WEST QUESNEL LAND STABILITY PROGRAM
ANNUAL MONITORING REPORT - 2015

Submitted to:

City of Quesnel
410 Kinchant Street
Quesnel, BC V2J 7J5

Submitted by:

Amec Foster Wheeler Environment & Infrastructure
A division of Amec Foster Wheeler Americas Limited
3456 Opie Crescent
Prince George, British Columbia, V2N 2P9

26 February 2016

KX0439744

TABLE OF CONTENTS

Page #

1.0 INTRODUCTION 1

2.0 GPS MOVEMENT HUBS 1

3.0 SLOPE INCLINOMETERS 5

4.0 PIEZOMETERS 7

5.0 PUMPING WELLS 9

6.0 HORIZONTAL DRAINS 11

7.0 PRECIPITATION DATA 12

8.0 TRENDS & CORRELATIONS 14
8.1 PRECIPITATION EFFECT ON GROUNDWATER 14
8.2 PRECIPITATION EFFECT ON GROUND MOVEMENT 15
8.3 GROUNDWATER CORRELATION WITH GROUND MOVEMENT 16

9.0 CLOSURE 16

LIST OF TABLES

Table 1: Typical Horizontal Movement (from GPS Hub 98-17) from 1998 to 2015 3
Table 2: Pumping Wells – Total Annual Flows 10
Table 3: Horizontal Drains – Total Annual Flows 11
Table 4: Annual Total Precipitation from 1996 to 2015 13

LIST OF FIGURES

Figure 1 Summary Plan of Ground Movement (GPS Hubs and Slope Inclinometers)
Figure 2 Total Horizontal Movement, September 1998 to December 2015
Figure 3 Total Horizontal Movement, December 2001 to December 2015
Figure 4 Total Horizontal Movement, November 2006 to December 2015
Figure 5 Total Vertical Movement, November 2006 to December 2015
Figure 6 Total 3D Movement, November 2006 to December 2015
Figure 7 Annual Horizontal Movement – 2007
Figure 8 Annual 3D Movement – 2007
Figure 9 Annual Horizontal Movement – 2008
Figure 10 Annual 3D Movement – 2008
Figure 11 Annual Horizontal Movement – 2009
Figure 12 Annual 3D Movement – 2009

LIST OF FIGURES Continued

Figure 13 Annual Horizontal Movement – 2010
Figure 14 Annual 3D Movement – 2010
Figure 15 Annual Horizontal Movement – 2011
Figure 16 Annual 3D Movement – 2011
Figure 17 Annual Horizontal Movement – 2012
Figure 18 Annual 3D Movement – 2012
Figure 19 Annual Horizontal Movement – 2013
Figure 20 Annual 3D Movement – 2013
Figure 21 Annual Horizontal Movement – 2014
Figure 22 Annual 3D Movement – 2014
Figure 23 Annual Horizontal Movement – 2015
Figure 24 Annual 3D Movement – 2015
Figure 25 Site Plan with Piezometers, Pumping Wells and Horizontal Drains
Figure 26 Groundwater Drawdown
Figure 27 2015 Pumping Well & Horizontal Drain Productivity

LIST OF APPENDICES

Appendix A GPS Movement Hubs – Figure A1, Status, Data Tables and Plots
Appendix B Slope Inclinometers – Summary Table and Trend Plots
Appendix C Piezometers – Status, Observation Summary Tables (C1 to C3), Trend Plots
Appendix D Pumping Wells – Status Table and Production Charts
Appendix E Horizontal Drains – Status Table and Production Charts
Appendix F Historical Precipitation Data Charts for the Quesnel Area (Figures F1 to F3)
- Figure F1 Total Monthly Precipitation – 2011 to 2015
- Figure F2 Total Monthly Precipitation and Historical Normals – 2011 to 2015
- Figure F3 Total Monthly Precipitation – Cumulative Difference 1976 to 2015

Appendix G Data Comparison Charts
- Figure G1 Total Monthly Precipitation & Selected Groundwater Elevations
- Figure G2 Horizontal Movement Relative to Antecedent Precipitation
- Figure G3 Cumulative Ground Movement & Daily Precipitation
- Figure G4 Cumulative Ground Movement & Daily Precipitation & Typical Groundwater Elevations
- Figure G5 Cumulative Ground Movement & Groundwater Elevation

1.0 INTRODUCTION

Amec Foster Wheeler Environment & Infrastructure (AmecFW) a division of Amec Foster Wheeler Americas Limited (previously AMEC Environment & Infrastructure) has carried out instrumentation monitoring in West Quesnel as part of the ongoing West Quesnel Land Stability Program. The purpose of the instrumentation monitoring is to track landslide related ground movement, groundwater conditions and precipitation.

Several sets of Global Positioning System (GPS) ground surface movement hubs have been established in the field and surveyed between 1998 and 2015. Beginning in the year 2000, AmecFW installed other instrumentation including slope inclinometers, piezometers, pumping wells and horizontal drains in several stages over time.

This report is intended to summarize the data collected during 2015 for the installed instrumentation and provides an update on observed trends or interpretations that have developed or changed since our 2014 Annual Monitoring Report, dated 23 January 2015.

For detailed background information including geology and project history, the reader is referred to previous AmecFW reports, including our previous annual monitoring reports, the "*2012 Subsurface Dewatering System*" report dated 21 November 2014, the "*Trial Dewatering"* report dated May 2008, and the "*West Quesnel Land Stability Study*" report dated May 2007.

2.0 GPS MOVEMENT HUBS

Beginning in September 1998, FortisBC (formerly Terasen Gas and BC Gas) installed and monitored a series of GPS surface movement hubs. Subsequently, in 2001, 2006 and 2008, the GPS hub network was expanded and modified such that a current total of up to 47 hubs have been monitored. The monitoring consisted of comparing changes in the specific positions of the defined survey reference points over time as measured periodically by survey contractors (most recently McElhanney Consultants Limited), retained by both FortisBC and AmecFW on behalf of the City of Quesnel. Surveys are typically conducted on a quarterly basis with the results forwarded to AmecFW. In 2011 Fortis arranged for installation of some additional closely spaced GPS hubs in a small part of West Quesnel that are monitored annually in conjunction with UBC for a research project. These hubs are not generally monitored as part of the West Quesnel Land Stability Program and are not reported on herein. The locations of the various GPS hubs monitored for the West Quesnel Land Stability Program are depicted on Figure 1.

During 2015, quarterly GPS monitoring was carried out in April, July, October and December for the GPS hubs established in 1998, 2001, 2006, and 2008 and for one replacement hub (13-02) established in 2013. For the portion of the GPS monitoring network determined to be within the identified landslide area, the rates of movement and total movement recorded in 2015 were slightly higher than those observed in 2013 and 2014, but still significantly less than the long term average observed prior to implementation of dewatering measures in late 2012.

An overall summary table and detailed individual plots of movements for all GPS hubs are provided in Appendix A. Please note that while both horizontal and vertical movement data is recorded, typically vertical GPS survey data has at least one order of magnitude lower accuracy than the horizontal data. Accordingly, while there are some general trends that can be observed regarding vertical and/or the resultant of both horizontal and vertical movement, the following discussion refers primarily to horizontal movement information.

The GPS movement hubs can be broken into four general categories based upon their location and displacement. The first category represents benchmark hubs, which are used to provide reference control for the survey. These benchmarks are theoretically located outside the slide area on stable ground and have recorded little, if any, movement since installation. The exceptions to this are survey tolerance variations that may suggest no or minor movement (typically less than 15 mm of total horizontal movement over the length of time the surveying has been conducted with no discernible consistent directional trend). While there have been as many as eight benchmark hubs installed, typically only three (Water Tank, GPS 01-38, and GPS 98-23) have been utilized to gauge the accuracy of the obtained survey data.

The second category consists of twelve hubs that are at or near the eastern extremity of the slide area and are used to define the approximate toe area or likely eastern boundary of active landslide movement. Generally, cumulative total horizontal displacement less than 20-25 mm is interpreted to mean that the location is beyond the active movement toe area. This is especially true if there is no long term consistent directional trend observed in successive measurements. Higher values suggest that the hub is on or very near the toe of the slide, more so if there is a consistent observed easterly trend in successive measurements.

The third category consists of two hubs that are located at or near the upper west portion of the slide, which were placed to assist in defining the western extent or crest of the slide. Similar to the toe area, where total horizontal displacement less than 20-25 mm and lack of consistent directionality of the hubs has occurred, they have been considered as being outside the area of active movement.

The fourth category involves the remaining 30 GPS hubs that are interpreted to be within the main body of the landslide. These hubs have shown significant increasing cumulative displacement and consistent directionality of movement (easterly or northeasterly) over the course of the 17 years that the 15 oldest hubs have been monitored. The total horizontal movement, measured since September 1998 for the 15 oldest hubs, ranged from 291 to 683 mm.

Following much higher than average movements in 2008 and 2009, movement was relatively limited in 2010 and 2011 but showed a significant increase in 2012 followed by a decrease again in 2013 and 2014. In 2015, horizontal displacement measured at Hub 98-17, representing the long term ‘worst-case’ monitoring location in the middle of the study area, recorded 24 mm of movement. This movement is the highest recorded movement since the installation of the Phase I dewatering program. However, when comparing this rate to pre-Phase I movement it is significantly lower than the typical long term average of approximately 44 mm per year. Table 1 presents cumulative, annual, and peak horizontal movement data for GPS Hub 98-17 from 1998 to 2015. Figure A1 reproduced below from Appendix A, graphically shows the pattern of cumulative annual movement data presented in Table 1.

Table 1: Typical Horizontal Movement (from GPS Hub 98-17) from 1998 to 2015

Year	Cumulative Movement (mm)	Annual Movement Rate (mm/yr)	Peak Movement Rate (mm/yr)*
1998	16**	n/a**	66
1999	96	80	115
2000	163	67	110
2001	225	62	75
2002	279	54	83
2003	300	21	23
2004	322	22	22
2005	409	87	75
2006	423	14	75
2007	447	24	43
2008	506	59	160
2009	574	68	216
2010	580	6	56
2011	588	8	107
2012	635	47	93
2013	647	12	38
2014	660	13	39
2015	684	24	53

*Note: Peak movement rate typically observed during the spring.
**Note: GPS Hub initialized in September 1998.

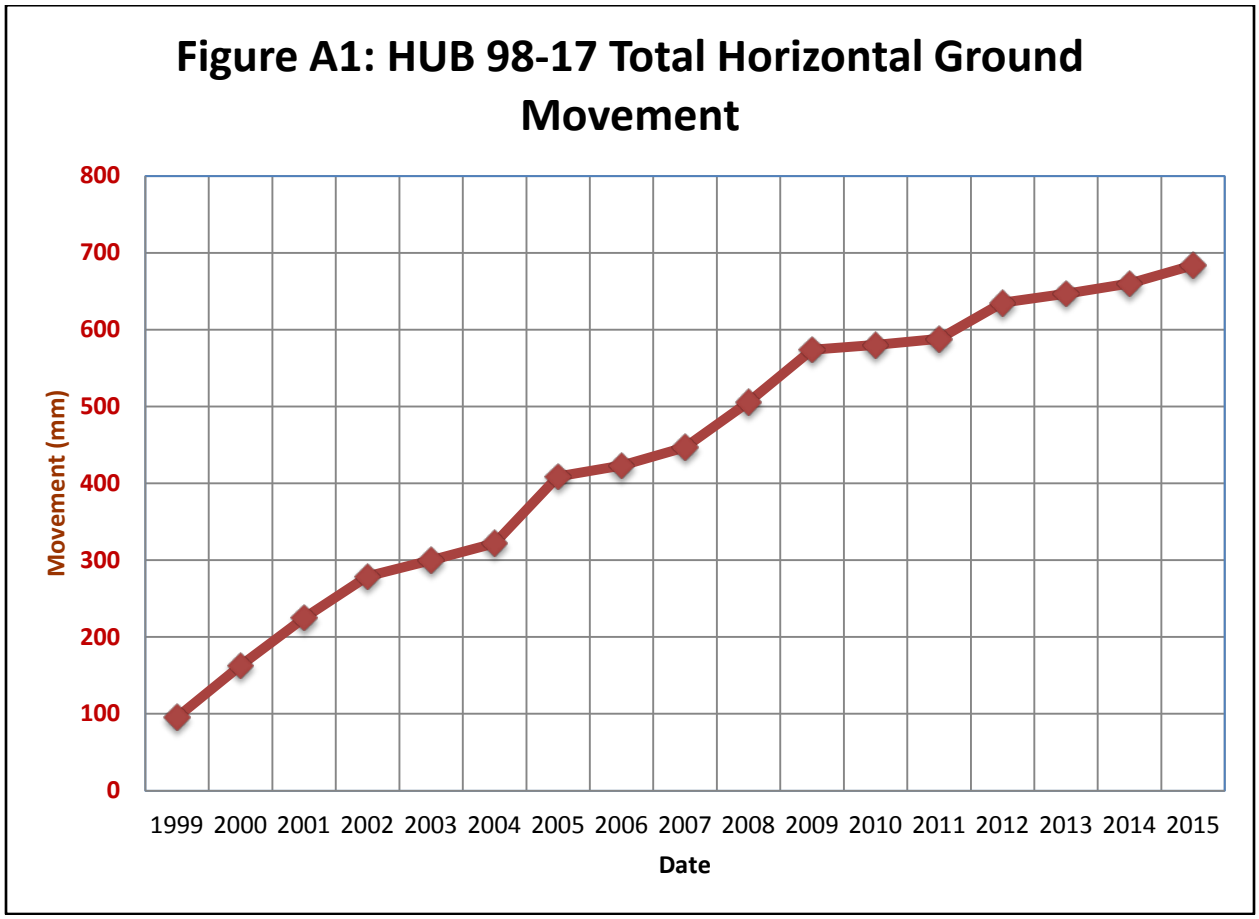


Figure 1 also provides a simplified vector movement plot for GPS hubs monitored in the West Quesnel area. The GPS vector plots in Figure 1 show relative magnitude and azimuth of the latest total horizontal movement vectors. Intermediate movements are approximated. Details for individual GPS movement hubs and intermediate movement vectors are provided in Appendix A.

Figures 2 through 24 show contour plots of total and annual GPS hub movement data selected over different time periods (which also means that only hubs active during the entire time period are included in the contour plotting) and for different components (i.e. horizontal movement, vertical movement and resultant total three dimensional (3D) movement). Historical ground movement contours (Figures 7 through 24) were drawn using triangulation in AutoCAD Civil 3D (2013); while the relative 2015 ground movement contours (Figures 2 though 6, 23, and 24) were triangulated in ArcGIS (version 10.2 for Desktop). Please note that these are simplified contour plots, and that not all the cumulative movements are necessarily in the same vector direction.

Figure 2 shows total horizontal movement between September 1998 and December 2015, for the GPS hubs installed in September 1998. Significant movement has been observed at the GPS hubs within the slide mass since 1998. A total horizontal movement of 684 mm has been detected at GPS Hub 98-17 (corner of Bettcher St. and Lark Ave.) since the inception of GPS monitoring.

Figure 3 shows total horizontal movement between December 2001 and December 2015, for the GPS hubs installed in September 1998 and December 2001.

Figure 4 shows total horizontal movement between November 2006 and December 2015, for the GPS hubs installed in September 1998, December 2001 and November 2006. Figures 2, 3, and 4 show that the greatest horizontal movement observed since 1998 has generally occurred in the middle of the slide area.

Figure 5 shows total vertical movement between November 2006 and December 2015. This contour plot shows generally downwards movement along the upper, north and west edges of the slide (typically near the scarp area, although it should be noted that there are very few hubs in this area to properly define the scarp area separately from the main body of the slide). There were also some observed upwards movement trends (thrusting/bulging) near the toe of the slide. A significant bulge related to toe thrust movements of the slide has been detected on Lewis Drive, just east of Healy Street.

Figure 6 shows total 3D movement between November 2006 and December 2015. As in Figure 4, the largest movements have generally been observed in the middle of the slide area.

Figures 7 through 24 show annual horizontal movement and annual 3D movement respectively for the years 2007 through 2015 (two figures per year). During 2007, relatively little movement was recorded by the GPS hubs, with total horizontal movement typically being between 10 to 30 mm (see Figure 7) and total 3D movement between 10 to 50 mm (see Figure 8). In 2008, significantly more horizontal movement occurred than in 2007 and 3D movement increased as well. Up to 60 mm of horizontal (see Figure 9) and 60 mm of 3D movement (see Figure 10) was observed in 2008. Total horizontal (see Figure 11) and 3D movement (see Figure 12) increased again in 2009 with up to 70 mm observed in both categories. These figures suggest that the slide accelerated in those two calendar years. In 2010, reduced horizontal and 3D movements, only up to 20 mm (see Figure 13) and 30 mm (see Figure 14), respectively, were observed. This

pattern of reduced movement was again observed in 2011, with less than 21 mm of horizontal movement (see Figure 15) and less than 22 mm of 3D movement (see Figure 16) being detected. An increase in movement was observed in 2012 with up to 51 mm of horizontal movement (see Figure 17) and up to 52 mm of 3D movement (see Figure 18). The movement rate decreased in 2013 with only a peak movement of 19 mm for both horizontal and 3D movement (see Figures 19 and 20). The movement for 2014 was similar to 2013 with a maximum of 21 mm of horizontal movement and 29 mm for 3D movement (see Figures 21 and 22) observed. The movement rate increased slightly for 2015 from 2013 and 2014 with a maximum of 32 mm of horizontal movement and 33 mm for 3D movement (see Figures 23 and 24).

The differences in annual movements between the relatively low activity years of 2007, 2010, and 2011 as compared to higher movement years of 2008, 2009, and 2012 are judged to be mainly attributable to differences in annual precipitation that influenced the groundwater pressures within the landslide area. However, in addition to the precipitation, beginning in the second half of 2012 the effects of the subsurface dewatering are likely to have been a significant contributing factor to the reduced movements relative to precipitation observed for 2013, 2014 and 2015 (see Section 7.0 for more details on precipitation data and Section 8.0 for a discussion on the relationships between precipitation, groundwater pressures and ground movement).

3.0 SLOPE INCLINOMETERS

A total of 15 slope inclinometer (SI) casings were installed by AmecFW in West Quesnel, between November 2000 and August 2006, to monitor depths and rates of subsurface lateral ground movements. Installation details and the results of previous SI monitoring on the original fifteen SI's are described in previous AmecFW reports. In mid-2009, the remaining slope inclinometers in this group of fifteen, sheared off as a result of the continued ground movement. Currently, there are only two remaining functional installations, however these installations have been judged to be too shallow to intersect the underlying slide surface and are not useful for monitoring overall slide movements. No manual SI readings were conducted on these instruments in 2015.

In 2012, as part of the monitoring package for the full scale subsurface dewatering program, two real time in-place slope inclinometer (IPI) strings were installed across the approximate depths of previously detected sub-surface landslide failure surfaces. These in-place inclinometers allow determination of subsurface lateral displacement in real time. The real time data allows for the most accurate correlation between movement, water infiltration and the dewatering activities. Real time data collection for these instruments, SI16 and SI17, commenced 20 September 2012 and 16 October 2012 respectively. Prior to installing the IPI's, manual baseline SI survey measurements were also performed. The locations of these two IPI's are depicted on Figure 1.

In late 2014, it was noted that the data collected from sensor SI17A was becoming inconsistent. In early 2015, it was noted that the data collected sensor SI17C was starting to become inconsistent as well. To verify the data in early July 2015, AmecFW conducted a site visit and a removal/replacement to reset the sensors. During the sensor string removal process, a strong foul odour was noted to be originating from within the SI17 casing. Initially after the reset, the data appeared to have stabilized. However, at the end of July sensor SI17A appeared to fail, followed by sensor SI17B in early September and all other SI17 sensors in early October. In early November, the SI17 sensor string was once again removed and sent to the manufacturer for diagnosis. To date the sensor string is still undergoing repairs. The sensor string is

scheduled to be replaced in early 2016. Data from SI17 was deemed unreliable in 2015 and has been largely ignored for the purposes of presentation in this report.

To assess the accuracy of the collected IPI data, manual SI measurements of SI16 and SI17 were also collected for comparison to the 2012 baseline manual measurements. The comparison plots are presented in Appendix B, and confirm a strong correlation with the reliable real time IPI displacement data.

The collected IPI displacement data since installation is presented in Appendix B, excluding the data for SI17 for 2015.

The plots depicting the IPI displacement presented in Appendix B have been automatically generated, utilizing AmecFW's web based data management system, custom developed for the West Quesnel Land Stability Program. Although the IPI's provide continuous real time movement detection, only the averaged daily horizontal ground displacement at specific depths along each IPI is presented in the Appendix B plots.

In the time between the 2012 installation and the beginning of 2014, the IPI plots showed four similar small movement events, with SI16 showing an additional event prior to SI17 being initialized (September 20-22, 2012). The four events occurred on October 17-18, 2012, January 3-7, 2013, April 29–May 7, 2013, and December 19-22, 2013. SI16 moved 12 mm in this time frame with movements of approximately 1.5 mm, 1.5 mm, 3 mm, 5 mm, and 1 mm respectively for the five movement events observed. SI17 moved 15 mm in this time frame with movements of approximately 2 mm, 4 mm, 6 mm and 3 mm respectively for the four movement events observed. Typically the movement is observed to be as a result of a sharp relatively short event; however, long creep like movements were also observed at SI17 between the two major movement events (January 7 through April 29).

In 2014, a total of 7 mm and 8 mm of movement was observed for SI16 and SI17, respectively. The movement occurred in two distinct movement events: April 20-25, 2014, and May 26-June 11, 2014. The April event had an approximate relative movement of 3 mm for both SI16 and SI17, while the May-June event had an approximate relative movement of 4 mm and 5 mm for SI16 and SI17, respectively.

In 2015 a larger than average movement event was noted on SI16 between March 10 and May 15 with a total of 18 mm of movement. The beginning of this movement event was also noted on SI17 before the instrument malfunctioned on April 9. Additional smaller movements of 2 mm and 1 mm were noted on February 7-23 and July 31-August 22 respectively for SI16. In addition, a relatively slow creep movement was noted to have occurred between approximately September 14 and the end of 2015 with a total movement of 4 mm. The total 2015 movement for SI16 was on the order of 25 mm with a total movement of approximately 44 mm measured since its 2012 installation. SI17 recorded a total movement of approximately 14 mm in 2015 before its failure in April bringing the total movement recorded since 2012 installation to approximately 38 mm.

In general there is a strong correlation between the ground movement data collected through surface GPS hub monitoring and the subsurface IPI sensors. Figure 1 also depicts ground movement observations from the daily IPI sensor measurements.

During the November removal of the SI17 sensor string, strong odor emanating from the installation casing water, and a dark staining was noted on a portion of the instrument sensor string. A water quality sample was collected at the time and submitted for chemical analysis. During the removal process, the water within the installation casing was purged to below the interpreted slide failure surface and replaced with fresh water. The water was tested for major cations and anions, nutrients, dissolved organic carbon, total organic carbon, biological oxygen demand, chemical oxygen demand, total and dissolved metals, and physical characteristics such as pH hardness and turbidity. The water quality testing showed an elevated amount of organics present within the water and slightly high ammonia nitrogen levels but no other high values. The water quality results are provided in Appendix B.

4.0 PIEZOMETERS

Two general types of piezometers (with three different installation configurations) have been utilized in West Quesnel to monitor groundwater pressures in the vicinity of the landslide area. The predominant type of piezometer used in West Quesnel is a vibrating wire piezometer (VWP), which is an electronic water pressure sensing device that is installed directly in the ground via grouting in a borehole, to continually and remotely detect and obtain a record of groundwater pressure over time. A vibrating wire piezometer measures water pressure acting at the specific depth of its tip, and can provide a rapid response to a change in ambient pressure. A number of retrofit installations have also been created where vibrating wire piezometer sensors were suspended inside open pipes (standpipes or well casings) for automated electronic detection of water pressures. Figure 25 depicts the locations for the various groundwater instruments and their related data logger stations.

Studies have shown that barometric pressure changes impact VWP readings[1]. Thus, all collected VWP readings have been corrected using readings from a barometer installed in Station 2.

The second type of installed piezometer at the site is a standpipe, which generally consists of a vertical pipe (plastic or steel) with openings (slots or screens) at depth that admit groundwater from the surrounding horizon where the screen is placed. The slotted screen sections of the standpipe piezometers are typically surrounded by a sand pack and have a bentonite seal both below and above the sand pack. Water pressures were historically measured manually using a water level dip tape, but these readings were discontinued at the end of 2012 as this information was more readily available with the addition of the automated VWPs installed during the 2012 full scale subsurface dewatering program.

Four standpipes have since been retrofitted with vibrating wire piezometer transducers installed inside the standpipes (VWP 3A/B and VWP 4A/B). A total of 48 vibrating wire piezometers were grouted directly in the ground to various depths at 21 different locations during the trial dewatering program prior to 2008. An additional 32 vibrating wire piezometers were grouted in at 14 new locations during the 2012 full scale dewatering program. Overall during the course of the program, 84 vibratory wire piezometers have been installed of which, nine have either dried up or been damaged. Late in 2014 one of the previously dry vibrating wires (VWP 33A) began recording measurable water bringing the current number of active VWP instruments to 76. No changes to the piezometer system were noted in 2015. The locations of the boreholes in which the various piezometers are installed is shown on Figure 25.

[1] Contreras, I.A., Grosser, A.T., Ver-Strate, R.H; 2012,"Update of the Fully-grouted Method for Peizometer Installations". Geotechnical News, Volume 30, No. 2., June 2012, www.geotechnicalnews.com/instrumentation_news.php

All of the vibrating wire piezometer sensors are connected to Campbell Scientific data loggers (stations). These data loggers are used to automatically record sensor water pressures at set intervals and can store large quantities of data. The Campbell Scientific data loggers have been connected to cellular modems, so that near real time data can be collected and accessed remotely by AmecFW staff.

A summary table listing the various piezometers, along with their groundwater pressures (phreatic surface elevation plots) can be found in Appendix C. Depending on the location of the piezometers, they depict various short and long term groundwater pressure conditions within the West Quesnel area. Some near surface installations are more sensitive to seasonal precipitation trends, short term weather events and potential water service line breaks, particularly if they are installed in shallow sands or gravels. Deeper installations tend to show longer term background trends with subdued seasonal response indicative of larger scale, more regional groundwater conditions. Some of the piezometers show the effects of nearby dewatering installations (pumping wells and horizontal drains).

Table C1 (Background Piezometers), in Appendix C, presents the individual trends and observations from 2015 for piezometer locations that are judged to be unlikely to have been affected by the dewatering efforts, and are more reflective of general background subsurface groundwater patterns in West Quesnel.

Table C2 (Piezometers Near Pumping Wells), Appendix C, presents overall trends and observations for piezometers that are situated near the pumping wells and may have been influenced by them. The piezometers nearest the pumping wells and closer to surface have experienced the greatest influence (decrease in groundwater pressure) since pumping started and many have reached a new steady-state pressure, depending on how productive the well has been. Piezometers that have groundwater pressures remaining at steady-state (with or without seasonal influences) are considered to be out of the radius of influence of the well or are too deep to be influenced. Some of the piezometers influenced by the pumping wells are also still reactive to seasonal precipitation. Generally in 2015 for this set of piezometers there were no significant changes noted from previous years, with steady-state groundwater pressure drawdowns continuing where previously influenced by pumping wells. Some instrument locations still indicated slight influences from seasonal or storm events.

Table C3 (Piezometers Near Horizontal Drains), in Appendix C, presents the overall trends and observations from 2015 for piezometers situated above or near the horizontal drain installations. These piezometers have generally been at steady-state since initial drawdowns in 2012 when the horizontal drains (HD) were first installed. A number of piezometers in the vicinity of HD8 continue to show a decreasing trend. Several of the instruments also exhibit regular variation patterns in reaction to seasonal weather and precipitation conditions.

The plots depicting the groundwater elevations found in Appendix C have been automatically generated, utilizing AmecFW's data management system, custom developed for the West Quesnel Land Stability Program. The average daily groundwater elevation (phreatic surface) is presented in the plots. However, in order to allow practical automated plotting of the instrument data, digital filters were utilized to remove some erroneous data points, and to smooth or bridge data gaps.

In general, historic groundwater pressures within the West Quesnel area have been considered to be generally quite high relative to the ground surface, and thus detrimental to slope stability. The overall background trend observed in 2015 was relatively constant with typical seasonal groundwater fluctuations. However, during early 2015 it was noted that the seasonal spring freshet induced groundwater peaks measured at many of the locations were higher, slightly earlier and longer than had been observed in previous years (example: VWP 14A). This was not only true for the areas considered indicative of the background hydrogeology, but also true for locations where the influence of dewatering activities has been observed. Groundwater pressures adjacent to and previously drawn down by the trial pumping wells and trial horizontal drains continued to remain at or near their steady state lowered pressures. The instruments near the 2012 installations initially showed significant response and lowering water pressures due to the horizontal drain and pumping well installations, and have since reached a steady state or continued with a slight downward trend. To date approximately 36 of the piezometer installations have registered reductions in groundwater pressures that appear to be attributable to the sub-surface dewatering program, with a number of other instruments that may also be showing some slight influence from the dewatering system. Figure 26 is a simplified diagrammatic plot showing the estimated groundwater drawdown at the end of 2015 relative to what was inferred to be natural background elevations just prior to the implementation of the subsurface dewatering systems.

5.0 PUMPING WELLS

As part of the 2012 subsurface dewatering program, 14 potential pumping wells (PW) were drilled and pumps were installed in 13 of them (the well at PW10 was dry on completion of drilling, so no pump was installed). Though the pumps were installed and tested during the latter part of 2012, they were not fully activated until April 2013 pending water quality testing and water discharge planning. Additionally, during early 2014 the pumps were also intermittently turned off to facilitate additional water quality sampling. Together with the four pumping wells (PW1, PW2, PW4, and PW5) installed as part of prior trial dewatering programs there are a total of 17 pumping wells installed in West Quesnel. Figure 25 shows the locations of all of the pumping wells.

The water pumped from PW1, PW13, and PW19 enters the West Quesnel sanitary sewer while water from PW2, PW4 through PW12 and PW14 through PW18 enters the West Quesnel storm drainage system, and ultimately Baker Creek.

In early February 2015 the pump installed in PW6 failed. In order to facilitate replacement of the pump and to increase functionality and future production, the pump controls were moved from within Station 4 to within the concrete casing protecting PW6. This move allows for dynamic control of the pump. On April 20-21, the failed pump was removed from PW6, the well was acid washed, and a new pump was installed. The new pump has a maximum flow rate of 18.9 L/min which is a reduction from the old pump's 37.8 L/min. The new pump was installed at a 3 m higher elevation to reduce the possibility of sediment from the bottom of the well plugging the pump. Calibration of the pump controls was performed in early summer 2015 and regular/ efficient pumping cycles were established in August 2015. In November 2015, due to reduced well water influx, the established pumping cycle drew the water level down to below the minimum set elevation and the pumping well automatically turned off. Additional calibration is scheduled to be conducted on PW6 in 2016.

A summary table of the well installation details, along with charts of well water elevations and production rates since installation are presented in Appendix D.

The plots depicting the pumping well levels and production rates presented in Appendix D have been automatically generated, utilizing AmecFW's data management system, custom developed for the West Quesnel Land Stability Program. The pumping well flow measurements were collected on an hourly basis and summed to establish a daily flow rate. Water well elevations presented are average daily values with digital filtering to remove erroneous readings.

Table 2 presents the annual and total cumulative flow measured for all of the pumping wells to date.

Table 2: Pumping Wells – Total Annual Flows

Well Name	Yearly Average (L)	Total (L)	Annual Flow (L)				Total Cumulative Flow (L)
	2008-2011	2008-2011	2012[3]	2013[3]	2014	2015	
PW1	31,828	127,313	26,867	25,968	25,593	24,630	230,371
PW2[1]	6,359	12,718	Failed	2,668	4,133	3,804	23,323
PW4	5,576,106	22,304,424	3,810,749	3,052,650	3,229,209	3,971,731	36,368,763
PW5	776	3,104	1,613	2,685	2,402	2,388	12,192
PW6[2]	INSTALLED IN 2012		35,940	2,766,654	1,799,771	1,746,516	6,348,881
PW7			321	66,372	75,270	55,996	197,959
PW8			682	347,589	602,785	767,049	1,718,105
PW9			949	621,910	1,940,319	3,184,648	5,747,826
PW11			560	80,110	90,536	93,443	264,649
PW12			300	502,858	542,492	529,493	1,575,143
PW13			288,641	7,592,947	6,597,194	7,575,833	22,054,615
PW14			641	119,548	155,488	145,181	420,858
PW15			859	244,830	262,035	205,415	713,139
PW16			532	16,222	17,033	17,098	50,885
PW17			530	90,417	116,501	102,347	309,795
PW18			1,123	391,458	350,403	469,060	1,212,044
PW19			8,177	98,713	140,671	163,317	410,878
Total	**5,615,069**	**22,447,559**	**4,178,484**	**16,023,599**	**15,951,835**	**19,057,949**	**77,659,426**

Note 1: PW2 data from 2009 represents values collected prior to the pump failing in May 2009. Data for 2013 represents values collected after the pump was replaced in May 2013.
Note 2: Data from PW6 represents values collected during functional operation; PW6 has had intermittent technical failures since installation.
Note 3: Full production activity at all the pumping wells began in April 2013.

During 2015 the pumping wells showed a relatively steady production rate with some variance likely due to seasonal precipitation and weather patterns, but an increase over what had been observed in the previous two years. A total of approximately 19 million litres of water was removed by the pumping wells during 2015. Relative to the 2014 monitoring season the majority of the wells produced similar volumes in 2015; however, three pumping wells (PW4, PW9 and PW13) experienced significant production increases of approximately 0.75, 1.25 and 0.95 million litres respectively. The amount of water removed by the pumping wells during 2015 increased by approximately 3 million litres (or about 19%) from the previous two years and likely reflects an increase in the amount of precipitation.

Overall a total of 77.7 million litres has been removed from all wells since installation. Figure 27 depicts a simplified diagrammatic comparison of average daily pumping well production rates between various well locations for 2015.

6.0 HORIZONTAL DRAINS

During the fall of 2007, four trial horizontal (gravity) drains were installed at two different locations into the slope underlying West Quesnel. In mid 2012, as part of the full scale subsurface dewatering program, 64 additional horizontal drains were installed at ten other sites (see Figure 25). A total of 21 of the drains were observed to be dry (at the discharge end) shortly after installation. This included all the drains at sites HD1, HD5, HD6, HD7 and HD14 as well as three drains at HD9 and one drain at HD11. Although there was no initial water flowing from any of the drains at HD14, one drain did begin to produce water during the 2013 spring melt, and the flow rate was manually measured periodically until it stopped flowing in midsummer 2013. A summary table of the drain installations can be found in Appendix E, along with individual production charts for HD4, HD8, HD9, HD10, HD11, HD12, and HD13. Table 3 presents a summary of the measurements of total annual flow per drain site from 2008 to 2015. To date, approximately 452 million L of water has been removed through the drains.

Table 3: Horizontal Drains – Total Annual Flows

Site Name	Yearly Average (L)	Total (L)	Annual Flow (L)				Total Cumulative Flow (L)
	2008-2011	2008-2011	2012	2013	2014	2015	
HD4	609,346	2,437,384[1]	448,443[2]	535,725	519,272	525,125	4,465,949
HD8	INSTALLED IN 2012		60,390,352	130,934,967	93,775,808	72,516,006	357,617,133
HD9			2,772,172	4,134,390	5,252,638	5,745,353	17,904,553
HD10			8,682,037	8,326,985	8,953,907	9,443,228	35,406,157
HD11			267,408[3]	6,291,139	2,464,888	2,832,054	11,855,489
HD12			3,151,386	3,210,809	3,244,899	3,472,076	13,079,170
HD13			1,254,748	1,914,268[4]	2,934,880	3,521,426[5]	9,625,322
HD14			Dry	2,015,064	Dry		2,015,064
Total	**609,346**	**2,437,384**	**76,966,546**	**157,363,347**	**117,146,292**	**98,055,268**	**451,968,837**

Note 1: HD4 flows for 2008 were interpolated based on manual flow readings.
Note 2: HD4 plugged due to nearby drilling, and no flow readings were observed between August to mid November 2012.
Note 3: HD11 flows for 2012 are only manual readings taken during and shortly after installation as the originally installed flow meter malfunctioned; this was corrected mid 2013, no trends yet established to allow interpolation of the lost flow readings during this period.
Note 4: HD13 flows dropped below the detectable limit of the flow meter in mid September. In mid November 2013 a secondary flow meter was installed with a lower detection limit to continue recording the lower flow. Zero flow was recorded between mid September to mid November.
Note 5: HD13 flows dropped below the detectable limit of the flow meter in mid September. Secondary flow meter malfunctioned and zero flow was recorded between mid September and year end.

The plots presented in Appendix E depicting the flow rate measurements for the horizontal drain sites have been automatically generated, utilizing AmecFW's data management system, custom developed for the West Quesnel Land Stability Program. The flow measurements were collected on an hourly basis and summed to establish daily flow rates. Where flow data gaps exist or an incomplete daily data set was collected, false drops in flow rates were recorded. These are temporary data aberrations and can generally be disregarded, as the horizontal drains flow regardless of the flow meters being functional or not.

For 2015 the maximum average daily flow rate for all the drains combined, for the year, was recorded mid April. The minimum average daily flow rate for all the drains combined, for the year, was recorded during the end of December. These measurements are consistent with the anticipated general seasonal increase in groundwater following spring thaw and the subsequent decrease in groundwater during the winter freeze.

Relative to 2013 and 2014 the continued gradual overall reduction in total flow for all drains was observed in 2015. This reduction is mainly due to the year over year production decrease for HD8, the flow from which dominates the other sites. It should be noted that this production decrease was anticipated and is considered typical of a system that is gradually dewatering an area, particularly where one considers the effect of HD8 and the drainage of the Lewis Pond area. However, if one excludes HD8, there was a noticeable increase in flow rates for the 2015 spring freshet in comparison to the two previous years. The increased flow also came a few weeks earlier and was more sustained in 2015 compared to the previous two years. This pattern is consistent with the pattern of higher precipitation over the preceding months compared to that seen in previous years and an earlier onset of snow melt and ground thawing in 2015.

Figure 27 depicts a simplified diagrammatic comparison of average daily horizontal drain production rates between various drain installation locations for 2015.

7.0 PRECIPITATION DATA

Appendix F contains various historical precipitation data charts for the Quesnel area. The primary source of information was precipitation data collected from Environment Canada (EC), for stations Quesnel AWOS[2] (prior to June 2010), Quesnel[2] (from June 2010 to the end of 2012) and Quesnel Airport Auto[2] (from 2013 to present), which are located approximately 6 km north of the project site at the Quesnel Airport. Monthly and daily precipitation records, including 30 year climate normals, were obtained for the EC stations.

During 2015 Environment Canada published an update for the historical normal[3] for the weather station at the Quesnel Airport. The latest data calculations indicate an average annual total precipitation (rainfall and snow water equivalent) or historical normal over the period from 1981 to 2010 as 536 mm. The annual total precipitation recorded at the EC weather station for 2015 was 501 mm which is only slightly less than the historical normal. However, on a monthly basis, 2015 was wetter than historical normal in January through March and September but was drier than historical normals for the remainder of the year. Table 4, below, presents the annual total precipitation and respective weather data station sources from 1996 to 2015 compared to the historical normal (536 mm). Figure F1, in Appendix F, presents total monthly precipitation since January 2011 and Figure F2 shows total monthly precipitation versus the historical normal for

[2] Environment Canada, 2015. Canadian Climate Data Search On-line - Canada's National Climate Archive. http://www.climate.weatheroffice.ec.gc.ca/climateData/canadae.html Last visited January 7, 2016.

[3] Environment Canada, 2015. Canadian Climate Normals 1981-2010 – Canada's National Climate Archive. http://www.climate.weatheroffice.ec.gc.ca/climate_normals/index_e.html Last visited January 7, 2016.

the same time frame. Figure F3 shows the cumulative difference between the actual recorded precipitation and the 30-year normal since 1976. Upward slopes in the cumulative difference graph represent wet trends, while downward slopes are drying trends. Near normal precipitation is indicated when the cumulative difference plot remains relatively horizontal. Overall, 2015 may represent a moderate increase in precipitation from the drying trend noted since 2009 or may only indicate a seasonal spike in early 2015.

However, when one more closely examines the total antecedent precipitation in the months leading up to spring freshet (e.g. from the previous November through to April), when groundwater levels are expected to be higher and more likely to trigger ground movement, a slightly different pattern is suggested. The historical normal antecedent November to April total precipitation is on the order of 205 mm. Therefore, while the years from 2009 to 2015 were drier than average on an annual basis, the period from late fall of 2014 through to the 2015 spring freshet at 233 mm of total precipitation was wetter than normal, the first since 2009. The total yearly and antecedent precipitation is shown in Table 4 below. The discussion in Section 8.0 below and the referenced data graphs in Appendix G further illustrate this point.

Table 4: Annual Total Precipitation from 1996 to 2015

Year	Data Source	Annual		Antecedent	
		Total Precipitation (mm)	Difference from Historical Normal (1981 to 2010) (mm)	Nov-Apr Precipitation (mm)	Difference from Historical Normal (1981 to 2010) (mm)
1996	Quesnel AWOS	657	+121	231	26
1997	Quesnel AWOS	579	+43	287	82
1998	Quesnel AWOS	488	-48	181	-24
1999	Quesnel AWOS	628	+92	275	70
2000	Quesnel AWOS	554	+18	189	-16
2001	Quesnel AWOS	554	+18	172	-33
2002	Quesnel AWOS	471	-65	213	8
2003	Quesnel AWOS	478	-58	140	-65
2004	Quesnel AWOS	692	+156	226	21
2005	Quesnel AWOS	524	-12	249	44
2006	Quesnel AWOS	465	-71	142	-63
2007	Quesnel AWOS	541	+5	273	68
2008	Quesnel AWOS	530	-6	206	1
2009	Quesnel AWOS	423	-113	238	33
2010	Quesnel AWOS/Quesnel	315	-221	135	-70
2011	Quesnel	450	-86	104	-101
2012	Quesnel	427	-109	163	-42
2013	Quesnel Airport Auto	404	-132	161	-44
2014	Quesnel Airport Auto	416	-120	168	-37
2015	Quesnel Airport Auto	501	-35	233	28

In August 2015, a new optical precipitation sensor (Optical Scientific Inc. ORS-815-DS) was installed within West Quesnel at Station 31 on Dixon Street north of Lewis Drive. This sensor will allow near real-time measurement of local precipitation (rain and snow events) intensity and duration within the West Quesnel Land Stability Program area. Data from this sensor will be utilized in reporting from 2016 onwards.

8.0 TRENDS & CORRELATIONS

Selected typical data from different types of instrumentation was plotted to determine if any general trends or correlations were apparent. Although the availability of relatively comprehensive data sets across the study area has been phased in between 2007 and 2012, several trends can be identified, and are discussed below. Charts illustrating the data comparisons are presented in Appendix G.

8.1 PRECIPITATION EFFECT ON GROUNDWATER

Figure G1, depicts total monthly precipitation compared to general groundwater pressures (elevations) at selected VWP sensors. Reviewing the collected data it is apparent that a significant natural seasonal rise in groundwater elevations occurs just after the winter season (during the freshet) each year. These seasonal rise patterns are more obvious on some instruments than others and can be artificially influenced by drainage systems and/or utility leaks. In general the natural groundwater increases are observed to occur either gradually (e.g. as depicted by VWP 14A) or relatively rapidly (e.g. VWP 15A and VWP 39B). Examples of more subdued seasonal responses (VWP 9A and VWP 10C) and little or no apparent spring freshet response (VWP 4) are also depicted on Figure G1. The freshet response at a particular location is highly dependent on local soil/rock permeability and precipitation accumulated over the preceding winter months. Shortly after the freshet increase, a gradual decrease in groundwater pressures can typically be observed. The rate of decrease is also dependent on soil/rock permeability and dissipation capacity within the overall regional groundwater system, but can also be influenced by the connectivity to the natural hydro-geologic environment and/or artificial dewatering systems.

An example of the apparent influence of the 2012 subsurface dewatering system is shown in the data plot for VWP 10C. Prior to activation of PW14, a natural but muted seasonal variation in groundwater pressure at VWP 10C can be seen in the winter of 2011 and 2012. In the spring of 2013, the natural groundwater fluctuation pattern observed for VWP 10C was interrupted by a sharp drop in groundwater pressure followed by a gradual stabilization and resumption of an even more subdued seasonal variation pattern approximately 5 m below the previous elevation. The interruption of the previous natural pattern coincided with the activation of nearby pumping well PW14, and the gradual decrease since then is considered attributable to the ongoing dewatering effects of this well.

There is also likely an over-riding time-lag effect of infiltration of previous rainfall or snow melt (during frozen/non-frozen and dry/saturated ground conditions) which likely influences groundwater pressures. There may also be additional factors operating such as infiltration variability depending on surface moisture conditions and near surface groundwater conditions, lawn watering, variable losses from sewers and water systems and other unknown factors. In addition, in some landslide masses, the degree of infiltration has been found to vary with ongoing ground movement over time, as internal flow paths, tension cracks and shear zones change as movement occurs.

On review of the 2015 data from the operating groundwater instruments, the observed natural seasonal spring increase in background groundwater pressures for instruments unlikely to have been affected by dewatering systems appeared to be higher than in previous years and in some places was the highest observed to date during our monitoring program (e.g. VWP 14A and VWP 39B). This correlates with the higher antecedent total precipitation, early melt and higher flow rates in wells and horizontal drains observed in the spring of 2015.

8.2 PRECIPITATION EFFECT ON GROUND MOVEMENT

Previous AmecFW reports describe a general and expected correlation between periods of higher precipitation and subsequently increased ground movements as measured by quarterly or annual GPS surveys. As noted in previous annual reports, there also appears to be a time-lag between increased precipitation and resulting ground movement, likely due to the delayed effect on groundwater pressures from the location, timing, type and amount of precipitation as noted above. Figure G2, updated for 2015, illustrates this time-lag effect between total movement in any given year and the total amount of antecedent precipitation (i.e. that occurring in the previous November to April) prior to the movement. Although still a fairly general and simplistic correlation made with limited available data, it is clear that up until 2012 there was a good correlation between movements and the amount of antecedent precipitation, i.e. whenever the total antecedent precipitation was higher than about 150 mm for one or two years then the annual ground movement would be typically in excess of 50 mm. However, starting in 2013 the antecedent rainfall has been consistently above 150 mm but the observed movement has been less than 25 mm. This break in the historic pattern is attributed to the early effects of the subsurface dewatering system coming on line in late 2012 and early 2013.

Beginning in the fall of 2012, more detailed (daily) ground movement data from IPI instruments (as opposed to quarterly GPS surveys) became available. Figure G3 depicts detailed plots of cumulative ground movements (as determined from horizontal GPS movement and daily IPI data) against daily precipitation and temperature. The majority of movement was observed to occur over very short and discrete intervals, mainly corresponding with a wetter season (freshet) but sometimes in response to significant rain storm events, especially when those storm events occurred during the freshet period when the ground was likely to still be saturated from seasonal snow melt. Some movement may also be correlated with utility line breaks. However, not all rain storm events correspond with movement, and some movement events have also been observed to coincide with reports of significant water or sewer utility breaks.

The majority of the ground movement (detected by the IPI in SI16) in 2015 occurred in essentially two very short events during the spring freshet, totaling about 19 or 20 mm. That was followed by about another 4 or 5 mm of slow creeping movement observed in the latter half of 2015. The slightly higher amount of movement that was observed in 2015 as compared to 2013 and 2014 is also attributed to the increased antecedent precipitation and correspondingly higher natural groundwater pressures.

8.3 GROUNDWATER CORRELATION WITH GROUND MOVEMENT

While precipitation patterns can be shown to have a general influence on ground movement, typically it is actually the resulting groundwater pressures that more directly influence landslide movements. Previous AmecFW reports have described how increased groundwater pressures acting on a landslide failure surface reduce overall stability and potentially cause subsequent increases in ground movement. Figure G4 (similar to G3) depicts daily precipitation, ground movement (as determined from quarterly horizontal GPS surveys and daily IPI data) and daily groundwater elevation from a typical background groundwater instrument (VWP 14A) since September 2012. Even though ground movements for 2013 through 2015 are significantly reduced from previous years, a clear correlation still exists between the most significant movement events that do occur and the corresponding spring freshet groundwater pressure rises. Some unexpected small winter movement events were also noted to occur, however those were noted to correspond with reports of significant water main and sewer utility leaks.

Figure G5 presents a longer term plot of horizontal ground movement (GPS 98-17 and IPI 16B) versus typical background groundwater pressure (VWP 14A). Between 2007 and 2012 a clear pattern of increased ground movement and corresponding annual spring freshet groundwater pressure increases is evident, with the exception of 2010. During 2010 and 2011 there was a very subdued spring groundwater pressure rise (likely due to an extended period of significantly lower than normal antecedent precipitation), which also corresponded with a period of lesser movement. In 2012, there was a return to a more typical pattern of spring freshet groundwater pressure rises. While a significant amount of ground movement occurred in 2012, there has been appreciably less ground movement in 2013, 2014, and 2015 despite background seasonal groundwater pressures at or above elevations that would have been expected to trigger greater movements in previous years. This apparent change in the historic pattern is deemed to be due to the incremental effects of the subsurface dewatering works installed and initiated between mid 2012 and the spring of 2013.

9.0 CLOSURE

This report presents the results of the annual monitoring carried out by AmecFW for the 2015 calendar year. This report has been prepared for the exclusive use of the City of Quesnel and their representatives for specific application to West Quesnel Land Stability Program. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. AmecFW accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This report was prepared in accordance with generally accepted geotechnical engineering principles and practice. No other warranty, expressed or implied, is made.

Please do not hesitate to contact the undersigned at (250) 564-3243 should you have any questions or require further information.

Amec Foster Wheeler Environment & Infrastructure
A division of Amec Foster Wheeler Americas Limited

Reviewed by:

Luke Marquis, EIT
Geotechnical Engineer

Greg Reid, P. Eng. P. Geo, FEC FGC
Associate Geological Engineer

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. OSTRITCHENKO
40670
Feb 26, 2016

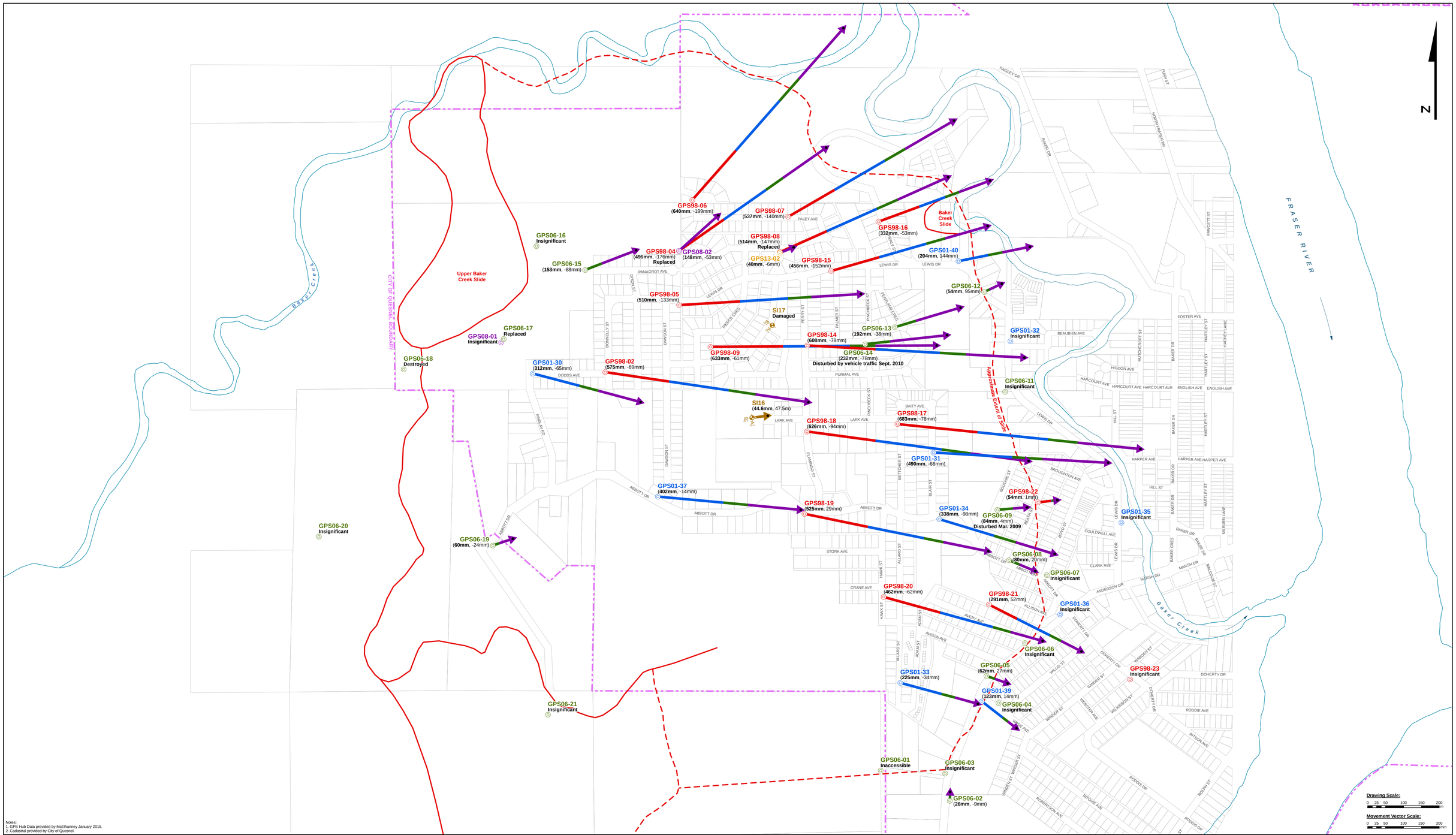
Dmitri Ostritchenko, P.Eng.
Geotechnical Engineer

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
N. C. POLYSOU
12974
2/26/16

Nick C. Polysou, P.Eng.
Senior Associate, Geotechnical Engineer

LIST OF FIGURES

Figure 1 Summary Plan of Ground Movement (GPS Hubs and Slope Inclinometers)
Figure 2 Total Horizontal Movement, September 1998 to December 2015
Figure 3 Total Horizontal Movement, December 2001 to December 2015
Figure 4 Total Horizontal Movement, November 2006 to December 2015
Figure 5 Total Vertical Movement, November 2006 to December 2015
Figure 6 Total 3D Movement, November 2006 to December 2015
Figure 7 Annual Horizontal Movement – 2007
Figure 8 Annual 3D Movement – 2007
Figure 9 Annual Horizontal Movement – 2008
Figure 10 Annual 3D Movement – 2008
Figure 11 Annual Horizontal Movement – 2009
Figure 12 Annual 3D Movement – 2009
Figure 13 Annual Horizontal Movement – 2010
Figure 14 Annual 3D Movement – 2010
Figure 15 Annual Horizontal Movement – 2011
Figure 16 Annual 3D Movement – 2011
Figure 17 Annual Horizontal Movement – 2012
Figure 18 Annual 3D Movement – 2012
Figure 19 Annual Horizontal Movement – 2013
Figure 20 Annual 3D Movement – 2013
Figure 21 Annual Horizontal Movement – 2014
Figure 22 Annual 3D Movement – 2014
Figure 23 Annual Horizontal Movement – 2015
Figure 24 Annual 3D Movement – 2015
Figure 25 Site Plan with Piezometers, Pumping Wells and Horizontal Drains
Figure 26 Groundwater Drawdown
Figure 27 2015 Pumping Well & Horizontal Drain Productivity



Notes:
1. GPS Hub Data provided by McElhanney January 2015.
2. Cadastral provided by City of Quesnel.

GPS Monitoring Dates

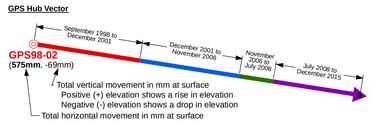
Initial September 1998				
#1 December 1998	#11 November 2003	#21 November 2008	#31 June 2011	#41 November 2013
#2 April 1999	#12 January 2005	#22 March 2009	#32 October 2011	#42 April 2014
#3 December 1999	#13 March 2006	#23 June 2009	#33 November 2011	#43 July 2014
#4 February 2000	#14 November 2006	#24 September 2009	#34 April 2012	#44 October 2014
#5 May 2000	#15 April 2007	#25 November 2009	#35 July 2012	#45 November 2014
#6 December 2000	#16 August 2007	#26 March 2010	#36 September 2012	#46 April 2015
#7 May 2001	#17 December 2007	#27 July 2010	#37 December 2012	#47 July 2015
#8 December 2001	#18 March 2008	#28 September 2010	#38 April 2013	#48 October 2015
#9 May 2002	#19 June 2008	#29 November 2010	#39 July 2013	#49 December 2015
#10 October 2002	#20 August 2008	#30 April 2011	#40 October 2013	#50

Legend

GPS Hubs Installed

- September 1998
- December 2001
- November 2006
- June 2008
- November 2013

GPS Hub Vector

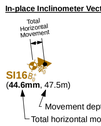


In-place Inclinometer Initialized

SI16 (44.6mm, 47.5m) (September 20, 2012)

SI17 Damaged (October 16, 2013)

In-place Inclinometer Vector



Slide Extent

Slide Extent (Approximate)

West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler
Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9

amec foster wheeler

DWN BY:	BB
CHK'D BY:	LM
DATUM:	NAD 83
PROJECTION:	UTM Zone 10
SCALE:	1:5,000

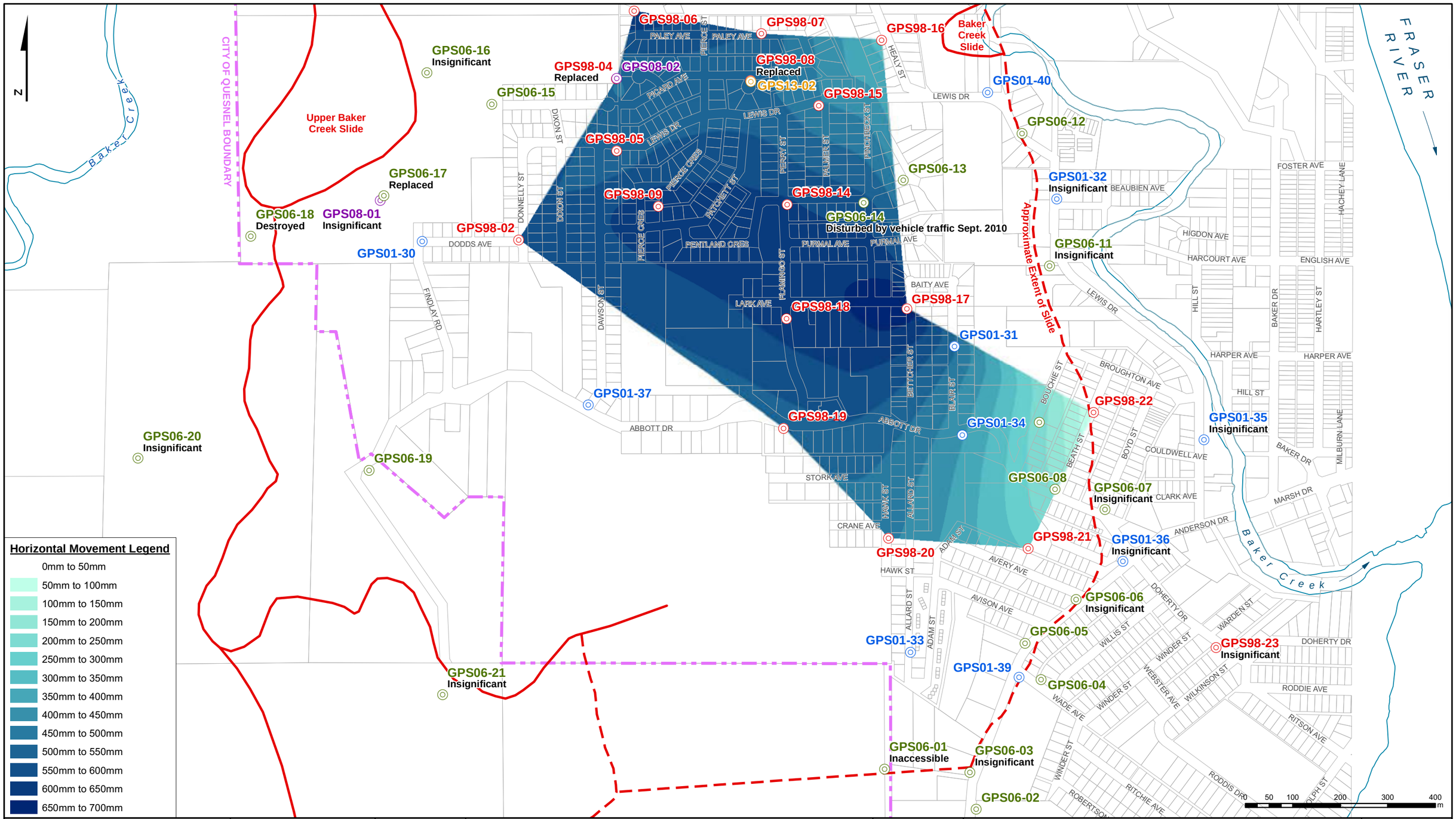
TITLE: SUMMARY PLAN OF GROUND MOVEMENT (GPS HUBS AND SLOPE INCLINOMETERS)

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM QUESNEL, BC

DATE:	FEBRUARY 2016
PROJECT NO.:	KX0439744
REV NO.:	A
	FIGURE 1

S:\Internal\KX04397-WQLS-GIS\0_KX0439744.6\KX0439744.6-Figure01-SummaryPlanOfGroundMovement-Dec2015.mxd

This drawing was originally produced in colour.



Horizontal Movement Legend

- 0mm to 50mm
- 50mm to 100mm
- 100mm to 150mm
- 150mm to 200mm
- 200mm to 250mm
- 250mm to 300mm
- 300mm to 350mm
- 350mm to 400mm
- 400mm to 450mm
- 450mm to 500mm
- 500mm to 550mm
- 550mm to 600mm
- 600mm to 650mm
- 650mm to 700mm

Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY: BB
CHK'D BY: LM
DATUM: NAD 83
PROJECTION: UTM Zone 10
SCALE: 1:7,500

TITLE: TOTAL HORIZONTAL MOVEMENT SEPTEMBER 1998 TO DECEMBER 2015 FOR THE 1998 GPS HUBS

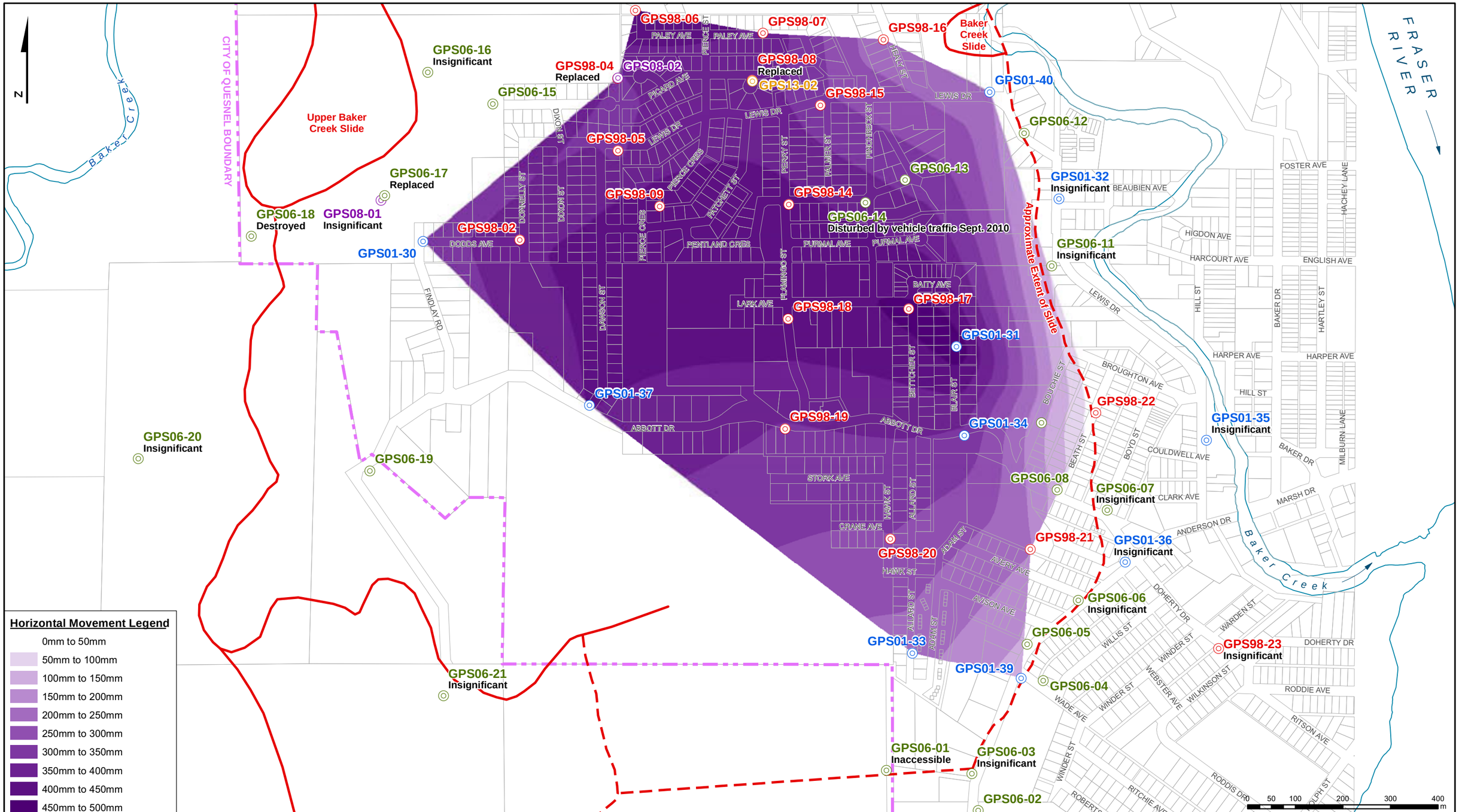
PROJECT: WEST QUESNEL LAND STABILITY PROGRAM QUESNEL, BC

DATE: FEBRUARY 2016
PROJECT NO.: KX0439744
REV NO.: A

FIGURE 2

S:\Internal\KX04397-WQLS-GIS\0_KX0439744.6\KX0439744.6-Figure02-HMove-Sept98-Dec15-98Hubs.mxd

This drawing was originally produced in colour.



Legend

- Slide Extent
- Slide Extent (Approximate)

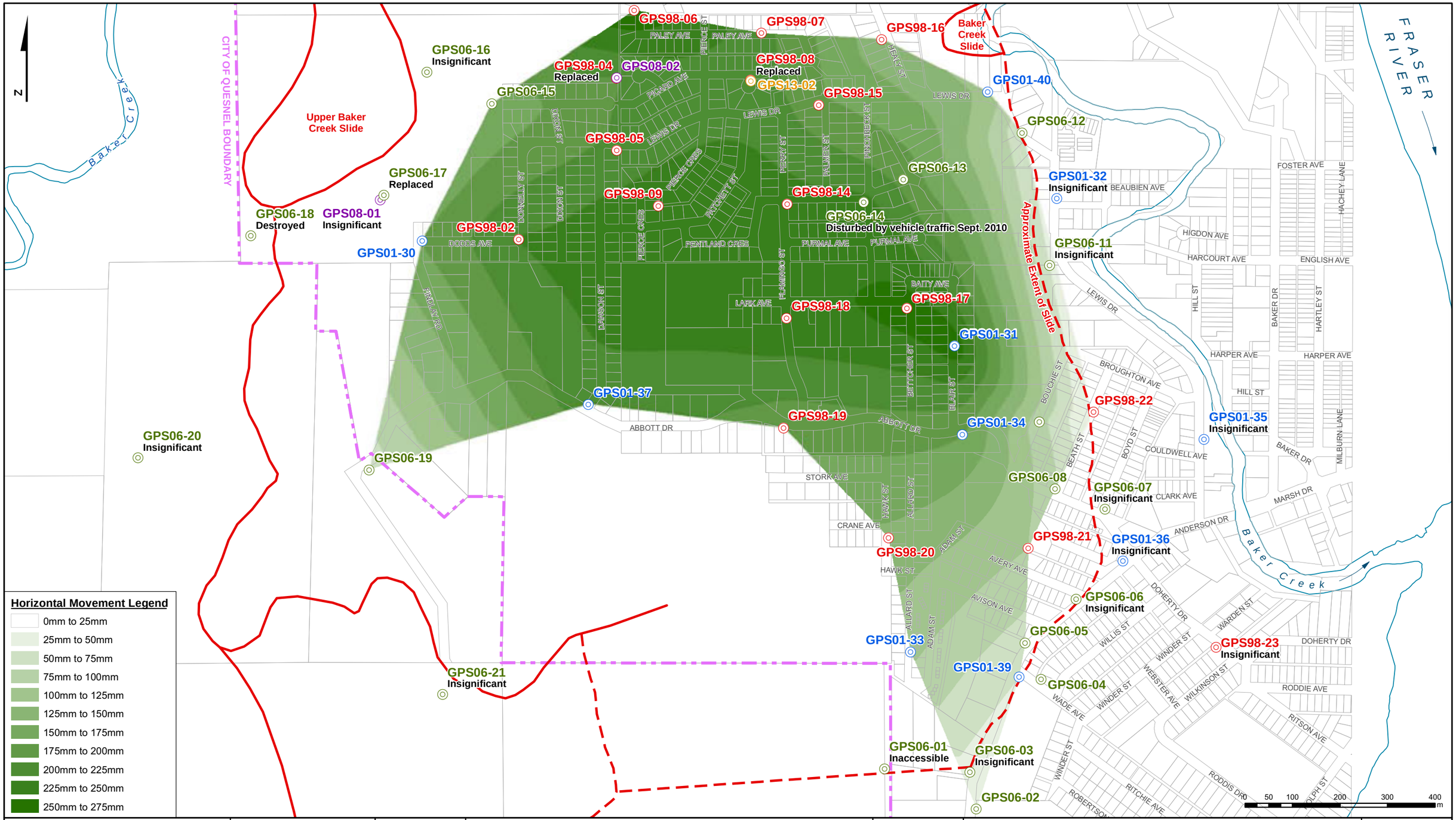
West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL	DWN BY: BB	TITLE: TOTAL HORIZONTAL MOVEMENT DECEMBER 2001 TO DECEMBER 2015 FOR THE 1998 AND 2001 GPS HUBS	DATE: FEBRUARY 2016
	CHK'D BY: LM		PROJECT NO.: KX0439744
Amec Foster Wheeler Environment & Infrastructure 3456 Opie Crescent Prince George, BC, CANADA V2N 2P9 Tel. (250) 564-3243 Fax (250) 562-7045	DATUM: NAD 83	PROJECT: WEST QUESNEL LAND STABILITY PROGRAM QUESNEL, BC	REV NO.: A
	PROJECTION: UTM Zone 10		FIGURE 3
	SCALE: 1:7,500		

S:\Internal\KX04397-WQLS-GIS\0_KX0439744.6\KX0439744.6-Figure03-HMove-Dec01-Dec15-98-01Hubs.mxd

This drawing was originally produced in colour.



Horizontal Movement Legend

- 0mm to 25mm
- 25mm to 50mm
- 50mm to 75mm
- 75mm to 100mm
- 100mm to 125mm
- 125mm to 150mm
- 150mm to 175mm
- 175mm to 200mm
- 200mm to 225mm
- 225mm to 250mm
- 250mm to 275mm

Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY: BB
CHK'D BY: LM
DATUM: NAD 83
PROJECTION: UTM Zone 10
SCALE: 1:7,500

TITLE: TOTAL HORIZONTAL MOVEMENT NOVEMBER 2006 TO DECEMBER 2015 FOR THE 1998, 2001 AND 2006 GPS HUBS

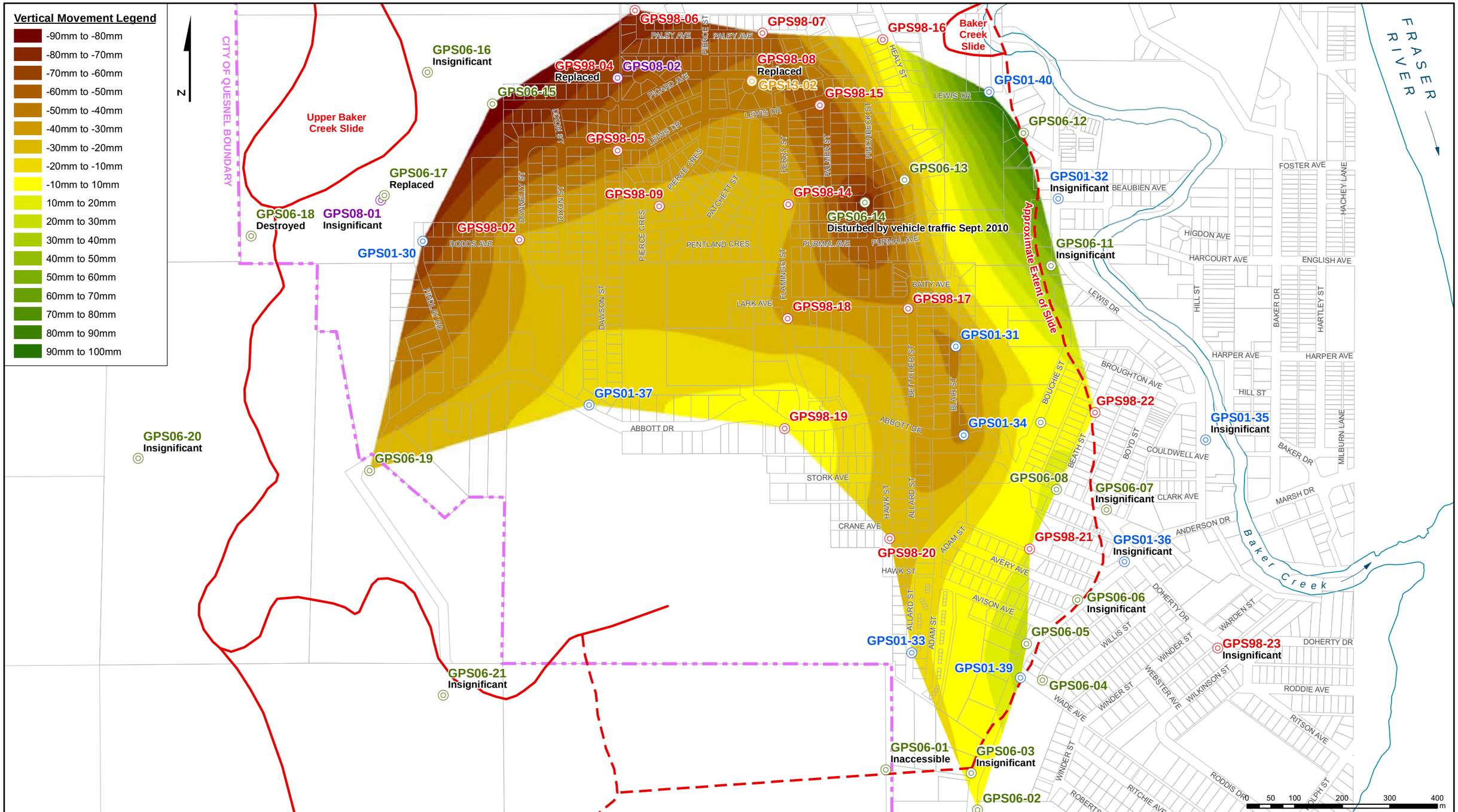
PROJECT: WEST QUESNEL LAND STABILITY PROGRAM QUESNEL, BC

DATE: FEBRUARY 2016
PROJECT NO.: KX0439744
REV NO.: A

FIGURE 4

S:\Internal\KX04397-WQLS-GIS\0_KX0439744.6\KX0439744.6-Figure04-HMove-Nov06-Dec15-AllHubs.mxd

This drawing was originally produced in colour.



Legend

- Slide Extent
- Slide Extent (Approximate)

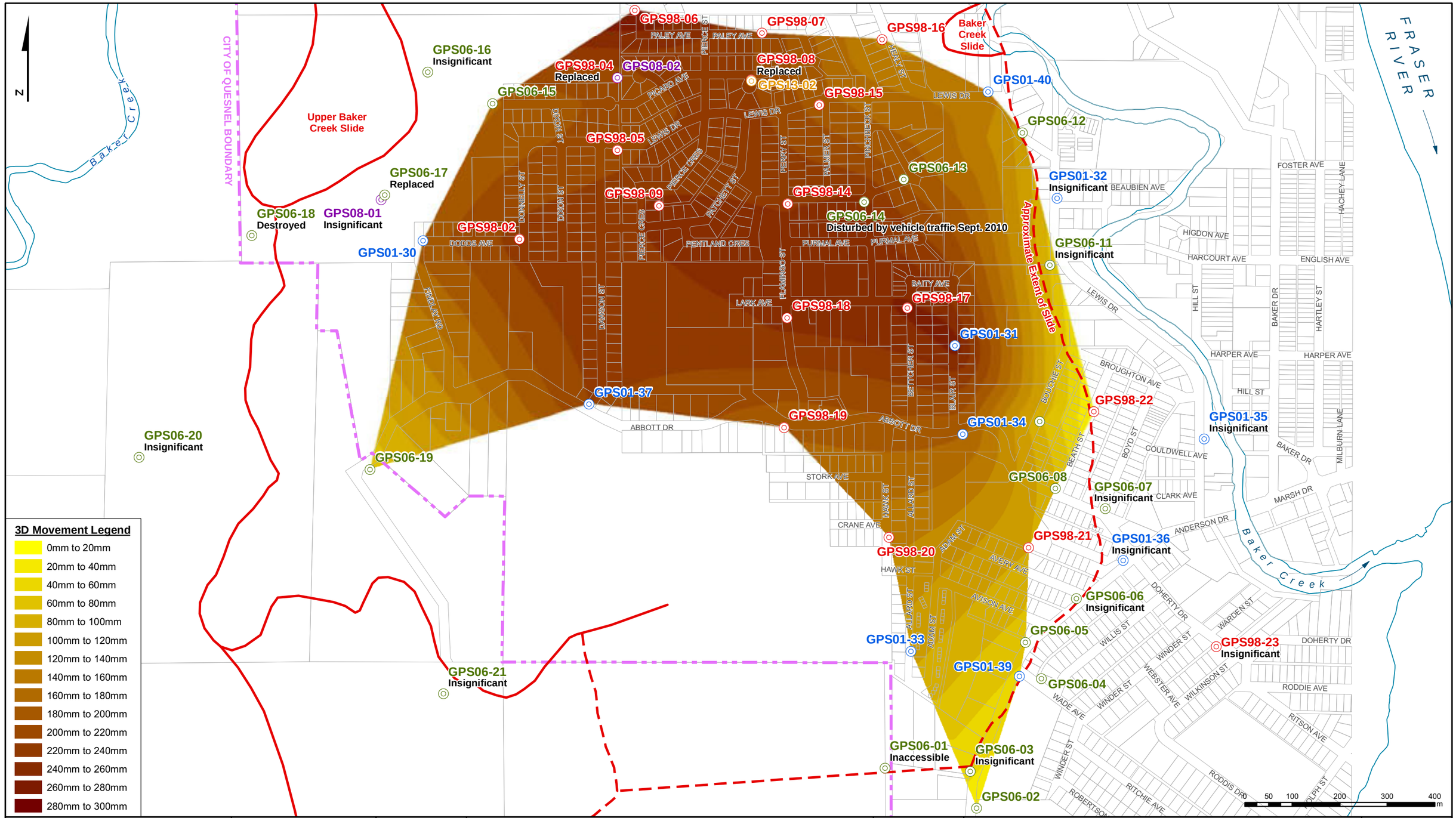
West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL	DWN BY: BB	TITLE: TOTAL VERTICAL MOVEMENT NOVEMBER 2006 TO DECEMBER 2015 FOR THE 1998, 2001 AND 2006 GPS HUBS	DATE: FEBRUARY 2016
	CHK'D BY: LM		PROJECT NO.: KX0439744
Amec Foster Wheeler Environment & Infrastructure 3456 Opie Crescent Prince George, BC, CANADA V2N 2P9 Tel. (250) 564-3243 Fax (250) 562-7045	DATUM: NAD 83	PROJECT: WEST QUESNEL LAND STABILITY PROGRAM QUESNEL, BC	REV NO.: A
	PROJECTION: UTM Zone 10		FIGURE 5
	SCALE: 1:7,500		

S:\Internal\KX04397-WQLS-GIS\0_KX0439744.6\KX0439744.6-Figure05-VMove-Nov06-Dec15-AllHubs.mxd

This drawing was originally produced in colour.



3D Movement Legend

- 0mm to 20mm
- 20mm to 40mm
- 40mm to 60mm
- 60mm to 80mm
- 80mm to 100mm
- 100mm to 120mm
- 120mm to 140mm
- 140mm to 160mm
- 160mm to 180mm
- 180mm to 200mm
- 200mm to 220mm
- 220mm to 240mm
- 240mm to 260mm
- 260mm to 280mm
- 280mm to 300mm

Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY:	BB
CHK'D BY:	LM
DATUM:	NAD 83
PROJECTION:	UTM Zone 10
SCALE:	1:7,500

TITLE: TOTAL 3D MOVEMENT
NOVEMBER 2006 TO DECEMBER 2015
FOR THE 1998, 2001 AND 2006 GPS HUBS

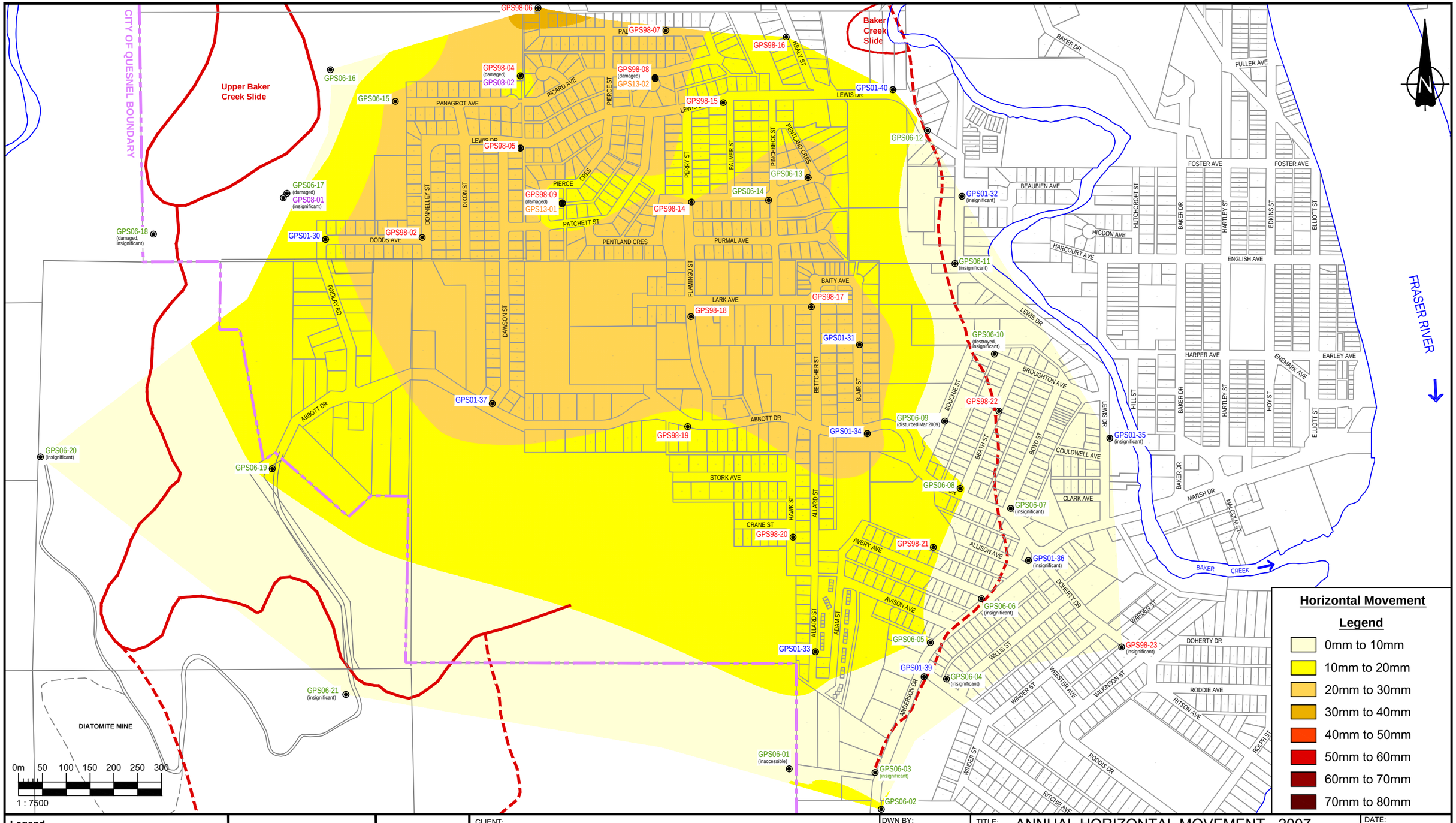
PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	FEBRUARY 2016
PROJECT NO.:	KX0439744
REV NO.:	A

FIGURE 6

S:\Internal\KX04397-WQLS-GIS\0_KX0439744.6\KX0439744.6-Figure06-3DMove-Nov06-Dec15-AllHubs.mxd

This drawing was originally produced in colour.



Horizontal Movement Legend

- 0mm to 10mm
- 10mm to 20mm
- 20mm to 30mm
- 30mm to 40mm
- 40mm to 50mm
- 50mm to 60mm
- 60mm to 70mm
- 70mm to 80mm

Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY:	SR/BB
CHK'D BY:	LM
DATUM:	NAD83
PROJECTION:	UTM Zone 10
SCALE:	1:7 500

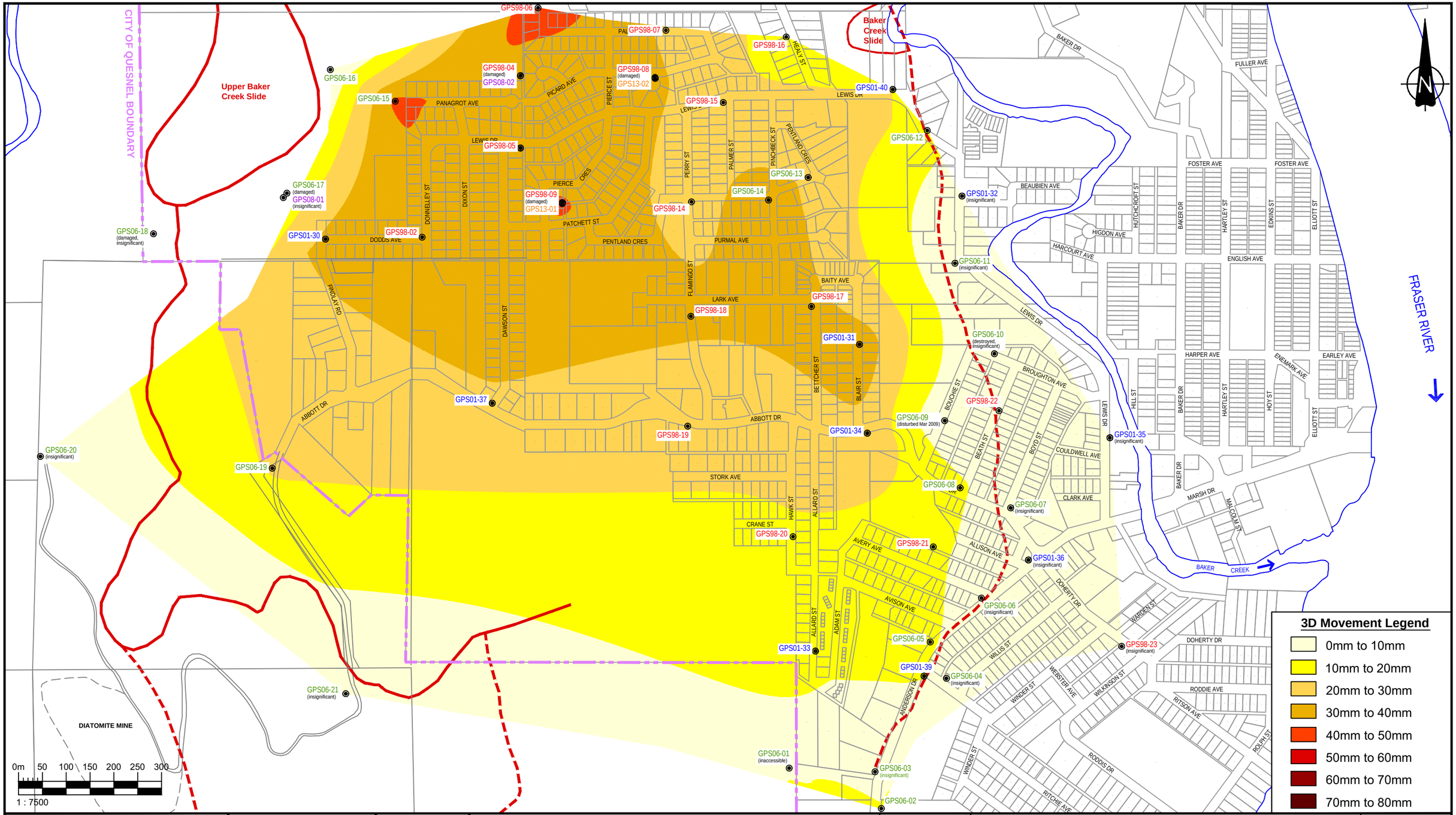
TITLE: ANNUAL HORIZONTAL MOVEMENT - 2007
NOVEMBER 2006 TO DECEMBER 2007
FOR THE 1998, 2001 AND 2006 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	FEBRUARY 2016
PROJECT NO:	KX0439744
REV. NO.:	A
FIGURE No.	FIGURE 7

C:\Users\ben.brown\appdata\local\temp\AcPublish_5172\KX0439744.6-Figure07-HMove-Nov06-Dec07-AllHubs.dwg - Figure7 - Feb. 10, 2016 10:39am - benjamin.brown

This drawing was originally produced in colour.



3D Movement Legend

- 0mm to 10mm
- 10mm to 20mm
- 20mm to 30mm
- 30mm to 40mm
- 40mm to 50mm
- 50mm to 60mm
- 60mm to 70mm
- 70mm to 80mm

Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY:	SR/BB
CHK'D BY:	LM
DATUM:	NAD83
PROJECTION:	UTM Zone 10
SCALE:	1:7 500

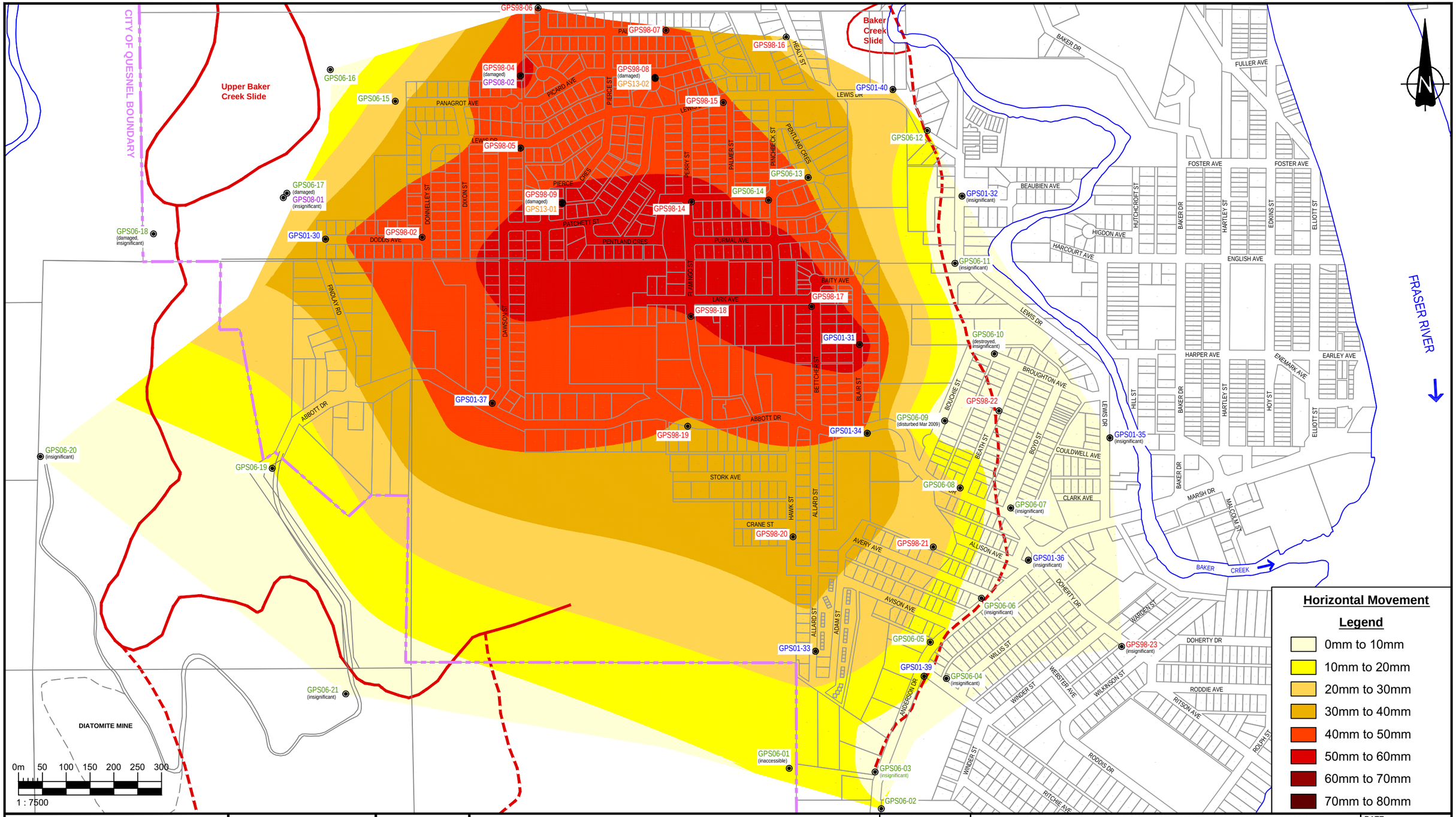
TITLE: ANNUAL 3D MOVEMENT - 2007
NOVEMBER 2006 TO DECEMBER 2007
FOR THE 1998, 2001 AND 2006 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	FEBRUARY 2016
PROJECT NO:	KX0439744
REV. NO.:	A
FIGURE No.	FIGURE 8

C:\Users\ben.brown\appdata\local\temp\AcPublish_5172\KX0439744.6-Figure08-3DMove-Nov06-Dec07-AllHubs.dwg - Figure8 - Feb. 10, 2016 10:41am - benjamin.brown

This drawing was originally produced in colour.



Horizontal Movement

Legend

- 0mm to 10mm
- 10mm to 20mm
- 20mm to 30mm
- 30mm to 40mm
- 40mm to 50mm
- 50mm to 60mm
- 60mm to 70mm
- 70mm to 80mm

Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY:	SR/BB
CHK'D BY:	LM
DATUM:	NAD83
PROJECTION:	UTM Zone 10
SCALE:	1:7 500

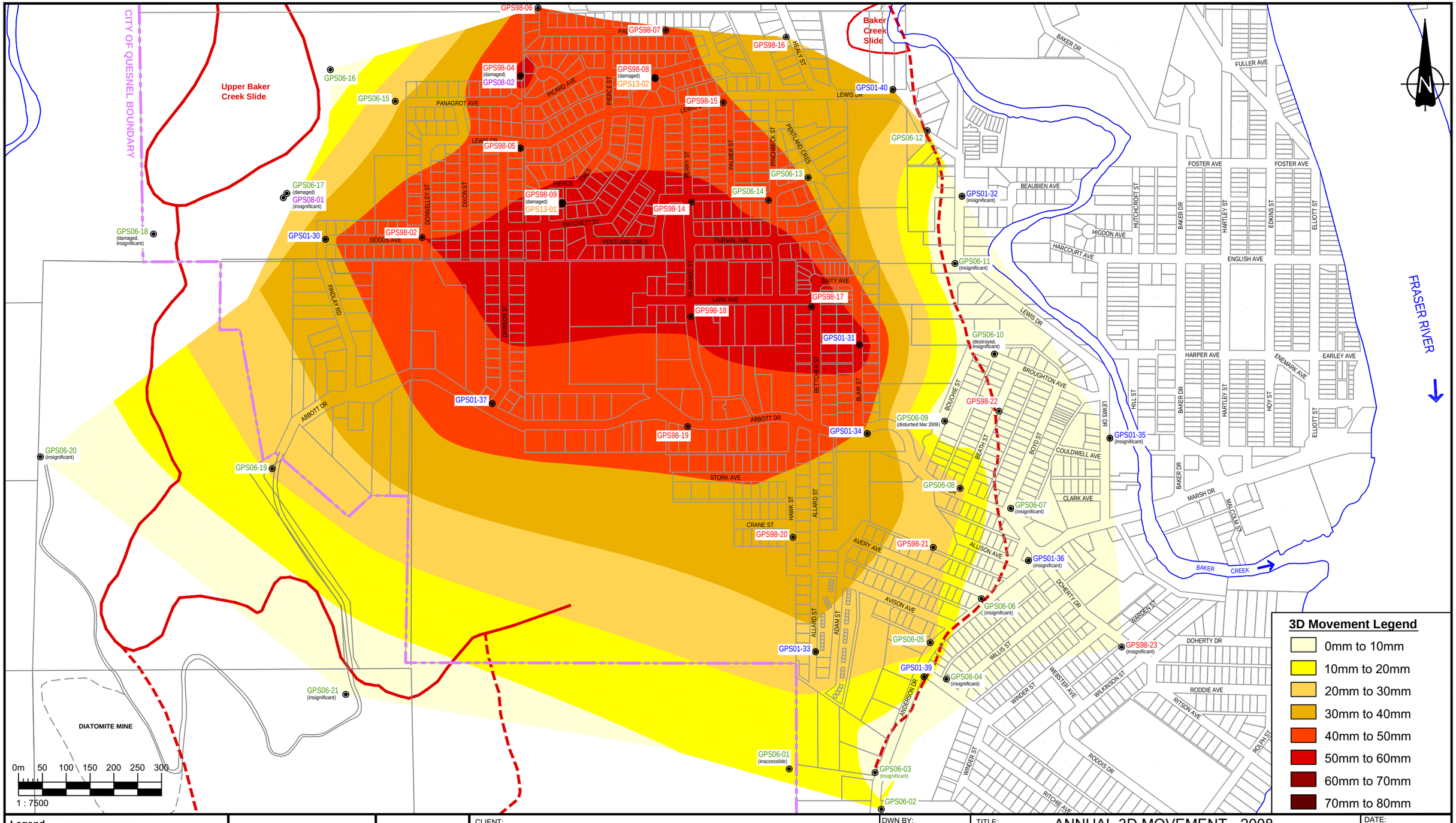
TITLE: ANNUAL HORIZONTAL MOVEMENT - 2008
DECEMBER 2007 TO NOVEMBER 2008
FOR THE 1998, 2001 AND 2006 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	FEBRUARY 2016
PROJECT NO:	KX0439744
REV. NO.:	A
FIGURE No.	FIGURE 9

C:\Users\ben.brown\appdata\local\temp\AcPublish_5172\KX0439744.6-Figure09-HMove-Dec07-Nov08-AllHubs.dwg - Figure9 - Feb. 10, 2016 10:43am - benjamin.brown

This drawing was originally produced in colour.



3D Movement Legend

- 0mm to 10mm
- 10mm to 20mm
- 20mm to 30mm
- 30mm to 40mm
- 40mm to 50mm
- 50mm to 60mm
- 60mm to 70mm
- 70mm to 80mm

Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY:	SR/BB
CHK'D BY:	LM
DATUM:	NAD83
PROJECTION:	UTM Zone 10
SCALE:	1:7 500

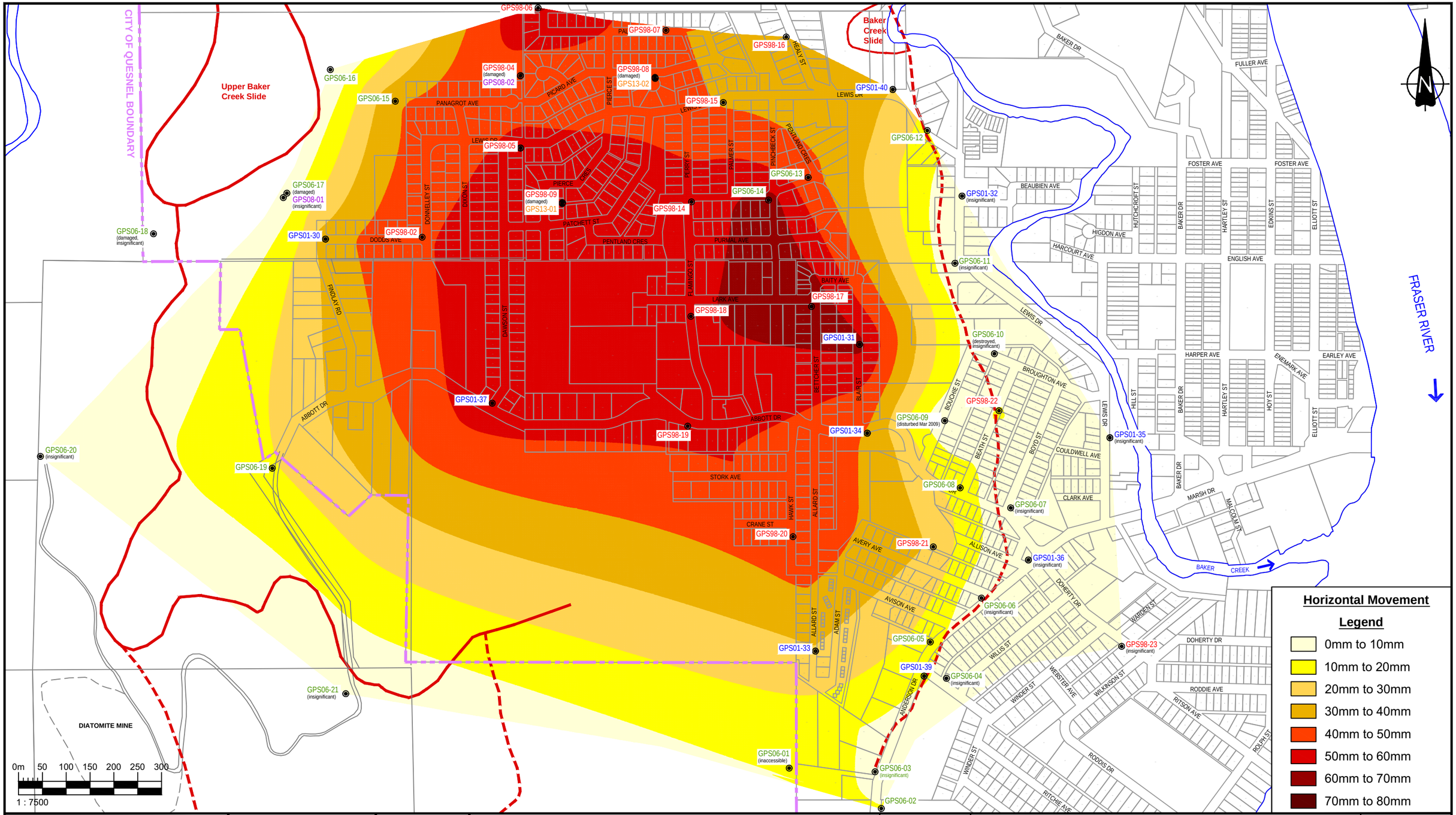
TITLE: ANNUAL 3D MOVEMENT - 2008
DECEMBER 2007 TO NOVEMBER 2008
FOR THE 1998, 2001 AND 2006 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	FEBRUARY 2016
PROJECT NO:	KX0439744
REV. NO.:	A
FIGURE No.	FIGURE 10

C:\Users\ben.brown\appdata\local\temp\AcPublish_5172\KX0439744.6-Figure10-3DMove-Dec07-Nov08-AllHubs.dwg - Figure10 - Feb. 10, 2016 10:46am - benjamin.brown

This drawing was originally produced in colour.



Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY:	SR/BB
CHK'D BY:	LM
DATUM:	NAD83
PROJECTION:	UTM Zone 10
SCALE:	1:7 500

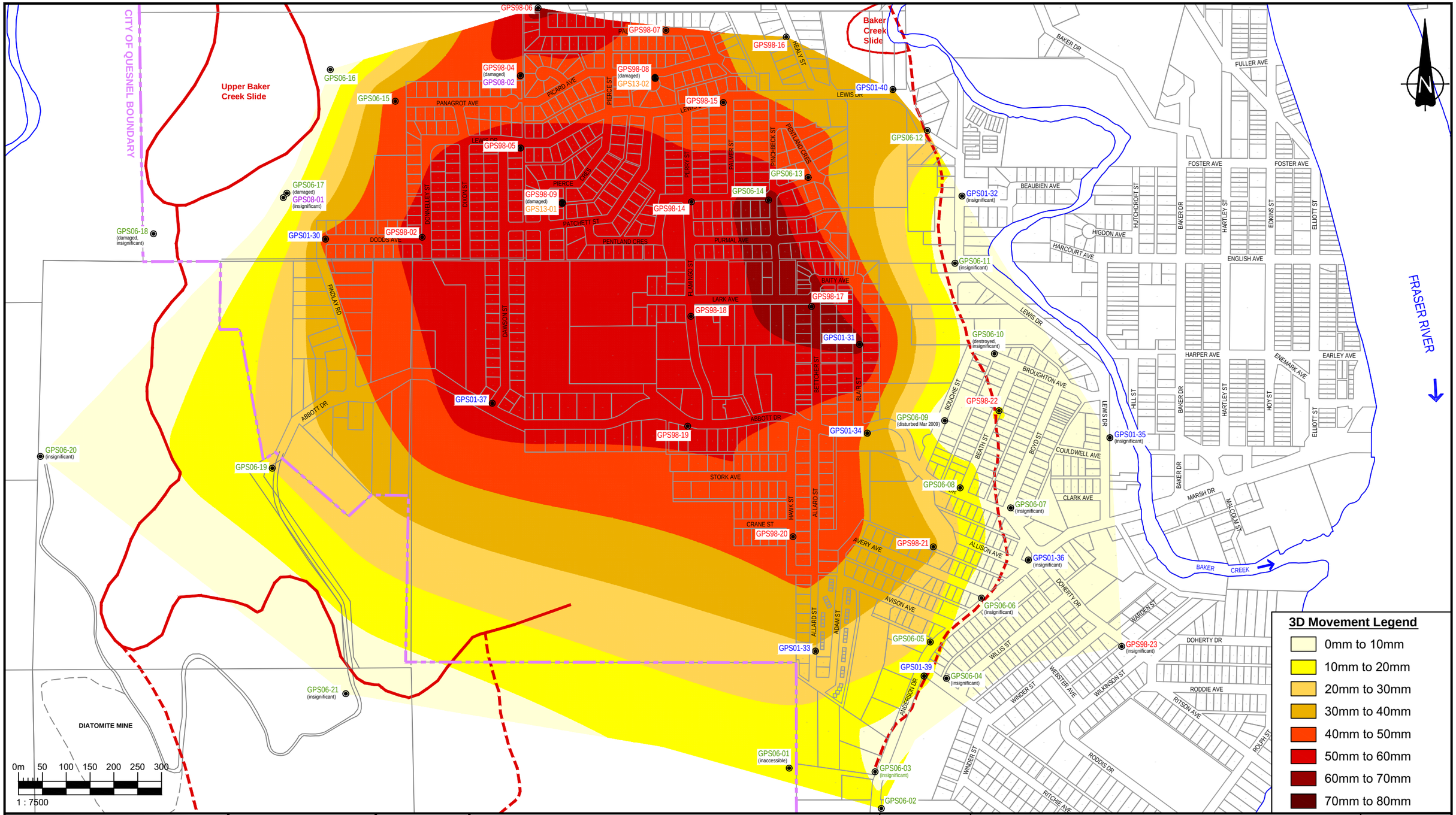
TITLE: ANNUAL HORIZONTAL MOVEMENT - 2009
NOVEMBER 2008 TO NOVEMBER 2009
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	FEBRUARY 2016
PROJECT NO:	KX0439744
REV. NO.:	A
FIGURE No.	FIGURE 11

C:\Users\ben.brown\appdata\local\temp\AcPublish_5172\KX0439744.6-Figure11-HMove-Nov08-Nov09-AllHubs.dwg - Figure11 - Feb. 10, 2016 10:48am - benjamin.brown

This drawing was originally produced in colour.



Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY:	SR/BB
CHK'D BY:	LM
DATUM:	NAD83
PROJECTION:	UTM Zone 10
SCALE:	1:7 500

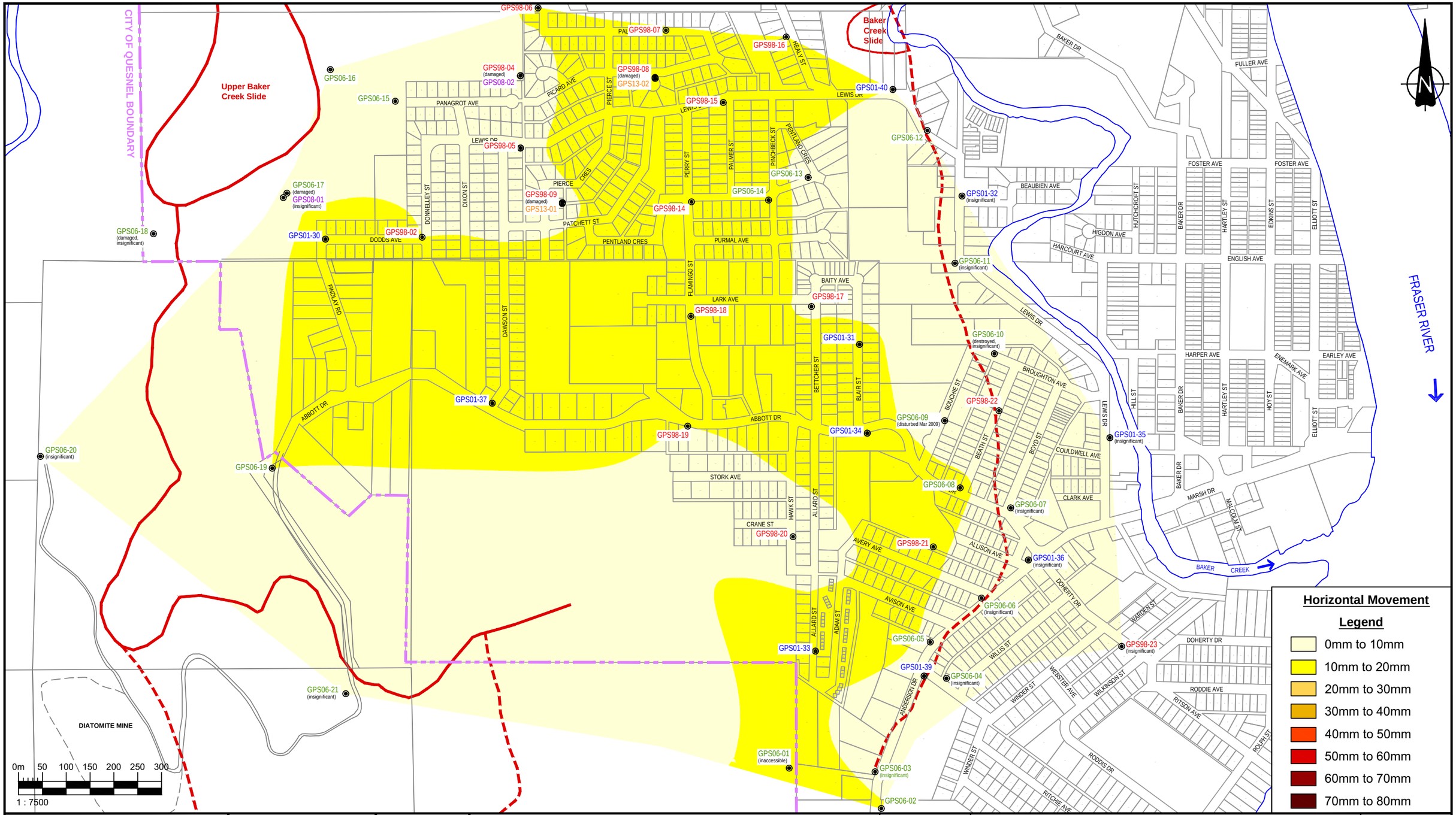
TITLE: ANNUAL 3D MOVEMENT - 2009
NOVEMBER 2008 TO NOVEMBER 2009
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	FEBRUARY 2016
PROJECT NO:	KX0439744
REV. NO.:	A
FIGURE No.	FIGURE 12

C:\Users\ben.brown\appdata\local\temp\AcPublish_5172\KX0439744.6-Figure12-3DMove-Nov08-Nov09-AllHubs.dwg - Figure12 - Feb. 10, 2016 10:50am - benjamin.brown

This drawing was originally produced in colour.



Horizontal Movement

Legend

- 0mm to 10mm
- 10mm to 20mm
- 20mm to 30mm
- 30mm to 40mm
- 40mm to 50mm
- 50mm to 60mm
- 60mm to 70mm
- 70mm to 80mm

Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY:	SR/BB
CHK'D BY:	LM
DATUM:	NAD83
PROJECTION:	UTM Zone 10
SCALE:	1:7 500

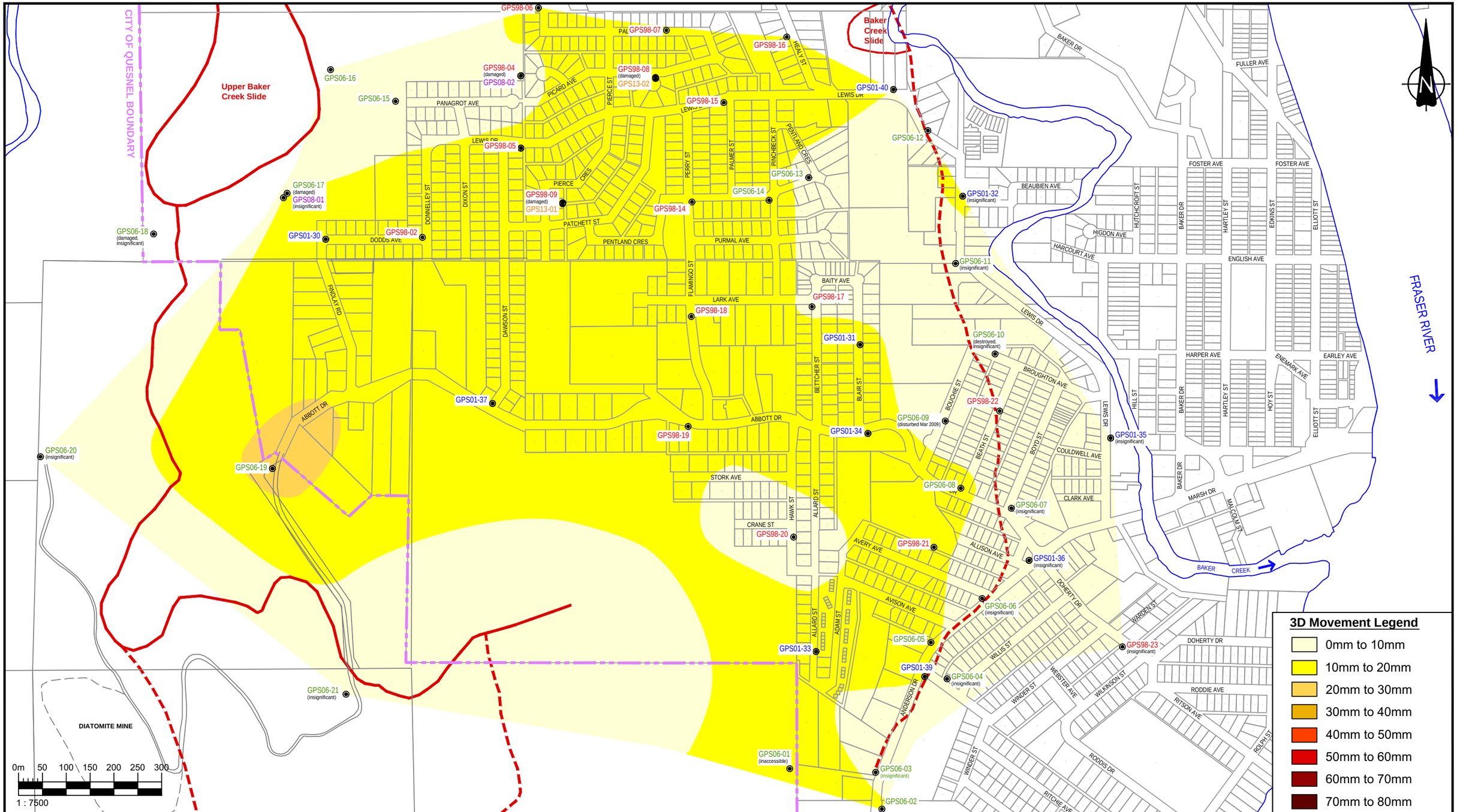
TITLE: ANNUAL HORIZONTAL MOVEMENT - 2010
NOVEMBER 2009 TO NOVEMBER 2010
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	FEBRUARY 2016
PROJECT NO:	KX0439744
REV. NO.:	A
FIGURE No.	FIGURE 13

C:\Users\ben.brown\appdata\local\temp\AcPublish_5172\KX0439744.6-Figure13-HMove-Nov09-Nov10-AllHubs.dwg - Figure13 - Feb. 10, 2016 10:52am - benjamin.brown

This drawing was originally produced in colour.



Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY:	SR/BB
CHK'D BY:	LM
DATUM:	NAD83
PROJECTION:	UTM Zone 10
SCALE:	1:7 500

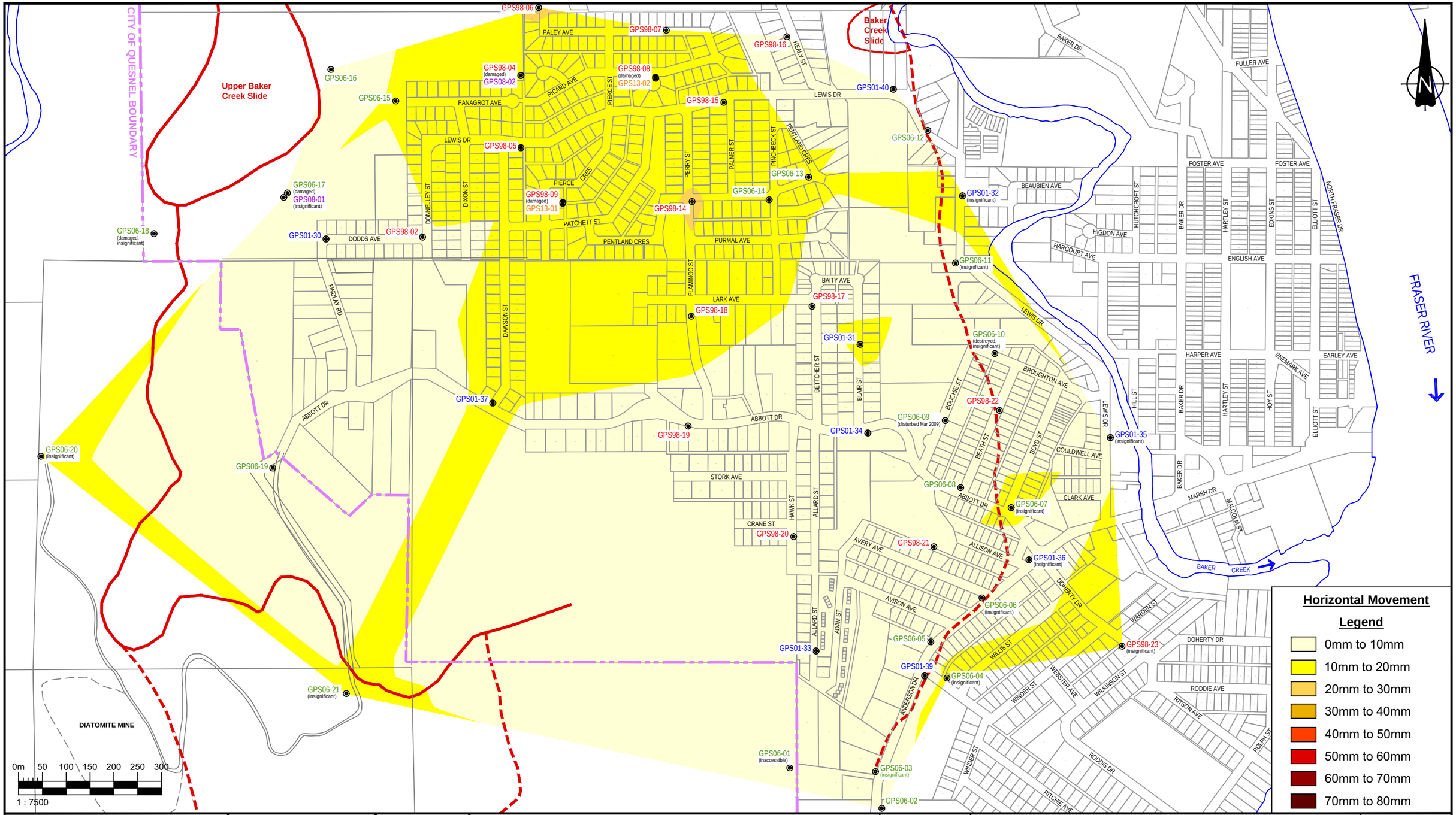
TITLE: ANNUAL 3D MOVEMENT - 2010
NOVEMBER 2009 TO NOVEMBER 2010
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	FEBRUARY 2016
PROJECT NO:	KX0439744
REV. NO.:	A
FIGURE No.	FIGURE 14

C:\Users\ben.brown\appdata\local\temp\AcPublish_5172\KX0439744.6-Figure14-3DMove-Nov09-Nov10-AllHubs.dwg - Figure14 - Feb. 10, 2016 10:56am - benjamin.brown

This drawing was originally produced in colour.



Horizontal Movement

Legend

- 0mm to 10mm
- 10mm to 20mm
- 20mm to 30mm
- 30mm to 40mm
- 40mm to 50mm
- 50mm to 60mm
- 60mm to 70mm
- 70mm to 80mm

Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY: BB
CHK'D BY: LM
DATUM: NAD83
PROJECTION: UTM Zone 10
SCALE: 1:7 500

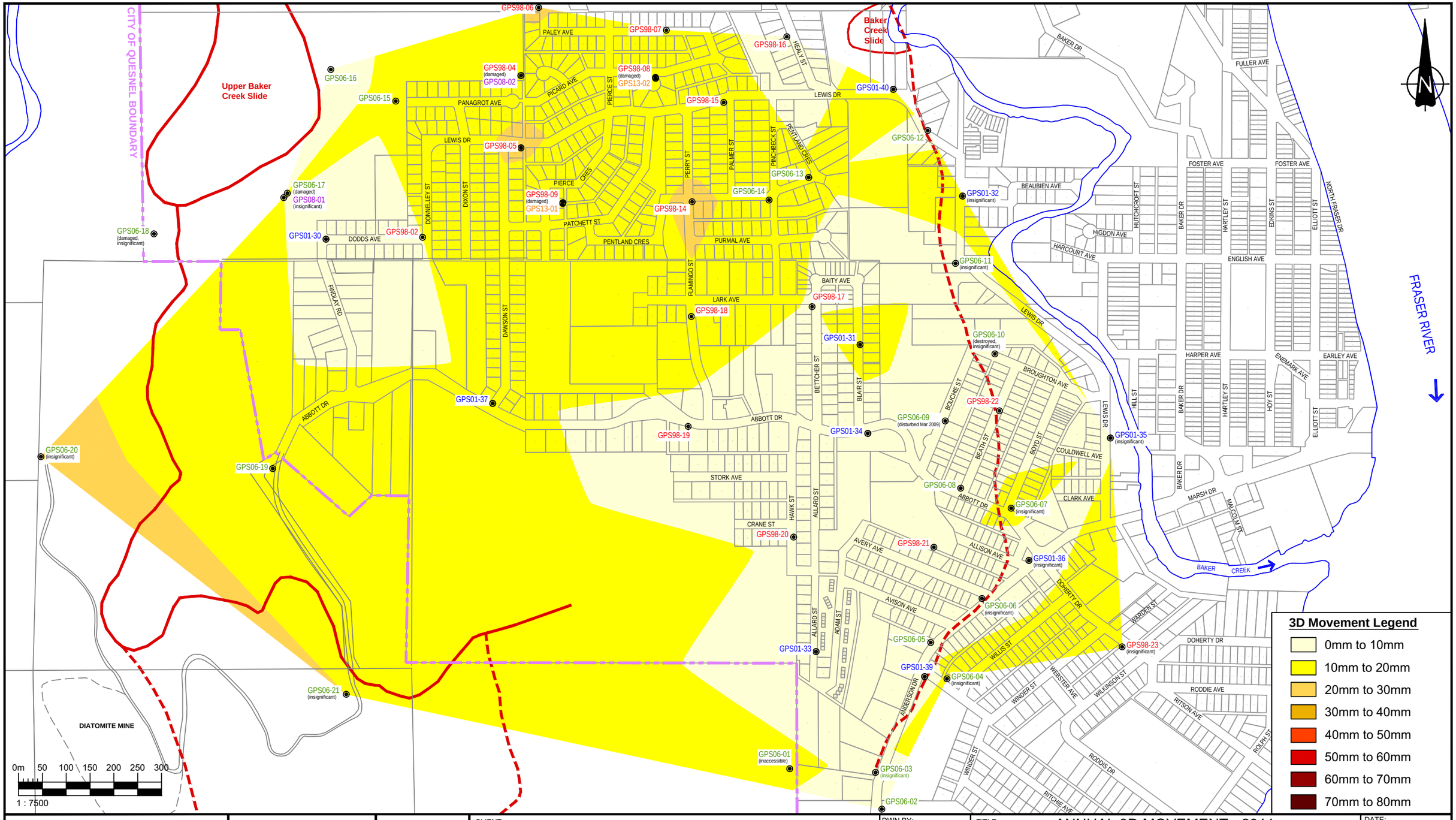
TITLE: ANNUAL HORIZONTAL MOVEMENT - 2011
NOVEMBER 2010 TO NOVEMBER 2011
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE: FEBRUARY 2016
PROJECT NO: KX0439744
REV. NO.: A
FIGURE No. FIGURE 15

C:\Users\ben.brown\appdata\local\temp\AcPublish_5172\KX0439744.6-Figure15-HMove-Nov10-Nov11-AllHubs.dwg - Figure15 - Feb. 10, 2016 10:59am - benjamin.brown

This drawing was originally produced in colour.



3D Movement Legend

- 0mm to 10mm
- 10mm to 20mm
- 20mm to 30mm
- 30mm to 40mm
- 40mm to 50mm
- 50mm to 60mm
- 60mm to 70mm
- 70mm to 80mm

Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY:	BB
CHK'D BY:	LM
DATUM:	NAD83
PROJECTION:	UTM Zone 10
SCALE:	1:7 500

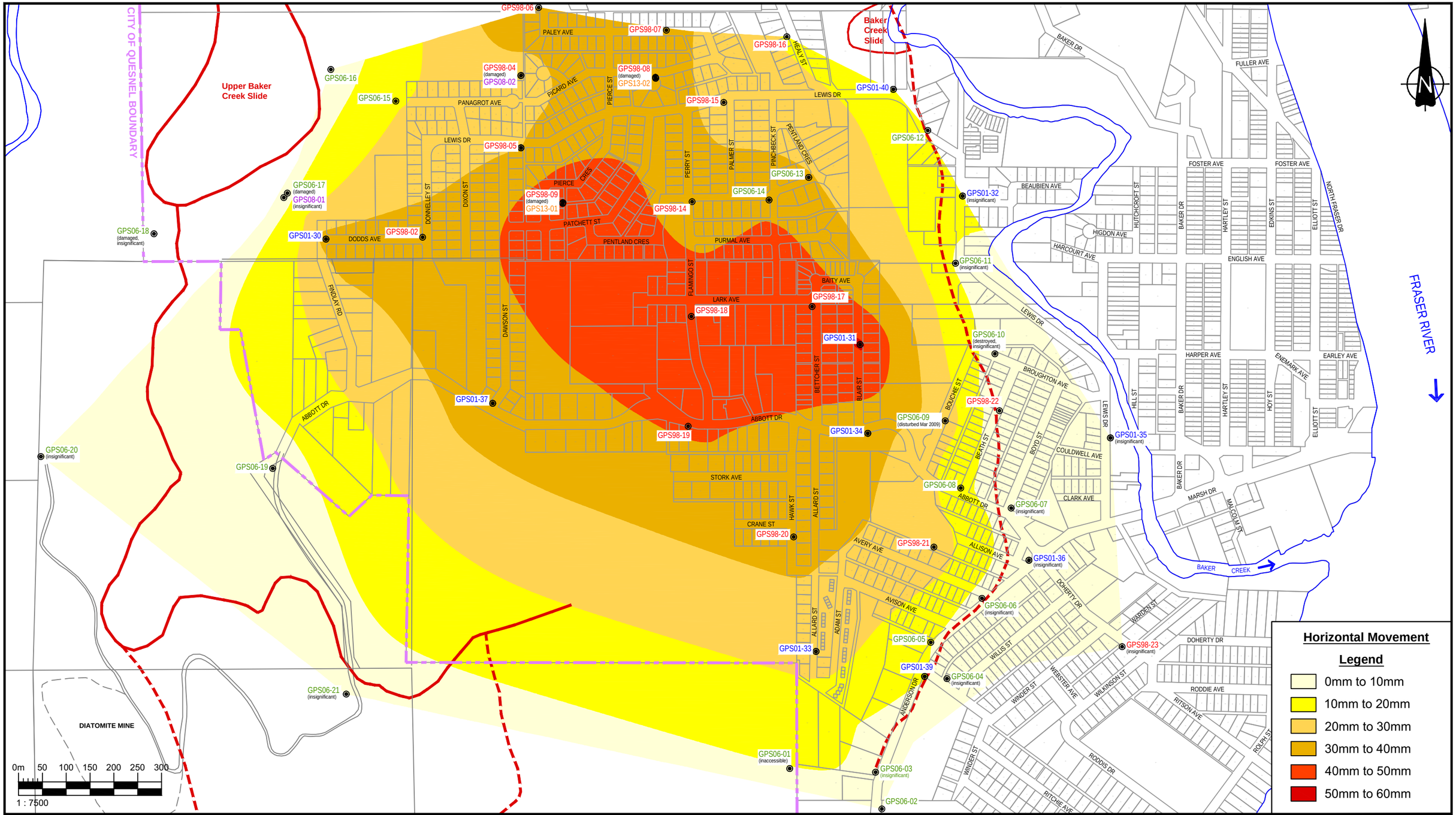
TITLE: ANNUAL 3D MOVEMENT - 2011
NOVEMBER 2010 TO NOVEMBER 2011
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	FEBRUARY 2016
PROJECT NO:	KX0439744
REV. NO.:	A
FIGURE No.	FIGURE 16

C:\Users\ben.brown\appdata\local\temp\AcPublish_5172\KX0439744.6-Figure16-3DMove-Nov10-Nov11-AllHubs.dwg - Figure16 - Feb. 10, 2016 11:01am - benjamin.brown

This drawing was originally produced in colour.



Legend

- Slide Extent
- Slide Extent (Approximate)

Horizontal Movement

Legend

- 0mm to 10mm
- 10mm to 20mm
- 20mm to 30mm
- 30mm to 40mm
- 40mm to 50mm
- 50mm to 60mm

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY:	BB
CHK'D BY:	LM
DATUM:	NAD83
PROJECTION:	UTM Zone 10
SCALE:	1:7 500

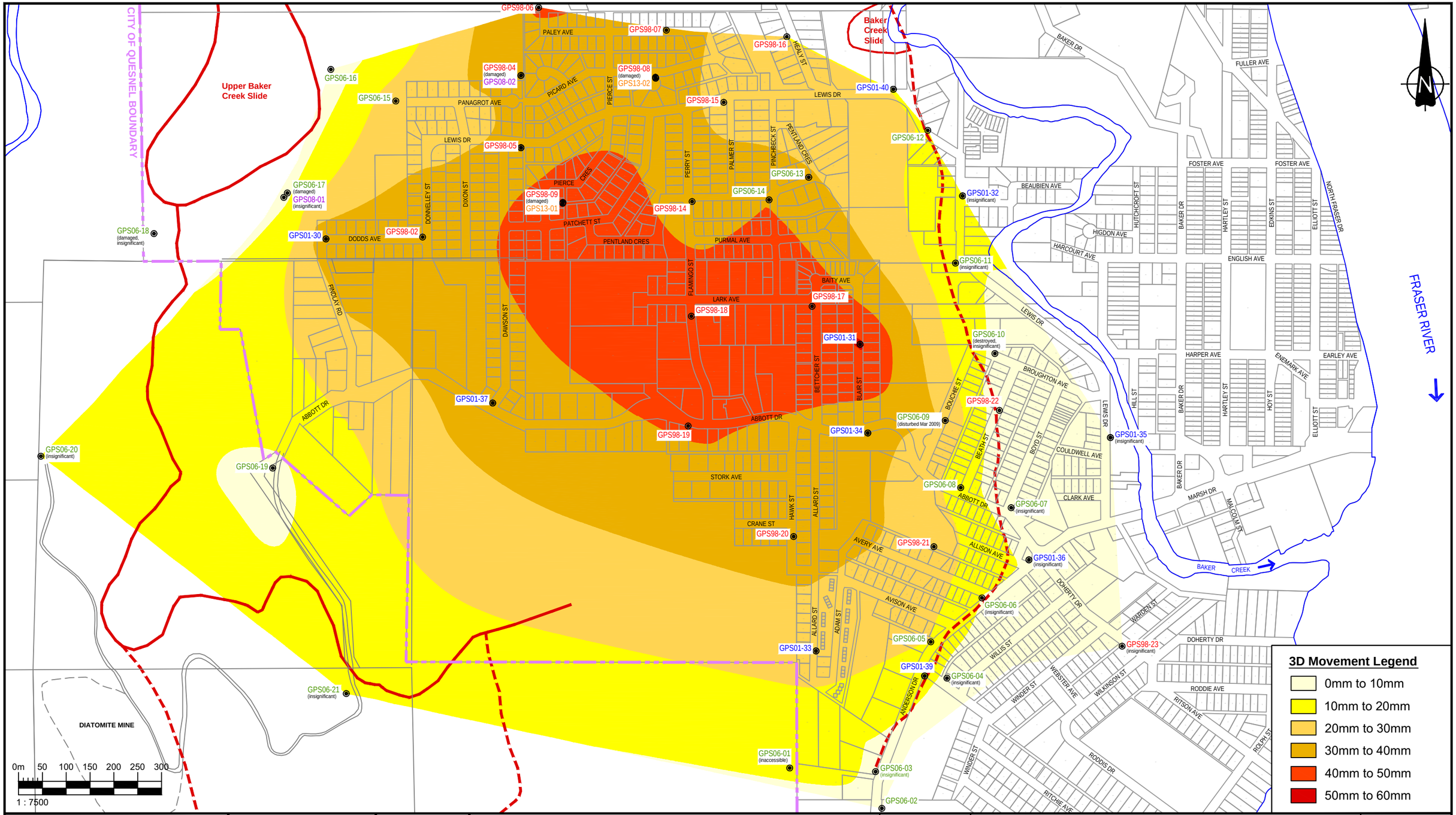
TITLE: ANNUAL HORIZONTAL MOVEMENT - 2012
NOVEMBER 2011 TO DECEMBER 2012
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	FEBRUARY 2016
PROJECT NO:	KX0439744
REV. NO.:	A
FIGURE No.	FIGURE 17

C:\Users\ben.brown\appdata\local\temp\AcPublish_5172\KX0439744.6-Figure17-HMove-Nov11-Dec12-AllHubs.dwg - Figure17 - Feb. 10, 2016 11:02am - benjamin.brown

This drawing was originally produced in colour.



3D Movement Legend

- 0mm to 10mm
- 10mm to 20mm
- 20mm to 30mm
- 30mm to 40mm
- 40mm to 50mm
- 50mm to 60mm

Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY:	BB
CHK'D BY:	LM
DATUM:	NAD83
PROJECTION:	UTM Zone 10
SCALE:	1:7 500

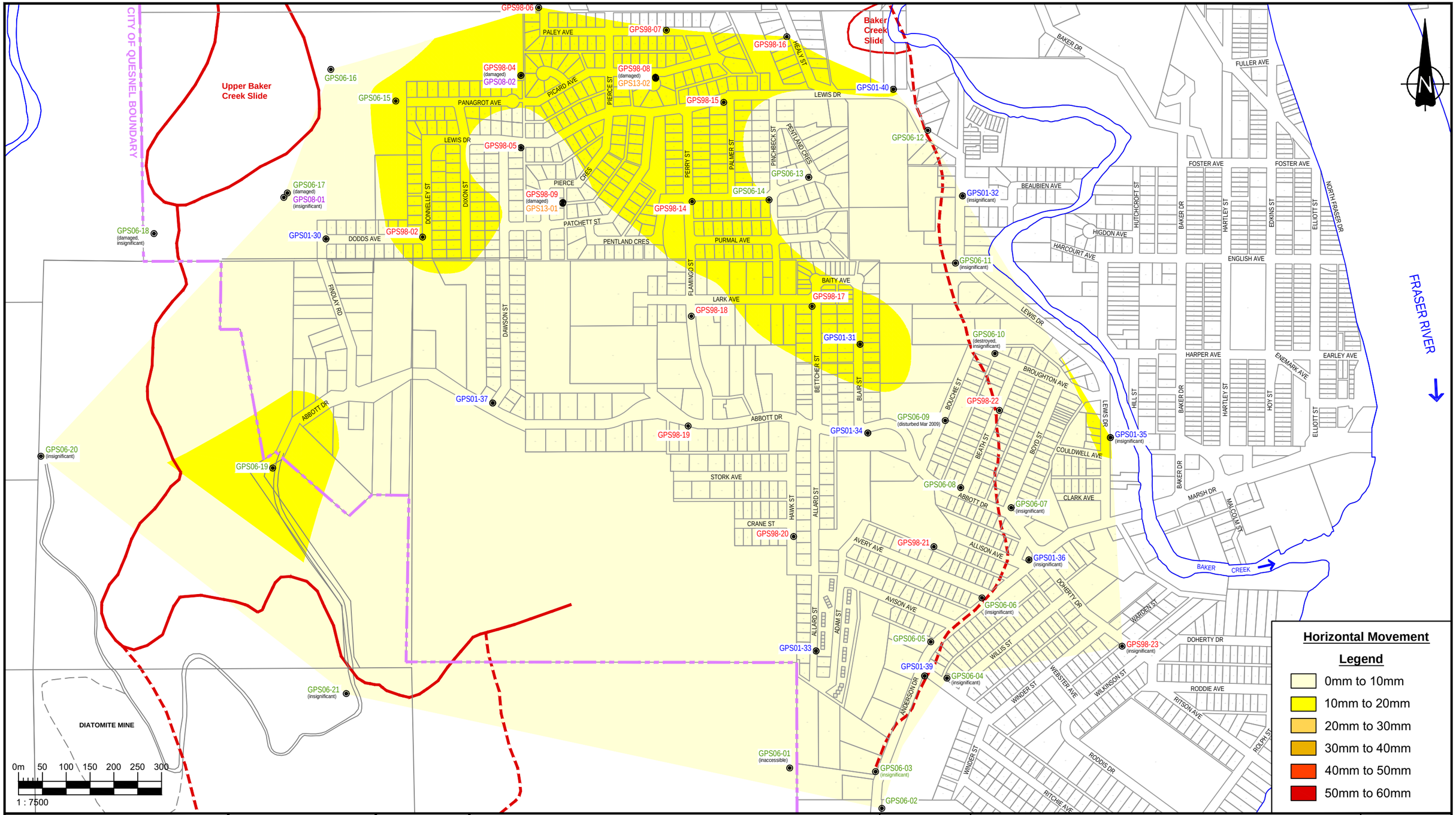
TITLE: ANNUAL 3D MOVEMENT - 2012
NOVEMBER 2011 TO DECEMBER 2012
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	FEBRUARY 2016
PROJECT NO:	KX0439744
REV. NO.:	A
FIGURE No.	FIGURE 18

C:\Users\ben.brown\appdata\local\temp\AcPublish_5172\KX0439744.6-Figure18-3DMove-Nov11-Dec12-AllHubs.dwg - Figure18 - Feb. 10, 2016 11:04am - benjamin.brown

This drawing was originally produced in colour.



Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY:	BB
CHK'D BY:	LM
DATUM:	NAD83
PROJECTION:	UTM Zone 10
SCALE:	1:7 500

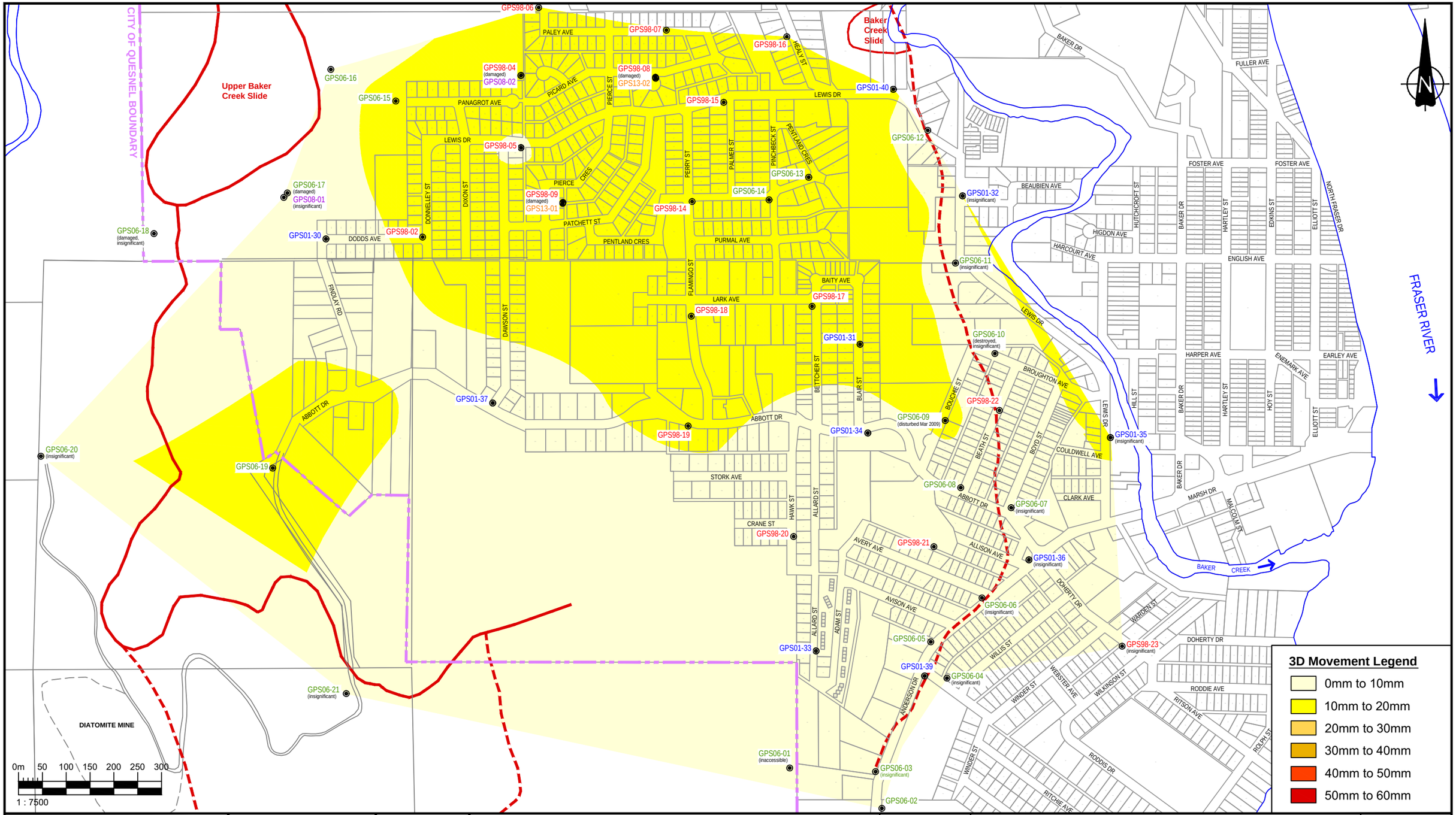
TITLE: ANNUAL HORIZONTAL MOVEMENT - 2013
NOVEMBER 2012 TO NOVEMBER 2013
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	FEBRUARY 2016
PROJECT NO:	KX0439744
REV. NO.:	A
FIGURE No.	FIGURE 19

S:\Internal\KX04397-WQLS-GIS\0_KX0439744.6\KX0439744.6-Figure19-HMove-Dec12-Nov13-AllHubs.dwg - Figure19 - Feb. 10, 2016 1:04pm - benjamin.brown

This drawing was originally produced in colour.



3D Movement Legend

- 0mm to 10mm
- 10mm to 20mm
- 20mm to 30mm
- 30mm to 40mm
- 40mm to 50mm
- 50mm to 60mm

Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY:	BB
CHK'D BY:	LM
DATUM:	NAD83
PROJECTION:	UTM Zone 10
SCALE:	1:7 500

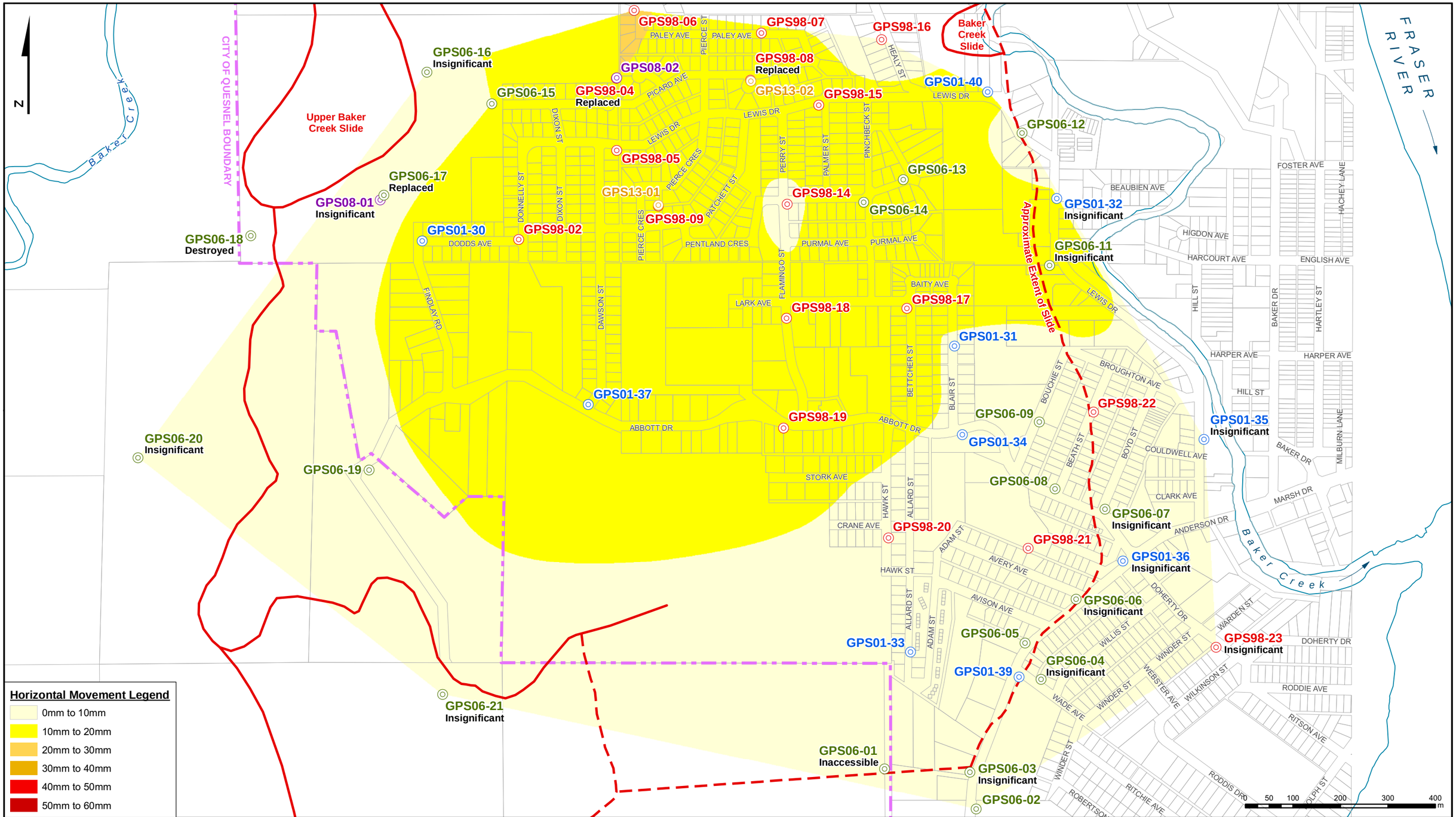
TITLE: ANNUAL 3D MOVEMENT - 2013
NOVEMBER 2012 TO NOVEMBER 2013
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	FEBRUARY 2016
PROJECT NO:	KX0439744
REV. NO.:	A
FIGURE No.	FIGURE 20

C:\Users\ben.brown\appdata\local\temp\AcPublish_4548\KX0439744.6-Figure20-3DMove-Dec12-Nov13-AllHubs.dwg - Figure20 - Feb. 10, 2016 1:12pm - benjamin.brown

This drawing was originally produced in colour.



Horizontal Movement Legend

- 0mm to 10mm
- 10mm to 20mm
- 20mm to 30mm
- 30mm to 40mm
- 40mm to 50mm
- 50mm to 60mm

Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY: BB
CHK'D BY: LM
DATUM: NAD 83
PROJECTION: UTM Zone 10
SCALE: 1:7,500

TITLE: ANNUAL HORIZONTAL MOVEMENT - 2014
NOVEMBER 2013 TO NOVEMBER 2014
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

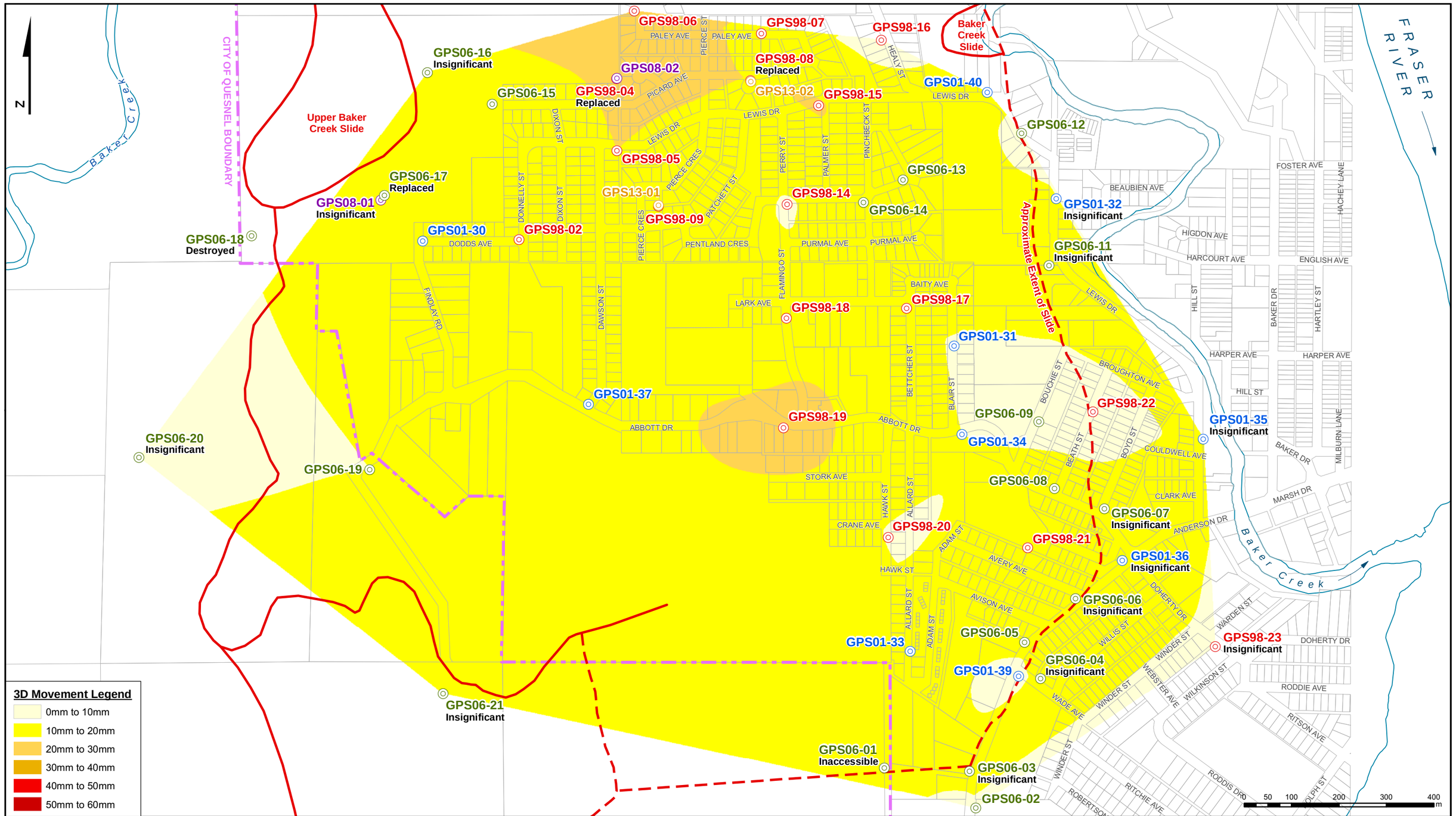
PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE: FEBRUARY 2016
PROJECT NO.: KX0439744
REV NO.: A

FIGURE 21

S:\Internal\KX04397-WQLS-GIS\0_KX0439744.6\KX0439744.6-Figure21-HMove-Nov13-Nov14-AllHubs.mxd

This drawing was originally produced in colour.



3D Movement Legend

- 0mm to 10mm
- 10mm to 20mm
- 20mm to 30mm
- 30mm to 40mm
- 40mm to 50mm
- 50mm to 60mm

Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY: BB
CHK'D BY: LM
DATUM: NAD 83
PROJECTION: UTM Zone 10
SCALE: 1:7,500

TITLE: ANNUAL 3D MOVEMENT - 2014
NOVEMBER 2013 TO NOVEMBER 2014
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

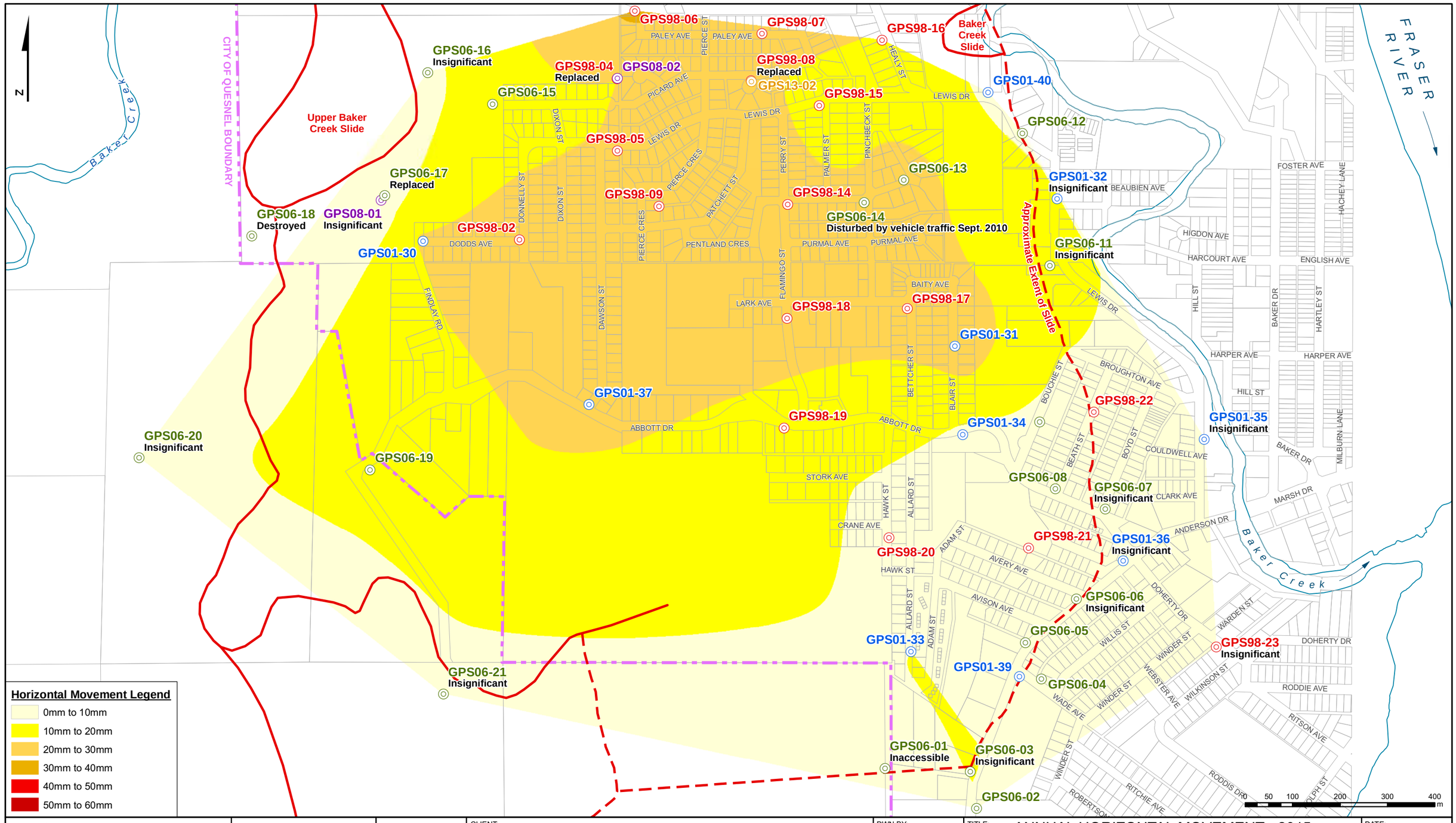
PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE: FEBRUARY 2016
PROJECT NO.: KX0439744
REV NO.: A

FIGURE 22

S:\Internal\KX04397-WQLS-GIS\0_KX0439744.6\KX0439744.6-Figure22-3DMove-Nov13-Nov14-AllHubs.mxd

This drawing was originally produced in colour.



Horizontal Movement Legend

- 0mm to 10mm
- 10mm to 20mm
- 20mm to 30mm
- 30mm to 40mm
- 40mm to 50mm
- 50mm to 60mm

Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY:	BB
CHK'D BY:	LM
DATUM:	NAD 83
PROJECTION:	UTM Zone 10
SCALE:	1:7,500

TITLE: ANNUAL HORIZONTAL MOVEMENT - 2015
NOVEMBER 2014 TO DECEMBER 2015
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	FEBRUARY 2016
PROJECT NO.:	KX0439744
REV NO.:	A

FIGURE 23

S:\Internal\KX04397-WQLS-GIS\0_KX0439744.6\KX0439744.6-Figure23-HMove-Nov14-Dec15-AllHubs.mxd

This drawing was originally produced in colour.

N

Baker Creek

CITY OF QUESNEL BOUNDARY

Upper Baker Creek Slide

Baker Creek Slide

Approximate Extent of Slide

FRASER RIVER

GPS98-06
GPS98-07
GPS98-16
GPS06-16
Insignificant
GPS98-04
Replaced
GPS08-02
GPS98-08
Replaced
GPS13-02
GPS06-15
GPS98-15
GPS01-40
GPS06-12
GPS98-05
GPS06-13
GPS06-17
Replaced
GPS01-32
Insignificant
GPS98-09
GPS98-14
GPS06-18
Destroyed
GPS08-01
Insignificant
GPS06-14
Disturbed by vehicle traffic Sept. 2010
GPS98-02
GPS01-30
GPS06-11
Insignificant
GPS98-18
GPS98-17
GPS01-31
GPS01-37
GPS98-19
GPS01-34
GPS98-22
GPS01-35
Insignificant
GPS06-20
Insignificant
GPS06-19
GPS06-08
GPS06-07
Insignificant
GPS98-20
GPS98-21
GPS01-36
Insignificant
GPS06-06
Insignificant
GPS06-05
GPS01-33
GPS98-23
Insignificant
GPS01-39
GPS06-04
GPS06-21
Insignificant
GPS06-01
Inaccessible
GPS06-03
Insignificant
GPS06-02

PALEY AVE
PIERCE ST
HEALY ST
PICARD AVE
LEWIS DR
DIXON ST
PERRY ST
PALMER ST
PINCHBECK ST
DONNELLY ST
PIERCE CRES
PATCHETT ST
DODDS AVE
PENTLAND CRES
PURMAL AVE
FLAMINGO ST
BAITY AVE
LARK AVE
FINDLAY RD
DAWSON ST
BETTCHER ST
BLAIR ST
ABBOTT DR
STORK AVE
CRANE AVE
HAWK ST
ALLARD ST
ADAM ST
AVERY AVE
AVISON AVE
FOSTER AVE
BEAUBIEN AVE
HACHEY LANE
HIGDON AVE
HARCOURT AVE
ENGLISH AVE
HILL ST
BAKER DR
HARTLEY ST
HARPER AVE
BOUCHIE ST
BROUGHTON AVE
BEATH ST
BOYD ST
COULDWELL AVE
MILBURN LANE
MARSH DR
CLARK AVE
ANDERSON DR
DOHERTY DR
WARDEN ST
WILLIS ST
WINDER ST
WEBSTER AVE
WILKINSON ST
RODDIE AVE
RITSON AVE
WADE AVE
RITCHIE AVE
RODDIS DR
DOLPH ST
ROBERTSON

0 50 100 200 300 400 m

3D Movement Legend

- 0mm to 10mm
- 10mm to 20mm
- 20mm to 30mm
- 30mm to 40mm
- 40mm to 50mm
- 50mm to 60mm

Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY: BB
CHK'D BY: LM
DATUM: NAD 83
PROJECTION: UTM Zone 10
SCALE: 1:7,500

TITLE: ANNUAL 3D MOVEMENT - 2015
NOVEMBER 2014 TO DECEMBER 2015
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

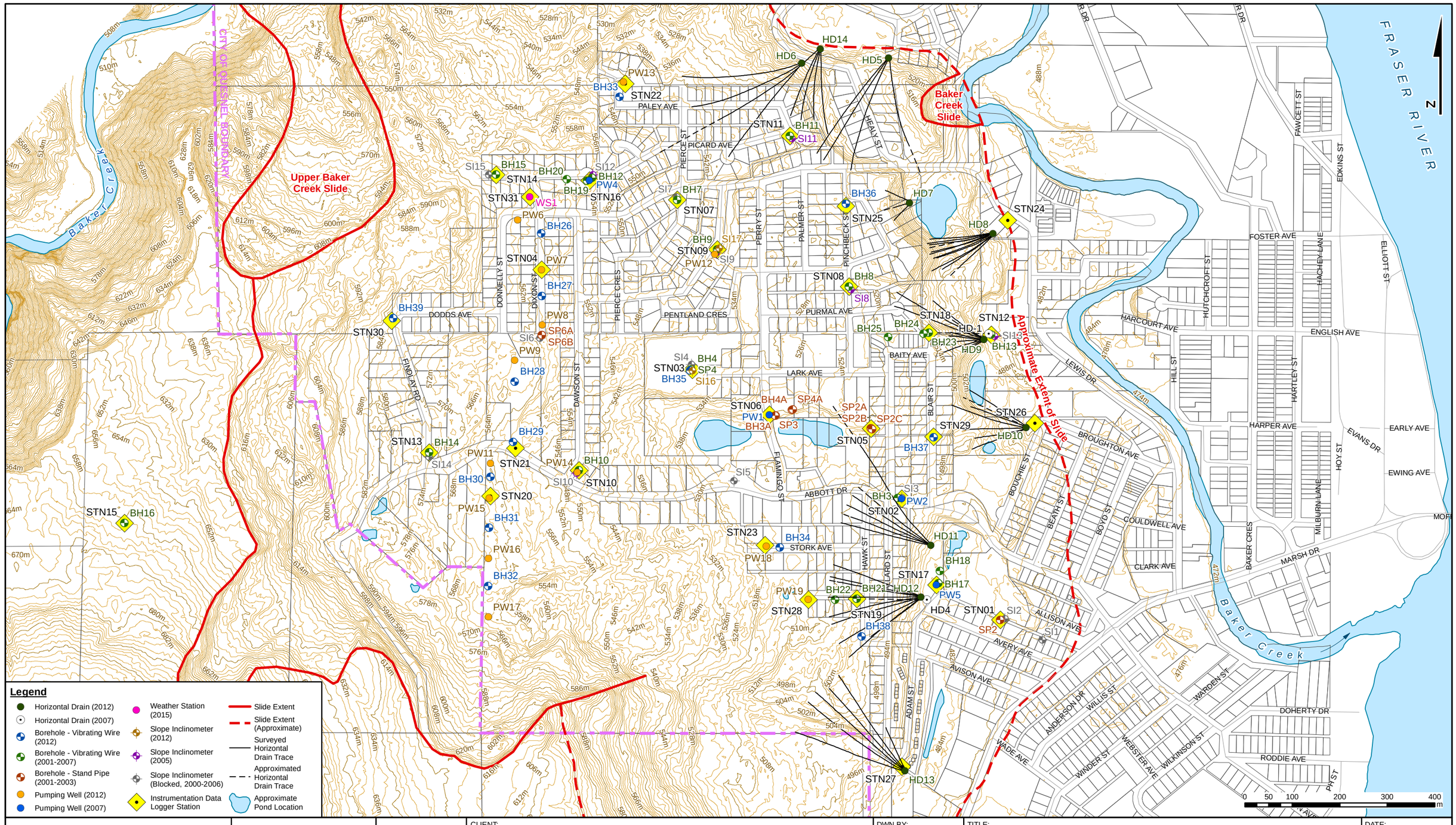
PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE: FEBRUARY 2016
PROJECT NO.: KX0439744
REV NO.: A

FIGURE 24

S:\Internal\KX04397-WQLS-GIS\0_KX0439744.6\KX0439744.6-Figure24-3DMove-Nov14-Dec15-AllHubs.mxd

This drawing was originally produced in colour.



Legend

- Horizontal Drain (2012)
- Horizontal Drain (2007)
- Borehole - Vibrating Wire (2012)
- Borehole - Vibrating Wire (2001-2007)
- Borehole - Stand Pipe (2001-2003)
- Pumping Well (2012)
- Pumping Well (2007)
- Weather Station (2015)
- Slope Inclinometer (2012)
- Slope Inclinometer (2005)
- Slope Inclinometer (Blocked, 2000-2006)
- Instrumentation Data Logger Station
- Slide Extent
- Slide Extent (Approximate)
- Surveyed Horizontal Drain Trace
- Approximated Horizontal Drain Trace
- Approximate Pond Location

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY: BB
CHK'D BY: LM
DATUM: NAD 83
PROJECTION: UTM Zone 10
SCALE: 1:7,500

TITLE: OVERALL INSTRUMENTATION SITE PLAN

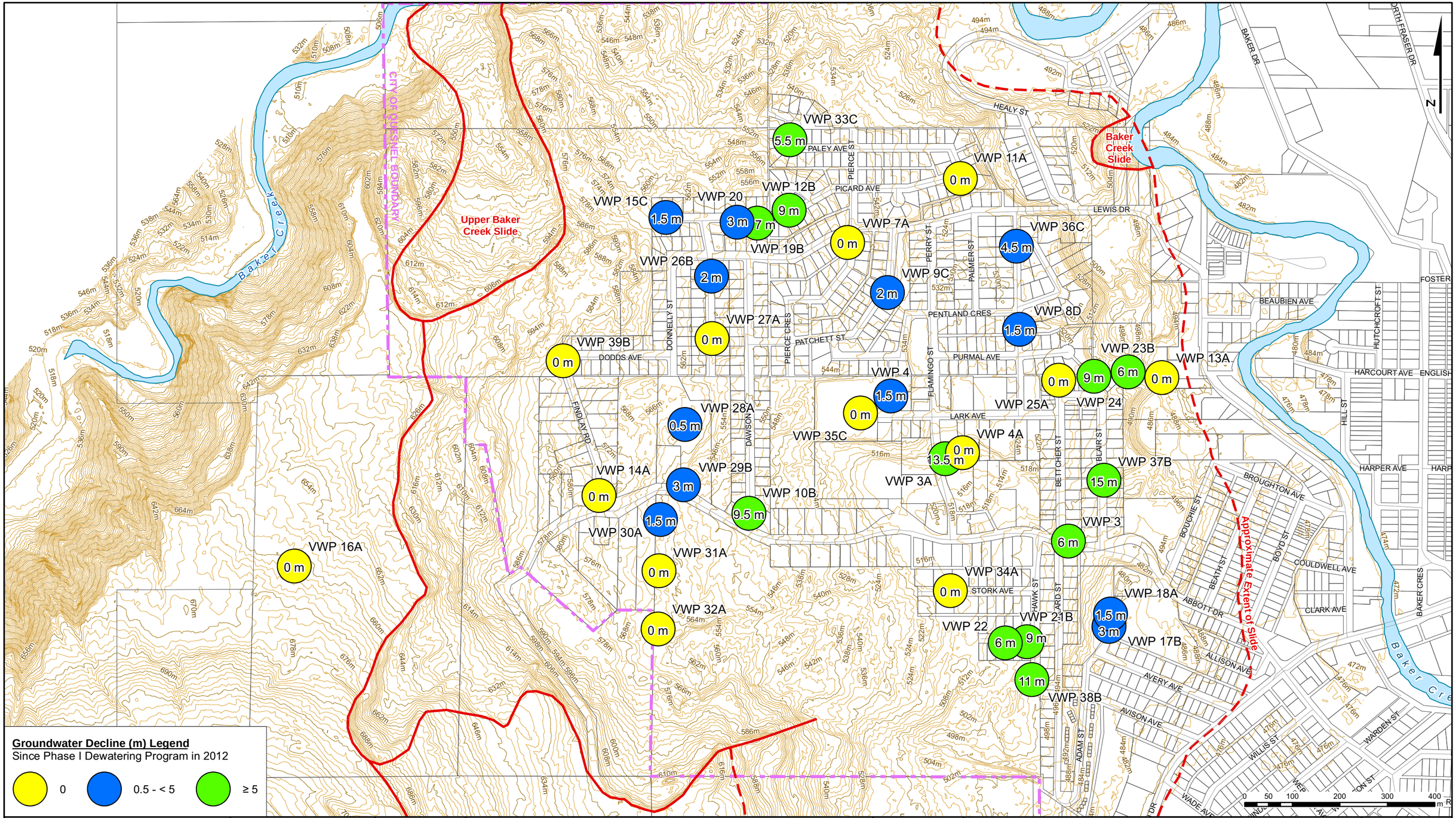
PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE: FEBRUARY 2016
PROJECT NO.: KX0439744
REV NO.: A

FIGURE 25

S:\Internal\KX04397-WQLS-GIS\0_KX0439744.6\KX0439744.6-Figure25-OverallInstrumentationSitePlan.mxd

This drawing was originally produced in colour.



Groundwater Decline (m) Legend
Since Phase I Dewatering Program in 2012

0 | 0.5 - < 5 | ≥ 5

Legend
- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

CLIENT: CITY OF QUESNEL

DWN BY: BB
CHK'D BY: LM
DATUM: NAD 83
PROJECTION: UTM Zone 10
SCALE: 1:7,500

TITLE: GROUNDWATER DRAWDOWN

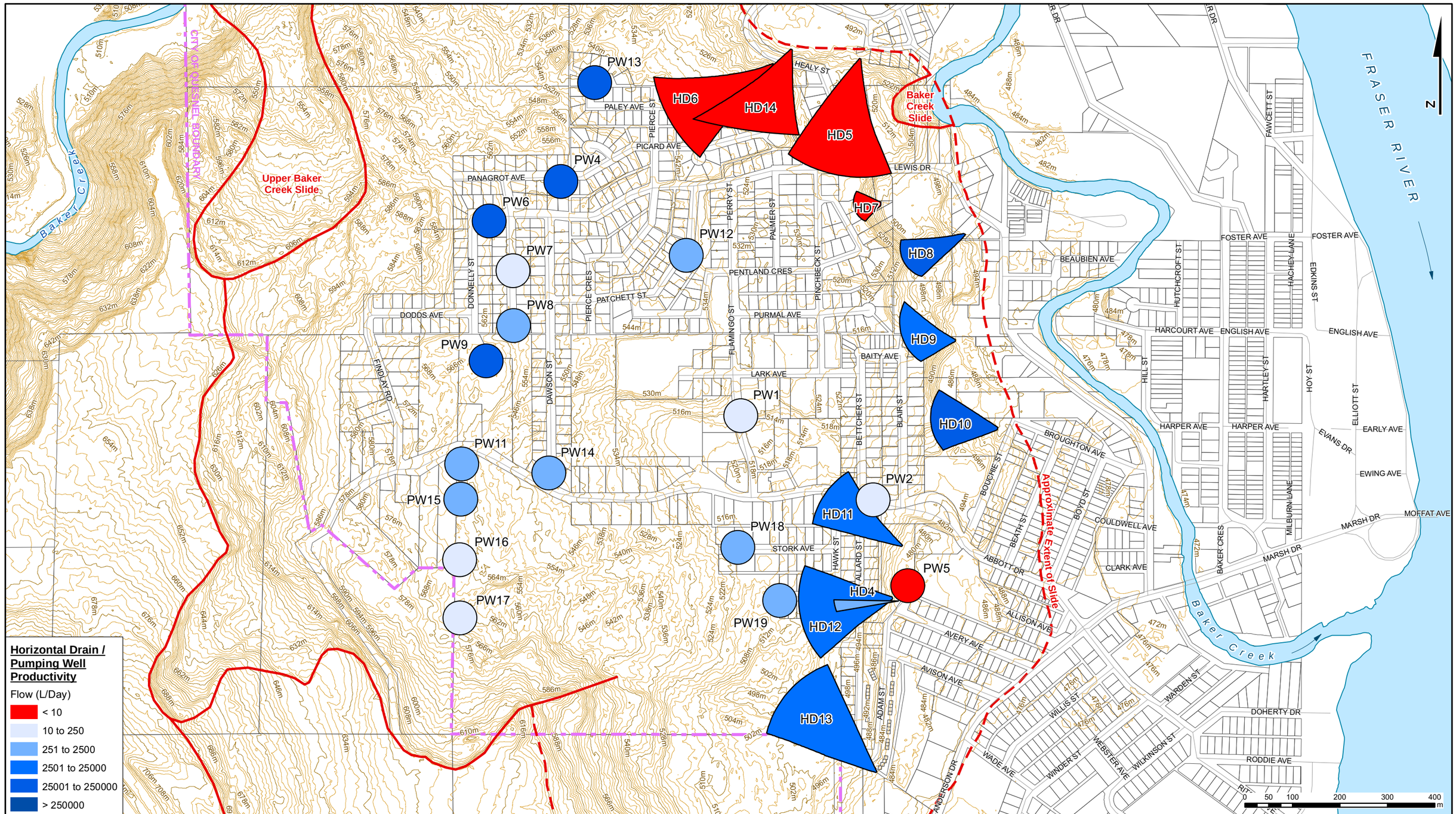
PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE: FEBRUARY 2016
PROJECT NO.: KX0439744
REV NO.: A

FIGURE 26

S:\Internal\KX04397-WQLS-GIS\0_KX0439744.6\KX0439744.6-Figure26-GroundwaterDrawdown.mxd

This drawing was originally produced in colour.



Horizontal Drain / Pumping Well Productivity

Flow (L/Day)

- < 10
- 10 to 250
- 251 to 2500
- 2501 to 25000
- 25001 to 250000
- > 250000

Legend

- Slide Extent
- Slide Extent (Approximate)

West Quesnel Land Stability Program

amec foster wheeler

CLIENT: CITY OF QUESNEL

Amec Foster Wheeler Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY:	BB
CHK'D BY:	LM
DATUM:	NAD 83
PROJECTION:	UTM Zone 10
SCALE:	1:7,500

TITLE: 2015 PUMPING WELL & HORIZONTAL DRAIN PRODUCTIVITY

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM QUESNEL, BC

DATE:	FEBRUARY 2016
PROJECT NO.:	KX0439744
REV NO.:	A

FIGURE 27

S:\Internal\KX04397-WQLS-GIS\0_KX0439744.6\KX0439744.6-Figure27-2015PW&HDProductivity.mxd

This drawing was originally produced in colour.

