

Columbia River Project Water Use Plan

Kinbasket and Arrow Recreational Management Plan

Monitoring Program and Physical Works

Annual Report: 2022

Implementation Period: January 2021 to December 2021

- **CLBMON-14 Boat Ramp Use Study**
- **CLBWORKS-4 Kinbasket: Bulldog Creek New Ramp**
- **CLBWORKS-5A Kinbasket: Valemount Boat Launch**
- **CLBWORKS-5B Kinbasket: Valemount Boat Launch Maintenance**
- **CLBWORKS-6A Kinbasket: Nixon Creek Boat Launch**
- **CLBWORKS-6B Kinbasket: Nixon Creek Boat Launch Maintenance**
- **CLBWORKS-7A Kinbasket: Bush Harbour Boat Launch**
- **CLBWORKS-7B Kinbasket: Bush Harbour Boat Launch Maintenance**
- **CLBWORKS-9 Revelstoke Ramp Extend or Build**
- **CLBWORKS-11A Arrow: Burton Boat Launch**
- **CLBWORKS-11B Arrow: Burton Boat Launch Maintenance**
- **CLBWORKS-12A Arrow: Edgewood Boat Launch**
- **CLBWORKS-12B Arrow: Edgewood Boat Launch Maintenance**
- **CLBWORKS-13A Arrow: Fauquier Boat Launch**
- **CLBWORKS-13B Arrow: Fauquier Boat Launcher Maintenance**
- **CLBWORKS-14A Arrow: McDonald Creek Park Boat Launch**
- **CLBWORKS-14B Arrow: McDonald Creek Park Boat Launch Maintenance**
- **CLBWORKS-16 Kinbasket: Debris Inventory, Management Strategy and Removal**
- **CLBWORKS-17 Arrow: Debris Inventory, Management Strategy and Removal**
- **CLBWORKS-18 Kinbasket & Arrow: Feasibility of Boat Ramps**
- **CLBWORKS-19 Lower Columbia: Indian Eddy Dredging Environmental and Engineering Assessment**
- **CLBWORKS-20 Lower Columbia: Indian Eddy Dredging**
- **CLBWORKS-21 Lower Columbia: Indian Eddy Debris Removal Environmental Review**
- **CLBWORKS-22 Lower Columbia: Indian Eddy Debris Removal**
- **CLBWORKS-23 Kinbasket & Arrow: Debris Removal Environmental Review**
- **CLBWORKS-32 Anderson (Renata) Boat Launch**
- **CLBWORKS-33A Arrow: Syringa Boat Launch**
- **CLBWORKS-33B Arrow: Syringa Boat Launch Maintenance**
- **CLBWORKS-35 Mid-Columbia: Bank Erosion Protection and Monitoring Program**
- **CLBWORKS-36 Mid-Columbia: Long-term Erosion Monitoring Program**

January 31, 2022

- **CLBWORKS-40 Kinbasket: Site Preparation and Debris Work**
- **CLBWORKS-41 Kinbasket: Floating Debris Removal**
- **CLBWORKS-43A Nakusp Boat Launch**
- **CLBWORKS-43B Nakusp Boat Launch Maintenance**
- **CLBWORKS-45 Anderson (Renata) Boat Launch Maintenance**
- **CLBWORKS-50A Shelter Bay Boat Launch**
- **CLBWORKS-50B Shelter Bay Boat Launch Maintenance**
- **CLBWORKS-51A Martha Creek Boat Launch Maintenance**
- **CLBWORKS-52A Downie Creek Boat Launch Maintenance**

Conditional Water Licences for Kinbasket storage (27068 and 39432), Mica diversion (39431), Revelstoke diversion and storage (47215), and Arrow storage (27066)

BC Hydro Columbia River Project Water Use Plan Kinbasket and Arrow Reservoir Recreational Management Plan Annual Report: 2022

1 Introduction

This document represents a summary of the status and the results of the Kinbasket and Arrow Reservoir Recreational Management Plan Water Use Plan (WUP) monitoring programs and physical works to December 31, 2021, as per the Columbia River Order under the *Water Act*, dated January 26, 2007. There is one monitoring program and 37 physical works.

2 Status

The following table outlines the dates that Terms of Reference (TOR) for the Kinbasket and Arrow Reservoir Recreational Management Plan WUP monitoring program and physical works were submitted to and approved by the Comptroller of Water Rights (CWR).

Table: 2-1: Dates of Kinbasket and Arrow Reservoir Recreational Management Plan WUP TOR Submissions and Approvals by the Comptroller of Water Rights

*Columbia River Water Use Plan – Kinbasket & Arrow Reservoir Recreation Management Plan
Monitoring Programs and Physical Works Annual Report: 2022*

