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APPENDIX X

DRAFT FISHERIES COMPENSATION STRATEGY AND PLANS

- X-1 Draft Fish Habitat Offset Strategy
- X-2 Draft Fish Habitat No Net Loss Plan: Section 35(2) Waterbodies
- X-3 Draft Fish Habitat No Net Loss Plan: MMER Schedule 2 Amendment Waterbodies



APPENDIX X-1

DRAFT FISH HABITAT OFFSET STRATEGY



RAINY RIVER RESOURCES LTD. RAINY RIVER PROJECT

DRAFT FISH HABITAT OFFSET STRATEGY

Version C

Submitted by:

AMEC Environment & Infrastructure a Division of AMEC Americas Limited 160 Traders Blvd. E., Suite 110 Mississauga, Ontario L4Z 3K7

> December 2013 TC111504





December 12, 2013 TC111504

Ms. Sara Eddy Department of Fisheries and Oceans 867 Lakeshore Road P.O. Box 5050 Burlington, Ontario L7R 4A6

Dear Ms. Eddy:

Re: Draft Fish Habitat Offset Strategy, Rainy River Project, Version C

Rainy River Resources Ltd. is pleased to submit the attached revised Draft Fish Habitat Offset Strategy – Rainy River Project, Version C, which incorporates the comments provided by the Department of Fisheries and Oceans Canada (Neville Ward May 15, 2013 and Julie Dahl July 31, 2013) and Ontario Ministry of Natural Resources (Matthew Myers July 16, 2013) and preliminary comments by the Fisheries Working Group on Version A of the Section 35 NNLP. This document has been developed as a summary to explain segregation of the overall Project fish habitat offset efforts into two separate documents to coincide with requirements of the *Fisheries Act* Section 35 and the Metal Mining Effluent Regulations (MMER) Schedule 2.

This draft strategy (Version C) is being circulated to the Fisheries Working Group (Department of Fisheries and Oceans Canada and the Ministry of Natural Resources) and is being included in the final Environmental Assessment Report for the Rainy River Project as Appendix X-1.

Yours very truly, **New Gold Inc.**

DRAFT

Kyle Stanfield Director, Environment & Sustainability







REVISION HISTORY

Revision Number	Revision Date	Purpose of Revision
Draft Version A	May 7, 2013	Draft for Fisheries Working Group review and comment
Draft Version B	October 31, 2013	Revised with Working Group comments from the Ministry of Natural Resources and Department of Fisheries and Oceans Canada.
Draft Version C	December 12, 2013	Draft revised based on preliminary comments from Fisheries Working Group on Section 35 NNLP Version A.





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1.0 PURPOSE

Rainy River Resources Ltd. (RRR) has been exploring the Rainy River Project (RRP) property since 2005, with the objective of developing a gold mine and milling complex on the site. RRR proposes to construct, operate and eventually reclaim a new open pit and underground gold mine at the RRP property. The RRP is located in the Rainy River District, in northwestern Ontario, Chapple Township, approximately 65 km northwest of Fort Frances and 420 km west of Thunder Bay (Figure 1). Land uses within the Project area mainly reflect low-density rural and some local agricultural and forestry practices. The area is intersected by a well-developed network of both Provincial and Municipal access roads as well as private roads crossing privately-held lands.

Development of the site will include an open pit, mine rock and overburden stockpiles, a tailings management area, process plant, local and Provincial roads, and water management ponds and ditches. The RRP is somewhat unique from an environmental perspective in that there are no lakes located within, or adjacent to, the main RRP site. While limited bait fishing does occur with certain project area streams, the area does not support a significant commercial or recreational fishery. The mine components described above will result in the unavoidable harm to fish and fish habitat and infilling of waters frequented by fish which requires the development and implementation of offsets (compensation) pursuant to the *Fisheries Act*.

Through a collaborative process initiated in mid-2012 with First Nations, Township of Chapple, as well as the Department of Fisheries and Oceans Canada (DFO) and the Ministry of Natural Resources (MNR) a fish habitat offset framework was developed. The purpose of this document is to summarize the RRP fish habitat offset strategy in a manner that explains the separation between *Fisheries Act* Section 35 Authorization requirements, and offset requirements associated with the Metal Mining Effluent Regulations (MMER) Schedule 2 amendment process.

Based on past experience with metal mines in Canada, it is our understanding that the impacts and offset measures associated with *Fisheries Act* Section 35 impacts to fish habitat and fisheries must be identified and offset in separate documentation from the impacts and offsets associated with mine waste deposition into natural waters frequented by fish pursuant to MMER Schedule 2 requirements. To this end, two separate No Net loss Plans (NNLP) will be prepared and submitted to DFO to address the overall offset strategy for the RRP.

The breakdown of which mine components will require Section 35 Authorization and those that will be considered MMER Schedule 2 Requirements are provided in Table 1. It is anticipated that any of the mine features deemed to be a mine waste, (tailings, mine water, overburden and mine rock) that overprint a natural water body frequented by fish, as determined by DFO will require approval under the MMER Schedule 2 process. However, from previous project experience, it is our understanding that the footprints of the dam / berm structures used to



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contain the mine waste will be included within the Section 35 fisheries offset plan, unless the dam is an internal structure within the boundary of the deposit.

2.0 BACKGROUND

Local creek systems within the natural environment local study area (NLSA) are all tributaries of the Pinewood River including: Westra Creek, Gallinger Creek, Blackhawk Creek, Clark Creek / Teeple Drain, West Creek, Marr Creek, Loslo Creek / Cowser Drain, Tait Creek, McCallum Creek and several other unnamed tributaries. The creeks in general are small, typically less than 5 metres (m) in average width and less than 1 m in average depth. Subwatershed areas of these contributing creeks range from less than 500 hectares (ha) for unnamed tributaries to 7,600 ha. Habitat features of the local creeks are described as generally low gradient; low energy systems characterized by single to braided diffuse channels with wide, densely vegetated grass and sedge dominated floodplains, with frequent naturally impounded waterbodies such as beaver ponds. Fish communities within the affected creek habitats are typically warm water and cool water baitfish (minnows), and other small bodied species (Table 2) considered common and widespread within the region.

