

HABITAT OFFSETTING PLAN

To Riley Wall, Biologist Ecosystems Management Branch Fisheries and Oceans Canada	From Gina Le Bel, RPBio, QEP Biologist McElhanney Ltd.
Re 21-HPAC-01303 – Offsetting Plan	Date March 4, 2024

1. Introduction

We are pleased to provide this habitat offsetting plan for proposed erosion protection works on the Dore River, downstream from Highway 16, just north of McBride, BC. Two significant flooding events occurred in 2020 and resulted in considerable loss of property for private landowners. In response to damage caused by these flooding events, the Regional District of Fraser Fort George (RDFFG) has contracted a design that will see 975 lineal meters of riprap installed along the banks of the Dore River between Highway 16 and the railway crossing. This plan outlines the details of the selected offsetting measures to be implemented during bank stabilization, and the rationale behind the selection of each method.

2. Offsetting Measures

All offsetting measures outlined below can be seen on Sheet 400 and 401 in [Appendix B](#) the engineer design drawings. Measured areas associated with each offsetting feature are detailed in [Section 3. Habitat Balance](#) of this memo. An official planting plan is included in the engineer design drawings in [Appendix B](#).

2.1. HABITAT ROCKS

Habitat rocks are large-sized riprap boulders that will be placed along the toe of the riprap to create slower velocity areas without compromising the hydraulic river opening ([Figure 1](#)). Boulders placed along the river's edge provide a place for smaller fish to escape the current and hide from predators¹. These habitat rocks will be installed every 10 m throughout most of the site and will roughen the edge of riprap, increase structural complexity and hydraulic diversity². Habitat rocks will be large angular riprap pieces measuring

¹ <https://waves-vagues.dfo-mpo.gc.ca/Library/40682468.pdf>

² https://people.wou.edu/~taylors/q407/restoration/WA_Dept_Forestory_2004_Boulder_Clusters.pdf

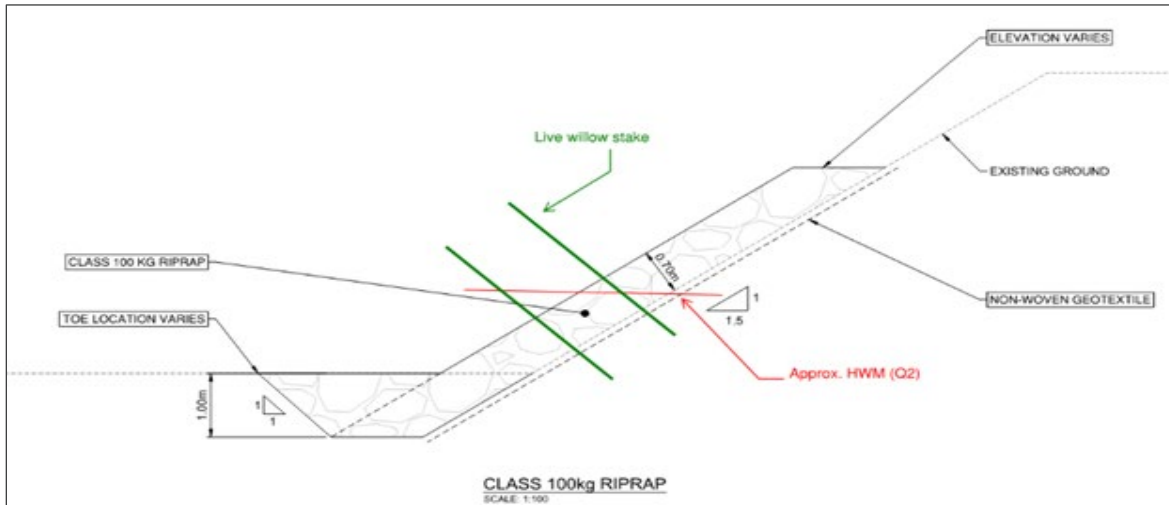


Figure 2: Sketch showing instream live stake (green lines) placement within the riprap.

Stems placed below the HWM will roughen the surface of the water and create micro-breaks in velocity. These stems will also provide a direct effect from overhanging vegetation, which is limited in this stream. The Dore River is generally forested, but the mature conifer canopy provides limited overhanging vegetation even when present. This area of the Dore River is lacking shade as any overhanging vegetation that was once present on the banks was lost in the flood event.

Planting live stakes in the riprap, below the HWM, will bring the typical benefits of riparian vegetation down to the waters edge. Instream vegetation will provide much faster and more impactful shade for temperature regulation and visual cover for fish⁵. Directly overhanging vegetation is limited in this reach of the Dore River and these plants will provide a direct food source for fish and aquatic insects. Leaf litter, coarse organic matter, and insects will fall off the instream willows and into the river. Stakes planted along the top of bank will have more indirect, and slightly delayed influence on the river, as it overhangs onto the rocks (Figure 3).

