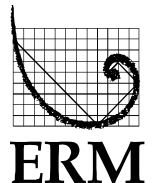


**BRUCEJACK GOLD MINE PROJECT**  
Application for an Environmental Assessment Certificate /  
Environmental Impact Statement

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## **Appendix 23-A**

Screening of Stream Crossings against the MWWO



# Memorandum



**DATE:** December 18, 2013  
**TO:** Max Holtby (Pretium Resources Inc.)  
**FROM:** Jaclyn Bowman and Ali Naghibi (ERM Rescan)  
**CC:** Greg Norton and Nicole Bishop (ERM Rescan)  
**SUBJECT:** Screening of Stream Crossings against the Minor Memorandum - Works and Waters Orders under the *Navigable Waters Protection Act*

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## 1. Introduction

A 55-km-long transmission line will be constructed from the Brucejack mine site to the Bowser River Valley and then southwesterly to connect with the provincial grid at the Long Lake Hydro Project near Stewart. A preliminary assessment using desk-based methods was performed to identify whether streams crossed by the transmission line fall within the *minor works* or *minor waters* categories.

In addition, the Mine Site roads will include a crossing over the Brucejack Creek. A preliminary screening was performed to identify whether the road crossing could be considered as *minor waters*.

## 2. Procedure

### 2.1 Transmission Line Crossings

If aerial cables for power or communication meet the specific standards and criteria under which Transport Canada considers them to be “minor works,” an application under the *Navigable Waters Protection Act* (NWPA) is not required. These standards and criteria include (Transport Canada 2009):

- the width of the navigable waters that the cables are over or across is less than 15 metres (m) when measured from the high-water mark on one side to the high-water mark on the other side of the waters. The alignment of the transmission line was not finalized in Valard (2013); rather, a 1-km-wide corridor was provided. For the purpose of this screening study, it was assumed that the transmission line was on the centre line of this corridor. The exact location of the stream crossing at this centre line was not always measurable on the imagery and in some cases, the points measured were upstream or downstream of the crossing. Once the alignment is finalized, the estimated channel width may change significantly;
- the works meet the design and construction requirements of Overhead Systems, CAN/CSA-C22.3 No. 1-06, as amended from time to time. Currently, the detail design of the transmission line is not finalized. However, for the purpose of this screening study, it was assumed that the transmission line would be in accordance with these requirements;
- the works are more than 1,000 m from any lake or tidal waters. For the purpose of this screening study, if a stream crossing was within a 1,000 m distance from a lake, which was directly connected to the stream, the work was considered in violation of this criterion;
- the works are not over or across charted navigable waters;
- the works are not over or across a canal that is accessible to the public; and

- the works do not include towers or poles within the navigable waters, including within the area from the waters' edge to the high-water mark.

Forty-seven potential crossings were identified along the transmission line alignment, i.e., the centre line of the proposed transmission corridor (Figures 1, 2-1 to 2-9, and A-1). These crossings were identified using 1:10,000 colour imagery of the project area from 1997, as well as Google Earth Pro Imagery. The 47 crossings were screened against the aforementioned aerial cables criteria and standards.

## 2.2 Brucejack Creek Mine Site Road Crossing

If road crossings are over streams that are considered “minor waters” (Transport Canada 2010), an application under the *Navigable Waters Protection Act* (NWP) is not required. If the channel width at high water level is greater than 3.0 m, the stream cannot be considered as “minor waters.”

One road crossing over Brucejack Creek was identified (Figures 1, A-2, and A-3). The approximate easting and northing coordinates of the crossing are 426,420 and 6,258,900 m, respectively.

## 3. Results and Observations

### 3.1 Transmission Line Crossings

The 47 crossings were assessed based on Transport Canada (2009) criteria (Table 1). The results show that:

- 18 crossings met all six criteria, and therefore can be exempted from submission of an application under the NWP; and
- 29 crossings did not meet these criteria due to either the width, which was estimated from imagery, being greater than 15 m, or the crossing being connected to a lake closer than 1,000 m. These streams were selected conservatively due to the resolution of the imagery and the difficulty in measuring the high-water mark from aerial views. For example, a channel width of greater than 11 m based on the imagery was assumed to be greater than 15 m in field. Some crossings were not measurable at the exact crossing location, and a measurement was taken upstream or downstream of the crossing on the imagery where a more defined stream channel existed. It is likely that if additional field data is collected several of the stream crossings not currently meeting the criteria may be proven to meet it.

### 3.2 Brucejack Creek Mine Site Road Crossing

Based on the preliminary drawings of the proposed road crossing (Figures A-2 and A-3), the Brucejack Creek width at high water level is greater than 3 m, therefore the crossing cannot be exempted from submission of an application under the NWP based on Transport Canada (2010) *minor waters* guideline.

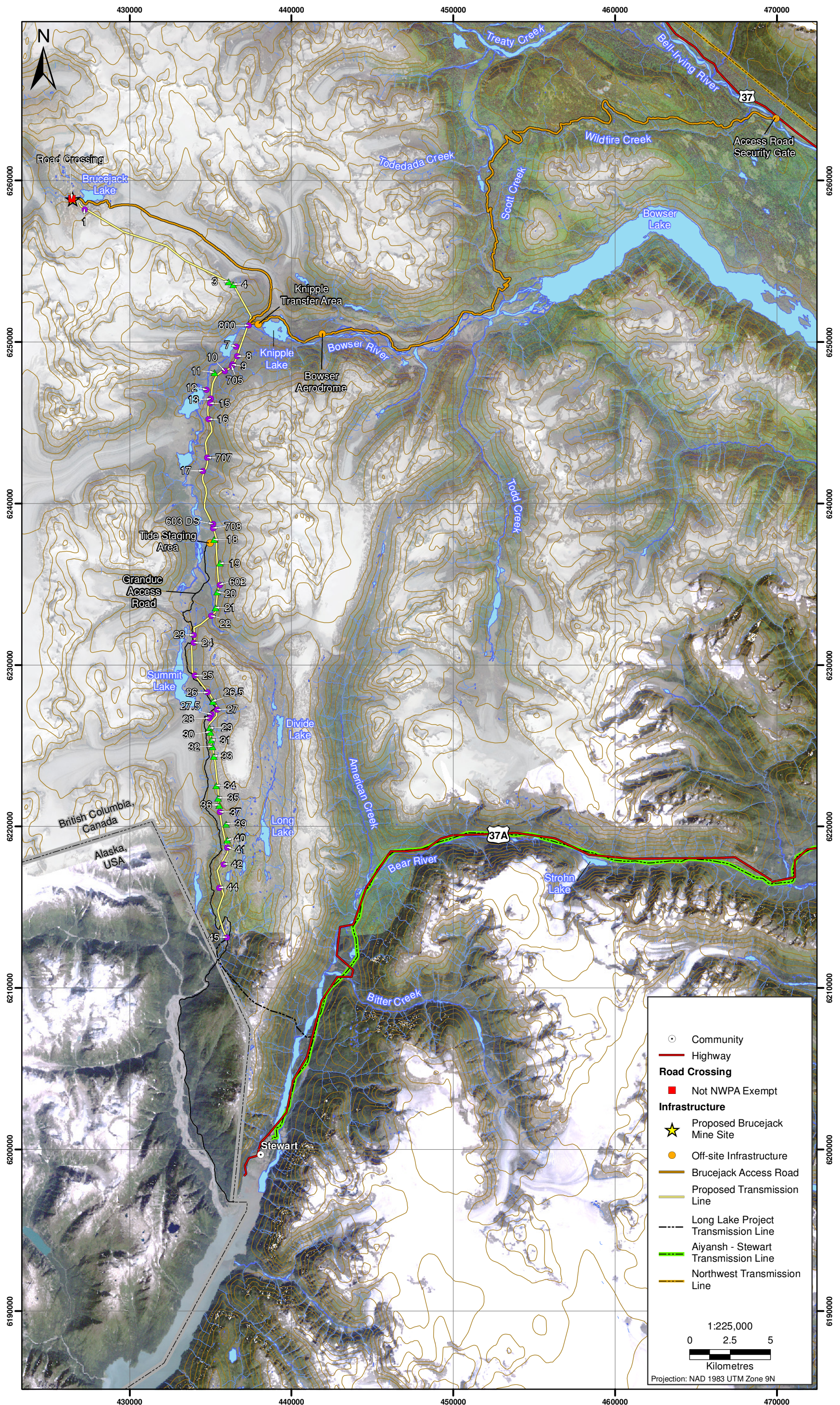
## 4. Conclusions and Recommendations

If applications are deemed necessary for the 29 transmission line crossings in Table 1, as well as the Mine Site road crossing on Brucejack Creek, it is recommended that field visits be conducted on these sites to obtain sufficient data to support the application. The field survey should measure the stream parameters as instructed by Transport Canada (2010). The channel characteristics to be collected at each crossing should include:

- cross-sectional depths;
- bankful and wetted widths;
- slopes;
- sinuosity; and
- natural obstructions.

