

Columbia River Project Water Use Plan

Kinbasket and Arrow Recreational Management Plan

Monitoring Program and Physical Works

Annual Report: 2018

Implementation Period: January 2017 to December 2017

- **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, 2018

- **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**

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: 2018

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, 2017, as per the Columbia River Order under the *Water Act*, dated January 26, 2007. There is one monitoring program and 25 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

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	Aug 31, 2017	Sep 14, 2017
CLBWORKS-5B Kinbasket: Valemount Boat Launch Maintenance	Conditional, 2(a)	Oct 24, 2007	Mar 03, 2008	May 28, 2015	Jun 09, 2015
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	Jun 22, 2009	Sep 18, 2009
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
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	Sep 04, 2015	Dec 23, 2015
	Conditional, 1(a)(b)	Oct 26, 2007	Mar 05, 2008	Sep 04, 2015	Dec 23, 2015
CLBWORKS-17 Arrow: Debris Inventory, management Strategy and Removal	(ONR) Conditional, 5(a)(b)	Oct 26, 2007	Mar 05, 2008	Sep 04, 2015	Dec 23, 2015
	Conditional, 5(a)(b)	Oct 26, 2007	Mar 05, 2008	Sep 04, 2015	Dec 23, 2015
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
CLBWORKS-33A Arrow: Syringa Boat Launch	Clause M (ONR)	Jan 22, 2015	Feb 04, 2015	Feb 25, 2015	Feb 27, 2015
	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	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		

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, 2017.

Monitoring Programs	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
	WLR YR1	WLR YR2	WLR YR3	WLR YR4	WLR YR5	WLR YR6	WLR YR7	WLR YR8 <small>Interim Review</small>	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
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				✓	✓	✓	✓ ^F														
CLBWORKS-7B Kinbasket: Bush Harbour Boat Launch Maintenance					✓	✓	✓	✓	✓	✓	✓	■	■	■	■	■	■	■	■	■	■
CLBWORKS-9 Revelstoke Ramp Upgrade Ramp not Ordered				✓ ^F																	
CLBWORKS-11A Arrow: Burton Boat Launch				✓	✓	✓	✓	✓	✓ ^F												
CLBWORKS-11B Arrow: Burton Boat Launch Maintenance					✓	✓	✓	✓	✓	✓	✓	■	■	■	■	■	■	■	■	■	■
CLBWORKS-12A Arrow: Edgewood Boat Launch								✓	✓	✓ ^F											
CLBWORKS-12B Arrow: Edgewood Boat Launch Maintenance								✓	✓	✓	✓	■	■	■	■	■	■	■	■	■	■
CLBWORKS-13A Arrow: Fauquier Boat Launch				✓	✓				✓ ^F												
CLBWORKS-13B Arrow: Fauquier Boat Launch Maintenance						✓	✓	✓	✓	✓	✓	■	■	■	■	■	■	■	■	■	■
CLBWORKS-14A Arrow: McDonald Ramp Boat Launch				✓	✓			✓	✓ ^F												
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	✓	✓	✓ ^F																		
CLBWORKS-19 Lower Columbia: Indian Eddy Dredging Environmental and Engineering Assessment	✓	✓	✓ ^F																		
CLBWORKS-20 Lower Columbia: Indian Eddy Dredging								x	✓	✓ ^F											
CLBWORKS-21 Lower Columbia: Indian Eddy Debris Removal Environmental Review		✓	✓ ^F																		
CLBWORKS-22 Lower Columbia: Debris Removal at Indian Eddy			x	✓	✓	✓	✓	✓	✓	✓	✓	■	■								
CLBWORKS-23 Kin and Arrow: Debris Removal Environmental Review	✓	✓ ^F																			
CLBWORKS-32 Arrow: Anderson (Renata) Boat Launch						✓	✓	✓	✓ ^F												
CLBWORKS-33A Arrow: Syringa Boat Launch									✓ ^F												
CLBWORKS-33B Arrow: Syringa Boat Launch Maintenance											✓	■	■	■	■	■	■	■	■	■	■
CLBWORKS-35 Mid Columbia Bank Erosion Protection and Monitoring				✓	✓	✓	✓		✓ ^F												
CLBWORKS-36 Mid Columbia Long Term Erosion Monitoring			✓	✓	✓	✓		✓		✓ ^F											
CLBWORKS-40 Site Prep and Debris Work		✓	✓	✓	✓ ^F																
CLBWORKS-41 Kinbasket: Floating Debris Removal																					
CLBWORKS-43A Nakusp Boat Launch							✓	✓	✓	✓ ^F											
CLBWORKS-43B Nakusp Boat Launch Maintenance									✓	✓	✓	■	■	■	■	■	■	■	■	■	■
CLBWORKS-45 Anderson (Renata) Boat Launch Maintenance									✓	✓	✓	■	■	■	■	■	■	■	■	■	■
CLBWORKS-50A Shelter Bay Boat Launch									✓	✓ ^F											
CLBWORKS-50B Shelter Bay 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
 x = 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.bchydro.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 program was initiated in 2010. The mid-term report which covers study Years 1 through 4 was submitted with the 2015 Annual Report. The results from the mid-term report suggest that visitors are very satisfied with the boat launch upgrades. However, the upgrades have had a mixed effect on visitor use (i.e., some launches show an increase in use, while others saw no change and one ramp showing a decline in use). These results are based on limited post-construction data and were confounded with the construction activity.

