



Upper Lillooet Hydro Project

Weekly Environmental Monitoring Report #113

Reporting Period: April 1 – 30, 2017

Upper Lillooet River Hydroelectric Facility (Water File No. 2002561, Water licence No. C130613), Boulder Creek Hydroelectric Facility (Water File No. 2003049, Water licence No. C129969) & Transmission Line (TX Line)

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Owner Construction Permits and Approvals

- Environmental Assessment Certificate No. E13-01 (Amendment 1, 2, 3, 4, 5, 6, 7)
- Fisheries Act Subsection 35(2)(b) Authorization No. 09-HPAC-PA2-000303 (Amendment 1, 2)
 - Letter of Advice for the Transmission Line No. 09-HPAC0-PA2-000303
 - Leave To Commence Construction (ULRHEF) File No. 2002561
 - Leave To Commence Construction (BDRHEF) File No. 2002453
 - Leave To Commence Construction (TX Line) File No. 2002561/2002453
 - Leave to Commence Diversion (ULRHEF) File No. 2002561
 - Leave to Commence Diversion (BDRHEF) File No. 2002453
 - Conditional Water Licence (ULRHEF C130613) File No. 2002561
 - Conditional Water Licence (BDRHEF C129969) File No. 2002453
 - Conditional Water Licence (BDRHEF C131153) File No. 2003601
- Licence of Occupation & Modification Agreement (ULRHEF #232384) File No. 2409871
 - Licence of Occupation (BDRHEF #232386) File No. 2409998
 - Licence of Occupation (TX Line #2423386) File No. 2410654
- Occupant Licence to Cut (ULRHEF) No. L49717 (Amendments 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11)
 - Occupant Licence to Cut (BDRHEF – KM38 laydown) No. L49698
 - Occupant Licence to Cut (BDRHEF) No. L49816 (Amendments 1, 2, 3, 4)
 - Occupant Licence to Cut (TX Line) No. L49697 (Amendments 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11)
- General Wildlife Measure Exemption Approval Letter (TX Line & BDRHEF) File No. 78700-35/06 UWR and 39585-20 WHA
 - Ground Water Licence (ULRHEF C50114) File No. 20003228
 - Ground Water Licence (BDRHEF C500112) File No. 20003239
- Heritage Conservation Act – Alteration Permit (ULRHEF) File No. 11200-03/2014-0033
- Road Use Permit No. 6123-13-02 (Lillooet River FSR); 5673-13-01 (Rutherford Creek FSR); 7977-13-01 (Lillooet South FSR); 8015-13-01 (Ryan River); 8188-13-01 (Pemberton Creek FSR); and 9717-13-01 (Miller Bench FSR)
 - Junction Permit (ULRHEF & BDRHEF) File No. 11250-32/6123 (Amendment 1)
- Aeronautical Obstruction Approval (Tx Line - Lillooet River Crossing) File No. 2013-004
 - Aeronautical Obstruction Approval (Tx Line - Ryan River) File No. 2013-005
 - Aeronautical Obstruction Approval (Tx Line - North Miller) File No. 2013-006
 - Aeronautical Obstruction Approval (Tx Line - South Miller) File No. 2013-007
 - Aeronautical Obstruction Approval (Tx Line - Pemberton Creek) File No. 2013-008
 - Aeronautical Obstruction Approval (Tx Line - Lillooet River near Pemberton) File No. 2013-009
 - Aeronautical Obstruction Approval (Tx Line - Lillooet River near Meager Creek) File No. 2013-010
- Navigable Water Protection Act (ULRHEF) File No. 8200-2009-500434-001
 - Navigable Water Protection Act (BDRHEF) File No. 8200-2012-501-032-001
 - Navigable Water Protection Act (Tx Line – North Creek) File No. 8200-2013-500103-001
 - Navigable Water Protection Act (Tx Line – Lillooet River) File No. 8200-2013-500101-001
 - Navigable Water Protection Act (Tx Line – Lillooet River) File No. 8200-2013-500102-01
 - Navigable Water Protection Act (Tx Line – Ryan River) File No. 8200-2013-500104-001
 - Navigable Water Protection Act (Tx Line – South Miller River) File No. 8200-2013-500100-001
 - Navigable Water Protection Act (Tx Line – Boulder Creek) File No. 8200-2013-500099-001
 - Navigable Water Protection Act – Extension Approval (ULRHEF, BDRHEF, Tx Line)
 - Navigable Water Protection Act (Bridge – Ryan River) File No. 8200-2013-500381
- Navigable Water Protection Act (Bridge – Upper Lillooet Side Channel; Extension Approval) File No. 8200-2013-500383
 - Section 57 Authorization (ULRHEF) File No. 16660-20/REC202717
 - SLRD Temporary Use Permit No. 34 – Boulder Creek HEF
 - SLRD Temporary Use Permit No. 35 – Upper Lillooet River HEF
 - SLRD Building Permit (10864) – Upper Lillooet River HEF Powerhouse
 - SLRD Building Permit (10865) – Boulder Creek HEF Powerhouse
 - Works Permit for Construction within FSR Right-of-Way No. 6123-14-01
 - Works Permit for Construction within FSR Right-of-Way No. 7977-15-01
- Section 52(1)(b) FRPA Authorization for Ryan River Wet Crossing File No. FOR-19400-01/2014
- MOTI Permit to Construct, Use and Maintain Works Upon the Right-Of-Way of a Provincial Public Highway No. 2014-06099
 - Section 8 - Special Use Permit issued for the operation of an avalanche weather station on Crown land (File No. S25988)
 - Special Use Permit issued for construction of the Lillooet River FSR KM48 bypass road on Crown land (File No. S26115)
 - Vancouver Coastal Health Letter of Certification (23966) Boulder Creek Powerhouse Sewerage System
 - Vancouver Coastal Health Letter of Certification (23966) Upper Lillooet Powerhouse Sewerage System