Instream vegetation slows water flow on the banks, as well as promotes sedimentation. Bank vegetation that is flexible and uniform can create a flexible barrier against flood flows. Willows planted at and below the HWM will increase the roughness, or resistance to flow⁶.

This proposed installation of willows is similar to the Live Siltation and Vegetative Riprap methods of streambank restoration, described by the



Figure 3: Example of live stakes planted within riprap.

⁵ https://www.for.gov.bc.ca/hfd/library/ffip/Donat_M1995.pdf

⁶ https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/idpmctn7064.pdf



Government of Alberta⁷. The vegetation would trap sediments and create fish rearing habitat. Once the vegetation has flushed, it will create a living brushy ecosystem at the water edge that can be valuable for providing quick-growing cover and fish habitat while other riparian plantings become established.

2.3. WILLOW STAKES IN THE UPPER REACH

There are several areas in the upper Dore River reach that were also affected by the flooding event. High water levels and flow removed vegetation on the outside bend in three locations of the Dore River, parallel to Dore River Road (see *Figure 4*). In Spring 2024, once the snow melts and sites are accessible, a site visit may be conducted.

The RDIFFG is committed to installing 550 lineal meters of willow stakes, at or below HWM, as described in *Section 2.2* above, distributed between the three proposed sites. The exact number and area covered at each site will be determined during the Spring 2024 site visit or at the start of construction.

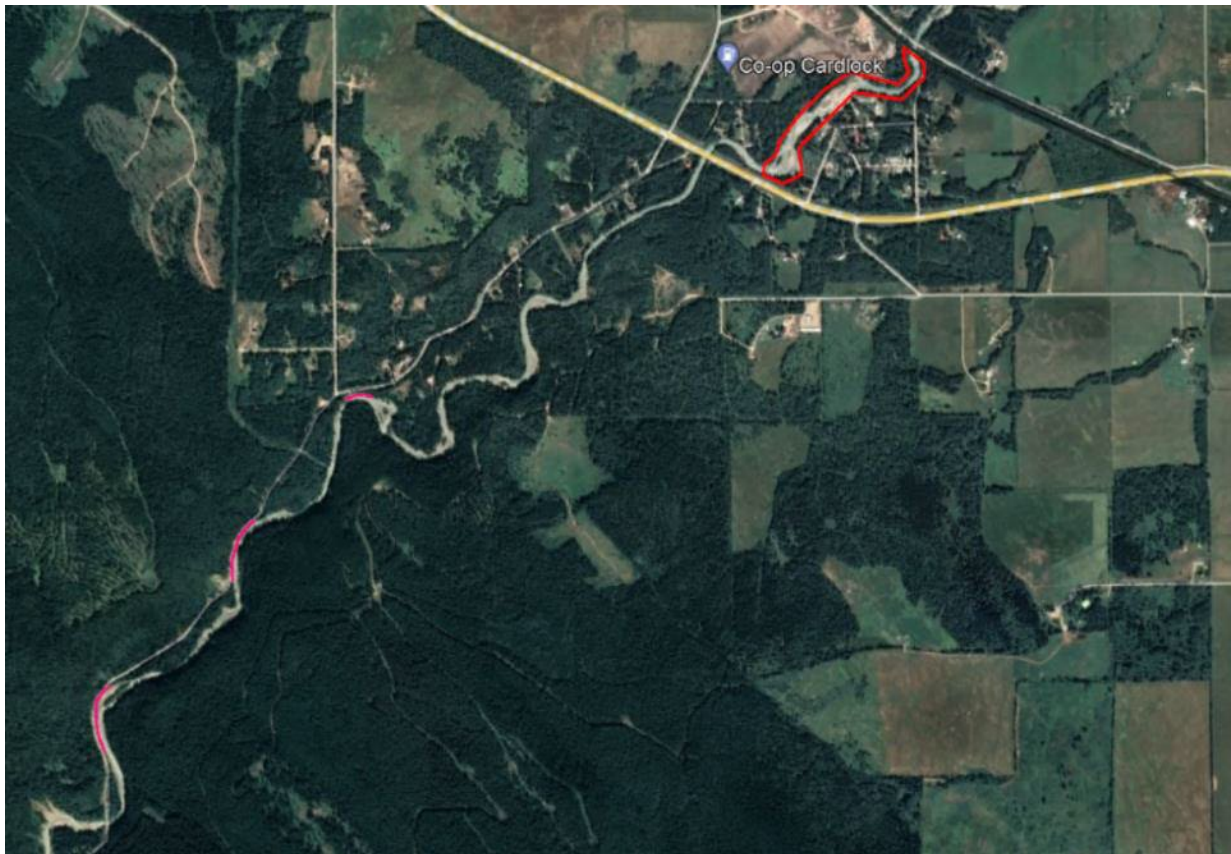


Figure 4: Additional sites indicated by pink lines and the main Dore River project area outlined in red.