Both traffic monitoring and survey work were stopped after the 2013 recreation season. Traffic monitoring resumed in 2016 after all the boat launch upgrades were completed. The in-person survey monitoring resumed in 2017. The summary report of the 2016 traffic monitoring is currently being reviewed and will be submitted with the next Annual Report. The summary report of the 2017 traffic monitoring and survey results will be submitted with the next Annual Report.

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. 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.

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. Following the feasibility study dated October 5, 2007 (CLBWORKS-18), the CWR approved the initial design at Valemount to extend the ramp from the existing toe at El. 732.7 m (2403.9 ft) to El. 730.0 m (2395 ft) which would require dredging. On September 18, 2009, following further community input, the CWR approved an alternative two-stage ramp with no dredging to provide access to El. 727 m (2385 ft lower ramp) and El. 734 m (2408 ft upper ramp) with a concrete turnaround.

The majority of the construction was completed in 2011 following delays due to high water. The CWR approved cost increases on February 25, 2013, and further

ramp construction was completed in 2013 and the CWR was advised the ramp was constructed to El. 727.6 m (2387.1 ft).

On June 9, 2015, the CWR approved the replacement of the boarding floats (walkway). The work was completed prior to the 2016 recreation season.

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.

On January 2, 2018, the CWR approved additional budget and scope for a wind and wave study and an additional survey to determine the need for repairs to the existing rock breakwater (under CLBWORKS-5B) or an additional breakwater (under CLBWORKS-5A). This is in response to concerns raised by local stakeholders in October 2017.

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.

The current maintenance budget for Valemount was approved by the CWR on March 3, 2008. An updated maintenance TOR is currently being developed, and will be submitted after the wind and wave analysis referenced in the CLBWORKS-5A update (above) is completed. The results of that analysis will inform future maintenance needs for the Valemount boat launch.

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 upper ramp has a natural slope of 7% that provides water level access to the reservoir from El. 764 m (2506.6 ft) to El. 733.0 m (2404.9 ft) and has a natural slope of approximately 15% from 733.0 m (2404.9 ft), to El. 713.5 m (2340.9 ft).

The feasibility evaluation for a concrete ramp to El. 712.1 m was included in the October 5, 2007 report (CLBWORKS-18). The Nixon Creek ramp upgrades were considered not feasible due to long term site access concerns. The current Forest Service Road was not being maintained by the tenure holder, and there was a concern for public safety access to the boat launch via this road in the future.

Additionally, in a report dated December 24, 2009 (also under CLBWORKS-18) five alternative sites to the Nixon Creek ramp were investigated. These sites were 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 regrading of the existing gravel ramp. The re-grading work was completed in 2011.

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 is currently being developed and will be submitted by March 31, 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. 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. In 2007, the elevation of the boat ramp was El. 734.6 m (2410.1 ft).

