From: max@brownhillconsulting.com <max@brownhillconsulting.com>
Sent: April 10, 2018 12:56 AM
To: Raska,Andrea [CEAA] <Andrea.Raska@ceaa-acee.gc.ca>
Cc: 'Michael McPhie' <mm@idmmining.com>; jasmin@falkirk.ca; 'Rob McLeod' <rm@idmmining.com>; sn@idmmining.com; 'Ryan Weymark' <rw@idmmining.com>; 'Luke, Lindsay EAO:EX' <Lindsay.Luke@gov.bc.ca>; 'Garside, Chelsea EAO:EX' <Chelsea.Garside@gov.bc.ca>; Zmuda,Katherine [CEAA\ACEE] <Katherine.Zmuda@ceaa-acee.gc.ca>
Subject: IDM Mining Red Mountain Underground Gold Project - Response to the Canadian Environmental Assessment Agency's Information Request #2

Good Afternoon Andrea,

On behalf of IDM Mining, please find attached memo: Response to the Canadian Environmental Assessment Agency's Information Request #2. The details for Information Request #2 were outlined in your letter dated March 16, 2018.

The attached document has been updated from the draft version (March 27, 2018) to address the Agency's request (April 4, 2018) to provide more information on the effects of the Fish Habitat Offsetting Plan on the environment.

If you have any questions, please don't hesitate to contact us.

Thank you,

-Max-

Max Brownhill, R.P.Bio
Brownhill Consulting Services Ltd.
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Max@brownhillconsulting.com

M E M O

Subject: Red Mountain Underground Gold Project -
Response to the Canadian Environmental Assessment Agency Information Request #2

Prepared for: Andrea Raska, Project Manager, Pacific and Yukon Region, Canadian Environmental Assessment Agency

Prepared by: IDM Mining Ltd.

Date: April 9, 2018

On March 16, 2018, the Canadian Environmental Assessment Agency (the Agency) provided IDM Mining Ltd. (IDM) with Information Request #2 for the proposed Red Mountain Underground Gold Project. Information Request #2 is comprised of one section, Fish and Fish Habitat (IR2-01).

Attachment 1 of this memo is provided as IDM's response to the Agency request for a conceptual fish habitat offsetting plan.

Suite 1800, Two Bentall Centre – 555 Burrard Street, Vancouver BC, V7X 1M9
(604) 681-5672 | info@idmmining.com

ATTACHMENT 1

CONCEPTUAL FISHERIES OFFSETTING PLAN

PALMER
ENVIRONMENTAL
CONSULTING
GROUP INC.

470 Granville Street, Suite 630, Vancouver, BC V6C 1V5
Tel: 904 629 9075 | www.pecg.ca

Red Mountain Underground Gold Project

Conceptual Fisheries Offsetting Plan

PECG Project #
160021

Prepared For
IDM Mining Ltd.

April 9, 2018

PALMER ENVIRONMENTAL CONSULTING GROUP INC.

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1. Introduction

1.1 Project Overview

IDM Mining Ltd. (IDM) proposes to develop and operate the Red Mountain Underground Gold Project (the Project) located approximately 18 kilometers (km) northeast of Stewart, British Columbia (BC). The Project is a proposed underground gold mine in the Bitter Creek valley on a contiguous group of mineral tenures known collectively as the Red Mountain property. The Project will extract high-grade gold and silver ore to be processed on site.

The Project is composed of two main areas of activity: 1) The Mine Site, with an underground mine and dual portal access at the upper elevations of Red Mountain (1,950 metres above sea level [masl]), and 2) Bromley Humps, situated in the Bitter Creek valley (500 masl), with a Process Plant and Tailings Management Facility (TMF).

Access to the mine site is proposed via an all-season road. The road right-of-way includes a proposed powerline. The road/powerline alignment has two sections: the first section, between Highway 37A junction and Bromley Humps (Access Road), and the second section, between Bromley Humps and the Mine Site (Haul Road). The proposed Access Road follows Bitter Creek along its right (north) bank for 14 km from Highway 37A to Bromley Humps. It follows an existing right-of-way developed by LAC Minerals in 1994. The proposed Haul Road comprises 13 km of new road connecting Bromley Humps to the Mine Site.

1.2 Project Context

The Access Road alignment has been located to avoid fish habitat in Bitter Creek, where possible, and follows a historical road. A wagon road was first constructed along the proposed road alignment in 1910 to access small lode mines in prospect of the Roosevelt Creek and Hartley Gulch tributaries of Bitter Creek. The wagon road was used intermittingly since the 1950s. The road was also used for logging operations in the valley during the 1960s. Lac Minerals upgraded and extended the Bitter Creek road to Bromley Humps in 1994. Throughout this time, the road was used for recreational and traditional use by Stewart residents. Minor portions of the road were washed away during a 2011 storm event, which also washed out the bridge at Highway 37A.

Due to the road washouts in 2011, and the steep terrain within the Bitter Creek valley, Access Road construction within the Bitter Creek channel below the current annual high-water mark (HWM) is required in a few areas. This constitutes a loss of fish habitat that cannot be fully avoided or mitigated and was therefore considered as a residual effect of the Project. The Haul Road will not affect fish habitat and is therefore not discussed further.

1.3 Background

In September 2017, IDM Mining Ltd. (IDM) submitted an Application for an Environmental Assessment Certificate/Environmental Impact Statement (the Application/EIS) to the Canadian Environmental Assessment Agency (the Agency), for the Red Mountain Underground Gold Project (the Project). The Application/EIS is currently in the review phase.

Palmer Environmental Consulting Group Inc. (PECG) submitted a Request for Review (the proposal) to Fisheries and Oceans Canada (DFO), on behalf of IDM, for construction of the Project's proposed Access Road in the Bitter Creek valley on September 18, 2017. DFO reviewed the proposal to determine if construction of the Access Road is likely to results in serious harm to fish, as defined by the *Fisheries Act*. Based on preliminary DFO feedback on November 20, 2017, it was expected that the construction of the Access Road within the Bitter Creek channel would require an Authorization. Investigations into potential offsetting options in the Project Regional Study Area (RSA) were then initiated shortly thereafter. On March 1, 2018, IDM received official notice from DFO of the determination for an authorization under the *Fisheries Act*, pertaining to locations where proposed works would fall below the HWM along the Access Road as this was considered to result in 'serious harm' to fish. IDM is currently in the process of finalizing fish habitat offsetting options and will submit an application for an authorization to DFO, once offsetting measures are mutually agreed upon. The application for an authorization will 1) include a comprehensive FOP, 2) be developed in alignment with DFO 3) be developed in consultation with the Nisga'a Nation, and 4) include detailed design drawings.

1.4 Legislative Context

The *Fisheries Act* prohibits the carrying out of any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational, or Aboriginal fishery, or to fish that support such a fishery. 'Serious harm' is defined under Section 2 of the *Fisheries Act* as: "the death of fish or the permanent alteration to, or destruction of, fish habitat". This definition is expanded in the *Fisheries Protection Policy Statement*, as follows:

- the death of fish;
- a permanent alteration to fish habitat of a spatial scale, duration or intensity that limits or diminishes the ability of fish to use such habitats as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes;
- the destruction of fish habitat of a spatial scale, duration, or intensity that fish can no longer rely upon such habitats for use as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes.

If a project cannot avoid, or is likely to cause, serious harm, then an authorization under Section 35(2) of the *Fisheries Act* is required. Proponents are required to submit an Offsetting Plan outlining how residual serious harm to fish will be counterbalanced to achieve DFO's overall goal of ensuring the sustainability and ongoing productivity of Canadian CRA fisheries.

Under Paragraph 35(2)(b) of the *Fisheries Act*, the Minister of Fisheries and Oceans may issue an

authorization with terms and conditions in relation to a proposed work, undertaking or activity that may result in serious harm to fish.

IDM intends to submit an application for an authorization for works along the Access Road. The application, including the final FOP, will be prepared in accordance with the information requirements outlined in Schedule 1 of the Applications for Authorization under Paragraph 35(2)(b) of the *Fisheries Act* Regulations, and the following guidance from Fisheries and Oceans Canada (DFO):

- Fisheries Productivity Investment Policy: A Proponent's Guide to Offsetting;
- An Applicant's Guide to Submitting an Application for Authorization under Paragraph 35(2)(b) of the *Fisheries Act*; and
- Fisheries Protection Policy Statement.

1.5 Consultation

IDM is committed to communicating clearly and openly about the planning of the Project with DFO and other interested parties, and to soliciting and incorporating feedback on fisheries offsetting. Since receiving official notice of the requirement for an authorization (March 1, 2018) IDM has consulted DFO and Nisga'a Nation, as represented by Nisga'a Lisims Government (NLG) (Table 1). Feedback and input on fisheries offsetting measures are important to ensure that the Fisheries Offsetting Plan aligns with provincial, federal, and Aboriginal fisheries management objectives.

Table 1 Summary of Fisheries Offsetting-related consultation, Red Mountain Project, 2018

Date	Meeting/Communication, Objectives	Attendance	Outcomes
January 19, 2018	Memorandum submitted to NLG to share information regarding the proposed Access Road	(not applicable)	Information regarding the proposed Access Road, fisheries habitat conditions, the interactions between the Access Road and the fisheries habitat, and IDM's proposed mitigation measures shared with NLG.
March 13, 2018	Meeting to present and discuss offsetting concepts and solicit feedback from DFO.	IDM, PECG, DFO (Ian Bergsma; assessor for the Project)	Received information and feedback on the concepts being considered, and suggestions for follow-up discussions and other contacts at DFO.
March 14, 2018	Discussion between Rick Palmer (PECG) and DFO restoration biologist Lana Miller, to solicit feedback on offsetting options.	Rick Palmer (PECG), Lana Miller (DFO)	Received feedback on viability and existing issues for three offsetting options (Clements Creek, Graveyard Creek, and Airport Creek).

Date	Meeting/Communication, Objectives	Attendance	Outcomes
March 16, 2018	Discussion between Rick Palmer (PECG) and DFO fisheries biologist Ian Bergsma, to solicit feedback on offsetting options.	Rick Palmer (PECG), Ian Bergsma (DFO)	Received feedback on viability and existing issues for three offsetting options (Rainey Creek, Graveyard Creek, and Airport Creek).
March 29, 2018	Call with NLG representatives to present and discuss offsetting concepts and solicit feedback	IDM, PECG, NLG	Received feedback on the concepts being considered, and suggestions for follow-up investigations.

Regular consultation with regulatory agencies, NLG, and stakeholders will continue as the offsetting plan is developed. This may include site visit tours as well as consultation meetings.

1.5.1 Summary of Consultation with Nisga'a Nation

IDM has been engaging with Nisga'a Nation, as represented by NLG, since acquiring the Red Mountain Property in May 2014. Recently, this engagement has included dialogue regarding IDM's discussions with DFO on fisheries habitat offsetting.

On January 19, 2018, IDM provided NLG with a memo titled "Red Mountain Proposed Access Road: Fisheries Act Permitting – Information and Requirements" to share information regarding the proposed Access Road, existing fisheries habitat conditions, the interactions between the Access Road and the fisheries habitat, and IDM's proposed mitigation measures.

