



Columbia River Water Use Plan

Physical Works Terms of Reference Addendum 2

**CLBWORKS-27 Lower Columbia White Sturgeon Physical Works:
Physical works options to address white sturgeon recruitment failure
in the lower Columbia River – Phase 3 Implementation**

December 4, 2021

Addendum 2 to CLBWORKS-27 Lower Columbia White Sturgeon Physical Works: Physical works options to address white sturgeon recruitment failure in the lower Columbia River

Physical Works Terms of Reference

1.0 Context

This Terms of Reference (TOR) Addendum 2 is for the Phase 3 Implementation of the CLBWORKS-27 Lower Columbia White Sturgeon Physical Works: Physical works options to address white sturgeon recruitment failure in the lower Columbia River. Following through the TOR dated March 2017, we have completed Phase 1: Hydraulic Modeling and Restoration Option Development for the three identified white sturgeon spawning areas (see West et al. 2020) and Phase 2: Construction Design/Definition (see Golder 2021). Phase 1 resulted in a recommendation of restoring spawning substrate at the Keenleyside (ALH) spawning area. Phase 2 resulted in a detailed construction design and plan.

This TOR is submitted in response to the *Water Act* Order issued by the Comptroller of Water Rights (CWR) on January 26, 2007, Schedule F, Clause 2(a) and Conditional Studies List Clause 10(a). The Order requires TOR for the “physical works options to address credible hypotheses for sturgeon recruitment failure in the lower Columbia River”.

2.0 Project Location

The lower Columbia River is in the West Kootenay Region of British Columbia and extends 57 km from Hugh L. Keenleyside Dam (HLK) to the Canada-USA Border. While three white sturgeon spawning areas were assessed for feasibility of spawning substrate restoration in Phase 1 of this project, the ALH spawning area (river kilometer (rkm) 0.1), was the only recommended candidate to continue to Phase 2 Construction Design/Definition. This area of interest is immediately downstream of HLK and Arrow Lakes Generating Station (Figure 1); both facilities provide a source of inflow, with the primary area of egg deposition being immediately downstream of the Arrow Lakes facility. Spawning at the ALH area has been previously documented at this location with geographical boundaries described by Terraquatic Resource Management (2011).

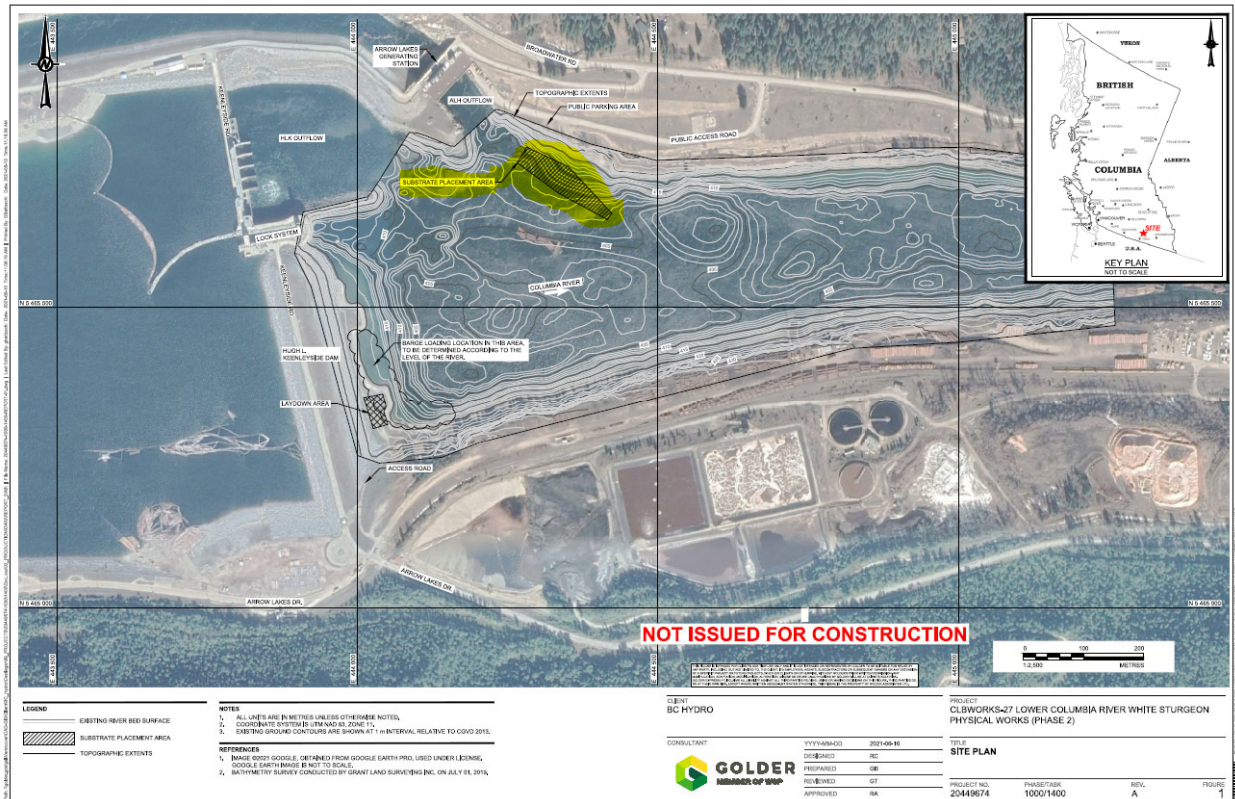


Figure 1: Location of Hugh Keenleyside Dam and substrate placement area (highlighted)

3.0 Phase 3 Implementation and Completion

This phase is the subject of this TOR and involves the implementation and completion of the detailed design developed during Phase 2 Construction Design.

