



File: 292-30/OGC2020-019

November 25, 2020

**VIA ELECTRONIC MAIL:**

Dear

**Re: Request for Information – Release  
*Freedom of Information and Protection of Privacy Act (FOIPP)***

I am writing further to your request received by the BC Oil and Gas Commission (Commission). You requested communications regarding the engineering and design of sections 7 & 8 of the CGL pipeline (Jan 2020-October 2020); and application materials and record of decision for AD100111261 and AD100111023.

Please find enclosed a copy of the records located in response to your request. Some information has been withheld pursuant to the following section(s): 17 (Disclosure harmful to the financial or economic interests of a public body); 18 (Disclosure harmful to the conservation of heritage sites); 21 (Disclosure harmful to the business interests of a third party); and, 22 (Disclosure harmful to personal privacy. A complete copy of FOIPP is available online at: [http://www.bclaws.ca/Recon/document/ID/freeside/96165\\_00](http://www.bclaws.ca/Recon/document/ID/freeside/96165_00)

These records will be published on the Commission's website within 72 hours after release. To find out more about the proactive disclosure of requests, please access the Commission's website at: <https://www.bcogc.ca/about/freedom-of-information/>

Your file is now closed.

Pursuant to section 52 of the FOIPP, you may ask the Office of the Information and Privacy Commissioner (OIPC) to review any decision, act, or failure to act with regard to your request under FOIPPA.

**Please note that you have 30 business days to file your review with the OIPC. In order to request a review please write to:**

*Information and Privacy Commissioner  
PO Box 9038 Stn Prov Govt  
4<sup>th</sup> Floor, 947 Fort Street  
Victoria BC V8W 9A4  
Phone: 250.387.5629 Fax: 250.387.1696  
Email: [info@oipc.bc.ca](mailto:info@oipc.bc.ca)*

If you request a review, please provide the OIPC with a copy of your original request, a copy of the Commission's response, and the reasons or grounds upon which you are requesting the review. Further information on the complaint and review process can be found on the OIPC website: <https://www.oipc.bc.ca>

Please write [FOIIntake@bcogc.ca](mailto:FOIIntake@bcogc.ca), if you have any questions regarding your request or require any further clarification.

Yours truly,

*Dana Keough*  
BC Oil and Gas Commission

**From:** Tracy Young <tracy\_young@tcenergy.com>  
**Sent:** Monday, August 24, 2020 8:52 AM  
**To:** Wilson, Jason  
**Cc:** Person, Darryl; Mana, Kate; Dan Wyman; Shelley McInnis  
**Subject:** Geohazards on Section 8 West  
**Attachments:** 16442-03-ML-03-079\_01 Geohazard Marked.pdf; 16442-03-ML-03-079\_01.pdf; 16442-03-ML-03-080\_01 reduced.pdf

Hi Jason,

Apologies for the delay in providing this information. As previously discussed, I am providing the drawings that have been issued for construction (IFC). The drawings for the remaining areas are not yet IFC.

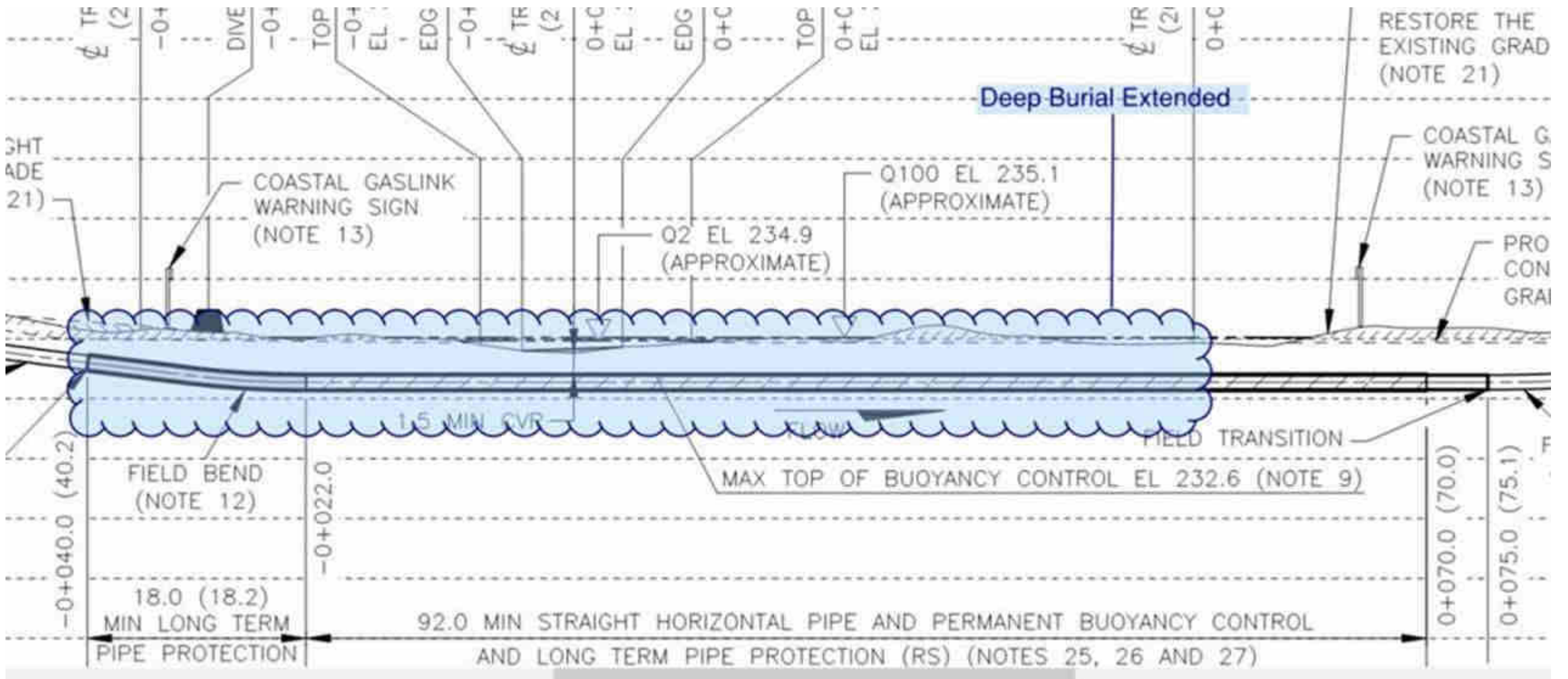
For Section 8 West, the documents for the geohazards identified between KP 650 to 654 are IFC. I have provided an overview of the information below and the drawings are attached. Please note that there was a transcription error in the table provided for Section 8 West that we have identified. The table stated 2.0 m deep burial at KP 650+879 to 650+930 however it should have read 1.8 m deep burial as is shown on the drawing 16442-03-ML-03-079. Please let me know if you require an updated geohazard table for Section 8 West correcting this error or if this email will suffice.

I have asked the engineers to highlight the areas on the drawings associated with the different geohazards for easier identification. To this end I have attached both an unmarked and marked up drawing 16442-03-ML-03-079 and unmarked drawing 16442-03-ML-03-080.

Section	Identified Geohazard	Start Kilometre Post (Route Rev F1)	End Kilometre Post (Route Rev F1)	Mitigation 1	Mitigation 2	Mitigation 3	Documents
				Description	Description	Description	
8W	Channel Migration	650+687	650+742	Deep burial (extended) <sup>2</sup>	Pipe protection <sup>1</sup>		16442-03-ML-03-079 The green shaded area in attached drawing.
8W	Channel Migration	650+736	650+930	Deep burial (extended) <sup>2</sup>			16442-03-ML-03-079 Deep Burial Extended (650+736 to 650+930) Please see blue in attached drawing.

8W	Vertical Scour	650+879	650+930	Deep burial (2.0 m)			<p>16442-03-ML-03-079</p> <p>Deep Burial (KP 650+879 to 650+930) Please see red in attached drawing.</p> <p>Please note that the drawing indicates 1.8 min CVR however the table incorrectly stated 2.0 min CVR.</p>
8W	Channel Migration	652+930	653+052	Deep burial (extended) <sup>2</sup>			<p>16442-03-ML-03-080</p> <p>The blue shaded area in figure below indicates the deep burial extended (KP</p>





Should you have any questions or require additional information, please let me know.

Thank you,

**Tracy Young**  
 Senior Regulatory Analyst  
 Coastal GasLink Pipeline Project

S.22

tel: 778-328-5327 mobile  
[TCEnergy.com](http://TCEnergy.com)



**NOTES:**

**GENERAL:**

- SEE ALIGNMENT SHEET 16442-03-ML-02-151 FOR BILL OF MATERIALS.
- PIPELINE INSTALLATION, TESTING AND MAINTENANCE SHALL BE IN ACCORDANCE WITH CSA Z662-19, BC OGC, ALL APPLICABLE FEDERAL, PROVINCIAL, REGIONAL, DISTRICTS AND MUNICIPAL REGULATIONS, PROJECT PERMITS, CONTRACT DOCUMENTS AND CURRENT COMPANY SPECIFICATIONS.
- ALL DIMENSIONS AND ELEVATIONS ARE IN METRES (m) UNLESS OTHERWISE SPECIFIED.
- ALL CHAINAGES ARE CONTOUR (SLACK) UNLESS OTHERWISE SPECIFIED.
- DIMENSIONS ARE HORIZONTAL, DIMENSIONS IN BRACKETS ARE SLACK.
- REFER TO WATERCOURSE CROSSING DESIGN REPORT CGL4703-WPC-GT-RP-047B.

**SURVEYING:**

- PIPELINE ROUTE AND CHAINAGES ARE BASED ON ROUTE REV G. WORKSPACE IS BASED ON CGW4703-MCS1-G-SHP-572-SECTIONS\_CONSTRUCTION\_FOOTPRINT\_REV8.
- THE PIPELINE CENTRELINE GROUND PROFILE WAS EXTRACTED FROM LIDAR OBTAINED IN 2012. THE CHANNEL BED PROFILES ARE BASED ON A 2014 SITE SPECIFIC SURVEYS, FILE: STANTEC\_WATERCOURSE\_CROSSING\_724\_HIRSCH\_CREEK AND STANTEC\_WATERCOURSE\_CROSSING\_724\_SIDE\_CHANNEL (HIRSCH CREEK). THE PIPELINE CENTRELINE GROUND AND CHANNEL THALWEG PROFILES SHALL BE SURVEYED PRIOR TO CONSTRUCTION TO CONFIRM THE PROFILES. A MINIMUM OF TWO TEMPORARY BENCHMARK LOCATIONS SHALL BE ESTABLISHED NEAR THE DESIGN CROSSING LOCATION. IF SUBSTANTIAL DIFFERENCES ARE FOUND IN EITHER THE CENTRELINE OR THALWEG PROFILES, THE DESIGN ENGINEER SHALL BE CONSULTED TO ALLOW FOR A REASSESSMENT OF THE CROSSING DESIGN. A DESIGN REVIEW SHOULD BE REQUESTED IF: THE BED SLOPE IS STEEPER; OR THE NEW CHANNEL PROFILE INDICATES ITEMS SUCH AS SCOUR HOLES, OR MULTIPLE BED SLOPE CHANGES; OR THE CENTRELINE PROFILE HAS A THALWEG DEPTH CHANGE GREATER THAN 0.2 m; OR THE THALWEG HAS CHANGED LOCATION AT THE PIPELINE, UPSTREAM, OR DOWNSTREAM. IN GENERAL, THALWEG CHANGES SHOULD BE CHECKED AS THIS HAS VARYING SCOUR EFFECTS DUE TO THE NON-LINEAR SCOUR EQUATIONS AND POTENTIAL BANK EROSION IMPACTS.

**CONSTRUCTION:**

- THE MAXIMUM TOP OF PIPE ELEVATION REFERS TO THE TOP OF BUOYANCY CONTROL OR PIPE PROTECTION OR THE PIPE, WHICHEVER IS HIGHEST.
- AT THE TIME OF DRAWING ISSUE, PIPELINE WAS IN A CLASS 1 (CSA Z662-19) LOCATION.
- THE DEPTH AND LOCATION OF ALL FOREIGN FACILITIES ARE APPROXIMATE AND SHALL BE CONFIRMED BY THE CONTRACTOR AS PER THE CONTRACT SPECIFICATIONS PRIOR TO CONSTRUCTION.
- MAXIMUM FIELD BENDING LIMIT IS ONE DEGREE PER PIPE DIAMETER (RADIUS= 57.2D) AS PER TES-CT-GEN-GL REV 05.
- PIPELINE WARNING SIGNS SHALL BE INSTALLED AS PER TES-CT-GEN-GL REV 05 AND DRAWING 16442-03-ML-03-094 OR AS DIRECTED BY THE COMPANY'S FIELD REPRESENTATIVE.
- ALL CONTINUOUS CONCRETE COATED PIPE MUST BE A MINIMUM OF 24.7 mm HEAVY WALL AND MUST BE PRE-TESTED PRIOR TO COATING WITH CONCRETE PER TES-PRES (REV 00) AND TES-PRES (REV 00) PER TES-PRES REV 00 SECTION 2.3.1.1. THE MINIMUM PRE-TEST PRESSURE SHALL BE 16,720 kPa; THE MAXIMUM PRE-TEST PRESSURE SHOULD BE THE MINIMUM TEST PRESSURE PLUS 700 kPa BUT MUST BE LESS THAN 100% SHMS (22,285 kPa). ALL PIPE WEIGHTED WITH BOLT-ON (RIVER) WEIGHTS ALSO MUST BE A MINIMUM OF 24.7 mm WALL THICKNESS.
- PIPELINE SHALL BE PLACED IN NATURAL, UNDISTURBED SOIL OR BEDROCK. THE DEPTH OF COVER WITHIN THE WATERCOURSE FROM STA -0+230 TO STA 0+020 CAN BE REDUCED IN COMPETENT BEDROCK PER 16442-03-ML-03-082 WHEN APPROVED BY THE COMPANY FIELD REPRESENTATIVE. EXCEPT FOR THE IDENTIFIED STRESS AREAS, THE MINIMUM COVER INDICATED ON THE DRAWING IS FROM THE CONSTRUCTION GRADE IN UNDISTURBED SOIL.
- PIPELINE ELEVATIONS MAY BE VARIED TO SUIT ACTUAL GRADING CONDITIONS. THE MINIMUM DEPTH OF COVER AND MAXIMUM BEND ANGLES WILL BE PER THE DRAWING. THE VERTICAL ALIGNMENT IS TO BE DETERMINED IN THE FIELD NOTING THAT SIGNIFICANT CHANGES MAY AFFECT PIPE STRESS RESULTS AS COMPLETED BY WOOD GROUP. CONSULT WITH WOOD GROUP AS REQUIRED. SEE ALSO NOTE 33.

**GRADING AND EXCAVATING:**

**SPOIL PLACEMENT:**

**TEMPORARY:**

- THE "PROPOSED CONSTRUCTION GRADE" IS FOR CONSTRUCTABILITY PURPOSES. THE PIPELINE CONTRACTOR MAY PROPOSE ALTERNATIVE GRADE PROFILES TO THE COMPANY FIELD REPRESENTATIVE FOR PRE-APPROVAL. ALL TEMPORARY AND PERMANENT CUT SLOPES MUST MEET ALL APPLICABLE GOVERNMENT AND COMPANY SAFETY CODES AND REQUIREMENTS. CONSULT WITH THE COMPANY'S QUALIFIED GEOTECHNICAL ENGINEER. SPOIL SHALL BE LOCATED 50 AS TO NOT REDUCE BANK OR SLOPE STABILITY. CHECK WITH THE COMPANY'S QUALIFIED GEOTECHNICAL ENGINEER. SPOIL PILE AREAS SHALL BE GRADED TO ENSURE THAT WATER WILL NOT POND ON THE SURFACE OR BE TRAPPED BY THE SPOIL PILE(S). (SPOIL AREA LOCATIONS AND SIZES ARE AS PER DATA PROVIDED BY THE COMPANY. WORLEY HAS NOT ASSESSED THE ADEQUACY OF THE AREAS TO ACCOMMODATE POTENTIAL SPOIL VOLUMES.)

**PERMANENT:**

- PIPE DITCH ACROSS THE MAIN CHANNEL SHALL BE BACKFILLED WITH NATIVE MATERIAL TO APPROXIMATELY 500 mm BELOW THE ORIGINAL GRADE. THE UPPER 500 mm OF THE CHANNEL BED SHALL BE BACKFILLED WITH THE ORIGINAL UPPER 500 mm OF GRANULAR MATERIAL IF PRESENT. IF GRANULAR MATERIAL WAS NOT PRESENT, COMPLETE BACKFILLING USING NATIVE MATERIAL OR AS SPECIFIED IN THE PROJECT ENVIRONMENTAL MANAGEMENT PLAN CGL4703-CGP-ENV-PLN-008.
- FINAL WATERCOURSE BED CONTOURS SHALL APPROXIMATE THE PRECONSTRUCTION BED CONTOURS AS MUCH AS PRACTICABLE.
- PERMANENTLY REPLACED BANK, FLOODPLAIN AND SLOPE SPOIL MATERIAL SHALL BE PLACED IN MAXIMUM 300 mm THICK LIFTS WITH EACH LIFT NOMINALLY COMPACTED USING A MINIMUM OF THREE PASSES WITH EQUIPMENT APPLYING A MINIMUM OF 100 kPa PRESSURE IF PLACED AT A SHALLOWER ANGLE THAN 3H:1V OR AS SPECIFIED IN THE COMPANY APPROVED RESTORATION PLANS. UNFROZEN SOIL FREE OF ORGANICS SHALL BE USED. DO NOT PLACE FILL DURING FREEZING CONDITIONS UNLESS SPECIFICALLY APPROVED BY THE COMPANY'S QUALIFIED GEOTECHNICAL ENGINEER. WATERCOURSE BANKS AND SLOPES RESTORATION SHALL ENSURE LONG-TERM STABILITY AND SHALL BE IN COMPLIANCE WITH THE COMPANY'S ENVIRONMENTAL MANAGEMENT PLAN AND PERMIT CONDITIONS. BANK AND SLOPE RESTORATION PLANS SHALL BE PROPOSED BY THE CONTRACTOR AND PRE-ACCEPTED BY BOTH THE COMPANY'S QUALIFIED GEOTECHNICAL ENGINEER AND ENVIRONMENTAL PROFESSIONALS PRIOR TO IMPLEMENTATION. BANKS AND SLOPES SHALL NOT BE REPLACED TO STEEPER THAN 3H:1V UNLESS PROPERLY COMPACTED TO A MINIMUM OF 95% OF STANDARD PROCTOR MAXIMUM DRY DENSITY OR AS PRE-APPROVED BY THESE PROFESSIONALS AND BY THE COMPANY'S ENGINEER OF RECORD. THE REQUIREMENTS OF COMPANY FIELD CHANGE PROCEDURE CGL4703-CGP-ENG-PRO-0005 AND GEOTECHNICAL FIELD CHANGE PROCEDURE CGL4703-CGP-ENG-PRO-0004 SHALL BE FOLLOWED FOR PROPOSAL AND ACCEPTANCE OF FIELD CHANGES.
- SPOIL AREAS SHOULD BE GRADED TO ENSURE THAT WATER WILL NOT POOL ON THE SURFACE OR BE TRAPPED BY THE REPLACED SPOIL. EXCESS PERMANENT SPOIL SHALL NOT BE PLACED ON THE BANKS OR APPROACH SLOPES.

**DRAINAGE AND EROSION CONTROL:**

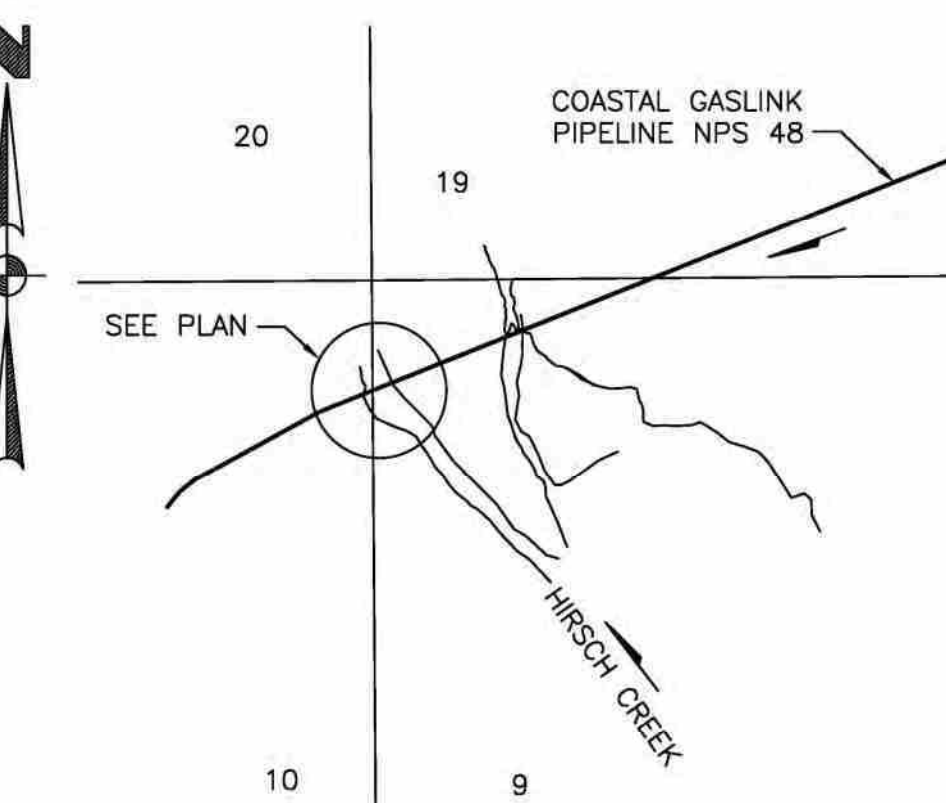
- CONTRACTOR SHALL INSTALL DIVERSION BERMS AND DITCH PLUGS, AND SUBDRAINS IF REQUIRED. PRELIMINARY LOCATIONS ARE SHOWN ON THE DRAWING AND IN THE GEHAZARD TABLES. FINAL LOCATIONS SHALL BE BASED ON ACTUAL SITE CONDITIONS PER THE CRITERIA OUTLINED IN DRAWINGS 16442-03-ML-10-029, 16442-03-ML-10-030 AND STDS-03-ML-12-211/212.01 AS DETERMINED BY COMPANY QUALIFIED FIELD PERSONNEL AND APPROVED BY THE ENGINEER OF RECORD.
- DURING CONSTRUCTION, TEMPORARY EROSION CONTROL MEASURES SUCH AS SILT FENCES OR OTHER NECESSARY MEASURES SHALL BE INSTALLED TO MAINTAIN SOIL CONSERVATION AND PREVENT SEDIMENT LADEN RUNOFF FROM ENTERING THE WATERCOURSE. (REFER ALSO TO THE ENVIRONMENTAL NOTES.)

**BUOYANCY CONTROL:**

- LONG TERM BUOYANCY CONTROL SHALL BE PLACED BETWEEN THE LIMITS SHOWN. THE LENGTH OF BUOYANCY CONTROL REQUIRED FOR INSTALLATION AS SHOWN IS APPROXIMATE. IF ACTUAL WATER LEVELS, PIPE BEND AND DITCH CONFIGURATION ARE DIFFERENT FROM THAT SHOWN ON THE DRAWING, CONTINUOUS CONCRETE COATING OR BOLT-ON (RIVER) WEIGHTS OR OTHER COMPANY APPROVED METHOD SHALL BE ADDED OR USED AS REQUIRED TO ENSURE THE PIPELINE IS PLACED AT OR BELOW THE MAXIMUM TOP OF PIPE OR WEIGHTING OR PIPE PROTECTION ELEVATION (WHICHEVER IS HIGHEST) AT THE TIME OF LOWERING-IN. A MINIMUM 10% NEGATIVE BUOYANCY IS REQUIRED FOR THE ENTIRE PIPE SECTION THAT WILL BE PLACED BELOW THE LOCAL WATER LEVEL AT THE TIME OF CONSTRUCTION PER COMPANY SPECIFICATIONS TEN-ME-BUY-00. WEIGHTING SHALL BE SUCH THAT IT ENSURES THE PIPE REMAINS AT ITS REQUIRED ELEVATION DURING BACKFILLING.
- FOR BUOYANCY CONTROL DETAILS, REFER TO DWG 16442-03-ML-10-019. CONTINUOUS CONCRETE COATING (CCC) MUST BE A MINIMUM OF 120 mm THICK FOR 24.7 mm WALL PIPE FOR EACH METRE OF PIPE. IF CCC CANNOT BE PLACED OVER THE WHOLE LENGTH OF THE SECTION TO BE WEIGHTED, INCREASED CCC THICKNESS OR OTHER COMPANY APPROVED BUOYANCY CONTROL METHODS WILL BE REQUIRED. THE PIPE AND PIPE COATING MUST BE PROTECTED PER THE COMPANY'S CONTRACT OR CONSTRUCTION SPECIFICATIONS TEN-ME-BUY-GL REV 00 AND TES-CT-GEN-GL REV 05.
- LONG TERM PROTECTION OF THE PIPE AND COATING SHALL BE PLACED BETWEEN THE LIMITS SHOWN. (CONSULT WITH THE COMPANY'S AUTHORIZED FIELD REPRESENTATIVE FOR ADDITIONAL INFORMATION ON APPROVED MAIN CHANNEL IN-STREAM (I.E. CONTINUOUS CONCRETE COATING OR APPROVED EQUIVALENT (LTPPI)) AND OUTSIDE MAIN CHANNEL PROTECTION MEASURES I.E. APPROVED ROCKSHIELD (RS)). (REFER ALSO TO THE PROJECT CONSTRUCTION SPECIFICATIONS TES-CT-GEN-GL REV 05.)

**ENVIRONMENTAL:**

- WITHIN ADDITIONAL TEMPORARY WORKSPACE AREAS, CLEARING IS PROHIBITED WITHIN 10.0 m OF THE WATERCOURSE TOP OF BANK TO PROTECT RIPARIAN AREAS.
- ALL WORKS ASSOCIATED WITH CROSSING THE WATERCOURSE SHALL OCCUR AS PER APPLICABLE PROVINCIAL AND FEDERAL PERMITS AND CONDITIONS AND SHALL MEET THE REQUIREMENTS AND COMMITMENTS OUTLINED IN THE CURRENT COMPANY ENVIRONMENTAL MANAGEMENT PLAN CGL4703-CGP-ENV-PLN-008. WORLEY HAS NOT ASSESSED THE ENVIRONMENTAL ASPECTS OF THE CROSSING INSTALLATION. TO LIMIT IN-STREAM SEDIMENT LOADING FROM PIPE INSTALLATION, A WATER MANAGEMENT PLAN COMPLIANT WITH ALL PERMIT CONDITIONS, THE CURRENT COMPANY ENVIRONMENTAL MANAGEMENT PLAN AND THE LATEST DITCHLINE MASTER WATERCOURSE CROSSING TABLE SHALL BE PROPOSED BY THE CONTRACTOR AND ACCEPTED BY THE COMPANY'S QUALIFIED ENVIRONMENTAL PROFESSIONAL PRIOR TO THE COMMENCEMENT OF IN-STREAM ACTIVITIES IN BOTH THE SIDE-CHANNEL AND THE MAIN CHANNEL. THE PRE-APPROVED WATER MANAGEMENT PLAN SHALL BE INSTALLED AND OPERATED THROUGHOUT THE DURATION OF ALL IN-STREAM ACTIVITIES.

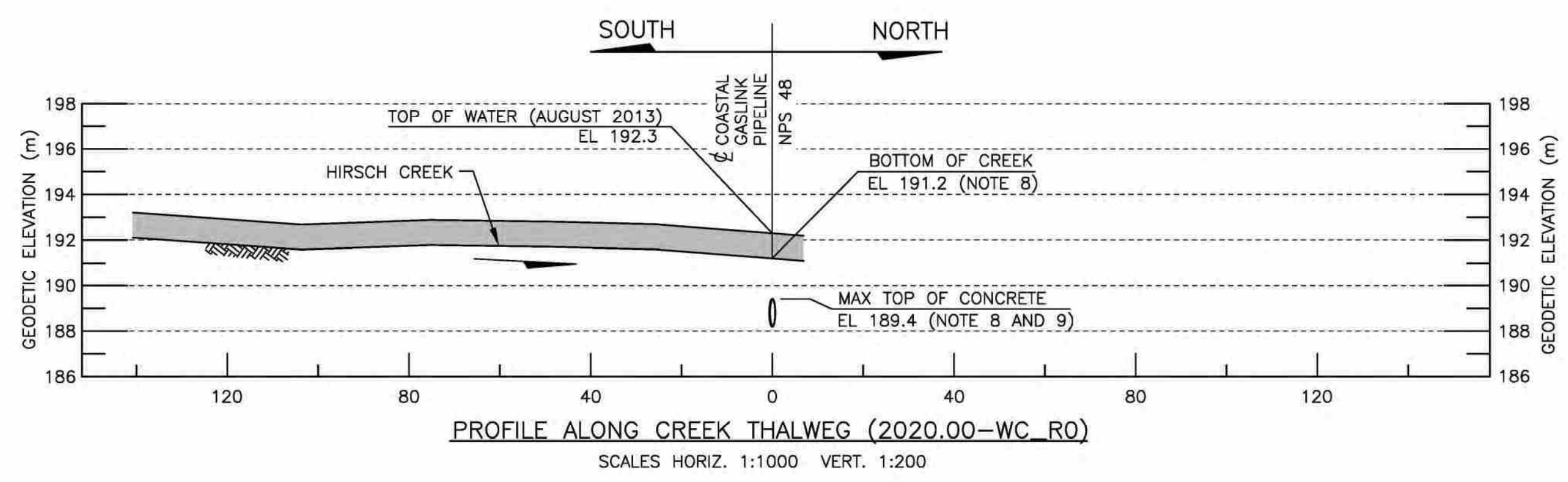


**LOCATION PLAN**

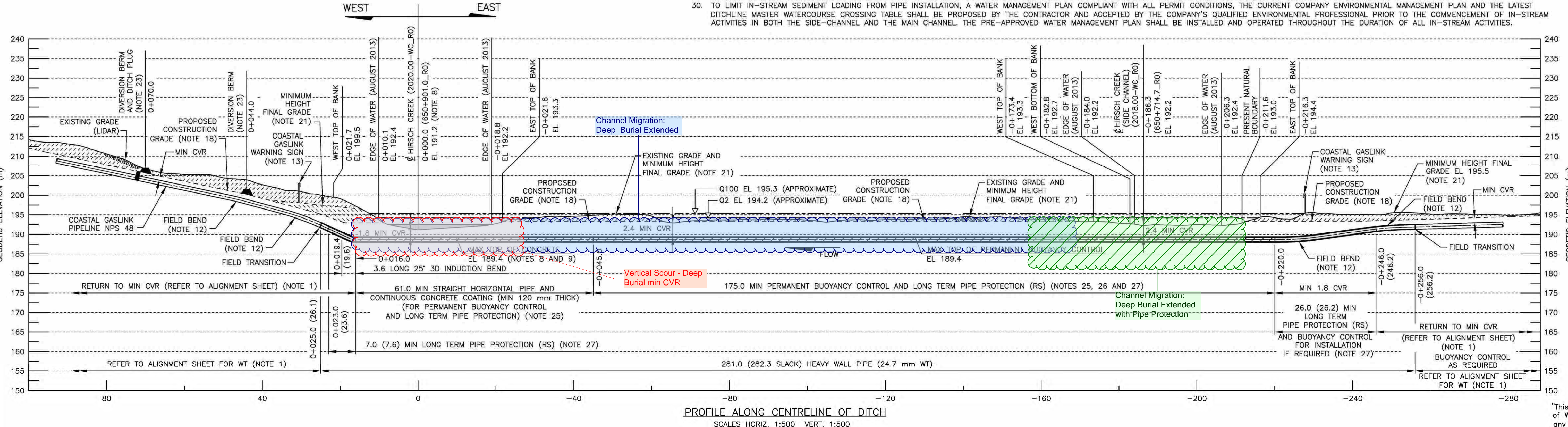
UNIT 09, BLOCK E, GROUP 103-1-01  
BRITISH COLUMBIA  
SCALE 1:10,000

**DATUM REFERENCE:**

UTM ZONE 9 NORTH, BASED ON THE NORTH AMERICAN DATUM OF 1983 (NAD83 CSRS - UTM ZONE 9N).  
ELEVATIONS ARE BASED ON THE CANADIAN GEODETIC VERTICAL DATUM OF 1928 (CGVD28) DERIVED USING THE HTV2.0 GEOD MODEL.



PROFILE ALONG CREEK THALWEG (2020.00-WC\_RO)  
SCALES HORIZ. 1:1000 VERT. 1:200



PROFILE ALONG CENTRELINE OF DITCH  
SCALES HORIZ. 1:500 VERT. 1:500

**CENTRELINE OF CROSSING**

NAD 83 ZONE 9  
ELEV : 191.2  
N : 5693689  
E : 533414  
STANTEC ID NO 182C AND 725  
SURVEY FILE DATE : SEPTEMBER 09, 2014  
FOOTPRINT : REV 8, DATED AUGUST 19, 2019

**GEOTECHNICAL:**

- ADDITIONAL MITIGATIONS THAT MAY BE REQUIRED AT THIS LOCATION ARE PROVIDED IN THE GEHAZARD AND CONSTRUCTION MITIGATION SUMMARY TABLE CGL4703-WPC-GT-027 REV 0.
- FOR GEOPHYSICS RESULTS, SEE WORLEYPARSONS REPORT CGL-4703-WPC-GT-RP-046.

**STRESS MITIGATION:**

- ENGINEERED BACKFILL AND FINAL DEEPER COVER FOR STRESS MITIGATION ARE CURRENTLY NOT REQUIRED PER ANALYSIS COMPLETED BY WOOD GROUP PER TABLE CGL4703-WGN-ENG-TBL-016. CONSULT WITH WOOD GROUP FOR UPDATED MITIGATION(S) AS REQUIRED. REFER ALSO TO THE "CONSTRUCTION ALIGNMENT GENERAL NOTES AND ACRONYMS" DRAWING 16442-03-ML-00-010.

**PIPE SPECIFICATIONS**

- LINE PIPE : .....CSA Z245.1-18, 1219 mm OD x 20.6 mm WT, GR 550, CAT II, MSC
- HEAVY WALL PIPE : .....CSA Z245.1-18, 1219 mm OD x 24.7 mm WT, GR 550, CAT II, MSC
- MAX OPERATING TEMPERATURE : ..... 49°C
- MIN OPERATING TEMPERATURE : ..... -5°C
- TYPE OF JOINT : ..... WELDED
- COATING : ..... FUSION BOND EPOXY (SYSTEM 1A-FBE)
- CROSSING METHOD : ..... ISOLATED
- ALTERNATE CROSSING METHOD : ..... OPEN CUT
- MIN TEST PRESSURE : ..... 16,720 kPa
- MAX OPERATING PRESSURE : ..... 13,375 kPa
- CATHODIC PROTECTION : ..... IMPRESSED CURRENT
- MAX CATHODIC PROTECTION VOLTAGE : ..... -2.5 VDC
- PRODUCT CARRIED : ..... SWEET NATURAL GAS

"This drawing is prepared for the use of the contractual customer of Worley Canada Services Ltd. and Worley assumes no liability to any other party for any representation contained in this drawing."

DRAWING No	TITLE
16442-03-ML-02-151	CONSTRUCTION ALIGNMENT SECTION 8
16442-01-ML-06-002	CONSTRUCTION FITTING TABLE FOR NPS 48 3D INDUCTION BEND
16442-01-ML-07-001	COUNTERBORRE AND TAPE STANDARD FOR NPS 48 PIPE
16442-03-ML-03-082	PIPELINE WATERCOURSE CROSSINGS TYPICAL PIPE BURIAL DETAILS WITHIN STREAM CHANNELS
16442-03-ML-03-094	WARNING SIGNS AND CROSSING RESTRICTION SIGNS
16442-03-ML-10-019	TYPICAL REQUIREMENTS FOR NPS 48 PIPE BUOYANCY CONTROL
16442-03-ML-10-029	TYPICAL DITCH PLUG
16442-03-ML-10-030	TYPICAL DIVERSION BERMS
STDS-03-ML-12-211.01/212.01	TYPICAL SUBDRAIN USING GRAVEL / TYPICAL SUBDRAIN

REV No	DATE	DESCRIPTION
00	2014-12-19	ISSUED FOR CONSTRUCTION
01	2020-07-22	RE-ISSUED FOR CONSTRUCTION

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2207465	HD	RPB	RPB	JR	KO	WORLEY
M.000955	LS					WORLEY

PROFESSIONAL ENGINEER/RPT	PERMIT/ ENG. APPROVAL

**TC Energy** Coastal GasLink Pipeline Project

COASTAL GASLINK PIPELINE (NPS 48 2020)

FACTORY # 16442 ENG STATION: 650+901.0\_R0 DISC # 03

ISOLATED CROSSING OF HIRSCH CREEK

SCALE AS SHOWN DRAWING # 16442-03-ML-03-079 REV 01



NOTES:

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CONSTRUCTION:

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- ALL CONTINUOUS CONCRETE COATED PIPE MUST BE A MINIMUM OF 24.7 mm HEAVY WALL AND MUST BE PRE-TESTED PRIOR TO COATING WITH CONCRETE PER TES-PRES (REV 00) AND TES-PRES (REV 00). PER TES-PRES REV 00 SECTION 2.3.1.1, THE MINIMUM PRE-TEST PRESSURE SHALL BE 16,720 kPa; THE MAXIMUM PRE-TEST PRESSURE SHOULD BE THE MINIMUM TEST PRESSURE PLUS 700 kPa BUT MUST BE LESS THAN 100% SHMS (22,285 kPa). ALL PIPE WEIGHTED WITH BOLT-ON (RIVER) WEIGHTS ALSO MUST BE A MINIMUM OF 24.7 mm WALL THICKNESS.
- PIPELINE SHALL BE PLACED IN NATURAL, UNDISTURBED SOIL OR BEDROCK. THE DEPTH OF COVER WITHIN THE WATERCOURSE FROM STA -0+230 TO STA 0+020 CAN BE REDUCED IN COMPETENT BEDROCK PER 16442-03-ML-03-082 WHEN APPROVED BY THE COMPANY FIELD REPRESENTATIVE. EXCEPT FOR THE IDENTIFIED STRESS AREAS, THE MINIMUM COVER INDICATED ON THE DRAWING IS FROM THE CONSTRUCTION GRADE IN UNDISTURBED SOIL.
- PIPELINE ELEVATIONS MAY BE VARIED TO SUIT ACTUAL GRADING CONDITIONS. THE MINIMUM DEPTH OF COVER AND MAXIMUM BEND ANGLES WILL BE PER THE DRAWING. THE VERTICAL ALIGNMENT IS TO BE DETERMINED IN THE FIELD NOTING THAT SIGNIFICANT CHANGES MAY AFFECT PIPE STRESS RESULTS AS COMPLETED BY WOOD GROUP. CONSULT WITH WOOD GROUP AS REQUIRED. SEE ALSO NOTE 33.

GRADING AND EXCAVATING:

SPOIL PLACEMENT:

- TEMPORARY:
- THE "PROPOSED CONSTRUCTION GRADE" IS FOR CONSTRUCTABILITY PURPOSES. THE PIPELINE CONTRACTOR MAY PROPOSE ALTERNATIVE GRADE PROFILES TO THE COMPANY FIELD REPRESENTATIVE FOR PRE-APPROVAL. ALL TEMPORARY AND PERMANENT CUT SLOPES MUST MEET ALL APPLICABLE GOVERNMENT AND COMPANY SAFETY CODES AND REQUIREMENTS. CONSULT WITH THE COMPANY'S QUALIFIED GEOTECHNICAL ENGINEER. SPOIL SHALL BE LOCATED 50 AS TO NOT REDUCE BANK OR SLOPE STABILITY. CHECK WITH THE COMPANY'S QUALIFIED GEOTECHNICAL ENGINEER. SPOIL PILE AREAS SHALL BE GRADED TO ENSURE THAT WATER WILL NOT POND ON THE SURFACE OR BE TRAPPED BY THE SPOIL PILE(S). (SPOIL AREA LOCATIONS AND SIZES ARE AS PER DATA PROVIDED BY THE COMPANY. WORLEY HAS NOT ASSESSED THE ADEQUACY OF THE AREAS TO ACCOMMODATE POTENTIAL SPOIL VOLUMES.)
- PERMANENT:
- PIPE DITCH ACROSS THE MAIN CHANNEL SHALL BE BACKFILLED WITH NATIVE MATERIAL TO APPROXIMATELY 500 mm BELOW THE ORIGINAL GRADE. THE UPPER 500 mm OF THE CHANNEL BED SHALL BE BACKFILLED WITH THE ORIGINAL UPPER 500 mm OF GRANULAR MATERIAL IF PRESENT. IF GRANULAR MATERIAL WAS NOT PRESENT, COMPLETE BACKFILLING USING NATIVE MATERIAL OR AS SPECIFIED IN THE PROJECT ENVIRONMENTAL MANAGEMENT PLAN CGL4703-CGP-ENV-PLN-008.
- FINAL WATERCOURSE BED CONTOURS SHALL APPROXIMATE THE PRECONSTRUCTION BED CONTOURS AS MUCH AS PRACTICABLE.
- PERMANENTLY REPLACED BANK, FLOODPLAIN AND SLOPE SPOIL MATERIAL SHALL BE PLACED IN MAXIMUM 300 mm THICK LIFTS WITH EACH LIFT NOMINALLY COMPACTED USING A MINIMUM OF THREE PASSES WITH EQUIPMENT APPLYING A MINIMUM OF 100 kPa PRESSURE IF PLACED AT A SHALLOWER ANGLE THAN 3H:1 TO 1V OR AS SPECIFIED IN THE COMPANY APPROVED RESTORATION PLANS. UNFROZEN SOIL FREE OF ORGANICS SHALL BE USED. DO NOT PLACE FILL DURING FREEZING CONDITIONS UNLESS SPECIFICALLY APPROVED BY THE COMPANY'S QUALIFIED GEOTECHNICAL ENGINEER. WATERCOURSE BANKS AND SLOPES RESTORATION SHALL ENSURE LONG-TERM STABILITY AND SHALL BE IN COMPLIANCE WITH THE COMPANY'S ENVIRONMENTAL MANAGEMENT PLAN AND PERMIT CONDITIONS. BANK AND SLOPE RESTORATION PLANS SHALL BE PROPOSED BY THE CONTRACTOR AND PRE-ACCEPTED BY BOTH THE COMPANY'S QUALIFIED GEOTECHNICAL ENGINEER AND ENVIRONMENTAL PROFESSIONALS PRIOR TO IMPLEMENTATION. BANKS AND SLOPES SHALL NOT BE REPLACED TO STEEPER THAN 3H:1V UNLESS PROPERLY COMPACTED TO A MINIMUM OF 95% OF STANDARD PROCTOR MAXIMUM DRY DENSITY OR AS PRE-APPROVED BY THESE PROFESSIONALS AND BY THE COMPANY'S ENGINEER OF RECORD. THE REQUIREMENTS OF COMPANY FIELD CHANGE PROCEDURE CGL4703-CGP-ENG-PRO-0005 AND GEOTECHNICAL FIELD CHANGE PROCEDURE CGL4703-CGP-ENG-PRO-0004 SHALL BE FOLLOWED FOR PROPOSAL AND ACCEPTANCE OF FIELD CHANGES.
- SPOIL AREAS SHOULD BE GRADED TO ENSURE THAT WATER WILL NOT POOL ON THE SURFACE OR BE TRAPPED BY THE REPLACED SPOIL. EXCESS PERMANENT SPOIL SHALL NOT BE PLACED ON THE BANKS OR APPROACH SLOPES.

DRAINAGE AND EROSION CONTROL:

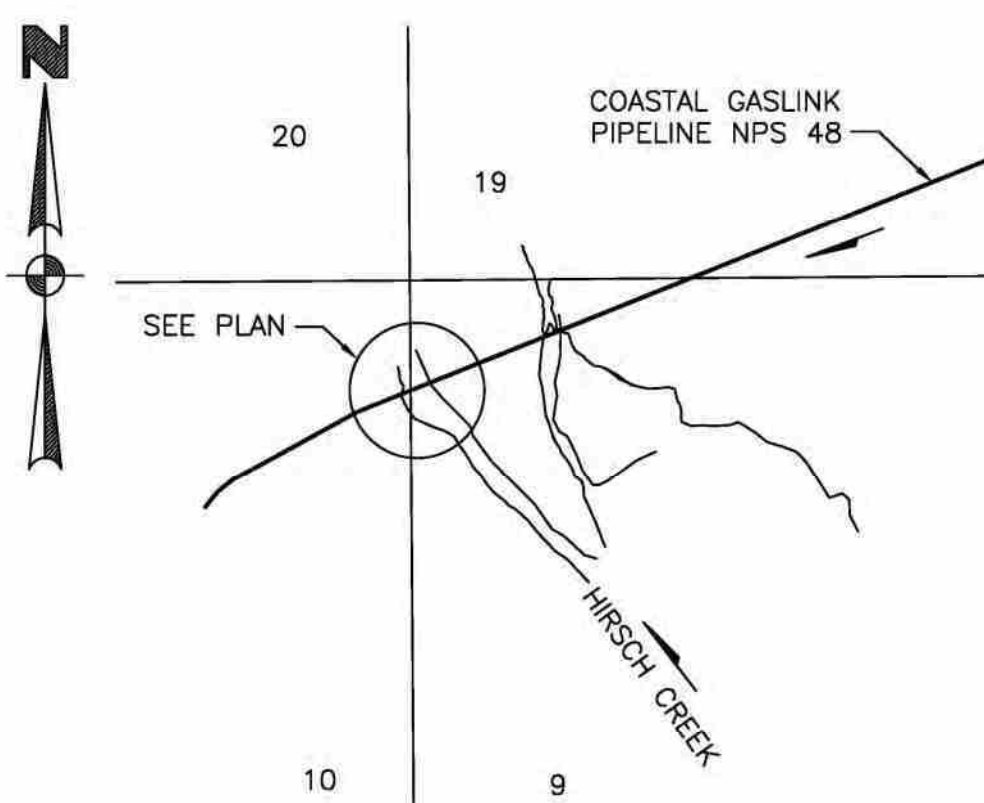
- CONTRACTOR SHALL INSTALL DIVERSION BERMS AND DITCH PLUGS, AND SUBDRAINS IF REQUIRED. PRELIMINARY LOCATIONS ARE SHOWN ON THE DRAWING AND IN THE GEHAZARD TABLES. FINAL LOCATIONS SHALL BE BASED ON ACTUAL SITE CONDITIONS PER THE CRITERIA OUTLINED IN DRAWINGS 16442-03-ML-10-029, 16442-03-ML-10-030 AND STDS-03-ML-12-211/212.01 AS DETERMINED BY COMPANY QUALIFIED FIELD PERSONNEL AND APPROVED BY THE ENGINEER OF RECORD.
- DURING CONSTRUCTION, TEMPORARY EROSION CONTROL MEASURES SUCH AS SILT FENCES OR OTHER NECESSARY MEASURES SHALL BE INSTALLED TO MAINTAIN SOIL CONSERVATION AND PREVENT SEDIMENT LADEN RUNOFF FROM ENTERING THE WATERCOURSE. (REFER ALSO TO THE ENVIRONMENTAL NOTES.)

BUOYANCY CONTROL:

- LONG TERM BUOYANCY CONTROL SHALL BE PLACED BETWEEN THE LIMITS SHOWN. THE LENGTH OF BUOYANCY CONTROL REQUIRED FOR INSTALLATION AS SHOWN IS APPROXIMATE. IF ACTUAL WATER LEVELS, PIPE BEND AND DITCH CONFIGURATION ARE DIFFERENT FROM THAT SHOWN ON THE DRAWING, CONTINUOUS CONCRETE COATING OR BOLT-ON (RIVER) WEIGHTS OR OTHER COMPANY APPROVED METHOD SHALL BE ADDED OR USED AS REQUIRED TO ENSURE THE PIPELINE IS PLACED AT OR BELOW THE MAXIMUM TOP OF PIPE OR WEIGHTING OR PIPE PROTECTION ELEVATION (WHICHEVER IS HIGHEST) AT THE TIME OF LOWERING-IN. A MINIMUM 10% NEGATIVE BUOYANCY IS REQUIRED FOR THE ENTIRE PIPE SECTION THAT WILL BE PLACED BELOW THE LOCAL WATER LEVEL AT THE TIME OF CONSTRUCTION PER COMPANY SPECIFICATIONS TEN-ME-BUOY-GL REV 00. WEIGHTING SHALL BE SUCH THAT IT REMAINS AT ITS REQUIRED ELEVATION DURING BACKFILLING.
- FOR BUOYANCY CONTROL DETAILS, REFER TO DWG 16442-03-ML-10-019. CONTINUOUS CONCRETE COATING (CCC) MUST BE A MINIMUM OF 120 mm THICK FOR 24.7 mm WALL PIPE FOR EACH METRE OF PIPE. IF CCC CANNOT BE PLACED OVER THE WHOLE LENGTH OF THE SECTION TO BE WEIGHTED, INCREASED CCC THICKNESS OR OTHER COMPANY APPROVED BUOYANCY CONTROL METHODS WILL BE REQUIRED. THE PIPE AND PIPE COATING MUST BE PROTECTED PER THE COMPANY'S CONTRACT OR CONSTRUCTION SPECIFICATIONS TEN-ME-BUOY-GL REV 00 AND TES-CT-GEN-GL REV 05.
- LONG TERM PROTECTION FOR THE PIPE AND COATING SHALL BE PLACED BETWEEN THE LIMITS SHOWN. (CONSULT WITH THE COMPANY'S AUTHORIZED FIELD REPRESENTATIVE FOR ADDITIONAL INFORMATION ON APPROVED MAIN CHANNEL IN-STREAM (I.E. CONTINUOUS CONCRETE COATING OR APPROVED EQUIVALENT (LTIPI)) AND OUTSIDE MAIN CHANNEL PROTECTION MEASURES I.E. APPROVED ROCKSHIELD (RS)). (REFER ALSO TO THE PROJECT CONSTRUCTION SPECIFICATIONS TES-CT-GEN-GL REV 05.)

ENVIRONMENTAL:

- WITHIN ADDITIONAL TEMPORARY WORKSPACE AREAS, CLEARING IS PROHIBITED WITHIN 10.0 m OF THE WATERCOURSE TOP OF BANK TO PROTECT RIPARIAN AREAS.
- ALL WORKS ASSOCIATED WITH CROSSING THE WATERCOURSE SHALL OCCUR AS PER APPLICABLE PROVINCIAL AND FEDERAL PERMITS AND CONDITIONS AND SHALL MEET THE REQUIREMENTS AND COMMITMENTS OUTLINED IN THE CURRENT COMPANY ENVIRONMENTAL MANAGEMENT PLAN CGL4703-CGP-ENV-PLN-008. WORLEY HAS NOT ASSESSED THE ENVIRONMENTAL ASPECTS OF THE CROSSING INSTALLATION.
- TO LIMIT IN-STREAM SEDIMENT LOADING FROM PIPE INSTALLATION, A WATER MANAGEMENT PLAN COMPLIANT WITH ALL PERMIT CONDITIONS, THE CURRENT COMPANY ENVIRONMENTAL MANAGEMENT PLAN AND THE LATEST DITCHLINE MASTER WATERCOURSE CROSSING TABLE SHALL BE PROPOSED BY THE CONTRACTOR AND ACCEPTED BY THE COMPANY'S QUALIFIED ENVIRONMENTAL PROFESSIONAL PRIOR TO THE COMMENCEMENT OF IN-STREAM ACTIVITIES IN BOTH THE SIDE-CHANNEL AND THE MAIN CHANNEL. THE PRE-APPROVED WATER MANAGEMENT PLAN SHALL BE INSTALLED AND OPERATED THROUGHOUT THE DURATION OF ALL IN-STREAM ACTIVITIES.

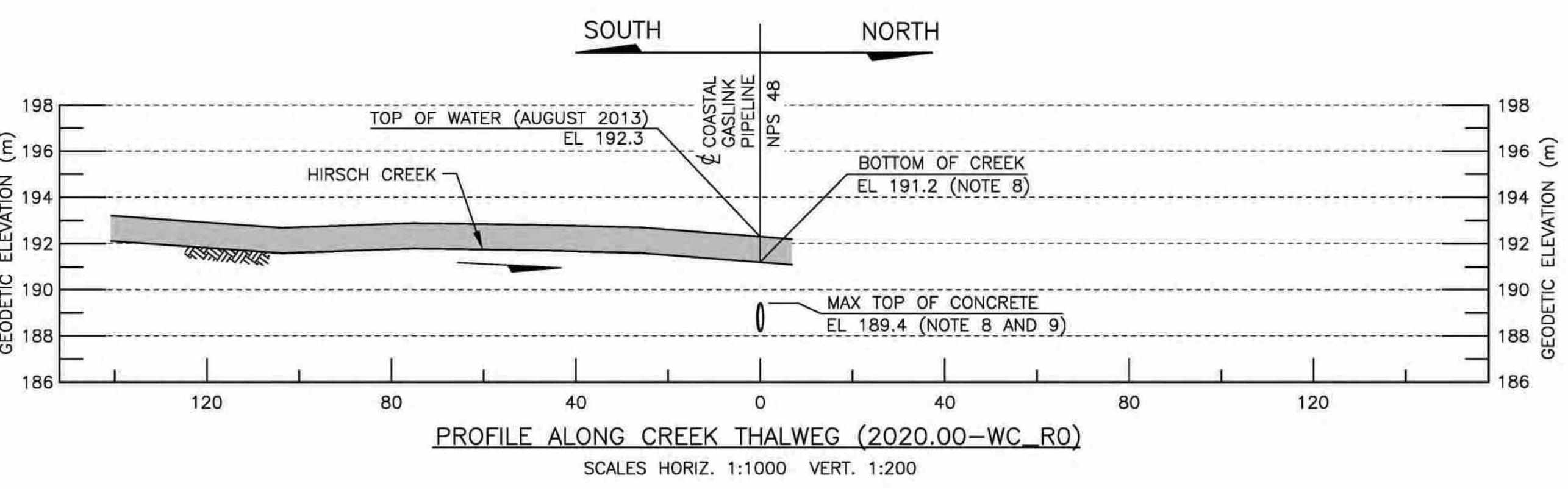


LOCATION PLAN

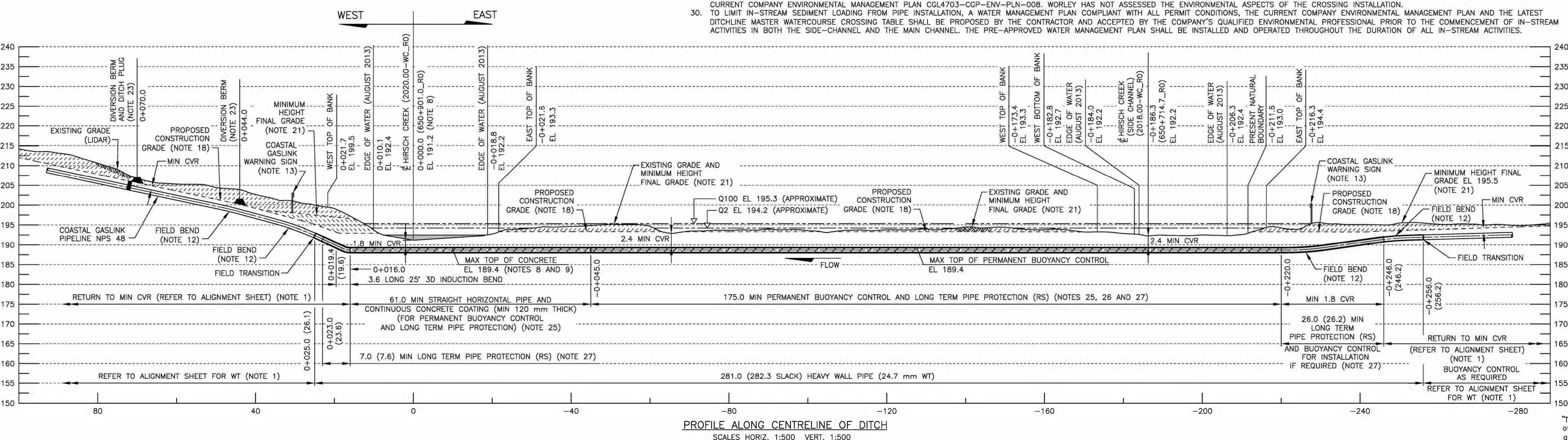
UNIT 09, BLOCK E, GROUP 103-1-01  
BRITISH COLUMBIA  
SCALE 1:10,000

DATUM REFERENCE:

UTM ZONE 9 NORTH, BASED ON THE NORTH AMERICAN DATUM OF 1983 (NAD83 CSRS - UTM ZONE 9N).  
ELEVATIONS ARE BASED ON THE CANADIAN GEODETIC VERTICAL DATUM OF 1928 (CGVD28) DERIVED USING THE HTV2.0 GEOD MODEL.