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 feasibility design was included in the October 5, 2007, report (CLBWORKS-18) and design phase work was approved March 3, 2008. On September 18, 2009, the CWR approved construction on the Bush Harbour launch which included extension of the concrete ramp to El. 724.6 m (2377.3 ft.), concrete turnaround, floating walkway, breakwaters, parking lot, and toilet.

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

Following a regular maintenance inspection in November 2016, significant erosion of the Bush Harbour boat launch was reported to BC Hydro. An approximately 35 foot section of the concrete ramp surface had been undercut due to wind, wave, and reservoir action. This erosion had caused the affected portion of the ramp to subside, crack, and posed a safety hazard for public access to the reservoir. Following an engineering assessment, BC Hydro sought and received TOR approval on June 5, 2017 for structural repairs and ongoing maintenance.

The repairs to the ramp included filling the voids under the concrete surface of the ramp with grout to bring the concrete panels back to a flat surface and to stop further slumping. The rip-rap that provided erosion protection on the sides of the ramp was re-positioned and cemented into place to provide a more resistant surface to the wind and wave action that is common on Kinbasket Reservoir and to also limit the general public from displacing the stones. All construction work

occurred within the first two weeks of June 2017 and prior to inundation of the affected portions of the ramp. In the spring of 2018, BC Hydro plans to re-contour the existing slope with larger, stronger and more angular rip-rap.

BC Hydro will continue to provide maintenance on access-related facilities at the Bush Harbour according to the approved TOR.

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 located in the City of Revelstoke near the ball park fields of Centennial Park and is located on property owned by the City. The launch is approximately 8 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, feasibility 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. By 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 5 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: Boat Launch Maintenance

BC Hydro will continue to provide maintenance on access- and non-access related facilities at the Burton boat launch as per the Kinbasket and Arrow Recreation Management Plan Maintenance Plan 2017 submitted January 30, 2017, as BC Hydro holds the Licence of Occupation. The maintenance budget for Burton was approved by the CWR office on July 16, 2013. An updated maintenance TOR which outlines BC Hydro's ongoing responsibilities was submitted to the CWR office on May 4, 2017, and approved on May 11, 2017.

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. 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).

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 feasibility designs for the Edgewood boat launch improvements are included in the report dated July 13, 2007 (CLBWORKS-18). The report included evaluation of options to extend the ramp to the Consultative Committee (CC) recommended level of El. 423.7 m (1390.1 ft), including an evaluation of alternative locations. Due to the contours of the reservoir floor at the reviewed locations, it was determined infeasible to extend the concrete ramp further without the need for regular ongoing and expensive dredging. Consequently, the design 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.

Discussions with the community were undertaken related to concerns about any possible impacts of Eagle Creek on the ramp. No impacts were identified.

In late 2014, the community expressed a safety concern regarding the anchor blocks for the southern floating breakwater becoming a hazard when exposed at low water. Following community meetings and redesign work in late 2014 and early 2015, BC Hydro received approval from the CWR on August 28, 2015, for an agreed design to relocate the southern breakwater.

The ramp reinforcement and walkway work was completed in spring 2015 to an elevation of El. 425.76 m (1396.9 ft), with gravel transition. 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 as per the Kinbasket and Arrow Recreation Management Plan Maintenance Plan 2017 submitted January 30, 2017. The maintenance budget for Edgewood was approved by the CWR office on February 5, 2015. An updated maintenance TOR which outlines BC Hydro's ongoing responsibilities was submitted to the CWR office on August 11, 2017, and approved on September 13, 2017.

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. 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).

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 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. 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.

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. 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) BC Hydro received approval on 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 which outlines BC Hydro's ongoing responsibilities as approved by the CWR on July 6, 2017.

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

Following completion of the debris removal session for 2017, an estimated 382,586 m³ of woody debris remains in the Kinbasket system. The remaining estimate will be verified in 2018 during scheduled debris inventory work. Boomsticks were built in 2017 and deployed in the Valemount end of the reservoir.

The third phase of the debris program was approved in December 2015 for implementation in 2016, 2017 and 2018.

This project continued in 2017 to provide some funding for further work in the Canoe Reach of Kinbasket Reservoir under BC Hydro's Reservoir Archaeology Program. Five new sites were recorded in 2017.