Contractor Construction Permits and Approvals

Waste Discharge under the Code of Practice for the Concrete and Concrete Products Industry under the Environmental Management Act (Authorization No. 107204) Tracking No. 349424 (Renewal 2)
Wildlife Act Permits – Pacific Tailed Frog Salvage Permit # SU15-164805; SU17-262991; Fish Salvage Permit # SU15-174722 Fisheries and Oceans Canada – Anadromous Fish Salvage Permit #XR 178 2015
BC Safety Authority – Temporary Construction Electrical Service Permit EL-140698-2014
Municipal Wastewater Regulation - Authorization # 107032
Water Supply System Construction Permits – VCH-14-613 for Main Camp
Water Supply System Permit to Operate Issued July 30th, 2014 for Main Camp
Section 6(3) and Schedule 3 Wildfire Regulations Fire Exemption for Ryan River Bridge File No. 14350-07
SLRD Building Inspection Report dated August 13, 2014 - Construction Camp Building Permit No. 10830
Lillooet River FSR Temporary Road Closures Approval File No. 11250-32/6123 (Amendment 1, 2)
Lillooet South FSR Temporary Road Closures Approval File No. 11250-32/7977
SLRD Building Permits for Mechanic Shop (10862) and Carpentry Shop (10836) March 18, 2015
Water Sustainability Act Section 10(1) Use Approval dated March 24, 2016
Section 7 Explosives Act – Magazine Licence (U76018) Renewal April 30, 2016
Magazine Licence File No. UL76018 (Renewal 1, 2)
Section 8 Approval – Short Term Use of Water File (Lillooet River and Tributaries) No. A2006123 (Amendment 1)

ACRONYMS:

AMBNS	Active Migratory Bird Nesting Survey	HWM	High water mark
Andritz	Andritz Hydro Canada Inc.	IE	Independent Engineer (True North Energy)
ANFO	Ammonia nitrate fuel oil (industrial explosive)	IEM	Independent Environmental Monitor
ARD M/L	Acid Rock Drainage and Metal Leaching	INX	Innergex Renewable Energy Inc.
BCEAO	British Columbia Environmental Assessment Office	ISW	Instream Works
BCCOS	British Columbia Conservation Officer Service	ITM	Environmental Issue Tracking Matrix
BCWQG	British Columbia Water Quality Guidelines	JEM	JEM Energy Ltd. (Delegate Independent Engineer)
BDRHEF	Boulder Creek Hydroelectric Facility	LTC	Leave to Construct
BEBO	ULRHEF Intake Concrete Arch & Foundation Wall	MFLNRO	Ministry of Forests, Lands and Natural Resource Operations
BG	Background	MOE	Ministry of Environment
BKL	BKL Consultants Ltd.	MOTI	Ministry of Transportation and Infrastructure
CE	CRT-ebc Construction Inc.	OGMA	Old Growth Management Area
CEMP	Construction Environmental Management Plan	OLTC	Occupational License to Cut
CTF	Coastal Tailed Frog	PAG	Potentially Acid Generating
DFO	Fisheries and Oceans Canada	QP	Qualified Professional
DS	Downstream	ROW	Right of Way
EPP	Environmental Protection Plan	RVMA	Riparian Vegetation Management Area
EAC	Environmental Assessment Certificate	SES	Sartori Environmental Services
EAO	Environmental Assessment Office	SLRD	Squamish-Lillooet Regional District
Ecofish	Ecofish Research Ltd.	TX Line	Transmission Line
Ecologic	Ecologic Consulting	ULRHEF	Upper Lillooet Hydroelectric Facility
EIR	Environmental Incident Report	UWR	Ungulate Winter Range
ESC	Erosion and Sediment Control	VC	Valued Component
FAM	Field Advice Memorandum	WEL	Westpark Electric Ltd.
FSR	Forest Service Road	WEMR	Weekly Environmental Monitoring Report
Golder	Golder Associates	WHA	Wildlife Habitat Area
GWR	Mountain Goat Winter Range		
Hedberg	Hedberg and Associates Ltd.		

