

Upper Lillooet Hydro Project

Weekly Environmental Monitoring Report #7

Reporting Period: October 27th – November 2nd, 2013

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)

*Environmental Assessment Certificate No.E13-01 (Amendment 1)
Licence of Occupation (Upper Lillooet River HEF #232384) File No. 2409871*

Licence of Occupation (Boulder Creek HEF #232386) File No. 2409998

Licence of Occupation (Transmission Line #2423386) File No. 2410654

Occupant Licence to Cut (FSR realignment) No. L49717

DFO Letter of Advice File No. 09-HPAC-PA2-00303

Occupant Licence to Cut (TX Line S.1-S5, Heli Pads) No. L49697 (Amendment 1)

General Wildlife Measure Exemption Approval Letter (Tx Line) File No. 78700-35/06 UWR and 39585-20 WHA

Section 57 Authorization (hiking trail construction) File No. 16660-20

Road Use Permit No. 6123-13-02

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ACRONYMS:

BCWQG	British Columbia Water Quality Guidelines
BDRHEF	Boulder Creek Hydroelectric Facility
BG	Background
BKL	BKL Consultants Ltd.
CRT-EBC	CRT-EBC Construction Inc.
DFO	Fisheries and Oceans Canada
DS	Downstream
Ecofish	Ecofish Research Ltd.
Ecologic	Ecologic Consulting
ESC	Erosion and Sediment Control
FSR	Forest Service Road
GWR	Mountain Goat Winter Range
Hedberg	Hedberg and Associates Ltd.
IEM	Independent Environmental Monitor
Innergex	Innergex Renewable Energy Inc.
ITM	Issue Tracking Matrix
LTC	Leave to Construct
MFLNRO	Ministry of Forests, Lands and Natural Resource Operations
MOE	Ministry of Environment
RVMA	Riparian Vegetation Management Area
SES	Sartori Environmental Services
TX Line	Transmission Line
ULRHEF	Upper Lillooet River Hydroelectric Facility
UWR	Ungulate Winter Range
WQ	Water Quality
WEL	Westpark Electric Ltd.
WEMR	Weekly Environmental Monitoring Report

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:

Day	Date	IEM Team Personnel	Weather Conditions	Monitoring Locations & Key Environmental Information
Sunday	Oct. 27	-	-	-
Monday	Oct. 28	TH	Sun	<p>Lillooet River FSR Realignment at Truckwash Creek</p> <ul style="list-style-type: none"> • Drilling and blasting at the west heading excavation. • Bulk excavation along east heading. <p>TX Line – Segment 1-5</p> <ul style="list-style-type: none"> • No activities. <p>Truckwash Creek Trail</p> <ul style="list-style-type: none"> • Trail construction is complete to the east bank of Truckwash Creek.
Tuesday	Oct. 29	ML	Sun and cloud	<p>Lillooet River FSR Realignment at Truckwash Creek</p> <ul style="list-style-type: none"> • Drilling and blasting at the west heading excavation. • Bulk excavation along east heading. <p>TX Line – Segment 2, 5</p> <ul style="list-style-type: none"> • Hand falling (Poles 23-24, 37.5-40). • Buncher clearing (Poles 134.5 – 138.5).
Wednesday	Oct. 30	TH	Sun and cloud	<p>Lillooet River FSR Realignment at Truckwash Creek</p> <ul style="list-style-type: none"> • Drilling and blasting at the west heading excavation. • Bulk excavation along east heading. • Removal of undercut stump on left bank of Truckwash Creek. • Installation of noise monitoring equipment within the Ungulate Migration Corridor at interface between UWRs (UL 11, UL 19) and construction activities. <p>TX Line – Segment 2&5</p> <ul style="list-style-type: none"> • Buncher clearing (Poles 134-129). • Hand falling (Poles 50-52).
Thursday	Oct. 31	DA, KR, SS, VD, TH	Periods of rain	<p>Lillooet River FSR Realignment at Truckwash Creek</p> <ul style="list-style-type: none"> • Drilling and blasting at the west heading excavation. • Bulk excavation along east heading. • Goat Monitoring at MG-OBS01, MG-OBS02 and MG-OBS03. <p>TX Line – Segment 2&5</p> <ul style="list-style-type: none"> • Hand falling (Poles 52, 57-59). • Buncher clearing (Poles 129-126).
Friday	Nov. 1	AA, KR, VD, TH	Rain	<p>Lillooet River FSR Realignment at Truckwash Creek</p> <ul style="list-style-type: none"> • Drilling and blasting at the west heading excavation. • Bulk excavation along east heading. • Goat Monitoring at MG-OBS01, MG-OBS02 and MG-OBS03. <p>TX Line – Segment 2</p> <ul style="list-style-type: none"> • Hand falling (Poles 37.5-40).

