Baker Creek North Diversion Initial Assessment for Fish Habitat
Statement of Work

MV2007L8-0031

PWGSC proposes to amend the current Baker Creek Restoration Concept contract with Stantec. The current contract specifies that Stantec will produce fish habitat restoration concepts to existing Baker Creek and apply a Habitat Suitability Index to the same area that will be used for authorizations under the Fisheries Act. Given the recommended measures related to Baker Creek in the Report of the Environmental Assessment, PWGSC feels it is prudent to conduct some preliminary investigations into the possibility and reasonableness of a Baker Creek North diversion that would support fish species and habitat. As such the current contract with Stantec is to be amended to remove the delivery of restoration concepts to Lower Baker Creek and replace it with a Viability Assessment of Fish Habitat for a North Diversion of Baker Creek. The following is a detailed summary of the Statement of Work.

Below are items from the original proposal (May 7, 2013), as well as current status and their relevance in the new scope:

Task 1.0: Project Management
Manage staff, distribute information, establish schedule and meet it, QA/QC, producing and submitting the Final Report, establish budget and meet it. Brad Fairley will be responsible for project management. – **This item is still required.**

Task 2.0: Report Outline (Stantec with Golder Input)
In order to ensure that the project is headed in the right direction, the Terms of Reference (TOR) specifies that early in the process, Stantec is to submit a draft report outline. Stantec will prepare the report outline with input from Golder Associates. Following the submission of the outline (Table of Contents), Stantec will organize a conference call with the PWGSC PM to discuss, review and, if necessary, modify the Report Outline. – **This item has been completed.**

Task 3.0: Comprehensive Summary (Golder)
This task will focus on producing a comprehensive description of the historic and current ecosystem related to Reaches 0 thru 6 of Baker Creek. It will include a description of the fish habitat that currently exists in the Creek. The description will provide a summary of the amount, type and location of habitat for each reach. The hope is that the consultant can efficiently compile the existing information. With more than 10 years of involvement with Baker Creek, it is hoped that Golder can go beyond a simple summary and provide some useful insights and thoughts that may not have been presented in the existing reports. -**This item is still required**; a draft has been submitted to PWGSC. PWGSC to provide comments to Stantec.

Task 4.0: Review Background Information (Stantec with Golder Input)
While Golder is preparing the Comprehensive Summary Report, the members of the Stantec team will review the report's outline in Section 4.1 "Reports Related to Baker Creek" of the

TOR. The Stantec staff will become familiar with the site by reading the reports. The staff will more carefully review those reports which provide information relevant to their role in preparing the report (e.g., fisheries staff will review the habitat and biological sampling reports more carefully). All members of the team will carefully review the reports related to the restoration options (i.e., Giant Mine Remediation Plan, SENES/SRK 200&, Giant Mine Developer's Assessment Report (2010) and the Preliminary Design Report for Baker Creek (Golder, 2012), as the restoration concepts are to be based on those presented in these reports. Stantec will review the Comprehensive Summary Report prepared by Golder as soon as it is available.

Stantec will compile a list of any questions that arise during the review. The questions will be submitted to Golder for answers.

Stantec will identify and review examples of constructed creek/stream restoration compensation plans in the NWT, as well as southern projects that can be used as part of the restoration concepts report. Stantec will have Golder (familiar with the Giant Mine site and Baker Creek) prepare and deliver a PowerPoint Presentation via Webinar to the Stantec Team regarding the Giant Mine Site and the restoration reaches. This will help ensure that all members of the Stantec Team are familiar with the site. PWGSC will be invited to participate in this webinar. - **This item is completed.**

Task 5.0 Develop and Apply HSI Models to Existing Conditions (Stantec)
In order to ensure that the Habitat Suitability Indices for the existing conditions and the restoration options are developed in a consistent manner, PWGSC agreed that Stantec would develop the HSI for the existing conditions. The HSI model for Arctic Grayling will be refined and applied to the existing conditions. In addition, Stantec will apply HSI models for up to 5 additional species. It is assumed that the models for the additional species are available and approved by DFO. - **This Item is still require**d. Stantec has submitted a preliminary graph and PWGSC is awaiting comments from DFO.

