



**Valentine Gold Project: Offsetting
Plan to Support the Application
for a *Fisheries Act Authorization***

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1.0 INTRODUCTION

Marathon Gold Corporation (Marathon) proposes to develop the Valentine Gold Project, an open pit gold mine near Valentine Lake (the Project), in central Newfoundland. The effects assessment for fish and fish habitat concluded that the Project is likely to result in the harmful alteration, disruption, or destruction (HADD) of fish habitat via the construction of the open pits, and alterations to stream flow resulting from alterations in groundwater and surface water management activities from Project infrastructure (e.g., open pits, waste rock piles, stockpiles) that may result in changes in water levels and flow in surrounding waterbodies.

As part of the permitting process for the Project, this offsetting plan has been prepared to fulfil the requirements of the *Fisheries Act* Authorization to counterbalance HADD of fish habitat. This plan proposes to offset HADD through the restoration of Victoria River Steady No. 5 via the removal of submerged pulpwood to improve fish habitat for salmonids.

2.0 PROPOSED OFFSETTING OPPORTUNITY

2.1 VICTORIA RIVER STEADY NO. 5 SUBMERGED PULPWOOD RESTORATION

This offsetting plan proposes to counterbalance effects on fish habitat through the restoration of substrates in Victoria River Steady No. 5. Figure 2.1 shows the location of Victoria River Steady No. 5 relative to the Project. The geographic coordinates of the proposed offsetting opportunity are N48.626017 W - 56.761045. It is located on Crown land.

Historically, the Victoria River was used to transport logs to sawmills located downstream. Water control structures were built to facilitate the movement of logs downriver during periods of lower flow. Many of the water control structures were abandoned following modernization of the logging industry and the river bottom became the final resting place for cords of pulpwood which did not make it to their final destination. These submerged logs have covered stream substrates required by salmonids to carry out their life processes. Over time, fine sediments have settled between the pulpwood and further covered stream substrate (Photos 1 and 2). There are two locations within Victoria Steady No. 5, where the substrate is covered with submerged pulpwood.



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This offsetting opportunity proposes to manually remove the submerged pulpwood from two areas along the banks of Victoria River Steady No. 5 with the intent of restoring the coarser substrates which would have been present prior to log driving. Logs will be removed from the river bottom manually using log handling tools (e.g., cant hooks or peavies) and placed in a boat, where they will be transported to shore. Following removal, the submerged pulpwood will be placed above the highwater mark along the riverbank. It is anticipated that periods of high flow (e.g., spring freshet) will flush fine sediments and thereby expose the natural substrate that is more suitable for salmonids to carry out their life processes. Additional habitat improvements (e.g., placement of preferred substrate) in Victoria Steady No. 5 will be conducted, if necessary (e.g., if natural flushing of fine sediments is not sufficient).



Photo 1 Submerged Pulpwood Visible by Air in Victoria Steady No. 5

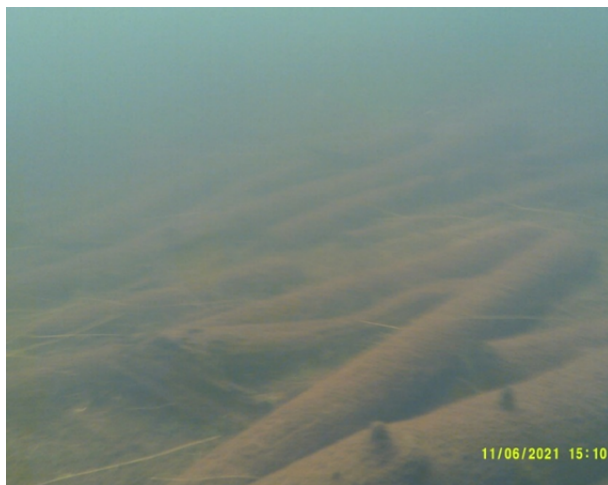


Photo 2 Submerged Pulpwood on the Bottom of Victoria Steady No. 5



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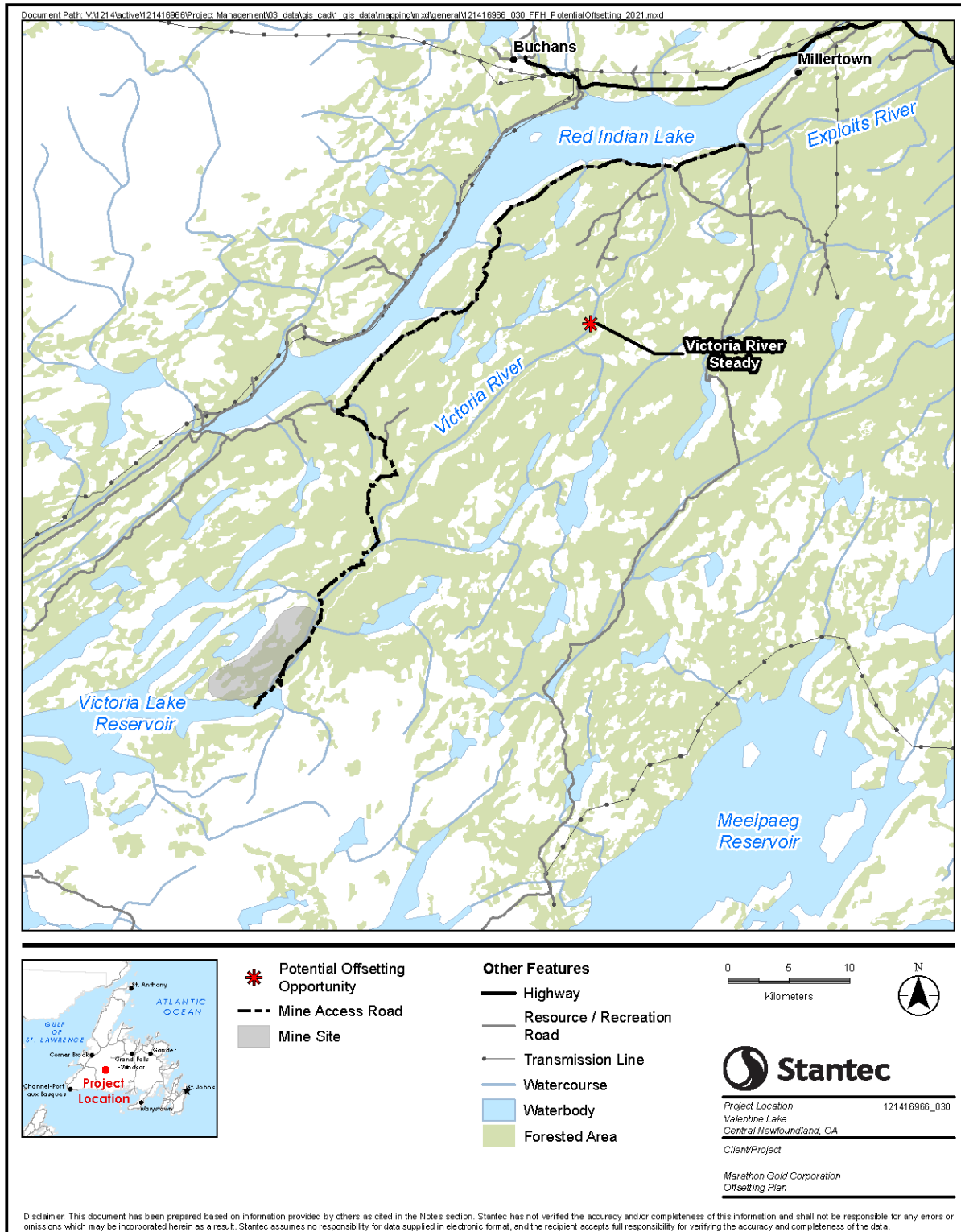


Figure 2.1 Location of the Proposed Offsetting Opportunity



2.2 SUITABILITY OF THE PROPOSED OPPORTUNITY

In selecting offsetting projects to counterbalance HADD, Marathon has considered Fisheries and Oceans Canada's (DFO's) *Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat Under the Fisheries Act* (DFO 2019a). This policy provides guidance of selecting measures to support the conservation and protection of fish and fish habitat by counterbalancing Project related HADD and/or the death of fish. Under this policy, four guiding principles are used to assess a proposed offsetting measure. These principles are provided below with a description as to how the proposed offsetting plan aligns with this policy:

1. *Measures to offset should support fisheries management objectives and give priority to the restoration of degraded fish habitat.*

Fisheries management measures on the Island of Newfoundland are managed through recreational angling seasons, special trout management areas, river classification and retention limits. Local priorities include the restoration and enhancement of salmonid populations, as proposed in this offsetting plan.