1.0 Summary of Site Inspections for Reporting Period

The table presented below summarizes the IEM team site presence, weather and monitoring locations by component:

Date	IEM Team Personnel	Key Monitoring Locations & Activities
April 1 – 30, 2017	MC, SE, TH	<p>Construction Camp, Laydown Areas and the Lillooet River FSR</p> <ul style="list-style-type: none"> • Road maintenance and snow removal on the Lillooet River FSR. • Maintaining parking areas to facilitate activities of the local trapline holder at designated areas along the Lillooet River FSR • Demobilizing equipment from the KM38 Laydown • BDRHEF tunnel blast rock washing at KM38 <p>ULRHEF Intake & Upstream Tunnel Portal</p> <ul style="list-style-type: none"> • Concrete repair works on the ULRHEF sluice way downstream of the sluice gate (works conducted in the dry) • Concrete repair works on the ULRHEF sluice way upstream of the sluice gate (works were completed under water by divers). <p>ULRHEF Powerhouse</p> <ul style="list-style-type: none"> • CE completed final grading activities around the ULRHEF powerhouse. • Commissioning works inside the powerhouse <p>BDRHEF Intake</p> <ul style="list-style-type: none"> • Commissioning works <p>BDRHEF Powerhouse</p> <ul style="list-style-type: none"> • CE completed final grading and drainage around the BDRHEF powerhouse, and decommissioning for the infiltration ponds • First flush of water through the generating equipment to Boulder Creek • Commissioning works <p>TX-Line</p> <ul style="list-style-type: none"> • No activities

IEM Team Personnel: SE – Stephanie Ellis; MC – Mike Champion; TH – Tom Hicks.

2.0 Administrative Summary

Key communications and meetings the IEM team had with the licensees, contractors and/or environmental authorities:

Date	Communication Type	Participants	Issues Discussed	ITM ID No.
April 4	<i>Email</i>	INX, SES, JEM	INX forwarded copies of the Conditional Water Licenses groundwater wells at the ULRHEF and BDRHEF powerhouses.	-
April 5	<i>Email</i>	CE, SES, INX	CE notified the IEM and INX of ditching works that would occur within 30m of Boulder Creek, to arrange for monitoring of the works.	-
April 6	<i>Email</i>	SES, CE, INX, MFLNRO, IE	The IEM consulted with MFLNRO to discuss instream works that were required to repair damages on the ULRHEF sluice way structure and that these works would be conducted by commercial divers. Works would involve drilling with hand tools into the concrete structure to anchor rubber matting protection on top of the sluice way structure. Because the timing of the repairs is outside of the projects approved instream work window, the IEM requested	-

Date	Communication Type	Participants	Issues Discussed	ITM ID No.
			confirmation that MFLNRO did not object to the methods proposed. MFLNRO confirmed that the works could proceed according to the proposed work plan.	
April 7	<i>Email</i>	INX, CE, INX	INX provided CE with the Leave to Construct Amendment to complete repair works on the ULRHEF sluice way.	-
April 9	<i>Email</i>	CE, SES	CE provided the IEM and INX with the results of ANFO residual testing of water samples from BDRHEF tunnel blast rock. The IEM requested a summary report of the results.	-
April 10	<i>Email</i>	INX, SES, CE	INX notified the IEM that they would be testing the BDRHEF sluice gate, by lowering it just above the current water level. INX requested that IEM be present to monitor and document the activities. No concerns were noted by the IEM onsite.	-
April 12	<i>Email</i>	CE, INX, SES	CE provided the IEM and INX with an updated workplan for the underwater construction activities at ULRHEF intake to include grouting. The IEM reviewed and commented on the revised work methods. The IEM felt that the changes to the work plan were significant enough that they required consultation with MFLNRO prior to works beginning.	-
April 13	<i>Email</i>	SES, DFO, IE, INX	The IEM provided MFLNRO with the updated underwater work methods for repair works at the ULRHEF sluice way for their approval, and no concern with the changes were raised.	-
April 17	<i>Kick-off Meeting</i>	SES, INX, CE, Andritz, Knight Piesold, Ecofish	A kick-off meeting was held for filling of the BDRHEF headpond. Filling rates, stepwise filling procedure, gauging to be used to verify IFR and roles and responsibilities were reviewed and discussed with all parties.	-
April 18	<i>Email</i>	CE, SES, INX	CE provided the IEM and INX with the results of ANFO residual testing of water samples from BDRHEF tunnel blast rock. The analysis showed that all samples were under the BC Water Quality Guidelines for the Protection of Aquatic Life allowable limits. The IEM reviewed the results with CE during a conference call, and accepted that samples were within allowable limits. The IEM informed CE that the blast rock from the "clean" stockpile may be used to armor ditch lines within the project footprint. However, blast rock not contained within the "clean" stockpile cannot be used for ditch armoring until additional ANFO residual testing is completed.	-
April 21	<i>Email</i>	INX, SES, Ecofish	INX forwarded the Boulder Creek Headpond Filling IFR Verification memorandum, confirming that IFR was maintained during the head pond filling.	-
April 21 - 22	<i>Email</i>	INX, SES	INX informed the IEM that a small amount of water would be discharged from the BDRHEF powerhouse. Crews were required to release water from the TIV to reduce pressure allowing them to conduct repair works. However, these works are not part of official commissioning activities. The majority of the water was collected in barrels and was discharged to ground.	-
April 24	<i>Email</i>	CE, SES, INX	CE provided the IEM and INX with the results of ANFO residual testing of water samples from the unwashed BRDHEF tunnel blast rock. All samples were under the BC Water Quality Guidelines for the Protection of Aquatic Life allowable limits. CE committed to additional testing if	-