On March 29, 2018, IDM had a conference call with NLG representatives to outline the discussions IDM and DFO have conducted to date (Table 1). In advance of this conference call, IDM also provided NLG with a copy of the PowerPoint presentation IDM made to DFO on March 13, 2018. During the conference call, IDM outlined its selection methodology and initial evaluation and elimination of potential offsetting locations, focusing on Graveyard Creek, which is IDM's preferred location. As the Graveyard Creek option is adjacent to Highway 37A and has been affected by Ministry of Transportation and Infrastructure (MOTI) highway maintenance and brushing, NLG asked whether ongoing MOTI maintenance might disturb IDM's offsetting works. IDM responded that only preliminary work on the Graveyard Creek option has been completed and acknowledged that communication with MOTI would be an important part of the offsetting works. NLG stated that they see no issue with IDM's site selection methodology nor with Graveyard Creek. NLG asked for more feasibility work and assurance that the Graveyard Creek option is viable before they can endorse the option.

2. Proponent Contact Information

The application for an authorization must provide the applicant's name, address, telephone number and, if applicable, the name, address and telephone number of their duly authorized representative.

Applicant Contact Information:

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Authorized Representative Contact Information:

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3. Description of Proposed Work, Undertaking or Activity

3.1 Road Alignment

The proposed Access Road follows Bitter Creek along its right bank for 14 kilometres (km) from Highway 37A to the area known as the Bromley Humps (where the tailings management facility is proposed). Where possible, the proposed Access Road will follow the existing right-of-way developed by LAC Minerals in 1994. The steep terrain within the Bitter Creek watershed necessitates infilling at some confined locations, where historical road washouts were generated by creek flood events. There are six locations (referred to as 'infill areas'), where placement of material (e.g. road fill, riprap armouring) within the annual HWM of Bitter Creek is required (*i.e.* instream). Earthworks (e.g. for placement of armouring, cut and fill slope, road surface) within the riparian zone of Bitter Creek (15 m buffer from the HWM) occurs adjacent to the infill areas. Some additional riparian area disturbance will occur from clearing of the road right-of-way (*i.e.* no earthworks but some vegetation clearing is required to maintain sightlines and maximum heights).

The proposed Access Road crosses 64 unnamed right bank tributaries of Bitter Creek, as well as 5 named tributary creeks: Lim Creek, Radio Creek, Roosevelt Creek, Cambria Creek, and Hartley Gulch. Only Roosevelt Creek and Hartley Gulch are fish bearing at road crossings, and these two crossings will be clearspan bridges. The abutments of clearspan bridges will have a footprint within the riparian zone, but there will be no placement of material or structures within the HWM.

IDM to provide more detail in the final FOP (submitted with the application) - The application requirements for timeline: A description of the anticipated phases, including the sequencing of the phases, of the proposed work, undertaking or activity and, if applicable, of the project of which the proposed work, undertaking or activity is a part and the schedule for carrying on the proposed work, undertaking or activity and, if applicable, the project."

3.2 Proposed Works

The guidance document Standards and Best Practices for In-stream Works (BC Ministry of Water, Land and Air Protection, 2004) will be employed for road fill work construction and riprap placement below the HWM, and will ideally occur during periods of low water levels in the creek (likely in spring before significant glacial melt; note that Bitter Creek is glacially influenced and flows peak in summer (*i.e.*, July/August)).

Construction will primarily be completed using large angular riprap to protect the existing banks of Bitter Creek from further erosion. Non-woven geotextile will be placed under the riprap, where suitable. Road surfacing materials will be separated from the riprap by way of non-woven geotextiles as well. All works will be completed utilizing hydraulic excavators to place the rock together tightly (i.e., not simply end-dumped from trucks) to create a stable and interlocked subgrade for the road. Where feasible, the road will be cut into the existing banks to minimize rock placement within the HWM area with excess material end-hauled to suitable spoil sites.

At road station 4+550 m to 4+840 m, a minor channel realignment of Bitter Creek is proposed. A channel length of 174 m will be realigned following placement of riprap along the right and left banks. The channel realignment is required to protect the road and the adjacent existing ravelling slopes from further scour. The realignment work will be completed away from current stream flows by staging the construction from left to right banks. The channel realignment will not result in any significant shortening of the channel, or any significant decrease in the radius of curvature of the meander. Based on hydrotechnical analysis, velocities are not expected to yield a measurable change compared to existing conditions. The remainder of the infill areas are mostly bank protection works and the creek will flow naturally along the rock works.

4. Description of Fish and Fish Habitat

Bitter Creek is a 4th order stream that originates at the toe of the Bromley glacier and flows for 18 kilometres (km) to its confluence with Bear River. The uppermost 4 km of Bitter Creek are non-fish bearing owing to a series of high gradient barriers. The creek is a low productivity stream, owing to high turbidity, low temperatures, and high energy of the system. High flow events (such as glacial outburst floods) that lead to bed scour and channel migration are frequent. Fish habitat complexity is therefore low because high flow events tend to out-transport woody debris and limit colonization by benthic invertebrates.

IDM to provide more detail in the final FOP (submitted with the application) - A description of the fish and fish habitat found at the location of the proposed work, undertaking or activity and within the area likely to be affected by the proposed work, undertaking or activity, including (a) the type of water source or water body; (b) the characteristics of the water source or water body and how those characteristics directly or indirectly support fish in carrying out their life processes; (c) the fish species that are present and an estimate of the abundance of those species; and (d) a description of how the information provided under paragraphs (a) to (c) was derived, including the sources, methodologies and sampling techniques used.

Dolly Varden (*Salvelinus malma*) are present in relatively low densities throughout the fish-bearing section of Bitter Creek, and coastrange sculpin (*Cottus aleuticus*) have been captured near the mouth. Bear River which contains more abundant, higher quality habitat for supporting Dolly Varden.

Representative photographs of the fish habitat in Bitter Creek along the road alignment are included in Appendix A.

IDM to provide more detail in the final FOP (submitted with the application) – inclusion of a photo log derived from the Bitter Creek Hydrotechnical Assessment Study Area for The Red Mountain Access Road Nov 15, 2017.

5. Description of Effects on Fish and Fish Habitat

The potential effects of the proposed works on fish and fish habitat in Bitter Creek are described in the Chapter 18 of Application/EIS.

Potential effects to fish and fish habitat from the road construction include:

- Loss or alteration of instream habitat;
- Loss or alteration of riparian habitat;
- Changes in water quality from inputs of sediment or other deleterious substances during works in and adjacent to the creek; and
- Blasting effects on fish (lethal or sub-lethal) and fish habitat (sedimentation).

Potential effects to fish and fish habitat from the road operation include:

- Changes in water and/sediment quality from road runoff (sediment, de-icing salts); and
- Changes in aquatic resources from changes in water and/or sediment quality.

Dolly Varden are the only fish species potentially affected, as there are no other fish species present in Bitter Creek. It is assumed that juvenile and adult life stages of Dolly Varden occur within the potentially affected areas of Bitter Creek. Effects on early life stages (eggs and fry) are not expected because the areas directly affected (infilled habitat) are suboptimal for Dolly Varden spawning, and the works are scheduled to occur during the Reduced Risk Work Windows for Dolly Varden (BC MoE, 2004), to avoid these sensitive life stages.

6. Measures and Standards to Avoid or Mitigate Serious Harm to Fish

Access Road construction works (including installation of culverts and clearspan bridges) will follow:

- Standards and Best Practices for In-stream Works (BC Ministry of Water, Land and Air Protection, 2004); and
- DFO Measures to avoid causing harm to fish and fish habitat (DFO, 2016).

Mitigation measures for road construction include:

- Develop and implement an Erosion and Sediment Control Plan for the site that minimizes risk of sedimentation of the water body during all phases of the Project;
- Respect timing windows (e.g., June 1 to August 31), where possible. High flows caused by summer glacial melt occurs during the timing windows so that some of the work might need to take place in March/April during lower flow conditions;
- Conduct instream work during low-flow periods, when possible, and in areas where no spawning habitat occurs;
- Keep riparian vegetation clearing to a minimum;
- Minimize the removal of natural woody debris, rocks, sand, or other materials from the banks, the shoreline, or the bed of the watercourse below the ordinary HWM. If material is removed from the watercourse, it will be set aside and returned to the original location once construction activities are completed;
- Shoreline or banks disturbed by any activity associated with the road construction will be stabilized to prevent erosion and/or sedimentation, preferably through revegetation with native species suitable for the site;
- The bed and banks of Bitter Creek will be restored to their original contour and gradient, where applicable. If the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage will be restored;
- Ensure that all in-water activities, or associated in-water structures, do not interfere with fish passage, constrict the channel width, or reduce flows, or result in the stranding or death of fish; and
- A Qualified Environmental Professional will monitor construction works.

7. Residual Serious Harm

The effects assessment for the VC Fish and the VC Fish Habitat (Chapter 18 of the Application/EIS) identified the following residual effects of the Project:

- Effects on Fish Habitat from Habitat Loss;
- Effects on Fish from Change in Surface Water Quality; and
- Effects on Fish and Fish Habitat from Changes in Streamflow.

Only residual effects resulting from habitat loss are considered, as they relate to this DFO requirement for offsetting. The residual effect of the Project on fish habitat from direct habitat loss is limited to the upgrading of the Access Road, which requires partial infilling of the Bitter Creek channel at some locations where historical washouts were generated by creek flood events. All other major mine components are contained within non-fish bearing areas within the Bitter Creek watershed.

The Access Road will follow a historical road alignment, and proposed improvements have focussed on avoiding impacts to fish habitat in Bitter Creek, where possible. The existing alignment dates to 1910, where a wagon road was first constructed to access small lode mines in the Roosevelt Creek and Hartley Gulch tributaries of Bitter Creek. The wagon road was used intermittingly since the 1950s. The road was upgraded for logging operations in the valley during the 1960s. Lac Minerals further upgraded and extended the road as far as Bromley Humps in 1994. Throughout this time, the road was also used for recreational and traditional use by Stewart residents. Minor portions of the road were washed away during a 2011 storm event, which also washed out the bridge at Highway 37A.

Due to the road washouts in 2011, and the steep terrain within the Bitter Creek Valley, access road construction within the Bitter Creek channel below the current annual HWM is required, resulting in potential for serious harm, as defined by the *Fisheries Act*. Offsetting is required to counterbalance residual serious harm and help achieve DFO's overall goal of ensuring the sustainability and ongoing productivity of commercial, recreational, or aboriginal (CRA) fisheries.

The residual effect on fish habitat (habitat loss) was assessed in the Application/EIS relative to the effects assessment endpoint defined in the Application/EIS Information Requirements (AIR): "Maintenance of ecological conditions that support populations [of Dolly Varden in Bitter Creek] relative to existing baseline". Significance criteria in the Application/EIS were applied to the residual effect, and it was concluded that the assessment endpoint would be met, and that overall productivity of Dolly Varden in Bitter Creek would be maintained. This conclusion was based on the following rationale:

- The total affected area is a small proportion of the habitat within Bitter Creek and is not limiting for Dolly Varden productivity or considered as critical habitat;
- At the channel realignment location (largest infill area), the realigned channel can accommodate the annual range of flows, and the channel cross section and stream velocities, at all flow levels, will be maintained;

- Bitter Creek is a very dynamic system that is continuously changing, and high flow events that lead to bed scour and channel migration are frequent, such that the distribution and proportions of different habitat types vary under natural baseline conditions; and
- Bitter Creek is a low productivity system, owing to it's low nutrient status, low water temperatures, high turbidity, and bedload movement. The population of Dolly Varden within Bitter Creek is therefore limited by the natural conditions, and the habitat loss from the road construction is not expected to further limit productivity.

8. Offsetting Plan

8.1 Quantification of Residual Serious Harm

Figure 1 to Figure 8 show the affected instream and riparian areas along Bitter Creek. These areas have been quantified (area in metres squared) and total areas and methods for calculating them are provided in the following sections for instream habitat (section 8.1.1) and riparian habitat (section 8.1.2).

