HAMMOND REEF GOLD PROJECT
RESPONSE TO COMMENTS ON FINAL EIS/EA

COMMENT – T(3)-07

Source: Canadian Environmental Assessment Agency

Summary of Comment

Subsections 10.2.4 and 13.1.2 of the EIS Guidelines require the EIS to provide information on the potential effects, proposed mitigation, and monitoring programs with respect to fish and fish habitat, including fish frequented wetlands.

Subsection 3.3.1.2 of the Terrestrial Ecology Technical Support Document (TSD) indicates that the No Net Loss Plan provides compensation for the ecological and hydrological function of the wetlands being lost in the mine study area.

Table A-1 in Appendix A of the Alternatives Assessment TSD indicates in the assessment of the preferred layout for the tailings management facility that some wetlands are drained by small streams and beaver ponds, which suggest the wetlands may be connected to fish habitat.

It is unclear if wetlands in the local and mine study areas provide direct or indirect fish habitat and will potentially be affected by the Project or project activities.

The information is required by the Agency to evaluate the potential effects, proposed mitigation, predicted residual effects, and proposed follow-up program with respect to fish and fish habitat.

Proposed Action

1. State whether there are wetlands that provide direct or indirect fish habitat within the local and mine study areas that may potentially be affected by the Project or project activities. If there are wetlands that provide direct or indirect fish habitat and may potentially be affected by the Project or project activities, incorporate these wetlands in the No Net Loss Plan.
2. Describe the potential effects, mitigation, residual effects, 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 follow-up program proposed to address the effects of the Project or project activities on wetlands that provide fish habitat in the local or mine study area.

Response

Extensive aquatic habitat mapping and field studies were completed for the Mine Study Area (MSA) and the Local Study Area (LSA) to characterize and evaluate the existing environment and to provide baseline data to support the environmental assessment process and permitting for the Project. These studies considered wetlands and littoral areas as areas of potential impact to fish habitat. The process consisted of consultation with regulatory agencies, Aboriginal engagement, a review of existing data sources, and aquatic field studies conducted during the spring and summer of 2010, 2011 and 2012.

Recognizing the importance of thoroughly addressing aquatic community and aquatic habitat concerns, regulatory agencies were consulted early in the Project planning phase and series of meetings and workshops were held with regulatory agencies to review and discuss a number of aquatics related issues, including solicitation of input on baseline studies and on the development of a fish habitat No Net Loss Plan (NNLP) for the Project. Participating agencies included local and regional offices of the Ontario Ministry of Natural Resources and Forestry (MNRF)

and Fisheries and Oceans Canada (DFO). Other agencies including the Canadian Environmental Assessment Agency (CEAA), Environment Canada and Climate Change (ECCC), Ontario Ministry of Northern Development and Mines (MNDM) and Ontario Ministry of Environment and Climate Change (MOECC) were consulted early and throughout the environmental assessment process.

Initially, a reconnaissance level aerial and ground survey of the MSA was completed to identify all waterbodies, including wetlands, which may potentially be affected by the Project. Representatives from the MNRF and DFO participated in the aerial survey. Based on this preliminary work, a list of Areas of Potential Impact (APIs) was prepared. APIs were defined as any waterbody within the MSA and its immediate vicinity and along the access road and transmission line corridors that could potentially be impacted by the Project and that could potentially represent fish habitat. Wetlands were considered as part of this initial assessment but only those with potential to represent fish habitat were carried through the assessment as APIs. MNRF and DFO were given an opportunity to review fish and fish habitat baseline studies and to identify locations where additional aquatic information may be required to support the environmental assessment and permitting processes.

A total of 55 APIs within and adjacent to the proposed mine and TMF areas and 14 APIs along the proposed alternatives for the access road were identified and assessed (see Figure 3-2 of the Aquatic Environment TSD). These included major receivers, such as Sawbill Bay and Lynxhead Bay of Upper Marmion Reservoir, Lizard Lake, smaller lakes such as API#2 and API#8, beaver ponds, streams and small natural ponds. All APIs were visited during field studies conducted in the spring and summer of 2010, 2011 and 2012 and their entire length was either walked or traversed by boat, to comprehensively evaluate aquatic habitats present, document species present, and identify habitat constraints, such as barriers to fish movement. The field studies included evaluation of wetland and littoral area habitat at each API.