⁷ <https://open.alberta.ca/dataset/aaaa5384-c0e0-4421-9fd8-6ab835c6f3af/resource/49bb74b8-db1b-4d21-bd36-7a7863a732fc/download/trans-erosion-and-sediment-control-manual-appendix-c.pdf>

2.4. CONCRETE DEBRIS REMOVAL

At the downstream end of the side channel (upstream end of Area F) debris was noted along the riverbank. Various pieces of old concrete curb and manholes have been placed along the bank where the side channel meets the river. This concrete debris will be removed from the river during installation of riprap at Area F.

2.5. LARGE WOODY DEBRIS (LWD)

We understand that several logs have been anchored to the bank, along the properties at Site A. These will be inspected during construction and will be left in-place if possible.

The placement of large woody debris (LWD) for habitat enhancement was considered at length. During the 2020 flooding there were substantial accumulations of LWD on the upstream side of the vegetated island near Site A which played a role in deflecting river flow towards the Dorval Road (Site A) properties. While LWD is a key component of fish habitat, we do not believe the addition of it would be suitable in this reach due to the potential for entrapment of additional debris, as seen during the 2020 flood event. LWD is present and abundant in this reach, both along the banks and on the gravel bars.

The LWD that has been anchored by others will be left in place, if deemed secure and stable. However, no additional LWD will be added.

2.6. RIPARIAN ENHANCEMENT

Riparian vegetation has been impacted by the flood, with additional temporary impacts anticipated in the creation of access paths required for bank stabilization. Because of the substantial bank erosion and loss of land that occurred during the 2020 flooding, much of the stream bank through the Site is now bare soil. Replanting will vary by Site, dependant on existing conditions and land use. Replanting details are illustrated in *Sheets 400 and 401 - Appendix B* in the engineer design drawings.

Top of Bank Planting for Flood Impacts

Along the top of bank, a 1.0 m wide band will be planted with locally harvested willow (*Salix* spp.), red osier dogwood (*Cornus sericea*), and balsam poplar (*Populus balsamifera*) live stakes (dependant on local availability) at a density of 1.0 per m².

All disturbed areas will be seeded and mulched in the first spring or fall immediately post construction. Grass seed may vary through the Sites. Areas that are currently lawn on private land may be seeded with a lawn seed and may be left un-mulched. Areas previously undisturbed will be seeded with an appropriate reclamation grass seed mixture, suitable for the climate and region. The contractor may choose to use a hydroseed application or may choose to hand seed and apply straw mulch.

Planting for Access Impacts

Areas to be cleared for machine access within 30m of the HWM will be replanted with similar species. Plant stock will be sourced as local as possible, and/or will be native species appropriate for the biogeoclimatic zone and region. Planting will most likely include spruce or pine tree seedlings (*Picea* or *Pinus* spp.), poplar and Douglas maple (*Acer glabrum*), and shrub seedlings such as rose (*Rosa* spp.) or thimbleberry (*Rubus parviflorus*) and will match existing areas. Revegetation areas are shown on *Sheets 400 and 401* in



Appendix B. Small stock will be prioritized as appropriate. On private land, areas will be restored to previous conditions; some areas may be left as lawn and/or vegetated with ornamental species. Previously forested areas that require clearing for machine access will be replanted at a density of 1 plant per 3 m².

As part of the Construction Environmental Management Plan (CEMP), the Contractor will be required to inventory vegetation types and densities removed or impacted at each Site so that the appropriate level of revegetation may occur. The final monitoring report will document the number and density of trees planted in each area, so they can be followed for survival.

Riparian planting will be considered effective when a minimum of 80% plant survivorship is achieved at the end of 10 years. 80% survivorship must be achieved in each planting area, not averaged over the entire site. If less than 80% survivorship is noted during any year of monitoring, replanting will occur. The proponent will complete minor maintenance as needed however, major maintenance will be outlined in a plan and provided to Fisheries and Oceans Canada (DFO) for review prior to implementation.

