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February 15, 2019

Mr. Patrick Wruck  
Commission Secretary and Manager  
Regulatory Support  
British Columbia Utilities Commission  
Suite 410, 900 Howe Street  
Vancouver, BC V6Z 2N3

Dear Mr. Wruck:

**RE: Project No. 3698854  
British Columbia Utilities Commission (BCUC or Commission)  
British Columbia Hydro and Power Authority (BC Hydro)  
W.A.C. Bennett Riprap Upgrade Project  
Annual Progress Report No. 3 – January 2018 to December 2018 (Report)**

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BC Hydro writes to provide its confidential Report in compliance with BCUC Order No. G-78-16, directive 3(b). The Report generally follows the same format as other BC Hydro project reporting, and covers activities and costs incurred for the period ended December 31, 2018. In the Report, BC Hydro has responded to the BCUC staff request from the correspondence received on September 25, 2018.

BC Hydro is providing the confidential Report to the BCUC only. The Report contains confidential commercially sensitive and contractor specific information that if issued publicly could harm the Contractor or ratepayers. A public version of the Report is being filed under separate cover redacting commercially sensitive and contractor specific information.

For further information, please contact Geoff Higgins at 604-623-4121 or by email at [bchydroregulatorygroup@bchydro.com](mailto:bchydroregulatorygroup@bchydro.com).

Yours sincerely,

Fred James  
Chief Regulatory Officer

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Enclosure

**W.A.C. Bennett Riprap Dam Upgrade Project**

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**Annual Progress Report No. 3**

**January 2018 to December 2018**

**PUBLIC**

## Table of Contents

1	Background .....	1
1.1	Project Overview .....	1
2	Project Status .....	1
2.1	General Project Status .....	1
2.2	Major Accomplishments, Work Completed and Key Decisions .....	2
2.2.1	Government Agency Approvals .....	2
2.2.2	Contract Management .....	2
2.2.3	Engineering and Design .....	2
2.2.4	Construction.....	3
2.2.5	First Nations.....	4
2.2.6	Environment and Archaeology.....	4
2.2.7	Stakeholder Engagement .....	4
2.2.8	Key Decisions .....	4
2.3	Project Challenges .....	4
2.4	Plans for Next 12 Months.....	5
2.5	Photographs.....	5
3	Project Schedule .....	5
4	Scope Change Summary .....	6
5	Project Costs .....	6
5.1	Project Cost Summary .....	6
5.1.1	Maintenance and Emergency Stockpile Shared Costs.....	10
5.2	Summary of Individual Contracts Exceeding \$3.0 million.....	11
6	Project Risks .....	11

## List of Tables

Table 1	Project Status Dashboard .....	2
Table 2	Rock Production .....	3
Table 3	First Nations Sub-Contract Amounts .....	4
Table 4	Project Milestones .....	5
Table 5	Project Expenditure Summary – Comparison Revised Forecast and Nominal Reference Estimate (From Attachment 1 to BCUC Staff IR 1.3.2 CONF) .....	7
Table 6	Summary of Contracts exceeding \$3.0 million .....	11

## **Appendices**

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Appendix A Photographs

## **1 Background**

### **1.1 Project Overview**

The WAC Bennett Dam is a zoned earthfill embankment dam constructed between 1963 and 1967 on the Peace River in north-eastern B.C. The dam is located 18 km west of the town of Hudson's Hope, B.C., and is upstream of the Peace Canyon Dam and the Site C project. The dam impounds the Williston Reservoir which provides storage for the GM Shrum Generating Station.

Since construction, the existing upstream protective sandstone riprap and some of the underlying fill was eroded and damaged as a result of wind generated waves, ice loading, and freeze-thaw action.

The W.A.C. Bennett Riprap Dam Upgrade Project (**the Project**), which is now substantially complete, replaced the existing riprap and upgraded the underlying dam fill at the eroded segments. The new rock material was produced and transported from the Sand Flat Quarry (**the Quarry**) which is located on Crown land, approximately 38 kilometers upstream of the dam by road.