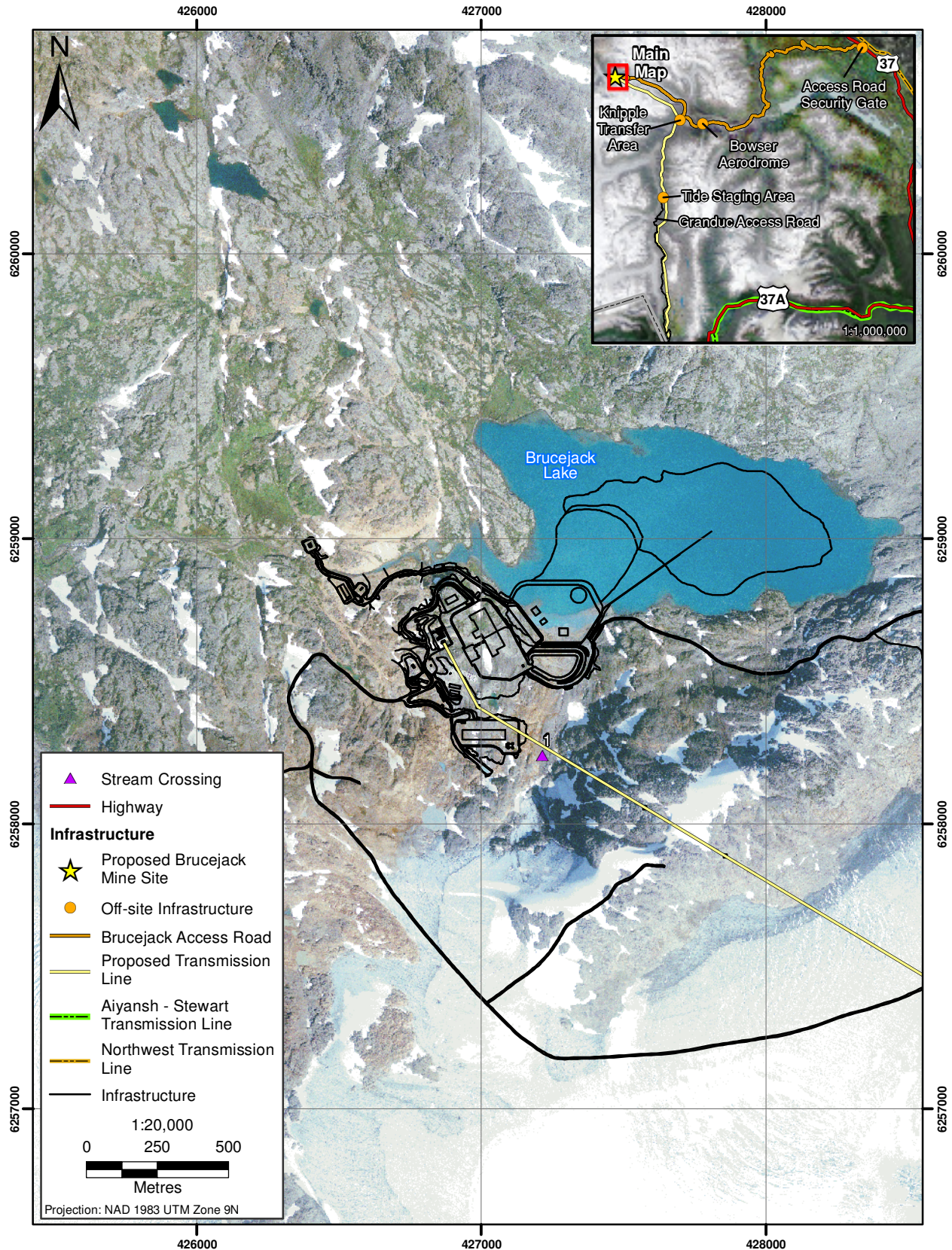


**Figure 1**  
**Brucejack Transmission Line and Mine Site Road Stream Crossings**



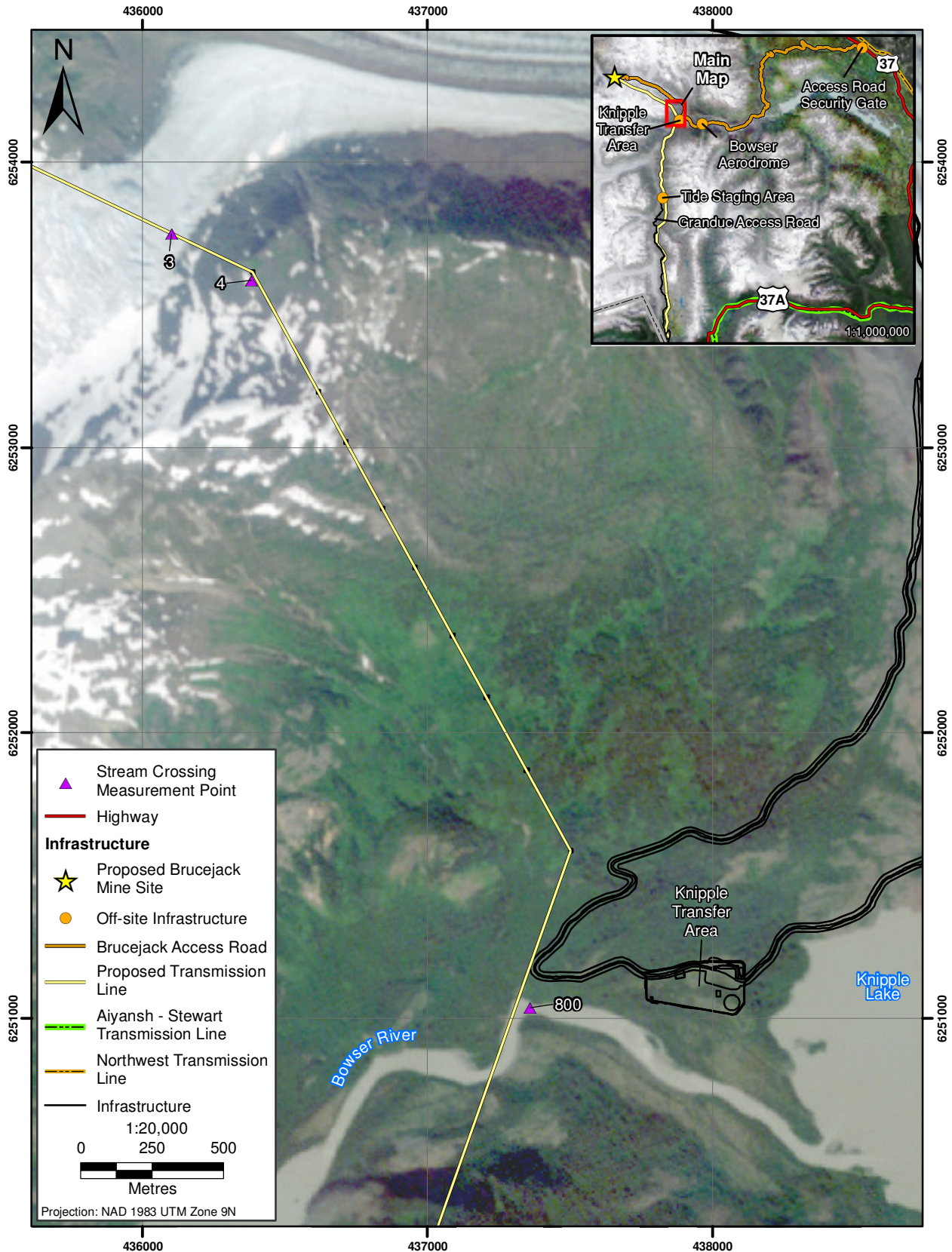


**Figure 2-1**  
**Brucejack Transmission Line**  
**Stream Crossing Locations**



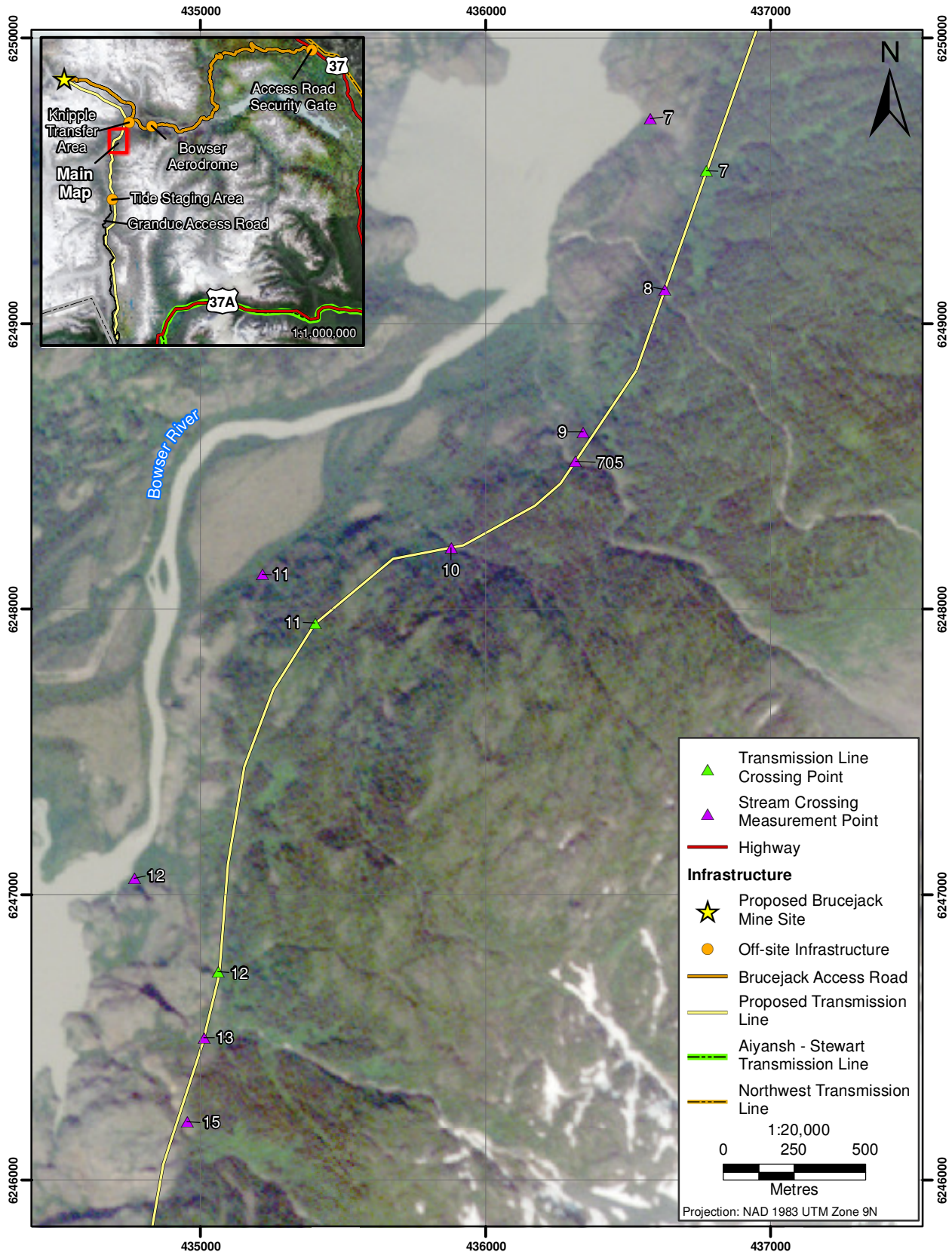


**Figure 2-2**  
**Brucejack Transmission Line**  
**Stream Crossing Locations**



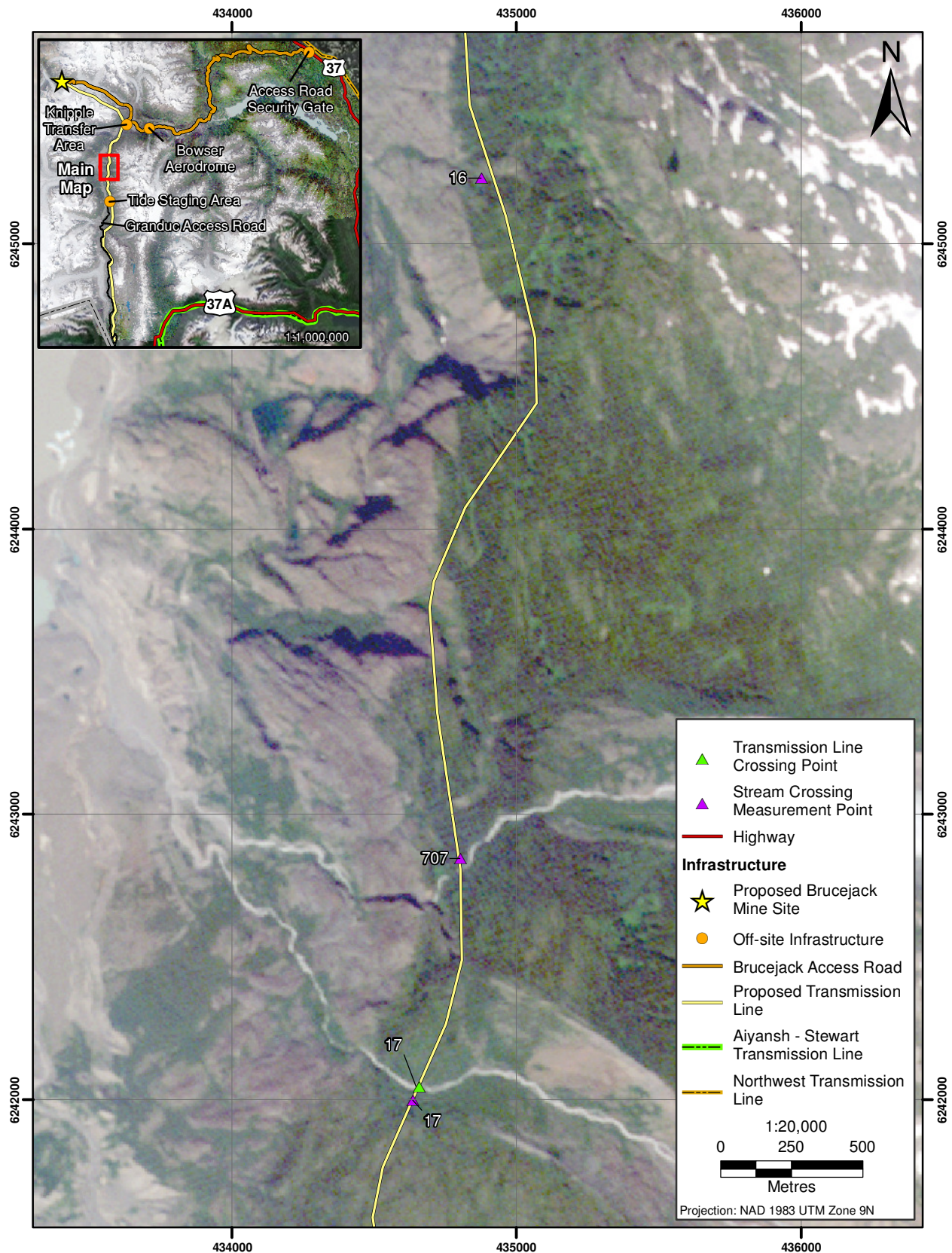


**Figure 2-3**  
**Brucejack Transmission Line**  
**Stream Crossing Locations**



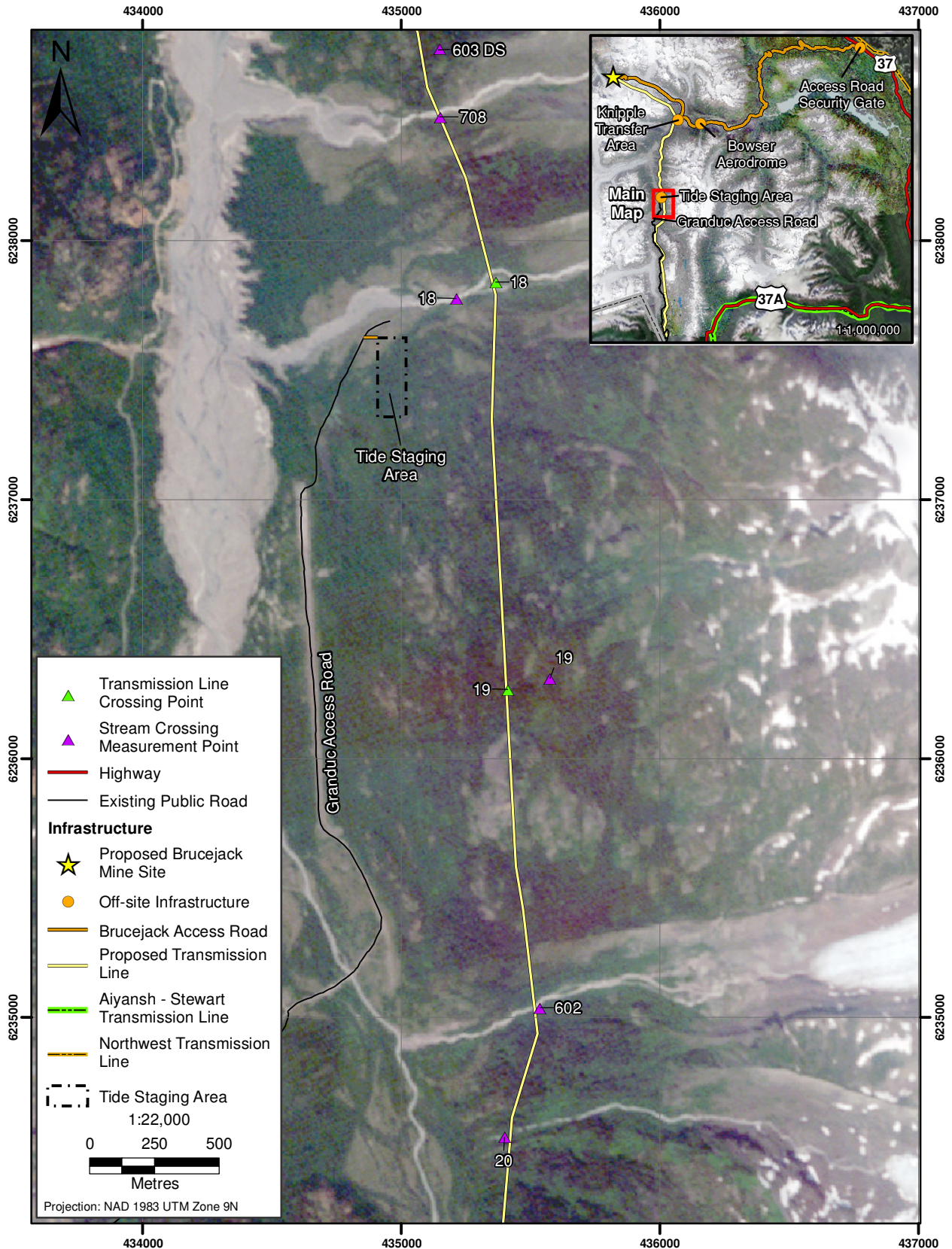


**Figure 2-4**  
**Brucejack Transmission Line**  
**Stream Crossing Locations**



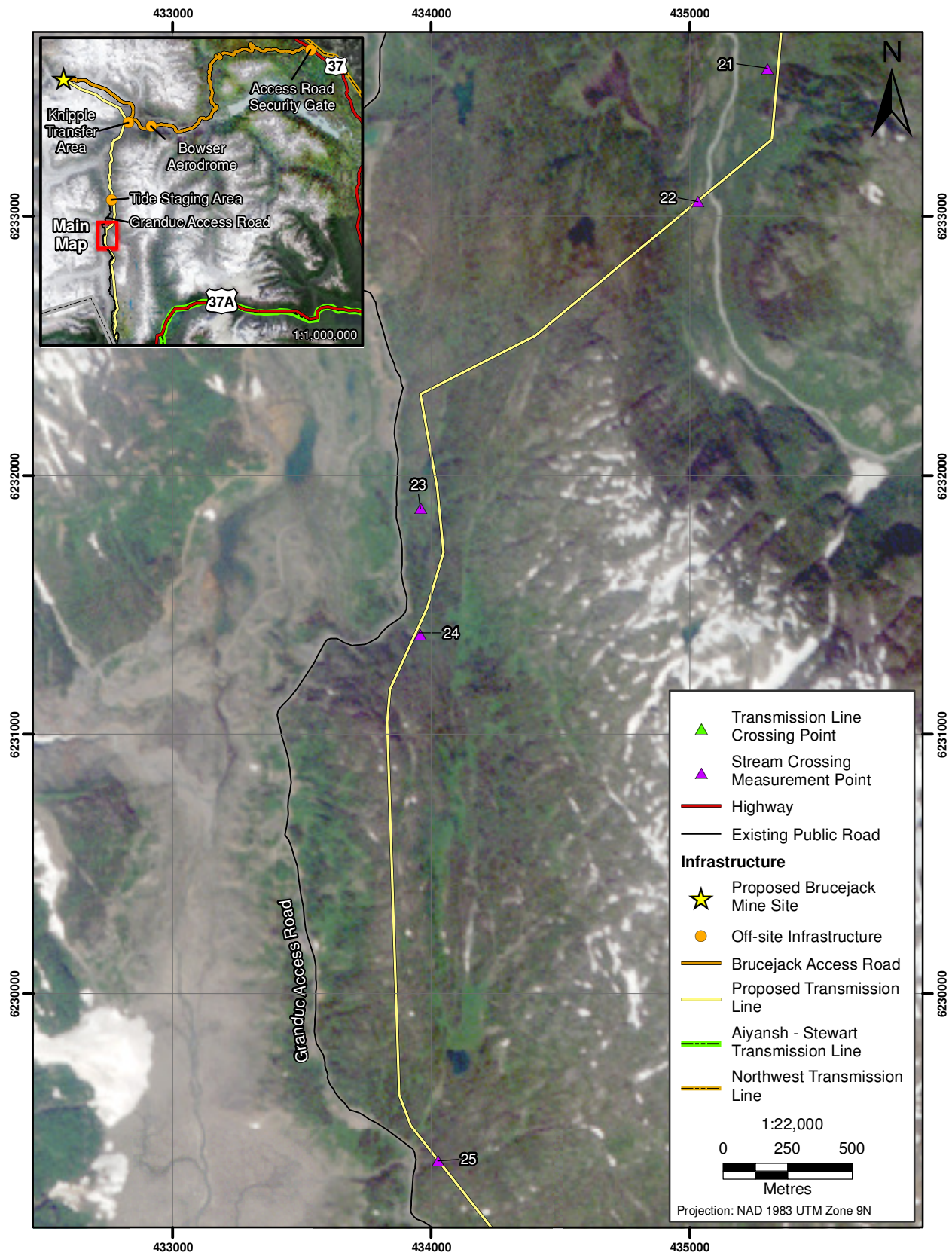


**Figure 2-5**  
**Brucejack Transmission Line**  
**Stream Crossing Locations**



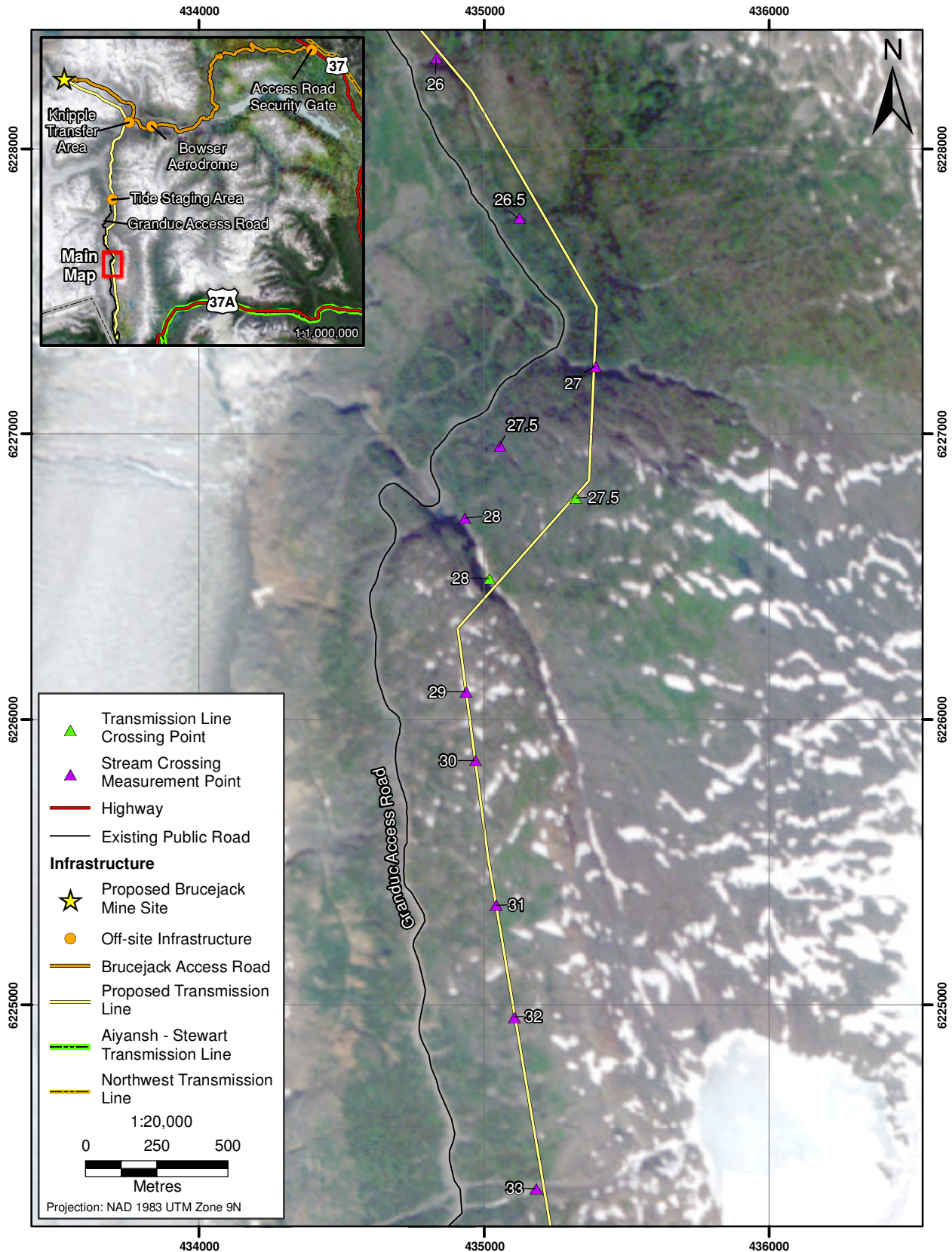


**Figure 2-6**  
**Brucejack Transmission Line**  
**Stream Crossing Locations**



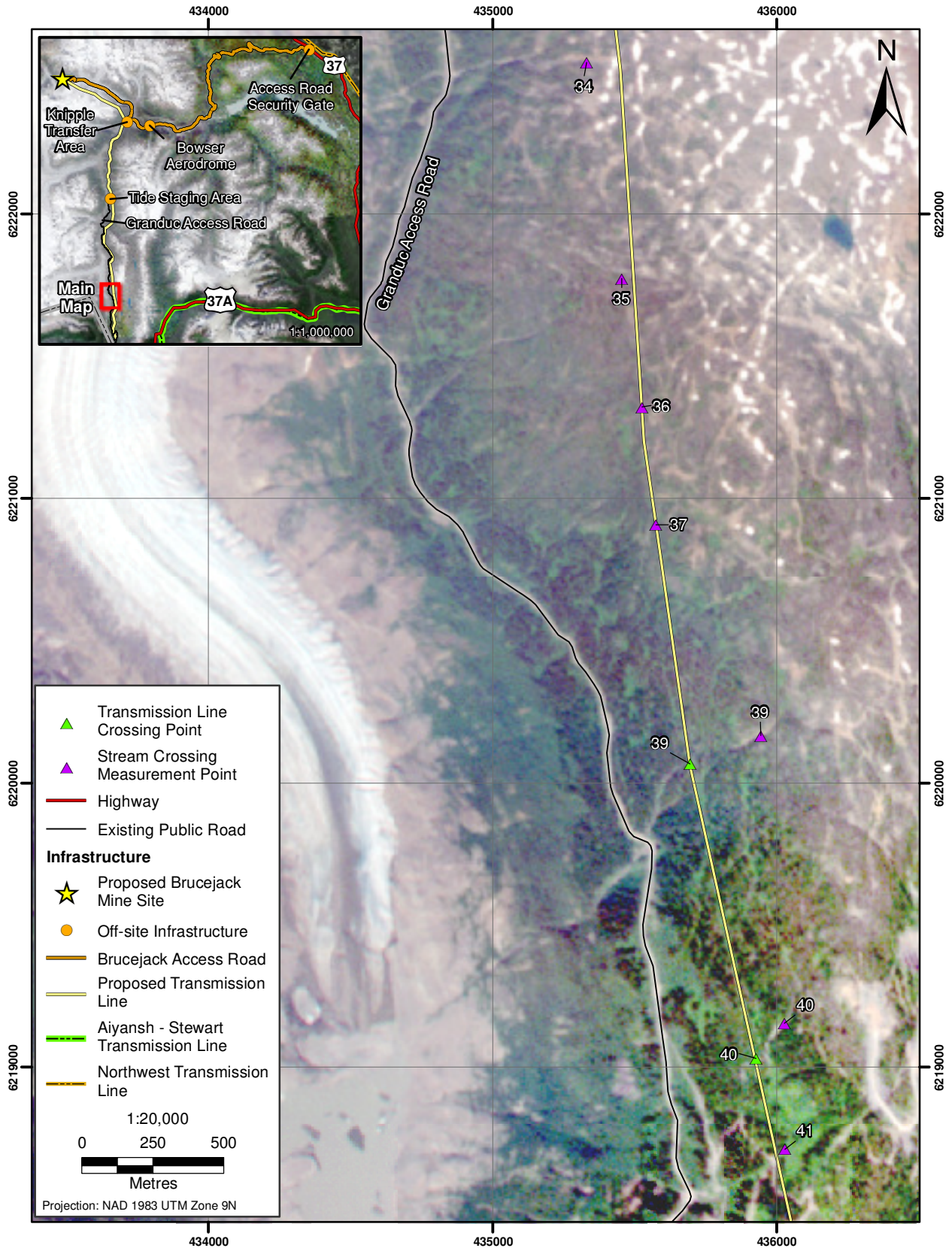


**Figure 2-7**  
**Brucejack Transmission Line**  
**Stream Crossing Locations**





**Figure 2-8**  
**Brucejack Transmission Line**  
**Stream Crossing Locations**





**Figure 2-9**  
**Brucejack Transmission Line**  
**Stream Crossing Locations**

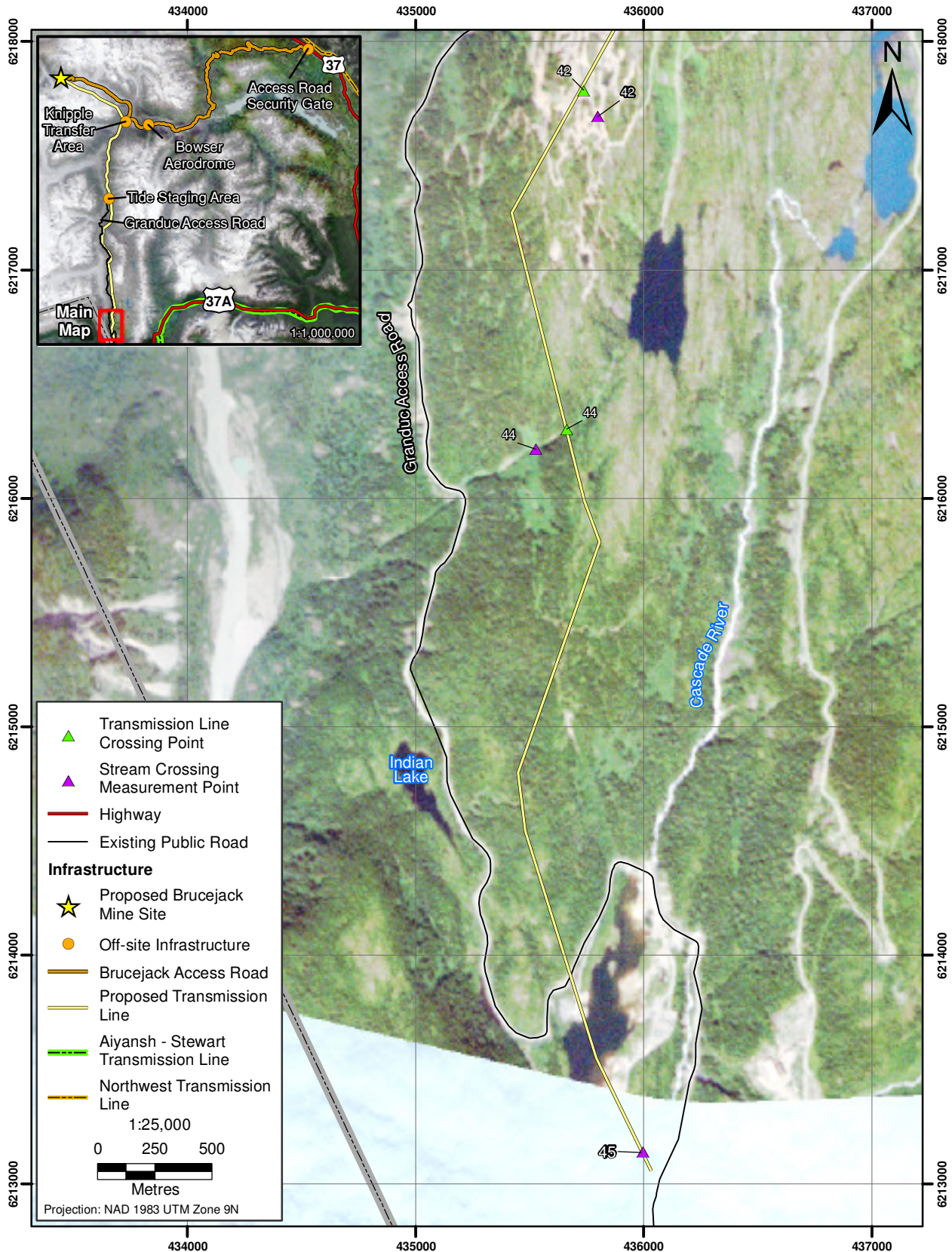




Table 1. Assessment of the Transmission Line Stream Crossings Based on Transport Canada Criteria

Crossing Site No.	Location of Measurement		Waterway Type	Criteria for Aerial Cables <i>Navigable Waters Protection Act</i>				NWP Exempt (Y/N)
