# Upper Lillooet Hydro Project

## Weekly Environmental Monitoring Report #41

### Reporting Period: September 28 – October 4, 2014

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)

| Distribution List | | Prepared By |
|---|---|---|
| **Name** | **Organization** | |
| Murray Manson | Fisheries and Oceans Canada |  **J. Alex Sartori, RPBio** *Independent Environmental Monitor (IEM)*  **J. Stephen Sims, RPBio** *Delegated IEM* |
| James Davies | MFLNRO – Water Allocation | |
| Danielle Cunningham | MFLNRO – Land and Resources | |
| Frank DeGagne | MFLNRO – Land and Resources | |
| Nathan Braun | BC Environmental Assessment Office | |
| George Steeves | True North Energy – Independent Engineer | |
| Jennifer McCash | True North Energy – Independent Engineer | |
| Thomas Hicks | Sartori Environmental Services | |
| Peter Ramsden | Innergex Renewable Energy Inc. | |
| Oliver Robson | Innergex Renewable Energy Inc. | |
| Greg Davis | Innergex Renewable Energy Inc. | |
| Julia Mancinelli | Innergex Renewable Energy Inc. | |
| Liz Scroggins | Innergex Renewable Energy Inc. | |
| Bas Brusche | Innergex Renewable Energy Inc. | |
| Matt Kennedy | Innergex Renewable Energy Inc. | |
| Renaud DeBatz | Innergex Renewable Energy Inc. | |
| Richard Blanchet | Innergex Renewable Energy Inc. | |
| Claude Denault | CRT-ebc Construction Inc. | |
| Jonathan Drapeau | CRT-ebc Construction Inc. | |
| Éric Ayotte | CRT-ebc Construction Inc. | |
| Jordan Gagne | CRT-ebc Construction Inc. | |
| Ian McKeachie | CRT-ebc Construction Inc. | |
| D'Arcy Soutar | Westpark Electric Ltd. | |
| Pontus Lindgren | Westpark Electric Ltd. | **Date Prepared:** October 28, 2014 |
| Harriet VanWart | Lil'wat Nation | **Date Submitted:** October 30, 2014 |

sartori environmental services

*106-185 forester street, north vancouver, bc v7h 2m9 tel 987.5588 fax 987.7740 email info@sartorienv.com*

## Owner Construction Permits and Approvals

*Environmental Assessment Certificate No. E13-01 (Amendment 1, 2, 3 & 4)*
*Fisheries Act Subsection 35(2)(b) Authorization No. 09-HPAC-PA2-000303 (Amendment 1)*
*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 Amendments 1, 2, 3, 4, 5) No. L49717*
*Occupant Licence to Cut (BDRHEF – KM 38 laydown) No. L49698*
*Occupant Licence to Cut (BDRHEF Amendments 1, 2, 3) No. L49816*
*Occupant Licence to Cut (TX Line Amendment 1, 2, 3, 4, 5) No. L49697*
*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. 8200-2013-500102-01*
*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*
*Works Permit for Construction within FSR Right-of-Way No. 6123-14-01*
*Section 52(1)(b) FRPA Authorization for Ryan River Wet Crossing File No. FOR-19400-01/2014*

## Contractor Construction Permits and Approvals

*Magazine Licence File No. UL76018*
*Section 8 Approval – Short Term Use of Water File (Lillooet River and Tributaries) No. A2006123 (Amendment 1)*
*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*
*Wildlife Act Permits – Pacific Tailed Frog Salvage Permit # SU14-95304 & SU13-90538, Fish Salvage Permit # SU14-95329*
*Section 52 of the Fisheries (General) Regulations – Fish Salvage Licence # XR 139 2014*
*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*

## ACRONYMS:

| | | | |
|---|---|---|---|
| **AMBNS** | Active Migratory Bird Nesting Survey | **IEM** | Independent Environmental Monitor |
| **ASMP** | Archaeological Sites Management Plan | **INX** | Innergex Renewable Energy Inc. |
| **ARD/ML** | Acid Rock Drainage and Metal Leaching | **ISW** | Instream Works |
| **BCEAO** | British Columbia Environmental Assessment Office | **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 |
| **BG** | Background | **MFLNRO** | Ministry of Forests, Lands and Natural Resource Operations |
| **BKL** | BKL Consultants Ltd. | **MOE** | Ministry of Environment |
| **CE** | CRT-ebc Construction Inc. | **NCD** | Non Classified Drainage |
| **DFO** | Fisheries and Oceans Canada | **OLTC** | Occupational License to Cut |
| **DS** | Downstream | **PAG** | Potentially Acid Generating |
| **Ecofish** | Ecofish Research Ltd. | **RoW** | Right of Way |
| **Ecologic** | Ecologic Consulting | **RVMA** | Riparian Vegetation Management Area |
| **EDI** | Environmental Dynamics Inc. | **SES** | Sartori Environmental Services |
| **EIR** | Environmental Incident Report | **TX Line** | Transmission Line |
| **ESC** | Erosion and Sediment Control | **ULRHEF** | Upper Lillooet River Hydroelectric Facility |
| **FAM** | Field Advice Memorandum | **UWR** | Ungulate Winter Range |
| **FSR** | Forest Service Road | **VC** | Valued Component |
| **GWR** | Mountain Goat Winter Range | **WQ** | Water Quality |
| **Hedberg** | Hedberg and Associates Ltd. | **WEL** | Westpark Electric Ltd. |
| **IE** | Independent Engineer (True North Energy) | **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:

| Date | IEM Team Personnel (on-site) | Weather Conditions | Key Monitoring Locations |
|---|---|---|---|
| Sunday, September 28 | BA, AS, VD | Partly cloudy | ***ULRHEF Intake Diversion Channel – South Side***<br>• Grouting of Obermeyer weir anchors continued<br>• Continued dewatering of Obermeyer works area<br>***ULRHEF Intake Open Cut – North Side***<br>• Bulk excavation (including drilling and blasting) continued below elevation 666m<br>***ULRHEF Downstream Tunnel Portal***<br>• Drilling, blasting and stabilization of the tunnel<br>• Seepage from tunnel pumped from sump at portal entrance into settling ponds<br>***ULRHEF Powerhouse***<br>• Continued dewatering of excavation to settling ponds<br>• Continued rebar installation and formwork<br>***BDRHEF Intake Access Road & Crane Pad***<br>• Continued access road construction<br>• Continued excavation and drilling/blasting on top level of crane pad<br>***BDRHEF Downstream Tunnel Portal***<br>• Drilling, blasting and tunnel stabilization<br>• Seepage from tunnel pumped from sump at portal entrance into settling ponds<br>***BDRHEF Powerhouse***<br>• Continued rebar installation and formwork<br>***TX-Line***<br>• **Segment 3**<br>➢ Helicopter pole placement throughout segment<br>➢ Ground works (including blasting) at structure 47<br>• **Segment 4**<br>➢ Helicopter pole placement throughout segment<br>• **Segment 5**<br>➢ Helicopter pole placement throughout segment<br>➢ Ground works at structures 84 and 119<br>• **Segment 6**<br>➢ Heli-yarding in segment 6<br>➢ Ground works at structure 143/144<br>• **Segment 7**<br>➢ Ground works – excavator working between structures 161 and 167 |
| Monday, September 29 | BA, AS, DA, AA | Periods of rain | ***ULRHEF Intake Diversion Channel – South Side***<br>• Continued dewatering of Obermeyer works area<br>• Concrete works – Obermeyer weir mud slab pour<br>***ULRHEF Intake Open Cut – North Side***<br>• Bulk excavation (including drilling and blasting) continued below elevation 666m<br>***ULRHEF Downstream Tunnel Portal***<br>• Drilling, blasting and stabilization of the tunnel<br>• Seepage from tunnel pumped from sump at portal entrance into settling ponds.<br>***ULRHEF Penstock***<br>• Clearing of penstock alignment commenced<br>***ULRHEF Powerhouse***<br>• Continued dewatering of excavation to settling ponds |