## **2 Project Status**

### **2.1 General Project Status**

All construction work at the dam and rock quarry reclamation is now complete except for some minor deficiencies that will be addressed in spring 2019. Work on Project close out documentation, including the Project Completion and Evaluation Report, is underway.

The table below provides a high level status update for the Project. Further details are included in the subsequent sections of this report.

**Table 1 Project Status Dashboard**

● Green: No Concerns; ● Amber: Some Concerns but in Control; ● Red: Serious Concerns

Status as of:		December 31, 2018	Overall:	●
Overall Assessment	●	The Project is now substantially complete. There were no significant issues in the reporting period and the Project was completed early and under budget.		
Schedule In-Service-Date (ISD)	●	The remaining riprap placement was completed and put in service in April 2018, a year ahead of BC Hydro's original planned In-Service-Date. Remediation of the quarry area was largely completed in September 2018, two years ahead of schedule. Outstanding work includes final road works and signage which is expected to be complete in February/March 2019.		
Cost	●	The cost at completion is expected to be \$118.7 million, excluding the Maintenance and Emergency Stockpile amount. This includes approximately \$1.1 million in remaining trailing costs. The total Project cost is within the BCUC approved Reference Baseline Estimate of \$132.9 million (which excludes the Maintenance & Emergency Stockpile amount).		
Environment	●	There were no significant <sup>1</sup> environmental incidents in the reporting period.		
First Nations	●	No significant issues.		
Stakeholder Engagement	●	No significant issues.		
Safety	●	There were no significant <sup>2</sup> safety incidents on the Project to-date and no lost time injuries to-date. During the reporting period, there were no WorkSafeBC or Ministry of Energy, Mines and Petroleum Resources inspections and no Orders.		

## 2.2 Major Accomplishments, Work Completed and Key Decisions

### 2.2.1 Government Agency Approvals

No permitting was required following Progress Report No. 2.

### 2.2.2 Contract Management

There were no contract issues with the contractor, Peter Kiewit & Sons (PKS), in the reporting period.

### 2.2.3 Engineering and Design

There were no significant engineering or design changes in the reporting period.

<sup>1</sup> 'Significant incidents' includes any incidents that are reportable to external agencies.

<sup>2</sup> 'Reportable' means reportable to WorkSafeBC and/or Ministry of Energy, Mines and Petroleum Resources.

The following table shows the original estimated total rock tonnage required on the dam face as well as the total tonnage produced for the Project as reported in BC Hydro's responses to BCUC Staff IR 1.4.1 in July 2018.

**Table 2 Rock Production**

Description	Previously Estimated Total Amount for the Project (Tonnes)	Final Quantities of Rock Delivered to the Main Stockpile Area (Tonnes)
Class 1 riprap	140,000	163,231
Class 2 riprap	45,000	48,366
Bedding	80,000	85,133

#### **2.2.4 Construction**

The following is a list of the key construction activities completed this reporting period:

- The remaining riprap placement started on February 20, 2018 and was completed on April 5, 2018. Riprap (Class 1 and Class 2) and bedding was placed along 415 meters of the dam face during this period.
- All capital work completed in the first placement season was put in service in April 2017 and the remaining capital works were put in service in April 2018.
- Reclamation of the Sand Flat rock quarry was completed in September 2018.
- Restoration of the Main Stockpile Area was completed in September 2018. The Main Stockpile Area is where the rock was moved to and stored prior to placement.
- Forest Service Road maintenance and Dam Crest Road upgrades, signage and traffic control works, and intake access stair work was undertaken. This work will be finalized in spring 2019.

### 2.2.5 First Nations

There were no significant First Nations concerns raised in the reporting period.

The total aggregate value of subcontracts awarded and services and employment opportunities to First Nations on this Project during the Implementation Phase is tabulated below.