Day	Date	IEM Team Personnel	Weather Conditions	Monitoring Locations & Key Environmental Information
Saturday	Nov 2	KR, VD, TH	Mix of rain and snow	<p>Lillooet River FSR Realignment at Truckwash Creek</p> <ul style="list-style-type: none"> • Drilling and blasting at the west heading excavation. • Bulk excavation along east heading. • Goat Monitoring at MG-OBS01, MG-OBS02 and MG-OBS03. <p>TX Line – Segment 2</p> <ul style="list-style-type: none"> • No activities.

IEM Team Personnel: AA – Anthony Andrews; DA – Danita Abraham; KR – Kirstie Rendall; ML – Mackenzie Lee; SS – Stephen Sims; TH – Tom Hicks; VD – Vanessa Dan

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.
Oct. 30	Onsite training session	BKL, SES	<ul style="list-style-type: none"> • Acoustic monitoring equipment use training. • Acoustic monitoring station installation. • Data collection protocol. 	N/A
	Pre-activities meeting	CRT-EBC, Whittaker, SES	<ul style="list-style-type: none"> • Stump removal procedure. 	N/A
Oct. 27 – Nov. 2	Email updates	WEL, SES	<ul style="list-style-type: none"> • Daily communication of upcoming clearing activities. 	N/A
Nov.1	Site Meeting	CRT-EBC, SES	<ul style="list-style-type: none"> • Confirmed adherence to daily shutdown requirements. • Blasting mitigations. 	N/A

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 Concern	Construction/Timing Restrictions & Mitigations
ULRHEF	Lillooet River FSR realignment at Truckwash Creek	<i>Grizzly Bear Class 1 suitable fall forage habitat – ULL-GB05 (Class 1 Summer & Fall)</i>	<i>IEM was onsite to oversee clearing and blasting activities within 500m of verified Class 1 Grizzly Bear forage habitat to ensure clearing boundaries were minimized and appropriate noise mitigation measures were implemented.</i>
	Lillooet River FSR realignment at Truckwash Creek	<i>Mountain Goat Winter Range Habitat (UL 11, UL 19 and Migration Corridor)</i>	<p><i>IEM was onsite to oversee daily construction equipment shutdowns beginning one hour before and two hours after sunrise as well as two hours before and one hour after sunset.</i></p> <p><i>Noise monitoring equipment was installed to monitor background noise levels and exceedances of the 75dbA noise level maximum resulting from blasting activities. Initial data will be analyzed during the following reporting period and, if required, adaptive drilling/blasting noise mitigation strategies will be implemented.</i></p> <p><i>Daily snow depth monitoring has commenced within the Truckwash Creek Migration Corridor according to the Project’s Mountain Goat Management Plan. A two week shutdown of work activities will occur once a significant snowfall is recorded (average snow depth of 10cm in forested habitat or 30cm in open terrain).</i></p> <p><i>Mountain Goat monitoring activities commenced on October 31st, at three established observation stations (MG-OBS01, MG-OBS02 & MG-OBS03). Stations are established to monitor three Mountain Goat critical winter habitats (UL 11, UL 19, and Migration Corridor), and each station was visited for a minimum of two hours daily on a rotating schedule.</i></p>