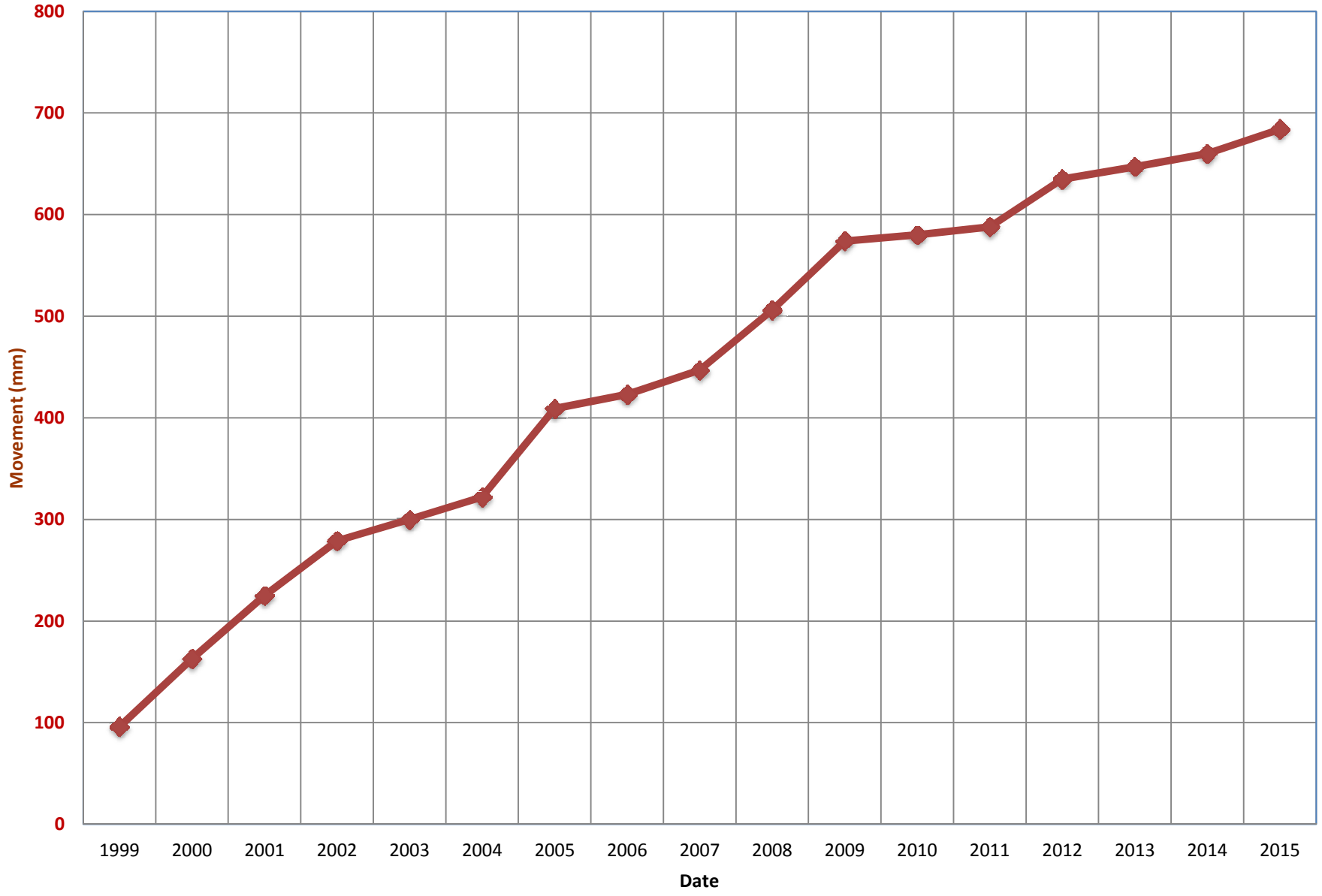
Appendix A

GPS Movement Hubs –Status, Figure A1, Data Tables and Plots

APPENDIX A - GPS Movement Hubs Status

Hub	Location	Initial Survey Date	Status
98-02	Donnely/Dodds Intersection	September 1998	Active
98-04	Picard Place (Lane)	September 1998	Destroyed - replaced by 08-02
98-05	East of Dawson/Lewis Intersection	September 1998	Active
98-06	Paley West	September 1998	Active
98-07	Paley East	September 1998	Active - minor disturbance/deterioration
98-08	Picard Avenue	September 1998	Destroyed - replaced by 13-02
98-09	Lane between Patchett/Pierce	September 1998	Active
98-14	Pentland/Flamingo Intersection	September 1998	Active
98-15	Palmer/Lewis Intersection	September 1998	Active
98-16	Healy Road	September 1998	Active
98-17	Bettcher/Lark Intersection	September 1998	Active
98-18	Lark/Flamingo Intersection	September 1998	Active
98-19	Abbott/Flamingo Intersection	September 1998	Active
98-20	Hawk Street @ Crane Ave.	September 1998	Active
98-21	Lane between Avery/Allison	September 1998	Active
98-22	Lane between Beath/Bouchie	September 1998	Active
98-23	Doherty Dr. - BM	September 1998	Active
98-24	Salton Road (Hixon Road)	September 1998	Not Currently Read
98-26	Benchmark by Airport - BM	September 1998	Not Currently Read
98-28	Red Bluff Pump Station - BM	September 1998	Not Currently Read
98-29	Quesnel Hill	September 1998	Not Currently Read
01-30	West End of Dodds Avenue at Findlay Road	December 2001	Active
01-31	Blair Street	December 2001	Active
01-32	Lewis Drive/Beabien Avenue	December 2001	Active
01-33	South End of Allard Street	December 2001	Active
01-34	Abbott Road and Blair Street	December 2001	Active
01-35	Lewis Drive North of Couldwell Street	December 2001	Active
01-36	Anderson Drive at Abbott Drive	December 2001	Active
01-37	Dawson Street at Abbott Drive	December 2001	Active
01-38	Quesnel No. 1 Station - BM	December 2001	Active - Benchmark Station
01-39	Anderson Avenue at Wade Avenue	December 2001	Active
01-40	Lewis Drive East of Healy Street	December 2001	Active
82C256	Government Benchmark at Airport	December 1998	Not Currently Read
WaterTank	Water Tank	March 2006	Active - Benchmark Station
06-01	End alley E. of Anderson Dr., opposite school	November 2006	Not Currently Read
06-02	East side Anderson Drive by school	November 2006	Active
06-03	West side Anderson Dr., opposite school yard	November 2006	Active
06-04	North side Wade Ave, one lot E. Anderson Dr.	November 2006	Active
06-05	Anderson Drive west side, one lot S. of Avison	November 2006	Active
06-06	North corner Avery Ave / Anderson Drive	November 2006	Active - minor disturbance/deterioration
06-07	NE. corner Boyd Street / Abbott Rd.	November 2006	Active
06-08	North side Abbott Road., alley E. Beath Street	November 2006	Active
06-09	East side Bouchie Street	November 2006	Active - minor disturbance/deterioration
06-10	South side Broughton Avenue	November 2006	Destroyed
06-11	East side Lewis Road, opposite house # 391	November 2006	Active
06-12	East side Lewis Road, opposite house # 547	November 2006	Active
06-13	NW. corner Pentland Crescent	November 2006	Active
06-14	SW. corner Pinchbeck Street / Pentland Crescent	November 2006	Active - minor disturbance/deterioration
06-15	By trail, NW unnamed Rd. N. Dixon St.	November 2006	Active - minor disturbance/deterioration
06-16	By end trail, NW unnamed road N. Dixon St.	November 2006	Active
06-17	In clearing, NW of end Findlay Road	November 2006	Disturbed - replaced by 08-01
06-18	On upper bench by trail, off end Findlay Road	November 2006	Destroyed
06-19	West side Abbott Dr.100m south last house	November 2006	Active
06-20	End of trail, by BH 16,off end Abbott Drive	November 2006	Active
06-21	100m past gate, off end Abbott Drive	November 2006	Active
08-01	In clearing, NW of end Findlay Road	June 2008	Active
08-02	Picard Place (Lane)	August 2008	Active
13-01	Lane between Patchett/Pierce	November 2013	Not Currently Read
13-02	Picard Avenue	November 2013	Active

Figure A1: HUB 98-17 Total Horizontal Ground Movement



West Quesnel Land Stability Program

GPS Hub 98-02 (Intersection of Donnelly Street and Dodds Avenue)

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5869992.878	531420.902	563.021	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/12/1998	5869992.871	531420.907	563.014	0.25	-0.007	0.005	0.009	-0.007	144.5	-39.1	0.035	-0.028	0.25	-0.007	0.005	0.009	-0.007	144.5	-39.1	34.527	-28.096
15/04/1999	5869992.867	531420.931	563.007	0.58	-0.011	0.029	0.031	-0.014	110.8	-24.3	0.053	-0.024	0.33	-0.004	0.024	0.024	-0.007	99.5	-16.1	73.446	-21.130
15/12/1999	5869992.879	531420.978	563.027	1.25	0.001	0.076	0.076	0.006	89.2	4.5	0.061	0.005	0.67	0.012	0.047	0.049	0.020	75.7	22.4	72.612	29.939
15/02/2000	5869992.874	531420.976	563.006	1.42	-0.004	0.074	0.074	-0.015	93.1	-11.4	0.052	-0.011	0.17	-0.005	-0.002	0.005	-0.021	201.8	-75.6	-31.725	-123.714
15/05/2000	5869992.860	531420.991	563.009	1.66	-0.018	0.089	0.091	-0.012	101.4	-7.5	0.055	-0.007	0.25	-0.014	0.015	0.021	0.003	133.0	8.3	83.270	12.175
30/11/2000	5869992.847	531421.038	562.998	2.21	-0.031	0.136	0.139	-0.023	102.8	-9.4	0.063	-0.010	0.54	-0.013	0.047	0.049	-0.011	105.5	-12.7	89.504	-20.190
05/05/2001	5869992.846	531421.051	562.986	2.64	-0.032	0.149	0.152	-0.035	102.1	-12.9	0.058	-0.013	0.43	-0.001	0.013	0.013	-0.012	94.4	-42.6	30.527	-28.096
15/12/2001	5869992.844	531421.079	562.988	3.25	-0.034	0.177	0.180	-0.033	100.9	-10.4	0.055	-0.010	0.61	-0.002	0.028	0.028	0.002	94.1	4.1	45.773	3.261
15/05/2002	5869992.824	531421.125	562.983	3.66	-0.054	0.223	0.229	-0.038	103.6	-9.4	0.063	-0.010	0.41	-0.020	0.046	0.050	-0.005	113.5	-5.7	121.330	-12.094
24/10/2002	5869992.849	531421.127	562.960	4.11	-0.029	0.225	0.227	-0.061	97.3	-15.1	0.055	-0.015	0.44	0.025	0.002	0.025	-0.023	4.6	-42.5	-56.546	-51.856
12/11/2003	5869992.830	531421.149	562.984	5.16	-0.048	0.247	0.251	-0.037	100.9	-8.5	0.049	-0.007	1.05	-0.019	0.022	0.029	0.024	130.2	39.4	27.323	22.467
11/01/2005	5869992.835	531421.159	562.997	6.32	-0.043	0.257	0.260	-0.024	99.5	-5.2	0.041	-0.004	1.17	0.005	0.010	0.011	0.014	64.1	51.6	9.291	11.729
10/03/2006	5869992.817	531421.230	562.976	7.48	-0.061	0.328	0.334	-0.045	100.5	-7.7	0.045	-0.006	1.16	-0.018	0.071	0.074	-0.021	104.3	-16.1	63.540	-18.392
10/11/2006	5869992.815	531421.245	562.980	8.15	-0.063	0.343	0.349	-0.041	100.4	-6.7	0.043	-0.005	0.67	-0.002	0.015	0.015	0.004	97.6	14.8	22.560	5.963
05/04/2007	5869992.816	531421.258	562.967	8.55	-0.062	0.356	0.361	-0.054	99.9	-8.5	0.042	-0.006	0.40	0.001	0.013	0.013	-0.013	85.6	-44.9	32.618	-32.522
16/08/2007	5869992.811	531421.276	562.960	8.92	-0.067	0.374	0.380	-0.061	100.2	-9.1	0.043	-0.007	0.36	-0.005	0.018	0.019	-0.007	105.5	-20.5	51.304	-19.224
13/12/2007	5869992.815	531421.272	562.956	9.24	-0.063	0.370	0.375	-0.065	99.7	-9.8	0.041	-0.007	0.33	0.004	-0.004	0.006	-0.004	315.0	-35.3	-17.363	-12.277
18/03/2008	5869992.814	531421.278	562.965	9.51	-0.064	0.376	0.381	-0.056	99.7	-8.4	0.040	-0.006	0.26	-0.001	0.006	0.006	0.009	99.5	55.9	23.143	34.242
03/06/2008	5869992.814	531421.303	562.956	9.72	-0.064	0.401	0.406	-0.065	99.1	-9.1	0.042	-0.007	0.21	0.000	0.025	0.025	-0.009	90.0	-19.8	118.588	-42.692
29/08/2008	5869992.805	531421.309	562.958	9.95	-0.073	0.407	0.413	-0.063	100.2	-8.7	0.042	-0.006	0.24	-0.009	0.006	0.011	0.002	146.3	10.5	45.411	8.397
19/11/2008	5869992.805	531421.320	562.964	10.18	-0.073	0.418	0.424	-0.057	99.9	-7.7	0.042	-0.006	0.22	0.000	0.011	0.011	0.006	90.0	28.6	48.997	26.726
26/03/2009	5869992.805	531421.326	562.964	10.53	-0.073	0.424	0.430	-0.057	99.8	-7.5	0.041	-0.005	0.35	0.000	0.006	0.006	0.000	90.0	0.0	17.256	0.000
10/06/2009	5869992.794	531421.358	562.972	10.74	-0.084	0.456	0.464	-0.049	100.4	-6.0	0.043	-0.005	0.21	-0.011	0.032	0.034	0.008	109.0	13.3	162.622	38.447
17/09/2009	5869992.797	531421.362	562.959	11.01	-0.081	0.460	0.467	-0.062	100.0	-7.6	0.042	-0.006	0.27	0.003	0.004	0.005	-0.013	53.1	-69.0	18.447	-47.962
23/11/2009	5869992.810	531421.369	562.947	11.19	-0.068	0.467	0.472	-0.074	98.3	-8.9	0.042	-0.007	0.18	0.013	0.007	0.015	-0.012	28.3	-39.1	80.490	-65.418
27/03/2010	5869992.801	531421.372	562.964	11.53	-0.077	0.470	0.476	-0.057	99.3	-6.8	0.041	-0.005	0.34	-0.009	0.003	0.009	0.017	161.6	60.8	27.944	50.075
04/07/2010	5869992.793	531421.368	562.957	11.80	-0.085	0.466	0.474	-0.064	100.3	-7.7	0.040	-0.005	0.27	-0.008	-0.004	0.009	-0.007	206.6	-38.0	-32.999	-25.826
13/09/2010	5869992.800	531421.370	562.956	11.99	-0.078	0.468	0.474	-0.065	99.5	-7.8	0.040	-0.005	0.19	0.007	0.002	0.007	-0.001	15.9	-7.8	37.452	-5.144
22/11/2010	5869992.806	531421.378	562.955	12.19	-0.072	0.476	0.481	-0.066	98.6	-7.8	0.040	-0.005	0.19	0.006	0.008	0.010	-0.001	53.1	-5.7	52.179	-5.218
04/04/2011	5869992.797	531421.376	562.957	12.55	-0.081	0.474	0.481	-0.064	99.7	-7.6	0.038	-0.005	0.36	-0.009	-0.002	0.009	0.002	192.5	12.2	-25.319	5.492
18/06/2011	5869992.792	531421.387	562.953	12.76	-0.086	0.485	0.493	-0.068	100.1	-7.9	0.039	-0.005	0.21	-0.005	0.011	0.012	-0.004	114.4	-18.3	58.844	-19.480
03/10/2011	5869992.797	531421.387	562.953	13.05	-0.081	0.485	0.492	-0.068	99.5	-7.9	0.038	-0.005	0.29	0.005	0.000	0.005	0.000	0.0	0.0	-17.068	0.000
28/11/2011	5869992.801	531421.386	562.951	13.20	-0.077	0.484	0.490	-0.070	99.0	-8.1	0.037	-0.005	0.15	0.004	-0.001	0.004	-0.002	346.0	-25.9	-26.892	-13.045
09/04/2012	5869992.796	531421.396	562.956	13.57	-0.082	0.494	0.501	-0.065	99.4	-7.4	0.037	-0.005	0.36	-0.005	0.010	0.011	0.005	116.6	24.1	30.704	13.731

West Quesnel Land Stability Program

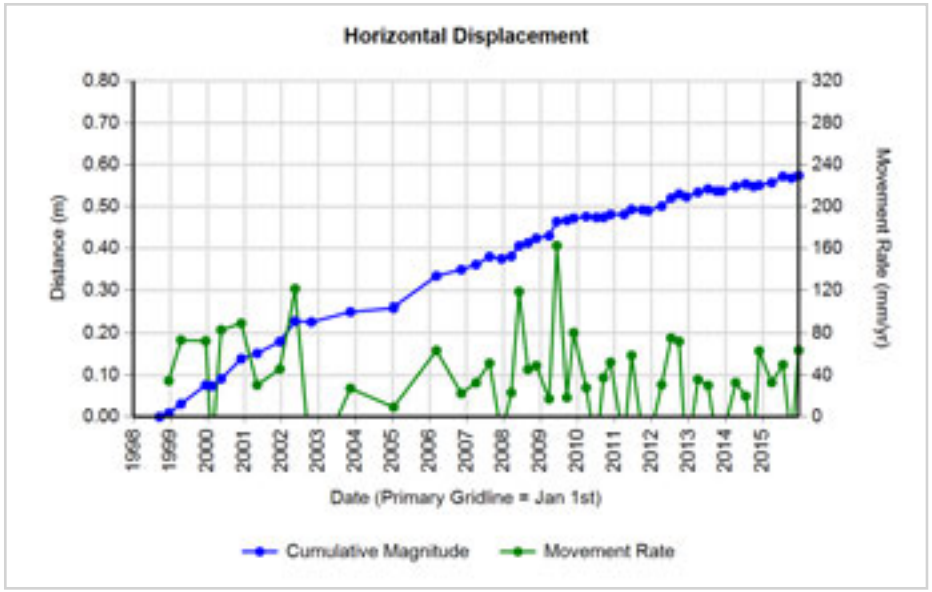
GPS Hub 98-02 (Intersection of Donnelly Street and Dodds Avenue)

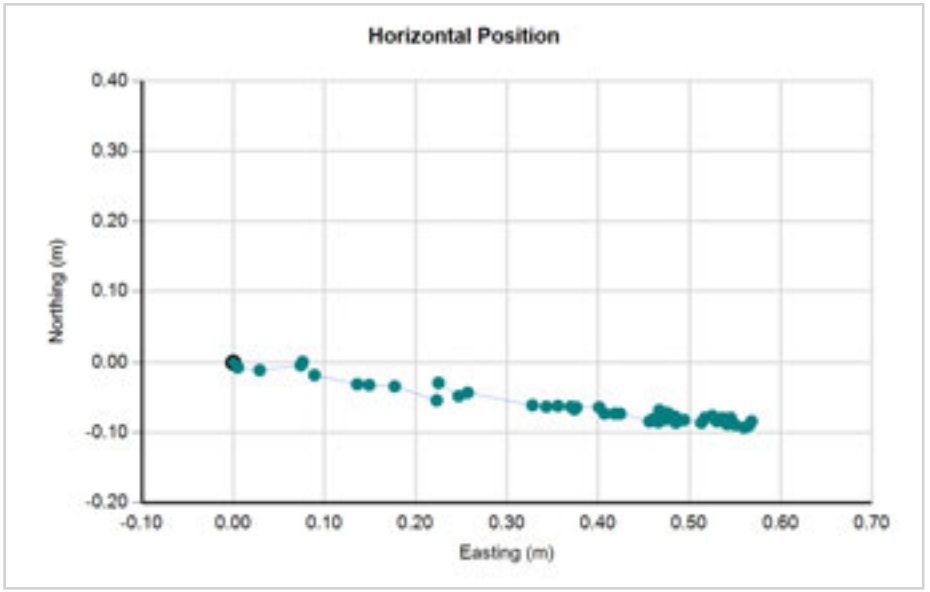
12/07/2012	5869992.792	531421.415	562.964	13.82	-0.086	0.513	0.520	-0.057	99.5	-6.3	0.038	-0.004	0.26	-0.004	0.019	0.019	0.008	101.9	22.4	75.445	31.085
29/09/2012	5869992.802	531421.427	562.952	14.04	-0.076	0.525	0.530	-0.069	98.2	-7.4	0.038	-0.005	0.22	0.010	0.012	0.016	-0.012	50.2	-37.5	72.220	-55.481
10/12/2012	5869992.799	531421.419	562.946	14.24	-0.079	0.517	0.523	-0.075	98.7	-8.2	0.037	-0.005	0.20	-0.003	-0.008	0.009	-0.006	249.4	-35.1	-43.343	-30.437
03/04/2013	5869992.797	531421.430	562.945	14.55	-0.081	0.528	0.534	-0.076	98.7	-8.1	0.037	-0.005	0.31	-0.002	0.011	0.011	-0.001	100.3	-5.1	35.821	-3.204
12/07/2013	5869992.799	531421.438	562.952	14.82	-0.079	0.536	0.542	-0.069	98.4	-7.3	0.037	-0.005	0.27	0.002	0.008	0.008	0.007	76.0	40.3	30.119	25.567
04/10/2013	5869992.797	531421.433	562.962	15.05	-0.081	0.531	0.537	-0.059	98.7	-6.3	0.036	-0.004	0.23	-0.002	-0.005	0.005	0.010	248.2	61.7	-23.416	43.482
27/11/2013	5869992.794	531421.432	562.946	15.20	-0.084	0.530	0.537	-0.075	99.0	-8.0	0.035	-0.005	0.15	-0.003	-0.001	0.003	-0.016	198.4	-78.8	-21.389	-108.222
10/04/2014	5869992.794	531421.444	562.948	15.57	-0.084	0.542	0.548	-0.073	98.8	-7.6	0.035	-0.005	0.37	0.000	0.012	0.012	0.002	90.0	9.5	32.709	5.451
18/07/2014	5869992.792	531421.449	562.947	15.84	-0.086	0.547	0.554	-0.074	98.9	-7.6	0.035	-0.005	0.27	-0.002	0.005	0.005	-0.001	111.8	-10.5	19.868	-3.689
02/10/2014	5869992.790	531421.443	562.948	16.05	-0.088	0.541	0.548	-0.073	99.2	-7.6	0.034	-0.005	0.21	-0.002	-0.006	0.006	0.001	251.6	9.0	-30.395	4.806
28/11/2014	5869992.799	531421.447	562.944	16.20	-0.079	0.545	0.551	-0.077	98.2	-8.0	0.034	-0.005	0.16	0.009	0.004	0.010	-0.004	24.0	-22.1	63.110	-25.632
01/04/2015	5869992.789	531421.452	562.947	16.54	-0.089	0.550	0.557	-0.074	99.2	-7.6	0.034	-0.004	0.34	-0.010	0.005	0.011	0.003	153.4	15.0	32.932	8.837
20/07/2015	5869992.788	531421.467	562.942	16.84	-0.090	0.565	0.572	-0.079	99.1	-7.9	0.034	-0.005	0.30	-0.001	0.015	0.015	-0.005	93.8	-18.4	49.917	-16.602
14/10/2015	5869992.785	531421.462	562.945	17.08	-0.093	0.560	0.568	-0.076	99.4	-7.6	0.033	-0.004	0.24	-0.003	-0.005	0.006	0.003	239.0	27.2	-24.765	12.741
22/12/2015	5869992.794	531421.470	562.952	17.27	-0.084	0.568	0.574	-0.069	98.4	-6.9	0.033	-0.004	0.19	0.009	0.008	0.012	0.007	41.6	30.2	63.742	37.054

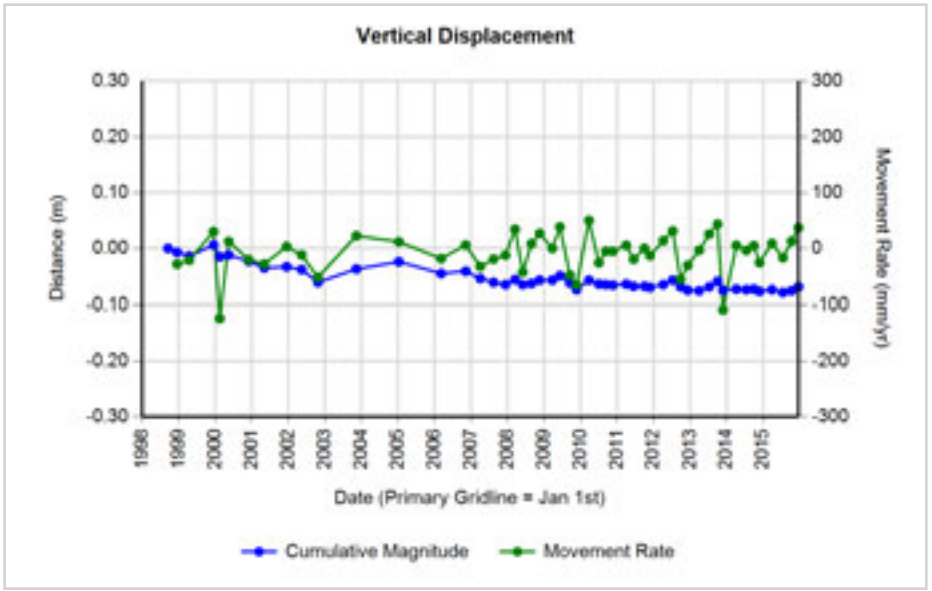
West Quesnel Land Stability Program

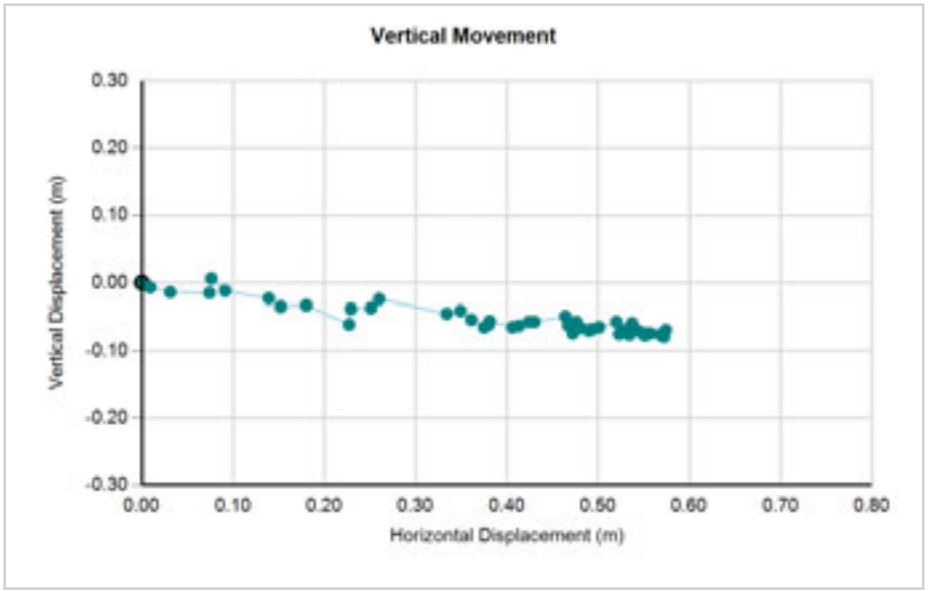
GPS Hub 98-02 (Intersection of Donnelly Street and Dodds Avenue)

amec foster wheeler









West Quesnel Land Stability Program

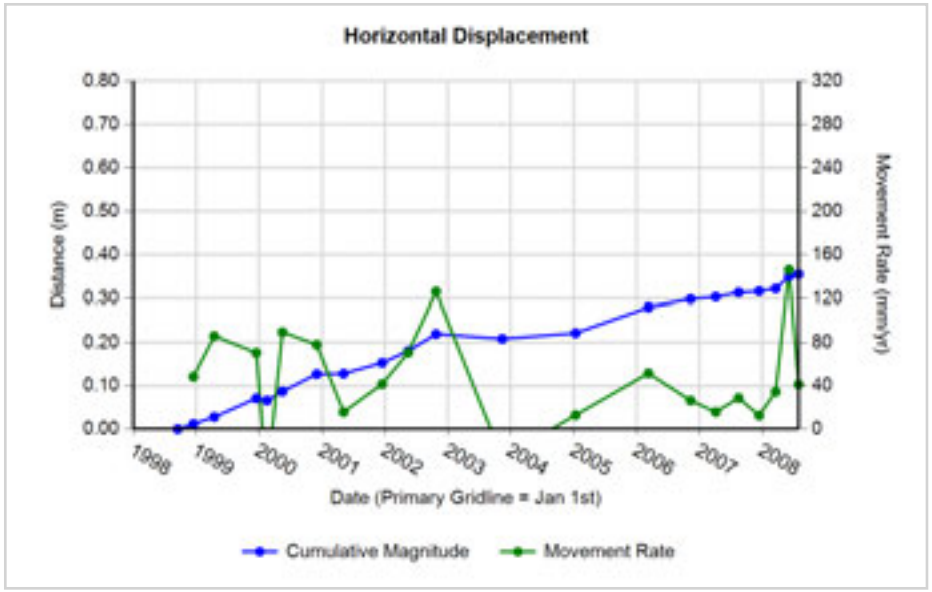
GPS Hub 98-04 (West of Picard Place) Replaced by 08-02

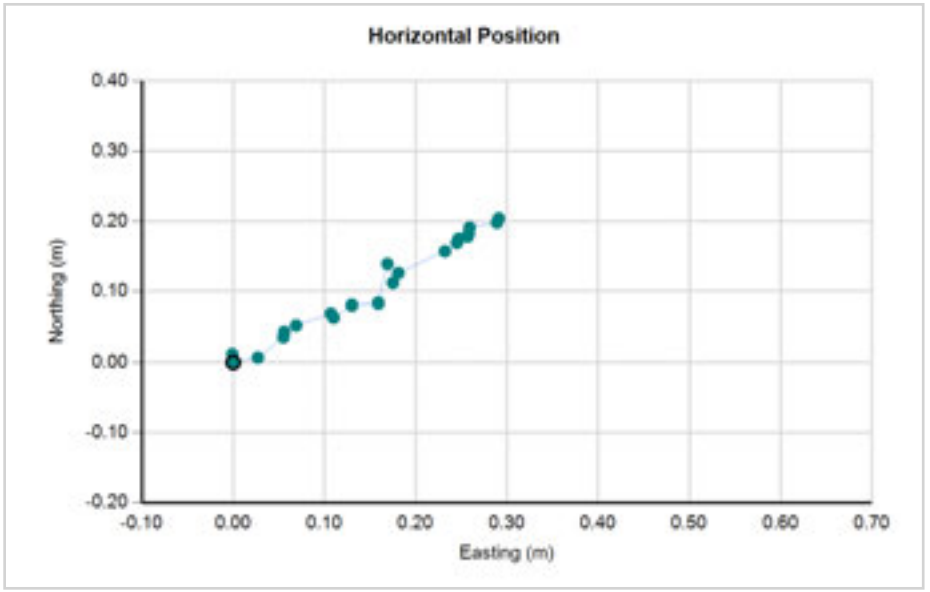
	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5870331.949	531626.829	557.171	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/12/1998	5870331.961	531626.828	557.163	0.25	0.012	-0.001	0.012	-0.008	355.2	-33.6	0.048	-0.032	0.25	0.012	-0.001	0.012	-0.008	355.2	-33.6	48.332	-32.110
15/04/1999	5870331.956	531626.856	557.150	0.58	0.007	0.027	0.028	-0.021	75.5	-37.0	0.048	-0.036	0.33	-0.005	0.028	0.028	-0.013	100.1	-24.6	85.858	-39.242
15/12/1999	5870331.993	531626.885	557.160	1.25	0.044	0.056	0.071	-0.011	51.8	-8.8	0.057	-0.009	0.67	0.037	0.029	0.047	0.010	38.1	12.0	70.371	14.969
15/02/2000	5870331.985	531626.884	557.159	1.42	0.036	0.055	0.066	-0.012	56.8	-10.3	0.046	-0.008	0.17	-0.008	-0.001	0.008	-0.001	187.1	-7.1	-47.496	-5.891
15/05/2000	5870332.002	531626.898	557.136	1.66	0.053	0.069	0.087	-0.035	52.5	-21.9	0.052	-0.021	0.25	0.017	0.014	0.022	-0.023	39.5	-46.2	89.376	-93.342
30/11/2000	5870332.013	531626.939	557.146	2.21	0.064	0.110	0.127	-0.025	59.8	-11.1	0.058	-0.011	0.54	0.011	0.041	0.042	0.010	75.0	13.3	77.914	18.354
05/05/2001	5870332.019	531626.936	557.100	2.64	0.070	0.107	0.128	-0.071	56.8	-29.0	0.048	-0.027	0.43	0.006	-0.003	0.007	-0.046	333.4	-81.7	15.706	-107.702
15/12/2001	5870332.030	531626.959	557.116	3.25	0.081	0.130	0.153	-0.055	58.1	-19.8	0.047	-0.017	0.61	0.011	0.023	0.025	0.016	64.4	32.1	41.572	26.089
15/05/2002	5870332.033	531626.988	557.090	3.66	0.084	0.159	0.180	-0.081	62.2	-24.2	0.049	-0.022	0.41	0.003	0.029	0.029	-0.026	84.1	-41.7	70.522	-62.891
24/10/2002	5870332.088	531626.998	557.052	4.11	0.139	0.169	0.219	-0.119	50.6	-28.5	0.053	-0.029	0.44	0.055	0.010	0.056	-0.038	10.3	-34.2	126.038	-85.676
12/11/2003	5870332.061	531627.004	557.107	5.16	0.112	0.175	0.208	-0.064	57.4	-17.1	0.040	-0.012	1.05	-0.027	0.006	0.028	0.055	167.8	63.4	-26.278	52.381
11/01/2005	5870332.075	531627.010	557.093	6.32	0.126	0.181	0.221	-0.078	55.3	-19.4	0.035	-0.012	1.17	0.014	0.006	0.015	-0.014	24.9	-42.4	12.947	-11.806
10/03/2006	5870332.106	531627.061	557.062	7.48	0.157	0.232	0.280	-0.109	55.9	-21.3	0.037	-0.015	1.16	0.031	0.051	0.060	-0.031	58.4	-27.7	51.522	-27.027
10/11/2006	5870332.118	531627.074	557.057	8.15	0.169	0.245	0.298	-0.114	55.4	-21.0	0.037	-0.014	0.67	0.012	0.013	0.018	-0.005	47.3	-15.8	26.375	-7.454
05/04/2007	5870332.124	531627.076	557.049	8.55	0.175	0.247	0.303	-0.122	54.7	-22.0	0.035	-0.014	0.40	0.006	0.002	0.006	-0.008	18.4	-51.7	15.822	-20.014
16/08/2007	5870332.127	531627.086	557.039	8.92	0.178	0.257	0.313	-0.132	55.3	-22.9	0.035	-0.015	0.36	0.003	0.010	0.010	-0.010	73.3	-43.8	28.672	-27.462
13/12/2007	5870332.131	531627.087	557.029	9.24	0.182	0.258	0.316	-0.142	54.8	-24.2	0.034	-0.015	0.33	0.004	0.001	0.004	-0.010	14.0	-67.6	12.655	-30.693
18/03/2008	5870332.140	531627.088	557.049	9.51	0.191	0.259	0.322	-0.122	53.6	-20.8	0.034	-0.013	0.26	0.009	0.001	0.009	0.020	6.3	65.6	34.453	76.094
03/06/2008	5870332.147	531627.118	557.060	9.72	0.198	0.289	0.350	-0.111	55.6	-17.6	0.036	-0.011	0.21	0.007	0.030	0.031	0.011	76.9	19.7	146.128	52.179
29/07/2008	5870332.153	531627.120	557.048	9.87	0.204	0.291	0.355	-0.123	55.0	-19.1	0.036	-0.012	0.15	0.006	0.002	0.006	-0.012	18.4	-62.2	41.251	-78.268

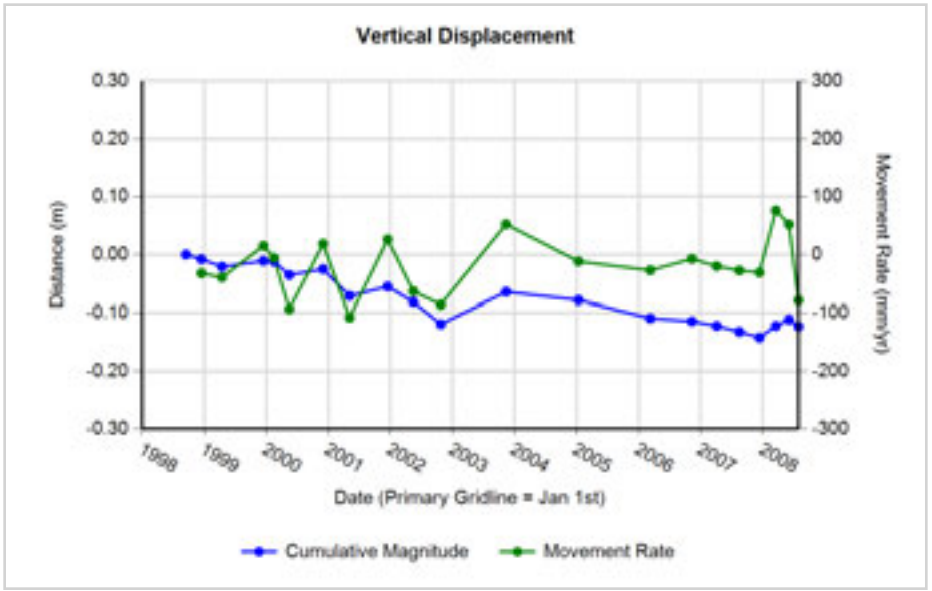
West Quesnel Land Stability Program

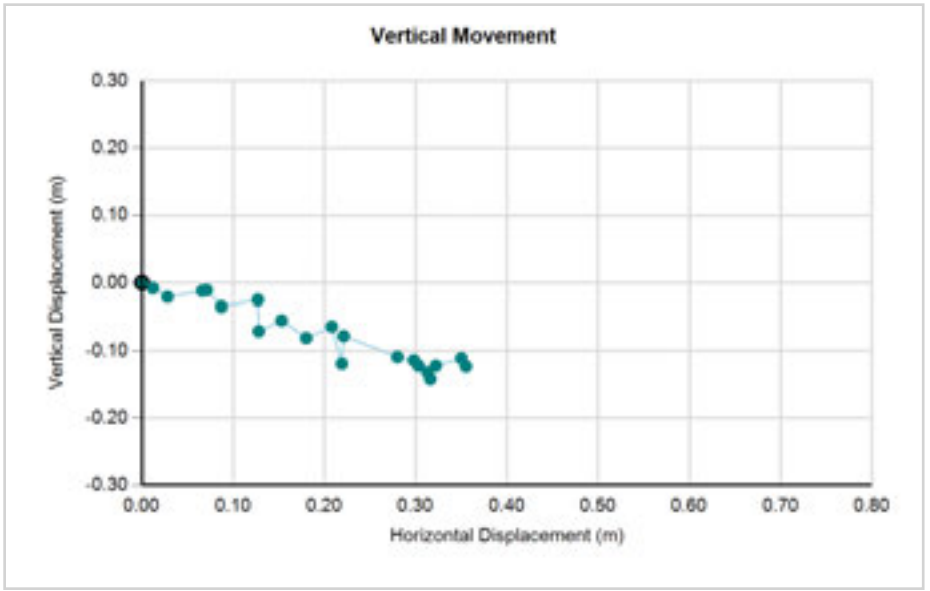
GPS Hub 98-04 (West of Picard Place) Replaced by 08-02

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 98-05 (Southeast Corner of Lewis Drive and Dawson Street)

amec foster wheeler

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5870180.442	531627.209	551.978	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/12/1998	5870180.445	531627.216	551.965	0.25	0.003	0.007	0.008	-0.013	66.8	-59.6	0.031	-0.052	0.25	0.003	0.007	0.008	-0.013	66.8	-59.6	30.568	-52.179
15/04/1999	5870180.438	531627.250	551.951	0.58	-0.004	0.041	0.041	-0.027	95.6	-33.2	0.071	-0.047	0.33	-0.007	0.034	0.035	-0.014	101.6	-22.0	104.785	-42.260
15/12/1999	5870180.448	531627.288	551.953	1.25	0.006	0.079	0.079	-0.025	85.7	-17.5	0.063	-0.020	0.67	0.010	0.038	0.039	0.002	75.3	2.9	58.820	2.994
15/02/2000	5870180.447	531627.289	551.948	1.42	0.005	0.080	0.080	-0.030	86.4	-20.5	0.057	-0.021	0.17	-0.001	0.001	0.001	-0.005	135.0	-74.2	8.331	-29.456
15/05/2000	5870180.448	531627.297	551.936	1.66	0.006	0.088	0.088	-0.042	86.1	-25.5	0.053	-0.025	0.25	0.001	0.008	0.008	-0.012	82.9	-56.1	32.719	-48.700
30/11/2000	5870180.441	531627.341	551.947	2.21	-0.001	0.132	0.132	-0.031	90.4	-13.2	0.060	-0.014	0.54	-0.007	0.044	0.045	0.011	99.0	13.9	81.774	20.190
05/05/2001	5870180.438	531627.349	551.923	2.64	-0.004	0.140	0.140	-0.055	91.6	-21.4	0.053	-0.021	0.43	-0.003	0.008	0.009	-0.024	110.6	-70.4	20.004	-56.192
15/12/2001	5870180.449	531627.379	551.943	3.25	0.007	0.170	0.170	-0.035	87.6	-11.6	0.052	-0.011	0.61	0.011	0.030	0.032	0.020	69.9	32.0	52.102	32.612
15/05/2002	5870180.432	531627.388	551.910	3.66	-0.010	0.179	0.179	-0.068	93.2	-20.8	0.049	-0.019	0.41	-0.017	0.009	0.019	-0.033	152.1	-59.8	46.528	-79.823
24/10/2002	5870180.456	531627.415	551.896	4.11	0.014	0.206	0.206	-0.082	86.1	-21.7	0.050	-0.020	0.44	0.024	0.027	0.036	-0.014	48.4	-21.2	81.448	-31.565
12/11/2003	5870180.438	531627.431	551.910	5.16	-0.004	0.222	0.222	-0.068	91.0	-17.0	0.043	-0.013	1.05	-0.018	0.016	0.024	0.014	137.7	29.9	22.974	13.193
11/01/2005	5870180.448	531627.446	551.906	6.32	0.006	0.237	0.237	-0.072	88.5	-16.8	0.037	-0.011	1.17	0.010	0.015	0.018	-0.004	56.0	-11.4	15.146	-3.061
10/03/2006	5870180.448	531627.506	551.899	7.48	0.006	0.297	0.297	-0.079	88.8	-14.9	0.040	-0.011	1.16	0.000	0.060	0.060	-0.007	90.0	-6.9	51.895	-6.303
10/11/2006	5870180.446	531627.515	551.893	8.15	0.004	0.306	0.306	-0.085	89.3	-15.5	0.038	-0.010	0.67	-0.002	0.009	0.009	-0.006	102.5	-33.1	13.745	-8.945
05/04/2007	5870180.448	531627.529	551.905	8.55	0.006	0.320	0.320	-0.073	88.9	-12.8	0.037	-0.009	0.40	0.002	0.014	0.014	0.012	81.9	40.3	35.380	30.021
16/08/2007	5870180.444	531627.541	551.877	8.92	0.002	0.332	0.332	-0.101	89.7	-16.9	0.037	-0.011	0.36	-0.004	0.012	0.013	-0.028	108.4	-65.7	34.738	-76.895
13/12/2007	5870180.451	531627.538	551.870	9.24	0.009	0.329	0.329	-0.108	88.4	-18.2	0.036	-0.012	0.33	0.007	-0.003	0.008	-0.007	336.8	-42.6	-23.375	-21.485
18/03/2008	5870180.457	531627.544	551.884	9.51	0.015	0.335	0.335	-0.094	87.4	-15.7	0.035	-0.010	0.26	0.006	0.006	0.008	0.014	45.0	58.8	32.284	53.266
03/06/2008	5870180.451	531627.565	551.876	9.72	0.009	0.356	0.356	-0.102	88.6	-16.0	0.037	-0.010	0.21	-0.006	0.021	0.022	-0.008	105.9	-20.1	103.600	-37.948
29/08/2008	5870180.467	531627.582	551.883	9.95	0.025	0.373	0.374	-0.095	86.2	-14.3	0.038	-0.010	0.24	0.016	0.017	0.023	0.007	46.7	16.7	98.010	29.388
19/11/2008	5870180.461	531627.579	551.874	10.18	0.019	0.370	0.370	-0.104	87.1	-15.7	0.036	-0.010	0.22	-0.006	-0.003	0.007	-0.009	206.6	-53.3	-29.880	-40.088
26/03/2009	5870180.457	531627.587	551.873	10.53	0.015	0.378	0.378	-0.105	87.7	-15.5	0.036	-0.010	0.35	-0.004	0.008	0.009	-0.001	116.6	-6.4	25.724	-2.876
10/06/2009	5870180.448	531627.627	551.881	10.74	0.006	0.418	0.418	-0.097	89.2	-13.1	0.039	-0.009	0.21	-0.009	0.040	0.041	0.008	102.7	11.0	197.043	38.447
17/09/2009	5870180.463	531627.632	551.882	11.01	0.021	0.423	0.424	-0.096	87.2	-12.8	0.038	-0.009	0.27	0.015	0.005	0.016	0.001	18.4	3.6	58.334	3.689
23/11/2009	5870180.470	531627.631	551.867	11.19	0.028	0.422	0.423	-0.111	86.2	-14.7	0.038	-0.010	0.18	0.007	-0.001	0.007	-0.015	351.9	-64.8	-38.548	-81.772
27/03/2010	5870180.466	531627.625	551.868	11.53	0.024	0.416	0.417	-0.110	86.7	-14.8	0.036	-0.010	0.34	-0.004	-0.006	0.007	0.001	236.3	7.9	-21.241	2.946
04/07/2010	5870180.454	531627.626	551.858	11.80	0.012	0.417	0.417	-0.120	88.4	-16.0	0.035	-0.010	0.27	-0.012	0.001	0.012	-0.010	175.2	-39.7	44.426	-36.894
13/09/2010	5870180.457	531627.629	551.851	11.99	0.015	0.420	0.420	-0.127	88.0	-16.8	0.035	-0.011	0.19	0.003	0.003	0.004	-0.007	45.0	-58.8	21.826	-36.011
22/11/2010	5870180.460	531627.632	551.862	12.19	0.018	0.423	0.423	-0.116	87.6	-15.3	0.035	-0.010	0.19	0.003	0.003	0.004	0.011	45.0	68.9	22.137	57.396
04/04/2011	5870180.456	531627.633	551.854	12.55	0.014	0.424	0.424	-0.124	88.1	-16.3	0.034	-0.010	0.36	-0.004	0.001	0.004	-0.008	166.0	-62.7	11.323	-21.970
18/06/2011	5870180.458	531627.649	551.867	12.76	0.016	0.440	0.440	-0.111	87.9	-14.1	0.035	-0.009	0.21	0.002	0.016	0.016	0.013	82.9	38.9	78.526	63.310
03/10/2011	5870180.459	531627.644	551.849	13.05	0.017	0.435	0.435	-0.129	87.8	-16.5	0.033	-0.010	0.29	0.001	-0.005	0.005	-0.018	281.3	-74.2	-17.406	-61.444
28/11/2011	5870180.467	531627.647	551.847	13.20	0.025	0.438	0.439	-0.131	86.7	-16.6	0.033	-0.010	0.15	0.008	0.003	0.009	-0.002	20.6	-13.2	55.727	-13.045
09/04/2012	5870180.459	531627.650	551.850	13.57	0.017	0.441	0.441	-0.128	87.8	-16.2	0.033	-0.009	0.36	-0.008	0.003	0.009	0.003	159.4	19.3	23.464	8.239

West Quesnel Land Stability Program

GPS Hub 98-05 (Southeast Corner of Lewis Drive and Dawson Street)

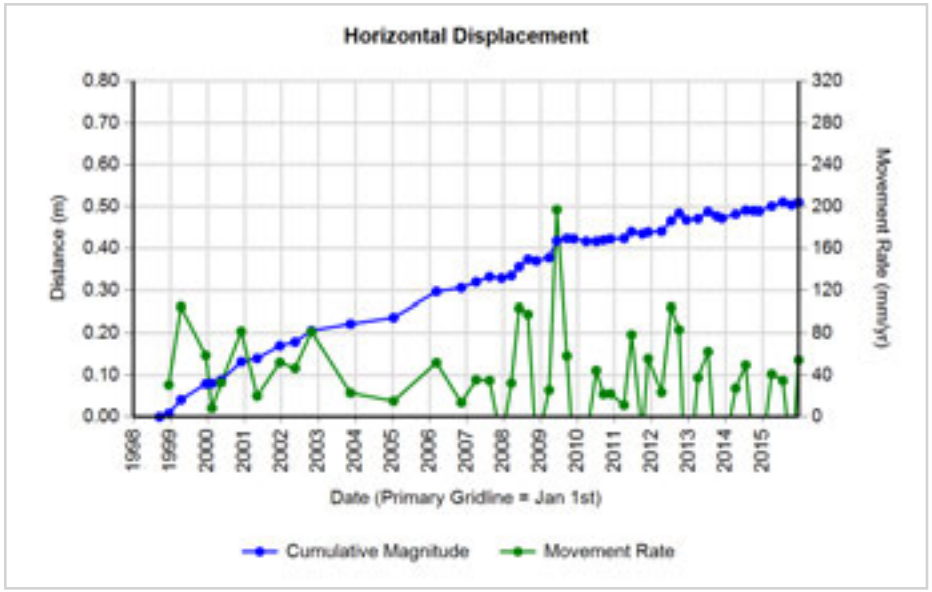
amec foster wheeler

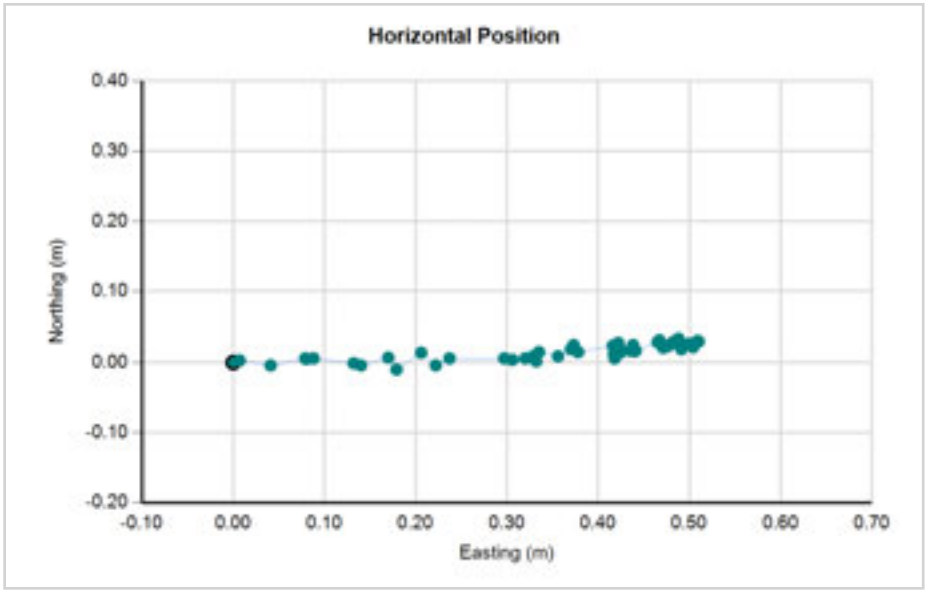
12/07/2012	5870180.471	531627.674	551.867	13.82	0.029	0.465	0.466	-0.111	86.4	-13.4	0.034	-0.008	0.26	0.012	0.024	0.027	0.017	63.4	32.4	104.263	66.056
29/09/2012	5870180.472	531627.692	551.882	14.04	0.030	0.483	0.484	-0.096	86.4	-11.2	0.034	-0.007	0.22	0.001	0.018	0.018	0.015	86.8	39.8	83.350	69.351
10/12/2012	5870180.474	531627.676	551.854	14.24	0.032	0.467	0.468	-0.124	86.1	-14.8	0.033	-0.009	0.20	0.002	-0.016	0.016	-0.028	277.1	-60.1	-81.798	-142.042
03/04/2013	5870180.463	531627.680	551.845	14.55	0.021	0.471	0.471	-0.133	87.4	-15.8	0.032	-0.009	0.31	-0.011	0.004	0.012	-0.009	160.0	-37.6	37.501	-28.836
12/07/2013	5870180.469	531627.696	551.859	14.82	0.027	0.487	0.488	-0.119	86.8	-13.7	0.033	-0.008	0.27	0.006	0.016	0.017	0.014	69.4	39.3	62.414	51.135
04/10/2013	5870180.465	531627.685	551.854	15.05	0.023	0.476	0.477	-0.124	87.2	-14.6	0.032	-0.008	0.23	-0.004	-0.011	0.012	-0.005	250.0	-23.1	-50.895	-21.741
27/11/2013	5870180.469	531627.680	551.849	15.20	0.027	0.471	0.472	-0.129	86.7	-15.3	0.031	-0.008	0.15	0.004	-0.005	0.006	-0.005	308.7	-38.0	-43.310	-33.819
10/04/2014	5870180.470	531627.690	551.849	15.57	0.028	0.481	0.482	-0.129	86.7	-15.0	0.031	-0.008	0.37	0.001	0.010	0.010	0.000	84.3	0.0	27.393	0.000
18/07/2014	5870180.461	531627.700	551.853	15.84	0.019	0.491	0.491	-0.125	87.8	-14.3	0.031	-0.008	0.27	-0.009	0.010	0.013	0.004	132.0	16.6	49.636	14.758
02/10/2014	5870180.468	531627.698	551.852	16.05	0.026	0.489	0.490	-0.126	87.0	-14.4	0.031	-0.008	0.21	0.007	-0.002	0.007	-0.001	344.1	-7.8	-34.988	-4.806
28/11/2014	5870180.476	531627.697	551.858	16.20	0.034	0.488	0.489	-0.120	86.0	-13.8	0.030	-0.007	0.16	0.008	-0.001	0.008	0.006	352.9	36.7	-51.662	38.447
01/04/2015	5870180.469	531627.709	551.839	16.54	0.027	0.500	0.501	-0.139	86.9	-15.5	0.030	-0.008	0.34	-0.007	0.012	0.014	-0.019	120.3	-53.8	40.921	-55.966
20/07/2015	5870180.472	531627.719	551.848	16.84	0.030	0.510	0.511	-0.130	86.6	-14.3	0.030	-0.008	0.30	0.003	0.010	0.010	0.009	73.3	40.8	34.667	29.884
14/10/2015	5870180.464	531627.713	551.841	17.08	0.022	0.504	0.504	-0.137	87.5	-15.2	0.030	-0.008	0.24	-0.008	-0.006	0.010	-0.007	216.9	-35.0	-42.471	-29.730
22/12/2015	5870180.473	531627.718	551.845	17.27	0.031	0.509	0.510	-0.133	86.5	-14.6	0.030	-0.008	0.19	0.009	0.005	0.010	0.004	29.1	21.2	54.500	21.174

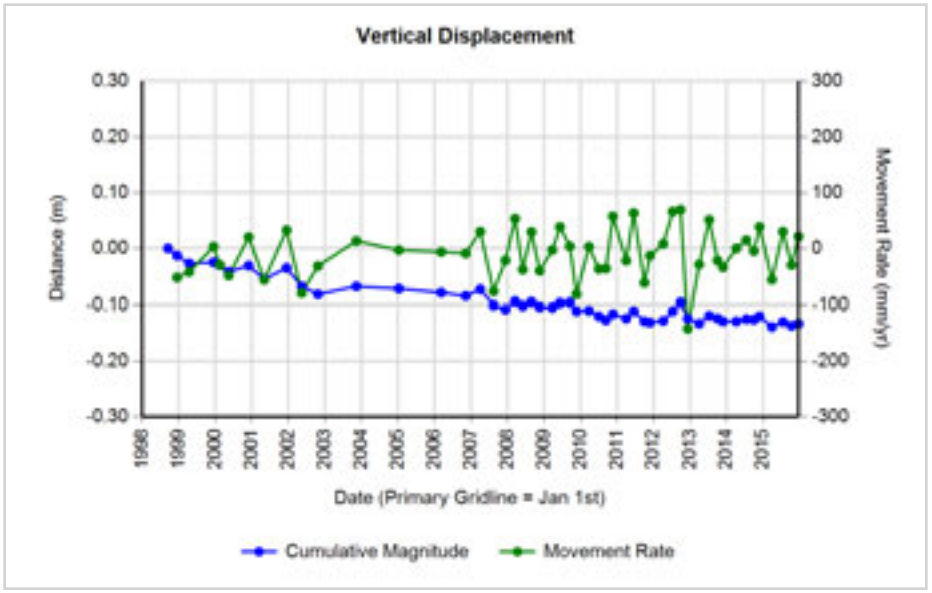
West Quesnel Land Stability Program

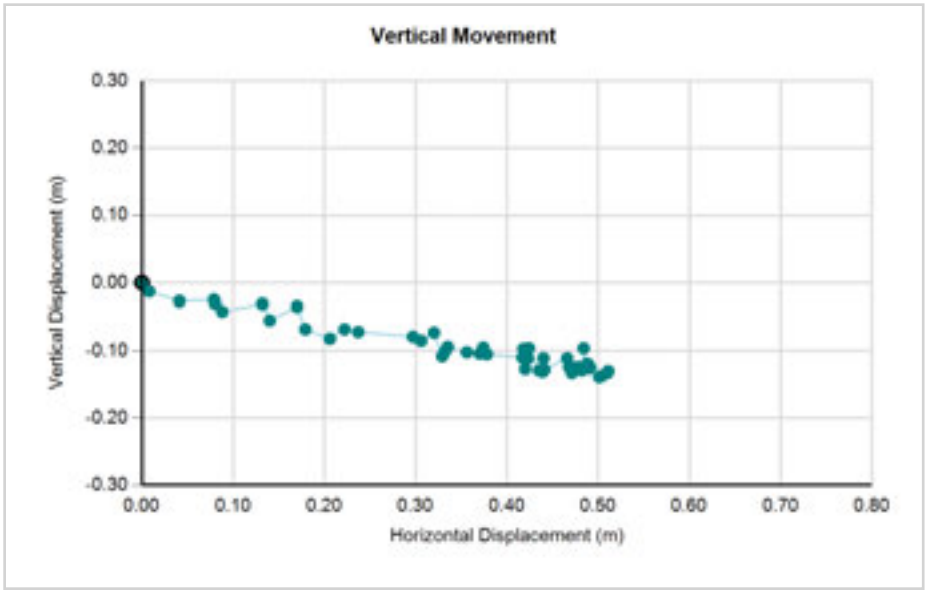
GPS Hub 98-05 (Southeast Corner of Lewis Drive and Dawson Street)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 98-06 (West End of Paley Avenue)

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5870474.774	531664.168	539.628	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/12/1998	5870474.771	531664.179	539.615	0.25	-0.003	0.011	0.011	-0.013	105.3	-48.7	0.046	-0.052	0.25	-0.003	0.011	0.011	-0.013	105.3	-48.7	45.764	-52.179
15/04/1999	5870474.788	531664.208	539.613	0.58	0.014	0.040	0.042	-0.015	70.7	-19.5	0.073	-0.026	0.33	0.017	0.029	0.034	-0.002	59.6	-3.4	101.471	-6.037
15/12/1999	5870474.805	531664.239	539.608	1.25	0.031	0.071	0.077	-0.020	66.4	-14.5	0.062	-0.016	0.67	0.017	0.031	0.035	-0.005	61.3	-8.0	52.924	-7.485
15/02/2000	5870474.829	531664.236	539.608	1.42	0.055	0.068	0.087	-0.020	51.0	-12.9	0.062	-0.014	0.17	0.024	-0.003	0.024	0.000	352.9	0.0	142.487	0.000
15/05/2000	5870474.840	531664.240	539.586	1.66	0.066	0.072	0.098	-0.042	47.5	-23.3	0.059	-0.025	0.25	0.011	0.004	0.012	-0.022	20.0	-62.0	47.502	-89.283
30/11/2000	5870474.883	531664.276	539.588	2.21	0.109	0.108	0.153	-0.040	44.7	-14.6	0.069	-0.018	0.54	0.043	0.036	0.056	0.002	39.9	2.0	102.931	3.671
05/05/2001	5870474.886	531664.285	539.551	2.64	0.112	0.117	0.162	-0.077	46.3	-25.4	0.061	-0.029	0.43	0.003	0.009	0.009	-0.037	71.6	-75.6	22.212	-86.630
15/12/2001	5870474.904	531664.298	539.564	3.25	0.130	0.130	0.184	-0.064	45.0	-19.2	0.057	-0.020	0.61	0.018	0.013	0.022	0.013	35.8	30.3	36.205	21.198
15/05/2002	5870474.892	531664.320	539.554	3.66	0.118	0.152	0.192	-0.074	52.2	-21.0	0.053	-0.020	0.41	-0.012	0.022	0.025	-0.010	118.6	-21.8	60.617	-24.189
24/10/2002	5870474.971	531664.345	539.518	4.11	0.197	0.177	0.265	-0.110	41.9	-22.6	0.064	-0.027	0.44	0.079	0.025	0.083	-0.036	17.6	-23.5	186.822	-81.167
12/11/2003	5870474.963	531664.357	539.530	5.16	0.189	0.189	0.267	-0.098	45.0	-20.2	0.052	-0.019	1.05	-0.008	0.012	0.014	0.012	125.2	38.8	13.775	11.072
11/01/2005	5870474.983	531664.364	539.544	6.32	0.209	0.196	0.287	-0.084	43.1	-16.3	0.045	-0.013	1.17	0.021	0.007	0.022	0.015	18.8	34.0	18.784	12.655
10/03/2006	5870475.037	531664.410	539.513	7.48	0.263	0.242	0.357	-0.115	42.6	-17.8	0.048	-0.015	1.16	0.054	0.046	0.071	-0.031	40.7	-23.9	61.046	-27.113
10/11/2006	5870475.043	531664.421	539.509	8.15	0.269	0.253	0.369	-0.119	43.2	-17.9	0.045	-0.015	0.67	0.006	0.011	0.013	-0.004	61.4	-17.7	18.680	-5.963
05/04/2007	5870475.051	531664.427	539.493	8.55	0.277	0.259	0.379	-0.135	43.1	-19.6	0.044	-0.016	0.40	0.008	0.006	0.010	-0.016	36.9	-58.0	25.017	-40.027
16/08/2007	5870475.072	531664.442	539.521	8.92	0.298	0.274	0.405	-0.107	42.6	-14.8	0.045	-0.012	0.36	0.021	0.015	0.026	0.028	35.5	47.3	70.872	76.895
13/12/2007	5870475.070	531664.444	539.479	9.24	0.296	0.276	0.405	-0.149	43.0	-20.2	0.044	-0.016	0.33	-0.002	0.002	0.003	-0.042	135.0	-86.1	-8.681	-128.912
18/03/2008	5870475.074	531664.442	539.498	9.51	0.300	0.274	0.406	-0.130	42.4	-17.7	0.043	-0.014	0.26	0.004	-0.002	0.004	0.019	333.4	76.8	17.015	72.289
03/06/2008	5870475.090	531664.464	539.498	9.72	0.316	0.296	0.433	-0.130	43.1	-16.7	0.045	-0.013	0.21	0.016	0.022	0.027	0.000	54.0	0.0	129.037	0.000
29/08/2008	5870475.091	531664.475	539.507	9.95	0.317	0.307	0.441	-0.121	44.1	-15.3	0.044	-0.012	0.24	0.001	0.011	0.011	0.009	84.8	39.2	46.371	37.784
19/11/2008	5870475.108	531664.470	539.474	10.18	0.334	0.302	0.450	-0.154	42.1	-18.9	0.044	-0.015	0.22	0.017	-0.005	0.018	-0.033	343.6	-61.8	78.930	-146.991
26/03/2009	5870475.114	531664.476	539.477	10.53	0.340	0.308	0.459	-0.151	42.2	-18.2	0.044	-0.014	0.35	0.006	0.006	0.008	0.003	45.0	19.5	24.404	8.628
10/06/2009	5870475.129	531664.500	539.474	10.74	0.355	0.332	0.486	-0.154	43.1	-17.6	0.045	-0.014	0.21	0.015	0.024	0.028	-0.003	58.0	-6.1	136.017	-14.418
17/09/2009	5870475.129	531664.519	539.500	11.01	0.355	0.351	0.499	-0.128	44.7	-14.4	0.045	-0.012	0.27	0.000	0.019	0.019	0.026	90.0	53.8	70.098	95.924
23/11/2009	5870475.157	531664.507	539.459	11.19	0.383	0.339	0.511	-0.169	41.5	-18.3	0.046	-0.015	0.18	0.028	-0.012	0.030	-0.041	336.8	-53.4	166.069	-223.511
27/03/2010	5870475.154	531664.513	539.470	11.53	0.380	0.345	0.513	-0.158	42.2	-17.1	0.045	-0.014	0.34	-0.003	0.006	0.007	0.011	116.6	58.6	19.759	32.401
04/07/2010	5870475.139	531664.511	539.473	11.80	0.365	0.343	0.501	-0.155	43.2	-17.2	0.042	-0.013	0.27	-0.015	-0.002	0.015	0.003	187.6	11.2	-55.831	11.068
13/09/2010	5870475.144	531664.522	539.490	11.99	0.370	0.354	0.512	-0.138	43.7	-15.1	0.043	-0.012	0.19	0.005	0.011	0.012	0.017	65.6	54.6	62.160	87.454
22/11/2010	5870475.151	531664.516	539.453	12.19	0.377	0.348	0.513	-0.175	42.7	-18.8	0.042	-0.014	0.19	0.007	-0.006	0.009	-0.037	319.4	-76.0	48.106	-193.061
04/04/2011	5870475.161	531664.509	539.449	12.55	0.387	0.341	0.516	-0.179	41.4	-19.1	0.041	-0.014	0.36	0.010	-0.007	0.012	-0.004	325.0	-18.1	33.522	-10.985
18/06/2011	5870475.155	531664.531	539.484	12.76	0.381	0.363	0.526	-0.144	43.6	-15.3	0.041	-0.011	0.21	-0.006	0.022	0.023	0.035	105.3	56.9	111.053	170.450
03/10/2011	5870475.172	531664.524	539.464	13.05	0.398	0.356	0.534	-0.164	41.8	-17.1	0.041	-0.013	0.29	0.017	-0.007	0.018	-0.020	337.6	-47.4	62.757	-68.271
28/11/2011	5870475.169	531664.527	539.453	13.20	0.395	0.359	0.534	-0.175	42.3	-18.2	0.040	-0.013	0.15	-0.003	0.003	0.004	-0.011	135.0	-68.9	-27.672	-71.746
09/04/2012	5870475.170	531664.529	539.461	13.57	0.396	0.361	0.536	-0.167	42.4	-17.3	0.039	-0.012	0.36	0.001	0.002	0.002	0.008	63.4	74.4	6.141	21.970

West Quesnel Land Stability Program

GPS Hub 98-06 (West End of Paley Avenue)

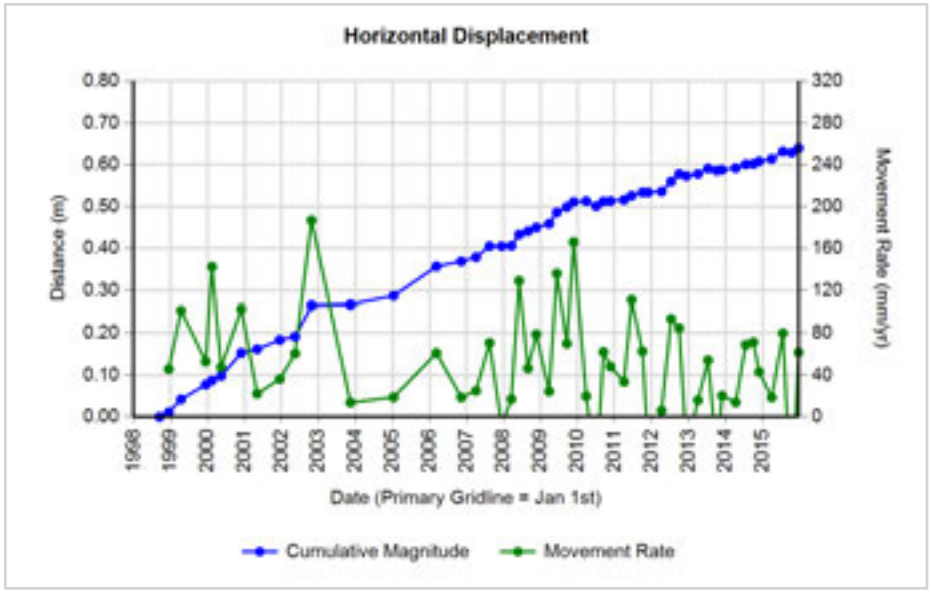
amec foster wheeler

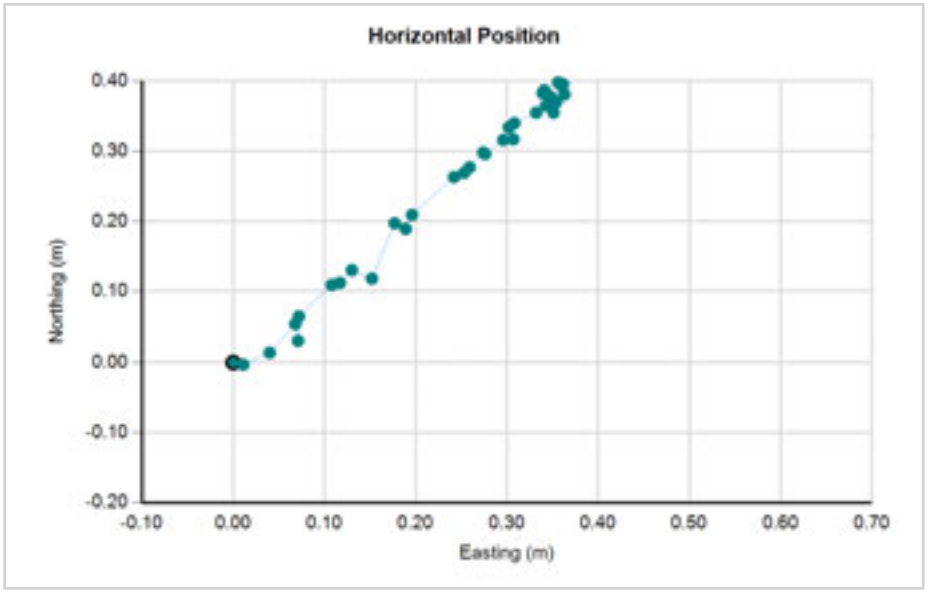
12/07/2012	5870475.188	531664.545	539.468	13.82	0.414	0.377	0.560	-0.160	42.3	-15.9	0.041	-0.012	0.26	0.018	0.016	0.024	0.007	41.6	16.2	93.579	27.199
29/09/2012	5870475.204	531664.554	539.448	14.04	0.430	0.386	0.578	-0.180	41.9	-17.3	0.041	-0.013	0.22	0.016	0.009	0.018	-0.020	29.4	-47.5	84.875	-92.468
10/12/2012	5870475.203	531664.548	539.442	14.24	0.429	0.380	0.573	-0.186	41.5	-18.0	0.040	-0.013	0.20	-0.001	-0.006	0.006	-0.006	260.5	-44.6	-30.857	-30.437
03/04/2013	5870475.207	531664.551	539.435	14.55	0.433	0.383	0.578	-0.193	41.5	-18.5	0.040	-0.013	0.31	0.004	0.003	0.005	-0.007	36.9	-54.5	16.020	-22.428
12/07/2013	5870475.212	531664.565	539.447	14.82	0.438	0.397	0.591	-0.181	42.2	-17.0	0.040	-0.012	0.27	0.005	0.014	0.015	0.012	70.3	38.9	54.298	43.830
04/10/2013	5870475.212	531664.557	539.442	15.05	0.438	0.389	0.586	-0.186	41.6	-17.6	0.039	-0.012	0.23	0.000	-0.008	0.008	-0.005	270.0	-32.0	-34.786	-21.741
27/11/2013	5870475.215	531664.557	539.441	15.20	0.441	0.389	0.588	-0.187	41.4	-17.6	0.039	-0.012	0.15	0.003	0.000	0.003	-0.001	0.0	-18.4	20.292	-6.764
10/04/2014	5870475.220	531664.558	539.441	15.57	0.446	0.390	0.592	-0.187	41.2	-17.5	0.038	-0.012	0.37	0.005	0.001	0.005	0.000	11.3	0.0	13.899	0.000
18/07/2014	5870475.215	531664.576	539.454	15.84	0.441	0.408	0.601	-0.174	42.8	-16.2	0.038	-0.011	0.27	-0.005	0.018	0.019	0.013	105.5	34.8	68.924	47.962
02/10/2014	5870475.226	531664.566	539.430	16.05	0.452	0.398	0.602	-0.198	41.4	-18.2	0.038	-0.012	0.21	0.011	-0.010	0.015	-0.024	317.7	-58.2	71.445	-115.342
28/11/2014	5870475.229	531664.572	539.420	16.20	0.455	0.404	0.608	-0.208	41.6	-18.9	0.038	-0.013	0.16	0.003	0.006	0.007	-0.010	63.4	-56.1	42.985	-64.079
01/04/2015	5870475.235	531664.574	539.426	16.54	0.461	0.406	0.614	-0.202	41.4	-18.2	0.037	-0.012	0.34	0.006	0.002	0.006	0.006	18.4	43.5	18.629	17.673
20/07/2015	5870475.237	531664.598	539.455	16.84	0.463	0.430	0.632	-0.173	42.9	-15.3	0.038	-0.010	0.30	0.002	0.024	0.024	0.029	85.2	50.3	79.967	96.293
14/10/2015	5870475.248	531664.581	539.423	17.08	0.474	0.413	0.629	-0.205	41.1	-18.1	0.037	-0.012	0.24	0.011	-0.017	0.020	-0.032	302.9	-57.7	-85.997	-135.907
22/12/2015	5870475.254	531664.591	539.429	17.27	0.480	0.423	0.640	-0.199	41.4	-17.3	0.037	-0.012	0.19	0.006	0.010	0.012	0.006	59.0	27.2	61.732	31.761

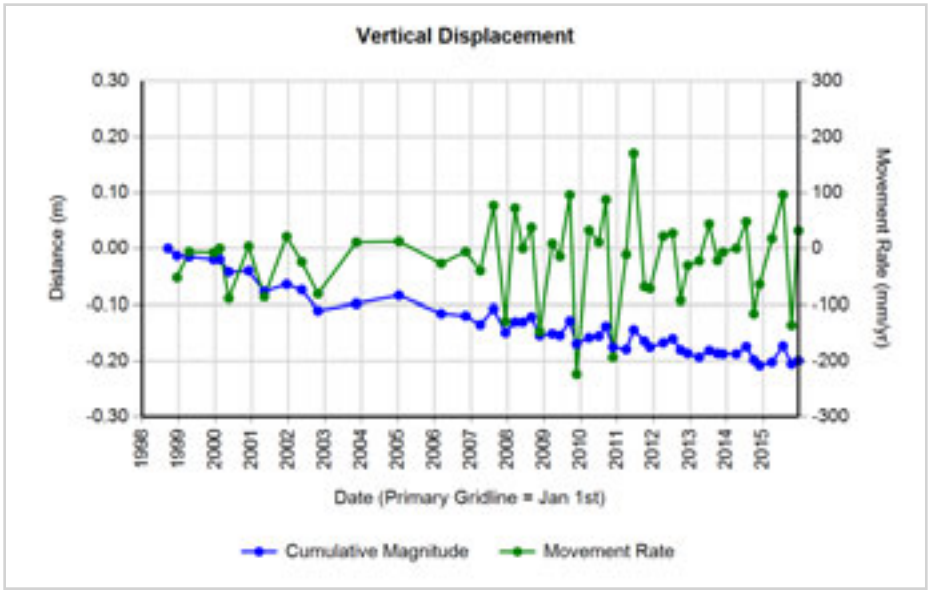
West Quesnel Land Stability Program

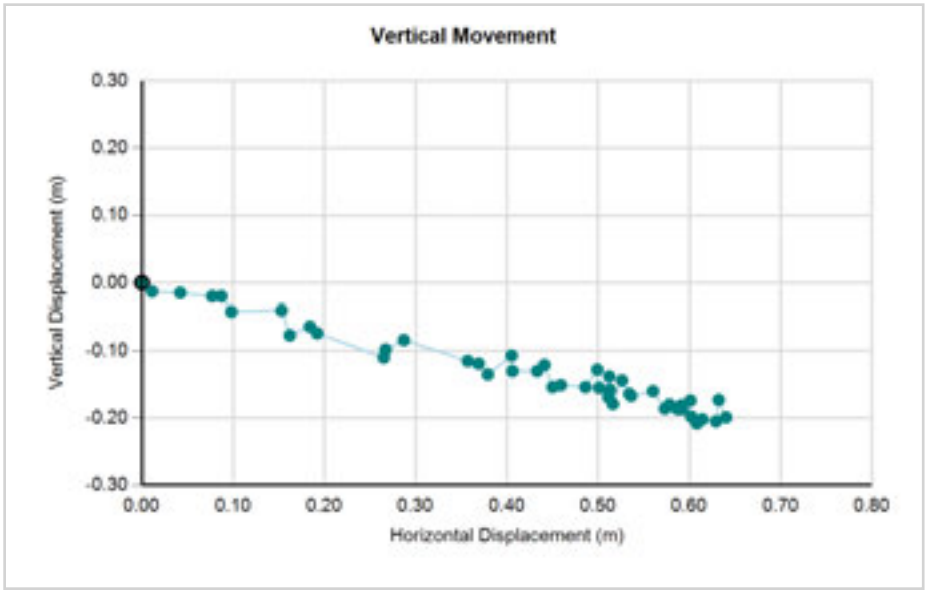
GPS Hub 98-06 (West End of Paley Avenue)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 98-07 (North Side of Paley Avenue)

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5870427.297	531932.241	533.473	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/12/1998	5870427.299	531932.249	533.467	0.25	0.002	0.008	0.008	-0.006	76.0	-36.0	0.033	-0.024	0.25	0.002	0.008	0.008	-0.006	76.0	-36.0	33.098	-24.082
15/04/1999	5870427.300	531932.279	533.462	0.58	0.003	0.038	0.038	-0.011	85.5	-16.1	0.066	-0.019	0.33	0.001	0.030	0.030	-0.005	88.1	-9.5	90.608	-15.093
15/12/1999	5870427.321	531932.307	533.461	1.25	0.024	0.066	0.070	-0.012	70.0	-9.7	0.056	-0.010	0.67	0.021	0.028	0.035	-0.001	53.1	-1.6	52.392	-1.497
15/02/2000	5870427.327	531932.311	533.457	1.42	0.030	0.070	0.076	-0.016	66.8	-11.9	0.054	-0.011	0.17	0.006	0.004	0.007	-0.004	33.7	-29.0	42.482	-23.565
15/05/2000	5870427.334	531932.321	533.449	1.66	0.037	0.080	0.088	-0.024	65.2	-15.2	0.053	-0.014	0.25	0.007	0.010	0.012	-0.008	55.0	-33.2	49.538	-32.467
30/11/2000	5870427.348	531932.349	533.436	2.21	0.051	0.108	0.119	-0.037	64.7	-17.2	0.054	-0.017	0.54	0.014	0.028	0.031	-0.013	63.4	-22.6	57.458	-23.861
05/05/2001	5870427.359	531932.364	533.417	2.64	0.062	0.123	0.138	-0.056	63.2	-22.1	0.052	-0.021	0.43	0.011	0.015	0.019	-0.019	53.7	-45.6	43.552	-44.486
15/12/2001	5870427.363	531932.376	533.430	3.25	0.066	0.135	0.150	-0.043	63.9	-16.0	0.046	-0.013	0.61	0.004	0.012	0.013	0.013	71.6	45.8	20.625	21.198
15/05/2002	5870427.379	531932.388	533.422	3.66	0.082	0.147	0.168	-0.051	60.8	-16.9	0.046	-0.014	0.41	0.016	0.012	0.020	-0.008	36.9	-21.8	48.377	-19.351
24/10/2002	5870427.421	531932.432	533.390	4.11	0.124	0.191	0.228	-0.083	57.0	-20.0	0.055	-0.020	0.44	0.042	0.044	0.061	-0.032	46.3	-27.7	137.144	-72.148
12/11/2003	5870427.392	531932.439	533.408	5.16	0.095	0.198	0.219	-0.065	64.3	-16.5	0.043	-0.013	1.05	-0.029	0.007	0.030	0.018	167.1	31.3	-28.284	17.169
11/01/2005	5870427.408	531932.451	533.424	6.32	0.111	0.210	0.237	-0.049	62.1	-11.7	0.037	-0.008	1.17	0.016	0.012	0.020	0.016	37.0	38.4	17.062	13.504
10/03/2006	5870427.431	531932.506	533.396	7.48	0.134	0.265	0.297	-0.077	63.2	-14.5	0.040	-0.010	1.16	0.023	0.055	0.060	-0.028	67.4	-24.9	51.828	-24.005
10/11/2006	5870427.441	531932.519	533.389	8.15	0.144	0.278	0.313	-0.084	62.6	-15.0	0.038	-0.010	0.67	0.010	0.013	0.016	-0.007	52.4	-23.1	24.451	-10.436
05/04/2007	5870427.447	531932.528	533.380	8.55	0.150	0.287	0.324	-0.093	62.4	-16.0	0.038	-0.011	0.40	0.006	0.009	0.011	-0.009	56.3	-39.8	27.060	-22.515
16/08/2007	5870427.454	531932.536	533.400	8.92	0.157	0.295	0.334	-0.073	62.0	-12.3	0.037	-0.008	0.36	0.007	0.008	0.011	0.020	48.8	62.0	29.193	54.925
13/12/2007	5870427.455	531932.537	533.372	9.24	0.158	0.296	0.336	-0.101	61.9	-16.8	0.036	-0.011	0.33	0.001	0.001	0.001	-0.028	45.0	-87.1	4.341	-85.941
18/03/2008	5870427.459	531932.544	533.382	9.51	0.162	0.303	0.344	-0.091	61.9	-14.8	0.036	-0.010	0.26	0.004	0.007	0.008	0.010	60.3	51.1	30.674	38.047
03/06/2008	5870427.460	531932.561	533.391	9.72	0.163	0.320	0.359	-0.082	63.0	-12.9	0.037	-0.008	0.21	0.001	0.017	0.017	0.009	86.6	27.9	80.779	42.692
29/08/2008	5870427.458	531932.561	533.399	9.95	0.161	0.320	0.358	-0.074	63.3	-11.7	0.036	-0.007	0.24	-0.002	0.000	0.002	0.008	180.0	76.0	-8.397	33.586
19/11/2008	5870427.480	531932.572	533.372	10.18	0.183	0.331	0.378	-0.101	61.1	-15.0	0.037	-0.010	0.22	0.022	0.011	0.025	-0.027	26.6	-47.7	109.561	-120.265
26/03/2009	5870427.478	531932.579	533.376	10.53	0.181	0.338	0.383	-0.097	61.8	-14.2	0.036	-0.009	0.35	-0.002	0.007	0.007	0.004	105.9	28.8	20.937	11.504
10/06/2009	5870427.484	531932.604	533.378	10.74	0.187	0.363	0.408	-0.095	62.7	-13.1	0.038	-0.009	0.21	0.006	0.025	0.026	0.002	76.5	4.4	123.560	9.612
17/09/2009	5870427.491	531932.612	533.372	11.01	0.194	0.371	0.419	-0.101	62.4	-13.6	0.038	-0.009	0.27	0.007	0.008	0.011	-0.006	48.8	-29.4	39.219	-22.136
23/11/2009	5870427.506	531932.605	533.360	11.19	0.209	0.364	0.420	-0.113	60.1	-15.1	0.038	-0.010	0.18	0.015	-0.007	0.017	-0.012	335.0	-35.9	90.238	-65.418
27/03/2010	5870427.502	531932.614	533.363	11.53	0.205	0.373	0.426	-0.110	61.2	-14.5	0.037	-0.010	0.34	-0.004	0.009	0.010	0.003	114.0	16.9	29.010	8.837
04/07/2010	5870427.482	531932.599	533.376	11.80	0.185	0.358	0.403	-0.097	62.7	-13.5	0.034	-0.008	0.27	-0.020	-0.015	0.025	0.013	216.9	27.5	-92.235	47.962
13/09/2010	5870427.496	531932.611	533.363	11.99	0.199	0.370	0.420	-0.110	61.7	-14.7	0.035	-0.009	0.19	0.014	0.012	0.018	-0.013	40.6	-35.2	94.857	-66.877
22/11/2010	5870427.504	531932.621	533.356	12.19	0.207	0.380	0.433	-0.117	61.4	-15.1	0.036	-0.010	0.19	0.008	0.010	0.013	-0.007	51.3	-28.7	66.821	-36.525
04/04/2011	5870427.500	531932.620	533.362	12.55	0.203	0.379	0.430	-0.111	61.8	-14.5	0.034	-0.009	0.36	-0.004	-0.001	0.004	0.006	194.0	55.5	-11.323	16.477
18/06/2011	5870427.507	531932.629	533.363	12.76	0.210	0.388	0.441	-0.110	61.6	-14.0	0.035	-0.009	0.21	0.007	0.009	0.011	0.001	52.1	5.0	55.527	4.870
03/10/2011	5870427.511	531932.622	533.366	13.05	0.214	0.381	0.437	-0.107	60.7	-13.8	0.033	-0.008	0.29	0.004	-0.007	0.008	0.003	299.7	20.4	-27.521	10.241
28/11/2011	5870427.516	531932.632	533.356	13.20	0.219	0.391	0.448	-0.117	60.7	-14.6	0.034	-0.009	0.15	0.005	0.010	0.011	-0.010	63.4	-41.8	72.922	-65.223
09/04/2012	5870427.507	531932.637	533.367	13.57	0.210	0.396	0.448	-0.106	62.1	-13.3	0.033	-0.008	0.36	-0.009	0.005	0.010	0.011	150.9	46.9	28.274	30.209

West Quesnel Land Stability Program

GPS Hub 98-07 (North Side of Paley Avenue)

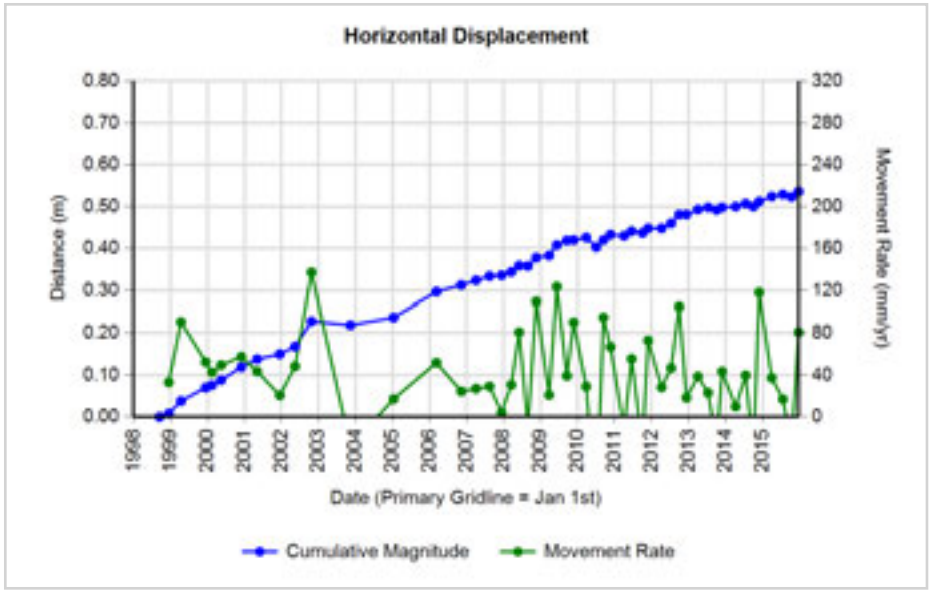
amec foster wheeler

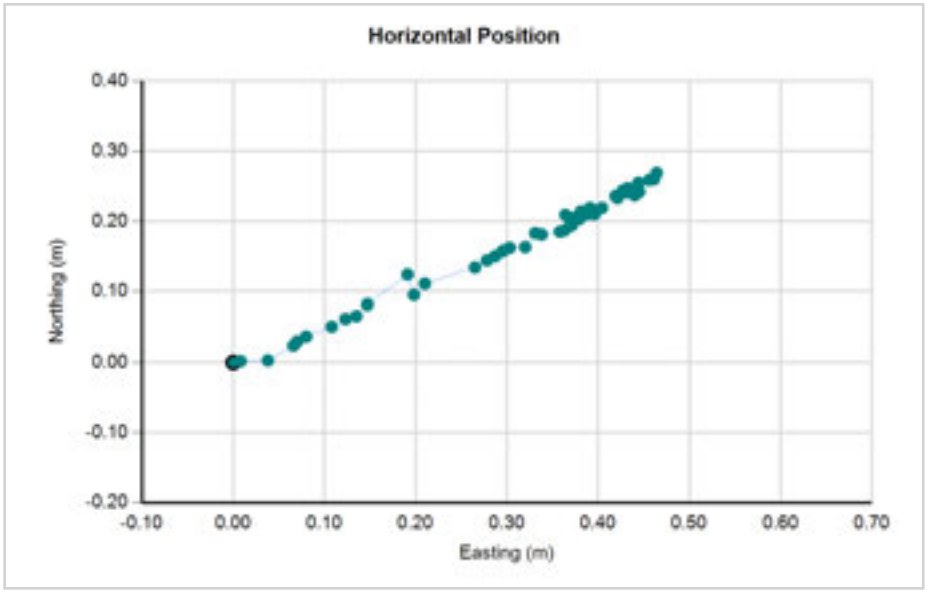
12/07/2012	5870427.516	531932.645	533.359	13.82	0.219	0.404	0.460	-0.114	61.5	-13.9	0.033	-0.008	0.26	0.009	0.008	0.012	-0.008	41.6	-33.6	46.789	-31.085
29/09/2012	5870427.533	531932.660	533.351	14.04	0.236	0.419	0.481	-0.122	60.6	-14.2	0.034	-0.009	0.22	0.017	0.015	0.023	-0.008	41.4	-19.4	104.820	-36.987
10/12/2012	5870427.530	531932.662	533.344	14.24	0.233	0.421	0.481	-0.129	61.0	-15.0	0.034	-0.009	0.20	-0.003	0.002	0.004	-0.007	146.3	-62.7	18.291	-35.510
03/04/2013	5870427.538	531932.671	533.338	14.55	0.241	0.430	0.493	-0.135	60.7	-15.3	0.034	-0.009	0.31	0.008	0.009	0.012	-0.006	48.4	-26.5	38.581	-19.224
12/07/2013	5870427.544	531932.673	533.348	14.82	0.247	0.432	0.498	-0.125	60.2	-14.1	0.034	-0.008	0.27	0.006	0.002	0.006	0.010	18.4	57.7	23.100	36.525
04/10/2013	5870427.541	531932.668	533.354	15.05	0.244	0.427	0.492	-0.119	60.3	-13.6	0.033	-0.008	0.23	-0.003	-0.005	0.006	0.006	239.0	45.8	-25.354	26.089
27/11/2013	5870427.545	531932.673	533.343	15.20	0.248	0.432	0.498	-0.130	60.1	-14.6	0.033	-0.009	0.15	0.004	0.005	0.006	-0.011	51.3	-59.8	43.310	-74.403
10/04/2014	5870427.543	531932.676	533.345	15.57	0.246	0.435	0.500	-0.128	60.5	-14.4	0.032	-0.008	0.37	-0.002	0.003	0.004	0.002	123.7	29.0	9.828	5.451
18/07/2014	5870427.539	531932.686	533.353	15.84	0.242	0.445	0.507	-0.120	61.5	-13.3	0.032	-0.008	0.27	-0.004	0.010	0.011	0.008	111.8	36.6	39.736	29.515
02/10/2014	5870427.534	531932.681	533.347	16.05	0.237	0.440	0.500	-0.126	61.7	-14.2	0.031	-0.008	0.21	-0.005	-0.005	0.007	-0.006	225.0	-40.3	-33.983	-28.836
28/11/2014	5870427.552	531932.685	533.336	16.20	0.255	0.444	0.512	-0.137	60.1	-15.0	0.032	-0.008	0.16	0.018	0.004	0.018	-0.011	12.5	-30.8	118.156	-70.487
01/04/2015	5870427.556	531932.697	533.332	16.54	0.259	0.456	0.524	-0.141	60.4	-15.0	0.032	-0.009	0.34	0.004	0.012	0.013	-0.004	71.6	-17.5	37.259	-11.782
20/07/2015	5870427.557	531932.702	533.344	16.84	0.260	0.461	0.529	-0.129	60.6	-13.7	0.031	-0.008	0.30	0.001	0.005	0.005	0.012	78.7	67.0	16.931	39.845
14/10/2015	5870427.553	531932.697	533.333	17.08	0.256	0.456	0.523	-0.140	60.7	-15.0	0.031	-0.008	0.24	-0.004	-0.005	0.006	-0.011	231.3	-59.8	-27.195	-46.718
22/12/2015	5870427.566	531932.705	533.333	17.27	0.269	0.464	0.536	-0.140	59.9	-14.6	0.031	-0.008	0.19	0.013	0.008	0.015	0.000	31.6	0.0	80.801	0.000

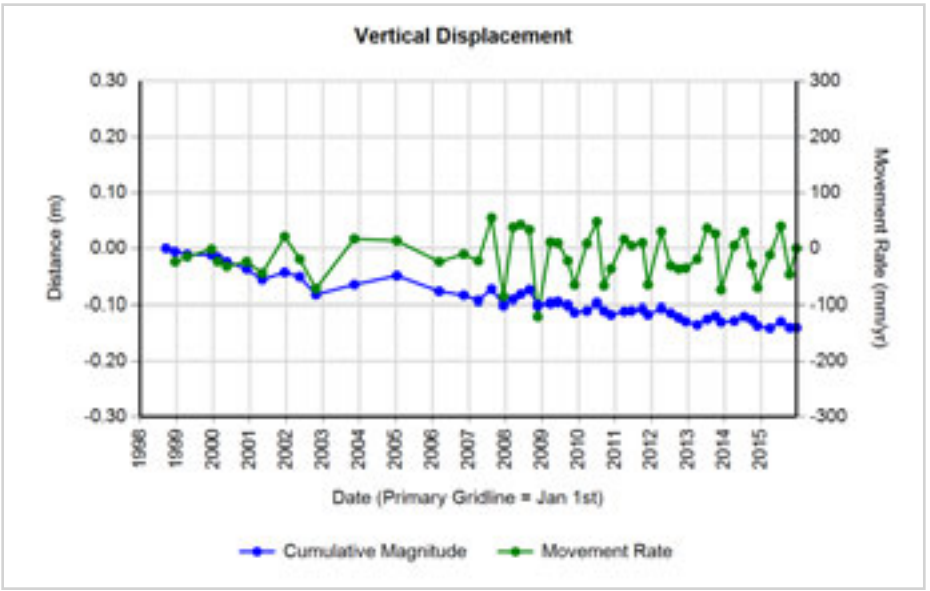
West Quesnel Land Stability Program

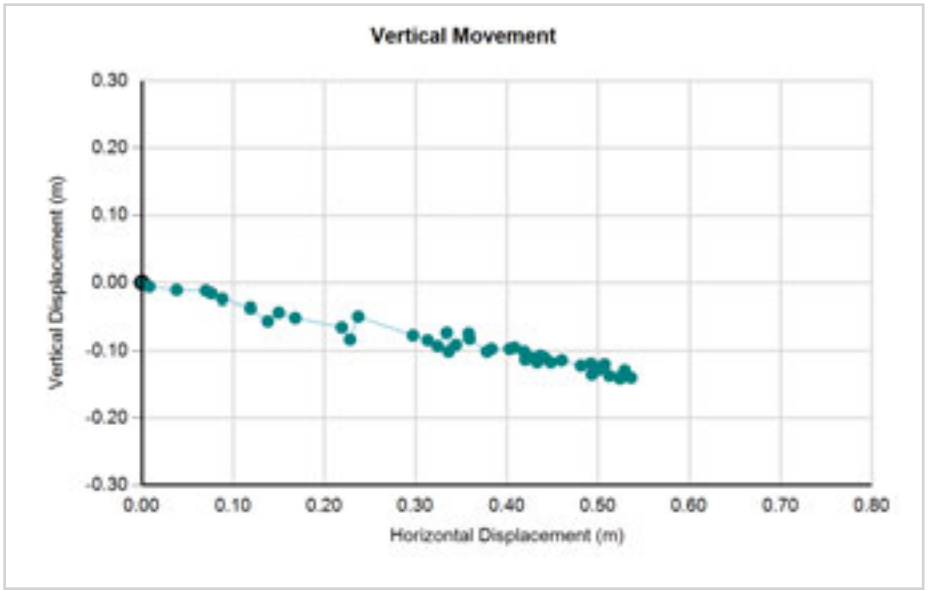
GPS Hub 98-07 (North Side of Paley Avenue)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 98-08 (South Side of Picard Avenue) Replaced by 13-02

amec foster wheeler

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5870328.580	531909.295	536.943	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/12/1998	5870328.580	531909.287	536.905	0.25	0.000	-0.008	0.008	-0.038	270.0	-78.1	0.032	-0.153	0.25	0.000	-0.008	0.008	-0.038	270.0	-78.1	32.110	-152.522
15/04/1999	5870328.581	531909.314	536.909	0.58	0.001	0.019	0.019	-0.034	87.0	-60.8	0.033	-0.059	0.33	0.001	0.027	0.027	0.004	87.9	8.4	81.558	12.074
15/12/1999	5870328.609	531909.354	536.909	1.25	0.029	0.059	0.066	-0.034	63.8	-27.3	0.053	-0.027	0.67	0.028	0.040	0.049	0.000	55.0	0.0	73.089	0.000
15/02/2000	5870328.601	531909.349	536.907	1.42	0.021	0.054	0.058	-0.036	68.7	-31.9	0.041	-0.025	0.17	-0.008	-0.005	0.009	-0.002	212.0	-12.0	-55.577	-11.782
15/05/2000	5870328.607	531909.363	536.886	1.66	0.027	0.068	0.073	-0.057	68.3	-37.9	0.044	-0.034	0.25	0.006	0.014	0.015	-0.021	66.8	-54.0	61.815	-85.225
30/11/2000	5870328.636	531909.396	536.885	2.21	0.056	0.101	0.115	-0.058	61.0	-26.7	0.052	-0.026	0.54	0.029	0.033	0.044	-0.001	48.7	-1.3	80.634	-1.835
05/05/2001	5870328.636	531909.408	536.872	2.64	0.056	0.113	0.126	-0.071	63.6	-29.4	0.048	-0.027	0.43	0.000	0.012	0.012	-0.013	90.0	-47.3	28.096	-30.438
15/12/2001	5870328.645	531909.423	536.882	3.25	0.065	0.128	0.144	-0.061	63.1	-23.0	0.044	-0.019	0.61	0.009	0.015	0.017	0.010	59.0	29.8	28.524	16.306
15/05/2002	5870328.645	531909.462	536.866	3.66	0.065	0.167	0.179	-0.077	68.7	-23.3	0.049	-0.021	0.41	0.000	0.039	0.039	-0.016	90.0	-22.3	94.336	-38.702
24/10/2002	5870328.687	531909.479	536.828	4.11	0.107	0.184	0.213	-0.115	59.8	-28.4	0.052	-0.028	0.44	0.042	0.017	0.045	-0.038	22.0	-40.0	102.157	-85.676
12/11/2003	5870328.664	531909.484	536.879	5.16	0.084	0.189	0.206	-0.064	66.1	-17.3	0.040	-0.012	1.05	-0.023	0.005	0.024	0.051	168.3	64.7	-22.796	48.167
11/01/2005	5870328.674	531909.503	536.862	6.32	0.094	0.208	0.228	-0.081	65.6	-19.5	0.036	-0.013	1.17	0.011	0.019	0.022	-0.016	60.0	-36.7	18.657	-13.924
10/03/2006	5870328.692	531909.551	536.845	7.48	0.112	0.256	0.279	-0.098	66.4	-19.3	0.037	-0.013	1.16	0.018	0.048	0.051	-0.017	70.0	-18.7	44.388	-15.024
10/11/2006	5870328.700	531909.567	536.839	8.15	0.120	0.272	0.297	-0.104	66.2	-19.3	0.036	-0.013	0.67	0.008	0.016	0.018	-0.006	63.4	-18.5	26.669	-8.945
05/04/2007	5870328.704	531909.572	536.840	8.55	0.124	0.277	0.303	-0.103	65.9	-18.7	0.035	-0.012	0.40	0.004	0.005	0.006	0.001	51.3	8.9	16.019	2.502
16/08/2007	5870328.703	531909.573	536.832	8.92	0.123	0.278	0.304	-0.111	66.1	-20.1	0.034	-0.012	0.36	-0.001	0.001	0.001	-0.008	135.0	-80.0	3.884	-21.970
13/12/2007	5870328.709	531909.588	536.817	9.24	0.129	0.293	0.320	-0.126	66.2	-21.5	0.035	-0.014	0.33	0.006	0.015	0.016	-0.015	68.2	-42.9	49.587	-46.040
18/03/2008	5870328.711	531909.588	536.835	9.51	0.131	0.293	0.321	-0.108	65.9	-18.6	0.034	-0.011	0.26	0.002	0.000	0.002	0.018	0.0	83.7	7.609	68.484
03/06/2008	5870328.720	531909.612	536.832	9.72	0.140	0.317	0.347	-0.111	66.2	-17.8	0.036	-0.011	0.21	0.009	0.024	0.026	-0.003	69.4	-6.7	121.586	-14.231
29/08/2008	5870328.721	531909.618	536.829	9.95	0.141	0.323	0.352	-0.114	66.4	-17.9	0.035	-0.011	0.24	0.001	0.006	0.006	-0.003	80.5	-26.3	25.537	-12.595
19/11/2008	5870328.729	531909.623	536.821	10.18	0.149	0.328	0.360	-0.122	65.6	-18.7	0.035	-0.012	0.22	0.008	0.005	0.009	-0.008	32.0	-40.3	42.021	-35.634
26/03/2009	5870328.730	531909.631	536.822	10.53	0.150	0.336	0.368	-0.121	65.9	-18.2	0.035	-0.011	0.35	0.001	0.008	0.008	0.001	82.9	7.1	23.187	2.876
10/06/2009	5870328.728	531909.656	536.824	10.74	0.148	0.361	0.390	-0.119	67.7	-17.0	0.036	-0.011	0.21	-0.002	0.025	0.025	0.002	94.6	4.6	120.532	9.612
17/09/2009	5870328.743	531909.664	536.818	11.01	0.163	0.369	0.403	-0.125	66.2	-17.2	0.037	-0.011	0.27	0.015	0.008	0.017	-0.006	28.1	-19.4	62.720	-22.136
23/11/2009	5870328.753	531909.660	536.808	11.19	0.173	0.365	0.404	-0.135	64.6	-18.5	0.036	-0.012	0.18	0.010	-0.004	0.011	-0.010	338.2	-42.9	58.714	-54.515
27/03/2010	5870328.748	531909.666	536.811	11.53	0.168	0.371	0.407	-0.132	65.6	-18.0	0.035	-0.011	0.34	-0.005	0.006	0.008	0.003	129.8	21.0	23.006	8.837
04/07/2010	5870328.740	531909.664	536.806	11.80	0.160	0.369	0.402	-0.137	66.6	-18.8	0.034	-0.012	0.27	-0.008	-0.002	0.008	-0.005	194.0	-31.2	-30.424	-18.447
13/09/2010	5870328.743	531909.668	536.813	11.99	0.163	0.373	0.407	-0.130	66.4	-17.7	0.034	-0.011	0.19	0.003	0.004	0.005	0.007	53.1	54.5	25.722	36.011
22/11/2010	5870328.745	531909.673	536.808	12.19	0.165	0.378	0.412	-0.135	66.4	-18.1	0.034	-0.011	0.19	0.002	0.005	0.005	-0.005	68.2	-42.9	28.099	-26.089
04/04/2011	5870328.744	531909.669	536.801	12.55	0.164	0.374	0.408	-0.142	66.3	-19.2	0.033	-0.011	0.36	-0.001	-0.004	0.004	-0.007	256.0	-59.5	-11.323	-19.224
18/06/2011	5870328.748	531909.679	536.808	12.76	0.168	0.384	0.419	-0.135	66.4	-17.9	0.033	-0.011	0.21	0.004	0.010	0.011	0.007	68.2	33.0	52.452	34.090
03/10/2011	5870328.755	531909.678	536.808	13.05	0.175	0.383	0.421	-0.135	65.4	-17.8	0.032	-0.010	0.29	0.007	-0.001	0.007	0.000	351.9	0.0	24.137	0.000
28/11/2011	5870328.754	531909.680	536.805	13.20	0.174	0.385	0.422	-0.138	65.7	-18.1	0.032	-0.010	0.15	-0.001	0.002	0.002	-0.003	116.6	-53.3	14.584	-19.567
09/04/2012	5870328.753	531909.685	536.803	13.57	0.173	0.390	0.427	-0.140	66.1	-18.2	0.031	-0.010	0.36	-0.001	0.005	0.005	-0.002	101.3	-21.4	14.003	-5.492

West Quesnel Land Stability Program

GPS Hub 98-08 (South Side of Picard Avenue) Replaced by 13-02

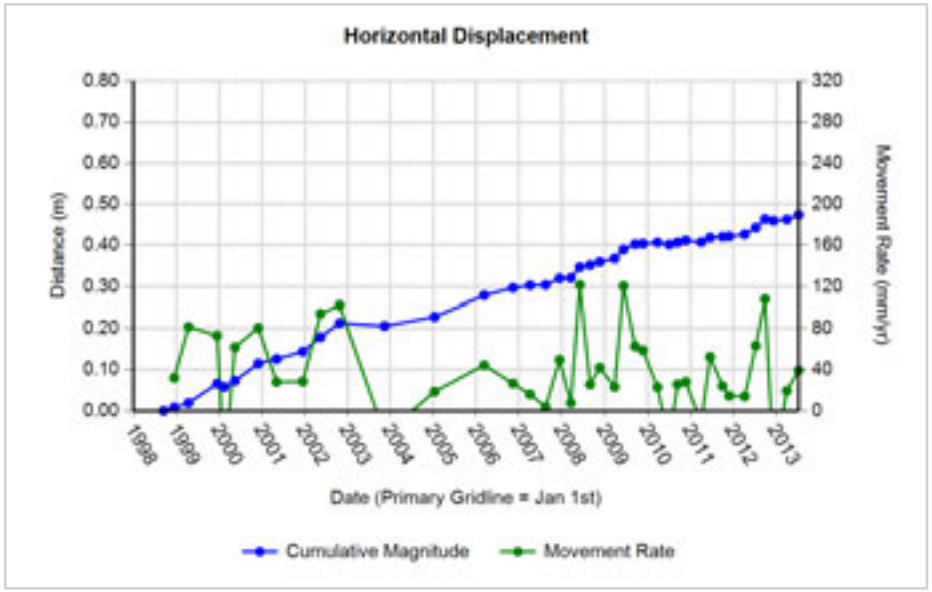
amec foster wheeler

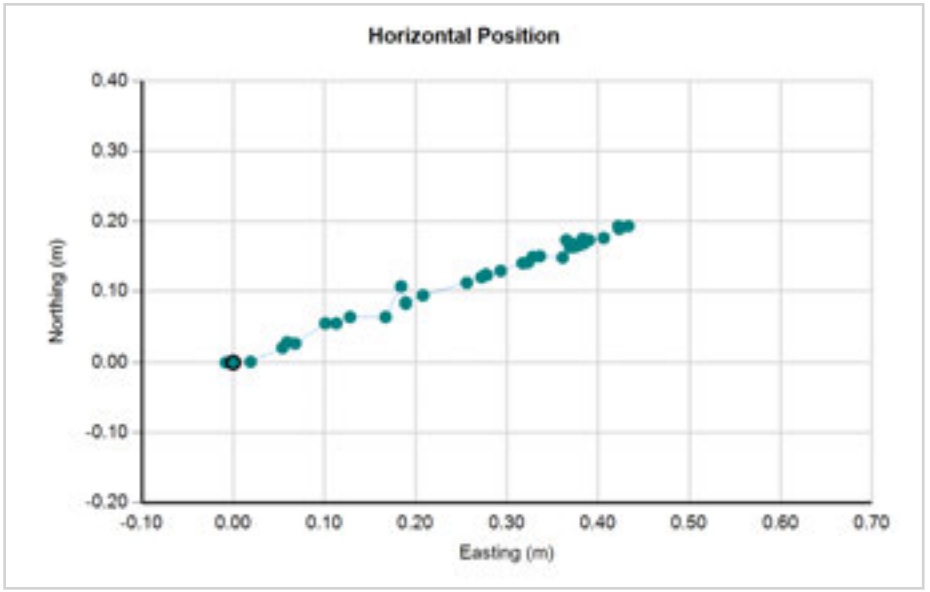
12/07/2012	5870328.756	531909.701	536.812	13.82	0.176	0.406	0.443	-0.131	66.6	-16.5	0.032	-0.009	0.26	0.003	0.016	0.016	0.009	79.4	28.9	63.254	34.971
29/09/2012	5870328.773	531909.717	536.800	14.04	0.193	0.422	0.464	-0.143	65.4	-17.1	0.033	-0.010	0.22	0.017	0.016	0.023	-0.012	43.3	-27.2	107.935	-55.481
10/12/2012	5870328.763	531909.717	536.799	14.24	0.183	0.422	0.460	-0.144	66.6	-17.4	0.032	-0.010	0.20	-0.010	0.000	0.010	-0.001	180.0	-5.7	-50.729	-5.073
03/04/2013	5870328.769	531909.718	536.794	14.55	0.189	0.423	0.463	-0.149	65.9	-17.8	0.032	-0.010	0.31	0.006	0.001	0.006	-0.005	9.5	-39.4	19.489	-16.020
12/07/2013	5870328.773	531909.728	536.802	14.82	0.193	0.433	0.474	-0.141	66.0	-16.6	0.032	-0.010	0.27	0.004	0.010	0.011	0.008	68.2	36.6	39.339	29.220

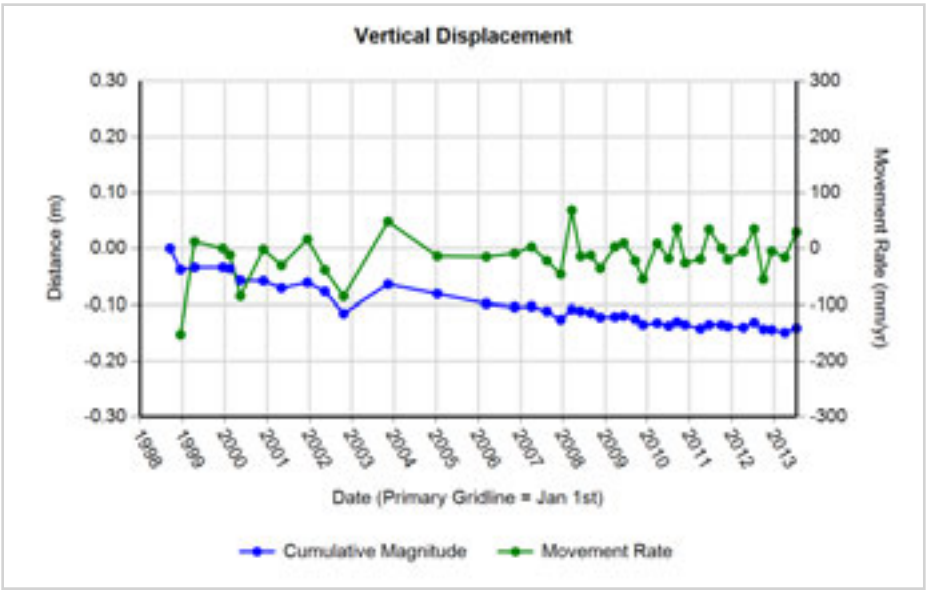
West Quesnel Land Stability Program

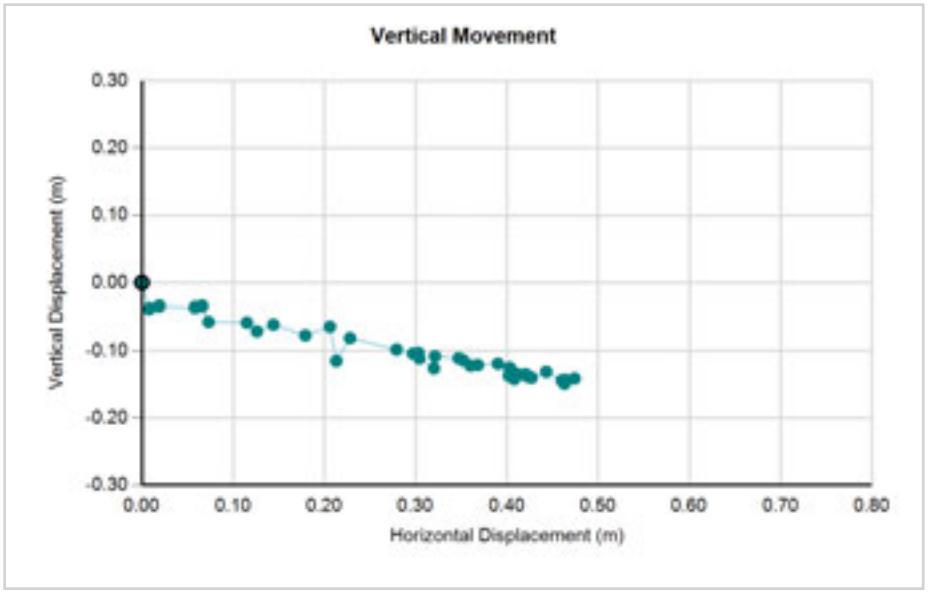
GPS Hub 98-08 (South Side of Picard Avenue) Replaced by 13-02

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 98-09 (Lane Between Patchett Street and Pierce Crescent)

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5870063.599	531714.863	549.785	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/12/1998	5870063.588	531714.875	549.766	0.25	-0.011	0.012	0.016	-0.019	132.5	-49.4	0.065	-0.076	0.25	-0.011	0.012	0.016	-0.019	132.5	-49.4	65.339	-76.261
15/04/1999	5870063.593	531714.910	549.753	0.58	-0.006	0.047	0.047	-0.032	97.3	-34.0	0.082	-0.055	0.33	0.005	0.035	0.035	-0.013	81.9	-20.2	106.723	-39.242
15/12/1999	5870063.614	531714.965	549.774	1.25	0.015	0.102	0.103	-0.011	81.6	-6.1	0.083	-0.009	0.67	0.021	0.055	0.059	0.021	69.1	19.6	88.128	31.435
15/02/2000	5870063.597	531714.959	549.773	1.42	-0.002	0.096	0.096	-0.012	91.2	-7.1	0.068	-0.008	0.17	-0.017	-0.006	0.018	-0.001	199.4	-3.2	-106.204	-5.891
15/05/2000	5870063.593	531714.979	549.763	1.66	-0.006	0.116	0.116	-0.022	93.0	-10.7	0.070	-0.013	0.25	-0.004	0.020	0.020	-0.010	101.3	-26.1	82.774	-40.583
30/11/2000	5870063.603	531715.031	549.752	2.21	0.004	0.168	0.168	-0.033	88.6	-11.1	0.076	-0.015	0.54	0.010	0.052	0.053	-0.011	79.1	-11.7	97.191	-20.190
05/05/2001	5870063.598	531715.033	549.740	2.64	-0.001	0.170	0.170	-0.045	90.3	-14.8	0.064	-0.017	0.43	-0.005	0.002	0.005	-0.012	158.2	-65.8	12.609	-28.096
15/12/2001	5870063.587	531715.066	549.752	3.25	-0.012	0.203	0.203	-0.033	93.4	-9.2	0.063	-0.010	0.61	-0.011	0.033	0.035	0.012	108.4	19.0	56.720	19.567
15/05/2002	5870063.581	531715.091	549.755	3.66	-0.018	0.228	0.229	-0.030	94.5	-7.5	0.062	-0.008	0.41	-0.006	0.025	0.026	0.003	103.5	6.7	62.189	7.257
24/10/2002	5870063.593	531715.120	549.734	4.11	-0.006	0.257	0.257	-0.051	91.3	-11.2	0.063	-0.012	0.44	0.012	0.029	0.031	-0.021	67.5	-33.8	70.761	-47.347
12/11/2003	5870063.592	531715.139	549.745	5.16	-0.007	0.276	0.276	-0.040	91.5	-8.3	0.053	-0.008	1.05	-0.001	0.019	0.019	0.011	93.3	29.4	17.808	10.054
11/01/2005	5870063.600	531715.159	549.753	6.32	0.001	0.296	0.296	-0.032	89.8	-6.2	0.047	-0.005	1.17	0.008	0.020	0.022	0.008	68.6	20.1	18.793	6.885
10/03/2006	5870063.593	531715.234	549.741	7.48	-0.006	0.371	0.371	-0.044	90.9	-6.8	0.050	-0.006	1.16	-0.007	0.075	0.075	-0.012	95.3	-8.8	64.948	-10.016
10/11/2006	5870063.594	531715.253	549.747	8.15	-0.005	0.390	0.390	-0.038	90.7	-5.6	0.048	-0.005	0.67	0.001	0.019	0.019	0.006	87.0	17.5	28.365	8.945
05/04/2007	5870063.598	531715.262	549.734	8.55	-0.001	0.399	0.399	-0.051	90.1	-7.3	0.047	-0.006	0.40	0.004	0.009	0.010	-0.013	66.0	-52.9	24.639	-32.522
16/08/2007	5870063.593	531715.273	549.738	8.92	-0.006	0.410	0.410	-0.047	90.8	-6.5	0.046	-0.005	0.36	-0.005	0.011	0.012	0.004	114.4	18.3	33.183	10.985
13/12/2007	5870063.593	531715.271	549.710	9.24	-0.006	0.408	0.408	-0.075	90.8	-10.4	0.044	-0.008	0.33	0.000	-0.002	0.002	-0.028	270.0	-85.9	-6.139	-85.941
18/03/2008	5870063.596	531715.282	549.739	9.51	-0.003	0.419	0.419	-0.046	90.4	-6.3	0.044	-0.005	0.26	0.003	0.011	0.011	0.029	74.7	68.5	43.380	110.336
03/06/2008	5870063.588	531715.312	549.747	9.72	-0.011	0.449	0.449	-0.038	91.4	-4.8	0.046	-0.004	0.21	-0.008	0.030	0.031	0.008	104.9	14.4	147.278	37.948
29/07/2008	5870063.581	531715.318	549.755	9.87	-0.018	0.455	0.455	-0.030	92.3	-3.8	0.046	-0.003	0.15	-0.007	0.006	0.009	0.008	139.4	40.9	60.133	52.179
29/08/2008	5870063.578	531715.312	549.740	9.95	-0.021	0.449	0.449	-0.045	92.7	-5.7	0.045	-0.005	0.08	-0.003	-0.006	0.007	-0.015	243.4	-65.9	-79.038	-176.734
19/11/2008	5870063.596	531715.324	549.722	10.18	-0.003	0.461	0.461	-0.063	90.4	-7.8	0.045	-0.006	0.22	0.018	0.012	0.022	-0.018	33.7	-39.8	96.361	-80.177
26/03/2009	5870063.597	531715.334	549.731	10.53	-0.002	0.471	0.471	-0.054	90.2	-6.5	0.045	-0.005	0.35	0.001	0.010	0.010	0.009	84.3	41.8	28.903	25.884
10/06/2009	5870063.589	531715.370	549.743	10.74	-0.010	0.507	0.507	-0.042	91.1	-4.7	0.047	-0.004	0.21	-0.008	0.036	0.037	0.012	102.5	18.0	177.234	57.671
17/09/2009	5870063.591	531715.384	549.726	11.01	-0.008	0.521	0.521	-0.059	90.9	-6.5	0.047	-0.005	0.27	0.002	0.014	0.014	-0.017	81.9	-50.2	52.176	-62.720
23/11/2009	5870063.603	531715.382	549.725	11.19	0.004	0.519	0.519	-0.060	89.6	-6.6	0.046	-0.005	0.18	0.012	-0.002	0.012	-0.001	350.5	-4.7	-66.320	-5.451
27/03/2010	5870063.604	531715.385	549.732	11.53	0.005	0.522	0.522	-0.053	89.5	-5.8	0.045	-0.005	0.34	0.001	0.003	0.003	0.007	71.6	65.7	9.315	20.619
04/07/2010	5870063.597	531715.379	549.744	11.80	-0.002	0.516	0.516	-0.041	90.2	-4.5	0.044	-0.003	0.27	-0.007	-0.006	0.009	0.012	220.6	52.5	-34.015	44.273
13/09/2010	5870063.596	531715.384	549.726	11.99	-0.003	0.521	0.521	-0.059	90.3	-6.5	0.043	-0.005	0.19	-0.001	0.005	0.005	-0.018	101.3	-74.2	26.231	-92.599
22/11/2010	5870063.598	531715.390	549.718	12.19	-0.001	0.527	0.527	-0.067	90.1	-7.2	0.043	-0.005	0.19	0.002	0.006	0.006	-0.008	71.6	-51.7	33.001	-41.743
04/04/2011	5870063.597	531715.390	549.722	12.55	-0.002	0.527	0.527	-0.063	90.2	-6.8	0.042	-0.005	0.36	-0.001	0.000	0.001	0.004	180.0	76.0	2.746	10.985
18/06/2011	5870063.598	531715.396	549.750	12.76	-0.001	0.533	0.533	-0.035	90.1	-3.8	0.042	-0.003	0.21	0.001	0.006	0.006	0.028	80.5	77.7	29.623	136.360
03/10/2011	5870063.592	531715.400	549.720	13.05	-0.007	0.537	0.537	-0.065	90.7	-6.9	0.041	-0.005	0.29	-0.006	0.004	0.007	-0.030	146.3	-76.5	24.615	-102.407
28/11/2011	5870063.605	531715.399	549.726	13.20	0.006	0.536	0.536	-0.059	89.4	-6.3	0.041	-0.004	0.15	0.013	-0.001	0.013	0.006	355.6	24.7	-85.041	39.134

West Quesnel Land Stability Program

GPS Hub 98-09 (Lane Between Patchett Street and Pierce Crescent)

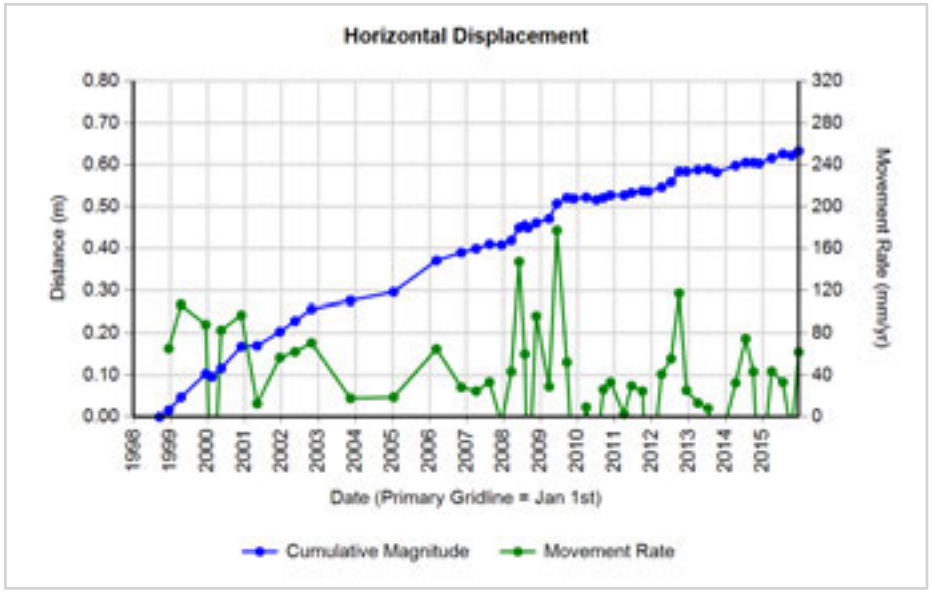
amec foster wheeler

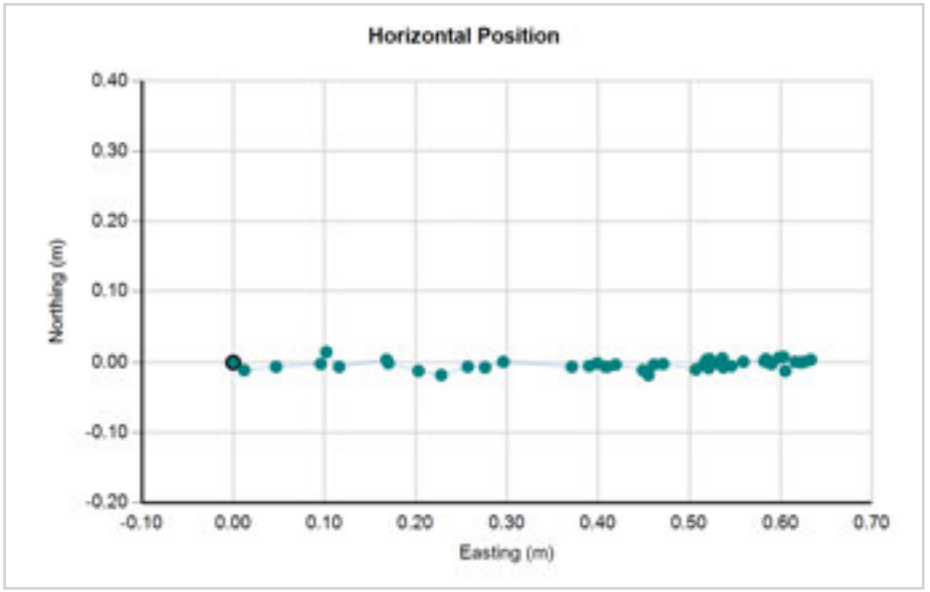
09/04/2012	5870063.594	531715.409	549.726	13.57	-0.005	0.546	0.546	-0.059	90.5	-6.2	0.040	-0.004	0.36	-0.011	0.010	0.015	0.000	137.7	0.0	40.826	0.000
12/07/2012	5870063.600	531715.422	549.748	13.82	0.001	0.559	0.559	-0.037	89.9	-3.8	0.040	-0.003	0.26	0.006	0.013	0.014	0.022	65.2	56.9	55.634	85.484
29/09/2012	5870063.604	531715.447	549.724	14.04	0.005	0.584	0.584	-0.061	89.5	-6.0	0.042	-0.004	0.22	0.004	0.025	0.025	-0.024	80.9	-43.5	117.056	-110.962
10/12/2012	5870063.599	531715.447	549.724	14.24	0.000	0.584	0.584	-0.061	90.0	-6.0	0.041	-0.004	0.20	-0.005	0.000	0.005	0.000	180.0	0.0	25.365	0.000
03/04/2013	5870063.598	531715.451	549.720	14.55	-0.001	0.588	0.588	-0.065	90.1	-6.3	0.040	-0.004	0.31	-0.001	0.004	0.004	-0.004	104.0	-44.1	13.210	-12.816
12/07/2013	5870063.597	531715.453	549.741	14.82	-0.002	0.590	0.590	-0.044	90.2	-4.3	0.040	-0.003	0.27	-0.001	0.002	0.002	0.021	116.6	83.9	8.167	76.702
04/10/2013	5870063.601	531715.445	549.743	15.05	0.002	0.582	0.582	-0.042	89.8	-4.1	0.039	-0.003	0.23	0.004	-0.008	0.009	0.002	296.6	12.6	-38.892	8.696
10/04/2014	5870063.606	531715.461	549.720	15.57	0.007	0.598	0.598	-0.065	89.3	-6.2	0.038	-0.004	0.51	0.005	0.016	0.017	-0.023	72.6	-53.9	32.568	-44.685
18/07/2014	5870063.587	531715.468	549.742	15.84	-0.012	0.605	0.605	-0.043	91.1	-4.1	0.038	-0.003	0.27	-0.019	0.007	0.020	0.022	159.8	47.4	74.705	81.167
02/10/2014	5870063.596	531715.468	549.723	16.05	-0.003	0.605	0.605	-0.062	90.3	-5.9	0.038	-0.004	0.21	0.009	0.000	0.009	-0.019	0.0	-64.7	43.253	-91.313
28/11/2014	5870063.607	531715.466	549.727	16.20	0.008	0.603	0.603	-0.058	89.2	-5.5	0.037	-0.004	0.16	0.011	-0.002	0.011	0.004	349.7	19.7	-71.642	25.632
01/04/2015	5870063.600	531715.479	549.711	16.54	0.001	0.616	0.616	-0.074	89.9	-6.9	0.037	-0.004	0.34	-0.007	0.013	0.015	-0.016	118.3	-47.3	43.491	-47.129
20/07/2015	5870063.600	531715.489	549.727	16.84	0.001	0.626	0.626	-0.058	89.9	-5.3	0.037	-0.003	0.30	0.000	0.010	0.010	0.016	90.0	58.0	33.205	53.127
14/10/2015	5870063.599	531715.485	549.723	17.08	0.000	0.622	0.622	-0.062	90.0	-5.7	0.036	-0.004	0.24	-0.001	-0.004	0.004	-0.004	256.0	-44.1	-17.511	-16.988
22/12/2015	5870063.603	531715.496	549.724	17.27	0.004	0.633	0.633	-0.061	89.6	-5.5	0.037	-0.004	0.19	0.004	0.011	0.012	0.001	70.0	4.9	61.959	5.293

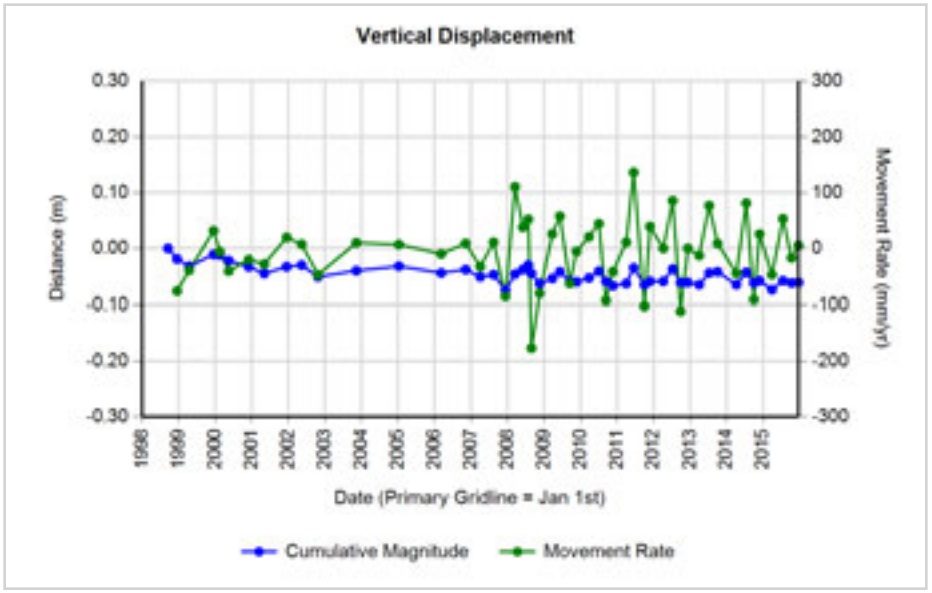
West Quesnel Land Stability Program

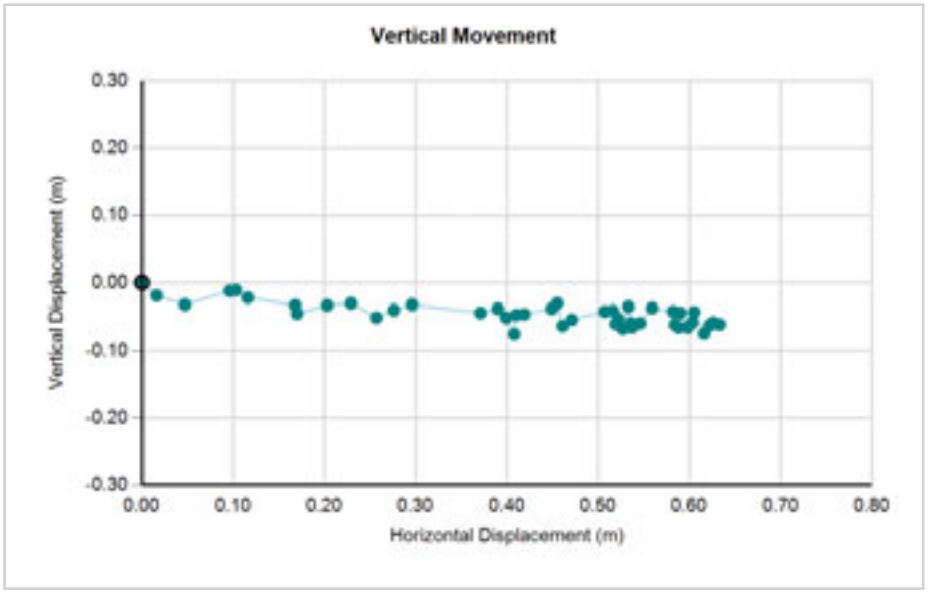
GPS Hub 98-09 (Lane Between Patchett Street and Pierce Crescent)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 98-14 (Southeast Corner of Pentland Crescent and Flamingo Street)

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5870067.437	531986.027	531.224	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/12/1998	5870067.435	531986.023	531.210	0.25	-0.002	-0.004	0.004	-0.014	243.4	-72.3	0.018	-0.056	0.25	-0.002	-0.004	0.004	-0.014	243.4	-72.3	17.950	-56.192
15/04/1999	5870067.428	531986.061	531.205	0.58	-0.009	0.034	0.035	-0.019	104.8	-28.4	0.061	-0.033	0.33	-0.007	0.038	0.039	-0.005	100.4	-7.4	116.637	-15.093
15/12/1999	5870067.441	531986.116	531.199	1.25	0.004	0.089	0.089	-0.025	87.4	-15.7	0.071	-0.020	0.67	0.013	0.055	0.057	-0.006	76.7	-6.1	84.600	-8.982
15/02/2000	5870067.437	531986.106	531.221	1.42	0.000	0.079	0.079	-0.003	90.0	-2.2	0.056	-0.002	0.17	-0.004	-0.010	0.011	0.022	248.2	63.9	-63.449	129.605
15/05/2000	5870067.432	531986.128	531.198	1.66	-0.005	0.101	0.101	-0.026	92.8	-14.4	0.061	-0.016	0.25	-0.005	0.022	0.023	-0.023	102.8	-45.6	91.560	-93.342
30/11/2000	5870067.429	531986.169	531.198	2.21	-0.008	0.142	0.142	-0.026	93.2	-10.4	0.064	-0.012	0.54	-0.003	0.041	0.041	0.000	94.2	0.0	75.454	0.000
05/05/2001	5870067.422	531986.189	531.193	2.64	-0.015	0.162	0.163	-0.031	95.3	-10.8	0.062	-0.012	0.43	-0.007	0.020	0.021	-0.005	109.3	-13.3	49.612	-11.707
15/12/2001	5870067.419	531986.217	531.202	3.25	-0.018	0.190	0.191	-0.022	95.4	-6.6	0.059	-0.007	0.61	-0.003	0.028	0.028	0.009	96.1	17.7	45.918	14.675
15/05/2002	5870067.410	531986.243	531.190	3.66	-0.027	0.216	0.218	-0.034	97.1	-8.9	0.059	-0.009	0.41	-0.009	0.026	0.028	-0.012	109.1	-23.6	66.552	-29.026
24/10/2002	5870067.409	531986.267	531.172	4.11	-0.028	0.240	0.242	-0.052	96.7	-12.1	0.059	-0.013	0.44	-0.001	0.024	0.024	-0.018	92.4	-36.8	54.158	-40.583
12/11/2003	5870067.414	531986.285	531.172	5.16	-0.023	0.258	0.259	-0.052	95.1	-11.3	0.050	-0.010	1.05	0.005	0.018	0.018	0.000	73.5	0.6	17.507	0.181
11/01/2005	5870067.427	531986.306	531.192	6.32	-0.010	0.279	0.279	-0.032	92.1	-6.6	0.044	-0.005	1.17	0.012	0.021	0.025	0.019	59.8	38.3	21.086	16.642
10/03/2006	5870067.418	531986.384	531.196	7.48	-0.019	0.357	0.358	-0.028	93.0	-4.5	0.048	-0.004	1.16	-0.009	0.078	0.079	0.004	96.3	3.2	67.845	3.799
10/11/2006	5870067.410	531986.397	531.171	8.15	-0.027	0.370	0.371	-0.053	94.2	-8.1	0.046	-0.007	0.67	-0.008	0.013	0.015	-0.025	121.6	-58.6	22.756	-37.270
05/04/2007	5870067.408	531986.404	531.167	8.55	-0.029	0.377	0.378	-0.057	94.4	-8.6	0.044	-0.007	0.40	-0.002	0.007	0.007	-0.004	105.9	-28.8	18.213	-10.007
16/08/2007	5870067.405	531986.420	531.157	8.92	-0.032	0.393	0.394	-0.067	94.7	-9.6	0.044	-0.008	0.36	-0.003	0.016	0.016	-0.010	100.6	-31.6	44.706	-27.462
13/12/2007	5870067.410	531986.417	531.157	9.24	-0.027	0.390	0.391	-0.067	94.0	-9.7	0.042	-0.007	0.33	0.005	-0.003	0.006	0.000	329.0	0.0	-17.897	0.000
18/03/2008	5870067.410	531986.431	531.173	9.51	-0.027	0.404	0.405	-0.051	93.8	-7.2	0.043	-0.005	0.26	0.000	0.014	0.014	0.016	90.0	48.8	53.266	60.875
03/06/2008	5870067.408	531986.455	531.168	9.72	-0.029	0.428	0.429	-0.056	93.9	-7.4	0.044	-0.006	0.21	-0.002	0.024	0.024	-0.005	94.8	-11.7	114.239	-23.718
29/08/2008	5870067.401	531986.466	531.170	9.95	-0.036	0.439	0.440	-0.054	94.7	-7.0	0.044	-0.005	0.24	-0.007	0.011	0.013	0.002	122.5	8.7	54.739	8.397
19/11/2008	5870067.411	531986.470	531.156	10.18	-0.026	0.443	0.444	-0.068	93.4	-8.7	0.044	-0.007	0.22	0.010	0.004	0.011	-0.014	21.8	-52.4	47.974	-62.360
26/03/2009	5870067.413	531986.476	531.167	10.53	-0.024	0.449	0.450	-0.057	93.1	-7.2	0.043	-0.005	0.35	0.002	0.006	0.006	0.011	71.6	60.1	18.189	31.636
10/06/2009	5870067.401	531986.514	531.167	10.74	-0.036	0.487	0.488	-0.057	94.2	-6.7	0.045	-0.005	0.21	-0.012	0.038	0.040	0.000	107.5	0.0	191.515	0.000
17/09/2009	5870067.411	531986.532	531.170	11.01	-0.026	0.505	0.506	-0.054	92.9	-6.1	0.046	-0.005	0.27	0.010	0.018	0.021	0.003	60.9	8.3	75.969	11.068
23/11/2009	5870067.416	531986.525	531.155	11.19	-0.021	0.498	0.498	-0.069	92.4	-7.9	0.045	-0.006	0.18	0.005	-0.007	0.009	-0.015	305.5	-60.2	-46.896	-81.772
27/03/2010	5870067.415	531986.525	531.160	11.53	-0.022	0.498	0.498	-0.064	92.5	-7.3	0.043	-0.006	0.34	-0.001	0.000	0.001	0.005	180.0	78.7	2.946	14.728
04/07/2010	5870067.396	531986.525	531.159	11.80	-0.041	0.498	0.500	-0.065	94.7	-7.4	0.042	-0.006	0.27	-0.019	0.000	0.019	-0.001	180.0	-3.0	70.098	-3.689
13/09/2010	5870067.407	531986.530	531.163	11.99	-0.030	0.503	0.504	-0.061	93.4	-6.9	0.042	-0.005	0.19	0.011	0.005	0.012	0.004	24.4	18.3	62.160	20.577
22/11/2010	5870067.404	531986.536	531.151	12.19	-0.033	0.509	0.510	-0.073	93.7	-8.1	0.042	-0.006	0.19	-0.003	0.006	0.007	-0.012	116.6	-60.8	35.002	-62.614
04/04/2011	5870067.403	531986.539	531.160	12.55	-0.034	0.512	0.513	-0.064	93.8	-7.1	0.041	-0.005	0.36	-0.001	0.003	0.003	0.009	108.4	70.6	8.684	24.716
18/06/2011	5870067.411	531986.552	531.166	12.76	-0.026	0.525	0.526	-0.058	92.8	-6.3	0.041	-0.005	0.21	0.008	0.013	0.015	0.006	58.4	21.5	74.337	29.220
03/10/2011	5870067.408	531986.547	531.155	13.05	-0.029	0.520	0.521	-0.069	93.2	-7.5	0.040	-0.005	0.29	-0.003	-0.005	0.006	-0.011	239.0	-62.1	-19.904	-37.549
28/11/2011	5870067.413	531986.555	531.157	13.20	-0.024	0.528	0.529	-0.067	92.6	-7.2	0.040	-0.005	0.15	0.005	0.008	0.009	0.002	58.0	12.0	61.531	13.045
09/04/2012	5870067.406	531986.555	531.154	13.57	-0.031	0.528	0.529	-0.070	93.4	-7.5	0.039	-0.005	0.36	-0.007	0.000	0.007	-0.003	180.0	-23.2	-19.224	-8.239

West Quesnel Land Stability Program

GPS Hub 98-14 (Southeast Corner of Pentland Crescent and Flamingo Street)

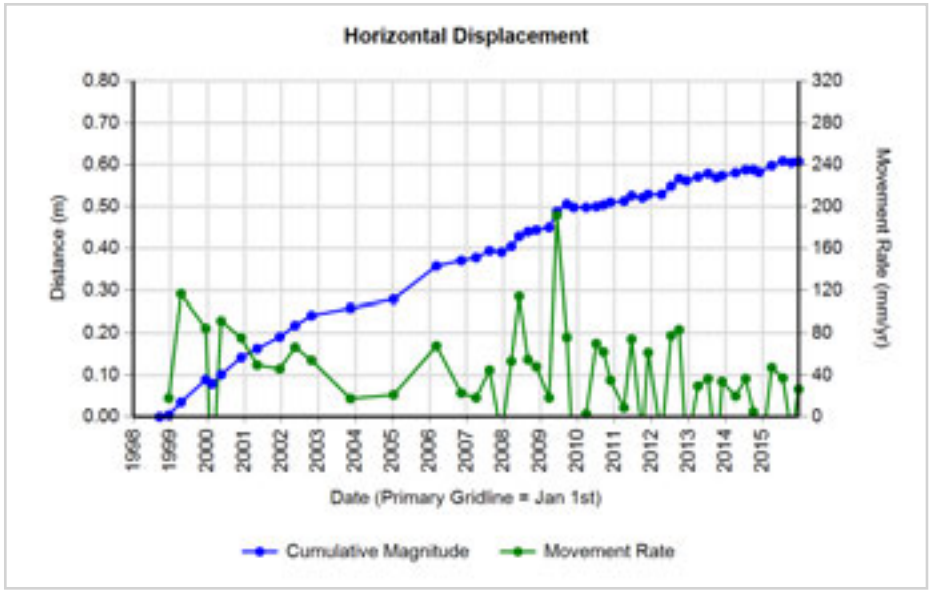
amec foster wheeler

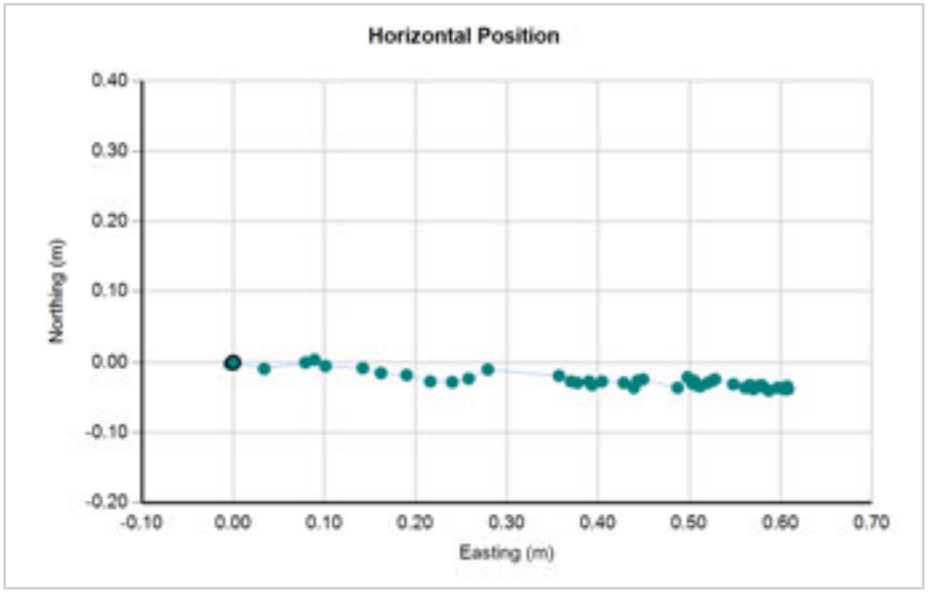
12/07/2012	5870067.406	531986.575	531.156	13.82	-0.031	0.548	0.549	-0.068	93.2	-7.1	0.040	-0.005	0.26	0.000	0.020	0.020	0.002	90.0	5.7	77.713	7.771
29/09/2012	5870067.405	531986.593	531.148	14.04	-0.032	0.566	0.567	-0.076	93.2	-7.6	0.040	-0.005	0.22	-0.001	0.018	0.018	-0.008	93.2	-23.9	83.350	-36.987
10/12/2012	5870067.401	531986.588	531.154	14.24	-0.036	0.561	0.562	-0.070	93.7	-7.1	0.039	-0.005	0.20	-0.004	-0.005	0.006	0.006	231.3	43.1	-32.483	30.437
03/04/2013	5870067.399	531986.597	531.148	14.55	-0.038	0.570	0.571	-0.076	93.8	-7.6	0.039	-0.005	0.31	-0.002	0.009	0.009	-0.006	102.5	-33.1	29.539	-19.224
12/07/2013	5870067.405	531986.605	531.152	14.82	-0.032	0.578	0.579	-0.072	93.2	-7.1	0.039	-0.005	0.27	0.006	0.008	0.010	0.004	53.1	21.8	36.525	14.610
04/10/2013	5870067.402	531986.595	531.161	15.05	-0.035	0.568	0.569	-0.063	93.5	-6.3	0.038	-0.004	0.23	-0.003	-0.010	0.010	0.009	253.3	40.8	-45.397	39.134
27/11/2013	5870067.402	531986.600	531.147	15.20	-0.035	0.573	0.574	-0.077	93.5	-7.6	0.038	-0.005	0.15	0.000	0.005	0.005	-0.014	90.0	-70.3	33.819	-94.694
10/04/2014	5870067.404	531986.607	531.146	15.57	-0.033	0.580	0.581	-0.078	93.3	-7.6	0.037	-0.005	0.37	0.002	0.007	0.007	-0.001	74.1	-7.8	19.844	-2.726
18/07/2014	5870067.397	531986.614	531.154	15.84	-0.040	0.587	0.588	-0.070	93.9	-6.8	0.037	-0.004	0.27	-0.007	0.007	0.010	0.008	135.0	38.9	36.523	29.515
02/10/2014	5870067.396	531986.614	531.147	16.05	-0.041	0.587	0.588	-0.077	94.0	-7.5	0.037	-0.005	0.21	-0.001	0.000	0.001	-0.007	180.0	-81.9	4.806	-33.641
28/11/2014	5870067.402	531986.608	531.142	16.20	-0.035	0.581	0.582	-0.082	93.4	-8.0	0.036	-0.005	0.16	0.006	-0.006	0.008	-0.005	315.0	-30.5	-54.373	-32.039
01/04/2015	5870067.401	531986.624	531.137	16.54	-0.036	0.597	0.598	-0.087	93.5	-8.3	0.036	-0.005	0.34	-0.001	0.016	0.016	-0.005	93.6	-17.3	47.221	-14.728
20/07/2015	5870067.399	531986.635	531.148	16.84	-0.038	0.608	0.609	-0.076	93.6	-7.1	0.036	-0.005	0.30	-0.002	0.011	0.011	0.011	100.3	44.5	37.124	36.525
14/10/2015	5870067.399	531986.631	531.145	17.08	-0.038	0.604	0.605	-0.079	93.6	-7.4	0.035	-0.005	0.24	0.000	-0.004	0.004	-0.003	270.0	-36.9	-16.988	-12.741
22/12/2015	5870067.403	531986.634	531.146	17.27	-0.034	0.607	0.608	-0.078	93.2	-7.3	0.035	-0.005	0.19	0.004	0.003	0.005	0.001	36.9	11.3	26.467	5.293

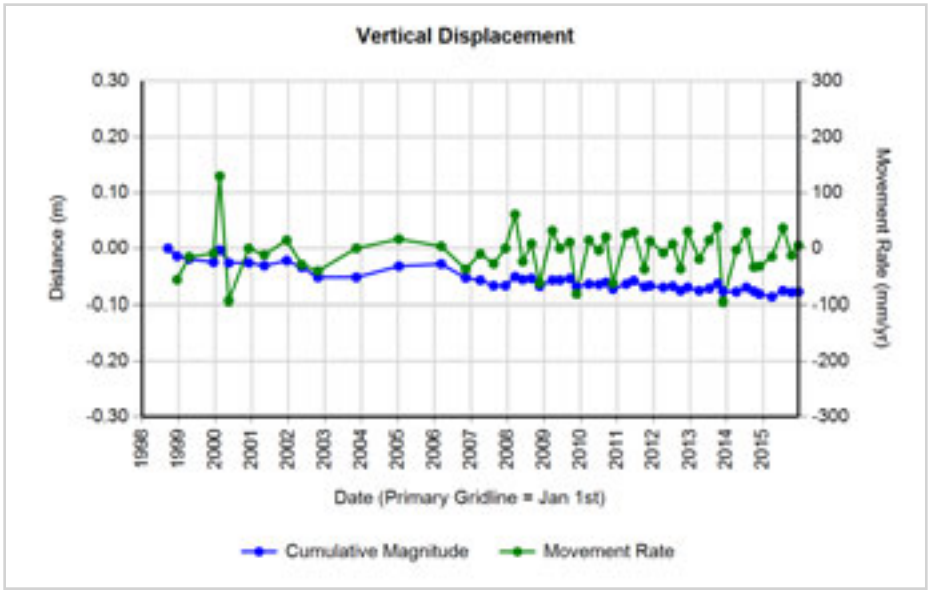
West Quesnel Land Stability Program

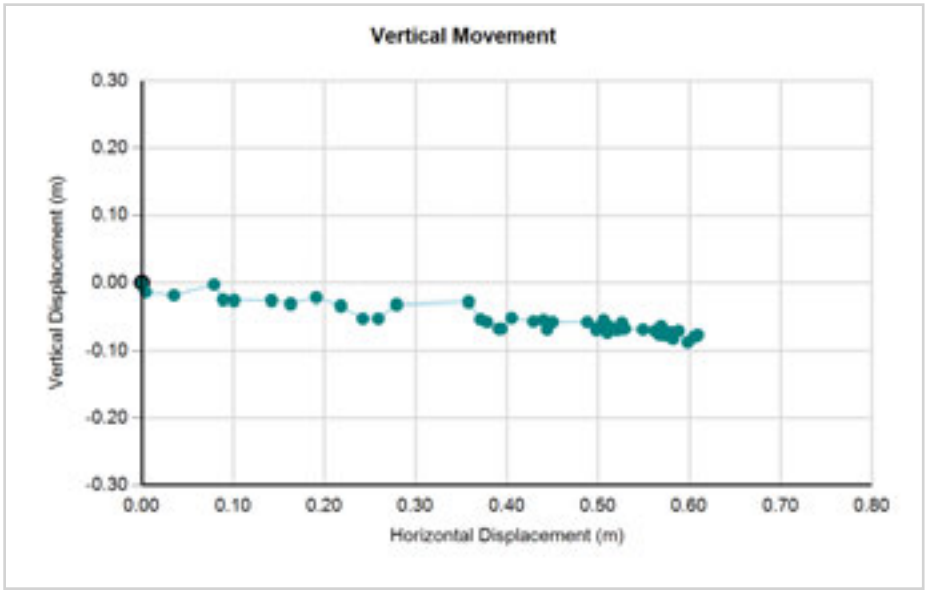
GPS Hub 98-14 (Southeast Corner of Pentland Crescent and Flamingo Street)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 98-15 (Southwest Corner of Palmer Street and Lewis Drive)

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5870275.888	532052.513	524.385	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/12/1998	5870275.892	532052.515	524.393	0.25	0.004	0.002	0.004	0.008	26.6	60.8	0.018	0.032	0.25	0.004	0.002	0.004	0.008	26.6	60.8	17.950	32.110
15/04/1999	5870275.902	532052.557	524.361	0.58	0.014	0.044	0.046	-0.024	72.3	-27.5	0.080	-0.041	0.33	0.010	0.042	0.043	-0.032	76.6	-36.5	130.325	-96.595
15/12/1999	5870275.903	532052.589	524.376	1.25	0.015	0.076	0.077	-0.009	78.8	-6.6	0.062	-0.007	0.67	0.001	0.032	0.032	0.015	88.2	25.1	47.925	22.454
15/02/2000	5870275.906	532052.581	524.364	1.42	0.018	0.068	0.070	-0.021	75.2	-16.6	0.050	-0.015	0.17	0.003	-0.008	0.009	-0.012	290.6	-54.5	-50.334	-70.694
15/05/2000	5870275.909	532052.594	524.343	1.66	0.021	0.081	0.084	-0.042	75.5	-26.7	0.050	-0.025	0.25	0.003	0.013	0.013	-0.021	77.0	-57.6	54.145	-85.225
30/11/2000	5870275.922	532052.628	524.353	2.21	0.034	0.115	0.120	-0.032	73.5	-14.9	0.054	-0.014	0.54	0.013	0.034	0.036	0.010	69.1	15.4	66.811	18.354
05/05/2001	5870275.914	532052.630	524.335	2.64	0.026	0.117	0.120	-0.050	77.5	-22.6	0.045	-0.019	0.43	-0.008	0.002	0.008	-0.018	166.0	-65.4	-19.307	-42.144
15/12/2001	5870275.910	532052.652	524.336	3.25	0.022	0.139	0.141	-0.049	81.0	-19.2	0.043	-0.015	0.61	-0.004	0.022	0.022	0.001	100.3	2.6	36.461	1.631
15/05/2002	5870275.924	532052.682	524.322	3.66	0.036	0.169	0.173	-0.063	78.0	-20.0	0.047	-0.017	0.41	0.014	0.030	0.033	-0.014	65.0	-22.9	80.079	-33.864
24/10/2002	5870275.960	532052.698	524.298	4.11	0.072	0.185	0.199	-0.087	68.7	-23.7	0.048	-0.021	0.44	0.036	0.016	0.039	-0.024	24.0	-31.4	88.822	-54.111
12/11/2003	5870275.932	532052.704	524.314	5.16	0.044	0.191	0.196	-0.071	77.0	-20.1	0.038	-0.014	1.05	-0.028	0.006	0.029	0.016	168.5	28.4	-27.242	14.753
11/01/2005	5870275.941	532052.719	524.317	6.32	0.053	0.206	0.213	-0.068	75.7	-17.6	0.034	-0.011	1.17	0.009	0.016	0.018	0.004	61.0	12.3	15.310	3.335
10/03/2006	5870275.957	532052.780	524.300	7.48	0.069	0.267	0.276	-0.085	75.5	-17.1	0.037	-0.011	1.16	0.016	0.061	0.063	-0.017	74.9	-15.5	54.292	-15.024
10/11/2006	5870275.950	532052.783	524.292	8.15	0.062	0.270	0.277	-0.093	77.1	-18.6	0.034	-0.011	0.67	-0.007	0.003	0.008	-0.008	156.8	-46.4	11.354	-11.927
05/04/2007	5870275.962	532052.791	524.282	8.55	0.074	0.278	0.288	-0.103	75.1	-19.7	0.034	-0.012	0.40	0.012	0.008	0.014	-0.010	33.7	-34.7	36.080	-25.017
16/08/2007	5870275.954	532052.794	524.292	8.92	0.066	0.281	0.289	-0.093	76.8	-17.9	0.032	-0.010	0.36	-0.008	0.003	0.009	0.010	159.4	49.5	23.464	27.462
13/12/2007	5870275.960	532052.795	524.275	9.24	0.072	0.282	0.291	-0.110	75.7	-20.7	0.031	-0.012	0.33	0.006	0.001	0.006	-0.017	9.5	-70.3	18.670	-52.179
18/03/2008	5870275.962	532052.804	524.287	9.51	0.074	0.291	0.300	-0.098	75.7	-18.1	0.032	-0.010	0.26	0.002	0.009	0.009	0.012	77.5	52.5	35.077	45.656
03/06/2008	5870275.967	532052.825	524.282	9.72	0.079	0.312	0.322	-0.103	75.8	-17.7	0.033	-0.011	0.21	0.005	0.021	0.022	-0.005	76.6	-13.0	102.398	-23.718
29/08/2008	5870275.964	532052.829	524.283	9.95	0.076	0.316	0.325	-0.102	76.5	-17.4	0.033	-0.010	0.24	-0.003	0.004	0.005	0.001	126.9	11.3	20.991	4.198
19/11/2008	5870275.971	532052.834	524.268	10.18	0.083	0.321	0.332	-0.117	75.5	-19.4	0.033	-0.011	0.22	0.007	0.005	0.009	-0.015	35.5	-60.2	38.317	-66.814
26/03/2009	5870275.974	532052.840	524.266	10.53	0.086	0.327	0.338	-0.119	75.3	-19.4	0.032	-0.011	0.35	0.003	0.006	0.007	-0.002	63.4	-16.6	19.293	-5.752
10/06/2009	5870275.968	532052.864	524.273	10.74	0.080	0.351	0.360	-0.112	77.2	-17.3	0.034	-0.010	0.21	-0.006	0.024	0.025	0.007	104.0	15.8	118.892	33.641
17/09/2009	5870275.973	532052.865	524.263	11.01	0.085	0.352	0.362	-0.122	76.4	-18.6	0.033	-0.011	0.27	0.005	0.001	0.005	-0.010	11.3	-63.0	18.812	-36.894
23/11/2009	5870275.985	532052.870	524.251	11.19	0.097	0.357	0.370	-0.134	74.8	-19.9	0.033	-0.012	0.18	0.012	0.005	0.013	-0.012	22.6	-42.7	70.869	-65.418
27/03/2010	5870275.986	532052.873	524.256	11.53	0.098	0.360	0.373	-0.129	74.8	-19.1	0.032	-0.011	0.34	0.001	0.003	0.003	0.005	71.6	57.7	9.315	14.728
04/07/2010	5870275.974	532052.870	524.260	11.80	0.086	0.357	0.367	-0.125	76.5	-18.8	0.031	-0.011	0.27	-0.012	-0.003	0.012	0.004	194.0	17.9	-45.635	14.758
13/09/2010	5870275.980	532052.875	524.264	11.99	0.092	0.362	0.374	-0.121	75.7	-18.0	0.031	-0.010	0.19	0.006	0.005	0.008	0.004	39.8	27.1	40.179	20.577
22/11/2010	5870275.984	532052.882	524.252	12.19	0.096	0.369	0.381	-0.133	75.4	-19.2	0.031	-0.011	0.19	0.004	0.007	0.008	-0.012	60.3	-56.1	42.068	-62.614
04/04/2011	5870275.984	532052.877	524.253	12.55	0.096	0.364	0.376	-0.132	75.2	-19.3	0.030	-0.011	0.36	0.000	-0.005	0.005	0.001	270.0	11.3	-13.731	2.746
18/06/2011	5870275.982	532052.888	524.257	12.76	0.094	0.375	0.387	-0.128	75.9	-18.3	0.030	-0.010	0.21	-0.002	0.011	0.011	0.004	100.3	19.7	54.448	19.480
03/10/2011	5870275.985	532052.887	524.253	13.05	0.097	0.374	0.386	-0.132	75.5	-18.9	0.030	-0.010	0.29	0.003	-0.001	0.003	-0.004	341.6	-51.7	-10.795	-13.654
28/11/2011	5870275.990	532052.893	524.250	13.20	0.102	0.380	0.393	-0.135	75.0	-18.9	0.030	-0.010	0.15	0.005	0.006	0.008	-0.003	50.2	-21.0	50.941	-19.567
09/04/2012	5870275.988	532052.891	524.252	13.57	0.100	0.378	0.391	-0.133	75.2	-18.8	0.029	-0.010	0.36	-0.002	-0.002	0.003	0.002	225.0	35.3	-7.768	5.492

West Quesnel Land Stability Program

GPS Hub 98-15 (Southwest Corner of Palmer Street and Lewis Drive)

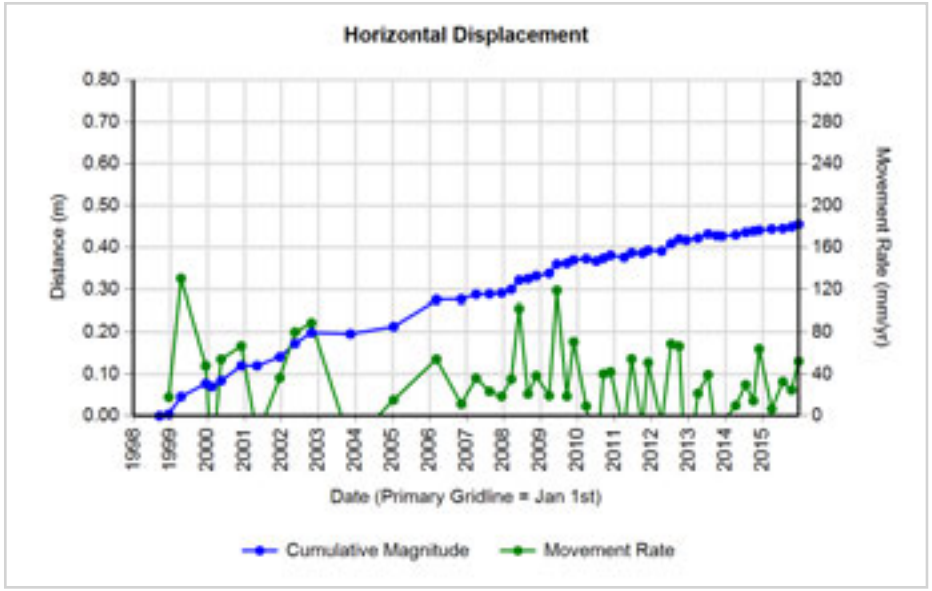
amec foster wheeler

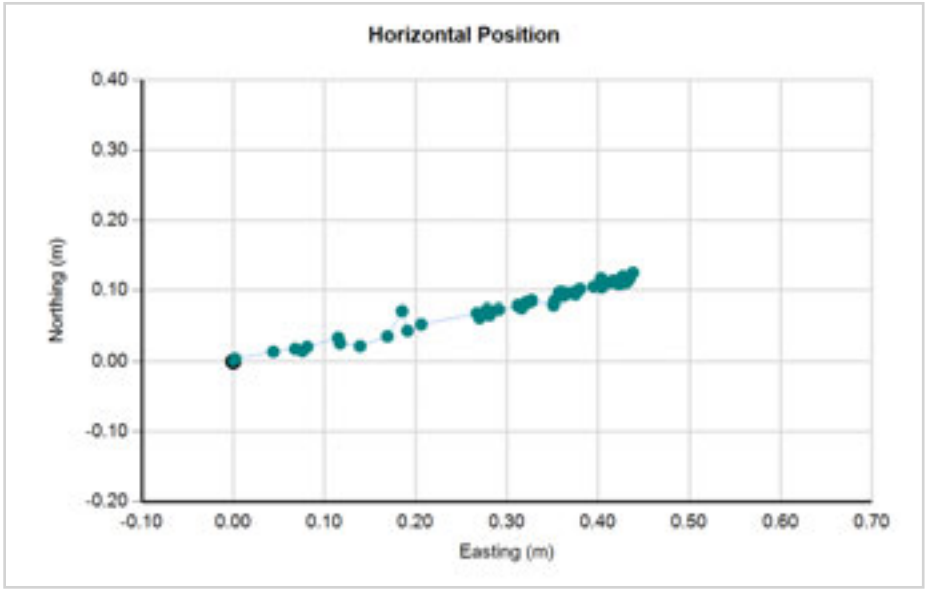
12/07/2012	5870275.993	532052.908	524.252	13.82	0.105	0.395	0.409	-0.133	75.1	-18.0	0.030	-0.010	0.26	0.005	0.017	0.018	0.000	73.6	0.0	68.854	0.000
29/09/2012	5870276.005	532052.916	524.251	14.04	0.117	0.403	0.420	-0.134	73.8	-17.7	0.030	-0.010	0.22	0.012	0.008	0.014	-0.001	33.7	-4.0	66.680	-4.623
10/12/2012	5870275.992	532052.917	524.242	14.24	0.104	0.404	0.417	-0.143	75.6	-18.9	0.029	-0.010	0.20	-0.013	0.001	0.013	-0.009	175.6	-34.6	-66.143	-45.656
03/04/2013	5870275.998	532052.920	524.232	14.55	0.110	0.407	0.422	-0.153	74.9	-19.9	0.029	-0.011	0.31	0.006	0.003	0.007	-0.010	26.6	-56.1	21.493	-32.039
12/07/2013	5870276.002	532052.930	524.240	14.82	0.114	0.417	0.432	-0.145	74.7	-18.5	0.029	-0.010	0.27	0.004	0.010	0.011	0.008	68.2	36.6	39.339	29.220
04/10/2013	5870275.999	532052.926	524.252	15.05	0.111	0.413	0.428	-0.133	75.0	-17.3	0.028	-0.009	0.23	-0.003	-0.004	0.005	0.012	233.1	67.4	-21.741	52.179
27/11/2013	5870275.998	532052.926	524.242	15.20	0.110	0.413	0.427	-0.143	75.1	-18.5	0.028	-0.009	0.15	-0.001	0.000	0.001	-0.010	180.0	-84.3	-6.764	-67.639
10/04/2014	5870276.001	532052.928	524.240	15.57	0.113	0.415	0.430	-0.145	74.8	-18.6	0.028	-0.009	0.37	0.003	0.002	0.004	-0.002	33.7	-29.0	9.828	-5.451
18/07/2014	5870275.997	532052.935	524.242	15.84	0.109	0.422	0.436	-0.143	75.5	-18.2	0.028	-0.009	0.27	-0.004	0.007	0.008	0.002	119.7	13.9	29.745	7.379
02/10/2014	5870275.997	532052.938	524.233	16.05	0.109	0.425	0.439	-0.152	75.6	-19.1	0.027	-0.009	0.21	0.000	0.003	0.003	-0.009	90.0	-71.6	14.418	-43.253
28/11/2014	5870276.007	532052.938	524.228	16.20	0.119	0.425	0.441	-0.157	74.4	-19.6	0.027	-0.010	0.16	0.010	0.000	0.010	-0.005	0.0	-26.6	64.079	-32.039
01/04/2015	5870276.008	532052.940	524.232	16.54	0.120	0.427	0.444	-0.153	74.3	-19.0	0.027	-0.009	0.34	0.001	0.002	0.002	0.004	63.4	60.8	6.586	11.782
20/07/2015	5870275.999	532052.944	524.230	16.84	0.111	0.431	0.445	-0.155	75.6	-19.2	0.026	-0.009	0.30	-0.009	0.004	0.010	-0.002	156.0	-11.5	32.703	-6.641
14/10/2015	5870276.004	532052.947	524.229	17.08	0.116	0.434	0.449	-0.156	75.0	-19.1	0.026	-0.009	0.24	0.005	0.003	0.006	-0.001	31.0	-9.7	24.765	-4.247
22/12/2015	5870276.013	532052.951	524.233	17.27	0.125	0.438	0.455	-0.152	74.1	-18.5	0.026	-0.009	0.19	0.009	0.004	0.010	0.004	24.0	22.1	52.135	21.174

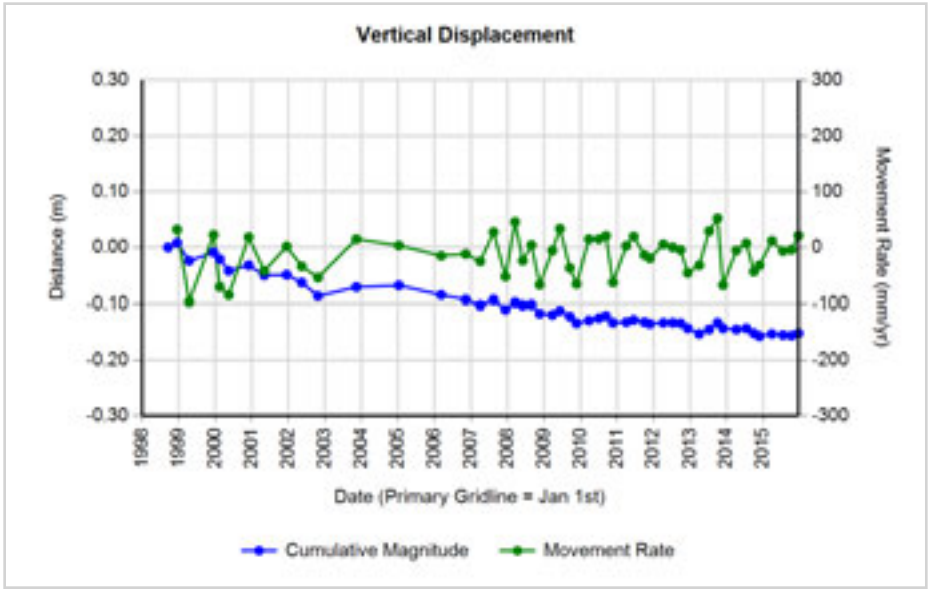
West Quesnel Land Stability Program

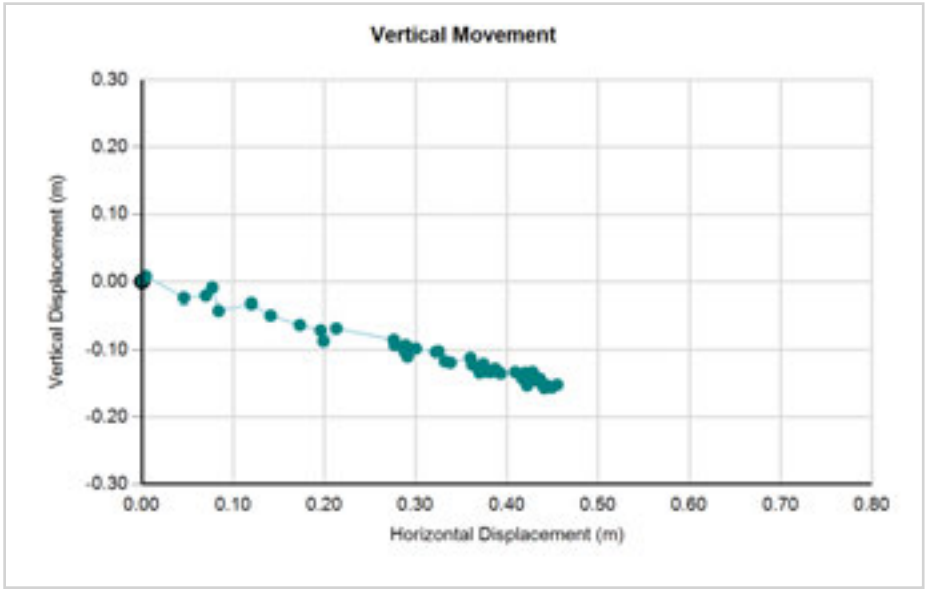
GPS Hub 98-15 (Southwest Corner of Palmer Street and Lewis Drive)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 98-16 (West Side of Healy Street)

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5870413.504	532184.864	509.104	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/12/1998	5870413.499	532184.859	509.086	0.25	-0.005	-0.005	0.007	-0.018	225.0	-68.6	0.028	-0.072	0.25	-0.005	-0.005	0.007	-0.018	225.0	-68.6	28.381	-72.247
15/04/1999	5870413.501	532184.880	509.054	0.58	-0.003	0.016	0.016	-0.050	100.6	-72.0	0.028	-0.086	0.33	0.002	0.021	0.021	-0.032	84.6	-56.6	63.677	-96.595
15/12/1999	5870413.509	532184.907	509.068	1.25	0.005	0.043	0.043	-0.036	83.4	-39.7	0.035	-0.029	0.67	0.008	0.027	0.028	0.014	73.5	26.4	42.154	20.957
15/02/2000	5870413.515	532184.912	509.064	1.42	0.011	0.048	0.049	-0.040	77.1	-39.1	0.035	-0.028	0.17	0.006	0.005	0.008	-0.004	39.8	-27.1	46.011	-23.565
15/05/2000	5870413.516	532184.916	509.071	1.66	0.012	0.052	0.053	-0.033	77.0	-31.7	0.032	-0.020	0.25	0.001	0.004	0.004	0.007	76.0	59.5	16.733	28.408
30/11/2000	5870413.524	532184.943	509.062	2.21	0.020	0.079	0.081	-0.042	75.8	-27.3	0.037	-0.019	0.54	0.008	0.027	0.028	-0.009	73.5	-17.7	51.686	-16.519
05/05/2001	5870413.522	532184.942	509.052	2.64	0.018	0.078	0.080	-0.052	77.0	-33.0	0.030	-0.020	0.43	-0.002	-0.001	0.002	-0.010	206.6	-77.4	-5.235	-23.413
15/12/2001	5870413.530	532184.984	509.054	3.25	0.026	0.120	0.123	-0.050	77.8	-22.2	0.038	-0.015	0.61	0.008	0.042	0.043	0.002	79.2	2.7	69.716	3.261
15/05/2002	5870413.517	532184.970	509.027	3.66	0.013	0.106	0.107	-0.077	83.0	-35.8	0.029	-0.021	0.41	-0.013	-0.014	0.019	-0.027	227.1	-54.7	-46.213	-65.310
24/10/2002	5870413.570	532184.994	509.024	4.11	0.066	0.130	0.146	-0.080	63.1	-28.8	0.036	-0.019	0.44	0.053	0.024	0.058	-0.003	24.4	-3.0	131.176	-6.764
12/11/2003	5870413.535	532185.001	509.048	5.16	0.031	0.137	0.140	-0.056	77.2	-21.7	0.027	-0.011	1.05	-0.035	0.007	0.036	0.024	169.1	34.3	-33.908	23.161
11/01/2005	5870413.550	532185.005	509.051	6.32	0.046	0.141	0.148	-0.053	71.9	-19.7	0.023	-0.008	1.17	0.015	0.004	0.016	0.003	15.7	9.5	13.547	2.272
10/03/2006	5870413.558	532185.041	509.050	7.48	0.054	0.177	0.185	-0.054	73.0	-16.3	0.025	-0.007	1.16	0.008	0.036	0.037	-0.001	77.8	-1.6	31.806	-0.863
10/11/2006	5870413.561	532185.055	509.051	8.15	0.057	0.191	0.199	-0.053	73.4	-14.9	0.024	-0.007	0.67	0.003	0.014	0.014	0.001	77.9	4.0	21.345	1.491
05/04/2007	5870413.563	532185.060	509.046	8.55	0.059	0.196	0.205	-0.058	73.2	-15.8	0.024	-0.007	0.40	0.002	0.005	0.005	-0.005	68.2	-42.9	13.472	-12.509
16/08/2007	5870413.572	532185.056	509.054	8.92	0.068	0.192	0.204	-0.050	70.5	-13.8	0.023	-0.006	0.36	0.009	-0.004	0.010	0.008	336.0	39.1	-27.047	21.970
13/12/2007	5870413.572	532185.064	509.043	9.24	0.068	0.200	0.211	-0.061	71.2	-16.1	0.023	-0.007	0.33	0.000	0.008	0.008	-0.011	90.0	-54.0	24.555	-33.763
18/03/2008	5870413.570	532185.068	509.052	9.51	0.066	0.204	0.214	-0.052	72.1	-13.6	0.023	-0.005	0.26	-0.002	0.004	0.004	0.009	116.6	63.6	17.015	34.242
03/06/2008	5870413.570	532185.079	509.046	9.72	0.066	0.215	0.225	-0.058	72.9	-14.5	0.023	-0.006	0.21	0.000	0.011	0.011	-0.006	90.0	-28.6	52.179	-28.461
29/08/2008	5870413.573	532185.087	509.059	9.95	0.069	0.223	0.233	-0.045	72.8	-10.9	0.023	-0.005	0.24	0.003	0.008	0.009	0.013	69.4	56.7	35.870	54.578
19/11/2008	5870413.583	532185.090	509.050	10.18	0.079	0.226	0.239	-0.054	70.7	-12.7	0.024	-0.005	0.22	0.010	0.003	0.010	-0.009	16.7	-40.8	46.504	-40.088
26/03/2009	5870413.582	532185.093	509.049	10.53	0.078	0.229	0.242	-0.055	71.2	-12.8	0.023	-0.005	0.35	-0.001	0.003	0.003	-0.001	108.4	-17.5	9.095	-2.876
10/06/2009	5870413.583	532185.108	509.056	10.74	0.079	0.244	0.256	-0.048	72.1	-10.6	0.024	-0.004	0.21	0.001	0.015	0.015	0.007	86.2	25.0	72.249	33.641
17/09/2009	5870413.578	532185.112	509.068	11.01	0.074	0.248	0.259	-0.036	73.4	-7.9	0.024	-0.003	0.27	-0.005	0.004	0.006	0.012	141.3	61.9	23.624	44.273
23/11/2009	5870413.595	532185.117	509.032	11.19	0.091	0.253	0.269	-0.072	70.2	-15.0	0.024	-0.006	0.18	0.017	0.005	0.018	-0.036	16.4	-63.8	96.601	-196.254
27/03/2010	5870413.596	532185.117	509.045	11.53	0.092	0.253	0.269	-0.059	70.0	-12.4	0.023	-0.005	0.34	0.001	0.000	0.001	0.013	0.0	85.6	2.946	38.292
04/07/2010	5870413.586	532185.113	509.050	11.80	0.082	0.249	0.262	-0.054	71.8	-11.6	0.022	-0.005	0.27	-0.010	-0.004	0.011	0.005	201.8	24.9	-39.736	18.447
13/09/2010	5870413.590	532185.121	509.021	11.99	0.086	0.257	0.271	-0.083	71.5	-17.0	0.023	-0.007	0.19	0.004	0.008	0.009	-0.029	63.4	-72.9	46.013	-149.187
22/11/2010	5870413.595	532185.130	509.039	12.19	0.091	0.266	0.281	-0.065	71.1	-13.0	0.023	-0.005	0.19	0.005	0.009	0.010	0.018	60.9	60.2	53.721	93.921
04/04/2011	5870413.598	532185.118	509.035	12.55	0.094	0.254	0.271	-0.069	69.7	-14.3	0.022	-0.005	0.36	0.003	-0.012	0.012	-0.004	284.0	-17.9	-33.969	-10.985
18/06/2011	5870413.592	532185.127	509.054	12.76	0.088	0.263	0.277	-0.050	71.5	-10.2	0.022	-0.004	0.21	-0.006	0.009	0.011	0.019	123.7	60.3	52.677	92.530
03/10/2011	5870413.597	532185.125	509.049	13.05	0.093	0.261	0.277	-0.055	70.4	-11.2	0.021	-0.004	0.29	0.005	-0.002	0.005	-0.005	338.2	-42.9	18.383	-17.068
28/11/2011	5870413.601	532185.130	509.038	13.20	0.097	0.266	0.283	-0.066	70.0	-13.1	0.021	-0.005	0.15	0.004	0.005	0.006	-0.011	51.3	-59.8	41.763	-71.746
09/04/2012	5870413.598	532185.131	509.050	13.57	0.094	0.267	0.283	-0.054	70.6	-10.8	0.021	-0.004	0.36	-0.003	0.001	0.003	0.012	161.6	75.2	8.684	32.955

West Quesnel Land Stability Program

GPS Hub 98-16 (West Side of Healy Street)

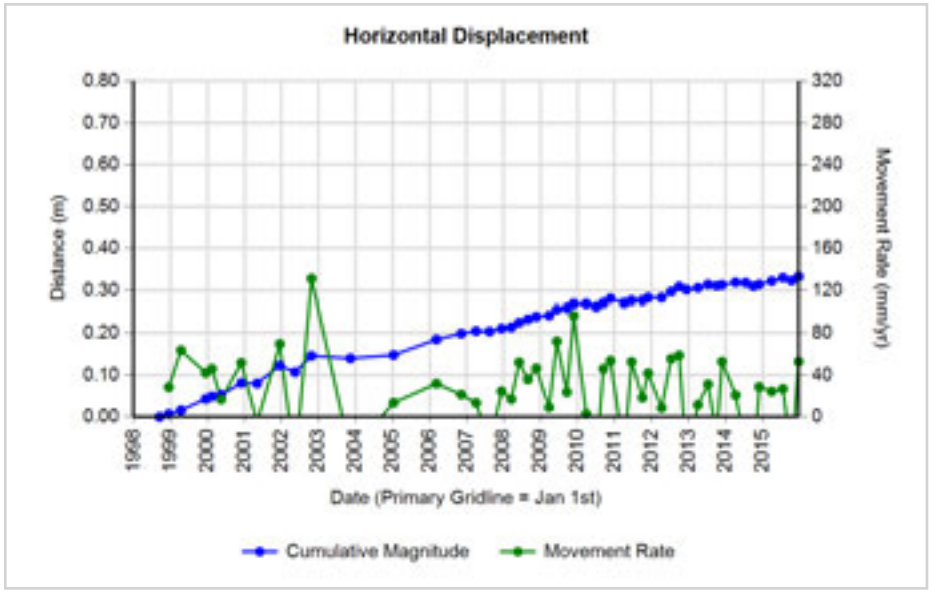
amec foster wheeler

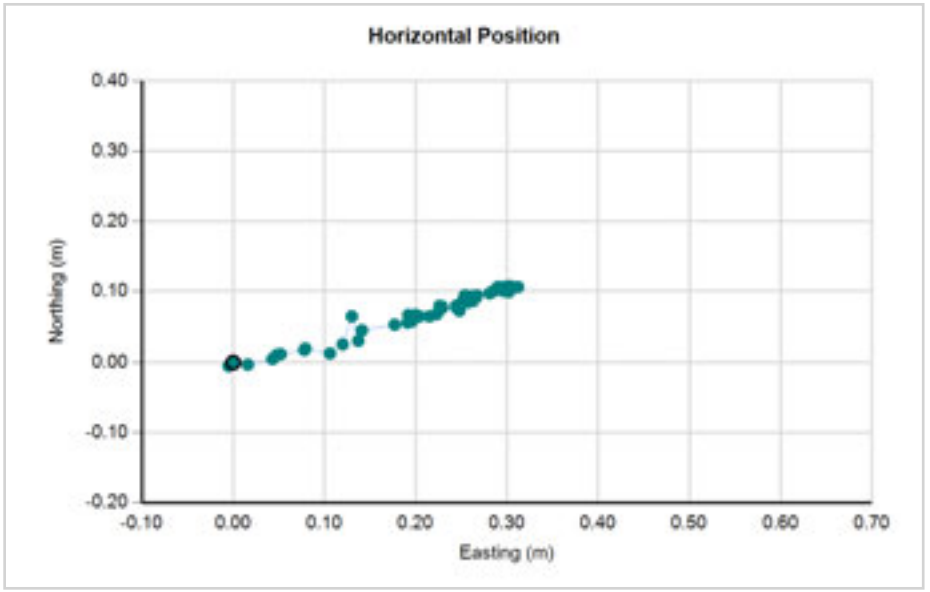
12/07/2012	5870413.601	532185.145	509.055	13.82	0.097	0.281	0.297	-0.049	71.0	-9.4	0.022	-0.004	0.26	0.003	0.014	0.014	0.005	77.9	19.2	55.634	19.428
29/09/2012	5870413.610	532185.154	509.056	14.04	0.106	0.290	0.309	-0.048	69.9	-8.8	0.022	-0.003	0.22	0.009	0.009	0.013	0.001	45.0	4.5	58.847	4.623
10/12/2012	5870413.604	532185.149	509.043	14.24	0.100	0.285	0.302	-0.061	70.7	-11.4	0.021	-0.004	0.20	-0.006	-0.005	0.008	-0.013	219.8	-59.0	-39.621	-65.948
03/04/2013	5870413.606	532185.152	509.046	14.55	0.102	0.288	0.306	-0.058	70.5	-10.7	0.021	-0.004	0.31	0.002	0.003	0.004	0.003	56.3	39.8	11.552	9.612
12/07/2013	5870413.609	532185.160	509.057	14.82	0.105	0.296	0.314	-0.047	70.5	-8.5	0.021	-0.003	0.27	0.003	0.008	0.009	0.011	69.4	52.2	31.207	40.178
04/10/2013	5870413.610	532185.156	509.061	15.05	0.106	0.292	0.311	-0.043	70.0	-7.9	0.021	-0.003	0.23	0.001	-0.004	0.004	0.004	284.0	44.1	-17.928	17.393
27/11/2013	5870413.604	532185.161	509.040	15.20	0.100	0.297	0.313	-0.064	71.4	-11.5	0.021	-0.004	0.15	-0.006	0.005	0.008	-0.021	140.2	-69.6	52.828	-142.042
10/04/2014	5870413.611	532185.164	509.047	15.57	0.107	0.300	0.319	-0.057	70.4	-10.1	0.020	-0.004	0.37	0.007	0.003	0.008	0.007	23.2	42.6	20.759	19.080
18/07/2014	5870413.603	532185.166	509.055	15.84	0.099	0.302	0.318	-0.049	71.9	-8.8	0.020	-0.003	0.27	-0.008	0.002	0.008	0.008	166.0	44.1	-30.424	29.515
02/10/2014	5870413.607	532185.156	509.043	16.05	0.103	0.292	0.310	-0.061	70.6	-11.1	0.019	-0.004	0.21	0.004	-0.010	0.011	-0.012	291.8	-48.1	-51.761	-57.671
28/11/2014	5870413.609	532185.160	509.037	16.20	0.105	0.296	0.314	-0.067	70.5	-12.0	0.019	-0.004	0.16	0.002	0.004	0.004	-0.006	63.4	-53.3	28.657	-38.447
01/04/2015	5870413.611	532185.168	509.052	16.54	0.107	0.304	0.322	-0.052	70.6	-9.2	0.019	-0.003	0.34	0.002	0.008	0.008	0.015	76.0	61.2	24.290	44.183
20/07/2015	5870413.610	532185.176	509.055	16.84	0.106	0.312	0.330	-0.049	71.2	-8.5	0.020	-0.003	0.30	-0.001	0.008	0.008	0.003	97.1	20.4	26.770	9.961
14/10/2015	5870413.613	532185.168	509.046	17.08	0.109	0.304	0.323	-0.058	70.3	-10.2	0.019	-0.003	0.24	0.003	-0.008	0.009	-0.009	290.6	-46.5	-36.287	-38.224
22/12/2015	5870413.619	532185.176	509.052	17.27	0.115	0.312	0.333	-0.052	69.8	-8.9	0.019	-0.003	0.19	0.006	0.008	0.010	0.006	53.1	31.0	52.935	31.761

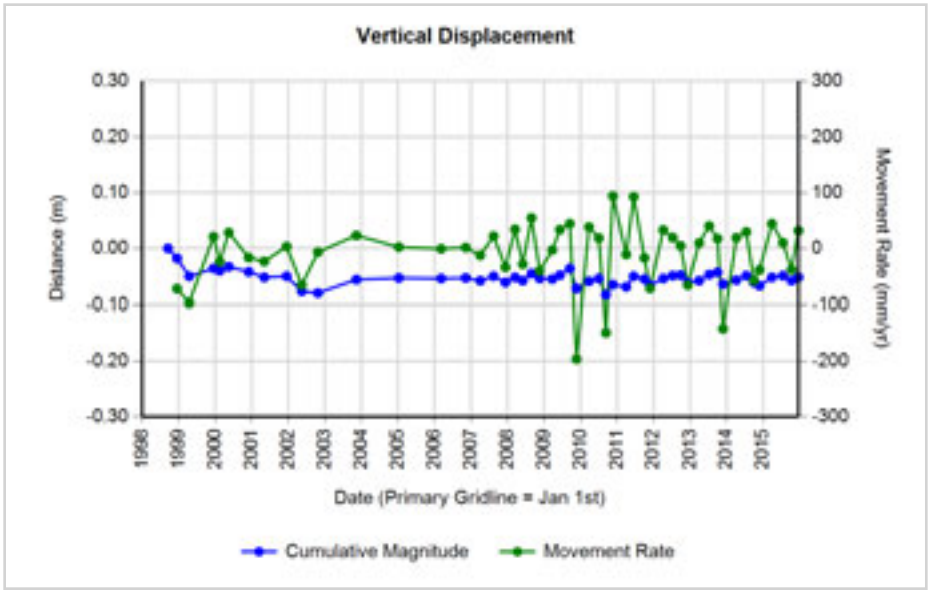
West Quesnel Land Stability Program

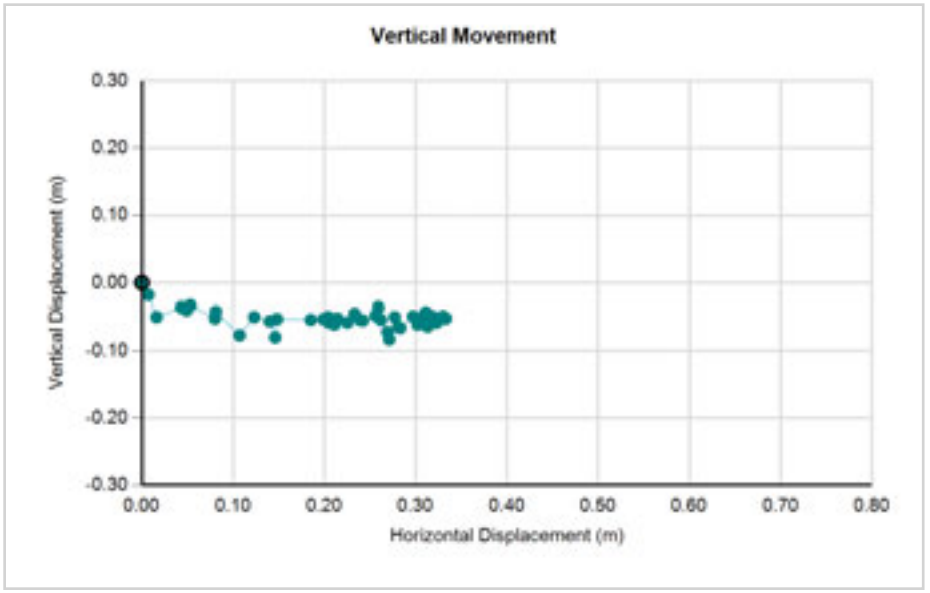
GPS Hub 98-16 (West Side of Healy Street)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 98-17 (Southwest Corner of Bettcher Street and Lark Avenue)

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5869847.647	532237.862	519.610	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/12/1998	5869847.634	532237.872	519.599	0.25	-0.013	0.010	0.016	-0.011	142.4	-33.8	0.066	-0.044	0.25	-0.013	0.010	0.016	-0.011	142.4	-33.8	65.830	-44.151
15/04/1999	5869847.634	532237.910	519.610	0.58	-0.013	0.048	0.050	0.000	105.2	0.0	0.086	0.000	0.33	0.000	0.038	0.038	0.011	90.0	16.1	114.707	33.205
15/12/1999	5869847.644	532237.958	519.608	1.25	-0.003	0.096	0.096	-0.002	91.8	-1.2	0.077	-0.002	0.67	0.010	0.048	0.049	-0.002	78.2	-2.3	73.395	-2.994
15/02/2000	5869847.634	532237.962	519.603	1.42	-0.013	0.100	0.101	-0.007	97.4	-4.0	0.071	-0.005	0.17	-0.010	0.004	0.011	-0.005	158.2	-24.9	63.449	-29.456
15/05/2000	5869847.626	532237.988	519.593	1.66	-0.021	0.126	0.128	-0.017	99.5	-7.6	0.077	-0.010	0.25	-0.008	0.026	0.027	-0.010	107.1	-20.2	110.399	-40.583
30/11/2000	5869847.618	532238.022	519.580	2.21	-0.029	0.160	0.163	-0.030	100.3	-10.5	0.074	-0.014	0.54	-0.008	0.034	0.035	-0.013	103.2	-20.4	64.109	-23.861
05/05/2001	5869847.619	532238.054	519.581	2.64	-0.028	0.192	0.194	-0.029	98.3	-8.5	0.074	-0.011	0.43	0.001	0.032	0.032	0.001	88.2	1.8	74.960	2.341
15/12/2001	5869847.610	532238.084	519.605	3.25	-0.037	0.222	0.225	-0.005	99.5	-1.3	0.069	-0.002	0.61	-0.009	0.030	0.031	0.024	106.7	37.5	51.071	39.134
15/05/2002	5869847.602	532238.105	519.573	3.66	-0.045	0.243	0.247	-0.037	100.5	-8.5	0.067	-0.010	0.41	-0.008	0.021	0.022	-0.032	110.9	-54.9	54.357	-77.404
24/10/2002	5869847.616	532238.139	519.552	4.11	-0.031	0.277	0.279	-0.058	96.4	-11.8	0.068	-0.014	0.44	0.014	0.034	0.037	-0.021	67.6	-29.7	82.902	-47.347
12/11/2003	5869847.601	532238.158	519.575	5.16	-0.046	0.296	0.300	-0.035	98.8	-6.7	0.058	-0.007	1.05	-0.015	0.019	0.024	0.023	127.6	42.7	23.302	21.506
11/01/2005	5869847.611	532238.182	519.582	6.32	-0.036	0.320	0.322	-0.028	96.3	-4.9	0.051	-0.004	1.17	0.010	0.024	0.026	0.007	66.6	16.0	22.334	6.422
10/03/2006	5869847.596	532238.268	519.572	7.48	-0.051	0.406	0.409	-0.038	97.2	-5.3	0.055	-0.005	1.16	-0.015	0.086	0.087	-0.010	100.2	-6.6	75.185	-8.721
10/11/2006	5869847.594	532238.282	519.571	8.15	-0.053	0.420	0.423	-0.039	97.2	-5.3	0.052	-0.005	0.67	-0.002	0.014	0.014	-0.001	98.1	-4.0	21.083	-1.491
05/04/2007	5869847.595	532238.292	519.562	8.55	-0.052	0.430	0.433	-0.048	96.9	-6.3	0.051	-0.006	0.40	0.001	0.010	0.010	-0.009	84.3	-41.8	25.142	-22.515
16/08/2007	5869847.591	532238.307	519.569	8.92	-0.056	0.445	0.449	-0.041	97.2	-5.2	0.050	-0.005	0.36	-0.004	0.015	0.016	0.007	104.9	24.3	42.633	19.224
13/12/2007	5869847.604	532238.307	519.553	9.24	-0.043	0.445	0.447	-0.057	95.5	-7.3	0.048	-0.006	0.33	0.013	0.000	0.013	-0.016	0.0	-50.9	-39.901	-49.109
18/03/2008	5869847.592	532238.315	519.569	9.51	-0.055	0.453	0.456	-0.041	96.9	-5.1	0.048	-0.004	0.26	-0.012	0.008	0.014	0.016	146.3	48.0	54.872	60.875
03/06/2008	5869847.599	532238.348	519.576	9.72	-0.048	0.486	0.488	-0.034	95.6	-4.0	0.050	-0.003	0.21	0.007	0.033	0.034	0.007	78.0	11.7	160.019	33.205
29/08/2008	5869847.593	532238.365	519.572	9.95	-0.054	0.503	0.506	-0.038	96.1	-4.3	0.051	-0.004	0.24	-0.006	0.017	0.018	-0.004	109.4	-12.5	75.685	-16.793
19/11/2008	5869847.590	532238.365	519.560	10.18	-0.057	0.503	0.506	-0.050	96.5	-5.6	0.050	-0.005	0.22	-0.003	0.000	0.003	-0.012	180.0	-76.0	13.363	-53.451
26/03/2009	5869847.593	532238.371	519.553	10.53	-0.054	0.509	0.512	-0.057	96.1	-6.4	0.049	-0.005	0.35	0.003	0.006	0.007	-0.007	63.4	-46.2	19.293	-20.132
10/06/2009	5869847.577	532238.413	519.570	10.74	-0.070	0.551	0.555	-0.040	97.2	-4.1	0.052	-0.004	0.21	-0.016	0.042	0.045	0.017	110.9	20.7	215.999	81.701
17/09/2009	5869847.595	532238.432	519.567	11.01	-0.052	0.570	0.572	-0.043	95.2	-4.3	0.052	-0.004	0.27	0.018	0.019	0.026	-0.003	46.5	-6.5	96.561	-11.068
23/11/2009	5869847.588	532238.433	519.552	11.19	-0.059	0.571	0.574	-0.058	95.9	-5.8	0.051	-0.005	0.18	-0.007	0.001	0.007	-0.015	171.9	-64.8	38.548	-81.772
27/03/2010	5869847.586	532238.424	519.546	11.53	-0.061	0.562	0.565	-0.064	96.2	-6.5	0.049	-0.006	0.34	-0.002	-0.009	0.009	-0.006	257.5	-33.1	-27.157	-17.673
04/07/2010	5869847.577	532238.425	519.561	11.80	-0.070	0.563	0.567	-0.049	97.1	-4.9	0.048	-0.004	0.27	-0.009	0.001	0.009	0.015	173.7	58.9	33.409	55.341
13/09/2010	5869847.586	532238.431	519.560	11.99	-0.061	0.569	0.572	-0.050	96.1	-5.0	0.048	-0.004	0.19	0.009	0.006	0.011	-0.001	33.7	-5.3	55.645	-5.144
22/11/2010	5869847.580	532238.438	519.551	12.19	-0.067	0.576	0.580	-0.059	96.6	-5.8	0.048	-0.005	0.19	-0.006	0.007	0.009	-0.009	130.6	-44.3	48.106	-46.961
04/04/2011	5869847.578	532238.433	519.546	12.55	-0.069	0.571	0.575	-0.064	96.9	-6.3	0.046	-0.005	0.36	-0.002	-0.005	0.005	-0.005	248.2	-42.9	-14.789	-13.731
18/06/2011	5869847.587	532238.453	519.578	12.76	-0.060	0.591	0.594	-0.032	95.8	-3.1	0.047	-0.003	0.21	0.009	0.020	0.022	0.032	65.8	55.6	106.807	155.840
03/10/2011	5869847.580	532238.449	519.554	13.05	-0.067	0.587	0.591	-0.056	96.5	-5.4	0.045	-0.004	0.29	-0.007	-0.004	0.008	-0.024	209.7	-71.4	-27.521	-81.925
28/11/2011	5869847.582	532238.446	519.548	13.20	-0.065	0.584	0.588	-0.062	96.4	-6.0	0.045	-0.005	0.15	0.002	-0.003	0.004	-0.006	303.7	-59.0	-23.517	-39.134
09/04/2012	5869847.577	532238.456	519.546	13.57	-0.070	0.594	0.598	-0.064	96.7	-6.1	0.044	-0.005	0.36	-0.005	0.010	0.011	-0.002	116.6	-10.1	30.704	-5.492

West Quesnel Land Stability Program

GPS Hub 98-17 (Southwest Corner of Bettcher Street and Lark Avenue)

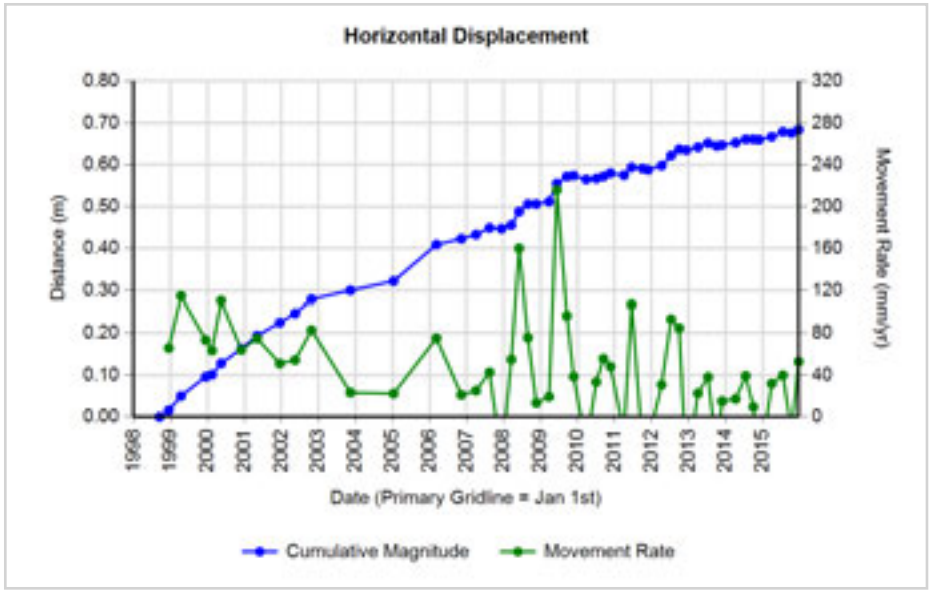
amec foster wheeler

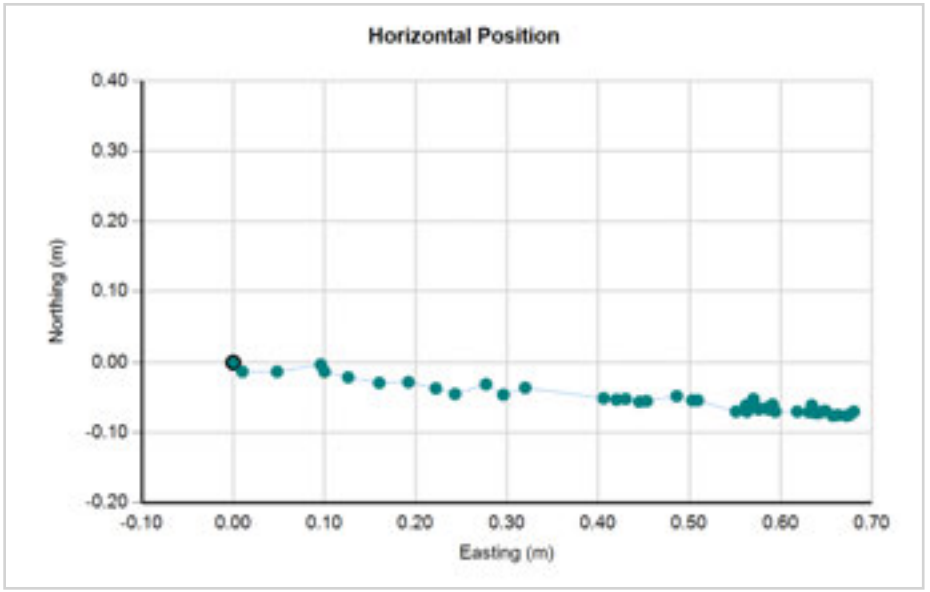
12/07/2012	5869847.577	532238.480	519.555	13.82	-0.070	0.618	0.622	-0.055	96.5	-5.1	0.045	-0.004	0.26	0.000	0.024	0.024	0.009	90.0	20.6	93.255	34.971
29/09/2012	5869847.586	532238.496	519.544	14.04	-0.061	0.634	0.637	-0.066	95.5	-5.9	0.045	-0.005	0.22	0.009	0.016	0.018	-0.011	60.6	-30.9	84.875	-50.858
10/12/2012	5869847.576	532238.493	519.545	14.24	-0.071	0.631	0.635	-0.065	96.4	-5.8	0.045	-0.005	0.20	-0.010	-0.003	0.010	0.001	196.7	5.5	-52.963	5.073
03/04/2013	5869847.575	532238.500	519.538	14.55	-0.072	0.638	0.642	-0.072	96.4	-6.4	0.044	-0.005	0.31	-0.001	0.007	0.007	-0.007	98.1	-44.7	22.655	-22.428
12/07/2013	5869847.578	532238.510	519.550	14.82	-0.069	0.648	0.652	-0.060	96.1	-5.3	0.044	-0.004	0.27	0.003	0.010	0.010	0.012	73.3	49.0	38.133	43.830
04/10/2013	5869847.575	532238.503	519.554	15.05	-0.072	0.641	0.645	-0.056	96.4	-5.0	0.043	-0.004	0.23	-0.003	-0.007	0.008	0.004	246.8	27.7	-33.115	17.393
27/11/2013	5869847.576	532238.505	519.545	15.20	-0.071	0.643	0.647	-0.065	96.3	-5.7	0.043	-0.004	0.15	0.001	0.002	0.002	-0.009	63.4	-76.0	15.125	-60.875
10/04/2014	5869847.578	532238.511	519.537	15.57	-0.069	0.649	0.653	-0.073	96.1	-6.4	0.042	-0.005	0.37	0.002	0.006	0.006	-0.008	71.6	-51.7	17.239	-21.806
18/07/2014	5869847.571	532238.519	519.549	15.84	-0.076	0.657	0.661	-0.061	96.6	-5.3	0.042	-0.004	0.27	-0.007	0.008	0.011	0.012	131.2	48.5	39.219	44.273
02/10/2014	5869847.573	532238.519	519.540	16.05	-0.074	0.657	0.661	-0.070	96.4	-6.0	0.041	-0.004	0.21	0.002	0.000	0.002	-0.009	0.0	-77.5	9.612	-43.253
28/11/2014	5869847.581	532238.519	519.534	16.20	-0.066	0.657	0.660	-0.076	95.7	-6.6	0.041	-0.005	0.16	0.008	0.000	0.008	-0.006	0.0	-36.9	-51.263	-38.447
01/04/2015	5869847.572	532238.525	519.538	16.54	-0.075	0.663	0.667	-0.072	96.5	-6.2	0.040	-0.004	0.34	-0.009	0.006	0.011	0.004	146.3	20.3	31.861	11.782
20/07/2015	5869847.572	532238.537	519.553	16.84	-0.075	0.675	0.679	-0.057	96.3	-4.8	0.040	-0.003	0.30	0.000	0.012	0.012	0.015	90.0	51.3	39.845	49.807
14/10/2015	5869847.571	532238.534	519.543	17.08	-0.076	0.672	0.676	-0.067	96.5	-5.7	0.040	-0.004	0.24	-0.001	-0.003	0.003	-0.010	251.6	-72.5	-13.430	-42.471
22/12/2015	5869847.577	532238.542	519.532	17.27	-0.070	0.680	0.684	-0.078	95.9	-6.5	0.040	-0.005	0.19	0.006	0.008	0.010	-0.011	53.1	-47.7	52.935	-58.228

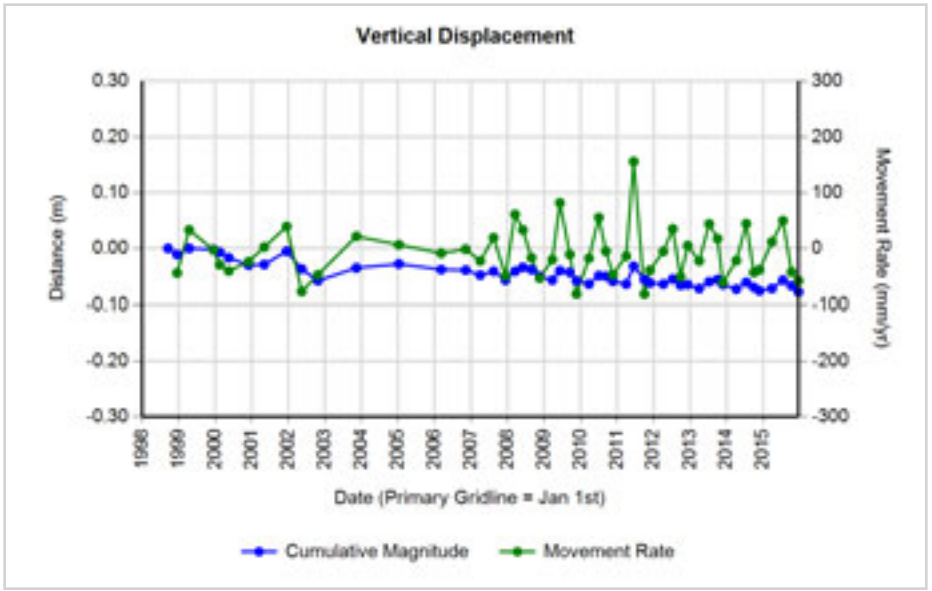
West Quesnel Land Stability Program

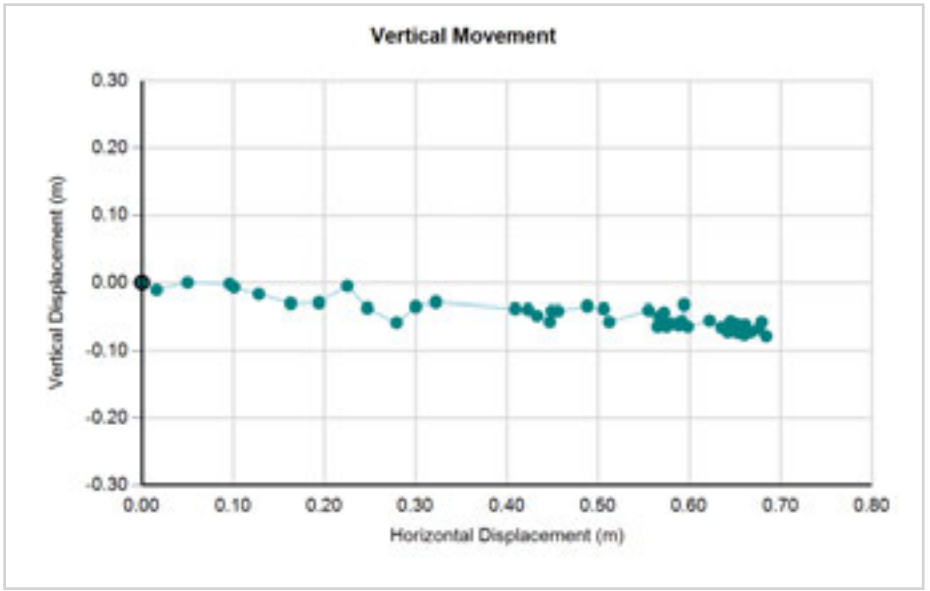
GPS Hub 98-17 (Southwest Corner of Bettcher Street and Lark Avenue)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 98-18 (Southest Corner of Lark Avenue and Flamingo Street)

amec foster wheeler

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5869826.923	531984.617	524.147	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/12/1998	5869826.929	531984.611	524.132	0.25	0.006	-0.006	0.008	-0.015	315.0	-60.5	0.034	-0.060	0.25	0.006	-0.006	0.008	-0.015	315.0	-60.5	34.058	-60.206
15/04/1999	5869826.930	531984.639	524.126	0.58	0.007	0.022	0.023	-0.021	72.3	-42.3	0.040	-0.036	0.33	0.001	0.028	0.028	-0.006	88.0	-12.1	84.575	-18.112
15/12/1999	5869826.923	531984.695	524.127	1.25	0.000	0.078	0.078	-0.020	90.0	-14.4	0.062	-0.016	0.67	-0.007	0.056	0.056	0.001	97.1	1.0	84.480	1.497
15/02/2000	5869826.919	531984.684	524.127	1.42	-0.004	0.067	0.067	-0.020	93.4	-16.6	0.047	-0.014	0.17	-0.004	-0.011	0.012	0.000	250.0	0.0	-68.954	0.000
15/05/2000	5869826.903	531984.719	524.125	1.66	-0.020	0.102	0.104	-0.022	101.1	-12.0	0.062	-0.013	0.25	-0.016	0.035	0.038	-0.002	114.6	-3.0	156.180	-8.117
30/11/2000	5869826.907	531984.751	524.107	2.21	-0.016	0.134	0.135	-0.040	96.8	-16.5	0.061	-0.018	0.54	0.004	0.032	0.032	-0.018	82.9	-29.2	59.191	-33.038
05/05/2001	5869826.892	531984.774	524.104	2.64	-0.031	0.157	0.160	-0.043	101.2	-15.0	0.061	-0.016	0.43	-0.015	0.023	0.027	-0.003	123.1	-6.2	64.291	-7.024
15/12/2001	5869826.906	531984.810	524.129	3.25	-0.017	0.193	0.194	-0.018	95.0	-5.3	0.060	-0.006	0.61	0.014	0.036	0.039	0.025	68.7	32.9	62.983	40.765
15/05/2002	5869826.867	531984.832	524.097	3.66	-0.056	0.215	0.222	-0.050	104.6	-12.7	0.061	-0.014	0.41	-0.039	0.022	0.045	-0.032	150.6	-35.6	108.310	-77.404
24/10/2002	5869826.897	531984.865	524.084	4.11	-0.026	0.248	0.249	-0.063	96.0	-14.2	0.061	-0.015	0.44	0.030	0.033	0.045	-0.013	47.7	-16.3	100.552	-29.310
12/11/2003	5869826.883	531984.873	524.079	5.16	-0.040	0.256	0.259	-0.068	98.8	-14.7	0.050	-0.013	1.05	-0.014	0.008	0.016	-0.005	148.3	-18.0	15.157	-4.927
11/01/2005	5869826.885	531984.896	524.112	6.32	-0.038	0.279	0.282	-0.035	97.8	-7.0	0.045	-0.005	1.17	0.001	0.023	0.023	0.033	86.6	55.7	19.609	28.706
10/03/2006	5869826.869	531984.980	524.087	7.48	-0.054	0.363	0.367	-0.060	98.5	-9.3	0.049	-0.008	1.16	-0.016	0.084	0.085	-0.025	100.7	-16.5	73.634	-21.846
10/11/2006	5869826.865	531984.993	524.085	8.15	-0.058	0.376	0.380	-0.062	98.8	-9.3	0.047	-0.008	0.67	-0.004	0.013	0.014	-0.002	107.1	-8.4	20.277	-2.982
05/04/2007	5869826.865	531985.000	524.082	8.55	-0.058	0.383	0.387	-0.065	98.6	-9.5	0.045	-0.008	0.40	0.000	0.007	0.007	-0.003	90.0	-23.2	17.512	-7.505
16/08/2007	5869826.861	531985.022	524.091	8.92	-0.062	0.405	0.410	-0.056	98.7	-7.8	0.046	-0.006	0.36	-0.004	0.022	0.022	0.009	100.3	21.9	61.408	24.716
13/12/2007	5869826.861	531985.023	524.074	9.24	-0.062	0.406	0.411	-0.073	98.7	-10.1	0.044	-0.008	0.33	0.000	0.001	0.001	-0.017	90.0	-86.6	3.069	-52.179
18/03/2008	5869826.864	531985.022	524.083	9.51	-0.059	0.405	0.409	-0.064	98.3	-8.9	0.043	-0.007	0.26	0.003	-0.001	0.003	0.009	341.6	70.6	-12.031	34.242
03/06/2008	5869826.854	531985.058	524.085	9.72	-0.069	0.441	0.446	-0.062	98.9	-7.9	0.046	-0.006	0.21	-0.010	0.036	0.037	0.002	105.5	3.1	177.232	9.487
29/07/2008	5869826.857	531985.076	524.093	9.87	-0.066	0.459	0.464	-0.054	98.2	-6.6	0.047	-0.005	0.15	0.003	0.018	0.018	0.008	80.5	23.7	119.021	52.179
29/08/2008	5869826.855	531985.074	524.081	9.95	-0.068	0.457	0.462	-0.066	98.5	-8.1	0.046	-0.007	0.08	-0.002	-0.002	0.003	-0.012	225.0	-76.7	-33.325	-141.387
19/11/2008	5869826.854	531985.073	524.081	10.18	-0.069	0.456	0.461	-0.066	98.6	-8.1	0.045	-0.006	0.22	-0.001	-0.001	0.001	0.000	225.0	0.0	-6.299	0.000
26/03/2009	5869826.852	531985.077	524.075	10.53	-0.071	0.460	0.465	-0.072	98.8	-8.8	0.044	-0.007	0.35	-0.002	0.004	0.004	-0.006	116.6	-53.3	12.862	-17.256
10/06/2009	5869826.844	531985.128	524.084	10.74	-0.079	0.511	0.517	-0.063	98.8	-6.9	0.048	-0.006	0.21	-0.008	0.051	0.052	0.009	98.9	9.9	248.099	43.253
17/09/2009	5869826.843	531985.137	524.076	11.01	-0.080	0.520	0.526	-0.071	98.7	-7.7	0.048	-0.006	0.27	-0.001	0.009	0.009	-0.008	96.3	-41.5	33.409	-29.515
23/11/2009	5869826.863	531985.130	524.062	11.19	-0.060	0.513	0.516	-0.085	96.7	-9.3	0.046	-0.008	0.18	0.020	-0.007	0.021	-0.014	340.7	-33.5	-115.515	-76.321
27/03/2010	5869826.853	531985.129	524.070	11.53	-0.070	0.512	0.517	-0.077	97.8	-8.5	0.045	-0.007	0.34	-0.010	-0.001	0.010	0.008	185.7	38.5	29.603	23.565
04/07/2010	5869826.841	531985.130	524.074	11.80	-0.082	0.513	0.520	-0.073	99.1	-8.0	0.044	-0.006	0.27	-0.012	0.001	0.012	0.004	175.2	18.4	44.426	14.758
13/09/2010	5869826.848	531985.133	524.074	11.99	-0.075	0.516	0.521	-0.073	98.3	-8.0	0.043	-0.006	0.19	0.007	0.003	0.008	0.000	23.2	0.0	39.178	0.000
22/11/2010	5869826.849	531985.135	524.067	12.19	-0.074	0.518	0.523	-0.080	98.1	-8.7	0.043	-0.007	0.19	0.001	0.002	0.002	-0.007	63.4	-72.3	11.667	-36.525
04/04/2011	5869826.843	531985.135	524.073	12.55	-0.080	0.518	0.524	-0.074	98.8	-8.0	0.042	-0.006	0.36	-0.006	0.000	0.006	0.006	180.0	45.0	16.477	16.477
18/06/2011	5869826.836	531985.157	524.079	12.76	-0.087	0.540	0.547	-0.068	99.2	-7.1	0.043	-0.005	0.21	-0.007	0.022	0.023	0.006	107.7	14.6	112.433	29.220
03/10/2011	5869826.839	531985.157	524.066	13.05	-0.084	0.540	0.546	-0.081	98.8	-8.4	0.042	-0.006	0.29	0.003	0.000	0.003	-0.013	0.0	-77.0	-10.241	-44.376
28/11/2011	5869826.844	531985.151	524.061	13.20	-0.079	0.534	0.540	-0.086	98.4	-9.1	0.041	-0.007	0.15	0.005	-0.006	0.008	-0.005	309.8	-32.6	-50.941	-32.612