**Table 3 First Nations Sub-Contract Amounts**

Items	Amounts (\$ million)
[Redacted Content]	

A Project event was held to celebrate riprap placement completion on August 1, 2018. This event was attended by forty Treaty 8 First Nations' community members including the Chiefs from Doig River First Nation and Blueberry River First Nation.

### 2.2.6 Environment and Archaeology

There were no reportable environmental incidents and no Archaeological finds or issues during the reporting period.

### 2.2.7 Stakeholder Engagement

There have been no new issues in the reporting period.

### 2.2.8 Key Decisions

No key decisions were required in the reporting period.

## 2.3 Project Challenges

There were no material Project challenges in the reporting period.



## 2.4 Plans for Next 12 Months

Work to be completed in 2019 includes the following:

- Trailing work on signage and on the Dam Crest Road;
- Anchor block access work; and
- Project Close out activities and documentation.

The schedule for the work above is tabulated in section [3](#).

## 2.5 Photographs

Please refer to [Appendix A](#) for photographs.

# 3 Project Schedule

**Table 4 Project Milestones**

No.	Description/ Status	Original Plan Date	Actual (A) or Forecast Date	Status
1.	Completion of ECI process ahead of the main civil contract	Apr 2016	Aug 2016 (A)	Completed Late
2.	Signing of the Interim Agreement with PKS to complete early construction work.	NA	Jul 2016 (A)	Complete
3.	Mobilization and Start of Construction Activities	Jun 2016	Sep 2016 (A)	Completed Late
4.	Award of Main Civil Contract	Jun 2016	Aug 2016 (A)	Completed Late
5.	Finalisation of Contract Terms and Contract Signing	NA	Sep 2016 (A)	Complete
6.	Start of Quarry Operations	Jun 2016	Sep 2016 (A)	Started Late
7.	Completion of Quarry Access Road Upgrades	Aug 2016	Dec 2016 (A)	Completed Late
8.	Start of Riprap Placement on Dam	Mar 2017	Mar 2017 (A)	Started on time
9.	Final-Placement-In-Service-Date	Nov 2019	Apr 2018 (A)	Early
10.	Substantial Completion of Quarry Reclamation	Sep 2020	Sep 2018 (A)	Early
11.	Completion of deficiencies and remaining road work on Dam Crest Road	N/A	Jun 2019	N/A
12.	Project Completion	Jul 2021	Jul / Aug 2019	Expected Early

## **4 Scope Change Summary**

There were no scope changes in the reporting period.

## **5 Project Costs**

### **5.1 Project Cost Summary**

The portion of the Project Reference Estimate Amount approved by the BCUC is \$132.9 million. This excludes the Maintenance Emergency Stockpile (**MES**) costs.

The table below shows the past and current Project cost forecasts, and the actuals to-date. The line numbers for each row, as they were ordered in the August 2016 BCUC update, are shown in the first column. The rows were re-ordered in Progress Report No. 1 in order to group the Contract costs together. Those revised line numbers are shown in the second column.

The revised total Project Cost forecast, excluding the MES cost is \$118.7 million which is 11% less than the approved expected amount.

**Table 5 Project Expenditure Summary – Comparison Revised Forecast and Nominal Reference Estimate (From Attachment 1 to BCUC Staff IR 1.3.2 CONF)**

Line # in the Aug 2016 Update (See Note 1)	New Line #	Description	A Aug 2016 Reference Estimate Amount (Real \$M, inflation below)	B Nominal \$ Reference Estimate Amount (\$M)	C Prior Report's Forecast Amount (Nominal \$M)	D Revised Forecast Amount (Nominal \$M)	E Change from Nominal \$ Reference Estimate Amount (Nominal \$M)	F % Variance	G Notes	H Actual Cost to-Date (\$M)	I % of Revised Cost Forecast (Column D)	I % of Nominal \$ Reference Amount (Column B)
	25	<b>Total Adjusted Project Baseline Cost</b>	132.9	132.9	132.9	118.7	(14.2)	-11%		117.6	99%	88%
24	26	Maintenance & Emergency Stockpile (MES) Cost (including IDC)	4.3	4.3	not provided	0.7	(3.6)	-84%		0.7	100%	16%
	27	<b>Project Cost Including the MES Cost</b>	137.1	137.1	not provided	119.4	(17.7)	-13%		118.3	99%	86%