8.1.1 Instream Habitat

In the Application/EIS, the Fish and Fish Habitat effects assessment identified that 1.14 ha of instream habitat below the annual HWM would be affected from road construction (placement of the road prism and armouring). This was a conservative estimate based on ortho-images and LiDAR data collected in July 2013, and for some select areas, engineering field surveys for the road completed in 2016.

In summer 2017, engineering field surveying of the annual HWM was completed for the entire length of Bitter Creek. The values (areas in m^2) associated with road infill within Bitter Creek were refined following this 2017 field work. The affected areas below the annual HWM were refined to six specific locations where infilling of the creek could not be avoided (Figure 1). These areas are based on the latest engineering design drawings (December 2017). The total area of infilling in Bitter Creek (sum of the six areas) is approximately 1 hectare (ha), the largest proportion of this occurs at road station 4+550 m to 4+840 m, where a creek realignment is required (Table 2).

Table 2 Road infill areas within the Bitter Creek HWM

Area #	Road Station Range	Planar area of road fill inside *HWM (m^2)
1	2+074 m to 2+584 m	1,670
2	2+775 m to 2+867 m	12
3	3+360 m to 3+485 m	1,079
4	3+945 m to 4+316 m	3,023
5	**4+550 m to 4+850 m**	**4,052**
6	5+040 m to 5+145 m	661
TOTAL		**10,497**

* The HWM for the 1-in-2-year high flow was applied as a conservative approximation for the annual HWM.

8.1.2 Riparian Habitat

Riparian habitat loss was calculated based on a 15 m riparian buffer along Bitter Creek. Overlap of earthworks within the riparian buffer zone accounts for 23,078 m^2 of riparian habitat loss. An additional 3,932 m^2 of riparian habitat will be cleared for the road ROW. Riparian habitat loss associated with the two fish-bearing crossings is 1,500 m^2 (25 m right-of-way times 15 m buffer, on both banks of the stream, for two crossings). The road will be deactivated prior to the end of the Closure and Reclamation phase of the Project, using forestry practices, and therefore riparian vegetation will revert to near baseline conditions.