This phase also includes obtaining any outstanding permitting (bulk of permitting work was initiated under Phase 2), construction, and completion reporting including ongoing maintenance, post-construction monitoring, and effectiveness monitoring as required. Biological monitoring will be completed post construction, via the concurrent Columbia WUP White Sturgeon Management Plan monitoring studies and collaboration through the Upper Columbia White Sturgeon Recovery Initiative. Post construction, the spawning habitat is expected to function effectively for 5 years. Performance of the habitat will be assessed via physical and biological monitoring. A provision has been included in this TOR to replenish up to 50% of gravel in each of Year 3 and Year 5, if required (see Section 4.6).

3.1 Task 1: Project Coordination

Project coordination involves the general administration and technical oversight of the program, which will include, but not be limited to project planning, resource identification and management, obtaining any outstanding permits, scope management and control, schedule oversight, and budget management and reporting.

3.2 Task 2: Construction planning and management

This task involves the support and oversight of a construction contractor to ensure the project is delivered to requirements.

The task includes but is not limited to:

- Constructability review and planning with contractor, including site visits;
- Procurement and negotiation of supply/install contracts, as appropriate to deliver on the design specifications;
- Construction planning and development of construction management plan; and
- Review of contractor's safety management plan and environmental protection plan.

3.3 Task 3: Construction

It is anticipated that the construction will be delivered on a supply/install basis (i.e., a contractor will be responsible for purchasing materials and installation. Construction includes spawning habitat restoration, which will be completed via placement of mixed size substrate (i.e., gravel and cobble) using a long-reach excavator stationed on a barge. Substrate placement is planned in an area approximately 5,880 m² within the spawning area (see Figure 1), which is immediately downstream of the ALH tailrace. General construction activities include dunnage placement, anchor setting, bathymetric surveys, and cleanup. The estimated duration of the instream work is 45 days and the timing is subject to operations and fisheries risks (see Section 4.3 below). The following tasks will be required during the construction:

- Construction management oversight on-site to ensure the contractor delivers on the requirements of the contract;
- Appropriate environmental monitoring and reporting;
- As required, archeological monitoring and reporting; and
- Oversight/inspection by the design engineer.

The timing of the construction window is dependent on operations and fisheries risk, as follows:

- Construction will be scheduled for a period outside of the sturgeon spawning window (instream works either in early spring, or in fall) when discharge flows are lowest. This will be coordinated with BC Hydro and Columbia Power Corporation (CPC).

3.4 Task 4: Completion reporting & inspection

This involves development of the final completion records for the life cycle of the project including construction reports, as built drawings, inspection reports and monitoring.

3.5 Task 5: Ongoing monitoring – physical and biological

Annual monitoring will be completed to ensure the functionality of the spawning habitat. Biological monitoring will be completed via the concurrent Columbia WUP White Sturgeon Management Plan monitoring studies, and in collaboration with members of the Upper Columbia White Sturgeon Recovery Initiative. Biological monitoring will determine frequency of use of the area for spawning, early life stage rearing success, and, longer-term, identify any recruitment associated with the habitat restoration.

Physical monitoring is included in this TOR and will be completed via a separate contract from the construction work. This physical monitoring will include an annual inspection of the spawning habitat and a determination of continued substrate suitability for spawning and early life stage rearing.

3.6 Task 6: Substrate replenishment (if required)

The results of physical monitoring from Task 5 above will inform a decision about whether replenishment of substrate at the spawning area is required. Discussions will be held with the Technical Committee that guided the Phase 1 Option Development to review results from biological and physical monitoring and determine if replenishment is required. This TOR includes provision for up to 50% substrate replenishment in each of Year 3 and 5.

4.0 Schedule

The anticipated project schedule is as follows. Should permits not be received in time, the construction window would need to be shifted to winter 2023 or to another DFO-approved work window.

Task/Milestone	2021	2022 (Year 1)	2023 (Year 2)	2024 (Year 3)	2025 (Year 4)	2026 (Year 5)
Constructability Review		X (winter)				
Procurement	X (winter)					
Permitting obtained		X (winter)				
Construction		X (spring or fall)				
Physical monitoring			X (summer)	X (summer)	X (summer)	X (summer)
Substrate Replenishment (if required)				X (spring or fall)		X (spring or fall)

5.0 Budget

Estimated construction cost for initial placement, 5 years of physical monitoring, and 2 years of refurbishment is: \$5,309,003 (include 2% inflation and 20% contingency)

6.0 References

Golder Associates Ltd. (Golder). 2021. CLBWORKS-27 Lower Columbia River White Sturgeon Physical Works (Phase 2) Engineering Design Memorandum. A technical memorandum submitted to BC Hydro.

Terraquatic (Terraquatic Resource Management). 2011. Arrow Lakes Generating Station White Sturgeon Spawn Monitoring Program (p. 19). Castlegar, BC: Report for Columbia Power Corporation.

West, D.T., M.J. Bayly, A.D. Tamminga, T. Perkins, L. Porto, M. Parsley and T. Hatfield. 2020. CLBWORKS-27 - Lower Columbia White Sturgeon Habitat Restoration Alternatives – Final Report. Consultant’s report prepared for BC Hydro and Power Authority by Ecofish Research Ltd. July 27, 2020.