



Upper Lillooet Hydro Project

Weekly Environmental Monitoring Report #88

Reporting Period: February 14 – February 27, 2016

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
 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 (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)
 Occupant Licence to Cut (BDRHEF – KM 38 laydown) No. L49698
 Occupant Licence to Cut (BDRHEF) No. L49816 (Amendments 1, 2, 3)
 Occupant Licence to Cut (TX Line) No. L49697 (Amendments 1, 2, 3, 4, 5, 6, 7, 8, 9)
 General Wildlife Measure Exemption Approval Letter (TX Line & BDRHEF) File No. 78700-35/06 UWR and 39585-20 WHA
 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. 8200-2013-500102-001
 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
 Magazine Licence File No. UL76018 (Renewal 1)
 Section 8 Approval – Short Term Use of Water File (Lillooet River and Tributaries) No. A2006123 (Amendment 1)
 Section 8 - Special Use Permit issued for the operation of an avalanche weather station on Crown land (File No. S25988)

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. 326969 (Renewal 1)
Wildlife Act Permits – Pacific Tailed Frog Salvage Permit # SU15-164805; 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
SLRD Building Permit Stages 1 - 4 – Boulder Powerhouse Architectural, Electrical and Mechanical (10865) October 8, 2015
SLRD Building Permit Stages 1 - 4 – Upper Lillooet Powerhouse Architectural and Mechanical (10864) October 6, 2015

ACRONYMS:

AMBNS	Active Migratory Bird Nesting Survey	INX	Innergex Renewable Energy Inc.
Andritz	Andritz Hydro Canada Inc.	ISW	Instream Works
ANFO	Ammonia nitrate fuel oil (industrial explosive)	ITM	Environmental Issue Tracking Matrix
ASMP	Archaeological Sites Management Plan	JEM	JEM Energy Ltd. (Delegate Independent Engineer)
ARD M/L	Acid Rock Drainage and Metal Leaching	LTC	Leave to Construct
BCEAO	British Columbia Environmental Assessment Office	MFLNRO	Ministry of Forests, Lands and Natural Resource Operations
BCWQG	British Columbia Water Quality Guidelines	MOE	Ministry of Environment
BDRHEF	Boulder Creek Hydroelectric Facility	MOTI	Ministry of Transportation and Infrastructure
BG	Background	NCD	Non Classified Drainage
BKL	BKL Consultants Ltd.	OLTC	Occupational License to Cut
CE	CRT-ebc Construction Inc.	PAG	Potentially Acid Generating
DFO	Fisheries and Oceans Canada	ROW	Right of Way
DS	Downstream	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.	Stringer Line	Temporary Backfeed Transmission Line
Ecologic	Ecologic Consulting	TX Line	Transmission Line
EIR	Environmental Incident Report	ULRHEF	Upper Lillooet Hydroelectric Facility
ESC	Erosion and Sediment Control	UWR	Ungulate Winter Range
FAM	Field Advice Memorandum	VC	Valued Component
FSR	Forest Service Road	WEL	Westpark Electric Ltd.
Golder	Golder Associates	WEMR	Weekly Environmental Monitoring Report
GWR	Mountain Goat Winter Range	WHA	Wildlife Habitat Area
Hedberg	Hedberg and Associates Ltd.	WQ	Water Quality
HWM	High water mark		
IE	Independent Engineer (True North Energy)		
IEM	Independent Environmental Monitor		

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
February 14 – 20, 2016	DA, TH, AS	<p>Construction Camp, Laydown Areas and the Lillooet River FSR</p> <ul style="list-style-type: none"> • Snow clearing and road maintenance on the Lillooet River FSR • Ditching completed at KM21 of the Lillooet River FSR resulting in an environmental incident tracked as ITM <i>ULR#42</i> and reported as <i>EIR#19</i>. <p>ULRHEF Intake & Upstream Tunnel</p> <ul style="list-style-type: none"> • Drilling, water testing and cover grout injection • Water treatment system maintenance and monitoring <p>ULRHEF Downstream Tunnel Portal</p> <ul style="list-style-type: none"> • Drilling, blasting and tunnel stabilization (including shotcrete) <p>ULRHEF Powerhouse</p> <ul style="list-style-type: none"> • Dewatering of clean ground water seepage to the Lillooet River • Construction activity is on hold <p>BDRHEF Downstream Tunnel Portal</p> <ul style="list-style-type: none"> • Drilling, blasting and tunnel stabilization • Shotcrete mix testing station within 30m of Boulder Creek (February 18, 2016) <p>BDRHEF Powerhouse</p> <ul style="list-style-type: none"> • Electrical component installation <p>TX-Line</p> <ul style="list-style-type: none"> • No activity
February 21 – 27, 2016	A. Sartori, SE, DA, TH, AS	<p>Construction Camp, Laydown Areas and the Lillooet River FSR</p> <ul style="list-style-type: none"> • Snow clearing and road maintenance on the Lillooet River FSR • Ditch armouring and culvert replacement at KM21 (Feb 23-25, 2016) <p>ULRHEF Intake & Upstream Tunnel</p> <ul style="list-style-type: none"> • Drilling, water testing and cover grout injection • Water treatment system maintenance and monitoring <p>ULRHEF Powerhouse</p> <ul style="list-style-type: none"> • Dewatering of clean ground water seepage to the Lillooet River • Construction activity is on hold <p>ULRHEF Downstream Tunnel Portal</p> <ul style="list-style-type: none"> • Drilling, blasting and tunnel stabilization (including shotcrete) • Ditching of downstream tunnel portal access road (Feb 25-27, 2016) <p>BDRHEF Downstream Tunnel Portal</p> <ul style="list-style-type: none"> • Drilling, blasting and tunnel stabilization <p>BDRHEF Powerhouse</p> <ul style="list-style-type: none"> • Electrical component installation <p>TX-Line</p> <ul style="list-style-type: none"> • No activity