2. *Benefits from measures to offset should balance the adverse effects resulting from the works, undertakings or activities.*

The fish habitat benefits which are anticipated to result from the offsetting opportunity will be scaled such that they meet or exceed the loss of fish habitat as a result of the Project (Section 2.3). The proposed offsetting opportunity is located within the Exploits River watershed, which is the same watershed as the Project. As a result, the offsetting opportunity will benefit local fish populations, specifically salmonids, such as ouananiche and brook trout, which currently reside within the Project area. Additionally, this offsetting opportunity is intended to replace the habitat lost as a result of the Project with salmonid habitat of equivalent quantity and quality (i.e., in-kind approach).

3. *Measures to offset should provide additional benefits to the ecosystem.*

The restoration of Victoria River Steady No. 5 is anticipated to achieve greater benefits to salmonid habitat than if the restoration were to not take place, and involves restoration of orphaned sites (with no known responsible party or owner or with no possibility of restoration due to company closure, bankruptcy or other similar circumstance), which aligns with this offsetting principle. There is no concern regarding attributing offsetting to coincidental positive benefits from the Project under consideration, as the proposed offsetting area is not within the area of the works, undertakings and activities being authorized. Furthermore, there are no publicly or privately funded habitat restoration programs at or near the proposed offsetting location.

4. *Measures to offset should generate self-sustaining benefits over the long term.*

The restoration of Victoria River Steady No. 5 will generate self-sustaining benefits to ouananiche and brook trout through the natural flushing of fine sediments and the restoration of larger coarse substrates which provide more suitable habitats for these species to carry out their life processes (i.e., spawning and rearing).



2.3 ESTIMATE OF OFFSET CREDIT

Under DFO's *Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat under the Fisheries Act* (DFO 2019a), there are two different approaches that can be taken for offsetting measures: in-kind approaches and out-of-kind approaches, both of which attempt to generate equivalency metrics to balance fisheries productivity offsetting gains with project losses (Bradford et al. 2016; DFO 2017). The in-kind approach aims to replace habitat (habitat type per unit area) that is destroyed or permanently altered due to a project with similar habitat of equivalent quantity and quality. The out-of-kind approach aims to offset the fish habitat that is adversely affected with an appropriate quantity and quality of a different type of fish or fish habitat than was adversely affected (DFO 2019). For this offsetting plan, an in-kind approach is considered to be the most appropriate. The direct and indirect loss of ouananiche and brook trout habitat are proposed to be offset by restoring habitat that will further support both of these species.

2.3.1 Methods

To provide a preliminary assessment of the potential for offsetting, an aerial survey was conducted via helicopter on October 8, 2021 to document the spatial extent and proportion of substrate covered by the submerged pulpwood. An "on the ground" baseline monitoring survey was then conducted on November 5 to 7, 2021 within the area delineated by the helicopter survey (Stantec 2022). The purpose of the "on the ground" survey was to further delineate the area of restoration, determine the coverage of submerged pulpwood, map dense weed beds, assess the depth of fine substrates over the existing coarse substrates, assess the types of coarse substrates present under fine substrates, and provide a baseline for post-restoration monitoring. The methods and results of the baseline monitoring are summarized in Stantec (2022).

The baseline monitoring was conducted along the right and left banks of the river where impacts from pulpwood deposition and accumulation of fines were greatest. Quadrats were spaced along transects within the area delineated by the helicopter survey. The water depth, area covered by pulpwood, embeddedness of pulpwood, area covered by aquatic vegetation, substrate composition, thickness of fines (e.g., muck, silt), and dominant substrate under the fines was estimated at each quadrat. Water velocity was determined at a minimum of two quadrats along each transect.

The percent coverage of pulpwood was interpolated between quadrats to estimate the percent coverage of pulpwood within the steady. The location of major weed beds was delineated based on available aerial imagery, as much of the aquatic vegetation had died prior to the surveys taking place.

The associated habitat equivalent units (HEU) for offsetting credits were based on the area directly effected by the submerged pulpwood multiplied by the highest habitat suitability index (HSI) rank of a given life stage of salmonid present within Victoria River Steady. The HSI model produces an index between 0 and 1, where 0 indicates unsuitable conditions and 1 indicates optimum conditions.



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It was assumed that the substrates beneath the submerged pulpwood had a HSI rating of zero since the submerged pulpwood is not a suitable “substrate” for spawning, young of the year, juvenile and adult life stages of brook trout and ouananiche. It would be most comparable to bedrock substrates (smooth flat surface) in terms of assigned numerical value for these species (Grant and Lee 2004).

The Newfoundland and Labrador model proposed by McCarthy et al. (2007) incorporates water velocity and substrate as habitat variables that affect all life stages of brook trout and ouananiche. Given that no substantive changes in velocity are anticipated following the restoration, velocity is not included in the model. The proposed model only incorporates “substrate” as a habitat variable that affects all life stages of brook trout and ouananiche. Similar fish habitat compensation/offsetting projects undertaken previously in NL provide precedence for this approach.

The HSI model is as follows:

$$HSI_L = \text{Maximum } (S_L)$$

Where: HSI = Habitat Suitability Index

L = Life stage (e.g., spawning, young of the year, juvenile, adult)

S = Substrate

$S_L = \% \text{ Fines (F)} * R_F \times \% \text{ Gravel (G)} * R_G \times \% \text{ Cobble/Rubble (C)} * R_C \times \% \text{ Boulder (B)} * R_B \times \% \text{ Bedrock (R)} * R_R \times \% \text{ Submerged Pulpwood (P)} * R_P$

R = Rating value for substrate

The area covered by submerged pulpwood was multiplied by the HSI to derive the HEU within the area of restoration (i.e. area underneath the submerged pulpwood). As a precautionary approach, the highest suitability value of the four life stages was used as the species-specific value for that habitat type so that important habitat requirements could be met. As brook trout and ouananiche were both present, the highest suitability value for each species for each life stage was used to calculate the HEUs.

2.3.2 Results

Victoria Steady No. 5 is heavily impacted by the deposition of submerged pulpwood and accumulation of fines. The percentage of substrate covered by submerged pulpwood was found to range from 0% to 100%, with the lowest coverage occurring in the upstream portion of the steady and the highest in the downstream portion (Figure 2.2). Also, higher percentages of submerged pulpwood were observed along the edges of the steady than in the center of the steady (Figure 2.2). Substrates throughout the steady were typically muck, however smaller proportions of sand, gravel and cobble were observed. Coarser substrates were frequently noted beneath the muck and included sand, gravel, cobble, boulder, and bedrock (Stantec 2022).