An updated debris removal strategy will be developed in 2018 in consultation with the Golden and Valemount Debris Committees.

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

Following completion of the debris removal session for 2017, an estimated 126,502 m³ of woody debris remains in the Arrow Lakes system.

The second phase of the debris program was approved in December 2015 for implementation in 2016, 2017 and 2018.

In the spring of 2017, an Archaeological Impact Assessment (AIA) of the debris program on the Arrow was conducted. One archaeological site was newly recorded and a debris burn pile will be relocated to provide a 100 m buffer around this site. No archaeological conflicts were identified for the remaining burn piles.

An updated debris removal strategy will be developed in 2018 in consultation with the Arrow Lakes Debris Committees.

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, Esplande, 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. BC Hydro and the City of Trail have negotiated a contribution agreement for the remaining years of 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).

Access roads were completed in 2011/3. Also in 2013, Columbia Power Corporation (CPC) constructed the ramp to El. 431.6 m (1414 ft) with turnarounds, walkway and parking lot. 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 2014, BC Hydro assessed the condition of the Syringa boat launch. The ramp was in generally good condition but repairs to the concrete ribs, and upland improvements were recommended. A survey in 2015 confirmed that the current ramp reached El. 421.87 m (1384.1 ft). On February 25, 2015, the CWR approved these improvements.

In spring 2015, taking advantage of low water, BC Hydro undertook repairs to the ramp and walkway. BC Hydro repaired damaged concrete ribs, and added infill between the ribs, and between the ramp and floating 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.

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 has occurred in 2010, 2011, 2012, 2014, and 2016. Attached is the 2016 (Year 5) report dated May 2017.

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, for Nakusp 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. By fall 2013, Columbia Power Corporation (CPC) had demolished the timber trestle, constructed the concrete ramp at grade to El. 430.1 m (1411.2 ft), upgraded the parking lot, and installed the walkway. Nine fish habitat boulder clusters were also installed for habitat compensation. On August 8, 2014, the CWR approved additional budget and confirmed the requirement to the elevation of El. 420.5 m (1379.6 ft), and approved a budget that including construction using under-water methods.

In spring 2015, with low water CPC constructed the ramp to El. 423.6 m (1390.8 ft). In December 2015, work resumed in Nakusp to complete to the final elevation using under-water construction methods and the ramp was constructed to El. 420.5 m (1379.6 ft) in February 2016. Two additional fish habitat boulder clusters (total of 11) were installed. The elevation of the ramp is expected to provide access 100% of the time during the peak recreation season.

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.

A feasibility assessment for improvement to Shelter Bay was completed December 24, 2009, (CLBWORKS-18) and 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.

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.

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, 2017.