Date	Communication Type	Participants	Issues Discussed	ITM ID No.
			required by the IEM, and to washing all blast rock to remove fines and sediment prior to being used in ditch lines.	
	<i>Email</i>	INX, MFLNRO, EAO, Ecofish, SES, JEM	In accordance with Condition 15 of the Upper Lillooet Hydro Project Environmental Assessment Certificate #E13-01, INX submitted a memorandum prepared by Ecofish Research Ltd. with supporting appendix reports prepared by Sartori Environmental Services detailing the effectiveness monitoring of the Upper Lillooet River Hydroelectric Facility downstream tunnel portal design and restoration for Mountain Goat migration between UL11 and UL19, mountain goat observations, and noise monitoring results from spring and fall 2016.	-
April 27	<i>Email</i>	CE, SES, INX	CE requested that the IEM accompany them on pre-restoration site surveys before de-compacting and re-contouring activities begin.	-
	<i>Email</i>	CE, SES, INX	CE informed the IEM and INX that drainage works at KM42 would begin on May 1, 2017 and requested the presence of the IEM as construction activities would be within 30 m of a watercourse.	-
	<i>Email</i>	INX, CE, SES, JEM	INX distributed the OLTC amendment (OLTC L49717 Amd11), to permit cutting trees in the KM42 area to permit widening of the FSR and construction of the roadside ditch.	-
April 30	<i>Email</i>	INX, SES, WEL	INX requested WEL's input on CE's drainage design under the transmission line from BDRHEF powerhouse to the intake access road. WEL indicated that the proposed design did not affect the transmission line.	-

3.0 Current Work Restrictions and Timing Windows

The table presented below outlines work restrictions applicable during the reporting period for each active Project component location:

Component	Location	Wildlife/Archeology Concern	Construction/Timing Restrictions & Mitigations
Lillooet River FSR, ULRHEF, & BDRHEF intake	Access roads above the lower limit of the 200m buffer to the Truckwash Creek Migration Corridor to the ULRHEF intake, as well as a portion of BDRHEF intake access road and intake structure within UWR u-2-002 UL 12	Mountain Goat UWRs & Migration Corridor	<p>The mountain goat monitoring program ended on December 16 as all construction activities at the ULRHEF lower tunnel portal and the ULRHEF intake are complete.</p> <p>During winter months (November 1 – April 30), access to BDRHEF intake must be gated at least 500 m from UWR to restrict motorized use within the UWR, unless otherwise directed by MFLNRO.</p> <p>All BDRHEF intake works and construction, in or within 500 m of UWR u-2-002 UL 12, will not occur from November 15 to April 30.</p> <p>NOTE: BDRHEF intake is now in the commissioning phase and all construction activities are complete.</p> <p>If a mountain goat is observed within 500m line of sight of construction operations, construction must cease for at least 48 hours. Approval from the IEM must be obtained prior</p>

Component	Location	Wildlife/Archeology Concern	Construction/Timing Restrictions & Mitigations
			to recommending construction activities, and the IEM must record and submit all goat observations to MFLNRO within 48 hours.
TX Line	All Segments	Mountain Goat UWRs SO-04 & SO-08	If a mountain goat is observed within 500m line of sight of construction operations, construction must cease for at least 48 hours. Approval from the IEM must be obtained prior to recommending construction activities, and the IEM must record and submit all goat observations to MFLNRO within 48 hours.

4.0 Upper Lillooet River HEF – Monitoring Results

4.1 Construction Camp, KM38 Laydown, Access Roads & Lillooet River FSR

Construction Activities:

- CE continued routine fuel management and maintenance of construction equipment within the mechanic shop at the KM38 laydown. CE temporarily stored all hazardous substance materials (waste oil, contaminated soil, used oil/hydraulic fluid containers, etc.) in a designated area at the laydown prior to off-site disposal. The materials were all well contained and protected from the weather. CE continued to demobilize equipment from various locations around site in preparation for project completion.
- Maintenance of the Lillooet River FSR continued throughout this period (Photo 1).

Environmental Summary:

- CE washed stockpiles of BDRHEF blast rock at KM38 (Photo 2). Water samples were collected and tested for residual ANFO. All samples testing had concentration below the BC Water Quality Guidelines for the Protection of Aquatic Life allowable limits. Based on the results the IEM agreed that the blast rock could be used to amour ditches across the construction site, as long as it came from the washed and sampled stock pile.