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Aquatic vegetation was present throughout Victoria River Steady No 5. and covered a high percentage of the substrate. The aquatic vegetation observed was typically short in height (e.g., 2.5 to 5 cm) and likely provides limited cover for fish. Taller submerged aquatic vegetation which is likely to provide enhanced cover for fish was observed and delineated by aerial imagery. At the downstream end of Victoria River Steady No. 5, the total estimated area of the aquatic weed bed (based on aerial imagery) that overlaps with the area of submerged pulpwood restoration is 1,480 m². As this weed bed may provide enhanced cover for fish, this area will not be included in the area to be restored.

Table 2.1 provides a breakdown of the area surveyed, coverage of submerged pulpwood and the area to be restored beneath the submerged pulpwood within Victoria Steady No. 5 and the pre-restoration and post-restoration HEUs. The pre-restoration estimate assumes the habitat rank of the submerged pulpwood or area beneath the submerged pulpwood is zero (Appendix A, Table A.1). Assuming the area to be restored beneath the submerged pulpwood can achieve a HSI rank of 1 for a given life stage and species (Appendix A, Table A.2), the potential for offset credit associated with Victoria River Steady No. 5 is 20,661 m².

It should be noted that the proposed potential offset credit associated with Victoria River Steady No. 5 only includes the area directly beneath the submerged pulpwood and not additional habitat adjacent to the submerged pulpwood that may also benefit from the natural flushing of fine sediments following removal of the submerged pulpwood (i.e., spaces between submerged pulpwood where sediments are trapped).

Table 2.1 Victoria River Steady No. 5 Potential Area for Offsetting

Cover of Submerged Pulpwood Class (%)	Area Surveyed (m ²)	Average Pulpwood Coverage (%)	Area Beneath Submerged Pulpwood (m ²)	Pre-Restoration Habitat Equivalent Units (m ²)	Post-Restoration Habitat Equivalent Units (m ²)
25 to 49	27,849	25	6,962	0	6,962
50 to 74	7,040*	50	3,520	0	3,520
75 to 100	11,567	88	10,179	0	10,179
Total	47,936	-	20,661	0	20,661
Note: * area excludes the 1,480 m ² of weed bed and submerged pulpwood which will not be restored					



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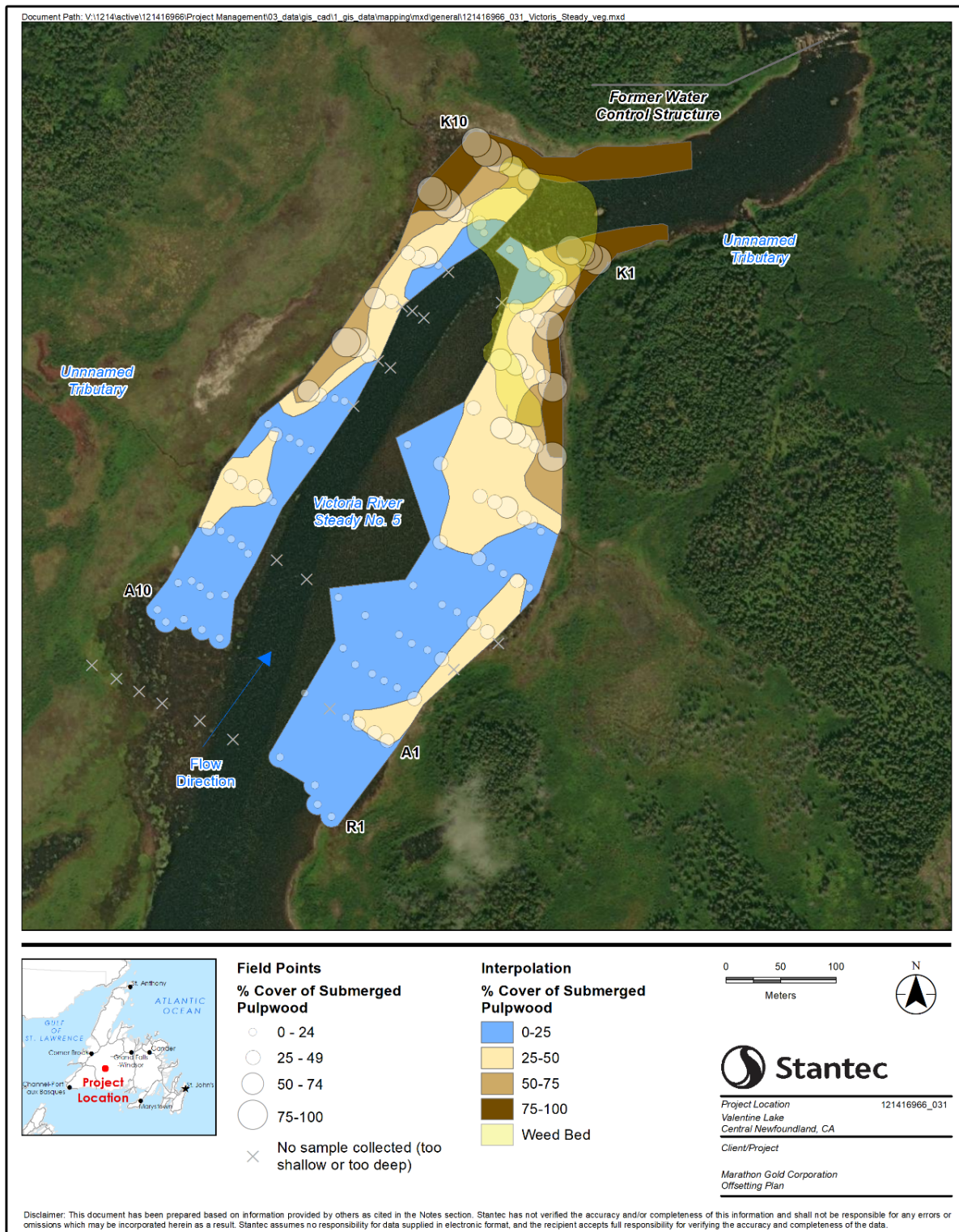


Figure 2.2 Area and Percent Cover of Submerged Pulpwood in Victoria River Steady No. 5



3.0 MONITORING MEASURES

Marathon will be responsible for implementing the offsetting project, monitoring its effectiveness, and reporting results of implementation and monitoring to DFO. The monitoring is designed to evaluate the effectiveness of the offsetting project in providing the intended benefits, including identifying the potential need for contingency measures should deficiencies be found.

3.1 OBJECTIVES

The objective of the monitoring measures is to confirm that the offsetting project is counterbalancing HADD of fish habitat resulting from the Project, as intended.

3.2 INDICATORS AND PERFORMANCE TARGETS

Fish and fish habitat indicators and performance targets will be used to monitor the effectiveness of the offsetting project in achieving its intended benefit and fulfilling the requirements of the *Fisheries Act* Authorization for the Project.

Existing habitat equivalency and suitability metrics for brook trout and ouananiche in Newfoundland and Labrador (i.e., McCarthy et al. 2007, Grand and Lee 2004) will be used to assess the performance of the offsetting project restoration activities for various life stages.

In addition, fish populations within the area of restoration in Victoria River Steady No. 5 will be monitored to assess the performance of the offsetting project restoration activities. The monitoring of fish populations will include redd surveys to assess the abundance of adult salmonids and improvements in spawning habitat, as well as electrofishing or fyke trapping, to provide estimates of relative abundance or population estimates of other life stages. The methods to assess the abundance of other life stages will be further defined during the baseline pre-restoration monitoring, in collaboration with DFO. A table of physical habitat indicators, fish abundance indicators, measurable parameters and performance targets for the stream restoration activities are provided in Table 3.1.