PROFILE ALONG CREEK THALWEG (2020.00-WC-RO)  
SCALES HORIZ. 1:1000 VERT. 1:200



PROFILE ALONG CENTRELINE OF DITCH  
SCALES HORIZ. 1:500 VERT. 1:500

CENTRELINE OF CROSSING

NAD 83 ZONE 9  
ELEV : 191.2  
N : 5693689  
E : 533414  
STANTEC ID NO 182C AND 725  
SURVEY FILE DATE : SEPTEMBER 09, 2014  
FOOTPRINT : REV 8, DATED AUGUST 19, 2019

GEOTECHNICAL:

- ADDITIONAL MITIGATIONS THAT MAY BE REQUIRED AT THIS LOCATION ARE PROVIDED IN THE GEHAZARD AND CONSTRUCTION MITIGATION SUMMARY TABLE CGL4703-WPC-GT-027 REV 0.
- FOR GEOPHYSICS RESULTS, SEE WORLEYPARSONS REPORT CGL-4703-WPC-GT-RP-046.

STRESS MITIGATION:

- ENGINEERED BACKFILL AND FINAL DEEPER COVER FOR STRESS MITIGATION ARE CURRENTLY NOT REQUIRED PER ANALYSIS COMPLETED BY WOOD GROUP PER TABLE CGL4703-WGN-ENG-TBL-016. CONSULT WITH WOOD GROUP FOR UPDATED MITIGATION(S) AS REQUIRED. REFER ALSO TO THE "CONSTRUCTION ALIGNMENT GENERAL NOTES AND ACRONYMS" DRAWING 16442-03-ML-00-010.

PIPE SPECIFICATIONS

- LINE PIPE : ..... CSA Z245.1-18, 1219 mm OD x 20.6 mm WT, GR 550, CAT II, MSC
- HEAVY WALL PIPE : ..... CSA Z245.1-18, 1219 mm OD x 24.7 mm WT, GR 550, CAT II, MSC
- MAX OPERATING TEMPERATURE : ..... 49°C
- MIN OPERATING TEMPERATURE : ..... -5°C
- TYPE OF JOINT : ..... WELDED
- COATING : ..... FUSION BOND EPOXY (SYSTEM 1A-FBE)
- CROSSING METHOD : ..... ISOLATED
- ALTERNATE CROSSING METHOD : ..... OPEN CUT
- MIN TEST PRESSURE : ..... 16,720 kPa
- MAX OPERATING PRESSURE : ..... 13,375 kPa
- CATHODIC PROTECTION : ..... IMPRESSED CURRENT
- MAX CATHODIC PROTECTION VOLTAGE : ..... -2.5 VDC
- PRODUCT CARRIED : ..... SWEET NATURAL GAS

\*This drawing is prepared for the use of the contractual customer of Worley Canada Services Ltd. and Worley assumes no liability to any other party for any representation contained in this drawing.

DRAWING No	TITLE
16442-03-ML-02-151	CONSTRUCTION ALIGNMENT SECTION 8
16442-01-ML-06-002	CONSTRUCTION FITTING TABLE FOR NPS 48 3D INDUCTION BEND
16442-01-ML-07-001	COUNTERBORRE AND TAPE STANDARD FOR NPS 48 PIPE
16442-03-ML-03-082	PIPELINE WATERCOURSE CROSSINGS TYPICAL PIPE BURIAL DETAILS WITHIN STREAM CHANNELS
16442-03-ML-03-094	WARNING SIGNS AND CROSSING RESTRICTION SIGNS
16442-03-ML-10-019	TYPICAL REQUIREMENTS FOR NPS 48 PIPE BUOYANCY CONTROL
16442-03-ML-10-029	TYPICAL DITCH PLUG
16442-03-ML-10-030	TYPICAL DIVERSION BERMS
STDS-03-ML-12-211.01/212.01	TYPICAL SUBDRAIN USING GRAVEL / TYPICAL SUBDRAIN

REV No	DATE	ISSUED FOR CONSTRUCTION	DESCRIPTION
00	2014-12-19	ISSUED FOR CONSTRUCTION	
01	2020-07-22	RE-ISSUED FOR CONSTRUCTION	

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2207465	HD	RPB	KJ	JR	KO	WORLEY
M.000955	LS					WORLEY

PROFESSIONAL ENGINEER/RPT	PERMIT/ ENG. APPROVAL
REV. NO.	DATE
	2020-07-23

**TC Energy** Coastal GasLink Pipeline Project

COASTAL GASLINK PIPELINE (NPS 48 2020)

FACILITY # 16442 ENG STATION: 650+901.0\_R0 DISC # 03

ISOLATED CROSSING OF HIRSCH CREEK

SCALE AS SHOWN DRAWING # 16442-03-ML-03-079 REV 01



**NOTES:**

**GENERAL:**

- SEE ALIGNMENT SHEET 16442-03-ML-02-151 FOR BILL OF MATERIALS.
- PIPELINE INSTALLATION, TESTING AND MAINTENANCE SHALL BE IN ACCORDANCE WITH CSA 2862-19, BC OOC, ALL APPLICABLE FEDERAL, PROVINCIAL, REGIONAL, DISTRICTS AND MUNICIPAL REGULATIONS, PROJECT PERMITS, CONTRACT DOCUMENTS AND CURRENT COMPANY SPECIFICATIONS.
- ALL DIMENSIONS AND ELEVATIONS ARE IN METRES (M) UNLESS OTHERWISE SPECIFIED.
- ALL CHAINAGES ARE CONTOUR (SLACK) UNLESS OTHERWISE SPECIFIED.
- DIMENSIONS ARE HORIZONTAL, DIMENSIONS IN BRACKETS ARE SLACK.
- REFER TO WATERCOURSE CROSSING DESIGN REPORT CGL4703-WPC-GT-RP-047B.

**SURVEYING:**

- PIPELINE ROUTE AND CHAINAGES ARE BASED ON ROUTE REV C. WORK SPACE IS BASED ON CGW4703-MCSL-G-SHP-572-SECTIONS\_CONSTRUCTION\_FOOTPRINT\_REV8.
- THE PIPELINE CENTRELINE GROUND PROFILE WAS EXTRACTED FROM LIDAR OBTAINED IN 2012. THE CHANNEL BED IS ALSO BASED ON LIDAR. THE PIPELINE CENTRELINE GROUND AND CHANNEL THALWEG PROFILES SHALL BE SURVEYED PRIOR TO CONSTRUCTION TO CONFIRM THE PROFILES. A MINIMUM OF TWO TEMPORARY BENCHMARK LOCATIONS SHALL BE ESTABLISHED NEAR THE DESIGN CROSSING LOCATION. IF SUBSTANTIAL DIFFERENCES ARE FOUND IN EITHER THE CENTRELINE OR THALWEG PROFILES, THE DESIGN ENGINEER SHALL BE CONSULTED TO ALLOW FOR A REASSESSMENT OF THE CROSSING DESIGN. A DESIGN REVIEW SHOULD BE REQUESTED IF THE BED SLOPE IS STEEPER, OR THE NEW CHANNEL PROFILE INDICATES ITEMS SUCH AS SCOUR HOLES, OR MULTIPLE BED SLOPE CHANGES, OR THE CENTRELINE PROFILE HAS A THALWEG DEPTH CHANGE GREATER THAN 0.2 M, OR THE THALWEG HAS CHANGED LOCATION AT THE PIPELINE, UPSTREAM OR DOWNSTREAM. IN GENERAL, THALWEG CHANGES SHOULD BE CHECKED AS THIS HAS VARYING SCOUR EFFECTS DUE TO THE NON-LINEAR SCOUR EQUATIONS AND POTENTIAL BANK EROSION IMPACTS.

**CONSTRUCTION:**

- THE MAXIMUM TOP OF PIPE ELEVATION REFERS TO THE TOP OF BUOYANCY CONTROL OR PIPE PROTECTION OR THE PIPE, WHICHEVER IS HIGHEST.
- AT THE TIME OF DRAWING ISSUE, PIPELINE WAS IN A CLASS 1 (CSA 2862-19) LOCATION.
- THE DEPTH AND LOCATION OF ALL FOREIGN FACILITIES ARE APPROXIMATE AND SHALL BE CONFIRMED BY THE CONTRACTOR AS PER THE CONTRACT SPECIFICATIONS PRIOR TO CONSTRUCTION.
- MAXIMUM FIELD BENDING LIMIT IS ONE DEGREE PER PIPE DIAMETER (RADIUS = 57.2D) AS PER TES-CT-GEN-GL REV 05.
- PIPELINE WARNING SIGNS SHALL BE INSTALLED AS PER TES-CT-GEN-GL REV 05 AND DRAWING 16442-03-ML-03-094 OR AS DIRECTED BY THE COMPANY'S FIELD REPRESENTATIVE.
- ALL CONTINUOUS CONCRETE COATED PIPE MUST BE A MINIMUM OF 24.7 mm HEAVY WALL AND MUST BE PRE-TESTED PRIOR TO COATING WITH CONCRETE PER TES-PRES (REV 00) AND TEMP-PRES (REV 00). PER TES-PRES REV 00 SECTION 2.3.1.1, THE MINIMUM PRE-TEST PRESSURE SHALL BE 16,720 kPa; THE MAXIMUM PRE-TEST PRESSURE SHOULD BE THE MINIMUM TEST PRESSURE PLUS 700 kPa BUT MUST BE LESS THAN 100% SMYS (22,285 kPa). ALL PIPE WEIGHTED WITH BOLT-ON (RIVER) WEIGHTS ALSO MUST BE A MINIMUM OF 24.7 mm WALL THICKNESS.
- PIPELINE SHALL BE PLACED IN NATURAL, UNDISTURBED SOIL OR BEDROCK. THE DEPTH OF COVER WITHIN THE WATERCOURSE FROM STA -0+025 TO STA 0+080 CAN BE REDUCED IN COMPACT BEDROCK PER 16442-03-ML-03-082 WHEN APPROVED BY THE COMPANY FIELD REPRESENTATIVE. EXCEPT FOR THE IDENTIFIED STRESS AREAS, THE MINIMUM COVER INDICATED ON THE DRAWING IS FROM THE CONSTRUCTION GRADE IN UNDISTURBED SOIL.
- PIPELINE ELEVATIONS MAY BE VARIED TO SUIT ACTUAL GRADING CONDITIONS. THE MINIMUM DEPTH OF COVER AND MAXIMUM BEND ANGLES WILL BE PER THE DRAWING. THE VERTICAL ALIGNMENT IS TO BE DETERMINED IN THE FIELD NOTING THAT SIGNIFICANT CHANGES MAY AFFECT PIPE STRESS RESULTS AS COMPLETED BY WOOD GROUP. CONSULT WITH WOOD GROUP AS REQUIRED. SEE ALSO NOTE 32.

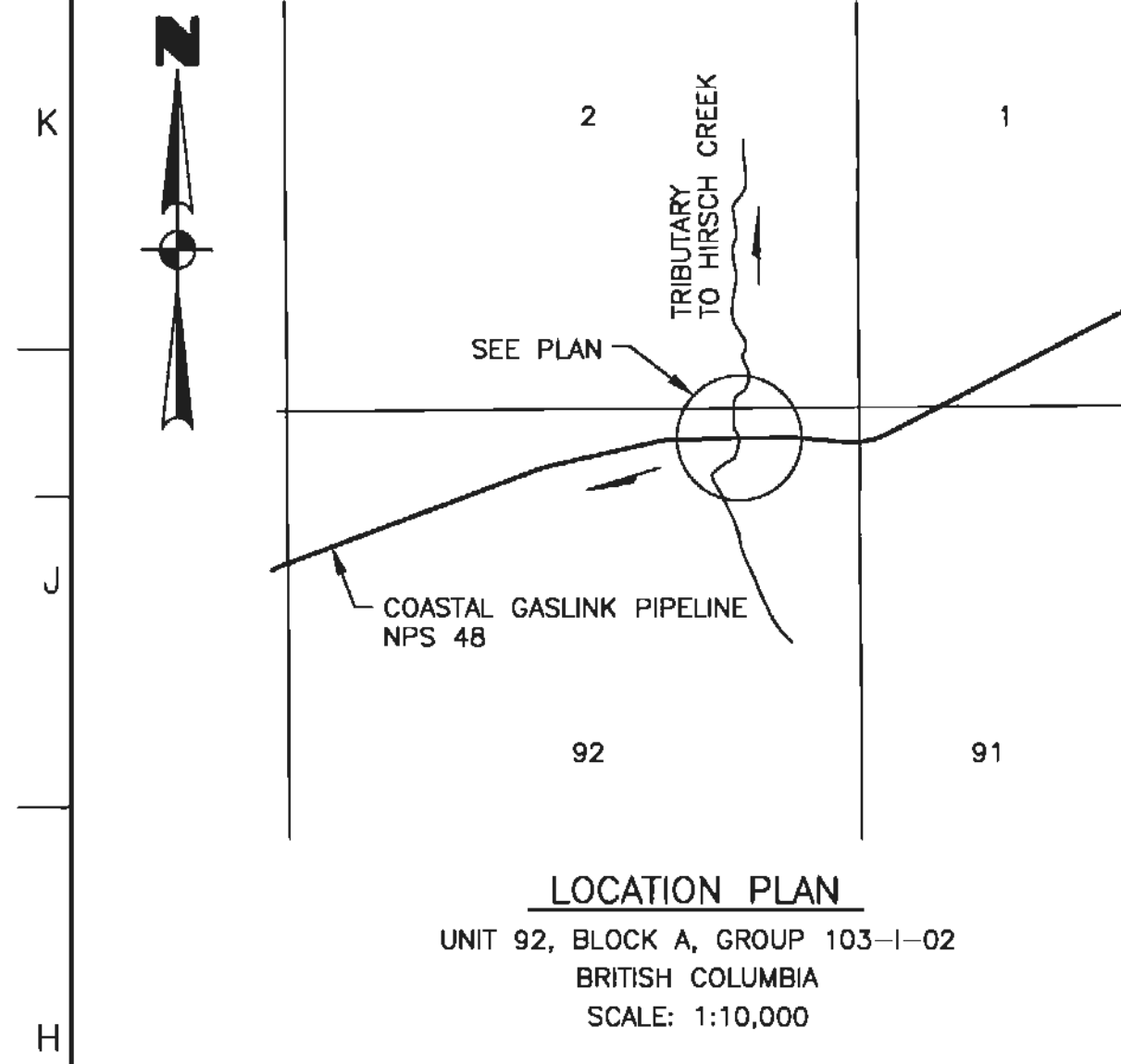
**GRADING AND EXCAVATING:**

**SPOIL PLACEMENT:**

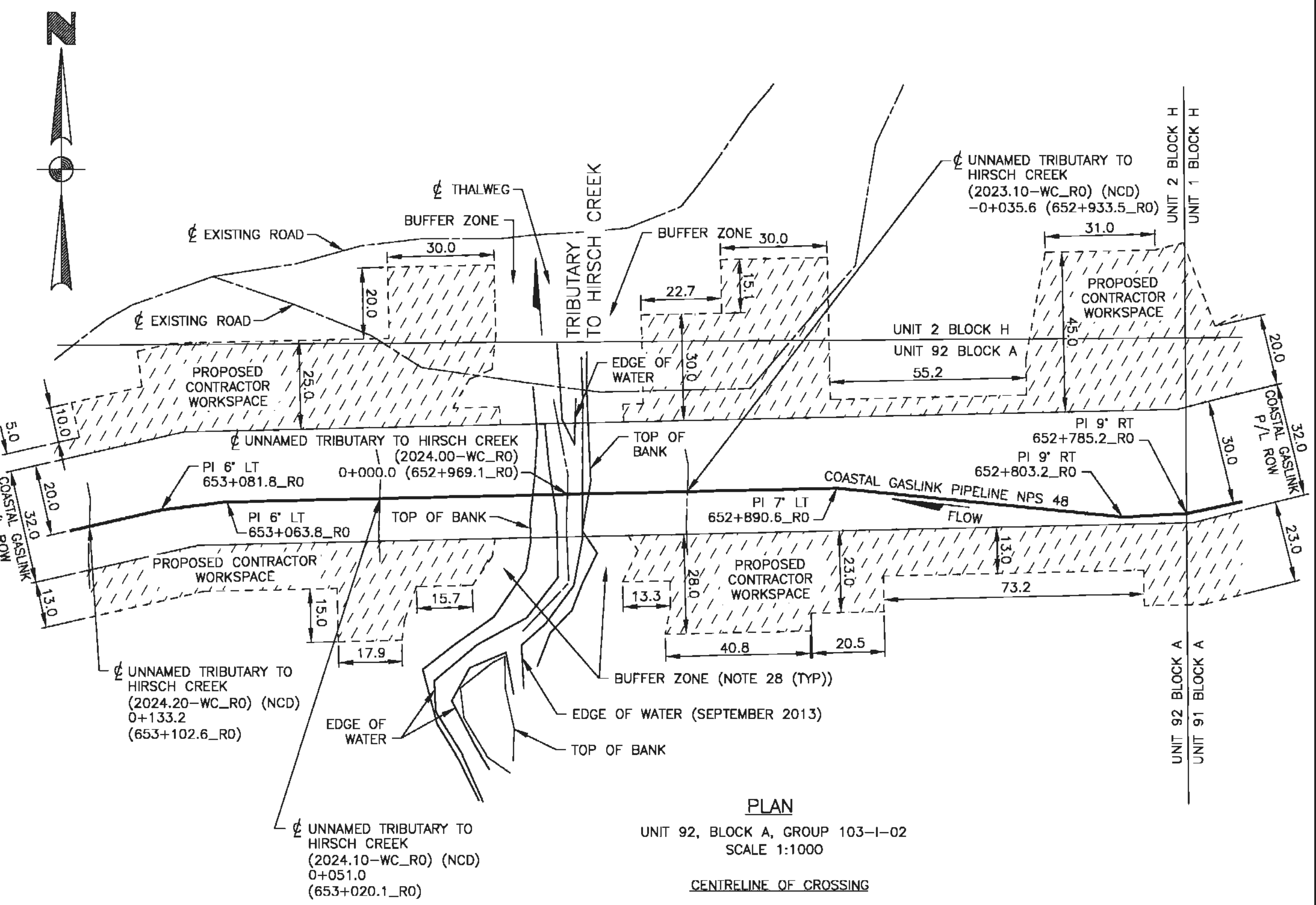
- TEMPORARY:
  - THE "PROPOSED CONSTRUCTION GRADE" IS FOR CONSTRUCTABILITY PURPOSES. THE PIPELINE CONTRACTOR MAY PROPOSE ALTERNATIVE GRADE PROFILES TO THE COMPANY FIELD REPRESENTATIVE FOR PRE-APPROVAL. ALL TEMPORARY AND PERMANENT CUT SLOPES MUST MEET ALL APPLICABLE GOVERNMENT AND COMPANY SAFETY CODES AND REQUIREMENTS. CONSULT WITH THE COMPANY'S QUALIFIED GEOTECHNICAL ENGINEER. SPOIL SHALL BE LOCATED SO AS TO NOT REDUCE BANK OR SLOPE STABILITY - CHECK WITH THE COMPANY'S QUALIFIED GEOTECHNICAL ENGINEER. SPOIL PILE AREAS SHALL BE GRADED TO ENSURE THAT WATER WILL NOT POOL ON THE SURFACE OR BE TRAPPED BY THE SPOIL PILE(S). (SPOIL AREA LOCATIONS AND SIZES ARE AS PER DATA PROVIDED BY THE COMPANY. WORLEY HAS NOT ASSESSED THE ADEQUACY OF THE AREAS TO ACCOMMODATE POTENTIAL SPOIL VOLUMES.)
- PERMANENT:
  - PIPE DITCH ACROSS THE MAIN CHANNEL SHALL BE BACKFILLED WITH NATIVE MATERIAL TO APPROXIMATELY 500 mm BELOW THE ORIGINAL GRADE. THE UPPER 500 mm OF THE CHANNEL BED SHALL BE BACKFILLED WITH THE ORIGINAL UPPER 500 mm OF GRANULAR MATERIAL. IF PRESENT, IF GRANULAR MATERIAL WAS NOT PRESENT, COMPLETE BACKFILLING USING NATIVE MATERIAL OR AS SPECIFIED IN THE PROJECT ENVIRONMENTAL MANAGEMENT PLAN CGL4703-CGP-ENV-PLN-008.
  - FINAL WATERCOURSE BED CONTOURS SHALL APPROXIMATE THE PRECONSTRUCTION BED CONTOURS (SEE MILESTAKES).
  - PERMANENTLY REPLACED BANK, FLOODPLAIN AND SLOPE SPOIL MATERIAL SHALL BE PLACED IN MAXIMUM 300 mm THICK LIFTS WITH EACH LIFT NOMINALLY COMPACTED USING A MINIMUM OF THREE PASSES WITH EQUIPMENT APPLYING A MINIMUM OF 100 kPa PRESSURE IF PLACED AT A SHALLower ANGLE THAN 3H TO 1V OR AS SPECIFIED IN THE COMPANY APPROVED RESTORATION PLANS. UNFROZEN SOIL FREE OF ORGANICS SHALL BE USED. DO NOT PLACE FILL DURING FREEZING CONDITIONS UNLESS SPECIFICALLY APPROVED BY THE COMPANY'S QUALIFIED GEOTECHNICAL ENGINEER. WATERCOURSE BANKS AND SLOPES RESTORATION SHALL ENSURE LONG-TERM STABILITY AND SHALL BE IN COMPLIANCE WITH THE COMPANY'S ENVIRONMENTAL MANAGEMENT PLAN AND PERMIT CONDITIONS. BANK AND SLOPE RESTORATION PLANS SHALL BE PROPOSED BY THE CONTRACTOR AND PRE-ACCEPTED BY BOTH THE COMPANY'S QUALIFIED GEOTECHNICAL ENGINEER AND ENVIRONMENTAL PROFESSIONALS PRIOR TO IMPLEMENTATION. BANKS AND SLOPES SHALL NOT BE REPLACED TO STEEPER THAN 3H TO 1V UNLESS PROPERLY COMPACTED TO A MINIMUM OF 95% OF STANDARD PROCTOR MAXIMUM DRY DENSITY OR AS PRE-APPROVED BY THESE PROFESSIONALS AND BY THE COMPANY'S ENGINEER OF RECORD. THE REQUIREMENTS OF COMPANY FIELD CHANGE PROCEDURE CGL4703-CGP-ENG-PRO-0005 AND GEOTECHNICAL FIELD CHANGE PROCEDURE CGL4703-CGP-ENG-PRO-0004 SHALL BE FOLLOWED FOR PROPOSAL AND ACCEPTANCE OF FIELD CHANGES.
  - SPOIL AREAS SHOULD BE GRADED TO ENSURE THAT WATER WILL NOT POOL ON THE SURFACE OR BE TRAPPED BY THE REPLACED SPOIL. EXCESS PERMANENT SPOIL SHALL NOT BE PLACED ON THE BANKS OR APPROACH SLOPES.

**DRAINAGE AND EROSION CONTROL:**

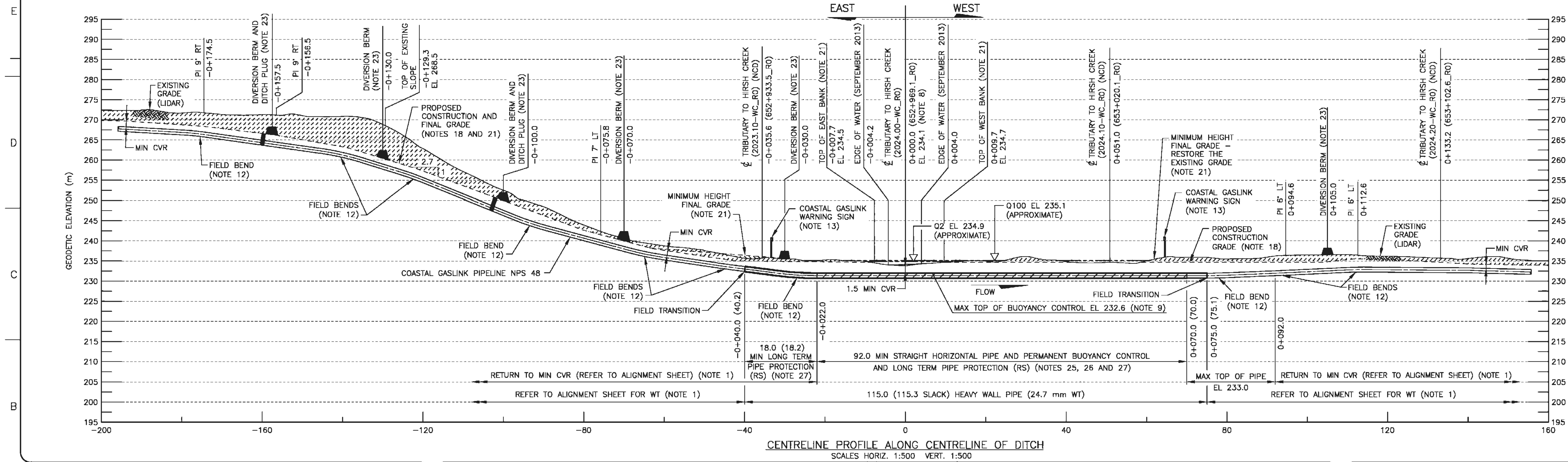
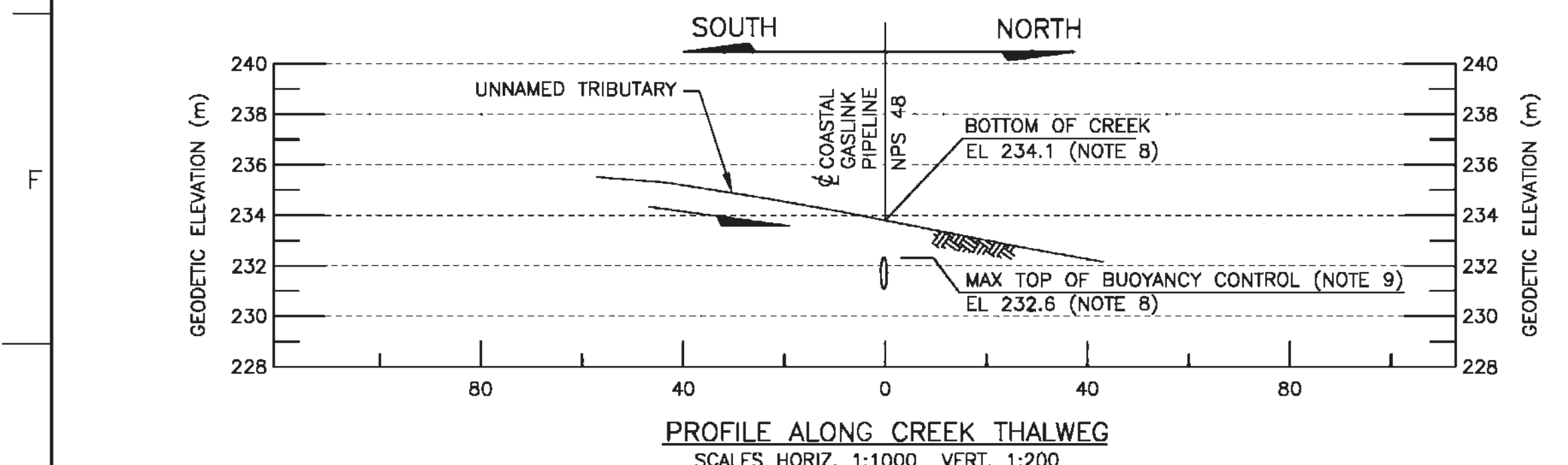
- CONTRACTOR SHALL INSTALL DIVERSION BERMS AND DITCH PLUGS, AND SUBDRAINS IF REQUIRED. PRELIMINARY LOCATIONS ARE SHOWN ON THE DRAWING AND IN THE GEOHAZARD TABLES. FINAL LOCATIONS SHALL BE BASED ON ACTUAL SITE CONDITIONS PER THE CRITERIA OUTLINED IN DRAWINGS 16442-03-ML-10-024, 16442-03-ML-10-028, 16442-03-ML-10-029, 16442-03-ML-10-030 AND STDS-03-ML-12-21/212\_01 AS DETERMINED BY COMPANY QUALIFIED FIELD PERSONNEL AND APPROVED BY THE ENGINEER OF RECORD. CONSIDERATION COULD ALSO BE GIVEN TO APPLYING 16442-03-ML-10-025 "TYPICAL TOP OF SLOPE INTERCEPTOR CHANNEL AND DIKE". DURING CONSTRUCTION, TEMPORARY EROSION CONTROL MEASURES SUCH AS SILT FENCES OR OTHER NECESSARY MEASURES SHALL BE INSTALLED TO MAINTAIN SOIL CONSERVATION AND PREVENT SEDIMENT LADEN RUNOFF FROM ENTERING THE WATERCOURSE. (REFER ALSO TO THE ENVIRONMENTAL NOTES.)



**DATUM REFERENCE:**  
 UTM ZONE 9 NORTH, BASED ON THE NORTH AMERICAN DATUM OF 1983 (NAD83 CSRS - UTM ZONE 9N).  
 ELEVATIONS ARE BASED ON THE CANADIAN GEODETIC VERTICAL DATUM OF 1928 (CGVD28) DERIVED USING THE HTV2.0 GEOD MODEL.



**PLAN**  
 UNIT 92, BLOCK A, GROUP 103-1-02  
 SCALE 1:1000  
**CENTRELINE OF CROSSING**  
 NAD 83 ZONE 9  
 ELEV : 234.1  
 N : 5992838  
 E : 531605  
 STANTEC ID NO 727  
 SURVEY FILE DATE : OCTOBER 30, 2013  
 FOOTPRINT : REV 8, DATED AUGUST 19, 2019



DRAWING No	TITLE
16442-03-ML-02-151	CONSTRUCTION ALIGNMENT SECTION B
16442-01-ML-07-001	COUNTERBORING AND TAPE STANDARD FOR NPS 48 PIPE
16442-03-ML-03-082	PIPELINE WATERCOURSE CROSSINGS TYPICAL PIPE BURIAL DETAILS WITHIN STREAM CHANNELS
16442-03-ML-03-094	WARNING SIGNS AND CROSSING RESTRICTION SIGNS
16442-03-ML-10-019	TYPICAL REQUIREMENTS FOR NPS 48 PIPE BUOYANCY CONTROL
16442-03-ML-10-024/028	TYPICAL PERMANENT EROSION CONTROL GRANULAR BLANKET COVER / TYPICAL GRAVEL LINED CHANNEL FOR SLOPES
16442-03-ML-10-029/030	TYPICAL DITCH PLUG / TYPICAL DIVERSION BERMS
STDS-03-ML-05-111_01/112_01	FLUME WATER COURSE CROSSINGS / DAM AND PUMP WATER COURSE CROSSINGS
STDS-03-ML-12-21_01/212_01	TYPICAL SUBDRAIN USING GRAVEL / TYPICAL SUBDRAIN

REV No	DATE	DESCRIPTION
00	2014-12-19	ISSUED FOR CONSTRUCTION
01	2020-07-22	RE-ISSUED FOR CONSTRUCTION

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2207465	HD	KJ	RPB	JR	KO	WORLEY
M.000955	LS					WORLEY

PROFESSIONAL ENGINEER/RPT	PERMIT/ ENG. APPROVAL
REV. NO.	DATE
	PERMIT NUMBER:

**TC Energy** Coastal GasLink Pipeline Project

COASTAL GASLINK PIPELINE (NPS 48 2020)

PROJECT # 16442 | ENG STATION: 652+969.1\_R0 | DISC # 03

**ISOLATED CROSSING OF UNNAMED TRIBUTARY TO HIRSCH CREEK**

SCALE: AS SHOWN | DRAWING # 16442-03-ML-03-080 | REV 01

- GEOTECHNICAL:**
- ADDITIONAL MITIGATIONS THAT MAY BE REQUIRED AT THIS LOCATION ARE PROVIDED IN THE GEOHAZARD AND CONSTRUCTION MITIGATION SUMMARY TABLE CGL4703-WPC-GT-027 REV 0.
- STRESS MITIGATION:**
- ENGINEERED BACKFILL AND FINAL DEEPER COVER FOR STRESS MITIGATION ARE CURRENTLY NOT REQUIRED PER ANALYSIS COMPLETED BY WOOD GROUP PER TABLE CGL4703-WGM-ENG-TBL-016. CONSULT WITH WOOD GROUP FOR UPDATED MITIGATION(S) AS REQUIRED. REFER ALSO TO THE "CONSTRUCTION ALIGNMENT GENERAL NOTES AND ACRONYMS" DRAWING 16442-03-ML-00-010.

PIPE SPECIFICATIONS	
1. LINE PIPE :	CSA 2245.1-18, 1219 mm OD x 18.5 mm WT, GR 550, CAT II, MSC
2. HEAVY WALL PIPE :	CSA 2245.1-18, 1219 mm OD x 24.7 mm WT, GR 550, CAT II, MSC
3. MAX OPERATING TEMPERATURE :	49°C
4. MIN OPERATING TEMPERATURE :	-5°C
5. TYPE OF JOINT :	WELDED
6. COATING :	FUSION BOND EPOXY (SYSTEM 1A-FBE)
7. PRIMARY CROSSING METHOD :	ISOLATED
8. ALTERNATE CROSSING METHOD :	OPEN CUT
9. MIN TEST PRESSURE :	16,720 kPa
10. MAX OPERATING PRESSURE :	13,375 kPa
11. CATHODIC PROTECTION :	IMPRESSED CURRENT
12. MAX CATHODIC PROTECTION VOLTAGE :	-2.5 VDC
13. PRODUCT CARRIED :	SWEET NATURAL GAS

"This drawing is prepared for the use of the contractual customer of Worley Canada Services Ltd. and Worley assumes no liability to any other party for any representation contained in this drawing."



**From:** Wilson, Jason  
**Sent:** Thursday, July 30, 2020 9:05 AM  
**To:** 'Tracy Young'  
**Cc:** Dan Wyman  
**Subject:** RE: CGL Section 8 Condition 88a Geohazards

Great that will work. Thank you.



**Jason Wilson** P.Eng.  
Engineer, Pipelines & Facilities  
[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)

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---

**From:** Tracy Young  
**Sent:** Thursday, July 30, 2020 9:00 AM  
**To:** Wilson, Jason  
**Cc:** Dan Wyman  
**Subject:** RE: CGL Section 8 Condition 88a Geohazards

Hi Jason,

We want to provide the Issued For Construction (IFC) drawings rather than the Issued For Review (IFR). I will provide the IFC drawings that are ready to you, Darryl and Kate shortly, apologies for the delay.

Thank you,

**Tracy Young**  
Senior Regulatory Analyst  
Coastal GasLink Pipeline Project

tel: 778-328-5327 mobile: S.22

[TCEnergy.com](http://TCEnergy.com)

---

**From:** Wilson, Jason <[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)>  
**Sent:** Thursday, July 30, 2020 8:48 AM  
**To:** Tracy Young <[tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com)>

Cc: Dan Wyman <[dan\\_wyman@tcenergy.com](mailto:dan_wyman@tcenergy.com)>

Subject: [EXTERNAL] RE: CGL Section 8 Condition 88a Geohazards

Morning Tracy, were you able to gather the information I had requested during our meeting. I don't recall seeing it come through. Thanks,



**Jason Wilson** P.Eng.  
Engineer, Pipelines & Facilities  
[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)

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**From:** Tracy Young <[tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com)>

**Sent:** Wednesday, July 15, 2020 7:49 AM

**To:** Wilson, Jason <[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)>

**Cc:** Dan Wyman <[dan\\_wyman@tcenergy.com](mailto:dan_wyman@tcenergy.com)>

**Subject:** RE: CGL Section 8 Condition 88a Geohazards

Hi Jason,

Are you available tomorrow at 9am or 1pm MST (would be 8am or noon PST) to discuss? Alternatively Friday at 11am or 2pm MST (10am or 1pm PST) would also work for our team. Please let me know if any of those times work for you and I will set up a call.

Thank you,

**Tracy Young**  
Senior Regulatory Analyst  
Coastal GasLink Pipeline Project

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---

**From:** Wilson, Jason <[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)>

**Sent:** Monday, July 13, 2020 1:01 PM

**To:** Tracy Young <[tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com)>

**Cc:** Dan Wyman <[dan\\_wyman@tcenergy.com](mailto:dan_wyman@tcenergy.com)>

**Subject:** [EXTERNAL] RE: CGL Section 8 Condition 88a Geohazards

Sure, either day works. I was thinking I'd provide more detail in our conversation but it can wait till later this week.



**Jason Wilson** P.Eng.  
Engineer, Pipelines & Facilities  
[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)

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**From:** Tracy Young <[tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com)>  
**Sent:** Monday, July 13, 2020 12:10 PM  
**To:** Wilson, Jason <[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)>  
**Cc:** Dan Wyman <[dan\\_wyman@tcenergy.com](mailto:dan_wyman@tcenergy.com)>  
**Subject:** RE: CGL Section 8 Condition 88a Geohazards

Hi Jason,

Your questions will require input from the engineers. I have reached out to them with your questions and suggest that we set up a time later this week to discuss. I have asked for their availability and will reach out to set up a time to discuss with you once I hear back from them.

Do you have availability on Wednesday or Thursday?

Thank you,

**Tracy Young**  
Senior Regulatory Analyst  
Coastal GasLink Pipeline Project

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---

**From:** Wilson, Jason <[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)>  
**Sent:** Monday, July 13, 2020 10:32 AM  
**To:** Dan Wyman <[dan\\_wyman@tcenergy.com](mailto:dan_wyman@tcenergy.com)>  
**Cc:** Tracy Young <[tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com)>  
**Subject:** [EXTERNAL] RE: CGL Section 8 Condition 88a Geohazards

Thanks Dan,

1 pm BC time works for me. In the table, as shown below, the description of mitigation is just a few words. We are looking for more detail, of what the mitigation measure entails. I expect for things like deeper burial there will be increased wall thickness, different coatings, other information could include how far the protection extends past the hazard.

Table 1: Identified geohazard and assigned mitigation measures for Section 8W (KP 623+800 to KP 667+392)

Section	Identified Geohazard	Start Kilometre Post (Route Rev F1)	End Kilometre Post (Route Rev F1)	UTM 9 Start Coordinates		UTM 9 End Coordinates		Mitigation 1	Mitigation 2	Mitigation 3
				Easting (m)	Northing (m)	Easting (m)	Northing (m)	Description	Description	Description
8W	Debris Flow or Flood	628+746	628+766	552639.2942	5991148.694	552622.552	5991157.697	Deep burial (1.8 m)	Pipe protection <sup>1</sup>	
8W	Debris Flow or Flood	629+523	629+546	551973.6837	5991506.613	551954.6596	5991516.843	Deep burial (1.8 m)	Pipe protection <sup>1</sup>	
8W	Vertical Scour	630+825	630+837	550765.2238	5991780.088	550754.2634	5991784.96	Deep burial (1.8 m)	Channel Bottom Protection (Pending confirmation of bedrock depth)	
8W	Channel Migration	630+825	630+839	550765.2238	5991780.088	550752.5449	5991785.724	Deep burial (extended) <sup>2</sup>		
8W	Debris Flow or Flood	633+173	633+194	548513.3102	5991726.022	548494.5039	5991731.689	Deep burial (1.8 m)		
8W	Channel Migration	633+174	633+192	548512.4845	5991726.271	548496.2195	5991731.172	Deep burial (extended) <sup>2</sup>		
8W	Debris Flow or Flood	633+505	633+533	548202.2347	5991819.757	548175.4381	5991827.832	Deep burial (1.8 m)		
8W	Channel Migration	633+505	633+533	548202.2347	5991819.757	548175.4381	5991827.832	Deep burial (extended) <sup>2</sup>		



**Jason Wilson** P.Eng.  
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**From:** Dan Wyman <[dan\\_wyman@tcenergy.com](mailto:dan_wyman@tcenergy.com)>  
**Sent:** Monday, July 13, 2020 10:08 AM  
**To:** Wilson, Jason <[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)>  
**Cc:** Tracy Young <[tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com)>  
**Subject:** RE: CGL Section 8 Condition 88a Geohazards



Hi Jason, happy to have a quick call, I'm free after 1pm BC time. That being said, I'm not a geotechnical engineer so I won't be able to answer any technical questions. Are you able to share any specific questions that we can circle with the team on in advance of the call?

S.22

so if we need to circle later in the week I've looped in Tracy as she might be the best person to connect with on site-specific issues.

---

**Dan Wyman**  
Regulatory -CGL  
O: 403.920.6296 |  
[TCEnergy.com](http://TCEnergy.com)

---

S.22

---

**From:** Wilson, Jason [<mailto:Jason.Wilson@BCOGC.ca>]  
**Sent:** Monday, July 13, 2020 10:19 AM  
**To:** Dan Wyman <[dan\\_wyman@tcenergy.com](mailto:dan_wyman@tcenergy.com)>  
**Subject:** [EXTERNAL] FW: CGL Section 8 Condition 88a Geohazards

Good morning Dan,

I've been discussing section 8's Geohazards with our inspectors, they are looking for more details with respect to the mitigation measures. As you can appreciate they are quite brief in the list. Do you have a free 15 minutes to chat today or tomorrow?



**Jason Wilson** P.Eng.  
Engineer, Pipelines & Facilities  
[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)

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**From:** Phillips, Lori L <[Lori.Phillips@BCOGC.ca](mailto:Lori.Phillips@BCOGC.ca)>  
**Sent:** Thursday, March 5, 2020 8:14 AM  
**To:** Anderson, Justin <[Justin.Anderson@BCOGC.ca](mailto:Justin.Anderson@BCOGC.ca)>; Friedrich, Hardy <[Hardy.Friedrich@bcogc.ca](mailto:Hardy.Friedrich@bcogc.ca)>; Wilson, Jason <[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)>  
**Subject:** FW: CGL Section 8 Condition 88a Geohazards

Hi Jason, would you guys be able to take a look at this one?



**Lori Phillips**  
Authorizations Manager  
[Lori.Phillips@BCOGC.ca](mailto:Lori.Phillips@BCOGC.ca)

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**From:** Tracy Young <[tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com)>  
**Sent:** Wednesday, March 4, 2020 7:07 PM  
**To:** Post Permit Requests <[postpermitrequests@bcogc.ca](mailto:postpermitrequests@bcogc.ca)>  
**Cc:** Phillips, Lori L <[Lori.Phillips@BCOGC.ca](mailto:Lori.Phillips@BCOGC.ca)>; Thoroughgood, Garth <[Garth.Thoroughgood@BCOGC.ca](mailto:Garth.Thoroughgood@BCOGC.ca)>; Dan Wyman <[dan\\_wyman@tcenergy.com](mailto:dan_wyman@tcenergy.com)>; Joseph Campbell <[joseph\\_campbell@tcenergy.com](mailto:joseph_campbell@tcenergy.com)>  
**Subject:** CGL Section 8 Condition 88a Geohazards

Coastal GasLink is providing the geohazard assessment for Section 8 West per Condition 88a of Permit AD#100084230. Section 8 has been broken into two parts, 8 West and 8 East. We will be providing the geohazard assessment for 8 East at a later date.

The field changes manual for geohazards (Condition 88b on Section 8 permit) will be provided as a separate filing as a project-wide submission. Anticipate that this submission will be filed this week.

Thank you,

**Tracy Young**  
Senior Regulatory Analyst  
Coastal GasLink Pipeline Project

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**From:** OGC Pipelines, Facilities  
**Sent:** Monday, May 25, 2020 10:30 AM  
**To:** Wilson, Jason  
**Cc:** Nazareth, James; OGC Pipelines, Facilities  
**Subject:** FW: Scheduled Watercourse Crossing Report #2  
**Attachments:** CGL4703-CGP-BCOGC-REG-LTR-0149\_June.pdf

Hi Jason,

Another submission from CGL.

Thanks  
Dana



**Dana Lockinger**  
Engineering Systems & Project Liaison  
[Dana.Lockinger@bcogc.ca](mailto:Dana.Lockinger@bcogc.ca)

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**From:** Phillips, Lori L  
**Sent:** Monday, May 25, 2020 10:26 AM  
**To:** Friedrich, Hardy ; Anderson, Justin ; OGC Pipelines, Facilities ; OGC Compliance & Enforcement <C&E@bcogc.ca>  
**Subject:** FW: Scheduled Watercourse Crossing Report #2



**Lori Phillips**  
Authorizations Manager  
[Lori.Phillips@BCOGC.ca](mailto:Lori.Phillips@BCOGC.ca)

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**From:** Shelley McInnis <[shelley\\_mcinnis@tcenergy.com](mailto:shelley_mcinnis@tcenergy.com)>

**Sent:** Monday, May 25, 2020 9:48 AM

**To:** Post Permit Requests <[postpermitrequests@bcogc.ca](mailto:postpermitrequests@bcogc.ca)>; Phillips, Lori L <[Lori.Phillips@BCOGC.ca](mailto:Lori.Phillips@BCOGC.ca)>

**Cc:** Thoroughgood, Garth <[Garth.Thoroughgood@BCOGC.ca](mailto:Garth.Thoroughgood@BCOGC.ca)>; Smook, Patrick <[Patrick.Smook@BCOGC.ca](mailto:Patrick.Smook@BCOGC.ca)>; Dan Wyman <[dan\\_wyman@tcenergy.com](mailto:dan_wyman@tcenergy.com)>; Tracy Young <[tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com)>; Joseph Campbell <[joseph\\_campbell@tcenergy.com](mailto:joseph_campbell@tcenergy.com)>

**Subject:** Scheduled Watercourse Crossing Report #2

Good afternoon Lori,

Please find attached CGL's Scheduled Watercourse Crossings Report #2. This report covers the planned construction of pipeline crossings of watercourses throughout the Project and is filed in response to the following conditions:

- Pipeline Section 1, AD 100082293, Condition 9
- Pipeline Section 2, AD 100082292, Condition 9
- Pipeline Section 3, AD 100082299, Condition 8
- Pipeline Section 4, AD 100082252, Condition 9
- Pipeline Section 5, AD 100082251, Condition 9
- Pipeline Section 6, AD 100082422, Condition 9
- Pipeline Section 7, AD 100082423, Condition 8
- Pipeline Section 8, AD 100084230, Condition 9

Please contact Dan Wyman if you have any questions regarding the contents of this report.

Thank you,

**Shelley McInnis**

Regulatory Administrative Analyst

Coastal GasLink

[shelley\\_mcinnis@tcenergy.com](mailto:shelley_mcinnis@tcenergy.com)

desk: 403-920-1370 cell: S.22



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**From:** Dan Wyman <dan\_wyman@tcenergy.com>  
**Sent:** Friday, May 22, 2020 7:40 AM  
**To:** Wilson, Jason; Nazareth, James  
**Cc:** Tracy Young; Joseph Campbell; Phillips, Lori L  
**Subject:** RE: CGL Questions on Status of Engineering Condition Reviews

Thank you Jason, just wanted to follow-up on whether there had been any progression on your review of the Geohazard Field Changes Manual. We intend to start some stringing activities in June and so would like to be sure there are no compliance issues with that.

Thanks for your help,  
-Dan

Dan Wyman  
Regulatory -CGL  
O: 403.920.6296 | M: S.22  
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---

**From:** Wilson, Jason [mailto:Jason.Wilson@BCOGC.ca]  
**Sent:** Tuesday, May 5, 2020 10:00 AM  
**To:** Dan Wyman ; Nazareth, James  
**Cc:** Tracy Young ; Joseph Campbell ; Lori Phillips  
**Subject:** [EXTERNAL] RE: CGL Questions on Status of Engineering Condition Reviews

Hello Dan;

CGL has met the requirements for the following conditions:

- Site-specific Geohazard Assessments (Sections 1, 3, 4, 8 East, and 8 West)
- CGL Fracture Control Program (Project-wide)

I am still reviewing the Field Changes Manual, I miss filed it but it is a priority for me and it shouldn't take too much longer for me to complete my initial review.

Thank you.



**Jason Wilson** P.Eng.  
Engineer, Pipelines & Facilities  
[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)

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**From:** Dan Wyman <[dan\\_wyman@tcenergy.com](mailto:dan_wyman@tcenergy.com)>  
**Sent:** Friday, May 1, 2020 8:12 AM  
**To:** Nazareth, James <[James.Nazareth@BCOGC.ca](mailto:James.Nazareth@BCOGC.ca)>; Wilson, Jason <[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)>  
**Cc:** Tracy Young <[tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com)>; Joseph Campbell <[joseph\\_campbell@tcenergy.com](mailto:joseph_campbell@tcenergy.com)>; Phillips, Lori L



<[Lori.Phillips@BCOGC.ca](mailto:Lori.Phillips@BCOGC.ca)>

**Subject:** CGL Questions on Status of Engineering Condition Reviews

Morning James and Jason,

I was hoping to be able to check-in on the status of your review of the following CGL Condition Submissions:

- CGL Field Changes Manual for Geohazards (Project-wide)
- Site-specific Geohazard Assessments (Sections 1, 3, 4, 8 East, and 8 West)
- CGL Fracture Control Program (Project-wide)

CGL understands that activities such as welding and stringing cannot commence until the OGC has approved these plans, as work is generally planned to start June 15 (note that the Kitimat DPI may start a little earlier), we wanted to confirm whether there were any concerns with these filings and what the timeline was for OGC approval?

Thank you in advance for your help,

-Dan

**Dan Wyman**

Team Lead, Regulatory

Coastal GasLink

[dan\\_wyman@transcanada.com](mailto:dan_wyman@transcanada.com)

mobile: S.22 desk: 403-920-6296



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**From:** OGC Pipelines, Facilities  
**Sent:** Monday, May 11, 2020 11:07 AM  
**To:** Wilson, Jason  
**Cc:** Nazareth, James; OGC Pipelines, Facilities  
**Subject:** FW: CGL Section 8 Condition 56  
**Attachments:** CGL4703-CGP-BCOGC-REG-LTR-3775\_Kitimat River\_S8.pdf; CGL4703-IPC-PM-PEP-0001 - Kitimat Execution Plan rev2.pdf

Hi Jason,

Attached are some more documents from CGL.

Thanks  
Dana



**Dana Lockinger**  
Engineering Systems & Project Liaison  
[Dana.Lockinger@bcogc.ca](mailto:Dana.Lockinger@bcogc.ca)

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**From:** Phillips, Lori L  
**Sent:** Monday, May 11, 2020 10:56 AM  
**To:** OGC Pipelines, Facilities ; Friedrich, Hardy ; Anderson, Justin  
**Subject:** Fw: CGL Section 8 Condition 56

---

**From:** Tracy Young <[tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com)>  
**Sent:** Monday, May 11, 2020 10:53 AM  
**To:** Post Permit Requests  
**Cc:** Phillips, Lori L; Thoroughgood, Garth; Dan Wyman; Shelley McInnis  
**Subject:** CGL Section 8 Condition 56

Please find attached the Execution Plan for the Kitimat River to satisfy Condition 56 of the Section 8 Pipeline Permit (AD# 10084230) for satisfaction of the Commission. Please note that the schedule is subject to change depending on site conditions and COVID-19 protocol implementations.

Should you have any questions, please do not hesitate to let me know.

Thank you,

**Tracy Young**  
Senior Regulatory Analyst

Coastal GasLink Pipeline Project

tel: 778-328-5327 mobile: S.22  
[TCEnergy.com](http://TCEnergy.com)

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May 11, 2020

Ms. Lori Phillips  
Authorizations Manager  
BC Oil and Gas Commission  
6534 Airport Road  
Fort St. John, B.C. V1J 4M6

Coastal GasLinkLLP  
630 – 609 Granville Street  
Vancouver, BC, Canada V7Y 1G5

Tel: 778.328.5327  
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Email: [tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com)  
Web: [www.TCenergy.com](http://www.TCenergy.com)

CGL4703-CGP-BCOGC-REG-LTR-3775

Dear Ms. Phillips,

**Re: Coastal GasLink Pipeline Project (Coastal GasLink or Project)  
Satisfaction of the Commission – Site-Specific Crossing Plan for Kitimat River  
Ref: Pipeline Permit Section 8 (AD# 100084230) – Condition 56**

Coastal GasLink is submitting the Section 8 Kitimat Direct Pipe Installation Execution Plan (Execution Plan) to address the Condition 56 requirement of a site-specific crossing plan for crossing 677 (Kitimat River) to the British Columbia (BC) Oil and Gas Commission (OGC) for review, and requests satisfaction of the Commission.

Should you have any questions regarding this request, do not hesitate to call me at 778.328.5327 or email me at [tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com).

Sincerely



Tracy Young  
Senior Regulatory Analyst  
Coastal GasLink

Pages: 20-143  
S.21

**From:** Nazareth, James  
**Sent:** Thursday, April 30, 2020 10:46 AM  
**To:** Wilson, Jason  
**Subject:** RE: Section 8 Condition 84 Road Crossing Submission

Thanks Jason.

