HAMMOND REEF GOLD PROJECT

CORRECTIONS TO THE VERSION 3 – AMENDED ENVIRONMENTAL IMPACT STATEMENT / ENVIRONMENTAL ASSESSMENT REPORT

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1656263

This Corrections Document provides corrections and additions to the Version 3 Amended Environmental Impact Statement/Environmental Assessment (EIS/EA) for the Hammond Reef Gold Project (the Project), as identified by the joint Federal-Provincial Government Review Team (GRT). The corrections and additions are organized with headings that reflect the organization of the Version 3 Amended EIS/EA. It is recommended that the reviewer consult this document during review of the Version 3 Amended EIS/EA. These corrections in no way change the overall conclusions and determinations of significance as indicated in the Version 3 Amended EIS/EA.

In April of 2018, ownership of the Project transferred from Canadian Malartic Corporation (CMC) to Agnico Eagle Mines Ltd. (AEM). As such, all occurrences of "Canadian Malartic Corporation," "CMC," and its predecessor "Osisko Hammond Reef Gold," ("Osisko," or "OHRG") and all variations of those names refer to AEM. AEM is a senior Canadian gold mining company that has produced precious metals since 1957. Its eight mines are located in Canada, Finland and Mexico, with exploration and development activities in each of these countries, as well as in the United States and Sweden. AEM assumes the responsibility for all commitments indicated in the Version 3 Amended EIS/EA Report.

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This Corrections Document has been submitted by AEM; however, for consistency with the Version 3 Amended EIS/EA, "CMC" has been used herein to refer to the Proponent.

EIS/EA – Executive Summary

The following corrections should be considered for Page ES-17 of the Executive Summary follows (deleted text represented by ~~strikethrough~~ text; additional text represented by grey highlighted *italic* text):

> The Project is located within the Treaty 3 lands. Treaty 3 is a written agreement between the Salteaux Tribe of the Ojibway Indians and her Majesty the Queen of Great Britain and Ireland signed in 1873 (Chiefs of Ontario 2005).
>
> Upon signing, each Chief received a British flag and a treaty medal. Treaty 3 includes an 1875 adhesion (addition to the Treaty) that extends all rights and benefits to the "Half-breeds" (Métis) of Rainy River and Rainy Lake. ~~The Métis were absorbed into the Little Eagle and are now part of the Couchiching First Nation~~ (Chiefs of Ontario, 2005).

The Métis Nation of Ontario (MNO) asserts that it represents a regional Métis community that has aboriginal and treaty rights and interests including spiritual, cultural, socio-economic, harvesting, and other traditional practices in the area in which the Project is situated. This regional Métis community includes the descendants of the beneficiaries of the Halfbreed Adhesion to Treaty 3. The MNO has a democratic, province-wide governance structure that includes elected leadership at the provincial, regional, and community level. MNO Community Councils have been established throughout the province and work collaboratively with the MNO and other Community Councils to represent the rights and interests of regional rights-bearing Métis communities throughout the province.

The MNO regulates the harvesting activities of its citizens through the MNO Harvesting Policy, which includes map of MNO Traditional Métis Harvesting Territories in Ontario which roughly correspond to the MNO's administrative regions. Each Region has a Captain of the Hunt.

~~Métis assert harvesting and trapping rights throughout most of Ontario. Their hunting and harvesting activities are organized by territories that represent large areas within which the Project is situated.~~

~~Each territory has a Captain of the Hunt. designated by the Métis Nation of Ontario (MNO).~~ The Captain of the Hunt, *as provided for in the MNO Harvesting Policy, has responsibility to oversee the Métis harvesting activities,* has authority over Métis hunts, issues harvesting certificates *to eligible MNO citizens* and gathers information on the number, species and location of animals taken. The RSA includes part of two *MNO Traditional Métis Harvesting Territories,* hunting territories, the Rainy Lake/Rainy River, and the Lake of the Woods/Lac Seul. The LSA includes a small part of the Rainy Lake/Rainy River harvesting territory.

Aboriginal engagement for the Project focussed on nine identified First Nations communities. These nine communities have been identified by the Crown as having an interest in the Project and having triggered the duty to consult on the Project. The Project is located in MNO Region 1. Region 1 includes four Métis *MNO Community Councils who represent MNO citizens* ~~communities~~ that may be affected by the Project through employment, business, and education and training opportunities."

Page ES-31 of the Executive Summary provides a list of proposed fish habitat offsetting measures associated with the Project. In response to comments received from Fisheries and Oceans Canada after the submission of the Version 3 Amended EIS/EA, additional clarification and details on the conceptual offsetting measures being proposed has been provided in Attachment A of this Corrections Document. The information and offsetting measures described in Attachment A supersede the list presented on page ES-31 of the Executive Summary.

EIS/EA – List of Abbreviations, Acronyms and Initialisms

The following additions should be considered when reviewing the List of Abbreviations (additional text represented by grey highlighted *italic* text):

Acronym	Definition
AEM	*Agnico Eagle Mines Limited*
CMC	*Canadian Malartic Corporation (now AEM)*
OHRG	Osisko Hammond Reef Gold Ltd. *(now CMC)*

EIS/EA Chapter 1 – Introduction

The following text is provided as an addition to the Version 3 Update summary of Chapter 1; Section 1.10.6:

Transport Canada has reviewed the EIS/EA and determined that there are no waterways within the Project site that are listed in the Schedule of waterways to which the Navigation Protection Act (formerly Navigable Waters Protection Act) applies. Therefore, regulatory authorization under the Navigation Protection Act is not required. Furthermore, Transport Canada has determined that all waterways that will be impacted by the Project are non-navigable. As a result of these determinations, Transport Canada is not a responsible authority.

The responsible federal authorities are Environment and Climate Change Canada, Fisheries and Oceans Canada, and Natural Resources Canada.

EIS/EA Chapter 4 – Assessment of Alternatives

The third paragraph of Section 4.2.6 of Chapter 4, is revised to the following (additional text represented by grey highlighted *italic* text):

> Lynxhead Bay and Lynxhead Narrows are located to the south – southeast of the Project Site, and are separated from the main infrastructure areas by topography and the open pits. While Lynxhead Bay and Lynxhead Narrows are small in surface area they are located in the main flow channel of the Seine River and, therefore, convey flow from upstream locations within the Upper Seine River watershed including the Lac des Milles watershed. As such, the turnover rate is high (less than 10 days), and a very large volume of water flows through this small zone. Consultation with Aboriginal groups, the public and the government review team has identified Lynxhead Narrows (*Alternative 1*) as a walleye spawning area. *Consultation with Aboriginal groups and the public identified Lynxhead Bay (Alternative 2) as a walleye spawning area.* Four alternatives have been identified for potential discharge locations and pipeline alignment, as described below and shown in Figure 4-2.

EIS/EA Chapter 5 – Project Description

As explained in Part 2 of the Version 3 Alternatives Assessment TSD, the location of the on-site accommodation camp was relocated in response to comments received from the GRT. The new location is shown on Figure 5-1 of Chapter 5 of the EIS/EA. However, other figures within the EIS/EA documentation show the accommodation camp at it previous location, near the shore of Sawbill Bay. The reviewer is directed to Figure 5-1 for the correct location of the on-site accommodation camp.

EIS/EA Chapter 6 – Effects Assessment

Section 6.2.4 provides a list of proposed fish habitat offsetting measures associated with the Project. In response to comments received from Fisheries and Oceans Canada after the submission of the Version 3 Amended EIS/EA, additional clarification and details on the conceptual offsetting measures being proposed has been provided in Attachment A of this Corrections Document. The information and offsetting measures described in Attachment A supersede the list presented in Section 6.2.4.

EIS/EA Chapter 7 – Public Consultation and Aboriginal Engagement

The presentation dated June 8, 2016 (found beginning on pg. 1371 of Appendix 7.V) was incorrectly included in Appendix 7.V (Record of Aboriginal Communications). The presentation was given to Mayor Dennis Brown of the Town of Atikokan and the presentation file should be considered part of Appendix 7.III (Record of Public Communications) rather than Appendix 7.V.

The Aboriginal Issues Tracking Log (found beginning on pg. 3 of Appendix 7.V) contains an incorrect entry. The entry dated 2016-10-19, on pg. 23 of Appendix 7.V, should be dated 2016-09-19. In addition, a reference to the presentation with file name '2016-09_Hammond reef update' should be included under the 'Documents' column of the Aboriginal Issues Tracking Log. This correction also applies to the entry dated 2016-10-19 in the Metis Nation of Ontario (MNO) Issues Tracking Log, on pg. 53 of Appendix 7.V.

On January 24, 2018, a letter from CMC was provided to the Canadian Environmental Assessment Agency (CEAA) regarding comments received from the Mitaanjigamiing First Nation. This letter was included in Appendix 7.V (Record of Aboriginal Communications) of the Version 3 Amended EIS/EA. The original version of the letter included typographic errors and inconsistencies between definitions used to refer to the Project. A revised version of this letter is provided as Attachment B of this Corrections Document.

EIS/EA Chapter 9 – Commitments Registry

Commitment 38 is revised as follows (additional text represented by grey highlighted *italic* text):

> Promote tourism in the Atikokan area through sponsorships of community events such as the Atikokan Bass Classic*, and directly work with the Atikokan Sportsman's Conservation Club*.

Commitment 66 has been revised. Commitment 66 in Chapter 9 of the Version 3 EIS/EA shall be replaced in its entirety with the following:

> In all project phases, OHRG will continue to communicate with the Indigenous communities identified in the EIS/EA about the Project, as well as any concerns and interests, including the sharing of environmental studies and providing information about environmental monitoring programs and results. OHRG will receive and address feedback, requests and input from all communities throughout the life of the Project, including how to involve Indigenous communities in environmental monitoring. The established Environmental Committee will also provide a mechanism for sharing environmental information with the First Nations communities that participate on that committee.

For Commitment 87, a reference to comment responses *MNDM 6 and MNDM 6B* (see Table B-1 of the Part B of the Addendum to the Version 3 EIS/EA) should be considered under the 'Reference to Version 3 EIS/EA' column.

Commitment 127 is revised as follows (deleted text represented by ~~strikethrough~~ text; additional text represented by grey highlighted *italic* text):

- ~~As a condition of EA approval,~~ CMC will collect additional subsurface data between the TMF and Long Hike Lake to re-evaluate and confirm the model results with respect to seepage discharge to Long Hike Lake. ~~If required based on the results of this subsequent confirmatory analysis,~~ *Prior to the operations phase,* CMC will collect the appropriate data to characterize baseline conditions in Long Hike Lake, including water quality, sediment quality, fish and fish habitat, benthic community, and hydrology data. CMC will provide a proposed outline of this baseline work to MOECC for review prior to undertaking the work.
- Long Hike Lake will be included in the EEM program for the project*, which will include a comprehensive aquatic effects monitoring plan that includes all receiving waterbodies (Upper Marmion Reservoir, Lizard Lake and Long Hike Lake)*.

For Commitments 140 and 141, a reference to comment response *MOE-Air-4* (see Table B-1 of the Part B of the Addendum to the Version3 EIS/EA) should considered under the 'Reference to Version 3 EIS/EA' column.

Commitment 143 is revised as follows (additional text represented by grey highlighted *italic* text):

Overburden will be separated from waste rock during site preparation and clearing *to allow for the use of overburden to encourage revegetation within the site. CMC will use the overburden stockpiled onsite to achieve the overall objectives of Part 9 of the Mine Rehabilitation Code*.

Commitment 145 is revised as follows (additional text represented by grey highlighted *italic* text):

CMC has committed to include the following in the official submission of a Certified Closure Plan:

a) Appropriate trigger levels and contingency planning for potential geochemical results outside the range of contingencies as required
b) Appropriate post closure planning for the management of surface and groundwater from the waste rock and tailings area

Appropriate monitoring and maintenance commitments regarding revegetation of the tailings management area.

CMC will develop detailed environmental monitoring programs for the closure phase in consultation with MNDM and other provincial ministries as appropriate.

For Commitment 145, a reference to comment response *MNDM 5* (see Table B-1 of the Part B of the Addendum to the Version3 EIS/EA) should considered under the 'Reference to Version 3 EIS/EA' column.

The following shall be added to the Commitments Registry as part of Commitment #66 (additional text represented by grey highlighted *italic* text):

> *As provided for in the agreed upon Resource Sharing Agreement, an environmental committee will be established with the First Nations communities that are party to the Resource Sharing Agreement. The environmental committee will meet on a quarterly basis and will provide a forum to discuss requests related to Indigenous participation in environmental monitoring activities. At a minimum, Fist Nations communities will be provided with all monitoring results and reports that are submitted to regulators in accordance with applicable permit conditions or commitments made in this EIS/EA.*

EIS/EA Chapter 10 – Other Approvals

The following correction should be applied to the Version 3 Update Summary introductory section of Chapter 10 (deletions represented by ~~strikethrough~~ text):

> *As per A-5, permitting under the Species at Risk Act ~~and the Migratory Birds Convention Act~~ will not be required because the Project is not located on federal lands.*

The *Migratory Birds Convention Act* applies to all lands in Canada, not just on federal lands. This correction also applies to the related response to Federal comment A-5 (see Table A-1 in Part A or the Addendum to the Version 3 EIS/EA) and Table 10-1 of the EIS/EA.

The following corrections should be applied to Table 10-1 (deletions represented by ~~strikethrough~~ text; additions represented by grey highlighted *italic* text):

Jurisdiction – Department	Applicable Act or Regulation	Activities that may Require Permit/Approval	Permit/Approval Required
~~Federal~~ ~~Environment Canada~~	~~*Canadian Environmental Protection Act*~~	~~Deposition of waste in Canadian Marine Waters~~	~~Permit under Section 127~~
~~Federal~~ ~~Environment Canada~~	~~*Endangered Species Act (Potentially, depending on expected bat habitat change)*~~	~~Construction or operational activities that kill, harm, harass threatened / endangered species or damages / destroys their habitat~~	~~Permit / Approval~~
~~Federal~~ ~~Fisheries and Oceans Canada~~ *Environment and Climate Change Canada*	~~*Fisheries Act*~~ *Metal Mining Effluent Regulations*	Water management and discharge	Metal Mining Effluent Regulations
~~Federal~~ ~~Fisheries and Oceans Canada~~ *Environment and Climate Change Canada*	~~■ *Fisheries Act*~~ ■ Metal Mining Effluent Regulations	Deposition of tailings (Schedule 2)	Authorization under the Regulation.

Jurisdiction – Department	Applicable Act or Regulation	Activities that may Require Permit/Approval	Permit/Approval Required
~~Federal~~ ~~Fisheries and Oceans;~~ Environment Canada	Metal Mining Effluent Regulations; Environmental Effects Monitoring	Mine Operations. Effluent discharge: ongoing compliance and effects monitoring	Acceptance of reporting

EIS/EA Chapter 12 – Conclusions

Section 12.1.2 provides a list of proposed fish habitat offsetting measures associated with the Project. In response to comments received from Fisheries and Oceans Canada after the submission of the Version 3 Amended EIS/EA, additional clarification and details on the conceptual offsetting measures being proposed has been provided in Attachment A of this Corrections Document. The information and offsetting measures described in Attachment A supersede the list presented in Section 12.1.2.

Addendum: Part A – Federal Comments

Table A-1

Section 6.2.1 of the Version 3 Amended EIS/EA is incorrectly referenced in Table A-1 under the 'Location of Reference within Version 3 EIS/EA' column for comments T-44, T-26 and T-62. The correct reference is to Section 6.2.2.

The following additions should be considered under the 'Subsequent Comment' column of Table A-1 (additions represented by grey highlighted *italic* text).

Reference #	Subsequent Comment
T-15	*R(2)-03 and R(2)-10*
T-18	*R(2)-03*
T-31	*R(2)-06*
T-35	*T(2)-17 and R(2)-07 (amended)*
T-44	*T(2)-04 and R(2)-04*

Table A-1 incorrectly indicates that updated version of tables MOE Air-2-3 and MOE Air-2-4 are provided as attachments to the response to T(3)-01. These tables included as part of the memorandum attachment to T(3)-01 entitled: 'Revised Emission Rate Assumptions and Dispersion Modelling Results'. The reference to these tables under the 'Attachment' column of Table A-1 should be disregarded.

Table A-1 incorrectly indicates that Figures T(3)-05-1 to T(3)-05-10 are provided as attachments to the response to T(3)-05. These figures are imbedded within the response to T(3)-05. The reference to these figures under the 'Attachment' column of Table A-1 should be disregarded.

Response to T(3)-08

CMC worked closely with the federal review team to address concerns related to potential seepage from the Tailings Management Facility (TMF). The agreed upon scope of work to address the comments received involved a multi-phase approach, with a summary memorandum provided to the federal review team (FRT) for review and concurrence before proceeding with each subsequent phase of work. These summary memorandums and associated communication are provided in the attachment to the response to T(3)-08 (and also in Part D of the Addendum). The memorandum entitled: Tailings Management Facility, Additional 3D Groundwater Modelling (beginning on pg 3 of the attachment to T(3)-08) was submitted on March 1, 2016 and concurrence was reached based on this version. However, this memo was not finalized until December 12, 2017, shortly before submission of the Version 3 EIS/EA. As a result, the date on this memorandum reflects the date upon which the memorandum was finalized, not the date upon which the final draft versions of the memorandum was submitted. A revised version of this memorandum with the date changed to reflect the date of submission to the government is provided in Attachment C to this Corrections Document. The version provided as Attachment C supersedes the version included in the attachment to T(3)-08. No changes have been made to this document.

Within the same attachment to T(3)-08, a preceding draft version of the memorandum: Tailing Management Facility, Additional Stratigraphic Information and Proposed 3D Groundwater Modelling (starting on pg. 26 of the attachment) was mistakenly submitted. This incorrect draft version of the memorandum, also dated December 12, 2017, differs slightly from the correct final version that was submitted to the FRT on June 15, 2016. To ensure transparency in the correspondence, the correct version of the memorandum is provided as Attachment D to this Corrections Document. The version provided as Attachment D supersedes the version included in the attachment to T(3)-08.

A formatting "document bookmark" to Part F has been added to the attachment to the response to T(3)-08. This is considered an insignificant, document formatting change that does not change the content of the Version 3 Amended EIS/EA and did not warrant issuance of a formal revision to the document.

Response to T(3)-09

On page 6 of the response to comment T(3)-09, the referenced date of the letter to CMC is incorrect. The letter was provided to CMC on December 22, 2016.

Addendum: Part B – Provincial Comments

Table B-1

The following additions should be considered under the 'Location of Reference within Version 3 EIS/EA' column of Table B-1 (additions represented by grey highlighted *italic* text).

Reference #	Location of Reference within EIS/EA
MOE-GW1 and MOE-GW2	*Chapter 9.0 – Commitments 127, 128, 169, 170 and 171*
MOE SW-3	*Chapter 9.0 – Commitments 171 and 172*
MOE SW-11	*Chapter 9.0 – Commitment 151*
MOE Air-4	*Chapter 9.0 – Commitments 113 to 119, 140 and 141*
MNDM 2 and MNDM 5	*Chapter 9.0 – Commitment 145*
MNDM 6	*Chapter 9.0 – Commitment 87*

The following additions should be considered under the 'Other Related/Reference IRs' column of Table B-1 (additions represented by grey highlighted *italic* text).

Reference #	Other Related/Reference IRs
MOE-GW1, MOE GW2 and MOE SW-4	*T(3)-08*
MOE Air-4	*T(3)-01*

The following corrections should be considered under the 'Reference to EIS or TSD' column of Table B-1. Deletions are represented by ~~strikethrough~~ text; additions are represented by grey highlighted *italic* text.

Reference #	Reference to EIS or TSD
EAB12-NEW	*Chapter 9* Commitments *Registry* ~~Register~~
MNR-3	Project Description – Road *(Chapter 5, Section 5.2.8.1)*
MNRF-WTCM 1 to MNRF-WTCM 6	*Corrections Document Attachment E: Contingency Measures to Mitigate Water Taking from Marmion Reservoir during Low Water Level and Outflow Periods at Raft Lake Dam'; and,* *Corrections Document Attachment F: 'Potential Peak Water Taking Requirements'* ~~Contingency Measures to Eliminate Water Taking from Marmion Reservoir During Low Water Level and Outflow Periods at Raft Lake Dam Technical Memorandum~~
MNR-4, MNRF 4, MNRF 4B, MOE Hydrology 4, MOE Hydrology 4B, MOE SW-11, MOE SW-11B, MOE SW-11C, MOE SW-15, MOE SW-15B, T-52, T-58 and T(2)-07	*Corrections Document Attachment E: Contingency Measures to Mitigate Water Taking from Marmion Reservoir during Low Water Level and Outflow Periods at Raft Lake Dam'; and,* *Corrections Document Attachment F: 'Potential Peak Water Taking Requirements'*
MOE SW-3, MOE SW-17 and MOE SW-17B	*03-Addendum, Part D Supporting Documents, 14- Sulphate, Methylmercury and Wild Rice';* *Corrections Document Attachment H: 'Mercury in Fish Tissue'* EIS/EA S6.0
MOE SW-4 and MOE SW-4B	*03-Addendum, Part D Supporting Documents, 02-* Tailings Management Facility, 3D Groundwater Modelling

Reference #	Reference to EIS or TSD
MOE-GW 1 and MOE-GW 1B	Hydrogeology TSD; *03-Addendum, Part D Supporting Documents, 07- 'Federal IR T(3)-08 Response Documents' (Part H)*
EMRB-2B	Atmospheric Environment TSD; *03-Addendum, Part D Supporting Documents, 06-* Best Management Practices Plan (BMPP)
MTCS-4B and MTCS-5B	*03-Addendum, Part D Supporting Documents, 06-* Heritage Impact Assessment
MTCS-6B	*02-TSDs, 06 Cultural Heritage Resources TSD, Part B,* Archaeological Assessment Report
MTCS-7B	*03-Addendum, Part D Supporting Documents, 06- Heritage Impact Assessment*/Cultural Heritage Evaluation Report

Responses to EAB10-NEW and MNRF 4

For responses to EAB10-NEW and MNRF 4, the attachment entitled 'Technical Memo – Contingency Measures to Eliminate Water Taking from Marmion Reservoir During Low Flow and Water Level Periods at Raft Lake Dam (Nov 2015)' should be replaced with the updated version provided as Attachment E of this Corrections document. See corrections to Addendum Part D below for additional details.

Response to MNR 5

The response to MNR-5 references a map showing the site topography and the currently planned pipeline alignment and spill containment areas. However, the map was not provided in the Version 3 Amended EIS/EA. This map is provided as Attachment G of this Corrections Document.

Addendum: Part C – Aboriginal and Public Comments

Fish and Fish Habitat

Related to comments received in 2013 from Indigenous groups and local stakeholders regarding mercury levels in the fish inhabiting Marmion Reservoir, CMC voluntarily funded and commissioned an additional fish tissue sampling study. This study was completed as a courtesy and gesture of good-will towards the local communities outside the scope of the EIS/EA. The study was completed with the assistance of local Indigenous community members.

The study confirmed the findings of the EIS/EA baseline information that mercury levels in large bodied fish within Marmion Reservoir were elevated. CMC provided a copy of the study report to the provincial and federal governments and requested support with the appropriate dissemination of this health-related information. In the CMC response column of the 'Aboriginal Communities Comments Jan 2017' table in Part C of the Addendum, the first response under the 'Fish and Fish Habitat' heading, indicates that 'the results of this sampling program were provided to the government for distribution to the local stakeholder and Indigenous communities'. However, the government indicated to CMC that they could not distribute the information because the study was not sanctioned by the government. As a result, the study report has not been broadly distributed and the above referenced sentence from the 'Aboriginal Communities Comments Jan 2017' table should be disregarded.

To ensure transparency, the fish tissue study report has been included as Attachment H to this Corrections Document.

The CMC response column of the ‘Aboriginal Communities Comments Jan 2017’ table in Part C of the Addendum includes incorrect references to commitments in the Commitments Registry for the Project (Chapter 9 of the EIS/EA). Corrections are provided as follows:

- In the sixth comment under the ‘Treating and monitoring water quality’ heading, the correct reference should be to Commitment 97.
- In the third comment under the ‘Fish and Fish Habitat’ heading, the correct reference should be to Commitment 164.
- Under the ‘Wildlife Health’ heading, the correct reference should be to Commitment 128.

The following additional references to commitments in the Commitments Registry for the Project should be considered when reviewing the ‘Aboriginal Communities Comments Jan 2017’ table in Part C of the Addendum:

Heading/Theme	Row of Table under Heading/Theme	Relevant Reference to Commitments Registry
Water Quantity	1	Commitments 158 and 165
	3	Commitments 158 and 165
	4	Commitments 14, 91 and 145
Water Quality	1	Commitments 30, 100, 107 and 161
	4	Commitments 136, 160, 164 and 171
Treating and Monitoring Water Quality	1	Commitments 13, 100, 101 and 136
	5	Commitments 63, 66, 71, 127, 152 and 168
Air Quality	3	Commitments 92, 114 and 141
Fish and Fish Habitat	2	Commitments 29 and 30
	5	Commitments 29 and 30
	6	Commitment 29
Terrestrial Wildlife and Habitat	2	Commitments 23, 109, 111 and 124
	3	Commitment 29
Rights of Indigenous Peoples	1	Commitments 33 and 102
Physical and Cultural Heritage	1	Commitments 44, 161 and 173(ah)
Cumulative Environmental Effects	1	Commitments 97, 136 and 165
Accidents and Malfunctions	1	Commitments 52 and 163
Indigenous Consultation	1	Commitments 63 to 72, and 121

Addendum: Part D – Supporting Documents

CMC has committed to implementing contingency measures to limit project related impacts to Marmion Reservoir during periods of low outflow and water level. In 2015, in response to comment from the GRT, CMC provided a memorandum outlining a framework for the water taking contingency plan. CMC has subsequently been in discussion with the downstream hydropower producers, Brookfield Renewable Energy and H20 Power, on the development of a water taking plan. These discussions have resulted in an update to the 2015 memorandum and an additional memorandum identifying potential peak daily water taking requirements which consider the need to fill on-site water storage facilities. These documents were completed outside of scope of the EIS/EA as part of ongoing discussions with the hydropower producers. As a courtesy, upon request, CMC provided a copy of the documents to the provincial and federal governments.

For transparency, at the request of the GRT, these memoranda have been provided as Attachments E and F of this Corrections Document. These documents do not change the conclusions and determinations of significance as indicated in the Version 3 Amended EIS/EA.

The memorandum: 'Contingency Measures to Mitigate Water Taking from Marmion Reservoir during Low Water Level and Outflow Periods at Raft Lake Dam' dated November 20, 2017 and provided as Attachment E supersedes the November 26, 2015 version of the memo provided in Part D of the Addendum to the Version 3 Amended EIS/EA.

References to the EIS/EA sections relevant to these documents include 6.1.3.1.2, 6.3.6, 6.8.3, 8.2.2, 9.0 (Commitment 165) and the Hydrology TSD. Relevant responses to comments (see Tables A-1 and B-1 in the Addendum) include: MNR-4, MNRF 4, MNRF 4B, MOE Hydrology 4, MOE Hydrology 4B, MOE SW-11B, MOE SW-11C, MOE SW-15, MOE SW-15B, MNRF-WTCM 1 to MNRF-WTCM 6, T-58, T(2)-07 and T(2)-14.

Attachment A

Fish Habitat Offsetting Plan – Response to DFO Comments

TECHNICAL MEMORANDUM

DATE April 16, 2018 **Project No.** 1656263 (DOC014_Rev 0)

TO Sara Eddy Team Leader, Triage and Planning, Fisheries Protection Program, Central and Arctic Region, Fisheries and Oceans Canada

FROM Erin Greenaway **EMAIL** egreenaway@golder.com

HAMMOND REEF FISH HABITAT OFFSETTING/NO NET LOSS PLAN - RESPONSE TO DFO COMMENTS (REV. 0)

The following memorandum is provided to address additional comments from Fisheries and Oceans Canada (DFO) as discussed in conference calls with the new Project proponent, Agnico Eagle Mines Ltd. (AEM) (preceding proponent was Canadian Malartic Corporation (CMC)) and Golder Associates Ltd. (Golder), and provided in an email to Loraine Cox of the Canadian Environmental Assessment Agency (CEAA) on March 12, 2018 with the subject: DFO Response - Hammond Reef - List of Fish Habitat Offsetting Projects.

Throughout this memorandum, the DFO comments that are being addressed are displayed in bold italic text and the responses are displayed in plain text. References to the 'No Net Loss Plan (NNLP)' shall be considered synonymous with 'Offsetting Plan' as defined in the current *Fisheries Act*. References to numbered Tables and Figures shall be considered references to the draft NNLP in Part B of the Aquatic Environment Technical Supporting Document (TSD) of the Version 3 Amended Environmental Impact Statement/Environmental Assessment (EIS/EA) for the Hammond Reef Gold Project.

Initially, during a phone call between AEM, Golder, CEAA and DFO on February 20, 2018, DFO requested the following:

- ***A list of the offsetting projects that are proposed including a brief description and location;***
- ***The surface area of each project; and***
- ***The habitat units associated with each project.***

In a follow-up email on March 12, 2018, DFO requested the following additional comments be addressed:

- ***As discussed, previous versions of the draft No Net Loss Plan (NNLP) included areas (m2 and ha) and habitat units (HUs) for species. The current table includes HU values only for Northern pike and Walleye. HUs and areas (m2 and ha) need to be provided for all the offsetting projects. Should an estimate be provided, the rationale for the estimate needs to be clear and defensible.***

Pond Creation and Fish Introduction: the introduction of rescued fish to fishless waterbodies is not to be included in the offsetting values.

- ***The increase in area being created (e.g. impoundments of headwater areas to create a gain in habitat availability) can be included in the offsetting values. Please include wording noting that these waterbodies will be connected to fish habitat.***

- ***Please clarify what offsetting the original 18ha and 6,800 HUs of like for like habitat in T(3)-07 represents.***
- ***Figures 9 and 11 in the NNLP give areas for beaver meadows #1 and #3, but Figure 10 does not include an area for beaver meadow #2.***

In an email on April 2, 2018 in response to submission of the Hammond Reef Fish Habitat Offsetting/No Net Loss Plan - Response to DFO Comments (Rev. B) memorandum, DFO requested an additional comment to be addressed:

- ***While it is recognized that the designs of the created ponds and water control structures have not been completed, DFO requires a commitment that these will be connected to fish habitat during the year to contribute to the productivity of the local fishery.***

The following is a list of viable offsetting options that can address the project needs. This list of offsetting projects is conceptual for the purposes of the EIS/EA. Should the project proceed, additional details, including design, habitat losses and offsetting gains, contingency measures and monitoring, will be provided during the regulatory phases for the *Fisheries Act* section 35(2) authorization and as well as the Metal Mining Effluent Regulations (administered by Environment and Climate Change Canada). During the regulatory phase, offsetting measures will be required to meet the current applicable *Fisheries Act*, any regulations pursuant to that Act and DFO policy.

The habitat offsetting projects as outlined in the draft NNLP have been categorized into Offsetting Approaches (representing "Like-for Like" habitat offsetting for lost habitat) as outlined in section 7.0 of the NNLP, and Additional Mitigation and Offsetting Measures as outlined in section 7.2 of the NNLP.

Offsetting Approaches as outlined in Section 7.0 in the NNLP includes the following:

- **Pond Creation:** Potential for impoundment of former beaver ponds that have reverted to meadows to create pond habitat. Several options for these forms of habitat enhancement have been identified on and offsite (Figures 9, 10, and 11).
- **Fish Introduction:** Assessment of Areas of Potential Impact (APIs) found on site to not contain fish during baseline studies to determine their potential for fish introduction and as suitable habitat.
- **Watercourse Crossings:** Examination of stream crossing upgrades along the proposed access road to determine measures that could be implemented to offset fish habitat losses (e.g., improve fish passage or enhance/create adjacent habitat).

There is a commitment that the final designs for ponds and water control structures (i.e., reservoirs) will be connected to fish habitat during the year to contribute to the productivity of the local fishery, as per DFO's comment on April 2, 2018.

It is now understood that fish introduction is not considered an offsetting measure under current DFO policy. As such the calculation in Table 14 of the NNLP which included the calculation for fishless waterbodies has been removed. The 18 ha of surface water area and 6,873 HUs of "like for like" fish habitat reported in Table 14 of the NNLP, includes the surface area and habitat units for the waterbodies wherein fish introduction into fishless waterbodies is proposed. As such the calculation of "like-for-like" projects has been updated in the table below to include only the calculations for the pond creations. Also, Table 14 in the NNLP did not include habitat calculations for Beaver Meadow 3 and as such this has also been corrected in the table below.

The following table summarizes the like-for-like habitat offsetting with the fish introductions removed, and Beaver Meadow 3 included. The result is approximately 15.55 HA and 6,230 HUs of like-for-like habitat. These calculations for HA and HUs will replace the 18 HA and 6,800 HUs referenced in the NNLP and T(3)-07.

Offsetting project	Locations	Description	Reference to NNLP	Surface Area (m^2)	Habitat Units
Pond Creation	Beaver Meadow 1	Impoundment of former beaver ponds that have reverted to meadows to create pond habitat. The existing watercourses to be flooded are fish-bearing. The watercourses will be flooded by installing a water level control structure at the downstream extent of the area to be flooded.	Figures 8, 9, Appendix C – table 11	48,176	1,904
	Beaver Meadow 2		Figures 8, 10, Appendix C – table 11	75,120	2,987
	Beaver Meadow 3		Figures 8, 11, Appendix C – table 11	32,225	1,339
Totals				155,521	6,230

While it is recognized that the designs of the created ponds and water control structures have not been completed, Fisheries and Oceans Canada (DFO), requires a commitment that these will be connected to fish habitat during the year to contribute to the productivity of the local fishery. Please confirm this commitment in the technical memo.

Although the detailed designs of the created ponds and water control structures have not been completed, AEM is committed to developing designs that will be connected to fish habitat and contribute to the productivity of the local fishery.

Watercourse crossings: as per comments in T(3)-07, stream crossings should be designed and mitigated to avoid serious harm to fish.

- ***Replacing culverts that are currently barriers to fish passage as part of upgrading the road is not considered to be offsetting. Removing barriers unrelated to these culverts may be considered offsetting.***
- ***Enhancement and creation of habitat at identified water crossing sites would be considered as offsetting (i.e. API#20, 21, 22, 60, 62, 63, 64, 65, 66, 70)***

The following table summarizes the potential offsetting measures for the watercourse crossings. As per DFO comments, replacing culverts that are currently barriers to fish passage as part of upgrading the road is not considered to be offsetting. The table below has been updated to remove watercourse crossings that did not have offsetting measures identified in addition to barrier removal resulting from culvert replacement.

The enhancement and/or habitat creation measures described at watercourse crossings are conceptual and calculations of habitat area and habitat units for each cannot be provided at this time. The site-specific details of the habitat offsetting at these proposed water crossings will rely on the work being undertaken to upgrade the proposed access road which will be developed at a later stage in the Project. Therefore, the surface area coverage and associated habitat units calculations for these offsetting projects will be developed and provided at a later date during the permitting phase of the Project. The table below contains the location and conceptual description of the potential offsetting measures at the watercourse crossings.

Offsetting project	Locations	Description	Reference to NNLP
Watercourse Crossings	API#1	Placement of mixed coarse substrate immediately upstream and downstream of the culvert(s) to provide spawning substrate for White sucker and Walleye. Stream banks to be vegetated with woody trees and shrubs to provide overhead cover.	Section 7.1.2 pg 69, Figure 8, Figure 14, Table 15, Appendix E
	API#20	A series of large boulders could be strategically placed in the lower stream and under the crossing structure to act as baffles, allowing fish better access these high gradient areas. It may also be possible to reduce the gradient of the upstream rapids, potentially allowing additional access to additional spawning habitat for White suckers and Walleye.	
	API#21	With creation of one or two small backwater areas connected to the main stream channel, and creating additional nursery and feeding areas for the existing fish community, it is anticipated that these areas would become established with aquatic macrophyte growth. The banks of new backwater areas would be graded and protected with cobble to reduce erosion.	
	API#23	Modestly increasing the area of the downstream channel	
	API#60	It is recommended that an excavation could be used to enlarge either the upstream or downstream pond. The newly excavated area could be used to place substrates that are not currently available within the pond, increasing habitat diversity.	
	API#62	Proposed offsetting would include excavating additional area upstream of the crossing to increase the area of the undefined channel in the sedge meadow.	
	API#63	Proposed offsetting includes the placement of course cobble and gravel substrates in the stream mouth and lake shoreline at the stream mouth to provide potential spawning locations for White sucker and Walleye.	
	API#64	Suggested offsetting for this crossing includes adding a mix of course substrate to the stream mouth at Finlayson Lake, to provide spawning substrate for White sucker and Walleye.	

Offsetting project	Locations	Description	Reference to NNLP
	API#65	Proposed offsetting for this crossing includes the creation of pool habitat a short distance upstream or downstream of the culvert. Pool habitat is lacking in this section of the stream and would provide refuge during low water periods. Pool habitat could be created through a combination of excavation and scouring features such as wing deflectors, boulder placements digger logs etc. Banks would be stabilized with course substrate and vegetation will be planted.	
	API#66	Proposed offsetting includes the removal of part of the bedrock chute upstream of the culvert to facilitate better upstream fish movement at all water levels. Part of the bedrock structure could be left in place to maintain the small scour pool at the bottom of the chute. Some additional cobble/gravel substrate could be added below the opened chute and scour pool to encourage White sucker spawning at this location.	
	API#70	Proposed offsetting for this crossing includes increasing the surface area of a small pool located a short distance upstream of the crossing. This would be done by excavating additional area from the pool along one of the banks. The shoreline would be stabilized with stone or geotextile.	