The RRP team has been exploring options and alternatives to mitigate the potential effects to fish habitat resulting from the RRP. Despite best efforts to avoid and minimize impacts, losses to fish habitat will occur, necessitating a requirement to provide measures to offset these losses. Project effects are primarily restricted to the NLSA Creeks in the immediate vicinity of the site, including the sub-catchments of: Loslo Creek / Cowser Drain, Marr Creek, West Creek and Clark Creek / Teeple Drain. There are no direct or meaningful indirect effects expected to local creek systems or the Pinewood River outside of this immediate catchment area.

3.0 ENVIRONMENTAL EFFECTS

Development of the RRP will result in impacts to local creeks and rivers due to direct habitat loss (overprinting) and habitat modifications such as channel realignment; and more indirect pathways such as flow reductions effluent discharge or a combination of the above.

The general arrangement of the site and the features that will overprint waterbodies are shown in Figure 2. The potential impacts to the aquatic environment and fish habitat are as follows:

 Direct loss or alteration of habitat resulting from the infilling and destruction of portions of creeks in the immediate footprint of the mine due to development of the tailings management area (TMA), open pit, overburden and mine rock stockpiles, and other infrastructure elements associated with mine development (road crossings, pipeline crossings and outlets);



- Alteration of habitats due to the realignment or interception of some site watercourses to accommodate project infrastructure or to collect water for processing plant and other usage; and
- Potential indirect effects to habitat due to flow reductions in the Pinewood River resulting from creek runoff collection at site, groundwater interception by the mine workings (open pit and underground) and/or direct water taking from the Pinewood River (construction and potentially closure / post-closure phases).

A brief description of each potential impact and expectation of whether the work would be considered harmful to require compensation is provided below.

3.1 Direct Habitat Loss (infilling) and Flow Diversion

Local creeks expected to be directly overprinted by the mine features in whole or in part, include from east to west, Clark Creek / Teeple Drain, West Creek and Marr Creek and Loslo Creek / Cowser Drain. The remaining upstream portions of these creeks not overprinted directly by mine facilities or infrastructure, will require flow diversion or interception to avoid the upstream flows from interacting with the developed mine areas. As a result a large proportion of the four creeks listed above will be directly impacted by the site footprint as shown in Figure 2, and summarized in Table 3. This figure and table are based on the current project design, but minor changes may occur during detailed design. These overprinted waterbodies and flow diversions are expected to result in the direct loss of fisheries and their supporting habitats present in the creeks, and the potential reduction of downstream productivity, and as such are considered to require full offset (compensation) in the NNLP.

3.2 Roads, Water intakes/Outlets

Works associated with road crossings (east access road, main haul road and Highway 600) are considered to be entirely mitigatable by using best management practices, and standard measures to maintain fish passage. Crossing structures will be sized to accommodate as a minimum the 25yr return flow unless otherwise required to have a greater capacity (i.e., provincial highway requirements). All culvert crossings would include embedment of the culverts by up to 20% to allow for natural substrates to develop within the culverts and promote fish passage.

Likewise any localized works on water body banks to facilitate pipeline crossings and or water intakes / discharge points are expected to be minor in nature and not result in impacts requiring offset measures. Banks would be restored and stabilized with permanent vegetation and armoured where necessary, and appropriately sized screens would be placed on all intake pipes to prevent fish entrainment as per the DFO Freshwater Intake End-of-Pipe Fish Screen Guideline.

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Flow Reductions (Pinewood River)

The net overall flow reduction or flow increase to the Pinewood River will be a function of the capture of approximately 21 square kilometres (km²) of watershed associated with the mine site development, periodic takings from the Pinewood River of water required for mine start up and closure, less the effect of returning surplus water (mine return water) back to the Pinewood River through the constructed wetland and the treated effluent discharge downstream of McCallum Creek. During mine life, all water captured and used at the site will be returned to the river with the exception of water loses due to evaporation from the ponds on site, and the water lost due to void spaces within the deposited tailings and dust suppression. A comprehensive description of flow management and water balance as it relates to receiver water volume and quality is provided in the Water Management Plan (AMEC 2013; Appendix W-1), but for completeness, the potential effect on the Pinewood River habitat is provided in this document below.

The amount of flow reduction, or increased flow, will be dependent on whether it is a wet or dry year (annual precipitation) as well as the stage of mine development and the location along the Pinewood River flow path. As the mine develops, there will be an increased surplus of water to return to the system because of increased runoff coefficients linked to changing landscapes, and as such reduction to net annual flow is greatest during the first years of mine life. As such, we have used year two in the examples below to illustrate effects of the mine on river flows.

Using year two of operation as an example, Table 4 shows the net annual effects of the 21 km² watershed capture without the mine return water and with the mine return water. There is no scenario where surplus water would not be returned to the Pinewood and accordingly, only examples with mine return water are discussed further.

On an average annual basis, the mine would result in a less than 2% flow reduction to the Pinewood River flows downstream of the Kishkakoesis River, a 3.5% reduction at the McCallum Creek inflow, an 8% reduction between McCallum Creek and Loslo Creek, and a more localized reduction of up to 34% between West Creek and Loslo Creek. The approximate net percent reduction in flow along the Pinewood River flow path is shown in Figure 3.

The larger flow reduction (27 to 34%) between West Creek and Loslo Creek results from a combination of diverting the sub watersheds of West Creek and Marr Creek further west to the Loslo Creek channel and the lack of opportunity to redirect mine return water into the Pinewood River at this location to mitigate the effect.