Supporting environmental measurements including, in-situ water temperature and water level, water depth and riparian vegetation will be collected to further support the evaluation of the measurable parameters and performance targets.



Table 3.1 Measurable Parameter and Performance Targets for the Offsetting Opportunity

Indicator	Measurable Parameter	Performance Target
Substrate	Percentage of fines (e.g., silt, clay, muck), sand, gravel, cobble, rubble, boulder and bedrock	Reduction in fine substrates; increase in sand, gravel, cobble, rubble and boulder
Submerged Pulpwood	Percentage of submerged pulpwood	Reduction in submerged pulpwood
Habitat Equivalency	Habitat suitability/equivalency for brook trout and ouananiche	Increase in suitable habitat area (m ²) for brook trout or ouananiche
Adult Reproduction (Salmonids)	Number of redds	Increase in the number of redds and use of habitat for spawning
Fish Abundance (Salmonids)	Catch per unit effort, or relative abundance (if fyke trapping or qualitative electrofishing methods are used) Density (# fish per m ²) of young of the year, juvenile and adult life stages (if quantitative electrofishing methods are used)	Increase in the number of young of the year, juvenile, or adult life stages and use of habitat for life processes

3.3 MONITORING

The proposed monitoring plan is a before-after study for the habitat monitoring and a before-after-control-impact (BACI) for the biological monitoring.

3.3.1 Habitat Monitoring

Habitat monitoring within the area of restoration will be conducted prior to the habitat restoration taking place, to document baseline conditions and following the habitat restoration to document habitat improvements over time. The study will assess physical stream parameters including water depth, substrate, submerged pulpwood, aquatic vegetation composition, water velocity and riparian vegetation composition to inform changes in fish habitat quality. There are no anticipated changes in flow or channel morphology, however water level, stream velocity and water temperature will be monitored to assess environmental conditions which may effect fish populations.

The baseline and post-restoration habitat monitoring areas are located on the left and right banks of the river (Figure 3.1). A minimum of ten transects will be established across Victoria River Steady No. 5 within the area of restoration (approximately every 30 m). Along each transect, sampling quadrats will be spaced every 10 m (Figure 3.1). It is anticipated that approximately 100 sampling quadrats will be assessed. The same locations will be monitored for the baseline and post-restoration monitoring to facilitate accurate before and after comparisons.



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Although no pre and post habitat monitoring is required at a reference area, a general habitat survey will be conducted to document how well the habitat within the selected reference area matches the habitat characteristics of the area of restoration. The reference area will be characterized by obtaining velocity measurements within approximately 100 m reaches. Bathymetry will be collected using a Garmin Chartplotter (Garmin Model GPSMAP 531s). Within each 100 m segment the habitat will be described based on substrate type, meso habitat type, stream gradient, riparian vegetation, and instream and overhead cover. Photos will be taken looking upstream and downstream, facing the left and right banks. Photos of substrate will also be taken. GPS coordinates of the sampling locations will be recorded.

At both the area of restoration and reference area, water temperature and water levels will be monitored using continual data loggers to assess environmental parameters that may affect fish populations on an annual basis. A staff gauge and in situ data loggers (temperature/pressure transducer) will be installed in the area of restoration and reference area. They will be downloaded each year in the spring and in fall following the redd surveys. Water level on the staff gauge will be recorded during each visit and correlated to the pressure transducer to establish relative water levels/flow conditions.



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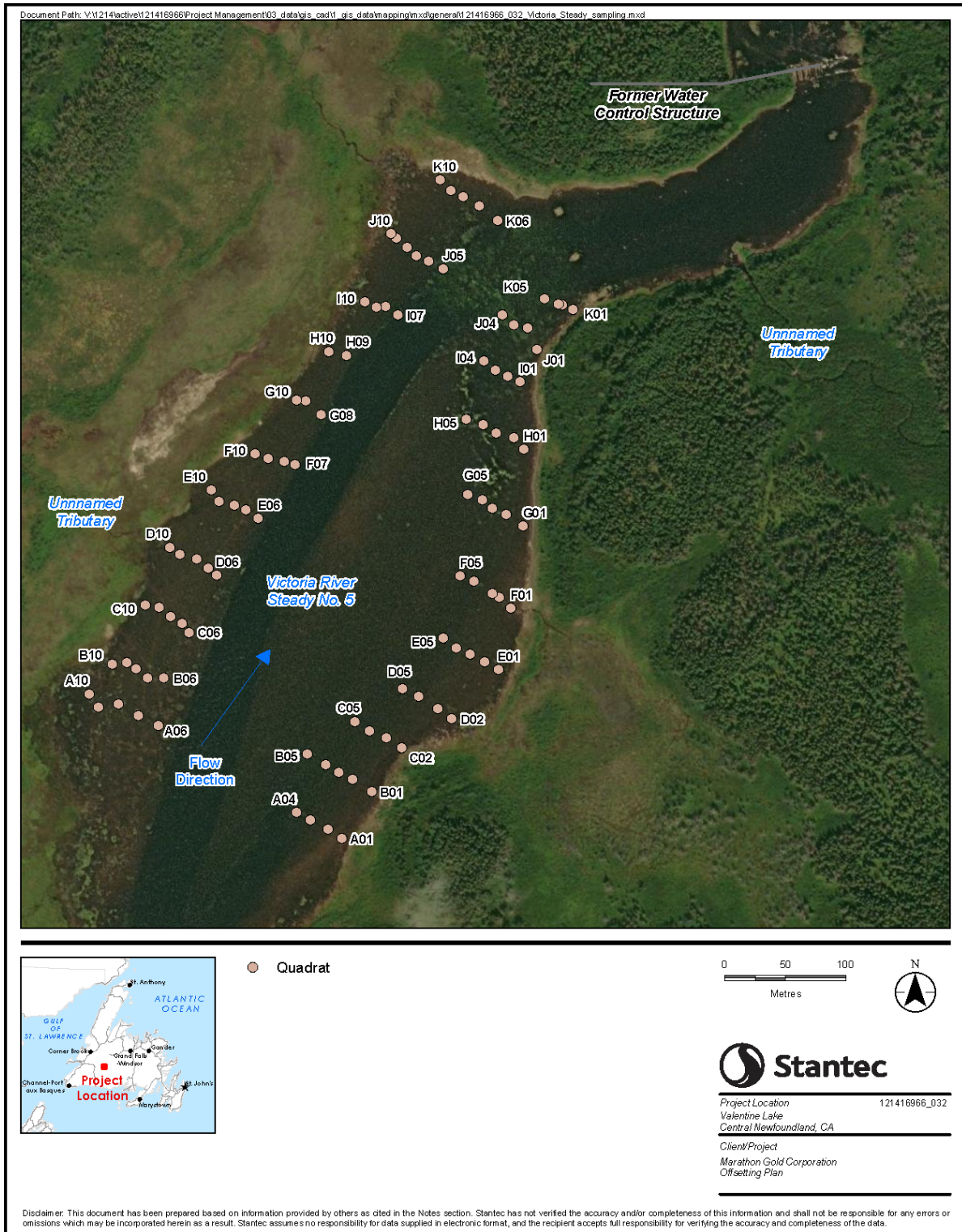


Figure 3.1 Habitat Monitoring Locations Within the Area of Restoration on Victoria River Steady No. 5



3.3.2 Biological Monitoring

3.3.2.1 Study Area Selection and Purpose

The study areas for the biological monitoring will consist of the area of restoration (i.e., impacted area) and one reference area. The area of restoration is located on Victoria River Steady No. 5 (Figure 3.2). The reference area will be located on Victoria River, upstream or downstream of the area of restoration. Biological monitoring at the reference area will provide insight into the natural, annual variation in fish populations on Victoria River, in an area of similar habitat as that of the restored area. The natural variation of fish populations in the reference area will provide the necessary context for interpreting the changes in fish abundance/usage that occur in the area of restoration.