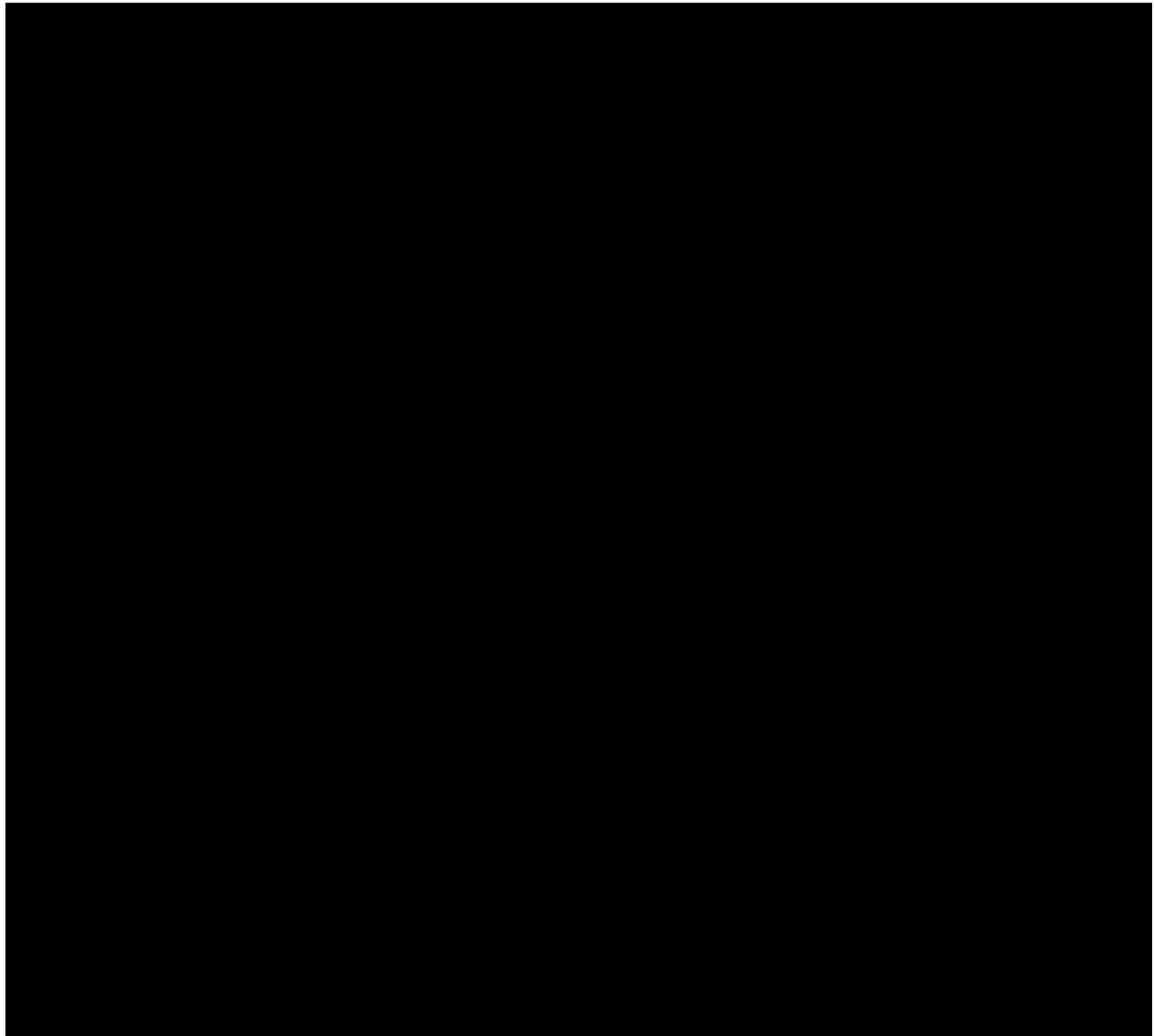
Minor addition errors are due to rounding.