| Date | IEM Team Personnel (on-site) | Weather Conditions | Key Monitoring Locations |
|---|---|---|---|
| | | | • Rebar installation and formworks continued<br>***BDRHEF Intake Access Road & Crane Pad***<br>• Continued access road construction included drainage works<br>• Continued excavation and drilling/blasting on top level of crane pad<br>***BDRHEF Downstream Tunnel Portal***<br>• Drilling, blasting and tunnel stabilization<br>• Seepage from tunnel pumped from sump at portal entrance into settling ponds<br>***BDRHEF Powerhouse***<br>• Continued rebar installation and formwork<br>***TX-Line***<br>• **Segment 3**<br>➢ Helicopter pole placement throughout segment<br>➢ Ground works (including blasting) at structure 47<br>• **Segment 5**<br>➢ Ground works at structure 84<br>➢ Grinder working in the vicinity of structure 80<br>➢ Helicopter pole placement throughout segment<br>• **Segment 6**<br>➢ RVMA clearing on south bank of Lillooet River Tx line crossing<br>➢ Ground works at structure 144<br>• **Segment 7**<br>➢ RVMA clearing<br>➢ Ground works – excavator working between structures 161 and 167<br>• **Segment 9**<br>➢ Road upgrades (including brushing) commenced along the Salmon Main FSR and Zorro Road<br>• **Segment 14**<br>➢ Drilling and hauling of ballast along road 343.1 near structure 349 |
| Tuesday, September 30 | BA, AS, AA, VD | Sun and cloud | ***ULRHEF Intake Diversion Channel – South Side***<br>• Continued dewatering of Obermeyer works area<br>• Rebar installation and formworks following mud slab pour<br>***ULRHEF Intake Open Cut – North Side***<br>• Bulk excavation (including drilling and blasting) continued below elevation 666m<br>***ULRHEF Downstream Tunnel Portal***<br>• Drilling, blasting and stabilization of the tunnel<br>• Seepage from tunnel pumped from sump at portal entrance into settling ponds.<br>***ULRHEF Penstock***<br>• Clearing continued along penstock alignment<br>• CTF salvage efforts within 30m of watercourse ULL-ASTR04<br>• Timber was decked roadside on pad near km 42.5 of the Lillooet River FSR<br>***ULRHEF Powerhouse***<br>• Continued dewatering of excavation to settling ponds<br>• Rebar installation and formworks continued<br>***BDRHEF Intake Access Road & Crane Pad***<br>• Continued access road construction<br>• Continued excavation and drilling/blasting on top level of crane pad<br>***BDRHEF Downstream Tunnel Portal***<br>• Drilling, blasting and tunnel stabilization<br>• Seepage from tunnel pumped from sump at portal entrance into settling ponds<br>***BDRHEF Powerhouse***<br>• Continued rebar installation and formwork |

| Date | IEM Team Personnel (on-site) | Weather Conditions | Key Monitoring Locations |
|---|---|---|---|
| | | | ***TX-Line***<br>• **Segment 5**<br>  ➢ Ground works at structures 107 and 119<br>  ➢ Helicopter pole placement at structures 84 and 99-107<br>• **Segment 6**<br>  ➢ RVMA clearing on south bank of Lillooet River Tx line crossing<br>  ➢ Ground works at structure 143<br>• **Segment 7**<br>  ➢ Continued RVMA clearing<br>  ➢ Ground works – excavator working at structures 162<br>• **Segment 9**<br>  ➢ Road upgrades (including brushing) continued along the Salmon Main FSR and Zorro Road<br>• **Segment 14**<br>  ➢ Log yarding along road 343.1<br>  ➢ Drilling and hauling of ballast for construction of road 371.1 |
| Wednesday, October 1 | BA, AS, DA, VD | Overcast | ***ULRHEF Intake Diversion Channel – South Side***<br>• Continued dewatering of Obermeyer works area<br>• Rebar installation and formworks<br>***ULRHEF Intake Open Cut – North Side***<br>• Bulk excavation (including drilling and blasting) continued below elevation 666m<br>***ULRHEF Downstream Tunnel Portal***<br>• Drilling, blasting and stabilization of the tunnel<br>• Seepage from tunnel pumped from sump at portal entrance into settling ponds.<br>***ULRHEF Penstock***<br>• Clearing continued along penstock alignment<br>• Timber was decked roadside on pad near km 42.5 of the Lillooet River FSR<br>***ULRHEF Powerhouse***<br>• Continued dewatering of excavation to settling ponds<br>• Rebar installation and formworks continued<br>***BDRHEF Intake Access Road & Crane Pad***<br>• Continued access road construction<br>• Continued excavation and drilling/blasting on top level of crane pad<br>***BDRHEF Downstream Tunnel Portal***<br>• Drilling, blasting and tunnel stabilization<br>• Seepage from tunnel pumped from sump at portal entrance into settling ponds<br>***BDRHEF Powerhouse***<br>• Continued rebar installation and formwork<br>***TX-Line***<br>• **Segment 2**<br>  ➢ Conductor clipping at structures 15-28<br>• **Segment 4**<br>  ➢ Grinder working between KM 31 to 33<br>• **Segment 5**<br>  ➢ Machine works at structure 119<br>• **Segment 6**<br>  ➢ Ground works at structure 143 and 144<br>• **Segment 7**<br>  ➢ Machine works between structure 162-167<br>• **Segment 8**<br>  ➢ Works commenced for the construction of the permanent bridge crossing over Black Creek<br>• **Segment 9** |

| Date | IEM Team Personnel (on-site) | Weather Conditions | Key Monitoring Locations |
|---|---|---|---|
| | | | ➢ Road upgrades (including brushing) continued along the Salmon Main FSR and Zorro Road<br>• **Segment 14**<br>➢ Brushing and RoW clearing along Branch F in the vicinity of structure 335<br>➢ Drilling and hauling of ballast for construction of road 371.1 |
| Thursday, October 2 | TH, MF, KM, TJ, DA | Sun and cloud | ***ULRHEF Intake Diversion Channel – South Side***<br>• Continued dewatering of Obermeyer works area<br>• Rebar installation and formworks<br>***ULRHEF Intake Open Cut – North Side***<br>• Bulk excavation (including drilling and blasting) continued below elevation 666m<br>***ULRHEF Downstream Tunnel Portal***<br>• Drilling, blasting and stabilization of the tunnel<br>• Seepage from tunnel pumped from sump at portal entrance into settling ponds.<br>***ULRHEF Penstock***<br>• Clearing continued along penstock alignment<br>• Timber was decked roadside on pad near km 42.5 of the Lillooet River FSR<br>***ULRHEF Powerhouse***<br>• Continued dewatering of excavation to settling ponds<br>• Rebar installation and formworks continued<br>**BDRHEF Intake Access Road & Crane Pad**<br>• Continued access road construction<br>• Continued excavation and drilling/blasting on top level of crane pad<br>***BDRHEF Downstream Tunnel Portal***<br>• Drilling, blasting and tunnel stabilization<br>• Seepage from tunnel pumped from sump at portal entrance into settling ponds<br>***BDRHEF Powerhouse***<br>• Continued rebar installation and formwork<br>***TX-Line***<br>• **Segment 3**<br>➢ Hand fallers clearing snags above KM 33 of the Lillooet River FSR<br>• **Segment 4**<br>➢ Grinder working between KM 29.5-31<br>• **Segment 6**<br>➢ Continued heli-yarding<br>➢ Ground works at structure 143 and 156<br>• **Segment 8**<br>➢ Construction works continued for the permanent bridge crossing over Black Creek<br>• **Segment 9**<br>➢ Road upgrades (including brushing) continued along the Salmon Main FSR and Zorro Road<br>• **Segment 14**<br>➢ Continued road upgrades along Branch F and road 371.1 |
| Friday, October 3 | MF, KM, DA | Overcast | ***ULRHEF Intake Diversion Channel – South Side***<br>• Continued dewatering of Obermeyer works area<br>• Rebar installation and formworks<br>***ULRHEF Intake Open Cut – North Side***<br>• Bulk excavation (including drilling and blasting) continued below elevation 666m<br>***ULRHEF Downstream Tunnel Portal***<br>• Drilling, blasting and stabilization of the tunnel<br>• Seepage from tunnel pumped from sump at portal entrance into |