TX Line	Segment 5 Poles (131.5 -132.5, 133.5 – 135)	<i>Legally designated OGMAs</i>	<i>IEM was onsite to oversee clearing activities within legally designated OGMAs to ensure clearing boundaries were minimized.</i>
	Segment 4	<i>Grizzly Bear Class 1 and/or Class 2 suitable forage habitat. Specifically:</i> <ul style="list-style-type: none"> • <i>ULH-GB11(Class 1 Early & Late Spring, Class 2 Summer & Fall)</i> • <i>ULH-GB12 (Class 2 Late Spring, Summer & Fall)</i> 	<i>IEM was onsite to oversee clearing activities within 500m of verified Class 1 and Class 2 Grizzly Bear forage habitat to ensure clearing boundaries were minimized.</i>
	Segment 4 & 5	<i>150m Wetland Buffer</i>	<i>IEM was onsite to oversee clearing activities within 150m of wetland habitats and ensure clearing boundaries were minimized.</i>

4.0 Upper Lillooet River Hydroelectric Facility

4.1 Monitoring Results

4.1.1 Lillooet River FSR Realignment at Truckwash Creek

Construction Activities

- Continued drilling, blasting, clearing, bulk excavation and road base construction on west side of Truckwash Creek for the FSR realignment. The top switchback alignment was cleared and grubbed to the clearing limits during this reporting period.
- Construction at the east heading included clearing and grubbing, bulk excavation and road base construction. Work on the first two switchbacks was the focus of this week's activities at the east heading.
- Removal of a large stump overhanging Truckwash Creek was attempted at the east bridge abutment location of Truckwash Creek FSR realignment (within 500m of ULL-GB05) on October 30th, 2013.

Environmental Summary:

- IEM was onsite periodically throughout this reporting period to oversee general construction activities (including grubbing) and full-time during clearing in Grizzly Bear Class 1 suitable summer and fall forage habitat (ULL-GB05). Clearing limits were minimized.
- Acoustic noise monitoring equipment was installed on October 30th, 2013, above and below the west heading of the Truckwash Creek realignment work area. The upper and lower station locations were chosen in coordination with Ecofish and Ecologic Mountain Goat specialists. Acoustic monitoring of blasting activities began

November 1st to document adherence to blasting noise level restrictions within 500m of the Mountain Goat UWR (specifically UL-11) and within the migration corridor. Blast mats were used as the primary noise reduction mitigation for all blasts beginning November 1st, 2013 ([Photo 1](#)). The data recorded after November 1st, 2013 is currently being analysed by BKL (noise monitoring consultants) and results of the data analysis will be provided in the following reporting period.

- On October 30th, an onsite pre-activity meeting was held with the CRT-EBC supervisor, excavator operator and the IEM to discuss the procedure for removing the large stump overhanging Truckwash Creek at the east bridge abutment location. Water quality concerns and equipment operation within the riparian area were discussed. As planned, the operator attempted to remove the stump by grasping the stump with the thumb and bucket of the excavator. While attempting the operation the stump and roots were found to be in a state of advanced decay, and when the roots broke away the excavator was unable to grasp the stump, and it slid down into Truckwash Creek below high water mark (11:19am; [Photo 2](#)). A temporary pulse of sediment was observed and a water quality sample within Truckwash Creek was taken as soon as possible following the event. Water quality was taken at 11:29am the turbidity was found to be within BCWQG (see [Water Quality Results](#)). Removal of the stump from within Truckwash Creek is not recommended at this time as removal would generate significant amounts of turbid water (as it would need to be dragged up the left bank), and the stump is likely to break apart if attempts are made to remove it.

Photos:



Photo 1. Blast mats used during blasts within 500m of Grizzly Bear Class 1 habitat (suitable summer and fall forage; ULL-GB05) and with 500m of Mountain Goat UWR (UL11) at the west heading of the Truckwash Creek FSR realignment (Nov 1, 2013).