To better characterize the potential effects of the flow reductions (or increases) on fish habitat, we have modelled representative cross-sections of the Pinewood River using WinXSPRO, developed by the USDA Forest Service to analyze stream channel cross section data for geometric, hydraulic, and sediment transport parameters. This analysis (Tables 5 through 8) provides estimated changes to the wetted width and depth of the channel under average annual

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flow conditions, by month at cross sections representative of the following locations:

- 1. Pinewood River downstream of the Kishkakoesis River (Table 5);
- 2. Pinewood River downstream of McCallum Creek (Table 6);
- 3. Pinewood River downstream of Loslo Creek (Table 7); and
- 4. Pinewood River between West Creek and Loslo Creek (Table 8).

The flows were modelled based on the top of bank / bankfull channel cross section as measured during our fish habitat surveys. Once the predicted flows exceed these sections changes to the wetted width and depth are considered nominal. The wetted width and depth values have only been modelled for the average annual flow condition at year 2 of operations. However, additional flow reductions in percent by month are available for the same stations along the Pinewood River for both low and high flow years, and at years 7 and 15 of operations in the Water Management Plan (AMEC 2013; Appendix W-1).

The results of the analysis based on average annual flow, demonstrates that monthly reductions in wetted width and depth downstream of the Kishkakoesis River inflow are minimal (generally less than 2%, Table 5) while changes to the Pinewood River channel downstream of McCallum Creek would be in the order of 4%, or less with the exception of February when flow is often negligible within the system due to natural conditions (Table 6).

Downstream of Loslo Creek (Table 7) the results are somewhat greater with monthly width and depth reductions of 1 to 13%, but typically less than 10%. As expected, the greatest changes in width and depth occur between Loslo Creek and Marr Creek (Table 8) where there will be a 34% reduction of flow. Width reductions through this reach are expected to range from 5 to 15%, and depth from 8 to 26%. This represents the greatest flow effect resulting from the diversion of flows around the site (Marr and West Creek) which occurs over approximately 1,700 m of channel before partial flows are returned to the river at Loslo Ceek.

Overall, the actual channel condition changes (width and depth) are considered low to moderate and it is the Project teams opinion that they are not expected to result in harmful impacts to the overall rivers productive capacity. However, should the effects be deemed harmful by DFO during their assessment of the Project, the currently proposed NNLP has contingency built into it to accommodate additional impacts (see Section 5).

3.3 Effects Segregation

As discussed in Section 1, it is AMEC's understanding that the *Fisheries Act* Section 35 Authorization and offsets require documentation separate from the impacts and offsets resulting from deposition of mine waste into natural water bodies frequented by fish and MMER Schedule 2 requirements. Table 3 shows the breakdown of water body effects as either Section 35 impacts or MMER Schedule 2 impacts. In total approximately 259,048 m² of habitat or waters frequented by fish will be altered or displaced by the RRP. The majority of impacts





(70%) are associated with mine waste deposition (mine rock, mine water or tailings) that are subject to MMER Schedule 2 inclusion while the remaining 30% of the effects on fish habitat are required to the pit development, dam construction, and plant facility development which will be authorized under Section 35(2) of the *Fisheries Act*.

4.0 OFFSET STRATEGY

Bill C-38 that passed in June 2012, proposed amendments to the *Fisheries Act* to focus on the protection of fisheries that include commercial, recreational or Aboriginal (CRA) fisheries, to more effectively manage activities that pose the greatest threat to fisheries resources and their habitats. However, as of preparation of this document, many of the proposed Bill C-38 amendments are not as yet in force, including changes to Section 35 of the Act that refer to CRA fisheries protection.

As such, under the currently in force Subsection 35(1) it is prohibited for a person to carry on any work, undertaking that results in harmful alteration disruption or destruction (HADD) of fish habitat unless it is authorized pursuant to Subsection 35(2). In order to receive an Authorization under Section 35(2), an offset plan must be developed and approved to clearly demonstrate no net loss of fish habitat. In addition to the need for an Authorization under Section 35(2) of the *Fisheries Act*, there will be a need to accommodate requirements of the MMER Schedule 2 provision to enable the deposition of mine waste into waters frequented by fish. This also requires an offset plan (referred to as Compensation Plan under the MMER Section 27.1) to be developed and approved, but must be documented and approved separate from the Section 35(2) Authorization.

Despite the separation of the two offset plans (Section 35 and MMER Schedule 2), there remains a requirement to document the Section 35 impacts associated with construction of mine waste containment facilities, and that authorization of those structures be withheld until the MMER Schedule 2 requirements for the containment facilities have been met.

To date, it is unclear how amendments to the *Fisheries Act* may affect DFO fish habitat policy and implementation of the *Fisheries Act*. Habitat policy including no net loss (NNL) is currently under review by the Federal government to ensure that it will provide consistent focus and guidance with respect to managing possible risks to CRA fisheries. Future updates to policy, which may affect NNL planning approaches and habitat accounting procedures, will be applied as appropriate. As per direction by DFO, the existing guidance and policies continue to apply until such a time as new policies are available.

Currently, DFO promotes a hierarchy of fish habitat offset measures as follows:

1. Create or increase the productive capacity of like-for-like habitat in the same ecological unit (local area);



- 2. Create or increase the productive capacity of unlike habitat in the same ecological unit;
- 3. Create or increase the productive capacity of habitat in a different ecological unit; and
- 4. As a last resort, use artificial production techniques to maintain a stock of fish, deferred compensation or restoration of chemically contaminated sites.

The typical method of addressing fish habitat offsets has been the direct replacement of like-forlike habitat, based on area calculations. For every square metre of habitat that is lost (impacted) a corresponding square metre of habitat is reconstructed elsewhere (offset). Typically DFO would require an increased quantity of newly developed habitat, compared to the quantity of lost habitat. In cases where habitat offsets are deferred well beyond the time the impacts occur, then larger amounts of offset habitat are required to account for the loss in productivity associated with the delay.