APIs that were determined to provide fish habitat and be affected either directly or indirectly by the project were identified (see Tables 3-5 and 3-6 of the Aquatic Environment TSD) and included in the No Net Loss Plan (NNLP) for the project, which provides compensation for the alternation, disruption or destruction of fish habitat.

To quantify habitat losses, a habitat accounting protocol was developed consistent with other NNLPs developed and approved for other mining projects. Habitat suitability relationships describing spawning, rearing/nursery, feeding, migratory corridor and overwintering/summer refuge habitats were derived from several published references including 'Fish use of wetlands in northwestern Ontario: A literature review and bibliography' (Hall-Armstrong et al. 1996). The habitat accounting protocol was reviewed by Dr. C.K. Minns, an expert in habitat modeling and former DFO staff member, at the request of DFO.

Habitat compensation measures proposed in the NNLP include the creation of shallow wetland habitat at low lying locations along the shorelines of Snail Bay and Sawbill Bay. These wetland habitat areas will provide spawning habitat for pike and will also likely be used by other species including baitfish and smallmouth bass.

In summary, wetlands were considered during the initial selection of the APIs. All water bodies, including wetlands, within the MSA and its immediate vicinity that could potentially be impacted by the Project and that could potentially represent fish habitat were identified as APIs and were assessed in detailed as part of the aquatic environment impact assessment. Wetland and littoral habitat that will be lost as a result of the project has been accounted for in the NNLP and compensation in the form of wetland habitat is proposed as a component of the NNLP.

Reference

Hall-Armstrong, J., A.G. Harris and R.F. Foster. 1996. Fish use of wetlands in northwestern Ontario: A literature review and bibliography. Northwest Science & Technology, Ontario Ministry of Natural Resources, Thunder Bay, Ont. TR-90.

GRT Review Findings and Comments on above Responses

(Provided in letter to proponent dated August 16, 2016)

The response clarifies the assessment of effects on fish habitat within the mine study area. It indicates that Tables 3-5 and 3-6 identify fish habitat potentially affected directly and indirectly by the Project, respectively. Table 3-5 describes "useable" habitat that will be directly lost as a result of the Project. It is not clear whether the proponent has considered indirect impacts to habitat that support the life processes of fish, such as temperature change, sedimentation, reduction of nutrients and food supply. Indirect effects may result in serious harm.

Table 3-6 describes the reduction in catchment areas for area of potential impact (API) #8, 15, 16 and 17. The reduction for API #8 is 24.08%. The proponent notes that this will affect the fish community. More information on how this reduction will reduce wetted width and depth and seasonal changes would be useful to determine the effect to fish and fish habitat.

The response indicates APIs determined to provide fish habitat and potentially be affected either directly or indirectly by the Project are included in the No Net Loss Plan (NNLP). In the NNLP, it is unclear how the ratio of habitat losses to gains has been calculated to reach the 1:1 ratio identified by the proponent. A clear table illustrating impacts associated with the serious harm (Fisheries Act s.35) and the mine waste management facilities (Metal Mining Effluent Regulation) and the associated offsetting would be useful to understand the habitat gains through offsetting.

Required Clarification

a) Further clarification is needed on indirect effects on fish and fish habitat in the local study area and how they are addressed by the proposed NNLP and follow-up program.
b) It is also expected that follow-up monitoring include monitoring to ensure water levels within Upper Marmion Reservoir, including areas proposed for offsetting measures, are not being lowered by project activities (e.g. water-taking) sufficiently to affect fish habitat in the nearshore area. A commitment to this should be included in the updated commitments registry.
c) To clarify the habitat accounting, Fisheries and Oceans Canada (DFO) expects the proponent to include in the NNLP information that distinguishes areas linked to *Fisheries Act* s.35 authorization from those linked to authorization under the *Metal Mining Effluent Regulation*. Habitat Unit losses per area should be defined along with the gains through offsetting. The information provided in the May 2013 email from the proponent (excerpt attached) could be used, if that information is still considered appropriate.
d) Fish salvage is not considered to be an offsetting (referred to in the NNLP as compensation) measure, but rather a mitigation measure. As such, this activity should not be included in the habitat gains and the habitat accounting should clearly reflect this.