Monitoring Program & Physical Works TOR	Order Clause	Original ToR Submission		Most Recent ToR Resubmission	
		Date Submitted	Date Approved	Date Submitted	Date Approved
CLBMON-14 Boat Ramp Use Study	Conditional, 2(b), 6(b)	Nov 13, 2009	Dec 17, 2009	Mar 31, 2016	Apr 08, 2016
CLBWORKS-4 Kinbasket: Bulldog Creek New Ramp	Conditional, 2(a)	Oct 24, 2007	Not Ordered Mar 03, 2008		
CLBWORKS-5A Kinbasket: Valemount Boat Launch	Conditional, 2(a)	Oct 24, 2007	Mar 03, 2008	May 31, 2019	Jul 09, 2019
CLBWORKS-5B Kinbasket: Valemount Boat Launch Maintenance	Conditional, 2(a)	Oct 24, 2007	Mar 03, 2008	May 31, 2019	Jul 09, 2019
CLBWORKS-6A Kinbasket: Nixon Creek Boat Launch	Conditional, 2(a)	Oct 24, 2007	Mar 03, 2008	Jun 22, 2009	Sep 18, 2009
CLBWORKS-6B Kinbasket: Nixon Creek Boat Launch Maintenance	Conditional, 2(a)	Oct 24, 2007	Mar 03, 2008	Apr 30, 2018	May 18, 2018
CLBWORKS-7A Kinbasket: Bush Harbour Boat Launch	Conditional, 2(a)	Oct 24, 2007	Mar 03, 2008	Aug 31, 2017	Nov 07, 2017
CLBWORKS-7B Kinbasket: Bush Harbour Boat Launch Maintenance	Conditional, 2(a)	Oct 24, 2007	Mar 03, 2008	May 26, 2017	Jun 05, 2017
CLBWORKS-9 Revelstoke Ramp Extend or Build	Conditional, 3(a)	Oct 24, 2007	Mar 03, 2008	Cancelled	Mar 14, 2011
CLBWORKS-11A Arrow: Burton Boat Launch	Clause M (ONR)	Jul 25, 2007	Aug 29, 2007	Jan 07, 2015	Feb 05, 2015
	Schedule D.4	Jul 25, 2007	Aug 29, 2007	Jan 07, 2015	Feb 05, 2015
CLBWORKS-11B Arrow: Burton Boat Launch Maintenance	Clause M (ONR)	Jul 25, 2007	Aug 29, 2007	May 04, 2017	May 11, 2017
	Schedule D.4	Jul 25, 2007	Aug 29, 2007	Jun 24, 2013	Jul 16, 2013
CLBWORKS-12A Arrow: Edgewood Boat Launch	Clause M (ONR)	Apr 02, 2013	Apr 24, 2013	Aug 24, 2015	Aug 28, 2015
	Schedule D.4	Mar 02, 2012	Jul 26, 2012	Jan 20, 2015	Feb 05, 2015
CLBWORKS-12B Arrow: Edgewood Boat Launch Maintenance	Clause M (ONR)	Apr 02, 2013	Apr 24, 2013	Aug 11, 2017	Sep 13, 2017
	Clause M (ONR)	Jul 25, 2007	Aug 29, 2007	Jan 07, 2015	Feb 04, 2015
CLBWORKS-13A Arrow: Fauquier Boat Launch	Clause M (ONR)	Jul 25, 2007	Aug 29, 2007	Jan 07, 2015	Feb 04, 2015
	Schedule D.4	Jul 25, 2007	Aug 29, 2007	Mar 02, 2012	Jul 26, 2012
CLBWORKS-13B Arrow: Fauquier Boat Launch Maintenance	Clause M (ONR)	Jun 22, 2009	Sep 18, 2009	Jun 09, 2017	Jul 06, 2017
Monitoring Program & Physical Works TOR	Order Clause	Original ToR Submission		Most Recent ToR Resubmission	
		Date Submitted	Date Approved	Date Submitted	Date Approved
CLBWORKS-14A Arrow: McDonald Creek Park Boat Launch	Clause M (ONR)	Jul 25, 2007	Aug 29, 2007	Jan 07, 2015	Feb 04, 2015
	Schedule D.4	Jul 25, 2007	Aug 29, 2007	Feb 19, 2014	May 08, 2014
CLBWORKS-14B Arrow: McDonald Creek Park Boat Launch Maintenance	Clause M (ONR)	Jul 25, 2007	Aug 29, 2007	Jun 26, 2017	Jul 06, 2017
CLBWORKS-16 Kinbasket: Debris Inventory, Management Strategy and Removal	(ONR) Conditional, 1(a)(b)	Nov 20, 2008	Nov 28, 2008	Aug 17, 2020	Oct 23, 2020
	Conditional, 1(a)(b)	Oct 26, 2007	Mar 05, 2008	Aug 17, 2020	Oct 23, 2020
CLBWORKS-17 Arrow: Debris Inventory, management Strategy and Removal	(ONR) Conditional, 5(a)(b)	Oct 26, 2007	Mar 05, 2008	Aug 17, 2020	Oct 23, 2020
	Conditional, 5(a)(b)	Oct 26, 2007	Mar 05, 2008	Aug 17, 2020	Oct 23, 2020
CLBWORKS-18 Kinbasket & Arrow: Feasibility of Boat Ramps	Schedule A, 4(a) Schedule C, 3(a) Schedule D, 4(a)	Apr 20, 2007	May 03, 2007	Mar 19, 2012	Not approved per letter of Jul 30, 2012
CLBWORKS-19 Lower Columbia: Indian Eddy Dredging Environmental and Engineering Assessment	Schedule E, 1(b)	Jul 24, 2007	Aug 29, 2007	Feb 02, 2009	Mar 26, 2009
CLBWORKS-20 Lower Columbia: Indian Eddy Dredging	Conditional, 8(a)	Sep 13, 2010	Nov 10, 2010 approval to develop TOR	Nov 14, 2016	Jan 27, 2017
CLBWORKS-21 Lower Columbia: Indian Eddy Debris Removal Environmental Review	Schedule E, 1(a)	Jul 24, 2007	Aug 29, 2007		
CLBWORKS-22 Lower Columbia: Indian Eddy Debris Removal	Conditional, 8(b)	Jun 25, 2009	Jul 13, 2009		
CLBWORKS-23 Kinbasket & Arrow: Debris Removal Environmental Review	Schedule A.3.a, Schedule D.3.a	Apr 27, 2007	May 03, 2007		
CLBWORKS-32 Arrow: Anderson (Renata) Boat Launch	Schedule D.4	Nov 13, 2009	Mar 15, 2010	Nov 17, 2015	Dec 03, 2015
	Clause M (ONR)	Jan 22, 2015	Feb 04, 2015	Feb 25, 2015	Feb 27, 2015
CLBWORKS-33A Arrow: Syringa Boat Launch	Schedule D.4	Nov 13, 2009	Not Approved per letter of Mar 15, 2010		
CLBWORKS-33B Arrow: Syringa Boat Launch Maintenance	Clause M (ONR)	May 04, 2017	May 11, 2017		
CLBWORKS-35 Mid-Columbia: Bank Erosion Protection and Monitoring Program	Amended Order, 2(a)	Jul 31, 2008	Sep 11, 2008	Mar 23, 2011	May 16, 2011
CLBWORKS-36 Mid-Columbia: Long-term erosion monitoring program	Amended Order, 2(d)	Jul 31, 2008	Sep 11, 2008		
CLBWORKS-40 Kinbasket: Site Preparation and Debris Work	(ONR)	Mar 12, 2008	Mar 28, 2008	Dec 12, 2008	Dec 16, 2008
		Mar 12, 2008	Mar 28, 2008	Dec 12, 2008	Dec 16, 2008
CLBWORKS-41 Kinbasket: Floating Debris Removal	Conditional, 1(c)	Mar 12, 2008	Mar 28, 2008	Dec 12, 2008	Dec 16, 2008
CLBWORKS-43A Nakusp Boat Launch	Clause M (ONR)	Apr 02, 2013	Apr 16, 2013	Jan 12, 2015	Feb 04, 2015
CLBWORKS-43B Nakusp Boat Launch Maintenance	Clause M (ONR)	Apr 02, 2013	Apr 16, 2013	Aug 11, 2017	Sep 29, 2017
CLBWORKS-45 Anderson (Renata) Boat Launch Maintenance	Schedule D.4	Nov 13, 2009	Mar 15, 2010	Sep 14, 2017	Nov 07, 2017
CLBWORKS-50A Shelter Bay Boat Launch	Clause M (ONR)	Jan 22, 2015	Feb 04, 2015	Sep 24, 2015	Oct 01, 2015
CLBWORKS-50B Shelter Bay Boat Launch Maintenance	Clause M (ONR)	May 04, 2017	May 11, 2017		
CLBWORKS-51A Martha Creek Boat Launch Maintenance	Clause O (ONR)	Nov 16, 2018	Dec 20, 2018	Mar 09, 2021	Mar 25, 2021
CLBWORKS-52A Downie Creek Boat Launch Maintenance	Clause O (ONR)	Nov 16, 2018	Dec 20, 2018		

3 Schedule

The following table outlines the current schedule for the monitoring programs and physical works being delivered for the Kinbasket and Arrow Reservoir Recreational Management Plan WUP.