JN



**James Nazareth** P.Eng.  
Supervisor, Engineering Reviews  
[James.Nazareth@BCOGC.ca](mailto:James.Nazareth@BCOGC.ca)

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S.17



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**From:** Wilson, Jason  
**Sent:** Thursday, April 30, 2020 10:44 AM  
**To:** Nazareth, James ; OGC Pipelines, Facilities  
**Subject:** RE: Section 8 Condition 84 Road Crossing Submission

Justin and lori have been on the emails. Also I asked Lori to check with James O, as I think he put it in. I'll make sure Lori/Justin/Hardy get the right person to review it.



**Jason Wilson** P.Eng.  
Engineer, Pipelines & Facilities  
[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)

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**From:** Nazareth, James <[James.Nazareth@BCOGC.ca](mailto:James.Nazareth@BCOGC.ca)>  
**Sent:** Thursday, April 30, 2020 9:30 AM

**To:** Wilson, Jason <[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)>; OGC Pipelines, Facilities <[OGCPipelines.Facilities@bcogc.ca](mailto:OGCPipelines.Facilities@bcogc.ca)>  
**Subject:** RE: Section 8 Condition 84 Road Crossing Submission

Hi Jason & Dana,

I think this should be sent to Patrick and Justin.

Have a good day.

James



**James Nazareth** P.Eng.  
Supervisor, Engineering Reviews  
[James.Nazareth@BCOGC.ca](mailto:James.Nazareth@BCOGC.ca)

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**From:** Wilson, Jason <[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)>  
**Sent:** Thursday, April 30, 2020 9:25 AM  
**To:** OGC Pipelines, Facilities <[OGCPipelines.Facilities@bcogc.ca](mailto:OGCPipelines.Facilities@bcogc.ca)>  
**Cc:** Nazareth, James <[James.Nazareth@BCOGC.ca](mailto:James.Nazareth@BCOGC.ca)>  
**Subject:** RE: Section 8 Condition 84 Road Crossing Submission

Thank you Dana. I don't know who should be reviewing the road crossing submissions, I cannot remember who added that condition but it wasn't engineering. I'll let Hardy know that I will not be reviewing them.



**Jason Wilson** P.Eng.  
Engineer, Pipelines & Facilities  
[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)

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**From:** OGC Pipelines, Facilities <[OGCPipelines.Facilities@bcogc.ca](mailto:OGCPipelines.Facilities@bcogc.ca)>  
**Sent:** Thursday, April 30, 2020 9:18 AM  
**To:** Wilson, Jason <[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)>  
**Cc:** Nazareth, James <[James.Nazareth@BCOGC.ca](mailto:James.Nazareth@BCOGC.ca)>; OGC Pipelines, Facilities <[OGCPipelines.Facilities@bcogc.ca](mailto:OGCPipelines.Facilities@bcogc.ca)>  
**Subject:** FW: Section 8 Condition 84 Road Crossing Submission

Hi Jason,

FYI - Some more reports for CGL.

Thanks  
Dana



**Dana Lockinger**  
Engineering Systems & Project Liaison  
[Dana.Lockinger@bcogc.ca](mailto:Dana.Lockinger@bcogc.ca)

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**From:** Phillips, Lori L <[Lori.Phillips@BCOGC.ca](mailto:Lori.Phillips@BCOGC.ca)>  
**Sent:** Wednesday, April 29, 2020 2:56 PM  
**To:** OGC Pipelines, Facilities <[OGCPipelines.Facilities@bcogc.ca](mailto:OGCPipelines.Facilities@bcogc.ca)>  
**Cc:** Friedrich, Hardy <[Hardy.Friedrich@bcogc.ca](mailto:Hardy.Friedrich@bcogc.ca)>; Anderson, Justin <[Justin.Anderson@BCOGC.ca](mailto:Justin.Anderson@BCOGC.ca)>  
**Subject:** FW: Section 8 Condition 84 Road Crossing Submission

Hi all, please find attached the submission for the road crossing permit condition in s. 8.



**Lori Phillips**  
Authorizations Manager  
[Lori.Phillips@BCOGC.ca](mailto:Lori.Phillips@BCOGC.ca)

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**From:** Tracy Young <[tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com)>  
**Sent:** Wednesday, April 29, 2020 2:53 PM  
**To:** Post Permit Requests <[postpermitrequests@bcogc.ca](mailto:postpermitrequests@bcogc.ca)>  
**Cc:** Phillips, Lori L <[Lori.Phillips@BCOGC.ca](mailto:Lori.Phillips@BCOGC.ca)>; Thoroughgood, Garth <[Garth.Thoroughgood@BCOGC.ca](mailto:Garth.Thoroughgood@BCOGC.ca)>; Dan Wyman <[dan\\_wyman@tcenergy.com](mailto:dan_wyman@tcenergy.com)>; Shelley McInnis <[shelley\\_mcinnis@tcenergy.com](mailto:shelley_mcinnis@tcenergy.com)>  
**Subject:** Section 8 Condition 84 Road Crossing Submission

Coastal GasLink is submitting the Road Crossing Report for satisfaction of the Commission per Pipeline Permit Section 8 (AD# 100084230) – Condition 84.

Should you have any questions or require additional information please let me know.

Thank you,

**Tracy Young**

**Senior Regulatory Analyst**

Coastal GasLink Pipeline Project

tel: 778-328-5327 mobile: S.22

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April 29, 2020

Ms. Lori Phillips  
Authorizations Manager  
BC Oil and Gas Commission  
6534 Airport Road  
Fort St. John, B.C. V1J 4M6

Coastal GasLink LLP  
630 – 609 Granville Street  
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Web: [www.TCenergy.com](http://www.TCenergy.com)

CGL4703-CGP-BCOGC-REG-LTR-3711

Dear Ms. Phillips,

**Re: Coastal GasLink Pipeline Project (Coastal GasLink or Project)  
Satisfaction of the Commission – Road Crossing Submission  
Ref: Pipeline Permit Section 8 (AD# 100084230) – Conditions 84**

Coastal GasLink is submitting the Section 8 Road Crossing Submission (Submission) to the British Columbia (BC) Oil and Gas Commission (OGC) for review, and requests satisfaction of the Commission. The Submission is required by Condition 84 on the Section 8 Pipeline Permit (AD #100084230).

The structure of the Submission is arranged as follows:

- road ID (internal reference number)
- crossing location both as kilometre post (KP) of the pipeline and the legal land description
- crossing method
- approximate date of construction start based on current schedule
- duration that traffic may be restricted during the crossing installation (estimated)
- pipeline specifications including pipeline diameter, wall thickness, and grade
- minimum depth of cover (measured from travel surface)
- maximum vehicular weight expected at crossing location
- stakeholder disposition (indicates type of road being crossed and common road name, if applicable)
- Stakeholder name
- Summary of engagement notes the date that the crossing request was sent and date that the agreement was received.

As noted in the Submission (Attachment 1), Coastal GasLink provides a letter to each road disposition holder requesting consent to cross. There are generally three categories of disposition holders:

- government body e.g. Ministry of Transportation and Infrastructure (MOTI), Ministry of Forests, Land, Natural Resource Operations and Rural Development (FLNRORD), etc.
- third-party e.g. forestry companies, BC Hydro, etc. and
- landowner.

Please refer to Attachment 2 for sample letters to road disposition holders. Generally, a disposition holder will respond to the request with a signed crossing agreement. If required, additional discussions will be held to clarify questions and concerns. An agreement is required to allow a crossing to proceed. Engaging with private landowners for crossing agreements is typically included as part of the land acquisition discussions.



As noted above, the timing of construction is based on the current Project schedule. If a significant change occurs to the schedule, Coastal GasLink will provide a Submission addendum to the OGC.

Should you have any questions regarding this request, do not hesitate to call me at 778.328.5327 or email me at [tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com).

A handwritten signature in blue ink, appearing to read "Tracy Young".

Tracy Young  
Senior Regulatory Analyst  
Coastal GasLink



Coastal GasLink Road ID	KP (Rev F1)	LAND LEGAL DESCRIPTION	CROSSING METHOD	DATE OF CONSTRUCTION START (Approximate)	TIMING (Traffic Restriction)	PIPE SPECIFICATIONS (Pipeline Diameter, Wall Thickness, Grade)	DEPTH OF COVER (m)	MAX VEHICLE WEIGHT EXPECTED (Tonne)	STAKEHOLDER DISPOSITION	STAKEHOLDER / GRANTOR	SUMMARY OF ENGAGEMENT
1738.00-RD	583+916	d-7-J/93-L-4	Open Cut	16-Feb-21	24 hours	NPS 48 24.7 mm WT GR 550	0.9	129	Road TENURE R07593 6 (CP 573)	Canadian Forest Products Limited	Consent requested 14-Dec-18, Rec'd 17-Dec-18.
1742.20-RD	585+337	c-8-J/93-L-4	Open Cut	16-Feb-21	24 hours	NPS 48 24.7 mm WT GR 550	0.9	129	Road OGC File 9636387 (AD# 100082962) PDR2226 SEG 061	Pacific Trail Pipelines Management Inc. c/o Chevron Canada Limited	Consent requested 04-Jul-18, Rec'd 12-Dec-18
1746.20-RD	586+552	a-20-J/93-L-4	Open Cut	16-Feb-21	24 hours	NPS 48 24.7 mm WT GR 550	0.9	129	Road OGC File 9636387 (AD# 100082962) PDR 2226 SEG 060	Pacific Trail Pipelines Management Inc. c/o Chevron Canada Limited	Consent requested 04-Jul-18, Rec'd 12-Dec-18
1751.20-RD	588+830	b-12-K/93-L-4	Open Cut	16-Feb-21	24 hours	NPS 48 24.7 mm WT GR 550	0.9	129	Road OGC File 9636387 (AD# 100082962) PDD 2226 SEG 059	Pacific Trail Pipelines Management Inc. c/o Chevron Canada Limited	Consent requested 04-Jul-18, Rec'd 12-Dec-18
1754.01-RD	591+085	b-94-F/93-L-4	Open Cut	16-Feb-21	24 hours	NPS 48 24.7 mm WT GR 550	0.9	129	Road OGC File 9636387 (AD# 100082962) PDR 2226 SEG 069	Pacific Trail Pipelines Management Inc. c/o Chevron Canada Limited	Consent requested 04-Jul-18, Rec'd 12-Dec-18
1754.02-RD	591+614	b-94-F/93-L-4	Open Cut	16-Feb-21	24 hours	NPS 48 24.7 mm WT GR 550	0.9	129	Road OGC File 9636387 (AD# 100082962) PDR 2226	Pacific Trail Pipelines Management Inc. c/o Chevron Canada Limited	Consent requested 04-Jul-18, Rec'd 12-Dec-18
1925.00-RD	631+527	c-89-B/103-l-1	Open Cut	24-May-20	24 hours	NPS 48 24.7 mm WT GR 550	1.5	129	Road OGC AD# 100105457 Road # 05017	Coastal GasLink Pipeline Ltd.	No Consent required - Road tenured to Coastal GasLink.
1927.00-RD	631+691	c-89-B/103-l-1	Open Cut	24-May-20	24 hours	NPS 48 24.7 mm WT GR 550	1.5	129	North Hirsch Branch 1200 FSR 9306 08	Ministry of Forests, Lands and Natural Resource Operations and Rural Development Coast Mountain Natural Resource District	Requested 15-Feb-18. Not Rec'd. Crossings under ongoing review with FLNRO.

Coastal GasLink Road ID	KP (Rev F1)	LAND LEGAL DESCRIPTION	CROSSING METHOD	DATE OF CONSTRUCTION START (Approximate)	TIMING (Traffic Restriction)	PIPE SPECIFICATIONS (Pipeline Diameter, Wall Thickness, Grade)	DEPTH OF COVER (m)	MAX VEHICLE WEIGHT EXPECTED (Tonne)	STAKEHOLDER DISPOSITION	STAKEHOLDER / GRANTOR	SUMMARY OF ENGAGEMENT
1929.00-RD	632+157	d-90-B/103-I-1	Open Cut	24-May-20	24 hours	NPS 48 24.7 mm WT GR 550	1.5	129	North Hirsch-BR.1100 FSR Road 9306 06	Ministry of Forests, Lands and Natural Resource Operations and Rural Development Coast Mountain Natural Resource District; Skeena Sawmills (primary maintainer)	Requested 15-Feb-18. Not Rec'd. Crossings under ongoing review with FLNRO. Skeena identified as primary maintainer. Crossing to be requested and obtained.
1936.00-RD	633+094	d-81-C/103-I-1	Open Cut	24-May-20	24 hours	NPS 48 24.7 mm WT GR 550	1.5	129	North Hirsch FSR 9306 01	Ministry of Forests, Lands and Natural Resource Operations and Rural Development Coast Mountain Natural Resource District Skeena Sawmills Ltd	Requested 15-Feb-18. Not Rec'd. Crossings under ongoing review with FLNRO. Skeena identified as primary maintainer. Crossing to be requested and obtained.
1972.00-RD	637+987	d-97-C/103-I-1	Open Cut	24-May-20	24 hours	NPS 48 24.7 mm WT GR 550	1.5	129	North Hirsch-BR.800 FSR 9306 04	Ministry of Forests, Lands and Natural Resource Operations and Rural Development Coast Mountain Natural Resource District Skeena Sawmills	Requested 15-Feb-18. Not Rec'd. Crossings under ongoing review with FLNRO. Skeena identified as primary maintainer. Crossing to be requested and obtained.
1986.10-RD	642+176	d-71-D/103-I-1	Open Cut	24-May-20	24 hours	NPS 48 24.7 mm WT GR 550	1.5	129	CUTBLOCK ACCESS 1622717	S.22	Cutblock access within retired cutblock. No crossing consent required.
1986.20-RD	642+385	d-71-D/103-I-1	Open Cut	24-May-20	24 hours	NPS 48 24.7 mm WT GR 550	1.5	129	CUTBLOCK ACCESS 1622717		Cutblock access within retired cutblock. No crossing consent required.
1991.00-RD	643+848	083-D/103-I-01	Open Cut	24-May-20	24 hours	NPS 48 18.5 mm WT GR 550	2	129	NON-STATUS ROAD	CROWN	No Consent Required - Non-Status road with no tenure holder.
1992.00-RD	644+091	083-D/103-I-01	Open Cut	24-May-20	24 hours	NPS 48 18.5 mm WT GR 550	0.9	129	NON-STATUS ROAD	CROWN	No Consent Required - Non-Status road with no tenure holder.
1995.00-RD	645+095	b-84-D/103-I-1	Open Cut	24-May-20	24 hours	NPS 48 24.7 mm WT GR 550	1.5	129	RETIRED Road TENURE R21056 A R21056 B	S.22	No Consent Required - Road Tenure retired, no replacing tenure identified (confirmed 13-Mar-20)
1997.00-RD	646+486	086-D/103-I-01	Open Cut	24-May-20	24 hours	NPS 48 18.5 mm WT GR 550	0.9	129	NON-STATUS ROAD	CROWN	No Consent Required - Non-Status road with no tenure holder.

Coastal GasLink Road ID	KP (Rev F1)	LAND LEGAL DESCRIPTION	CROSSING METHOD	DATE OF CONSTRUCTION START (Approximate)	TIMING (Traffic Restriction)	PIPE SPECIFICATIONS (Pipeline Diameter, Wall Thickness, Grade)	DEPTH OF COVER (m)	MAX VEHICLE WEIGHT EXPECTED (Tonne)	STAKEHOLDER DISPOSITION	STAKEHOLDER / GRANTOR	SUMMARY OF ENGAGEMENT
1998.00-RD	646+718	086-D/103-I-01	Open Cut	24-May-20	24 hours	NPS 48 18.5 mm WT GR 550	0.9	129	NON-STATUS ROAD	CROWN	No Consent Required - Non-Status road with no tenure holder.
2000.00-RD	646+973	096-D/103-I-01	Open Cut	24-May-20	24 hours	NPS 48 18.5 mm WT GR 550	1.2	129	NON-STATUS ROAD	CROWN	No Consent Required - Non-Status road with no tenure holder.
2004.00-RD	647+788	d-97-D/103-I-1	Open Cut	24-May-20	24 hours	NPS 48 18.5 mm WT GR 550	0.9	129	NON-STATUS ROAD	CROWN	No Consent Required - Non-Status road with no tenure holder.
2007.00-RD	648+108	d-97-D/103-I-1	Open Cut	24-May-20	24 hours	NPS 48 24.7 mm WT GR 550	1.5	129	North Hirsch FSR 9306 01	Ministry of Forests, Lands and Natural Resource Operations and Rural Development Coast Mountain Natural Resource District Skeena Sawmills	Requested 15-Feb-18. Not Rec'd. Crossings under ongoing review with FLNRO. Skeena identified as primary maintainer. Crossing to be requested and obtained.
2008.00-RD	648+223	a-007-E/103-I-1	Open Cut	24-May-20	24 hours	NPS 48 18.5 mm WT GR 550	0.9	129	CUTBLOCK TFL41 5 - Non-Status Road / Trail	Skeena Sawmills Ltd.	Notification of crossing sent 11-Jan-19. Formal crossing agreement in progress.
2010.00-RD	648+745	b-007-E/103-I-1	Open Cut	24-May-20	24 hours	NPS 48 18.5 mm WT GR 550	1.8	129	CUTBLOCK TFL41 5 - Non-Status Road / Trail	Skeena Sawmills Ltd.	Notification of crossing sent 11-Jan-19. Formal crossing agreement in progress.
2016.00-RD	650+168	a-19-E/103-I-1	Open Cut	20-Aug-20	24 hours	NPS 48 24.7 mm WT GR 550	1.5	129	North Hirsch FSR 9306 01	Ministry of Forests, Lands and Natural Resource Operations and Rural Development Coast Mountain Natural Resource District Skeena Sawmills	Requested 15-Feb-18. Not Rec'd. Crossings under ongoing review with FLNRO.
2021.00-RD	651+235	010-E/103-I-01	Open Cut	20-Jul-20	24 hours	NPS 48 18.5 mm WT GR 550	0.9	129	NON-STATUS ROAD	CROWN	No Consent Required - Non-Status road with no tenure holder.
2021.10-RD	651+867	001-H/103-I-2 010-E/103-I-1	Open Cut	20-Jul-20	24 hours	NPS 48 24.7 mm WT GR 550	1.5	129	Non-Status Road (Cutblock Access)	Skeena Sawmills Ltd.	Notification of crossing sent 11-Jan-19. Formal crossing agreement in progress.
2025.00-RD	653+165	092-A/103-I-02	Open Cut	20-Jul-20	24 hours	NPS 48 24.7 mm WT GR 550	1.5	129	TENURE R14742 D South Hirsch M/L	Skeena Sawmills Ltd.	Notification of crossing sent 11-Jan-19. Formal crossing agreement in progress.

Coastal GasLink Road ID	KP (Rev F1)	LAND LEGAL DESCRIPTION	CROSSING METHOD	DATE OF CONSTRUCTION START (Approximate)	TIMING (Traffic Restriction)	PIPE SPECIFICATIONS (Pipeline Diameter, Wall Thickness, Grade)	DEPTH OF COVER (m)	MAX VEHICLE WEIGHT EXPECTED (Tonne)	STAKEHOLDER DISPOSITION	STAKEHOLDER / GRANTOR	SUMMARY OF ENGAGEMENT
1926.00-RD	653+172	c-89-B/103-I-1	Open Cut	20-Jul-20	24 hours	NPS 48 24.7 mm WT GR 550	1.5	129	North Hirsch-BR.1100 FSR 9306 06	Ministry of Forests, Lands and Natural Resource Operations and Rural Development Coast Mountain Natural Resource District	Requested 15-Feb-18. Not Rec'd. Crossings under ongoing review with FLNRO.
2026.00-RD	653+172	092-A/103-I-02	Open Cut	20-Jul-20	24 hours	NPS 48 24.7 mm WT GR 550	0.9	129	NON-STATUS ROAD	CROWN	No Consent Required - Non-Status road with no tenure holder.
2028.00-RD	653+545	092-A/103-I-02	Open Cut	20-Jul-20	24 hours	NPS 48 18.5 mm WT GR 550	0.9	129	NON-STATUS ROAD	CROWN	No Consent Required - Non-Status road with no tenure holder.
2029.00-RD	653+560	c-092-A/103-I-2	Open Cut	20-Jul-20	24 hours	NPS 48 24.7 mm WT GR 550	1.5	129	TENURE R14742 D South Hirsch M/L	Skeena Sawmills Ltd.	Notification of crossing sent 11-Jan-19. Formal crossing agreement in progress.
2030.00-RD	653+681	d-093-A/103-I-2	Open Cut	20-Jul-20	24 hours	NPS 48 24.7 mm WT GR 550	1.5	129	TENURE R14742 G Branch 2000	Skeena Sawmills Ltd.	Notification of crossing sent 11-Jan-19. Formal crossing agreement in progress.
2031.00-RD	653+726	093-A/103-I-02	Open Cut	20-Jul-20	24 hours	NPS 48 18.5 mm WT GR 550	0.9	129	NON-STATUS ROAD	CROWN	No Consent Required - Non-Status road with no tenure holder.
2032.00-RD	653+848	093-A/103-I-02	Open Cut	20-Jul-20	24 hours	NPS 48 18.5 mm WT GR 550	0.9	129	NON-STATUS ROAD	CROWN	No Consent Required - Non-Status road with no tenure holder.
2033.00-RD	654+302	093-A/103-I-02	Open Cut	20-Jul-20	24 hours	NPS 48 18.5 mm WT GR 550	0.9	129	NON-STATUS ROAD	CROWN	No Consent Required - Non-Status road with no tenure holder.
2037.00-RD	655+213	084-A/103-I-02	Open Cut	20-Jul-20	24 hours	NPS 48 18.5 mm WT GR 550	0.9	129	NON-STATUS ROAD	CROWN	No Consent Required - Non-Status road with no tenure holder.
2040.00-RD	655+521	084-A/103-I-02	Open Cut	20-Jul-20	24 hours	NPS 48 18.5 mm WT GR 550	0.9	129	NON-STATUS ROAD	CROWN	No Consent Required - Non-Status road with no tenure holder.
2042.00-RD	655+727	084-A/103-I-02	Open Cut	20-Jul-20	24 hours	NPS 48 18.5 mm WT GR 550	0.9	129	NON-STATUS ROAD	CROWN	No Consent Required - Non-Status road with no tenure holder.
2046.00-RD	656+382	d-075-A/103-I-2	Open Cut	20-Jul-20	24 hours	NPS 48 24.7 mm WT GR 550	1.5	129	TENURE R14742 H Branch 1000	Skeena Sawmills Ltd.	Notification of crossing sent 11-Jan-19. Formal crossing agreement in progress.
2054.00-RD	658+014	076-A/103-I-02 077-A/103-I-02	Open Cut	20-Jul-20	24 hours	NPS 48 24.7 mm WT GR 550	0.9	129	NON-STATUS ROAD	CROWN	No Consent Required - Non-Status road with no tenure holder.
2055.00-RD	658+379	a-077-A/103-I-2	Bore	24-Jul-20	None	NPS 48 29.6 mm WT GR 550	1.5	129	TENURE R14742 D SOUTH HIRCSH M/L	Skeena Sawmills Ltd.	Notification of crossing sent 11-Jan-19. Formal crossing agreement in progress.

Coastal GasLink Road ID	KP (Rev F1)	LAND LEGAL DESCRIPTION	CROSSING METHOD	DATE OF CONSTRUCTION START (Approximate)	TIMING (Traffic Restriction)	PIPE SPECIFICATIONS (Pipeline Diameter, Wall Thickness, Grade)	DEPTH OF COVER (m)	MAX VEHICLE WEIGHT EXPECTED (Tonne)	STAKEHOLDER DISPOSITION	STAKEHOLDER / GRANTOR	SUMMARY OF ENGAGEMENT
2056.00-RD	658+531	a-077-A/103-I-02	Open Cut	20-Jul-20	24 hours	NPS 48 29.6 mm WT GR 550	1.5	129	Quarry Licence 6400365	S.22	Consent requested 15-Jul-14, Rec'd 15-Jul-14
2057.00-RD	658+884	a-78-A/103-I-2	Open Cut	20-Jul-20	24 hours	NPS 48 29.6 mm WT GR 550	1.5	129	Quarry Licence 0354668 Permitted Road 354668	J H W Construction Ltd.	Requested 15-Feb-18. Consent Rec'd 20-Dec-18.
2058.00-RD	659+169	068-A/103-I-02	Bore	16-Jul-20	None	NPS 48 29.6 mm WT GR 550	1.5	129	Forest Service Road Wathl Creek 9015 01	Ministry of Forests, Lands, Natural Resource Operations and Rural Development Coast Mountain Natural Resource District	Requested 15-Feb-18. Crossings under ongoing review with FLNRO.
2060.00-RD	659+913	d-69-A/103-I-2	Bore	16-Jul-20	None	NPS 48 29.6 mm WT GR 550	1.5	129	Non-status Logging Road (Canceled Road Plan 5410)	CROWN	Non-status road. No consent required
2063.00-RD	660+310	A-69-A/103-I-2 DL 7597, Range 5 Coast District	Open Cut	20-Jul-20	24 hours	NPS 48 29.6 mm WT GR 550	1.5	129	Non-Status Road (Trail)	Rio Tinto Alcan Inc.	Private road, non-status. Consent obtained as a part of acquisition and PCR with landowner. 10-Dec-18
2068.00-RD	660+505	59-A/103-I-02	Bore	24-Jun-20	None	NPS 48 29.6 mm WT GR 550	3.4	129	Kitamaat Village Road Road Plan 5420 File: 2018-02761	Ministry of Transportation and Infrastructure Skeena District	Consent to cross for clearing activities rec'd 18-Dec-18. Pipeline crossing permit outstanding.
2071.00-RD	661+433	d-60-A/103-I-2	Open Cut	20-Jul-20	24 hours	NPS 48 29.6 mm WT GR 550	1.5	129	Non-Status Road (Trail)	Rio Tinto Alcan Inc.	Private road, non-status. Consent obtained as a part of acquisition and PCR with landowner 10-Dec-18.
2049.00-RD		076-A/103-I-02	Open Cut	20-Jul-20	24 hours	NPS 48 18.5 mm WT GR 550	0.9	129	NON-STATUS ROAD	CROWN	No Consent Required - Non-Status road with no tenure holder.
2074.00-RD	663+326	District Lot 6013A Range 5 Coast District	Open Cut	20-Jul-20	24 hours	NPS 48 29.6 mm WT GR 550	1.5	129	Non-Status Road (Trail)	Rio Tinto Alcan Inc.	Email consent obtained for crossing 13-Dec-18.
2079.00-RD	664+082	District Lot 6008 Range 5 Coast District	Open Cut	20-Jul-20	24 hours	NPS 48 29.6 mm WT GR 550	1.5	129	Non-Status Road (Trail)	Rio Tinto Alcan Inc.	Email consent obtained for crossing 13-Dec-18.
2079.10-RD	664+428	DL 6007 R5C EXCEPT PLAN EPP40842	Bore	03-Jun-20	None	NPS 48 29.6 mm WT GR 550	1.5	129	Loganberry Ave.	District of Kitimat	Not requested. Mapping required for request is outstanding, in process of being obtained.

Coastal GasLink Road ID	KP (Rev F1)	LAND LEGAL DESCRIPTION	CROSSING METHOD	DATE OF CONSTRUCTION START (Approximate)	TIMING (Traffic Restriction)	PIPE SPECIFICATIONS (Pipeline Diameter, Wall Thickness, Grade)	DEPTH OF COVER (m)	MAX VEHICLE WEIGHT EXPECTED (Tonne)	STAKEHOLDER DISPOSITION	STAKEHOLDER / GRANTOR	SUMMARY OF ENGAGEMENT
2081.00-RD	664+469	Lot A (see BA134362) District Lot 307 Range 5 Coast District Plan 815 except: Plans BCP28371 and BCP50842	Bore	03-Jun-20	None	NPS 48 29.6 mm WT GR 550	1.5	129	Non-Status Road (Trail)	B.C. Hydro and Power Authority	Non-status road. Confirmation that consent to cross is not required from BC Hydro rec'd 16-Jan-19.
2082.00-RD	664+644	Lot A (see BA134362) District Lot 307 Range 5 Coast District Plan 815 except: Plans BCP28371 and BCP50842	Bore	21-May-20	None	NPS 48 29.6 mm WT GR 550	1.5	129	Non-Status Road (Trail)	J. Oviatt Contracting Ltd.	Private road, non-status. Consent obtained as a part of acquisition and PCR with landowner. 06-Dec-18
2084.00-RD	664+838	b-42-B/103-I-2	Bore	11-May-20	None	NPS 48 29.6 mm WT GR 550	1.5	129	Elderberry Street	District of Kitimat	Not requested. Mapping required for request is outstanding, in process of being obtained.
2088.00-RD	665+441	b-43-B/103-I-2	Bore	01-May-20	None	NPS 48 29.6 mm WT GR 550	1.5	129	Dyke Road	District of Kitimat	Not requested. Mapping required for request is outstanding, in process of being obtained.
2092.00-RD	666+457	District Lot 6016 Range 5 Coast District except Plan 5744	Open Cut	20-Jul-20	24 hours	NPS 48 29.6 mm WT GR 550	1.5	129	Non-Status Road (Trail)	Rio Tinto Alcan Inc.	Private road, non-status. Consent obtained as a part of acquisition and PCR with landowner. 10-Dec-18

February 1, 2019

S.22

**RE: Coastal GasLink Pipeline Ltd.**

Proposed 26.0, 32.0 & 42.0 Pipeline Right of Way Section 1 from SW 1/4 Sec 33, Tp 78, R19, W6M to Unit 31, Block F, 93-P-5

RLNS File: 120496

Lands: SW 1/4 Sec 5 Tp 78 R 19 W6M, NW 1/4 Sec 13 Tp 77 R 20 W6M & NE 1/4 Sec 13 Tp 77 R 21 W6M

Crossing Request Letter

---

On behalf of our client **Coastal GasLink Pipeline Ltd. ("Coastal GasLink")**, we hereby request your consent to conduct the following as shown on the attached plan(s).

**Within SW 1/4 Sec 5 Tp 78 R 19 W6M (UTM Zone 10, N:6178028 E:630802)**

- Crossing #28.00-RD request permission to cross Road Tenure No. FSR 8020 02 – Groundbirch at the above mentioned location.

**Within NW 1/4 Sec 13 Tp 77 R 20 W6M (UTM Zone 10, N:6171753 E:627404)**

- Crossing #36.00-RD request permission to cross Road Tenure No. FSR 8020 02 – Groundbirch at the above mentioned location.

**Within NE 1/4 Sec 13 Tp 77 R 21 W6M (UTM Zone 10, N: 6171997 E: 618781)**

- Crossing #59.00-RD request permission to cross Road Tenure No. FSR 8020 01 – Groundbirch at the above mentioned location.

Coastal GasLink respectfully requests that your agreement provide a term of 4 years to accommodate the construction and final cleanup of the project.

Coastal GasLink looks to industry to support the exclusion of certain damages from agreements on the basis that it is not commercially reasonable to impose liability for these types of damages on companies who have an operational need to cross foreign facilities. In this regard, **Coastal GasLink requests the following exclusion clause be included** in any agreement(s):

*"In no case shall either party have any liability to the other party for any consequential or special damages, loss of profits or business interruption suffered by that party."*


**Please issue your consent in the name of:**

**Coastal GasLink Pipeline Ltd., as general partner for and on behalf of Coastal GasLink Pipeline East B.C. Limited Partnership**  
P.O. Box 1000, Station "M"  
450 – 1<sup>st</sup> Street SW, Calgary, Alberta T2P 4K5  
Attention: Surface Land

Please email your consent to Lauralee Schoenenberger at [Lauralee@roynorthernbc.com](mailto:Lauralee@roynorthernbc.com) for further handling. Your early attention to this matter would be greatly appreciated and we thank you for your assistance in this regard.

Sincerely,

**Roy Northern Land and Environmental**



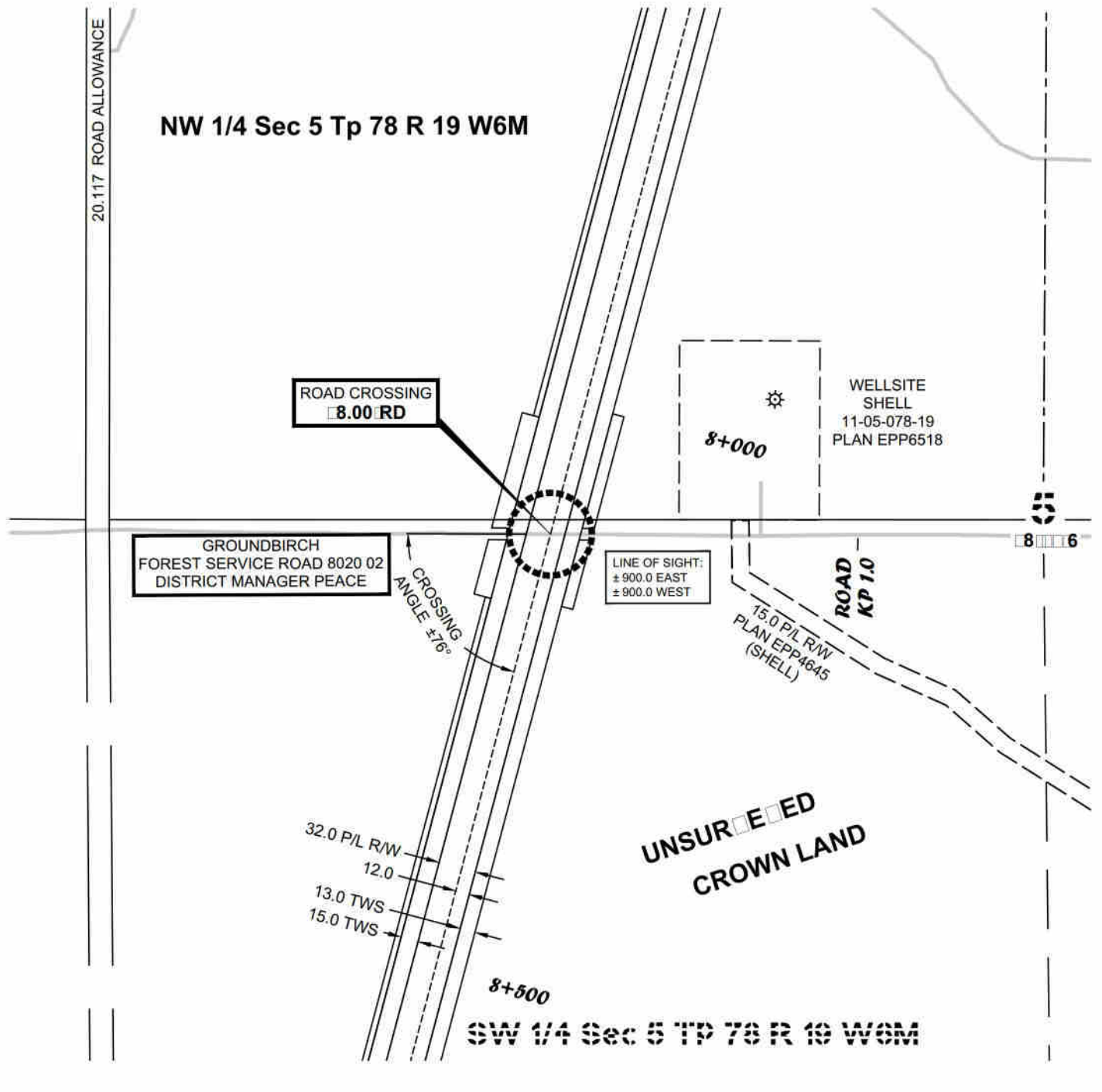
Lauralee Schoenenberger  
Project Coordinator

Enclosures

*cc: Dave Kmet, Coastal GasLink Pipeline Ltd.*



**PLAN SHOWING  
 PIPELINE RIGHT OF WAY CROSSING  
 FOREST SERVICE ROAD  
 P 3  
 8.00 RD  
 DISTRICT MANAGER PEACE DPC  
 FOREST TENURE FSR 80 0 0  
 GROUNDBIRCH FSR BRANCH ROAD HIGH GRADE**



**PEACE  
 FOREST DISTRICT**

Coastal GasLink Route shown thus:	-----
Coastal GasLink Preliminary Pipeline Right of Way shown thus:	=====
Coastal GasLink Preliminary Temporary Work Space shown thus:	-----
Buried Pipe shown thus:	-----
Power Line shown thus:	----- P -----
Buried Communication Line shown thus:	----- T -----
Buried Cable shown thus:	----- C -----
Road/Trail shown thus:	-----
DL . . . . . District Lot	R/W . . . . . Right of way
H.O.W. . . . . Height Of Wire	Sec. . . . . Section
M. . . . . Meridian	Tp. . . . . Township
P/L . . . . . Pipeline	TWS. . . . . Temporary Work Space
R. . . . . Range	W. . . . . West

**NOTE:** Positions of buried facilities shown are derived from interpretations of signals from electronic devices. Reception of electronic signals is subject to interference and has limitations, therefore it should not be assumed that all buried facilities are shown, and facilities which are shown should not be construed as "located" until physically exposed. All underground installations should be marked by the respective authorities prior to excavation or construction. **Br Co a On Ca 800 4 6886**

**CROSSING LOCATION CO-ORDINATES:**  
 N: ±6178028  
 E: ±630802

**NOTES:**  
 - UTM Coordinates shown are NAD83 Zone 10 N.  
 - Distances shown are in metres and decimals thereof.

**MIDWEST SURVEYING LTD.**  
 11003 Alaska Road  
 Fort St. John, BC  
 Tel: 250-785-3902  
 V1J 6P3  
 IB-0015-12




**COASTAL GASLINK PIPELINE LTD.**

**ROAD CROSSING  
 8.00 RD  
 Construction Station**

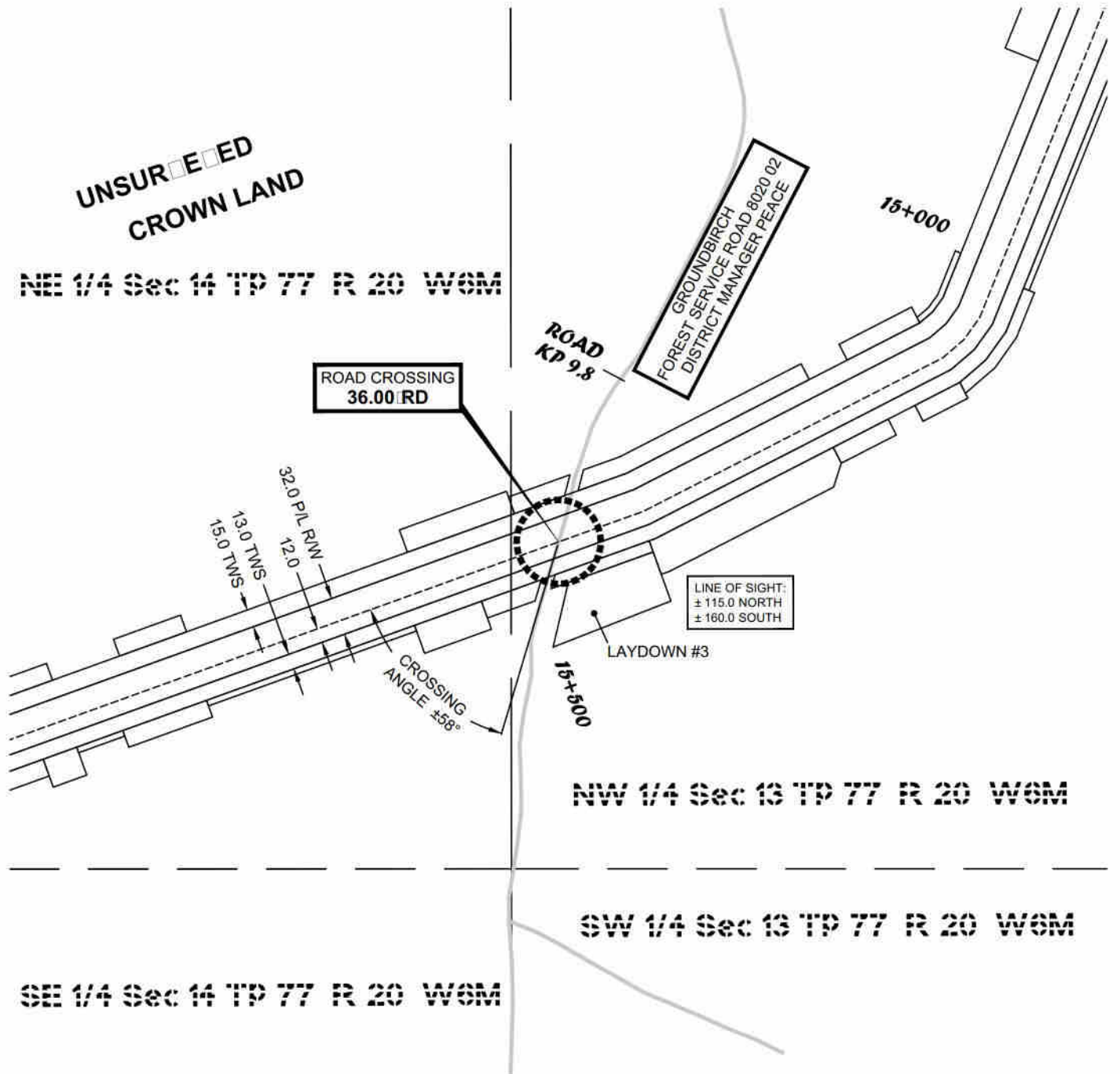
BCGS: 93P076	
REVISION	DESCRIPTION
2	Issued, January 15, 2019



- Route Reference: Horizontal Alignment (Rev F1)	January 15, 2019
Document No. CGE4703-MSI-G-MP-588	Rev 2

PLAN SHOWING  
 PIPELINE RIGHT OF WAY CROSSING  
 FOREST SERVICE ROAD

P.L.  
 36.00 RD  
 DISTRICT MANAGER PEACE DPC  
 FOREST TENURE FSR 8000  
 GROUND BIRCH FSR BRANCH ROAD HIGH GRADE



PEACE  
 FOREST DISTRICT

Coastal GasLink Route shown thus:	-----
Coastal GasLink Preliminary Pipeline Right of Way shown thus:	=====
Coastal GasLink Preliminary Temporary Work Space shown thus:	-----
Buried Pipe shown thus:	-----
Power Line shown thus:	----- P -----
Buried Communication Line shown thus:	----- T -----
Buried Cable shown thus:	----- C -----
Road/Trail shown thus:	-----
DL . . . . . District Lot	R/W . . . . . Right of way
H.O.W. . . . . Height Of Wire	Sec. . . . . Section
M. . . . . Meridian	Tp. . . . . Township
P/L . . . . . Pipeline	TWS. . . . . Temporary Work Space
R. . . . . Range	W. . . . . West

**NOTE:** Positions of buried facilities shown are derived from interpretations of signals from electronic devices. Reception of electronic signals is subject to interference and has limitations, therefore it should not be assumed that all buried facilities are shown, and facilities which are shown should not be construed as "located" until physically exposed. All underground installations should be marked by the respective authorities prior to excavation or construction. **Br Co a On Ca 800 4 6886**

CROSSING LOCATION CO-ORDINATES:  
 N: ±6171753  
 E: ±627404

**MIDWEST SURVEYING LTD.**  
 11003 Alaska Road  
 Fort St. John, BC  
 Tel: 250-785-3902  
 V1J 6P3  
 IB-0015-12



COASTAL GASLINK PIPELINE LTD.

**ROAD CROSSING  
 36.00 RD  
 Construction Season**

BCGS: 93P076

REVISION	DESCRIPTION
2	Issued, January 15, 2019



- Route Reference: Horizontal Alignment (Rev F1)	January 15, 2019
Document No. CGE4703-MSI-G-MP-590	Rev 2



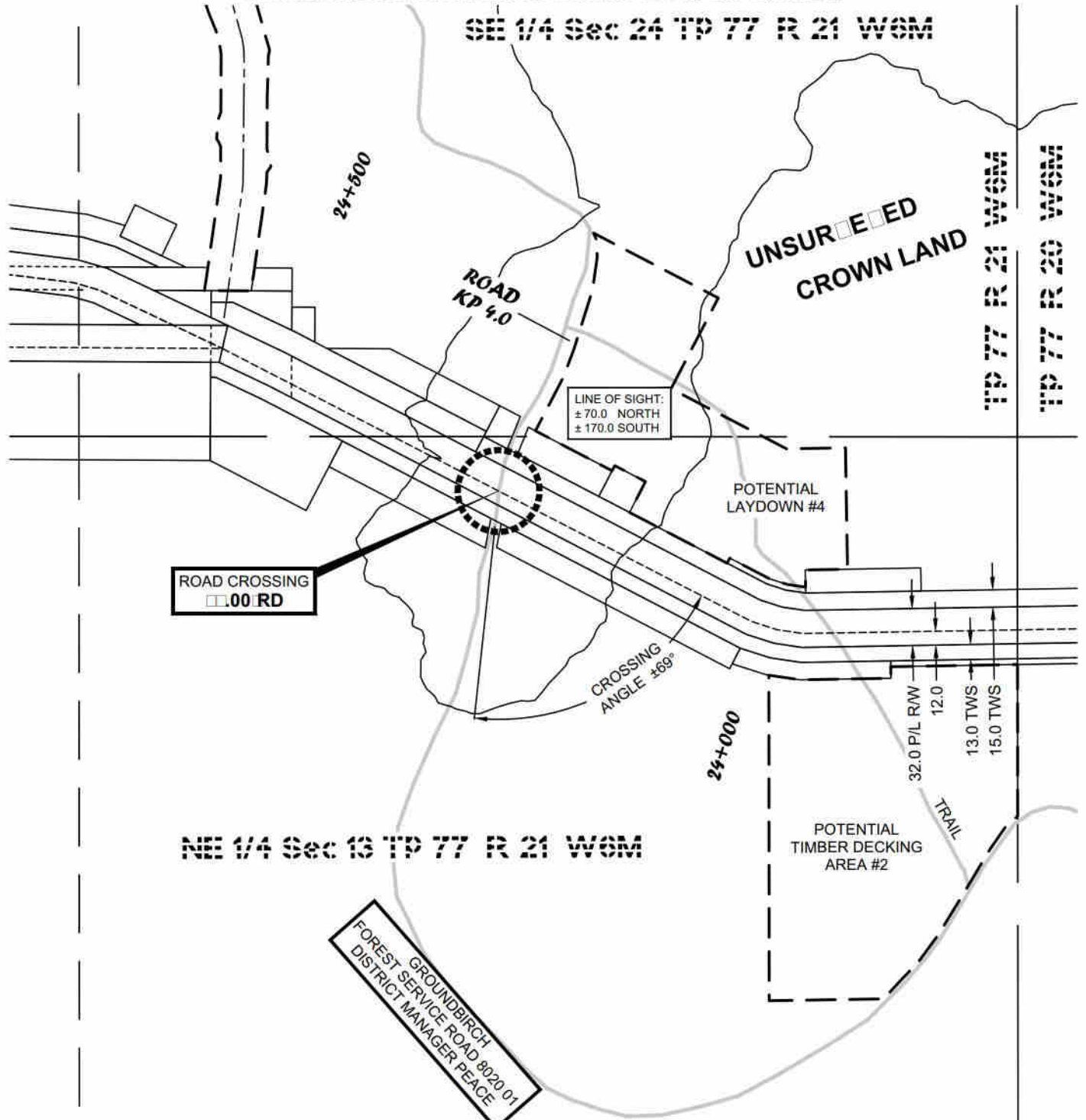
PLAN SHOWING  
 PIPELINE RIGHT OF WAY CROSSING  
 FOREST SERVICE ROAD

P 3.  
 .00 RD

DISTRICT MANAGER PEACE  
 FOREST TENURE

GROUND BIRCH FSR BRANCH HIGH GRADE

SE 1/4 Sec 24 TP 77 R 21 W6M



ROAD CROSSING  
 .00 RD

NE 1/4 Sec 13 TP 77 R 21 W6M

GROUND BIRCH  
 FOREST SERVICE ROAD 8020 01  
 DISTRICT MANAGER PEACE

PEACE  
 FOREST DISTRICT

Coastal GasLink Route shown thus:	-----
Coastal GasLink Preliminary Pipeline Right of Way shown thus:	=====
Coastal GasLink Preliminary Temporary Work Space shown thus:	-----
Buried Pipe shown thus:	-----
Power Line shown thus:	----- P -----
Buried Communication Line shown thus:	----- T -----
Buried Cable shown thus:	----- C -----
Road/Trail shown thus:	-----
DL . . . . . District Lot	R/W . . . . . Right of way
H.O.W. . . . . Height Of Wire	Sec. . . . . Section
M. . . . . Meridian	Tp. . . . . Township
P/L . . . . . Pipeline	TWS. . . . . Temporary Work Space
R. . . . . Range	W. . . . . West

**NOTE:** Positions of buried facilities shown are derived from interpretations of signals from electronic devices. Reception of electronic signals is subject to interference and has limitations, therefore it should not be assumed that all buried facilities are shown, and facilities which are shown should not be construed as "located" until physically exposed. All underground installations should be marked by the respective authorities prior to excavation or construction. **Br 800 4 6886**

CROSSING LOCATION CO-ORDINATES:  
 N: ±6171997  
 E: ±618781

**NOTES:**  
 - UTM Coordinates shown are NAD83 Zone 10 N.  
 - Distances shown are in metres and decimals thereof.

MIDWEST SURVEYING LTD.  
 11003 Alaska Road  
 Fort St. John, BC  
 Tel: 250-785-3902  
 V1J 6P3  
 IB-0015-12

**Coastal GasLink Pipeline Project**  **TransCanada**  
*In business to deliver*

COASTAL GASLINK PIPELINE LTD.

**ROAD CROSSING**  
 .00 RD  
**Construction Season**

BCGS: 93P065

REVISION	DESCRIPTION
2	Issued, January 15, 2019



- Route Reference: Horizontal Alignment (Rev F1)	January 15, 2019
Document No. CGE4703-MSI-G-MP-591	Rev 2

January 28, 2019

S.22

Via Email: [info@cattlemen.bc.ca](mailto:info@cattlemen.bc.ca)

Attn: Sir/Madame

**RE: COASTAL GASLINK PIPELINE LTD.  
Vertex File: 12-3313  
Lands: 30-E/93-P-11  
CROSSING**

---

On behalf of our client COASTAL GASLINK PIPELINE LTD. ("Coastal GasLink"), we hereby request LONE PRAIRIE LIVESTOCK ASSOCIATION'S consent to conduct the following:

1. **TO CROSS S.22 ACCESS ROAD" WITH THE PROPOSED PIPELINE (INCLUDING TEMPORARY WORKSPACE) AND HEAVY EQUIPMENT**

**All as shown on the attached Schedule A and attached mapping.**

Coastal GasLink's clearing, construction and initial reclamation will commence between January 2019 and December 2024; however, the timing of some activities may vary depending on weather and ground conditions. We respectfully request that your agreement provide for a term of **four (4) years** to accommodate the construction and final cleanup of the project.

Coastal GasLink looks to industry to support the exclusion of certain damages from agreements on the basis that it is not commercially reasonable to impose liability for these types of damages on companies who have an operational need to cross foreign facilities. In this regard, **COASTAL GASLINK PIPELINE LTD. requests the following exclusion clause be included in any agreement(s):**

*"In no case shall either party have any liability to the other party for any consequential or special damages loss of profits or business interruption suffered by that party."*

**Please issue your consent in the name of:**

**COASTAL GASLINK PIPELINE LIMITED PARTNERSHIP,  
by its general partner Coastal GasLink Pipeline Ltd.  
PO BOX 1000, STATION M  
450 - 1ST STREET SW, CALGARY, AB T2P 4K5  
Attention: Surface Land**

Should LONE PRAIRIE LIVESTOCK ASSOCIATION have any other roads/pipelines/utilities in this area that are not identified on the enclosed drawings, please include them in your consent.

**Please email your consent to Maria Gimblett at [cglthirdparties@vertex.ca](mailto:cglthirdparties@vertex.ca)** for further handling. Your early attention to this matter would be greatly appreciated and we thank you for your assistance in this regard. Should you have any questions or concerns regarding the proposed work noted above, please contact the undersigned at (587) 415-6535.

Sincerely,  
Vertex Professional Services Ltd.

Maria Gimblett  
Land Administrator

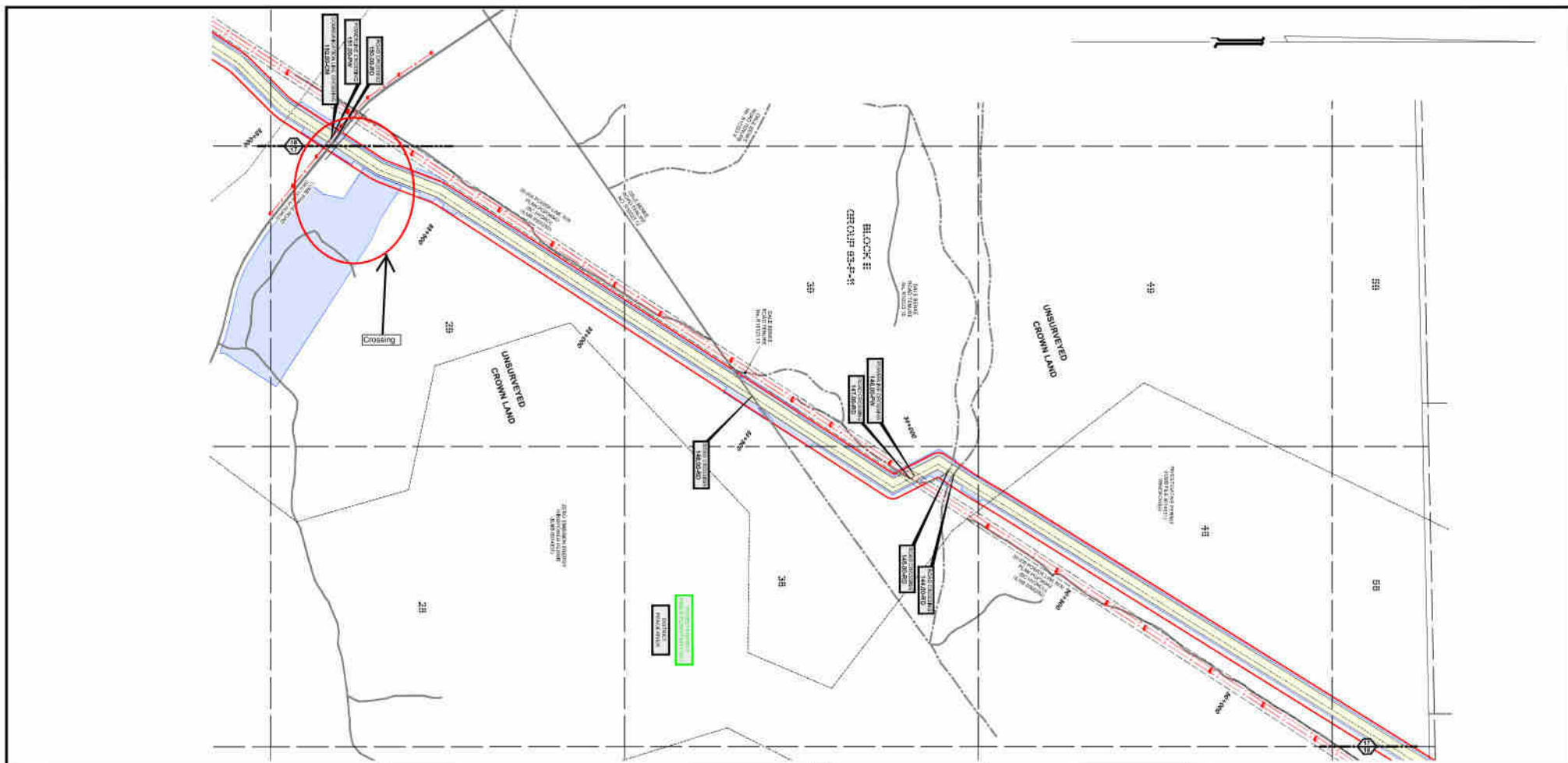
/Enclosures  
cc: COASTAL GASLINK PIPELINE LTD.