Additional Recommendations to Clarify Measures in the Commitments Registry and NNLP

Given the uncertainty with regard to effects due to blasting, DFO recommends that as blasting activities approach final pit design (i.e. near Sawbill Bay), the overpressure be reduced to 50kPa, from the 100kPa indicated in the DFO guidelines. Should fish habitat be present in the zone that will be used coincident with the timing of blasting, additional measures to exclude fish from the area should be implemented with additional monitoring to assess impacts to fish. DFO recommends that the timing of blasting near Sawbill Bay be undertaken in accordance with the Ontario Fisheries Timing Windows to minimize impacts to spawning activities and egg incubation. These recommended actions should be included in the updated commitments registry.

CMC Response

Part a)

The potential indirect effects on fish and fish habitat have been identified through the completed assessment and are summarized in the Environmental Impact Statement/Environmental Assessment Report (EIS/EA) and the Version 2 Aquatic Environment TSD. The Fish Habitat No Net Loss / Habitat Offset Plan (NNLP) provides further discussion, including various assessment methods, assumptions and commitments, associated with indirect effects. The NNLP is provided in Part B of the Version 2 Aquatic Environment TSD.

The potential for indirect Project effects was identified for the lower reaches of watercourses that drain the Project footprint (API #8, #15, #16, #17). Indirect effects were identified as a consequence of required changes to headwater ponds and streams and corresponding changes to the hydrographs in their associated drainages. Hydrologic analysis were used to determine the geographic extent and magnitude of downstream flow and water level effects. A review and assessment of water quality effects was undertaken to determine potential changes to water quality within downstream waterbodies. The potential effects on fish and fish habitat that were identified through the assessment and reported in the Version 2 Aquatic Environment TSD include changes in nutrient transport from upstream to downstream areas and the potential for changes in flow that may affect fish movements. A potential for changes in water levels was identified within Marmion Reservoir, Lizard Lake and API#8 as a result of changes required to upstream drainage areas associated with the Project footprint and mine water withdrawal. The NNLP identifies the likely effect would be a change in water levels in the order of 5 to 7 cm in Marmion Reservoir and less than 5 cm in Lizard Lake and API#8. The potential effects of the noted changes in water levels were evaluated as part of the effects assessment. It was determined that the anticipated change in hydrographs would be within typical seasonal fluctuations and there is no expected residual effects to fish and fish habitat.

Potential for indirect effects related to water quality were also identified. Discharges from the mine water treatment facility may exceed stated water quality objectives. Predicted concentrations are lower than both the Provincial Water Quality Objectives (PWQO) and Municipal Industrial Strategy for Abatement (MISA) criteria for most parameters with the exception of copper and free cyanide, which were predicted to be slightly above PWQO and MISA criteria. Site-specific water quality objectives (SSWQOs) that would be protective of aquatic life but that take into account the existing characteristics of surface waters in Upper Marmion Reservoir and Lizard Lake were developed for these two substances. Based on these analyses, there is no predicted effect on aquatic organisms for these parameters.

Part b)

An assessment of water levels under present conditions compared with those expected under the proposed Project operation indicate that any future changes in water levels in Upper Marmion Reservoir would be within the current typical range in water level fluctuation. Furthermore, low flow contingency measures have been developed (see Golder 2015 submitted in response to IR2 comments MNRF #4 and EAB #10) such that the Project will impose no net water withdrawal from Upper Marmion Reservoir when water levels reach the minimum elevations defined in the Seine River Water Management Plan. In other words, the project will only withdraw water during period when the Reservoir is operating within its regulated water level range.