The reference area will be chosen to match the the predicted post-restoration habitat characteristics of the area of restoration to the extent practicable. This will enable fish populations and life stage composition within the area of restoration to be compared with established, well functioning habitat of similar quality in the reference area. A well chosen reference area on Victoria River will reduce the potential confounding influence of different fish usage/abundance between the two areas. Monitoring at the reference area will also provide information on the potential confounding influences of environmental factors such as flow, water temperatures, water quality, and biological factors such as fish population characteristics, including fish community assemblages, life history characteristics and timing of fish movements.

A second reference area is not proposed as part of this offsetting plan, as a preliminary desktop analysis indicated that it may be difficult to find a suitable second reference area. Marathon will consider including a second reference area following baseline field reconnaissance in 2022 and/or 2023, however this is outside the current offsetting plan. If a second reference is added, it will be located within the Exploits River Watershed upstream of Red Indian Dam. Downstream of Red Indian Lake Dam, sea-run Atlantic salmon are expected to be more prevalent, thus confounding biological monitoring and comparison with monitoring locations upstream of the dam. The reference area should also be located on a river which has a similar stream order to Victoria River Steady No. 5, is of similar width, habitat type and is located at the downstream end of a steady.

Biological monitoring will take place within the area of restoration on Victoria River Steady No. 5 before and after the restoration is completed (i.e., before-after study design). No pre-restoration biological monitoring is proposed for the reference area. Post-restoration biological monitoring will take place in both the area of restoration and reference area (i.e., control-impact study design).

3.3.2.2 Fish Monitoring Methods

Fish monitoring will be completed during the summer low flow period in conjunction with the habitat monitoring and will consist of backpack electrofishing and fyke netting. The pre-restoration fish monitoring will only be conducted in the area of restoration while post-restoration fish monitoring will be conducted in the area of restoration and the reference area.



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Fyke netting, will consist of four fyke net sets, fished overnight and perpendicular to shore in shallow (<2 m) water. Fyke nets will be spaced approximately 200 m apart and in roughly the same locations during all monitoring events. This will reduce bias associated with habitat quality and or migratory pathways between years. The approximate set locations of fyke nets in the restoration area is shown on Figure 3.2. Fyke net locations for the reference area locations are not yet determined. The location and soak time of nets will be recorded. Ouananiche and brook trout will be measured, weighed, and released. Sticklebacks will be counted and weighed as a batch. Catch per unit effort and biomass per unit effort will be determined for each monitoring event for brook trout, ouananiche and other fish species.

Quantitative electrofishing in the area of restoration will be conducted pre-restoration (if it can be conducted safely) and post-restoration. The anticipated location of quantitative electrofishing in the area of restoration is shown on Figure 3.2. The reference area locations are not yet determined. Barrier nets will be installed to isolate an area of approximately 200 m² within the steady (Sooley et al. 1998). A minimum of four passes will be completed and the effort and number of fish per pass will be recorded. Ouananiche and brook trout will be measured (fork length), weighed, and released outside the barricaded area. Sticklebacks will be counted and weighed as a batch. Population densities and biomass of ouananiche and brook trout will be determined and standardized to one unit of habitat (1 unit = 100 m²).

If quantitative electrofishing cannot be safely implemented pre-restoration (as a result of water depths, slippery logs or mucky substrates), qualitative electrofishing will be undertaken along the river margin at locations deemed safe to fish. The approximate area and time fished per electrofishing event will be recorded. Ouananiche and brook trout will be measured (fork length), weighed, and released. Sticklebacks will be counted and weighed as a batch. Catch per unit effort of ouananiche and brook trout will be determined and standardized to 100 electrofishing seconds (number of fish per 100 seconds and weight of fish per 100 seconds).

Redd surveys will be conducted within the area of restoration prior to restoration activities taking place, and at both the area of restoration and reference area, after restoration is completed. The redd surveys will be conducted during the fall (October or November) over one day, once the peak spawning period of brook trout and ouananiche, have occurred. The redd survey will be completed visually, by boat (Figure 3.2).



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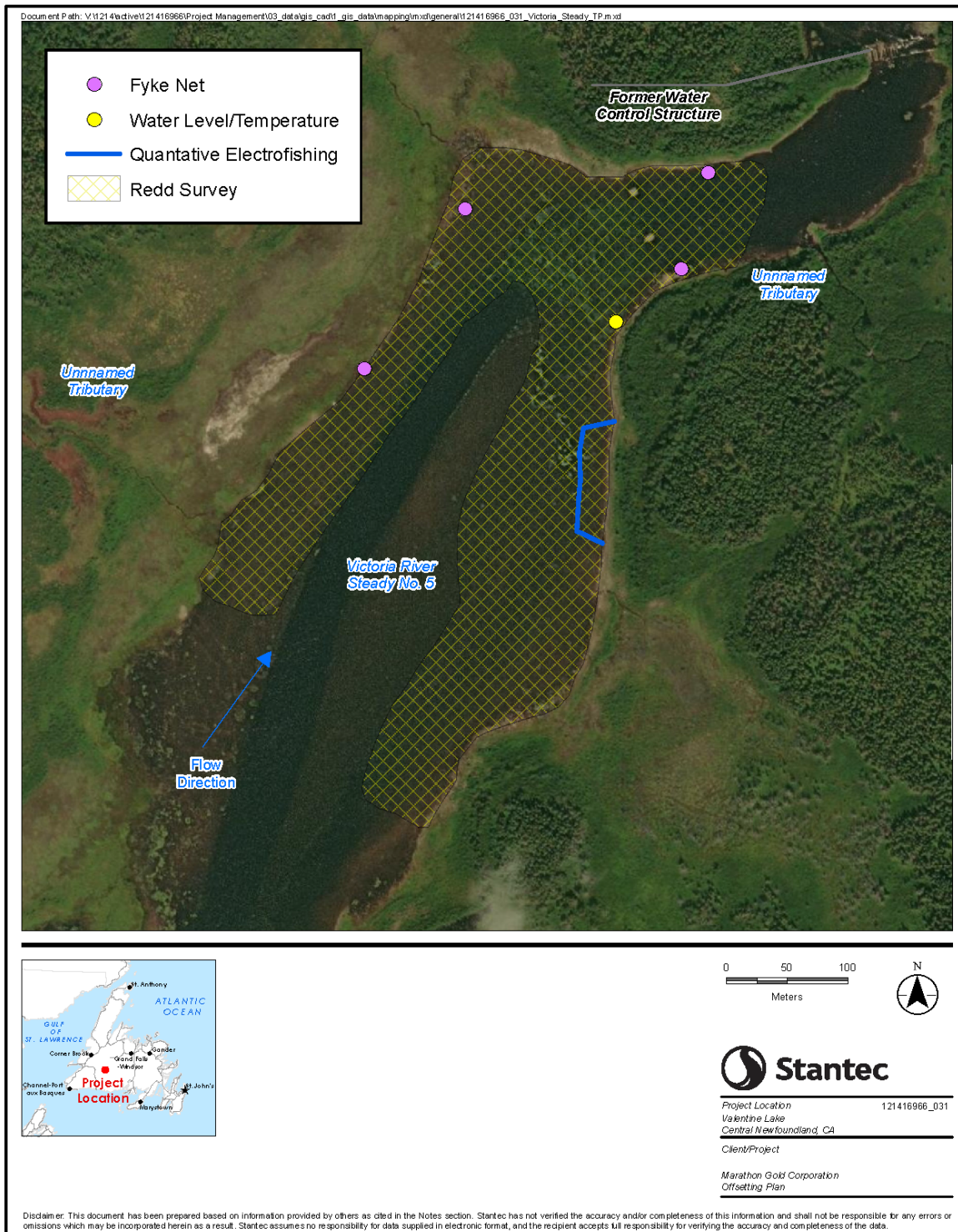


Figure 3.2 Proposed Biological Monitoring Locations Within the Area of Restoration on Victoria River Steady No. 5 Schedule



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The monitoring schedule is outlined in Table 3.2.