| Date | IEM Team Personnel (on-site) | Weather Conditions | Key Monitoring Locations |
|---|---|---|---|
| | | | settling ponds.<br>***ULRHEF Penstock***<br>• Clearing continued along penstock alignment<br>• Timber was decked roadside on pad near km 42.5 of the Lillooet River FSR<br>***ULRHEF Powerhouse***<br>• Continued dewatering of excavation to settling ponds<br>• Rebar installation and formworks continued<br>***BDRHEF Intake Access Road & Crane Pad***<br>• Continued access road construction<br>• Continued excavation and drilling/blasting on top level of crane pad<br>• Installation of mesh fencing above crane pad for slope stabilization<br>***BDRHEF Downstream Tunnel Portal***<br>• Drilling, blasting and tunnel stabilization<br>• Seepage from tunnel pumped from sump at portal entrance into settling ponds<br>***BDRHEF Powerhouse***<br>• Continued rebar installation and formwork<br>***TX-Line***<br>• **Segment 4**<br>➢ Grinder working near KM 30<br>• **Segment 6**<br>➢ Continued heli-yarding<br>➢ Ground works at structure 143 and 156<br>• **Segment 8**<br>➢ Construction works continued for the permanent bridge crossing over Black Creek<br>• **Segment 9**<br>➢ Continued heli-yarding<br>➢ Road upgrades (including brushing) continued along the Salmon Main FSR and Zorro Road<br>• **Segment 14**<br>➢ Continued road upgrades along Branch F and road 371.1<br>➢ RVMA clearing/topping on the south side of Pemberton Creek |
| Saturday, October 4 | MF, KM, AA, VD | Sun and cloud | ***ULRHEF Intake Diversion Channel – South Side***<br>• Continued dewatering of Obermeyer works area<br>• Rebar installation and formworks<br>***ULRHEF Intake Open Cut – North Side***<br>• Bulk excavation (including drilling and blasting) continued below elevation 666m<br>***ULRHEF Downstream Tunnel Portal***<br>• Drilling, blasting and stabilization of the tunnel<br>• Seepage from tunnel pumped from sump at portal entrance into settling ponds.<br>***ULRHEF Penstock***<br>• Clearing continued along penstock alignment<br>• Timber was decked roadside on pad near km 42.5 of the Lillooet River FSR<br>***ULRHEF Powerhouse***<br>• Continued dewatering of excavation to settling ponds<br>• Rebar installation and formworks continued<br>• Concrete works – Structure pour (235m$^3$)<br>***BDRHEF Intake Access Road & Crane Pad***<br>• Continued access road construction<br>• Continued excavation and drilling/blasting on top level of crane pad<br>• Continued installation of mesh fencing above crane pad for slope |

| Date | IEM Team Personnel (on-site) | Weather Conditions | Key Monitoring Locations |
|---|---|---|---|
| | | | stabilization<br>***BDRHEF Downstream Tunnel Portal***<br>• Drilling, blasting and tunnel stabilization<br>• Seepage from tunnel pumped from sump at portal entrance into settling ponds<br>***BDRHEF Powerhouse***<br>• Continued rebar installation and formwork<br>***Tx-Line***<br>• **Segment 4**<br>➢ Grinder working near KM 30<br>• **Segment 6**<br>➢ Ground works at structure 143 and 156<br>• **Segment 8**<br>➢ Construction works continued for the permanent bridge crossing over Black Creek<br>• **Segment 9**<br>➢ Continued heli-yarding<br>➢ Road upgrades (including brushing) continued along the Salmon Main FSR and Zorro Road<br>• **Segment 14**<br>➢ Continued road upgrades along Branch F and road 371.1 |

***IEM Team Personnel:*** *TH – Tom Hicks; MF – Matt Fuller; KM – Kathy Mai; AS – Anne Sutherland; BA – Blake Aleksich; VD – Vanessa Dan; AA – Anthony Andrews; DA – Danita Abraham; TJ – Tammie Jenkins*

# 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. |
|---|---|---|---|---|
| September 28 | *email* | CE, SES | SES was notified by CE of an oil spill inside the ULRHEF downstream tunnel portal that had contaminated the treatment system (settling ponds) due to a non-functioning oil/water separator. Further information is provided in the *Environmental Summary* component of Section 4.2. | - |
| September 29 | *Field Advice Memo (via email)* | SES, CE, INX | *FAM04* was prepared and provided to CE to highlight onsite areas where ESC measures need to be installed to maintain compliance with the Project CEMP and EPP's. *FAM04* identifies ESC issues at the ULRHEF intake (north and south sides), ULRHEF downstream portal access road, ULRHEF powerhouse, Lillooet River FSR at KM 42.75, BDRHEF intake access road, BDRHEF downstream tunnel portal and the construction camp access road. For specifics, please refer to attached *FAM04*. | - |
| | *email* | CE, SES, INX | ULRHEF downstream portal access road drainage – Issues discussed included road ditching culvert/cross ditch locations, rock capping and curlex log installation. | - |
| | *email* | Ecofish, WEL, INX, SES | Managing ULH_GB33 Class 1 fall forage habitat in Segment 8 – Following discussions between Ecofish and MFLNRO it was determined that conditional approval to complete road building and transmission line clearing above the South Lillooet FSR and east of the WHA after September 30 would be issued provided works were consolidated over several consecutive days and completed prior to October 15. | - |
| September 29 & 30 | *pre-work meeting* | CE, INX, SES | Following IEM/INX review and approval ULRHEF Penstock Clearing Work Plan, a pre-work meeting was held on consecutive mornings (with different subcontractors) to discuss clearing activities, timber decking and environmental constraints/restrictions. It was communicated that no grubbing or bulk excavation was permitted prior to issuance of LTC. | - |
| September 30 & October 1 | *emails* | CE, SES, INX | *FAM04* – CE issued a series of email responses in reply to the FAM issued by SES on September 29. Proposed action items to address ESC concerns and a schedule for completion have been added to the ITM as *ULR#20*. | *ULR#20* |
| October 1 | *pre-work meeting* | WEL, Mumleqs, SES, INX | Following review and approval of ULHP Black Creek Work Plan a pre-work meeting was held on-site to discuss the construction activities, proposed mitigations, Hold Points and environmental sensitive features. It was noted that works will only commence once LTC is issued. | - |
| | *LTC (via email)* | INX, WEL, SES, JEM | LTC for the installation of the permanent bridge over Black Creek was provided to WEL prior to the start of construction activities (as indicated in the row above). | - |
| | *conference call* | CE, Ecofish, INX, | Conference call regarding fish window extension | - |

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| | | SES | application for ULRHEF intake diversion – Issues discussed included diversion methodology, cofferdam construction, environmental mitigations, water quality monitoring and previous diversion experiences. | |
| October 2 | *emails* | INX, MFLNRO, BCEAO, DFO, Lil'wat, CE, Ecofish, SES | ULHP Instream Work Window Extension – A formal request was sent from INX to the regulatory agencies. Package included the contractor's detailed Work Plan '*Upper Lillooet River HEF – Diversion and Cofferdam Construction*', Ecofish's Memorandum '*Upper Lillooet River Hydroelectric Facility Intake – Instream Work Window Extension for Cofferdam Construction*', and a confirmation that the IEM has reviewed the two documents prior to request submission. | - |
| October 3 | *email* | INX, CE, SES | Re. ULRHEF tunnel borehole – INX provided confirmation to CE that following notification of intended work and submission of a Work Plan to MFNLRO, no comments or questions were provided in response and therefore CE may move forward with works by arranging a pre-work meeting to outline the works and address associated drainage/ESC measures. | - |
| October 3 – 4 | *emails & phone call* | CE, SES, INX | Re: Sediment Pond - ULRHEF Intake (North) – Discussion included the location of the proposed settling pond, intended use, requirements to adequately treat and discharge site water in accordance with BCWQG and the likelihood for a more robust treatment system for tunneling activities. Further details are provided in Environmental Summary component of Section 4.1. | - |
| October 4 | *email* | SES, CE, INC | BRDHEF intake, crane pad excavation – An email was sent to the contractor from the IEM indicating that, to extents possible/practical, precautions to avoid rock and other material (blasting mats) falling down the slope have been implemented, however it is requested that the contractor track any fallen material (in particular blasting mats), and ensure recovery as soon as possible. | - |

