

CONSULTANT TEAM REVIEW MEMORANDUM

Intake Preliminary Selection Overview

To: Alison Regan P.Eng., SCMP	From: MPE Engineering Ltd. Team
Director of Projects (WaterSmart Solutions)	cc: Steve Herman
Re: GIG Water Intake Approval	Date: March 1, 2023
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Email: alison.regan@watersmartsolutions.ca	

1.0 INTRODUCTION

Preliminary hydrotechnical design was completed by Northwest Hydraulic Consultants (NHC) for a water intake on the Smokey River and the draft report reviewed by the Owner Group and Project Team. The Option 2 location of the river intake was recommended by NHC and accepted by all. Selection of the river intake structure from the options provided by NHC is the next step in advance of proceeding with further pre-design work.

2.0 PURPOSE

Two intake geometry alternatives to Option 2 (Option 2A and Option 2B) were presented in NHC's report and this memorandum intends to review, summarize discussions, and provide a recommendation of the preferred alternative for Consultant Team consideration. The objective is for the Consultant Team's consensus adoption of the preferred intake structure alternate. The pre-design for the intake and pumping station can then proceed based on the selected alternate.

3.0 REVIEW OF OPTION 2 ALTERNATIVES

The table on the following page briefly compares the two alternatives to Option 2 based on NHC's report.

Option 2 Intake Geometry Comparison		
Geometry Alternative	2A – 13.8m x 8.8m x 3.6m	2B – 29m x 4.7m x 3.4m
Description	Short Stout Configuration i.e., smaller intake with Fish Screens inside each chamber.	Long, Skinny Configuration i.e., larger structure with Fish Screens at the ports. Two screens/ports per chamber.
Screen Type and location	Tee screen installed at the conductor pipe inlet inside the chamber. To be oriented perpendicular to the ports to minimize structure size.	Rectangle screens, installed at the inlet ports behind the bar racks. Intake ports must match the screen size.
Approx. Structure Aquatic Footprint	As shown in Figure 28 of the Prelim Hydrotechnical Report and covers a smaller area relative to Option 2B.	As shown in Figure 30 of the Prelim Hydrotechnical Report. However, estimated to be approximately 1.70 times larger than 2A
Coffer Dam Requirement	Size to suit construction of the structure.	Much larger coffer dam than 2A required.
Fish Protection	Screening with approach velocities < 0.035 m/s for Burbot fish. Fish return system is required.	Screening with approach velocities < 0.035 m/s for Burbot fish. Screen rejects fish at inlet to intake structure. Fish return system not required.
Port size per Chamber	3.98 m ²	10.14 m ²
Screen Security - Frazil Ice	Screens are in the chambers and suspended clear from impact. Potentially more resistant to effects of frazil ice.	Exposed to frazil ice which could block the screens.
River Rock Bank Impact	About 13.8m of the length of rock bank needs to be excavated.	About 29m of the length of rock bank needs to be excavated.
Chamber Maintenance	Chambers will need routine cleaning of sediment.	Chambers will need routine cleaning of sediment.
Screen Maintenance	Backwash and Airburst System (if required).	Backwash and Airburst System (likely required).

Selection of the preferred option for this project will factor heavily on regulatory approval requirements and in particular the option that presents the least impact on the river and the aquatic habitat. Option 2A is estimated to have a footprint or aquatic impact area that is approximately 1.70 times smaller than the aquatic impact area of Option 2B. Option 2B's structure also extends out into the river further than Option 2A does. Based on this, Option 2A would likely be the more preferred option by the regulatory agencies.

The smaller footprint of Option 2A is driven by the screen design being inside the intake chambers instead of at the inlet ports as is the case of Option 2B. The screens being independent of the inlet ports in Option 2A allows for an optimised compact design to reduce the inlet structure faces and overall footprint. For both options, the back faces of the intake structures would be integrated into the river's rock bank, Option 2B has about twice the length of face hence it would require more time and cost to integrate its structure to the riverbank than would Option 2A.

Option 2A requires construction of a smaller coffer dam structure which becomes a significant factor considering the very short non-restrictive activity period (July 16 to July 31) within the river. The smaller footprint of the temporary coffer dam together with the smaller permanent footprint of the final intake structure shall in both cases present less of an obstacle within the river from a navigation standpoint which will be a consideration for Transport Canada (Navigable Waters).

Another advantage of having the screens in the intake chamber for Option 2A is the screens would not be susceptible to debris impact damage and could be less susceptible to frazil ice during river freeze up. Option 2B carries more risk of the exposed screens being damaged by debris impact or blocked by frazil ice.

Option 2A would be a more cost-effective alternative than Option 2B because of the lower footprint. A lower footprint area typically means less construction costs and less offset costs for habitat loss.

One disadvantage of Option 2A is that a fish pumping system would be required to return the fish to the river from the chambers. This is deemed an acceptable method of practise in industry for intakes of this nature. However, this does involve another mechanical process that requires operation and maintenance. Also, debris material that gets through the bar screens at the port may build up within the chamber. However, routine cleaning of the chambers will be required for either intake option.

A significant advantage of Option 2B is that a fish return system is not required due to the screen locations being incorporated at the inlets to the intake structure.

4.0 CLOSING

Of the geometry options presented by NHC for Option 2 River Intake, MPE recommends the Project Team consider Option 2A – the smaller Intake with fish screens on the inside, as the preferred option. We seek consensus from the Consultant Team on the selection.