West Quesnel Land Stability Program

GPS Hub 98-18 (Southest Corner of Lark Avenue and Flamingo Street)

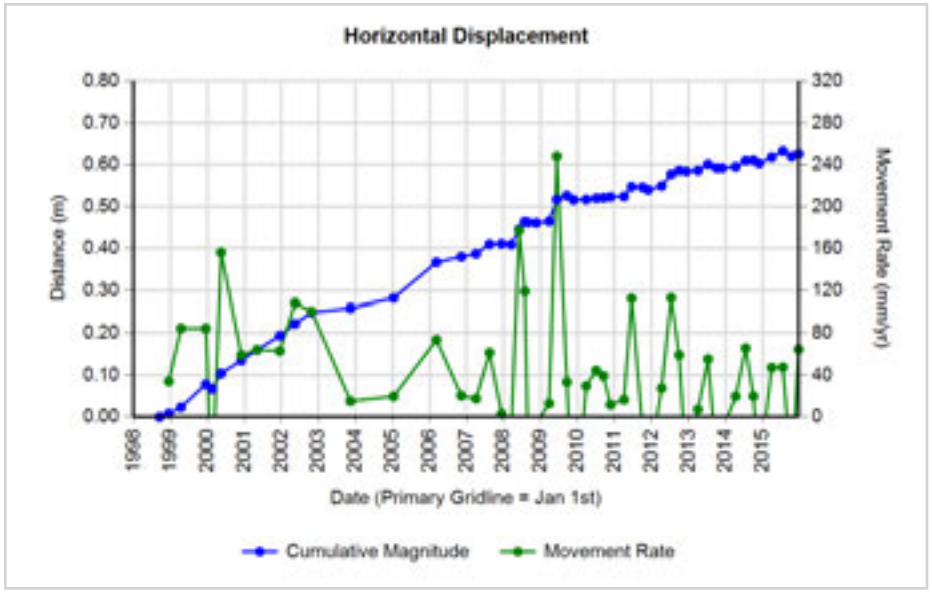
amec foster wheeler

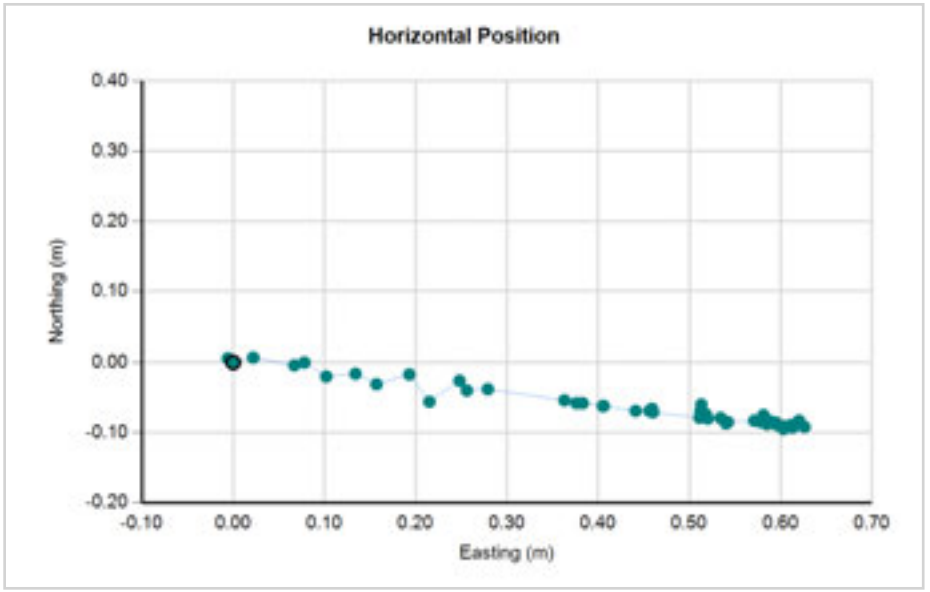
09/04/2012	5869826.838	531985.159	524.066	13.57	-0.085	0.542	0.549	-0.081	98.9	-8.4	0.040	-0.006	0.36	-0.006	0.008	0.010	0.005	126.9	26.6	27.462	13.731
12/07/2012	5869826.840	531985.188	524.076	13.82	-0.083	0.571	0.577	-0.071	98.3	-7.0	0.042	-0.005	0.26	0.002	0.029	0.029	0.010	86.1	19.0	112.951	38.856
29/09/2012	5869826.848	531985.198	524.073	14.04	-0.075	0.581	0.586	-0.074	97.4	-7.2	0.042	-0.005	0.22	0.008	0.010	0.013	-0.003	51.3	-13.2	59.209	-13.870
10/12/2012	5869826.838	531985.195	524.066	14.24	-0.085	0.578	0.584	-0.081	98.4	-7.9	0.041	-0.006	0.20	-0.010	-0.003	0.010	-0.007	196.7	-33.8	-52.963	-35.510
03/04/2013	5869826.839	531985.197	524.060	14.55	-0.084	0.580	0.586	-0.087	98.2	-8.4	0.040	-0.006	0.31	0.001	0.002	0.002	-0.006	63.4	-69.6	7.164	-19.224
12/07/2013	5869826.837	531985.212	524.069	14.82	-0.086	0.595	0.601	-0.078	98.2	-7.4	0.041	-0.005	0.27	-0.002	0.015	0.015	0.009	97.6	30.7	55.272	32.873
04/10/2013	5869826.835	531985.202	524.080	15.05	-0.088	0.585	0.592	-0.067	98.6	-6.5	0.039	-0.004	0.23	-0.002	-0.010	0.010	0.011	258.7	47.2	-44.343	47.830
27/11/2013	5869826.833	531985.202	524.058	15.20	-0.090	0.585	0.592	-0.089	98.7	-8.6	0.039	-0.006	0.15	-0.002	0.000	0.002	-0.022	180.0	-84.8	-13.528	-148.806
10/04/2014	5869826.839	531985.206	524.056	15.57	-0.084	0.589	0.595	-0.091	98.1	-8.7	0.038	-0.006	0.37	0.006	0.004	0.007	-0.002	33.7	-15.5	19.656	-5.451
18/07/2014	5869826.828	531985.220	524.064	15.84	-0.095	0.603	0.610	-0.083	99.0	-7.7	0.039	-0.005	0.27	-0.011	0.014	0.018	0.008	128.2	24.2	65.688	29.515
02/10/2014	5869826.832	531985.221	524.068	16.05	-0.091	0.604	0.611	-0.079	98.6	-7.4	0.038	-0.005	0.21	0.004	0.001	0.004	0.004	14.0	44.1	19.815	19.224
28/11/2014	5869826.834	531985.213	524.060	16.20	-0.089	0.596	0.603	-0.087	98.5	-8.2	0.037	-0.005	0.16	0.002	-0.008	0.008	-0.008	284.0	-44.1	-52.841	-51.263
01/04/2015	5869826.834	531985.229	524.060	16.54	-0.089	0.612	0.618	-0.087	98.3	-8.0	0.037	-0.005	0.34	0.000	0.016	0.016	0.000	90.0	0.0	47.129	0.000
20/07/2015	5869826.831	531985.243	524.060	16.84	-0.092	0.626	0.633	-0.087	98.4	-7.8	0.038	-0.005	0.30	-0.003	0.014	0.014	0.000	102.1	0.0	47.542	0.000
14/10/2015	5869826.830	531985.230	524.065	17.08	-0.093	0.613	0.620	-0.082	98.6	-7.5	0.036	-0.005	0.24	-0.001	-0.013	0.013	0.005	265.6	21.0	-55.375	21.235
22/12/2015	5869826.840	531985.237	524.053	17.27	-0.083	0.620	0.626	-0.094	97.6	-8.5	0.036	-0.005	0.19	0.010	0.007	0.012	-0.012	35.0	-44.5	64.615	-63.522

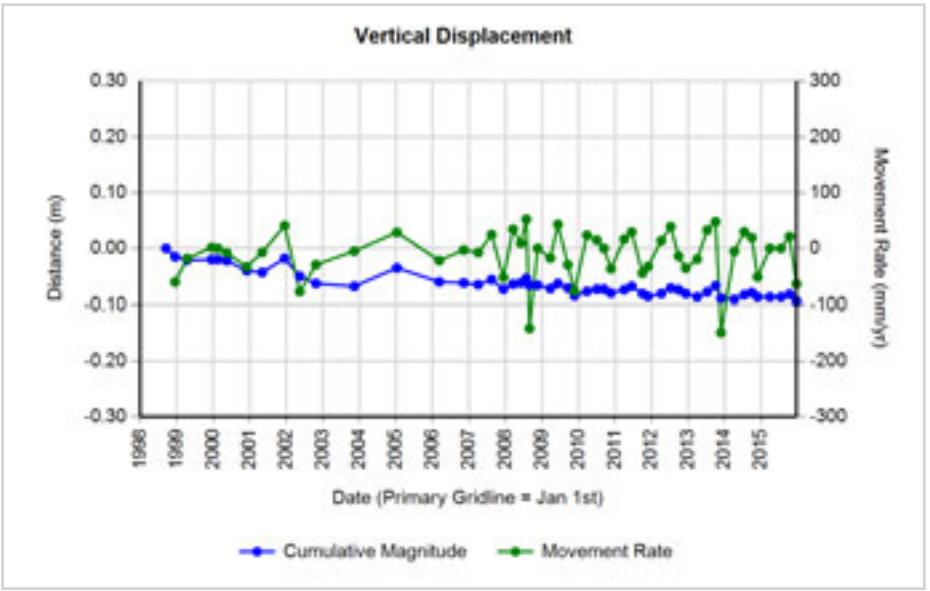
West Quesnel Land Stability Program

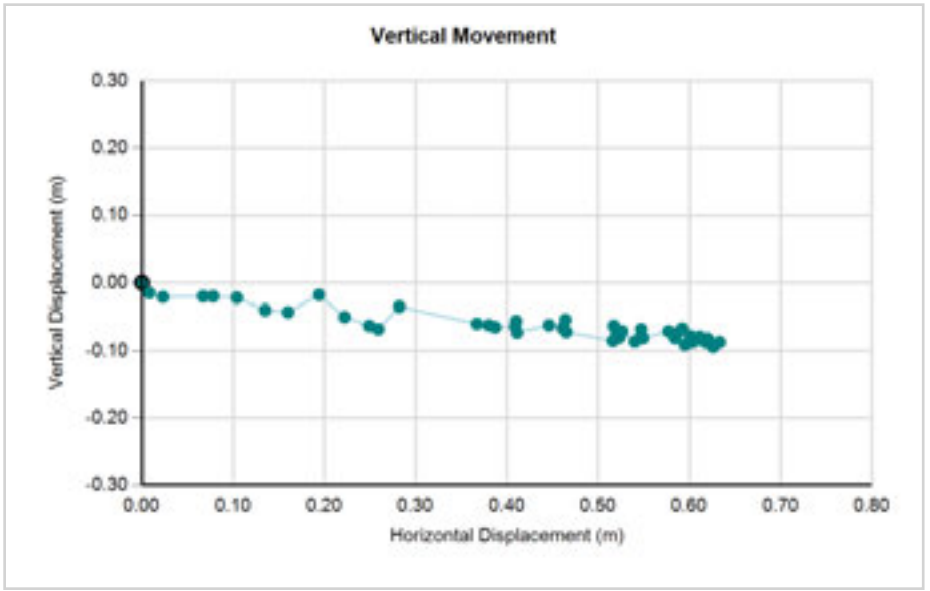
GPS Hub 98-18 (Southest Corner of Lark Avenue and Flamingo Street)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 98-19 (South Side of Abbott Drive)

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5869596.532	531978.061	517.225	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/12/1998	5869596.534	531978.063	517.219	0.25	0.002	0.002	0.003	-0.006	45.0	-64.8	0.011	-0.024	0.25	0.002	0.002	0.003	-0.006	45.0	-64.8	11.353	-24.082
15/04/1999	5869596.525	531978.098	517.218	0.58	-0.007	0.037	0.038	-0.007	100.7	-10.5	0.065	-0.012	0.33	-0.009	0.035	0.036	-0.001	104.4	-1.6	109.088	-3.019
15/12/1999	5869596.519	531978.134	517.213	1.25	-0.013	0.073	0.074	-0.012	100.1	-9.2	0.059	-0.010	0.67	-0.006	0.036	0.036	-0.005	99.5	-7.8	54.633	-7.485
15/02/2000	5869596.525	531978.140	517.238	1.42	-0.007	0.079	0.079	0.013	95.1	9.3	0.056	0.009	0.17	0.006	0.006	0.008	0.025	45.0	71.3	49.988	147.278
15/05/2000	5869596.502	531978.164	517.224	1.66	-0.030	0.103	0.107	-0.001	106.2	-0.5	0.064	-0.001	0.25	-0.023	0.024	0.033	-0.014	133.8	-22.8	134.905	-56.817
30/11/2000	5869596.531	531978.200	517.202	2.21	-0.001	0.139	0.139	-0.023	90.4	-9.4	0.063	-0.010	0.54	0.029	0.036	0.046	-0.022	51.1	-25.5	84.848	-40.379
05/05/2001	5869596.487	531978.205	517.207	2.64	-0.045	0.144	0.151	-0.018	107.4	-6.8	0.057	-0.007	0.43	-0.044	0.005	0.044	0.005	173.5	6.4	103.682	11.707
15/12/2001	5869596.493	531978.237	517.234	3.25	-0.039	0.176	0.180	0.009	102.5	2.9	0.055	0.003	0.61	0.006	0.032	0.033	0.027	79.4	39.7	53.088	44.026
15/05/2002	5869596.463	531978.282	517.216	3.66	-0.069	0.221	0.232	-0.009	107.3	-2.2	0.063	-0.002	0.41	-0.030	0.045	0.054	-0.018	123.7	-18.4	130.821	-43.540
24/10/2002	5869596.484	531978.276	517.200	4.11	-0.048	0.215	0.220	-0.025	102.6	-6.5	0.054	-0.006	0.44	0.021	-0.006	0.022	-0.016	344.1	-36.2	-49.242	-36.074
12/11/2003	5869596.467	531978.287	517.212	5.16	-0.065	0.226	0.235	-0.013	106.1	-3.1	0.046	-0.002	1.05	-0.017	0.011	0.021	0.012	147.5	31.3	19.523	11.852
11/01/2005	5869596.480	531978.307	517.249	6.32	-0.052	0.246	0.251	0.024	102.0	5.3	0.040	0.004	1.17	0.013	0.020	0.024	0.036	56.0	56.8	20.244	30.900
10/03/2006	5869596.456	531978.375	517.242	7.48	-0.076	0.314	0.323	0.017	103.6	3.0	0.043	0.002	1.16	-0.024	0.068	0.072	-0.007	109.3	-5.1	62.563	-5.613
10/11/2006	5869596.451	531978.392	517.248	8.15	-0.081	0.331	0.341	0.023	103.8	3.9	0.042	0.003	0.67	-0.005	0.017	0.018	0.006	106.4	18.7	26.417	8.945
05/04/2007	5869596.454	531978.393	517.244	8.55	-0.078	0.332	0.341	0.019	103.2	3.2	0.040	0.002	0.40	0.003	0.001	0.003	-0.004	18.4	-51.7	7.911	-10.007
16/08/2007	5869596.459	531978.408	517.241	8.92	-0.073	0.347	0.355	0.016	101.9	2.6	0.040	0.002	0.36	0.005	0.015	0.016	-0.003	71.6	-10.7	43.422	-8.239
13/12/2007	5869596.450	531978.410	517.233	9.24	-0.082	0.349	0.359	0.008	103.2	1.3	0.039	0.001	0.33	-0.009	0.002	0.009	-0.008	167.5	-40.9	28.298	-24.555
18/03/2008	5869596.458	531978.410	517.253	9.51	-0.074	0.349	0.357	0.028	102.0	4.5	0.038	0.003	0.26	0.008	0.000	0.008	0.020	0.0	68.2	-30.437	76.094
03/06/2008	5869596.441	531978.438	517.242	9.72	-0.091	0.377	0.388	0.017	103.6	2.5	0.040	0.002	0.21	-0.017	0.028	0.033	-0.011	121.3	-18.6	155.382	-52.179
29/08/2008	5869596.440	531978.449	517.252	9.95	-0.092	0.388	0.399	0.027	103.3	3.9	0.040	0.003	0.24	-0.001	0.011	0.011	0.010	95.2	42.2	46.371	41.983
19/11/2008	5869596.453	531978.449	517.253	10.18	-0.079	0.388	0.396	0.028	101.5	4.0	0.039	0.003	0.22	0.013	0.000	0.013	0.001	0.0	4.4	-57.905	4.454
26/03/2009	5869596.438	531978.457	517.244	10.53	-0.094	0.396	0.407	0.019	103.4	2.7	0.039	0.002	0.35	-0.015	0.008	0.017	-0.009	151.9	-27.9	48.892	-25.884
10/06/2009	5869596.426	531978.495	517.261	10.74	-0.106	0.434	0.447	0.036	103.7	4.6	0.042	0.003	0.21	-0.012	0.038	0.040	0.017	107.5	23.1	191.515	81.701
17/09/2009	5869596.435	531978.503	517.260	11.01	-0.097	0.442	0.453	0.035	102.4	4.4	0.041	0.003	0.27	0.009	0.008	0.012	-0.001	41.6	-4.7	44.426	-3.689
23/11/2009	5869596.437	531978.497	517.256	11.19	-0.095	0.436	0.446	0.031	102.3	4.0	0.040	0.003	0.18	0.002	-0.006	0.006	-0.004	288.4	-32.3	-34.478	-21.806
27/03/2010	5869596.434	531978.494	517.243	11.53	-0.098	0.433	0.444	0.018	102.8	2.3	0.039	0.002	0.34	-0.003	-0.003	0.004	-0.013	225.0	-71.9	-12.497	-38.292
04/07/2010	5869596.429	531978.497	517.247	11.80	-0.103	0.436	0.448	0.022	103.3	2.8	0.038	0.002	0.27	-0.005	0.003	0.006	0.004	149.0	34.4	21.513	14.758
13/09/2010	5869596.437	531978.501	517.258	11.99	-0.095	0.440	0.450	0.033	102.2	4.2	0.038	0.003	0.19	0.008	0.004	0.009	0.011	26.6	50.9	46.013	56.588
22/11/2010	5869596.432	531978.506	517.249	12.19	-0.100	0.445	0.456	0.024	102.7	3.0	0.037	0.002	0.19	-0.005	0.005	0.007	-0.009	135.0	-51.8	36.896	-46.961
04/04/2011	5869596.427	531978.500	517.245	12.55	-0.105	0.439	0.451	0.020	103.5	2.5	0.036	0.002	0.36	-0.005	-0.006	0.008	-0.004	230.2	-27.1	-21.449	-10.985
18/06/2011	5869596.433	531978.513	517.264	12.76	-0.099	0.452	0.463	0.039	102.4	4.8	0.036	0.003	0.21	0.006	0.013	0.014	0.019	65.2	53.0	69.728	92.530
03/10/2011	5869596.431	531978.511	517.254	13.05	-0.101	0.450	0.461	0.029	102.7	3.6	0.035	0.002	0.29	-0.002	-0.002	0.003	-0.010	225.0	-74.2	-9.655	-34.136
28/11/2011	5869596.432	531978.510	517.253	13.20	-0.100	0.449	0.460	0.028	102.6	3.5	0.035	0.002	0.15	0.001	-0.001	0.001	-0.001	315.0	-35.3	-9.224	-6.522
09/04/2012	5869596.434	531978.521	517.249	13.57	-0.098	0.460	0.470	0.024	102.0	2.9	0.035	0.002	0.36	0.002	0.011	0.011	-0.004	79.7	-19.7	30.704	-10.985

West Quesnel Land Stability Program

GPS Hub 98-19 (South Side of Abbott Drive)

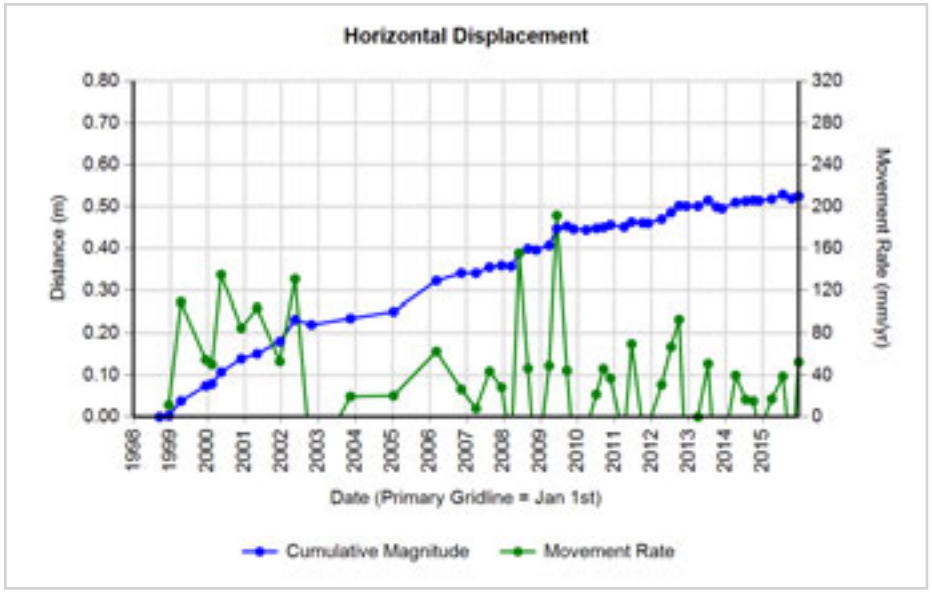
amec foster wheeler

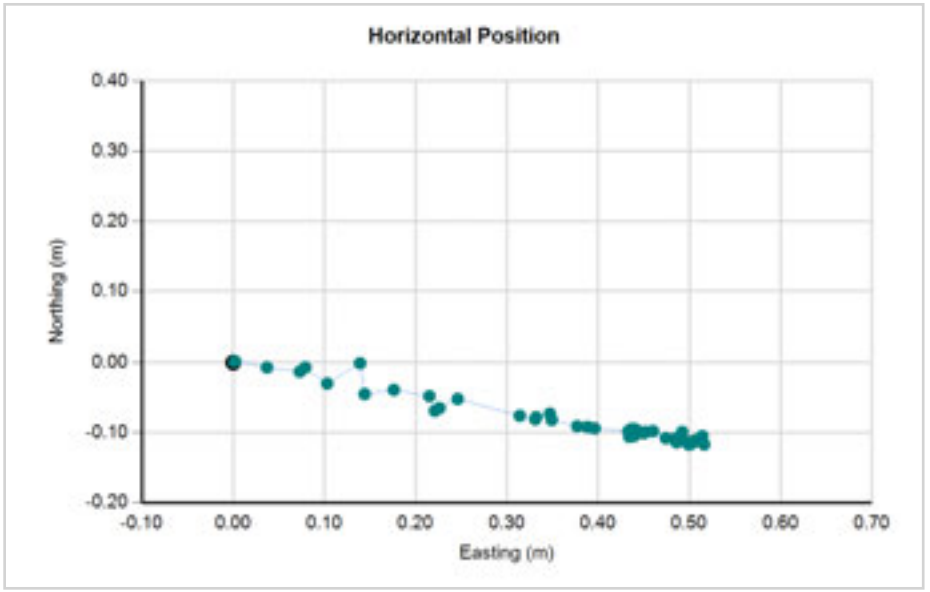
12/07/2012	5869596.424	531978.535	517.266	13.82	-0.108	0.474	0.486	0.041	102.8	4.8	0.035	0.003	0.26	-0.010	0.014	0.017	0.017	125.5	44.7	66.851	66.056
29/09/2012	5869596.433	531978.553	517.256	14.04	-0.099	0.492	0.502	0.031	101.4	3.5	0.036	0.002	0.22	0.009	0.018	0.020	-0.010	63.4	-26.4	93.044	-46.234
10/12/2012	5869596.421	531978.550	517.251	14.24	-0.111	0.489	0.501	0.026	102.8	3.0	0.035	0.002	0.20	-0.012	-0.003	0.012	-0.005	194.0	-22.0	-62.749	-25.365
03/04/2013	5869596.421	531978.550	517.257	14.55	-0.111	0.489	0.501	0.032	102.8	3.7	0.034	0.002	0.31	0.000	0.000	0.000	0.006	0.0	0.0	0.000	19.224
12/07/2013	5869596.416	531978.563	517.258	14.82	-0.116	0.502	0.515	0.033	103.0	3.7	0.035	0.002	0.27	-0.005	0.013	0.014	0.001	111.0	4.1	50.873	3.653
04/10/2013	5869596.418	531978.547	517.264	15.05	-0.114	0.486	0.499	0.039	103.2	4.5	0.033	0.003	0.23	0.002	-0.016	0.016	0.006	277.1	20.4	-70.113	26.089
27/11/2013	5869596.423	531978.544	517.261	15.20	-0.109	0.483	0.495	0.036	102.7	4.2	0.033	0.002	0.15	0.005	-0.003	0.006	-0.003	329.0	-27.2	-39.440	-20.292
10/04/2014	5869596.419	531978.558	517.250	15.57	-0.113	0.497	0.510	0.025	102.8	2.8	0.033	0.002	0.37	-0.004	0.014	0.015	-0.011	105.9	-37.1	39.687	-29.983
18/07/2014	5869596.415	531978.560	517.264	15.84	-0.117	0.499	0.513	0.039	103.2	4.4	0.032	0.002	0.27	-0.004	0.002	0.004	0.014	153.4	72.3	16.499	51.652
02/10/2014	5869596.416	531978.563	517.248	16.05	-0.116	0.502	0.515	0.023	103.0	2.6	0.032	0.001	0.21	0.001	0.003	0.003	-0.016	71.6	-78.8	15.198	-76.895
28/11/2014	5869596.418	531978.562	517.243	16.20	-0.114	0.501	0.514	0.018	102.8	2.0	0.032	0.001	0.16	0.002	-0.001	0.002	-0.005	333.4	-65.9	-14.328	-32.039
01/04/2015	5869596.421	531978.567	517.254	16.54	-0.111	0.506	0.518	0.029	102.4	3.2	0.031	0.002	0.34	0.003	0.005	0.006	0.011	59.0	62.1	17.175	32.401
20/07/2015	5869596.415	531978.577	517.256	16.84	-0.117	0.516	0.529	0.031	102.8	3.4	0.031	0.002	0.30	-0.006	0.010	0.012	0.002	121.0	9.7	38.723	6.641
14/10/2015	5869596.420	531978.568	517.263	17.08	-0.112	0.507	0.519	0.038	102.5	4.2	0.030	0.002	0.24	0.005	-0.009	0.010	0.007	299.1	34.2	-43.726	29.730
22/12/2015	5869596.427	531978.575	517.254	17.27	-0.105	0.514	0.525	0.029	101.5	3.2	0.030	0.002	0.19	0.007	0.007	0.010	-0.009	45.0	-42.3	52.403	-47.641

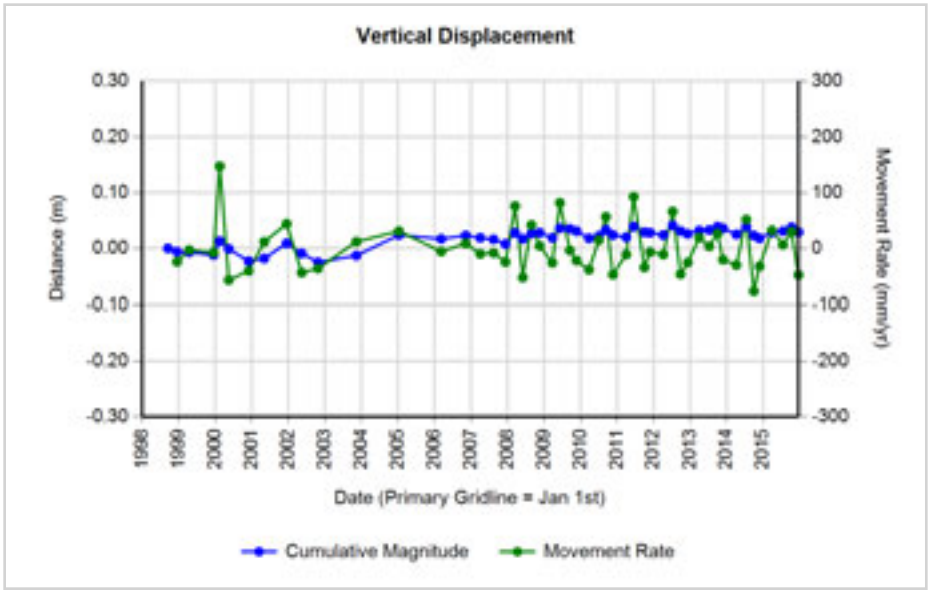
West Quesnel Land Stability Program

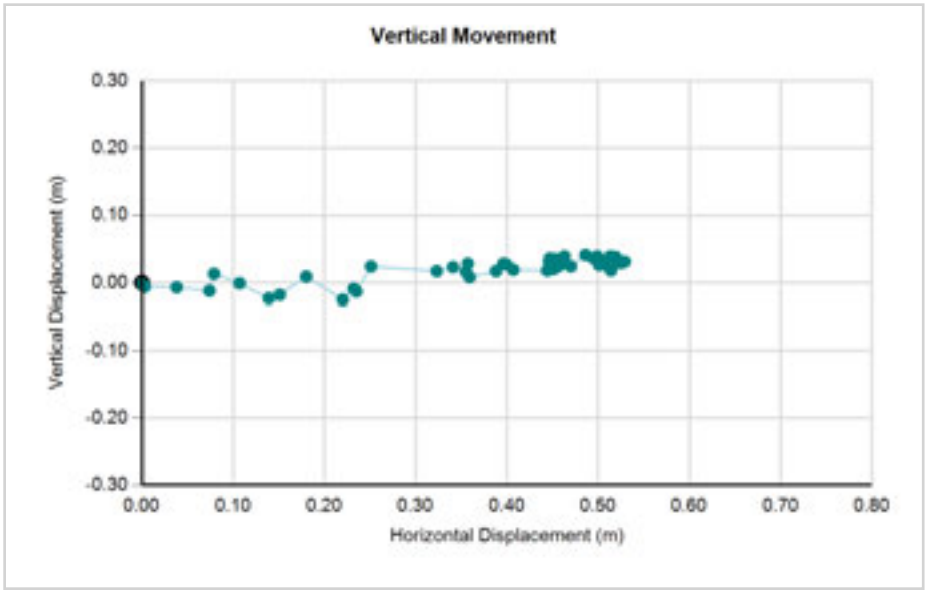
GPS Hub 98-19 (South Side of Abbott Drive)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 98-20 (East Side of Hawk Street)

amec foster wheeler

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5869364.259	532199.105	504.356	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/12/1998	5869364.263	532199.109	504.333	0.25	0.004	0.004	0.006	-0.023	45.0	-76.2	0.023	-0.092	0.25	0.004	0.004	0.006	-0.023	45.0	-76.2	22.705	-92.316
15/04/1999	5869364.256	532199.136	504.327	0.58	-0.003	0.031	0.031	-0.029	95.5	-43.0	0.054	-0.050	0.33	-0.007	0.027	0.028	-0.006	104.5	-12.1	84.197	-18.112
15/12/1999	5869364.259	532199.176	504.353	1.25	0.000	0.071	0.071	-0.003	90.0	-2.4	0.057	-0.002	0.67	0.003	0.040	0.040	0.026	85.7	33.0	60.045	38.920
15/02/2000	5869364.255	532199.171	504.340	1.42	-0.004	0.066	0.066	-0.016	93.5	-13.6	0.047	-0.011	0.17	-0.004	-0.005	0.006	-0.013	231.3	-63.8	-37.722	-76.585
15/05/2000	5869364.247	532199.193	504.330	1.66	-0.012	0.088	0.089	-0.026	97.8	-16.3	0.053	-0.016	0.25	-0.008	0.022	0.023	-0.010	110.0	-23.1	95.003	-40.583
30/11/2000	5869364.240	532199.240	504.315	2.21	-0.019	0.135	0.136	-0.041	98.0	-16.7	0.062	-0.019	0.54	-0.007	0.047	0.048	-0.015	98.5	-17.5	87.217	-27.531
05/05/2001	5869364.221	532199.244	504.315	2.64	-0.038	0.139	0.144	-0.041	105.3	-15.9	0.055	-0.016	0.43	-0.019	0.004	0.019	0.000	168.1	0.0	45.461	0.000
15/12/2001	5869364.223	532199.265	504.332	3.25	-0.036	0.160	0.164	-0.024	102.7	-8.3	0.050	-0.007	0.61	0.002	0.021	0.021	0.017	84.6	38.9	34.397	27.720
15/05/2002	5869364.206	532199.318	504.309	3.66	-0.053	0.213	0.219	-0.047	104.0	-12.1	0.060	-0.013	0.41	-0.017	0.053	0.056	-0.023	107.8	-22.5	134.634	-55.634
24/10/2002	5869364.218	532199.317	504.299	4.11	-0.041	0.212	0.216	-0.057	100.9	-14.8	0.053	-0.014	0.44	0.012	-0.001	0.012	-0.010	355.2	-39.7	-27.149	-22.546
12/11/2003	5869364.193	532199.318	504.319	5.16	-0.066	0.213	0.223	-0.037	107.1	-9.5	0.043	-0.007	1.05	-0.025	0.001	0.025	0.020	176.6	38.5	23.517	18.729
11/01/2005	5869364.194	532199.331	504.332	6.32	-0.065	0.226	0.235	-0.024	106.1	-5.8	0.037	-0.004	1.17	0.000	0.012	0.012	0.014	87.8	48.1	10.485	11.669
10/03/2006	5869364.172	532199.396	504.320	7.48	-0.087	0.291	0.304	-0.036	106.6	-6.8	0.041	-0.005	1.16	-0.022	0.065	0.069	-0.012	108.5	-10.1	59.444	-10.621
10/11/2006	5869364.170	532199.409	504.322	8.15	-0.089	0.304	0.317	-0.034	106.3	-6.1	0.039	-0.004	0.67	-0.002	0.013	0.013	0.002	98.7	8.6	19.609	2.982
05/04/2007	5869364.173	532199.407	504.316	8.55	-0.086	0.302	0.314	-0.040	105.9	-7.3	0.037	-0.005	0.40	0.003	-0.002	0.004	-0.006	326.3	-59.0	-9.020	-15.010
16/08/2007	5869364.162	532199.421	504.308	8.92	-0.097	0.316	0.331	-0.048	107.1	-8.3	0.037	-0.005	0.36	-0.011	0.014	0.018	-0.008	128.2	-24.2	48.895	-21.970
13/12/2007	5869364.165	532199.424	504.313	9.24	-0.094	0.319	0.333	-0.043	106.4	-7.4	0.036	-0.005	0.33	0.003	0.003	0.004	0.005	45.0	49.7	13.022	15.347
18/03/2008	5869364.166	532199.424	504.319	9.51	-0.093	0.319	0.332	-0.037	106.3	-6.4	0.035	-0.004	0.26	0.001	0.000	0.001	0.006	0.0	80.5	-3.805	22.828
03/06/2008	5869364.153	532199.455	504.322	9.72	-0.106	0.350	0.366	-0.034	106.8	-5.3	0.038	-0.003	0.21	-0.013	0.031	0.034	0.003	112.8	5.1	159.455	14.231
29/07/2008	5869364.148	532199.461	504.314	9.87	-0.111	0.356	0.373	-0.042	107.3	-6.4	0.038	-0.004	0.15	-0.005	0.006	0.008	-0.008	129.8	-45.7	50.941	-52.179
29/08/2008	5869364.156	532199.458	504.313	9.95	-0.103	0.353	0.368	-0.043	106.3	-6.7	0.037	-0.004	0.08	0.008	-0.003	0.009	-0.001	339.4	-6.7	-100.668	-11.782
19/11/2008	5869364.159	532199.460	504.309	10.18	-0.100	0.355	0.369	-0.047	105.7	-7.3	0.036	-0.005	0.22	0.003	0.002	0.004	-0.004	33.7	-48.0	16.060	-17.817
26/03/2009	5869364.158	532199.465	504.308	10.53	-0.101	0.360	0.374	-0.048	105.7	-7.3	0.036	-0.005	0.35	-0.001	0.005	0.005	-0.001	101.3	-11.1	14.665	-2.876
10/06/2009	5869364.134	532199.506	504.315	10.74	-0.125	0.401	0.420	-0.041	107.3	-5.6	0.039	-0.004	0.21	-0.024	0.041	0.048	0.007	120.3	8.4	228.319	33.641
17/09/2009	5869364.142	532199.509	504.312	11.01	-0.117	0.404	0.421	-0.044	106.2	-6.0	0.038	-0.004	0.27	0.008	0.003	0.009	-0.003	20.6	-19.3	31.522	-11.068
23/11/2009	5869364.139	532199.506	504.311	11.19	-0.120	0.401	0.419	-0.045	106.7	-6.1	0.037	-0.004	0.18	-0.003	-0.003	0.004	-0.001	225.0	-13.3	-23.129	-5.451
27/03/2010	5869364.148	532199.499	504.311	11.53	-0.111	0.394	0.409	-0.045	105.7	-6.3	0.036	-0.004	0.34	0.009	-0.007	0.011	0.000	322.1	0.0	-33.585	0.000
04/07/2010	5869364.138	532199.502	504.305	11.80	-0.121	0.397	0.415	-0.051	107.0	-7.0	0.035	-0.004	0.27	-0.010	0.003	0.010	-0.006	163.3	-29.9	38.518	-22.136
13/09/2010	5869364.146	532199.506	504.317	11.99	-0.113	0.401	0.417	-0.039	105.7	-5.3	0.035	-0.003	0.19	0.008	0.004	0.009	0.012	26.6	53.3	46.013	61.732
22/11/2010	5869364.142	532199.510	504.309	12.19	-0.117	0.405	0.422	-0.047	106.1	-6.4	0.035	-0.004	0.19	-0.004	0.004	0.006	-0.008	135.0	-54.7	29.517	-41.743
04/04/2011	5869364.149	532199.508	504.305	12.55	-0.110	0.403	0.418	-0.051	105.3	-7.0	0.033	-0.004	0.36	0.007	-0.002	0.007	-0.004	344.1	-28.8	-19.993	-10.985
18/06/2011	5869364.136	532199.515	504.312	12.76	-0.123	0.410	0.428	-0.044	106.7	-5.9	0.034	-0.003	0.21	-0.013	0.007	0.015	0.007	151.7	25.4	71.905	34.090
03/10/2011	5869364.140	532199.513	504.305	13.05	-0.119	0.408	0.425	-0.051	106.3	-6.8	0.033	-0.004	0.29	0.004	-0.002	0.004	-0.007	333.4	-57.4	-15.266	-23.895
28/11/2011	5869364.140	532199.510	504.300	13.20	-0.119	0.405	0.422	-0.056	106.4	-7.6	0.032	-0.004	0.15	0.000	-0.003	0.003	-0.005	270.0	-59.0	-19.567	-32.612

West Quesnel Land Stability Program

GPS Hub 98-20 (East Side of Hawk Street)

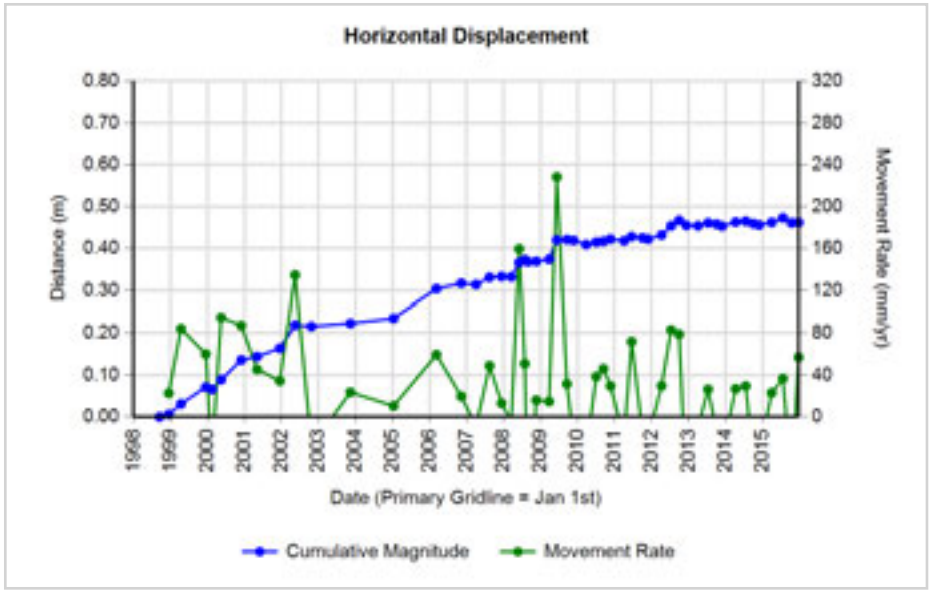
amec foster wheeler

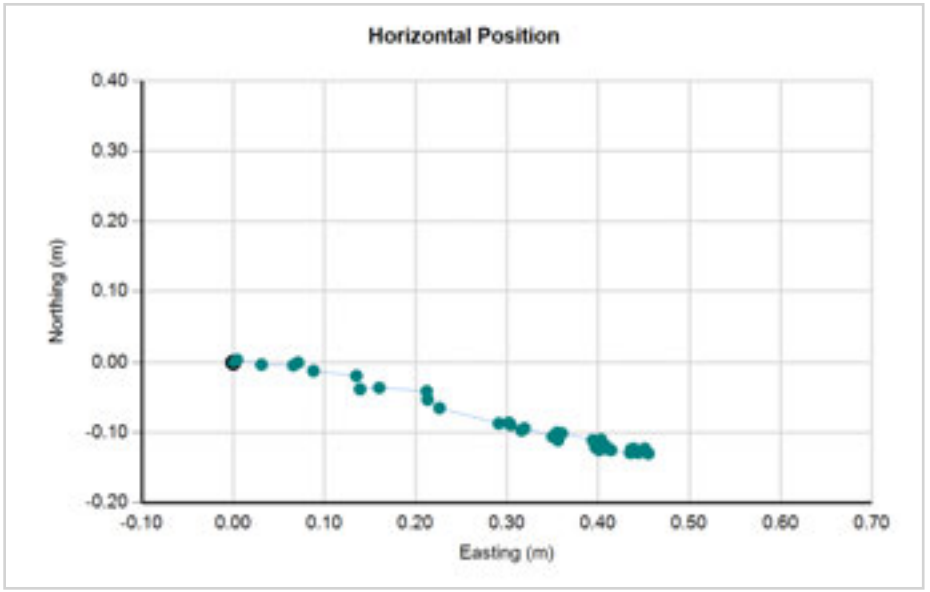
09/04/2012	5869364.134	532199.519	504.304	13.57	-0.125	0.414	0.432	-0.052	106.8	-6.9	0.032	-0.004	0.36	-0.006	0.009	0.011	0.004	123.7	20.3	29.705	10.985
12/07/2012	5869364.130	532199.540	504.316	13.82	-0.129	0.435	0.454	-0.040	106.5	-5.0	0.033	-0.003	0.26	-0.004	0.021	0.021	0.012	100.8	29.3	83.065	46.628
29/09/2012	5869364.136	532199.556	504.318	14.04	-0.123	0.451	0.467	-0.038	105.3	-4.6	0.033	-0.003	0.22	0.006	0.016	0.017	0.002	69.4	6.7	79.005	9.247
10/12/2012	5869364.132	532199.542	504.306	14.24	-0.127	0.437	0.455	-0.050	106.2	-6.3	0.032	-0.004	0.20	-0.004	-0.014	0.015	-0.012	254.1	-39.5	-73.863	-60.875
03/04/2013	5869364.135	532199.542	504.303	14.55	-0.124	0.437	0.454	-0.053	105.8	-6.7	0.031	-0.004	0.31	0.003	0.000	0.003	-0.003	0.0	-45.0	-9.612	-9.612
12/07/2013	5869364.131	532199.548	504.307	14.82	-0.128	0.443	0.461	-0.049	106.1	-6.1	0.031	-0.003	0.27	-0.004	0.006	0.007	0.004	123.7	29.0	26.339	14.610
04/10/2013	5869364.132	532199.545	504.320	15.05	-0.127	0.440	0.458	-0.036	106.1	-4.5	0.030	-0.002	0.23	0.001	-0.003	0.003	0.013	288.4	76.3	-13.750	56.527
27/11/2013	5869364.135	532199.541	504.304	15.20	-0.124	0.436	0.453	-0.052	105.9	-6.5	0.030	-0.003	0.15	0.003	-0.004	0.005	-0.016	306.9	-72.6	-33.819	-108.222
10/04/2014	5869364.131	532199.550	504.301	15.57	-0.128	0.445	0.463	-0.055	106.0	-6.8	0.030	-0.004	0.37	-0.004	0.009	0.010	-0.003	114.0	-16.9	26.845	-8.177
18/07/2014	5869364.123	532199.550	504.320	15.84	-0.136	0.445	0.465	-0.036	107.0	-4.4	0.029	-0.002	0.27	-0.008	0.000	0.008	0.019	180.0	67.2	29.515	70.098
02/10/2014	5869364.131	532199.546	504.297	16.05	-0.128	0.441	0.459	-0.059	106.2	-7.3	0.029	-0.004	0.21	0.008	-0.004	0.009	-0.023	333.4	-68.7	-42.985	-110.536
28/11/2014	5869364.136	532199.544	504.296	16.20	-0.123	0.439	0.456	-0.060	105.7	-7.5	0.028	-0.004	0.16	0.005	-0.002	0.005	-0.001	338.2	-10.5	-34.508	-6.408
01/04/2015	5869364.130	532199.549	504.304	16.54	-0.129	0.444	0.462	-0.052	106.2	-6.4	0.028	-0.003	0.34	-0.006	0.005	0.008	0.008	140.2	45.7	23.006	23.565
20/07/2015	5869364.129	532199.560	504.331	16.84	-0.130	0.455	0.473	-0.025	105.9	-3.0	0.028	-0.001	0.30	-0.001	0.011	0.011	0.027	95.2	67.8	36.676	89.652
14/10/2015	5869364.126	532199.546	504.298	17.08	-0.133	0.441	0.461	-0.058	106.8	-7.2	0.027	-0.003	0.24	-0.003	-0.014	0.014	-0.033	257.9	-66.5	-60.809	-140.154
22/12/2015	5869364.136	532199.550	504.294	17.27	-0.123	0.445	0.462	-0.062	105.5	-7.6	0.027	-0.004	0.19	0.010	0.004	0.011	-0.004	21.8	-20.4	57.013	-21.174

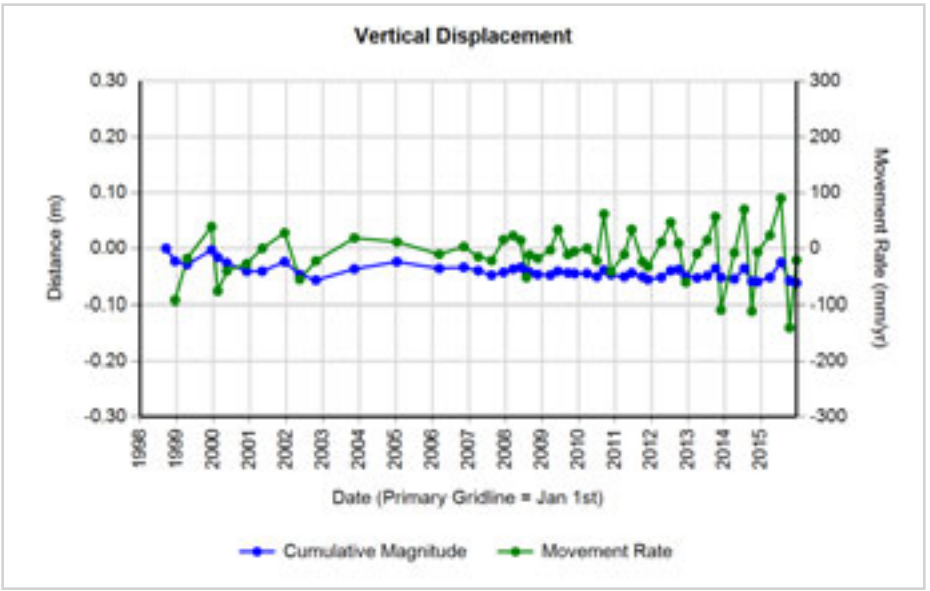
West Quesnel Land Stability Program

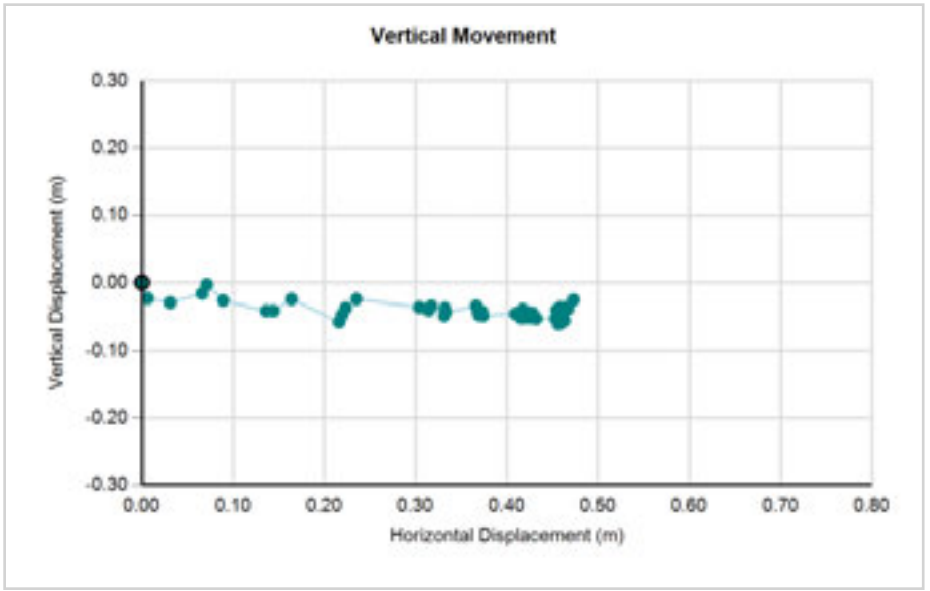
GPS Hub 98-20 (East Side of Hawk Street)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 98-21 (Lane North of Avery Avenue)

amec foster wheeler

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5869342.996	532493.483	485.474	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/12/1998	5869343.005	532493.492	485.459	0.25	0.009	0.009	0.013	-0.015	45.0	-49.7	0.051	-0.060	0.25	0.009	0.009	0.013	-0.015	45.0	-49.7	51.087	-60.206
15/04/1999	5869342.998	532493.516	485.473	0.58	0.002	0.033	0.033	-0.001	86.5	-1.7	0.057	-0.002	0.33	-0.007	0.024	0.025	0.014	106.3	29.2	75.465	42.260
15/12/1999	5869342.998	532493.539	485.478	1.25	0.002	0.056	0.056	0.004	88.0	4.1	0.045	0.003	0.67	0.000	0.023	0.023	0.005	90.0	12.3	34.429	7.485
15/02/2000	5869342.994	532493.539	485.472	1.42	-0.002	0.056	0.056	-0.002	92.0	-2.0	0.040	-0.001	0.17	-0.004	0.000	0.004	-0.006	180.0	-56.3	23.565	-35.347
15/05/2000	5869342.985	532493.547	485.486	1.66	-0.011	0.064	0.065	0.012	99.8	10.5	0.039	0.007	0.25	-0.009	0.008	0.012	0.014	138.4	49.3	48.869	56.817
30/11/2000	5869343.007	532493.555	485.488	2.21	0.011	0.072	0.073	0.014	81.3	10.9	0.033	0.006	0.54	0.022	0.008	0.023	0.002	20.0	4.9	42.966	3.671
05/05/2001	5869342.971	532493.555	485.475	2.64	-0.025	0.072	0.076	0.001	109.1	0.8	0.029	0.000	0.43	-0.036	0.000	0.036	-0.013	180.0	-19.9	84.288	-30.437
15/12/2001	5869342.958	532493.562	485.490	3.25	-0.038	0.079	0.088	0.016	115.7	10.3	0.027	0.005	0.61	-0.013	0.007	0.015	0.015	151.7	45.5	24.075	24.459
12/11/2003	5869342.951	532493.603	485.500	5.16	-0.045	0.120	0.128	0.026	110.7	11.5	0.025	0.005	1.91	-0.007	0.041	0.041	0.010	100.2	13.7	21.700	5.293
11/01/2005	5869342.944	532493.612	485.502	6.32	-0.052	0.129	0.139	0.028	112.1	11.5	0.022	0.004	1.17	-0.007	0.009	0.011	0.002	127.8	10.5	9.710	1.801
10/03/2006	5869342.914	532493.648	485.507	7.48	-0.082	0.165	0.184	0.033	116.4	10.2	0.025	0.004	1.16	-0.030	0.036	0.047	0.005	129.3	5.8	40.499	4.145
10/11/2006	5869342.914	532493.655	485.515	8.15	-0.082	0.172	0.191	0.041	115.5	12.1	0.023	0.005	0.67	0.000	0.007	0.007	0.008	90.0	48.8	10.436	11.927
05/04/2007	5869342.918	532493.661	485.504	8.55	-0.078	0.178	0.194	0.030	113.7	8.8	0.023	0.004	0.40	0.004	0.006	0.007	-0.011	56.3	-56.8	18.040	-27.519
16/08/2007	5869342.901	532493.666	485.513	8.92	-0.095	0.183	0.206	0.039	117.4	10.7	0.023	0.004	0.36	-0.017	0.005	0.018	0.009	163.6	26.9	48.664	24.716
13/12/2007	5869342.907	532493.664	485.507	9.24	-0.089	0.181	0.202	0.033	116.2	9.3	0.022	0.004	0.33	0.006	-0.002	0.006	-0.006	341.6	-43.5	-19.412	-18.416
18/03/2008	5869342.910	532493.663	485.519	9.51	-0.086	0.180	0.199	0.045	115.5	12.7	0.021	0.005	0.26	0.003	-0.001	0.003	0.012	341.6	75.2	-12.031	45.656
03/06/2008	5869342.895	532493.686	485.510	9.72	-0.101	0.203	0.227	0.036	116.5	9.0	0.023	0.004	0.21	-0.015	0.023	0.027	-0.009	123.1	-18.1	130.252	-42.692
29/08/2008	5869342.895	532493.688	485.546	9.95	-0.101	0.205	0.229	0.072	116.2	17.5	0.023	0.007	0.24	0.000	0.002	0.002	0.036	90.0	86.8	8.397	151.138
19/11/2008	5869342.900	532493.688	485.501	10.18	-0.096	0.205	0.226	0.027	115.1	6.8	0.022	0.003	0.22	0.005	0.000	0.005	-0.045	0.0	-83.7	-22.271	-200.442
26/03/2009	5869342.889	532493.693	485.511	10.53	-0.107	0.210	0.236	0.037	117.0	8.9	0.022	0.004	0.35	-0.011	0.005	0.012	0.010	155.6	39.6	34.751	28.760
10/06/2009	5869342.879	532493.714	485.523	10.74	-0.117	0.231	0.259	0.049	116.9	10.7	0.024	0.005	0.21	-0.010	0.021	0.023	0.012	115.5	27.3	111.783	57.671
17/09/2009	5869342.888	532493.721	485.536	11.01	-0.108	0.238	0.261	0.062	114.4	13.3	0.024	0.006	0.27	0.009	0.007	0.011	0.013	37.9	48.7	42.066	47.962
23/11/2009	5869342.887	532493.714	485.515	11.19	-0.109	0.231	0.255	0.041	115.3	9.1	0.023	0.004	0.18	-0.001	-0.007	0.007	-0.021	261.9	-71.4	-38.548	-114.481
27/03/2010	5869342.887	532493.716	485.522	11.53	-0.109	0.233	0.257	0.048	115.1	10.6	0.022	0.004	0.34	0.000	0.002	0.002	0.007	90.0	74.1	5.891	20.619
04/07/2010	5869342.871	532493.717	485.531	11.80	-0.125	0.234	0.265	0.057	118.1	12.1	0.022	0.005	0.27	-0.016	0.001	0.016	0.009	176.4	29.3	59.145	33.205
13/09/2010	5869342.880	532493.716	485.538	11.99	-0.116	0.233	0.260	0.064	116.5	13.8	0.022	0.005	0.19	0.009	-0.001	0.009	0.007	353.7	37.7	-46.584	36.011
22/11/2010	5869342.881	532493.725	485.521	12.19	-0.115	0.242	0.268	0.047	115.4	9.9	0.022	0.004	0.19	0.001	0.009	0.009	-0.017	83.7	-62.0	47.250	-88.704
04/04/2011	5869342.872	532493.716	485.522	12.55	-0.124	0.233	0.264	0.048	118.0	10.3	0.021	0.004	0.36	-0.009	-0.009	0.013	0.001	225.0	4.5	-34.954	2.746
18/06/2011	5869342.871	532493.723	485.532	12.76	-0.125	0.240	0.271	0.058	117.5	12.1	0.021	0.005	0.21	-0.001	0.007	0.007	0.010	98.1	54.7	34.436	48.700
03/10/2011	5869342.874	532493.726	485.528	13.05	-0.122	0.243	0.272	0.054	116.7	11.2	0.021	0.004	0.29	0.003	0.003	0.004	-0.004	45.0	-43.3	14.482	-13.654
28/11/2011	5869342.878	532493.719	485.523	13.20	-0.118	0.236	0.264	0.049	116.6	10.5	0.020	0.004	0.15	0.004	-0.007	0.008	-0.005	299.7	-31.8	-52.585	-32.612
09/04/2012	5869342.863	532493.724	485.526	13.57	-0.133	0.241	0.275	0.052	118.9	10.7	0.020	0.004	0.36	-0.015	0.005	0.016	0.003	161.6	10.7	43.422	8.239
12/07/2012	5869342.861	532493.735	485.541	13.82	-0.135	0.252	0.286	0.067	118.2	13.2	0.021	0.005	0.26	-0.002	0.011	0.011	0.015	100.3	53.3	43.443	58.285
29/09/2012	5869342.870	532493.741	485.544	14.04	-0.126	0.258	0.287	0.070	116.0	13.7	0.020	0.005	0.22	0.009	0.006	0.011	0.003	33.7	15.5	50.010	13.870

West Quesnel Land Stability Program

GPS Hub 98-21 (Lane North of Avery Avenue)

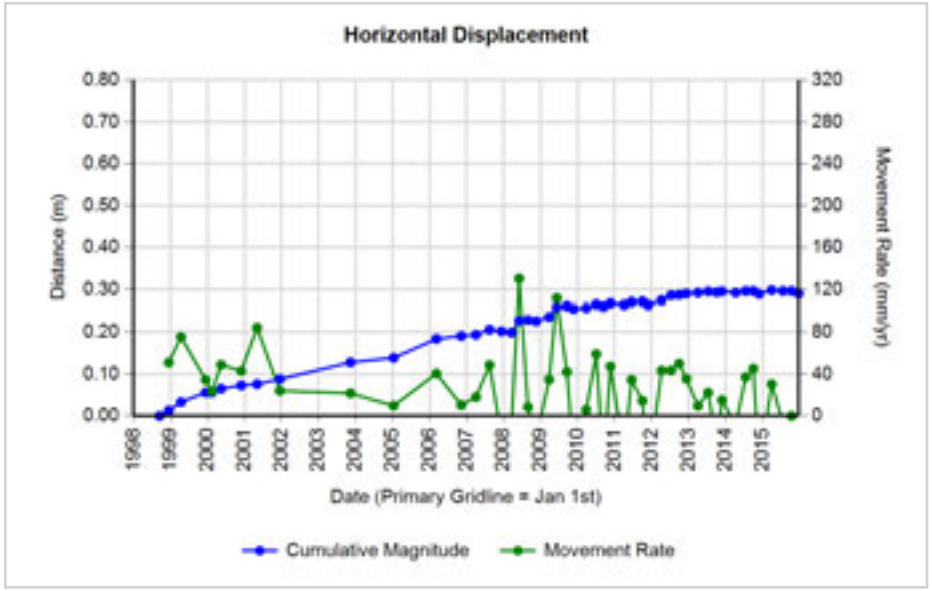
amec foster wheeler

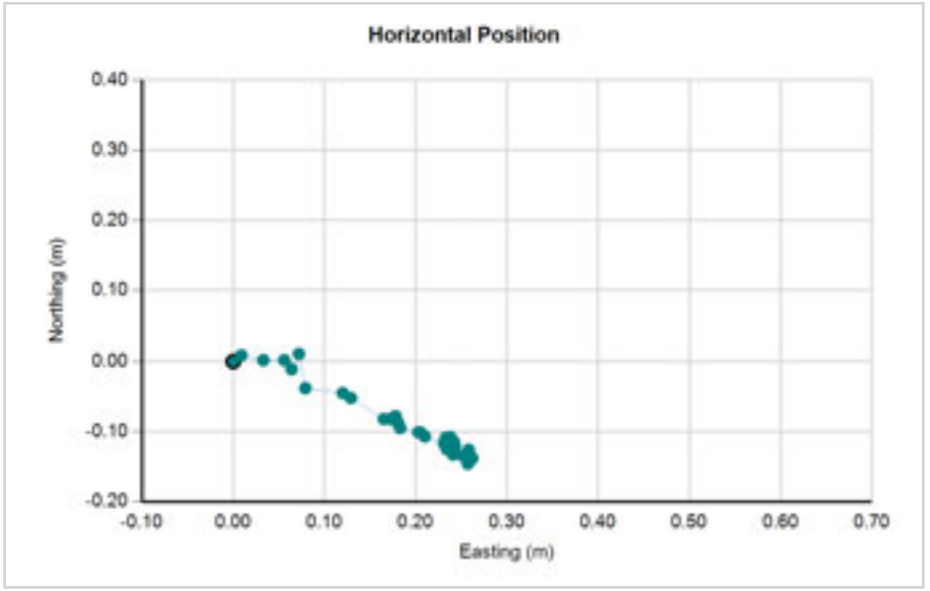
10/12/2012	5869342.863	532493.741	485.533	14.24	-0.133	0.258	0.290	0.059	117.3	11.5	0.020	0.004	0.20	-0.007	0.000	0.007	-0.011	180.0	-57.5	35.510	-55.802
03/04/2013	5869342.860	532493.741	485.525	14.55	-0.136	0.258	0.292	0.051	117.8	9.9	0.020	0.004	0.31	-0.003	0.000	0.003	-0.008	180.0	-69.4	9.612	-25.632
12/07/2013	5869342.854	532493.742	485.549	14.82	-0.142	0.259	0.295	0.075	118.7	14.2	0.020	0.005	0.27	-0.006	0.001	0.006	0.024	170.5	75.8	22.217	87.660
04/10/2013	5869342.860	532493.742	485.550	15.05	-0.136	0.259	0.293	0.076	117.7	14.6	0.019	0.005	0.23	0.006	0.000	0.006	0.001	0.0	9.5	-26.089	4.348
27/11/2013	5869342.859	532493.744	485.539	15.20	-0.137	0.261	0.295	0.065	117.7	12.4	0.019	0.004	0.15	-0.001	0.002	0.002	-0.011	116.6	-78.5	15.125	-74.403
10/04/2014	5869342.860	532493.741	485.533	15.57	-0.136	0.258	0.292	0.059	117.8	11.4	0.019	0.004	0.37	0.001	-0.003	0.003	-0.006	288.4	-62.2	-8.620	-16.354
18/07/2014	5869342.850	532493.740	485.549	15.84	-0.146	0.257	0.296	0.075	119.6	14.2	0.019	0.005	0.27	-0.010	-0.001	0.010	0.016	185.7	57.9	37.078	59.030
02/10/2014	5869342.858	532493.745	485.529	16.05	-0.138	0.262	0.296	0.055	117.8	10.5	0.018	0.003	0.21	0.008	0.005	0.009	-0.020	32.0	-64.7	45.339	-96.118
28/11/2014	5869342.864	532493.740	485.529	16.20	-0.132	0.257	0.289	0.055	117.2	10.8	0.018	0.003	0.16	0.006	-0.005	0.008	0.000	320.2	0.0	-50.047	0.000
01/04/2015	5869342.855	532493.745	485.525	16.54	-0.141	0.262	0.298	0.051	118.3	9.7	0.018	0.003	0.34	-0.009	0.005	0.010	-0.004	150.9	-21.2	30.326	-11.782
20/07/2015	5869342.855	532493.743	485.544	16.84	-0.141	0.260	0.296	0.070	118.5	13.3	0.018	0.004	0.30	0.000	-0.002	0.002	0.019	270.0	84.0	-6.641	63.089
14/10/2015	5869342.855	532493.743	485.539	17.08	-0.141	0.260	0.296	0.065	118.5	12.4	0.017	0.004	0.24	0.000	0.000	0.000	-0.005	0.0	0.0	0.000	-21.235
22/12/2015	5869342.865	532493.742	485.526	17.27	-0.131	0.259	0.290	0.052	116.8	10.2	0.017	0.003	0.19	0.010	-0.001	0.010	-0.013	354.3	-52.3	-53.199	-68.815

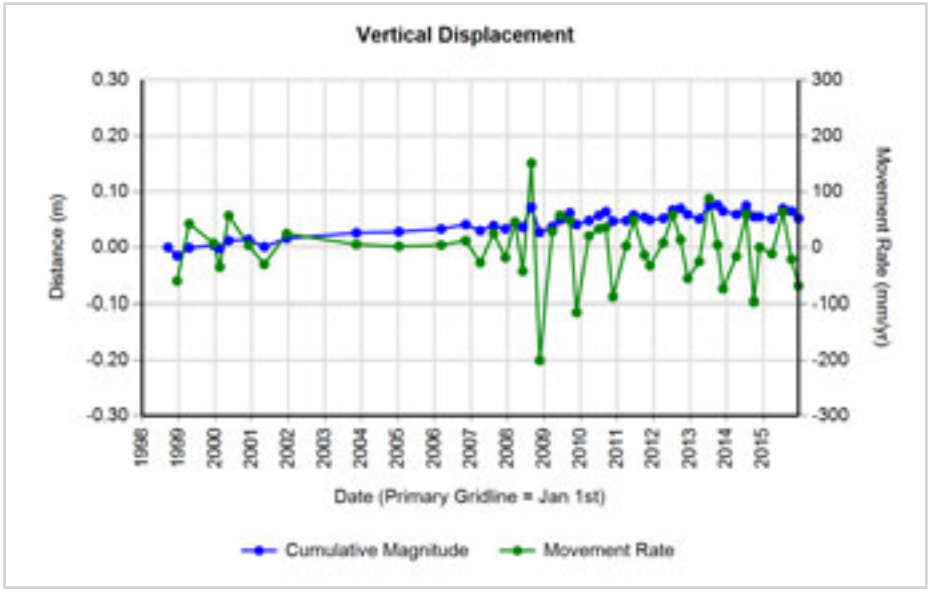
West Quesnel Land Stability Program

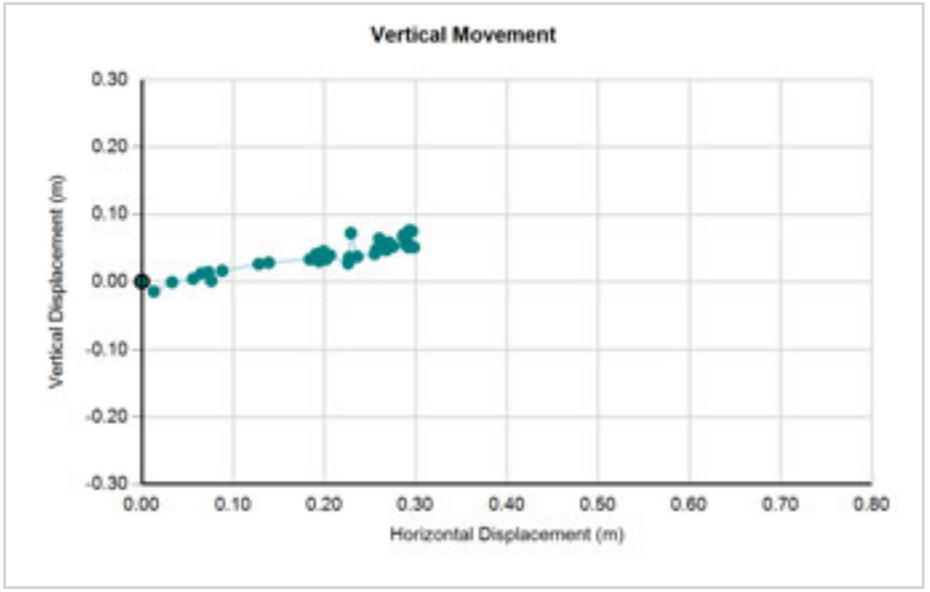
GPS Hub 98-21 (Lane North of Avery Avenue)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 98-22 (East Side of Beath Street)

amec foster wheeler

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5869628.968	532631.086	478.920	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/12/1998	5869628.968	532631.095	478.920	0.25	0.000	0.009	0.009	0.000	90.0	0.0	0.036	0.000	0.25	0.000	0.009	0.009	0.000	90.0	0.0	36.124	0.000
15/04/1999	5869628.972	532631.109	478.920	0.58	0.004	0.023	0.023	0.000	80.1	0.0	0.040	0.000	0.33	0.004	0.014	0.015	0.000	74.1	0.0	43.951	0.000
15/12/1999	5869628.969	532631.117	478.922	1.25	0.001	0.031	0.031	0.002	88.2	3.7	0.025	0.002	0.67	-0.003	0.008	0.009	0.002	110.6	13.2	12.790	2.994
15/02/2000	5869628.979	532631.117	478.918	1.42	0.011	0.031	0.033	-0.002	70.5	-3.5	0.023	-0.001	0.17	0.010	0.000	0.010	-0.004	0.0	-21.8	58.911	-23.565
15/05/2000	5869628.964	532631.113	478.913	1.66	-0.004	0.027	0.027	-0.007	98.4	-14.4	0.016	-0.004	0.25	-0.015	-0.004	0.016	-0.005	194.9	-17.9	-63.002	-20.292
30/11/2000	5869628.980	532631.118	478.908	2.21	0.012	0.032	0.034	-0.012	69.4	-19.3	0.015	-0.005	0.54	0.016	0.005	0.017	-0.005	17.4	-16.6	30.767	-9.177
05/05/2001	5869628.962	532631.106	478.908	2.64	-0.006	0.020	0.021	-0.012	106.7	-29.9	0.008	-0.005	0.43	-0.018	-0.012	0.022	0.000	213.7	0.0	-50.651	0.000
15/12/2001	5869628.967	532631.124	478.927	3.25	-0.001	0.038	0.038	0.007	91.5	10.4	0.012	0.002	0.61	0.005	0.018	0.019	0.019	74.5	45.5	30.462	30.981
15/05/2002	5869628.946	532631.150	478.912	3.66	-0.022	0.064	0.068	-0.008	109.0	-6.7	0.018	-0.002	0.41	-0.021	0.026	0.033	-0.015	128.9	-24.2	80.843	-36.283
24/10/2002	5869628.966	532631.114	478.894	4.11	-0.002	0.028	0.028	-0.026	94.1	-42.8	0.007	-0.006	0.44	0.020	-0.036	0.041	-0.018	299.1	-23.6	-92.851	-40.583
12/11/2003	5869628.958	532631.116	478.922	5.16	-0.010	0.030	0.032	0.002	107.7	2.8	0.006	0.000	1.05	-0.008	0.002	0.008	0.028	162.9	73.8	7.621	26.195
11/01/2005	5869628.965	532631.123	478.934	6.32	-0.003	0.037	0.037	0.014	95.1	20.9	0.006	0.002	1.17	0.006	0.006	0.009	0.013	45.4	54.2	7.767	10.769
10/03/2006	5869628.963	532631.126	478.926	7.48	-0.005	0.040	0.040	0.006	97.1	8.5	0.005	0.001	1.16	-0.002	0.003	0.004	-0.008	118.0	-65.9	3.129	-6.994
10/11/2006	5869628.961	532631.126	478.922	8.15	-0.007	0.040	0.041	0.002	99.9	2.8	0.005	0.000	0.67	-0.002	0.000	0.002	-0.004	180.0	-63.4	2.982	-5.963
05/04/2007	5869628.968	532631.128	478.926	8.55	0.000	0.042	0.042	0.006	90.0	8.1	0.005	0.001	0.40	0.007	0.002	0.007	0.004	15.9	28.8	18.213	10.007
16/08/2007	5869628.962	532631.129	478.924	8.92	-0.006	0.043	0.043	0.004	97.9	5.3	0.005	0.000	0.36	-0.006	0.001	0.006	-0.002	170.5	-18.2	16.705	-5.492
13/12/2007	5869628.966	532631.124	478.921	9.24	-0.002	0.038	0.038	0.001	93.0	1.5	0.004	0.000	0.33	0.004	-0.005	0.006	-0.003	308.7	-25.1	-19.653	-9.208
18/03/2008	5869628.967	532631.127	478.925	9.51	-0.001	0.041	0.041	0.005	91.4	7.0	0.004	0.001	0.26	0.001	0.003	0.003	0.004	71.6	51.7	12.031	15.219
03/06/2008	5869628.963	532631.129	478.926	9.72	-0.005	0.043	0.043	0.006	96.6	7.9	0.004	0.001	0.21	-0.004	0.002	0.004	0.001	153.4	12.6	21.214	4.744
29/08/2008	5869628.958	532631.129	478.927	9.95	-0.010	0.043	0.044	0.007	103.1	9.0	0.004	0.001	0.24	-0.005	0.000	0.005	0.001	180.0	11.3	20.991	4.198
19/11/2008	5869628.965	532631.130	478.922	10.18	-0.003	0.044	0.044	0.002	93.9	2.6	0.004	0.000	0.22	0.007	0.001	0.007	-0.005	8.1	-35.3	31.496	-22.271
26/03/2009	5869628.964	532631.133	478.924	10.53	-0.004	0.047	0.047	0.004	94.9	4.8	0.004	0.000	0.35	-0.001	0.003	0.003	0.002	108.4	32.3	9.095	5.752
10/06/2009	5869628.947	532631.140	478.940	10.74	-0.021	0.054	0.058	0.020	111.3	19.0	0.005	0.002	0.21	-0.017	0.007	0.018	0.016	157.6	41.0	88.356	76.895
17/09/2009	5869628.963	532631.139	478.930	11.01	-0.005	0.053	0.053	0.010	95.4	10.6	0.005	0.001	0.27	0.016	-0.001	0.016	-0.010	356.4	-32.0	-59.145	-36.894
23/11/2009	5869628.970	532631.140	478.923	11.19	0.002	0.054	0.054	0.003	87.9	3.2	0.005	0.000	0.18	0.007	0.001	0.007	-0.007	8.1	-44.7	38.548	-38.160
27/03/2010	5869628.973	532631.135	478.921	11.53	0.005	0.049	0.049	0.001	84.2	1.2	0.004	0.000	0.34	0.003	-0.005	0.006	-0.002	301.0	-18.9	-17.175	-5.891
04/07/2010	5869628.959	532631.134	478.923	11.80	-0.009	0.048	0.049	0.003	100.6	3.5	0.004	0.000	0.27	-0.014	-0.001	0.014	0.002	184.1	8.1	-51.783	7.379
13/09/2010	5869628.966	532631.137	478.925	11.99	-0.002	0.051	0.051	0.005	92.2	5.6	0.004	0.000	0.19	0.007	0.003	0.008	0.002	23.2	14.7	39.178	10.289
22/11/2010	5869628.968	532631.134	478.927	12.19	0.000	0.048	0.048	0.007	90.0	8.3	0.004	0.001	0.19	0.002	-0.003	0.004	0.002	303.7	29.0	-18.813	10.436
04/04/2011	5869628.970	532631.135	478.924	12.55	0.002	0.049	0.049	0.004	87.7	4.7	0.004	0.000	0.36	0.002	0.001	0.002	-0.003	26.6	-53.3	6.141	-8.239
18/06/2011	5869628.966	532631.145	478.943	12.76	-0.002	0.059	0.059	0.023	91.9	21.3	0.005	0.002	0.21	-0.004	0.010	0.011	0.019	111.8	60.5	52.452	92.530
03/10/2011	5869628.960	532631.137	478.928	13.05	-0.008	0.051	0.052	0.008	98.9	8.8	0.004	0.001	0.29	-0.006	-0.008	0.010	-0.015	233.1	-56.3	-34.136	-51.203
28/11/2011	5869628.972	532631.138	478.930	13.20	0.004	0.052	0.052	0.010	85.6	10.9	0.004	0.001	0.15	0.012	0.001	0.012	0.002	4.8	9.4	78.539	13.045
09/04/2012	5869628.966	532631.139	478.927	13.57	-0.002	0.053	0.053	0.007	92.2	7.5	0.004	0.001	0.36	-0.006	0.001	0.006	-0.003	170.5	-26.3	16.705	-8.239

West Quesnel Land Stability Program

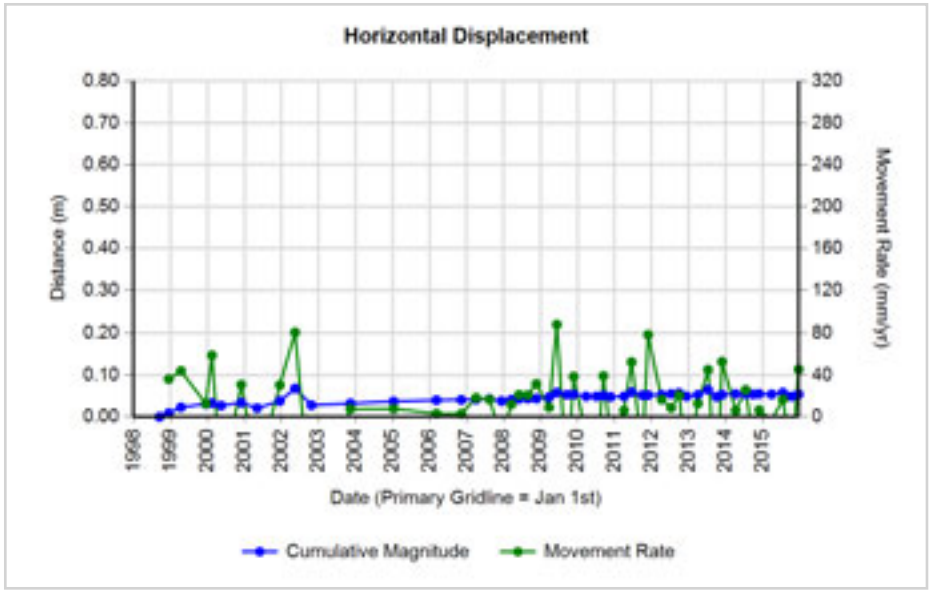
GPS Hub 98-22 (East Side of Beath Street)

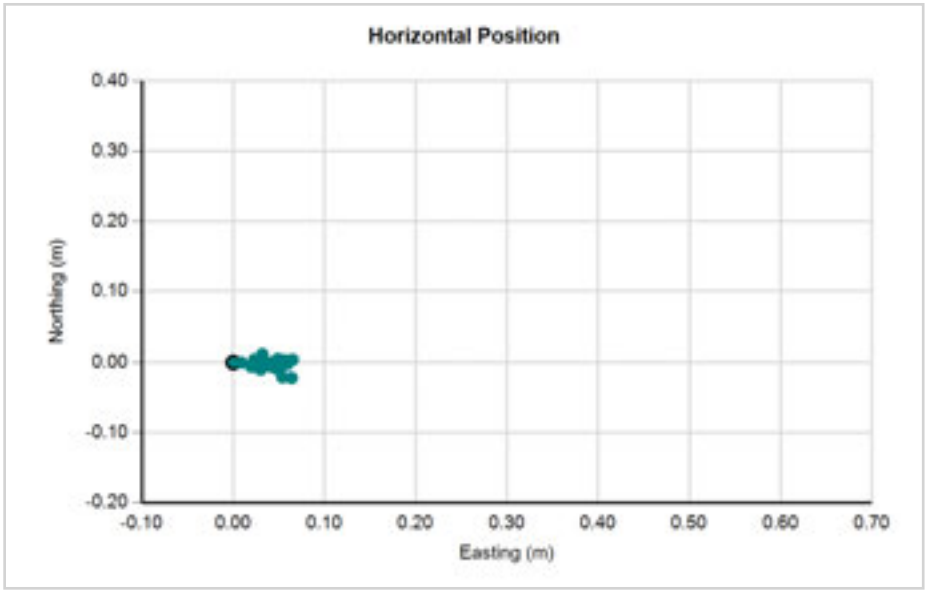
amec foster wheeler

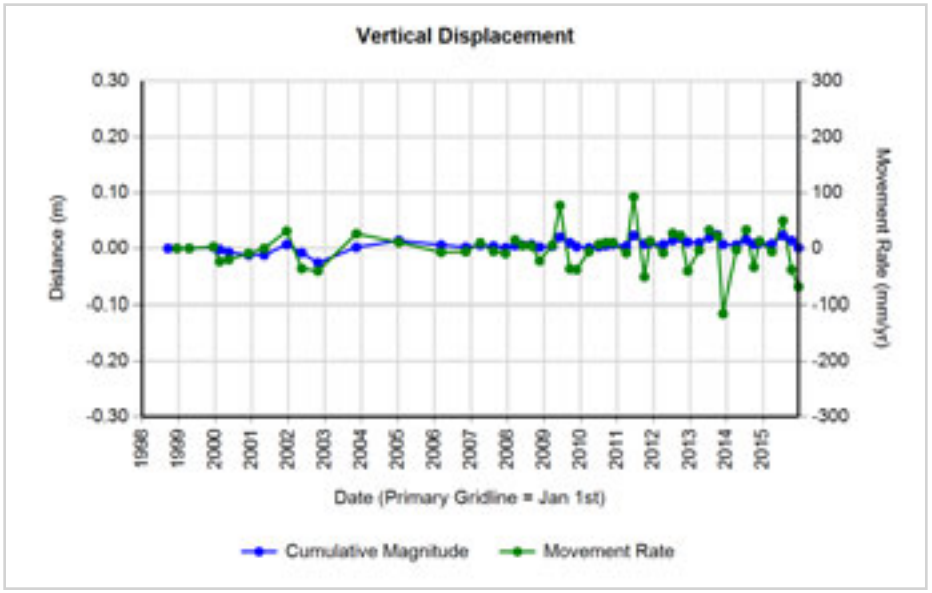
12/07/2012	5869628.967	532631.141	478.934	13.82	-0.001	0.055	0.055	0.014	91.0	14.3	0.004	0.001	0.26	0.001	0.002	0.002	0.007	63.4	72.3	8.689	27.199
29/09/2012	5869628.971	532631.143	478.939	14.04	0.003	0.057	0.057	0.019	87.0	18.4	0.004	0.001	0.22	0.004	0.002	0.004	0.005	26.6	48.2	20.677	23.117
10/12/2012	5869628.969	532631.135	478.931	14.24	0.001	0.049	0.049	0.011	88.8	12.7	0.003	0.001	0.20	-0.002	-0.008	0.008	-0.008	256.0	-44.1	-41.832	-40.583
03/04/2013	5869628.969	532631.139	478.930	14.55	0.001	0.053	0.053	0.010	88.9	10.7	0.004	0.001	0.31	0.000	0.004	0.004	-0.001	90.0	-14.0	12.816	-3.204
12/07/2013	5869628.972	532631.151	478.939	14.82	0.004	0.065	0.065	0.019	86.5	16.3	0.004	0.001	0.27	0.003	0.012	0.012	0.009	76.0	36.0	45.179	32.872
04/10/2013	5869628.966	532631.134	478.944	15.05	-0.002	0.048	0.048	0.024	92.4	26.5	0.003	0.002	0.23	-0.006	-0.017	0.018	0.005	250.6	15.5	-78.389	21.741
27/11/2013	5869628.972	532631.139	478.927	15.20	0.004	0.053	0.053	0.007	85.7	7.5	0.003	0.000	0.15	0.006	0.005	0.008	-0.017	39.8	-65.3	52.828	-114.986
10/04/2014	5869628.971	532631.141	478.926	15.57	0.003	0.055	0.055	0.006	86.9	6.2	0.004	0.000	0.37	-0.001	0.002	0.002	-0.001	116.6	-24.1	6.095	-2.726
18/07/2014	5869628.964	532631.141	478.935	15.84	-0.004	0.055	0.055	0.015	94.2	15.2	0.003	0.001	0.27	-0.007	0.000	0.007	0.009	180.0	52.1	25.826	33.205
02/10/2014	5869628.969	532631.140	478.928	16.05	0.001	0.054	0.054	0.008	88.9	8.4	0.003	0.000	0.21	0.005	-0.001	0.005	-0.007	348.7	-53.9	-24.505	-33.641
28/11/2014	5869628.969	532631.141	478.930	16.20	0.001	0.055	0.055	0.010	89.0	10.3	0.003	0.001	0.16	0.000	0.001	0.001	0.002	90.0	63.4	6.408	12.816
01/04/2015	5869628.969	532631.140	478.928	16.54	0.001	0.054	0.054	0.008	88.9	8.4	0.003	0.000	0.34	0.000	-0.001	0.001	-0.002	270.0	-63.4	-2.946	-5.891
20/07/2015	5869628.966	532631.144	478.943	16.84	-0.002	0.058	0.058	0.023	92.0	21.6	0.003	0.001	0.30	-0.003	0.004	0.005	0.015	126.9	71.6	16.602	49.807
14/10/2015	5869628.967	532631.135	478.934	17.08	-0.001	0.049	0.049	0.014	91.2	15.9	0.003	0.001	0.24	0.001	-0.009	0.009	-0.009	276.3	-44.8	-38.459	-38.224
22/12/2015	5869628.974	532631.140	478.921	17.27	0.006	0.054	0.054	0.001	83.7	1.1	0.003	0.000	0.19	0.007	0.005	0.009	-0.013	35.5	-56.5	45.536	-68.815

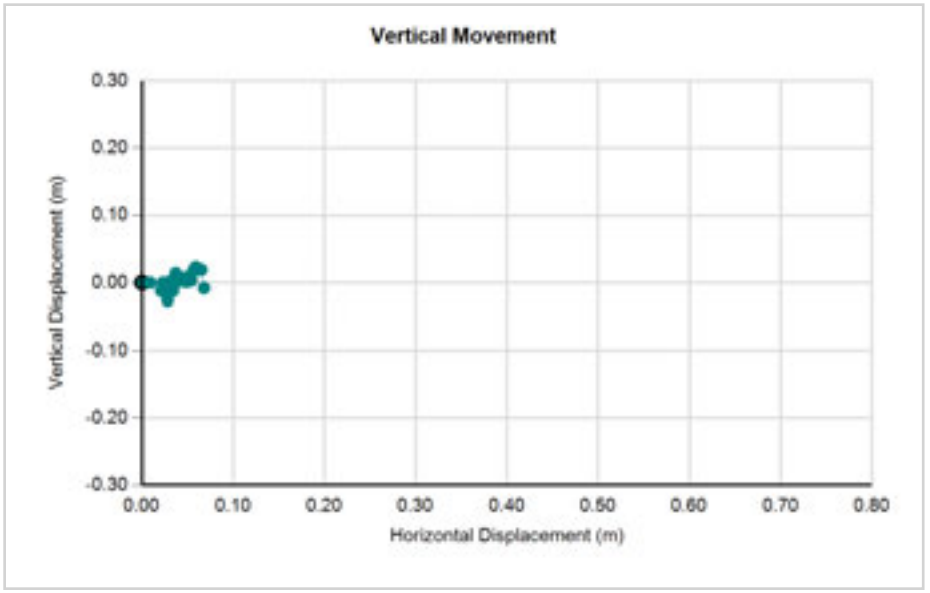
West Quesnel Land Stability Program

GPS Hub 98-22 (East Side of Beath Street)









West Quesnel Land Stability Program

GPS Hub 98-23 (South Side of Doherty Drive)

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5869134.064	532888.607	475.384	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/12/1998	5869134.061	532888.608	475.357	0.25	-0.003	0.001	0.003	-0.027	161.6	-83.3	0.013	-0.108	0.25	-0.003	0.001	0.003	-0.027	161.6	-83.3	12.693	-108.371
15/04/1999	5869134.068	532888.623	475.365	0.58	0.004	0.016	0.016	-0.019	76.0	-49.0	0.028	-0.033	0.33	0.007	0.015	0.017	0.008	65.0	25.8	49.967	24.149
15/12/1999	5869134.069	532888.628	475.374	1.25	0.005	0.021	0.022	-0.010	76.6	-24.9	0.017	-0.008	0.67	0.001	0.005	0.005	0.009	78.7	60.5	7.633	13.472
15/02/2000	5869134.068	532888.624	475.373	1.42	0.004	0.017	0.017	-0.011	76.8	-32.2	0.012	-0.008	0.17	-0.001	-0.004	0.004	-0.001	256.0	-13.6	-24.290	-5.891
15/05/2000	5869134.069	532888.617	475.376	1.66	0.005	0.010	0.011	-0.008	63.4	-35.6	0.007	-0.005	0.25	0.001	-0.007	0.007	0.003	278.1	23.0	-28.697	12.175
30/11/2000	5869134.081	532888.636	475.383	2.21	0.017	0.029	0.034	-0.001	59.6	-1.7	0.015	0.000	0.54	0.012	0.019	0.022	0.007	57.7	17.3	41.246	12.848
05/05/2001	5869134.053	532888.618	475.346	2.64	-0.011	0.011	0.016	-0.038	135.0	-67.7	0.006	-0.014	0.43	-0.028	-0.018	0.033	-0.037	212.7	-48.0	-77.936	-86.630
15/12/2001	5869134.066	532888.633	475.373	3.25	0.002	0.026	0.026	-0.011	85.6	-22.9	0.008	-0.003	0.61	0.013	0.015	0.020	0.027	49.1	53.7	32.366	44.026
15/05/2002	5869134.071	532888.631	475.342	3.66	0.007	0.024	0.025	-0.042	73.7	-59.2	0.007	-0.011	0.41	0.005	-0.002	0.005	-0.031	338.2	-80.1	-13.026	-74.985
12/11/2003	5869134.065	532888.627	475.369	5.16	0.001	0.020	0.020	-0.015	87.7	-35.7	0.004	-0.003	1.49	-0.006	-0.004	0.007	0.027	211.2	75.2	-4.836	18.349
11/01/2005	5869134.059	532888.627	475.375	6.32	-0.005	0.020	0.021	-0.009	104.0	-23.6	0.003	-0.001	1.17	-0.006	0.000	0.006	0.006	182.5	43.7	4.995	4.776
10/03/2006	5869134.058	532888.626	475.375	7.48	-0.006	0.019	0.020	-0.009	107.5	-24.3	0.003	-0.001	1.16	-0.001	-0.001	0.001	0.000	225.0	0.0	-1.221	0.000
10/11/2006	5869134.058	532888.627	475.366	8.15	-0.006	0.020	0.021	-0.018	106.7	-40.8	0.003	-0.002	0.67	0.000	0.001	0.001	-0.009	90.0	-83.7	1.491	-13.417
05/04/2007	5869134.057	532888.631	475.358	8.55	-0.007	0.024	0.025	-0.026	106.3	-46.1	0.003	-0.003	0.40	-0.001	0.004	0.004	-0.008	104.0	-62.7	10.315	-20.014
16/08/2007	5869134.051	532888.623	475.354	8.92	-0.013	0.016	0.021	-0.030	129.1	-55.5	0.002	-0.003	0.36	-0.006	-0.008	0.010	-0.004	233.1	-21.8	-27.462	-10.985
13/12/2007	5869134.062	532888.631	475.359	9.24	-0.002	0.024	0.024	-0.025	94.8	-46.1	0.003	-0.003	0.33	0.011	0.008	0.014	0.005	36.0	20.2	41.747	15.347
18/03/2008	5869134.059	532888.629	475.369	9.51	-0.005	0.022	0.023	-0.015	102.8	-33.6	0.002	-0.002	0.26	-0.003	-0.002	0.004	0.010	213.7	70.2	-13.718	38.047
03/06/2008	5869134.060	532888.628	475.364	9.72	-0.004	0.021	0.021	-0.020	100.8	-43.1	0.002	-0.002	0.21	0.001	-0.001	0.001	-0.005	315.0	-74.2	-6.708	-23.718
29/07/2008	5869134.055	532888.629	475.365	9.87	-0.009	0.022	0.024	-0.019	112.2	-38.6	0.002	-0.002	0.15	-0.005	0.001	0.005	0.001	168.7	11.1	33.257	6.522
29/08/2008	5869134.056	532888.626	475.359	9.95	-0.008	0.019	0.021	-0.025	112.8	-50.5	0.002	-0.003	0.08	0.001	-0.003	0.003	-0.006	288.4	-62.2	-37.259	-70.694
19/11/2008	5869134.060	532888.627	475.360	10.18	-0.004	0.020	0.020	-0.024	101.3	-49.6	0.002	-0.002	0.22	0.004	0.001	0.004	0.001	14.0	13.6	-18.365	4.454
26/03/2009	5869134.062	532888.634	475.362	10.53	-0.002	0.027	0.027	-0.022	94.2	-39.1	0.003	-0.002	0.35	0.002	0.007	0.007	0.002	74.1	15.4	20.937	5.752
10/06/2009	5869134.052	532888.639	475.372	10.74	-0.012	0.032	0.034	-0.012	110.6	-19.3	0.003	-0.001	0.21	-0.010	0.005	0.011	0.010	153.4	41.8	53.732	48.059
17/09/2009	5869134.057	532888.635	475.361	11.01	-0.007	0.028	0.029	-0.023	104.0	-38.6	0.003	-0.002	0.27	0.005	-0.004	0.006	-0.011	321.3	-59.8	-23.624	-40.583
23/11/2009	5869134.069	532888.636	475.365	11.19	0.005	0.029	0.029	-0.019	80.2	-32.8	0.003	-0.002	0.18	0.012	0.001	0.012	0.004	4.8	18.4	65.645	21.806
27/03/2010	5869134.068	532888.630	475.360	11.53	0.004	0.023	0.023	-0.024	80.1	-45.8	0.002	-0.002	0.34	-0.001	-0.006	0.006	-0.005	260.5	-39.4	-17.917	-14.728
04/07/2010	5869134.057	532888.631	475.363	11.80	-0.007	0.024	0.025	-0.021	106.3	-40.0	0.002	-0.002	0.27	-0.011	0.001	0.011	0.003	174.8	15.2	40.751	11.068
13/09/2010	5869134.060	532888.628	475.370	11.99	-0.004	0.021	0.021	-0.014	100.8	-33.2	0.002	-0.001	0.19	0.003	-0.003	0.004	0.007	315.0	58.8	-21.826	36.011
22/11/2010	5869134.059	532888.639	475.374	12.19	-0.005	0.032	0.032	-0.010	98.9	-17.2	0.003	-0.001	0.19	-0.001	0.011	0.011	0.004	95.2	19.9	57.633	20.871
04/04/2011	5869134.065	532888.630	475.364	12.55	0.001	0.023	0.023	-0.020	87.5	-41.0	0.002	-0.002	0.36	0.006	-0.009	0.011	-0.010	303.7	-42.8	-29.705	-27.462
18/06/2011	5869134.059	532888.632	475.368	12.76	-0.005	0.025	0.025	-0.016	101.3	-32.1	0.002	-0.001	0.21	-0.006	0.002	0.006	0.004	161.6	32.3	30.801	19.480
03/10/2011	5869134.061	532888.628	475.365	13.05	-0.003	0.021	0.021	-0.019	98.1	-41.8	0.002	-0.001	0.29	0.002	-0.004	0.004	-0.003	296.6	-33.9	-15.266	-10.241
28/11/2011	5869134.068	532888.624	475.365	13.20	0.004	0.017	0.017	-0.019	76.8	-47.4	0.001	-0.001	0.15	0.007	-0.004	0.008	0.000	330.3	0.0	-52.585	0.000
09/04/2012	5869134.057	532888.630	475.366	13.57	-0.007	0.023	0.024	-0.018	106.9	-36.8	0.002	-0.001	0.36	-0.011	0.006	0.013	0.001	151.4	4.6	34.410	2.746

West Quesnel Land Stability Program

GPS Hub 98-23 (South Side of Doherty Drive)

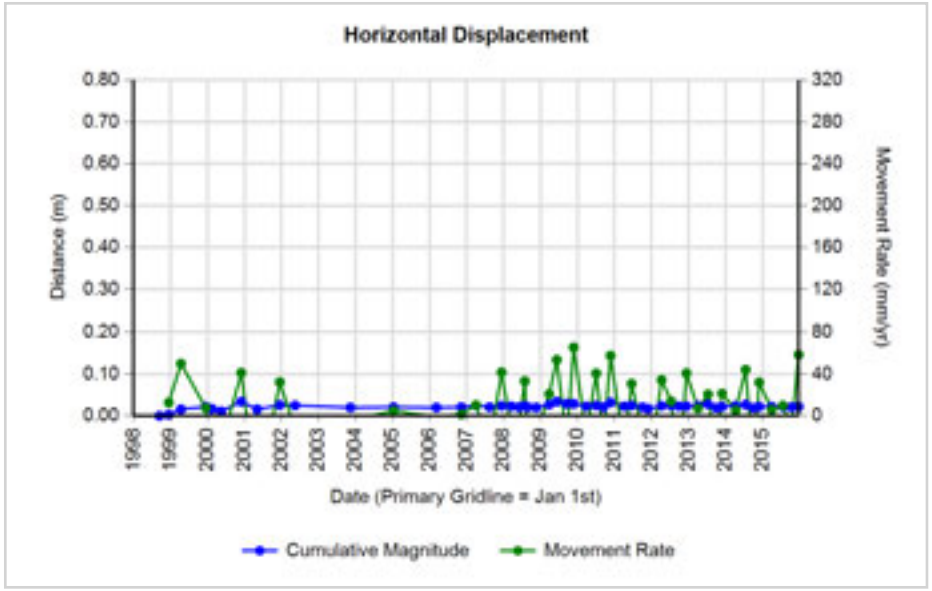
amec foster wheeler

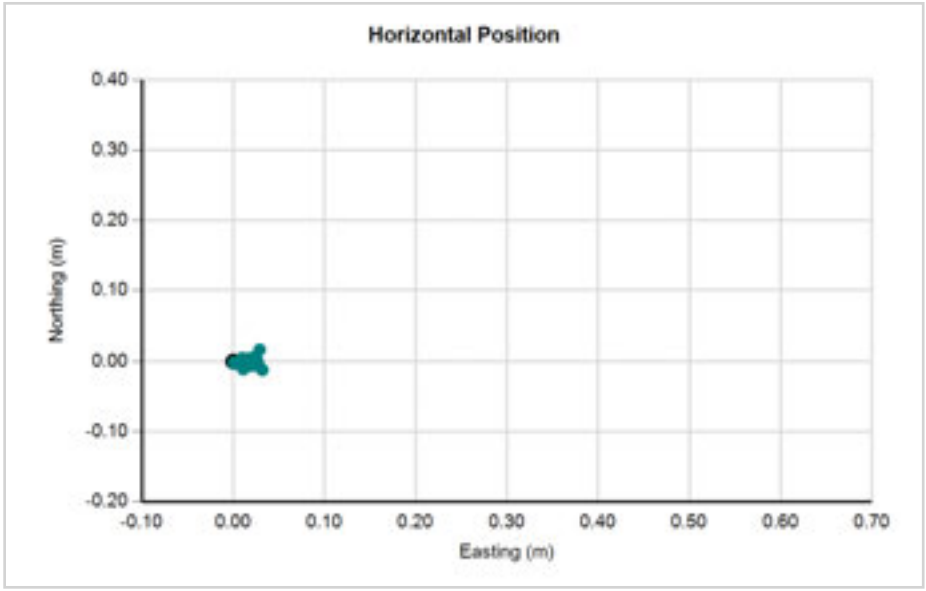
12/07/2012	5869134.060	532888.632	475.373	13.82	-0.004	0.025	0.025	-0.011	99.1	-23.5	0.002	-0.001	0.26	0.003	0.002	0.004	0.007	33.7	62.7	14.010	27.199
29/09/2012	5869134.071	532888.629	475.373	14.04	0.007	0.022	0.023	-0.011	72.3	-25.5	0.002	-0.001	0.22	0.011	-0.003	0.011	0.000	344.7	0.0	-52.715	0.000
10/12/2012	5869134.063	532888.630	475.367	14.24	-0.001	0.023	0.023	-0.017	92.5	-36.4	0.002	-0.001	0.20	-0.008	0.001	0.008	-0.006	172.9	-36.7	40.899	-30.437
03/04/2013	5869134.065	532888.631	475.365	14.55	0.001	0.024	0.024	-0.019	87.6	-38.3	0.002	-0.001	0.31	0.002	0.001	0.002	-0.002	26.6	-41.8	7.164	-6.408
12/07/2013	5869134.061	532888.635	475.373	14.82	-0.003	0.028	0.028	-0.011	96.1	-21.3	0.002	-0.001	0.27	-0.004	0.004	0.006	0.008	135.0	54.7	20.662	29.220
04/10/2013	5869134.063	532888.626	475.380	15.05	-0.001	0.019	0.019	-0.004	93.0	-11.9	0.001	0.000	0.23	0.002	-0.009	0.009	0.007	282.5	37.2	-40.089	30.438
27/11/2013	5869134.064	532888.629	475.369	15.20	0.000	0.022	0.022	-0.015	90.0	-34.3	0.001	-0.001	0.15	0.001	0.003	0.003	-0.011	71.6	-74.0	21.389	-74.403
10/04/2014	5869134.064	532888.631	475.371	15.57	0.000	0.024	0.024	-0.013	90.0	-28.4	0.002	-0.001	0.37	0.000	0.002	0.002	0.002	90.0	45.0	5.451	5.451
18/07/2014	5869134.052	532888.631	475.378	15.84	-0.012	0.024	0.027	-0.006	116.6	-12.6	0.002	0.000	0.27	-0.012	0.000	0.012	0.007	180.0	30.3	44.273	25.826
02/10/2014	5869134.061	532888.626	475.366	16.05	-0.003	0.019	0.019	-0.018	99.0	-43.1	0.001	-0.001	0.21	0.009	-0.005	0.010	-0.012	330.9	-49.4	-49.480	-57.671
28/11/2014	5869134.065	532888.629	475.361	16.20	0.001	0.022	0.022	-0.023	87.4	-46.2	0.001	-0.001	0.16	0.004	0.003	0.005	-0.005	36.9	-45.0	32.039	-32.039
01/04/2015	5869134.063	532888.629	475.370	16.54	-0.001	0.022	0.022	-0.014	92.6	-32.4	0.001	-0.001	0.34	-0.002	0.000	0.002	0.009	180.0	77.5	5.891	26.510
20/07/2015	5869134.060	532888.629	475.369	16.84	-0.004	0.022	0.022	-0.015	100.3	-33.9	0.001	-0.001	0.30	-0.003	0.000	0.003	-0.001	180.0	-18.4	9.961	-3.320
14/10/2015	5869134.058	532888.627	475.367	17.08	-0.006	0.020	0.021	-0.017	106.7	-39.2	0.001	-0.001	0.24	-0.002	-0.002	0.003	-0.002	225.0	-35.3	-12.013	-8.494
22/12/2015	5869134.069	532888.628	475.357	17.27	0.005	0.021	0.022	-0.027	76.6	-51.4	0.001	-0.002	0.19	0.011	0.001	0.011	-0.010	5.2	-42.2	58.468	-52.935

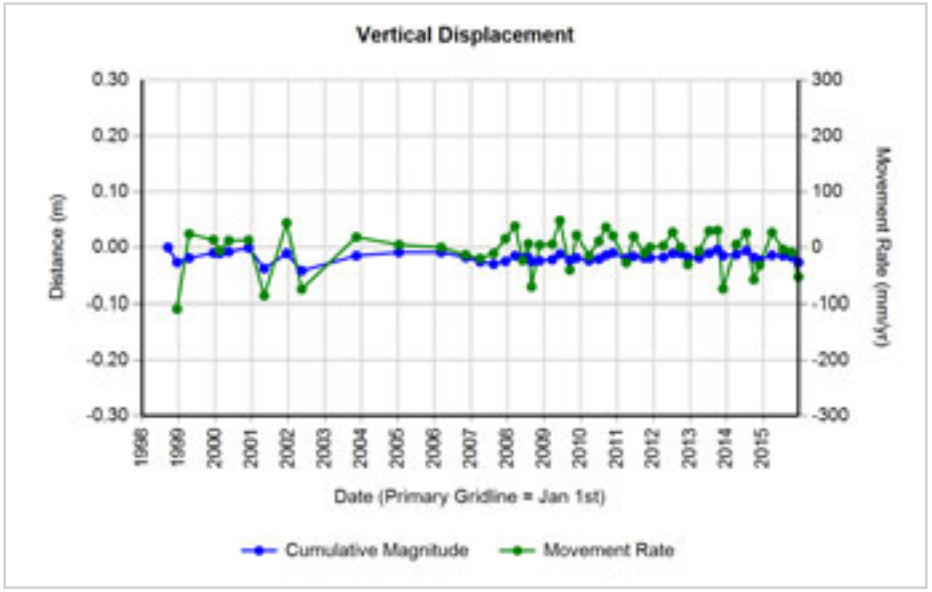
West Quesnel Land Stability Program

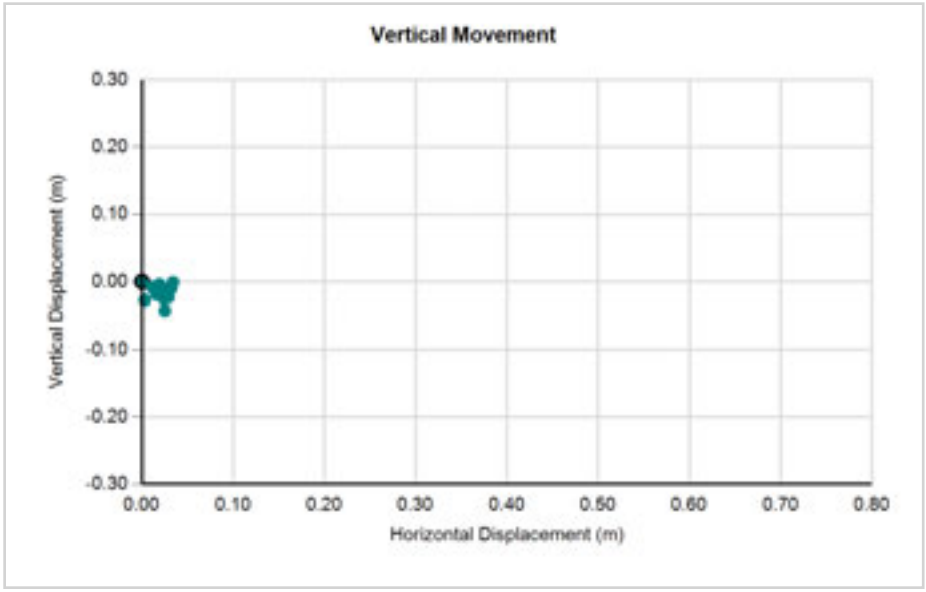
GPS Hub 98-23 (South Side of Doherty Drive)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 01-30 (West End of Dodds Avenue at Findlay Road)

amec foster wheeler

Surveyed Position				Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/12/2001	5869989.266	531217.807	575.401	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/05/2002	5869989.252	531217.849	575.435	0.41	-0.014	0.042	0.044	0.034	108.4	37.5	0.107	0.082	0.41	-0.014	0.042	0.044	0.034	108.4	37.5	107.088	82.242
24/10/2002	5869989.264	531217.857	575.398	0.86	-0.002	0.050	0.050	-0.003	92.3	-3.4	0.058	-0.004	0.44	0.012	0.008	0.014	-0.037	33.7	-68.7	32.517	-83.421
12/11/2003	5869989.248	531217.866	575.425	1.91	-0.018	0.059	0.061	0.024	107.4	21.2	0.032	0.012	1.05	-0.016	0.009	0.019	0.027	152.1	55.4	17.628	25.510
11/01/2005	5869989.254	531217.875	575.426	3.07	-0.012	0.069	0.069	0.025	99.6	20.0	0.023	0.008	1.17	0.007	0.010	0.012	0.001	55.4	7.1	10.238	1.269
10/03/2006	5869989.233	531217.925	575.406	4.23	-0.033	0.118	0.123	0.005	105.6	2.3	0.029	0.001	1.16	-0.021	0.050	0.054	-0.020	113.4	-20.6	46.565	-17.529
10/11/2006	5869989.230	531217.937	575.406	4.90	-0.036	0.130	0.135	0.005	105.5	2.1	0.028	0.001	0.67	-0.003	0.012	0.012	0.000	104.0	0.0	18.440	0.000
05/04/2007	5869989.230	531217.942	575.386	5.30	-0.036	0.135	0.140	-0.015	104.9	-6.1	0.026	-0.003	0.40	0.000	0.005	0.005	-0.020	90.0	-76.0	12.509	-50.034
16/08/2007	5869989.219	531217.951	575.383	5.67	-0.047	0.144	0.151	-0.018	108.1	-6.8	0.027	-0.003	0.36	-0.011	0.009	0.014	-0.003	140.7	-11.9	39.031	-8.239
13/12/2007	5869989.233	531217.956	575.380	5.99	-0.033	0.149	0.153	-0.021	102.5	-7.8	0.025	-0.004	0.33	0.014	0.005	0.015	-0.003	19.7	-11.4	45.629	-9.208
18/03/2008	5869989.226	531217.953	575.384	6.26	-0.040	0.146	0.151	-0.017	105.3	-6.4	0.024	-0.003	0.26	-0.007	-0.003	0.008	0.004	203.2	27.7	-28.976	15.219
03/06/2008	5869989.222	531217.971	575.378	6.47	-0.044	0.164	0.170	-0.023	105.0	-7.7	0.026	-0.004	0.21	-0.004	0.018	0.018	-0.006	102.5	-18.0	87.466	-28.461
29/08/2008	5869989.214	531217.983	575.380	6.70	-0.052	0.176	0.184	-0.021	106.5	-6.5	0.027	-0.003	0.24	-0.008	0.012	0.014	0.002	123.7	7.9	60.548	8.397
19/11/2008	5869989.215	531217.990	575.376	6.93	-0.051	0.183	0.190	-0.025	105.6	-7.5	0.027	-0.004	0.22	0.001	0.007	0.007	-0.004	81.9	-29.5	31.496	-17.817
26/03/2009	5869989.212	531217.996	575.374	7.28	-0.054	0.189	0.197	-0.027	105.9	-7.8	0.027	-0.004	0.35	-0.003	0.006	0.007	-0.002	116.6	-16.6	19.293	-5.752
10/06/2009	5869989.202	531218.025	575.377	7.49	-0.064	0.218	0.227	-0.024	106.4	-6.0	0.030	-0.003	0.21	-0.010	0.029	0.031	0.003	109.0	5.6	147.425	14.418
17/09/2009	5869989.203	531218.028	575.356	7.76	-0.063	0.221	0.230	-0.045	105.9	-11.1	0.030	-0.006	0.27	0.001	0.003	0.003	-0.021	71.6	-81.4	11.667	-77.477
23/11/2009	5869989.213	531218.026	575.351	7.94	-0.053	0.219	0.225	-0.050	103.6	-12.5	0.028	-0.006	0.18	0.010	-0.002	0.010	-0.005	348.7	-26.1	-55.595	-27.257
27/03/2010	5869989.210	531218.027	575.362	8.28	-0.056	0.220	0.227	-0.039	104.3	-9.7	0.027	-0.005	0.34	-0.003	0.001	0.003	0.011	161.6	74.0	9.315	32.401
04/07/2010	5869989.196	531218.031	575.353	8.55	-0.070	0.224	0.235	-0.048	107.4	-11.6	0.027	-0.006	0.27	-0.014	0.004	0.015	-0.009	164.1	-31.7	53.718	-33.205
13/09/2010	5869989.204	531218.034	575.357	8.74	-0.062	0.227	0.235	-0.044	105.3	-10.6	0.027	-0.005	0.19	0.008	0.003	0.009	0.004	20.6	25.1	43.953	20.577
22/11/2010	5869989.205	531218.037	575.355	8.94	-0.061	0.230	0.238	-0.046	104.9	-10.9	0.027	-0.005	0.19	0.001	0.003	0.003	-0.002	71.6	-32.3	16.500	-10.436
04/04/2011	5869989.203	531218.032	575.358	9.30	-0.063	0.225	0.234	-0.043	105.6	-10.4	0.025	-0.005	0.36	-0.002	-0.005	0.005	0.003	248.2	29.1	-14.789	8.239
18/06/2011	5869989.194	531218.044	575.362	9.51	-0.072	0.237	0.248	-0.039	106.9	-8.9	0.026	-0.004	0.21	-0.009	0.012	0.015	0.004	126.9	14.9	73.050	19.480
03/10/2011	5869989.202	531218.041	575.354	9.80	-0.064	0.234	0.243	-0.047	105.3	-11.0	0.025	-0.005	0.29	0.008	-0.003	0.009	-0.008	339.4	-43.1	-29.165	-27.308
28/11/2011	5869989.205	531218.041	575.354	9.95	-0.061	0.234	0.242	-0.047	104.6	-11.0	0.024	-0.005	0.15	0.003	0.000	0.003	0.000	0.0	0.0	-19.567	0.000
09/04/2012	5869989.194	531218.047	575.348	10.32	-0.072	0.240	0.251	-0.053	106.7	-11.9	0.024	-0.005	0.36	-0.011	0.006	0.013	-0.006	151.4	-25.6	34.410	-16.477
12/07/2012	5869989.192	531218.064	575.358	10.57	-0.074	0.257	0.267	-0.043	106.1	-9.1	0.025	-0.004	0.26	-0.002	0.017	0.017	0.010	96.7	30.3	66.511	38.856
29/09/2012	5869989.196	531218.071	575.347	10.79	-0.070	0.264	0.273	-0.054	104.9	-11.2	0.025	-0.005	0.22	0.004	0.007	0.008	-0.011	60.3	-53.8	37.275	-50.858
10/12/2012	5869989.194	531218.073	575.336	10.99	-0.072	0.266	0.276	-0.065	105.1	-13.3	0.025	-0.006	0.20	-0.002	0.002	0.003	-0.011	135.0	-75.6	14.348	-55.802
03/04/2013	5869989.195	531218.073	575.335	11.30	-0.071	0.266	0.275	-0.066	104.9	-13.5	0.024	-0.006	0.31	0.001	0.000	0.001	-0.001	0.0	-45.0	-3.204	-3.204
12/07/2013	5869989.191	531218.077	575.348	11.57	-0.075	0.270	0.280	-0.053	105.5	-10.7	0.024	-0.005	0.27	-0.004	0.004	0.006	0.013	135.0	66.5	20.662	47.482
04/10/2013	5869989.191	531218.077	575.348	11.80	-0.075	0.270	0.280	-0.053	105.5	-10.7	0.024	-0.004	0.23	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
27/11/2013	5869989.193	531218.076	575.336	11.95	-0.073	0.269	0.279	-0.065	105.2	-13.1	0.023	-0.005	0.15	0.002	-0.001	0.002	-0.012	333.4	-79.4	-15.125	-81.167
10/04/2014	5869989.196	531218.083	575.343	12.32	-0.070	0.276	0.285	-0.058	104.2	-11.5	0.023	-0.005	0.37	0.003	0.007	0.008	0.007	66.8	42.6	20.759	19.080

West Quesnel Land Stability Program

GPS Hub 01-30 (West End of Dodds Avenue at Findlay Road)

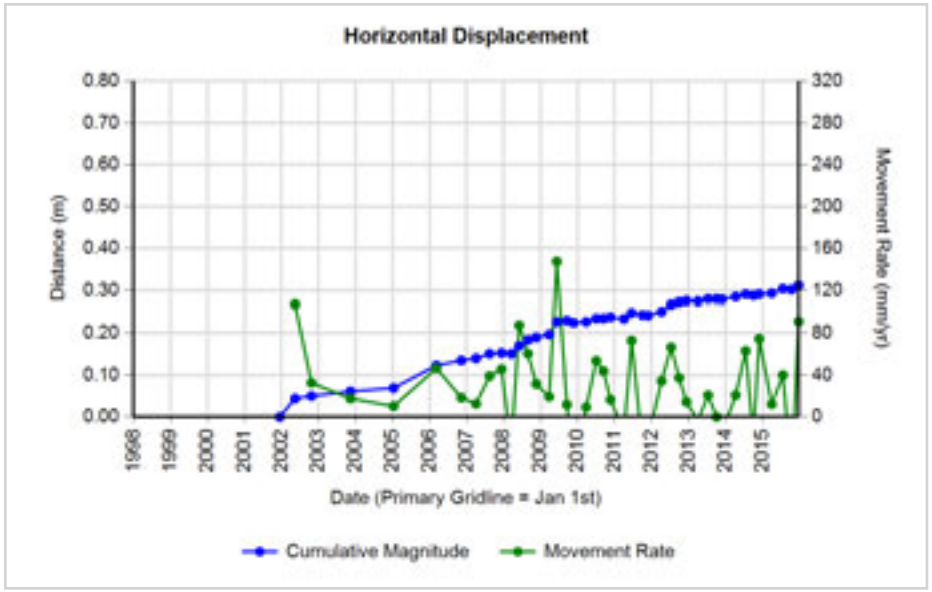
amec foster wheeler

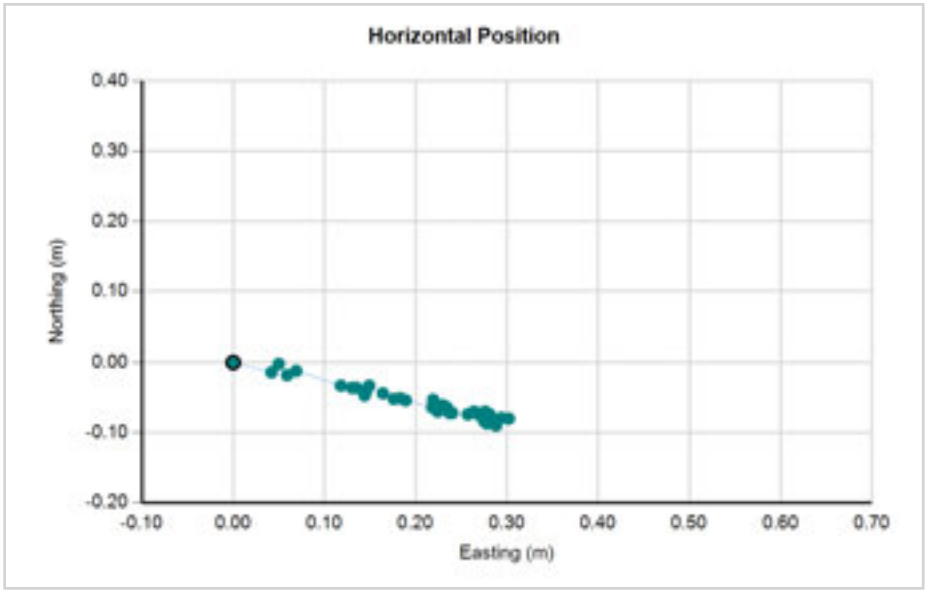
18/07/2014	5869989.179	531218.085	575.352	12.59	-0.087	0.278	0.291	-0.049	107.4	-9.5	0.023	-0.004	0.27	-0.017	0.002	0.017	0.009	173.3	27.7	63.152	33.205
02/10/2014	5869989.182	531218.082	575.335	12.80	-0.084	0.275	0.288	-0.066	107.0	-12.9	0.022	-0.005	0.21	0.003	-0.003	0.004	-0.017	315.0	-76.0	-20.390	-81.701
28/11/2014	5869989.192	531218.088	575.331	12.95	-0.074	0.281	0.291	-0.070	104.8	-13.5	0.022	-0.005	0.16	0.010	0.006	0.012	-0.004	31.0	-18.9	74.728	-25.632
01/04/2015	5869989.188	531218.089	575.329	13.29	-0.078	0.282	0.293	-0.072	105.5	-13.8	0.022	-0.005	0.34	-0.004	0.001	0.004	-0.002	166.0	-25.9	12.145	-5.891
20/07/2015	5869989.187	531218.101	575.328	13.59	-0.079	0.294	0.304	-0.073	105.0	-13.5	0.022	-0.005	0.30	-0.001	0.012	0.012	-0.001	94.8	-4.7	39.984	-3.320
14/10/2015	5869989.176	531218.095	575.329	13.83	-0.090	0.288	0.302	-0.072	107.4	-13.4	0.022	-0.005	0.24	-0.011	-0.006	0.013	0.001	208.6	4.6	-53.216	4.247
22/12/2015	5869989.186	531218.109	575.336	14.02	-0.080	0.302	0.312	-0.065	104.8	-11.8	0.022	-0.005	0.19	0.010	0.014	0.017	0.007	54.5	22.1	91.072	37.054

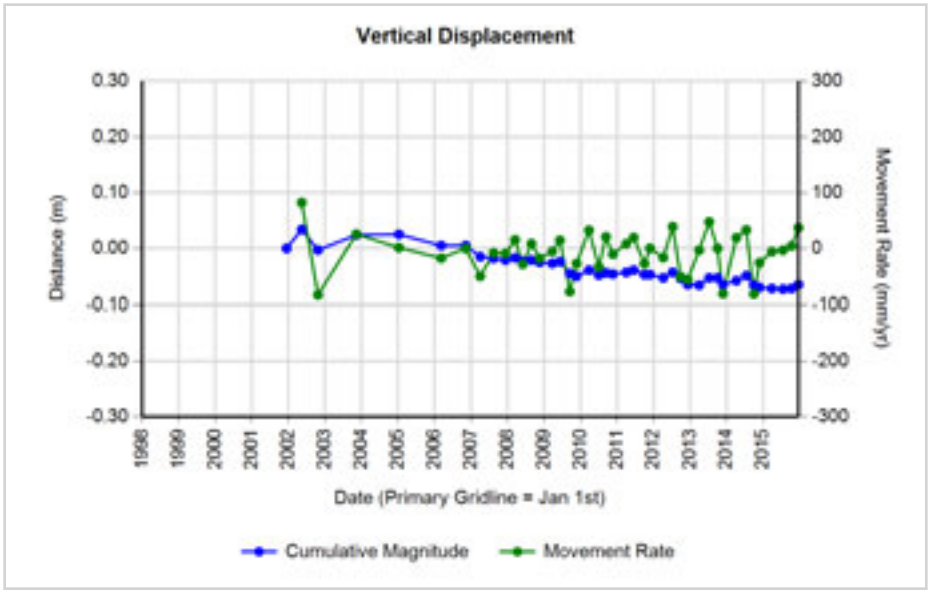
West Quesnel Land Stability Program

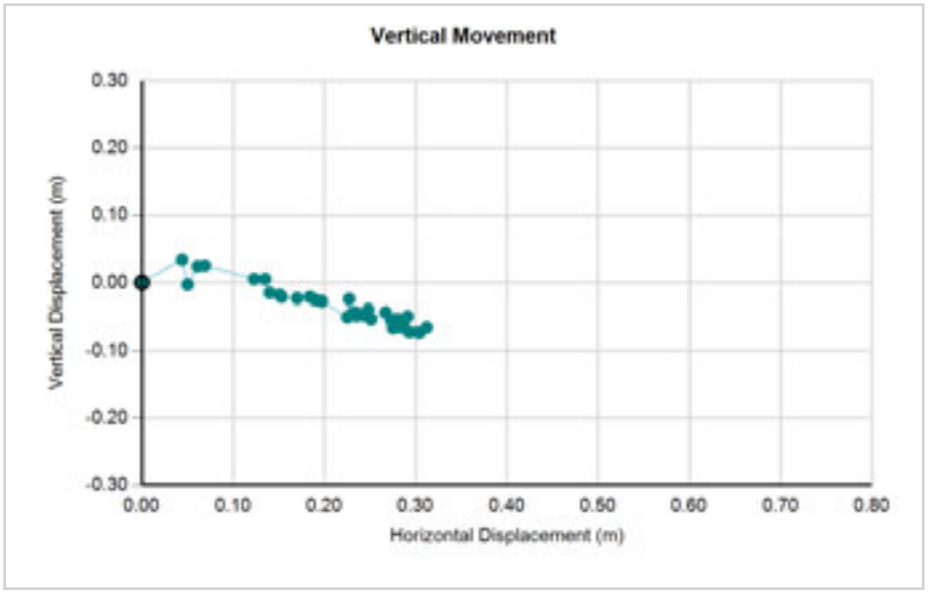
GPS Hub 01-30 (West End of Dodds Avenue at Findlay Road)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 01-31 (East Side of Blair Street)

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/12/2001	5869768.124	532338.411	508.144	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/05/2002	5869768.142	532338.444	508.116	0.41	0.018	0.033	0.038	-0.028	61.4	-36.7	0.091	-0.068	0.41	0.018	0.033	0.038	-0.028	61.4	-36.7	90.925	-67.728
24/10/2002	5869768.143	532338.482	508.117	0.86	0.019	0.071	0.073	-0.027	75.0	-20.2	0.086	-0.032	0.44	0.001	0.038	0.038	0.001	88.5	1.5	85.706	2.255
12/11/2003	5869768.122	532338.497	508.122	1.91	-0.002	0.086	0.086	-0.022	91.6	-14.2	0.045	-0.011	1.05	-0.021	0.015	0.026	0.005	144.4	11.2	24.997	4.946
11/01/2005	5869768.131	532338.519	508.128	3.07	0.007	0.108	0.108	-0.017	86.1	-8.7	0.035	-0.005	1.17	0.010	0.022	0.024	0.005	66.2	12.5	20.515	4.544
10/03/2006	5869768.115	532338.611	508.108	4.23	-0.009	0.200	0.200	-0.036	92.6	-10.2	0.047	-0.009	1.16	-0.016	0.092	0.093	-0.019	100.1	-11.8	80.507	-16.838
10/11/2006	5869768.115	532338.632	508.118	4.90	-0.009	0.221	0.221	-0.026	92.3	-6.7	0.045	-0.005	0.67	0.000	0.021	0.021	0.010	90.0	25.5	31.307	14.908
05/04/2007	5869768.112	532338.638	508.105	5.30	-0.012	0.227	0.227	-0.039	93.0	-9.7	0.043	-0.007	0.40	-0.003	0.006	0.007	-0.013	116.6	-62.7	16.782	-32.522
16/08/2007	5869768.108	532338.658	508.104	5.67	-0.016	0.247	0.248	-0.040	93.7	-9.2	0.044	-0.007	0.36	-0.004	0.020	0.020	-0.001	101.3	-2.8	56.013	-2.746
13/12/2007	5869768.103	532338.660	508.097	5.99	-0.021	0.249	0.250	-0.047	94.8	-10.7	0.042	-0.008	0.33	-0.005	0.002	0.005	-0.007	158.2	-52.4	16.529	-21.485
18/03/2008	5869768.112	532338.663	508.109	6.26	-0.012	0.252	0.252	-0.035	92.7	-7.9	0.040	-0.006	0.26	0.009	0.003	0.009	0.012	18.4	51.7	36.094	45.656
03/06/2008	5869768.098	532338.700	508.102	6.47	-0.026	0.289	0.290	-0.042	95.1	-8.2	0.045	-0.006	0.21	-0.014	0.037	0.040	-0.007	110.7	-10.0	187.654	-33.205
29/07/2008	5869768.100	532338.716	508.098	6.62	-0.024	0.305	0.306	-0.046	94.5	-8.6	0.046	-0.007	0.15	0.002	0.016	0.016	-0.004	82.9	-13.9	105.169	-26.089
29/08/2008	5869768.105	532338.710	508.101	6.70	-0.019	0.299	0.300	-0.043	93.6	-8.2	0.045	-0.006	0.08	0.005	-0.006	0.008	0.003	309.8	21.0	-92.022	35.347
19/11/2008	5869768.106	532338.716	508.093	6.93	-0.018	0.305	0.306	-0.051	93.4	-9.5	0.044	-0.007	0.22	0.001	0.006	0.006	-0.008	80.5	-52.8	27.094	-35.634
26/03/2009	5869768.109	532338.727	508.096	7.28	-0.015	0.316	0.316	-0.048	92.7	-8.6	0.043	-0.007	0.35	0.003	0.011	0.011	0.003	74.7	14.7	32.791	8.628
10/06/2009	5869768.087	532338.771	508.098	7.49	-0.037	0.360	0.362	-0.046	95.9	-7.2	0.048	-0.006	0.21	-0.022	0.044	0.049	0.002	116.6	2.3	236.420	9.612
17/09/2009	5869768.101	532338.778	508.101	7.76	-0.023	0.367	0.368	-0.043	93.6	-6.7	0.047	-0.006	0.27	0.014	0.007	0.016	0.003	26.6	10.8	57.748	11.068
23/11/2009	5869768.102	532338.779	508.088	7.94	-0.022	0.368	0.369	-0.056	93.4	-8.6	0.046	-0.007	0.18	0.001	0.001	0.001	-0.013	45.0	-83.8	7.710	-70.869
27/03/2010	5869768.105	532338.784	508.084	8.28	-0.019	0.373	0.373	-0.060	92.9	-9.1	0.045	-0.007	0.34	0.003	0.005	0.006	-0.004	59.0	-34.4	17.175	-11.782
04/07/2010	5869768.099	532338.777	508.096	8.55	-0.025	0.366	0.367	-0.048	93.9	-7.5	0.043	-0.006	0.27	-0.006	-0.007	0.009	0.012	229.4	52.5	-34.015	44.273
13/09/2010	5869768.101	532338.780	508.052	8.74	-0.023	0.369	0.370	-0.092	93.6	-14.0	0.042	-0.011	0.19	0.002	0.003	0.004	-0.044	56.3	-85.3	18.548	-226.352
22/11/2010	5869768.095	532338.790	508.091	8.94	-0.029	0.379	0.380	-0.053	94.4	-7.9	0.043	-0.006	0.19	-0.006	0.010	0.012	0.039	121.0	73.4	60.850	203.496
04/04/2011	5869768.094	532338.790	508.087	9.30	-0.030	0.379	0.380	-0.057	94.5	-8.5	0.041	-0.006	0.36	-0.001	0.000	0.001	-0.004	180.0	-76.0	2.746	-10.985
18/06/2011	5869768.101	532338.803	508.101	9.51	-0.023	0.392	0.393	-0.043	93.4	-6.2	0.041	-0.005	0.21	0.007	0.013	0.015	0.014	61.7	43.5	71.905	68.180
03/10/2011	5869768.099	532338.803	508.089	9.80	-0.025	0.392	0.393	-0.055	93.6	-8.0	0.040	-0.006	0.29	-0.002	0.000	0.002	-0.012	180.0	-80.5	-6.827	-40.963
28/11/2011	5869768.098	532338.802	508.085	9.95	-0.026	0.391	0.392	-0.059	93.8	-8.6	0.039	-0.006	0.15	-0.001	-0.001	0.001	-0.004	225.0	-70.5	-9.224	-26.089
09/04/2012	5869768.087	532338.811	508.090	10.32	-0.037	0.400	0.402	-0.054	95.3	-7.7	0.039	-0.005	0.36	-0.011	0.009	0.014	0.005	140.7	19.4	39.031	13.731
12/07/2012	5869768.089	532338.840	508.090	10.57	-0.035	0.429	0.430	-0.054	94.7	-7.2	0.041	-0.005	0.26	0.002	0.029	0.029	0.000	86.1	0.0	112.951	0.000
29/09/2012	5869768.096	532338.856	508.084	10.79	-0.028	0.445	0.446	-0.060	93.6	-7.7	0.041	-0.006	0.22	0.007	0.016	0.017	-0.006	66.4	-19.0	80.745	-27.741
10/12/2012	5869768.091	532338.853	508.083	10.99	-0.033	0.442	0.443	-0.061	94.3	-7.8	0.040	-0.006	0.20	-0.005	-0.003	0.006	-0.001	211.0	-9.7	-29.580	-5.073
03/04/2013	5869768.093	532338.859	508.082	11.30	-0.031	0.448	0.449	-0.062	94.0	-7.9	0.040	-0.005	0.31	0.002	0.006	0.006	-0.001	71.6	-9.0	20.264	-3.204
12/07/2013	5869768.094	532338.867	508.089	11.57	-0.030	0.456	0.457	-0.055	93.8	-6.9	0.039	-0.005	0.27	0.001	0.008	0.008	0.007	82.9	41.0	29.447	25.568
04/10/2013	5869768.092	532338.863	508.094	11.80	-0.032	0.452	0.453	-0.050	94.0	-6.3	0.038	-0.004	0.23	-0.002	-0.004	0.004	0.005	243.4	48.2	-19.446	21.741
27/11/2013	5869768.091	532338.868	508.080	11.95	-0.033	0.457	0.458	-0.064	94.1	-8.0	0.038	-0.005	0.15	-0.001	0.005	0.005	-0.014	101.3	-70.0	34.489	-94.694

West Quesnel Land Stability Program

GPS Hub 01-31 (East Side of Blair Street)

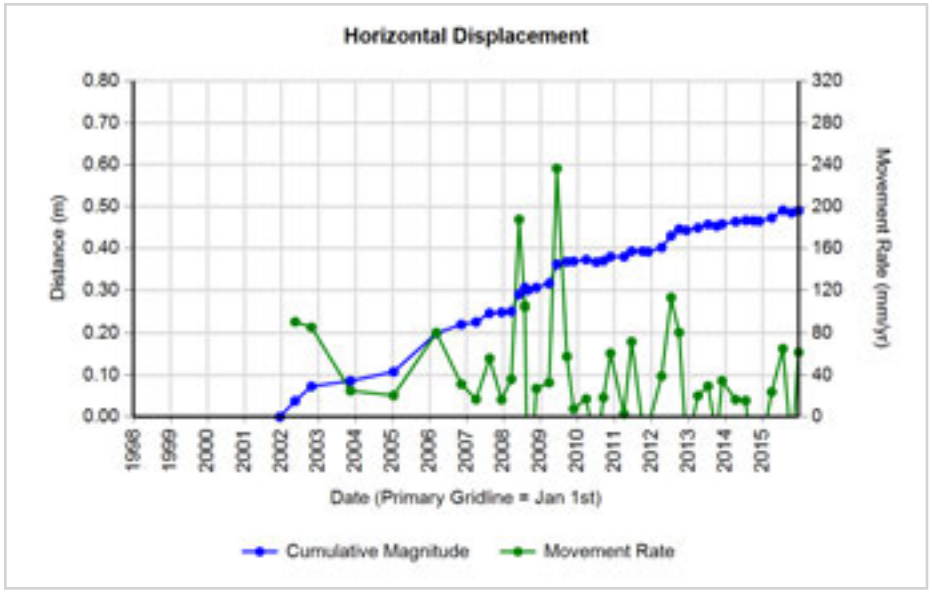
amec foster wheeler

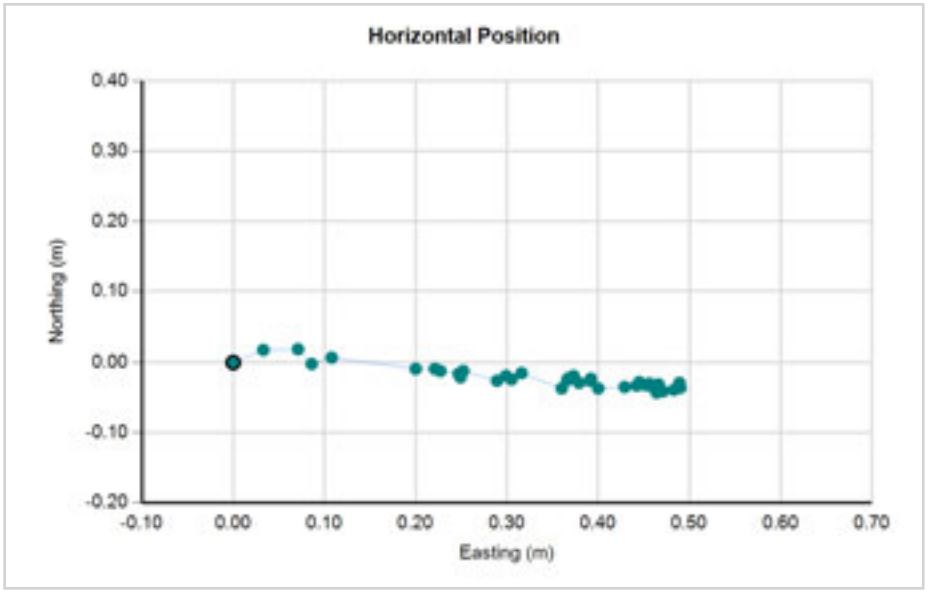
10/04/2014	5869768.090	532338.874	508.075	12.32	-0.034	0.463	0.464	-0.069	94.2	-8.5	0.038	-0.006	0.37	-0.001	0.006	0.006	-0.005	99.5	-39.4	16.580	-13.629
18/07/2014	5869768.093	532338.877	508.063	12.59	-0.031	0.466	0.467	-0.081	93.8	-9.8	0.037	-0.006	0.27	0.003	0.003	0.004	-0.012	45.0	-70.5	15.653	-44.273
02/10/2014	5869768.081	532338.875	508.086	12.80	-0.043	0.464	0.466	-0.058	95.3	-7.1	0.036	-0.005	0.21	-0.012	-0.002	0.012	0.023	189.5	62.1	-58.467	110.536
28/11/2014	5869768.087	532338.875	508.080	12.95	-0.037	0.464	0.465	-0.064	94.6	-7.8	0.036	-0.005	0.16	0.006	0.000	0.006	-0.006	0.0	-45.0	-38.447	-38.447
01/04/2015	5869768.083	532338.882	508.087	13.29	-0.041	0.471	0.473	-0.057	95.0	-6.9	0.036	-0.004	0.34	-0.004	0.007	0.008	0.007	119.7	41.0	23.748	20.619
20/07/2015	5869768.088	532338.901	508.080	13.59	-0.036	0.490	0.491	-0.064	94.2	-7.4	0.036	-0.005	0.30	0.005	0.019	0.020	-0.007	75.3	-19.6	65.237	-23.243
14/10/2015	5869768.085	532338.894	508.083	13.83	-0.039	0.483	0.485	-0.061	94.6	-7.2	0.035	-0.004	0.24	-0.003	-0.007	0.008	0.003	246.8	21.5	-32.345	12.741
22/12/2015	5869768.095	532338.900	508.076	14.02	-0.029	0.489	0.490	-0.068	93.4	-7.9	0.035	-0.005	0.19	0.010	0.006	0.012	-0.007	31.0	-31.0	61.732	-37.054

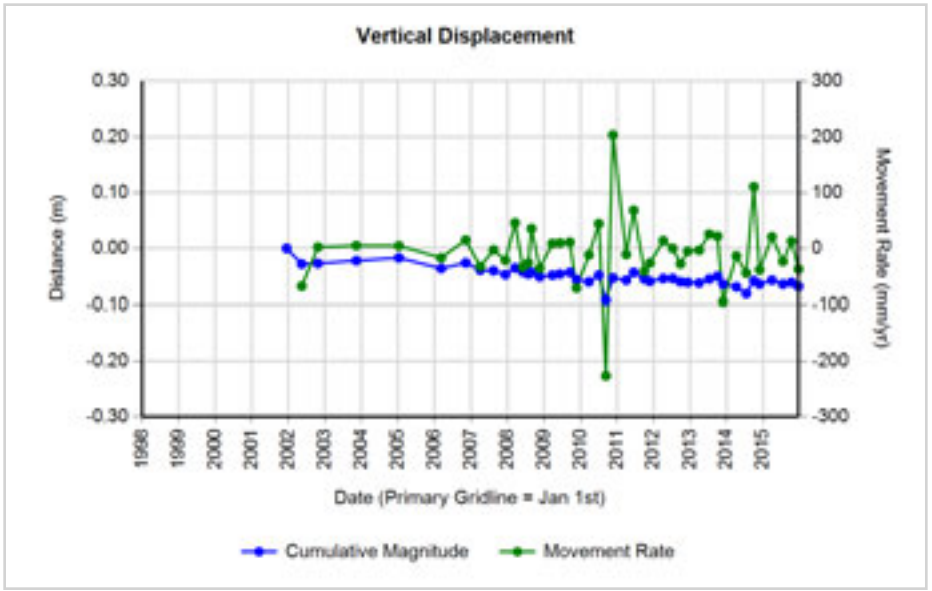
West Quesnel Land Stability Program

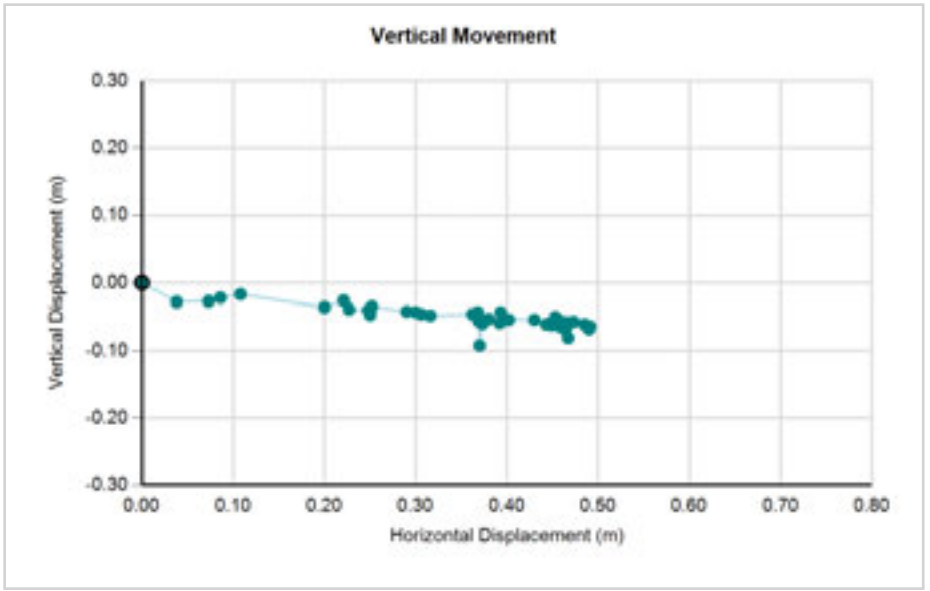
GPS Hub 01-31 (East Side of Blair Street)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 01-32 (Intersection of Lewis Drive and Beabien Avenue)

amec foster wheeler

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/12/2001	5870079.631	532553.538	481.549	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/05/2002	5870079.618	532553.546	481.519	0.41	-0.013	0.008	0.015	-0.030	148.4	-63.0	0.037	-0.073	0.41	-0.013	0.008	0.015	-0.030	148.4	-63.0	36.923	-72.566
24/10/2002	5870079.634	532553.543	481.512	0.86	0.003	0.005	0.006	-0.037	59.0	-81.0	0.007	-0.043	0.44	0.016	-0.003	0.016	-0.007	349.4	-23.3	-36.703	-15.782
12/11/2003	5870079.614	532553.534	481.561	1.91	-0.017	-0.004	0.017	0.012	191.7	33.7	0.009	0.006	1.05	-0.020	-0.009	0.022	0.049	203.0	65.8	20.743	46.246
11/01/2005	5870079.619	532553.544	481.545	3.07	-0.012	0.006	0.013	-0.004	154.2	-15.8	0.004	-0.001	1.17	0.005	0.009	0.011	-0.015	60.3	-55.2	-9.113	-13.135
10/03/2006	5870079.615	532553.543	481.542	4.23	-0.016	0.005	0.017	-0.007	162.6	-22.7	0.004	-0.002	1.16	-0.004	-0.001	0.004	-0.003	189.5	-37.8	3.677	-2.849
10/11/2006	5870079.618	532553.548	481.536	4.90	-0.013	0.010	0.016	-0.013	142.4	-38.4	0.003	-0.003	0.67	0.003	0.005	0.006	-0.006	59.0	-45.8	-8.693	-8.945
05/04/2007	5870079.619	532553.545	481.543	5.30	-0.012	0.007	0.014	-0.006	149.7	-23.4	0.003	-0.001	0.40	0.001	-0.003	0.003	0.007	288.4	65.7	-7.911	17.512
16/08/2007	5870079.619	532553.542	481.547	5.67	-0.012	0.004	0.013	-0.002	161.6	-9.0	0.002	0.000	0.36	0.000	-0.003	0.003	0.004	270.0	53.1	-8.239	10.985
13/12/2007	5870079.616	532553.540	481.540	5.99	-0.015	0.002	0.015	-0.009	172.4	-30.7	0.003	-0.002	0.33	-0.003	-0.002	0.004	-0.007	213.7	-62.7	11.067	-21.485
18/03/2008	5870079.619	532553.543	481.544	6.26	-0.012	0.005	0.013	-0.005	157.4	-21.0	0.002	-0.001	0.26	0.003	0.003	0.004	0.004	45.0	43.3	-16.142	15.219
03/06/2008	5870079.615	532553.546	481.554	6.47	-0.016	0.008	0.018	0.005	153.4	15.6	0.003	0.001	0.21	-0.004	0.003	0.005	0.010	143.1	63.4	23.718	47.435
29/08/2008	5870079.610	532553.543	481.564	6.70	-0.021	0.005	0.022	0.015	166.6	34.8	0.003	0.002	0.24	-0.005	-0.003	0.006	0.010	211.0	59.8	24.480	41.983
19/11/2008	5870079.611	532553.546	481.544	6.93	-0.020	0.008	0.022	-0.005	158.2	-13.1	0.003	-0.001	0.22	0.001	0.003	0.003	-0.020	71.6	-81.0	-14.086	-89.085
26/03/2009	5870079.621	532553.547	481.539	7.28	-0.010	0.009	0.013	-0.010	138.0	-36.6	0.002	-0.001	0.35	0.010	0.001	0.010	-0.005	5.7	-26.5	-28.903	-14.380
10/06/2009	5870079.608	532553.549	481.543	7.49	-0.023	0.011	0.025	-0.006	154.4	-13.2	0.003	-0.001	0.21	-0.013	0.002	0.013	0.004	171.3	16.9	63.212	19.224
17/09/2009	5870079.618	532553.542	481.556	7.76	-0.013	0.004	0.014	0.007	162.9	27.2	0.002	0.001	0.27	0.010	-0.007	0.012	0.013	325.0	46.8	-45.035	47.962
23/11/2009	5870079.624	532553.547	481.541	7.94	-0.007	0.009	0.011	-0.008	127.9	-35.1	0.001	-0.001	0.18	0.006	0.005	0.008	-0.015	39.8	-62.5	-42.578	-81.772
27/03/2010	5870079.625	532553.537	481.554	8.28	-0.006	-0.001	0.006	0.005	189.5	39.4	0.001	0.001	0.34	0.001	-0.010	0.010	0.013	275.7	52.3	-29.603	38.292
04/07/2010	5870079.616	532553.545	481.556	8.55	-0.015	0.007	0.017	0.007	155.0	22.9	0.002	0.001	0.27	-0.009	0.008	0.012	0.002	138.4	9.4	44.426	7.379
13/09/2010	5870079.619	532553.547	481.542	8.74	-0.012	0.009	0.015	-0.007	143.1	-25.0	0.002	-0.001	0.19	0.003	0.002	0.004	-0.014	33.7	-75.6	-18.548	-72.021
22/11/2010	5870079.616	532553.555	481.555	8.94	-0.015	0.017	0.023	0.006	131.4	14.8	0.003	0.001	0.19	-0.003	0.008	0.009	0.013	110.6	56.7	44.581	67.832
04/04/2011	5870079.616	532553.545	481.540	9.30	-0.015	0.007	0.017	-0.009	155.0	-28.5	0.002	-0.001	0.36	0.000	-0.010	0.010	-0.015	270.0	-56.3	-27.462	-41.194
18/06/2011	5870079.616	532553.547	481.567	9.51	-0.015	0.009	0.017	0.018	149.0	45.8	0.002	0.002	0.21	0.000	0.002	0.002	0.027	90.0	85.8	9.740	131.490
03/10/2011	5870079.618	532553.546	481.553	9.80	-0.013	0.008	0.015	0.004	148.4	14.7	0.002	0.000	0.29	0.002	-0.001	0.002	-0.014	333.4	-80.9	-7.633	-47.790
28/11/2011	5870079.619	532553.540	481.557	9.95	-0.012	0.002	0.012	0.008	170.5	33.3	0.001	0.001	0.15	0.001	-0.006	0.006	0.004	279.5	33.3	-39.674	26.089
09/04/2012	5870079.612	532553.545	481.548	10.32	-0.019	0.007	0.020	-0.001	159.8	-2.8	0.002	0.000	0.36	-0.007	0.005	0.009	-0.009	144.5	-46.3	23.624	-24.716
12/07/2012	5870079.620	532553.542	481.582	10.57	-0.011	0.004	0.012	0.033	160.0	70.5	0.001	0.003	0.26	0.008	-0.003	0.009	0.034	339.4	75.9	-33.199	132.112
29/09/2012	5870079.625	532553.543	481.569	10.79	-0.006	0.005	0.008	0.020	140.2	68.7	0.001	0.002	0.22	0.005	0.001	0.005	-0.013	11.3	-68.6	-23.575	-60.104
10/12/2012	5870079.617	532553.551	481.553	10.99	-0.014	0.013	0.019	0.004	137.1	11.8	0.002	0.000	0.20	-0.008	0.008	0.011	-0.016	135.0	-54.7	57.394	-81.167
03/04/2013	5870079.621	532553.546	481.555	11.30	-0.010	0.008	0.013	0.006	141.3	25.1	0.001	0.001	0.31	0.004	-0.005	0.006	0.002	308.7	17.3	-20.515	6.408
12/07/2013	5870079.634	532553.538	481.607	11.57	0.003	0.000	0.003	0.058	0.0	87.0	0.000	0.005	0.27	0.013	-0.008	0.015	0.052	328.4	73.6	-55.753	189.930
04/10/2013	5870079.617	532553.523	481.600	11.80	-0.014	-0.015	0.021	0.051	227.0	68.1	0.002	0.004	0.23	-0.017	-0.015	0.023	-0.007	221.4	-17.2	98.581	-30.438
27/11/2013	5870079.619	532553.543	481.558	11.95	-0.012	0.005	0.013	0.009	157.4	34.7	0.001	0.001	0.15	0.002	0.020	0.020	-0.042	84.3	-64.4	-135.952	-284.083
10/04/2014	5870079.621	532553.547	481.557	12.32	-0.010	0.009	0.013	0.008	138.0	30.7	0.001	0.001	0.37	0.002	0.004	0.004	-0.001	63.4	-12.6	12.190	-2.726

West Quesnel Land Stability Program

GPS Hub 01-32 (Intersection of Lewis Drive and Beabien Avenue)

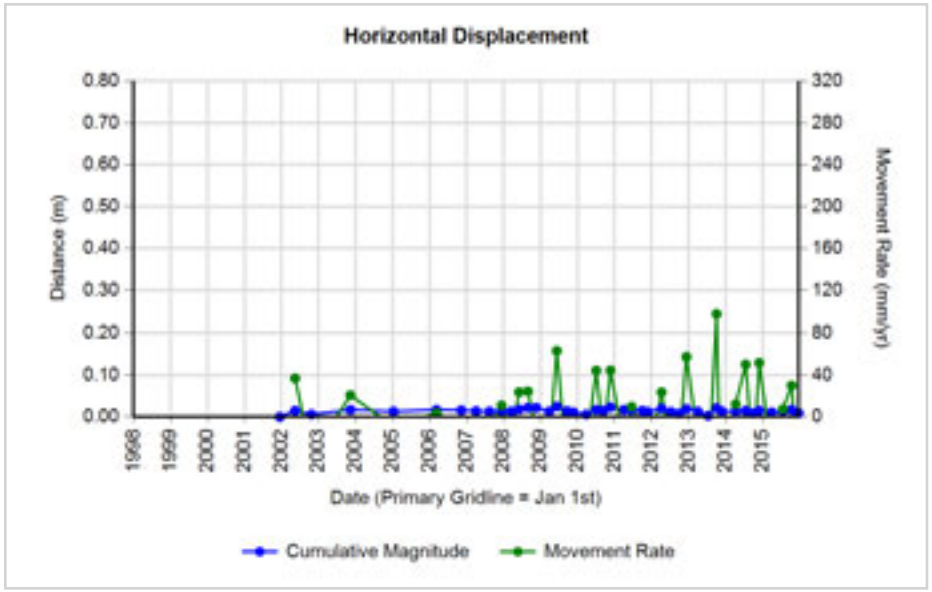
amec foster wheeler

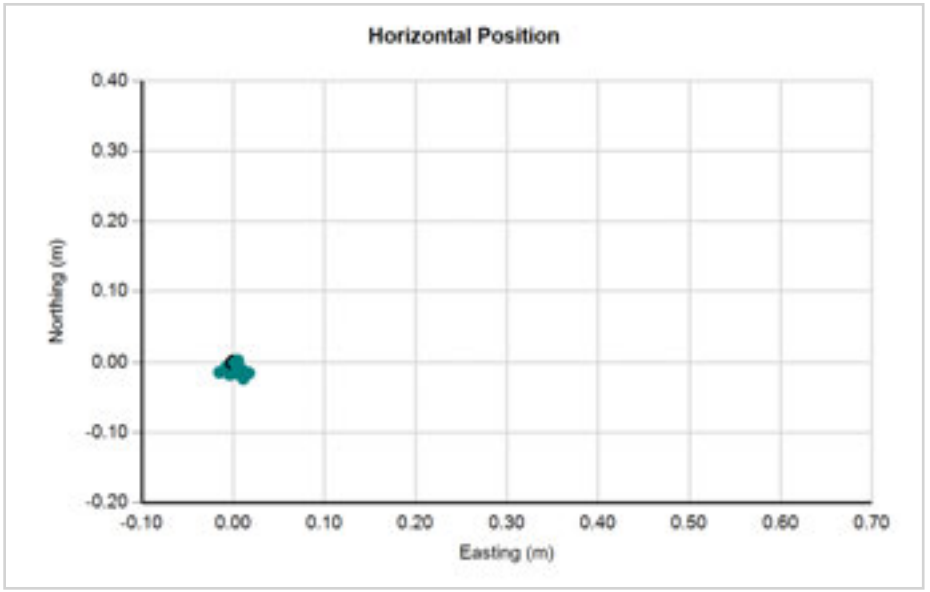
18/07/2014	5870079.617	532553.534	481.600	12.59	-0.014	-0.004	0.015	0.051	195.9	74.1	0.001	0.004	0.27	-0.004	-0.013	0.014	0.043	252.9	72.4	50.181	158.644
02/10/2014	5870079.625	532553.531	481.567	12.80	-0.006	-0.007	0.009	0.018	229.4	62.9	0.001	0.001	0.21	0.008	-0.003	0.009	-0.033	339.4	-75.5	-41.062	-158.595
28/11/2014	5870079.617	532553.532	481.559	12.95	-0.014	-0.006	0.015	0.010	203.2	33.3	0.001	0.001	0.16	-0.008	0.001	0.008	-0.008	172.9	-44.8	51.662	-51.263
01/04/2015	5870079.621	532553.543	481.561	13.29	-0.010	0.005	0.011	0.012	153.4	47.0	0.001	0.001	0.34	0.004	0.011	0.012	0.002	70.0	9.7	-34.477	5.891
20/07/2015	5870079.619	532553.542	481.568	13.59	-0.012	0.004	0.013	0.019	161.6	56.3	0.001	0.001	0.30	-0.002	-0.001	0.002	0.007	206.6	72.3	7.425	23.243
14/10/2015	5870079.614	532553.537	481.566	13.83	-0.017	-0.001	0.017	0.017	183.4	45.0	0.001	0.001	0.24	-0.005	-0.005	0.007	-0.002	225.0	-15.8	30.031	-8.494
22/12/2015	5870079.623	532553.543	481.559	14.02	-0.008	0.005	0.009	0.010	148.0	46.7	0.001	0.001	0.19	0.009	0.006	0.011	-0.007	33.7	-32.9	-57.258	-37.054

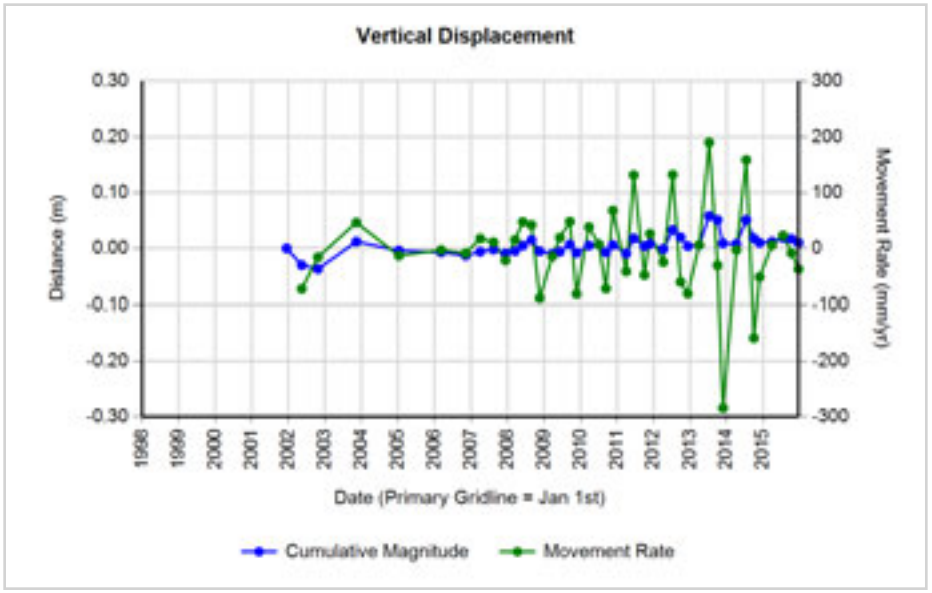
West Quesnel Land Stability Program

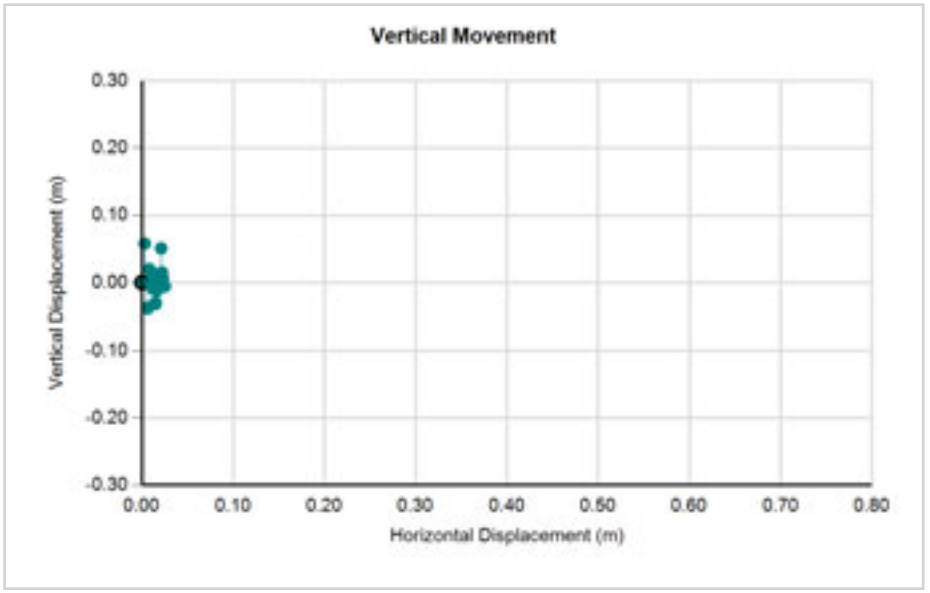
GPS Hub 01-32 (Intersection of Lewis Drive and Beabien Avenue)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 01-33 (South End of Allard Street)

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/12/2001	5869124.379	532245.960	495.342	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/05/2002	5869124.352	532245.998	495.329	0.41	-0.027	0.038	0.047	-0.013	125.4	-15.6	0.113	-0.031	0.41	-0.027	0.038	0.047	-0.013	125.4	-15.6	112.757	-31.445
24/10/2002	5869124.378	532245.999	495.304	0.86	-0.001	0.039	0.039	-0.038	91.5	-44.2	0.046	-0.044	0.44	0.026	0.001	0.026	-0.025	2.2	-43.9	-58.664	-56.366
12/11/2003	5869124.365	532246.002	495.322	1.91	-0.014	0.042	0.044	-0.020	108.0	-24.4	0.023	-0.010	1.05	-0.013	0.003	0.013	0.018	167.8	54.7	12.196	17.245
11/01/2005	5869124.368	532246.017	495.344	3.07	-0.011	0.057	0.058	0.002	100.9	1.7	0.019	0.001	1.17	0.003	0.015	0.015	0.022	80.6	54.3	13.279	18.494
10/03/2006	5869124.341	532246.061	495.330	4.23	-0.038	0.101	0.108	-0.012	110.6	-6.3	0.025	-0.003	1.16	-0.027	0.044	0.052	-0.014	121.5	-14.9	44.576	-11.830
10/11/2006	5869124.347	532246.075	495.325	4.90	-0.032	0.115	0.119	-0.017	105.5	-8.1	0.024	-0.003	0.67	0.006	0.014	0.015	-0.005	66.8	-18.2	22.707	-7.454
05/04/2007	5869124.345	532246.074	495.323	5.30	-0.034	0.114	0.119	-0.019	106.6	-9.1	0.022	-0.004	0.40	-0.002	-0.001	0.002	-0.002	206.6	-41.8	-5.594	-5.003
16/08/2007	5869124.330	532246.083	495.309	5.67	-0.049	0.123	0.132	-0.033	111.7	-14.0	0.023	-0.006	0.36	-0.015	0.009	0.017	-0.014	149.0	-38.7	48.040	-38.447
13/12/2007	5869124.338	532246.084	495.321	5.99	-0.041	0.124	0.131	-0.021	108.3	-9.1	0.022	-0.004	0.33	0.008	0.001	0.008	0.012	7.1	56.1	-24.746	36.832
18/03/2008	5869124.342	532246.081	495.326	6.26	-0.037	0.121	0.127	-0.016	107.0	-7.2	0.020	-0.003	0.26	0.004	-0.003	0.005	0.005	323.1	45.0	-19.023	19.023
03/06/2008	5869124.332	532246.109	495.334	6.47	-0.047	0.149	0.156	-0.008	107.5	-2.9	0.024	-0.001	0.21	-0.010	0.028	0.030	0.008	109.7	15.1	141.035	37.948
29/07/2008	5869124.323	532246.113	495.325	6.62	-0.056	0.153	0.163	-0.017	110.1	-6.0	0.025	-0.003	0.15	-0.009	0.004	0.010	-0.009	156.0	-42.4	64.237	-58.701
29/08/2008	5869124.327	532246.112	495.318	6.70	-0.052	0.152	0.161	-0.024	108.9	-8.5	0.024	-0.004	0.08	0.004	-0.001	0.004	-0.007	346.0	-59.5	-48.579	-82.476
19/11/2008	5869124.333	532246.111	495.314	6.93	-0.046	0.151	0.158	-0.028	106.9	-10.1	0.023	-0.004	0.22	0.006	-0.001	0.006	-0.004	350.5	-33.3	-27.094	-17.817
26/03/2009	5869124.334	532246.116	495.319	7.28	-0.045	0.156	0.162	-0.023	106.1	-8.1	0.022	-0.003	0.35	0.001	0.005	0.005	0.005	78.7	44.4	14.665	14.380
10/06/2009	5869124.318	532246.152	495.321	7.49	-0.061	0.192	0.201	-0.021	107.6	-6.0	0.027	-0.003	0.21	-0.016	0.036	0.039	0.002	114.0	2.9	189.331	9.612
17/09/2009	5869124.323	532246.149	495.318	7.76	-0.056	0.189	0.197	-0.024	106.5	-6.9	0.025	-0.003	0.27	0.005	-0.003	0.006	-0.003	329.0	-27.2	-21.513	-11.068
23/11/2009	5869124.321	532246.137	495.310	7.94	-0.058	0.177	0.186	-0.032	108.1	-9.7	0.023	-0.004	0.18	-0.002	-0.012	0.012	-0.008	260.5	-33.3	-66.320	-43.612
27/03/2010	5869124.323	532246.144	495.313	8.28	-0.056	0.184	0.192	-0.029	106.9	-8.6	0.023	-0.004	0.34	0.002	0.007	0.007	0.003	74.1	22.4	21.444	8.837
04/07/2010	5869124.309	532246.146	495.326	8.55	-0.070	0.186	0.199	-0.016	110.6	-4.6	0.023	-0.002	0.27	-0.014	0.002	0.014	0.013	171.9	42.6	52.176	47.962
13/09/2010	5869124.321	532246.146	495.320	8.74	-0.058	0.186	0.195	-0.022	107.3	-6.4	0.022	-0.003	0.19	0.012	0.000	0.012	-0.006	0.0	-26.6	-61.732	-30.866
22/11/2010	5869124.326	532246.151	495.314	8.94	-0.053	0.191	0.198	-0.028	105.5	-8.0	0.022	-0.003	0.19	0.005	0.005	0.007	-0.006	45.0	-40.3	36.896	-31.307
04/04/2011	5869124.321	532246.145	495.318	9.30	-0.058	0.185	0.194	-0.024	107.4	-7.1	0.021	-0.003	0.36	-0.005	-0.006	0.008	0.004	230.2	27.1	-21.449	10.985
18/06/2011	5869124.312	532246.159	495.332	9.51	-0.067	0.199	0.210	-0.010	108.6	-2.7	0.022	-0.001	0.21	-0.009	0.014	0.017	0.014	122.7	40.1	81.053	68.180
03/10/2011	5869124.321	532246.150	495.317	9.80	-0.058	0.190	0.199	-0.025	107.0	-7.2	0.020	-0.003	0.29	0.009	-0.009	0.013	-0.015	315.0	-49.7	-43.447	-51.203
28/11/2011	5869124.321	532246.152	495.311	9.95	-0.058	0.192	0.201	-0.031	106.8	-8.8	0.020	-0.003	0.15	0.000	0.002	0.002	-0.006	90.0	-71.6	13.045	-39.134
09/04/2012	5869124.317	532246.156	495.317	10.32	-0.062	0.196	0.206	-0.025	107.6	-6.9	0.020	-0.002	0.36	-0.004	0.004	0.006	0.006	135.0	46.7	15.535	16.477
12/07/2012	5869124.310	532246.174	495.328	10.57	-0.069	0.214	0.225	-0.014	107.9	-3.6	0.021	-0.001	0.26	-0.007	0.018	0.019	0.011	111.3	29.7	75.044	42.742
29/09/2012	5869124.320	532246.184	495.318	10.79	-0.059	0.224	0.232	-0.024	104.8	-5.9	0.021	-0.002	0.22	0.010	0.010	0.014	-0.010	45.0	-35.3	65.385	-46.234
10/12/2012	5869124.314	532246.176	495.317	10.99	-0.065	0.216	0.226	-0.025	106.7	-6.3	0.021	-0.002	0.20	-0.006	-0.008	0.010	-0.001	233.1	-5.7	-50.729	-5.073
03/04/2013	5869124.315	532246.177	495.318	11.30	-0.064	0.217	0.226	-0.024	106.4	-6.1	0.020	-0.002	0.31	0.001	0.001	0.001	0.001	45.0	35.3	4.531	3.204
12/07/2013	5869124.312	532246.185	495.329	11.57	-0.067	0.225	0.235	-0.013	106.6	-3.2	0.020	-0.001	0.27	-0.003	0.008	0.009	0.011	110.6	52.2	31.207	40.178
04/10/2013	5869124.311	532246.174	495.327	11.80	-0.068	0.214	0.225	-0.015	107.6	-3.8	0.019	-0.001	0.23	-0.001	-0.011	0.011	-0.002	264.8	-10.3	-48.028	-8.696
27/11/2013	5869124.315	532246.178	495.316	11.95	-0.064	0.218	0.227	-0.026	106.4	-6.5	0.019	-0.002	0.15	0.004	0.004	0.006	-0.011	45.0	-62.8	38.262	-74.403

West Quesnel Land Stability Program

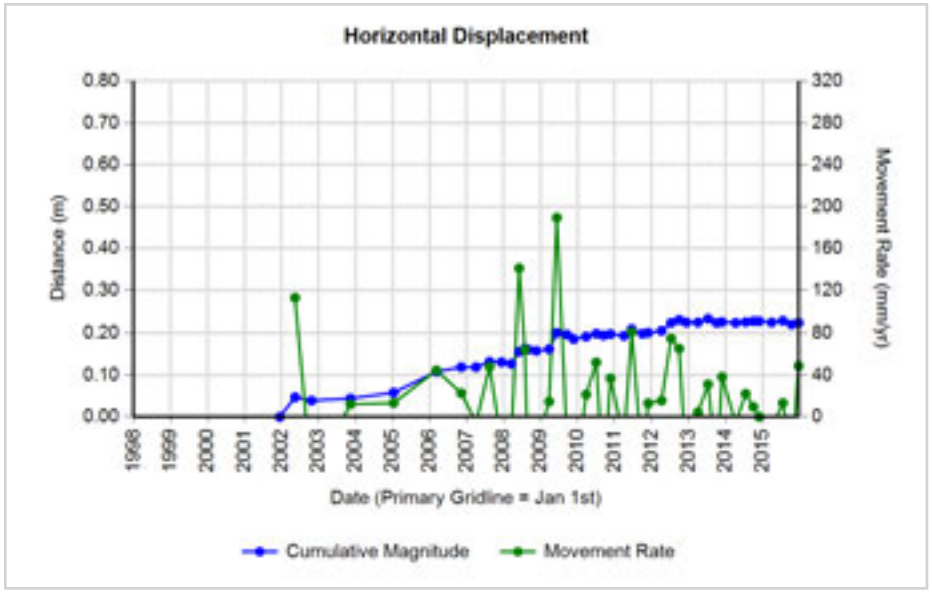
GPS Hub 01-33 (South End of Allard Street)

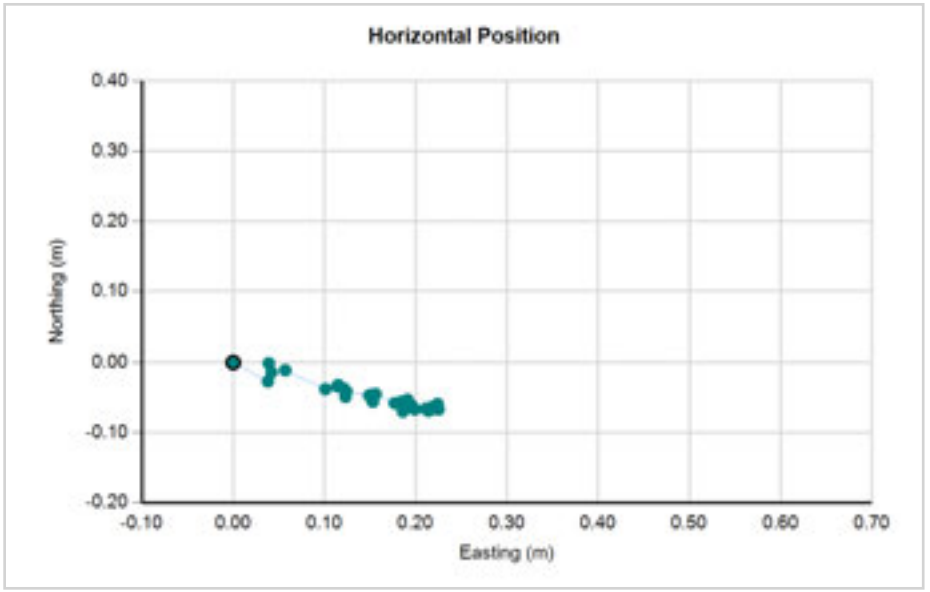
10/04/2014	5869124.316	532246.176	495.316	12.32	-0.063	0.216	0.225	-0.026	106.3	-6.6	0.018	-0.002	0.37	0.001	-0.002	0.002	0.000	296.6	0.0	-6.095	0.000
18/07/2014	5869124.310	532246.176	495.329	12.59	-0.069	0.216	0.227	-0.013	107.7	-3.3	0.018	-0.001	0.27	-0.006	0.000	0.006	0.013	180.0	65.2	22.136	47.962
02/10/2014	5869124.310	532246.178	495.312	12.80	-0.069	0.218	0.229	-0.030	107.6	-7.5	0.018	-0.002	0.21	0.000	0.002	0.002	-0.017	90.0	-83.3	9.612	-81.701
28/11/2014	5869124.310	532246.178	495.304	12.95	-0.069	0.218	0.229	-0.038	107.6	-9.4	0.018	-0.003	0.16	0.000	0.000	0.000	-0.008	90.0	-90.0	0.000	-51.263
01/04/2015	5869124.313	532246.176	495.315	13.29	-0.066	0.216	0.226	-0.027	107.0	-6.8	0.017	-0.002	0.34	0.003	-0.002	0.004	0.011	326.3	71.9	-10.620	32.401
20/07/2015	5869124.313	532246.180	495.320	13.59	-0.066	0.220	0.230	-0.022	106.7	-5.5	0.017	-0.002	0.30	0.000	0.004	0.004	0.005	90.0	51.3	13.282	16.602
14/10/2015	5869124.313	532246.171	495.312	13.83	-0.066	0.211	0.221	-0.030	107.4	-7.7	0.016	-0.002	0.24	0.000	-0.009	0.009	-0.008	270.0	-41.6	-38.224	-33.977
22/12/2015	5869124.320	532246.177	495.308	14.02	-0.059	0.217	0.225	-0.034	105.2	-8.6	0.016	-0.002	0.19	0.007	0.006	0.009	-0.004	40.6	-23.5	48.803	-21.174

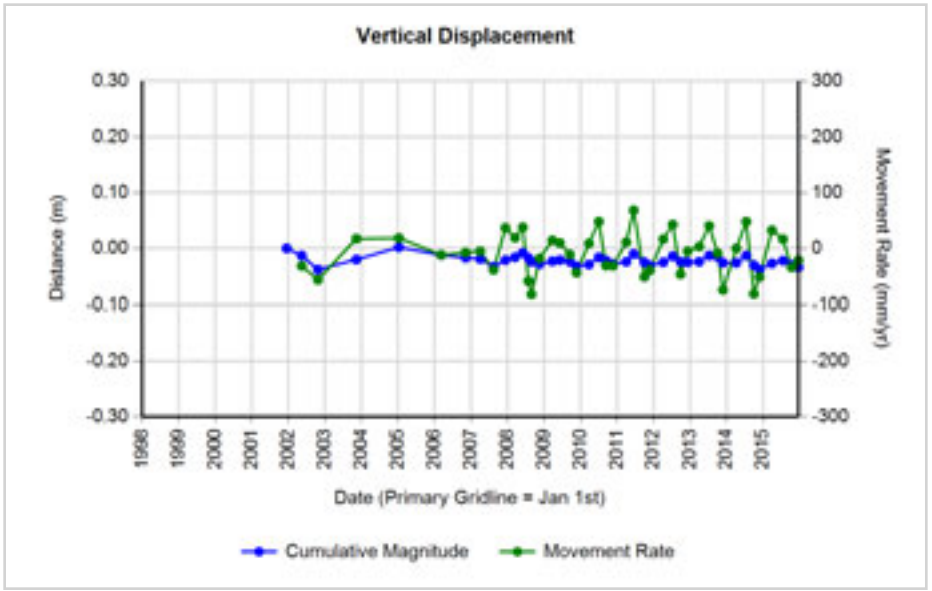
West Quesnel Land Stability Program

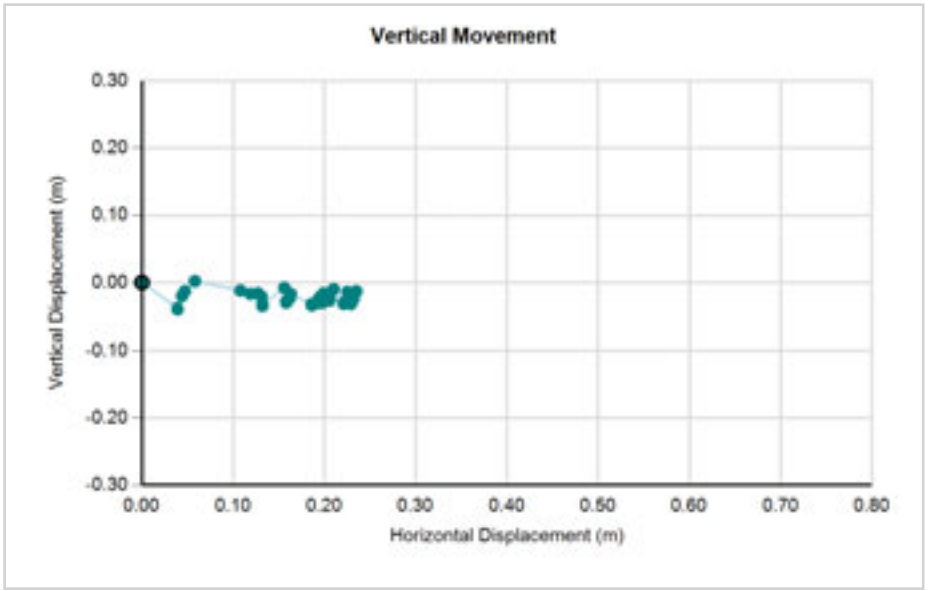
GPS Hub 01-33 (South End of Allard Street)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 01-34 (Abbott Road and Blair Street)

amec foster wheeler

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/12/2001	5869581.862	532354.652	494.462	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/05/2002	5869581.832	532354.679	494.423	0.41	-0.030	0.027	0.040	-0.039	138.0	-44.0	0.098	-0.094	0.41	-0.030	0.027	0.040	-0.039	138.0	-44.0	97.628	-94.336
24/10/2002	5869581.848	532354.695	494.407	0.86	-0.014	0.043	0.045	-0.055	108.0	-50.6	0.053	-0.064	0.44	0.016	0.016	0.023	-0.016	45.0	-35.3	51.016	-36.074
12/11/2003	5869581.840	532354.709	494.425	1.91	-0.022	0.057	0.061	-0.037	110.8	-31.2	0.032	-0.019	1.05	-0.008	0.014	0.016	0.018	118.6	47.4	15.595	16.988
11/01/2005	5869581.838	532354.726	494.434	3.07	-0.024	0.074	0.078	-0.028	108.1	-19.6	0.025	-0.009	1.17	-0.002	0.017	0.017	0.009	98.1	29.4	14.376	8.094
10/03/2006	5869581.814	532354.794	494.411	4.23	-0.048	0.142	0.150	-0.051	108.7	-18.8	0.035	-0.012	1.16	-0.024	0.068	0.072	-0.023	109.3	-17.9	62.209	-20.119
10/11/2006	5869581.813	532354.805	494.407	4.90	-0.049	0.153	0.161	-0.055	107.8	-18.9	0.033	-0.011	0.67	-0.001	0.011	0.011	-0.004	95.2	-19.9	16.467	-5.963
05/04/2007	5869581.805	532354.814	494.403	5.30	-0.057	0.162	0.172	-0.059	109.4	-19.0	0.032	-0.011	0.40	-0.008	0.009	0.012	-0.004	131.6	-18.4	30.125	-10.007
16/08/2007	5869581.805	532354.825	494.403	5.67	-0.057	0.173	0.182	-0.059	108.2	-17.9	0.032	-0.010	0.36	0.000	0.011	0.011	0.000	90.0	0.0	30.209	0.000
13/12/2007	5869581.807	532354.828	494.392	5.99	-0.055	0.176	0.184	-0.070	107.4	-20.8	0.031	-0.012	0.33	0.002	0.003	0.004	-0.011	56.3	-71.9	11.067	-33.763
18/03/2008	5869581.805	532354.830	494.406	6.26	-0.057	0.178	0.187	-0.056	107.8	-16.7	0.030	-0.009	0.26	-0.002	0.002	0.003	0.014	135.0	78.6	10.761	53.266
03/06/2008	5869581.795	532354.857	494.400	6.47	-0.067	0.205	0.216	-0.062	108.1	-16.0	0.033	-0.010	0.21	-0.010	0.027	0.029	-0.006	110.3	-11.8	136.577	-28.461
29/08/2008	5869581.794	532354.868	494.398	6.70	-0.068	0.216	0.226	-0.064	107.5	-15.8	0.034	-0.010	0.24	-0.001	0.011	0.011	-0.002	95.2	-10.3	46.371	-8.397
19/11/2008	5869581.794	532354.865	494.390	6.93	-0.068	0.213	0.224	-0.072	107.7	-17.8	0.032	-0.010	0.22	0.000	-0.003	0.003	-0.008	270.0	-69.4	-13.363	-35.634
26/03/2009	5869581.792	532354.870	494.389	7.28	-0.070	0.218	0.229	-0.073	107.8	-17.7	0.031	-0.010	0.35	-0.002	0.005	0.005	-0.001	111.8	-10.5	15.488	-2.876
10/06/2009	5869581.771	532354.910	494.386	7.49	-0.091	0.258	0.274	-0.076	109.4	-15.5	0.037	-0.010	0.21	-0.021	0.040	0.045	-0.003	117.7	-3.8	217.119	-14.418
17/09/2009	5869581.774	532354.908	494.388	7.76	-0.088	0.256	0.271	-0.074	109.0	-15.3	0.035	-0.010	0.27	0.003	-0.002	0.004	0.002	326.3	29.0	-13.302	7.379
23/11/2009	5869581.782	532354.902	494.386	7.94	-0.080	0.250	0.262	-0.076	107.7	-16.1	0.033	-0.010	0.18	0.008	-0.006	0.010	-0.002	323.1	-11.3	-54.515	-10.903
27/03/2010	5869581.774	532354.910	494.375	8.28	-0.088	0.258	0.273	-0.087	108.8	-17.7	0.033	-0.011	0.34	-0.008	0.008	0.011	-0.011	135.0	-44.2	33.325	-32.401
04/07/2010	5869581.768	532354.910	494.383	8.55	-0.094	0.258	0.275	-0.079	110.0	-16.1	0.032	-0.009	0.27	-0.006	0.000	0.006	0.008	180.0	53.1	22.136	29.515
13/09/2010	5869581.784	532354.918	494.398	8.74	-0.078	0.266	0.277	-0.064	106.3	-13.0	0.032	-0.007	0.19	0.016	0.008	0.018	0.015	26.6	40.0	92.025	77.165
22/11/2010	5869581.775	532354.919	494.380	8.94	-0.087	0.267	0.281	-0.082	108.0	-16.3	0.031	-0.009	0.19	-0.009	0.001	0.009	-0.018	173.7	-63.3	47.250	-93.921
04/04/2011	5869581.774	532354.914	494.375	9.30	-0.088	0.262	0.276	-0.087	108.6	-17.5	0.030	-0.009	0.36	-0.001	-0.005	0.005	-0.005	258.7	-44.4	-14.003	-13.731
18/06/2011	5869581.768	532354.931	494.381	9.51	-0.094	0.279	0.294	-0.081	108.6	-15.4	0.031	-0.009	0.21	-0.006	0.017	0.018	0.006	109.4	18.4	87.795	29.220
03/10/2011	5869581.769	532354.925	494.375	9.80	-0.093	0.273	0.288	-0.087	108.8	-16.8	0.029	-0.009	0.29	0.001	-0.006	0.006	-0.006	279.5	-44.6	-20.764	-20.481
28/11/2011	5869581.773	532354.923	494.376	9.95	-0.089	0.271	0.285	-0.086	108.2	-16.8	0.029	-0.009	0.15	0.004	-0.002	0.004	0.001	333.4	12.6	-29.169	6.522
09/04/2012	5869581.765	532354.934	494.372	10.32	-0.097	0.282	0.298	-0.090	109.0	-16.8	0.029	-0.009	0.36	-0.008	0.011	0.014	-0.004	126.0	-16.4	37.353	-10.985
12/07/2012	5869581.762	532354.953	494.386	10.57	-0.100	0.301	0.317	-0.076	108.4	-13.5	0.030	-0.007	0.26	-0.003	0.019	0.019	0.014	99.0	36.0	74.742	54.399
29/09/2012	5869581.766	532354.965	494.374	10.79	-0.096	0.313	0.327	-0.088	107.1	-15.0	0.030	-0.008	0.22	0.004	0.012	0.013	-0.012	71.6	-43.5	58.482	-55.481
10/12/2012	5869581.759	532354.954	494.376	10.99	-0.103	0.302	0.319	-0.086	108.8	-15.1	0.029	-0.008	0.20	-0.007	-0.011	0.013	0.002	237.5	8.7	-66.143	10.146
03/04/2013	5869581.761	532354.960	494.377	11.30	-0.101	0.308	0.324	-0.085	108.2	-14.7	0.029	-0.008	0.31	0.002	0.006	0.006	0.001	71.6	9.0	20.264	3.204
12/07/2013	5869581.759	532354.969	494.379	11.57	-0.103	0.317	0.333	-0.083	108.0	-14.0	0.029	-0.007	0.27	-0.002	0.009	0.009	0.002	102.5	12.2	33.674	7.305
04/10/2013	5869581.759	532354.957	494.385	11.80	-0.103	0.305	0.322	-0.077	108.7	-13.5	0.027	-0.007	0.23	0.000	-0.012	0.012	0.006	270.0	26.6	-52.179	26.089
27/11/2013	5869581.759	532354.959	494.375	11.95	-0.103	0.307	0.324	-0.087	108.5	-15.0	0.027	-0.007	0.15	0.000	0.002	0.002	-0.010	90.0	-78.7	13.528	-67.639
10/04/2014	5869581.758	532354.963	494.371	12.32	-0.104	0.311	0.328	-0.091	108.5	-15.5	0.027	-0.007	0.37	-0.001	0.004	0.004	-0.004	104.0	-44.1	11.239	-10.903

West Quesnel Land Stability Program

GPS Hub 01-34 (Abbott Road and Blair Street)

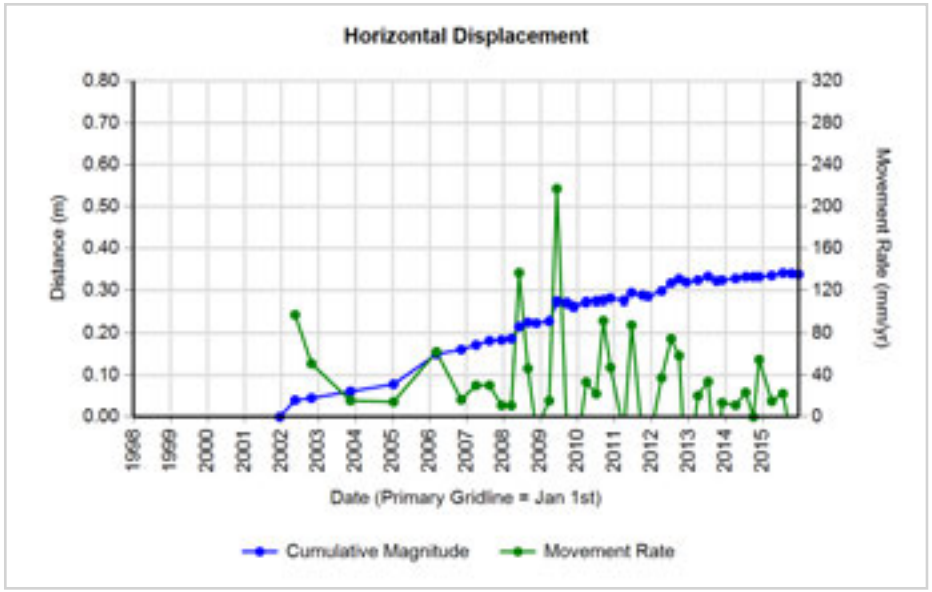
amec foster wheeler

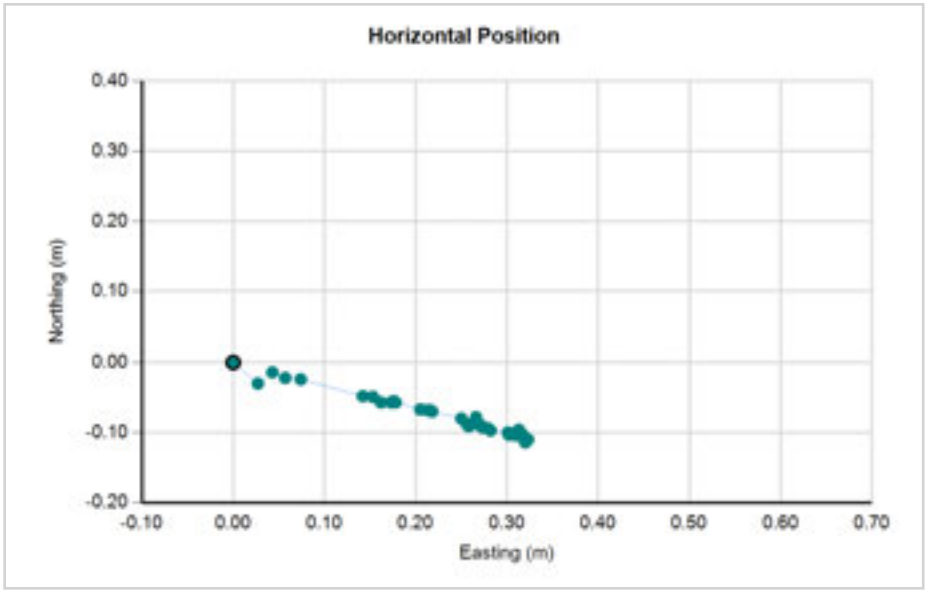
18/07/2014	5869581.752	532354.965	494.377	12.59	-0.110	0.313	0.332	-0.085	109.4	-14.4	0.026	-0.007	0.27	-0.006	0.002	0.006	0.006	161.6	43.5	23.334	22.136
02/10/2014	5869581.752	532354.965	494.367	12.80	-0.110	0.313	0.332	-0.095	109.4	-16.0	0.026	-0.007	0.21	0.000	0.000	0.000	-0.010	0.0	0.0	0.000	-48.059
28/11/2014	5869581.760	532354.968	494.371	12.95	-0.102	0.316	0.332	-0.091	107.9	-15.3	0.026	-0.007	0.16	0.008	0.003	0.009	0.004	20.6	25.1	54.749	25.632
01/04/2015	5869581.755	532354.969	494.369	13.29	-0.107	0.317	0.335	-0.093	108.7	-15.5	0.025	-0.007	0.34	-0.005	0.001	0.005	-0.002	168.7	-21.4	15.019	-5.891
20/07/2015	5869581.752	532354.975	494.376	13.59	-0.110	0.323	0.341	-0.086	108.8	-14.1	0.025	-0.006	0.30	-0.003	0.006	0.007	0.007	116.6	46.2	22.274	23.243
14/10/2015	5869581.748	532354.972	494.363	13.83	-0.114	0.320	0.340	-0.099	109.6	-16.2	0.025	-0.007	0.24	-0.004	-0.003	0.005	-0.013	216.9	-69.0	-21.235	-55.212
22/12/2015	5869581.764	532354.975	494.364	14.02	-0.098	0.323	0.338	-0.098	106.9	-16.2	0.024	-0.007	0.19	0.016	0.003	0.016	0.001	10.6	3.5	-86.172	5.293