# 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 |
|---|---|---|---|
| Tx-Line | Segments 1 –11, & 14 | Within 150m of wetlands or 100m of Coastal Tailed-Frog Streams | IEM presence is required when clearing within 150m of wetlands or 100m of Coastal Tailed-Frog Streams, to ensure clearing area is minimized. |
| | | Riparian Vegetation Management Areas (RVMA) | IEM monitoring is required during clearing within RVMAs. |
| | | Old Growth Management Areas (OGMAs) | IEM monitoring is required when clearing within legally designated OGMAs, to ensure clearing area is minimized. |
| | | Ungulate Winter Range (UWR) | IEM monitoring is required when clearing within identified deer and moose UWR, to ensure clearing area is minimized. |
| | | Suitable Class 1 & 2 Grizzly Bear forage habitat | IEM monitoring is required when clearing within identified Class 1 & 2 Grizzly Bear forage habitat, to ensure clearing area is minimized.<br>Blasting mats (or other noise reduction methods) are to be employed within 500m of Class 1 and Class 2 grizzly bear forage habitat during critical seasonal foraging periods (fall, September – October).<br>ULH-GB33 (Class 1 fall forage habitat) – Clearing and construction activities should avoid the fall season to avoid the displacement of bears *(*see Section 6.3 of this report for further information regarding adjusted mitigations*). |
| ULRHEF powerhouse, and Intake diversion channel | Within 50m of identified archeologically significant area | Archaeologically significant site EdRu-3 | The ASMP recommends that an archaeological technician from the Lil'wat Nation be present to monitor initial ground-disturbance activities within 50 m of the EdRu-3 site boundaries. |
| | Within 30m of the Upper Lillooet River | Riparian area and fish bearing streams | IEM presence is required when working within 30m of the Upper Lillooet River. Instream acoustic pressure monitoring required when blasting within 30m of the Upper Lillooet River. |

| | | | |
|---|---|---|---|
| Lillooet River FSR; ULRHEF intake access; FSR realignment at Truckwash Creek | Access roads above the lower limit of the 200m buffer Truckwash Creek Migration Corridor to the ULRHEF intake; including FSR realignment at Truckwash Creek | Mountain Goat UWR | If a goat is observed within 500m 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. |
| BDRHEF intake | Portion of intake access road and crane pad within UWR | Mountain Goat UWR | IEM monitoring is required when clearing within UWR to ensure that clearing areas are minimized.<br>If a goat is observed within 500m of construction operations, construction must cease for at least 48 hours. The IEM must record and submit all goat observations to MFLNRO within 48 hours. |

# 4.0 Upper Lillooet River HEF – Monitoring Results

## *4.1* Intake (North & South Sides) and Access Roads

### *Construction Activities:*

- Bulk excavation (including drilling and blasting) continued at the ULRHEF upstream tunnel portal below elevation 666m throughout this reporting period on the north side (Photo 1 and Photo 2) of the Lillooet River.
- ULRHEF intake diversion channel (south side) activities focused on construction of the Obermeyer Weir. Anchor grouting (Photo 3) was completed at the beginning of this reporting period prior to the mud slab pour (Photo 4) which occurred September 29-30. Following the pour, rebar and formworks (Photo 5) commenced for the weir structure and continued throughout the week.

### *Environmental Summary:*

- Throughout concrete activities (anchor grouting and mud slab pours) at the Obermeyer weir, CE used used a combination of two $CO_2$ injection/static mixer pH treatment systems, dewatering bags and pumping/trucking of alkaline water to an infiltration/wash pit as means to ensure that water directed to the Lillooet River remained within BCWQG. The IEM was onsite full-time to monitor turbidity and pH during grouting and concrete pours, and activities were successfully managed to mitigate the potential for environmental incidents due to alkaline discharge.
- On September 29, the IEM issued *FAM04* to address ESC concerns at the ULRHEF intake. Primary concerns included slope protection and ditch management/installation on the north and south sides of the Upper Lillooet River, and spoil pile stabilization at ULR-SP-01 and ULR-SP-02. *FAM04* is attached to this WEMR and details identified environmental issues, requested outcomes and photodocumentation. In response to the FAM, the contractor provided email

communications to the IEM outlining proposed mitigations and a timeline to complete the ESC measures prior to winter shutdown. Proposed mitigations included comprehensive ditch maintenance and new ditch installation, construction of a sediment pond on the north side of the Upper Lillooet River adjacent to the upstream tunnel portal excavation, curlex sediment log placement on slopes, hydroseeding/engineered fiber matrix application and spoil area winterization. As of the end of this reporting period, the contractor had initiated implementation of ESC mitigations (see Photo 6 to Photo 8). Outstanding issues pertaining to ditch maintenance/installation, slope stabilization and spoil pile winterization at the ULRHEF intake have been included in the Project's ITM as *ULR#20 – open*. The IEM continues to monitor construction activities within 30m of the Lillooet River during day and night shifts.

## *Photos:*

**Photo 1 – Overview of the north side of the ULRHEF intake (September 28, 2014).**

**Photo 2 – ULRHEF north side tunnel portal drilling/blasting for tunnel portal (September 30, 2014).**

**Photo 3 – ULRHEF intake diversion channel, Obermeyer weir anchors (September 28, 2014).**

**Photo 4 – Obermeyer weir mud slab pour, alkaline water was treated with $CO_2$ injection as required system prior to discharge (September 29, 2014).**

**Photo 5 – ULRHEF intake diversion channel, rebar and formworks at Obermeyer weir (October 2, 2104).**

**Photo 6 – Hydroseeding and drainage works near south side spoil area at ULRHEF intake (October 2, 2014).**

**Photo 7 – Ditch lining and armouring of Lillooet River FSR on south side of ULRHEF intake (October 3, 2014).**

**Photo 8 – ULRHEF north side drilling/blasting for tunnel portal bulk excavation and construction of settling pond (October 3, 2014).**

## *4.2* Downstream Tunnel Portal

### *Construction Activities:*

- Drilling, blasting, mucking and stabilization (anchoring and shotcrete application) continued within the tunnel. Seepage water from the tunnel portal was conveyed effectively to the settling ponds for treatment and storage.

### *Environmental Summary:*

- On September 27 a mining scoop working within the ULRHEF downstream spilled hydraulic oil from a failed hose. Due to the nature of tunnel activities and the management of wastewater the oil was conveyed to the water treatment system. The majority of contaminants was captured in the oil/water separator, however due to heavy sediment load and modifications undertaken by the contractor to the separator, a small portion (IEM estimated it to be <5L) of the hydraulic fluid was

allowed to flow into the settling ponds (Photo 9) located adjacent to Truckwash Creek. Although not at reportable threshold volumes and isolated from surface connection (ponds not at capacity) to adjacent watercourses, this spill has been included in the WEMR as it highlights the need to properly maintain water quality treatment systems to their prescribed specifications. CE Environmental Coordinator notified the IEM of the spill as soon as they became aware and the tunnel operators used absorbent pads and booms within the oil/water separator and the settling ponds to adequately clean the spilled hydraulic fluid. All contaminated absorbent material was disposed of in sealed hazardous waste barrels and will be removed offsite in an appropriate manner (Photo 10). The oil/water separator was returned to working specifications and contractor was reminded of the need to continually maintain water quality treatment systems.

- On September 29, the IEM issued *FAM04* (attached) to address ESC concerns at the ULRHEF downstream portal access road regarding road surface run-off and ineffective ditching. Further discussion took place in the field and general recommendations were made by the IEM that included disbursement of flows from within the high-side ditch line via ditch blocks and drainage culverts to convey water during rain events and spring melt to vegetation on the low side of the permanent access road, and road capping. CE implemented a series of mitigations (Photo 11 and Photo 12) during this reporting period and the IEM will continue to monitor the effectiveness.
- The settling ponds installed adjacent to Truckwash Creek were used to treat the seepage and process water emanating from the tunnel. No surface discharge from the sediment ponds was observed this week; therefore no WQ measurements were taken by the IEM.
- Blast rock was hauled to the lower spoil area and managed according to the ULRHEF ARD/ML Monitoring and Control Plan.
- A gravity fed water extraction system was used for drilling activities according to the conditions of the Short Term Water Use Approval (*No.A2006123)*.

*Photos:*

**Photo 9 – ULRHEF downstream portal settling ponds following spill within tunnel, no discharge from ponds (September 28, 2014)**

**Photo 10 – ULRHEF downstream portal settling ponds following cleanup efforts, no visual or olfactory signs of hydrocarbons remained (October 2, 2014).**

**Photo 11 – ULRHEF downstream tunnel portal access road, drainage works included ditch block and culvert installation (October 1, 2014).**

**Photo 12 – French drain installation of ULRHEF downstream tunnel portal access road, woods side (October 1, 2014).**

## *4.3* Penstock

*Construction Activities:*

- Clearing activities (Photo 13) along penstock alignment commenced on September 29 and continued throughout the reporting period. Decking of timber continued near KM 42.5 of the Lillooet River FSR (Photo 14).