Alternatively, the affected habitat would be standardized into habitat weighted usable areas (WUA) based on quality and suitability for the targeted fish community and compared to the created offset habitats which are also converted into WUA. This technique removes some of the variability of habitat values from the process, and for that reason the RRP has opted to use both the area calculations and the WUA conversion process in the project NNLP. The calculated areas and WUA values for the RRP are shown in Tables 3, 9 and 10, and described in detail in the project NNLP.

Through discussions regarding fish habitat offset strategy options with the Rainy River First Nations (RRFN), MNR and DFO the fisheries working group has determined that local stakeholders are interested in fish habitat offset efforts that focus on overall water quality and general habitat improvements to the Pinewood River Watershed as a whole, rather than only providing only like-for-like replacement of small creek habitat. Letters from stakeholders supporting the idea of watershed focused offset measures as a component of the offset measures are provided as Attachment 1. RRR has committed to implementing these measures in the offset strategy as reasonable. However, there will be a significant amount of onsite habitat concurrently developed during the diversion and impoundment of the West Creek and Clark Creek systems that can offset impacts to fish habitat using the more traditional like for like habitat replacement. The use of offsite general watershed / water quality enhancements as an offset strategy still requires acceptance and further development with DFO in terms of how RRR would achieve the required NNL. Possible approaches to offset implementation are described in greater detail in Section 5.

Watershed based offset measures would make every effort to compliment and work with existing local programs and initiatives, such as the RRFN Watershed Program, and MNR District Partnership Programs (formerly stewardship program). This means that the compensation program would be established to support local groups and efforts, with a transparent mechanism to track these contributions with respect to ultimate RRR commitments.

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The onsite like for like habitat development associated with the West Creek and Clark Creek diversions and impoundments (and other more minor works), would provide more conventional like-for-like capacity to provide more certainty of meeting required habitat quantity requirements within the NNLPs. This more conventional like-for-like habitat development on site is considered to be more compatible with the needs of meeting the expectations of DFO and Environment Canada associated with the MMER Schedule 2 process.

Figure 4 shows a schematic representation of the resulting fish and fish habitat offset strategy, accounting for the types of impacts expected from the RRP, and the segregation of the offset measures that will be developed as independent NNLP.

5.0 IMPACT TO OFFSET BALANCE

The overall balance between impacts and offsets has been calculated for the Section 35(2) NNLP and the MMER Schedule 2 NNLP separately. Like for like offset habitat locations associated with the site are shown in Figure 2.

5.1 MMER Schedule 2 NNLP

The predicted impacts to natural water bodies frequented by fish through the deposition of mine waste are estimated to be approximately 213,189 m² which has been converted to 48,928 WUA (Table 9). The proposed offsets (compensation) consisting of like-for-like habitat replacement at West Creek, the Stockpile Pond and Clark Creek Pond will result in approximately 235,800 m² of habitat developed (53,204 WUA) for a total increase of habitat at a ratio of approximately 1.1 times habitat gained to that lost. Given that the proposed habitats are predictable in quality and planned to be constructed during early mine development, RRR considers this ratio to be appropriate.

Habitats associated with the West Creek, Stockpile Pond and Clark Creek Pond offset measures would consist of both creek channel and pond habitats. One of the limiting conditions within the existing small creek systems is the lack of deeper pools that would provide for summer and winter refuge during the naturally occurring low flow conditions, often resulting in periods of no notable flow. As such, the offset habitat would make good use of frequent pool habitats in the channels with depth up to 0.9 m, and deeper water ponds with productive littoral zones and wetland features. Ponds will vary in depth but deeper sections greater than 1 m will ensure abundant overwintering conditions in all of the pond habitat, while providing large shallow littoral areas for greater productivity and wetland attributes. Maximum depth will range from 1.5 to 2.25 m in the Clark Pond, 3.5-4 m in the Stockpile Pond and 3 to 3.5 m in the West Pond.





5.2 Section 35(2) NNLP

The predicted impacts not associated with mine waste, and as such authorized under Section 35(2) of the *Fisheries Act*, represent approximately 45,543 m² of habitat loss or 10,148 WUA (Table 10). The proposed offsets for these impacts will be achieved through a combination of the following methods.

5.2.1 Watershed Based Enhancements

This approach will be largely focused on reversing long term and wide spread agricultural impacts. The specific locations of where the offset works are best completed would require the ongoing participation of the MNR and a stewardship council composed of the various stakeholders in the Pinewood River watershed, and as such cannot be determined at this time. However, the following general approaches will be used and built upon through continued consultation with DFO and MNR.

Restoration techniques would include measures previously implemented successfully in the watershed such as cattle fencing, offline cattle watering sources, and channel and riparian zone restoration. The proposed strategy would make every effort to compliment and work with existing local programs and initiatives, such as the RRFN Watershed Program, and MNR District Partnership Programs (stewardship council). This means that the compensation program would be set up to support local groups and efforts with a mechanism to track these contributions with respect to ultimate Project commitments.

The challenge with this method is that it is difficult to quantify the overall benefit to both physical habitat and long term water quality to the aquatic community as a whole. As an example, by restoring riparian function and limiting cattle access to creek habitat that is nutrient enriched, the offset measures may actually decrease overall productivity due to nutrient reduction, but improve the conditions of the creek for more sensitive species of fish, and increase species richness.

We have assumed that watershed restoration works would be performed at a combined ratio with like for like habitat replacement of between 1.5:1 and 2:1 to account for the long term water quality improvement as well as the more immediate physical habitat restoration. Under this assumption then a maximum of approximately 20,000 WUA would need to be created as compensation if all of the works were composed of watershed restoration works at a 2:1 ratio. Assuming a 4 m bankfull width results in approximately 30 km of streambank rehabilitation required to achieve the determined offset area. If only a 1:1 ratio of watershed restoration works is required, then 15 km of stream restoration would be necessary. Note that this calculation requires that the works receive 100 percent credit for the total area restored.

