

Peace River Water Use Plan Williston Reservoir and Communications Management Plan

Monitoring Programs and Physical Works Annual Report 2016

Implementation Period: June 2015 to April 2016

- **GMSMON-15 WLL Wetland Habitat**
- **GMSMON-16 WLL Debris Trends**
- **GMSMON-17 WLL Tributary Habitat**
- **GMSMON-18 WLL Dust Control**
- **GMSMON-19 WLL Erosion Control**
- **GMSMON-20 WLL Recreation Use**
- **GMSWORKS-14 WLL Air Photos & DEM**
- **GMSWORKS-16 WLL Wetland Inventory**
- **GMSWORKS-17 WLL Trial Wetlands**
- **GMSWORKS-18 WLL Debris Field Survey**
- **GMSWORKS-19 WLL Trial Tributaries**
- **GMSWORKS-20 WLL Dust Source Survey**
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- **GMSWORKS-25 WLL Reservoir Bathymetry**
- **GMSWORKS-26 WLL Communications/Safety**
- **GMSWORKS-27 WLL Finlay River Access Information Plan**
- **GMSWORKS-28 Industry Feasibility & Design Study**
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- **GMSWORKS-61 6 Mile Bay Maintenance**
- **GMSWORKS-62 Cut Thumb Bay Maintenance**

For Water Licences 123018, 123019, 123020, 123021, 123025

May 31, 2016

BC Hydro Peace River Water Use Plan Williston Reservoir and Communications Management Plan Annual Report: 2016

1 Introduction

This document represents a summary of the status and the results of the Peace Project Williston Reservoir and Communications Management Plan Water Use Plan (WUP) monitoring program and physical works projects to April 30, 2016, as per the Peace Order under the *Water Act*, dated August 9, 2007. This annual report includes GMSWORKS-26 as well as those projects in Schedule A of the Order. There are six monitoring programs and thirty-four physical works.

2 Status

The following table outlines the dates that Terms of Reference (TOR) for the Williston Reservoir and Communications Management Plan WUP monitoring programs and physical works were submitted to and approved by the CWR.

Table 2-1 Dates of Williston Reservoir and Communications 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
GMSMON-15 WLL WETLAND HABITAT	Schedule A.6.b	Aug 08, 2008	Sep 15, 2008		
GMSMON-16 WLL DEBRIS TRENDS	Schedule A.3.c, Schedule A.5.a	Nov 26, 2008	Dec 17, 2008	Jan 10, 2014	Deferred - BCH to provide further info
GMSMON-17 WLL TRIBUTARY HABITAT	Schedule A.6.c	Aug 08, 2008	Sep 15, 2008	Jul 24, 2015	Jul 31, 2015
GMSMON-18 WLL DUST CONTROL	Schedule A.6.d	Apr 02, 2008	Apr 28, 2008	Apr 09, 2014	Jun 17, 2014
GMSMON-19 WLL EROSION CONTROL	Schedule A.6.e				
GMSMON-20 WLL RECREATION USE	Schedule A.6.f	Aug 08, 2008	Sep 15, 2008	Nov 05, 2015	Nov 24, 2015
GMSWORKS-14 WLL AIR PHOTOS & DEM	Schedule A.3.d	May 09, 2008	Jun 02, 2008		
GMSWORKS-16 WLL WETLAND INVENTORY	Schedule A.2.a	May 09, 2008	Jun 02, 2008	Aug 07, 2009	Jan 20, 2010
GMSWORKS-17 WLL TRIAL WETLANDS	Schedule A.2.a	May 09, 2008	Jun 02, 2008	Feb 25, 2014	Mar 13, 2014
GMSWORKS-18 WLL DEBRIS FIELD SURVEY	Schedule A.3.c	Nov 26, 2008	Dec 17, 2008	Jan 10, 2014	Feb 17, 2014
GMSWORKS-19 WLL TRIAL TRIBUTARY(S)	Schedule A.2.b	May 09, 2008	Jun 02, 2008	Feb 25, 2014	Mar 12, 2014
GMSWORKS-20 WLL DUST SOIL MAPPING	Schedule A.3.a	Apr 02, 2008	Apr 28, 2008	Apr 13, 2011	Jun 01, 2011
GMSWORKS-21 WLL DUST CONTROL TRIAL	Schedule A.3.a	Apr 02, 2008	Apr 28, 2008	Mar 04, 2014	Mar 13, 2014
GMSWORKS-22 WLL DEBRIS REMOVAL	Schedule A.3.c, Schedule A.5.a	Nov 26, 2008	Mar 23, 2009	Nov 26, 2008	Mar 23, 2009
GMSWORKS-23 WLL EROSION CONTROL TRIAL	Schedule A.3.b				
GMSWORKS-24 WLL BOAT ACCESS	Schedule A.4	May 09, 2008	Jun 02, 2008	Aug 07, 2009	Jan 20, 2010
GMSWORKS-25 WLL BATHYMETRIC MAPPING	Schedule A.3.d	May 09, 2008	Jun 02, 2008	Jun 08, 2011	Oct 12, 2011
GMSWORKS-26 WLL COMMUNICATIONS/SAFETY	Schedule A.5.b, Schedule A.5.c, Schedule B.2.b, Schedule C.3.a	May 09, 2008	Jun 02, 2008	Oct 21, 2015	Nov 03, 2015
GMSWORKS-27 WLL FINLAY RIVER ACCESS INFORMATION PLAN	Schedule A.6.a	Aug 08, 2008	Sep 15, 2008	Aug 07, 2009	Jan 20, 2010
GMSWORKS-28 INDUSTRY FEASIBILITY AND DESIGN STUDY	Schedule A.1	Nov 30, 2009	Jan 11, 2010	Dec 22, 2015	May 20, 2016
GMSWORKS-31 KWADACHA (Fort Ware)	Schedule A.4.b	Apr 16, 2010	May 07, 2010		
GMSWORKS-33 BOAT RAMP DESIGN INGENIKA (Billy's Bay)	Schedule A.4.b	Apr 15, 2010	Jun 28, 2010	Apr 18, 2011	Apr 3, 2012 Deferred - TOR to be resubmitted
GMSWORKS-34 BOAT RAMP DESIGN FINLAY BAY	Schedule A.4.c	Apr 15, 2010	Jun 28, 2010	Apr 18, 2011	Apr 3, 2012 CWR does not approve moving forward
GMSWORKS-35 BOAT RAMP DESIGN 6 MILE BAY	Schedule A.4.c	Apr 15, 2010	Jun 28, 2010	Apr 18, 2011	Apr 3, 2012 CWR does not approve moving forward
GMSWORKS-36 BOAT RAMP DESIGN CUTTHUMB BAY	Schedule A.4.c	Apr 15, 2010	Jun 28, 2010	Apr 18, 2011	Apr 3, 2012 CWR does not approve moving forward
GMSWORKS-37 BOAT RAMP DESIGN MACKENZIE LANDING	Schedule A.4.c	Apr 15, 2010	Jun 28, 2010	Aug 14, 2013	Aug 15, 2013
GMSWORKS-43 BOAT RAMP INGENIKA (Billy's Bay)	Schedule A.4.b	Apr 18, 2011	Apr 3, 2012 Deferred - TOR to be resubmitted		
GMSWORKS-44 BOAT RAMP FINLAY BAY	Schedule A.4.c	Apr 18, 2011	Apr 3, 2012 CWR does not approve moving forward		
GMSWORKS-45 BOAT RAMP 6 MILE BAY	Schedule A.4.c	Apr 18, 2011	Apr 3, 2012 CWR does not approve moving forward		
GMSWORKS-46 BOAT RAMP CUTTHUMB BAY	Schedule A.4.c	Apr 18, 2011	Apr 3, 2012 CWR does not approve moving forward		
GMSWORKS-47 BOAT RAMP MACKENZIE LANDING	Schedule A.4.c	Apr 18, 2011	Apr 03, 2012	Nov 21, 2013	Nov 29, 2013
GMSWORKS-49 BOAT RAMP DUNLEVY	Schedule A.4.a	Apr 18, 2011	Apr 3, 2012 Deferred	Dec 19, 2014	Feb 04, 2015
GMSWORKS-54 CAP BOAT RAMP DESIGN DUNLEVY	Schedule A.4.a	Apr 15, 2010	May 07, 2010	Jul 12, 2013	Jul 16, 2013
GMSWORKS-57 DUNLEVY MAINTENANCE	Schedule A.4.a	Apr 18, 2011	Apr 3, 2012 Deferred	May 07, 2013	May 15, 2013
GMSWORKS-58 MACKENZIE MAINTENANCE	Schedule A.4.c	Apr 18, 2011	Apr 03, 2012		
GMSWORKS-59 INGENIKA MAINTENANCE (Billy's Bay)	Schedule A.4.b	Apr 18, 2011	Apr 3, 2012 Deferred TOR to be resubmitted		
GMSWORKS-60 FINLAY BAY MAINTENANCE	Schedule A.4.c	Apr 18, 2011	Apr 3, 2012 CWR does not approve moving forward		
GMSWORKS-61 6 MILE BAY MAINTENANCE	Schedule A.4.c	Apr 18, 2011	Apr 3, 2012 CWR does not approve moving forward		
GMSWORKS-62 CUTTHUMB BAY MAINTENANCE	Schedule A.4.c	Apr 18, 2011	Apr 3, 2012 CWR does not approve moving forward		