**SCHEDULE "A"**

<b>Type of Activity</b>	<b>Plan / Tenure #</b>	<b>Legal Location</b>	<b>CGL ID</b>
CROSSING	SECTION 42 ROAD	30-E/093-P-11	150.00-RD

**\*NOTE: Please be advised that CGLs preferred crossing method of roads is to open cut. If this is agreeable, we kindly ask that the following clause be added to your crossing conditions:**

1. *Grantor authorizes Grantee to open cut the roads outlined in the attached Schedule 'B', granted alternative access will be provided so that Grantors activities are not interrupted.*



**LEGEND:**

- Construction Right-of-Way
- Proposed Pipeline
- Power Line
- Water Line
- Other Utilities
- Proposed Pipeline
- Power Line
- Water Line
- Other Utilities
- Proposed Pipeline
- Power Line
- Water Line
- Other Utilities
- Proposed Pipeline
- Power Line
- Water Line
- Other Utilities

Construction Map Scale: 1:1000

Proprietary Data: (C) 2019 Coastal GasLink Pipeline Ltd.

**BCOS:** 007-215, 007-200, 007-201, 007-204, 007-205, 007-206, 007-207

**PROJECT INFORMATION:**

- Coastal GasLink Pipeline Project
- Block F, Section 33, Township 78 R, Range 19 W, Meridian 5 W
- Unit 31, Block F, 93-P-5

**NOTE:** The information shown on this plan is based on the current records of the Province of British Columbia. Information from these records may change without notice and may not reflect the status of things on the ground. The user assumes responsibility for the accuracy or completeness of this information. See also the disclaimer on the back of this plan.

**NOTE:** The information shown on this plan is based on the current records of the Province of British Columbia. Information from these records may change without notice and may not reflect the status of things on the ground. The user assumes responsibility for the accuracy or completeness of this information. See also the disclaimer on the back of this plan.

REVISION / ISSUED				
No.	Date	Description	Drawn By	CRD By
1	04/15/2020	Final Release	SLP	SLP

**Coastal GasLink Pipeline Project**

**TransCanada In business to deliver**

**COASTAL GASLINK PIPELINE LTD.**

**SKETCH PLANS SHOWING CONTRACTOR FOOTPRINT SECTION 1**

FROM SW 1/4 Sec 33, Tp 78, R 19, W5M TO UNIT 31, BLOCK F, 93-P-5

THROUGH PRIVATE AND UNSURVEYED CROWN LAND PEACE RIVER DISTRICT

SCALE: 1:5000 METRES

Sheet 17 of 29

Route Reference: RevF

Document No.: CGE4703-MSJ-G-MP-001-017

Jan. 15, 2019

Rev D

MIDWEST SURVEYS LAND SERVICES LTD.  
11825 Alana Road  
Fort St. John, BC V1J 6N5  
Tel: (250) 725-2000  
Fax: (250) 725-2002

July 15, 2014

Coastal GasLink  
450 1 St. SW  
Calgary, Ab. T2P 5H1

S.22

Dear Sirs

RE: Non-Objection to Crossing My Quarry Tenure

I/We, S.22 (the "Tenure holder"), acknowledge that the Coastal GasLink pipeline (the "Pipeline") may cross Quarry tenure # 6400365, which is registered to S.22 as shown on the attached sketch plan, and I/We hereby give my/our consent to the pipeline routing as it affects this tenure. The Company hereby commits to construct the pipeline in such a way to allow access to the quarry location during construction and shall grant the tenure holder a crossing agreement to cross over the Right of Way on identified trails after construction.

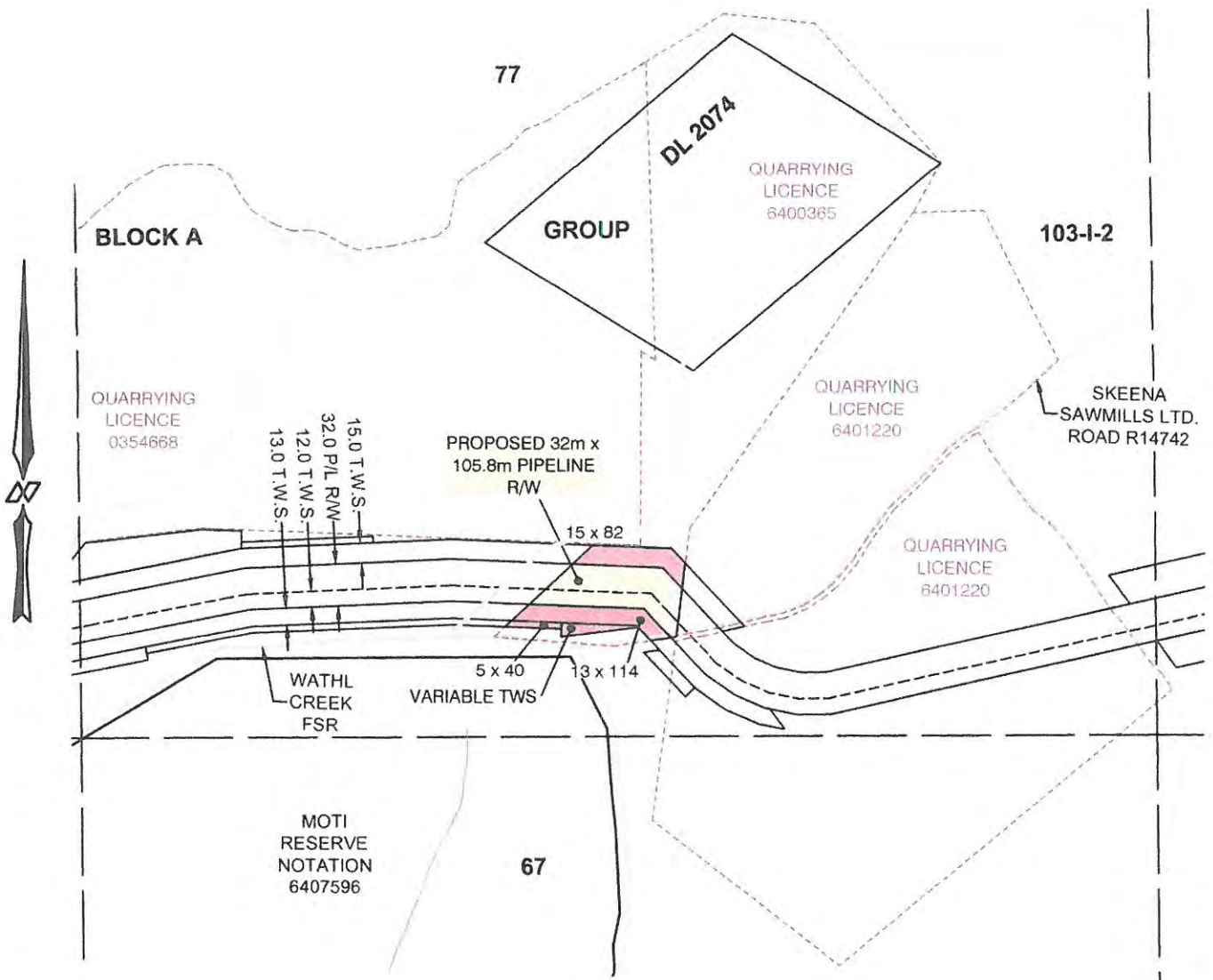
Regards

S.22 



QUARRYING LICENCE 0354668

RANGE 5 COAST DISTRICT  
BRITISH COLUMBIA





**From:** Friedrich, Hardy  
**Sent:** Thursday, April 30, 2020 8:38 AM  
**To:** Thoroughgood, Garth; Phillips, Lori L; Wilson, Jason  
**Subject:** CGL EAO Tie-In  
**Attachments:** CGL4703-CGP-BCEAO-REG-LTR-3596\_CGL\_Amendment\_LNGC\_TieIn.pdf

G'morning – You may have seen this already but it forms the CGL's application to the EAO for the EAC amendment. I had been expecting documents more but that's not the case. It is for notification purposes, so nothing formal required from us. I expect the EAO will make a decision this week, or if not next.

Thanks,

Hardy



**Hardy Friedrich**  
Manager, Major Projects  
[Hardy.Friedrich@bcogc.ca](mailto:Hardy.Friedrich@bcogc.ca)

Victoria BC  
[Office Address Directory](#)  
[bcogc.ca](http://bcogc.ca)

T. 250 419-4427  
F. 250-419-4403



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April 1, 2020

Mr. Bernard Achampong  
Executive Project Director  
Environmental Assessment Office  
836 Yates Street  
Victoria, BC

Coastal GasLink LLP  
630 – 609 Granville Street  
Vancouver, BC, Canada V7Y 1G5

Tel: 778.328.5327  
Fax: 403.920.2443  
Email: [tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com)  
Web: [www.TCenergy.com](http://www.TCenergy.com)

CGL4703-CGP-BCEAO-REG-LTR-3596

Dear Mr. Achampong,

**Re: Coastal GasLink Pipeline Project (Coastal GasLink or Project)  
Amendment Request LNG Canada Tie-In  
EAC**

On October 23, 2014, Coastal GasLink Pipeline Ltd. (Coastal GasLink) received an Environmental Assessment Certificate (EAC #E 14-03) to construct the Coastal GasLink Pipeline Project (the Project), a sweet natural gas pipeline and associated components from Groundbirch, BC to Kitimat, BC.

As a result of more detailed Project planning and optimization, Coastal GasLink is proposing a change to the Project and is requesting an amendment to EAC #E 14-03 in accordance with section 32 of the BC Environmental Assessment Act. The requested amendment would address the following change to Schedule A (Certified Project Description; CPD) of the EAC:

- Extend the Certified Pipeline Corridor by approximately 235 metres (m) – see attached figures.

Coastal GasLink's current approvals from the Environmental Assessment Office (EAO) and the BC Oil and Gas Commission reflect that the Project ends at the exit point (south side) of the trenchless crossing of the Kitimat River just inside the fence line of the LNG Canada Development Inc. (LNG Canada) site. The requested amendment will result in the tie-in point of the Project moving further inside the LNG Canada site and increase the length of the pipeline by approximately 188 m. Incorporating this portion of pipeline under the Coastal GasLink EAC and associated pipeline permit increases clarity that construction and operation of the pipeline up to and including the tie-in point would be managed under Coastal GasLink's management plans and Coastal GasLink would have full care and control of the pipeline through the life of the Project. During operations phase, access to the pipe within the LNG Canada site will be managed through an access agreement with Coastal GasLink and LNG Canada.

The longer pipeline will result in a change of location for the associated in-line inspection receiver and tie-in connection, however these facilities will remain within the LNG Canada site as previously planned. The LNG Canada site is on privately owned land (owner is LNG Canada); it is zoned for industrial use and has already been cleared to allow construction to proceed on the LNG Canada project. The site was previously assessed and approved under EAC #E 15-01 (issued to LNG Canada in 2015). No additional potential adverse changes to the environment, economic, social, heritage and health effects are anticipated due to this change.



Coastal GasLink has engaged with LNG Canada and Haisla Nation in regard to this amendment. Both parties have indicated that they support the amendment and have no outstanding concerns.

Coastal GasLink is proposing construction of these works to commence in May 2020 and be completed sometime in the fourth quarter of 2020. Final schedule for these activities will be determined in consultation with LNG Canada to ensure no conflict with activities ongoing on the LNG Canada site.

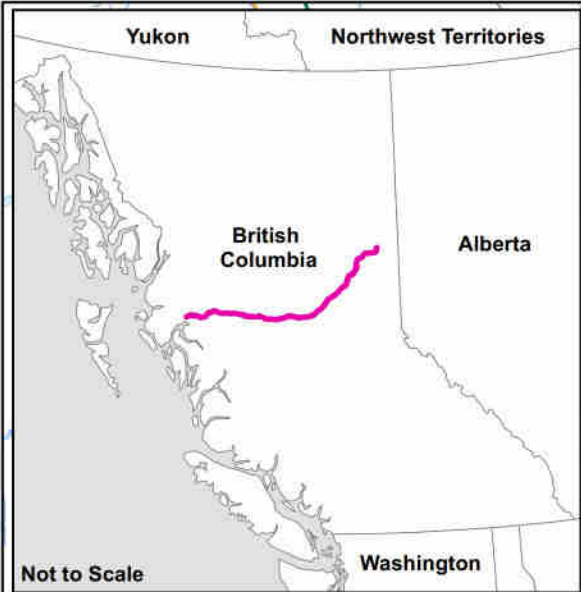
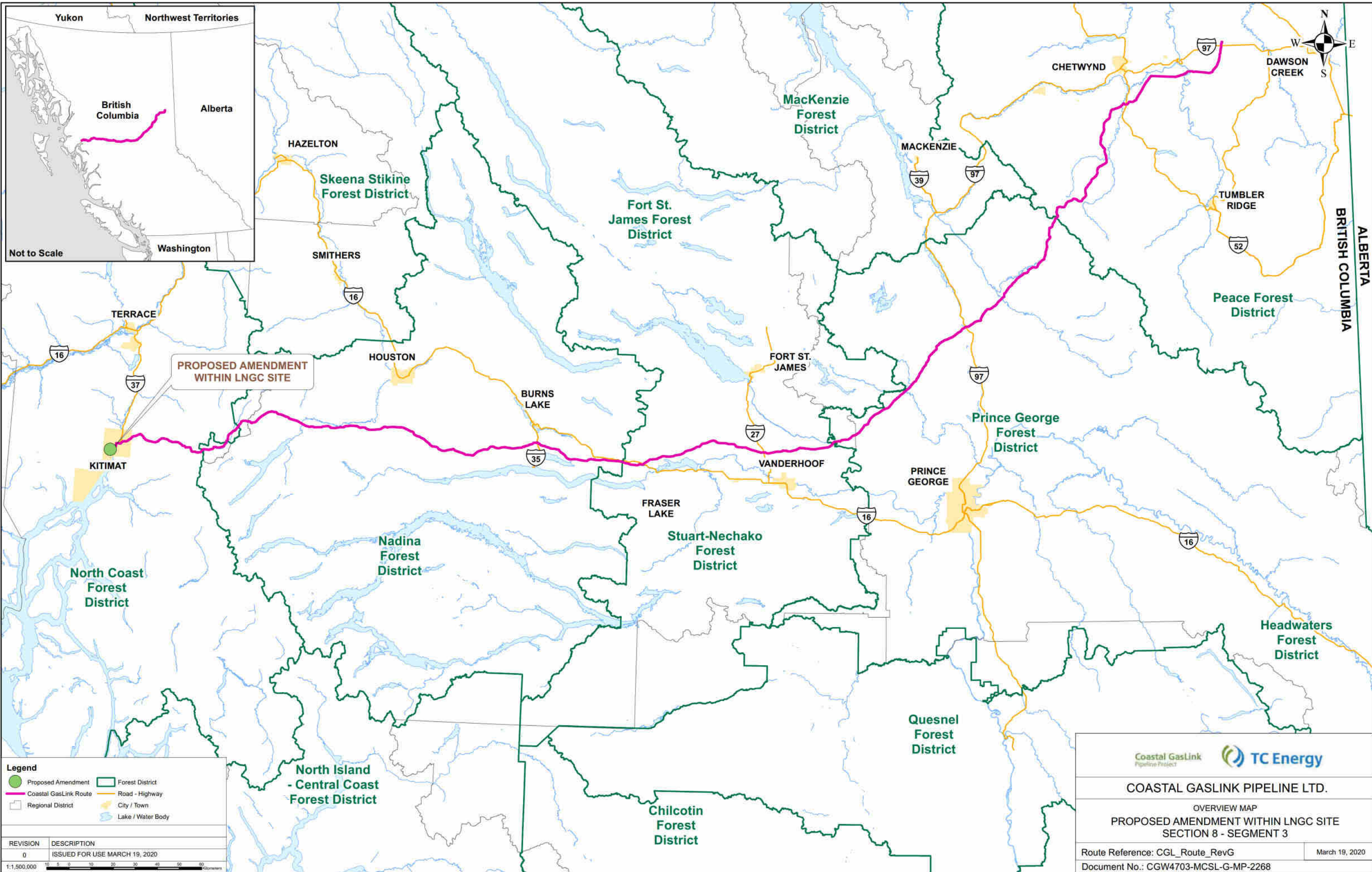
Should you have any questions regarding this request, do not hesitate to call me at 778.328.5327 or email me at [tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com).

A handwritten signature in blue ink, appearing to read "Tracy Young".

Tracy Young  
Senior Regulatory Analyst  
Coastal GasLink

Cc: Dan Motisca, EAO  
Garth Thoroughgood, Oil and Gas Commission  
Lori Phillips, Oil and Gas Commission





PROPOSED AMENDMENT  
WITHIN LNGC SITE

**Legend**

- Proposed Amendment
- Coastal GasLink Route
- Forest District
- Road - Highway
- Regional District
- City / Town
- Lake / Water Body

REVISION	DESCRIPTION
0	ISSUED FOR USE MARCH 19, 2020

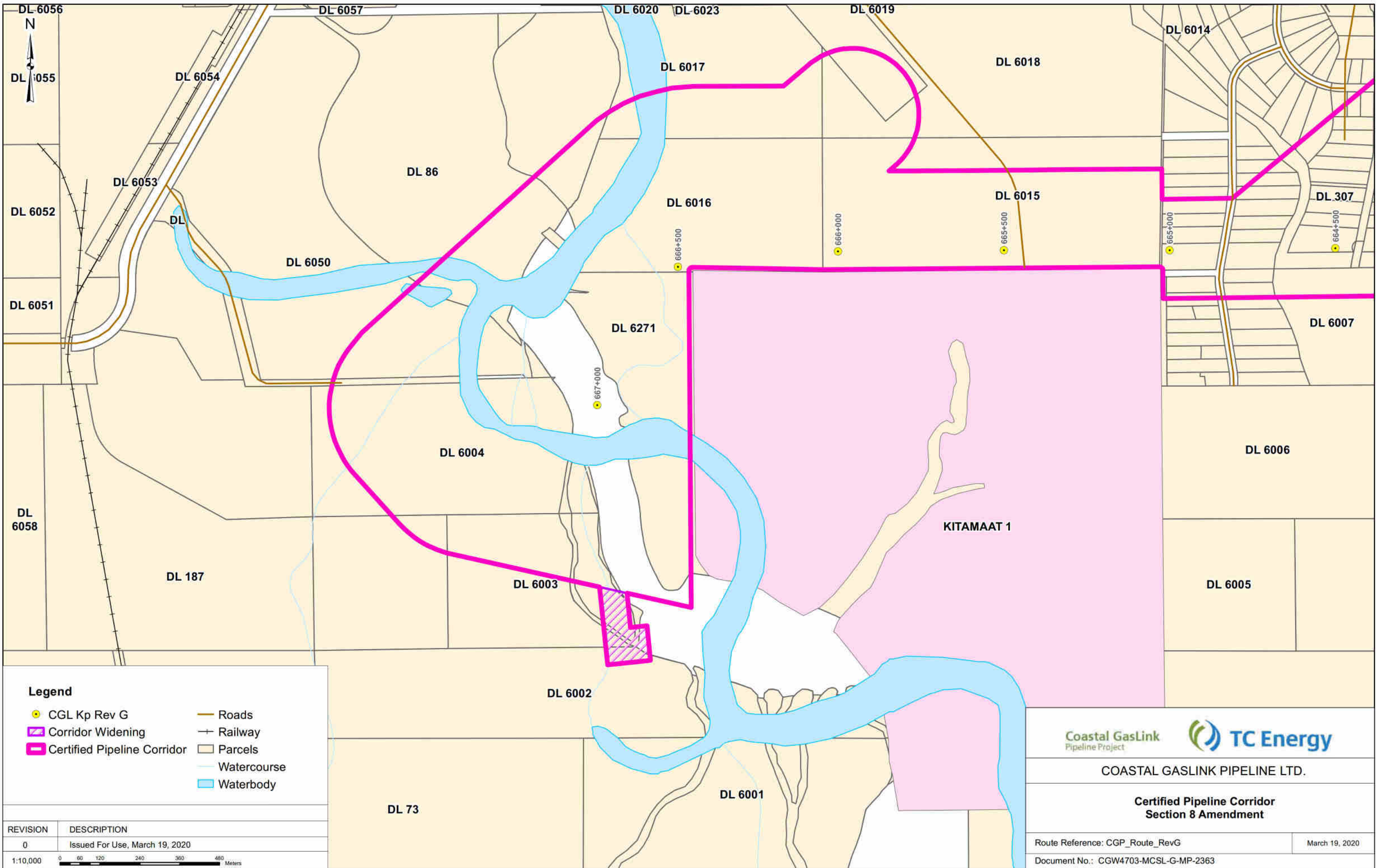
1:1,500,000

**COASTAL GASLINK PIPELINE LTD.**

OVERVIEW MAP  
PROPOSED AMENDMENT WITHIN LNGC SITE  
SECTION 8 - SEGMENT 3

Route Reference: CGL_Route_RevG	March 19, 2020
Document No.: CGW4703-MCSL-G-MP-2268	





**Legend**

- CGL Kp Rev G
- Corridor Widening
- Certified Pipeline Corridor
- Roads
- Railway
- Parcels
- Watercourse
- Waterbody

REVISION	DESCRIPTION
0	Issued For Use, March 19, 2020

1:10,000  0 60 120 240 360 480 Meters



COASTAL GASLINK PIPELINE LTD.

**Certified Pipeline Corridor  
Section 8 Amendment**

Route Reference: CGP\_Route\_RevG March 19, 2020  
 Document No.: CGW4703-MCSL-G-MP-2363

**From:** Tracy Young <tracy\_young@tcenergy.com>  
**Sent:** Thursday, April 16, 2020 4:51 PM  
**To:** Post Permit Requests  
**Cc:** Phillips, Lori L; Thoroughgood, Garth; Dan Wyman  
**Subject:** CGL Section 8 East Condition 88a Geohazards  
**Attachments:** CGL4703-CGP-BCOGC-REG-LTR-3693\_Cond88a\_S8\_East.pdf; CGL4703-WPC-GT-MEM-019-0\_Geohazard and Mitigation Sec8E\_rev0.pdf

Coastal GasLink is providing the geohazard assessment for Section 8 East per Condition 88a of Pipeline Permit AD#100084230.

Section 8 has been broken into two parts, 8 West and 8 East. The geohazard assessment for 8 West was submitted on March 4, 2020.

Thank you,

**Tracy Young**  
Senior Regulatory Analyst  
Coastal GasLink Pipeline Project

S.22

tel: 778-328-5327 mobile

[TCEnergy.com](http://TCEnergy.com)

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April 16, 2020

Ms. Lori Phillips  
Authorizations Manager  
BC Oil and Gas Commission  
6534 Airport Road  
Fort St. John, B.C. V1J 4M6

Coastal GasLinkLLP  
630 – 609 Granville Street  
Vancouver, BC, Canada V7Y 1G5

Tel: 778.328.5327  
Fax: 778.328.5336  
Email: [tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com)  
Web: [www.TCenergy.com](http://www.TCenergy.com)

CGL4703-CGP-BCOGC-REG-LTR-3693

Dear Ms. Phillips,

**Re: Coastal GasLink Pipeline Project (Coastal GasLink or Project)  
Satisfaction of the Commission Request  
Pipeline Permit (Section 8) (AD # 100084230) Condition 84**

Please find enclosed a request for satisfaction of Commission for the noted condition in British Columbia (BC) Oil and Gas Commission (OGC) Section 8 permit Condition 88(a) – road crossings.

Coastal GasLink has assessed the east side of Section 8 [Kilometre Post (KP) 583+180 to KP 623+800, rev F1] for geohazards. Results of the geohazard assessment are described in the attached memo. Specific design measures to address the potential impacts to the pipeline are included in the memo.

Should you have any questions regarding this request, do not hesitate to call me at 778.328.5327 or email me at [tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com).

Sincerely

A handwritten signature in blue ink, appearing to read "Tracy Young", written over a light blue horizontal line.

Tracy Young  
Senior Regulatory Analyst  
Coastal GasLink

15-April-2020

Ref: CGL4703-WPC-GT-MEM-019\_IFI

Coastal GasLink Pipeline Ltd  
450 1st Street SW  
Calgary, Alberta CANADA  
T2P 5H1

ATTENTION: Carolyn Clifton, P.Eng. - Project Manager, Engineering

Dear Carolyn Clifton,

**SUBJECT**

**Geohazard Locations and Mitigation Measures for Section 8 East - Input to British Columbia Oil and Gas Commission – OGC Pipeline Permit # 100084230 Condition 88 – Part A**

This memorandum has been compiled to address Condition 88 in the Coastal GasLink Pipeline Project (Coastal Gaslink) Section 8 East Pipeline Permit (AD #100084230) from British Columbia Oil and Gas Commission (OGC), which states, in part:

“At least 90 days prior to pipe-stringing activities in areas where geohazards are present, the permit holder must submit, to the satisfaction of the Commission:

a) a geohazard assessment that includes:

- (i). a description of the geohazard(s) identified that have reasonable probability of impacting the pipeline, with the location of each geohazard illustrated on either a map or in a table; and
- (ii). specific design measures, such as materials to be used, installation procedures, protective structures, depth of cover, and monitoring that will be implemented to mitigate the geohazard(s) identified in (i)”

Geohazard assessment for the Coastal GasLink pipeline was completed along route revision F1 in Section 8 East (Kilometre Post (KP583+180 to KP 623+800) with no considerations for construction grade profile and pipe profile. As a result, construction induced hazards and their impact are not considered in this assessment. Results from the geohazard assessment delineate identified geohazards and associated proposed mitigation measures. Geohazards requiring special design measures to mitigate potential impacts to the pipeline are reported in this memorandum; those that can be mitigated using standard typical pipeline design measures are not included.



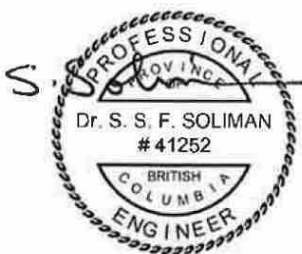
**Background:**

Information used in the geohazard assessment includes:

- Updated surficial geology (terrain) mapping supported by original field notes, a borehole database, results from a bedrock investigation field program, and public federal and provincial bedrock and surficial geology maps and databases;
- Light Detection and Ranging (LiDAR) digital elevation model;
- Results from desktop and non-intrusive field investigations of existing landslide and mass movement features, and potential rock fall locations;
- Data from surveyed watercourse crossing locations;
- Results from desktop assessment of locations susceptible to debris flow or debris slide geohazards, supplemented by field verification of critical assessment parameters.

Based on this information, Table 1 provides locations of the identified geohazards in Section 8 East along route revision F1 that have a reasonable probability of impacting the pipeline and are assigned special mitigation measures beyond standard pipeline design practice. If multiple mitigation measures are assigned to a specific geohazard, all these mitigations, or approved alternates, are required to be implemented to mitigate this geohazard.

Sincerely,



Sherif Soliman, Ph.D., P.Eng.  
Principal Geotechnical Engineer  
Geohazard Lead, Geotechnical Manager  
Worley Canada Services Ltd.

Table 1: Identified geohazard and assigned mitigation measures along Section 8 East (KP 583+180 to KP 623+800)

Unique_ID	Section	Identified Geohazard	Start Kilometer Post (Route Rev F1)	End Kilometer Post (Route Rev F1)	UTM 9 Start Coordinates		UTM 9 End Coordinates		Mitigation 1	Mitigation 2	Mitigation 3
					Easting (m)	Northing (m)	Easting (m)	Northing (m)	Description	Description	Description
1	8 East	Rock Fall <sup>1</sup>	589+735	589+860	579282	6003562	579176	6003508	Deflection Berm or 1.1 m Depth of Cover <sup>2</sup>		
2	8 East	Rock Fall <sup>1</sup>	589+860	589+920	579176	6003508	579152	6003464	Catchment Ditch (Left Side of the Right of Way) <sup>2</sup>		
3	8 East	Rock Fall <sup>1</sup>	592+315	592+525	578207	6001455	578176	6001283	Deflection Berm or 3.4 m Depth of Cover <sup>2</sup>		
4	8 East	Vertical Scour	592+533	592+577	578174	6001276	578167	6001233	Deep Burial (2.1 m)		
5	8 East	Channel Migration	592+537	592+575	578174	6001272	578167	6001235	Extended Deep Burial (2.1 m below thalweg)		
6	8 East	Debris Flow or Flood	592+575	592+612	578167	6001235	578161	6001201	Deep Burial (2.1 m Min.)		
7	8 East	Channel Migration	595+575	595+703	576316	5999065	576190	5999042	Extended Deep Burial (1.8 m below thalweg)	Permanent Buoyancy Control	
8	8 East	Avulsion	597+750	597+769	574746	5997751	574730	5997742	Protection Berm		
9	8 East	Avulsion	597+769	597+810	574730	5997742	574694	5997722	Extended Deep Burial (2.0 m Min. below thalweg)		
10	8 East	Debris Flow or Flood	597+769	597+857	574730	5997742	574653	5997700	Deep Burial (2.0 m Min.)		
11	8 East	Channel Migration	597+817	597+845	574688	5997719	574663	5997706	Extended Deep Burial (2.0 m below thalweg)		
12	8 East	Rock Fall <sup>1</sup>	600+600	601+050	573741	5995342	573715	5994902	Deflection Berm or 3.3 m Depth of Cover <sup>2</sup>		
13	8 East	Channel Migration	602+143	602+174	573130	5994057	573134	5994028	Extended Deep Burial (1.7 m below thalweg)		

Unique_ID	Section	Identified Geohazard	Start Kilometer Post (Route Rev F1)	End Kilometer Post (Route Rev F1)	UTM 9 Start Coordinates		UTM 9 End Coordinates		Mitigation 1	Mitigation 2	Mitigation 3
					Easting (m)	Northing (m)	Easting (m)	Northing (m)	Description	Description	Description
14	8 East	Vertical Scour	602+149	602+171	573130	5994052	573134	5994031	Deep Burial 1.8 m Min	Modified Backfill <sup>3</sup>	
15	8 East	Debris Flow or Flood	604+143	604+238	572458	5992311	572419	5992226	Deep Burial (2.0 m Min.)		
16	8 East	Channel Migration	604+143	604+238	572458	5992311	572419	5992226	Extended Deep Burial (2.0 m below thalweg)		
17	8 East	Channel Migration	609+081	609+134	568196	5991053	568143	5991048	Extended Deep Burial (2.0 m below thalweg)		
18	8 East	Vertical Scour	609+098	609+115	568179	5991051	568162	5991050	Deep Burial 2.0 m Min		
19	8 East	Avulsion	613+216	613+253	564927	5989558	564891	5989555	Extended Deep Burial (2.0 m Min. below thalweg)		
20	8 East	Channel Migration	613+234	613+290	564910	5989556	564854	5989551	Extended Deep Burial (2.0 m below thalweg)	Modified Backfill <sup>3</sup>	
21	8 East	Avulsion	613+238	613+406	564905	5989556	564738	5989542	Extended Deep Burial (2.0 m Min. below thalweg)		
22	8 East	Avulsion	613+341	613+423	564803	5989547	564721	5989540	Extended Deep Burial (2.0 m Min. below thalweg)		
23	8 East	Channel Migration	613+421	613+449	564724	5989541	564696	5989538	Extended Deep Burial (2.0 m below thalweg)		
24	8 East	Channel Migration	613+665	613+725	564494	5989554	564436	5989569	Extended Deep Burial (1.8 m below thalweg)		
25	8 East	Avulsion	614+558	614+719	563610	5989612	563450	5989608	Extended Deep Burial (2.0 m Min. below thalweg)		
26	8 East	Debris Flow or Flood	614+643	614+783	563525	5989610	563386	5989607	Deep Burial (2.0 m Min.)	Modified Backfill <sup>3</sup>	
27	8 East	Avulsion	614+678	614+783	563490	5989609	563386	5989607	Extended Deep Burial (2.0 m Min.)		



Unique_ID	Section	Identified Geohazard	Start Kilometer Post (Route Rev F1)	End Kilometer Post (Route Rev F1)	UTM 9 Start Coordinates		UTM 9 End Coordinates		Mitigation 1	Mitigation 2	Mitigation 3
					Easting (m)	Northing (m)	Easting (m)	Northing (m)	Description	Description	Description
28	8 East	Channel Migration	614+711	614+777	563457	5989609	563392	5989607	Extended Deep Burial (2.0 m below thalweg)		
29	8 East	Channel Migration	615+782	615+819	562756	5989097	562728	5989073	Extended Deep Burial (1.8 m below thalweg)		
30	8 East	Channel Migration	616+814	616+877	562159	5988317	562115	5988272	Extended Deep Burial (2.0 m below thalweg)		
31	8 East	Vertical Scour	616+814	616+877	562159	5988317	562115	5988272	Deep Burial 2.0 m Min		
32	8 East	Avulsion	617+880	618+026	561209	5988018	561075	5987977	Extended Deep Burial (2.0 m Min.)		
33	8 East	Debris Flow or Flood	618+026	618+199	561076	5987977	560912	5987926	Deep Burial (2.0 m Min.)	Modified Backfill <sup>3</sup>	
34	8 East	Channel Migration	618+089	618+156	561016	5987959	560953	5987939	Extended Deep Burial (2.0 m below thalweg)		
35	8 East	Debris Flow or Flood	618+397	618+497	560720	5987883	560622	5987870	Deep Burial (2.1 m Min.)	Continuous Concrete Coating (or similar Pipe Protection)	Modified Backfill <sup>3</sup>
36	8 East	Channel Migration	618+411	618+437	560707	5987881	560681	5987878	Extended Deep Burial (2.1 m below thalweg)	Modified Backfill <sup>3</sup>	
37	8 East	Channel Migration	618+417	618+507	560700	5987881	560612	5987869	Extended Deep Burial (2.1 m below thalweg)	Modified Backfill <sup>3</sup>	
38	8 East	Vertical Scour	618+425	618+447	560693	5987880	560671	5987877	Deep Burial 2.1 m Min	Modified Backfill <sup>3</sup>	
39	8 East	Vertical Scour	619+132	619+148	560004	5987952	559988	5987955	Deep Burial 1.8 m Min		
40	8 East	Channel Migration	621+483	621+526	557875	5988166	557857	5988205	Extended Deep Burial (1.8 m below thalweg)		

Notes:

- <sup>1</sup> At Rock Fall sites, excavation is anticipated to be in bedrock. Typical pipeline design and construction measures such as Rock Jacket and suitable backfill will provide extra pipe protection at these locations.
- <sup>2</sup> The actual requirement for mitigation and proper mitigation measure are subject to final site grading and actual site conditions.
- <sup>3</sup> Currently, the suggested “modified backfill” material is Class 25 as shown in Tables 205-A and 205-B (BC Ministry of Transportation and Infrastructure, Riprap Guide, 2013). Final backfill sizing may change as engineering design progresses.

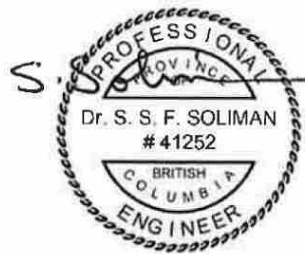
**Table 205-A: Gradation of Rock Sizes in Each Class of Riprap – Mass (kg)**

Class of Riprap (kg)	Nominal Riprap Thickness (mm)	Rock Gradation Percentage Smaller Than Given Rock Mass (kg)		
		15%	50%	85%
10	350	1	10	30
25	450	2.5	25	75
50	550	5	50	150
100	700	10	100	300
250	1000	25	250	750
500	1200	50	500	1500
1000	1500	100	1000	3000
2000	2000	200	2000	6000
4000	2500	400	4000	12000

**Table 205-B: Approximate Average Dimension of Each Specified Rock Class Mass (Sg=2.640) – Equivalent Diameter (mm)**

Class of Riprap (kg)	Approximate Average Dimension (mm)			
	15%	50%	85%	<100%
10	90	195	280	330
25	120	260	380	450
50	155	330	475	565
100	195	415	600	715
250	260	565	815	965
500	330	715	1030	1220
1000	415	900	1295	1535
2000	525	1130	1630	1935
4000	660	1425	2055	2440

Sincerely,



Sherif Soliman, Ph.D., P.Eng.  
Principal Geotechnical Engineer  
Geohazard Lead, Geotechnical Manager  
Worley Canada Services Ltd.

**From:** Motisca, Dan ENV:EX <Dan.Motisca@gov.bc.ca>  
**Sent:** Thursday, February 20, 2020 4:38 PM  
**To:** Friedrich, Hardy  
**Cc:** Achampong, Bernard ENV:EX; Carter, Lori ENV:EX  
**Subject:** RE: CGL Question for OGC and EAO Regarding CGL/LNGC Tie-in Point

Hi Hardy,  
We will get back to you on this when we've figured it out.

Regards,

**DAN MOTISCA**  
Project Assessment Officer  
Environmental Assessment Office  
Government of British Columbia  
OFFICE: 778-698-9316  
MOBILE: S.22



*The EAO respectfully acknowledges that it carries out its work on the traditional territories of Indigenous nations throughout British Columbia.*

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**From:** Friedrich, Hardy <Hardy.Friedrich@bcogc.ca>  
**Sent:** February 18, 2020 9:55 AM  
**To:** Motisca, Dan EAO:EX <Dan.Motisca@gov.bc.ca>  
**Subject:** FW: CGL Question for OGC and EAO Regarding CGL/LNGC Tie-in Point

Hi Dan – We've been discussing this one internally and it would probably require a permit amendment on our end. We're interested in what would be required on the EAO side once you've had a chance to discuss.

Thanks,

Hardy



**Hardy Friedrich**  
Manager, Major Projects  
[Hardy.Friedrich@bcogc.ca](mailto:Hardy.Friedrich@bcogc.ca)

Victoria BC  
[Office Address Directory](#)  
[bcogc.ca](http://bcogc.ca)

T. 250 419-4427  
F. 250-419-4403



---

**From:** Dan Wyman <[dan\\_wyman@tcenergy.com](mailto:dan_wyman@tcenergy.com)>

**Sent:** Friday, February 14, 2020 3:28 PM

**To:** Achampong, Bernard EAO:EX <[Bernard.Achampong@gov.bc.ca](mailto:Bernard.Achampong@gov.bc.ca)>; Parks, Chris EAO:EX <[Chris.Parks@gov.bc.ca](mailto:Chris.Parks@gov.bc.ca)>; Anderson, Justin <[Justin.Anderson@BCOGC.ca](mailto:Justin.Anderson@BCOGC.ca)>; Motisca, Dan EAO:EX <[Dan.Motisca@gov.bc.ca](mailto:Dan.Motisca@gov.bc.ca)>; Phillips, Lori L <[Lori.Phillips@BCOGC.ca](mailto:Lori.Phillips@BCOGC.ca)>; Smook, Patrick <[Patrick.Smook@BCOGC.ca](mailto:Patrick.Smook@BCOGC.ca)>; Nazareth, James <[James.Nazareth@BCOGC.ca](mailto:James.Nazareth@BCOGC.ca)>; Friedrich, Hardy <[Hardy.Friedrich@bcogc.ca](mailto:Hardy.Friedrich@bcogc.ca)>; Thoroughgood, Garth <[Garth.Thoroughgood@BCOGC.ca](mailto:Garth.Thoroughgood@BCOGC.ca)>; Wilson, Jason <[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)>; Justin Carlson <[Justin.Carlson@gov.bc.ca](mailto:Justin.Carlson@gov.bc.ca)>

**Cc:** Joel Forrest <[joel\\_forrest@tcenergy.com](mailto:joel_forrest@tcenergy.com)>; Tracy Young <[tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com)>

**Subject:** CGL Question for OGC and EAO Regarding CGL/LNGC Tie-in Point

Good afternoon, my apologies for the large email. This issue was initially brought up during this week's liaison call, however as this situation requires input from both the OGC and EAO (and some folks were not able to participate in this week's call) I wanted to bring it up with this larger group. Also, by engaging this joint group, I'm hopeful that this approach will be as transparent as possible and will facilitate a quick resolution.

In the original Coastal GasLink applications to the OGC and EAO, the Coastal GasLink pipeline ended at the exit point of the Kitimat River Direct Pipe Installation (DPI) south of the Kitimat River just inside the LNG Canada footprint. At that point Coastal GasLink planned to install a pig receiver site and tie-in with a 300m LNG Canada pipeline that would connect directly to the LNG Canada plant. My understanding from LNG Canada is that in its filings to both the OGC and EAO, LNG Canada has shown that pipeline as part of its scope and therefore the 300m pipe is currently permitted under both the LNG Canada EAC and the applicable OGC permits. As a result of this arrangement, Coastal GasLink's OGC construction corridor and footprint, and the CPD outlined in the Coastal GasLink EAC, currently end at the DPI exit point just within the LNG Canada footprint.

Recently, LNG Canada and Coastal GasLink have identified the benefit of Coastal GasLink constructing the 300m connection pipeline and moving the receiver and tie-in points directly adjacent to the LNG Canada plant facility. The point of this email is to establish the appropriate regulatory framework to allow that to proceed.

In order to ensure that the construction of the 300m section of pipe is appropriately covered under the proper regulatory authorizations, Coastal GasLink suggests the following path forward:

**EAO**

- Coastal GasLink proposes to construct the additional 300m of pipe under LNG Canada's EAC and will abide by the terms of that EAC during construction of that section of pipe.
- As this section of pipe was already assessed under LNG Canada's EA, and is included in the existing LNG Canada approved scope, there will be no additional environmental or socio-economic effects as a result of Coastal GasLink constructing this section of pipe.
- Based on the reasons above, there are also no practical reasons Coastal GasLink is aware of to amend Coastal GasLink's EAC to cover this scope.
- During operations, Coastal GasLink also suggests that any EAO inspection of the LNG Canada site would be best conducted under LNG Canada's EAC due to their continued above-ground operations at this location and overall larger scope.

**OGC**

- As Coastal GasLink will construct this section of pipe, Coastal GasLink's operational programs and oversight (including TC Energy's integrity management program and emergency response plan) are likely best situated to be applied to this 300m section of pipe.
- As the specific construction and operational details of the pipeline are under the jurisdiction of the OGC, CGL proposes to amend its section 8 pipeline permit to add the additional 300m of right-of-way and to move the receiver location to the new end-point.

- OGC operational inspections of this section of pipe may need be completed in conjunction with inspections of the LNG Canada facility, however record audits around the condition of the pipe may be more efficient as they would cover the entirety of section 8 right up to the LNG Canada plant.

For reference, I've attached a rough draft of a map showing the location of the DPI exit point and a rough outline of the additional 300m. Based on the clearing shown in the imagery, the extent of the LNG Canada footprint is also visible. (note: the attached map is a draft and only provided for illustrative purposes)

At present, we're hoping to be able to get some agreement from both the OGC and EAO with regard to this proposal. Once we are able to confirm an appropriate regulatory path forward, we will confirm details with LNG Canada and proceed with preparing the appropriate submissions. One important detail that needs to be considered is that work on this section of pipe is tentatively planned to start in May 2020, pending regulatory approval. As such, we would respectfully request initial responses from both the OGC and EAO by the end of February if possible. That timeline should allow us to better understand the required next steps and proceed with filing the required amendments.

Thank you for your time and assistance in this matter. If you have any questions please feel free to contact me directly,

-Dan

---

**Dan Wyman**  
Team Lead, Regulatory  
Coastal GasLink

[dan\\_wyman@transcanada.com](mailto:dan_wyman@transcanada.com)

mobile S.22 desk: 403-920-6296



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Canada, T2P 5H1

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**From:** Phillips, Lori L  
**Sent:** Tuesday, February 18, 2020 10:50 AM  
**To:** Friedrich, Hardy; Thoroughgood, Garth  
**Subject:** RE: CGL Question for OGC and EAO Regarding CGL/LNGC Tie-in Point

Hi all, we can chat. I did discuss it with Suzanne and Jason and subsequently with Justin and Donna to figure out how the amendment application to the Commission would work. The amendment application submission to the Commission itself is relatively easy. As Hardy notes, I would be interested to hear what EAO thinks for their certificate(s).



**Lori Phillips**  
Authorizations Manager  
[Lori.Phillips@BCOGC.ca](mailto:Lori.Phillips@BCOGC.ca)

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---

**From:** Friedrich, Hardy <Hardy.Friedrich@bcogc.ca>  
**Sent:** Friday, February 14, 2020 5:04 PM  
**To:** Thoroughgood, Garth <Garth.Thoroughgood@BCOGC.ca>; Phillips, Lori L <Lori.Phillips@BCOGC.ca>  
**Subject:** RE: CGL Question for OGC and EAO Regarding CGL/LNGC Tie-in Point

Sounds good. Came up on yesterday's call and there's been some internal dialogue already and browsing of the CPDs. I'm reaching out to the EAO as that may be where any complications pop up.

Have a good weekend,

Hardy



**Hardy Friedrich**  
Manager, Major Projects  
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**From:** Thoroughgood, Garth <[Garth.Thoroughgood@BCOGC.ca](mailto:Garth.Thoroughgood@BCOGC.ca)>  
**Sent:** Friday, February 14, 2020 3:44 PM  
**To:** Friedrich, Hardy <[Hardy.Friedrich@bcogc.ca](mailto:Hardy.Friedrich@bcogc.ca)>; Phillips, Lori L <[Lori.Phillips@BCOGC.ca](mailto:Lori.Phillips@BCOGC.ca)>  
**Subject:** Fwd: CGL Question for OGC and EAO Regarding CGL/LNGC Tie-in Point

Hi,  
We should find some time to talk through this.

Garth Thoroughgood  
BC Oil and Gas Commission

Begin forwarded message:

**From:** "Dan Wyman" <[dan\\_wyman@tcenergy.com](mailto:dan_wyman@tcenergy.com)>  
**To:** "Achampong, Bernard EAO:EX" <[Bernard.Achampong@gov.bc.ca](mailto:Bernard.Achampong@gov.bc.ca)>, "Parks, Chris EAO:EX" <[Chris.Parks@gov.bc.ca](mailto:Chris.Parks@gov.bc.ca)>, "Anderson, Justin" <[Justin.Anderson@BCOGC.ca](mailto:Justin.Anderson@BCOGC.ca)>, "Motisca, Dan EAO:EX" <[Dan.Motisca@gov.bc.ca](mailto:Dan.Motisca@gov.bc.ca)>, "Phillips, Lori L" <[Lori.Phillips@BCOGC.ca](mailto:Lori.Phillips@BCOGC.ca)>, "Smook, Patrick" <[Patrick.Smook@BCOGC.ca](mailto:Patrick.Smook@BCOGC.ca)>, "Nazareth, James" <[James.Nazareth@BCOGC.ca](mailto:James.Nazareth@BCOGC.ca)>, "Friedrich, Hardy" <[Hardy.Friedrich@bcogc.ca](mailto:Hardy.Friedrich@bcogc.ca)>, "Thoroughgood, Garth" <[Garth.Thoroughgood@BCOGC.ca](mailto:Garth.Thoroughgood@BCOGC.ca)>, "Wilson, Jason" <[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)>, "Justin Carlson" <[Justin.Carlson@gov.bc.ca](mailto:Justin.Carlson@gov.bc.ca)>  
**Cc:** "Joel Forrest" <[joel\\_forrest@tcenergy.com](mailto:joel_forrest@tcenergy.com)>, "Tracy Young" <[tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com)>  
**Subject:** CGL Question for OGC and EAO Regarding CGL/LNGC Tie-in Point

Good afternoon, my apologies for the large email. This issue was initially brought up during this week's liaison call, however as this situation requires input from both the OGC and EAO (and some folks were not able to participate in this week's call) I wanted to bring it up with this larger group. Also, by engaging this joint group, I'm hopeful that this approach will be as transparent as possible and will facilitate a quick resolution.

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In order to ensure that the construction of the 300m section of pipe is appropriately covered under the proper regulatory authorizations, Coastal GasLink suggests the following path forward:

**EAO**

- Coastal GasLink proposes to construct the additional 300m of pipe under LNG Canada's EAC and will abide by the terms of that EAC during construction of that section of pipe.
- As this section of pipe was already assessed under LNG Canada's EA, and is included in the existing LNG Canada approved scope, there will be no additional environmental or socio-economic effects as a result of Coastal GasLink constructing this section of pipe.

- Based on the reasons above, there are also no practical reasons Coastal GasLink is aware of to amend Coastal GasLink’s EAC to cover this scope.
- During operations, Coastal GasLink also suggests that any EAO inspection of the LNG Canada site would be best conducted under LNG Canada’s EAC due to their continued above-ground operations at this location and overall larger scope.

**OGC**

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- As the specific construction and operational details of the pipeline are under the jurisdiction of the OGC, CGL proposes to amend its section 8 pipeline permit to add the additional 300m of right-of-way and to move the receiver location to the new end-point.
- OGC operational inspections of this section of pipe may need be completed in conjunction with inspections of the LNG Canada facility, however record audits around the condition of the pipe may be more efficient as they would cover the entirety of section 8 right up to the LNG Canada plant.

For reference, I’ve attached a rough draft of a map showing the location of the DPI exit point and a rough outline of the additional 300m. Based on the clearing shown in the imagery, the extent of the LNG Canada footprint is also visible. (note: the attached map is a draft and only provided for illustrative purposes)

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Thank you for your time and assistance in this matter. If you have any questions please feel free to contact me directly,

-Dan

**Dan Wyman**

**Team Lead, Regulatory**  
Coastal GasLink

[dan\\_wyman@transcanada.com](mailto:dan_wyman@transcanada.com)

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**From:** Phillips, Lori L  
**Sent:** Tuesday, February 18, 2020 3:53 PM  
**To:** Anderson, Justin  
**Subject:** FW: CGL Question for OGC and EAO Regarding CGL/LNGC Tie-in Point



**Lori Phillips**  
Authorizations Manager  
[Lori.Phillips@BCOGC.ca](mailto:Lori.Phillips@BCOGC.ca)

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**From:** Dan Wyman  
**Sent:** Tuesday, February 18, 2020 3:23 PM  
**To:** Phillips, Lori L  
**Subject:** RE: CGL Question for OGC and EAO Regarding CGL/LNGC Tie-in Point

Hi Lori, yes its our preference to sign a right-of-way agreement with LNG Canada and add this 300m to our statutory right-of-way. There is a minor issue that there are 2-3 former stream beds that run through this part of LNG Canada's footprint that may still be Crown land. LNG Canada is in the process of acquiring that land however depending on the timing of that process, we may initially be both on LNGC and Crown lands (though eventually it will all be owned by LNGC.

Does that help and/or make sense?

---

**Dan Wyman**  
Regulatory -CGL  
O: 403.920.6296 | M: S.22  
[TCEnergy.com](http://TCEnergy.com)

---

**From:** Phillips, Lori L [<mailto:Lori.Phillips@BCOGC.ca>]  
**Sent:** Tuesday, February 18, 2020 11:09 AM  
**To:** Dan Wyman <[dan\\_wyman@tcenergy.com](mailto:dan_wyman@tcenergy.com)>  
**Subject:** [EXTERNAL] RE: CGL Question for OGC and EAO Regarding CGL/LNGC Tie-in Point

Hi Dan, just a quick question – does CGL intend to encompass the additional 300m as part of the eventual statutory right of way?



**Lori Phillips**  
Authorizations Manager  
[Lori.Phillips@BCOGC.ca](mailto:Lori.Phillips@BCOGC.ca)

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**From:** Dan Wyman <[dan\\_wyman@tcenergy.com](mailto:dan_wyman@tcenergy.com)>

**Sent:** Friday, February 14, 2020 4:28 PM

**To:** Achampong, Bernard EAO:EX <[Bernard.Achampong@gov.bc.ca](mailto:Bernard.Achampong@gov.bc.ca)>; Parks, Chris EAO:EX <[Chris.Parks@gov.bc.ca](mailto:Chris.Parks@gov.bc.ca)>; Anderson, Justin <[Justin.Anderson@BCOGC.ca](mailto:Justin.Anderson@BCOGC.ca)>; Motisca, Dan EAO:EX <[Dan.Motisca@gov.bc.ca](mailto:Dan.Motisca@gov.bc.ca)>; Phillips, Lori L <[Lori.Phillips@BCOGC.ca](mailto:Lori.Phillips@BCOGC.ca)>; Smook, Patrick <[Patrick.Smook@BCOGC.ca](mailto:Patrick.Smook@BCOGC.ca)>; Nazareth, James <[James.Nazareth@BCOGC.ca](mailto:James.Nazareth@BCOGC.ca)>; Friedrich, Hardy <[Hardy.Friedrich@bcogc.ca](mailto:Hardy.Friedrich@bcogc.ca)>; Thoroughgood, Garth <[Garth.Thoroughgood@BCOGC.ca](mailto:Garth.Thoroughgood@BCOGC.ca)>; Wilson, Jason <[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)>; Justin Carlson <[Justin.Carlson@gov.bc.ca](mailto:Justin.Carlson@gov.bc.ca)>

**Cc:** Joel Forrest <[joel\\_forrest@tcenergy.com](mailto:joel_forrest@tcenergy.com)>; Tracy Young <[tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com)>

**Subject:** CGL Question for OGC and EAO Regarding CGL/LNGC Tie-in Point

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**OGC**

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Thank you for your time and assistance in this matter. If you have any questions please feel free to contact me directly,

-Dan

---

**Dan Wyman**  
Team Lead, Regulatory  
Coastal GasLink

[dan\\_wyman@transcanada.com](mailto:dan_wyman@transcanada.com)  
mobile S.22 desk: 403-920-6296



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**From:** Anderson, Justin  
**Sent:** Tuesday, February 18, 2020 11:13 AM  
**To:** Nazareth, James  
**Cc:** Person, Darryl; Phillips, Lori L; Mana, Kate; Wilson, Jason  
**Subject:** RE: CGL Question for OGC and EAO Regarding CGL/LNGC Tie-in Point

Hi James

I have provided a response below.

If you have any more questions, let me know.



**Justin Anderson**  
Authorizations Manager  
[Justin.Anderson@BCOGC.ca](mailto:Justin.Anderson@BCOGC.ca)

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**From:** Nazareth, James  
**Sent:** Friday, February 14, 2020 4:53 PM  
**To:** Anderson, Justin  
**Cc:** Person, Darryl ; Phillips, Lori L ; Mana, Kate ; Wilson, Jason  
**Subject:** RE: CGL Question for OGC and EAO Regarding CGL/LNGC Tie-in Point

Hi Justin,

Lots of people on this email, eh...

