond	East Clam Lake (east section lost, water level lowered 0.8 m)	Realignment Chester to Clam Lake (40 m floodplain with 20 m inset channel)
	Côte Lake	Clam Lake (water level lowered 0.8 m)	Realignment Clam Lake to Little Clam Lake (30-40 m wetland between lakes)
	North Beaver Pond	Upper Three Duck Lake (west arm lost)	Realignment Little Clam to West Beaver Pond (10-15 m wide step-pool channel)
	Mollie River (Chester to Côte)	Chester Lake (water level increased 0.3 m)	Realignment Bagsverd to Weeduck (40 m floodplain with 20 m inset channel)
	Clam Creek	Little Clam Lake (water level lowered 2.4 m)	Realignment Weeduck to Upper Three Duck Lake (submerged rock riffle between lakes)
	Intermittent stream between Unnamed Pond and Beaver Pond	Bagsverd Lake South Arm (water level increased 1.5 m)	
	Stream where Beaver Pond was located	Unnamed Inlet stream to Chester (flow reversed, new lake outlet)	
	Intermittent stream between Beaver Pond and Mollie River	West Beaver Pond stream to Bagsverd South Arm (becomes lake habitat)	
	East Beaver Pond	Bagsverd Pond outlet to Bagsverd South Arm (flow reversed, increased water level)	
	Upper Inlet Unnamed Lake #3	Bagsverd Pond (water level increase 0.5 m)	
Tailings Management Facility	Bagsverd Creek from Bagsverd Lake to Unnamed Lake #1	Unnamed Lake #2 (water level increase 0.3 m)	Realignment Bagsverd Lake to Unnamed Lake #2 (30 m floodplain with 8 m inset channel)
	Unnamed inlet to Bagsverd Creek	Permanent Pond (water level increase 2 m)	

change or loss (the habitat units attributed to these losses are provided in Appendix B; Tables B.1 to B.12).

3.1.1 Open Pit Construction

Several habitats will be lost due to the development of the open pit including:

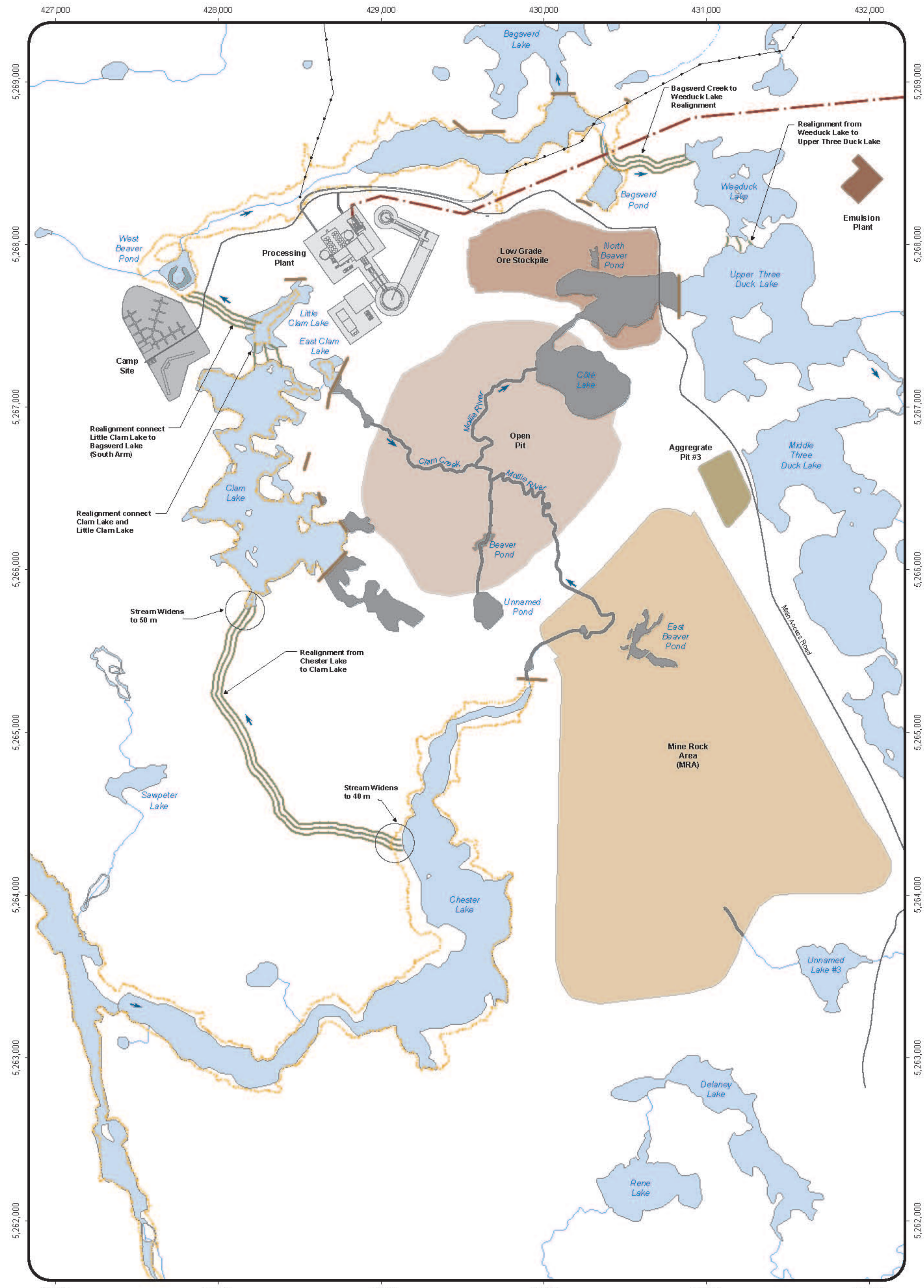
- Unnamed Pond,
- Beaver Pond,
- North Beaver Pond,
- A portion of the Mollie River
- Clam Creek,
- Côté Lake,
- Portions of Clam Lake, and
- The East Arm of Upper Three Duck Lake.

A brief description of the quality and quantity of these habitats is provided below.

Unnamed Pond is located just south of the proposed open pit, covering approximately 28,400 m^2, and will be lost as part of the open pit construction (Figure 3.3, Table 3.2). The pond discharges intermittently at the north end to Beaver Pond. Aquatic vegetation within the pond is limited, though the shoreline is bordered by a floating sphagnum mat. This provides good spawning and juvenile rearing habitat for northern pike and yellow perch, as well as good foraging habitat for adult yellow perch (Appendix A; Appendix B Tables B.1 and B.2). The pond does not provide habitat for walleye, lake whitefish or smallmouth bass. (Tables B.3 to B.5) Due to the relatively shallow depth, overwintering habitat is very limited, though various age classes of northern pike and yellow perch suggest populations are self-sustaining.

Beaver Pond was a small waterbody adjacent to a road within the footprint of the proposed open pit (Figure 3.3). The Ministry of Natural Resources installed a culvert at the road crossing prior to the summer of 2013, reducing the pond to a small defined channel 180 m in length (Table 3.2). Abundant macrophytes were present within the pond prior to culvert installation, and likely remain within the channel. Only small bodied fish were captured within the pond. The installation of the culvert likely reduced fish densities, and suitable habitat for large bodied species is likely extremely limited. (i.e., no habitat quality accounted for the five key species).

The Mollie River connects Chester Lake to Côté Lake, with three small tributaries flowing into the river within this reach, including drainage from East Beaver Pond, Beaver Pond and Clam Creek. The entire reach of the Mollie River downstream of Chester Lake will be lost due to construction of both the open pit and the MRA (Figure 3.3, Table 3.2). The Mollie River will be



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MAP INFORMATION
Datum: NAD 1983 Map Projection: Zone 17N
Data Source: Department of Natural Resources Canada. All rights reserved.
Created By: M.A.LaPalme
Creation Date: January 2015
Project No.: 2526

Proposed Lake Area
Waterbody Lost
Camp Site
Plant Facilities
Low Grade Ore Stockpile
Open Pit
Emulsion Plant
Aggregate Pit #3
Mine Rock Area (MRA)
Waterbody
Wetland

Watercourse Lost
Dam
Watercourse Realignment
Tailings and Reclaim Pipeline
Main Access Road
Transmission Line Alignment
Intermittent Watercourse
Permanent Watercourse
Water Flow Direction

Figure 3.3: Areas to be Lost to the Open Pit and Mine Rock Area

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Table 3.2: Lake areas and stream lengths and areas lost under post construction configuration.

	Location of Impact	Identification	Depth Range (m)	Current Configuration (m^2)	Post Construction Configuration (m^2)	Loss (m^2)
Lakes	Open Pit	Unnamed Pond	0-max	28,424	0	-28,424
		East Clam Lake (southern section lost)	0-max	2,074	0	-2,074
		Clam Lake (south arm)	0-2	42,852	0	-42,852
		Clam Lake (east arm)	0-2	6,286	0	-7,006
			2-max	720		
		Côte Lake	0-2	61,045	0	-149,066
			2-max	88,021		
		Upper Three Duck Lake (western arm lost)	0-2	79,309	0	-182,391
			2-max	103,082		
		North Beaver Pond	0-max	9,409	0	-9,409
	Mollie River realignment	East Clam Lake (northern section, lowered water level)	0-2	10,237	10,473	-4,490
			2-max	5,373	647	
		Clam Lake (main body, lowered water level)	0-2	142,711	153,059	-58,159
			2-8	410,214	346,413	
			8-max	4,706	0	
		Little Clam Lake (lowered water level)	0-2	32,663	17,585	-37,256
			2-max	24,133	1,955	
	MRA	East Beaver Pond	0-max	29,299	0	-29,299
					Net Loss	**-550,426**

	Location of Impact	Identification	Habitat Type	Length (m)	Area (m^2)
Streams	Open Pit	Mollie River (area lost to pit, do not include MRA)	High-gradient	-280	-3,080
			Low-gradient	-2,480	-51,832
		Clam Creek (from the Mollie River to East Clam Lake)	Low-gradient	-510	-1,148
			Intermittent	-270	-135
		Unnamed stream between Unnamed Pond and Beaver Pond	Intermittent	-220	-110
		Stream through old Beaver Pond	Low-gradient	-180	-178
		Unnamed stream between Beaver Pond and Mollie River	Moderate-gradient	-180	-475
			Low-gradient	-150	-266
	Mollie River realignment	Inlet stream to Chester Lake	Low-gradient	-470	-564
		West Beaver Pond stream to Bagsverd South Arm	Low-gradient	-1,210	-8,833
		Bagsverd Pond outlet to Bagsverd South Arm	Low-gradient	-90	-234
			Intermittent	-160	-80
			Low-gradient	-60	-114
	Bagsverd realignment for TMF and the polishing pond	Bagsverd Creek from Bagsverd Lake to Unnamed Lake #1	Moderate-gradient	-80	-640
			Moderate-gradient	-60	-990
			High-gradient	-80	-1,232
			Moderate-gradient	-730	-9,709
			High-gradient	-190	-1,539
			Moderate-gradient	-1,260	-11,088
			High-gradient	-510	-4,131
			Low-gradient	-2,560	-20,736
			Low-gradient	-420	-1,974
		Unnamed inlet to Bagsverd Creek	Low-gradient	-380	-456
			Pond/pool	-90	-2,628
			Low-gradient	-140	-168
			High-gradient	-140	-350
			Pond/pool	-90	-4,131
			Low-gradient	-450	-225
	Mine Rock Area	Inlet Unnamed Lake #3	Intermittent	-80	-40
			Low-gradient	-220	-114
		Mollie River (area lost to MRA only)	High-gradient	-200	-4,156
			Low-gradient	-470	-9,400
			High-gradient	-70	-1,330
			Low-gradient	-130	-2,483
			Stream Length / Area Lost	**-14,610**	**-144,569**

realigned from Chester Lake to flow through Clam Lake, Little Clam Lake, West Beaver Pond, the South Arm of Bagsverd Lake, Bagsverd Pond and Weeduck Lake, rejoining the original watershed in Upper Three Duck Lake (see Section 3.2.2). As a result of this realignment, approximately 3 km of the Mollie River, 220 m of intermittent stream between Unnamed Pond and Beaver Pond, 180 m of Beaver Pond (now a stream) and its downstream channel to the Mollie River (330 m), and approximately 750 m of Clam Creek will be lost (Figure 3.3). Dams will be constructed along the eastern boundary of Clam Lake to allow for the safe operation of the open pit. The habitat changes in Clam Lake are described in Section 3.1.4.

The majority of the Mollie River within the affected reach is low gradient with abundant instream vegetation bordered by wetland habitat. High gradient areas occur downstream of Chester Lake and a small area downstream of the confluence with East Beaver Pond, which has large cobble and boulder substrate. Clam Creek originates at the outlet of East Clam Lake and flows intermittently to the Mollie River. The upper portion had no identifiable channel and no flow during the baseline survey (Minnow 2014). The lower portion of the creek is low gradient with dense vegetation and adjacent wetland habitat, with water levels reflecting those of the Mollie River. Similarly, the lower 150 m of the stream entering the Mollie River from Beaver Pond is low gradient with habitat similar to that found in the Mollie River. Within the low gradient areas of the Mollie River and lower portions of the Beaver Pond stream and Clam Creek, wetland vegetation and instream macrophytes provide excellent spawning and rearing habitat for northern pike (Table B.7). Those features also provide excellent habitat for yellow perch spawning, rearing and foraging (Table B.8). High gradient areas on the Mollie River provide marginal habitat for walleye spawning (Table B.9). The general lack of rocky structure and shallow nature of the river throughout this reach provides marginal/poor habitat for juvenile and adult walleye (Table B.9).

Côté Lake, which covers approximately 149,000 m^2 will be completely lost with the construction of the open pit (Figure 3.3; Table 3.2) Moderately dense vegetation is present throughout the areas of the lake with depths less than 1 m. Wetland habitat bordered much of the lake, including floating mats of vegetation. The wetland vegetation likely provides moderate/average spawning habitat for northern pike, while the submerged aquatic vegetation provides excellent juvenile rearing and good adult foraging habitat (Table B.1). A general lack of cobble, gravel and sand substrate suggests very limited habitat for walleye and whitefish spawning, though the submergent vegetation and open water provide excellent rearing/foraging for walleye (Table B.3). Habitat within Côté Lake is marginal for lake whitefish, though the presence of this species indicates some suitable foraging habitat exists Table B.4).

The inlet arm to Upper Three Duck Lake (182,000 m^2), which receives flow from Côté Lake via the Mollie River, will be lost due to a dam required to keep water out of the open pit and provide safe work conditions (Figure 3.3, Table 3.2). Extensive vegetation beds were present within the inlet arm and the shoreline consists of a combination of sand, cobble and organics. Marginal spawning habitat was present for northern pike due to limited wetland areas, though the aquatic vegetation would provide excellent rearing and foraging habitat (Table B.1). The vegetation would also provide excellent spawning, rearing and foraging habitat for yellow perch (Table B.2). The combination of vegetation and open water provide excellent rearing and foraging habitat for walleye and lake whitefish (Tables B.3 and B.4). The sandy-silt and gravel substrate along the shoreline provides excellent spawning habitat for small mouth bass, while rocky shorelines and shoals provide good juvenile rearing and adult foraging habitat for bass (Table B.5).

North Beaver Pond is located north of the proposed open pit, covering approximately 9,400 m^2 (Table 3.2). Discharge occurs intermittently to Upper Three Duck Lake through the south end. The pond will be lost due to construction of the open pit and the realignment works to the north (Figure 3.3). Specifically, a small access road which currently impounds the water within the pond will be removed for the open pit construction and will result in the draining of the pond. Furthermore, a dam to be constructed on Bagsverd Pond to direct flow northward will eliminate most of the upstream catchment. Thus, it is expected that the pond will be lost due to these construction activities. Currently, aquatic vegetation within the pond covers nearly the entire area, which could provide marginal/poor rearing habitat for both northern pike and yellow perch, and marginal spawning habitat for yellow perch (Tables B.1 and B.2). However, only small bodied fish species have been found within the pond (Minnow 2014) and access is limited to an intermittent channel. Nevertheless, average to poor habitat quality was assigned for yellow perch and northern pike respectfully (Table B.1 and B.2).

3.1.2 Mine Rock Area

East Beaver Pond, which covers approximately 29,000 m^2, will be lost to allow for the development of the MRA (Figure 3.3, Table 3.2). The pond consists of four waterbodies of varying size and drains intermittently to the Mollie River downstream of Chester Lake through an undefined wetland. Sparse vegetation occurs within the pond. Only small bodied fish species were found within the ponds, suggesting limited large bodied habitat or migration barriers to the pond (Tables B.1 to B.5).

Approximately 300 m of an inlet to Unnamed Lake #3 will be lost as part of the MRA construction (Figure 3.3, Table 3.2). The upper reaches are narrow and shallow before reaching a wetland area with slightly greater widths and depths, with sedges and grasses along the banks. Large bodied fish habitat within the stream is limited due to shallow depths (Tables B.7 to B.11).

3.1.3 Mollie River Realignment Implications

A 470 m long inlet stream on the west side of Chester Lake will be lost as it will be incorporated into the new outlet for the lake as part of the Mollie River realignment (Figure 3.3, Table 3.2). The existing inlet stream is narrow and shallow, flowing through a wetland area, and has instream vegetation through much of the channel. Upstream of a beaver dam located 250 m from Chester Lake, the channel is less defined for some distance before narrowing to a defined channel. Limited large bodied fish habitat is present within this reach due to the shallow depths and limited flow. The channel offers limited/poor spawning and juvenile rearing habitat for northern pike and yellow perch and no suitable habitat for walleye, lake whitefish and smallmouth bass (Tables B.7 to B.11).

Clam Lake, located to the west of the proposed open pit, will be lowered 0.8 m as part of the Mollie River realignment, with several dams installed along eastern portions of the lake adjacent to the open pit to secure the pit for safe operations (Figure 3.3). As a result, the combined surface area of Clam Lake and East Clam Lake will be reduced from approximately 573,200 m^2 to 510,600 m^2 (Table 3.2). Vegetation within Clam Lake is sparse, and the shoreline is dominated by cobble and/or boulder embedded in silty-sand. Limited wetland habitat is found adjacent to Clam Lake, with the exception of the Southeast Arm and East Clam Lake. Clam Lake provides excellent habitat for all life stages of small mouth bass, though the reduction in water level will reduce the sandy-silt, gravel or rocky spawning habitat adjacent to shore, and shallow bays available for juvenile rearing and adult foraging (Table B.5). The reduced water levels and dams will also eliminate the vegetated areas within, and wetland areas adjacent to the Southeast Arm and East Clam Lake which could be used for northern pike and yellow perch juvenile rearing and spawning (Tables B.1 and B.2).

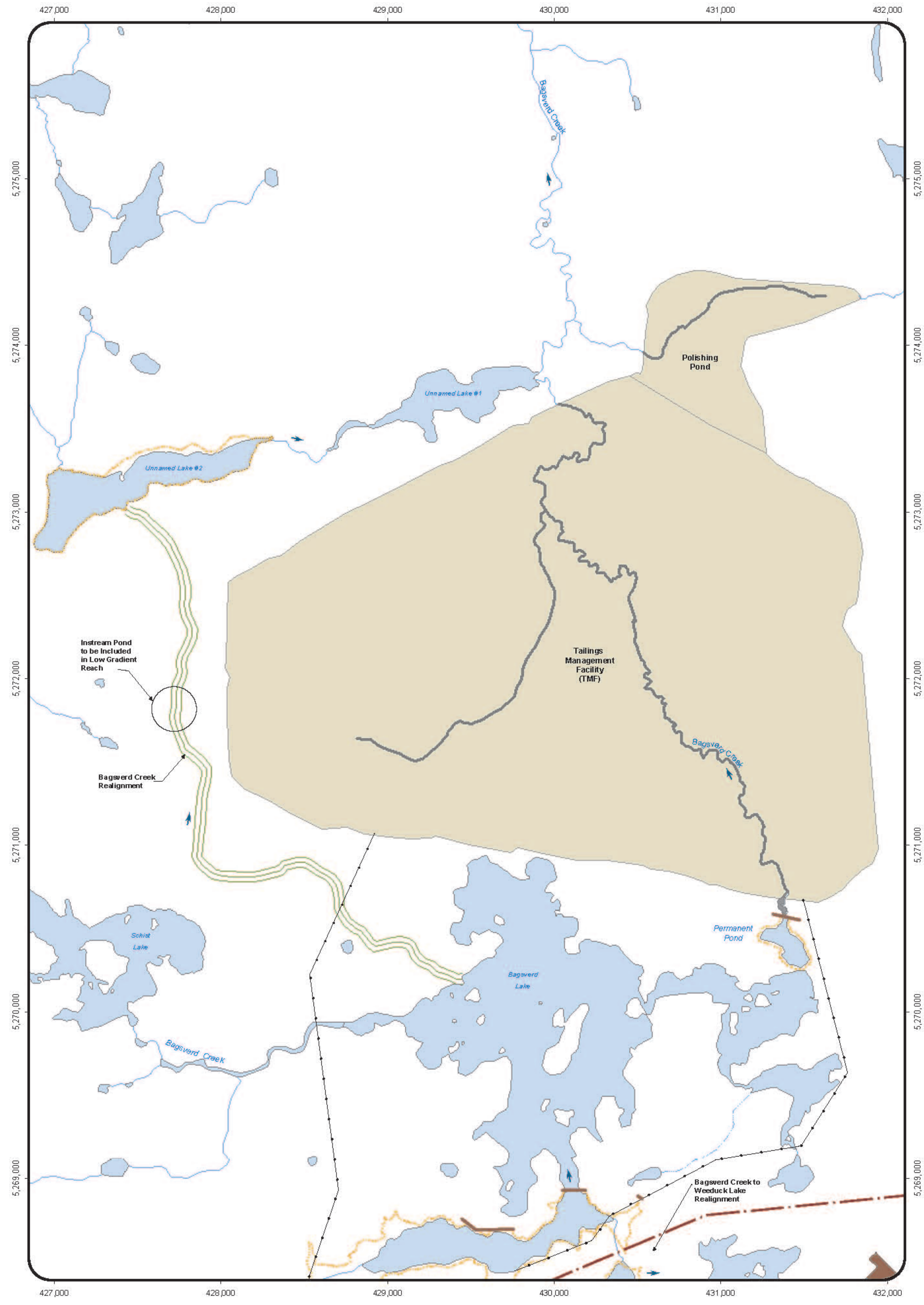
Little Clam Lake will be lowered as part of the Mollie River realignment, and will receive flow from Clam Lake and discharge to West Beaver Pond (Figure 3.3, Table 3.2). As a result, the surface area will be reduced from approximately 56,700 m^2 to 19,500 m^2. Currently, the lake is a headwater lake draining intermittently through a beaver dam and wetland area at the north end towards the South Arm of Bagsverd Lake. The shoreline of Little Clam Lake is largely cobble, though substrate changes to silt and woody debris within 1 to 2 m of shore. Vegetation within Little Clam Lake is sparse and wetlands adjacent to the shoreline are limited. Average to poor spawning, rearing and foraging habitat for northern pike, yellow perch and smallmouth bass is provided as a result of the sparse aquatic vegetation growth (Tables B.1, B.2 and B.5). Some limited/poor habitat is available for adult walleye and whitefish foraging with good over wintering habitat provided in the deeper section of the lake (Tables B.3 and B.4). However, only northern pike and yellow perch were captured in Little Clam Lake during baseline studies (Minnow 2014) and the lack of access to and from the lake likely prevent its use by walleye, lake whitefish or smallmouth bass in its current configuration.

The 1.2 km long inlet to the South Arm of Bagsverd Lake, originating in the West Beaver Pond, will become lake habitat as part of the Mollie River realignment (Figure 3.2, Table 3.2). This reach has a low-gradient with moderate vegetation cover and predominantly wetland habitat along its banks. The reach contains excellent spawning and rearing habitat for northern pike and excellent rearing and foraging habitat for yellow perch (Tables B.7 and B.8). Limited/poor juvenile rearing habitat is available for walleye, lake whitefish and smallmouth bass (Tables B.3 to B.5).

The outlet of Bagsverd Pond, covering 310 m, will also become part of the Mollie River realignment, with flow directed toward Weeduck Lake (Figure 3.2, Table 3.2). The habitat of the Bagsverd Pond outlet is low gradient and shallow with undefined sections through cedar and moss vegetation. Limited large bodied fish habitat occurs within the stream due to lack of depth and connectivity to other habitats providing only poor juvenile rearing habitat for yellow perch, (Tables B.7 to B.11).

3.1.4 Tailings Management Facility

Approximately 5.9 km of Bagsverd Creek will be lost due to construction of the TMF (Figure 3.4, Table 3.2). Bagsverd Creek, from the outlet of Permanent Pond to 2.9 km downstream, consists of a high proportion of moderate gradient habitat, with three smaller areas of high gradient habitat (780 m total length). The remaining 3.0 km to the outlet of Unnamed Lake #1, which includes an inlet channel from the west, is low gradient habitat. Moderate gradient areas have instream vegetation often covering 90 to 100% of the stream bed and are bordered by wetland areas. High gradient areas contained riffle or riffle-run habitat with boulder and cobble substrate. Low-gradient habitat is dominated by dense vegetation in the main channel bordered by wetland habitat. The abundance of shallow vegetation through Bagsverd Creek provides excellent spawning and rearing habitat for northern pike and excellent spawning, rearing and foraging habitat for yellow perch Tables B.7 and B.8). Foraging habitat for northern pike is also present within this reach (Table B.7). High gradient areas within Bagsverd Creek provide poor to good habitat for walleye spawning (Table B.9). Shallow water depths and



MAP INFORMATION
Datum: NAD 1983 Map Projection: Zone 17N
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Creation Date: January 2015
Project No.: 2526

Figure 3.4: Areas to be Lost to the Tailings Management Facitlity

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moderate water transparency result in marginal habitat for juvenile and adult walleye (Table B.9).

A portion of an unnamed inlet to Bagsverd Creek (approximately 1.3 km), which joins Bagsverd Creek downstream of Unnamed Lake #1, will be lost as part of the TMF (Figure 3.4, Table 3.2). This stream consists of a series of low-gradient habitat and beaver ponds separated by a forested riffle with a cascade representing a barrier to upstream fish migration, located approximately 600 m upstream of the road crossing. Sedges and wetland vegetation provide spawning and juvenile rearing habitat for northern pike (Table B.7). Though not captured during baseline sampling, the reach contains spawning, rearing and foraging habitat for yellow perch (Table B.8).

3.1.5 Summary of Lost Habitat

The development of the Côté Gold Project will result in the loss of stream and lake habitat in order to accommodate the development of the Open Pit, MRA, and the TMF. The total length of stream habitat lost is 14,610 m which based on measured stream widths is equal to 144,569 m^2 (Table 3.2). The area of lake habitat to be lost is estimated to be 550,426 m^2 (55.0 ha). Based on habitat characteristics measured during baseline studies relative to the habitat requirements for the various life history stages of the fish species assessed habitat quality values were assigned (none to excellent as described above). The habitat quality and quantity was used to calculate the habitat units lost. The total habitat units to be lost is equal to 21,180,026 lake habitat units and 868,356 stream habitat units (Tables B.6 and B.12).