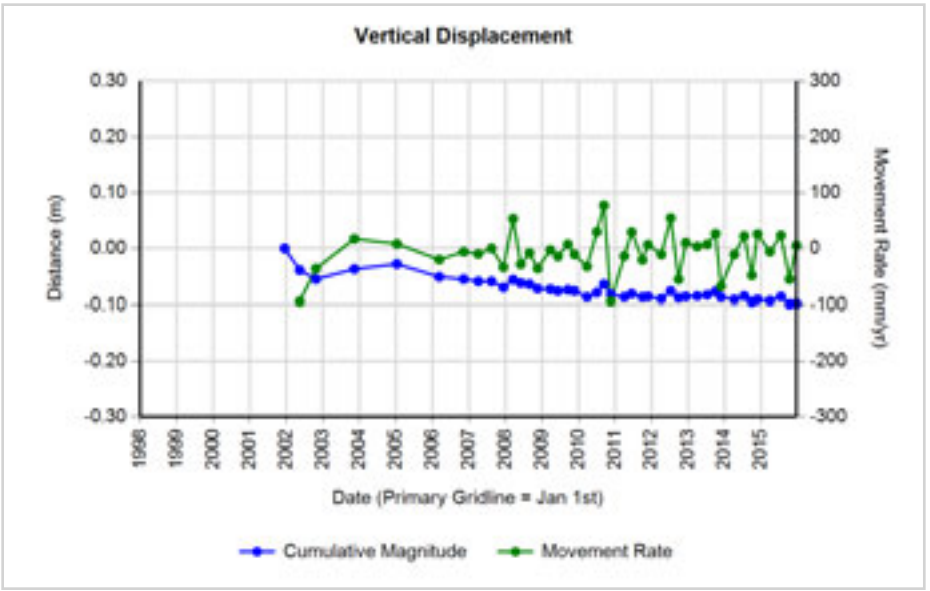
West Quesnel Land Stability Program

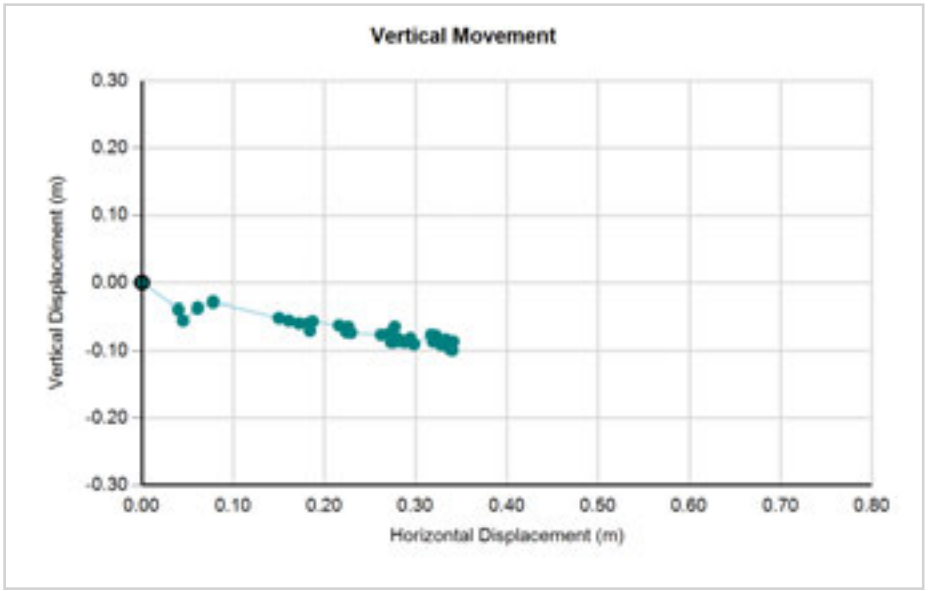
GPS Hub 01-34 (Abbott Road and Blair Street)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 01-35 (Lewis Drive North of Couldwell Street)

amec foster wheeler

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/12/2001	5869572.261	532863.710	473.090	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/05/2002	5869572.217	532863.733	473.093	0.41	-0.044	0.023	0.050	0.003	152.4	3.5	0.120	0.007	0.41	-0.044	0.023	0.050	0.003	152.4	3.5	120.094	7.257
24/10/2002	5869572.284	532863.719	473.019	0.86	0.023	0.009	0.025	-0.071	21.4	-70.8	0.029	-0.083	0.44	0.067	-0.014	0.068	-0.074	348.2	-47.2	-154.323	-166.843
12/11/2003	5869572.241	532863.717	473.076	1.91	-0.020	0.007	0.021	-0.014	160.8	-32.9	0.011	-0.007	1.05	-0.043	-0.002	0.043	0.057	182.7	53.1	-40.918	54.521
11/01/2005	5869572.256	532863.720	473.093	3.07	-0.005	0.010	0.011	0.003	117.5	14.2	0.004	0.001	1.17	0.015	0.003	0.015	0.017	12.5	47.8	-12.881	14.216
10/03/2006	5869572.252	532863.717	473.087	4.23	-0.009	0.007	0.011	-0.003	142.1	-14.7	0.003	-0.001	1.16	-0.004	-0.003	0.005	-0.006	220.9	-50.3	4.224	-5.095
10/11/2006	5869572.250	532863.721	473.087	4.90	-0.011	0.011	0.016	-0.003	135.0	-10.9	0.003	-0.001	0.67	-0.002	0.004	0.004	0.000	116.6	0.0	6.667	0.000
05/04/2007	5869572.252	532863.721	473.085	5.30	-0.009	0.011	0.014	-0.005	129.3	-19.4	0.003	-0.001	0.40	0.002	0.000	0.002	-0.002	0.0	-45.0	-5.003	-5.003
16/08/2007	5869572.247	532863.717	473.113	5.67	-0.014	0.007	0.016	0.023	153.4	55.8	0.003	0.004	0.36	-0.005	-0.004	0.006	0.028	218.7	77.1	17.585	76.895
13/12/2007	5869572.257	532863.714	473.076	5.99	-0.004	0.004	0.006	-0.014	135.0	-68.0	0.001	-0.002	0.33	0.010	-0.003	0.010	-0.037	343.3	-74.2	-32.045	-113.565
18/03/2008	5869572.253	532863.717	473.089	6.26	-0.008	0.007	0.011	-0.001	138.8	-5.4	0.002	0.000	0.26	-0.004	0.003	0.005	0.013	143.1	69.0	19.023	49.461
03/06/2008	5869572.250	532863.718	473.094	6.47	-0.011	0.008	0.014	0.004	144.0	16.4	0.002	0.001	0.21	-0.003	0.001	0.003	0.005	161.6	57.7	15.000	23.718
29/08/2008	5869572.251	532863.712	473.114	6.70	-0.010	0.002	0.010	0.024	168.7	67.0	0.002	0.004	0.24	0.001	-0.006	0.006	0.020	279.5	73.1	-25.537	83.966
19/11/2008	5869572.258	532863.719	473.087	6.93	-0.003	0.009	0.009	-0.003	108.4	-17.5	0.001	0.000	0.22	0.007	0.007	0.010	-0.027	45.0	-69.9	-44.095	-120.265
26/03/2009	5869572.250	532863.717	473.090	7.28	-0.011	0.007	0.013	0.000	147.5	0.0	0.002	0.000	0.35	-0.008	-0.002	0.008	0.003	194.0	20.0	23.716	8.628
10/06/2009	5869572.247	532863.722	473.099	7.49	-0.014	0.012	0.018	0.009	139.4	26.0	0.002	0.001	0.21	-0.003	0.005	0.006	0.009	121.0	57.1	28.023	43.253
17/09/2009	5869572.246	532863.720	473.100	7.76	-0.015	0.010	0.018	0.010	146.3	29.0	0.002	0.001	0.27	-0.001	-0.002	0.002	0.001	243.4	24.1	8.250	3.689
23/11/2009	5869572.262	532863.717	473.093	7.94	0.001	0.007	0.007	0.003	81.9	23.0	0.001	0.000	0.18	0.016	-0.003	0.016	-0.007	349.4	-23.3	-88.744	-38.160
27/03/2010	5869572.261	532863.713	473.085	8.28	0.000	0.003	0.003	-0.005	90.0	-59.0	0.000	-0.001	0.34	-0.001	-0.004	0.004	-0.008	256.0	-62.7	-12.145	-23.565
04/07/2010	5869572.247	532863.721	473.078	8.55	-0.014	0.011	0.018	-0.012	141.8	-34.0	0.002	-0.001	0.27	-0.014	0.008	0.016	-0.007	150.3	-23.5	59.490	-25.826
13/09/2010	5869572.255	532863.723	473.097	8.74	-0.006	0.013	0.014	0.007	114.8	26.1	0.002	0.001	0.19	0.008	0.002	0.008	0.019	14.0	66.5	-42.422	97.743
22/11/2010	5869572.253	532863.724	473.084	8.94	-0.008	0.014	0.016	-0.006	119.7	-20.4	0.002	-0.001	0.19	-0.002	0.001	0.002	-0.013	153.4	-80.2	11.667	-67.832
04/04/2011	5869572.263	532863.717	473.076	9.30	0.002	0.007	0.007	-0.014	74.1	-62.5	0.001	-0.002	0.36	0.010	-0.007	0.012	-0.008	325.0	-33.2	-33.522	-21.970
18/06/2011	5869572.247	532863.722	473.104	9.51	-0.014	0.012	0.018	0.014	139.4	37.2	0.002	0.001	0.21	-0.016	0.005	0.017	0.028	162.6	59.1	81.636	136.360
03/10/2011	5869572.254	532863.718	473.094	9.80	-0.007	0.008	0.011	0.004	131.2	20.6	0.001	0.000	0.29	0.007	-0.004	0.008	-0.010	330.3	-51.1	-27.521	-34.136
28/11/2011	5869572.261	532863.723	473.087	9.95	0.000	0.013	0.013	-0.003	90.0	-13.0	0.001	0.000	0.15	0.007	0.005	0.009	-0.007	35.5	-39.1	56.107	-45.656
09/04/2012	5869572.249	532863.719	473.081	10.32	-0.012	0.009	0.015	-0.009	143.1	-31.0	0.001	-0.001	0.36	-0.012	-0.004	0.013	-0.006	198.4	-25.4	34.738	-16.477
12/07/2012	5869572.253	532863.721	473.101	10.57	-0.008	0.011	0.014	0.011	126.0	39.0	0.001	0.001	0.26	0.004	0.002	0.004	0.020	26.6	77.4	-17.377	77.713
29/09/2012	5869572.263	532863.723	473.092	10.79	0.002	0.013	0.013	0.002	81.3	8.6	0.001	0.000	0.22	0.010	0.002	0.010	-0.009	11.3	-41.4	-47.150	-41.611
10/12/2012	5869572.263	532863.716	473.089	10.99	0.002	0.006	0.006	-0.001	71.6	-9.0	0.001	0.000	0.20	0.000	-0.007	0.007	-0.003	270.0	-23.2	-35.510	-15.219
03/04/2013	5869572.256	532863.720	473.093	11.30	-0.005	0.010	0.011	0.003	116.6	15.0	0.001	0.000	0.31	-0.007	0.004	0.008	0.004	150.3	26.4	25.831	12.816
12/07/2013	5869572.256	532863.722	473.110	11.57	-0.005	0.012	0.013	0.020	112.6	57.0	0.001	0.002	0.27	0.000	0.002	0.002	0.017	90.0	83.3	7.305	62.092
04/10/2013	5869572.255	532863.722	473.105	11.80	-0.006	0.012	0.013	0.015	116.6	48.2	0.001	0.001	0.23	-0.001	0.000	0.001	-0.005	180.0	-78.7	4.348	-21.741
27/11/2013	5869572.262	532863.727	473.088	11.95	0.001	0.017	0.017	-0.002	86.6	-6.7	0.001	0.000	0.15	0.007	0.005	0.009	-0.017	35.5	-63.2	58.185	-114.986
10/04/2014	5869572.257	532863.724	473.092	12.32	-0.004	0.014	0.015	0.002	105.9	7.8	0.001	0.000	0.37	-0.005	-0.003	0.006	0.004	211.0	34.4	-15.894	10.903

West Quesnel Land Stability Program

GPS Hub 01-35 (Lewis Drive North of Couldwell Street)

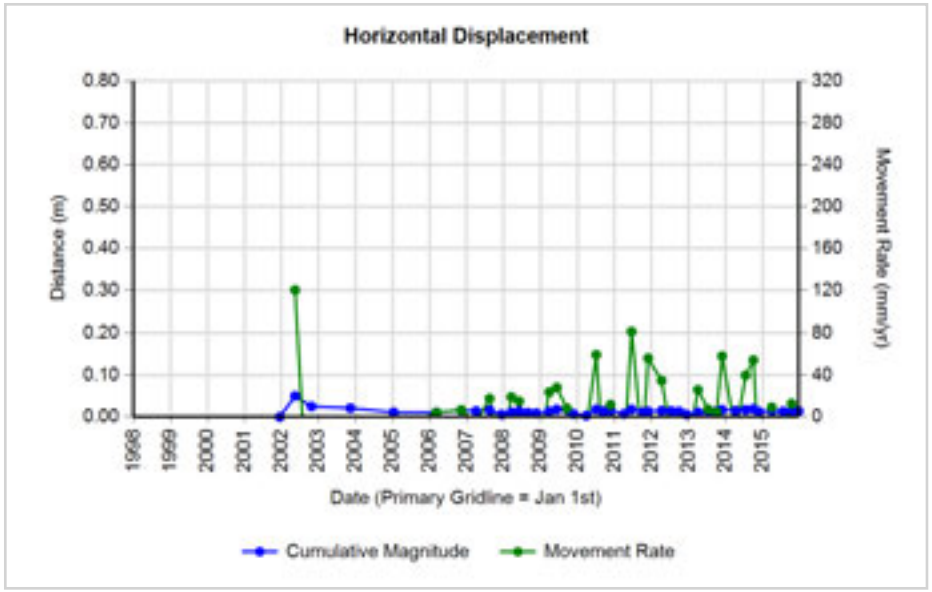
amec foster wheeler

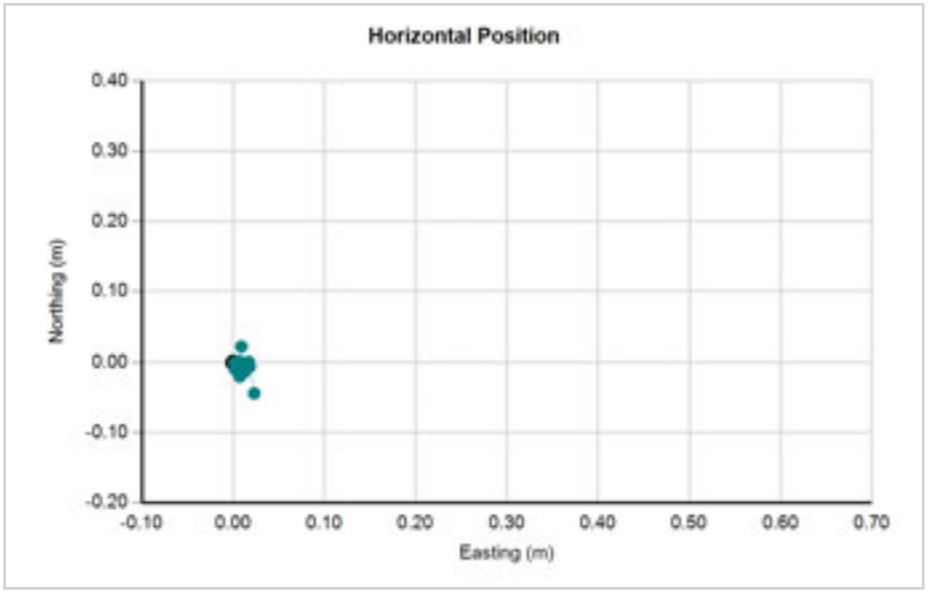
18/07/2014	5869572.247	532863.720	473.108	12.59	-0.014	0.010	0.017	0.018	144.5	46.3	0.001	0.001	0.27	-0.010	-0.004	0.011	0.016	201.8	56.1	39.736	59.030
02/10/2014	5869572.255	532863.728	473.080	12.80	-0.006	0.018	0.019	-0.010	108.4	-27.8	0.001	-0.001	0.21	0.008	0.008	0.011	-0.028	45.0	-68.0	54.373	-134.566
28/11/2014	5869572.256	532863.721	473.096	12.95	-0.005	0.011	0.012	0.006	114.4	26.4	0.001	0.000	0.16	0.001	-0.007	0.007	0.016	278.1	66.2	-45.311	102.526
01/04/2015	5869572.257	532863.724	473.088	13.29	-0.004	0.014	0.015	-0.002	105.9	-7.8	0.001	0.000	0.34	0.001	0.003	0.003	-0.008	71.6	-68.4	9.315	-23.565
20/07/2015	5869572.254	532863.721	473.094	13.59	-0.007	0.011	0.013	0.004	122.5	17.1	0.001	0.000	0.30	-0.003	-0.003	0.004	0.006	225.0	54.7	-14.087	19.923
14/10/2015	5869572.251	532863.721	473.088	13.83	-0.010	0.011	0.015	-0.002	132.3	-7.7	0.001	0.000	0.24	-0.003	0.000	0.003	-0.006	180.0	-63.4	12.741	-25.483
22/12/2015	5869572.260	532863.724	473.077	14.02	-0.001	0.014	0.014	-0.013	94.1	-42.8	0.001	-0.001	0.19	0.009	0.003	0.009	-0.011	18.4	-49.2	-50.218	-58.228

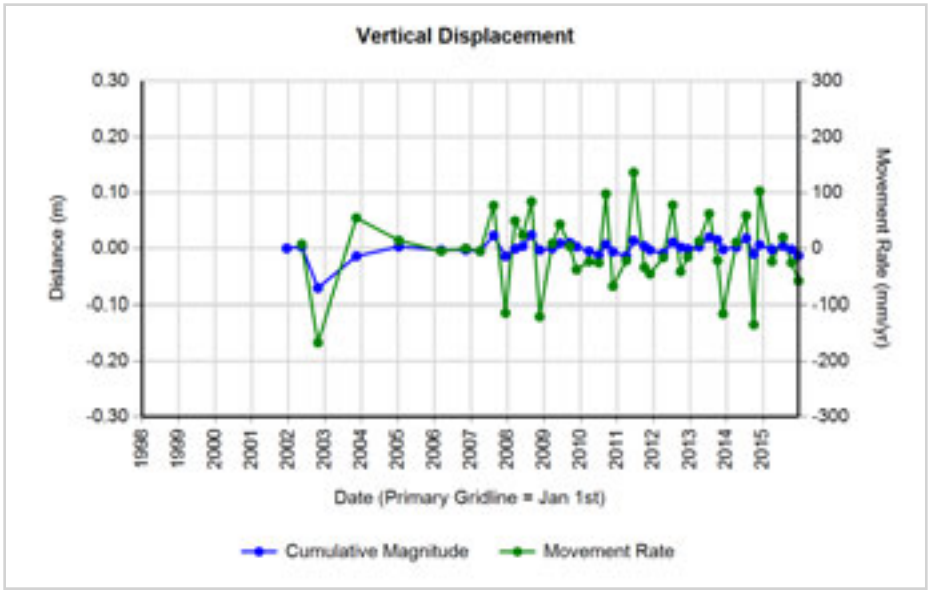
West Quesnel Land Stability Program

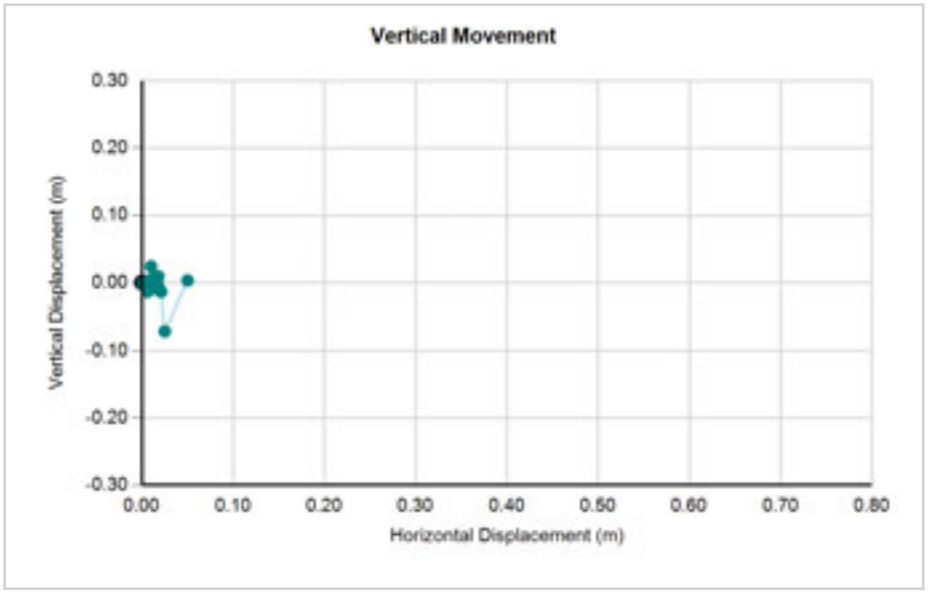
GPS Hub 01-35 (Lewis Drive North of Couldwell Street)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 01-36 (Anderson Drive at Abbott Drive)

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/12/2001	5869315.625	532692.784	476.837	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/05/2002	5869315.619	532692.818	476.814	0.41	-0.006	0.034	0.035	-0.023	100.0	-33.7	0.084	-0.056	0.41	-0.006	0.034	0.035	-0.023	100.0	-33.7	83.512	-55.634
24/10/2002	5869315.641	532692.787	476.793	0.86	0.016	0.003	0.016	-0.044	10.6	-69.7	0.019	-0.051	0.44	0.022	-0.031	0.038	-0.021	305.4	-28.9	-85.706	-47.347
12/11/2003	5869315.631	532692.792	476.822	1.91	0.006	0.008	0.010	-0.015	56.7	-56.4	0.005	-0.008	1.05	-0.010	0.005	0.012	0.029	152.2	67.7	-11.203	27.299
11/01/2005	5869315.625	532692.801	476.820	3.07	0.000	0.017	0.018	-0.017	88.7	-45.0	0.006	-0.006	1.17	-0.005	0.009	0.010	-0.002	119.9	-12.0	8.911	-1.886
10/03/2006	5869315.629	532692.794	476.820	4.23	0.004	0.010	0.011	-0.017	68.2	-57.6	0.003	-0.004	1.16	0.004	-0.007	0.008	0.000	295.6	3.4	-7.183	0.432
10/11/2006	5869315.631	532692.795	476.818	4.90	0.006	0.011	0.013	-0.019	61.4	-56.6	0.003	-0.004	0.67	0.002	0.001	0.002	-0.002	26.6	-41.8	3.334	-2.982
05/04/2007	5869315.629	532692.800	476.808	5.30	0.004	0.016	0.016	-0.029	76.0	-60.4	0.003	-0.005	0.40	-0.002	0.005	0.005	-0.010	111.8	-61.7	13.472	-25.017
16/08/2007	5869315.623	532692.792	476.832	5.67	-0.002	0.008	0.008	-0.005	104.0	-31.2	0.001	-0.001	0.36	-0.006	-0.008	0.010	0.024	233.1	67.4	-27.462	65.910
13/12/2007	5869315.633	532692.796	476.811	5.99	0.008	0.012	0.014	-0.026	56.3	-61.0	0.002	-0.004	0.33	0.010	0.004	0.011	-0.021	21.8	-62.8	33.058	-64.456
18/03/2008	5869315.631	532692.796	476.825	6.26	0.006	0.012	0.013	-0.012	63.4	-41.8	0.002	-0.002	0.26	-0.002	0.000	0.002	0.014	180.0	81.9	-7.609	53.266
03/06/2008	5869315.629	532692.796	476.817	6.47	0.004	0.012	0.013	-0.020	71.6	-57.7	0.002	-0.003	0.21	-0.002	0.000	0.002	-0.008	180.0	-76.0	-9.487	-37.948
29/08/2008	5869315.629	532692.793	476.823	6.70	0.004	0.009	0.010	-0.014	66.0	-54.9	0.001	-0.002	0.24	0.000	-0.003	0.003	0.006	270.0	63.4	-12.595	25.190
19/11/2008	5869315.631	532692.797	476.812	6.93	0.006	0.013	0.014	-0.025	65.2	-60.2	0.002	-0.004	0.22	0.002	0.004	0.004	-0.011	63.4	-67.9	19.920	-48.997
26/03/2009	5869315.632	532692.799	476.814	7.28	0.007	0.015	0.017	-0.023	65.0	-54.3	0.002	-0.003	0.35	0.001	0.002	0.002	0.002	63.4	41.8	6.431	5.752
10/06/2009	5869315.628	532692.796	476.825	7.49	0.003	0.012	0.012	-0.012	76.0	-44.1	0.002	-0.002	0.21	-0.004	-0.003	0.005	0.011	216.9	65.6	-24.030	52.865
17/09/2009	5869315.624	532692.792	476.811	7.76	-0.001	0.008	0.008	-0.026	97.1	-72.8	0.001	-0.003	0.27	-0.004	-0.004	0.006	-0.014	225.0	-68.0	-20.870	-51.652
23/11/2009	5869315.634	532692.798	476.813	7.94	0.009	0.014	0.017	-0.024	57.3	-55.3	0.002	-0.003	0.18	0.010	0.006	0.012	0.002	31.0	9.7	63.575	10.903
27/03/2010	5869315.640	532692.798	476.818	8.28	0.015	0.014	0.021	-0.019	43.0	-42.8	0.002	-0.002	0.34	0.006	0.000	0.006	0.005	0.0	39.8	17.673	14.728
04/07/2010	5869315.626	532692.793	476.821	8.55	0.001	0.009	0.009	-0.016	83.7	-60.5	0.001	-0.002	0.27	-0.014	-0.005	0.015	0.003	199.7	11.4	-54.847	11.068
13/09/2010	5869315.634	532692.797	476.820	8.74	0.009	0.013	0.016	-0.017	55.3	-47.1	0.002	-0.002	0.19	0.008	0.004	0.009	-0.001	26.6	-6.4	46.013	-5.144
22/11/2010	5869315.640	532692.797	476.817	8.94	0.015	0.013	0.020	-0.020	40.9	-45.2	0.002	-0.002	0.19	0.006	0.000	0.006	-0.003	0.0	-26.6	31.307	-15.654
04/04/2011	5869315.629	532692.803	476.812	9.30	0.004	0.019	0.019	-0.025	78.1	-52.2	0.002	-0.003	0.36	-0.011	0.006	0.013	-0.005	151.4	-21.8	-34.410	-13.731
18/06/2011	5869315.629	532692.798	476.823	9.51	0.004	0.014	0.015	-0.014	74.1	-43.9	0.002	-0.001	0.21	0.000	-0.005	0.005	0.011	270.0	65.6	-24.350	53.570
03/10/2011	5869315.632	532692.793	476.820	9.80	0.007	0.009	0.011	-0.017	52.1	-56.2	0.001	-0.002	0.29	0.003	-0.005	0.006	-0.003	301.0	-27.2	-19.904	-10.241
28/11/2011	5869315.635	532692.794	476.816	9.95	0.010	0.010	0.014	-0.021	45.0	-56.0	0.001	-0.002	0.15	0.003	0.001	0.003	-0.004	18.4	-51.7	20.625	-26.089
09/04/2012	5869315.632	532692.797	476.817	10.32	0.007	0.013	0.015	-0.020	61.7	-53.6	0.001	-0.002	0.36	-0.003	0.003	0.004	0.001	135.0	13.3	11.651	2.746
12/07/2012	5869315.629	532692.800	476.826	10.57	0.004	0.016	0.016	-0.011	76.0	-33.7	0.002	-0.001	0.26	-0.003	0.003	0.004	0.009	135.0	64.8	16.485	34.971
29/09/2012	5869315.638	532692.795	476.828	10.79	0.013	0.011	0.017	-0.009	40.2	-27.9	0.002	-0.001	0.22	0.009	-0.005	0.010	0.002	330.9	11.0	47.601	9.247
10/12/2012	5869315.635	532692.800	476.824	10.99	0.010	0.016	0.019	-0.013	58.0	-34.6	0.002	-0.001	0.20	-0.003	0.005	0.006	-0.004	121.0	-34.4	29.580	-20.292
03/04/2013	5869315.633	532692.800	476.819	11.30	0.008	0.016	0.018	-0.018	63.4	-45.2	0.002	-0.002	0.31	-0.002	0.000	0.002	-0.005	180.0	-68.2	-6.408	-16.020
12/07/2013	5869315.635	532692.801	476.827	11.57	0.010	0.017	0.020	-0.010	59.5	-26.9	0.002	-0.001	0.27	0.002	0.001	0.002	0.008	26.6	74.4	8.167	29.220
04/10/2013	5869315.634	532692.795	476.832	11.80	0.009	0.011	0.014	-0.005	50.7	-19.4	0.001	0.000	0.23	-0.001	-0.006	0.006	0.005	260.5	39.4	-26.449	21.741
27/11/2013	5869315.637	532692.796	476.825	11.95	0.012	0.012	0.017	-0.012	45.0	-35.3	0.001	-0.001	0.15	0.003	0.001	0.003	-0.007	18.4	-65.7	21.389	-47.347
10/04/2014	5869315.637	532692.797	476.822	12.32	0.012	0.013	0.018	-0.015	47.3	-40.3	0.001	-0.001	0.37	0.000	0.001	0.001	-0.003	90.0	-71.6	2.726	-8.177

West Quesnel Land Stability Program

GPS Hub 01-36 (Anderson Drive at Abbott Drive)

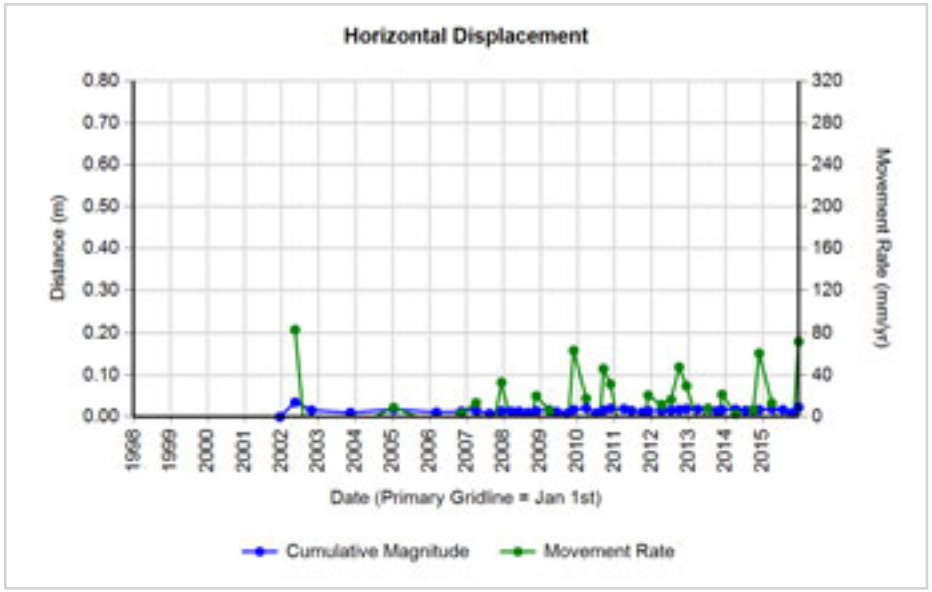
amec foster wheeler

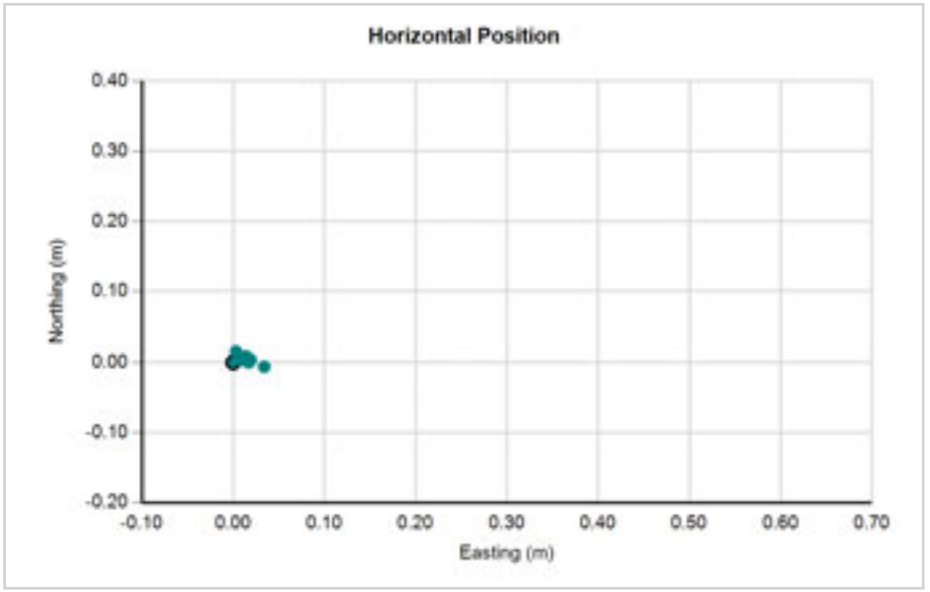
18/07/2014	5869315.626	532692.799	476.834	12.59	0.001	0.015	0.015	-0.003	86.2	-11.3	0.001	0.000	0.27	-0.011	0.002	0.011	0.012	169.7	47.0	-41.249	44.273
02/10/2014	5869315.627	532692.800	476.822	12.80	0.002	0.016	0.016	-0.015	82.9	-42.9	0.001	-0.001	0.21	0.001	0.001	0.001	-0.012	45.0	-83.3	6.797	-57.671
28/11/2014	5869315.636	532692.797	476.808	12.95	0.011	0.013	0.017	-0.029	49.8	-59.6	0.001	-0.002	0.16	0.009	-0.003	0.009	-0.014	341.6	-55.9	60.791	-89.711
01/04/2015	5869315.640	532692.795	476.824	13.29	0.015	0.011	0.019	-0.013	36.3	-34.9	0.001	-0.001	0.34	0.004	-0.002	0.004	0.016	333.4	74.4	13.173	47.129
20/07/2015	5869315.634	532692.798	476.819	13.59	0.009	0.014	0.017	-0.018	57.3	-47.2	0.001	-0.001	0.30	-0.006	0.003	0.007	-0.005	153.4	-36.7	-22.274	-16.602
14/10/2015	5869315.630	532692.792	476.823	13.83	0.005	0.008	0.009	-0.014	58.0	-56.0	0.001	-0.001	0.24	-0.004	-0.006	0.007	0.004	236.3	29.0	-30.626	16.988
22/12/2015	5869315.641	532692.800	476.811	14.02	0.016	0.016	0.023	-0.026	45.0	-49.0	0.002	-0.002	0.19	0.011	0.008	0.014	-0.012	36.0	-41.4	71.999	-63.522

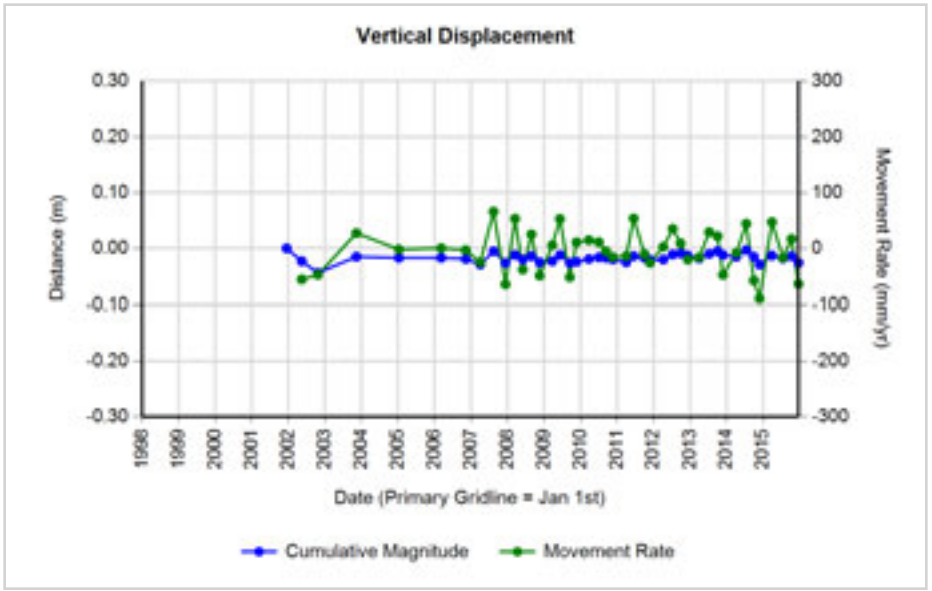
West Quesnel Land Stability Program

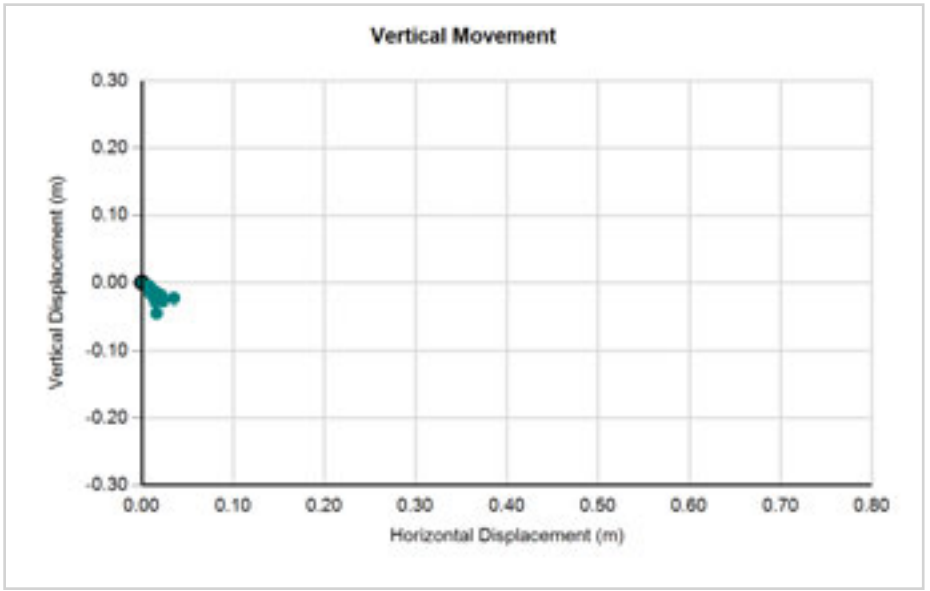
GPS Hub 01-36 (Anderson Drive at Abbott Drive)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 01-37 (Dawson Street at Abbott Drive)

amec foster wheeler

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/12/2001	5869644.821	531567.709	545.684	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/05/2002	5869644.805	531567.740	545.706	0.41	-0.016	0.031	0.035	0.022	117.3	32.2	0.084	0.053	0.41	-0.016	0.031	0.035	0.022	117.3	32.2	84.384	53.215
24/10/2002	5869644.819	531567.765	545.664	0.86	-0.002	0.056	0.056	-0.020	92.0	-19.6	0.065	-0.023	0.44	0.014	0.025	0.029	-0.042	60.8	-55.7	64.602	-94.694
12/11/2003	5869644.808	531567.776	545.704	1.91	-0.013	0.067	0.068	0.020	100.7	16.3	0.036	0.010	1.05	-0.011	0.011	0.015	0.040	133.9	68.9	14.698	38.075
11/01/2005	5869644.810	531567.789	545.704	3.07	-0.011	0.080	0.081	0.020	97.6	13.8	0.026	0.006	1.17	0.002	0.013	0.013	0.000	80.5	-1.5	11.014	-0.283
10/03/2006	5869644.790	531567.873	545.689	4.23	-0.031	0.164	0.167	0.005	100.7	1.7	0.039	0.001	1.16	-0.020	0.084	0.087	-0.015	103.6	-9.6	74.808	-12.693
10/11/2006	5869644.782	531567.890	545.685	4.90	-0.039	0.181	0.185	0.001	102.2	0.3	0.038	0.000	0.67	-0.008	0.017	0.019	-0.004	115.2	-12.0	28.010	-5.963
05/04/2007	5869644.790	531567.891	545.679	5.30	-0.031	0.182	0.185	-0.005	99.7	-1.6	0.035	-0.001	0.40	0.008	0.001	0.008	-0.006	7.1	-36.7	-20.169	-15.010
16/08/2007	5869644.778	531567.912	545.676	5.67	-0.043	0.203	0.208	-0.008	102.0	-2.2	0.037	-0.001	0.36	-0.012	0.021	0.024	-0.003	119.7	-7.1	66.423	-8.239
13/12/2007	5869644.794	531567.911	545.669	5.99	-0.027	0.202	0.204	-0.015	97.6	-4.2	0.034	-0.003	0.33	0.016	-0.001	0.016	-0.007	356.4	-23.6	-49.205	-21.485
18/03/2008	5869644.788	531567.910	545.676	6.26	-0.033	0.201	0.204	-0.008	99.3	-2.2	0.033	-0.001	0.26	-0.006	-0.001	0.006	0.007	189.5	49.0	-23.143	26.633
03/06/2008	5869644.788	531567.942	545.674	6.47	-0.033	0.233	0.235	-0.010	98.1	-2.4	0.036	-0.002	0.21	0.000	0.032	0.032	-0.002	90.0	-3.6	151.792	-9.487
29/07/2008	5869644.781	531567.957	545.683	6.62	-0.040	0.248	0.251	-0.001	99.2	-0.2	0.038	0.000	0.15	-0.007	0.015	0.017	0.009	115.0	28.5	107.964	58.701
29/08/2008	5869644.781	531567.965	545.697	6.70	-0.040	0.256	0.259	0.013	98.9	2.9	0.039	0.002	0.08	0.000	0.008	0.008	0.014	90.0	60.3	94.258	164.952
19/11/2008	5869644.793	531567.960	545.675	6.93	-0.028	0.251	0.253	-0.009	96.4	-2.0	0.036	-0.001	0.22	0.012	-0.005	0.013	-0.022	337.4	-59.4	-57.905	-97.994
26/03/2009	5869644.788	531567.963	545.657	7.28	-0.033	0.254	0.256	-0.027	97.4	-6.0	0.035	-0.004	0.35	-0.005	0.003	0.006	-0.018	149.0	-72.1	16.770	-51.768
10/06/2009	5869644.777	531568.017	545.691	7.49	-0.044	0.308	0.311	0.007	98.1	1.3	0.042	0.001	0.21	-0.011	0.054	0.055	0.034	101.5	31.7	264.849	163.401
17/09/2009	5869644.769	531568.025	545.698	7.76	-0.052	0.316	0.320	0.014	99.3	2.5	0.041	0.002	0.27	-0.008	0.008	0.011	0.007	135.0	31.7	41.741	25.826
23/11/2009	5869644.790	531568.017	545.666	7.94	-0.031	0.308	0.310	-0.018	95.7	-3.3	0.039	-0.002	0.18	0.021	-0.008	0.022	-0.032	339.1	-54.9	-122.507	-174.448
27/03/2010	5869644.788	531568.016	545.669	8.28	-0.033	0.307	0.309	-0.015	96.1	-2.8	0.037	-0.002	0.34	-0.002	-0.001	0.002	0.003	206.6	53.3	-6.586	8.837
04/07/2010	5869644.767	531568.022	545.688	8.55	-0.054	0.313	0.318	0.004	99.8	0.7	0.037	0.000	0.27	-0.021	0.006	0.022	0.019	164.1	41.0	80.578	70.098
13/09/2010	5869644.785	531568.020	545.665	8.74	-0.036	0.311	0.313	-0.019	96.6	-3.5	0.036	-0.002	0.19	0.018	-0.002	0.018	-0.023	353.7	-51.8	-93.168	-118.320
22/11/2010	5869644.781	531568.026	545.673	8.94	-0.040	0.317	0.320	-0.011	97.2	-2.0	0.036	-0.001	0.19	-0.004	0.006	0.007	0.008	123.7	48.0	37.627	41.743
04/04/2011	5869644.790	531568.021	545.657	9.30	-0.031	0.312	0.314	-0.027	95.7	-4.9	0.034	-0.003	0.36	0.009	-0.005	0.010	-0.016	330.9	-57.2	-28.274	-43.940
18/06/2011	5869644.768	531568.041	545.698	9.51	-0.053	0.332	0.336	0.014	99.1	2.4	0.035	0.001	0.21	-0.022	0.020	0.030	0.041	137.7	54.1	144.796	199.670
03/10/2011	5869644.777	531568.030	545.660	9.80	-0.044	0.321	0.324	-0.024	97.8	-4.2	0.033	-0.002	0.29	0.009	-0.011	0.014	-0.038	309.3	-69.5	-48.516	-129.715
28/11/2011	5869644.780	531568.037	545.668	9.95	-0.041	0.328	0.331	-0.016	97.1	-2.8	0.033	-0.002	0.15	0.003	0.007	0.008	0.008	66.8	46.4	49.673	52.179
09/04/2012	5869644.776	531568.041	545.665	10.32	-0.045	0.332	0.335	-0.019	97.7	-3.2	0.032	-0.002	0.36	-0.004	0.004	0.006	-0.003	135.0	-27.9	15.535	-8.239
12/07/2012	5869644.774	531568.067	545.678	10.57	-0.047	0.358	0.361	-0.006	97.5	-1.0	0.034	-0.001	0.26	-0.002	0.026	0.026	0.013	94.4	26.5	101.325	50.513
29/09/2012	5869644.782	531568.075	545.667	10.79	-0.039	0.366	0.368	-0.017	96.1	-2.6	0.034	-0.002	0.22	0.008	0.008	0.011	-0.011	45.0	-44.2	52.308	-50.858
10/12/2012	5869644.777	531568.073	545.669	10.99	-0.044	0.364	0.367	-0.015	96.9	-2.3	0.033	-0.001	0.20	-0.005	-0.002	0.005	0.002	201.8	20.4	-27.318	10.146
03/04/2013	5869644.778	531568.073	545.653	11.30	-0.043	0.364	0.367	-0.031	96.7	-4.8	0.032	-0.003	0.31	0.001	0.000	0.001	-0.016	0.0	-86.4	-3.204	-51.263
12/07/2013	5869644.777	531568.085	545.674	11.57	-0.044	0.376	0.379	-0.010	96.7	-1.5	0.033	-0.001	0.27	-0.001	0.012	0.012	0.021	94.8	60.2	43.982	76.702
04/10/2013	5869644.773	531568.081	545.688	11.80	-0.048	0.372	0.375	0.004	97.4	0.6	0.032	0.000	0.23	-0.004	-0.004	0.006	0.014	225.0	68.0	-24.597	60.875
27/11/2013	5869644.777	531568.074	545.662	11.95	-0.044	0.365	0.368	-0.022	96.9	-3.4	0.031	-0.002	0.15	0.004	-0.007	0.008	-0.026	299.7	-72.8	-54.532	-175.861

West Quesnel Land Stability Program

GPS Hub 01-37 (Dawson Street at Abbott Drive)

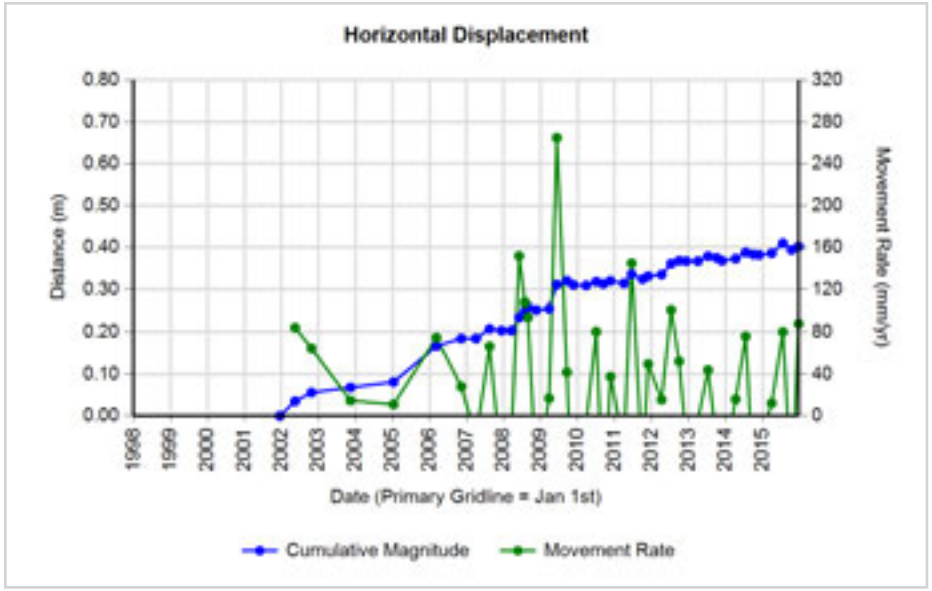
amec foster wheeler

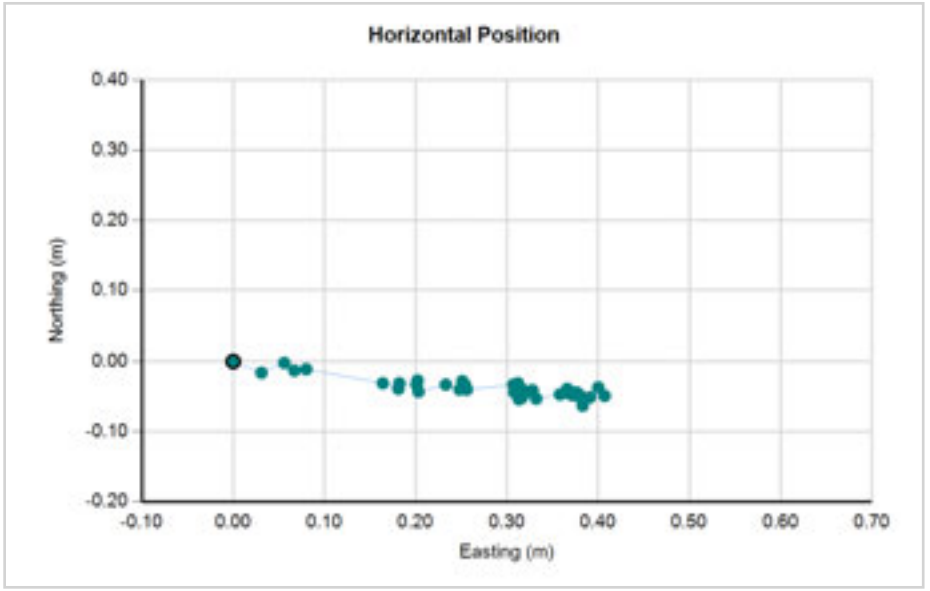
10/04/2014	5869644.774	531568.079	545.658	12.32	-0.047	0.370	0.373	-0.026	97.2	-4.0	0.030	-0.002	0.37	-0.003	0.005	0.006	-0.004	121.0	-34.4	15.894	-10.903
18/07/2014	5869644.758	531568.092	545.686	12.59	-0.063	0.383	0.388	0.002	99.3	0.3	0.031	0.000	0.27	-0.016	0.013	0.021	0.028	140.9	53.6	76.059	103.303
02/10/2014	5869644.770	531568.089	545.667	12.80	-0.051	0.380	0.383	-0.017	97.6	-2.5	0.030	-0.001	0.21	0.012	-0.003	0.012	-0.019	346.0	-56.9	-59.446	-91.313
28/11/2014	5869644.774	531568.088	545.658	12.95	-0.047	0.379	0.382	-0.026	97.1	-3.9	0.029	-0.002	0.16	0.004	-0.001	0.004	-0.009	346.0	-65.4	-26.420	-57.671
01/04/2015	5869644.775	531568.092	545.655	13.29	-0.046	0.383	0.386	-0.029	96.8	-4.3	0.029	-0.002	0.34	0.001	0.004	0.004	-0.003	76.0	-36.0	12.145	-8.837
20/07/2015	5869644.772	531568.116	545.655	13.59	-0.049	0.407	0.410	-0.029	96.9	-4.0	0.030	-0.002	0.30	-0.003	0.024	0.024	0.000	97.1	0.0	80.311	0.000
14/10/2015	5869644.770	531568.100	545.655	13.83	-0.051	0.391	0.394	-0.029	97.4	-4.2	0.029	-0.002	0.24	-0.002	-0.016	0.016	0.000	262.9	0.0	-68.482	0.000
22/12/2015	5869644.784	531568.109	545.670	14.02	-0.037	0.400	0.402	-0.014	95.3	-2.0	0.029	-0.001	0.19	0.014	0.009	0.017	0.015	32.7	42.0	88.101	79.402

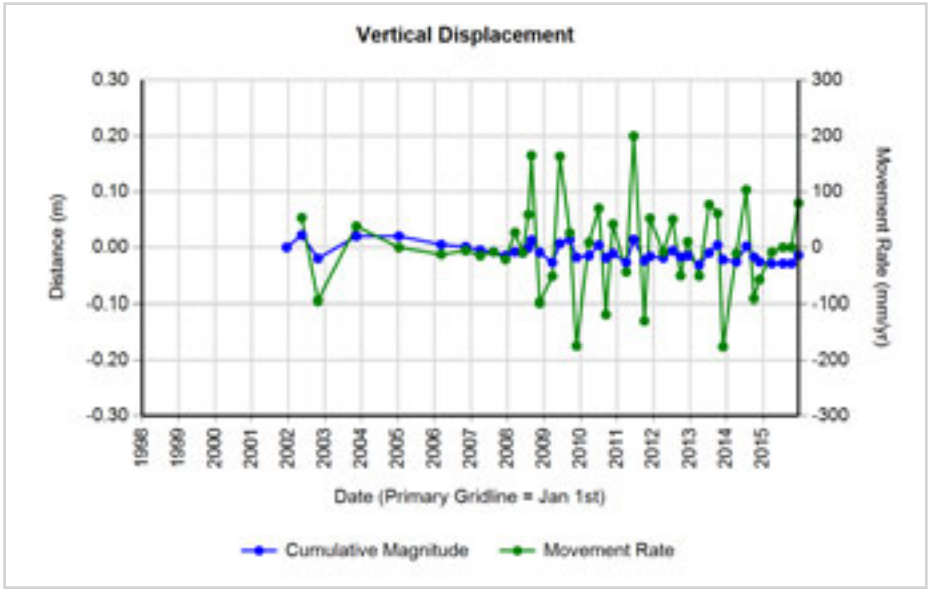
West Quesnel Land Stability Program

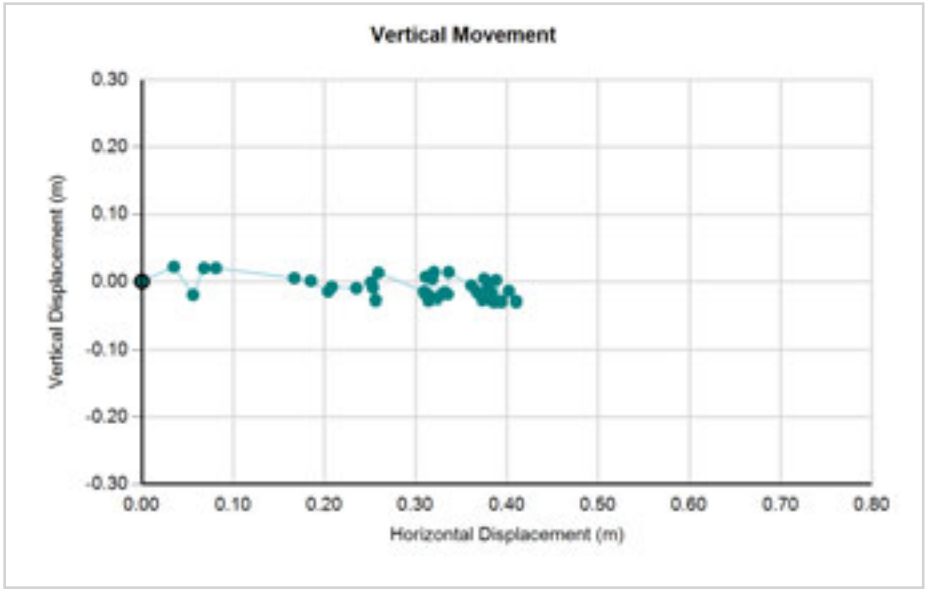
GPS Hub 01-37 (Dawson Street at Abbott Drive)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 01-38 (Quesnel No. 1 Station Benchmark)

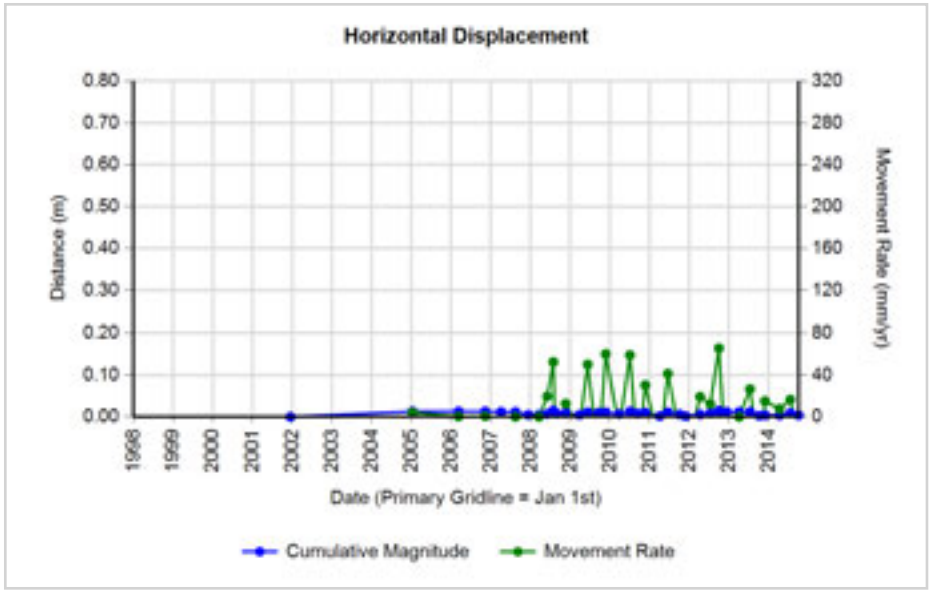
amec foster wheeler

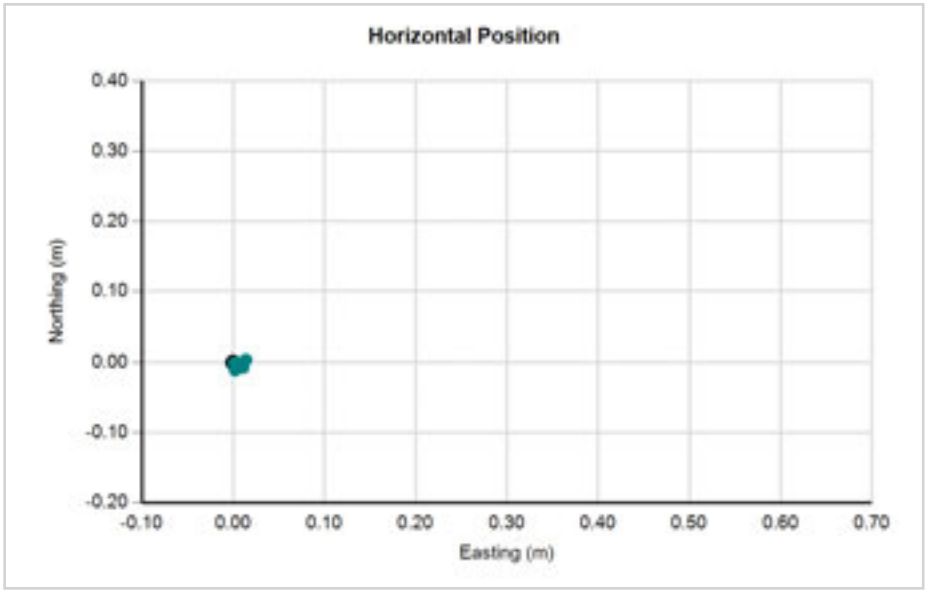
	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/12/2001	5870193.015	537018.228	596.514	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
11/01/2005	5870193.008	537018.239	596.526	3.07	-0.007	0.011	0.013	0.012	122.5	42.6	0.004	0.004	3.07	-0.007	0.011	0.013	0.012	122.5	42.6	4.241	3.903
10/03/2006	5870193.008	537018.239	596.525	4.23	-0.007	0.011	0.013	0.011	120.8	40.9	0.003	0.003	1.16	0.000	0.000	0.000	0.000	63.4	-48.2	0.386	-0.432
10/11/2006	5870193.008	537018.239	596.526	4.90	-0.007	0.011	0.013	0.012	122.5	42.6	0.003	0.002	0.67	0.000	0.000	0.000	0.000	243.4	48.2	0.667	0.745
05/04/2007	5870193.008	537018.238	596.527	5.30	-0.007	0.010	0.012	0.013	125.0	46.8	0.002	0.002	0.40	0.000	-0.001	0.001	0.001	270.0	45.0	-2.502	2.502
16/08/2007	5870193.008	537018.238	596.527	5.67	-0.007	0.010	0.012	0.013	125.0	46.8	0.002	0.002	0.36	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
13/12/2007	5870193.013	537018.233	596.512	5.99	-0.002	0.005	0.005	-0.002	111.8	-20.4	0.001	0.000	0.33	0.005	-0.005	0.007	-0.015	315.0	-64.8	-21.703	-46.040
18/03/2008	5870193.013	537018.233	596.512	6.26	-0.002	0.005	0.005	-0.002	111.8	-20.4	0.001	0.000	0.26	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
03/06/2008	5870193.009	537018.232	596.515	6.47	-0.006	0.004	0.007	0.001	146.3	7.9	0.001	0.000	0.21	-0.004	-0.001	0.004	0.003	194.0	36.0	19.558	14.231
29/07/2008	5870193.005	537018.239	596.510	6.62	-0.010	0.011	0.015	-0.004	132.3	-15.1	0.002	-0.001	0.15	-0.004	0.007	0.008	-0.005	119.7	-31.8	52.585	-32.612
29/08/2008	5870193.010	537018.234	596.505	6.70	-0.005	0.006	0.008	-0.009	129.8	-49.0	0.001	-0.001	0.08	0.005	-0.005	0.007	-0.005	315.0	-35.3	-83.313	-58.911
19/11/2008	5870193.012	537018.236	596.501	6.93	-0.003	0.008	0.009	-0.013	110.6	-56.7	0.001	-0.002	0.22	0.002	0.002	0.003	-0.004	45.0	-54.7	12.599	-17.817
26/03/2009	5870193.014	537018.233	596.510	7.28	-0.001	0.005	0.005	-0.004	101.3	-38.1	0.001	-0.001	0.35	0.002	-0.003	0.004	0.009	303.7	68.2	-10.370	25.884
10/06/2009	5870193.004	537018.230	596.506	7.49	-0.011	0.002	0.011	-0.008	169.7	-35.6	0.001	-0.001	0.21	-0.010	-0.003	0.010	-0.004	196.7	-21.0	50.175	-19.224
17/09/2009	5870193.011	537018.237	596.504	7.76	-0.004	0.009	0.010	-0.010	114.0	-45.4	0.001	-0.001	0.27	0.007	0.007	0.010	-0.002	45.0	-11.4	-36.523	-7.379
23/11/2009	5870193.022	537018.236	596.505	7.94	0.007	0.008	0.011	-0.009	48.8	-40.3	0.001	-0.001	0.18	0.011	-0.001	0.011	0.001	354.8	5.2	60.214	5.451
27/03/2010	5870193.020	537018.233	596.517	8.28	0.005	0.005	0.007	0.003	45.0	23.0	0.001	0.000	0.34	-0.002	-0.003	0.004	0.012	236.3	73.3	-10.620	35.347
04/07/2010	5870193.004	537018.234	596.510	8.55	-0.011	0.006	0.013	-0.004	151.4	-17.7	0.001	0.000	0.27	-0.016	0.001	0.016	-0.007	176.4	-23.6	59.145	-25.826
13/09/2010	5870193.011	537018.235	596.504	8.74	-0.004	0.007	0.008	-0.010	119.7	-51.1	0.001	-0.001	0.19	0.007	0.001	0.007	-0.006	8.1	-40.3	-36.376	-30.866
22/11/2010	5870193.016	537018.238	596.505	8.94	0.001	0.010	0.010	-0.009	84.3	-41.8	0.001	-0.001	0.19	0.005	0.003	0.006	0.001	31.0	9.7	30.425	5.218
04/04/2011	5870193.013	537018.229	596.511	9.30	-0.002	0.001	0.002	-0.003	153.4	-53.3	0.000	0.000	0.36	-0.003	-0.009	0.009	0.006	251.6	32.3	-26.053	16.477
18/06/2011	5870193.007	537018.235	596.512	9.51	-0.008	0.007	0.011	-0.002	138.8	-10.7	0.001	0.000	0.21	-0.006	0.006	0.008	0.001	135.0	6.7	41.323	4.870
03/10/2011	5870193.011	537018.232	596.511	9.80	-0.004	0.004	0.006	-0.003	135.0	-27.9	0.001	0.000	0.29	0.004	-0.003	0.005	-0.001	323.1	-11.3	-17.068	-3.414
28/11/2011	5870193.016	537018.230	596.503	9.95	0.001	0.002	0.002	-0.011	63.4	-78.5	0.000	-0.001	0.15	0.005	-0.002	0.005	-0.008	338.2	-56.1	-35.124	-52.179
09/04/2012	5870193.009	537018.230	596.516	10.32	-0.006	0.002	0.006	0.002	161.6	17.5	0.001	0.000	0.36	-0.007	0.000	0.007	0.013	180.0	61.7	19.224	35.701
12/07/2012	5870193.008	537018.233	596.512	10.57	-0.007	0.005	0.009	-0.002	144.5	-13.1	0.001	0.000	0.26	-0.001	0.003	0.003	-0.004	108.4	-51.7	12.287	-15.543
29/09/2012	5870193.019	537018.242	596.502	10.79	0.004	0.014	0.015	-0.012	74.1	-39.5	0.001	-0.001	0.22	0.011	0.009	0.014	-0.010	39.3	-35.1	65.711	-46.234
10/12/2012	5870193.009	537018.238	596.503	10.99	-0.006	0.010	0.012	-0.011	121.0	-43.3	0.001	-0.001	0.20	-0.010	-0.004	0.011	0.001	201.8	5.3	-54.637	5.073
03/04/2013	5870193.009	537018.238	596.503	11.30	-0.006	0.010	0.012	-0.011	121.0	-43.3	0.001	-0.001	0.31	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
12/07/2013	5870193.016	537018.240	596.513	11.57	0.001	0.012	0.012	-0.001	85.2	-4.7	0.001	0.000	0.27	0.007	0.002	0.007	0.010	15.9	53.9	26.591	36.525
04/10/2013	5870193.015	537018.231	596.505	11.80	0.000	0.003	0.003	-0.009	90.0	-71.6	0.000	-0.001	0.23	-0.001	-0.009	0.009	-0.008	263.7	-41.5	-39.375	-34.786
27/11/2013	5870193.013	537018.232	596.503	11.95	-0.002	0.004	0.004	-0.011	116.6	-67.9	0.000	-0.001	0.15	-0.002	0.001	0.002	-0.002	153.4	-41.8	15.125	-13.528
10/04/2014	5870193.011	537018.230	596.515	12.32	-0.004	0.002	0.004	0.001	153.4	12.6	0.000	0.000	0.37	-0.002	-0.002	0.003	0.012	225.0	76.7	7.710	32.709
18/07/2014	5870193.007	537018.232	596.511	12.59	-0.008	0.004	0.009	-0.003	153.4	-18.5	0.001	0.000	0.27	-0.004	0.002	0.004	-0.004	153.4	-41.8	16.499	-14.758
02/10/2014	5870193.012	537018.231	596.501	12.80	-0.003	0.003	0.004	-0.013	135.0	-71.9	0.000	-0.001	0.21	0.005	-0.001	0.005	-0.010	348.7	-63.0	-24.505	-48.059

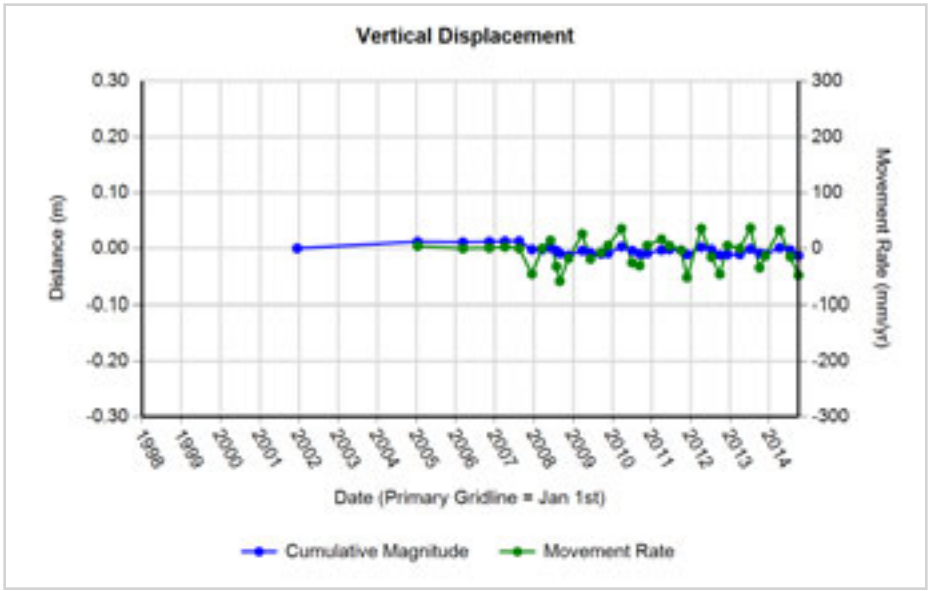
West Quesnel Land Stability Program

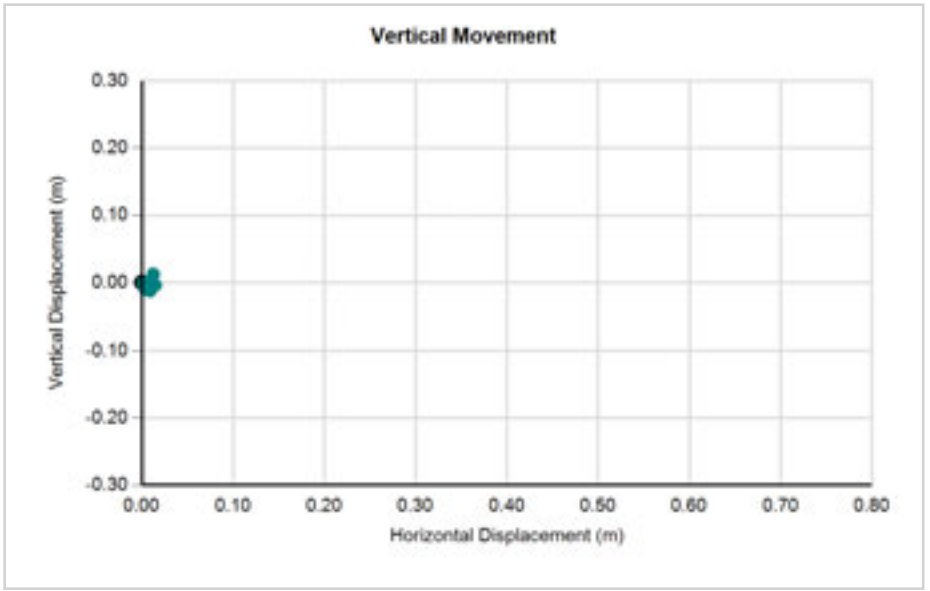
GPS Hub 01-38 (Quesnel No. 1 Station Benchmark)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 01-39 (Anderson Avenue at Wade Avenue)

amec foster wheeler

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/12/2001	5869071.953	532473.937	476.875	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/05/2002	5869071.931	532473.976	476.838	0.41	-0.022	0.039	0.045	-0.037	119.4	-39.6	0.108	-0.089	0.41	-0.022	0.039	0.045	-0.037	119.4	-39.6	108.310	-89.498
24/10/2002	5869071.948	532473.964	476.827	0.86	-0.005	0.027	0.027	-0.048	100.5	-60.2	0.032	-0.056	0.44	0.017	-0.012	0.021	-0.011	324.8	-27.9	-46.916	-24.801
12/11/2003	5869071.923	532473.967	476.852	1.91	-0.030	0.030	0.042	-0.023	135.0	-28.8	0.022	-0.012	1.05	-0.025	0.003	0.025	0.025	174.0	45.2	23.587	23.713
11/01/2005	5869071.918	532473.970	476.859	3.07	-0.035	0.033	0.048	-0.016	136.7	-18.4	0.016	-0.005	1.17	-0.005	0.003	0.006	0.007	147.6	48.2	5.423	6.062
10/03/2006	5869071.910	532473.985	476.870	4.23	-0.043	0.048	0.064	-0.005	131.9	-4.4	0.015	-0.001	1.16	-0.008	0.015	0.017	0.011	118.1	32.9	14.679	9.498
10/11/2006	5869071.902	532473.990	476.865	4.90	-0.051	0.053	0.074	-0.010	133.9	-7.7	0.015	-0.002	0.67	-0.008	0.005	0.009	-0.005	148.0	-27.9	14.064	-7.454
05/04/2007	5869071.905	532473.991	476.858	5.30	-0.048	0.054	0.072	-0.017	131.6	-13.2	0.014	-0.003	0.40	0.003	0.001	0.003	-0.007	18.4	-65.7	-7.911	-17.512
16/08/2007	5869071.890	532473.993	476.856	5.67	-0.063	0.056	0.084	-0.019	138.4	-12.7	0.015	-0.003	0.36	-0.015	0.002	0.015	-0.002	172.4	-7.5	41.558	-5.492
13/12/2007	5869071.904	532473.997	476.873	5.99	-0.049	0.060	0.077	-0.002	129.2	-1.5	0.013	0.000	0.33	0.014	0.004	0.015	0.017	15.9	49.4	-44.690	52.179
18/03/2008	5869071.902	532473.994	476.871	6.26	-0.051	0.057	0.076	-0.004	131.8	-3.0	0.012	-0.001	0.26	-0.002	-0.003	0.004	-0.002	236.3	-29.0	-13.718	-7.609
03/06/2008	5869071.890	532474.006	476.876	6.47	-0.063	0.069	0.093	0.001	132.4	0.6	0.014	0.000	0.21	-0.012	0.012	0.017	0.005	135.0	16.4	80.500	23.718
29/08/2008	5869071.885	532474.005	476.876	6.70	-0.068	0.068	0.096	0.001	135.0	0.6	0.014	0.000	0.24	-0.005	-0.001	0.005	0.000	191.3	0.0	21.407	0.000
19/11/2008	5869071.896	532474.009	476.874	6.93	-0.057	0.072	0.092	-0.001	128.4	-0.6	0.013	0.000	0.22	0.011	0.004	0.012	-0.002	20.0	-9.7	-52.136	-8.909
26/03/2009	5869071.891	532474.007	476.874	7.28	-0.062	0.070	0.094	-0.001	131.5	-0.6	0.013	0.000	0.35	-0.005	-0.002	0.005	0.000	201.8	0.0	15.488	0.000
10/06/2009	5869071.871	532474.024	476.891	7.49	-0.082	0.087	0.120	0.016	133.3	7.6	0.016	0.002	0.21	-0.020	0.017	0.026	0.017	139.6	32.9	126.150	81.701
17/09/2009	5869071.875	532474.025	476.887	7.76	-0.078	0.088	0.118	0.012	131.6	5.8	0.015	0.002	0.27	0.004	0.001	0.004	-0.004	14.0	-44.1	-15.212	-14.758
23/11/2009	5869071.887	532474.020	476.882	7.94	-0.066	0.083	0.106	0.007	128.5	3.8	0.013	0.001	0.18	0.012	-0.005	0.013	-0.005	337.4	-21.0	-70.869	-27.257
27/03/2010	5869071.889	532474.019	476.889	8.28	-0.064	0.082	0.104	0.014	128.0	7.7	0.013	0.002	0.34	0.002	-0.001	0.002	0.007	333.4	72.3	-6.586	20.619
04/07/2010	5869071.876	532474.021	476.888	8.55	-0.077	0.084	0.114	0.013	132.5	6.5	0.013	0.002	0.27	-0.013	0.002	0.013	-0.001	171.3	-4.3	48.526	-3.689
13/09/2010	5869071.883	532474.023	476.890	8.74	-0.070	0.086	0.111	0.015	129.1	7.7	0.013	0.002	0.19	0.007	0.002	0.007	0.002	15.9	15.4	-37.452	10.289
22/11/2010	5869071.879	532474.019	476.889	8.94	-0.074	0.082	0.110	0.014	132.1	7.2	0.012	0.002	0.19	-0.004	-0.004	0.006	-0.001	225.0	-10.0	-29.517	-5.218
04/04/2011	5869071.878	532474.017	476.884	9.30	-0.075	0.080	0.110	0.009	133.2	4.7	0.012	0.001	0.36	-0.001	-0.002	0.002	-0.005	243.4	-65.9	-6.141	-13.731
18/06/2011	5869071.877	532474.026	476.894	9.51	-0.076	0.089	0.117	0.019	130.5	9.2	0.012	0.002	0.21	-0.001	0.009	0.009	0.010	96.3	47.8	44.100	48.700
03/10/2011	5869071.876	532474.022	476.891	9.80	-0.077	0.085	0.115	0.016	132.2	7.9	0.012	0.002	0.29	-0.001	-0.004	0.004	-0.003	256.0	-36.0	-14.074	-10.241
28/11/2011	5869071.877	532474.019	476.888	9.95	-0.076	0.082	0.112	0.013	132.8	6.6	0.011	0.001	0.15	0.001	-0.003	0.003	-0.003	288.4	-43.5	-20.625	-19.567
09/04/2012	5869071.873	532474.026	476.882	10.32	-0.080	0.089	0.120	0.007	132.0	3.3	0.012	0.001	0.36	-0.004	0.007	0.008	-0.006	119.7	-36.7	22.141	-16.477
12/07/2012	5869071.870	532474.032	476.908	10.57	-0.083	0.095	0.126	0.033	131.1	14.7	0.012	0.003	0.26	-0.003	0.006	0.007	0.026	116.6	75.5	26.066	101.027
29/09/2012	5869071.879	532474.032	476.904	10.79	-0.074	0.095	0.120	0.029	127.9	13.5	0.011	0.003	0.22	0.009	0.000	0.009	-0.004	0.0	-24.0	-41.611	-18.494
10/12/2012	5869071.879	532474.030	476.899	10.99	-0.074	0.093	0.119	0.024	128.5	11.4	0.011	0.002	0.20	0.000	-0.002	0.002	-0.005	270.0	-68.2	-10.146	-25.365
03/04/2013	5869071.873	532474.030	476.893	11.30	-0.080	0.093	0.123	0.018	130.7	8.3	0.011	0.002	0.31	-0.006	0.000	0.006	-0.006	180.0	-45.0	19.224	-19.224
12/07/2013	5869071.871	532474.038	476.910	11.57	-0.082	0.101	0.130	0.035	129.1	15.1	0.011	0.003	0.27	-0.002	0.008	0.008	0.017	104.0	64.1	30.119	62.093
04/10/2013	5869071.872	532474.026	476.910	11.80	-0.081	0.089	0.120	0.035	132.3	16.2	0.010	0.003	0.23	0.001	-0.012	0.012	0.000	274.8	0.0	-52.359	0.000
27/11/2013	5869071.873	532474.032	476.896	11.95	-0.080	0.095	0.124	0.021	130.1	9.6	0.010	0.002	0.15	0.001	0.006	0.006	-0.014	80.5	-66.5	41.143	-94.694
10/04/2014	5869071.872	532474.035	476.900	12.32	-0.081	0.098	0.127	0.025	129.6	11.1	0.010	0.002	0.37	-0.001	0.003	0.003	0.004	108.4	51.7	8.620	10.903

West Quesnel Land Stability Program

GPS Hub 01-39 (Anderson Avenue at Wade Avenue)

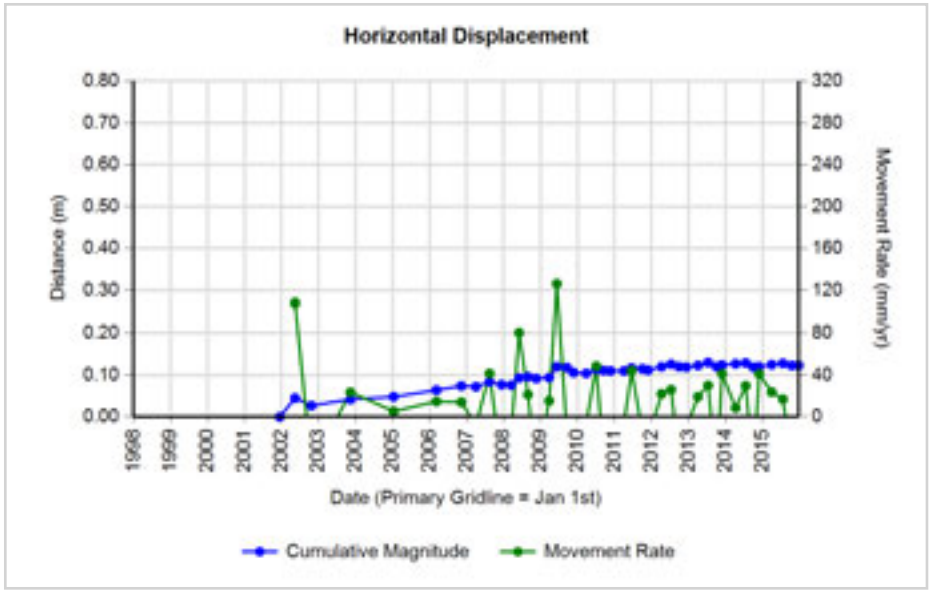
amec foster wheeler

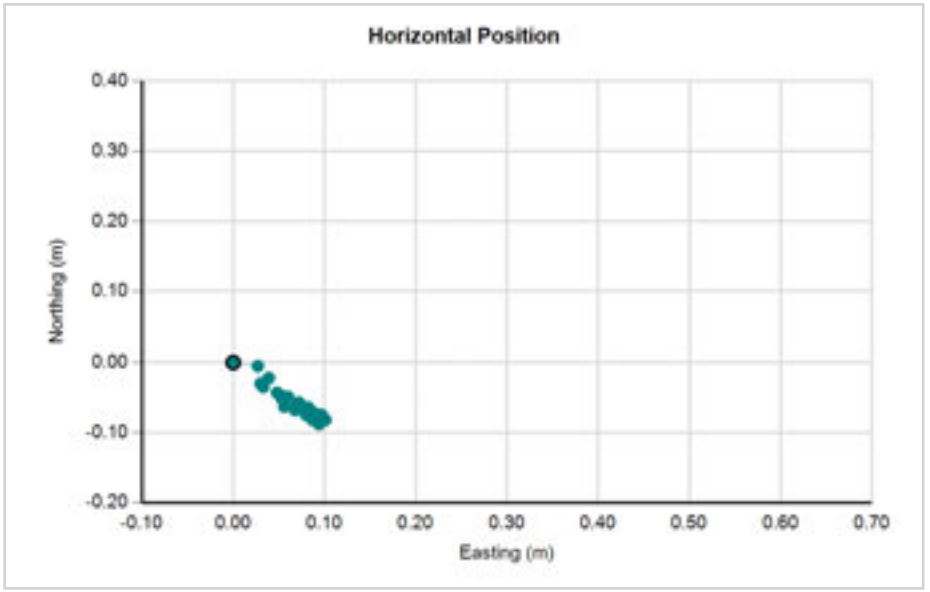
18/07/2014	5869071.865	532474.031	476.903	12.59	-0.088	0.094	0.129	0.028	133.1	12.3	0.010	0.002	0.27	-0.007	-0.004	0.008	0.003	209.7	20.4	29.745	11.068
02/10/2014	5869071.874	532474.026	476.885	12.80	-0.079	0.089	0.119	0.010	131.6	4.8	0.009	0.001	0.21	0.009	-0.005	0.010	-0.018	330.9	-60.2	-49.480	-86.507
28/11/2014	5869071.878	532474.031	476.893	12.95	-0.075	0.094	0.120	0.018	128.6	8.5	0.009	0.001	0.16	0.004	0.005	0.006	0.008	51.3	51.3	41.031	51.263
01/04/2015	5869071.870	532474.030	476.901	13.29	-0.083	0.093	0.125	0.026	131.7	11.8	0.009	0.002	0.34	-0.008	-0.001	0.008	0.008	187.1	44.8	23.748	23.565
20/07/2015	5869071.871	532474.035	476.902	13.59	-0.082	0.098	0.128	0.027	129.9	11.9	0.009	0.002	0.30	0.001	0.005	0.005	0.001	78.7	11.1	16.931	3.320
14/10/2015	5869071.868	532474.026	476.900	13.83	-0.085	0.089	0.123	0.025	133.7	11.5	0.009	0.002	0.24	-0.003	-0.009	0.009	-0.002	251.6	-11.9	-40.291	-8.494
22/12/2015	5869071.878	532474.034	476.889	14.02	-0.075	0.097	0.123	0.014	127.7	6.5	0.009	0.001	0.19	0.010	0.008	0.013	-0.011	38.7	-40.7	-67.790	-58.228

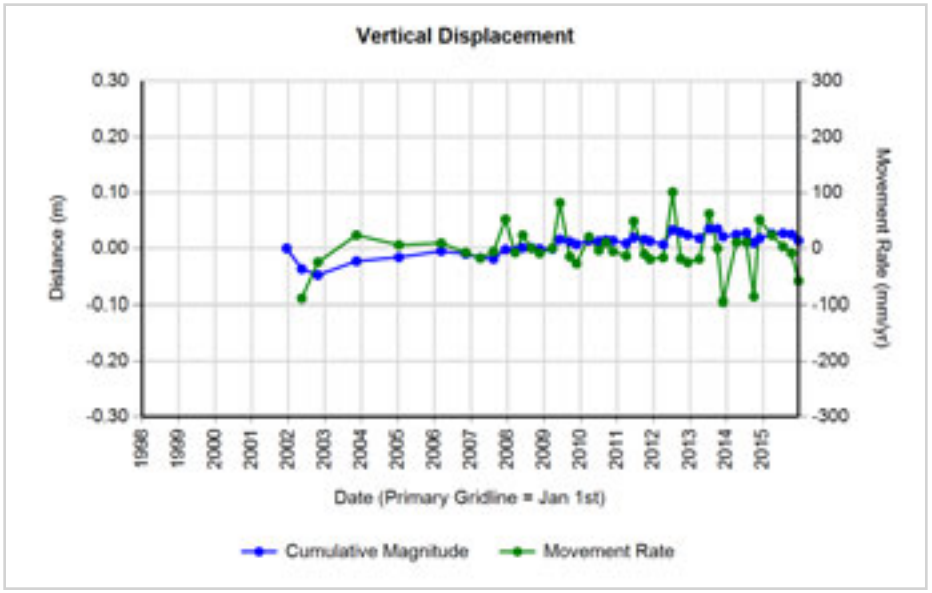
West Quesnel Land Stability Program

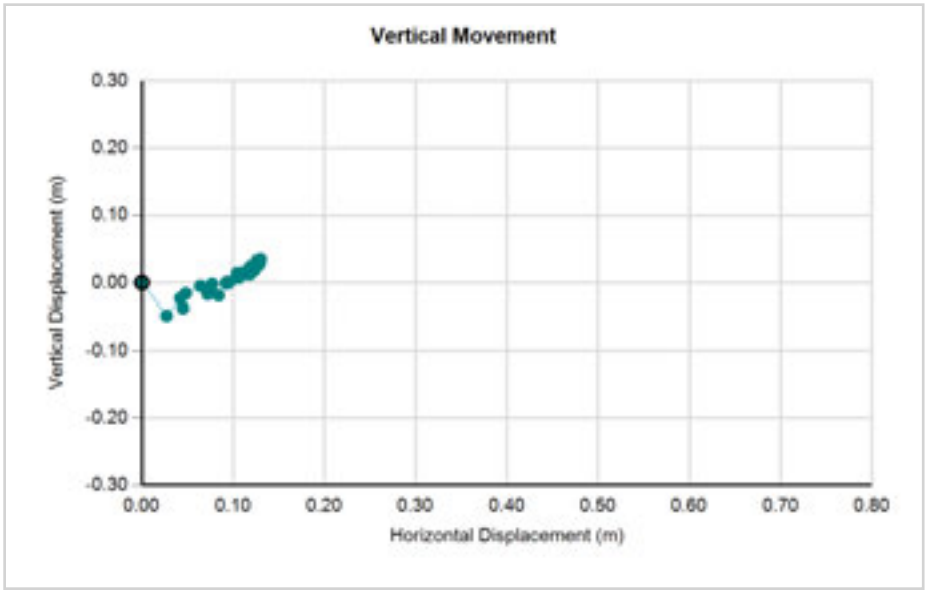
GPS Hub 01-39 (Anderson Avenue at Wade Avenue)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 01-40 (Lewis Drive East of Healy Street)

amec foster wheeler

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/12/2001	5870303.346	532408.207	493.536	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
15/05/2002	5870303.321	532408.222	493.526	0.41	-0.025	0.015	0.029	-0.010	149.0	-18.9	0.071	-0.024	0.41	-0.025	0.015	0.029	-0.010	149.0	-18.9	70.522	-24.189
24/10/2002	5870303.370	532408.233	493.514	0.86	0.024	0.026	0.035	-0.022	47.3	-31.9	0.041	-0.026	0.44	0.049	0.011	0.050	-0.012	12.7	-13.4	113.226	-27.056
12/11/2003	5870303.345	532408.242	493.575	1.91	-0.001	0.035	0.035	0.039	92.0	48.2	0.018	0.021	1.05	-0.025	0.009	0.027	0.061	160.2	66.4	25.478	58.202
11/01/2005	5870303.349	532408.249	493.571	3.07	0.003	0.042	0.042	0.035	85.9	39.7	0.014	0.011	1.17	0.004	0.007	0.008	-0.004	58.7	-27.4	6.940	-3.592
10/03/2006	5870303.347	532408.282	493.589	4.23	0.001	0.075	0.075	0.053	89.2	35.2	0.018	0.013	1.16	-0.002	0.033	0.033	0.018	93.5	28.6	28.547	15.543
10/11/2006	5870303.355	532408.292	493.587	4.90	0.009	0.085	0.085	0.051	84.0	30.8	0.017	0.010	0.67	0.008	0.010	0.013	-0.002	51.3	-8.9	19.092	-2.982
05/04/2007	5870303.358	532408.295	493.596	5.30	0.012	0.088	0.089	0.060	82.2	34.0	0.017	0.011	0.40	0.003	0.003	0.004	0.009	45.0	64.8	10.614	22.515
16/08/2007	5870303.359	532408.302	493.598	5.67	0.013	0.095	0.096	0.062	82.2	32.9	0.017	0.011	0.36	0.001	0.007	0.007	0.002	81.9	15.8	19.419	5.492
13/12/2007	5870303.361	532408.306	493.600	5.99	0.015	0.099	0.100	0.064	81.4	32.6	0.017	0.011	0.33	0.002	0.004	0.004	0.002	63.4	24.1	13.726	6.139
18/03/2008	5870303.360	532408.308	493.607	6.26	0.014	0.101	0.102	0.071	82.1	34.8	0.016	0.011	0.26	-0.001	0.002	0.002	0.007	116.6	72.3	8.508	26.633
03/06/2008	5870303.363	532408.320	493.637	6.47	0.017	0.113	0.114	0.101	81.4	41.5	0.018	0.016	0.21	0.003	0.012	0.012	0.030	76.0	67.6	58.674	142.305
29/08/2008	5870303.366	532408.326	493.641	6.70	0.020	0.119	0.121	0.105	80.5	41.0	0.018	0.016	0.24	0.003	0.006	0.007	0.004	63.4	30.8	28.163	16.793
19/11/2008	5870303.366	532408.331	493.621	6.93	0.020	0.124	0.126	0.085	80.8	34.1	0.018	0.012	0.22	0.000	0.005	0.005	-0.020	90.0	-76.0	22.271	-89.085
26/03/2009	5870303.370	532408.334	493.624	7.28	0.024	0.127	0.129	0.088	79.3	34.2	0.018	0.012	0.35	0.004	0.003	0.005	0.003	36.9	31.0	14.380	8.628
10/06/2009	5870303.362	532408.346	493.644	7.49	0.016	0.139	0.140	0.108	83.4	37.7	0.019	0.014	0.21	-0.008	0.012	0.014	0.020	123.7	54.2	69.312	96.118
17/09/2009	5870303.370	532408.354	493.649	7.76	0.024	0.147	0.149	0.113	80.7	37.2	0.019	0.015	0.27	0.008	0.008	0.011	0.005	45.0	23.8	41.741	18.447
23/11/2009	5870303.380	532408.357	493.643	7.94	0.034	0.150	0.154	0.107	77.2	34.8	0.019	0.013	0.18	0.010	0.003	0.010	-0.006	16.7	-29.9	56.915	-32.709
27/03/2010	5870303.378	532408.357	493.639	8.28	0.032	0.150	0.153	0.103	78.0	33.9	0.019	0.012	0.34	-0.002	0.000	0.002	-0.004	180.0	-63.4	-5.891	-11.782
04/07/2010	5870303.363	532408.356	493.649	8.55	0.017	0.149	0.150	0.113	83.5	37.0	0.018	0.013	0.27	-0.015	-0.001	0.015	0.010	183.8	33.6	-55.464	36.894
13/09/2010	5870303.364	532408.360	493.610	8.74	0.018	0.153	0.154	0.074	83.3	25.7	0.018	0.008	0.19	0.001	0.004	0.004	-0.039	76.0	-84.0	21.211	-200.630
22/11/2010	5870303.373	532408.364	493.643	8.94	0.027	0.157	0.159	0.107	80.2	33.9	0.018	0.012	0.19	0.009	0.004	0.010	0.033	24.0	73.4	51.390	172.189
04/04/2011	5870303.374	532408.360	493.637	9.30	0.028	0.153	0.156	0.101	79.6	33.0	0.017	0.011	0.36	0.001	-0.004	0.004	-0.006	284.0	-55.5	-11.323	-16.477
18/06/2011	5870303.369	532408.370	493.670	9.51	0.023	0.163	0.165	0.134	82.0	39.1	0.017	0.014	0.21	-0.005	0.010	0.011	0.033	116.6	71.3	54.448	160.710
03/10/2011	5870303.366	532408.364	493.654	9.80	0.020	0.157	0.158	0.118	82.7	36.7	0.016	0.012	0.29	-0.003	-0.006	0.007	-0.016	243.4	-67.3	-22.899	-54.617
28/11/2011	5870303.374	532408.372	493.653	9.95	0.028	0.165	0.167	0.117	80.4	35.0	0.017	0.012	0.15	0.008	0.008	0.011	-0.001	45.0	-5.1	73.792	-6.522
09/04/2012	5870303.371	532408.371	493.656	10.32	0.025	0.164	0.166	0.120	81.3	35.9	0.016	0.012	0.36	-0.003	-0.001	0.003	0.003	198.4	43.5	-8.684	8.239
12/07/2012	5870303.368	532408.388	493.687	10.57	0.022	0.181	0.182	0.151	83.1	39.6	0.017	0.014	0.26	-0.003	0.017	0.017	0.031	100.0	60.9	67.077	120.455
29/09/2012	5870303.382	532408.389	493.692	10.79	0.036	0.182	0.186	0.156	78.8	40.1	0.017	0.014	0.22	0.014	0.001	0.014	0.005	4.1	19.6	64.893	23.117
10/12/2012	5870303.387	532408.377	493.667	10.99	0.041	0.170	0.175	0.131	76.4	36.8	0.016	0.012	0.20	0.005	-0.012	0.013	-0.025	292.6	-62.5	-65.948	-126.823
03/04/2013	5870303.380	532408.386	493.663	11.30	0.034	0.179	0.182	0.127	79.2	34.9	0.016	0.011	0.31	-0.007	0.009	0.011	-0.004	127.9	-19.3	36.531	-12.816
12/07/2013	5870303.374	532408.395	493.687	11.57	0.028	0.188	0.190	0.151	81.5	38.5	0.016	0.013	0.27	-0.006	0.009	0.011	0.024	123.7	65.7	39.508	87.660
04/10/2013	5870303.379	532408.387	493.694	11.80	0.033	0.180	0.183	0.158	79.6	40.8	0.016	0.013	0.23	0.005	-0.008	0.009	0.007	302.0	36.6	-41.021	30.438
27/11/2013	5870303.381	532408.386	493.669	11.95	0.035	0.179	0.182	0.133	78.9	36.1	0.015	0.011	0.15	0.002	-0.001	0.002	-0.025	333.4	-84.9	-15.125	-169.097
10/04/2014	5870303.380	532408.393	493.669	12.32	0.034	0.186	0.189	0.133	79.6	35.1	0.015	0.011	0.37	-0.001	0.007	0.007	0.000	98.1	0.0	19.274	0.000

West Quesnel Land Stability Program

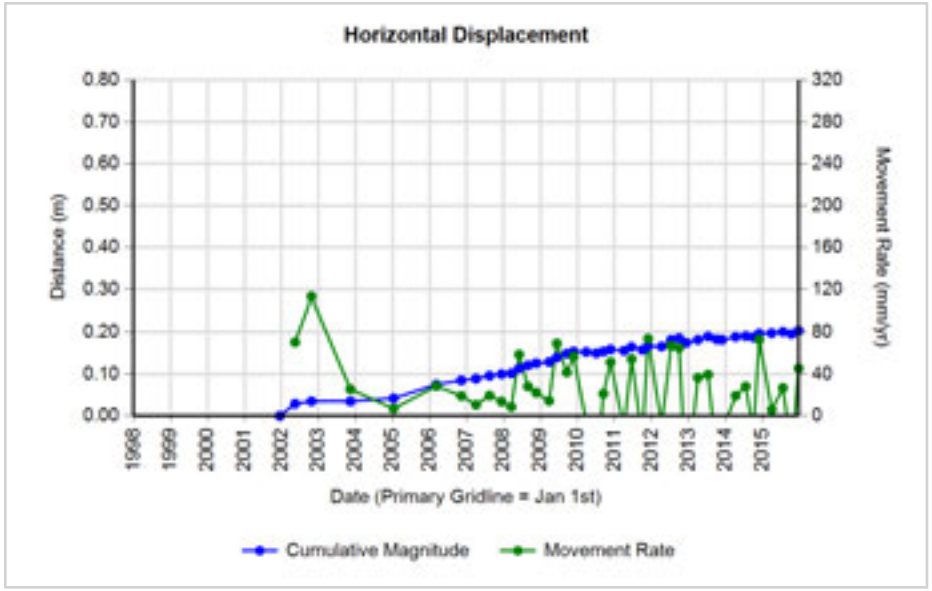
GPS Hub 01-40 (Lewis Drive East of Healy Street)

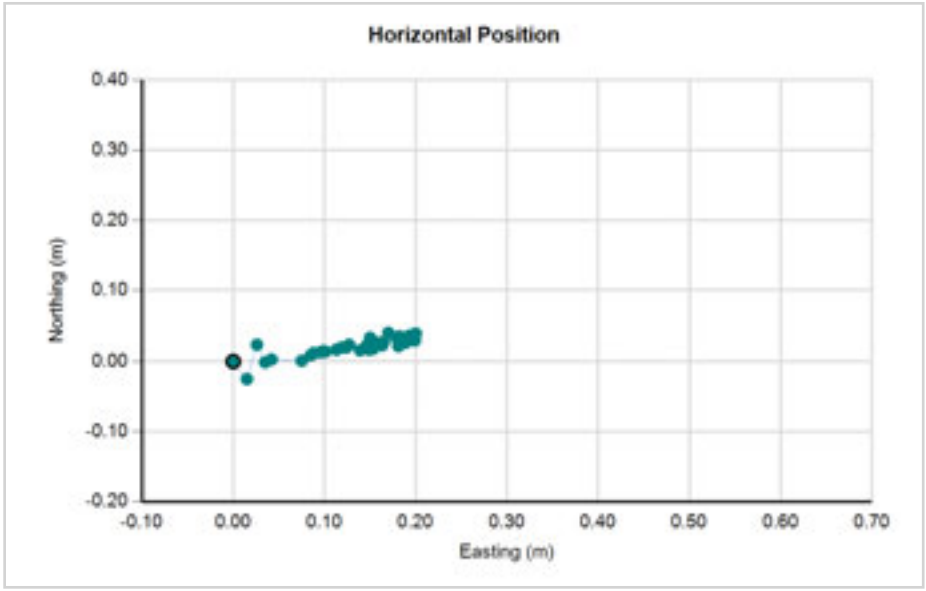
18/07/2014	5870303.373	532408.396	493.691	12.59	0.027	0.189	0.191	0.155	81.9	39.1	0.015	0.012	0.27	-0.007	0.003	0.008	0.022	156.8	70.9	28.098	81.167
02/10/2014	5870303.374	532408.393	493.680	12.80	0.028	0.186	0.188	0.144	81.4	37.4	0.015	0.011	0.21	0.001	-0.003	0.003	-0.011	288.4	-74.0	-15.198	-52.865
28/11/2014	5870303.383	532408.400	493.674	12.95	0.037	0.193	0.197	0.138	79.1	35.1	0.015	0.011	0.16	0.009	0.007	0.011	-0.006	37.9	-27.8	73.061	-38.447
01/04/2015	5870303.383	532408.402	493.677	13.29	0.037	0.195	0.198	0.141	79.3	35.4	0.015	0.011	0.34	0.000	0.002	0.002	0.003	90.0	56.3	5.891	8.837
20/07/2015	5870303.376	532408.406	493.701	13.59	0.030	0.199	0.201	0.165	81.4	39.3	0.015	0.012	0.30	-0.007	0.004	0.008	0.024	150.3	71.4	26.770	79.691
14/10/2015	5870303.381	532408.400	493.684	13.83	0.035	0.193	0.196	0.148	79.7	37.0	0.014	0.011	0.24	0.005	-0.006	0.008	-0.017	309.8	-65.3	-33.171	-72.201
22/12/2015	5870303.386	532408.407	493.680	14.02	0.040	0.200	0.204	0.144	78.7	35.2	0.015	0.010	0.19	0.005	0.007	0.009	-0.004	54.5	-24.9	45.536	-21.174

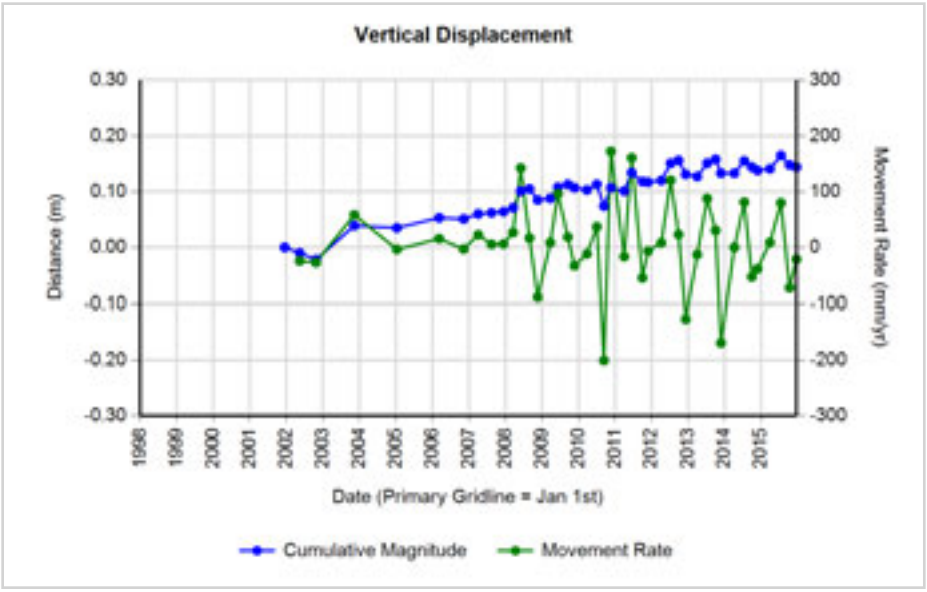
West Quesnel Land Stability Program

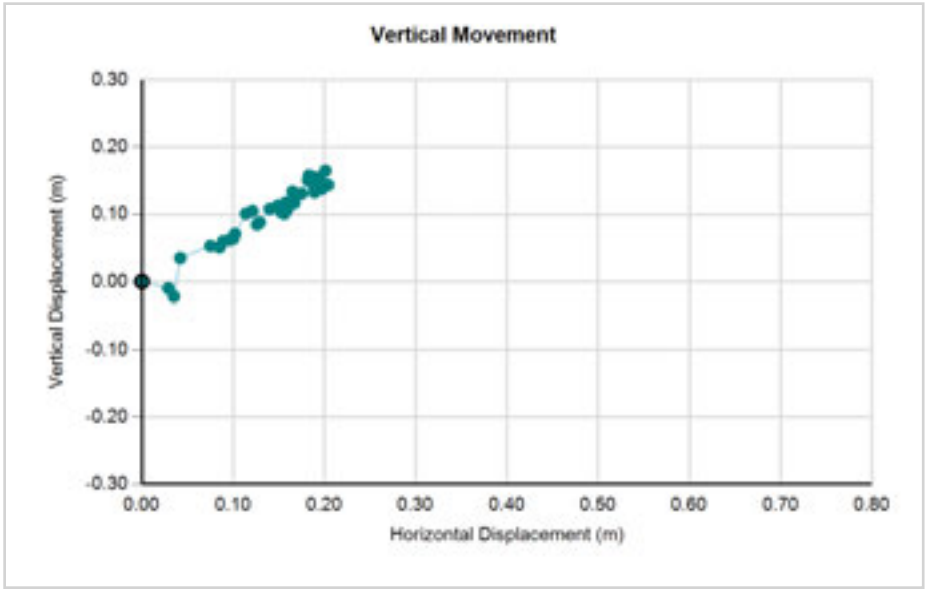
GPS Hub 01-40 (Lewis Drive East of Healy Street)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub Water Tank (Water Tank Benchmark)

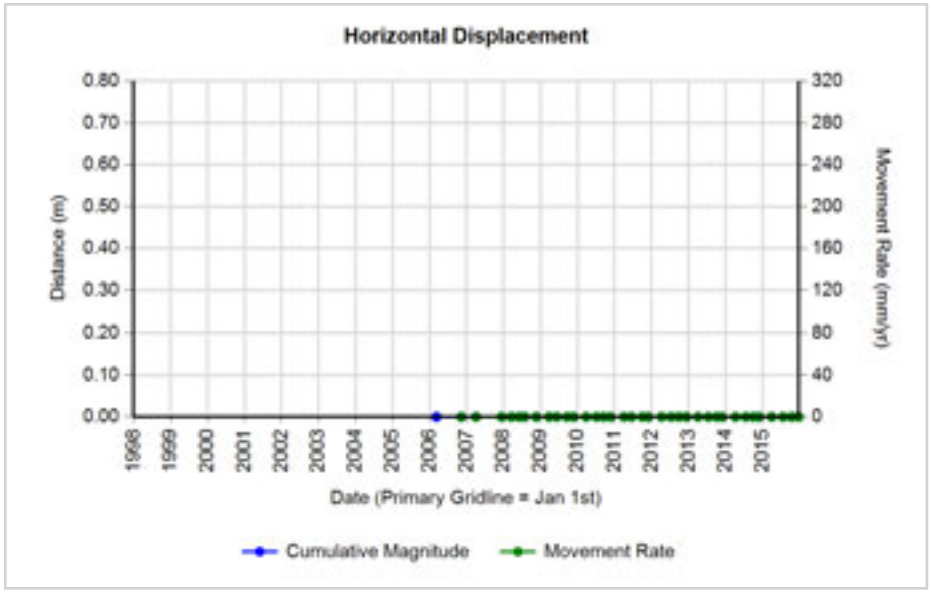
	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/03/2006	5872728.745	532867.388	527.263	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
10/11/2006	5872728.745	532867.388	527.263	0.67	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.67	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
05/04/2007	5872728.745	532867.388	527.263	1.07	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.40	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
13/12/2007	5872728.745	532867.388	527.263	1.76	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.69	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
18/03/2008	5872728.745	532867.388	527.263	2.02	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.26	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
03/06/2008	5872728.745	532867.388	527.263	2.23	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.21	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
29/07/2008	5872728.745	532867.388	527.263	2.39	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.15	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
19/11/2008	5872728.745	532867.388	527.263	2.70	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.31	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
26/03/2009	5872728.745	532867.388	527.263	3.04	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.35	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
10/06/2009	5872728.745	532867.388	527.263	3.25	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.21	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
17/09/2009	5872728.745	532867.388	527.263	3.52	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.27	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
23/11/2009	5872728.745	532867.388	527.263	3.71	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.18	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
27/03/2010	5872728.745	532867.388	527.263	4.05	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.34	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
04/07/2010	5872728.745	532867.388	527.263	4.32	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.27	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
13/09/2010	5872728.745	532867.388	527.263	4.51	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.19	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
22/11/2010	5872728.745	532867.388	527.263	4.70	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.19	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
04/04/2011	5872728.745	532867.388	527.263	5.07	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.36	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
18/06/2011	5872728.745	532867.388	527.263	5.27	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.21	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
03/10/2011	5872728.745	532867.388	527.263	5.57	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.29	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
28/11/2011	5872728.745	532867.388	527.263	5.72	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.15	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
09/04/2012	5872728.745	532867.388	527.263	6.08	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.36	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
12/07/2012	5872728.745	532867.388	527.263	6.34	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.26	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
29/09/2012	5872728.745	532867.388	527.263	6.56	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.22	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
10/12/2012	5872728.745	532867.388	527.263	6.75	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.20	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
03/04/2013	5872728.745	532867.388	527.263	7.07	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.31	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
12/07/2013	5872728.745	532867.388	527.263	7.34	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.27	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
04/10/2013	5872728.745	532867.388	527.263	7.57	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.23	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
27/11/2013	5872728.745	532867.388	527.263	7.72	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.15	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
09/04/2014	5872728.745	532867.388	527.263	8.08	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.36	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
18/07/2014	5872728.745	532867.388	527.263	8.36	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.27	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
02/10/2014	5872728.745	532867.388	527.263	8.56	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.21	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
28/11/2014	5872728.745	532867.388	527.263	8.72	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.16	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
01/04/2015	5872728.745	532867.388	527.263	9.06	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.34	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
20/07/2015	5872728.745	532867.388	527.263	9.36	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.30	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000
14/10/2015	5872728.745	532867.388	527.263	9.60	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.24	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000

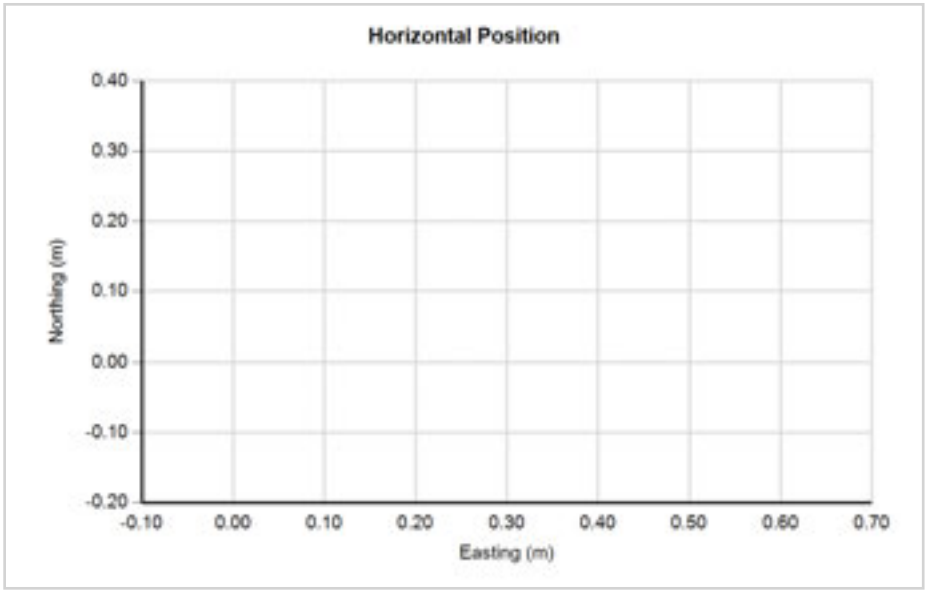
22/12/2015	5872728.745	532867.388	527.263	9.79	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.19	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000

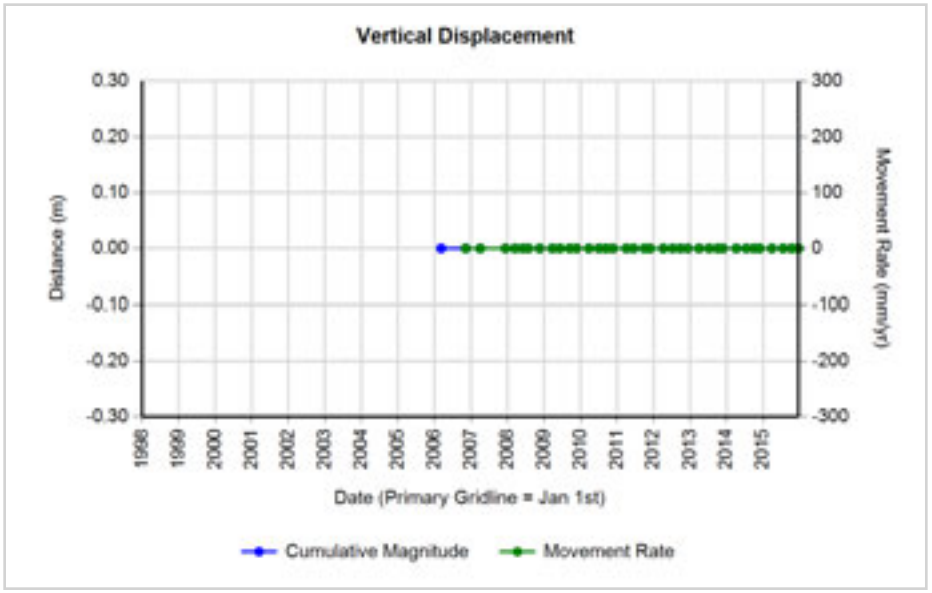
West Quesnel Land Stability Program

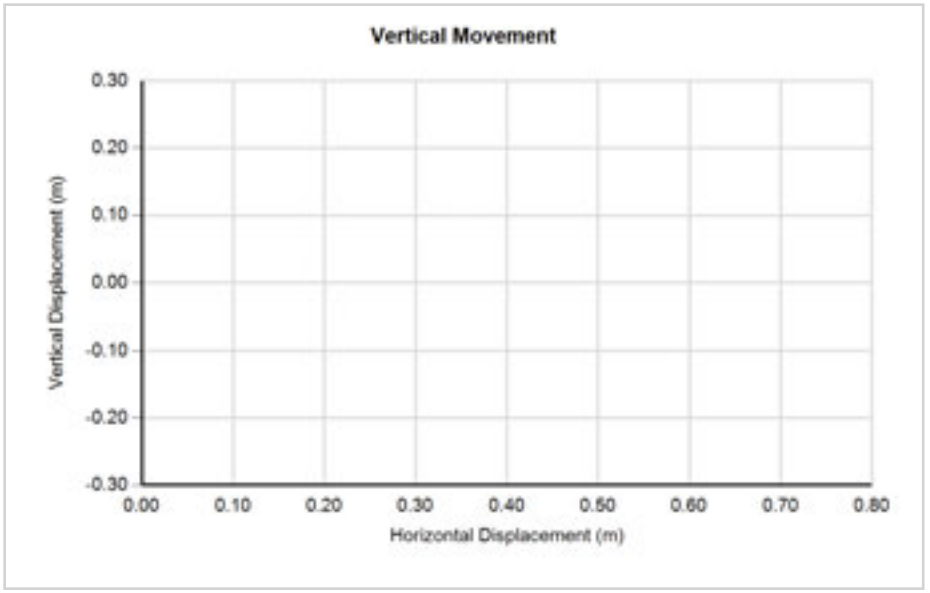
GPS Hub Water Tank (Water Tank Benchmark)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 06-02 (East Side of Anderson Drive by School)

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5868793.977	532384.115	473.102	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
05/04/2007	5868793.986	532384.108	473.099	0.40	0.009	-0.007	0.011	-0.003	322.1	-14.7	0.029	-0.008	0.40	0.009	-0.007	0.011	-0.003	322.1	-14.7	28.524	-7.505
16/08/2007	5868793.981	532384.109	473.110	0.76	0.004	-0.006	0.007	0.008	303.7	48.0	0.009	0.010	0.36	-0.005	0.001	0.005	0.011	168.7	65.1	-14.003	30.209
13/12/2007	5868793.988	532384.111	473.098	1.09	0.011	-0.004	0.012	-0.004	340.0	-18.9	0.011	-0.004	0.33	0.007	0.002	0.007	-0.012	15.9	-58.8	22.345	-36.832
18/03/2008	5868793.988	532384.104	473.107	1.35	0.011	-0.011	0.016	0.005	315.0	17.8	0.012	0.004	0.26	0.000	-0.007	0.007	0.009	270.0	52.1	26.633	34.242
03/06/2008	5868793.988	532384.119	473.117	1.56	0.011	0.004	0.012	0.015	20.0	52.0	0.007	0.010	0.21	0.000	0.015	0.015	0.010	90.0	33.7	-71.153	47.435
29/08/2008	5868793.990	532384.119	473.120	1.80	0.013	0.004	0.014	0.018	17.1	52.9	0.008	0.010	0.24	0.002	0.000	0.002	0.003	0.0	56.3	8.397	12.595
19/11/2008	5868794.000	532384.113	473.091	2.03	0.023	-0.002	0.023	-0.011	355.0	-25.5	0.011	-0.005	0.22	0.010	-0.006	0.012	-0.029	329.0	-68.1	51.945	-129.174
26/03/2009	5868793.992	532384.111	473.118	2.37	0.015	-0.004	0.016	0.016	345.1	45.9	0.007	0.007	0.35	-0.008	-0.002	0.008	0.027	194.0	73.0	-23.716	77.652
10/06/2009	5868793.982	532384.118	473.112	2.58	0.005	0.003	0.006	0.010	31.0	59.8	0.002	0.004	0.21	-0.010	0.007	0.012	-0.006	145.0	-26.2	-58.664	-28.836
17/09/2009	5868793.980	532384.121	473.111	2.85	0.003	0.006	0.007	0.009	63.4	53.3	0.002	0.003	0.27	-0.002	0.003	0.004	-0.001	123.7	-15.5	13.302	-3.689
23/11/2009	5868794.011	532384.112	473.105	3.04	0.034	-0.003	0.034	0.003	355.0	5.0	0.011	0.001	0.18	0.031	-0.009	0.032	-0.006	343.8	-10.5	175.974	-32.709
27/03/2010	5868793.999	532384.112	473.104	3.38	0.022	-0.003	0.022	0.002	352.2	5.1	0.007	0.001	0.34	-0.012	0.000	0.012	-0.001	180.0	-4.8	-35.347	-2.946
04/07/2010	5868793.990	532384.120	473.120	3.65	0.013	0.005	0.014	0.018	21.0	52.3	0.004	0.005	0.27	-0.009	0.008	0.012	0.016	138.4	53.0	-44.426	59.030
13/09/2010	5868793.998	532384.123	473.121	3.84	0.021	0.008	0.022	0.019	20.9	40.2	0.006	0.005	0.19	0.008	0.003	0.009	0.001	20.6	6.7	43.953	5.144
22/11/2010	5868793.998	532384.118	473.112	4.03	0.021	0.003	0.021	0.010	8.1	25.2	0.005	0.002	0.19	0.000	-0.005	0.005	-0.009	270.0	-60.9	-26.089	-46.961
04/04/2011	5868793.994	532384.110	473.102	4.40	0.017	-0.005	0.018	0.000	343.6	0.0	0.004	0.000	0.36	-0.004	-0.008	0.009	-0.010	243.4	-48.2	-24.563	-27.462
18/06/2011	5868793.990	532384.119	473.115	4.60	0.013	0.004	0.014	0.013	17.1	43.7	0.003	0.003	0.21	-0.004	0.009	0.010	0.013	114.0	52.9	-47.964	63.310
03/10/2011	5868793.994	532384.114	473.109	4.90	0.017	-0.001	0.017	0.007	356.6	22.3	0.003	0.001	0.29	0.004	-0.005	0.006	-0.006	308.7	-43.1	21.857	-20.481
28/11/2011	5868794.001	532384.112	473.107	5.05	0.024	-0.003	0.024	0.005	352.9	11.7	0.005	0.001	0.15	0.007	-0.002	0.007	-0.002	344.1	-15.4	47.483	-13.045
09/04/2012	5868793.991	532384.120	473.096	5.41	0.014	0.005	0.015	-0.006	19.7	-22.0	0.003	-0.001	0.36	-0.010	0.008	0.013	-0.011	141.3	-40.7	-35.169	-30.209
12/07/2012	5868793.993	532384.122	473.119	5.67	0.016	0.007	0.017	0.017	23.6	44.2	0.003	0.003	0.26	0.002	0.002	0.003	0.023	45.0	83.0	10.990	89.370
29/09/2012	5868794.005	532384.120	473.111	5.89	0.028	0.005	0.028	0.009	10.1	17.6	0.005	0.002	0.22	0.012	-0.002	0.012	-0.008	350.5	-33.3	56.246	-36.987
10/12/2012	5868793.997	532384.120	473.107	6.08	0.020	0.005	0.021	0.005	14.0	13.6	0.003	0.001	0.20	-0.008	0.000	0.008	-0.004	180.0	-26.6	-40.583	-20.292
03/04/2013	5868793.999	532384.116	473.102	6.40	0.022	0.001	0.022	0.000	2.6	0.0	0.003	0.000	0.31	0.002	-0.004	0.004	-0.005	296.6	-48.2	14.328	-16.020
12/07/2013	5868793.992	532384.126	473.069	6.67	0.015	0.011	0.019	-0.033	36.3	-60.6	0.003	-0.005	0.27	-0.007	0.010	0.012	-0.033	125.0	-69.7	-44.584	-120.532
04/10/2013	5868793.998	532384.114	473.116	6.90	0.021	-0.001	0.021	0.014	357.3	33.7	0.003	0.002	0.23	0.006	-0.012	0.013	0.047	296.6	74.1	58.337	204.366
27/11/2013	5868794.004	532384.118	473.108	7.05	0.027	0.003	0.027	0.006	6.3	12.5	0.004	0.001	0.15	0.006	0.004	0.007	-0.008	33.7	-48.0	48.775	-54.111
10/04/2014	5868794.003	532384.115	473.104	7.41	0.026	0.000	0.026	0.002	0.0	4.4	0.004	0.000	0.37	-0.001	-0.003	0.003	-0.004	251.6	-51.7	-8.620	-10.903
18/07/2014	5868793.993	532384.116	473.116	7.69	0.016	0.001	0.016	0.014	3.6	41.1	0.002	0.002	0.27	-0.010	0.001	0.010	0.012	174.3	50.1	-37.078	44.273
02/10/2014	5868793.998	532384.119	473.092	7.89	0.021	0.004	0.021	-0.010	10.8	-25.1	0.003	-0.001	0.21	0.005	0.003	0.006	-0.024	31.0	-76.3	28.023	-115.342
28/11/2014	5868793.999	532384.118	473.100	8.05	0.022	0.003	0.022	-0.002	7.8	-5.1	0.003	0.000	0.16	0.001	-0.001	0.001	0.008	315.0	80.0	9.062	51.263
01/04/2015	5868794.004	532384.114	473.105	8.39	0.027	-0.001	0.027	0.003	357.9	6.3	0.003	0.000	0.34	0.005	-0.004	0.006	0.005	321.3	38.0	18.861	14.728
20/07/2015	5868793.999	532384.116	473.104	8.69	0.022	0.001	0.022	0.002	2.6	5.2	0.003	0.000	0.30	-0.005	0.002	0.005	-0.001	158.2	-10.5	-17.881	-3.320
14/10/2015	5868793.992	532384.113	473.105	8.93	0.015	-0.002	0.015	0.003	352.4	11.2	0.002	0.000	0.24	-0.007	-0.003	0.008	0.001	203.2	7.5	-32.345	4.247

West Quesnel Land Stability Program

GPS Hub 06-02 (East Side of Anderson Drive by School)

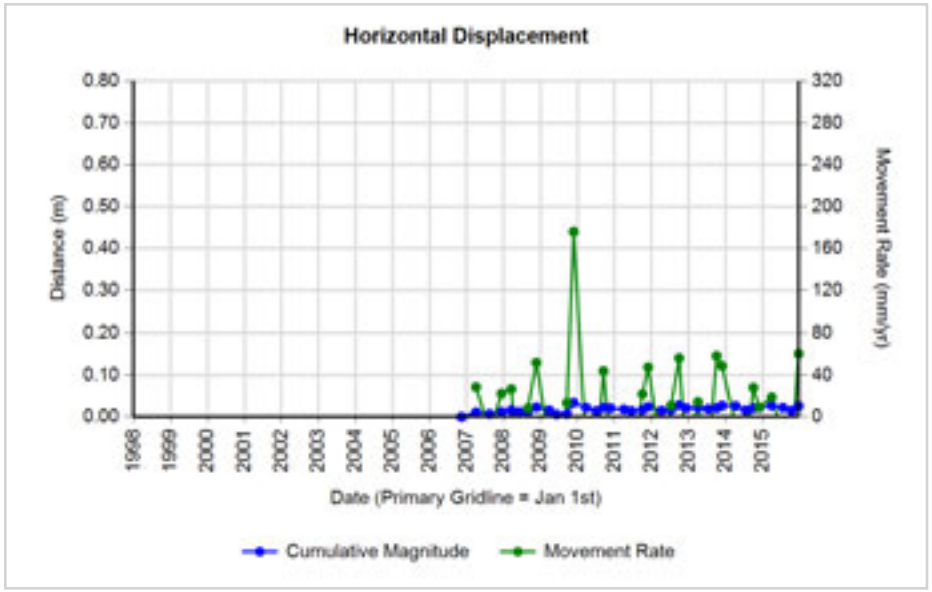
amec foster wheeler

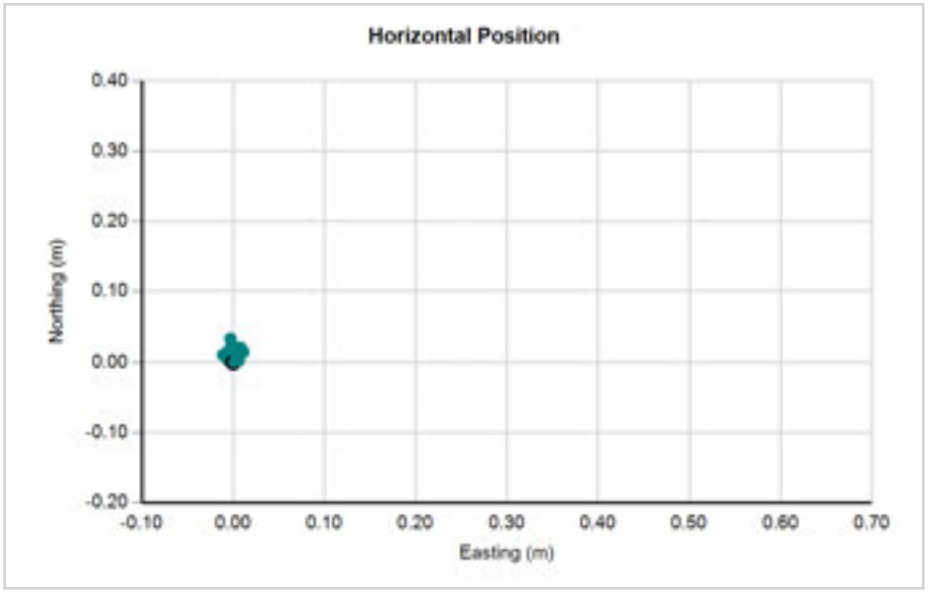
22/12/2015	5868794.003	532384.116	473.093	9.11	0.026	0.001	0.026	-0.009	2.2	-19.1	0.003	-0.001	0.19	0.011	0.003	0.011	-0.012	15.3	-46.5	60.355	-63.522

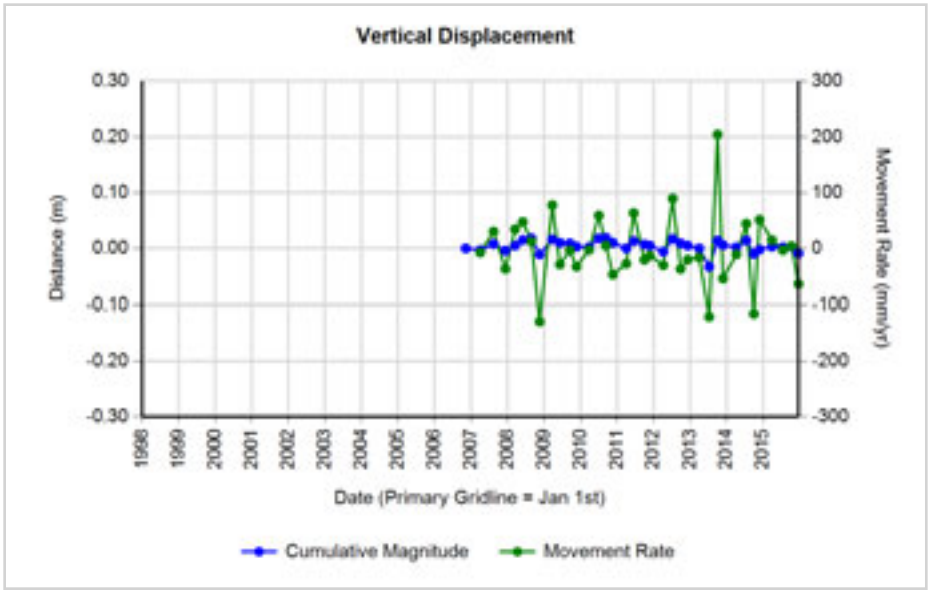
West Quesnel Land Stability Program

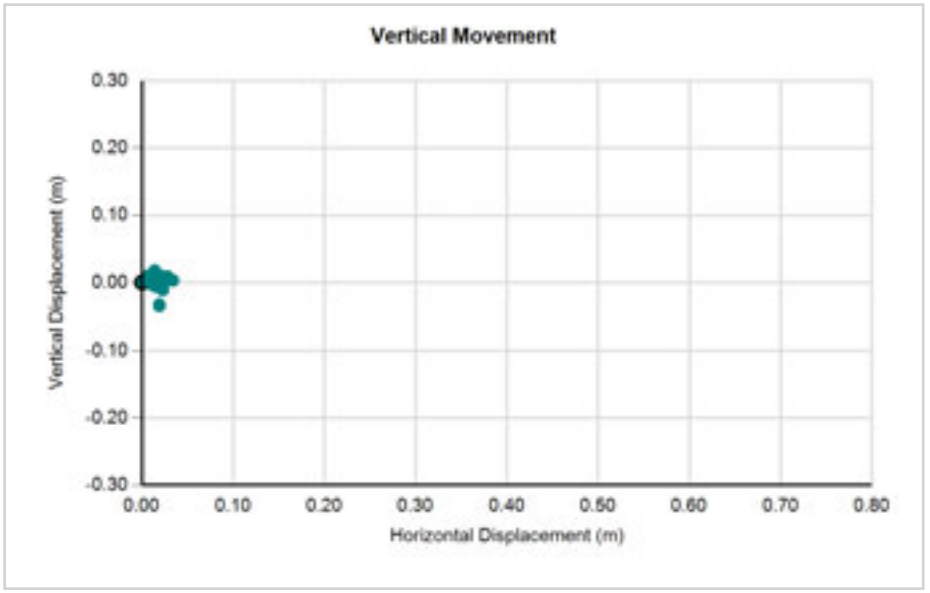
GPS Hub 06-02 (East Side of Anderson Drive by School)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 06-03 (West Side of Anderson Drive)

amec foster wheeler

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5868871.062	532370.952	474.521	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
05/04/2007	5868871.072	532370.949	474.515	0.40	0.010	-0.003	0.010	-0.006	343.3	-29.9	0.026	-0.015	0.40	0.010	-0.003	0.010	-0.006	343.3	-29.9	26.119	-15.010
16/08/2007	5868871.049	532370.956	474.536	0.76	-0.013	0.004	0.014	0.015	162.9	47.8	0.018	0.020	0.36	-0.023	0.007	0.024	0.021	163.1	41.1	66.024	57.671
13/12/2007	5868871.068	532370.952	474.525	1.09	0.006	0.000	0.006	0.004	0.0	33.7	0.006	0.004	0.33	0.019	-0.004	0.019	-0.011	348.1	-29.5	-59.596	-33.763
18/03/2008	5868871.066	532370.950	474.522	1.35	0.004	-0.002	0.004	0.001	333.4	12.6	0.003	0.001	0.26	-0.002	-0.002	0.003	-0.003	225.0	-46.7	-10.761	-11.414
03/06/2008	5868871.057	532370.960	474.544	1.56	-0.005	0.008	0.009	0.023	122.0	67.7	0.006	0.015	0.21	-0.009	0.010	0.013	0.022	132.0	58.6	63.817	104.357
29/08/2008	5868871.059	532370.956	474.550	1.80	-0.003	0.004	0.005	0.029	126.9	80.2	0.003	0.016	0.24	0.002	-0.004	0.004	0.006	296.6	53.3	-18.775	25.190
19/11/2008	5868871.064	532370.954	474.512	2.03	0.002	0.002	0.003	-0.009	45.0	-72.6	0.001	-0.004	0.22	0.005	-0.002	0.005	-0.038	338.2	-81.9	-23.987	-169.262
26/03/2009	5868871.064	532370.951	474.514	2.37	0.002	-0.001	0.002	-0.007	333.4	-72.3	0.001	-0.003	0.35	0.000	-0.003	0.003	0.002	270.0	33.7	-8.628	5.752
10/06/2009	5868871.044	532370.977	474.529	2.58	-0.018	0.025	0.031	0.008	125.8	14.6	0.012	0.003	0.21	-0.020	0.026	0.033	0.015	127.6	24.6	157.646	72.089
17/09/2009	5868871.065	532370.953	474.520	2.85	0.003	0.001	0.003	-0.001	18.4	-17.5	0.001	0.000	0.27	0.021	-0.024	0.032	-0.009	311.2	-15.8	-117.656	-33.205
23/11/2009	5868871.067	532370.954	474.513	3.04	0.005	0.002	0.005	-0.008	21.8	-56.1	0.002	-0.003	0.18	0.002	0.001	0.002	-0.007	26.6	-72.3	12.190	-38.160
27/03/2010	5868871.063	532370.948	474.518	3.38	0.001	-0.004	0.004	-0.003	284.0	-36.0	0.001	-0.001	0.34	-0.004	-0.006	0.007	0.005	236.3	34.7	-21.241	14.728
04/07/2010	5868871.041	532370.962	474.541	3.65	-0.021	0.010	0.023	0.020	154.5	40.7	0.006	0.005	0.27	-0.022	0.014	0.026	0.023	147.5	41.4	96.208	84.856
13/09/2010	5868871.063	532370.970	474.543	3.84	0.001	0.018	0.018	0.022	86.8	50.7	0.005	0.006	0.19	0.022	0.008	0.023	0.002	20.0	4.9	-120.427	10.289
22/11/2010	5868871.063	532370.957	474.518	4.03	0.001	0.005	0.005	-0.003	78.7	-30.5	0.001	-0.001	0.19	0.000	-0.013	0.013	-0.025	270.0	-62.5	-67.832	-130.446
04/04/2011	5868871.069	532370.952	474.517	4.40	0.007	0.000	0.007	-0.004	0.0	-29.7	0.002	-0.001	0.36	0.006	-0.005	0.008	-0.001	320.2	-7.3	21.449	-2.746
18/06/2011	5868871.068	532370.960	474.543	4.60	0.006	0.008	0.010	0.022	53.1	65.6	0.002	0.005	0.21	-0.001	0.008	0.008	0.026	97.1	72.8	39.263	126.620
03/10/2011	5868871.061	532370.960	474.534	4.90	-0.001	0.008	0.008	0.013	97.1	58.2	0.002	0.003	0.29	-0.007	0.000	0.007	-0.009	180.0	-52.1	-23.895	-30.722
28/11/2011	5868871.067	532370.954	474.525	5.05	0.005	0.002	0.005	0.004	21.8	36.6	0.001	0.001	0.15	0.006	-0.006	0.008	-0.009	315.0	-46.7	-55.344	-58.701
09/04/2012	5868871.059	532370.956	474.525	5.41	-0.003	0.004	0.005	0.004	126.9	38.7	0.001	0.001	0.36	-0.008	0.002	0.008	0.000	166.0	0.0	-22.646	0.000
12/07/2012	5868871.053	532370.961	474.532	5.67	-0.009	0.009	0.013	0.011	135.0	40.8	0.002	0.002	0.26	-0.006	0.005	0.008	0.007	140.2	41.9	30.348	27.199
29/09/2012	5868871.068	532370.966	474.528	5.89	0.006	0.014	0.015	0.007	66.8	24.7	0.003	0.001	0.22	0.015	0.005	0.016	-0.004	18.4	-14.2	73.103	-18.494
10/12/2012	5868871.067	532370.955	474.520	6.08	0.005	0.003	0.006	-0.001	31.0	-9.7	0.001	0.000	0.20	-0.001	-0.011	0.011	-0.008	264.8	-35.9	-56.032	-40.583
03/04/2013	5868871.066	532370.955	474.519	6.40	0.004	0.003	0.005	-0.002	36.9	-21.8	0.001	0.000	0.31	-0.001	0.000	0.001	-0.001	180.0	-45.0	-3.204	-3.204
12/07/2013	5868871.060	532370.962	474.527	6.67	-0.002	0.010	0.010	0.006	101.3	30.5	0.002	0.001	0.27	-0.006	0.007	0.009	0.008	130.6	40.9	33.674	29.220
04/10/2013	5868871.063	532370.961	474.534	6.90	0.001	0.009	0.009	0.013	83.7	55.1	0.001	0.002	0.23	0.003	-0.001	0.003	0.007	341.6	65.7	-13.750	30.438
27/11/2013	5868871.070	532370.957	474.521	7.05	0.008	0.005	0.009	0.000	32.0	0.0	0.001	0.000	0.15	0.007	-0.004	0.008	-0.013	330.3	-58.2	54.532	-87.931
10/04/2014	5868871.070	532370.959	474.521	7.41	0.008	0.007	0.011	0.000	41.2	0.0	0.001	0.000	0.37	0.000	0.002	0.002	0.000	90.0	0.0	5.451	0.000
18/07/2014	5868871.051	532370.969	474.538	7.69	-0.011	0.017	0.020	0.017	122.9	40.0	0.003	0.002	0.27	-0.019	0.010	0.021	0.017	152.2	38.4	79.215	62.720
02/10/2014	5868871.056	532370.969	474.528	7.89	-0.006	0.017	0.018	0.007	109.4	21.2	0.002	0.001	0.21	0.005	0.000	0.005	-0.010	0.0	-63.4	-24.030	-48.059
28/11/2014	5868871.065	532370.958	474.510	8.05	0.003	0.006	0.007	-0.011	63.4	-58.6	0.001	-0.001	0.16	0.009	-0.011	0.014	-0.018	309.3	-51.7	-91.073	-115.342
01/04/2015	5868871.074	532370.955	474.520	8.39	0.012	0.003	0.012	-0.001	14.0	-4.6	0.001	0.000	0.34	0.009	-0.003	0.009	0.010	341.6	46.5	27.944	29.456
20/07/2015	5868871.060	532370.966	474.529	8.69	-0.002	0.014	0.014	0.008	98.1	29.5	0.002	0.001	0.30	-0.014	0.011	0.018	0.009	141.8	26.8	59.119	29.884
14/10/2015	5868871.063	532370.952	474.521	8.93	0.001	0.000	0.001	0.000	0.0	0.0	0.000	0.000	0.24	0.003	-0.014	0.014	-0.008	282.1	-29.2	-60.809	-33.977

West Quesnel Land Stability Program

GPS Hub 06-03 (West Side of Anderson Drive)

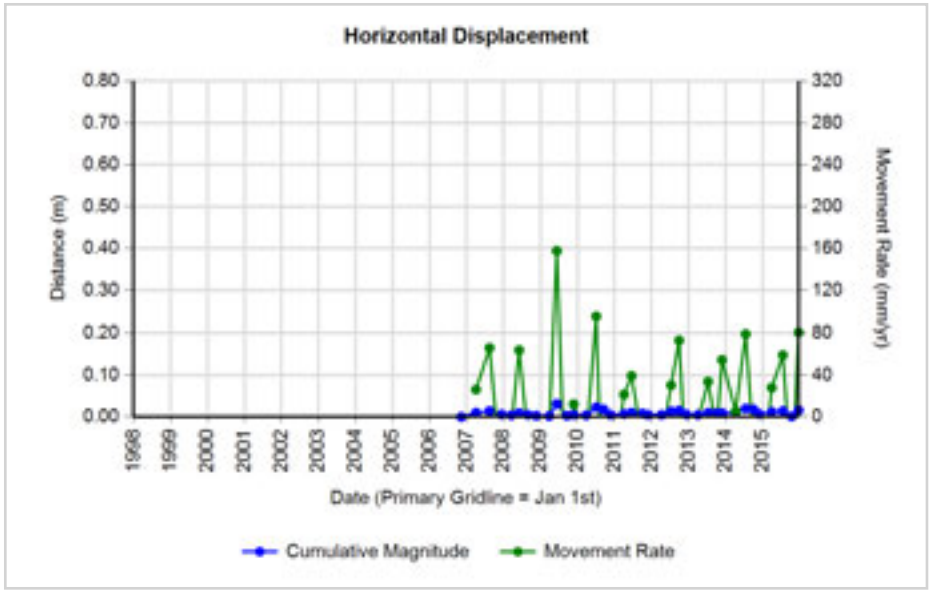
amec foster wheeler

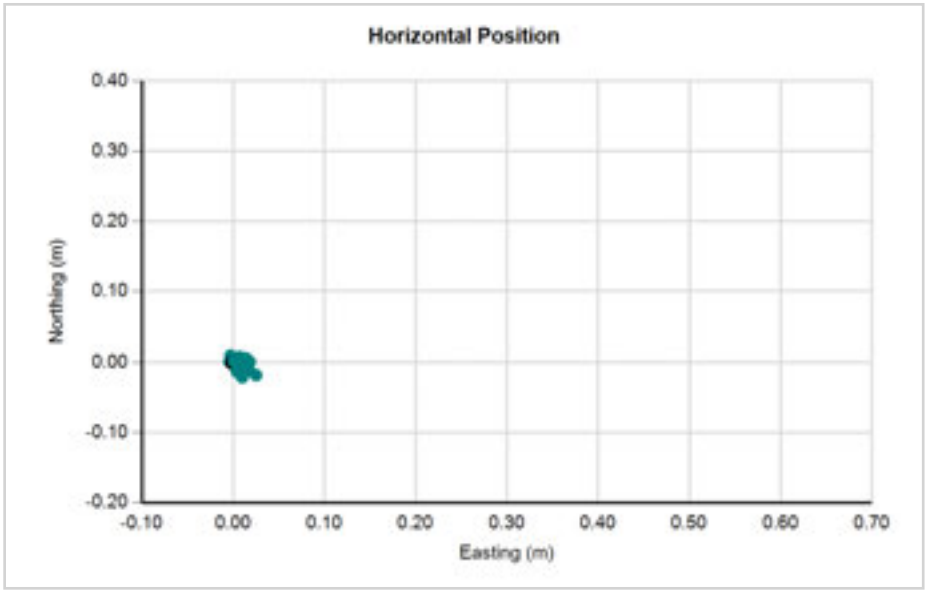
22/12/2015	5868871.076	532370.960	474.514	9.11	0.014	0.008	0.016	-0.007	29.7	-23.5	0.002	-0.001	0.19	0.013	0.008	0.015	-0.007	31.6	-24.6	80.801	-37.054

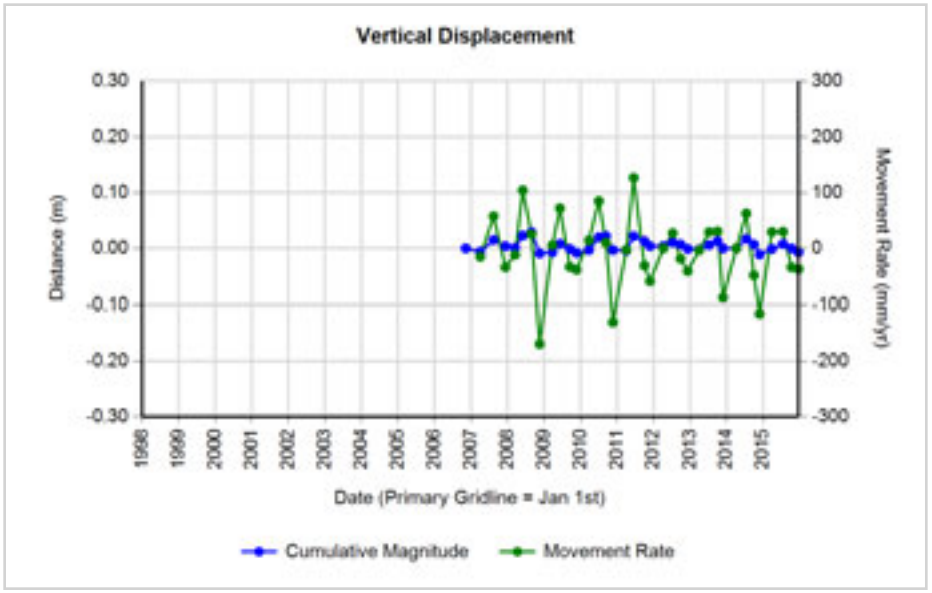
West Quesnel Land Stability Program

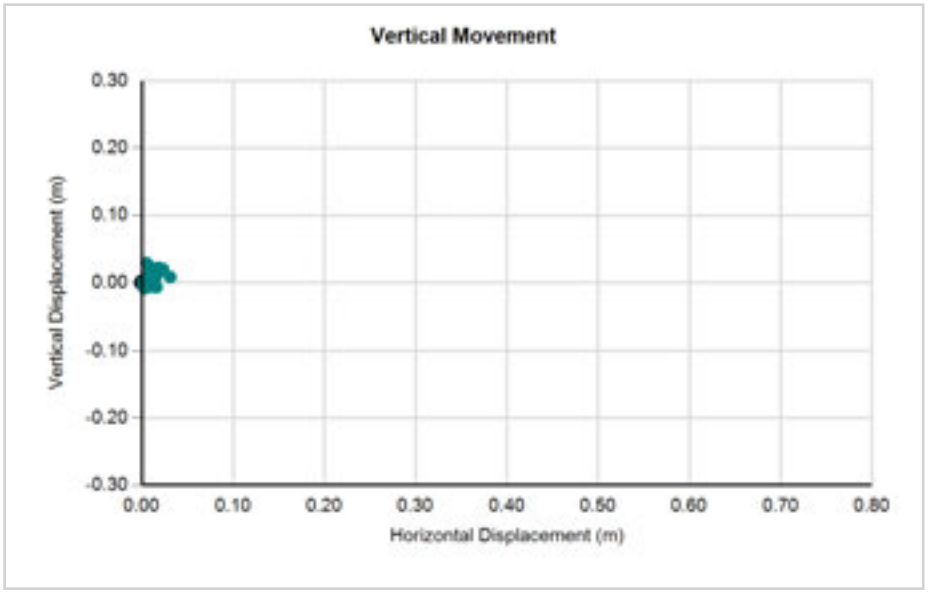
GPS Hub 06-03 (West Side of Anderson Drive)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 06-04 (North Side of Wade Avenue)

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5869067.298	532520.728	474.933	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
05/04/2007	5869067.297	532520.728	474.927	0.40	-0.001	0.000	0.001	-0.006	180.0	-80.5	0.003	-0.015	0.40	-0.001	0.000	0.001	-0.006	180.0	-80.5	2.502	-15.010
16/08/2007	5869067.291	532520.719	474.941	0.76	-0.007	-0.009	0.011	0.008	232.1	35.1	0.015	0.010	0.36	-0.006	-0.009	0.011	0.014	236.3	52.3	29.705	38.447
13/12/2007	5869067.302	532520.725	474.927	1.09	0.004	-0.003	0.005	-0.006	323.1	-50.2	0.005	-0.006	0.33	0.011	0.006	0.013	-0.014	28.6	-48.2	-38.459	-42.971
18/03/2008	5869067.301	532520.722	474.937	1.35	0.003	-0.006	0.007	0.004	296.6	30.8	0.005	0.003	0.26	-0.001	-0.003	0.003	0.010	251.6	72.5	12.031	38.047
03/06/2008	5869067.298	532520.722	474.931	1.56	0.000	-0.006	0.006	-0.002	270.0	-18.4	0.004	-0.001	0.21	-0.003	0.000	0.003	-0.006	180.0	-63.4	-14.231	-28.461
29/08/2008	5869067.300	532520.728	474.931	1.80	0.002	0.000	0.002	-0.002	0.0	-45.0	0.001	-0.001	0.24	0.002	0.006	0.006	0.000	71.6	0.0	-26.552	0.000
19/11/2008	5869067.295	532520.724	475.019	2.03	-0.003	-0.004	0.005	0.086	233.1	86.7	0.002	0.042	0.22	-0.005	-0.004	0.006	0.088	218.7	85.8	28.521	391.976
26/03/2009	5869067.301	532520.726	474.924	2.37	0.003	-0.002	0.004	-0.009	326.3	-68.2	0.002	-0.004	0.35	0.006	0.002	0.006	-0.095	18.4	-86.2	-18.189	-273.219
10/06/2009	5869067.289	532520.720	474.937	2.58	-0.009	-0.008	0.012	0.004	221.6	18.4	0.005	0.002	0.21	-0.012	-0.006	0.013	0.013	206.6	44.1	64.478	62.477
17/09/2009	5869067.294	532520.731	474.939	2.85	-0.004	0.003	0.005	0.006	143.1	50.2	0.002	0.002	0.27	0.005	0.011	0.012	0.002	65.6	9.4	-44.579	7.379
23/11/2009	5869067.301	532520.729	474.926	3.04	0.003	0.001	0.003	-0.007	18.4	-65.7	0.001	-0.002	0.18	0.007	-0.002	0.007	-0.013	344.1	-60.8	-39.687	-70.869
27/03/2010	5869067.303	532520.714	474.935	3.38	0.005	-0.014	0.015	0.002	289.7	7.7	0.004	0.001	0.34	0.002	-0.015	0.015	0.009	277.6	30.7	44.574	26.510
04/07/2010	5869067.287	532520.725	474.934	3.65	-0.011	-0.003	0.011	0.001	195.3	5.0	0.003	0.000	0.27	-0.016	0.011	0.019	-0.001	145.5	-2.9	-71.635	-3.689
13/09/2010	5869067.298	532520.727	474.927	3.84	0.000	-0.001	0.001	-0.006	270.0	-80.5	0.000	-0.002	0.19	0.011	0.002	0.011	-0.007	10.3	-32.1	-57.516	-36.011
22/11/2010	5869067.301	532520.729	474.930	4.03	0.003	0.001	0.003	-0.003	18.4	-43.5	0.001	-0.001	0.19	0.003	0.002	0.004	0.003	33.7	39.8	18.813	15.654
04/04/2011	5869067.285	532520.726	474.925	4.40	-0.013	-0.002	0.013	-0.008	188.7	-31.3	0.003	-0.002	0.36	-0.016	-0.003	0.016	-0.005	190.6	-17.1	44.706	-13.731
18/06/2011	5869067.293	532520.724	474.939	4.60	-0.005	-0.004	0.006	0.006	218.7	43.1	0.001	0.001	0.21	0.008	-0.002	0.008	0.014	346.0	59.5	-40.159	68.180
03/10/2011	5869067.294	532520.720	474.930	4.90	-0.004	-0.008	0.009	-0.003	243.4	-18.5	0.002	-0.001	0.29	0.001	-0.004	0.004	-0.009	284.0	-65.4	14.074	-30.722
28/11/2011	5869067.296	532520.717	474.930	5.05	-0.002	-0.011	0.011	-0.003	259.7	-15.0	0.002	-0.001	0.15	0.002	-0.003	0.004	0.000	303.7	0.0	23.517	0.000
09/04/2012	5869067.289	532520.720	474.928	5.41	-0.009	-0.008	0.012	-0.005	221.6	-22.5	0.002	-0.001	0.36	-0.007	0.003	0.008	-0.002	156.8	-14.7	20.915	-5.492
12/07/2012	5869067.292	532520.726	474.944	5.67	-0.006	-0.002	0.006	0.011	198.4	60.1	0.001	0.002	0.26	0.003	0.006	0.007	0.016	63.4	67.3	-26.066	62.170
29/09/2012	5869067.300	532520.722	474.935	5.89	0.002	-0.006	0.006	0.002	288.4	17.5	0.001	0.000	0.22	0.008	-0.004	0.009	-0.009	333.4	-45.2	41.353	-41.611
10/12/2012	5869067.297	532520.722	474.934	6.08	-0.001	-0.006	0.006	0.001	260.5	9.3	0.001	0.000	0.20	-0.003	0.000	0.003	-0.001	180.0	-18.4	15.219	-5.073
03/04/2013	5869067.294	532520.722	474.937	6.40	-0.004	-0.006	0.007	0.004	236.3	29.0	0.001	0.001	0.31	-0.003	0.000	0.003	0.003	180.0	45.0	9.612	9.612
12/07/2013	5869067.295	532520.728	474.947	6.67	-0.003	0.000	0.003	0.014	180.0	77.9	0.000	0.002	0.27	0.001	0.006	0.006	0.010	80.5	58.7	-22.217	36.525
04/10/2013	5869067.293	532520.717	474.946	6.90	-0.005	-0.011	0.012	0.013	245.6	47.1	0.002	0.002	0.23	-0.002	-0.011	0.011	-0.001	259.7	-5.1	48.615	-4.348
27/11/2013	5869067.299	532520.720	474.934	7.05	0.001	-0.008	0.008	0.001	277.1	7.1	0.001	0.000	0.15	0.006	0.003	0.007	-0.012	26.6	-60.8	-45.374	-81.167
10/04/2014	5869067.296	532520.721	474.937	7.41	-0.002	-0.007	0.007	0.004	254.1	28.8	0.001	0.001	0.37	-0.003	0.001	0.003	0.003	161.6	43.5	-8.620	8.177
18/07/2014	5869067.288	532520.716	474.937	7.69	-0.010	-0.012	0.016	0.004	230.2	14.4	0.002	0.001	0.27	-0.008	-0.005	0.009	0.000	212.0	0.0	34.806	0.000
02/10/2014	5869067.288	532520.717	474.927	7.89	-0.010	-0.011	0.015	-0.006	227.7	-22.0	0.002	-0.001	0.21	0.000	0.001	0.001	-0.010	90.0	-84.3	-4.806	-48.059
28/11/2014	5869067.302	532520.715	474.920	8.05	0.004	-0.013	0.014	-0.013	287.1	-43.7	0.002	-0.002	0.16	0.014	-0.002	0.014	-0.007	351.9	-26.3	-90.621	-44.855
01/04/2015	5869067.299	532520.715	474.927	8.39	0.001	-0.013	0.013	-0.006	274.4	-24.7	0.002	-0.001	0.34	-0.003	0.000	0.003	0.007	180.0	66.8	-8.837	20.619
20/07/2015	5869067.296	532520.721	474.902	8.69	-0.002	-0.007	0.007	-0.031	254.1	-76.8	0.001	-0.004	0.30	-0.003	0.006	0.007	-0.025	116.6	-75.0	-22.274	-83.011
14/10/2015	5869067.290	532520.717	474.897	8.93	-0.008	-0.011	0.014	-0.036	234.0	-69.3	0.002	-0.004	0.24	-0.006	-0.004	0.007	-0.005	213.7	-34.7	30.626	-21.235

West Quesnel Land Stability Program

GPS Hub 06-04 (North Side of Wade Avenue)

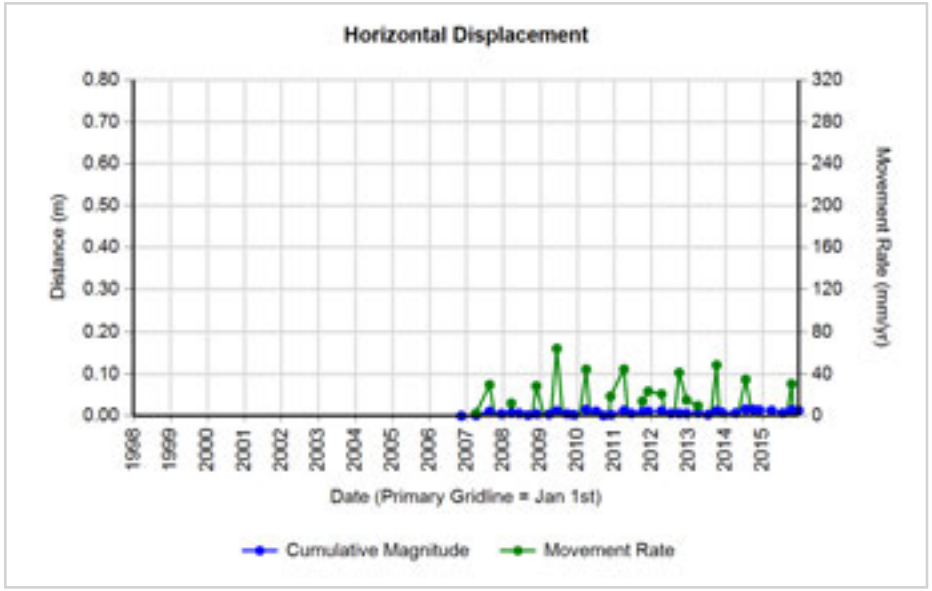
amec foster wheeler

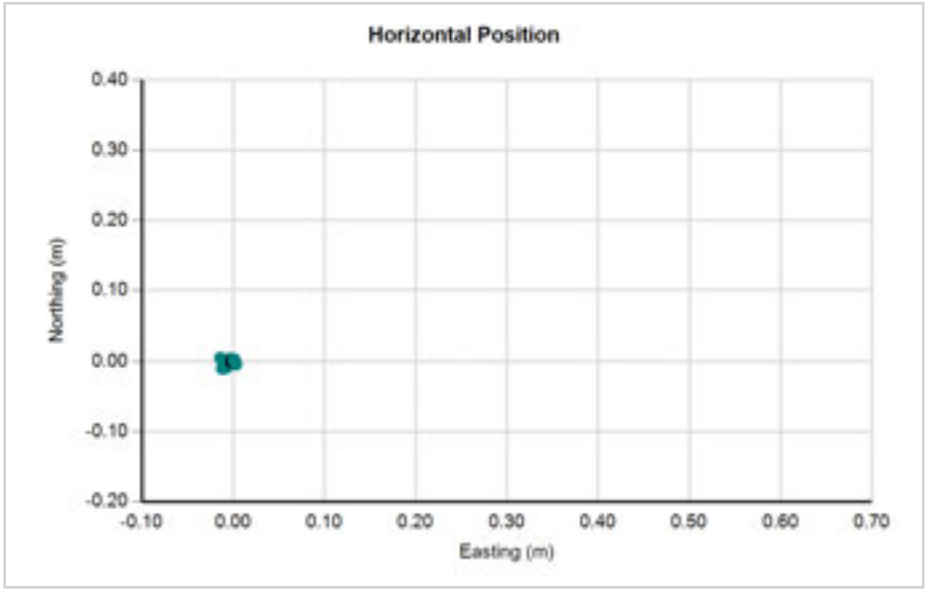
22/12/2015	5869067.305	532520.717	474.889	9.11	0.007	-0.011	0.013	-0.044	302.5	-73.5	0.001	-0.005	0.19	0.015	0.000	0.015	-0.008	0.0	-28.1	-79.402	-42.348

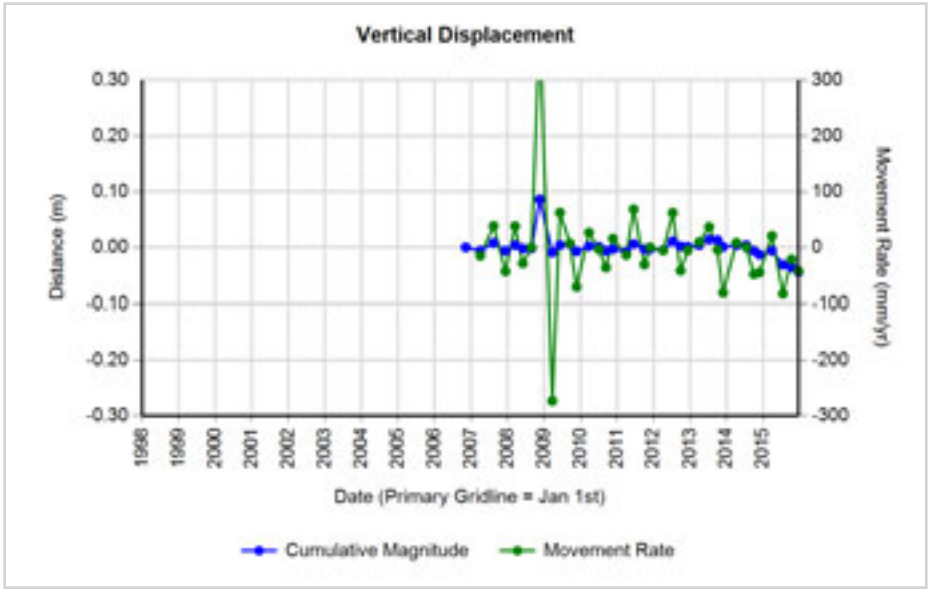
West Quesnel Land Stability Program

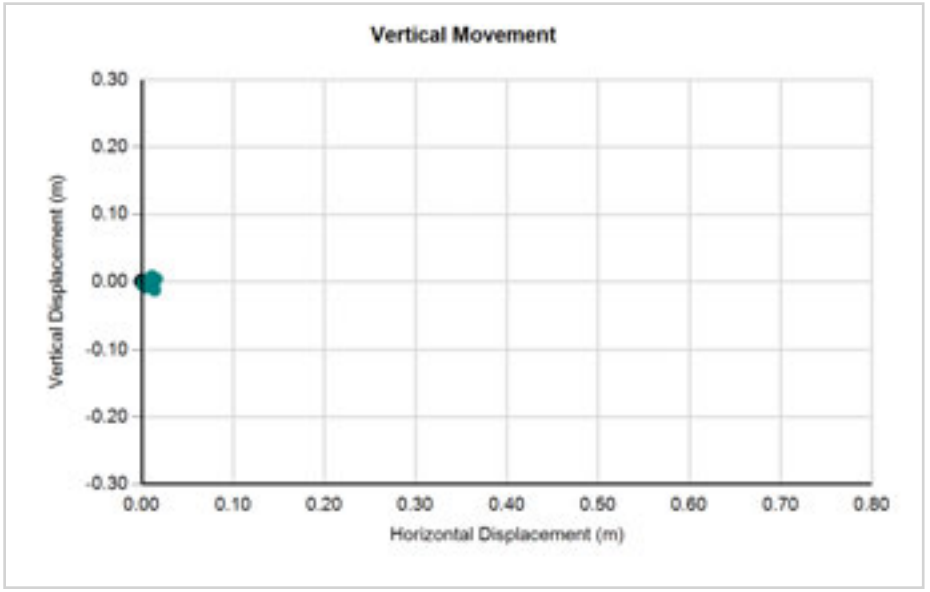
GPS Hub 06-04 (North Side of Wade Avenue)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 06-05 (West Side of Anderson Drive)

amec foster wheeler

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5869143.444	532486.772	478.133	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
05/04/2007	5869143.448	532486.774	478.128	0.40	0.004	0.002	0.004	-0.005	26.6	-48.2	0.011	-0.013	0.40	0.004	0.002	0.004	-0.005	26.6	-48.2	11.188	-12.509
16/08/2007	5869143.438	532486.773	478.114	0.76	-0.006	0.001	0.006	-0.019	170.5	-72.2	0.008	-0.025	0.36	-0.010	-0.001	0.010	-0.014	185.7	-54.3	27.599	-38.447
13/12/2007	5869143.445	532486.782	478.125	1.09	0.001	0.010	0.010	-0.008	84.3	-38.5	0.009	-0.007	0.33	0.007	0.009	0.011	0.011	52.1	44.0	34.996	33.763
18/03/2008	5869143.445	532486.779	478.144	1.35	0.001	0.007	0.007	0.011	81.9	57.3	0.005	0.008	0.26	0.000	-0.003	0.003	0.019	270.0	81.0	-11.414	72.289
03/06/2008	5869143.439	532486.790	478.142	1.56	-0.005	0.018	0.019	0.009	105.5	25.7	0.012	0.006	0.21	-0.006	0.011	0.013	-0.002	118.6	-9.1	59.436	-9.487
29/08/2008	5869143.434	532486.794	478.149	1.80	-0.010	0.022	0.024	0.016	114.4	33.5	0.013	0.009	0.24	-0.005	0.004	0.006	0.007	141.3	47.5	26.882	29.388
19/11/2008	5869143.437	532486.796	478.141	2.03	-0.007	0.024	0.025	0.008	106.3	17.7	0.012	0.004	0.22	0.003	0.002	0.004	-0.008	33.7	-65.7	16.060	-35.634
26/03/2009	5869143.436	532486.797	478.142	2.37	-0.008	0.025	0.026	0.009	107.7	18.9	0.011	0.004	0.35	-0.001	0.001	0.001	0.001	135.0	35.3	4.067	2.876
10/06/2009	5869143.427	532486.812	478.170	2.58	-0.017	0.040	0.043	0.037	113.0	40.4	0.017	0.014	0.21	-0.009	0.015	0.017	0.028	121.0	58.0	84.069	134.566
17/09/2009	5869143.431	532486.805	478.155	2.85	-0.013	0.033	0.035	0.022	111.5	31.8	0.012	0.008	0.27	0.004	-0.007	0.008	-0.015	299.7	-61.7	-29.745	-55.341
23/11/2009	5869143.439	532486.812	478.151	3.04	-0.005	0.040	0.040	0.018	97.1	24.1	0.013	0.006	0.18	0.008	0.007	0.011	-0.004	41.2	-20.6	57.950	-21.806
27/03/2010	5869143.434	532486.813	478.154	3.38	-0.010	0.041	0.042	0.021	103.7	26.5	0.013	0.006	0.34	-0.005	0.001	0.005	0.003	168.7	30.5	15.019	8.837
04/07/2010	5869143.423	532486.810	478.157	3.65	-0.021	0.038	0.043	0.024	118.9	28.9	0.012	0.007	0.27	-0.011	-0.003	0.011	0.003	195.3	14.7	42.066	11.068
13/09/2010	5869143.430	532486.814	478.160	3.84	-0.014	0.042	0.044	0.027	108.4	31.4	0.012	0.007	0.19	0.007	0.004	0.008	0.003	29.7	20.4	41.475	15.433
22/11/2010	5869143.430	532486.813	478.160	4.03	-0.014	0.041	0.043	0.027	108.9	31.9	0.011	0.007	0.19	0.000	-0.001	0.001	0.000	270.0	0.0	-5.218	0.000
04/04/2011	5869143.427	532486.812	478.164	4.40	-0.017	0.040	0.043	0.031	113.0	35.5	0.010	0.007	0.36	-0.003	-0.001	0.003	0.004	198.4	51.7	8.684	10.985
18/06/2011	5869143.425	532486.820	478.161	4.60	-0.019	0.048	0.052	0.028	111.6	28.5	0.011	0.006	0.21	-0.002	0.008	0.008	-0.003	104.0	-20.0	40.159	-14.610
03/10/2011	5869143.427	532486.816	478.156	4.90	-0.017	0.044	0.047	0.023	111.1	26.0	0.010	0.005	0.29	0.002	-0.004	0.004	-0.005	296.6	-48.2	-15.266	-17.068
28/11/2011	5869143.427	532486.816	478.155	5.05	-0.017	0.044	0.047	0.022	111.1	25.0	0.009	0.004	0.15	0.000	0.000	0.000	-0.001	0.0	0.0	0.000	-6.522
09/04/2012	5869143.419	532486.821	478.154	5.41	-0.025	0.049	0.055	0.021	117.0	20.9	0.010	0.004	0.36	-0.008	0.005	0.009	-0.001	148.0	-6.1	25.908	-2.746
12/07/2012	5869143.420	532486.828	478.177	5.67	-0.024	0.056	0.061	0.044	113.2	35.8	0.011	0.008	0.26	0.001	0.007	0.007	0.023	81.9	72.9	27.476	89.370
29/09/2012	5869143.429	532486.829	478.171	5.89	-0.015	0.057	0.059	0.038	104.7	32.8	0.010	0.006	0.22	0.009	0.001	0.009	-0.006	6.3	-33.5	-41.867	-27.741
10/12/2012	5869143.422	532486.825	478.172	6.08	-0.022	0.053	0.057	0.039	112.5	34.2	0.009	0.006	0.20	-0.007	-0.004	0.008	0.001	209.7	7.1	-40.899	5.073
03/04/2013	5869143.422	532486.827	478.164	6.40	-0.022	0.055	0.059	0.031	111.8	27.6	0.009	0.005	0.31	0.000	0.002	0.002	-0.008	90.0	-76.0	6.408	-25.632
12/07/2013	5869143.417	532486.832	478.181	6.67	-0.027	0.060	0.066	0.048	114.2	36.1	0.010	0.007	0.27	-0.005	0.005	0.007	0.017	135.0	67.4	25.827	62.093
04/10/2013	5869143.421	532486.823	478.183	6.90	-0.023	0.051	0.056	0.050	114.3	41.8	0.008	0.007	0.23	0.004	-0.009	0.010	0.002	294.0	11.5	-42.825	8.696
27/11/2013	5869143.421	532486.829	478.175	7.05	-0.023	0.057	0.061	0.042	112.0	34.3	0.009	0.006	0.15	0.000	0.006	0.006	-0.008	90.0	-53.1	40.583	-54.111
10/04/2014	5869143.420	532486.828	478.166	7.41	-0.024	0.056	0.061	0.033	113.2	28.4	0.008	0.004	0.37	-0.001	-0.001	0.001	-0.009	225.0	-81.1	-3.855	-24.532
18/07/2014	5869143.415	532486.829	478.173	7.69	-0.029	0.057	0.064	0.040	117.0	32.0	0.008	0.005	0.27	-0.005	0.001	0.005	0.007	168.7	53.9	18.812	25.826
02/10/2014	5869143.418	532486.828	478.164	7.89	-0.026	0.056	0.062	0.031	114.9	26.7	0.008	0.004	0.21	0.003	-0.001	0.003	-0.009	341.6	-70.6	-15.198	-43.253
28/11/2014	5869143.428	532486.830	478.164	8.05	-0.016	0.058	0.060	0.031	105.4	27.3	0.007	0.004	0.16	0.010	0.002	0.010	0.000	11.3	0.0	-65.348	0.000
01/04/2015	5869143.425	532486.830	478.171	8.39	-0.019	0.058	0.061	0.038	108.1	31.9	0.007	0.005	0.34	-0.003	0.000	0.003	0.007	180.0	66.8	8.837	20.619
20/07/2015	5869143.421	532486.833	478.174	8.69	-0.023	0.061	0.065	0.041	110.7	32.2	0.008	0.005	0.30	-0.004	0.003	0.005	0.003	143.1	31.0	16.602	9.961
14/10/2015	5869143.416	532486.826	478.172	8.93	-0.028	0.054	0.061	0.039	117.4	32.7	0.007	0.004	0.24	-0.005	-0.007	0.009	-0.002	234.5	-13.1	-36.535	-8.494

West Quesnel Land Stability Program

GPS Hub 06-05 (West Side of Anderson Drive)

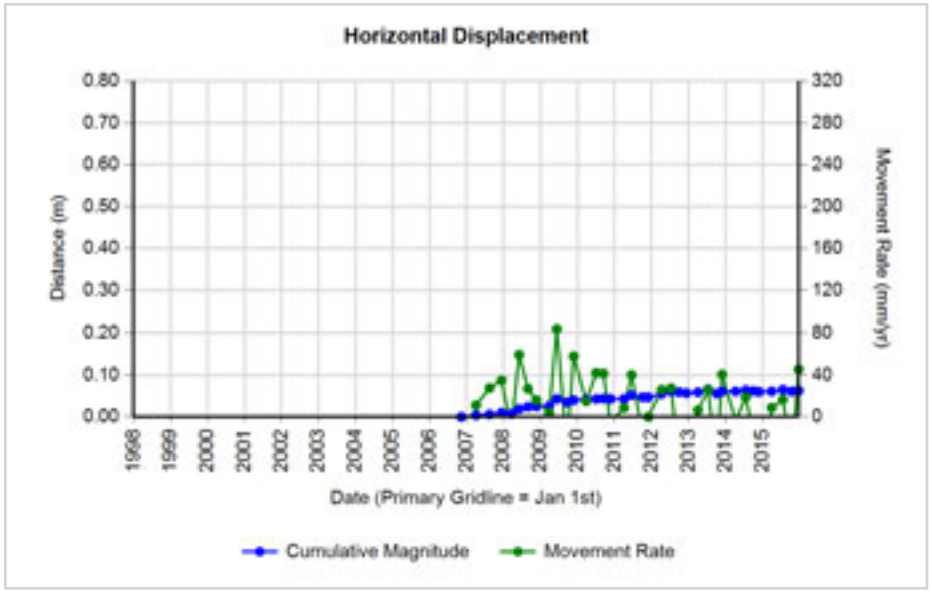
amec foster wheeler

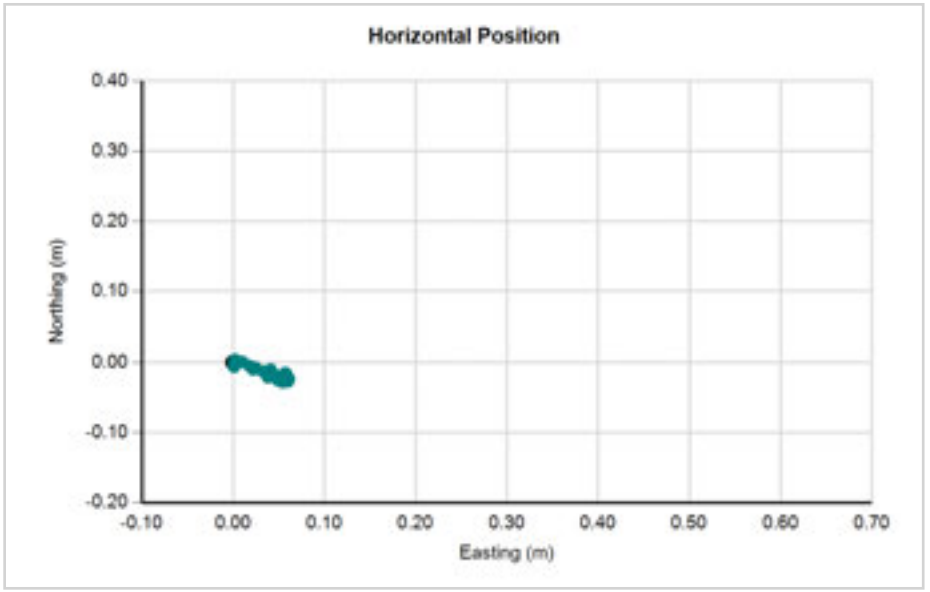
22/12/2015	5869143.423	532486.831	478.160	9.11	-0.021	0.059	0.063	0.027	109.6	23.3	0.007	0.003	0.19	0.007	0.005	0.009	-0.012	35.5	-54.4	45.536	-63.522

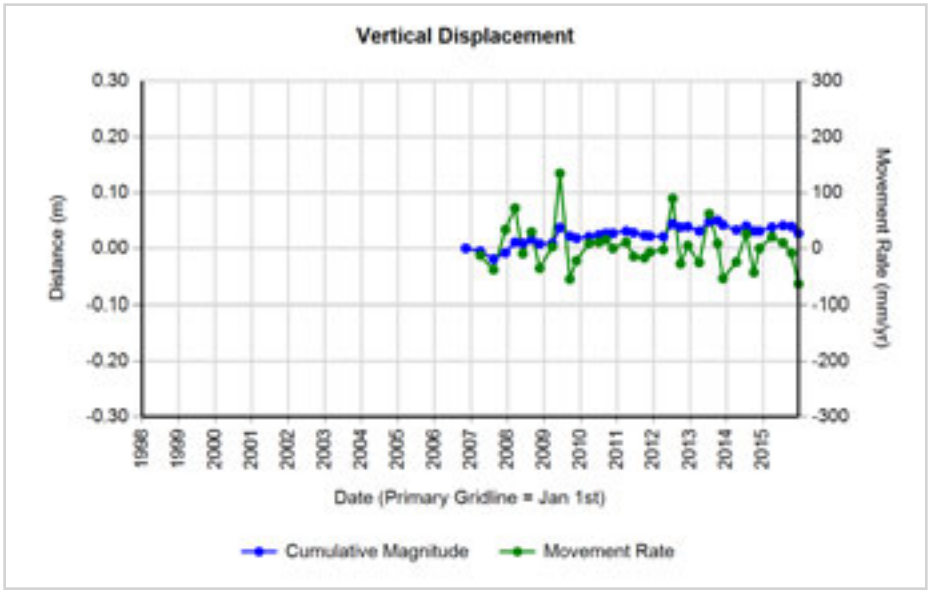
West Quesnel Land Stability Program

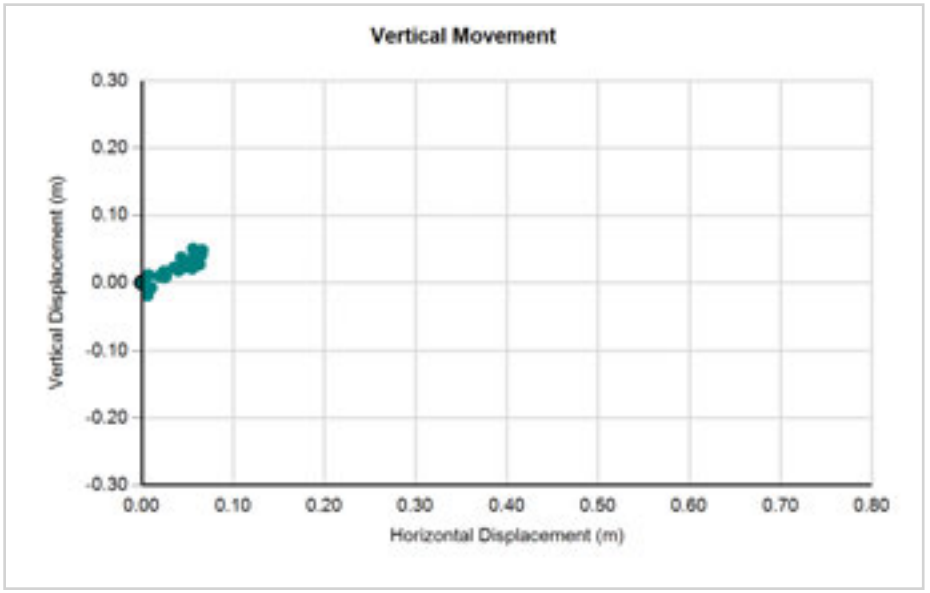
GPS Hub 06-05 (West Side of Anderson Drive)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 06-06 (North Corner of Avery Avenue and Anderson Drive)

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5869235.696	532594.188	476.641	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
05/04/2007	5869235.691	532594.191	476.638	0.40	-0.005	0.003	0.006	-0.003	149.0	-27.2	0.015	-0.008	0.40	-0.005	0.003	0.006	-0.003	149.0	-27.2	14.587	-7.505
16/08/2007	5869235.683	532594.184	476.627	0.76	-0.013	-0.004	0.014	-0.014	197.1	-45.8	0.018	-0.018	0.36	-0.008	-0.007	0.011	-0.011	221.2	-46.0	29.193	-30.209
13/12/2007	5869235.695	532594.193	476.639	1.09	-0.001	0.005	0.005	-0.002	101.3	-21.4	0.005	-0.002	0.33	0.012	0.009	0.015	0.012	36.9	38.7	-46.040	36.832
18/03/2008	5869235.691	532594.189	476.646	1.35	-0.005	0.001	0.005	0.005	168.7	44.4	0.004	0.004	0.26	-0.004	-0.004	0.006	0.007	225.0	51.1	21.523	26.633
03/06/2008	5869235.685	532594.192	476.641	1.56	-0.011	0.004	0.012	0.000	160.0	0.0	0.007	0.000	0.21	-0.006	0.003	0.007	-0.005	153.4	-36.7	31.820	-23.718
29/08/2008	5869235.685	532594.195	476.686	1.80	-0.011	0.007	0.013	0.045	147.5	73.8	0.007	0.025	0.24	0.000	0.003	0.003	0.045	90.0	86.2	12.595	188.922
19/11/2008	5869235.682	532594.197	476.641	2.03	-0.014	0.009	0.017	0.000	147.3	0.0	0.008	0.000	0.22	-0.003	0.002	0.004	-0.045	146.3	-85.4	16.060	-200.442
26/03/2009	5869235.685	532594.195	476.646	2.37	-0.011	0.007	0.013	0.005	147.5	21.0	0.005	0.002	0.35	0.003	-0.002	0.004	0.005	326.3	54.2	-10.370	14.380
10/06/2009	5869235.676	532594.204	476.658	2.58	-0.020	0.016	0.026	0.017	141.3	33.6	0.010	0.007	0.21	-0.009	0.009	0.013	0.012	135.0	43.3	61.169	57.671
17/09/2009	5869235.686	532594.198	476.653	2.85	-0.010	0.010	0.014	0.012	135.0	40.3	0.005	0.004	0.27	0.010	-0.006	0.012	-0.005	329.0	-23.2	-43.025	-18.447
23/11/2009	5869235.693	532594.202	476.653	3.04	-0.003	0.014	0.014	0.012	102.1	40.0	0.005	0.004	0.18	0.007	0.004	0.008	0.000	29.7	0.0	43.951	0.000
27/03/2010	5869235.692	532594.197	476.647	3.38	-0.004	0.009	0.010	0.006	114.0	31.4	0.003	0.002	0.34	-0.001	-0.005	0.005	-0.006	258.7	-49.6	-15.019	-17.673
04/07/2010	5869235.674	532594.196	476.652	3.65	-0.022	0.008	0.023	0.011	160.0	25.2	0.006	0.003	0.27	-0.018	-0.001	0.018	0.005	183.2	15.5	66.511	18.447
13/09/2010	5869235.679	532594.198	476.656	3.84	-0.017	0.010	0.020	0.015	149.5	37.3	0.005	0.004	0.19	0.005	0.002	0.005	0.004	21.8	36.6	-27.703	20.577
22/11/2010	5869235.685	532594.202	476.653	4.03	-0.011	0.014	0.018	0.012	128.2	34.0	0.004	0.003	0.19	0.006	0.004	0.007	-0.003	33.7	-22.6	-37.627	-15.654
04/04/2011	5869235.682	532594.203	476.656	4.40	-0.014	0.015	0.021	0.015	133.0	36.2	0.005	0.003	0.36	-0.003	0.001	0.003	0.003	161.6	43.5	8.684	8.239
18/06/2011	5869235.674	532594.200	476.659	4.60	-0.022	0.012	0.025	0.018	151.4	35.7	0.005	0.004	0.21	-0.008	-0.003	0.009	0.003	200.6	19.3	41.609	14.610
03/10/2011	5869235.684	532594.195	476.659	4.90	-0.012	0.007	0.014	0.018	149.7	52.3	0.003	0.004	0.29	0.010	-0.005	0.011	0.000	333.4	0.0	-38.165	0.000
28/11/2011	5869235.683	532594.198	476.655	5.05	-0.013	0.010	0.016	0.014	142.4	40.5	0.003	0.003	0.15	-0.001	0.003	0.003	-0.004	108.4	-51.7	20.625	-26.089
09/04/2012	5869235.676	532594.199	476.654	5.41	-0.020	0.011	0.023	0.013	151.2	29.7	0.004	0.002	0.36	-0.007	0.001	0.007	-0.001	171.9	-8.0	19.419	-2.746
12/07/2012	5869235.676	532594.202	476.668	5.67	-0.020	0.014	0.024	0.027	145.0	47.9	0.004	0.005	0.26	0.000	0.003	0.003	0.014	90.0	77.9	11.657	54.399
29/09/2012	5869235.684	532594.202	476.664	5.89	-0.012	0.014	0.018	0.023	130.6	51.3	0.003	0.004	0.22	0.008	0.000	0.008	-0.004	0.0	-26.6	-36.987	-18.494
10/12/2012	5869235.679	532594.203	476.662	6.08	-0.017	0.015	0.023	0.021	138.6	42.8	0.004	0.003	0.20	-0.005	0.001	0.005	-0.002	168.7	-21.4	25.867	-10.146
03/04/2013	5869235.678	532594.203	476.655	6.40	-0.018	0.015	0.023	0.014	140.2	30.9	0.004	0.002	0.31	-0.001	0.000	0.001	-0.007	180.0	-81.9	3.204	-22.428
12/07/2013	5869235.676	532594.204	476.664	6.67	-0.020	0.016	0.026	0.023	141.3	41.9	0.004	0.003	0.27	-0.002	0.001	0.002	0.009	153.4	76.0	8.167	32.873
04/10/2013	5869235.676	532594.198	476.670	6.90	-0.020	0.010	0.022	0.029	153.4	52.4	0.003	0.004	0.23	0.000	-0.006	0.006	0.006	270.0	45.0	-26.089	26.089
27/11/2013	5869235.679	532594.201	476.659	7.05	-0.017	0.013	0.021	0.018	142.6	40.1	0.003	0.003	0.15	0.003	0.003	0.004	-0.011	45.0	-68.9	-28.697	-74.403
10/04/2014	5869235.679	532594.202	476.659	7.41	-0.017	0.014	0.022	0.018	140.5	39.3	0.003	0.002	0.37	0.000	0.001	0.001	0.000	90.0	0.0	2.726	0.000
18/07/2014	5869235.668	532594.200	476.667	7.69	-0.028	0.012	0.030	0.026	156.8	40.5	0.004	0.003	0.27	-0.011	-0.002	0.011	0.008	190.3	35.6	41.249	29.515
02/10/2014	5869235.674	532594.204	476.658	7.89	-0.022	0.016	0.027	0.017	144.0	32.0	0.003	0.002	0.21	0.006	0.004	0.007	-0.009	33.7	-51.3	-34.656	-43.253
28/11/2014	5869235.681	532594.204	476.649	8.05	-0.015	0.016	0.022	0.008	133.2	20.0	0.003	0.001	0.16	0.007	0.000	0.007	-0.009	0.0	-52.1	-44.855	-57.671
01/04/2015	5869235.680	532594.201	476.657	8.39	-0.016	0.013	0.021	0.016	140.9	37.8	0.002	0.002	0.34	-0.001	-0.003	0.003	0.008	251.6	68.4	-9.315	23.565
20/07/2015	5869235.677	532594.203	476.666	8.69	-0.019	0.015	0.024	0.025	141.7	45.9	0.003	0.003	0.30	-0.003	0.002	0.004	0.009	146.3	68.2	11.972	29.884
14/10/2015	5869235.671	532594.197	476.663	8.93	-0.025	0.009	0.027	0.022	160.2	39.6	0.003	0.002	0.24	-0.006	-0.006	0.008	-0.003	225.0	-19.5	36.038	-12.741

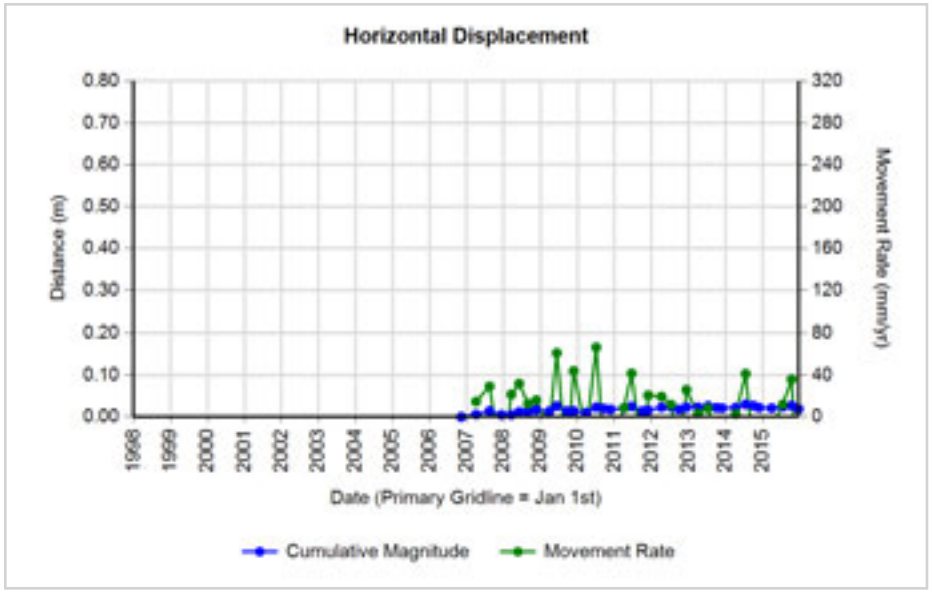
GPS Hub 06-06 (North Corner of Avery Avenue and Anderson Drive)

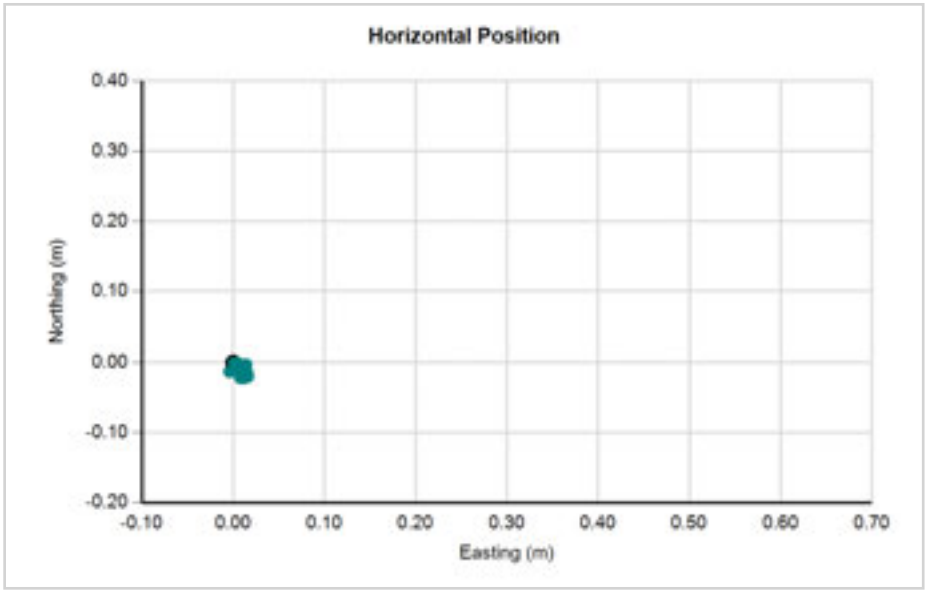
22/12/2015	5869235.685	532594.204	476.652	9.11	-0.011	0.016	0.019	0.011	124.5	29.5	0.002	0.001	0.19	0.014	0.007	0.016	-0.011	26.6	-35.1	-82.856	-58.228

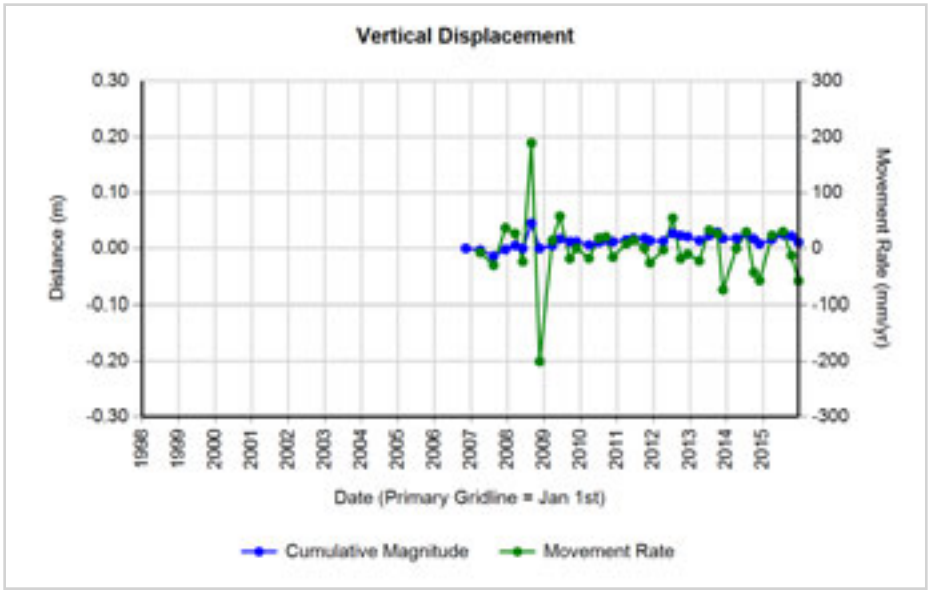
West Quesnel Land Stability Program

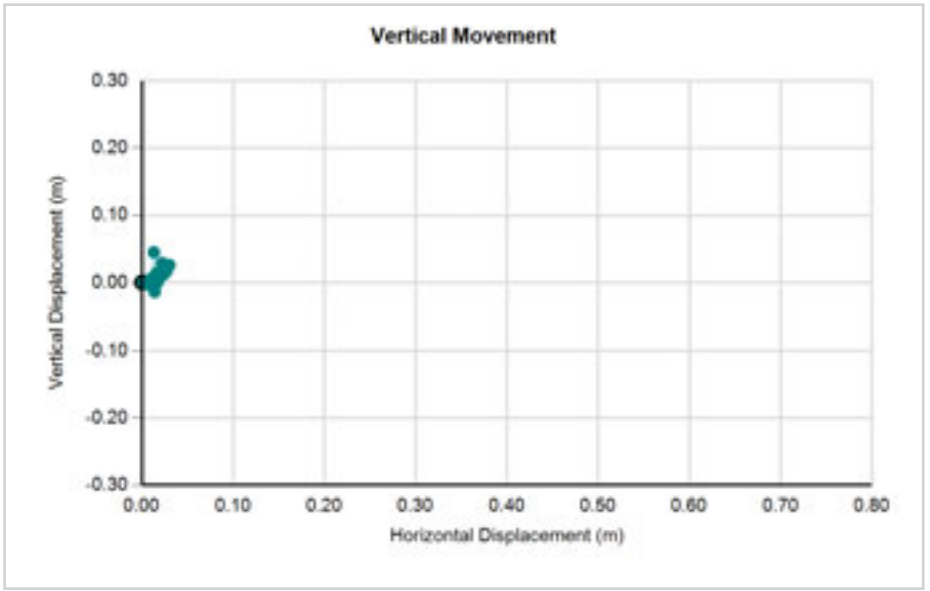
GPS Hub 06-06 (North Corner of Avery Avenue and Anderson Drive)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 06-07 (Northeast Corner of Boyd Street and Abbott Road)

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5869425.109	532655.428	477.850	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
05/04/2007	5869425.106	532655.425	477.843	0.40	-0.003	-0.003	0.004	-0.007	225.0	-58.8	0.011	-0.018	0.40	-0.003	-0.003	0.004	-0.007	225.0	-58.8	10.614	-17.512
16/08/2007	5869425.093	532655.418	477.844	0.76	-0.016	-0.010	0.019	-0.006	212.0	-17.6	0.025	-0.008	0.36	-0.013	-0.007	0.015	0.001	208.3	3.9	40.548	2.746
13/12/2007	5869425.107	532655.420	477.858	1.09	-0.002	-0.008	0.008	0.008	256.0	44.1	0.008	0.007	0.33	0.014	0.002	0.014	0.014	8.1	44.7	-43.407	42.971
18/03/2008	5869425.105	532655.418	477.853	1.35	-0.004	-0.010	0.011	0.003	248.2	15.6	0.008	0.002	0.26	-0.002	-0.002	0.003	-0.005	225.0	-60.5	10.761	-19.023
03/06/2008	5869425.099	532655.416	477.850	1.56	-0.010	-0.012	0.016	0.000	230.2	0.0	0.010	0.000	0.21	-0.006	-0.002	0.006	-0.003	198.4	-25.4	30.001	-14.231
29/08/2008	5869425.101	532655.419	477.851	1.80	-0.008	-0.009	0.012	0.001	228.4	4.7	0.007	0.001	0.24	0.002	0.003	0.004	0.001	56.3	15.5	-15.137	4.198
19/11/2008	5869425.106	532655.418	477.844	2.03	-0.003	-0.010	0.010	-0.006	253.3	-29.9	0.005	-0.003	0.22	0.005	-0.001	0.005	-0.007	348.7	-53.9	-22.712	-31.180
26/03/2009	5869425.099	532655.417	477.849	2.37	-0.010	-0.011	0.015	-0.001	227.7	-3.8	0.006	0.000	0.35	-0.007	-0.001	0.007	0.005	188.1	35.3	20.336	14.380
10/06/2009	5869425.100	532655.415	477.852	2.58	-0.009	-0.013	0.016	0.002	235.3	7.2	0.006	0.001	0.21	0.001	-0.002	0.002	0.003	296.6	53.3	10.746	14.418
17/09/2009	5869425.088	532655.426	477.851	2.85	-0.021	-0.002	0.021	0.001	185.4	2.7	0.007	0.000	0.27	-0.012	0.011	0.016	-0.001	137.5	-3.5	60.059	-3.689
23/11/2009	5869425.105	532655.421	477.837	3.04	-0.004	-0.007	0.008	-0.013	240.3	-58.2	0.003	-0.004	0.18	0.017	-0.005	0.018	-0.014	343.6	-38.3	-96.601	-76.321
27/03/2010	5869425.112	532655.414	477.851	3.38	0.003	-0.014	0.014	0.001	282.1	4.0	0.004	0.000	0.34	0.007	-0.007	0.010	0.014	315.0	54.7	29.160	41.238
04/07/2010	5869425.098	532655.416	477.853	3.65	-0.011	-0.012	0.016	0.003	227.5	10.4	0.004	0.001	0.27	-0.014	0.002	0.014	0.002	171.9	8.0	52.176	7.379
13/09/2010	5869425.098	532655.417	477.856	3.84	-0.011	-0.011	0.016	0.006	225.0	21.1	0.004	0.002	0.19	0.000	0.001	0.001	0.003	90.0	71.6	-5.144	15.433
22/11/2010	5869425.107	532655.424	477.849	4.03	-0.002	-0.004	0.004	-0.001	243.4	-12.6	0.001	0.000	0.19	0.009	0.007	0.011	-0.007	37.9	-31.5	-59.493	-36.525
04/04/2011	5869425.097	532655.421	477.841	4.40	-0.012	-0.007	0.014	-0.009	210.3	-32.9	0.003	-0.002	0.36	-0.010	-0.003	0.010	-0.008	196.7	-37.5	28.672	-21.970
18/06/2011	5869425.095	532655.418	477.848	4.60	-0.014	-0.010	0.017	-0.002	215.5	-6.6	0.004	0.000	0.21	-0.002	-0.003	0.004	0.007	236.3	62.7	17.559	34.090
03/10/2011	5869425.102	532655.416	477.846	4.90	-0.007	-0.012	0.014	-0.004	239.7	-16.1	0.003	-0.001	0.29	0.007	-0.002	0.007	-0.002	344.1	-15.4	-24.851	-6.827
28/11/2011	5869425.102	532655.413	477.852	5.05	-0.007	-0.015	0.017	0.002	245.0	6.9	0.003	0.000	0.15	0.000	-0.003	0.003	0.006	270.0	63.4	19.567	39.134
09/04/2012	5869425.095	532655.417	477.842	5.41	-0.014	-0.011	0.018	-0.008	218.2	-24.2	0.003	-0.001	0.36	-0.007	0.004	0.008	-0.010	150.3	-51.1	22.141	-27.462
12/07/2012	5869425.093	532655.419	477.856	5.67	-0.016	-0.009	0.018	0.006	209.4	18.1	0.003	0.001	0.26	-0.002	0.002	0.003	0.014	135.0	78.6	10.990	54.399
29/09/2012	5869425.108	532655.421	477.859	5.89	-0.001	-0.007	0.007	0.009	261.9	51.8	0.001	0.002	0.22	0.015	0.002	0.015	0.003	7.6	11.2	-69.965	13.870
10/12/2012	5869425.098	532655.415	477.852	6.08	-0.011	-0.013	0.017	0.002	229.8	6.7	0.003	0.000	0.20	-0.010	-0.006	0.012	-0.007	211.0	-31.0	59.160	-35.510
03/04/2013	5869425.099	532655.416	477.847	6.40	-0.010	-0.012	0.016	-0.003	230.2	-10.9	0.002	0.000	0.31	0.001	0.001	0.001	-0.005	45.0	-74.2	-4.531	-16.020
12/07/2013	5869425.097	532655.422	477.860	6.67	-0.012	-0.006	0.013	0.010	206.6	36.7	0.002	0.001	0.27	-0.002	0.006	0.006	0.013	108.4	64.1	-23.100	47.482
04/10/2013	5869425.097	532655.414	477.865	6.90	-0.012	-0.014	0.018	0.015	229.4	39.1	0.003	0.002	0.23	0.000	-0.008	0.008	0.005	270.0	32.0	34.786	21.741
27/11/2013	5869425.102	532655.417	477.855	7.05	-0.007	-0.011	0.013	0.005	237.5	21.0	0.002	0.001	0.15	0.005	0.003	0.006	-0.010	31.0	-59.8	-39.440	-67.639
10/04/2014	5869425.099	532655.419	477.847	7.41	-0.010	-0.009	0.013	-0.003	222.0	-12.6	0.002	0.000	0.37	-0.003	0.002	0.004	-0.008	146.3	-65.7	9.828	-21.806
18/07/2014	5869425.088	532655.415	477.855	7.69	-0.021	-0.013	0.025	0.005	211.8	11.4	0.003	0.001	0.27	-0.011	-0.004	0.012	0.008	200.0	34.4	43.183	29.515
02/10/2014	5869425.099	532655.420	477.848	7.89	-0.010	-0.008	0.013	-0.002	218.7	-8.9	0.002	0.000	0.21	0.011	0.005	0.012	-0.007	24.4	-30.1	-58.070	-33.641
28/11/2014	5869425.101	532655.417	477.842	8.05	-0.008	-0.011	0.014	-0.008	234.0	-30.5	0.002	-0.001	0.16	0.002	-0.003	0.004	-0.006	303.7	-59.0	23.104	-38.447
01/04/2015	5869425.096	532655.414	477.845	8.39	-0.013	-0.014	0.019	-0.005	227.1	-14.7	0.002	-0.001	0.34	-0.005	-0.003	0.006	0.003	211.0	27.2	17.175	8.837
20/07/2015	5869425.098	532655.418	477.848	8.69	-0.011	-0.010	0.015	-0.002	222.3	-7.7	0.002	0.000	0.30	0.002	0.004	0.004	0.003	63.4	33.9	-14.850	9.961
14/10/2015	5869425.092	532655.411	477.848	8.93	-0.017	-0.017	0.024	-0.002	225.0	-4.8	0.003	0.000	0.24	-0.006	-0.007	0.009	0.000	229.4	0.0	39.156	0.000