The proponent should identify that other options for offsetting have been identified, though not quantified, and included in the draft NNLP (7.2.1 and 7.2.2)

Additional Offsetting Measures as outlined in section 7.2 of the NNLP include the following:

- **Creation of Northern pike spawning habitat:** to enhance Northern pike spawning habitat, which is currently impacted by water level fluctuation in Upper Marmion Reservoir, several areas can be excavated to create the appropriate depths within or adjacent to the zone of water level fluctuation. The following areas have been identified:
  - Sawbill Creek Mouth Pike Spawning Habitat Creation (Location 2, Figure 16): An area of low-lying shore near the east side of the shallow embayment at the mouth of Sawbill Creek. This area would be excavated to a depth equal to the lower limit of the water level fluctuation to create about 1.5 ha of spawning and nursery habitat. These habitats would also be used to some extent by other species in Upper Marmion Reservoir, including baitfish, Smallmouth bass and other species. It is estimated that this habitat would create about 4,000 HUs.
  - Hammond Embayment and Snail Bay Northern pike Spawning Habitat Creation (Locations 4 and 3, Figures 17 and 18): Two additional shallow excavations and shallow channel excavations to create Northern pike spawning habitat would be established along the shoreline of Snail Bay and Hammond

Peninsula equivalent to an area of about 3.0 ha of spawning and nursery habitat. These habitats would also be used to some extent by other species in Upper Marmion Reservoir, including baitfish, Smallmouth bass and other species. It is estimated that this habitat would create about 8,000 HUs.

- API#37 Northern pike Spawning Habitat Creation (Location 1, Figure 19): API #37 is at the mouth of a small tributary to Sawbill Bay, just east of the mouth of Sawbill Creek. In this location, two areas can be enhanced for Northern pike spawning: one in the shallow embayment, constructed in a similar way as the previous two projects described above; and, the other as a flooded marsh connected to the inlet stream itself. This would result in about 1.5 ha of habitat. These habitats would also likely be used by other species in Upper Marmion Reservoir, including baitfish, Smallmouth bass and other species. It is estimated that this habitat would create about 4,000 HUs.

- **Creation of Walleye Spawning Habitat or Access to Spawning Habitat:** Although spawning habitat exists in Sawbill Creek, fish passage is an issue. Removal of barriers and improvement of spawning habitat (Inflow 1 and 2, Figure 8) will improve existing spawning areas for Walleye and improve access by Upper Marmion Reservoir Walleye into Sawbill Creek. This would provide access to a substantial length of stream/floodplain habitat with suitable spawning, nursery and adult habitat. Spawning habitat exists in Lumby Creek between the outlet of Lizard Lake and the mouth in Lynxhead Bay; currently fish passage is limited for Walleye in Upper Marmion Reservoir. Removal of barriers and improvement of spawning habitat will improve existing spawning areas for Walleye and improve access by Upper Marmion Reservoir Walleye into Sawbill Creek. This would provide access to a substantial length of stream/floodplain habitat with suitable spawning, nursery and adult habitat. It is estimated that this improvement in fish passage would create about 1,000 HUs.

The table below summarizes the areas and habitat units relating to these offsetting measures. The compensation values that are provided in the EIS/EA and section 7.2 of the NNLP (as outlined above) reflect calculated habitat based on the average habitat suitability for all species present. The HU calculations have been updated to include only Northern pike and Walleye HSI values as discussed in CMC response #2 in T(3)-07. The updated HU values are presented in the table below.

Offsetting project	Locations	Description	Reference to NNLP	Surface Area (m^2)	Habitat Units[1,2]
Northern Pike Spawning Habitat Creation	Sawbill Creek Mouth	An area of low-lying shore near the proposed Helipad to the east side of the shallow embayment at the mouth of Sawbill Creek. This area would be excavated to a depth equal to the lower limit of the water level fluctuation to create about 1.5 ha of spawning and nursery habitat. These habitats would also be used to some extent by other species in Upper Marmion Reservoir, including baitfish, Smallmouth bass and other species	Sec 7.2 pg 77, Figure 16, Sec 7.2.1 pg 84	15,000	8,250
	API#37	API #37 is at the mouth of a small tributary to Sawbill Bay, just east of the mouth of Sawbill Creek. In this location,	Sec 7.2 pg 77, Figure 19	15,000	8,250

Offsetting project	Locations	Description	Reference to NNLP	Surface Area (m^2)	Habitat Units[1,2]
		two areas can be enhanced for Northern pike spawning: one in the shallow embayment using shallow excavations and shallow channel excavations to create Northern pike spawning habitat; and, the other as a flooded marsh connected to the inlet stream itself. This would result in about 1.5 ha of habitat. These habitats would also likely be used by other species in Upper Marmion Reservoir, including baitfish, Smallmouth bass and other species			
	Snail Bay	Shallow excavations and shallow channel excavations to create Northern pike spawning habitat would be established along the shoreline of Snail Bay equivalent to an area of about 1.5[4] ha of spawning and nursery habitat. These habitats would also be used to some extent by other species in Upper Marmion Reservoir, including baitfish, Smallmouth bass and other species	Sec 7.2 pg 77, Figure 17, Figure 18,	15,000[4]	8,250
	Hammond Embayment	Shallow excavations and shallow channel excavations to create Northern pike spawning habitat would be established along the shoreline of Hammond Embayment equivalent to an area of about 1.5[4] ha of spawning and nursery habitat. These habitats would also be used to some extent by other species in Upper Marmion Reservoir, including baitfish, Smallmouth bass and other species	Sec 7.2 pg 77, Figure 17, Figure 17,	15,000[4]	8,250
Walleye Access to Spawning Areas	Sawbill Creek	Spawning habitat exists in Sawbill Creek (the creek adjacent to the mine camp Helipad); however, fish passage is an issue. Removal of barriers and improvement of spawning habitat (Inflow 1 and 2, Figure 8) will improve existing spawning areas for Walleye and improve access by Upper Marmion Reservoir	Sec 7.2.2 pg 88	3,500	1,050

Offsetting project	Locations	Description	Reference to NNLP	Surface Area (m^2)	Habitat Units[1,2]
		Walleye into Sawbill Creek. This would provide access to a substantial length of stream/floodplain habitat with suitable spawning, nursery and adult habitat.			
	Lumby Creek[3]	Spawning habitat exists in Lumby Creek between the mouth (in Lynxhead Bay) at the outlet of Lizard Lake; currently fish passage is limited for Walleye in Upper Marmion Reservoir. Removal of barriers and improvement of spawning habitat will improve existing spawning areas for Walleye and improve access by Upper Marmion Reservoir Walleye into Sawbill Creek. This would provide access to a substantial length of stream/floodplain habitat with suitable spawning, nursery and adult habitat	Sec 7.2 pg 77	3,500	1,050

1. Northern pike Habitat Suitability Index (HSI) factor used in the calculations. Note that the calculated habitat units were corrected subsequent to the draft NNLP submission (Golder, Dec 2013) based on comments provided in T(3)-07.
2. Yellow Walleye Habitat Suitability Index (HSI) factor used in the calculations. Note that the calculated habitat units were corrected subsequent to the draft NNLP submission (Golder, Dec 2013) based on comments provided in T(3)-07.
3. CMC Response to comment T(3)-07 incorrectly refers to this as Trap Bay
4. Snail Bay and Hammond Embayment were discussed together in the NNLP, and the surface area was determined to be 3.0 ha in total for both areas. For the calculations, this was split into 1.5 ha for each area

Please include total habitat lost and potential offsets, in area and habitat units, to the document.

A total of 34,177 HUs of habitat is estimated to be lost. The following summarizes habitat losses for each of the habitat VECs as outlined in section 6.0 of the NNLP:

- Receivers: 0.8 ha of seasonal habitat within the drawdown zone of Sawbill Bay, representing seasonal habitat for baitfish, Northern pike and Smallmouth bass.
- Lower Reaches: 3.9491 ha of inlet streams, 0 ha of lakes and 0.5385 ha of ponds that provide habitat for baitfish.
- Headwaters: 1.8635 ha of headwater streams, 29.7088 ha of lakes (API #12 and #2), and 3.7648 ha of ponds that provide habitat for baitfish and Northern pike.
- 14 stream crossings or crossing upgrades on the proposed access road that will result in the loss of habitat within the footprint of the culvert/bridge structure. This represents habitat for baitfish and Northern pike.
- There are also several ephemeral streams and a number of fishless headwater ponds and headwater streams.

The available offsetting measures summarized in the tables above, represent the potential for creation of 41,330 HUs of offsetting habitat, not including the HUs that could be realized through fish habitat enhancement at the watercourse crossing locations:

- Pond Creation: a total of 15.55 HA and 6,230 HUs
- Northern Pike Spawning Habitat Creation: 6 HA and 33,000 HUs
- Walleye Access to Spawning Areas: 0.7 HA and 2,100 HUs
- Watercourse Crossings: The surface area coverage and associated habitat units calculations for these offsetting projects will be developed and provided at a later date during the permitting phase of the Project.

We trust that the above addresses all of DFO's concerns. Please do not hesitate to contact the undersigned should you have any questions or comments.

Sincerely,

<Original signed by>

<Original signed by>

Erin Greenaway
Senior Ecologist

Heather Melcher
Associate, Senior Ecologist

JW/EG/GA/wlm/sk

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Attachment B

Revised Letter from CMC to CEAA; January 24, 2018

January 24th, 2018 (Email only)

Loraine Cox
Project Manager, Ontario Regional Office
Canadian Environmental Assessment Agency / Government of Canada

Subject: Response to Comment from Mitaanjigamiing First Nation regarding Best Management Practices at the Malartic Mine - Hammond Reef Gold Project

Dear Ms. Cox,

CMC has received an email from CEAA (November 24, 2017) regarding a request from the Mitaanjigamiing First Nation for information about Best Management Practices and mitigation measures that are used by CMC at their Canadian Malartic Mine in northern Quebec to reduce environmental effects. This letter is provided in response to this information request.

It must first be understood that the Canadian Malartic Mine and the proposed Hammond Reef Gold Project differ significantly in terms of physical setting and Project context. The Malartic Mine is located within Malartic, a town of approximately 4,000 people, and the mine is located immediately adjacent to residences and human receptors. In contrast, the Hammond Reef Gold Project is located within a relatively remote area with very few potential human health receptors. As such, the level of mitigation required to reduce and limit potential effects will differ between these two Projects.

CMC has extensive experience in mine operation and, in particular, implementation of mitigation measures to reduce impacts to surrounding sensitive receptors. CMC will lean on their experience and ongoing innovation at the Malartic Mine to design and implement appropriate Best Management Practices for the Hammond Reef Gold Project to reduce impacts to nearby receptors. Examples of technologies and Best Management Practices (BMP) that are being employed at the Canadian Malartic Mine and will be considered for the Hammond Reef Gold Project are listed in Table 1 below. Included in Table 1 are references to currently proposed mitigation measures identified in the Version 3 Amended EIS/EA.

The mitigation measures identified in Table 1 have significantly aided in the environmental compliance of the Canadian Malartic Mine, reduced annoyance of the nearby human receptors, and improved relations with the community and regulating authorities. CMC and the qualified professionals and workers at the Canadian Malartic Mine are proud of the innovations and practices that have been developed to protect the environment and to limit impacts to nearby receptors. These same professionals and workers will be able to provide ongoing advice to the Hammond Reef Gold Project team.

CANADIAN MALARTIC CORPORATION

Table 1: Examples of Technologies and BMPs

Technology/BMP	Reference to Version 3 EIS/EA
Noise monitoring and mitigation	Section 6.1.5.2; Table 8-2
Dust and air emission monitoring and mitigation, including NO_x emissions from blasting	Sections 6.1.5.2 and 8.2.2.1, Response to T(3)-01 (see Addendum Table A-1)
Appropriate blasting procedures	Sections 6.1.2.3, 6.1.5.2 and 8.2.2.1, Response to T(3)-07 (see Addendum Table A-1)
Thickening of tailings	Sections 4.2.10, 5.2.4.8 and 5.2.5
Implementation of a public communication and complaint resolution plan	Sections 8.1.3 and 8.3

If you have any questions or comments on the above matter, do not hesitate to contact me by email or at (819) 856-9866.

Regards,

<Original signed by>

Sandra Pouliot
Environment specialist
Canadian Malartic Corporation
spouliot@canadianmalartic.com

c. Pascal Lavoie, CMC Director Environment and Sustainability

Attachment C

Tailings Management Facility – Additional 3D Groundwater Modelling; Mar. 1, 2016

TECHNICAL MEMORANDUM

DATE March 1, 2016 **PROJECT No.** 1408383 3500 3501

TO Cathryn Moffett
Canadian Malartic Corporation **DOC No.** 008 (Rev 0)

FROM Adam Auckland and Devin Hannan **EMAIL** adam_auckland@golder.com

HAMMOND REEF GOLD PROJECT – TAILINGS MANAGEMENT FACILITY, ADDITIONAL 3D GROUNDWATER MODELLING

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) has prepared this memorandum for Canadian Malartic Corporation (CMC) as a basis for further discussion with the Government Review Team (GRT) regarding additional numerical groundwater modelling of the proposed tailings management facility (TMF) at the Hammond Reef Gold Project (the Project). The purpose of the additional groundwater modelling proposed herein is to address concerns raised by the GRT following their review of the Project's Environmental Impact Statement/Environmental Impact (EIS/EA) and responses submitted by CMC to Information Requests (IRs) received after submittal of the EIS/EA. A summary of the GRT concerns and previous responses from CMC are documented in the attached TMF Seepage Issue Tracking Log.

Following a recent Project meeting between CMC, Golder and federal and provincial government reviewers (February 2, 2016), it was agreed that CMC would complete the following:

- Conduct a search for historic borehole data not previously presented or considered in the EIS/EA (e.g., exploration drilling data); and
- Request that Golder develop a scope of work to address the concerns of the GRT for review by and discussion with the GRT.

2.0 BACKGROUND

2.1 Previous Groundwater Modelling of the TMF

In response to comments on the final EIS/EA regarding seepage related impacts to Lizard Lake, a 3D MODFLOW model of the eastern portion of the TMF was developed in 2014 to evaluate the capture efficiency of the proposed seepage collection system and to quantify potential residual seepage rates to Lizard Lake (Golder, 2014). This modelling demonstrated that the assumptions made in the EIS/EA regarding seepage capture were valid but the GRT raised additional concerns about the modelling assumptions and impacts to other potential receivers.

2.2 Government Review Team Commentary

The GRT conducted a review of the TMF modelling and communicated concerns (summarized in the attached comment log). In summary, we understand the key issues / requests to be as follows:

- Address the applicability of the currently available data to adequately characterize the site baseline hydrogeology and, if necessary, collect additional field data.
- Provide a detailed conceptual hydrogeologic model that will serve as the basis for the numerical model. Particular consideration should be given to: 1) granular troughs underlying the TMF and their potential as seepage pathways; 2) hydraulic conductivity assignments, particularly anisotropy, in lieu of heterogeneity observed in borehole logs across the site. The adequacy of the existing slug testing and grain size data as a basis for characterizing the hydraulic conductivity is also questioned.
- Develop a more regional-scale model that encompasses the entirety of the TMF, as opposed to just the eastern flank.
- Conduct a model calibration using baseline data.
- Based on the expanded domain, estimate the amount of seepage by-pass to downgradient receptors other than Lizard Lake, for example, Sawbill Bay and smaller water bodies around the perimeter of the TMF.
- Quantify the proportion of seepage occurring below the TMF base versus through the TMF dams.
- Consider all project phases from baseline to closure.
- Conduct a sensitivity analysis to examine the potential range of seepage rates emanating from the TMF.
- Evaluate potential environment impacts to all receiving water bodies.

3.0 ADDITIONAL GEOTECHNICAL DATA

Following the meeting with the GRT on February 2, 2016, a search was completed for additional geotechnical data in the area of the TMF that was not available or considered in the previous groundwater modelling analysis. This search resulted in the following information:

- Sixty (60) exploration/condemnation boreholes within the footprint of the TMF facility (Figure 1). These holes do not provide detailed stratigraphy of the overburden but do indicate depth to bedrock, allowing for improved characterization of the underlying bedrock surface.
- Five (5) detailed geotechnical boreholes (BH13-1 to BH13-5) completed in 2013 along the proposed TMF dam alignment (Figure 1).
- The attached report entitled '*Surficial Geology update of the Golden Winner area; sedimentology and stratigraphy of glaciofluvial deposits and recommendations for recce samples*' prepared in 2010, including overburden characterization of seven (7) sampling trenches within the TMF footprint (Figure 1).

This information will be integrated with the existing data to provide an improved basis for the proposed scope of work to address the concerns of the GRT.

4.0 PROPOSED SCOPE OF WORK

Golder proposes to address the GRT concerns through the expansion and refinement of the current groundwater model as well as integration of the above identified data. The proposed scope of work will consist of the following:

1) **Model Domain Expansion.** Expand the model domain to include the entirety of the TMF and delineate the extents based on regional hydrologic boundaries. This will allow for the simulation of a comprehensive site groundwater budget and TMF seepage tracking to all collection systems and potential downgradient receptors.
2) **Overburden Isopach Development.** Incorporate additional data (as identified in Section 3.0) and regional surficial geology mapping with previously used logs to develop a detailed overburden isopach underneath the TMF. In our view the incorporation of this additional data, which provides good coverage over the TMF footprint, negates the need for additional boreholes. External to the TMF, where overburden data may not exist, the isopach will be extended into the broader model domain based on conservative assumptions (for example, assuming lateral continuity at an appropriate uniform thickness).
3) **Hydraulic Conductivity Review.** Review hydraulic conductivity data within the model domain. Discrete hydraulic conductivity zones may be developed if the data suggests significant heterogeneity exists across the site. If anisotropy is not clearly supported by either the data or calibration effort (below), an isotropic system may be conservatively assumed. In our view the existing slug testing and grain size analysis results provide for a reasonable means to characterize hydraulic conductivity and additional testing is not warranted. In any event, the model sensitivity to a range of hydraulic conductivities will be tested during sensitivity analysis (described below).
4) **Calibration.** Model calibration typically involves adjusting initial model input parameters within a reasonable range until simulated results reasonably approximate field observations. The model will be calibrated in steady-state to average water levels at monitoring wells within domain. In addition, stream / baseflow data may be considered, depending on the gauge location relative to the model domain. Finally, a base case, pre-TMF groundwater flow budget will be derived based on the calibrated model output. It is likely that an iterative, trial-and-error approach to calibration will be employed as per ASTM D 5490- 93 (Reapproved 2002) *Standard Guide for Comparing Ground-Water Flow Model Simulations to Site-Specific Information.*
5) **Project Phase Analysis.** The modelling will consider two phases of Project development: 1) current conditions (i.e. pre-TMF baseline) – this is the calibrated model described above; and 2) TMF during operational phase at full build-out. The operational phase at full build-out considers the period where impacts are expected to be maximal because the aerial extent of the tailings stack and elevation of the reclaim water pond will be at their highest. From an environmental impact perspective, detailed evaluation of the construction, closure, and post-closure phases is not considered necessary for the following reasons:
    a. **Construction** – During construction, no tailings placement will occur and no water will be stored within the TMF, therefore no change to existing conditions is expected.
    b. **Closure** – At closure, tailings deposition and discharge of process water to the TMF reclaim pond will cease and TMF water is expected to improve with time (see Site Water Quality TSD, pp 106). Consequently, both the potential for seepage and its associated environmental impact will decrease with over time given that the tailings are non-acid generating with excess neutralizing capacity (See Geochemistry TSD). Furthermore, as indicated in Section 4.2 of the Conceptual Closure and Rehabilitation Plan TSD, seepage will continue to be collected and

pumped back to the TMF until it is determined that the seepage water quality is suitable for release. At such time, the active seepage collection system will be decommissioned.

c. **Post-Closure** – During the post-closure period, seepage water quality will have been deemed to be suitable for discharge and the TMF reclaim pond spillway will be lowered, reducing the potential for seepage.

6) **Groundwater Flow and Seepage Simulation.** Groundwater conditions during the TMF operational phase at full-build out will be simulated. A comprehensive flow budget will be developed based on the model output. Particle tracking will be employed to illustrate seepage pathways. Seepage rates emanating from the TMF vertically through the base and laterally through the flanks / dams will be discretely quantified. Discharge to seepage collection systems and further downgradient receptors will be assessed using the zone budget utility in the modelling software. Additional mitigation or modifications to the presently proposed seepage collection system may be identified during this analysis.

7) **Sensitivity Analysis.** A sensitivity analysis will be performed to establish an upper bound on results by varying select input parameters within a reasonable range about the base case input value. Golder will seek the Government Review Team's opinion in selecting parameters to test during the sensitivity analysis. Currently, we feel that recharge rates, and hydraulic conductivities/anisotropies of tailings, overburden and weathered bedrock may be potential candidates for analysis. For the purpose of scoping, we have assumed four (4) variables will be examined. Model calibration is not planned to be re-assessed during this task.

8) **Environment Impacts.** The potential impacts to the water bodies receiving TMF seepage will be re-assessed based on the predicted residual seepage rates and TMF seepage water quality. This scope of this assessment will only include Lizard Lake and Sawbill Bay. Aquatic habitat in the smaller lakes and streams around the perimeter of the TMF has already been determined to be 'impacted' by the project due to loss of inflow (due to watershed reduction) or loss of connectivity to larger water bodies. As a result, these water bodies have been included in the No Net Loss/Fish Habitat Offset Plan and compensation for the loss of habitat is planned (see Part B of the Version 2 Aquatic Environment TSD).

9) **Report**. A report documenting model conceptualization, construction, calibration, TMF seepage collection mitigations applied, predictive analysis, sensitivity analysis and conclusions will be provided as a supporting document to the responses to Information Request T(3)-08.

5.0 CLOSURE

We trust that this memorandum serves as sufficient foundation for further discussions on refining a path forward to fully satisfy the requirements of the Government Review Team. Please contact the undersigned if you have any questions.

Prepared by:

<Original signed by>

Adam Auckland, M.Sc., P.Eng.
Project Manager, Water Resources Engineer

Reviewed by:

<Original signed by>

Devin Hannan, P.Eng.
Associate, Environmental Engineer

DAH/AA/sk

Attachments:

Figure 1 – Available Subsurface Information in the TMF Area

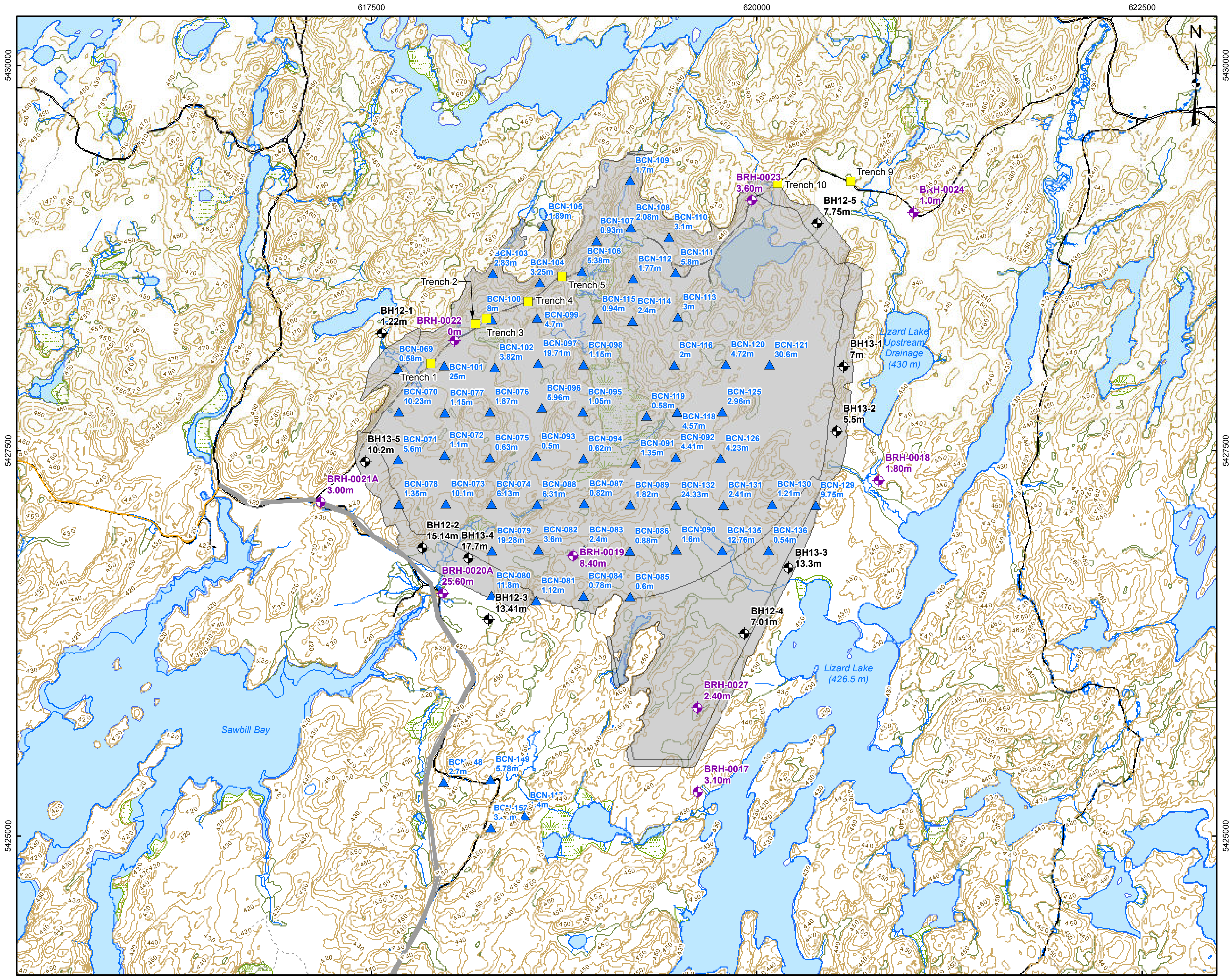
Report - '*Surficial Geology update of the Golden Winner area; sedimentology and stratigraphy of glaciofluvial deposits and recommendations for recce samples*'

TMF Seepage Issue Tracking Log

REFERENCES

Golder, 2014. *Technical Memorandum: Osisko Hammond Reef Gold Project – Tailings Management Facility, 3D Groundwater Modelling.* 13-1118-0010 (5008). May 27, 2014.

n:\active\2014\1188\1408383-cm -hammond reef ea follow-up\3500 - water quality\3501 - tmf seepage\work scope memo\1408383_doc008_tmf modelling work scope memo_1mar2016.docx



LEGEND

- Index Contour (5m interval)
- Ditch
- Marsh/Swamp
- River/Stream
- Road
- Trail
- Lake
- Wetland
- Osisko Exploration/Condemnation Borehole (Overburden Thickness Labelled)
- Hydrogeological Borehole (Overburden Thickness Labelled)
- Geotechnical Borehole (Overburden Thickness Labelled)
- Surficial Geology Study Investigation Trench
- Mine Site Road
- Access Road (Hardtack / Sawbill)
- Tailings Management Facility

DRAFT

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.
Base Data - MNR NRVIS, obtained 2004
Produced by Golder Associates Ltd under licence from Ontario Ministry of Natural Resources, © Queens Printer 2008
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 15N

500 0 500
SCALE 1:25,000 METERS

PROJECT
HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE
AVAILABLE SUBSURFACE INFORMATION IN TMF AREA

Golder Associates
Mississauga, Ontario

PROJECT NO. 1408383			SCALE AS SHOWN	REV. 0
DESIGN	CGE	14 Nov. 2008	**FIGURE: 1**	
GIS	CGE	25 Feb. 2016		
CHECK	AA	25 Feb. 2016		
REVIEW				

G:\Projects\2013\13-1118-0010_Osisko_Hammond_Reef\GIS\MXDs\Reporting\Hydrogeology\1408383_TMF_Sampling\GeneralArrangement_TMF.mxd

Surficial Geology update of the Golden Winner area: sedimentology and stratigraphy of glaciofluvial deposits and recommendations for recce sampling.

Stea Surficial Geology Services

Photo. Looking eastward from a granite ridge into the valley south of the Golden Winner prospect; lowland areas covered by thick outwash deposits.).

Surficial Geology update of the Golden Winner area: sedimentology and stratigraphy of glaciofluvial deposits and recommendations for recce sampling

Prepared for:
BRETT RESOURCES INC.
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B3R 1Z1

June 10th, 2010

Table of Contents

Introduction

In the spring of 2010 Stea Surficial Geology Services was contracted by Brett Resources Inc. to conduct a pilot sampling study on the area surrounding the Golden Winner property on the northern part of the Hammond Reef claim areas (Map 1). This area is characterized by a broad basin and numerous granite-cored ridges and hills, in which the basin is host to thick glaciofluvial deposits and muskeg (Stea, 2009a). The purpose of this study was to:

1 Assess the sedimentology and stratigraphy of glaciofluvial deposits and the potential of sampling glaciofluvial deposits for gold content.

2. Ascertain if it is possible to sample topographic highs for locally-derived glacial till.

In the initial mapping (Stea, 2009a) this area was not extensively surveyed, so it was not known whether glaciofluvial deposits covered some or all of these hills. If it can be shown that this is not the case, these hills would be useful sites for sampling during a planned reconnaissance till sampling survey as envisioned by Stea (2009b).

Methods

Forty-three sites were examined over 6 days at the site (Appendix 1; Map 1). Thirty two ~8-10 kg samples were taken at selected locations of both till and glaciofluvial/glaciolacustrine sediments (Appendix 1; Map 1). These samples were taken to quantitatively assess the properties of the sediments including grain size and lithology, but most importantly, to investigate the heavy mineral fraction for economic mineral content. Several samples were obtained from tills near and down-ice of the main Hammond Reef showing as a check that local gold mineralization is represented in till samples and to assess what other indicator mineral types may be best suited for regional exploration.

In order to understand the thickness, extent and origin of the glaciofluvial deposits in the broad basins north of the main Hammond Property a trenching program was begun. A large excavator was used for this purpose. Unfortunately, ATV trails at present have access to only the small part of the Golden Winner basins. .

Samples were sent for evaluation of free gold content to Overburden Drilling Management Limited in Ottawa, Ontario (ODM; results pending).

Results

Hills in the Golden Winner area vary from 20-50m in height and have the form of drumlins (inverted spoon shaped hills, streamlined by ice action), ridges and knolls. Sampling of the topographic highs in the Golden Winner property produced some interesting results. Generally the topographic highs were dominated by moss-covered granite outcrop. Enclaves of sediment were found in areas between granite bedrock knobs, often marked by poplar stands. The sediment was either a stony sandy diamicton (till) or silty-fine sand sediment without stones, or both (Map 1). In some localities the till was found underneath the fine-grained sediment. The origin of the fine sediment is uncertain, but it is thought to be a deep water lacustrine facies of glaciolacustrine deposition in Glacial Lake Agassiz.

In addition to sampling topographic highs a trenching program was initiated. Five trenches were dug across the eastern part of the basin and five in the western part (Map 1; Figs. 1, 3). In the western basin an ATV trail runs at the base of a prominent granite scarp. Five trenches were dug along this trail in what was originally mapped as till and glaciofluvial sediments (Stea, 2009a). In all five trenches glaciofluvial sediments were encountered, with Trench 1 exceeding 5 meters in thickness. The main sediment facies encountered were:

1 Parallel-laminated medium to coarse sand with graded beds (Trench 1) becoming finer at depth (Trench 1; Figs. 1, 2)

2. Coarse, matrix-supported gravelly sand with boulder-cobble facies. Well rounded granite boulders becoming larger to the west, exceeding one metre in diameter in some cases (Figs. 1-4).

In Trenches 2-5 granite bedrock was encountered at depths between 3 and 5m (Fig. 1). Approximately 20-40% of the cobbles/boulders were thought to be locally derived tonalitic granitoids, but there were also a high percentages of reddish syenite-or syeno-granite (which may also be locally derived) and ~10-20% mafic and felsic volcanic and metasedimentary erratics.

The eastern transect (Trenches 5-10) encountered both glacial till and glaciofluvial sediments. Till areas (Trenches 6, 7, 10) revealed a stony, sandy, matrix-supported diamicton (till) with a bouldery surface layer (Figs. 3, 4). A quasi-layering was observed in the till at Trenches 6 and 7. Granite bedrock was encountered at between 2-4m depth in all these trenches. Till samples were obtained at the till/bedrock interface in all these trenches (Fig. 4). Thick glaciofluvial sediments were seen at Trenches 8 and 9 (Figs 3, 4), with similar facies to the eastern basin with the addition of cross-bedded, coarse sand. Stea (2009a) suggested a subareal deltaic origin for these glaciofluvial sediments, but the lack of identifiable surface landforms (moraines/delta-fans), the presence of fine-grained

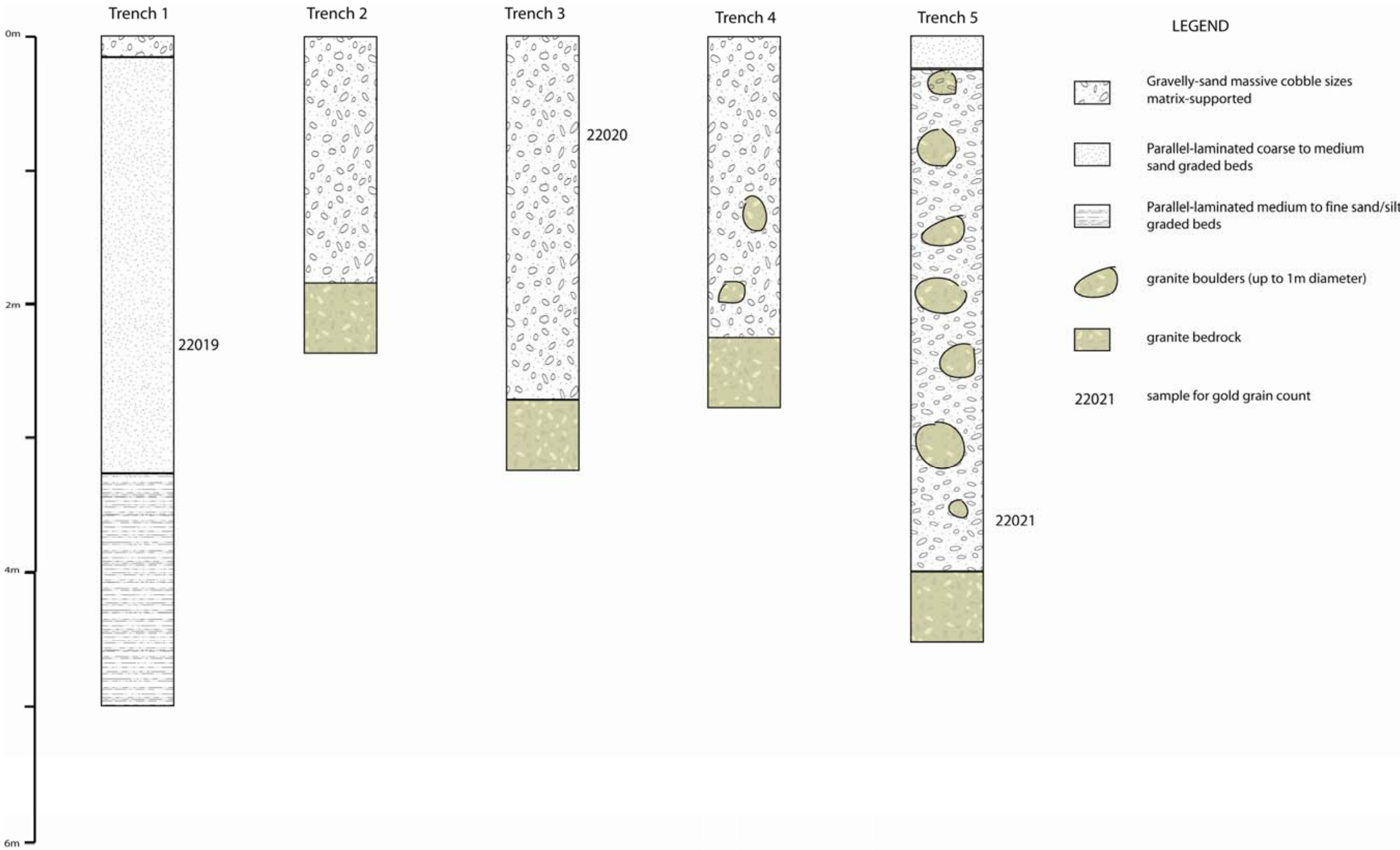


Figure 1. Trench sections along the western portion of the glaciofluvial basin in the Golden Winner property (Map 1-trench locations)

Figure 2. A Trench 1. B. Trench 1 sand facies C. Trench 2 bouldery facies D. Large rounded boulders Trench 5

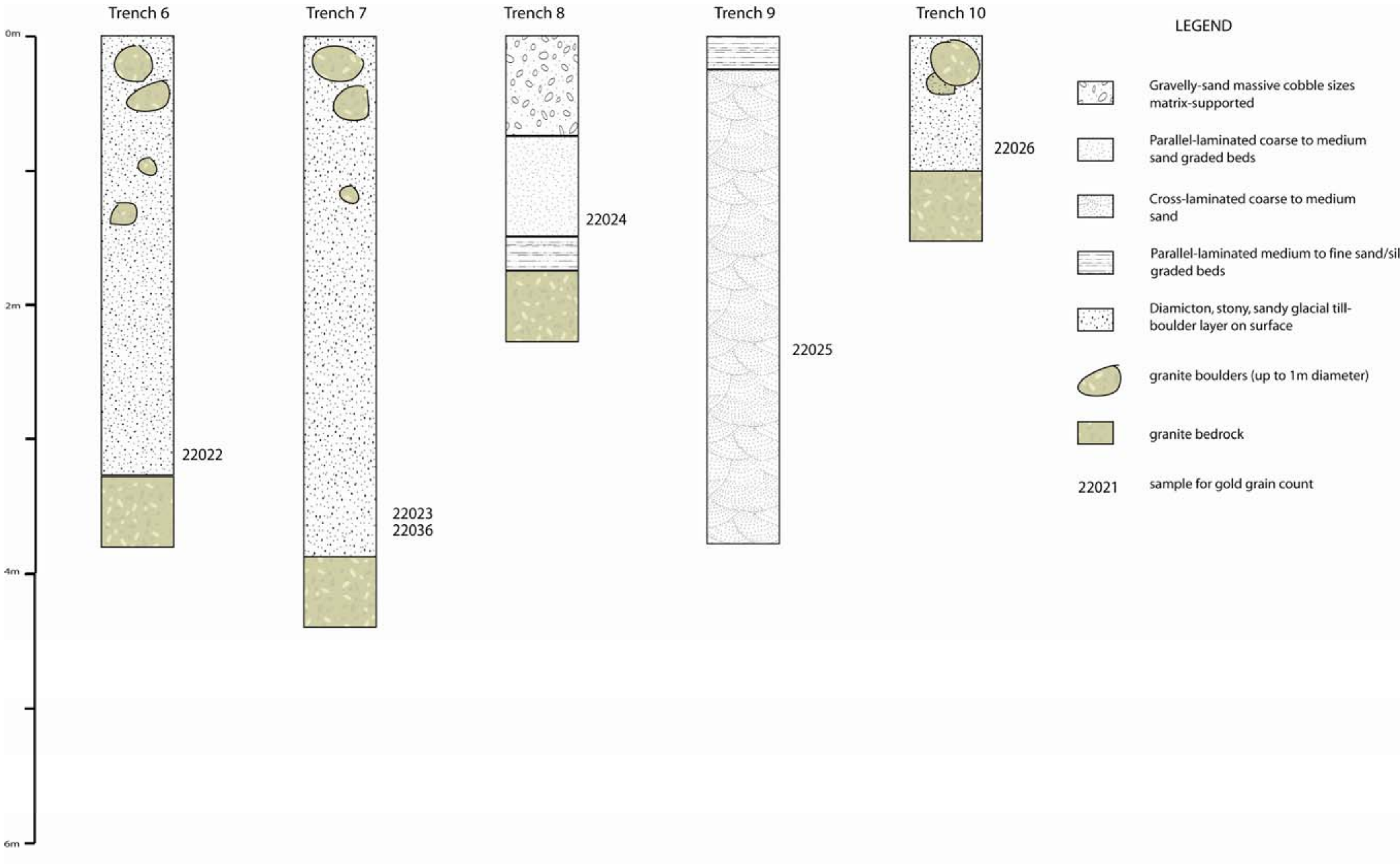


Figure 3. Trench sections along the eastern portion of the glaciofluvial basin in the Golden Winner property (Map 1-trench locations)

Figure 4 A. Bullet boulder in till indicating basal lodgement process Trench 6 B. Trench 8 C. Trench 9 sand D Trench 7 sampling till

sediments (rhythmites), complex sedimentology, and the evidence of deep water lacustrine facies on topographic highs suggests that the glaciofluvial sediments are facies of subaqueous outwash or grounding-line fans (Rust and Romanelli, 1975; Powell and Domack, 1995). These sediments were deposited by subglacial streams at the base of a glacier, into a flanking glacial lake (Glacial Lake Agassiz).