3.2 Habitat to be Gained Through Proposed Offsetting Plan

To accommodate the open pit, MRA and the TMF, fish habitat within the Mollie River and Neville Lake watersheds will be lost (Section 3.1). In order to offset the loss a habitat, water course realignments and habitat development are planned. The proposed realignment plan has been developed such that key design considerations include:

- Maintenance of existing watersheds to the extent possible,
- Maintenance of the existing hydrologic flow regime to the extent possible,
- Minimize any temporal disruptions to the extent possible,
- Promotion of connectivity within watersheds and habitats,
- Natural channel design and features to convey water flows and prevent erosion,
- Seek opportunities to increase productivity of the system,
- Enhance habitat complexity, and

- Incorporate any limiting habitat types for resident fish populations to the extent possible.

Through this approach, the habitat offsetting measures will provide sustainable and functional habitat to support key resident fish species.

The development of the realignments will result in the creation of fish habitat. These habitats have been incorporated into the assessment as habitat gains designed to offset the habitat losses described above. The habitat realignment plan will result in the creation of additional lotic (stream) and lentic (lake/pond) habitat (Tables 3.1 and 3.3). The created habitats include:

- An increase in the size of Chester Lake,
- The realignment of the Mollie River through a channel connecting Chester Lake to Clam Lake,
- A channel connecting Clam Lake and Little Clam Lake,
- Habitat enhancement measures in Clam Lake, Little Clam Lake and East Clam Lake,
- A connecting channel between Little Clam Lake and West Beaver Pond,
- The extension of the South Arm of Bagsverd Lake,
- A channel connecting the South Arm of Bagsverd Lake to Weeduck Lake,
- A channel connecting Weeduck Lake to Upper Three Duck Lake,
- The realignment of Bagsverd Creek from Bagsverd Lake (Main Basin) to Unnamed Lake #2.

A description of the fish habitat quality and quantity associated with each of these created water courses/waterbodies is provided below.

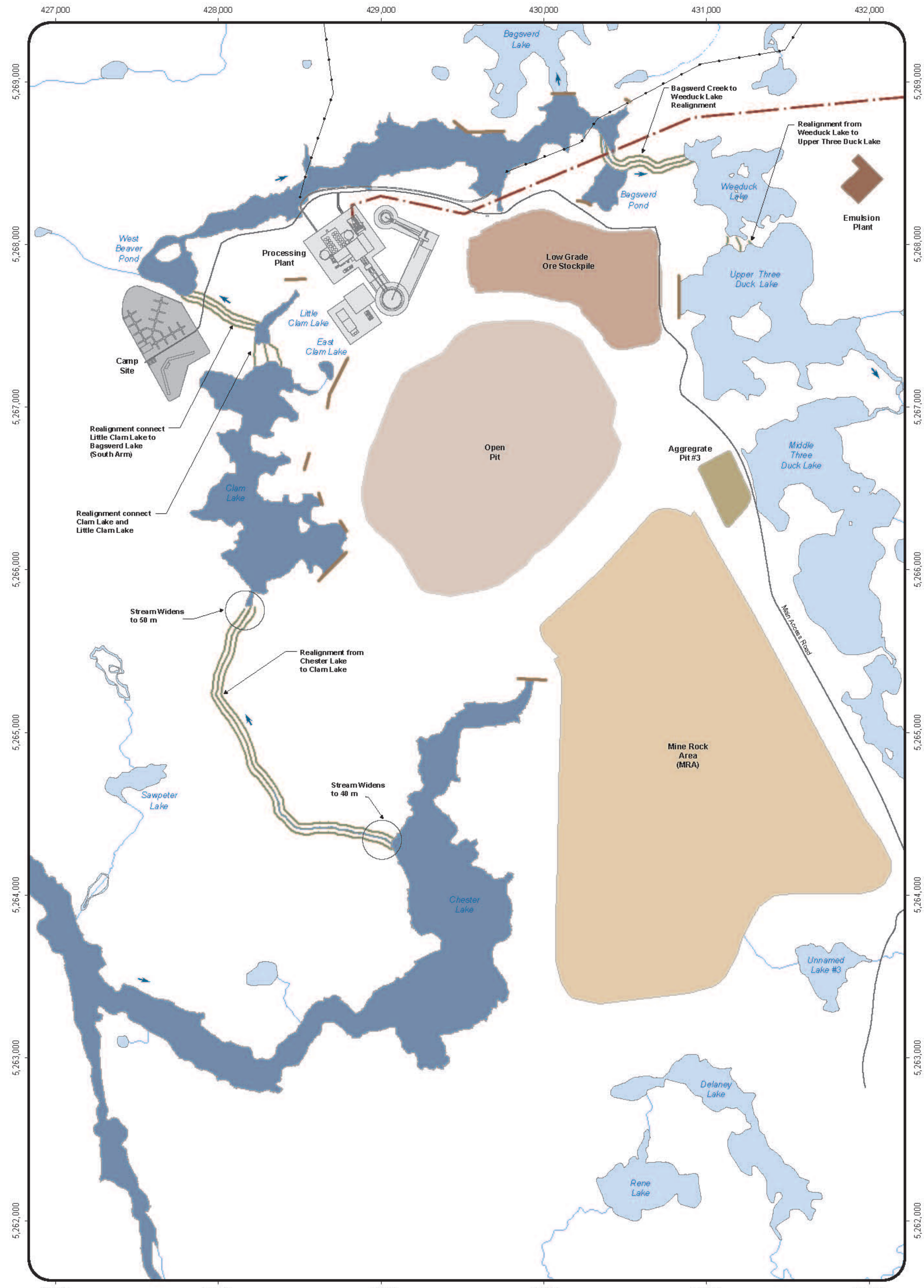
3.2.1 Chester Lake

The water level in Chester Lake will be raised approximately 30 cm through the installation of a dam at the north end of Chester Lake (Figure 3.5). The water level needs to be increased in order to allow water to flow north to Clam Lake via a designed channel. The increase in water level will result in an increase in littoral habitat (0 -2 m) of approximately 23,800 m^2 and an increase in profundal habitat (2 m to maximum depth) 139,700 m^2 (Table 3.3). The lake is currently seasonally flooded and as such the vegetation surrounding the lake is principally aquatic emergent vegetation (Minnow 2014). When the water level is increased, the area of flooded aquatic vegetation will also increase. It is expected that the newly created habitat will provide good spawning, rearing and adult habitat for yellow perch and average habitat for these life stages of northern pike, whitefish and smallmouth bass (Tables B.1, B.2, B.4 and B.5). Limited/poor juvenile rearing and adult forage habitat will be available for walleye,

Table 3.3: Lake areas and stream lengths and areas gained under post-construction configuration.

	Location of Impact	Identification	Depth Range (m)	Current Configuration (m^2)	Post Construction Configuration (m^2)	Gain (m^2)
Lakes	Bagsverd Creek realignment	Unnamed Lake #2 (increase in water level)	0-2	180,175	176,474	16,697
			2-4	115,114	108,512	
			4-max	165,788	192,788	
		Permanent Pond	0-max	39,645	54,662	15,017
	Mollie River realignment	Chester Lake (increase in water level)	0-2	748,512	772,355	163,537
			2-max	223,996	363,690	
		Bagsverd Lake South Arm (disconnection from watershed, increase in size)	0-2	237,385	477,070	283,752
			2-max	37,704	81,771	
		Bagsverd Pond (increase in water level)	0-max	37,061	44,592	7,531
					Net Gain	**486,534**

	Location of Impact	Identification	Habitat Type	Length (m)	Area (m^2)
Streams	Mollie River realignment	Realignment Chester Lake to Clam Lake	Low-gradient	1,500	30,000
			Low-gradient	500	25,000
			Low-gradient	404	16,160
		Realignment Clam Lake to Little Clam Lake	Low-gradient	163	16,300
		Realignment Little Clam Lake to West Beaver Pond	High-gradient	400	8,000
			Low-gradient	200	4,000
		Realignment Bagsverd Lake South Arm to Weeduck Lake	Low-gradient	600	12,000
			High-gradient	38	760
			Low-gradient	100	4,000
		Realignment Weeduck Lake to Upper Three Duck Lake	High-gradient	104	2,080
	Bagsverd realignment for TMF and the	Realignment Bagsverd Lake to Unnamed Lake #2	Low-gradient	3,000	24,000
			Low-gradient	227	9,080
			High-gradient	1,250	10,000
			Stream Length / Area Gained	**8,486**	**161,380**



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MAP INFORMATION
Datum: NAD 1983 Map Projection: Zone 17N
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Created By: M.A.LaPalme
Creation Date: January 2015
Project No.: 2526

- Proposed Lake Area
- Camp Site
- Plant Facilities
- Low Grade Ore Stockpile
- Open Pit
- Emulsion Plant
- Aggregate Pit #3
- Mine Rock Area (MRA)
- Waterbody
- Dam
- Watercourse Realignment
- Tailings and Reclaim Pipeline
- Main Access Road
- Transmission Line Alignment
- Intermittent Watercourse
- Permanent Watercourse
- Water Flow Direction

Figure 3.5: Habitat Created within the Mollie River Realignment

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consistent with pre-development conditions (Table B.3) The increase in lake water levels will also improve over wintering habitat for most species within the lake (Tables B.1 to B.5).

3.2.2 Mollie River Realignment

The Mollie River realignment will connect Chester Lake to Clam Lake through a 1,904 m watercourse which follows a natural valley between the two water bodies (Figure 3.5, Table 3.3). At the upstream end of the realignment channel, the stream will be approximately 40 m wide, 2 m deep and extend 404 m (i.e., large opening from Chester Lake). This habitat will be low gradient and is designed to provide good spawning, rearing and adult foraging habitat for northern pike and yellow perch, as well as some rearing and adult foraging habitat for walleye and lake whitefish (Tables B.7 to B.11).

The channel will follow a natural channel design for 1,500 m with an average width of 20 m and a depth ranging from 0.7 to 2.0 m in a 40 m floodplain (Figures 3.6, 3.7 and 3.8). The geomorphic characteristics of this channel will be similar to the characteristics of the existing Mollie River Channel (Table 3.4). There are two proposed plan forms for the Mollie River realignment; Type A and Type B (Figure 3.8). The Type A plan form is representative of a low gradient habitat with a channel morphology dominated by runs and pools, with limited riffles or shallow areas. While Type B is also a low gradient habitat, the channel morphology has a lower relative sinuosity and the occasional riffle area. The Mollie River realignment will be configured by the connection of these two habitat forms to suit channel gradients. Physical habitat features such as stump bank shelters, rock cluster linings, spawning hummocks and fallen trees (Figure 3.9) will be incorporated to provide habitat complexity and enhance habitat suitability for the target species. It is expected that this portion of the channel will provide good spawning, rearing and adult foraging habitat for northern pike and yellow perch along with some overwintering habitat provided through deeper pools (i.e., 3 m) within the channel (Tables B.7 and B.8). The channel is also expected to provide some habitat for juvenile and adult walleye and small mouth bass, and limited habitat for juvenile whitefish (Tables B.9 to B.11).

The lower (most downstream) 500 m of the channel will be wider (approximately 50 m) prior to discharging into Clam Lake. This area will be relatively shallow (1.5 m) and will be vegetated to provide spawning and nursery habitat for northern pike and yellow perch resident to Clam Lake (Figure 3.6; Tables B.7 and B.8). Spawning hummocks will be incorporated to offset the loss of the vegetated area in the Southeast Arm of Clam Lake, which will be lost to the development of the open pit. Some rock clusters will be incorporated near the outlet of the channel to provide spawning habitat for smallmouth bass resident to Clam Lake (Table B.11).

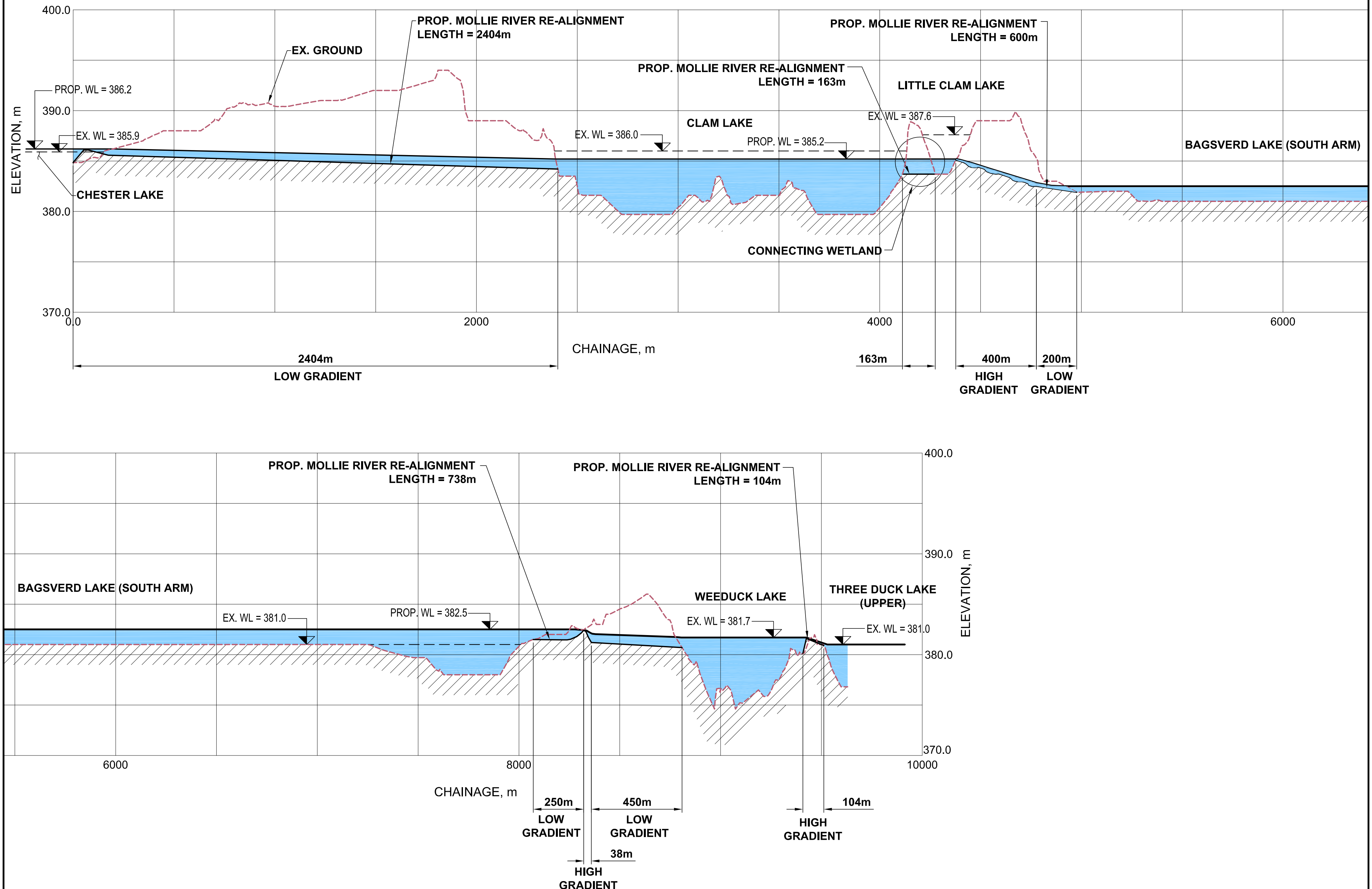

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FIGURE 3.6
TYPICAL PROFILE
PROPOSED MOLLIE RIVER RE-ALIGNMENT

Prepared for:

minnow

January 27, 2015

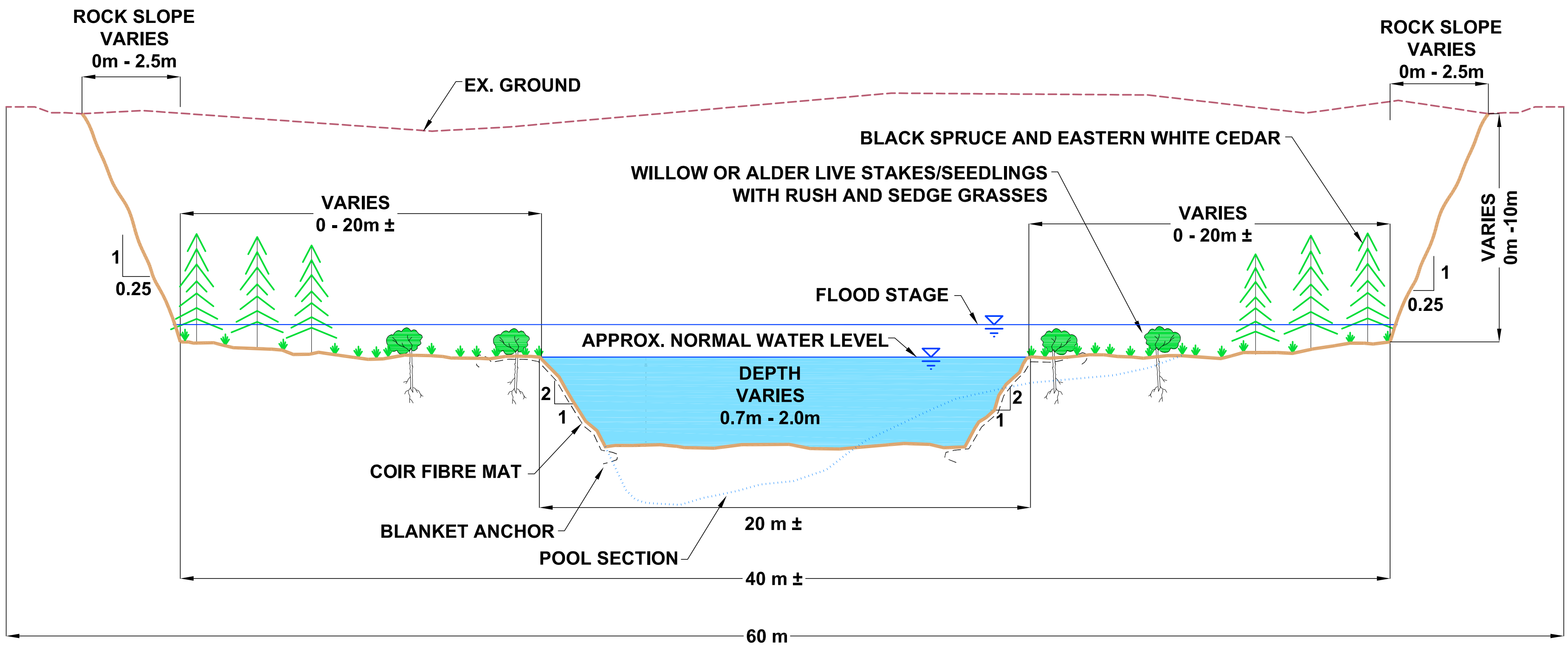

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FIGURE 3.7
TYPICAL CHANNEL SECTION
PROPOSED MOLLIE RIVER RE-ALIGNMENT

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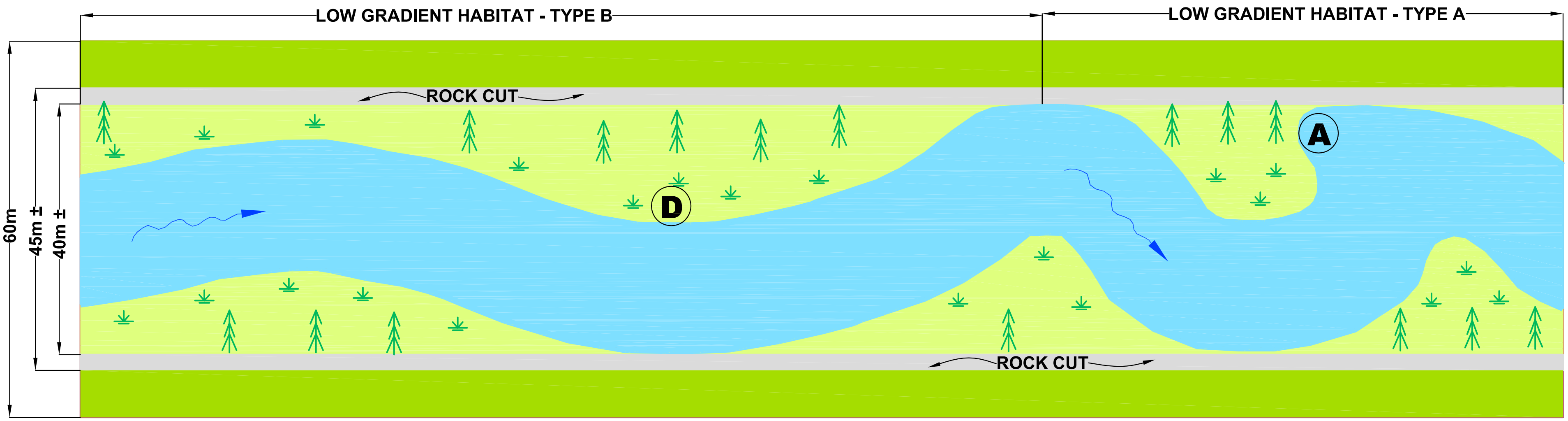

LOW GRADIENT HABITAT - TYPE B

MEANDER BELT WIDTH ~ 40m
MEANDER AMPLITUDE ~ 20 - 25m
CHANNEL SINUOSITY ~ 1.05
CHANNEL BANK FULL WIDTH ~ 20m

LOW GRADIENT HABITAT - TYPE A

MEANDER BELT WIDTH ~ 40m
MEANDER AMPLITUDE ~ 20 - 25m
CHANNEL SINUOSITY ~ 1.29
CHANNEL BANK FULL WIDTH ~ 20m

LEGEND

- BLACK SPRUCE AND EASTERN WHITE CEDAR
- RUSHES AND SEDGES WITH WILLOW AND ALDERS
- A HABITAT FEATURE - FALLEN LOGS SEE FIGURE 3.9 FOR DETAIL
- D HABITAT FEATURE - SPAWNING HUMMOCKS SEE FIGURE 3.9 FOR DETAIL

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FIGURE 3.8
TYPICAL CHANNEL PLAN FORM - LOW GRADIENT HABITAT
PROPOSED MOLLIE RIVER RE-ALIGNMENT

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Table 3.4: Summary of existing watercourse and proposed realignment geomorphic characteristics for the Mollie River and Mollie River realignment.

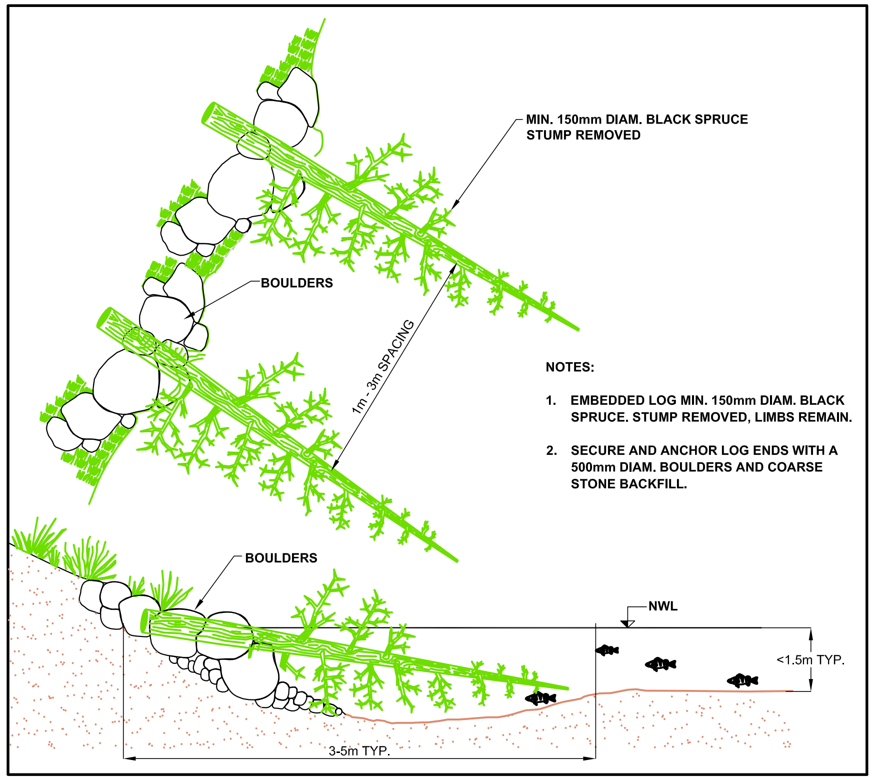
Item[a]	Existing Conditions (m)	Proposed Conditions (m)
Low Gradient Habitat (Type A and Type B)		
Meander Belt Width	54 - 57	40
Meander Amplitude	20 - 45	20 - 25
Channel Sinuosity	1.08 - 1.55	1.05 - 1.29
Bankfull Width	19.0 - 20.9	18.0 - 20.0
Bankfull Depth	0.7 - 3.0	0.7 - 2.0
High Gradient Habitat		
Meander Belt Width	- [b]	- [b,c]
Meander Amplitude	- [b]	- [b,c]
Channel Sinuosity	- [b]	- [b,c]
Bankfull Width	11.0 - 20.8	10.0 - 20.0[c]
Bankfull Depth	<0.5	<0.5[c]

Source: Calder Engineering Ltd.

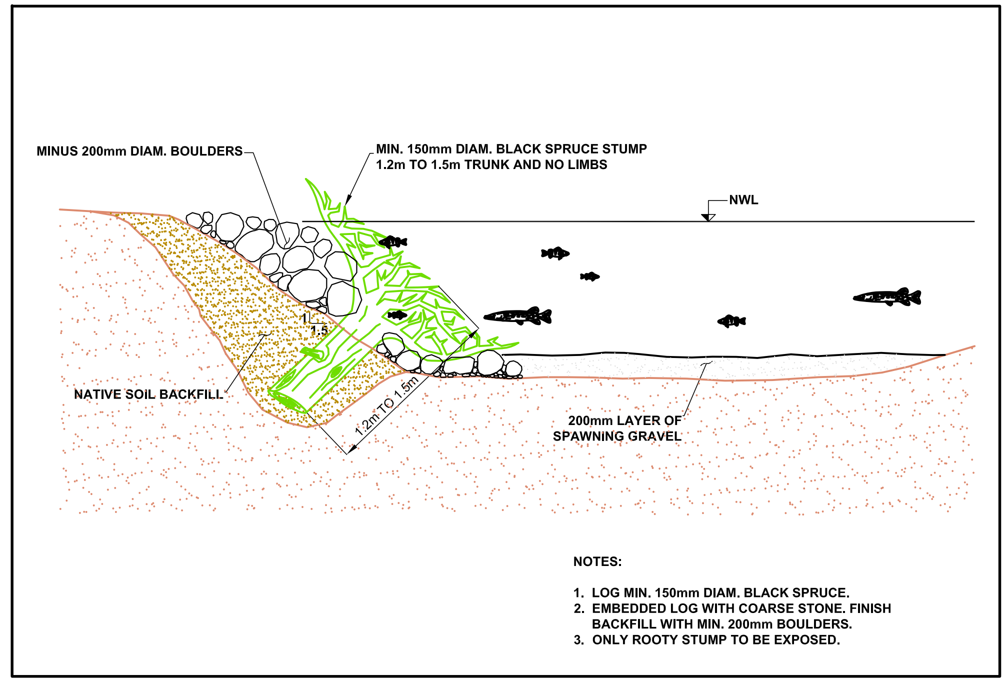
[a] Habitat Type: Low Gradient – channel morphology dominated by runs and pools; Moderate Gradient – channel morphology comprised predominately of runs and pools with some shallower areas and riffles; High Gradient – channel morphology comprised predominately of riffles with some intermixed pools.