IEM Team Personnel: TH – Tom Hicks; SS – Stephen Sims; DA – Danita Abraham; SE – Stephanie Ellis; AS – Anne Sutherland; A. Sartori: Alex Sartori

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	EIR/ITM ID No.
February 14 - 19, 2016	<i>Emails, site inspections, verbal communications, EIR#19</i>	SES, INX, CE, JEM, Squamish Mills, MFLNRO, BC EAO, DFO, Lil'wat Nation	CE constructed a ditch to drain a section of flooded road at KM21 of the Lillooet River FSR. The ditch was excavated to the edge of the Lillooet River and potential Western Toad breeding habitat. As the ditch was not armoured and had visibly unstable side-walls, it presented a sediment and erosion concern. If left unmitigated the IEM felt this ditch presented a potential impact to Western Toad breeding habitat. After a review of all timing restrictions and wildlife sensitive area polygons, the IEM determined that the work was completed within the timing restriction associated with Moose UWR (no construction between November 1 – May 15); and was therefore considered an environmental incident. The IEM determined that repair work was required immediately to address ESC concerns and protect potential downstream Western Toad breeding habitat and water quality, despite the Moose UWR timing restriction. CE prepared a work plan and the IEM prepared EIR#19 (attached) and submitted it to regulatory agencies, prior to initiating the repair works. The repairs were completed under direction of Primary Road User (Squamish Mills) according to the Road Use Agreement, and under IEM supervision. See Section 4.1, ITM ULR#42, and EIR#19 for further details.	EIR#19, ULR#42
February 16, 2016	<i>Email, site communications</i>	SES, CE, INX	SES formalized concerns surrounding ponded water directly over the woodbox culvert at KM48 of the Lillooet River FSR. The IEM suggested that CE investigated the concern before the sediment laden water impacted the cutthroat trout stream at this location.	
February 17 - 18, 2016	<i>Email, site inspection</i>	SES, CE, INX	On February 17, CE notified SES of the start of shotcrete application training to certify operators in the use of the machinery and to perform testing of the grout strength following test application. The testing site was setup within 30m of Boulder Creek and therefore the IEM was onsite throughout the test to verify that work did not affect Boulder Creek water quality. A large snow berm separated the work site from Boulder Creek and the IEM inspected the area prior to the start of the operations to assess the risk to Boulder Creek surface water quality. The IEM monitored the grout test work on February 18, 2016.	-
February 19, 2016	<i>Email, site communications</i>	SES, CE, INX	SES notified the CE Environment team of a breach in the snow berm at KM48 of the Lillooet River FSR that caused road drainage and ponded sediment laden water to enter the cutthroat trout stream. The IEM also identified road drainage concerns from KM46-KM44.7 and between KM48 – KM49, where turbid road runoff generated in these sections of the Lillooet River FSR were entering directly into watercourses (Truckwash Creek & the Lillooet River, respectively).	ULR#43

Date	Communication Type	Participants	Issues Discussed	EIR/ITM ID No.
February 19, 2016	<i>Email</i>	SES, INX CE	CE provided INX and SES with an update on new protocols to be implemented during the Spring 2016 Mountain Goat sunrise and sunset shutdown period (May 1 – June 1530) as per EAC Amendment No. 7. The updated mitigation measures include: <ul style="list-style-type: none"> • Construction must not occur before sunrise and after sunset in areas within, or within 200 m of UWR u-2-002 UL 11 and the identified migration corridor, unless the IEM has confirmed that mountain goats are not present in the UWR u-2-002 UL11 or in the migration corridor within 1000m of UWR u-2-002 UL11. • A five minute buffer is to be added to the official shut down. This will allow for “clearing of the travelling zone” between road blocks setup on either end of the mountain goat mitigation corridor buffer. The five additional minutes will be integrated in the calendar to be distributed to CE crews. • Dedicated personnel will be hired specifically for the task of blocking travel through the migration corridor during the shutdown periods, these people will be provided with training under the • CE will ensure the road blocks are in place 15 minutes prior to the official time of the shutdown. 	-
February 22, 2016	<i>Email</i>	INX, SES, CE, JEM	CE distributed a Notice of Activity for KM21 repair works including ditch armouring and culvert replacement.	-
February 25, 2016	<i>Email</i>	INX, SES	INX informed SES that excavation was set to start following the cover grouting injection program, which could be as early as February 27, 2016.	-
February 27, 2016	<i>Email</i>	SES, CE, INX	SES provided a progress update on status of drainage concerns outlined as <i>ULR#43</i> . Work remains to be completed along the ULRHEF lower portal access road and from KM48.5 – KM49 of the Lillooet River FSR to restore ditches and direct water off the running surface, and prevent turbid water from entering Truckwash Creek and the Lillooet River.	<i>ULR#43</i>

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	Access roads above the lower limit of the 200m buffer Truckwash Creek Migration Corridor to the ULRHEF intake	Mountain Goat UWR & Migration Corridor	<p>Noise monitoring equipment was in place to monitor background noise levels and exceedances of the 75dbA noise level maximum resulting from blasting activities. Adaptive drilling/blasting noise mitigation strategies will be developed and implemented should activities show persistent exceedances of the noise level threshold.</p> <p>Mountain Goat monitoring activities will occur daily throughout the winter and spring (November 1 – June 15) when construction activities are occurring at the ULRHEF lower tunnel portal and/or the ULRHEF intake.</p> <p>If a mountain goat is observed within 500m line of sight of construction operations, construction must cease for at least 48 hours. The IEM must record and submit all goat observations to FLNR within 48 hours.</p>
BDRHEF intake	Portion of intake access road and crane pad within UWR	Mountain Goat UWR	<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>If a mountain goat is observed within a 500 m line of site of a construction activity within UWR u-2-002 UL 12, construction activities will cease for at least 48 hours. Approval from the IEM must be obtained prior to recommencing construction activities.</p>

4.0 Upper Lillooet River HEF – Monitoring Results

4.1 Construction Camp, KM 38 Laydown, Access Roads & Lillooet River FSR

Activities:

- Routine maintenance of construction equipment within the mechanic shop and fuel management continued at the KM 38 laydown (Photo 1). All hazardous substance materials (waste oil, contaminated soil, used oil/hydraulic fluid containers, etc.) were stored temporarily for off-site disposal in a designated area at the laydown. The materials were all well contained and protected from the weather.
- The electric fences surrounding the construction camp were maintained and operational throughout this reporting period.