Recommendations

The para-autochthonous nature and thickness of glaciofluvial sediments in the lowland portions of the Golden Winner area make sampling of these sediments as a reconnaissance exploration tool for local gold deposits problematic. Glaciofluvial sediment samples obtained in the western basin trench transect are all down-ice of the Golden Winner prospect so these conclusions are tentative until the gold count results are in. Theoretically, the subglacial streams that deposit subaqueous outwash, are deriving a lot of material from the basal zone of the glacier base which should be locally derived. However, unlike till, which is essentially crushed bedrock, the complex sedimentology of subaqueous outwash renders the possibility of discerning a dispersal fan of gold concentrations from an up-ice ore body less likely. Conventional soil sampling on the surface of these deposits seems an even more problematic venture.

Sampling topographic highs in the area may be a better alternative as locally-derived glacial till is a common sediment found as a discontinuous veneer on these highs. The purpose of a recce survey is to eliminate barren ground, so till sampling is preferred over soil sampling because of the large dispersal fans produced from moderate sized ore bodies (Stea, 2009a). Silty-sand deposits found on some highs may be a masking allochthonous sediment, but till can be found under these sediment veneers in most cases, and digging is relatively easy. Soil sampling can also be considered, but the effect of the lacustrine sand veneer covering some of these highs on soil results is unknown.

The ubiquity of outcrop in both lowland and highland areas of Golden Winner makes prospecting and lithogeochemical sampling an important tool.

In this study and the earlier 2009 sampling survey the author sampled several trenches near and within the Hammond Reef orebody and obtained substantial gold counts in till. It seems like a good opportunity while the trenches are open to re-sample these sites in more detail using both till and conventional soil samples within the same profiles. Differing till fractions can be analyzed to determine if a cheaper analytical method can be used and the geochemical relationships of soil, till and bedrock can be better established.

Some practical sampling recommendations. Existing trails should be cleared to get better ATV access to sites like Golden Winner. Map 1 shows only accessible trails. All others in the Brett resources trail database tested by the author were proven to be non-existent or impassable. In order to gain access for till and rock sampling of more remote muskeg-dominated parts of Golden Winner the company could consider the use of an ARGO eight wheel transport vehicle which can take three or four geologists across bog areas with little difficulty and carry lots of cargo.

References

Powell, R. D., and Domack, E., 1995 Modern glacimarine environments *in Modern glacial environments processes, dynamics and sediments*, Butterworth, p. 445-486

Rust, B. R., and Romanelli, R., 1975, Late Quaternary subaqueous outwash deposits near Ottawa, Canada, *in Glaciofluvial and glaciolacustrine sedimentation* SEPM special publication, 23, p. 177-192.

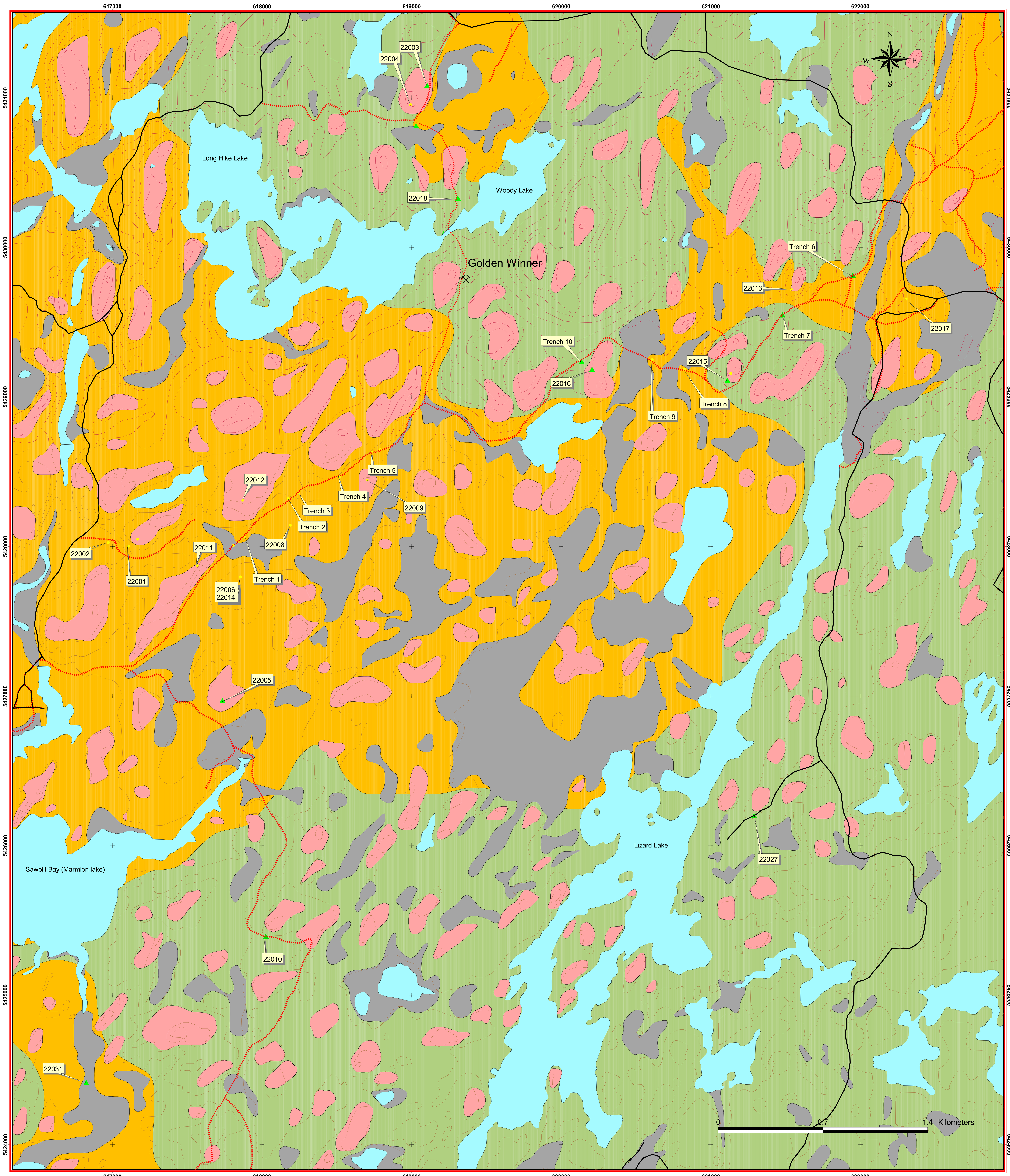
Stea, R. R., 2009a Surficial Geology of the Hammond Reef Property, West-Central Ontario. Internal report Brett ResourcesInc.28p.

Stea, R. R., 2009b Till sampling pilot study on the Hammond Reef Property, West-Central Ontario. Brett Resources Inc (addendum); Internal report Brett resources Inc. 12p.

Appendix 1:

Terrain Unit		Strat unit	Sed description
Tb	Till blanket >10 m thick masking bedrock structure	Unit 1- basal till lodgement-meltout	sDmm sandy diamicton-till matrix support
Tvd	Till veneer discontinuous <2m thick topography controlled by bedrock	Unit 2 - englacial/ablation till	sDmc sandy diamicton-till clast support
GFb	Glaciofluvial- blanket- >20m thick		BGSc -bouldery gravelly sand clast support
GFvd	Glaciofluvial- veneer discontinuous <2m thick		m-f S medium to fine sand
			F/Dmm silt+clay over till
BR	bedrock		

SAMPLE_NUM	STOP_NUMBE	NORTHING	EASTING_	TERRAIN_UN	STRAT_UNIT	SED_DEST	STRIAE	STRI	PHOTOS	COMMENTS
22001	BR-10-1	5427999.90	617106.84	GFvd	GF	S-m-f			2	Fine to medium sand discontinuos vener over granite knobs
	BR-10-2	5428048.16	617168.81	GFvd	GF	G-S			2	Gravelly-sand btween bedrock knobs of granite-
22002	BR-10-3	5428024.53	616972.72	GFvd	GF	ROCK			3	Bedrock exposed in tree throw quartz vein
22003	BR-10-4	5431082.67	619103.81	Tvd	Unit 1	Dmm			2	glacial till with 10cm sand veneer
	BR-10-5	5430812.98	619029.77	Tvd	Unit 1	Dmm			1	glacial till abundant in hollowsma few isolated granite knob
22004	BR-10-6	5430952.65	618994.48	GFvd/Tvd					2	top of rock drumlin veneer of sand/silt over till over bedrock.
22005	BR-10-7	5426969.13	617734.47	Tvd	Unit 1	Dmm			2	till veneer discontinuous top of knob wet hole.
	BR-10-8	5428006.17	617808.77	GFb	GF	G-S			2	gravelly-sand in low area near swamp
22006	BR-10-9	5427794.74	617857.78	GFb	GF	G-S			2	top of hig spot-flat area-poplars
22014	BR-10-9	5427794.74	617857.78	GFb	GF	G-S			2	top of hig spot-flat area-poplars
22007	BR-10-11	5428319.47	618174.94	GFb	GF	G-S			2	borrow pit polymictic gravel >4m thick gr-mafic, metased, gneiss mineralized granite
22008	BR-10-12	5428141.65	618188.25	GFv	GF	G-S			2	top of small knob -outcrop nearby
22009	BR-10-13	5428443.48	618702.33	GFvd	GF	m-fS			2	top of high knob in GF terrain medium to fine sand with 30& silt lacustrine?
	BR-10-14	5428645.04	618789.74	GFb	GF	G-S			2	road cut large rounded boulders Gf
22010	BR-10-15	5425392.41	618025.60	Tb	Unit 2	Dmm			2	road cut till deposit, melt-out till washed layers clay skins
	BR-10-16	5427862.22	617595.52	BR	BR	BR			4	top of high ridge granite outcrop 40m cliff.
22011	BR-10-17	5427871.30	617566.50	GFvd	GF	m-fS			3	top of high ridge granite outcrop area between outcrops silt!!!.
22012	BR-10-18	5428308.48	617871.61	GFvd	GF	m-fS			2	top of knoll silty sand material few cobbles wet hole 2m
22013	BR-10-19	5429718.56	621538.73	GFvd	GF	m-fS			2	top of knoll, bedrock oucrop around, silty-sand well sorted poor B
22015	BR-10-20	5429110.65	621111.14	Tvd	Unit 1	Dmm			2	halfway up slope till exposed in hole well developed B/C transition
	BR-10-21	5429157.39	621134.83	GFvd/Tvd					2	Silty sediment thin overlying till at top of knoll among bedrock outcrop
22016	BR-10-22	5429184.06	620206.02	Tvd	Unit 1	Dmm			3	great transitions from B/C till well developed
22017	BR-10-23	5429654.52	622306.03	GFb		m-fS/F				delta exposure fine grained beds sampled to compare with knoll silt.
	BR-10-24	5430090.49	619214.30	Tvd					3	end of atv acess at Woody lake-
22018	BR-10-25	5430327.85	619309.38	Tvd	Unit 1	Dmm			2	bouldery diamicton near granite outcrop
	BR-10-26	5431235.96	620609.09							no access by atv along trail
	BR-10-27	5432242.86	618704.95							BOAT ACCESS Claw Lake
	BR-10-28	5430917.08	617574.73							BOAT ACCESS Long Hike Lake
	BR-10-29	5428787.05	621913.23							BOAT ACCESS LIZARD LAKE
22019	BR-10-30	5428065.75	617885.27	GFb	GF	m-fS			4	Trench 1 me-f S conformably bedded graded beds-lacustrine 5m+ deep
22020	BR-10-31	5428356.24	618246.32	GFb	GF	G-S			3	Trench 3 3.5 me cobbly gravelly sand lage angular gr bldrs near bedrock 3.5m
	BR-10-32	5428466.18	618516.53	GFb	GF	G-S			2	Trench 4-bouldery gravelly sand -g-s matrix, bedrock 3.5m.
22021	BR-10-33	5428631.04	618735.59	GFb	GF	G-S			4	Trench 5-bouldery (1-2m d) gravely sand overlain by m-fS, bedrock 4m.
22022	BR-10-34	5429813.02	621949.68	Tb	Unit 1	Dmm			3	Trench 6 3.5 m of till overlyinh granite bedrock big glacial bullet boulder
22023	BR-10-35	5429547.10	621479.53	Tb	Unit2?	Dmm			3	Trench 7 Stony sandy consolidated till granite clasts quasi-layered/bedrock 4m
22036	BR-10-35	5429547.10	621479.53	Tb	Unit2?	Dmm			3	Trench 7 Stony sandy consolidated till granite clasts quasi-layered
22024	BR-10-36	5429182.52	620824.54	GFb	GF/GL	BGS/c-mS			3	Trench 8 Bouldery GS overlying medium sand parallel lam, then fine sand/silt/bed 3m
22025	BR-10-37	5429247.27	620608.39	GFb	GF/GL	m-fS/cS-GS			2	Trench 9 Medium-fine sand overlying par lam coarse sand-granules, x-beds, local
22026	BR-10-38	5429235.75	620135.77	Tvd	Unit 1	Dmm			3	Trench 10 Sandy stony till 2m over bedrock local derviation
22027	BR-10-39	5426198.65	621288.30	Tvd	Unit 1	Dmm			2	Old borrow pit, vener os sandy till over granite bedrock
22028	BR-10-40	5422200.28	615060.46	Tvd					3	Hole 20" good B 40cm, Till stony,sandy olive grey
22029	BR-10-41	5422149.98	614631.55	Tvd	Unit 2	Dmm	206		3	trench for bedrock sampling Hammond reef infill hollow
22030	BR-10-42	5422490.33	614039.29	Tvd	Unit 2	Dmm			3	trench for bedrock sampling Hammond reef infill hollow
22031	BR-10-43	5424414.91	616825.21	Tvd	unit 1	Dmm			3	hole 40 inches deep B hor BC/ till



LEGEND

HOLOCENE NONGLACIAL ENVIRONMENT

Terrain Unit and Significance to Mineral Exploration

Organic Terrain:
(deposits of peat laid down in areas of high water table)

Areas where peat and muck are greater than 1m, constituting bogs and muskeg, low-lying floodplains (peat underlain by sand) and lake shore swamps. Significant detriment to exploration due to masking effect of thick organic material and creation of false anomalies by spurious concentration of metals.

PLEISTOCENE GLACIAL ENVIRONMENT

Subaqueous outwash and associated glacio-lacustrine facies:
(deposits of sand and gravel formed at a glacier margin where subglacial meltwater streams empty into glacial lakes).

Sand and gravel deposits are found in broad valleys at the head of Marmion and Finlayson Lakes. Thicknesses vary widely from >10m to less than 1m and bedrock is exposed sporadically. These deposits consist of subaqueously deposited, parallel-laminated, graded beds of coarse/fine sand and coarse open-work gravels interbedded with high energy bouldery, gravel deposits. Deposits are considered detrimental to geochemical prospecting because of far-travelled material diluting a local bedrock signature. Sand deposits are probably more extensive than mapped.

Till Veneer-Discontinuous:
(unsorted deposits of boulders/gravel/mud deposited directly by a glacier;
basal facies formed near base of glacier,
ablation facies from debris higher in the ice)

Bedrock outcrop interspersed with deposits of till, 10-80% outcrop. Topography controlled by bedrock. Till is divisible into two facies: Unit 1- silty-sandy, locally -derived basal facies; Unit 2: Bouldery sandy ablation facies with high erratic content. Terrain is suitable for prospecting and geochemical/geophysical surveys as local bedrock is either at surface or within 1m, buried by a locally-derived till. Soil may be too thin for sampling. Occasional deposits of thick ablation till may mask local bedrock.

Bedrock with sediment veneer:
(bedrock scoured by ice and meltwater action, remnants of till and glaciolacustine silt in hollows between bedrock knobs.

Bedrock outcrop or moss/boulder covered outcrop, with a thin, discontinuous cover of till and glaciolacustrine sediment . A period of intense meltwater flow may be indicated and may account for the lack of sediment cover. Terrain suitable for prospecting because bedrock is ubiquitous. Soils may be thin or absent.

Symbols

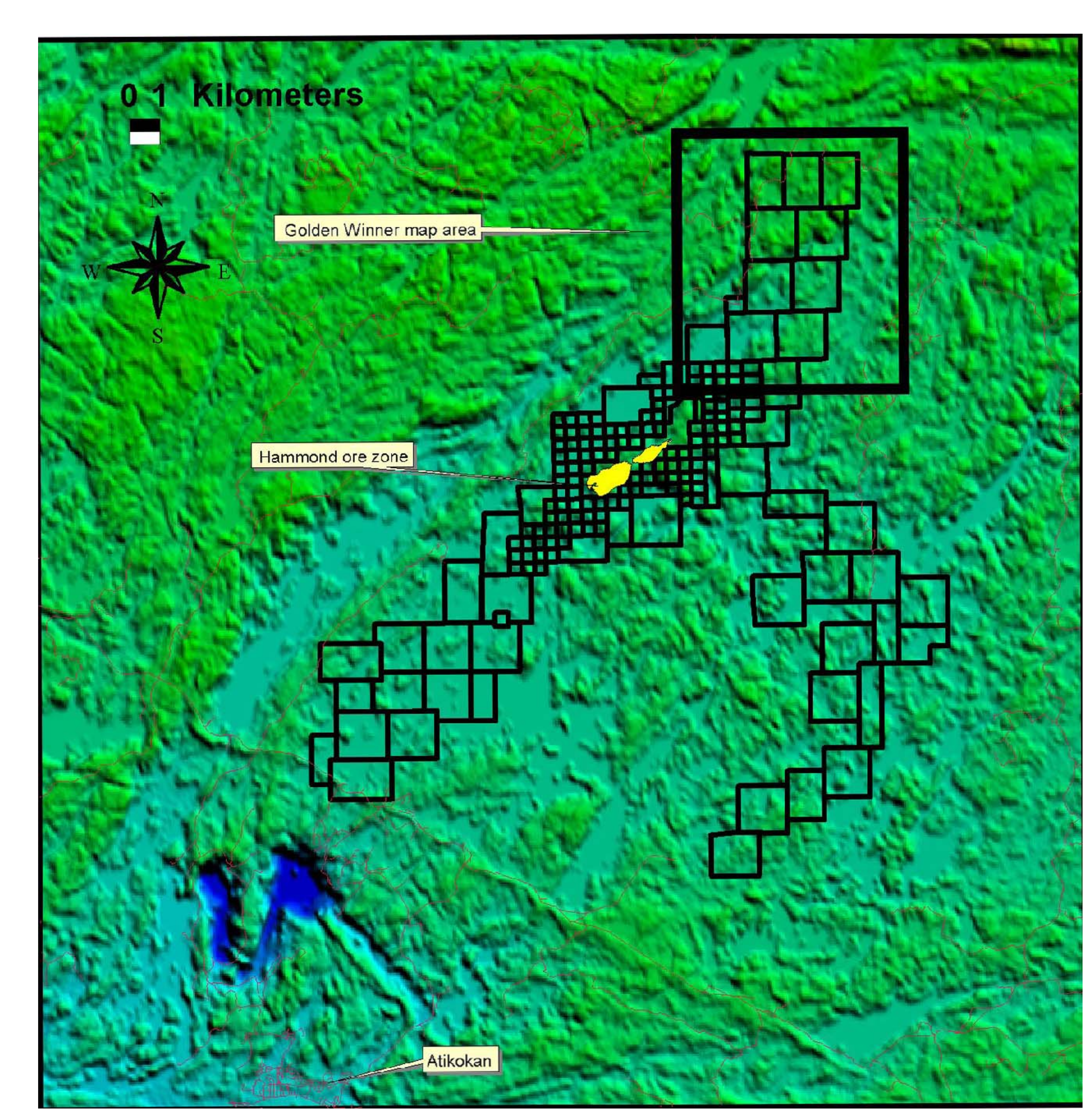
Trails accessible by ATV

Truck accesible roads

Trench 2 — Trench site- 2010 survey glaciofluvial sediments -sample number on accomapnying figure

22019 — Sample site- glacial till sample number

Golden Winner prospect (gold)



Stea Surficial Geology Services

Surficial Geology of the Golden Winner prospect area, Hammond Reef Property (Brett Resources Inc.)

Universal Transverse Mercator
North American Datum 1983

Scale 1:10,000

IR1

Ref #	Summary of Comment	Information Request	CMC Response
T-39	An essential component of all numerical hydrogeological models is a sensitivity analysis. Such an assessment of the proponent's water balance model is absent, but presumably could be conducted in order to assess the sensitivity of the water balance model to variations in input parameters. All models, including the one utilized by the proponent are subject to error. The proponent states in the response to NRCan-8 that "In the water balance model all runoff and seepage is captured and the mass is therefore included in the final discharge water quality…", indicating that in order for model results to be valid, all seepage must be collected. In order to collect all seepage, the proponent will need to quantify seepage beneath the TMF and determine the proportion of seepage below the TMF versus through dams. This information will be needed in order to develop an appropriate seepage collection system at the detailed design phase. For example, if a significant amount of seepage occurs beneath the TMF, then the proponent will need to take measures to reduce seepage beneath the TMF (e.g. liner) and/or collect seepage via pumping wells that intercept this flow.	Provide an evaluation of the accuracy of the water balance model used to evaluate potential for near surface versus groundwater water quality influence, including a sensitivity analysis of the model to varied input parameters. Provide clarification on the seepage collection system. Specifically, will pumping wells be utilized to collect seepage from underneath the TMF? If not, please provide justification for this decision. Estimate seepage losses from the TMF, WRMF, PPCP and overburden storage using the groundwater model. Assess the effectiveness of the proposed seepage control measures, and assess the potential impact of seepage discharge to receptors.	In response to comments received on the Final EIS/EA Report, Canadian Malartic Corporation hosted a water quality workshop on April 28, 2014 with the Government Review Team. We also initiated communications with the Regional Groundwater Group Leader for MOE's Northern Region who stated on May 15, 2014 that upon further clarification he is "satisfied at this time with the estimates of seepage to Lizard Lake." Measures to limit, prevent and collect seepage from the TMF, WRMA, ore, low-grade ore, and overburden stockpiles have been developed at the conceptual level only at this time and consist of a series of collection ditches, and pumping stations. There are many proven ways to intercept seepage from a given site. During the detailed design stage for the Project additional drilling will be undertaken along the dam alignments, ditch alignments and near the edges of proposed stockpiles, and at that time it will be appropriate to further specify the details of the seepage collection system design. Considerations during detailed design will include bedrock and depth of overburden conditions, and use of pumping; however it is not possible for Canadian Malartic Corporation to fully define these measures at a detailed design level without appropriate funding and Project EIS/EA approval.
	In the proponent's response to MOE's comment, it is noted that 10% of the seepage reporting to the collection system along the east side of the TMF would likely report to Lizard Lake (a total of 227 m3/day of seepage). However it is not clear what impact this would have on Lizard Lake. This information will be necessary to have a clear understanding of what the effects of seepage will be on water quality in the receiving environment, as well as inform the design of mitigation to intercept seepage, and any monitoring networks.	Provide a determination of seepage below the TMF versus seepage through dams. Identify contingency plans and mitigation measures if seepage beneath the TMF is greater than initially predicted. Provide a more detailed assessment of the impacts to Lizard Lake, which should be based on a more suitable and defensible estimate of seepage from the TMF to Lizard Lake.	As all incident water is accounted for in the receiving waters, it is immaterial whether the water flows through the dams or beneath the TMF. Further detail regarding the conservativeness of the water quality modelling approach is in the memorandum entitled 'Water Quality Background Information', provided as Attachment 4 of the Final EIS/EA Report Addendum. The water quality of seepage has been predicted and assessed in the Final EIS/EA Report. All infiltration from Project facilities was assigned a water quality (as identified and discussed in the responses to information requests from the Draft EIS/EA Report) and direct discharge of this water from the facilities was evaluated. Infiltration water is expected to be compliant with applicable MMER and O. Reg 560/94 criteria. In addition, concentrations for each potential point source were considered (as part of IR-MOE-NR-GW-16 in Appendix 1.IV of the Final EIS/EA Report) and it was found that direct discharge of these concentrations into a water body would not result in adverse aquatic impacts. The water quality assessment considered sensitivity in relation to flows and water quality as provided in both the Site Water Quality TSD (Section 4.3) and the Lake Water Quality TSD (Section 4.2 and 4.3.2). The sensitivity analysis considered a range of flow conditions ranging from 100-year dry to 100-year wet and "average" case and "upper bound" water quality scenarios (using 75th percentile values for chemistry inputs). It is considered that the sensitivity model runs as provided are appropriate since they are based on measured and modelled data developed following standard procedures such as those provided in MEND 2009 and GARD, 2012. At the request of the Government Review Team, additional 3D groundwater modelling efforts were undertaken for the eastern portion of the TMF. The preliminary 3D groundwater model was constructed using available information and, through this evaluation, it was shown that capture of greater than 90% of seepage could be achieved by the proposed control system given the current TMF design configuration and the current understanding of the tailing properties and geologic conditions of the site. Further details of this modelling evaluation are provided in the memorandum entitled 'Tailings Management Facility, 3D Groundwater Modelling' provided as Attachment 3 of the Final EIS/EA Report Addendum. In light of the results of the newly undertaken groundwater modelling, it is considered that the assumed seepage capture efficiency is realistically achievable based on the conceptual design. During the detailed design stage additional information collected will be used to develop a more robust modelling evaluation to refine and optimize the design of the seepage collection system. It is the intent of Canadian Malartic Corporation to work with the design engineers and the applicable regulatory agencies to ensure that future data collection and the development of predictive models will meet both the requirements of engineering design and needs of the agencies with respect to permitting requirements.

IR2

Ref #	Summary of Comment	Information Request	CMC Response
T(2)-17	In the review of the draft EIS, it was noted in the Hydrogeology Technical Supporting Document (TSD), dated February 2013 that a trough of granular material was encountered to depths of approximately 25m at the southwest section of the tailings management facility (TMF). Groundwater elevations at the monitoring well (BRH-0020) are about 2 metres above those of the Upper Marmion Reservoir. This suggests that overburden groundwater in this area readily discharges to Upper Marmion Reservoir through a permeable pathway in granular materials. The proponent plans to collect seepage from the TMF along the downstream toe of the TMF dams but did not consider seepage from the base of the TMF. Thus, it was requested that the proponent provide an evaluation of the potential seepage to groundwater underneath the TMF and assessment of the potential effect the seepage could have on groundwater quality and the resultant surface water quality in Lizard Lake and Upper Marmion Reservoir. In response the proponent used a water balance approach and noted that it contains less uncertainty than a hydrogeological modelling approach. The proponent also stated that In the water balance model all runoff and seepage is captured and the mass is therefore included in the final discharge water quality, indicating that in order for model results to be valid, all seepage must be collected. However, federal reviewers noted that the model results do not take into account the seepage losses from the base of the TMF or through dams. Thus, in the first information request dated March 25, 2014, comment T-39 indicated that in order to collect all seepage, the proponent would need to quantify seepage losses from the base of the TMF, using a groundwater model and determine the proportion of seepage below the TMF versus through dams. Comment T-39 also included the request to assess the effectiveness of the proposed seepage control measures and assess the potential impact of seepage discharge to receptors. In response, the proponent conducted numerical groundwater modelling on a portion of the TMF. The proponent's model assumes that there is a presence of clay lenses within the overburden material that would tend to impede vertical flow. However, federal reviewers noted that Figure 2-5 of the Hydrogeology TSD shows the overburden as primarily comprised of silts and sand, and much of the footprint of the TMF is classified as "Outwash Deltas/Channels" and "Organic Terrain". The clay layers that do exist in some boreholes do not show lateral continuity.	1. Drill additional boreholes to obtain borehole and stratigraphic logs to characterize the permeability of the base of the entire TMF. Develop a plan for the additional boreholes and stratigraphic logs in discussion with relevant government agencies to ensure adequate characterization of baseline conditions within the proposed TMF footprint. 2. If the results indicate that the base of the TMF is permeable (as compared to thick sequences of laterally continuous clay), provide responses to and action on questions 3-7. 3. Drill additional monitoring wells to obtain sufficient information to determine the groundwater flow paths and the fate of chemical constituents in the TMF seepage water. Perform additional single-well response tests and consider performing a pump test to better characterize hydraulic conductivity values and isotropy/anisotropy. Develop a plan for the additional monitoring wells in discussion with relevant government agencies to ensure baseline information is gathered in regions where more granular material is found within the proposed TMF footprint. 4. Using the data from the additional monitoring wells, model the entire TMF using the 3D numerical groundwater model.	To complete the requested undertaking would require a level of effort commensurate with the detailed feasibility and design phases of a project. The EIS/EA must adequately address potential for impact to the environment at a level that allows for appropriate decision making with respect to the potential for impacts of a given project. The current assessment is suitable and appropriate to make these decisions for the following reasons as documented in the TSD and subsequent IR Responses as provided in the Final EIS/EA Report Addendum (June 2015): 1. All water and chemical mass load placed on the TMF is accounted for in the discharge, and is used in analysis of basin impact, with no resulting aquatic effects (see TSDs as identified and IR T-34, T-39 and IR MOE-NR-GW-16 from the first round of IRS) a. To state this differently, we assign water the same concentration, based on the chemistry of the tailings, weather it leaves as surface water or groundwater, and both of these waters report to Marmion Basin in our assessment – if we increase groundwater discharge, then there will be more infiltration, and less surface runoff so the total amount of water, and mass load, will be the same – regardless of the outcome of any groundwater modelling. 2. Even at full predicted concentrations of the tailings water (i.e. groundwater reporting directly to surface water in the basin) there are no resulting aquatic impacts (IR MOE-NR-GW-16 from the first round of IRS) Therefore it follows that 3. As a result of points 1, and 2, above it is inconsequential weather the water (or chemical mass) reports via a surface water pathway or groundwater pathway, it is all accounted for, and at full concentrations (and full mass loads) does not cause aquatic impacts, either as a point source, or overall mass load to the basin.
	It also appears that the 3D groundwater modelling conducted does not adequately characterize the site because it only covers a portion of the TMF and is based on very limited data. This approach does not provide an understanding of the permeability of the overburden underneath the TMF nor does it provide an understanding of groundwater seepage flow paths from the TMF into adjacent waterbodies such as Lizard Lake and Upper Marmion Reservoir. It is not clear what the magnitude and geographic extent (direction and distance) of the effects from seepage losses from the base of the TMF are on surface water quality and fish and fish habitat in Lizard Lake and in Upper Marmion Reservoir. The entire TMF needs to be modelled with sufficient monitoring well data and the use of particle tracking in order to determine the groundwater flow paths and the fate of chemical constituents in the TMF seepage water. The 3D groundwater modeling must be re-run and the sensitivity analysis and model results provided. Based on the review of the Technical Memorandum on the 3D groundwater Modelling (dated May 21, 2014), the following deficiencies were noted: • The model is not calibrated properly nor was a detailed conceptual model presented. The conceptual model provides a visual depiction of the existing groundwater system including stratigraphic layers (shown in cross sections or block diagrams) and information on groundwater flow directions. • The hydraulic conductivity for the overburden is poorly characterized and based on limited single-well response tests and estimates based on grain-size distribution. Hydraulic conductivity is an important model parameter that can significantly affect model outcomes. • The assumption Khorizontal:Kvertical = 1:0.1 is not supported by the borehole data. The borehole logs do not show thick sequences of clay that are continuous across the TMF site. • The proponent's response to previous comments about seepage effects on Lizard Lake have focused on the operating phase of the mine, or the immediate post-operating phase when human intervention is still available to manage seepage. Seepage loss during post-closure phase could be a concern if permeability of units underneath TMF is higher than modeled, even with revegetation. The proponent needs to adequately model the post-closure (abandonment) phase to assess the long-term effects of seepage losses to Lizard Lake and the Upper Marmion Reservoir.	5. Re-run the 3D model based on the following: a) perform more robust calibration using additional monitoring well data; b) present a detailed conceptual model using visual depictions to describe the baseline hydrogeological conditions; c) model all project phases including baseline, operations phase, closure (decommissioning), and post-closure (abandonment); d) as described in 2., include the information from the additional boreholes and stratigraphic logs for the entire TMF to determine if the overburden is isotropic or anisotropic, based on the absence or presence of laterally continuous horizontally bedded sedimentary deposits, and if the assumption Khorizontal:Kvertical = 1:0.1 is valid. If it is not, update the model assumption for isotropy/anisotropy. The installation of additional monitoring wells and hydraulic testing will also help better define the Khorizontal:Kvertical relationship; and e) provide a sensitivity analysis for the model that considers possible extremes in such parameters as recharge and hydraulic conductivity. 6. Provide the methodology, analysis and model results. 7. Based on the results from question 1-6 above, provide a detailed description of the mitigation measures proposed to intercept seepage and contingency plans in the event seepage beneath the TMF would be greater than predicted.	Based on the above CMC submits that: - there is ample evidence and analyses completed to reasonably conclude there will be no impact to human health, terrestrial life, or aquatic life, regardless of the outcome of any proposed groundwater modelling conducted, - as a result CMC further submits that the current groundwater analyses and model is sufficient to reasonably make decisions regarding potential project impacts at the Hammond reef property. CMC did conduct some supplemental modelling in response to regulator concerns (see IR T-40 located in Appendix 1.IV of the Final EIS/EA Report) , it was directed at responding to questions related to the North and West sides of the TMF, and demonstrating that seepage capture was feasible under typical conditions, as was requested by the reviewers. The intent was not to model the entire basin at the level of detail design. CMC acknowledges that understanding the groundwater will be important during construction and operation of the facility, such that appropriate seepage reduction or collection measures can be incorporated into the final design. CMC is willing to commit to the following course of action (as a condition of approval of the EIS/EA), but only as part of the detailed design engineering work to be completed prior to construction: - collection of the requested additional drilling data in Item 1 of the request during the detailed design phase of the project through installation of 3 to 5 monitoring wells within the central area of the impoundment. - Collection of additional data through drilling, including depth to bedrock, and sediment profiles along all proposed dam alignments. - Re-evaluation of all potential seepage pathways for each proposed dam of the facility, including 2D seepage models (or a 3D model if needed depending on the results of drilling in the center of the impoundment), in order to produce: o Phreatic surface detail and seepage rates for dam stability analysis o Detailed design drawings for each dam o Construction specifications and material specifications for the dam proper
	The proponent indicates that there "are many additional options to intercept seepage" but does not identify other possible mitigation measures. The proponent indicated that the current plan for the seepage collection systems is in the conceptual stage only and that ditching and pumping stations will be utilized. However, no further details are provided. It is important to provide details on the seepage collection systems, taking into consideration the results of the 3D groundwater model for the entire TMF, in order to assess not only the effectiveness and suitability of the proposed mitigation measures, but also the comparative suitability of the proposed site itself. Furthermore, it is important to have information on the framework of the follow-up program to monitor seepage and to identify the response actions that would be undertaken in the event that a malfunction were to occur or in the event seepage beneath the TMF is greater than predicted. This information will assist the Agency in assessing the adverse environmental effects of seepage losses from the TMF, the magnitude and geographic extent (direction and distance) of any seepage that may pass underneath the TMF to Lizard Lake and Upper Marmion Reservoir and the effectiveness of the proposed mitigation measures. This information is required in order for the Agency to provide a recommendation to the federal Minister of Environment on whether the project is likely to cause significant adverse environmental effects.		o Construction specifications for seepage interception and collection, including depths of ditches, pumping requirements, and interception well requirements as needed to achieve the seepage design objectives. o This will satisfy the overall request, and in particular Item 7 of the above request To be clear CMC believes that seepage capture objectives as stated in the EIS/EA document are effectively achievable through engineering controls that will be put in place for the project, additional data will be collected and modelling will be completed during the detailed design phase, and CMC is willing to accept these requirements as conditions of EIS/EA approval, however given the cost of the proposed course of action in the request it is not realistic or feasible for CMC to undertake this at this time.