Table 3-1: Monitoring Programs and Physical Works Schedule as of December 31, 2021.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
	WLR YR1	WLR YR2	WLR YR3	WLR YR4	WLR YR5	WLR YR6	WLR YR7	WLR YR8	WLR YR9	WLR YR10	WLR YR11	WLR YR12	WLR YR13	WLR YR14	WLR YR15	WLR YR16	WLR YR17	WLR YR18	WLR YR19	WLR YR20	WLR YR21	WLR YR22
Monitoring Programs																						
CLBMON-14 Boat Ramp Use Study				✓	✓	✓	✓			✓	✓	✓	✓									
Physical Works																						
CLBWORKS-5A Kinbasket: Valemount Boat Launch					✓	✓	✓			✓		✓	✓									
CLBWORKS-5B Kinbasket: Valemount Boat Launch Maintenance						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	■	■	■	■	■	■	■
CLBWORKS-6A Kinbasket: Nixon Creek Boat Launch Ramp not Ordered																						
CLBWORKS-6B Kinbasket: Nixon Creek Boat Launch Maintenance					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	■	■	■	■	■	■	■
CLBWORKS-7A Kinbasket: Bush Harbour Boat Launch				✓	✓	✓	✓	✓														
CLBWORKS-7B Kinbasket: Bush Harbour Boat Launch Maintenance					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	■	■	■	■	■	■	■
CLBWORKS-9 Revelstoke Ramp Upgrade Ramp not Ordered				✓																		
CLBWORKS-11A Arrow: Burton Boat Launch				✓	✓	✓	✓	✓	✓													
CLBWORKS-11B Arrow: Burton Boat Launch Maintenance					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	■	■	■	■	■	■	■
CLBWORKS-12A Arrow: Edgewood Boat Launch							✓	✓	✓													
CLBWORKS-12B Arrow: Edgewood Boat Launch Maintenance								✓	✓	✓	✓	✓	✓	✓	✓	■	■	■	■	■	■	■
CLBWORKS-13A Arrow: Fauquier Boat Launch				✓	✓				✓													
CLBWORKS-13B Arrow: Fauquier Boat Launch Maintenance						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	■	■	■	■	■	■	■
CLBWORKS-14A Arrow: McDonald Ramp Boat Launch				✓	✓			✓	✓													
CLBWORKS-14B Arrow: McDonald Boat Launch Maintenance						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	■	■	■	■	■	■	■
CLBWORKS-16 Kinbasket: Debris Inventory, Management Strategy and Removal		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	■	■	■	■	■	■	■
CLBWORKS-17 Arrow: Debris Inventory, Management Strategy and Removal		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	■	■	■	■	■	■	■
CLBWORKS-18 Feasibility of Boat Ramps	✓	✓	✓																			
CLBWORKS-19 Lower Columbia: Indian Eddy Dredging Environmental and Engineering Assessment	✓	✓	✓																			
CLBWORKS-20 Lower Columbia: Indian Eddy Dredging								x	✓	✓												
CLBWORKS-21 Lower Columbia: Indian Eddy Debris Removal Environmental Review		✓	✓																			
CLBWORKS-22 Lower Columbia: Debris Removal at Indian Eddy			x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	■						
CLBWORKS-23 Kin and Arrow: Debris Removal Environmental Review	✓	✓																				
CLBWORKS-32 Arrow: Anderson (Renata) Boat Launch						✓	✓	✓	✓	✓												
CLBWORKS-33A Arrow: Syringa Boat Launch									✓													
CLBWORKS-33B Arrow: Syringa Boat Launch Maintenance										✓	✓	✓	✓	✓	✓	■	■	■	■	■	■	■
CLBWORKS-35 Mid Columbia Bank Erosion Protection and Monitoring				✓	✓	✓	✓		✓													
CLBWORKS-36 Mid Columbia Long Term Erosion Monitoring			✓	✓	✓	✓		✓		✓												
CLBWORKS-40 Site Prep and Debris Work		✓	✓	✓	✓																	
CLBWORKS-41 Kinbasket: Flsating Debris Removal																						
CLBWORKS-43A Nakusp Boat Launch							✓	✓	✓	✓												
CLBWORKS-43B Nakusp Boat Launch Maintenance									✓	✓	✓	✓	✓	✓	✓	■	■	■	■	■	■	■
CLBWORKS-45 Anderson (Renata) Boat Launch Maintenance									✓	✓	✓	✓	✓	✓	✓	■	■	■	■	■	■	■
CLBWORKS-50A Shelter Bay Boat Launch									✓	✓		✓										
CLBWORKS-50B Shelter Bay Boat Launch Maintenance										✓	✓	✓	✓	✓	✓	■	■	■	■	■	■	■
CLBWORKS-51A Martha Creek Boat Launch Maintenance												✓	✓	✓	✓	■	■	■	■	■	■	■
CLBWORKS-52A Downie Creek Boat Launch Maintenance												✓	✓	✓	✓	■	■	■	■	■	■	■
¹ Project formerly labelled as CLBWORKS-33 Syringa referred to a WUP project that was never ordered. The name and number was reused for the clause (m) required project at Syringa Park.																						
Legend: ■ = Program to be undertaken/initiated in identified year = = Approval of upcoming Terms of Reference submission will determine if program is to be undertaken/initiated in identified year ✓ = Program completed for the year * = Program started, but encountered operational or hydrological delays ✓F = All field work for this project is complete. No further field work is planned.																						

4 Monitoring Programs and Physical Works Terms of Reference

The monitoring programs and physical works being implemented under the Kinbasket and Arrow Reservoir Recreational Management Plan WUP are

described in Terms of Reference. These Terms of Reference and the reports for work completed to date can be found here:

http://www.BC Hydro.com/about/sustainability/conservation/water_use_planning/southern_interior/columbia_river/kinbasket-recreation.html

5 Status of Monitoring Programs

5.1 CLBMON-14 Boat Ramp Use Study

The objective of CLBMON-14 is to monitor boat launch traffic and use in-person surveys to measure the general public's satisfaction and use of upgraded boat launches on both Kinbasket and Arrow Reservoirs.

This monitoring project was initiated in 2010 and field work for this 10-year project was completed in 2019.

The final report with the 2010-2019 results is attached. This project is complete.

6 Status of Physical Works

6.1 CLBWORKS-5A Kinbasket: Valemount Boat Launch

Under Clause (m) of Conditional Water Licence 27068, BC Hydro is required to provide reservoir access at Valemount. Under the Columbia WUP order (File: 76975-35/Columbia), BC Hydro was required to evaluate the construction of a new ramp or extension of the existing ramp at Valemount. The Valemount Marina site is located on the eastern shore of the northern-most end of the Kinbasket Reservoir. It is located approximately 24 km off Highway 5.

The construction design was approved by the CWR on September 18, 2009. Most of the construction was completed in 2011 and some final construction was further completed in 2013. Boarding floats were replaced in 2016.

On September 14, 2017, the CWR accepted that the ramp as constructed with a toe elevation of El. 727.6 m (2387.1 ft) meets the requirements to provide reservoir access at Valemount.

Discussions continued over 2021 with stakeholders related to the breakwaters, and agreement was reached related to the proposed additional breakwater located to the north of the ramp at Valemount. A 60m length of polyethylene piping will be installed alongside a portion of the lower ramp, to provide wind and wave protection to boaters launching.

The TOR resubmission date is targeted for March 2022.

6.2 CLBWORKS-5B Kinbasket: Valemount Boat Launch Maintenance

BC Hydro will continue to provide maintenance on access-related facilities at the Valemount boat launch as per the Kinbasket and Arrow Recreation Management Plan Maintenance Plan 2017 submitted January 30, 2017.

An updated maintenance TOR was approved by the CWR on July 9, 2019 which included an estimate for future repairs to the southern rock breakwater. An inspection will be completed in spring 2022 to document the current status of the breakwater, which will inform planning for repairs.

6.3 CLBWORKS-6A Kinbasket: Nixon Creek Boat Launch

Under Clause (m) of Conditional Water Licence 27068, BC Hydro is required to provide reservoir access at Nixon Creek. Under the Columbia WUP Order (File: 76975-35/Columbia), BC Hydro was required to evaluate the construction of a new ramp or extension of the existing ramp at Nixon Creek.

The Nixon Creek boat launch is located approximately 93 km from the turn-off to Donald which is a westbound exit off Highway 1 when headed towards Revelstoke from Golden. It is a gravel ramp.

The feasibility evaluation for a concrete ramp to El. 712.1 m at Nixon Creek was included in the October 5, 2007 report (CLBWORKS-18). Evaluation of five alternative sites was completed in the December 24, 2009 report, also under CLBWORKS-18. The Nixon Creek ramp upgrades were considered not feasible due to long term site access concerns. The alternative sites were also all deemed not feasible due to either similar access concerns as Nixon, topography, or large capital costs for construction.

Given the results of these feasibility studies, on March 3, 2008 the CWR approved re-grading of the existing gravel ramp. The re-grading work was completed in 2011.

This project is complete.

6.4 CLBWORKS-6B Kinbasket: Nixon Creek Boat Launch Maintenance

BC Hydro will continue to provide annual cleanup of the gravel ramp at Nixon Creek, according to the maintenance TOR which was approved by the CWR on March 3, 2008. An updated maintenance TOR was submitted to the CWR's office April 30, 2018 and approved on May 18, 2018.

6.5 CLBWORKS-7A Kinbasket: Bush Harbour Boat Launch

Under Clause (m) of Conditional Water Licence 27068, BC Hydro is required to provide reservoir access at Bush Harbour. Under the Columbia WUP Order (File: 76975-35/Columbia), BC Hydro was required to evaluate the construction of a new ramp or extension of the existing ramp at Bush Harbour. The Bush Harbour site is located approximately 42 km from the exit to Donald – a westbound exit off Highway 1 when headed towards Revelstoke from Golden.

On September 18, 2009, the CWR approved construction on the Bush Harbour launch. Construction for these works occurred between 2011 and May 2013, to a toe elevation of El. 725.3 m (2379.6 ft).

On November 17, 2017, the CWR accepted that the ramp as constructed with a toe elevation of El. 725.3 m (2379.6 ft) meets the requirements to provide reservoir access at Bush Harbour. The ramp is expected to provide accessibility 99.8% of the time during the peak recreation season.

This project is complete.

6.6 CLBWORKS-7B Kinbasket: Bush Harbour Boat Launch Maintenance

BC Hydro will continue to provide maintenance on access-related facilities at the Bush Harbour boat launch as per the Kinbasket and Arrow Recreation

Management Plan Maintenance Plan 2017 submitted January 30, 2017, and the specific TOR for Bush Harbour approved on June 5, 2017.