[b] Existing geomorphic characteristics not inventoried for High Gradient Habitat conditions: these sections are typically linear with a channel sinuosity approaching 1.

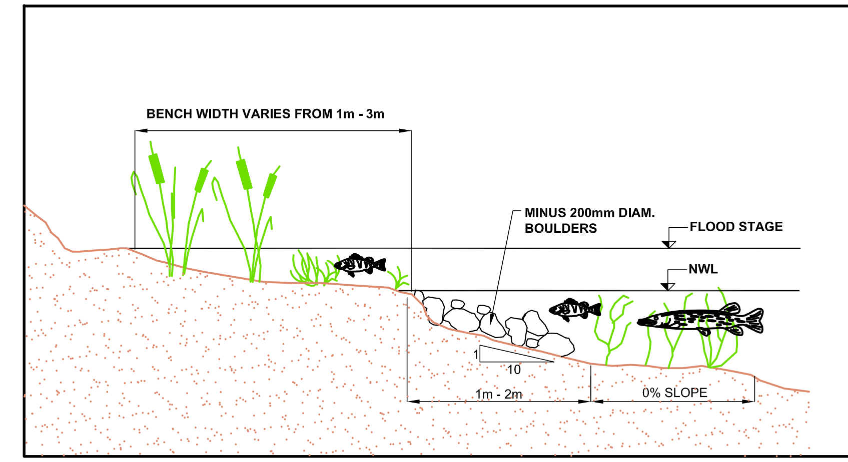
[c] High Gradient Habitat for the Mollie River Realignment incorporated in realignments between Little Clam Lake and West Beaver Pond, and the South Arm of Bagvserd Lake and Wee Duck Lake.



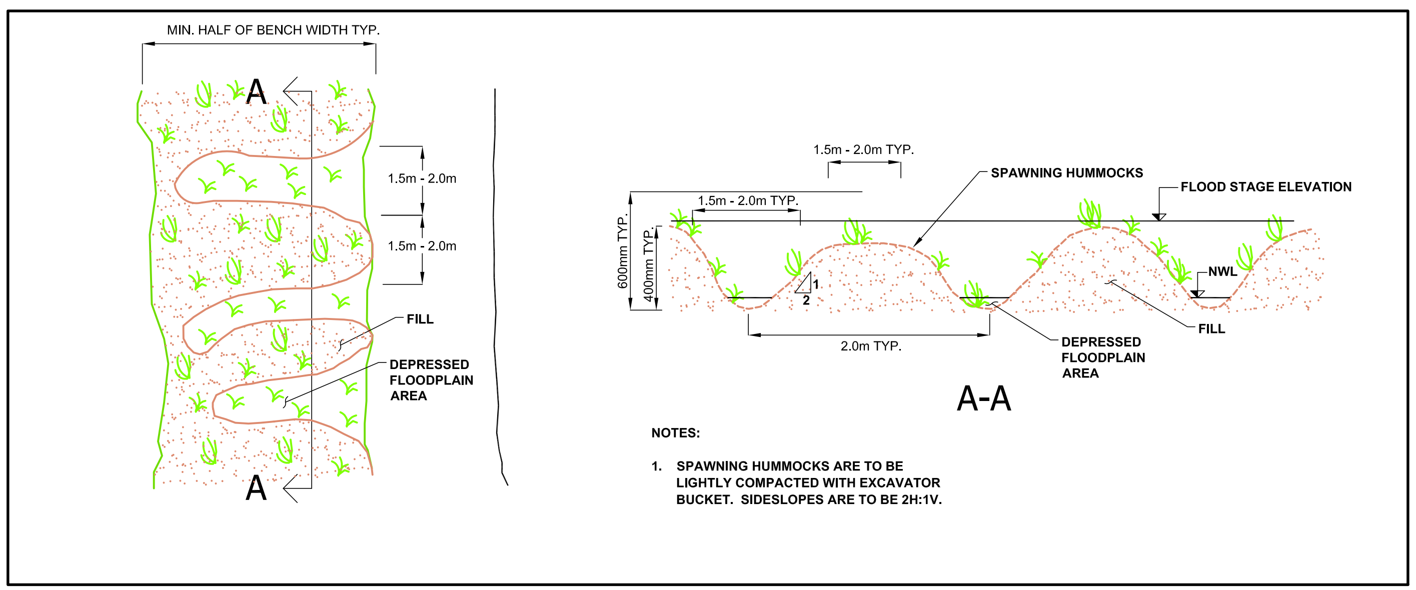
DETAIL A- FALLEN TREES



DETAIL B- STUMP BANK SHELTER



DETAIL C- ROCK CLUSTER LINING



DETAIL D- SPAWNING HUMMOCKS

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FIGURE 3.9
HABITAT FEATURES - TYPICAL DETAILS

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It is expected that this reach of the Mollie River realignment will provide good spawning and juvenile rearing habitat for northern pike and yellow perch and average to poor adult foraging habitat for the other species assessed (Tables B.7 to B.11). Given the shallow depths, this reach will provide limited over wintering habitat, but access to greater depths (up to 8 m) in Clam Lake will provide adequate overwintering refuge for resident fish within the channel (Tables B.7 to B.11).

3.2.3 Clam Lake, Little Clam Lake and East Clam Lake

The water level in Clam Lake will be lowered by approximately 0.8 m through the construction of a new outlet for the lake (Figure 3.5). Once the lake is lowered, the littoral zone will consist of soft organic substrate between bedrock and cobble. In order to maintain the productivity of the fishery, which is dominated by smallmouth bass, with a moderate abundance of northern pike and yellow perch, shoreline and littoral zone habitat will be enhanced. Cobble will be placed in selected areas within the littoral zone to provide spawning habitat for smallmouth bass (Table B.5). In areas of soft organic substrates, submergent vegetation will be planted to promote growth of aquatic vegetation for juvenile rearing and adult foraging (Tables B.1 to B.5). These measures are anticipated to maintain the productivity of Clam Lake and reduce lag times between construction and the establishment of habitat (see Section 4.0). The exposed shoreline will be vegetated with native species to stabilize banks and prevent erosion. It is anticipated that Clam Lake will continue to provide adequate habitat for the various life stages of the resident fish (Tables B.1 to B.5).

East Clam Lake will maintain its connection to Clam Lake. The water level in East Clam Lake will be reduced by the same depth as Clam Lake (0.8 m) resulting in a slightly shallower basin (3.0 m vs. 2.2 m). Similar to Clam Lake, shoreline and littoral vegetation will be planted to enhance habitat conditions (Tables B.1.to B.5).

Clam Lake will be connected to Little Clam Lake (currently an isolated head water lake in the Neville Lake watershed) through a 163 m channel (30 to 40 m wide) which will provide wetland habitat that can be used by northern pike, yellow perch and smallmouth bass as spawning (northern pike and yellow perch), juvenile rearing and adult foraging habitat (Tables B.1, B.2 and B.5). Submergent aquatic plant species will be planted to promote the colonization of aquatic vegetation in this area (Figure 3.5, Table 3.3).

The water level in Little Clam Lake will be lowered by 2.4 m, which will result in a shallower basin (5.6 m vs. 3.2 m maximum depth) and a large exposed shoreline area. The littoral zone will be planted with submergent and emergent aquatic vegetation and the shoreline will be vegetated with native species to stabilize the shoreline and prevent erosion. It is expected that this shallower vegetated lake, connected to Clam Lake by a wide accessible channel will provide good spawning and juvenile rearing habitat for northern pike and yellow perch from Clam Lake and good juvenile rearing habitat for smallmouth bass from Clam Lake as well (Tables B.1, B.2 and B.5). Little Clam Lake will provide some limited over wintering habitat, but with accessibility to over wintering habitat in Clam Lake, this should not limit the productivity of the fish community (Tables B.1 to B.5).

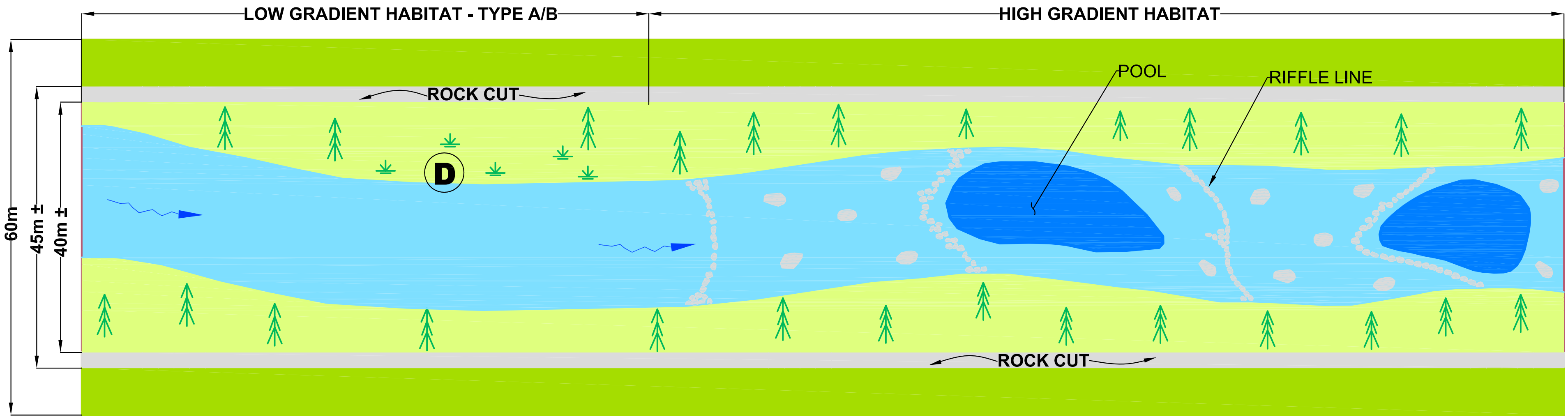
There is currently no connection between Clam and Little Clam Lake and a confined connection between Clam Lake and East Clam Lake. The connections between Clam, Little Clam and East Clam Lake will provide the fish community with a variety of habitats to address all their life history requirements. This connectivity between the lakes is expected to enhance fish productivity, although this benefit is not accounted for in the habitat units which consider each lake separately.

3.2.4 Channel to West Beaver Pond

Little Clam Lake will be connected to West Beaver Pond through a 600 m natural channel design, of which the upper 400 m will be a high gradient channel (10 to 15 m wide) with a step pool design incorporating predominately riffle habitat with shallow pool areas (Figure 3.10, Figure 3.5, Table 3.3). The final (downstream) 200 m of the channel will be low gradient dominated by runs and pools where the channel connects into West Beaver Pond/South Arm of Bagsverd Lake. This high gradient habitat will provide spawning habitat for Walleye residing in the South Arm of Bagsverd Lake (Table B.9). The low gradient habitat of the lower channel combined with the shallow vegetated habitat of West Beaver Pond (1 to 2 m) will provide good juvenile rearing habitat for young-of-the-year Walleye (Table B.3). It is also expected that the low gradient section will provide good spawning and juvenile rearing habitat for northern pike and yellow perch (Tables B.7 and B.8). Over wintering habitat will be available in the main basin of the South Arm of Bagsverd Lake (Tables B.1 to B.5).

3.2.5 South Arm of Bagsverd Lake

The South Arm of Bagsverd Lake will be isolated from the main basin through a dam constructed at the narrows that currently connects the two water bodies, in order to redirect the Mollie River flow back into the Mollie River watershed via Weeduck Lake (Figure 3.5). The water level in the South Arm of Bagsverd Lake will be raised 1.5 m through the construction of three dams which will flood the area between the South Arm of Bagsverd Lake and West Beaver Pond, forming a much larger lake area (i.e. a 290,000 m^2 increase – more than double the current size of the lake; Table 3.3). The area between the existing South Arm of Bagsverd Lake and West Beaver Pond will be scrubbed to remove terrestrial vegetation, and the surface



LOW GRADIENT HABITAT - TYPE A

MEANDER BELT WIDTH ~ 40m
MEANDER AMPLITUDE ~ 20 - 25m
CHANNEL SINUOSITY ~ 1.29
CHANNEL BANK FULL WIDTH ~ 20m

HIGH GRADIENT HABITAT

CHANNEL BANK FULL WIDTH ~ ±20m

LOW GRADIENT HABITAT - TYPE B

MEANDER BELT WIDTH ~ 40m
MEANDER AMPLITUDE ~ 20 - 25m
CHANNEL SINUOSITY ~ 1.05
CHANNEL BANK FULL WIDTH ~ 20m

LEGEND

BLACK SPRUCE
AND EASTERN WHITE CEDAR

RUSHES AND SEDGES
WITH WILLOW AND ALDERS

D HABITAT FEATURE - SPAWNING HUMMOCKS
SEE FIGURE 3.9 FOR DETAIL

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FIGURE 3.10
TYPICAL CHANNEL PLAN FORM - LOW AND HIGH GRADIENT HABITAT
PROPOSED MOLLIE RIVER RE-ALIGNMENT

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organic soil layer will be removed as well, to prevent methyl-mercury production. Both submergent (pond lily and pondweed species) and emergent (horsetail, arrowhead, sedges) vegetation will be planted in the newly flooded area to promote the establishment of an aquatic vegetative community within this portion of the lake.

Physical habitat features will be constructed as well including stump bank shelters, rock cluster linings and fallen trees to provide habitat structure and complexity (Figure 3.9). It is expected that the newly created lake habitat will provide good spawning and juvenile rearing habitat for northern pike and yellow perch and average to good juvenile rearing and adult foraging habitat for walleye and smallmouth bass (Tables B.7 to B.11). The greater depth within the South Arm of Bagsverd Lake will provide good overwintering habitat for all species (Tables B.7 to B.11). The connection to the high gradient riffle habitat in the channel from Little Clam Lake combined with the shallow heavily vegetated habitat of West Beaver Pond should enhance the overall walleye productivity within the South Arm of Bagsverd Lake, where access to these critical life stage habitats was previously limited.

3.2.6 South Bagsverd Lake to Weeduck Lake

The Mollie River realignment, which will be directed up through the South Arm of Bagsverd Lake (previously in the Neville Lake watershed) will be reconnected to the Mollie River watershed through a channel constructed between the South Arm of Bagsverd Lake and Weeduck Lake (Figure 3.5). The channel (738 m long) will follow a natural design and incorporate sections of low and high gradient habitat (Table 3.3). The low gradient habitat, with a morphology dominated by runs and pools will occur at the upstream (600 m) and downstream (100 m) ends of the channel (Type A; Figure 3.8). A small section of passable high gradient habitat (38m) will occur mid reach, providing shallow riffle habitat.

Physical habitat features will be incorporated to increase habitat complexity (Figure 3.9). The channel will consist of a 40 m floodplain with a 20 m inset channel between 0.7 to 3 m deep, with the deeper sections occurring in constructed pools within the low gradient sections. With the reversal of flow, the water level in Bagsverd Pond will rise 0.5 m, increasing the area from approximately 37,000 m^2 to 44,500 m^2 (Table 3.2). The flood plain will be vegetated to allow for pike spawning in the spring when water levels are higher. As with other channel construction, aquatic vegetation will be planted to expedite the establishment of aquatic vegetative communities for spawning and juvenile rearing habitat. The channel will also serve to connect the previously isolated Bagsverd Pond to both the South Arm of Bagsverd Lake and Weeduck Lake, opening up this shallow habitat to yellow perch and northern pike and providing good spawning and juvenile rearing habitat (Table B.7 and B.8).

It is expected that the channel will provide good spawning, and juvenile rearing habitat and average adult forage and over wintering habitat for northern pike and yellow perch (Tables B.7 and B.8). However, connection to both South Bagsverd Lake, and Weeduck Lake will provide additional access to good over wintering habitat. The high gradient habitat will provide good spawning habitat for walleye and the downstream low gradient habitat will be ideal for walleye juvenile rearing (Table B.9). The channel is also expected to provide some limited habitat for juvenile and adult whitefish and smallmouth bass (Table B.10 and B.11).

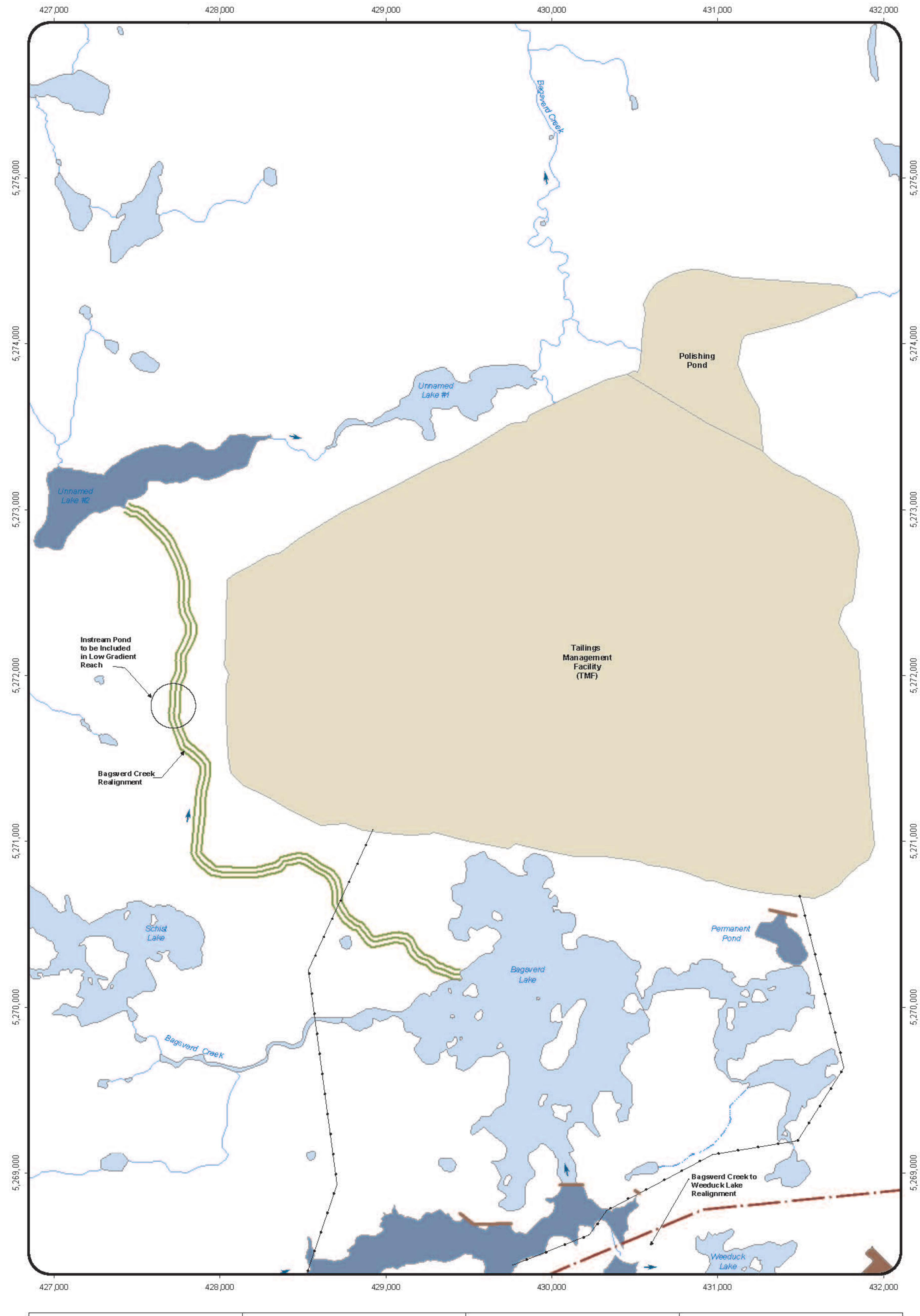
3.2.7 Weeduck Lake to Upper Three Duck Lake

Wee Duck Lake will be connected to Upper Three Duck Lake (currently an isolated headwater lake) through a 104 m high gradient channel (Table 3.3). The channel will provide rock riffle habitat (Figures 3.5 and 3.10). The channel will provide good spawning habitat for walleye resident to Upper Three Duck Lake. This habitat is currently very limited in Upper Three Duck Lake and therefore the provision of good spawning habitat is expected to increase walleye productivity within the Lake. (Table B.9) The channel will also provide some limited habitat for whitefish spawning (Table B.10). The connection between the lakes will provide access to good spawning, juvenile rearing and adult foraging habitat within Weeduck Lake for northern pike and yellow perch.

3.2.8 Bagsverd Creek Realignment

In order to accommodate the development of the TMF, Bagsverd Creek will need to be realigned such that it will flow from the northwest shore of Bagsverd Lake north to Unnamed Lake #2, where it will flow to Unnamed Lake #1 before connecting to its original configuration (Figure 3.11). As noted earlier, this realignment will remain in perpetuity. This channel will be the longest constructed channel in the offsetting plan with a length of 4,478 m (Table 3.3). The geomorphic characteristics of this channel are similar to the characteristics of the existing Bagsverd Creek channel (Table 3.5).

The intent is to apply natural channel design principles to replicate the form and function of the Bagsverd Creek system. The existing channel includes predominantly low and moderate gradient habitat bordered by wetlands. The new channel will incorporate low, moderate and high gradient habitats to replace existing habitat and also provide opportunities to incorporate habitat features that are currently limited in the system (i.e., high gradient habitat). Similar to the Mollie River realignment, the low gradient habitat consists of two plan forms; Type A and Type B (Figure 3.12). The Type A plan form is representative of a low gradient habitat with a channel morphology dominated by runs and pools with limited riffles or shallow areas. While Type B is also a low gradient habitat, the channel morphology has a lower relative sinuosity



MAP INFORMATION
Datum: NAD 1983 Map Projection: Zone 17N
Data Source: Department of Natural Resources Canada. All rights reserved.
Created By: M.A.LaPalme
Creation Date: January 2015
Project No.: 2526

Figure 3.11: Habitat Created for the Bagsverd Creek Alignment

Created by:
minnow environmental inc.

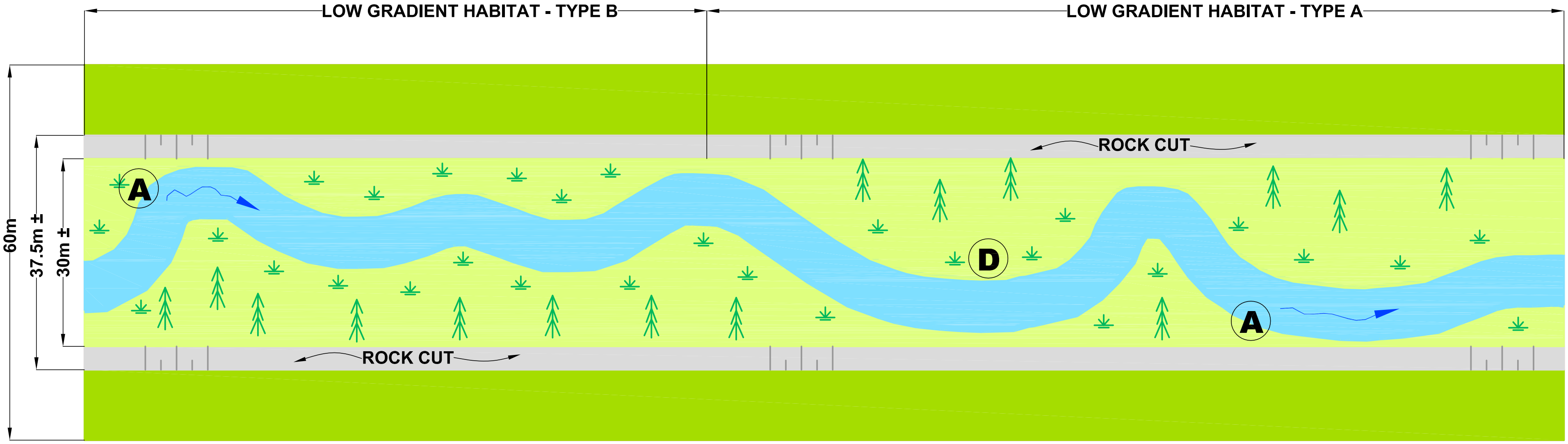
Table 3.5: Summary of existing watercourse and proposed realignment geomorphic characteristics for Bagsverd Creek and Bagsverd Creek realignment.

Item[a]	Existing Conditions (m)	Proposed Conditions (m)
Low Gradient Habitat (Type A and Type B)		
Meander Belt Width	59	30
Meander Amplitude	10 - 20	10 - 15
Channel Sinuosity	1.55	1.12 - 1.13
Bankfull Width	4.7 - 8.1 (approx. 8m typically)	8.0
Bankfull Depth	0.8 - 1.8	0.6 - 1.5
Moderate Gradient Habitat		
Meander Belt Width	60 - 89	30
Meander Amplitude	10 - 50	10 - 15
Channel Sinuosity	1.28 - 1.36	1.12
Bankfull Width	8.0 - 16.5 (approx. 8m typically)	8.0
Bankfull Depth	0.2 - 1.4	0.2 - 1.5
High Gradient Habitat		
Meander Belt Width	- [b]	- [b]
Meander Amplitude	- [b]	- [b]
Channel Sinuosity	- [b]	- [b]
Bankfull Width	8.1 - 15.4	8.0 - 15.0
Bankfull Depth	0.2 - 1.0	<0.5

Source: Calder Engineering Ltd.

[a] Habitat Type: Low Gradient – channel morphology dominated by runs and pools; Moderate Gradient – channel morphology dominated by runs and pools with some shallower areas and riffles; High Gradient – channel morphology dominated by riffles with some intermixed pools.

[b] Existing geomorphic characteristics not inventoried for High Gradient Habitat conditions: these sections are typically linear with a channel sinuosity approaching 1.



LOW GRADIENT HABITAT - TYPE B

MEANDER BELT WIDTH ~ 30m
MEANDER AMPLITUDE ~ 10m - 15m
CHANNEL SINUOSITY ~ 1.12
CHANNEL BANK FULL WIDTH ~ 8m

LOW GRADIENT HABITAT - TYPE A

MEANDER BELT WIDTH ~ 30m
MEANDER AMPLITUDE ~ 10m - 15m
CHANNEL SINUOSITY ~ 1.13
CHANNEL BANK FULL WIDTH ~ 8m

LEGEND

BLACK SPRUCE
AND EASTERN WHITE CEDAR

RUSHES AND SEDGES
WITH WILLOW AND ALDERS

A — HABITAT FEATURE - FALLEN LOGS
SEE FIGURE 3.9 FOR DETAIL

D — HABITAT FEATURE - SPAWNING HUMMOCKS
SEE FIGURE 3.9 FOR DETAIL

Prepared by:
Calder Engineering Ltd.