3 Schedule

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

Table 3-1: Monitoring Programs and Physical Works Schedule as of April 30, 2016

Monitoring Programs	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
	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
GMSMON-15: WLL Wetland Habitat			Del	✓	✓	✓	✓	✓	u/w	■	■	■	■	
GMSMON-16: WLL Debris Trends									u/w		■			
GMSMON-17: WLL Tributary Habitat			Del	✓	✓	✓	✓	✓	u/w	■	■	■	■	
GMSMON-18: WLL Dust Control	✓	✓	✓	✓	✓	✓	✓	✓	u/w	■				
GMSMON-19: WLL Erosion Control ¹														
GMSMON-20: WLL Recreation Use		✓	✓	✓	✓	✓	✓	✓	u/w	■	■			
GMSWORKS-14: WLL Air Photos & DEM		✓	✓	✓							■			
GMSWORKS-16: WLL Wetland Inventory		✓	✓											
GMSWORKS-17: WLL Trial Wetlands			✓	✓	✓	✓	✓	✓	u/w*	■*	■*	■*	■*	
GMSWORKS-18: WLL Debris Field Survey		✓	✓	✓			✓							
GMSWORKS-19: WLL Trial Tributaries	Del	✓			✓	✓	✓	✓	u/w*	■*	■*	■*	■*	
GMSWORKS-20: WLL Dust Source Survey		✓	✓	✓	✓									
GMSWORKS-21: WLL Dust Control Trial	✓	✓	✓	✓	✓	✓	✓							
GMSWORKS-22: WLL Debris Management		✓	✓	✓	✓	✓	✓	✓	u/w	■	■			
GMSWORKS-23: WLL Erosion Control Trial ¹														
GMSWORKS-24: WLL Boat Access	Del	✓	✓											
GMSWORKS-25: WLL Bathymetric Mapping			✓	✓	✓									
GMSWORKS-26: WLL Communications/Safety	Del	✓	Del	✓	✓	✓	✓	✓	u/w	■*	■*	■*	■*	■*
GMSWORKS-27: WLL Finlay River Access Information Plan		✓	✓											
GMSWORKS-28: Industry Feasibility & Design Study	Del	Del	Del	Del	✓	✓	✓	✓						
GMSWORKS-28a: District of Mackenzie Effluent Discharge Feasibility & Design Study			✓	✓	✓									
GMSWORKS-31 Kwadacha Boat Launch Maintenance			✓	✓	✓	✓	✓	✓	u/w*	■*	■*	■*		
GMSWORKS-33 Boat Ramp Design Ingenika ¹			✓	✓										
GMSWORKS-34 Boat Ramp Design Finlay Bay			✓	✓										
GMSWORKS-35 Boat Ramp Design 6 Mile Bay			✓	✓										
GMSWORKS-36 Boat Ramp Design Cut Thumb Bay			✓	✓										
GMSWORKS-37 Boat Ramp Design Mackenzie Landing			✓	✓	✓	✓								
GMSWORKS-43 Boat Ramp Ingenika ¹														
GMSWORKS-44 Boat Ramp Finlay Bay														
GMSWORKS-45 Boat Ramp 6 Mile Bay														
GMSWORKS-46 Boat Ramp Cut Thumb Bay														
GMSWORKS-47 Boat Ramp Mackenzie Landing							✓							
GMSWORKS-49 Boat Ramp Dunlevy							✓	✓						
GMSWORKS-54 Boat Ramp Design Dunlevy			✓	✓	✓	✓								
GMSWORKS-57 Dunlevy Maintenance						✓		x	u/w*	■*	■*	■*	■*	■*
GMSWORKS-58 Mackenzie Maintenance							x	✓	u/w*	■*	■*	■*	■*	■*
GMSWORKS-59 Ingenika Maintenance ¹														
GMSWORKS-60 Finlay Bay Maintenance														
GMSWORKS-61 6 Mile Bay Maintenance														
GMSWORKS-62 Cut Thumb Bay Maintenance														
Legend	■ Program to be undertaken/initiated in identified year							* Maintenance only in identified year						
	u/w Project is under way							x Project not undertaken as planned for this year						
	✓ Project is completed for the year							Del Project is delayed for the year						

Footnotes:

1. Pending agreement between BC Hydro and the Tsay Keh Dene First Nation.

4 Monitoring Programs and Physical Works Terms of Reference

The monitoring programs and physical works being implemented under the Williston Reservoir and Communications 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/northern_interior/peace_river.html

5 Status of Monitoring Programs

5.1 GMSMON-15 Williston Wetland Habitat

The objective of this ten year monitoring project is to assess the effectiveness of two wetland enhancement trials to improve foreshore habitat for fisheries, wildlife, and riparian areas as well as maintain the enhancement over the life of the project. The key management questions addressed by this monitoring program are:

1. Are the enhanced (or newly created) wetlands used by fish?
2. Are the enhanced (or newly created) wetlands used by waterfowl and other wildlife?
3. Is there a change in the abundance, diversity, and extent of vegetation in the enhancement area?
4. Is the area and quality of fish and wildlife habitat created by the wetland enhancement maintained over time?