*Environmental Summary:*

- Following Penstock Clearing Work Plan approval by the IEM/INX, the contractor held a pre-work meeting prior to commencement of clearing activities on consecutive days (September 29 and 30) to discuss clearing activities, timber decking and

environmental mitigations/restrictions. It was communicated that no grubbing or earthworks was permitted prior to issuance of LTC for those activities.

- The IEM was onsite to monitor clearing activities within 15m of non-CTF watercourses (Photo 15) and 30m of CTF watercourses. No environmental issues were observed.
- On September 30, Ecofish performed a survey/sweep for CTF within 30m of ULL-ASTR04 prior to clearing activities. During the survey/sweep some sediment deposition was noted within the watercourse. The sediment source was determined to be road drainage from the old Lillooet River FSR alignment. Following identification of the source CE repaired the silt fence at the input location and added rock blast to the road to prevent further erosion of the road surface and sediment transport to the creek.

*Photos:*

**Photo 13 – ULRHEF penstock clearing (October 1, 2014).**

**Photo 14 – Yarding and roadside decking at KM 42.5 (October 4, 2014).**


**Photo 15 – Surveyed 15m buffer on Truckwash Creek in preparation for ULRHEF penstock clearing (September 28, 2014).**

## *4.4* Powerhouse & Access Road

*Construction Activities:*

- Rebar installation and form works for the powerhouse foundation continued throughout the reporting period (Photo 16 and Photo 17).
- Two pumps (6" and 10") previously installed in the sump draining seepage waters in the powerhouse excavation continued to convey water to the existing settling ponds. No flowing surface water was observed within the excavation and pump capacity appears to be adequate to maintain isolation from active work areas.

*Environmental Summary:*

- On September 29, the IEM issued *FAM04* (attached) to address ESC concerns relating to slope protection on cut slopes above the ULRHEF powerhouse. In response, CE indicated that the hydroseeding/engineered fiber matrix would be applied following installation of back-power cables. Outstanding issues pertaining to slope protection at the ULRHEF powerhouse have been included in the Project's ITM as *ULR#20 – open*.
- Dewatering of the ULRHEF powerhouse continued without environmental concerns. The IEM will continue to monitor the works area to confirm that future concrete pours are adequately isolated from flowing waters and protected from precipitation during curing.

*Photos:*

**Photo 16 – Current conditions at ULRHEF powerhouse (September 30, 2014).**

**Photo 17 – Continued rebar and formworks at ULRHEF powerhouse (October 3, 2014).**

## *4.5* Water Quality Results

The following table presents the results of the routine water quality sampling program for the ULRHEF. 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 the Lillooet River due to seasonal melt fluctuations and large tributary inputs. In the event that an exceedance of *in-situ* water quality (turbidity 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 (*u*S) | Temp (°C) |
|---|---|---|---|---|---|---|
| **Routine Water Quality** | | | | | | |
| September 30, 2014 | 10:30 | ULR Background – ULRHEF Intake | - | 49.6 | 33 | - |
| | 10:45 | ULR #0.5 – Downstream of ULRHEF intake at Keyhole Bridge | - | 45.4 | 27 | - |
| | 11:10 | ULR #1 – Upstream of ULRHEF Powerhouse | - | 52.2 | 36 | - |
| | 11:30 | ULR #2 – Downstream of ULRHEF Powerhouse between 40.5k and 41k | - | 54.4 | 39 | - |
| | 12:05 | ULR #3 – Lillooet River FSR KM 38 Laydown – D/S of Boulder confluence | - | 52.2 | 33 | - |
| | 12:50 | ULR #4 – Lillooet River FSR 24km – D/S of all works and Meager confluence | - | 55.8 | 46 | - |
| October 4, 2014 | 16:23 | ULR Background – ULRHEF Intake | - | 64.0 | 57 | 8.7 |
| | 16:03 | ULR #0.5 – Downstream of ULRHEF intake at Keyhole Bridge | - | 59.0 | 57 | 8.6 |
| | 15:30 | ULR # 1 – Upstream of ULRHEF Powerhouse | - | 48.0 | 54 | 13.8 |
| | 15:00 | ULR #2 – Downstream of ULRHEF Powerhouse between 40.5k and 41k | - | 52.0 | 54 | 9.8 |
| | 14:23 | ULR #3 – Lillooet River FSR KM 38 Laydown – D/S of Boulder confluence | - | 73.0 | 56 | 11.3 |
| | 13:43 | ULR #4 – Lillooet River FSR 24km – D/S of all works and Meager confluence | - | 82.0 | 66 | 10.2 |

## *4.6* Recommendations

IEM recommendations for the ULRHEF are as follows:

- ULRHEF intake north side bulk excavation – Communications continued in regards to ongoing treatment of potentially sediment laden water when drilling/blasting activities (and subsequent tunnel activities) reach elevations where seepage water entering into the excavation needs to be actively managed (via pump) and treated prior to discharge to the Lillooet River. Following an alteration to the Work Plan pertaining to the location and usage of a sediment pond, the IEM reinforced the importance of adequately treating water to within acceptable BCWQG prior to discharge and recommended that if proposed/implemented treatment could not maintain BCWQG then a more robust system would be required.

- As a follow up to *FAM04*, the IEM recommends addressing ESC concerns specific to the ULRHEF in a timely manner. In addition, the IEM expects that the contractor should take a proactive approach in identifying ESC concerns throughout the Project site. Once areas of concern are identified, contractor's focus should be firstly towards erosion source control (*e.g.,* topsoil placement, hydroseeding, fibre matrix application, armouring, erosion control blankets, slope texturing/recontouring, etc.), and secondly towards sediment (or runoff) control (*e.g.,* cut-off ditches, armoured ditching, slope drains, check dams, sub-surface drains, rolls/wattles, silt fencing, settling ponds, filter bags, etc.).

### *4.7 Upcoming Works*

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

- Bulk excavation at the north side ULRHEF intake open cut below elevation 666m will continue and is expected to come in contact with seepage water. Construction of a proposed settling pond is to be completed during the next reporting period.
- Concrete works ULRHEF intake Obermeyer weir will continue for the structure foundation and walls.
- Grubbing and bulk excavation to commence along the ULRHEF penstock alignment following completion of clearing and issuance of the LTC.

## 5.0 Boulder Creek Hydroelectric Facility – Monitoring Results

### *5.1 Intake Access Road & Crane Pad*

*Construction Activities:*

- Sequences of drilling, small controlled blasts, and blast rock excavation proceeded on the top bench of the crane pad throughout the reporting period (Photo 18). Care was taken to prevent material from escaping down the slope adjacent to the excavation. Wire meshing was installed on slopes above the crane pad for slope stabilization (Photo 19).
- Intake access road construction continued. Works included the installation of high-side ditching (Photo 20) and drainage culverts.

*Environmental Summary:*

- On September 29, the IEM issued *FAM04* (attached) to address ESC concerns relating to slope protection on newly contoured slopes below the BDRHEF intake access road. In response, CE indicated that the hydroseeding/engineered fiber matrix will be applied following road sign-off by Hedberg. Outstanding issues pertaining to slope protection along the BDRHEF intake access road have been included in the Project's ITM as *ULR#20 – open*.

- On October 3, it was observed that a blasting mat had fallen down the embankment of Boulder Creek during blasting activities at the BDRHEF intake crane pad excavation. The IEM understands that all practical measures are being taken to mitigate the potential for material to enter Boulder Creek, and communicated to the contractor the expectation that lost material (including blasting mats) should be tracked and once the crane is installed and access is feasible, be removed to the extents possible.
- Construction activities occurred along the BDRHEF intake access road and crane pad with the IEM onsite for construction activities within 30m of Boulder Creek. No environmental issues were observed.

*Photos:*

**Photo 18 – BDRHEF crane pad excavation and drilling/blasting at top level of crane pad (September 28, 2014).**

**Photo 19 – BDRHEF crane pad wire mesh installation for slope stabilization (October 2, 2014).**

**Photo 20 – BDRHEF Intake access road construction including ditching (September 30, 2014).**

## 5.2 Downstream Tunnel Portal and Powerhouse

### Construction Activities:

- Rebar installation and formworks (Photo 21) at the powerhouse continued throughout the reporting period.
- Drilling, blasting, mucking and stabilization (anchoring and shotcrete application) continued within the tunnel.