IR3

Ref #	Summary of Comment	Information Request	CMC Response
T(3)-08	The T(2)-17 response does not provide information to assess the potential adverse effects of seepage from the tailings management facility (TMF) on particular receiving water bodies that are frequented by fish, including but necessarily limited to Lizard Lake and Sawbill Bay. Instead CMC's response outlines a perspective on the potential impacts of seepage to aquatic life in the Marmion basin. By focusing on the entire basin, rather than individual water bodies within the basin, the approach fails to predict whether seepage may affect any particular water body. According to subsection 10.2.3.1 of the EIS Guidelines, the EIS shall … provide results of the hydrogeological assessment that determines: groundwater seepage location, rates, seepage quality, and direction into or from the open pits, mine rock stockpiles and other stockpiles, TIA facilities, primary sedimentation pond and process water pond, and from the pits during future overflow. Clarity on seepage is required to understand the flow regime, including whether the seepage flow through the base of the TMF and/or through the TMF dam potentially will enter any receiving water body frequented by fish. Also, Subsection 13.1.2 of the EIS Guidelines requires the EIS to include a description of the follow-up program to evaluate the predictions of effects and the effectiveness of the proposed mitigation. T(2)-17 is re-submitted, with minor changes in items 1 and 3, to request the information needed by the Agency to assess the adverse environmental effects of seepage losses from the TMF, the magnitude and geographic extent (direction and distance), of any seepage that may discharge into any receiving water body frequented by fish, and the effectiveness of the proposed mitigation measures. Discussion on the potential adverse effects and their significance linked to the findings should also be provided. This information is required in order for the Agency to provide a recommendation to the federal Minister of Environment and Climate Change on whether the Project is likely to cause significant adverse environmental effects.	*The response to T(2)-17 of Information Request #2 does not meet the expectations of the Agency and federal reviewers. Therefore, we are repeating the request and have synthesized it to provide additional clarity.* 1. Drill additional boreholes to obtain borehole and stratigraphic logs to characterize the permeability of the base of the entire TMF. Perform additional single-well response tests and consider performing a pump test to better characterize hydraulic conductivity values and isotropy/anisotropy. Develop a plan for the additional boreholes and stratigraphic logs in discussion with relevant government agencies to ensure adequate characterization of baseline conditions within the proposed TMF footprint. 2. If the results indicate that the base of the TMF is permeable (as compared to thick sequences of laterally continuous clay), provide responses to and action on questions 3-7. 3. Drill additional monitoring wells to obtain sufficient information to determine the groundwater flow paths and the fate of chemical constituents in the TMF seepage water. Develop a plan for the additional monitoring wells in discussion with relevant government departments to ensure baseline information is gathered in regions where units with higher hydraulic conductivities are found within the proposed TMF footprint. 4. Using the data from the additional monitoring wells, model the entire TMF using the 3D numerical groundwater model. 5. Re-run the 3D model based on the following: a) perform a more robust calibration using additional monitoring well data; b) presenting a detailed conceptual model using visual depictions to describe the baseline hydrogeological conditions; c) model all project phases including baseline, operations phase, closure (decommissioning), and post-closure (abandonment); d) as described in 2., include information from the additional boreholes and stratigraphic logs for the entire TMF to determine if the overburden is isotropic or anisotropic, based on the absence or presence of laterally continuous horizontally bedded sedimentary deposits, and to determine if the assumption Khorizontal:Kvertical = 1:0.1 is valid. If it is not, update the model assumption for isotropy/anisotropy. The installation of additional monitoring wells and hydraulic testing will also help better define the Khorizontal:Kvertical relationship; and e) provide a sensitivity analysis for the model that considers possible extremes in such parameters as recharge and hydraulic conductivity. 6. Provide the methodology, analysis and model results. 7. Based on the results from question 1-6 above, provide a detailed description of the mitigation measures proposed to intercept seepage and contingency plans in the event seepage beneath the TMF would be greater than predicted. 8. Describe the residual effects on water quality; the significance of those residual effects based on the Agency's methodology for assessing significance (including the criteria of magnitude, geographic extent, duration, frequency, reversibility, ecological/social/cultural context); and the follow-up program, including any monitoring measures, which will be implemented to evaluate the predictions of effects and the effectiveness of the proposed mitigation.	

Attachment D

Tailings Management Facility – Additional Stratigraphic Information and Proposed 3D Groundwater Modelling; June 15, 2016

TECHNICAL MEMORANDUM

DATE June 15, 2016 **PROJECT No.** 1408383 3500 3501

TO Sandra Pouliot
Canadian Malartic Corporation **DOC No.** 011 (Rev 0)

FROM Karen Besemann and Devin Hannan **EMAIL** adam_auckland@golder.com

CC Adam Auckland and Ken De Vos

HAMMOND REEF GOLD PROJECT – TAILINGS MANAGEMENT FACILITY, ADDITIONAL STRATIGRAPHIC INFORMATION AND PROPOSED 3D GROUNDWATER MODELLING

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) has prepared this Technical Memorandum (memorandum) for Canadian Malartic Corporation (CMC) as clarification for the Government Review Team (GRT) regarding questions brought forward relating to the need for additional field data collection, assessing the assumption of isotropy / anisotropy and additional numerical groundwater modelling of the proposed tailings management facility (TMF) at the Hammond Reef Gold Project (the Project). This is a supplementary memorandum to the Hammond Reef Gold Project – Tailings Management Facility, Additional 3D Groundwater modelling memorandum, dated March 1, 2016. The review comments by the GRT on the aforementioned memorandum were provided to CMC in a letter dated May 6, 2016 titled "Federal Review of the Draft Technical Memorandum on the Additional 3D Groundwater Modelling for the Hammond Reef Gold Project Federal Environmental Assessment".

Key items that were identified by the GRT included: 1) additional information on stratigraphy; 2) additional hydraulic conductivity data; 3) assessment of anisotropy; 4) completion of modelling for closure and post closure phases; and, 5) inclusion of the conceptual seepage collection system in the model. These items were discussed in a conference call between CMC, the GRT and Golder on May 18, 2016. During this call, the GRT requested that items clarified on the call also be provided in a memo in order to have the opportunity to review the additional information provided.

Baseline Hydrogeological Conditions

A review of the current hydrogeological conditions in the vicinity of the Tailings Management Facility (TMF) was provided in order to explain our rational for the locations of existing boreholes / monitoring wells and why we consider that there is sufficient subsurface information to complete the proposed hydrogeological model as described in the aforementioned March 1, 2016 memorandum. The following is a summary of the baseline conditions and existing information.

Stratigraphy

In total, there are 22 single and nested borehole locations with detailed stratigraphic information and an additional 64 condemnation drillholes for which overburden thickness is available. The locations of these boreholes and drillholes are shown in Figure 1. We wish to note that, in our opinion, the dataset as illustrated in Figure 1 provides excellent coverage within and around the boundaries of the propose TMF and is in our view sufficient to adequately characterize overburden thickness in the area.

Local relief in the Marmion Lake area is commonly less than 45 m but may exceed 60 m in some areas (Mollard and Mollard 1980). Over the project area, overburden is generally thin and discontinuous. The proposed TMF is located in a low lying area, bounded to the north, northwest and northeast by a generally continuous topographic high, with elevations on the order of 470 to 480 metres above mean sea level (m amsl) compared to elevations of approximately 420 m amsl in the low lying areas of the centre of the proposed TMF. The southwest, south and east of the proposed TMF are characterized by troughs or valleys between extensive bedrock outcrops (Figure 1). As such, borehole drilling and monitoring well installations in the area were primarily focused in the valleys between bedrock outcrops along the perimeter of the TMF as these would be considered the key potential seepage pathways. In order to illustrate this topography and constraints on groundwater flow, topographic cross-sections were produced around the perimeter of the proposed TMF and are presented in Figures 2A through 2E.

As can be observed in these cross-sections, overburden aquifers are generally of limited lateral extent due to significant bedrock outcropping. Bedrock, which is situated at or near the ground surface over much of the project area, controls the topography and therefore the surface drainage conditions (Mollard and Mollard 1980). In general, the overburden, overlying bedrock, ranges from not present to greater than 30 m in thickness in the area of the TMF. The stratigraphy encountered by boreholes in the area of the TMF is detailed in Table 1 below (data from condemnation holes is not listed as the bulk overburden logged was not separated into sub-units). Note that not all of the layers were present in all boreholes. Boreholes were either advanced into the bedrock (19 of 21 holes) or terminated upon refusal on probable bedrock (3 of 21 holes). It is possible that the maximum thickness of the overburden is greater than recorded in the boreholes that were terminated upon refusal.

Table 1: General Stratigraphy at the TMF

Borehole Location	Peat/ Organics Thickness (m)	Silt and Sand Thickness (m)	Silty clay to clayey silt Thickness (m)	Till (Sand and Gravel/ Boulders, Sand, Clay) Thickness (m)	Overburden/ Bedrock contact Depth (m)
BRH-0016	-	1.1	-	0.4	1.5
BRH-0017	-	2.3	-	0.8	3.1
BRH-0018	-	1.8	-	-	1.8
BRH-0019	0.3	1.2	6.1	0.8	8.4
BRH-0020	0.2	0.6	14	10.8	25.6
BRH-0021	0.6	0.6	1.4	0.4	3.0
BRH-0022	-	-	-	0.1	0.1
BRH-0023	0.5	1.0	-	2.1	3.6
BRH-0024	-	-	-	1.0	1.0
BRH-0025	1.2	0.3	-	0.2	1.7
RH-0026	0.2	1.0	-	0.3	1.5
BRH-0027	0.6	1.1	-	0.7	2.4

Borehole Location	Peat/ Organics Thickness (m)	Silt and Sand Thickness (m)	Silty clay to clayey silt Thickness (m)	Till (Sand and Gravel/ Boulders, Sand, Clay) Thickness (m)	Overburden/ Bedrock contact Depth (m)
BH12-1	0.1	0.81		0.3	1.2
BH12-2		2.9	5.7	6.53	15.14
BH12-3	1.37	2.9	4.57	4.57	13.41
BH12-4	2.13		3.05	1.83	7.01
BH12-5	1.65	3.91		2.19	7.75
BH13-1	2.74	1.53	0.91	1.83	7.01
BH13-2	0.61	3.96		0.92	5.49
BH13-3	2.59		6.25	4.42	13.26*
BH13-4		1.52	4.58	13.1	17.68*
BH13-5	1.68		2.74	7.47	10.21*

Notes: * indicates borehole terminated upon auger refusal.

Stratigraphy across the TMF, based upon the above noted boreholes, is generally consistent, with peat at surface underlain by silt and sand. A silty clay / clayey silt layer is observed in approximately half of the boreholes. It is consistently observed in all of the boreholes located along the south and east of the TMF, and seems to be correlated to areas of thicker overburden deposits. The silty clay / clayey silt layer is generally not observed in boreholes with less than 5 metres total overburden and generally present in boreholes with more than 5 metres of overburden. This can be accounted for in the model, such that the silty clay / clayey silt unit would not be considered in the areas of shallow overburden. The silty clay / clayey silt unit is underlain by a sandy, gravelly till. Overall the thickness of these units are relative to the overall thickness of the overburden.

The combination of detailed stratigraphic information from the 22 boreholes and the laterally extensive information on overburden thickness from the condemnation drillholes provides sufficient information to characterize the hydrostratigraphic setting in the area of the TMF in order to develop the proposed groundwater model. Key areas for assessing potential seepage pathways will be the bedrock valleys along the perimeter of the TMF footprint, as most seepage from the base of the TMF in the overburden would be expected to report laterally through the overburden in these valleys. These are the areas where most of the available hydrogeological / geotechnical boreholes have been completed.

Hydraulic Conductivity

The hydraulic conductivity of the subsurface materials were estimated by conducting rising head tests and analysis of grain size. Within the TMF footprint, a total of 11 overburden and 6 bedrock hydraulic conductivities were obtained through either rising head tests or grain size (Hazen) method. In addition to hydraulic conductivities measured in the immediate vicinity of the TMF, an additional 20 bedrock and 19 overburden measurements were obtained from locations around the proposed Open Pit, Mine Rock Area and alternative TMF areas. Based on a review of the borehole logs, the stratigraphic units logged at these locations are similar to those encountered at the TMF and would supplement the data available for the TMF groundwater model.

Recognizing the concern brought forward by the GRT of providing additional hydraulic conductivity information, it is proposed that rising / falling head tests be completed at the monitoring wells that have been installed in 2012. These include 3 bedrock monitoring wells and 4 overburden monitoring wells at the TMF as well as 6 additional overburden monitoring wells located to the west and south of the TMF with well screens considered to be in units representative of the stratigraphy at the TMF. With these additional locations, a total of 29 bedrock and 36 overburden hydraulic conductivity measurements will be available to be used in the development of the groundwater model.

Anisotropy

Although Vertical Hydraulic Conductivity (Kv) is considered an important hydraulic characteristic, it is rarely measured in the field, generally for lack of practical field tests. Laboratory analyses for Kv are generally based on permeameter measurements but these are often difficult when applied to cores from heterogeneous and especially unconsolidated formations because these measurements are generally small scale and representative of the disturbed sample (Kabala, 1993). Although some studies have been completed that suggest options for measurement of Kv in the field, in practice, Kv/Kh is often based on the review of stratigraphic logs and assessment of the presence or absence of horizontally bedded formations. It can then be further assessed through sensitivity analyses within a groundwater model. In reviewing borehole logs at the TMF, and the project site in general, and as summarized in Table 1 above, a Silt and Sand or Silty Sand unit is observed in almost every borehole. In general, wherever overburden deposits tend to be thicker than approximately 10 m, a Clayey Silt / Silty Clay is also observed. The presence of these units would indicate that the ratio of Kv / Kh in the bulk overburden aquifer would be less than 1 and that the originally proposed anisotropy ratio of 0.1 is within the generally accepted range. Freeze and Cheery (1979) summarize a study completed by Jonson and Morris (1962) in which vertical and horizontal conductivities of 61 laboratory samples of fluvial and lacustrine sediments were assessed. From this study, it was determined that horizontal conductivities were between 2 to 10 times larger than the vertical values, which would consist of Kv/Kh of between 0.5 and 0.1.

Nonetheless, in order to address concerns raised by the GRT, it is proposed that the anisotropy be evaluated as a sensitivity analysis in the groundwater model. Two anisotropy ratios will be assessed, and calibrations performed on both a ratio of Kv/Kh of 0.1 and 1.0; the latter implying conservative isotropic conditions.

Operational Seepage collection

Conceptual seepage collection measures, which will consist of a perimeter seepage collection system of ditches and pump stations is proposed downstream of the TMF containment dams to collect and pump seepage back into the TMF. It should be recognized however that the detailed design of the seepage collection measures has not completed and is not available for the proposed groundwater model. Reasonable assumptions will be made with respect to the location and depth of these ditches and a summary of these assumptions will be provided. Conceptual level designs of seepage control systems will developed based standard engineering practice. Collection ditches will have an assumed trapezoidal cross-section and will typically be excavated through the native soil. A typical collection ditch cross-section is shown in Figure 3. A review will be completed to confirm viability of seepage collection using reasonable and proven methods, based on the observed borehole conditions, stratigraphy, modelled flow and literature data following the model runs. Once the Project progresses to the permitting phase, detailed designs will be completed of the collection system and the groundwater model can be updated at that time if deemed necessary. Conceptual design details of the proposed seepage collection system, including typical figures, will be provided in the final report.

As is typical for operating tailings facilities, monitoring wells will be installed along the perimeter of the TMF, in low lying areas along which key seepage pathways would be expected, and monitoring will be completed throughout the life of the Project and into closure. This monitoring would be used to confirm if the seepage control measures are operating as anticipated. As part of the report that will be prepared to accompany the groundwater model, high level monitoring plans for the TMF will be proposed and possible contingency measures, beyond the seepage collection system described above, will be proposed.

Closure and Post-closure modelling

During the closure and post-closure phases of the project, it is expected that seepage will be reduced compared to the operations phase. At closure, tailings deposition and discharge of process water to the TMF reclaim pond will cease; therefore, the potential for seepage will decrease with time. Furthermore, as indicated in Section 4.2 of the Conceptual Closure and Rehabilitation Plan TSD, seepage will continue to be collected and pumped back to the TMF until it is determined that the seepage water quality is suitable for release. At such time, the active seepage collection system will be decommissioned and the post-closure phase will commence. During the post-closure period, seepage water quality will have been deemed to be suitable for discharge and the TMF reclaim pond spillway will be lowered, reducing water storage in the TMF and the potential for seepage.

Despite the expectation that seepage rates will be lower than during the operations phase, as requested by the GRT, groundwater modelling will also be completed for the closure and post-closure phases of the project.

CLOSURE

We trust that this memorandum serves as sufficient foundation for further discussions on refining a path forward to fully satisfy the requirements of the Government Review Team. Please contact the undersigned if you have any questions.

Prepared by:

<Original signed by>

Karen Besemann, P.Geo
Associate / Hydrogeologist

Reviewed by:

<Original signed by>

Devin Hannan, P.Eng.
Associate, Enviromental Engineer

KB/DH/AA/sk

Attachments:

Figure 1 – Topographic Cross-Section Locations

Figures 2A – 2E – Topographic Cross-Sections A through E

Figure 3 – Seepage Collection Ditch Typical Cross-Section

REFERENCES

Golder, 2014. *Technical Memorandum: Osisko Hammond Reef Gold Project – Tailings Management Facility, 3D Groundwater Modelling.* 13-1118-0010 (5008). May 27, 2014.

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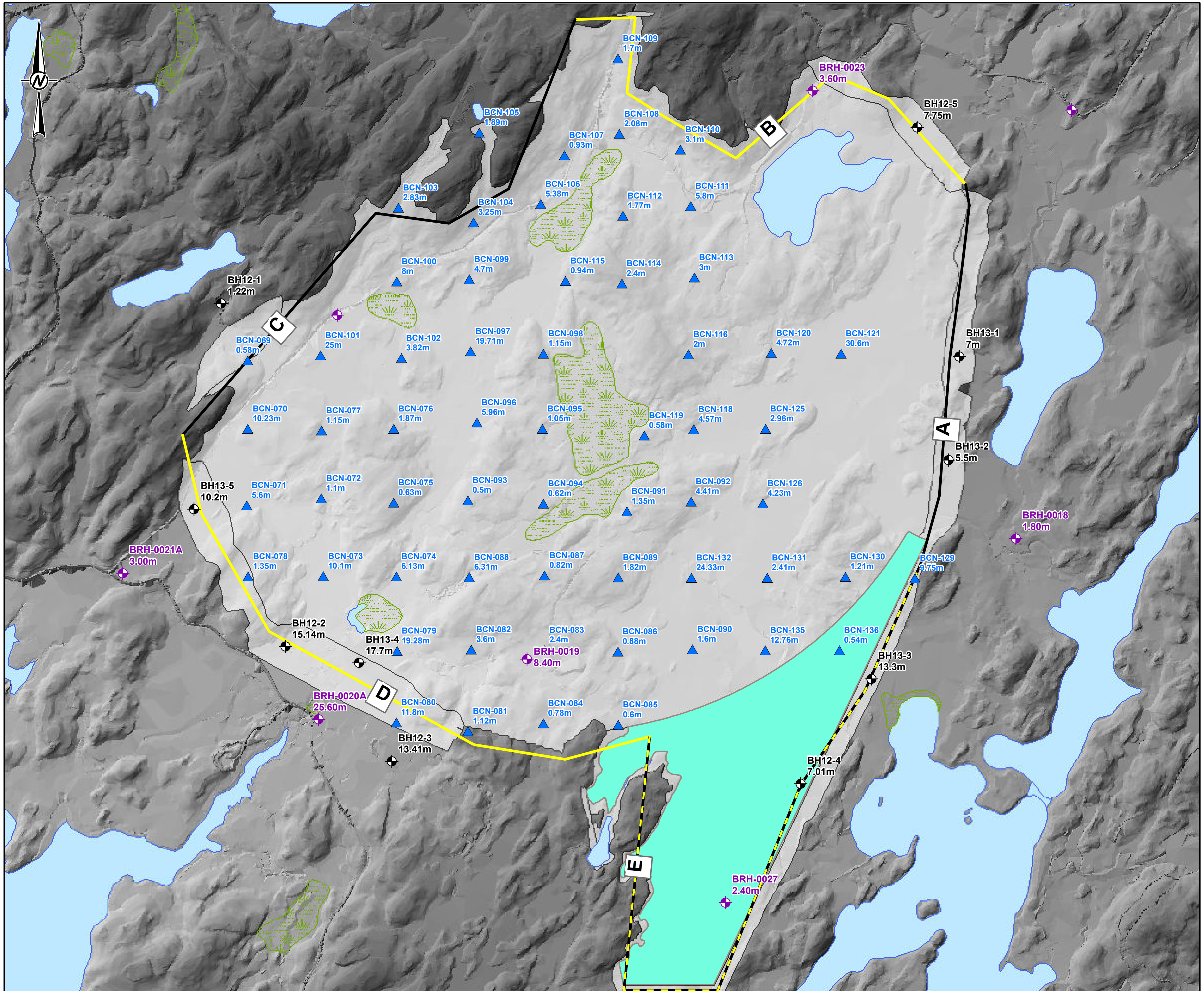

LEGEND

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- Hydrogeological Borehole (Overburden Thickness Labelled)
- Geotechnical Borehole (Overburden Thickness Labelled)
- Cross-Section
- Cross-Section
- Cross-Section
- Polishing Pond
- Tailings Management Facility
- Lake
- Wetland

NOTES

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CLIENT
CANADIAN MALARTIC CORPORATION

PROJECT
HAMMOND REEF GOLD P ROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE
TOPOGRAPHIC CROSS-SECTION LOCATIONS

CONSULTANT

Golder Associates

YYYY-MM-DD	2016-06-15
PREPARED	RRD
DESIGN	RRD
REVIEW	KAB
APPROVED	AA

PROJECT No.	PHASE	Rev.	FIGURE
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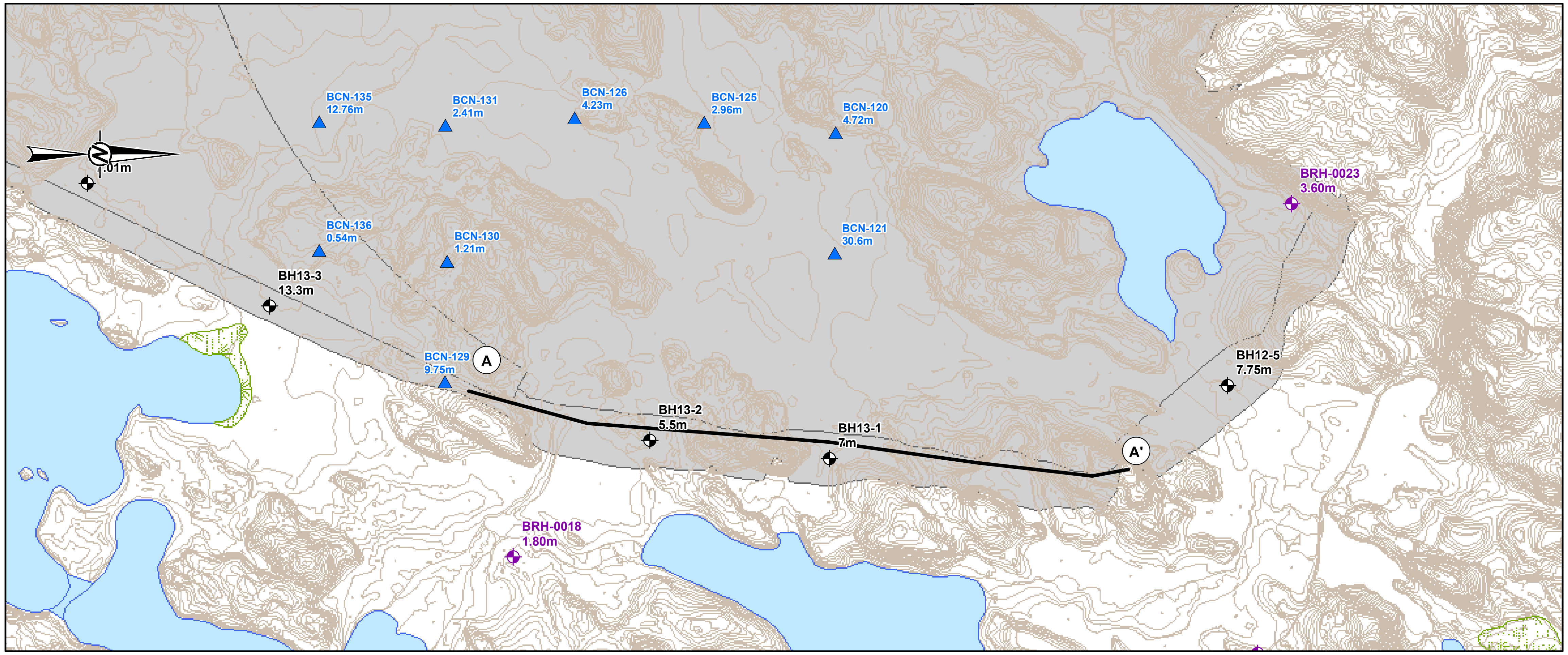

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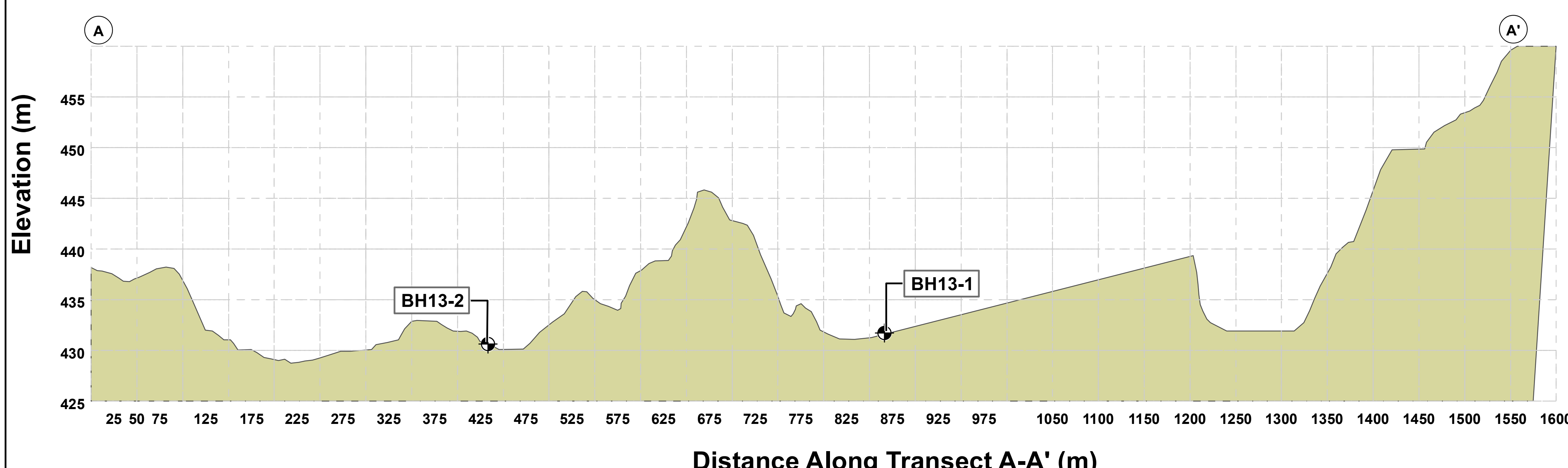

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CLIENT
CANADIAN MALARTIC CORPORATION

PROJECT
HAMMOND REEF GOLD P ROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE
TOPOGRAPHIC CROSS-SECTION A-A'

CONSULTANT

Golder Associates

YYYY-MM-DD	2016-06-15
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REVIEW	KAB
APPROVED	AA

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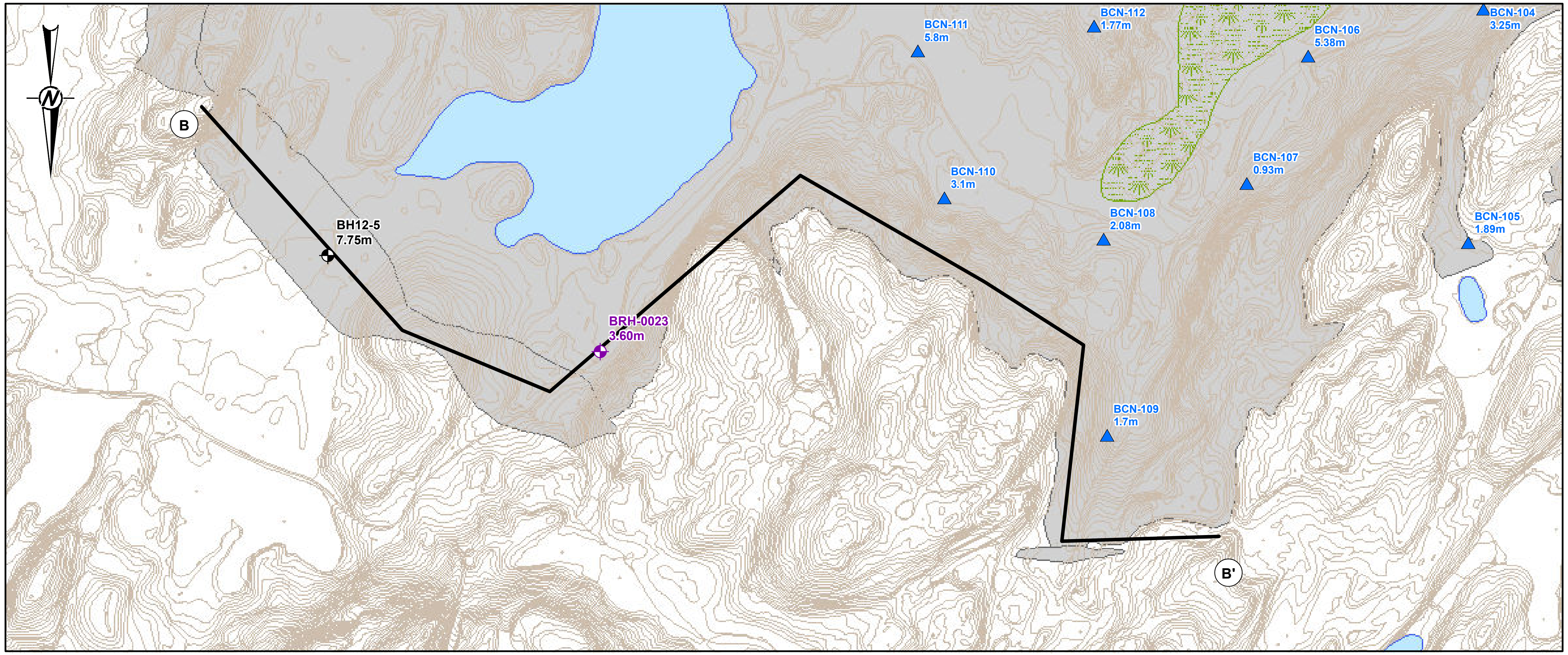

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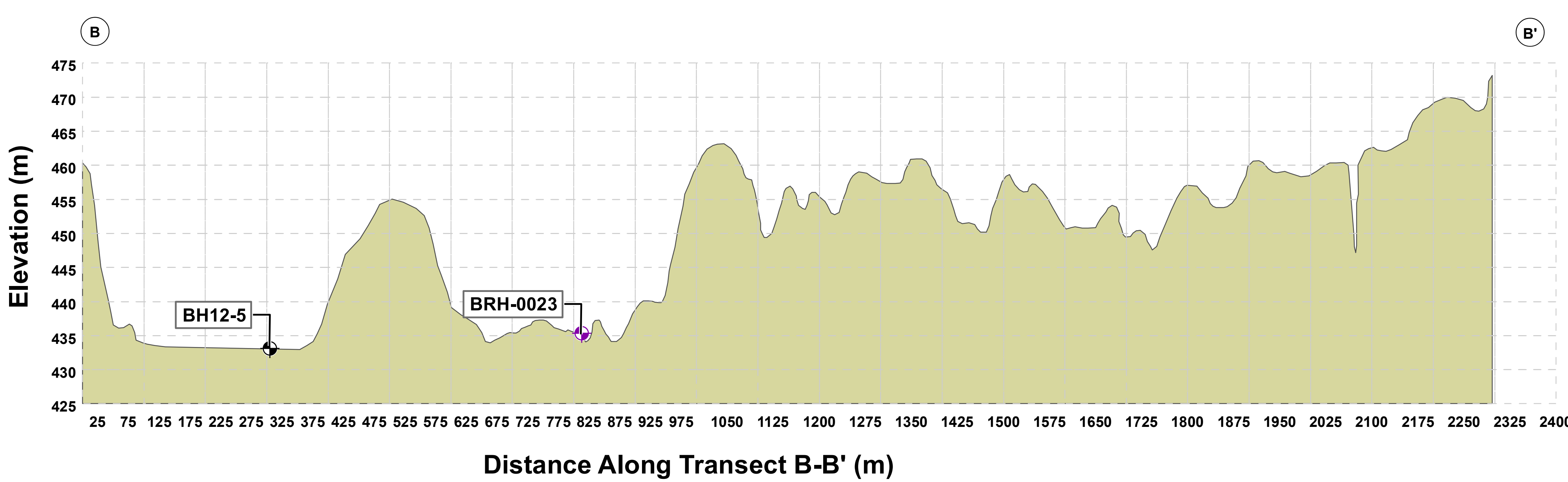

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CLIENT
CANADIAN MALARTIC CORPORATION

PROJECT
HAMMOND REEF GOLD P ROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE
TOPOGRAPHIC CROSS-SECTION B-B'

CONSULTANT

Golder Associates

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REVIEW	KAB
APPROVED	AA

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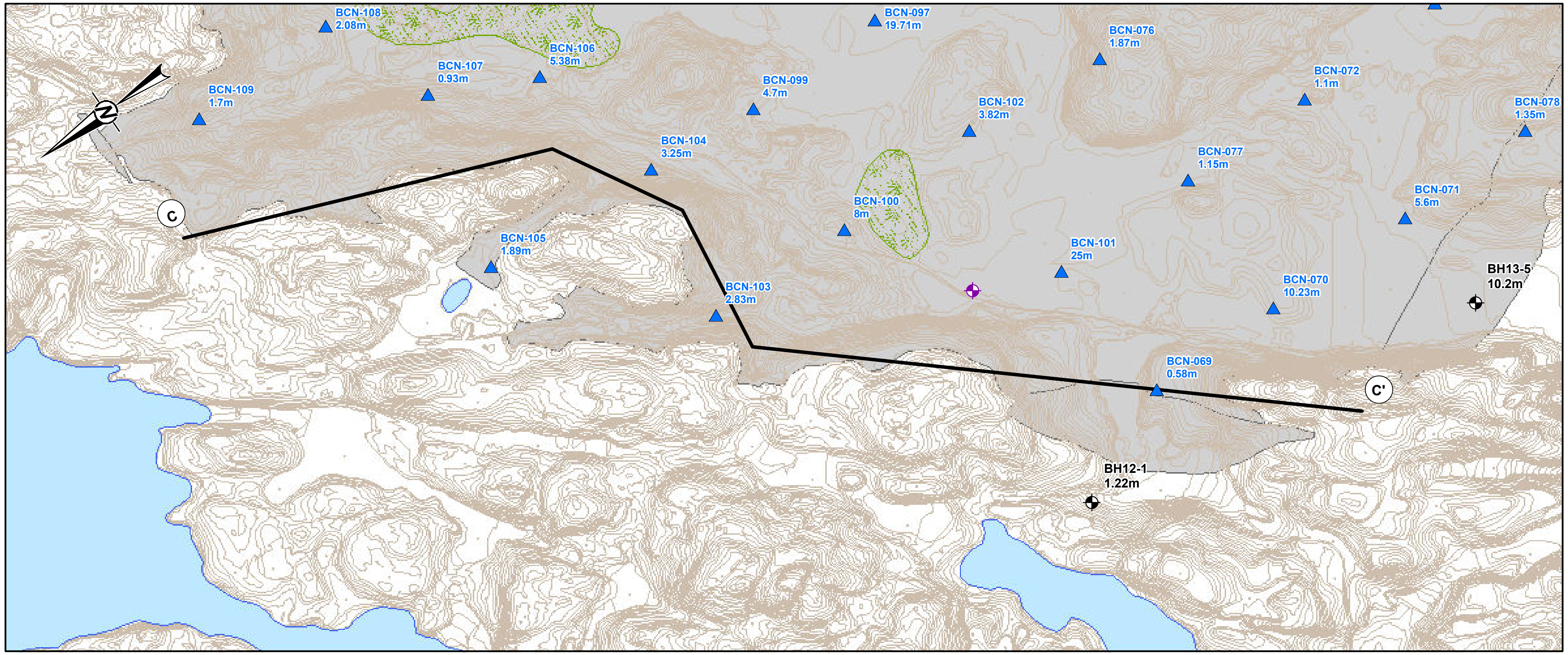