Pre-construction monitoring work began in April 2011 and continued after the construction of trial wetlands (under GMSWORKS-17 Williston Trial Wetlands) was completed at Airport Lagoon in 2013 and Beaver Pond in 2014. Monitoring, to the end of the project, will be required to confirm what changes to fish, wildlife and vegetation are associated with the enhancement projects. Attached is the Year 5 report dated February 2016.

5.2 GMSMON-16 Williston Debris Trends

The objective of the monitoring project is to assess the effectiveness of GMSWORKS-22 (Williston Targeted Debris Management). The key management questions addressed by this monitoring program are:

1. How is the volume of woody debris in Williston Reservoir changing over time?
2. Is woody debris collecting at trial and project sites associated with the Peace River Water Use Plan?
3. What are the primary sources for woody debris recruitment into Williston Reservoir and what is the rate of debris recruitment from these sources?

Following the analysis of the aerial photography of 2009 for GMSWORKS-14 (Williston Air Photo and DEM), a reservoir debris survey was completed in 2010 as part of the GMSWORKS-18 (Williston Debris Field Survey) deliverables. A baseline debris survey is a shared objective of GMSMON-16 and GMSWORKS-18. The final analysis of changing debris volume over time will follow the aerial photography collected through GMSWORKS-14 which is scheduled for 2018.

5.3 GMSMON-17 Tributary Habitat Review

This ten year monitoring program began in April 2011 and continued following construction of enhancement work (under GMSWORKS-19 Williston Trial Tributaries) at Ole Creek and Six Mile Creek in 2014. The focus of the effectiveness monitoring is to determine the response of fish and selected indicator groups to the tributary enhancements. Based on results from the first few years of monitoring, it was determined that the original study design was unlikely to detect a change in fisheries productivity related to the habitat enhancements. The improved study design was outlined in a Terms of Reference Revision (Revision 1.0) which was approved on July 31, 2015.

The key management questions for this program are:

1. Does access for spring spawners (i.e. rainbow trout and/or arctic grayling) improve as a result of enhancement?
2. Is the area and quality of fish habitat created by the tributary enhancement maintained over time?
3. Does riparian vegetation along tributaries increase in abundance and diversity as a result of enhancement?
4. Does abundance and diversity of song birds (passerines) around tributaries change as a result of enhancement?
5. Does amphibian abundance and diversity in tributaries change as a result of enhancement?
6. Does tributary enhancement change the area and quality of amphibian breeding habitat over time? If so, is the area and quality maintained over time?

The Year 5 (2015) report is in draft and will be submitted with the 2017 Annual Report.

5.4 GMSMON-18 Williston Dust Control

This work was initiated in April 2008 and will be undertaken every year for ten years (completed in 2017).

The objective of this monitoring project is to provide long-term data on airborne particulate matter concentrations in the upper Finlay Arm airshed and to evaluate the effectiveness of dust mitigation treatments in the drawdown zone of Finlay Arm.

There have been a number of revisions to this program during implementation. In 2008 and 2009, data collection occurred from early May through late June, a period coinciding with the lowest water levels and greatest potential for dust emissions from Williston beaches. In 2010, air monitoring was extended to the end of August. In 2011, the instrumentation was replaced with more suitable monitoring units. The revisions outlined above are included in Terms of Reference Addendum 3 which was approved on June 17, 2014.

Attached is the Year 7 (2014) report dated April 15, 2015. The Year 8 (2015) report is in draft and will be submitted with the 2017 Annual Report.

5.5 GMSMON-19 Williston Erosion Control

The objective of this project is to monitor the effectiveness of any constructed erosion works under GMSWORKS-23 (Williston Erosion Control Trials). The submission of a

Terms of Reference for this project is on hold pending an agreement between Tsay Keh Dene First Nation and BC Hydro.

5.6 GMSMON-20 Reservoir Recreation Use

This work was initiated in May 2009 and will be undertaken every year for ten years (completed in 2018). The objective of the monitoring project is to assess boat ramp usage on the Williston Reservoir. Vehicle counters and remote cameras are being used concurrently to evaluate the following management questions:

The key management questions addressed by this monitoring program are:

1. Does the recreational use of the Williston Reservoir boat ramps increase after boat access has been improved?
2. What is the frequency of use of newly constructed boat ramps?

Attached is the Year 7 report dated May 2016.

6 Status of Physical Works

6.1 GMSWORKS-14 Williston Air Photos and DEM

The objective of this project was to

1. Conduct a mapping inventory to compile a bibliography of all existing maps of the Williston Reservoir
2. Acquire aerial photos of Williston Reservoir at low pool in 2009 and develop a bare earth digital elevation model (DEM) and
3. Acquire aerial photos of the Williston Reservoir in 2013 and 2018 and re-compile the DEM based on new data.

The imagery obtained from this project is designed to support other management plans within the Williston Reservoir. Spatial data and information will support a number of Peace projects including, but not limited to, debris management, dust mitigation, wetlands and tributaries and bathymetry.

The first stage of work was initiated in April 2009 and completed in December 2010. The second set of air photos was scheduled to be acquired in 2013, but those photos were taken in spring of 2011 to take advantage of the very low reservoir level. The third set of photos is scheduled to be acquired in 2018.

6.2 GMSWORKS-16 Williston Wetland Inventory

The purpose of this project was to compile a list of candidate sites within the Williston Reservoir for wetland habitat creation. This project was completed in 2010 and information from this project was used to generate sites where wetland enhancement works were completed under GMSWORKS-17 (Williston Trial Wetlands).

This project is complete.

6.3 GMSWORKS-17 Williston Trial Wetlands

The objective of this project was to create wetland habitats in areas that may be dewatered for long periods to improve reservoir habitat and increase the utility of the drawdown zone for some wildlife and fish species. Construction was completed at the two trial sites, Airport Lagoon in 2013 and Beaver Pond in 2014.

The work at the Airport Lagoon site consisted of replacing two culverts under the forestry road causeway to raise the invert elevation. This allowed for water storage and creation of wetted habitat which may facilitate colonization of vegetation in the perimeter of the treatment area and enhancement of the riparian zone for the benefit of wildlife.

Beaver Pond work involved construction of a geo-synthetic berm.

The projects are inspected for maintenance issues on an annual basis.

6.4 GMSWORKS-18 Williston Debris Field Survey

The objectives of the Williston Debris Field Survey are to collect baseline information on volume of debris within the reservoir and recruitment of debris to the reservoir, as well as to assess the feasibility of alternative means of debris management to pile and burn.

The project consists of two components; 1) a debris field survey; and 2) a debris management strategy. The debris field survey was completed in June 2010 following the aerial photography from GMSWORKS-14 (Williston Air Photos & DEM) in April 2009. The survey was a shared deliverable between this project and GMSMON-16 (Williston Debris Trends). The debris management strategy was prepared in 2011. A second report in 2015 expanded on the operational requirements for the alternative methods.

This project is complete.

6.5 GMSWORKS-19 Williston Reservoir Tributaries

The overall objective of the physical work was to improve or restore the access to rivers that are tributary to Williston Reservoir. A build-up of debris may compromise access at the mouth of the tributary and/or by the seasonally fluctuating water levels in the reservoir. Two tributaries, Ole Creek and Six Mile Creek, were selected for enhancement.