FIGURE 3.12
TYPICAL CHANNEL PLAN FORM - LOW GRADIENT HABITAT
PROPOSED BAGSVERD CREEK RE-ALIGNMENT

Prepared for:
minnow

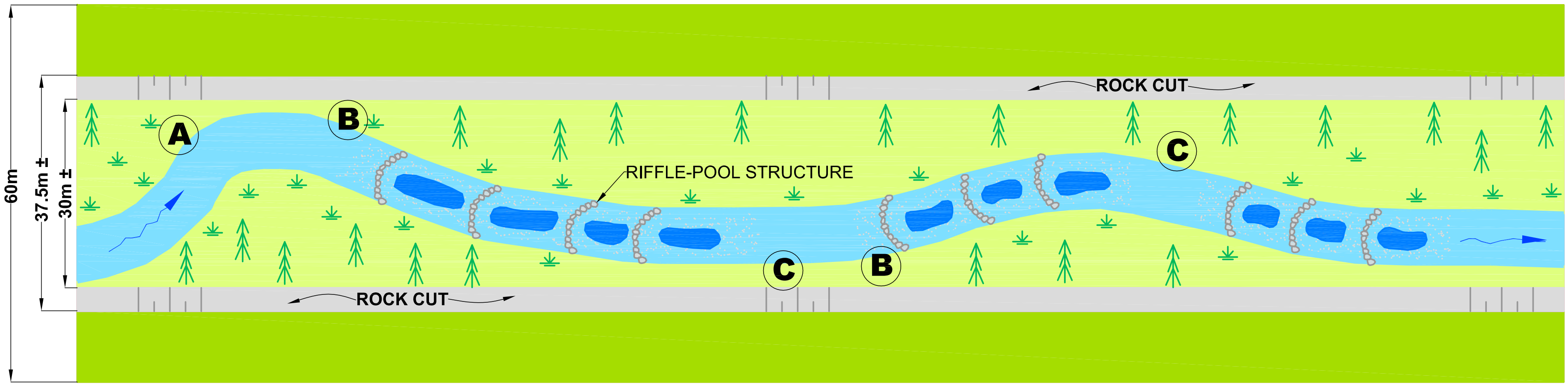
January 27, 2015

and the occasional riffle area. The Bagsverd Creek realignment will be configured to connect these two habitat forms to suit channel gradients. Within the Type A plan form, spawning hummocks for northern pike will be created enhance spawning habitat. The moderate gradient habitat channel morphology will be predominately runs and pools with some intermixed riffle areas (Figure 3.13). High gradient habitat will consist primarily of riffles and shallow pools (Figure 3.14). There will be three sections of high gradient habitat for a total of 1,250 m with channel widths of 8 m (Figure 3.15). The remaining 3,228 m of channel will be low to moderate gradient. Based on the preliminary profile of the realignment, the high gradient habitat will occur at the outlet of Bagsverd Lake (500 m), mid reach (450 m) and at the inlet to Unnamed Lake # 2 (300 m; Figure 3.15). In a topographical low area, a wider channel (40 m wide by 230m long) will be created to promote vegetation and high quality juvenile rearing habitat (Figure 3.11). Other than this wider section, the low to moderate gradient stream sections will consist of an 8 m channel set in a 30 m floodplain (Figure 3.16; Table 3.5).

The floodplain will be planted with willow and alder live stakes/seedlings, and rush and sedge grasses, which will provided spawning substrate for northern pike in the spring under the flooded condition (Figure 3.16). Physical habitat features, such as stump bank shelters, rock cluster linings, spawning hummocks and fallen trees (Figure 3.9), will be incorporated to provide habitat complexity and enhance habitat suitability for the target species. In the low gradient sections and the wider section of the channel, aquatic vegetation will be planted to expedite the establishment of vegetative communities.

The high gradient habitat at the inlet and outlet of the Bagsverd Creek Realignment Channel is expected to provide excellent spawning habitat for walleye resident to Bagsverd Lake and Unnamed Lake # 2 (Table B.9). This habitat, combined with the wider, low gradient habitat within the channel and adult foraging and over wintering habitat available in both Bagsverd Lake and Unnamed Lake # 2 is expected to increase the walleye productivity in both these lakes where spawning habitat is currently limited. The low and moderate gradient habitat is expected to provide good spawning, juvenile rearing and adult foraging habitat for northern pike and yellow perch (Tables B.7 and B.8). The channel will provide some juvenile rearing habitat for smallmouth bass, walleye and lake whitefish as well. Pools within the channel will provide some overwintering habitat for northern pike, yellow perch and smallmouth bass but will not support the over wintering requirements of lake whitefish or walleye (Tables B.7 to B.11). However, both walleye and lake whitefish will have access to good overwintering habitat within Bagsverd Lake and Unnamed Lake # 2.

As a result of the Bagsverd Creek realignment, increased flow from Bagsverd Lake will cause the water level in Unnamed Lake #2 to increase by 0.3 m, which will increase the lake surface



LOW GRADIENT HABITAT | **MODERATE GRADIENT HABITAT**

MODERATE GRADIENT HABITAT

MEANDER BELT WIDTH ~ 30m
MEANDER AMPLITUDE ~ 10m - 15m
CHANNEL SINUOSITY ~ 1.12
CHANNEL BANK FULL WIDTH ~ 8m

LEGEND

- BLACK SPRUCE AND EASTERN WHITE CEDAR
- RUSHES AND SEDGES WITH WILLOW AND ALDERS
- **A** HABITAT FEATURE - FALLEN LOGS SEE FIGURE 3.9 FOR DETAIL
- **B** HABITAT FEATURE - STUMP BANK SHELTER SEE FIGURE 3.9 FOR DETAIL
- **C** HABITAT FEATURE - ROCK CLUSTER SEE FIGURE 3.9 FOR DETAIL

Prepared by: Calder Engineering Ltd.

FIGURE 3.13
TYPICAL CHANNEL PLAN FORM - MODERATE GRADIENT HABITAT
PROPOSED BAGSVERD CREEK RE-ALIGNMENT

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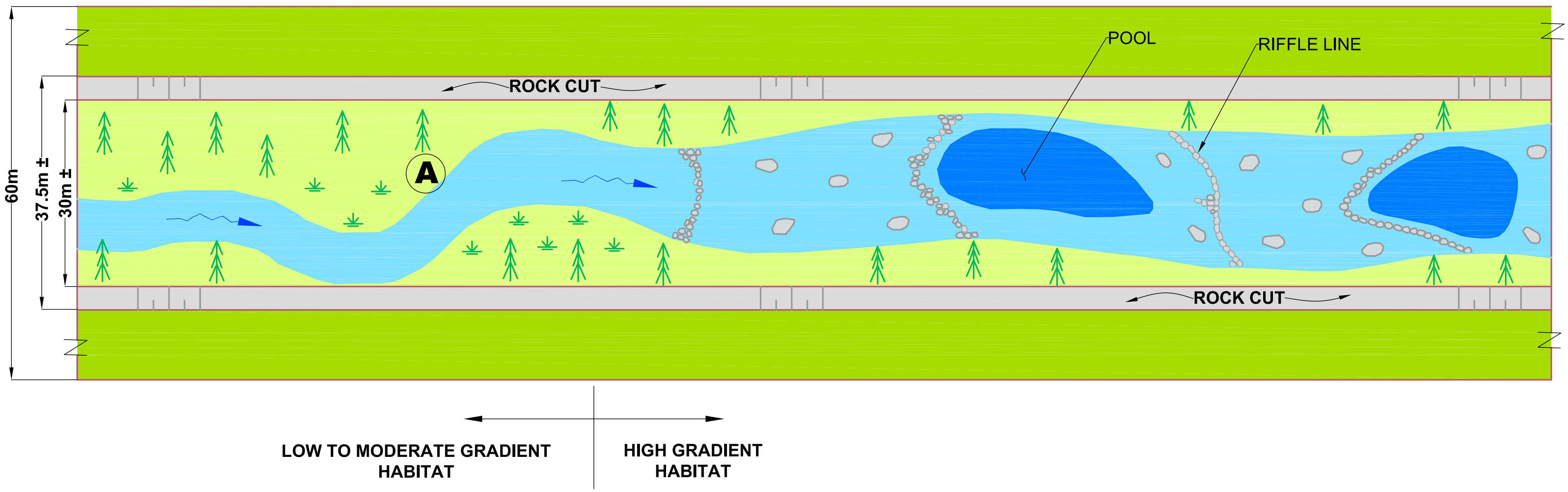

HIGH GRADIENT HABITAT

CHANNEL BANK FULL WIDTH ~ ±15m

LEGEND

- BLACK SPRUCE AND EASTERN WHITE CEDAR
- RUSHES AND SEDGES WITH WILLOW AND ALDERS
- (A) HABITAT FEATURE - FALLEN LOGS SEE FIGURE 3.9 FOR DETAIL

Prepared by: Calder Engineering Ltd.

FIGURE 3.14

TYPICAL CHANNEL PLAN FORM - LOW TO MODERATE AND HIGH GRADIENT HABITAT PROPOSED BAGSVERD CREEK RE-ALIGNMENT

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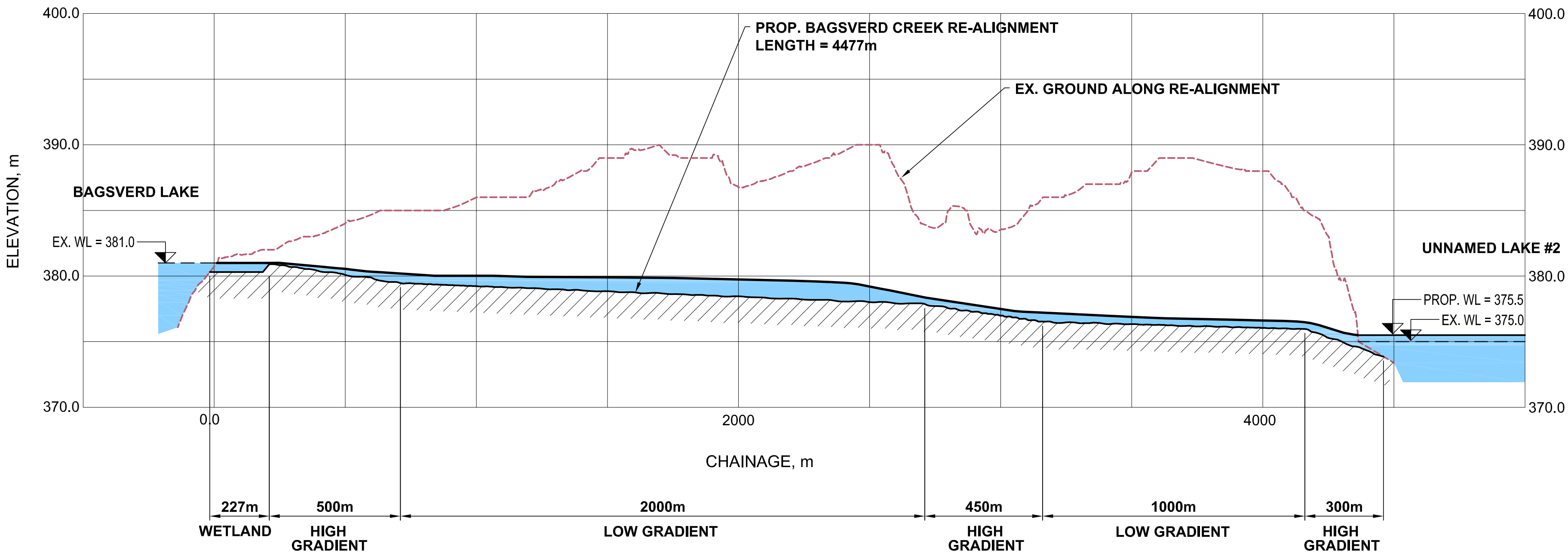


Prepared by:

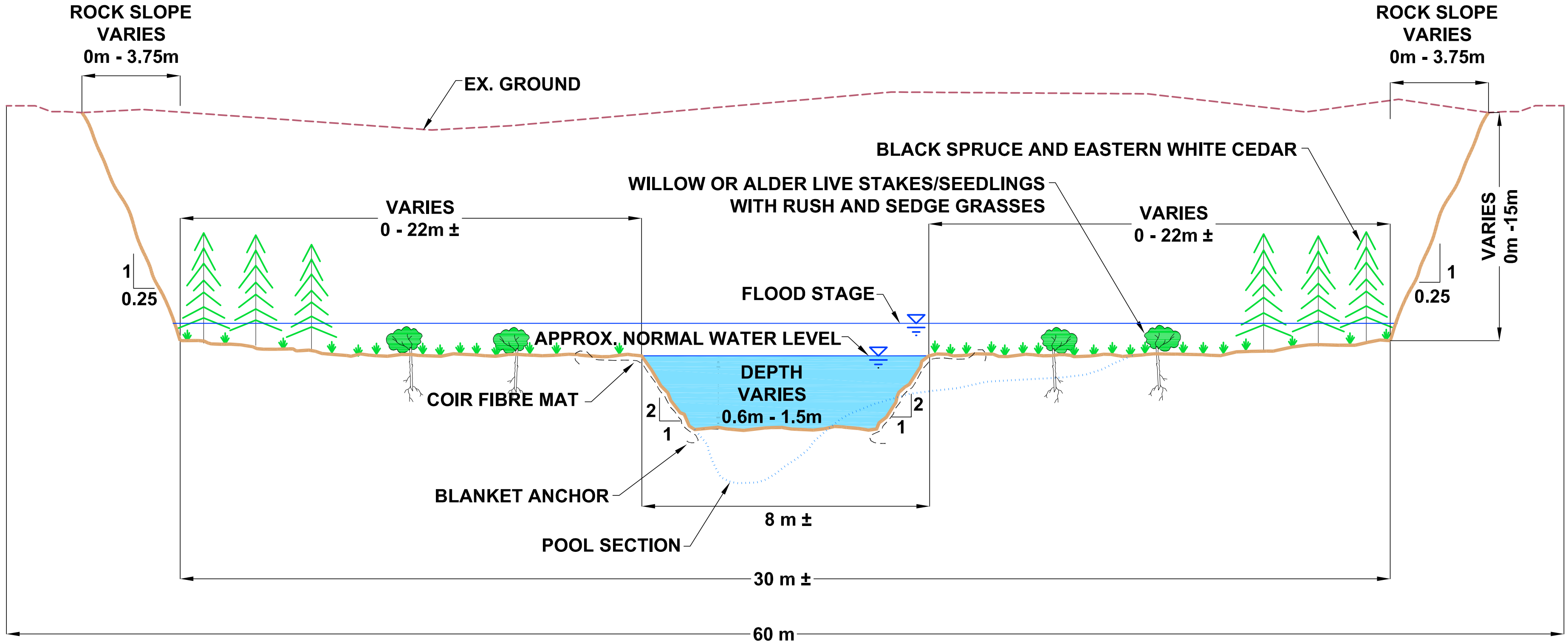
Calder Engineering Ltd.

FIGURE 3.15
TYPICAL PROFILE
PROPOSED BAGSVERD CREEK RE-ALIGNMENT

Prepared for:

minnow

January 27, 2015



Prepared by:

Calder Engineering Ltd.

FIGURE 3.16
TYPICAL CHANNEL SECTION
PROPOSED BAGSVERD CREEK RE-ALIGNMENT

Prepared for:

minnow

January 27, 2015

area from approximately 460,000 m^2 to 478,000 m^2 (Figure 3.11, Table 3.3). The increase in water level will provide additional spawning habitat for northern pike as the low-lying, vegetated, wetland areas become flooded (Table B.1).

The dam constructed to block the original Bagsverd Creek path will result in Permanent Pond increasing in water level (approximately 2 m), with flow directed back to Bagsverd Lake. The surface area of Permanent Pond will increase from approximately 40,000 m^2 to 55,000 m^2 (Figure 3.11, Table 3.3). No change in habitat quality is expected, though the increased area will result in an increases the overall habitat units within the pond (Tables B.1 to B.5).

3.2.9 Summary of Habitat Gained Through Offsetting Plan

Habitat will be created through the construction of realignment channels (Mollie River realignment and associated channels and the Bagsverd Creek realignment) and the increase in lake water levels in Chester Lake, the South Arm of Bagsverd Lake, Unnamed Lake #2 and Permanent Pond. The total length of stream habitat to be created is 8,486 m which based on design stream widths is equal to 161,380 m^2 (Table 3.3). The area of lake habitat to be created is estimated to be 486,532m^2 (48.6 ha; Table 3.3). Based on habitat characteristics incorporated into the conceptual habitat designs (presented herein) relative to the habitat requirements for the various life history stages of the fish species assessed, habitat quality values were assigned (none to excellent as described above). The habitat quality and quantity was used to calculate the habitat units to be created (gained). The total habitat units to be created is equal to 21,154,664 lake habitat units and 1,077,030 stream habitat units (Tables B.6 and B.12). In addition to the habitat units created, the proposed offsetting plan will provide greater connectivity between habitats, allowing fish improved access to habitats created for various life stages. It is expected that the increased connectivity will result in increased fish productivity in most areas beyond that accounted for in the habitat units assessment. This is particularly true for walleye which will now have improved access to spawning habitat for resident walleye from the South Arm of Bagsverd Lake, Weeduck Lake, Upper Three Duck Lake, Bagsverd Lake and Unnamed Lake #2 that was previously limited in the system.

4.0 AVOIDANCE OF LAG TIMES

Lag times, represent the time between the commissioning of new habitats and the ability of the habitat to be fully productive, as designed (Minns 2006). Lag times have the potential to effect the productivity of the system through limiting the ability of fish to fully utilized constructed habitats for their various life stages. Measures have been incorporated into the Côté Gold Project offsetting plan to minimize lag times. Principally, lag times will be minimized through pre-commissioning measures that will enhance the habitat stability, succession and biological communities (food web). These measures will include, physical structures (e.g., spawning hummocks for northern pike), vegetation planting (aquatic and riparian), invertebrate transplanting and staged relocation of fish from habitats to be lost to avoid loss of a year class and ensure survival.

To minimize lag times it is proposed that the newly created habitats for the Côté Gold Project not only include the construction of physical habitat features (described in Section 3.2) but also the effective transplanting of various ecosystem components in an effort to stimulate the establishment of the aquatic ecosystem in the newly constructed habitat/realignments. The transplanting of vegetation (aquatic and riparian), placement of soils containing rooting material, and transplanting of benthic invertebrates and forage fish will be carried out to expedite the establishment of created habitat. In addition, fish will be collected in habitats to be lost and transferred to newly created habitats that provide the most optimal habitat for that specific species and life stage. The relocation of fish will be scheduled to minimize the impacts on critical life stages (i.e., egg incubation). Through the promotion of vegetation and biological communities (e.g. benthic invertebrates) and the systematic collection and relocation of resident fish, lag times for the newly constructed habitat are anticipated to be minimal.

The objective of this effort is to rapidly increase the productivity of habitat, ensuring there is no loss of year class for the fish (i.e., spawning habitat is established before the next spawning season) and therefore reducing the lag times in the constructed habitat. The sections below describe the planned measures to minimize lag times for the offsetting plan.

4.1 Physical Structure

Construction activities that will reduce the lag time for establishment of fish communities within the affected waterbodies will include installation and/or creation of specific habitat features required by certain fish species. For northern pike, these include hummocks and seasonally flooded shoreline vegetation for spawning, vegetated shallow areas for juvenile rearing and adult foraging, and deeper water for overwintering. These features will also provide necessary habitat for yellow perch. Habitat features created for walleye will include high gradient riffle areas within stream reaches for spawning, combined with moderate to low gradient areas downstream for juvenile rearing, root wads and shoals for adult walleye foraging, and sufficient depths for overwintering. Lake whitefish habitat features will include small cobble substrate along shorelines and in streams for spawning and juvenile rearing, and sufficient depths for adult foraging and overwintering. Smallmouth bass habitat will include sandy-gravel areas with rock or large woody debris cover for spawning, vegetated shallow areas and rocky shoals for juvenile rearing and adult foraging, and sufficient depths for overwintering.

Many of the species specific habitat requirements are common with others, so incorporation of these features will benefit multiple species. Some of these features will be incorporated into the design and construction phases (i.e., riffle habitat, rock shoals, tree stump structures, Figure 3.9), while others will be incorporated after construction has been completed (i.e., vegetation within shallow water and shorelines, discussed below) but prior to commissioning.

4.2 Vegetation

Aquatic macrophytes provide habitat and food for many different types of organisms such as zooplankton, benthic invertebrates and fish. Vegetation provides cover from predators, shade from sun and spawning substrate for certain species of fish (i.e., northern pike and yellow perch). Plants will also improve water quality by stabilizing substrates or preventing erosion (caused by wind or run off). Therefore, it is important to relocate and start the plant community within the realignments as soon as possible to establish a productive, successful plant community, which will provide habitat and a food base for relocated fish. The goal of the aquatic plant transplant is to start/boost the aquatic plant community within the realignments through scattered clusters of plants, and not by completely planting the entire area.

Aquatic macrophytes (plants) will be relocated during the spring after construction is complete. Planting in the mid to late spring is ideal because it will give the plants a longer growing season to establish good rooting and shoot growth in the new environment. If plants are not well rooted during the spring freshet (high water levels), they are more prone to being washed away (Environment Canada (EC) 2006). Therefore, the early planting will help to prevent this from occurring.

The transplant will require extensive manual labour associated with physically digging up and removing various types of aquatic plants from donor sites in the watershed and transporting them to the newly constructed areas. The source areas for these transplantations will be the areas to be lost within the same watershed. Therefore the transplant activities will not impact the source areas as they are to be lost with the construction of the mine site. During transport, care will be taken to ensure that plants remain damp and that they are replanted in similar water depths to where they were found. Planting at a standard distance apart of 0.5 to 1.0 m is suitable for most plants (EC 2006). Care will be taken to ensure that plants (excluding submergents) will have a portion of their stems above the water line to grow. It is anticipated that bur reed (*Sparganium* sp.), mermaid's hair (*Scirpus subterminalis*), pond weed (*Potamogeton* sp.) and sedges (*Carex* sp.) will be transplanted to the newly constructed habitat areas.

Macrophytes with a tuber or rhizome (i.e., yellow water lilies [*Nuphar variegatum*]) will be planted differently to accommodate the greater water depths required for these species. Following the removal of tuber/rhizome, the plants will be placed with a portion of the donor site soil and some small rocks/gravel into a burlap bag. Care will be taken to ensure there is no damage to the new growth, and small holes will be cut to allow roots to grow and spread in the soil of the new site. The bag will then be relocated in deeper areas of newly constructed habitat. This effort will be further complimented by the placement of soils from donor areas containing rooting material from native aquatic plants that will serve to promote the establishment of vegetation.

In addition, soils harvested from areas lost, containing rooting material and a seed bank of native plants, will be placed in the littoral zone to further promote the establishment of vegetation. The establishment of vegetation in the littoral zone has been shown to increase fish productivity (Randall et. al., 1996).

It is also proposed that shoreline areas will be seeded with native sedges and grasses in early spring. Native seeds can be purchased from Acorus Restorations, Native Plant Nursery, Walsingham, Ontario. A variety of seeds can be purchased which include Canada bluejoint (*Calamagrostis Canadensis*), porcupine sedge (*Carex hystericina*), tussock sedge (*Carex stricta*), softstem bulrush (*Scirpus validus*), and green bulrush (*Scirpus atrovirens*). Shorelines will be planted with live stakes of native tree species such as poplar, alder and willow to further stabilize the banks and provide shade.

Previous experience with other sites has shown that in areas where aquatic vegetation was transplanted, the coverage and expansion of colonization was much larger and quicker than in areas that were not transplanted, providing cover for juvenile fish and decreasing erosion from construction and wind (Minnow 2006; Connors and Munnoch 2011).

4.3 Invertebrate Transplants/Relocation

Benthic invertebrates will be collected from various habitats within the areas to be lost and transferred to the newly created habitats. The intent of this process is not to relocate all the benthic organisms from the areas to be lost, but rather to use the native benthic organisms to seed the newly created habitats, thereby expediting the establishment of the base of the food web in these habitats.

Benthos, or benthic invertebrates, living on the bottom of the lotic or lentic habitat to be lost will be transplanted after the aquatic plants in the spring. Benthos are ecologically important to the newly constructed habitat and will aid in the cycling of nutrients and provide a food base for fish (i.e., forage fish). Natural colonization of the benthic community, especially for sedentary taxa, would take much more time if they were not transplanted. Therefore, it is proposed that two different methods will be employed to collect benthic invertebrates. A Ponar grab will be used to collect benthos from depositional areas, whereas benthos along the shoreline or in water less than one meter in depth will be collected using a D-net following a kick and sweep method. Using both of these methods helps provide a broader benthic community food base for fish in the newly constructed areas (Minnow 2006).

A petite Ponar grab will be used to collect benthos from depositional areas. The sediment from the grab will be emptied into a 500 µm mesh sieve bag and the tub will be rinsed to ensure removal of all residual matter. After sieving, the retained material from the grab will be carefully transferred into buckets with fresh water. These buckets will be transferred to the newly constructed areas and emptied.

Kick and sweep sampling will capture benthic organisms living closer to shore in and around macrophytes/large organic debris. Samples will be collected near the shoreline using a 500 µm D-net. The sampler will hold the net just above the sediment and disturb the substrate with their feet. Starting from shore the sampler will move backwards out to a depth of 1 m, while moving the D-net in a figure “eight” motion, allowing the disturbed sediment to flow into the net. Once the sampler reached a depth of 1 m, another transect at a 45° angle to the first will be started back towards the shore, ultimately forming a zig-zap pattern. Each sample will then be sieved in the 500 µm D-net and carefully transferred into buckets with fresh water for transport to the newly constructed areas. Notes will be made on the general species composition of the kick and sweep samples (i.e., to family).

4.4 Fish Relocation

Transplanting activities will be sequenced to allow for the best opportunity for the successful transfer of fish from lost areas to the newly constructed habitat. The sequence of transfers will take into account spawning and incubation periods of the dominant species found within the systems to ensure successful transfer of young-of-the-year fish. In addition, fish will not be transferred until the aquatic plants and benthos have had a chance to become established (i.e. 1 growing season). Small-bodied fish relocation will commence first, prior to the transfer of higher trophic level fish (e.g., northern pike, walleye) to ensure the food base for these top predators.

Capture of the small-bodied fish will commence in mid-summer and will be accomplished through electrofishing, minnow trapping, hoop netting and/or seining. An electrofishing boat or punt -boat equipped with Smith-Root 5.0 GPP electroshocking equipment with a maximum effective fishing depth of approximately 2 m will be used and/or a Smith-Root backpack electrofisher. Any young-of-the-year large-bodied predatory fish caught will be returned to the area of capture in order to allow them to complete the first year of growth prior to transfer. The captured fish will be transported in a time effective manner in aerated containers. Minimizing fish stress will be managed through minimal handling, effective time management, adequate aeration and fish densities within the transportation containers.

In later summer, the large-bodied fish transplant will commence prior to and after initial draw downs. It is anticipated that a series of water drawdowns will occur to aid in concentrating fish for capture. Periods of fishing will occur around these successive draw-downs. The first of a series of fish captures will include intensive fishing effort using non-destructive collection techniques at the original water level. This will allow as many fish as possible to be removed prior to enduring additional stress associated with the higher total suspended solids that will occur during pump downs. Non-destructive collection techniques will include hoop and trap nets, short set gill nets, and electrofishing with either a boat or punt boat equipped with a Smith-Root 5.0 GPP electroshocking equipment. Any additional small-bodied fish captured will also be transferred at this time. Special attention will be given to ensuring that the larger fish are not overcrowded during the transfer, causing additional undue stress. Weather may become an issue if prolonged periods of high temperatures occur. In such an event, fishing will be conducted during cooler parts of the day (e.g., early morning) or will cease in response to water and air temperatures and fish mortalities. Fishing will recommence once water and air temperatures are cooler.

Following each draw down, fish will continue to be captured and transferred to the newly constructed areas using methods similar to those noted above. As water levels decline, seining may be an option depending on the substrate and safety issues. Catch totals and catch-per-unit-effort will be monitored to evaluate an appropriate time when fishing will cease.

