

| Description of Terrain  | Geohazard Code | Unmitigated       |                    |      | Potential Protection, Mitigation and Management Measures <sup>1</sup>  | Mitigated         |                    |      |
|---|----------------|-------------------|--------------------|------|--|-------------------|--------------------|------|
|   |                | Hazard Likelihood | Consequence Rating | Risk |  | Hazard Likelihood | Consequence Rating | Risk |
| <ul style="list-style-type: none"> <li>Very extensive deep-seated slides in glaciolacustrine clays extend far to the south on east and west approaches</li> <li>Moderately deep-seated slide along lower valley wall on west side of river. Involves lowest terrace</li> <li>Gullies are dry and not eroding</li> </ul> | 94DS           | 5                 | 5                  | 25   | <ul style="list-style-type: none"> <li>Control groundwater and surface water drainage.</li> <li>Design to avoid stream erosion.</li> <li>Use routing or design to avoid instabilities.</li> <li>Trenchless crossing method to avoid slide on west side.</li> </ul> | 1                 | 2                  | 2    |
|   | 95SM           | 5                 | 4                  | 20   |  | 1                 | 1                  | 1    |

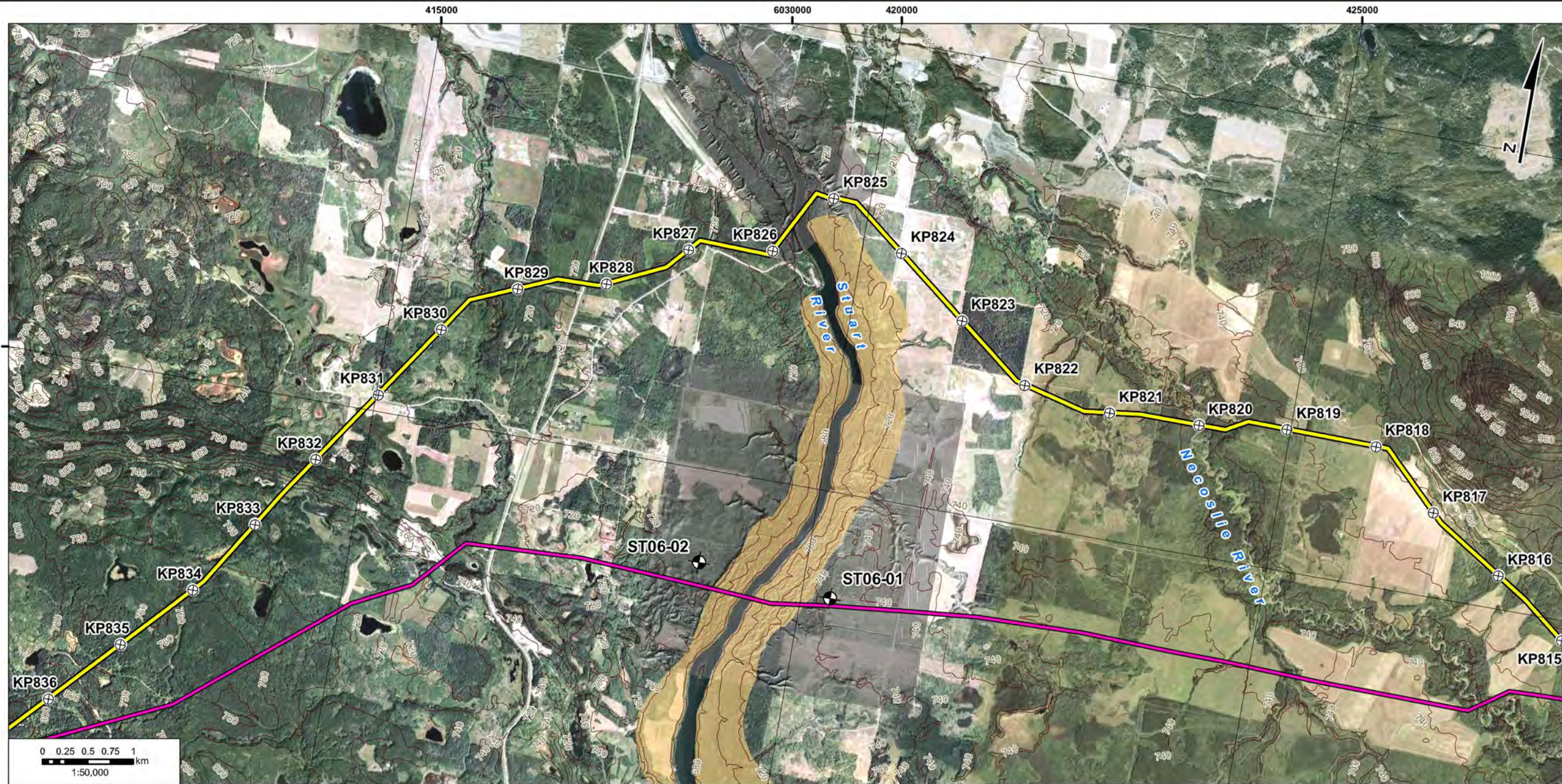
<sup>1</sup> Excerpt taken from Table C-1 included in Overall Geotechnical Report