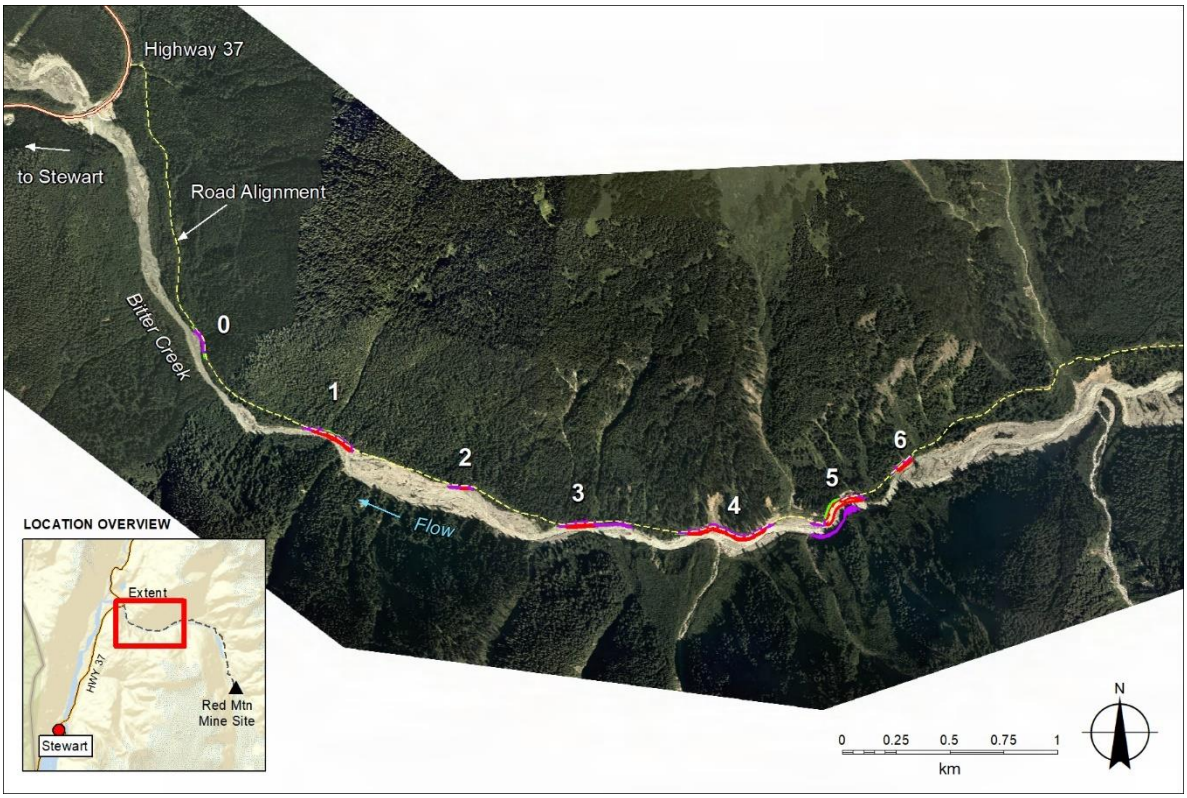

Figure 1. Overview of Access Road areas along Bitter Creek

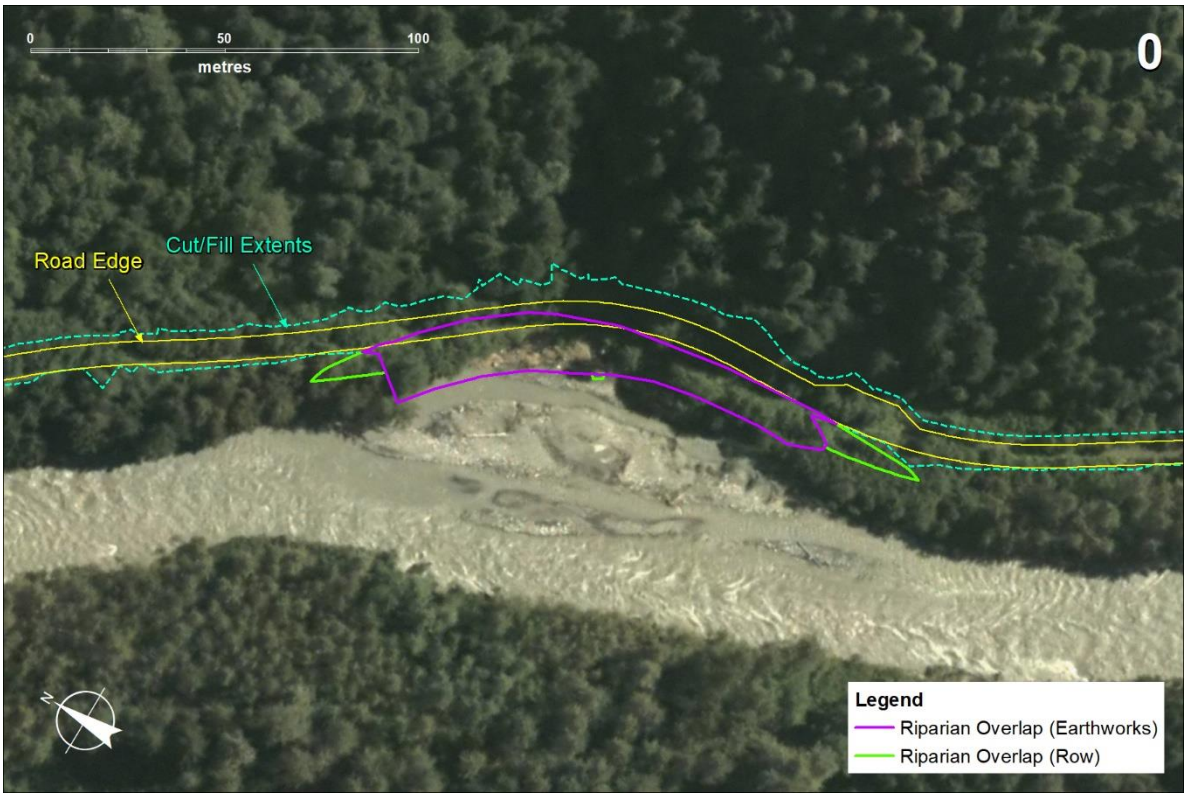

Figure 2. Site 0 (riparian areas only) along Bitter Creek

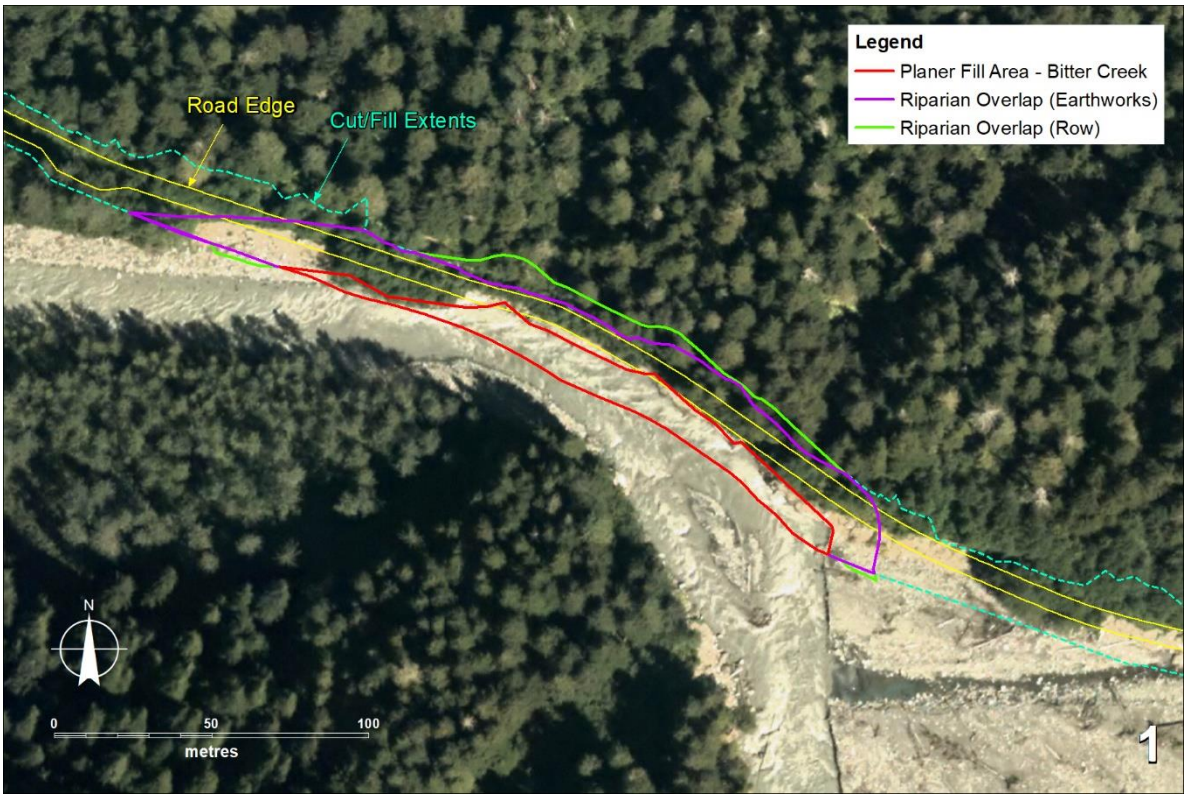

Figure 3. Site 1 (instream and riparian area) along Bitter Creek

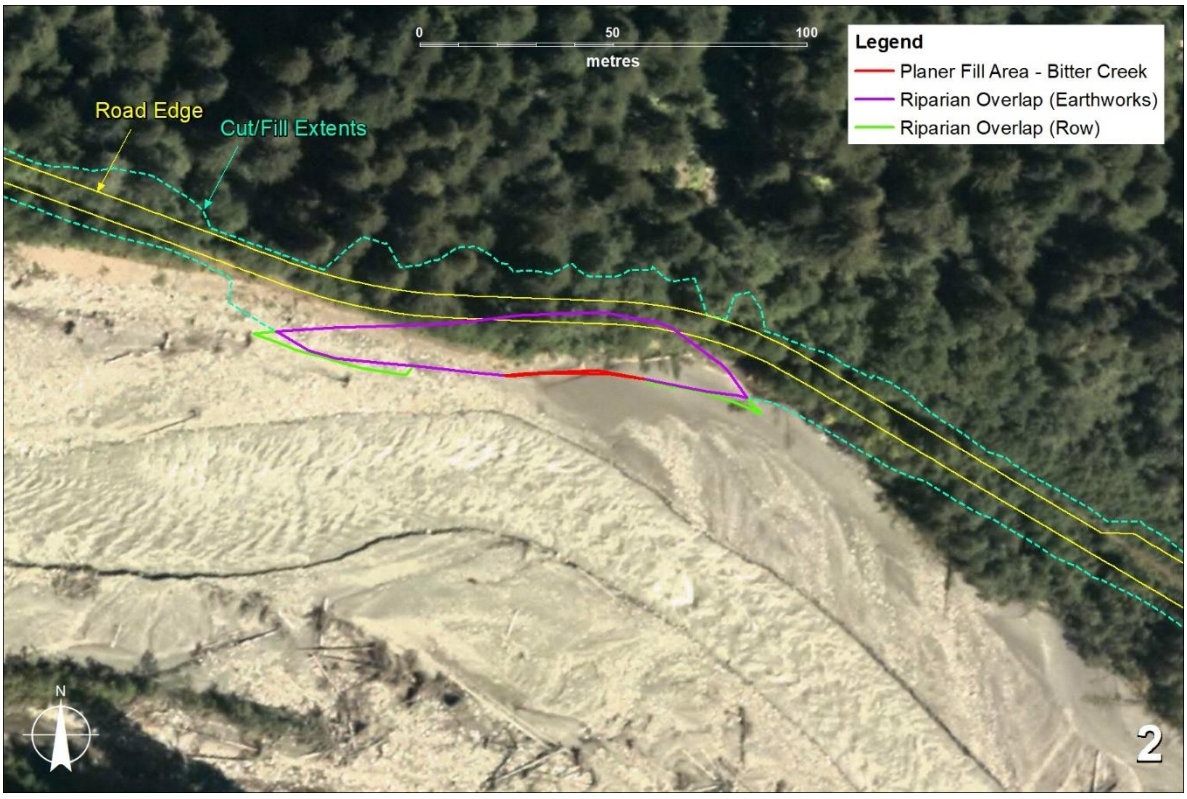

Figure 4. Site 2 (instream and riparian area) along Bitter Creek

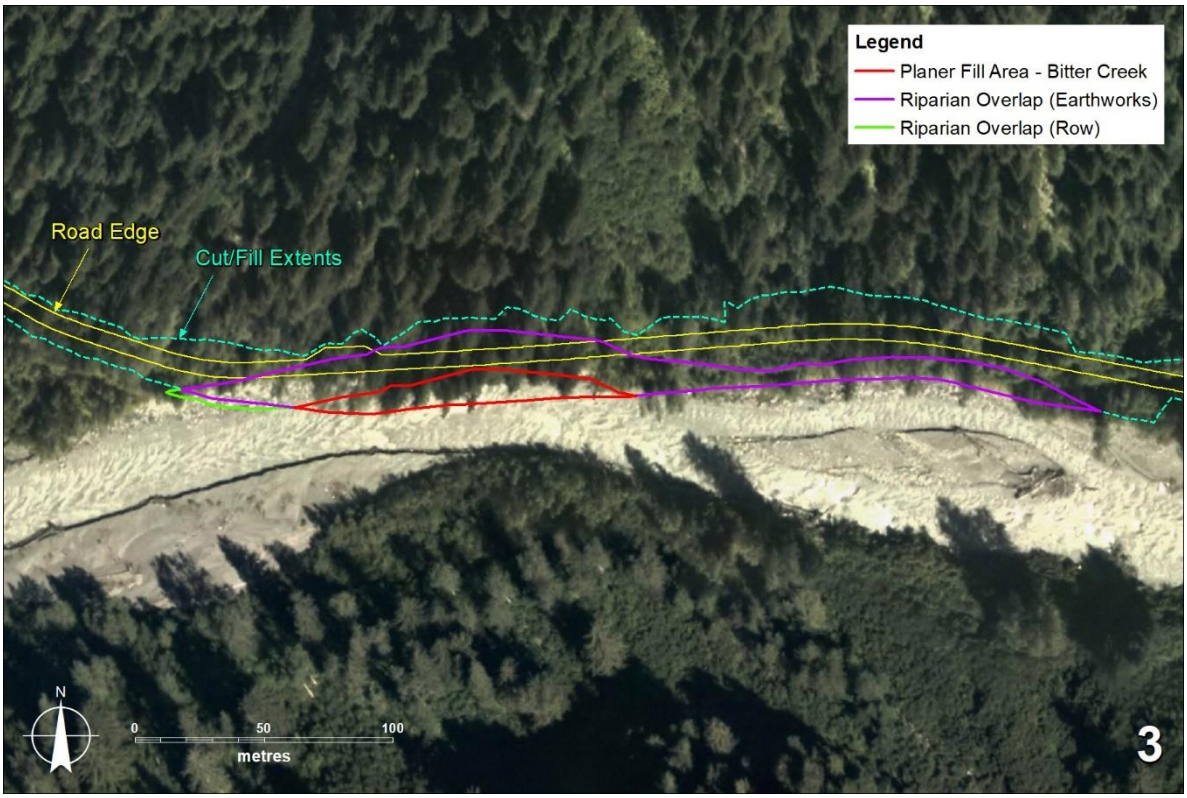

Figure 5. Site 3 (instream and riparian area) along Bitter Creek

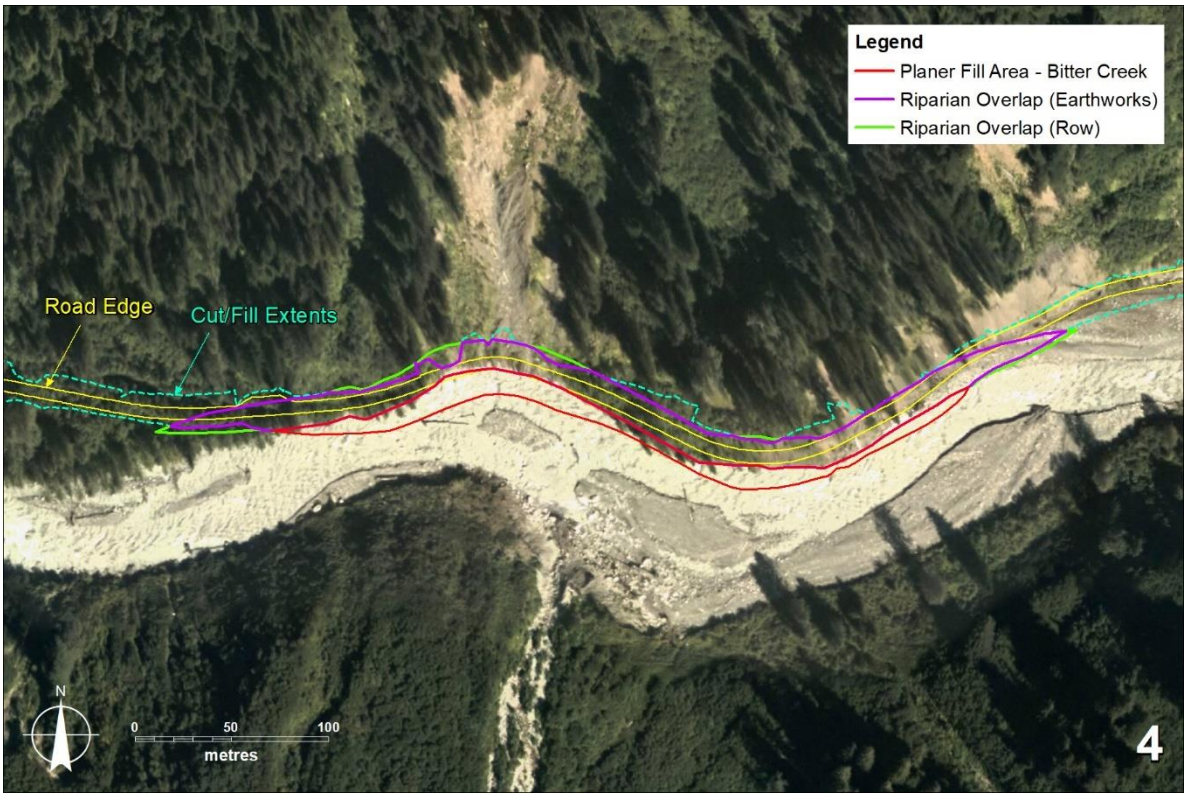

Figure 6. Site 4 (instream and riparian area) along Bitter Creek

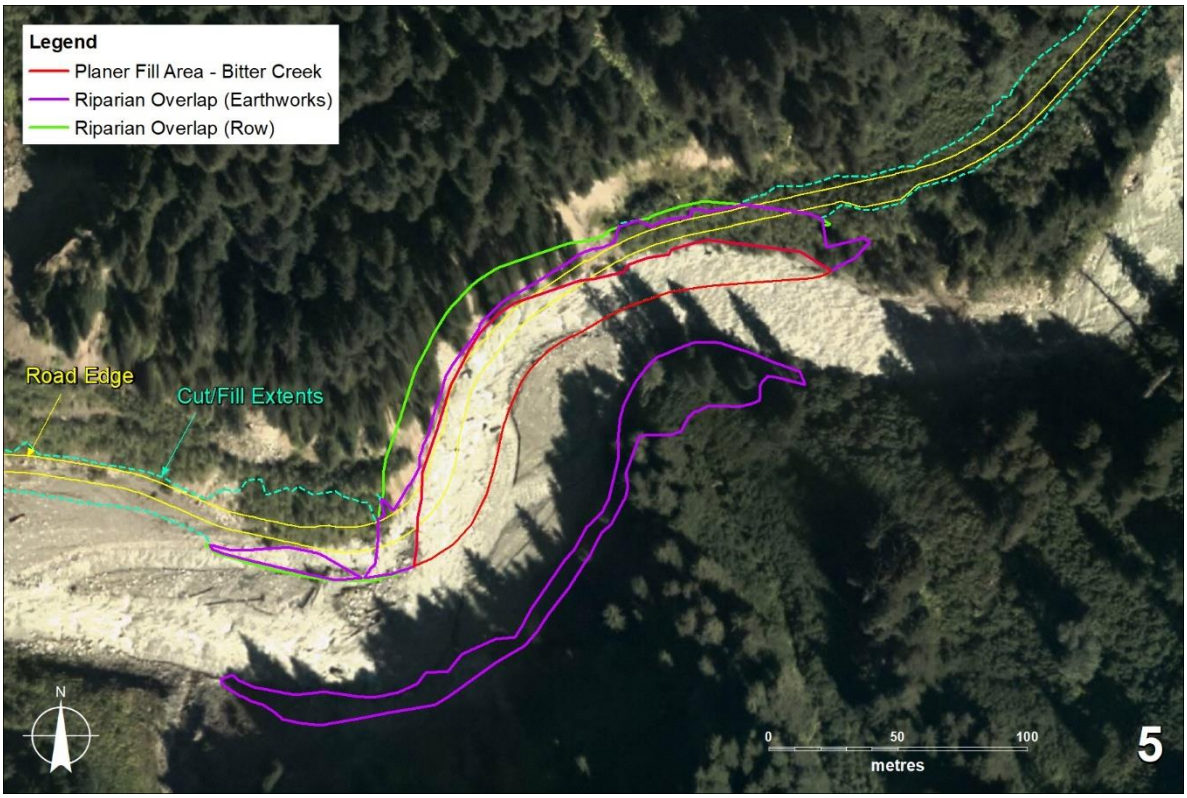

Figure 7. Site 5 (instream and riparian area) along Bitter Creek

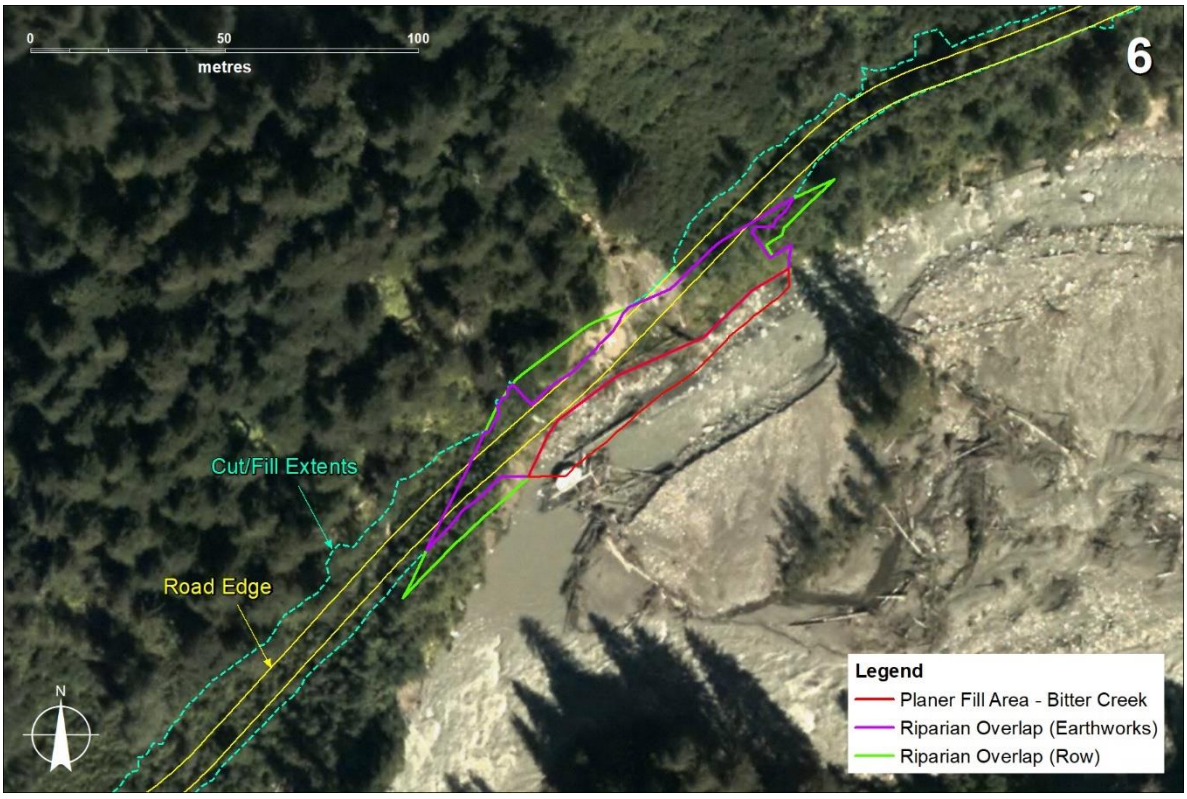

Figure 8. Site 6 (instream and riparian area) along Bitter Creek

8.2 Preliminary Offsetting Options

Investigations into potential offsetting options in the RSA were initiated in late-November 2017 when IDM was unofficially informed of the likely need for an authorization. Nine potential fish habitat offsetting sites within the Bear River watershed were identified, through consultation with the DFO community advisor for Stewart, BC, and Dave Green (IDM employee, and Stewart, BC resident with local fisheries knowledge). A field visit was conducted (November 29-30, 2017) and each of the sites was assessed for technical feasibility (including constructability and potential for ancillary affects), stability and permanence, and likelihood of providing habitat benefits for fish. Four options are being investigated further at this time, based on field findings, local understanding of fisheries issues, and recent discussions with DFO representatives. This includes the DFO community advisor (Rob Dams), the DFO assessor assigned to the Project file (Ian Bergsma), and a DFO restoration biologist (Lana Miller), all familiar with the Project area. The options currently being considered have been evaluated against regulatory, biological, engineering, construction and socio-economic screening criteria. Potential habitat gains (area in m^2) have also been estimated.

8.2.1 Graveyard Creek

8.2.1.1 Overview