Physical works at Six Mile Creek consisted of the creation of a single deep channel and protective installations. Ole Creek was impeded by unconfined channel flow, as well as woody debris, so restoration efforts focused on digging and maintaining a single thread channel, and placing installations to protect the channel. Woody debris was cleared and a log boom was installed at the mouth of the creek

Construction works at Ole Creek and Six Mile Creek were completed in 2014. The projects are inspected for maintenance issues on an annual basis.

6.6 GMSWORKS-20 Williston Dust Mapping

This is a feasibility study to assess the practicality of using satellite technology to predict dust emission potential based on soil characteristics of Williston beaches. The four objectives of the study were to:

1. Assess the ability of satellite technology to predict near surface soil moisture and surface roughness, which critically control the wind erosion threshold, at appropriate spatial and temporal scales on a representative beach;
2. Assess the ability of satellite technology to differentiate the textural characteristics of the surface sediments;

3. Characterize the wind erosion threshold and dust emission potential of selected GMS beach surfaces and evaluate the relationship between those measurements and the satellite signals for soil moisture, roughness, and texture; and
4. Develop a preliminary near real-time algorithm to predict potential dust emission for typical wind speeds at Williston Reservoir based on weekly satellite scenes.

This work was initiated in May 2009 and the final season of field data was collected in 2012. This project is complete.

6.7 GMSWORKS-21 Williston Dust Control Trials

Aerial movement of fine particles of silts and clays (“dust”) from the exposed drawdown zone in the Finlay Reach of the Williston Reservoir have been a concern of Tsay Keh Dene and Kwadacha First Nations. An adaptive management program of dust mitigation was implemented on a beach-by-beach basis. Seven years of dust control trials were completed (from 2008-2014) which included assessments of several different dust methodologies including:

- Various tillage techniques
- Irrigation, using gravity-fed distribution in 2011 and a high output pump in 2014
- Native vegetation
- Vegetation protection using protective debris berm and
- Engineering roughness.

The Williston Dust Control Trials are complete. Reports indicated as outstanding in the 2015 Annual Report remain outstanding and will be provided when they are finalized.

6.8 GMSWORKS-22 Williston Targeted Debris Management

The Williston Targeted Debris Management project provides debris management in the reservoir over a 10-year period. Debris is managed to: (i) minimize damage to Peace Water Use Plan (WUP) study sites, (ii) improve navigation, (iii) improve fish access to tributaries, and (iv) reduce shoreline erosion and destruction to riparian vegetation.

The project entails conducting an annual aerial debris reconnaissance survey, collecting debris (on land or water) at selected sites, and managing debris to prevent negative impacts to WUP projects, navigational safety, fisheries, and shorelines.

Work was initiated in May 2009 and will be completed in 2018. It was estimated that the amount of debris piled above the high water mark in 2013 was 6,200 m³ from the Finlay Reach. In 2014 it was estimated that 28,000 m³ of debris was piled in the Finlay Reach and 7,000 m³ of debris in the Parsnip Reach. Efforts in 2015 focused on the beaches in the Finlay Reach based on priority debris accumulation areas, accessibility and operational feasibility. The method to estimate production was improved with the addition of a log scaler to estimate the loads on the rock trucks. In 2015, it was reported that 11,142 m³ of debris was piled. The Year 6 (2014) reports dated October 31, 2014 and Year 7 (2015) report dated January 12, 2016 are attached.

6.9 GMSWORKS-23 Williston Erosion Control Trial

The objective of this project is to investigate the feasibility of erosion controls at Tsay Keh Dene village site and implement any chosen solution on a trial basis. This project is on hold pending an agreement between Tsay Keh Dene First Nation and BC Hydro.

6.10 GMSWORKS-24 Finlay Reach Access

The objectives of this project were to complete feasibility studies on options for recreational access to the Williston Reservoir or for improvements to the existing access points to the reservoir, and to make recommendations.

Two feasibility studies were completed in March 2009 for seven sites on the Parsnip Reach of the Williston Reservoir (GMSWORKS-24B) and two sites at Finlay Reach (GMSWORKS-24A).

The seven sites on Parsnip Reach were as follows:

- One existing boat launch site located in the BC Hydro campsite (Alexander Mackenzie's Landing Recreation Area);
- Two existing boat launch sites located at Forest Service campsites (Cut Thumb Bay and Finlay Bay); and,
- Four locations with, at most, informal gravel ramps (Six Mile Bay, Strandberg, Manson Dump, and Black Water).

The sites on Finlay Reach included potential boat launch ramp locations at the following locations:

- Ingenika; and
- in the vicinity of Tsay Keh Village, including the existing barge landing .

The feasibility studies included engineering technical feasibility, archaeological feasibility, and environmental criteria, and cost in their evaluations.

This project is complete.

6.11 GMSWORKS-25 Williston Reservoir Bathymetry

The objective of this project was to map the reservoir between full pool and 652.27 meters.

Between 2010 and 2012, twenty-five bathymetric charts of the reservoir were created. This project is complete.

6.12 GMSWORKS-26 Williston Communication and Safety

This project has the objective of enhancing safe navigational access of Williston reservoirs and the Peace River by conducting a study that details current radio communication resources, recommending a plan for and developing a radio communication network, installing information signage, and developing an annual maintenance plan.

This work was initiated in January 2009. Installation and commissioning of the radio communications network for Williston reservoir was completed in September 2013. Signage has been posted at each boat launch to provide information on reservoir

access points and to warn users of local and potential hazards. Test calls sent by tug and barge operators have been successfully received from various points in the reservoir. Beyond test calls from tugs, overall usage of the system after two years of full-time monitoring is very low.

In considering the low use of the system, high maintenance costs and availability of other modes of communication, in a letter dated November 3, 2015, the Comptroller of Water Rights (CWR) approved pausing further development of the communication system under this project. An investigation into the best steps forward for the remaining Peace area and the maintenance and works of the already developed system will be conducted in 2016. A TOR addendum outlining recommendations for next steps will not be provided to the CWR office by August 15, 2016, as originally proposed. We will continue to monitor and perform maintenance as required and will submit a TOR addendum by April 18, 2017.

6.13 GMSWORKS-27 Finlay River Access Information Plan

The objective of this project was to conduct an investigation into sedimentation problems in the lower Finlay River that may be associated with fluctuating levels of the Williston Reservoir. This project is complete.

6.14 GMSWORKS-28 Mackenzie Industry Feasibility & Design Study

The objective of this engineering feasibility and design study was to determine practical and cost-effective solutions associated with lower reservoir levels at Mackenzie's three industrial plants for water supply, effluent disposal and log supply.

The Phase Two report was submitted to the Comptroller of Water Rights which was accepted on May 20, 2016. This project is complete.

6.15 GMSWORKS-28A District of Mackenzie Effluent Discharge Feasibility & Design Study

This project was intended to be an engineering feasibility and design study to determine practical and cost-effective solutions to the issues associated with lower reservoir levels at Mackenzie and effluent disposal at the District of Mackenzie. The study was submitted to the Comptroller of Water Rights in December 2015. This project is complete.