3. Offsetting Balance

Placement of riprap armouring below HWM has the potential to permanently affect instream habitat and requires appropriate offsetting measures. The areas expected to undergo change below the HWM are described in *Table 1*. Through reclamation and riparian vegetation enhancement, a net increase in both instream habitat is anticipated. *Appendix B* includes Habitat Effects Balance for the proposed restoration and enhancement described in *Table 1*.

Table 1: Offsetting balance table

Activity	Instream Change (m ²)	Riparian Change (m ²)
Temporary riparian loss due to machine access roads and along TOB		-9,050
Reclamation and enhancement of riparian areas within 30 m of HWM		9,050
Instream loss to riprap	-2900	
Instream enhancement from habitat rocks	300	
Instream enhancement from willow stakes within riprap (below HWM)	3340	
Instream enhancement from removal of concrete debris	40	
Instream enhancement from upstream Dore River willow stakes (below HWM)	550	
Balance	+1,330	+0



4. Monitoring and Reporting

The following post-construction monitoring schedule is proposed for the Dore River erosion protection works and is based on general DFO conditions outlined for other projects of similar scope. Any conditions within the actual Authorization, once received will be incorporated into the project.

RDFFG will provide a post-construction report outlining the offsetting measures that were implemented as part of the project according to the conditions set out in relevant permits. The report will include details of the construction and revegetation works and will be submitted within 6 months of the completion of the offsetting measures.

RDFFG will conduct monitoring of the offsetting measures according to the methodologies outlined in this report. RDFFG proposes to conduct monitoring according to the schedule below from 2025-2035 assuming construction occurs in 2024:

- Dore River channel stability conducted annually post high-flow conditions on years 1, 2, 3, 5 & 10 (from 2025 – 2035);
- Riparian vegetation monitoring conducted annually during the growing season on years 1, 2, 3, 5, & 10 (from 2025 – 2035);

RDFFG will report on whether the offsetting measures have been conducted according to any permit Conditions by providing the following:

Summary reports addressing the conditions of the offsetting measures and their effectiveness. Each report will include:

1. Geo-referenced photographic assessment of the offsetting measures;
2. Responses to the following five questions from the *Protocol for Evaluation the Condition of Stream and Riparian Management Areas* listed as numbered in the document (Tripp, Tschaplinski, Bird and Hogan. 2022):

6. Does the stream support good diversity of fish cover attributes?

11. Has the amount of bare erodible ground or soil compaction in the riparian area been minimized?

13. Has sufficient vegetation been retained to provide shade and reduce bank microclimate change?

14. Have the number of disturbance increaser species, noxious weeds and/or invasive plant species present been limited to a satisfactory level?

15. Is the riparian vegetation within the first 10m from the edge of the stream generally characteristic of what the healthy unmanaged riparian plant community would normally be along the reach?

The above items will assess the success and effectiveness of the offsetting measures and identify any functional concerns with the offsetting measures and description of any remedial measures taken.



RDFFG will submit six monitoring reports according to the schedule below to ReferralsPacific@dfompo-gc.ca with the DFO reference File number:

- One report for the results of the construction environmental monitoring within 60 days of project completion; and
- One planting report each for years 1, 2, 3, 5, and 10 of the post-construction monitoring prior to December 31 of each year.

5. Cost Estimate

The Cost estimate for the offsetting plan is included in *Table 2* and shows the value to be included in the Letter of Credit. Costs associated with construction have assumed riprap was installed as designed and offsetting measures were not; therefore, these are standalone supply and install prices.

Table 2: Offsetting construction cost estimate

Item	Cost
Supply and install habitat rocks	\$35,000
Supply and install instream willow live stakes	\$14,000
Supply and install riparian vegetation	\$23,000
Supply and install grass seed and mulch	\$3,800
Annual monitoring and reporting offsetting measures (\$8,000/year) for monitoring in years 1, 2, 3, 5 and 10	\$40,000
Total	\$115,800

An irrevocable letter of credit for **\$115,800** is being developed by the RDFFG and will be submitted to DFO as soon as received from a financial institution.



6. CLOSING

We trust that the information provided in this Technical Memo satisfies the requirements for offsetting plans. If you have any further questions, please do not hesitate to contact the undersigned.

Sincerely,

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References

Tripp, D.B., P.J. Tschaplinski, S.A. Bird and D.L. Hogan. 2022. Protocol for Evaluating the Condition of Streams and Riparian Management Areas (Riparian Management Routine Effectiveness Evaluation). Version 6.1. Revised by D. McGeough and L.J. Nordin. Forest and Range Evaluation Program, B.C. Ministry of Forests, Range, Natural Resource Operations and Rural Development.



APPENDIX A

Statement of Limitations

Statement of Limitations

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APPENDIX B

Engineer Design Drawings