- Road maintenance on the Lillooet River FSR at KM48 (Photo 2), between KM48 – KM49, between KM46 – 44.7, and along the lower tunnel portal access road was completed to address drainage concerns highlighted by the IEM. These issues are tracked as ITM *ULR#43* (Photo 2). Work to address road drainage concerns at KM49 of the Lillooet River FSR and along the ULRHEF lower tunnel portal access road remains to be completed.

Environmental Summary:

- CE constructed a ditch to drain a section of flooded road at KM21 of the Lillooet River FSR, which ultimately resulted in EIR#19 (attached) and included in the ITM as *ULR#42* (Photo 3). To repair the issue, CE repaired a work plan to satisfy conditions outlined by the IEM in EIR#19. The IEM was onsite to ensure the following mitigation measures were implemented during the repair works:
 - Fulltime IEM monitoring of the works to ensure moose are not occupying the work area or 200 m buffer surrounding the work area.
 - If a moose is observed within 200 m of the work area, all equipment and works must be halted until the moose has left the area.
 - Vehicle traffic associated with the repair work within the Moose Winter Range Forage Management Zone, must adhere to a 40km/h speed limit to prevent vehicular collisions.
 - The work must be coordinated and completed within the shortest amount of time possible and should be continuous once started.
 - Work should be completed during daylight hours only to minimize impacts to moose from construction noise and additional light that would be generated during a typically quiet period.

The repair works were completed under the direction of a Professional Forester and under IEM supervision from February 23 – 25, 2016 (Photo 4). No moose were observed during active construction works and water quality was maintained throughout the repair works by pumping all road drainage to vegetation. Some turbid seepage was encountered during the rock armouring works and during commissioning of the newly installed culvert and armoured ditch. Water quality returned to background condition less than 24hours following completion of the works. The area is now stabilized from an erosion and sediment control perspective, and the risk to potential Western Toad breeding habitat and Lillooet River water quality has been eliminated. The environmental incident EIR#19 and ITM *ULR#42* are now closed.

Photos:



Photo 1 – Current conditions at the KM38 crusher pad (February 27, 2016).



Photo 2 – CE installed a cross ditch to address runoff issues at KM48 on the Lillooet River FSR. Road runoff was directed to a vegetated area and away from the cuthroat trout stream (February 19, 2016).



Photo 3 – Ditch excavated by CE at KM21 of the Lillooet River FSR (February 15, 2016).



Photo 4 – Repairs completed under IEM supervision to stabilize the ditch at KM21 of the Lillooet River FSR (February 25, 2016).

4.2 Intake (North & South Sides), and Upstream Tunnel Portal

Construction Activities:

- Grout cover injection at the ULRHEF upstream tunnel portal (**Error! Reference source not found.**). Current conditions at the ULRHEF upstream portal access road are shown in Photo 8.
- Dewatering to ULRHEF intake sediment basins (Photo 6).

Environmental Summary:

- During all grout cover injection in the upstream tunnel, seepage water was directed to the ULRHEF intake sediment basins for treatment. CE's environmental management team ensured that the active treatment system was functioning and well maintained.

- The IEM was at the ULRHEF intake to conduct water quality monitoring during grout cover injection activities. During works, the IEM conducted sampling in the cells downstream of the treatment system and at the outlet to the Lillooet River (Photo 6 and Photo 7). The water treatment was successful and water quality remained within Project guidelines for pH (pH 6.5 – 9) and turbidity during grouting injection works. Please see Section 4.5 Water Quality Results.

Photos:



Photo 5 – The face of the ULRHEF upstream tunnel during tunnel cover grouting (February 24, 2016).



Photo 6 – The second cell of the ULRHEF sediment basins at the discharge of the primary treatment system. (February 14, 2016).



Photo 7 – Sampling discharge from ULRHEF sediment basins to Lillooet River during grouting in the tunnel (February 14, 2016).



Photo 8 – Current conditions at the ULRHEF upstream tunnel portal access road (February 24, 2016).

4.3 Downstream Tunnel Portal

Construction Activities:

- Drilling, blasting, mucking and stabilization works within the tunnel (Photo 11).
- Ditching and snowbank removal along the downstream portal access road (Photo 9 and Photo 10; ULR#43).

Environmental Summary:

- All seepage water was directed to the downstream sediment basins for treatment. CE's environmental management team ensured that the active treatment system was functioning and well maintained throughout the reporting period (Photo 12). Please see Section 4.5 Water Quality Results

Photos:



Photo 9 – Ditching of the downstream tunnel portal access road (February 27, 2016).



Photo 10 – Ditching of the downstream tunnel portal access road (February 27, 2016).



Photo 11 – Current conditions at the downstream tunnel portal (February 27, 2016).



Photo 12 – Repairing a hole in a hose in the water treatment system hose (February 26, 2016).

4.4 Powerhouse & Access Road

Construction Activities & Environmental Summary:

- No construction activities are currently occurring at the powerhouse (Photo 13 and Photo 14).
- No environmental issues were observed or reported at the ULRHEF powerhouse during this reporting period.

Photos:



Photo 13 – Current conditions at the ULRHEF powerhouse (February 27, 2016).



Photo 14 – Current conditions inside the ULRHEF powerhouse (February 27, 2016).

4.5 Water Quality Results

The following table presents the results of WQ sampling results collected at the ULRHEF intake water treatment system. The IEM did not conduct weekly water quality sampling during the winter shutdown, as activities occurring had no effect on water quality.