Task 6.0: Outline Restoration Concepts (Stantec with Golder Input)
Based on the review carried out in Task 4.0, Stantec's restoration specialists will summarize the design criteria for the project (e.g., flows, etc.) and the general concepts developed by Golder in the PDR. Stantec will then develop up to 3 concepts for each reach. It should be noted that more than 3 options may be developed for Reach 6. The concepts will not be based solely on the geometry or physical structures associated with habitat. They will give consideration to ecological factors including food and cover. Stantec will take into account the factors that may affect habitat (e.g., realignment may cause elimination of shoreline habitat, dredging of sediment will eliminate benthic habitat and food source for fish, elimination of the pond will keep temperatures cooler).

Stantec will provide recommendations on the establishment of appropriate riparian zones, including appropriate species, methods of establishment and constraints or possible challenges with their use (e.g., growth rates, substrates). Stantec will provide a general statement with respect to the likely success and recovery time for each of the restoration concepts regarding the development of ecological functions and habitat for aquatic organisms and fish in a harsh

northern aquatic environment. Stantec will organize a webinar and present the restoration concepts to the client. Stantec will revise the concepts based on feedback from the client. – **This item is no longer required.**

Task 7.0: Evaluate Restoration Concepts (Stantec with Golder Input)

Based on the outlines prepared in work in Task 6.0, Stantec will develop a set of evaluation criteria. Stantec will present the criteria to the client. The criteria will be presented as part of the webinar identified in Task 6.0. Stantec will revise the criteria based on input from the client.

Using the agreed upon evaluation criteria, Stantec will evaluate the restoration concepts. This will be completed in a systematic manner. As noted in Section 5.0, this Task will be carried out via teleconference. The PM will prepare notes summarizing the discussion, distribute the notes to the team and revise them based on feedback. - **This item is no longer required.**

Task 7.1: Restoration Concepts

Stantec will evaluate the restoration concepts for each Reach individually (i.e., Reach 0 through 6). Stantec will identify and evaluate ways of restoring fish habitat and the adjacent riparian environment. For the Reaches where sediment removal is planned, Stantec will identify how best to do this to maximize fish habitat (e.g., removal depths, moving bed material from a non-contaminated reach into the dredged reach to jump start benthic populations) and how best to minimize damage to the riparian community while carrying out the work. For the reaches to be relocated, Stantec will identify how best to design the new channel to maximize fish habitat (the general alignment has been set so Stantec will focus pattern, dimension, profile, in-stream structures, and riparian vegetation. Stantec will provide drawings for typical instream and streambank structures. Stantec will also look at how best to implement the work to minimize damage to the riparian community and how best to restore the riparian community. For the reaches where all options are on the table, Stantec will identify which option would be best for fish habitat. - **This item is no longer required.**

Task 7.2: Recommendations

Stantec will look at the results from Task 7.1 as a package and determine if the recommendations warrant adjustment when considered as a package. - **This item is no longer required.**

Task 7.3: Sequence of Implementation

Stantec will consider the sequence of implementation. That is, in what order should the restoration options resulting from Task 7.2 be implemented to restore maximum fish habitat. For example, should the relocations take place first, or should the work take place in an upstream to downstream fashion.) - **This item is no longer required.**

Task 7.4: Schedule Consideration

Stantec will consider the schedule. For example, should the system be given a year or two to recover after the sediment removal takes place before any other restoration activities occurs. - **This item is no longer required.**

Task 7.5: Restoration Plan Summary

Stantec will summarize the results of the above to produce the ideal restoration plan for Baker Creek. - **This item is no longer required.**

Task 7.6: Monitoring Program

Stantec will outline a Monitoring Program(s) that would be effective in documenting the success of the proposed restoration activities. - **This item is no longer required.**

Task 8.0: Apply HSI Models to Post-Restoration Conditions (Stantec)

Based on the results of Task 7.5, Stantec will apply the HSI model for Arctic Grayling and HSI models for up to 5 additional species to the Restored Baker Creek System. It is assumed that the models for the additional species are available and approved by DFO. - **This item is no longer required.**

Task 9.0: Final Report

Using the summary notes from each conference call, Stantec will prepare a Final Report outlining the Recommended Restoration Plan. Stantec will submit a draft Final Report to PWGSC, address comments and submit a Final Report. - **This item is no longer required**.