Graveyard Creek is a multi-thread, groundwater fed channel at the base of the Bear River valley, near Stewart (Figure 9). A section of the creek is contained within both ditch lines along Highway 37A for approximately 1 km. Coho salmon (*Oncorhynchus kisutch*) spawn in this section of the creek along the highway, which has suitable gradient (approximately 1%), flow, water depth, and substrate (gravels). Adult coho salmon in spawning colours were observed during a site visit in early November (as part of a spawning survey field visit to Bitter Creek), and again during the fisheries offsetting field visit on November 29, 2017. Other branches of Graveyard creek are low gradient and impacted by beaver activity and are not optimal for spawning.

The habitat along the ditch line has been previously impacted through vegetation clearing and channelization, such that there is little to no cover for spawning salmon (e.g. lacks deep pools). As a result, there is heavy predation of the salmon (Dave Green, personal communication), evidenced by visual observations of salmon carcasses along the banks above the HWM, and high abundance of bald eagles feeding on salmon carcasses. Other anthropogenic activities identified as potential pathways to adverse effects on coho salmon spawning and survival include brush cutting (occurs in October/November), snow ploughing, and de-icing using road salts (winter). The stressors from these activities (which ultimately lead to effects on salmon) are machine vibrations (from brush cutting heavy machinery), and inputs of salt, sediment, snow, and brush cuttings. These stressors potentially affect water quality, physical habitat quality, and ultimately survival of coho eggs and juvenile life stages.

DFO has previously tried to protect the salmon by installing snow fencing and lattice but was not successful in the long-term (Dave Green, personal comm.). This site is easily accessible, has few technical constraints, and has a high likelihood of success. Data collection requirements (survey and habitat assessment) for

Graveyard Creek were achieved during the November field visit, and additional field data collection is not anticipated to be required. Potential habitat restoration would include creating heterogenous habitat (e.g. refuge pools) and providing in-channel cover (e.g. boulders, large woody debris) to protect fish from predation.

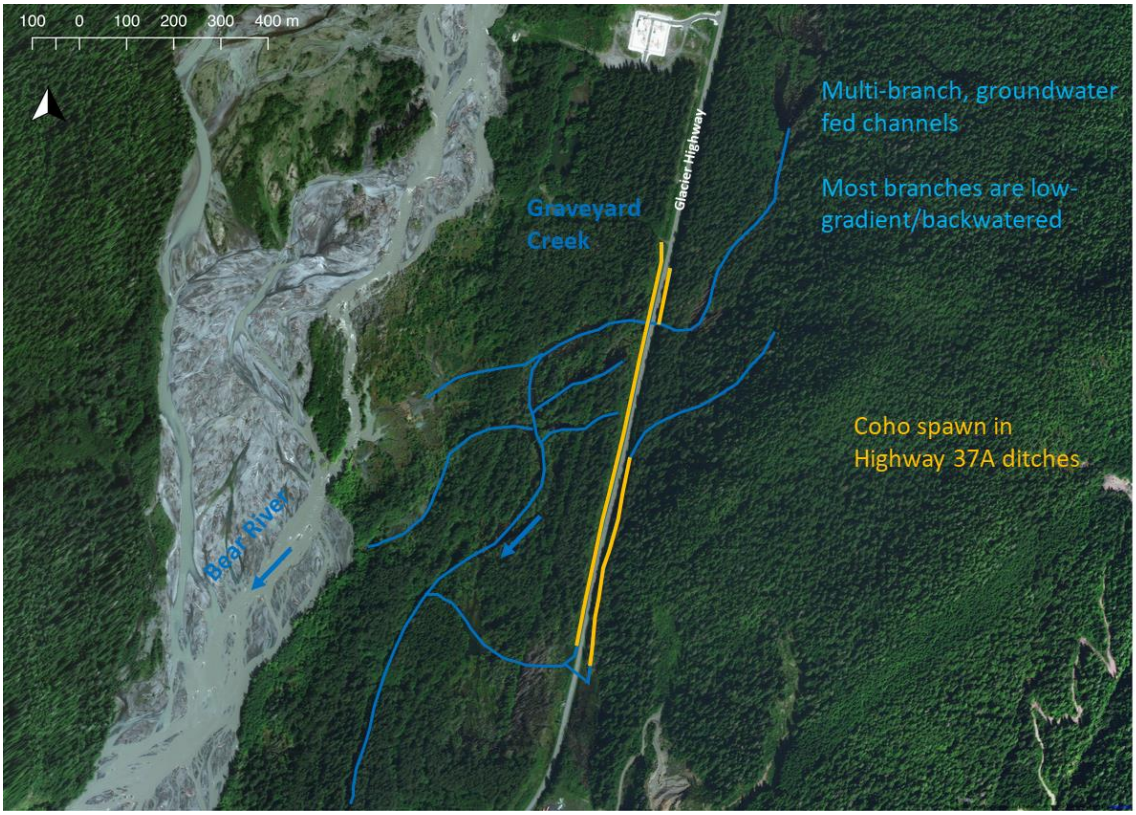

Figure 9. Aerial image of Graveyard Creek showing coho salmon spawning areas

8.2.1.2 Potential Habitat Gain

A preliminary estimate of the potential habitat gain is approximately 4,000 m^2, based on the length and width of the channel that could be enhanced (Figure 10). Although this area is less than the potentially affected area below the Bitter Creek HWM (approximately 10,000 m^2), it represents high value habitat with higher fisheries productivity compared to Bitter Creek.