Significant structural maintenance was completed on the ramp in 2018 due to erosion that had begun to undercut the sides and integrity of the ramp.

Based on the condition assessment completed in 2020, we investigated options for structural repair or replacement of all or a portion of the breakwater at Bush Harbour. BC Hydro's Construction Services group will build and replace the segments of the breakwater in most need of repair in late spring of 2022.

6.7 CLBWORKS-9 Revelstoke Ramp Extend or Build (Not Ordered)

The Revelstoke boat launch is also known as Centennial Park boat launch. The Centennial Park boat launch is in the City of Revelstoke, on property owned by the City. The launch is approximately eight km downstream of the Revelstoke Dam.

Under the Columbia WUP Order (File: 76975-35/Columbia), BC Hydro was required to evaluate the construction of a new ramp or the upgrade of an existing ramp at Centennial Park. The feasibility study for the Centennial Park launch upgrade was included in the October 5, 2007 report (CLBWORKS-18). The preliminary designs explored the possibility of extending the ramp and improving safety by realigning the ramp to reduce its exposure to river currents. In a letter dated September 18, 2009, the CWR approved the preliminary designs.

However, BC Hydro was unable to enter into an agreement with the landowner for the upgrades. The City of Revelstoke, as the landowner, continued to have concerns about safety of the ramp usage even with the revised design. In a letter dated January 21, 2011, the City of Revelstoke requested the CWR re-evaluate its decision regarding improvements at Centennial Boat Ramp due to ongoing safety concerns.

Subsequently, by letter dated March 14, 2011, the CWR relieved BC Hydro of the obligation to refurbish the Centennial Park ramp. No further work is required.

6.8 CLBWORKS-11A Arrow: Burton Boat Launch

Under Clause (m) of Conditional Water Licence 27066, and by *Water Act* order (File No. 0236915) dated January 23, 2006, BC Hydro is required to provide reservoir access at Burton. The original Burton launch (with a toe elevation of El. 431 m (1414 ft), was located within the Burton Historical Park (formerly a Provincial Park) near the community of Burton, 32 km south of Nakusp.

Under the Columbia WUP Order (File 76975-35/Columbia), BC Hydro was required to evaluate the construction of a new ramp or extension of the existing ramp at Burton. The feasibility report dated July 13, 2007, (CLBWORKS-18) explored two alternative sites in addition to the extension and upgrade of existing ramp within Burton Historic Park, and recommended a greenfield site located approximately five km south of Burton. The alternative site was suitable due to the natural slope of the foreshore, access to deeper lake bed elevations, and minimal environmental impacts. On September 18, 2009, the CWR approved the design and implementation phase for the Burton (South) alternative.

The CWR confirmed the budget and final design requirements on February 5, 2015. The site design includes a ramp of El. 425.5 m (1396 ft), with an access road from the highway, parking lot, turnaround, walkway and breakwater.

Construction took place between 2010 and 2015 and was completed in April 2015 with the ramp toe elevation of El. 425.4 m (1395.7 ft). The ramp is expected to provide accessibility 99.9% of the time during the peak recreation season.

This project is complete.

6.9 CLBWORKS-11B Arrow: Burton Boat Launch Maintenance

BC Hydro will continue to provide maintenance on access- and non-access related facilities at the Burton boat launch according to the maintenance TOR for Burton which was approved on May 11, 2017.

Due to the current condition of the breakwater, investigation of options for structural repair or replacement of all or a portion of the breakwater at Burton are ongoing. The options currently being pursued would not require a TOR resubmission and would utilize the existing contingency already approved.

6.10 CLBWORKS-12A Arrow: Edgewood Boat Launch

Under Clause (m) of Conditional Water Licence 27066, and by *Water Act* Order (File No. 0236915) dated January 23, 2006, BC Hydro is required to provide reservoir access at Edgewood. Under the Columbia WUP Order (File 76975-35/Columbia), BC Hydro was required to evaluate the construction of a new ramp or extension of the existing ramp at Edgewood. The boat launch at Edgewood is located in the Provincial Park near the community of Edgewood. The concrete ramp is constructed to El. 425.76 m (1396.7 ft).

The July 13, 2007 feasibility report recommended a design which incorporated a gravel transition at the end of the existing concrete ramp to facilitate low water launching. On April 23, 2013, the CWR approved the agreed conceptual design and cost estimates for erosion reinforcement of the existing concrete ramp with a gravel transition to the floor of the reservoir, the addition of breakwaters and, replacement of the floating walkway.

In 2013, Columbia Power Corporation completed the installation of the walkway, floating breakwaters and upper ramp reinforcements. Work on the ramp extension was postponed in 2014 due to high water.

The ramp reinforcement and walkway work were completed in spring 2015 to an elevation of El. 425.76 m (1396.9 ft), with gravel transition. Following safety concerns expressed by the community, the southern breakwater was moved to a new location between the ramp and the spit in October 2015. The elevation of the ramp is expected to provide access 100% of the time during the peak recreation season.

This project is complete.

6.11 CLBWORKS-12B Arrow: Edgewood Boat Launch Maintenance

BC Hydro will continue to provide access-related maintenance at this location according to the maintenance TOR (approved on September 13, 2017) which outlines BC Hydro's ongoing responsibilities.

6.12 CLBWORKS-13A Arrow: Fauquier Boat Launch

Under Clause (m) of Conditional Water Licence 27066, and by *Water Act* Order (File No. 0236915) dated January 23, 2006, BC Hydro is required to provide reservoir access at Fauquier. Under the Columbia WUP Order (File: 76975-35/Columbia, BC Hydro was required to evaluate the construction of a new ramp or extension of the existing ramp at Fauquier. The Fauquier boat launch is located in Fauquier Provincial Park, off Highway 6 just north of Fauquier Creek and a 45-minute drive to Nakusp. The ramp toe reaches elevation El. 424.7 m (1393.4 ft).

The feasibility report for Fauquier dated July 13, 2007, (under CLBWORKS-18) identified a low water option to El. 419.7 m (1376.9 ft) as recommended by the CC. This option required the creation and maintenance of a dredged channel to access the concrete ramp due to the reservoir contours at the location.

On September 8, 2009, the CWR approved the installation of floating walkways, breakwaters and access ramp, as well as the extension, based on preliminary cost estimates. In 2010 and 2011, BC Hydro installed a floating walkway, two breakwaters and an access ramp for the floating walkway.

On February 4, 2015, following BC Hydro's resubmissions on the feasibility of dredging a channel for a low water ramp access, the CWR confirmed the existing elevation of 424.7 m (1393.4 ft) meets the water licence requirement.

Some adjustments to the breakwater placement were completed by BC Hydro in 2015. The elevation of the ramp is expected to provide access 100% of the time during the peak recreation season.

This project is complete.

6.13 CLBWORKS-13B Arrow: Fauquier Boat Launch Maintenance

BC Hydro will continue to provide maintenance on access-related facilities according to the maintenance TOR approved by the CWR on July 6, 2017.

6.14 CLBWORKS-14A Arrow: McDonald Creek Park Boat Launch

Under Clause (m) of Conditional Water Licence 27066, and by *Water Act* Order (File No. 0236915) dated January 23, 2006, BC Hydro is required to provide reservoir access at McDonald Creek. Under the Columbia WUP Order (File: 76975-35/Columbia), BC Hydro was required to evaluate the construction of a new ramp or extension of an existing ramp at McDonald Creek Park. McDonald Creek boat launch is located in McDonald Creek Provincial Park, located approximately 12 km south of Nakusp. This ramp met the TOR approved by the CWR on August 28, 2006.

The end of the ramp at McDonald Creek was at El. 429.2 m (1408.1 ft) at the time of the July 13, 2007 feasibility report (CLBWORKS-18). On September 18, 2009, (and February 4, 2015) the CWR approved the design and installation of the floating walkway and breakwaters, as well as approval for ramp extension and turnaround.

In 2010, BC Hydro installed the piles for the floating walkway. In spring 2014, the scour protection on the existing ramp and floating walkway were installed as well as the turnaround.

With low water in 2015, the extension of the ramp to El. 426 m (1397.6 ft) was completed, with the installation of a creek diversion on the north side of the ramp, and two floating breakwaters. The elevation of the ramp is expected to provide access 100% of the time during the peak recreation season.