	Easting	Northing		Bankful Channel Width Estimated from Imagery (m)	Meets CAN/CSA-C22.3 No. 1-06 (Y/N)	Within 1,000 m of a Lake that is Connected to the Crossing (Y/N)	Charted Navigable Water or Accessible to the Public (Y/N)	
1	427215	6258239	stream	n/a	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
3	436103	6253747	glacial meltwater stream	8	n/a <sup>1</sup>	N	n/a <sup>2</sup>	Y
4	436382	6253584	glacial meltwater stream	8	n/a <sup>1</sup>	N	n/a <sup>2</sup>	Y
800 <sup>3</sup>	437360	6251037	stream	44.3	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
7	436578	6249719	stream	12	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
8	436629	6249119	stream	8	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
9	436343	6248620	stream	4	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
705	436315	6248517	stream	15	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
10	435878	6248215	stream	5	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
11	435217	6248122	stream	6	n/a <sup>1</sup>	N	n/a <sup>2</sup>	Y
12	434768	6247057	stream	8	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
13	435012	6246498	stream	10	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
15	434952	6246205	stream	8	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
16	434876	6245230	stream	5	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
707	434802	6242843	glacial meltwater stream	14	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
17	434534	6242031	glacial meltwater stream	10	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
708	435149	6238475	glacial meltwater stream	16	n/a <sup>1</sup>	N	n/a <sup>2</sup>	N
603 DS	435147	6238740	stream	14	n/a <sup>1</sup>	N	n/a <sup>2</sup>	N
18	435212	6237776	stream	8	n/a <sup>1</sup>	N	n/a <sup>2</sup>	Y
19	435575	6236307	stream	9	n/a <sup>1</sup>	N	n/a <sup>2</sup>	Y
602	435558	6234975	stream	12	n/a <sup>1</sup>	N	n/a <sup>2</sup>	N
20	435398	6234537	stream	3	n/a <sup>1</sup>	N	n/a <sup>2</sup>	Y
21	435299	6233569	stream	5	n/a <sup>1</sup>	N	n/a <sup>2</sup>	Y
22	435031	6233055	stream	16	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
23	433959	6231872	stream	6	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N

(continued)



**Table 1. Assessment of the Transmission Line Stream Crossings Based on Transport Canada Criteria (completed)**

Crossing Site No.	Location of Measurement		Waterway Type	Criteria for Aerial Cables <i>Navigable Waters Protection Act</i>				NWPA Exempt (Y/N)
	Easting	Northing		Bankful Channel Width Estimated from Imagery (m)	Meets CAN/CSA-C22.3 No. 1-06 (Y/N)	Within 1,000 m of a Lake that is Connected to the Crossing (Y/N)	Charted Navigable Water or Accessible to the Public (Y/N)	
23	433959	6231872	stream	6	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
24	433957	6231388	stream	7	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
25	434026	6229356	stream	5	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