5.0 PREDICTED NET CHANGE IN HABITAT/FISH PRODUCTIVITY

5.1 Offsetting Plan Gains/Balance

The predicted loss of fish habitat associated with the Côté Gold Project(Section 3.1) was assessed relative to the planned habitat to be created through the offsetting plan (Section3.2) such that the net change in productive fish capacity could be considered. Habitat units were used as a surrogate for fish productivity. As described in the Methods (Section 2.0), habitat units were considered for stream and lakes separately for five representative resident species considering four key life history stages (i.e., spawning and egg incubation, juvenile rearing, adult foraging, and overwintering (all life stages)). Habitat quality was based on habitat suitability indices or literature references (Appendix A). The results of this assessment were tabulated for each species for both habitat types before and after mine development (Appendix Tables B.1 to B.12). The overall results of the assessment (i.e., net loss or gain in habitat units) are summarized in Table 5.1.

While this approach provides a quantitative method for the assessment of habitat change, it provides equal weight to all habitat types and life history stages and considers each habitat in isolation, and therefore does not account for the benefits of habitat connectivity. Furthermore, it does not allow for the accounting of benefits (increased productivity) in areas where no new habitat is created. For example, in Upper Three Duck and Bagsverd lakes where no new habitat is planned, the connection to high gradient spawning habitat is expected to improve the walleye productivity in both lakes but this was not accounted for in the habitat units assessment because it does not represent a change in a specific habitat unit.

Despite these limitations, the assessment suggests that the proposed habitat offsetting plan will result in an increase in habitat units (183,130; Table 5.1). Overall, there will be a decrease in lake (lentic) habitat (-25,364 units) but an increase in stream (lotic) habitat (+208,494 units). In terms of fish productivity, it is expected that the stream habitat will be more productive than the lake habitat (Randall et al., 1995, Minns 1995 and Portt et. al, 1986) and, as such, the overall productivity of the system is expected to increase more than the additional habitat units may suggest. The greatest loss of habitat type is over wintering habitat, but as noted above, the assessment method could not consider connectivity between habitats. In every case where overwintering habitat within a lake or stream was decreased, the offsetting plan provides a connection to good, often better, overwintering habitat in existing lakes/ponds (see Section 3.2). Therefore, while the habitat units accounting process predicts a decrease in

Table 5.1: Summary of lake and stream habitat unit balance for the Project.

Area	Species	Habitat Unit Balance[a]				
		Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL
Lakes[b]	Northern pike	71,306	-44,076	-54,484	-33,600	-60,854
	Yellow perch	72,104	-3,679	-16,094	-51,637	694
	Walleye	7,623	21,477	-49,378	-60,051	-80,329
	Lake whitefish	82,159	31,095	101,611	-9,281	205,584
	Smallmouth bass	40,925	-67,648	-53,112	-10,625	-90,459
	Total	**274,117**	**-62,832**	**-71,456**	**-165,193**	**-25,364**
Streams[c]	Northern pike	8,841	13,097	-3,509	19,929	38,359
	Yellow perch	-8,694	7,674	15,201	13,968	28,149
	Walleye	6,606	24,374	36,164	-15,929	51,216
	Lake whitefish	2,710	25,374	14,560	-15,929	26,715
	Smallmouth bass	22,126	28,076	13,282	571	64,055
	Total	**31,589**	**98,595**	**75,699**	**2,611**	**208,494**
Overall Site Balance		**305,705**	**35,763**	**4,243**	**-162,582**	**183,130**

[a] Spatial areas used for habitat unit calculations are based on current conceptual designs.
[b] From Appendix Table B.6
[c] From Appendix Table B.12

overwintering habitat, connection to good quality over-wintering habitat will result in little to no change in available overwintering habitat to the resident species. The habitat offsetting plan will result in a net increase in spawning habitat in both lake and streams. Again, the connections between habitat is expected to further increase productivity, as fish will be able to access spawning habitat that was previously isolated or very limited. For example, walleye within the South Arm of Bagsverd Lake will now have access to high gradient riffle habitat for spawning in the channel from Little Clam Lake and the shallow heavily vegetated habitat in West Beaver Pond which will be ideal for juvenile rearing. Access to these two habitat types, which are not accounted for in the increased water level in the South Arm of Bagsverd Lake, will nevertheless result in enhanced walleye productivity within this waterbody, where access to these critical life stage habitats is currently limited

5.2 Other Considerations

As noted above, factors such as increase connectivity of habitat and an increase in stream versus lake habitat are expect to increase fish productivity more than the habitat units account for. In addition, while the longest stream channels will remain in perpetuity, the open pit will be allowed to fill and will form a 210 ha lake (2.1 million m^2), with the flow from Calm Lake being redirected into the pit and re-establishing the original configuration of the Mollie River watershed. While the additional lake habitat to be created has not been included in the habitat offsetting evaluation, it does represent a substantial future gain in lentic habitat following closure.

5.3 Lag times

Lag times are the period between the construction of habitat and its ability to functionally support the fishery as designed. The proposed offsetting plan presented herein has incorporated numerous measures to minimize lag times and allow for the habitat to be fully functional upon commissioning. These measures, described in Sections 3.2, and 4.1 and 4.2, include:

- The incorporation of physical habitat features into new habitat construction such as stump bank shelters, rock cluster linings, spawning hummocks and fallen trees (Figure 3.9) to provide habitat complexity and enhance habitat suitability for the target species.
- Transplanting aquatic vegetation (i.e., bur reed, mermaid’s hair, pond weed, sedges, and pond lilies) to expedite the establishment of vegetative communities and habitats for juvenile rearing.

- Placement of harvested soils from areas lost containing rooting material and a seed bank of native plants will serve to promote the establishment of vegetation. The establishment of vegetation in the littoral zone has been shown to increase fish productivity (Randall et. al., 1996).
- Floodplains and shorelines will be vegetated (willow and alder live stakes/seedlings, and rush and sedge grasses) to stabilize soils and provide vegetation for northern pike spawning during flooded spring conditions.
- Riparian and aquatic vegetation will be allowed a full growing season prior to transfer of fish to ensure the vegetation is established.
- Transplanting of aquatic invertebrates to expedite the establishment of the aquatic foodweb.
- Transfer of small-bodied fish from habitats to be lost prior to the transfer of predatory fish to further establish the aquatic food web.
- Strategic transfer of large-bodied (predatory) fish near the end of their growing season to provide YOY with the maximum growth period before transfer, and the placement of transferred fish in suitable habitat for their life history stage.

Through these measures it is expected that the created habitat for the offsetting plan will be functional to support the fishery upon commissioning of the habitat. Thus lag times are not expected to be a factor in the productive capacity of the newly created habitat.

5.4 Summary

The key aspects of the offsetting plan include:

- The plan will result in a net increase in habitat units and thereby fish productivity,
- The increase in habitat units is associated with an increase in stream habitat which has been shown to be more productive than the lake habitat (Randall et al., 1995, Minns 1995 and Portt et. al, 1986) and as such the expected productivity will likely be greater than accounted for with the net habitat units.
- The connectivity between habitats afforded by the offsetting plan will further increase fish productivity beyond that estimated through the habitat units accounting process, particularly for walleye which is currently limited in terms of abundance/productivity due to limited spawning habitat.

- The realignment channels will follow natural channel design and be designed to maintain flow conveyance characteristics allowing for self-sustaining habitat.
- Measures have been incorporated into the offsetting plan which will minimize lag times through the establishment of fish habitat prior to its commissioning.
- While not included in the offsetting plan, at closure the open pit will fill be allowed to fill and will form a 210 ha lake (2.1 million m^2), with the flow from Calm Lake being redirected into the pit and re-establishing the original configuration of the Mollie River watershed. This represents a future significant gain in lentic habitat.

Based on this assessment, the proposed offsetting plan, as described herein, will result in an increase in fish productivity over the existing conditions and will not result in serious harm to CRA fish.

6.0 MONITORING

Biological monitoring will be conducted within the realigned channels and modified lake habitat to assess habitat structure, vegetation growth, and fish species composition and abundance. Monitoring of vegetation and fish communities will be completed each year for the first three years following commissioning, and every three years thereafter, for three cycles of monitoring (i.e., 9 years post commissioning). Monitoring during construction will be captured as part of a site wide construction monitoring program to ensure the protection of water quality and fish habitat. Pursuant to the *Fisheries Act* Application Regulations, a detailed monitoring plan will be included in a future application for authorization and implemented prior to the construction of fish habitat and realignments of watercourses. The monitoring plan will provide detailed methods for each monitoring component and assessment endpoint. Progress reports will be prepared following each field monitoring program for submission to DFO, with an integrated report prepared following the first three years of monitoring and then subsequent reports prepared every three years.

6.1 Habitat Conditions and Stability

Habitat condition and stability will be incorporated into the monitoring program to ensure that habitat is constructed as planned, vegetation is becoming established and other physical structures are functioning as designed. The objective of this aspect of the monitoring program will be to document the post commissioning habitat relative to the design and the requirements of the target species. It is expected that the monitoring will document the establishment and succession of habitats over the first few years of operation.

Generally, all habitat structures created will be monitored for size, form and function (i.e. proposed riffle areas are present where proposed). The habitat quality and quantity will be recorded on field maps and augmented with photographs for key structures and/or habitats. Vegetation will be monitored at set locations using photo documentation to record growth and succession, as well as structure available for fish habitat. All physical structures developed to increase habitat complexity will be documented and inspected to ensure that they are secure and able to function as designed. For example, hummocks constructed for northern pike spawning will be inspected in the spring to ensure that they are sufficiently flooded for use by northern pike. If structures are not functioning as planned, these will be documented and remediation proposed to address the specific issue.

6.2 Fish Community Structure and Abundance

Fish community structure and abundance within created habitat will also be included in the monitoring program. The objective of this aspect of the program will be to demonstrate fish usage of the created habitat for the intended life history stage. To ensure that the fish populations are successful and growing, both small- and large-bodied fish sampling will be incorporated into the monitoring program.

Small-bodied fish will be assessed for composition and abundance annually for the first three years. It is essential that the small-bodied fish populations are thriving within the newly created habitats in order to provide a solid food base for the predatory fish populations. Standardized electrofishing, to determine abundance, will be employed along with supplemental seining and minnow trapping within in a variety of different fish habitats.

The key components of the large-bodied fish species monitoring will include:

- composition and abundance,
- reproduction (including spawning success),
- young of the year (YOY) monitoring in targeted juvenile rearing habitat,
- growth and condition, and
- tissue mercury concentrations.

Composition and abundance will be determined through standardized fish collection protocols to determine catch-per-unit-effort (CPUE) for each species in the various new habitats. Reproduction or spawning success will be determined by monitoring spawning in the spring (1 and 3 year post commissioning) and by sampling young-of-the-year during August in the first three years following commissioning of the new habitat. Growth and condition of the fish will be determined by collecting lengths and weights of each species, which can then be compared to data collected during baseline studies. Mercury concentrations in fish tissue will also be monitored to ensure mercury levels are not elevated relative to the concentration observed in baseline.

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APPENDIX A

HABITAT SUITABILITY INFORMATION

APPENDIX A: HABITAT SUITABILITY INDICES

Fish habitat was evaluated based on the quality of spawning and incubation, rearing (juvenile), foraging (juvenile/adult), and overwintering habitat available for northern pike, yellow perch, lake whitefish, walleye and smallmouth bass. It is assumed that these species requirements should cover the gamut of habitat required for the remaining fish community within the affected area. Habitat requirements for each life stage of each species are described in detail in the following sections. The availability of these habitat requirements within a waterbody has been ranked for each combination based on a scale from 1 (excellent) to 0 (no available habitat), for which the available habitat within the study area lakes and streams could be evaluated. These classifications/rankings are presented in Table A.1 for each species evaluated.

A.1 Northern Pike

Northern pike are large piscivores that are important in “top–down” predatory regulation of the fish community and can tolerate a wide range of environmental conditions (Casselman and Lewis 1996). Their occurrence over a broad latitudinal belt (e.g., from Great Bear Lake in the Northwest Territories to Lake Mendota in southern Wisconsin) demonstrates their adaptability to a variety of thermal regimes (Inskip 1982). Optimal conditions include cool-water, shallow (<12 m), productive, mesotrophic to eutrophic environments (Casselman and Lewis 1996).

Northern pike are spring spawners with spawning taking place shortly after the ice melts when water temperatures reach 8 to 12 °C (Casselman and Lewis 1996, Inskip 1982). Pre-spawning movements are typically triggered by warming water and movement of ice from the shoreline. Both lake and river populations of northern pike can migrate up tributaries to flooded marshes, wetlands, or shallow pools (Inskip 1982). Spawning occurs over vegetation in areas of calm, shallow water (Inskip 1982). Optimal substrate for spawning includes flooded vegetation, with preference for grasses and sedges, but other vegetation is also used (Casselman and Lewis 1996). The substrate should be adequate to trap eggs and suspend them above the bottom sediment where anoxic conditions can develop (Casselman and Lewis 1996). Eggs are broadcast and adhere to vegetation and typically hatch in 12 to 14 days at adequate water temperatures (Scott and Crossman 1998). Once hatched, alevins remain within the vegetation, feeding on the stored yolk (Scott and Crossman 1998). Northern pike embryos are sensitive to heavy siltation caused by excessive wave action and/or currents (Casselman and Lewis 1996).

Young-of-the-year (YOY) northern pike grow rapidly and increase in size and activity, therefore their physical habitat needs change, and as they grow their preferred depth range increases (Casselman and Lewis 1996). They are usually found in moderately dense vegetation, and

Table A.1: Rationale for assigning numerical ranking for habitat evaluation.

Species	Numerical Ranking	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering
Northern pike	1.00	Dense optimal vegetation (e.g., sedges or grasses) for spawning, calm shallow water (<2 m)	Moderately dense vegetation and prefer submerged vegetation with some emergent and floating vegetation, water depth generally <4 m, depth increases with size	Moderately dense (70%) vegetative cover within 300 m of shore, usually within 10 m depth (optimal 4 m) and rarely venture below the thermocline	Greater than 2 m water depth, large area where oxic conditions could persist for the entire winter, can tolerate very low dissolved oxygen
	0.75	Moderate to dense inundated vegetation	Moderate vegetation and cover	Habitat less than 10 m and within 300 m of shore, moderate to dense vegetative cover	Greater than 2 m water depth, maximum depth and anoxic conditions considered
	0.50	Moderate inundated vegetation	Sparse to moderate vegetation and cover	Habitat less than 10 m depth and within 300 m of shore, sparse to moderate vegetative cover	A minimum of 2 m water depth, abundance of aquatic vegetation taken into consideration to potentially cause anoxic conditions
	0.25	Sparse inundated vegetation	Sparse vegetation and cover, and/or depths >4 m	Shallow water depth (< 1.5 m), with sparse vegetation cover	Shallow water depth (<1.5 m), abundance of aquatic vegetation that could cause anoxic conditions
	0.00	No suitable habitat	No suitable habitat	No suitable habitat	No suitable habitat, less than 1 m water depth
Yellow perch	1.00	Use moderate to dense aquatic or inundated terrestrial vegetation, rocks, sand or gravel may be used if vegetation is not available, typically <4 m water depth and require low current velocities (<0.05 m/s)	Use moderate vegetated littoral areas before dispersing to open water, shallower water compared to adults, often school with mixed species of minnow	Use the littoral area in schools or near vegetation, prefer moderate vegetation cover (25-50%), river habitat - deep pools, slow water currents (< 0.10 m/s) with moderate vegetation (25-50%)	Greater than 2 m water depth, large area where oxic conditions could persist for the entire winter, can tolerate low dissolved oxygen (>1.5 mg/L)
	0.75	Moderate vegetation	Moderate to sparse vegetation and cover	Moderate to sparse vegetation and cover	Greater than 2 m water depth, maximum depth and consideration for anoxic conditions considered
	0.50	Sparse to moderate vegetation, or rock, sand or gravel	Sparse vegetation and cover	Sparse vegetation and cover	A minimum of 2 m water depth, abundance of aquatic vegetation taken into consideration to potentially cause anoxic conditions
	0.25	Sparse vegetation or rock, sand, gravel substrate	Little to sparse vegetation or cover, depths greater than littoral	Little to sparse vegetation or suitable cover	Shallow water depth (<1.5 m), abundance of aquatic vegetation that could cause anoxic conditions
	0.00	No suitable habitat	No suitable habitat	No suitable habitat	No suitable habitat (<1.5 m)
Walleye	1.00	Migrate to tributaries to spawn over rocky areas in white water with boulder to coarse-gravel substrate, boulder to course-gravel shoreline areas, or shoals of lakes with good circulation, water velocities can range from 0.4 to 1.5 m/s	Use heavily vegetated areas in 2 to 5 m water depth, juveniles will school and use deeper habitat depending on water clarity	Habitat use driven by sensitivity to light, often associated with moderate cover, shoals, weed beds (25-45%), moderate turbidities (1 to 2 m Secchi depth),	Minimum dissolved oxygen of 3 mg/L, water depth >2 m, most abundant in large >100 ha lakes
	0.75	Abundance of suitable spawning substrate with appropriate water velocity	Moderate to dense available habitat	Moderate to dense available habitat with optimal turbidity	Maximum depth of lake >8 m, substantial overwintering area available (>2 m water depth)
	0.50	Moderate amount of suitable spawning substrate with appropriate water velocity	Moderate amount of available habitat	Moderate amount of available habitat with adequate turbidity	Water depth >4 m, total area taken into consideration and potential of dissolved oxygen to remain > 3 mg/L
	0.25	Sparse amount of suitable substrate, sub-optimal water velocity	Sparse amount of suitable habitat	Sparse amount of suitable habitat with suboptimal turbidity	Shallow water depth (<3 or 4 m), high potential for dissolved oxygen to fall below 3 mg/L
	0.00	No suitable habitat	No suitable habitat	No suitable habitat	No suitable habitat (<2 m)
Lake whitefish	1.00	Littoral spawners over gravel, cobble, flat stones or boulder, sometimes over sand, shallow water depths <8 m, can spawn in rivers over gravel to cobble or rubble in <1 m	Will remain in spawning areas, can be associated with emergent vegetation within 1 m of shore, shallower water than adults, can tolerate warmer temperatures (15.5 to 19.5°C)	Use the hypolimnion during summer months and the oxic conditions that exist (>5mg/L), no preference for substrate, during spring and fall will use shallower water, temperature preference between 8 to 14°C	Greater than 2 m water depth, well oxygenated (> 5 mg/L)
	0.75	Moderate to dense suitable substrate within adequate depth, and fetch within the lake	Moderate to dense suitable habitat, appropriate temperature range	Moderate to abundant available habitat below the thermocline, oxic conditions taken into consideration during summer months	Maximum depth of lake >8 m, substantial overwintering area available (>2 m water depth)
	0.50	Moderate suitable substrate within adequate depth, and fetch within the lake	Moderate suitable habitat, suboptimal to appropriate temperatures available	Moderate to sparse available habitat below thermocline, oxic conditions taken into consideration during summer months	Water depth >4 m, total area taken into consideration and potential of dissolved oxygen to fall below 5 mg/L
	0.25	Sparse suitable substrate within adequate depth	Sparse suitable habitat, suboptimal temperatures	Sparse available habitat below thermocline, anoxic conditions likely exist, shallow water depth (<2 m) making available habitat not used for much of the year	Shallow water depth (<3 or 4 m), high potential for dissolved oxygen to fall below 5 mg/L
	0.00	No suitable habitat	No suitable habitat	No suitable habitat	No suitable habitat (<2 m)
Smallmouth bass	1.00	Nest construction <3 m water depth, over sandy, gravel, or rocky bottom near protection of rocks or large woody debris, in protected areas of lakes and backwaters of rivers	Use quiet water near cover in littoral, tend to school, in rivers use isolated pools or still-water along banks associated with larger substrate and cover	Use all forms of submerged cover, summer occupy warm epilimnetic water, in rivers, movements are typically within riffle boundaries, prefer slower currents	Water depth at least 3 to 15 m, dissolved oxygen >6 mg/L, use deep areas during winter and cease eating once temperatures reach 10°C
	0.75	Moderate abundance of appropriate substrate with nearby protection	Moderate vegetation and cover	Moderate vegetation and cover	Water depth >8 m
	0.50	Sparse to moderate suitable substrate, sparse cover	Sparse to moderate vegetation and cover	Sparse to moderate vegetation and cover	Water depth > 3 m and < 6 m
	0.25	Sparse appropriate substrate within <3 m water depth	Sparse vegetation and cover	Sparse vegetation and cover	Water depth >3 m and < 4
	0.00	No suitable habitat	No suitable habitat	No suitable habitat	No suitable habitat (< 3 m)

prefer submerged vegetation with some emergent and floating vegetation (Casselman and Lewis 1996). In late summer and early fall, YOY use a wider range of depths (approximately 10 cm in depth for every 10 mm of body length until 150 mm in length; Casselman and Lewis 1996).

Typically, adult northern pike inhabit water shallower than 4 m, are within 300 m of shore, and frequently associate with vegetation (Inskip 1982). They are rarely found at depths greater than 10 m and rarely venture below the thermocline (Inskip 1982). Northern pike populations typically require a minimum of 30% vegetative cover, and are generally most abundant when vegetation is moderately dense (31 to 70%; Casselman and Lewis 1996). In winter, northern pike will tend to occupy deeper habitats as ice cover and decaying vegetation deplete dissolved oxygen in the nearshore habitat (Casselman and Lewis 1996).

Dissolved oxygen concentrations are usually the most important variable affecting overwintering survival (Inskip 1982). Northern pike are more tolerant of low dissolved oxygen conditions during the winter than are many other species (Inskip 1982). They are able to tolerate concentrations as low as 0.1 to 0.4 mg/L for at least several days, and over longer term periods, concentrations greater than 1.5 mg/L are required for survival (Inskip 1982).

Northern pike are not adapted for strong currents, and therefore, throughout their range occur more frequently in lakes than in rivers (Inskip 1982). In rivers, they will inhabit backwater and pools, and avoid channelized reaches and currents greater than 1.5 m/s (Inskip 1982). Currents stronger than this can block spawning migrations (Inskip 1982).

A.2 Yellow Perch

Yellow perch are very adaptable and able to utilize a wide variety of warm to cooler habitats in lakes or quieter rivers (Scott and Crossman 1998). They are most common in clear freshwater but can be found in brackish water at river mouths (Kreiger et al. 1983). Population sizes in freshwater tend to decrease with increasing turbidity or decreasing vegetation (Scott and Crossman 1998). They are associated with shallow waters (less than 10 m depth), especially small weedy water bodies with muck, sand or gravel bottoms (Brown et al. 2009a).

Yellow perch begin spawning migrations from deep water into tributaries, lake shallows or low velocity areas of rivers from April to June when water temperatures warm to 7 °C (Krieger et al. 1983, Scott and Crossman 1998). Females release a string of eggs near aquatic or inundated terrestrial vegetation (plants, woody debris). Rocks, sand or gravel may be used if submerged vegetation is not available (Robillard and Marsden 2001; Parker et al. 2009). Yellow perch require low current velocities (<0.05 m/s) for spawning (Krieger et al. 1983). Eggs are broadcast in water depths of 1 to 3.7 m and hatch in approximately 8 to 10 days (Krieger et al. 1983, Scott and Crossman 1998). Soon after hatching, the larvae move into the limnetic zone where they begin feeding (Whiteside et al. 1985). When they reach 25 mm (total length) they return to the littoral zone (Whiteside et al. 1985).

Young-of-the-year and age-1 individuals tend to stay in vegetated areas before dispersing to open water habitats (Parker et al. 2009). Juvenile habitat requirements are similar to those of adults with the exception that juveniles tend to inhabit slightly shallower water than adults (Kreiger et al. 1983). Young will often be found in loose aggregation of 50 to 200 individuals segregated by size and often mixed with species of minnow (e.g., spottail shiner; Scott and Crossman 1998).

Adults can be found in moderate currents but prefer sluggish currents or slack water habitat (Krieger et al. 1983). The schools of adult yellow perch are often dense in the summer and more separated in the winter (Scott and Crossman 1998). They are typically inactive at night and rest along the bottom; however they are active throughout the winter under the ice in both shallow and deeper water (Scott and Crossman 1998). Optimal lacustrine habitat is characterized by a littoral area of 20 to 30% of the total lake; 25 to 50% of the littoral area vegetated; warm (20 to 28 °C) surface water temperature in summer; and low to moderate turbidities (Brown et al. 2009a). Temperature preferences during the growing season are between 17.6 to 25 °C (Krieger et al. 1983). Winter dissolved oxygen levels of 0.2 to 1.5 mg/L are considered lethal, and 5 mg/L is considered the lower optimum limit (Kreiger et al 1983, Brown et al. 2009a).

Optimal riverine habitat is characterized by deep pools (deeper than average river depth) and slack water areas (25 to 75% of river area) with moderate amounts of vegetation (25 to 50% of pool and backwater area) and low velocities (less than 0.10 m/s; Brown et al. 2009a).

A.3 Lake Whitefish

Lake whitefish are a cool water species (Scott and Crossman 1998). Spawning usually takes place in lakes in late fall, September to December depending on latitude, at water temperatures of less than 8 °C (Bradbury et al. 1999, Bégout Aras et al. 1999, Scott and Crossman 1998). Lake whitefish are littoral spawners, with spawning usually occurring in shallow water at depths of less than 7.6 m, but can occur at depths up to 30 m in larger lakes (Bradbury et al. 1999, Scott and Crossman 1998). Typically, eggs are broadcast at depths ranging from 2 to 4.5 m (Bégout Anras et al. 1999). Preferred spawning substrate is a hard or stoney bottom usually of gravel, cobble, flat stones, or boulder but spawning may occasionally occur over sand (Bradbury et al. 1999, Bégout Anras et al. 1999, Scott and Crossman 1998). Lake whitefish have been observed spawning in rivers over gravel or rubble substrates at depths less than one meter (Bradbury et al. 1999, McPhail 2007). Site fidelity has been observed for lake whitefish towards specific substratum and slope characteristics, and low fidelity toward geographical location (Bégout Anras et al. 1999). Mud bottoms are generally avoided by both lake and river spawners (Bradbury et al. 1999).

Eggs will remain on the spawning substrate for four to six months and typically hatch from April to May. Once hatched, fish will remain within the general vicinity of the spawning area (Scott and Crossman 1998, Bégout Anras et al. 1999). Young-of-the-year are generally found over gravel, cobble, or boulder substrate and typically remain in these shallow inshore areas until water temperatures increase (Bégout Anras et al. 1999, Scott and Crossman 1998). They can be associated with emergent vegetation, often within 1 m of shore (McPhail 2007). Juvenile lake whitefish occupy similar habitat to those used by adults, however they are tolerant of higher temperatures (15.5 to 19.5 °C), and therefore can be found in the summer in shallower waters compared to adults (McPhail 2007). By late fall, juveniles begin to move into deeper water as the adults migrate to shallower water to spawn (McPhail 2007).

Adult lake whitefish are bottom feeders consuming a wide variety of bottom-living invertebrates and small fishes (Scott and Crossman 1998). They descend into cooler waters of the hypolimnion during summer months if thermal stratification exists. Preferred temperature range is from about 8 to 14 °C, although they can tolerate ranges from near 0 to 22 °C (McPhail 2007). Outside of the spawning period, adults show no preference for substrate type (Bégout Anras et al. 1999). During spring both juveniles and adults leave deeper water and move into shallower water, returning to deeper, cooler depths as summer water temperatures increase (Scott and Crossman 1998, Bégout Anras et al. 1999).