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

Monitoring Programs and Physical Works	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	\$13,484	\$14,434	\$27,918	\$19,410		
C03M14A Boat Ramp Use Study	\$825,868	\$515,284	\$143,428	\$658,712	\$167,156	Efficiencies found during project implementation	
C03M14A Boat Ramp Use Study - OR DM	\$90,000	\$52,819	\$13,449	\$66,268	\$23,732		
C03M14A Boat Ramp Use Study - OR Imp	\$735,868	\$462,465	\$129,978	\$592,444	\$143,424		
C03W05A KIN Valemount Ramp	\$1,057,792	\$1,005,303	\$37,860	\$1,043,163	\$14,629		
C03W05A KIN Valemount Ramp - ONR DM	\$33,596	\$27,307	\$2,595	\$29,902	\$3,694		
C03W05A KIN Valemount Ramp - ONR Imp	\$1,024,196	\$977,996	\$35,265	\$1,013,261	\$10,935		
C03W05B KIN Valemount Maintenance	\$119,000	\$33,328	\$42,944	\$76,272	\$42,728	Forecast will be adjusted according to the revised maintenance approach.	Maintenance TOR to be submitted
C03W05B KIN Valemount Maint - ONR DM		\$17,212	\$7,277	\$24,489	(\$24,489)		
C03W05B KIN Valemount Maint - ONR Imp	\$119,000	\$16,116	\$35,667	\$51,783	\$67,217		
C03W06A KIN Nixon Ramp	\$18,036	\$5,779	\$3,803	\$9,582	\$8,454		
C03W06A KIN Nixon Ramp - ONR DM	\$18,036	\$3,739	\$3,803	\$7,542	\$10,494		
C03W06A KIN Nixon Ramp - ONR Imp		\$2,040		\$2,040	(\$2,040)		
C03W06B KIN Nixon Maint	\$60,844	\$1,974	\$37,438	\$39,411	\$21,433		
C03W06B KIN Nixon Maint - ONR DM		\$1,974	\$7,438	\$9,411	(\$9,411)		
C03W06B KIN Nixon Maint - ONR Imp	\$60,844		\$30,000	\$30,000	\$30,844		
C03W07A KIN Bush Harbr Ramp	\$1,906,480	\$1,812,480	\$1,430	\$1,813,911	\$92,569	Project complete.	
C03W07A KIN Bush Harbr Ramp - ONR DM	\$49,993	\$51,721	\$1,430	\$53,151	(\$3,158)		
C03W07A KIN Bush Harbr Ramp - ONR Imp	\$1,856,487	\$1,760,759		\$1,760,759	\$95,728		
C03W07B KIN Bush Harbr Maint	\$721,439	\$152,663	\$517,401	\$670,064	\$51,375	Estimate complete only forecast to 2023 while TOR is approved to 2027	Forecast will be extended to 2027.
C03W07B KIN Bush Harbr Maint - ONR DM	\$32,983	\$27,869	\$16,353	\$44,222	(\$11,239)		
C03W07B KIN Bush Harbr Maint - ONR Imp	\$688,456	\$124,794	\$501,049	\$625,843	\$62,613		
C03W09A REV Extend Or Build	\$28,791	\$28,791		\$28,791	(\$0)	Project cancelled.	
C03W09A REV Extend Or Build - OR DM	\$10,108	\$10,108		\$10,108			
C03W09A REV Extend Or Build - OR Imp	\$18,683	\$18,683		\$18,683	(\$0)		
C03W11A ARR Burton Newramp - OR	\$3,518,210	\$796,518		\$796,518	\$2,721,692	Construction complete. Favourable water levels reduced construction cost compared to budget.	
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		
C03W11A ARR Burton Newramp - ONR	\$1,681,909	\$1,683,784		\$1,683,784	(\$1,875)	Slight overspend due to completion reporting and visible once maintenance budget had been separated	
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)		
C03W11B ARR Burton Maint	\$458,311	\$33,967	\$295,624	\$329,591	\$128,720	Estimate to Complete only forecast to 2023 while TOR is approved to 2027	Forecast will be extended to 2027.
C03W11B ARR Burton Maint - ONR DM	\$44,388	\$9,404	\$8,853	\$18,258	\$26,130		