I don't really see any engineering issue with what they are proposing. If the CGL right-of-way for the pipeline is being extended, a pipeline amendment application with the new land for ROW will need to be submitted, along with all the other submission requirements for pipeline amendments.

What is a section 8 pipeline permit? **When the originally applied for the pipeline the divided the entire project into 8 applications or as they say 'sections'. The last permit that goes into Kitimat is section 8.**

Where is this additional 300 m in relation to the Kitimat meter station? **It is well after the kitimat meter station as show in the image below. The meter station is circled in red.**



Is this additional 300 m going to be owned and operated by CGL? Or are they just proposing to install it on the LNG Canada lease? **CGL is proposing to amend their permit to include the additional 300m so it would be owned and operated by CGL.**

Darryl & Kate, I copied you on this one to keep you in the loop.

Have a good weekend.

James



**James Nazareth** P.Eng.  
Supervisor, Engineering Reviews  
[James.Nazareth@BCOGC.ca](mailto:James.Nazareth@BCOGC.ca)

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**From:** Dan Wyman <[dan\\_wyman@tcenergy.com](mailto:dan_wyman@tcenergy.com)>

**Sent:** Friday, February 14, 2020 3:28 PM

**To:** Achampong, Bernard EAO:EX <[Bernard.Achampong@gov.bc.ca](mailto:Bernard.Achampong@gov.bc.ca)>; Parks, Chris EAO:EX <[Chris.Parks@gov.bc.ca](mailto:Chris.Parks@gov.bc.ca)>; Anderson, Justin <[Justin.Anderson@BCOGC.ca](mailto:Justin.Anderson@BCOGC.ca)>; Motisca, Dan EAO:EX <[Dan.Motisca@gov.bc.ca](mailto:Dan.Motisca@gov.bc.ca)>; Phillips, Lori L <[Lori.Phillips@BCOGC.ca](mailto:Lori.Phillips@BCOGC.ca)>; Smook, Patrick <[Patrick.Smook@BCOGC.ca](mailto:Patrick.Smook@BCOGC.ca)>; Nazareth, James <[James.Nazareth@BCOGC.ca](mailto:James.Nazareth@BCOGC.ca)>; Friedrich, Hardy <[Hardy.Friedrich@bcogc.ca](mailto:Hardy.Friedrich@bcogc.ca)>; Thoroughgood, Garth <[Garth.Thoroughgood@BCOGC.ca](mailto:Garth.Thoroughgood@BCOGC.ca)>; Wilson, Jason <[Jason.Wilson@BCOGC.ca](mailto:Jason.Wilson@BCOGC.ca)>; Justin Carlson <[Justin.Carlson@gov.bc.ca](mailto:Justin.Carlson@gov.bc.ca)>

**Cc:** Joel Forrest <[joel\\_forrest@tcenergy.com](mailto:joel_forrest@tcenergy.com)>; Tracy Young <[tracy\\_young@tcenergy.com](mailto:tracy_young@tcenergy.com)>

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Thank you for your time and assistance in this matter. If you have any questions please feel free to contact me directly,

-Dan

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**Dan Wyman**

Team Lead, Regulatory  
Coastal GasLink

[dan\\_wyman@transcanada.com](mailto:dan_wyman@transcanada.com)

mobile S.22 desk: 403-920-6296



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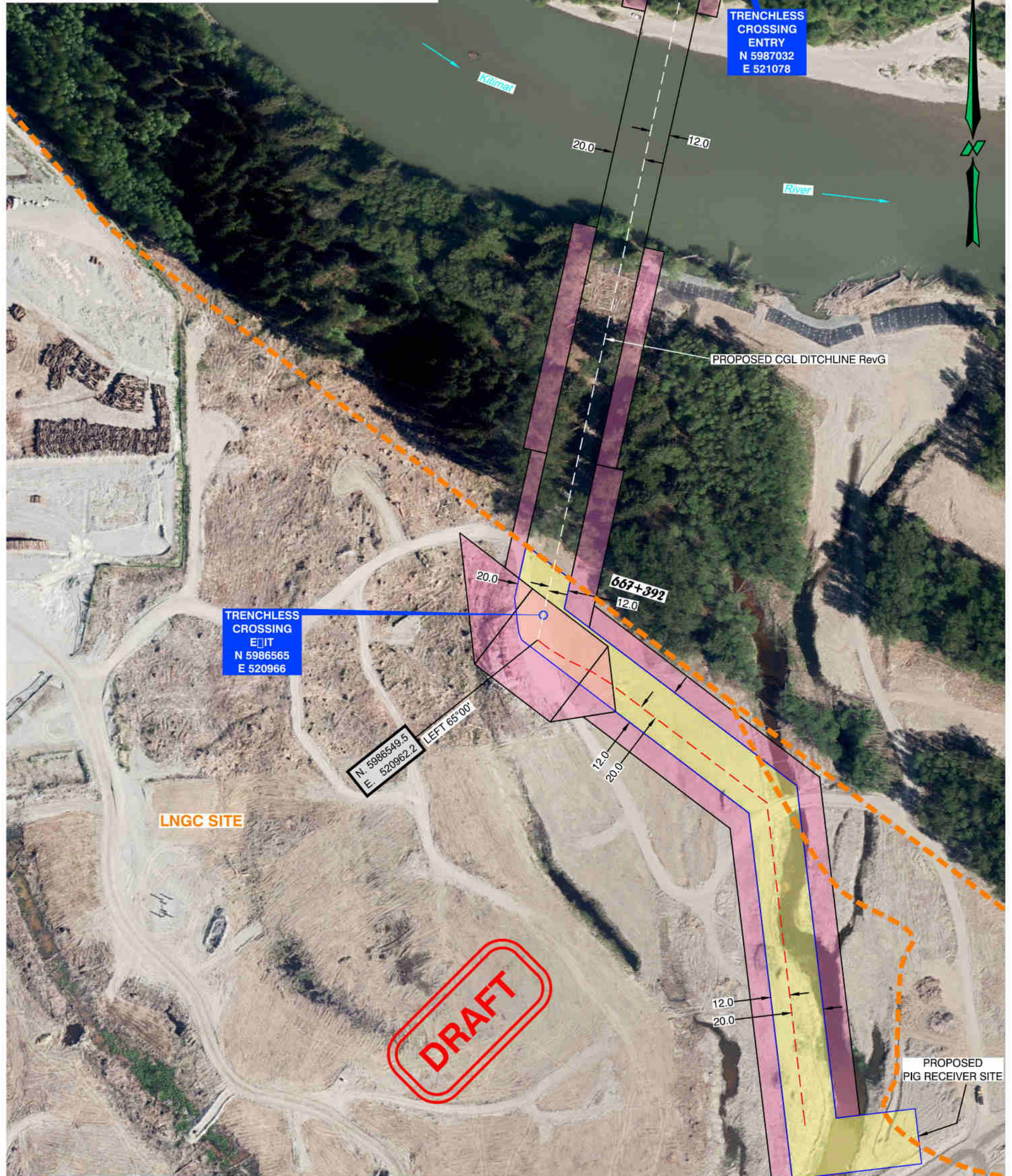
**NOTES :**

- Distances shown are in metres and decimals thereof.
- UTM Coordinates shown are NAD83 Zone 9 N.
- The proposed project is within the South West OGC Zone.

**McELHANNEY**  
 8808 - Northern Lights Drive  
 Fort St. John, British Columbia  
 Phone:(250)787-0356, Fax:(250)787-0310

BCGS 1031 . 007

REVISION	DESCRIPTION
0	Issued for Information, December 4, 2019



COASTAL GASLINK PIPELINE LTD.

SKETCH PLAN SHOWING  
**PROPOSED ROUTE**  
 WITHIN  
**THE LNGC SITE**

DISTRICT OF KITIMAT  
 RANGE 5 COAST DISTRICT

December 4, 2019

Route Reference: CGL\Route\RevG

Rev 0





**APPLICATION MANAGEMENT SYSTEM**  
**APPLICATION REPORT**

The information contained within this report is a summary of the content that was accepted into the Commission's Application Management System.

**APPLICATION OVERVIEW**

Application Type: New OGAA	Application Number: 100111023	Revision Number: 1
Created Date: 05-07-2020	Submitted Date: 08-18-2020	
List of Activities:	Associated Oil and Gas Activity, Changes In and About a Stream	
Application Description:	14.4kV single wire Power Line with Poles and Guy-wires where needed Within c-68-A, 103-l-2 to d-67-A, 103-l-2, Range 5 Coast District	
Revision Explanation:	Updates to the Archaeology tab as per request of James Greenhalgh	
OGC Operational Zones:	South West	

**PROPONENT INFORMATION**

Proponent Name:	Coastal GasLink Pipeline Ltd.		
Proponent Address:	450 - 1st Street SW Calgary , AB. T2P5H1 CA		
Proponent Phone Number:	(587) 933-3854	Proponent Email:	robert_macleod@transcanada.com
Proponent Fax:	(403) 920-2347	Proponent File Reference:	
Contact Name:	Matt Quinlan	Contact Phone:	S.22
Contact Fax:	null	Contact Email:	matt_quinlan@transcanada.com
Contact Address:			

**AREA DETAILS**

Total Application Area (ha):	1.524
Total Area of Crown Land (ha):	1.524
Total Area of Private Land (ha):	0

**ADMINISTRATIVE INFORMATION**

Representative Name:	Matt Quinlan		
Type:	Other		
File Reference:	S.22		
Phone:		Email:	matt_quinlan@transcanada.com
Address:			
Company:			
Representative Description			



Representative Name:	Dan Wyman		
Type:	Other		
File Reference:			
Phone:	(403) 920-6296	Email:	dan_wyman@transcanada.com
Address:			
Company:	Coastal GasLink Pipeline Ltd.		
Representative Description	Regulatory		
Representative Name:	Kyla Mumby		
Type:	Surface Land Administrator		
File Reference:			
Phone:	(403) 933-0404	Email:	kyla_mumby@tcenergy.com
Address:			
Company:			
Representative Description			
Representative Name:	Carole Horst		
Type:	Referral Agent		
File Reference:			
Phone:	(250) 787-0356	Email:	chorst@mcelhanney.com
Address:	10012 97th Avenue Fort St. John, BC. V1J 5P CA		
Company:	McElhanney Geomatics Professional Land Surveying Ltd.		
Representative Description	Preparing application		
Representative Name:	Ecofor		
Type:	Archaeology Company		
File Reference:			
Phone:	(250) 787-6009	Email:	inform@ecofor.ca
Address:	9607 112 Street Fort St. John, BC. V1J7C7 CA		
HCA Permit Holder:	James Mooney	HCA Permit Number:	2020-0120
Representative Description			
Representative Name:	James Mooney		
Type:	Archaeologist		
File Reference:			
Phone:	S.22	Email:	james@ecofor.ca
Address:			
Company:	Ecofor		
HCA Permit Holder:	James Mooney	HCA Permit Number:	2020-0120
Representative Description			

Representative Name:	Hayley Chester		
Type:	Other		
File Reference:			
Phone:	(250) 785-9281	Email:	hayley_chester@golder.com
Address:	Site 18, Comp 26, SS 2 Stn.Main Fort St. John, BC. V1J4M7 CA		
Company:			

Representative Description

**CHANGES IN AND ABOUT A STREAM**

Changes In and About a Stream Number:	0006189		
BCGS Map:	103I.008		
Proposed Start Date:	07-15-2020	Proposed Completion Date:	07-14-2022

Activity Description:  
 14.4kV single wire Power Line with Poles and Guy-wires where needed  
 Within c-68-A, 103-I-2 to d-67-A, 103-I-2, Range 5 Coast District  
 See Table 1-1,page 6 of 12 for the stream information.

Sketch Plan Attached?	No
-----------------------	----

**STREAM IMPACT: 12**

**STREAM IMPACT SPECIFICATION**

Primary Activity Type:	N/A	File XREF Number:	None
If no File XRef Number available, please provide a rationale: Overhead power line crossing over an S3 creek. The creek is flowing through an existing culvert on the existing road.			

Location ID Number:	12		
Stream / Watercourse Name:	CREEK		
Duration:	Permanent	Riparian Class:	S3
Riparian Class Verification:	Field Verified		
Bank Full Stream Width(m):	2.43	Stream Gradient:	2.67
	Zone	Northing	Easting
Impact Location (UTM):	09	5990017.069	526600.567
Primary Crossing Method:	Aerial		
Crossing method Rationale (Optional): Overhead power line.			

Is a mechanical crossing required at this location? No

**STREAM EXEMPTIONS**

Does Stream Crossing Methods Meet Best Management Practice? Yes

**ASSOCIATED OIL & GAS ACTIVITY DETAILS**

Land Area Number: 100014343

Is one or more of the associated activities within a previously assessed construction corridor? No

Activity Description:

14.4kV single wire Power Line with Poles and Guy-wires where needed  
Within c-68-A, 103-I-2 to d-67-A, 103-I-2, Range 5 Coast District

**ASSOCIATED OIL & GAS ACTIVITY SUMMARY**

**POWERLINE**

Associated Oil & Gas Activity Number	Crown Area (ha)	Private Area (ha)	Total Area (ha)
00206536	1.524	N/A	1.524

**ASSOCIATED OIL & GAS LAND DETAILS**

Activity Area: 1.524 Land Status: Crown

Total Area of Crown Land for Activity (ha): 1.524

**LAND DETAILS**

Total Application Area: 1.524 Land Status: Crown Crown Land Type: Crown Municipal

Total Area of Crown Land for Application (ha): 1.524

**FORESTRY DETAILS**

New Cut Required: Yes

**FOREST DISTRICT AND MASTER LICENSE TO CUT**

Forest District Name: Master License to Cut: Area of Proposed Cut Over Crown Land and MoTI(ha):  
Coast Mountains Natural Resource District M02617 1.280

Total Area of Proposed Cut over Crown Land and MoTI(ha): 1.280

Proposed Area (Crown) (ha): 1.5240

Total Area over MoTI(ha):

Within a Timber Harvesting Land Base? No

**STEWARDSHIP DETAILS**

The application is within an Area-Based Analysis Enhanced Management and/or Regulatory Policy Area: No

The application overlaps a park, protected area, or ecological reserve: No

The application overlap the Muskwa-Kechika Management Area: No

The application overlaps a resource management zone: Yes

Does the application adhere to the strategies outlined for the resource management zone identified in the applicable Land and Resource Management Plan? Yes

The application overlaps an area established by order: No

The application overlaps an area established by OGC:	No
All activities included in this application will be planned and carried out in accordance with the planning and operational measures outlined in the Environmental Protection and Management Guideline:	Yes
Is an exemption requested from Part 3 of the Environmental Protection and Management Regulation?	No

### AGRICULTURE LAND RESERVE DETAILS

Based on the spatial data submitted, the application overlaps the agriculture land reserve: No

### ARCHAEOLOGY DETAILS

Administrative Change Only: No

Source to identify archaeological potential:  
S.18

Areas containing archaeological potential:	Yes
Specify factors used to assess potential:	S.18

Archaeology Report Attached: No

### NON-GEOPHYSICAL ARCHAEOLOGY INFORMATION

Archaeology Site within 200 m:	No	
Has field work been completed?	No	
Is field work required?	Yes	Type of Field Work Required: AIA-Archaeological Impact Assessment
Archaeological Site Identified:	No	

### MAPS & PLANS DETAILS

Survey Company:	McElhanney Associates Land Surveying Ltd.		
Job Number:	2353-10331-00		
Sheet Number:	1	Original Plan Date:	06-02-2020

Revised Plan Date:	07-02-2020	Revision Number:	2
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# SDM Review and Determination

**Application #:** [100111023 - Rev. 1](#)

**Application Type:** New OGAA

**Activity Type:** Associated Oil and Gas Activity, Changes In and About a Stream

**Proponent:** Coastal GasLink Pipeline Ltd.

**Application Submitted Date:** 2020-08-18

**Zone(s):** South West

**Task Created Date:** 2020-08-20

**Task Started Date:** 2020-09-16

**Days in Progress:** 0

**Application Status:** Approved

**Assignee:** May Fong

**Task ID:** 2792951

**Task Status:** Completed

## [Decision Maker Notes](#)

100111023 – Coastal GasLink Pipeline Ltd. – AOGA (Powerline) and CIAS

Site information:

The proposed Power Line is from BC Hydro's existing Power Line within District Lot 1867 (c-68-A, 103-I-2), located in the vicinity of Forest Avenue in Kitimat, to CGL's Kitimat Meter Station within d-67-A, 103-I-2. The Power Line parallels the existing Wathl Creek Forest Service Road and the South Hirsch Main Line Road 14742, Section D, as shown on the attached mapping. The Power Line will be a 14.4 kV single wire service directly to the Kitimat Meter Station with no branches to other sites along the route. There will be 23 poles in total with guy-wire tension cables as required on 11 of these pole locations. A total of 1.52 hectares of area is required for this project with 1.28 hectares of new cut.

Environment:

Section 4- Water: The proposed AOGA is NOT located within 100 m of any waterworks diversions, water storage reservoirs, water supply wells, (or groundwater capture zones associated with water supply wells), identified ground water recharge areas, designated watersheds, or identified aquifers. GEOs as per Section 4 of the EPMR will be met.

#### Section 5- Riparian Values:

There is 1 aerial stream crossing which is included in the Changes In and About a Stream application. There are no other identified streams, lakes, wetlands, or enclosed uplands within the project area. The reviewer noted no encroachments to Riparian Reserve Zones, or Riparian Management Areas, and there are no identified temperature sensitive streams being impacted. GEOs as per Section 5 of the EPMR will be met.

#### Section 6- Wildlife and Wildlife Habitat:

The proposed project site is NOT located within a wildlife habitat area, approved/mapped UWR, fisheries sensitive watersheds, WTRA, “identified” wildlife habitat feature(s), (designated RRAs, Boreal Caribou Core Habitat) or CDC Species and Ecosystems at Risk polygons. GEOs as per section 6 of the EPMR will be met.

#### Section 7- OGMAs, Resources Features, CHRs:

The proposed site does not overlap any OGMAs, resource features or known cultural heritage resources. GEOs as per section 7 of the EPMR will be met.

The proposed site is within a Notation of Interest (File 7409630) for a Gas and Oil Pipeline purpose, which is compatible use. No Map Reserves or statutory rightsof way are impacted.

#### Consultation and Notification:

The C&N radius is shown as 0 m (consultation) and 0 m (notification). All impacted parties were engaged. No Written Submissions or responses have been received, and there are no outstanding concerns. Consultation and Notification completed as per regulation.

#### Forestry:

1.28 ha of new cut required. Stumpage condition has been added to the permit.

#### Agriculture:

Application is not within the ALR. An agriculture review is not required.

#### Area Based Analysis:

The proposed activity is not within northeastern BC; hence, ABA is not applicable.

Archaeology: The Archaeology Review indicates no sites were identified within 200 metres. The recommended standard archaeology permit conditions have been included.

#### First Nations:

There was one (1) Nation community consulted for this application. This Nation was Haisla Nation Council (HN). HN had no objections to the issuance of a permit for the proposed activity. After reviewing the available consultation record, I have concluded that the Commission has met the crown’s duty to consult. The condition will be added to permit as recommended by the FNLO.

Decision: After reviewing all applicable information, I have decided, as the Delegated Decision Maker, to approve this proposal powerline as applied for.

May Fong

September 16, 2020



**ARCHAEOLOGY INFORMATION FORM**  
**Non-Geophysical Programs**  
 Physical Address: 6534 Airport Road,  
 Fort St. John, B.C.  
 Mailing Address: Bag 2, Fort St. John, B.C. V1J 2B0  
 Phone: (250) 794-5200

THIS IS AN AUDITABLE DOCUMENT

This form is to be submitted under the authority of the *Heritage Conservation Act* by oil and gas applicants or their agents as part of their application to carry out exploration, development, construction or production activities.

**APPLICANT INFORMATION** **A**

Application Type: <input checked="" type="checkbox"/> New Application <input type="checkbox"/> Amendment	Commission File AA No. : 100111023 *Commission File AD No. : *If this is an amendment, provide the original AD file number for the project.	
Company Name: Coastal GasLink Pipeline Ltd.	Project Name: Proposed Powerline 10.0m, 14.0m And 15.0m Right Of Way From c-68-A, 103-I-2 To d-67-A, 103-I-2 Through Unsurveyed Crown Land Range 5 Coast District	
Construction Plan Map Job No.: CGL4774-ALP-G-MP-0001-Const Plan-Rev2	Revision No.: 2	Revision Date: July 2, 2020
Application Shapefile Reviewed? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  Date viewed: N/A	<input type="checkbox"/> Administrative change (no ground activity) OR Activity with no ground disturbance* (Describe):  *Does <b>not</b> include work on existing.	

**ARCHAEOLOGICAL POTENTIAL ESTABLISHMENT** **B**

1) Are there known archaeological sites within 200 m of the proposed development?  Yes  No

<i>Borden Number (AaBb-1234)</i>	<i>Distance (0.00m)</i>

2) List other sources of information used to identify archaeological potential: (*plan maps with revision number and date, RAAD, orthophotos, field visit, Millennia Model, etc.*)

S.18

Google Earth, RAAD (accessed May 20, 2020)

3) Describe factors used to assess potential: (describe specific terrestrial, hydraulic , cultural attributes, historic features, etc.)

S.18

4) Are there areas/components in the project that contain archaeological potential?  Yes  No

**ASSESSMENT INFORMATION**

**C**

1)  No field work is required

2)  Field work is required (specify type):  
 AIA  PFR  Other (Description):

3)  All field work has been completed (specify type):  
 AIA  PFR  Other (Describe):  
a. New archaeological site identified?  Yes  No  
b. If Yes, indicate Borden number(s) and/or temporary site number(s) and describe mitigation strategy:  
Borden Number: \_\_\_\_\_  
Site Mitigation – brief description: \_\_\_\_\_

Has Commission archaeology staff approved the mitigation strategy for site(s) identified?  Yes  No (If Yes, upload approval letter)

Archaeology Company: Ecofor Consulting Ltd.

HCA Permit No.: 2020-0120


First Nations Heritage Permit No.:

*I declare that I have read and agree with the information contained in this form and to the best of my knowledge the application area is consistent with this assessment.*

**This is a legal document. Signatory, please print and sign name:**

James Mooney

HCA PERMIT HOLDER – PRINT NAME

  
HCA PERMIT HOLDER – SIGN NAME

August 13, 2020

DATE





## CS8 POWER LINE

Revision 1 June 26, 2020

**Please don't delete this page or the blank page that follows it. They are used by formatters and editors, and should be ignored by all other users.**

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Company name	Coastal GasLink Pipeline Project
Document title	CS8 Power Line
Section or attachment number (optional) and title (required)	Environmental Protection and Management Summary Table
Publication date	June 26, 2020
Document number	
Revision number (caption and digits)	Revision 1
Document status	
Hearing Order number (leave cell empty for none)	
Number lines? (Yes or No)	No
Number Headings 1 to 3? (Yes or No)	Yes
Format for landscape layout? (Yes or No)	No

To update all variable definitions. [DOUBLE-CLICK HERE](#)



**Table 1-1: Proposed CS8 Power Line**

Provincially Designated Area	Description	Justification	Mitigation	References
<b>Water Values</b>				
<b>Water Works and Water Supply Wells</b>				
The Proposed Power Line does not occur in Water Works and Water Supply Well areas				BC MFLNRORD 2019b,c,d BC ENV 2019a BC ENV 2020a
<b>Groundwater Recharge Areas and Identified Aquifers</b>				
The Proposed Power Line does not occur in a Groundwater Recharge Area or Identified Aquifer				BC ENV 2020b
<b>Designated Watersheds</b>				
The Proposed Power Line does not occur in a Designated Watershed				BC ENV 2020c
<b>Wildlife and Wildlife Habitat</b>				
<b>Wildlife Habitat Areas (WHA)</b>				
The Proposed Power Line does not occur in a WHA				BC MFLNRORD 2019a
<b>Ungulate Winter Range (UWR)</b>				
The Proposed Power Line does not occur in a UWR				BC MFLNRORD 2019e,f,g
<b>Caribou Range</b>				
The Proposed Power Line does not occur in a Caribou Range				BC ENV 2019c
<b>Fisheries-Sensitive Watersheds</b>				
The Proposed Power Line does not occur in a Fisheries-Sensitive Watershed				BC MFLNRORD 2019h,i

**Table 1-1: Proposed CS8 Power Line (cont'd)**

<b>Provincially Designated Area</b>	<b>Description</b>	<b>Justification</b>	<b>Mitigation</b>	<b>References</b>
<b>High Priority Wildlife and Wildlife Habitat Features</b>				
In the event that high priority wildlife and wildlife habitat features are encountered along the Proposed Power Line, Coastal GasLink will apply mitigation identified in the Environmental Management Plan (EMP), as appropriate, including any applicable appendices (e.g., Wildlife and Wildlife Habitat Management Plan [WWHMP], Caribou Mitigation Management Plan (CMMP), Access Control Management Plan [ACMP], Traffic Control Management Plan [TCMP], Acid Rock Construction Response Plan [ARCRP], Wetlands Management Plan [WMP] and Water Quality Monitoring Plan [WQMP])				
<b>Wildlife Tree Retention Areas</b>				
	The Proposed Power Line does not occur within a Wildlife Tree Retention Area			BC MFLNRORD 2019a,j BC MFLNRORD 2020b
<b>Old-Growth Management Areas (OGMAs)</b>				
<b>Legal Established OGMAs</b>				
	The Proposed Power Line does not occur in a Legal OGMA			BC MFLNRORD 2019k
<b>Non-Legal Established OGMAs</b>				
	The Proposed Power Line does not occur in a Non-Legal OGMA			BC MFLNRORD 2019l
<b>Resource Features</b>				
<b>Karst Features</b>				
	The Proposed Power Line does not affect any identified Karst features			BC MFLNRORD 2019m-
<b>Range Development and Range Tenures</b>				
	The Proposed Power Line does not occur in a Range Development or Range Tenure			BC MFLNRORD 2019n BC MFLNRORD 2020c,d,e,h
<b>Research/Experimental Crown Land</b>				
	The Proposed Power Line does not occur on Research or Experimental Crown Land			BC MFLNRORD 2019o,g
<b>Permanent Sample Site-Snow Courses</b>				
	The Proposed Power Line does not occur in an area with Permanent Sample Site-Snow Courses			BC ENV 2019b

**Table 1-1: Proposed CS8 Power Line (cont'd)**

Provincially Designated Area	Description	Justification	Mitigation	References
<b>Recreational Features</b>				
The Proposed Power Line does not affect any identified Recreational Features				BC MFLNRORD 2019p BC MFLNRORD 2020f
<b>Commercial Recreational Features</b>				
The Proposed Power Line does not affect any identified Commercial Recreational Features				BC MFLNRORD 2020g
<b>Visually Sensitive Areas/Objectives</b>				
The Proposed Power Line does not affect any Visually Sensitive Area or Objectives				BC MFLNRORD 2019q
<b>Land and Resource Management Plans (LRMP)</b>				
Kalum LRMP	<p>Resource activities are permitted, however, conservation of resource values, such as fish and wildlife habitat, water quality and tourism, are of primary importance. Resource development will include measures to conserve these priority resource values</p> <p>No land uses that conflict with Proposed Power Line construction and operations were identified in the Kalum LRMP</p>	The Proposed Power Line was selected based on factors such as ongoing engagement, the use of existing clearing, where practical, proximity to the proposed Coastal GasLink pipeline right-of-way, access, and ensuring compatibility with existing land use	<ul style="list-style-type: none"> <li>• Implement the Environmental Management Plan (EMP), including the Access Control Management Plan (ACMP), and Traffic Control Management Plan (TCMP)</li> <li>• Implement the Wetlands Management Plan (WMP), Water Quality Monitoring Plan (WQMP), Wildlife and Wildlife Habitat Management Plan (WWHMP), Visual Quality Management Plan (VQMP), Post Construction Monitoring Program (PCMP) and Reclamation Program, to reduce potential adverse effects of The Proposed Power Line on lands crossed in the Kalum LRMP area</li> <li>• Implement the EMP Section 5.0: Notification of Concerned Parties, Section 6.0: Construction Preparation, Section 7.0: Proposed Project-Specific Protection Measures and Section 8.0: Pipeline Construction, which outline mitigation relevant for the Kalum LRMP area</li> </ul>	Government of British Columbia 2002 BC MFLNRORD 2019r

**Table 1-1: Proposed CS8 Power Line (cont'd)**

Provincially Designated Area	Description	Justification	Mitigation	References
<b>Sustainable Resource Management Plans (SRMP)</b>				
Kalum SLRMP	<p>Resource activities are permitted, however, conservation of resource values, such as fish and wildlife habitat, water quality and tourism, are of primary importance. Resource development will include measures to conserve these priority resource values</p> <p>No land uses that conflict with Proposed Power Line construction and operations were identified in the Kalum LRMP</p>	<p>The Proposed Power Line was selected based on factors such as ongoing engagement, the use of existing clearing, where practical, proximity to the proposed Coastal GasLink pipeline right-of-way, access, and ensuring compatibility with existing land use</p>	<ul style="list-style-type: none"> <li>• Implement the Environmental Management Plan (EMP), including the Access Control Management Plan (ACMP), and Traffic Control Management Plan (TCMP)</li> <li>• Implement the Wetlands Management Plan (WMP), Water Quality Monitoring Plan (WQMP), Wildlife and Wildlife Habitat Management Plan (WWHMP), Visual Quality Management Plan (VQMP), Post Construction Monitoring Program (PCMP) and Reclamation Program, to reduce potential adverse effects of The Proposed Power Line on lands crossed in the Kalum LRMP area</li> <li>• Implement the EMP Section 5.0: Notification of Concerned Parties, Section 6.0: Construction Preparation, Section 7.0: Proposed Project-Specific Protection Measures and Section 8.0: Pipeline Construction, which outline mitigation relevant for the Kalum LRMP area</li> </ul>	<p>Government of British Columbia 2006 BC MFLRNORD 2019s,t</p>



**Table 1-1: Proposed CS8 Power Line (cont'd)**

Provincially Designated Area	Description	Justification	Mitigation	References
<b>Resource Management Zones</b>				
<b>Kalum Land and Resource Management Plan</b>				
Kalum Resource Management Zone - General	RMZ direction applies to specific geographic areas with distinct biophysical characteristics and resource issues	The Proposed Power Line was selected based on factors such as ongoing engagement, the use of existing clearing, where practical, proximity to the proposed Coastal GasLink pipeline right-of-way, access, and ensuring compatibility with existing land use	<ul style="list-style-type: none"> <li>• Implement the Environmental Management Plan (EMP), including the Access Control Management Plan (ACMP), and Traffic Control Management Plan (TCMP)</li> <li>• Implement the Wetlands Management Plan (WMP), Water Quality Monitoring Plan (WQMP), Wildlife and Wildlife Habitat Management Plan (WWHMP), Visual Quality Management Plan (VQMP), Post Construction Monitoring Program (PCMP) and Reclamation Program, to reduce potential adverse effects of The Proposed Power Line on lands crossed in the Vanderhoof LRMP area</li> <li>• Implement Section 8.2 Clearing and Disposal in the EMP, which describes mitigation for timber resources</li> </ul>	Government of British Columbia 2002 BC MFLNRORD 2019r
<b>Agriculture Land Reserve (ALR)</b>				
The Proposed Power Line does not occur within an ALR				Agriculture Land Commission 2020
<b>First Nation Land Use Plans</b>				
The Proposed Power Line does not occur in a First Nation Land Use Plan area				BC MFLNRORD 2020a
<b>Area-Based Analysis Enhanced Management and Regulatory Policy Area</b>				
The Proposed Power Line does not affect an Enhanced or Regulatory Policy Area within the Area-Based Enhanced Management and Regulatory Policy Area				BC OGC 2019a,b BC OGC a,b,c,d

**Table 1-1: Proposed CS8 Power Line (cont'd)**

Provincially Designated Area	Description	Justification	Mitigation	References
<b>Watercourses</b>				
Jacobs ID: CMn150	Watercourse Class: S3 Unnamed Tributary to Pine Creek (Kitimat River Watershed)	The Proposed Power Line was selected based on factors such as ongoing engagement, the use of existing clearing, where practical, proximity to the proposed Coastal GasLink pipeline right-of-way, access, and ensuring compatibility with existing land use	<ul style="list-style-type: none"> <li>• The power poles and anchor will be sited outside of the RMZ, where practical.</li> <li>• Where NCDs are present, drainage contours will remain, water management measures will be employed, if flowing and if necessary.</li> <li>• Potential vehicle crossing methods include the following:                             <ul style="list-style-type: none"> <li>- open bottom structure;</li> <li>- closed bottom structure (if non-fish bearing);</li> <li>- clearspan bridge;</li> <li>- snowfill; and</li> <li>- ice bridge.</li> </ul> </li> </ul> Coastal GasLink will implement the EMP, including Section 7.1: Resource-Specific Protection Measures, Section 8.1: General Environmental Protection Measures, Section 8.2: Clearing, Section 8.4: Watercourse Crossings, Section 8.8: Cleanup and Reclamation.	Watercourses based on TRIM & Field Data
Jacobs ID: 8111	Watercourse Class: NCD Unnamed Tributary to Hirsch Creek (Kitimat River Watershed)			
Jacobs ID: 8114	Watercourse Class: NCD Unnamed Tributary to Pine Creek (Kitimat River Watershed)			
Jacobs ID: CMn1	Watercourse Class: NCD Unnamed Tributary to Pine Creek (Kitimat River Watershed)			
Jacobs ID: UN12-67	Watercourse Class: NCD Unnamed Tributary to Hirsch Creek (Kitimat River Watershed)			
Jacobs ID: UN12-68	Watercourse Class: NCD Unnamed Tributary to Hirsch Creek (Kitimat River Watershed)			
Jacobs ID: UN12-69	Watercourse Class: NCD Unnamed Tributary to Hirsch Creek (Kitimat River Watershed)			
Jacobs ID: UN12-70	Watercourse Class: NCD Unnamed Tributary to Hirsch Creek (Kitimat River Watershed)			
Jacobs ID: S1049	Watercourse Class: NCD Unnamed Tributary to Hirsch Creek (Kitimat River Watershed)			

## 1.0 REFERENCES

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## PROJECT DESCRIPTION FORM

Company Name: Coastal GasLink Pipeline Ltd.

OGC File No: 100111023

Company File No.: **CGL4774-ALP-G-MP-0001-Const Plan-Rev1**

### PROJECT DESCRIPTION

- 1. What is the scope of the proposed activity?** (Include infrastructure and equipment, and geospatial data on anticipated total land disturbance.)

The proposed Power Line is from BC Hydro's existing Power Line within District Lot 1867 (c-68-A, 103-I-2), located in the vicinity of Forest Avenue in Kitimat, to CGL's Kitimat Meter Station within d-67-A, 103-I-2. The Power Line parallels the existing Wathl Creek Forest Service Road and the South Hirsch Main Line Road 14742, Section D, as shown on the attached mapping. The Power Line will be a 14.4 kV single wire service directly to the Kitimat Meter Station with no branches to other sites along the route. There will be 23 poles in total with guy-wire tension cables as required on 11 of these pole locations. Activity is scheduled to proceed once government approvals are in place – tentatively Q2/3 of 2020.

- 2. Provide information about any roads required to carry out the proposed activity:**

The roads are all existing as the line parallels and existing Forest Service Road and Mainline Road.

- 3. Detail the order in which the proposed activities will be carried out, including timeframes:**

The poles will be installed with guy wires where needed for safety and the single wire will be added to the poles. The activity is scheduled to be completed by Q3 of 2020, once government approvals are in place.

- 4. If the activity is planned in phases, describe each phase of the activity:**

This is not a phased activity.

- 5. What are the estimated increases to dust, noise and odours from the proposed activity?**

Any increase to dust, noise or odors will be during construction only. Once construction is complete these factors will return to pre-construction levels.

- 6. Detail any mitigation activities that will be carried out:**

All activities associated with the design, construction and operation of the proposed powerline will be conducted in accordance with applicable safety regulations, the Commission requirements and Coastal GasLink and its contractor's safety programs.

- 7. Detail the nature and extent of vehicle traffic required to carry out the proposed activity:**

Vehicles to include but not be limited to heavy equipment, haul trucks, crew trucks, pick up trucks, etc.



**COVER LETTER FOR  
FIRST NATIONS REFERRAL  
PACKAGE**

OGC, 100 10003 110 AVE  
Fort St. John, B.C. V1J 6M7  
Phone: (250) 794-5200

Date Received

THIS IS AN AUDITABLE DOCUMENT

**COMMISSION USE ONLY** **A**

Commission File No.:

**ADMINISTRATION** **B**

Commission File No.(if applicable): 100111023 Land Agent: Carole Horst, McElhanney (2353-10031)

Applicant/Company: Coastal GasLink Pipeline Ltd. Land Agent Phone No.: 778-844-0108

Program Name: Powerline R/W c-68-A to d-67-A, 103-I-2 First Nation File No.:

**COVER LETTER FOR FIRST NATIONS REFERRAL PACKAGE** **C**

**To:**

Ktunaxa Nation Council

Kaska Dena Nation

Other (specify): Haisla Nation Council

<p><b>Program Type:</b></p> <p><input type="checkbox"/> Geophysical</p> <p><input type="checkbox"/> Pipeline</p> <p><input type="checkbox"/> Wellsite</p> <p><input type="checkbox"/> Facility</p> <p><input checked="" type="checkbox"/> Other: Powerline</p>	<p><b>Application Type:</b></p> <p><input checked="" type="checkbox"/> New</p> <p><input type="checkbox"/> Amendment</p> <p><input type="checkbox"/> Revision</p>
--	---

*Attached is a copy of the above-noted application for your review. We would like your input as to your view as to the manner in which the application represents a potential adverse impact on the exercise by the First Nation of rights recognized and affirmed by Section 35 (1) of the Constitution Act, 1982, and input and advice on the manner that potential adverse impact could be avoided or mitigated.*

*We would appreciate receiving any comments you may have about this application within 10 working days.*

*Please be aware that if we have not heard from you within 10 working days, the Oil and Gas Commission may proceed with an evaluation and decision of the application based on available information.*

*If you have any questions or concerns regarding this application, please feel free to contact your First Nation Liaison Officer at (250) 794-5200, or fax your written reply to (250) 794-5379.*

**ATTACHMENTS** **D**

**For your information, attached is a copy of the Application Package for the above-noted program proposed for development in your area.**

<input checked="" type="checkbox"/> Application Form	<input checked="" type="checkbox"/> 1:20,000 BCGS Sketch Plan
<input type="checkbox"/> Geophysical Application	<input checked="" type="checkbox"/> 1:50,000 Program Map
<input checked="" type="checkbox"/> Project Description Form	<input checked="" type="checkbox"/> 1:250,000 Access Map
<input checked="" type="checkbox"/> Survey/Construction Plan (if applicable)	<input checked="" type="checkbox"/> Archaeological Assessment Information Form (AAIF)
<input type="checkbox"/> Other (specify):	<input type="checkbox"/> Archaeological Report (specify):

**COMMISSION USE ONLY** **E**

Attachments checked by: Date:

The personal information requested on this form is collected under the authority of and used for the purpose of administering the *Petroleum and Natural Gas Act*. Under certain circumstances, some information may be released subject to the provisions of the *Freedom of Information and Protection of Privacy Act*. If you have any questions about the collection, use or disclosure of this information, contact the Finance & Administration Branch, Records Administrator, in Fort St. John at the address above.



# Coastal Gaslink Pipelines Ltd

## 14.4 kV powerline

June 2020

ISSUED	REFERENCES	DISTRIBUTION MAP:	REVISIONS	No.	MADE BY	DATE	DESCRIPTION	ENGINEERING STAMP:	 	TITLE Coastal GasLink Pipelines Ltd 14.4 kV powerline June 2020	DRAWING NUMBER		REVISION	
	Plot Date:													
	CAD DWG:													0



ISSUED

REFERENCES	DISTRIBUTION MAP
Plot Date:	
CAD DWG:	

REVISIONS	No.	MADE BY	DATE	DESCRIPTION

ENGINEERING STAMP:



TITLE  
 Coastal GasLink Pipelines Ltd  
 14.4 kV powerline  
 June 2020

DRAWING NUMBER	REVISION
HMI Project #1939 Page 2 of 5	0



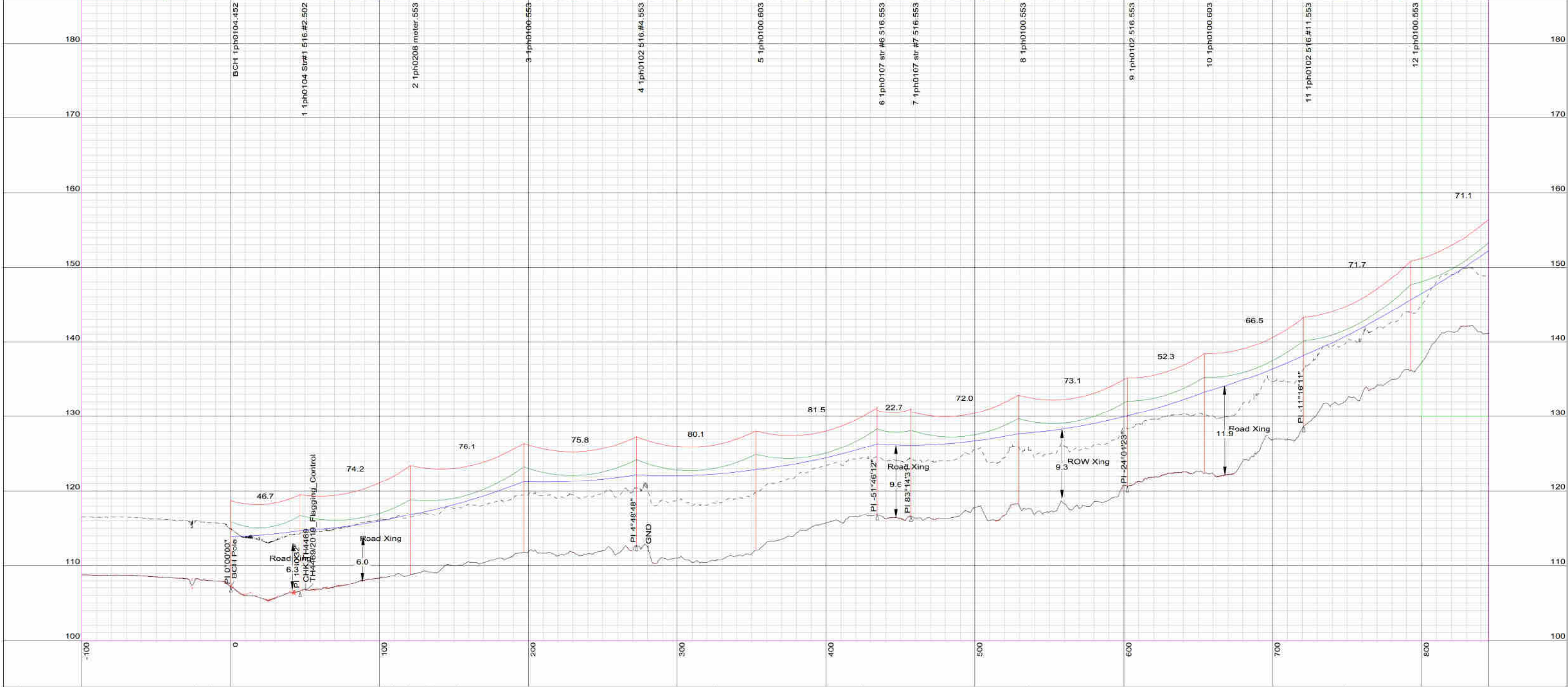
Coastal GasLink Pipelines  
 Weather: mean annual is 7.5 deg C. Lowest on record is -24.4 deg C  
 Grade 2 construction used.  
 Telus: 24 Fiber PSP (armored between jackets) lashed onto 5/16" messenger. Fiber to be 2m below neutral.  
 Guy wires are 5/16" EHS for primary and 7/16" for Tel.  
 Clearance for 14.4kV is 7.05 meter and for Communication/Neutral cable is 6.7 meter. These include a 1.5 m buffer due to construction inaccuracies, snowpack and road crest increases over time.  
 This is based on land accessible to vehicles.  
 For wire clearances, assume 14.4kV max loading at 100 deg C and neutral at 7.5 deg C for worse case (minimum separation) between the conductors.  
 There are road crossings over FSR.  
 Type of Soil has not been checked. It affects holding capacity of anchors.

Structure Longitude, Latitude, and Height

Number	Name	Longitude (deg)	Latitude (deg)	Height (m)	Longitude (DMS)	Latitude (DMS)
1	1ph0104 Str#1 516.453	-128.59981124	54.05595306	106.6	128d35`59.32"W	54d3`21.431"N
2	1ph0208 meter.553	-128.59882479	54.05628096	108.8	128d35`55.769"W	54d3`22.611"N
3	1ph0100.553	-128.59781293	54.05661729	111.8	128d35`52.127"W	54d3`23.822"N
4	1ph0102 516.#4.553	-128.59680520	54.05695224	112.7	128d35`48.499"W	54d3`25.028"N
5	1ph0100.603	-128.59569299	54.05725251	112.1	128d35`44.495"W	54d3`26.109"N
6	1ph0107 str #6 516.553	-128.59456097	54.05755812	116.9	128d35`40.419"W	54d3`27.209"N
7	1ph0107 str #7 516.553	-128.59447944	54.05775666	116.7	128d35`40.126"W	54d3`27.924"N
8	1ph0100.553	-128.59338682	54.05767973	118.2	128d35`36.193"W	54d3`27.647"N
9	1ph0102 516.553	-128.59227772	54.05760164	120.6	128d35`32.2"W	54d3`27.366"N
10	1ph0100.603	-128.59151520	54.05774048	122.4	128d35`29.455"W	54d3`27.866"N
11	1ph0102 516.#11.553	-128.59054507	54.05791713	128.7	128d35`25.962"W	54d3`28.502"N
12	1ph0100.553	-128.58958157	54.05822447	136.2	128d35`22.494"W	54d3`29.608"N
13	1ph0100.553	-128.58862650	54.05852910	145.4	128d35`19.055"W	54d3`30.705"N
14	1ph0106 str#14 516.#14.553	-128.58767116	54.05883381	149.9	128d35`15.616"W	54d3`31.802"N
15	1ph0100.553	-128.58667411	54.05886707	153.2	128d35`12.027"W	54d3`31.921"N
16	1ph0100.553	-128.58568506	54.05890006	158.1	128d35`8.466"W	54d3`32.04"N
17	1ph0102 516.#17.553	-128.58458759	54.05894086	161.7	128d35`4.515"W	54d3`32.187"N
18	1ph0100.553	-128.58374296	54.05894206	165.2	128d35`1.475"W	54d3`32.191"N
19	1ph0102 str#19 516.#19.553	-128.58289285	54.05894326	168.7	128d34`58.414"W	54d3`32.196"N
20	1ph0100.553	-128.58193313	54.05902999	173.9	128d34`54.959"W	54d3`32.508"N
21	1ph0107 str# 21 516.603	-128.58096584	54.05911740	176.1	128d34`51.477"W	54d3`32.823"N
22	1ph0102 516.603	-128.58075924	54.05864383	178.8	128d34`50.733"W	54d3`31.118"N
23	1ph0107 str#23 516.551	-128.58007790	54.05808294	179.9	128d34`48.28"W	54d3`29.099"N

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REFERENCES	
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REVISIONS			
No.	MADE BY	DATE	DESCRIPTION

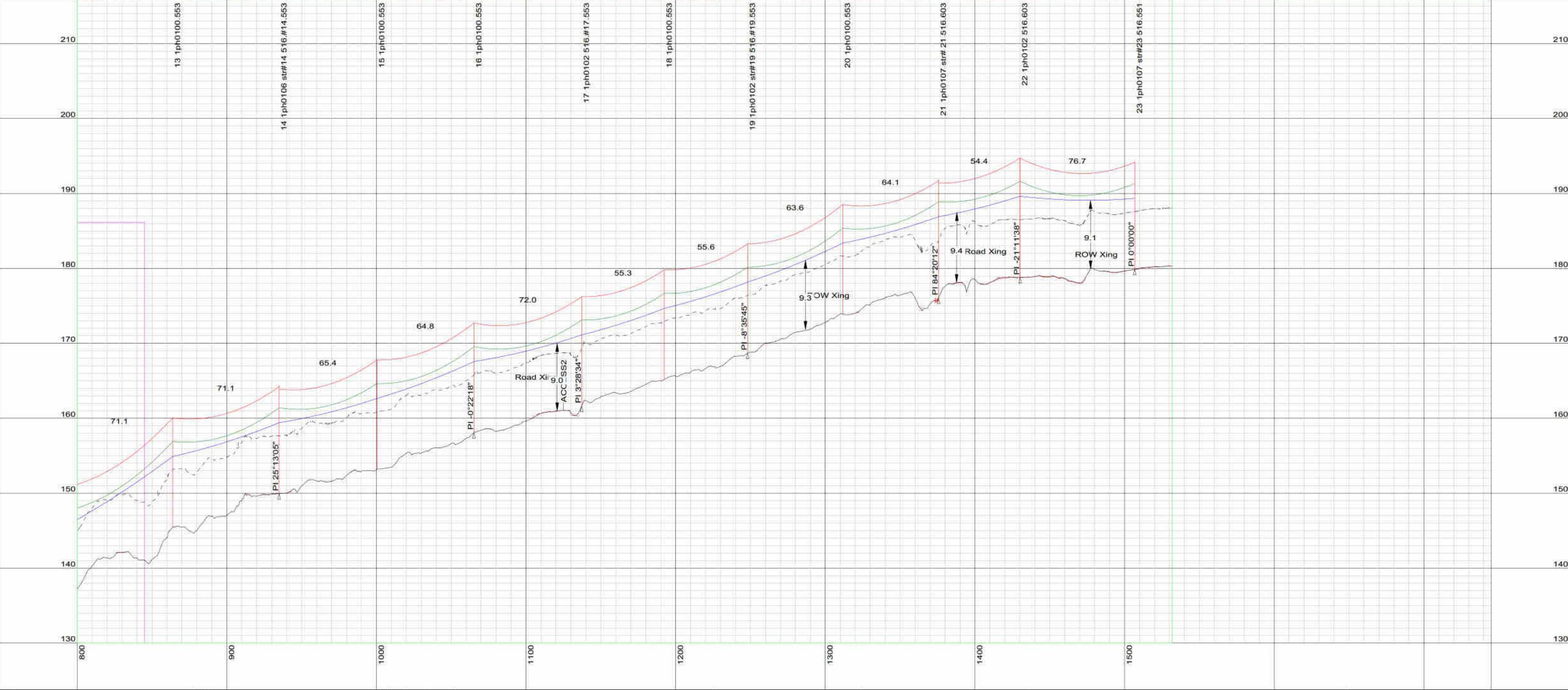
ENGINEERING STAMP:



TITLE  
 Coastal GasLink Pipelines Ltd  
 14.4 kV powerline  
 June 2020

DRAWING NUMBER		REVISION
HMI Project #1939		0
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ISSUED

REFERENCES
DISTRIBUTION MAP
Plot Date:
CAD DWG:

REVISIONS			
No.	MADE BY	DATE	DESCRIPTION

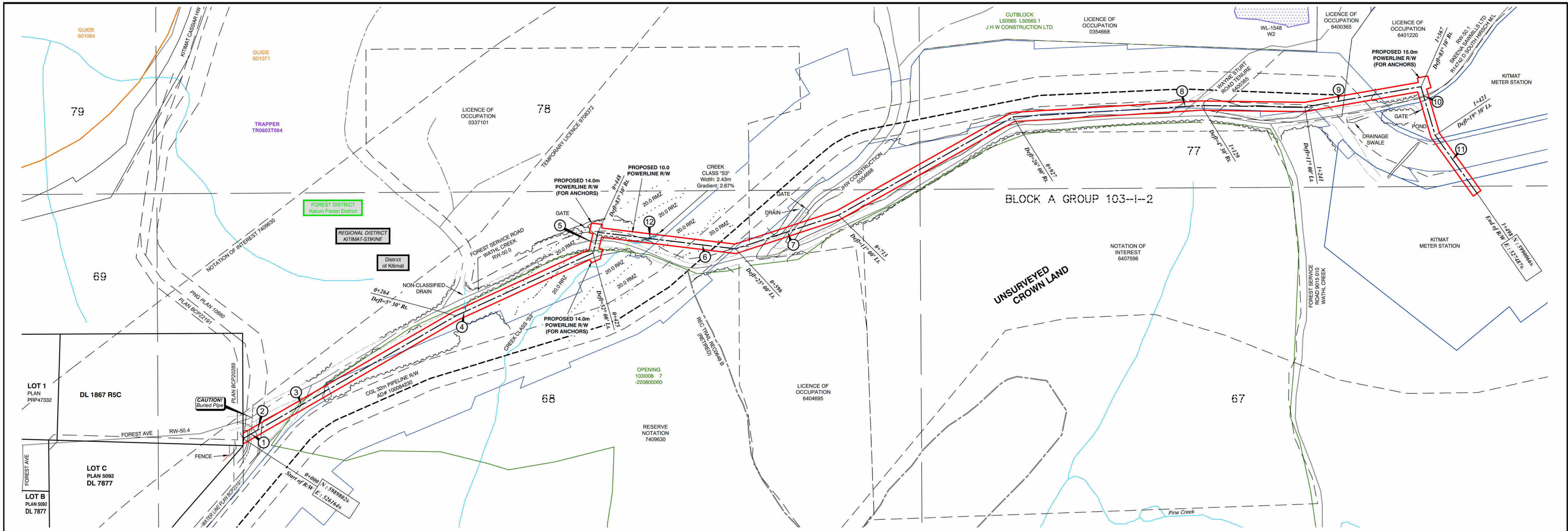
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 14.4 kV powerline  
 June 2020

DRAWING NUMBER	REVISION
HMI Project #1939 Page 5 of 5	0





**LEGEND:**

- OGC P/L R/W Permit (Rev G)
- Coastal Gaslink Route RevG
- Proposed 14.4kV Powerline 10m R/W
- Proposed 14.4kV Powerline
- Tree / Bush Line
- Forest Cut Block / Opening
- Guide
- Tenured Road
- Non-Tenured Road
- Road Shoulder
- Wetland
- Riparian Reserve Zone (RRZ)
- Riparian Management Zone (RMZ)

**TABLE OF CROSSINGS**

No.	DESCRIPTION	STATION	NORTHING	EASTING	DRAWING
1	Buried Pipe PNG Plan 10880	0+010	5989807.5	526173.0	No Plan Required
2	Existing Access Non-Tenured	0+018	5989811.5	526179.9	No Plan Required
3	Existing Access Non-Tenured	0+072	5989838.4	526226.7	No Plan Required
4	Non-Classified Drain	0+273	5989938.1	526401.2	No Plan Required
5	Wathl Creek FSR	0+436	5990012.0	526542.0	No Plan Required
6	Proposed CGL P/L R/W	0+562	5990010.2	526657.5	No Plan Required
7	JW Construction Road Tenure 0354668	0+656	5990024.5	526748.6	No Plan Required
8	Wayne Sturt Road Tenure 6400365	1+113	5990158.7	527174.7	No Plan Required
9	Proposed CGL P/L R/W	1+278	5990164.5	527339.1	No Plan Required
10	Skeena Sawmills LTD Road R14742 D South Hirsch M/L	1+377	5990170.4	527429.9	No Plan Required
11	Proposed CGL P/L R/W	1+453	5990102.1	527460.9	No Plan Required
12	Creek Class 'S3' Width: 2.43m Gradient: 2.67%	0+504	5990017.1	526600.6	No Plan Required

**BCGS: 1031.008 AND 1031.007**

**NOTES:**  
The marked location of underground facilities (and depth, if applicable) are approximate only. Line locators are subject to errors and distortions from a variety of sources. Before excavating, with machinery or within 5m of the crossing area, facilities involved must be exposed by hand digging or hydrovac. See applicable legislation and company policies. Clients and/or Contractors are responsible to perform BC-ONE-CALL services (1-800-474-6886) prior to construction.