West Quesnel Land Stability Program

GPS Hub 06-07 (Northeast Corner of Boyd Street and Abbott Road)

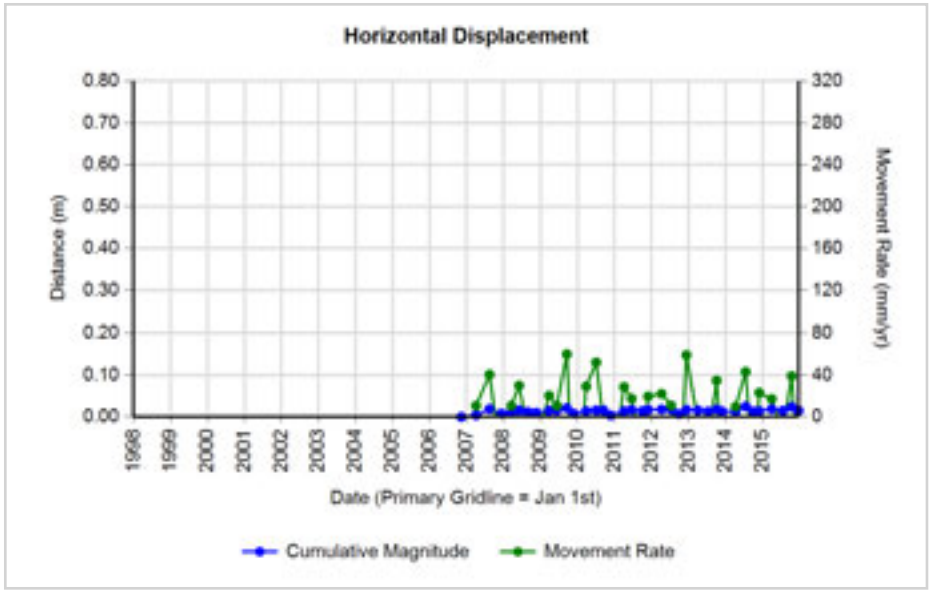
amec foster wheeler

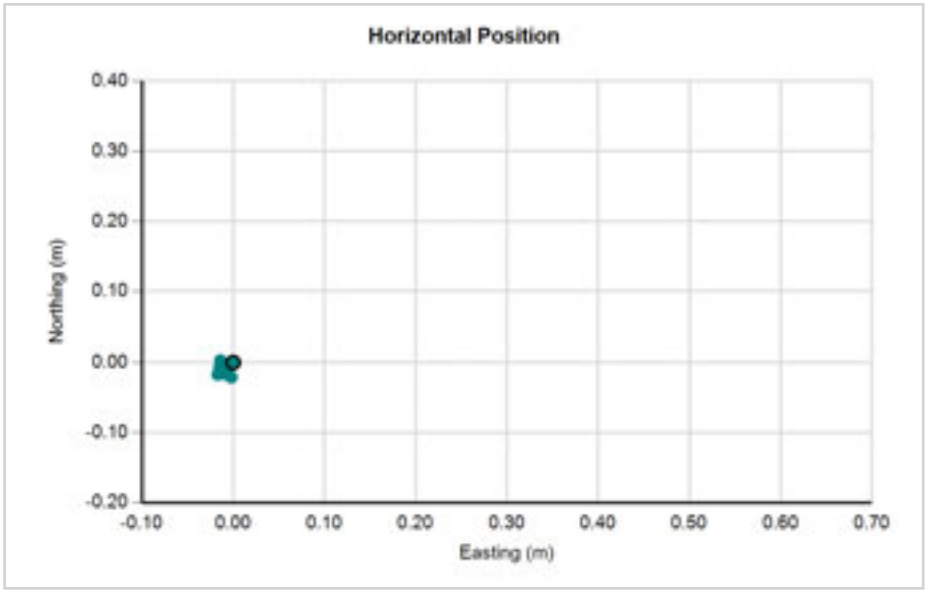
22/12/2015	5869425.102	532655.415	477.840	9.11	-0.007	-0.013	0.015	-0.010	241.7	-34.1	0.002	-0.001	0.19	0.010	0.004	0.011	-0.008	21.8	-36.6	-57.013	-42.348

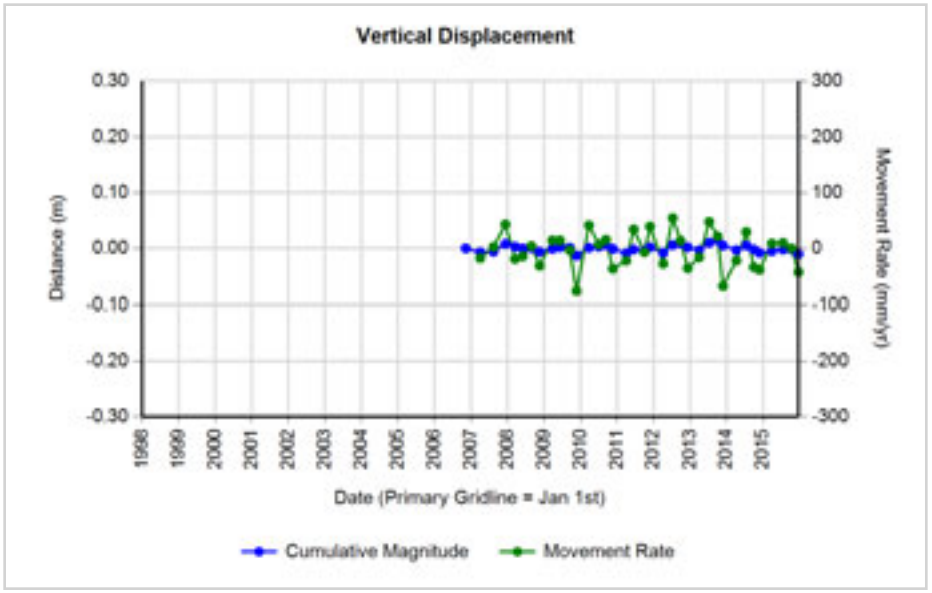
West Quesnel Land Stability Program

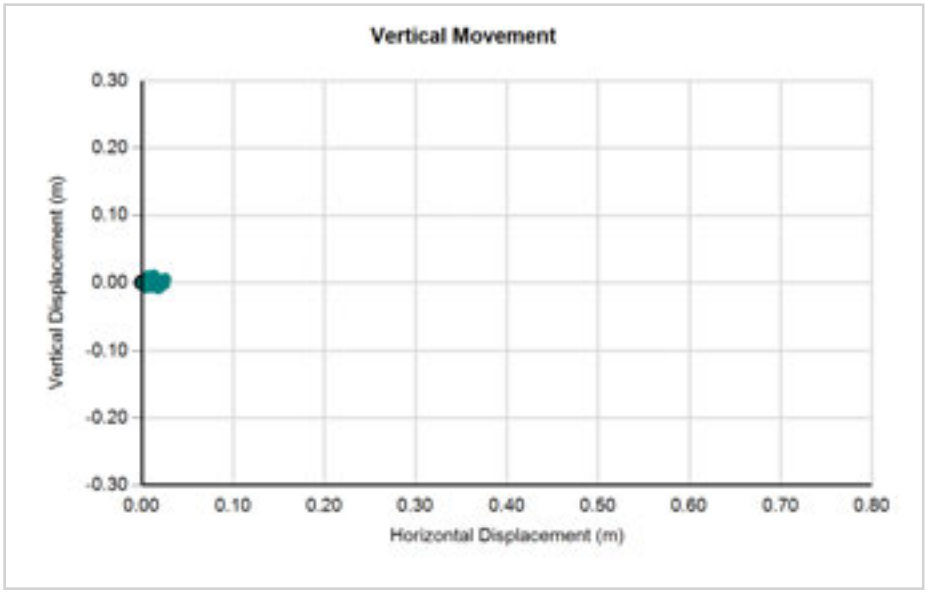
GPS Hub 06-07 (Northeast Corner of Boyd Street and Abbott Road)

amec foster wheeler









GPS Hub 06-08 (North Side of Abbott Road at Beath Street)

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5869467.088	532549.595	480.412	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
05/04/2007	5869467.091	532549.600	480.419	0.40	0.003	0.005	0.006	0.007	59.0	50.2	0.015	0.018	0.40	0.003	0.005	0.006	0.007	59.0	50.2	14.587	17.512
16/08/2007	5869467.079	532549.607	480.409	0.76	-0.009	0.012	0.015	-0.003	126.9	-11.3	0.020	-0.004	0.36	-0.012	0.007	0.014	-0.010	149.7	-35.7	38.152	-27.462
13/12/2007	5869467.081	532549.604	480.414	1.09	-0.007	0.009	0.011	0.002	127.9	9.9	0.010	0.002	0.33	0.002	-0.003	0.004	0.005	303.7	54.2	-11.067	15.347
18/03/2008	5869467.084	532549.606	480.424	1.35	-0.004	0.011	0.012	0.012	110.0	45.7	0.009	0.009	0.26	0.003	0.002	0.004	0.010	33.7	70.2	13.718	38.047
03/06/2008	5869467.079	532549.622	480.427	1.56	-0.009	0.027	0.028	0.015	108.4	27.8	0.018	0.010	0.21	-0.005	0.016	0.017	0.003	107.4	10.1	79.516	14.231
29/08/2008	5869467.074	532549.620	480.427	1.80	-0.014	0.025	0.029	0.015	119.2	27.6	0.016	0.008	0.24	-0.005	-0.002	0.005	0.000	201.8	0.0	22.608	0.000
19/11/2008	5869467.077	532549.625	480.421	2.03	-0.011	0.030	0.032	0.009	110.1	15.7	0.016	0.004	0.22	0.003	0.005	0.006	-0.006	59.0	-45.8	25.973	-26.726
26/03/2009	5869467.070	532549.624	480.426	2.37	-0.018	0.029	0.034	0.014	121.8	22.3	0.014	0.006	0.35	-0.007	-0.001	0.007	0.005	188.1	35.3	20.336	14.380
10/06/2009	5869467.056	532549.643	480.445	2.58	-0.032	0.048	0.058	0.033	123.7	29.8	0.022	0.013	0.21	-0.014	0.019	0.024	0.019	126.4	38.8	113.424	91.313
17/09/2009	5869467.066	532549.648	480.433	2.85	-0.022	0.053	0.057	0.021	112.5	20.1	0.020	0.007	0.27	0.010	0.005	0.011	-0.012	26.6	-47.0	-41.249	-44.273
23/11/2009	5869467.073	532549.639	480.426	3.04	-0.015	0.044	0.046	0.014	108.8	16.8	0.015	0.005	0.18	0.007	-0.009	0.011	-0.007	307.9	-31.5	-62.157	-38.160
27/03/2010	5869467.073	532549.641	480.426	3.38	-0.015	0.046	0.048	0.014	108.1	16.1	0.014	0.004	0.34	0.000	0.002	0.002	0.000	90.0	0.0	5.891	0.000
04/07/2010	5869467.060	532549.644	480.434	3.65	-0.028	0.049	0.056	0.022	119.7	21.3	0.015	0.006	0.27	-0.013	0.003	0.013	0.008	167.0	30.9	49.223	29.515
13/09/2010	5869467.063	532549.646	480.437	3.84	-0.025	0.051	0.057	0.025	116.1	23.8	0.015	0.007	0.19	0.003	0.002	0.004	0.003	33.7	39.8	18.548	15.433
22/11/2010	5869467.062	532549.645	480.432	4.03	-0.026	0.050	0.056	0.020	117.5	19.5	0.014	0.005	0.19	-0.001	-0.001	0.001	-0.005	225.0	-74.2	-7.379	-26.089
04/04/2011	5869467.066	532549.646	480.427	4.40	-0.022	0.051	0.056	0.015	113.3	15.1	0.013	0.003	0.36	0.004	0.001	0.004	-0.005	14.0	-50.5	-11.323	-13.731
18/06/2011	5869467.064	532549.652	480.440	4.60	-0.024	0.057	0.062	0.028	112.8	24.4	0.013	0.006	0.21	-0.002	0.006	0.006	0.013	108.4	64.1	30.801	63.310
03/10/2011	5869467.063	532549.654	480.430	4.90	-0.025	0.059	0.064	0.018	113.0	15.7	0.013	0.004	0.29	-0.001	0.002	0.002	-0.010	116.6	-77.4	7.633	-34.136
28/11/2011	5869467.062	532549.650	480.436	5.05	-0.026	0.055	0.061	0.024	115.3	21.5	0.012	0.005	0.15	-0.001	-0.004	0.004	0.006	256.0	55.5	-26.892	39.134
09/04/2012	5869467.059	532549.655	480.434	5.41	-0.029	0.060	0.067	0.022	115.8	18.3	0.012	0.004	0.36	-0.003	0.005	0.006	-0.002	121.0	-18.9	16.013	-5.492
12/07/2012	5869467.056	532549.665	480.448	5.67	-0.032	0.070	0.077	0.036	114.6	25.1	0.014	0.006	0.26	-0.003	0.010	0.010	0.014	106.7	53.3	40.567	54.399
29/09/2012	5869467.069	532549.667	480.444	5.89	-0.019	0.072	0.074	0.032	104.8	23.3	0.013	0.005	0.22	0.013	0.002	0.013	-0.004	8.7	-16.9	-60.812	-18.494
10/12/2012	5869467.057	532549.661	480.443	6.08	-0.031	0.066	0.073	0.031	115.2	23.0	0.012	0.005	0.20	-0.012	-0.006	0.013	-0.001	206.6	-4.3	-68.060	-5.073
03/04/2013	5869467.056	532549.665	480.437	6.40	-0.032	0.070	0.077	0.025	114.6	18.0	0.012	0.004	0.31	-0.001	0.004	0.004	-0.006	104.0	-55.5	13.210	-19.224
12/07/2013	5869467.056	532549.669	480.455	6.67	-0.032	0.074	0.081	0.043	113.4	28.1	0.012	0.006	0.27	0.000	0.004	0.004	0.018	90.0	77.5	14.610	65.745
04/10/2013	5869467.055	532549.661	480.452	6.90	-0.033	0.066	0.074	0.040	116.6	28.5	0.011	0.006	0.23	-0.001	-0.008	0.008	-0.003	262.9	-20.4	-35.056	-13.045
27/11/2013	5869467.061	532549.661	480.449	7.05	-0.027	0.066	0.071	0.037	112.2	27.4	0.010	0.005	0.15	0.006	0.000	0.006	-0.003	0.0	-26.6	-40.583	-20.292
10/04/2014	5869467.058	532549.666	480.441	7.41	-0.030	0.071	0.077	0.029	112.9	20.6	0.010	0.004	0.37	-0.003	0.005	0.006	-0.008	121.0	-53.9	15.894	-21.806
18/07/2014	5869467.049	532549.668	480.453	7.69	-0.039	0.073	0.083	0.041	118.1	26.4	0.011	0.005	0.27	-0.009	0.002	0.009	0.012	167.5	52.5	34.015	44.273
02/10/2014	5869467.053	532549.666	480.438	7.89	-0.035	0.071	0.079	0.026	116.2	18.2	0.010	0.003	0.21	0.004	-0.002	0.004	-0.015	333.4	-73.4	-21.493	-72.089
28/11/2014	5869467.057	532549.667	480.436	8.05	-0.031	0.072	0.078	0.024	113.3	17.0	0.010	0.003	0.16	0.004	0.001	0.004	-0.002	14.0	-25.9	-26.420	-12.816
01/04/2015	5869467.053	532549.667	480.435	8.39	-0.035	0.072	0.080	0.023	115.9	16.0	0.010	0.003	0.34	-0.004	0.000	0.004	-0.001	180.0	-14.0	11.782	-2.946
20/07/2015	5869467.049	532549.671	480.438	8.69	-0.039	0.076	0.085	0.026	117.2	16.9	0.010	0.003	0.30	-0.004	0.004	0.006	0.003	135.0	27.9	18.783	9.961
14/10/2015	5869467.048	532549.665	480.441	8.93	-0.040	0.070	0.081	0.029	119.7	19.8	0.009	0.003	0.24	-0.001	-0.006	0.006	0.003	260.5	26.3	-25.834	12.741

West Quesnel Land Stability Program

GPS Hub 06-08 (North Side of Abbott Road at Beath Street)

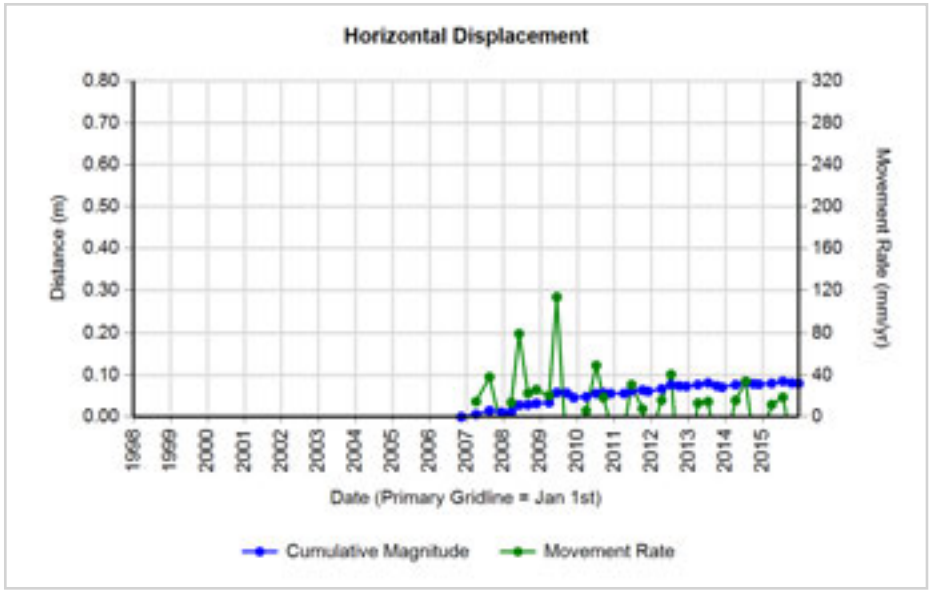
amec foster wheeler

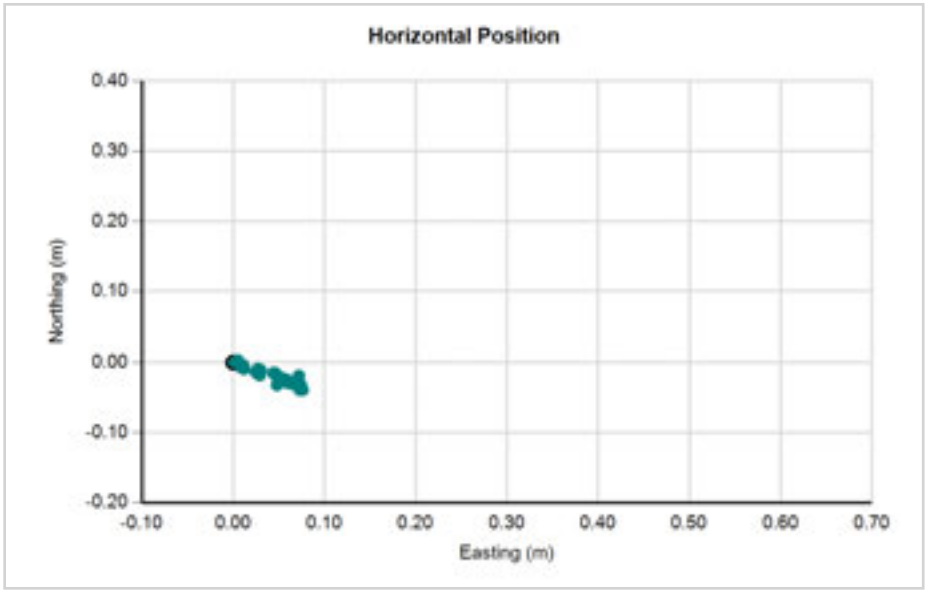
22/12/2015	5869467.057	532549.669	480.432	9.11	-0.031	0.074	0.080	0.020	112.7	14.0	0.009	0.002	0.19	0.009	0.004	0.010	-0.009	24.0	-42.4	-52.135	-47.641

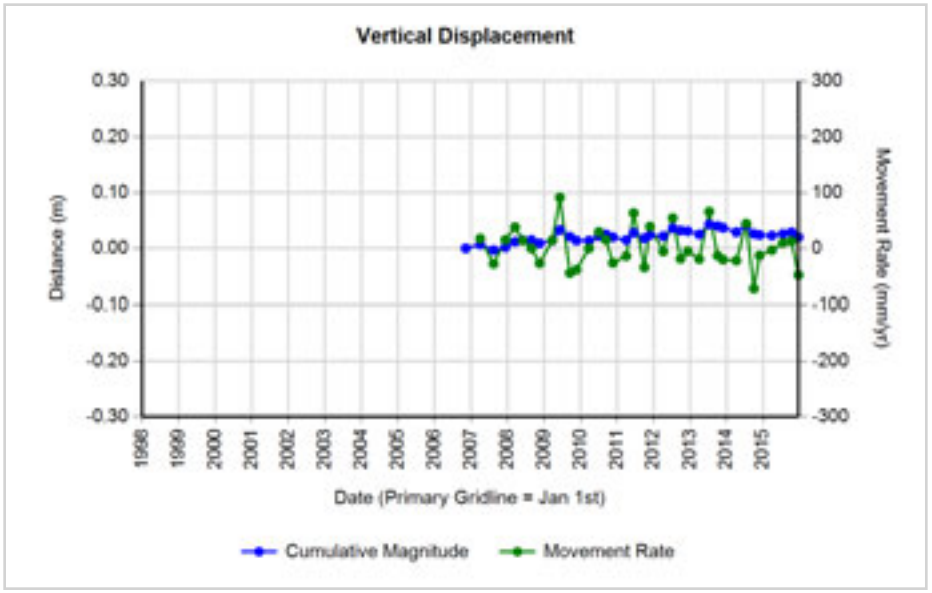
West Quesnel Land Stability Program

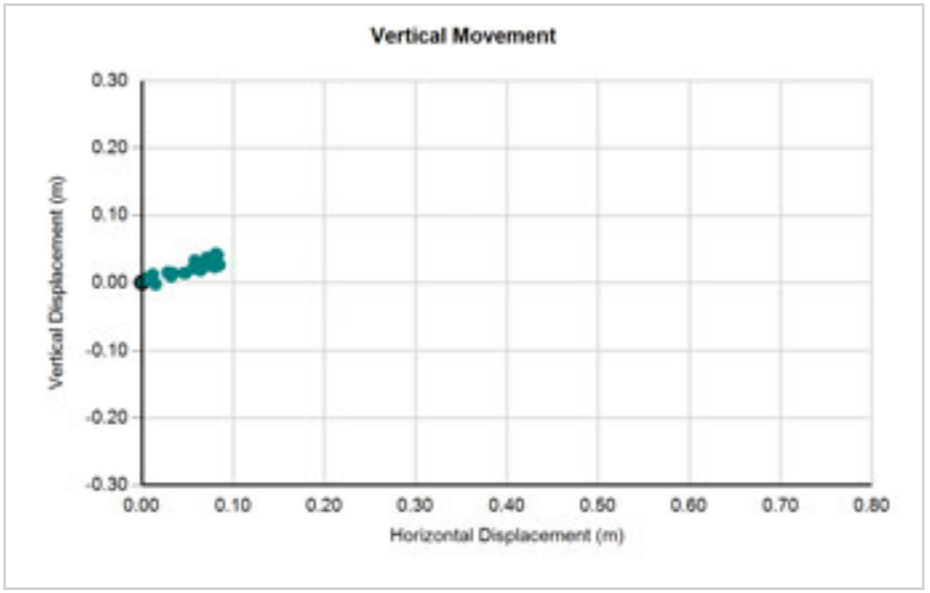
GPS Hub 06-08 (North Side of Abbott Road at Beath Street)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 06-09 (East Side of Bouchie Street)

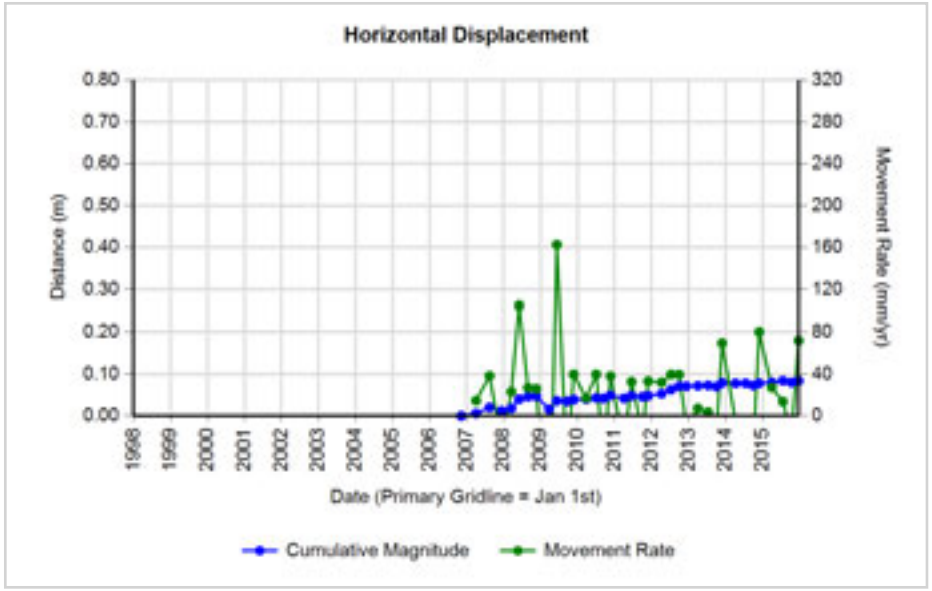
	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5869608.045	532517.087	491.073	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
05/04/2007	5869608.042	532517.092	491.064	0.40	-0.003	0.005	0.006	-0.009	121.0	-57.1	0.015	-0.023	0.40	-0.003	0.005	0.006	-0.009	121.0	-57.1	14.587	-22.515
16/08/2007	5869608.037	532517.105	491.070	0.76	-0.008	0.018	0.020	-0.003	114.0	-8.7	0.026	-0.004	0.36	-0.005	0.013	0.014	0.006	111.0	23.3	38.251	16.477
13/12/2007	5869608.038	532517.097	491.064	1.09	-0.007	0.010	0.012	-0.009	125.0	-36.4	0.011	-0.008	0.33	0.001	-0.008	0.008	-0.006	277.1	-36.7	-24.746	-18.416
18/03/2008	5869608.037	532517.103	491.079	1.35	-0.008	0.016	0.018	0.006	116.6	18.5	0.013	0.004	0.26	-0.001	0.006	0.006	0.015	99.5	67.9	23.143	57.070
03/06/2008	5869608.030	532517.124	491.081	1.56	-0.015	0.037	0.040	0.008	112.1	11.3	0.026	0.005	0.21	-0.007	0.021	0.022	0.002	108.4	5.2	105.002	9.487
29/08/2008	5869608.026	532517.129	491.089	1.80	-0.019	0.042	0.046	0.016	114.3	19.1	0.026	0.009	0.24	-0.004	0.005	0.006	0.008	128.7	51.3	26.882	33.586
19/11/2008	5869608.031	532517.132	491.074	2.03	-0.014	0.045	0.047	0.001	107.3	1.2	0.023	0.000	0.22	0.005	0.003	0.006	-0.015	31.0	-68.8	25.973	-66.814
26/03/2009	5869608.059	532517.095	491.067	2.37	0.014	0.008	0.016	-0.006	29.7	-20.4	0.007	-0.003	0.35	0.028	-0.037	0.046	-0.007	307.1	-8.6	-133.447	-20.132
10/06/2009	5869608.040	532517.123	491.082	2.58	-0.005	0.036	0.036	0.009	97.9	13.9	0.014	0.003	0.21	-0.019	0.028	0.034	0.015	124.2	23.9	162.622	72.089
17/09/2009	5869608.053	532517.121	491.063	2.85	0.008	0.034	0.035	-0.010	76.8	-16.0	0.012	-0.004	0.27	0.013	-0.002	0.013	-0.019	351.3	-55.3	-48.526	-70.098
23/11/2009	5869608.060	532517.123	491.072	3.04	0.015	0.036	0.039	-0.001	67.4	-1.5	0.013	0.000	0.18	0.007	0.002	0.007	0.009	15.9	51.0	39.687	49.063
27/03/2010	5869608.055	532517.126	491.071	3.38	0.010	0.039	0.040	-0.002	75.6	-2.8	0.012	-0.001	0.34	-0.005	0.003	0.006	-0.001	149.0	-9.7	17.175	-2.946
04/07/2010	5869608.045	532517.130	491.077	3.65	0.000	0.043	0.043	0.004	90.0	5.3	0.012	0.001	0.27	-0.010	0.004	0.011	0.006	158.2	29.1	39.736	22.136
13/09/2010	5869608.052	532517.128	491.086	3.84	0.007	0.041	0.042	0.013	80.3	17.4	0.011	0.003	0.19	0.007	-0.002	0.007	0.009	344.1	51.0	-37.452	46.299
22/11/2010	5869608.054	532517.135	491.079	4.03	0.009	0.048	0.049	0.006	79.4	7.0	0.012	0.001	0.19	0.002	0.007	0.007	-0.007	74.1	-43.9	37.987	-36.525
04/04/2011	5869608.046	532517.129	491.078	4.40	0.001	0.042	0.042	0.005	88.6	6.8	0.010	0.001	0.36	-0.008	-0.006	0.010	-0.001	216.9	-5.7	-27.462	-2.746
18/06/2011	5869608.043	532517.135	491.081	4.60	-0.002	0.048	0.048	0.008	92.4	9.5	0.010	0.002	0.21	-0.003	0.006	0.007	0.003	116.6	24.1	32.669	14.610
03/10/2011	5869608.047	532517.133	491.083	4.90	0.002	0.046	0.046	0.010	87.5	12.3	0.009	0.002	0.29	0.004	-0.002	0.004	0.002	333.4	24.1	-15.266	6.827
28/11/2011	5869608.052	532517.134	491.078	5.05	0.007	0.047	0.048	0.005	81.5	6.0	0.009	0.001	0.15	0.005	0.001	0.005	-0.005	11.3	-44.4	33.257	-32.612
09/04/2012	5869608.042	532517.140	491.073	5.41	-0.003	0.053	0.053	0.000	93.2	0.0	0.010	0.000	0.36	-0.010	0.006	0.012	-0.005	149.0	-23.2	32.026	-13.731
12/07/2012	5869608.044	532517.150	491.088	5.67	-0.001	0.063	0.063	0.015	90.9	13.4	0.011	0.003	0.26	0.002	0.010	0.010	0.015	78.7	55.8	39.626	58.285
29/09/2012	5869608.047	532517.158	491.088	5.89	0.002	0.071	0.071	0.015	88.4	11.9	0.012	0.003	0.22	0.003	0.008	0.009	0.000	69.4	0.0	39.502	0.000
10/12/2012	5869608.045	532517.158	491.092	6.08	0.000	0.071	0.071	0.019	90.0	15.0	0.012	0.003	0.20	-0.002	0.000	0.002	0.004	180.0	63.4	-10.146	20.292
03/04/2013	5869608.043	532517.159	491.090	6.40	-0.002	0.072	0.072	0.017	91.6	13.3	0.011	0.003	0.31	-0.002	0.001	0.002	-0.002	153.4	-41.8	7.164	-6.408
12/07/2013	5869608.043	532517.160	491.094	6.67	-0.002	0.073	0.073	0.021	91.6	16.0	0.011	0.003	0.27	0.000	0.001	0.001	0.004	90.0	76.0	3.653	14.610
04/10/2013	5869608.042	532517.157	491.089	6.90	-0.003	0.070	0.070	0.016	92.5	12.9	0.010	0.002	0.23	-0.001	-0.003	0.003	-0.005	251.6	-57.7	-13.750	-21.741
27/11/2013	5869608.047	532517.166	491.083	7.05	0.002	0.079	0.079	0.010	88.5	7.2	0.011	0.001	0.15	0.005	0.009	0.010	-0.006	60.9	-30.2	69.638	-40.583
10/04/2014	5869608.045	532517.165	491.082	7.41	0.000	0.078	0.078	0.009	90.0	6.6	0.011	0.001	0.37	-0.002	-0.001	0.002	-0.001	206.6	-24.1	-6.095	-2.726
18/07/2014	5869608.033	532517.164	491.088	7.69	-0.012	0.077	0.078	0.015	98.9	10.9	0.010	0.002	0.27	-0.012	-0.001	0.012	0.006	184.8	26.5	-44.426	22.136
02/10/2014	5869608.036	532517.159	491.069	7.89	-0.009	0.072	0.073	-0.004	97.1	-3.2	0.009	-0.001	0.21	0.003	-0.005	0.006	-0.019	301.0	-72.9	-28.023	-91.312
28/11/2014	5869608.047	532517.165	491.077	8.05	0.002	0.078	0.078	0.004	88.5	2.9	0.010	0.000	0.16	0.011	0.006	0.013	0.008	28.6	32.6	80.291	51.263
01/04/2015	5869608.038	532517.167	491.088	8.39	-0.007	0.080	0.080	0.015	95.0	10.6	0.010	0.002	0.34	-0.009	0.002	0.009	0.011	167.5	50.0	27.157	32.401
20/07/2015	5869608.037	532517.171	491.086	8.69	-0.008	0.084	0.084	0.013	95.4	8.8	0.010	0.001	0.30	-0.001	0.004	0.004	-0.002	104.0	-25.9	13.691	-6.641
14/10/2015	5869608.039	532517.167	491.088	8.93	-0.006	0.080	0.080	0.015	94.3	10.6	0.009	0.002	0.24	0.002	-0.004	0.004	0.002	296.6	24.1	-18.994	8.494

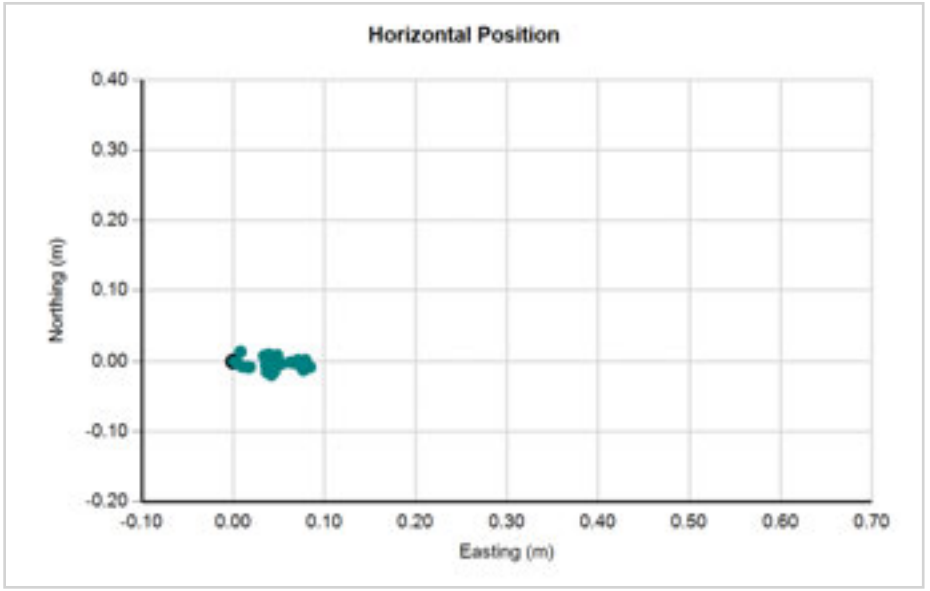
22/12/2015	5869608.052	532517.171	491.077	9.11	0.007	0.084	0.084	0.004	85.2	2.7	0.009	0.000	0.19	0.013	0.004	0.014	-0.011	17.1	-39.0	71.999	-58.228

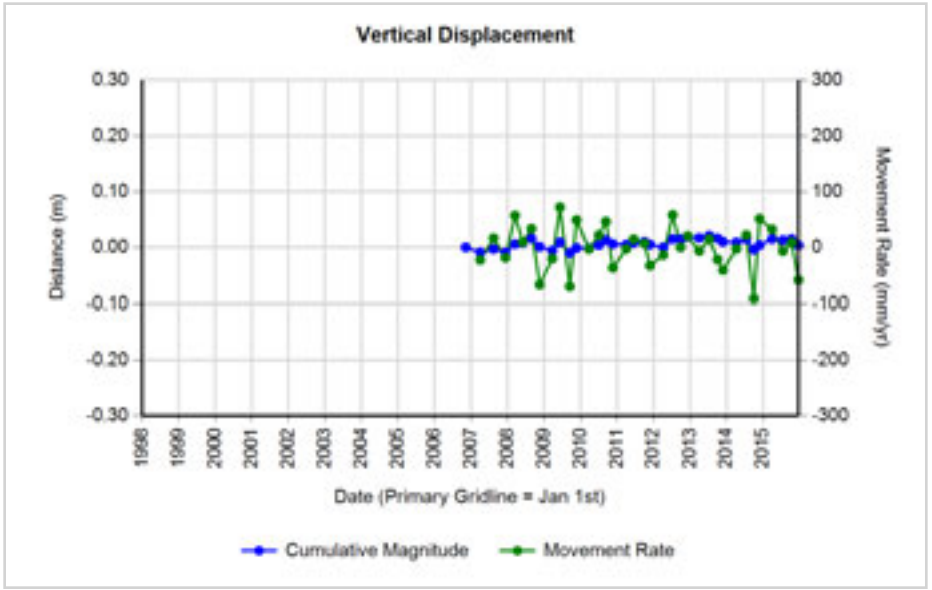
West Quesnel Land Stability Program

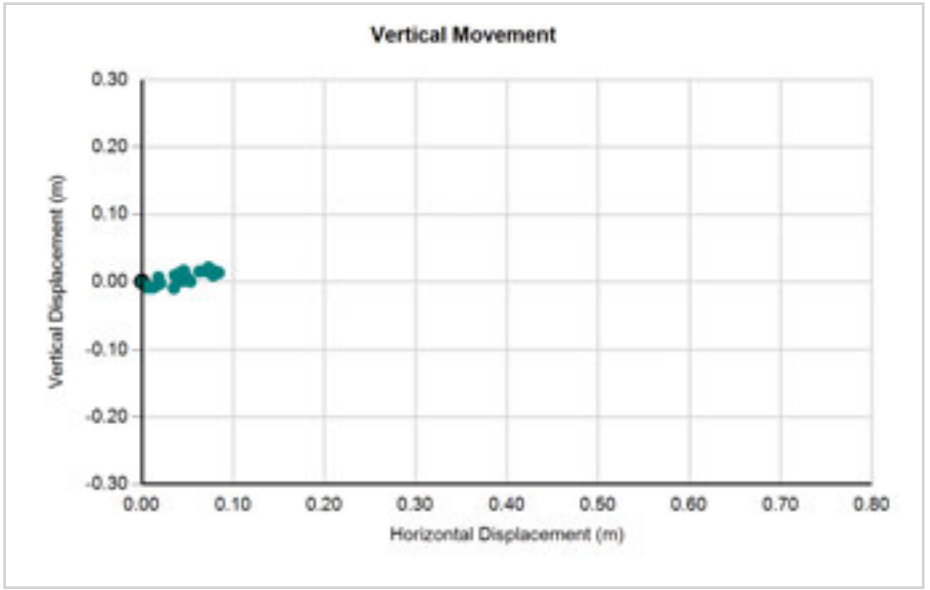
GPS Hub 06-09 (East Side of Bouchie Street)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 06-11 (East Side of Lewis Road)

amec foster wheeler

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5869938.491	532538.683	480.061	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
05/04/2007	5869938.492	532538.686	480.067	0.40	0.001	0.003	0.003	0.006	71.6	62.2	0.008	0.015	0.40	0.001	0.003	0.003	0.006	71.6	62.2	7.911	15.010
16/08/2007	5869938.494	532538.680	480.071	0.76	0.003	-0.003	0.004	0.010	315.0	67.0	0.006	0.013	0.36	0.002	-0.006	0.006	0.004	288.4	32.3	17.369	10.985
13/12/2007	5869938.497	532538.679	480.065	1.09	0.006	-0.004	0.007	0.004	326.3	29.0	0.007	0.004	0.33	0.003	-0.001	0.003	-0.006	341.6	-62.2	9.706	-18.416
18/03/2008	5869938.492	532538.680	480.065	1.35	0.001	-0.003	0.003	0.004	288.4	51.7	0.002	0.003	0.26	-0.005	0.001	0.005	0.000	168.7	0.0	-19.400	0.000
03/06/2008	5869938.497	532538.686	480.071	1.56	0.006	0.003	0.007	0.010	26.6	56.1	0.004	0.006	0.21	0.005	0.006	0.008	0.006	50.2	37.5	37.048	28.461
29/08/2008	5869938.507	532538.683	480.080	1.80	0.016	0.000	0.016	0.019	0.0	49.9	0.009	0.011	0.24	0.010	-0.003	0.010	0.009	343.3	40.8	43.831	37.784
19/11/2008	5869938.495	532538.684	480.066	2.03	0.004	0.001	0.004	0.005	14.0	50.5	0.002	0.002	0.22	-0.012	0.001	0.012	-0.014	175.2	-49.3	-53.636	-62.360
26/03/2009	5869938.504	532538.690	480.064	2.37	0.013	0.007	0.015	0.003	28.3	11.5	0.006	0.001	0.35	0.009	0.006	0.011	-0.002	33.7	-10.5	31.109	-5.752
10/06/2009	5869938.498	532538.684	480.078	2.58	0.007	0.001	0.007	0.017	8.1	67.4	0.003	0.007	0.21	-0.006	-0.006	0.008	0.014	225.0	58.8	-40.780	67.283
17/09/2009	5869938.499	532538.694	480.080	2.85	0.008	0.011	0.014	0.019	54.0	54.4	0.005	0.007	0.27	0.001	0.010	0.010	0.002	84.3	11.3	37.078	7.379
23/11/2009	5869938.499	532538.691	480.065	3.04	0.008	0.008	0.011	0.004	45.0	19.5	0.004	0.001	0.18	0.000	-0.003	0.003	-0.015	270.0	-78.7	-16.354	-81.772
27/03/2010	5869938.505	532538.685	480.065	3.38	0.014	0.002	0.014	0.004	8.1	15.8	0.004	0.001	0.34	0.006	-0.006	0.008	0.000	315.0	0.0	24.994	0.000
04/07/2010	5869938.489	532538.684	480.069	3.65	-0.002	0.001	0.002	0.008	153.4	74.4	0.001	0.002	0.27	-0.016	-0.001	0.016	0.004	183.6	14.0	-59.145	14.758
13/09/2010	5869938.499	532538.689	480.041	3.84	0.008	0.006	0.010	-0.020	36.9	-63.4	0.003	-0.005	0.19	0.010	0.005	0.011	-0.028	26.6	-68.2	57.516	-144.042
22/11/2010	5869938.496	532538.695	480.070	4.03	0.005	0.012	0.013	0.009	67.4	34.7	0.003	0.002	0.19	-0.003	0.006	0.007	0.029	116.6	77.0	35.002	151.318
04/04/2011	5869938.494	532538.686	480.053	4.40	0.003	0.003	0.004	-0.008	45.0	-62.1	0.001	-0.002	0.36	-0.002	-0.009	0.009	-0.017	257.5	-61.5	-25.319	-46.686
18/06/2011	5869938.499	532538.687	480.087	4.60	0.008	0.004	0.009	0.026	26.6	71.0	0.002	0.006	0.21	0.005	0.001	0.005	0.034	11.3	81.5	24.832	165.580
03/10/2011	5869938.498	532538.687	480.075	4.90	0.007	0.004	0.008	0.014	29.7	60.1	0.002	0.003	0.29	-0.001	0.000	0.001	-0.012	180.0	-85.2	-3.414	-40.963
28/11/2011	5869938.499	532538.690	480.072	5.05	0.008	0.007	0.011	0.011	41.2	46.0	0.002	0.002	0.15	0.001	0.003	0.003	-0.003	71.6	-43.5	20.625	-19.567
09/04/2012	5869938.494	532538.687	480.068	5.41	0.003	0.004	0.005	0.007	53.1	54.5	0.001	0.001	0.36	-0.005	-0.003	0.006	-0.004	211.0	-34.4	-16.013	-10.985
12/07/2012	5869938.503	532538.687	480.081	5.67	0.012	0.004	0.013	0.020	18.4	57.7	0.002	0.004	0.26	0.009	0.000	0.009	0.013	0.0	55.3	34.971	50.513
29/09/2012	5869938.507	532538.686	480.083	5.89	0.016	0.003	0.016	0.022	10.6	53.5	0.003	0.004	0.22	0.004	-0.001	0.004	0.002	346.0	25.9	19.063	9.247
10/12/2012	5869938.505	532538.683	480.077	6.08	0.014	0.000	0.014	0.016	0.0	48.8	0.002	0.003	0.20	-0.002	-0.003	0.004	-0.006	236.3	-59.0	-18.291	-30.438
03/04/2013	5869938.507	532538.685	480.064	6.40	0.016	0.002	0.016	0.003	7.1	10.5	0.003	0.000	0.31	0.002	0.002	0.003	-0.013	45.0	-77.7	9.062	-41.651
12/07/2013	5869938.507	532538.690	480.087	6.67	0.016	0.007	0.017	0.026	23.6	56.1	0.003	0.004	0.27	0.000	0.005	0.005	0.023	90.0	77.7	18.262	84.007
04/10/2013	5869938.504	532538.680	480.099	6.90	0.013	-0.003	0.013	0.038	347.0	70.7	0.002	0.006	0.23	-0.003	-0.010	0.010	0.012	253.3	49.0	-45.397	52.179
27/11/2013	5869938.508	532538.685	480.070	7.05	0.017	0.002	0.017	0.009	6.7	27.7	0.002	0.001	0.15	0.004	0.005	0.006	-0.029	51.3	-77.5	43.310	-196.153
10/04/2014	5869938.511	532538.688	480.079	7.41	0.020	0.005	0.021	0.018	14.0	41.1	0.003	0.002	0.37	0.003	0.003	0.004	0.009	45.0	64.8	11.564	24.532
18/07/2014	5869938.500	532538.690	480.086	7.69	0.009	0.007	0.011	0.025	37.9	65.5	0.001	0.003	0.27	-0.011	0.002	0.011	0.007	169.7	32.1	-41.249	25.826
02/10/2014	5869938.504	532538.682	480.069	7.89	0.013	-0.001	0.013	0.008	355.6	31.5	0.002	0.001	0.21	0.004	-0.008	0.009	-0.017	296.6	-62.2	42.985	-81.701
28/11/2014	5869938.497	532538.695	480.071	8.05	0.006	0.012	0.013	0.010	63.4	36.7	0.002	0.001	0.16	-0.007	0.013	0.015	0.002	118.3	7.7	94.611	12.816
01/04/2015	5869938.505	532538.684	480.073	8.39	0.014	0.001	0.014	0.012	4.1	40.5	0.002	0.001	0.34	0.008	-0.011	0.014	0.002	306.0	8.4	40.064	5.891
20/07/2015	5869938.507	532538.689	480.087	8.69	0.016	0.006	0.017	0.026	20.6	56.7	0.002	0.003	0.30	0.002	0.005	0.005	0.014	68.2	69.0	17.881	46.486
14/10/2015	5869938.499	532538.680	480.087	8.93	0.008	-0.003	0.009	0.026	339.4	71.8	0.001	0.003	0.24	-0.008	-0.009	0.012	0.000	228.4	0.0	-51.142	0.000

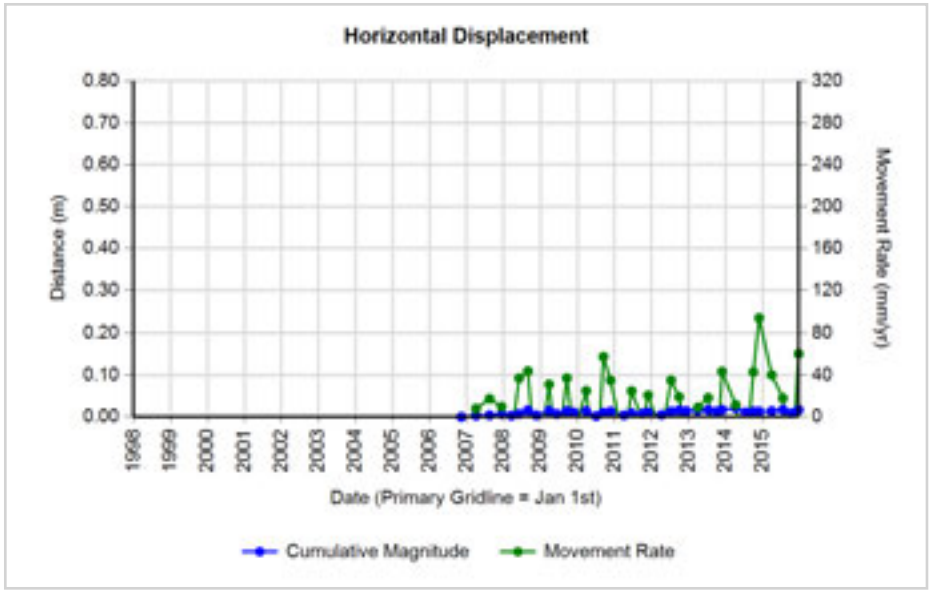
West Quesnel Land Stability Program

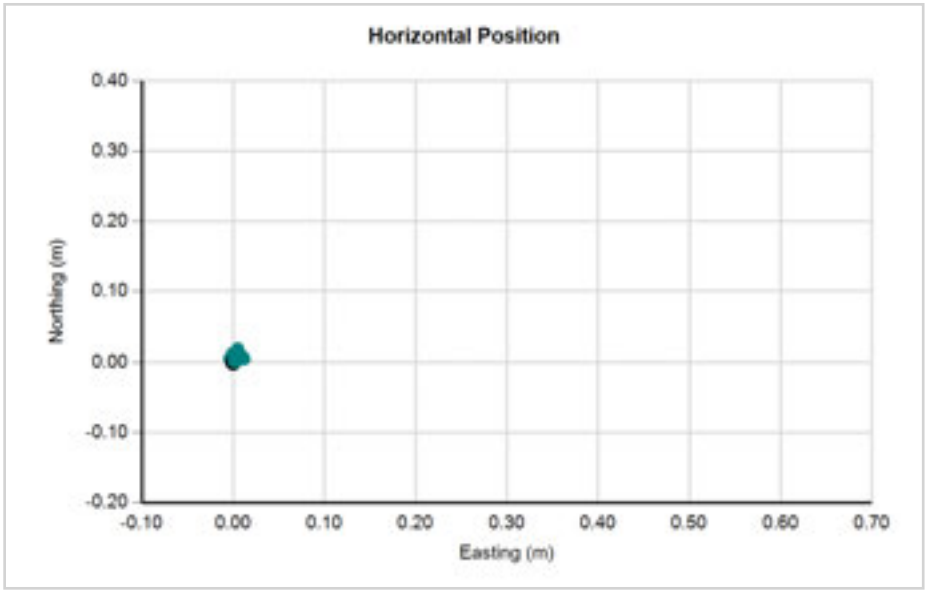
GPS Hub 06-11 (East Side of Lewis Road)

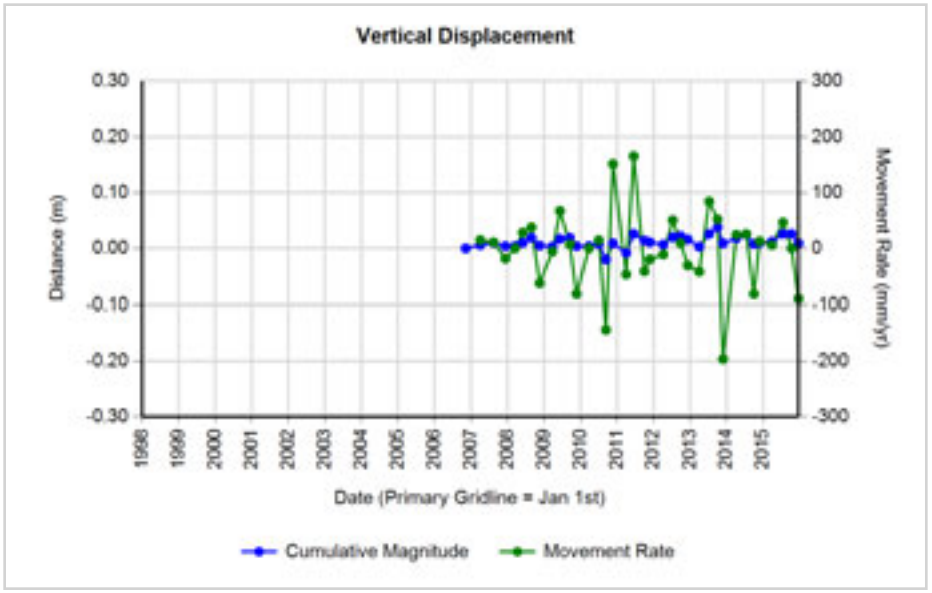
amec foster wheeler

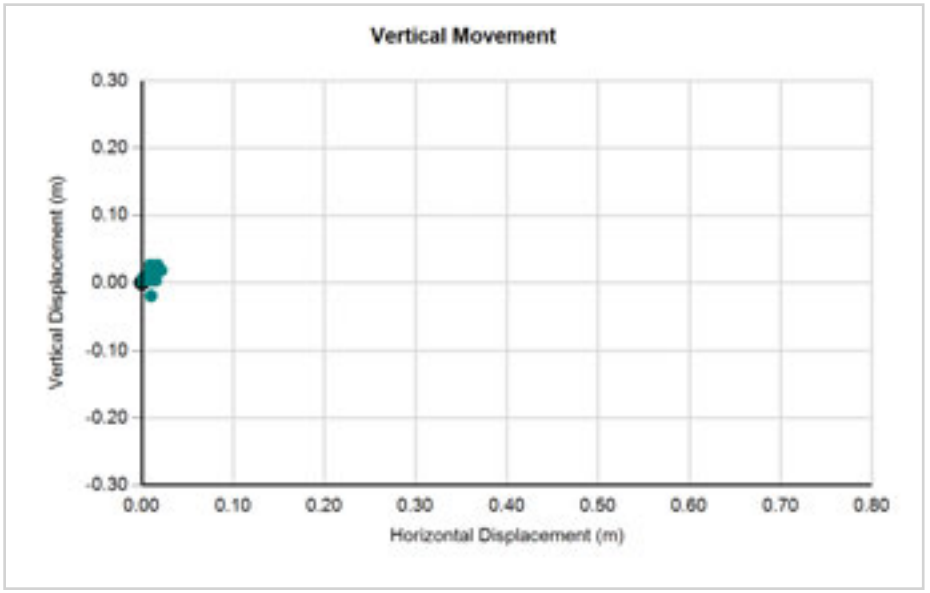
22/12/2015	5869938.508	532538.687	480.070	9.11	0.017	0.004	0.017	0.009	13.2	27.3	0.002	0.001	0.19	0.009	0.007	0.011	-0.017	37.9	-56.2	60.355	-89.989

GPS Hub 06-11 (East Side of Lewis Road)









West Quesnel Land Stability Program

GPS Hub 06-12 (East Side of Lewis Road)

amec foster wheeler

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5870217.210	532480.538	484.776	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
05/04/2007	5870217.214	532480.538	484.776	0.40	0.004	0.000	0.004	0.000	0.0	0.0	0.010	0.000	0.40	0.004	0.000	0.004	0.000	0.0	0.0	10.007	0.000
16/08/2007	5870217.218	532480.541	484.785	0.76	0.008	0.003	0.009	0.009	20.6	46.5	0.011	0.012	0.36	0.004	0.003	0.005	0.009	36.9	60.9	13.731	24.716
13/12/2007	5870217.218	532480.537	484.791	1.09	0.008	-0.001	0.008	0.015	352.9	61.7	0.007	0.014	0.33	0.000	-0.004	0.004	0.006	270.0	56.3	-12.277	18.416
18/03/2008	5870217.217	532480.537	484.792	1.35	0.007	-0.001	0.007	0.016	351.9	66.2	0.005	0.012	0.26	-0.001	0.000	0.001	0.001	180.0	45.0	-3.805	3.805
03/06/2008	5870217.211	532480.545	484.812	1.56	0.001	0.007	0.007	0.036	81.9	78.9	0.005	0.023	0.21	-0.006	0.008	0.010	0.020	126.9	63.4	47.435	94.870
29/08/2008	5870217.217	532480.554	484.830	1.80	0.007	0.016	0.017	0.054	66.4	72.1	0.010	0.030	0.24	0.006	0.009	0.011	0.018	56.3	59.0	45.411	75.569
19/11/2008	5870217.218	532480.552	484.807	2.03	0.008	0.014	0.016	0.031	60.3	62.5	0.008	0.015	0.22	0.001	-0.002	0.002	-0.023	296.6	-84.4	-9.960	-102.448
26/03/2009	5870217.228	532480.554	484.810	2.37	0.018	0.016	0.024	0.034	41.6	54.7	0.010	0.014	0.35	0.010	0.002	0.010	0.003	11.3	16.4	29.329	8.628
10/06/2009	5870217.215	532480.560	484.831	2.58	0.005	0.022	0.023	0.055	77.2	67.7	0.009	0.021	0.21	-0.013	0.006	0.014	0.021	155.2	55.7	-68.810	100.924
17/09/2009	5870217.220	532480.564	484.835	2.85	0.010	0.026	0.028	0.059	69.0	64.7	0.010	0.021	0.27	0.005	0.004	0.006	0.004	38.7	32.0	23.624	14.758
23/11/2009	5870217.228	532480.565	484.832	3.04	0.018	0.027	0.032	0.056	56.3	59.9	0.011	0.018	0.18	0.008	0.001	0.008	-0.003	7.1	-20.4	43.951	-16.354
27/03/2010	5870217.238	532480.566	484.838	3.38	0.028	0.028	0.040	0.062	45.0	57.4	0.012	0.018	0.34	0.010	0.001	0.010	0.006	5.7	30.8	29.603	17.673
04/07/2010	5870217.217	532480.562	484.833	3.65	0.007	0.024	0.025	0.057	73.7	66.3	0.007	0.016	0.27	-0.021	-0.004	0.021	-0.005	190.8	-13.2	-78.870	-18.447
13/09/2010	5870217.227	532480.566	484.825	3.84	0.017	0.028	0.033	0.049	58.7	56.2	0.009	0.013	0.19	0.010	0.004	0.011	-0.008	21.8	-36.6	55.407	-41.155
22/11/2010	5870217.224	532480.568	484.837	4.03	0.014	0.030	0.033	0.061	65.0	61.5	0.008	0.015	0.19	-0.003	0.002	0.004	0.012	146.3	73.3	18.813	62.614
04/04/2011	5870217.225	532480.562	484.824	4.40	0.015	0.024	0.028	0.048	58.0	59.5	0.006	0.011	0.36	0.001	-0.006	0.006	-0.013	279.5	-64.9	-16.705	-35.701
18/06/2011	5870217.234	532480.573	484.871	4.60	0.024	0.035	0.042	0.095	55.6	65.9	0.009	0.021	0.21	0.009	0.011	0.014	0.047	50.7	73.2	69.216	228.890
03/10/2011	5870217.222	532480.569	484.842	4.90	0.012	0.031	0.033	0.066	68.8	63.3	0.007	0.013	0.29	-0.012	-0.004	0.013	-0.029	198.4	-66.4	-43.178	-98.993
28/11/2011	5870217.224	532480.570	484.845	5.05	0.014	0.032	0.035	0.069	66.4	63.2	0.007	0.014	0.15	0.002	0.001	0.002	0.003	26.6	53.3	14.584	19.567
09/04/2012	5870217.223	532480.571	484.850	5.41	0.013	0.033	0.035	0.074	68.5	64.4	0.007	0.014	0.36	-0.001	0.001	0.001	0.005	135.0	74.2	3.884	13.731
12/07/2012	5870217.242	532480.582	484.878	5.67	0.032	0.044	0.054	0.102	54.0	61.9	0.010	0.018	0.26	0.019	0.011	0.022	0.028	30.1	51.9	85.307	108.798
29/09/2012	5870217.233	532480.577	484.870	5.89	0.023	0.039	0.045	0.094	59.5	64.3	0.008	0.016	0.22	-0.009	-0.005	0.010	-0.008	209.1	-37.8	-47.601	-36.987
10/12/2012	5870217.226	532480.579	484.862	6.08	0.016	0.041	0.044	0.086	68.7	62.9	0.007	0.014	0.20	-0.007	0.002	0.007	-0.008	164.1	-47.7	-36.931	-40.583
03/04/2013	5870217.229	532480.581	484.860	6.40	0.019	0.043	0.047	0.084	66.2	60.8	0.007	0.013	0.31	0.003	0.002	0.004	-0.002	33.7	-29.0	11.552	-6.408
12/07/2013	5870217.229	532480.584	484.870	6.67	0.019	0.046	0.050	0.094	67.6	62.1	0.007	0.014	0.27	0.000	0.003	0.003	0.010	90.0	73.3	10.958	36.525
04/10/2013	5870217.227	532480.583	484.885	6.90	0.017	0.045	0.048	0.109	69.3	66.2	0.007	0.016	0.23	-0.002	-0.001	0.002	0.015	206.6	81.5	-9.723	65.223
27/11/2013	5870217.227	532480.577	484.866	7.05	0.017	0.039	0.043	0.090	66.4	64.7	0.006	0.013	0.15	0.000	-0.006	0.006	-0.019	270.0	-72.5	-40.583	-128.514
10/04/2014	5870217.224	532480.581	484.867	7.41	0.014	0.043	0.045	0.091	72.0	63.6	0.006	0.012	0.37	-0.003	0.004	0.005	0.001	126.9	11.3	13.629	2.726
18/07/2014	5870217.219	532480.586	484.883	7.69	0.009	0.048	0.049	0.107	79.4	65.5	0.006	0.014	0.27	-0.005	0.005	0.007	0.016	135.0	66.2	26.088	59.030
02/10/2014	5870217.230	532480.580	484.865	7.89	0.020	0.042	0.047	0.089	64.5	62.4	0.006	0.011	0.21	0.011	-0.006	0.013	-0.018	331.4	-55.2	-60.218	-86.507
28/11/2014	5870217.229	532480.580	484.861	8.05	0.019	0.042	0.046	0.085	65.7	61.5	0.006	0.011	0.16	-0.001	0.000	0.001	-0.004	180.0	-76.0	-6.408	-25.632
01/04/2015	5870217.225	532480.580	484.869	8.39	0.015	0.042	0.045	0.093	70.3	64.4	0.005	0.011	0.34	-0.004	0.000	0.004	0.008	180.0	63.4	-11.782	23.565
20/07/2015	5870217.229	532480.587	484.878	8.69	0.019	0.049	0.053	0.102	68.8	62.7	0.006	0.012	0.30	0.004	0.007	0.008	0.009	60.3	48.1	26.770	29.884
14/10/2015	5870217.225	532480.582	484.877	8.93	0.015	0.044	0.046	0.101	71.2	65.3	0.005	0.011	0.24	-0.004	-0.005	0.006	-0.001	231.3	-8.9	-27.195	-4.247

West Quesnel Land Stability Program

GPS Hub 06-12 (East Side of Lewis Road)

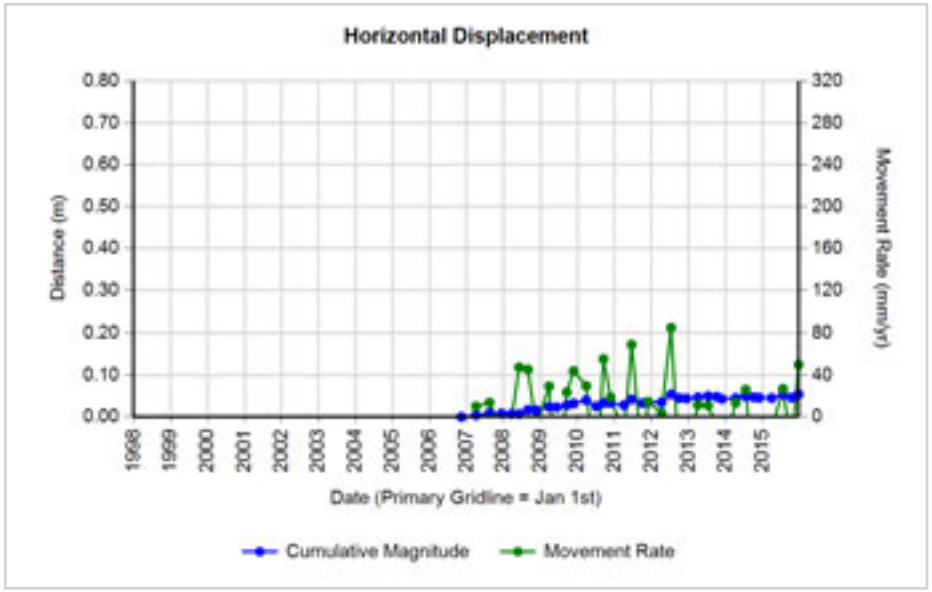
amec foster wheeler

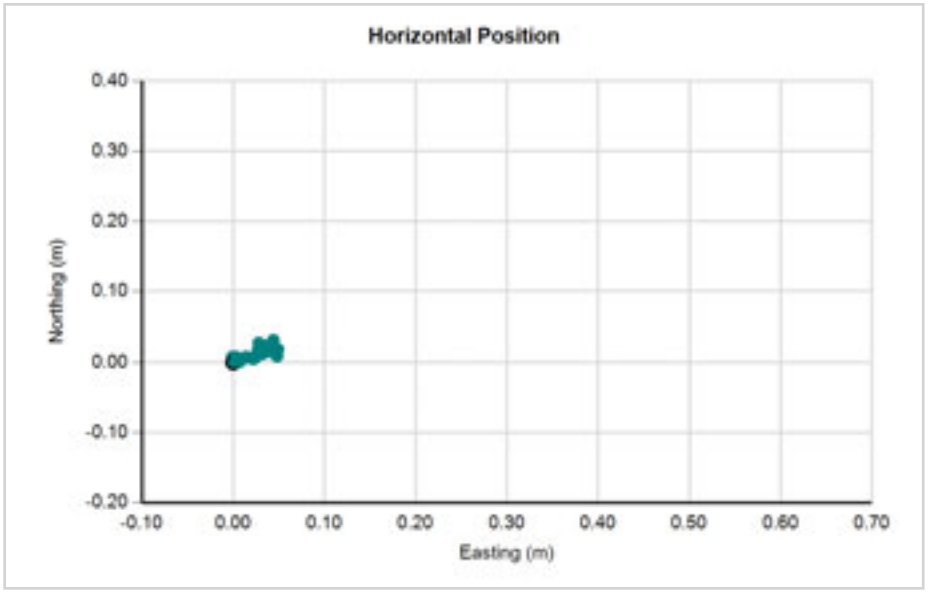
22/12/2015	5870217.233	532480.587	484.871	9.11	0.023	0.049	0.054	0.095	64.9	60.3	0.006	0.010	0.19	0.008	0.005	0.009	-0.006	32.0	-32.5	49.939	-31.761

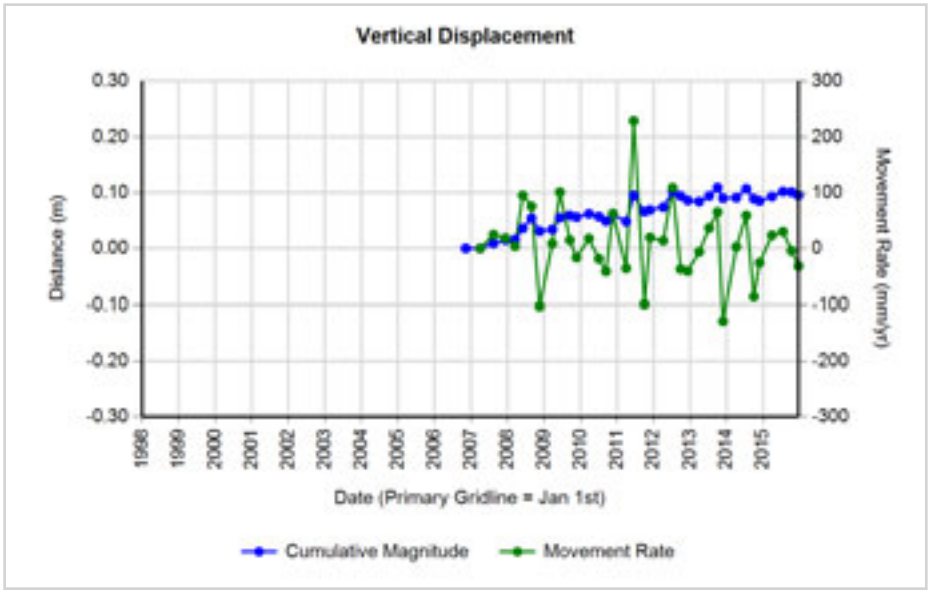
West Quesnel Land Stability Program

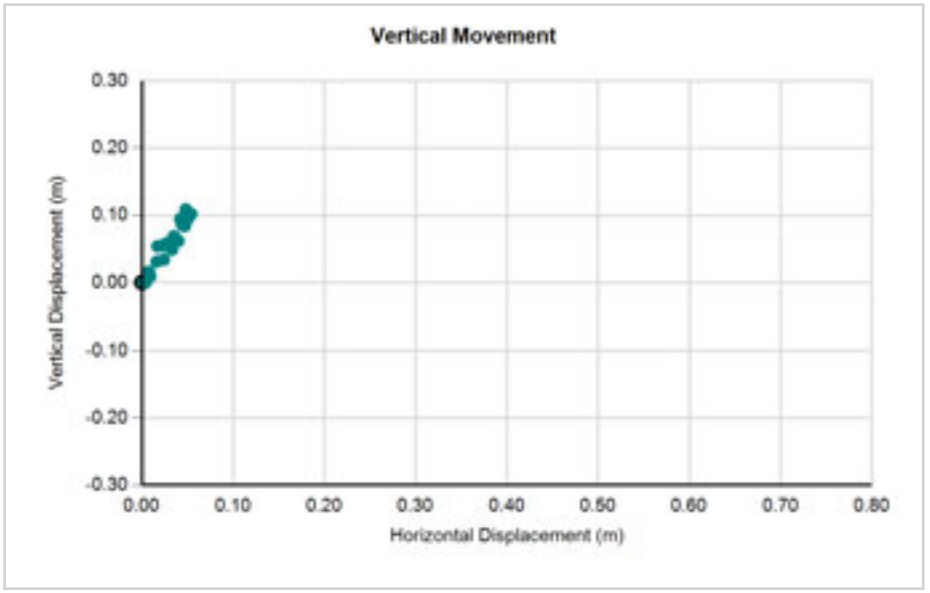
GPS Hub 06-12 (East Side of Lewis Road)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 06-13 (Northwest Corner of Pentland Crescent)

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5870118.621	532230.725	527.301	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
05/04/2007	5870118.621	532230.735	527.300	0.40	0.000	0.010	0.010	-0.001	90.0	-5.7	0.025	-0.003	0.40	0.000	0.010	0.010	-0.001	90.0	-5.7	25.017	-2.502
16/08/2007	5870118.627	532230.741	527.292	0.76	0.006	0.016	0.017	-0.009	69.4	-27.8	0.022	-0.012	0.36	0.006	0.006	0.008	-0.008	45.0	-43.3	23.303	-21.970
13/12/2007	5870118.627	532230.747	527.287	1.09	0.006	0.022	0.023	-0.014	74.7	-31.5	0.021	-0.013	0.33	0.000	0.006	0.006	-0.005	90.0	-39.8	18.416	-15.347
18/03/2008	5870118.624	532230.752	527.300	1.35	0.003	0.027	0.027	-0.001	83.7	-2.1	0.020	-0.001	0.26	-0.003	0.005	0.006	0.013	121.0	65.8	22.185	49.461
03/06/2008	5870118.638	532230.774	527.290	1.56	0.017	0.049	0.052	-0.011	70.9	-12.0	0.033	-0.007	0.21	0.014	0.022	0.026	-0.010	57.5	-21.0	123.696	-47.435
29/08/2008	5870118.629	532230.778	527.309	1.80	0.008	0.053	0.054	0.008	81.4	8.5	0.030	0.004	0.24	-0.009	0.004	0.010	0.019	156.0	62.6	41.348	79.767
19/11/2008	5870118.638	532230.784	527.282	2.03	0.017	0.059	0.061	-0.019	73.9	-17.2	0.030	-0.009	0.22	0.009	0.006	0.011	-0.027	33.7	-68.2	48.180	-120.265
26/03/2009	5870118.641	532230.786	527.285	2.37	0.020	0.061	0.064	-0.016	71.8	-14.0	0.027	-0.007	0.35	0.003	0.002	0.004	0.003	33.7	39.8	10.370	8.628
10/06/2009	5870118.639	532230.818	527.306	2.58	0.018	0.093	0.095	0.005	79.0	3.0	0.037	0.002	0.21	-0.002	0.032	0.032	0.021	93.6	33.2	154.090	100.924
17/09/2009	5870118.639	532230.820	527.280	2.85	0.018	0.095	0.097	-0.021	79.3	-12.3	0.034	-0.007	0.27	0.000	0.002	0.002	-0.026	90.0	-85.6	7.379	-95.924
23/11/2009	5870118.653	532230.824	527.274	3.04	0.032	0.099	0.104	-0.027	72.1	-14.5	0.034	-0.009	0.18	0.014	0.004	0.015	-0.006	15.9	-22.4	79.375	-32.709
27/03/2010	5870118.653	532230.821	527.285	3.38	0.032	0.096	0.101	-0.016	71.6	-9.0	0.030	-0.005	0.34	0.000	-0.003	0.003	0.011	270.0	74.7	-8.837	32.401
04/07/2010	5870118.638	532230.818	527.296	3.65	0.017	0.093	0.095	-0.005	79.6	-3.0	0.026	-0.001	0.27	-0.015	-0.003	0.015	0.011	191.3	35.7	-56.437	40.583
13/09/2010	5870118.649	532230.827	527.285	3.84	0.028	0.102	0.106	-0.016	74.6	-8.6	0.028	-0.004	0.19	0.011	0.009	0.014	-0.011	39.3	-37.7	73.115	-56.588
22/11/2010	5870118.650	532230.833	527.274	4.03	0.029	0.108	0.112	-0.027	75.0	-13.6	0.028	-0.007	0.19	0.001	0.006	0.006	-0.011	80.5	-61.1	31.739	-57.396
04/04/2011	5870118.649	532230.833	527.283	4.40	0.028	0.108	0.112	-0.018	75.5	-9.2	0.025	-0.004	0.36	-0.001	0.000	0.001	0.009	180.0	83.7	-2.746	24.716
18/06/2011	5870118.653	532230.843	527.301	4.60	0.032	0.118	0.122	0.000	74.8	0.0	0.027	0.000	0.21	0.004	0.010	0.011	0.018	68.2	59.1	52.452	87.660
03/10/2011	5870118.652	532230.837	527.269	4.90	0.031	0.112	0.116	-0.032	74.5	-15.4	0.024	-0.007	0.29	-0.001	-0.006	0.006	-0.032	260.5	-79.2	-20.764	-109.234
28/11/2011	5870118.656	532230.842	527.273	5.05	0.035	0.117	0.122	-0.028	73.3	-12.9	0.024	-0.006	0.15	0.004	0.005	0.006	0.004	51.3	32.0	41.763	26.089
09/04/2012	5870118.647	532230.841	527.287	5.41	0.026	0.116	0.119	-0.014	77.4	-6.7	0.022	-0.003	0.36	-0.009	-0.001	0.009	0.014	186.3	57.1	-24.868	38.447
12/07/2012	5870118.660	532230.863	527.283	5.67	0.039	0.138	0.143	-0.018	74.2	-7.2	0.025	-0.003	0.26	0.013	0.022	0.026	-0.004	59.4	-8.9	99.293	-15.543
29/09/2012	5870118.670	532230.878	527.280	5.89	0.049	0.153	0.161	-0.021	72.2	-7.4	0.027	-0.004	0.22	0.010	0.015	0.018	-0.003	56.3	-9.4	83.350	-13.870
10/12/2012	5870118.663	532230.872	527.273	6.08	0.042	0.147	0.153	-0.028	74.1	-10.4	0.025	-0.005	0.20	-0.007	-0.006	0.009	-0.007	220.6	-37.2	-46.770	-35.510
03/04/2013	5870118.666	532230.875	527.263	6.40	0.045	0.150	0.157	-0.038	73.3	-13.6	0.024	-0.006	0.31	0.003	0.003	0.004	-0.010	45.0	-67.0	13.593	-32.039
12/07/2013	5870118.666	532230.883	527.275	6.67	0.045	0.158	0.164	-0.026	74.1	-9.0	0.025	-0.004	0.27	0.000	0.008	0.008	0.012	90.0	56.3	29.220	43.830
04/10/2013	5870118.665	532230.875	527.273	6.90	0.044	0.150	0.156	-0.028	73.7	-10.2	0.023	-0.004	0.23	-0.001	-0.008	0.008	-0.002	262.9	-13.9	-35.056	-8.696
27/11/2013	5870118.668	532230.874	527.257	7.05	0.047	0.149	0.156	-0.044	72.5	-15.7	0.022	-0.006	0.15	0.003	-0.001	0.003	-0.016	341.6	-78.8	21.389	-108.222
10/04/2014	5870118.664	532230.885	527.273	7.41	0.043	0.160	0.166	-0.028	75.0	-9.6	0.022	-0.004	0.37	-0.004	0.011	0.012	0.016	110.0	53.8	31.904	43.612
18/07/2014	5870118.659	532230.888	527.281	7.69	0.038	0.163	0.167	-0.020	76.9	-6.8	0.022	-0.003	0.27	-0.005	0.003	0.006	0.008	149.0	53.9	21.513	29.515
02/10/2014	5870118.667	532230.891	527.258	7.89	0.046	0.166	0.172	-0.043	74.5	-14.0	0.022	-0.005	0.21	0.008	0.003	0.009	-0.023	20.6	-69.6	41.062	-110.536
28/11/2014	5870118.661	532230.890	527.260	8.05	0.040	0.165	0.170	-0.041	76.4	-13.6	0.021	-0.005	0.16	-0.006	-0.001	0.006	0.002	189.5	18.2	-38.978	12.816
01/04/2015	5870118.668	532230.894	527.259	8.39	0.047	0.169	0.175	-0.042	74.5	-13.5	0.021	-0.005	0.34	0.007	0.004	0.008	-0.001	29.7	-7.1	23.748	-2.946
20/07/2015	5870118.675	532230.906	527.273	8.69	0.054	0.181	0.189	-0.028	73.4	-8.4	0.022	-0.003	0.30	0.007	0.012	0.014	0.014	59.7	45.2	46.129	46.486
14/10/2015	5870118.670	532230.902	527.264	8.93	0.049	0.177	0.184	-0.037	74.5	-11.4	0.021	-0.004	0.24	-0.005	-0.004	0.006	-0.009	218.7	-54.6	-27.195	-38.224

West Quesnel Land Stability Program

GPS Hub 06-13 (Northwest Corner of Pentland Crescent)

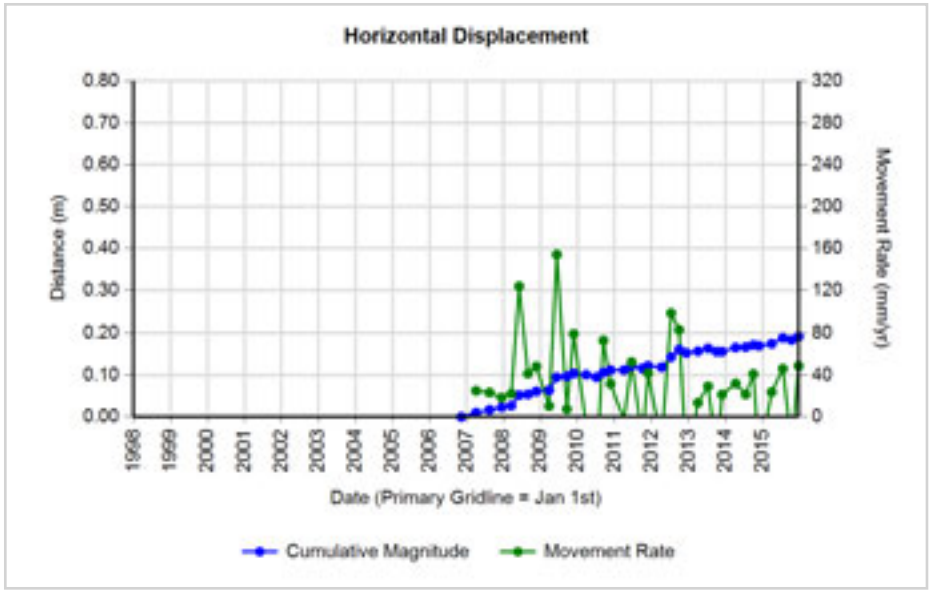
amec foster wheeler

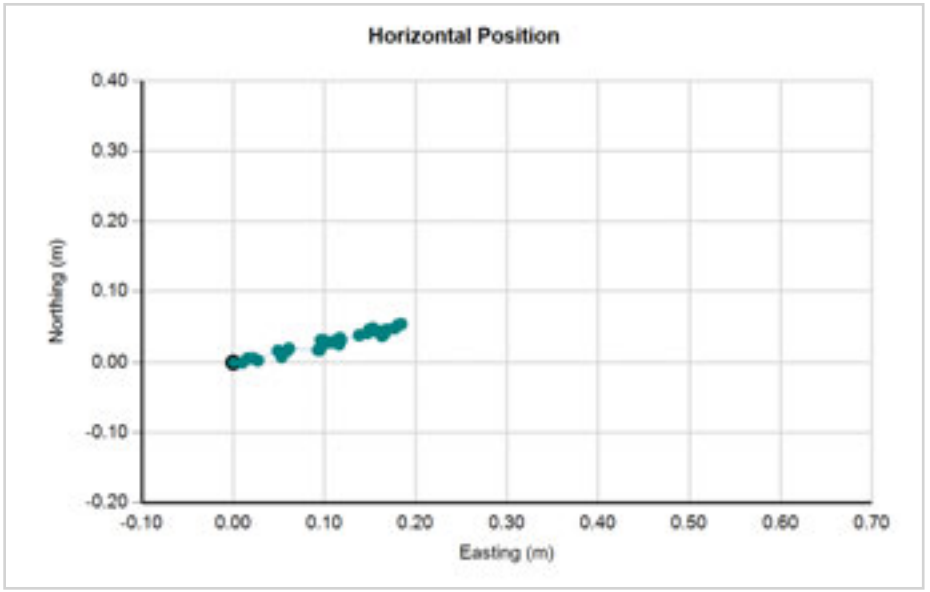
22/12/2015	5870118.676	532230.909	527.263	9.11	0.055	0.184	0.192	-0.038	73.4	-11.2	0.021	-0.004	0.19	0.006	0.007	0.009	-0.001	49.4	-6.2	48.803	-5.293

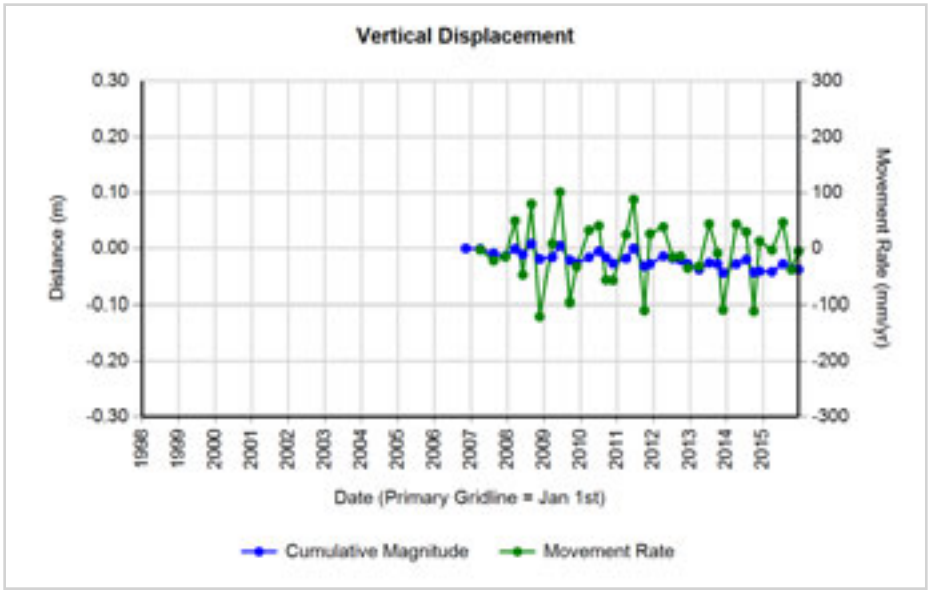
West Quesnel Land Stability Program

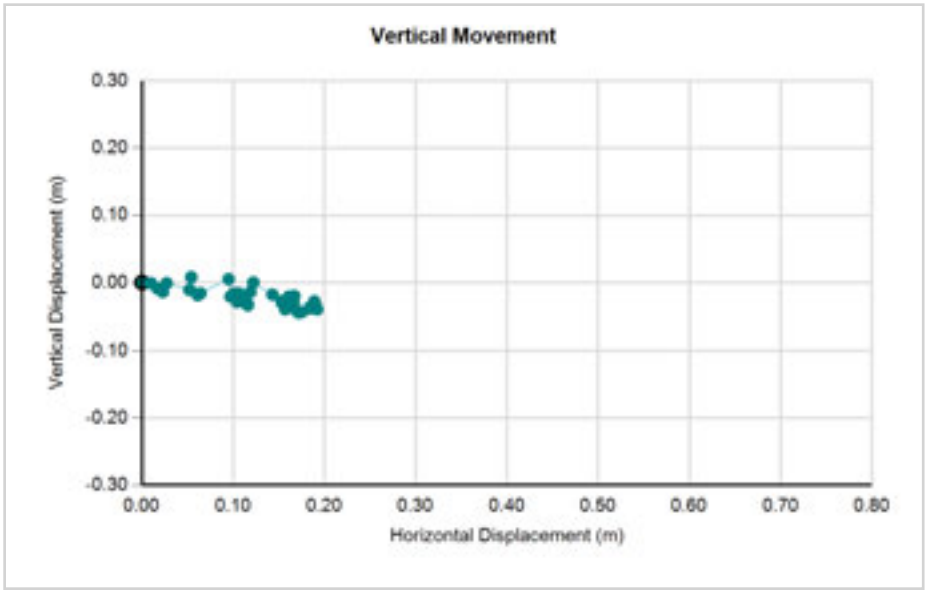
GPS Hub 06-13 (Northwest Corner of Pentland Crescent)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 06-14 (Southwest Corner of Pinchbeck Street and Pentland Crescent)

amec foster wheeler

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5870071.251	532147.507	527.150	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
05/04/2007	5870071.250	532147.515	527.129	0.40	-0.001	0.008	0.008	-0.021	97.1	-69.0	0.020	-0.053	0.40	-0.001	0.008	0.008	-0.021	97.1	-69.0	20.169	-52.536
16/08/2007	5870071.249	532147.533	527.126	0.76	-0.002	0.026	0.026	-0.024	94.4	-42.6	0.034	-0.031	0.36	-0.001	0.018	0.018	-0.003	93.2	-9.4	49.509	-8.239
13/12/2007	5870071.253	532147.529	527.119	1.09	0.002	0.022	0.022	-0.031	84.8	-54.5	0.020	-0.028	0.33	0.004	-0.004	0.006	-0.007	315.0	-51.1	-17.363	-21.485
18/03/2008	5870071.254	532147.535	527.133	1.35	0.003	0.028	0.028	-0.017	83.9	-31.1	0.021	-0.013	0.26	0.001	0.006	0.006	0.014	80.5	66.5	23.143	53.266
03/06/2008	5870071.264	532147.565	527.128	1.56	0.013	0.058	0.059	-0.022	77.4	-20.3	0.038	-0.014	0.21	0.010	0.030	0.032	-0.005	71.6	-9.0	150.003	-23.718
29/08/2008	5870071.256	532147.573	527.123	1.80	0.005	0.066	0.066	-0.027	85.7	-22.2	0.037	-0.015	0.24	-0.008	0.008	0.011	-0.005	135.0	-23.8	47.498	-20.991
19/11/2008	5870071.262	532147.576	527.114	2.03	0.011	0.069	0.070	-0.036	80.9	-27.3	0.034	-0.018	0.22	0.006	0.003	0.007	-0.009	26.6	-53.3	29.880	-40.088
26/03/2009	5870071.256	532147.584	527.108	2.37	0.005	0.077	0.077	-0.042	86.3	-28.6	0.033	-0.018	0.35	-0.006	0.008	0.010	-0.006	126.9	-31.0	28.760	-17.256
10/06/2009	5870071.253	532147.624	527.137	2.58	0.002	0.117	0.117	-0.013	89.0	-6.3	0.045	-0.005	0.21	-0.003	0.040	0.040	0.029	94.3	35.9	192.777	139.372
17/09/2009	5870071.249	532147.629	527.107	2.85	-0.002	0.122	0.122	-0.043	90.9	-19.4	0.043	-0.015	0.27	-0.004	0.005	0.006	-0.030	128.7	-78.0	23.624	-110.682
23/11/2009	5870071.282	532147.637	527.121	3.04	0.031	0.130	0.134	-0.029	76.6	-12.2	0.044	-0.010	0.18	0.033	0.008	0.034	0.014	13.6	22.4	185.110	76.321
27/03/2010	5870071.259	532147.629	527.094	3.38	0.008	0.122	0.122	-0.056	86.2	-24.6	0.036	-0.017	0.34	-0.023	-0.008	0.024	-0.027	199.2	-48.0	-71.729	-79.530
04/07/2010	5870071.255	532147.632	527.104	3.65	0.004	0.125	0.125	-0.046	88.2	-20.2	0.034	-0.013	0.27	-0.004	0.003	0.005	0.010	143.1	63.4	18.447	36.894
13/09/2010	5870071.260	532147.635	527.110	3.84	0.009	0.128	0.128	-0.040	86.0	-17.3	0.033	-0.010	0.19	0.005	0.003	0.006	0.006	31.0	45.8	29.997	30.866
22/11/2010	5870071.197	532147.670	527.098	4.03	-0.054	0.163	0.172	-0.052	108.3	-16.8	0.043	-0.013	0.19	-0.063	0.035	0.072	-0.012	150.9	-9.5	376.048	-62.614
04/04/2011	5870071.198	532147.662	527.097	4.40	-0.053	0.155	0.164	-0.053	108.9	-17.9	0.037	-0.012	0.36	0.001	-0.008	0.008	-0.001	277.1	-7.1	-22.141	-2.746
18/06/2011	5870071.195	532147.676	527.105	4.60	-0.056	0.169	0.178	-0.045	108.3	-14.2	0.039	-0.010	0.21	-0.003	0.014	0.014	0.008	102.1	29.2	69.728	38.960
03/10/2011	5870071.198	532147.680	527.094	4.90	-0.053	0.173	0.181	-0.056	107.0	-17.2	0.037	-0.011	0.29	0.003	0.004	0.005	-0.011	53.1	-65.6	17.068	-37.549
28/11/2011	5870071.201	532147.683	527.090	5.05	-0.050	0.176	0.183	-0.060	105.9	-18.2	0.036	-0.012	0.15	0.003	0.003	0.004	-0.004	45.0	-43.3	27.672	-26.089
09/04/2012	5870071.198	532147.684	527.096	5.41	-0.053	0.177	0.185	-0.054	106.7	-16.3	0.034	-0.010	0.36	-0.003	0.001	0.003	0.006	161.6	62.2	8.684	16.477
12/07/2012	5870071.197	532147.711	527.091	5.67	-0.054	0.204	0.211	-0.059	104.8	-15.6	0.037	-0.010	0.26	-0.001	0.027	0.027	-0.005	92.1	-10.5	104.984	-19.428
29/09/2012	5870071.211	532147.721	527.087	5.89	-0.040	0.214	0.218	-0.063	100.6	-16.1	0.037	-0.011	0.22	0.014	0.010	0.017	-0.004	35.5	-13.1	79.544	-18.494
10/12/2012	5870071.199	532147.722	527.082	6.08	-0.052	0.215	0.221	-0.068	103.6	-17.1	0.036	-0.011	0.20	-0.012	0.001	0.012	-0.005	175.2	-22.5	61.086	-25.365
03/04/2013	5870071.203	532147.724	527.074	6.40	-0.048	0.217	0.222	-0.076	102.5	-18.9	0.035	-0.012	0.31	0.004	0.002	0.004	-0.008	26.6	-60.8	14.328	-25.632
12/07/2013	5870071.201	532147.736	527.091	6.67	-0.050	0.229	0.234	-0.059	102.3	-14.1	0.035	-0.009	0.27	-0.002	0.012	0.012	0.017	99.5	54.4	44.435	62.093
04/10/2013	5870071.205	532147.729	527.096	6.90	-0.046	0.222	0.227	-0.054	101.7	-13.4	0.033	-0.008	0.23	0.004	-0.007	0.008	0.005	299.7	31.8	-35.056	21.741
27/11/2013	5870071.203	532147.731	527.074	7.05	-0.048	0.224	0.229	-0.076	102.1	-18.4	0.033	-0.011	0.15	-0.002	0.002	0.003	-0.022	135.0	-82.7	19.131	-148.806
10/04/2014	5870071.204	532147.737	527.075	7.41	-0.047	0.230	0.235	-0.075	101.5	-17.7	0.032	-0.010	0.37	0.001	0.006	0.006	0.001	80.5	9.3	16.580	2.726
18/07/2014	5870071.194	532147.742	527.081	7.69	-0.057	0.235	0.242	-0.069	103.6	-15.9	0.031	-0.009	0.27	-0.010	0.005	0.011	0.006	153.4	28.2	41.249	22.136
02/10/2014	5870071.204	532147.747	527.073	7.89	-0.047	0.240	0.245	-0.077	101.1	-17.5	0.031	-0.010	0.21	0.010	0.005	0.011	-0.008	26.6	-35.6	53.732	-38.447
28/11/2014	5870071.205	532147.747	527.076	8.05	-0.046	0.240	0.244	-0.074	100.9	-16.8	0.030	-0.009	0.16	0.001	0.000	0.001	0.003	0.0	71.6	-6.408	19.224
01/04/2015	5870071.202	532147.749	527.072	8.39	-0.049	0.242	0.247	-0.078	101.4	-17.5	0.029	-0.009	0.34	-0.003	0.002	0.004	-0.004	146.3	-48.0	10.620	-11.782
20/07/2015	5870071.208	532147.767	527.068	8.69	-0.043	0.260	0.264	-0.082	99.4	-17.3	0.030	-0.009	0.30	0.006	0.018	0.019	-0.004	71.6	-11.9	63.001	-13.282
14/10/2015	5870071.203	532147.761	527.070	8.93	-0.048	0.254	0.258	-0.080	100.7	-17.2	0.029	-0.009	0.24	-0.005	-0.006	0.008	0.002	230.2	14.4	-33.171	8.494

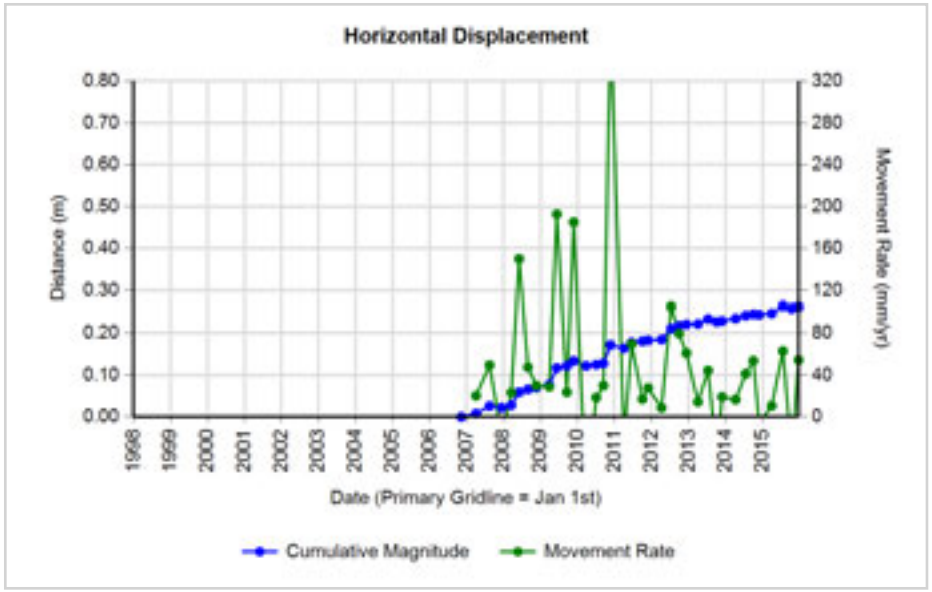
GPS Hub 06-14 (Southwest Corner of Pinchbeck Street and Pentland Crescent)

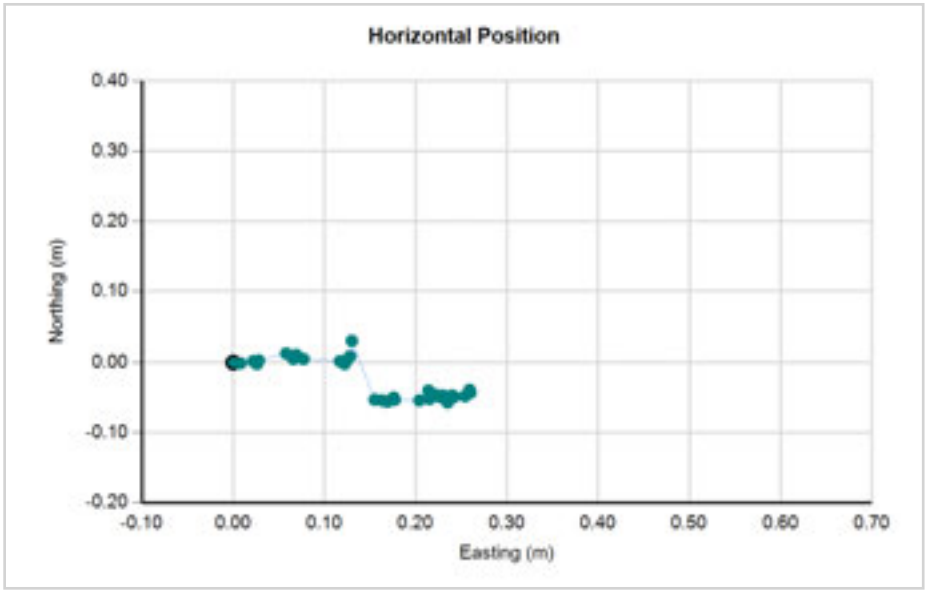
22/12/2015	5870071.212	532147.766	527.071	9.11	-0.039	0.259	0.262	-0.079	98.6	-16.8	0.029	-0.009	0.19	0.009	0.005	0.010	0.001	29.1	5.5	54.500	5.293

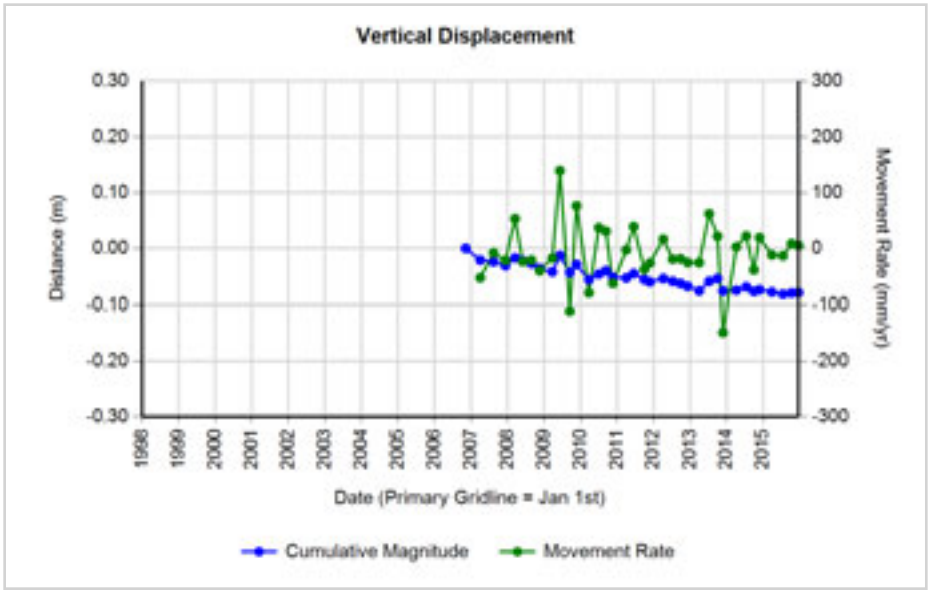
West Quesnel Land Stability Program

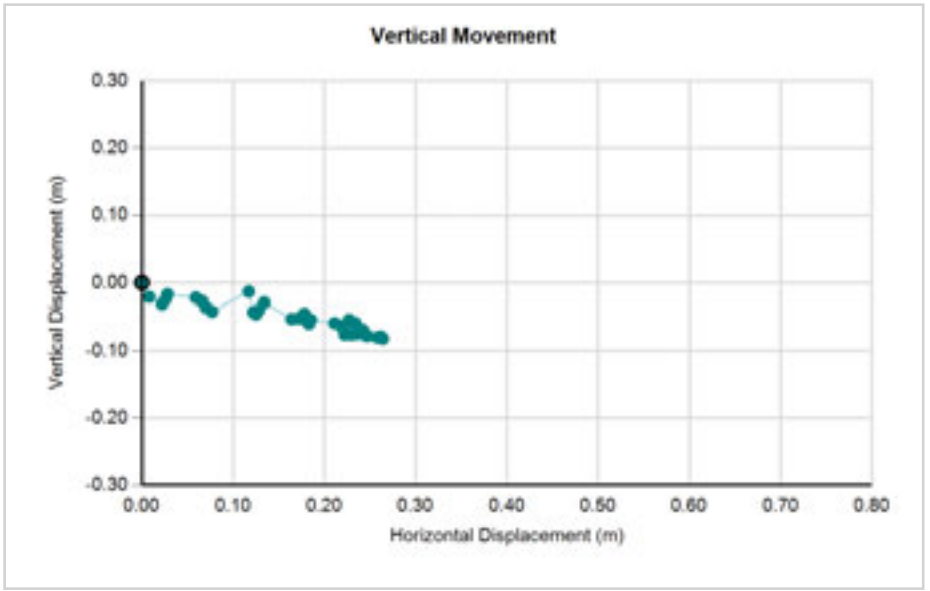
GPS Hub 06-14 (Southwest Corner of Pinchbeck Street and Pentland Crescent)

amec foster wheeler









GPS Hub 06-15 (North End of Panagrot Avenue)

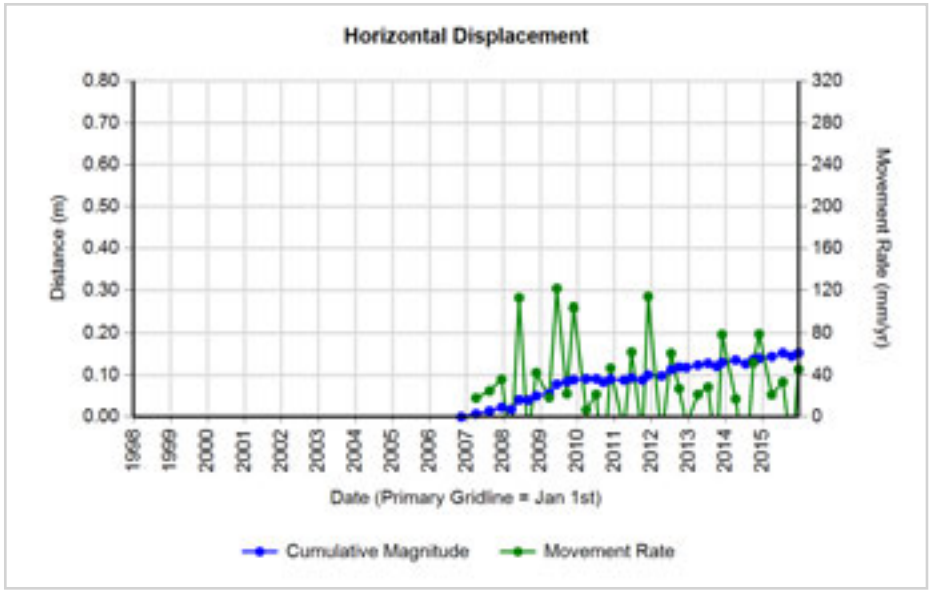
	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5870278.754	531364.331	568.367	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
05/04/2007	5870278.760	531364.335	568.348	0.40	0.006	0.004	0.007	-0.019	33.7	-69.2	0.018	-0.048	0.40	0.006	0.004	0.007	-0.019	33.7	-69.2	18.040	-47.533
16/08/2007	5870278.759	531364.344	568.349	0.76	0.005	0.013	0.014	-0.018	69.0	-52.3	0.018	-0.024	0.36	-0.001	0.009	0.009	0.001	96.3	6.3	24.868	2.746
13/12/2007	5870278.770	531364.348	568.332	1.09	0.016	0.017	0.023	-0.035	46.7	-56.3	0.021	-0.032	0.33	0.011	0.004	0.012	-0.017	20.0	-55.5	35.926	-52.179
18/03/2008	5870278.762	531364.347	568.342	1.35	0.008	0.016	0.018	-0.025	63.4	-54.4	0.013	-0.018	0.26	-0.008	-0.001	0.008	0.010	187.1	51.1	-30.674	38.047
03/06/2008	5870278.768	531364.370	568.351	1.56	0.014	0.039	0.041	-0.016	70.3	-21.1	0.027	-0.010	0.21	0.006	0.023	0.024	0.009	75.4	20.7	112.752	42.692
29/08/2008	5870278.772	531364.367	568.333	1.80	0.018	0.036	0.040	-0.034	63.4	-40.2	0.022	-0.019	0.24	0.004	-0.003	0.005	-0.018	323.1	-74.5	-20.991	-75.569
19/11/2008	5870278.775	531364.376	568.337	2.03	0.021	0.045	0.050	-0.030	65.0	-31.1	0.025	-0.015	0.22	0.003	0.009	0.009	0.004	71.6	22.9	42.257	17.817
26/03/2009	5870278.779	531364.381	568.335	2.37	0.025	0.050	0.056	-0.032	63.4	-29.8	0.024	-0.013	0.35	0.004	0.005	0.006	-0.002	51.3	-17.3	18.415	-5.752
10/06/2009	5870278.775	531364.406	568.342	2.58	0.021	0.075	0.078	-0.025	74.4	-17.8	0.030	-0.010	0.21	-0.004	0.025	0.025	0.007	99.1	15.5	121.676	33.641
17/09/2009	5870278.775	531364.412	568.319	2.85	0.021	0.081	0.084	-0.048	75.5	-29.8	0.029	-0.017	0.27	0.000	0.006	0.006	-0.023	90.0	-75.4	22.136	-84.856
23/11/2009	5870278.794	531364.410	568.310	3.04	0.040	0.079	0.089	-0.057	63.1	-32.8	0.029	-0.019	0.18	0.019	-0.002	0.019	-0.009	354.0	-25.2	104.151	-49.063
27/03/2010	5870278.795	531364.412	568.323	3.38	0.041	0.081	0.091	-0.044	63.2	-25.9	0.027	-0.013	0.34	0.001	0.002	0.002	0.013	63.4	80.2	6.586	38.292
04/07/2010	5870278.790	531364.415	568.335	3.65	0.036	0.084	0.091	-0.032	66.8	-19.3	0.025	-0.009	0.27	-0.005	0.003	0.006	0.012	149.0	64.1	21.513	44.273
13/09/2010	5870278.780	531364.410	568.335	3.84	0.026	0.079	0.083	-0.032	71.8	-21.0	0.022	-0.008	0.19	-0.010	-0.005	0.011	0.000	206.6	0.0	-57.516	0.000
22/11/2010	5870278.788	531364.414	568.306	4.03	0.034	0.083	0.090	-0.061	67.7	-34.2	0.022	-0.015	0.19	0.008	0.004	0.009	-0.029	26.6	-72.9	46.670	-151.318
04/04/2011	5870278.791	531364.411	568.315	4.40	0.037	0.080	0.088	-0.052	65.2	-30.5	0.020	-0.012	0.36	0.003	-0.003	0.004	0.009	315.0	64.8	-11.651	24.716
18/06/2011	5870278.782	531364.420	568.315	4.60	0.028	0.089	0.093	-0.052	72.5	-29.1	0.020	-0.011	0.21	-0.009	0.009	0.013	0.000	135.0	0.0	61.985	0.000
03/10/2011	5870278.779	531364.415	568.313	4.90	0.025	0.084	0.088	-0.054	73.4	-31.6	0.018	-0.011	0.29	-0.003	-0.005	0.006	-0.002	239.0	-18.9	-19.904	-6.827
28/11/2011	5870278.795	531364.422	568.311	5.05	0.041	0.091	0.100	-0.056	65.7	-29.3	0.020	-0.011	0.15	0.016	0.007	0.017	-0.002	23.6	-6.5	113.907	-13.045
09/04/2012	5870278.787	531364.423	568.313	5.41	0.033	0.092	0.098	-0.054	70.3	-28.9	0.018	-0.010	0.36	-0.008	0.001	0.008	0.002	172.9	13.9	-22.141	5.492
12/07/2012	5870278.794	531364.437	568.314	5.67	0.040	0.106	0.113	-0.053	69.3	-25.1	0.020	-0.009	0.26	0.007	0.014	0.016	0.001	63.4	3.7	60.820	3.886
29/09/2012	5870278.797	531364.442	568.306	5.89	0.043	0.111	0.119	-0.061	68.8	-27.1	0.020	-0.010	0.22	0.003	0.005	0.006	-0.008	59.0	-53.9	26.959	-36.987
10/12/2012	5870278.796	531364.441	568.294	6.08	0.042	0.110	0.118	-0.073	69.1	-31.8	0.019	-0.012	0.20	-0.001	-0.001	0.001	-0.012	225.0	-83.3	-7.174	-60.875
03/04/2013	5870278.799	531364.447	568.288	6.40	0.045	0.116	0.124	-0.079	68.8	-32.4	0.019	-0.012	0.31	0.003	0.006	0.007	-0.006	63.4	-41.8	21.493	-19.224
12/07/2013	5870278.794	531364.453	568.294	6.67	0.040	0.122	0.128	-0.073	71.8	-29.6	0.019	-0.011	0.27	-0.005	0.006	0.008	0.006	129.8	37.5	28.527	21.915
04/10/2013	5870278.796	531364.444	568.312	6.90	0.042	0.113	0.121	-0.055	69.6	-24.5	0.017	-0.008	0.23	0.002	-0.009	0.009	0.018	282.5	62.9	-40.089	78.268
27/11/2013	5870278.806	531364.450	568.291	7.05	0.052	0.119	0.130	-0.076	66.4	-30.3	0.018	-0.011	0.15	0.010	0.006	0.012	-0.021	31.0	-61.0	78.880	-142.042
10/04/2014	5870278.808	531364.456	568.301	7.41	0.054	0.125	0.136	-0.066	66.6	-25.9	0.018	-0.009	0.37	0.002	0.006	0.006	0.010	71.6	57.7	17.239	27.257
18/07/2014	5870278.794	531364.452	568.295	7.69	0.040	0.121	0.127	-0.072	71.7	-29.5	0.017	-0.009	0.27	-0.014	-0.004	0.015	-0.006	195.9	-22.4	-53.718	-22.136
02/10/2014	5870278.798	531364.462	568.288	7.89	0.044	0.131	0.138	-0.079	71.4	-29.8	0.018	-0.010	0.21	0.004	0.010	0.011	-0.007	68.2	-33.0	51.761	-33.641
28/11/2014	5870278.810	531364.459	568.285	8.05	0.056	0.128	0.140	-0.082	66.4	-30.4	0.017	-0.010	0.16	0.012	-0.003	0.012	-0.003	346.0	-13.6	79.261	-19.224
01/04/2015	5870278.806	531364.465	568.284	8.39	0.052	0.134	0.144	-0.083	68.8	-30.0	0.017	-0.010	0.34	-0.004	0.006	0.007	-0.001	123.7	-7.9	21.241	-2.946
20/07/2015	5870278.805	531364.475	568.301	8.69	0.051	0.144	0.153	-0.066	70.5	-23.4	0.018	-0.008	0.30	-0.001	0.010	0.010	0.017	95.7	59.4	33.370	56.448
14/10/2015	5870278.804	531364.467	568.278	8.93	0.050	0.136	0.145	-0.089	69.8	-31.6	0.016	-0.010	0.24	-0.001	-0.008	0.008	-0.023	262.9	-70.7	-34.241	-97.683

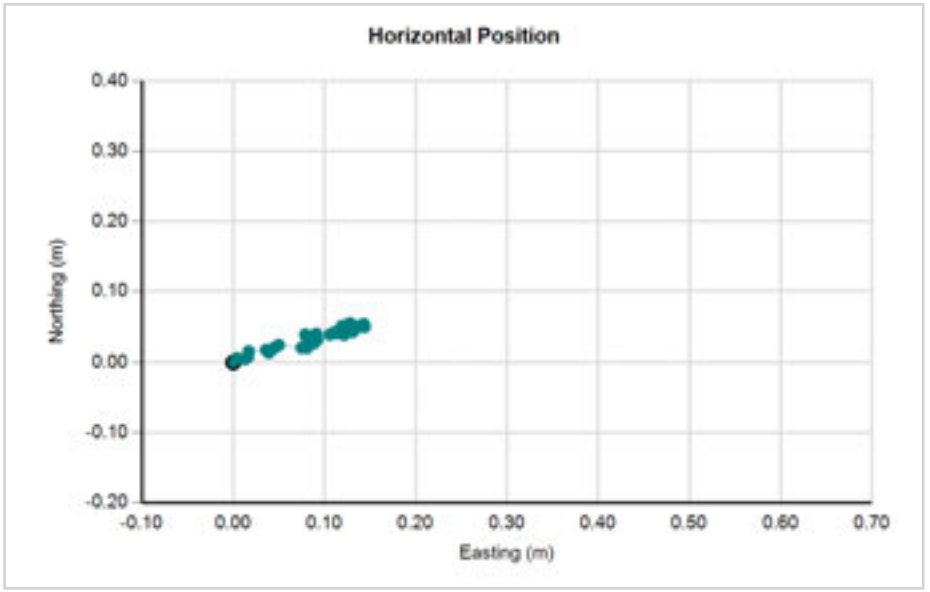
22/12/2015	5870278.809	531364.474	568.279	9.11	0.055	0.143	0.153	-0.088	69.0	-29.9	0.017	-0.010	0.19	0.005	0.007	0.009	0.001	54.5	6.6	45.536	5.293

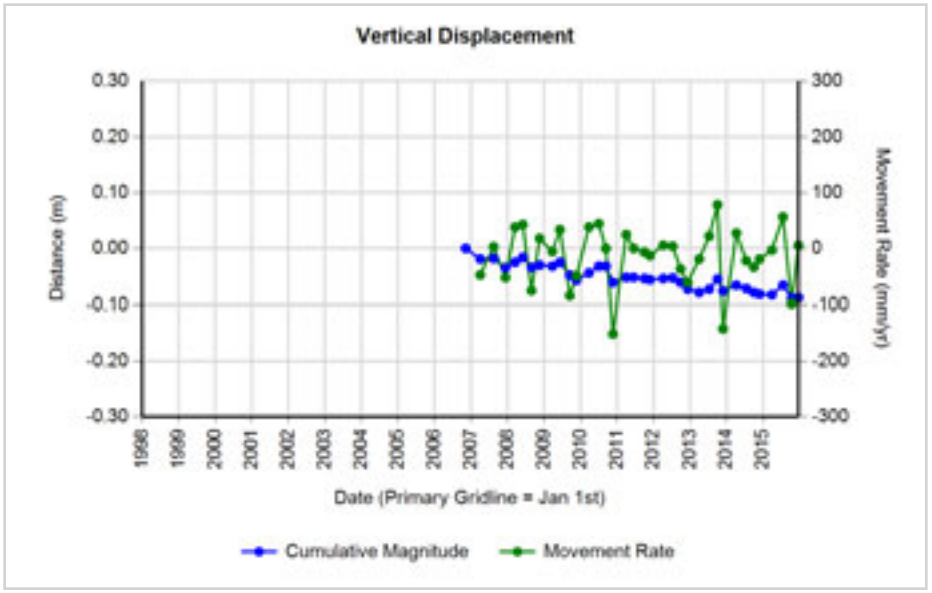
West Quesnel Land Stability Program

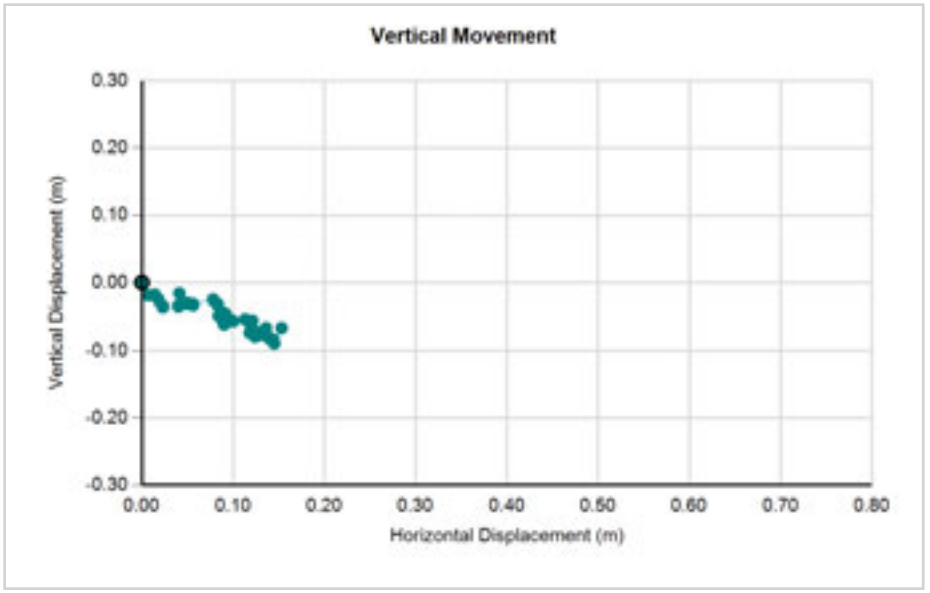
GPS Hub 06-15 (North End of Panagrot Avenue)

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 06-16 (North of Panagrot Avenue)

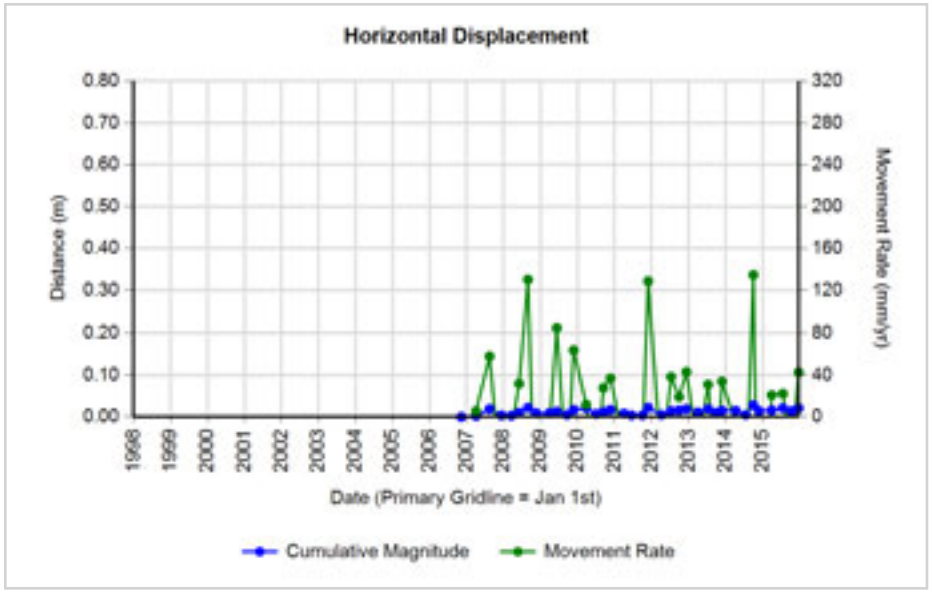
	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5870345.023	531228.061	572.222	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
05/04/2007	5870345.025	531228.062	572.189	0.40	0.002	0.001	0.002	-0.033	26.6	-86.1	0.006	-0.083	0.40	0.002	0.001	0.002	-0.033	26.6	-86.1	5.594	-82.557
16/08/2007	5870345.004	531228.064	572.185	0.76	-0.019	0.003	0.019	-0.037	171.0	-62.5	0.025	-0.048	0.36	-0.021	0.002	0.021	-0.004	174.6	-10.7	57.932	-10.985
13/12/2007	5870345.025	531228.065	572.159	1.09	0.002	0.004	0.004	-0.063	63.4	-85.9	0.004	-0.058	0.33	0.021	0.001	0.021	-0.026	2.7	-51.0	-64.529	-79.803
18/03/2008	5870345.026	531228.062	572.170	1.35	0.003	0.001	0.003	-0.052	18.4	-86.5	0.002	-0.038	0.26	0.001	-0.003	0.003	0.011	288.4	74.0	-12.031	41.852
03/06/2008	5870345.032	531228.065	572.193	1.56	0.009	0.004	0.010	-0.029	24.0	-71.2	0.006	-0.019	0.21	0.006	0.003	0.007	0.023	26.6	73.7	31.820	109.101
29/08/2008	5870345.001	531228.065	572.198	1.80	-0.022	0.004	0.022	-0.024	169.7	-47.0	0.012	-0.013	0.24	-0.031	0.000	0.031	0.005	180.0	9.2	130.147	20.991
19/11/2008	5870345.032	531228.060	572.174	2.03	0.009	-0.001	0.009	-0.048	353.7	-79.3	0.004	-0.024	0.22	0.031	-0.005	0.031	-0.024	350.8	-37.4	-139.867	-106.902
26/03/2009	5870345.031	531228.065	572.172	2.37	0.008	0.004	0.009	-0.050	26.6	-79.9	0.004	-0.021	0.35	-0.001	0.005	0.005	-0.002	101.3	-21.4	-14.665	-5.752
10/06/2009	5870345.014	531228.070	572.216	2.58	-0.009	0.009	0.013	-0.006	135.0	-25.2	0.005	-0.002	0.21	-0.017	0.005	0.018	0.044	163.6	68.1	85.161	211.461
17/09/2009	5870345.028	531228.063	572.215	2.85	0.005	0.002	0.005	-0.007	21.8	-52.4	0.002	-0.002	0.27	0.014	-0.007	0.016	-0.001	333.4	-3.7	-57.748	-3.689
23/11/2009	5870345.039	531228.067	572.174	3.04	0.016	0.006	0.017	-0.048	20.6	-70.4	0.006	-0.016	0.18	0.011	0.004	0.012	-0.041	20.0	-74.1	63.808	-223.511
27/03/2010	5870345.043	531228.067	572.185	3.38	0.020	0.006	0.021	-0.037	16.7	-60.6	0.006	-0.011	0.34	0.004	0.000	0.004	0.011	0.0	70.0	11.782	32.401
04/07/2010	5870345.029	531228.065	572.201	3.65	0.006	0.004	0.007	-0.021	33.7	-71.0	0.002	-0.006	0.27	-0.014	-0.002	0.014	0.016	188.1	48.5	-52.176	59.030
13/09/2010	5870345.031	531228.070	572.196	3.84	0.008	0.009	0.012	-0.026	48.4	-65.1	0.003	-0.007	0.19	0.002	0.005	0.005	-0.005	68.2	-42.9	27.703	-25.722
22/11/2010	5870345.038	531228.069	572.177	4.03	0.015	0.008	0.017	-0.045	28.1	-69.3	0.004	-0.011	0.19	0.007	-0.001	0.007	-0.019	351.9	-69.6	36.896	-99.139
04/04/2011	5870345.030	531228.065	572.173	4.40	0.007	0.004	0.008	-0.049	29.7	-80.7	0.002	-0.011	0.36	-0.008	-0.004	0.009	-0.004	206.6	-24.1	-24.563	-10.985
18/06/2011	5870345.022	531228.065	572.198	4.60	-0.001	0.004	0.004	-0.024	104.0	-80.3	0.001	-0.005	0.21	-0.008	0.000	0.008	0.025	180.0	72.3	-38.960	121.750
03/10/2011	5870345.026	531228.059	572.182	4.90	0.003	-0.002	0.004	-0.040	326.3	-84.8	0.001	-0.008	0.29	0.004	-0.006	0.007	-0.016	303.7	-65.7	-24.615	-54.617
28/11/2011	5870345.043	531228.069	572.182	5.05	0.020	0.008	0.022	-0.040	21.8	-61.7	0.004	-0.008	0.15	0.017	0.010	0.020	0.000	30.5	0.0	128.640	0.000
09/04/2012	5870345.028	531228.063	572.185	5.41	0.005	0.002	0.005	-0.037	21.8	-81.7	0.001	-0.007	0.36	-0.015	-0.006	0.016	0.003	201.8	10.5	-44.367	8.239
12/07/2012	5870345.032	531228.072	572.196	5.67	0.009	0.011	0.014	-0.026	50.7	-61.3	0.003	-0.005	0.26	0.004	0.009	0.010	0.011	66.0	48.2	38.269	42.742
29/09/2012	5870345.036	531228.071	572.206	5.89	0.013	0.010	0.016	-0.016	37.6	-44.3	0.003	-0.003	0.22	0.004	-0.001	0.004	0.010	346.0	67.6	19.063	46.234
10/12/2012	5870345.042	531228.065	572.182	6.08	0.019	0.004	0.019	-0.040	11.9	-64.1	0.003	-0.007	0.20	0.006	-0.006	0.008	-0.024	315.0	-70.5	43.045	-121.750
03/04/2013	5870345.033	531228.066	572.176	6.40	0.010	0.005	0.011	-0.046	26.6	-76.3	0.002	-0.007	0.31	-0.009	0.001	0.009	-0.006	173.7	-33.5	-29.013	-19.224
12/07/2013	5870345.039	531228.072	572.195	6.67	0.016	0.011	0.019	-0.027	34.5	-54.3	0.003	-0.004	0.27	0.006	0.006	0.008	0.019	45.0	65.9	30.992	69.398
04/10/2013	5870345.033	531228.063	572.202	6.90	0.010	0.002	0.010	-0.020	11.3	-63.0	0.001	-0.003	0.23	-0.006	-0.009	0.011	0.007	236.3	32.9	-47.033	30.437
27/11/2013	5870345.037	531228.066	572.184	7.05	0.014	0.005	0.015	-0.038	19.7	-68.6	0.002	-0.005	0.15	0.004	0.003	0.005	-0.018	36.9	-74.5	33.819	-121.750
10/04/2014	5870345.036	531228.068	572.165	7.41	0.013	0.007	0.015	-0.057	28.3	-75.5	0.002	-0.008	0.37	-0.001	0.002	0.002	-0.019	116.6	-83.3	-6.095	-51.789
18/07/2014	5870345.019	531228.058	572.204	7.69	-0.004	-0.003	0.005	-0.018	216.9	-74.5	0.001	-0.002	0.27	-0.017	-0.010	0.020	0.039	210.5	63.2	-72.766	143.886
02/10/2014	5870345.003	531228.081	572.189	7.89	-0.020	0.020	0.028	-0.033	135.0	-49.4	0.004	-0.004	0.21	-0.016	0.023	0.028	-0.015	124.8	-28.2	134.652	-72.089
28/11/2014	5870345.033	531228.071	572.196	8.05	0.010	0.010	0.014	-0.026	45.0	-61.5	0.002	-0.003	0.16	0.030	-0.010	0.032	0.007	341.6	12.5	-202.635	44.855
01/04/2015	5870345.038	531228.066	572.175	8.39	0.015	0.005	0.016	-0.047	18.4	-71.4	0.002	-0.006	0.34	0.005	-0.005	0.007	-0.021	315.0	-71.4	20.828	-61.857
20/07/2015	5870345.041	531228.072	572.196	8.69	0.018	0.011	0.021	-0.026	31.4	-50.9	0.002	-0.003	0.30	0.003	0.006	0.007	0.021	63.4	72.3	22.274	69.730
14/10/2015	5870345.037	531228.064	572.187	8.93	0.014	0.003	0.014	-0.035	12.1	-67.8	0.002	-0.004	0.24	-0.004	-0.008	0.009	-0.009	243.4	-45.2	-37.987	-38.224

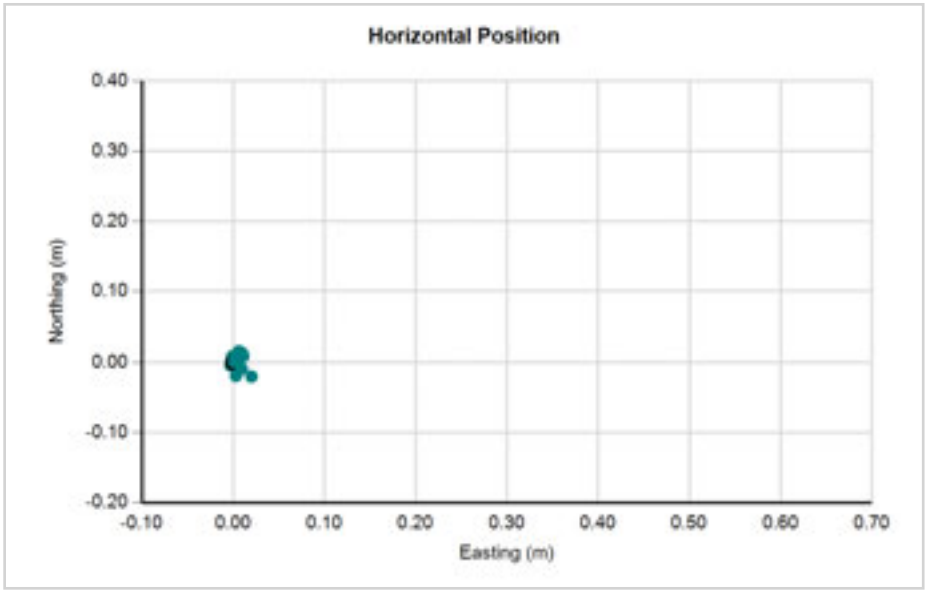
22/12/2015	5870345.041	531228.071	572.200	9.11	0.018	0.010	0.021	-0.022	29.1	-46.9	0.002	-0.002	0.19	0.004	0.007	0.008	0.013	60.3	58.2	42.677	68.815

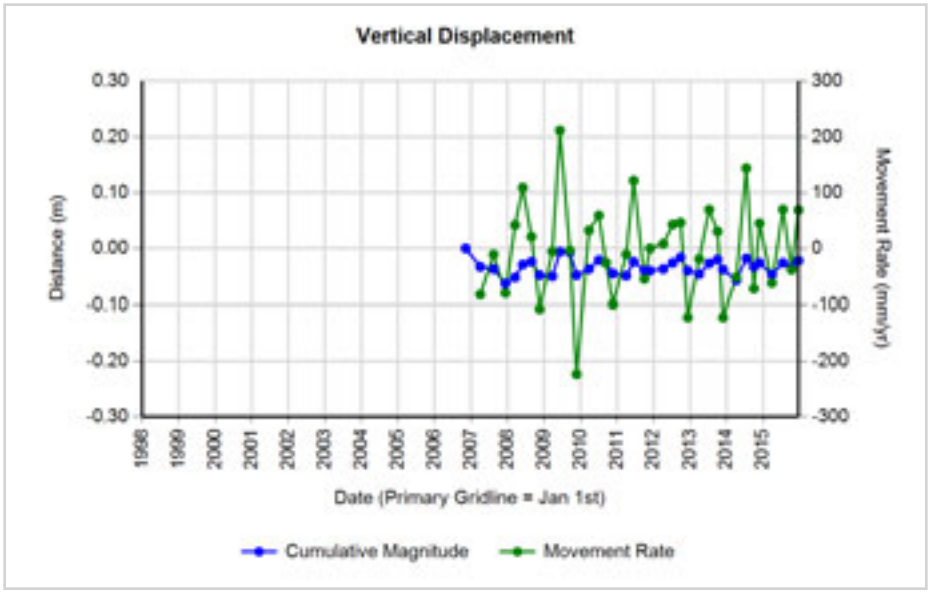
West Quesnel Land Stability Program

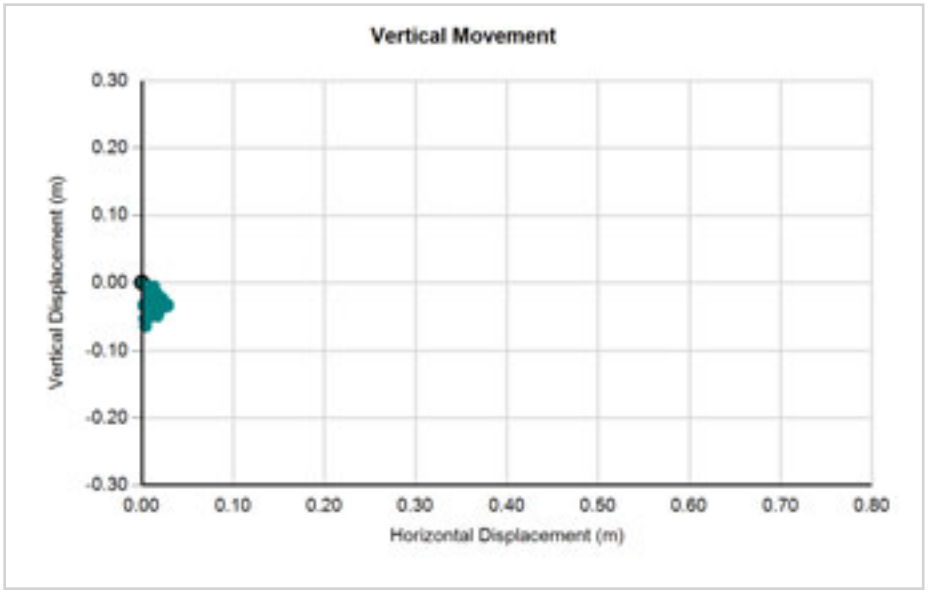
GPS Hub 06-16 (North of Panagrot Avenue)

amec foster wheeler









West Quesnel Land Stability Program

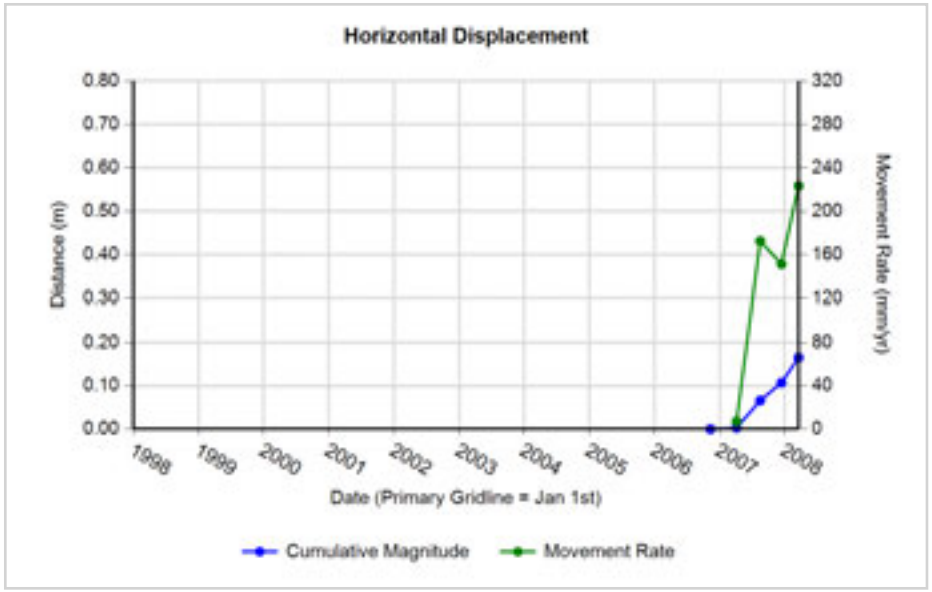
GPS Hub 06-17 (Northwest End of Findlay Road) replaced by 08-01

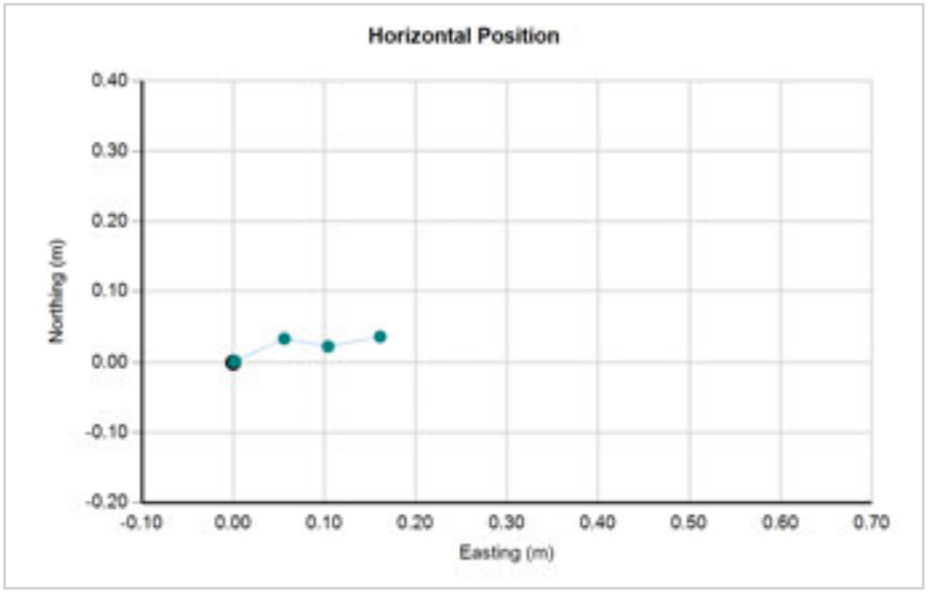
	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5870085.686	531136.829	595.126	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
05/04/2007	5870085.688	531136.831	595.120	0.40	0.002	0.002	0.003	-0.006	45.0	-64.8	0.007	-0.015	0.40	0.002	0.002	0.003	-0.006	45.0	-64.8	7.076	-15.010
16/08/2007	5870085.720	531136.885	595.013	0.76	0.034	0.056	0.066	-0.113	58.7	-59.9	0.086	-0.148	0.36	0.032	0.054	0.063	-0.107	59.3	-59.6	172.380	-293.848
13/12/2007	5870085.709	531136.933	595.049	1.09	0.023	0.104	0.107	-0.077	77.5	-35.9	0.098	-0.071	0.33	-0.011	0.048	0.049	0.036	102.9	36.2	151.147	110.496
18/03/2008	5870085.723	531136.990	595.109	1.35	0.037	0.161	0.165	-0.017	77.1	-5.9	0.122	-0.013	0.26	0.014	0.057	0.059	0.060	76.2	45.6	223.313	228.281

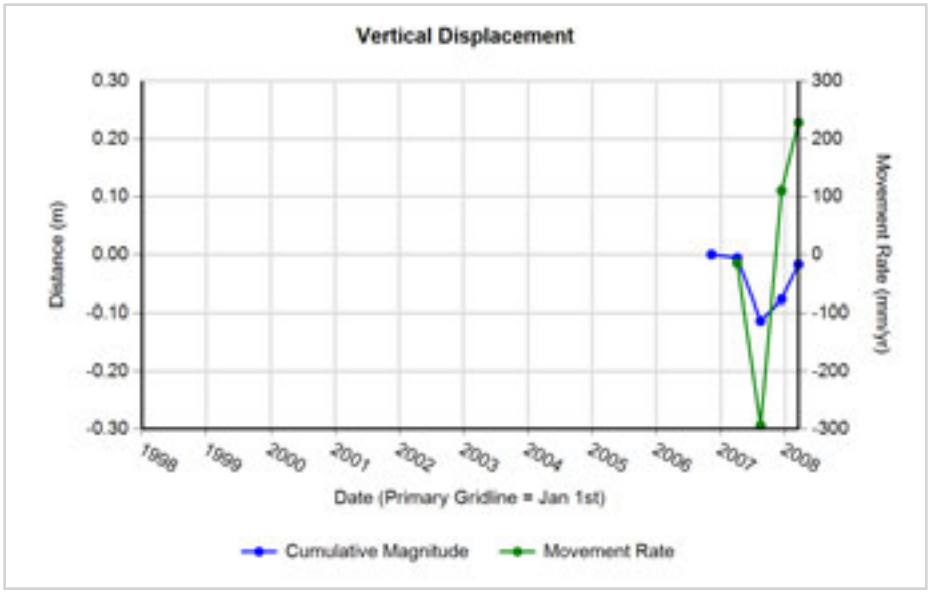
West Quesnel Land Stability Program

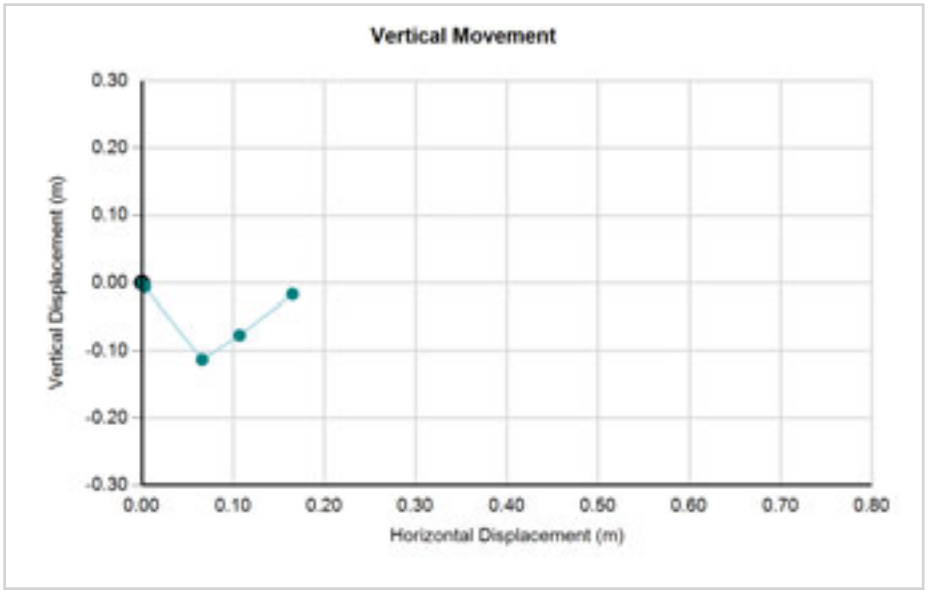
GPS Hub 06-17 (Northwest End of Findlay Road) replaced by 08-01

amec foster wheeler









West Quesnel Land Stability Program

GPS Hub 06-19 (West Side of Abbott Drive)

amec foster wheeler

	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5869508.279	531106.114	585.415	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
05/04/2007	5869508.279	531106.122	585.395	0.40	0.000	0.008	0.008	-0.020	90.0	-68.2	0.020	-0.050	0.40	0.000	0.008	0.008	-0.020	90.0	-68.2	20.014	-50.034
16/08/2007	5869508.274	531106.123	585.400	0.76	-0.005	0.009	0.010	-0.015	119.1	-55.5	0.013	-0.020	0.36	-0.005	0.001	0.005	0.005	168.7	44.4	14.003	13.731
13/12/2007	5869508.286	531106.123	585.397	1.09	0.007	0.009	0.011	-0.018	52.1	-57.6	0.010	-0.017	0.33	0.012	0.000	0.012	-0.003	0.0	-14.0	36.832	-9.208
18/03/2008	5869508.281	531106.122	585.395	1.35	0.002	0.008	0.008	-0.020	76.0	-67.6	0.006	-0.015	0.26	-0.005	-0.001	0.005	-0.002	191.3	-21.4	-19.400	-7.609
03/06/2008	5869508.281	531106.131	585.396	1.56	0.002	0.017	0.017	-0.019	83.3	-48.0	0.011	-0.012	0.21	0.000	0.009	0.009	0.001	90.0	6.3	42.692	4.744
29/08/2008	5869508.276	531106.130	585.391	1.80	-0.003	0.016	0.016	-0.024	100.6	-55.9	0.009	-0.013	0.24	-0.005	-0.001	0.005	-0.005	191.3	-44.4	-21.407	-20.991
19/11/2008	5869508.283	531106.133	585.379	2.03	0.004	0.019	0.019	-0.036	78.1	-61.7	0.010	-0.018	0.22	0.007	0.003	0.008	-0.012	23.2	-57.6	33.923	-53.451
26/03/2009	5869508.283	531106.132	585.387	2.37	0.004	0.018	0.018	-0.028	77.5	-56.6	0.008	-0.012	0.35	0.000	-0.001	0.001	0.008	270.0	82.9	-2.876	23.008
10/06/2009	5869508.288	531106.145	585.411	2.58	0.009	0.031	0.032	-0.004	73.8	-7.1	0.013	-0.002	0.21	0.005	0.013	0.014	0.024	69.0	59.9	66.939	115.342
17/09/2009	5869508.287	531106.150	585.391	2.85	0.008	0.036	0.037	-0.024	77.5	-33.1	0.013	-0.008	0.27	-0.001	0.005	0.005	-0.020	101.3	-75.7	18.812	-73.788
23/11/2009	5869508.294	531106.148	585.373	3.04	0.015	0.034	0.037	-0.042	66.2	-48.5	0.012	-0.014	0.18	0.007	-0.002	0.007	-0.018	344.1	-68.0	39.687	-98.127
27/03/2010	5869508.293	531106.147	585.378	3.38	0.014	0.033	0.036	-0.037	67.0	-45.9	0.011	-0.011	0.34	-0.001	-0.001	0.001	0.005	225.0	74.2	-4.166	14.728
04/07/2010	5869508.262	531106.145	585.397	3.65	-0.017	0.031	0.035	-0.018	118.7	-27.0	0.010	-0.005	0.27	-0.031	-0.002	0.031	0.019	183.7	31.5	-114.609	70.098
13/09/2010	5869508.288	531106.147	585.387	3.84	0.009	0.033	0.034	-0.028	74.7	-39.3	0.009	-0.007	0.19	0.026	0.002	0.026	-0.010	4.4	-21.0	-134.149	-51.444
22/11/2010	5869508.287	531106.155	585.395	4.03	0.008	0.041	0.042	-0.020	79.0	-25.6	0.010	-0.005	0.19	-0.001	0.008	0.008	0.008	97.1	44.8	42.068	41.743
04/04/2011	5869508.284	531106.142	585.391	4.40	0.005	0.028	0.028	-0.024	79.9	-40.2	0.006	-0.005	0.36	-0.003	-0.013	0.013	-0.004	257.0	-16.7	-36.639	-10.985
18/06/2011	5869508.291	531106.155	585.400	4.60	0.012	0.041	0.043	-0.015	73.7	-19.3	0.009	-0.003	0.21	0.007	0.013	0.015	0.009	61.7	31.4	71.905	43.830
03/10/2011	5869508.287	531106.151	585.385	4.90	0.008	0.037	0.038	-0.030	77.8	-38.4	0.008	-0.006	0.29	-0.004	-0.004	0.006	-0.015	225.0	-69.3	-19.310	-51.203
28/11/2011	5869508.289	531106.157	585.380	5.05	0.010	0.043	0.044	-0.035	76.9	-38.4	0.009	-0.007	0.15	0.002	0.006	0.006	-0.005	71.6	-38.3	41.251	-32.612
09/04/2012	5869508.279	531106.153	585.381	5.41	0.000	0.039	0.039	-0.034	90.0	-41.1	0.007	-0.006	0.36	-0.010	-0.004	0.011	0.001	201.8	5.3	-29.578	2.746
12/07/2012	5869508.282	531106.161	585.395	5.67	0.003	0.047	0.047	-0.020	86.3	-23.0	0.008	-0.004	0.26	0.003	0.008	0.009	0.014	69.4	58.6	33.199	54.399
29/09/2012	5869508.296	531106.158	585.380	5.89	0.017	0.044	0.047	-0.035	68.9	-36.6	0.008	-0.006	0.22	0.014	-0.003	0.014	-0.015	347.9	-46.3	66.197	-69.351
10/12/2012	5869508.285	531106.154	585.374	6.08	0.006	0.040	0.040	-0.041	81.5	-45.4	0.007	-0.007	0.20	-0.011	-0.004	0.012	-0.006	200.0	-27.1	-59.377	-30.437
03/04/2013	5869508.283	531106.154	585.374	6.40	0.004	0.040	0.040	-0.041	84.3	-45.6	0.006	-0.006	0.31	-0.002	0.000	0.002	0.000	180.0	0.0	6.408	0.000
12/07/2013	5869508.289	531106.165	585.392	6.67	0.010	0.051	0.052	-0.023	78.9	-23.9	0.008	-0.003	0.27	0.006	0.011	0.013	0.018	61.4	55.2	45.766	65.745
04/10/2013	5869508.290	531106.156	585.382	6.90	0.011	0.042	0.043	-0.033	75.3	-37.2	0.006	-0.005	0.23	0.001	-0.009	0.009	-0.010	276.3	-47.8	-39.375	-43.482
27/11/2013	5869508.297	531106.163	585.380	7.05	0.018	0.049	0.052	-0.035	69.8	-33.8	0.007	-0.005	0.15	0.007	0.007	0.010	-0.002	45.0	-11.4	66.959	-13.528
10/04/2014	5869508.289	531106.159	585.386	7.41	0.010	0.045	0.046	-0.029	77.5	-32.2	0.006	-0.004	0.37	-0.008	-0.004	0.009	0.006	206.6	33.9	-24.380	16.354
18/07/2014	5869508.281	531106.165	585.417	7.69	0.002	0.051	0.051	0.002	87.8	2.2	0.007	0.000	0.27	-0.008	0.006	0.010	0.031	143.1	72.1	36.894	114.371
02/10/2014	5869508.288	531106.164	585.388	7.89	0.009	0.050	0.051	-0.027	79.8	-28.0	0.006	-0.003	0.21	0.007	-0.001	0.007	-0.029	351.9	-76.3	-33.983	-139.372
28/11/2014	5869508.288	531106.165	585.383	8.05	0.009	0.051	0.052	-0.032	80.0	-31.7	0.006	-0.004	0.16	0.000	0.001	0.001	-0.005	90.0	-78.7	6.408	-32.039
01/04/2015	5869508.295	531106.167	585.385	8.39	0.016	0.053	0.055	-0.030	73.2	-28.5	0.007	-0.004	0.34	0.007	0.002	0.007	0.002	15.9	15.4	21.444	5.891
20/07/2015	5869508.296	531106.170	585.404	8.69	0.017	0.056	0.059	-0.011	73.1	-10.6	0.007	-0.001	0.30	0.001	0.003	0.003	0.019	71.6	80.6	10.500	63.089
14/10/2015	5869508.288	531106.161	585.375	8.93	0.009	0.047	0.048	-0.040	79.2	-39.9	0.005	-0.004	0.24	-0.008	-0.009	0.012	-0.029	228.4	-67.5	-51.142	-123.166

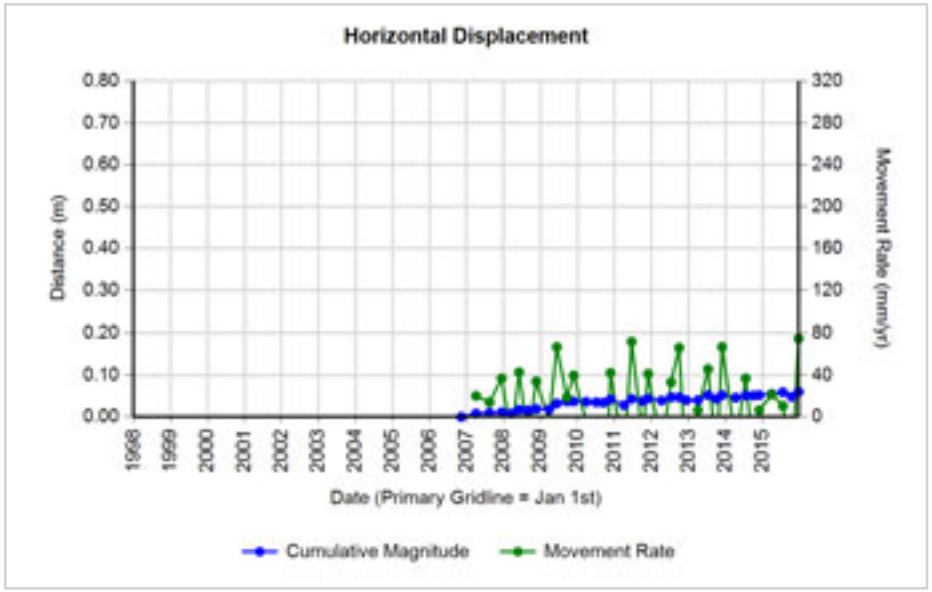
GPS Hub 06-19 (West Side of Abbott Drive)

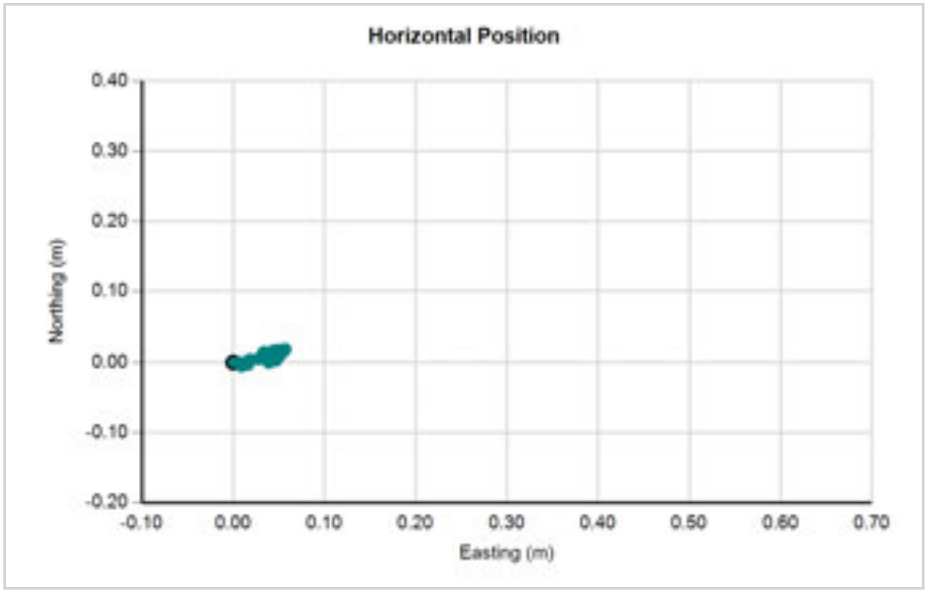
22/12/2015	5869508.298	531106.171	585.391	9.11	0.019	0.057	0.060	-0.024	71.6	-21.8	0.007	-0.003	0.19	0.010	0.010	0.014	0.016	45.0	48.5	74.861	84.696

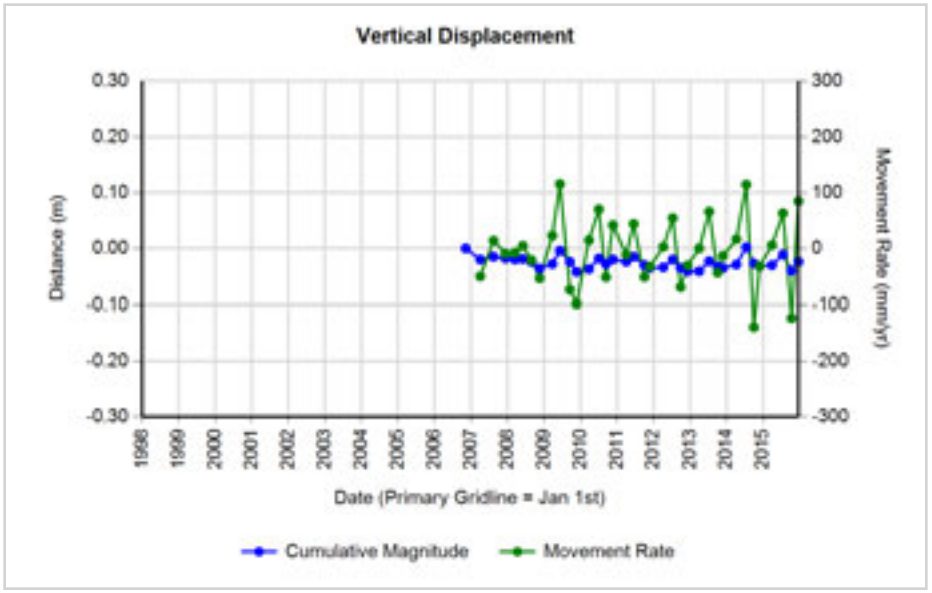
West Quesnel Land Stability Program

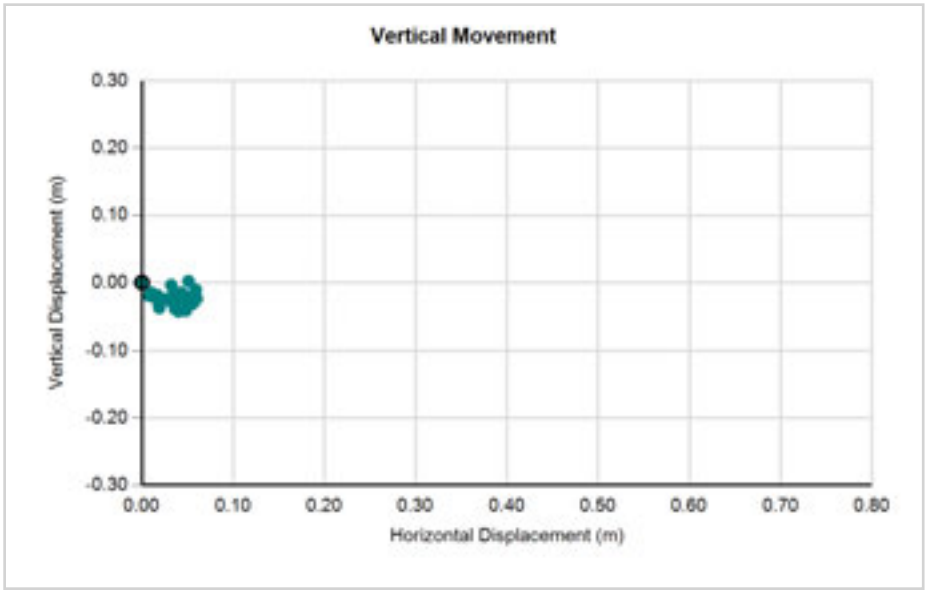
GPS Hub 06-19 (West Side of Abbott Drive)

amec foster wheeler









West Quesnel Land Stability Program

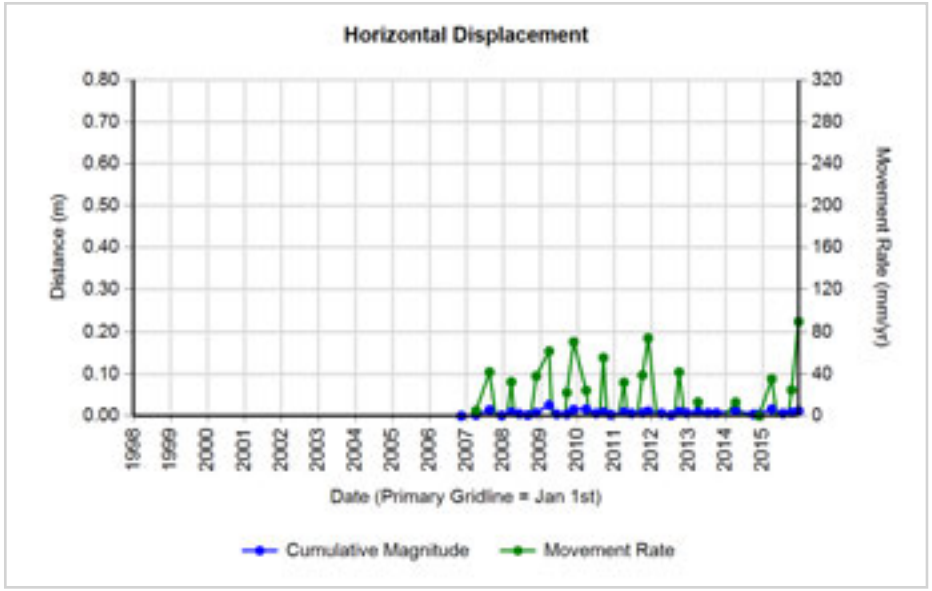
GPS Hub 06-20 (Diatomite Nine)

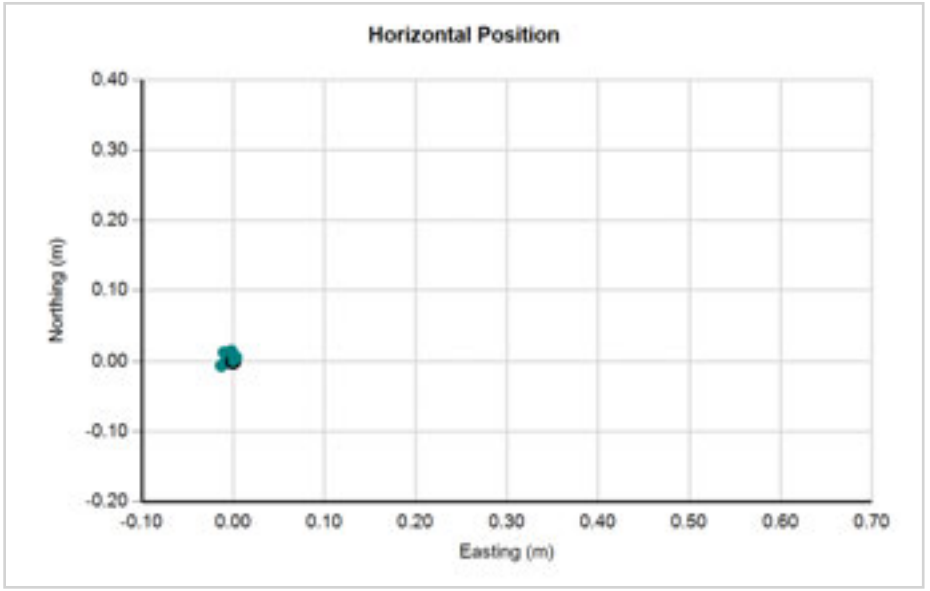
	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5869533.109	530619.695	661.719	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
05/04/2007	5869533.111	530619.695	661.723	0.40	0.002	0.000	0.002	0.004	0.0	63.4	0.005	0.010	0.40	0.002	0.000	0.002	0.004	0.0	63.4	5.003	10.007
16/08/2007	5869533.103	530619.682	661.736	0.76	-0.006	-0.013	0.014	0.017	245.2	49.9	0.019	0.022	0.36	-0.008	-0.013	0.015	0.013	238.4	40.4	41.920	35.701
13/12/2007	5869533.109	530619.694	661.719	1.09	0.000	-0.001	0.001	0.000	270.0	0.0	0.001	0.000	0.33	0.006	0.012	0.013	-0.017	63.4	-51.7	-41.179	-52.179
18/03/2008	5869533.117	530619.691	661.725	1.35	0.008	-0.004	0.009	0.006	333.4	33.9	0.007	0.004	0.26	0.008	-0.003	0.009	0.006	339.4	35.1	32.507	22.828
03/06/2008	5869533.107	530619.690	661.718	1.56	-0.002	-0.005	0.005	-0.001	248.2	-10.5	0.003	-0.001	0.21	-0.010	-0.001	0.010	-0.007	185.7	-34.9	-47.672	-33.205
29/08/2008	5869533.107	530619.695	661.728	1.80	-0.002	0.000	0.002	0.009	180.0	77.5	0.001	0.005	0.24	0.000	0.005	0.005	0.010	90.0	63.4	-20.991	41.983
19/11/2008	5869533.115	530619.698	661.723	2.03	0.006	0.003	0.007	0.004	26.6	30.8	0.003	0.002	0.22	0.008	0.003	0.009	-0.005	20.6	-30.3	38.057	-22.271
26/03/2009	5869533.135	530619.690	661.726	2.37	0.026	-0.005	0.026	0.007	349.1	14.8	0.011	0.003	0.35	0.020	-0.008	0.022	0.003	338.2	7.9	61.951	8.628
10/06/2009	5869533.112	530619.692	661.742	2.58	0.003	-0.003	0.004	0.023	315.0	79.5	0.002	0.009	0.21	-0.023	0.002	0.023	0.016	175.0	34.7	-110.953	76.895
17/09/2009	5869533.112	530619.698	661.710	2.85	0.003	0.003	0.004	-0.009	45.0	-64.8	0.001	-0.003	0.27	0.000	0.006	0.006	-0.032	90.0	-79.4	22.136	-118.061
23/11/2009	5869533.124	530619.693	661.723	3.04	0.015	-0.002	0.015	0.004	352.4	14.8	0.005	0.001	0.18	0.012	-0.005	0.013	0.013	337.4	45.0	70.869	70.869
27/03/2010	5869533.122	530619.685	661.721	3.38	0.013	-0.010	0.016	0.002	322.4	7.0	0.005	0.001	0.34	-0.002	-0.008	0.008	-0.002	256.0	-13.6	24.290	-5.891
04/07/2010	5869533.109	530619.689	661.739	3.65	0.000	-0.006	0.006	0.020	270.0	73.3	0.002	0.005	0.27	-0.013	0.004	0.014	0.018	162.9	52.9	-50.181	66.409
13/09/2010	5869533.118	530619.695	661.729	3.84	0.009	0.000	0.009	0.010	0.0	48.0	0.002	0.003	0.19	0.009	0.006	0.011	-0.010	33.7	-42.8	55.645	-51.444
22/11/2010	5869533.109	530619.698	661.725	4.03	0.000	0.003	0.003	0.006	90.0	63.4	0.001	0.001	0.19	-0.009	0.003	0.009	-0.004	161.6	-22.9	-49.501	-20.871
04/04/2011	5869533.115	530619.688	661.729	4.40	0.006	-0.007	0.009	0.010	310.6	47.3	0.002	0.002	0.36	0.006	-0.010	0.012	0.004	301.0	18.9	32.026	10.985
18/06/2011	5869533.115	530619.697	661.726	4.60	0.006	0.002	0.006	0.007	18.4	47.9	0.001	0.002	0.21	0.000	0.009	0.009	-0.003	90.0	-18.4	-43.830	-14.610
03/10/2011	5869533.108	530619.688	661.711	4.90	-0.001	-0.007	0.007	-0.008	261.9	-48.5	0.001	-0.002	0.29	-0.007	-0.009	0.011	-0.015	232.1	-52.8	38.920	-51.203
28/11/2011	5869533.119	530619.691	661.706	5.05	0.010	-0.004	0.011	-0.013	338.2	-50.4	0.002	-0.003	0.15	0.011	0.003	0.011	-0.005	15.3	-23.7	74.366	-32.612
09/04/2012	5869533.103	530619.693	661.739	5.41	-0.006	-0.002	0.006	0.020	198.4	72.5	0.001	0.004	0.36	-0.016	0.002	0.016	0.033	172.9	64.0	-44.282	90.626
12/07/2012	5869533.110	530619.697	661.730	5.67	0.001	0.002	0.002	0.011	63.4	78.5	0.000	0.002	0.26	0.007	0.004	0.008	-0.009	29.7	-48.1	-31.327	-34.971
29/09/2012	5869533.119	530619.698	661.730	5.89	0.010	0.003	0.010	0.011	16.7	46.5	0.002	0.002	0.22	0.009	0.001	0.009	0.000	6.3	0.0	41.867	0.000
10/12/2012	5869533.116	530619.696	661.720	6.08	0.007	0.001	0.007	0.001	8.1	8.0	0.001	0.000	0.20	-0.003	-0.002	0.004	-0.010	213.7	-70.2	-18.291	-50.729
03/04/2013	5869533.117	530619.692	661.718	6.40	0.008	-0.003	0.009	-0.001	339.4	-6.7	0.001	0.000	0.31	0.001	-0.004	0.004	-0.002	284.0	-25.9	13.210	-6.408
12/07/2013	5869533.116	530619.694	661.716	6.67	0.007	-0.001	0.007	-0.003	351.9	-23.0	0.001	0.000	0.27	-0.001	0.002	0.002	-0.002	116.6	-41.8	-8.167	-7.305
04/10/2013	5869533.115	530619.692	661.724	6.90	0.006	-0.003	0.007	0.005	333.4	36.7	0.001	0.001	0.23	-0.001	-0.002	0.002	0.008	243.4	74.4	-9.723	34.786
10/04/2014	5869533.121	530619.695	661.721	7.41	0.012	0.000	0.012	0.002	0.0	9.5	0.002	0.000	0.51	0.006	0.003	0.007	-0.003	26.6	-24.1	13.033	-5.828
02/10/2014	5869533.113	530619.693	661.717	7.89	0.004	-0.002	0.004	-0.002	333.4	-24.1	0.001	0.000	0.48	-0.008	-0.002	0.008	-0.004	194.0	-25.9	-17.211	-8.349
28/11/2014	5869533.113	530619.693	661.717	8.05	0.004	-0.002	0.004	-0.002	333.4	-24.1	0.001	0.000	0.16	0.000	0.000	0.000	0.000	90.0	0.0	0.000	0.000
01/04/2015	5869533.125	530619.693	661.702	8.39	0.016	-0.002	0.016	-0.017	352.9	-46.5	0.002	-0.002	0.34	0.012	0.000	0.012	-0.015	0.0	-51.3	35.347	-44.183
20/07/2015	5869533.113	530619.690	661.713	8.69	0.004	-0.005	0.006	-0.006	308.7	-43.1	0.001	-0.001	0.30	-0.012	-0.003	0.012	0.011	194.0	41.6	-41.072	36.525
14/10/2015	5869533.108	530619.687	661.720	8.93	-0.001	-0.008	0.008	0.001	262.9	7.1	0.001	0.000	0.24	-0.005	-0.003	0.006	0.007	211.0	50.2	24.765	29.730
22/12/2015	5869533.121	530619.698	661.735	9.11	0.012	0.003	0.012	0.016	14.0	52.3	0.001	0.002	0.19	0.013	0.011	0.017	0.015	40.2	41.4	90.145	79.402

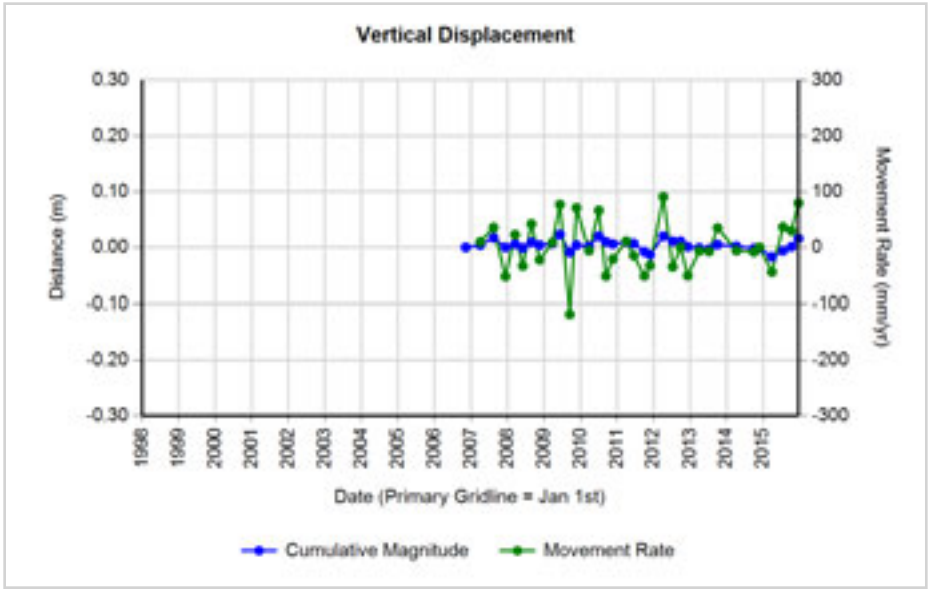
West Quesnel Land Stability Program

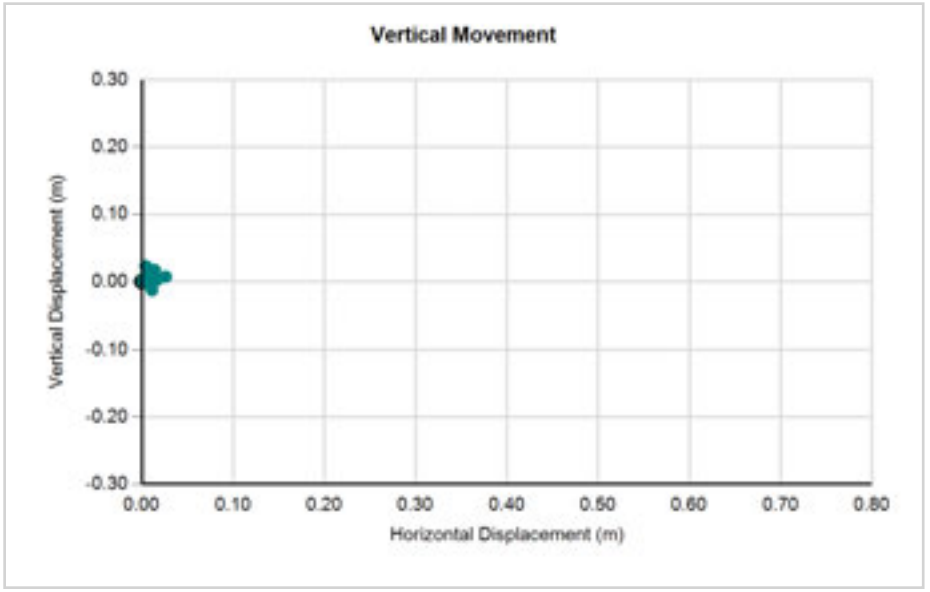
GPS Hub 06-20 (Diatomite Nine)

amec foster wheeler









West Quesnel Land Stability Program

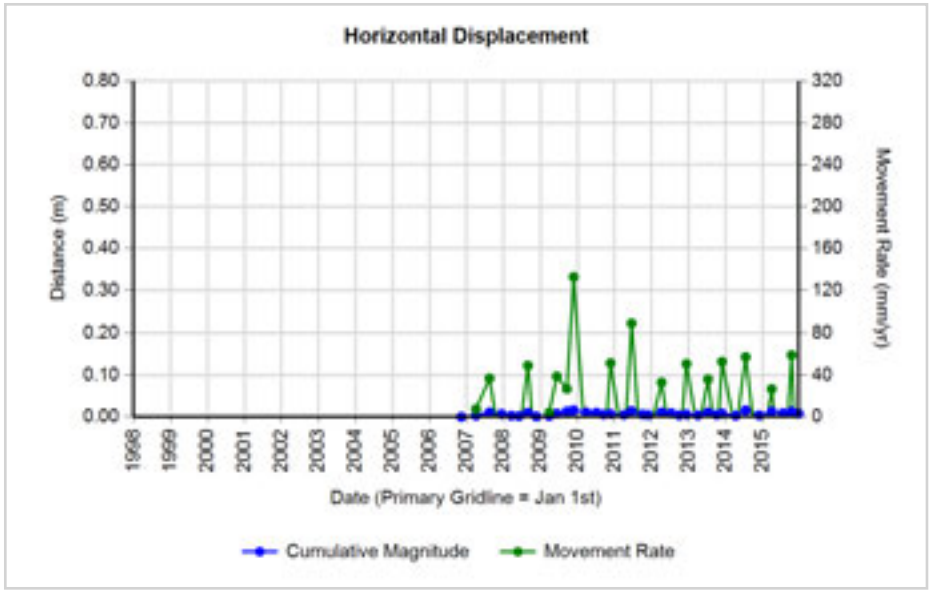
GPS Hub 06-21 (North End of Abbott Road)

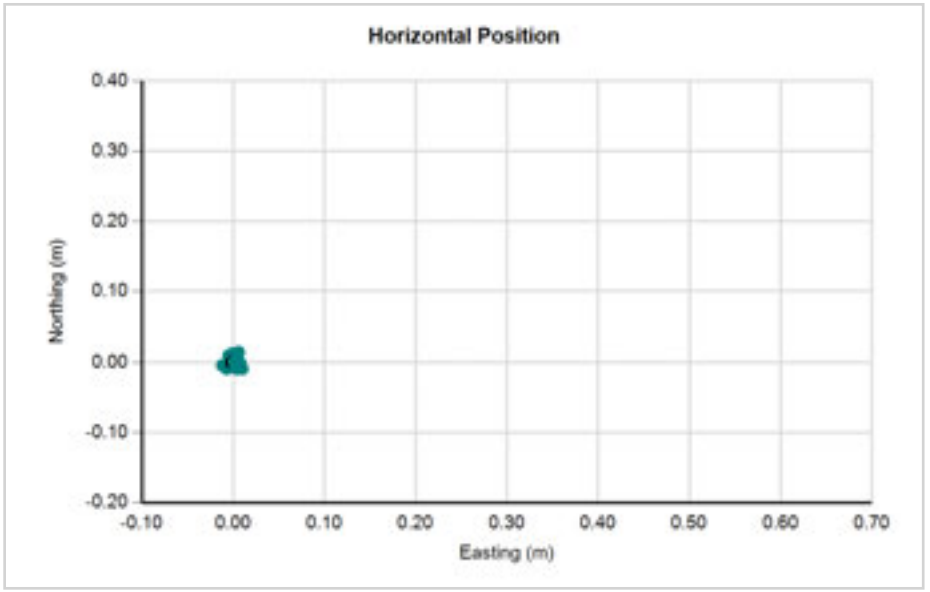
	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5869034.916	531260.448	620.924	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
05/04/2007	5869034.916	531260.451	620.919	0.40	0.000	0.003	0.003	-0.005	90.0	-59.0	0.008	-0.013	0.40	0.000	0.003	0.003	-0.005	90.0	-59.0	7.505	-12.509
16/08/2007	5869034.907	531260.441	620.938	0.76	-0.009	-0.007	0.011	0.014	217.9	50.8	0.015	0.018	0.36	-0.009	-0.010	0.013	0.019	228.0	54.7	36.947	52.179
13/12/2007	5869034.918	531260.441	620.922	1.09	0.002	-0.007	0.007	-0.002	285.9	-15.4	0.007	-0.002	0.33	0.011	0.000	0.011	-0.016	0.0	-55.5	-33.763	-49.109
18/03/2008	5869034.916	531260.445	620.920	1.35	0.000	-0.003	0.003	-0.004	270.0	-53.1	0.002	-0.003	0.26	-0.002	0.004	0.004	-0.002	116.6	-24.1	-17.015	-7.609
03/06/2008	5869034.918	531260.448	620.938	1.56	0.002	0.000	0.002	0.014	0.0	81.9	0.001	0.009	0.21	0.002	0.003	0.004	0.018	56.3	78.7	-17.103	85.383
29/08/2008	5869034.907	531260.452	620.940	1.80	-0.009	0.004	0.010	0.016	156.0	58.4	0.005	0.009	0.24	-0.011	0.004	0.012	0.002	160.0	9.7	49.140	8.397
19/11/2008	5869034.917	531260.448	620.923	2.03	0.001	0.000	0.001	-0.001	0.0	-45.0	0.000	0.000	0.22	0.010	-0.004	0.011	-0.017	338.2	-57.6	-47.974	-75.723
26/03/2009	5869034.918	531260.449	620.920	2.37	0.002	0.001	0.002	-0.004	26.6	-60.8	0.001	-0.002	0.35	0.001	0.001	0.001	-0.003	45.0	-64.8	4.067	-8.628
10/06/2009	5869034.914	531260.456	620.948	2.58	-0.002	0.008	0.008	0.024	104.0	71.0	0.003	0.009	0.21	-0.004	0.007	0.008	0.028	119.7	73.9	38.747	134.566
17/09/2009	5869034.907	531260.458	620.926	2.85	-0.009	0.010	0.013	0.002	132.0	8.5	0.005	0.001	0.27	-0.007	0.002	0.007	-0.022	164.1	-71.7	26.859	-81.167
23/11/2009	5869034.931	531260.454	620.921	3.04	0.015	0.006	0.016	-0.003	21.8	-10.5	0.005	-0.001	0.18	0.024	-0.004	0.024	-0.005	350.5	-11.6	132.641	-27.257
27/03/2010	5869034.926	531260.443	620.915	3.38	0.010	-0.005	0.011	-0.009	333.4	-38.8	0.003	-0.003	0.34	-0.005	-0.011	0.012	-0.006	245.6	-26.4	-35.591	-17.673
04/07/2010	5869034.910	531260.456	620.927	3.65	-0.006	0.008	0.010	0.003	126.9	16.7	0.003	0.001	0.27	-0.016	0.013	0.021	0.012	140.9	30.2	-76.059	44.273
13/09/2010	5869034.918	531260.454	620.926	3.84	0.002	0.006	0.006	0.002	71.6	17.5	0.002	0.001	0.19	0.008	-0.002	0.008	-0.001	346.0	-6.9	-42.422	-5.144
22/11/2010	5869034.909	531260.450	620.926	4.03	-0.007	0.002	0.007	0.002	164.1	15.4	0.002	0.000	0.19	-0.009	-0.004	0.010	0.000	204.0	0.0	51.390	0.000
04/04/2011	5869034.918	531260.443	620.924	4.40	0.002	-0.005	0.005	0.000	291.8	0.0	0.001	0.000	0.36	0.009	-0.007	0.011	-0.002	322.1	-9.9	-31.312	-5.492
18/06/2011	5869034.905	531260.456	620.944	4.60	-0.011	0.008	0.014	0.020	144.0	55.8	0.003	0.004	0.21	-0.013	0.013	0.018	0.020	135.0	47.4	89.534	97.400
03/10/2011	5869034.915	531260.442	620.929	4.90	-0.001	-0.006	0.006	0.005	260.5	39.4	0.001	0.001	0.29	0.010	-0.014	0.017	-0.015	305.5	-41.1	-58.729	-51.203
28/11/2011	5869034.918	531260.443	620.909	5.05	0.002	-0.005	0.005	-0.015	291.8	-70.3	0.001	-0.003	0.15	0.003	0.001	0.003	-0.020	18.4	-81.0	-20.625	-130.446
09/04/2012	5869034.906	531260.443	620.926	5.41	-0.010	-0.005	0.011	0.002	206.6	10.1	0.002	0.000	0.36	-0.012	0.000	0.012	0.017	180.0	54.8	32.955	46.686
12/07/2012	5869034.907	531260.450	620.939	5.67	-0.009	0.002	0.009	0.015	167.5	58.4	0.002	0.003	0.26	0.001	0.007	0.007	0.013	81.9	61.5	-27.476	50.513
29/09/2012	5869034.914	531260.452	620.956	5.89	-0.002	0.004	0.004	0.032	116.6	82.0	0.001	0.005	0.22	0.007	0.002	0.007	0.017	15.9	66.8	-33.659	78.598
10/12/2012	5869034.914	531260.442	620.919	6.08	-0.002	-0.006	0.006	-0.005	251.6	-38.3	0.001	-0.001	0.20	0.000	-0.010	0.010	-0.037	270.0	-74.9	50.729	-187.698
03/04/2013	5869034.918	531260.444	620.920	6.40	0.002	-0.004	0.004	-0.004	296.6	-41.8	0.001	-0.001	0.31	0.004	0.002	0.004	0.001	26.6	12.6	-14.328	3.204
12/07/2013	5869034.909	531260.440	620.923	6.67	-0.007	-0.008	0.011	-0.001	228.8	-5.4	0.002	0.000	0.27	-0.009	-0.004	0.010	0.003	204.0	16.9	35.973	10.958
04/10/2013	5869034.911	531260.446	620.956	6.90	-0.005	-0.002	0.005	0.032	201.8	80.4	0.001	0.005	0.23	0.002	0.006	0.006	0.033	71.6	79.2	-27.501	143.491
27/11/2013	5869034.916	531260.440	620.917	7.05	0.000	-0.008	0.008	-0.007	270.0	-41.2	0.001	-0.001	0.15	0.005	-0.006	0.008	-0.039	309.8	-78.7	52.828	-263.792
10/04/2014	5869034.917	531260.445	620.921	7.41	0.001	-0.003	0.003	-0.003	288.4	-43.5	0.000	0.000	0.37	0.001	0.005	0.005	0.004	78.7	38.1	-13.899	10.903
18/07/2014	5869034.902	531260.441	620.931	7.69	-0.014	-0.007	0.016	0.007	206.6	24.1	0.002	0.001	0.27	-0.015	-0.004	0.016	0.010	194.9	32.8	57.275	36.894
28/11/2014	5869034.920	531260.446	620.898	8.05	0.004	-0.002	0.004	-0.026	333.4	-80.2	0.001	-0.003	0.36	0.018	0.005	0.019	-0.033	15.5	-60.5	-51.304	-90.626
01/04/2015	5869034.929	531260.447	620.906	8.39	0.013	-0.001	0.013	-0.018	355.6	-54.1	0.002	-0.002	0.34	0.009	0.001	0.009	0.008	6.3	41.5	26.673	23.565
20/07/2015	5869034.907	531260.449	620.929	8.69	-0.009	0.001	0.009	0.005	173.7	28.9	0.001	0.001	0.30	-0.022	0.002	0.022	0.023	174.8	46.2	-73.351	76.370
14/10/2015	5869034.912	531260.436	620.917	8.93	-0.004	-0.012	0.013	-0.007	251.6	-29.0	0.001	-0.001	0.24	0.005	-0.013	0.014	-0.012	291.0	-40.7	59.155	-50.965
22/12/2015	5869034.922	531260.453	620.929	9.11	0.006	0.005	0.008	0.005	39.8	32.6	0.001	0.001	0.19	0.010	0.017	0.020	0.012	59.5	31.3	-104.404	63.522

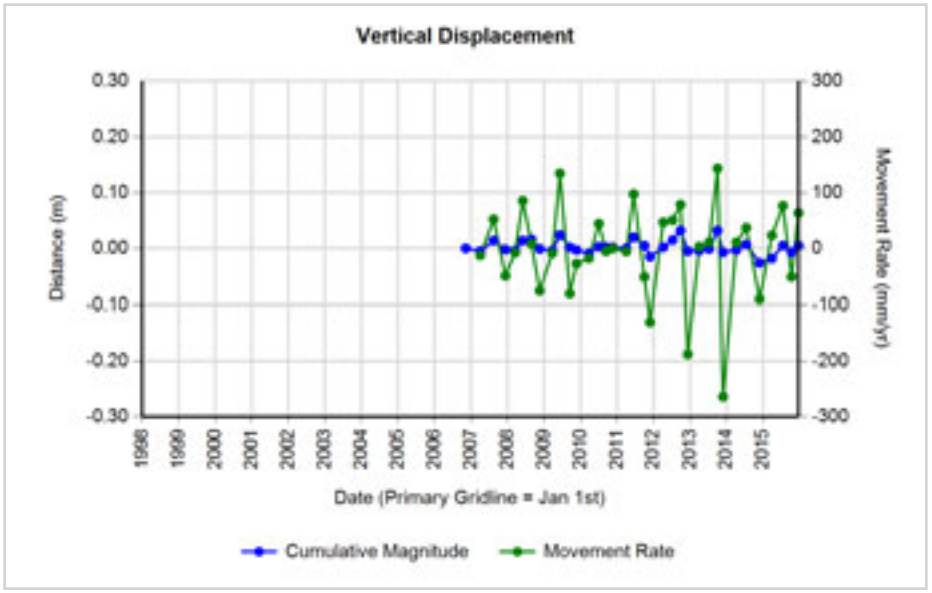
West Quesnel Land Stability Program

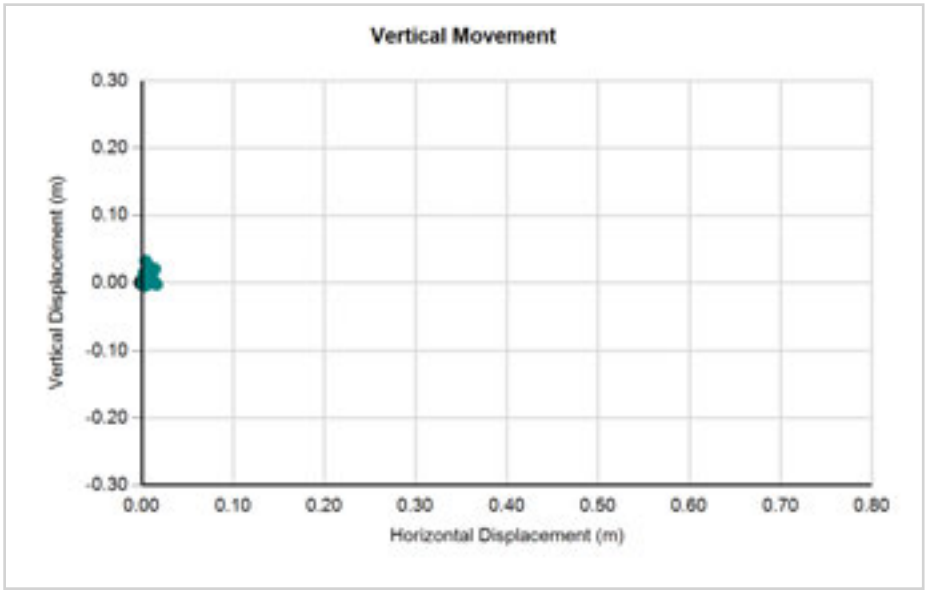
GPS Hub 06-21 (North End of Abbott Road)

amec foster wheeler









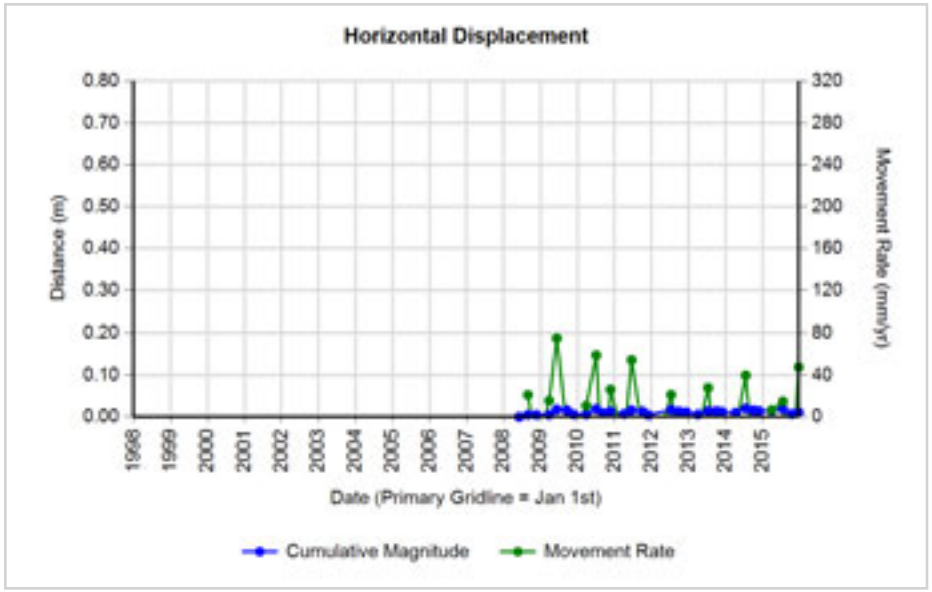
GPS Hub 08-01 (Northwest End of Findaly Road)