6.16 GMSWORKS-31 Kwadacha Boat Ramp

This project is for the ongoing maintenance costs associated with the boat launch facility at Kwadacha, across from the village of Fort Ware, on the Finlay Reach of the Williston Reservoir.

This project arises a requirement under Clause (j) of the Final Water Licence 123021, BC Hydro is required to provide reservoir access on the Williston Reservoir.

At the time of the Water Use Plan, the Williston Reservoir had no boat launch sites in the Finlay Reach and only an informal site on the Finlay River at Kwadacha. A location at Kwadacha (Fort Ware) was identified by the Consultative Committee as a priority site. Following the Consultative Committee report (2003) but prior to the WUP being approved and the Peace Order being given under the Water Act, agreement was reached between Kwadacha and BC Hydro to build a new boat ramp on the Finlay River at Kwadacha. The ramp was constructed in December 2007.

When the Peace Water Use Plan Order (76975-35) was issued in October, 2007, it included the direction to undertake a feasibility study for a ramp at Kwadacha (Fort Ware). As the ramp had been built, no feasibility studies as required by the Order were undertaken.

In 2010, issues identified with the constructed ramp were identified. Significant upgrades were undertaken in February and March 2009. BC Hydro will continue to maintain the ramp.

6.17 GMSWORKS-33 Boat Ramp Design Ingenika

Under Clause (j) of Final Water Licence 123021, BC Hydro is required to provide reservoir access at areas as directed by the Comptroller of Water Rights (CWR). The WUP order identified Finlay Reach, with feasibility of new access at Ingenika to be studied. The feasibility study was undertaken in March 2010, GMSWORKS-24 (Finlay Reach Access).

In April 2012, BC Hydro indicated that the proposed options in the GMSWORKS-24 report did not meet the needs of the Tsay Keh Dene community and the CWR agreed to defer the project to allow for ongoing conversations with the community.

6.18 GMSWORKS-34 Boat Ramp Design Finlay Bay

Under Clause (j) of Final Water Licence 123021, BC Hydro is required to provide reservoir access at areas as directed by the Comptroller of Water Rights (CWR). Finlay Bay was identified as a site for access as part of the WUP, and the feasibility study was undertaken in March 2010, GMSWORKS-24 (Finlay Reach Access).

The Finlay Bay boat launch is adjacent to the Finlay Bay Forest Service Campsite. The campsite and boat launch ramp are reached via 75 km of the rough gravel West Parsnip Forest Service Road. The boat launch ramp is reached along a gravel track that passes through a relatively wide, open area. There is an existing outhouse as well as picnic tables on the upland grassy area, but there are otherwise no significant facilities there.

The feasibility study identified challenging design options that required dredging of a channel approximately 90 m long to provide access to relatively low water (e.g., El. 659 m), which adds to the expense of the project and the ongoing maintenance costs.

Following an assessment under GSMON-20 (Williston Recreation Use) for Williston Reservoir, the CWR did not approve further implementation at the Finlay Bay site. If future recreation demand proves that greater reservoir access is needed, then this ramp development may be reconsidered as per letter from the CWR dated April 3, 2012.

6.19 GMSWORKS-35 Boat Ramp Design 6 Mile Bay

Under Clause (j) of Final Water Licence 123021, BC Hydro is required to provide reservoir access at areas as directed by the Comptroller of Water Rights (CWR). 6 Mile Bay was identified as a site for access as part of the WUP, and the feasibility study was undertaken in March 2010, GMSWORKS-24 (Finlay Reach Access).

The 6 Mile Bay site has an existing gravel ramp with the lower part of the boat launch cut into the side of a bank and the upper portion angled around this bank. A design was prepared for a pre-cast concrete ramp accessible at water elevations of

El. 657 m. Lower water access was not feasible due to the bathymetry of the reservoir at this location.

Following an assessment under GSMON-20 (Williston Recreation Use) for Williston Reservoir, the CWR did not approve further design (GMSWORKS-34) or implementation (GMSWORKS-44) at the 6 Mile Bay site. If future recreation demand proves that greater reservoir access is needed, then this ramp development may be reconsidered as per letter from the CWR dated April 3, 2012.

6.20 GMSWORKS-36 Boat Ramp Design Cut Thumb Bay

Under Clause (j) of Final Water Licence 123021, BC Hydro is required to provide reservoir access at areas as directed by the Comptroller of Water Rights (CWR). Cut Thumb Bay was identified as a site for access as part of the WUP, and the feasibility study was undertaken in March 2010, GMSWORKS-24 (Finlay Reach Access).

Cut Thumb Bay accessed from the Parsnip West Forest Service Road. This is the best site for launches into the Williston Reservoir at low water. There is a large area available for parking and turnaround. While there is a visible gravel track to the best launching spots, the entire area of the bay provides a driveable gravel surface.

Following an assessment of the Recreation Use Study for Williston Reservoir (GSMON-20), the CWR did not approve further design (GMSWORKS-36) or implementation (GMSWORKS-46) at the Cut Thumb Bay site. If future recreation demand proves that greater reservoir access is needed, then this ramp development may be reconsidered as per letter from the CWR dated April 3, 2012.

6.21 GMSWORKS-37 Boat Ramp Design Mackenzie Landing

Under Clause (j) of Final Water Licence 123021, BC Hydro is required to provide reservoir access at areas as directed by the Comptroller of Water Rights (CWR). Alexander Mackenzie's Landing Recreation Site ("Mackenzie Landing") was identified as a site for access as part of the WUP, and the feasibility study was undertaken in March 2010, GMSWORKS-24 (Finlay Reach Access).

Mackenzie Landing recreation site is located 8 km from Mackenzie on the West Parsnip forest service road off Highway 39 on the east side of the Williston Reservoir.

The feasibility for the boat launch was undertaken as part of GMSWORKS -24B. This project is for the design phase associated with the design options selected from the feasibility study. The design involved the development of an upper concrete ramp with a toe elevation at El. 662 m a lower ramp with a toe elevation of El. 654.4 m and a gravel access road between the two ramps, a gravel parking area and turnaround, and erosion protection along the ramp and roads.

The CWR approved this design on April 3, 2012, and work commenced on the upper portions of the ramp under GMSWORKS-47 (Boat Ramp Construction Mackenzie Landing).

In August 2013, after a constructability review in preparation for construction of this design, due to the need for a significant coffer dam, the costs estimates increased significantly and BC Hydro revisited the design.

Revised designs were prepared with a lower ramp to El. 658 m and were discussed and agreed with the District of Mackenzie and from the community through an open

house. The revised design would also allow construction of the lower portion without the use of a coffer dam. The CWR approved this design on November 29, 2013. Construction of these facilities was undertaken as part of GMSWORKS-47.

6.22 GMSWORKS-43 Boat Ramp Ingenika

This project is for the construction of a boat launch facility at Ingenika on Finlay Reach. As described in GMSWORKS-33 above (Boat Ramp Design Ingenika), this project has not been approved for implementation pending ongoing conversations with local First Nations, Tsay Keh Dene, in particular.

6.23 GMSWORKS-44 Boat Ramp Finlay Bay

This project is for the construction of the Finlay Bay boat ramp. As described in GMSWORKS-34 above (Boat Ramp Design Finlay Bay), this project has not been approved for implementation.