### Environmental Summary:

- On September 29, the IEM issued *FAM04* (attached) to address ESC concerns relating to slope protection on slopes above the BDRHEF downstream tunnel portal. Hydro-seeding had been previously applied but had generally been unsuccessful to date. CE applied additional hydroseed during this reporting period and the IEM will continue to monitor germination and slope protection effectiveness in the coming reporting periods.
- The gravity fed water diversion system was used in tunneling and shotcrete process works in accordance with Short Term Water Use Approval (*No.A2006123).* No WQ or environmental concerns were noted within Boulder Creek.
- Seepage flowing out of the tunnel continues to be collected at the portal tunnel entrance in a sump and this water is then pumped from the sump to the oil/water separator, pH adjustment holding tank, and settlement ponds for treatment. No discharge from the treatment ponds occurred during this reporting period; therefore, the IEM did not collect WQ results. The first pond is now completely full of sediment, second pond is at full capacity and the third pond has started to fill (Photo 22). The maintenance of these ponds is pending the results of confirmatory samples taken to determine whether the sediment (mostly rock fines from the tunnel drilling activities) should be treated as PAG or non-PAG, as discussed with CE's Environmental Coordinator.
- Water from the Boulder Creek water withdrawal site authorized in the Short Term Water Use Approval (*No.A2006123)* was used effectively for dust suppression above KM 37.5 of the Lillooet River FSR and on active construction site access roads.

*Photos:*

**Photo 21 – Current conditions at BDRHEF powerhouse, continued rebar/formworks (September 30, 2014).**

**Photo 22 – BDRHEF powerhouse settling pond, no discharge observed; however pond #1 remains full of sediment and requires maintenance. (September 30, 2014).**

## *5.3 Water Quality Results*

The following table presents the results of the routine water quality 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* water quality (turbidity 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 (*u*S) | Temp (°C) |
|---|---|---|---|---|---|---|
| **Routine Water Quality** | | | | | | |
| NA | NA | BDR Background – Upstream of BDRHEF intake *not currently accessible* | - | - | - | - |
| NA | NA | BDR #1 – Downstream of BDRHEF intake *not currently accessible* | - | - | - | - |
| September 30, 2014 | 11:50 | BDR #2 – Upstream of BDRHEF Powerhouse | - | 32.7 | 34 | - |
| | 12:10 | BDR #3 – Downstream of BDRHEF Powerhouse at Pebble Creek Bridge | - | 30.5 | 30 | - |
| October 4 2014 | 14:48 | BDR #2 – Upstream of BDRHEF Powerhouse | - | 60.1 | 46 | 11.0 |
| | 14:38 | BDR #3 – Downstream of BDRHEF Powerhouse at Pebble Creek Bridge | - | 45.0 | 45 | 11.4 |

### 5.4 Recommendations

IEM recommendations for the BDRHEF are as follows:

- As a follow up to *FAM04*, the IEM recommends addressing ESC concerns specific to the BDRHEF in a timely manner. In addition, the IEM expects that the contractor should take a proactive approach in identifying ESC concerns throughout the Project site. Once areas of concern are identified, contractor's focus should be firstly towards erosion source control (*e.g.,* topsoil placement, hydroseeding, fibre matrix application, armouring, erosion control blankets, slope texturing/recontouring, etc.), and secondly towards sediment (or runoff) control (*e.g.,* cut-off ditches, armoured ditching, slope drains, check dams, sub-surface drains, rolls/wattles, silt fencing, settling ponds, filter bags, etc.).
- Settling ponds at the downstream portal should be continually monitored to ensure appropriate treatment of seepage from tunnelling activities is occurring. With rain forecast for the upcoming reporting period, increased water volumes in the form of increased infiltration rates within the tunnel excavation may result in discharge from the ponds. The maintenance of the ponds was discussed with CE's Environmental Coordinator and it was agreed that confirmatory samples would be taken to characterize whether the sediment/slurry (mostly rock fines from the tunnel drilling activities) should be treated as PAG or non-PAG. Results are expected in the next reporting period.

### 5.5 Upcoming Works

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

- Construction is scheduled to continue on the intake access road and crane pad which extends within the 30m Boulder Creek riparian buffer and UWR.

## 6.0 Transmission Line – Monitoring Results

### 6.1 Transmission Line Construction Activities

*Right-of-Way Clearing:*

- Hand fallers clearing snags above KM 33 of the Lillooet River FSR.
- RVMA clearing occurred in Segment 6 (south bank of Lillooet River), Segment 7 (Photo 23), and Segment 14 (south side of Pemberton Creek – Photo 24).
- Helicopter yarding occurred in Segment 6 and 9.
- Brushing and clearing of Branch F.
- A grinder continued processing slash in Segment 4 from KM 29.5 – 33 on the Lillooet River FSR.

*Existing Road Upgrades and Access Road Construction*

- Transmission line access road upgrades/construction (including brushing, ballasting and drilling/blasting where necessary) were conducted in Segment 9 (along Salmon Main FSR and Zorro Road) and Segment 14 (road 343.1 and 371.1).
- Construction of the permanent bridge over Black Creek in Segment 8 commenced during this reporting period with abutment excavation and installation, as well as geotextile/rip-rap placement (Photo 25 and Photo 26).

### *Transmission Line Pole Installation, Line Stringing and Clipping*

- Foundation construction (ground works including blasting and use of heavy machinery) was conducted in Segments 3 and 5 – 7.
- Helicopter pole placement was conducted throughout Segments 3 – 5.

### *Environmental Summary:*

- Construction activities for the installation of the permanent bridge over Black Creek were monitored fulltime during the reporting period. The installation did not involve any instream works and no fording of machinery was required. Water quality remained visually unaffected throughout the work activities and no environmental concerns were noted.
- The IEM was present as required when clearing activities occurred within 150m of wetlands, 15m RVMAs (30m for CTF streams), 100m of Coastal Tailed Frog Streams, Class 1 & 2 suitable Grizzly Bear WHA and/or suitable forage habitat, moose and deer UWR, and within legally designated Old Growth Management Areas (OGMAs). All flagged boundaries were respected during clearing activities. No environmental issues were observed.

### *Photos:*

**Photo 23 – Segment 7 RVMA clearing (September 30, 2014).**

**Photo 24 – Segment 14 RVMA clearing (October 3, 2014).**

**Photo 25 – Segment 8, Black Creek looking upstream from temporary bridge crossing to permanent location during pre-work meeting (October 1, 2014).**

**Photo 26 – Segment 8, construction of Black Creek permanent bridge (October 4, 2014).**

## 6.2 Water Quality Results

| Date | Time | Sample Location Description | pH | Turbidity (NTU) | Temperature (°C) |
|---|---|---|---|---|---|
| No WQ measurements were recorded at active Tx-line work areas during this reporting period. Construction and clearing activities had no visual effect on WQ. | | | | | |

## 6.3 Recommendations

IEM recommendations for the Tx Line are as follows:

- Following extended discussions between WEL, INX, Ecofish, IEM and subsequently MFLNRO pertaining to the management of ULH-GB33 Class 1 fall forage habitat, it was determined that construction activities in Segment 8 could proceed within the construction restriction window of September 2 – October 31 as indicated in the Human-Bear Conflict Management Plan provided road building and transmission line clearing/installation is completed by October 15, and are consolidated to consecutive construction days. Rational behind the alteration to Project mitigations were rationalized as in the opinion of Project's QP (Ecofish), and through discussions with MFLNRO Ecosystem Biologist, "*bears are currently not food limited and the area does not represent critical limited foraging habitat. Further, the berry production was good this year. In addition, in good years, bears have more capacity to be able to take advantage of other foraging habitats. Nevertheless, it was agreed that works should be completed as soon as possible, to better avoid disturbing grizzly bears foraging on coho salmon in Rohb Creek and South Creek. Based on baseline surveys, coho are present from October 15th and peak spawning occurs in early December*". It is recommended by the IEM that construction activities occur as per the adjusted mitigation measures.

### *6.4 Upcoming Works*

The following new and/or environmentally sensitive construction activities are scheduled to occur along the Tx line in the upcoming reporting period(s):

- Construction of the permanent Black Creek Bridge in Segment 8 will be completed during the following reporting period with sensitive works including deck placement and grouting.
- Road upgrades will continue in Segment 9 on the Salmon Main FSR and Zorro Road. Upgrades are expected to require culvert installations and IEM presence will be required.