Proposed offsetting measures include creation of additional habitat for pike and walleye and CMC has committed to a quantitative monitoring program that references change from baseline conditions. Specifically, monitoring will confirm compliance with the design of compensation works (i.e., the number of habitat units created) and document physical and biological indicators as measures of success (i.e., species utilization). The timing of monitoring activities will be linked to the completion each compensation element and the proposed program

includes five bi-annual surveys over a 10 year post operation period (NNLP, Section 7.2, pg. 77). Complimentary to the compensation monitoring is a commitment to water level monitoring in Upper Marmion Reservoir. Water level monitoring will be undertaken at pre-identified locations including some locations proximate to or within the location of the NNLP offsetting measures. Water level information will form part of the assessment and discussion of the offsetting measure success. A commitment to monitoring of water levels in Upper Marmion Reservoir is included in the commitments registry for the project.

Part c)

The habitat losses related to MMER and Fisheries Act s.35 are provided in Table 16 of the NNLP v.0. For ease of reference, this table is provided below.

Table 16: Summary of MMER and Section 35 Habitat Losses

Habitat Loss	Area (ha)	Habitat Units	Species Present
MMER (TMF)			
API#2	12.4351	14,485	Pike, Suckers, small bodied fish
Other (9 features)	0.5016	5,726	Small bodied fish
MMER (WRMF)			
API#11	2.7777	1,874	Small bodied fish
Other (4 features)	0.0154	103	Small bodied fish
Section 35			
Mitta Lake	17.2737	9,608	Suckers, small bodied fish
Other (6 features)	3.146	2,381	Small bodied fish

Offsetting measures to address specific losses are described in the NNLP v.0 and identify habitat compensation measures that address all of the noted losses associated with the project. Offsetting was not identified specifically for MMER and Fisheries Act s.35 purposes because some of the identified compensation opportunities are larger than the specific unit losses under each legislation.

The important component of the NNLP is that all of the identified losses can be offset. Within the NNLP is accounting for approximately 18 ha of surface water area and 6,800 HUs of like for like fish habitat compensation. In addition to like for like compensation, the following offsetting measures have also been identified:

- Northern pike spawning habitat creation at the mouth of Sawbill Bay, API#37 Bay, Snail Bay and Hammond Peninsula bay: 32,000 HUs.
- Walleye spawning habitat enhancements in Sawbill Creek and Lumby Creek: 2,000 HUs.

These measures, considered together, represent more than a 1:1 ratio of habitat losses and gains. However, since the majority of the habitat gains are focused on valued fisheries, walleye, northern pike, lake whitefish and baitfish, the value of the habitat gain is considered greater than the habitat lost, which is predominantly baitfish and other species. Stream crossings related impacts are addressed through site specific restoration and

considered to be self-compensating. Fish rescues are functionally mitigation and while noted as compensation, such measures are not included in the Habitat Accounting Model and hold no compensation value.

Part d)

Fish salvage measures were not included in the identification or calculation of fisheries offsetting opportunities, and are not reflected in the overall area or net benefit calculations within the Project NNLP. The relocation or salvage of local fish is considered relative only to the intrinsic value of retaining local species, of varying age classes, within the project area. Details related to compensation approach and calculations are provided in Sections 7.2 and 7.3 of the NNLP and do not include fish salvage.

Response to Additional Recommendations to Clarify Measures in the Commitments Registry and NNLP

At this time there is no justification to support voluntary adoption of the recommended reduction in overpressure from DFO guidelines of 100kPa to a lower value of 50KPa. Collecting blasting and fisheries information is important for decision making actions related to blasting. For this reason, the NNLP identifies the requirement for monitoring of blasting operations during initial pit development to obtain site-specific data on the potential for damaging vibrations to affect adjacent aquatic habitats. Blasting information, in combination with fish and fish habitat data will be used to develop guidance as to when, if at all, blast designs should be altered to accommodate vibration levels at the nearest active spawning beds and to assess the effectiveness of blast mitigation on fish.

Reference

Golder Associates Ltd. 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. Technical memorandum submitted to Canadian Malartic Corporation. November 26, 2015.