### Hazard Likelihood Category

|  |   |   |  |  |
|--|---|---|--|--|
| Very low annual likelihood of occurrence and much less likely to occur over the life of the Project. | Unlikely to happen in any given year and less likely over that life of the Project. | It could happen (likely as not) over the life of the Project. | Probably will happen over the life of the Project. | Will likely happen regularly over the life of the Project. |
|--|---|---|--|--|

### Consequence Category

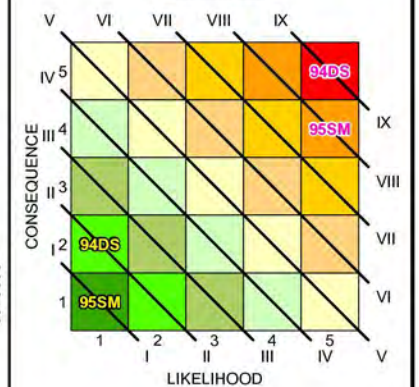
|   |  |   |  |   |
|---|--|---|--|---|
| Minor incident or inefficiency of little or no consequence. | Minor incident or inefficiency that may require engineering review but is easily and predictably remediated. | Moderate event requiring mitigation and certainly engineering review/input. | Significant event that can be addressed but with great effort. | Major event with extremely costly and difficult remediation |
|---|--|---|--|---|



### Geohazard Codes

- Mass Wasting**
- DS Deep-seated slides
  - SM Shallow to moderately deep slides
  - DF Debris Flow
  - RF Rock Fall
  - AV Avalanches
  - LS Lateral Spreading
  - SE Stream Erosion & sedimentation
  - ER Wind & shallow stream or overland erosion
- Settlement**
- CS Consolidation Settlement
  - KS Karst induced Settlement or displacement
- Seismic**
- EQ Seismic Motion
  - LQ Liquefaction
- Tsunamis**
- TS Tsunamis
- (#) Number of occurrences of Geohazard that fit in that square of the Risk Matrix

### Risk Matrix



- Legend**
- 94DS Risk Before Mitigation
  - 94DS Risk After Mitigation
  - 2006 AMEC Borehole
  - Proposed Gateway Pipeline KP (Route Rev T)
  - Proposed Gateway Pipeline Route (Route Rev T)
  - Former Proposed Gateway Pipeline Route (Route Rev J)
  - TRIM Contour
  - Landslide Terrain Feature

**Notes:**

- Data sources: Imagery - Google Earth Pro (2002-2003); LIDAR hillshade.



CLIENT:  
NORTHERN GATEWAY PIPELINES INC.

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3456 Opie Crescent  
Prince George, BC, CANADA V2N 2P9



DWN BY: BB  
CHK'D BY: SK  
DATUM: NAD 83  
PROJECTION: UTM Zone 10  
SCALE: 1:50,000

STUART RIVER CROSSING  
  
GEOTECHNICAL ENGINEERING  
RISK-BASED DESIGN APPROACH  
ENBRIDGE NORTHERN GATEWAY PROJECT

DATE: MARCH 2011  
PROJECT NO.: EG0926008.2001.100  
REV NO.: A  
FIGURE C-5