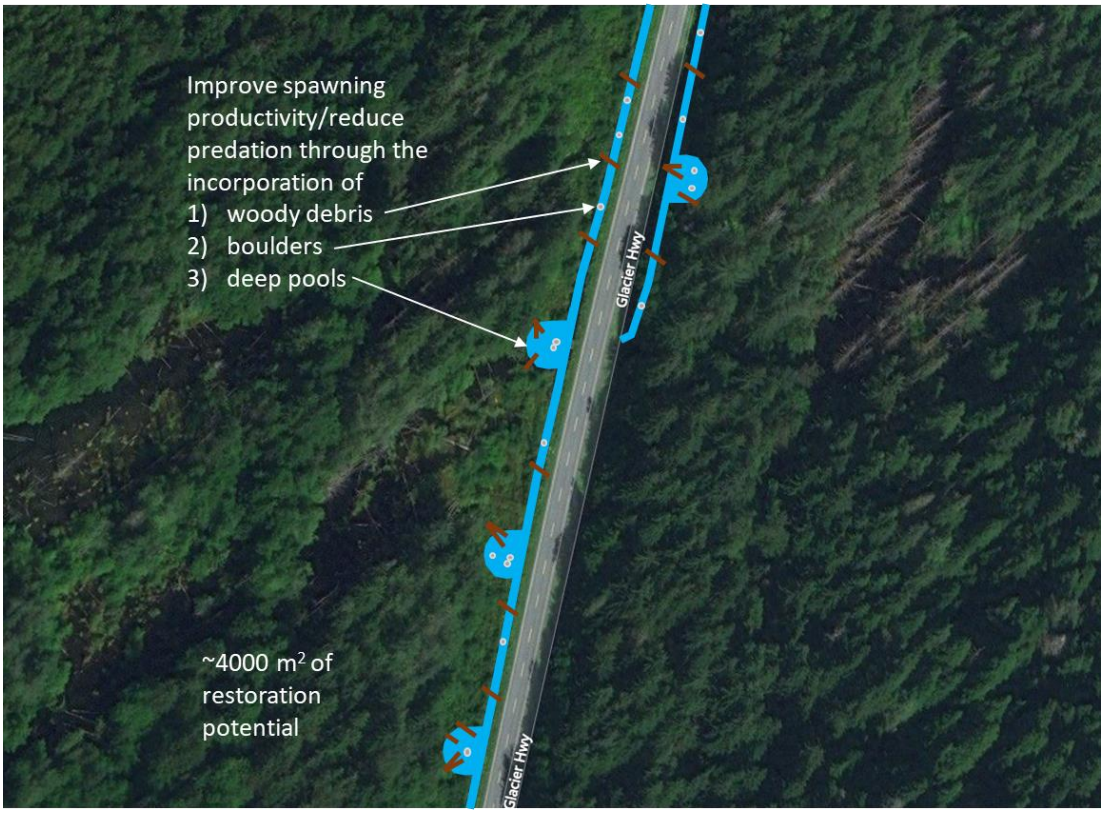

Figure 10. Aerial image of Graveyard Creek showing potential coho salmon spawning habitat enhancement areas

8.2.2 Airport Creek

8.2.2.1 Overview

Airport Creek (also known as Dyke Road Creek) is located in Stewart along Dyke Road (Figure 11). The creek is a low gradient watercourse characterized by areas of slow-moving open water with little to no channel definition. Beaver activity has contributed to the impoundment of the creek. The creek previously drained into Bear River through two corrugated steel pipe (CSP) culverts under Dyke Road at the south end of the airport (Figure 11). With this drainage system, the creek provided spawning habitat for salmon and eulachon (Dave Green, personal communication).

When the Tercon log yard was constructed, a rock berm was installed upstream of the culvert outlets, to protect the log yard from erosion. The rock berm led to sediment deposition downstream of the berm, which reduced flow conveyance through the culverts and hindered fish passage into Airport Creek. The double culverts were fully decommissioned in the late 1990s, when the District of Stewart sealed the culvert outlets with steel plates (District of Stewart, 2015). The creek was re-routed through a new culvert under Main St., which drains directly into the neighbouring estuary, instead of Bear River. The new culvert is perched under the majority of flow conditions and is only passable to fish at high tide levels. As a result of these modifications to the drainage, anadromous fish (salmon, eulachon) migration into Airport Creek is effectively fully impeded. As there is no longer a hydraulic connection between Bear River and Airport Creek, fish

migrating up Bear River can no longer access the creek. Fish access from the estuary side is impeded by the perched culvert, furthermore; this is not historically the main migratory route for salmon and eulachon. Restoration of fish passage into Airport Creek from Bear River would provide access to this historical spawning habitat to multiple salmon species, and eulachon, which are a species of cultural significance to Nisga'a Nation. This option would also require beaver management to improve fish access into the upper areas of Airport Creek, as well as measures to control sediment accumulation.

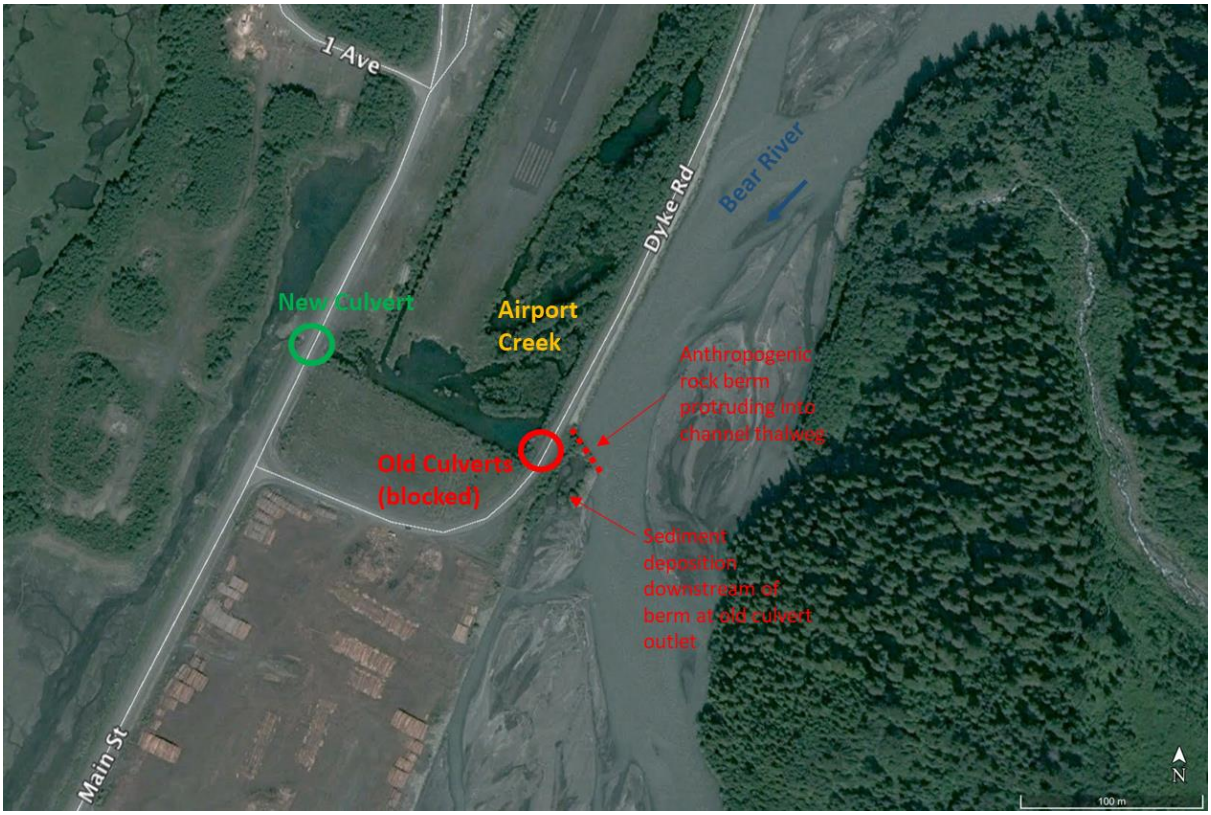

Figure 11. Aerial image of Airport Creek showing locations of old and new culvert outlets

8.2.2.2 Potential Habitat Gain

The habitat gain will be a percentage of the habitat area that becomes accessible through the restoration works. Typically, this is 10%, but there are methods (e.g. based on difference in fish density upstream and downstream of barrier) that can be used to develop a site-specific percentage. Based on aerial extent of habitat, and its potential for high fisheries productivity, 10% of the area would likely be equivalent to the calculated effect in Bitter Creek.

8.2.3 Clements Creek

8.2.3.1 Overview

Clements Creek drains Clements Lake and flows for approximately one kilometre before discharging into Bear River (Figure 12). Sockeye salmon enter the creek in the spring and migrate upstream to spawning

areas at the lake outlet. The sockeye salmon run in Clements Creek has declined in recent decades (Rob McLeod, personal communication). Stewart residents recall large runs of the order of hundreds of salmon in the 1940s and 1950s (Rob McLeod, personal communication). Following construction of the Highway 37A crossing over Clements Creek in the 1950s, sockeye returns declined, and in the 1980s there were low or no returns (Rob McLeod, personal communication). Higher returns were observed in the 1990s; however, numbers remained reduced relative to historical runs.

High levels of beaver activity have been identified as a contributing factor to the decline in the sockeye salmon run. At the Highway 37A bridge, beaver dams reaching to the deck of bridge have been observed, which severely hinder upstream salmon migration (Ian Bergsma, personal communication). Each spring, DFO biologists and local volunteers remove beaver dams to clear the channel for migrating sockeye (Lana Miller, personal communication). A beaver trapping program is also in place (Lana Miller, personal communication). A beaver management program to implement practical mitigation measures for beaver activity could provide a more long-term and cost-effective solution than these traditional methods. Examples include installation of fish passage structures (e.g. gated fish ladders) or pipe culverts transecting a beaver dam. These strategies have potential to provide an ecological triple win: they are behaviourally neutral for beavers (*i.e.*, they do not trigger a damming response); they maintain the positive aspects of beaver behaviour on fish ecology (e.g. formation of juvenile rearing habitat); and they allow for fish passage at critical periods.

Figure 12. Aerial image of Clements Creek, showing Clements Lake (Clements creek drains from the southern end of the lake, and flows west to Bear River)

8.2.3.2 Potential Habitat Gain

Habitat credit assigned for this option would be determined based on further discussions with DFO. Quantification of habitat area gained may be based on the extent of areas upstream of beaver dams, or a percentage of those areas. As this offsetting concept has only been considered at a high-level, more work is needed to assess potential habitat gain if this option is carried forward.

8.2.4 Rainey Creek

8.2.4.1 Overview

Rainey Creek is a sinuous channel that flows south along the west side of Stewart, through Rainey Creek campground, and under 5th Avenue (Highway 37A) approximately 2 km upstream of the creek mouth at the Portland Canal. Portions of the Rainey Creek Nature Trail are adjacent to the creek, which provides recreational users with an opportunity to observe spawning salmon. The creek supports coho salmon, and several (20+) adult coho salmon in spawning colors were observed in a pool along the creek during the field visit in late November 2017.

Double culverts convey the creek under 5th Avenue, which are undersized, but not a full barrier to fish passage. Fish passage could be improved by installing an appropriately-sized crossing structure. Cover for fish is limited along a 250-m section of the creek downstream of 5th Avenue. Addition of cover (e.g. large woody debris, boulders, plantings) along this section would improve fish habitat conditions. As this reach is tidally-influenced, restoration features would need to be tolerable to high tides and brackish conditions. Beavers are also active in Rainey Creek upstream of 5th Avenue, and mitigation measures may be required to prevent beaver dams from impeding fish passage (refer to section 8.2.3 for examples). Salmon habitat enhancement on Rainey Creek has been carried out in recent decades (Rob McLeod, personal communication).