Implementation of watershed restoration works would commence during the first year of the project, but it is not anticipated to be completed until several years into the project.

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5.2.2 Like for Like Habitat Replacement

Like for like habitat replacement is consistent with currently in place DFO hierarchy for the preferred replacement of fish habitat. This is due to the greater certainty of demonstrating a no net loss of fish habitat by providing an equal to or greater area of new habitat to offset the lost habitats. The method is simple and readily monitored for performance.

Within the RRP properties, there are additional opportunities to create like for like habitat replacement associated with the Clark Creek diversion, immediately upstream of Teeple Road. An impoundment is proposed at this location which could provide up to 80,000 m² of new fish habitat depending on the height of the flow control structure. This would provide an opportunity to provide a minimum of a 1:1 offset ratio for the Section 35(2) impacts.

5.2.3 Blended Approach (Preferred)

As discussed above, stakeholders have expressed an interest in seeing watershed based and water quality focused offset measures implemented within the NNLP. The feasibility and acceptability of this approach as a sole offset measure has significant challenges with respect to quantifying the benefits of the measures and follow up monitoring. As such DFO in consultation with the working group has expressed a preference for a blended approach, consisting of a minimum 1:1 ratio of like for like habitat to provide assurance that minimum habitat replacement targets are met, with watershed based improvement measures employed to account for local stakeholder interests and for consistency with MNR watershed management objectives .

As discussed above in section 5.2.2, there is appropriate opportunity within the Project property to provide like for like habitat development with the Teeple Road Pond on the Clark Creek realigned system. This combined with the offsite watershed based improvements described in section 5.2.1 would result in an effective balance between supporting and advancing local fisheries restoration initiatives and achieving offset quantities that are, definable, defendable and reasonably monitored consistent with the current DFO policies.

The ratio of efforts between the two approaches would require further discussion and determination between RRR and DFO but have tentatively been suggested as being between 1.5:1 and 2:1 of gain to loss.

6.0 **REFERENCES**

AMEC. 2013. Rainy River Resources Ltd. Volume 2: Final Environmental Assessment (Environmental Impact Statement).





- 1995. Silt, Turbidity and Suspended Sediments in the Aquatic Environment: An Annotated Bibliography and Literature Review. Ontario Ministry of Natural Resources, Southern Region Science & Technology Transfer Unit Technical Report TR-008. 277 pp.
- Homer, B.D. 1956. Effects of Turbidity on Fish and Fishing. Transactions of the 1956 North American Wildlife Conference 21: 249-261. *In* Kerr, S.J. 1995. Silt, Turbidity and Suspended Sediments in the Aquatic Environment: An Annotated Bibliography and Literature Review. Ontario Ministry of Natural Resources, Southern Region Science & Technology Transfer Unit Technical Report TR-008. 277 pp.





Table 1: Summary of Mine Features or Components Consideration under MMER Schedule 2 or Fisheries Act Section 35

Mine Feature or Component	MMER Schedule 2 Consideration	Section 35(2) <i>Fisheries Act</i> Consideration
Open Pit		Х
Plant Site / Ancillary Facilities		Х
Overburden Stockpile	X	
Dams and Berms		Х
Flow Reduction		Х
Road Crossings, Pipeline Crossings, Intakes, Outlets		Х
Tailings Management Area	X	
Constructed Wetland (water treatment)	X	
West Mine Rock Stockpile	X	
East Mine Rock Stockpile		Х
Mine Rock Pond		Х



Table 2: Fish Species Present in Affected Water Bodies

Family	Common Name	Pinewood River	Loslo Creek (Cowser Drain)	Marr Creek	West Creek	Clark Creek (Teeple Drain)
Acipenseridae	*Lake Sturgeon	Х				
Catagtamidag	Shorthead Redhorse	Х				
Catostomidae	White Sucker	Х	Х		Х	Х
	Black Crappie	Х				
O a v (v a v a b i al a a	Pumpkinseed	Х				
Centrarchidae	Rock Bass	Х				
	Smallmouth Bass	Х				
	Blackchin Shiner	Х	Х		Х	
	Blacknose Dace	Х				Х
	Brassy Minnow	Х	Х	Х	Х	Х
	Common Shiner	Х		Х	Х	Х
	Creek Chub	Х	Х	Х	Х	Х
	Emerald Shiner	Х	Х	Х	Х	Х
	Fathead Minnow			Х	Х	Х
Cyprinidae	Finescale Dace	Х	Х	Х	Х	Х
51	Golden Shiner	Х				Х
	Hornyhead Chub	Х				
	Lake Chub	Х	Х	Х	Х	Х
	Mimic Shiner	Х				
	Northern Pearl Dace	Х		Х	Х	Х
	Northern Redbelly Dace	Х	Х	Х	Х	Х
	Spottail Shiner	Х	Х	Х	Х	Х
Esocidae	Northern Pike	Х				
Gasterosteidae	Brook Stickleback	Х	Х	Х	Х	Х
Ictaluridae	Brown Bullhead	Х				
	Blackside Darter	Х			Х	Х
	Iowa Darter				Х	
	Johnny Darter	Х				
Percidae	Log Perch	Х				
	Sauger	Х				
	Walleye	Х				
	Yellow Perch	Х				
Percopsidae	Trout-perch	Х				
Umbridae	Central Mudminnow	Х	Х	Х	Х	Х

* Three adult Lake Sturgeon were capture in the lower reached of the Pinewood River during the spring of 2013, but are not considered to be present in the Natural Local study Area (NLSA)