If future recreation demand proves that greater reservoir access is needed, then this ramp development may be reconsidered, per letter from the Comptroller of Water Rights dated April 3, 2012.

6.24 GMSWORKS-45 Boat Ramp 6 Mile Bay

This project is for the construction of the 6 Mile Bay boat ramp. As described in GMSWORKS-35 above (Boat Ramp Design 6 Mile Bay), this has not been approved for implementation.

If future recreation demand proves that greater reservoir access is needed, then this ramp development may be reconsidered, per letter from the Comptroller of Water Rights dated April 3, 2012.

6.25 GMSWORKS-46 Boat Ramp Cut Thumb Bay

This project is for the construction of the Cut Thumb Bay boat ramp. As described in GMSWORKS-36 above (Boat Ramp Design Cut Thumb Bay), upgrades have not been approved for implementation.

If future recreation demand proves that greater reservoir access is needed, then this ramp development may be reconsidered, per letter from the Comptroller of Water Rights dated April 3, 2012.

6.26 GMSWORKS-47 Boat Ramp Mackenzie Landing

As described in GMSWORKS-37 above (Boat Ramp Construction Mackenzie Landing), the Comptroller of Water Rights (CWR) approved the first design on April 3, 2012, and work commenced on upland work, upper portions of the ramp and procurement of the concrete ramp panels in spring 2013.

Following approval of the revised design for the lower ramp in November 2013, construction work on site started in March 2014, and was completed in May 2014. The construction team was able to take advantage of a natural ice coffer dam that arose during construction to complete the project under the approved budget.

This construction work is now complete, with the exception of the final completion reporting.

6.27 GMSWORKS-49 Boat Ramp Dunlevy

The project objective is to construct the ramp upgrade for the boat launch at Dunlevy developed under GMSWORKS-54.

Permits and planning for ramp upgrade work were initiated in 2013. Work was planned for winter 2014 but was delayed due to early road restrictions. Work commenced in June 2014 on the upland work including the road, the parking areas and the turnaround area. Materials for the 2015 work were delivered and stored on site.

Work commenced in February 2015 to demolish the existing ramp. Due to water elevations and construction challenges (e.g. large boulder that needed to be removed), construction of the ramp reached a toe elevation of 660.75 m, short of the planned elevation of 658 m.

The current elevation of 660.75 m provides access to the ramp 100% of the time from June 1 to October 31 and 91.8% of the time from May 15 to October 31 based on historical records.

Assessment for proceeding to El. 658 m will consider usage data of the newly improved ramp over the next few years. A completion report will remain outstanding until the boat ramp is acknowledged as complete.

6.28 GMSWORKS-54 – Boat Ramp Design Dunlevy

This project was to provide an engineered design for a recreational Boat Launch suitable for the Dunlevy location.

Under Clause (j) of Final Water Licence 123021, BC Hydro is required to provide reservoir access at areas as directed by the Comptroller of Water Rights (CWR). Dunlevy was identified as a site for access as part of the WUP. The Dunlevy location is on the east shore of the Dunlevy Inlet approximately 30 km northwest of Hudson's Hope. It is located within Butler Ridge Provincial Park.

The initial feasibility study was undertaken in GMSWORKS-13 Peace and Williston Recreation Access Feasibility Study (March 2010) (described in the Annual Report for Peace River (Schedule C)), and explored two sites – the existing site and an alternative location on the west side of Dunlevy Inlet.

At the time of the feasibility, the existing concrete ramp was in poor condition as a result of erosion and slumping and had been closed since 2009. The west side site was not considered feasible due to geotechnical conditions and it was recommended that further geotechnical investigations be undertaken at the existing location prior to determining a final design.

Following these additional extensive geotechnical investigations at the site, a second feasibility report was prepared (June 2013). This report looked at multiple design variations at the existing site.

The profile along the centerline of the existing boat ramp is comprised of two main gradients:

- From the top of the ramp towards the bottom of the ramp, the gradient is approximately 14% (1 in 7.2) between El. 674 m to El. 664 m.
- From lake bed contour at El. 664 m, the gradient of the shoreline steepens sharply to 53.4% (1 in 1.9) to El. 631 m offshore.

While the upper portion of the ramp is at the preferred gradient for boat launch operations, the lower section of the ramp was too steep to function as a boat ramp without significant fill. As a result all design options in the 2013 report reviewed options at elevations El. 654 m plus options with higher elevations. The options with toe elevations below El. 664 m became increasingly more expensive the lower the toe.

On July 16, 2013 the CWR accepted a design to elevation El. 658 m, and work proceeded to develop the design specifications and issue for construction drawings.

6.29 GMSWORKS-57 Dunlevy Maintenance

When the operations and maintenance manual from GMSWORKS-49 is complete, a maintenance TOR will be developed and submitted.

6.30 GMSWORKS-58 Mackenzie Maintenance

When the operations and maintenance manual from GMSWORKS-47 is complete, a maintenance TOR will be developed and submitted.

6.31 GMSWORKS-59 Ingenika Maintenance

Ingenika Boat Ramp under GMSWORKS-43 has not yet been built.

6.32 GMSWORKS-60 Finlay Bay Maintenance

No maintenance is required for Finlay Bay, as no ramp upgrades have been constructed, as discussed in GMSWORKS- 34 and -44 above.

6.33 GMSWORKS-61 6 Mile Bay Maintenance

No maintenance is required for 6 Mile Bay, as no ramp upgrades have been constructed, as mentioned in GMSWORKS- 35 and 45 above.

6.34 GMSWORKS-62 Cut Thumb Bay Maintenance

No maintenance is required for Cut Thumb Bay, as no ramp upgrades have been constructed, as mentioned in GMSWORKS- 36 and 46 above.

7 Monitoring Programs and Physical Works Costs

The following table summarizes the Williston Reservoir and Communications Management Plan WUP monitoring programs and physical works costs approved by the Comptroller and the Actual Costs to Mar 31, 2016.

Table 7-1: Williston Reservoir and Communications Management Plan WUP Monitoring Programs and Physical Works Costs