A.4 Walleye

Walleye are a highly successful species inhabiting a wide range of latitudes and habitat conditions including rivers, lake, lake-river networks and reservoirs. Walleye have evolved physiology and behaviour to efficiently utilize low light, turbidity and nocturnal conditions, allowing them to effectively partition habitat with most other co-occurring species (Kelso 1978). They are most abundant in moderate-to-large mesotrophic lacustrine (>100 ha) or riverine systems, or smaller oligotrophic lacustrine or riverine systems characterized by cool water temperatures, shallow to moderate depths, extensive littoral areas and moderate turbidities (1 to 2 m Secchi disc; Scott and Crossman 1998, McMahon et al. 1984).

Spawning occurs in the spring, shortly after ice break up in a lake, at water temperatures of 6.7 to 8.9 °C (Scott and Crossman 1998), with most spawning occurring in the range of 6 to 11 °C

(McMahon et al. 1984). Spawning grounds are rocky areas in white water, riffles below impassable falls and dams in rivers, or boulder, to coarse-gravel shoreline areas or shoals of lakes with good water circulation from currents or wave action (McMahon et al. 1984, Scott and Crossman 1998). Spawning water depth can range from 0.20 to 2 m (Bozek et al. 2011) or greater (up to 6 m; McPhail 2007). In rivers, preferred water velocities typically range from 0.40 to 1.5 m/s (Bozek et al. 2011, McPhail 2007). Walleye can also successfully spawn in lakes, reservoirs and even wetland-marsh environments to take advantage of local environments (Bozek et al. 2011). In lake systems, walleye can spawn along gravel and cobble shorelines, on point bars or reefs or over dense mats of vegetation with adequate water circulation (Bozek et al. 2011, McMahon et al. 1984). Spawning takes place at night with eggs broadcast over substrate (Scott and Crossman 1998). Eggs hatch in 12 to 18 days, the yolk sac is absorbed quickly and young disperse into the upper levels of open water within 10 to 15 days of hatching (Scott and Crossman 1998). In river systems, larvae are passively transported downstream to river mouths and nearshore areas where they begin feeding on zooplankton (Jones et al. 2003).

Young-of-the-year walleye ultimately become demersal and piscivorous and the timing of when this occurs varies by water body (Pratt and Fox 2001). Pratt and Fox (2001) observed YOY walleye were located primarily at heavily vegetated areas 2 to 5 m in depth and were rarely found in habitats that provided little or no cover. As YOY grew, they moved to shallow, low cover habitat where high densities of prey existed, and remained there well into October (Pratt and Fox 2001). Other studies have found YOY at depths of up to 10 m by the fall (Raney and Lachner 1942).

Juvenile and adult walleye often form schools and will remain in deeper or darker water or cover during daytime hours (Bozek et al. 2011). It has been assumed that habitat selection of other environmental features for juvenile walleye probably matches that of adults (Ryder 1977).

Adult movements and habitat use are driven by the fact they are sensitive to light intensities. Lakes with optimum transparencies (1 to 2 m Secchi depth) will allow walleye to feed intermittently throughout the day, whereas, in clear lakes, feeding is restricted to twilight or dark periods (McMahon et al. 1984, Scott and Crossman 1998). Walleye will often be associated with sunken trees, boulder shoals, weed beds or thicker layers of ice to avoid bright light (Scott and Crossman 1998). Optimal vegetation cover was found to be around 25-45% (McMahon et al. 1984). However, other populations do well without any vegetation (Bozek et al. 2011). Larger fish have been associated with greater depths (McMahon et al. 1984).

Optimal dissolved oxygen concentrations for walleye are 5 to 6 mg/L, however they prefer levels above 5 mg/L (Bozek et al. 2011, McMahon et al. 1984). They can survive extended periods at

3 mg/L dissolved oxygen and can tolerate lower oxygen concentrations for short periods of time (Barton and Taylor 1996, McMahon et al. 1984). Optimal thermal tolerance for walleye range between 20 to 24 °C and the upper lethal limit is 29.7 ° (Barton and Taylor 1996, McMahon et al. 1984).

A.5 Smallmouth Bass

Originally, smallmouth bass were limited to the Great Lakes-St. Lawrence system in Canada, however, since this species has been widely introduced outside its original range, it now occurs from Nova Scotia to central Saskatchewan (Scott and Crossman 1989, Edwards et al. 1983). It is also found in eastern British Columbia and Vancouver Island as a result of invasion from introductions in Washington State (Scott and Crossman 1989).

Bass are primarily a lake fish, but they can also inhabit rivers. They prefer large, mesotrophic, clean and clear lakes (>40.5 ha) with an average depth of >9 m with rocky shoals and wide rivers or streams (>10.5 m wide; Edwards et al. 1983). Optimal river habitat includes cool and clear water, with moderate current and composed of >50% pool habitat (Brown et al. 2009b, Edwards et al. 1983). Shade and cover should be abundant with substrate composition comprised of gravel and larger material (Brown et al. 2009b).

In northern areas, smallmouth bass spawn as late as June or July, and the eggs hatch after 4 to 10 days at appropriate temperatures (13 to 25 °C; Edwards et al. 1983, Scott and Crossman 1989). They typically spawn over a period of 6 to 10 days (Scott and Crossman 1989). Nest construction is conducted by the males and nests can be found at 0.61 to 6.1 m, although rarely at depths greater than 3 m. Smallmouth bass spawn on sandy, gravel, or rocky bottom of lakes or rivers, usually near the protection of rocks or large woody debris (Scott and Crossman 1989, Edwards et al. 1983, Brown et al. 2009b). Optimal substrate size is considered to be 30 mm (Clark et al. 1998). Nests can typically be found in protected areas of lakes, such as coves, bays and shorelines where water warms the earliest in the spring (Brown et al. 2009b). Optimal spawning temperature ranges from 12.8 to 21 °C (Brown et al. 2009b, Scott and Crossman 1989). The male will guard the nest and the young for approximately two weeks after they hatch and before they disperse (Scott and Crossman 1989, Brown et al. 2009b).

In river habitat, fingerling bass are abundant in isolated pools, sloughs and shallow still-water areas along banks, whereas juveniles can be found under larger substrate or shallow water (Brown et al. 2009b). In lakes, juveniles spend most of their time in quiet water near cover, such as brush or rocks (Edwards et al. 1983). Young bass have a schooling tendency (Brown et al. 2009b).

Bass seek protection from light at all stages (Edwards et al. 1983) and will seek cover under angular bedrock crevices, or under banks or pools in rivers and deep water in lakes (Brown et al. 2009b). Adult bass will use all forms of submerged cover (e.g., rocks, stumps, root-masses, trees, boulders, and crevices) without any apparent preference (Edwards et al. 1983). In the summer, they will occupy the warm epilimnetic waters of shallow lakes (Brown et al. 2009b). In rivers, bass movements may be more restricted and they appear to respect stream riffles as boundaries (Brown et al. 2009b). When water temperatures dip to 15 to 20 °C in the fall, adults seek deeper water, and when temperatures reach 10 °C they become inactive and cease eating (Scott and Crossman 1989, Edwards et al. 1983). Lakes should be at least 3 to 15 m deep to support over-wintering bass (Brown et al. 2009b).

Optimal dissolved oxygen levels for smallmouth bass vary by life stage. Dissolved oxygen requirements for eggs require levels to be at or greater than 7 mg/L, embryo/larvae development requires greater than 6.5 mg/L and normal activities require greater than 6 mg/L (Brown et al. 2009b, Edwards et al. 1983). Smallmouth bass can tolerate periodic turbidity, however, excessive turbidity and siltation will reduce populations (Edwards et al. 1983).

Water temperature is one of the most important environmental variables to affect smallmouth bass (Edwards et al. 1983). It influences range and distribution, migration, spawning, nest guarding behaviour, success of incubation, growth rate, and winter survival (Brown el al. 2009b, Edwards et al. 1983). Optimal range for adult rearing is 21 to 27 °C, with an upper limit of 32 °C (Brown et al. 2009b). Water temperatures must be sufficient for adequate growth of young-of-the-year for winter survival (Brown et al. 2009b). Therefore, the northern distribution of smallmouth bass is limited by temperature, as the size of fish in autumn is correlated with their over-winter survival and length of starvation period (Brown et al. 2009b).

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APPENDIX B

HABITAT UNIT CALCULATIONS

Table B.1: Habitat Evaluation Procedure results and accounting for northern pike in lakes, IAMGOLD Côte Lake.

Location of Impact	FAA / Schedule 2 or Created Compensation?	Lake Area	CURRENT CONFIGURATION				Current Habitat Suitability Index				Current Habitat Units					POST CONSTRUCTION			Post Habitat Suitability Index				Post Habitat Units				
			Max Depth (m)	Max Secchi Depth (m)	Depth Range (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL	Max Depth (m)	Depth Range (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL
Open Pit	FAA	Unnamed Pond	~1.8	na	0-max	28,424	0.50	0.50	0.50	0.25	14,212	14,212	14,212	7,106	49,742	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	FAA	East Clam Lake (southern section lost)	2.4	na	0-max	2,074	0.75	0.75	0.75	0.50	1,556	1,556	1,556	1,037	5,704	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	FAA	Clam Lake (south arm)	2.0	3.85	0-2	42,852	0.75	0.75	0.75	0.25	32,139	32,139	32,139	10,713	107,130	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
		Clam Lake (east arm)	3.0	3.85	0-2	6,286	0.50	0.50	0.50	0.50	3,143	3,143	3,143	3,143	13,472	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
					2-max	720	0.00	0.25	0.50	0.50	0	180	360	360					0.00	0.00	0.00	0.00	0	0	0	0	
	FAA	Cote Lake	3.4	2.2	0-2	61,045	0.75	0.75	0.75	0.50	45,784	45,784	45,784	30,523	321,911	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
					2-max	88,021	0.00	0.50	0.50	0.75	0	44,011	44,011	66,016					0.00	0.00	0.00	0.00	0	0	0	0	
	FAA	North Beaver Pond	~0.5	na	0-max	9,409	0.00	0.25	0.00	0.00	0	2,352	0	0	2,352	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	Schedule 2	Upper Three Duck Lake (western arm lost)	4.1	2.9	0-2	79,309	0.75	0.75	0.75	0.50	59,482	59,482	59,482	39,655	424,264	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
					2-max	103,082	0.00	0.50	0.75	0.75	0	51,541	77,312	77,312					0.00	0.00	0.00	0.00	0	0	0	0	
Bagsverd Creek realignment	FAA	Unnamed Lake #2 (increase in water level)	15.9	1.7	0-2	180,175	0.25	0.50	0.50	0.50	45,044	90,088	90,088	90,088	612,318	16.2	0-2	176,474	0.50	0.50	0.50	0.50	88,237	88,237	88,237	88,237	660,307
					2-4	115,114	0.00	0.25	0.50	0.75	0	28,779	57,557	86,336			2-4	108,512	0.00	0.25	0.50	0.75	0	27,128	54,256	81,384	
					4-max	165,788	0.00	0.00	0.25	0.50	0	0	41,447	82,894			4-max	192,788	0.00	0.00	0.25	0.50	0	0	48,197	96,394	
	FAA	Permanent Pond	5	na	0-max	39,645	0.25	0.25	0.25	0.75	9,911	9,911	9,911	29,734	59,468	7	0-max	54,662	0.25	0.25	0.25	0.75	13,666	13,666	13,666	40,997	81,993
Mollie River realignment	FAA	Chester Lake (increase in water level)	2.9	1.7	0-2	748,512	0.50	0.50	0.50	0.50	374,256	374,256	374,256	374,256	1,721,020	3.2	0-2	772,355	0.50	0.50	0.50	0.50	386,178	386,178	386,178	386,178	1,908,400
					2-max	223,996	0.00	0.25	0.25	0.50	0	55,999	55,999	111,998			2-max	363,690	0.00	0.25	0.25	0.50	0	90,923	90,923	181,845	
	FAA	East Clam Lake (northern section, lowered water level)	3.0	na	0-2	10,237	0.50	0.50	0.50	0.50	5,119	5,119	5,119	5,119	25,847	2.2	0-2	10,473	0.25	0.25	0.50	0.50	2,618	2,618	5,237	5,237	16,357
					2-max	5,373	0.00	0.25	0.25	0.50	0	1,343	1,343	2,687			2-max	647	0.00	0.25	0.25	0.50	0	162	162	324	
	FAA	Clam Lake (main body, lowered water level)	9.0	3.85	0-2	142,711	0.25	0.25	0.25	0.50	35,678	35,678	35,678	71,356	691,156	8.2	0-2	153,059	0.25	0.25	0.25	0.50	38,265	38,265	38,265	76,530	624,340
					2-8	410,214	0.00	0.25	0.25	0.75	0	102,554	102,554	307,661			2-max	346,413	0.00	0.25	0.25	0.75	0	86,603	86,603	259,810	
					8-max	4,706	0.00	0.00	0.00	0.00	0	0	0	0			-	0	-	-	-	-	-	-	-	-	
	FAA	Little Clam Lake (lowered water level)	5.6	3.5	0-2	32,663	0.50	0.50	0.50	0.50	16,332	16,332	16,332	16,332	95,492	3.2	0-2	17,585	0.50	0.25	0.25	0.50	8,793	4,396	4,396	8,793	27,844
					2-max	24,133	0.00	0.25	0.50	0.50	0	6,033	12,067	12,067			2-max	1,955	0.00	0.00	0.25	0.50	0	0	489	978	
	FAA	Bagsverd Lake South Arm (disconnection from wateshed, increase in size)	4.8	2.9	0-2	237,385	0.75	0.75	0.75	0.50	178,039	178,039	178,039	118,693	718,791	6.3	0-2	477,070	0.75	0.75	0.75	0.50	357,803	357,803	357,803	238,535	1,475,485
					2-max	37,704	0.00	0.50	0.75	0.50	0	18,852	28,278	18,852			2-max	81,771	0.00	0.50	0.75	0.75	0	40,886	61,328	61,328	
	FAA	Bagsverd Pond (increase in water level)	2.5	na	0-max	37,061	0.50	0.50	0.50	0.50	18,531	18,531	18,531	18,531	74,122	3.0	0-2	44,592	0.50	0.50	0.50	0.50	22,296	22,296	22,296	22,296	89,184
Mine Rock Area	Schedule 2	East Beaver Pond	<2	na	0-max	29,299	0.25	0.25	0.25	0.00	7,325	7,325	7,325	0	21,974	-	0-max	0	0.00	0.00	0.00	0.00	0	0	0	0	0
										TOTAL	846,548	1,203,235	1,312,518	1,582,462	4,944,762							TOTAL	917,854	1,159,159	1,258,034	1,548,863	4,883,909
																						DIFFERENCE	71,306	-44,076	-54,484	-33,600	-60,854

na - not available

Table B.2: Habitat Evaluation Procedure results and accounting for yellow perch in lakes, IAMGOLD Côte Lake.

Location of Impact	FAA / Schedule 2 or Created Compensation?	Lake Area	CURRENT CONFIGURATION				Current Habitat Suitability Index				Current Habitat Units					POST CONSTRUCTION			Post Habitat Suitability Index				Post Habitat Units				
			Max Depth (m)	Max Secchi Depth (m)	Depth Range (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL	Max Depth (m)	Depth Range (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL
Open Pit	FAA	Unnamed Pond	~1.8	na	0-max	28,424	0.50	0.50	0.50	0.25	14,212	14,212	14,212	7,106	49,742	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	FAA	East Clam Lake (southern section lost)	2.4	na	0-max	2,074	0.75	0.75	0.75	0.50	1,556	1,556	1,556	1,037	5,704	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	FAA	Clam Lake (south arm)	2.0	3.85	0-2	42,852	0.75	0.75	0.75	0.50	32,139	32,139	32,139	21,426	117,843	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
		Clam Lake (east arm)	3.0	3.85	0-2	6,286	0.50	0.50	0.50	0.50	3,143	3,143	3,143	3,143	13,652	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
					2-max	720	0.00	0.50	0.50	0.50	0	360	360	360					0.00	0.00	0.00	0.00	0	0	0	0	
	FAA	Cote Lake	3.4	2.2	0-2	61,045	0.75	0.75	0.75	0.50	45,784	45,784	45,784	30,523	343,916	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
					2-max	88,021	0.00	0.50	0.75	0.75	0	44,011	66,016	66,016					0.00	0.00	0.00	0.00	0	0	0	0	
	FAA	North Beaver Pond	~0.5	na	0-max	9,409	0.25	0.25	0.00	0.00	2,352	2,352	0	0	4,705	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	Schedule 2	Upper Three Duck Lake (western arm lost)	4.1	2.9	0-2	79,309	0.75	0.75	0.75	0.50	59,482	59,482	59,482	39,655	450,034	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
					2-max	103,082	0.00	0.75	0.75	0.75	0	77,312	77,312	77,312					0.00	0.00	0.00	0.00	0	0	0	0	
Bagsverd Creek realignment	FAA	Unnamed Lake #2 (increase in water level)	15.9	1.7	0-2	180,175	0.50	0.50	0.50	0.50	90,088	90,088	90,088	90,088	714,919	16.2	0-2	176,474	0.50	0.50	0.50	0.50	88,237	88,237	88,237	88,237	714,563
					2-4	115,114	0.25	0.50	0.50	0.75	28,779	57,557	57,557	86,336			2-4	108,512	0.25	0.50	0.50	0.75	27,128	54,256	54,256	81,384	
					4-max	165,788	0.00	0.00	0.25	0.50	0	0	41,447	82,894			4-max	192,788	0.00	0.00	0.25	0.50	0	0	48,197	96,394	
	FAA	Permanent Pond	5	na	0-max	39,645	0.50	0.50	0.50	0.75	19,823	19,823	19,823	29,734	89,201	7	0-max	54,662	0.50	0.50	0.50	0.75	27,331	27,331	27,331	40,997	122,990
Mollie River realignment	FAA	Chester Lake (increase in water level)	2.9	1.7	0-2	748,512	0.75	0.75	0.75	0.50	561,384	561,384	561,384	374,256	2,562,399	3.2	0-2	772,355	0.75	0.75	0.75	0.50	579,266	579,266	579,266	386,178	2,942,279
					2-max	223,996	0.25	0.75	0.75	0.50	55,999	167,997	167,997	111,998			2-max	363,690	0.25	0.75	0.75	0.50	90,923	272,768	272,768	181,845	
	FAA	East Clam Lake (northern section, lowered water level)	3.0	na	0-2	10,237	0.50	0.75	0.75	0.50	5,119	7,678	7,678	5,119	36,339	2.2	0-2	10,473	0.50	0.50	0.50	0.50	5,237	5,237	5,237	5,237	21,593
					2-max	5,373	0.00	0.75	0.75	0.50	0	4,030	4,030	2,687			2-max	647	0.00	0.25	0.25	0.50	0	162	162	324	
	FAA	Clam Lake (main body, lowered water level)	9.0	3.85	0-2	142,711	0.50	0.50	0.50	0.50	71,356	71,356	71,356	71,356	1,003,297	8.2	0-2	153,059	0.50	0.50	0.50	0.50	76,530	76,530	76,530	76,530	912,341
					2-8	410,214	0.00	0.50	0.50	0.75	0	205,107	205,107	307,661			2-max	346,413	0.00	0.50	0.50	0.75	0	173,207	173,207	259,810	
					8-max	4,706	0.00	0.00	0.00	0.00	0	0	0	0			-	0					-	-	-	-	
	FAA	Little Clam Lake (lowered water level)	5.6	3.5	0-2	32,663	0.50	0.50	0.50	0.50	16,332	16,332	16,332	16,332	101,526	3.2	0-2	17,585	0.50	0.50	0.50	0.50	8,793	8,793	8,793	8,793	37,614
					2-max	24,133	0.00	0.50	0.50	0.50	0	12,067	12,067	12,067			2-max	1,955	0.00	0.25	0.50	0.50	0	489	978	978	
	FAA	Bagsverd Lake South Arm (disconnection from wateshed, increase in size)	4.8	2.9	0-2	237,385	0.75	0.75	0.75	0.50	178,039	178,039	178,039	118,693	728,217	6.3	0-2	477,070	0.75	0.75	0.75	0.50	357,803	357,803	357,803	238,535	1,495,927
					2-max	37,704	0.00	0.75	0.75	0.50	0	28,278	28,278	18,852			2-max	81,771	0.00	0.75	0.75	0.75	0	61,328	61,328	61,328	
	FAA	Bagsverd Pond (increase in water level)	2.5	na	0-max	37,061	0.50	0.75	0.75	0.50	18,531	27,796	27,796	18,531	92,653	3.0	0-2	44,592	0.50	0.75	0.75	0.50	22,296	33,444	33,444	22,296	111,480
Mine Rock Area	Schedule 2	East Beaver Pond	<2	na	0-max	29,299	0.25	0.50	0.50	0.25	7,325	14,650	14,650	7,325	43,949	-	0-max	0	0.00	0.00	0.00	0.00	0	0	0	0	0
										TOTAL	1,211,438	1,742,527	1,803,627	1,600,500	6,358,093							TOTAL	1,283,542	1,738,848	1,787,534	1,548,863	6,358,786
																						DIFFERENCE	72,104	-3,679	-16,094	-51,637	694

na - not available

Table B.3: Habitat Evaluation Procedure results and accounting for walleye in lakes, IAMGOLD Côte Lake.

Location of Impact	FAA / Schedule 2 or Created Compensation?	Lake Area	CURRENT CONFIGURATION				Current Habitat Suitability Index				Current Habitat Units					POST CONSTRUCTION			Post Habitat Suitability Index				Post Habitat Units				
			Max Depth (m)	Max Secchi Depth (m)	Depth Range (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL	Max Depth (m)	Depth Range (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL
Open Pit	FAA	Unnamed Pond	~1.8	na	0-max	28,424	0.00	0.00	0.00	0.00	0	0	0	0	0	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	FAA	East Clam Lake (southern section lost)	2.4	na	0-max	2,074	0.00	0.50	0.25	0.00	0	1,037	519	0	1,556	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	FAA	Clam Lake (south arm)	2.0	3.85	0-2	42,852	0.00	0.25	0.25	0.00	0	10,713	10,713	0	21,426	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
		Clam Lake (east arm)	3.0	3.85	0-2	6,286	0.00	0.25	0.25	0.00	0	1,572	1,572	0	3,683	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
					2-max	720	0.00	0.25	0.25	0.25	0	180	180	180					0.00	0.00	0.00	0.00	0	0	0	0	
	FAA	Cote Lake	3.4	2.2	0-2	61,045	0.00	0.50	0.25	0.00	0	30,523	15,261	0	177,815	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
					2-max	88,021	0.00	0.50	0.50	0.50	0	44,011	44,011	44,011					0.00	0.00	0.00	0.00	0	0	0	0	
	FAA	North Beaver Pond	~0.5	na	0-max	9,409	0.00	0.00	0.00	0.00	0	0	0	0	0	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	Schedule 2	Upper Three Duck Lake (western arm lost)	4.1	2.9	0-2	79,309	0.00	0.50	0.25	0.00	0	39,655	19,827	0	214,105	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
					2-max	103,082	0.00	0.50	0.50	0.50	0	51,541	51,541	51,541					0.00	0.00	0.00	0.00	0	0	0	0	
Bagsverd Creek realignment	FAA	Unnamed Lake #2 (increase in water level)	15.9	1.7	0-2	180,175	0.25	0.50	0.25	0.00	45,044	90,088	45,044	0	630,307	16.2	0-2	176,474	0.25	0.50	0.25	0.00	44,119	88,237	44,119	0	655,552
					2-4	115,114	0.00	0.50	0.50	0.75	0	57,557	57,557	86,336			2-4	108,512	0.00	0.50	0.50	0.75	0	54,256	54,256	81,384	
					4-max	165,788	0.00	0.25	0.50	0.75	0	41,447	82,894	124,341			4-max	192,788	0.00	0.25	0.50	0.75	0	48,197	96,394	144,591	
	FAA	Permanent Pond	5	na	0-max	39,645	0.00	0.00	0.00	0.25	0	0	0	9,911	9,911	7	0-max	54,662	0.00	0.00	0.00	0.25	0	0	0	13,666	13,666
Mollie River realignment	FAA	Chester Lake (increase in water level)	2.9	1.7	0-2	748,512	0.25	0.25	0.25	0.00	187,128	187,128	187,128	0	729,381	3.2	0-2	772,355	0.25	0.25	0.25	0.00	193,089	193,089	193,089	0	852,034
					2-max	223,996	0.00	0.25	0.25	0.25	0	55,999	55,999	55,999			2-max	363,690	0.00	0.25	0.25	0.25	0	90,923	90,923	90,923	
	FAA	East Clam Lake (northern section, lowered water level)	3.0	na	0-2	10,237	0.00	0.25	0.25	0.00	0	2,559	2,559	0	9,148	2.2	0-2	10,473	0.00	0.25	0.25	0.00	0	2,618	2,618	0	5,560
					2-max	5,373	0.00	0.25	0.25	0.25	0	1,343	1,343	1,343			2-max	647	0.00	0.25	0.25	0.00	0	162	162	0	
	FAA	Clam Lake (main body, lowered water level)	9.0	3.85	0-2	142,711	0.25	0.25	0.25	0.00	35,678	35,678	35,678	0	722,354	8.2	0-2	153,059	0.25	0.50	0.25	0.00	38,265	76,530	38,265	0	672,679
					2-8	410,214	0.00	0.25	0.50	0.75	0	102,554	205,107	307,661			2-max	346,413	0.00	0.25	0.50	0.75	0	86,603	173,207	259,810	
					8-max	4,706	0.00	0.00	0.00	0.00	0	0	0	0			-	0					-	-	-	-	
	FAA	Little Clam Lake (lowered water level)	5.6	3.5	0-2	32,663	0.00	0.25	0.25	0.00	0	8,166	8,166	0	40,465	3.2	0-2	17,585	0.00	0.25	0.25	0.00	0	4,396	4,396	0	10,259
					2-max	24,133	0.00	0.25	0.25	0.50	0	6,033	6,033	12,067			2-max	1,955	0.00	0.25	0.25	0.25	0	489	489	489	
	FAA	Bagsverd Lake South Arm (disconnection from wateshed, increase in size)	4.8	2.9	0-2	237,385	0.00	0.50	0.25	0.00	0	118,693	59,346	0	234,595	6.3	0-2	477,070	0.00	0.50	0.25	0.00	0	238,535	119,268	0	500,902
					2-max	37,704	0.00	0.50	0.50	0.50	0	18,852	18,852	18,852			2-max	81,771	0.00	0.50	0.50	0.75	0	40,886	40,886	61,328	
	FAA	Bagsverd Pond (increase in water level)	2.5	na	0-max	37,061	0.00	0.25	0.25	0.00	0	9,265	9,265	0	18,531	3.0	0-2	44,592	0.00	0.25	0.25	0.00	0	11,148	11,148	0	22,296
Mine Rock Area	Schedule 2	East Beaver Pond	<2	na	0-max	29,299	0.00	0.00	0.00	0.00	0	0	0	0	0	-	0-max	0	0.00	0.00	0.00	0.00	0	0	0	0	0
										TOTAL	267,850	914,591	918,595	712,241	2,813,276							TOTAL	275,472	936,068	869,217	652,190	2,732,946
																						DIFFERENCE	7,623	21,477	-49,378	-60,051	-80,329

na - not available

Table B.4: Habitat Evaluation Procedure results and accounting for lake whitefish in lakes, IAMGOLD Côte Lake.