Table 3: Local Creek Habitat Impacts by Mine Feature

		Watercourse Length (m)				Total Area Overprinted (m ²)				Weighted Usable Area (WUA) Overprinted			
Regulation	Mine Feature	Loslo Creek (Cowser Drain)	Marr Creek	West Creek	Clark Creek (Teeple Drain)	Loslo Creek (Cowser Drain)	Marr Creek	West Creek	Clark Creek	Loslo Creek (Cowser Drain)	Marr Creek	West Creek	Clark Creek (Teeple Drain)
e 2	Tailing Management Area (including TMA Pond and Water Management Pond)	10,160	2,350			143,344	14,949			32,895	3,434		
Inbər	Constructed Wetland / Water Discharge Pond	2,379				47,437				10,941			
Sch	West Mine Rock Stockpile		1,583				5,514				1,230		
•,	Overburden Stockpile		851				1,945				428		
	Total	12,539	4,784			190,781	22,408			43,836	5,092		
(2)	East Mine Rock Stockpile and Mine rock Pond				3,753				21,355				4,828
35	Open Pit			3,826				17, 412				3,768	
no	Dam structures		316		103		196		227		41		47
ctic	Plant Site / Ancillary Facilities			718				2,139				447	
Se	Remnant Channels		1,023				4,214				1,017		
	Total	0	1,339	4,544	3,856	0	4,410	19,551	21,582	0	1,058	4,215	4,875
	Grand Total	12,539	6,209	4,544	3,856	190,781	26,818	19,551	21,582	43,836	6,150	4,215	4,875





Table 4: Summary of Average Annual Flow Reduction with and without Mine Return Water Discharge

Flow Scenario (Year 2 operations)	Downstream of Kishkakoesis River	Downstream of McCallum Creek	McCallum Creek to Loslo Creek	Loslo Creek to Marr Creek	Marr Creek to West Creek	West Creek to Clark Creek	
Average Annual Flow without Mine Return Water	-4.5%	-10.1	-19.8	-34.2%	-27.5%	-8.1%	
Average Annual Flow with Mine Return Water	-1.5%	-3.5%	-8.0	-34.2%	-27.5%	-8.1%	

Table 5: Summary of Mine Effects on Monthly Flow Downstream of Kishkakoesis River with Water Discharge through Pipeline.

Month	Existing Average Flow (m ³ /s)	Flow with Mine Return Water (m ³ /s)	Flow Percent Change	Existing Wetted Width	Existing Depth	New Wetted Width	New Depth	Change in Wetted Width (m)	Change in Wetted Depth (m)	Change in Wetted Width (%)	Change in Wetted Depth (%)
January	0.217	0.226	4.0%	6.06	0.4	6.17	0.41	0.11	0.01	1.8%	2.5%
February	0.144	0.137	-4.6%	5.31	0.33	5.31	0.33	0.00	0.00	0.0%	0.0%
March	0.536	0.512	-4.6%	6.7	0.59	6.67	0.58	-0.03	-0.01	-0.4%	-1.7%
April*	9.574	9.328	-2.6%	*	*	*	*	*	*	*	*
May*	7.119	6.979	-2.0%	*	*	*	*	*	*	*	*
June*	5.400	5.211	-3.5%	*	*	*	*	*	*	*	*
July	3.156	3.128	-0.9%	8.1	1.38	8.09	1.37	-0.01	-0.01	-0.1%	-0.7%
August	1.533	1.578	3.0%	7.62	0.96	7.64	0.98	0.02	0.02	0.3%	2.1%
September	1.783	1.818	1.9%	7.7	1.03	7.71	1.04	0.01	0.01	0.1%	1.0%
October	2.347	2.333	-0.6%	7.87	1.18	7.87	1.18	0.00	0.00	0.0%	0.0%
November	1.909	1.917	0.4%	7.75	1.07	7.75	1.07	0.00	0.00	0.0%	0.0%
December	0.383	0.403	5.2%	6.46	0.51	6.49	0.52	0.03	0.01	0.5%	2.0%
Average				7.06	0.83	7.08	0.83	0.01	0.00	0.2%	0.6%

Notes:

Assumes an average flow year in year two of operations

Zero values reflect changes to the wetted depth of less than 1 cm

Positive numbers represent a flow increase from existing conditions

* Model is only calibrated to the bankfull channel section as measured in the field during aquatic habitat surveys. Once the predicted flows exceed these sections changes to the wetted width and depth are considered nominal.



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Table 6: Summary of Mine Effects on Monthly Flow Downstream of McCallum Creek with Water Discharge through Pipeline

Month	Existing Average Flow (m ³ /s)	Flow with Mine Return Water (m ³ /s)	Flow Percent Change	Existing Wetted width	Existing Depth	New Wetted width	New Depth	Change in Wetted Width (m)	Change in Wetted Depth (m)	Change in Wetted Width (%)	Change in Wetted Depth (%)
January	0.098	0.107	9%	4.05	0.4	4.26	0.41	0.21	0.01	5%	2%
February	0.065	0.058	-10%	2.25	0.3	2.17	0.28	-0.08	-0.02	-4%	-7%
March	0.241	0.217	-10%	6.57	0.56	6.34	0.54	-0.23	-0.02	-4%	-4%
April	4.308	4.062	-6%	13.14	1.56	13.03	1.52	-0.11	-0.04	-1%	-3%
May	3.204	3.063	-4%	12.65	1.39	12.59	1.37	-0.06	-0.02	0%	-1%
June	2.430	2.241	-8%	12.25	1.25	12.13	1.21	-0.12	-0.04	-1%	-3%
July	1.420	1.392	-2%	11.1	1.03	11.01	1.02	-0.09	-0.01	-1%	-1%
August	0.690	0.735	7%	8.94	0.8	8.99	0.81	0.05	0.01	1%	1%
September	0.803	0.837	4%	9.11	0.84	9.11	0.84	0.00	0.00	0%	0%
October	1.056	1.042	-1%	10.39	0.93	10.46	0.94	0.07	0.01	1%	1%
November	0.859	0.867	1%	9.19	0.86	9.62	0.88	0.43	0.02	5%	2%
December	0.172	0.192	12%	5.87	0.5	6.11	0.52	0.24	0.02	4%	4%
Average				8.79	0.87	8.82	0.86	0.03	-0.01	0.4%	-0.6%