The MES cost in columns D and H has not been put in service pending a determination on the MES cost in the next revenue requirements proceeding.

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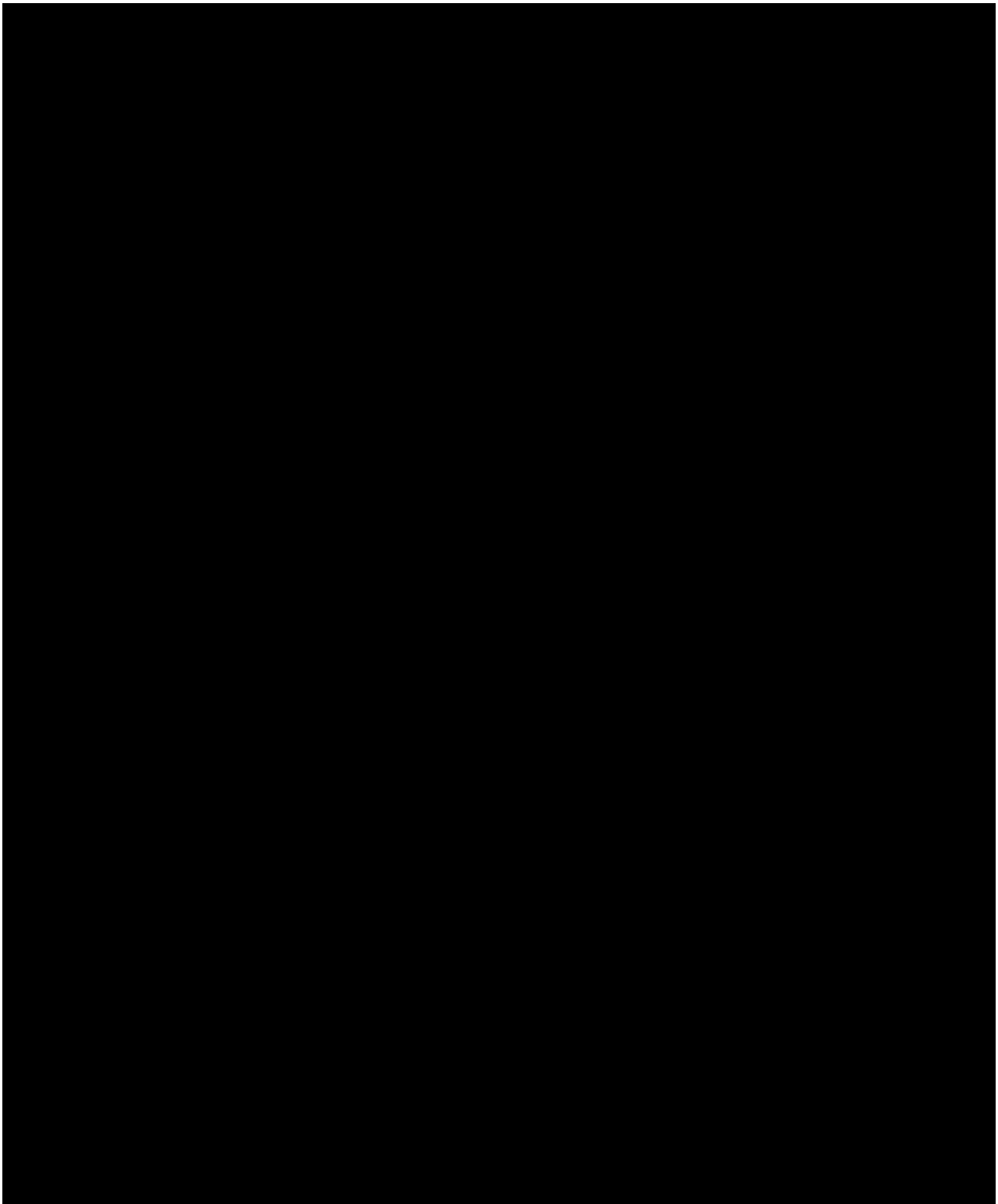
Notes (refer to Note 1 at the top left corner and notes 2 to 8 in Column G of [Table 5](#)):