## 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) and will 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 |

## 8.0 Mountain Goat Monitoring Program

Mountain Goat Monitoring has been temporarily suspended until the fall monitoring period as outlined in the Mountain Goat Management Plan.

No Mountain Goats were observed within 500m line of sight of construction activities during this reporting period; therefore 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#17*** | **Open** | BDR Intake Access Road | Damage to standing timber and impacts outside of minimized clearing boundary & approved OLTC limit (both within and adjacent to UWR) | 1. Prepare and submit EIR#011 outlining the root cause of the incident and how it will be avoided in future. | July 25, 2014 | July 30, 2014 | *August 1, 2014* |
| | | | | 2. Assess damage to standing timber and impacts outside of the minimized clearing boundaries and approved OLTC (both within and adjacent to UWR). Preliminary information has been provided to satisfy the requirements of *ULR#18*, however detailed survey is necessary to confirm impacted areas and access is currently not available due to slope stability issues. | Confirmed in Hedberg report July 25, 2014 | October 17, 2014 | - |
| ***ULR#20*** | **Open** | Various location at ULRHEF, BDRHEF and along the Lillooet FSR | ***FAM04*** (attached) was issued to the contractor to address ESC concerns at HEF component sites | **1. ULRHEF Intake (north and south sides)**<br>a. Ditch installation/maintenance<br>b. Slope protection<br>c. Spoil area winterization<br>**2. ULRHEF Powerhouse**<br>a. Slope protection<br>**3. BDRHEF Intake Access Road**<br>**a.** Slope protection | September 29, 2014 | October 17, 2014 | - |
| | | | | | | | *next ITM – ULR#20* |

## 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 Issue Closed |
| *No outstanding environmental issues (next ITM – Tx#2)* | | | | | | | |

# FIELD ADVICE MEMO (FAM)

| | | | |
|---|---|---|---|
| **Project:** | Upper Lillooet Hydro Project | **FAM Number:** *(yyyy-mm-dd_FAM##)* | 2014-26-2014_FAM#4 |
| **FAM Author:** | Tom Hicks, Lead Monitor<br>Sartori Environmental Services | **Date of FAM Issuance:** | September 29, 2014 |
| **Distribution List:** *(Name - Company)* | To: Jordan Gagne & Ian McKeachie - CRT-ebc<br>CC: Julia Mancinelli - Innergex, Stephen Sims - Sartori Environmental Services | | |
| **Environmental Incident Reports (EIR):** *(If applicable)* | This FAM is not associated with an environmental incident.<br><br>The ESC concerns presented will be tracked in the Weekly Environmental Monitoring Report, and will be updated as the recommend works are completed. | | |

## Identified Environmental Issue(s):

Following a site review during rain events on September 23rd, 24th, and 25th, the IEM has found that there are multiple areas that require ESC improvements. This FAM has been prepared to outline the main areas of concern and to highlight potential problem areas before they become a significant issue resulting in erosion damage to final slopes and the downstream transportation of sediment to receiving waters. CRT-ebc is responsible for developing site specific ESC plans and executing the required installations. In summary, the IEM has found that there are three main categories of ESC installation measures that CRT-ebc should plan to install and maintain to ensure continued adherence to the Erosion Prevention and Sediment Control Plan, the Surface Water Quality Protection Plan, and the Ditch Management Plan.

1. Slope Protection:
The installation of slope protection measures has been recommended in the Weekly Environmental Reports for some time and the timing for the installation and application of these measures is now, prior the onset of high rainfall events that are common during the fall months in this Region. There are many high angle slopes with lengthy unbroken runs that are at risk of eroding once the rainy season begins. Hydro-seeding has been applied to some of these slopes with marginal success to date. There is significant risk that these slopes will develop rills and gully erosion and will need to be re-contoured. In particular slopes at the ULRHEF intake on the North side, the ULRHEF and BDRHEF portal cut slopes, the ULRHEF powerhouse cut slopes, and the recently completed slopes along the BDRHEF intake access road are at risk and are showing signs of erosion after the first few rain events of the season. Should hydro-seeding be chosen as the preferred slope protection measure it is recommended that a BFM (bonded fiber matrix) or FGM (flexible growth medium) product be applied because of their high tensile strength, erosion protection and seed/root protection. The installation of permeable slope interceptors on contour lines, perpendicular to the slope is recommended to slow water velocities and prevent the formation of rills.

2. Ditch Management and Installation
The following site access roads require ditch installation (and check dams in areas of steeper access roads) to collect and convey surface runoff and prevent erosion of the running surface:
- All access roads at the ULRHEF intake (north and south side) should be reviewed to ensure ditches are installed and that check dams are placed to ensure sediments drop out prior to reaching receiving waters.
- ULRHEF downstream tunnel portal access road - installed ditching is not effectively conveying runoff. The access road should be graded to ensure water flows into the ditch line and not along the road surface. Also the ditching should be designed to convey water away from the tunnel portal excavation and should have check dams installed to help protect water quality.
- Camp Access road - there is currently no ditching installed along the camp access road and surface water runoff has eroded the running surface and resulted in the transportation of sediment down slope.

3. Spoil Pile Stabilization
Spoil piles at the ULRHEF intake require slope protection and perimeter drainage installation as their height and catchment size puts them at risk of eroding. As these spoil areas are nearing maximum capacity, the final contour of these spoil areas should be developed while considering the goals of long term erosion protection and their ability to support plant growth.

Photos of the identified areas of concern are provided in the following pages. Recommendations for each area are provided within the photo captions.

## Requested Outcome(s)

To maintain adherence to the Surface Water Quality Protection Plan the Contractor is responsible for developing plans that mitigate potential sediment sources, for identifying problem areas, and for implementing mitigations measures to protect surface water quality. The IEM considers the current areas described above to present a erosion risks that will require future repair if not adequately addressed in near future. Some of these erosion prone area also present a risk to surface water quality through the mobilization and downstream transportation of sediment. The IEM expects that the Contractor will develop ESC plans and execute them prior to the next high rainfall event to mitigation the risk of erosion and reduce the opportunity for sediment input to receiving waters.

It is requested that CRT-ebc provide a response to this FAM by end of day Wednesday October 1st, 2014 confirming the intended compliance with the above requested outcomes and indicating the expected date for completion of the action items. Information contained within this FAM and CRT-ebc's response will be updated in the environmental Issue Tracking Matrix (ITM) included in the Project's Weekly Environmental Monitoring Report. Once completed these ITMs will be marked as complete and removed from the matrix.

# PHOTOS: AREAS REQUIRING EROSION AND SEDIMENT CONTROL

Photo 1. South side access road surface runoff causing erosion must be mitigated. Ditching and check dam installation in recommended.

Photo 2. North side upstream portal access road surface runoff causing erosion must be mitigated. Ditching and check dam installation in recommended.

Photo 3. Rilling and gully erosion forming on the north side/upstream portal excavation cut slopes. The installation of velocity dissipation slope breaks to slow surface runoff or the application of a hydro-mulch better suited to the slopes (BFM or FGM) is recommended. Ditches should be cleaned and check dams installed/maintained as required. Erosion of the ditch line is not currently achieving intended ESC goals.

Photo 4. The south spoil area at the ULRHEF intake requires material consolidation, erosion protection and drainage installation to prevent further erosion and the generation of sediment laden runoff. Recommend coutouring to final design slopes, capping final slopes with organic material and hydro-seeding as a temporary ESC protection measure (with slope appropriate mulch type), until the final reclamation prescription is presented and approved.

Photo 5. The north spoil area at the ULRHEF intake requires material consolidation, erosion protection and drainage installation to prevent further erosion and the generation of sediment laden runoff. Recommend coutouring to final design slopes, capping final slopes with organic material and hydro-seeding as a temporary ESC protection measure (with slope appropriate mulch type), until the final reclamation prescription is presented and approved.

Photo 6. Rilling and gully erosion forming on the north side/upstream portal excavation cut slopes. The installation of velocity dissipation slope breaks to slow surface runoff or the application of a hydro-mulch better suited to the slopes (BFM or FGM) is recommended. Ditches should be cleaned and check dams installed/maintained as required. Erosion of the ditch line is not currently achieving intended ESC goals.