26	434831	6228317	stream	6	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
26.5	435124	6227756	stream	9	n/a <sup>1</sup>	N	n/a <sup>2</sup>	Y
27	435392	6227237	Stream	11	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
27.5	435055	6226959	Stream	9	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
28	434932	6226706	stream	12	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
29	434936	6226098	stream	10	n/a <sup>1</sup>	N	n/a <sup>2</sup>	Y
30	434969	6225857	stream	10	n/a <sup>1</sup>	N	n/a <sup>2</sup>	Y
31	435041	6225349	stream	11	n/a <sup>1</sup>	N	n/a <sup>2</sup>	Y
32	435106	6224958	stream	6	n/a <sup>1</sup>	N	n/a <sup>2</sup>	Y
33	435183	6224357	stream	11	n/a <sup>1</sup>	N	n/a <sup>2</sup>	Y
34	435330	6222532	stream	5	n/a <sup>1</sup>	N	n/a <sup>2</sup>	Y
35	435454	6221773	stream	6	n/a <sup>1</sup>	N	n/a <sup>2</sup>	Y
36	435525	6221321	stream	4	n/a <sup>1</sup>	N	n/a <sup>2</sup>	Y
37	435574	6220908	stream	4	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
39	435942	6220165	stream	5	n/a <sup>1</sup>	N	n/a <sup>2</sup>	Y
40	436025	6219155	stream	5	n/a <sup>1</sup>	N	n/a <sup>2</sup>	Y
41	436028	6218712	stream	n/a <sup>4</sup>	n/a <sup>1</sup>	N	n/a <sup>2</sup>	N
42	435798	6217674	stream	n/a <sup>4</sup>	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
44	435527	6216216	stream	6	n/a <sup>1</sup>	Y	n/a <sup>2</sup>	N
45	435997	6213140	stream	14	n/a <sup>1</sup>	N	n/a <sup>2</sup>	N

<sup>1</sup> Currently, the detail design of the transmission line is not finalized. However, for the purpose of this screening study, it was assumed that the transmission line would be in accordance with these requirements.

<sup>2</sup> In the absence of further information, it was assumed that none of the streams are charted navigable waters or accessible to the public. One exception was crossing site no. 800 over Bowser River that was assumed accessible to the public.

<sup>3</sup> The plan and cross-section views for this crossing site are shown in Figure A-1.

<sup>4</sup> Resolution of the imagery was not sufficient to estimate the channel width at high water levels.



The cross-section data should be collected at the proposed crossing and at locations 100 m upstream and 100 m downstream of the crossings. Complete photo documentation of the site would also be required.

When the alignment of the transmission line within the 1-km-wide corridor is finalized, the location of the crossings, and therefore the results of the screening against minor works order, could change.

## 5. Disclaimer

This memorandum was prepared by ERM Rescan for Pretium Resources Inc. The content reflects ERM Rescan's best judgment in light of the information available to it at the time of preparation and the uncertainty associated with such information. Any third party use of this study, or any reliance on it, is the responsibility of such third parties.