Photo 2. Accidental release of stump into Truckwash Creek (Oct. 30, 2013).

Water Quality Results

Date	Time	Sample Location Description	pH	Turbidity (NTU)	Temperature (°C)
Oct 30	11:29	Truckwash Creek - immediately downstream of accidental input of decaying stump	-	6.38	-

4.1.2 Truckwash Creek Trail Construction

Construction Activities

- Crews completed trail construction to the left bank abutment of the footbridge to be installed over Truckwash Creek. Upgrades to rocky sections and steeper sections were completed during this reporting period.

Environmental Summary:

- No environmental concerns were noted.

Photos:

- No photos were taken during this reporting period.

Water Quality Results

Date	Time	Sample Location Description	pH	Turbidity (NTU)	Temperature (°C)
No WQ measurements were recorded during this reporting period. Trail construction activities had no visual effect on WQ.					

4.2 Recommendations

The following recommendations are provided for this reporting period:

- Based on recent monitoring results, the IEM recommends continued implementation of current blast mitigation measures (maximum 10-hole sets and use of minimum required charges) with the addition of blast mats for all remaining blasting activities within 500m of ULL-GB05 and within 500m of the Mountain Goat UWR (specifically UL-11) or within the migration corridor.
- Develop and implement an ESC winterization plan to ensure that the site is stabilized prior to the winter shutdown. The winterization plan should include the following;
 - culvert inlet armouring finalization at the 1600mm culvert located along east alignment (armouring to be completed in the dry);
 - removal of woody debris within the channel upstream of the 1600mm culvert;
 - formalization and armouring of ditch lines;
 - cross ditching across steep road grades;
 - slope protection and perimeter controls around spoil areas and fill slopes; and

- road capping in areas where final grades have been achieved.

4.3 Upcoming Works

The realignment of the Lillooet River FSR and Truckwash Creek Bridge Crossing work is scheduled to continue for the next 1 - 2 weeks. Work will continue on both the east and west headings of the alignment during the next reporting period. Blasting at the west heading and continued bulk excavation of the switchbacks at the east heading are expected to occur next week.

Truckwash Creek Trail construction will resume in the Spring within the installation of a footbridge over Truckwash Creek.

5.0 Transmission Line

5.1 Monitoring Results

5.1.1 Segment 1, 2, 4, and 5 Clearing (Poles 23 – 24, 37.5 – 40, 50 – 52, 57 – 59, and 126 – 138.5)

Clearing Activities

- Feller buncher clearing activities began in Segment 5 during this reporting period (Poles 126 – 138.5) ([Photo 3](#)).
- Hand falling was completed in the following areas;
 - Poles 23 – 24; 37.5 – 40; 50 – 52; and 57 – 59.
- No activities occurred within RVMAs during this reporting period.

Environmental Summary:

- IEM was onsite to ensure clearing boundaries were minimized for all clearing works within wildlife timing restriction areas as identified in Section **3.0**. No environmental concerns were noted.
- Gaps were made in the visual barrier fencing installed to protect the adjacent wetland areas along the Lillooet River FSR ([Photo 4](#)). The IEM has verified that all currently required 30m wetland barrier fencing is installed according to the CEMP commitments.
- No ESC or WQ issues were observed throughout the active works areas.

Photos:



Photo 3. Monitoring of feller buncher clearing within legally designated OGMA near North Creek (Pole 135). Equipment did not enter or clear within the North Creek RVMA during clearing works (Oct. 29, 2013).



Photo 4. Gaps installed in the visual barrier fencing installed to protect the adjacent wetland areas along the Lillooet River FSR (Oct. 31, 2013).

Water Quality Results

Date	Time	Sample Location Description	pH	Turbidity (NTU)	Temperature (°C)
No WQ measurements were recorded during this reporting period. Clearing activities had no visual effect on WQ.					

5.2 Recommendations

No recommendations are provided for transmission line activities during this reporting period.