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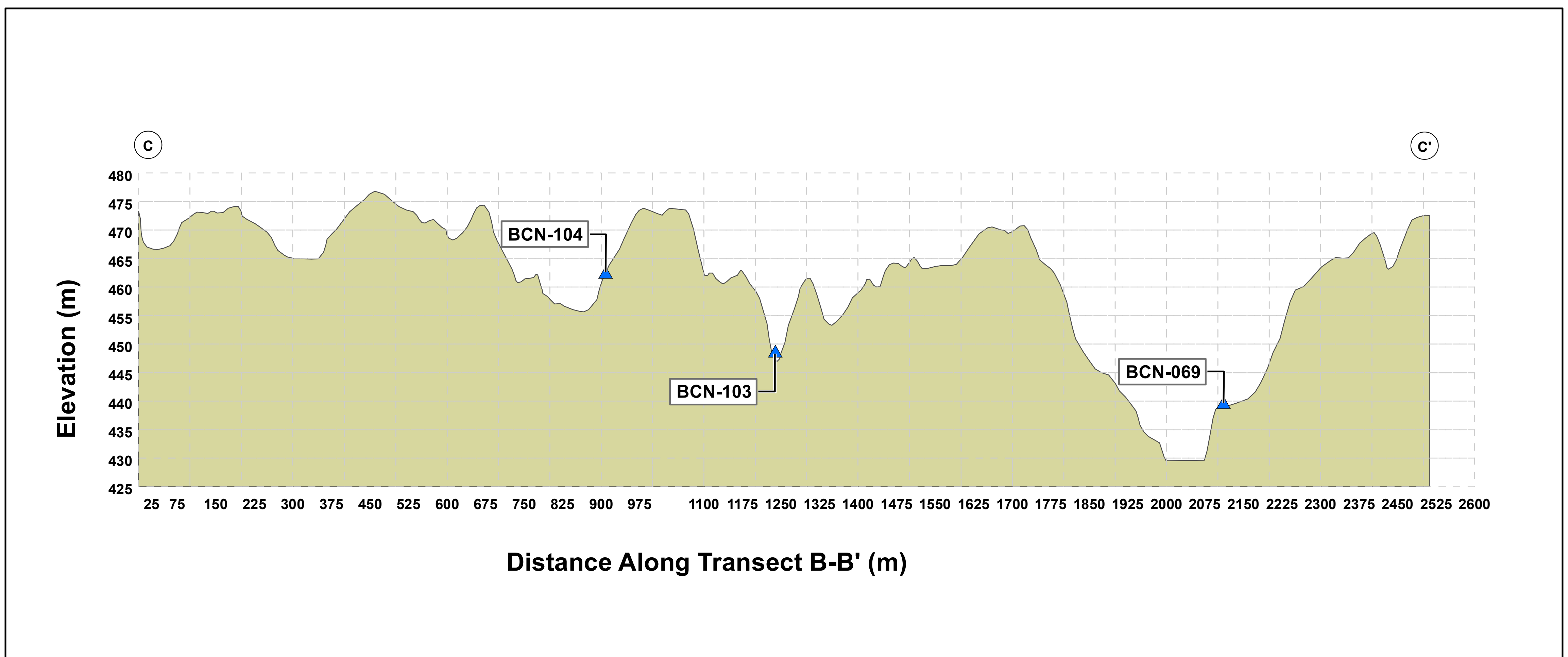
- Lake
- Wetland



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CLIENT
CANADIAN MALARTIC CORPORATION

PROJECT
HAMMOND REEF GOLD P ROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE
TOPOGRAPHIC CROSS-SECTION C-C'

CONSULTANT

Golder Associates

YYYY-MM-DD	2016-06-15
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REVIEW	KAB
APPROVED	AA

PROJECT No.	PHASE	Rev.	FIGURE
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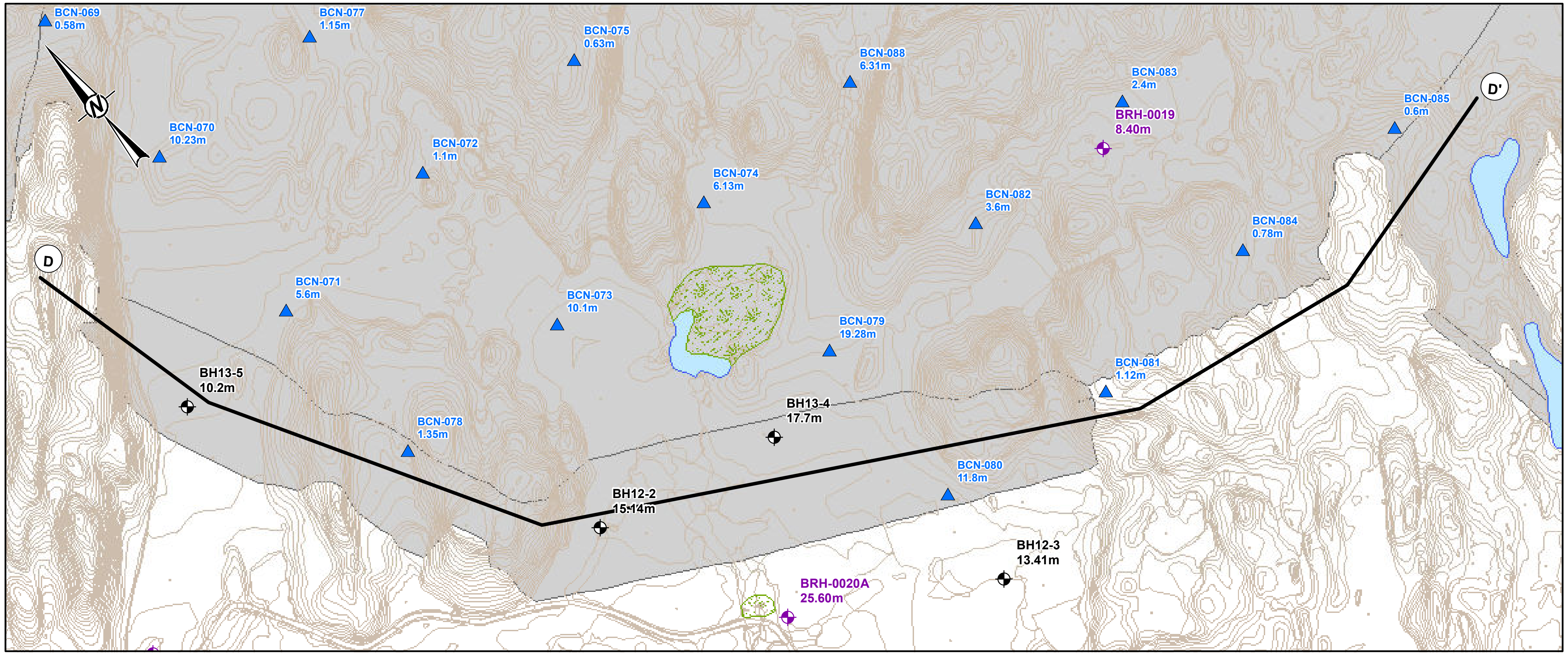

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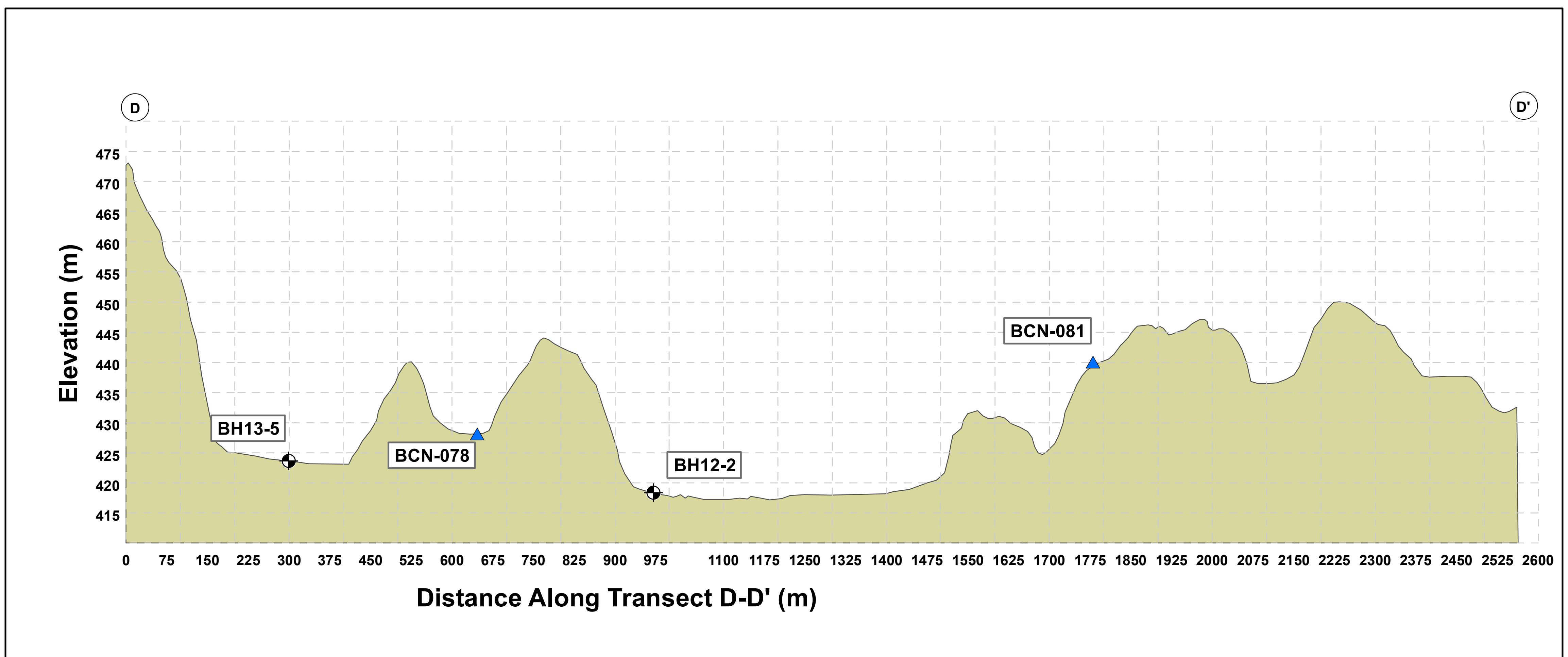
- Lake
- Wetland



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CLIENT
CANADIAN MALARTIC CORPORATION

PROJECT
HAMMOND REEF GOLD P ROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE
TOPOGRAPHIC CROSS-SECTION D-D'

CONSULTANT

Golder Associates

YYYY-MM-DD	2016-06-15
PREPARED	RRD
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REVIEW	KAB
APPROVED	AA

PROJECT No.	PHASE	Rev.	FIGURE
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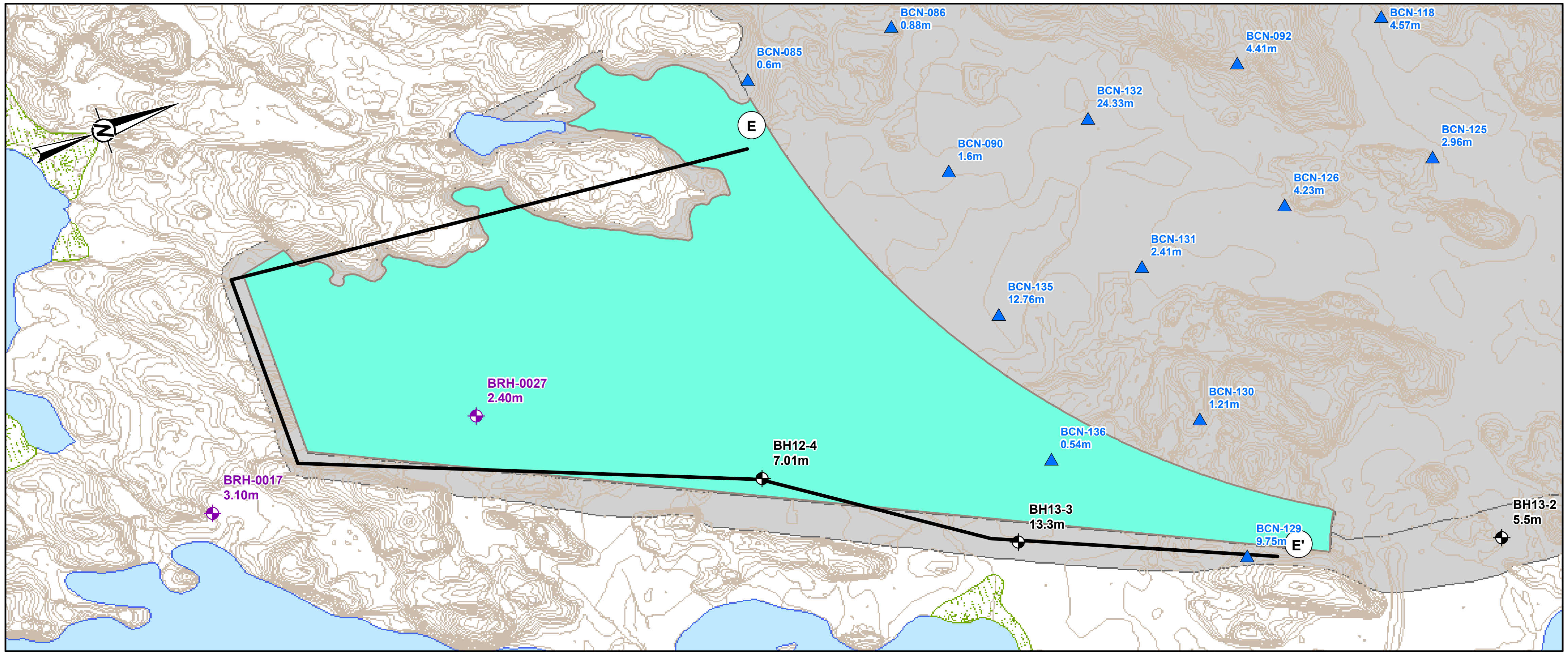

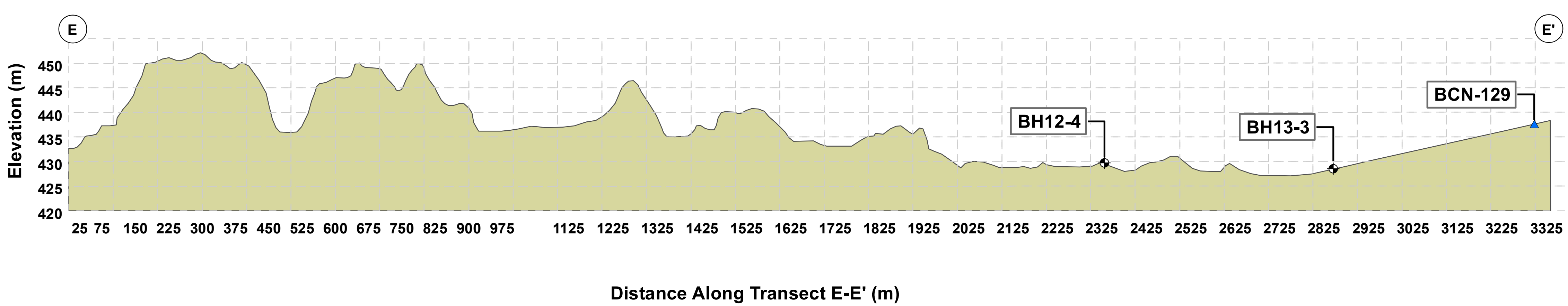

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- Cross-Section
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- Contour
- Lake
- Wetland

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CLIENT
CANADIAN MALARTIC CORPORATION

PROJECT
HAMMOND REEF GOLD P ROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE
TOPOGRAPHIC CROSS-SECTION E-E'

CONSULTANT

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DESIGN	RRD
REVIEW	KAB
APPROVED	AA

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PROJECT No.	PHASE	Rev.	FIGURE
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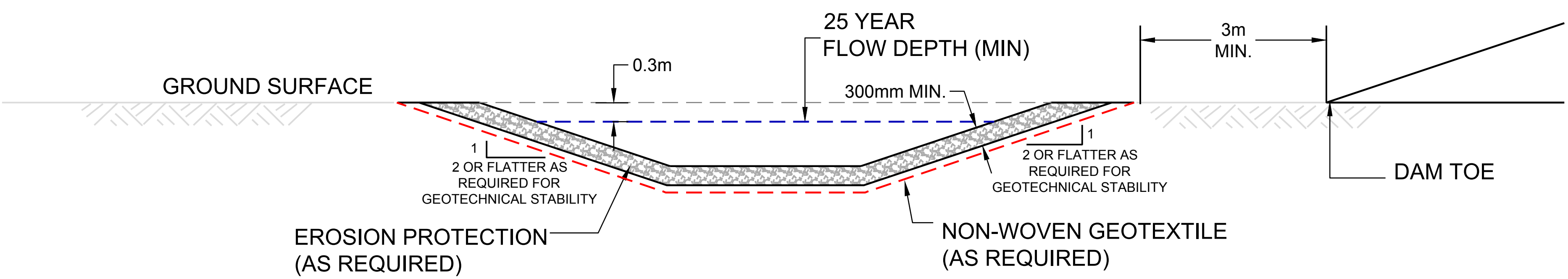

CLIENT
CANADIAN MALARTIC CORPORATION

PROJECT
HAMMOND REEF GOLD PROJECT

CONSULTANT

Golder Associates

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DESIGNED	AP
PREPARED	SZ
REVIEWED	AA
APPROVED	KDV

TITLE
SEEPAGE COLLECTION DITCH TYPICAL CROSS-SECTION

PROJECT NO.	PHASE	REV.	FIGURE
1408383	3501	A	3

Attachment E

Contingency Measures to Mitigate Water Taking from Marmion Reservoir during Low Water Level and Outflow Periods at Raft Lake Dam – Hammond Reef Gold Project; Revision 1

TECHNICAL MEMORANDUM

DATE November 20, 2017 **REFERENCE No.** 1408383_3201_Rev 1

TO Sandra Pouliot
Canadian Malartic Corporation

CC Ken De Vos, Adwoa Cobbina - Golder Associates Ltd.

FROM Adam Auckland **EMAIL** aauckland@golder.com

CONTINGENCY MEASURES TO MITIGATE WATER TAKING FROM MARMION RESERVOIR DURING LOW WATER LEVEL AND OUTFLOW PERIODS AT RAFT LAKE DAM – HAMMOND REEF GOLD PROJECT

1.0 INTRODUCTION

This revised (Rev 1) memorandum describes a water management contingency plan for operation of the onsite storage facilities as described in the Hammond Reef Gold Project (HRGP) Environmental Impact Statement/Environmental Assessment (EIS/EA) report. The contingency and mitigation measures described in this memorandum have been updated based on discussions with downstream hydropower producers, Brookfield and H2O Power.

1.1 Objective

The objective of the contingency water management measures is to provide a reasonable and acceptable framework for operating the mine with limited impact to Marmion Reservoir, downstream water users and HRGP operations.

1.2 Below Normal Water Level and Outflow Conditions at Raft Lake Dam

The operating water levels and outflows specified for Raft Lake Dam in the Seine River Water Management Plan (SRWMP) are intended to guide the management of the water control structure under normal water level and outflow conditions. However, there are conditions beyond the control of the operator that may result in the specified water levels and outflows not being achieved. The SRWMP defines the lower compliance level as occurring when outflows are at the minimum values specified and water levels are below the minimum specified elevation for that day. Both conditions must exist at the same time. Below normal conditions occur when water levels and outflows fall below the lower compliance level.

A review of available water level and outflow data for Raft Lake Dam between 2004 and 2016 (H2O Power 2016) indicate that below normal conditions occurred approximately 6% of the time during that period, with the longest period occurring between April 29 and August 7, 2010 (101 days).

1.3 Project Water Demands and Supply Sources Proposed in the EIS/EA Report

Table 1 summarizes the water demands for the Project during non-winter conditions and the supply sources included as part of the mine water balance presented in the EIS/EA Report. During winter, water would not be required for dust control and overall water demand would be lower. Water requirements for ore processing (i.e. water for reagent mixing and process make-up water in **Table 1**) account for 91% of the total water demand. The mine will be designed and operated to maximize the re-use of process water to the extent practicable. Marmion Reservoir is the preferred source for potable water and water for reagent mixing for water quality reasons. Use of recycled process water for reagent mixing can be problematic for the chemical processes employed by the process plant and can result in accelerated scaling of mechanical equipment and mass accumulation in the process water (i.e., increasing concentration of chemical constituents).

Table 1: Project Water Demands and Supply Sources

Water Demand	Average Daily Rate (m^3/d)	Supply Sources
Potable water at the accommodation camp	300	■ Water taking from Marmion Reservoir
Potable water at the process plant	35	■ Water taking from Marmion Reservoir
Water for reagent mixing	7,200	■ Water taking from Marmion Reservoir
Process make-up water	27,698	■ Reclaimed water from the Tailings Management Facility (TMF) ■ Runoff intercepted within the Project footprint ■ Groundwater seepage into the open pits ■ Treated sewage from the process plant site ■ Water taking from Marmion Reservoir (if required)
Water for dust control	3,320	■ Runoff intercepted within the Project footprint
TOTAL	38,553	

1.4 Onsite Storage Facilities Included in the Current Project Description

1.4.1 Process Plant Collecting Pond

The Process Plant Collecting Pond (PPCP) will be located in the southwest corner of the process plant site. The pond will be divided into two cells:

- A runoff cell collecting dewatering flows from the open pits, runoff from the area surrounding the pond, the overburden stockpile, waste rock stockpile, and low grade ore stockpile, and treated sewage from the process plant site. Water collecting in the runoff cell will be used to satisfy process make-up water and dust control water requirements, and any excess will be treated (if required) and discharged to the reservoir.
- An emergency spill cell providing passive containment in the event of a spill from failure of a process plant vessel.

An emergency spillway will be provided on the south side of the runoff cell in order to discharge excess flows into the West Pit. The runoff cell will have a water storage capacity of 400,000 m^3 to the spillway invert. However, the maximum operating volume will be 350,000 m^3 to provide 50,000 m^3 of surplus capacity to ensure that discharges via the emergency spillway only occur during extreme flood events. The operating volume within the pond below the spillway invert will be controlled by pumping.

1.4.2 TMF Reclaim Pond

The Tailings Management Facility (TMF) and its associated Reclaim Pond will be located approximately 8 km northeast of the process plant site, and will be constructed in stages over the mine operating life. Thickened tailings slurry will be delivered to the TMF from the Process Plant. Water released from the deposited tailings due to consolidation/settlement, and runoff from the TMF footprint will be collected in the Reclaim Pond. Water collecting in the pond will be used to satisfy process make-up water requirements and any excess water will be treated (if required) and discharged to the reservoir.

An emergency spillway will be provided on the southeast side of the Reclaim Pond in the early years of mine operation to convey excess flows to Lizard Lake. In later years, the spillway will be relocated to the southwest side of the pond to convey excess flows to Sawbill Bay. The Reclaim Pond will have a water storage capacity of 6,200,000 m^3 to the spillway invert at all stages of construction/operation of the TMF. However, the maximum operating volume will be 5,370,000 m^3 to provide 830,000 m^3 of surplus capacity to ensure that discharges via the emergency spillway only occur during extreme flood events. Similar to the PPCP, the operating volume within the pond below the spillway invert will be controlled by pumping.

Due to the natural topography within the TMF and Reclaim Pond footprint, there will be ponding in low points when water levels are low. An allowance was included for 1,800,000 m^3 of dead storage in the Reclaim Pond that cannot be easily accessed, although some of this water could likely be made available under extreme conditions if necessary. Therefore, the effective operating volume of the pond will be 3,570,000 m^3 (5,370,000 m^3 minus 1,800,000 m^3).

1.4.3 Other Holding Ponds

In addition to the PPCP and TMF Reclaim Pond, holding ponds will be located in the northeast corner of the process plant site adjacent to the waste rock stockpile (the Intermediate Collection Pond), at the Emulsion Plant, and at the Detonator Storage Area. The Intermediate Collection Pond (ICP) will collect runoff from the waste rock stockpile which will be pumped to the PPCP and used to satisfy process make-up water requirements in the mill. Runoff from the Emulsion Plant and Detonator Storage Area will be collected in the holding ponds prior to treatment (if required) and discharged to the environment. These holding ponds will have a limited water storage capacity and will be emptied following runoff events.

2.0 PROPOSED WATER MANAGEMENT OPTION

2.1 Normal and High Water Level and Outflow Periods at Raft Lake Dam

During normal and high water level and outflow conditions in Marmion Reservoir, the PPCP and TMF Reclaim Pond will be operated to maintain minimum water storage volumes that can be used during periods when low flow and water level conditions are occurring at Raft Lake Dam. The proposed approach is to draw water from the ponds when the storage volumes are above the minimum values (**Section 2.2**), and discharge to the environment when the water accumulating in the ponds exceeds the maximum operating capacities (350,000 m^3 for the PPCP and 5,370,000 m^3 for the TMF Reclaim Pond). The Project is located in a net positive water environment (average precipitation exceeds average evaporation) and there will be a carryover of water accumulating in the ponds during wet periods to dry periods. In months when precipitation and runoff inflows to the ponds cannot satisfy Project water demands and maintain the minimum water storage volumes, the deficit will be met by water taking from Marmion Reservoir provided that water level and flow conditions are above the contingency trigger values (see **Section 2.2**). Water taking from Marmion Reservoir will also be used to satisfy Project water demands for potable water, and water for reagent mixing (**Table 1**).

2.2 Low Water Level and Outflow Periods at Raft Lake Dam

Water taking contingency measures will be implemented when the water level in Marmion Reservoir at the Raft Lake Dam is within 5 cm of the lower compliance level as defined by the SRWMP and the outflow from Raft Lake Dam is at or below the minimum outflow. The minimum outflow is defined as the greater of (10 m^3/s) or flow after removal of one stoplog (control band error) required to maintain minimum flow. The lower compliance water levels, minimum outflows and contingency trigger water levels are defined in Appendix A. Figure 1 shows the number of times that the contingency measures would have been triggered for each day of the year based on the available water level and outflow data for Raft Lake Dam between 2004 and 2016 (H2O Power 2016) together with the SRWMP lower compliance water levels. As demonstrated in Figure 1, the contingency measures are most likely to be triggered between April 15 and October 1 when the minimum water levels required by the SRWMP are increasing or constant.

When the contingency measures are implemented, potable and raw reagent mixing water will continue to be taken from the reservoir but will be offset by an equivalent discharge from site storage to mitigate potential decreases in water levels and outflows at the Raft Lake Dam resulting from operations. Water management operations during periods when the contingency measures have been triggered are as follows:

- Water taking from Marmion Reservoir to satisfy demands for potable water, and water for reagent mixing (**Table 1**). It is preferred to draw water from the reservoir to meet these demands rather than use reclaimed water from the process for water quality reasons.
- Discharge water to Marmion Reservoir to offset water taking, to mitigate potential changes to levels and outflows at Raft Lake Dam during this period.
- Draw from the water storage volumes in the PPCP and TMF Reclaim Pond to satisfy demands for process make-up water and dust control water;
- Draw from the water storage volumes in the PPCP and TMF Reclaim Pond for discharge to Marmion Reservoir; and

When water level and outflow conditions at Raft Lake Dam rise above the defined contingency trigger values, the minimum water storage volumes in the PPCP and TMF Reclaim Pond will be recovered by allowing water to accumulate in the ponds and by water taking from Marmion Reservoir during wet periods when excess water from the reservoir is available.

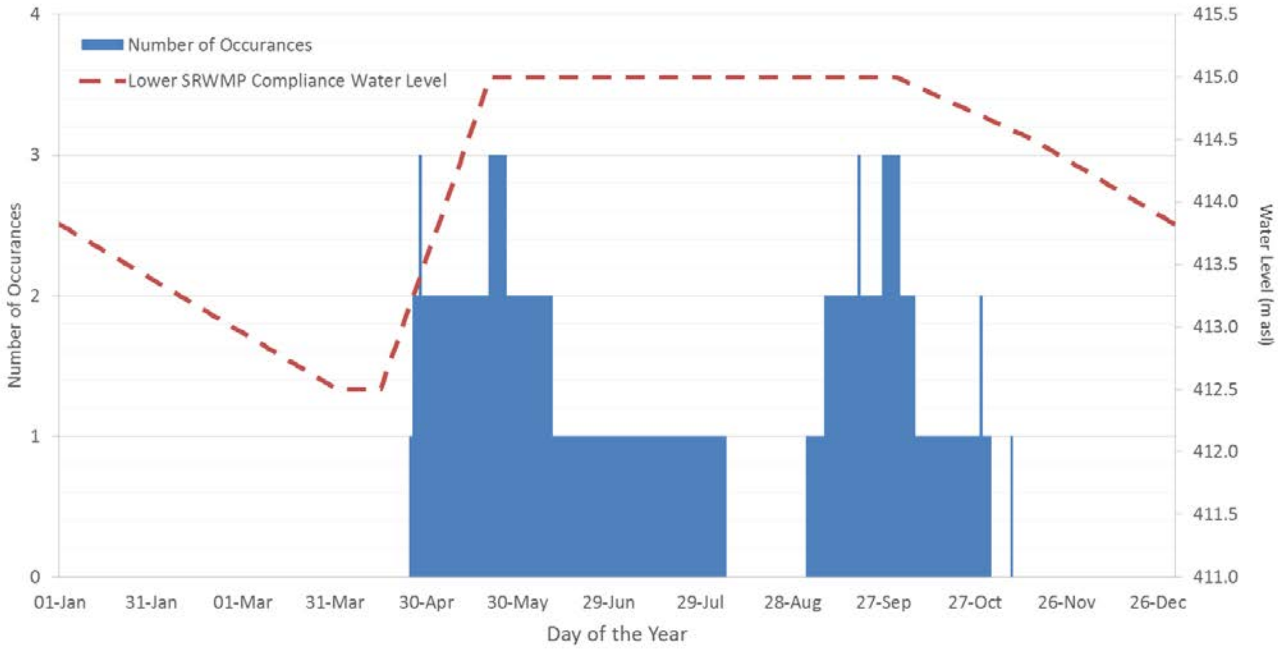

Figure 1: Number of times contingency measures would have been triggered (2004 to 2016) compared to SRWMP lower compliance water level

3.0 MINIMUM WATER STORAGE VOLUMES

Minimum water storage volumes to be maintained in the PPCP and TMF Reclaim Pond have been selected based on the following:

- The requirement to offset water taking to satisfy demands for potable water and water for reagent mixing;
- The deficit in process make-up water requirements after accounting for reclaimed water from the TMF, groundwater seepage into the open pits, treated sewage from the process plant, and runoff intercepted within the Project footprint.
  - Reclaimed water has been calculated as the difference between water in the tailings slurry discharged to the TMF and water retained in the deposited tailings.
  - The predicted full-build out pit seepage inflow has been reduced by 50% in consideration that the contingency measures may be triggered at a time when the pits have not reached their full extent.
  - Runoff intercepted within the Project footprint will vary depending on hydrologic conditions. The minimum runoff collection volume has been estimated from mine water balance modelling over a 90-year period using precipitation, sublimation, and evaporation inputs from 1921 to 2011. The estimated lowest historical 120-day-total runoff volume occurring between April 15 and October 1 was used as the basis for selection of the minimum contingency storage volume. The period between April 15 and October 1 is assumed to be when it would be possible for the contingency measures to be triggered for a prolonged duration (see Figure 1).
- The demand for dust control water;
- The water storage capacities in the ponds.

- The potential length of time that the water level and outflow conditions at Raft Lake Dam could require implementation of the contingency measures.
  - Based on the water level and outflow record between 2004 and 2016 (H2O Power 2016), 120 days has been selected as a reasonably conservative basis for selection of the minimum contingency storage volume.

Table 2 summarizes the proposed sources of process make-up water during periods of low water levels and outflows at Raft Lake Dam. The runoff volume of 4,467 m^3/d is the minimum 120-day cumulative value obtained from the 90-year mine water balance model. A draw of 10,254 m^3/d from the PPCP and TMF Reclaim Pond reserves will be required to satisfy the deficit in process make-up water requirements.

Table 2: Sources of Process Make-Up Water during Low Water Level and Outflow Periods

Source	**Average Daily Rate (m^3/d)**
Reclaimed water from TMF	12,579
Groundwater seepage into the open pits	370
Treated sewage from process plant site	28
Runoff intercepted within the Project footprint	4,467
Draw from PPCP and TMF Reclaim Pond Reserves	10,254
TOTAL	27,698

Table 3 provides the total average daily rate of draw from the ponds that will be required during periods of low water levels and outflows at Raft Lake Dam.

Table 3: Average Daily Draw Rate during Low Water Level and Outflow Periods

Water Demand	**Average Daily Rate (m^3/d)**
Offset water taking from Marmion Reservoir for potable water and raw (clean) water for reagent mixing	7,535
Satisfy deficit in process make-up requirements for design runoff event	10,254
Satisfy demand for dust control water	3,320
TOTAL	21,109

Table 4 provides the minimum storage volumes to be maintained in the PPCP and TMF Reclaim Pond, together with the number of days of water supply.

Table 4: Minimum Storage Volumes

Facility	Minimum Contingency Storage Volume (m^3)	Days of Water Supply
PPCP	211,090	10
TMF Reclaim Pond	2,321,990	110
TOTAL	2,533,080	120

4.0 CLOSING REMARKS

The water management option outlined above can be used as a contingency measure for periods when water level and outflow conditions at Raft Lake Dam are at the lower compliance level described in the Seine River Water Management Plan (Section 1.2). This approach is expected to achieve no net decrease in water flows or levels at the Raft Lake Dam resulting from operations during low water level and outflow periods, while allowing for mine operations to continue during these periods. The proposed option does not include new sources of water or onsite storage facilities and is not expected to require significant design changes or additional capital costs. Changes to operating costs are expected to be marginal in consideration of overall mine operating costs.

We trust the above meets your requirements at this time. Please do not hesitate to contact the undersigned for clarification or further information.

GOLDER ASSOCIATES LTD.