C03W11B ARR Burton Maint - ONR Imp	\$413,923	\$24,563	\$286,771	\$311,333	\$102,590		
C03W12A ARR Edgewood Ramp - ONR	\$2,755,035	\$2,612,333		\$2,612,333	\$142,702	Construction complete. Favourable water levels reduced construction cost compared to budget.	
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	\$7,083	\$159,412	\$166,496	\$63,371	Estimate to Complete only forecast to 2023 while TOR is approved to 2027	Forecast will be extended to 2027.
C03W12B ARR Edgewood Maint - ONR DM	\$21,655	\$2,831	\$8,853	\$11,684	\$9,971		
C03W12B ARR Edgewood Maint - ONR Imp	\$208,212	\$4,253	\$150,559	\$154,812	\$53,400		
C03W13A ARR Fauquier Ramp - ONR	\$744,659	\$629,720		\$629,720	\$114,939	Project complete	
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 complete	
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	\$5,963	\$159,413	\$165,376	\$59,991	Estimate to Complete only forecast to 2023 while TOR is approved to 2027	Forecast will be extended to 2027.
C03W13B ARR Fauquier Maint - ONR DM	\$21,408	\$4,362	\$8,854	\$13,215	\$8,193		
C03W13B ARR Fauquier Maint - ONR Imp	\$203,959	\$1,601	\$150,559	\$152,160	\$51,799		
C03W14A ARR McDonald Ramp - ONR	\$3,796,186	\$1,098,991		\$1,098,991	\$2,697,195	Construction complete. Favourable water levels reduced construction cost compared to budget.	
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 complete	
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	\$4,459	\$159,761	\$164,219	\$63,251	Estimate to Complete only forecast to 2023 while TOR is approved to 2027	Forecast will be extended to 2027.
C03W14B ARR McDonald Maint - ONR DM	\$22,522	\$3,470	\$9,202	\$12,671	\$9,851		
C03W14B ARR McDonald Maint - ONR Imp	\$204,948	\$989	\$150,559	\$151,548	\$53,400		
C03W16A KIN Debris Mgmt	\$2,070,756	\$1,520,598	\$497,402	\$2,018,000	\$52,756	Efficiencies found during project implementation.	TOR submission for next five years by October 2018.
C03W16A KIN Debris Mgmt - OR DM	\$253,542	\$195,679	\$56,321	\$251,999	\$1,543		
C03W16A KIN Debris Mgmt - OR Imp	\$1,817,214	\$1,324,919	\$441,082	\$1,766,001	\$51,213		
C03W16B KIN Debris	\$1,648,074	\$1,169,605	\$238,533	\$1,408,138	\$239,936	Approved amount includes \$240,000 for high water contingency, which is not included in our forecast as it is conditional.	TOR submission for next five years by October 2018.
C03W16B KIN Debris - ONR Imp	\$1,648,074	\$1,169,605	\$238,533	\$1,408,138	\$239,936		
C03W17A ARROW Debris Mgmt	\$800,444	\$573,874	\$224,862	\$798,736	\$1,708		TOR submission for next five years by October 2018.
C03W17A ARROW Debris Mgmt - OR DM	\$107,220	\$82,170	\$26,798	\$108,968	(\$1,748)		
C03W17A ARROW Debris Mgmt - OR Imp	\$693,224	\$491,704	\$198,064	\$689,769	\$3,455		
C03W17B ARR Debris	\$784,739	\$449,189	\$100,050	\$549,239	\$235,500	Approved amount includes \$222,000 for high water contingency, which is not included in our forecast as it is conditional.	TOR submission for next five years by October 2018.
C03W17B ARR Debris - ONR Imp	\$784,739	\$449,189	\$100,050	\$549,239	\$235,500		