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
GMS Prepare Annual Report - OR	\$43,074	\$16,892	\$26,182	\$43,074	\$0		
GMSM15A WLL Wetland Habitat	\$981,420	\$423,869	\$482,767	\$906,636	\$74,784	Efficiencies found during Implementation	
GMSM15A WLL Wetland Habitat - OR DM	\$157,922	\$51,949	\$55,431	\$107,380	\$50,542		
GMSM15A WLL Wetland Habitat - OR Imp	\$823,498	\$371,920	\$427,336	\$799,256	\$24,242		
GMSM16A WLL Debris Trends	\$215,564	\$13,288	\$202,276	\$215,564	\$0		
GMSM16A WLL Debris Trends - OR DM	\$46,860	\$13,288	\$33,572	\$46,860			
GMSM16A WLL Debris Trends - OR Imp	\$168,704		\$168,704	\$168,704			
GMSM17A WLL Tributary Habita	\$1,467,158	\$776,183	\$690,975	\$1,467,158	(\$0)		
GMSM17A WLL Tributary Habita - OR DM	\$75,898	\$61,317	\$8,408	\$69,725	\$6,173		
GMSM17A WLL Tributary Habita - OR Imp	\$1,391,260	\$714,867	\$682,567	\$1,397,434	(\$6,174)		
GMSM18A WLL Dust Control	\$5,806,148	\$3,676,462	\$1,069,182	\$4,745,645	\$1,060,503	Efficiencies found during Implementation	
GMSM18A WLL Dust Control - OR DM	\$184,905	\$79,835	\$84,161	\$163,996	\$20,909		
GMSM18A WLL Dust Control - OR Imp	\$5,621,243	\$3,596,627	\$985,021	\$4,581,648	\$1,039,595		
GMSM19A WLL Erosion Control	\$0	\$3,423	\$0	\$3,423	(\$3,423)	Project not yet approved	
GMSM19A WLL Erosion Control - OR DM	\$0	\$3,423	\$0	\$3,423	(\$3,423)		
GMSM19A WLL Erosion Control - OR Imp	\$0		\$0	\$0	(\$0)		
GMSM20A WLL Recreation Use	\$384,270	\$225,776	\$158,494	\$384,270	(\$0)		
GMSM20A WLL Recreation Use - OR DM	\$64,182	\$47,705	\$16,203	\$63,909	\$273		
GMSM20A WLL Recreation Use - OR Imp	\$320,088	\$178,070	\$142,291	\$320,361	(\$273)		
GMSW14A WLL Air Photos & Dem	\$2,804,180	\$1,740,574	\$640,148	\$2,380,722	\$0		
GMSW14A WLL Air Photos & Dem - OR DM	\$30,295	\$28,015	\$10,276	\$38,291	(\$7,996)		
GMSW14A WLL Air Photos & Dem - OR Imp	\$2,773,885	\$1,712,560	\$1,053,329	\$2,765,889	\$7,996		
GMSW16A WLL Wetland Invent - OR	\$143,076	\$143,076		\$143,076	\$0	Project Complete	
GMSW16A WLL Wetland Invent - OR DM	\$12,656	\$12,656		\$12,656	\$0		
GMSW16A WLL Wetland Invent - OR Imp	\$130,420	\$130,420	\$0	\$130,420	\$0		
GMSW17A WLL Trial Wetlands	\$2,323,692	\$2,059,481	\$184,565	\$2,244,046	\$79,646	Efficiencies found during Implementation	
GMSW17A WLL Trial Wetlands - OR DM	\$30,273	\$36,454	\$14,465	\$50,919	(\$20,646)		
GMSW17A WLL Trial Wetlands - OR Imp	\$2,293,419	\$2,023,027	\$170,100	\$2,193,127	\$100,292		
GMSW18A WLL Debris Field - OR	\$342,368	\$342,206	\$162	\$342,368	\$0		
GMSW18A WLL Debris Field - OR DM	\$20,735	\$18,255	\$162	\$18,417	\$2,318		
GMSW18A WLL Debris Field - OR Imp	\$321,633	\$323,951	\$0	\$323,951	(\$2,318)		
GMSW19A WLL Trial Tributary	\$2,552,026	\$1,989,728	\$193,985	\$2,183,713	\$368,313	Efficiencies found during Implementation	
GMSW19A WLL Trial Tributary - OR DM	\$40,649	\$42,672	\$11,985	\$54,657	(\$14,008)		
GMSW19A WLL Trial Tributary - OR Imp	\$2,511,377	\$1,947,056	\$182,000	\$2,129,056	\$382,321		
GMSW20A Dust Source Survey	\$733,672	\$714,406	\$8,961	\$723,367	\$10,305		
GMSW20A Dust Source Survey - OR DM	\$35,587	\$37,537	\$8,961	\$46,498	(\$10,911)		
GMSW20A Dust Source Survey - OR Imp	\$698,085	\$676,869		\$676,869	\$21,216		
GMSW21A WLL Dust Ctrl Trial	\$3,361,598	\$2,980,082	\$13,961	\$2,994,044	\$367,554	Efficiencies found during Implementation	
GMSW21A WLL Dust Ctrl Trial - OR DM	\$140,246	\$120,481	\$13,961	\$134,442	\$5,804		
GMSW21A WLL Dust Ctrl Trial - OR Imp	\$3,221,352	\$2,859,602		\$2,859,602	\$361,750		
GMSW22A WLL Debris Removal - ONR	\$5,470,099	\$3,214,267	\$1,987,500	\$5,201,767	\$268,332	Efficiencies found during Implementation	
GMSW22A WLL Debris Removal - ONR DM	\$75,919	\$83,738	\$32,400	\$116,138	(\$40,219)		
GMSW22A WLL Debris Removal - ONR Imp	\$5,394,180	\$3,130,529	\$1,955,100	\$5,085,629	\$308,551		
GMSW22A WLL Debris Removal - OR	\$5,470,099	\$3,215,640	\$1,987,500	\$5,203,140	\$266,959	Efficiencies found during Implementation	
GMSW22A WLL Debris Removal - OR DM	\$75,919	\$85,110	\$32,400	\$117,510	(\$41,591)		
GMSW22A WLL Debris Removal - OR Imp	\$5,394,180	\$3,130,530	\$1,955,100	\$5,085,630	\$308,550		
GMSW23A Erosion Ctrl Trial	\$0	\$106		\$106	(\$106)	Project not yet approved	
GMSW23A Erosion Ctrl Trial - OR DM	\$0	\$106		\$106	(\$106)		
GMSW23A Erosion Ctrl Trial - OR Imp	\$0		\$0	\$0	(\$0)		
GMSW24A WLL Boat Access	\$891,306	\$212,865	\$2,005	\$214,870	\$676,436	Project Complete	
GMSW24A WLL Boat Access - OR DM	\$427,592	\$42,110	\$2,005	\$44,116	\$383,476		
GMSW24A WLL Boat Access - OR Imp	\$463,714	\$170,755	\$0	\$170,755	\$292,959		
GMSW25A WLL Bathymetric Ma - OR	\$1,379,386	\$1,379,386	\$0	\$1,379,386	(\$0)	Project Complete	
GMSW25A WLL Bathymetric Ma - OR DM	\$50,979	\$50,979	\$0	\$50,979	(\$0)		
GMSW25A WLL Bathymetric Ma - OR Imp	\$1,328,407	\$1,328,407	\$0	\$1,328,407	(\$0)		
GMSW26A WLL Comm Safety	\$1,610,081	\$862,563	\$193,465	\$1,056,028	\$554,053	Efficiencies found during Implementation	
GMSW26A WLL Comm Safety - OR DM	\$425,173	\$115,438	\$18,465	\$133,903	\$291,270		
GMSW26A WLL Comm Safety - OR Imp	\$1,184,908	\$747,125	\$175,000	\$922,125	\$262,783		
GMSW27A WLL Finlay River A	\$82,146	\$73,699	\$0	\$73,699	\$8,447	Project Complete	
GMSW27A WLL Finlay River A - OR DM	\$21,284	\$12,198	\$0	\$12,198	\$9,086		
GMSW27A WLL Finlay River A - OR Imp	\$60,862	\$61,501	\$0	\$61,501	(\$639)		
GMSW28A Industry Feasibili	\$1,594,520	\$1,101,111	\$7,236	\$1,108,348	\$486,172	Efficiencies found during Implementation	
GMSW28A Industry Feasibili - OR DM	\$114,520	\$144,649	\$7,236	\$151,885	(\$37,365)		
GMSW28A Industry Feasibili - OR Imp	\$1,480,000	\$956,463	\$0	\$956,463	\$523,537		
GMSW31A Kwadacha	\$354,136	\$133,668	\$55,044	\$188,712	\$165,424	Efficiencies found during Implementation	
GMSW31A Kwadacha - ONR DM	\$165,469	\$10,963	\$2,276	\$13,239	\$152,231		
GMSW31A Kwadacha - ONR Imp	\$188,667	\$122,705	\$52,768	\$175,473	\$13,194		
GMSW33A BRD Ingenika	\$0	\$63,477	\$540,000	\$603,477	(\$603,477)	Project deferred. Costs associated with design prior to decision	
GMSW33A BRD Ingenika - ONR DM	\$0	\$5,479	\$0	\$5,479	(\$5,479)		
GMSW33A BRD Ingenika - ONR Imp	\$0	\$57,998	\$540,000	\$597,998	(\$597,998)		
GMSW34A BRD Finlay Bay	\$0	\$62,736	\$0	\$62,736	(\$62,736)	Project deferred. Costs associated with design prior to decision	
GMSW34A BRD Finlay Bay - ONR DM	\$0	\$5,854	\$0	\$5,854	(\$5,854)		
GMSW34A BRD Finlay Bay - ONR Imp	\$0	\$56,882	\$0	\$56,882	(\$56,882)		
GMSW35A BRD Six Mile Bay	\$0	\$55,535	\$0	\$55,535	(\$55,535)	Project deferred. Costs associated with design prior to decision	
GMSW35A BRD Six Mile Bay - ONR DM	\$0	\$4,666	\$0	\$4,666	(\$4,666)		
GMSW35A BRD Six Mile Bay - ONR Imp	\$0	\$50,869	\$0	\$50,869	(\$50,869)		
GMSW36A BRD Cut Thumb Bay	\$0	\$59,186	\$0	\$59,186	(\$59,186)	Project deferred. Costs associated with design prior to decision	
GMSW36A BRD Cut Thumb Bay - ONR DM	\$0	\$6,193	\$0	\$6,193	(\$6,193)		
GMSW36A BRD Cut Thumb Bay - ONR Imp	\$0	\$52,993	\$0	\$52,993	(\$52,993)		
GMSW37A BRD Mackenzie Landing	\$743,878	\$519,541	\$977	\$520,518	\$223,360	Project Complete	
GMSW37A BRD Mackenzie Landing - ONR DM	\$24,396	\$15,766	\$977	\$16,743	\$7,653		
GMSW37A BRD Mackenzie Landing - ONR Imp	\$719,482	\$503,775	\$0	\$503,775	\$215,707		