GRT Review Findings and Comments on above Responses

(Provided in letter to proponent dated December 22, 2016)

Further clarification of the mitigation and offsetting measures described in the T(3)-07 (fish and fish habitat) response is required. In addition, supplementary comments and recommendations for action are identified with respect to regulatory matters, should the Hammond Reef Gold Project enter the regulatory (post-EA) phase. The Agency has summarized review findings for the T(3)-07 responses as follows:

Required clarification:

Part D, page 6 of the Response

1) Section 7.2.3 Summary of Offsetting Compensation Measures and 8.2 Final No Net Loss/Habitat Offset Plan

   In the response the proponent states that fish rescues are mitigation and "while noted as compensation, such measures are not included in the Habitat Accounting Model and hold no compensation value." This is correct. Fisheries and Oceans Canada (DFO) considers fish rescue to be a mitigation measures rather than offsetting. However, the No Net Loss Plan (NNLP), Sections 7.2.3 and 8.2, list fish salvage and rescue as a compensation option.

   Clarify whether the introduction of rescued fish into fishless lakes has been included in the habitat accounting model as compensation value.

2) Section 7.2 Additional Mitigation and Compensation Measures

The response states that "details related to the compensation approach and calculations are provided in sections 7.2 and 7.3 of the NNLP. Section 7.2 Additional Mitigation and Compensation Measures lists a number of options to create and enhance Northern Pike spawning habitat and create or enhance access to Walleye spawning habitat."

Clarification is required on the 32 000 HUs proposed through the creation of Northern Pike spawning habitat creation at the mouth of Sawbill Bay, API #37, Snail Bay and Hammond Peninsula Bay, as well as the 2000 HUs through Walleye spawning habitat enhancements in Sawbill Creek and Lumby Creek. In the NNLP, the HUs identified on pages 77-78 do not appear to add up to these numbers.

3) Section 7.2 Additional Mitigation and Compensation Measures:

Section 7.2.2 describes Lake Whitefish spawning habitat creation that would also benefit Walleye, Smallmouth Bass and Cisco. It is DFO's understanding that the offsetting measures described in Sections 7.2.1and 7.2.2 are included as alternatives, should additional offsetting be required. For the purposes of the environmental assessment, clarification is required on how the potential environmental effects from implementing alternative offsetting measures have been assessed, as well as the details and outcome of the effects assessment.

DFO also recognizes that additional discussion will be required as the project plans are further developed and a *Fisheries Act* authorization is sought.

4) Monitoring of blasting activities would be required; therefore a commitment to undertake monitoring should be included in the commitments registry. Should impacts to fish and fish habitat be identified, additional mitigation and offsetting measures may also be required.

Part D, page 6 of the Response

5) Section 7.1 Compensation Calculations, page 63 Table 14

Clarification of the following is required:

- how stocking of fishless lakes has been included in the compensation calculations; and
- whether the calculations have been scoped to include the additional flooded habitat.

Please note that stocking of fishless ponds/impoundments would require monitoring to demonstrate their effectiveness (e.g., sustainability and productivity). As well, under the Fisheries Act, contingency measures would be required should the introduction of fish to these waterbodies not function as intended.

Supplementary Comments and Recommendations

6) Sections 7.0, 7.1.1 and 7.1.2:

Stream crossings may be designed and mitigated in such a manner that avoids serious harm to fish. As noted in the NNLP, should a water crossing result in serious harm, offsetting would be required. DFO does not use the term “self-compensating’.

7) Please be aware that language and references throughout the document are not consistent with the current Fisheries Act and policies. For example, use of terms such as HADD, compensation and No Net Loss. For clarification, note that baitfish are considered as commercial, recreational and Aboriginal (CRA)

fisheries. DFO also considers fish that support CRA fisheries in our assessments. For guidance on the Fisheries Act, specifically offsetting (formerly compensation) and applications for Authorization, please refer to DFO's web site at: http:://www.dfo-mpo.gc.ca/pnw-ppe/fpp-ppp/guide-eng.html.

CMC Response

1) CMC reaffirms that fish rescue has not been factored into the calculation of offsetting compensation in the proposed NNLP. Fish rescue is a mitigation measure.