This project is complete.

6.15 CLBWORKS-14B Arrow: McDonald Creek Park Boat Launch Maintenance

BC Hydro will continue to provide maintenance on access-related facilities at this according to the maintenance TOR as approved by the CWR on July 6, 2017.

Due to the current condition of the breakwater, investigation of options for structural repair or replacement of all or a portion of the breakwater at Burton are ongoing. The options currently being pursued would not require a TOR resubmission and would utilize the existing contingency already approved.

6.16 CLBWORKS-16 Kinbasket: Debris Inventory, Management Strategy and Removal

Debris removal estimates for the Kinbasket Reservoir over the past few years include:

- 2013 – 50,000 m³
- 2014 – 35,000 m³
- 2015 – 38,540 m³
- 2016 – 25,240 m³
- 2017 – 39,300 m³
- 2018 – 14,980 m³
- 2019 – 17,620 m³
- 2020 - 55,000 m³
- 2021 – 36,875 m³

Debris removed from Kinbasket reservoir on an annual basis contributes to achieving the management objectives of removing navigational hazards and maintaining shoreline access.

The collection of reservoir-derived wood in 2021 was effective despite above normal reservoir levels in the early fall which delayed land-based collection. A total of 36,875 m³ of wood was collected and all was burned. Land-based spring collection commenced in Canoe Reach in early April during seasonally low water levels and ended by mid-June due to rapidly increasing fire danger. Collection and burning resumed in Canoe Reach mid-October once reservoir levels lowered and continued until end of November 2021. A total of 6925 m³ of wood debris deposited in the 2020 summer reservoir high water was collected, piled and burned from three km of shoreline at the north end of Canoe Reach. In Columbia Reach, a total of 29,950 m³ of wood was collected, 17,800 m³ of which was floating wood in southern parts of the reservoir including along the northern shoreline of Bear Island, with the remainder being land-based collection from other locations on Bush Arm.

Of the total 36,875 m³ collected in 2021, new debris inputs from tributaries, landslides and avalanches are an estimated 5-10% of the total.

On December 4, 2019, the CWR approved the creation of an accurate inventory of remaining debris on Kinbasket Reservoir. The debris inventory using May 14,

2019 aerial photography is complete. The reservoir total debris volume in May 2019 was 839,850 m³, a substantially higher volume than the value of 255,000m³ woody debris remaining in the Kinbasket system which was based on prior methods (helicopter and drone-based inventory). Debris volumes calculated for the Kinbasket by category are:

Debris Accumulation Type	Volume (m ³)	Percentage
Scattered wood debris	450,000	54%
Moderate density debris “bathtub ring”	335,000	40%
Dense debris “bathtub ring”	30,000	4%
Slide inputs	19,000	2%
Piled wood debris (pre-burning)	4625	<1%
Single logs	700	<1%
Floating Wood	525	<1%
Total	839,850	100%

The updated volume calculation and details on data collection were presented at the November 2021 update and consultation with the Golden and Valemount Debris Committees.

The 2022 update is planned for April 2022 including continued discussion of volume-based debris removal approaches using the updated May 2019 volume estimate.

6.17 CLBWORKS-17 Arrow: Debris Inventory, Management Strategy and Removal

Debris removal estimates for the Arrow Reservoir over the past few years include:

- 2013 – 23,319 m³
- 2014 – 9,900 m³
- 2015 – 4,100 m³
- 2016 – 4,200 m³
- 2017 – 4,000 m³
- 2018 – 5,500 m³
- 2019 – 4,500 m³
- 2020 – 1,240 m³
- 2021 – 6,415 m³

Debris removed from Arrow Lakes reservoir on an annual basis contributes to achieving the management objectives of removing navigational hazards and maintaining shoreline access. In 2021, the program removed 6,415 m³ of debris removal from beaches in the southern part of the reservoir from Hutchinson Creek north to McDonald Creek Boat Launch. The Octopus Creek fire burned down to the shoreline in summer 2021 and may result in an increase in debris entering from unstable banks in these areas.

The May 2019 debris inventory is allowing BC Hydro to better estimate the volume of debris that needs to be removed from Arrow Lakes reservoir on an annual basis to achieve the management objectives of removing navigational hazards and maintaining shoreline access. An updated debris removal approach using the debris inventory was presented to the Arrow Lakes Debris Committee in 2021.

6.18 CLBWORKS-18 Kinbasket and Arrow: Feasibility of Boat Ramps

The objective of this project was to determine the feasibility of extending or constructing ramps at multiple sites on Kinbasket and Arrow Lakes reservoirs. The studies included engineering technical feasibility, heritage values environmental values and cost analysis.

- For Kinbasket, sites were considered at Bulldog Creek, Game Creek, Smith Creek, Bush Arm Recreation Site, South Gold Arm, Esplanade, Valemount Marina, Nixon Creek, and Bush Harbour.
- On Arrow Lake Reservoir, ramp sites were considered for Burton (multiple sites), Fauquier, Edgewood, McDonald Creek Park, Centennial Park Ramp, multiple sites in the Syringa Creek/Renata area (e.g., Anderson), and Shelter Bay Provincial Park.

This project was completed in December 2009.

6.19 CLBWORKS-19 Lower Columbia: Indian Eddy Dredging Environmental and Engineering Assessment

The objectives of the project were to assess the following:

1. Whether sand from Gyro Park has been eroding and depositing sediment in Indian Eddy;
2. Whether such deposition was due to changes in flushing flows on the Columbia River, and
3. Whether dredging, if required, would cause residual environmental impacts.

This project was completed in September 2009.

6.20 CLBWORKS-20 Lower Columbia: Indian Eddy Dredging

Following the submission of CLBWORKS-19 reports, the CWR developing a two-phased TOR on November 10, 2010. The first phase TOR would include a detailed dredging and material disposal plan with extensive sampling of the sediment and an assessment of risks. Subsequently, a TOR for the second phase would be submitted for the actual dredging work. BC Hydro began drafting

the first phase TOR in 2011 and was not completed due to a reorganization and resource constraints.

The Definition Phase TOR was approved on September 8, 2015. A bathymetric survey and stakeholder engagement were completed in 2016. Based on these findings it was determined that the existing sediment at Indian Eddy did not pose a safety risk to boater access at the site. Consequently, the CWR granted relief on January 27, 2017 for any subsequent dredging.

This project is complete.

6.21 CLBWORKS-21 Lower Columbia: Indian Eddy Debris Removal Environmental Review

Project was completed in 2008.

6.22 CLBWORKS-22 Lower Columbia: Indian Eddy Debris Removal

Debris removal started in 2010 will continue annually until 2019. Additional funds were remaining in the existing contract so the contribution agreement between BC Hydro and the City of Trail was extended for an additional three years (2020 to 2022) for the Indian Eddy debris removal program.

6.23 CLBWORKS-23 Kinbasket and Arrow: Debris Removal Environmental Review

Project was completed in 2007.

6.24 CLBWORKS-32 Arrow: Anderson (Renata) Boat Launch

Under the Columbia WUP Order, Schedule D, Clause 4.v, BC Hydro was required to recommend an option for up to two boat launch sites between Renata and Syringa Creek Park. The feasibility report dated October 23, 2009 for two ramps between Renata and Syringa on the lower Arrow Reservoir was undertaken as part of CLBWORKS-18. During public meetings in 2009 and 2010, BC Hydro received a consensus recommendation for only one site at Anderson Point (Renata).

On October 12, 2012, the CWR approved the final design and budget for a new ramp at Anderson Point (Renata). Construction was completed between 2011 and 2014.

In June 2014, the breakwater was installed. After navigational issues arose with the location of the breakwater, the breakwater was relocated in early 2015. In 2015, CPC completed the ramp to El. 425.0 m (1394.4 ft). The elevation of the ramp is expected to provide access 100% of the time during the peak recreation season.

Maintenance for this boat launch is completed under CLBWORKS-45. This project is complete.

6.25 CLBWORKS-33A Arrow: Syringa Boat Launch

Under Clause (m) of Conditional Water Licence 27066, and by *Water Act* Order (File No. 0236915) dated January 23, 2006, BC Hydro is required to provide

reservoir access at Syringa Provincial Park. The park is located 19 km northwest of Castlegar on Highway 3A.