Notes:

Assumes an average flow year in year two of operations Zero values reflect changes to the wetted depth of less than 1 cm Positive numbers represent a flow increase from existing conditions



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Table 7: Summary of Mine Effects on Monthly Flow in Pinewood River (Downstream of LosloCreek) with Water Discharge through Constructed Wetland in Year 2 of Operation

Month	Existing Average Flow (m ³ /s)	Flow with Mine Water through Wetland (m ³ /s)	Flow Percent Change	Existing Wetted width	Existing Depth	New Wetted width	New Depth	Change in Wetted Width (m)	Change in Wetted Depth (m)	Change in Wetted Width (%)	Change in Wetted Depth (%)
January	0.050	0.059	17%	2.95	0.2	3	0.21	0.05	0.01	2%	5%
February	0.033	0.027	-20%	2.69	0.15	2.59	0.13	-0.10	-0.02	-4%	-13%
March	0.124	0.099	-20%	3.56	0.32	3.36	0.28	-0.20	-0.04	-6%	-13%
April	2.206	1.885	-15%	7.46	1.35	7.01	1.22	-0.45	-0.13	-6%	-10%
May	1.641	1.431	-13%	6.84	1.17	6.5	1.07	-0.34	-0.10	-5%	-9%
June	1.244	1.056	-15%	6.33	1.02	5.98	0.92	-0.35	-0.10	-6%	-10%
July	0.727	0.699	-4%	5.54	0.79	5.44	0.76	-0.10	-0.03	-2%	-4%
August	0.353	0.399	13%	4.75	0.56	4.82	0.58	0.07	0.02	1%	4%
September	0.411	0.445	8%	4.89	0.6	4.92	0.61	0.03	0.01	1%	2%
October	0.541	0.549	2%	5.2	0.69	5.16	0.68	-0.04	-0.01	-1%	-1%
November	0.440	0.468	7%	4.95	0.62	4.99	0.63	0.04	0.01	1%	2%
December	0.088	0.108	23%	3.31	0.27	3.46	0.3	0.15	0.03	5%	11%
Average				4.87	0.65	4.77	0.62	-0.10	-0.03	-2%	-3%

Notes:

Assumes an average flow year in year two of operations

Positive numbers represent a flow increase from existing conditions



Table 8: Summary of Mine Effects on Monthly Flow Pinewood River, between Loslo Creek and Marr Creek (34.2% Watershed Diversion)

Month	Existing Average Flow (m³/s)	Flow with 34.2% Watershed Diversion (m³/s)	Flow Percent Change	Existing Wetted Width	Existing Depth	New Wetted width	New Depth	Change in Wetted Width (m)	Change in Wetted depth (m)	Change in Wetted Width (%)	Change in Wetted Depth (%)
January	0.050	0.033	-34.2%	2.91	0.27	2.47	0.2	-0.44	-0.07	-15%	-26%
February	0.033	0.022	-34.2%	2.47	0.2	2.3	0.17	-0.17	-0.03	-7%	-15%
March	0.124	0.081	-34.2%	3.41	0.35	3.22	0.32	-0.19	-0.03	-6%	-9%
April	2.206	1.452	-34.2%	*	*	*	*	*	*	*	*
May	1.641	1.079	-34.2%	*	*	*	*	*	*	*	*
June	1.244	0.819	-34.2%	6.05	0.97	5.77	0.89	-0.28	-0.08	-5%	-8%
July	0.727	0.479	-34.2%	5.59	0.84	5.09	0.7	-0.50	-0.14	-9%	-17%
August	0.353	0.232	-34.2%	4.7	0.61	4.27	0.51	-0.43	-0.10	-9%	-16%
September	0.411	0.270	-34.2%	4.88	0.65	4.45	0.55	-0.43	-0.10	-9%	-15%
October	0.541	0.356	-34.2%	5.25	0.74	4.75	0.62	-0.50	-0.12	-10%	-16%
November	0.440	0.289	-34.2%	4.88	0.65	4.49	0.56	-0.39	-0.09	-8%	-14%
December	0.088	0.058	-34.2%	3.29	0.33	2.91	0.27	-0.38	-0.06	-12%	-18%
Average				4.34	0.56	3.97	0.48	-0.37	-0.08	-9%	-15%

Notes:

Assumes an average flow year

The approximate 34.2% watershed diversion (West Cleek, Marr creek and partial Clark Creek) is constant throughout mine life

Positive numbers represent a flow increase from existing conditions

* Model is only calibrated to the bankfull channel section as measured in the field during aquatic habitat surveys. Once the predicted flows exceed these sections changes to the wetted width and depth are considered nominal.





Table 9: MMER Schedule 2 Habitat Impacts and Offset Balance

		Total Ar	ea Overpr	inted (m ²)		Weight	ted Usable	e Area (W	UA) Overp	rinted		Total Area of Offset (m ²)	Weighted Usability Value	Weighted Usable Area Offset
Mine Feature	Loslo Creek (Cowser Drain)	Marr Creek	West Creek	Clark Creek (Teeple Drain)	Total	Loslo Creek (Cowser Drain)	Marr Creek	West Creek	Clark Creek (Teeple Drain)	Total	Offset Feature			
Tailings Management Area (including TMA Pond and Water Management Pond)	143,344	14,949	0	0	158,293	32,895	3,434	0	0	36,329	West Creek Diversion Channel and Stockpile Pond Diversion Chanel	47,241	0.21	9,921
Constructed Wetland/ Water Discharge Pond	47,437	0	0	0	47,437	10,941	0	0	0	10,941	West Creek Pond and Stockpile Pond	150,089	0.23	34,520
West Mine Rock Stockpile	0	5,514	0	0	5,514	0	1,230	0	0	1,230	Clark Creek Diversion Channel	8,470	0.22	1,863
Overburden Stockpile		1,945			1,945		428			428	Clark Creek Pond	30,000	0.23	6,900
Total	190,781	22,408	0	0	213,189	43,836	5,092	0	0	48,928	Total	235,800		53,204
Net Result										let Result	Net Gain = 22,611 m ² (approximately 1.1 ratio)		Net Gain = 4,276 WUA (approximately 1.1 ratio)	