Photos:



Photo 1 – Maintenance of the Lillooet River FSR at KM48 (April 6, 2017)



Photo 2 – CE washing BDRHEF tunnel rock at KM38 (April 18, 2017)

4.2 *Intake Commissioning and Sluiceway Armouring*

Construction Activities:

- CE repaired the concrete and placed protective rubber matting on the downstream side of the ULRHEF sluiceway, all repairs were conducted in isolation from flowing water (Photo 3).
- Commercial divers examined, cleaned, and installed protective rubber matting on the upstream portion of the ULRHEF sluiceway (Photo 4).
- Repairs the trash rack cleaner were completed.

Environmental Summary:

- During the November 2016 flood event, high water levels and heavy sediment loads eroded portions of the concrete in the ULRHEF sluiceway. Due to the severity of the damage, repairs to sections of concrete and the installation of protective rubber matting were required to prevent future erosion. On April 7, CE grouted a 2-meter section of the slab immediately downstream of the sluiceway gate (Photo 5). On April 8, crews began installing protective rubber matting downstream of the sluiceway gate. The matting was secured in with ¾” anchors drilled into the sluiceway concrete. Crews used a shop vacuum to clean up all drilling residue (Photo 3), and disposed of any concrete slurry into the designated concrete wash pit located more than 30 meters from the intake structure. All construction activities were conducted in isolation of flowing water. The IEM monitored all activities associated with these works and did not observe any environmental issues.
- On April 11, commercial divers inspected the upstream portion of the ULRHEF sluiceway for damage (Photo 4). Divers had to clear the sluiceway of approximately 6 inches of sediment before the inspection could be completed. The IEM installed a multi-sensor

probe above the divers to monitor turbidity and pH. During the sediment removal turbidity levels fluctuated resulting in minor (12 – 51 NTU) exceedances of BCWQG. All exceedances were short lived (usually <1 minute each). Additionally, the works posed minimal risk to downstream WQ because there was no flowing water near the sluice way (Photo 6). Additional water quality results are available upon request. The divers inspected the damage to the concrete and found that the upstream edge of the sluice way concrete slab was significantly eroded and would require concrete works to repair the damage. A new work plan to repair the upstream edge of the slab, and to mitigate the effects of underwater concrete works was developed and submitted to MFLNRO for approval. While waiting for approval, the divers installed protective rubber matting on the undamaged portion of the slab (Photo 7). A CO₂ diffuser was installed to mitigate elevated pH that could be associated with drilling into concrete. The IEM monitored all underwater works and did not observe an increase in sediment or pH associated with the installation of the protective rubber matting.

Photos:



Photo 3 – Crews vacuum concrete dust while installing protective rubber matting on the downstream portion of the ULRHEF sluice way. (April 8, 2017)



Photo 4 – Commercial divers inspecting the upstream portion of the ULRHEF sluice way slab (April 11, 2017)



Photo 5 – Concrete works to repair a 2-meter section of the concrete on the downstream side of the ULRHEF sluice way (April 07, 2017)



Photo 6 – No change in visual water quality while divers clear sediment from the upstream portion of the ULRHEF sluice way (April 11, 2017)



Photo 7 – Divers installing protective rubber matting on the upstream portion of the ULRHEF sluice way (April 13, 2017)

4.3 Powerhouse, Tailrace & Access Road

Construction Activities:

- Electrical works within the powerhouse continued throughout this monitoring period.
- CE completed final grading and drainage works around the ULRHEF powerhouse.

Environmental Summary:

- The IEM monitored construction activities throughout the monitoring period and observed no environmental issues (Photo 8).

Photos:



Photo 8 – Current conditions at the ULRHEF powerhouse (April 14, 2017)

4.4 *Water Quality Results*

The IEM has suspended the routine water quality monitoring program as current activities pose low risk of negativity impacting water quality in the Lillooet River. Instead water quality monitoring was performed during all construction activities that had the potential to affect downstream water quality including; repairs to the ULRHEF sluiceway. Water quality sampling results are discussed in Section 4.2 and detailed results are available upon request. Any instream works or works with the potential to affect downstream water quality will continue to be monitored by the IEM during the commissioning period.

4.5 *Recommendations*

IEM recommendations for the ULRHEF are as follows:

- CE should continue to maintain the Lillooet River FSR and maintain ditching during the spring freshet.
- CE should ensure that escape gaps are plowed through road side snow berms at approximately 100 metre intervals to allow ungulates safe passage off the FSR and worksite access roads.

4.6 *Upcoming Works*

The following new and/or environmentally sensitive construction activities are scheduled to occur at the ULRHEF:

- Road maintenance associated with spring freshet.
- Raising the Lillooet River FSR and ditching works at KM42.
- Clearing of the KM41.2 culvert.