In spring 2015, taking advantage of low water, repairs were made to the ramp and walkway.

In 2015, following an engineering assessment of the wind, wave, and vessel wake conditions, it was determined that breakwaters were not required to ensure safe boat launching. In October 2015, BC Hydro expanded the upland turnaround area to provide safer and quicker access to the ramp. The elevation of the ramp is expected to provide access 100% of the time during the peak recreation season.

This project is complete.

6.26 CLBWORKS-33B Arrow: Syringa Boat Launch Maintenance

BC Hydro will continue to provide maintenance on access-related facilities according to the maintenance TOR approved by the CWR on May 11, 2017. The 2021 annual inspection of the Syringa boat launch indicated that the boarding float decking surface (wood plank) was in poor condition and required immediate attention. To provide a robust long-term solution, the wood decking was removed and replaced with a composite decking material.

6.27 CLBWORKS-35 Mid-Columbia: Bank Erosion Protection and Monitoring Program

This physical works was initiated in 2010, with monitoring implemented in 2011, 2012, 2013, and 2015. This project is complete.

6.28 CLBWORKS-36 Mid-Columbia: Long-term Erosion Monitoring Program

Site selection occurred in 2009, and monitoring occurred in 2010, 2011, 2012, 2014, and 2016. This project is complete.

6.29 CLBWORKS-40 Kinbasket: Site Preparation and Debris Work

Project was completed in 2011.

6.30 CLBWORKS-41 Kinbasket: Floating Debris Removal

In a letter to the CWR (dated December 12, 2008), BC Hydro requested reallocation of funds for boomstick fabrication and mobilization/demobilization of tugboats to barged-based debris removal activities under CLBWORKS-40. This request was made to seek significant efficiencies that could be realized by barging equipment directly to the work area and by reducing the need for remediation of access roads and ground disturbance.

In response, the CWR approved the reallocation of these funds as well as the funds from the Floating Debris Program to land-based removal activities under CLBWORKS-40, which was completed in 2011.

6.31 CLBWORKS-43A Nakusp Boat Launch

Under Clause (m) of Conditional Water Licence 27066, and by *Water Act* Order (File No. 0236915) dated January 23, 2006, BC Hydro is required to provide

reservoir access in the Village of Nakusp. A wood trestle ramp extending to El. 420.5 m (1379.6 ft) with boarding floats met the requirements of TOR approved by the CWR on August 28, 2006.

In the WUP, the community raised safety concerns and the high cost of maintenance associated with the facilities at Nakusp. The feasibility study dated August 8, 2008 identified options to address these issues. In the summer of 2008, BC Hydro agreed with the community on the option to dismantle the wood trestle ramp and replace it with a concrete ramp, with turnaround and walkway.

The detailed design was completed in 2011. The CWR approved the budget and design and implementation for the first phase on April 16, 2013 and again on August 8, 2014, in which the CWR confirmed the requirement to the elevation of El. 420.5 m (1379.6 ft) which is expected to provide access 100% of the time during the peak recreation season.

Construction occurred in three phases:

- Construction was initiated in summer 2013 in which the old timber trestle was removed, and a new concrete ramp was installed to El. 431.1m.
- In spring 2015, with low water, the ramp was extended to El. 423.6 m (1390.8 ft).
- In December 2015 to February 2016, the final elevation was constructed to El. 420.5 m (1379.6 ft) using under-water construction methods and the ramp was in February 2016.

This project is complete.

6.32 CLBWORKS-43B Nakusp Boat Launch Maintenance

BC Hydro will continue to provide maintenance on access-related facilities at Nakusp according to the maintenance TOR approved by the CWR on September 14, 2017.

6.33 CLBWORKS-45 Anderson (Renata) Boat Launch Maintenance

The construction of the Anderson ramp was undertaken as part of CLBWORKS-32. BC Hydro will continue to provide maintenance on both access and non-access related facilities according to the TOR approved by the CWR on November 7, 2017.

6.34 CLBWORKS-50A Shelter Bay Boat Launch

Under Clause (m) of Conditional Water Licence 27066, and by *Water Act* Order (File No. 0236915) dated January 23, 2006, BC Hydro is required to provide reservoir access at Shelter Bay Provincial Park. Shelter Bay Provincial Park is located approximately 55 km south of Revelstoke on the eastern side of Highway 23. The TOR approved by the CWR on August 28, 2006 required an elevation of 423.7 m (1390.1 ft). A survey of the ramp in 2015 concluded that the ramp reaches El. 422.9 m (1387.5 ft), meeting the original TOR.

The feasibility report dated December 24, 2009 (CLBWORKS-18) concluded the concrete ramp was in reasonable condition requiring minor repairs with erosion

protection and recommended upgrades to the upland parking area, turnaround, and replacement of the gabion walkway.

On February 4, 2015, the CWR approved design development and implementation for these changes and for a feasibility assessment of breakwaters. Following public feedback in 2015, the CWR approved a revised design including the breakwaters on October 1, 2015.

Work commenced in the fall of 2015 and was completed on in April 2016. The work included the walkway, parking lot, turnaround expansion, and breakwater. The elevation of the ramp is expected to provide access 100% of the time during the peak recreation season.

Some deficiencies related to the original construction of the access road were addressed in 2019.

This project is complete.

6.35 CLBWORKS-50B Shelter Bay Boat Ramp Launch Maintenance

BC Hydro will continue to provide maintenance on access-related facilities at this location according to the maintenance TOR approved by the CWR on May 11, 2017.

The 2021 annual inspection of the Shelter Bay boat launch indicated that the breakwater had two broken sections and required immediate attention. A design for the new sections, based on the original breakwater design, was accepted by BC Hydro and the repairs were completed.

6.36 CLBWORKS-51A Martha Creek Boat Ramp Launch Maintenance

BC Hydro commenced maintenance on access-related facilities at this location in May 2019 according to the maintenance TOR approved by the CWR on December 20, 2018.

BC Hydro requested approval on March 9, 2021 for an amendment regarding the scope and budget to proceed with the structural maintenance repairs identified during the maintenance inspections. BC Hydro received approval from the CWR on March 25, 2021 to proceed with the structural repairs. The construction work is scheduled for late March/early April 2022 before the recreation season pending regulatory approvals and suitable reservoir levels. A budget increase will be submitted by February 2022 as engineering estimates were higher than originally forecast.

6.37 CLBWORKS-52A Downie Creek Boat Ramp Launch Maintenance

BC Hydro commenced maintenance on access-related facilities at this location in May 2019 according to the maintenance TOR approved by the CWR on December 20, 2018.

7 Monitoring Programs and Physical Works Costs

The following table summarizes the Kinbasket and Arrow Recreational Management Plan WUP monitoring programs and physical works costs approved by the Comptroller and the Actual Costs to December 31, 2021.

Table 7-1: Kinbasket and Arrow Recreational Management Plan WUP Monitoring Programs and Physical Works Cost