All coordinates shown for ancillary sites are for the centroid, shown in UTM Zone 9, NAD 83.  
Job 2353-10331-00

Crown Land	NEW CUT	EXISTING	TOTAL
Powerline	1.28 ha	0.24 ha	1.52 ha
<b>TOTAL</b>	<b>1.28 ha</b>	<b>0.24 ha</b>	<b>1.52 ha</b>

The Proposed Powerline R/W and Associated Disturbances do not fall within the Agricultural Land Reserve

The Proposed Powerline R/W and Associated Disturbance were not flagged at time of survey.

**REVISION / ISSUED**

No.	Date	Description	Drawn By	CKD By
1	June 2, 2020	- ISSUED FOR INFORMATION	A.J.	S.T./S.K.
2	June 17, 2020	- ISSUED FOR INFORMATION - ADDED ADDITIONAL CROSSING	A.J.	W.J.H.
3	July 02, 2020	- ISSUED FOR INFORMATION - REVISED CREEK CROSSING 12	A.J.	W.J.H.

**Coastal GasLink Pipeline Project**

**TC Energy**

**COASTAL GASLINK PIPELINE LTD.**

**CONSTRUCTION PLAN SHOWING PROPOSED POWERLINE 10.0m, 14.0m AND 15.0m RIGHT OF WAY FROM c-68-A, 103-I-2 TO d-67-A, 103-I-2 THROUGH UNSURVEYED CROWN LAND RANGE 5 COAST DISTRICT**

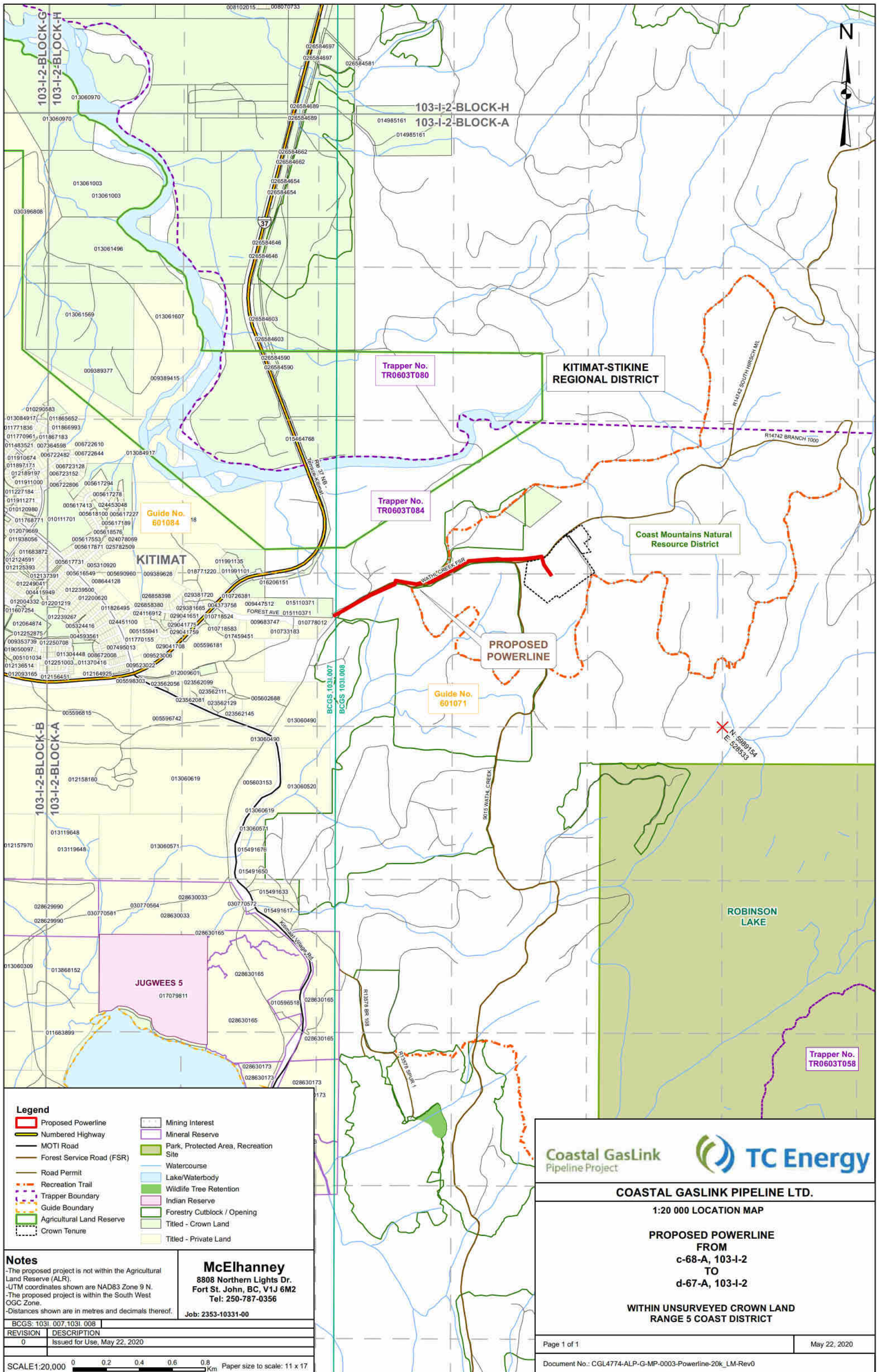
SCALE - 1:2000

Route Reference: **Document No. CGL4774-ALP-G-MP-0001-Const Plan-Rev2**

Sheet 1 of 1  
July 02, 2020  
Rev 2

**McELHANNEY**  
8808 - Northern Lights Drive  
Fort St. John, British Columbia  
Phone: (250)787-0356  
2353-10331





**Legend**

Proposed Powerline	Mining Interest
Numbered Highway	Mineral Reserve
MOTI Road	Park, Protected Area, Recreation Site
Forest Service Road (FSR)	Watercourse
Road Permit	Lake/Waterbody
Recreation Trail	Wildlife Tree Retention
Trapper Boundary	Indian Reserve
Guide Boundary	Forestry Cutblock / Opening
Agricultural Land Reserve	Titled - Crown Land
Crown Tenure	Titled - Private Land

**Notes**

- The proposed project is not within the Agricultural Land Reserve (ALR).
- UTM coordinates shown are NAD83 Zone 9 N.
- The proposed project is within the South West OGC Zone.
- Distances shown are in metres and decimals thereof.

**McElhanney**  
 8808 Northern Lights Dr.  
 Fort St. John, BC, V1J 6M2  
 Tel: 250-787-0356  
 Job: 2353-10331-00

BCGS: 1031.007, 1031.008	
REVISION	DESCRIPTION
0	Issued for Use, May 22, 2020

SCALE 1:20,000 Paper size to scale: 11 x 17



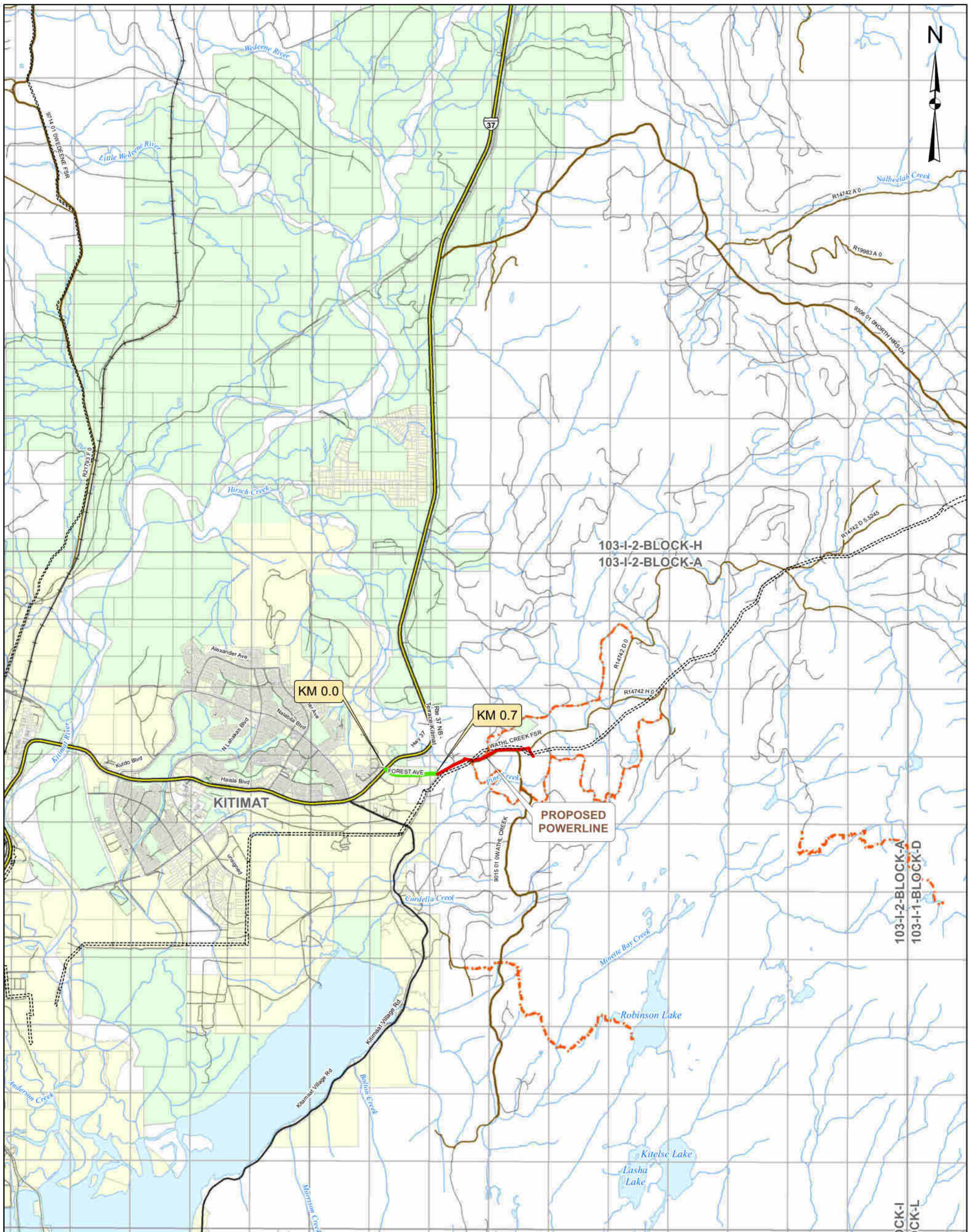
**COASTAL GASLINK PIPELINE LTD.**

1:20 000 LOCATION MAP

**PROPOSED POWERLINE FROM c-68-A, 103-I-2 TO d-67-A, 103-I-2**

**WITHIN UNSURVEYED CROWN LAND RANGE 5 COAST DISTRICT**





**Legend**

Proposed Powerline	MOTI Road
Existing Access	Forest Service Road (FSR)
Railway	Road Permit
Crown Land	Recreation Trail
Private Land	Road / Trail
Crown Tenure	Watercourse
Numbered Highway	Lake / Water Body

**Notes**

- The proposed project is not within the Agricultural Land Reserve (ALR).
- The proposed project is within the South West OGC Zone.
- UTM coordinates shown are NAD83 Zone 9 N.

**McElhanney**  
 8808 Northern Lights Dr.  
 Fort St. John, BC, V1J 6M2  
 Tel: 250-787-0356  
 Job: 2353-10331-00

BCGS: 1031_007_1031_008	
REVISION	DESCRIPTION
0	Issued for Use, May 22, 2020

SCALE 1:50,000 Paper size to scale: 11 x 17



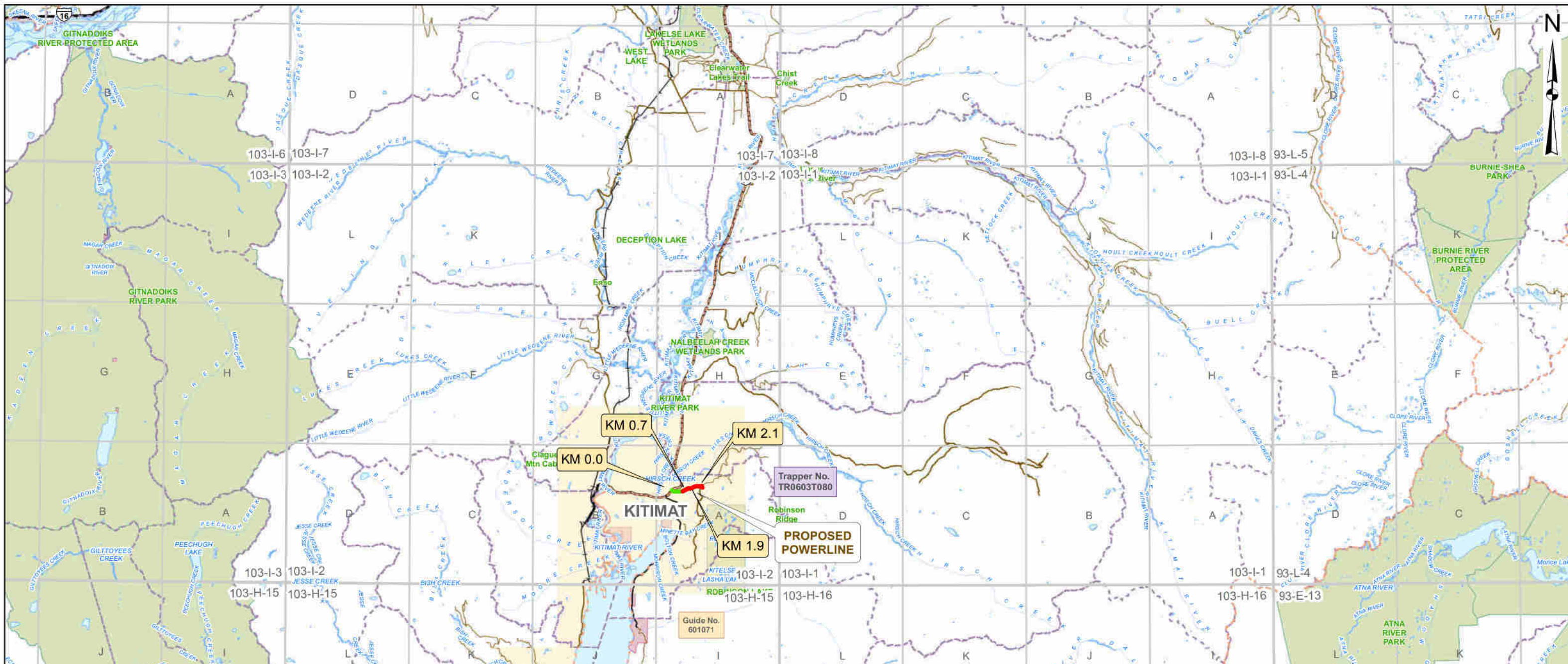
**COASTAL GASLINK PIPELINE LTD.**

1:50,000 LOCATION MAP

**PROPOSED POWERLINE  
 FROM  
 c-68-A, 103-I-2  
 TO  
 d-67-A, 103-I-2**

**WITHIN UNSURVEYED CROWN LAND  
 RANGE 5 COAST DISTRICT**







- Legend**
- █ Proposed Powerline
  - █ Existing Access
  - █ Numbered Highway
  - █ MOTI Road
  - █ Forest Service Road (FSR)
  - █ Road Permit
  - █ Trapper Boundary
  - █ Guide Boundary
  - + Railway
  - Watercourse
  - █ Lake / Water Body
  - █ Municipalities
  - █ Indian Reserve
  - █ Parks, Protected Areas, Ecological Reserves

**Notes**  
 -The proposed project is not within the Agricultural Land Reserve (ALR).  
 -The proposed project is within the South West OGC Zone.

**McElhanney**  
 8808 Northern Lights Dr.  
 Fort St. John, BC, V1J 6M2  
 Tel: 250-787-0356  
 Job: 2353-10331-00

Access Route from Intersection of Highway 37 & Forest Ave to Proposed Powerline						
From	To	Distance	Road Name	Owner	FSR Segment	
0	0.7	0.7	Forest Avenue	District of Kitimat		
0.7	1.9	1.2	Wathl Creek FSR 9015 01 0	District Manager Kalum	0 - 1.2	
1.9	2.1	0.2	South Hirsch M/L R14742 D	Skeena Sawmills		

**COASTAL GASLINK PIPELINE LTD.**

ACCESS LOCATION MAP

**PROPOSED POWERLINE**  
 FROM  
 c-68-A, 103-I-2  
 TO  
 d-67-A, 103-I-2

**WITHIN UNSURVEYED CROWN LAND**  
 RANGE 5 COAST DISTRICT

Page 1 of 1 May 22, 2020

Document No.: CGL4774-ALP-G-MP-0005-Powerline-250k\_LM-Rev0



**APPLICATION MANAGEMENT SYSTEM****APPLICATION REPORT**

The information contained within this report is a summary of the content that was accepted into the Commission's Application Management System.

**APPLICATION OVERVIEW**

Application Type: New OGAA	Application Number: 100111261	Revision Number: 0
Created Date: 06-18-2020	Submitted Date: 06-19-2020	
List of Activities:	Changes In and About a Stream	
Application Description: Coastal GasLink Pipeline Ltd. (Coastal GasLink) will construct and operate a natural gas pipeline from the area near the community of Groundbirch (about 40 km west of Dawson Creek, British Columbia [BC]) to the LNG Canada Development Inc. (LNG Canada) liquefied natural gas (LNG) export facility (LNG Canada export facility) near Kitimat, BC.  This section 11 is required in support of construction of pipeline Section 8 permitted under OGC permit AD 100084230 and other OGC related activities permits (e.g. ancillary, access) issued for the Project.		
OGC Operational Zones:	South West	

**PROPONENT INFORMATION**

Proponent Name:	Coastal GasLink Pipeline Ltd.		
Proponent Address:	450 - 1st Street SW Calgary , AB. T2P5H1 CA		
Proponent Phone Number:	(587) 933-3854	Proponent Email:	robert_macleod@transcanada.com
Proponent Fax:	(403) 920-2347	Proponent File Reference:	
Contact Name:	Tracy Young	Contact Phone:	(778) 328-5327
Contact Fax:	null	Contact Email:	tracy_young@tcenergy.com
Contact Address:			

**AREA DETAILS**

Total Application Area (ha):	
Total Area of Crown Land (ha):	
Total Area of Private Land (ha):	

**ADMINISTRATIVE INFORMATION**

Representative Name:	Kelsey Tunney		
Type:	Other		
File Reference:			
Phone:	(403) 726-7177	Email:	kelsey.tunney@jacobs.com
Address:			
Company:			
Representative Description	Jacobs Canada Ltd.		

Representative Name:	Tracy Young		
Type:	Other		
File Reference:			
Phone:	(778) 328-5327	Email:	tracy_young@tcenergy.com
Address:			
Company:	Coastal GasLink Pipeline Ltd.		
Representative Description	Coastal GasLink Pipeline Project Ltd.		

### CHANGES IN AND ABOUT A STREAM

Changes In and About a Stream Number:	0006111		
BCGS Map:	103I.010	103I.009	
Proposed Start Date:	06-30-2020	Proposed Completion Date:	10-31-2023
Activity Description:	<p>This section 11 is required in support of construction of pipeline Section 8 permitted under OGC permit AD 100084230 and other OGC related activities permits (e.g. ancillary, access) issued for the Project. The specific details of this application are as follows:</p> <p>S11-08: Stream ID 48D1 (AMS Stream Impact 1) diverted into stream 689(AMS Stream Impact 2).</p> <p>S11-09: Stream ID S1043(AMS Stream Impact 3) diverted into stream 691(AMS Stream Impact 4). By diverting S1043, Stream UN21-5 would by way auto-divert as well, as this steam splits from S1043 after the proposed diversion point, please see mapping attached to this application for additional details.</p> <p>S11-11: Stream ID 692.1T(AMS Stream Impact 5) diverted into stream S1046(AMS Stream Impact 6).</p> <p>S11-12: Stream ID 49D1(AMS Stream Impact 7) diverted into stream 8169(AMS Stream Impact 8).</p> <p>S11-20: Stream ID 8583A (AMS Stream Impact 9) diverted into stream 28D (AMS Stream Impact 10).</p> <p>Additional site-specific information regarding diversion has been provided in the Works Plan's and the Geotechnical Memorandum's attached to this application.</p>		
Sketch Plan Attached?	Yes		

### STREAM IMPACT: 1

#### STREAM IMPACT SPECIFICATION

Primary Activity Type:	N/A	File XREF Number:	Other
If other, please specify:	9708372		
Location ID Number:	1		
Stream / Watercourse Name:	48D1: Unnamed Tributary (Hirsch Creek)		
Duration:	Temporary	Riparian Class:	S6
Riparian Class Verification:	Field Verified		
Bank Full Stream Width(m):	0.78	Stream Gradient:	20.5

	Zone	Northing	Easting
Impact Location (UTM):	09	5991118.6	552729.49
Primary Crossing Method:	Stream Diversion		
Crossing method Rationale (Optional):			

Is a mechanical crossing required at this location? No

<b>STREAM EXEMPTIONS</b>
--------------------------

Does Stream Crossing Methods Meet Best Management Practice? Yes

<b>STREAM IMPACT: 2</b>
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<b>STREAM IMPACT SPECIFICATION</b>
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Primary Activity Type:	N/A	File XREF Number:	Other
If other, please specify:	9708372		

Location ID Number: 2

Stream / Watercourse Name: 689: Unnamed Tributary (Hirsch Creek)

Duration: Temporary Riparian Class: S6

Riparian Class Verification: Field Verified

Bank Full Stream Width(m):	1.5	Stream Gradient:	26.5
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	Zone	Northing	Easting
Impact Location (UTM):	09	5991170.21	552632.85

Primary Crossing Method: Stream Diversion

Crossing method Rationale (Optional):

Is a mechanical crossing required at this location? No

<b>STREAM EXEMPTIONS</b>
--------------------------

Does Stream Crossing Methods Meet Best Management Practice? Yes

<b>STREAM IMPACT: 3</b>
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<b>STREAM IMPACT SPECIFICATION</b>
------------------------------------

Primary Activity Type:	N/A	File XREF Number:	Other
If other, please specify:	9708372		

Location ID Number: 3

Stream / Watercourse Name: S1043: Unnamed Tributary (Hirsch Creek)

Duration: Temporary Riparian Class: S6

Riparian Class Verification: Field Verified

Bank Full Stream Width(m):	1	Stream Gradient:	1
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	Zone	Northing	Easting
Impact Location (UTM):	09	5991332.59	552321.76

Primary Crossing Method: Stream Diversion

Crossing method Rationale (Optional):

Is a mechanical crossing required at this location? No



STREAM EXEMPTIONS			
Does Stream Crossing Methods Meet Best Management Practice?		Yes	
STREAM IMPACT: 4			
STREAM IMPACT SPECIFICATION			
Primary Activity Type:	N/A	File XREF Number:	Other
If other, please specify:	9708372		
Location ID Number:	4		
Stream / Watercourse Name:	691: Unnamed Tributary (Hirsch Creek)		
Duration:	Temporary	Riparian Class:	S6
Riparian Class Verification:	Field Verified		
Bank Full Stream Width(m):	2.64	Stream Gradient:	13
	Zone	Northing	Easting
Impact Location (UTM):	09	5991366.79	552273.57
Primary Crossing Method:	Stream Diversion		
Crossing method Rationale (Optional):			
Is a mechanical crossing required at this location?	No		

STREAM EXEMPTIONS			
Does Stream Crossing Methods Meet Best Management Practice?		Yes	
STREAM IMPACT: 5			
STREAM IMPACT SPECIFICATION			
Primary Activity Type:	N/A	File XREF Number:	Other
If other, please specify:	970832		
Location ID Number:	5		
Stream / Watercourse Name:	692.1T: Unnamed Tributary (Hirsch Creek)		
Duration:	Temporary	Riparian Class:	S6
Riparian Class Verification:	Field Verified		
Bank Full Stream Width(m):	1.13	Stream Gradient:	25
	Zone	Northing	Easting
Impact Location (UTM):	09	5991778.99	551467.56
Primary Crossing Method:	Stream Diversion		
Crossing method Rationale (Optional):			
Is a mechanical crossing required at this location?	No		

STREAM EXEMPTIONS			
Does Stream Crossing Methods Meet Best Management Practice?		Yes	
STREAM IMPACT: 6			
STREAM IMPACT SPECIFICATION			

Primary Activity Type:	N/A	File XREF Number:	Other
If other, please specify:	9708372		
Location ID Number:	6		
Stream / Watercourse Name:	S1046: Unnamed Tributary (Hirsch Creek)		
Duration:	Temporary	Riparian Class:	S6
Riparian Class Verification:	Field Verified		
Bank Full Stream Width(m):	1	Stream Gradient:	1
	Zone	Northing	Easting
Impact Location (UTM):	09	5991732.47	551425.74
Primary Crossing Method:	Stream Diversion		
Crossing method Rationale (Optional):			
Is a mechanical crossing required at this location?	No		

STREAM EXEMPTIONS			
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Does Stream Crossing Methods Meet Best Management Practice?	Yes		
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STREAM IMPACT: 7			
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STREAM IMPACT SPECIFICATION			
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Primary Activity Type:	N/A	File XREF Number:	Other
If other, please specify:	9708372		
Location ID Number:	7		
Stream / Watercourse Name:	49D1: Unnamed Tributary (Hirsch Creek)		
Duration:	Temporary	Riparian Class:	S6
Riparian Class Verification:	Field Verified		
Bank Full Stream Width(m):	1.62	Stream Gradient:	13.25
	Zone	Northing	Easting
Impact Location (UTM):	09	5991808.79	551211.3
Primary Crossing Method:	Stream Diversion		
Crossing method Rationale (Optional):			
Is a mechanical crossing required at this location?	No		

STREAM EXEMPTIONS			
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Does Stream Crossing Methods Meet Best Management Practice?	Yes		
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STREAM IMPACT: 8			
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STREAM IMPACT SPECIFICATION			
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Primary Activity Type:	N/A	File XREF Number:	Other
If other, please specify:	9708372		
Location ID Number:	8		
Stream / Watercourse Name:	8169: Unnamed Tributary (Hirsch Creek)		
Duration:	Temporary	Riparian Class:	S6

Riparian Class Verification:	Field Verified		
Bank Full Stream Width(m):	0.52	Stream Gradient:	19.33
	Zone	Northing	Easting
Impact Location (UTM):	09	5991804	551173.71
Primary Crossing Method:	Stream Diversion		
Crossing method Rationale (Optional):			
Is a mechanical crossing required at this location?	No		

<b>STREAM EXEMPTIONS</b>
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Does Stream Crossing Methods Meet Best Management Practice?	Yes
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<b>STREAM IMPACT: 9</b>
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<b>STREAM IMPACT SPECIFICATION</b>
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Primary Activity Type:	N/A	File XREF Number:	Other
If other, please specify:	9708372		
Location ID Number:	9		
Stream / Watercourse Name:	8583A: Unnamed Tributary (Hirsch Creek)		
Duration:	Temporary	Riparian Class:	S6
Riparian Class Verification:	Field Verified		
Bank Full Stream Width(m):	1	Stream Gradient:	32.5
	Zone	Northing	Easting
Impact Location (UTM):	09	5991118.6	552729.49
Primary Crossing Method:	Stream Diversion		
Crossing method Rationale (Optional):			
Is a mechanical crossing required at this location?	No		

<b>STREAM EXEMPTIONS</b>
--------------------------

Does Stream Crossing Methods Meet Best Management Practice?	Yes
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<b>STREAM IMPACT: 10</b>
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<b>STREAM IMPACT SPECIFICATION</b>
------------------------------------

Primary Activity Type:	N/A	File XREF Number:	Other
If other, please specify:	9708372		
Location ID Number:	10		
Stream / Watercourse Name:	28D: Unnamed Tributary (Hirsch Creek)		
Duration:	Temporary	Riparian Class:	S2
Riparian Class Verification:	Field Verified		
Bank Full Stream Width(m):	11.66	Stream Gradient:	1.5
	Zone	Northing	Easting
Impact Location (UTM):	09	5991170.21	552632.85
Primary Crossing Method:	Stream Diversion		



Crossing method Rationale (Optional):

Is a mechanical crossing required at this location? No

**STREAM EXEMPTIONS**

Does Stream Crossing Methods Meet Best Management Practice? Yes

**MAPS & PLANS DETAILS**

Survey Company:	TransCanada Pipelines Limited		
Job Number:	CE769504.A.CS.EV.RP.12		
Sheet Number:	1-5	Original Plan Date:	03-26-2020
Revised Plan Date:		Revision Number:	0

## SDM Review and Determination

**Application #:** [100111261 - Rev. 0](#)

**Application Type:** New OGAA

**Activity Type:** Changes In and About a Stream

**Proponent:** Coastal GasLink Pipeline Ltd.

**Application Submitted Date:** 2020-06-19

**Zone(s):** South West

**Task Created Date:** 2020-07-22

**Task Started Date:** 2020-09-14

**Days in Progress:** 2

**Application Status:** Approved

**Assignee:** Heather Book

**Task ID:** 2756987

**Task Status:** Completed

### [Decision Maker Notes](#)

100111261 – COASTAL GASLINK PIPELINE LTD. – APPLICATION

Site information:

Application type – New OGAA, Changes In and About a Stream Area required (new cut vs. existing) – 0.0 ha Geographical Location – South West Zone

Environment:

Section 4- Water:

(a) Reviews show there are no water works, water storage reservoirs, water supply wells or groundwater capture zones within 100 m of the proposed project.

(b) Reviews show the proposed project does not conflict with identified groundwater recharge areas, designated watersheds, or identified aquifers.

GEOs as per Section 4 of the EPMR will be met.

Section 5- Riparian Values:

No wetlands crossings noted.

10 stream crossings noted.

Operating areas within the riparian areas are to facilitate crossings.

GEOs as per Section 5 of the EPMR will be met.

Section 6- Wildlife and Wildlife Habitat:

- (a) There are no overlaps with WHAs, UWRs, or Fisheries Sensitive Watersheds.
- (b) The activity will be carried out at a time and in a manner that does not result in physical disturbance to high priority wildlife or their habitat, including disturbance during sensitive seasons and critical life-cycle stages.
- (c) The proposed project does not overlap with WTRA.
- (d) No wildlife habitat features have been identified within the project area. GEOs as per section 6 of the EPMR will be met.

Section 7- OGMAs, Resources Features, CHRs:

- (a) The proposed project does not overlap with any OGMAs.
  - (b) No Resource Features have been identified within the proposed project area.
  - (c) No Cultural Heritage Resources have been identified within the proposed project area.
- GEOs as per section 7 of the EPMR will be met.

Map Reserves and NOIs:

- Section 16 map reserve – No conflicts identified.
- Section 17 map reserve – No conflicts identified.
- NOI – No conflicts identified.

Consultation and Notification:

- No written submissions have been received and there are no outstanding concerns.
- Consultation and Notification completed as per regulation .
- There is no EPZ. Consultation and Notification completed as per regulation.

Area Based Analysis:

- Site is located outside NEBC.
- Area Based Analysis not applicable.

First Nations:

- Notification sent to Haisla Nation Council.
- After reviewing the available consultation record, I have concluded that the Commission has met the Crown's duty to consult.

Decision:

- After reviewing all applicable information, I have decided, as the Delegated Decision Maker, to approve this Changes In and About a Stream as applied for.

Heather Book  
September 16, 2020



## PROJECT DESCRIPTION FORM

Company Name: Coastal GasLink Pipeline Ltd.

OGC File No: 100111261

Company File No.: 120496

### PROJECT DESCRIPTION

- 1. What is the scope of the proposed activity?** (Include infrastructure and equipment, and geospatial data on anticipated total land disturbance.)

Coastal GasLink Pipeline Ltd. (Coastal GasLink) will construct and operate a natural gas pipeline from the area near the community of Groundbirch (about 40 km west of Dawson Creek, British Columbia [BC]) to the LNG Canada Development Inc. (LNG Canada) liquefied natural gas (LNG) export facility (LNG Canada export facility) near Kitimat, BC.

This section 11 is required in support of construction of pipeline Section 8 permitted under OGC permit AD 100084230 and other OGC related activities permits (e.g. ancillary, access) issued for the Project. The specific details of this application are as follows:

- S11-08
  - Stream ID 48D1 (AMS Stream Impact 1) diverted into stream 689(AMS Stream Impact 2).
- S11-09
  - Stream ID S1043(AMS Stream Impact 3) diverted into stream 691(AMS Stream Impact 4). By diverting S1043, Stream UN21-5 would by way auto-divert as well, as this stream splits from S1043 after the proposed diversion point, please see mapping attached to this application for additional details.
- S11-11
  - Stream ID 692.1T(AMS Stream Impact 5) diverted into stream S1046(AMS Stream Impact 6).
- S11-12
  - Stream ID 49D1(AMS Stream Impact 7) diverted into stream 8169(AMS Stream Impact 8).
- S11-20
  - Stream ID 8583A (AMS Stream Impact 9) diverted into stream 28D (AMS Stream Impact 10).

Additional site-specific information regarding diversion has been provided in the Works Plan's and the Geotechnical Memorandum's attached to this application.

- 2. Provide information about any roads required to carry out the proposed activity:**

Existing or permitted access roads, as well as the existing Right of Way (RoW), will be utilized for access and to carry out the activity, when applicable.

**3. Detail the order in which the proposed activities will be carried out, including timeframes:**

Work associated with these stream diversions, if approved, is planned to start June 2020, functioning and maintained until reclamation by end of October 2023.

**4. If the activity is planned in phases, describe each phase of the activity:**

1. Cut in new stream channel including entry channel. Maintain 1m minimum separation from existing stream to maintain plug.
2. The new channel width will maintain, as a minimum, the existing channel dimensions. The Q10 flow rates will be calculated and diversions channels sized to manage the flow (see note 6).
3. Verify diversion channel is clean. Verify dimensions align with the minimum requirements and can handle flow rates. Install clean rip rap and bedding, as required.
4. Commence pump and temporary dam installation within the stream for diversion. – refer to typical - STDS-03-ML-05-112-1\_01 - DAM AND PUMP WATER COURSE CROSSINGS.
5. Pump into the diversion channel below the plug location. Verify flow stream and commence removal of plug between the stream and diversion channel.
6. The diversion dam to be constructed for the life cycle of the diversion application. Diversion dam to be a combination of aqua dam, steel plates or sheet piling, washed rock, plastic sheeting, filter cloth and sandbags. Minimum 2m thick.
7. Following construction of the channel and diversion dam; adjust pumping location to remove the temporary dam and commence establishment of complete diversion channel.
8. Excavate original channel, store stream bedding material separately from other materials and label
9. Perform pipeline grade works and installation
10. Reinstate the channel by following the pump and dam sequence in reverse. Return stream bedding to watercourse.

Please refer to the Works Plan's and the Geotechnical Memorandum's attached to this application for additional site-specific activities.

**5. What are the estimated increases to dust, noise and odours from the proposed activity?**

There will be noise and odor associated with the equipment used to divert the streams, which is anticipated to be temporary in nature.

**6. Detail any mitigation activities that will be carried out:**

An Environmental Management Plan (EMP) has been approved for the Coastal GasLink Pipeline Project. The mitigation measures outlined in this plan will be implemented and adhered to.

**7. Detail the nature and extent of vehicle traffic required to carry out the proposed activity:**

Increased traffic will be temporary in nature and associated with the construction of the stream diversion. All vehicles will travel along existing roads and stay within the designated footprint. A Traffic Control Management Plan for the Project has been developed as part of the EMP and applicable mitigations will be implemented.





**COVER LETTER FOR  
FIRST NATIONS REFERRAL  
PACKAGE**

OGC, 100 10003 110 AVE  
Fort St. John, B.C. V1J 6M7  
Phone: (250) 794-5200

Date Received

THIS IS AN AUDITABLE DOCUMENT

**COMMISSION USE ONLY** **A**

Commission File No.:

**ADMINISTRATION** **B**

Commission File No.(if applicable): 100111261

Land Agent: Coastal GasLink Environment, Indigenous Relations  
Engagement Lead/ Miles Jolliffe

Applicant/Company: Coastal GasLink Pipeline Ltd.

Land Agent Phone No.: 604-619-7438

Program Name: Coastal GasLink Pipeline Project

First Nation File No.:

**COVER LETTER FOR FIRST NATIONS REFERRAL PACKAGE** **C**

**To:**

Ktunaxa Nation Council

Kaska Dena Nation

Other (specify): Haisla Nation Council

**Program Type:**

Geophysical

Pipeline

Wellsite

Facility

Other: Section 11

**Application Type:**

New

Amendment

Revision

*Attached is a copy of the above-noted application for your review. We would like your input as to your view as to the manner in which the application represents a potential adverse impact on the exercise by the First Nation of rights recognized and affirmed by Section 35 (1) of the Constitution Act, 1982, and input and advice on the manner that potential adverse impact could be avoided or mitigated.*

*We would appreciate receiving any comments you may have about this application within 10 working days.*

*Please be aware that if we have not heard from you within 10 working days, the Oil and Gas Commission may proceed with an evaluation and decision of the application based on available information.*

*If you have any questions or concerns regarding this application, please feel free to contact your First Nation Liaison Officer at (250) 794-5200, or fax your written reply to (250) 794-5379.*

**ATTACHMENTS** **D**

**For your information, attached is a copy of the Application Package for the above-noted program proposed for development in your area.**

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> Application Form   | <input type="checkbox"/> 1:20,000 BCGS Sketch Plan                         |
| <input type="checkbox"/> Geophysical Application   | <input type="checkbox"/> 1:50,000 Program Map                              |
| <input checked="" type="checkbox"/> Project Description Form   | <input type="checkbox"/> 1:250,000 Access Map                              |
| <input type="checkbox"/> Survey/Construction Plan (if applicable)  |  |
| <input checked="" type="checkbox"/> Other (specify): Works Plan and Geotechnical Memos listed below:   | <input type="checkbox"/> Archaeological Assessment Information Form (AAIF) |
| <ul style="list-style-type: none"> <li>• Works Plan – "Works_Plan_100111261_S11-8.ID#48D1_v1_RevB.xlsx"</li> <li>• Geotechnical Memo – "Memo_100111261_S11-8.ID#48D1.pdf"</li> </ul> | <input type="checkbox"/> Archaeological Report (specify):                  |



- Works Plan –  
"Works\_Plan\_100111261\_S11-9.  
ID#S1043\_v1\_RevB.xlsx"
- Geotechnical Memo –  
"Memo\_100111261\_S11-  
9.ID#S1043.pdf"
- Works Plan –  
"Works\_Plan\_100111261\_S11-11.  
ID#S1046\_692.1T\_v1.xlsx"
- Geotechnical Memo –  
"Memo\_100111261\_S11-  
11.ID#692.1T.pdf"
- Works Plan –  
"Works\_Plan\_100111261\_S11-12.  
ID#49D1\_v1.xlsx"
- Geotechnical Memo –  
"Memo\_100111261\_S11-12.ID#  
49D1.pdf"
- Works Plan –  
"Works\_Plan\_100111261\_S11-20.  
ID#719.3T\_v1\_RevB.xlsx"
- Geotechnical Memo –  
"Memo\_100111261\_S11-  
20.ID#719.-3T.pdf"

**COMMISSION USE ONLY**

**E**

Attachments checked by:

Date:

The personal information requested on this form is collected under the authority of and used for the purpose of administering the *Petroleum and Natural Gas Act*. Under certain circumstances, some information may be released subject to the provisions of the *Freedom of Information and Protection of Privacy Act*. If you have any questions about the collection, use or disclosure of this information, contact the Finance & Administration Branch, Records Administrator, in Fort St. John at the address above.



# memo

## **GEOTECHNICAL MEMORANDUM S11-8 Application Watercourses 48D1 and 689**

To: CGL Engineering  
From: Norman Deverney, P.Eng., MSJV Senior Geotechnical Engineer  
CC: Karim Tahallaiti, MSJV, Philippe Deacon, MSJV  
Date: May 4, 2020  
Subject: Geotechnical Engineering Support for Section 11 Streamflow Diversion Application

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### **1 Introduction**

At the request of CGL, MSJV has prepared this memorandum and attached sketches to support the Section 11 Application of the Water Sustainability Act for proposed streamflow diversions to be implemented during construction of the Coastal GasLink Pipeline. This diversion will direct flow from Watercourse 48D1 into Watercourse 689.

The memorandum is to accompany the Watercourse Crossing Section 11 Diversion Request (Diversion Request) and attached Site Plan Drawings. The Diversion request provides details of the proposed streamflow diversions including location (Pipeline KP), stream Identification Number(s), work plan summary, construction notes, reference Typical Drawings, Standards and Specifications, diversion procedure and project timing.

This memorandum summarises the diversion assessment, channel design and compatibility characteristics of the proposed diversion streams. Pre-Construction and construction requirements to warrant the diversion are provided in the Diversion Request.

### **2 Office Review Summary**

#### **2.1 Review References**

An office – based review of the proposed streamflow diversion has been undertaken. Reference has been made to the Diversion Request, Grading Plans, Site Plan, CGL Master Watercourse Inventory, as well as the available topographic information and aerial imagery.

Watercourse characteristics have been examined based on documented field measurements (where available) and inferred / calculated from topography and watershed basin area, slope and morphology.

Channel and flume hydraulic characteristics have been calculated using Manning’s Equation, which considers channel hydraulic radius, channel slope, and a roughness coefficient (Manning’s “n”). Roughness coefficients for various soil and material types are as described in common references, e.g. Table 4.1 of the Handbook of Steel Drainage and Highway Construction Products for constructed channels.

## 2.2 Streamflow Diversion Design Parameters

Project – specific design criterion is for the Streamflow Diversion to provide suitable hydraulic capacity to carry the estimated 1 in 10 – Year (Q10) streamflow. Elements to pass the Q10 streamflow include culverts, open channels / ditches, as well as pumps and associated hoses, sumps, weirs and control devices.

This Streamflow Diversion will be in place through the entire year and will be exposed to spring freshet flows. The diversion channel requires capacity to carry the maximum applicable Q10 estimate regardless of basis, being snowmelt - derived or rainfall runoff, whichever is greater.

## 2.3 Streamflow Compatibility - Diverted Stream and Receiving Stream

The general suitability of the receiving watercourse to accept the additional flow delivered by the diverted stream is examined in broad terms by the Office Review.

Comparison has been made to Q10 flows for both the diverted and receiving streams for the season and period that the Streamflow Diversion will be in place.

## 3 Diversion Design

Channel diversion design criteria are described below. The attached “Typical” drawing shows recommended channel dimensions, channel bed liner materials, and construction requirements including pre-construction assessments, supervision, and conformance requirements to existing CGL project commitments, and to applicable Regulations.

Diversions will be designed and constructed using the methodology below based on the site location and stream hydrology.

### 3.1 Diversion Hydraulic Capacity – Open Channel Dimensions

At sites where the Streamflow Diversion consists of an open channel, e.g. excavated ditch, natural depression, or wetland / small lake, then the channel dimensions will be constructed to meet or exceed the dimensions of the diverted channel upstream of the diversion, with reference to stream reaches with similar gradient and channel bed substrate.

Channel hydraulic capacity has been calculated using Manning’s Equation. Separate calculations have been provided for distinct channel conditions and slope gradients where applicable at this pre-construction planning stage.

For this diversion of watercourse **48D1**, there is one section of diversion, and one Typical Drawing has been prepared and attached to this memo.

- Section 1, from Point of Diversion to outfall at watercourse 689 is 110 m long at average gradient 21%

Diversion Channel dimensions include additional depth in the form of a Freeboard Allowance. The Freeboard Allowance will accommodate short term “surge” flows that might occur due to re-starting pumps or re-opening the diversion entrance control. Unless otherwise specified, the recommended freeboard allowance will comprise banks that are a minimum of 0.3m (1 foot) above the estimated open channel flow depth at the Q10 design discharge.

### 3.2 Diversion Channel Substrate

The CGL Master Watercourse Inventory includes field estimates of channel substrate sizes (D95 and D<sub>50</sub>) and channel gradient at the point of the field survey for some streams but not all. Where available, that information has been used to determine the substrate size distributions of the Diversion Channel.

The initial design concept is to construct an open channel using existing substrate to carry flows. If ground conditions are not favourable for an open channel, then a structure will be used for the diversion as described below in Section 3.3.



For locations without survey substrate and gradient data; the recommended Diversion Channel substrate materials and grain size distribution has been determined by calculating the hydraulic characteristics of the channel at the design discharge to minimize potential for erosion during high flows. Those material specifications are indicated on the Typical Drawings as Riprap Class, with grain size distributions and riprap layer thickness.

### 3.3 Diversion Hydraulic Capacity – Flumes and Culverts

In some instances, all or part of the Streamflow Diversion might comprise a flume structure, such as half culverts (heavy gauge steel, corrugated steel, or High Density Polyethylene), concrete box sections, or timber / wood structures with polyethylene or similar impermeable liners. The flume could also include sections of a fully enclosed culvert. Flume and culvert dimensions are indicated on the Typical Drawings.

Culvert and flume hydraulic capacity has been calculated using Manning’s Equation for rectangular or trapezoidal sections. For circular sections, including enclosed culverts, hydraulic capacity has been determined by design nomograms in the Handbook of Steel Drainage and Highway Construction Products.

Flume dimensions include additional depth in the form of a Freeboard Allowance. The Freeboard Allowance will accommodate short term “surge” flows that might occur due to re-starting pumps or re-opening the diversion entrance control. As a general reference, the Freeboard Allowance will comprise flume margins that are a minimum of 0.15m (0.5 feet) above the estimated open channel flow depth.

Culvert dimensions have been sized to pass the design discharge with inlet (headwater) depth not exceeding the culvert diameter.

Where floating or entrained debris presents potential for blockage of flow, accommodations will be provided during installation for debris catchment several metres upstream of the inlet. The use of gratings or other similar barriers attached directly to the culvert inlet is **not recommended**.

## 4 Stream Information

Site-specific stream and channel characteristics employed in the diversion design are summarized below.

### 4.1 Diverted Stream Characteristics

Stream Identification	<b>48D1</b>
Riparian Class	S6
Channel Width	0.78 m
Channel Depth	0.51m
Channel Gradient	21% (12 °)
Substrate D95	no information
Substrate D <sub>50</sub>	no information
Basin Area	0.057 km <sup>2</sup> (5.7 ha)
Q10 Estimate	0.26 m <sup>3</sup> /s (Regional Estimate)

### 4.2 Receiving Stream Characteristics

Stream Identification	<b>689</b>
Riparian Class	S6
Channel Width	1.5 m
Channel Depth	0.25 (estimate)
Channel Gradient	26% (15 °)
Substrate	Bedrock Dominant, Boulders Sub-Dominant
Basin Area	1.2 km <sup>2</sup> (120 ha.)
Q10 Estimate	1.1 m <sup>3</sup> /s (Regional Estimate)

## 5 Compatibility – Diverted Stream into Receiving Stream

This section examines compatibility of the diverted and receiving streams.

The diverted stream **48D1** is a small S6 watercourse with Q10 peak flow of 0.26 m<sup>3</sup>/s. Flows will be diverted into receiving stream **689**, a large S6 watercourse with Q10 peak flow of 1.1 m<sup>3</sup>/s. Channel substrate of the receiving stream is bedrock and boulders – a robust and non-erodible stream bed.

Design discharge (Q10) for the diverted stream is approximately 24% of the Q10 discharge for the receiving stream.

On this basis, the proposed diversion of Stream **48D1** (Diverted Stream) into stream **689** (Receiving Stream) is judged to present **Low** potential for adverse impacts on channel bed and channel bank stability of the Receiving Stream at the point of entry during the construction period.

## 6 Energy Dissipation, Steep Channels and at Entry Point to Receiving Channel

Energy dissipation measures might warrant consideration in the Diversion Channel design both for steep sections of constructed channel and at the point of discharge where the diverted flows enter the receiving channel.

Energy dissipation design typically comprises the use of a riprap apron to convert the confined flow to a broader overland sheet flow and / or the use of a riprap outlet basin that uses a hydraulic jump to dissipate energy.

Substrate sizes and apron / basin dimensions are to be determined during the Pre-Construction Assessment as described in Section 7 and as noted on the Typical Drawing.

## 7 Construction and Field Requirements

The following section details the conditions that will be implemented prior to and during construction of the stream diversions to warrant the diversion design. All work activities will be conducted with conformance to the existing CGL project commitments, permits, environmental specification and applicable Regulations

### 7.1 Pre-Construction Assessments

Additional field assessments are required prior to construction including:

- site survey of stream(s) prior to diversion / realignment
- site assessment to confirm that stream(s) can be diverted/ realigned
  - correct watercourse(s)
  - substrate and dimensions as per field notes
  - consideration of alternate diversion methods
- requirements for stream bank erosion protection, energy dissipation

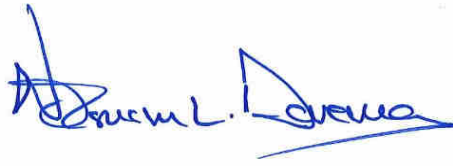
### 7.2 Construction Requirements

Additional requirements for Diversion, to be implemented during construction include:

- Commitment for supervision and monitoring by Professional Engineer
- Commitment for construction in accordance with site-specific work plan
- Conformance with Regulations and project commitments in Permits
- Conformance with WorkSafeBC OHS Regulation 296/97 Part 20

## 8 Closure

On behalf of MSJV Engineering,

A handwritten signature in blue ink, appearing to read "Norman L. Deverney". The signature is stylized with a large initial 'N' and a long horizontal stroke at the end.

Norman L. Deverney, P.Eng., FEC

Senior Geotechnical Engineer

Reviewed by:

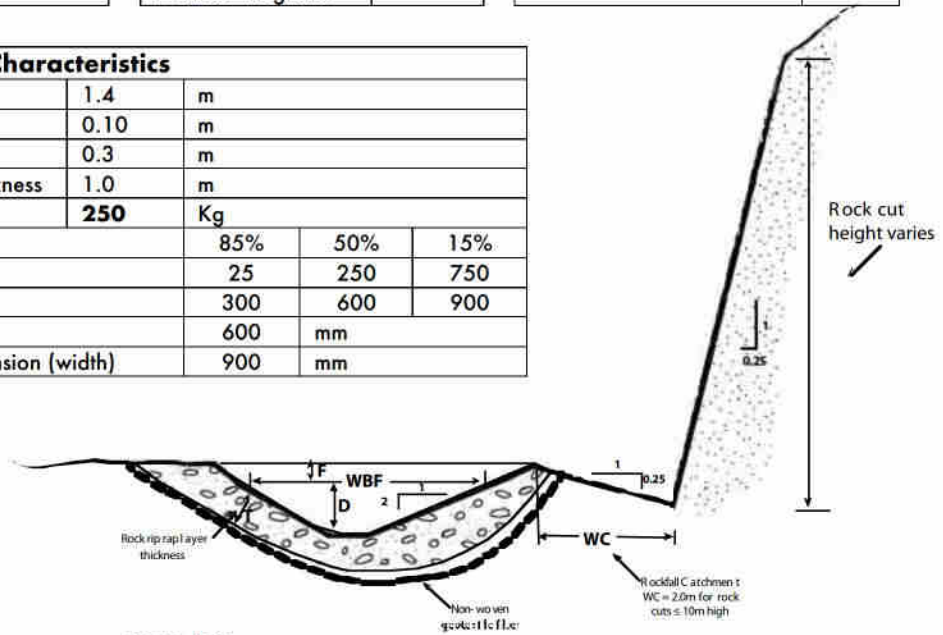


Diverted Stream Characteristics	
Stream Identification	48D1
Riparian Class	S6
Channel Width	0.78 m
Channel Depth	0.51 m
Channel Gradient	21% 12°
Substrate - D <sub>95</sub>	n/a
Substrate D <sub>50</sub>	n/a
Basin Area	0.06 km <sup>2</sup>
Q10 Estimate	0.26 m <sup>3</sup> /s
Method - Regional	

Receiving Stream Characteristics	
Stream Identification	689
Riparian Class	S6
Channel Width	1.5 m
Channel Depth	0.25 m
Channel Gradient	26% 15°
Substrate - Dominant	Rock
Substrate Sub-Dom.	Boulders
Basin Area	1.2 km <sup>2</sup>
Q10 Estimate	1.1 m <sup>3</sup> /s
Method - Regional	

Diversion, Stream 48D1	
No. of Sections	1
Section Number	1
From:	POD
To:	Outfall at 689
Average gradient for Diversion	21% 12°
Diversion Section Length	110 m

Diversion Channel Characteristics			
WBF = Width Bank Full	1.4	m	
D = Channel Depth	0.10	m	
F = Freeboard Allowance	0.3	m	
T = Rock riprap layer thickness	1.0	m	
<b>Riprap Class</b>	<b>250</b>	<b>Kg</b>	
% Larger than	85%	50%	15%
Mass (kg)	25	250	750
Avg. Dimension (mm)	300	600	900
Culvert Size (diameter)	600	mm	
Half Culvert/ Flume Dimension (width)	900	mm	



### Design Basis

Designs shown are based on office – based assessment using available information and limited field measurements.

### Pre-Construction Assessments

Additional field assessments are required prior to construction including:

- site survey of stream(s) prior to diversion / realignment
- site assessment to confirm that stream(s) can be diverted/ realigned
  - correct watercourse(s)
  - substrate and dimensions as per field notes
  - consideration of alternate diversion methods
- requirements for stream bank erosion protection, energy dissipation

### Construction Requirements

- Supervision and monitoring by Professional Engineer
- Construction in accordance with site-specific work plan
- Conformance with Regulations and project commitments in Permits

### Rockfall Catchment / No Work Zone

Rockfall catchment / No Work Zone to be established where warranted in conformance with Excavation Inspection Form prepared under WorkSafeBC OHS Regulation 296/97, Part 20

**S11-8 Application  
Watercourse 48D1  
Diversion at RoW**

 Joint Venture		Typical Drawing Stream Channel Diversion Design Supporting Memorandum CGL – Coastal GasLink Pipeline Project
Typical Channel Diversion R.0	Dwg. by: JCD	Scale: NTS
		Drawing Date: May 4, 2020

**Watercourse Crossing Section 11 Request - Stantec ID# 48D1 RevB**

**1. Section 11 Duration**

Section 11 Start	Jun-20	Section 11 Finish	Oct-23
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**2. Construction and instream Works**

Construction Installation Start	Jun-20	Construction Installation Duration	7 days
Construction Reinstatement Start	Oct-23	Construction Reinstatement Duration	7 days

**3. Watercourse**

Stantec ID#	48D1	CGL ID#	1905.00-WC	KP	628+653
Stantec ID#	689	CGL ID#	1906.00-WC	KP	628+756

**4. Reason for Section 11 Application**

A >10m cut is required for the stream crossing. The stream will require relocation and management due to this >10m cut. The diversion from 48D1 into 689 will allow water control in the area and maintain overall water flows in the area and reduce one water crossing to aid construction. Aligning 48D1 will allow safer and controlled water management through this section.