Date	Time	Sample Location Description	pH	Turbidity (NTU)	Cond (µS)	Temp (°C)
Routine Water Quality						
February 27, 2016	14:20	ULR Background – ULRHEF Intake	7.7	4.7	147	4.9
	16:25	ULR #0.5 – Downstream of ULRHEF intake at Keyhole Bridge	7.5	5.5	154	4.3
	13:08	ULR # 1 – Upstream of ULRHEF Powerhouse	7.6	5.7	152	4.9
	12:50	ULR #2 – Downstream of ULRHEF Powerhouse between KM 40.5 and KM 41	7.5	5.4	150	4.9
	12:00	ULR #3 – Lillooet River FSR KM 38 Laydown – D/S of Boulder confluence	7.4	3.3	171	5.2
	9:45	ULR #4 – Lillooet River FSR KM 24 – D/S of all works and Meager confluence	7.4	4.6	150	4.4
Water Quality for Specific Works						
ULRHEF Intake sediment basins and Lillooet River following grout injection at upstream tunnel						
February 14, 2016	15:30	Discharge to Lillooet River	7.4	6.4	-	-
	15:33	Pond 2 (before primary treatment)	8.8	-	-	-
February 17, 2016	12:45	Discharge to Lillooet River	7.1	6.5	-	-
February 19, 2016	14:07	Discharge from tunnel portal sump	7.0	27.4	-	-
	14:10	Discharge to Lillooet River	6.9	7.6	-	-

Date	Time	Sample Location Description	pH	Turbidity (NTU)	Cond (µS)	Temp (°C)
February 22, 2016	14:54	Pond 7 (lower basins)	7.0		-	-
	15:00	Discharge to Lillooet River	7.6	48.8	-	-
	15:00	Downstream Confluence	-	11.7	-	-
February 23, 2016	10:30	Discharge to Lillooet River	7.1	11.7	-	-
	15:16	Pond 7 (lower basins)	8.1	-	-	-
February 26, 2016	10:05	Discharge to Lillooet River	7.3	-	-	-
February 27, 2016	13:37	Pond 7 (lower basins)	7.3	-	-	-
	14:21	Discharge to Lillooet River	7.5	17.3	-	-
ULRHEF Downstream Portal settling ponds discharge						
February 14, 2016	16:30	Water treatment system outlet test port	8.8	0.9	-	-
February 15, 2016	-	Water treatment system outlet test port	7.5	0.7	-	-
February 17, 2016	14:00	Water treatment system outlet test port	8.1	2.3	-	-
February 23, 2016	11:20	Water treatment system outlet test port	8.5	-	-	-
February 26, 2016	13:30	Water treatment system outlet test port	7.4	-	-	-
February 27, 2016	15:25	Water treatment system outlet test port	8.7	-	-	-

4.6 Recommendations

ITEM recommendations for the ULRHEF are as follows:

- All water from the ULRHEF upstream tunnel heading should be conveyed to the sediment basins for treatment. CE should perform regularly monitoring to ensure that the water treatment system is functioning as intended and that discharge to the Lillooet River continues to meet BCWQGs.
- CE should be regularly monitoring the downstream tunnel water treatment system to ensure it is functioning as intended and that discharge into Truckwash Creek continues to meet BCWQGs.
- The ULRHEF powerhouse sump water should be monitored regularly. Alkaline or turbid water should be pumped to the settling ponds for treatment.
- CE should access drainage along all access roads to ensure road runoff is directed to road- side ditches to prevent erosion of the running surface. Areas outlined in *ULR#43* should be treated as priority areas.

4.7 Upcoming Works

The following new and/or environmentally sensitive construction activities are scheduled to occur in the upcoming reporting period:

- Cover grouting and consolidation works in the upstream tunnel, followed by short blasting/mucking rounds.
- Drilling, blasting and tunnel stabilization at the downstream tunnel.
- Dewatering to the intake sediment basins will continue.

5.0 Boulder Creek Hydroelectric Facility – Monitoring Results

5.1 Intake & Diversion Tunnel

Construction Activities:

- No activity due to winter shutdown period.

5.2 Downstream Tunnel Portal and Powerhouse

Construction Activities:

- Drilling; blasting; tunnel stabilization; and, mucking in the downstream tunnel portal (Photo 15).
- BDRHEF powerhouse electrical component installation (Photo 16).
- Dewatering of the tunnel and powerhouse to the oil water separator and settling ponds continued (Photo 17).

Environmental Summary:

- All wastewater related to the BDRHEF tunnelling works continued to be contained and conveyed to the downstream portal settling ponds for treatment (Photo 17).
- On February 17, CE notified SES of the start of shotcrete application training to certify operators in the use of the machinery and to perform testing of the grout strength following test application. The testing site was setup within 30m of Boulder Creek and therefore the IEM was onsite throughout the test to verify that work did not affect Boulder Creek water quality. A large snow berm separated the work site from Boulder Creek and the IEM inspected the area prior to the start of the operations to assess the risk to Boulder Creek surface water quality. The IEM monitored the grout test work on February 18, 2016, and no water quality concerns were noted, as the work area remained isolated from Boulder Creek (Photo 18).

Photos:



Photo 15 – Spoil pile at BDRHEF downstream tunnel portal (February 27, 2016).



Photo 16 – Electrical component installation inside BDRHEF Powerhouse (February 27, 2016).



Photo 17 – BDRHEF downstream portal settling ponds (February 27, 2016).



Photo 18 – Shotcrete testing station at BDRHEF downstream tunnel portal, (February 18, 2016).