Monitoring Programs	Costs approved by CWR	Life to Date Actuals (LTD)	Estimated to Complete (Forecast)	Total Forecast (LTD and Forecast)	Variance Total to Approved	Explanation	Corrective Action
CLB MP3 Kin & Arrow Rec Annual Report	\$47,328	\$18,338	\$6,400	\$24,738	\$22,590		
C03M14A Boat Ramp Use Study	\$825,868	\$769,127	\$1,119	\$770,246	\$55,622	Project completed	
C03M14A Boat Ramp Use Study - OR DM	\$90,000	\$68,160	\$978	\$69,138	\$20,862		
C03M14A Boat Ramp Use Study - OR Imp	\$735,868	\$700,967	\$141	\$701,108	\$34,760		
C03W05A KIN Valemount Ramp	\$1,377,234	\$1,099,579	\$471,900	\$1,571,479	(\$194,245)	Additional funds required. Budget includes estimate for known breakwater maintenance.	Resubmit TOR by March 2022.
C03W05A KIN Valemount Ramp - ONR DM	\$58,091	\$54,009	\$28,199	\$82,207	(\$24,116)		
C03W05A KIN Valemount Ramp - ONR Imp	\$1,319,143	\$1,045,571	\$443,701	\$1,489,272	(\$170,129)		
C03W05B KIN Valemount Maintenance	\$708,318	\$58,667	\$622,564	\$681,230	\$27,088		
C03W05B KIN Valemount Maint - ONR DM	\$68,357	\$28,250	\$4,778	\$33,028	\$35,329		
C03W05B KIN Valemount Maint - ONR Imp	\$639,961	\$30,417	\$617,785	\$648,202	(\$8,241)		
C03W06A KIN Nixon Ramp	\$18,036	\$6,602		\$6,602	\$11,434	Project completed	
C03W06A KIN Nixon Ramp - ONR DM	\$18,036	\$4,562		\$4,562	\$13,474		
C03W06A KIN Nixon Ramp - ONR Imp		\$2,040		\$2,040	(\$2,040)		
C03W06B KIN Nixon Maint	\$76,605	\$3,210	\$56,765	\$59,975	\$16,630		
C03W06B KIN Nixon Maint - ONR DM	\$9,867	\$2,622	\$11,765	\$14,387	(\$4,520)		
C03W06B KIN Nixon Maint - ONR Imp	\$66,738	\$588	\$45,000	\$45,588	\$21,150		
C03W07A KIN Bush Harbr Ramp	\$1,906,480	\$1,818,690		\$1,818,690	\$87,790	Project completed.	
C03W07A KIN Bush Harbr Ramp - ONR DM	\$49,993	\$51,721		\$51,721	(\$1,728)		
C03W07A KIN Bush Harbr Ramp - ONR Imp	\$1,856,487	\$1,766,969		\$1,766,969	\$89,518		
C03W07B KIN Bush Harbr Maint	\$721,439	\$386,315	\$231,100	\$617,415	\$104,024	Budget includes estimate for known breakwater maintenance.	
C03W07B KIN Bush Harbr Maint - ONR DM	\$32,983	\$63,318	\$35,409	\$98,727	(\$65,744)		
C03W07B KIN Bush Harbr Maint - ONR Imp	\$688,456	\$322,996	\$195,691	\$518,687	\$169,769		
C03W09A REV Extend Or Build	\$28,791	\$28,791		\$28,791	(\$0)		
C03W09A REV Extend Or Build - ONR DM	\$10,108	\$10,108		\$10,108			
C03W09A REV Extend Or Build - ONR Imp	\$18,683	\$18,683		\$18,683	(\$0)		
C03W11A ARR Burton Newramp - ONR	\$1,681,909	\$1,683,784		\$1,683,784	(\$1,875)	Project completed	
C03W11A ARR Burton Newramp - ONR DM	\$68,262	\$28,186		\$28,186	\$40,076		
C03W11A ARR Burton Newramp - ONR Imp	\$1,613,647	\$1,655,598		\$1,655,598	(\$41,951)		
C03W11A ARR Burton Newramp - OR	\$3,518,210	\$796,518		\$796,518	\$2,721,692	Project completed	
C03W11A ARR Burton Newramp - OR DM	\$76,517	\$35,227		\$35,227	\$41,290		
C03W11A ARR Burton Newramp - OR Imp	\$3,441,693	\$761,291		\$761,291	\$2,680,402		
C03W11B ARR Burton Maint	\$458,311	\$86,434	\$243,469	\$329,903	\$128,408		
C03W11B ARR Burton Maint - ONR DM	\$44,388	\$24,408	\$36,410	\$60,818	(\$16,430)		
C03W11B ARR Burton Maint - ONR Imp	\$413,923	\$62,026	\$207,059	\$269,085	\$144,838		
C03W12A ARR Edgewood Ramp - ONR	\$2,755,035	\$2,612,333		\$2,612,333	\$142,702	Project completed	
C03W12A ARR Edgewood Ramp - ONR DM	\$91,604	\$77,010		\$77,010	\$14,594		
C03W12A ARR Edgewood Ramp - ONR Imp	\$2,663,431	\$2,535,323		\$2,535,323	\$128,108		
C03W12B ARR Edgewood Maint	\$229,867	\$27,269	\$178,374	\$205,643	\$24,224		
C03W12B ARR Edgewood Maint - ONR DM	\$21,655	\$8,356	\$13,188	\$21,543	\$112		
C03W12B ARR Edgewood Maint - ONR Imp	\$208,212	\$18,913	\$165,186	\$184,099	\$24,113		
C03W13A ARR Fauquier Ramp - ONR	\$744,659	\$710,020		\$710,020	\$34,639	Project completed	
C03W13A ARR Fauquier Ramp - ONR DM	\$31,352	\$23,445		\$23,445	\$7,907		
C03W13A ARR Fauquier Ramp - ONR Imp	\$713,307	\$606,275		\$606,275	\$107,032		
C03W13A ARR Fauquier Ramp - OR	\$452,081	\$80,300		\$80,300	\$371,781	Project completed	
C03W13A ARR Fauquier Ramp - OR DM	\$17,310	\$10,255		\$10,255	\$7,055		
C03W13A ARR Fauquier Ramp - OR Imp	\$434,771	\$70,045		\$70,045	\$364,726		
C03W13B ARR Fauquier Maint	\$225,367	\$17,167	\$198,327	\$215,494	\$9,873		
C03W13B ARR Fauquier Maint - ONR DM	\$21,408	\$7,425	\$13,141	\$20,567	\$842		
C03W13B ARR Fauquier Maint - ONR Imp	\$203,959	\$9,742	\$185,186	\$194,928	\$9,031		
C03W14A ARR McDonald Ramp - ONR	\$3,796,186	\$1,098,991		\$1,098,991	\$2,697,195	Project completed	
C03W14A ARR McDonald Ramp - ONR DM	\$147,035	\$49,068		\$49,068	\$97,967		
C03W14A ARR McDonald Ramp - ONR Imp	\$3,649,151	\$1,049,923		\$1,049,923	\$2,599,228		
C03W14A ARR McDonald Ramp - OR	\$261,344	\$21,671		\$21,671	\$239,673	Project completed	
C03W14A ARR McDonald Ramp - OR DM	\$16,065	\$10,065		\$10,065	\$6,000		
C03W14A ARR McDonald Ramp - OR Imp	\$245,279	\$11,606		\$11,606	\$233,673		
C03W14B ARR McDonald Maint	\$227,470	\$23,313	\$192,660	\$215,973	\$11,497		
C03W14B ARR McDonald Maint - ONR DM	\$22,522	\$9,906	\$29,074	\$38,980	(\$16,458)		
C03W14B ARR McDonald Maint - ONR Imp	\$204,948	\$13,407	\$163,586	\$176,993	\$27,955		
C03W16A KIN Debris Mgmt	\$5,240,393	\$3,020,660	\$2,199,809	\$5,220,469	\$19,924		
C03W16A KIN Debris Mgmt - OR DM	\$702,698	\$407,722	\$165,499	\$573,221	\$129,477		
C03W16A KIN Debris Mgmt - OR Imp	\$4,537,695	\$2,612,938	\$2,034,310	\$4,647,248	(\$109,553)		
C03W16B KIN Debris	\$3,587,773	\$2,085,471	\$1,491,014	\$3,576,485	\$11,288		
C03W16B KIN Debris - ONR Imp	\$3,587,773	\$2,085,471	\$1,491,014	\$3,576,485	\$11,288		
C03W17A ARROW Debris Mgmt	\$2,671,667	\$1,288,380	\$1,284,558	\$2,572,938	\$98,729		
C03W17A ARROW Debris Mgmt - OR DM	\$531,856	\$264,822	\$187,771	\$452,593	\$79,263		
C03W17A ARROW Debris Mgmt - OR Imp	\$2,139,811	\$1,023,558	\$1,096,787	\$2,120,345	\$19,466		
C03W17B ARR Debris	\$1,447,109	\$699,049	\$625,000	\$1,324,049	\$123,060		
C03W17B ARR Debris - ONR Imp	\$1,447,109	\$699,049	\$625,000	\$1,324,049	\$123,060		
C03W18A Feasbly Boat Ramp	\$238,120	\$238,120		\$238,120	\$0	Project complete	
C03W18A Feasbly Boat Ramp - OR DM	\$53,942	\$53,942		\$53,942			
C03W18A Feasbly Boat Ramp - OR Imp	\$184,178	\$184,178		\$184,178			
C03W19A LC Indian Env	\$181,019	\$159,393		\$159,393	\$21,626	Project complete	
C03W19A LC Indian Env - OR DM	\$53,892	\$33,470		\$33,470	\$20,422		
C03W19A LC Indian Env - OR Imp	\$127,127	\$125,924		\$125,924	\$1,203		
C03W20A LC Indian Dred	\$114,002	\$55,447		\$55,447	\$58,555	Project complete	
C03W20A LC Indian Dred - OR DM	\$45,722	\$31,022		\$31,022	\$14,700		
C03W20A LC Indian Dred - OR Imp	\$68,280	\$24,424		\$24,424	\$43,856		