<Original signed by>

Adam Auckland, M.Sc., P.Eng.
Water Resources Engineer

<Original signed by>

Ken De Vos
Principal, Project Director

CC/KDV/AA/sk

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Appendix A
SRWMP Lower Compliance Water Levels and Outflows, and HRGP Contingency Trigger Water Levels

Day of Year	SRWMP Lower Compliance Water Level (masl)	Minimum Outflow (m^3/s)	HRGP Contingency Trigger Water Level (masl)
1 January	413.819	11.6	413.869
2 January	413.804	11.5	413.854
3 January	413.790	11.3	413.84
4 January	413.775	11.2	413.825
5 January	413.761	11.1	413.811
6 January	413.746	10.9	413.796
7 January	413.732	10.8	413.782
8 January	413.717	10.6	413.767
9 January	413.703	10.5	413.753
10 January	413.688	10.3	413.738
11 January	413.674	10.2	413.724
12 January	413.659	10	413.709
13 January	413.645	13.74	413.695
14 January	413.630	13.63	413.68
15 January	413.616	13.41	413.666
16 January	413.601	13.3	413.651
17 January	413.587	13.08	413.637
18 January	413.572	12.97	413.622
19 January	413.558	12.75	413.608
20 January	413.543	12.64	413.593
21 January	413.529	12.42	413.579
22 January	413.514	12.31	413.564
23 January	413.500	12.2	413.55
24 January	413.486	12	413.536
25 January	413.471	11.9	413.521
26 January	413.457	11.7	413.507
27 January	413.442	11.6	413.492
28 January	413.428	11.4	413.478
29 January	413.413	11.3	413.463
30 January	413.399	11.11	413.449
31 January	413.384	11.02	413.434
1 February	413.370	10.84	413.42
2 February	413.355	10.75	413.405
3 February	413.341	10.66	413.391
4 February	413.326	10.48	413.376
5 February	413.312	10.39	413.362
6 February	413.297	10.2	413.347
7 February	413.283	10.1	413.333

Day of Year	SRWMP Lower Compliance Water Level (masl)	Minimum Outflow (m^3/s)	HRGP Contingency Trigger Water Level (masl)
8 February	413.268	10.66	413.318
9 February	413.254	10.52	413.304
10 February	413.239	10.24	413.289
11 February	413.225	10.1	413.275
12 February	413.210	11.54	413.26
13 February	413.196	11.23	413.246
14 February	413.181	11.08	413.231
15 February	413.167	10.78	413.217
16 February	413.152	10.63	413.202
17 February	413.138	10.33	413.188
18 February	413.123	10.18	413.173
19 February	413.109	11.83	413.159
20 February	413.094	11.67	413.144
21 February	413.080	11.35	413.13
22 February	413.065	11.19	413.115
23 February	413.051	11.03	413.101
24 February	413.036	10.71	413.086
25 February	413.022	10.55	413.072
26 February	413.007	10.24	413.057
27 February	412.993	10.1	413.043
28 February	412.978	11.98	413.028
29 February	412.964	11.83	413.014
1 March	412.949	11.53	412.999
2 March	412.935	11.38	412.985
3 March	412.920	11.23	412.97
4 March	412.906	10.92	412.956
5 March	412.891	10.75	412.941
6 March	412.877	10.41	412.927
7 March	412.862	10.24	412.912
8 March	412.848	12.32	412.898
9 March	412.833	12.14	412.883
10 March	412.819	11.78	412.869
11 March	412.804	11.6	412.854
12 March	412.790	11.28	412.84
13 March	412.775	11.12	412.825
14 March	412.761	10.96	412.811
15 March	412.746	10.64	412.796
16 March	412.732	10.48	412.782

Day of Year	SRWMP Lower Compliance Water Level (masl)	Minimum Outflow (m^3/s)	HRGP Contingency Trigger Water Level (masl)
17 March	412.717	10.16	412.767
18 March	412.703	10	412.753
19 March	412.688	12.2	412.738
20 March	412.674	12.05	412.724
21 March	412.659	11.75	412.709
22 March	412.645	11.6	412.695
23 March	412.630	11.45	412.68
24 March	412.616	11.15	412.666
25 March	412.601	11	412.651
26 March	412.587	10.66	412.637
27 March	412.572	10.49	412.622
28 March	412.558	10.15	412.608
29 March	412.543	12.67	412.593
30 March	412.529	12.33	412.579
31 March	412.514	12.16	412.564
1 April	412.500	11.99	412.55
2 April	412.500	11.99	412.55
3 April	412.500	11.99	412.55
4 April	412.500	11.99	412.55
5 April	412.500	11.99	412.55
6 April	412.500	11.99	412.55
7 April	412.500	11.99	412.55
8 April	412.500	11.99	412.55
9 April	412.500	11.99	412.55
10 April	412.500	11.99	412.55
11 April	412.500	11.99	412.55
12 April	412.500	11.99	412.55
13 April	412.500	11.99	412.55
14 April	412.500	11.99	412.55
15 April	412.500	11.99	412.55
16 April	412.569	10.32	412.619
17 April	412.639	11.45	412.689
18 April	412.708	10	412.758
19 April	412.778	11.12	412.828
20 April	412.847	12.32	412.897
21 April	412.917	11.08	412.967
22 April	412.986	12.13	413.036
23 April	413.056	11.03	413.106

Day of Year	SRWMP Lower Compliance Water Level (masl)	Minimum Outflow (m^3/s)	HRGP Contingency Trigger Water Level (masl)
24 April	413.125	12.16	413.175
25 April	413.194	11.23	413.244
26 April	413.264	10.66	413.314
27 April	413.333	10.57	413.383
28 April	413.403	11.2	413.453
29 April	413.472	11.9	413.522
30 April	413.542	12.64	413.592
1 May	413.611	13.41	413.661
2 May	413.681	10.3	413.731
3 May	413.750	11	413.8
4 May	413.819	11.6	413.869
5 May	413.889	12.3	413.939
6 May	413.958	10.2	414.008
7 May	414.028	10.9	414.078
8 May	414.097	11.6	414.147
9 May	414.167	12.3	414.217
10 May	414.236	10.1	414.286
11 May	414.306	10.8	414.356
12 May	414.375	11.5	414.425
13 May	414.444	12.22	414.494
14 May	414.514	10.2	414.564
15 May	414.583	10.84	414.633
16 May	414.653	11.5	414.703
17 May	414.722	12.2	414.772
18 May	414.792	12.97	414.842
19 May	414.861	10.57	414.911
20 May	414.931	11.2	414.981
21 May	415.000	11.9	415.05
22 May	415.000	11.9	415.05
23 May	415.000	11.9	415.05
24 May	415.000	11.9	415.05
25 May	415.000	11.9	415.05
26 May	415.000	11.9	415.05
27 May	415.000	11.9	415.05
28 May	415.000	11.9	415.05
29 May	415.000	11.9	415.05
30 May	415.000	11.9	415.05
31 May	415.000	11.9	415.05

Day of Year	SRWMP Lower Compliance Water Level (masl)	Minimum Outflow (m^3/s)	HRGP Contingency Trigger Water Level (masl)
1 June	415.000	11.9	415.05
2 June	415.000	11.9	415.05
3 June	415.000	11.9	415.05
4 June	415.000	11.9	415.05
5 June	415.000	11.9	415.05
6 June	415.000	11.9	415.05
7 June	415.000	11.9	415.05
8 June	415.000	11.9	415.05
9 June	415.000	11.9	415.05
10 June	415.000	11.9	415.05
11 June	415.000	11.9	415.05
12 June	415.000	11.9	415.05
13 June	415.000	11.9	415.05
14 June	415.000	11.9	415.05
15 June	415.000	11.9	415.05
16 June	415.000	11.9	415.05
17 June	415.000	11.9	415.05
18 June	415.000	11.9	415.05
19 June	415.000	11.9	415.05
20 June	415.000	11.9	415.05
21 June	415.000	11.9	415.05
22 June	415.000	11.9	415.05
23 June	415.000	11.9	415.05
24 June	415.000	11.9	415.05
25 June	415.000	11.9	415.05
26 June	415.000	11.9	415.05
27 June	415.000	11.9	415.05
28 June	415.000	11.9	415.05
29 June	415.000	11.9	415.05
30 June	415.000	11.9	415.05
1 July	415.000	11.9	415.05
2 July	415.000	11.9	415.05
3 July	415.000	11.9	415.05
4 July	415.000	11.9	415.05
5 July	415.000	11.9	415.05
6 July	415.000	11.9	415.05
7 July	415.000	11.9	415.05
8 July	415.000	11.9	415.05

Day of Year	SRWMP Lower Compliance Water Level (masl)	Minimum Outflow (m^3/s)	HRGP Contingency Trigger Water Level (masl)
9 July	415.000	11.9	415.05
10 July	415.000	11.9	415.05
11 July	415.000	11.9	415.05
12 July	415.000	11.9	415.05
13 July	415.000	11.9	415.05
14 July	415.000	11.9	415.05
15 July	415.000	11.9	415.05
16 July	415.000	11.9	415.05
17 July	415.000	11.9	415.05
18 July	415.000	11.9	415.05
19 July	415.000	11.9	415.05
20 July	415.000	11.9	415.05
21 July	415.000	11.9	415.05
22 July	415.000	11.9	415.05
23 July	415.000	11.9	415.05
24 July	415.000	11.9	415.05
25 July	415.000	11.9	415.05
26 July	415.000	11.9	415.05
27 July	415.000	11.9	415.05
28 July	415.000	11.9	415.05
29 July	415.000	11.9	415.05
30 July	415.000	11.9	415.05
31 July	415.000	11.9	415.05
1 August	415.000	11.9	415.05
2 August	415.000	11.9	415.05
3 August	415.000	11.9	415.05
4 August	415.000	11.9	415.05
5 August	415.000	11.9	415.05
6 August	415.000	11.9	415.05
7 August	415.000	11.9	415.05
8 August	415.000	11.9	415.05
9 August	415.000	11.9	415.05
10 August	415.000	11.9	415.05
11 August	415.000	11.9	415.05
12 August	415.000	11.9	415.05
13 August	415.000	11.9	415.05
14 August	415.000	11.9	415.05
15 August	415.000	11.9	415.05

Day of Year	SRWMP Lower Compliance Water Level (masl)	Minimum Outflow (m^3/s)	HRGP Contingency Trigger Water Level (masl)
16 August	415.000	11.9	415.05
17 August	415.000	11.9	415.05
18 August	415.000	11.9	415.05
19 August	415.000	11.9	415.05
20 August	415.000	11.9	415.05
21 August	415.000	11.9	415.05
22 August	415.000	11.9	415.05
23 August	415.000	11.9	415.05
24 August	415.000	11.9	415.05
25 August	415.000	11.9	415.05
26 August	415.000	11.9	415.05
27 August	415.000	11.9	415.05
28 August	415.000	11.9	415.05
29 August	415.000	11.9	415.05
30 August	415.000	11.9	415.05
31 August	415.000	11.9	415.05
1 September	415.000	11.9	415.05
2 September	415.000	11.9	415.05
3 September	415.000	11.9	415.05
4 September	415.000	11.9	415.05
5 September	415.000	11.9	415.05
6 September	415.000	11.9	415.05
7 September	415.000	11.9	415.05
8 September	415.000	11.9	415.05
9 September	415.000	11.9	415.05
10 September	415.000	11.9	415.05
11 September	415.000	11.9	415.05
12 September	415.000	11.9	415.05
13 September	415.000	11.9	415.05
14 September	415.000	11.9	415.05
15 September	415.000	11.9	415.05
16 September	415.000	11.9	415.05
17 September	415.000	11.9	415.05
18 September	415.000	11.9	415.05
19 September	415.000	11.9	415.05
20 September	415.000	11.9	415.05
21 September	415.000	11.9	415.05
22 September	415.000	11.9	415.05

Day of Year	SRWMP Lower Compliance Water Level (masl)	Minimum Outflow (m^3/s)	HRGP Contingency Trigger Water Level (masl)
23 September	415.000	11.9	415.05
24 September	415.000	11.9	415.05
25 September	415.000	11.9	415.05
26 September	415.000	11.9	415.05
27 September	415.000	11.9	415.05
28 September	415.000	11.9	415.05
29 September	415.000	11.9	415.05
30 September	415.000	11.9	415.05
1 October	415.000	11.9	415.05
2 October	414.989	11.7	415.039
3 October	414.978	11.6	415.028
4 October	414.967	11.5	415.017
5 October	414.956	11.4	415.006
6 October	414.944	11.3	414.994
7 October	414.933	11.2	414.983
8 October	414.922	11.11	414.972
9 October	414.911	11.02	414.961
10 October	414.900	10.93	414.95
11 October	414.889	10.75	414.939
12 October	414.878	10.66	414.928
13 October	414.867	10.57	414.917
14 October	414.856	10.48	414.906
15 October	414.844	10.39	414.894
16 October	414.833	10.3	414.883
17 October	414.822	10.2	414.872
18 October	414.811	10.1	414.861
19 October	414.800	10	414.85
20 October	414.789	12.86	414.839
21 October	414.778	12.75	414.828
22 October	414.767	12.64	414.817
23 October	414.756	12.53	414.806
24 October	414.744	12.42	414.794
25 October	414.733	12.31	414.783
26 October	414.722	12.2	414.772
27 October	414.711	12.1	414.761
28 October	414.700	12	414.75
29 October	414.689	11.8	414.739
30 October	414.678	11.7	414.728

Day of Year	SRWMP Lower Compliance Water Level (masl)	Minimum Outflow (m^3/s)	HRGP Contingency Trigger Water Level (masl)
31 October	414.667	11.6	414.717
1 November	414.656	11.5	414.706
2 November	414.644	11.4	414.694
3 November	414.633	11.3	414.683
4 November	414.622	11.2	414.672
5 November	414.611	11.11	414.661
6 November	414.600	11.02	414.65
7 November	414.589	10.84	414.639
8 November	414.578	10.75	414.628
9 November	414.567	10.66	414.617
10 November	414.556	10.57	414.606
11 November	414.544	10.48	414.594
12 November	414.533	10.39	414.583
13 November	414.522	10.3	414.572
14 November	414.511	10.2	414.561
15 November	414.500	10.1	414.55
16 November	414.485	12.66	414.535
17 November	414.471	12.55	414.521
18 November	414.456	12.33	414.506
19 November	414.442	12.22	414.492
20 November	414.427	12	414.477
21 November	414.412	11.9	414.462
22 November	414.398	11.7	414.448
23 November	414.383	11.6	414.433
24 November	414.369	11.4	414.419
25 November	414.354	11.3	414.404
26 November	414.339	11.1	414.389
27 November	414.325	11	414.375
28 November	414.310	10.9	414.36
29 November	414.296	10.7	414.346
30 November	414.281	10.6	414.331
1 December	414.266	10.4	414.316
2 December	414.252	10.3	414.302
3 December	414.237	10.1	414.287
4 December	414.223	10	414.273
5 December	414.208	12.7	414.258
6 December	414.193	12.6	414.243
7 December	414.179	12.4	414.229

Day of Year	SRWMP Lower Compliance Water Level (masl)	Minimum Outflow (m^3/s)	HRGP Contingency Trigger Water Level (masl)
8 December	414.164	12.3	414.214
9 December	414.150	12.1	414.2
10 December	414.135	12	414.185
11 December	414.120	11.9	414.17
12 December	414.106	11.7	414.156
13 December	414.091	11.6	414.141
14 December	414.077	11.4	414.127
15 December	414.062	11.3	414.112
16 December	414.047	11.1	414.097
17 December	414.033	11	414.083
18 December	414.018	10.8	414.068
19 December	414.004	10.7	414.054
20 December	413.989	10.5	414.039
21 December	413.974	10.4	414.024
22 December	413.960	10.2	414.01
23 December	413.945	10.1	413.995
24 December	413.931	10	413.981
25 December	413.916	12.6	413.966
26 December	413.901	12.5	413.951
27 December	413.887	12.3	413.937
28 December	413.872	12.2	413.922
29 December	413.858	12	413.908
30 December	413.843	11.9	413.893
31 December	413.828	11.7	413.878

Attachment F

Potential Peak Water Taking Requirements – Hammond Reef Gold Project; Revision 1

TECHNICAL MEMORANDUM

DATE February 21, 2017 **PROJECT No.** 1656263 (DOC006_Rev 1)

TO Sandra Pouliot
Canadian Malartic Corporation

CC Ken De Vos

FROM Adam Auckland **EMAIL** aauckland@golder.com

POTENTIAL PEAK WATER TAKING REQUIREMENTS – HAMMOND REEF GOLD PROJECT (REV. 1)

EXECUTIVE SUMMARY

The Hammond Reef Gold Project (the Project) will require water taking from Marmion Reservoir for potable water supply, reagent mixing, dust control and process make-up water. Marmion Reservoir water levels and outflows are controlled at the Raft Lake Dam in accordance with the Seine River Water Management Plan (SRWMP), a legally binding agreement between the water power producers that operate dams along the Seine River and the Ontario Ministry of Natural Resources (MNRF). To mitigate potential impacts on the water power producer's ability to meet the requirements of the SRWMP, CMC has committed to the implementation of contingency measures that would allow the Project to continue to operate during low water level and outflow conditions while imposing no net withdrawal from Marmion Reservoir.

Water management and compensation agreements with the water power producers are in development. In support of the water management agreement, Brookfield and H20 Power have requested additional information relating to potential peak project water requirements and the filling of the on-site storage ponds. This information is provided in this technical memorandum along with the results of mine site water balance modelling scenarios that are designed to address concerns from power producers regarding the ability to meet the requirements of the SRWMP during drier than normal conditions.

The modelling analysis presented in this memorandum demonstrates that, under most operating conditions, the project will draw from accumulated on-site storage and water taking will be limited to the minimum fresh water requirement. All net water taking will be occur during periods when the reservoir is operating under normal conditions and the requirement to actively refill the on-site contingency storage volume following a period when the reservoir is operated at below normal conditions will occur only on rare occasions. If additional water taking is required to refill the on-site storage, this requirement will be communicated to H20 Power and Brookfield so that an appropriate management strategy can be developed that meets the requirements of all parties to the extent possible based on natural hydrologic conditions encountered.

Through appropriate management, open communication and data sharing, the Project can be operated such that it does not adversely impact the water power producer's ability to adhere to the requirements of the SRWMP.

1.0 INTRODUCTION

Operating water levels and outflows specified in the SRWMP are intended to guide the management of the Raft Lake Dam under normal water level and outflow conditions. However, there are conditions beyond the control of the operator that may result in the specified water levels and outflows not being achieved. The SRWMP defines the lower compliance level as occurring when outflows are at the minimum values specified and water levels are below the minimum specified elevation for that day. Both conditions must exist at the same time. Below normal conditions occur when water levels and outflows fall below the specified minimums. Since the implementation of the SRWMP in 2004, below normal conditions have occurred approximately 6% of the time with the longest period occurring between April 29 and August 7, 2010 (101 days).

H20 Power, Brookfield and the MNRF raised concerns following submission of the Environmental Impact Statement/Environmental Assessment (EIS/EA) that Project water taking may adversely impact the operator's ability to achieve the minimum water levels and outflows specified in the SRWMP during drier than normal conditions. In response to these concerns, CMC proposed contingency measures that will offset water taking from Marmion Reservoir during below normal water level and outflow periods at Raft Lake Dam (Golder 2015). The proposed contingency measures would allow the project to continue to operate during below normal conditions by drawing from on-site water storage while imposing no net withdrawal from Marmion Reservoir.

During subsequent discussions with H20 Power and Brookfield, additional information related to potential peak project water requirements and the filling of the on-site storage ponds was requested.

2.0 NORMAL PROJECT WATER REQUIREMENTS

Under normal operating conditions, the project has an average water demand of 38,555 m^3/d during periods when dust control is required and 35,235 m^3/d during periods when dust control is not required (i.e., winter conditions), as broken down in Tables 1 and 2. Of the total water requirement, 7,535 m^3/d of fresh water from Marmion Reservoir is required at all times to supply potable (335 m^3/d) and reagent mixing (7,200 m^3/d) water. Under most conditions, other water demand will be satisfied by water recycle and on-site water collection of runoff and seepage. The Project is located in a net positive water environment (average precipitation exceeds average evaporation) and there will be a carryover of water accumulating in the ponds during wet periods to dry periods. Under average and wet hydrologic conditions, on-site water collection are predicted to exceed project water requirements; excess water will be treated and discharged to Marmion Reservoir.

During dry periods when runoff collection is limited but when the reservoir is operating within its normal range (i.e., water levels or outflows are above minimum specified values), additional water may be required from the reservoir to maintain the minimum contingency water storage. Under a worst-case scenario, a temporary maximum of 26,000 m^3/d (0.30 m^3/s) would be required from the reservoir if there is no runoff or seepage available for collection and the on-site reserve volume is at the minimum contingency level.

Table 1: Project Water Demand (April to October)

Water Demand	Average Daily Rate (m^3/d)
Potable water for camp and process plant	335
Water for reagent mixing	7,200
Process make-up water	27,700
Water for dust control	3,320
TOTAL	**38,555**

Table 2: Project Water Demand (November to March)

Water Demand	Average Daily Rate (m^3/d)
Potable water for camp and process plant	335
Water for reagent mixing	7,200
Process make-up water	27,700
Water for dust control	0
TOTAL	**35,235**

3.0 CONTINGENCY MEASURES AND ON-SITE STORAGE

During below normal conditions (i.e., water levels and outflows below minimum specified values), the project will draw from onsite storage reserves. Fresh water withdrawal from Marmion Reservoir will still be required to supply potable and reagent mixing water but this withdrawal will be offset by the discharge of an equivalent volume of treated effluent from on-site reserves.

The proposed low flow contingency measures will be triggered when the reservoir reaches a water level elevation that is within 5 cm of the lower compliance limit (as defined in the SRWMP) and the outflow from Raft Lake Dam is at or below the minimum outflow. The minimum outflow is defined as the greater of (10 m^3/s) or flow after removal of one stoplog (control band error) required to maintain minimum flow. The contingency measures will require CMC to maintain a minimum water storage volume of 2,533,000 m^3 above the 1,800,000 m^3 dead storage in the Tailings Management Facility (TMF) Reclaim Pond. Therefore, a total volume of 4,333,000 m^3 is proposed to be maintained on-site to be able to offset water taking when the reservoir water level and outflow conditions are at the lower compliance level. This minimum volume will be maintained within the TMF Reclaim Pond and Process Plant Collection Pond (PPCP). These ponds will require filling during construction and re-filling following periods when the reservoir is operated at below normal conditions and withdrawal from contingency storage is triggered. Both of these water taking scenarios would constitute periods when project water requirements may exceed those identified in Section 2.0 for normal operating conditions.

4.0 ON-SITE STORAGE FILLING AND RE-FILLING

4.1 Initial Filling during Construction

To estimate potential water taking requirements for the initial filling of the TMF Reclaim Pond and PPCP, a high-level filling water balance has been completed based on the following assumptions:

- Pre-filling of both the TMF Reclaim Pond and PPCP will be required to provide operational redundancy (i.e., two separate sources of water in event of mechanical breakdown);
- The TMF Reclaim Pond will be filled to a minimum initial volume of 4,122,000 m^3 and the PPCP to a minimum initial volume of 211,000 m^3; for a total minimum initial volume of 4,333,000 m^3;
- Dam and pond construction will occur during non-freezing conditions with a completion date of October 31;
- Filling will commence November 1 and the full contingency volume will be required by April 15 (i.e., when the minimum water levels specified in the SRWMP begin to increase);
- Runoff collection will be limited to the immediate TMF and PPCP watersheds and is estimated based on 1 in 25-year dry conditions;

- Water taking from Marmion Reservoir will be required during entire filling period to supply potable water to the accommodation camp at the same average rate required during operations;
- Water taking from Marmion Reservoir for filling the ponds is assumed to be available only 50% of the time to account for potential mechanical breakdown or maintenance and the potential that outflows or water levels may temporarily drop below the specified minimums;
- Water for dust control will not be required during filling period (i.e., during winter and spring melt conditions); and
- The filling period has been selected to be reflective of a low runoff collection period. Should filling occur during a different time of year, the volume of collected runoff would be larger and water taking from Marmion reservoir would be reduced.

Based on the above assumptions, an average daily withdrawal rate of 46,800 m^3/d (0.54 m^3/s) would be required to fill the TMF and PPCP to the minimum contingency volume.

4.2 Refilling after Drawdown of Contingency Storage

When the water taking contingency measures are triggered, the project will draw from onsite storage reserves. Once the reservoir returns to normal conditions, the contingency volume will be recovered by allowing water from on-site runoff and seepage collection to accumulate in the ponds and from additional water taking from Marmion Reservoir, as required. Active refilling of the contingency reserves from Marmion Reservoir will only occur when water levels and outflows are above the contingency trigger conditions. H20 Power and Brookfield will be aware of the requirement to refill the contingency storage though regular sharing of information. A peak refilling rate of 20,800 m^3/d (0.24 m^3/s) is proposed based on the following hypothetical dry year scenario:

- The contingency volume is drawdown during summer and is completely exhausted on October 31 (i.e., refilling of the entire contingency volume of 2,533,000 m^3 is required);
- The contingency volume is required to be available to CMC by April 15 (i.e., when the minimum water levels specified in the SRWMP begin to increase);
- Runoff collection associated with 1 in 25 year dry conditions;
- Open pit seepage collection reduced by 50%;
- Water taking from Marmion Reservoir is assumed to be available only 50% of the time to account for potential mechanical breakdown or maintenance and the potential that outflows or water levels may temporarily drop below the specified minimums;

The proposed refilling rate will be additional to the Project’s normal operational water requirements and assumes that all runoff and seepage collection contributes to refilling the contingency storage. Therefore, during this hypothetical conservative scenario, a peak daily water taking rate of about 46,800 m^3/d (0.54 m^3/s) would be required to support project operations and refill the entire contingency storage volume.

4.3 Water Balance Simulation

The minimum contingency volume was conservatively selected based on the following assumptions to ensure the project can continue to operate during extreme dry conditions (Golder 2015):

- Minimum 120-day runoff collection volume obtained from mine water balance modelling over a 90-year period;
- On-site storage is at the minimum contingency volume when the contingency measures are triggered.

The continuous monthly mine-site water balance has been updated to evaluate the influence of the proposed contingency measures and potential refilling requirements on net-water taking from Marmion Reservoir (i.e. withdrawal minus treated effluent discharge). It is understood that the hydro power operators are concerned about low flow conditions and the potential need to re-fill the contingency reserve during dry hydrologic conditions. To focus on these concerns, an artificial monthly time series was created by combining the following years in series:

1) 2010 – the year that experienced the longest period in which the reservoir was operated below normal conditions (May, June and July);
2) 2011 – selected to demonstrate how the contingency storage would have actually been recovered following the conditions experienced in 2010;
3) 2010 – selected to trigger the contingency measures a second time; and,
4) 2006 – the driest year on record since the implementation of the SRWMP.

For this simulation, water levels in Marmion Reservoir and outflows from Raft Lake Dam provided by H20 Power were used to determine when water was available for the project and when implementation of the contingency measures was required. For simplicity, the model was run on a monthly average basis and the provided daily water level and outflow data were converted to monthly averages.

The results of this simulation are provided in Figure 1. The key results with respect to the contingency storage can be summarized as follows:

- In 2010, the contingency storage volume would have reached a minimum volume of 3.85 Mm^3 in June, a reduction of only about 20% of the total volume available, demonstrating the conservativeness of the on-site storage volume.
- In 2010, on-site run-off collection in July would have been sufficient to recover the contingency storage without the need to draw additional water from Marmion Reservoir.

5.0 CONCLUSIONS

Table 3 summarizes the estimated maximum water taking requirements for the Project assuming implementation of the proposed water taking contingency measures.

Table 3: Estimated Maximum Water Taking Requirements

Water Taking Scenario	Net Water Taking Rate	
	(m^3/d)	(m^3/s)
Initial Pond Filling during Construction	46,800	0.54
Normal Project Operation Conditions (Nov. to Mar.)	22,650	0.26
Normal Project Operating Conditions (Apr. to Oct.)	26,000	0.30
Normal Project Operation Conditions with Refill (Nov. to Mar.)	43,450	0.50
Normal Project Operating Conditions with Refill (Apr. to Oct.)	46,800	0.54

The maximum water taking rates have been conservatively estimated based on low runoff and seepage collection conditions. Under normal Project operating conditions, the peak potential water requirement is equal to 0.7% to 1.4% of annual average outflows since the implementation of the SRWMP.

The contingency volume has been selected based on conservative assumptions and this has been demonstrated with the water balance analysis presented in this memorandum. Under most operating conditions, the project will draw from accumulated on-site storage and water taking will be limited to the minimum fresh water requirement.

All net water taking will be occur during periods when the reservoir is operating under normal conditions and the requirement to actively refill the on-site contingency storage volume following a period when the reservoir is operated at below normal conditions will occur only on rare occasions. If additional water taking is required to refill the on-site storage, this requirement will be communicated to H20 Power and Brookfield so that an appropriate management strategy can be developed that meets the requirements of all parties to the extent possible based on natural hydrologic conditions encountered.

Through appropriate management, open communication and data sharing, the Project can be operated such that it does not adversely impact the water power producer's ability to adhere to the requirements of the SRWMP.

6.0 CLOSURE

We trust this memorandum meets your expectations and present requirements. Should you have any questions, please contact the undersigned.

Sincerely,
GOLDER ASSOCIATES LTD.

<Original signed by>

<Original signed by>

Adam Auckland, M.Sc., P.Eng.
Water Resources Engineer

Ken De Vos
Principal, Project Director

AA/KD/sk

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References

Golder Associates Ltd. (Golder). 2015. Contingency Measures to Eliminate Water Taking from Marmion Reservoir during Low Water Level and Outflow Periods at Raft Lake Dam – Hammond Reef Gold Project. November 2015.

Attachments:

Figure 1: Simulated Net Water Taking and On-site Storage with the Proposed Water Taking Contingency Measures

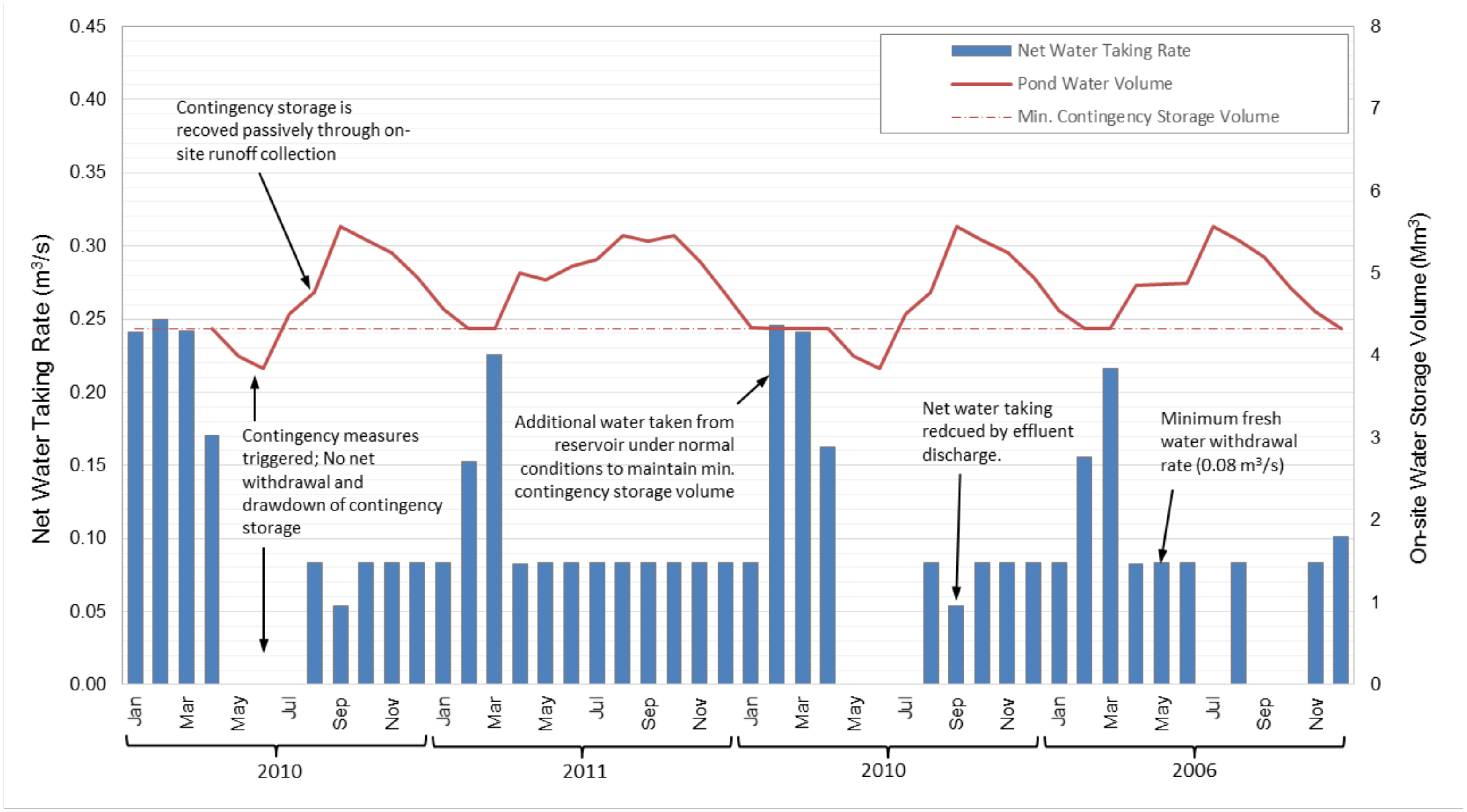
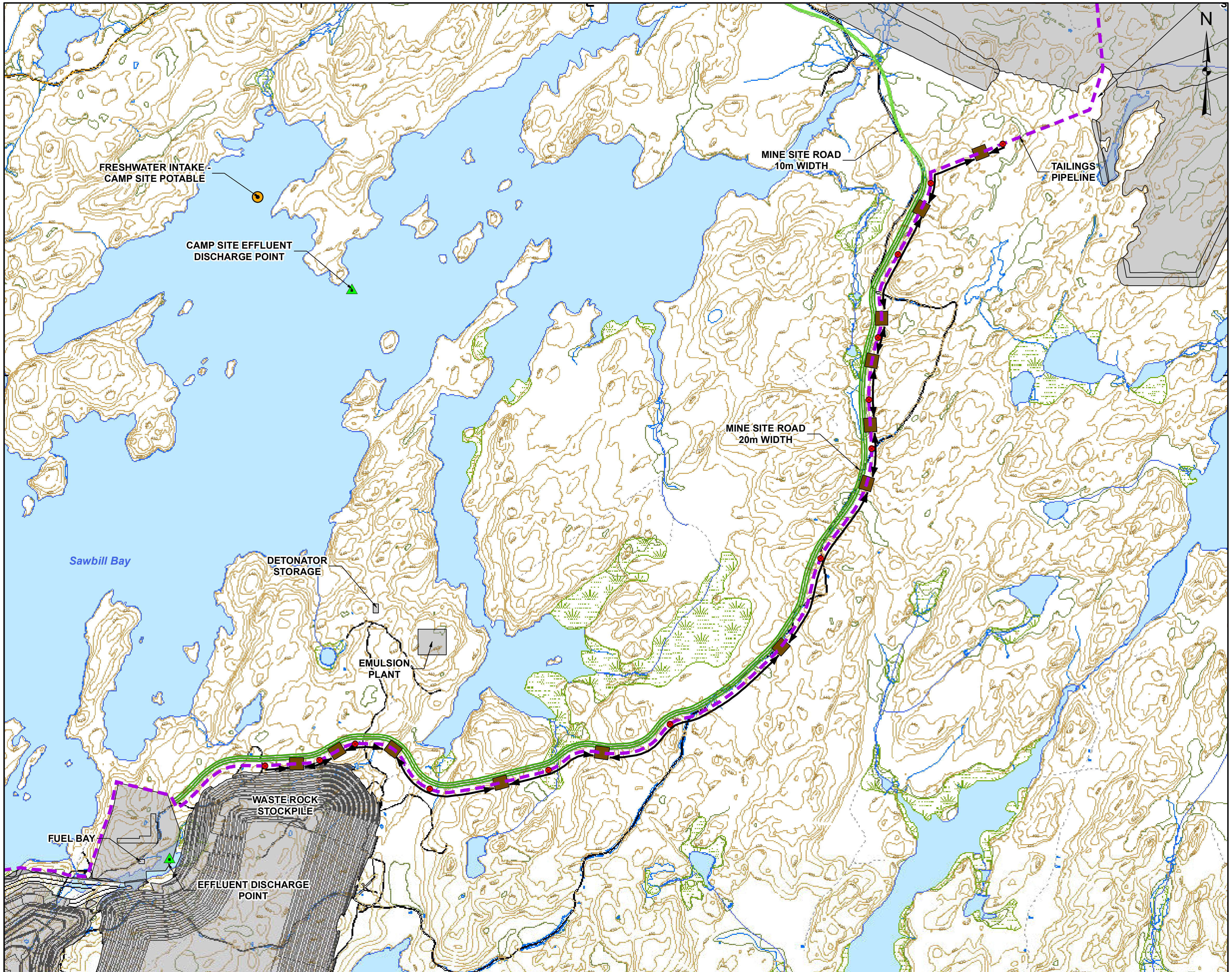


Figure 1: Simulated Net Water Taking and On-site Storage with the Proposed Water Taking Contingency Measures

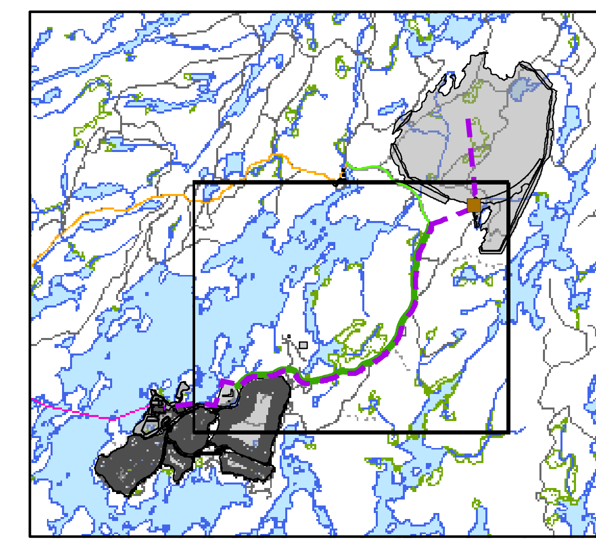
Attachment G

Map MNR 5: Tailings Pipeline Containment Areas



LEGEND

- Freshwater Intake - Camp Site Potable
- Discharge Location
- Effluent Discharge Point
- Index Contour (5m interval)
- Ditch
- Marsh/Swamp
- River/Stream
- Road
- Trail
- Lake
- Wetland
- High Point Chainage
- Flow Direction
- Containment Areas
- Mine Site Road - 10m Width
- Mine Site Road - 20m Width
- Access Road (Hardtack / Sawbill)
- Tailings Pipeline
- Mine Facilities



REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.
Base Data - MNR NRVIS, obtained 2004
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 15N

500 0 500
SCALE 1:20,000 METERS

PROJECT

HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE

TAILINGS PIPELINE CONTAINMENT AREAS

Golder Associates
Mississauga, Ontario

PROJECT NO. 1656263			SCALE AS SHOWN	REV. ION 1
DESIGN	RAD	14 Nov. 2008	MNR 5	
GIS	SO	20 Mar. 2018		
CHECK	AA	20 Mar. 2018		
REVIEW	AA	20 Mar. 2018		

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Attachment H

Mercury in Fish Tissue

9 December, 2016

CANADIAN MALARTIC CORPORATION

Mercury in Fish Tissue, Hammond Reef Project

Submitted to:
Sandra Pouliot
Canadian Malartic

Report Number: 1408383_DOC007_Rev 0

REPORT

Table of Contents

1.0 INTRODUCTION

In response to comments received on the Hammond Reef Gold Project (the Project) Environmental Impact Statement/Environmental Assessment Report (EIS/EA) (Golder 2013a), Canadian Malartic Corporation (Canadian Malartic) retained Golder Associates Ltd. (Golder) to conduct a supplemental study to assess mercury concentration in fish tissue from four waterbodies near the Project in 2014.