5.3 *Water Quality Results*

The following table presents the results of the routine WQ sampling program for the BDRHEF. The IEM is undertaking a weekly monitoring program according to the conditions outlined in the Surface Water Quality Protection Plan. The regular monitoring sites have been selected to quantify WQ conditions within the Lillooet River upstream and downstream of active construction areas. The IEM acknowledges the natural variability of instream WQ conditions in Boulder Creek due to seasonal fluctuations in snowmelt. In the event that an exceedance of *in-situ* WQ (turbidity and/or pH) is deemed to be caused by project-related activities, the IEM will highlight the exceedance, discuss the cause, and outline measures undertaken by the Contractor to correct the issue. When an exceedance cannot be attributed to project related activities, the exceedance will be marked by an asterisk (*).

Date	Time	Sample Location Description	pH	Turbidity (NTU)	Cond (uS)	Temp (°C)
Routine Water Quality						
February 27, 2016	-	BDR BG – Upstream of BDRHEF intake *not accessible*	-	-	-	-
	-	BDR #1 – Downstream of BDRHEF intake *not accessible*	-	-	-	-
	12:25	BDR #2 – Upstream of BDRHEF Powerhouse	7.4	1.1	105	3.3
	12:15	BDR #3 – Downstream of BDRHEF Powerhouse at Pebble Creek Bridge	7.4	1.1	110	4.5

5.4 Recommendations

IEM recommendations for the BDRHEF are as follows:

- All wastewater related to the BDRHEF tunnelling works should continue to be contained and conveyed to the downstream portal settling ponds for treatment. Regular inspections of the treatment ponds should be performed to ensure the necessary maintenance activities outlined in the work plan are performed.
- The IEM requests that in future, any shotcrete testing stations be located outside of 30m from any watercourses.

5.5 Upcoming Works

The following new and/or environmentally sensitive construction activities are scheduled to occur in the upcoming reporting period:

- BDRHEF downstream portal tunnelling works will continue.
- Electrical component installation will continue at the BDRHEF powerhouse.

6.0 Transmission Line – Monitoring Results

6.1 Transmission Line Construction Activities

- No activities occurred on the TX Line during this reporting period.

7.0 Wildlife Sightings

As per the CEMP, a wildlife sightings record has been implemented and will be updated regularly by Project Personnel. It is mandatory for all personnel to report wildlife sightings including, but not limited to bears, cougars, mountain goats and deer. Wildlife sighting will be reported and recorded by the contractor(s). 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

8.0 Mountain Goat Monitoring Program

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

- Access to the BDRHEF intake was gated and will now be locked fulltime to restrict motorized use within the UWR until April 30, 2016.
- Noise level monitoring data continued to be collected and used to adaptively manage construction noise and ensure that the 75db noise level threshold is not exceeded as outlined in the Mountain Goat Management Plan.
- The IEM or designate was on site to monitor mountain goat activity within 500m of construction activities at the ULRHEF intake and the ULRHEF downstream tunnel portal. Mountain goats were monitored from four sites:
- Truckwash Creek viewing river right of the Migration Corridor– MG-OBS01 (10U 467955 5612773);
- Keyhole Falls viewing the south side u-2-002 UL11 – MG-OBS02 (10U 466593 5613988); and,
- Garibaldi Pumice mine site viewing u-2-002 UL 19 – MG-OBS03 (10U 467388 561408); and,
- Salal Creek monitoring site viewing u-2-002 UL 8 – MG-OBS04 (10U 466133 5613991).

Monitoring effort was split between all sites during daylight hours, unless safety concerns or weather conditions interfered. The order of site visits rotated daily. Construction activities must cease if a goat(s) is/are observed moving towards the ULRHEF intake and/or if a goat(s) is/are observed within a 500m line of site of a construction activity. No goats were observed within 500m line of sight of construction activities and no work stoppages were required.

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#42	CLOSED	Lillooet River FSR – KM21	Road drainage works completed by the CRT-ebc within Moose Winter Range Forage Management Zone UWR U-2-005 J55/54-204-RE at 21KM of the Lillooet River FSR during the November 1 - May 15 winter timing restriction. See EIR#019 for further details.	<ol style="list-style-type: none"> 1. Complete ditch line stabilization as soon as possible (ditch profile re-shaping, rock armouring, culvert replacement), to prevent the transport of sediment laden water to the Lillooet River and potential Western Toad breeding pond located downstream. 2. Complete works within the Moose Winter Range winter timing restriction (November 1 – May 15), but prior to the Western Toad breeding period timing restriction (March 1 – August 31) by employing the following mitigation measures under IEM supervision: <ol style="list-style-type: none"> a. Full-time IEM monitoring of the works to ensure moose are not occupying the work area or 200 m buffer surrounding the work area. b. If a moose is observed within 200 m of the work area, all equipment and works must be halted until the moose has left the area. c. Vehicle traffic associated with the repair work within the Moose Winter Range Forage Management Zone must adhere to a 40km/h speed limit to prevent vehicular collisions. d. The work must be coordinated and completed within the shortest amount of time possible and should be continuous once started. e. Work should be completed during daylight hours only to minimize impacts to moose from construction noise and additional light that would be generated during a typically quiet period. f. Temporarily disturbed areas away from road verges (outside of the FSR ROW) should be replanted with at least 50% native forage species for moose (e.g. red-osier dogwood, willow sp.). Revegetation will be completed during the appropriate planting season in conjunction with the planting of the TX-Line ROW. 	February 15, 2016	February 22, 2016	February 24, 2016









ID No.	Status	Location	Issue Description	Action Taken/Recommended	Date of Identification	Targeted Date for Completion	Date Completed
ULR#43	OPEN	Road Drainage along the Lillooet River FSR between KM44.5 – KM49	Road run-off caused by rain and snowmelt is not being directed to roadside ditches and is eroding the running surface/contributing sediment to watercourses.	<ol style="list-style-type: none"> 1. Address road drainage concerns between KM47.5 and KM48 to prevent further turbid water inputs to the fish-bearing stream at KM48. Update: CE installed a temporary cross-ditch to divert water away from the watercourse on February 19. 2. Address road drainage concerns between KM44.5 - KM46 and along the ULRHEF downstream tunnel portal access road to prevent further turbid water inputs to Truckwash Creek. Update February 27: CE has opened up the ditch line, which is now conveying road runoff to the ephemeral drainage and road culvert and away from the lower portal access road. Work remains to be completed along the lower portal access road to restore the ditch line and direct water off the running surface. 3. Address road drainage concerns between KM48 and KM49 to prevent further turbid water inputs to the Lillooet River at Keyhole Bridge. 	February 19, 2016	February 26, 2016	-
<i>No outstanding environmental issues (next ITM – BDR#28 & ULR#44)</i>							