Table 3.2 Schedule of Restoration, Monitoring and Reporting Activities

Activity	Location	Year							
		Year -1	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
		2022	2023	2024	2025	2026	2027	2028	2029
Restoration/As-Built	Victoria River Steady No. 5	-	√	-	-	-	-	-	-
Habitat Monitoring	Victoria River Steady No. 5	Completed in 2021	-	√	√	√	-	√	√
	Reference Area*	-	-	-	-	-	-	-	-
Biological Monitoring	Victoria River Steady No. 5	√	-	√	√	√	-	√	√
	Reference Area	-	-	√	√	√	-	√	√
Reporting	Victoria River Steady No. 5 and Reference Area(s)	Dec 31	Dec 31	Dec 31	Dec 31	Dec 31	-	Dec 31	Dec 31
Note: * Although no pre and post habitat monitoring using transects and quadrats are proposed at the reference area, a general habitat survey and supporting environmental measurements will be collected to assess fish habitat usage (i.e., biological parameters) in association with the biological monitoring.									



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The proposed schedule is intended to allow sufficient time for a measurable change in physical habitat and biological parameters and subsequent habitat quality and fish habitat utilization improvements. The removal of additional submerged pulpwood may be required in subsequent years as fine substrates are flushed away potentially exposing more pulpwood. Initially, no supplemental substrates are proposed to be placed following pulpwood removal. However, a contingency for the placement of supplemental substrates and associated labour has been included if post-restoration monitoring indicates flushing did not expose high valued (HSI = 1) natural substrate.

3.3.3 Reporting

The results of the offsetting project will be documented through the following deliverables:

1. A baseline pre-restoration report documenting pre-restoration habitat conditions and existing habitat utilization within the area of restoration on Victoria River Steady No. 5. The report will include site layout maps, photos, quantification of baseline fish habitat indicators (e.g., physical parameters, habitat equivalency for both ouananiche and brook trout) and biological indicators (i.e., number of redds and estimates of fish abundance or density/biomass). An assessment of potential reference areas will also be included. Indicators may be modified following baseline data collection, with approval from DFO. The reports will be submitted to DFO by December 31, 2022.
2. A report documenting the submerged pulpwood removal activities within the area of restoration (Year 0). The report will contain an as-built drawing showing the area of restoration, quantity of submerged pulpwood removed, coordinates, and photos of the restoration. The report will be submitted to DFO by December 31, 2023.
3. Five post-restoration reports (Year 1, 2, 3, 5 and 6) documenting habitat conditions and fish habitat utilization within the area of restoration on Victoria River Steady No. 5 and a reference area. The report will include site maps, photos, quantification of fish habitat indicators (e.g., physical parameters and habitat equivalency) and biological indicators (i.e., number of redds or estimates of fish abundance or density/biomass). The post-restoration data will be compared to the pre-restoration and/or post-restoration data in the two monitoring areas over time, as applicable. The reports will be submitted to DFO by December 31 of the year field work is conducted.

4.0 CONTINGENCY MEASURES

The sections below describe contingency opportunities to be considered for implementation in the event that the proposed offsetting opportunity does not confirm the offsetting measures have been effective in counterbalancing the HADD of fish habitat. The locations of the additional offsetting opportunities relative to the Project are shown in Figure 4.1.



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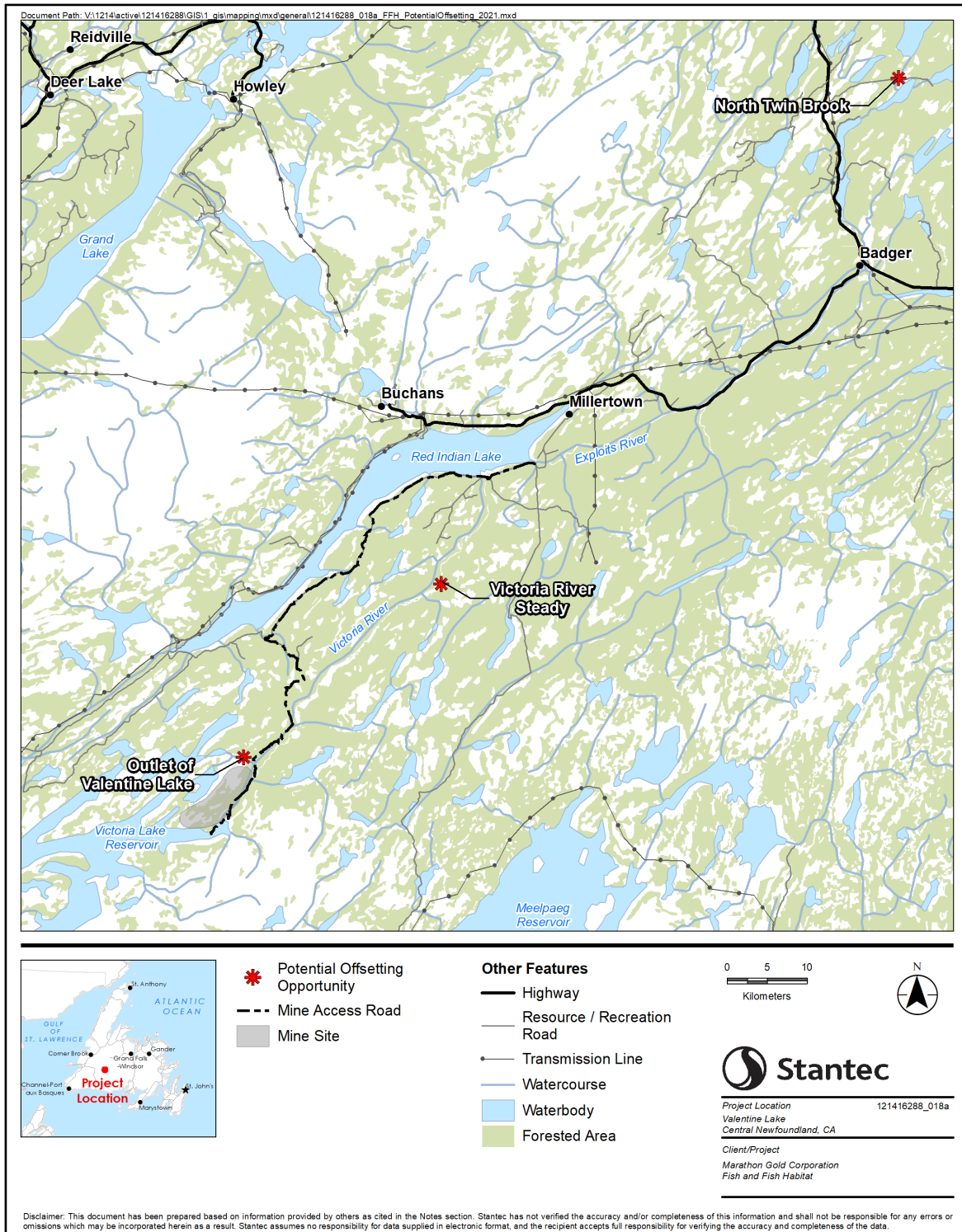


Figure 4.1 Location of Contingency Opportunities



4.1 OPTION 1: SUPPLEMENTAL HABITAT ENHANCEMENT IN VICTORIA RIVER STEADY NO. 5.

The preferred option for enhancing Victoria Steady No. 5 would be to provide additional fish habitat improvements at that location, prior to proceeding with the additional contingency options described below. These improvements may include the removal of additional submerged pulpwood which is located near the area of restoration, the mechanical removal of fines to expose coarser substrates, the addition of additional coarse substrates (beyond what is proposed above), addition of rock-clusters or deflectors to direct flow. These additional habitat improvements may require the input of a stream restoration specialist and take place following the post-restoration monitoring, as required.