**5. Assessment of Alternative Crossing Methods**

Adjusting the centreline will not remove the large cut through this crossing.

**6. Reinstatement**

The reroute is temporary and will be reinstated after the crossing is completed, during the overall ROW reinstatement.

**7. Work Plan Summary**

1.	Cut in new stream channel including entry channel. Maintain 1m minimum separation from existing stream to maintain plug.
2.	The new channel width will maintain, as a minimum, the existing channel dimensions. The Q10 flow rate will be calculated and verified (see note 6.)
3.	Verify diversion channel is clean. Verify dimensions align with the minimum requirements and can handle flow rates. Install clean rip rap and bedding, as required.
4.	Commence pump and temporary dam installation within streams 48D1 and 689 for diversion. – refer to typical - STDS-03-ML-05-112-1_01 - DAM AND PUMP WATER COURSE CROSSINGS. Dam required on stream being diverted and stream being tied into. The diversion dam to be constructed for the life cycle of the diversion application.
5.	Pump from 48D1 into 689 downstream of plug on 689.
6.	Verify flow stream and construct stream channel entry into 689. Commence removal of plug on 48D1 to create continuous 48D1 and 689.
7.	Following construction of the channel and diversion dam; adjust pumping location to remove the temporary dam and commence establishment of complete diversion channel.

Watercourse Crossing Section 11 Request - Stantec ID# 48D1 RevB

- |     |  |
|-----|--|
| 8.  | Excavate original channel, store stream bedding material separately from other materials and label             |
| 9.  | Perform pipeline grade works and installation  |
| 10. | Reinstate the channel by following the pump and dam sequence in reverse. Return stream bedding to watercourse. |



**Watercourse Crossing Section 11 Request - Stantec ID# 48D1 RevB**

**8. Construction Notes**

<p>1. Water monitoring performed per stream classification in accordance with CGL4703-CGP-ENV-PLN-008 Environmental Work Plan</p> <p>2. Stream data taken from the Company MWCT dated 5February2020</p> <p>3. Diversion is temporary and will be reinstated as per Company direction during crossing workshop November 2019.</p> <p>4. Bank diversion channel to be established using construction typical drawings</p> <p>5. Work plan to be updated following site survey</p>	<p>6. If Q10 flow is not provided in the MWCT; then the flow rate is calculated using the MELP Regional Area Based Method. Peak flows are Snowmelt - Derived.</p> <p>7. Pump to be sized for Q10 flow rate with back up pump available during installation</p> <p>8. Fish salvage to be performed by QEP, as required.</p> <p>9. Biodegradable hydraulic oil n excavators working in the wetland area</p> <p>10. Spill kits to be located within the work area</p>
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**9. Construction Typical**

STDS-03-ML-05-112	Dam and Pump Water Course Crossings
STDS-03-ML-05-601	Streambank Reclamation - Rootward
STDS-03-ML-05-602	Streambank Reclamation - Deflectors
STDS-03-ML-05-603	Streambank Reclamation - Brush Layer in Cross Cut Slope
STDS-03-ML-05-606	Streambank Reclamation - Vegetated Geotextile Installation
STDS-03-ML-05-607	Streambank Reclamation - Tree Revetment
STDS-03-ML-05-608	Watercrossing Bank Erosion Protection

**10. Standards and Specifications**

CGL4703-CGP-ENV-PLN-008	Environmental Management Plan
Revision Date: January 23, 2019	BC - Forestry Engineering Road Manual_2002
September, 2012	BC fish-stream_crossing_web 2012
Chapter 4.8	Completing Changes In & About a Stream - BC - OGC
December, 2019	BC OGC Oil & Gas Activity Application Manual

**11. Access**

Via ROW and Shoofly RW-190.0.B

**12. Project Monitoring**

The work will be monitored in accordance with the CGL Environmental Management Plan. Water monitoring will follow the requirements in Appendix E.2 Water Quality Monitoring Plan. Erosion, Sediment and Control (ESC) measures will be implemented throughout construction. ESC measures will be implemented for the duration of the diversion and routinely monitored throughout.

**13. Diversion Layout**

- MSJV-FSK-0167 RevB



# memo

## **GEOTECHNICAL MEMORANDUM S11-9 Application Watercourses S1043 and 691**

To: CGL Engineering  
From: Norman Deverney, P.Eng., MSJV Senior Geotechnical Engineer  
CC: Karim Tahallaiti, MSJV, Philippe Deacon, MSJV  
Date: May 4, 2020  
Subject: Geotechnical Engineering Support for Section 11 Streamflow Diversion Application

---

### **1 Introduction**

At the request of CGL, MSJV has prepared this memorandum and attached sketches to support the Section 11 Application of the Water Sustainability Act for proposed streamflow diversions to be implemented during construction of the Coastal GasLink Pipeline. This diversion will direct flow from Watercourse S1043 into Watercourse 691.

The memorandum is to accompany the Watercourse Crossing Section 11 Diversion Request (Diversion Request) and attached Site Plan Drawings. The Diversion request provides details of the proposed streamflow diversions including location (Pipeline KP), stream Identification Number(s), work plan summary, construction notes, reference Typical Drawings, Standards and Specifications, diversion procedure and project timing.

This memorandum summarises the diversion assessment, channel design and compatibility characteristics of the proposed diversion streams. Pre-Construction and construction requirements to warrant the diversion are provided in the Diversion Request.

### **2 Office Review Summary**

#### **2.1 Review References**

An office – based review of the proposed streamflow diversion has been undertaken. Reference has been made to the Diversion Request, Grading Plans, Site Plan, CGL Master Watercourse Inventory, as well as the available topographic information and aerial imagery.

Watercourse characteristics have been examined based on documented field measurements (where available) and inferred / calculated from topography and watershed basin area, slope and morphology.

Channel and flume hydraulic characteristics have been calculated using Manning’s Equation, which considers channel hydraulic radius, channel slope, and a roughness coefficient (Manning’s “n”). Roughness coefficients for various soil and material types are as described in common references, e.g. Table 4.1 of the Handbook of Steel Drainage and Highway Construction Products for constructed channels.

## 2.2 Streamflow Diversion Design Parameters

Project – specific design criterion is for the Streamflow Diversion to provide suitable hydraulic capacity to carry the estimated 1 in 10 – Year (Q10) streamflow. Elements to pass the Q10 streamflow include culverts, open channels / ditches, as well as pumps and associated hoses, sumps, weirs and control devices.

This Streamflow Diversion will be in place through the entire year and will be exposed to spring freshet flows. The diversion channel requires capacity to carry the maximum applicable Q10 estimate regardless of basis, being snowmelt - derived or rainfall runoff, whichever is greater.

## 2.3 Streamflow Compatibility - Diverted Stream and Receiving Stream

The general suitability of the receiving watercourse to accept the additional flow delivered by the diverted stream is examined in broad terms by the Office Review.

Comparison has been made to Q10 flows for both the diverted and receiving streams for the season and period that the Streamflow Diversion will be in place.

## 3 Diversion Design

Channel diversion design criteria are described below. The attached “Typical” drawing shows recommended channel dimensions, channel bed liner materials, and construction requirements including pre-construction assessments, supervision, and conformance requirements to existing CGL project commitments, and to applicable Regulations.

Diversions will be designed and constructed using the methodology below based on the site location and stream hydrology.

### 3.1 Diversion Hydraulic Capacity – Open Channel Dimensions

At sites where the Streamflow Diversion consists of an open channel, e.g. excavated ditch, natural depression, or wetland / small lake, then the channel dimensions will be constructed to meet or exceed the dimensions of the diverted channel upstream of the diversion, with reference to stream reaches with similar gradient and channel bed substrate.

Channel hydraulic capacity has been calculated using Manning’s Equation. Separate calculations have been provided for distinct channel conditions and slope gradients where applicable at this pre-construction planning stage.

For this diversion of watercourse **S1043**, there is one section of diversion, and one Typical Drawing has been prepared and attached to this memo.

- Section 1, from Point of Diversion to outfall at watercourse **691** is 80 m long at average gradient 14%

Diversion Channel dimensions include additional depth in the form of a Freeboard Allowance. The Freeboard Allowance will accommodate short term “surge” flows that might occur due to re-starting pumps or re-opening the diversion entrance control. Unless otherwise specified, the recommended freeboard allowance will comprise banks that are a minimum of 0.3m (1 foot) above the estimated open channel flow depth at the Q10 design discharge.

### 3.2 Diversion Channel Substrate

The CGL Master Watercourse Inventory includes field estimates of channel substrate sizes (D95 and D<sub>50</sub>) and channel gradient at the point of the field survey for some streams but not all. Where available, that information has been used to determine the substrate size distributions of the Diversion Channel.

The initial design concept is to construct an open channel using existing substrate to carry flows. If ground conditions are not favourable for an open channel, then a structure will be used for the diversion as described below in Section 3.3.



For locations without survey substrate and gradient data; the recommended Diversion Channel substrate materials and grain size distribution has been determined by calculating the hydraulic characteristics of the channel at the design discharge to minimize potential for erosion during high flows. Those material specifications are indicated on the Typical Drawings as Riprap Class, with grain size distributions and riprap layer thickness.

### 3.3 Diversion Hydraulic Capacity – Flumes and Culverts

In some instances, all or part of the Streamflow Diversion might comprise a flume structure, such as half culverts (heavy gauge steel, corrugated steel, or High Density Polyethylene), concrete box sections, or timber / wood structures with polyethylene or similar impermeable liners. The flume could also include sections of a fully enclosed culvert. Flume and culvert dimensions are indicated on the Typical Drawings.

Culvert and flume hydraulic capacity has been calculated using Manning’s Equation for rectangular or trapezoidal sections. For circular sections, including enclosed culverts, hydraulic capacity has been determined by design nomograms in the Handbook of Steel Drainage and Highway Construction Products.

Flume dimensions include additional depth in the form of a Freeboard Allowance. The Freeboard Allowance will accommodate short term “surge” flows that might occur due to re-starting pumps or re-opening the diversion entrance control. As a general reference, the Freeboard Allowance will comprise flume margins that are a minimum of 0.15m (0.5 feet) above the estimated open channel flow depth.

Culvert dimensions have been sized to pass the design discharge with inlet (headwater) depth not exceeding the culvert diameter.

Where floating or entrained debris presents potential for blockage of flow, accommodations will be provided during installation for debris catchment several metres upstream of the inlet. The use of gratings or other similar barriers attached directly to the culvert inlet is **not recommended**.

## 4 Stream Information

Site-specific stream and channel characteristics employed in the diversion design are summarized below.

### 4.1 Diverted Stream Characteristics

Stream Identification	<b>S1043</b>
Riparian Class	S6
Channel Width	n/a
Channel Depth	n/a
Channel Gradient	18% (10 °)
Substrate D95	no information
Substrate D <sub>50</sub>	no information
Basin Area	0.01 km <sup>2</sup> (1 ha.)
Q10 Estimate	0.03 m <sup>3</sup> /s (Regional Estimate)

### 4.2 Receiving Stream Characteristics

Stream Identification	<b>691</b>
Riparian Class	S6
Channel Width	2.64 m
Channel Depth	0.47 (estimate)
Channel Gradient	13% (7 °)
Substrate	no information
Basin Area	0.53 km <sup>2</sup> (53 ha.)
Q10 Estimate	2.4 m <sup>3</sup> /s (Regional Estimate)

## 5 Compatibility – Diverted Stream into Receiving Stream

This section examines compatibility of the diverted and receiving streams.

The diverted stream **S1043** is a small S6 watercourse with Q10 peak flow of 0.03 m<sup>3</sup>/s. Flows will be diverted into receiving stream **691**, a larger S6 watercourse with Q10 peak flow of 2.4 m<sup>3</sup>/s. Channel substrate of the receiving stream is not known.

Design discharge (Q10) for the diverted stream is approximately 1.3% of the Q10 discharge for the receiving stream.

On this basis, the proposed diversion of Stream **S1043** (Diverted Stream) into stream **691** (Receiving Stream) is judged to present **Negligible** potential for adverse impacts on channel bed and channel bank stability of the Receiving Stream at the point of entry during the construction period.

## 6 Energy Dissipation, Steep Channels and at Entry Point to Receiving Channel

Energy dissipation measures might warrant consideration in the Diversion Channel design both for steep sections of constructed channel and at the point of discharge where the diverted flows enter the receiving channel.

Energy dissipation design typically comprises the use of a riprap apron to convert the confined flow to a broader overland sheet flow and / or the use of a riprap outlet basin that uses a hydraulic jump to dissipate energy.

Substrate sizes and apron / basin dimensions are to be determined during the Pre-Construction Assessment as described in Section 7 and as noted on the Typical Drawing.

## 7 Construction and Field Requirements

The following section details the conditions that will be implemented prior to and during construction of the stream diversions to warrant the diversion design. All work activities will be conducted with conformance to the existing CGL project commitments, permits, environmental specification and applicable Regulations

### 7.1 Pre-Construction Assessments

Additional field assessments are required prior to construction including:

- site survey of stream(s) prior to diversion / realignment
- site assessment to confirm that stream(s) can be diverted/ realigned
  - correct watercourse(s)
  - substrate and dimensions as per field notes
  - consideration of alternate diversion methods
- requirements for stream bank erosion protection, energy dissipation

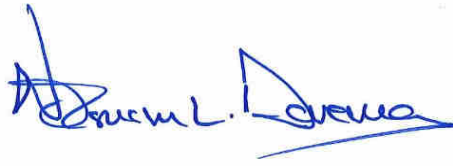
### 7.2 Construction Requirements

Additional requirements for Diversion, to be implemented during construction include:

- Commitment for supervision and monitoring by Professional Engineer
- Commitment for construction in accordance with site-specific work plan
- Conformance with Regulations and project commitments in Permits
- Conformance with WorkSafeBC OHS Regulation 296/97 Part 20

## 8 Closure

On behalf of MSJV Engineering,

A handwritten signature in blue ink, appearing to read "Norman L. Deverney". The signature is stylized with a large initial 'N' and a long horizontal stroke at the end.

Norman L. Deverney, P.Eng., FEC

Senior Geotechnical Engineer

Reviewed by:

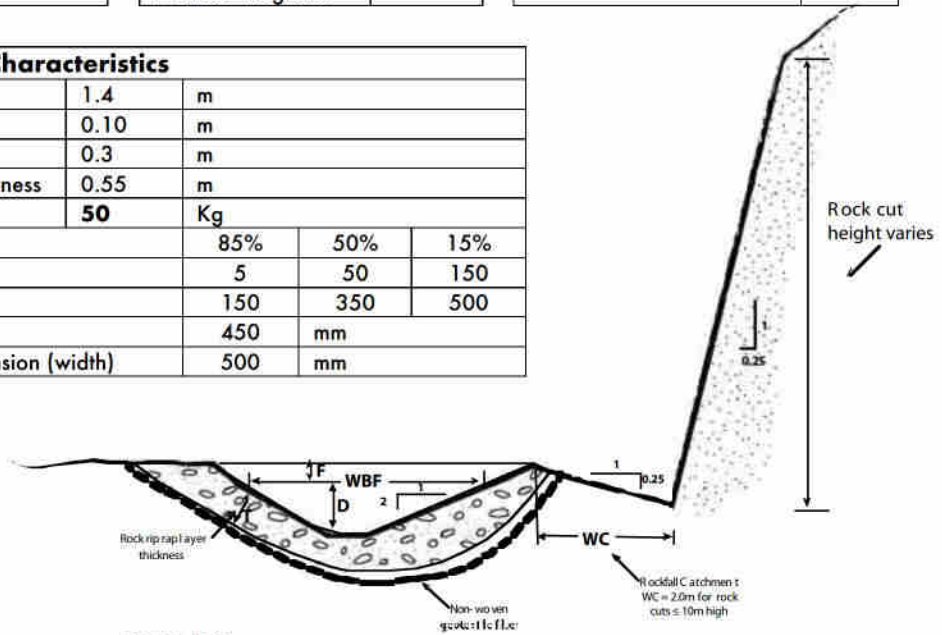


Diverted Stream Characteristics	
Stream Identification	S1043
Riparian Class	S6
Channel Width	n/a
Channel Depth	n/a
Channel Gradient	18% 10°
Substrate - D <sub>95</sub>	n/a
Substrate D <sub>50</sub>	n/a
Basin Area	0.01 km <sup>2</sup>
Q10 Estimate	0.03 m <sup>3</sup> /s
Method - Regional	

Receiving Stream Characteristics	
Stream Identification	691
Riparian Class	S6
Channel Width	2.64 m
Channel Depth	0.47 m
Channel Gradient	18% 10°
Substrate - Dominant	n/a
Substrate Sub-Dom.	n/a
Basin Area	0.53 km <sup>2</sup>
Q10 Estimate	2.4 m <sup>3</sup> /s
Method - Regional	

Diversion of Stream S1043	
No. of Sections	1
Section Number	1
From:	POD
To:	Outfall at 691
Average gradient for Diversion	14% 8°
Diversion Section Length	80 m

Diversion Channel Characteristics			
WBF = Width Bank Full	1.4	m	
D = Channel Depth	0.10	m	
F = Freeboard Allowance	0.3	m	
T = Rock riprap layer thickness	0.55	m	
<b>Riprap Class</b>	<b>50</b>	<b>Kg</b>	
% Larger than		85%	50%
		50%	15%
Mass (kg)		5	50
		150	
Avg. Dimension (mm)		150	350
		500	
Culvert Size (diameter)		450	mm
Half Culvert/ Flume Dimension (width)		500	mm



### Design Basis

Designs shown are based on office – based assessment using available information and limited field measurements.

### Pre-Construction Assessments

Additional field assessments are required prior to construction including:

- site survey of stream(s) prior to diversion / realignment
- site assessment to confirm that stream(s) can be diverted/ realigned
  - correct watercourse(s)
  - substrate and dimensions as per field notes
  - consideration of alternate diversion methods
- requirements for stream bank erosion protection, energy dissipation

### Construction Requirements

- Supervision and monitoring by Professional Engineer
- Construction in accordance with site-specific work plan
- Conformance with Regulations and project commitments in Permits

### Rockfall Catchment / No Work Zone

Rockfall catchment / No Work Zone to be established where warranted in conformance with Excavation Inspection Form prepared under WorkSafeBC OHS Regulation 296/97, Part 20

**S11-9 Application  
Watercourse S1043  
Diversion at RoW**

 Joint Venture		Typical Drawing Stream Channel Diversion Design Supporting Memorandum CGL – Coastal GasLink Pipeline Project
Typical Channel Diversion R.0	Dwg. by: JCD	Scale: NTS
		Drawing Date: May 4, 2020

**Watercourse Crossing Section 11 Diversion Request - Stantec ID# S1043 RevB**

**1. Section 11 Duration**

Section 11 Start	Jul-20	Section 11 Finish	Oct-23
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**2. Construction and instream Works**

Construction Installation Start	Jul-20	Construction Installation Duration	7 days
Construction Reinstatement Start	Oct-23	Construction Reinstatement Duration	7 days

**3. Watercourses**

Stantec ID#	S1043	CGL ID#	1910.00-WC	KP	629+166
Stantec ID#	UN21-5	CGL ID#	TBD	KP	629+126
Stantec ID#	691	CGL ID#	1910.10-WC	KP	629+201

**4. Reason for Section 11 Application**

Divert S1043 into 691 to create a single crossing point. UN21-5 crossing will be temporary diverted on ROW for construction. This will aid overall water management at this location. Isolate and open cut is the most efficient installation method based on the location, timing and project schedule.

**5. Assessment of Alternative Crossing Methods**

Relocating pipe centreline South will impact wetland WL-20089. Move North will create the piep running underneath Stream # S1043.

**6. Reinstatement**

The diversion is temporary and will be reinstated after the crossing is completed, during the overall ROW reinstatement.

**7. Work Plan Summary**

1. Cut in new stream channel including entry channel. Maintain 1m minimum separation from existing stream to maintain plug.
2. The new channel width will maintain, as a minimum, the existing channel dimensions. The Q10 flow rates will be calculated and diversions channels sized to manage the flow (see note 6)
3. Verify diversion channel is clean. Verify dimensions align with the minimum requirements and can handle flow rates. Install clean rip rap and bedding, as required.
4. Commence pump and temporary dam installation within the stream for diversion. – refer to typical - STDS-03-ML-05-112-1\_01 - DAM AND PUMP WATER COURSE CROSSINGS
5. Pump into the diversion channel below the plug location. Verify flow stream and commence removal of plug between the stream and diversion channel
6. The diversion dam to be constructed for the life cycle of the diversion application. Diversion dam to be a combination of aqua dam, steel plates or sheet piling , washed rock, plastic sheeting, filter cloth and sandbags. Minimum 2m thick.
7. Following construction of the channel and diversion dam; adjust pumping location to remove the temporary dam and commence establishment of complete diversion channel.

Watercourse Crossing Section 11 Diversion Request - Stantec ID# S1043 RevB

- |     |   |
|-----|---|
| 8.  | Excavate original channel, store stream bedding material separately from other materials and label  |
| 9.  | Perform pipeline grade works and installation   |
| 10. | Reinstate the channel by following the pump and dam sequence in reverse. Return stream bedding to watercourse. Seal temporary channel with bentonite. |



**Watercourse Crossing Section 11 Diversion Request - Stantec ID# S1043 RevB**

**8. Construction Notes**

- |  |  |
|--|--|
| <p>1. Water monitoring performed per stream classification in accordance with CGL4703-CGP-ENV-PLN-008 Environmental Work Plan Appendix E.2 Water Quality Monitoring Plan</p> <p>2. Stream data taken from the Company MWCT dated 5February2020</p> <p>3. Diversion is temporary and will be reinstated as per Company direction during crossing workshop November 2019.</p> <p>4. Bank diversion channel to be established using construction typical drawings</p> <p>5. Work plan to be updated following site survey</p> | <p>6. If Q10 flow is not provided in the MWCT; then the flow rate is calculated using the MELP Regional Area - Based Method. Peak flows are Snowmelt - Derived.</p> <p>7. Pump to be sized for Q10 flow rate with back up pump available during installation</p> <p>8. Fish salvage to be performed by QEP, as required.</p> <p>9. Biodegradable hydraulic oil n excavators working in the wetland area</p> <p>10. Spill kits to be located within the work area</p> |
|--|--|

**9. Construction Typical**

STDS-03-ML-05-112	Dam and Pump Water Course Crossings
STDS-03-ML-05-601	Streambank Reclamation - Rootward
STDS-03-ML-05-602	Streambank Reclamation - Deflectors
STDS-03-ML-05-603	Streambank Reclamation - Brush Layer in Cross Cut Slope
STDS-03-ML-05-606	Streambank Reclamation - Vegetated Geotextile Installation
STDS-03-ML-05-607	Streambank Reclamation - Tree Revetment
STDS-03-ML-05-608	Watercrossing Bank Erosion Protection

**10. Standards and Specifications**

CGL4703-CGP-ENV-PLN-008	Environmental Management Plan
Revision Date: January 23, 2019	Engineering Manual
September, 2012	BC fish-stream_crossing_web 2012
Chapter 4.8	Completing Changes In & About a Stream - BC - OGC
December, 2019	BC OGC Oil & Gas Activity Application Manual

**11. Access**

Via ROW

**12. Project Monitoring**

The work will be monitored in accordance with the CGL Environmental Management Plan. Water monitoring will follow the requirements in Appendix E.2 Water Quality Monitoring Plan. Erosion, Sediment and Control (ESC) measures will be implemented throughout construction. ESC measures will be implemented for the duration of the diversion and routinely monitored throughout.

**13. Diversion Layout**

- MSJV-FSK-0172 RevB



# memo

## **GEOTECHNICAL MEMORANDUM S11-11 Application Watercourses 692.1T and S1046**

To: CGL Engineering  
From: Norman Deverney, P.Eng., MSJV Senior Geotechnical Engineer  
CC: Karim Tahallaiti, MSJV, Philippe Deacon, MSJV  
Date: May 4, 2020  
Subject: Geotechnical Engineering Support for Section 11 Streamflow Diversion Application

---

### **1 Introduction**

At the request of CGL, MSJV has prepared this memorandum and attached sketches to support the Section 11 Application of the Water Sustainability Act for proposed streamflow diversions to be implemented during construction of the Coastal GasLink Pipeline. This diversion will direct flow from Watercourse 692.1T into Watercourse S1046.

The memorandum is to accompany the Watercourse Crossing Section 11 Diversion Request (Diversion Request) and attached Site Plan Drawings. The Diversion request provides details of the proposed streamflow diversions including location (Pipeline KP), stream Identification Number(s), work plan summary, construction notes, reference Typical Drawings, Standards and Specifications, diversion procedure and project timing.

This memorandum summarises the diversion assessment, channel design and compatibility characteristics of the proposed diversion streams. Pre-Construction and construction requirements to warrant the diversion are provided in the Diversion Request.

### **2 Office Review Summary**

#### **2.1 Review References**

An office – based review of the proposed streamflow diversion has been undertaken. Reference has been made to the Diversion Request, Grading Plans, Site Plan, CGL Master Watercourse Inventory, as well as the available topographic information and aerial imagery.

Watercourse characteristics have been examined based on documented field measurements (where available) and inferred / calculated from topography and watershed basin area, slope and morphology.

Channel and flume hydraulic characteristics have been calculated using Manning’s Equation, which considers channel hydraulic radius, channel slope, and a roughness coefficient (Manning’s “n”). Roughness coefficients for various soil and material types are as described in common references, e.g. Table 4.1 of the Handbook of Steel Drainage and Highway Construction Products for constructed channels.

## 2.2 Streamflow Diversion Design Parameters

Project – specific design criterion is for the Streamflow Diversion to provide suitable hydraulic capacity to carry the estimated 1 in 10 – Year (Q10) streamflow. Elements to pass the Q10 streamflow include culverts, open channels / ditches, as well as pumps and associated hoses, sumps, weirs and control devices.

This Streamflow Diversion will be in place through the entire year and will be exposed to spring freshet flows. The diversion channel requires capacity to carry the maximum applicable Q10 estimate regardless of basis, being snowmelt - derived or rainfall runoff, whichever is greater.

## 2.3 Streamflow Compatibility - Diverted Stream and Receiving Stream

The general suitability of the receiving watercourse to accept the additional flow delivered by the diverted stream is examined in broad terms by the Office Review.

Comparison has been made to Q10 flows for both the diverted and receiving streams for the season and period that the Streamflow Diversion will be in place.

## 3 Diversion Design

Channel diversion design criteria are described below. The attached “Typical” drawing shows recommended channel dimensions, channel bed liner materials, and construction requirements including pre-construction assessments, supervision, and conformance requirements to existing CGL project commitments, and to applicable Regulations.

Diversions will be designed and constructed using the methodology below based on the site location and stream hydrology.

### 3.1 Diversion Hydraulic Capacity – Open Channel Dimensions

At sites where the Streamflow Diversion consists of an open channel, e.g. excavated ditch, natural depression, or wetland / small lake, then the channel dimensions will be constructed to meet or exceed the dimensions of the diverted channel upstream of the diversion, with reference to stream reaches with similar gradient and channel bed substrate.

Channel hydraulic capacity has been calculated using Manning’s Equation. Separate calculations have been provided for distinct channel conditions and slope gradients where applicable at this pre-construction planning stage.

For this diversion of watercourse **692.1T**, there is one section of diversion, and one Typical Drawing has been prepared and attached to this memo.

- Section 1, from Point of Diversion to outfall at watercourse **S1046** is 63 m long at average gradient 19%

Diversion Channel dimensions include additional depth in the form of a Freeboard Allowance. The Freeboard Allowance will accommodate short term “surge” flows that might occur due to re-starting pumps or re-opening the diversion entrance control. Unless otherwise specified, the recommended freeboard allowance will comprise banks that are a minimum of 0.3m (1 foot) above the estimated open channel flow depth at the Q10 design discharge.

### 3.2 Diversion Channel Substrate

The CGL Master Watercourse Inventory includes field estimates of channel substrate sizes (D95 and D<sub>50</sub>) and channel gradient at the point of the field survey for some streams but not all. Where available, that information has been used to determine the substrate size distributions of the Diversion Channel.

The initial design concept is to construct an open channel using existing substrate to carry flows. If ground conditions are not favourable for an open channel, then a structure will be used for the diversion as described below in Section 3.3.



For locations without survey substrate and gradient data; the recommended Diversion Channel substrate materials and grain size distribution has been determined by calculating the hydraulic characteristics of the channel at the design discharge to minimize potential for erosion during high flows. Those material specifications are indicated on the Typical Drawings as Riprap Class, with grain size distributions and riprap layer thickness.

### 3.3 Diversion Hydraulic Capacity – Flumes and Culverts

In some instances, all or part of the Streamflow Diversion might comprise a flume structure, such as half culverts (heavy gauge steel, corrugated steel, or High Density Polyethylene), concrete box sections, or timber / wood structures with polyethylene or similar impermeable liners. The flume could also include sections of a fully enclosed culvert. Flume and culvert dimensions are indicated on the Typical Drawings.

Culvert and flume hydraulic capacity has been calculated using Manning’s Equation for rectangular or trapezoidal sections. For circular sections, including enclosed culverts, hydraulic capacity has been determined by design nomograms in the Handbook of Steel Drainage and Highway Construction Products.

Flume dimensions include additional depth in the form of a Freeboard Allowance. The Freeboard Allowance will accommodate short term “surge” flows that might occur due to re-starting pumps or re-opening the diversion entrance control. As a general reference, the Freeboard Allowance will comprise flume margins that are a minimum of 0.15m (0.5 feet) above the estimated open channel flow depth.

Culvert dimensions have been sized to pass the design discharge with inlet (headwater) depth not exceeding the culvert diameter.

Where floating or entrained debris presents potential for blockage of flow, accommodations will be provided during installation for debris catchment several metres upstream of the inlet. The use of gratings or other similar barriers attached directly to the culvert inlet is **not recommended**.

## 4 Stream Information

Site-specific stream and channel characteristics employed in the diversion design are summarized below.

### 4.1 Diverted Stream Characteristics

Stream Identification	<b>692.1T</b>
Riparian Class	S6
Channel Width	1.13 m
Channel Depth	0.45 m
Channel Gradient	25% (14 °)
Substrate D <sub>95</sub>	20 cm Cobbles dominant
Substrate Sub-D <sub>50</sub>	15 cm Boulders Sub-Dominant
Basin Area	0.19 km <sup>2</sup> (19 ha.)
Q10 Estimate	0.86 m <sup>3</sup> /s (Regional Estimate)

### 4.2 Receiving Stream Characteristics

Stream Identification	<b>S1046</b>
Riparian Class	S6
Channel Width	n/a
Channel Depth	n/a
Channel Gradient	15% (8 °)
Substrate Dominant	no information
Sub-Dominant	no information
Basin Area	0.03 km <sup>2</sup> (3 ha.)
Q10 Estimate	0.14 m <sup>3</sup> /s (Regional Estimate)

## 5 Compatibility – Diverted Stream into Receiving Stream

This section examines compatibility of the diverted and receiving streams.

The diverted stream **692.1T** is a medium size S6 watercourse with Q10 peak flow of 0.86 m<sup>3</sup>/s. Flows will be diverted into receiving stream **S1046**, a small S6 watercourse with Q10 peak flow of 0.14 m<sup>3</sup>/s. Channel substrate of the receiving stream is not known.

Design discharge (Q10) for the diverted stream is approximately 600% of the Q10 discharge for the receiving stream.

On this basis, the proposed diversion of Stream **692.1T** (Diverted Stream) into stream **S1046** (Receiving Stream) is judged to present **Moderate to High** potential for adverse impacts on channel bed and channel bank stability of the Receiving Stream at the point of entry during the construction period.

The receiving stream re-enters the diverted stream approximately 50m downstream of the tie-in point

Mitigation measures may be warranted to protect the channel bed and banks of the receiving stream over the 50m section of channel. Such measures are to be determined during pre-construction field assessments as described below in Sections 6, 7, and 8.

## 6 Energy Dissipation, Steep Channels and at Entry Point to Receiving Channel

Energy dissipation measures might warrant consideration in the Diversion Channel design both for steep sections of constructed channel and at the point of discharge where the diverted flows enter the receiving channel.

Energy dissipation design typically comprises the use of a riprap apron to convert the confined flow to a broader overland sheet flow and / or the use of a riprap outlet basin that uses a hydraulic jump to dissipate energy.

Substrate sizes and apron / basin dimensions are to be determined during the Pre-Construction Assessment as described in Section 7 and as noted on the Typical Drawing.

## 7 Construction and Field Requirements

The following section details the conditions that will be implemented prior to and during construction of the stream diversions to warrant the diversion design. All work activities will be conducted with conformance to the existing CGL project commitments, permits, environmental specification and applicable Regulations

### 7.1 Pre-Construction Assessments

Additional field assessments are required prior to construction including:

- site survey of stream(s) prior to diversion / realignment
- site assessment to confirm that stream(s) can be diverted/ realigned
  - correct watercourse(s)
  - substrate and dimensions as per field notes
  - consideration of alternate diversion methods
- requirements for stream bank erosion protection, energy dissipation

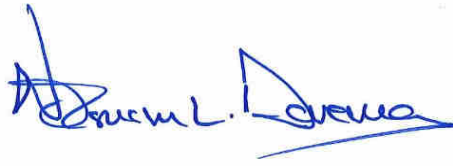
### 7.2 Construction Requirements

Additional requirements for Diversion, to be implemented during construction include:

- Commitment for supervision and monitoring by Professional Engineer
- Commitment for construction in accordance with site-specific work plan
- Conformance with Regulations and project commitments in Permits
- Conformance with WorkSafeBC OHS Regulation 296/97 Part 20

## 8 Closure

On behalf of MSJV Engineering,

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Norman L. Deverney, P.Eng., FEC

Senior Geotechnical Engineer

Reviewed by:

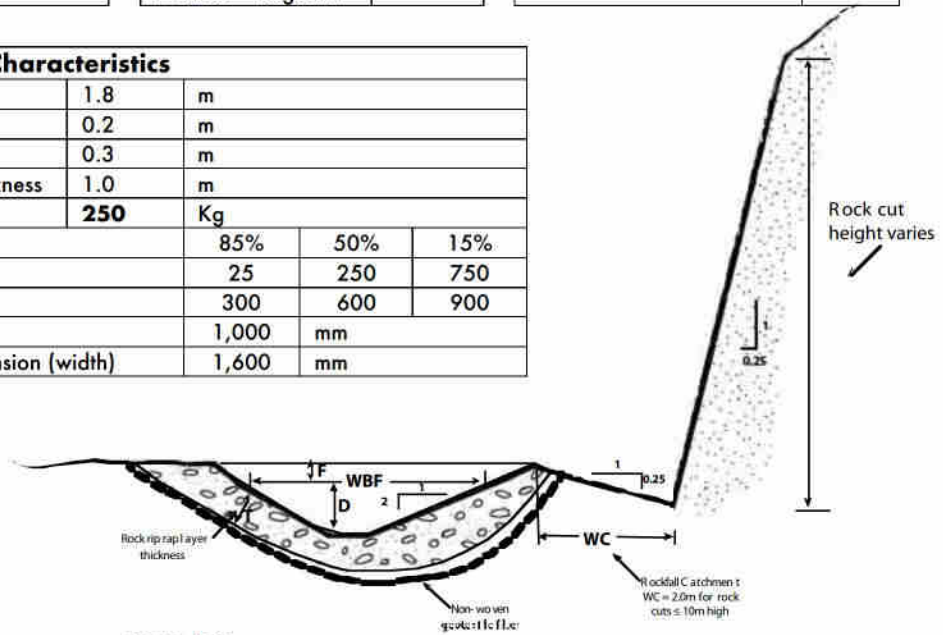


Diverted Stream Characteristics	
Stream Identification	692.1T
Riparian Class	S6
Channel Width	1.13
Channel Depth	0.45 m
Channel Gradient	25% 14°
Substrate - D <sub>95</sub>	20 cm
Substrate D <sub>50</sub>	15 cm
Basin Area	0.19 km <sup>2</sup>
Q10 Estimate	0.86 m <sup>3</sup> /s
Method - Regional	

Receiving Stream Characteristics	
Stream Identification	S1046
Riparian Class	S6
Channel Width	n/a
Channel Depth	n/a
Channel Gradient	15% 8°
Substrate	n/a
Substrate Sub-Dom.	n/a
Basin Area	0.03 km <sup>2</sup>
Q10 Estimate	0.14 m <sup>3</sup> /s
Method - Regional	

Diversion of Stream 692.1T	
No. of Sections	1
Section Number	1
From:	POD
To:	Outfall at S1046
Average gradient for Diversion	19% 11°
Diversion Section Length	63 m

Diversion Channel Characteristics			
WBF = Width Bank Full	1.8	m	
D = Channel Depth	0.2	m	
F = Freeboard Allowance	0.3	m	
T = Rock riprap layer thickness	1.0	m	
<b>Riprap Class</b>	<b>250</b>	<b>Kg</b>	
% Larger than	85%	50%	15%
Mass (kg)	25	250	750
Avg. Dimension (mm)	300	600	900
Culvert Size (diameter)	1,000	mm	
Half Culvert/ Flume Dimension (width)	1,600	mm	



### Design Basis

Designs shown are based on office – based assessment using available information and limited field measurements.

### Pre-Construction Assessments

Additional field assessments are required prior to construction including:

- site survey of stream(s) prior to diversion / realignment
- site assessment to confirm that stream(s) can be diverted/ realigned
  - correct watercourse(s)
  - substrate and dimensions as per field notes
  - consideration of alternate diversion methods
- requirements for stream bank erosion protection, energy dissipation

### Construction Requirements

- Supervision and monitoring by Professional Engineer
- Construction in accordance with site-specific work plan
- Conformance with Regulations and project commitments in Permits

### Rockfall Catchment / No Work Zone

Rockfall catchment / No Work Zone to be established where warranted in conformance with Excavation Inspection Form prepared under WorkSafeBC OHS Regulation 296/97, Part 20

**S11-11 Application  
Watercourse 692.1T  
Diversion at RoW**

 Joint Venture		Typical Drawing Stream Channel Diversion Design Supporting Memorandum CGL – Coastal GasLink Pipeline Project
Typical Channel Diversion R.0	Dwg. by: JCD	Scale: NTS
		Drawing Date: May 4, 2020

**Watercourse Crossing Section 11 Request - Stantec ID# S1046\_682.1T**

**1. Section 11 Duration**

Section 11 Start	Sep-20	Section 11 Finish	Oct-23
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**2. Construction and instream Works**

Construction Installation Start	Sep-20	Construction Installation Duration	7 days
Construction Reinstatement Start	Oct-23	Construction Reinstatement Duration	7 days

**3. Watercourses**

Stantec ID#	692.1T	CGL ID#	1916.00-WC	KP	630+199
Stantec ID#	S1046	CGL ID#	TBD	KP	630+114

**4. Reason for Section 11 Application**

692.1T diverted into S1046. The diversion is required for water control by creating a dedicated channel and single crossing. This will connect and maintain existing flows to the stream channels either side of the ROW during construction. Aligning 692.1T into one channel will allow safer and controlled water management through this section. Isolate and open cut is the most efficient installation method based on the location, timing and project schedule

**5. Assessment of Alternative Crossing Methods**

The pipe centreline cannot be adjusted within the existing OGC footprint boundary to remove the Section 11 requirements because of the quantity of streams and crossings through this section.

**6. Reinstatement**

The diversion is temporary and will be reinstated after the crossing is completed, during the overall ROW reinstatement.

**7. Work Plan Summary**

- |    |  |
|----|--|
| 1. | Cut in new stream channel including entry channel. Maintain 1m minimum separation from existing stream to maintain plug. Based on the geotechnical survey data, this is anticipated to be installed in Cobble. |
| 2. | The new channel width will maintain, as a minimum, the existing channel dimensions. The Q10 flow rates will be calculated and diversions channels sized to manage the flow (see note 6).                       |
| 3. | Verify diversion channel is clean. Verify dimensions align with the minimum requirements and can handle flow rates. Install clean rip rap and bedding, as required.  |
| 4. | Commence pump and temporary dam installation within the stream for diversion. – refer to typical - STDS-03-ML-05-112-1_01 - DAM AND PUMP WATER COURSE CROSSINGS  |
| 5. | Pump into the diversion channel below the plug location. Verify flow stream and commence removal of plug between the stream and diversion channel  |
| 6. | The diversion dam to be constructed for the life cycle of the diversion application.   |
| 7. | Following construction of the channel and diversion dam; adjust pumping location to remove the temporary dam and commence establishment of complete diversion channel.   |

Watercourse Crossing Section 11 Request - Stantec ID# S1046\_682.1T

- |     |  |
|-----|--|
| 8.  | Excavate original channel, store stream bedding material separately from other materials and label             |
| 9.  | Perform pipeline grade works and installation  |
| 10. | Reinstate the channel by following the pump and dam sequence in reverse. Return stream bedding to watercourse. |



**Watercourse Crossing Section 11 Request - Stantec ID# S1046\_682.1T**

**8. Construction Notes**

<p>1. Water monitoring performed per stream classification in accordance with CGL4703-CGP-ENV-PLN-008 Environmental Work Plan</p> <p>2. Stream data taken from the Company MWCT dated 5February2020</p> <p>3. Diversion is temporary and will be reinstated as per Company direction during crossing workshop November 2019.</p> <p>4. Bank diversion channel to be established using construction typical drawings</p> <p>5. Work plan to be updated following site survey</p>	<p>6. If Q10 flow is not provided in the MWCT; then the flow rate is calculated using the MELP Regional Area Based Method. Peak flows are Snowmelt - Derived.</p> <p>7. Pump to be sized for Q10 flow rate with back up pump available during installation</p> <p>8. Fish salvage to be performed by QEP, as required.</p> <p>9. Biodegradable hydraulic oil n excavators working in the wetland area</p> <p>10. Spill kits to be located within the work area</p>
---	--

**9. Construction Typical**

STDS-03-ML-05-112	Dam and Pump Water Course Crossings
STDS-03-ML-05-601	Streambank Reclamation - Rootward
STDS-03-ML-05-602	Streambank Reclamation - Deflectors
STDS-03-ML-05-603	Streambank Reclamation - Brush Layer in Cross Cut Slope
STDS-03-ML-05-606	Streambank Reclamation - Vegetated Geotextile Installation
STDS-03-ML-05-607	Streambank Reclamation - Tree Revetment
STDS-03-ML-05-608	Watercrossing Bank Erosion Protection

**10. Standards and Specifications**

CGL4703-CGP-ENV-PLN-008	Environmental Management Plan
Revision Date: January 23, 2019	BC - Forestry Engineering Road Manual_2002
September, 2012	BC fish-stream_crossing_web 2012
Chapter 4.8	Completing Changes In & About a Stream - BC - OGC
December, 2019	BC OGC Oil & Gas Activity Application Manual

**11. Access**

Via ROW

**12. Project Monitoring**

The work will be monitored in accordance with the CGL Environmental Management Plan. Water monitoring will follow the requirements in Appendix E.2 Water Quality Monitoring Plan. Erosion, Sediment and Control (ESC) measures will be implemented throughout construction. ESC measures will be implemented for the duration of the diversion and routinely monitored throughout.

**13. Diversion Layout**

- MSJV-FSK-0161



# memo

## **GEOTECHNICAL MEMORANDUM S11-20 Application Watercourse 719.3T**

To: CGL Engineering  
From: Norman Deverney, P.Eng., MSJV Senior Geotechnical Engineer  
CC: Karim Tahallaiti, MSJV, Philippe Deacon, MSJV  
Date: May 6, 2020  
Subject: Geotechnical Engineering Support for Section 11 Streamflow Diversion Application

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### **1 Introduction**

At the request of CGL, MSJV has prepared this memorandum and attached sketches to support the Section 11 Application of the Water Sustainability Act for proposed streamflow alterations or diversions to be implemented during construction of the Coastal GasLink Pipeline. This diversion will re-direct upland flows from watercourse **719.3T** and several smaller NCD tributaries (**8006, 8583A, and 8A268**) to the east side of the RoW with outfall to Stream **28D**, which is the natural receiving watercourse.

The memorandum is to accompany the Watercourse Crossing Section 11 Diversion Request (Diversion Request) and attached Site Plan Drawings. The Diversion request provides details of the proposed streamflow diversions including location (Pipeline KP), stream Identification Number(s), work plan summary, construction notes, reference Typical Drawings, Standards and Specifications, diversion procedure and project timing.

This memorandum summarises the diversion assessment, channel design and compatibility characteristics of the proposed diversion streams. Pre-Construction and construction requirements to warrant the diversion are provided in the Diversion Request.

### **2 Office Review Summary**

#### **2.1 Review References**

An office – based review of the proposed streamflow diversion has been undertaken. Reference has been made to the Diversion Request, Grading Plans, Site Plan, CGL Master Watercourse Inventory, as well as the available topographic information and aerial imagery.

Watercourse characteristics have been examined based on documented field measurements (where available) and inferred / calculated from topography and watershed basin area, slope and morphology.

Channel and flume hydraulic characteristics have been calculated using Manning's Equation, which considers channel hydraulic radius, channel slope, and a roughness coefficient (Manning's "n"). Roughness coefficients for various soil and material types are as described in common references, e.g. Table 4.1 of the Handbook of Steel Drainage and Highway Construction Products for constructed channels.

## 2.2 Streamflow Diversion Design Parameters

Project – specific design criterion is for the Streamflow Diversion to provide suitable hydraulic capacity to carry the estimated 1 in 10 – Year (Q10) streamflow. Elements to pass the Q10 streamflow include culverts, open channels / ditches, as well as pumps and associated hoses, sumps, weirs and control devices.

This Streamflow Diversion will be in place through the entire year and will be exposed to spring freshet flows. The diversion channel requires capacity to carry the maximum applicable Q10 estimate regardless of basis, being snowmelt - derived or rainfall runoff, whichever is greater.

## 2.3 Streamflow Compatibility - Diverted Stream and Receiving Stream

The general suitability of the receiving watercourse to accept the additional flow delivered by the diverted stream is examined in broad terms by the Office Review.

Comparison has been made to Q10 flows for both the diverted and receiving streams for the season and period that the Streamflow Diversion will be in place.

## 3 Diversion Design

Channel diversion design criteria are described below. The attached “Typical” drawing shows recommended channel dimensions, channel bed liner materials, and construction requirements including pre-construction assessments, supervision, and conformance requirements to existing CGL project commitments, and to applicable Regulations.

Diversions will be designed and constructed using the methodology below based on the site location and stream hydrology.

For this diversion of watercourse **719.3T**, a single diversion channel will be constructed, and one Typical Drawing has been prepared and attached to this memo.

Noting the presence of Shoofly Access RW-120.0 that crossed the RoW upstream of this diversion, consideration is warranted for capture of inflows at the culvert outlets on the lower side of the Shoofly.

Culverted Flows from NCD **8A268** that crosses RW-120.0 east of the pipeline RoW eventually meet the RoW further south. These flows can be picked up at the lower side of the Shoofly, or captured by the Diversion channel further downstream.

### 3.1 Diversion Hydraulic Capacity – Open Channel Dimensions

At sites where the Streamflow Diversion consists of an open channel, e.g. excavated ditch, natural depression, or wetland / small lake, then the channel dimensions will be constructed to meet or exceed the dimensions of the diverted channel upstream of the diversion, with reference to stream reaches with similar gradient and channel bed substrate.

Channel hydraulic capacity has been calculated using Manning’s Equation. Separate calculations have been provided for distinct channel conditions and slope gradients where applicable at this pre-construction planning stage.

### 3.2 Diversion Channel Substrate

The CGL Master Watercourse Inventory includes field estimates of channel substrate sizes (D95 and D<sub>50</sub>) and channel gradient at the point of the field survey for some streams but not all. Where available, that information has been used to determine the substrate size distributions of the Diversion Channel.

The initial design concept is to simply allow the receiving channel to accept and carry flows with the existing bed and banks. Flume and culvert dimensions have been provided as a reference in the event that some or all of the diverted flow might be carried downstream within a structure.



Culvert and flume hydraulic capacity has been calculated using Manning's Equation for rectangular or trapezoidal sections. For circular sections, including enclosed culverts, hydraulic capacity has been determined by design nomograms in the Handbook of Steel Drainage and Highway Construction Products.

Flume dimensions include additional depth in the form of a Freeboard Allowance. The Freeboard Allowance will accommodate short term "surge" flows that might occur due to re-starting pumps or re-opening the diversion entrance control. As a general reference, the Freeboard Allowance will comprise flume margins that are a minimum of 0.15m (0.5 feet) above the estimated open channel flow depth.

Culvert dimensions have been sized to pass the design discharge with inlet (headwater) depth not exceeding the culvert diameter.

Where floating or entrained debris presents potential for blockage of flow, accommodations will be provided during installation for debris catchment several metres upstream of the inlet. The use of gratings or other similar barriers attached directly to the culvert inlet is **not recommended**.

#### 4 Stream Information

Site-specific stream and channel characteristics employed in the diversion design are summarized below.

##### 4.1 Diverted Stream Characteristics

Stream Identification	<b>719.3T</b>
Riparian Class	S6
Channel Width	1.0 m
Channel Depth	n/a
Channel Gradient	33% (18 °)
Substrate Dominant	Organics
Substrate Sub.Dom.	n/a
Basin Area	0.06 km <sup>2</sup> (6 ha.) *
Q10 Estimate	0.27 m <sup>3</sup> /s (Regional Estimate)

\* Note, Basin Area includes the smaller NCD tributaries, **8006, 8583A, and 8A268**

##### 4.2 Receiving Stream Characteristics

Stream Identification	<b>28D</b>
Riparian Class	S2
Channel Width	11.7 m
Channel Depth	n/a
Channel Gradient	1.5% (1 °)
Substrate Dominant	Organics
Substrate Sub.Dom.	n/a
Basin Area	0.16 km <sup>2</sup> (16 ha.)
Q10 Estimate	0.72 m <sup>3</sup> /s (Regional Estimate)

#### 5 Compatibility – Diverted Stream into Receiving Streams

This section examines compatibility of the diverted and receiving streams.

The diverted stream **719.3T** is a small to medium size S6 watercourse with Q10 peak flow of 0.27 m<sup>3</sup>/s. The receiving stream **28D** is an S2 watercourse with a relatively wide channel in proportion to the estimated topographic-based contributing drainage area due to the presence of beaver dams. Stream **719.3T** is tributary to **28D**, so they share some of the same upland source area.

Substrate materials (Organics) identified as present in **28D**, are inferred as erodible, so the proposed diversion is judged to present **Moderate** potential for adverse impacts on channel bed and channel bank at the diversion outfall.

Mitigation measures may be warranted at outfall of the diversion to protect the channel bed and banks of the receiving stream channel. Such measures are to be determined during pre-construction field assessments as described below in Sections 6 and 7.

## **6 Energy Dissipation, Steep Channels and at Entry Point to Receiving Channel**

Energy dissipation measures might warrant consideration in the Diversion Channel design both for steep sections of constructed channel and at the point of discharge where the diverted flows enter the receiving channel.

Energy dissipation design typically comprises the use of a riprap apron to convert the confined flow to a broader overland sheet flow and / or the use of a riprap outlet basin that uses a hydraulic jump to dissipate energy.

Substrate sizes and apron / basin dimensions are to be determined during the Pre-Construction Assessment as described in Section 7.

## **7 Construction and Field Requirements**

The following section details the conditions that will be implemented prior to and during construction of the stream diversions to warrant the diversion design. All work activities will be conducted with conformance to the existing CGL project commitments, permits, environmental specification and applicable Regulations

### **7.1 Pre-Construction Assessments**

Additional field assessments are required prior to construction including:

- site survey of stream(s) prior to diversion / realignment
- site assessment to confirm that stream(s) can be diverted/ realigned
  - correct watercourse(s)
  - substrate and dimensions as per field notes
  - consideration of alternate diversion methods
- requirements for stream bank erosion protection, energy dissipation

### **7.2 Construction Requirements**

Additional requirements for Diversion, to be implemented during construction include:

- Commitment for supervision and monitoring by Professional Engineer
- Commitment for construction in accordance with site-specific work plan
- Conformance with Regulations and project commitments in Permits
- Conformance with WorkSafeBC OHS Regulation 296/97 Part 20

## **8 Closure**

On behalf of MSJV Engineering,



Norman L. Deverney, P.Eng., FEC

Senior Geotechnical Engineer

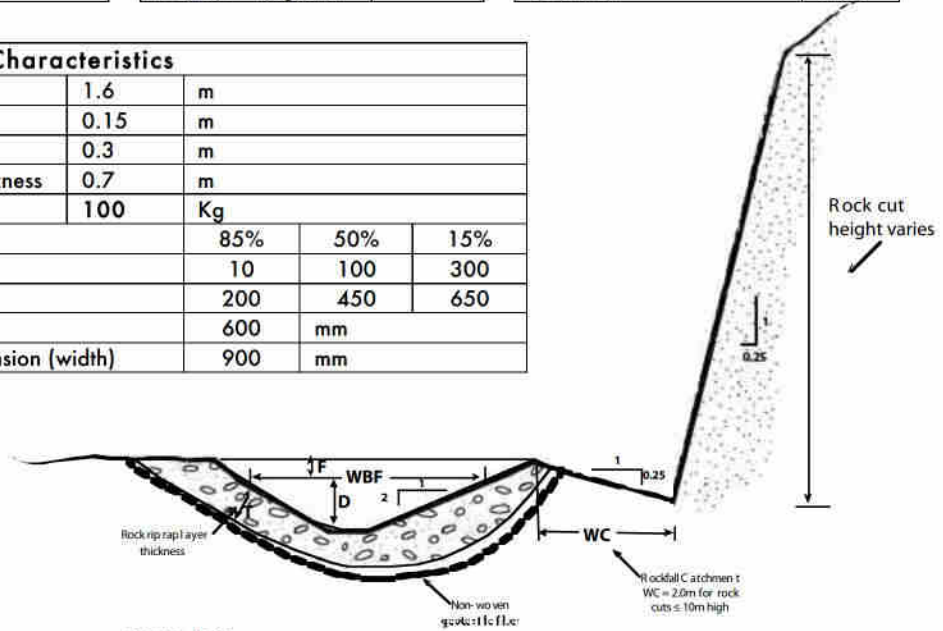
Reviewed by:

Diverted Stream Characteristics	
Stream Identification	719.3T
Riparian Class	S6
Channel Width	1.0 m
Channel Depth	n/a
Channel Gradient	33% 18°
Substrate - Dominant	Organics
Substrate Sub Dom.	n/a
Basin Area	0.06 km <sup>2</sup>
Q10 Estimate	0.27 m <sup>3</sup> /s
Method - Regional	

Receiving Stream Characteristics	
Stream Identification	28D
Riparian Class	S2
Channel Width	11.7 m
Channel Depth	n/a
Channel Gradient	1.5% 1°
Substrate Dominant	Organics
Substrate Sub-Dom.	n/a
Basin Area	0.16 km <sup>2</sup>
Q10 Estimate	0.72 m <sup>3</sup> /s
Method - Regional	

Diversion of 719.3T	
No. of Sections	1
Section Number	1
From:	POD
To:	Outfall at 28D
Average gradient for Diversion Section	17% 10°
Diversion Section Length	145 m
Combined Flow in Diversion	0.3 m <sup>3</sup> /s

Diversion Channel Characteristics			
WBF = Width Bank Full	1.6	m	
D = Channel Depth	0.15	m	
F = Freeboard Allowance	0.3	m	
T = Rock riprap layer thickness	0.7	m	
Riprap Class	100	Kg	
% Larger than		85%	50%
Mass (kg)		10	100
Avg. Dimension (mm)		200	450
Culvert Size (diameter)		600	mm
Half Culvert/ Flume Dimension (width)		900	mm



SCALE: NTS

#### Design Basis

Designs shown are based on office – based assessment using available information and limited field measurements.