Columbia River Water Use Plan – Kinbasket & Arrow Reservoir Recreation Management Plan
Monitoring Programs and Physical Works Annual Report: 2022

Monitoring Programs	Costs approved by CWR	Life to Date Actuals (LTD)	Estimated to Complete (Forecast)	Total Forecast (LTD and Forecast)	Variance Total to Approved	Explanation	Corrective Action
C03W21A LC Debris Env	\$53,601	\$45,886		\$45,886	\$7,715	Project complete	
C03W21A LC Debris Env - OR DM	\$15,367	\$15,259		\$15,259	\$108		
C03W21A LC Debris Env - OR Imp	\$38,234	\$30,627		\$30,627	\$7,607		
C03W22A LC In Ed Debre	\$44,726	\$30,529	\$9,140	\$39,669	\$5,057		
C03W22A LC In Ed Debre - OR DM	\$16,512	\$9,735	\$1,103	\$10,838	\$5,674		
C03W22A LC In Ed Debre - OR Imp	\$28,214	\$20,793	\$9,000	\$29,793	(\$1,579)		
C03W23A KIN & ARR Debris Env	\$126,716	\$68,960		\$68,960	\$57,756	Project complete	
C03W23A KIN & ARR Debris Env - OR DM	\$34,233	\$15,326		\$15,326	\$18,907		
C03W23A KIN & ARR Debris Env - OR Imp	\$92,483	\$53,633		\$53,633	\$38,850		
C03W32A ARR Anderson Newramp- ONR	\$91,500	\$42,817		\$42,817	\$48,683	Project complete	
C03W32A ARR Anderson Newramp - ONR DM		\$720		\$720	(\$720)		
C03W32A ARR Anderson Newramp - ONR IMP	\$91,500	\$42,097		\$42,097	\$49,403		
C03W32A ARR Anderson Newramp - OR L4	\$6,181,717	\$3,668,544		\$3,668,544	\$2,513,173	Project complete	
C03W32A ARR Anderson Newramp - OR DM	\$64,653	\$83,933		\$83,933	(\$19,280)		
C03W32A ARR Anderson Newramp - OR Imp	\$6,117,064	\$3,584,611		\$3,584,611	\$2,532,453		
C03W33A ARR Syringa Ramp	\$2,527,085	\$369,016		\$369,016	\$2,158,069	Project complete	
C03W33A ARR Syringa Ramp - ONR DM	\$189,085	\$57,387		\$57,387	\$131,698		
C03W33A ARR Syringa Ramp - ONR Imp	\$2,338,000	\$311,630		\$311,630	\$2,026,370		
C03W33B ARR Syringa Maint	\$188,861	\$49,651	\$138,358	\$188,009	\$852		
C03W33B ARR Syringa Maint - ONR DM	\$21,408	\$13,720	\$15,333	\$29,053	(\$7,645)		
C03W33B ARR Syringa Maint - ONR Imp	\$167,453	\$35,931	\$123,025	\$158,956	\$8,497		
C03W35A MCR Bank Erosion	\$712,739	\$710,725		\$710,725	\$2,014	Project complete	
C03W35A MCR Bank Erosion - ONR DM	\$72,964	\$59,641		\$59,641	\$13,323		
C03W35A MCR Bank Erosion - ONR Imp	\$639,775	\$651,085		\$651,085	(\$11,310)		
C03W36A MCR Erosion Mon	\$311,993	\$297,117		\$297,117	\$14,876	Project complete	
C03W36A MCR Erosion Mon - ONR DM	\$70,240	\$50,547		\$50,547	\$19,693		
C03W36A MCR Erosion Mon - ONR Imp	\$241,753	\$246,570		\$246,570	(\$4,817)		
C03W40A KIN Dbrs Site Prep	\$785,000	\$784,170		\$784,170	\$830	Project complete	
C03W40A KIN Dbrs Site Prep - OR DM	\$78,000	\$53,119		\$53,119	\$24,881		
C03W40A KIN Dbrs Site Prep - OR Imp	\$707,000	\$731,051		\$731,051	(\$24,051)		
C03W40B KIN Debris Rmvl	\$1,800,000	\$1,995,488		\$1,995,488	(\$195,488)	Project complete	
C03W40B KIN Debris Rmvl - ONR Imp	\$1,800,000	\$1,995,488		\$1,995,488	(\$195,488)		
C03W41A KIN Fit Dbrs Rmvl	\$42,026	\$1,909		\$1,909	\$40,117	Project complete	
C03W41A KIN Fit Dbrs Rmvl - ONR DM	\$29,784	\$1,866		\$1,866	\$27,918		
C03W41A KIN Fit Dbrs Rmvl - ONR Imp	\$12,242	\$43		\$43	\$12,199		
C03W43A Nakusp Boat Launch	\$9,457,731	\$5,408,367		\$5,408,367	\$4,049,364	Project complete	
C03W43A Nakusp Boat Launch - ONR DM	\$69,038	\$100,715		\$100,715	(\$31,677)		
C03W43A Nakusp Boat Launch - ONR Imp	\$9,388,693	\$5,307,652		\$5,307,652	\$4,081,041		
C03W43B Nakusp Maintenance	\$274,526	\$28,150	\$240,345	\$268,495	\$6,031		
C03W43B Nakusp Maint - ONR DM	\$24,706	\$10,519	\$16,293	\$26,812	(\$2,106)		
C03W43B Nakusp Maint - ONR Imp	\$249,820	\$17,632	\$224,052	\$241,684	\$8,136		
C03W45A Anderson Maintenance	\$429,945	\$112,726	\$224,323	\$337,049	\$92,896		
C03W45A Anderson Maintenance - OR DM	\$35,121	\$27,968	\$11,385	\$39,354	(\$4,233)		
C03W45A Anderson Maintenance - OR Imp	\$394,824	\$84,758	\$212,937	\$297,695	\$97,129		
C03W50A Shelter Bay	\$3,065,308	\$1,401,354		\$1,401,354	\$1,663,954	Project complete	
C03W50A Shelter Bay - ONR DM	\$209,308	\$108,092		\$108,092	\$101,216		
C03W50A Shelter Bay - ONR Imp	\$2,856,000	\$1,293,262		\$1,293,262	\$1,562,738		
C03W50B Shelter Bay Maint	\$234,299	\$62,950	\$164,873	\$227,824	\$6,475		
C03W50B Shelter Bay Maint - ONR DM	\$21,785	\$13,652	\$15,583	\$29,235	(\$7,450)		
C03W50B Shelter Bay Maint - ONR Imp	\$212,514	\$49,298	\$149,291	\$198,589	\$13,925		
C03W51A Martha Creek BL Maintenance	\$716,495	\$120,192	\$698,944	\$819,136	(\$102,641)		A TOR submission will be submitted February 28, 2022
C03W51A Martha Creek BL Maint - ONR DM	\$174,477	\$67,176	\$109,562	\$176,738	(\$2,261)		
C03W51A Martha Creek BL Maint - ONR IMP	\$542,018	\$53,015	\$589,382	\$642,397	(\$100,379)		
C03W52A Downie Creek BL Maintenance	\$219,283	\$27,822	\$170,849	\$198,670	\$20,613		
C03W52A Downie Creek BL Maint - ONR DM	\$18,283	\$9,749	\$16,349	\$26,097	(\$7,814)		
C03W52A Downie Creek BL Maint - ONR IMP	\$201,000	\$18,073	\$154,500	\$172,573	\$28,427		

OR - Ordered Remissible
ONR - Ordered Non-Remissible

* Red values in parentheses denote overage.