Note 1. Rows 1 to 8 in the August 2016 update table were sorted in order to group the PKS contract costs and subtotal rows 17 and 21 were removed in order to simplify the table.



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<sup>3</sup> Note that this increased the total quarrying cost over the planned amount but the increase would have been more substantial if this revised plan was not implemented. The alternative was to include this rock in the amount processed and sorted to produce riprap which would have led to even higher costs.



### **5.1.1 Maintenance and Emergency Stockpile Shared Costs**

BC Hydro is reporting on the MES cost and is seeking to recover this cost in the Fiscal 2020 to Fiscal 2021 Revenue Requirements Application, as allowed for in Order No. G-78-16.

The final MES cost was \$0.7 million and the final volume was 4,050 cubic meters (7,695 tonnes) of smaller Class 3 rock as discussed in our response to BCUC Staff IR 1.4.4 submitted July 25, 2018.

In BCUC correspondence to BC Hydro received on September 25, 2018, BCUC staff requested that additional detail regarding the MES be included in the next progress report as follows:

1. A breakdown in table form of all shared costs (indirect construction costs) for the MES and whether or not the costs have been allocated to the MES; and
2. For each shared cost identified in the table, an explanation as to why the costs have not been allocated to the MES.

The Project's indirect costs are BC Hydro Project Management, Engineering, Aboriginal Relations, Regulatory, Environment and Stakeholder Engagement staff time and costs. As explained in our response to BCUC Staff IR 1.4.5, the sorting and transportation of the MES was done in parallel with the production and transportation of rock for placement on the dam. This was therefore not a critical path activity and did not extend the Project schedule. Therefore, there was no measurable MES

indirect cost. For this reason, BC Hydro has not allocated any indirect costs to the MES as noted in BC Hydro's response to BCUC Staff IR 1.4.7.

## 5.2 Summary of Individual Contracts Exceeding \$3.0 million

The table below provides a summary of the total Contract with PKS excluding the contract amount related to the MES. There are no other contracts exceeding \$3 million on the Project. The total forecast contract cost is \$89.6 million.

**Table 6 Summary of Contracts exceeding \$3.0 million**

No.	Description Supplier and Scope of Supply	Initial Contract Value <sup>1</sup> (\$ million)	Expected Equitable Adjustment (\$ million)	Forecast Contract Cost <sup>2</sup> (\$ million)	Actuals to December 31, 2018 (\$ million)
	PKS	██████	-	██████	██████

1 Estimated value at the time the contract was awarded or amended, including direct costs and escalation, excluding the emergency & maintenance stockpile and the quarry reclamation work amounts.

2 Accounting for lower than expected yield and excluding the amounts paid for the emergency and maintenance stockpile and for the quarry reclamation work.

The costs under this contract are provided in more detail in rows 2 to 6 in [Table 5](#).

## 6 Project Risks

There are no material remaining risks on the Project.

**W.A.C. Bennett Riprap Dam Upgrade Project**

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**Annual Progress Report No. 3**

**Appendix A**

**Photographs**





**Riprap placed on the WAC Bennett Dam**