#### Pre-Construction Assessments

Additional field assessments are required prior to construction including:

- site survey of stream(s) prior to diversion / realignment
- site assessment to confirm that stream(s) can be diverted/ realigned
  - correct watercourse(s)
  - substrate and dimensions as per field notes
  - consideration of alternate diversion methods
- requirements for stream bank erosion protection, energy dissipation

#### Construction Requirements

- Supervision and monitoring by Professional Engineer
- Construction in accordance with site-specific work plan
- Conformance with Regulations and project commitments in Permits

#### Rockfall Catchment / No Work Zone

Rockfall catchment / No Work Zone to be established where warranted in conformance with Excavation Inspection Form prepared under WorkSafeBC OHS Regulation 296/97, Part 20

**S11-20 Application  
Watercourse 719.3T  
Diversion at RoW**

 Joint Venture		Typical Drawing Stream Channel Diversion Design Supporting Memorandum CGL – Coastal GasLink Pipeline Project
Typical Channel Diversion R.0	Dwg. by: JCD	Scale: NTS
		Drawing Date: May 6, 2020



**Watercourse Crossing Section 11 Diversion Request - Stantec ID# 719.3T RevB**

**1. Section 11 Duration**

Section 11 Start	Oct-20	Section 11 Finish	Oct-23
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**2. Construction and instream Works**

Construction Installation Start	Oct-20	Construction Installation Duration	7 days
Construction Reinstatement Start	Oct-23	Construction Reinstatement Duration	7 days

**3. Watercourse**

Stantec ID#	719.3T	CGL ID#	2006.00-WC	KP	648+047
Stantec ID#	8583A	CGL ID#	TBD	KP	-
Stantec ID#	28D	CGL ID#	2005.00-WC	KP	647+946

**4. Reason for Section 11 Application**

Stream meanders across the centreline and worksite. Propose diversion to tie 8583A / 719.3T into 28D. Stream 719.3T will be temporary diverted for duration of construction. Isolate and open cut is the most efficient installation method based on the location, timing and project schedule.

**5. Assessment of Alternative Crossing Methods**

Relocating pipe centreline will not change the requirement to divert the stream channel.

**6. Reinstatement**

The diversion is temporary and will be reinstated after the crossing is completed, during the overall ROW reinstatement.

**7. Work Plan Summary**

1. Cut in new stream channel including entry channel. Maintain 1m minimum separation from existing streams to maintain plug.
2. The new channel width will maintain, as a minimum, the existing channel dimensions. The Q10 flow rates will be calculated and diversions channels sized to manage the flow (see note 6).
3. Verify diversion channel is clean. Verify dimensions align with the minimum requirements and can handle flow rates. Install clean rip rap and bedding, as required.
4. Commence pump and temporary dam installations within the stream for diversion 28D and 8583A. – refer to typical - STDS-03-ML-05-112-1\_01 - DAM AND PUMP WATER COURSE CROSSINGS
5. Pump into the diversion channel below the plug location. Verify flow stream and commence removal of plug between the streams and diversion channel
6. The diversion dam to be constructed for the life cycle of the diversion application. Diversion dam to be a combination of aqua dam, steel plates or sheet piling , washed rock, plastic sheeting, filter cloth and sandbags. Minimum 2m thick.
7. Following construction of the channel and diversion dam; adjust pumping location to remove the temporary dam and commence establishment of complete diversion channel.

Watercourse Crossing Section 11 Diversion Request - Stantec ID# 719.3T RevB

- |     |   |
|-----|---|
| 8.  | Excavate original channel, store stream bedding material separately from other materials and label  |
| 9.  | Perform pipeline grade works and installation   |
| 10. | Reinstate the channel by following the pump and dam sequence in reverse. Return stream bedding to watercourse. Seal temporary channel with bentonite. |

**Watercourse Crossing Section 11 Diversion Request - Stantec ID# 719.3T RevB**

**8. Construction Notes**

- |  |  |
|--|--|
| <p>1. Water monitoring performed per stream classification in accordance with CGL4703-CGP-ENV-PLN-008 Environmental Work Plan Appendix E.2 Water Quality Monitoring Plan</p> <p>2. Stream data taken from the Company MWCT dated 5February2020</p> <p>3. Diversion is temporary and will be reinstated as per Company direction during crossing workshop November 2019.</p> <p>4. Bank diversion channel to be established using construction typical drawings</p> <p>5. Work plan to be updated following site survey</p> | <p>6. If Q10 flow is not provided in the MWCT; then the flow rate is calculated using the MELP Regional Area - Based Method. Peak flows are Snowmelt - Derived.</p> <p>7. Pump to be sized for Q10 flow rate with back up pump available during installation</p> <p>8. Fish salvage to be performed by QEP, as required.</p> <p>9. Biodegradable hydraulic oil n excavators working in the wetland area</p> <p>10. Spill kits to be located within the work area</p> |
|--|--|

**9. Construction Typical**

STDS-03-ML-05-112	Dam and Pump Water Course Crossings
STDS-03-ML-05-601	Streambank Reclamation - Rootward
STDS-03-ML-05-602	Streambank Reclamation - Deflectors
STDS-03-ML-05-603	Streambank Reclamation - Brush Layer in Cross Cut Slope
STDS-03-ML-05-606	Streambank Reclamation - Vegetated Geotextile Installation
STDS-03-ML-05-607	Streambank Reclamation - Tree Revetment
STDS-03-ML-05-608	Watercrossing Bank Erosion Protection

**10. Standards and Specifications**

CGL4703-CGP-ENV-PLN-008	Environmental Management Plan
Revision Date: January 23, 2019	Engineering Manual
September, 2012	BC fish-stream_crossing_web 2012
Chapter 4.8	Completing Changes In & About a Stream - BC - OGC
December, 2019	BC OGC Oil & Gas Activity Application Manual

**11. Access**

Via ROW and Access Road RW-120.0

**12. Project Monitoring**

The work will be monitored in accordance with the CGL Environmental Management Plan. Water monitoring will follow the requirements in Appendix E.2 Water Quality Monitoring Plan. Erosion, Sediment and Control (ESC) measures will be implemented throughout construction. ESC measures will be implemented for the duration of the diversion and routinely monitored throughout.

**13. Diversion Layout**

- MSJV-FSK-0164 RevB





# memo

## **GEOTECHNICAL MEMORANDUM S11-12 Application Watercourses 49D1 and 8169**

To: CGL Engineering  
From: Norman Deverney, P.Eng., MSJV Senior Geotechnical Engineer  
CC: Karim Tahallaiti, MSJV, Philippe Deacon, MSJV  
Date: May 4, 2020  
Subject: Geotechnical Engineering Support for Section 11 Streamflow Diversion Application

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### **1 Introduction**

At the request of CGL, MSJV has prepared this memorandum and attached sketches to support the Section 11 Application of the Water Sustainability Act for proposed streamflow diversions to be implemented during construction of the Coastal GasLink Pipeline. This diversion will direct flow from Watercourse 49D1 into Watercourse 8169.

The memorandum is to accompany the Watercourse Crossing Section 11 Diversion Request (Diversion Request) and attached Site Plan Drawings. The Diversion request provides details of the proposed streamflow diversions including location (Pipeline KP), stream Identification Number(s), work plan summary, construction notes, reference Typical Drawings, Standards and Specifications, diversion procedure and project timing.

This memorandum summarises the diversion assessment, channel design and compatibility characteristics of the proposed diversion streams. Pre-Construction and construction requirements to warrant the diversion are provided in the Diversion Request.

### **2 Office Review Summary**

#### **2.1 Review References**

An office – based review of the proposed streamflow diversion has been undertaken. Reference has been made to the Diversion Request, Grading Plans, Site Plan, CGL Master Watercourse Inventory, as well as the available topographic information and aerial imagery.

Watercourse characteristics have been examined based on documented field measurements (where available) and inferred / calculated from topography and watershed basin area, slope and morphology.

Channel and flume hydraulic characteristics have been calculated using Manning’s Equation, which considers channel hydraulic radius, channel slope, and a roughness coefficient (Manning’s “n”). Roughness coefficients for various soil and material types are as described in common references, e.g. Table 4.1 of the Handbook of Steel Drainage and Highway Construction Products for constructed channels.

## 2.2 Streamflow Diversion Design Parameters

Project – specific design criterion is for the Streamflow Diversion to provide suitable hydraulic capacity to carry the estimated 1 in 10 – Year (Q10) streamflow. Elements to pass the Q10 streamflow include culverts, open channels / ditches, as well as pumps and associated hoses, sumps, weirs and control devices.

This Streamflow Diversion will be in place through the entire year and will be exposed to spring freshet flows. The diversion channel requires capacity to carry the maximum applicable Q10 estimate regardless of basis, being snowmelt - derived or rainfall runoff, whichever is greater.

## 2.3 Streamflow Compatibility - Diverted Stream and Receiving Stream

The general suitability of the receiving watercourse to accept the additional flow delivered by the diverted stream is examined in broad terms by the Office Review.

Comparison has been made to Q10 flows for both the diverted and receiving streams for the season and period that the Streamflow Diversion will be in place.

## 3 Diversion Design

Channel diversion design criteria are described below. The attached “Typical” drawing shows recommended channel dimensions, channel bed liner materials, and construction requirements including pre-construction assessments, supervision, and conformance requirements to existing CGL project commitments, and to applicable Regulations.

Diversions will be designed and constructed using the methodology below based on the site location and stream hydrology.

### 3.1 Diversion Hydraulic Capacity – Open Channel Dimensions

At sites where the Streamflow Diversion consists of an open channel, e.g. excavated ditch, natural depression, or wetland / small lake, then the channel dimensions will be constructed to meet or exceed the dimensions of the diverted channel upstream of the diversion, with reference to stream reaches with similar gradient and channel bed substrate.

Channel hydraulic capacity has been calculated using Manning’s Equation. Separate calculations have been provided for distinct channel conditions and slope gradients where applicable at this pre-construction planning stage.

For this diversion of watercourse **49D1**, there is one section of diversion, and one Typical Drawing has been prepared and attached to this memo.

- Section 1, from Point of Diversion to outfall at watercourse **8169** is 38 m long at average gradient 17%

Diversion Channel dimensions include additional depth in the form of a Freeboard Allowance. The Freeboard Allowance will accommodate short term “surge” flows that might occur due to re-starting pumps or re-opening the diversion entrance control. Unless otherwise specified, the recommended freeboard allowance will comprise banks that are a minimum of 0.3m (1 foot) above the estimated open channel flow depth at the Q10 design discharge.

### 3.2 Diversion Channel Substrate

The CGL Master Watercourse Inventory includes field estimates of channel substrate sizes (D95 and D<sub>50</sub>) and channel gradient at the point of the field survey for some streams but not all. Where available, that information has been used to determine the substrate size distributions of the Diversion Channel.

The initial design concept is to construct an open channel using existing substrate to carry flows. If ground conditions are not favourable for an open channel, then a structure will be used for the diversion as described below in Section 3.3.

For locations without survey substrate and gradient data; the recommended Diversion Channel substrate materials and grain size distribution has been determined by calculating the hydraulic characteristics of the channel at the design discharge to minimize potential for erosion during high flows. Those material specifications are indicated on the Typical Drawings as Riprap Class, with grain size distributions and riprap layer thickness.

### 3.3 Diversion Hydraulic Capacity – Flumes and Culverts

In some instances, all or part of the Streamflow Diversion might comprise a flume structure, such as half culverts (heavy gauge steel, corrugated steel, or High Density Polyethylene), concrete box sections, or timber / wood structures with polyethylene or similar impermeable liners. The flume could also include sections of a fully enclosed culvert. Flume and culvert dimensions are indicated on the Typical Drawings.

Culvert and flume hydraulic capacity has been calculated using Manning’s Equation for rectangular or trapezoidal sections. For circular sections, including enclosed culverts, hydraulic capacity has been determined by design nomograms in the Handbook of Steel Drainage and Highway Construction Products.

Flume dimensions include additional depth in the form of a Freeboard Allowance. The Freeboard Allowance will accommodate short term “surge” flows that might occur due to re-starting pumps or re-opening the diversion entrance control. As a general reference, the Freeboard Allowance will comprise flume margins that are a minimum of 0.15m (0.5 feet) above the estimated open channel flow depth.

Culvert dimensions have been sized to pass the design discharge with inlet (headwater) depth not exceeding the culvert diameter.

Where floating or entrained debris presents potential for blockage of flow, accommodations will be provided during installation for debris catchment several metres upstream of the inlet. The use of gratings or other similar barriers attached directly to the culvert inlet is **not recommended**.

## 4 Stream Information

Site-specific stream and channel characteristics employed in the diversion design are summarized below.

### 4.1 Diverted Stream Characteristics

Stream Identification	<b>49D1</b>
Riparian Class	S6
Channel Width	1.62 m
Channel Depth	0.47 m
Channel Gradient	13% (7 °)
Substrate D <sub>95</sub>	16 cm Cobbles dominant
Substrate D <sub>50</sub>	25 cm Gravel Sub-Dominant
Basin Area	0.11 km <sup>2</sup> (11 ha.)
Q10 Estimate	0.48 m <sup>3</sup> /s (Regional Estimate)

### 4.2 Receiving Stream Characteristics

Stream Identification	<b>8169</b>
Riparian Class	S6
Channel Width	0.52
Channel Depth	0.2
Channel Gradient	19% (11 °)
Substrate D <sub>95</sub>	17 cm Cobbles Dominant
Substrate D <sub>50</sub>	4 cm Gravel Sub-dominant
Basin Area	0.09 km <sup>2</sup> (9 ha.)
Q10 Estimate	0.41 m <sup>3</sup> /s (Regional Estimate)



## 5 Compatibility – Diverted Stream into Receiving Stream

This section examines compatibility of the diverted and receiving streams.

The diverted stream **49D1** is a small to medium size S6 watercourse with Q10 peak flow of 0.48 m<sup>3</sup>/s. Flows will be diverted into receiving stream **8169**, a somewhat smaller S6 watercourse with Q10 peak flow of 0.41 m<sup>3</sup>/s. Channel substrate of the receiving stream is cobbles and gravel.

Design discharge (Q10) for the diverted stream is approximately 120% of the Q10 discharge for the receiving stream. Combined flow (after diversion) will be more than double the original discharge. Under existing conditions, these two watercourses merge to a single channel near the mid-line of the pipeline RoW.

On this basis, the proposed diversion of Stream **49D1** (Diverted Stream) into stream **8169** (Receiving Stream) is judged to present **Low** potential for adverse impacts on channel bed and channel bank stability of the Receiving Stream at the point of entry during the construction period.

Mitigation measures may be warranted to protect the channel bed and banks of the receiving stream over the 30m section of channel on the north side of the RoW. Such measures are to be determined during pre-construction field assessments as described below in Sections 6, 7, and 8.

## 6 Energy Dissipation, Steep Channels and at Entry Point to Receiving Channel

Energy dissipation measures might warrant consideration in the Diversion Channel design both for steep sections of constructed channel and at the point of discharge where the diverted flows enter the receiving channel.

Energy dissipation design typically comprises the use of a riprap apron to convert the confined flow to a broader overland sheet flow and / or the use of a riprap outlet basin that uses a hydraulic jump to dissipate energy.

Substrate sizes and apron / basin dimensions are to be determined during the Pre-Construction Assessment as described in Section 7 and as noted on the Typical Drawing.

## 7 Construction and Field Requirements

The following section details the conditions that will be implemented prior to and during construction of the stream diversions to warrant the diversion design. All work activities will be conducted with conformance to the existing CGL project commitments, permits, environmental specification and applicable Regulations

### 7.1 Pre-Construction Assessments

Additional field assessments are required prior to construction including:

- site survey of stream(s) prior to diversion / realignment
- site assessment to confirm that stream(s) can be diverted/ realigned
  - correct watercourse(s)
  - substrate and dimensions as per field notes
  - consideration of alternate diversion methods
- requirements for stream bank erosion protection, energy dissipation

### 7.2 Construction Requirements

Additional requirements for Diversion, to be implemented during construction include:

- Commitment for supervision and monitoring by Professional Engineer
- Commitment for construction in accordance with site-specific work plan
- Conformance with Regulations and project commitments in Permits
- Conformance with WorkSafeBC OHS Regulation 296/97 Part 20

## 8 Closure

On behalf of MSJV Engineering,

A handwritten signature in blue ink, appearing to read "Norman L. Deverney". The signature is stylized with a large initial 'N' and a long horizontal stroke at the end.

Norman L. Deverney, P.Eng., FEC

Senior Geotechnical Engineer

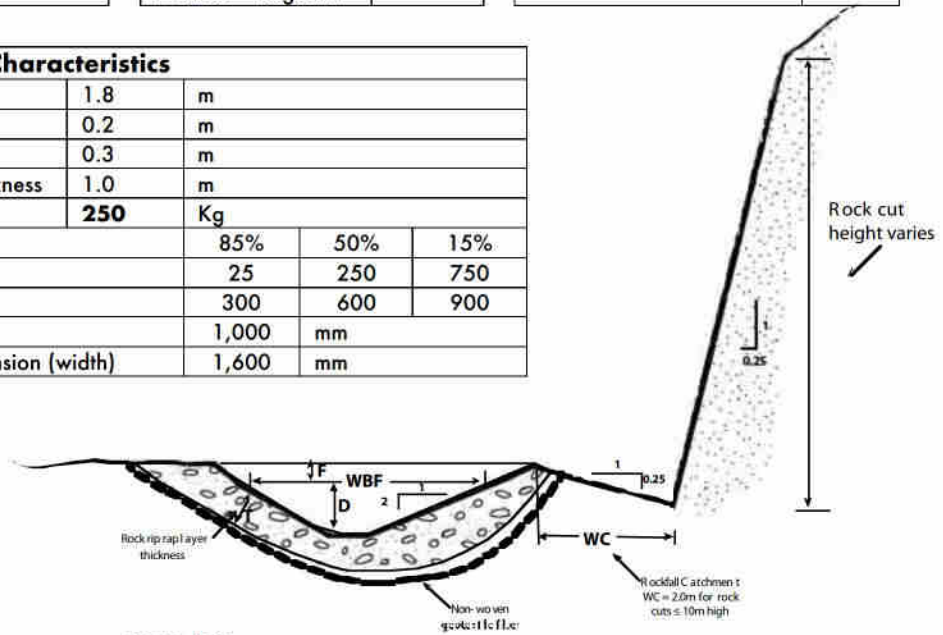
Reviewed by:

Diverted Stream Characteristics	
Stream Identification	49D1
Riparian Class	S6
Channel Width	1.62 m
Channel Depth	0.47 m
Channel Gradient	13% 7°
Substrate - D <sub>95</sub>	16 cm
Substrate D <sub>50</sub>	25 cm
Basin Area	0.11 km <sup>2</sup>
Q10 Estimate	0.48 m <sup>3</sup> /s
Method - Regional	

Receiving Stream Characteristics	
Stream Identification	8169
Riparian Class	S6
Channel Width	0.52 m
Channel Depth	0.2 m
Channel Gradient	19% 11°
Substrate	17 cm
Substrate D <sub>50</sub>	4 cm
Basin Area	0.09 km <sup>2</sup>
Q10 Estimate	0.41 m <sup>3</sup> /s
Method - Regional	

Diversion of Stream 49D1	
No. of Sections	1
Section Number	1
From:	POD
To:	Outfall at 8169
Average gradient for Diversion	17% 9°
Diversion Section Length	38 m

Diversion Channel Characteristics			
WBF = Width Bank Full	1.8	m	
D = Channel Depth	0.2	m	
F = Freeboard Allowance	0.3	m	
T = Rock riprap layer thickness	1.0	m	
<b>Riprap Class</b>	<b>250</b>	<b>Kg</b>	
% Larger than	85%	50%	15%
Mass (kg)	25	250	750
Avg. Dimension (mm)	300	600	900
Culvert Size (diameter)	1,000	mm	
Half Culvert/ Flume Dimension (width)	1,600	mm	



### Design Basis

Designs shown are based on office – based assessment using available information and limited field measurements.

### Pre-Construction Assessments

Additional field assessments are required prior to construction including:

- site survey of stream(s) prior to diversion / realignment
- site assessment to confirm that stream(s) can be diverted/ realigned
  - correct watercourse(s)
  - substrate and dimensions as per field notes
  - consideration of alternate diversion methods
- requirements for stream bank erosion protection, energy dissipation

### Construction Requirements

- Supervision and monitoring by Professional Engineer
- Construction in accordance with site-specific work plan
- Conformance with Regulations and project commitments in Permits

### Rockfall Catchment / No Work Zone

Rockfall catchment / No Work Zone to be established where warranted in conformance with Excavation Inspection Form prepared under WorkSafeBC OHS Regulation 296/97, Part 20

**S11-12 Application  
Watercourse 49D1  
Diversion at RoW**

 Joint Venture		Typical Drawing Stream Channel Diversion Design Supporting Memorandum CGL – Coastal GasLink Pipeline Project
Typical Channel Diversion R.0	Dwg. by: JCD	Scale: NTS
		Drawing Date: May 4, 2020

**Watercourse Crossing Section 11 Request - Stantec ID# 49D1\_8169**

**1. Section 11 Duration**

Section 11 Start	Sep-20	Section 11 Finish	Oct-23
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**2. Construction and instream Works**

Construction Installation Start	Sep-20	Construction Installation Duration	7 days
Construction Reinstatement Start	Oct-23	Construction Reinstatement Duration	7 days

**3. Watercourse**

Stantec ID#	49D1	CGL ID#	1917.00-WC	KP	630+400
Stantec ID#	8169	CGL ID#	TBD	KP	630+418

**4. Reason for Section 11 Application**

49D1 diverted into 8169. The diversion is required for water control by creating a dedicated channel and single crossing through the side slope. This will connect and maintain existing flows to the stream channels either side of the ROW during construction. Aligning 49D1 into one channel will allow safer and controlled water management through this section. Isolate and open cut is the most efficient installation method based on the location, timing and project schedule

**5. Assessment of Alternative Crossing Methods**

Moving the pipe centreline will create greater interference with WL-2006. Relocating centreline South will not remove the side slope or stream diversion requirements.

**6. Reinstatement**

The diversion is temporary and will be reinstated after the crossing is completed, during the overall ROW reinstatement.

**7. Work Plan Summary**

1.	Cut in new stream channel including entry channel. Maintain 1m minimum separation from existing stream to maintain plug.
2.	The new channel width will maintain, as a minimum, the existing channel dimensions. The Q10 flow rates will be calculated and diversions channels sized to manage the flow (see note 6).
3.	Verify diversion channel is clean. Verify dimensions align with the minimum requirements and can handle flow rates. Install clean rip rap and bedding, as required.
4.	Commence pump and temporary dam installation within the stream for diversion. – refer to typical - STDS-03-ML-05-112-1_01 - DAM AND PUMP WATER COURSE CROSSINGS
5.	Pump into the diversion channel below the plug location. Verify flow stream and commence removal of plug between the stream and diversion channel
6.	The diversion dam to be constructed for the life cycle of the diversion application.
7.	Following construction of the channel and diversion dam; adjust pumping location to remove the temporary dam and commence establishment of complete diversion channel.



Watercourse Crossing Section 11 Request - Stantec ID# 49D1\_8169

- |     |  |
|-----|--|
| 8.  | Excavate original channel, store stream bedding material separately from other materials and label             |
| 9.  | Perform pipeline grade works and installation  |
| 10. | Reinstate the channel by following the pump and dam sequence in reverse. Return stream bedding to watercourse. |

**Watercourse Crossing Section 11 Request - Stantec ID# 49D1\_8169**

**8. Construction Notes**

1. Water monitoring performed per stream classification in accordance with CGL4703-CGP-ENV-PLN-008 Environmental Work Plan	6. If Q10 flow is not provided in the MWCT; then the flow rate is calculated using the MELP Regional Area - Based Method. Peak flows are Snowmelt - Derived.
2. Stream data taken from the Company MWCT dated 5February2020	7. Pump to be sized for Q10 flow rate with back up pump available during installation
3. Diversion is temporary and will be reinstated as per Company direction during crossing workshop November 2019.	8. Fish salvage to be performed by QEP, as required.
4. Bank diversion channel to be established using construction typical drawings	9. Biodegradable hydraulic oil n excavators working in the wetland area
5. Work plan to be updated following site survey	10. Spill kits to be located within the work area

**9. Construction Typical**

STDS-03-ML-05-112	Dam and Pump Water Course Crossings
STDS-03-ML-05-601	Streambank Reclamation - Rootward
STDS-03-ML-05-602	Streambank Reclamation - Deflectors
STDS-03-ML-05-603	Streambank Reclamation - Brush Layer in Cross Cut Slope
STDS-03-ML-05-606	Streambank Reclamation - Vegetated Geotextile Installation
STDS-03-ML-05-607	Streambank Reclamation - Tree Revetment
STDS-03-ML-05-608	Watercrossing Bank Erosion Protection

**10. Standards and Specifications**

CGL4703-CGP-ENV-PLN-008	Environmental Management Plan
Revision Date: January 23, 2019	BC - Forestry Engineering Road Manual_2002
September, 2012	BC fish-stream_crossing_web 2012
Chapter 4.8	Completing Changes In & About a Stream - BC - OGC
December, 2019	BC OGC Oil & Gas Activity Application Manual

**11. Access**

Via ROW and Shoofly RW-180.0

**12. Project Monitoring**

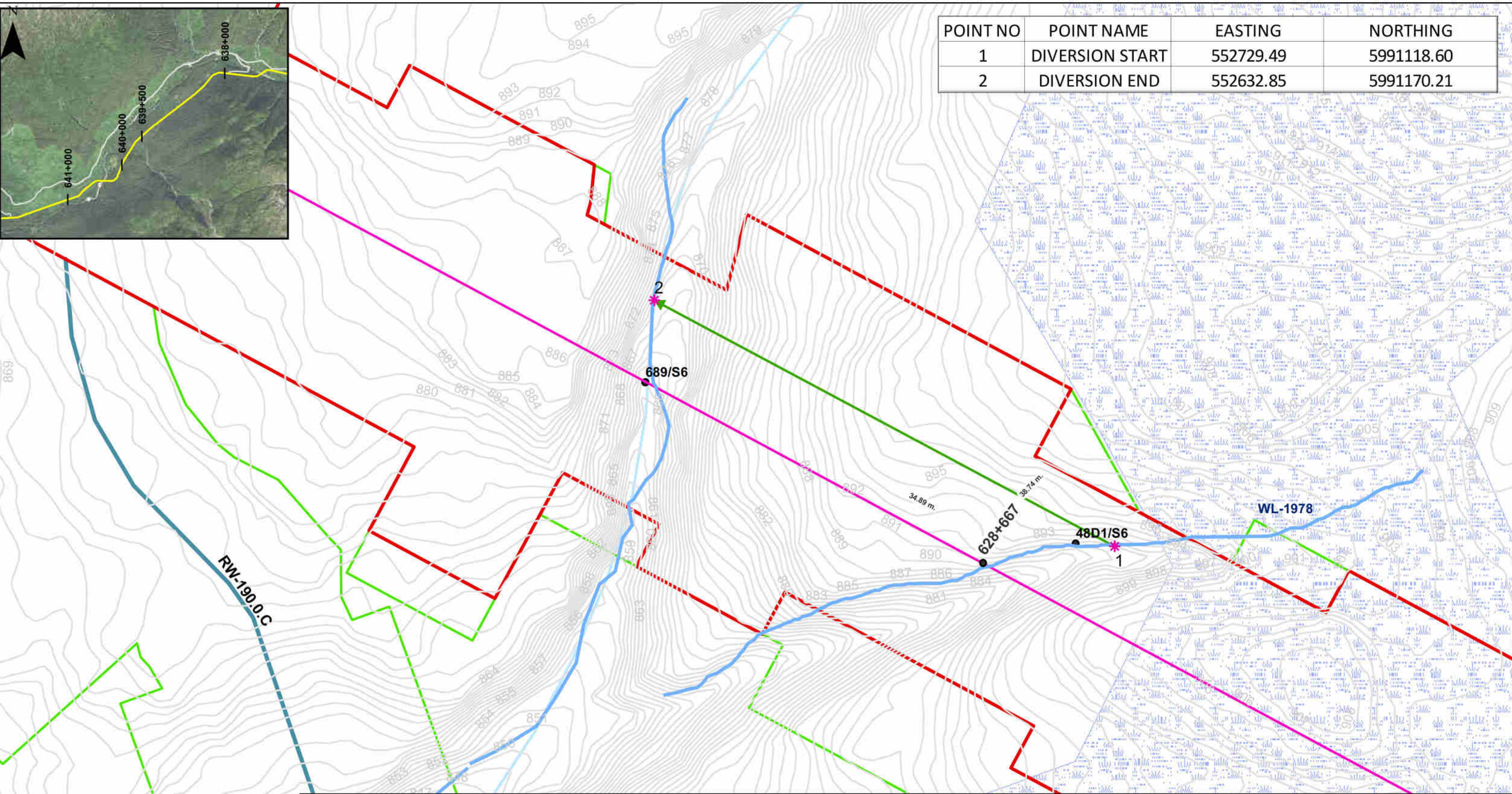
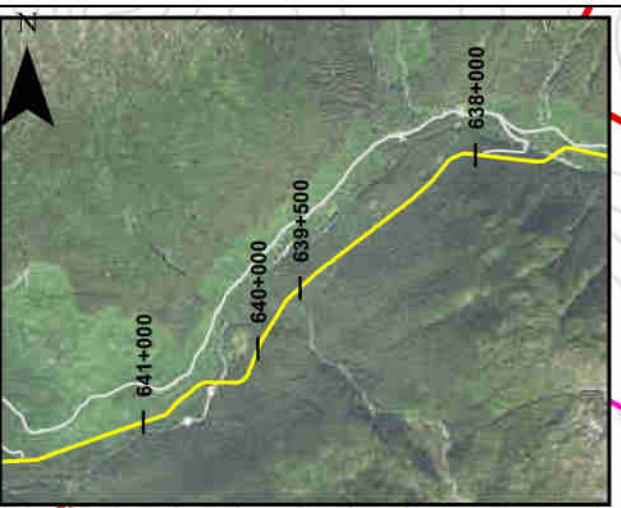
The work will be monitored in accordance with the CGL Environmental Management Plan. Water monitoring will follow the requirements in Appendix E.2 Water Quality Monitoring Plan. Erosion, Sediment and Control (ESC) measures will be implemented throughout construction. ESC measures will be implemented for the duration of the diversion and routinely monitored throughout.

**13. Diversion Layout**

- MSJV-FSK-0160



POINT NO	POINT NAME	EASTING	NORTHING
1	DIVERSION START	552729.49	5991118.60
2	DIVERSION END	552632.85	5991170.21



Joint Venture

**COASTAL GASLINK**  
**SECTION-8 CENTERLINE**  
**SECTION 11 48D1**  
**KP 628+667**

Legend	
* CONNECTION POINTS	MWCT_TRACKS
● Kilometre Posts	- - - Non-visible Crossing
CENTERLINE SECTION 8 REV F1.dwg Polyline	— Non-classified Drainage
— NEW CENTERLINE	— Non-Fish Bearing
— OGC Boundary	— Fish Bearing
— CONTOUR LINES	→ STREAM REROUTE
● MWCT	— STREAM PATH DIVERTED

REVISION	DESCRIPTION
B	ISSUED FOR USE

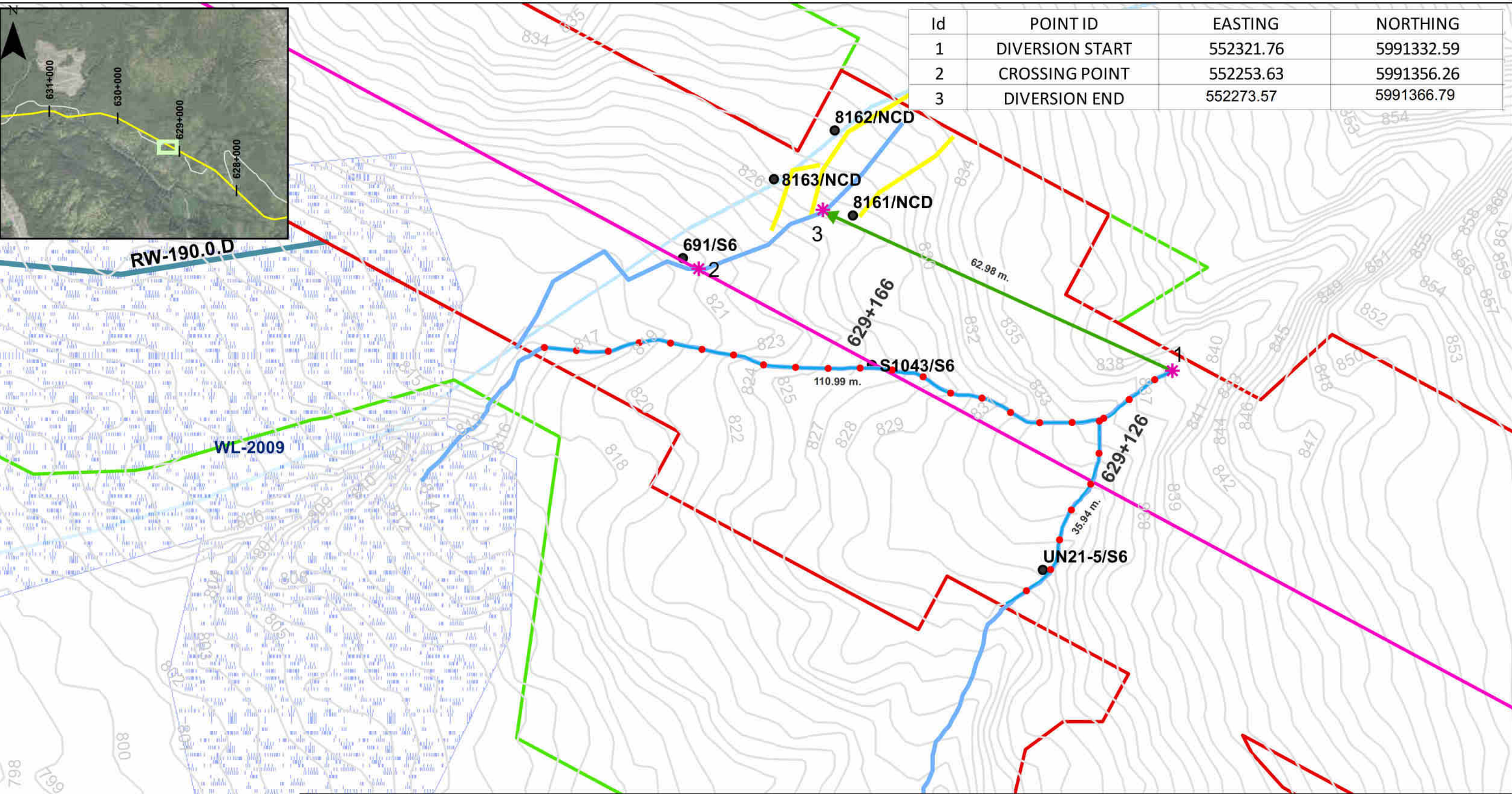
DRAWN BY: JYOTI VADJE  
 CHECKED BY: TAHALLAITI KARIM  
 APPROVED BY: SEBASTIEN DUVAL

DWG NO: MSJV-FSK-0167  
 SHEET NO: 1 OF 1  
 DATE: 26-Mar-20  
 SCALE 1:750

REV NO. B



Id	POINT ID	EASTING	NORTHING
1	DIVERSION START	552321.76	5991332.59
2	CROSSING POINT	552253.63	5991356.26
3	DIVERSION END	552273.57	5991366.79



Legend	
* CONNECTION POINTS	MWCT_TRACKS
— NEW CENTERLINE	- - - Non-visible Crossing
● Kilometre Posts	— Non-classified Drainage
● STREAM PATH DIVERTED	— Non-Fish Bearing
□ OGC Boundary	— Fish Bearing
● MWCT	→ STREAM REROUTE
	— CONTOUR LINES

Joint Venture

COASTAL GASLINK SECTION-8 CENTERLINE SECTION 11 S1043 & UN21-5 KP 629+126 TO 629+166		
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SHEET NO:	1 OF 1	
DATE :	12-JUN-20	SCALE 1:750

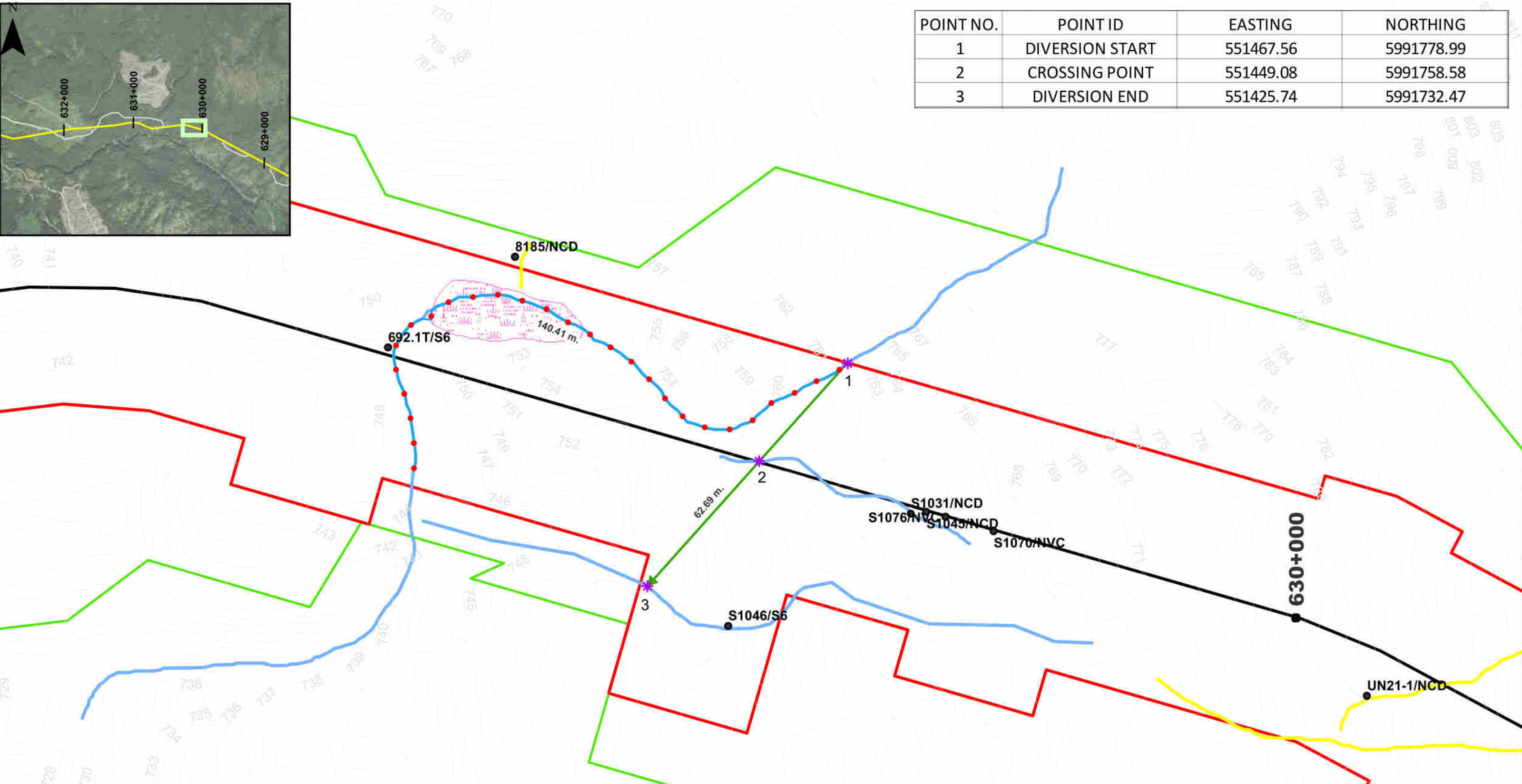
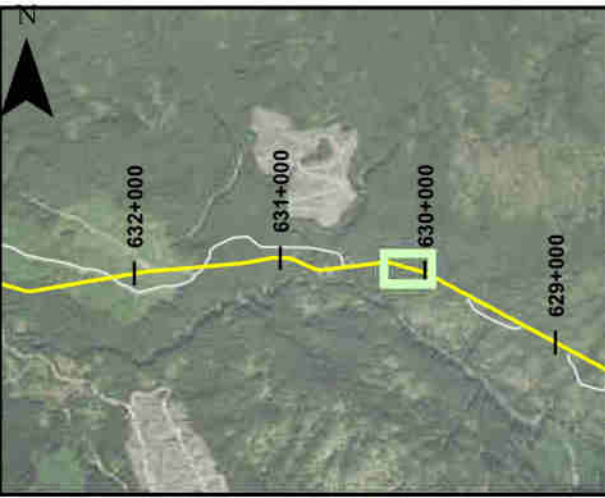
REVISION	DESCRIPTION
C	ISSUED FOR USE

DRAWN BY:	PHIL DEACON
CHECKED BY :	TAHALLAITI KARIM
APPROVED BY :	SEBASTIEN DUVAL





POINT NO.	POINT ID	EASTING	NORTHING
1	DIVERSION START	551467.56	5991778.99
2	CROSSING POINT	551449.08	5991758.58
3	DIVERSION END	551425.74	5991732.47



**Legend**

* CONNECTION POINT 692-1T MWCT_TRACKS	- - - Non-visible Crossing
● Kilometre Posts	— Non-classified Drainage
— CGL Centerline	— Non-Fish Bearing
— Construction Footprint	— Fish Bearing
— OGC Boundary	— STREAM REROUTE
— CONTOUR LINES	● STREAM PATH DIVERTED
● MWCT	

**Joint Venture**

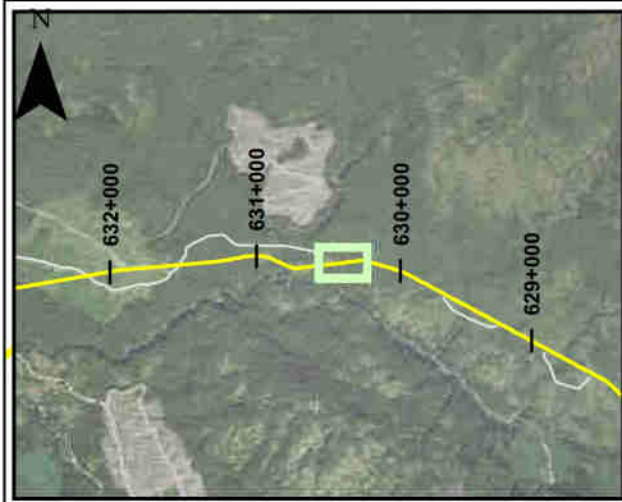
**COASTAL GASLINK**  
**SECTION-8 CENTERLINE**  
**SECTION 11 692-1T**  
**KP 630+400**

REVISION	DESCRIPTION
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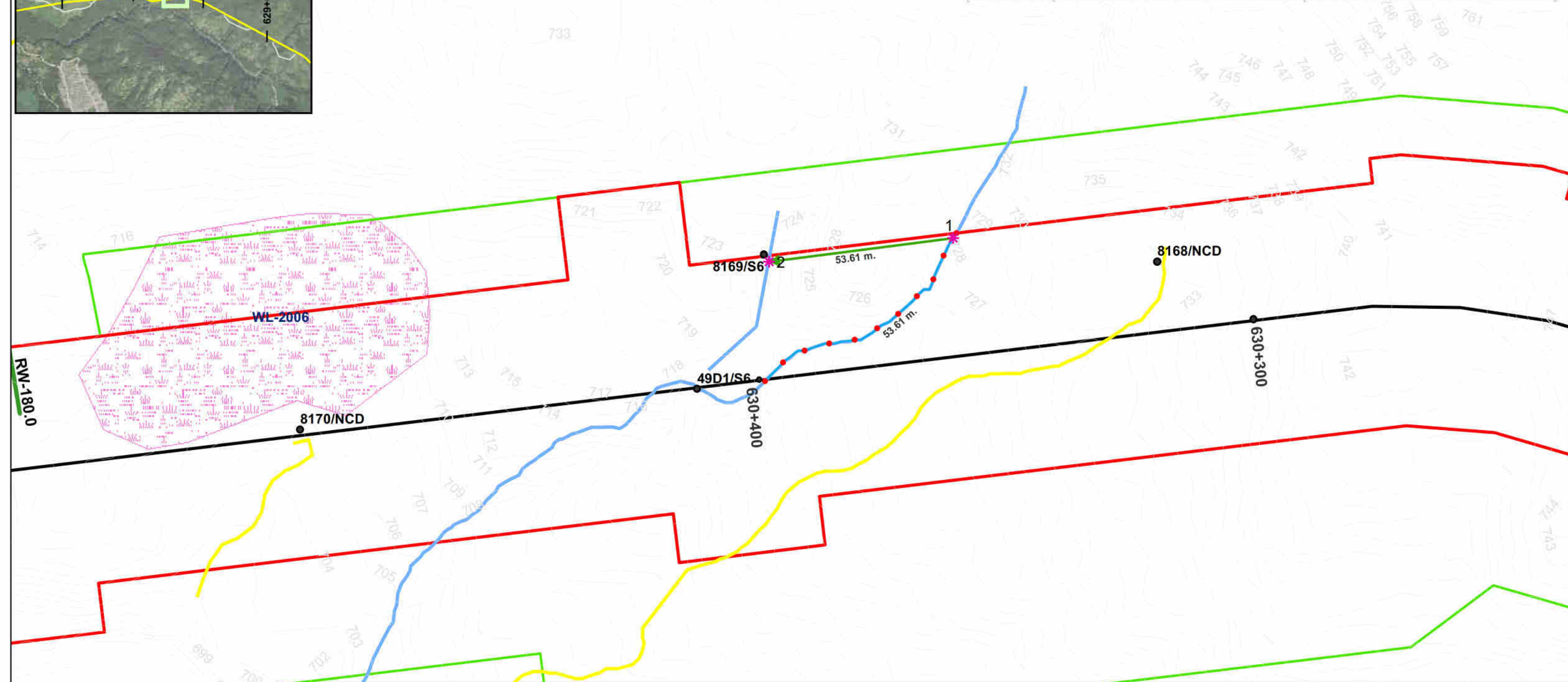
DRAWN BY: JYOTI VADJE  
 CHECKED BY: TAHALLAITI KARIM  
 APPROVED BY: SEBASTIEN DUVAL

DWG NO: MSJV-FSK-0161	REV NO. A
SHEET NO: 1 OF 1	
DATE: 11-Mar-20	SCALE 1:750





Id	EASTING	NORTHING
1	551211.30	5991808.79
2	551173.71	5991804.00



Legend	
* CONNECTION POINT MWCT_TRACKS	--- Non-visible Crossing
● Kilometre Posts	— Non-classified Drainage
— CGL Centerline	— Non-Fish Bearing
— Construction Footprint	— Fish Bearing
— OGC Boundary	— STREAM REROUTE
— CONTOUR LINES	— STREAM PATH DIVERTED
● MWCT	

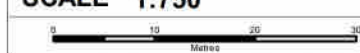
**Joint Venture**

**COASTAL GASLINK**  
**SECTION-8 CENTERLINE**  
**SECTION 11 49D1**  
**KP 630+400**

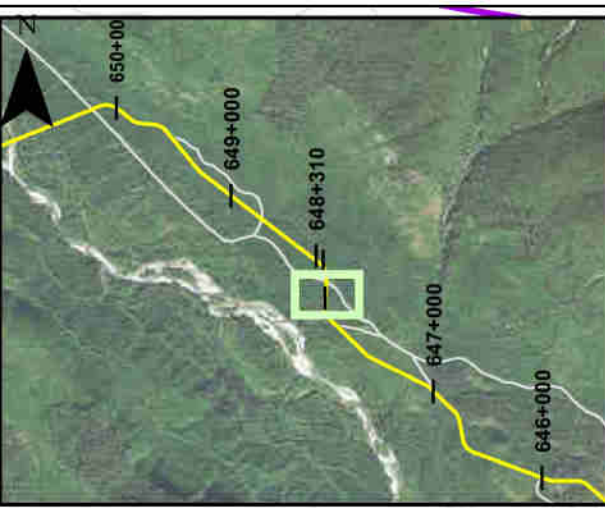
REVISION	DESCRIPTION
1	ISSUED FOR REVIEW

DRAWN BY:	JYOTI VADJE
CHECKED BY :	TAHALLAITI KARIM
APPROVED BY :	SEBASTIEN DUVAL

DWG NO:	MSJV-FSK-0160	REV NO. A
SHEET NO:	1 OF 1	
DATE :	05-Mar-20	SCALE 1:750



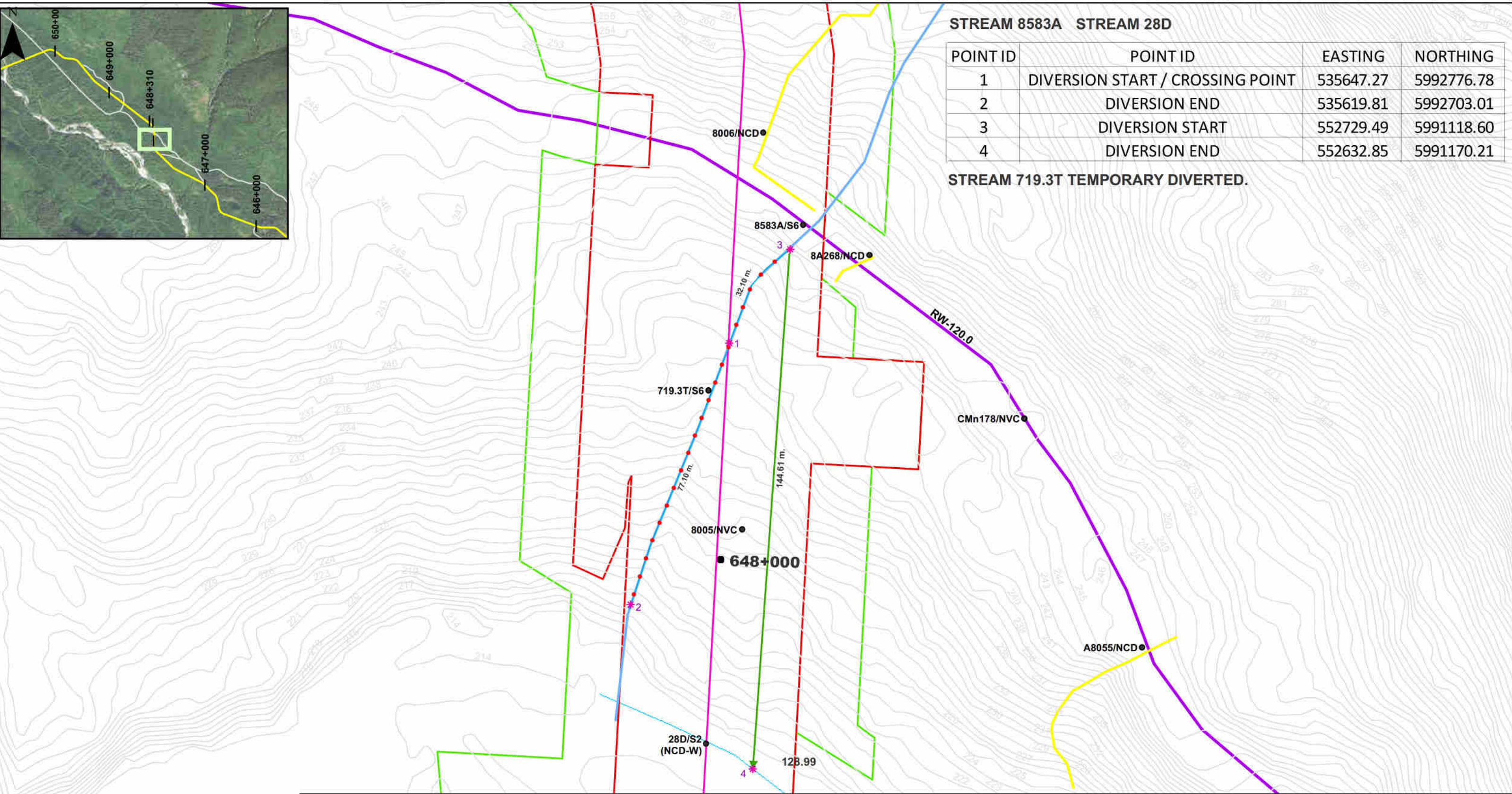




STREAM 8583A STREAM 28D

POINT ID	POINT ID	EASTING	NORTHING
1	DIVERSION START / CROSSING POINT	535647.27	5992776.78
2	DIVERSION END	535619.81	5992703.01
3	DIVERSION START	552729.49	5991118.60
4	DIVERSION END	552632.85	5991170.21

STREAM 719.3T TEMPORARY DIVERTED.



**Legend**

- \* CROSSING POINTS MWCT\_TRACKS
- Kilometre Posts
- NEW CENTERLINE
- OGC Boundary
- CONTOUR LINES
- MWCT
- - - Non-visible Crossing
- Non-classified Drainage
- Non-Fish Bearing
- Fish Bearing
- STREAM REROUTE
- TRIM\_watercourses
- STREAM PATH DIVERTED

Joint Venture

**COASTAL GASLINK**  
**SECTION-8 CENTERLINE**  
**SECTION 11 719.3T , 8583A & 28D**  
**KP 648+000**

DWG NO: MSJV-FSK-0164	REV NO. B
SHEET NO: 1 OF 1	
DATE: 26-Mar-20	SCALE 1:1000

REVISION	DESCRIPTION
B	ISSUED FOR USE

DRAWN BY: JYOTI VADJE  
 CHECKED BY: TAHALLAITI KARIM  
 APPROVED BY: SEBASTIEN DUVAL