9.2 Transmission Line

ITM Tracking Legend:		<i>Work Item Open</i>					
		<i>Work Item Complete</i>					
		<i>Issue Closed</i>					
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>							

Environmental Incident Reporting Form

General Information			
Project Name: Upper Lillooet Hydro Project	Project Component: Lillooet River FSR near KM21; Within Moose Winter Range Forage Management Zone UWR U-2-005 J55/54-204-RE		
Time/Date of Incident Start: February 15, 2016	Time/Date Incident Stopped: February 15, 2016		
Date of Report: Draft Submitted: February 18, 2016 Final Submitted: February 19, 2016	Project Incident Report Number: EIR-019 Incident Location: Lillooet River FSR near KM21 Incident Description: Conducting road maintenance outside of the Lillooet River FSR ROW within Moose Winter Range Forage Management Zone UWR U-2-005 J55/54-204-RE		
Report Prepared by: Tom Hicks, Lead Field Monitor – Sartori Environmental Services			
Contractor’s Environmental Manager: Jean M. Pelletier – CRT-ebc (CE)			
Independent Environmental Monitor (IEM): Tom Hicks			
Initial IEM Contact: Tom Hicks			
Licensee’s Environmental Manager: Julia Mancinelli – Innergex			
Contact Information for Company Involved in Incident			
Company: CRT-ebc (CE)	Address: PO Box 585, Pemberton BC – V0N 2L0		
Phone #: 604-894-5002	Email: jdrapeau@crtconstruction.ca		
Contact Person: Jonathan Drapeau	Position: Assistant Project Manager		
Incident Type (check all that apply)			
Encroachment of an Environmentally Sensitive Area (e.g. Riparian/Wildlife Buffer) Please provide details in “Description” section below.	<input checked="" type="checkbox"/>	Potential Adverse Impacts to Fish/Wildlife (e.g. Mortality/Injury) Please provide details in “Description” section below.	<input type="checkbox"/>
Water Quality/Quantity Please provide details in “Description” section below.	<input checked="" type="checkbox"/>	Hazardous Material Spills (to ground or water) Please provide details in description section in regards to: <ul style="list-style-type: none"> • Perceives extent of damage • Type, quantity and area of the spill • Containment Procedures • Environmental features in close proximity to the spill 	<input type="checkbox"/>
Disturbance of known or unknown archeological /heritage site Please provide details in “Description” section below.	<input type="checkbox"/>	Air Quality Please provide details in “Description” section below.	<input type="checkbox"/>
Spill reported to external agencies If yes, describe the receiving environment and substance/quantity spilled.	<input type="checkbox"/>	Other Please provide details in “Description” section below.	<input type="checkbox"/>

Incident Profile								
Weather at time of incident	 <input type="checkbox"/> Clear	 <input type="checkbox"/> Partly Cloudy/ Variable	 <input type="checkbox"/> Cloudy	 <input type="checkbox"/> Showers/ Periods of Rain	 <input checked="" type="checkbox"/> Rain	 <input type="checkbox"/> Heavy Rain (>25mm in 24hr)	 <input type="checkbox"/> Storm (Heavy rain and high winds)	 <input type="checkbox"/> Snow
Specific Incident Location:								
Description and Cause of Incident:								
<u>Description</u> <ul style="list-style-type: none"> See Appended Summary 								
<u>Cause</u> <ul style="list-style-type: none"> See Appended Summary 								
Incident Witness: Incident was discovered after the work had been complete. The IEM informed the CE Environmental manager upon discovery.								
Were there any Potential Environmental impacts as a result of the incident? (e.g., surface contamination, storm sewers, or fish/wildlife mortalities)							Yes <input checked="" type="checkbox"/>	None Observed <input type="checkbox"/>
See Appended Summary for details relating to Potential Environmental Impacts								
If Yes, please describe: See Appended Summary								
Has Wildlife Salvage Protocol been followed?						Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
If No, please explain:								
Water Quality Samples Collected?						Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	N/A <input type="checkbox"/>
If yes, attach results of water quality analysis to report in table format. Include Laboratory analysis if completed. If No please explain: IEM was not onsite when the work was performed.								
Have applicable photos and/or drawings been attached to the incident report?						Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>

Incident Response Measures

On the afternoon of February 15, 2016 the IEM identified the incident while travelling down the FSR. Further work was suspended until a plan to correct the potential impacts of the incident could be developed and work completed by the Primary Road Use Permit holder (Squamish Mills). The earliest this work can proceed is Monday, February 22, 2016. See Appended Summary for further details.

Actions to Prevent Incident Recurrence


The IEM recognizes that CE was attempting to address the drainage concerns highlighted by the IEM, by completing the work at 21KM; however, as the critical planning phase of this work was omitted, the completed drainage works were not in adherence with conditions of the EAC, CEMP (including EPPs), and Road Use Agreement. The IEM discussed this issue with Innergex and CE project management teams the morning of February 16, 2016, and clearly communicated that all work being conducted as part of the ULHP must be thoroughly planned, to ensure all permit conditions are satisfied and best management practices are employed for each piece of work no matter how small.