4.2 OPTION 2: OUTLET OF VALENTINE LAKE CHANNELIZATION

The outlet of Valentine Lake contains rock walls which were constructed in the lower portion of the steady to divert logs away from the side channels and contain them within the main river channel (Photos 3 and 4). In total, there are three large walls, measuring 130, 20, and 55 m in length. The removal of the rock walls could facilitate increased flow through the downstream and southern portion of the steady, resulting in scouring of fine sediments to expose coarser substrates. Since the majority of substrates beneath the fines consist of small and large boulders, the addition of small and large gravel in this area would increase the available spawning habitats for salmonids and provide additional habitat for benthic invertebrate communities. Small and large boulders which make up the rock walls could be used to create “boulder” clusters within the steady or main river channel to provide structure for fish, increase the heterogeneity of the habitat, and provide additional areas for food (benthic invertebrate) production.

The potential area for restoration associated with the outlet of Valentine Lake channelization is 14,931 m². The opportunity is located on Crown Land which was formerly Abitibi charter lands.



Photo 3 Channelization in Outlet of Valentine Lake



Photo 4 Channelized Flow in Outlet of Valentine Lake



4.3 OPTION 3: NORTH TWIN BROOK CHANNELIZATION

There are numerous locations on North Twin Brook where rock walls were used to channel the river to facilitate log driving (Photos 5 and 6). The rock walls channelize flow and divert logs away from side channels and concentrate flow within the main river channel. In some areas, the rock walls and channelization resulted in dewatering of side channels or substantially reduced flow. The channelized area of the main river is observed to have high velocities, even when water levels are very low. The modification or removal of the rock walls would facilitate flow to areas of North Twin Brook which were historically wetted, even during low flow periods. Since the majority of substrates consist of small and large boulders, the addition of small and large gravel would increase the available spawning habitats and provide additional areas for benthic invertebrates (i.e., food for salmonids). Small and large boulders which make up the rock walls could be used to create boulder clusters within slower moving areas of the main channel to reduce flows, and provide resting places and structure for fish and additional areas for food production.

The potential area for restoration associated with North Twin Brook is 17,687 m². The opportunity is located on Crown Land that is licensed for forestry operations.



Photo 5 Channelized Section of River on North Twin Brook



Photo 6 Dry River Channel Behind Rock Wall on North Twin Brook



4.4 OPTION 4: NORTH TWIN BROOK OUTLET RESTORATION

In addition to the channelization that has occurred on North Twin Brook, the original outlet of North Twin Brook steady was blocked off and an alternate outlet channel was created to facilitate log driving . The alternate channel is straight and extends approximately 125 m, from North Twin Brook steady to the original channel of North Twin Brook. At the time of the survey, there was no flow though the former outlet channel of North Twin Brook, which extends approximately 375 m. The former outlet channel consists of dry and partially wetted stream bed and stagnant pools of warm water (Photo 7). The last pool in the former channel is filled with submerged pulpwood. Water velocities through the alternate channel are very fast, even during low flow periods (Photo 8). As a result, substrates throughout the alternate channel are relatively uniform and the habitat relatively homogenous.

The restoration of the original channel would include the removal of the rock wall blocking the original outlet of North Twin Brook steady to facilitate flow through the outlet, create fish habitat within the dry or partially wetted areas of the stream channel and improve velocities and water depths for fish. As the majority of substrates consist of small and large boulders the addition of small and large gravel would increase the available spawning habitats and provide additional areas for benthic invertebrates (i.e., food for salmonids). At the upstream end of the alternate channel, the outlet would be redesigned to increase the height of the water control, reduce flow through the alternate channel and divert flow to the original channel. Large boulders could also be used to provide resting places and structure for fish and increase the heterogeneity of fish habitat.

The potential area for restoration associated with North Twin Brook is 5,036 m². The opportunity is located on Crown Land that is licensed for forestry operations.



Photo 7 Pooled Water in Former Outlet of North Twin Brook



Photo 8 North Twin Brook Outlet Constructed Channel



4.5 MONITORING MEASURES

The monitoring of the contingency measures is similar to the monitoring measures described in Section 3.0.

The monitoring measures for the additional contingency measures would likely include:

- Use of fish habitat quality indicators including water depth, velocity and substrate
- Use of habitat equivalency and suitability metrics for brook trout and ouananiche to assess performance targets
- Use of biological metrics (e.g., backpack electrofishing) to assess salmonid density (number of fish per m²) and habitat utilization
- A before-after study design which includes baseline, restoration, and post-restoration monitoring to document an increase in habitat quality or habitat area for brook trout and/or ouananiche

5.0 POTENTIAL ADVERSE EFFECTS ON FISH AND FISH HABITAT

While the overall restoration of substrates in Victoria Lake Steady No. 5 is anticipated to result in a net gain in usable fish habitat for salmonids, there is the potential for small localized and temporary adverse effects during the restoration. The removal of submerged pulpwood may result in:

- Temporary disturbances to fish residing within the area of restoration
- Temporary increases in total suspended sediments as submerged pulpwood is removed from the river bottom
- Temporary increases in total suspended sediments during high rivers flows as fine sediments are transported downstream
- Temporary changes in food supply (i.e., benthic invertebrates) as a result of changes in the preferred substrates of benthic invertebrate taxa

6.0 MEASURES AND STANDARDS TO AVOID OR MITIGATE ADVERSE EFFECTS

The mitigation measures in Table 6.1 below, have been selected in consideration of the environmental effects pathways and include standard proven mitigation measures for sediment and erosion control, incorporating DFO standards and best management practices, and in consideration of regulations and guidelines that govern fish and fish habitat protection.