The Project is a gold deposit located on 1,250 hectares (ha) within the Thunder Bay Mining District in north-western Ontario, approximately 170 kilometres (km) west of Thunder Bay and 23 km northeast of the town of Atikokan (Figure 1). The Project is located mainly on a peninsula extending into the north end of the Upper Marmion Reservoir. This peninsula is surrounded by the Marmion Reservoir on three sides with Sawbill Bay to the northwest and Lynx head Bay to the southeast. Current access to the Project site is via the Hardtack-Sawbill Lake Road. The Project is also accessible by water from the southwest end of Marmion Reservoir at its access point from Highway 622, west of Atikokan.

1.1 Background

Fish tissue samples were in collected 2010 and 2011 as part of EIS/EA baseline data collection to identify whether there were existing concerns with respect to fish tissue accumulation of contaminants, specifically mercury. The baseline data collected indicated that some fish have elevated concentrations of mercury, which could be a concern for consumption (See Table 2-8 in the Aquatic Environment Technical Support Document of the EIS/EA [Golder 2013b]).

Analyses completed as part of the EIS/EA identified that mercury would not be a concern at the project site due to low mercury concentrations in the rock samples, negligible leaching of mercury in the geochemical testing, and no use of mercury anywhere in the production circuits (Golder 2013c). Therefore, the project is not predicted to cause an incremental increase in the release of mercury to the environment and it was determined that additional fish tissue sampling was not required.

Notwithstanding the EIS/EA predictions, several stakeholder groups requested additional tissue chemistry analyses beyond those required by, and provided in, the EIS/EA. The following provides a high-level summary of the key comments received from the Seine River First Nation (Klyne 2013), the Atikokan Sportsmen's Conservation Club (Charbonneau et al. 2013), and the Ontario Federation of Anglers and Hunters (Sokay 2013) on the Draft EIS/EA report. In response to these comments, Canadian Malartic agreed to collect additional fish tissue data for mercury analysis.

Seine River First Nation provided the following comments:

- Fish tissue data should to be presented at a standard length versus mean concentration; and
- Information on methods used to analyze samples and proof that laboratory used was appropriately accredited to conduct these analyses should be provided.

The Atikokan Sportsmen's Conservation Club provided the following comments:

- Results were not presented consistent with how the Ontario sport fish contaminant program presents results (e.g., standardizing mercury concentrations at a specific length);
- Lengths and ages of fish were not reported;
- Northern Pike and Smallmouth Bass should have been included in the contaminant analysis program; and

- There was no indication that the laboratory used was appropriately accredited was provided.

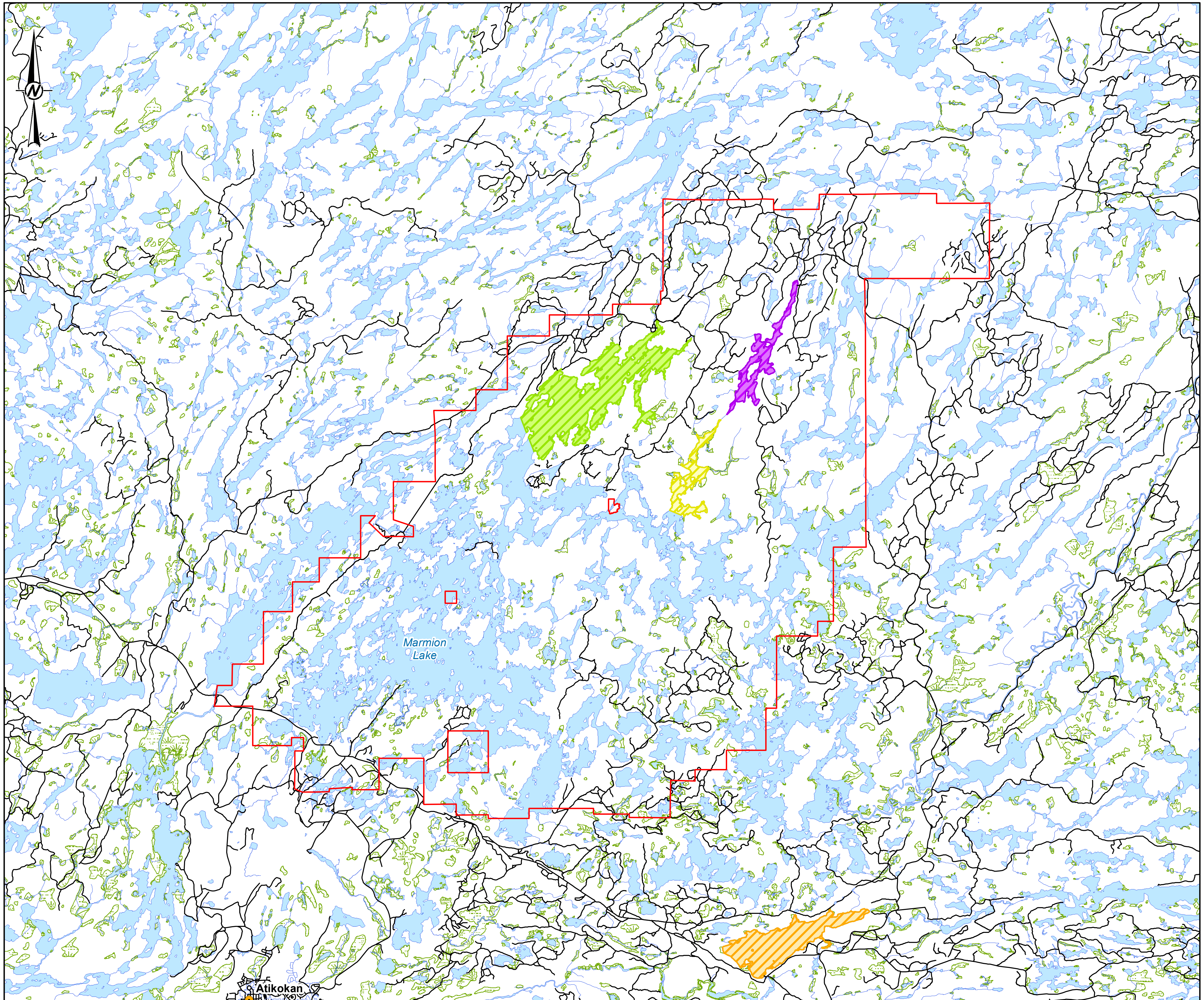
Ontario Federation of Anglers and Hunters comments are based upon discrepancies between the EA guidelines and the Ontario sport fish contaminant sampling program, and were as follows:

- No reference location was sampled;
- Only a single forage fish was included;
- Fish lengths were not provided;
- A minimum sample size of 20 individuals per potentially impacted area is required; and
- Details on preservation and analyses should be provided.

1.2 Objectives

The objectives of this mercury in fish tissue study were developed to address the stakeholder concerns and are as follows:

- Collect multiple tissue samples from Walleye (*Sander vitreus*), Northern Pike (*Esox lucius*), and Smallmouth Bass (*Micropterus dolomieu*) from Lizard Lake, Sawbill Bay, Turtle Bay and Sapawe Lake;
- Collect a single whole-body composite sample of a small-bodied forage species (Cyprinidae family) in each of Lizard Lake, Sawbill Bay, Turtle Bay and Sapawe Lake;
- Submit fish tissue and composite samples to a qualified laboratory for analysis of mercury; and
- Provide a technical report summarizing the mercury results.



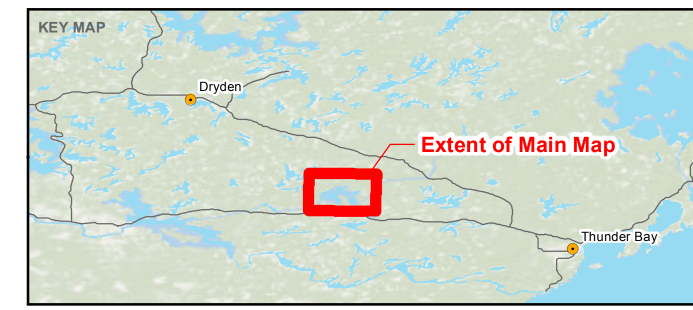
LEGEND

- City/Town

Fish Collection Locations

- Lizard Lake
- Sapawe Lake
- Sawbill Bay
- Turtle Bay
- Roads
- Project Location
- River/Stream
- Lake
- Wetland

KEY MAP



NOTES

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO.1408383/3000

REFERENCE

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

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METRES

SCALE 1:150,000

CLIENT
CANADIAN MALARTIC CORPORATION

PROJECT
HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE
FISH COLLECTION LOCATIONS

CONSULTANT		
Golder Associates	YYYY-MM-DD	2015-11-17
	PREPARED	RRD
	DESIGN	RRD
	REVIEW	JD
	APPROVED	JS

PROJECT No.	PHASE	Rev.	FIGURE
1408383	3000	A	1

2.0 METHODS

2.1 Study Area and Timing

The sampling areas for the 2014 fish tissue collection work were (Figure 1):

- Lizard Lake;
- Sawbill Bay, on Marmion Reservoir;
- Turtle Bay, on Marmion Reservoir; and
- Sapawe Lake.

Lizard Lake, Sawbill Bay and Turtle Bay were previously sampled in 2010 as part of the Environmental Baseline; results are reported in the EIS/EA (Golder 2013b). Sapawe Lake was added to the 2014 tissue collection program to provide an additional local lake for comparison outside of the Project study area. Field sampling took place between August 19 and August 28, and September 8 and September 12, 2014.

2.2 Sampling Methods

Fish sampling was completed in accordance with Ontario Ministry of Natural Resources and Forestry (MNRF) Licence to Collect Fish for Scientific Purposes (Lic. No.1078003). The licence allowed for the capture and collection of fish tissue from both sport fish and forage fish using a variety of capture methods.

A sample size of 20 fish from each of the three species were targeted mercury analysis. Sportfish were captured by long duration gill net sets. Gill nets used for this assessment consisted of experimental gangs comprised of eight, 15 m panels of monofilament mesh in the following sizes: 3.8 centimetres (cm), 5.1 cm, 6.4 cm, 7.6 cm, 8.9 cm, 10.2 cm, 11.4 cm, 12.7 cm. Shorter, single panel gillnets (9.1 m) were occasionally used when the target number of samples from a given area was close to being met in order to try and reduce unwanted by-catch. Gill nets were set in locations commonly used by the target species and were fished overnight for a length of 12 to 24 hours. Captured fish were placed on ice in plastic totes; non-target species were identified, counted, and released. Total length (± 1 mm) and fresh body weight (± 0.1 gram [g] wet weight [ww]) were recorded for all captured target fish species.

Forage fish species were captured with seine nets. In general, sampling for forage fish was not effective because of a lack of suitable size forage fish in the study areas. A compounding factor in the inability to collect sufficient forage fish was the age class representation within the population. Forage species that were captured in seine hauls were generally young-of-the-year (YOY) fish that would not have sufficient size and exposure period for useful metals analysis. As a result of insufficient sample size, forage fish were not submitted for tissue chemistry analysis.

Fish Tissue Collection

Fish Tissue collections were completed by a two person crew consisting of one Golder staff (crew leader) and one assistant, either from a local First Nation community or the Atikokan Sportsmen's Conservation Club. Tissue collection followed methods outlined in the Protocol for the Collection of Fish Samples for Contaminant analysis (MOE 2014). A skinless, boneless, dorsal muscle sample was collected from the target species.

Several precautionary procedures were followed to avoid potential tissue contamination and ensure sample integrity. Nitrile gloves were replaced prior to processing a fish. Cutting surfaces were covered with plastic wrap, which was replaced each time a new fish was processed. Stainless fillet knives were wiped clean with disposable wipes after processing each fish.

For most fish, a tissue sample of 100 g or larger was collected. This is above the 5 gram minimum sample size required by the lab for a single metal analysis. Individual tissue samples were placed in re-sealable food grade plastic bags. A labeled identification tag with the date, fish species, length, weight, waterbody name and a unique identification code was placed in the bag. The outside of the bag was labeled with the same information included on the tag. The bag was then placed inside a second re-sealable food grade bag for added protection. Tissue samples were placed in a cooler with either dry ice or cube ice. At the end of the each day, the samples were transferred from the coolers to a freezer. Samples were shipped frozen to the laboratory, as per the Protocol for the Collection of Fish Samples for Contaminant Analysis (MOE 2014). Tissue samples were shipped to The Ontario Ministry of the Environment's Provincial Sport Fish Contaminant Laboratory (Etobicoke, ON) for analysis of total mercury. The Provincial Sport Fish Contaminant Laboratory is accredited by the Canadian Association for Laboratory Accreditation (CALA). Table 1 provides a summary of tissue samples analysed for mercury, by species and location.

Table 1: Fish Tissue Samples Analysed by the Provincial Sportfish Laboratory, 2014

	Dates Sampled	Tissue Samples Submitted to Provincial Sportfish Contaminant Laboratory	
		Species	**Sample Size**
Lizard Lake	August 18-22	Smallmouth Bass	19
		Walleye	21
		Northern Pike	19
Sawbill Bay	August 21-28	Smallmouth Bass	20
		Walleye	21
		Northern Pike	20
Turtle Bay	August 26-September 11	Smallmouth Bass	21
		Walleye	20
		Northern Pike	20
Sapawe Lake	September 8-12	Smallmouth Bass	19
		Walleye	22
		Northern Pike	20

2.3 Data Analysis

Total length and mercury concentration were analyzed using R v.3.2.3 (R 2015). Total length and mercury concentration values were transformed to natural logarithms (ln). Linear regression analysis was run for each species, by sample location. Length (ln) was set as the independent variable and mercury (ln) was used as the dependent variable.

The results of the regression analysis were used to determine mercury values for each species, at a standardized fish length that would typically be consumed by anglers. The standardized lengths assigned to each species were: Smallmouth Bass = 35 cm; Northern Pike = 50 cm; and Walleye = 40 cm. The resulting values were then converted back to a true number representing the mercury concentration in microgram per gram [µg/g] ww. A copy of the regression analysis output is provided in Appendix A.

The 95% prediction intervals for the standardized lengths were calculated for each species/lake combination (Table 6). The values of the 95% prediction intervals represent the points on the 95% prediction interval lines shown in Appendix A for each species/lake combination.

3.0 RESULTS

Total mercury concentration results for each individual fish are provided in Appendix B. Summary statistics for mercury concentration by waterbody and species are included in Tables 2 to Table 5.

The predicted mercury concentration for a 35 cm Smallmouth Bass ranged from 0.259 µg/g ww in Sapawe Lake to 0.427 µg/g ww in Sawbill Bay (Table 6). Predicted mercury concentrations for a 50 cm Northern Pike ranged from 0.307 µg/g in Sapawe Lake to 0.402 µg/g in Turtle Bay (Table 6). Predicted mercury concentrations for a 40 cm Walleye ranged from 0.642 µg/g in Sapawe Lake to 1.014 µg/g in Sawbill Bay. Walleye collected from Sawbill Bay had the highest mercury concentration of all species and lakes sampled.

Table 2: Mercury Concentration in Lizard Lake Fish Tissue

Species	Length (cm)	Weight (g)	Mercury (µg/g ww)
Smallmouth Bass (n=19)			
Minimum	29.8	340	0.24
Maximum	48.6	1850	1.10
Median	42.1	1100	0.57
Average	41.5	1107	0.61
SD	4.8	378	0.26
Northern Pike (n=19)			
Minimum	31.3	280	0.26
Maximum	79.9	3500	0.92
Median	52.8	875	0.52
Average	54.7	1125	0.54
SD	11.5	774	0.22
Walleye (n=21)			
Minimum	25.5	117	0.39
Maximum	71.3	3250	1.90
Median	54.4	1500	0.70
Average	52.8	1543	0.92
SD	12.3	963	0.47

Notes: µg ww = microgram per gram wet weight; n = sample size; SD = standard deviation; cm = centimetre; g = gram.

Table 3: Summary of Mercury Concentrations in Sawbill Bay Fish Tissue

Species	Length (cm)	Weight (g)	Mercury (µg/g ww)
Smallmouth Bass (n=20)			
Minimum	29.3	350	0.29
Maximum	49.2	1900	0.91
Median	40.6	1000	0.51
Average	40.0	1045	0.54
SD	5.5	451	0.18
Northern Pike (n=20)			
Minimum	41.6	380	0.25
Maximum	93.1	3200	2.80
Median	49.2	600	0.55
Average	51.8	860	0.68
SD	12.6	693.6	0.54
Walleye (n=21)			
Minimum	28.0	180.0	0.34
Maximum	53.6	1550.0	1.80
Median	35.4	360.0	0.62
Average	37.1	518.3	0.73
SD	7.6	376.1	0.37

Notes: µg ww = microgram per gram wet weight; n = sample size; SD = standard deviation; cm = centimetre; g = gram.

Table 4: Summary of Mercury Concentrations in Turtle Bay Fish Tissue

Species	Length (cm)	Weight (g)	Mercury (µg/g ww)
Smallmouth Bass (n=21)			
Minimum	35.0	740.0	0.29
Maximum	51.4	2075.0	1.50
Median	41.5	1010.0	0.55
Average	41.4	1101.7	0.59
SD	4.2	332.0	0.26
Northern Pike (n=20)			
Minimum	38.5	350.0	0.33
Maximum	66.2	1700.0	1.50
Median	53.7	937.5	0.73
Average	52.4	864.5	0.77
SD	7.1	332.9	0.30
Walleye (n=20)			
Minimum	27.3	170.0	0.32
Maximum	51.1	1325.0	1.10
Median	43.7	837.5	0.66
Average	43.1	813.5	0.64
SD	6.2	330.3	0.19

Notes: µg ww = microgram per gram wet weight; n = sample size; SD = standard deviation; cm = centimetre; g = gram.

Table 5: Summary of Mercury Concentrations in Sapawe Bay Fish Tissue

Species	Length (cm)	Weight (g)	Mercury (µg/g ww)
Smallmouth Bass (n=19)			
Minimum	29.8	340	0.24
Maximum	48.6	1850	1.10
Median	42.1	1100	0.57
Average	41.5	1107.4	0.61
SD	4.8	377.8	0.26
Northern Pike (n=19)			
Minimum	31.3	280.0	0.26
Maximum	79.9	3500.0	0.92
Median	52.8	875.0	0.52
Average	54.7	1125.3	0.54
SD	11.5	774.0	0.22
Walleye (n=21)			
Minimum	25.5	117.0	0.39
Maximum	71.3	3250.0	1.90
Median	54.4	1500.0	0.70
Average	52.8	1542.5	0.92
SD	12.3	963.0	0.47

Notes: µg ww = microgram per gram wet weight; n = sample size; SD = standard deviation; cm = centimetre; g = gram.

Table 6: Estimated Fish Tissue Mercury Concentration Presented at a Standardized Length; 95% Prediction Interval Shown in Parentheses.

Species	Mercury Concentration (µg/g ww)			
	Lizard Lake	Sawbill Bay	Turtle Bay	Sapawe Lake
Smallmouth Bass (35 cm)	0.335 (0.18-0.626)	0.427 (0.244-0.749)	0.353 (0.179-0.697)	0.259 (0.16-0.42)
Northern Pike (50 cm)	0.353 (0.173-0.72)	0.324 (0.204-0.513)	0.402 (0.246-0.659)	0.307 (0.186-0.506)
Walleye (40 cm)	0.786 (0.424-1.458)	1.014 (0.481-2.135)	0.785 (0.525-1.172)	0.642 (0.46-0.896)

Notes: µg ww = microgram per gram wet weight; cm = centimetre.

4.0 DISCUSSION

Fish tissue samples were collected from three lakes located in the area near the proposed Project and an additional lake outside the Project area. Tissue samples were analyzed for total mercury, and mercury was adjusted to a standardized fish length that would typically be consumed by anglers. These baseline data were collected following comments from various stakeholders interested in understanding mercury in the local area where the proposed Project will be situated.

Mercury levels found in Walleye (40 cm) from all four sites were above Heath Canada's maximum acceptable levels in the edible portion of retail fish (0.5 µg/g ww) (CFIA 2015). All Smallmouth Bass and Northern Pike at the reported standard length were below the Health Canada criterion.

The Guide to Eating Ontario Fish (MOECC 2015) provides consumption guidelines for fish containing mercury, in addition to other contaminants. The guide provides advice to anglers, subsistence fishers and their families, and First Nations and Métis communities for choosing fish caught from Ontario waterbodies to minimize exposure to toxins. The guide provides further advice on contaminants in Ontario, and should be referred to if looking for detailed information on various fish consumption guidelines, and how they are derived. The guide also provides advice for those interested in limiting contaminant consumption, and the benefits versus risks of consuming fish.

As per the Guide to Eating Ontario Fish (MOECC 2015), for the sensitive population (i.e., women who intend to become pregnant or are pregnant, and children under 15), consumption restrictions for fish containing mercury begin at mercury concentrations of 0.06 µg/g ww, with total restriction advised for mercury concentrations above 0.50 µg/g ww (Table 7). For the general population, consumption restrictions begin at levels above 0.15 µg/g ww, with total restriction advised for levels above 1.80 µg/g ww.

A comparison of mercury concentrations from the four lakes sampled in 2014, to the MOECC guidelines, are presented in Table 8. Based on the guide, individuals who would qualify as part of the sensitive population should limit their intake of fish from both Sawbill Bay and Turtle Bay. The Guide to Eating Ontario Fish (MOECC 2015) also contains general consumption guidelines for Marmion Reservoir, where Sawbill Bay and Turtle Bay are located (Table 9).

Table 7: Mercury Consumption Guidelines from the Guide to Eating Ontario Fish, 2015-2016

Suggested Number of Meals Per Month	Total Mercury Concentration (µg/g ww)	
	Sensitive Population	General Population
32	<0.06	<0.15
16	0.06-0.12	0.15-0.30
12	0.12-0.16	0.30-0.40
8	0.16-0.25	0.40-0.60
4	0.25-0.50	0.60-1.20
2	-	1.20-1.80
0	>0.50	>1.80

Source: MOECC 2015.
Notes: cm = centimetre; > = greater than; sensitive population = women who intend to become pregnant, or are pregnant.

Table 8: Estimated Mercury Concentration in Fish Tissue at a Standardized Length Compared to the Guide to Eating Ontario Fish Monthly Consumption Guidelines

Waterbody	Mercury Concentration (µg/g ww)			Number of Meals per month					
				Sensitive Population			General Population		
	Smallmouth Bass	Northern Pike	Walleye	Smallmouth Bass	Northern Pike	Walleye	Smallmouth Bass	Northern Pike	Walleye
Lizard Lake	0.335	0.353	0.786	4	4	0	12	12	4
Sawbill Bay	0.427	0.324	1.014	4	4	0	8	12	4
Turtle Bay	0.353	0.402	0.785	4	4	0	12	8	4
Sapawe Lake	0.259	0.307	0.642	4	4	0	16	12	4

Fish Consumption Guideline Source: MOECC 2015.
Notes: cm = centimetre; > = greater than; sensitive population = women who intend to become pregnant, or are pregnant; Smallmouth Bass = 35 cm; Northern Pike = 50 cm; Walleye = 40 cm.

Table 9: Marmion Reservoir Fish Consumption Guidelines

Species	Number of Meals per Month	
	Sensitive Population	General Population
Smallmouth Bass (35 cm)	4	12
Northern Pike (50 cm)	0	4
Walleye (40 cm)	4	8

Source: MOECC 2015.
Notes: cm = centimetre; sensitive population = women who intend to become pregnant, or are pregnant.

5.0 REFERENCES

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Sokay. S (Ontario Federation of Anglers and Hunters). 2013. Osisko Hammond Reef Gold Project. Letter to Alexandra Drapack. 4 April 2013. OFAH File: 339/349A/420/451

We trust that this report meets your requirements. Should you have any questions, please do not hesitate to contact us.

GOLDER ASSOCIATES LTD.

<Original signed by>

<Original signed by>

Jay Dickison
Aquatic Biology Specialist

Richard Booth
Senior Biologist, Associate

JD/RB/AA/sk

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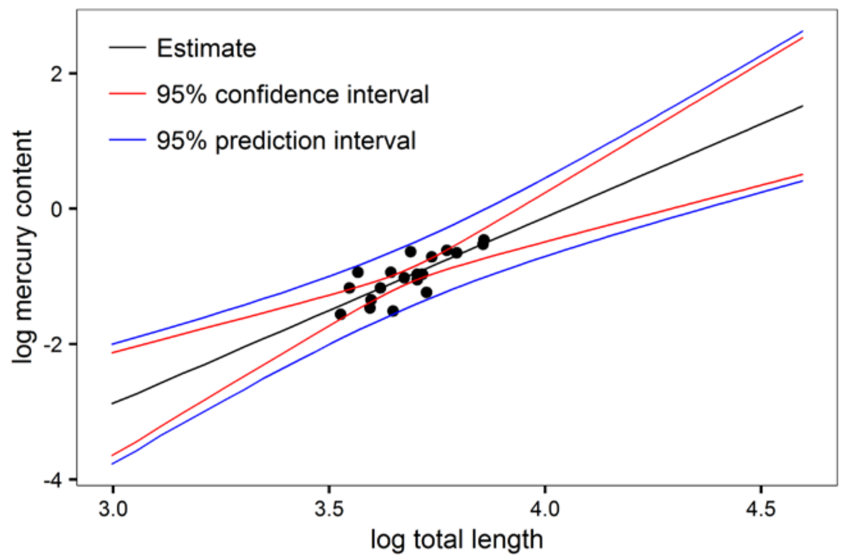
APPENDIX A

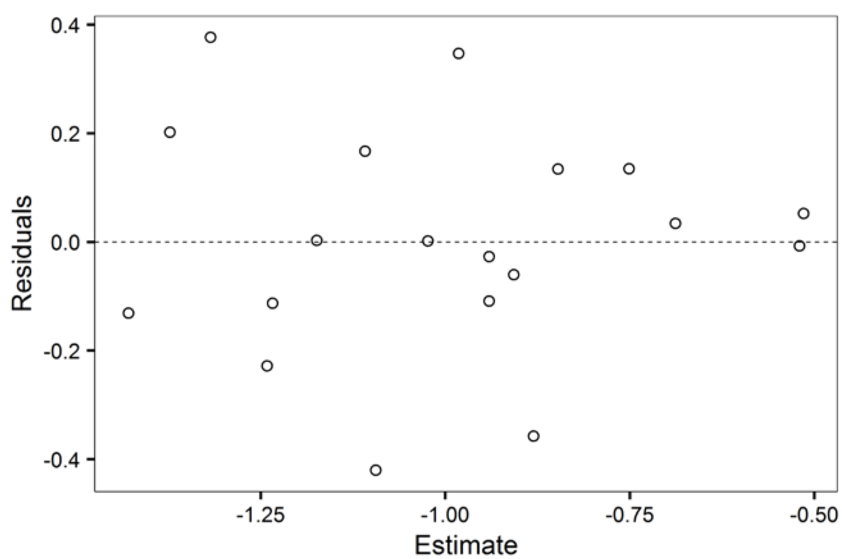
Regression Analyses

Results for Sawape Smallmouth Bass

Table 1: Regression Coefficient Estimates. R^2 = 0.621.

Parameter	Estimate	SE	t value	p
Intercept	-11.140	1.921	-5.798	<0.001
Ln(TL)	2.754	0.522	5.280	<0.001

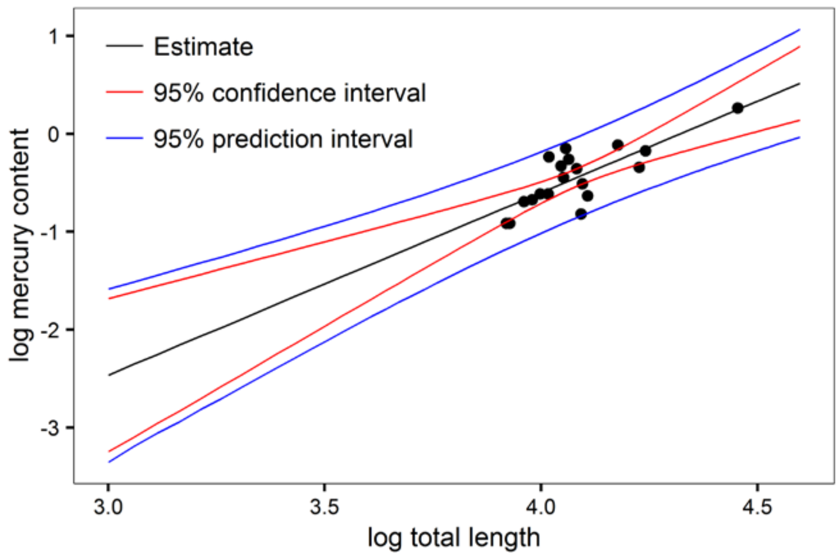


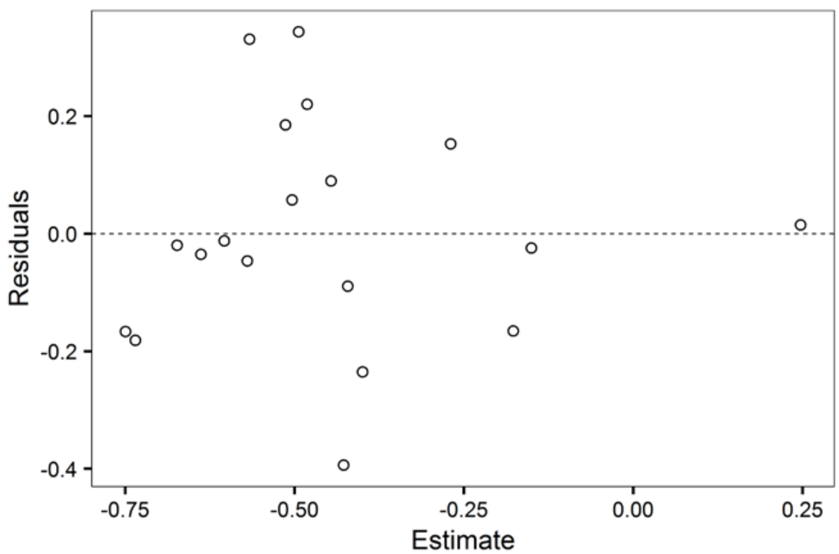


Results for Sapawe Northern Pike

Table 2: Regression Coefficient Estimates. R^2 = 0.625.

Parameter	Estimate	SE	t value	p
Intercept	-8.065	1.395	-5.783	<0.001
Ln(TL)	1.866	0.341	5.473	<0.001

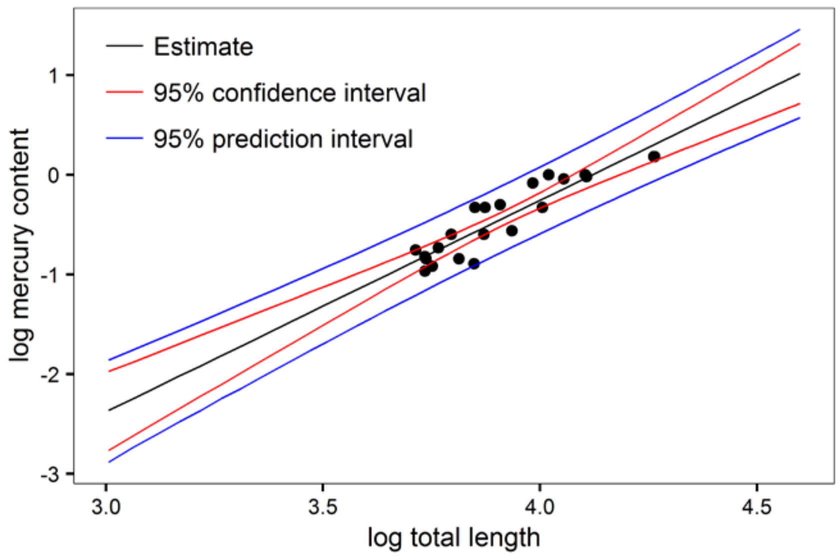


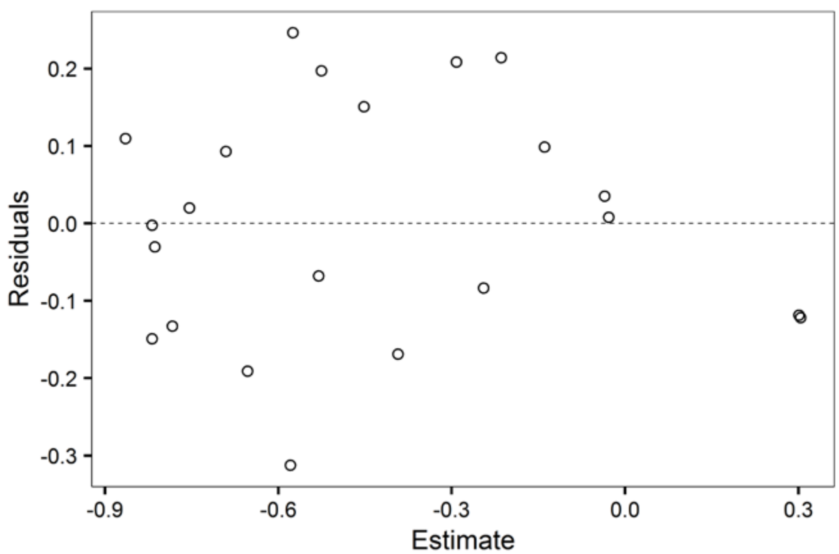


Results for Sapawe Walleye

Table 3: Regression Coefficient Estimates. R^2 = 0.843.

Parameter	Estimate	SE	t value	p
Intercept	-8.749	0.802	-10.91	<0.001
Ln(TL)	2.123	0.205	10.38	<0.001

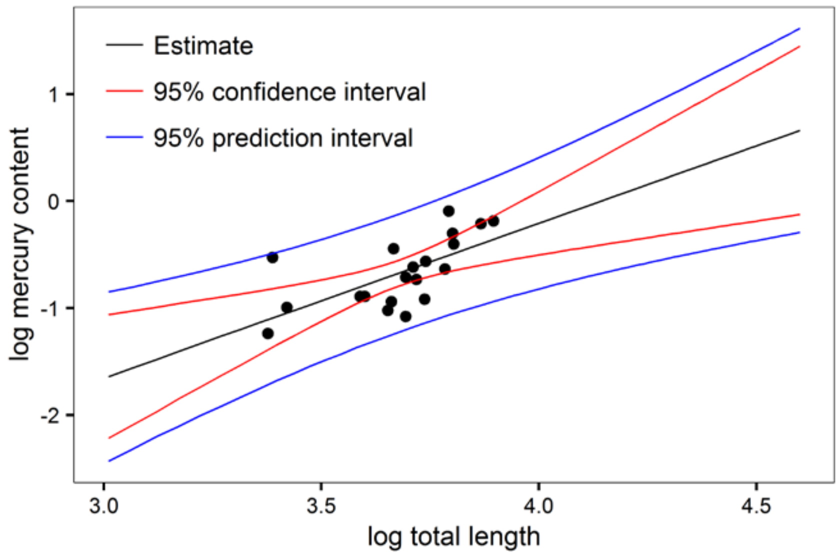


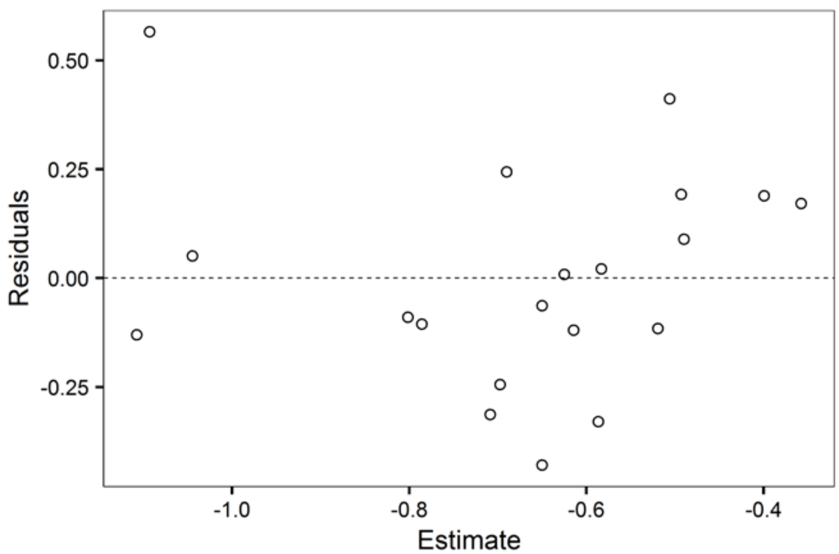


Results for Sawbill Bay Smallmouth Bass

Table 4: Regression Coefficient Estimates. R^2 = 0.418.