Location of Impact	FAA / Schedule 2 or Created Compensation?	Lake Area	CURRENT CONFIGURATION				Current Habitat Suitability Index				Current Habitat Units					POST CONSTRUCTION			Post Habitat Suitability Index				Post Habitat Units				
			Max Depth (m)	Max Secchi Depth (m)	Depth Range (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL	Max Depth (m)	Depth Range (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL
Open Pit	FAA	Unnamed Pond	~1.8	na	0-max	28,424	0.00	0.00	0.00	0.00	0	0	0	0	0	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	FAA	East Clam Lake (southern section lost)	2.4	na	0-max	2,074	0.00	0.25	0.00	0.00	0	519	0	0	519	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	FAA	Clam Lake (south arm)	2.0	3.85	0-2	42,852	0.00	0.25	0.00	0.00	0	10,713	0	0	10,713	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
		Clam Lake (east arm)	3.0	3.85	0-2	6,286	0.00	0.25	0.00	0.00	0	1,572	0	0	2,112	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
					2-max	720	0.00	0.25	0.25	0.25	0	180	180	180					0.00	0.00	0.00	0.00	0	0	0	0	
	FAA	Cote Lake	3.4	2.2	0-2	61,045	0.00	0.25	0.25	0.00	0	15,261	15,261	0	96,538	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
					2-max	88,021	0.00	0.25	0.25	0.25	0	22,005	22,005	22,005					0.00	0.00	0.00	0.00	0	0	0	0	
	FAA	North Beaver Pond	~0.5	na	0-max	9,409	0.00	0.00	0.00	0.00	0	0	0	0	0	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	Schedule 2	Upper Three Duck Lake (western arm lost)	4.1	2.9	0-2	79,309	0.00	0.25	0.25	0.00	0	19,827	19,827	0	116,966	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
					2-max	103,082	0.00	0.25	0.25	0.25	0	25,771	25,771	25,771					0.00	0.00	0.00	0.00	0	0	0	0	
Bagsverd Creek realignment	FAA	Unnamed Lake #2 (increase in water level)	15.9	1.7	0-2	180,175	0.50	0.50	0.25	0.00	90,088	90,088	45,044	0	828,470	16.2	0-2	176,474	0.50	0.50	0.25	0.00	88,237	88,237	44,119	0	871,390
					2-4	115,114	0.50	0.50	0.50	0.50	57,557	57,557	57,557	57,557			2-4	108,512	0.50	0.50	0.50	0.50	54,256	54,256	54,256	54,256	
					4-max	165,788	0.25	0.50	0.75	0.75	41,447	82,894	124,341	124,341			4-max	192,788	0.25	0.50	0.75	0.75	48,197	96,394	144,591	144,591	
	FAA	Permanent Pond	5	na	0-max	39,645	0.00	0.25	0.25	0.25	0	9,911	9,911	9,911	29,734	7	0-max	54,662	0.00	0.25	0.25	0.25	0	13,666	13,666	13,666	40,997
Mollie River realignment	FAA	Chester Lake (increase in water level)	2.9	1.7	0-2	748,512	0.50	0.50	0.25	0.00	374,256	374,256	187,128	0	1,215,635	3.2	0-2	772,355	0.50	0.50	0.25	0.00	386,178	386,178	193,089	0	1,601,901
					2-max	223,996	0.25	0.50	0.25	0.25	55,999	111,998	55,999	55,999			2-max	363,690	0.50	0.50	0.50	0.25	181,845	181,845	181,845	90,923	
	FAA	East Clam Lake (northern section, lowered water level)	3.0	na	0-2	10,237	0.00	0.25	0.25	0.00	0	2,559	2,559	0	7,805	2.2	0-2	10,473	0.00	0.25	0.25	0.00	0	2,618	2,618	0	5,560
					2-max	5,373	0.00	0.25	0.25	0.00	0	1,343	1,343	0			2-max	647	0.00	0.25	0.25	0.00	0	162	162	0	
	FAA	Clam Lake (main body, lowered water level)	9.0	3.85	0-2	142,711	0.50	0.25	0.25	0.00	71,356	35,678	35,678	0	963,139	8.2	0-2	153,059	0.25	0.25	0.25	0.00	38,265	38,265	38,265	0	807,620
					2-8	410,214	0.25	0.50	0.50	0.75	102,554	205,107	205,107	307,661			2-max	346,413	0.25	0.50	0.50	0.75	86,603	173,207	173,207	259,810	
					8-max	4,706	0.00	0.00	0.00	0.00	0	0	0	0			-	0					-	-	-	-	
	FAA	Little Clam Lake (lowered water level)	5.6	3.5	0-2	32,663	0.25	0.25	0.25	0.00	8,166	8,166	8,166	0	48,630	3.2	0-2	17,585	0.00	0.25	0.25	0.00	0	4,396	4,396	0	10,259
					2-max	24,133	0.00	0.25	0.25	0.50	0	6,033	6,033	12,067			2-max	1,955	0.00	0.25	0.25	0.25	0	489	489	489	
	FAA	Bagsverd Lake South Arm (disconnection from wateshed, increase in size)	4.8	2.9	0-2	237,385	0.00	0.25	0.25	0.00	0	59,346	59,346	0	156,397	6.3	0-2	477,070	0.00	0.25	0.25	0.00	0	119,268	119,268	0	340,749
					2-max	37,704	0.00	0.25	0.25	0.50	0	9,426	9,426	18,852			2-max	81,771	0.00	0.25	0.25	0.75	0	20,443	20,443	61,328	
	FAA	Bagsverd Pond (increase in water level)	2.5	na	0-max	37,061	0.00	0.25	0.25	0.00	0	9,265	9,265	0	18,531	3.0	0-2	44,592	0.00	0.25	0.25	0.00	0	11,148	11,148	0	22,296
Mine Rock Area	Schedule 2	East Beaver Pond	<2	na	0-max	29,299	0.00	0.00	0.00	0.00	0	0	0	0	0	-	0-max	0	0.00	0.00	0.00	0.00	0	0	0	0	0
										TOTAL	**801,421**	**1,159,475**	**899,948**	**634,343**	**3,495,187**							**TOTAL**	**883,581**	**1,190,570**	**1,001,559**	**625,062**	**3,700,771**
																						DIFFERENCE	**82,159**	**31,095**	**101,611**	**-9,281**	**205,584**

na - not available

Table B.5: Habitat Evaluation Procedure results and accounting for smallmouth bass in lakes, IAMGOLD Côte Lake.

Location of Impact	FAA / Schedule 2 or Created Compensation?	Lake Area	CURRENT CONFIGURATION				Current Habitat Suitability Index				Current Habitat Units					POST CONSTRUCTION			Post Habitat Suitability Index				Post Habitat Units				
			Max Depth (m)	Max Secchi Depth (m)	Depth Range (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL	Max Depth (m)	Depth Range (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL
Open Pit/ Low Grade Ore Stockpile	FAA	Unnamed Pond	~1.8	na	0-max	28,424	0.00	0.00	0.00	0.00	0	0	0	0	0	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	FAA	East Clam Lake (southern section lost)	2.4	na	0-max	2,074	0.25	0.25	0.25	0.00	519	519	519	0	1,556	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	FAA	Clam Lake (south arm)	2.0	3.85	0-2	42,852	0.25	0.50	0.25	0.00	10,713	21,426	10,713	0	42,852	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
		Clam Lake (east arm)	3.0	3.85	0-2	6,286	0.00	0.25	0.25	0.00	0	1,572	1,572	0	3,683	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
					2-max	720	0.00	0.25	0.25	0.25	0	180	180	180					0.00	0.00	0.00	0.00	0	0	0	0	
	FAA	Cote Lake	3.4	2.2	0-2	61,045	0.25	0.25	0.25	0.00	15,261	15,261	15,261	0	111,800	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
					2-max	88,021	0.00	0.25	0.25	0.25	0	22,005	22,005	22,005					0.00	0.00	0.00	0.00	0	0	0	0	
	FAA	North Beaver Pond	~0.5	na	0-max	9,409	0.00	0.00	0.00	0.00	0	0	0	0	0	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	Schedule 2	Upper Three Duck Lake (western arm lost)	4.1	2.9	0-2	79,309	0.25	0.25	0.25	0.00	19,827	19,827	19,827	0	162,564	-	-	0	0.00	0.00	0.00	0.00	0	0	0	0	0
					2-max	103,082	0.00	0.25	0.50	0.25	0	25,771	51,541	25,771					0.00	0.00	0.00	0.00	0	0	0	0	
Bagsverd Creek realignment	FAA	Unnamed Lake #2 (increase in water level)	15.9	1.7	0-2	180,175	0.50	0.50	0.50	0.00	90,088	90,088	90,088	0	608,722	16.2	0-2	176,474	0.50	0.50	0.50	0.00	88,237	88,237	88,237	0	620,267
					2-4	115,114	0.25	0.25	0.50	0.50	28,779	28,779	57,557	57,557			2-4	108,512	0.25	0.25	0.50	0.50	27,128	27,128	54,256	54,256	
					4-max	165,788	0.00	0.00	0.25	0.75	0	0	41,447	124,341			4-max	192,788	0.00	0.00	0.25	0.75	0	0	48,197	144,591	
	FAA	Permanent Pond	5	na	0-max	39,645	0.25	0.25	0.25	0.25	9,911	9,911	9,911	9,911	39,645	7	0-max	54,662	0.25	0.25	0.25	0.25	13,666	13,666	13,666	13,666	54,662
Mollie River realignment	FAA	Chester Lake (increase in water level)	2.9	1.7	0-2	748,512	0.25	0.50	0.50	0.00	187,128	374,256	374,256	0	1,215,635	3.2	0-2	772,355	0.50	0.50	0.50	0.00	386,178	386,178	386,178	0	1,613,145
					2-max	223,996	0.25	0.25	0.50	0.25	55,999	55,999	111,998	55,999			2-max	363,690	0.25	0.25	0.50	0.25	90,923	90,923	181,845	90,923	
	FAA	East Clam Lake (northern section, lowered water level)	3.0	na	0-2	10,237	0.25	0.25	0.25	0.00	2,559	2,559	2,559	0	13,051	2.2	0-2	10,473	0.25	0.25	0.25	0.00	2,618	2,618	2,618	0	8,178
					2-max	5,373	0.25	0.25	0.25	0.25	1,343	1,343	1,343	1,343			2-max	647	0.00	0.25	0.25	0.00	0	162	162	0	
	FAA	Clam Lake (main body, lowered water level)	9.0	3.85	0-2	142,711	0.50	0.75	0.75	0.00	71,356	107,033	107,033	0	1,105,850	8.2	0-2	153,059	0.25	0.50	0.50	0.00	38,265	76,530	76,530	0	797,547
					2-8	410,214	0.25	0.50	0.50	0.75	102,554	205,107	205,107	307,661			2-max	346,413	0.00	0.50	0.50	0.75	0	173,207	173,207	259,810	
					8-max	4,706	0.00	0.00	0.00	0.00	0	0	0	0			-	0					-	-	-	-	
	FAA	Little Clam Lake (lowered water level)	5.6	3.5	0-2	32,663	0.50	0.50	0.50	0.00	16,332	16,332	16,332	0	79,161	3.2	0-2	17,585	0.25	0.25	0.00	0.00	4,396	4,396	0	0	10,259
					2-max	24,133	0.00	0.25	0.50	0.50	0	6,033	12,067	12,067			2-max	1,955	0.00	0.25	0.25	0.25	0	489	489	489	
	FAA	Bagsverd Lake South Arm (disconnection from wateshed, increase in size)	4.8	2.9	0-2	237,385	0.00	0.25	0.25	0.00	0	59,346	59,346	0	156,397	6.3	0-2	477,070	0.00	0.25	0.25	0.00	0	119,268	119,268	0	340,749
					2-max	37,704	0.00	0.25	0.25	0.50	0	9,426	9,426	18,852			2-max	81,771	0.00	0.25	0.25	0.75	0	20,443	20,443	61,328	
	FAA	Bagsverd Pond (increase in water level)	2.5	na	0-max	37,061	0.25	0.25	0.25	0.00	9,265	9,265	9,265	0	27,796	3.0	0-2	44,592	0.25	0.25	0.25	0.00	11,148	11,148	11,148	0	33,444
Mine Rock Area	Schedule 2	East Beaver Pond	<2	na	0-max	29,299	0.00	0.00	0.00	0.00	0	0	0	0	0	-	0-max	0	0.00	0.00	0.00	0.00	0	0	0	0	0
										TOTAL	621,633	1,082,038	1,229,353	635,686	3,568,709							TOTAL	662,558	1,014,390	1,176,241	625,062	3,478,250
																						DIFFERENCE	40,925	-67,648	-53,112	-10,625	-90,459

na - not available

Table B.6: Summary of Habitat Evaluation Procedure results for lake habitat, IAMGOLD Côte Lake. All values represent habitat units.

Species		Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL
Habitat Units Lost	Northern pike	846,548	1,203,235	1,312,518	1,582,462	4,944,762
	Yellow perch	1,211,438	1,742,527	1,803,627	1,600,500	6,358,093
	Walleye	267,850	914,591	918,595	712,241	2,813,276
	Lake whitefish	801,421	1,159,475	899,948	634,343	3,495,187
	Smallmouth bass	621,633	1,082,038	1,229,353	635,686	3,568,709
Total Habitat Units Lost		3,748,889	6,101,865	6,164,040	5,165,232	21,180,026
		Spawning/ Incubation	**Juvenile Rearing**	**Adult Foraging**	**Over-wintering**	**TOTAL**
Post Habitat Units	Northern pike	917,854	1,159,159	1,258,034	1,548,863	4,883,909
	Yellow perch	1,283,542	1,738,848	1,787,534	1,548,863	6,358,786
	Walleye	275,472	936,068	869,217	652,190	2,732,946
	Lake whitefish	883,581	1,190,570	1,001,559	625,062	3,700,771
	Smallmouth bass	662,558	1,014,390	1,176,241	625,062	3,478,250
Total Habitat Units Gained		4,023,006	6,039,034	6,092,585	5,000,038	21,154,662
		Spawning/ Incubation	**Juvenile Rearing**	**Adult Foraging**	**Over-wintering**	**TOTAL**
Balance	Northern pike	71,306	-44,076	-54,484	-33,600	-60,854
	Yellow perch	72,104	-3,679	-16,094	-51,637	694
	Walleye	7,623	21,477	-49,378	-60,051	-80,329
	Lake whitefish	82,159	31,095	101,611	-9,281	205,584
	Smallmouth bass	40,925	-67,648	-53,112	-10,625	-90,459
	TOTAL	**274,117**	**-62,832**	**-71,456**	**-165,193**	**-25,364**

Table B.7: Habitat Evaluation Procedure results and accounting for northern pike in streams, IAMGOLD Côte Lake.

Location of Impact	FAA / Schedule 2 or Created Compensation?	Identification	CURRENT CONFIGURATION					Current Habitat Suitability Index				Current Habitat Units					POST CONSTRUCTION				Post Habitat Suitability Index				Post Habitat Units				
			Habitat Type[a]	Avg. Channel Width (m)	Avg. Depth (m)	Length (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL	Avg. Channel Width (m)	Avg. Depth (m)	Length (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL
Open Pit	FAA	Mollie River (area lost to pit, does not include MRA)	High-gradient	11.0	0.2	280	3,080	0.00	0.00	0.00	0.00	0	0	0	0	142,538	-		-	0									0
			Low-gradient	20.9	0.7-3	2,480	51,832	0.75	0.75	0.75	0.50	38,874	38,874	38,874	25,916		-		-										
	FAA	Clam Creek (from the Mollie River to East Clam Lake)	Low-gradient	2.25	0.1-3.5	510	1,148	0.50	0.50	0.50	0.25	574	574	574	287	2,008	-		-	0									0
			Intermittent	0.5	<0.4	270	135	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
	FAA	Unnamed stream between Unnamed Pond and Beaver Pond	Intermittent	0.5	<0.5	220	110	0.00	0.00	0.00	0.00	0	0	0	0	407	-		-	0									0
		Stream through old Beaver Pond	Low-gradient	0.99	<0.5	180	178	0.25	0.25	0.00	0.00	45	45	0	0		-		-	0									0
		Unnamed stream between Beaver Pond and Mollie River	Moderate-gradient	2.64	<0.5	180	475	0.00	0.25	0.00	0.00	0	119	0	0		-		-	0									0
			Low-gradient	1.77	~0.5	150	266	0.25	0.25	0.25	0.00	66	66	66	0		-		-	0									0
Mollie River realignment	FAA	Inlet stream to Chester	Low-gradient	1.2	0.3	470	564	0.25	0.25	0.00	0.00	141	141	0	0	282													
	Created Compensation	Realignment Chester to Clam Lake	Low-gradient	-		-	-										20	0.7-3	1,500	30,000	0.75	0.75	0.50	0.50	22,500	22,500	15,000	15,000	169,440
			Low-gradient														50	1.5	500	25,000	0.75	0.75	0.25	0.25	18,750	18,750	6,250	6,250	
			Low-gradient														40	2	404	16,160	0.75	0.75	0.75	0.50	12,120	12,120	12,120	8,080	
	Created Compensation	Realignment Clam Lake to Little Clam Lake	Low-gradient	-		-	-										100	0.7-2	163	16,300	0.75	0.75	0.50	0.50	12,225	12,225	8,150	8,150	40,750
	Created Compensation	Realignment Little Clam to West Beaver Pond	High-gradient	-		-	-										20	0.5	400	8,000	0.50	0.50	0.25	0.25	4,000	4,000	2,000	2,000	22,000
			Low-gradient														20	0.7-3	200	4,000	0.75	0.75	0.50	0.50	3,000	3,000	2,000	2,000	
	FAA	West Beaver Pond stream to Bagsverd South Arm	Low-gradient	7.3	0.75	1,210	8,833	1.00	1.00	0.50	0.25	8,833	8,833	4,417	2,208	24,291													
	FAA	Bagsverd Pond outlet to Bagsverd South Arm	Low-gradient	2.6	0.24	90	234	0.00	0.00	0.00	0.00	0	0	0	0	0													
			Intermittent	0.5	<0.3	160	80	0.00	0.00	0.00	0.00	0	0	0	0														
			Low-gradient	1.9	~0.3	60	114	0.00	0.00	0.00	0.00	0	0	0	0														
	Created Compensation	Realignment Bagsverd to Weeduck	Low-gradient	-		-	-										20	0.7-3	600	12,000	0.75	0.75	0.50	0.50	9,000	9,000	6,000	6,000	42,520
			High-gradient														20	0.5	38	760	0.50	0.50	0.50	0.50	380	380	380	380	
			Low-gradient														40	2	100	4,000	0.75	0.75	0.75	0.50	3,000	3,000	3,000	2,000	
	Created Compensation	Realignment Weeduck to Upper Three Duck Lake	High-gradient	-		-	-										20	0.5	104	2,080	0.50	0.50	0.50	0.50	1,040	1,040	1,040	1,040	4,160
Bagsverd realignment for Tailings Management Facility (TMF) and the polishing pond	Created Compensation	Realignment Bagsverd Lake to Unnamed Lake #2	Low-gradient														8	1.6-1.5	3,000	24,000	0.75	0.75	0.50	0.50	18,000	18,000	12,000	12,000	92,470
			Low-gradient														40	2	227	9,080	0.75	0.75	0.75	0.50	6,810	6,810	6,810	4,540	
			High-gradient	-		-	-										8	0.5	1,250	10,000	0.00	0.00	0.25	0.50	0	0	2,500	5,000	
	FAA	Bagsverd Creek from Bagsverd Lake to Unnamed Lake #1	Moderate-gradient	8	0.2-1.4	80	640	0.75	0.50	0.50	0.25	480	320	320	160	117,426	-		-	0									0
	Schedule 2		Moderate-gradient	16.5	0.2-1.4	60	990	0.75	0.50	0.50	0.25	743	495	495	248		-		-	0									0
			High-gradient	15.4	0.2-1	80	1,232	0.00	0.25	0.00	0.00	0	308	0	0		-		-										
			Moderate-gradient	13.3	0.2-1.4	730	9,709	0.75	0.50	0.50	0.25	7,282	4,855	4,855	2,427		-		-										
			High-gradient	8.1	0.2-1	190	1,539	0.00	0.25	0.00	0.00	0	385	0	0		-		-										
			Moderate-gradient	8.8	0.2-1.4	1,260	11,088	0.75	0.50	0.50	0.25	8,316	5,544	5,544	2,772		-		-										
			High-gradient	8.1	0.2-1	510	4,131	0.00	0.25	0.00	0.00	0	1,033	0	0		-		-										
			Low-gradient	8.1	0.8-1.8	2,560	20,736	1.00	1.00	0.75	0.50	20,736	20,736	15,552	10,368		-		-										
			Low-gradient	4.7	na	420	1,974	0.75	0.50	0.25	0.25	1,481	987	494	494		-		-										
	Schedule 2	Unnamed inlet to Bagsverd Creek	Low-gradient	1.2	0.5	380	456	0.25	0.25	0.00	0.00	114	114	0	0	7,352	-		-	0									0
			Pond/pool	29.2	~2	90	2,628	0.50	0.50	0.25	0.25	1,314	1,314	657	657		-		-										
			Low-gradient	1.2	0.5	140	168	0.25	0.25	0.00	0.00	42	42	0	0		-		-										
			High-gradient	2.5	<0.3	140	350	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			Pond/pool	45.9	~2	90	4,131	0.25	0.25	0.00	0.25	1,033	1,033	0	1,033		-		-										
			Low-gradient	0.5	<0.5	450	225	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
Mine Rock Area (MRA)	Schedule 2	Inlet Unnamed Lake #3	Intermittent	0.5	<0.3	80	40	0.00	0.00	0.00	0.00	0	0	0	0	57	-		-	0									0
			Low-gradient	0.52	<1	220	114	0.25	0.25	0.00	0.00	29	29	0	0		-		-										
	Schedule 2	Mollie River (area lost to MRA only)	High-gradient	20.78	<0.5	200	4,156	0.00	0.00	0.00	0.00	0	0	0	0	38,620	-		-	0									0
			Low-gradient	20.0	0.7-3	470	9,400	1.00	1.00	0.75	0.50	9,400	9,400	7,050	4,700		-		-										
			High-gradient	19.0	<0.5	70	1,330	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			Low-gradient	19.1	0.7-3	130	2,483	1.00	1.00	0.75	0.50	2,483	2,483	1,862	1,242		-		-										
											TOTAL	101,984	97,728	80,759	52,511	332,981								TOTAL	110,825	110,825	77,250	72,440	371,340
																								DIFFERENCE	8,841	13,097	-3,509	19,929	38,359

[a] intermittent channel/or undefined channel was assigned a channel width of 0.5 m

Table B.8: Habitat Evaluation Procedure results and accounting for yellow perch in streams, IAMGOLD Côte Lake.

Location of Impact	FAA / Schedule 2 or Created Compensation?	Identification	CURRENT CONFIGURATION					Current Habitat Suitability Index				Current Habitat Units					POST CONSTRUCTION				Post Habitat Suitability Index				Post Habitat Units				
			Habitat Type[a]	Avg. Channel Width (m)	Avg. Depth (m)	Length (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL	Avg. Channel Width (m)	Avg. Depth (m)	Length (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL
Open Pit	FAA	Mollie River (area lost to pit, does not include MRA)	High-gradient	11.0	0.2	280	3,080	0.00	0.00	0.00	0.00	0	0	0	0	155,496	-		-	0									0
			Low-gradient	20.9	0.7-3	2,480	51,832	1.00	0.75	0.75	0.50	51,832	38,874	38,874	25,916		-		-										
	FAA	Clam Creek (from the Mollie River to East Clam Lake)	Low-gradient	2.25	0.1-3.5	510	1,148	0.50	0.50	0.50	0.25	574	574	574	287	2,008	-		-	0									0
			Intermittent	0.5	<0.4	270	135	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
	FAA	Unnamed stream between Unnamed Pond and Beaver Pond	Intermittent	0.5	<0.5	220	110	0.00	0.25	0.00	0.00	0	28	0	0	479	-		-	0									0
		Stream through old Beaver Pond	Low-gradient	0.99	<0.5	180	178	0.25	0.25	0.25	0.00	45	45	45	0		-		-	0									0
		Unnamed stream between Beaver Pond and Mollie River	Moderate-gradient	2.64	<0.5	180	475	0.00	0.25	0.00	0.00	0	119	0	0		-		-	0									0
			Low-gradient	1.77	0.5	150	266	0.25	0.25	0.25	0.00	66	66	66	0		-		-	0									0
Mollie River realignment	FAA	Inlet stream to Chester	Low-gradient	1.2	0.3	470	564	0.25	0.25	0.25	0.00	141	141	141	0	423													
	Created Compensation	Realignment Chester to Clam Lake	Low-gradient	-		-	-										20	0.7-3	1,500	30,000	0.50	0.50	0.50	0.50	15,000	15,000	15,000	15,000	160,690
			Low-gradient														50	1.5	500	25,000	0.75	0.75	0.50	0.25	18,750	18,750	12,500	6,250	
			Low-gradient														40	2	404	16,160	0.75	0.75	0.75	0.50	12,120	12,120	12,120	8,080	
	Created Compensation	Realignment Clam Lake to Little Clam Lake	Low-gradient	-		-	-										100	0.7-2	163	16,300	0.75	0.75	0.75	0.25	12,225	12,225	12,225	4,075	40,750
	Created Compensation	Realignment Little Clam to West Beaver Pond	High-gradient	-		-	-										20	0.5	400	8,000	0.25	0.25	0.50	0.50	2,000	2,000	4,000	4,000	22,000
			Low-gradient														20	0.7-3	200	4,000	0.75	0.75	0.50	0.50	3,000	3,000	2,000	2,000	
	FAA	West Beaver Pond stream to Bagsverd South Arm	Low-gradient	7.3	0.75	1,210	8,833	0.75	1.00	1.00	0.25	6,625	8,833	8,833	2,208	26,499													
	FAA	Bagsverd Pond outlet to Bagsverd South Arm	Low-gradient	2.6	0.24	90	234	0.00	0.25	0.00	0.00	0	59	0	0	87													
			Intermittent	0.5	<0.3	160	80	0.00	0.00	0.00	0.00	0	0	0	0														
			Low-gradient	1.9	~0.3	60	114	0.00	0.25	0.00	0.00	0	29	0	0														
	Created Compensation	Realignment Bagsverd to Weeduck	Low-gradient	-		-	-										20	0.7-3	600	12,000	0.75	0.75	0.50	0.50	9,000	9,000	6,000	6,000	41,760
			High-gradient														20	0.5	38	760	0.25	0.25	0.25	0.25	190	190	190	190	
			Low-gradient														40	2	100	4,000	0.75	0.75	0.75	0.50	3,000	3,000	3,000	2,000	
	Created Compensation	Realignment Weeduck to Upper Three Duck Lake	High-gradient	-		-	-										20	0.5	104	2,080	0.50	0.50	0.50	0.50	1,040	1,040	1,040	1,040	4,160
Bagsverd realignment for TMF and the polishing pond	Created Compensation	Realignment Bagsverd Lake to Unnamed Lake #2	Low-gradient	-		-	-										8	1.6-1.5	3,000	24,000	0.75	0.75	0.75	0.50	18,000	18,000	18,000	12,000	100,970
			Low-gradient														40	2	227	9,080	0.75	0.75	0.75	0.50	6,810	6,810	6,810	4,540	
			High-gradient														8	0.5	1,250	10,000	0.25	0.25	0.25	0.25	2,500	2,500	2,500	2,500	
	FAA	Bagsverd Creek from Bagsverd Lake to Unnamed Lake #1	Moderate-gradient	8	0.2-1.4	80	640	0.75	0.50	0.25	0.25	480	320	160	160	111,819	-		-	0									0
	Schedule 2		Moderate-gradient	16.5	0.2-1.4	60	990	0.75	0.50	0.25	0.25	743	495	248	248		-		-	0									0
			High-gradient	15.4	0.2-1	80	1,232	0.00	0.25	0.00	0.00	0	308	0	0		-		-										
			Moderate-gradient	13.3	0.2-1.4	730	9,709	0.75	0.50	0.25	0.25	7,282	4,855	2,427	2,427		-		-										
			High-gradient	8.1	0.2-1	190	1,539	0.00	0.25	0.00	0.00	0	385	0	0		-		-										
			Moderate-gradient	8.8	0.2-1.4	1,260	11,088	0.75	0.50	0.25	0.25	8,316	5,544	2,772	2,772		-		-										
			High-gradient	8.1	0.2-1	510	4,131	0.00	0.25	0.00	0.00	0	1,033	0	0		-		-										
			Low-gradient	8.1	0.8-1.8	2,560	20,736	1.00	1.00	0.75	0.50	20,736	20,736	15,552	10,368		-		-										
			Low-gradient	4.7	na	420	1,974	0.75	0.50	0.50	0.00	1,481	987	987	0		-		-										
	Schedule 2	Unnamed inlet to Bagsverd Creek	Low-gradient	1.2	0.5	380	456	0.00	0.25	0.25	0.00	0	114	114	0	15,576	-		-	0									0
			Pond/pool	29.2	~2	90	2,628	0.75	0.50	0.50	0.50	1,971	1,314	1,314	1,314		-		-										
			Low-gradient	1.2	0.5	140	168	0.00	0.25	0.25	0.00	0	42	42	0		-		-										
			High-gradient	2.5	<0.3	140	350	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			Pond/pool	45.9	~2	90	4,131	0.75	0.50	0.50	0.50	3,098	2,066	2,066	2,066		-		-										
			Low-gradient	0.5	<0.5	450	225	0.00	0.25	0.00	0.00	0	56	0	0		-		-										
Mine Rock Area	Schedule 2	Inlet Unnamed Lake #3	Intermittent	0.5	<0.3	80	40	0.00	0.00	0.00	0.00	0	0	0	0	86	-		-	0									0
			Low-gradient	0.52	<1	220	114	0.25	0.25	0.25	0.00	29	29	29	0		-		-										
	Schedule 2	Mollie River (area lost to MRA only)	High-gradient	20.78	<0.5	200	4,156	0.00	0.00	0.00	0.00	0	0	0	0	29,708	-		-	0									0
			Low-gradient	20.0	0.7-3	470	9,400	0.75	0.75	0.50	0.50	7,050	7,050	4,700	4,700		-		-										
			High-gradient	19.0	<0.5	70	1,330	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			Low-gradient	19.1	0.7-3	130	2,483	0.75	0.75	0.50	0.50	1,862	1,862	1,242	1,242		-		-										
											TOTAL	**112,329**	**95,961**	**80,184**	**53,707**	**342,181**								**TOTAL**	**103,635**	**103,635**	**95,385**	**67,675**	**370,330**
																								DIFFERENCE	**-8,694**	**7,674**	**15,201**	**13,968**	**28,149**

[a] intermittent channel/or undefined channel was assigned a channel width of 0.5 m

Table B.9: Habitat Evaluation Procedure results and accounting for walleye in streams, IAMGOLD Côte Lake.