Notification Record


Agency Reported to	Contact Information	Agency Contacted		Date and Time Reported	Reported By	Method of Reporting
		Yes	No			
External Notifications						
MFLNRO	James Davies	<input checked="" type="checkbox"/>	<input type="checkbox"/>	February 19, 2016	Tom Hicks	Email
	Malcolm Shultz	<input checked="" type="checkbox"/>	<input type="checkbox"/>	February 19, 2016	Tom Hicks	Email
BC EAO	Justin Carlson	<input checked="" type="checkbox"/>	<input type="checkbox"/>	February 19, 2016	Tom Hicks	Email
Lil'wat Nation	Harriet VanWart	<input checked="" type="checkbox"/>	<input type="checkbox"/>	February 19, 2016	Tom Hicks	Email
PEP	1-800-663-3456	<input type="checkbox"/>	<input checked="" type="checkbox"/>			
DFO	Herb Klassen	<input checked="" type="checkbox"/>	<input type="checkbox"/>	February 19, 2016	Tom Hicks	Email
Environment Canada	604-666-6100	<input type="checkbox"/>	<input checked="" type="checkbox"/>			
Canadian Coast Guard	604-666-6011	<input type="checkbox"/>	<input checked="" type="checkbox"/>			
Local Fire Rescue	911	<input type="checkbox"/>	<input checked="" type="checkbox"/>			

Reported to	Contact Information	Contacted		Date and Time Reported	Reported By	Method of Reporting
		Yes	No			
Internal Notifications (Provide in chronological order)						
CE	Jean M. Pelletier jeanpelletier@crtconstruction.ca Ian McKeachie imckeachie@crtconstruction.ca	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Feb 15, 2016 (12:30pm)	Tom Hicks	Verbal discussion at the CE site offices
Owner Innergex	Julia Mancinelli jmancinelli@innergex.com	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Feb 15, 2016 (6:00pm)	Tom Hicks	Verbal communications
Owner Innergex	Oliver Robson Orobson@innergex.com	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Feb 15, 2016 (6:00pm)	Tom Hicks	Verbal communications
IEM Sartori Environmental	Stephen Sims steve@sartorienv.com	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Feb 15, 2016 (6:00pm)	Tom Hicks	Verbal communications
IE True North Energy	Jenn McCash jemenergy@telus.net	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Feb 16, 2016	Tom Hicks	Email

Report Prepared by:

Tom Hicks, R.P.Bio.	Lead Field Monitor, Sartori Environmental Services		2016-02-19
Print Name	Position and Company	Signature	Date

Reviewed by:

J. Stephen Sims, R.P.Bio.	Delegate IEM, Sartori Environmental Services		2016-02-19
Print Name	Position and Company	Signature	Date

Incident Summary

Description:

On Sunday, February 14, 2016 the IEM requested that CE address drainage concerns at 21 KM of the Lillooet River FSR as water was flooding the road and flowing over the road surface towards the Lillooet River. It was suggested by the IEM that a culvert may need to be installed to prevent the continued generation of sediment laden water being caused by vehicle traffic through the pooled water. Flooding of the road and offsite transport of sediment laden water towards the Lillooet River was in contravention of the Project's Surface Water Quality Protection Plan and needed attention to protect downstream habitats. At no time did the IEM direct CE to perform repairs, but it was discussed that fording of flowing water across the FSR should be looked at immediately to protect downstream water quality, road safety and maintain adherence to the Surface Water Quality Protection Plan.

The road flooding at this location did not occur as a result of project related activity and was caused by natural conditions of sustained snow melting. A change to localized drainage patterns may have contributed to the increased flows observed.

In response to the IEM's request to investigate the issue, CE sent an excavator to the area on February 15, 2016. The excavator dug a ditch perpendicular to the Lillooet River FSR along a previously decommissioned forestry spur road towards the Lillooet River (approximately 25 m). Vegetation on the spur road consisted of saplings and non-merchantable timber. The ditch was excavated in flowing water, through organic and fine erodible material, with the terminus of the newly excavated ditch connected to a side channel of the Lillooet River, which is part of a wetland complex. The wetland complex is identified as a potential Western Toad breeding pond, and has been afforded a 30 m protection buffer which was flagged with yellow flagging tape in the field at the time of the incident. Conditions of the Western Toad Management Plan outline the following:

"If it is not possible to maintain a 30 m buffer around high quality breeding habitat, work within the 30 m will not be conducted during the breeding season (March 1 – August 31) and areas that can be protected will be fenced under the direction of the IEM. All disturbed areas within 150 m protection buffer will be restored promptly, within 14 days of completing all works (see "Onsite Restoration, Revegetation, and Reclamation")."

Construction of the ditch at 21 KM has created an erodible pathway that will continue to convey sediment laden water to the Lillooet River side channel and wetland complex until repair works are completed. The excavation of a new channel and ditch line was done without a formalized plan, consideration of applicable wildlife constraints, appropriate water management, supervision of the CE environmental team, communication of a plan to the IEM, notification of the start of works, or supervision of the IEM, without a machine containing bio-oil, and without notification to the primary road maintainer (Squamish Mills). Once identified, further works in the area were suspended as of end of shift February 15, 2016 and this issue was communicated to the Owner and CE by the IEM.

Upon initial review of the area and completed drainage works, it was the opinion of the IEM that further repair work is required to stabilize that ditch line and prevent continued fording of water flowing across the FSR road surface leading to continued generation of sediment laden water. Completing repairs as soon as possible should be performed to prevent continued conveyance of sediment laden water to the Lillooet River side channel and potential Western Toad breeding habitat.

In accordance with the Road Use Permit, the Project and primary road maintainer (Squamish Mills) have entered into a Road Use Agreement. Under this Agreement Squamish Mills (according to the understanding of the IEM) has the primary right to perform any and all maintenance work required on the Lillooet River FSR between 0 KM – 47 KM. Once Squamish Mills was advised of the situation on February 16, 2016, an onsite meeting was arranged for the following morning between Squamish Mills, a Registered Professional Forester (John Howe), potential sub-contractor (Brock Whitaker),

Innergex representative (Josh Zandbergen), and the IEM (Tom Hicks) to review what would be needed to repair the drainage issue and protect wildlife values to the satisfaction of the IEM. During the meeting it was identified that CE completed work outside of the 37.5m FSR maintenance right of way (ROW), and therefore further discussions were needed before Squamish Mills could proceed with the repair work. During the site meeting it was also discussed that the earliest repair work could begin would be Monday, February 22, 2016.