- Instream grouting and rubber matting installation on ULRHEF upstream sluice way concrete structure.
- Repairs to road edge of the Lillooet River FSR (multiple sections between KM46 & KM48) remain outstanding and present as ESC risk once the spring melt begins. Any mobilization of side cast material during the spring melt will need to be re-assessed and the slopes repaired/stabilized prior to further erosion in the spring of 2017 (ULR#60).
- Road widening and raising from KM41.5 – 42.75 on the Lillooet River FSR.
- Mixed material placed on the permanent penstock access road (organics, soils, and snow) are to be assessed and removed if they present an ESC risk before spring melt begins in 2017 (ULR#64).
- Site wide reclamation activities will continue once snow recedes in the spring.

5.0 Boulder Creek Hydroelectric Facility – Monitoring Results

5.1 Access Road & Intake

Construction Activities:

- Electrical work associated with commissioning inside the control room at BDRHEF Intake.
- Sluice way and head gate commissioning.
- CE concrete and Coanda repairs (Photo 9).
- Sediment removal from the BDRHEF regulation chamber (Photo 10 - Photo 11).
- Head pond and water conveyance filling (Photo 12).

Environmental Summary:

- A small team of Andritz electricians continue to complete commissioning activities. As these works are being completed inside UWR u-2-002 UL12 during the sensitive winter period (November 15 – April 30), the IEM has been conducting regular audits to ensure that no works are occurring that would result in adverse effects to mountain goats. No plowing has occurred in UWR u-2-002 UL12 during this monitoring period and all personnel accessed the BDRHEF Intake by snowcat (Photo 13).
- On April 14, CE addressed deficiencies at the BDRHEF intake structure, including concrete patching and caulking joints in the Coanda screen (Photo 9).
- On April 18, CE began filling the BDRHEF headpond. Crews slowly closed the sluice gate allowing the head pond to fill while maintaining IFR (Photo 12). Sand deposited in the regulation chamber during the November 2016 floods, had to be removed prior to filling the tunnel, to prevent damage to the turbines. The sand was removed by allowing water into the regulation chamber through the coanda. Crews then quickly opened and closed the bypass gate to flush out the sand (Photo 11). The IEM monitored these works to ensure that the sand was released downstream slowly. The bypass gate was opened and closed 19 times over the course of the day to completely clear the sand from the regulation

chamber. Because the sand was very coarse most of it dropped out of suspension directly downstream of the intake structure (Photo 14). Water quality was not taken directly downstream of the intake structure due to safety concerns. However, Ecofish monitored turbidity levels 300 meters upstream of the BDRHEF powerhouse on behalf on the IEM and did not observe any increase in turbidity associated with these works. Water quality results are available upon request. Once the sand was removed from the regulation chamber, CE slowly opened the head gate to allow water to begin filling the tunnel on April 19. The tunnel was filled by the evening of April 21. Crews were careful to maintain minimum instream flows during tunnel filling operations. The IEM and Ecofish monitored tunnel filling operations and did not observe any environmental issues.

Photos:



Photo 9 – CE patching concrete and caulking joints in the Coanda screen at the BDRHEF intake (April 14, 2017)



Photo 10 – Water and sand spilling out of the BDRHEF regulation channel (April 18, 2017)



Photo 11 – Flushing sand out of the BDRHEF regulation chamber via the bypass gate (April 18, 2017)



Photo 12 – Filling the BDRHEF head pond (April 18, 2017)



Photo 13 – Snowcat transporting crews to the BDRHEF intake (April 14, 2017)



Photo 14 – Sand from the regulation chamber deposited directly downstream of the BDRHEF intake (April 18, 2017)

5.2 ***Powerhouse***

Construction Activities:

- CE completed final grading and drainage around the BDRHEF powerhouse (Photo 15 - Photo 16).
- First release of water to Boulder Creek through the water conveyance and generating equipment in the BDRHEF powerhouse (Photo 17 - Photo 18).

Environmental Summary:

- On April 26, a small amount of water from the BDRHEF tunnel was conveyed through the generating equipment and released into the tailrace and Boulder Creek. The IEM collected water samples from the tailrace during the initial flush to confirm that water quality met BCWQGs for the protection of aquatic life. The IEM did not observe any environmental issues associated with the release of water.

Photos:



Photo 15 – Drainage and final grading around the BDRHEF powerhouse (April 14, 2017)



Photo 16 – Completed drainage at the BDRHEF powerhouse (April 26, 2017)



Photo 17 – First flush of water through the BDRHEF generating equipment (April 26, 2017)



Photo 18 – First flush of water entering Boulder Creek from the BDRHEF tailrace (April 26, 2017)

5.3 Water Quality Results

The IEM has suspended the routine water quality monitoring program as current activities pose low risk of negativity impacting water quality in Boulder Creek. Instead water quality monitoring was performed during all construction activities that had the potential to affect downstream water quality including; flushing of sand from the regulation chamber and first release of water through the water to Boulder creek through the water conveyance structures. Water quality sampling results are discussed in Section 5.1 & 5.2 and detailed results are available upon request. Any instream works or works with the potential to affect downstream water quality will continue to be monitored by the IEM during the commissioning period.