Location of Impact	FAA / Schedule 2 or Created Compensation?	Identification	CURRENT CONFIGURATION					Current Habitat Suitability Index				Current Habitat Units					POST CONSTRUCTION				Post Habitat Suitability Index				Post Habitat Units				
			Habitat Type[a]	Avg. Channel Width (m)	Avg. Depth (m)	Length (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL	Avg. Channel Width (m)	Avg. Depth (m)	Length (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL
Open Pit	FAA	Mollie River (area lost to pit, does not include MRA)	High-gradient	11.0	0.2	280	3,080	0.50	0.00	0.00	0.00	1,540	0	0	0	27,456	-		-	0									0
			Low-gradient	20.9	0.7-3	2,480	51,832	0.00	0.25	0.00	0.25	0	12,958	0	12,958		-		-										
	FAA	Clam Creek (from the Mollie River to East Clam Lake)	Low-gradient	2.25	0.1-3.5	510	1,148	0.00	0.00	0.00	0.00	0	0	0	0	0	-		-	0									0
			Intermittent	0.5	<0.4	270	135	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
	FAA	Unnamed stream between Unnamed Pond and Beaver Pond	Intermittent	0.5	<0.5	220	110	0.00	0.00	0.00	0.00	0	0	0	0	0	-		-	0									0
		Stream through old Beaver Pond	Low-gradient	0.99	<0.5	180	178	0.00	0.00	0.00	0.00	0	0	0	0		-		-	0									0
		Unnamed stream between Beaver Pond and Mollie River	Moderate-gradient	2.64	<0.5	180	475	0.00	0.00	0.00	0.00	0	0	0	0		-		-	0									0
			Low-gradient	1.77	0.5	150	266	0.00	0.00	0.00	0.00	0	0	0	0		-		-	0									0
Mollie River realignment	FAA	Inlet stream to Chester	Low-gradient	1.2	0.3	470	564	0.00	0.00	0.00	0.00	0	0	0	0	0													
	Created Compensation	Realignment Chester to Clam Lake	Low-gradient	-		-	-										20	0.7-3	1,500	30,000	0.00	0.25	0.25	0.00	0	7,500	7,500	0	35,580
			Low-gradient														50	1.5	500	25,000	0.00	0.25	0.25	0.00	0	6,250	6,250	0	
			Low-gradient														40	2	404	16,160	0.00	0.25	0.25	0.00	0	4,040	4,040	0	
	Created Compensation	Realignment Clam Lake to Little Clam Lake	Low-gradient	-		-	-										100	0.7-2	163	16,300	0.00	0.25	0.25	0.00	0	4,075	4,075	0	8,150
	Created Compensation	Realignment Little Clam to West Beaver Pond	High-gradient	-		-	-										20	0.5	400	8,000	0.50	0.25	0.00	0.00	4,000	2,000	0	0	9,000
			Low-gradient														20	0.7-3	200	4,000	0.00	0.50	0.25	0.00	0	2,000	1,000	0	
	FAA	West Beaver Pond stream to Bagsverd South Arm	Low-gradient	7.3	0.75	1,210	8,833	0.00	0.25	0.00	0.00	0	2,208	0	0	2,208													
	FAA	Bagsverd Pond outlet to Bagsverd South Arm	Low-gradient	2.6	0.24	90	234	0.00	0.00	0.00	0.00	0	0	0	0	0													
			Intermittent	0.5	<0.3	160	80	0.00	0.00	0.00	0.00	0	0	0	0														
			Low-gradient	1.9	~0.3	60	114	0.00	0.00	0.00	0.00	0	0	0	0														
	Created Compensation	Realignment Bagsverd to Weeduck	Low-gradient	-		-	-										20	0.7-3	600	12,000	0.00	0.25	0.00	0.00	0	3,000	0	0	8,950
			High-gradient														20	0.5	38	760	1.00	0.00	0.25	0.00	760	0	190	0	
			Low-gradient														40	2	100	4,000	0.00	0.75	0.50	0.00	0	3,000	2,000	0	
	Created Compensation	Realignment Weeduck to Upper Three Duck Lake	High-gradient	-		-	-										20	0.5	104	2,080	1.00	0.25	0.50	0.00	2,080	520	1,040	0	3,640
Bagsverd realignment for TMF and the polishing pond	Created Compensation	Realignment Bagsverd Lake to Unnamed Lake #2	Low-gradient	-		-	-										8	1.6-1.5	3,000	24,000	0.00	0.25	0.25	0.00	0	6,000	6,000	0	35,850
			Low-gradient														40	2	227	9,080	0.00	0.75	0.50	0.00	0	6,810	4,540	0	
			High-gradient														8	0.5	1,250	10,000	0.75	0.25	0.25	0.00	7,500	2,500	2,500	0	
	FAA	Bagsverd Creek from Bagsverd Lake to Unnamed Lake #1	Moderate-gradient	8	0.2-1.4	80	640	0.00	0.00	0.00	0.00	0	0	0	0	8,635	-		-	0									0
	Schedule 2		Moderate-gradient	16.5	0.2-1.4	60	990	0.00	0.00	0.00	0.00	0	0	0	0		-		-	0									0
			High-gradient	15.4	0.2-1	80	1,232	0.50	0.00	0.00	0.00	616	0	0	0		-		-										
			Moderate-gradient	13.3	0.2-1.4	730	9,709	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			High-gradient	8.1	0.2-1	190	1,539	0.50	0.00	0.00	0.00	770	0	0	0		-		-										
			Moderate-gradient	8.8	0.2-1.4	1,260	11,088	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			High-gradient	8.1	0.2-1	510	4,131	0.50	0.00	0.00	0.00	2,066	0	0	0		-		-										
			Low-gradient	8.1	0.8-1.8	2,560	20,736	0.00	0.25	0.00	0.00	0	5,184	0	0		-		-										
			Low-gradient	4.7	na	420	1,974	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
	Schedule 2	Unnamed inlet to Bagsverd Creek	Low-gradient	1.2	0.5	380	456	0.00	0.00	0.00	0.00	0	0	0	0	0	-		-	0									0
			Pond/pool	29.2	~2	90	2,628	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			Low-gradient	1.2	0.5	140	168	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			High-gradient	2.5	<0.3	140	350	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			Pond/pool	45.9	~2	90	4,131	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			Low-gradient	0.5	<0.5	450	225	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
Mine Rock Area	Schedule 2	Inlet Unnamed Lake #3	Intermittent	0.5	<0.3	80	40	0.00	0.00	0.00	0.00	0	0	0	0	0	-		-	0									0
			Low-gradient	0.52	<1	220	114	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
	Schedule 2	Mollie River (area lost to MRA only)	High-gradient	20.78	<0.5	200	4,156	0.50	0.00	0.00	0.00	2,078	0	0	0	11,655	-		-	0									0
			Low-gradient	20.0	0.7-3	470	9,400	0.00	0.25	0.25	0.25	0	2,350	2,350	2,350		-		-										
			High-gradient	19.0	<0.5	70	1,330	0.50	0.00	0.00	0.00	665	0	0	0		-		-										
			Low-gradient	19.1	0.7-3	130	2,483	0.00	0.25	0.25	0.25	0	621	621	621		-		-										
											TOTAL	7,734	23,321	2,971	15,929	49,955								TOTAL	14,340	47,695	39,135	0	101,170
																								DIFFERENCE	6,606	24,374	36,164	-15,929	51,216

[a] intermittent channel/or undefined channel was assigned a channel width of 0.5 m

Table B.10: Habitat Evaluation Procedure results and accounting for lake whitefish in streams, IAMGOLD Côte Lake.

Location of Impact	FAA / Schedule 2 or Created Compensation?	Identification	CURRENT CONFIGURATION					Current Habitat Suitability Index				Current Habitat Units					POST CONSTRUCTION				Post Habitat Suitability Index				Post Habitat Units				
			Habitat Type[a]	Avg. Channel Width (m)	Avg. Depth (m)	Length (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL	Avg. Channel Width (m)	Avg. Depth (m)	Length (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL
Open Pit	FAA	Mollie River (area lost to pit, does not include MRA)	High-gradient	11.0	0.2	280	3,080	0.00	0.00	0.00	0.00	0	0	0	0	25,916	-		-	0									0
			Low-gradient	20.9	0.7-3	2,480	51,832	0.00	0.25	0.00	0.25	0	12,958	0	12,958		-		-										
	FAA	Clam Creek (from the Mollie River to East Clam Lake)	Low-gradient	2.25	0.1-3.5	510	1,148	0.00	0.00	0.00	0.00	0	0	0	0	0	-		-	0									0
			Intermittent	0.5	<0.4	270	135	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
	FAA	Unnamed stream between Unnamed Pond and Beaver Pond	Intermittent	0.5	<0.5	220	110	0.00	0.00	0.00	0.00	0	0	0	0	0	-		-	0									0
		Stream through old Beaver Pond	Low-gradient	0.99	<0.5	180	178	0.00	0.00	0.00	0.00	0	0	0	0		-		-	0									0
		Unnamed stream between Beaver Pond and Mollie River	Moderate-gradient	2.64	<0.5	180	475	0.00	0.00	0.00	0.00	0	0	0	0		-		-	0									0
			Low-gradient	1.77	0.5	150	266	0.00	0.00	0.00	0.00	0	0	0	0		-		-	0									0
Mollie River realignment	FAA	Inlet stream to Chester	Low-gradient	1.2	0.3	470	564	0.00	0.00	0.00	0.00	0	0	0	0	0													
	Created Compensation	Realignment Chester to Clam Lake	Low-gradient	-		-	-										20	x - 2	1,500	30,000	0.00	0.25	0.00	0.00	0	7,500	0	0	38,370
			Low-gradient														50	1.5	500	25,000	0.00	0.50	0.25	0.00	0	12,500	6,250	0	
			Low-gradient														40	2	404	16,160	0.00	0.50	0.25	0.00	0	8,080	4,040	0	
	Created Compensation	Realignment Clam Lake to Little Clam Lake	Low-gradient	-		-	-										100	0.7-2	163	16,300	0.00	0.25	0.00	0.00	0	4,075	0	0	4,075
	Created Compensation	Realignment Little Clam to West Beaver Pond	High-gradient	-		-	-										20	0.5	400	8,000	0.25	0.00	0.00	0.00	2,000	0	0	0	4,000
			Low-gradient														20	0.7-3	200	4,000	0.00	0.25	0.25	0.00	0	1,000	1,000	0	
	FAA	West Beaver Pond stream to Bagsverd South Arm	Low-gradient	7.3	0.75	1,210	8,833	0.00	0.25	0.00	0.00	0	2,208	0	0	2,208													
	FAA	Bagsverd Pond outlet to Bagsverd South Arm	Low-gradient	2.6	0.24	90	234	0.00	0.00	0.00	0.00	0	0	0	0	0													
			Intermittent	0.5	<0.3	160	80	0.00	0.00	0.00	0.00	0	0	0	0														
			Low-gradient	1.9	~0.3	60	114	0.00	0.00	0.00	0.00	0	0	0	0														
	Created Compensation	Realignment Bagsverd to Weeduck	Low-gradient	-		-	-										20	0.7-3	600	12,000	0.00	0.25	0.00	0.00	0	3,000	0	0	6,190
			High-gradient														20	0.5	38	760	0.25	0.00	0.00	0.00	190	0	0	0	
			Low-gradient														40	2	100	4,000	0.00	0.50	0.25	0.00	0	2,000	1,000	0	
	Created Compensation	Realignment Weeduck to Upper Three Duck Lake	High-gradient	-		-	-										20	0.5	104	2,080	0.25	0.00	0.00	0.00	520	0	0	0	520
Bagsverd realignment for TMF and the polishing pond	Created Compensation	Realignment Bagsverd Lake to Unnamed Lake #2	Low-gradient	-		-	-										8	1.6-1.5	3,000	24,000	0.00	0.25	0.00	0.00	0	6,000	0	0	12,810
			Low-gradient														40	2	227	9,080	0.00	0.50	0.25	0.00	0	4,540	2,270	0	
			High-gradient														8	0.5	1,250	10,000	0.00	0.00	0.00	0.00	0	0	0	0	
	FAA	Bagsverd Creek from Bagsverd Lake to Unnamed Lake #1	Moderate-gradient	8	0.2-1.4	80	640	0.00	0.00	0.00	0.00	0	0	0	0	5,184	-		-	0									0
	Schedule 2		Moderate-gradient	16.5	0.2-1.4	60	990	0.00	0.00	0.00	0.00	0	0	0	0		-		-	0									0
			High-gradient	15.4	0.2-1	80	1,232	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			Moderate-gradient	13.3	0.2-1.4	730	9,709	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			High-gradient	8.1	0.2-1	190	1,539	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			Moderate-gradient	8.8	0.2-1.4	1,260	11,088	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			High-gradient	8.1	0.2-1	510	4,131	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			Low-gradient	8.1	0.8-1.8	2,560	20,736	0.00	0.25	0.00	0.00	0	5,184	0	0		-		-										
			Low-gradient	4.7	na	420	1,974	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
	Schedule 2	Unnamed inlet to Bagsverd Creek	Low-gradient	1.2	0.5	380	456	0.00	0.00	0.00	0.00	0	0	0	0	0	-		-	0									0
			Pond/pool	29.2	~2	90	2,628	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			Low-gradient	1.2	0.5	140	168	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			High-gradient	2.5	<0.3	140	350	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			Pond/pool	45.9	~2	90	4,131	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			Low-gradient	0.5	<0.5	450	225	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
Mine Rock Area	Schedule 2	Inlet Unnamed Lake #3	Intermittent	0.5	<0.3	80	40	0.00	0.00	0.00	0.00	0	0	0	0	0	-		-	0									0
			Low-gradient	0.52	<1	220	114	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
	Schedule 2	Mollie River (area lost to MRA only)	High-gradient	20.78	<0.5	200	4,156	0.00	0.00	0.00	0.00	0	0	0	0	5,942	-		-	0									0
			Low-gradient	20.0	0.7-3	470	9,400	0.00	0.25	0.00	0.25	0	2,350	0	2,350		-		-										
			High-gradient	19.0	<0.5	70	1,330	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			Low-gradient	19.1	0.7-3	130	2,483	0.00	0.25	0.00	0.25	0	621	0	621		-		-										
											TOTAL	0	23,321	0	15,929	39,250								TOTAL	2,710	48,695	14,560	0	65,965
																								DIFFERENCE	2,710	25,374	14,560	-15,929	26,715

[a] intermittent channel/or undefined channel was assigned a channel width of 0.5 m

Table B.11: Habitat Evaluation Procedure results and accounting for smallmouth bass in streams, IAMGOLD Côte Lake.

Location of Impact	FAA / Schedule 2 or Created Compensation?	Identification	CURRENT CONFIGURATION					Current Habitat Suitability Index				Current Habitat Units					POST CONSTRUCTION				Post Habitat Suitability Index				Post Habitat Units				
			Habitat Type[a]	Avg. Channel Width (m)	Avg. Depth (m)	Length (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL	Avg. Channel Width (m)	Avg. Depth (m)	Length (m)	Area (m^2)	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL
Open Pit	FAA	Mollie River (area lost to pit, does not include MRA)	High-gradient	11.0	0.2	280	3,080	0.00	0.00	0.00	0.00	0	0	0	0	51,832	-		-	0									0
			Low-gradient	20.9	0.7-3	2,480	51,832	0.25	0.25	0.25	0.25	12,958	12,958	12,958	12,958		-		-										
	FAA	Clam Creek (from the Mollie River to East Clam Lake)	Low-gradient	2.25	0.1-3.5	510	1,148	0.00	0.25	0.00	0.00	0	287	0	0	287	-		-	0									0
			Intermittent	0.5	<0.4	270	135	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
	FAA	Unnamed stream between Unnamed Pond and Beaver Pond	Intermittent	0.5	<0.5	220	110	0.00	0.00	0.00	0.00	0	0	0	0	0	-		-	0									0
		Stream through old Beaver Pond	Low-gradient	0.99	<0.5	180	178	0.00	0.00	0.00	0.00	0	0	0	0		-		-	0									0
		Unnamed stream between Beaver Pond and Mollie River	Moderate-gradient	2.64	<0.5	180	475	0.00	0.00	0.00	0.00	0	0	0	0		-		-	0									0
			Low-gradient	1.77	0.5	150	266	0.00	0.00	0.00	0.00	0	0	0	0		-		-	0									0
Mollie River realignment	FAA	Inlet stream to Chester	Low-gradient	1.2	0.3	470	564	0.00	0.00	0.00	0.00	0	0	0	0	0													
	Created Compensation	Realignment Chester to Clam Lake	Low-gradient	-		-	-										20	0.7-3	1,500	30,000	0.25	0.25	0.25	0.25	7,500	7,500	7,500	7,500	81,450
			Low-gradient														50	1.5	500	25,000	0.50	0.50	0.25	0.00	12,500	12,500	6,250	0	
			Low-gradient														40	2	404	16,160	0.25	0.50	0.50	0.00	4,040	8,080	8,080	0	
	Created Compensation	Realignment Clam Lake to Little Clam Lake	Low-gradient	-		-	-										100	0.7-2	163	16,300	0.75	0.50	0.50	0.00	12,225	8,150	8,150	0	28,525
	Created Compensation	Realignment Little Clam to West Beaver Pond	High-gradient	-		-	-										20	0.5	400	8,000	0.00	0.25	0.25	0.00	0	2,000	2,000	0	9,000
			Low-gradient														20	0.7-3	200	4,000	0.50	0.50	0.25	0.00	2,000	2,000	1,000	0	
	FAA	West Beaver Pond stream to Bagsverd South Arm	Low-gradient	7.3	0.75	1,210	8,833	0.00	0.25	0.25	0.00	0	2,208	2,208	0	4,417													
	FAA	Bagsverd Pond outlet to Bagsverd South Arm	Low-gradient	2.6	0.24	90	234	0.00	0.00	0.00	0.00	0	0	0	0	0													
			Intermittent	0.5	<0.3	160	80	0.00	0.00	0.00	0.00	0	0	0	0														
			Low-gradient	1.9	~0.3	60	114	0.00	0.00	0.00	0.00	0	0	0	0														
	Created Compensation	Realignment Bagsverd to Weeduck	Low-gradient	-		-	-										20	0.7-3	600	12,000	0.25	0.25	0.00	0.25	3,000	3,000	0	3,000	14,380
			High-gradient														20	0.5	38	760	0.00	0.25	0.25	0.00	0	190	190	0	
			Low-gradient														40	2	100	4,000	0.25	0.50	0.50	0.00	1,000	2,000	2,000	0	
	Created Compensation	Realignment Weeduck to Upper Three Duck Lake	High-gradient	-		-	-										20	0.5	104	2,080	0.00	0.25	0.00	0.00	0	520	0	0	520
Bagsverd realignment for TMF and the polishing pond	Created Compensation	Realignment Bagsverd Lake to Unnamed Lake #2	Low-gradient	-		-	-										8	1.6-1.5	3,000	24,000	0.25	0.25	0.00	0.25	6,000	6,000	0	6,000	34,350
			Low-gradient														40	2	227	9,080	0.25	0.50	0.50	0.00	2,270	4,540	4,540	0	
			High-gradient														8	0.5	1,250	10,000	0.00	0.25	0.25	0.00	0	2,500	2,500	0	
	FAA	Bagsverd Creek from Bagsverd Lake to Unnamed Lake #1	Moderate-gradient	8	0.2-1.4	80	640	0.25	0.25	0.25	0.00	160	160	160	0	32,372	-		-	0									0
	Schedule 2		Moderate-gradient	16.5	0.2-1.4	60	990	0.25	0.25	0.25	0.00	248	248	248	0		-		-	0									0
			High-gradient	15.4	0.2-1	80	1,232	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			Moderate-gradient	13.3	0.2-1.4	730	9,709	0.25	0.25	0.25	0.00	2,427	2,427	2,427	0		-		-										
			High-gradient	8.1	0.2-1	190	1,539	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			Moderate-gradient	8.8	0.2-1.4	1,260	11,088	0.25	0.25	0.25	0.00	2,772	2,772	2,772	0		-		-										
			High-gradient	8.1	0.2-1	510	4,131	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			Low-gradient	8.1	0.8-1.8	2,560	20,736	0.25	0.25	0.25	0.00	5,184	5,184	5,184	0		-		-										
			Low-gradient	4.7	na	420	1,974	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
	Schedule 2	Unnamed inlet to Bagsverd Creek	Low-gradient	1.2	0.5	380	456	0.00	0.00	0.00	0.00	0	0	0	0	3,380	-		-	0									0
			Pond/pool	29.2	~2	90	2,628	0.25	0.25	0.00	0.00	657	657	0	0		-		-										
			Low-gradient	1.2	0.5	140	168	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			High-gradient	2.5	<0.3	140	350	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			Pond/pool	45.9	~2	90	4,131	0.25	0.25	0.00	0.00	1,033	1,033	0	0		-		-										
			Low-gradient	0.5	<0.5	450	225	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
Mine Rock Area	Schedule 2	Inlet Unnamed Lake #3	Intermittent	0.5	<0.3	80	40	0.00	0.00	0.00	0.00	0	0	0	0	0	-		-	0									0
			Low-gradient	0.52	<1	220	114	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
	Schedule 2	Mollie River (area lost to MRA only)	High-gradient	20.78	<0.5	200	4,156	0.00	0.00	0.00	0.00	0	0	0	0	11,883	-		-	0									0
			Low-gradient	20.0	0.7-3	470	9,400	0.25	0.25	0.25	0.25	2,350	2,350	2,350	2,350		-		-										
			High-gradient	19.0	<0.5	70	1,330	0.00	0.00	0.00	0.00	0	0	0	0		-		-										
			Low-gradient	19.1	0.7-3	130	2,483	0.25	0.25	0.25	0.25	621	621	621	621		-		-										
											TOTAL	**28,409**	**30,904**	**28,928**	**15,929**	**104,170**								**TOTAL**	**50,535**	**58,980**	**42,210**	**16,500**	**168,225**
																								DIFFERENCE	**22,126**	**28,076**	**13,282**	**571**	**64,055**

[a] intermittent channel/or undefined channel was assigned a channel width of 0.5 m

Table B.12: Summary of Habitat Evaluation Procedure results for stream habitat, IAMGOLD Côte Lake. All values represent habitat units.

Species		Spawning/ Incubation	Juvenile Rearing	Adult Foraging	Over-wintering	TOTAL
Habitat Units Lost	Northern pike	101,984	97,728	80,759	52,511	332,981
	Yellow perch	112,329	95,961	80,184	53,707	342,181
	Walleye	7,734	23,321	2,971	15,929	49,955
	Lake whitefish	0	23,321	0	15,929	39,250
	Smallmouth Bass	28,409	30,904	28,928	15,929	104,170
Total Habitat Units Lost		250,456	271,235	192,841	154,004	868,536
		Spawning/ Incubation	**Juvenile Rearing**	**Adult Foraging**	**Over-wintering**	**TOTAL**
Post Habitat Units	Northern pike	110,825	110,825	77,250	72,440	371,340
	Yellow perch	103,635	103,635	95,385	67,675	370,330
	Walleye	14,340	47,695	39,135	0	101,170
	Lake whitefish	2,710	48,695	14,560	0	65,965
	Smallmouth Bass	50,535	58,980	42,210	16,500	168,225
Total Habitat Units Gained		282,045	369,830	268,540	156,615	1,077,030
		Spawning/ Incubation	**Juvenile Rearing**	**Adult Foraging**	**Over-wintering**	**TOTAL**
Balance	Northern pike	8,841	13,097	-3,509	19,929	38,359
	Yellow perch	-8,694	7,674	15,201	13,968	28,149
	Walleye	6,606	24,374	36,164	-15,929	51,216
	Lake whitefish	2,710	25,374	14,560	-15,929	26,715
	Smallmouth Bass	22,126	28,076	13,282	571	64,055
TOTAL		**31,589**	**98,595**	**75,699**	**2,611**	**208,494**