Photo 7. Ditches are not collecting and transporting road runoff as intended due to the road grading along the lower ULRHEF tunnel portal access road. Regrading of the road surface is recommended to direct runoff to the road side ditch and check dam installation is recommended to slow water velocities along the steep sections and permit sediments to drop out of suspension in the ditch line.

Photo 8. . Ditches are not collecting and transporting road runoff as intended due to the road grading along the lower ULRHEF tunnel portal access road. Regrading of the road surface is recommended to direct runoff to the road side ditch and check dam installation is recommended to slow water velocities along the steep sections and permit sediments to drop out of suspension in the ditch line.

Photo 9. Gully erosion forming where road runoff flows over the edge of the slope into the ULRHEF lower portal work area. Directing road runoff away from this slope and installating slope protection to prevent further erosion is recommened.

Photo 10. The ULRHEF lower tunnel portal access road drainage discharges directly to Truckwash Creek. Ditch improvements and road grading is required to protect surface water quality.

Photo 11. Ditch improvement, road grading to direct surface runoff to the ditch line, and slope erosion protection (to prevent further ril erosion) is recommended at the start of the Truckwash Creek FSR realignment (~42.75 km).

Photo 12. Newly contoured/completed slopes along the BDRHEF intake access road required erosion protection (example 1)

Photo 13. Newly contoured/completed slopes along the BDRHEF intake access road required erosion protection (example 2)

Photo 14. Newly contoured/completed slopes along the BDRHEF intake access road required erosion protection (example 3)

Photo 15. Slope stabilization measures required at the BDRHEF lower tunnel portal where hydro-seeding has been unsuccessful.

Photo 16. Road grading and ditch installation along the length of the camp access road/pebble main (~1.25km) is required to direct and convey road surface runoff to prevent further erosion. Check dams installation is recommended in stepper sections to prevent ditch line erosion and permit sediments to drop out of suspension.

Photo 17. Slope stabilization measures required at the ULRHEF powerhouse cut slopes to protect against erosion. Recommendations include the application of hydro-seed with appropriate mulch product (BFM or FGM) for the upper (final slopes) and covering temporary slopes (below powerhouse backfill elevation) with poly-sheeting.

Photo 18. Slope stabilization measures required at the ULRHEF powerhouse cut slopes to protect against erosion. Recommendations include the application of hydro-seed with appropriate mulch product (BFM or FGM) for the upper (final slopes) and covering temporary slopes (below powerhouse backfill elevation) with poly-sheeting.

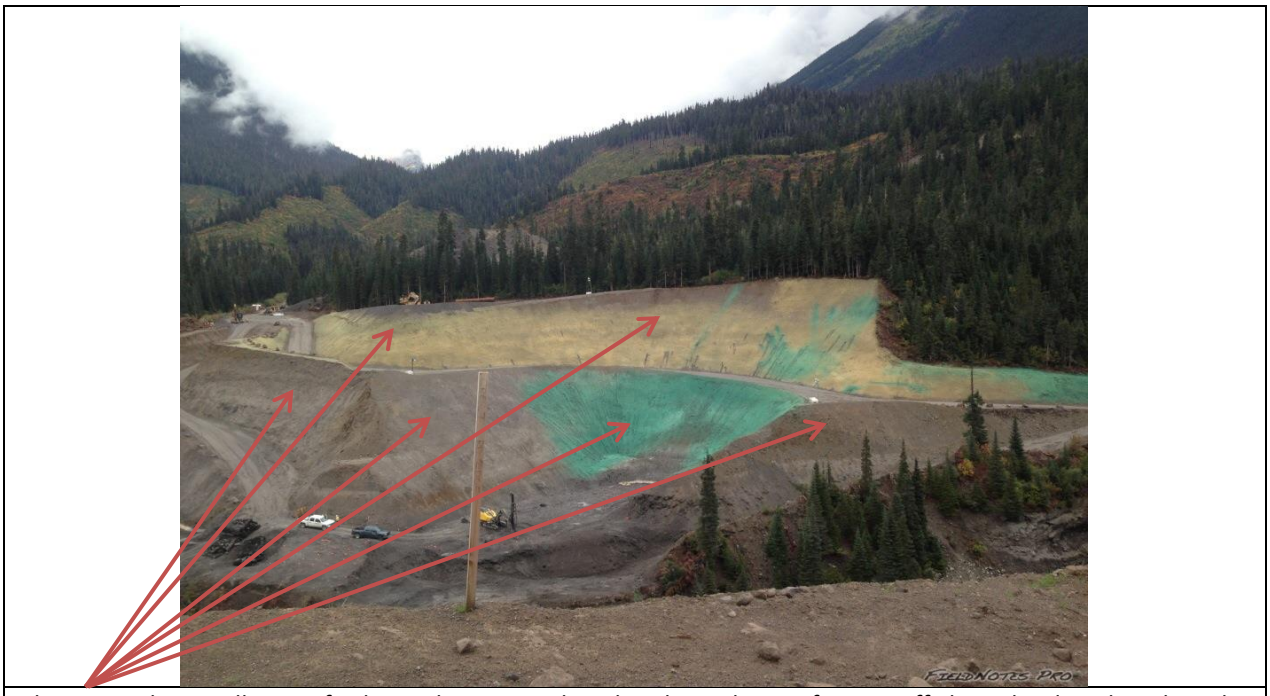

Photo 19. The installation of velocity dissipation slope breaks to slow surface runoff along the slope length or the application of a hydro-mulch better suited to the slopes (BFM or FGM) is recommended.

# Upper Lillooet Hydro Project - Wildlife Observation Form (September 2014)

| Required Data | | | | | | Optional Data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Date | Time | Observer (Company) | Species or Description | Location | Comments | Sex | Number | Activity* | Photos |
| 9/3/2014 | 8:30:00 AM | Kyle Maitland | Cougar | km 41.5 Lillooet FSR | | | 1 | TF | No |
| 9/5/2014 | 3:10:00 PM | Angel Orejas | Bald Eagle | over camp | | | 1 | TF | No |
| 9/6/2014 | 2:00:00 PM | Angel Orejas | Black Bear | km 34 Lillooet FSR | | | 1 | FL | No |
| 9/8/2014 | 7:00:00 PM | Jordan Gagné | Black Bear | km 39.5 Lillooet FSR | | | 1 | TF | No |
| 9/10/2014 | 12:15:00 PM | Shea Irving (WEL) | Mountain Goat | km 30.5 Lillooet FSR | No visible horns. Travelled across | | 1 | TF | Yes (tracks) |
| 9/8/2014 | 12:00:00 PM | Pontus Lindgren (WEL) | Pacific Sideband | Segment 8, near structures 186 | | | 2 | TF | Yes |
| 9/9/2014 | 4:45:00 PM | Ian McKeachie | Black Bear | km 45 Lillooet FSR | | | 1 | TF | No |
| 9/11/2014 | 5:30:00 PM | Jordan Gagné | Black Bear | km 39.7 Lillooet FSR | | | 1 | FD | Yes |
| 9/12/2014 | 7:00:00 AM | Jordan Gagné | Black Bear | Camp Road | | | 1 | FL | No |
| 9/15/2014 | 3:30:00 PM | Hugo Pelletier | Black Bear | km 38.5 Lillooet FSR | | | 1 | LI | No |
| 9/17/2014 | 4:45:00 PM | Hugo Pelletier | Black Bear | km 1 Camp Road | | | 1 | FL | No |
| 9/18/2014 | 7:00:00 AM | Luke Andrew | Mule Deer | km 37 Lillooet FSR | | | 2 | TF | No |
| 9/19/2014 | 4:25:00 PM | Danny Dugas | Black Bear | km 44.5 Lillooet FSR | | Female & young | 3 | TF | No |
| 9/23/2014 | 12:20:00 PM | Greg Davis | Black Bear | km 3.5 BDR Intake | | | 1 | TF | No |

* Activity :

BU: building nest
DI: disturbed
FD: Feeding
EX: excreting
FL: fleeing
GR: grooming
IN: incubating
LI: unspecified
RR: rearing
ST: security/thermal
TE: territorial (singing)
TF: traveling,flying

| Species Observed or De | Notification Peri |
|---|---|
| Northern Rubber Boa | Immediately |
| Grizzly Bear | 24hrs |
| Wolverine Den | 24hrs |
| Spotted Owls | 24hrs |
| Mountain Goats | 48hrs |