5.4 Recommendations

IEM recommendations for the BDRHEF are as follows:

- CE should continue to remove garbage from both the BDRHEF powerhouse and intake as they demobilize equipment.
- Now that steel liners are removed from the laydown and installed into the BDRHEF downstream tunnel portal; observed hydrocarbon contaminated soils underneath the liners should be cleaned up and removed as required to prevent attracting wildlife (ULR#58).
- CE to provide an update to the design for the drainage ditch that was installed that bisects six identified ephemeral drainage paths along the conduit alignment between the BRDHEF intake access road and the BDRHEF powerhouse. The IEM is awaiting a final drainage design to be presented for this section of the conduit alignment prior to CE completing any necessary repairs that will be performed once snow levels recede (ULR#63).

5.5 Upcoming Works

New and/or environmentally sensitive construction activities scheduled to occur at the BDRHEF in May 2017:

- Sluice gate and stop log commissioning.
- Final grading, drainage, and reclamation works.

6.0 Transmission Line – Monitoring Results

6.1 Transmission Line Construction Activities

Construction Activities:

- No construction activities occurred during the reporting period. Works will resume once snow levels recede.

Environmental Summary:

- There were no works along the Transmission Line that required IEM environmental monitoring during this reporting period.

6.2 Recommendations

IEM recommendations for the Transmission Line are as follows:

- WEL's Environmental Manager continues to provide regular scheduling updates that permits the IEM to assess environmental risks and coordinate monitoring requirements. WEL should continue to provide the IEM with a minimum of 48 hours' notice if IEM presence is required or expected for construction activities.

6.3 Upcoming Works

New and/or environmentally sensitive construction activities scheduled to occur along the Transmission Line alignment in 2017:

All Segments

- Seasonal and permanent road de-activation works.
- Reclamation and planting within sensitive wildlife areas.

7.0 Wildlife Sightings

As per the CEMP, the IEM implemented a wildlife sightings record. Project Personal are required to regularly update the record and it is mandatory for all personnel to report wildlife sightings including, but not limited to bears, cougars, mountain goats and deer. Wildlife Observation forms will be included in first reporting period following month end. Observation or detection of the following species will trigger notification to identified parties according to the following table.

Species Observed or Detected	Notification Period	Agencies to be Notified
Northern rubber boa	Immediately	IEM, Owner
Grizzly bear	24hrs	IEM, Safety Officer, Conservation Officer, Owner
Wolverine den	24hrs	IEM, MFLNRO, Owner
Spotted owls	24hrs	IEM, MOE, Owner
Mountain goats	48hrs	IEM, MFLNRO, Owner

The Owner, Contractors, and IEM team reported the following wildlife sightings in April 2017:

Upper Lillooet Hydro Project - Wildlife Observation Form					
Date	Time	Observer (Company)	Species or Description	Location	Comments
04/17/2017	6:30	Ian McKeachie (CRT-ebc)	Moose	KM30	No comments
04/25/2017	10:30	Peter Ramsden (Innergex)	Black Bear	BDR Powerhouse	No comments
04/25/2017	20:30	Peter Ramsden (Innergex)	Black Bear	BDR Powerhouse	No comments
04/26/2017	12:30	Peter Ramsden (Innergex)	Black Bear	BDR Powerhouse	No comments

8.0 Mountain Goat Monitoring Program

The following mitigation measures related to mountain goats were implemented during this monitoring period:

- The BDRHEF intake access road is gated to restrict motorized public access to the UWR (UL-12). Construction activities at the BDRHEF intake are now complete. Commissioning activities will not involve loud construction activities.
- All construction activities within the Truckwash Creek mountain goat migration corridor and at the ULRHEF intake are now complete (as of December 15, 2016). These areas are now in the commissioning phase and no loud construction activities within 500m of sensitive

mountain goat UWR are planned for 2017. The ULHP mountain goat monitoring program is now complete.

- To mitigate potential impacts to mountain goats during the sensitive winter period, construction activities will cease if a mountain goat(s) is (are) observed moving towards the ULRHEF intake and/or if a mountain goat(s) is (are) observed within a 500m line of site of a construction activity. No mountain goats were observed within 500m line of sight of construction activities and no work stoppages were required during this monitoring period.