The following items are to be captured in the new scope of work and reflected in the cost proposal and timeline estimate. Please include cost line items for each of the tasks below. It is worthwhile to note that some of the following items are very similar to the original Tasks; however the main variance is that these items would be applied to a proposed northern diversion as opposed to the existing lower Baker Creek.

1) Identify the target fish species (e.g., arctic grayling, Northern pike, walleye etc.) and seasonal use (e.g., spring, summer) for the North Diversion. Stantec will identify the fish to be considered in the viability assessment and detail the recommendation on why the particular species were choosen. (Predicted rate of success, recreational or aboriginal value, limiting habitat available in the general area, cost of implementation, etc.)
2) Background Data Collection and Survey - Stantec will consider available information on the North Diversion (Golder report, LIDAR data and DEM) and review it to ensure efficiency in the field. Stantec will conduct a site visit to collect survey data for the north diversion to accurately select an alignment and profile. Survey data will also be provided as a separate CAD file to PWGSC.
3) Stantec will conduct a review of the drainage areas and revise the flow data appropriately, considering the removal of effluent discharge, historic flow data and establish maximum flood thresholds.
4) Stantec will refine the alignment for the North Diversion and develop a single design. Note: Stantec is to determine the most reasonable route based on their review of information and survey, not necessarily carrying forward with concepts previously presented. The design will be based on the fish identified in step 1 (above) and will consider cost as well.

5) The design will include appropriate profiles, cross-sections, instream structures and bed material based on target fish species. The design will not be based on solely on the geometry or physical structures associated with habitat. The design will give consideration to ecological factors including cover. Stantec will take into account the factors that may affect habitat (e.g., blasting, dredging, inclusion of additional ponds, which may drive up temperatures or enhance habitat for pike). Stantec will consider fish passage in the design (e.g., to allow target species to access the reach). Stantec will consider riparian vegetation in the design. Stantec will provide recommendations on the establishment of appropriate riparian zones, including appropriate species, methods of establishment and constraints or possible challenges to their use (e.g., growth rates, substrates). Stantec will provide general comments on the likely success and the recovery time for the North Diversion. Note: This section should outline what, if any, data gaps are required to properly assess the North Diversion, such a bathymetry or limnological information on the existing lakes, point of discharge, etc.
6) Stantec will prepare a webinar and present the restoration concept to the client. Stantec will revise the concept based on feedback from the client.
7) Stantec will develop a rough cost estimate for the proposed North Diversion.
8) Stantec will provide recommendations regarding sequence and scheduling of implementation of construction activities to ensure success of the eco-engineering (habitat creation).
9) Stantec will develop a monitoring plan capable of documenting the success of the proposed restoration activities.
10) Apply HSI models to the Post Restoration Conditions - Stantec will apply the HSI models developed in Task 5 of the original Restoration Concepts Report proposal to the design for the proposed North Diversion. A summary calculation will be presented on whether there are outstanding habitat commitments. Note: the area of potential lost fish habitat in upper Baker Creek should also be presented here. It is understood that Stantec does not have detailed habitat information available, however some generalized numbers can be put forward, such as length of lost habitat due to realignment, average channel with, estimate on total spatial area of habitat lost, etc.
11) Stantec will provide Report outlining all the details above and will also provide an overall recommendation regarding the Viability of creating Fish Habitat for the North Diversion of Baker Creek. This recommendation is to include factors such as cost, complexity of the work required, overall benefit to species chosen, possible risks to fish populations or the existing ecosystem, etc.