Table 10: Section 35 Habitat Impacts and Offset Balance

		Total Are	nted (m ²)	Weight	ed Usable	e Area (W	UA) Overpi	rinted		ĺ				
Mine Feature	Loslo Creek (Cowser Drain)	Marr Creek	West Creek	Clark Creek (Teeple Drain)	Total	Loslo Creek (Cowser Drain)	Marr Creek	West Creek	Clark Creek (Teeple Drain)	Total	Offset Feature	Total Area of Offset (m ²)	Weighted Usability Value	Weighted Useable Area Offset
East Mine Rock Stockpile				21,355	21,355				4,828	4,828	Offsite Cattle fencing, offline			
Open Pit			17,412		17,412			3,768		3,768	watering, riparian and channel restoration	TBD	TBD	TBD
Dam Structures		196		227	423		41		47	88				
Plant Site / Ancillary Facilities			2,139		2,139			447		447	Teerle Deed	Minimum of 45,543m ²	0.23	Minimum of 10,148
Remnant Channels		4,214			4,214		1,017			1,017	Pond			
Grand Total	0	4,410	19,551	21,582	45,543	0	1,058	4,215	4,875	10,148				
Net Result											Blended Approach	Min. 45,543 m ² plus Offsite Measures	Varies	Min. 10,148 plus Offsite Measures

















ATTACHMENT 1

STAKEHOLDER LETTERS SUPPORTING THE USE OF WATERSHED-BASED HABITAT ENHANCEMENT ALTERNATIVE OFFSET STRATEGY FOR FISH HABITAT IMPACTS







Rainy River First Nations Manitou Rapids

P. O. Box 450 Emo, Ontario P0W 1E0 Phone (807) 482-2479 Fax (807)482-2603

March 20. 2013

Kyle Stanfield Vice President, Environment & Sustainability Rainy River Resources Ltd. Box 5 Emo, ON P0W1E0

Re: Fish Habitat Compensation Proposal Associated with the Rainy River Gold Project

Dear Mr. Stanfield:

On behalf of the Chief and Council of Rainy River First Nations, would like to reiterate our support for the proposed fish habitat compensation plan, as described in your letter dated February 14, 2013.

As you know, the Rainy River First Nations Watershed Program and protection of the watershed has been an important part of our traditional stewardship in the past. The proposal to support this work with both Rainy River Resources and the MNR District Partnership Program, renewing efforts to protect the water quality of the Pinewood River and its surrounding watershed, is a compensation plan we support, and look forward to being a part of. We believe this is a positive way that Rainy River Resources can proactively compensate for any fish habitat lost as the Rainy River Gold Project development progresses to becoming a producing mine.

We look forward to the opportunity to be a part of the development and implementation of this compensation plan. As the work moves forward, please coordinate with Kiley Hanson, our Watershed Program Coordinator. If you require any other information, please don't hesitate to contact me.

Sinde

Chief/Jim Leonard Rainy River First Nations

NAICATCHEWENIN FIRST NATION

R.R. No. 1, Box 15 DEVLIN, ONTARIO P0W 1C0 Phone: (807)486-3407 Fax: (807) 486-3704



February 20. 2013

Kyle Stanfield Vice President, Environment & Sustainability Rainy River Resources Ltd. Box 5, Emo, ON P0W1E0

Re: Proposed Methods of Fish Habitat Compensation Associated with the Rainy River Gold Project

Dear Mr. Stanfield:

The Chief and Council of Naicatchewenin First Nation recently received your letter regarding the proposed fish habitat compensation, and would like to confirm our support for the plan as described.

We are supportive of your plans to develop this program in partnership with the Rainy River First Nations Watershed Program and MNR District Partnership Program. Protection and restoration of the existing watershed is important work that has been undertaken by these organizations in the past, and Naicatchewenin First Nation has always been a proponent of these organizations and their programs. Building on their efforts to protect the water quality of the Pinewood River and surrounding watershed is a positive way that we believe Rainy River Resources can compensate for loss of fish habitat within the project footprint.

If there is any way in which our community can offer assistance or expertise as consultations and discussions proceed regarding the implementation strategy for the proposed work, please do not hesitate to contact Chief & Council.

Sincerelv

Chief Wayne Smith Naicatchewenin First Nation

CORPORATION OF THE TOWNSHIP OF CHAPPLE

P.O. Box 4 BARWICK, ONTARIO POW 1A0 Phone 807-487-2354 Fax 807-487-2406

OFFICE OF THE CLERK-TREASURER e-mail: chapple@tbaytel.net

March 13, 2013

Rainy River Resources Ltd. 1111 Victoria Avenue East Thunder Bay, Ontario P7C 1B7

Re: Stakeholder Support for Proposed Methods of Fish Habitat Compensation Associated with the Rainy River Gold Project

Dear Kyle Stanfield:

Please be advised that at the regular meeting of Council, on March 12, 2013, the Township of Chapple reviewed your letter dated February 14, 2013 with regards to Fish Habitat Compensation.

Council was in support of the proposed compensation strategy that will be directed at water quality and habitat improvement. This approach is acceptable with our expectations of the Rainy River Gold Project.

Thank you for providing us with this information.

Sincerely,

Peggy Johnson, CMO CAO/Clerk Treasurer

