SG1 Ref. No. 10222

25 August 2021

VANCOUVER ISLAND WHITEWATER PADDLING SOCIETY
P.O. Box 193
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Attention: Mr. J.R. (Rick) Bryan
Project Lead

Via email: rickbryan@shaw.ca

Re: Lake Cowichan Weir Modification Project
Engineering and Technical Support with Recreational Hydraulic Issues and Concerns
Follow-up to Recreational Memo Discussion with CVRD and Stantec

Dear Mr. Bryan:

This memorandum is a follow-up to a technical meeting involving key personnel from the Vancouver Island Whitewater Paddling Society (VIWPS), the Cowichan Valley Regional District (CVRD), Stantec Consulting Ltd. (Stantec), Recreation Engineering and Planning Inc. (REP), and SG1 Water Consulting Ltd. (SG1) that was held via web conference on 18 August 2021. The CVRD retained Stantec to develop the engineering design for the Lake Cowichan Weir Modification Project. REP and SG1 are acting on behalf of the VIWPS to provide engineering input and technical support regarding instream user safety and the potential for incorporating recreational amenities into the proposed modified design of the facility. Both SG1 and REP have been in the business of designing river improvement projects for over 35 years, including public recreational and safety projects, fish passage projects, dam removal / rehabilitation projects, and riverside parks and greenways.

This summary is based on discussions held during the August 18 meeting along with a review of the draft Preliminary Design Report by Stantec, dated 4 June 2021, and the Final Design Presentation by the CVRD and Stantec held online in a public forum on 8 July 2021 and attended by REP and the VIWPS. In addition, Darren Shepherd of SG1 conducted a site reconnaissance on 22 June 2021 when the weir was "on control" and the river discharge was being ramped down and close to its mandated set point of 7 m^3/s. The information and observations gathered on this project have allowed REP and SG1 to thoroughly review and to provide meaningful input on the weir modification project.

The CVRD stated at the outset of the meeting that (i) the final design of the weir modifications is now complete as per the terms of the funding agreement and (ii) they have no desire to revise the proposed final design concept. We were informed that the funds for this project are strictly for fish improvements, not for recreational improvements. It was also made clear that the only way to possibly include recreational amenities as part of the project would be to utilize the reach of the Cowichan River immediately downstream of one of the four control structure gates; under no circumstances would the

design or layout of the proposed south abutment fishway be modified to accommodate boat passage or river users. Developing a recreational amenity (in the form of a playwave feature) by modifying one of the control gate bays and utilizing its outflow may be feasible from an engineering perspective; however, such an approach would require the facility operator to release flow past Lake Cowichan Weir in addition to what is necessary for operation of the new south abutment fishway. Based on our experience, developing a decent playwave for kayakers in this situation would require a minimum flow rate on the order of 4 m^3/s to 5 m^3/s. For this feature to function properly, the CVRD would need to agree to release this amount of water through a dedicated bay of the control structure over the summer months – and possibly over the fall and winter seasons when flow releases are higher and the weir is no longer on control.

The overall purpose of the weir modification project is to raise the weir crest elevation by 0.7 m and includes improvements and/or upgrades to the boat lock, island sill, vertical slot fish passage, and control structure. Our main concern is regarding the proposed new south abutment fishway that will extend south of the control structure on the right (south) overbank. This fish passage facility is intended to pass adult and juvenile migrants in both directions throughout the year, with the target species being salmon (coho, chum, chinook, and kokanee) and trout (rainbow, steelhead, cutthroat, and brown). As shown on Stantec's Drawing No. 20093-S501, the proposed facility is composed of an upstream forebay that is separated from a rockfill ramp fishway channel by a vertical concrete partition wall. The wall is comprised of nine gated rectangular ports, each 1500 mm wide by 400 mm high and with a 200 mm wide by 550 mm high slot at the bottom, set at varying elevations along the length of the wall. It is understood that the gate openings will be manually adjusted by the facility operator based on lake levels and flow release requirements to the Cowichan River. It is not a "natural-like" fishway as presented in the Stantec (2021) report.

Our concerns with the south abutment fishway proposed by Stantec and accepted by the CVRD are as follows:

1) The partition wall poses a serious threat to public safety as people who inadvertently enter the water upstream of the partition wall could be drawn into the gated ports (under pressure) and held under water and potentially drown. The geometry and placement of the ports within the water column make them highly susceptibly to trapping a body and/or limb entrapment. In addition, the proposed rockfill ramp structure downstream of the wall poses a threat to human safety by having protruding sharp rocks installed at its surface.

2) The facility requires fish to attain the rockfill ramp, then swim through gated openings in a concrete wall that may be closed, under pressure, or above the lake surface depending on the lake level and river flow. There appears to be a lack of hydraulic modelling to support and confirm whether the proposed fishway is capable of successfully passing upstream migrants over the range of flows, let alone using such a design-aid tool to evaluate the hydraulic design of the facility. It is not clear from the Stantec (2021) report if the design considered the expected flow conditions for fish movement periods, which include spring and fall spawners.

3) The fish passage facility will not provide any open water connectivity between the lake and the river for fish or recreational boat passage. From an aesthetic perspective, it will appear to be an unsightly concrete wall to the public, not a nature-mimicking facility as presented by the CVRD and Stantec.

An open water channel was included as an alternative design for the south abutment fishway; however, Stantec confirmed that it was eliminated because “the geometry was an issue” and that it would be difficult hydraulically to accommodate the fluctuation in lake level. Furthermore, the Stantec (2021) report states that, “The outcome of the discussion [regarding the two options for the south abutment fishway] was direction that Stantec should proceed with the design of Option B [which is the final design as it currently stands].” The open-channel option, which was only assessed by Stantec at a conceptual level and not studied in detail, would provide for a more effective and reliable design for fish passage and could also be utilized to create a recreational amenity that is firmly supported, as evidenced by the public survey conducted by Stantec in June/July 2020.

We are confident that it is possible to achieve an open-channel design for a new fishway structure along the right bank that is effective at facilitating fish movement while also improving public safety and creating an attractive recreational amenity with user safety as its primary objective. The cost to construct this combined fishway/recreational bypass option should be as cost effective as Stantec’s proposed fishway. In fact, it is expected that the costs associated with operation and long-term maintenance of the combined bypass option would be considerably less than that of the facility currently proposed by Stantec.

There are many examples of fish/recreational bypass channels similar to this project that have been developed adjacent to water management facilities. REP and SG1 have not been commissioned to complete a detailed hydrotechnical assessment for the bypass option; however, we have reviewed the project design in enough detail to be confident that the more natural open-channel bypass option, as proposed herein, is the more viable and effective option.

We trust that the information contained in this memorandum is sufficient for your present needs. Please do not hesitate to contact the undersigned should you have any questions or wish to discuss.

Sincerely,

SG1 WATER CONSULTING LTD.

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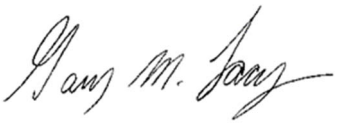
RECREATION ENGINEERING AND PLANNING



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