Monitoring Programs and Physical Works	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
C03W18A Feasblty Boat Ramp - OR	\$238,120	\$238,120		\$238,120	(\$0)	Project complete	
C03W18A Feasblty Boat Ramp - OR DM	\$53,942	\$53,942		\$53,942	(\$0)		
C03W18A Feasblty Boat Ramp - OR Imp	\$184,178	\$184,178		\$184,178	\$0		
C03W19A LC Indian Env	\$181,019	\$158,596	\$3,526	\$162,123	\$18,896	Project complete	
C03W19A LC Indian Env - OR DM	\$53,892	\$32,673	\$3,526	\$36,199	\$17,693		
C03W19A LC Indian Env - OR Imp	\$127,127	\$125,924		\$125,924	\$1,203		
C03W20A LC Indian Dred	\$114,002	\$54,209	\$3,721	\$57,930	\$56,072	Project complete	
C03W20A LC Indian Dred - OR DM	\$45,722	\$29,785	\$3,721	\$33,506	\$12,216		
C03W20A LC Indian Dred - OR Imp	\$68,280	\$24,424		\$24,424	\$43,856		
C03W21A LC Debris Env	\$53,601	\$45,886		\$45,886	\$7,715		
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	\$22,714	\$9,781	\$32,495	\$12,231	Efficiencies found during project implementation	
C03W22A LC In Ed Debre - OR DM	\$16,512	\$8,968	\$781	\$9,749	\$6,763		
C03W22A LC In Ed Debre - OR Imp	\$28,214	\$13,746	\$9,000	\$22,746	\$5,468		
C03W23A KIN & ARR Debris Env	\$126,716	\$68,960		\$68,960	\$57,756	Project complete. Final reporting outstanding.	
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 - OR	\$6,181,717	\$3,668,544		\$3,668,544	\$2,513,173	Construction complete. Favourable water levels reduced construction cost compared to budget.	
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		
C03W32A ARR Anderson Newramp- ONR	\$91,500	\$42,817		\$42,817	\$48,683		
C03W32A ARR Anderson Newramp - ONR DM		\$720		\$720	(\$720)		
C03W32A ARR Anderson Newramp - ONR IMP	\$91,500	\$42,097		\$42,097	\$49,403		
C03W33A ARR Syringa Ramp ONR	\$2,527,085	\$369,016		\$369,016	\$2,158,069	Construction complete. On further review, scope of breakwater eliminated reducing cost.	
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	\$5,488	\$140,323	\$145,811	\$43,050	Estimate to Complete only forecast to 2023 while TOR is approved to 2027	Forecast will be extended to 2027.
C03W33B ARR Syringa Maint - ONR DM	\$21,408	\$5,488	\$8,689	\$14,177	\$7,231		
C03W33B ARR Syringa Maint - ONR Imp	\$167,453		\$131,634	\$131,634	\$35,819		
C03W35A MCR Bank Erosion	\$712,739	\$708,779		\$708,779	\$3,960	Project complete. Final reporting outstanding.	
C03W35A MCR Bank Erosion - ONR DM	\$72,964	\$57,695		\$57,695	\$15,269		
C03W35A MCR Bank Erosion - ONR Imp	\$639,775	\$651,085		\$651,085	(\$11,310)		
C03W36A MCR Erosion Mon	\$311,993	\$295,690		\$295,690	\$16,303	Project complete. Final reporting outstanding.	
C03W36A MCR Erosion Mon - ONR DM	\$70,240	\$49,120		\$49,120	\$21,120		
C03W36A MCR Erosion Mon - ONR Imp	\$241,753	\$246,570		\$246,570	(\$4,817)		
C03W40A KIN Dbrs Site Prep	\$785,000	\$783,522		\$783,522	\$1,478	Project complete.	
C03W40A KIN Dbrs Site Prep - OR DM	\$78,000	\$52,470		\$52,470	\$25,530		
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	\$1,498		\$1,498	\$40,528	Project complete.	
C03W41A KIN Fit Dbrs Rmvl - ONR DM	\$29,784	\$1,455		\$1,455	\$28,329		
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	Construction complete. Favourable water levels reduced construction cost compared to budget.	
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	\$21,051	\$177,955	\$199,007	\$75,519	Estimate to Complete only forecast to 2023 while TOR is approved to 2027	Forecast will be extended to 2027.
C03W43B Nakusp Maint - ONR DM	\$24,706	\$5,375	\$11,864	\$17,239	\$7,467		
C03W43B Nakusp Maint - ONR Imp	\$249,820	\$15,676	\$166,092	\$181,768	\$68,052		
C03W45A Anderson Maintenance	\$429,945	\$58,252	\$288,878	\$347,130	\$82,815	Estimate to Complete only forecast to 2023 while TOR is approved to 2027	Forecast will be extended to 2027.
C03W45A Anderson Maintenance - OR DM	\$35,121	\$19,887	\$8,946	\$28,833	\$6,288		
C03W45A Anderson Maintenance - OR Imp	\$394,824	\$38,365	\$279,932	\$318,297	\$76,527		
C03W50A Shelter Bay	\$3,065,308	\$1,400,039		\$1,400,039	\$1,665,269	Construction complete. Favourable water levels reduced construction cost compared to budget.	
C03W50A Shelter Bay - ONR DM	\$209,308	\$106,777		\$106,777	\$102,531		
C03W50A Shelter Bay - ONR Imp	\$2,856,000	\$1,293,262		\$1,293,262	\$1,562,738		
C03W50B Shelter Bay Maint	\$234,299	\$14,764	\$158,417	\$173,181	\$61,118	Estimate to Complete only forecast to 2023 while TOR is approved to 2027	Forecast will be extended to 2027.
C03W50B Shelter Bay Maint - ONR DM	\$21,785	\$5,125	\$8,942	\$14,067	\$7,718		
C03W50B Shelter Bay Maint - ONR Imp	\$212,514	\$9,639	\$149,475	\$159,114	\$53,400		

OR - Ordered Remissible
ONR - Ordered Non-Remissible

* Red values in parentheses denote overage.