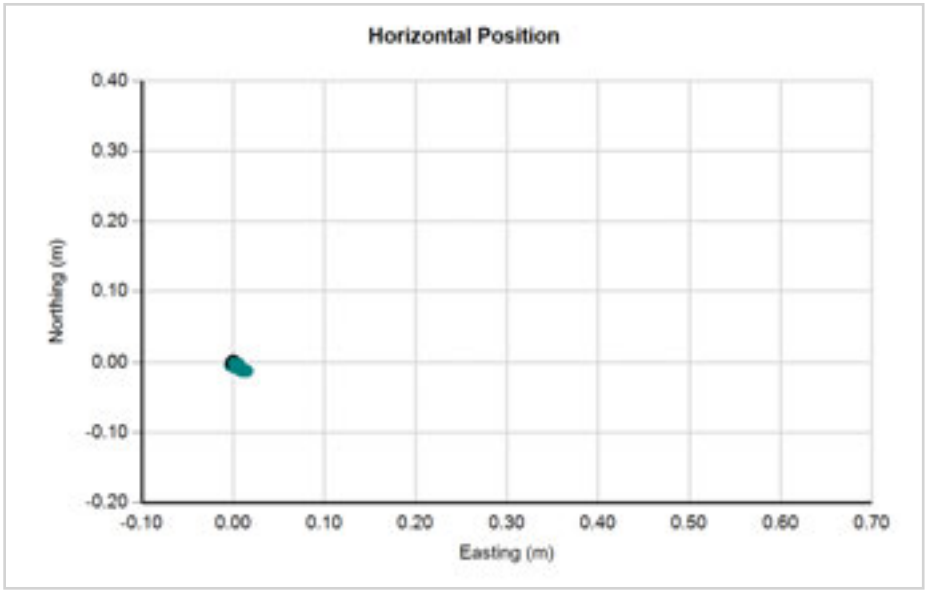
	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
03/06/2008	5870076.380	531129.361	595.426	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
29/08/2008	5870076.376	531129.358	595.411	0.24	-0.004	-0.003	0.005	-0.015	216.9	-71.6	0.021	-0.063	0.24	-0.004	-0.003	0.005	-0.015	216.9	-71.6	20.991	-62.974
19/11/2008	5870076.377	531129.365	595.407	0.46	-0.003	0.004	0.005	-0.019	126.9	-75.3	0.011	-0.041	0.22	0.001	0.007	0.007	-0.004	81.9	-29.5	-31.496	-17.817
26/03/2009	5870076.375	531129.360	595.419	0.81	-0.005	-0.001	0.005	-0.007	191.3	-53.9	0.006	-0.009	0.35	-0.002	-0.005	0.005	0.012	248.2	65.8	15.488	34.512
10/06/2009	5870076.368	531129.374	595.425	1.02	-0.012	0.013	0.018	-0.001	132.7	-3.2	0.017	-0.001	0.21	-0.007	0.014	0.016	0.006	116.6	21.0	75.225	28.836
17/09/2009	5870076.368	531129.371	595.414	1.29	-0.012	0.010	0.016	-0.012	140.2	-37.5	0.012	-0.009	0.27	0.000	-0.003	0.003	-0.011	270.0	-74.7	-11.068	-40.583
23/11/2009	5870076.375	531129.365	595.409	1.47	-0.005	0.004	0.006	-0.017	141.3	-69.4	0.004	-0.012	0.18	0.007	-0.006	0.009	-0.005	319.4	-28.5	-50.260	-27.257
27/03/2010	5870076.378	531129.367	595.413	1.81	-0.002	0.006	0.006	-0.013	108.4	-64.1	0.003	-0.007	0.34	0.003	0.002	0.004	0.004	33.7	48.0	10.620	11.782
04/07/2010	5870076.362	531129.367	595.411	2.08	-0.018	0.006	0.019	-0.015	161.6	-38.3	0.009	-0.007	0.27	-0.016	0.000	0.016	-0.002	180.0	-7.1	59.030	-7.379
13/09/2010	5870076.375	531129.368	595.418	2.28	-0.005	0.007	0.009	-0.008	125.5	-42.9	0.004	-0.004	0.19	0.013	0.001	0.013	0.007	4.4	28.2	-67.074	36.011
22/11/2010	5870076.371	531129.371	595.402	2.47	-0.009	0.010	0.013	-0.024	132.0	-60.7	0.005	-0.010	0.19	-0.004	0.003	0.005	-0.016	143.1	-72.6	26.089	-83.486
04/04/2011	5870076.373	531129.363	595.409	2.83	-0.007	0.002	0.007	-0.017	164.1	-66.8	0.003	-0.006	0.36	0.002	-0.008	0.008	0.007	284.0	40.3	-22.646	19.224
18/06/2011	5870076.371	531129.374	595.419	3.04	-0.009	0.013	0.016	-0.007	124.7	-23.9	0.005	-0.002	0.21	-0.002	0.011	0.011	0.010	100.3	41.8	54.448	48.700
03/10/2011	5870076.370	531129.370	595.418	3.33	-0.010	0.009	0.013	-0.008	138.0	-30.7	0.004	-0.002	0.29	-0.001	-0.004	0.004	-0.001	256.0	-13.6	-14.074	-3.414
28/11/2011	5870076.378	531129.366	595.407	3.49	-0.002	0.005	0.005	-0.019	111.8	-74.2	0.002	-0.005	0.15	0.008	-0.004	0.009	-0.011	333.4	-50.9	-58.337	-71.746
12/07/2012	5870076.365	531129.368	595.422	4.11	-0.015	0.007	0.017	-0.004	155.0	-13.6	0.004	-0.001	0.62	-0.013	0.002	0.013	0.015	171.3	48.8	21.163	24.135
29/09/2012	5870076.371	531129.371	595.415	4.32	-0.009	0.010	0.013	-0.011	132.0	-39.3	0.003	-0.003	0.22	0.006	0.003	0.007	-0.007	26.6	-46.2	-31.015	-32.364
10/12/2012	5870076.372	531129.368	595.404	4.52	-0.008	0.007	0.011	-0.022	138.8	-64.2	0.002	-0.005	0.20	0.001	-0.003	0.003	-0.011	288.4	-74.0	-16.042	-55.802
03/04/2013	5870076.376	531129.366	595.392	4.83	-0.004	0.005	0.006	-0.034	128.7	-79.3	0.001	-0.007	0.31	0.004	-0.002	0.004	-0.012	333.4	-69.6	-14.328	-38.447
12/07/2013	5870076.369	531129.369	595.424	5.11	-0.011	0.008	0.014	-0.002	144.0	-8.4	0.003	0.000	0.27	-0.007	0.003	0.008	0.032	156.8	76.6	27.817	116.880
04/10/2013	5870076.366	531129.361	595.420	5.34	-0.014	0.000	0.014	-0.006	180.0	-23.2	0.003	-0.001	0.23	-0.003	-0.008	0.009	-0.004	249.4	-25.1	-37.151	-17.393
27/11/2013	5870076.371	531129.369	595.398	5.48	-0.009	0.008	0.012	-0.028	138.4	-66.7	0.002	-0.005	0.15	0.005	0.008	0.009	-0.022	58.0	-66.8	-63.810	-148.806
10/04/2014	5870076.375	531129.370	595.397	5.85	-0.005	0.009	0.010	-0.029	119.1	-70.5	0.002	-0.005	0.37	0.004	0.001	0.004	-0.001	14.0	-13.6	-11.239	-2.726
18/07/2014	5870076.365	531129.374	595.418	6.12	-0.015	0.013	0.020	-0.008	139.1	-22.0	0.003	-0.001	0.27	-0.010	0.004	0.011	0.021	158.2	62.8	39.736	77.477
02/10/2014	5870076.364	531129.365	595.402	6.33	-0.016	0.004	0.016	-0.024	166.0	-55.5	0.003	-0.004	0.21	-0.001	-0.009	0.009	-0.016	263.7	-60.5	-43.519	-76.895
28/11/2014	5870076.369	531129.370	595.392	6.49	-0.011	0.009	0.014	-0.034	140.7	-67.3	0.002	-0.005	0.16	0.005	0.005	0.007	-0.010	45.0	-54.7	-45.311	-64.079
01/04/2015	5870076.370	531129.372	595.396	6.83	-0.010	0.011	0.015	-0.030	132.3	-63.6	0.002	-0.004	0.34	0.001	0.002	0.002	0.004	63.4	60.8	6.586	11.782
20/07/2015	5870076.368	531129.376	595.420	7.13	-0.012	0.015	0.019	-0.006	128.7	-17.3	0.003	-0.001	0.30	-0.002	0.004	0.004	0.024	116.6	79.4	14.850	79.691
14/10/2015	5870076.373	531129.361	595.405	7.36	-0.007	0.000	0.007	-0.021	180.0	-71.6	0.001	-0.003	0.24	0.005	-0.015	0.016	-0.015	288.4	-43.5	-67.152	-63.706
22/12/2015	5870076.373	531129.370	595.413	7.55	-0.007	0.009	0.011	-0.013	127.9	-48.7	0.002	-0.002	0.19	0.000	0.009	0.009	0.008	90.0	41.6	47.641	42.348

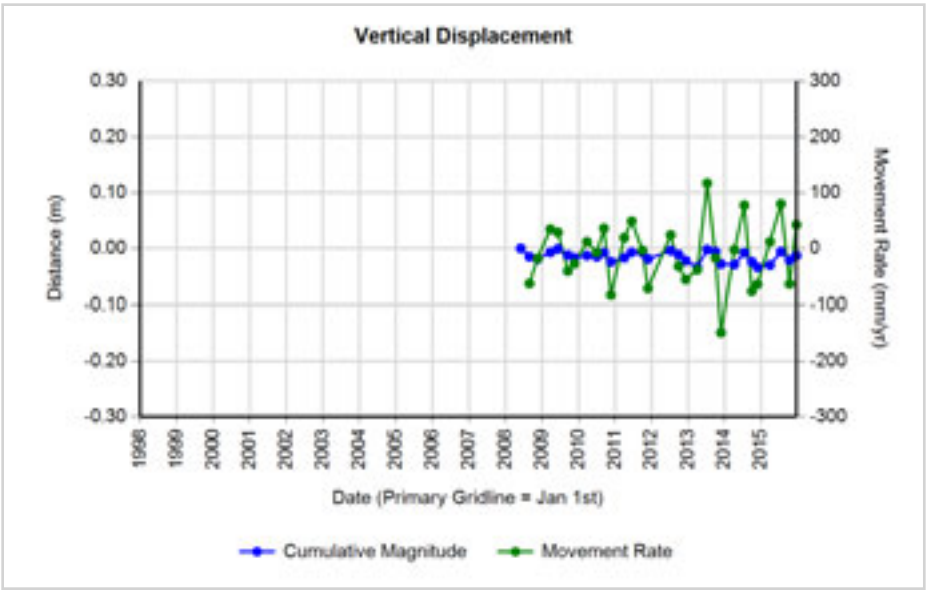
West Quesnel Land Stability Program

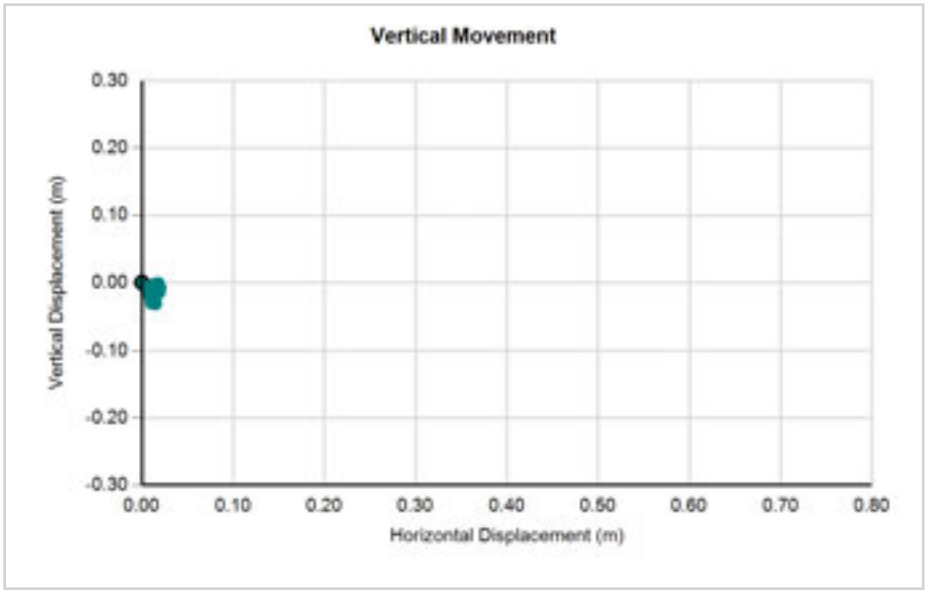
GPS Hub 08-01 (Northwest End of Findaly Road)

amec foster wheeler









West Quesnel Land Stability Program

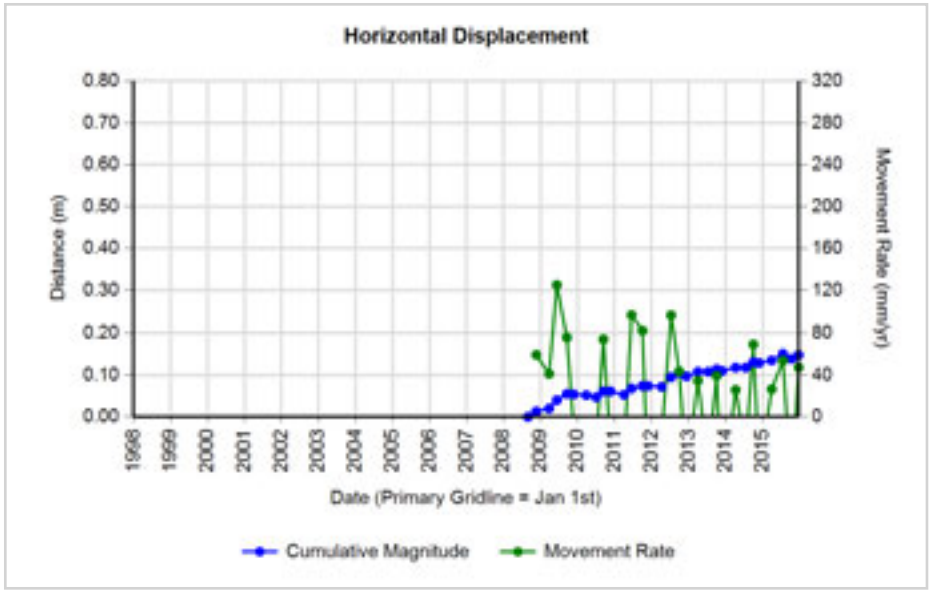
GPS Hub 08-02 (West of Picard Place)

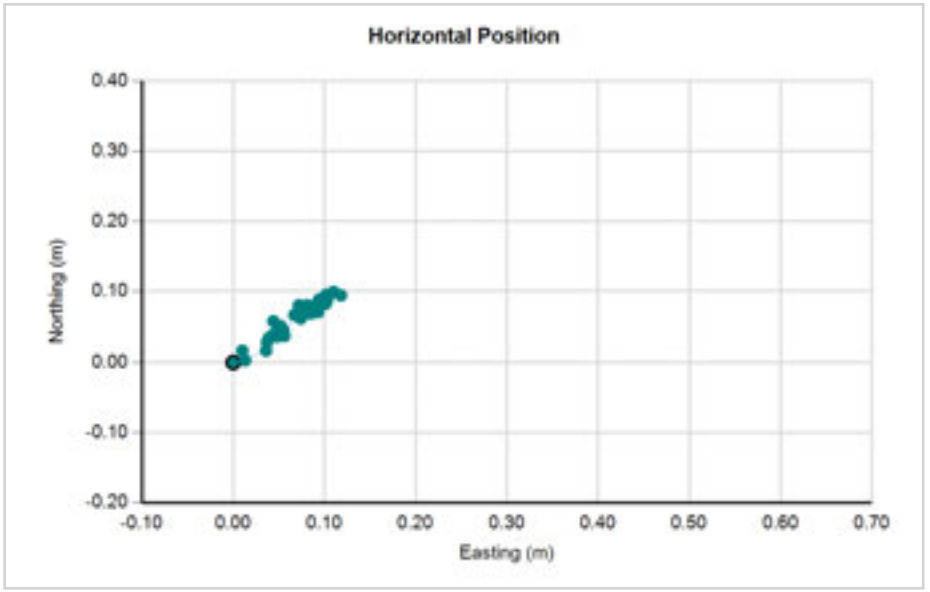
	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
29/08/2008	5870332.611	531627.128	557.121	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
19/11/2008	5870332.614	531627.141	557.102	0.22	0.003	0.013	0.013	-0.019	77.0	-54.9	0.059	-0.085	0.22	0.003	0.013	0.013	-0.019	77.0	-54.9	59.427	-84.631
26/03/2009	5870332.628	531627.138	557.112	0.57	0.017	0.010	0.020	-0.009	30.5	-24.5	0.034	-0.016	0.35	0.014	-0.003	0.014	0.010	347.9	34.9	41.178	28.760
10/06/2009	5870332.628	531627.164	557.119	0.78	0.017	0.036	0.040	-0.002	64.7	-2.9	0.051	-0.003	0.21	0.000	0.026	0.026	0.007	90.0	15.1	124.954	33.641
17/09/2009	5870332.648	531627.169	557.108	1.05	0.037	0.041	0.055	-0.013	47.9	-13.2	0.053	-0.012	0.27	0.020	0.005	0.021	-0.011	14.0	-28.1	76.059	-40.583
23/11/2009	5870332.646	531627.169	557.090	1.23	0.035	0.041	0.054	-0.031	49.5	-29.9	0.044	-0.025	0.18	-0.002	0.000	0.002	-0.018	180.0	-83.7	-10.903	-98.127
27/03/2010	5870332.646	531627.167	557.096	1.57	0.035	0.039	0.052	-0.025	48.1	-25.5	0.033	-0.016	0.34	0.000	-0.002	0.002	0.006	270.0	71.6	-5.891	17.673
04/07/2010	5870332.640	531627.165	557.113	1.85	0.029	0.037	0.047	-0.008	51.9	-9.7	0.025	-0.004	0.27	-0.006	-0.002	0.006	0.017	198.4	69.6	-23.334	62.720
13/09/2010	5870332.652	531627.173	557.103	2.04	0.041	0.045	0.061	-0.018	47.7	-16.5	0.030	-0.009	0.19	0.012	0.008	0.014	-0.010	33.7	-34.7	74.193	-51.444
22/11/2010	5870332.648	531627.176	557.094	2.23	0.037	0.048	0.061	-0.027	52.4	-24.0	0.027	-0.012	0.19	-0.004	0.003	0.005	-0.009	143.1	-60.9	-26.089	-46.961
04/04/2011	5870332.650	531627.164	557.095	2.60	0.039	0.036	0.053	-0.026	42.7	-26.1	0.020	-0.010	0.36	0.002	-0.012	0.012	0.001	279.5	4.7	-33.409	2.746
18/06/2011	5870332.649	531627.184	557.104	2.80	0.038	0.056	0.068	-0.017	55.8	-14.1	0.024	-0.006	0.21	-0.001	0.020	0.020	0.009	92.9	24.2	97.522	43.830
03/10/2011	5870332.670	531627.172	557.113	3.09	0.059	0.044	0.074	-0.008	36.7	-6.2	0.024	-0.003	0.29	0.021	-0.012	0.024	0.009	330.3	20.4	82.563	30.722
28/11/2011	5870332.663	531627.180	557.102	3.25	0.052	0.052	0.074	-0.019	45.0	-14.5	0.023	-0.006	0.15	-0.007	0.008	0.011	-0.011	131.2	-46.0	-69.333	-71.746
09/04/2012	5870332.657	531627.183	557.094	3.61	0.046	0.055	0.072	-0.027	50.1	-20.6	0.020	-0.007	0.36	-0.006	0.003	0.007	-0.008	153.4	-50.0	-18.422	-21.970
12/07/2012	5870332.679	531627.195	557.096	3.87	0.068	0.067	0.095	-0.025	44.6	-14.7	0.025	-0.006	0.26	0.022	0.012	0.025	0.002	28.6	4.6	97.374	7.771
29/09/2012	5870332.684	531627.203	557.083	4.08	0.073	0.075	0.105	-0.038	45.8	-20.0	0.026	-0.009	0.22	0.005	0.008	0.009	-0.013	58.0	-54.0	43.617	-60.104
10/12/2012	5870332.674	531627.202	557.082	4.28	0.063	0.074	0.097	-0.039	49.6	-21.9	0.023	-0.009	0.20	-0.010	-0.001	0.010	-0.001	185.7	-5.7	-50.982	-5.073
03/04/2013	5870332.683	531627.208	557.079	4.59	0.072	0.080	0.108	-0.042	48.0	-21.3	0.023	-0.009	0.31	0.009	0.006	0.011	-0.003	33.7	-15.5	34.656	-9.612
12/07/2013	5870332.691	531627.200	557.097	4.87	0.080	0.072	0.108	-0.024	42.0	-12.6	0.022	-0.005	0.27	0.008	-0.008	0.011	0.018	315.0	57.8	-41.323	65.745
04/10/2013	5870332.691	531627.209	557.107	5.10	0.080	0.081	0.114	-0.014	45.4	-7.0	0.022	-0.003	0.23	0.000	0.009	0.009	0.010	90.0	48.0	39.134	43.482
27/11/2013	5870332.681	531627.213	557.069	5.25	0.070	0.085	0.110	-0.052	50.5	-25.3	0.021	-0.010	0.15	-0.010	0.004	0.011	-0.038	158.2	-74.2	-72.849	-257.028
10/04/2014	5870332.690	531627.216	557.077	5.61	0.079	0.088	0.118	-0.044	48.1	-20.4	0.021	-0.008	0.37	0.009	0.003	0.009	0.008	18.4	40.1	25.859	21.806
18/07/2014	5870332.683	531627.221	557.077	5.88	0.072	0.093	0.118	-0.044	52.3	-20.5	0.020	-0.007	0.27	-0.007	0.005	0.009	0.000	144.5	0.0	-31.737	0.000
02/10/2014	5870332.695	531627.229	557.082	6.09	0.084	0.101	0.131	-0.039	50.3	-16.5	0.022	-0.006	0.21	0.012	0.008	0.014	0.005	33.7	19.1	69.312	24.030
28/11/2014	5870332.699	531627.222	557.077	6.25	0.088	0.094	0.129	-0.044	46.9	-18.9	0.021	-0.007	0.16	0.004	-0.007	0.008	-0.005	299.7	-31.8	-51.662	-32.039
01/04/2015	5870332.699	531627.231	557.073	6.59	0.088	0.103	0.135	-0.048	49.5	-19.5	0.021	-0.007	0.34	0.000	0.009	0.009	-0.004	90.0	-24.0	26.510	-11.782
20/07/2015	5870332.705	531627.246	557.078	6.89	0.094	0.118	0.151	-0.043	51.5	-15.9	0.022	-0.006	0.30	0.006	0.015	0.016	0.005	68.2	17.2	53.644	16.602
14/10/2015	5870332.706	531627.230	557.070	7.12	0.095	0.102	0.139	-0.051	47.0	-20.1	0.020	-0.007	0.24	0.001	-0.016	0.016	-0.008	273.6	-26.5	-68.086	-33.977
22/12/2015	5870332.710	531627.238	557.068	7.31	0.099	0.110	0.148	-0.053	48.0	-19.7	0.020	-0.007	0.19	0.004	0.008	0.009	-0.002	63.4	-12.6	47.346	-10.587

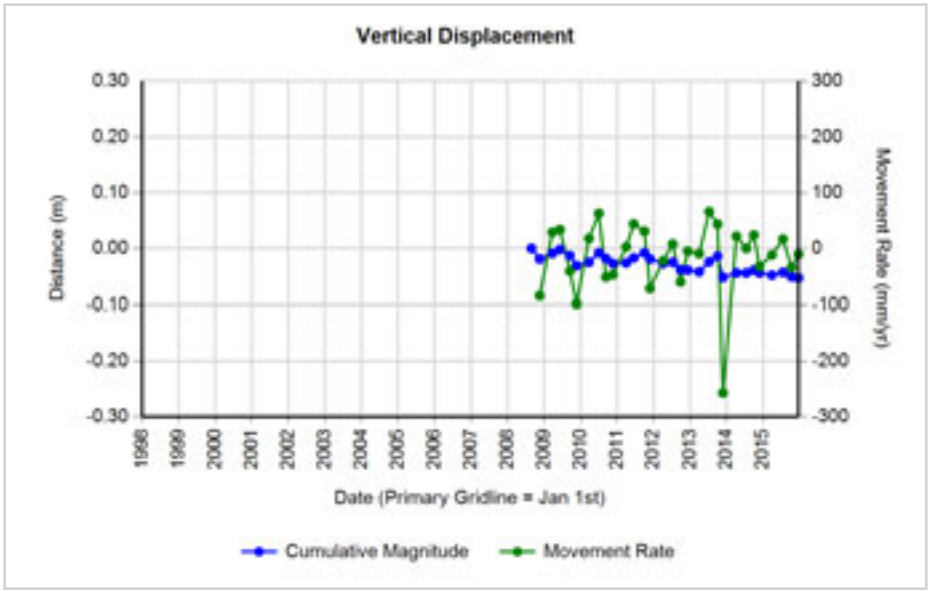
West Quesnel Land Stability Program

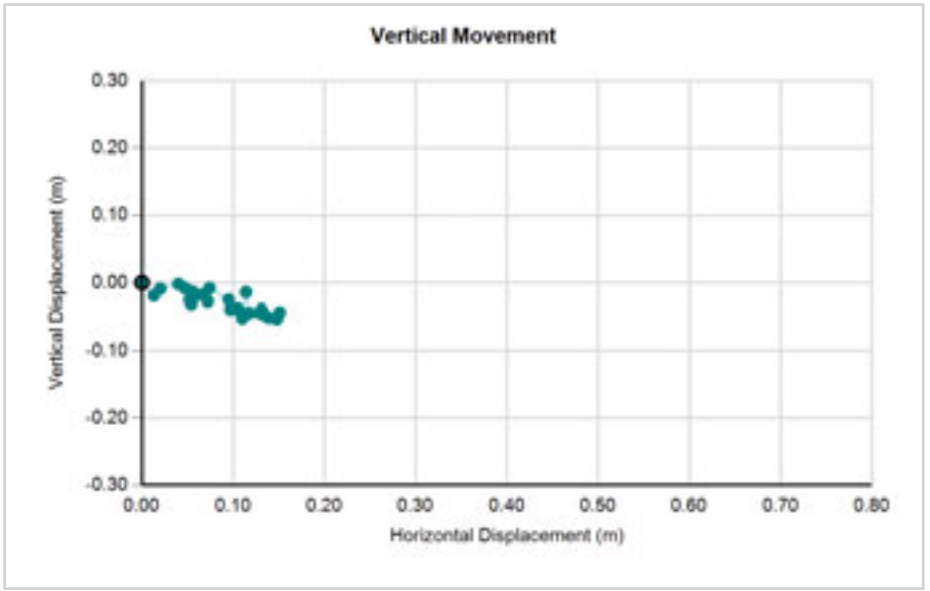
GPS Hub 08-02 (West of Picard Place)

amec foster wheeler









West Quesnel Land Stability Program

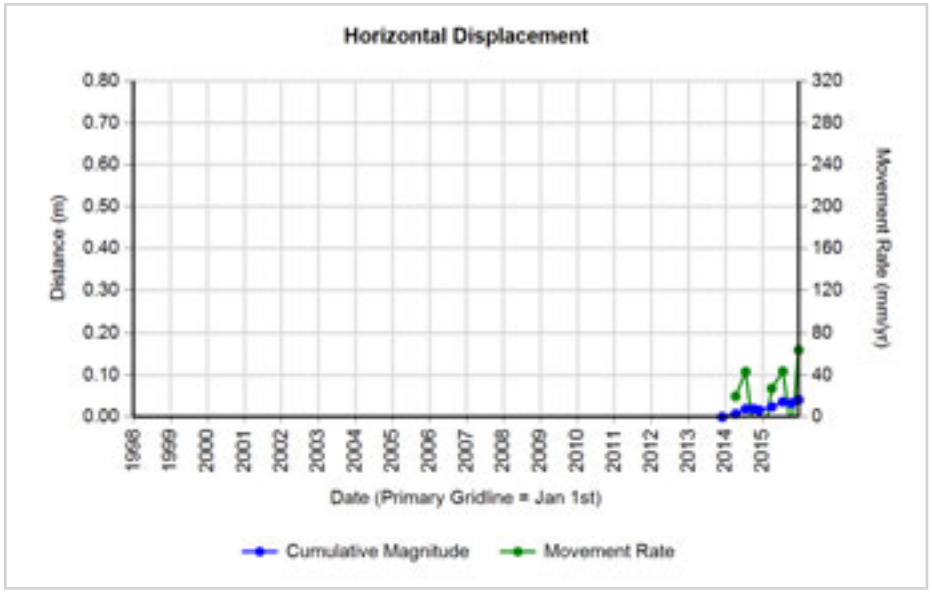
GPS Hub 13-02 (South Side of Picard Avenue)

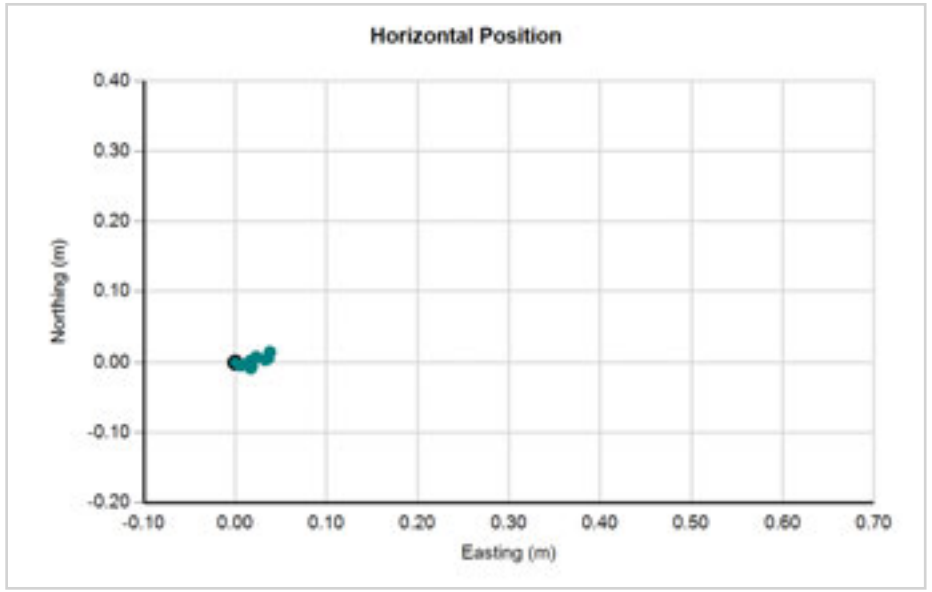
	Surveyed Position			Total Change in Position							Overall Rates(m/yr)		Incremental Change in Position							Incremental Rates	
Date	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
27/11/2013	5870326.711	531909.535	537.074	0.00	0.000	0.000	0.000	0.000	0.0	0.0			0.00	0.000	0.000	0.000	0.000	0.0	0.0		
10/04/2014	5870326.707	531909.541	537.070	0.37	-0.004	0.006	0.007	-0.004	123.7	-29.0	0.020	-0.011	0.37	-0.004	0.006	0.007	-0.004	123.7	-29.0	19.656	-10.903
18/07/2014	5870326.703	531909.552	537.072	0.64	-0.008	0.017	0.019	-0.002	115.2	-6.1	0.029	-0.003	0.27	-0.004	0.011	0.012	0.002	110.0	9.7	43.183	7.379
02/10/2014	5870326.706	531909.553	537.059	0.85	-0.005	0.018	0.019	-0.015	105.5	-38.8	0.022	-0.018	0.21	0.003	0.001	0.003	-0.013	18.4	-76.3	-15.198	-62.477
28/11/2014	5870326.713	531909.551	537.062	1.00	0.002	0.016	0.016	-0.012	82.9	-36.7	0.016	-0.012	0.16	0.007	-0.002	0.007	0.003	344.1	22.4	-46.650	19.224
01/04/2015	5870326.719	531909.558	537.066	1.34	0.008	0.023	0.024	-0.008	70.8	-18.2	0.018	-0.006	0.34	0.006	0.007	0.009	0.004	49.4	23.5	27.157	11.782
20/07/2015	5870326.717	531909.571	537.064	1.64	0.006	0.036	0.036	-0.010	80.5	-15.3	0.022	-0.006	0.30	-0.002	0.013	0.013	-0.002	98.7	-8.6	43.674	-6.641
14/10/2015	5870326.715	531909.568	537.062	1.88	0.004	0.033	0.033	-0.012	83.1	-19.8	0.018	-0.006	0.24	-0.002	-0.003	0.004	-0.002	236.3	-29.0	-15.313	-8.494
22/12/2015	5870326.726	531909.573	537.068	2.07	0.015	0.038	0.041	-0.006	68.5	-8.4	0.020	-0.003	0.19	0.011	0.005	0.012	0.006	24.4	26.4	63.961	31.761

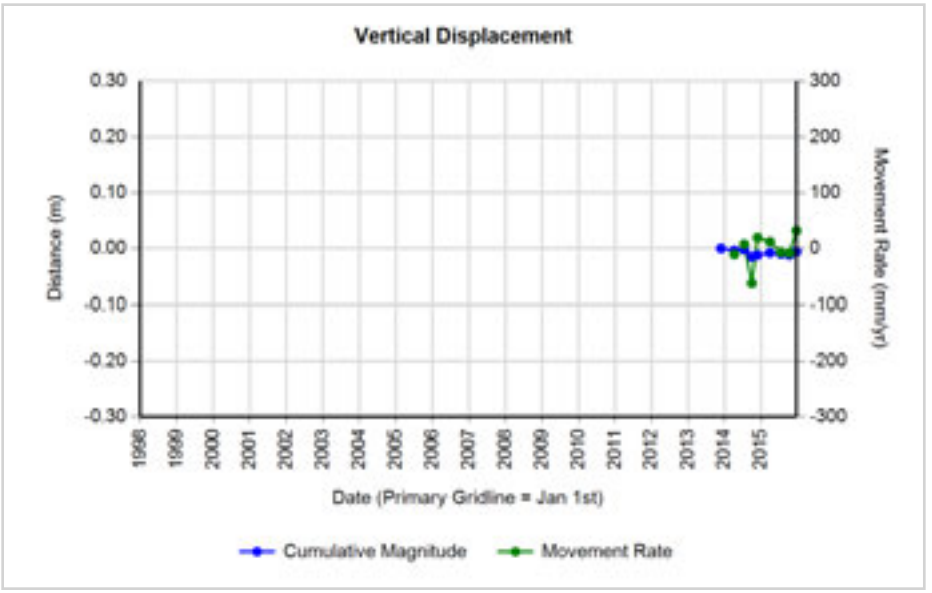
West Quesnel Land Stability Program

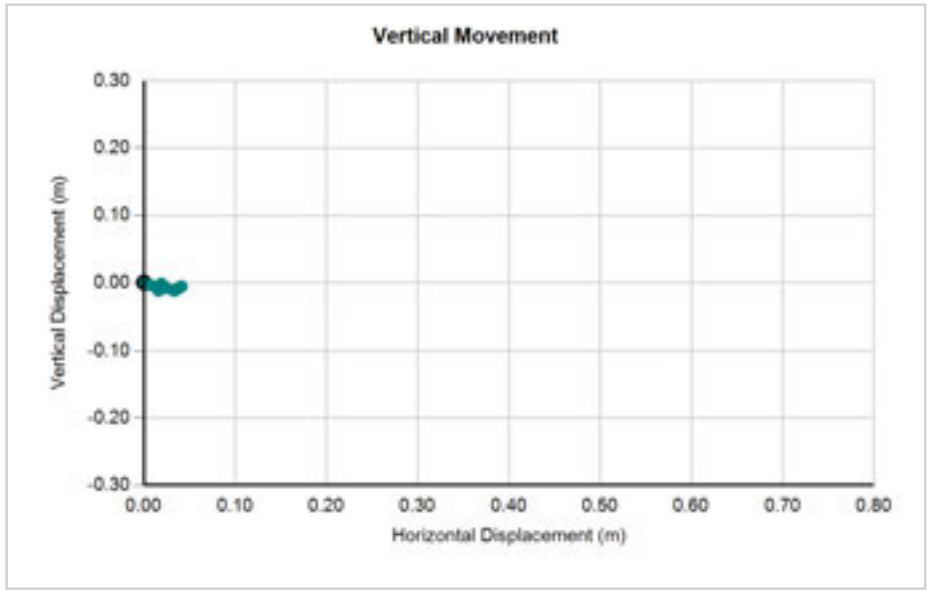
GPS Hub 13-02 (South Side of Picard Avenue)

amec foster wheeler









Appendix B

Slope Inclinometers – Summary Table and Trend Plots

West Quesnel Land Stability Program

amec foster wheeler

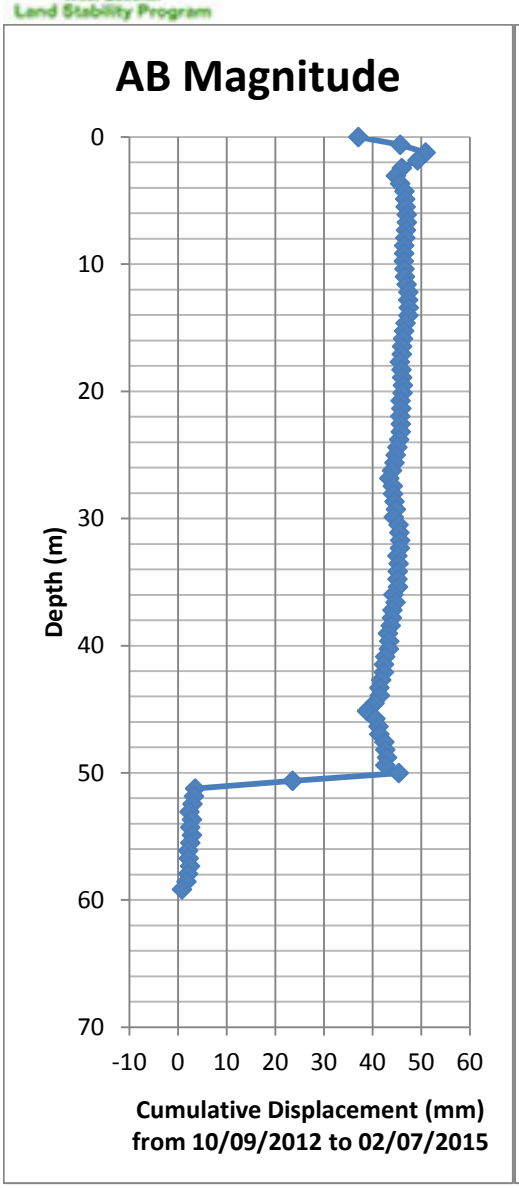
Appendix B - Slope Inclinometer Status

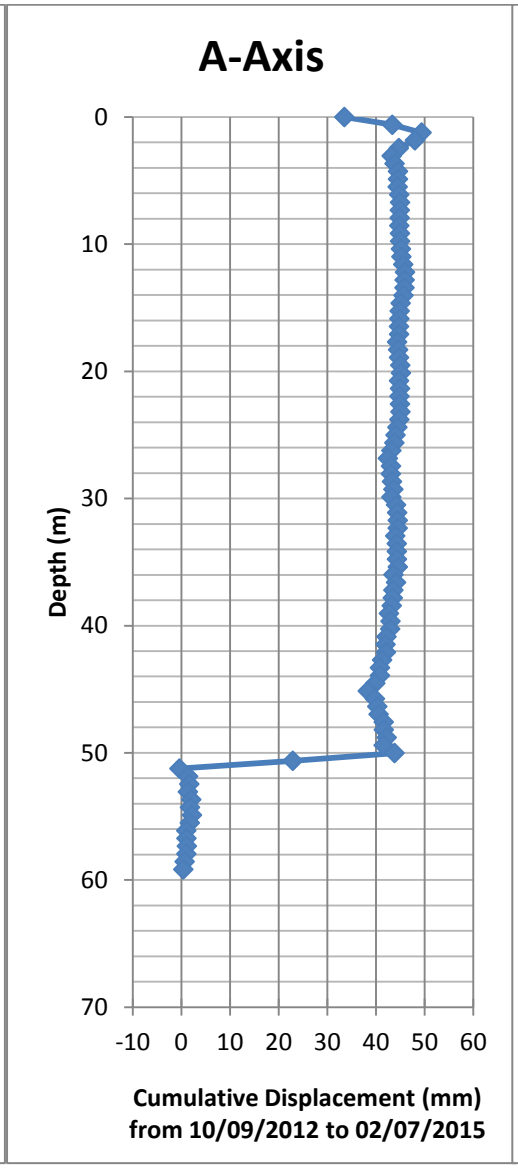
SI	Location	Initial Reading Date	Status	Max Displacement To Date
SI1	Avery Lane	November 2000	Blocked at 40m bgs between Apr-June 2008	23mm*
SI2	Avery Lane	November 2000	Blocked at 41m bgs between Nov. 04-Apr. 05	86mm*
SI3	Abbott Dr. & Bettcher St.	November 2000	Blocked at 39m bgs between May-Nov. 2002	61mm*
SI4	Voyager School	November 2000	Blocked at 51m bgs between May-Nov. 2002	59mm*
SI5	Abbott Dr. (near Flamingo)	October 2000	Blocked at 35m bgs between Dec. 03-June 04	13mm*
SI6	Dixon St.	November 2000	Blocked at 78m bgs between Nov 01-May 02	83mm*
SI7	Pierce Cres.	November 2000	Blocked at 68m bgs between May-Nov. 2002	73mm*
SI8	Pinchbeck St.	June 2005	Active - no movement (SI not deep enough)	0mm
SI9	Patchett St.	April 2005	Blocked at 65m bgs between Nov. 08-Apr. 09	110mm*
SI10	Dawson St.	April 2005	Blocked at 21m bgs between June 05-May 06	12mm*
SI11	Picard Ave.	May 2005	Active - no movement (SI not deep enough)	0mm
SI12	Panagrot Ave. (east end)	April 2005	Blocked at 63m bgs between Mar.-May 2007	47mm*
SI13	Lewis Dr. (at Sikh Temple)	April 2005	Blocked at 13m bgs between June-Sept. 2008	72mm*
SI14	Findlay Rd.	November 2006	Blocked at 20m bgs between Nov. 08-Apr. 09	62mm*
SI15	Panagrot Ave. (west end)	November 2006	Blocked at 18m bgs between Apr.-June 09	56mm*
SI16	Voyager School	September 2012	Active - with real time monitoring (47.5m bgs)	44.6mm
SI17	Uplands Park	October 2012	Active - Technical issues (65.0m bgs)	37.3mm**

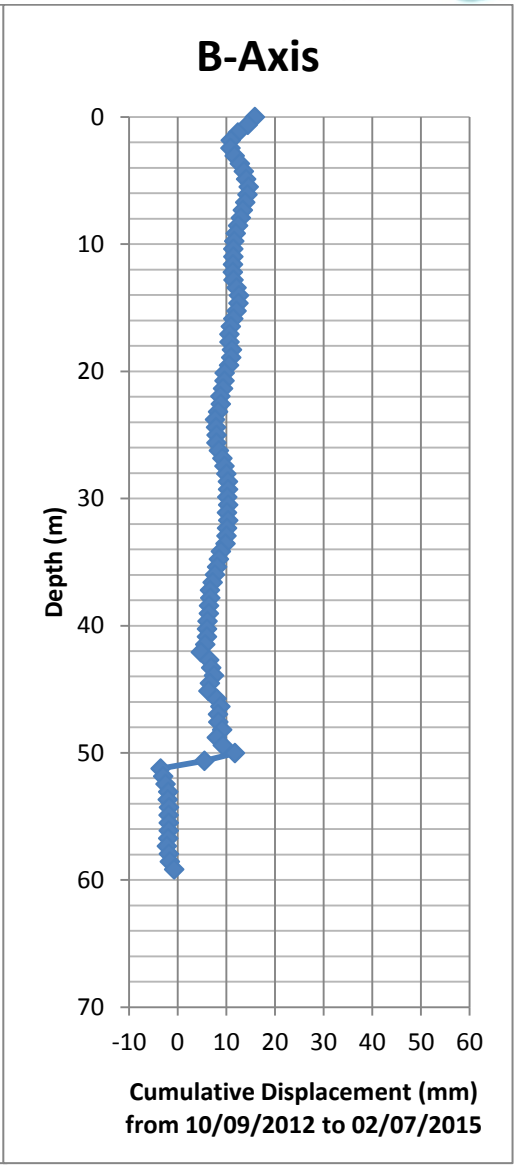
* Displacements are reported from last reading before SI blocked

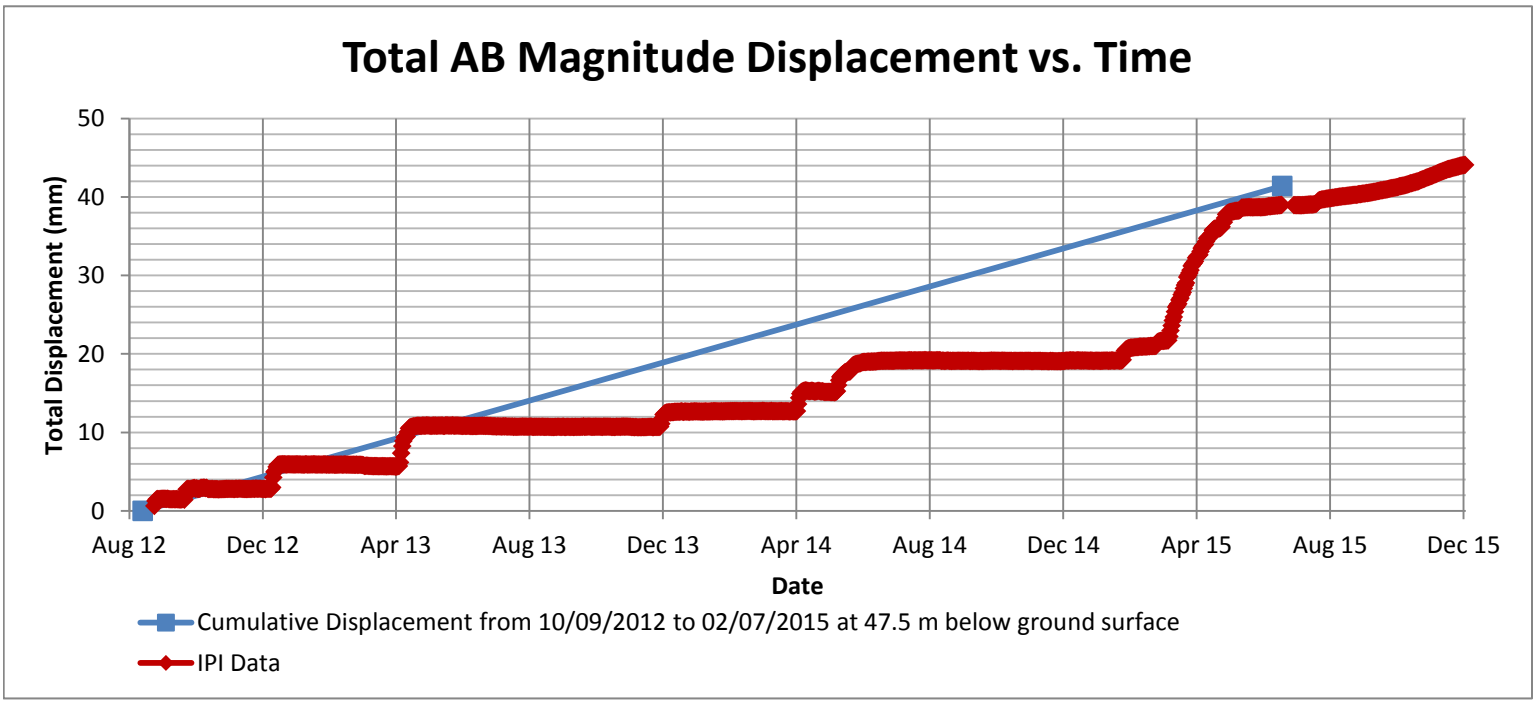
**Movement recorded up to April 9, 2015 before instrument malfunctioned and was sent for repairs

SI16

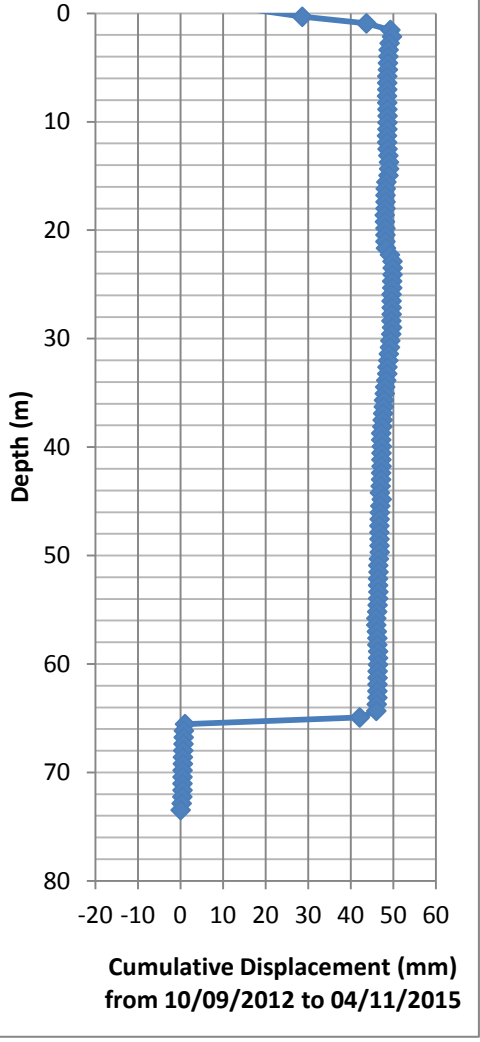

AB Magnitude
Depth (m)
0
10
20
30
40
50
60
70
-10 0 10 20 30 40 50 60
Cumulative Displacement (mm)
from 10/09/2012 to 02/07/2015

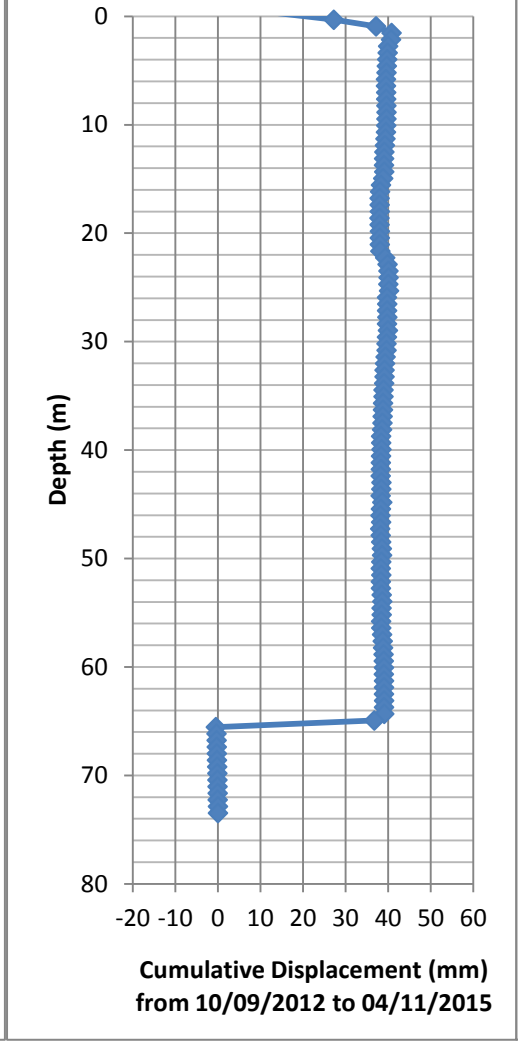

A-Axis
Depth (m)
0
10
20
30
40
50
60
70
-10 0 10 20 30 40 50 60
Cumulative Displacement (mm)
from 10/09/2012 to 02/07/2015

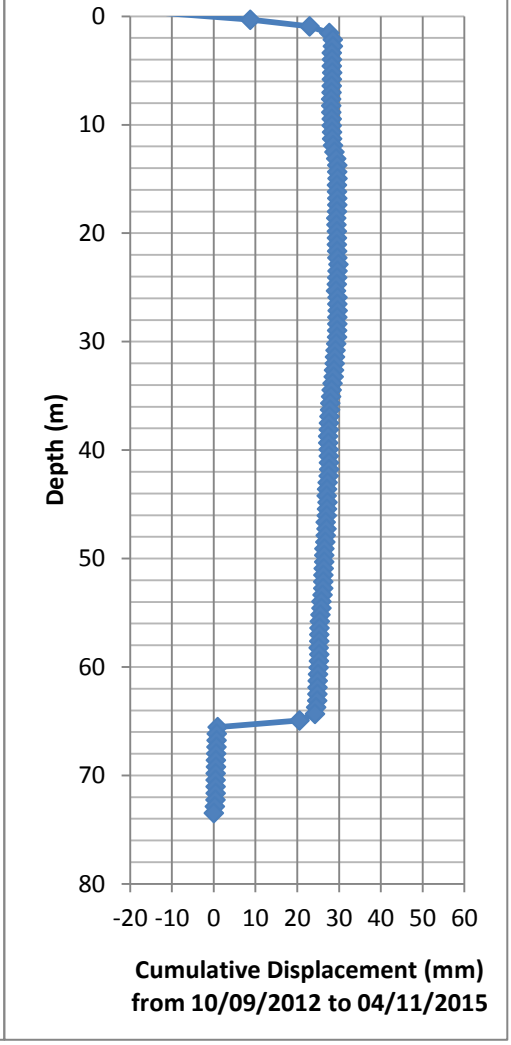

B-Axis
Depth (m)
0
10
20
30
40
50
60
70
-10 0 10 20 30 40 50 60
Cumulative Displacement (mm)
from 10/09/2012 to 02/07/2015

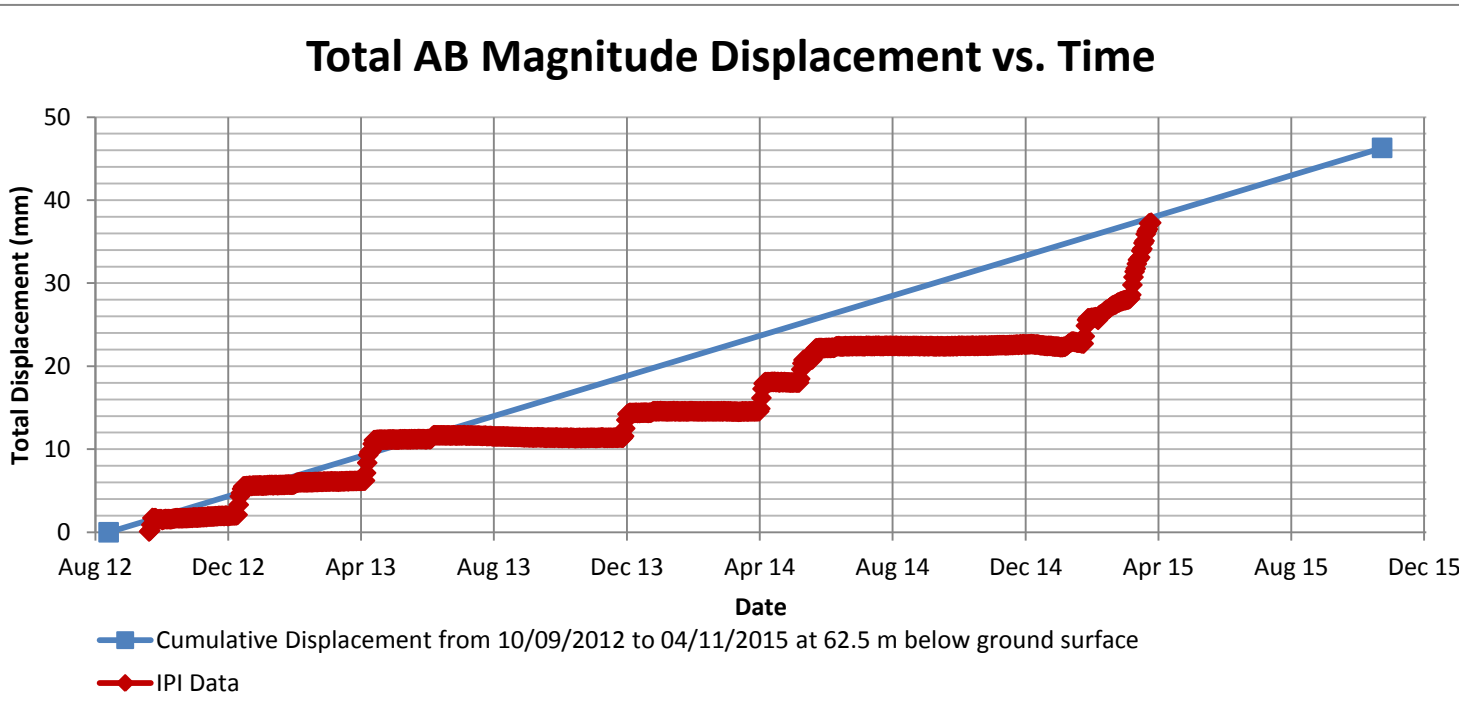

Total AB Magnitude Displacement vs. Time
Total Displacement (mm)
0
10
20
30
40
50
Aug 12
Dec 12
Apr 13
Aug 13
Dec 13
Apr 14
Aug 14
Dec 14
Apr 15
Aug 15
Dec 15
Date
Cumulative Displacement from 10/09/2012 to 02/07/2015 at 47.5 m below ground surface
IPI Data

SI17


AB Magnitude
Depth (m)
0
10
20
30
40
50
60
70
80
-20 -10 0 10 20 30 40 50 60
Cumulative Displacement (mm)
from 10/09/2012 to 04/11/2015


A-Axis
Depth (m)
0
10
20
30
40
50
60
70
80
-20 -10 0 10 20 30 40 50 60
Cumulative Displacement (mm)
from 10/09/2012 to 04/11/2015


B-Axis
Depth (m)
0
10
20
30
40
50
60
70
80
-20 -10 0 10 20 30 40 50 60
Cumulative Displacement (mm)
from 10/09/2012 to 04/11/2015


Total AB Magnitude Displacement vs. Time
Total Displacement (mm)
0
10
20
30
40
50
Aug 12
Dec 12
Apr 13
Aug 13
Dec 13
Apr 14
Aug 14
Dec 14
Apr 15
Aug 15
Dec 15
Date
Cumulative Displacement from 10/09/2012 to 04/11/2015 at 62.5 m below ground surface
IPI Data

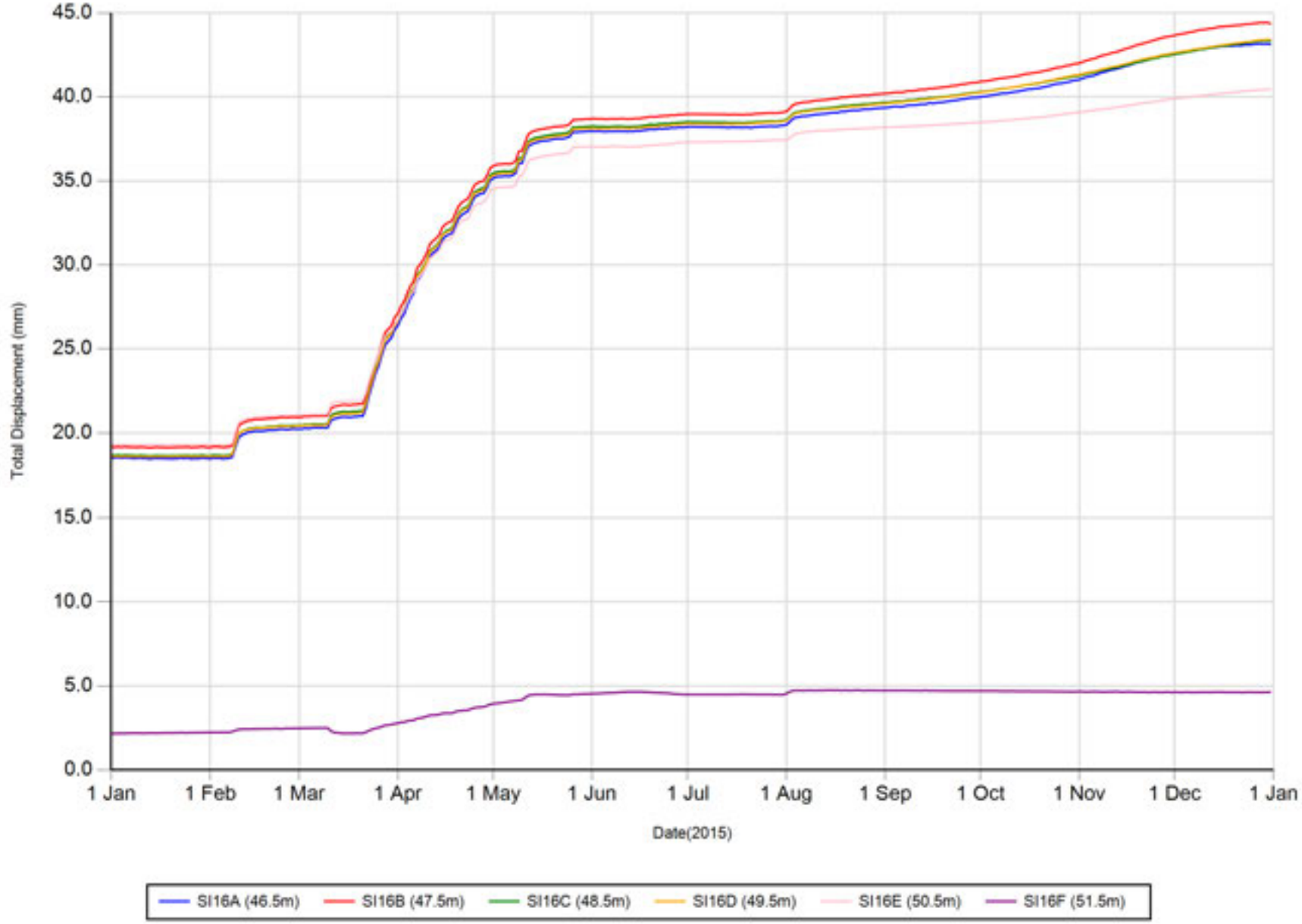
West Quesnel
Land Stability Program

amec
foster
wheeler

Slope Inclinometer Trends for 2015

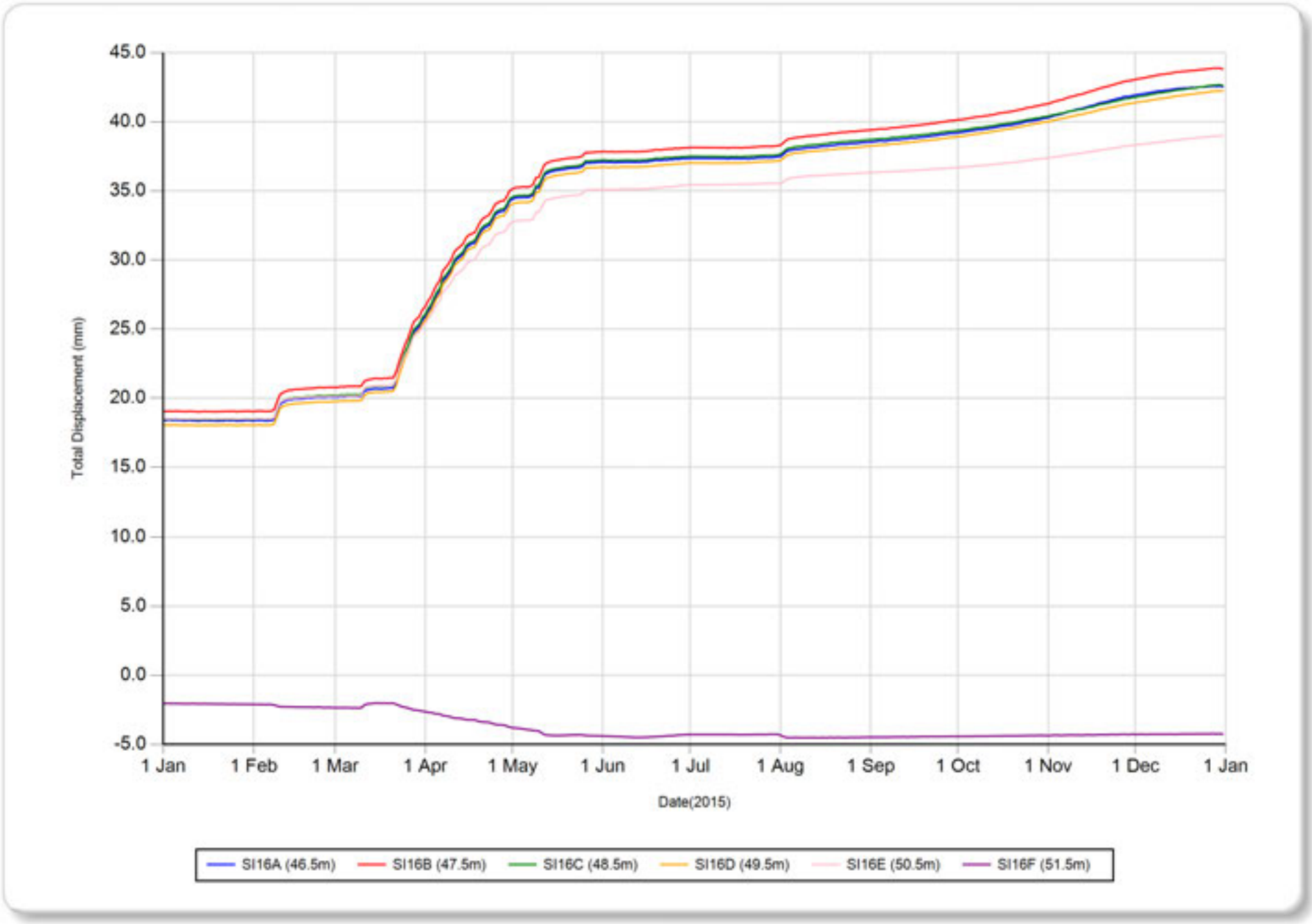
West Quesnel Land Stability Program

SI16 (Station 3) AB-Axis



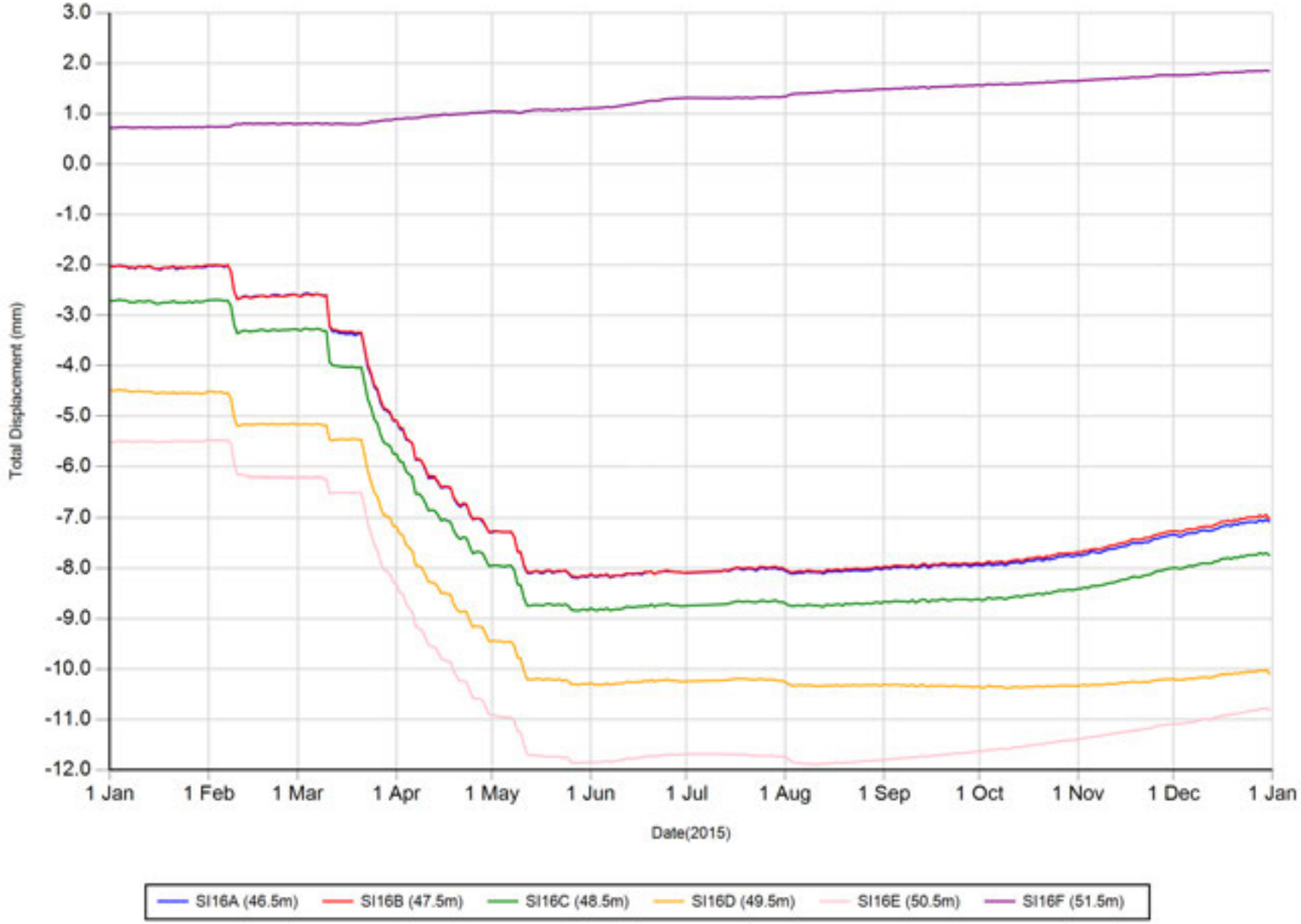
West Quesnel Land Stability Program

SI16 (Station 3) A-Axis



West Quesnel Land Stability Program

SI16 (Station 3) B-Axis



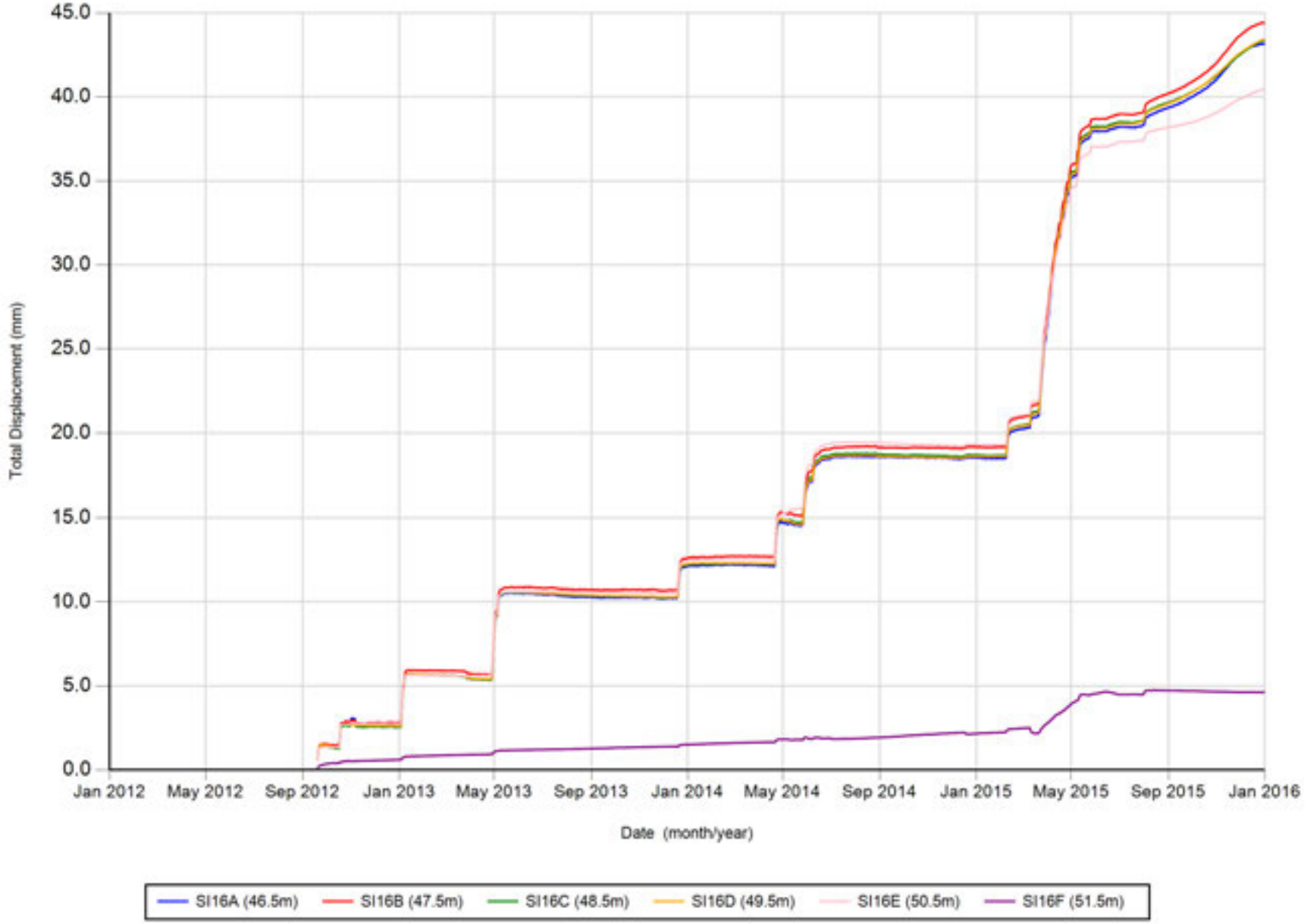
West Quesnel
Land Stability Program

amec
foster
wheeler

Long Term Slope Inclinometer Trends

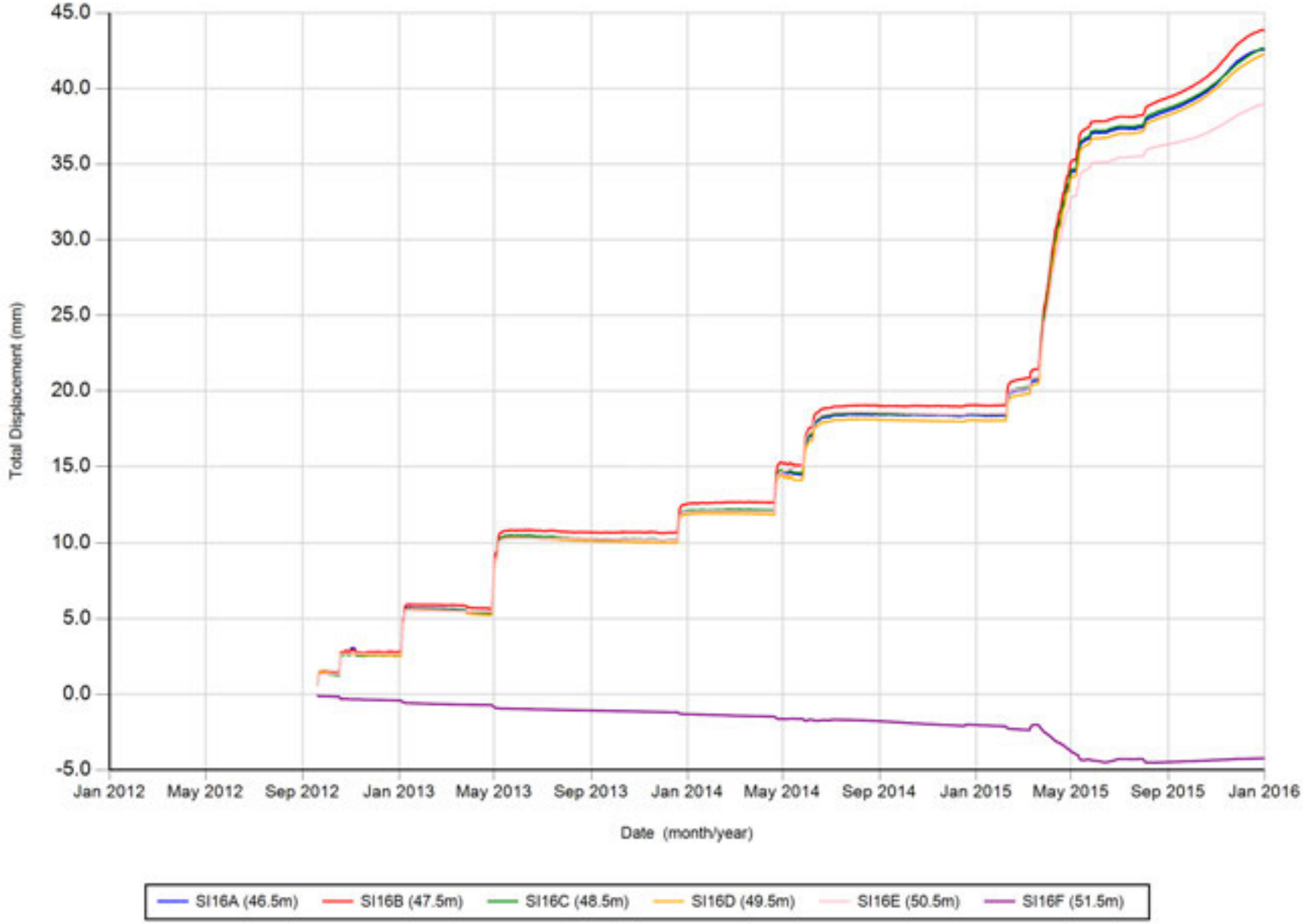
West Quesnel Land Stability Program

SI16 (Station 3) AB-Axis



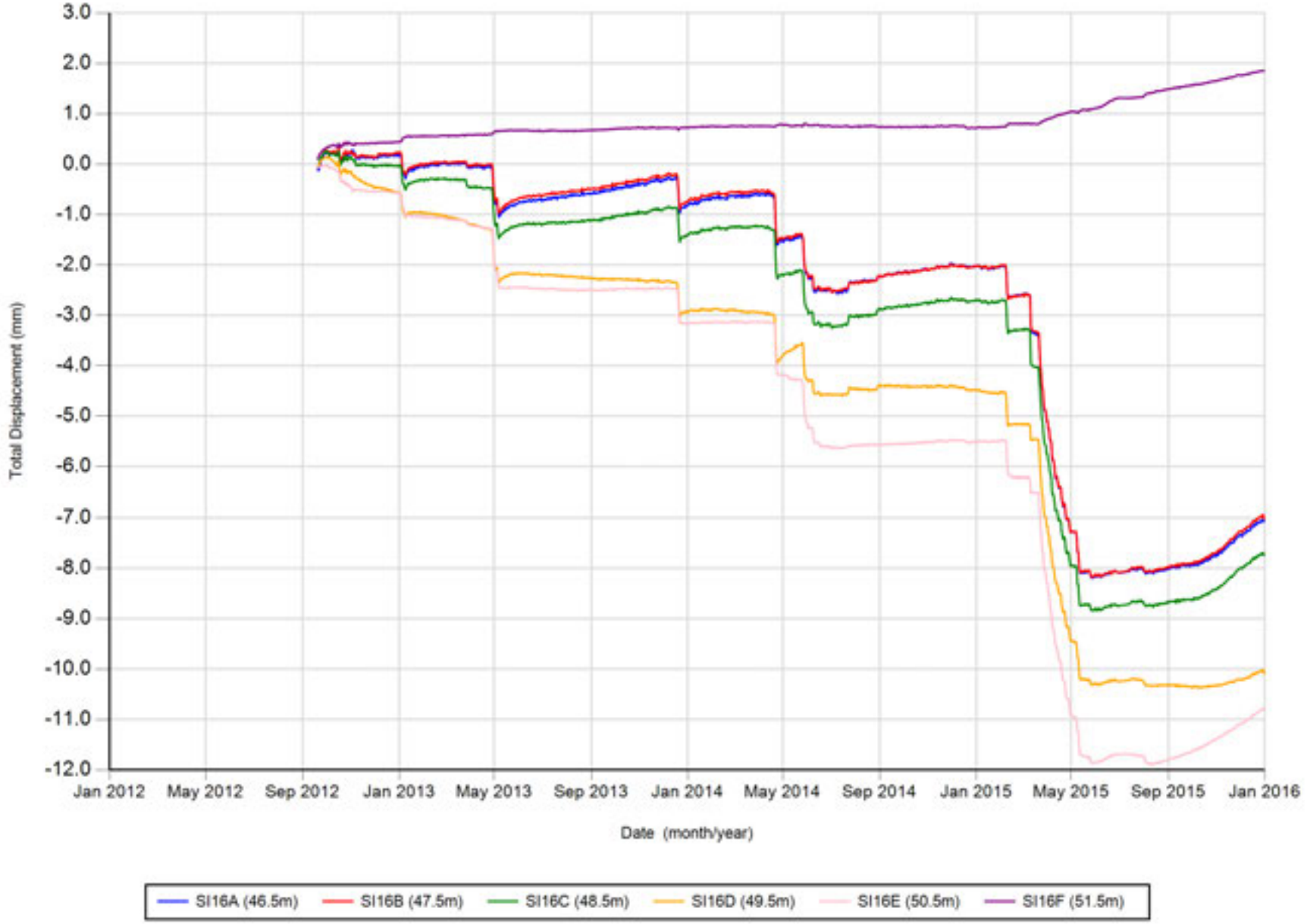
West Quesnel Land Stability Program

SI16 (Station 3) A-Axis



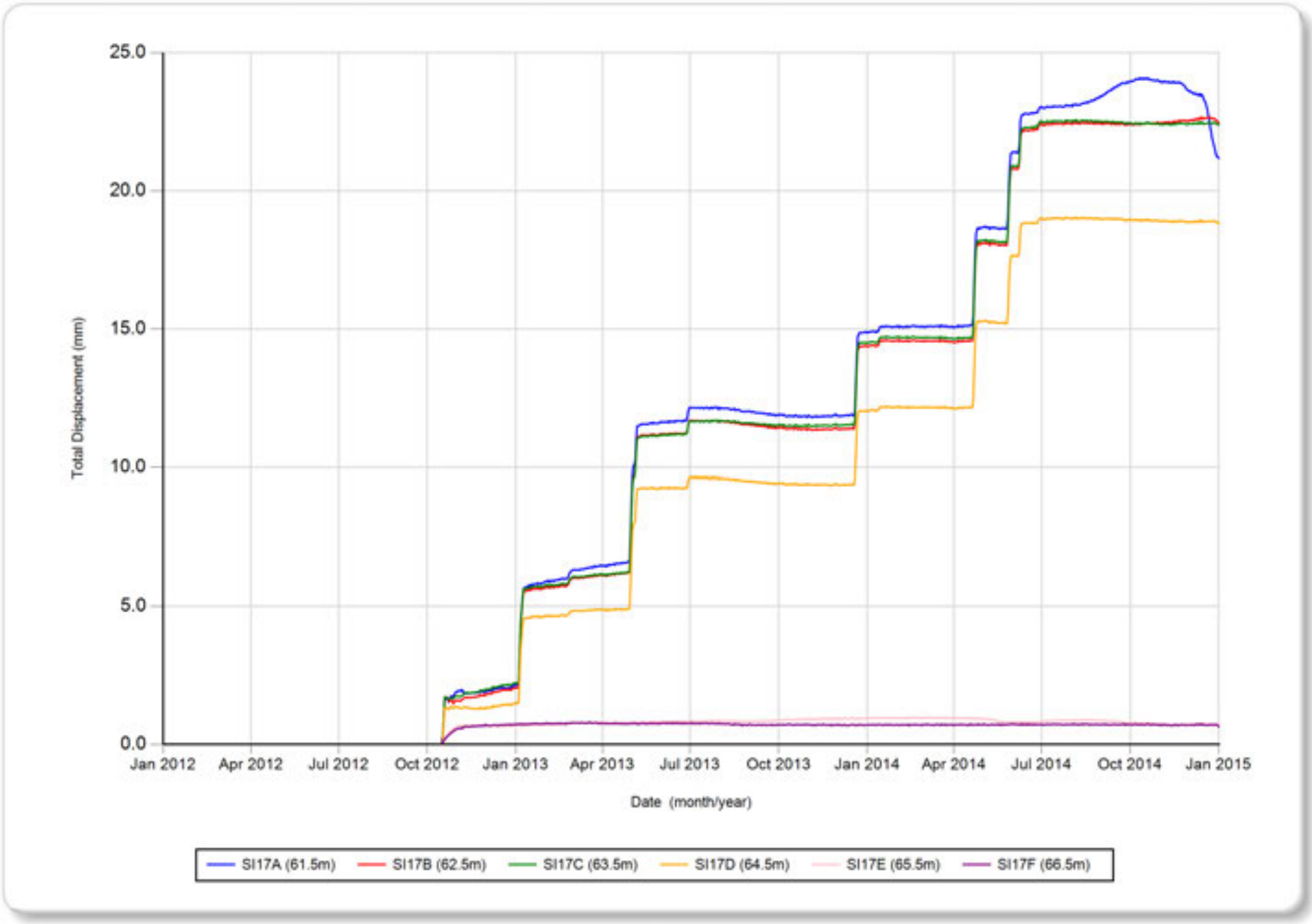
West Quesnel Land Stability Program

SI16 (Station 3) B-Axis



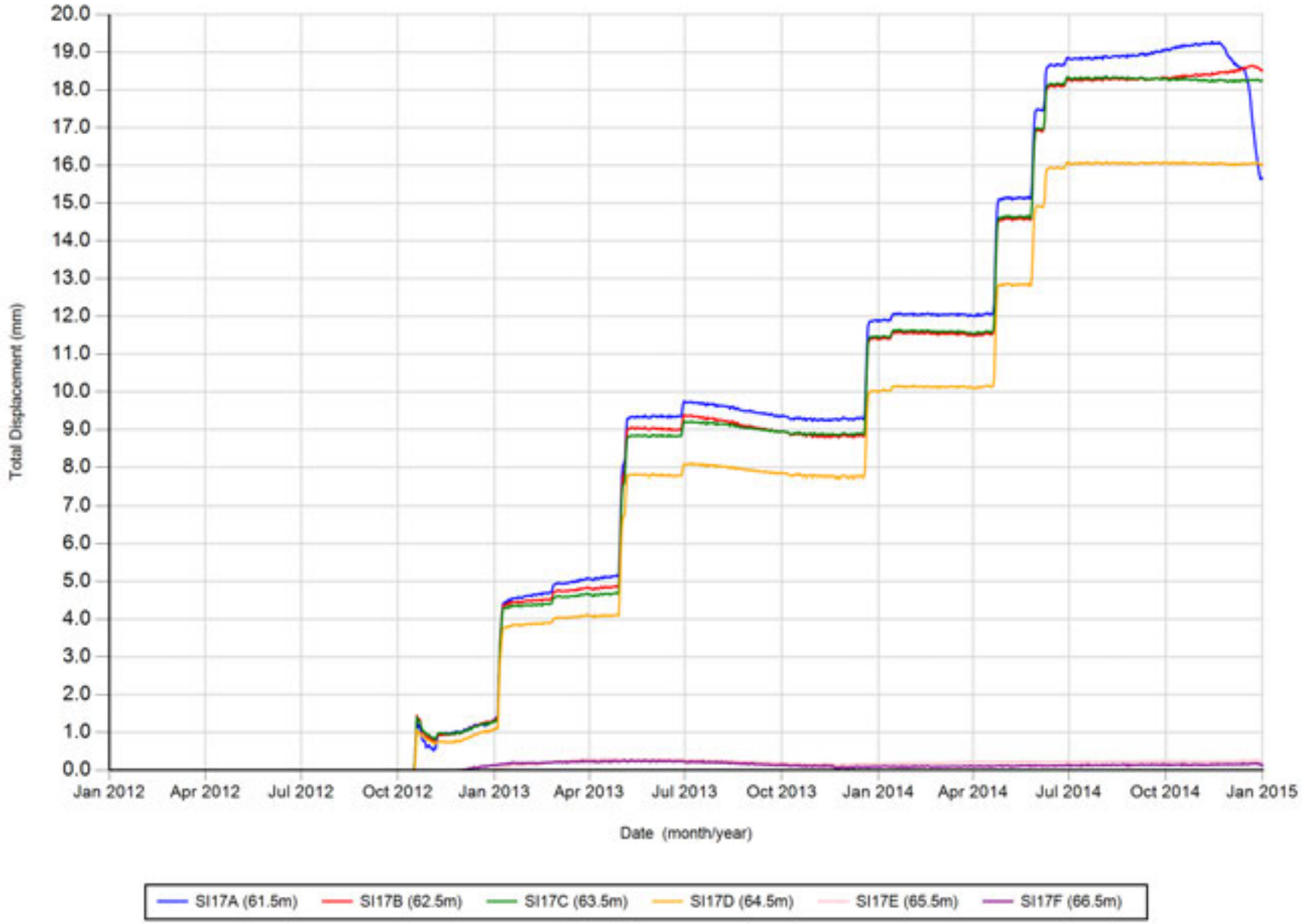
West Quesnel Land Stability Program

SI17(Station 9) AB-Axis



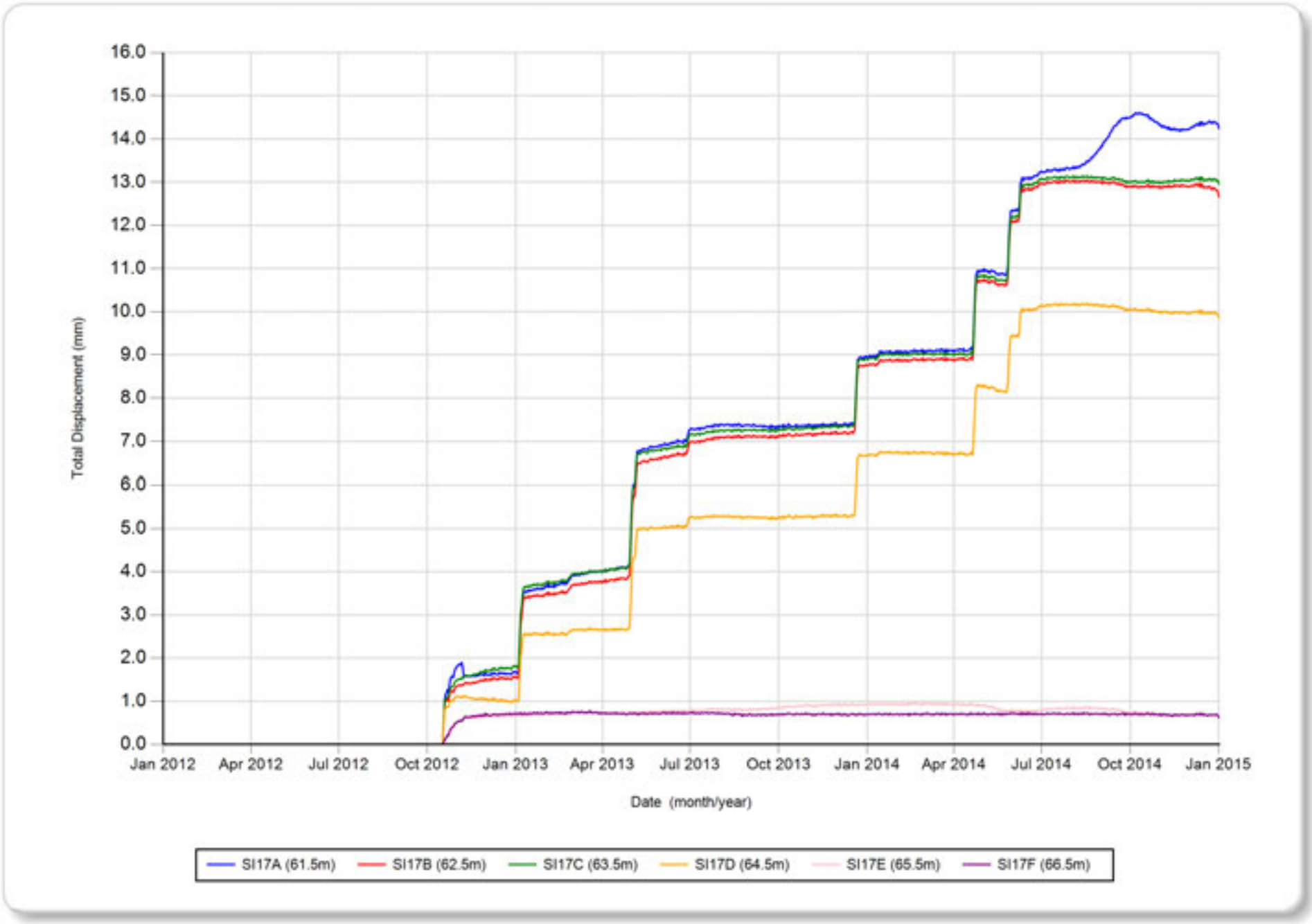
West Quesnel Land Stability Program

SI17(Station 9) A-Axis



West Quesnel Land Stability Program

SI17(Station 9) B-Axis



West Quesnel
Land Stability Program

amec
foster
wheeler

Water Quality Results SI17

Water Analysis

Project No. KX0439744.4

Final
File No. EC-70318

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Lab #: Client ID: Sample Date: DL	15-15662 SI17 2015/11/19 0:00	15-15662-D SI17 Lab Duplicate
JP	2015/11/24	Total Suspended Solids @105°C	mg/L (ppm)	APHA 2540-D	2	18	16
LL	2015/11/24	Calcium -D	mg/L (ppm)	APHA 3120B	0.5	31.7	---
LL	2015/11/24	Iron -D	mg/L (ppm)	APHA 3120 B	0.01	0.20	---
LL	2015/11/24	Magnesium -D	mg/L (ppm)	APHA 3120 B	0.5	14.6	---
LL	2015/11/24	Manganese -D	mg/L (ppm)	APHA 3120 B	0.01	0.02	---
LL	2015/11/24	Potassium -D	mg/L (ppm)	APHA 3120 B	0.5	3.2	---
LL	2015/11/24	Sodium -D	mg/L (ppm)	APHA 3120 B	0.5	18.8	---
EL	2015/11/24	Bicarbonate-D	mg/L (ppm)	APHA 2320	1	202	---
EL	2015/11/24	Carbonate-D	mg/L (ppm)	APHA 2320	1	< 1	---
EL	2015/11/24	Chloride-D	mg/L (ppm)	APHA 4110	0.5	10.2	---
EL	2015/11/24	Fluoride-D	mg/L (ppm)	APHA 4500F-c	0.02	0.07	---
EL	2015/11/24	Hydroxide (as CaCO3)-D	mg/L (ppm)	APHA 2320	1	< 1	---
EL	2015/11/24	Nitrate-Nitrogen-D	mg/L (ppm)	APHA 4110	0.02	< 0.02	---
EL	2015/11/24	Nitrite-Nitrogen-D	mg/L (ppm)	APHA 4110	0.02	< 0.02	---
EL	2015/11/24	Nitrate + Nitrite	mg/L (ppm)	Calculation	0.04	< 0.04	---
EL	2015/11/24	Sulphate-D	mg/L (ppm)	APHA 4110	0.5	17.5	---
EL	2015/11/24	Alkalinity as CaCO3	mg/L (ppm)	APHA 2320	1	166	---
EL	2015/11/24	Conductivity @ 25°C	mS/cm	APHA 2510 B	0.001	0.358	---
EL	2015/11/24	pH @ 25°C	pH units	APHA 4500H	0.01	8.10	---
EL	2015/11/25	Turbidity	NTU	APHA 2130-b	0.1	39	---
AD	2015/11/24	Calculated TDS	mg/L (ppm)	APHA 1030-f	0.50	195	---
AD	2015/11/24	Hardness as CaCO3	mg/L (ppm)	Calculation	6.0	139	---
AD	2015/11/24	Balance (+ions/-ions)	Ratio	Calculation	0.01	0.93	---

Water Analysis

Project No. KX0439744.4

Final
File No. EC-70318

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Lab #: Client ID: Sample Date: DL	15-15662 SI17 2015/11/19 0:00	15-15662-D SI17 Lab Duplicate
EL	2015/11/24	Carbon (Total Organic)	mg/L (ppm)	APHA 5310 B	0.1	32.6	---
EL	2015/11/24	Carbon (Dissolved Organic)	mg/L (ppm)	APHA 5310 B	0.1	29.8	---
JP	2015/11/24	Ammonia - Nitrogen	mg/L (ppm)	APHA 4500NH3-G	0.018	3.72	3.77
JP	2015/11/27	Total Kjeldahl Nitrogen (TKN)	mg/L (ppm)	APHA 4500Norg-D/4500-NH3 D	0.08	5.41	6.07
JP	2015/11/26	Chemical Oxygen Demand (COD)	mg/L (ppm)	APHA 5220-d	20	166	---
EL	2015/11/26	Colour (True)	Colour Units	APHA 2120C	10	11	10

Water Analysis - Total Metals

Project No. KX0439744.4

Final
File No. EC-70318

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Lab #: / Client ID: / Sample Date: / DL	15-15662 / SI17 / 2015/11/19 0:00
LL	2015/11/23	Aluminum-T	µg/L (ppb)	EPA200.2/APHA3125B	2	42
LL	2015/11/23	Antimony-T	µg/L (ppb)	EPA200.2/APHA3125B	0.05	3.89
LL	2015/11/23	Arsenic-T	µg/L (ppb)	EPA200.2/APHA3125B	0.1	0.6
LL	2015/11/23	Barium-T	µg/L (ppb)	EPA200.2/APHA3125B	0.05	115
LL	2015/11/23	Beryllium-T	µg/L (ppb)	EPA200.2/APHA3125B	0.1	< 0.1
LL	2015/11/23	Boron-T	µg/L (ppb)	EPA200.2/APHA3125B	1	59
LL	2015/11/23	Cadmium-T	µg/L (ppb)	EPA200.2/APHA3125B	0.015	0.073
LL	2015/11/23	Calcium-T	mg/L (ppm)	EPA200.2/APHA3125B	0.5	35.0
LL	2015/11/23	Chromium-T	µg/L (ppb)	EPA200.2/APHA3125B	0.3	8.3
LL	2015/11/23	Cobalt-T	µg/L (ppb)	EPA200.2/APHA3125B	0.02	0.24
LL	2015/11/23	Copper-T	µg/L (ppb)	EPA200.2/APHA3125B	0.1	5.5
LL	2015/11/23	Iron-T	mg/L (ppm)	EPA200.2/APHA3125B	0.01	0.38
LL	2015/11/23	Lead-T	µg/L (ppb)	EPA200.2/APHA3125B	0.05	6.15
LL	2015/11/23	Magnesium-T	mg/L (ppm)	EPA200.2/APHA3125B	0.50	15.8
LL	2015/11/23	Manganese-T	mg/L (ppm)	EPA200.2/APHA3125B	0.01	0.04
LL	2015/11/23	Mercury-T	µg/L (ppb)	APHA 3112	0.005	< 0.005
LL	2015/11/23	Molybdenum-T	µg/L (ppb)	EPA200.2/APHA3125B	0.05	0.98
LL	2015/11/23	Nickel-T	µg/L (ppb)	EPA200.2/APHA3125B	0.05	80.9
LL	2015/11/23	Selenium-T	µg/L (ppb)	EPA200.2/APHA3125B	0.1	0.2
LL	2015/11/23	Silver-T	µg/L (ppb)	EPA200.2/APHA3125B	0.05	< 0.05
LL	2015/11/23	Sodium-T	mg/L (ppm)	EPA200.2/APHA3125B	0.5	25.6
LL	2015/11/23	Thallium-T	µg/L (ppb)	EPA200.2/APHA3125B	0.05	< 0.05
LL	2015/11/23	Titanium-T	µg/L (ppb)	EPA200.2/APHA3125B	0.2	0.9
LL	2015/11/23	Uranium-T	µg/L (ppb)	EPA200.2/APHA3125B	0.05	0.37
LL	2015/11/23	Vanadium-T	µg/L (ppb)	EPA200.2/APHA3125B	0.1	0.9
LL	2015/11/23	Zinc-T	µg/L (ppb)	EPA200.2/APHA3125B	0.5	1110
AD	2015/11/24	T-Hardness as CaCO3	mg/L (ppm)	Calculation	6.0	153

Water Analysis - Dissolved Metals

Project No. KX0439744.4

Final
File No. EC-70318

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Lab #: Client ID: Sample Date: DL	15-15662 SI17 2015/11/19 0:00
LL	2015/11/23	Aluminum-D	µg/L (ppb)	APHA 3125 B	2	10
LL	2015/11/23	Antimony-D	µg/L (ppb)	APHA 3125 B	0.05	0.12
LL	2015/11/23	Arsenic-D	µg/L (ppb)	APHA 3125 B	0.1	0.1
LL	2015/11/23	Barium-D	µg/L (ppb)	APHA 3125 B	0.05	102
LL	2015/11/23	Beryllium-D	µg/L (ppb)	APHA 3125 B	0.1	< 0.1
LL	2015/11/23	Boron-D	µg/L (ppb)	APHA 3125 B	1	66
LL	2015/11/23	Cadmium-D	µg/L (ppb)	APHA 3125 B	0.015	< 0.015
LL	2015/11/23	Calcium-D	mg/L (ppm)	APHA 3125 B	0.5	35.5
LL	2015/11/23	Chromium-D	µg/L (ppb)	APHA 3125 B	0.3	2.7
LL	2015/11/23	Cobalt-D	µg/L (ppb)	APHA 3125 B	0.02	0.02
LL	2015/11/23	Copper-D	µg/L (ppb)	APHA 3125 B	0.1	< 0.1
LL	2015/11/23	Iron-D	mg/L (ppm)	APHA 3125 B	0.01	0.02
LL	2015/11/23	Lead-D	µg/L (ppb)	APHA 3125 B	0.05	0.19
LL	2015/11/23	Magnesium-D	mg/L (ppm)	APHA 3125 B	0.5	16.0
LL	2015/11/23	Manganese-D	mg/L (ppm)	APHA 3125 B	0.01	0.02
LL	2015/11/23	Mercury-D	µg/L (ppb)	APHA 3112	0.005	< 0.005
LL	2015/11/23	Molybdenum-D	µg/L (ppb)	APHA 3125 B	0.05	0.14
LL	2015/11/23	Nickel-D	µg/L (ppb)	APHA 3125 B	0.05	8.99
LL	2015/11/23	Selenium-D	µg/L (ppb)	APHA 3125 B	0.1	0.3
LL	2015/11/23	Silver-D	µg/L (ppb)	APHA 3125 B	0.05	< 0.05
LL	2015/11/23	Sodium-D	mg/L (ppm)	APHA 3125 B	0.5	22.5
LL	2015/11/23	Thallium-D	µg/L (ppb)	APHA 3125 B	0.05	< 0.05
LL	2015/11/23	Titanium-D	µg/L (ppb)	APHA 3125 B	0.2	< 0.2
LL	2015/11/23	Uranium-D	µg/L (ppb)	APHA 3125 B	0.05	0.32
LL	2015/11/23	Vanadium-D	µg/L (ppb)	APHA 3125 B	0.05	< 0.05
LL	2015/11/23	Zinc-D	µg/L (ppb)	APHA 3125 B	0.5	145
AD	2015/11/24	D-Hardness as CaCO3	mg/L (ppm)	Calculation	6.0	154

Quality Control Standard

Project No. KX0439744.4 File No. EC-70318

Water Analysis

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Analyzed Value	Advisory Range	Target Value	Reference No.
JP	2015/11/24	Total Suspended Solids @105°C	mg/L (ppm)	APHA 2540-d	68	53.1-74.5	66	G2-SLD02011
LL	2015/11/24	Calcium -D	mg/L (ppm)	APHA 3120 B	40.1	33.8-41.3	37.5	QCP-QCS (CCV-Cats)
LL	2015/11/24	Iron -D	mg/L (ppm)	APHA 3120 B	1.06	0.90-1.10	1.00	QCP-QCS (CCV-Cats)
LL	2015/11/24	Magnesium -D	mg/L (ppm)	APHA 3120 B	38.1	33.8-41.3	37.5	QCP-QCS (CCV-Cats)
LL	2015/11/24	Manganese -D	mg/L (ppm)	APHA 3120 B	1.06	0.90-1.10	1.00	QCP-QCS (CCV-Cats)
LL	2015/11/24	Potassium -D	mg/L (ppm)	APHA 3120 B	43.7	38.3-46.8	42.5	QCP-QCS (CCV-Cats)
LL	2015/11/24	Sodium -D	mg/L (ppm)	APHA 3120 B	42.2	33.8-41.3	37.5	QCP-QCS (CCV-Cats)
EL	2015/11/24	Chloride-D	mg/L (ppm)	APHA 4110	3.9	3.6-4.4	4.0	CC-Anion-138
EL	2015/11/24	Fluoride-D	mg/L (ppm)	APHA 4500F-c	0.53	0.4-0.6	0.50	QC-Alk/F-94
EL	2015/11/24	Nitrate-Nitrogen-D	mg/L (ppm)	APHA 4110	1.47	1.44-1.76	1.60	CC-Anion-138
EL	2015/11/24	Nitrite-Nitrogen-D	mg/L (ppm)	APHA 4110	0.59	0.54-0.66	0.60	CC-Anion-138
EL	2015/11/24	Sulphate-D	mg/L (ppm)	APHA 4110	25.5	25.2-30.8	28.0	CC-Anion-138
EL	2015/11/24	Alkalinity as CaCO3	mg/L (ppm)	APHA 2320	58	53-72	63	QC-Alk/F-94
EL	2015/11/24	Conductivity @ 25°C	mS/cm	APHA 2510B	2.66	2.54-2.94	2.790	CC-EC-0.02M-80
EL	2015/11/24	pH @ 25°C	pH Units	APHA 4500H	6.00	5.94-6.06	6.00	QC-pH-26
EL	2015/11/25	Turbidity	NTU	APHA 2103-b	10	8.5-11.5	10.0	QC-Turb-27

Water Analysis

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Analyzed Value	Advisory Range	Target Value	Reference No.
EL	2015/11/24	Carbon (Total Organic)	mg/L (ppm)	APHA 5310-B	29.4	24-36	30.0	D28008-02-Low
EL	2015/11/24	Carbon (Dissolved Organic)	mg/L (ppm)	APHA 5310-B	29.4	24-36	30.0	D28008-02-Low
JP	2015/11/24	Ammonia - Nitrogen	mg/L (ppm)	APHA 4500NH3-G	1.49	1.09-1.66	1.370	QC-F2NUT01117
JP	2015/11/27	Total Kjeldahl Nitrogen (TKN)	mg/L(ppm)	APHA 4500Norg-D/4500-NH3 D	7.76	6.55-11.37	9.00	G2-NUT01118
JP	2015/11/26	Chemical Oxygen Demand (COD)	mg/L (ppm)	APHA 5220-d	394	329.6-494.4	412	QC-F2DMD01074
EL	2015/11/26	Colour (True)	Colour units	CPPA H.5P	529	400-600	500	QCP-500 C.U. Hazen

Quality Control Standard

Project No. KX0439744.4 File No. EC-70318

Water Analysis - Total Metals

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Analyzed Value	Advisory Range	Target Value	Reference No.
LL	2015/11/23	Aluminum-T	µg/L (ppb)	APHA 3125 B	53	42.5-57.5	50	MS-CCV-HIGH
LL	2015/11/23	Antimony-T	µg/L (ppb)	APHA 3125 B	107	85-115	100.00	MS-CCV-HIGH
LL	2015/11/23	Arsenic-T	µg/L (ppb)	APHA 3125 B	99.0	85-115	100.0	MS-CCV-HIGH
LL	2015/11/23	Barium-T	µg/L (ppb)	APHA 3125 B	54.8	42.5-57.5	50.00	MS-CCV-HIGH
LL	2015/11/23	Beryllium-T	µg/L (ppb)	APHA 3125 B	50.0	42.5-57.5	50.0	MS-CCV-HIGH
LL	2015/11/23	Boron-T	µg/L (ppb)	APHA 3125 B	51	42.5-57.5	50	MS-CCV-HIGH
LL	2015/11/23	Cadmium-T	µg/L (ppb)	APHA 3125 B	50.9	42.5-57.5	50.000	MS-CCV-HIGH
LL	2015/11/23	Calcium-T	µg/L (ppb)	APHA 3125 B	24000	21293-28808	25050.0	MS-CCV-HIGH
LL	2015/11/23	Chromium-T	µg/L (ppb)	APHA 3125 B	49.8	42.5-57.5	50.0	MS-CCV-HIGH
LL	2015/11/23	Cobalt-T	µg/L (ppb)	APHA 3125 B	52.6	42.5-57.5	50.00	MS-CCV-HIGH
LL	2015/11/23	Copper-T	µg/L (ppb)	APHA 3125 B	52.0	42.5-57.5	50.0	MS-CCV-HIGH
LL	2015/11/23	Iron-T	µg/L (ppb)	APHA 3125 B	50.1	42.5-57.5	50.00	MS-CCV-HIGH
LL	2015/11/23	Lead-T	µg/L (ppb)	APHA 3125 B	96.8	85-115	100.00	MS-CCV-HIGH
LL	2015/11/23	Magnesium-T	µg/L (ppb)	APHA 3125 B	26300	21293-28808	25050.00	MS-CCV-HIGH
LL	2015/11/23	Manganese-T	µg/L (ppb)	APHA 3125 B	49.4	42.5-57.5	50.00	MS-CCV-HIGH
LL	2015/11/23	Mercury-T	µg/L (ppb)	APHA 3112	0.291	0.1745-0.3760	0.275	G2-QCPHG01011
LL	2015/11/23	Molybdenum-T	µg/L (ppb)	APHA 3125 B	51.2	42.5-57.5	50.00	MS-CCV-HIGH
LL	2015/11/23	Nickel-T	µg/L (ppb)	APHA 3125 B	50.1	42.5-57.5	50.00	MS-CCV-HIGH
LL	2015/11/23	Selenium-T	µg/L (ppb)	APHA 3125 B	48.3	42.5-57.5	50.0	MS-CCV-HIGH
LL	2015/11/23	Silver-T	µg/L (ppb)	APHA 3125 B	12.7	10.6-14.4	12.50	MS-CCV-HIGH
LL	2015/11/23	Sodium-T	µg/L (ppb)	APHA 3125 B	25500	21293-28808	25050.0	MS-CCV-HIGH
LL	2015/11/23	Thallium-T	µg/L (ppb)	APHA 3125 B	249	212.5-287.5	250.00	MS-CCV-HIGH
LL	2015/11/23	Titanium-T	µg/L (ppb)	APHA 3125 B	50.5	42.5-57.5	50.0	MS-CCV-HIGH
LL	2015/11/23	Uranium-T	µg/L (ppb)	APHA 3125 B	98.4	85-115	100.00	MS-CCV-HIGH
LL	2015/11/23	Vanadium-T	µg/L (ppb)	APHA 3125 B	50.5	42.5-57.5	50.0	MS-CCV-HIGH
LL	2015/11/23	Zinc-T	µg/L (ppb)	APHA 3125 B	54.3	42.5-57.5	50.0	MS-CCV-HIGH

Quality Control Standard

Project No. KX0439744.4 File No. EC-70318

Water Analysis - Dissolved Metals

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Analyzed Value	Advisory Range	Target Value	Reference No.
LL	2015/11/23	Aluminum-D	µg/L (ppb)	APHA 3125 B	53	42.5-57.5	50	MS-CCV-HIGH
LL	2015/11/23	Antimony-D	µg/L (ppb)	APHA 3125 B	107	85-115	100.00	MS-CCV-HIGH
LL	2015/11/23	Arsenic-D	µg/L (ppb)	APHA 3125 B	99.0	85-115	100.0	MS-CCV-HIGH
LL	2015/11/23	Barium-D	µg/L (ppb)	APHA 3125 B	54.8	42.5-57.5	50.00	MS-CCV-HIGH
LL	2015/11/23	Beryllium-D	µg/L (ppb)	APHA 3125 B	50.0	42.5-57.5	50.0	MS-CCV-HIGH
LL	2015/11/23	Boron-D	µg/L (ppb)	APHA 3125 B	51	42.5-57.5	50	MS-CCV-HIGH
LL	2015/11/23	Cadmium-D	µg/L (ppb)	APHA 3125 B	50.9	42.5-57.5	50.000	MS-CCV-HIGH
LL	2015/11/23	Calcium-D	µg/L (ppb)	APHA 3125 B	24000	21293-28808	25050.0	MS-CCV-HIGH
LL	2015/11/23	Chromium-D	µg/L (ppb)	APHA 3125 B	49.8	42.5-57.5	50.0	MS-CCV-HIGH
LL	2015/11/23	Cobalt-D	µg/L (ppb)	APHA 3125 B	52.6	42.5-57.5	50.00	MS-CCV-HIGH
LL	2015/11/23	Copper-D	µg/L (ppb)	APHA 3125 B	52.0	42.5-57.5	50.0	MS-CCV-HIGH
LL	2015/11/23	Iron-D	µg/L (ppb)	APHA 3125 B	50.1	42.5-57.5	50.00	MS-CCV-HIGH
LL	2015/11/23	Lead-D	µg/L (ppb)	APHA 3125 B	96.8	85-115	100.00	MS-CCV-HIGH
LL	2015/11/23	Magnesium-D	µg/L (ppb)	APHA 3125 B	26300	21293-28808	25050.0	MS-CCV-HIGH
LL	2015/11/23	Manganese-D	µg/L (ppb)	APHA 3125 B	49.4	42.5-57.5	50.00	MS-CCV-HIGH
LL	2015/11/23	Mercury-D	µg/L (ppb)	APHA 3112	0.291	0.1745-0.3760	0.275	G2-QCPHG01011
LL	2015/11/23	Molybdenum-D	µg/L (ppb)	APHA 3125 B	51.2	42.5-57.5	50.00	MS-CCV-HIGH
LL	2015/11/23	Nickel-D	µg/L (ppb)	APHA 3125 B	50.1	42.5-57.5	50.00	MS-CCV-HIGH
LL	2015/11/23	Selenium-D	µg/L (ppb)	APHA 3125 B	48.3	42.5-57.5	50.0	MS-CCV-HIGH
LL	2015/11/23	Silver-D	µg/L (ppb)	APHA 3125 B	12.7	10.6-14.4	12.50	MS-CCV-HIGH
LL	2015/11/23	Sodium-D	µg/L (ppb)	APHA 3125 B	25500	21293-28808	25050.0	MS-CCV-HIGH
LL	2015/11/23	Thallium-D	µg/L (ppb)	APHA 3125 B	249	212.5-287.5	250.00	MS-CCV-HIGH
LL	2015/11/23	Titanium-D	µg/L (ppb)	APHA 3125 B	50.5	42.5-57.5	50.0	MS-CCV-HIGH
LL	2015/11/23	Uranium-D	µg/L (ppb)	APHA 3125 B	98.4	85-115	100.00	MS-CCV-HIGH
LL	2015/11/23	Vanadium-D	µg/L (ppb)	APHA 3125 B	50.5	42.5-57.5	50.00	MS-CCV-HIGH
LL	2015/11/23	Zinc-D	µg/L (ppb)	APHA 3125 B	54.3	42.5-57.5	50.0	MS-CCV-HIGH

Quality Control Report

Workorder: L1705674 Report Date: 30-NOV-15

Client: AMEC Foster Wheeler
5667 - 70 Street NW
EDMONTON AB T6B 3P6
Contact: KRISTINE CONNOR

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BOD-ED	**Water**							
Batch R3320970								
WG2219607-4 DUP		**L1705674-1**						
Biochemical Oxygen Demand		47.3	51.9		mg/L	9.3	20	23-NOV-15
WG2219607-2 LCS								
Biochemical Oxygen Demand			109.2		%		85-115	23-NOV-15
WG2219607-3 MB								
Biochemical Oxygen Demand			<2.0		mg/L		2	23-NOV-15

Appendix C

Piezometers – Status, Observation Summary Tables (C1 to C3), Trend Plots

APPENDIX C - Piezometer Status

Standpipe Piezometers					
Piezometer	**Datalogger Station**	**Location**	**Installation Date**	**Depth (screen)**	**Status**
SP2 (BH2)	STN01	Avery Lane	November 2001	54.2 to 60.2m	Inactive
SP2A (BH2A)	STN05	Bettcher St.	August 2003	86.9-88.4m	Inactive
SP2B (BH2B)	STN05	Bettcher St.	August 2003	47.4-48.2m	Inactive
SP2C (BH2C)	STN05	Bettcher St.	August 2003	25.3-25.9m	Inactive
SP3 (BH3A)	STN06	Flamingo St.	July 2003	50.0-50.6m	Inactive
SP4A (BH4C)	STN06	Flamingo St.	July 2003	22.9-23.5m	Inactive
SP4 (BH4 SP)	STN03	Voyager School	December 2001	39.6-39.9m	Damaged and plugged
SP6A (BH6A)	STN04	Dixon St.	December 2001	44.0-45.2m	Damaged - sheared at 26.8m
SP6B (BH6B)	STN04	Dixon St.	December 2001	26.4-27.8m	Inactive

Standpipe Piezometers with Vibrating Wires					
Piezometer		**Location**	**Installation Date**	**Depth (tip)**	**Status**
VWP 3A (BH3B)	STN06	Flamingo St.	August 2003	40.0m	Active
VWP 3B (BH3C)	STN06	Flamingo St.	August 2003	31.0m	Active
VWP 4A (BH4A)	STN06	Flamingo St.	July 2003	40.0m	Active
VWP 4B (BH4B)	STN06	Flamingo St.	July 2003	23.0m	Active

Vibrating Wire Piezometers					
Piezometer	**Datalogger Station**	**Location**	**Installation Date**	**Depth (tip)**	**Status**
VWP 3 (BH3)	STN02	Abbott Dr.	November 2001	37.5m	Active
VWP 4 (BH4)	STN03	Voyager School	December 2001	49.0m	Active
VWP 7A (BH7A)	STN07	Pierce Cres.	July 2005	27.0m	Active
VWP 7B (BH7B)	STN07	Pierce Cres.	July 2005	64.9m	Inactive
VWP 8A (BH8A)	STN08	Pinchbeck St.	June 2005	13.1m	Dry
VWP 8B (BH8B)	STN08	Pinchbeck St.	June 2005	13.0m	Dry
VWP 8C (BH8C)	STN08	Pinchbeck St.	June 2005	28.0m	Active
VWP 8D (BH8D)	STN08	Pinchbeck St.	June 2005	56.2m	Active
VWP 9A (BH9A)	STN09	Patchett St.	June 2005	15.1m	Active
VWP 9B (BH9B)	STN09	Patchett St.	June 2005	30.6m	Active
VWP 9C (BH9C)	STN09	Patchett St.	June 2005	50.1m	Active
VWP 10A (BH10A)	STN10	Dawson St.	July 2005	11.6m	Active
VWP 10B (BH10B)	STN10	Dawson St.	July 2005	20.4m	Active
VWP 10C (BH10C)	STN10	Dawson St.	July 2005	48.6m	Active
VWP 11A (BH11A)	STN11	Picard Ave.	June 2005	14.3m	Active
VWP 11B (BH11B)	STN11	Picard Ave.	June 2005	32.0m	Active
VWP 11C (BH11C)	STN11	Picard Ave.	June 2005	50.3m	Active
VWP 12A (BH12A)	STN16	Panagrot Ave. (east end)	June 2005	18.0m	Dry
VWP 12B (BH12B)	STN16	Panagrot Ave. (east end)	June 2005	22.9m	Active
VWP 12C (BH12C)	STN16	Panagrot Ave. (east end)	June 2005	26.5m	Active
VWP 12D (BH12D)	STN16	Panagrot Ave. (east end)	June 2005	54.9m	Active
VWP 13A (BH13A)	STN12	Lewis Dr. (at Sikh Temple)	July 2005	51.m	Active
VWP 13B (BH13B)	STN12	Lewis Dr. (at Sikh Temple)	July 2005	14.4m	Active
VWP 14A (BH14A)	STN13	Findlay Rd.	June 2006	20.1m	Active
VWP 14B (BH14B)	STN13	Findlay Rd.	June 2006	65.9m	Active
VWP 14C (BH14C)	STN13	Findlay Rd.	June 2006	98.7m	Active
VWP 15A (BH15A)	STN14	Panagrot Ave. (west end)	July 2006	8.8m	Active
VWP 15B (BH15B)	STN14	Panagrot Ave. (west end)	July 2006	63.3m	Active
VWP 15C (BH15C)	STN14	Panagrot Ave. (west end)	July 2006	83.2m	Active
VWP 16A (BH16A)	STN15	Diatomite Mine	October 2006	42.7m	Active
VWP 16B (BH16B)	STN15	Diatomite Mine	October 2006	85.5m	Active
VWP 16C (BH16C)	STN15	Diatomite Mine	October 2006	139.1m	Active
VWP 16D (BH16D)	STN15	Diatomite Mine	October 2006	214.9m	Active
VWP 17A (BH17A)	STN17	Adam St.	July 2007	37.7m	Active
VWP 17B (BH17B)	STN17	Adam St.	July 2007	57.4m	Active

(Previous Name)

Vibrating Wire Piezometers cont.					
VWP 18A (BH18A)	STN17	Adam St.	July 2007	38.2m	Active
VWP 18B (BH18B)	STN17	Adam St.	July 2007	60.1m	Inactive
VWP 19A (BH19A)	STN16	Panagrot Ave. (east end)	July 2007	16.5m	Active
VWP 19B (BH19B)	STN16	Panagrot Ave. (east end)	July 2007	22.3m	Active
VWP 20 (BH20)	STN16	Panagrot Ave. (east end)	July 2007	21.4m	Active
VWP 21A (BH21A)	STN19	Crane St.	July 2007	12.6m	Active
VWP 21B (BH21B)	STN19	Crane St.	July 2007	21.3m	Active
VWP 22 (BH22)	STN19	Crane St.	July 2007	18.3m	Active
VWP 23A (BH23A)	STN18	Baity Ave.	July 2007	22.4m	Active
VWP 23B (BH23B)	STN18	Baity Ave.	July 2007	33.1m	Active
VWP 24 (BH24)	STN18	Baity Ave.	July 2007	22.9m	Dry
VWP 25A (BH25A)	STN18	Baity Ave.	July 2007	16.8m	Active
VWP 25B (BH25B)	STN18	Baity Ave.	July 2007	30.2m	Active
VWP 26A	STN4	Dixon St.	August 2012	13.7m	Active
VWP 26B	STN4	Dixon St.	August 2012	29.3m	Active
VWP 27A	STN4	Dixon St.	August 2012	13.9m	Active
VWP 27B	STN4	Dixon St.	August 2012	30.9m	Active
VWP 28A	STN21	South of Dixion St.	August 2012	14.0m	Active
VWP 28B	STN21	South of Dixion St.	August 2012	27.3m	Active
VWP 29A	STN21	South of Dixion St.	August 2012	14.0m	Active
VWP 29B	STN21	South of Dixion St.	August 2012	22.6m	Active
VWP 30A	STN20	South of Abbot Dr.	August 2012	13.4m	Active
VWP 30B	STN20	South of Abbot Dr.	August 2012	22.3m	Active
VWP 31A	STN20	South of Abbot Dr.	August 2012	14.2m	Active
VWP 31B	STN20	South of Abbot Dr.	August 2012	22.3m	Active
VWP 32A	STN20	South of Abbot Dr.	August 2012	14.0m	Active
VWP 32B	STN20	South of Abbot Dr.	August 2012	22.3m	Active
VWP 33A	STN22	Paley Ave.	August 2012	13.7m	Active
VWP 33B	STN22	Paley Ave.	August 2012	22.9m	Active
VWP 33C	STN22	Paley Ave.	August 2012	64.3m	Active
VWP 34A	STN23	Stork Ave.	August 2012	11.3m	Active
VWP 34B	STN23	Stork Ave.	August 2012	23.5m	Active
VWP 34C	STN23	Stork Ave.	August 2012	39.0m	Active
VWP 35A	STN03	Voyager School	August 2012	13.7m	Active
VWP 35B	STN03	Voyager School	August 2012	27.4m	Active
VWP 35C	STN03	Voyager School	August 2012	48.8m	Active
VWP 36A	STN25	Pinchbeck St.	August 2012	18.3m	Dry
VWP 36B	STN25	Pinchbeck St.	August 2012	41.1m	Active
VWP 36C	STN25	Pinchbeck St.	August 2012	67.1m	Active
VWP 37A	STN29	Blair St.	August 2012	12.2m	Dry
VWP 37B	STN29	Blair St.	August 2012	34.1m	Active
VWP 38A	STN19	Hawk St.	August 2012	13.7m	Active
VWP 38B	STN19	Hawk St.	August 2012	34.4m	Active
VWP 39A	STN30	Dodds Ave.	August 2012	14.2m	Active
VWP 39B	STN30	Dodds Ave.	August 2012	19.8m	Active

(Previous Name)

Table C1 Background Piezometers – Overall Trend and Recent Observations

Instrument	Background Groundwater Condition	Post Dewatering Observations	Difference Between Pre and Post Dewatering
VWP 4	Steady-state at 521 m elevation until sharp rise to 526 m elevation in April 2009, spike to 531.8 during BH 35 installation during summer of 2012	Steady-state near 527 m with slight seasonal groundwater response then gradual decline to 525.5 starting in September 2015	1.5 m decrease
VWP 7A	Varies, 537 m to 537.5 m elevation	Slight seasonal groundwater rise to 537.5 m in spring, then decreased to 537 m	Relatively unchanged
VWP 7B	Varies, 535 m to 536 m elevation	Failed in September 2014	Relatively unchanged
VWP 8A	Steady-state at 513 m elevation, intermittently dry	Dry	Unchanged
VWP 8B	Steady-state at 513 m elevation, intermittently dry	Dry	Unchanged
VWP 8C	Steady-state at 511 m elevation	Steady-state near 510.5 m	0.5 m decrease
VWP 8D	Gradual decline from 508 m to 505 m elevation, with slight seasonal precipitation response	No seasonal response, continued gradual decline to 503.5 m	1.5 m decrease
VWP 11A	Steady-state at 517 m elevation	No significant change, possibly dry	Unchanged
VWP 11B	Steady-state at 515.4 m elevation with slight seasonal precipitation response	Steady state near 515.2 m with slight seasonal precipitation response	Relatively unchanged
VWP 11C	Slight decline 515 m to 514 m elevation	Steady state near 514 m with slight seasonal precipitation response then gradual decline to 513.5 starting in September 2015	0.5 m decrease
VWP 13A	Varies, generally between 480 m to 479 m elevation, slight longer term decline	Seasonal groundwater responses, varied between 480 m and 479 m	Relatively unchanged
VWP 13B	Varies, generally between 481 m to 482.5 m elevation	Seasonal groundwater responses, varied between 481 m and 483 m	Relatively unchanged
VWP 14A	Varies, 566 m to 568 m elevation, with seasonal precipitation response	Seasonal groundwater responses, varied between 566 and 567 m	Relatively unchanged
VWP 14B	Varies, 530 m to 531 m elevation, with minimal seasonal precipitation response	A groundwater increase to 532 m in March 2015 then return to steady state near 530 m	Relatively unchanged
VWP 14C	Varies, 529 m to 530 m elevation, with minimal seasonal precipitation response	A groundwater increase to 533 m in March 2015 then return to Steady state near 529 m	Relatively unchanged
VWP 15A	Varies, 560 m to 563 m elevation, with strong seasonal and storm precipitation response	Seasonal groundwater response in the spring, from 560 m to 563 m. Dissipated to 560.5 m	Relatively unchanged

Table C1 Background Piezometers – Overall Trend and Recent Observations

Instrument	Background Groundwater Condition	Post Dewatering Observations	Difference Between Pre and Post Dewatering
VWP 15B	Gradual decline from 540 m to 537.5 m elevation	Gradual decrease to 537 m	0.5 m decease
VWP 15C	Gradual decline from 538 m to 534.5 m elevation	Gradual decrease to 533.0 m	1.5 m decrease
VWP 16A	Gradual rise from 645 m to steady-state near 646.5 m elevation	Steady state near 646.5 m	Relatively unchanged
VWP 16B	Increasing from 580 to 589 m elevation until August 2010, steady state until May 2012, then decreasing to near 587 m	Gradual decrease to 586	1 m decrease
VWP 16C	Steady-state near 550 m elevation	Steady state near 550 m	Relatively unchanged
VWP 16D	Slight variation, near 550 m elevation	Steady state near 550 m	Relatively unchanged
VWP 35A	Varies, 531 m to 532.5 m elevation, with seasonal precipitation response	Seasonal groundwater response in the spring, from 531.5 m to 533 m	Relatively unchanged
VWP 35B	Varies, 530 m to 531 m elevation, with seasonal precipitation response	Seasonal groundwater response in the spring, from 530 m to 531 m	Relatively unchanged
VWP 35C	Decrease from 532 m to near 528.5 m elevation after completion of drilling.	Steady state near 528.5 m	Relatively unchanged
VWP 39A	Varies, 564 m to 561.5 m elevation, intermittently dry, seasonal precipitation response	Seasonal groundwater responses, varied between 561.5 m and 564 m, intermittently dry	Relatively unchanged
VWP 39B	Varies, 561 m to 558 m elevation, with seasonal precipitation response	Seasonal groundwater responses, varied between 558 m and 561 with a seasonal increase to 562 m in 2015	Slight increase

Table C2 Piezometers Near Pumping Wells – Overall Trend and Recent Observations

Instrument	Background Groundwater Condition	Post Dewatering Observations	Difference Between Pre and Post Dewatering
VWP 3 (PW2)	Groundwater level generally varied between 500 to 501 m elevation with seasonal precipitation response; level began to decrease from near 500.5 m following horizontal drain installation in 2012	Continued decrease, to near 494.5 m	6 m decrease
VWP 3A (PW1)	Decreased from start of pump trials in Nov. 2007 until mid-2009, from 518.5 to 504.5 m elevation	Slight increase in 2015 to 505m	13.5 m decrease
VWP 3B (PW1)	Decreasing from start of pump trials in Nov. 2007, from 518.5 to 505.5 m elevation	Steady state near 505.5 m	13 m decrease
VWP 4A (PW1)	Steady-state near 516 m elevation with spikes due to precipitation events, no apparent influence from pumping	No significant change	Relatively unchanged
VWP 4B (PW1)	Steady-state near 516 m elevation with spikes due to precipitation events, no apparent influence from pumping	No significant change	Relatively unchanged
VWP 9A (PW12)	Varies, 529.5 m to 530.5 m elevation, with seasonal precipitation response	Seasonal groundwater rise to 530 m in the spring, then gradual decrease to near 529 m	Relatively unchanged
VWP 9B (PW12)	Varies, 530 m to 531 m elevation, with slight seasonal precipitation response	Decreased from near 531 m to near 529 m, following activation of PW12 in April 2013. Seasonal groundwater rise to 530 m	1 m decrease
VWP 9C (PW12)	Varies, 531.5 to 529 m elevation	Decreased from near 531 m to near 529 m, following activation of PW12 in April 2013	2 m decrease
VWP 10A (PW14)	Varies, 541 m to 542.5 m elevation, with seasonal precipitation response	Decreased from near 542 m to near 540 m, following activation of PW14 in April 2013 Seasonal groundwater rise to 543 m	2 m decrease, only temporary
VWP 10B (PW14)	Varies, 541 m to 543 m elevation, with seasonal precipitation response	Decreased from near 542 m to near 532.5 m, following activation of PW14 in April 2013	9.5 m decrease
VWP 10C (PW14)	At or near 536 m elevation, slightly decreasing over time	Decreased from near 536 m to near 531 m, following activation of PW14 in April 2013	5 m decrease
VWP 12A (PW4)	Decreased from start of pump trials in Oct. 2007 until early 2008 from 545 to near 538 m elevation, dry	Dry	7 m decrease
VWP 12B (PW4)	Decreased from start of pump trials in Oct. 2007 until early 2008, from 545 to 537 m elevation, steady state since then	Gradual decrease to 536 m	9 m decrease
VWP 12C (PW4)	Decreased from start of pump trials in Oct. 2007 until early 2008, from 537 to 530.5 m elevation.	Seasonal groundwater response in the spring, from 530.5 m to 533 m	6.5 m decrease
VWP 12D (PW4)	Steady state near 526 m elevation, no apparent influence from pumping or seasonal precipitation response	Steady state near 526 m	Relatively unchanged

Table C2 Piezometers Near Pumping Wells – Overall Trend and Recent Observations

Instrument	Background Groundwater Condition	Post Dewatering Observations	Difference Between Pre and Post Dewatering
VWP 17A (PW5)	Gradual decrease from start of pump trials in Oct. 2007 until present, from 484 to 483 m elevation, with slight seasonal precipitation response	Continued decrease, to near 482.5 m	1.5 m decrease
VWP 17B (PW5)	Gradual decrease from start of pump trials in Oct. 2007 until present, from 483 to 482 m elevation, with slight seasonal precipitation response	Continued decrease, to near 480 m	3 m decrease
VWP 18A (PW5)	Gradual decrease from start of pump trials in Oct. 2007 until present from 481 to 479.5 m elevation	Steady state near 479.5 m	1.5 m decrease
VWP 18B (near PW5)	Not working	n/a	n/a
VWP 19A (PW4)	Decreased from start of pump trials in Oct. 2007 until early 2008, from 545 to 541 m elevation, possibly dry	Possibly dry	4 m decrease
VWP 19B (PW4)	Decreased from start of pump trials in Oct. 2007 until early 2008 from 545 to 538 m elevation	Steady state near 538 m	7 m decrease
VWP 20 (PW4)	Gradual decrease from start of pump trials in Oct. 2007 until early 2008, from 545 to 542 m elevation), seasonal increases to 543 m	No significant change, similar seasonal variation	3 m decrease
VWP 26A (PW6 and PW7)	Decreasing from 554 m to 552 m elevation since installation, slight seasonal precipitation response	Seasonal groundwater response in the late spring, from 552 m to 553 m. Dissipated to 551.5 m	0.5 m decrease
VWP 26B (PW6 and PW7)	Decreasing from near 555 m to near 553 m elevation since installation	Decrease from 553 m to 551 m	2 m decrease
VWP 27A (PW7 and PW8)	Decreasing from near 553 m to 552.5 m elevation since installation	Seasonal groundwater response in the late spring, from 552.5 m to 553 m	Relatively unchanged
VWP 27B (PW7 and PW8)	Steady state near 551.5 m elevation, no apparent influence from pumping	Steady state near 551.5 m	Relatively unchanged
VWP 28A (PW9)	Decreasing from near 551 m to 550.5 m elevation since installation	Seasonal groundwater response in the spring, 549 to 550.5 m	Possibly 0.5 m decrease
VWP 28B (PW9)	Decreasing from near 551 m to 550.5 m elevation since installation	Seasonal groundwater response in the spring, 549 to 550.5 m	Possibly 0.5 m decrease
VWP 29A (PW11)	Decreasing from near 555 m to near 551 m elevation since installation	Seasonal groundwater response in the spring, from 551 m to 553 m	Possibly 2 m decrease
VWP 29B (PW11)	Decreasing from near 556 m to near 551 m elevation since installation	Seasonal groundwater response in the spring, from 551 m to 553 m	Possibly 3 m decrease
VWP 30A (PW11 and PW15)	Decreasing from near 558 m to near 555 m elevation since installation	Seasonal groundwater response in the spring, from 555 m to 557.5 m	Possibly 1.5 m decrease

Table C2 Piezometers Near Pumping Wells – Overall Trend and Recent Observations

Instrument	Background Groundwater Condition	Post Dewatering Observations	Difference Between Pre and Post Dewatering
VWP 30B (PW11 and PW15)	Decreasing from near 558 m to near 554.5 m elevation since installation	Seasonal groundwater response in the spring, from 554.5 m to 557 m	Possibly 1.5 m decrease
VWP 31A (PW15 and PW16)	Decreasing from near 558.5 m to near 557.5 m elevation since installation	Seasonal groundwater response in the spring, from 557.5 m to 559 m	Relatively unchanged
VWP 31B (PW15 and PW16)	Decreasing from near 553 m to near 550.5 m elevation since installation	Seasonal groundwater response in the late spring, from 550.5 m to 551.5 m	Relatively unchanged
VWP 32A (PW16 and PW17)	Decreasing from near 560.5 m to near 559 m elevation since installation	Seasonal groundwater response in the spring, from 559 m to 561 m	Relatively unchanged
VWP 32B (PW16 and PW17)	Decreasing from near 560.5 m to near 559 m elevation since installation	Seasonal groundwater response in the spring, from 559 m to 560.5 m	Relatively unchanged
VWP 33A (PW13)	Increasing from dry to 527.5 m	Seasonal groundwater response in the spring, from 527.5 m to 529 m	1.5 m increase
VWP 33B (PW13)	Decreasing from near 526.5 m to near 525.5 m elevation since installation	Decreasing from 525.5 m to near 522 m with activation of PW13 in Jan 2013, seasonal increase to 524 m	3.5 m decrease
VWP 33C (PW13)	Gradual decrease from near 530 m to near 519 m elevation since installation	Steady decrease from 519 m to near 513.5 m with activation of PW13 in Jan 2013	5.5 m decrease
VWP 34A (PW18)	Varies, between 511.5 m and 512 m elevation, with seasonal precipitation response	Seasonal groundwater response in the spring, from 512 m to 513 m	Relatively unchanged
VWP 34B (PW18)	Decreasing from near 513 m to near 511.5 m elevation since installation	Seasonal groundwater response in the spring, from 511.5 m to 512.5 m	Relatively unchanged
VWP 34C (PW18)	Varies, near 512 m elevation, with seasonal precipitation response	Seasonal groundwater response in the spring, from 512 m to 513 m	Relatively unchanged

Table C3 Piezometers Near Horizontal Drains – Overall Trend and Recent Observations

Instrument	Background Groundwater Condition	Post Dewatering Observations	Difference Between Pre and Post Dewatering
VWP 21A (HD4/HD12)	Varied, between 499 m and 501 m elevation, with significant seasonal precipitation response; until affected by HD12 install in summer of 2012 drawing down from 500 m to 498 m	Seasonal increase to 500 m, dissipated to 498 m	1 m decrease
VWP 21B (HD4/HD12)	Varied, between 500.5 m and 501.5 m elevation, with seasonal precipitation response, large drop to 492.5 m after HD12 install in summer of 2012	Seasonal increase to 493 m in the spring, dissipated to near 492.5 m	9 m decrease
VWP 22 (HD4/HD12)	Varied, 504.5 m to 505.5 m elevation, with seasonal precipitation response, large drop to 497.5 m after HD12 install in summer of 2012	Seasonal increase to 500 m in the spring, dissipated to 499 m	6 m decrease
VWP 23A (HD9)	Steady state near 495 m elevation, no apparent seasonal or influence from horizontal drains	Steady state near 495 m	Relatively unchanged
VWP 23B (HD9)	Gradual decrease since installation of trial HD1 in Nov. 2007 until mid-2010 from near 495 m to 489 m elevation, steady-state since then, no seasonal precipitation response	Slight seasonal fluctuation, near 489 m	6 m decrease
VWP 24 (HD9)	Decreased upon installation of trial HD1 in Nov. 2007 from 501 m to below 492 m elevation, dry	Dry	9 m decrease
VWP 25A (HD9)	Varies, 500 to 501 m elevation, very slight seasonal precipitation response, no apparent influence from horizontal drains	Steady state near 500 m	Relatively unchanged
VWP 25B (HD9)	Steady-state near 498 m elevation, no apparent seasonal or influence from horizontal drains	Steady state near 498	Relatively unchanged
VWP 36A (HD8)	Dry	Dry	Unchanged
VWP 36B (HD8)	Near 502 m elevation shortly after installation	Gradual decrease from 502 m to near 494.5 m	7.5 m decrease
VWP 36C (HD8)	Near 501.5 m elevation shortly after installation	Gradual decrease from 501.5 m to near 492 m	9.5 m decrease
VWP 37A (HD10)	Dry	Dry	Unchanged
VWP 37B (HD10)	Decreasing from near 508 m shortly after installation	Gradual decrease to near 493 m	15 m decrease
VWP 38A (HD4/HD12)	Varied from near 494.5 m to 492 m elevation, with seasonal precipitation response	Seasonal increase to 495 m in the spring	Relatively unchanged
VWP 38B (HD4/HD12)	Near 500 m shortly after installation	Gradual decrease with seasonal variations between 489 and 492 m	11 m decrease

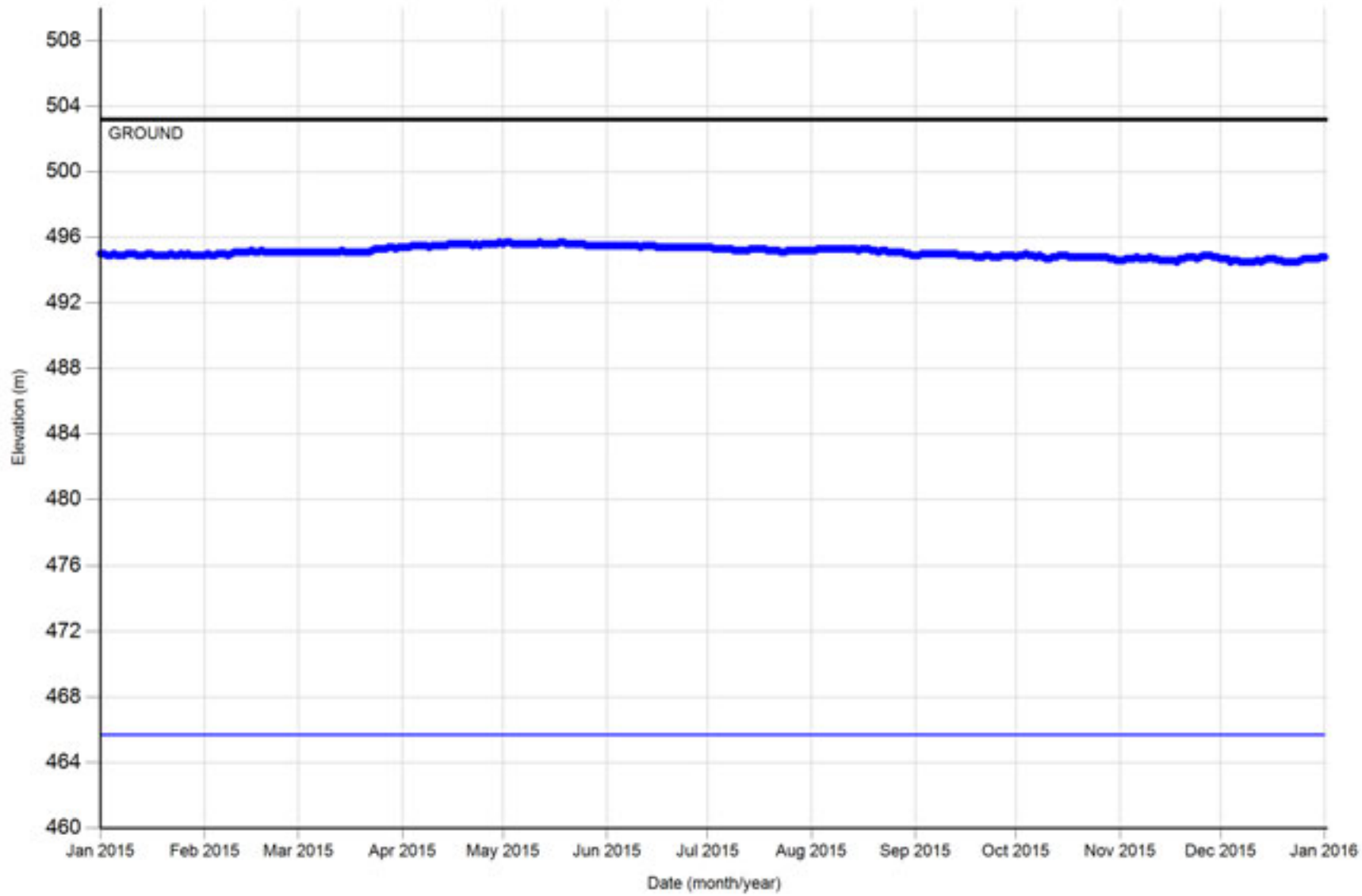
West Quesnel
Land Stability Program

amec
foster
wheeler

VWP Trends for 2015

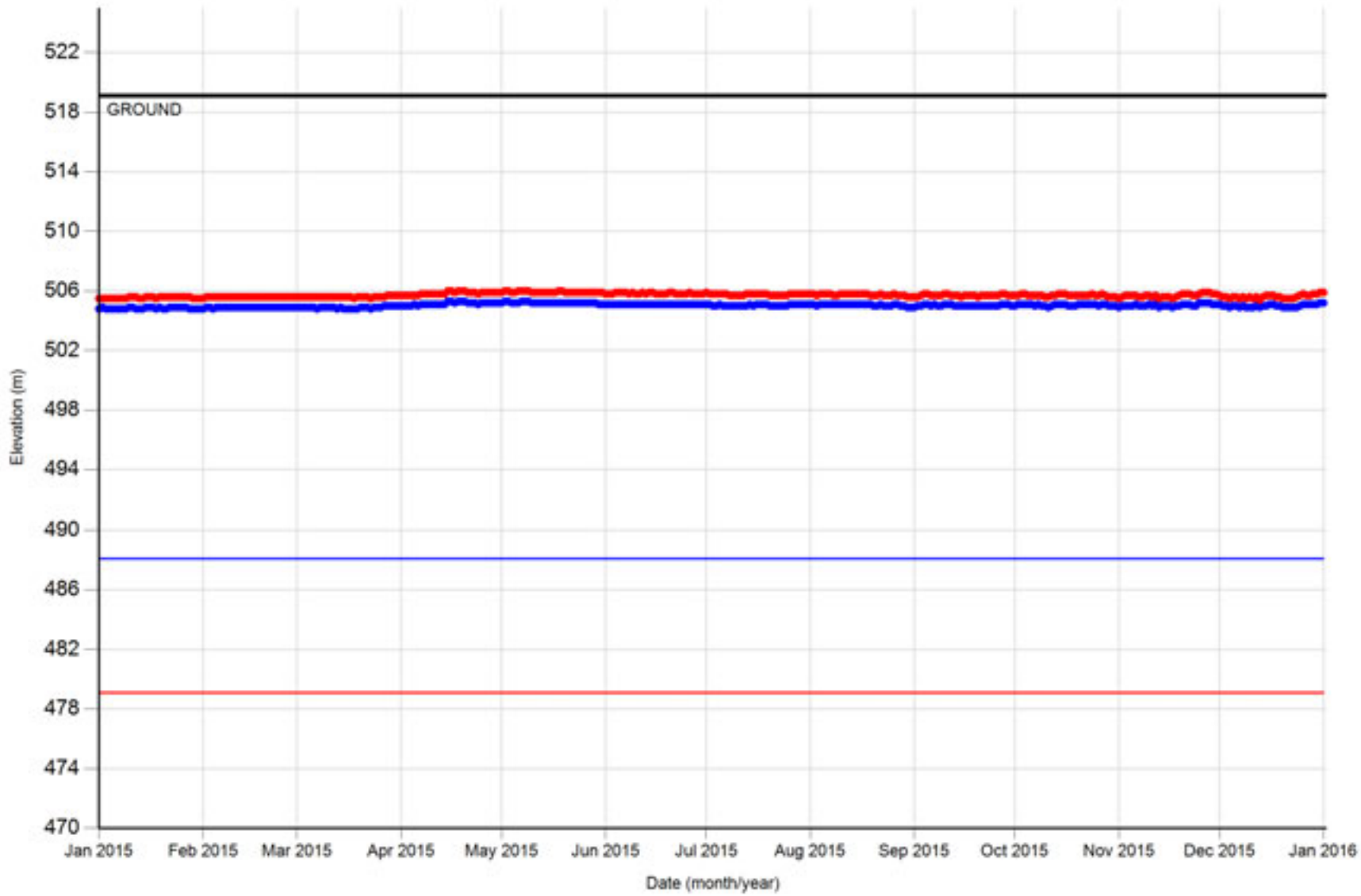
West Quesnel Land Stability Program

VWP 3 (Station 02)



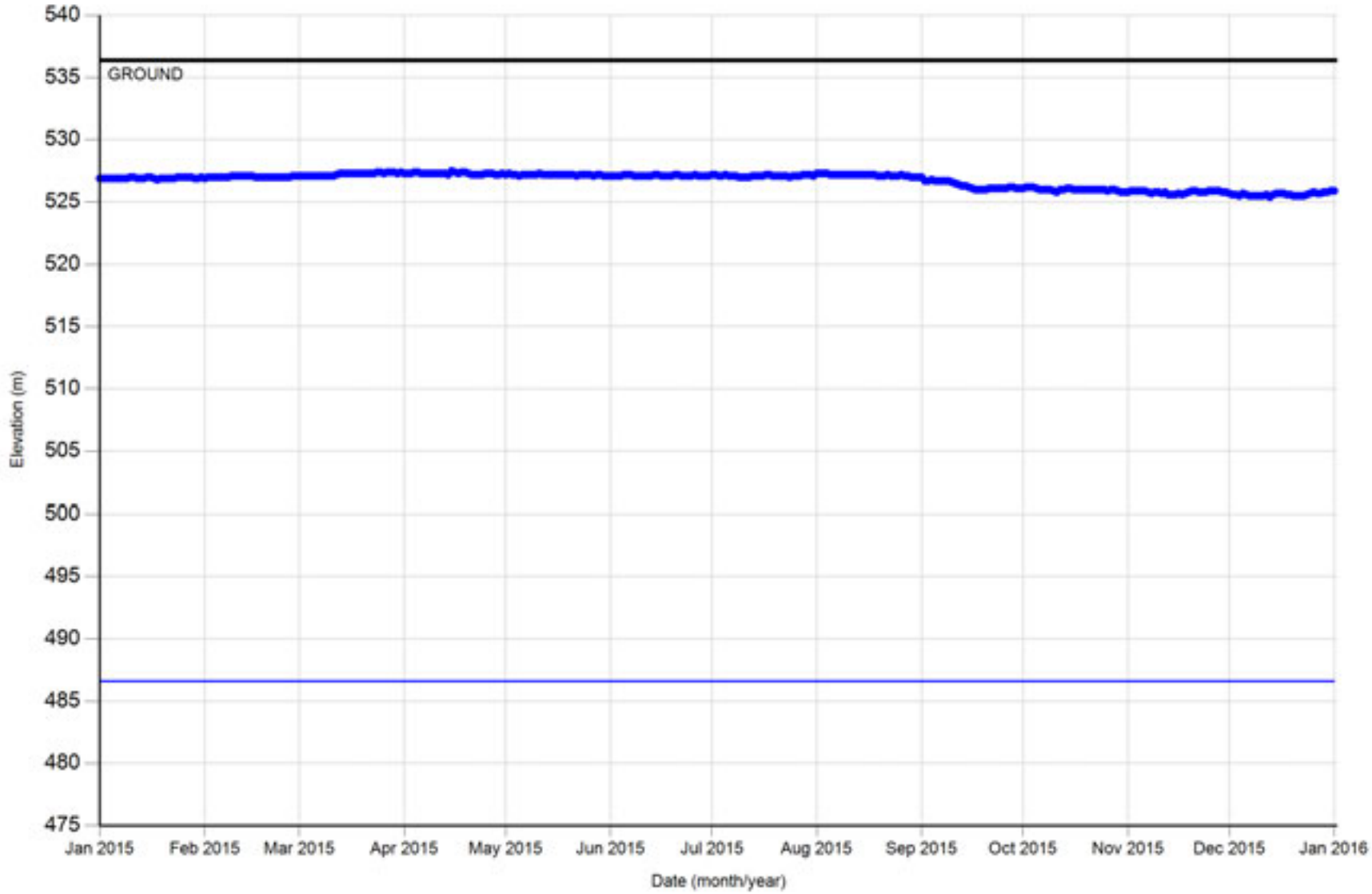
West Quesnel Land Stability Program

VWP 3A and B (Station 06)



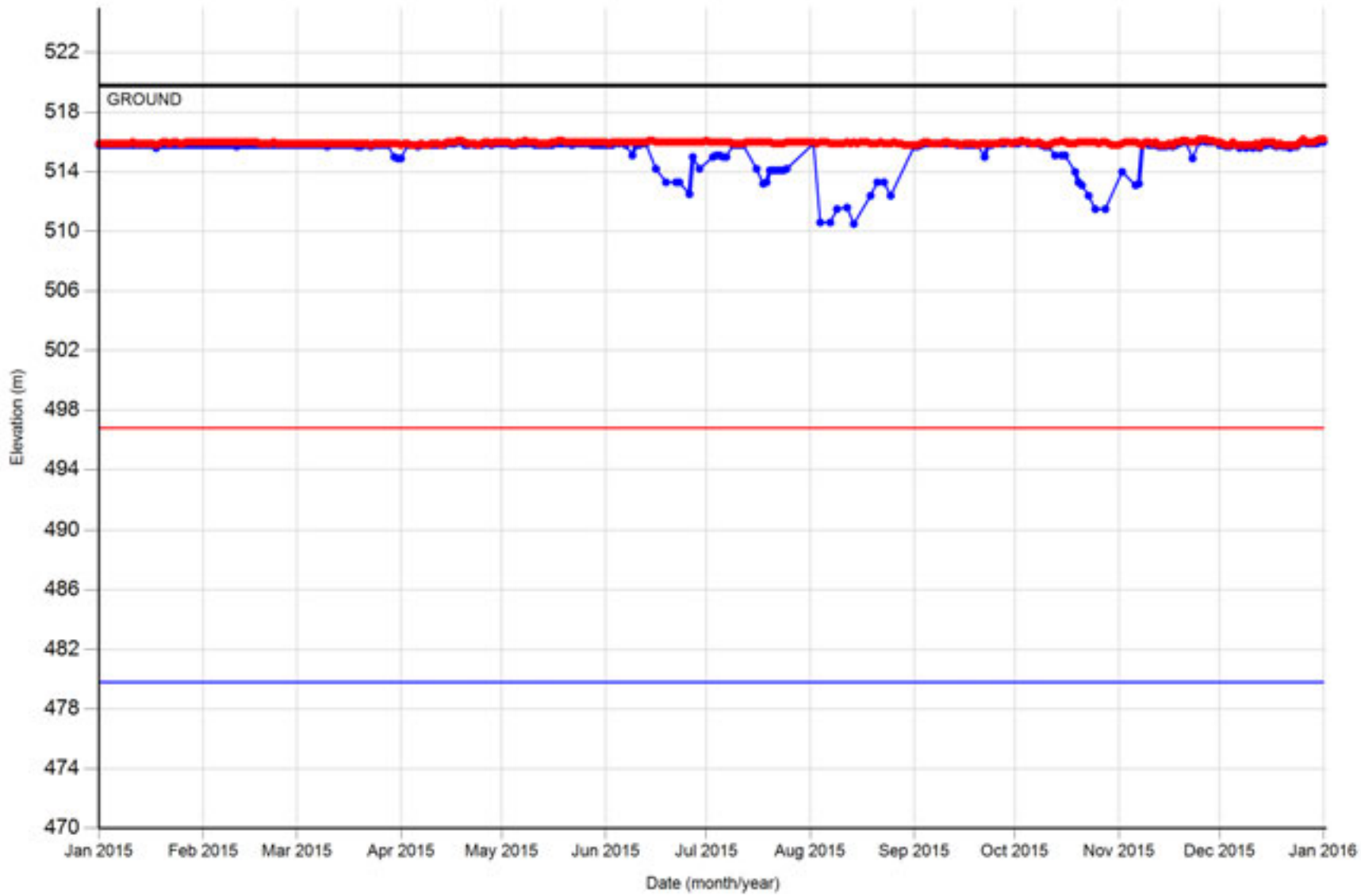
West Quesnel Land Stability Program

VWP 4 (Station 03)



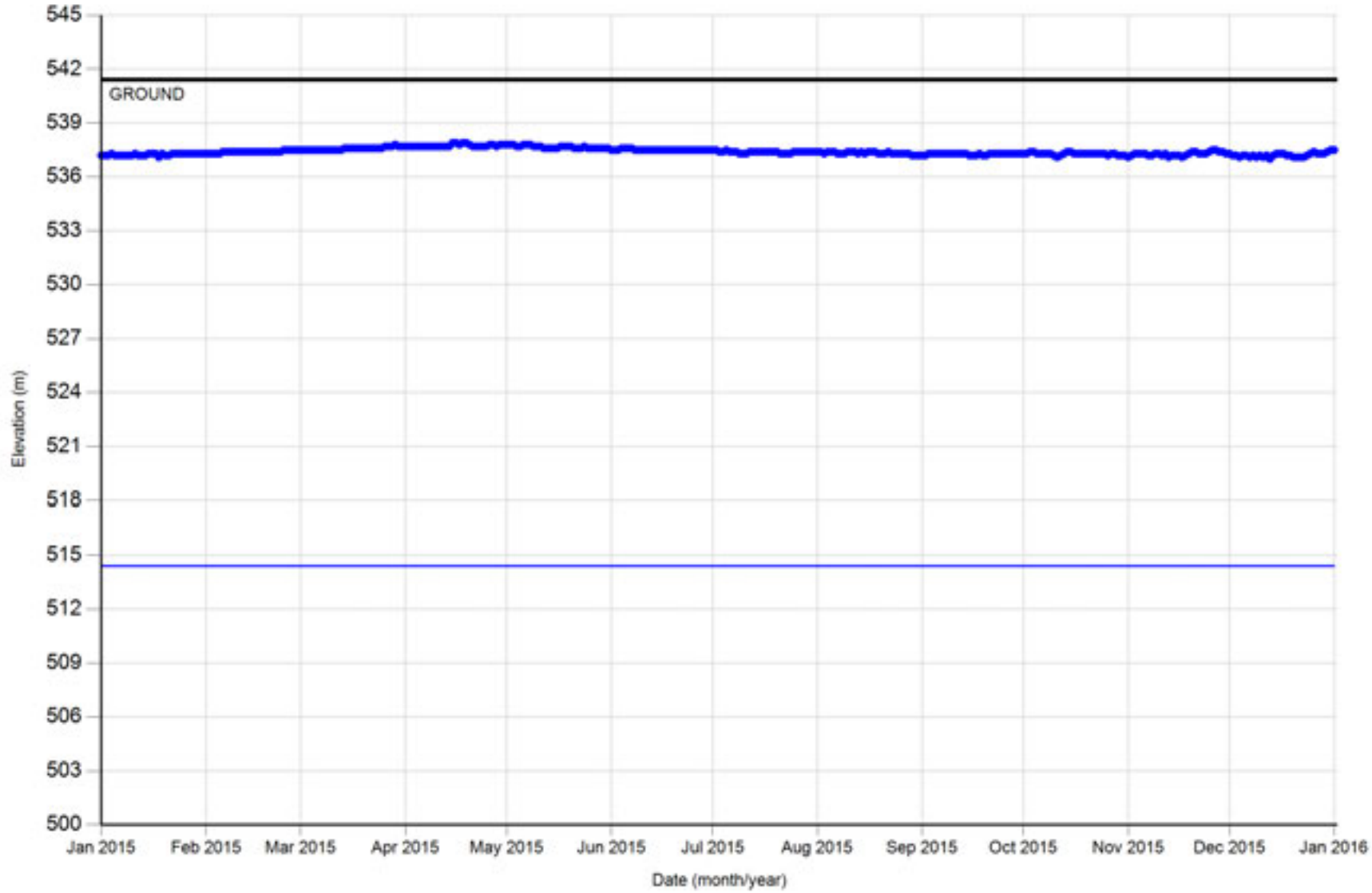
West Quesnel Land Stability Program

VWP 4A and B (Station 06)



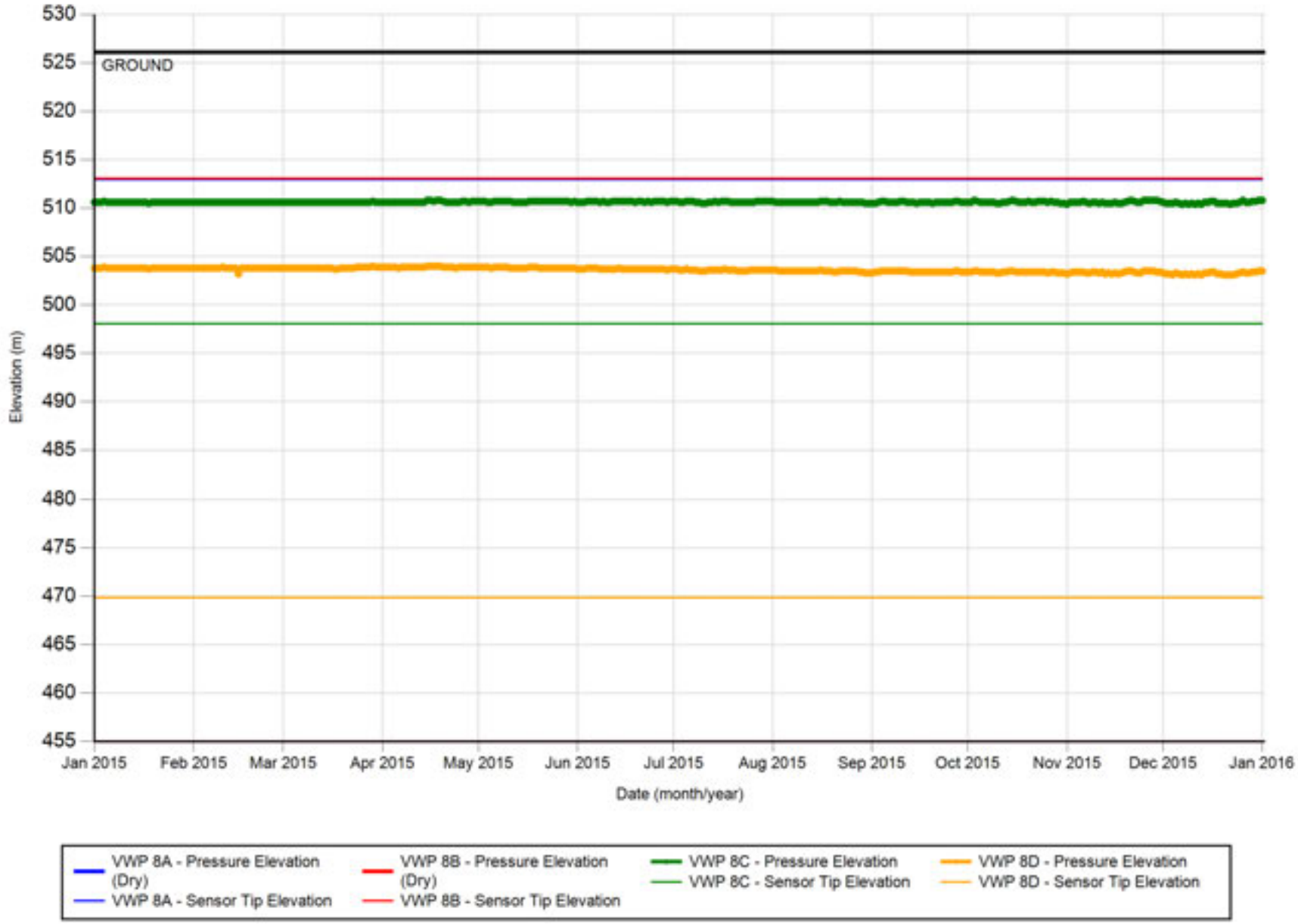
West Quesnel Land Stability Program

VWP 7A and B (Station 07)



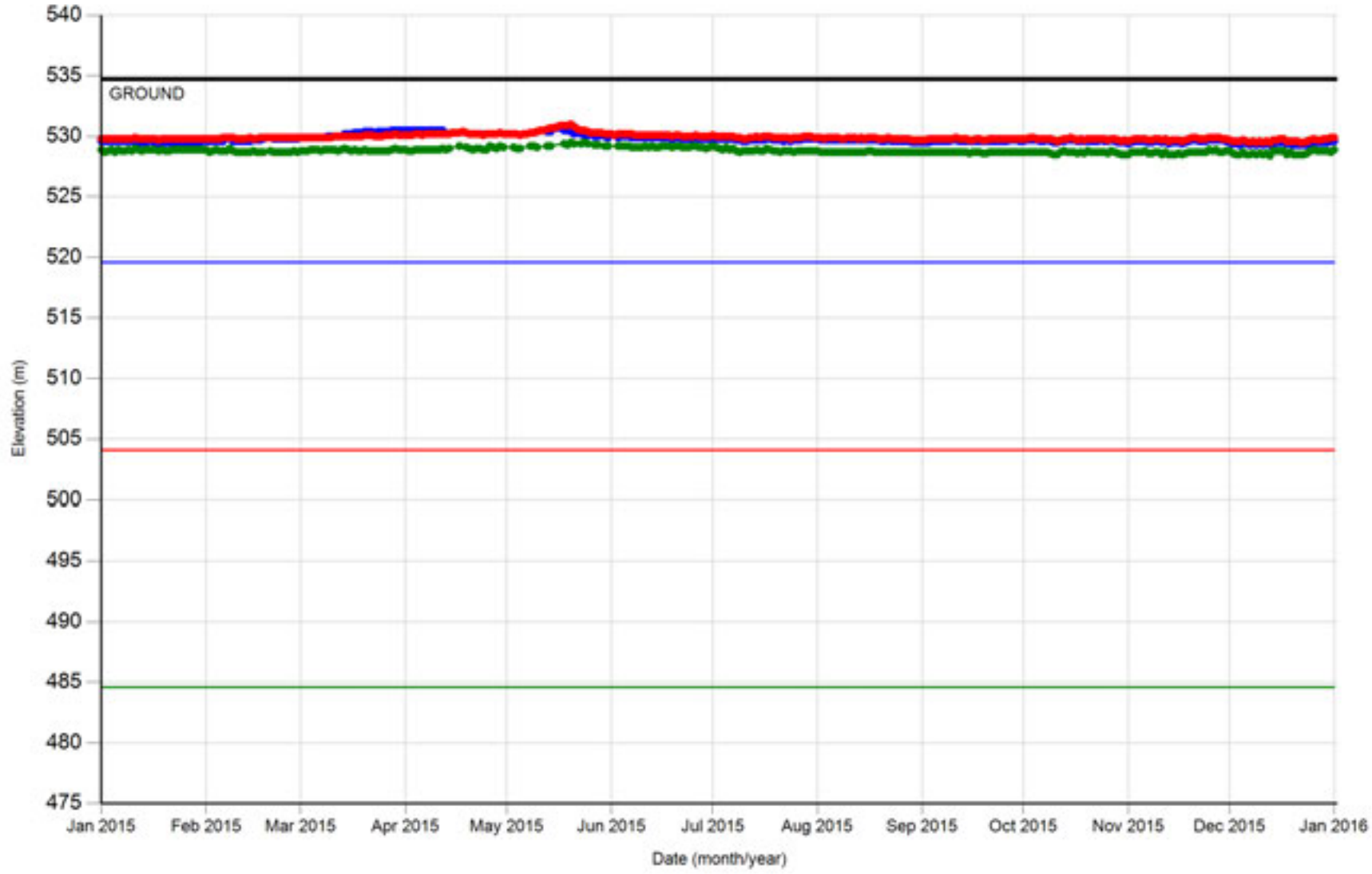
West Quesnel Land Stability Program

VWP 8A, B, C, and D (Station 08)



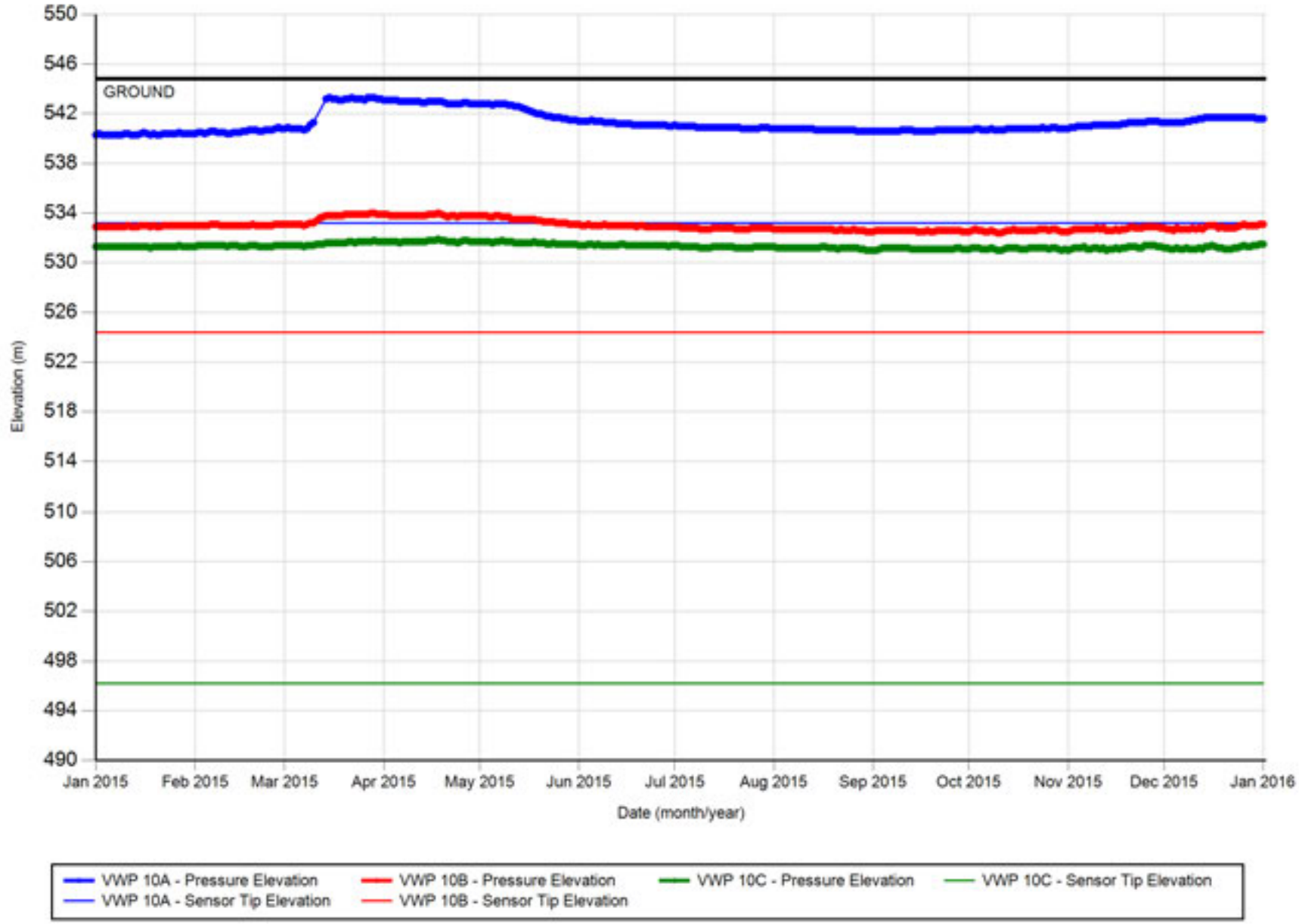
West Quesnel Land Stability Program

VWP 9A, B, and C (Station 09)



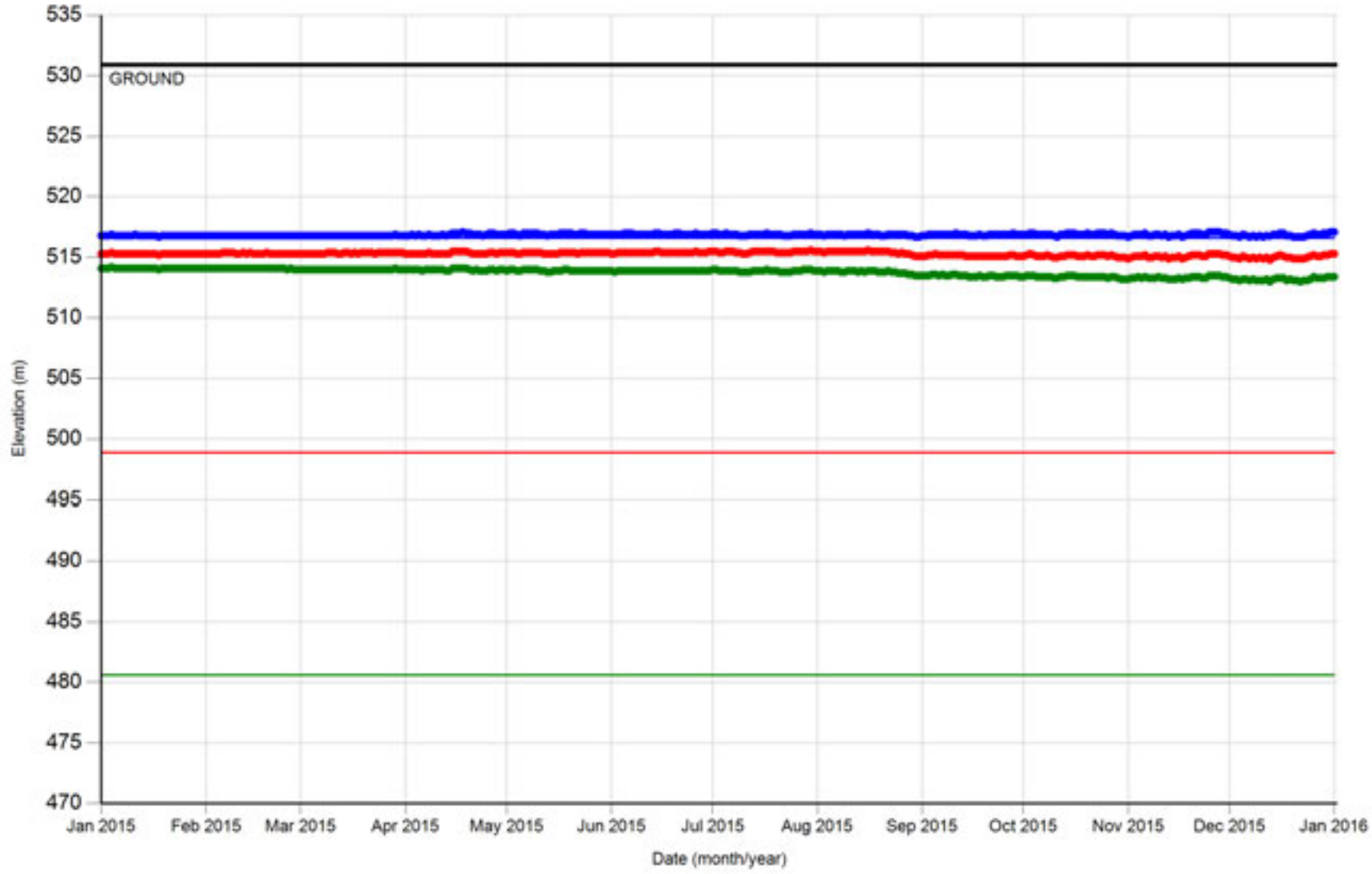
West Quesnel Land Stability Program

VWP 10A, B, and C (Station 10)



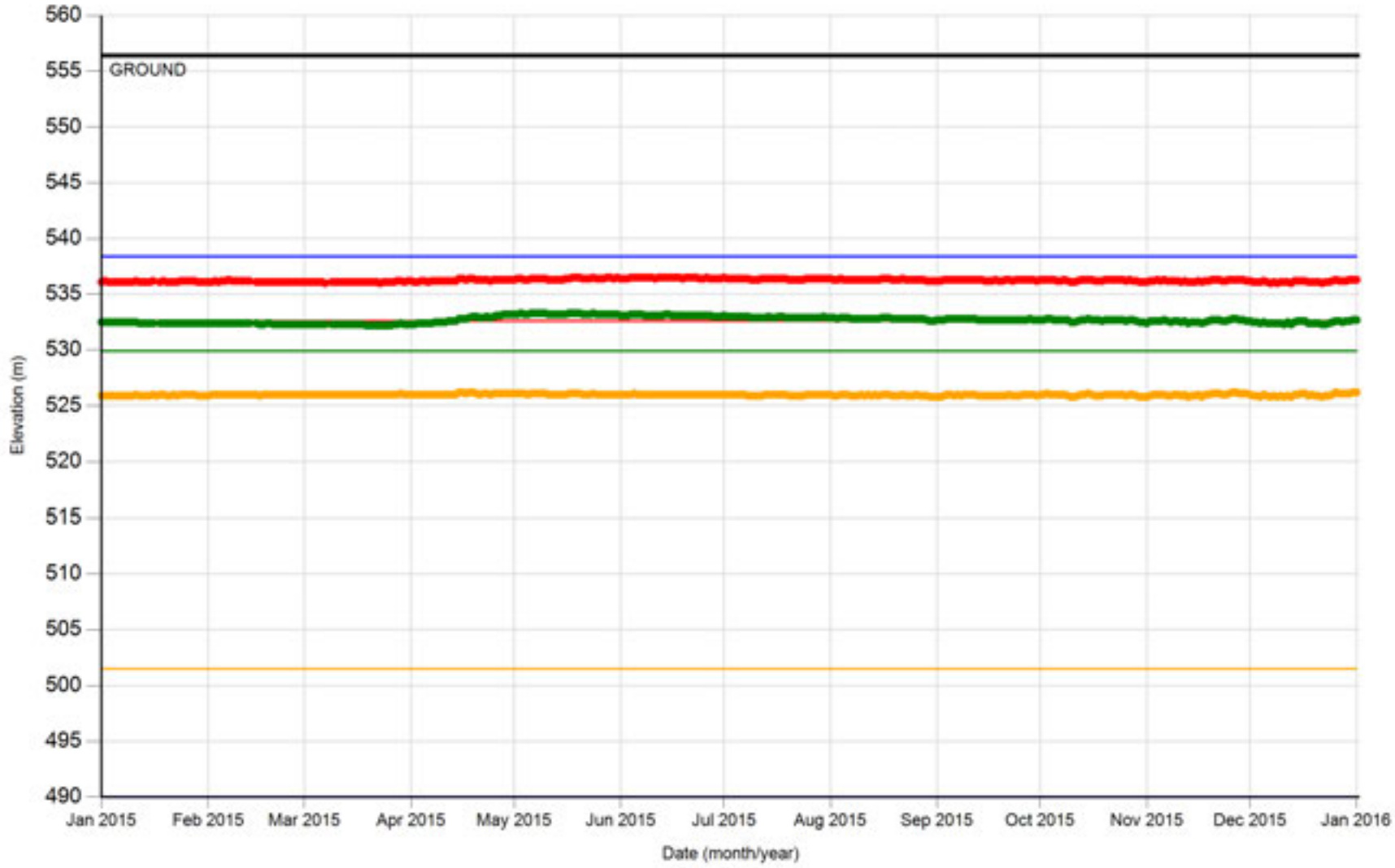
West Quesnel Land Stability Program

VWP 11A, B, and C (Station 11)



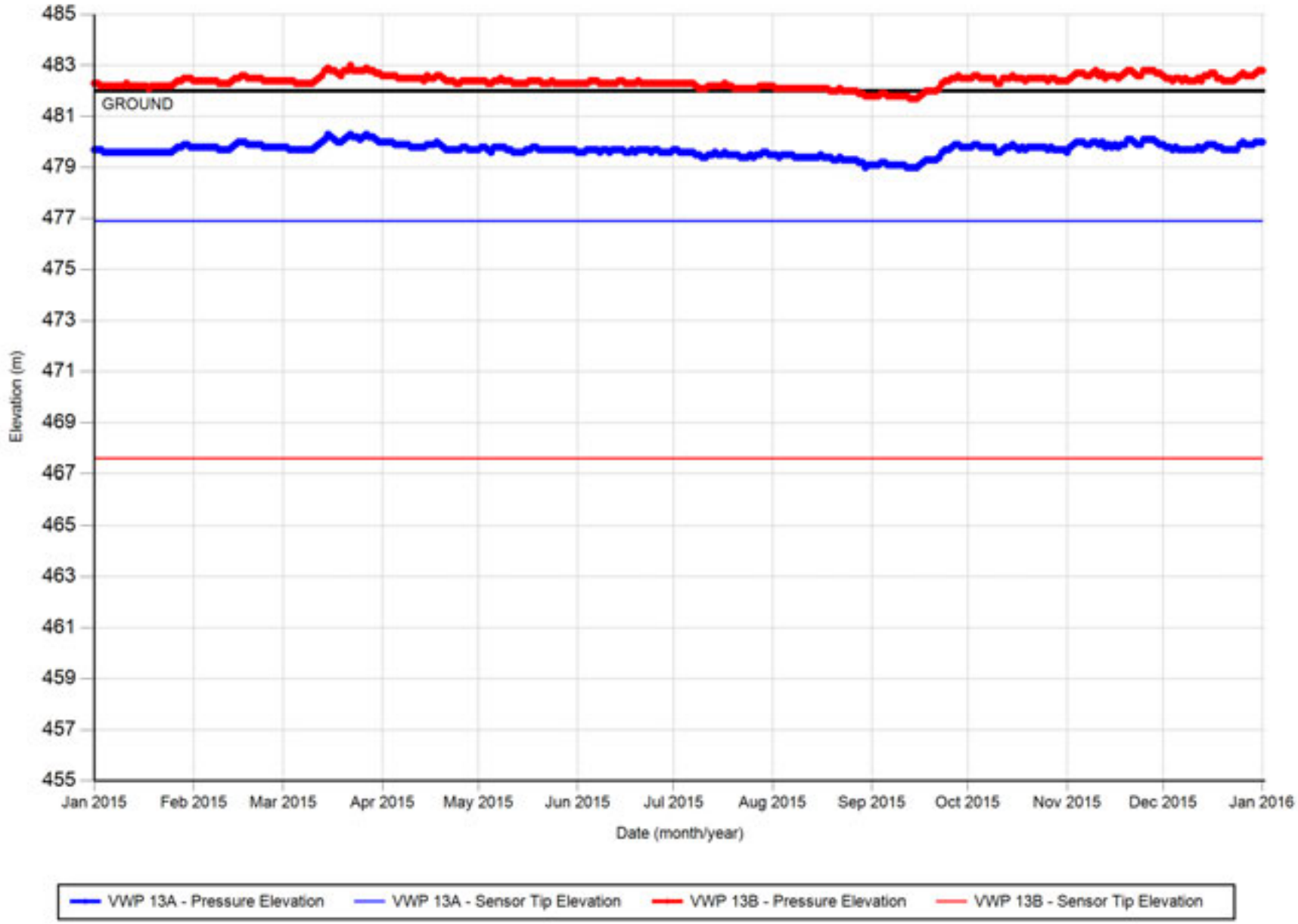
West Quesnel Land Stability Program

VWP 12A, B, C, and D (Station 16)



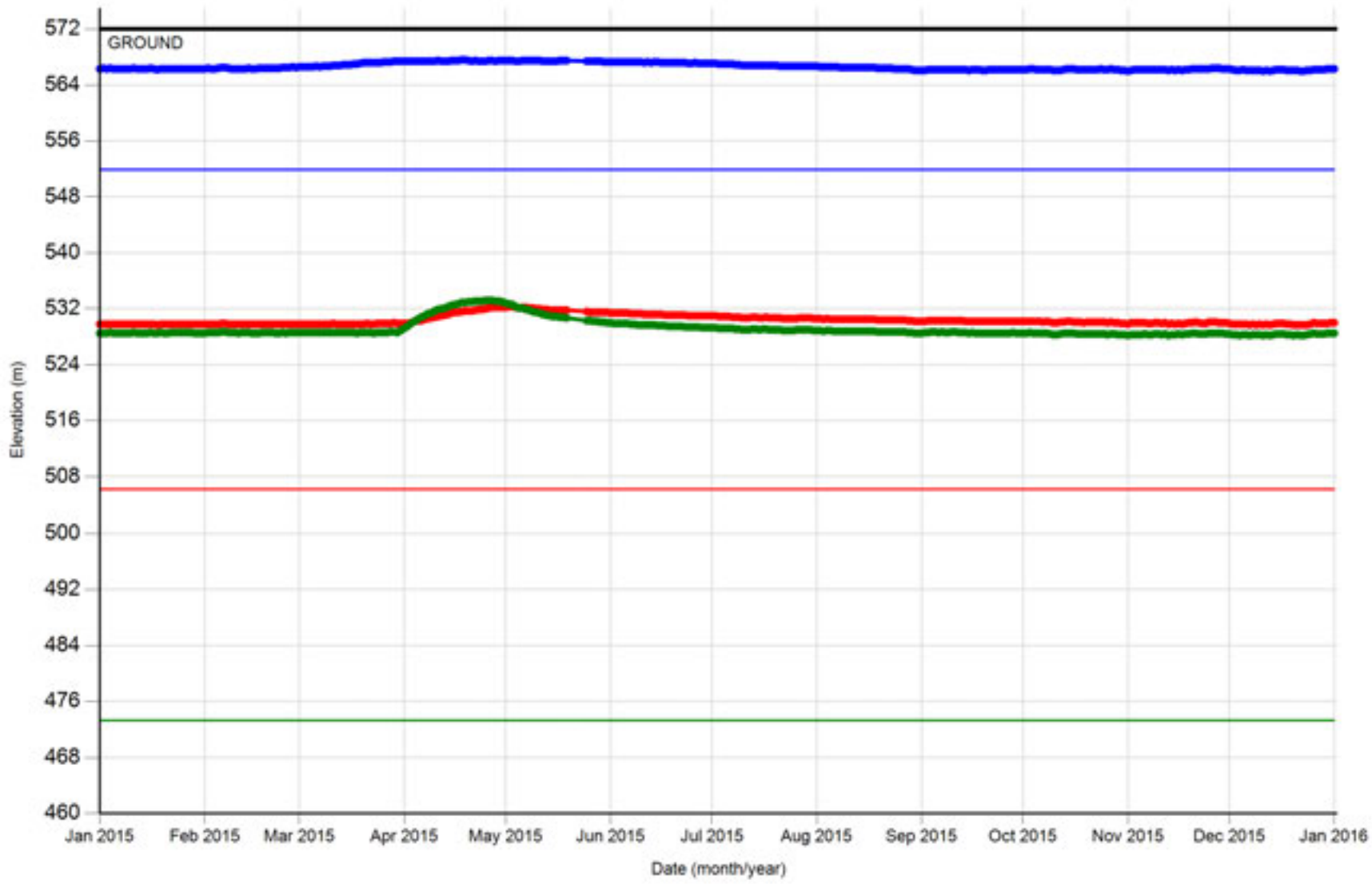
West Quesnel Land Stability Program

VWP 13A and B (Station 12)



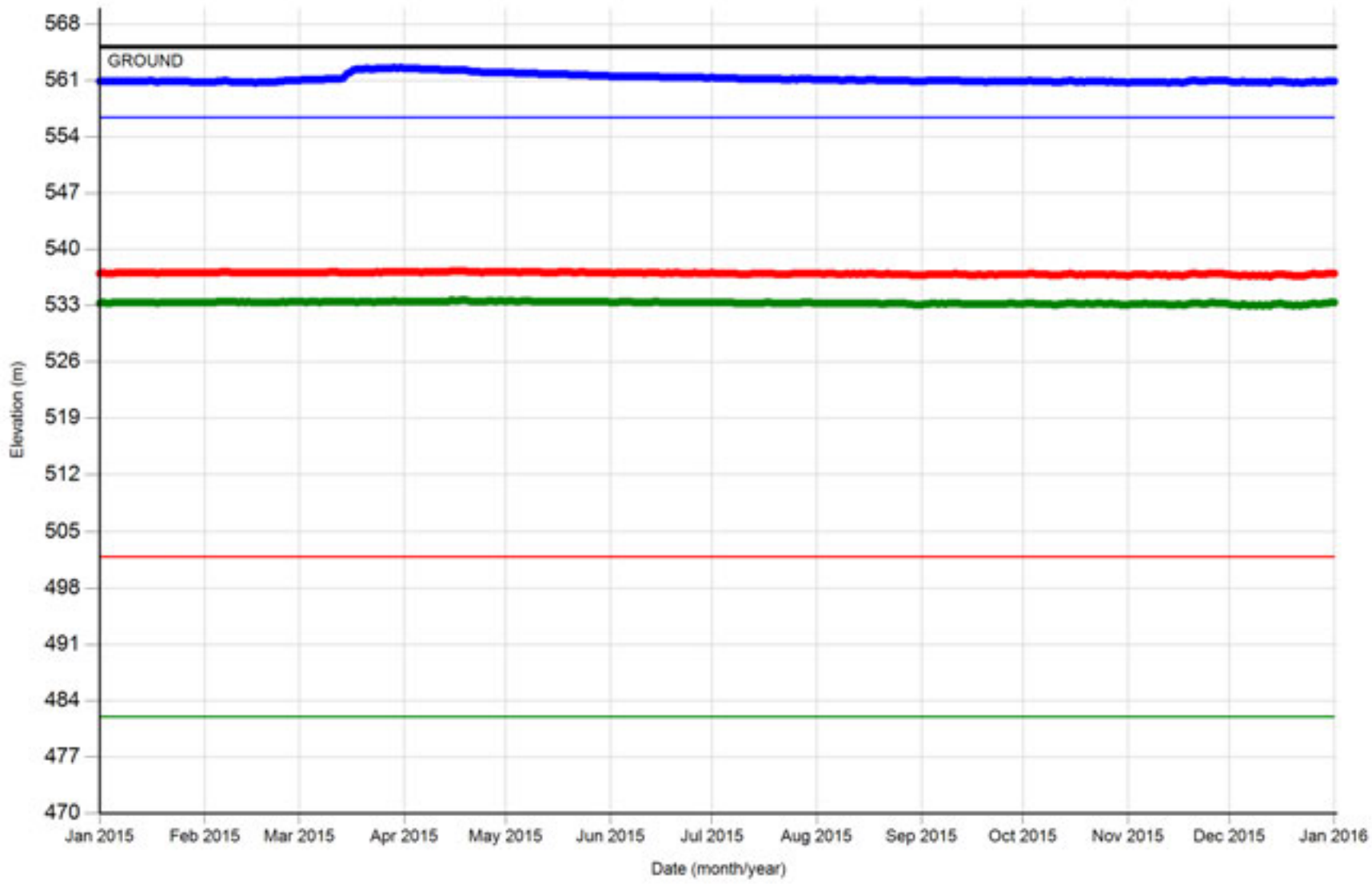
West Quesnel Land Stability Program

VWP 14A, B, and C (Station 13)



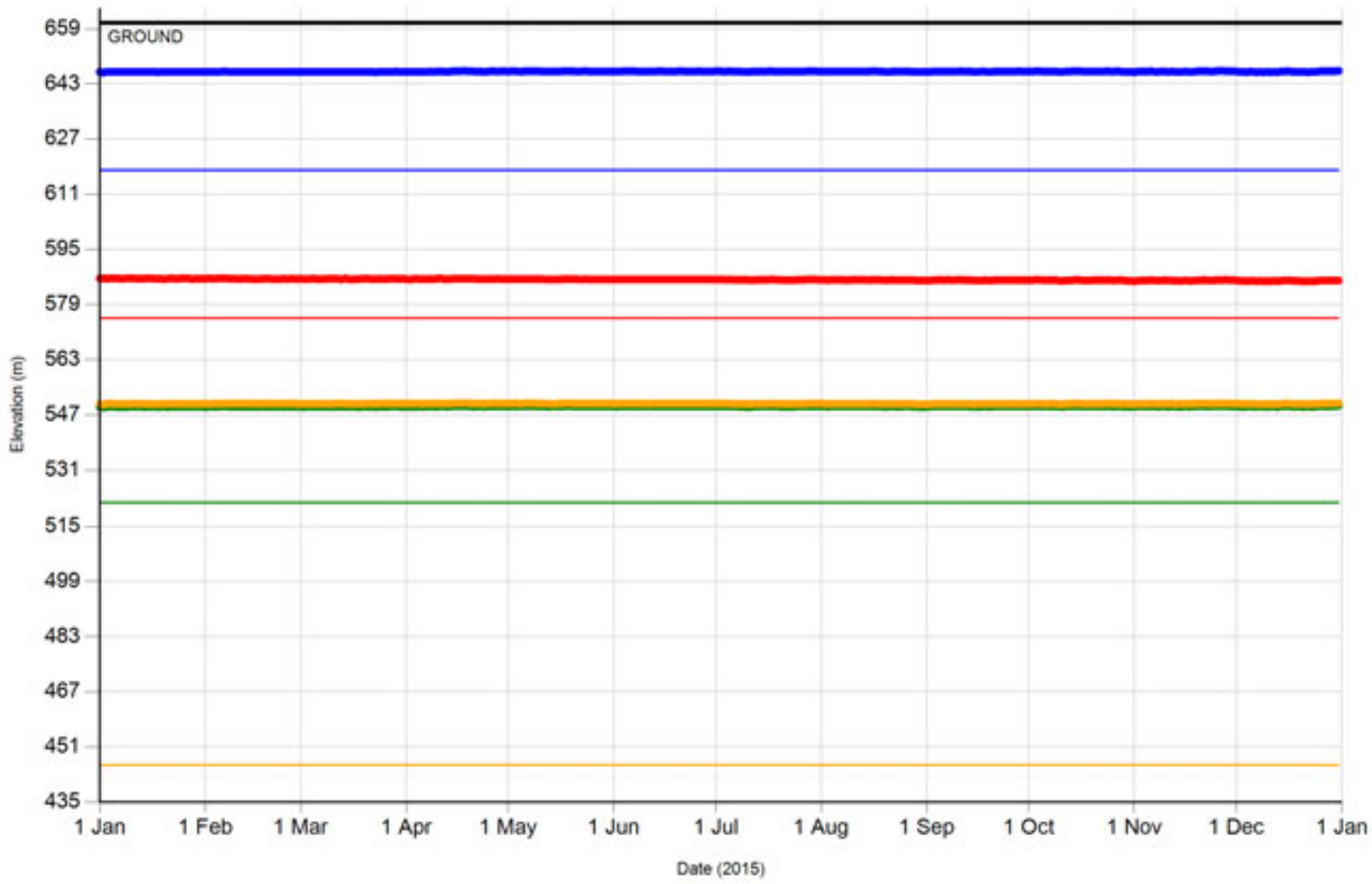
West Quesnel Land Stability Program

VWP 15A, B, and C (Station 14)



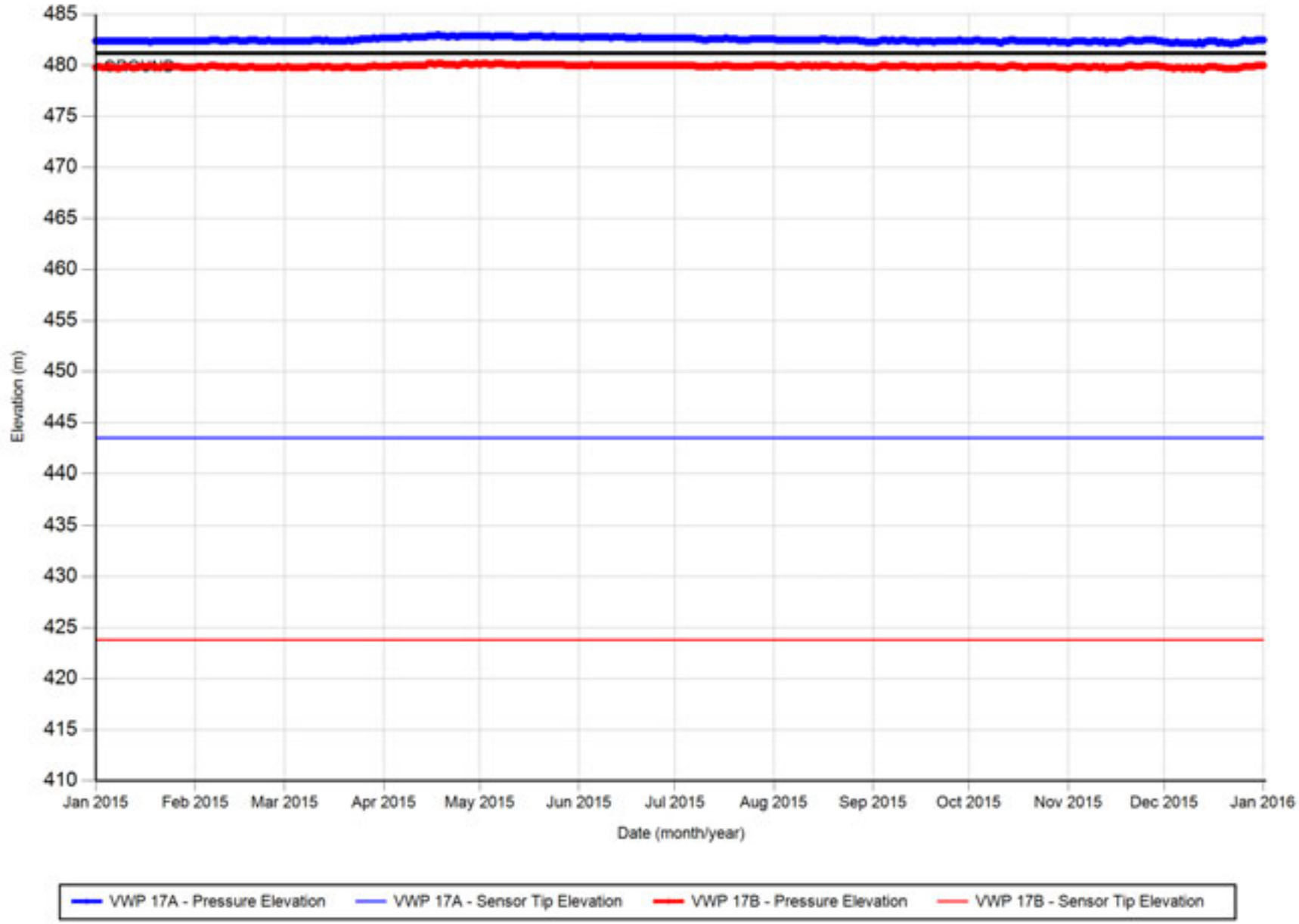
West Quesnel Land Stability Program

VWP 16A, B, C, and D (Station 15)



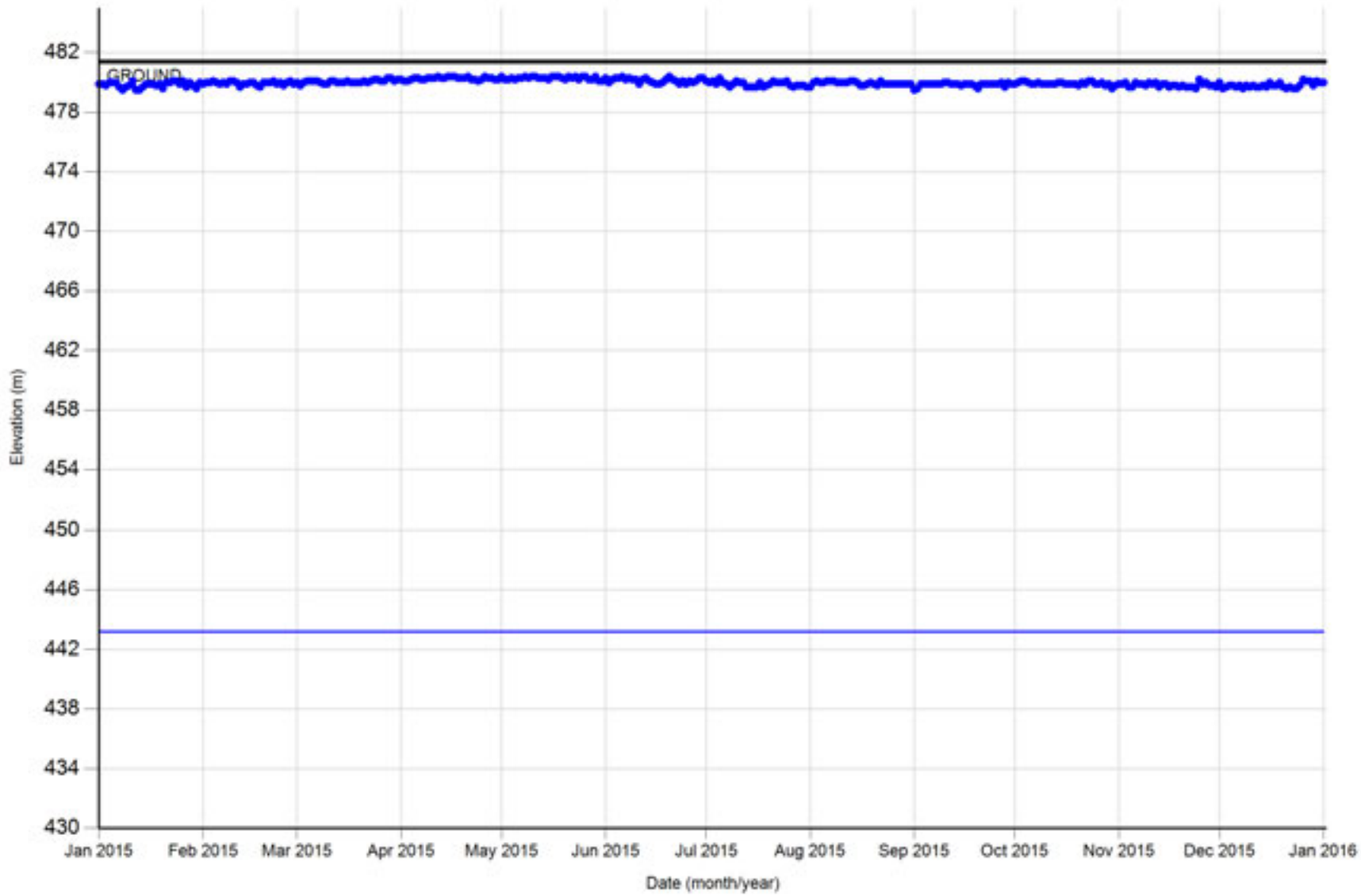
West Quesnel Land Stability Program

VWP 17A and B (Station 17)