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Table 6.1 Mitigation Measures for Offsetting: Fish and Fish Habitat

Category	Mitigation
Works In or Near Fish Habitat	<ul style="list-style-type: none"> Disturbed areas will be limited to the extent practicable
	<ul style="list-style-type: none"> Riparian vegetation will be maintained and impacts to shorelines and banks will be limited
	<ul style="list-style-type: none"> Signs of erosion along the banks associated with the restoration (e.g., foot traffic) will be monitored and corrective action will be taken where required
	<ul style="list-style-type: none"> Submerged pulpwood will be removed manually; heavy equipment will not be used for removal of pulpwood
	<ul style="list-style-type: none"> Movement of equipment / vehicles will be restricted to defined work areas and roads
	<ul style="list-style-type: none"> An undisturbed vegetated buffer zone will be maintained near the high-water mark to the extent practicable
	<ul style="list-style-type: none"> Submerged pulpwood will be placed above the high high-water mark to reduce potential of re-entry into the watercourse
	<ul style="list-style-type: none"> In-water work will be planned in respect of DFO timing windows to protect fish in Newfoundland and Labrador (DFO 2019b), to the extent practicable and as required through letter(s) of advice and <i>Fisheries Act</i> Authorization issued for the Project
	<ul style="list-style-type: none"> Additional substrates (if needed) will include non-acid generating river rock, free of excessive fines
	<ul style="list-style-type: none"> In-water work will not obstruct or interfere with the movement or migration of fish
Materials Handling and Waste Management	<ul style="list-style-type: none"> Fuel storage will be a minimum of 200 m from a salmon river or tributary and 100 m from other waterbodies
	<ul style="list-style-type: none"> Refueling and servicing of equipment will not take place within 30 m of watercourses to reduce the likelihood that deleterious substances will enter watercourses; spill kits will be available

7.0 COST AND TIMELINE OF IMPLEMENTING THE OFFSETTING PLAN

The proposed offsetting plan will be implemented during construction of the Project, after the *Fisheries Act* Authorization and other required approvals have been obtained. The schedule to complete the various activities associated with the offsetting plan is subject to the timing of other necessary construction permits, market conditions and project financing. The estimated costs and timeline associated with the implementation of the offsetting plan are provided in Table 7.1 with a more detailed budget breakdown provided in Appendix B. The costs include consultant fees for the restoration and pre- and post-restoration monitoring, consultant expenses and equipment rentals, sub-consultant labour associated with the removal of submerged pulpwood, sub-consultant expenses and equipment rentals, a quantity of contingency substrates and associated labour (if needed) and costs associated with the access road upgrade. The estimate also includes a 20% contingency and variable inflation rate over the time period (range of 2.0 to 5.1%). Inflation estimates are based on the Bank of Canada long-term consumer price index forecasts for Canada (Macklem 2022). The pre-restoration habitat monitoring of Victoria River Steady No. 5 was completed in 2021 (Stantec 2022) and is not included in the cost estimates below.



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Table 7.1 High Level Costs Associated with Implementing the Proposed Offsetting Plan

Activity	Estimated Cost	Proposed Schedule
Pre-Restoration Monitoring	\$66,907	2022
Victoria River Steady No. 5 Restoration (Year 0) and Supplemental Substrates (if needed)	\$279,846	2023
As-Build Inspection (Year 0)	\$36,079	2023
Post-Restoration Offsetting Monitoring (Year 1)	\$99,311	2024
Post-Restoration Offsetting Monitoring (Year 2)	\$101,298	2025
Post-Restoration Offsetting Monitoring (Year 3)	\$103,324	2026
Post-Restoration Offsetting Monitoring (Year 5)	\$105,390	2028
Post-Restoration Offsetting Monitoring (Year 6)	\$107,498	2029
Total	\$899,653	-----

8.0 AUTHORIZATION FOR LAND ACCESS

The restoration area on Victoria River Steady No. 5 is located on Crown Land. Land access will be managed in consultation with Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture and applicable Crown Land grant holders.

9.0 CLOSURE

This document entitled Valentine Gold Project: Offsetting Plan to Support the Application for a Fisheries Act Authorization was prepared by Stantec Consulting Ltd. (“Stantec”) for the account of Marathon Gold Corporation (the “Client”). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.



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10.0 REFERENCES

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APPENDIX A

Pre-restoration and Post-restoration Habitat Equivalent Units

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Table A.1. Pre-Restoration Habitat Equivalent Units for Victoria River Steady No. 5, Valentine Gold Project Offsetting Plan

Total Area (m ²)	Brook Trout (HSI Rank)				Ouananiche (HSI Rank)				Maximum HSI of Brook Trout/Ouananiche (All Life Stages)	Habitat Equivalent Units Prior to Restoration (m ²)
	Spawning	Young of the Year	Juvenile	Adult	Spawning	Young of the Year	Juvenile	Adult		
	Substrate	Substrate	Substrate	Substrate	Substrate	Substrate	Substrate	Substrate		
6,962	0	0	0	0	0	0	0	0	0	0
3,520	0	0	0	0	0	0	0	0	0	0
10,179	0	0	0	0	0	0	0	0	0	0

Table A.2. Predicted Post-Restoration Habitat Equivalent Units for Victoria River Steady No. 5, Valentine Gold Project Offsetting Plan

Total Area (m ²)	Brook Trout (HSI Rank)				Ouananiche (HSI Rank)				Maximum HSI of Brook Trout/Ouananiche (All Life Stages)	Habitat Equivalent Units Following Restoration (m ²)
	Spawning	Young of the Year	Juvenile	Adult	Spawning	Young of the Year	Juvenile	Adult		
	Substrate	Substrate	Substrate	Substrate	Substrate	Substrate	Substrate	Substrate		
6,962	1	1	1	1	1	1	1	1	1	6,962
3,520	1	1	1	1	1	1	1	1	1	3,520
10,179	1	1	1	1	1	1	1	1	1	10,179

APPENDIX B

Detailed Cost Breakdown for Implementing the Offsetting Plan

Table B.1. Detailed Cost Breakdown Associated With Victoria River Steady No. 5 Offsetting

Category	Description	Year -1 Baseline Offsetting Monitoring / Reporting	Year 0 Restoration	Year 0 As Build Inspection Monitoring / Reporting	Year 1 Offsetting Monitoring / Reporting	Year 2 Offsetting Monitoring / Reporting	Year 3 Offsetting Monitoring / Reporting	Year 5 Offsetting Monitoring / Reporting	Year 6 Offsetting Monitoring / Reporting
Consultant Fees for Restoration and Monitoring	Project Management, Mob/Demob, Field Work, Reporting and Liason With Regulators.	\$38,862	\$17,012	\$21,193	\$63,087	\$63,087	\$63,087	\$63,087	\$63,087
Consultant Expenses	Vehicles, meals, flights and accomodations associated with inspection/monitoring	\$10,538	\$1,034	\$7,128	\$11,902	\$11,902	\$11,902	\$11,902	\$11,902
Consultant Equipment Rentals	Boat and motor, fish capture equipment, flow meter etc. associated with inspection/monitoring	\$3,651	\$240	\$300	\$2,997	\$2,997	\$2,997	\$2,997	\$2,997
Sub-Consultant Labour (i.e., Local Watershed Group)	Labour associated with a non-governmental organization completing the pulpwood removal and contingency substrates. Assumes four two person crews over 12 weeks for submedged pulpwood and 18 weeks for contingency substrates (if needed).	-	\$39,181	-	-	-	-	-	-
Sub-Consultant Expenses	Vehicles and meals associated with the restoration	-	\$78,643	-	-	-	-	-	-
Sub-Consultant Equipment Rentals	Boat and motor or other incidental field supplies associated with the restoration	-	\$36,181	-	-	-	-	-	-
Contingency Substrates	Assumes 25% of the HADD compensation area will require supplemental substrates approximately 0.1 m deep. Approximately 775 metric tons of sand, gravel, cobble and boulder substrates transported by dump truck.	-	\$37,703	-	-	-	-	-	-
Road Upgrade (Marathon)	Assumes 1.5 km of road maintenance/upgrade of existing old logging road from existing logging road to area of restoration	-	\$12,000	-	-	-	-	-	-
Contingency	Assumes 20%	\$10,610	\$44,399	\$5,724	\$15,597	\$15,597	\$15,597	\$15,597	\$15,597
Inflation	Assumes 5.1% for 2022, 2.5% for 2023 and 2.0% for 2024 to 2029	\$3,247	\$13,453	\$1,734	\$5,728	\$7,714	\$9,740	\$11,807	\$13,915
Total	Total	\$66,907	\$279,846	\$36,079	\$99,311	\$101,298	\$103,324	\$105,390	\$107,498