9.0 Environmental Issues Tracking Matrix (ITM)

9.1 Hydroelectric Facilities (ULRHEF & BDRHEF)

ITM Tracking Legend:		Work Item Open		Work Item Complete		Issue Closed	
Issue Tracking		Environmental Issue		Mitigation Measures			
ID No.	Status	Location	Issue Description	Action Taken/Recommended	Date of Identification	Targeted Date for Completion	Date Completed
ULR#58	OPEN	All work areas	Conservation Officer and BCEAO Compliance and Enforcement Officer Inspection noted non-compliance with regard to wildlife attractant management.	1. Develop, implement and document internal waste and attractant management auditing tool. Tool will be available for use by the IEM and CE's EM Team. Records of inspections and noted non-compliances should be tracked internally with clean-up documented in each report. This tracking tool will be available to agencies upon request. This tool should be used similarly to the Spill Reporting tool currently being employed onsite.	July 6, 2016	July 9, 2016	July 8, 2016
				2. Repair and adjust the electric fences and charged entrance mats at the construction camp (perimeter fence, camp kitchen fence, and waste compactor fence) and surrounding the septic field.			July 21, 2016
				3. Install self-closing door hinges in all site lunchrooms and anywhere food is being stored temporarily (lunch rooms, kitchen storage area) OR adjust how food is transported, stored and consumed onsite to eliminate the possibility of food and food waste attractants onsite.			July 21, 2016
				4. Perform maintenance to clean-up grease and liquid waste around and underneath the garbage compactor			July 21, 2016
				5. Install berms surrounding parking areas that are lined with impermeable fabric in areas where tunneling equipment is parked. All leaks could be considered wildlife attractants; therefore all leaky equipment should be repaired and leaks or spills to ground in parking areas must be cleaned up daily and be disposed of in appropriate contaminated soil bins. Update April 13 – CE has removed all stained and potentially contaminated material from the parking areas and mechanics yard. CE's QP (Cascade Environmental) performed soil sampling for hydrocarbon contamination and recommended that stockpiled material be buried >3m deep. CE has temporarily stockpiled the material in the mechanics yard, and will perform an additional round of confirmatory soil sampling once the material has been removed and buried in the Boulder Spoil pile.			

ITM Tracking Legend:		Work Item Open		Work Item Complete		Issue Closed	
Issue Tracking		Environmental Issue		Mitigation Measures			
ID No.	Status	Location	Issue Description	Action Taken/Recommended	Date of Identification	Targeted Date for Completion	Date Completed
ULR#60	OPEN	Lillooet River FSR from 46 – 48 Km	The road fill slope of the Lillooet River FSR between KM46 – KM48 requires ESC measures to ensure slope stability and prevent rill erosion from transporting material into the forested area below.	1. Assess the road fill slope conditions following conduit installation in the Lillooet River FSR in this section. Update September 30, 2016: CE and the IEM have assessed areas of concern and have discussed ESC stabilization/reclamation of the slopes by hydro-seeding with alder and hydro-mulch of appropriate strength (BFM) and at sufficient application rate.	August 8, 2016	August 16, 2016	September 30, 2016
				2. Provide and implement an agreed upon plan to protect the slope from an erosion and sediment transport perspective and/or a plan to initiate reclamation of the impacted area. Update December 8, 2016 – CE failed to address this concern and now snow and weather will prevent hydro-seeding from occurring this year. Repairs to road edge also remain outstanding and present as ESC risk once the spring melt begins. Any mobilization of side cast material during the spring melt will need to be re-assessed and the slopes repaired/stabilized prior to further erosion in the spring of 2017.			
ULR #63	OPEN	Conduit alignment between the BDRHEF intake access road and BDRHEF powerhouse along TX Line ROW.	Drainage paths interrupted by conduit installation have resulted in significant erosion and does not conform to the work plan or design.	3. The work plan and design of the power and tech cable conduit between the BDRHEF intake access road and the BDRHEF powerhouse called for the installation of swales at all ephemeral drainage paths. The work plan and design were not implemented resulting in substantial erosion along the conduit alignment and along two of the TX Line temporary access roads. An updated drainage plan should be prepared and installed to prevent further erosion. Update November 30: A drainage ditch was installed that bisects six identified ephemeral drainage paths along the conduit alignment without notification to the IEM. The IEM has requested an update on when the work was performed and to what end, as this ditch does not currently meet the design.	November 10, 2016	November 17, 2016	
ULR #64	OPEN	Penstock access road and riparian area on the left bank of Truckwash Creek	Organics, mineral soils, and snow were mixed during construction of an access path on the left bank of Truckwash Creek	1. Soils (organics and mineral soil) were mixed with snow and placed on an access path constructed to perform Truckwash Creek over-drain repairs. This material is placed on the permanent penstock access road and in the riparian area of Truckwash creek, which will need to be reclaimed in 2017. The mixed material (organics, soils, and snow) are to be removed upon completion of the penstock over-drain repair works, to eliminate the ESC risk.	December 1, 2016	Upon completion of Truckwash Creek over-drain repairs	

ITM Tracking Legend:		Work Item Open							
		Work Item Complete							
		Issue Closed							
Issue Tracking		Environmental Issue		Mitigation Measures					
ID No.	Status	Location	Issue Description	Action Taken/Recommended	Date of Identification	Targeted Date for Completion	Date Completed		
<i>(next ITM – BDR#28 & ULR#66)</i>									

9.2 *Transmission Line*

ITM Tracking Legend:		Work Item Open							
		Work Item Complete							
		Issue Closed							
Issue Tracking		Environmental Issue		Mitigation Measures					
ID No.	Status	Location	Issue Description	Action Taken/Recommended	Date of Identification	Targeted Date for Completion	Date Completed		
<i>No outstanding environmental issues (next ITM – Tx#3)</i>									