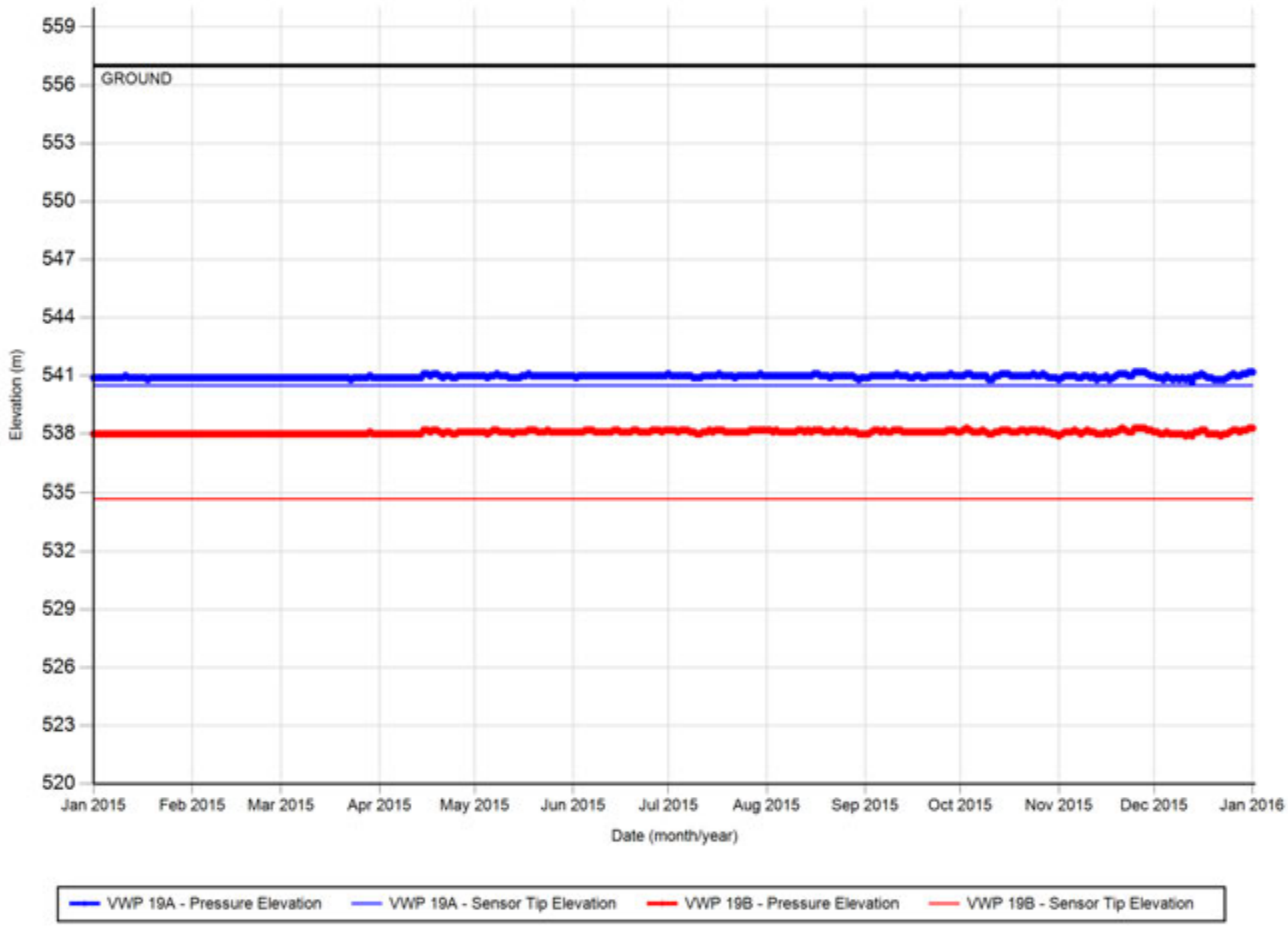
West Quesnel Land Stability Program

VWP 18A (Station 17)



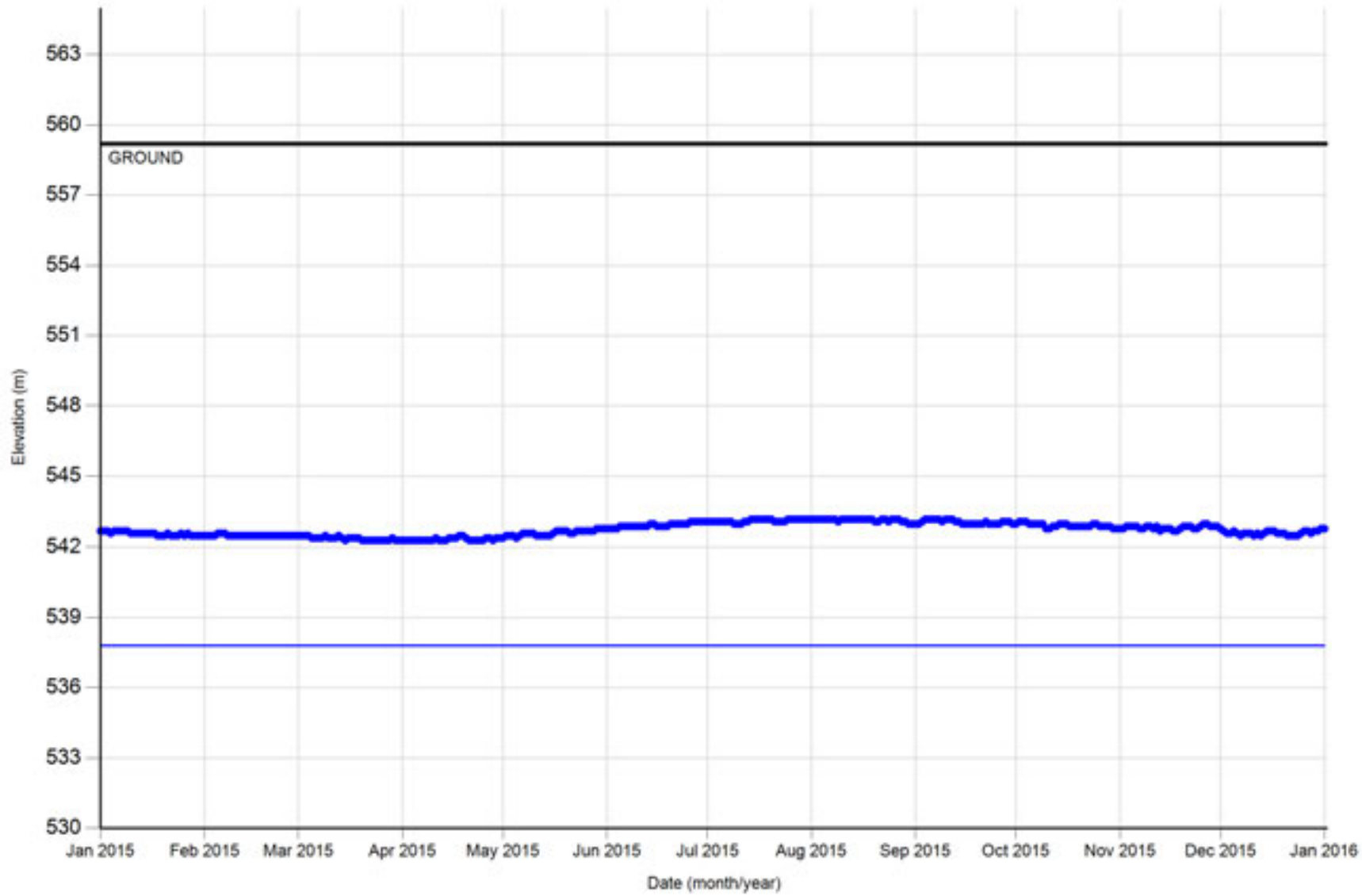
West Quesnel Land Stability Program

VWP 19A and B (Station 16)



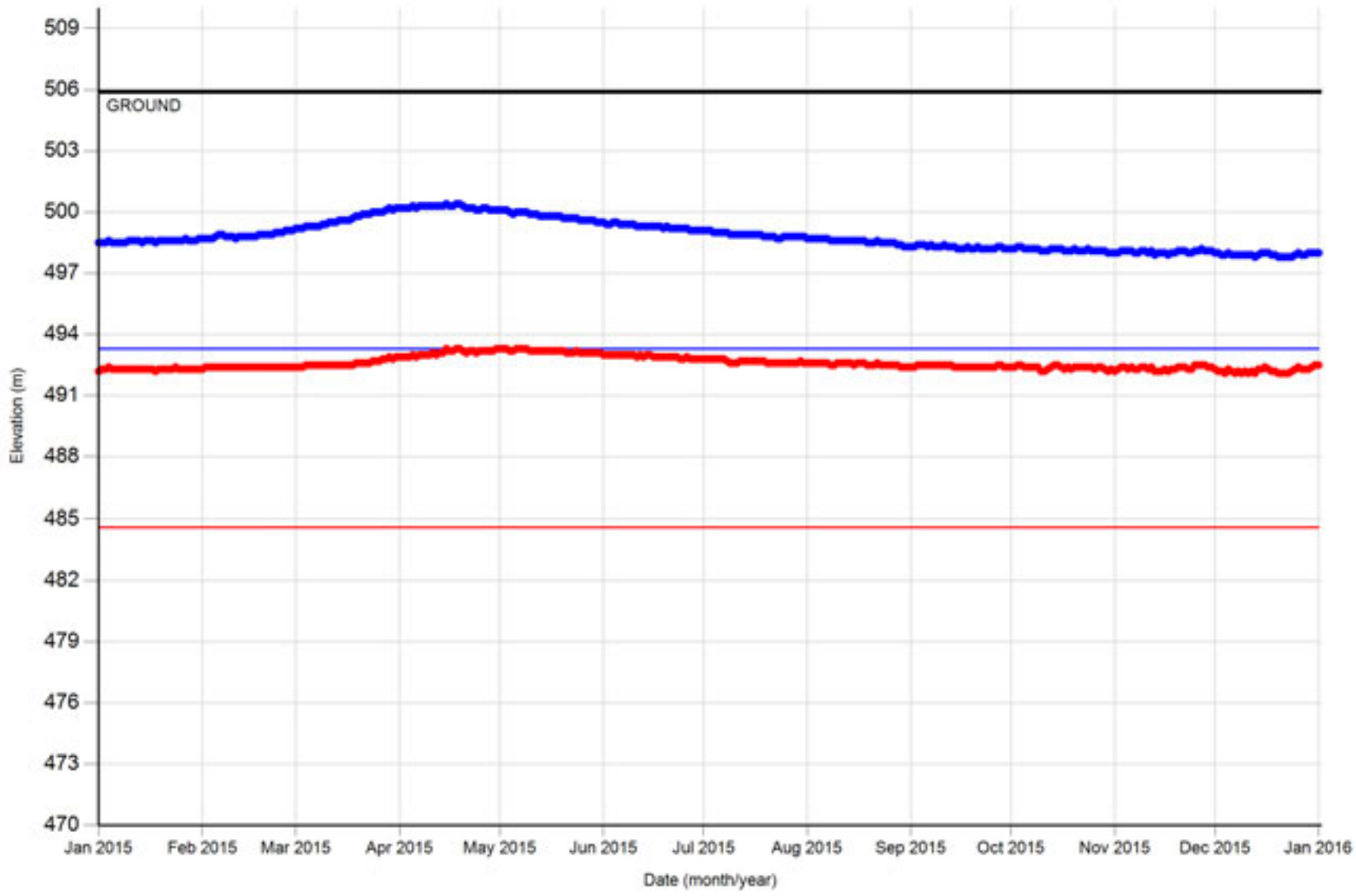
West Quesnel Land Stability Program

VWP 20 (Station 16)



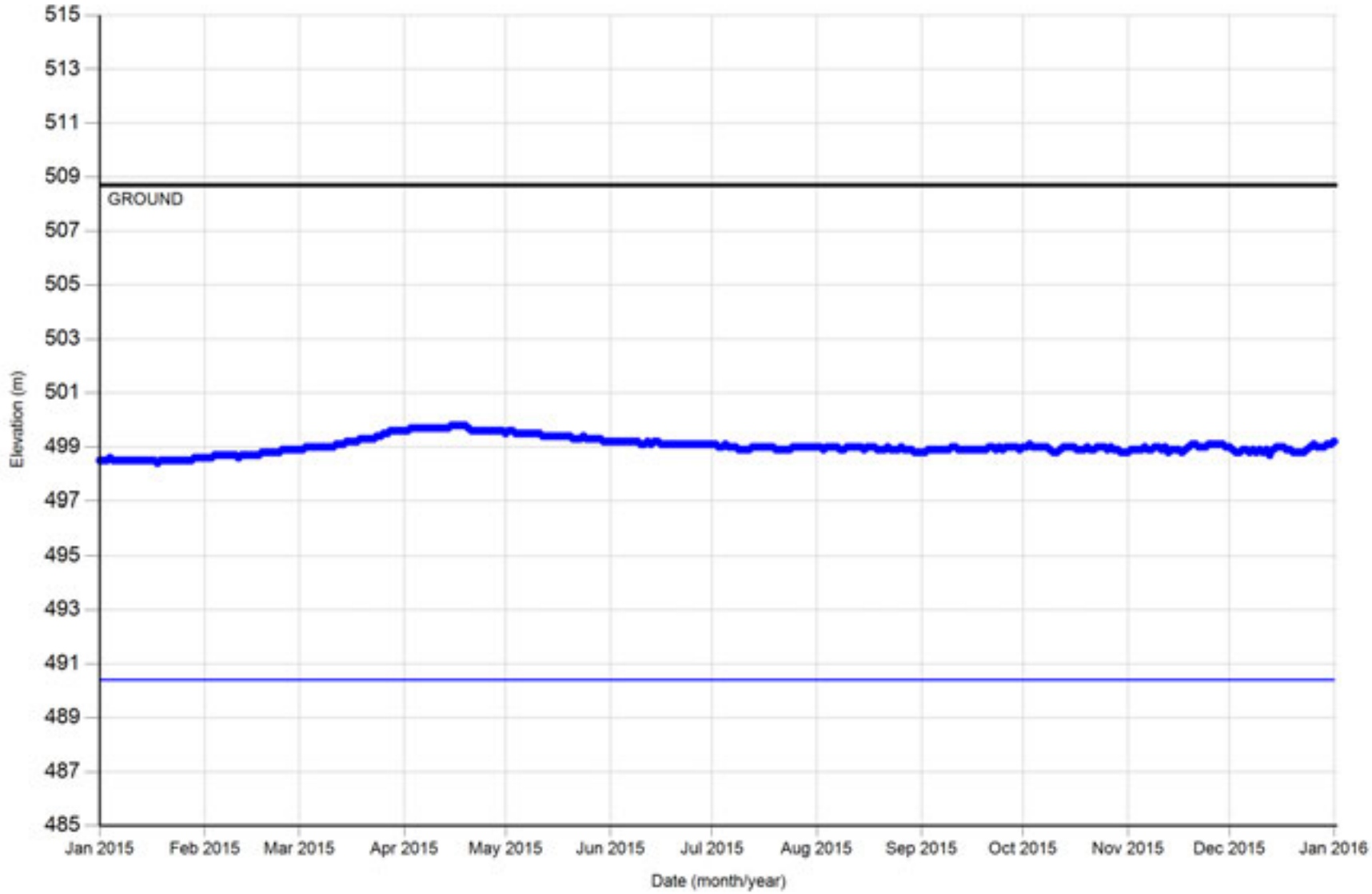
West Quesnel Land Stability Program

VWP 21A and B (Station 19)



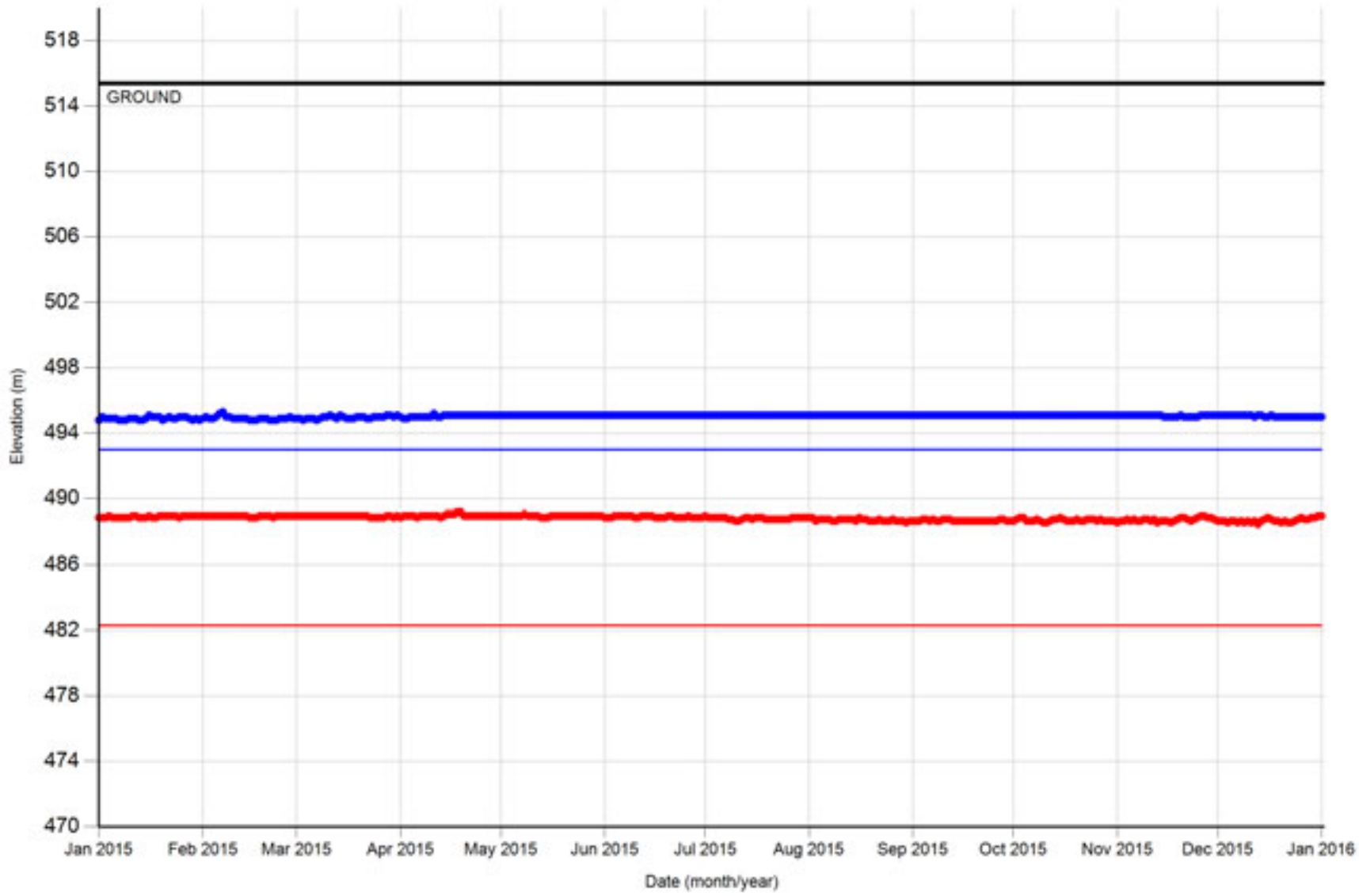
West Quesnel Land Stability Program

VWP 22 (Station 19)



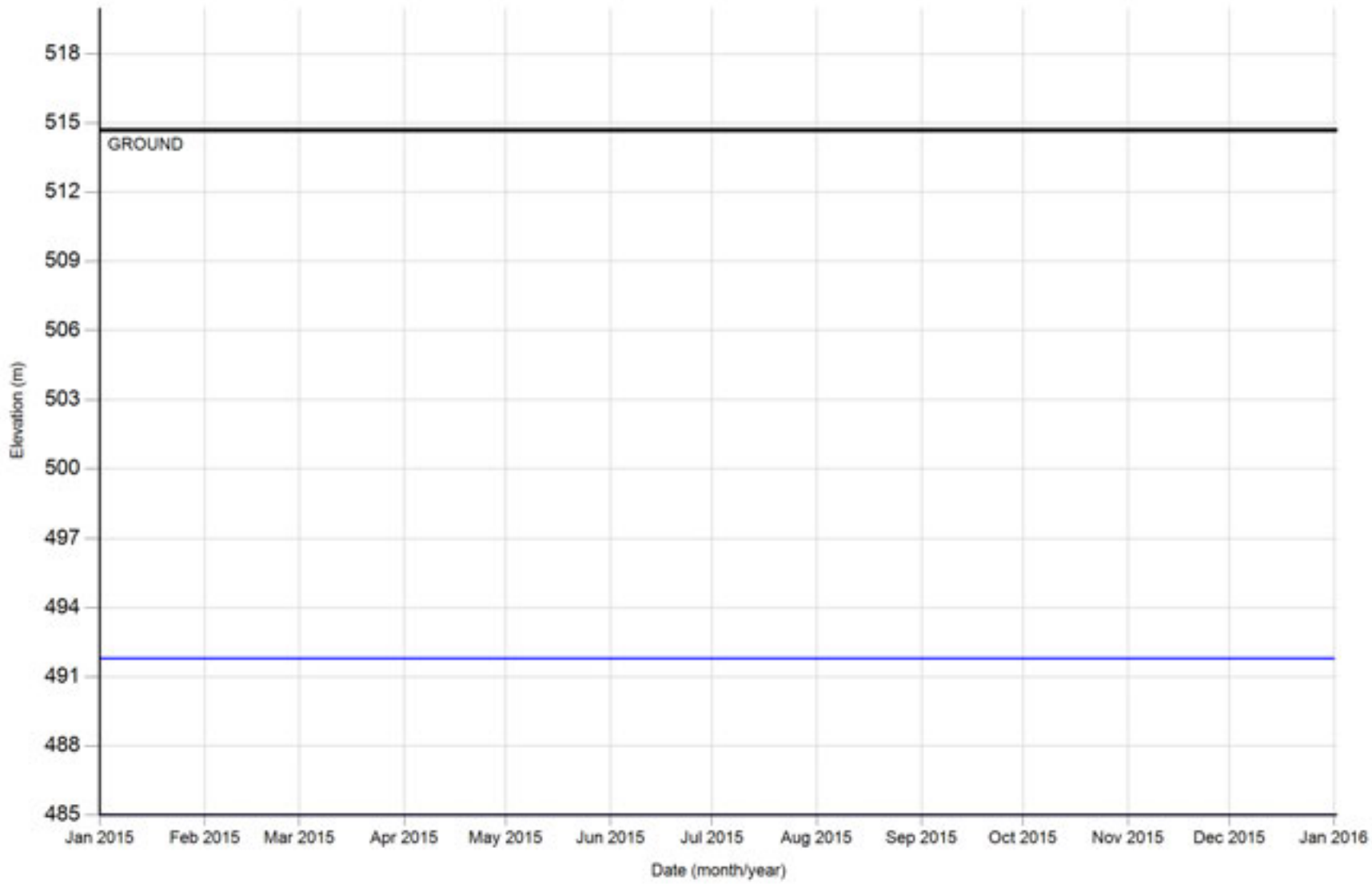
West Quesnel Land Stability Program

VWP 23A and B (Station 18)



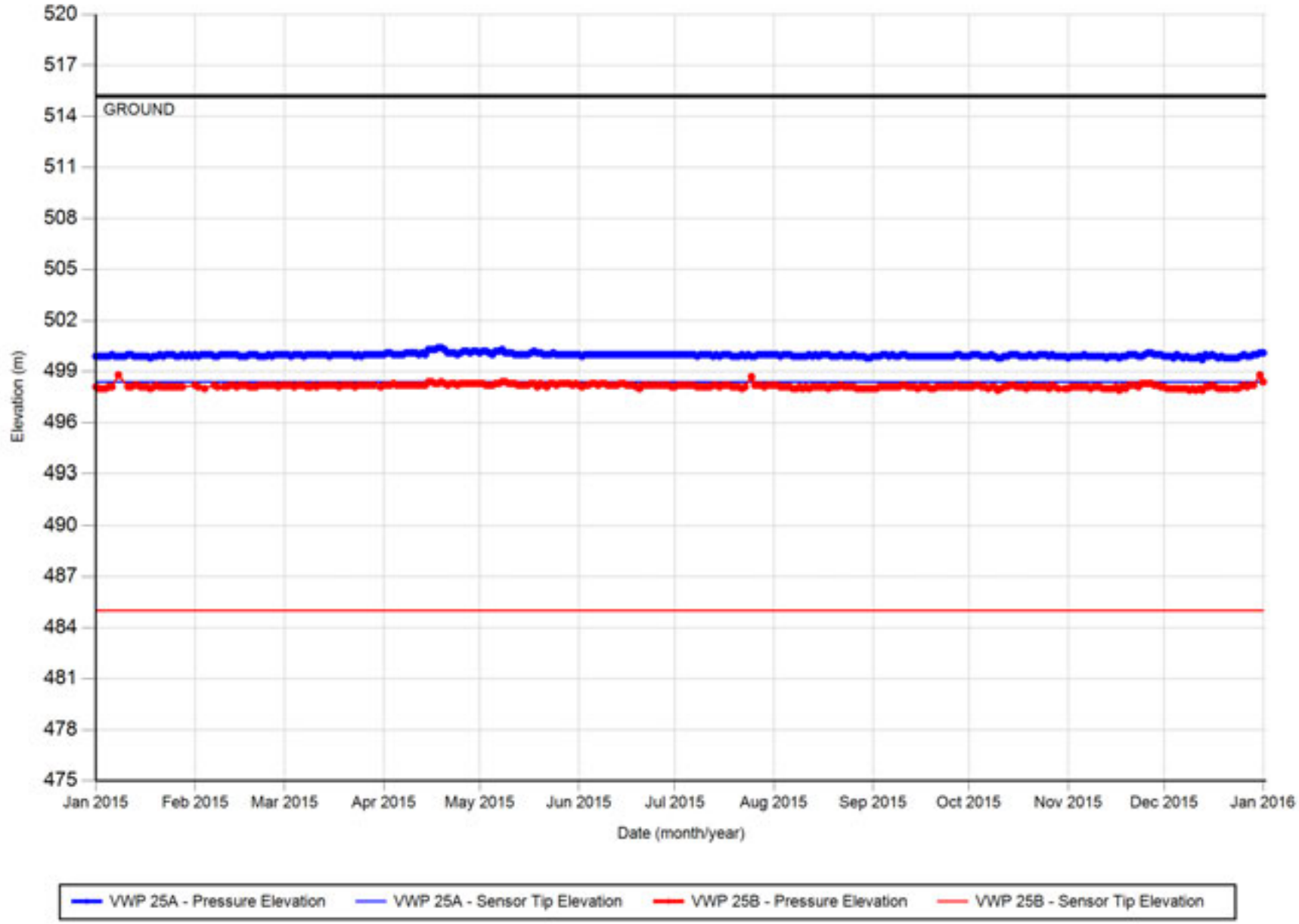
West Quesnel Land Stability Program

VWP 24 (Station 18)



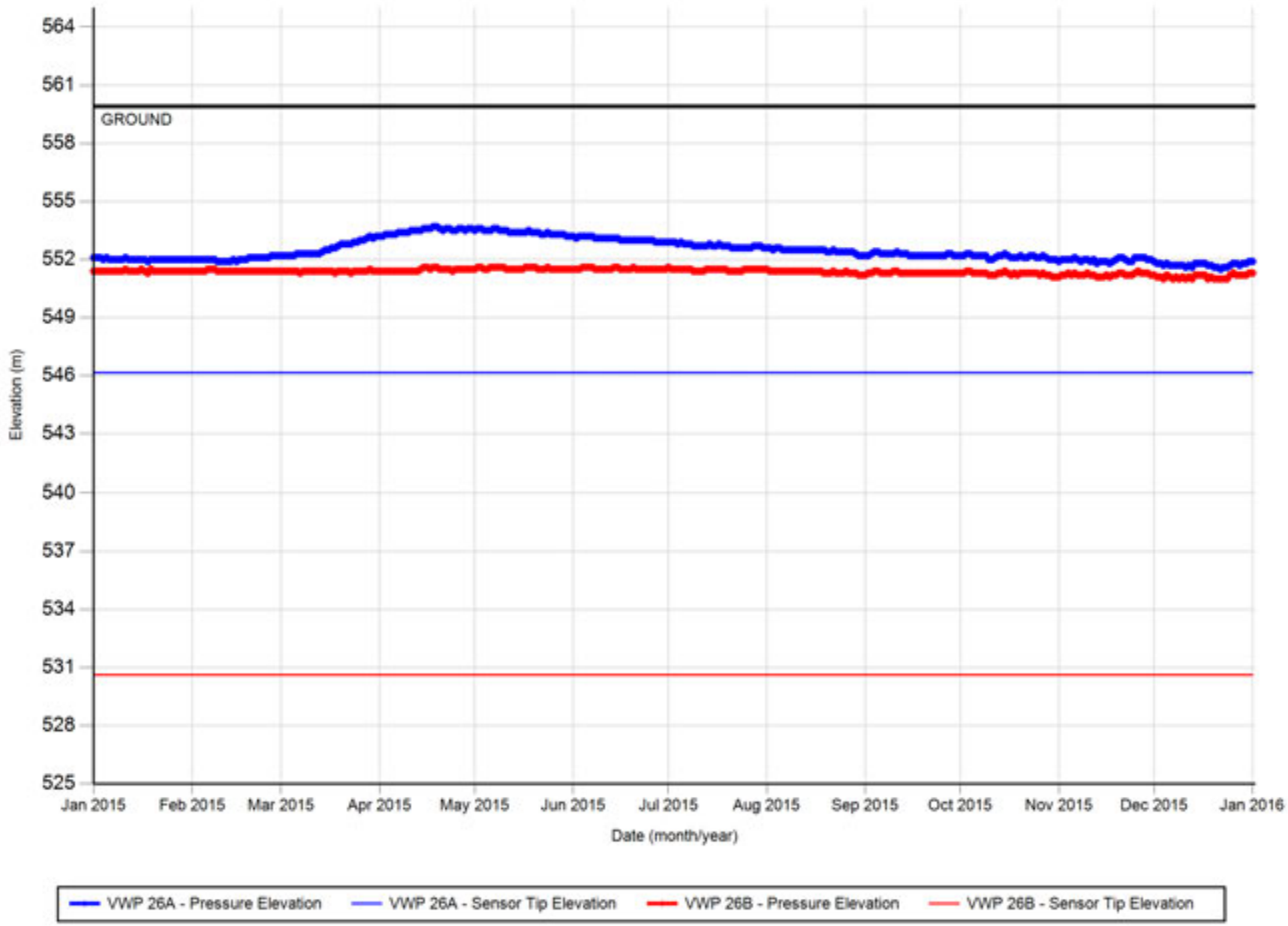
West Quesnel Land Stability Program

VWP 25A and B(Station 18)



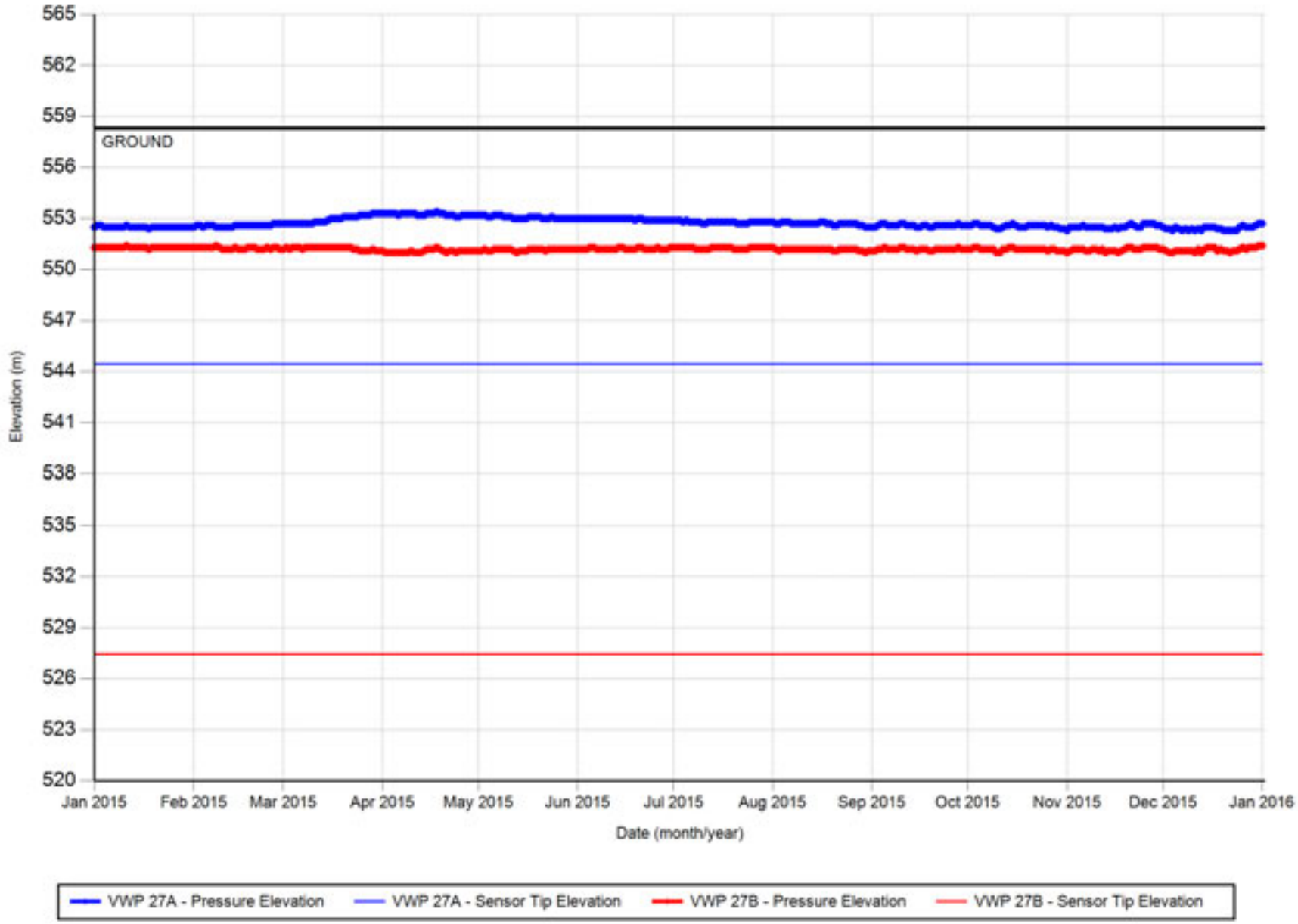
West Quesnel Land Stability Program

VWP 26A and B (Station 04)



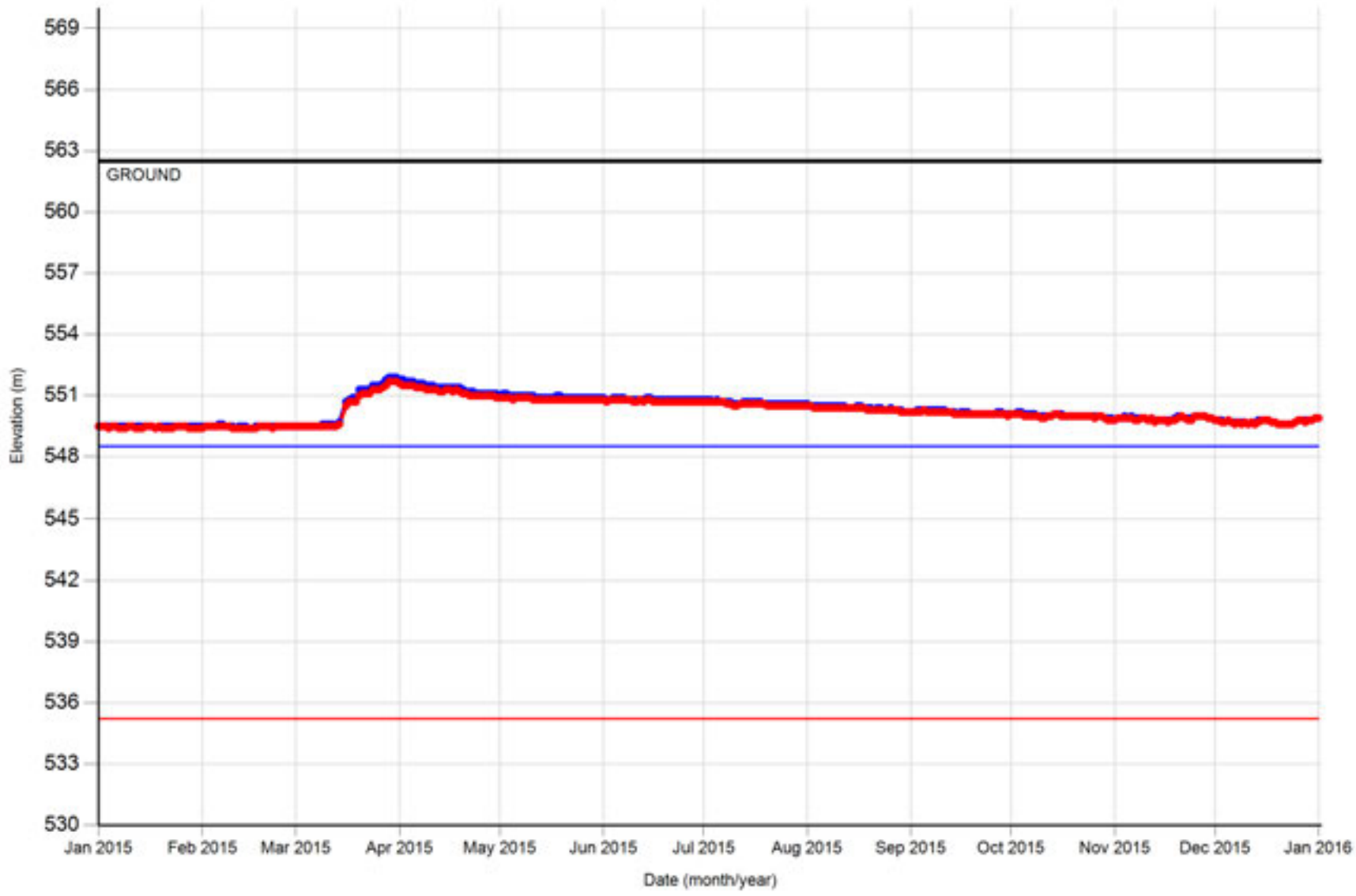
West Quesnel Land Stability Program

VWP 27A and B (Station 04)



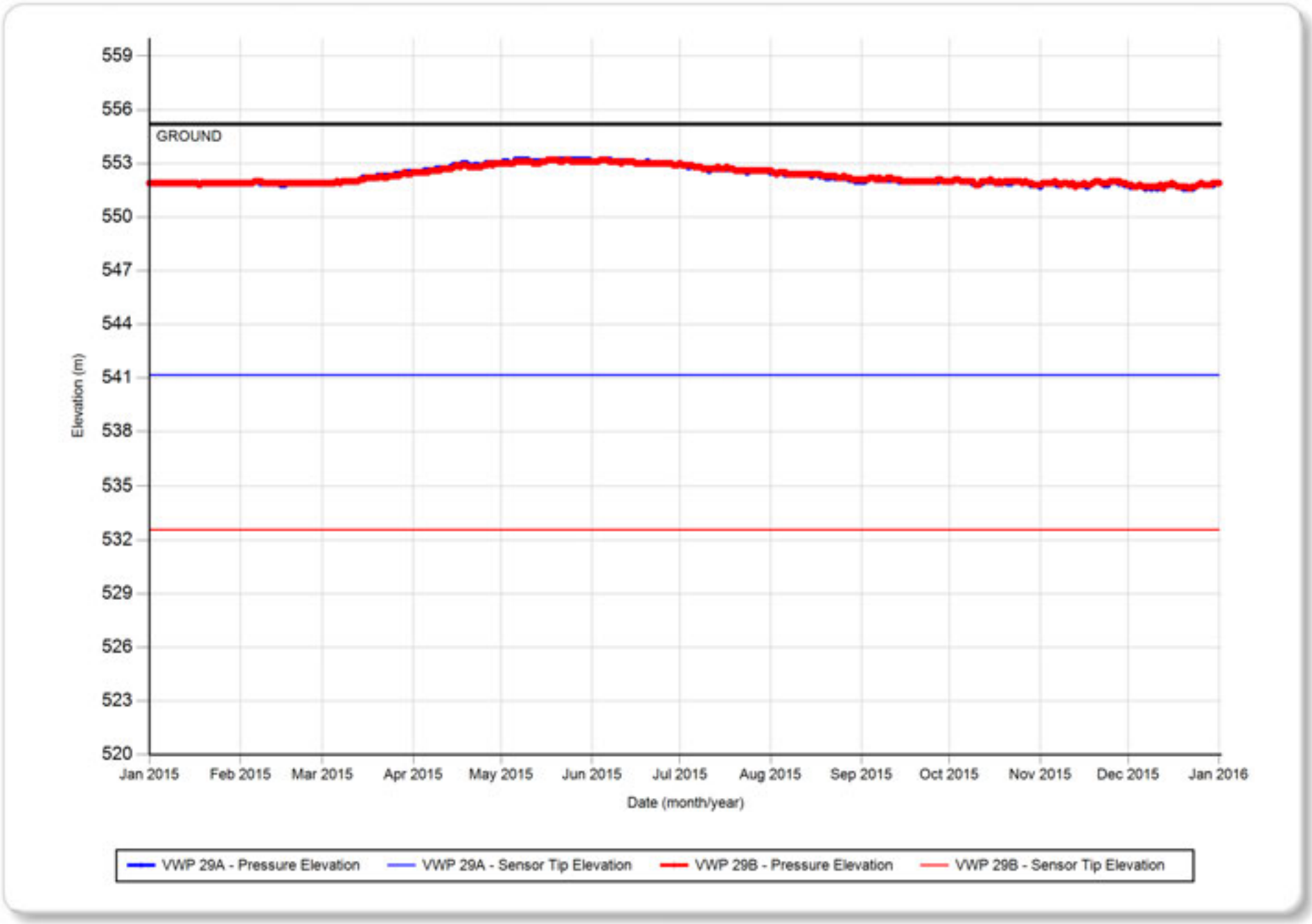
West Quesnel Land Stability Program

VWP 28A and B (Station 21)



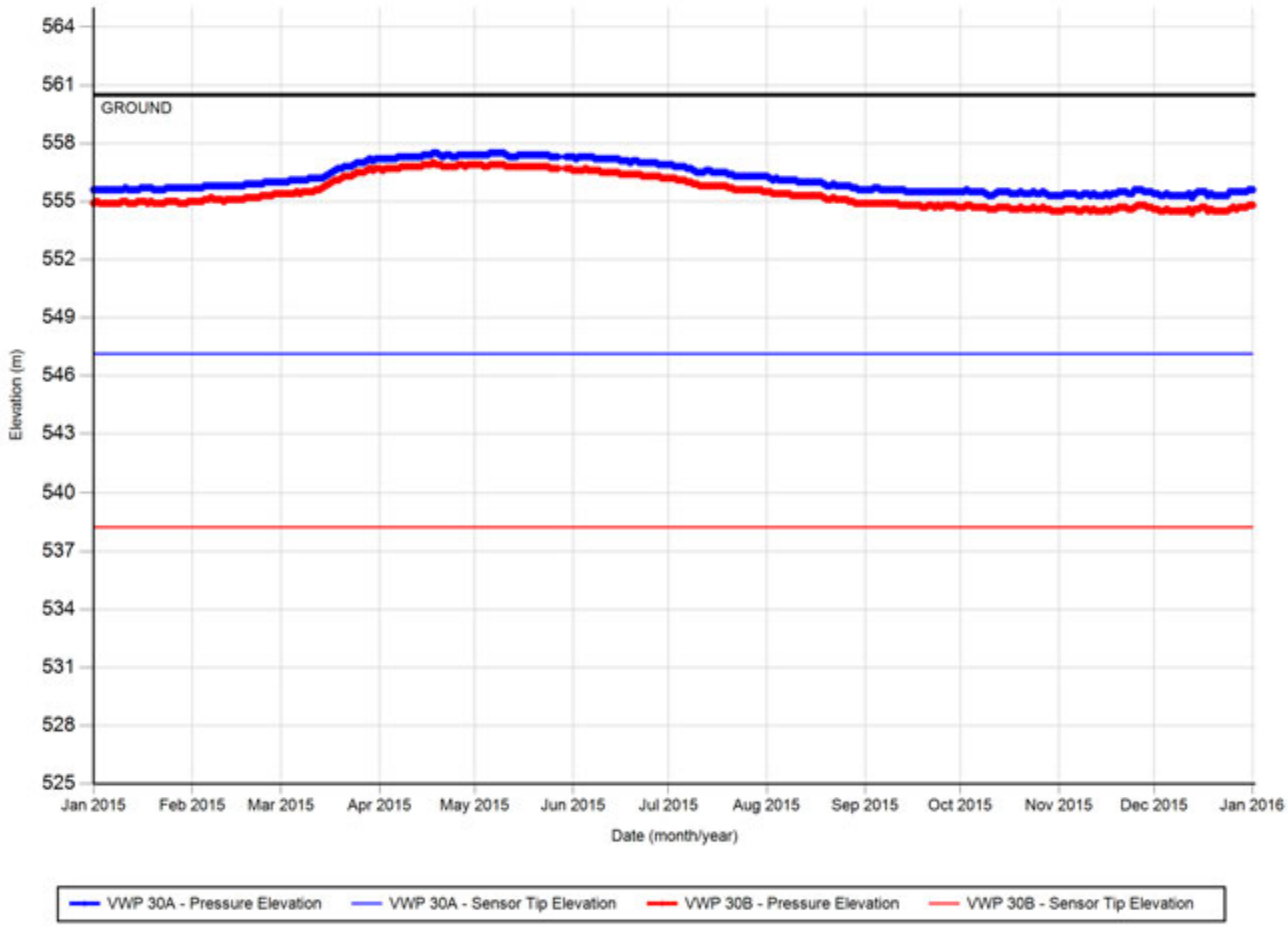
West Quesnel Land Stability Program

VWP 29A and B (Station 21)



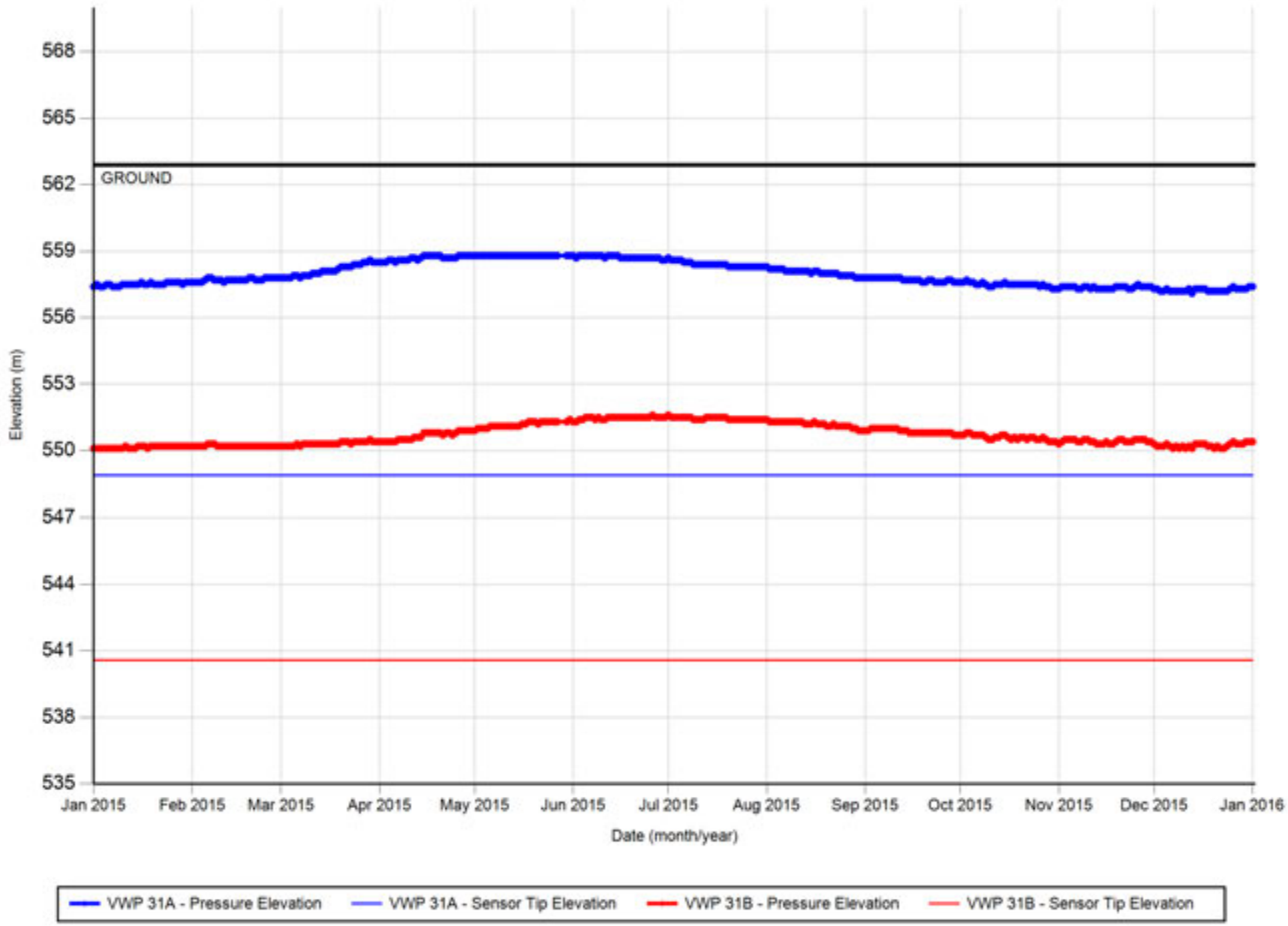
West Quesnel Land Stability Program

VWP 30A and B (Station 20)



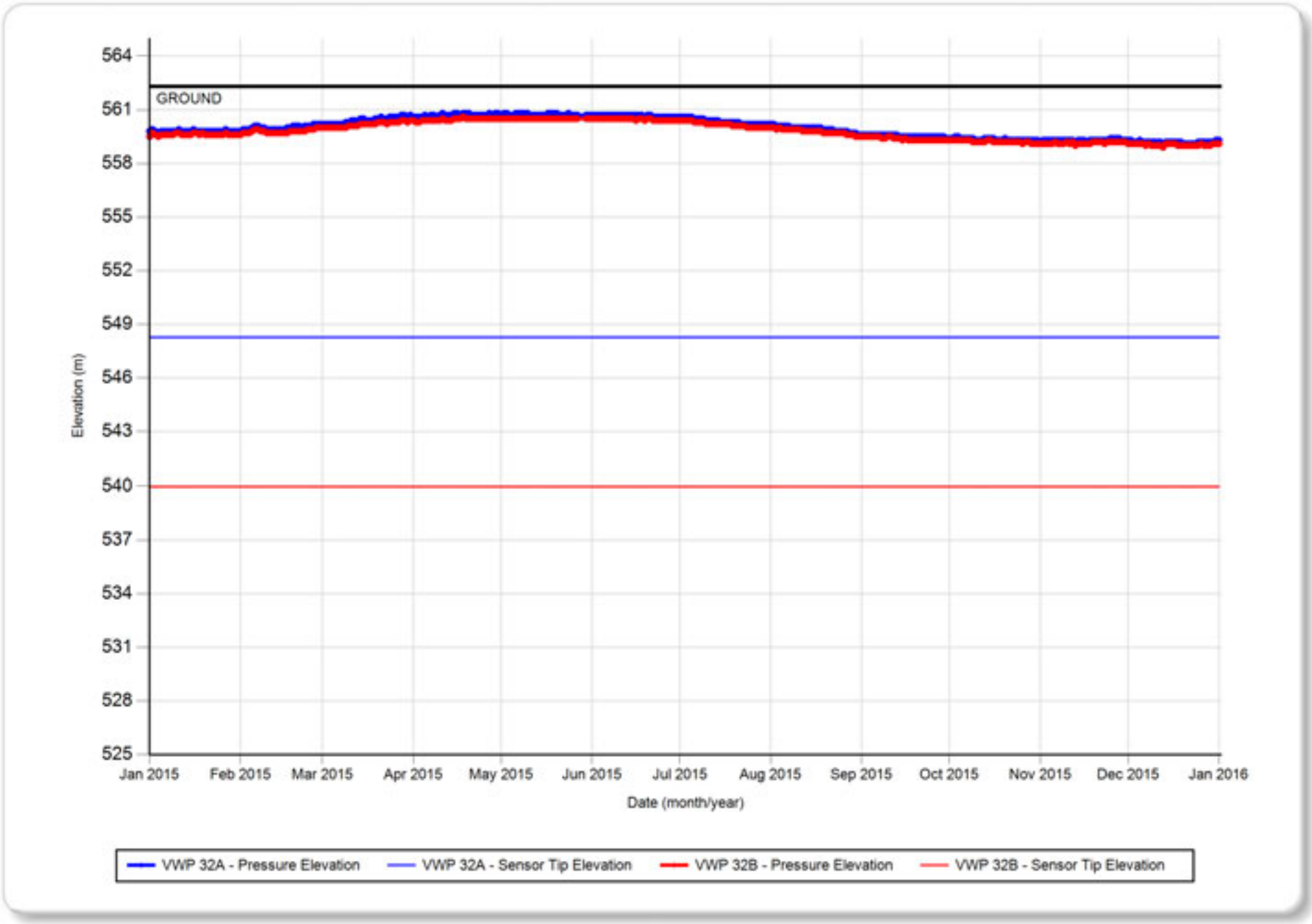
West Quesnel Land Stability Program

VWP 31A and B (Station 20)



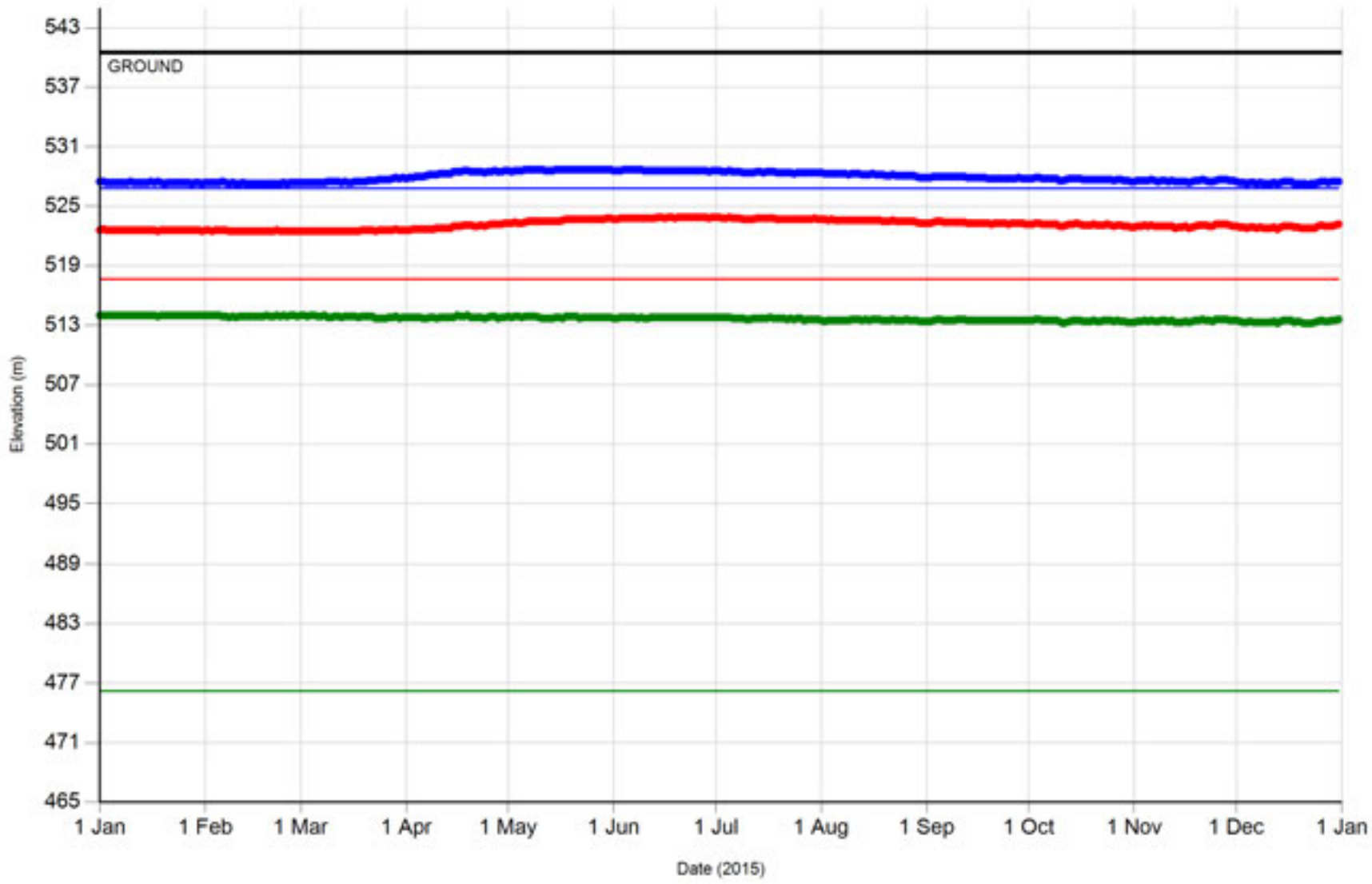
West Quesnel Land Stability Program

VWP 32A and B (Station 20)



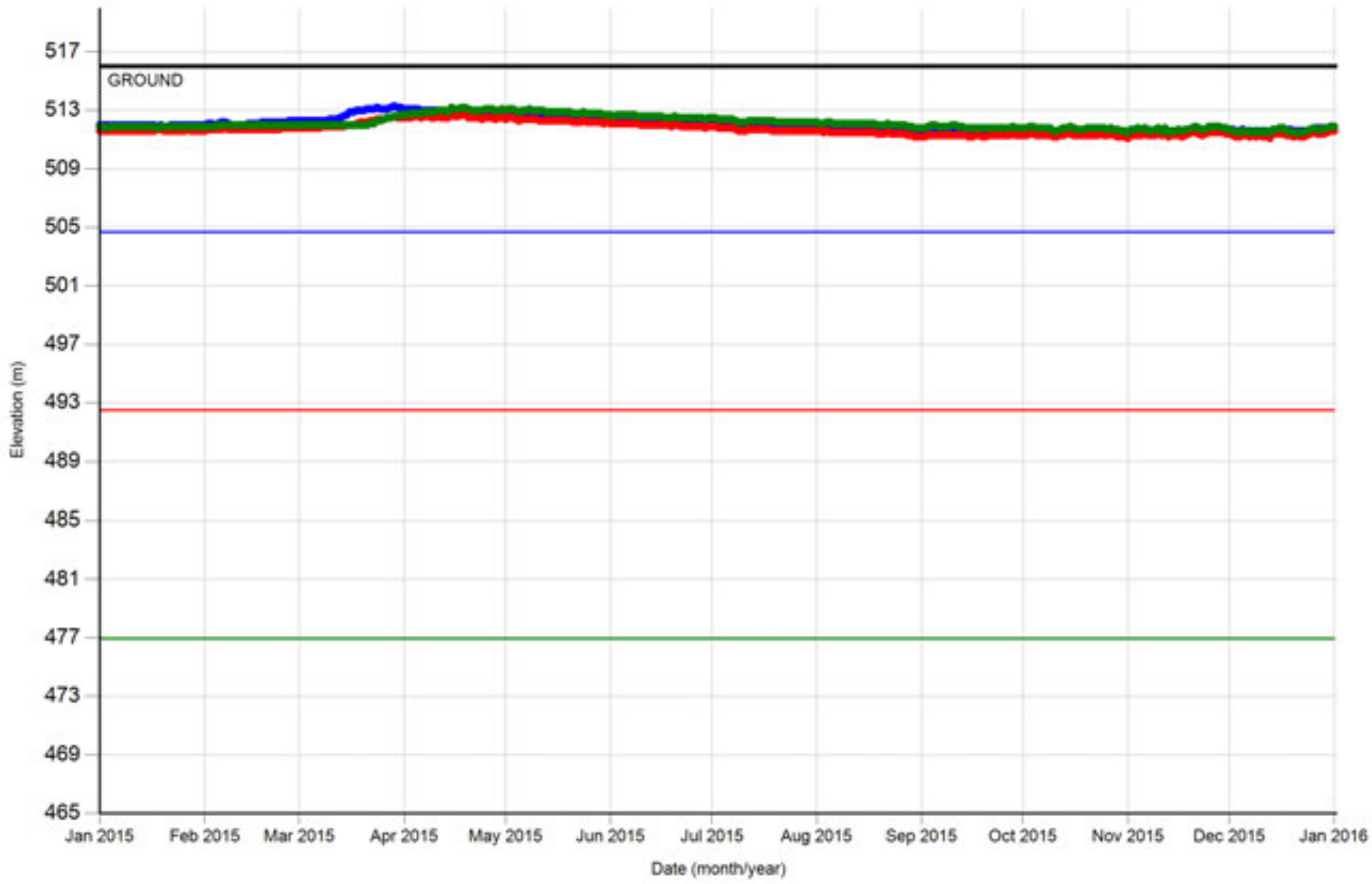
West Quesnel Land Stability Program

VWP 33A, B, and C (Station 22)



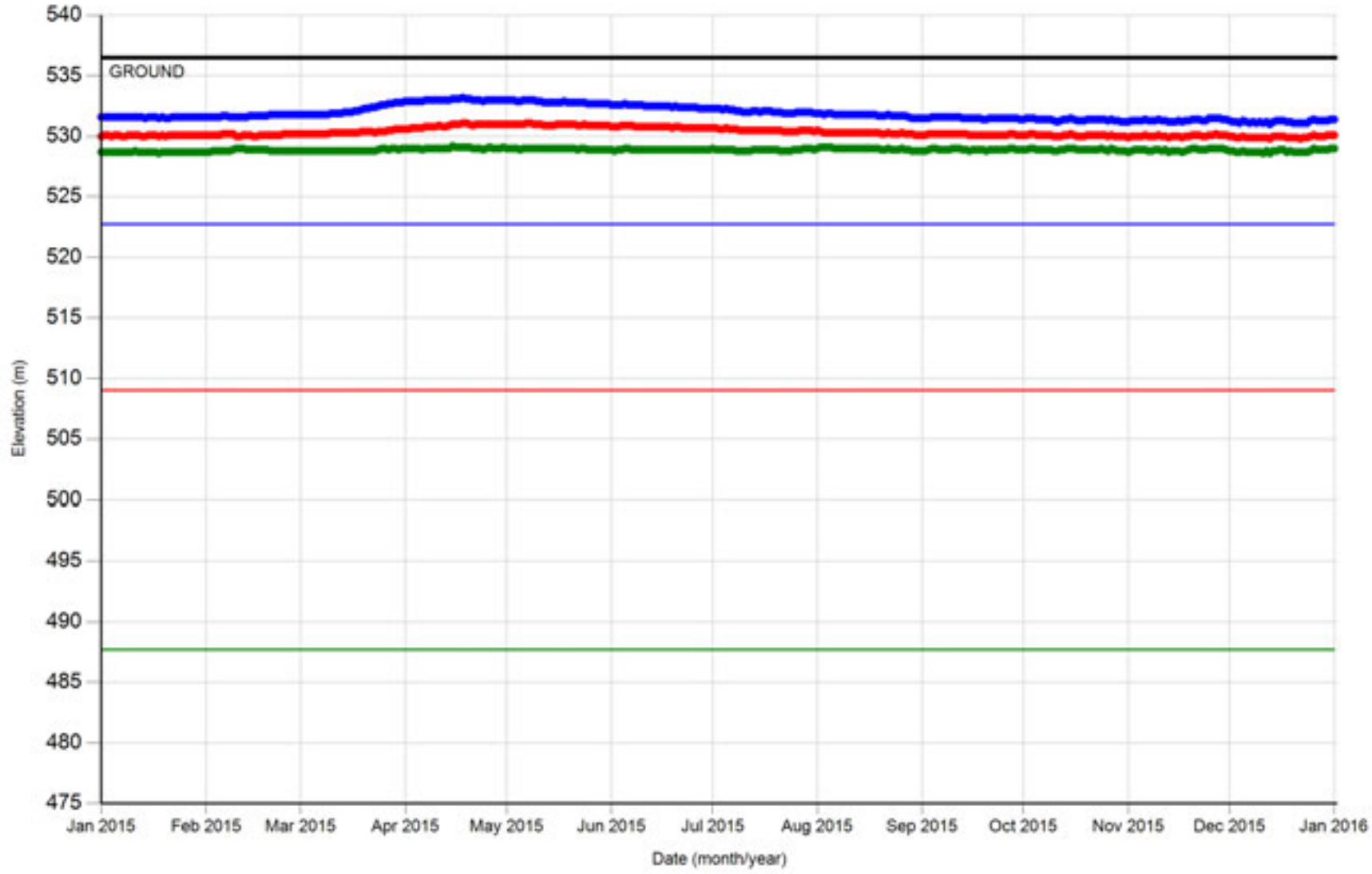
West Quesnel Land Stability Program

VWP 34A, B, and C (Station 23)



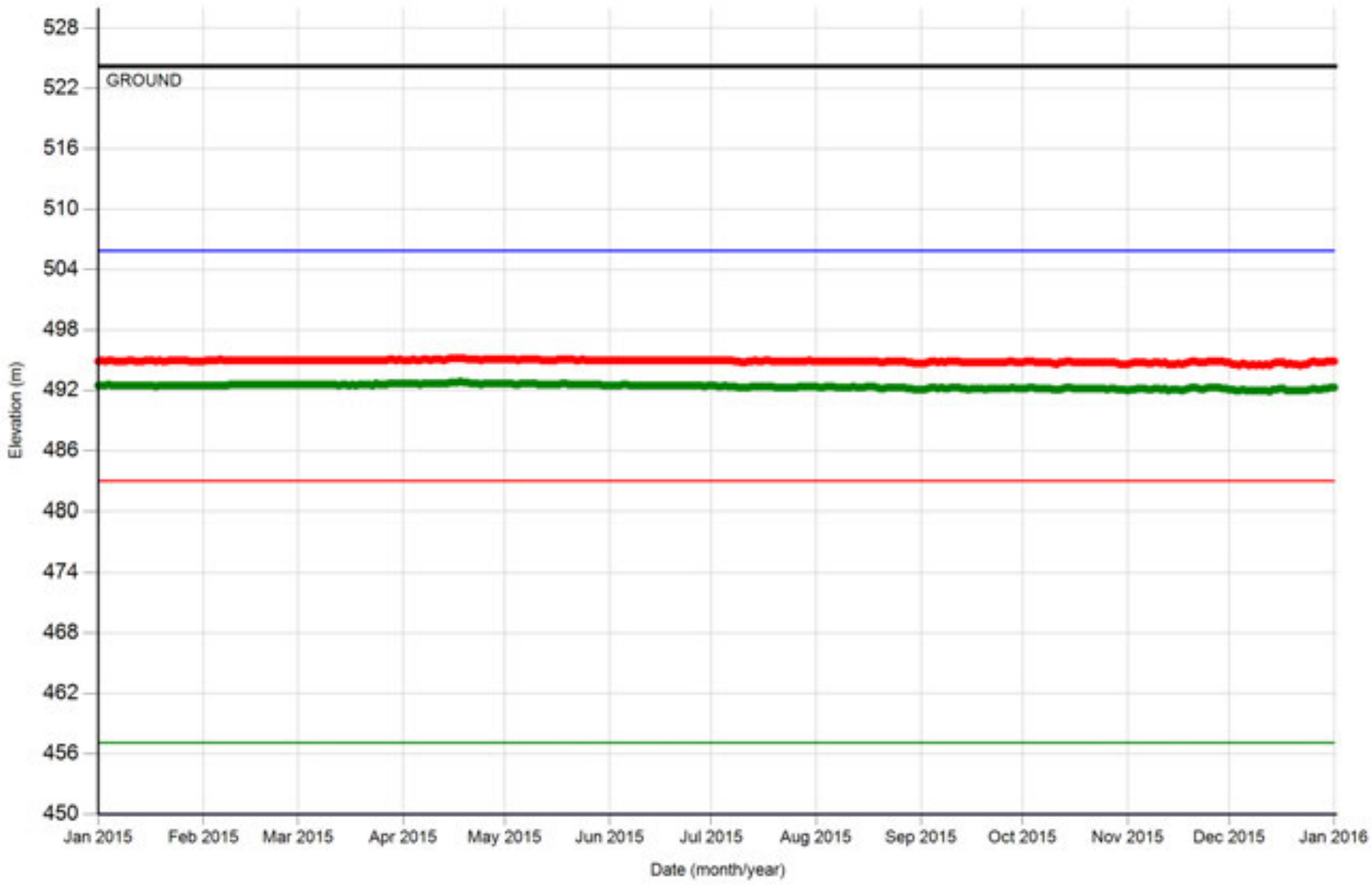
West Quesnel Land Stability Program

VWP 35A, B, and C (Station 03)



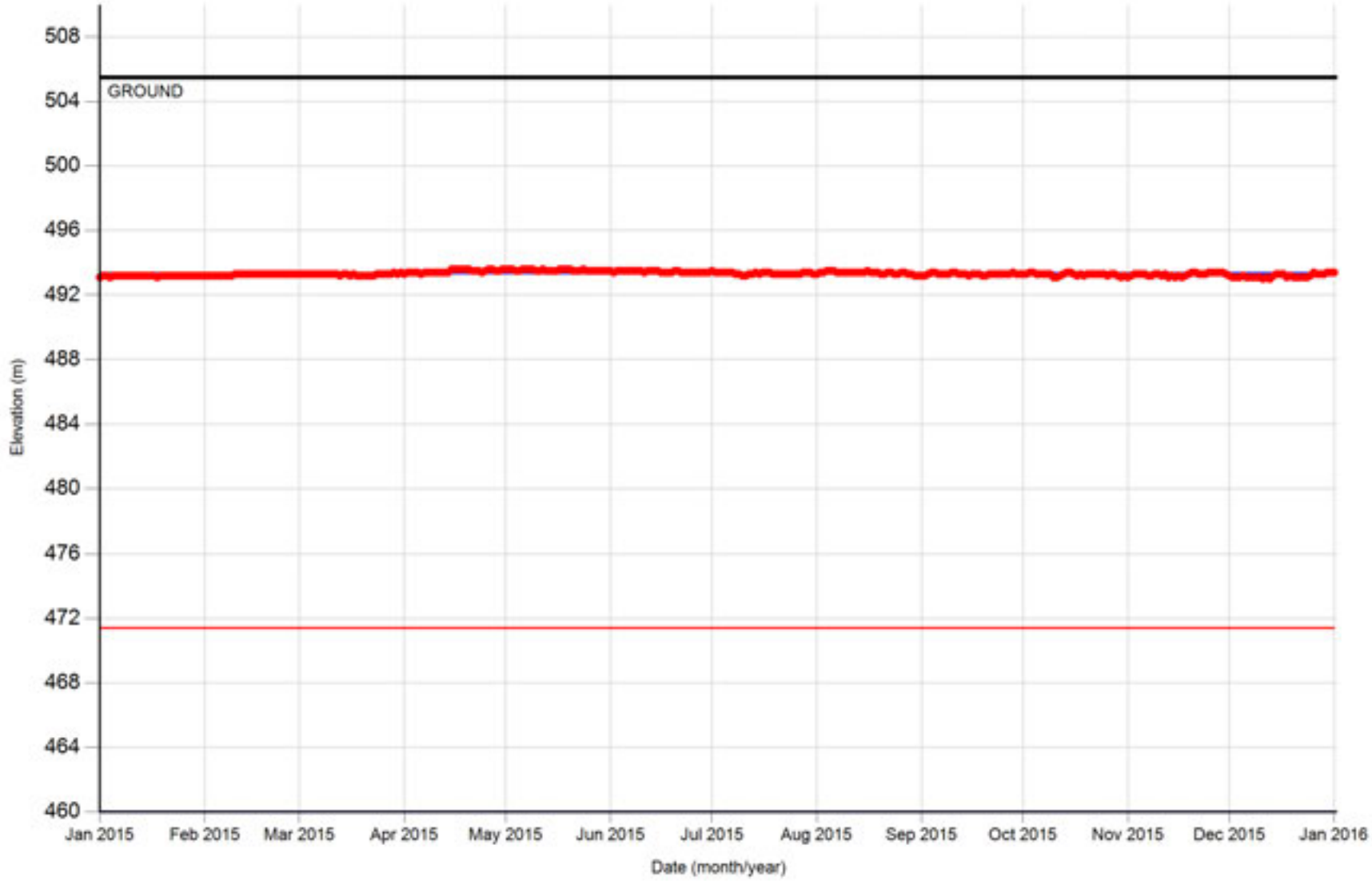
West Quesnel Land Stability Program

VWP 36A, B, and C (Station 25)



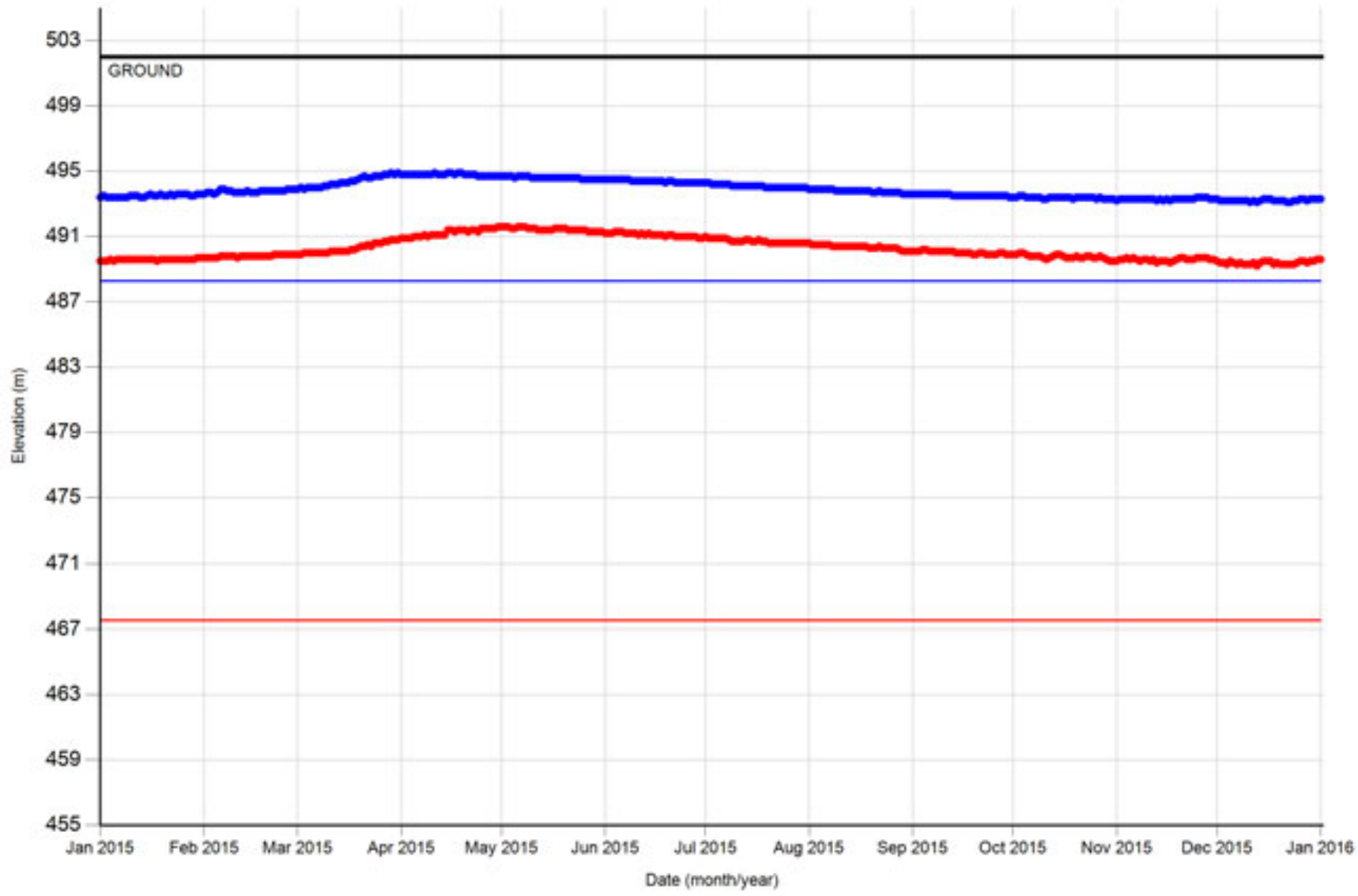
West Quesnel Land Stability Program

VWP 37A and B (Station 29)



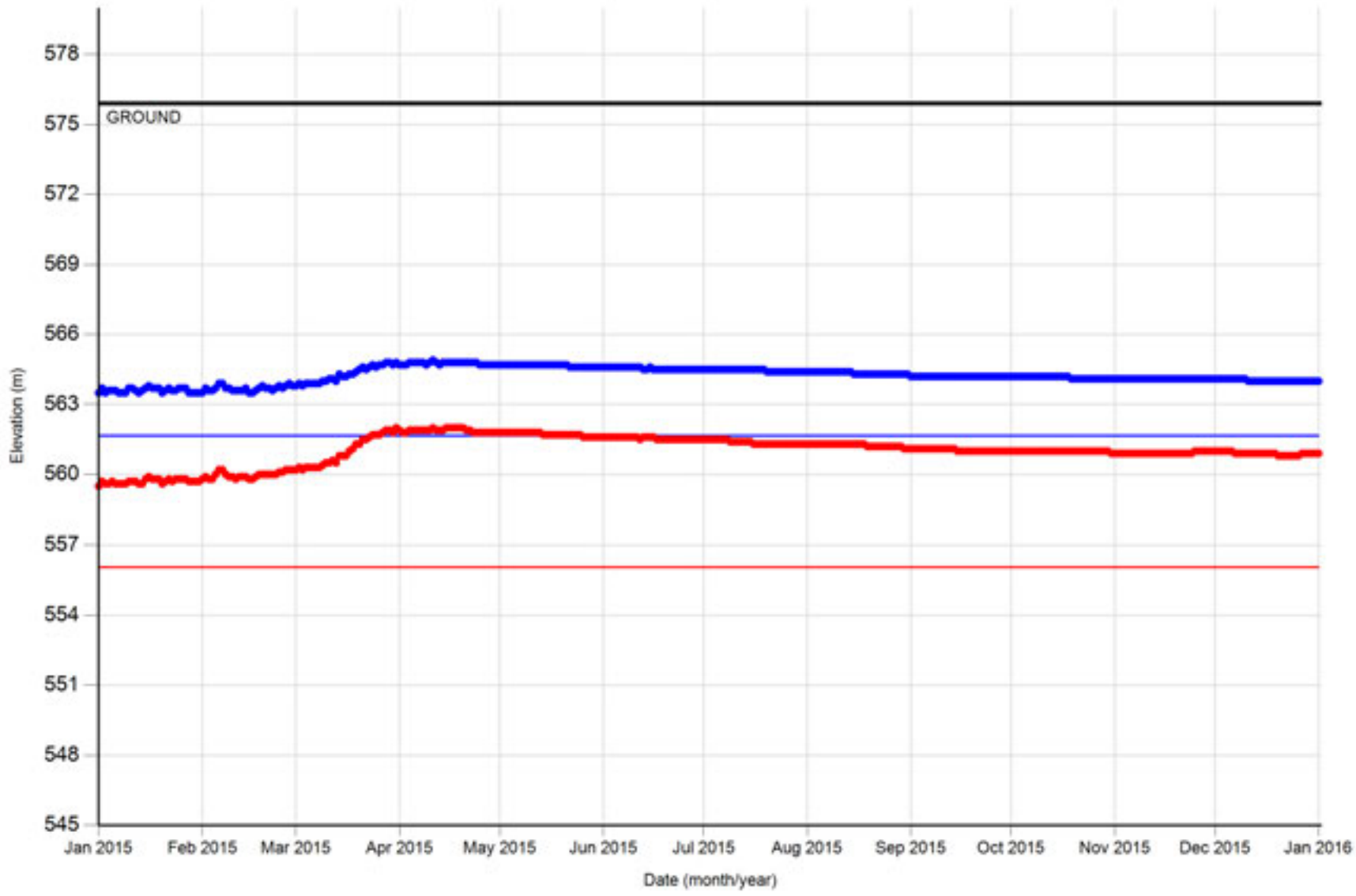
West Quesnel Land Stability Program

VWP 38A and B (Station 19)



West Quesnel Land Stability Program

VWP 39A and B (Station 30)



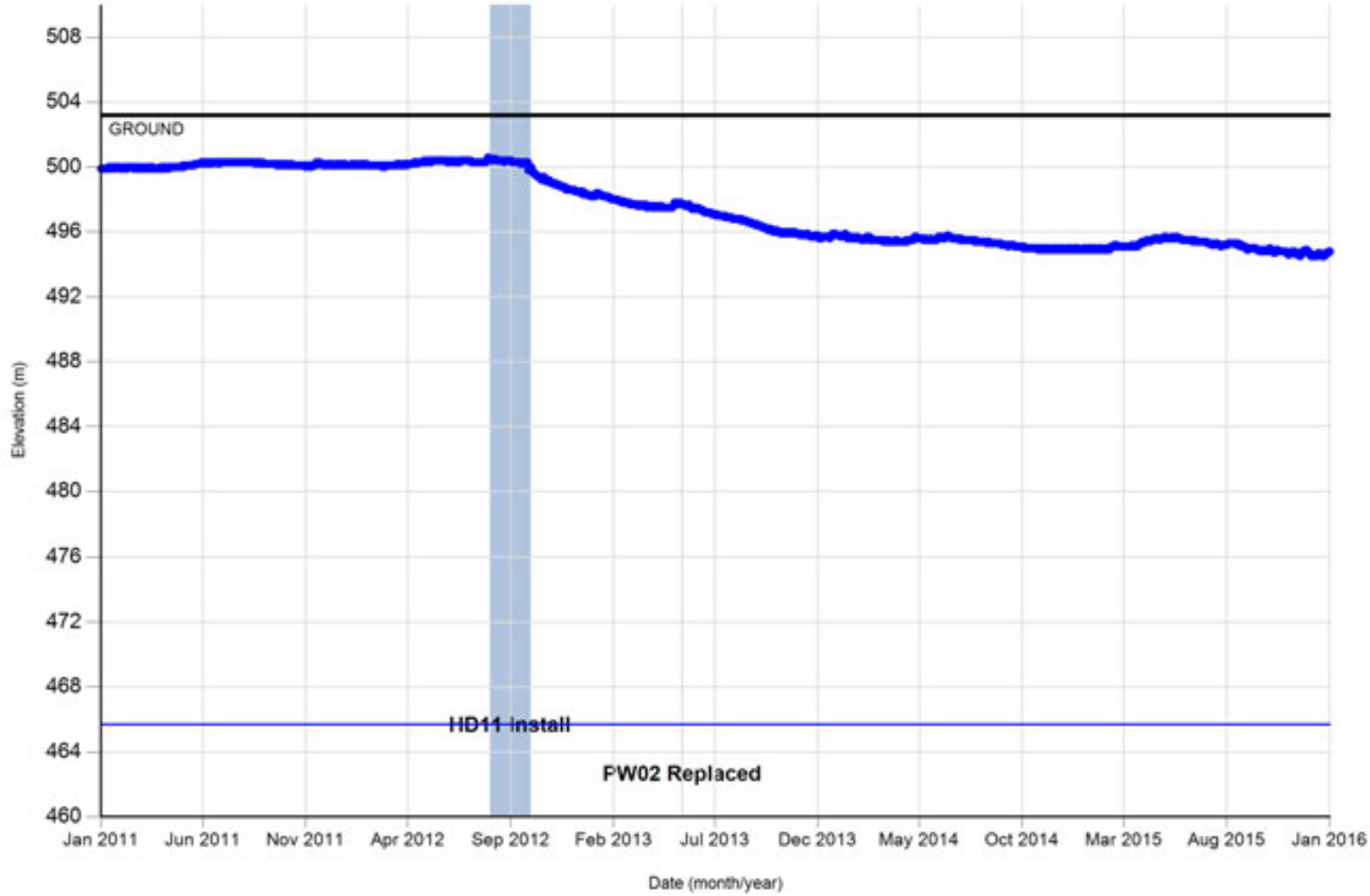
West Quesnel
Land Stability Program

amec
foster
wheeler

Long Term VWP Trends

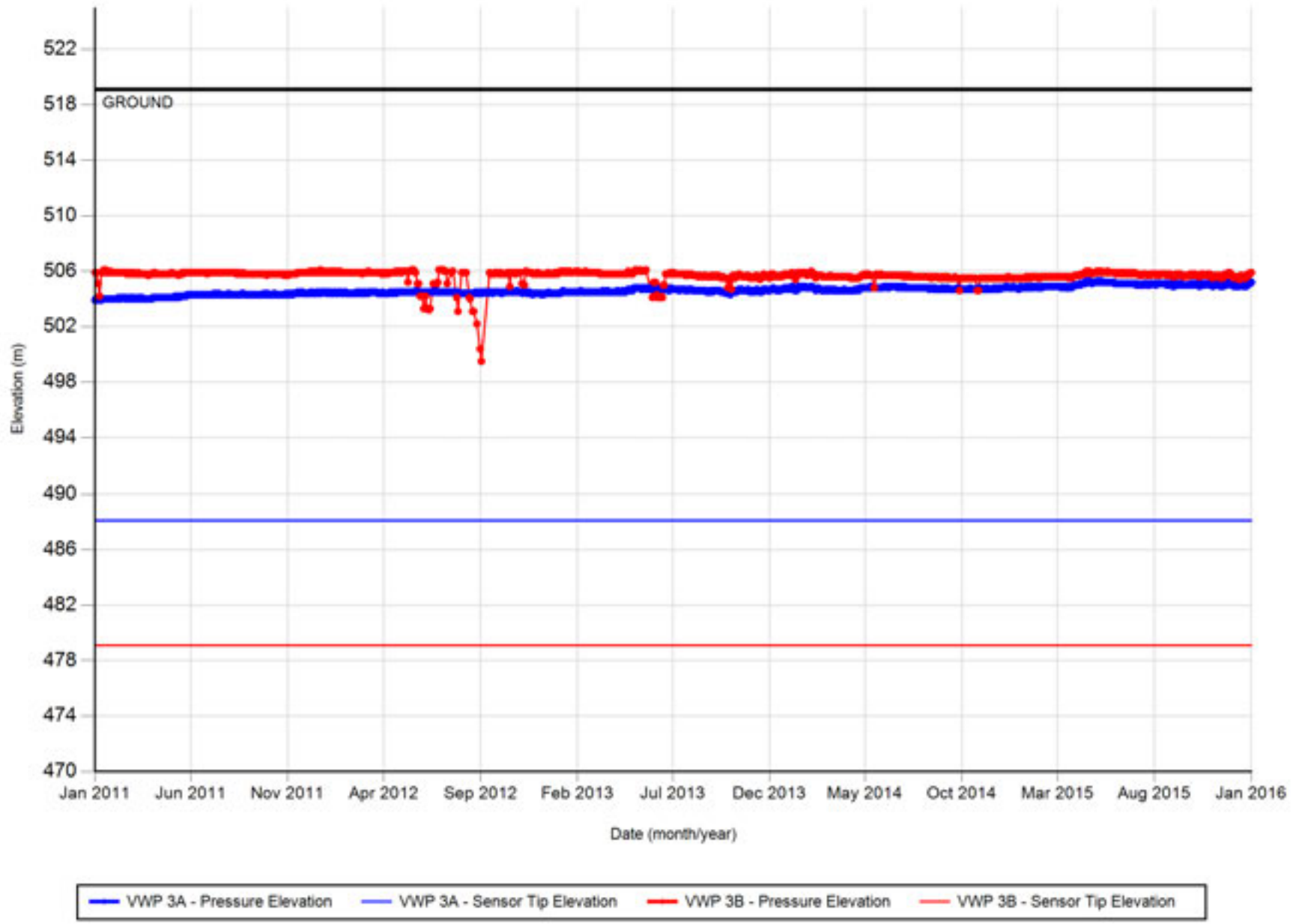
West Quesnel Land Stability Program

VWP 3 (Station 02)



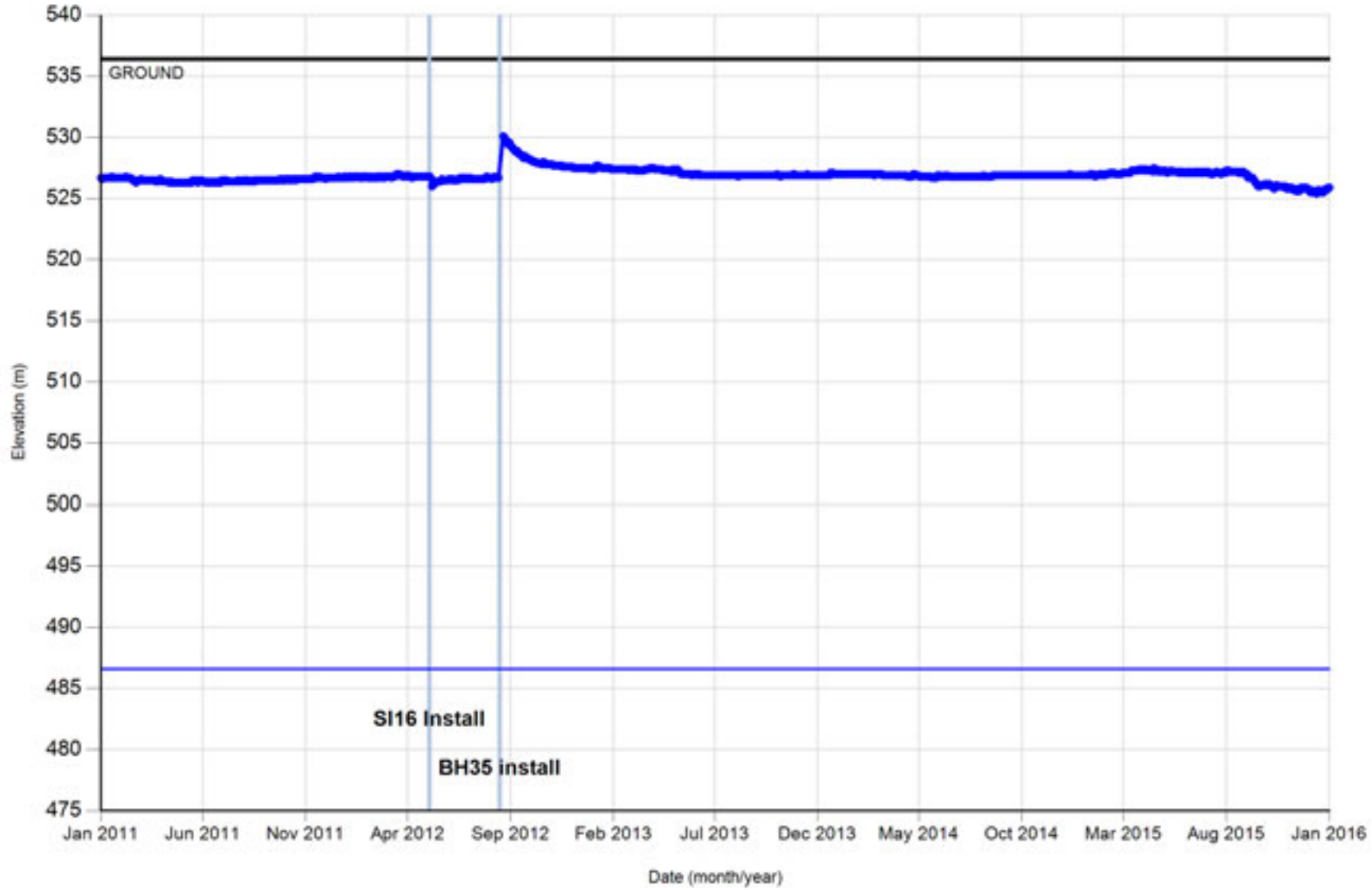
West Quesnel Land Stability Program

VWP 3A and B (Station 06)



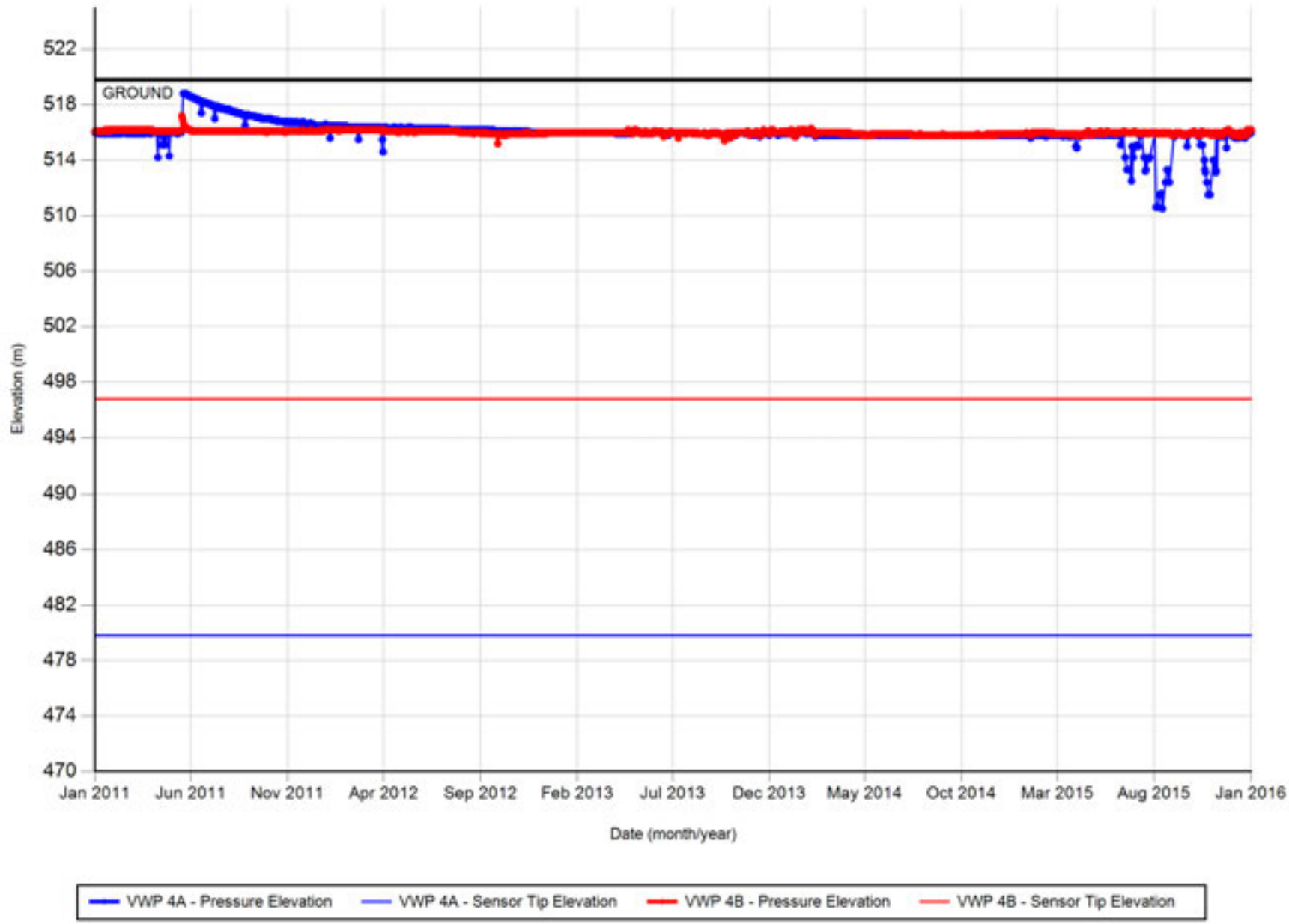
West Quesnel Land Stability Program

VWP 4 (Station 03)



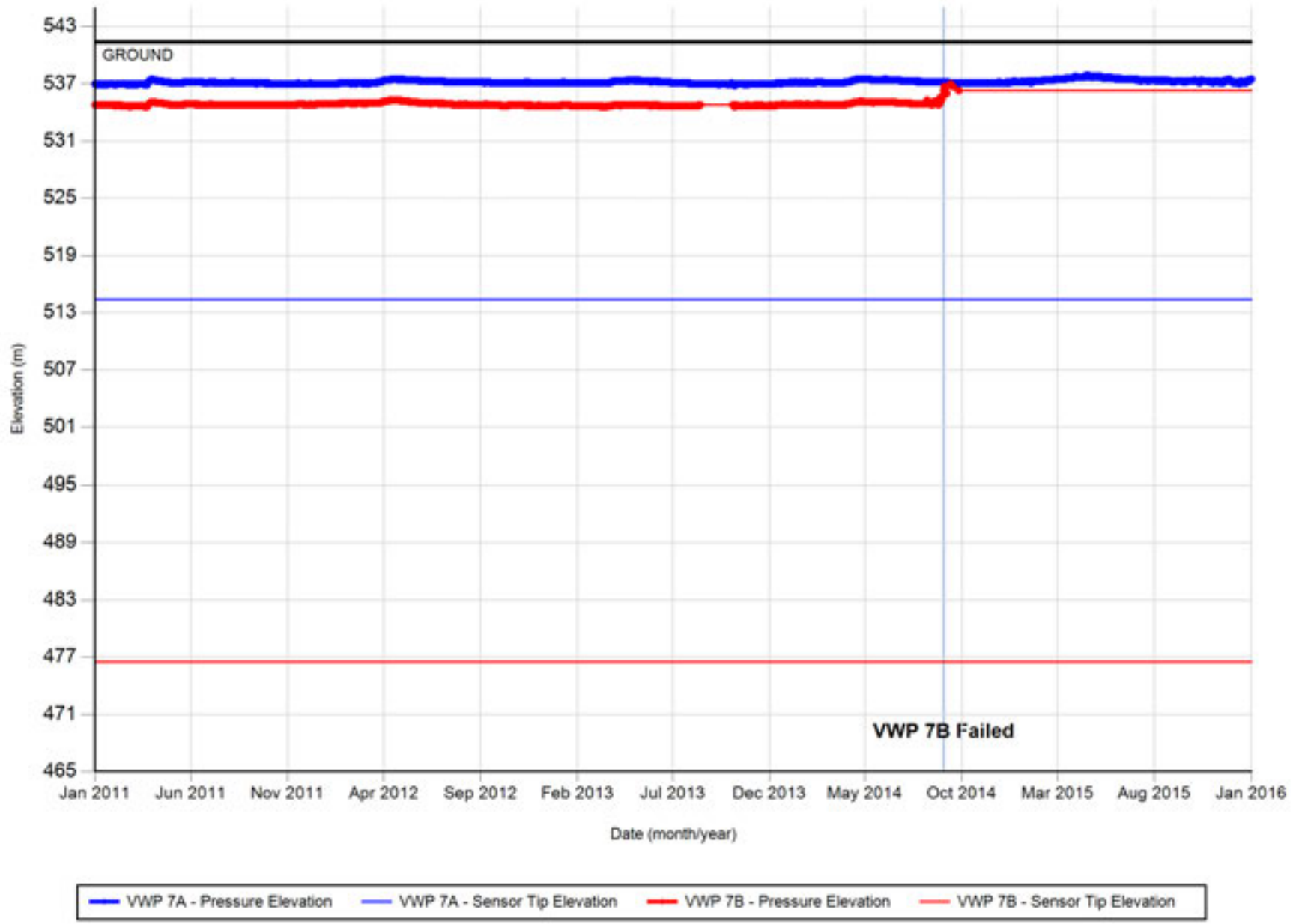
West Quesnel Land Stability Program

VWP 4A and B (Station 06)



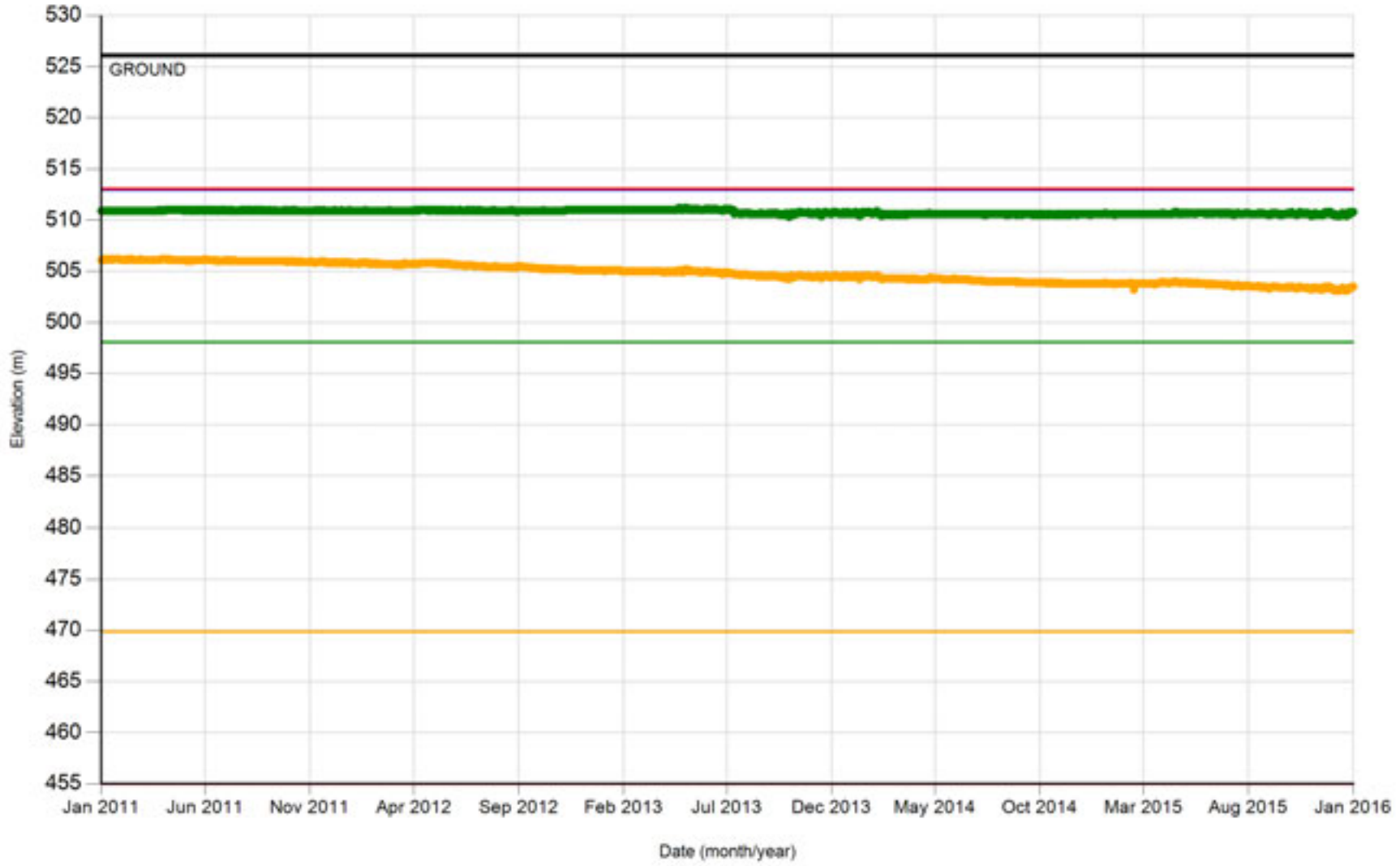
West Quesnel Land Stability Program

VWP 7A and B (Station 07)



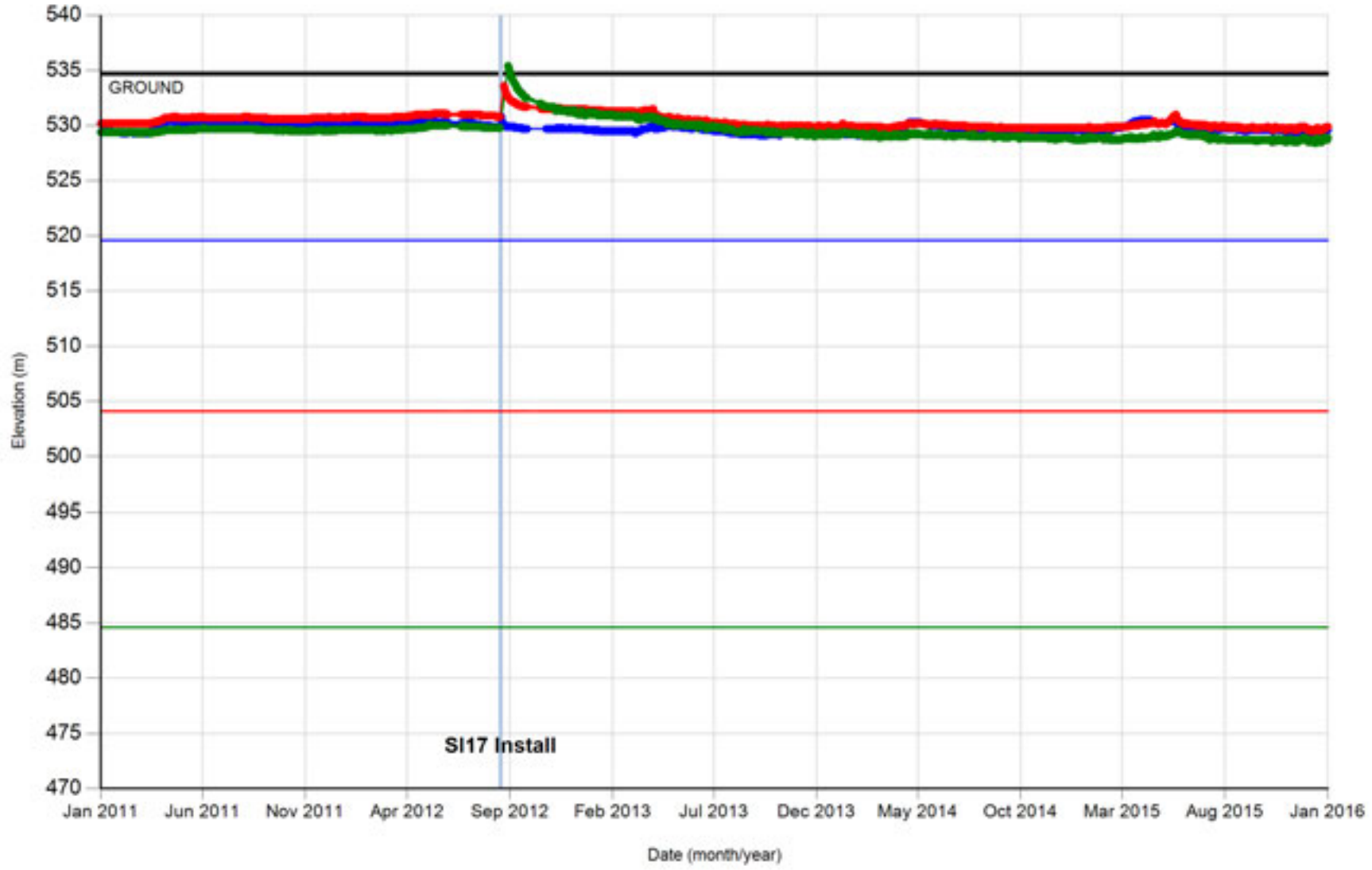
West Quesnel Land Stability Program

VWP 8A, B, C, and D (Station 08)



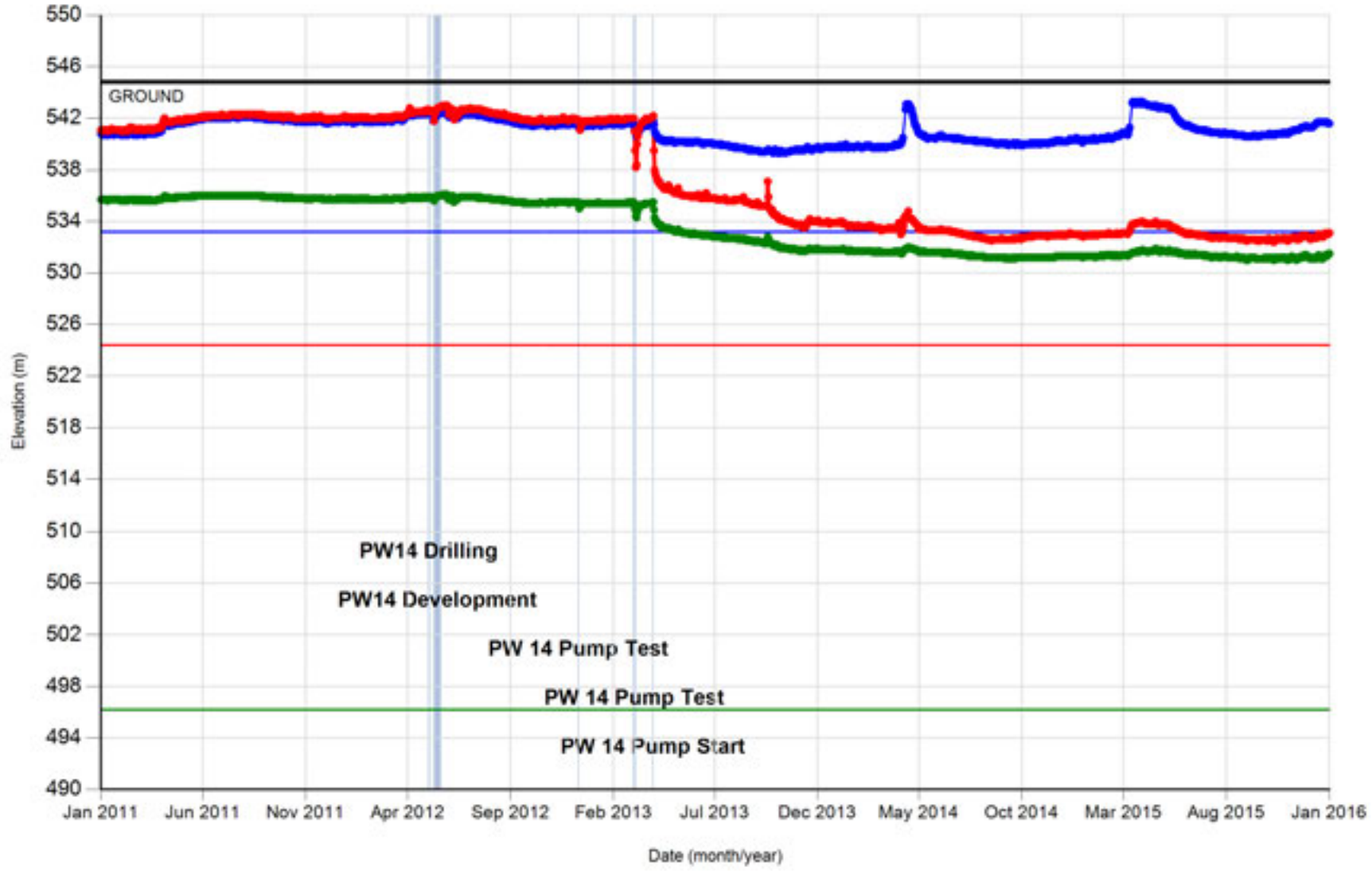
West Quesnel Land Stability Program

VWP 9A, B, and C (Station 09)



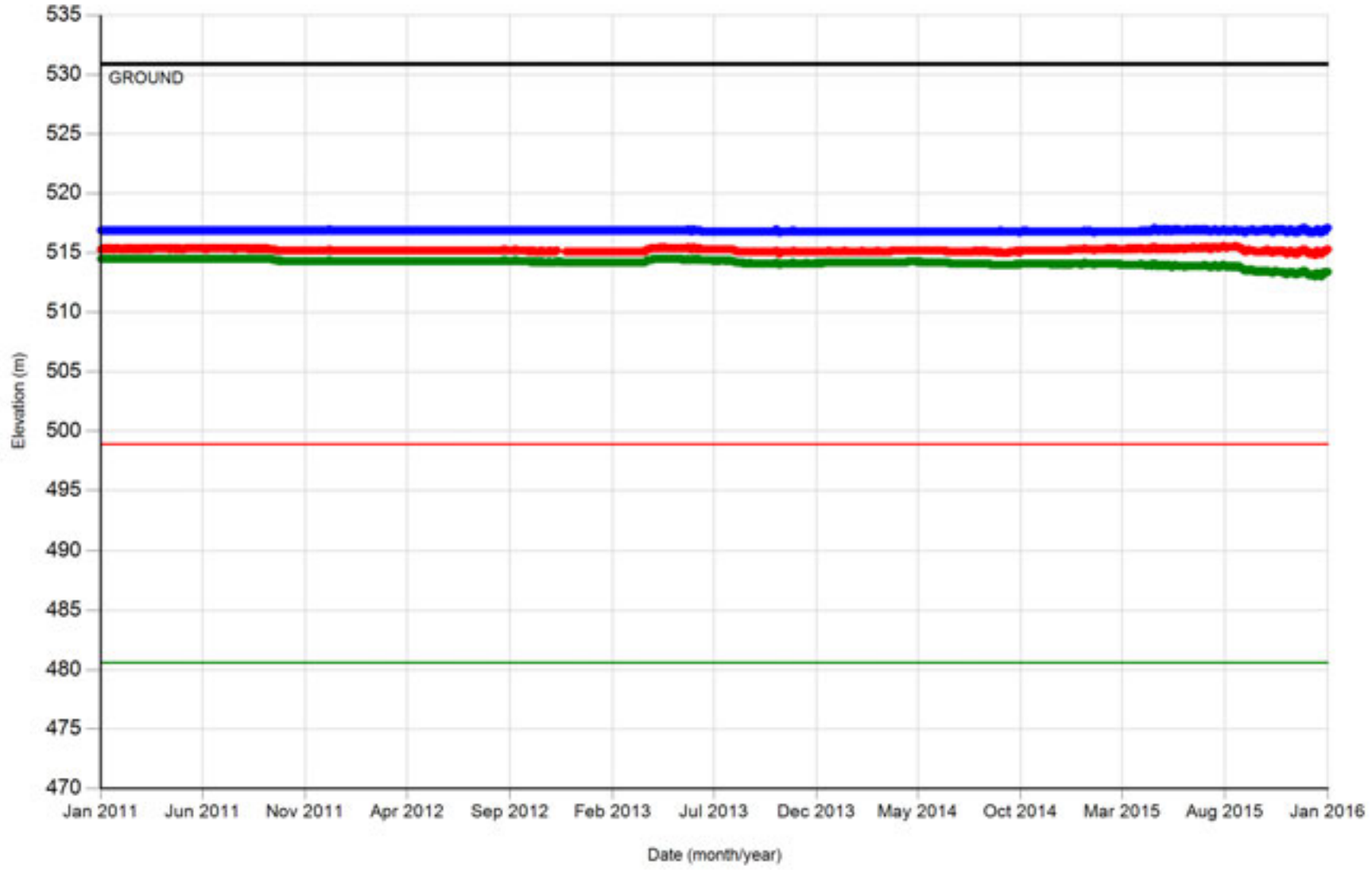
West Quesnel Land Stability Program

VWP 10A, B, and C (Station 10)



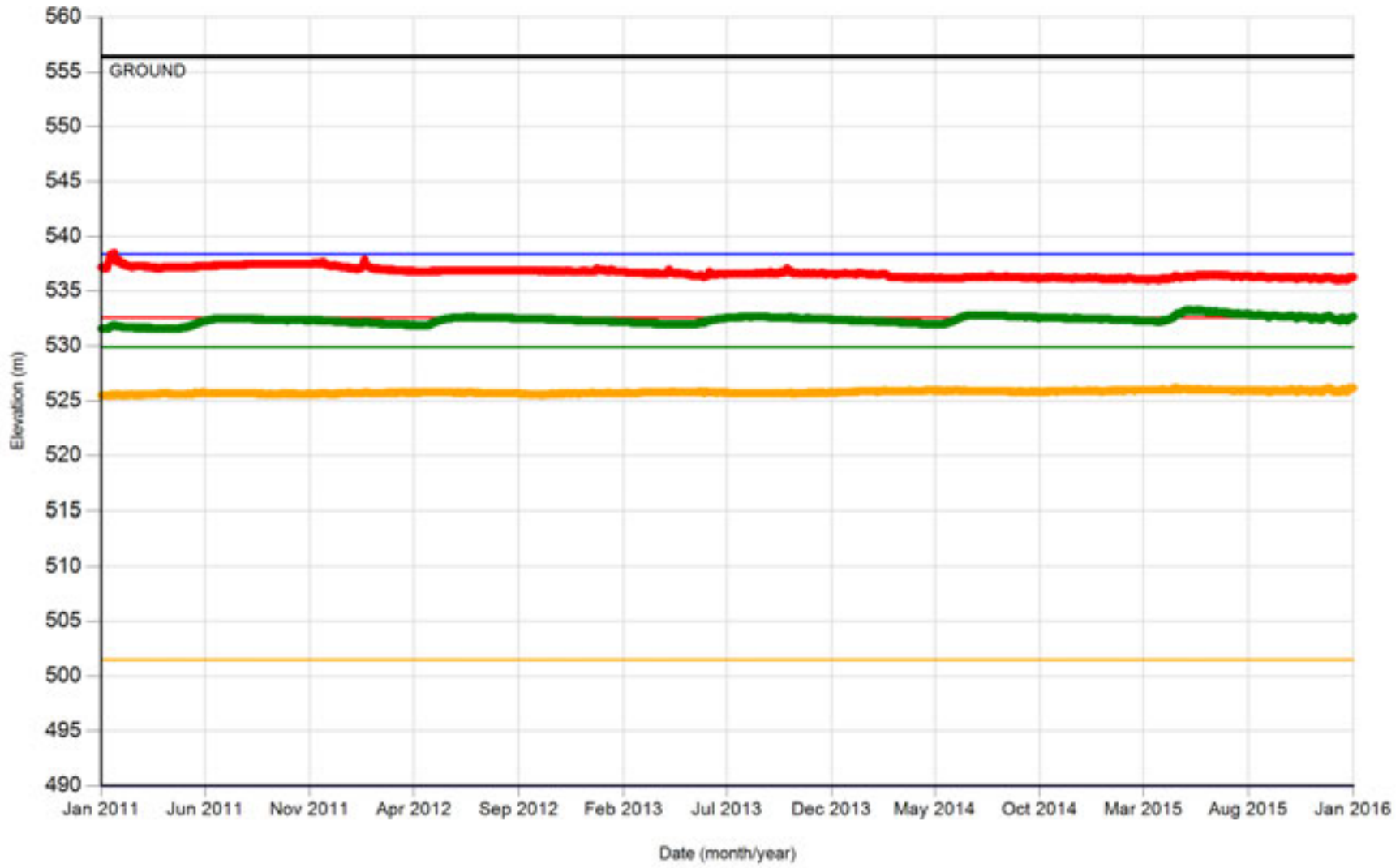
West Quesnel Land Stability Program

VWP 11A, B, and C (Station 11)



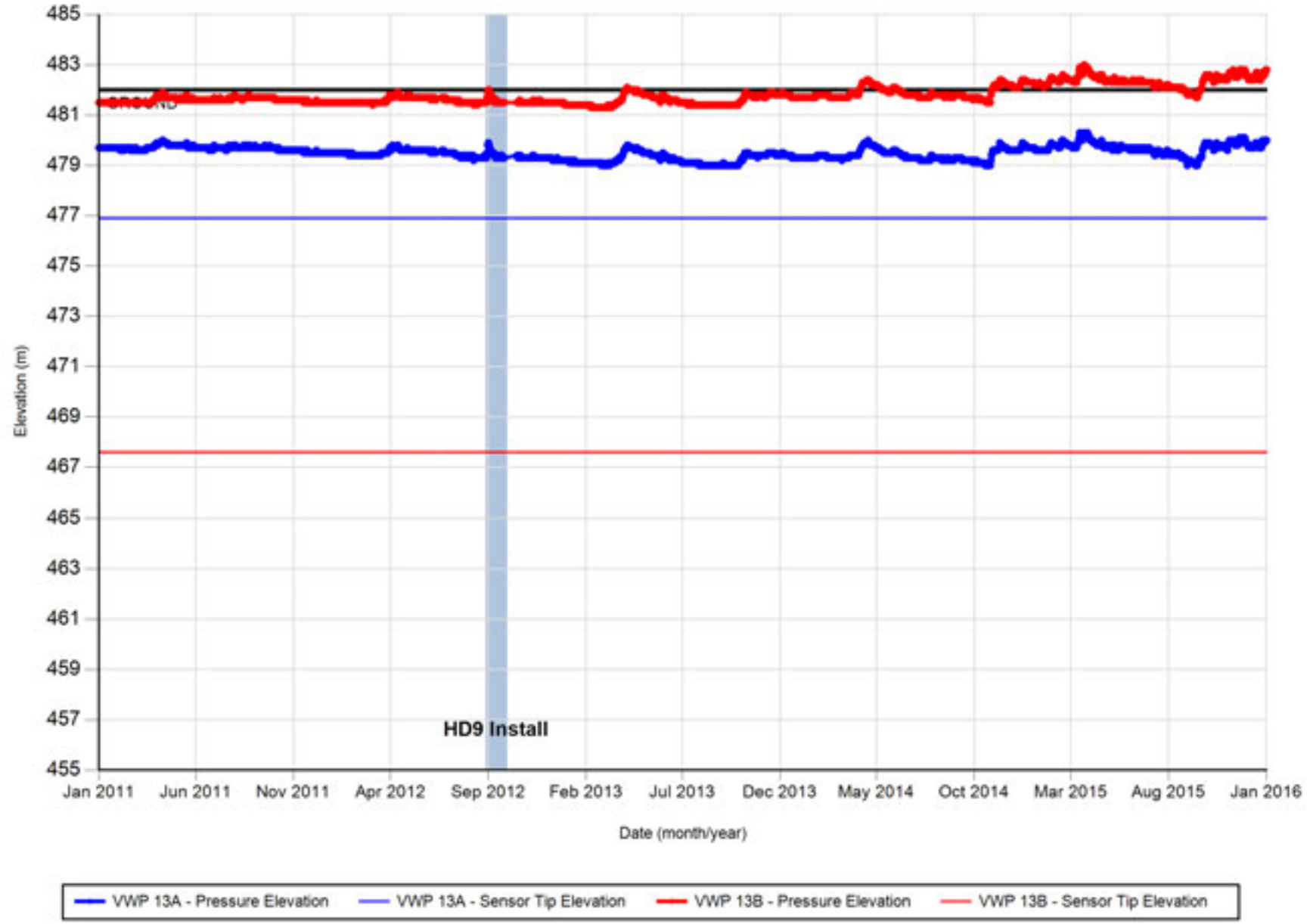
West Quesnel Land Stability Program

VWP 12A, B, C, and D (Station 16)



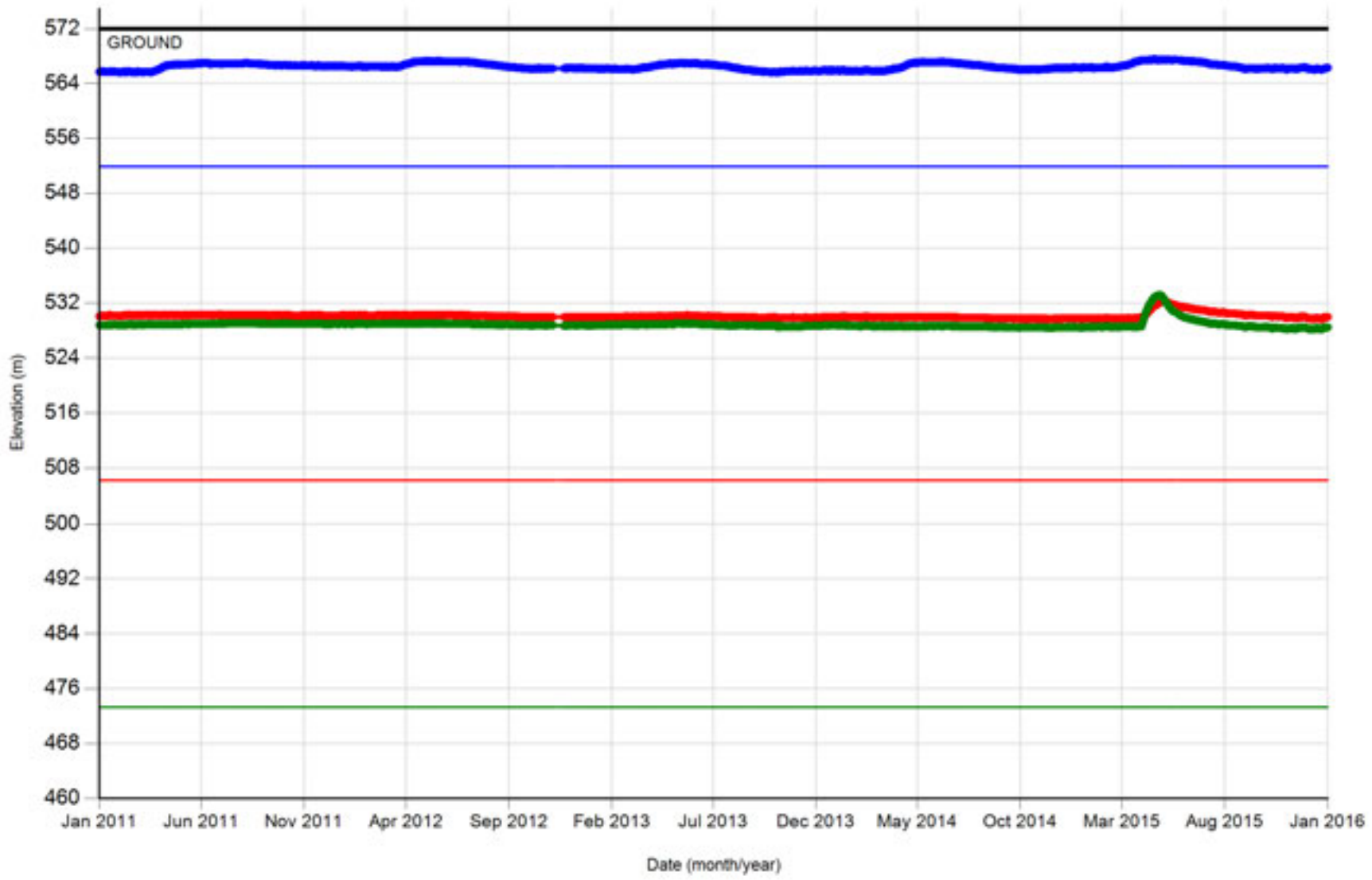
West Quesnel Land Stability Program

VWP 13A and B (Station 12)



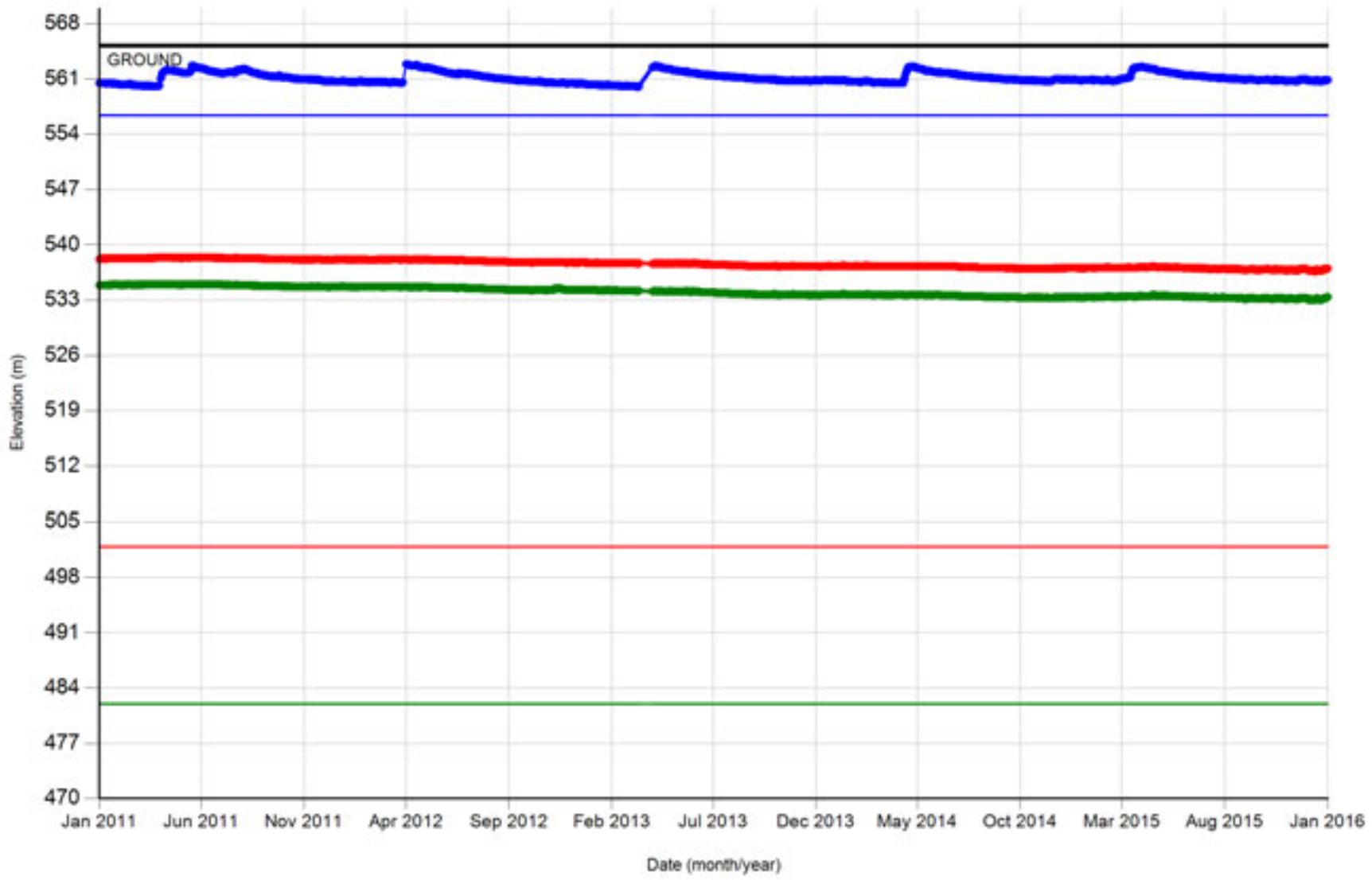
West Quesnel Land Stability Program

VWP 14A, B, and C (Station 13)



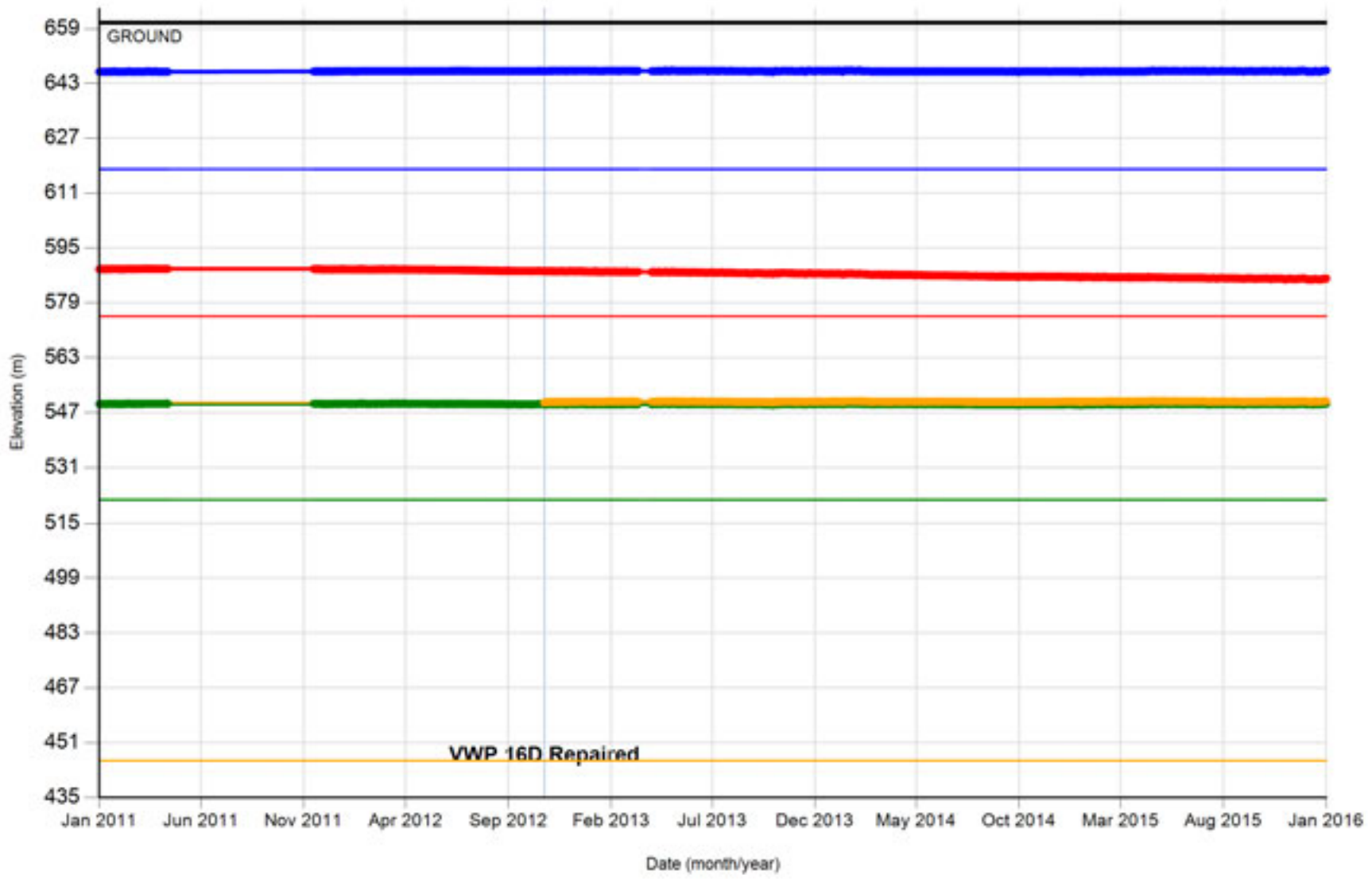
West Quesnel Land Stability Program

VWP 15A, B, and C (Station 14)



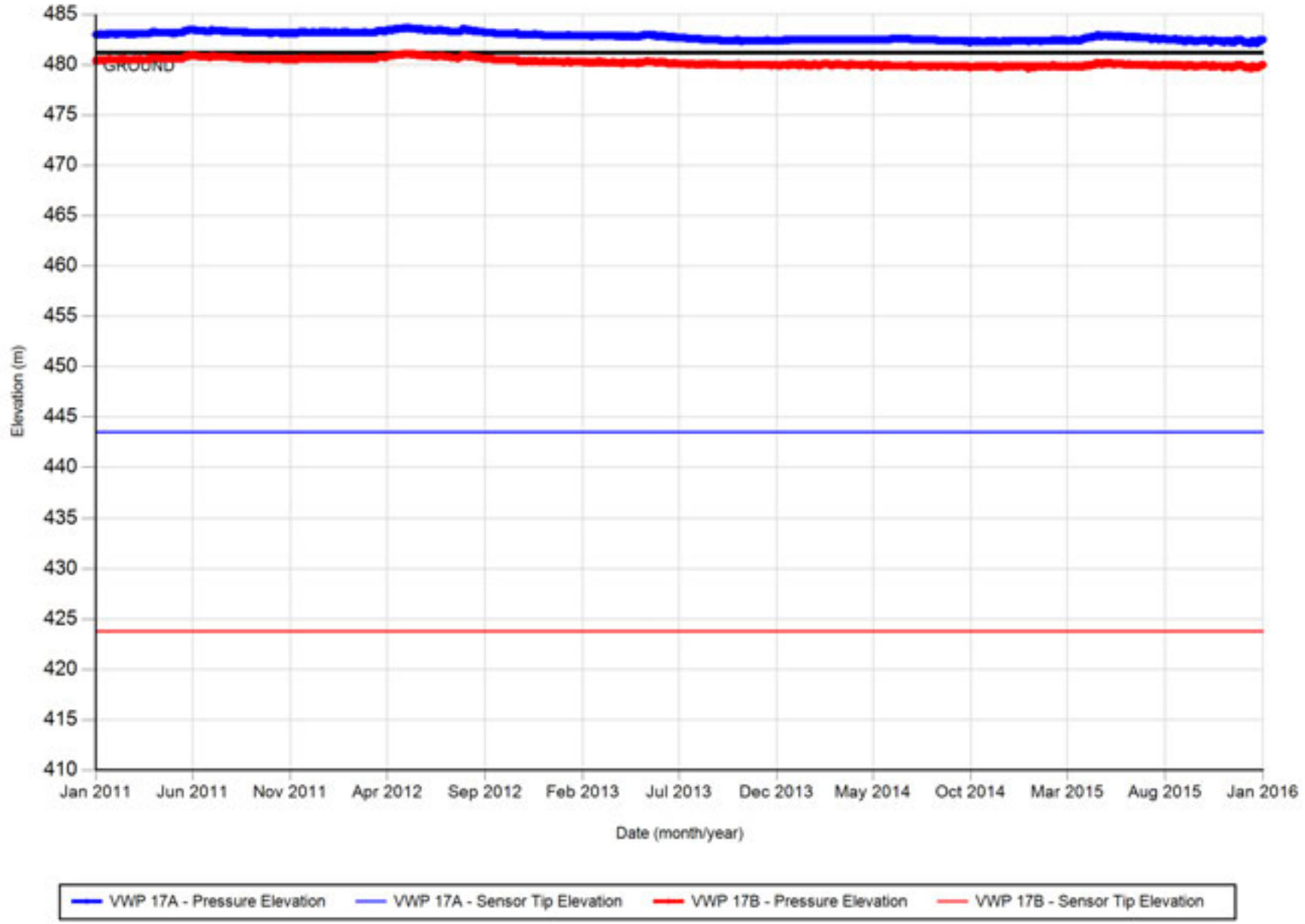
West Quesnel Land Stability Program

VWP 16A, B, C, and D (Station 15)



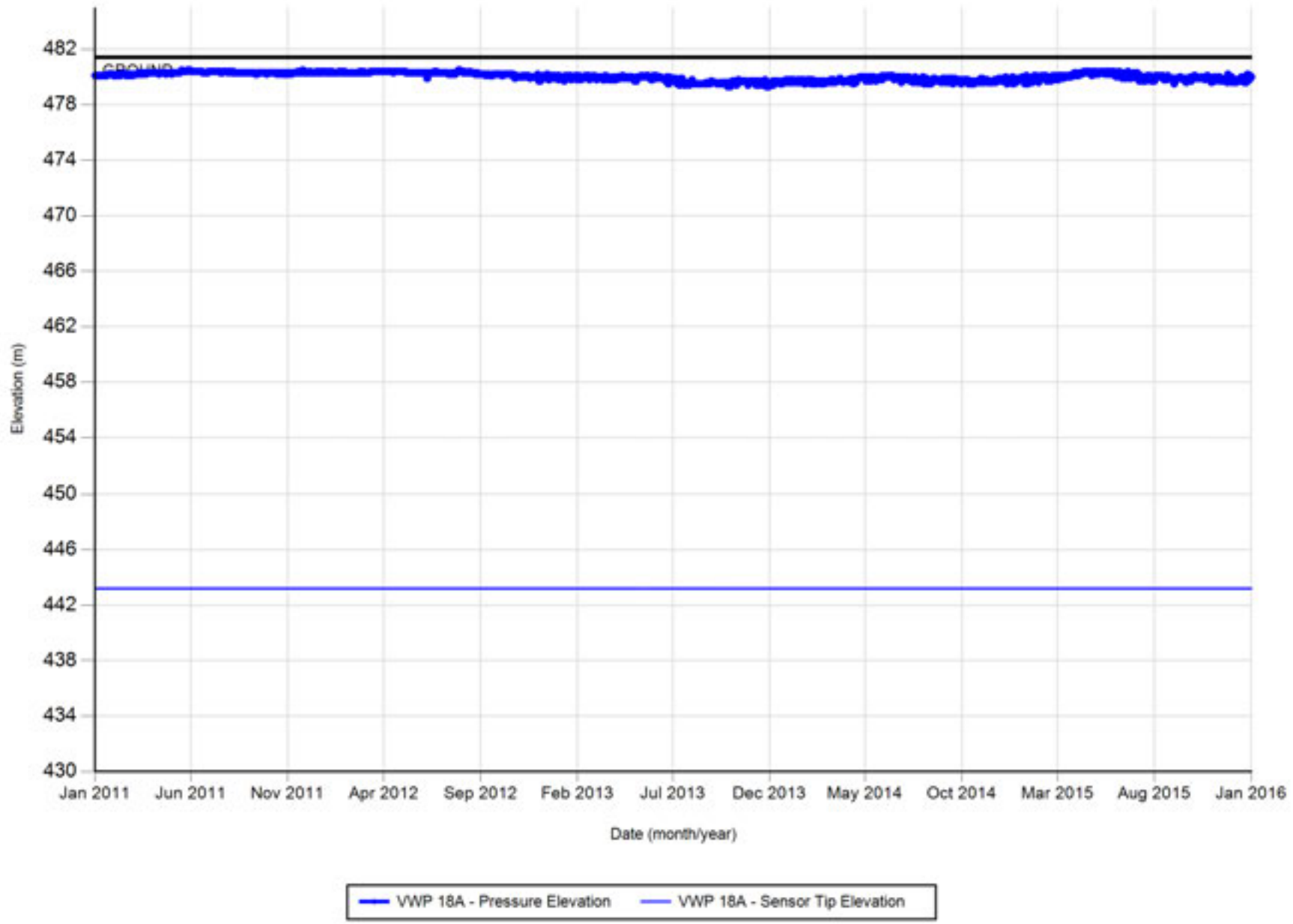
West Quesnel Land Stability Program

VWP 17A and B (Station 17)



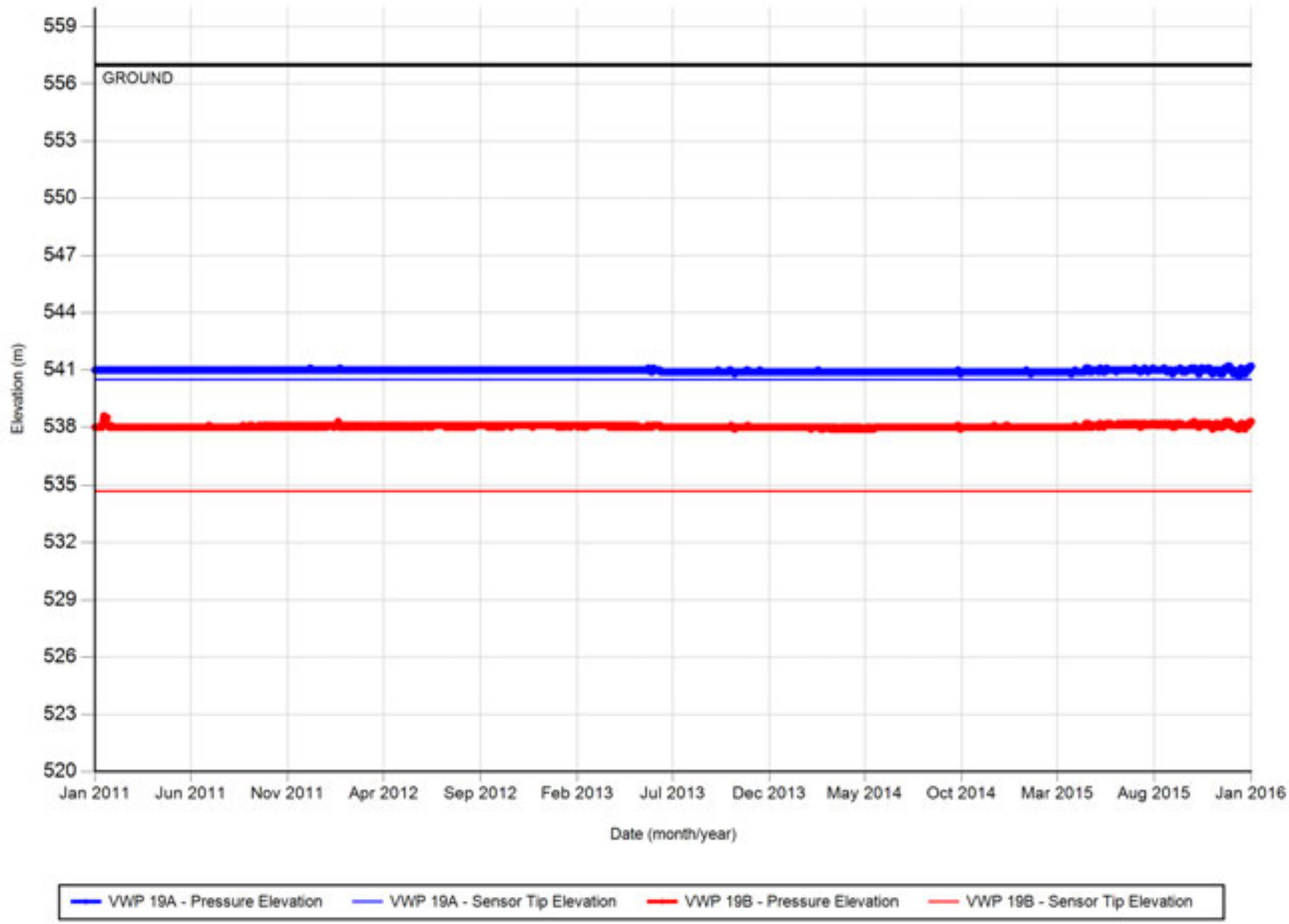
West Quesnel Land Stability Program

VWP 18A (Station 17)



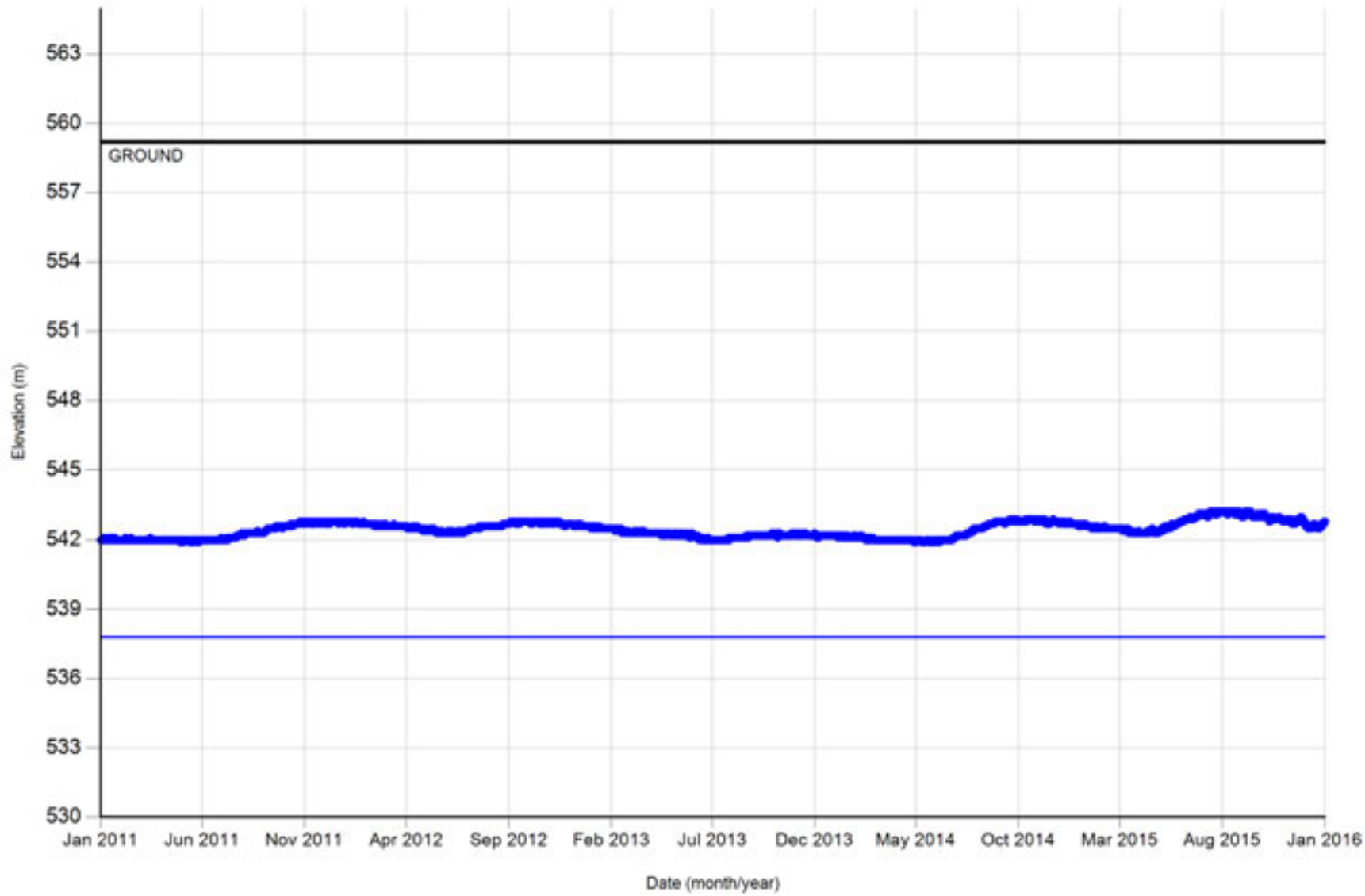
West Quesnel Land Stability Program

VWP 19A and B (Station 16)



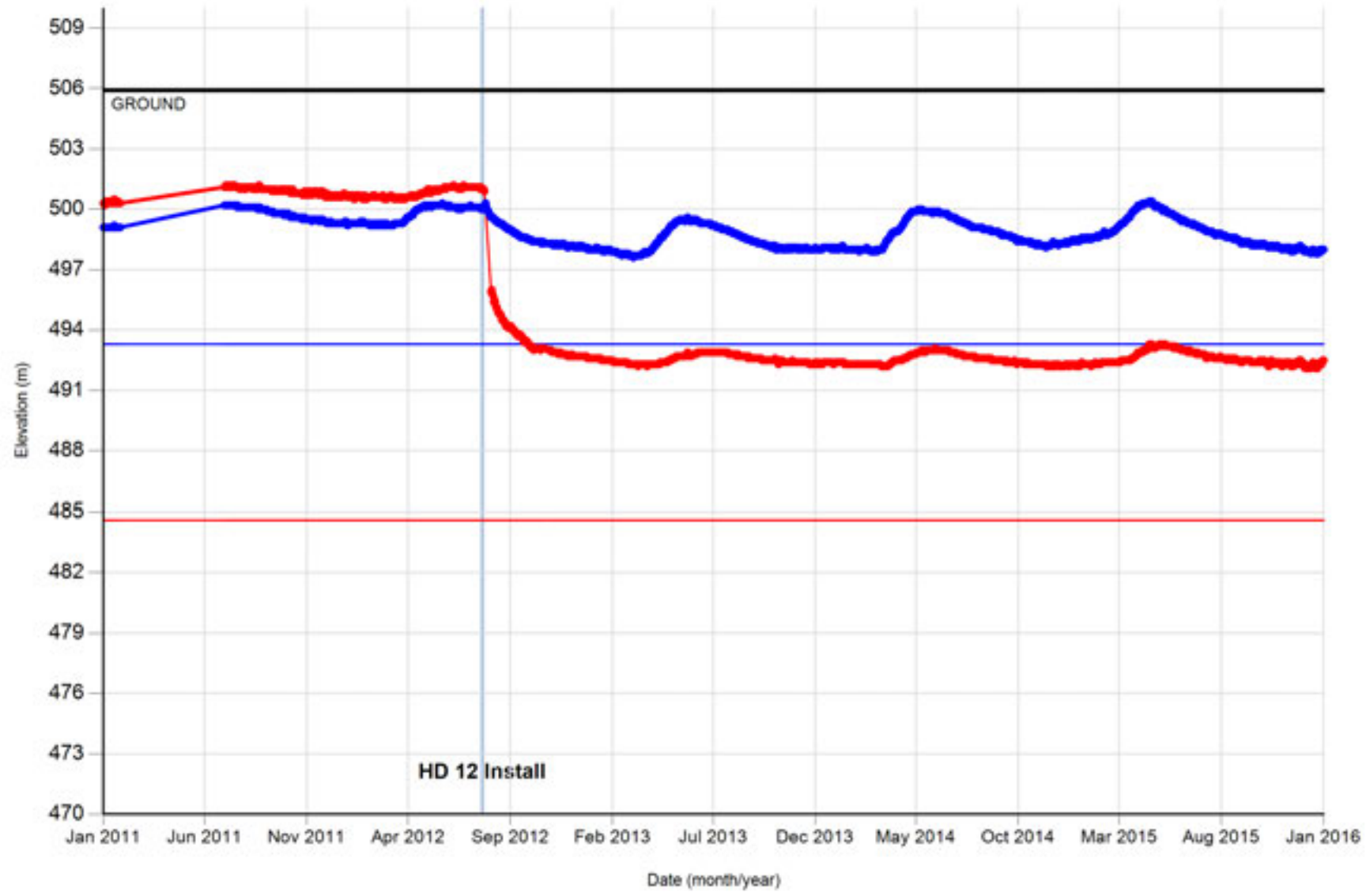
West Quesnel Land Stability Program

VWP 20 (Station 16)

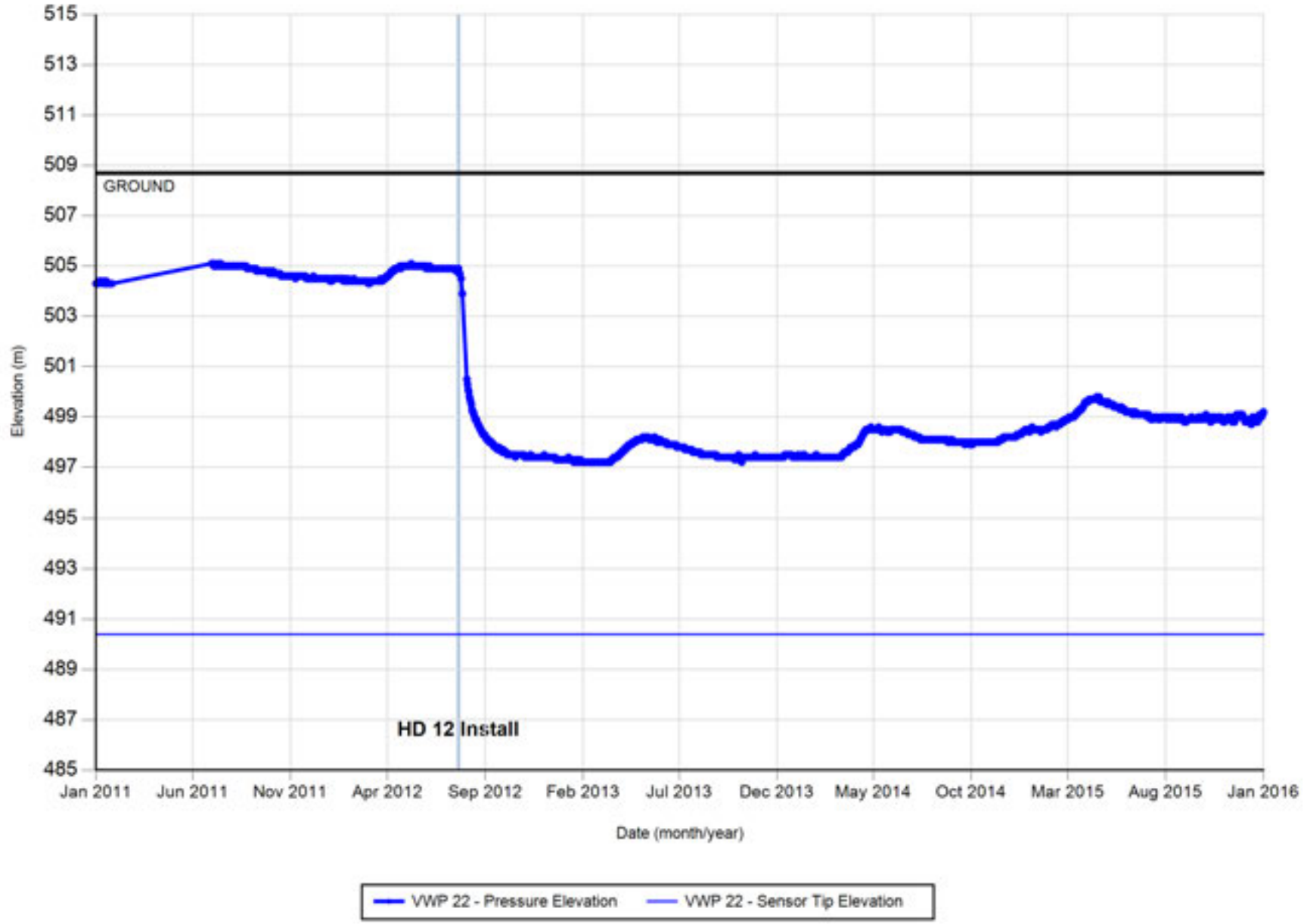


West Quesnel Land Stability Program

VWP 21A and B (Station 19)

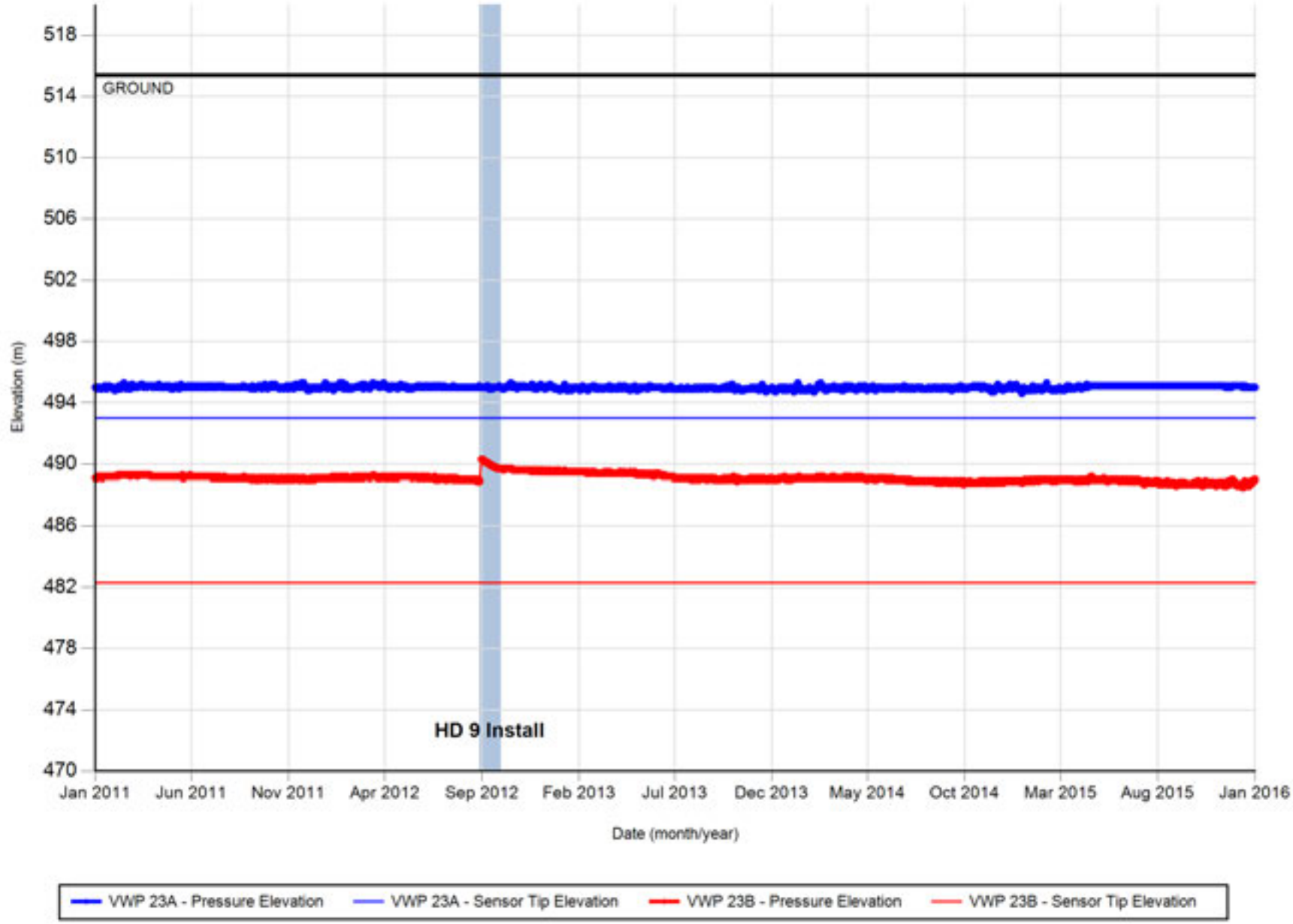


VWP 22 (Station 19)



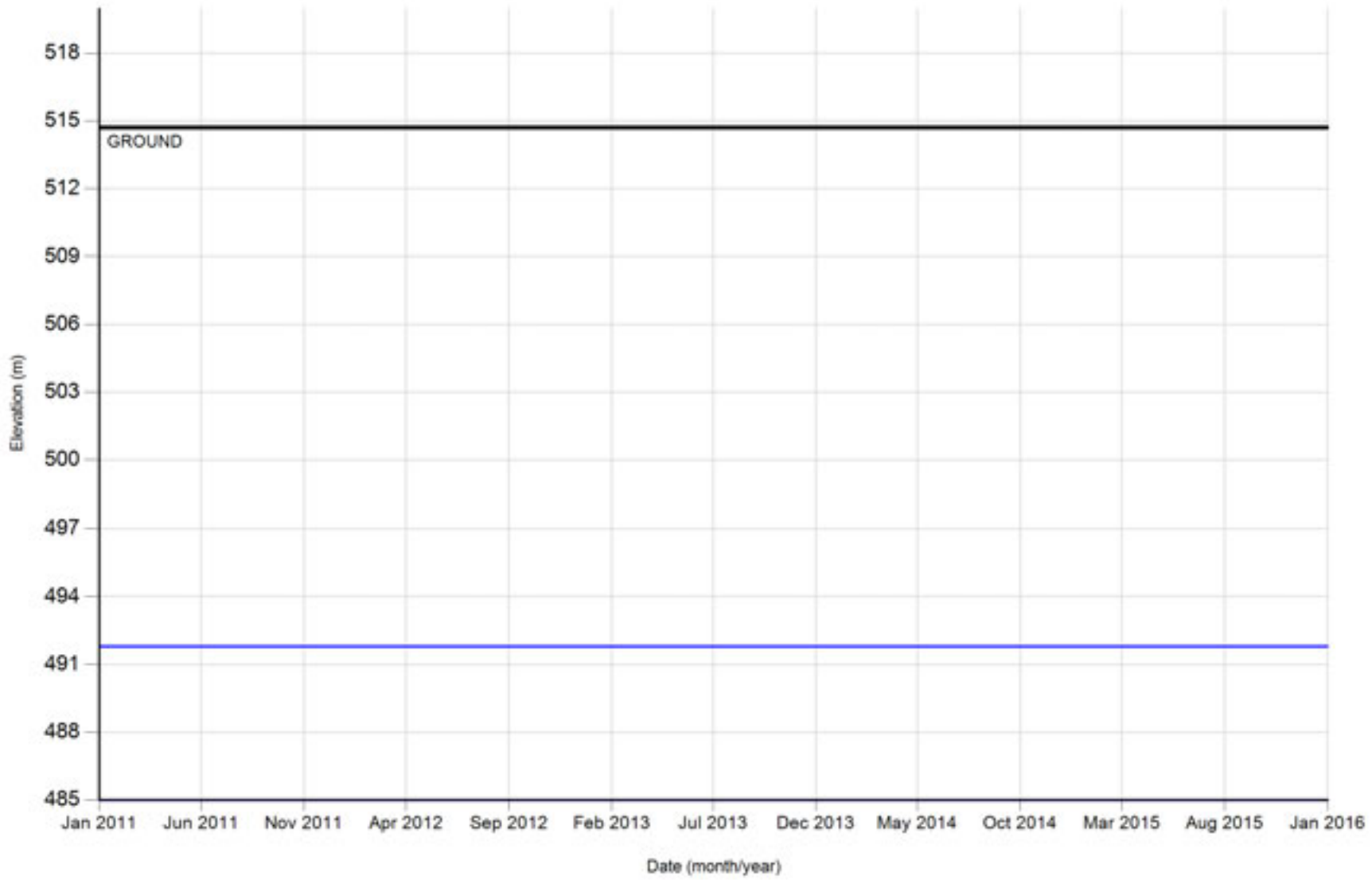
West Quesnel Land Stability Program

VWP 23A and B (Station 18)



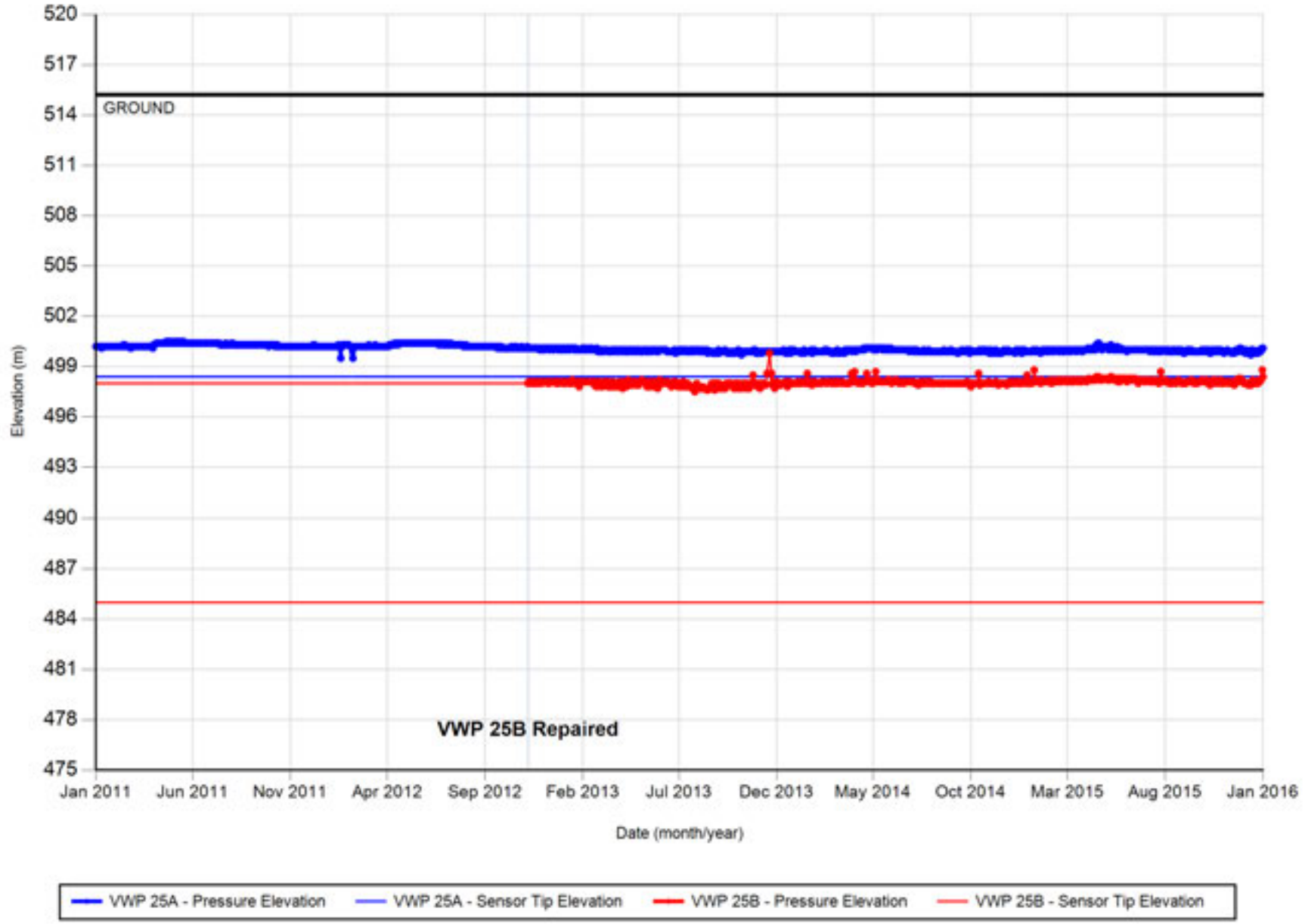
West Quesnel Land Stability Program

VWP 24 (Station 18)



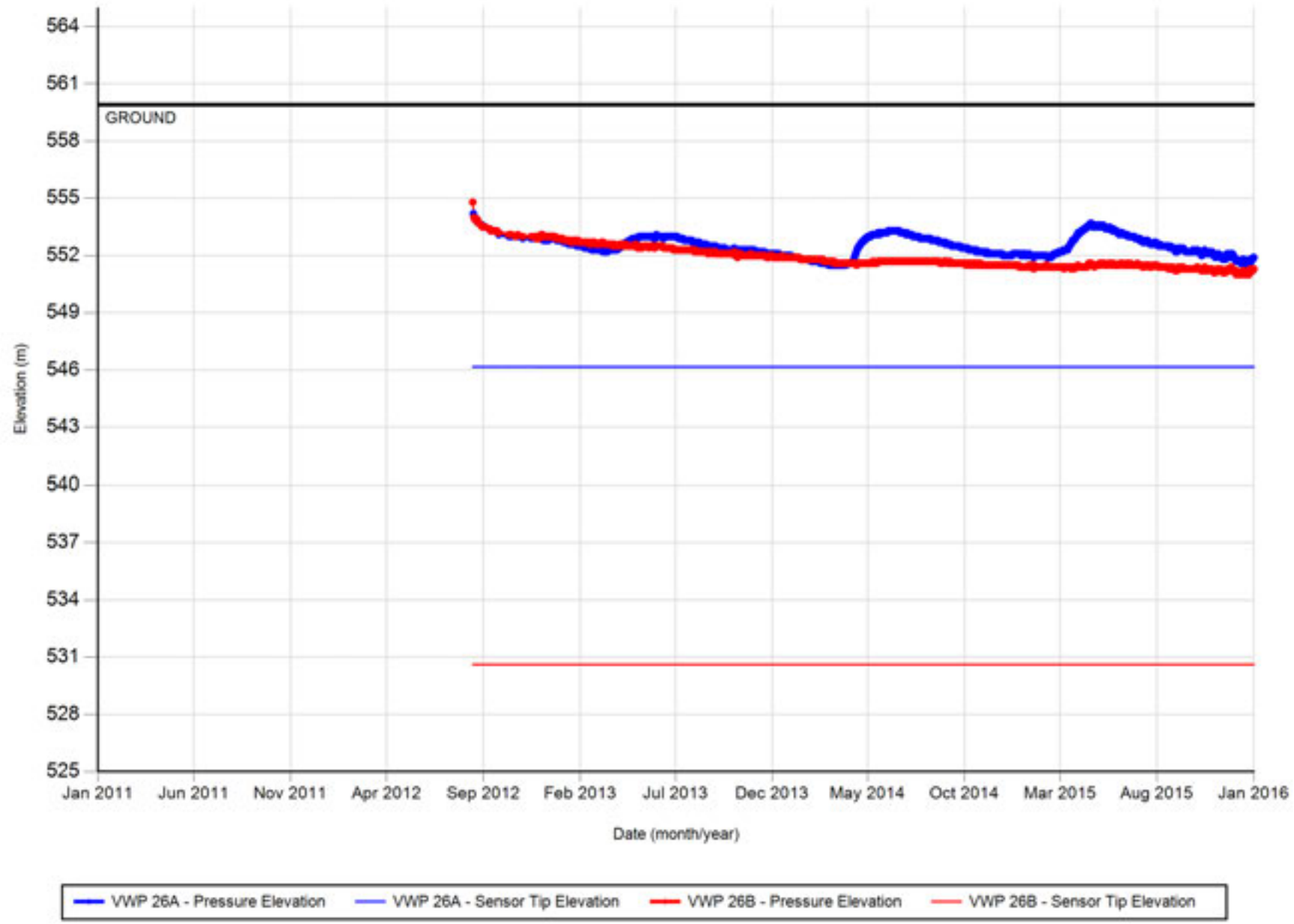
West Quesnel Land Stability Program

VWP 25A and B(Station 18)



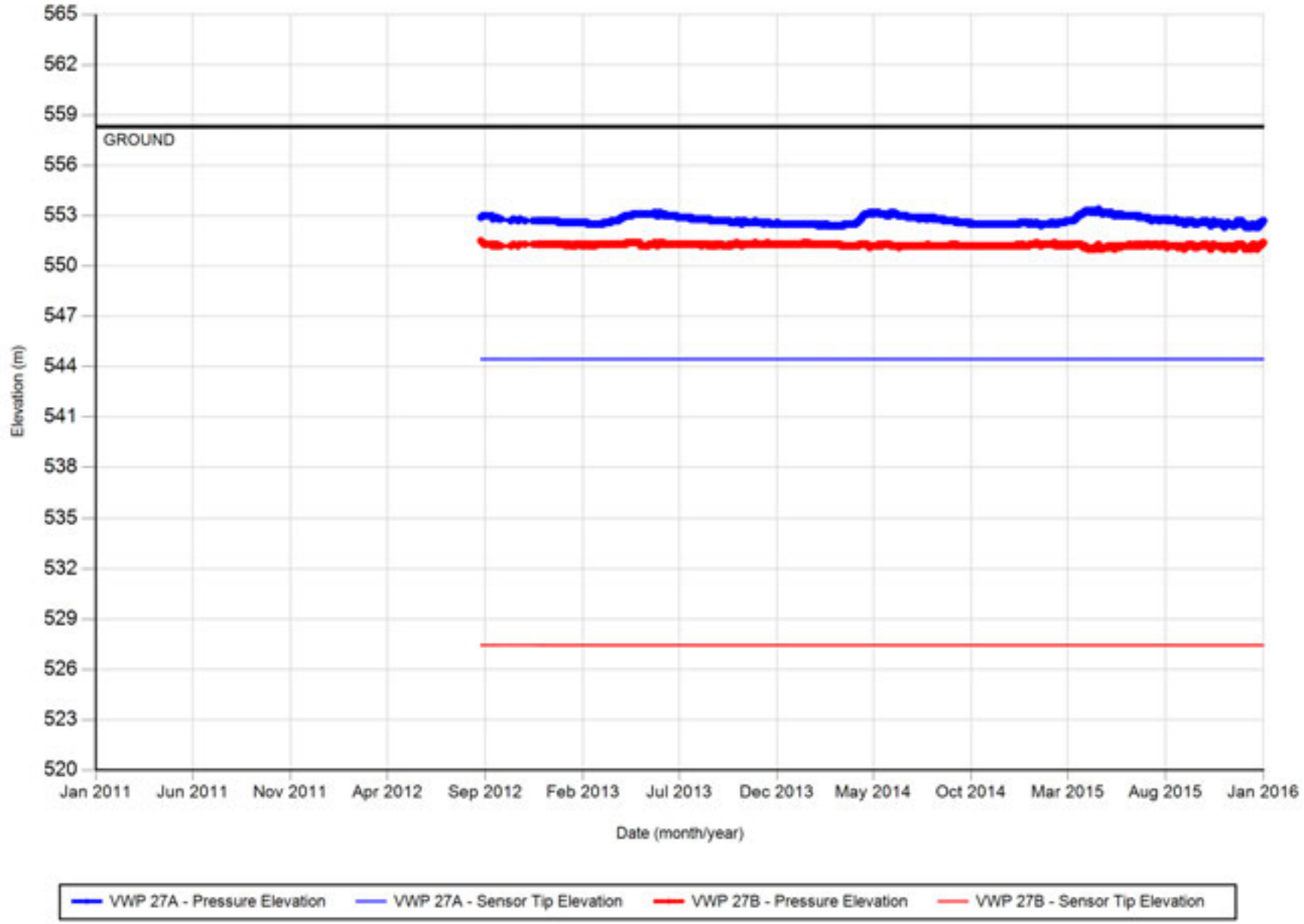
West Quesnel Land Stability Program

VWP 26A and B (Station 04)



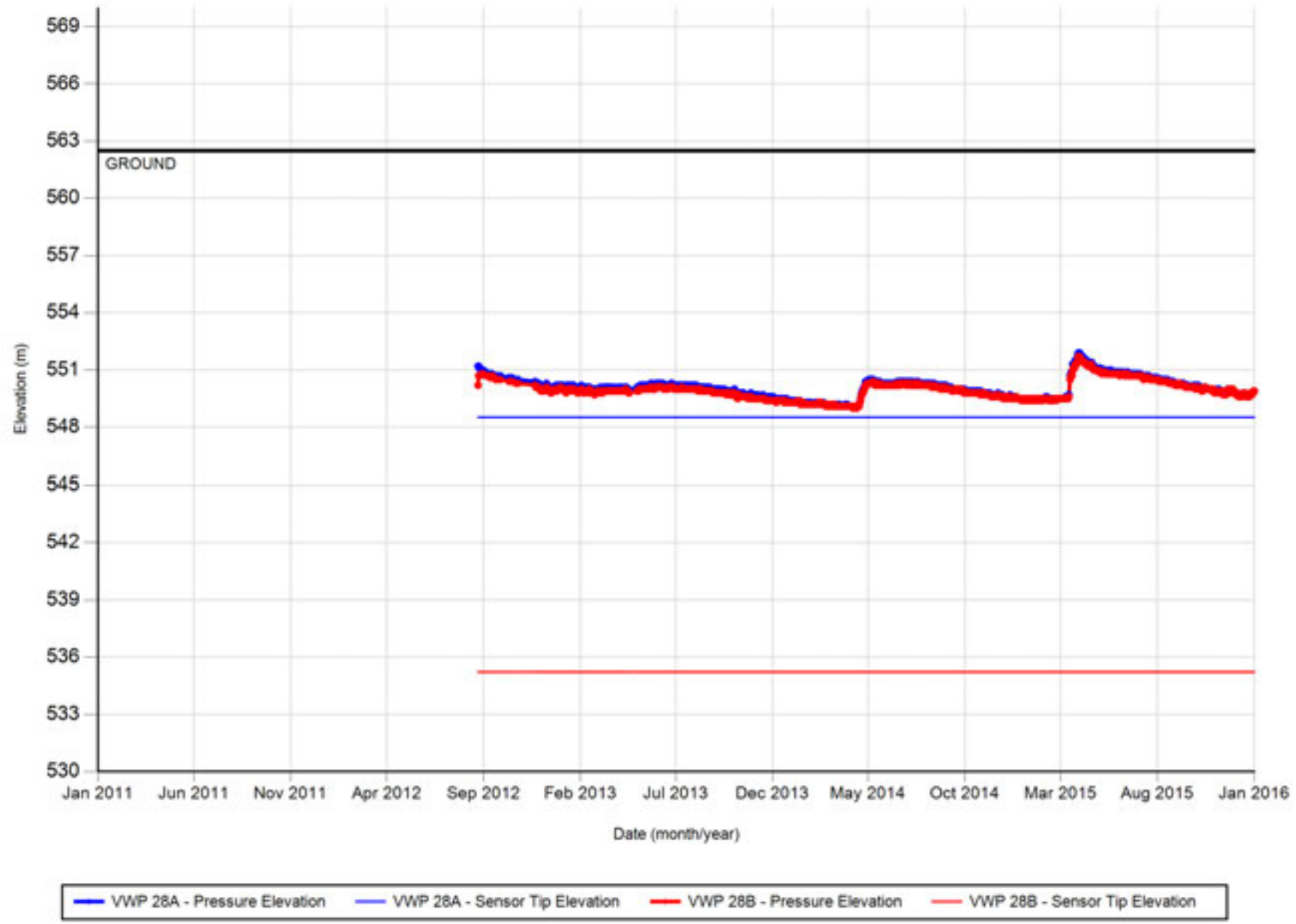
West Quesnel Land Stability Program

VWP 27A and B (Station 04)



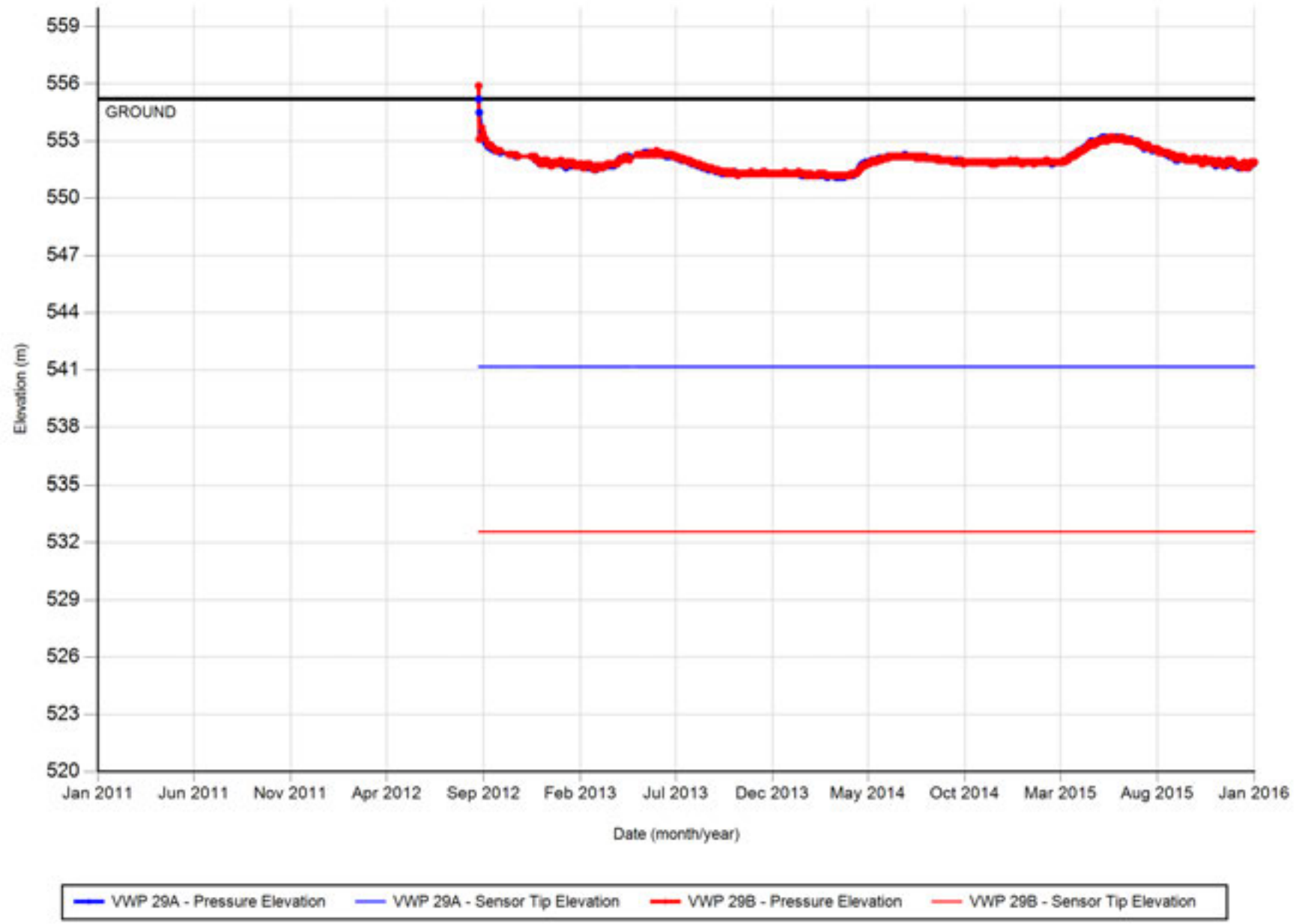
West Quesnel Land Stability Program

VWP 28A and B (Station 21)



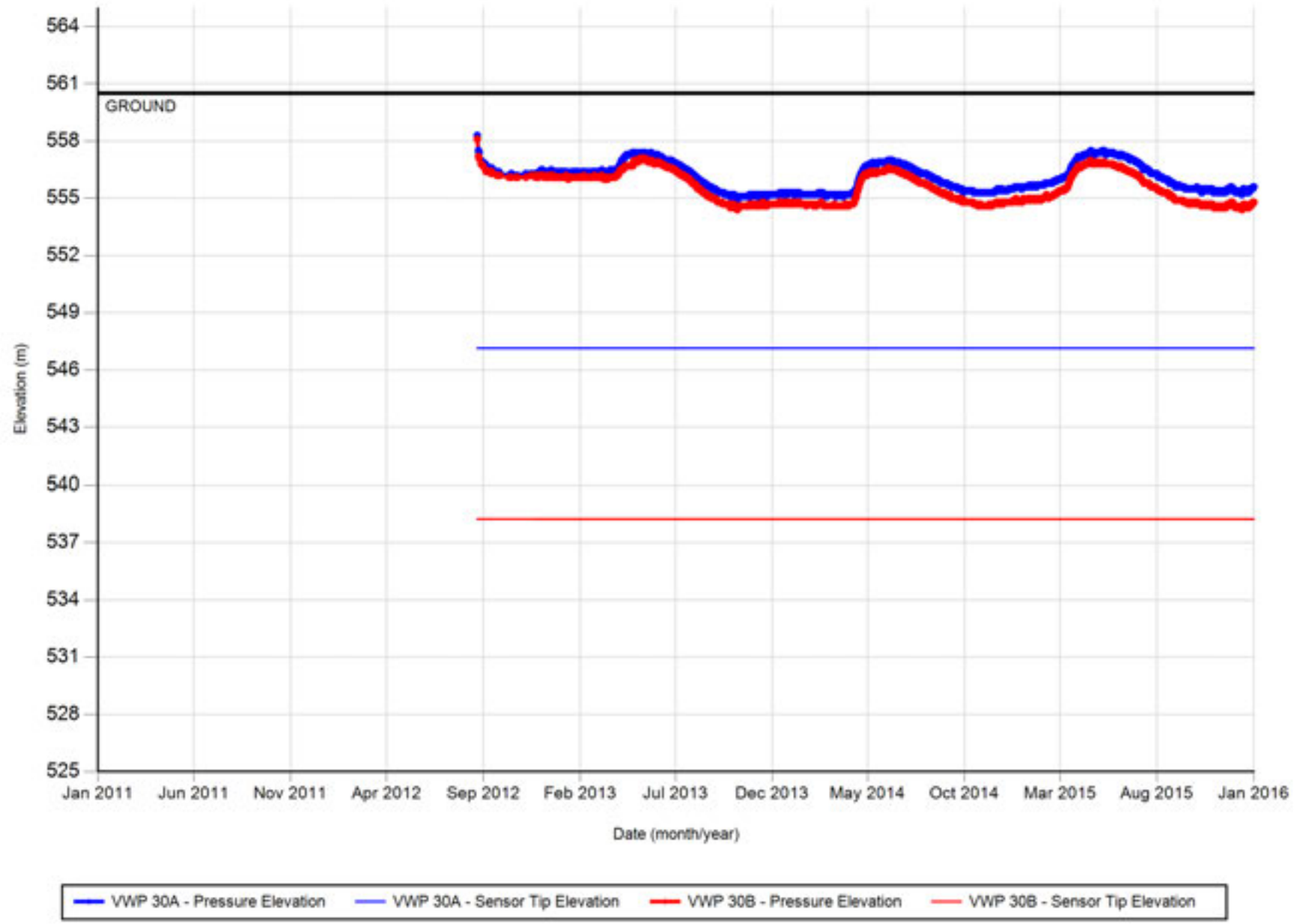
West Quesnel Land Stability Program

VWP 29A and B (Station 21)



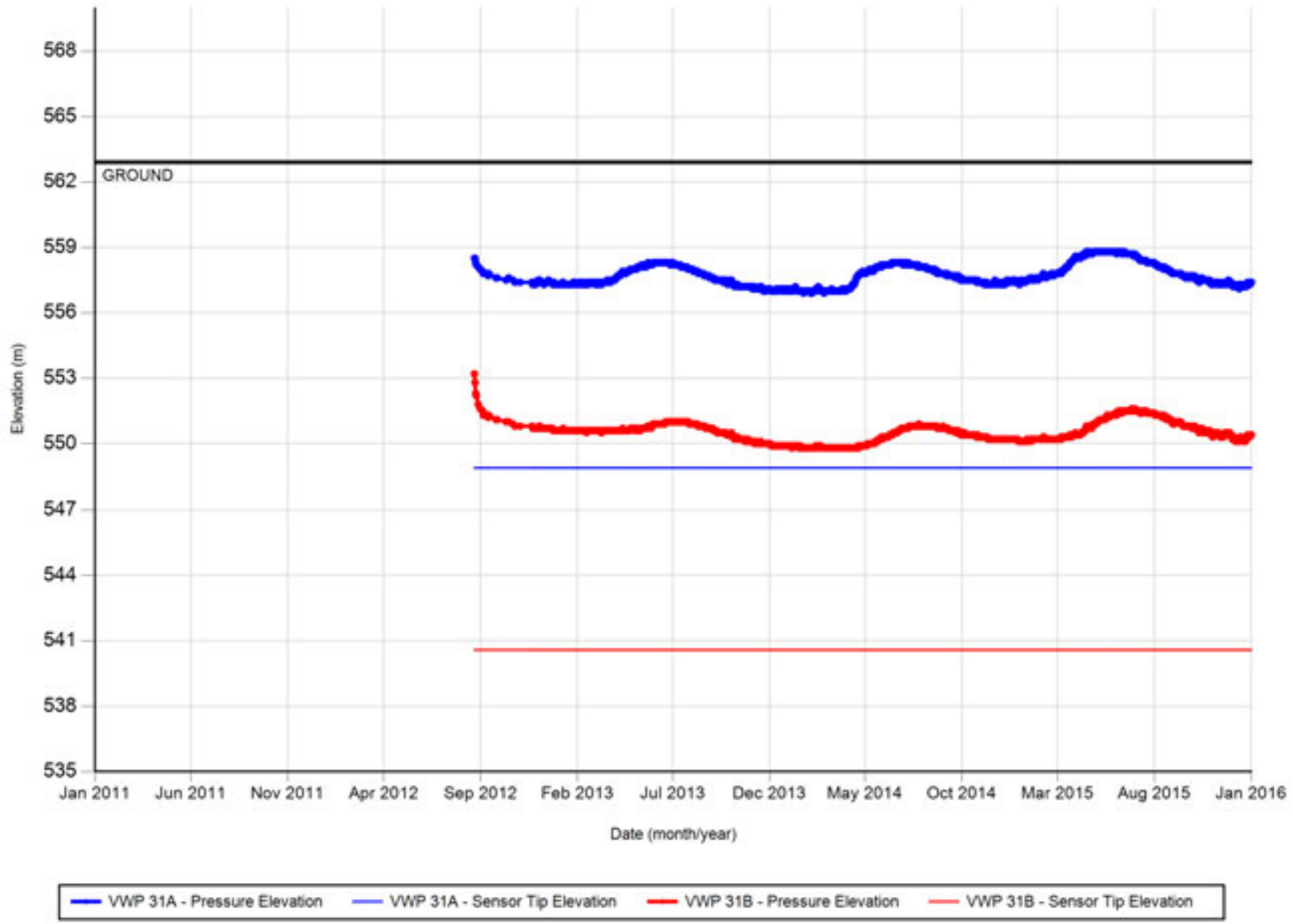
West Quesnel Land Stability Program

VWP 30A and B (Station 20)



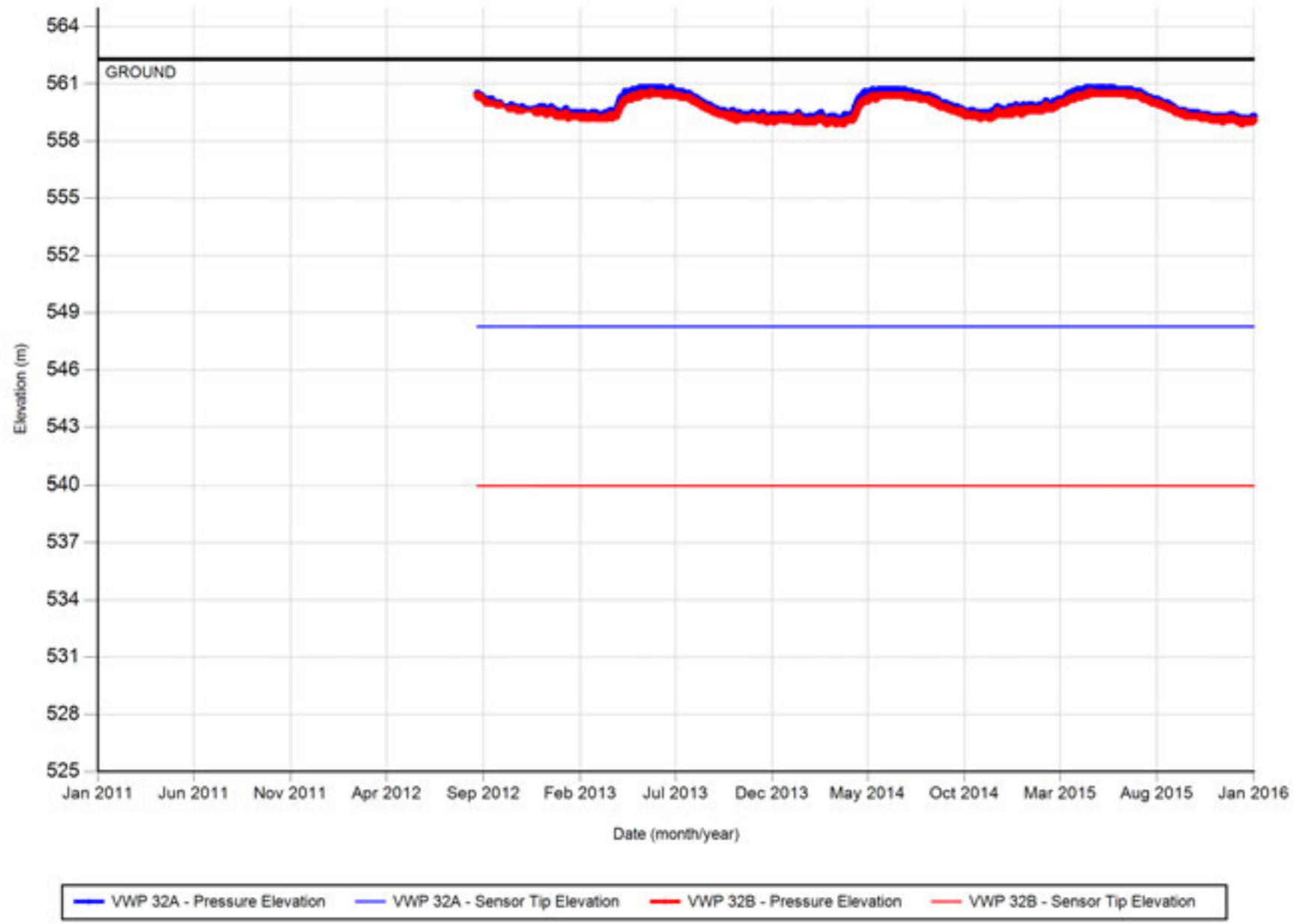
West Quesnel Land Stability Program

VWP 31A and B (Station 20)