5.3 Upcoming Works

Transmission line clearing work is currently on hold in Segments 4 and 5 due to construction restrictions related to UWR habitats. No temporary or permanent access road construction or transmission line infrastructure construction will occur as part of the currently scheduled clearing activities. The burning of slash piles will commence once appropriate venting is forecast.

6.0 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) and will be submitted to the IEM on a weekly basis. Wildlife Observation forms will be summarized on a monthly basis and appended to the first WEMR of the following month. 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

*Please refer to the attached Wildlife Observation Form for a summary of **October 2013** wildlife sightings.*

6.1 Mountain Goat Monitoring Program

As of November 1st, the IEM initiated a Mountain Goat Monitoring program. The IEM or designate was on site to monitor Mountain Goat activity within 500 m of clearing/construction activities at the ULR HEF downstream tunnel portal. Mountain Goats will be observed from three 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).

Monitoring effort will be split between all three sites between sunrise and sunset, unless safety concerns precluding from doing so. The order of site visits will rotate daily. Construction activities will cease if a goat(s) are observed moving towards the migration corridor at MG-OBS01 and/or if a goat(s) are observed within a 500m line of site of a construction activity, and/or moving towards the migration corridor from MG-OBS03 or other location.

Please refer to the attached Mountain Goat Monitoring Daily Observation Forms for a summary of observations from this reporting period.

7.0 Environmental Issues Tracking Matrix (ITM)

7.1 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 Completion Date	Date Completed
<i>No outstanding environmental issues.</i>							

7.2 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 Completion Date	Date Completed
<i>No outstanding environmental issues.</i>							

MOUNTAIN GOAT DAILY OBSERVATION FORM

UPPER LILLOOET HYDRO PROJECT



Goat Monitor's Name(s): Kirstie Rendall, Vanessa Dan

Date (YYYY-MM-DD): 2013-11-02

106-185 forester street, north vancouver, bc v7h 2m9
office tel 987.5588 fax 987.7740

Weather (cloud cover, precipitation and temperature): Overcast w. fog / light showers & snow / 3

Please submit **Mountain Goat Daily Observation Form** in person to a representative of Sartori Environmental Services (**Tom Hicks** or **Stephen Sims**) or by email to steve@sartorienv.com following each day of monitoring.

Mountain Goat Observation Site	UWR/Migration Corridor - Location	UTM Coordinates <i>(approximate center of observation area)</i>	Daily Start Time <i>(24hr clock)</i>	Daily End Time <i>(24hr clock)</i>
MG - OBS01	Migration Corridor - East side of Truckwash Creek	10U 467898 5612845	8h37	10h30
MG - OBS02	UWR u-2-002 UL 11 - Keyhole Falls	10U 466760 5613967	13h10	14h57
MG - OBS03	UWR u-2-002 UL 19 - Garibaldi Pumice	10U 469155 5614960	10h50	12h40

Daily form #	1	of	1
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If more space is needed in the below table, please fill out additional daily forms and indicate total number of forms above.

Observation Site <i>(indicate if location other than OBS sites)</i>	Time <i>(use 24hr clock)</i>	UTM Coordinates or Waypoint <i>(10U)</i>	Species Observed <i>(indicate Mountain Goat or other species)</i>	Observations <i>(Be specific - visual, tracks, other sign)</i>	# of Animals	Age <i>(if known)</i>	Sex <i>(if known)</i>	Description of Activities <i>(feeding, moving, etc.)</i>	Comments <i>(habitat, snow conditions, etc.)</i>	Photos #
MG-OBS01									No observations	24 - 26
MG-OBS03	11h24		Mule Deer	Fresh tracks	1			On pumice road across from parking pullout; Moving SE	Light layer of snow	30-32
MG-OBS03									No goat observations	27 - 29
MG-OBS02									No observations	33 - 35
FSR @ 32-33 Km	15h40		Mule Deer	Visual	1			Moving quickly south	No snow/rain	None