Parameter	Estimate	SE	t value	p
Intercept	-5.995	1.481	-4.048	<0.001
Ln(TL)	1.447	0.402	3.598	0.002

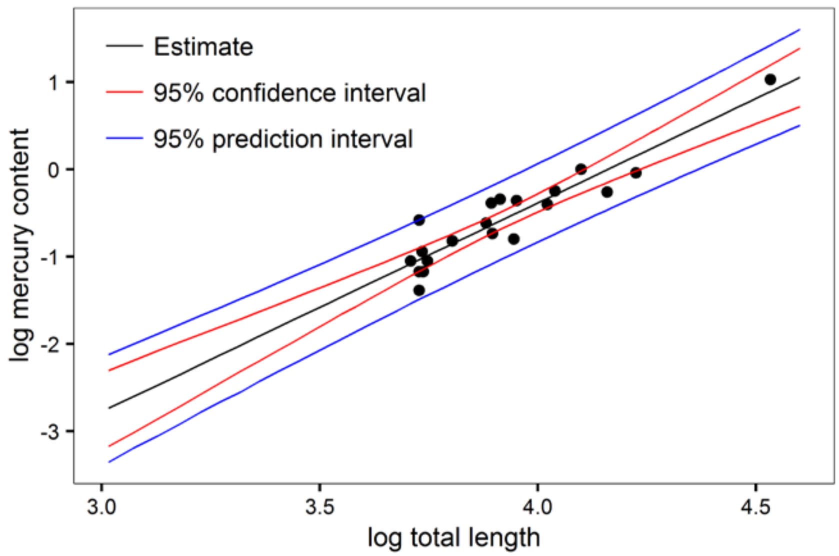


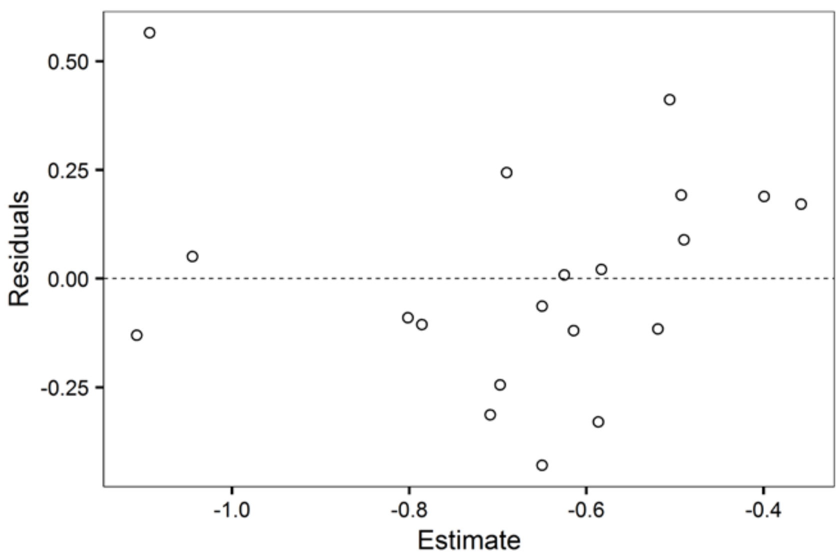


Results for Sawbill Bay, Northern Pike

Table 5: Regression Coefficient Estimates. R^2 = 0.863.

Parameter	Estimate	SE	t value	p
Intercept	-9.947	0.883	-11.260	<0.001
Ln(TL)	2.391	0.225	10.640	<0.001

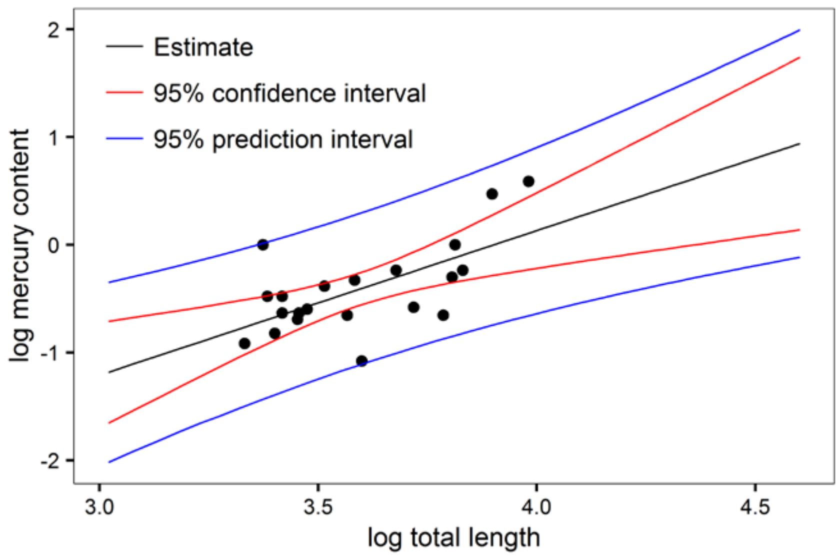


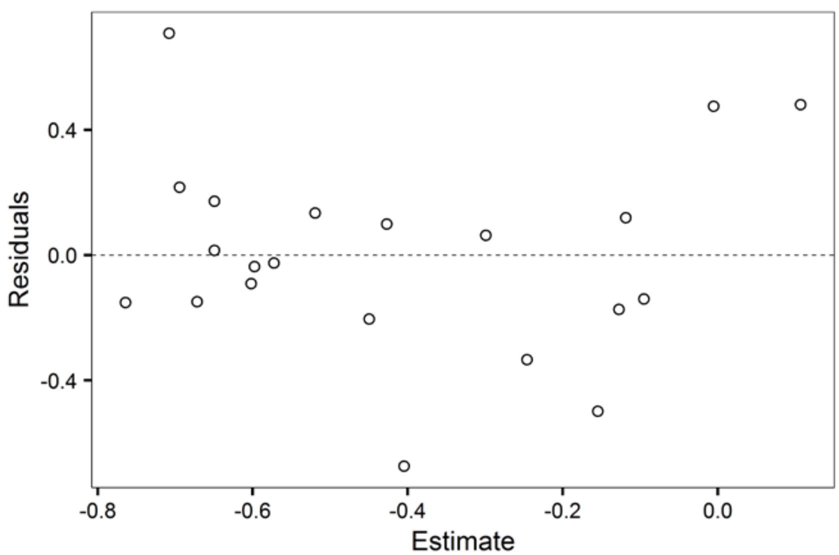


Results for Sawbill Bay, Walleye

Table 6: Regression Coefficient Estimates. R^2 = 0.405.

Parameter	Estimate	SE	t value	p
Intercept	-5.235	1.343	-3.897	<0.001
Ln(TL)	1.342	0.373	3.596	0.002

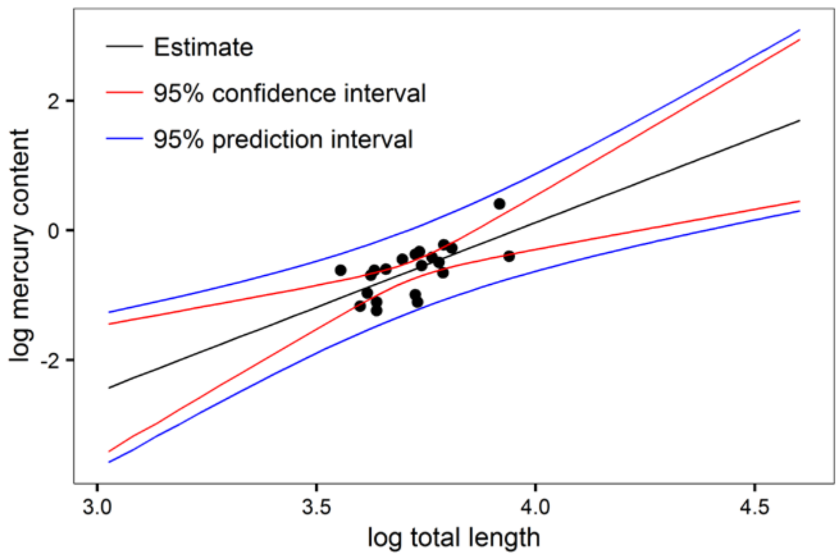


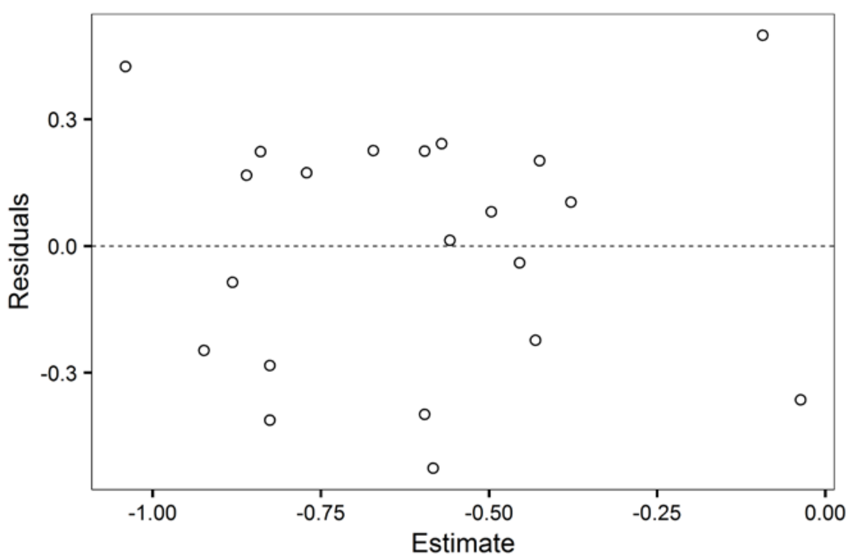


Results fore Turtle Bay, Smallmouth Bass

Table 7: Regression Coefficient Estimates. R^2 = 0.445.

Parameter	Estimate	SE	t value	p
Intercept	-10.330	2.493	-4.144	<0.001
Ln(TL)	2.613	0.670	3.899	<0.001

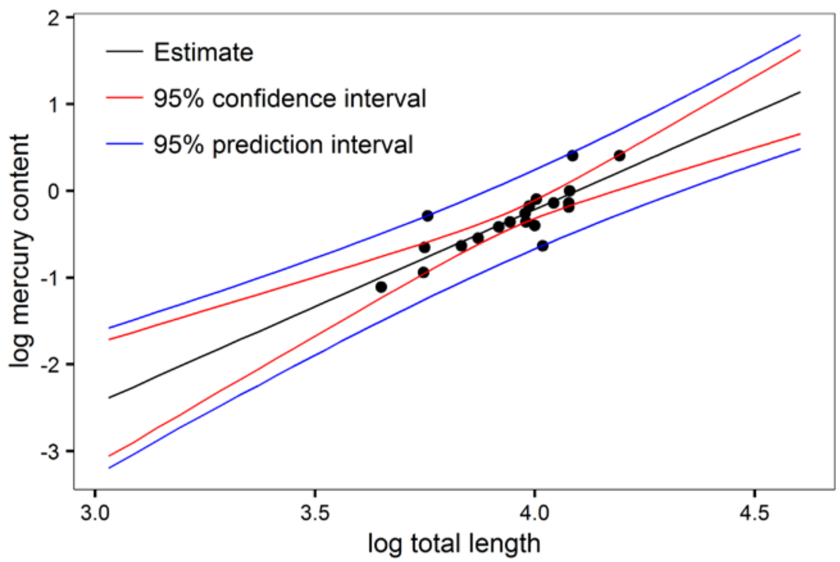


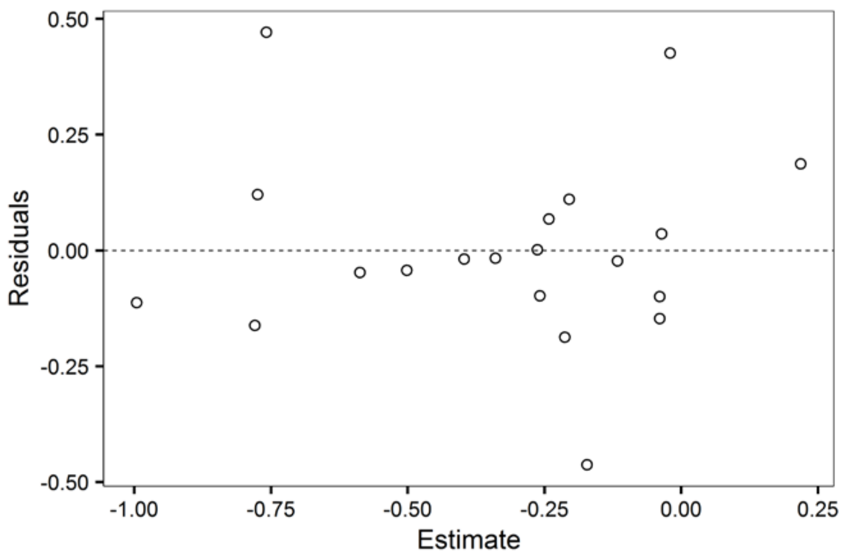


Results for Turtle Bay, Northern Pike

Table 8: Regression Coefficient Estimates. R^2 = 0.702.

Parameter	Estimate	SE	t value	p
Intercept	-9.175	1.360	-6.746	<0.001
Ln(TL)	2.241	0.344	6.511	<0.001

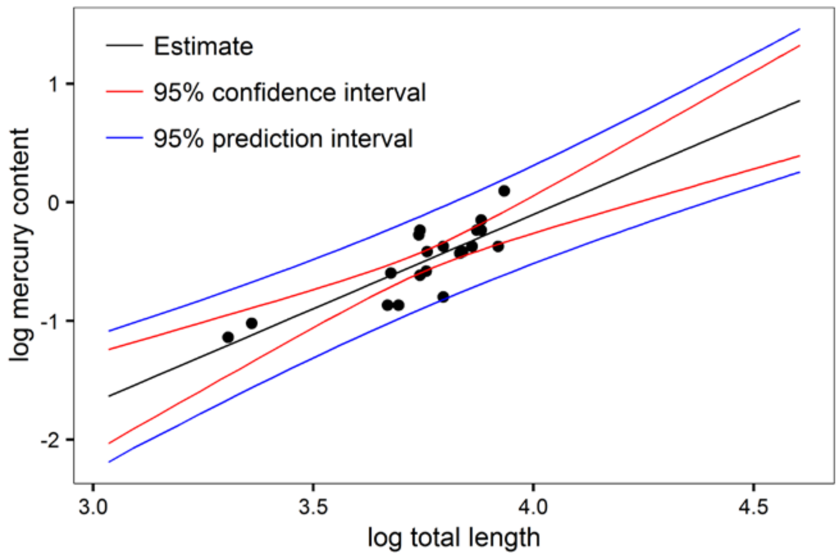


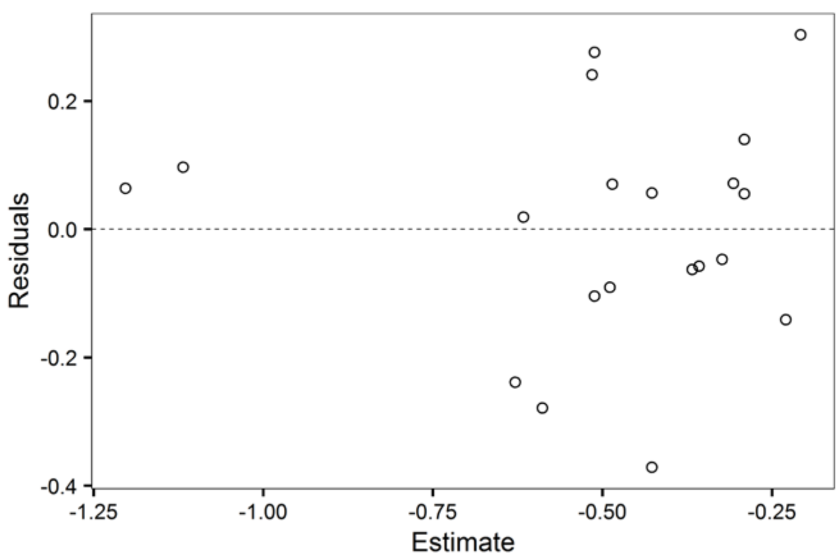


Results for Turtle Bay, Walleye

Table 9: Regression Coefficient Estimates. R^2 = 0.682.

Parameter	Estimate	SE	t value	p
Intercept	-6.455	0.961	-6.719	<0.001
Ln(TL)	1.588	0.256	6.209	<0.001

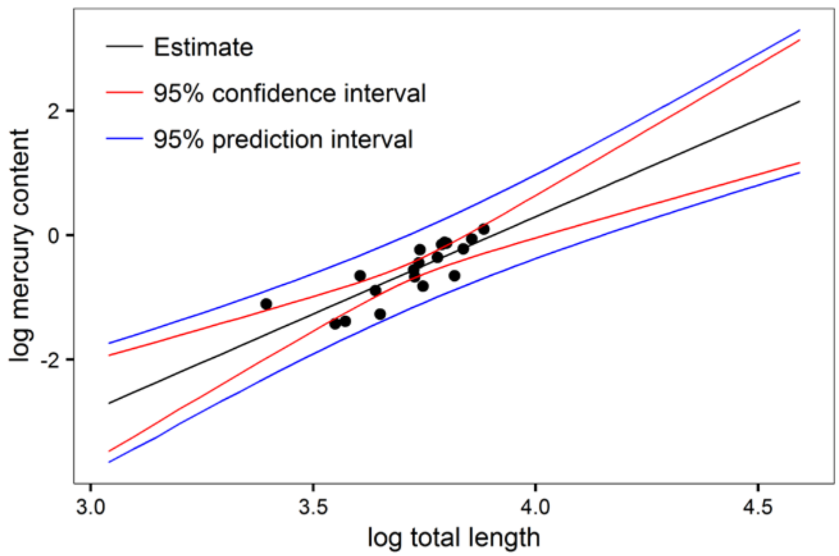


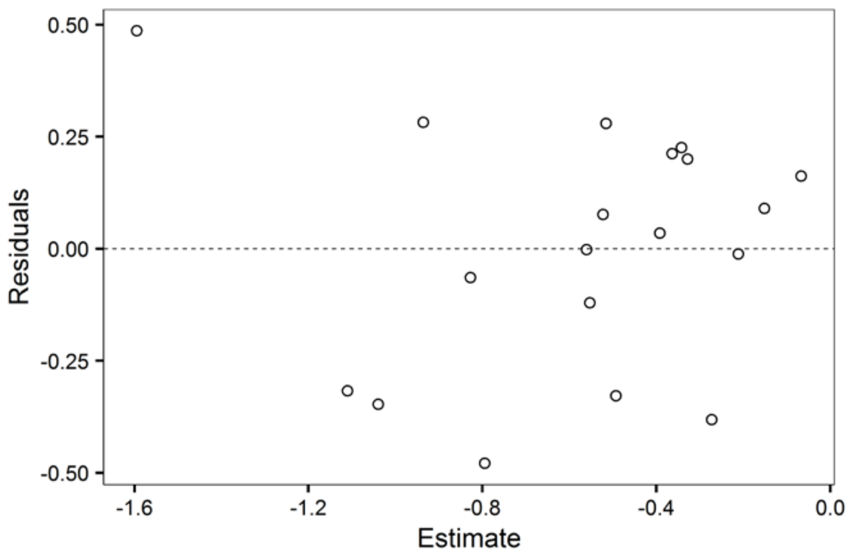


Results for Lizard Lake, Smallmouth Bass

Table 10: Regression Coefficient Estimates. R^2 = 0.672.

Parameter	Estimate	SE	t value	p
Intercept	-12.199	1.968	-6.198	<0.001
Ln(TL)	3.124	0.529	5.904	<0.001

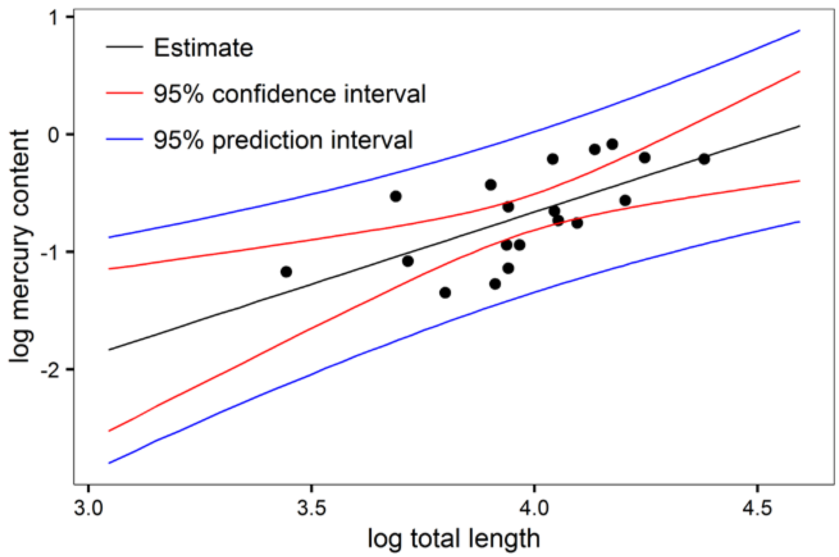


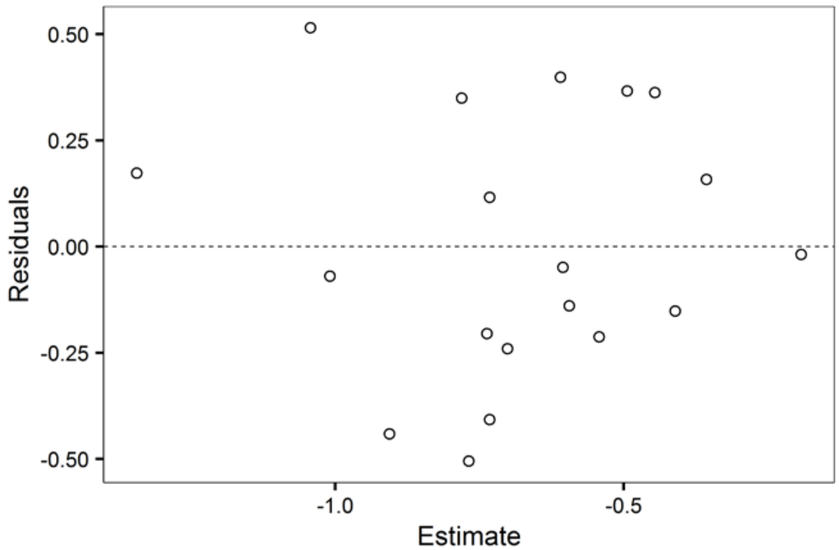


Results for Lizard Lake, Northern Pike

Table 11: Regression Coefficient Estimates. R^2 = 0.435.

Parameter	Estimate	SE	t value	p
Intercept	-5.576	1.355	-4.115	<0.001
Ln(TL)	1.229	0.340	3.615	0.002

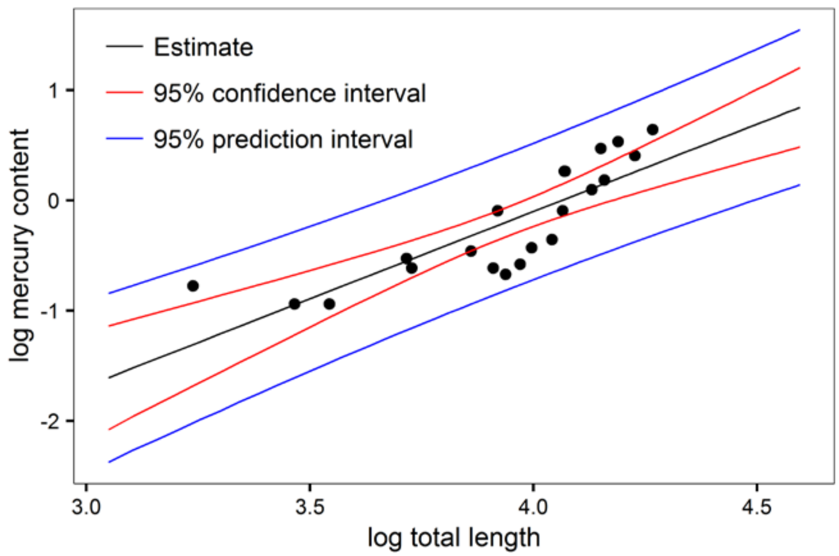


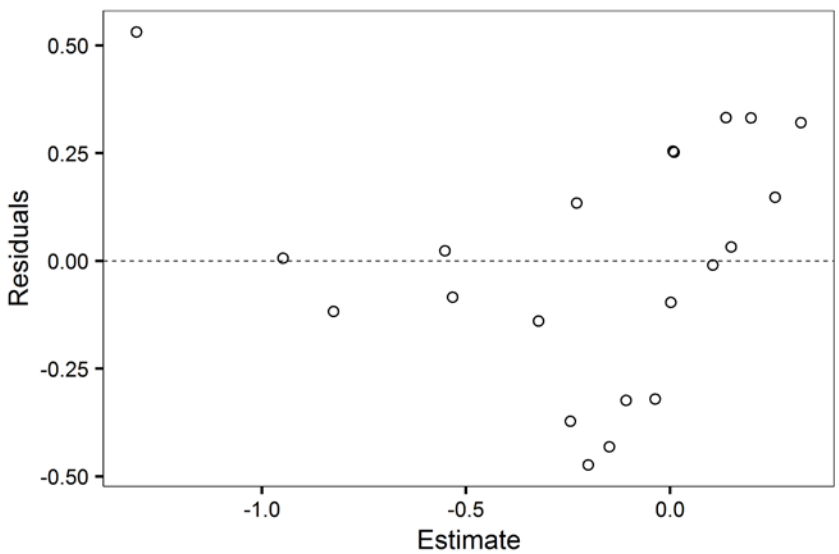


Results for Lizard Lake, Walleye

Table 12: Regression Coefficient Estimates. R^2 = 0.693.

Parameter	Estimate	SE	t value	p
Intercept	-6.437	0.955	-6.742	<0.001
Ln(TL)	1.584	0.242	6.544	<0.001





APPENDIX B

Fish Tissue Mercury Concentrations

Table 1: Mercury Concentrations in Fish Captured from Sapawe Lake, 2014

Species	Total Length (cm)	Weight (g)	Mercury (µg/g w/w)
Smallmouth Bass	47.3	1550	0.59
Smallmouth Bass	35.4	625	0.39
Smallmouth Bass	34.7	665	0.31
Smallmouth Bass	34.0	615	0.21
Smallmouth Bass	47.4	1650	0.63
Smallmouth Bass	44.5	1375	0.52
Smallmouth Bass	43.5	1320	0.54
Smallmouth Bass	42.0	1115	0.49
Smallmouth Bass	41.5	1055	0.29
Smallmouth Bass	40.6	960	0.35
Smallmouth Bass	40.0	950	0.53
Smallmouth Bass	39.4	975	0.36
Smallmouth Bass	37.3	720	0.31
Smallmouth Bass	38.4	800	0.22
Smallmouth Bass	36.4	725	0.23
Smallmouth Bass	41.1	960	0.38
Smallmouth Bass	40.6	975	0.38
Smallmouth Bass	38.2	850	0.39
Smallmouth Bass	36.5	800	0.26
Northern Pike	69.5	1900	0.84
Northern Pike	68.5	1880	0.71
Northern Pike	65.2	1800	0.89
Northern Pike	60.8	1200	0.53
Northern Pike	57.5	850	0.64
Northern Pike	52.5	800	0.50
Northern Pike	57.2	960	0.72
Northern Pike	86.0	3660	1.3
Northern Pike	69.5	1875	0.84
Northern Pike	60.1	1050	0.60
Northern Pike	59.9	1150	0.44
Northern Pike	59.3	1440	0.70
Northern Pike	58.2	1225	0.77
Northern Pike	57.8	880	0.86
Northern Pike	55.6	925	0.79

Species	Total Length (cm)	Weight (g)	Mercury (µg/g w/w)
Northern Pike	55.5	925	0.54
Northern Pike	54.5	900	0.54
Northern Pike	53.5	950	0.51
Northern Pike	50.4	900	0.40
Northern Pike	50.8	700	0.40
Walleye	71.1	3625	1.20
Walleye	60.6	2500	1.00
Walleye	55.7	770	1.00
Walleye	47.0	845	0.72
Walleye	46.9	980	0.41
Walleye	45.3	880	0.43
Walleye	42.0	775	0.43
Walleye	41.9	700	0.44
Walleye	41.0	650	0.47
Walleye	53.7	1900	0.92
Walleye	54.9	1550	0.72
Walleye	49.8	1450	0.74
Walleye	51.2	1275	0.57
Walleye	48.0	1130	0.55
Walleye	44.5	970	0.55
Walleye	43.2	750	0.48
Walleye	42.6	1700	0.40
Walleye	41.9	730	0.38
Walleye	71.0	3090	1.20
Walleye	60.8	2200	0.98
Walleye	57.7	1720	0.96
Walleye	48.1	1150	0.72

Note: cm = centimetre; g = gram; µg/g w/w = microgram per gram wet weight.

Table 2: Mercury Concentrations in Fish Captured from Sawbill Bay, Marmion Lake, 2014

Species	Length (cm)	Weight (g)	Mercury (µg/g w/w)
Smallmouth Bass	49.2	1900	0.83
Smallmouth Bass	44.0	1350	0.53
Smallmouth Bass	42.1	1250	0.57
Smallmouth Bass	41.2	950	0.48
Smallmouth Bass	40.9	850	0.54
Smallmouth Bass	36.6	700	0.41
Smallmouth Bass	40.2	1800	0.34
Smallmouth Bass	38.6	910	0.36
Smallmouth Bass	30.6	400	0.37
Smallmouth Bass	29.6	365	0.59
Smallmouth Bass	29.3	350	0.29
Smallmouth Bass	44.8	1325	0.74
Smallmouth Bass	44.4	1375	0.91
Smallmouth Bass	40.2	1050	0.49
Smallmouth Bass	42.0	1050	0.40
Smallmouth Bass	36.2	700	0.41
Smallmouth Bass	47.8	1675	0.81
Smallmouth Bass	44.9	1300	0.67
Smallmouth Bass	39.1	800	0.64
Smallmouth Bass	38.9	800	0.39
Northern Pike	68.4	1950	0.96
Northern Pike	55.8	900	0.67
Northern Pike	49.1	600	0.68
Northern Pike	48.5	600	0.54
Northern Pike	56.8	950	0.78
Northern Pike	44.9	500	0.44
Northern Pike	42.4	400	0.35
Northern Pike	60.3	1075	1.00
Northern Pike	93.1	3200	2.80
Northern Pike	64.0	1600	0.77
Northern Pike	52.0	750	0.70
Northern Pike	51.7	950	0.45
Northern Pike	50.1	590	0.71
Northern Pike	49.2	750	0.48

Species	Length (cm)	Weight (g)	Mercury (µg/g w/w)
Northern Pike	42.0	390	0.31
Northern Pike	41.9	400	0.39
Northern Pike	41.6	430	0.25
Northern Pike	41.6	410	0.31
Northern Pike	41.6	380	0.56
Northern Pike	40.8	370	0.35
Walleye	53.6	1550	1.80
Walleye	49.3	1150	1.60
Walleye	45.3	850	1.00
Walleye	45.0	850	0.74
Walleye	44.1	800	0.52
Walleye	41.2	650	0.56
Walleye	39.6	550	0.79
Walleye	36.6	440	0.34
Walleye	36.0	385	0.72
Walleye	35.4	360	0.52
Walleye	33.6	285	0.68
Walleye	32.3	260	0.55
Walleye	31.7	250	0.53
Walleye	31.6	270	0.50
Walleye	30.5	240	0.62
Walleye	30.5	225	0.53
Walleye	30.0	230	0.44
Walleye	29.5	200	0.62
Walleye	29.2	210	1.00
Walleye	28.0	180	0.40
Walleye	46.1	950	0.79

Note: cm = centimetre; g = gram; µg/g w/w = microgram per gram wet weight.

Table 3: Mercury Concentrations in Fish Captured from Turtle Bay, Marmion Lake, 2014

Species	Total Length (cm)	Weight (g)	Mercury (µg/g w/w)
Smallmouth Bass	37.5	760	0.50
Smallmouth Bass	36.6	740	0.31
Smallmouth Bass	50.3	2075	1.50
Smallmouth Bass	43.1	1225	0.66
Smallmouth Bass	42.1	1325	0.58
Smallmouth Bass	41.5	1000	0.37
Smallmouth Bass	38.8	950	0.55
Smallmouth Bass	37.2	850	0.38
Smallmouth Bass	45.1	1350	0.76
Smallmouth Bass	41.7	1125	0.33
Smallmouth Bass	41.9	1140	0.72
Smallmouth Bass	38.0	850	0.29
Smallmouth Bass	51.4	800	0.67
Smallmouth Bass	44.3	1510	0.80
Smallmouth Bass	44.2	1450	0.52
Smallmouth Bass	43.8	1300	0.61
Smallmouth Bass	41.5	1260	0.69
Smallmouth Bass	40.3	1010	0.64
Smallmouth Bass	38.0	840	0.33
Smallmouth Bass	37.8	825	0.54
Smallmouth Bass	35.0	750	0.54
Northern Pike	59.1	1050	1.00
Northern Pike	59.0	1225	0.87
Northern Pike	54.6	1050	0.67
Northern Pike	53.5	950	0.70
Northern Pike	42.4	430	0.39
Northern Pike	57.0	950	0.87
Northern Pike	55.6	1050	0.53
Northern Pike	53.9	850	0.84
Northern Pike	53.4	1050	0.77
Northern Pike	51.6	925	0.70
Northern Pike	48.0	650	0.58
Northern Pike	42.5	450	0.52

Species	Total Length (cm)	Weight (g)	Mercury (µg/g w/w)
Northern Pike	38.5	350	0.33
Northern Pike	66.2	1700	1.50
Northern Pike	59.5	1100	1.50
Northern Pike	54.8	845	0.91
Northern Pike	50.3	660	0.66
Northern Pike	42.8	380	0.75
Northern Pike	46.2	575	0.53
Northern Pike	59.0	1050	0.83
Walleye	51.1	1325	1.10
Walleye	50.4	1325	0.69
Walleye	48.5	1050	0.86
Walleye	48.5	1100	0.79
Walleye	48.0	1050	0.79
Walleye	47.5	950	0.69
Walleye	46.5	1000	0.66
Walleye	46.2	1050	0.65
Walleye	44.5	800	0.45
Walleye	44.5	900	0.69
Walleye	42.9	800	0.66
Walleye	42.8	750	0.56
Walleye	42.2	850	0.54
Walleye	42.2	225	0.79
Walleye	42.1	825	0.76
Walleye	40.2	700	0.42
Walleye	39.5	590	0.55
Walleye	39.2	600	0.42
Walleye	28.8	210	0.36
Walleye	27.3	170	0.32

Note: cm = centimetre; g = gram; µg/g w/w = microgram per gram wet weight.

Table 4: Mercury Concentrations in Fish Captured from Lizard Lake, September 2014

Species	Length (cm)	Weight (g)	Mercury (µg/g w/w)
Smallmouth Bass	43.8	1225	0.70
Smallmouth Bass	42.4	1025	0.44
Smallmouth Bass	42.1	1100	0.79
Smallmouth Bass	41.6	1000	0.51
Smallmouth Bass	38.5	900	0.28
Smallmouth Bass	36.8	750	0.52
Smallmouth Bass	35.6	650	0.25
Smallmouth Bass	34.8	625	0.24
Smallmouth Bass	48.6	1850	1.10
Smallmouth Bass	46.4	1550	0.80
Smallmouth Bass	44.5	1325	0.89
Smallmouth Bass	41.5	1100	0.57
Smallmouth Bass	47.3	1450	0.94
Smallmouth Bass	44.2	1450	0.86
Smallmouth Bass	38.1	750	0.41
Smallmouth Bass	45.5	1450	0.52
Smallmouth Bass	44.7	1350	0.88
Smallmouth Bass	42.0	1150	0.64
Smallmouth Bass	29.8	340	0.33
Northern Pike	44.7	550	0.26
Northern Pike	69.9	2250	0.82
Northern Pike	65.0	1650	0.92
Northern Pike	60.1	1250	0.47
Northern Pike	57.6	1000	0.48

Species	Length (cm)	Weight (g)	Mercury (µg/g w/w)
Northern Pike	56.9	950	0.81
Northern Pike	52.8	875	0.39
Northern Pike	51.5	750	0.54
Northern Pike	51.3	775	0.39
Northern Pike	50.0	750	0.28
Northern Pike	79.9	3500	0.81
Northern Pike	66.9	1825	0.57
Northern Pike	57.1	1100	0.52
Northern Pike	62.5	1550	0.88
Northern Pike	51.5	825	0.32
Northern Pike	49.5	750	0.65
Northern Pike	41.1	410	0.34
Northern Pike	40.0	340	0.59
Northern Pike	31.3	280	0.31
Walleye	71.3	3250	1.90
Walleye	68.5	3200	1.50
Walleye	66.0	2750	1.70
Walleye	64.0	250	1.20
Walleye	63.5	2600	1.60
Walleye	62.2	2650	1.10
Walleye	58.6	2025	1.30
Walleye	58.5	1800	1.30
Walleye	58.3	1900	0.91
Walleye	56.9	1800	0.70

Species	Length (cm)	Weight (g)	Mercury (µg/g w/w)
Walleye	54.4	1500	0.65
Walleye	53.0	1400	0.56
Walleye	51.3	1600	0.51
Walleye	50.4	1200	0.91
Walleye	49.9	1350	0.54
Walleye	47.5	950	0.63
Walleye	41.6	650	0.54
Walleye	41.1	700	0.59
Walleye	34.6	400	0.39
Walleye	32.0	300	0.39
Walleye	25.5	117	0.46

Note: cm = centimetre; g = gram; µg/g w/w = microgram per gram wet weight.

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