Prepared by:



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ERM Rescan

Reviewed by:



---

David Luzi (M.Sc.), Hydrology Manager  
ERM Rescan



## **References**

Transport Canada. 2009. *Navigable Waters Protection Act - Aerial Cables (Power and Communication)*. TP-14596, December 2009.

Transport Canada. 2010. *Minor Waters User Guide*. TP-14838, March 2010.

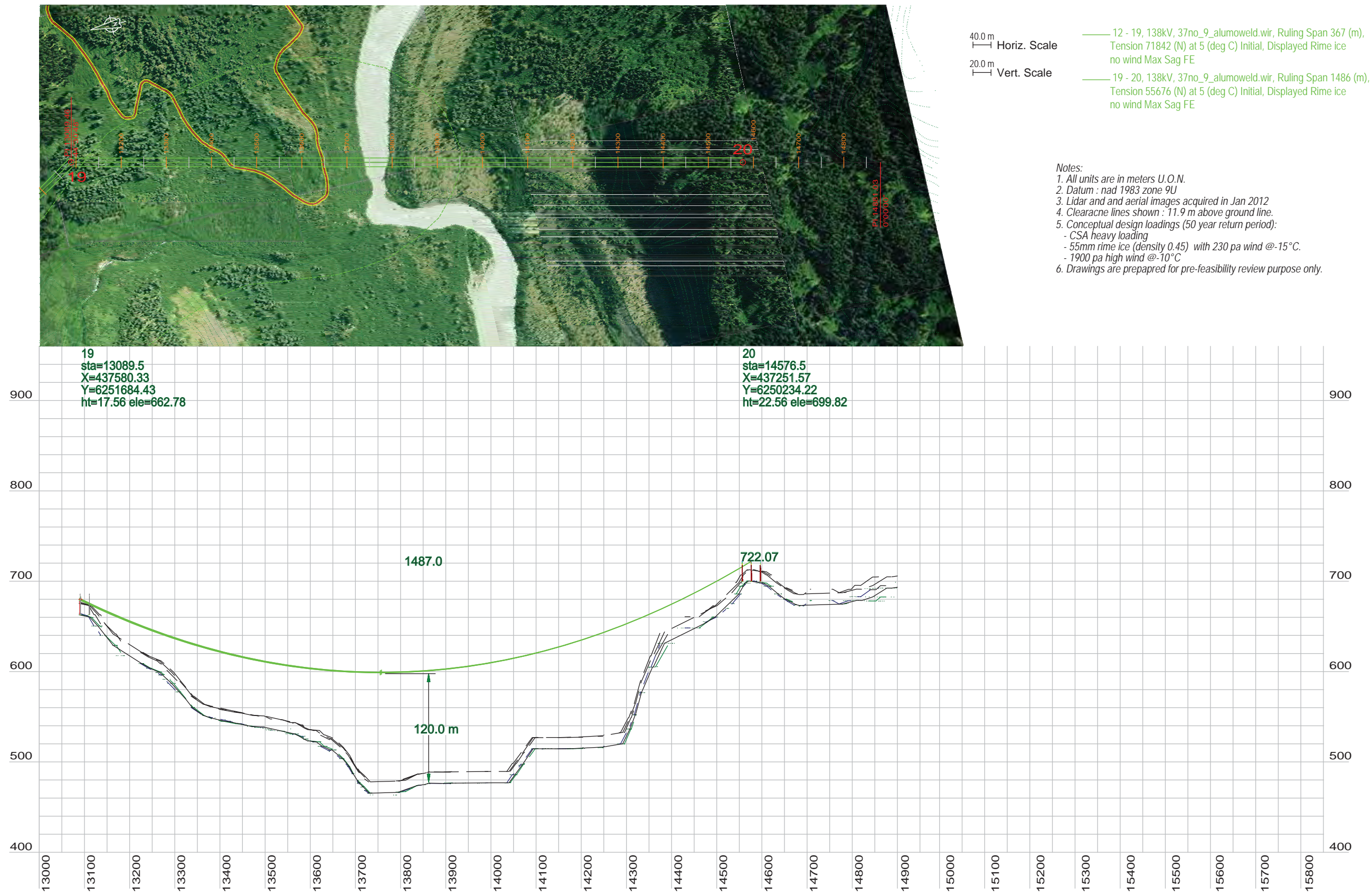
Valard Construction LP (Valard). 2013. *Brucejack Mine - Transmission Feasibility Study and Cost Estimates*. Prepared for Pretium Resources Inc., Vancouver, BC.

**- Appendix A -**

**Bowser River and Brucejack Creek Crossing Figures**



Figure A-1  
Transmission Line Crossing over Bowser River (Crossing Site No. 800)





**Figure A-2**  
**Preliminary Plan View of the Road Crossing over Brucejack Creek**



**SURVEY INFORMATION**

1. DATE OF SURVEY: JULY 16, 2013
2. ELEVATIONS ARE RELATIVE TO BRASS MONUMENT DATUM 1376.143 METERS AT CONTROL 2
3. MAGNETIC DECLINATION: 20.2 DEGREES EAST
4. RIPARIAN CLASSIFICATION: S5 (Inventory)