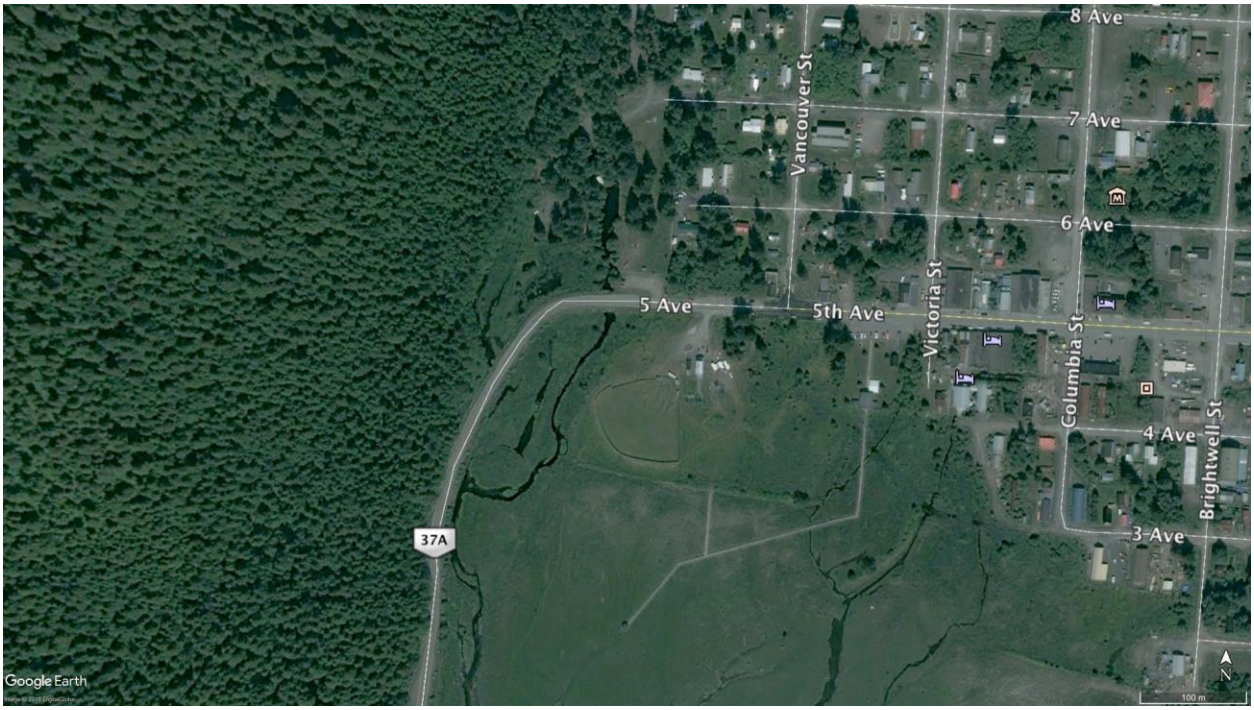

Figure 13. Aerial image showing Rainey Creek where it flows south under and adjacent to Highway 37A in Stewart

8.2.4.2 Potential Habitat Gain

Localized habitat gains of approximately 1,000 m^2 are estimated (based on section length and channel width) for the section of Rainey Creek between Highway 37A and the estuary, which could be achieved by adding more habitat cover (e.g. woody debris, riparian plantings, boulders). Further habitat gains are possible if areas upstream of the highway are restored or access is improved through replacement of the crossing structure or beaver dams. Habitat credit assigned for this form of habitat improvement would be determined based on discussions with DFO. Quantification of habitat area gained may be based on the extent of areas upstream of the crossing and beaver dams, or a percentage of those areas. As this offsetting concept has only been considered at a high-level, more work is needed to assess potential habitat gain if this option is carried forward.

8.2.5 Bitter Creek

8.2.5.1 Overview

Habitat creation or enhancement along Bitter Creek would provide like-for-like offsetting and benefit the Dolly Varden population in this system. However, opportunities are limited because high flow events that lead to bed scour and channel migration are frequent. Long-term stability of in-channel habitat creation or enhancement is unlikely. Potential off-channel sites along Bitter Creek were investigated using aerial imagery and field data (e.g. survey data, LiDAR). Options included construction of side channels in areas which are naturally protected by the surrounding topography from channel migration and high flows. Bitter Creek is a low productivity system, owing to its low nutrient status, low water temperatures, high turbidity, and bedload movement. Fish habitat quality within Bitter Creek is generally low. The creek does not support

high densities of Dolly Varden, as productivity is limited by natural conditions. Offsetting within Bitter Creek therefore would have low influence on fisheries productivity. This option has not been ruled-out because offsetting in this system may be sufficient to counterbalance the affected area, given that the infill areas are also within this area of low productivity habitat.

8.2.5.2 Potential Habitat Gain

Creation of off-channel habitat in Bitter Creek would be comprised of side channels providing rearing (refuge and foraging areas), and overwintering habitats for Dolly Varden. Three potential sites have been identified, which could each provide approximately 2,000 m^2 of habitat. Side channel habitat created would incorporate features such as large woody debris and boulders, with the aim of providing higher quality habitat than at the affected areas along the mainstem.

8.3 Habitat Accounting Approach

8.3.1 Habitat Evaluation Procedure

One, or a combination, of the options described above will be carried forward to the detailed FOP that will be submitted to DFO as part of an application for an authorization. Additional options not presented herein may be added if identified by Nisga'a Nation or stakeholders. Offsetting will be commensurate with the fisheries productivity contribution of the infill areas to overall Dolly Varden productivity in Bitter Creek. Habitat Evaluation Procedure (HEP) may be used to accurately compare the habitat loss with anticipated gains and develop a habitat budget. This method, originally developed by the U.S. Fish and Wildlife Service, has been widely used across North America as a reliable model for quantifying habitat loss or gain. Due to challenges in directly measuring fish productivity, HEP can be used to indirectly evaluate project-related impacts to fish productivity. HEP quantifies biologically-relevant habitat loss, or gain, by incorporating the habitat preferences and requirements of fish species and life stages present in a watercourse. It allows a standardized measurement of habitat, that considers the quality and quantity of the habitat, thereby facilitating an effective comparison with different potential offsetting opportunities, regardless of habitat type and target fish species. HEP produces 'habitat units', which are calculated by multiplying habitat area (measured in m^2) by a habitat suitability index (HSI). HSI curves applicable for the affected and target fish species in the project area will be used for the HEP model.

8.3.2 Riparian Habitat Accounting

Riparian vegetation contributes to the productivity of adjacent and downstream fish habitat. Riparian habitat provides shading and woody debris for cover, moderates water temperature, contributes allocthonous inputs, and helps maintain overall channel morphology. In recognition of these important ecological functions, riparian habitat restoration, creation or enhancement (e.g. riparian plantings, brush layers, rootwad/boulder complexing) will be integrated into the instream habitat offsetting opportunities, where existing riparian areas are disturbed.

Some effects to riparian habitat are anticipated to occur from the Access Road construction, without an effect to adjacent instream fish habitat. The abutments of clearspan bridges at the two watercourse crossings along the access roads will affect riparian habitat, but not instream habitat, and there are areas

where the road right-of-way or earthworks overlap within the riparian zone, but not the stream channel. As a result, gains in riparian habitat that can be achieved through the implementation of instream habitat offsetting opportunities cannot fully offset the lost riparian habitat, if a direct comparison of riparian area lost to area gained is made. In the determination of requirements for riparian habitat offsetting, consideration must also be given to the suitability and sensitivity of fish habitat supported by adjacent riparian habitat. The contribution of riparian habitat in Bitter Creek to adjacent and downstream fish habitat productivity is relatively low. Bitter Creek is subject to high flow events that out-transport woody debris and sediment. Flood events, including glacial outburst floods, scour the channel forming flood terraces which have no or sparse vegetation. Established riparian areas tend to be setback from the wetted channel for most of the year. In comparison, the contributions of riparian habitat to fish habitat productivity are anticipated to be higher in association with the offsets. The proposed offsetting is on higher-order watercourses at lower elevations, which support a greater diversity and density of fish.

IDM will seek guidance from DFO on the requirements for riparian offsetting, with the aim of producing riparian habitat gains that are commensurate with the contribution of lost or altered riparian habitat to fisheries productivity.

8.4 Potential Environmental Effects from Offsetting and Mitigation Measures

Under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), environmental effects of the Project, including effects that may occur as a result of offsetting activities, need to be assessed. Environmental effects are defined in Section 5 of CEAA 2012 as:

a) a change that may be caused to the following components of the environment that are within the legislative authority of Parliament:
    i. fish and fish habitat as defined in subsection 2(1) of the Fisheries Act
    ii. aquatic species as defined in subsection 2(1) of the Species at Risk Act
    iii. migratory birds as defined in subsection 2(1) of the Migratory Birds Convention Act, 1994, and
    iv. any other component of the environment that is set out in Schedule 2;
b) a change that may be caused to the environment that would occur
    i. on federal lands
    ii. in a province other than the one in which the act or thing is done or where the physical activity, the designated project or the project is being carried out, or
    iii. outside Canada; and
c) with respect to aboriginal peoples, an effect occurring in Canada of any change that may be caused to the environment on
    i. health and socio-economic conditions
    ii. physical and cultural heritage
    iii. the current use of lands and resources for traditional purposes, or (iv) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

The following sections present an assessment of these potential effects.

8.4.1 Potential Direct Effects on the Environment

Activities such as use of machinery, excavation, vegetation clearing, and placement of material or structures in water have the potential to cause effects on several environmental Valued Components (VCs) that were assessed in the Application/EIS. Potential ancillary effects may include clearing of sensitive vegetation (e.g., tree clearing to create pool habitat for fish), wildlife disturbance (e.g., noise or human presence), or alteration of habitat used by terrestrial animals (e.g., activities within or proximate to wildlife migration corridors, bird nesting sites). The potential for ancillary effects is an important criterion for screening offsetting options.

The preliminary offsetting options have low potential for causing adverse effects on the environment (namely wildlife and vegetation). The preliminary offsetting sites are in easily accessible, non-pristine areas, and the physical works associated with each of the options are of small scale. For example, the Graveyard Creek offset option is within the highway right-of-way, and the Airport Creek and Rainey Creek offset options are in downtown Stewart.

Mitigation measures identified in the Application/EIS shall be employed while implementing offsetting works, and will be applied to avoid or mitigate potential ancillary effects on other VCs which may interact with these works. This would include (but not limited to) measures outlined in the Vegetation and Ecosystems Management Plan (see Volume 5, Chapter 29, Section 29.24 of the Application/EIS), such as:

- Vegetation Management Plan:
    - Minimize the clearing of vegetation and soil to the extent possible;
    - Conduct pre-construction invasive plant surveys within the Project footprint to determine the presence/absence of invasive plants;
    - Remove existing invasive plant populations to prevent the spread to adjacent areas;
    - Activities will be restricted to the defined offsetting project footprint. Vehicle use will be restricted to areas that are surveyed, approved, marked, and flagged. Due care will be taken by all personnel to avoid excessive and unnecessary disturbance to existing riparian and aquatic areas, vegetation, and wildlife habitat within the Project footprint; and
    - Pre-construction surveys will be conducted to delineate relevant boundaries of the BC conservation data centre (CDC) listed ecosystems and the location of BC CDC listed ecosystems, if within the offsetting project site, will be communicated to ground crews. “No work” zones and/or buffers will be delineated accordingly, where feasible.

- Wildlife Management Plan:
    - A species-specific buffer will be employed around all probable or actual bird nest sites that are detected during pre-clearing nest surveys or on infrastructure. Species-specific buffers will be selected using guidance from General Nesting Periods of Migratory Birds in Canada (ECCC). These nests will be monitored until the young have fledged or the nest is abandoned. The minimum buffer distance of 30 m will be utilized wherever practicable as determined by a Qualified Environmental Professional, assuming Project operability; and
    - Vegetation clearing and construction activities will be timed to avoid sensitive habitats during sensitive periods for wildlife (e.g. grizzly bear, migratory birds) if they occur with the offsetting project site. If construction cannot be scheduled outside of sensitive periods for

wildlife, a Qualified Environmental Professional will conduct species-specific pre-clearing surveys within suitable habitat, and site-specific procedures will be developed.