During a secondary review of the permitting conditions and wildlife constraints applicable to the area (which occurred on February 17, 2016) the IEM discovered that the area was also within Moose Winter Range Forage Management Zone UWR U-2-005 J55/54-204-RE. Construction activities in this area are not permitted from November 1 - May 15 to avoid impacts to Moose during the winter period. Once this wildlife constraint was discovered the IEM determined that the work completed by CE was in contravention of timing restrictions outlined in the Human-Wildlife Interaction Management Plan, and therefore in contravention of the EAC. As a result, the work completed by CE is considered an Environmental Incident, and this report has been prepared.

Recommendations:

To achieve the goals of the Surface Water Quality Protection Plan and mitigate the continual erosion and transport of sediment laden water along the ditch line and newly excavated channel outside of the FSR maintenance ROW, the IEM recommends that the following repairs be performed as soon as possible:

1. Rock armouring of the newly excavated channel from the FSR to the confluence with the Lillooet River side channel and wetland complex. The rock armouring size, quantity and installation should be specified by a QP, to ensure erosion protection from road drainage and potential backwatering in to the newly excavated channel during elevated river conditions.
2. A culvert, sized by a QP should be installed, with the outlet installed at the start of the newly excavated channel.
3. As this drainage path is expected to remain into the future, the road side ditch should be armoured to ensure long term function and erosion protection.
4. All work to armour the channel and install the culvert must be performed in the absence of flowing water. Work site isolation and pumping to vegetation will be required to protect water quality.

In addition to recommendations to repair the area post impact outlined above, and according to conditions of the General Wildlife Measures exemption associated with UWR u-2-005 J55/54-204-RE, a planting prescription should be prepared by a QP that fulfils the following:

5. Temporarily disturbed areas away from road verges (outside of the FSR ROW) should be replanted with at least 50% native forage species for moose (*e.g.* red-osier dogwood, willow sp.).

When the ditch excavation was originally discovered by the IEM, the issue was not considered as an Environmental Incident for the following reasons:

1. The work was completed outside of the sensitive Western Toad breeding period (March 1- August 31); therefore, the impacts to Western toad habitat is considered of low-moderate severity and the occurrence had a low chance of being repeated.
2. Works in the vicinity of the drainage were originally necessary as turbid runoff was constantly being generated by vehicle traffic and conveyed from the running surface towards the potential Western Toad breeding pond.
3. Work to armor the ditch line and prevent further erosion would be completed by Squamish Mills (the primary road-use permit holder) with recommendations from the IEM to protect the adjacent habitat values, and under the advice/direction of a Registered Professional Forester.
4. The work would be completed prior to the Western Toad breeding season and before the end of the western toad hibernation period, (prior to March 1).

The IEM is of the opinion that immediate repairs to the ditch line are required to protect downstream water quality and western toad habitat values despite the wildlife timing restriction associated with the Moose Winter Range Forage Management Zone UWR U-2-005 J55/54-204-RE being currently applicable.

To repair/restore the area following the Environmental Incident, the IEM recommends that works be completed prior to March 1, 2016 in an effort protect the Western Toad breeding areas that are currently at risk of being affected by the transport and deposition of sediment from the FSR alignment and the unarmoured ditch line.

To mitigate potential impacts to the Moose Winter Range Forage Management Zone, the IEM recommends the following mitigation measures be employed during the repair works:

1. Fulltime IEM monitoring of the works to ensure moose are not occupying the work area or 200 m buffer surrounding the work area.
2. If a moose is observed within 200 m of the work area, all equipment and works must be halted until the moose has left the area.
3. Vehicle traffic associated with the repair work within the Moose Winter Range Forage Management Zone, must adhere to a 40km/h speed limit to prevent vehicular collisions.
4. The work must be coordinated and completed within the shortest amount of time possible and should be continuous once started.
5. Work should be completed during daylight hours only to minimize impacts to moose from construction noise and additional light that would be generated during a typically quiet period.

Cause of the Environmental Incident:

The IEM recognizes that CE was attempting to address the drainage concerns highlighted by the IEM by completing the work at 21KM quickly; however, as the critical planning phase of this work was omitted, conditions of the EAC, CEMP (including EPPs), and Road Use Agreement were violated.

CE did not adequately review the wildlife constraints applicable to the area, nor did they respect measures outlined in the Surface Water Quality Protection Plan. As outlined in the Surface Water Quality Protection Plan it is the Contractor's responsibility to:

- Identify activities and problem areas that have the potential to affect surface water quality before, during and after construction.
- Develop site-specific work plans to mitigate potential sources of sediment due to erosion issues and construction activities.
- Implement erosion and sediment control (ESC) mitigation measures as required.
- Undertake construction methods that adhere to the CEMP, BMPs, EPPs and applicable permits and legislation.
- Notify the IEM of potential or suspected water quality exceedances in real time and correcting instances of non-compliance immediately following initial identification.

These responsibilities were not followed which ultimately led to the Environmental Incident.

Photo documentation:



Photo 1. Water continues to flow across the Lillooet River FSR. February 17, 2016



Photo 2. Water crossing the road is conveyed downstream in a new ditch line excavated parallel to the FSR. February 17, 2016



Photo 3. Water flowing along the road side ditch turns a corner here and heads towards the Lillooet River in this newly excavated channel. This channel is composed of highly erodible material that requires armouring to be protected from erosion. February 17, 2016



Photo 4. Looking back toward the Lillooet River FSR from the terminus of the newly excavated channel. February 17, 2016



Photo 5 – Looking upstream at the confluence of the new channel and Lillooet River side channel. February 17, 2016



Photo 6 – Looking downstream at the confluence of the new channel and Lillooet River side channel. February 17, 2016