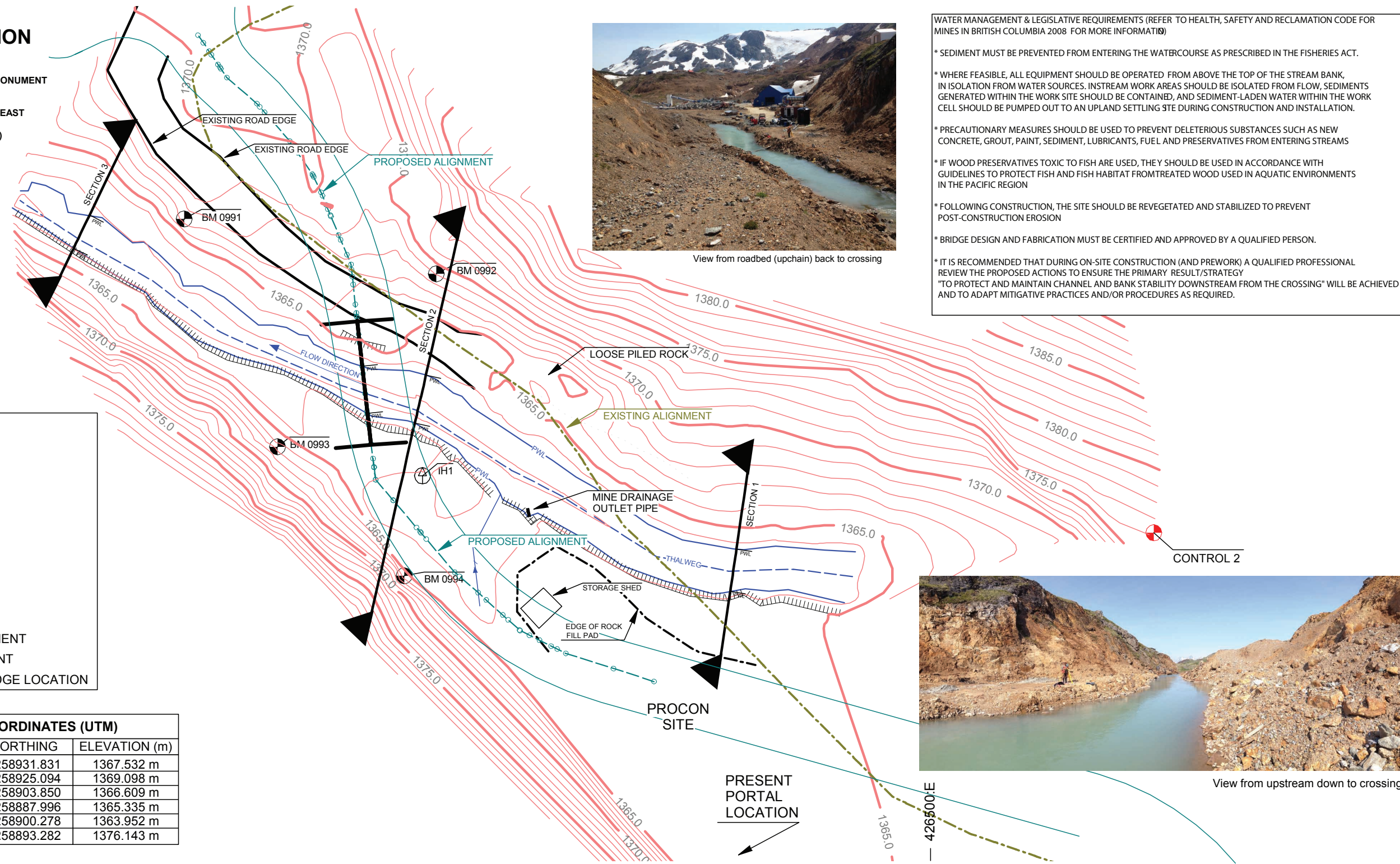
MAPSHEET: 104 B 050



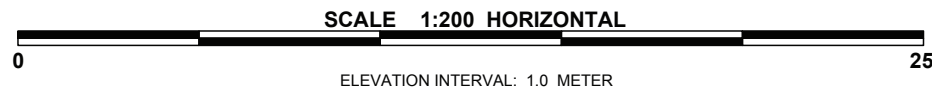
**Legend**

- BM
- ROAD EDGE
- PWL
- DITCH
- Contour 1.0m
- Contour 5m
- FLOW DIRECTION
- SLOPE BREAK
- CROSS SECTION
- PROPOSED ALIGNMENT
- EXISTING ALIGNMENT
- APPROXIMATE BRIDGE LOCATION

SURVEY CONTROL COORDINATES (UTM)			
LOCATION	EASTING	NORTHING	ELEVATION (m)
BM 0991	426408.114	6258931.831	1367.532 m
BM 0992	426439.149	6258925.094	1369.098 m
BM 0993	426419.600	6258903.850	1366.609 m
BM 0994	426435.185	6258887.996	1365.335 m
IH 1	426437.439	6258900.278	1363.952 m
CONTROL 2	426527.511	6258893.282	1376.143 m



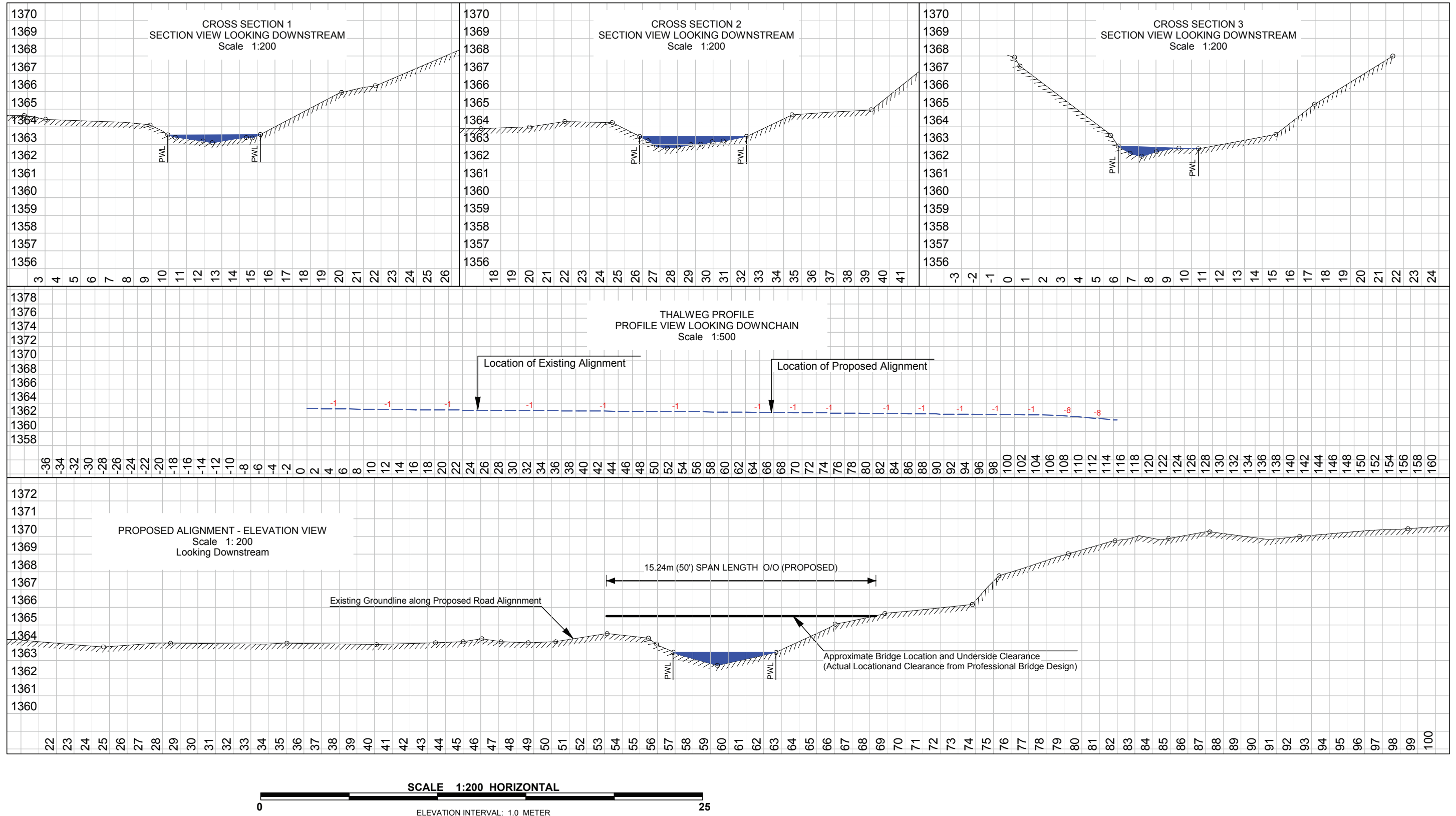
- WATER MANAGEMENT & LEGISLATIVE REQUIREMENTS (REFER TO HEALTH, SAFETY AND RECLAMATION CODE FOR MINES IN BRITISH COLUMBIA 2008 FOR MORE INFORMATION)
- \* SEDIMENT MUST BE PREVENTED FROM ENTERING THE WATERCOURSE AS PRESCRIBED IN THE FISHERIES ACT.
  - \* WHERE FEASIBLE, ALL EQUIPMENT SHOULD BE OPERATED FROM ABOVE THE TOP OF THE STREAM BANK, IN ISOLATION FROM WATER SOURCES. INSTREAM WORK AREAS SHOULD BE ISOLATED FROM FLOW, SEDIMENTS GENERATED WITHIN THE WORK SITE SHOULD BE CONTAINED, AND SEDIMENT-LADEN WATER WITHIN THE WORK CELL SHOULD BE PUMPED OUT TO AN UPLAND SETTLING SITE DURING CONSTRUCTION AND INSTALLATION.
  - \* PRECAUTIONARY MEASURES SHOULD BE USED TO PREVENT DELETERIOUS SUBSTANCES SUCH AS NEW CONCRETE, GROUT, PAINT, SEDIMENT, LUBRICANTS, FUEL AND PRESERVATIVES FROM ENTERING STREAMS
  - \* IF WOOD PRESERVATIVES TOXIC TO FISH ARE USED, THEY SHOULD BE USED IN ACCORDANCE WITH GUIDELINES TO PROTECT FISH AND FISH HABITAT FROM TREATED WOOD USED IN AQUATIC ENVIRONMENTS IN THE PACIFIC REGION
  - \* FOLLOWING CONSTRUCTION, THE SITE SHOULD BE REVEGETATED AND STABILIZED TO PREVENT POST-CONSTRUCTION EROSION
  - \* BRIDGE DESIGN AND FABRICATION MUST BE CERTIFIED AND APPROVED BY A QUALIFIED PERSON.
  - \* IT IS RECOMMENDED THAT DURING ON-SITE CONSTRUCTION (AND PREWORK) A QUALIFIED PROFESSIONAL REVIEW THE PROPOSED ACTIONS TO ENSURE THE PRIMARY RESULT/STRATEGY "TO PROTECT AND MAINTAIN CHANNEL AND BANK STABILITY DOWNSTREAM FROM THE CROSSING" WILL BE ACHIEVED AND TO ADAPT MITIGATIVE PRACTICES AND/OR PROCEDURES AS REQUIRED.



Source: Cypress Forest Consultants Ltd.



**Figure A-3**  
**Preliminary Cross Section View of the Road Crossing over Brucejack Creek**



Source: Cypress Forest Consultants Ltd.