In addition to applicable mitigation measures in the Application/EIS, IDM will implement a habitat offsetting environmental management plan (EMP) for construction of the habitat offsets. This will be similar to a construction EMP, and will define site-specific environmental best practices, guidance, and mitigation measures to avoid and limit potential effects on fish and fish habitat. Where possible, habitat offsetting works will be scheduled during the Reduced Risk Work Windows for the fish species present (BC MoE, 2004). The EMP will be developed and finalized by a qualified environmental professional (QEP) in accordance with guidelines and best management practices, namely DFO measures, to avoid causing harm to fish and fish habitat (DFO, 2016). The construction plans and EMP will also be submitted to DFO for approval, as part of the application for an authorization.

Offsetting will be designed to minimize potential interactions with adjacent terrestrial ecosystems. This, combined with the implementation of the mitigation measures outlined above and in the Application/EIS, is expected to reduce potential effects to a negligible level. Residual effects are not anticipated. Overall, implementation of habitat offsetting measures is expected to have a net positive effect on the environment and contribute to the DFO goal of ensuring the sustainability and ongoing productivity of (CRA) fisheries.

8.4.2 Potential Effects to CEAA 2012 Section 5(1)C Aspects

IDM's offset options are located within the Nass Wildlife Area and the larger Nass Area, as set out in the Nisga'a Final Agreement (NFA). Nisga'a Nation holds Treaty rights to manage and harvest fish species in the Nass Wildlife Area, including salmon species, Steelhead, and Eulachon; to manage and harvest wildlife in the Nass Wildlife Area, including Grizzly Bear, Moose, and Mountain Goat; and to manage and harvest migratory birds for domestic purposes in the Nass Area. The offset options are also located within areas where Tsetsaut Skii km Lax Ha (TSKLH) and Métis Nation BC (MNBC) assert Aboriginal Interests, including hunting, fishing, trapping, and harvesting plants.

8.4.2.1 Potential Effects to Aboriginal Peoples' Health and Socio-Economic Conditions

Due to the location of IDM's offset options, which are primarily along the Highway 37A corridor, the small footprint of the offset works proposed, and the lack of anticipated adverse residual effects on pathway VCs, such as Wildlife, Vegetation and Ecosystems, Fish, and Water Quality, IDM does not anticipate any interaction with, or potential effect to, Aboriginal peoples' health and socio-economic conditions. This includes consideration of navigable waters, forestry and logging operations, commercial fishing, commercial hunting, commercial trapping, and commercial gathering. There is a commercial trapline and a guide outfitting license in the area that will not be adversely affected by the offset works; the other activities are absent from the potential offset locations.

8.4.2.2 Potential Effects to Aboriginal Peoples' Physical and Cultural Heritage

IDM is not aware of any physical or cultural heritage sites in the vicinity of the offset options locations. There is also a lack of anticipated interaction with pathway VCs that might affect physical or cultural heritage, such

as Noise or Air Quality. Therefore, IDM does not anticipate any interaction or residual adverse effects to Aboriginal peoples' physical or cultural heritage.

As noted below, IDM will employ a Chance Find Procedure during the development of the offset works that will include notification of Aboriginal Groups should previously unidentified cultural or heritage resources be discovered during earthmoving. IDM's preliminary Chance Find Procedure is located in Volume 5, Chapter 29, Section 29.7 of the Application/EIS.

8.4.2.3 Potential Effects to Nisga'a Nation Treaty Interests

The Nisga'a Nation Treaty interests assessed in the Application/EIS that are relevant to the proposed offsetting works are:

- Nisga'a Treaty right to manage and harvest fish, including, specific allocations for:
  - Nass salmon (i.e., sockeye, pink, chinook, coho, and chum salmon originating in the Nass Area);
  - Nass steelhead (i.e., winter run and summer run steelhead originating in the Nass Area); and
  - Eulachon (also known as Oolichan) within the Nass Area.
- Nisga'a Treaty right to harvest non-salmon species of fish and aquatic plants, including marine mammals, for domestic purposes in the Nass Area;
- Nisga'a Treaty right to manage and harvest wildlife, for domestic purposes in the Nass Wildlife Area, with specific allocations for:
  - Grizzly bear;
  - Moose;
  - Mountain goats; and
  - Other species as designated through annual management plans.
- Nisga'a Treaty right to manage and harvest migratory birds for domestic purposes in the Nass Area; and
- Nisga'a Treaty right to access to other lands:
  - Agents, employees, and contractors of Nisga'a Nation, Nisga'a Villages, Nisga'a Corporations and members of the Nisga'a Police Service and Nisga'a Institutions access to Nass Wildlife Area to carry out their responsibilities; and
  - Nisga'a citizens' reasonable access to Crown lands to allow for the exercise of Nisga'a Treaty rights and for the normal use and enjoyment of Nisga'a interests set out in the NFA.

As the proposed offsetting works have no anticipated adverse residual effects to pathway VCs that might affect Nisga'a Nation Treaty interests, such as Fish and Fish Habitat, Wildlife (including birds), or Vegetation and Ecosystems, and because the proposed offsetting works will have no effect on individuals' access, the proposed offsetting works will have no residual adverse effects on Nisga'a Nation Treaty interests. The successful creation of improved fish habitat may have a net positive effect on Nisga'a Nation Treaty interests.

In addition, IDM notes that the proposed offsetting works are unlikely to have adverse residual effects on Nisga'a citizens' economic, social, or cultural wellbeing through lack of interaction with Nisga'a businesses,

resources, and the Nisga'a Villages and their infrastructure. The successful creation of improved fish habitat may have a net positive effect on Nisga'a citizens' economic, social, and cultural wellbeing.

8.4.2.4 Potential Effects to TSKLH's and MNBC's Current Use of Land and Resources for Traditional Purposes

As stated above, the proposed offset options are located within areas where TSKLH and MNBC assert Aboriginal Interests, including hunting, fishing, trapping, and harvesting plants. As part of consultation on the Application/EIS, MNBC provided IDM with a Use and Occupancy map showing Métis citizens' use of the area around the proposed Project, including the Bear River valley. Use sites shown on the map that are near the proposed offsetting locations include:

- Mountain goat hunting;
- Camping;
- Salmon and other fishing;
- Clam harvesting;
- Crab harvesting; and
- Firewood gathering.

Also, as stated above, the proposed offsetting works are not anticipated to have adverse residual effects on pathways VCs, such as Fish and Fish Habitat, Wildlife (including Birds), or Vegetation and Ecosystems, nor are they anticipated to affect individuals' access. Therefore, no residual adverse effects on TSKLH's and MNBC's current use of land and resources for traditional purposes (CULRTP). The successful creation of improved fish habitat may have a net positive effect on TSKLH's and MNBC's CULRTP.

8.4.2.5 Potential Effects to Historical, Archaeological, Paleontological, or Architectural Resources

IDM is not aware of any historical, archaeological, paleontological, or architectural resources in the vicinity of the offset options locations. Therefore, IDM does not anticipate any interaction or residual adverse effects to. historical, archaeological, paleontological, or architectural resources.

As outlined in Section 21.6.1.1 and Section 29.7 of the Application/EIS, IDM will employ a Cultural and Heritage Resources Protection Plan, including a Chance Find Procedure, during the development of the offset works that will include notification of Aboriginal Groups should previously unidentified cultural or heritage resources be discovered during earthmoving.

The key aspects of the Chance Find Procedure are:

- Identifying personnel responsible for identifying previously undiscovered archaeological, paleontological, heritage, and cultural resources that may be uncovered and ensuring that those personnel are provided with adequate training to do so; and
- Outlining the procedure that will be followed should previously undiscovered archaeological, paleontological, heritage, and cultural resources be identified. The procedure includes stopping work at the location, ensuring the protection of the resource, and promptly notifying the appropriate parties (including Nisga'a Nation and the BC Archaeology Branch of the Ministry of Forests, Lands, and Natural Resource Operations).

8.5 Monitoring Approach

An offsetting monitoring program will be developed that incorporates two levels of monitoring:

- Compliance Monitoring to assess whether offsetting measures are constructed in accordance with final designs and whether the terms and conditions prescribed under the *Fisheries Act* authorization were implemented (e.g. design conditions to promote specific ecological functions, environmental protection measures); and
- Effectiveness Monitoring to assess whether the offsetting measures are successful and function as intended, or whether contingency measures should be implemented.

A comprehensive monitoring plan, based on guidance provided by DFO "science on effectiveness monitoring plan design and metrics" (DFO 2012; Smokorowski et al., 2015) will be included in the detailed FOP.

8.5.1 Compliance Monitoring

Compliance monitoring is anticipated to be a condition of the *Fisheries Act* Authorization. The purpose of compliance monitoring is to assess if the offset works have been constructed, as designed, and conditions of the associated *Fisheries Act* Authorization have been met. Compliance monitoring includes assessing whether the created habitat is stable and would withstand extreme weather events (e.g. storms, high or low flow events). DFO science guidance describes compliance monitoring as an operational activity conducted by either DFO Habitat Management or Compliance and Enforcement staff (Smokorowski *et al.*, 2015). Compliance monitoring initiated by IDM will be conducted during, and immediately after, construction of habitat offsetting by a suitability qualified environmental professional (*i.e.* experienced in habitat restoration design and implementation, and a relevant professional designation). Regular (at least annual) compliance monitoring to inform whether adjustments or maintenance of constructed habitat or habitat features will be implemented for the duration of the monitoring period (e.g. 5 to 10 years, or as specified by DFO). Any adjustments to the design required to adaptively manage site-specific, or unanticipated conditions, will be discussed with DFO prior to proceeding.

8.5.2 Effectiveness Monitoring

Effectiveness monitoring is used to quantitatively assess the productivity of fish offset habitat, using a rigorous, science-based, and standardized design (Smokorowski *et al.*, 2015). The purpose of effectiveness monitoring is to assess if the offsets are functioning as intended. Metrics for effectiveness monitoring should measure fisheries productivity or an appropriate surrogate of productivity. Success criteria, monitoring methods, and measurable parameters for effectiveness monitoring of the selected offsetting measures will be provided in the detailed FOP. Effectiveness monitoring will focus on habitat function and the use of that habitat by the target fish species and life stages. Monitoring will be completed at appropriate time intervals (typically annually) and over the monitoring period (e.g. 5 to 10 years, or as specified by DFO) to determine whether the success criteria have been met.

9. Summary

IDM initiated investigations into fisheries offsetting options in late November 2017. Preliminary options have been identified, and evaluated against regulatory, biological, engineering, construction and socio-economic screening criteria. A detailed FOP will be developed to compensate for serious harm, in accordance with the *Fisheries Act*, the Fisheries Protection Policy Statement, and the Fisheries Productivity Investment Policy: A Proponent's Guide to Offsetting. The plan will support the application for an authorization, which will also include an overview of the proposed works, description of fish and fish habitat, the anticipated effects, mitigation measures, an assessment of residual serious harm to fish, monitoring approach, and a letter of credit to cover the costs of offsetting.

IDM is committed to reducing any losses to fisheries productivity, will commence offsetting activities as early as practical, and will select options that meet or exceed DFO's requirements and guiding principles. IDM will work with regulators, Nisga'a Nation, and stakeholders to align offsetting goals with local and regional fisheries objectives.

10. References

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IDM to provide with the final FOP (submitted with the application):

Appendix A

Supplemental Photos
Study Area for the Red Mountain Access Road

IDM to provide with the final FOP (submitted with the application):

Appendix B

Detailed Offset Drawings