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
GMSW43A BRC Ingenika	\$0	\$113	\$0	\$113	(\$113)	Project deferred. Costs associated with design prior to decision	
GMSW43A BRC Ingenika - ONR DM	\$0	\$113	\$0	\$113	(\$113)		
GMSW43A BRC Ingenika - ONR Imp	\$0				\$0		
GMSW44A BRC Finlay Bay	\$0	\$113	\$0	\$113	(\$113)	Project deferred. Costs associated with design prior to decision	
GMSW44A BRC Finlay Bay - ONR DM	\$0	\$113	\$0	\$113	(\$113)		
GMSW44A BRC Finlay Bay - ONR Imp	\$0		\$0	\$0	(\$0)		
GMSW45A BRC Six Mile Bay	\$0		\$0	\$0	(\$0)	Project deferred.	
GMSW45A BRC Six Mile Bay - ONR DM	\$0		\$0	\$0	(\$0)		
GMSW45A BRC Six Mile Bay - ONR Imp	\$0		\$0	\$0	(\$0)		
GMSW46A BRC Cut Thumb Bay	\$0	\$113	\$0	\$113	(\$113)	Project deferred. Costs associated with design prior to decision	
GMSW46A BRC Cut Thumb Bay - ONR DM	\$0	\$113	\$0	\$113	(\$113)		
GMSW46A BRC Cut Thumb Bay - ONR Imp	\$0		\$0	\$0	(\$0)		
GMSW47A BRC Mackenzie Landing	\$4,242,756	\$2,517,642	\$2,977	\$2,520,619	\$1,722,137	Project Complete	
GMSW47A BRC Mackenzie Landing - ONR DM	\$55,854	\$44,190	\$2,977	\$47,167	\$8,687		
GMSW47A BRC Mackenzie Landing - ONR Imp	\$4,186,902	\$2,473,452	\$0	\$2,473,452	\$1,713,450		
GMSW49A BRC Dunlevy	\$5,065,450	\$4,417,493	\$5,063	\$4,422,556	\$642,894	Future work may be required	
GMSW49A BRC Dunlevy - ONR DM	\$15,000	\$8,444	\$5,063	\$13,507	\$1,493		
GMSW49A BRC Dunlevy - ONR Imp	\$5,050,450	\$4,409,049	\$0	\$4,409,049	\$641,401		
GMSW54A BRD Dunlevy	\$1,247,610	\$876,325	\$0	\$876,325	\$371,285	Efficiencies found during Implementation	
GMSW54A BRD Dunlevy - ONR DM	\$46,765	\$29,283	\$0	\$29,283	\$17,482		
GMSW54A BRD Dunlevy - ONR Imp	\$1,200,845	\$847,042	\$0	\$847,042	\$353,803		
GMSW57A Dunlevy Maintenance	\$194,971	\$120,415	\$166,992	\$287,407	(\$0)		
GMSW57A Dunlevy Maintenance - ONR DM	\$13,000	\$10,206	\$2,794	\$13,000			
GMSW57A Dunlevy Maintenance - ONR Imp	\$181,971	\$110,209	\$171,762	\$181,971	(\$0)		
GMSW58A Mackenzie Maintenance	\$150,000	\$14,325	\$92,585	\$106,910	\$0		
GMSW58A Mackenzie Maintenance - ONR DM	\$0	\$9,333	\$12,584	\$21,918	(\$21,918)		
GMSW58A Mackenzie Maintenance - ONR Imp	\$150,000	\$4,992	\$123,090	\$128,082	\$21,918		
GMSW59A Ingenika Maintenance				\$0	\$0		
GMSW59A Ingenika Maintenance - ONR DM				\$0	\$0		
GMSW59A Ingenika Maintenance - ONR Imp				\$0	\$0		
GMSW60A Finlay Maintenance				\$0	\$0		
GMSW60A Finlay Maintenance - ONR DM				\$0	\$0		
GMSW60A Finlay Maintenance - ONR Imp				\$0	\$0		
GMSW61A 6 Mile Maintenance				\$0	\$0		
GMSW61A 6 Mile Maintenance - ONR DM				\$0	\$0		
GMSW61A 6 Mile Maintenance - ONR Imp				\$0	\$0		
GMSW62A CutThumb Maintenance				\$0	\$0		
GMSW62A CutThumb Maintenance - ONR DM				\$0	\$0		
GMSW62A CutThumb Maintenance - ONR Imp				\$0	\$0		

OR - Ordered Remissible
ONR - Ordered Non-Remissible

* Red values in parentheses denote overage.