   Fish salvaged from impacted waterbodies will be introduced into fishless waterbodies as part of the overall project compensation outlined by the NNLP. This approach is based on agreement with both MNRF and DFO that stocking of fishless waterbodies would be supported as project compensation (Meeting of May 9th, 2013 with Neville Ward, DFO and Brian Jackson, MNRF).

2) Up to 32,000 habitat units are identified through the NNLP as potential Northern Pike habitat compensation habitat. As correctly noted by the DFO, the NNLP compensation area descriptions provided on pages 77 and 78 do not account for the full value of compensation habitat opportunities for Northern Pike.

   The compensation values that are provided in the EA and NNLP (pp 77 and 78) reflect calculated habitat based on the average habitat suitability for all species present. It should have reflected only the habitat suitability for the target species (i.e., Northern Pike and Walleye). As described in Section 3.0 of the NNLP, Habitat Unit is the product of habitat quantity (HA) measured as a unit area (typically square metres) and habitat quality expressed as a Habitat Suitability Index (HSI). The formula for calculating HU is: HU = HSI x HA. Consequently when the HSI of Northern Pike spawning habitat is calculated for species such as Burbot, the HSI is low; reflecting the fact that the habitat is not suitable. Since the HSI is a critical component of the HU calculation, low HSI values reduce the HU available as compensation. Below is the correct compensation tabular data in support of the NNLP statements regarding Northern Pike, and Walleye compensation. These HU values are consistent with the statements made in the NNLP, and discussed previously with the DFO and MNRF. The calculations underlying the information provided is consistent with the methods outlined in Section 3.0 (page 6) and the specific parameter values summarized in the habitat compensation tables of Appendix C of the NNLP.

Table T(3)-07: Northern Pike and Walleye Compensation Data

	Habitat Unit Reference	Habitat Quantity (HA, m^2)	Yellow Walleye Habitat Suitability (HSI) Factor	Northern Pike Habitat Suitability (HSI) Factor	Habitat Expansion Factor	Ecotype Productive Capacity Index	Ecotype Weighted Useable Area (HU)
Northern Pike Compensation	Sawbill Creek Mouth	15,000	na	0.55	1	1	8,250
	Hammond Embayment	15,000	na	0.55	1	1	8,250
	Snail Bay	15,000	na	0.55	1	1	8,250
	API #37	15,000	na	0.55	1	1	8,250
Walleye Compensation	Trap Bay	3,500	0.3	na	1	1	1,050
	Sawbill Creek	3,500	0.3	na	1	1	1,050

3) The EA does not include an assessment of impacts associated with potential additional compensation measures. This is because it is not known if such additions are required. The MNRF and DFO have not requested additional measures as compensation as part of a final NNLP or Authorization requirement. It is expected that if additional measures are required, the potential effects of constructing these measures would be addressed through the DFO review process with the requirement being consistent with the EA commitments of no net loss of fish and fish habitat.

4) Any identified impacts to fish and fish habitat associated with blasting would be discussed with the DFO and relevant mitigation or offsetting measured required to support DFO authorization would be considered. A commitment to monitor blasting activities with respect to potential impacts on fish habitat has been made in Chapter 8 of the EIS/EA (Table 8-8) and will be included in the commitments registry for the project.

5) In proposed locations where impoundment is proposed as a means of increasing habitat availability (i.e. gain), the NNLP accounting excludes the area of the pre-impoundment feature from the net habitat gain calculation. As a result the NNLP calculations only accounts for the net increase in useable habitat area associated with the flooded area.

   Post stocking monitoring to ensure the success of fish introductions and to validate the habitat contribution gains are understood as part of regulatory acceptance and authorization of the NNLP's commitments to offsetting measures. The specific requirements for monitoring are expected to part of formal consultation with the DFO and MNRF during design and permitting stages of the Project. The commitment to undertake such monitoring is identified in the NNLP under Section 7.2 and in Chapter 8 of the EIS/EA (Table 8-10).

6) Supplementary comments provided by the DFO are acknowledged and will be considered or implemented in future project documents or in consultation with the DFO.