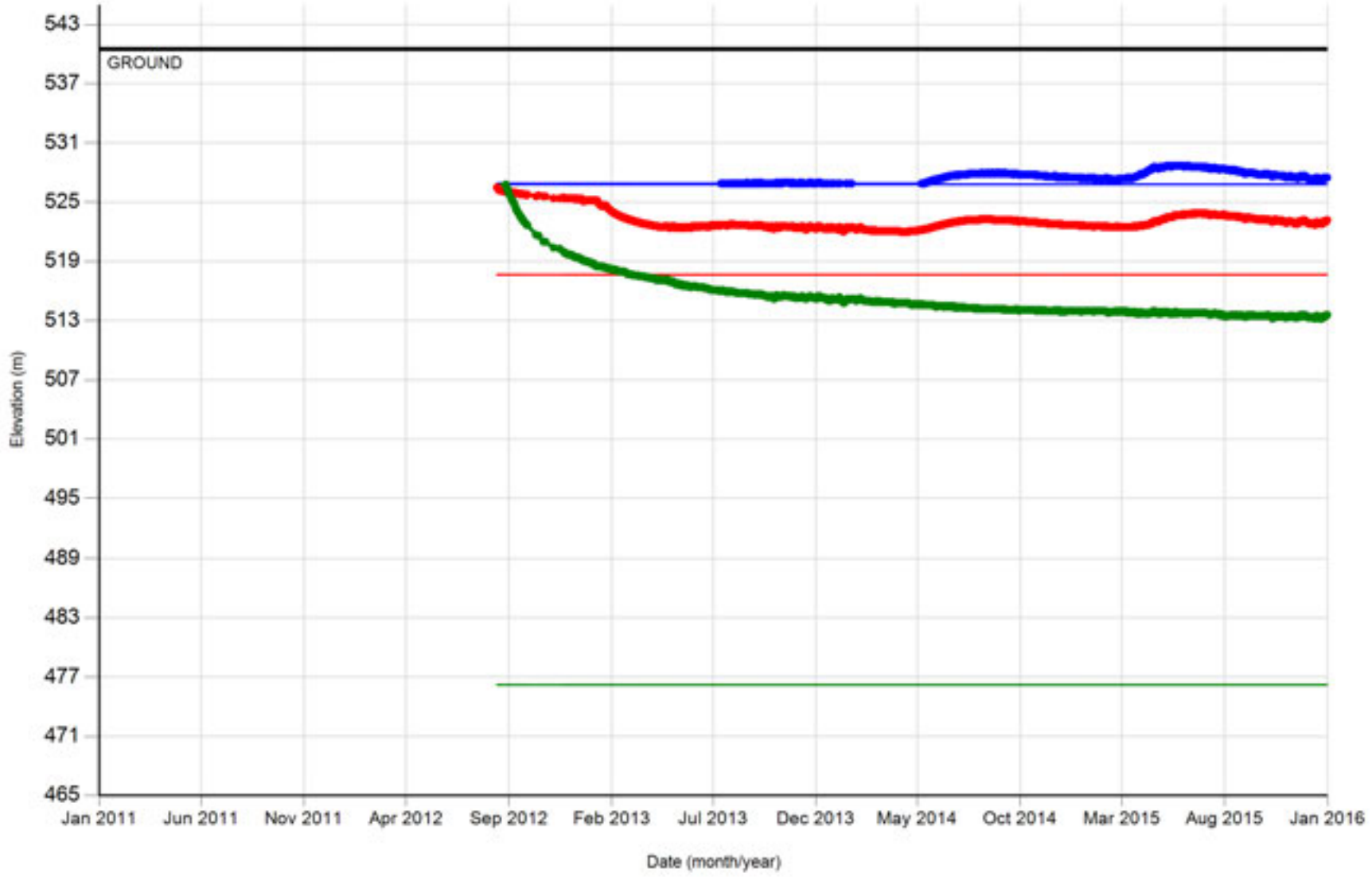
West Quesnel Land Stability Program

VWP 32A and B (Station 20)



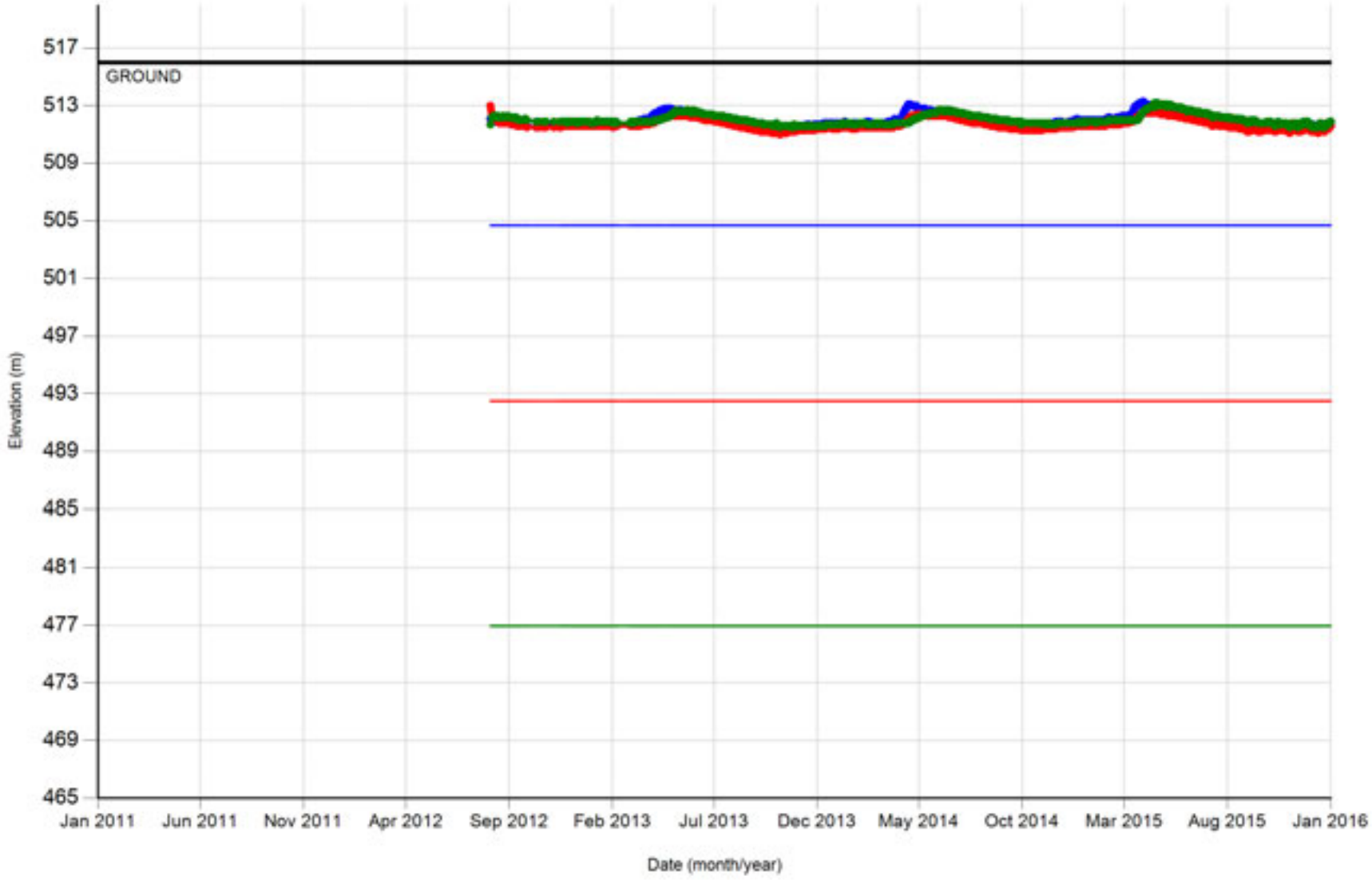
West Quesnel Land Stability Program

VWP 33A, B, and C (Station 22)



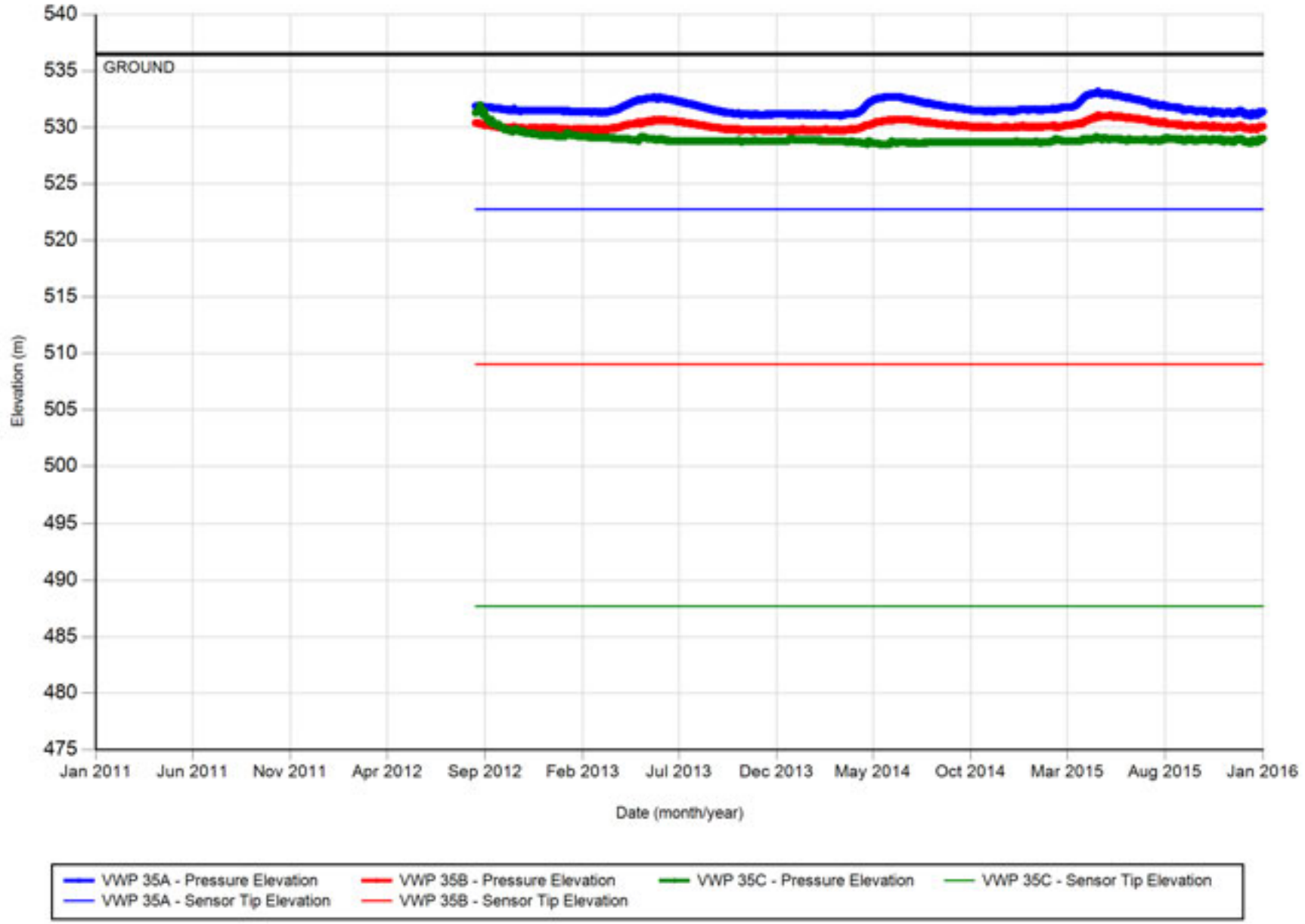
West Quesnel Land Stability Program

VWP 34A, B, and C (Station 23)



West Quesnel Land Stability Program

VWP 35A, B, and C (Station 03)

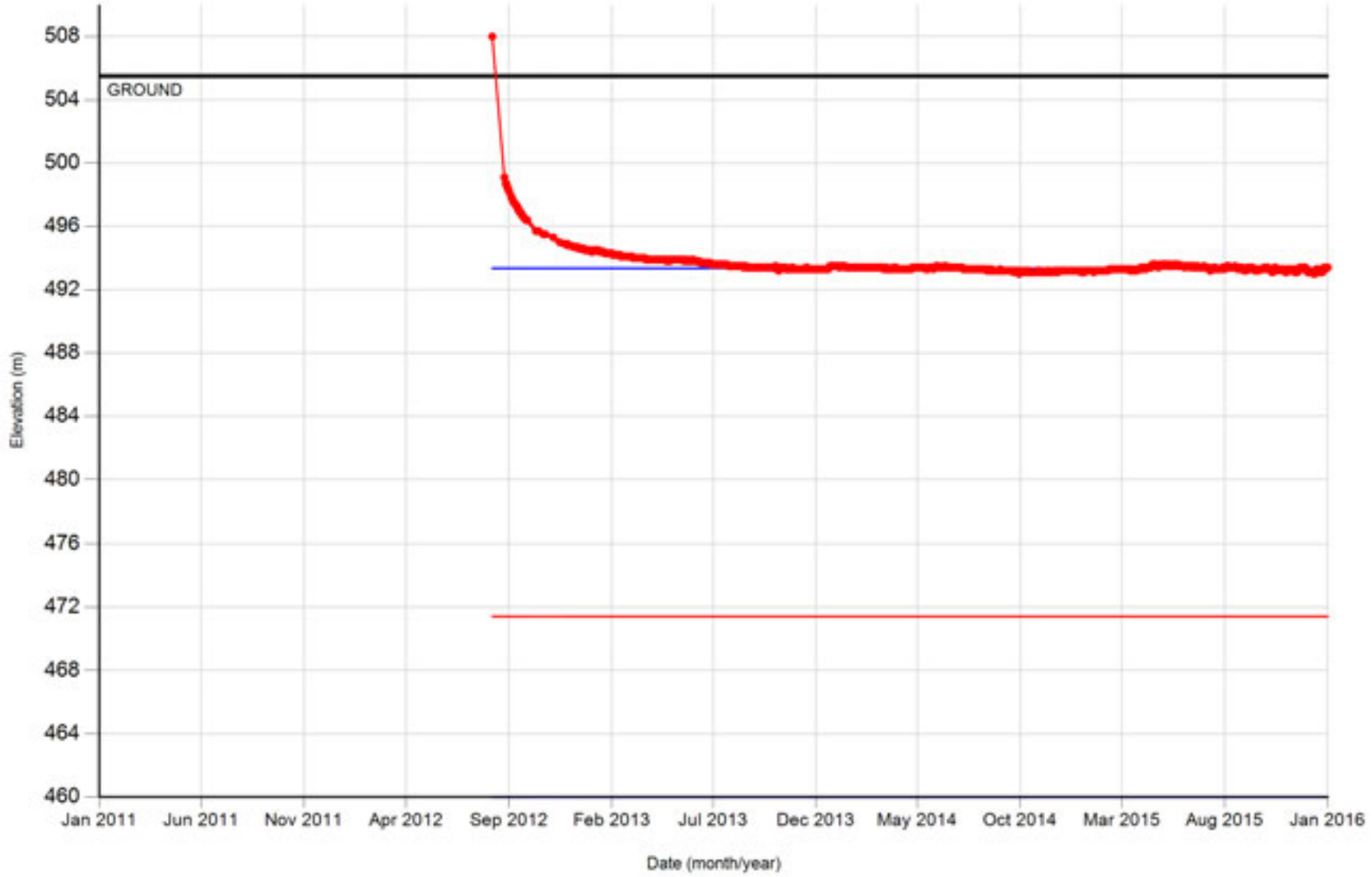


West Quesnel Land Stability Program

VWP 36A, B, and C (Station 25)

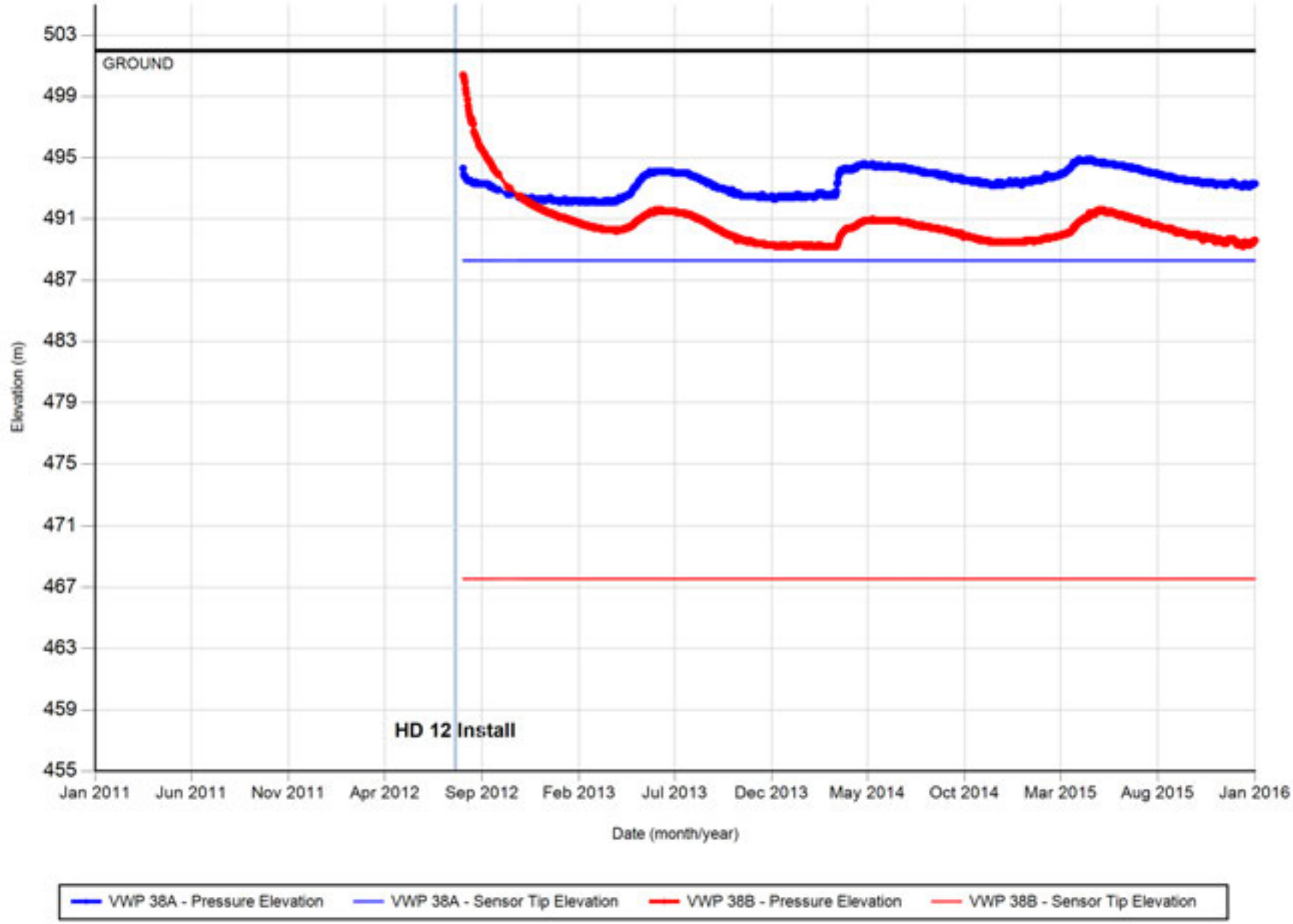
West Quesnel Land Stability Program

VWP 37A and B (Station 29)



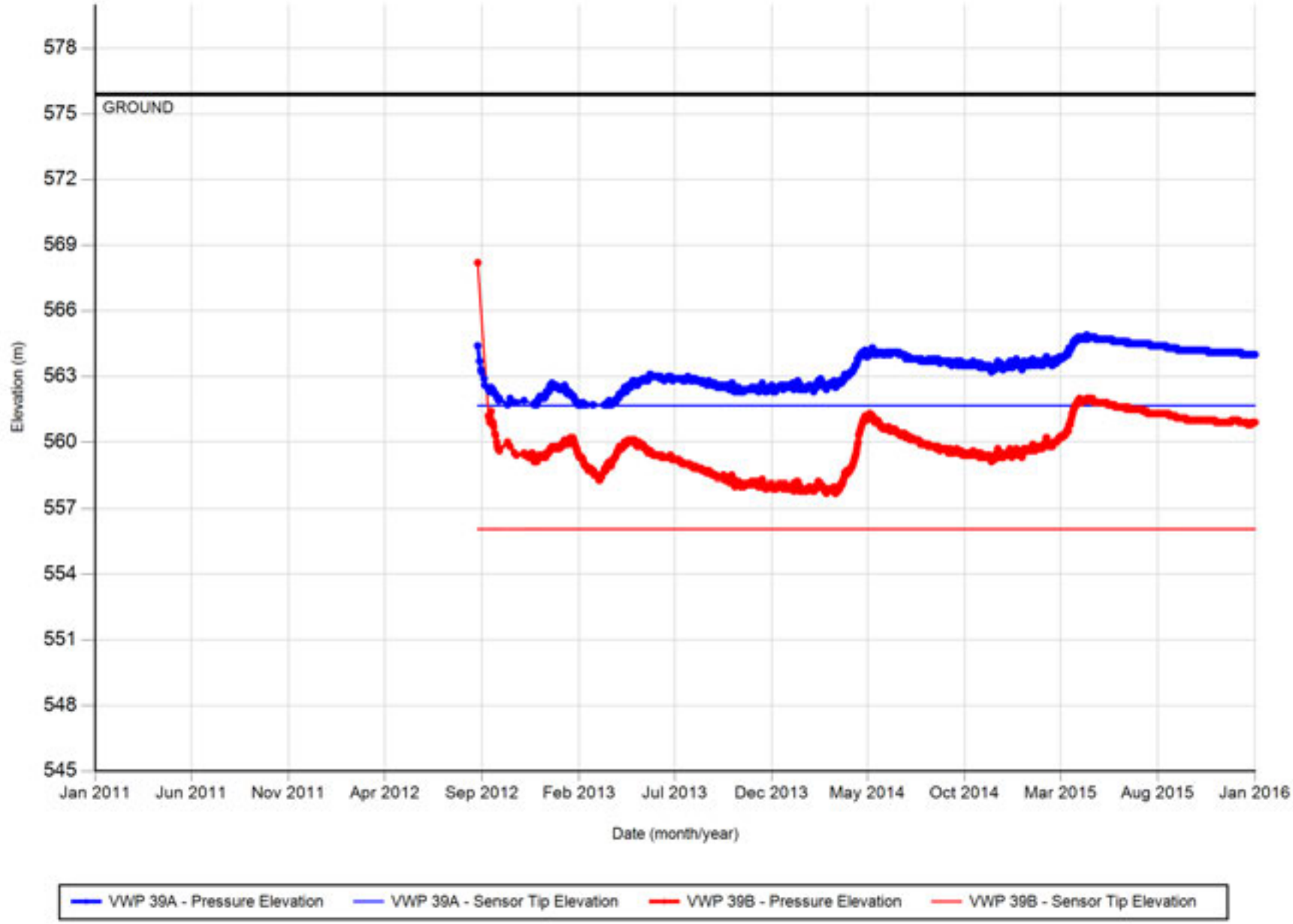
West Quesnel Land Stability Program

VWP 38A and B (Station 19)



West Quesnel Land Stability Program

VWP 39A and B (Station 30)



Appendix D

Pumping Wells – Status Table and Production Charts

APPENDIX D - Pumping Well Status

Well	Location	Installation Date	Depth (Screen)	Depth (Pump)	Depth (VW tip)	Monitoring Well VWPs	Status
PW1	Flamingo St.	September 2003	29.9-47.5m	45.0m	44.3m	VWP 3A&B, VWP 4A&B	Active - VWP dynamic controls
PW2	Abbott Dr.	September 2003	30.0-55.0m	33.5m	32.9m	VWP 3	Active - VWP dynamic controls
PW4	Panagrot Ave. (east end)	June 2007	6.1-30.5m	29.0m	28.3m	VWP 12A,B,C&D, VWP 19A&B, VWP 20	Active - VWP dynamic controls
PW5	Adam St.	June 2007	42.7-61.0m	58.5m	57.9m	VWP 17A&B, VWP 18A	Active - level controls at 55.3m and 57.4m
PW6	Lewis Dr.	October 2012	8.3-33.5m	31.7m	29.9m	VWP 26A&B	Inactive - Technical difficulties
PW7	Dixon St.	October 2012	8.4-33.5m	32.8m	32m	VWP 26A&B, VWP 27A&B	Active - VWP dynamic controls
PW8	Dixon St.	October 2012	8.5-33.5m	32.7m	31.9m	VWP 27A&B	Active - VWP dynamic controls
PW9	South of Dixon St.	October 2012	8.7-39.6m	39.2m	38.7m	VWP 28A&B	Active - VWP dynamic controls
PW10	South of Dixon St.	NA	3.9-16.8m	NA	NA	NA	Inactive - Pump not installed (dry)
PW11	South of Abbot Dr.	October 2012	8.7-33.5m	32.8m	32.0m	VWP 30A&B	Active - VWP dynamic controls
PW12	Uplands Park	October 2012	10.5-72.5m	71.5m	70.7m	VWP 9A,B&C	Active - VWP dynamic controls
PW13	Paley Ave.	October 2012	8.6-70.1m	68.1m	67.3m	VWP 33A,B&C	Active - VWP dynamic controls
PW14	Dawson St.	October 2012	8.5-33.5m	32.8m	32.0m	VWP 10A,B&C	Active - VWP dynamic controls
PW15	South of Abbot Dr.	October 2012	8.5-33.5m	32.8m	32.0m	VWP 30A&B, VWP 31A&B	Active - VWP dynamic controls
PW16	South of Abbot Dr.	October 2012	8.6-33.5m	32.8m	32.0m	VWP 31A&B, VWP 31A&B	Active - VWP dynamic controls
PW17	South of Abbot Dr.	October 2012	4.1-29.0m	26.2	25.6	VWP 32A&B	Active - VWP dynamic controls
PW18	Stork Ave.	October 2012	13.7-44.2m	43.8m	43.0m	VWP 34A,B&C	Active - VWP dynamic controls
PW19	Crane Ave.	October 2012	13.7-44.2m	42.7m	41.9m	VWP 22	Active - VWP dynamic controls

West Quesnel
Land Stability Program

amec
foster
wheeler

Pumping Well Trends for 2015

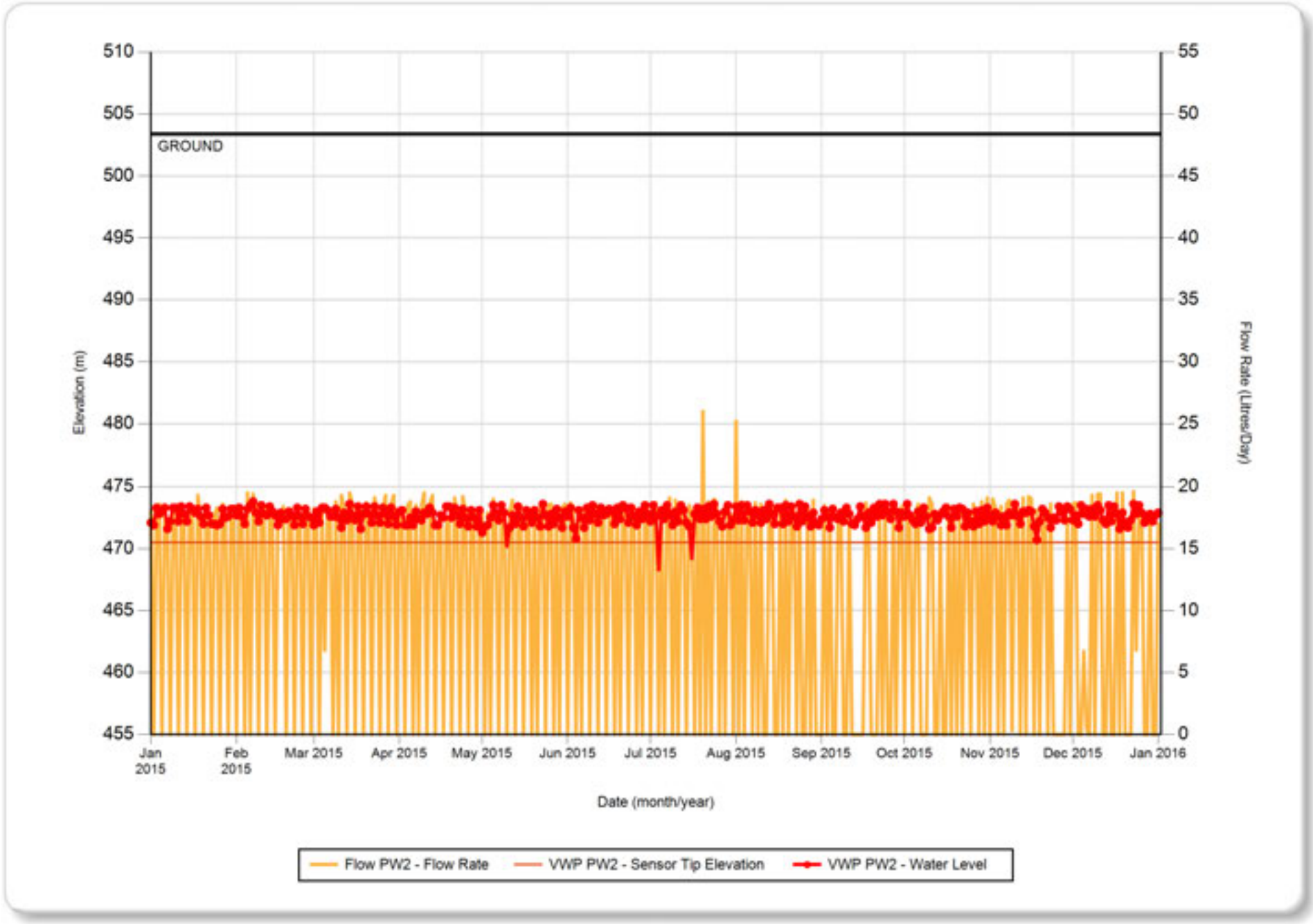
West Quesnel Land Stability Program

PW1 (Station 06) - Daily Flow and Well Level

West Quesnel Land Stability Program

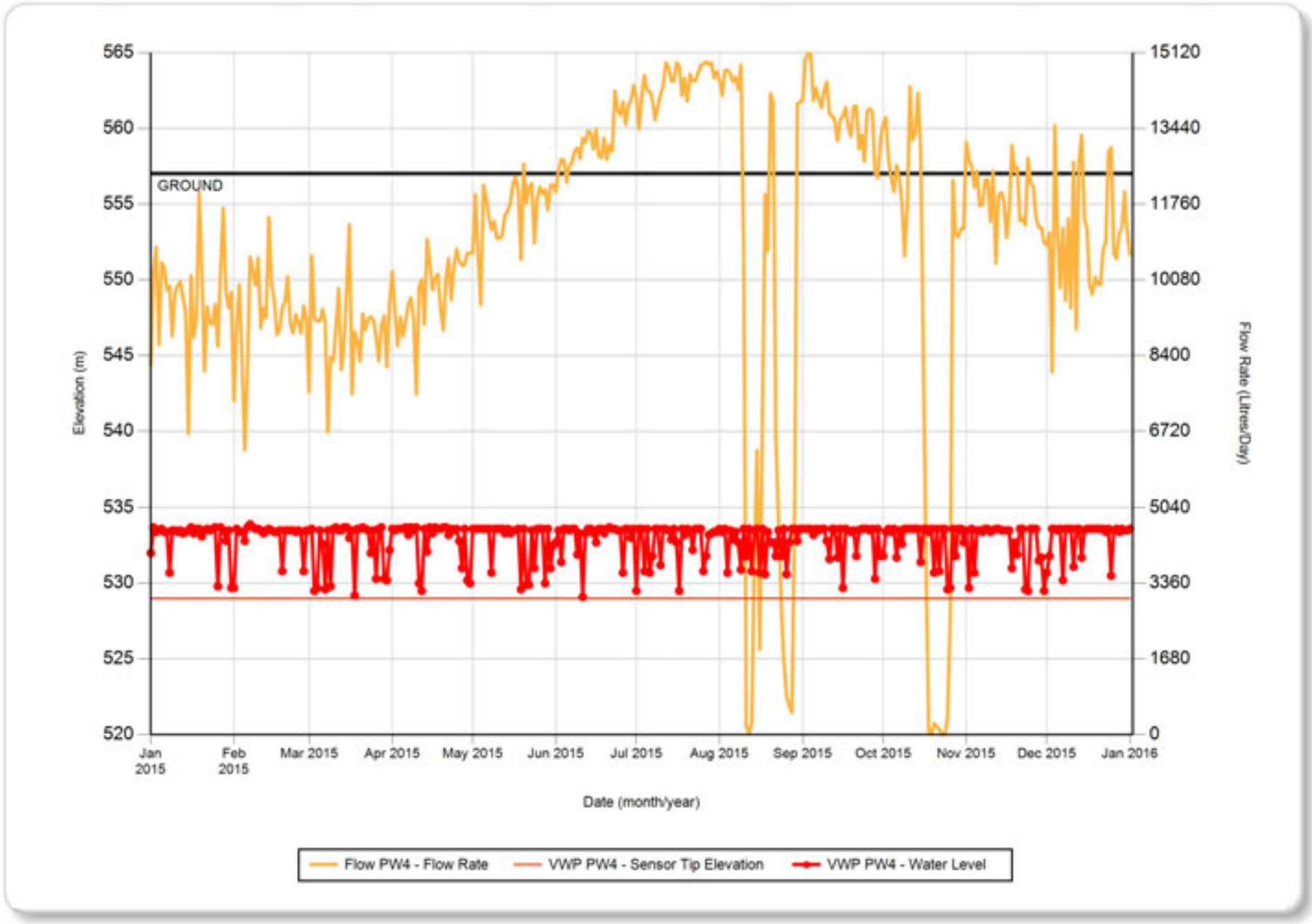
PW2 (Station 02)- Daily Flow and Well Level

amec foster wheeler



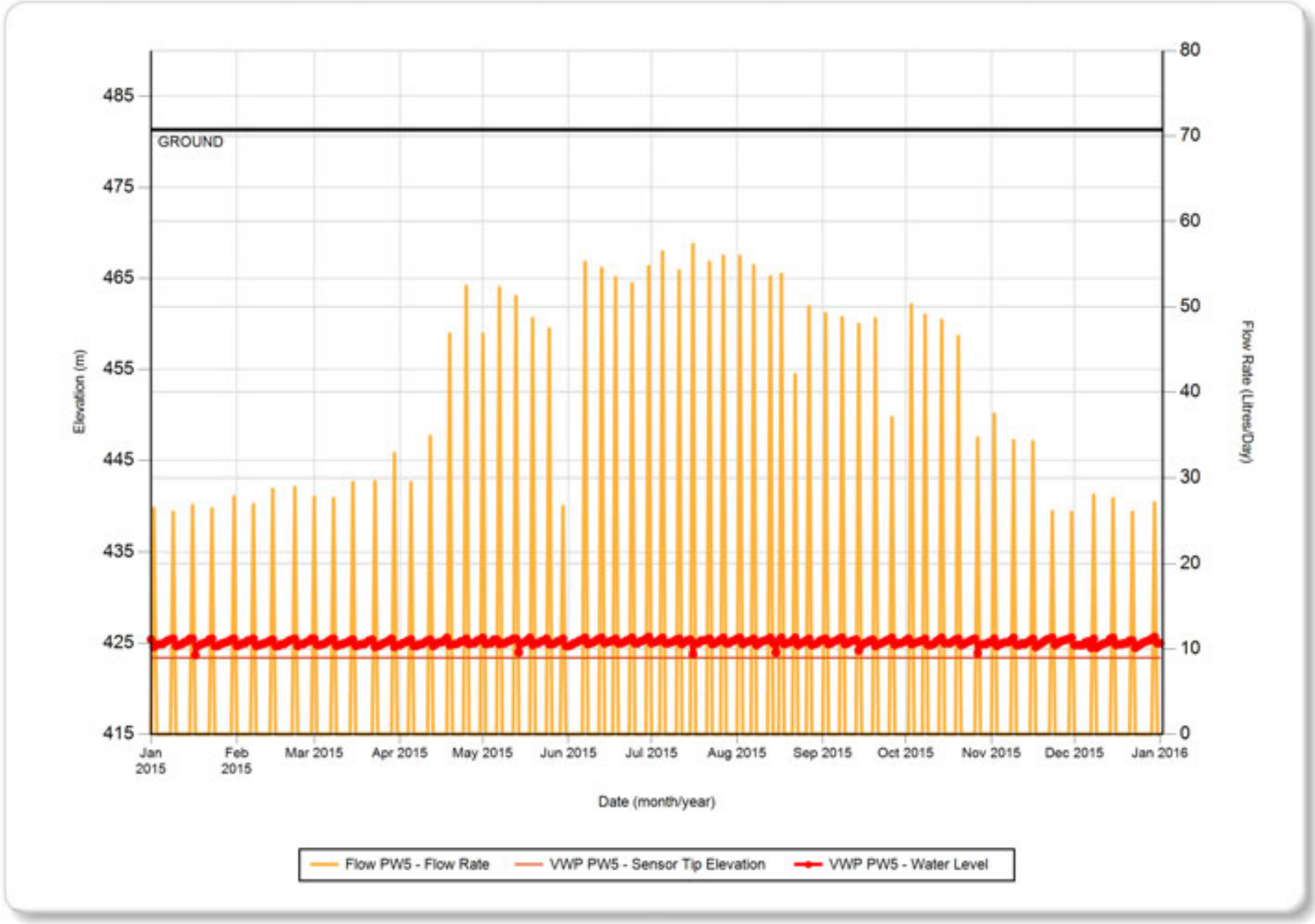
West Quesnel Land Stability Program

PW4 (Station 16) - Daily Flow and Well Level



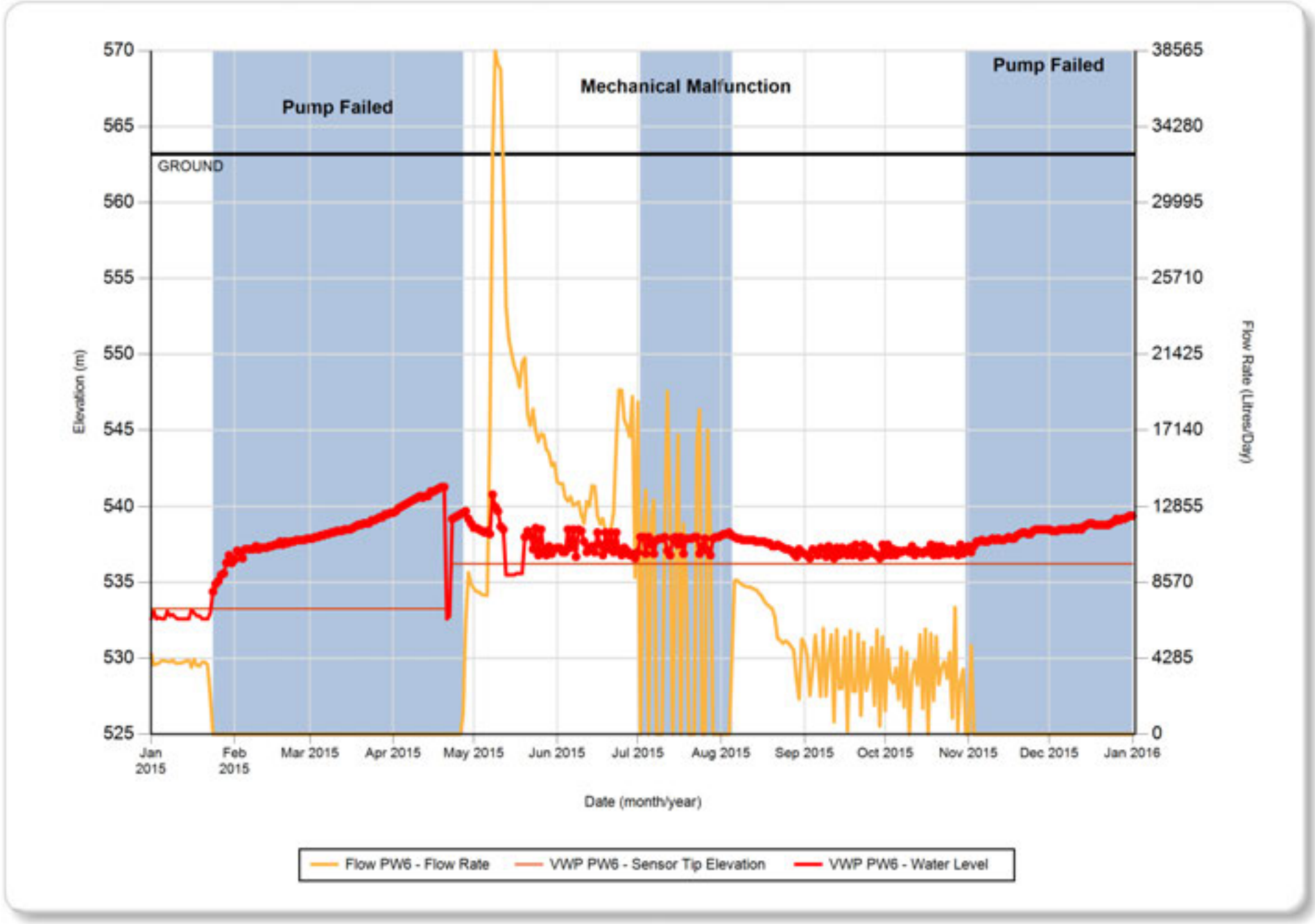
West Quesnel Land Stability Program

PW5 (Station 17) - Daily Flow and Well Level



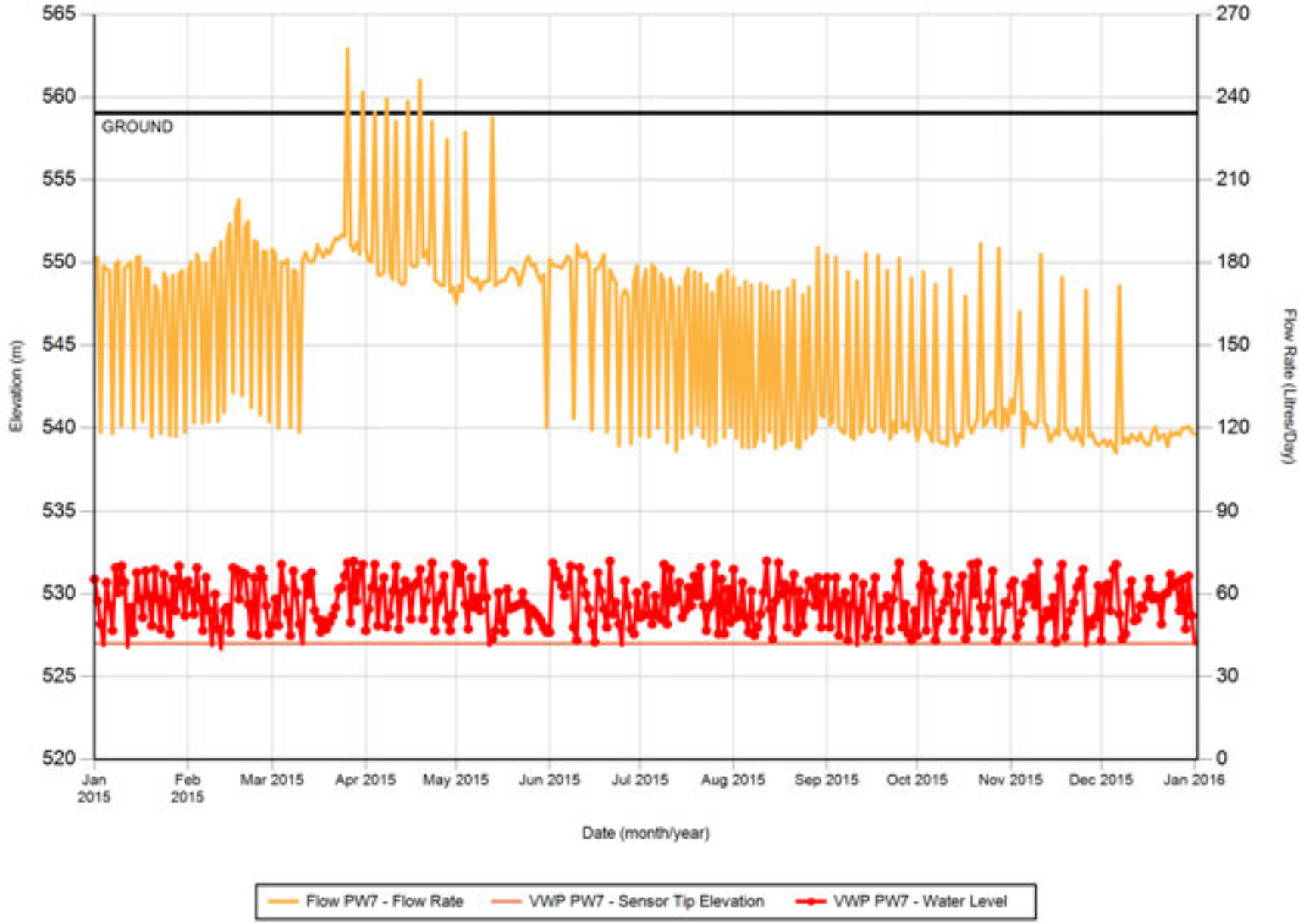
West Quesnel Land Stability Program

PW6 (Station 04) - Daily Flow and Well Level



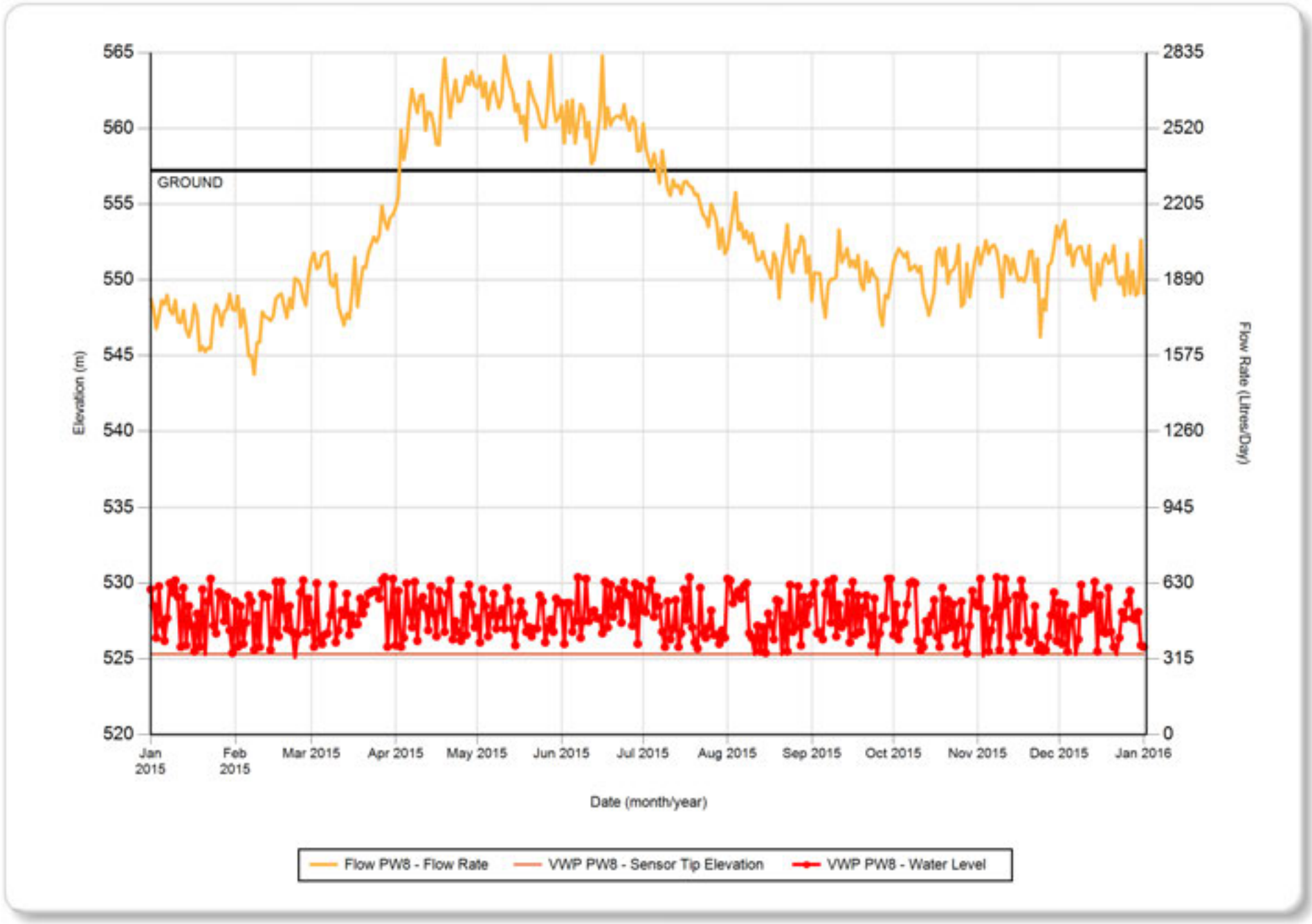
West Quesnel Land Stability Program

PW7 (Station 04) - Daily Flow and Well Level



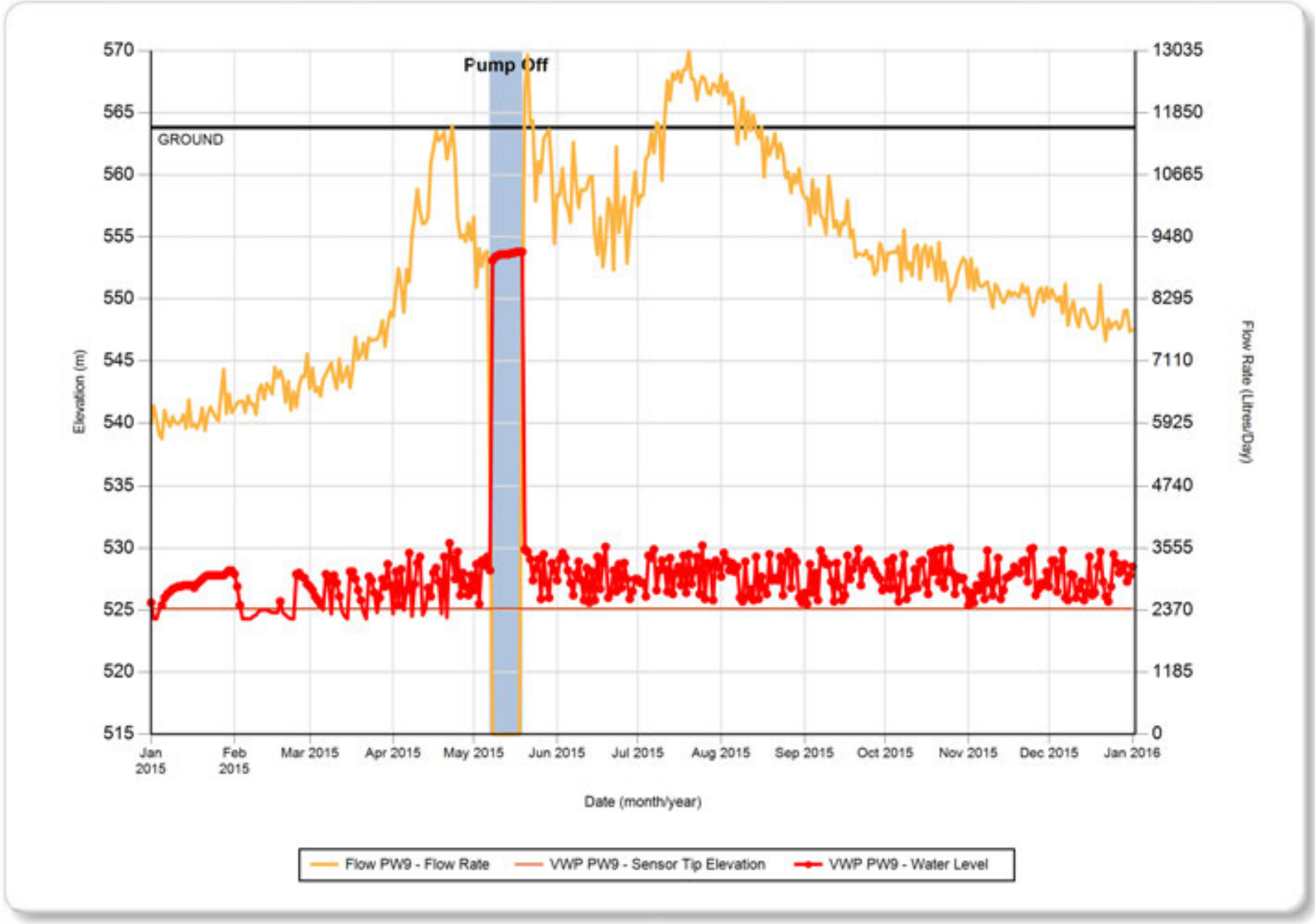
West Quesnel Land Stability Program

PW8 (Station 04) - Daily Flow and Well Level



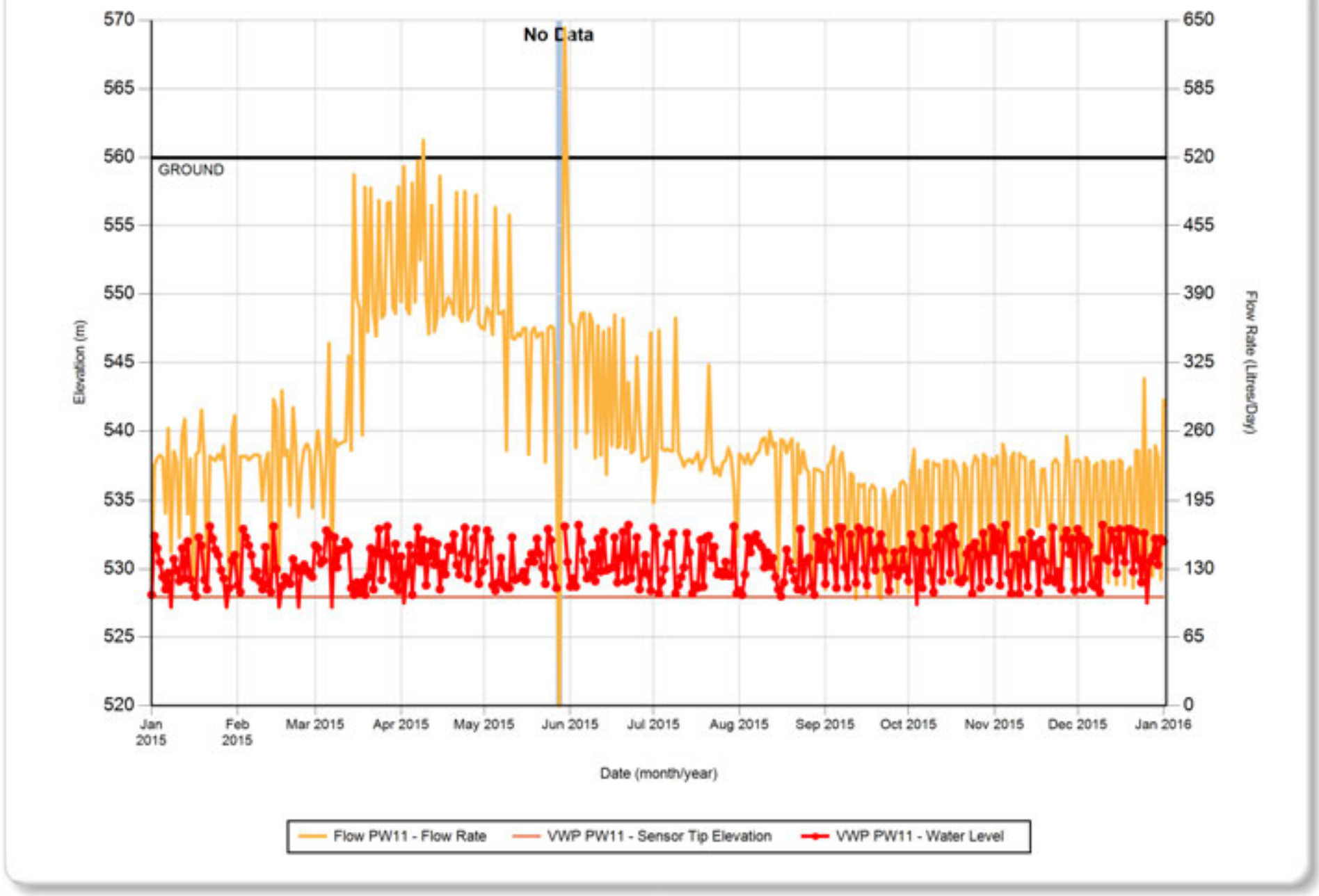
West Quesnel Land Stability Program

PW9 (Station 21) - Daily Flow and Well Level



West Quesnel Land Stability Program

PW11 (Station 20) - Daily Flow and Well Level

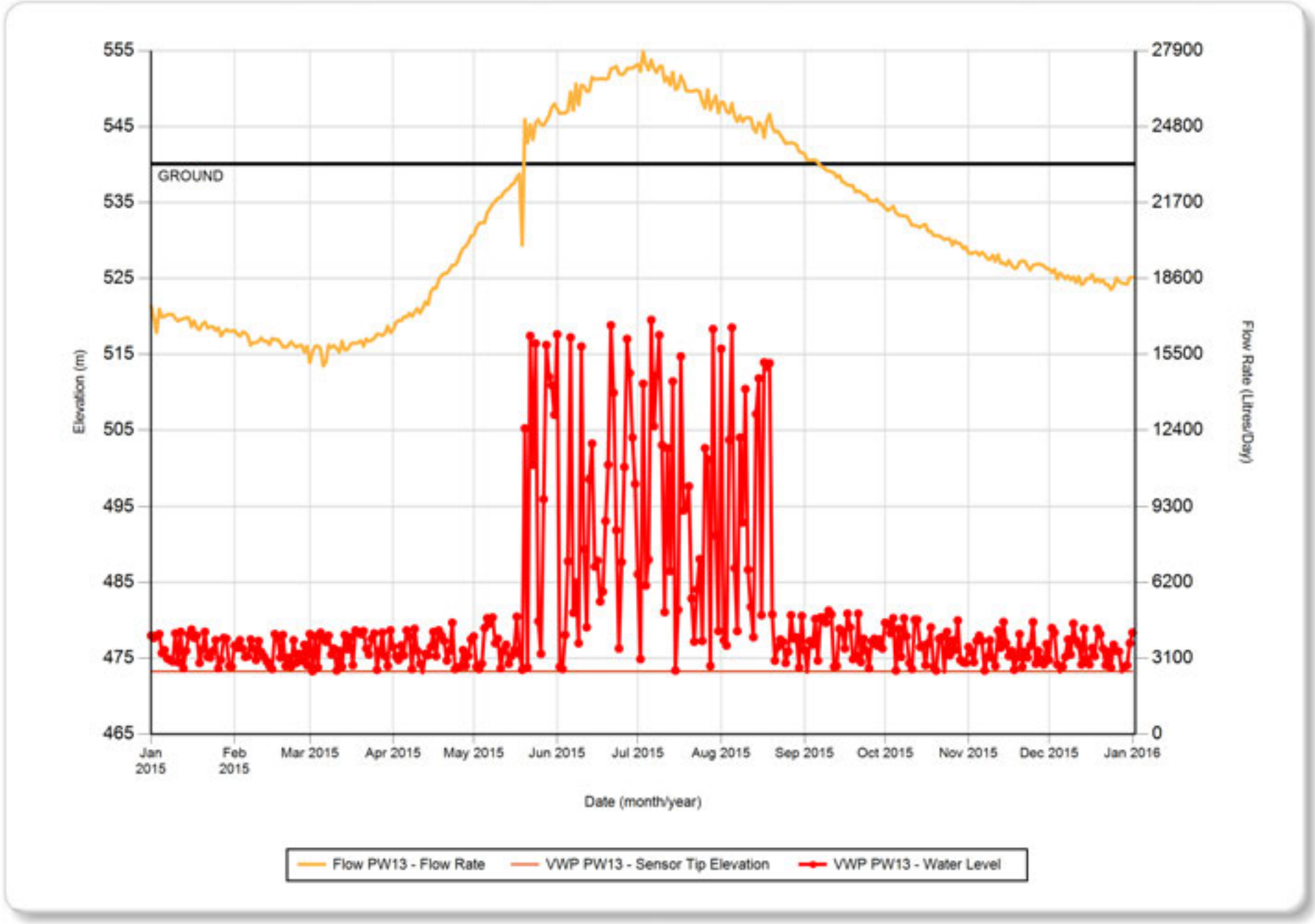


West Quesnel Land Stability Program

PW12 (Station 09) - Daily Flow and Well Level

West Quesnel Land Stability Program

PW13 (Station 22) - Daily Flow and Well Level



West Quesnel Land Stability Program

PW14 (Station 10) - Daily Flow and Well Level

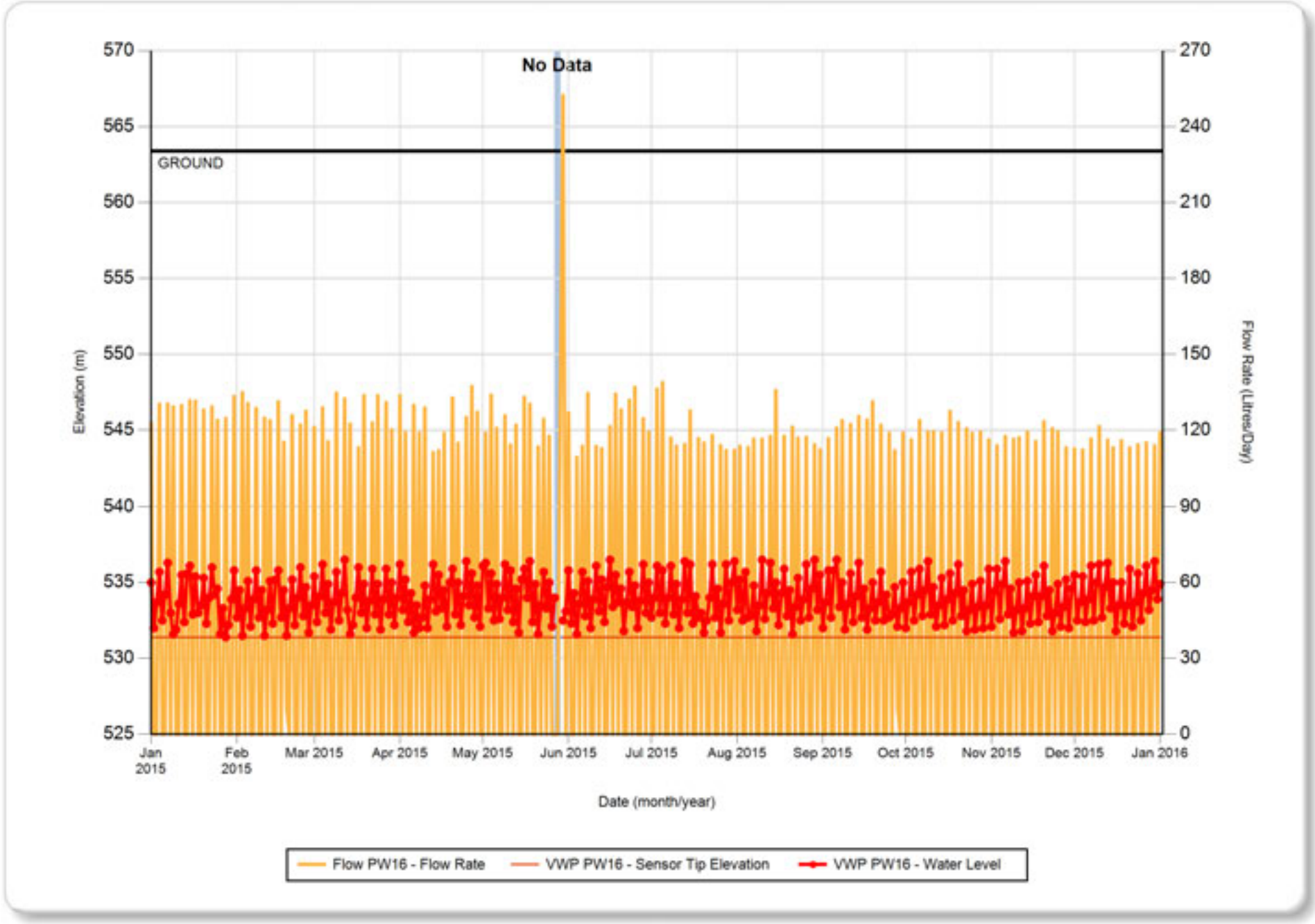
West Quesnel Land Stability Program

PW15 (Station 20) - Daily Flow and Well Level

amec foster wheeler

West Quesnel Land Stability Program

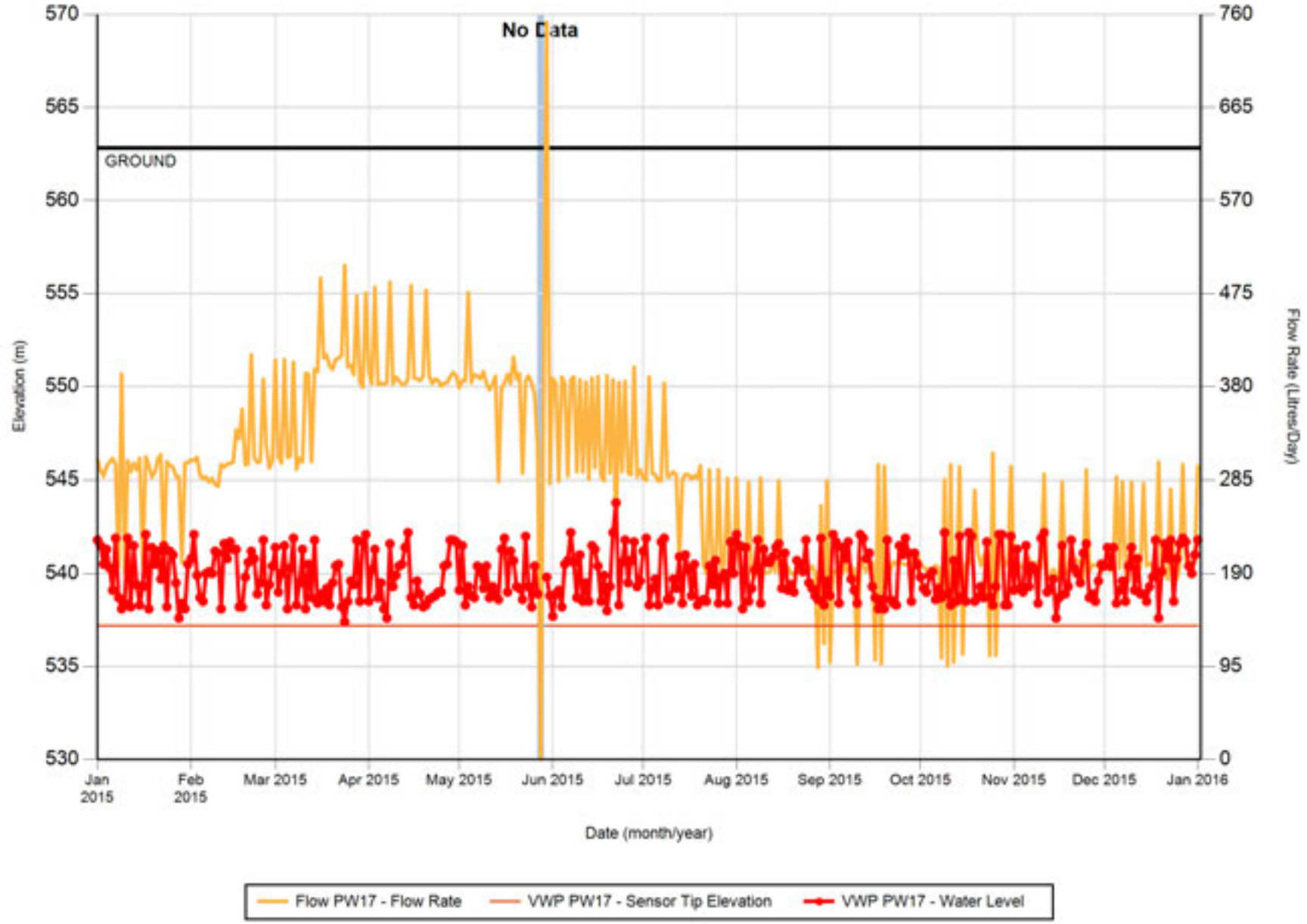
PW16 (Station 20) - Daily Flow and Well Level



West Quesnel Land Stability Program

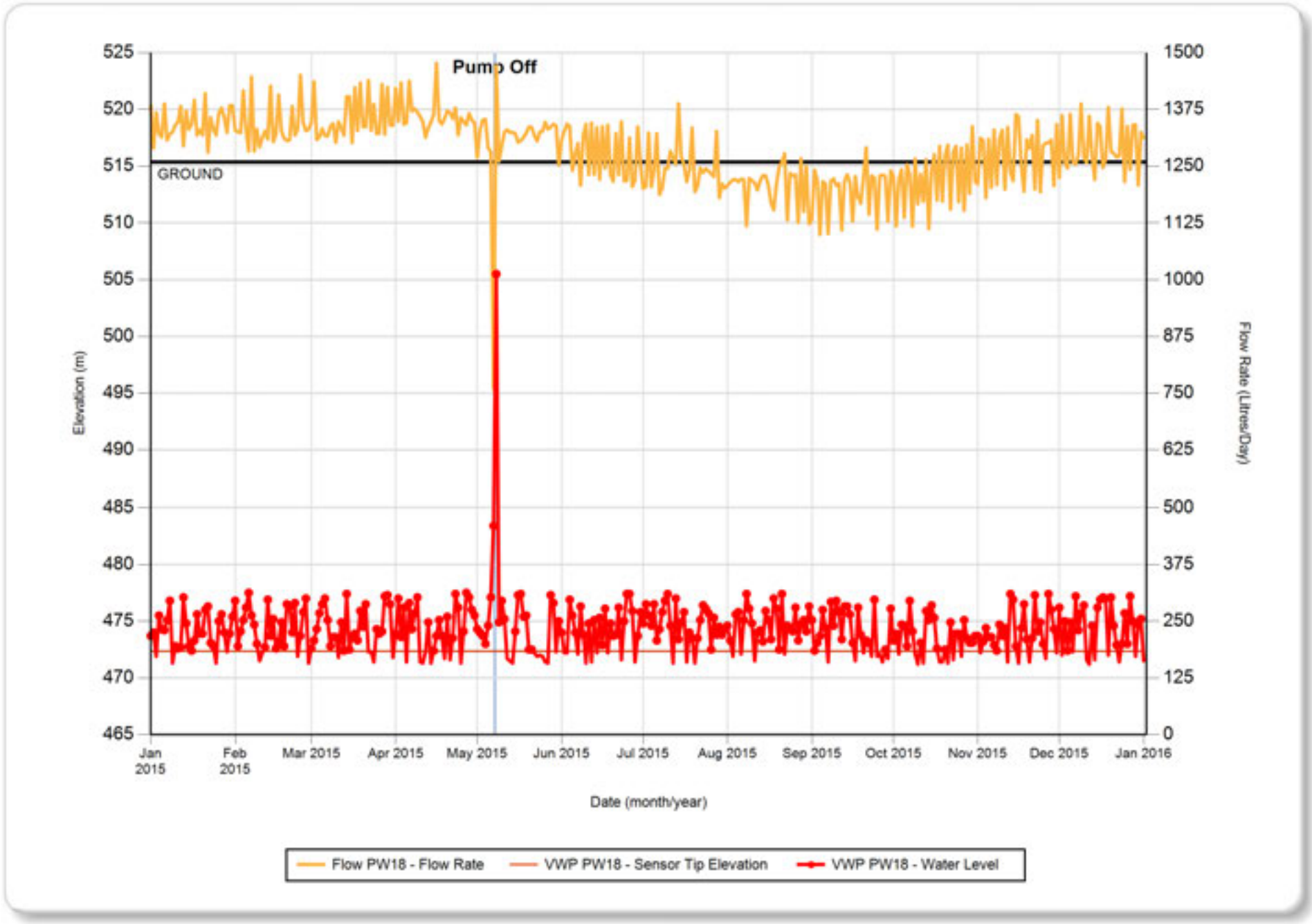
PW17 (Station 20) - Daily Flow and Well Level

amec foster wheeler



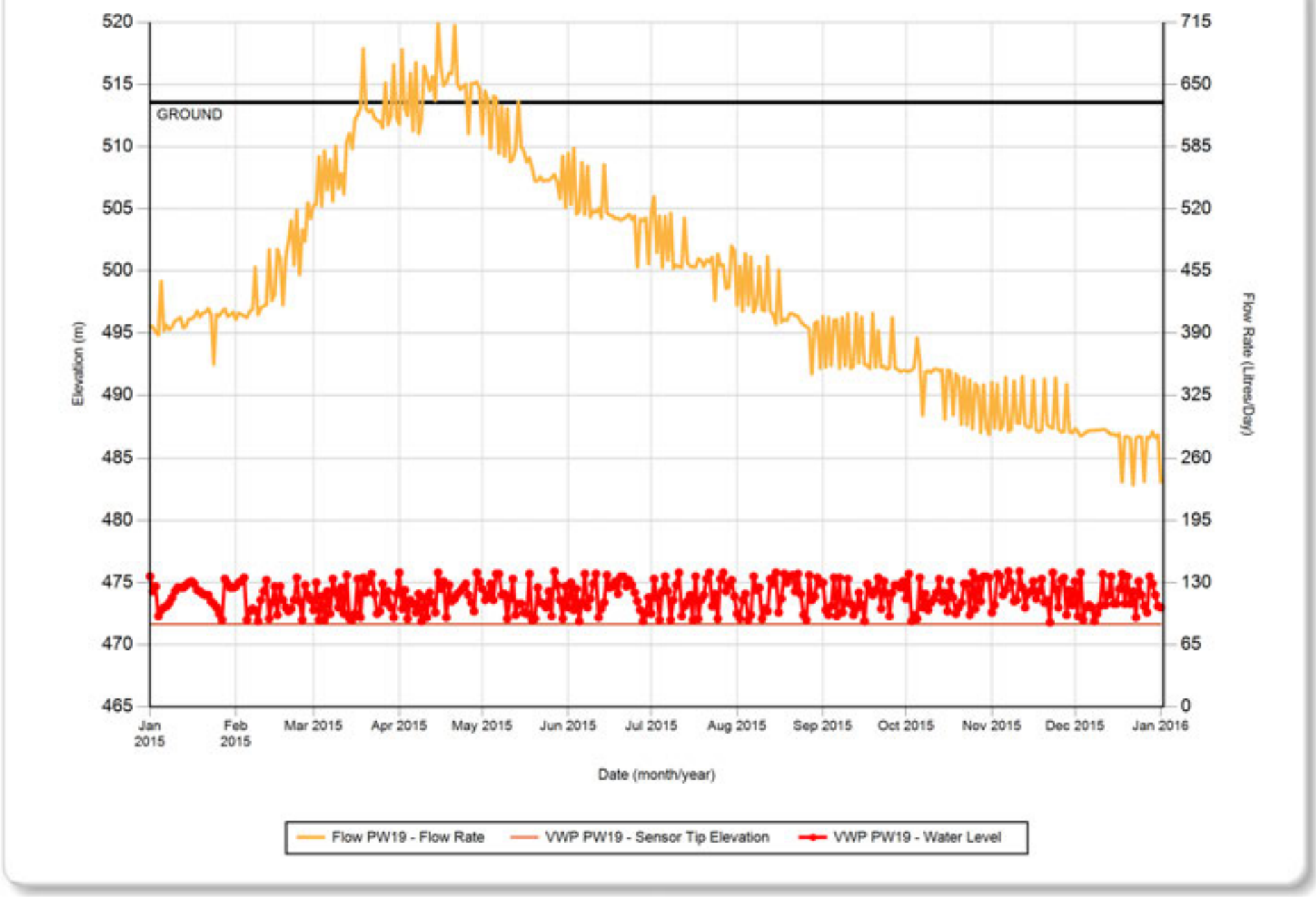
West Quesnel Land Stability Program

PW18 (Station 23) - Daily Flow and Well Level



West Quesnel Land Stability Program

PW19 (Station 28) - Daily Flow and Well Level



West Quesnel
Land Stability Program

amec
foster
wheeler

Long Term Pumping Well Trends

West Quesnel Land Stability Program

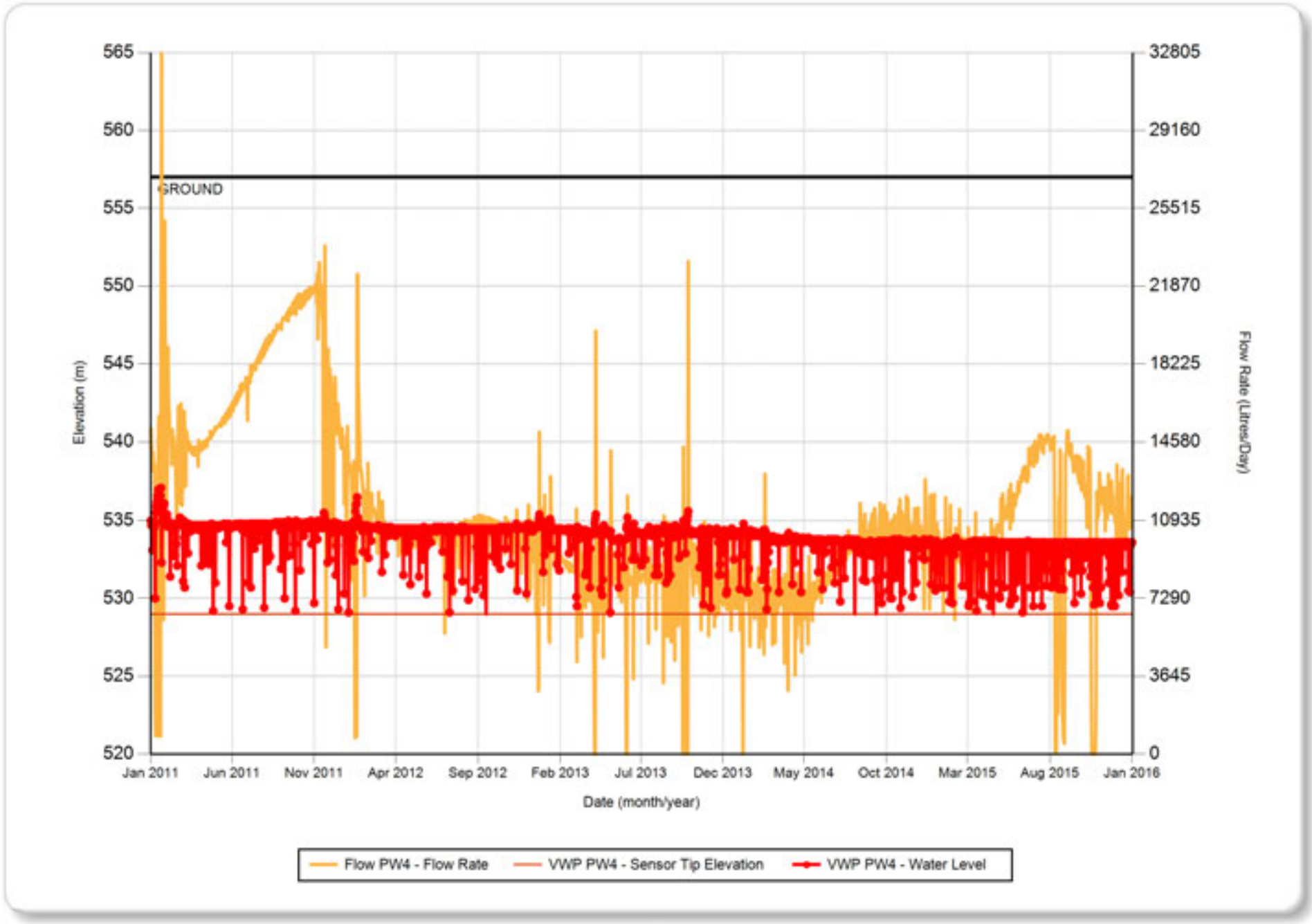
PW1 (Station 06) - Daily Flow and Well Level

West Quesnel Land Stability Program

PW2 (Station 02)- Daily Flow and Well Level

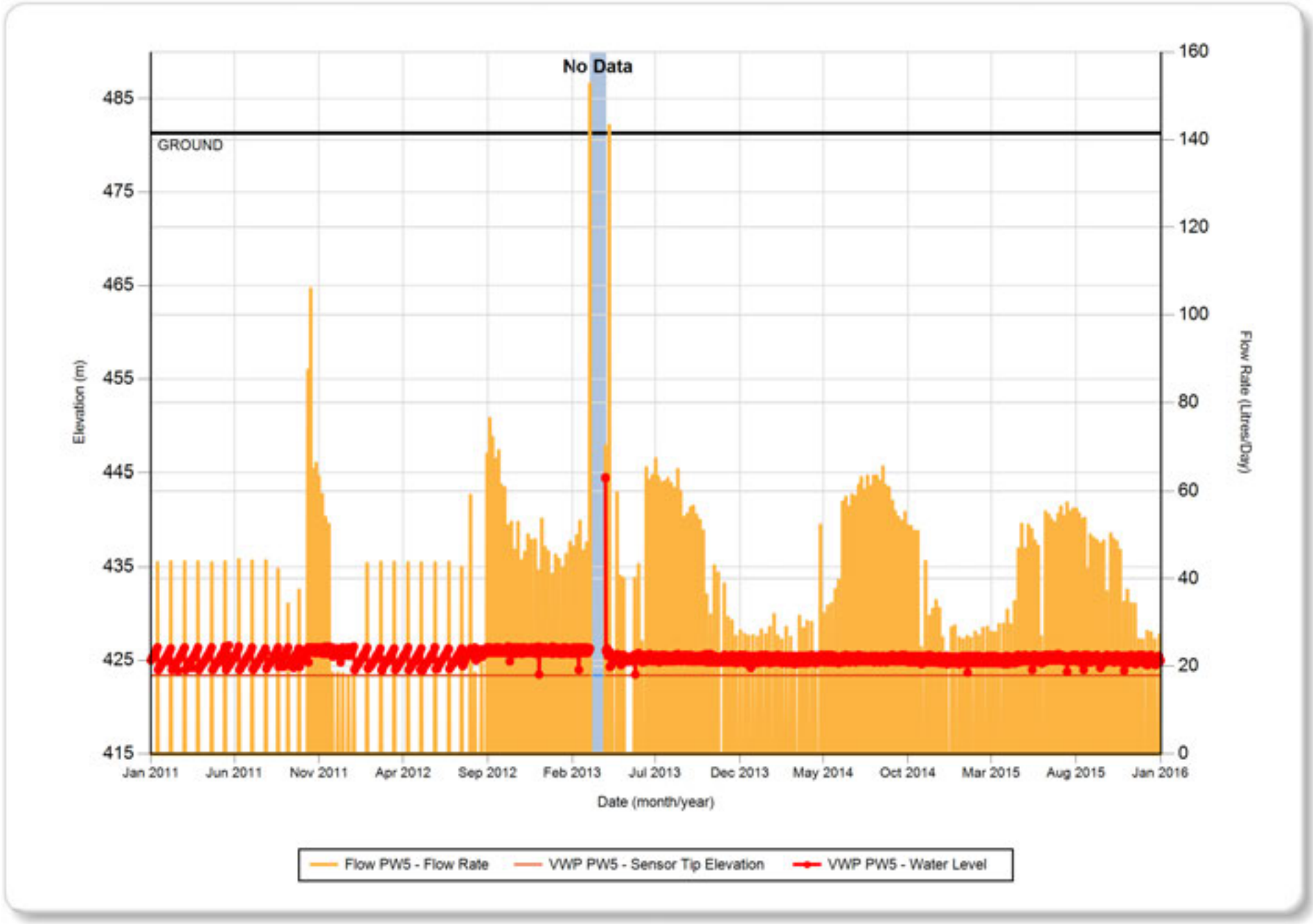
West Quesnel Land Stability Program

PW4 (Station 16) - Daily Flow and Well Level



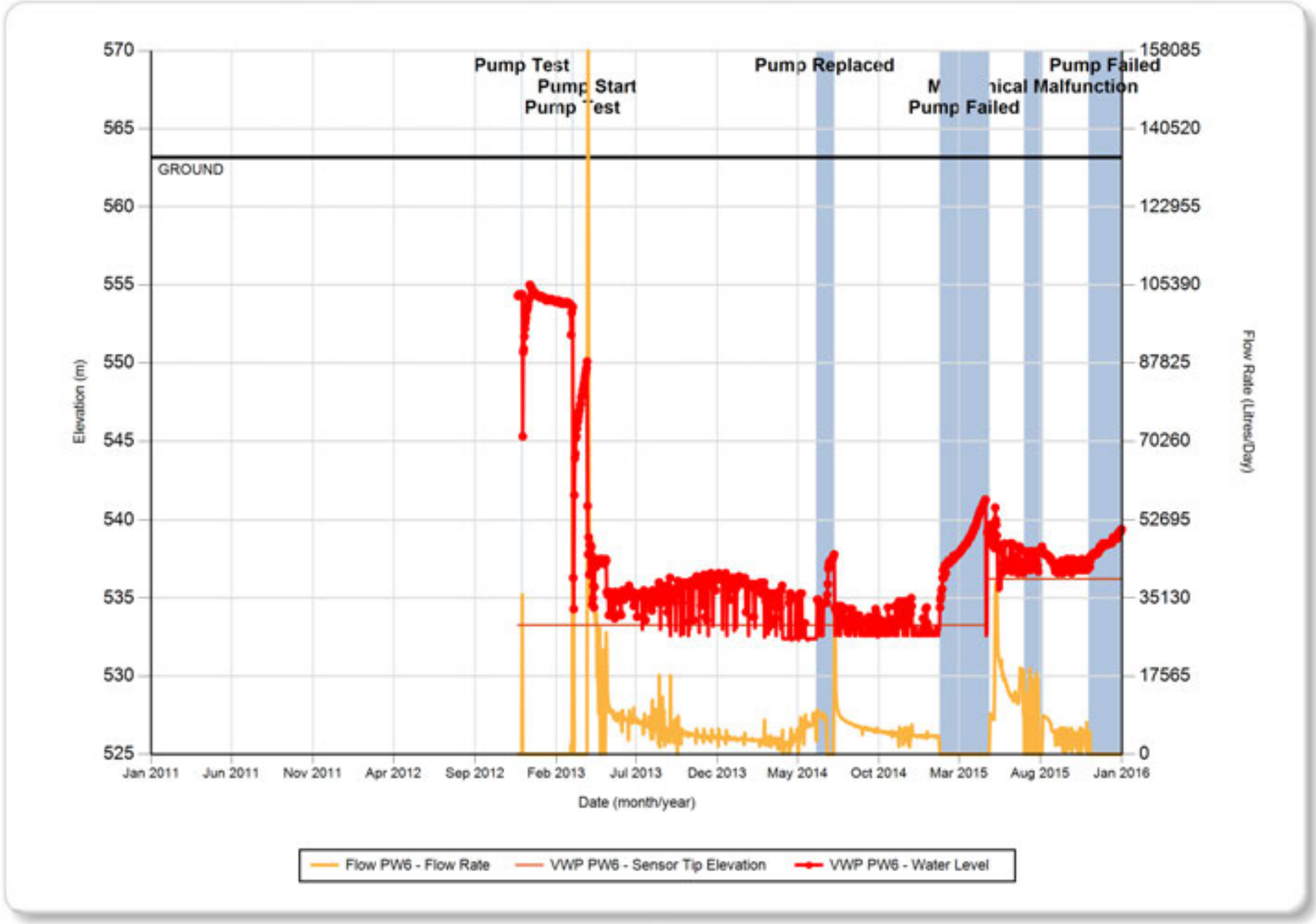
West Quesnel Land Stability Program

PW5 (Station 17) - Daily Flow and Well Level



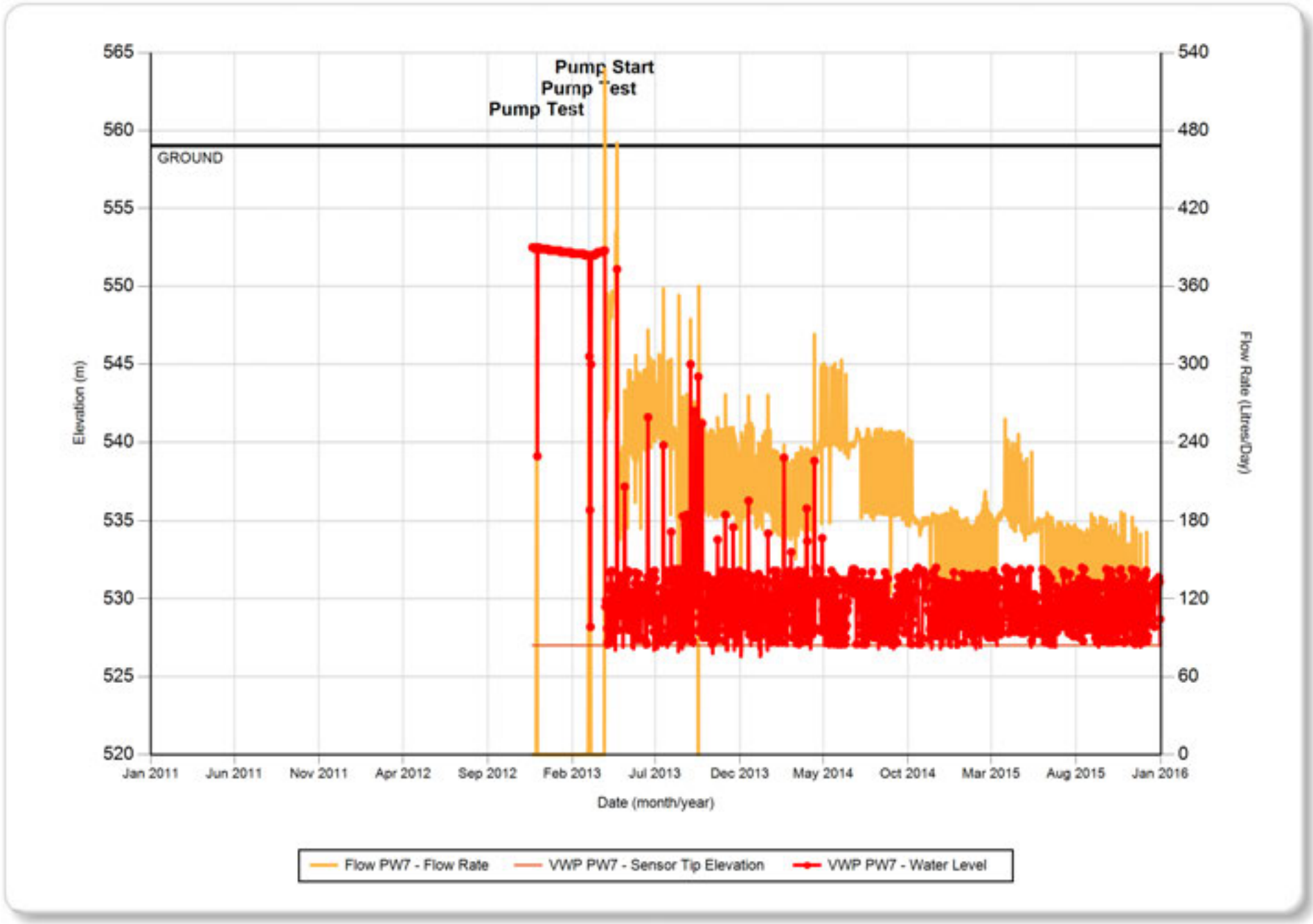
West Quesnel Land Stability Program

PW6 (Station 04) - Daily Flow and Well Level



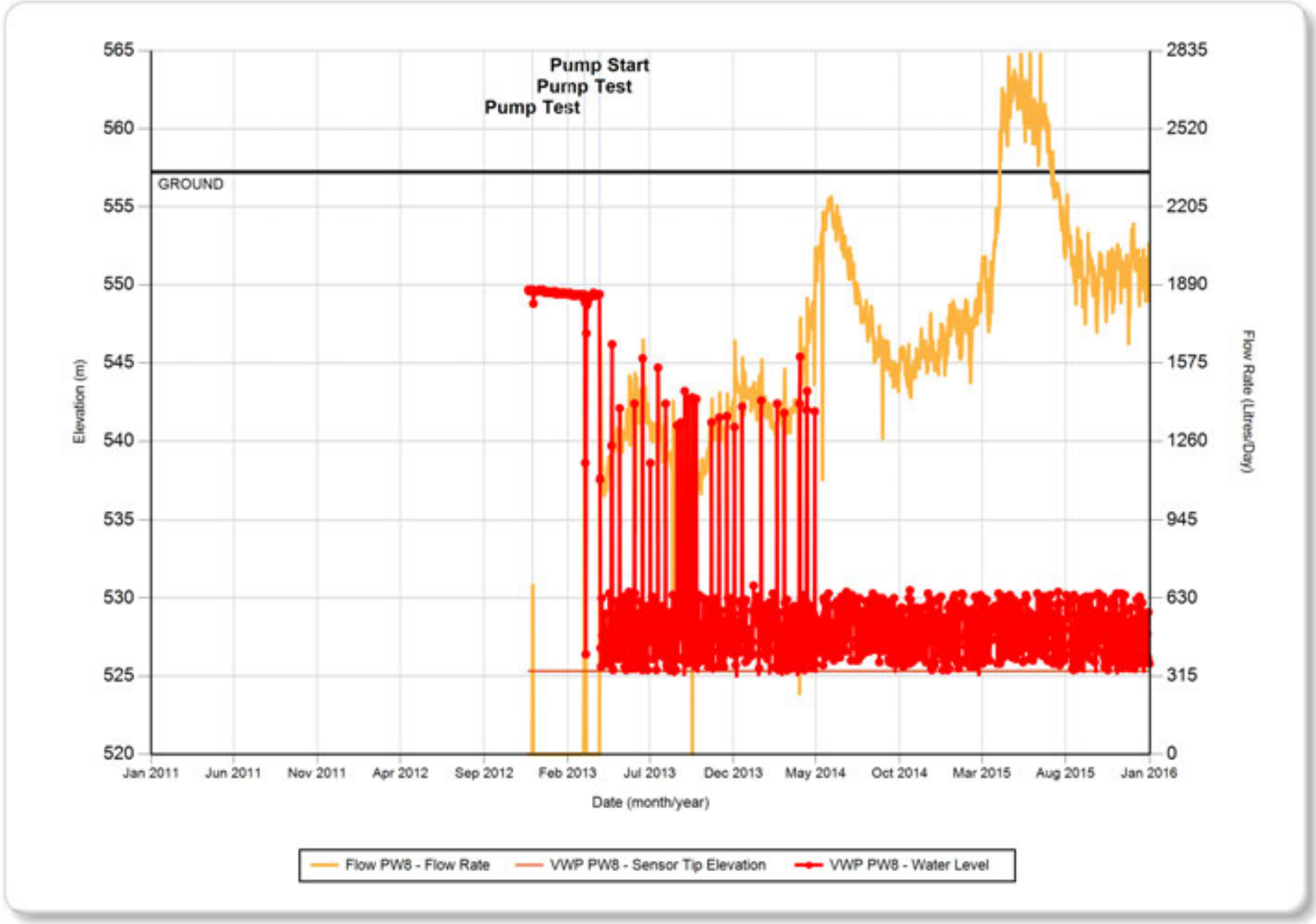
West Quesnel Land Stability Program

PW7 (Station 04) - Daily Flow and Well Level



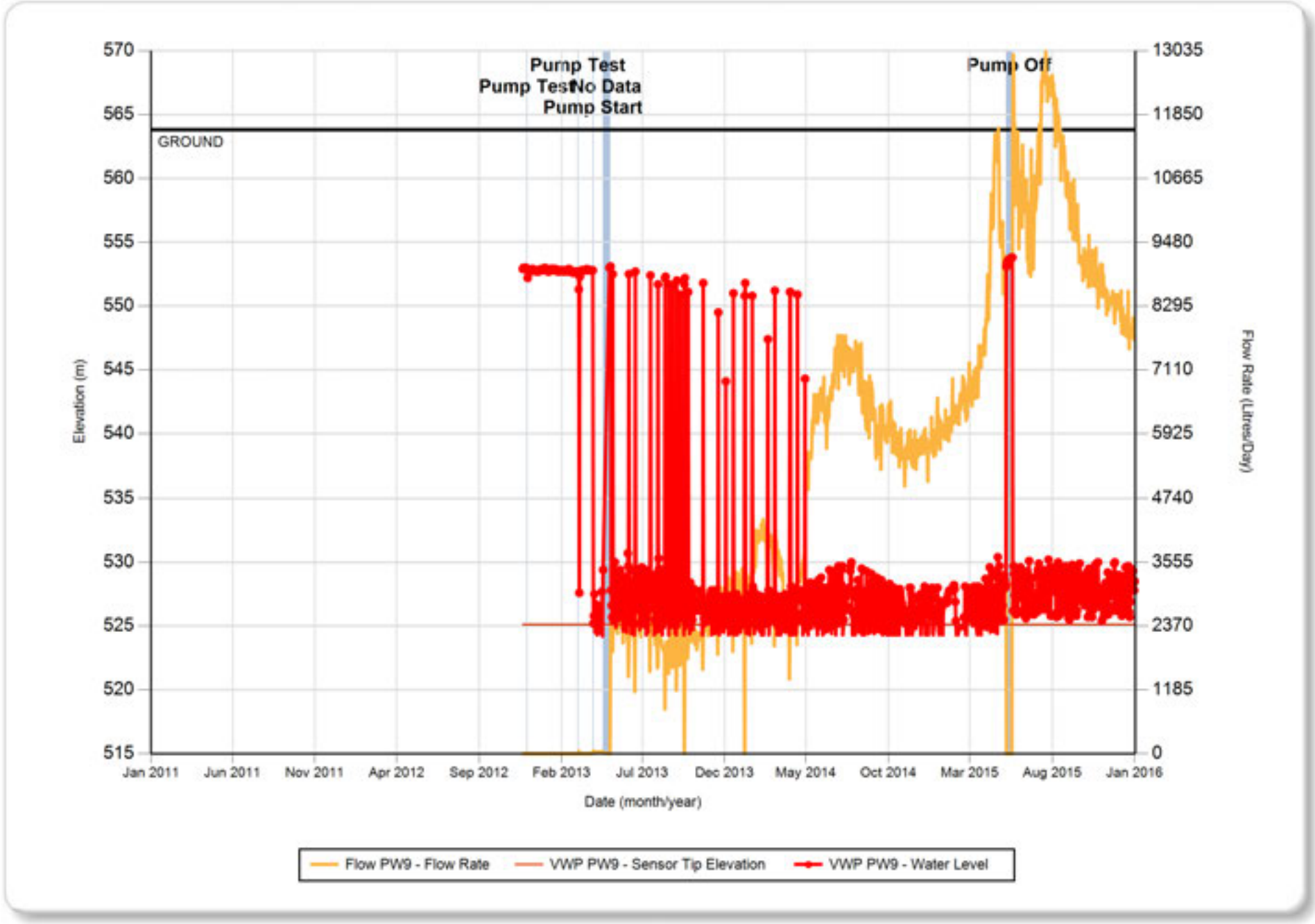
West Quesnel Land Stability Program

PW8 (Station 04) - Daily Flow and Well Level



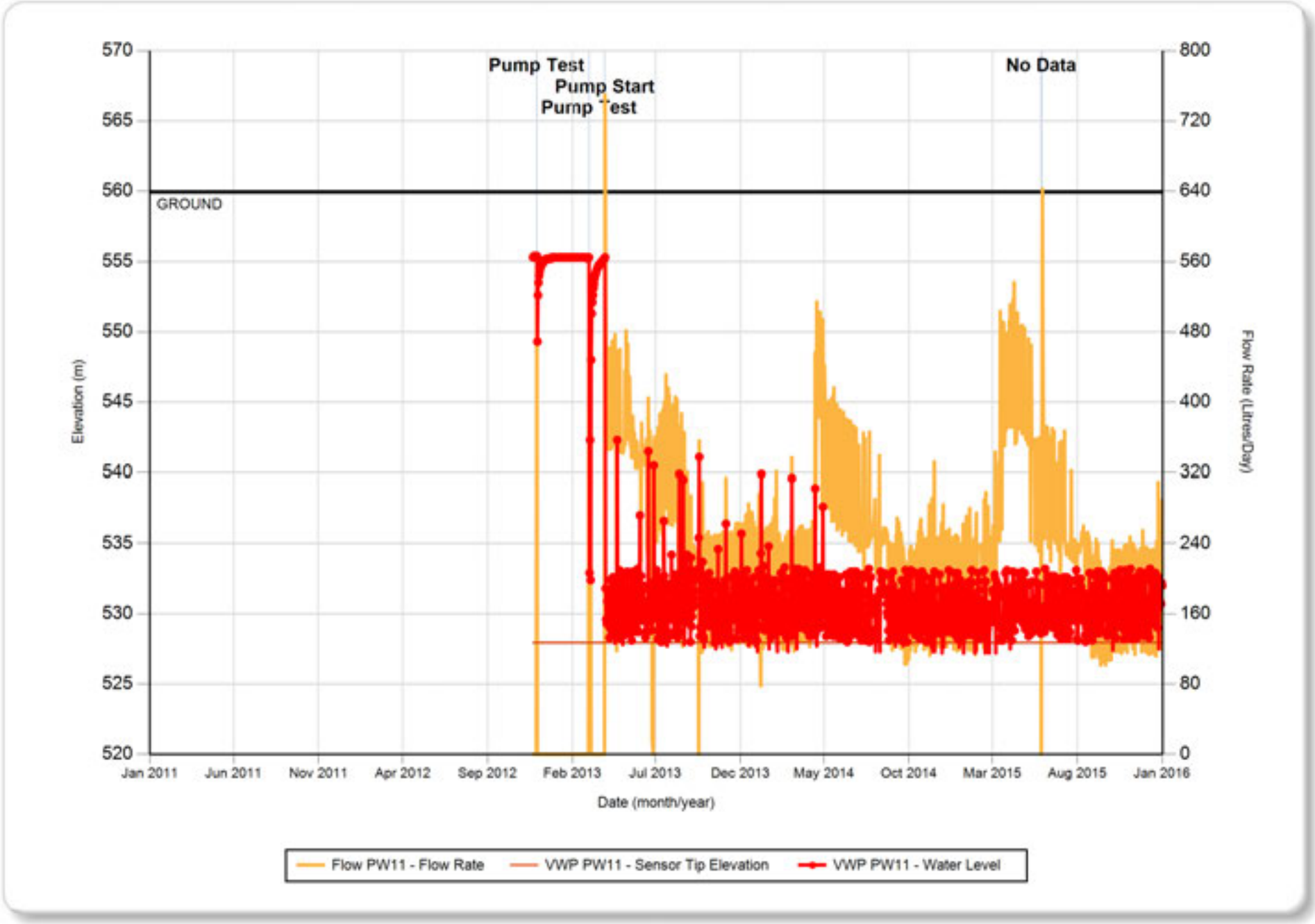
West Quesnel Land Stability Program

PW9 (Station 21) - Daily Flow and Well Level



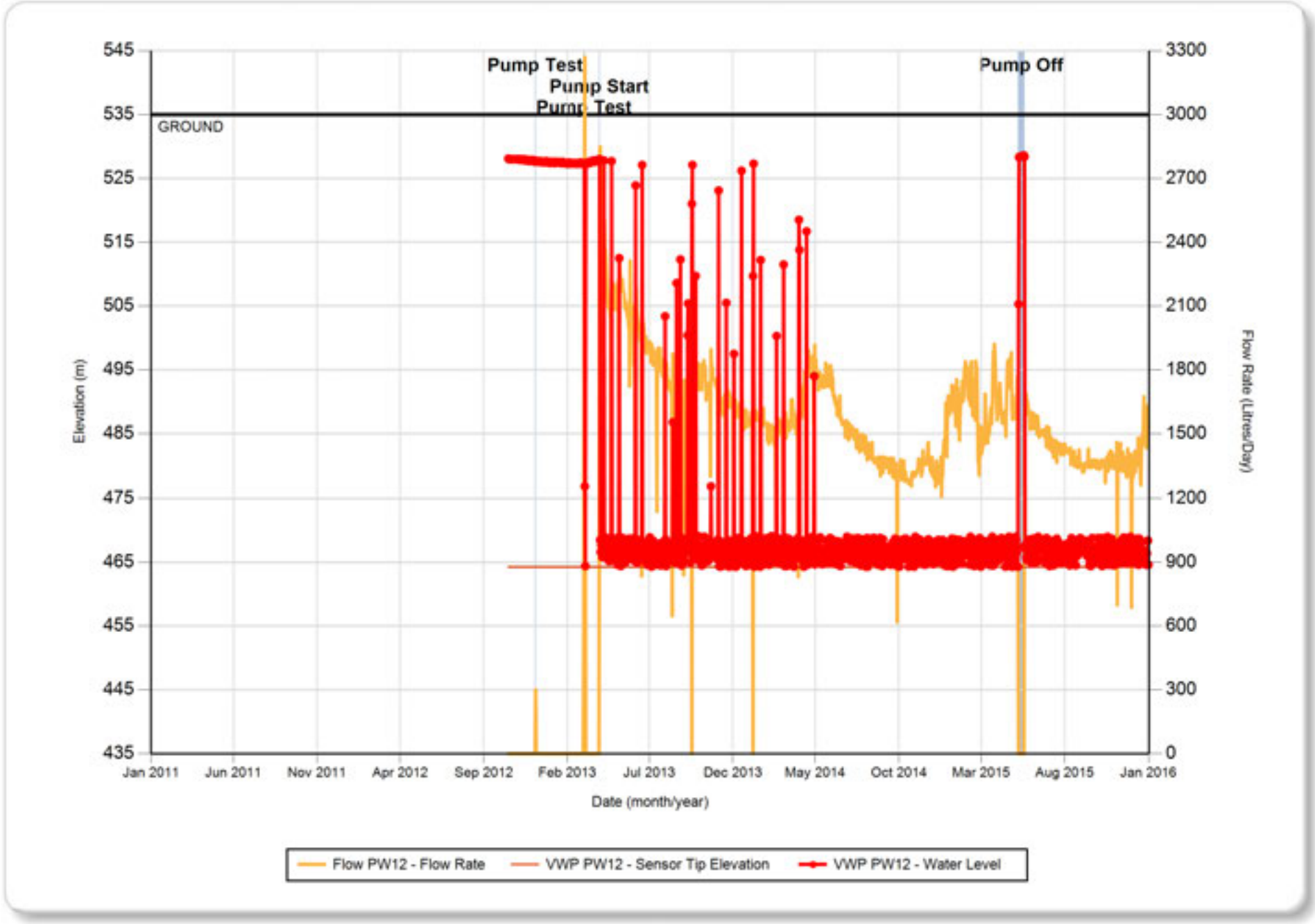
West Quesnel Land Stability Program

PW11 (Station 20) - Daily Flow and Well Level



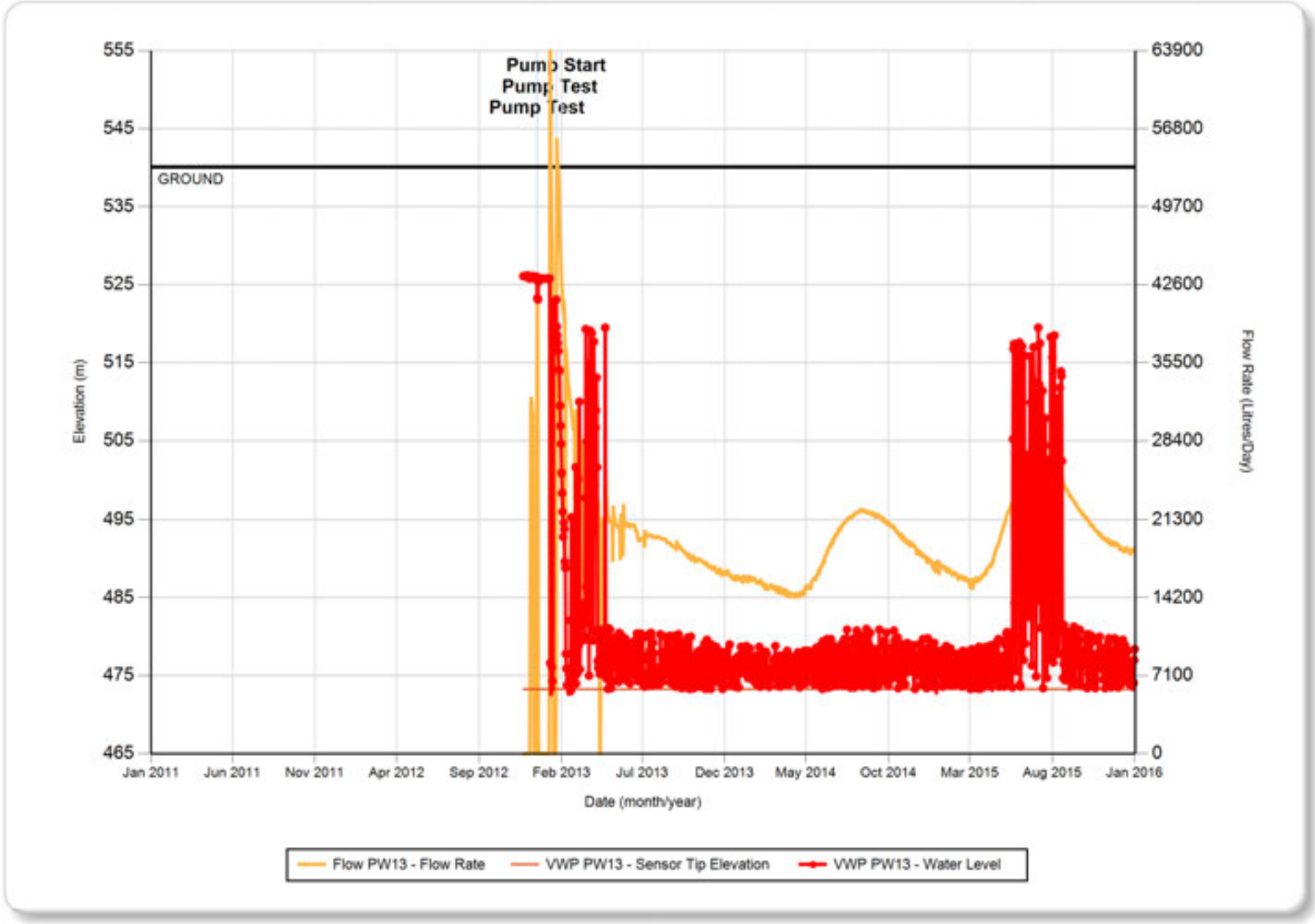
West Quesnel Land Stability Program

PW12 (Station 09) - Daily Flow and Well Level



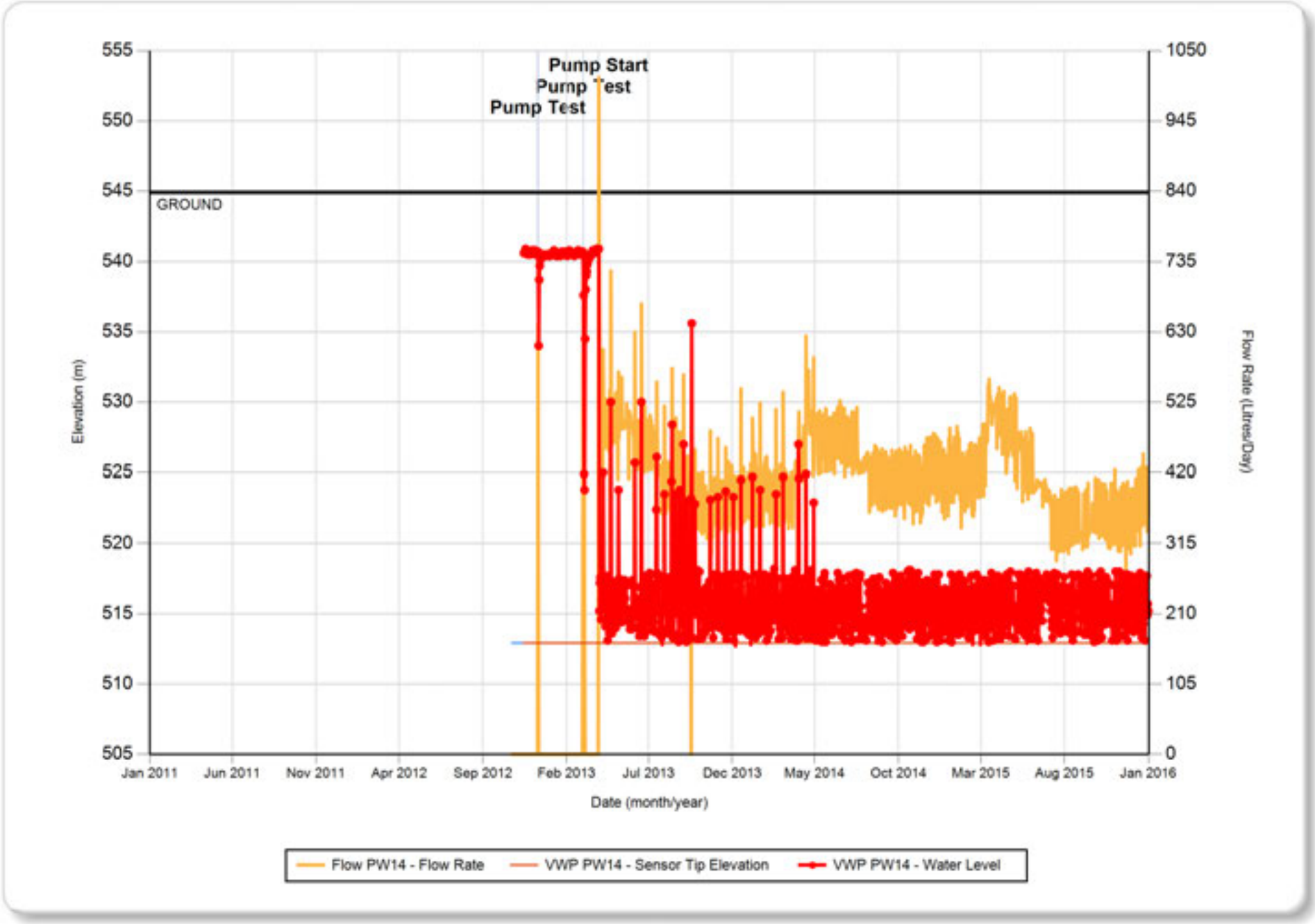
West Quesnel Land Stability Program

PW13 (Station 22) - Daily Flow and Well Level



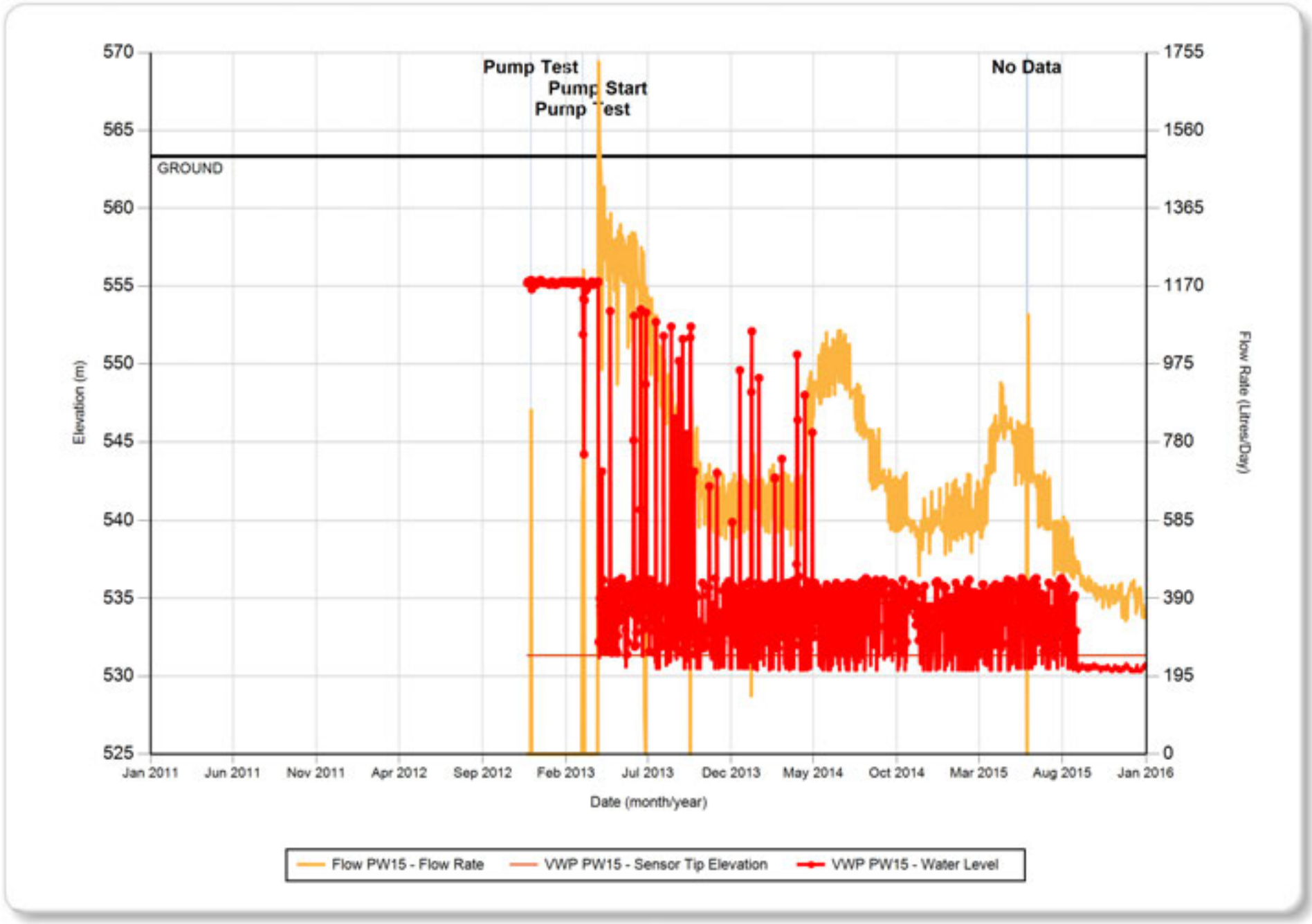
West Quesnel Land Stability Program

PW14 (Station 10) - Daily Flow and Well Level



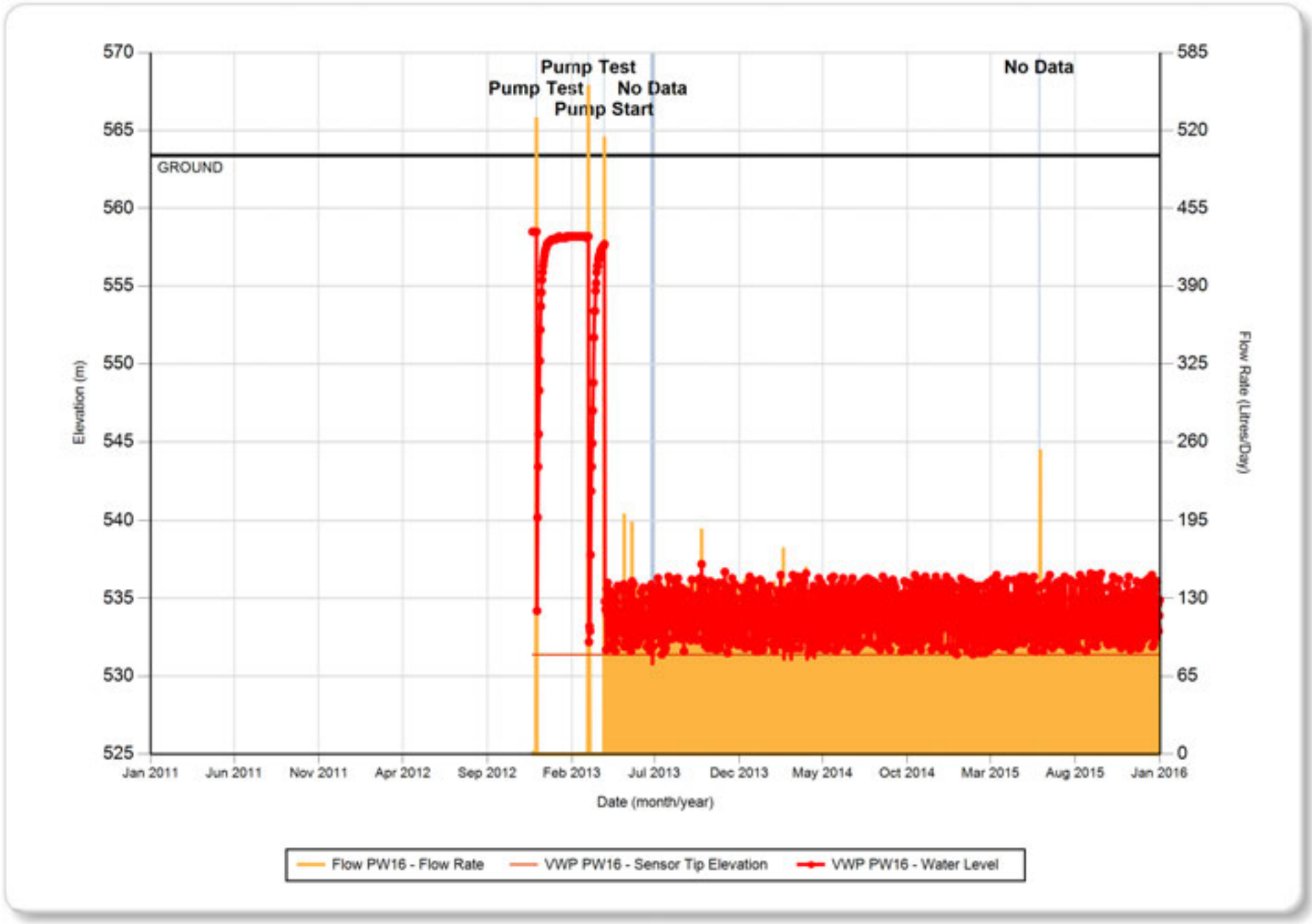
West Quesnel Land Stability Program

PW15 (Station 20) - Daily Flow and Well Level



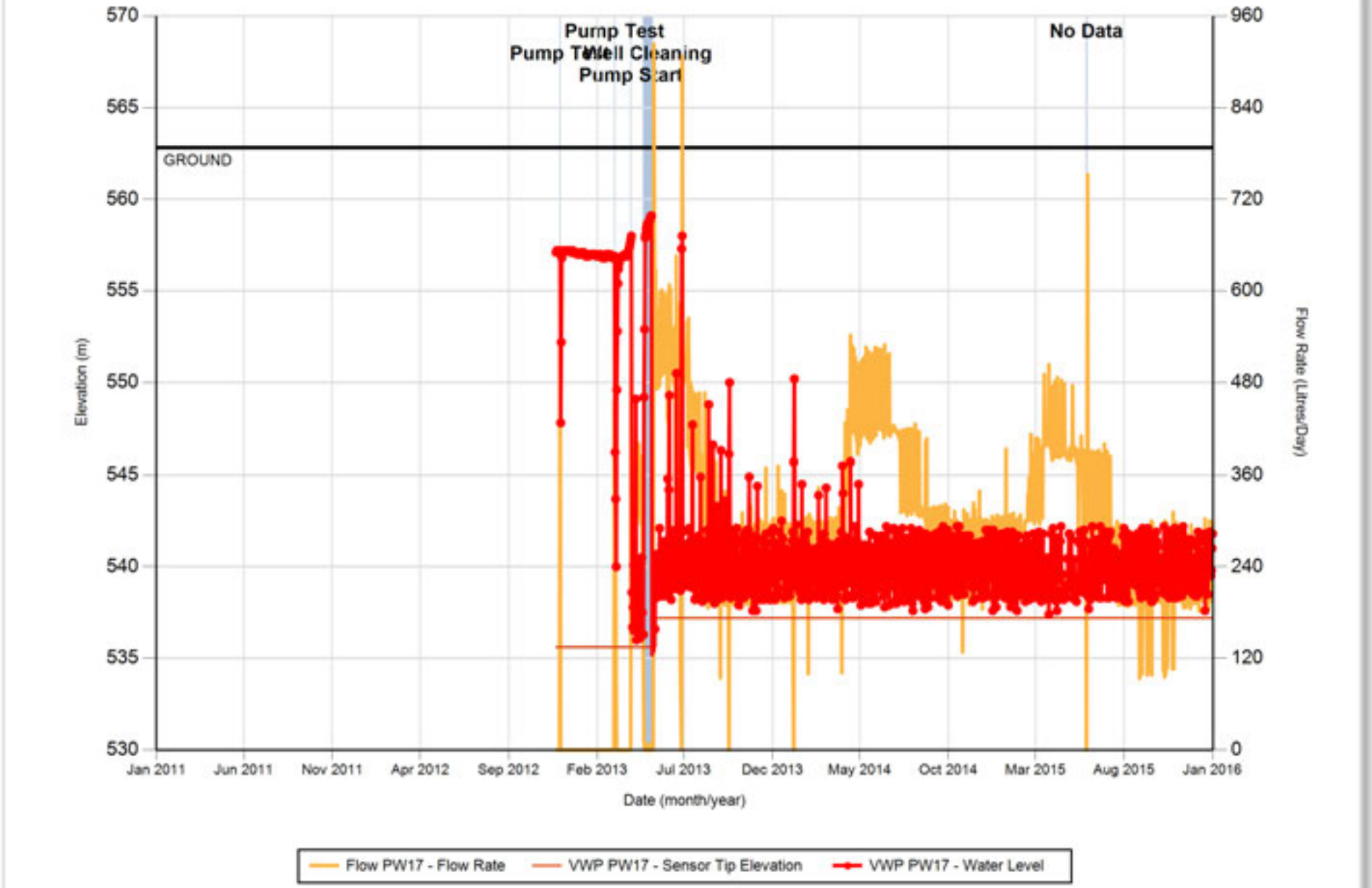
West Quesnel Land Stability Program

PW16 (Station 20) - Daily Flow and Well Level



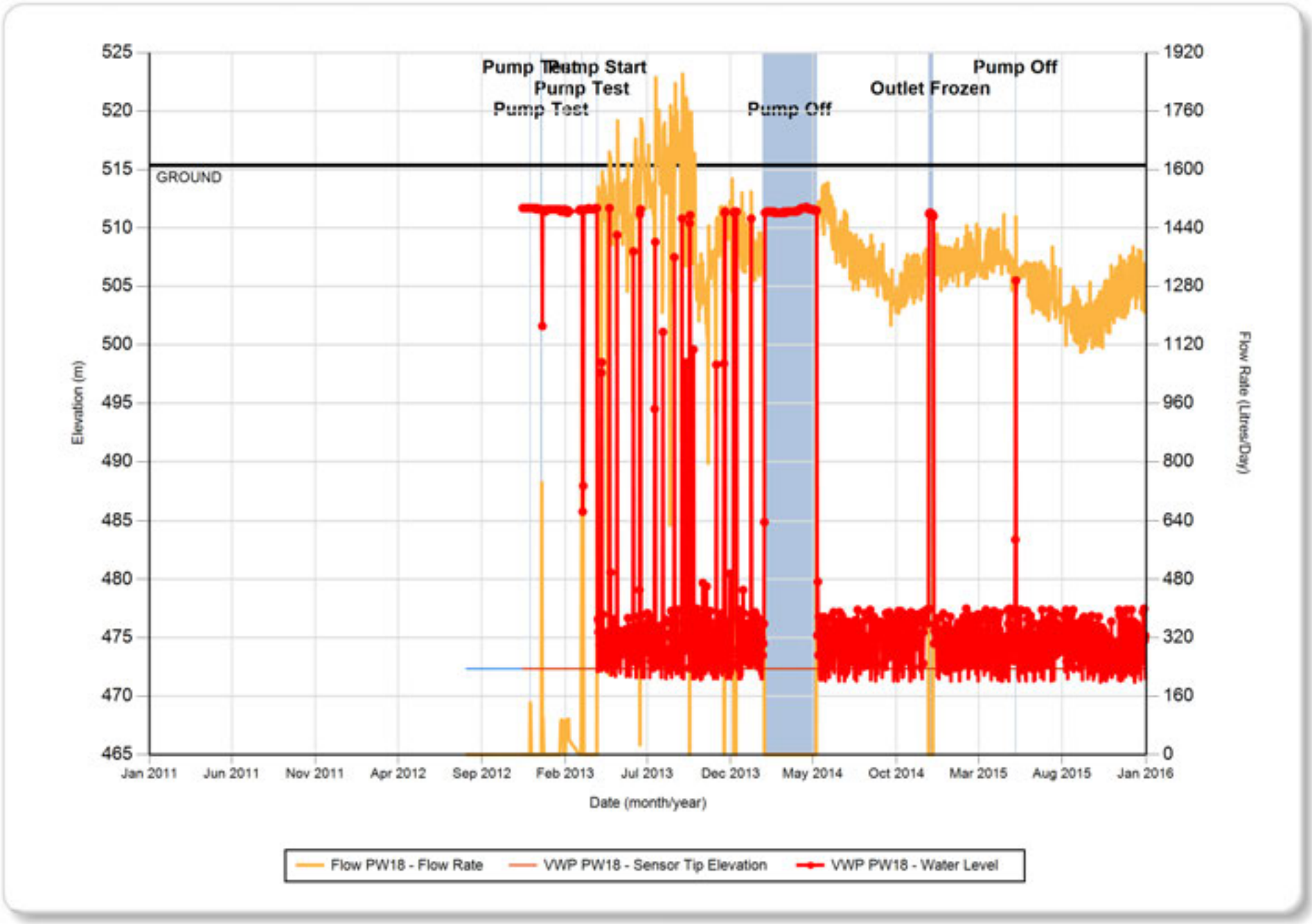
West Quesnel Land Stability Program

PW17 (Station 20) - Daily Flow and Well Level



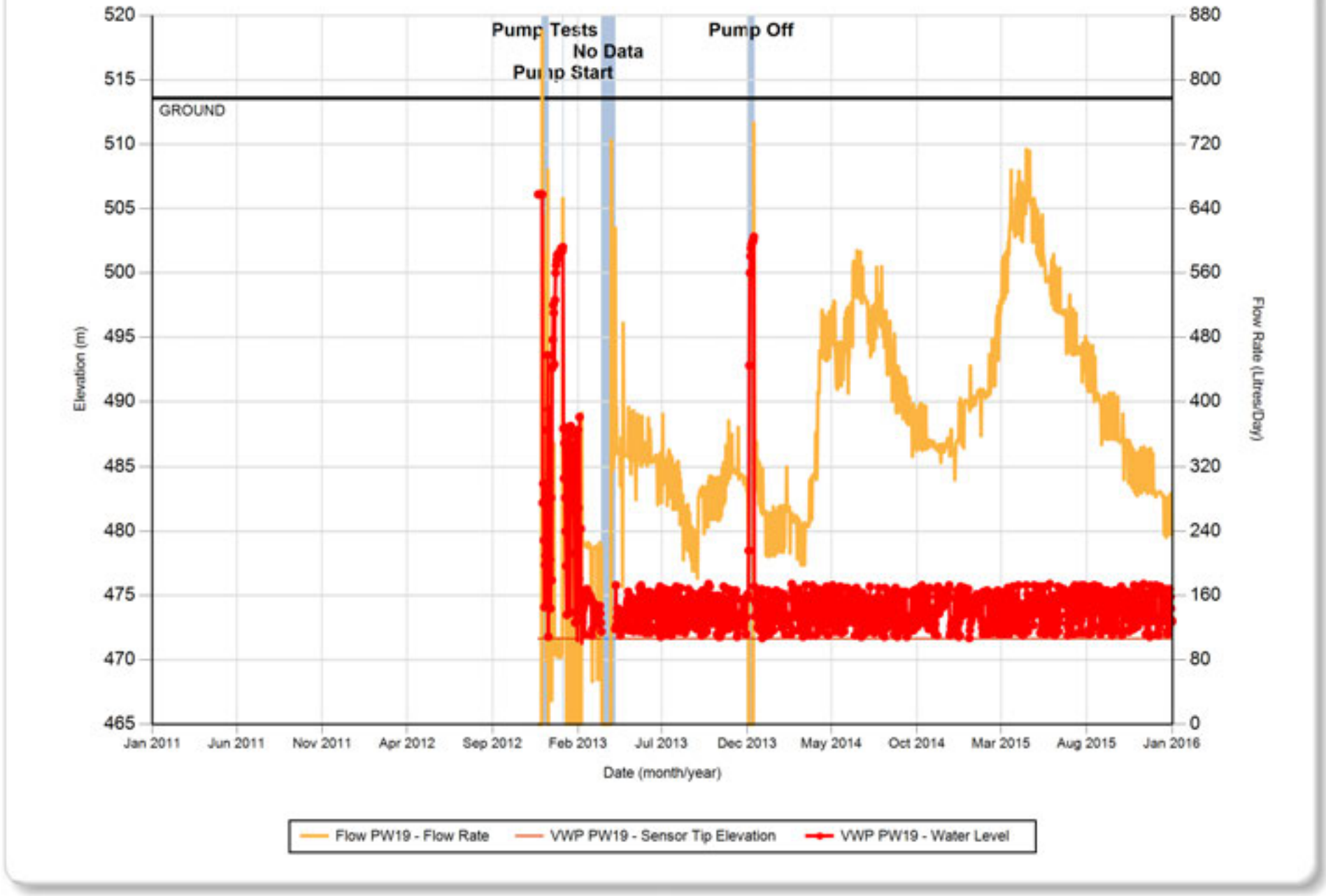
West Quesnel Land Stability Program

PW18 (Station 23) - Daily Flow and Well Level



West Quesnel Land Stability Program

PW19 (Station 28) - Daily Flow and Well Level



Appendix E

Horizontal Drains – Status Table and Production Charts

APPENDIX E - Horizontal Drain Status

HD	Location	Drilled Date	Length (total/slotted)	Azimuth	Inclination	Monitoring Well VWPs	Status
HD1-1	Lewis Dr. (at Sikh Temple)	November 2007	64.0m/57.9m	271	+2°	VWP 23A&B, VWP 24, VWP 25A&B	Inactive - dry
HD1-2	Lewis Dr. (at Sikh Temple)	November 2007	48.8m/42.7m	241	+1°	VWP 23A&B, VWP 24, VWP 25A&B	Inactive - dry
HD4-1	Adam St.	October 2007	135.6m/129.5m	271	+2°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD4-2	Adam St.	November 2007	45.7m/39.6m	271	-2°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD5-1	Below Healy St.	August 2012	251.5m/245.4m	220	0°	VWP 11A,B&C	Inactive - dry
HD5-2	Below Healy St.	August 2012	251.5m/245.4m	210	-1°	VWP 11A,B&C	Inactive - dry
HD5-3	Below Healy St.	August 2012	251.5m/245.4m	200	+0.5°	VWP 11A,B&C	Inactive - dry
HD5-4	Below Healy St.	August 2012	251.5m/245.4m	175	-2°	VWP 11A,B&C	Inactive - dry
HD6-1	Healy St.	August 2012	250.9m/244.8m	216	0°	VWP 11A,B&C	Inactive - dry
HD6-2	Healy St.	August 2012	251.2m/245.1m	240	-2°	VWP 11A,B&C	Inactive - dry
HD6-3	Healy St.	August 2012	251.5m/245.4m	226	-0.5°	VWP 11A,B&C	Inactive - dry
HD7-1	Below Pentland Cres.	August 2012	15.2m/15.2m	252	0°	VWP 36A,B&C	Inactive - dry
HD7-2	Below Pentland Cres.	August 2012	47.2m/32.0m	212	-2°	VWP 36A,B&C	Inactive - dry
HD7-3	Below Pentland Cres.	August 2012	56.1m/48.8m	292	-2°	VWP 36A,B&C	Inactive - dry
HD8-1	Below Pentland Cres.	September 2012	137.2m/134.1m	250	0°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8-2	Below Pentland Cres.	September 2012	137.2m/134.1m	260	-1°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8-3	Below Pentland Cres.	September 2012	140.2m/137.2m	240	-2°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8-4	Below Pentland Cres.	September 2012	140.2m/137.2m	252	-1°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8-5	Below Pentland Cres.	September 2012	134.1m/131.1m	254	-3°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8-6	Below Pentland Cres.	September 2012	137.2m/134.1m	248	-2.5°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8-7	Below Pentland Cres.	September 2012	137.2m/134.1m	238	-2°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8-8	Below Pentland Cres.	September 2012	132.6m/131.1m	228	0°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8-9	Below Pentland Cres.	September 2012	153.9m/152.4m	225	+1°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8-10	Below Pentland Cres.	September 2012	134.1m/131.1m	222	-2°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8-11	Below Pentland Cres.	September 2012	128.0m/125.0m	218	0°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD9-1	Lewis Dr. (at Sikh Temple)	August 2012	208.8m/204.2m	290	-5°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD9-2	Lewis Dr. (at Sikh Temple)	August 2012	202.7m/199.6m	280	-2°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD9-3	Lewis Dr. (at Sikh Temple)	August 2012	71.6m/67.1m	270	0°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD9-4	Lewis Dr. (at Sikh Temple)	August 2012	105.2m/97.5m	260	-1.8°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD9-5	Lewis Dr. (at Sikh Temple)	August 2012	99.1m/94.5m	250	-2°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD9-6	Lewis Dr. (at Sikh Temple)	August 2012	50.3m/45.2m	230	-2°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD9-6	Lewis Dr. (at Sikh Temple)	August 2012	135.6m/134.1m	300	-1°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD9-7	Lewis Dr. (at Sikh Temple)	August 2012	77.7m/73.2m	290	+0.5°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD9-8	Lewis Dr. (at Sikh Temple)	August 2012	74.7m/70.1m	265	-1.5°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD9-9	Lewis Dr. (at Sikh Temple)	August 2012	47.2m/42.7m	265	-1°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD10-1	Bouchie St.	September 2012	134.1m/131.1m	265	-0.5°	VWP 37A&B	Active
HD10-2	Bouchie St.	September 2012	146.3m/143.3m	305	0°	VWP 37A&B	Active
HD10-3	Bouchie St.	September 2012	146.3m/143.3m	295	-1.5°	VWP 37A&B	Active
HD10-4	Bouchie St.	September 2012	125.0m/121.9m	285	+0.1°	VWP 37A&B	Active
HD10-5	Bouchie St.	September 2012	164.6m/161.5m	275	-1.7°	VWP 37A&B	Active
HD10-6	Bouchie St.	September 2012	109.7m/106.7m	255	+1°	VWP 37A&B	Active
HD10-7	Bouchie St.	September 2012	121.9m/118.9m	244	+.8°	VWP 37A&B	Active

Horizontal Drains Cont.							
HD11-1	Below Allard St.	August 2012	196.6m/190.5m	315	-1.5°	VWP 3, VWP 34A,B&C	Active
HD11-2	Below Allard St.	August 2012	196.6m/190.5m	305	-2.2°	VWP 3, VWP 34A,B&C	Active
HD11-3	Below Allard St.	August 2012	196.6m/190.5m	295	-1.5°	VWP 3, VWP 34A,B&C	Active
HD11-4	Below Allard St.	August 2012	196.6m/190.5m	285	-2.2°	VWP 3, VWP 34A,B&C	Active
HD11-5	Below Allard St.	August 2012	196.6m/190.5m	275	-1.5°	VWP 3, VWP 34A,B&C	Active
HD11-6	Below Allard St.	August 2012	365.8m/362.8m	315	+0.2°	VWP 3, VWP 34A,B&C	Active
HD12-1	Adam St.	July 2012	198.1m/190.5m	258	0°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD12-2	Adam St.	July 2012	198.1m/190.5m	240	0°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD12-3	Adam St.	July 2012	132.6m/131.1m	230	0°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD12-4	Adam St.	July 2012	196.6m/190.5m	260	0°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD12-5	Adam St.	July 2012	196.6m/190.5m	278	0°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD12-6	Adam St.	July 2012	196.6m/190.5m	250	0°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD12-7	Adam St.	July 2012	196.6m/190.5m	230	-1.5°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD12-8	Adam St.	July 2012	196.6m/190.5m	286	-0.5°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD12-9	Adam St.	July 2012	196.6m/190.5m	292	-1°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD13-1	Below Adam St.	August 2012	245.4m/239.3m	330	0°	VWP 38A&B	Active
HD13-2	Below Adam St.	August 2012	251.5m/245.4m	320	-0.5°	VWP 38A&B	Active
HD13-3	Below Adam St.	August 2012	251.5m/245.4m	310	-0.5°	VWP 38A&B	Active
HD13-4	Below Adam St.	August 2012	251.5m/245.4m	300	0°	VWP 38A&B	Active
HD13-5	Below Adam St.	August 2012	99.1m/92.0m	340	-2°	VWP 38A&B	Active
HD13-6	Below Adam St.	August 2012	245.4m/239.3m	290	0°	VWP 38A&B	Active
HD14-1	Below Healy St.	September 2012	150.9m/147.9m	218	-1.5°	VWP 11A,B&C	Inactive - dry
HD14-2	Below Healy St.	September 2012	157.0m/154.0m	205	+0.5°	VWP 11A,B&C	Inactive - dry
HD14-3	Below Healy St.	September 2012	157.0m/154.0m	192	+2°	VWP 11A,B&C	Inactive - dry
HD14-4	Below Healy St.	September 2012	181.4m/178.4m	180	0°	VWP 11A,B&C	Inactive - dry
HD14-5	Below Healy St.	September 2012	403.9m/400.9m	230	+1°	VWP 11A,B&C	Inactive - dry

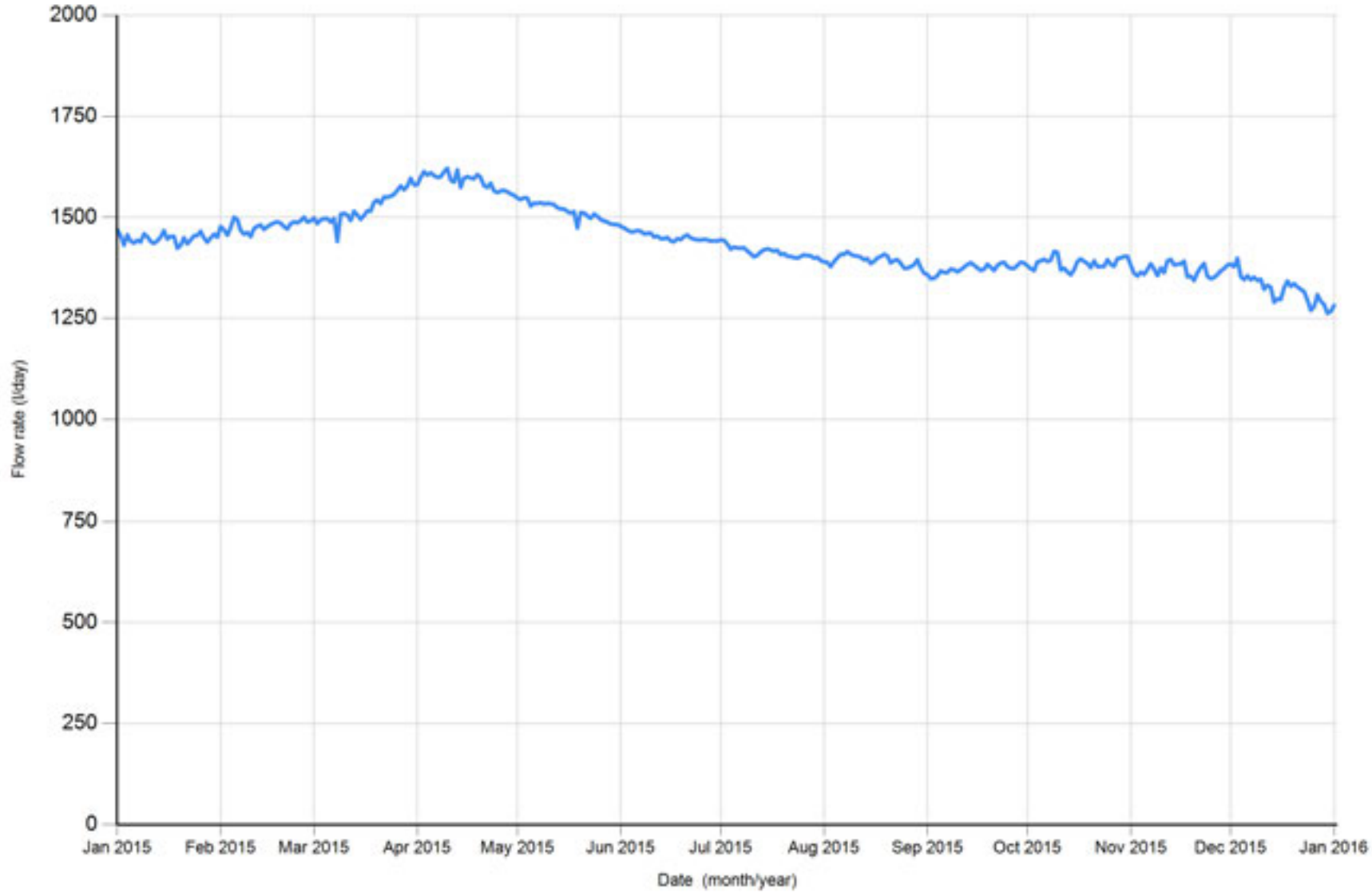
West Quesnel
Land Stability Program

amec
foster
wheeler

Horizontal Drain Trends for 2015

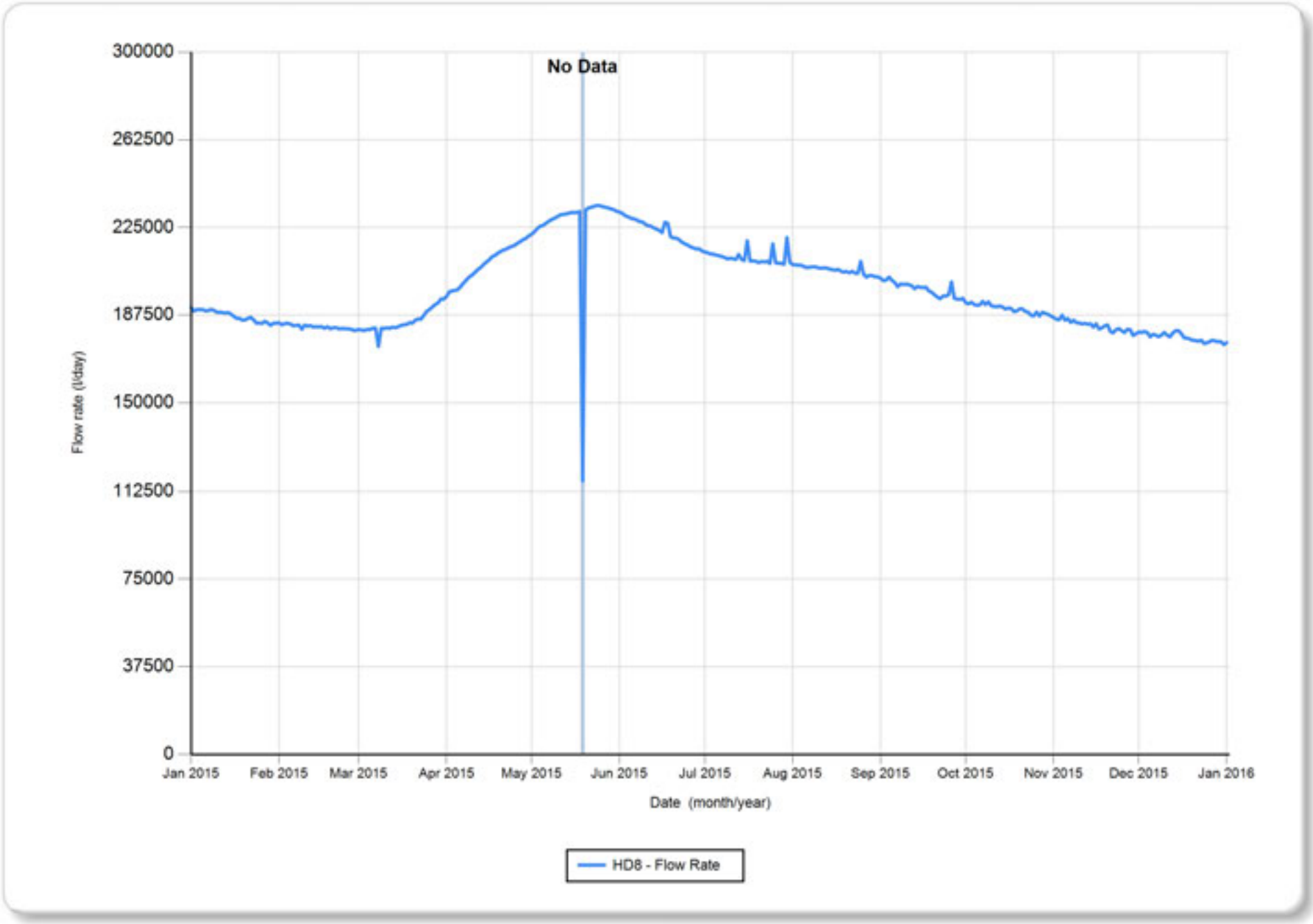
West Quesnel Land Stability Program

HD4 (Station 17) - Daily Flow Rate



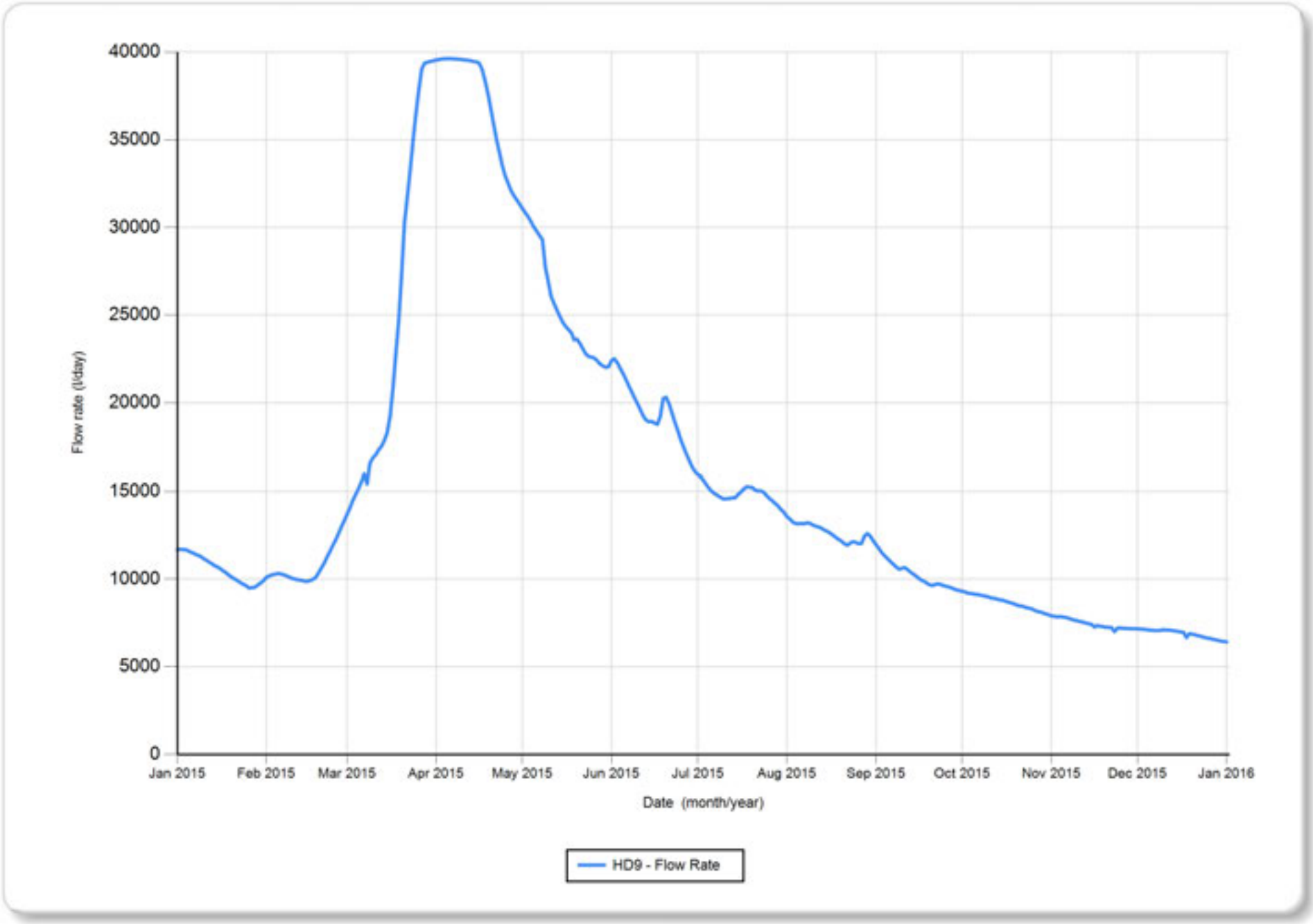
West Quesnel Land Stability Program

HD8 (Station 24) - Daily Flow Rate



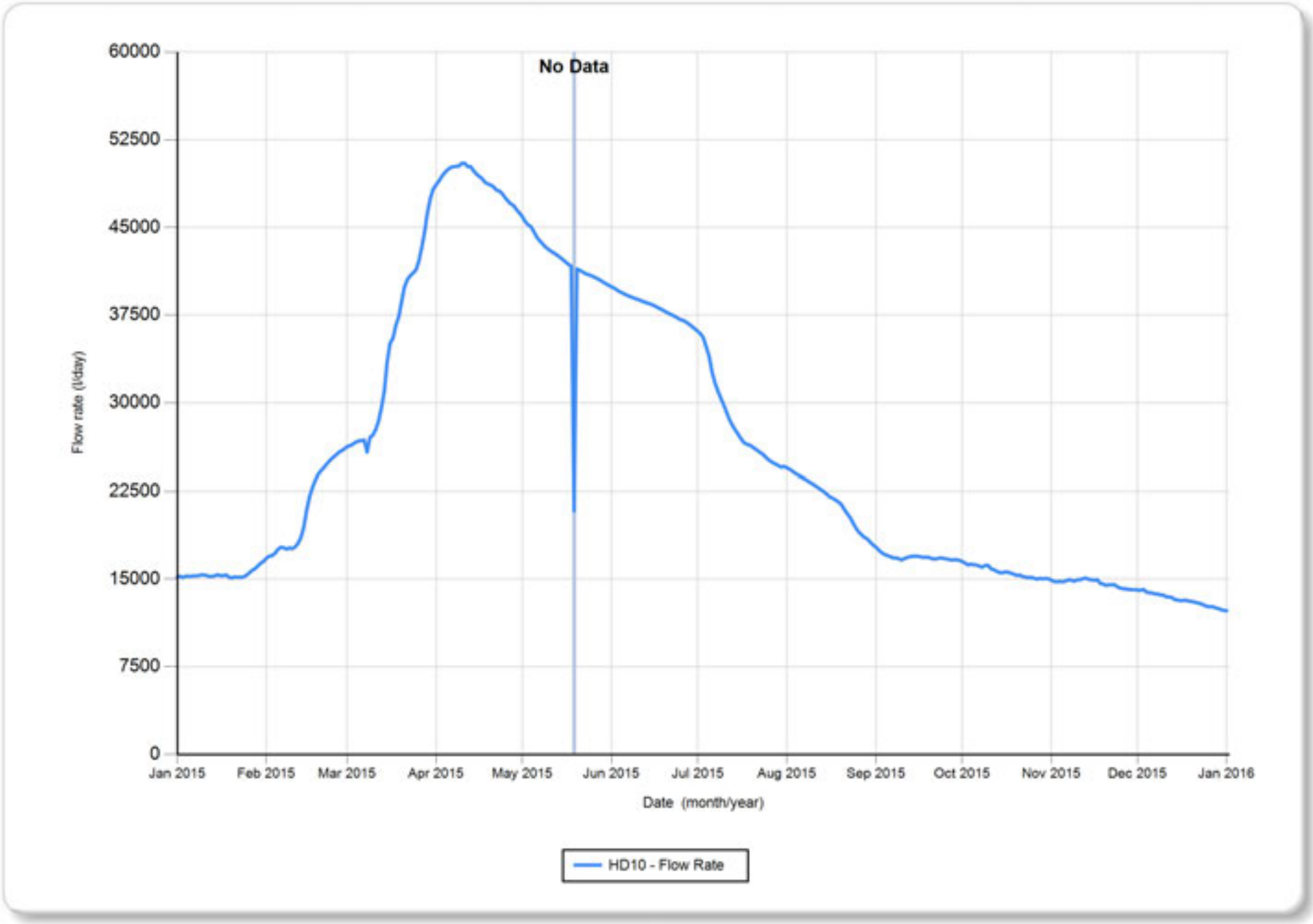
West Quesnel Land Stability Program

HD9 (Station 12) - Daily Flow Rate



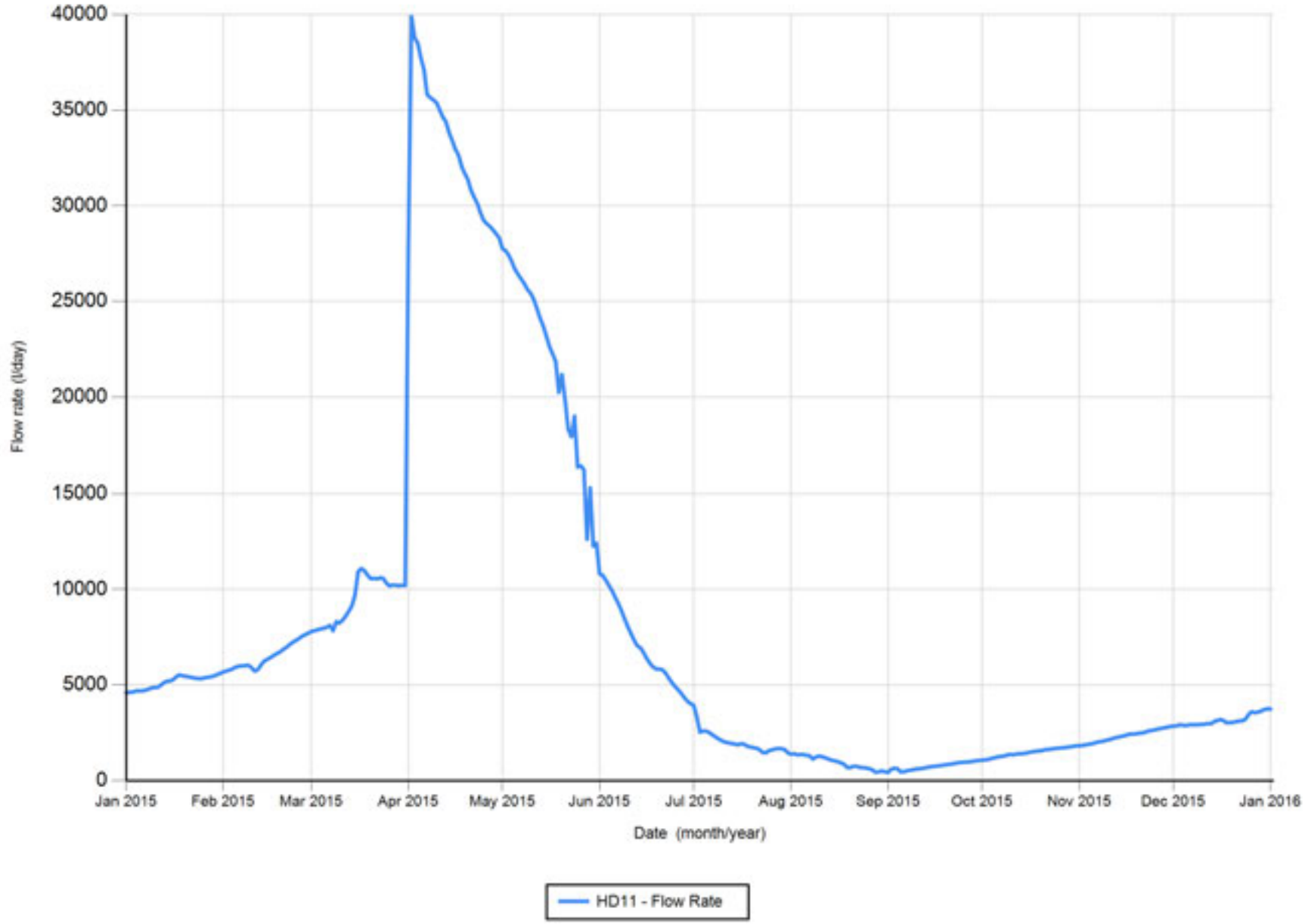
West Quesnel Land Stability Program

HD10 (Station 26) - Daily Flow Rate



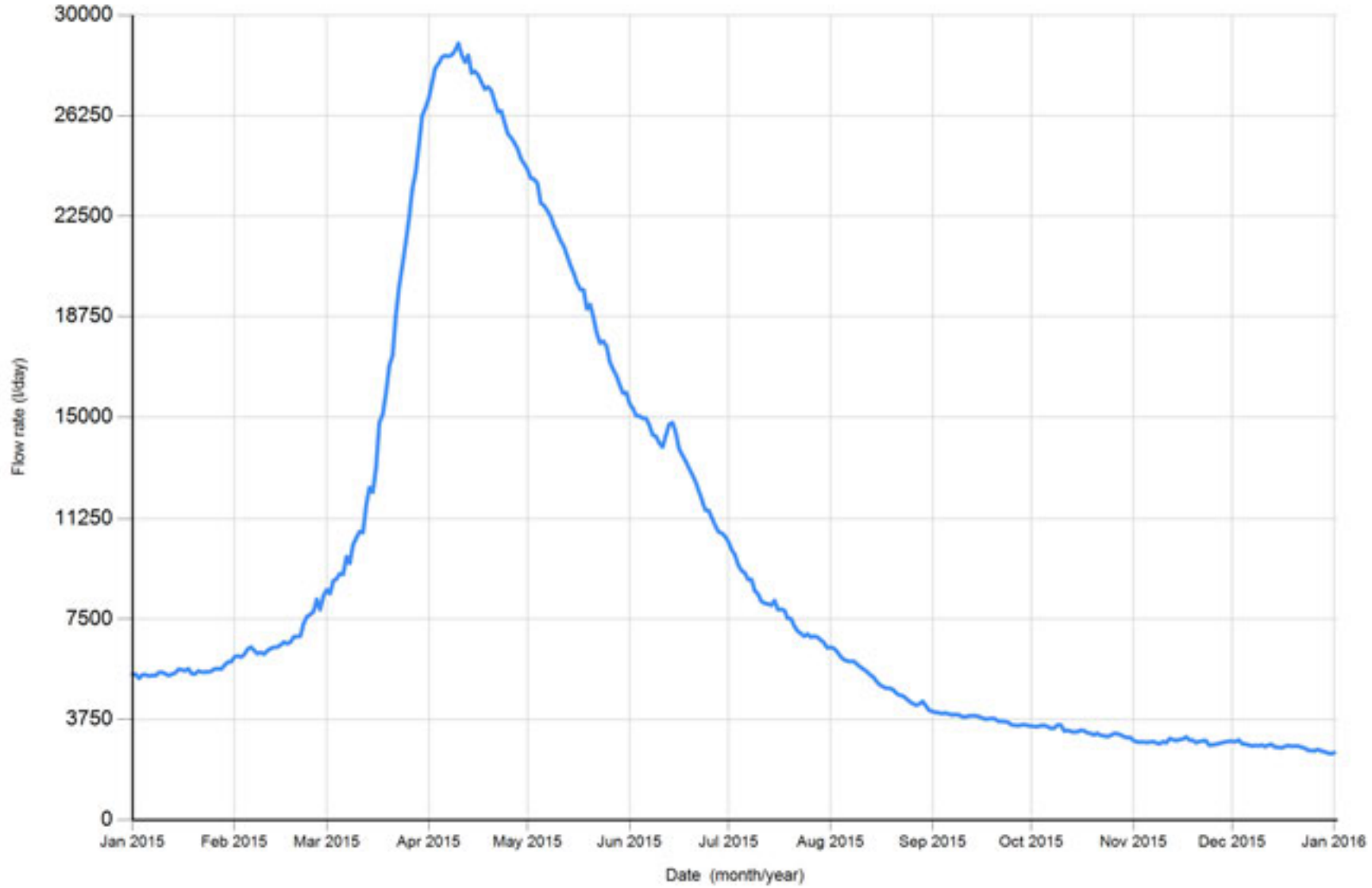
West Quesnel Land Stability Program

HD11 (Station 17) - Daily Flow Rate



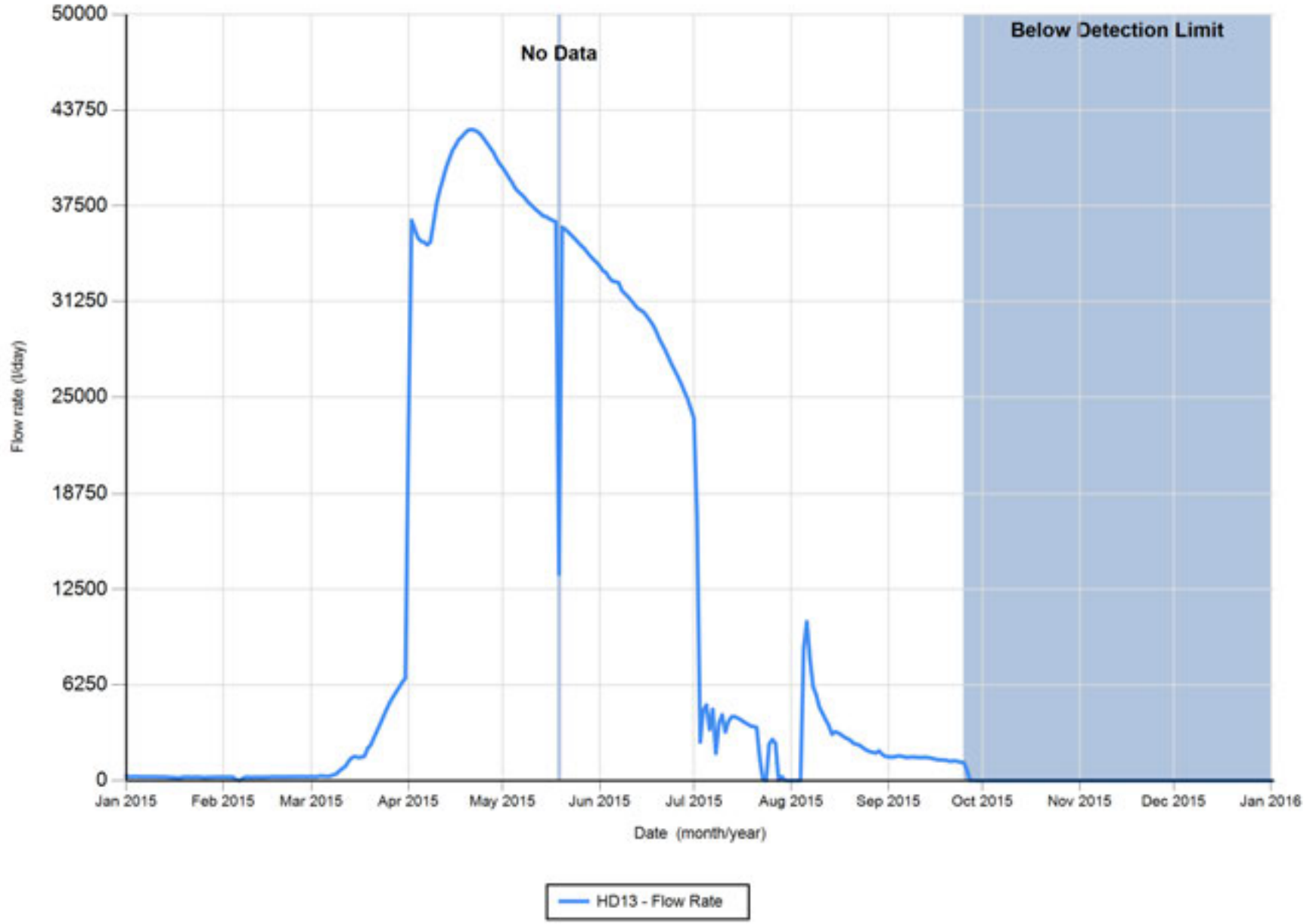
West Quesnel Land Stability Program

HD12 (Station 17) - Daily Flow Rate



West Quesnel Land Stability Program

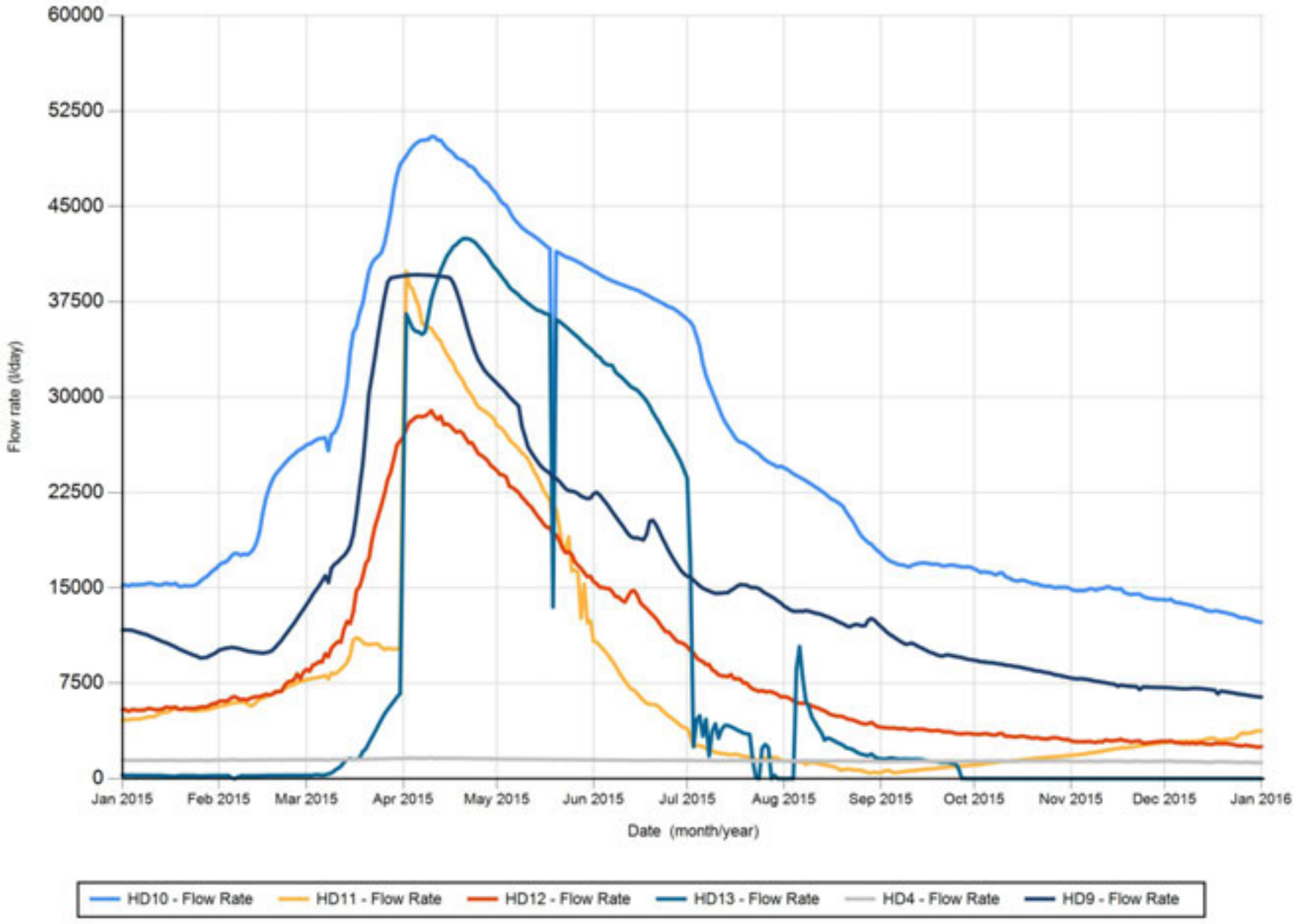
HD13 (Station 27) - Daily Flow Rate

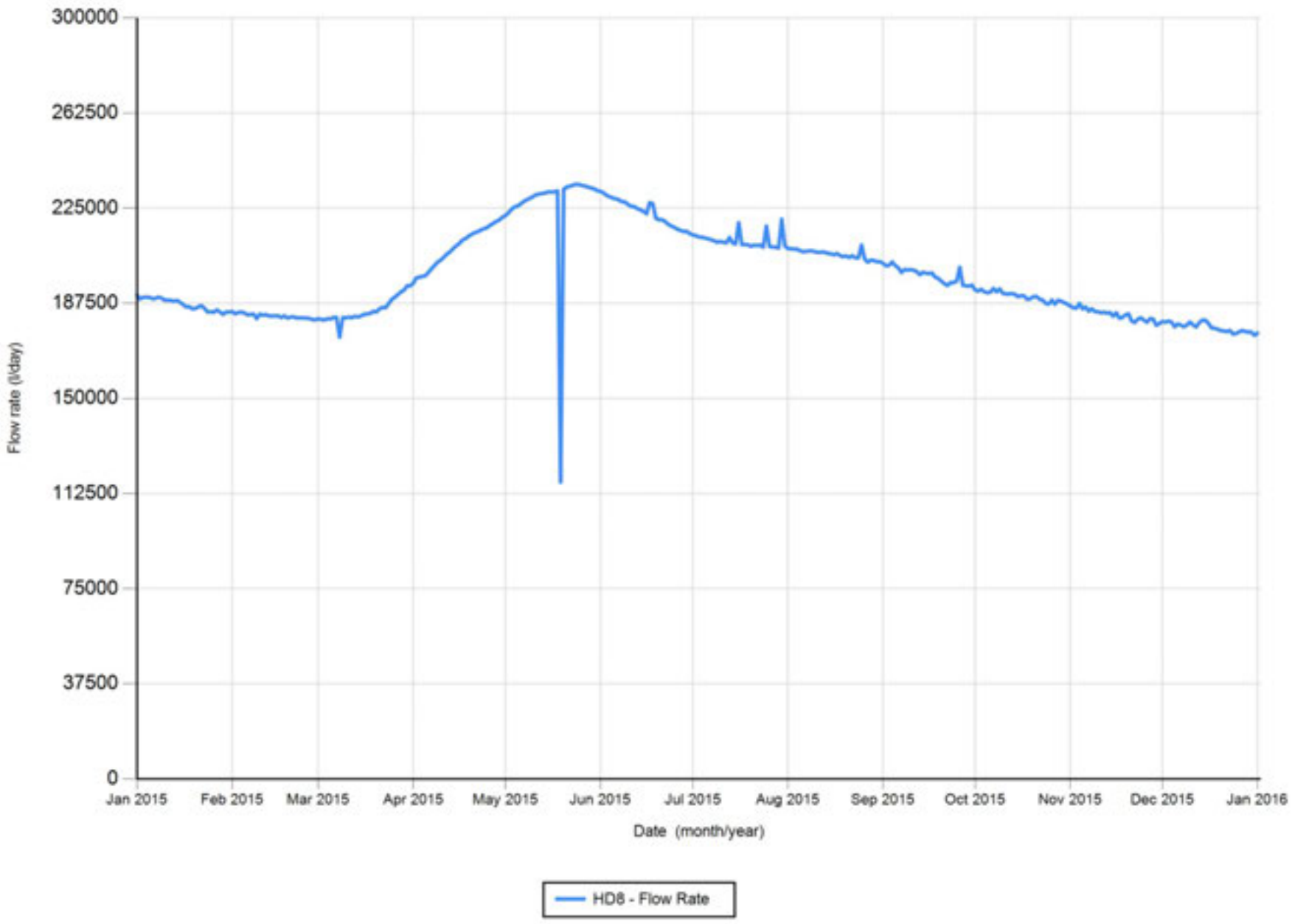


West Quesnel
Land Stability Program

Horizontal Drains Flow Rates (Combined)

amec foster wheeler





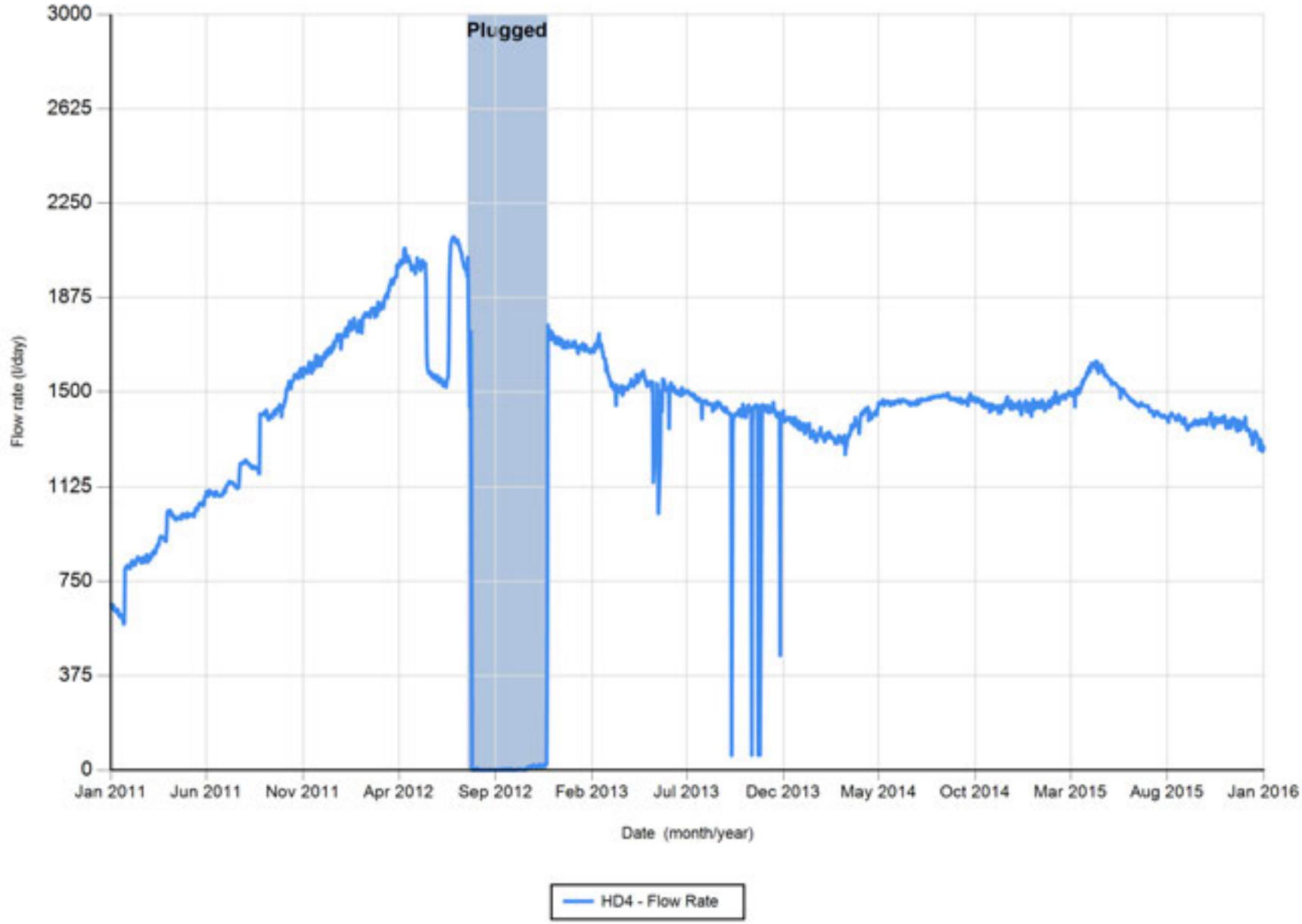
West Quesnel
Land Stability Program

amec
foster
wheeler

Long Term Horizontal Drain Trends

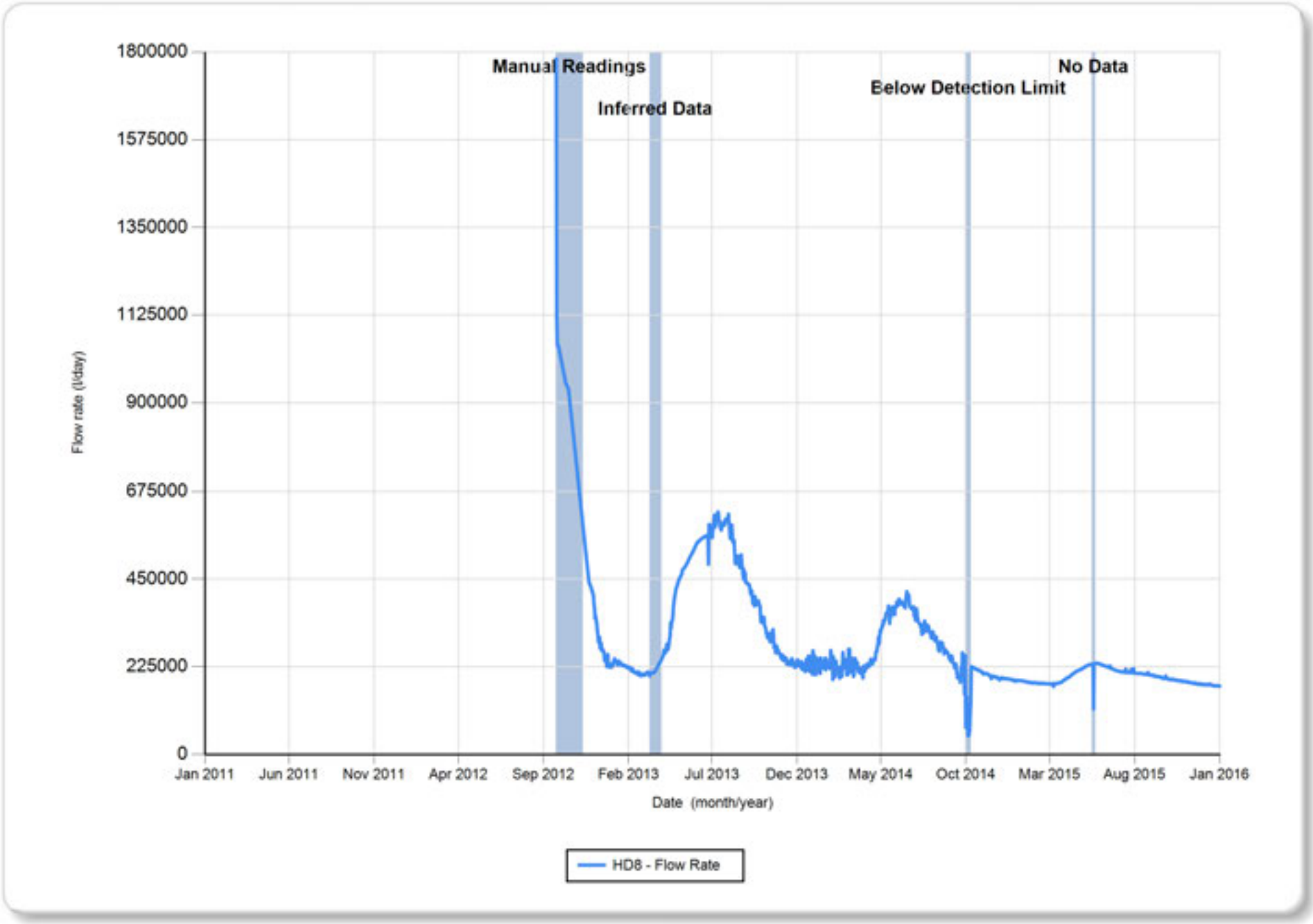
West Quesnel Land Stability Program

HD4 (Station 17) - Daily Flow Rate



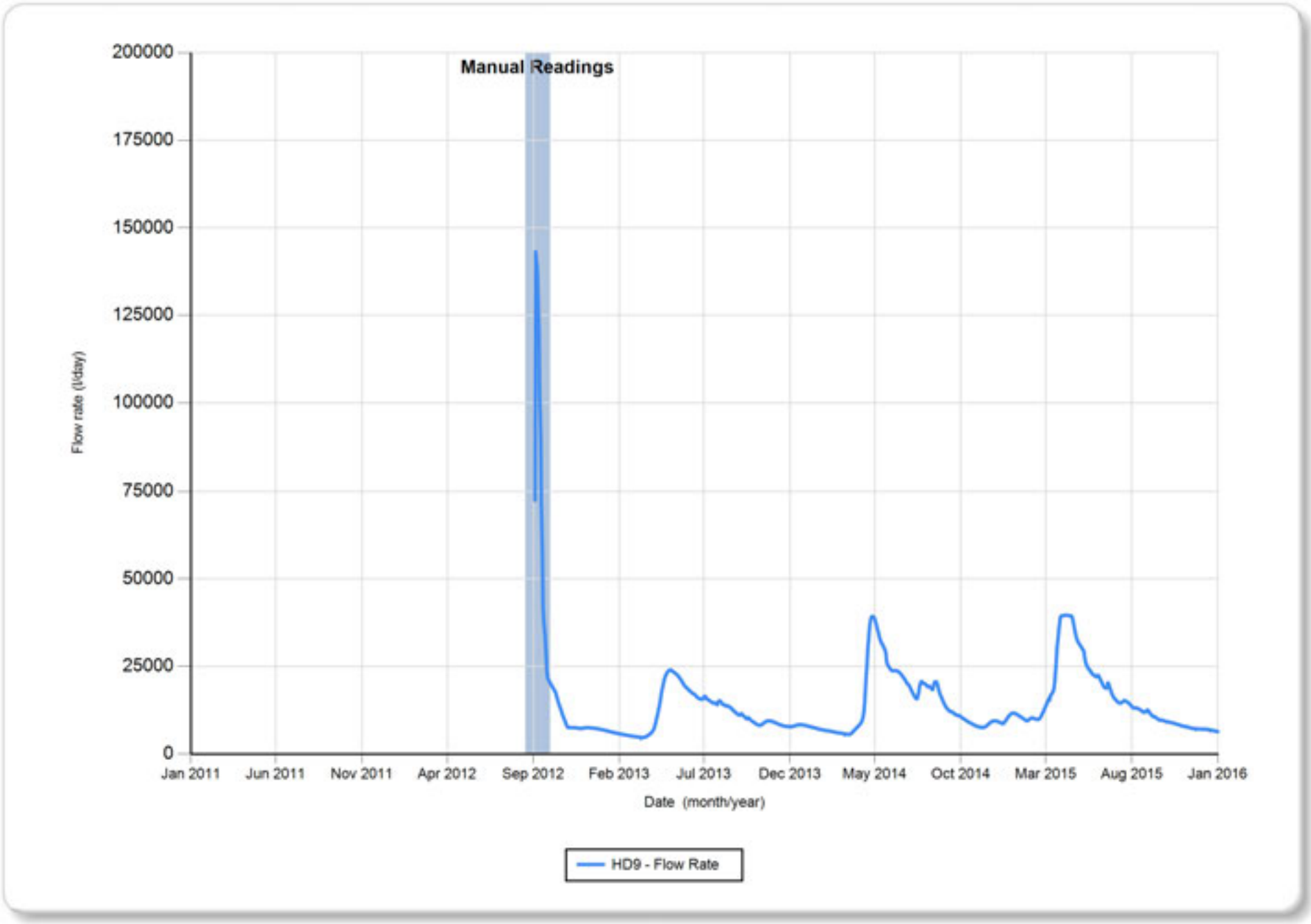
West Quesnel Land Stability Program

HD8 (Station 24) - Daily Flow Rate



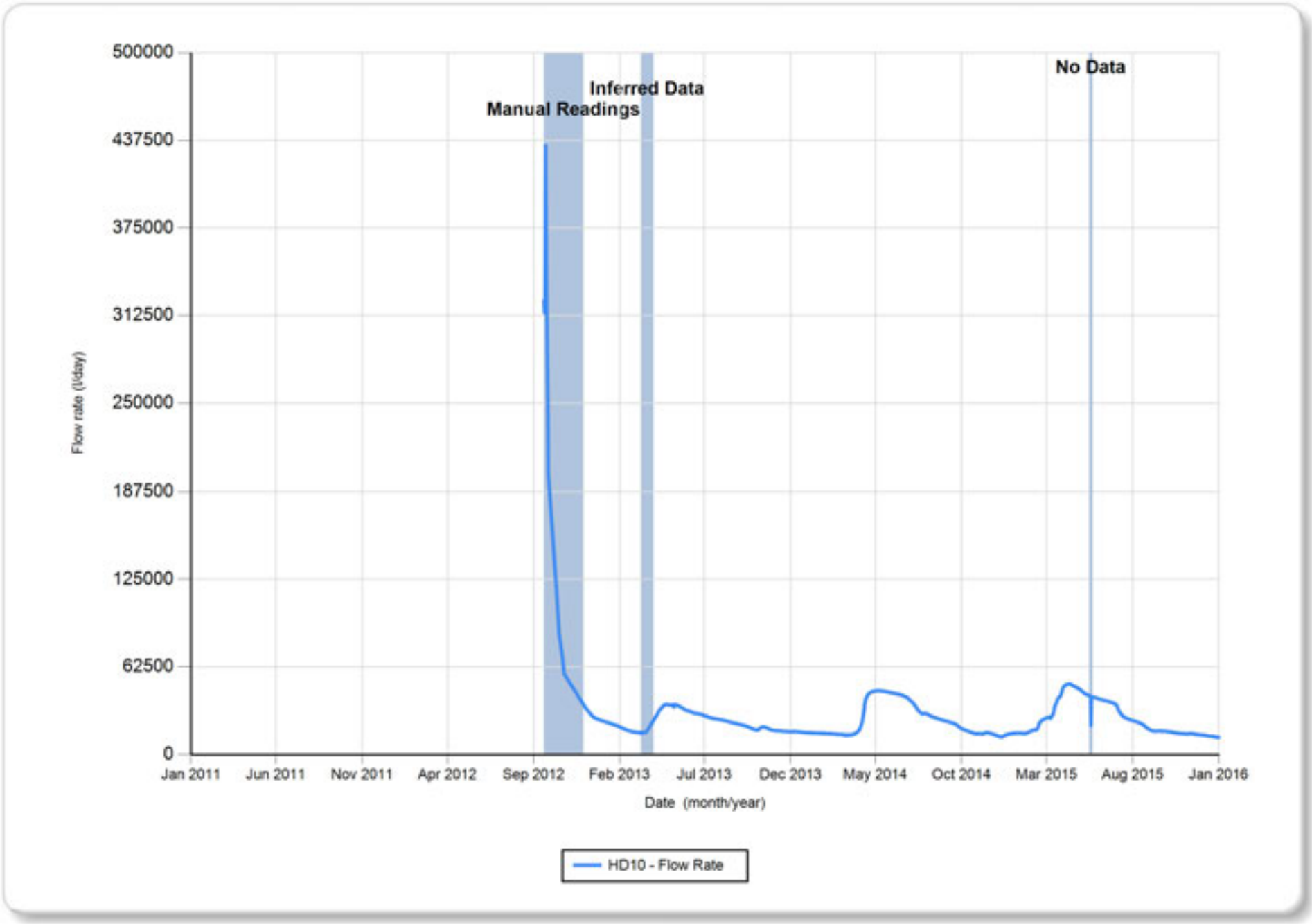
West Quesnel Land Stability Program

HD9 (Station 12) - Daily Flow Rate



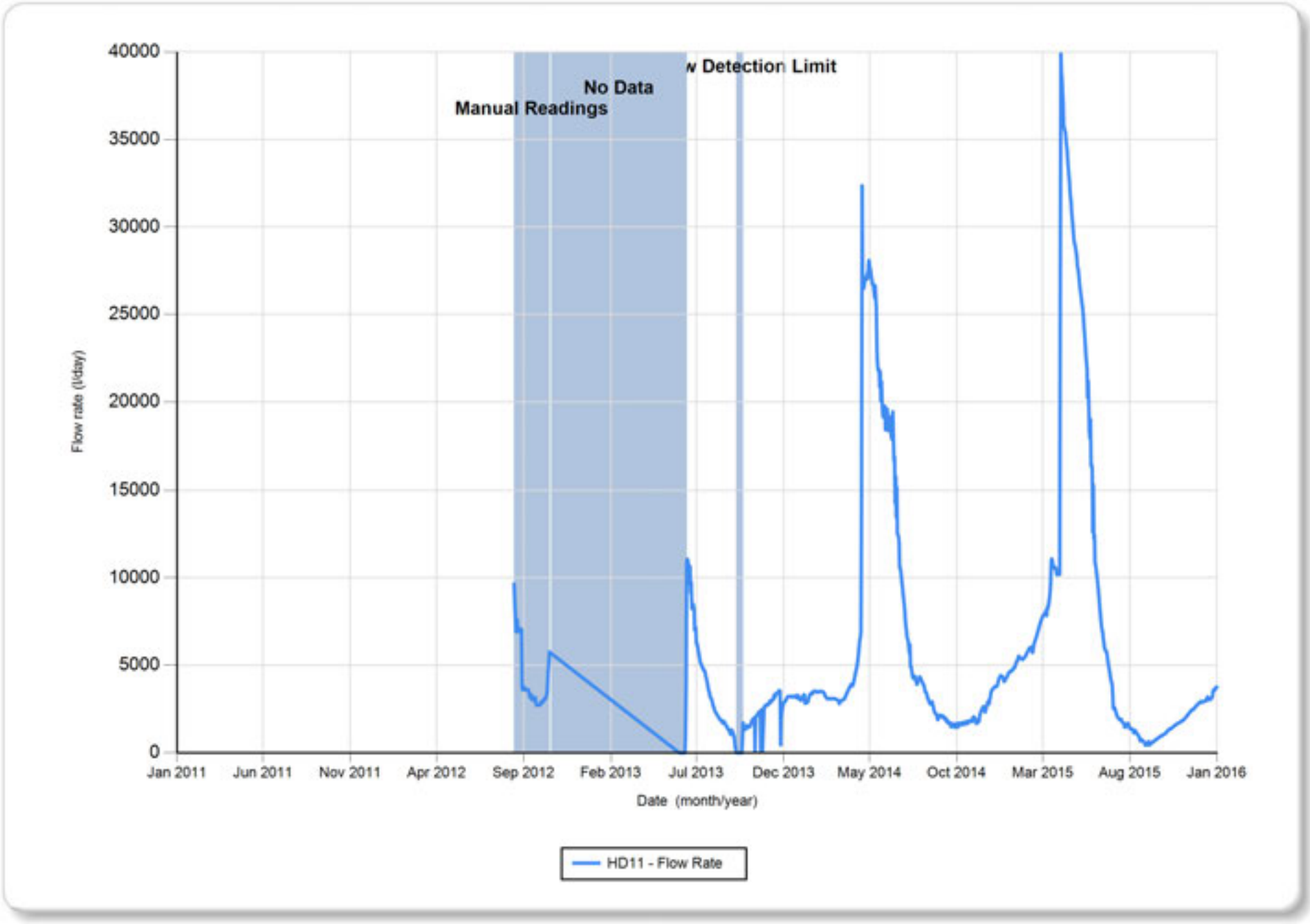
West Quesnel Land Stability Program

HD10 (Station 26) - Daily Flow Rate



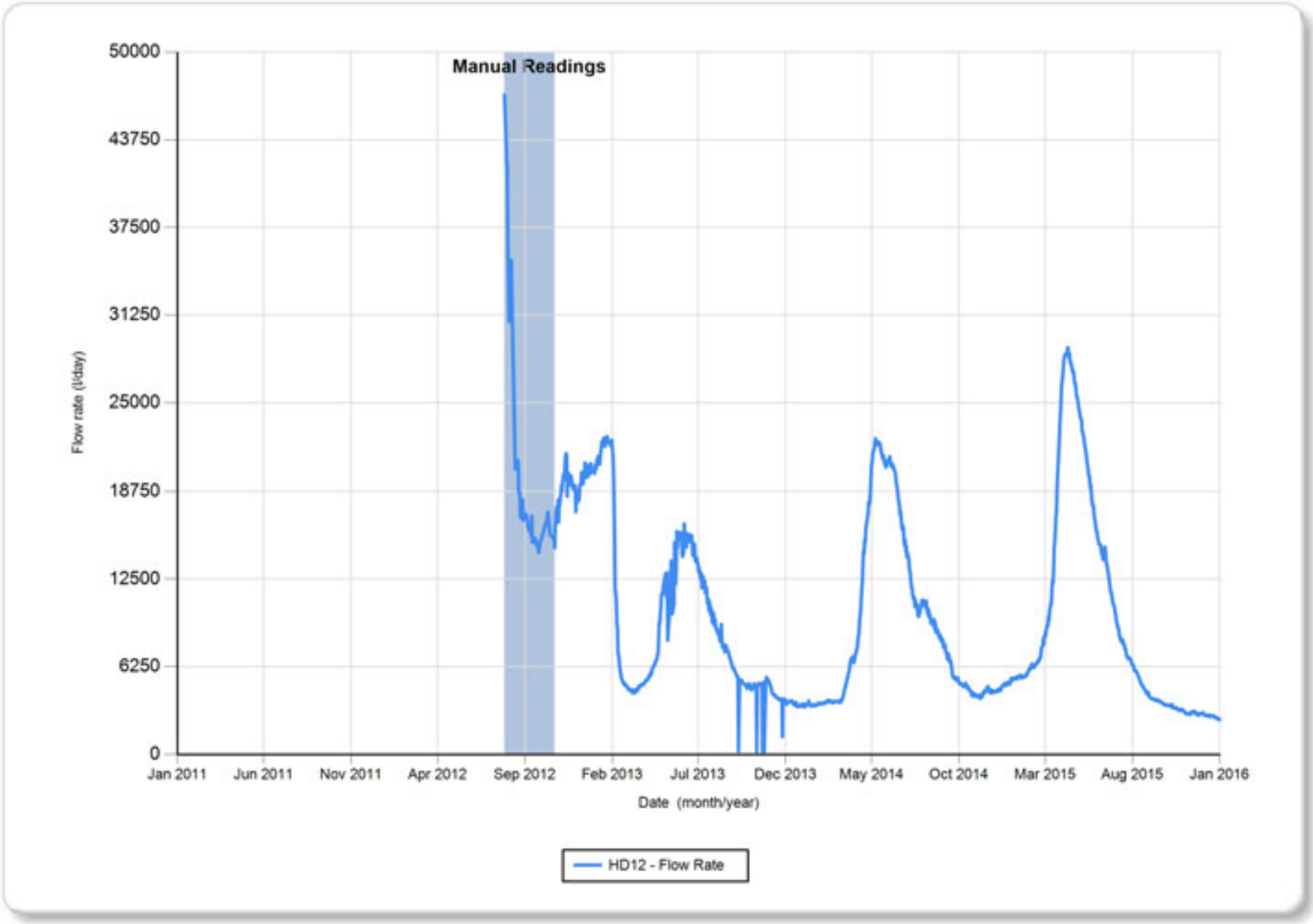
West Quesnel Land Stability Program

HD11 (Station 17) - Daily Flow Rate



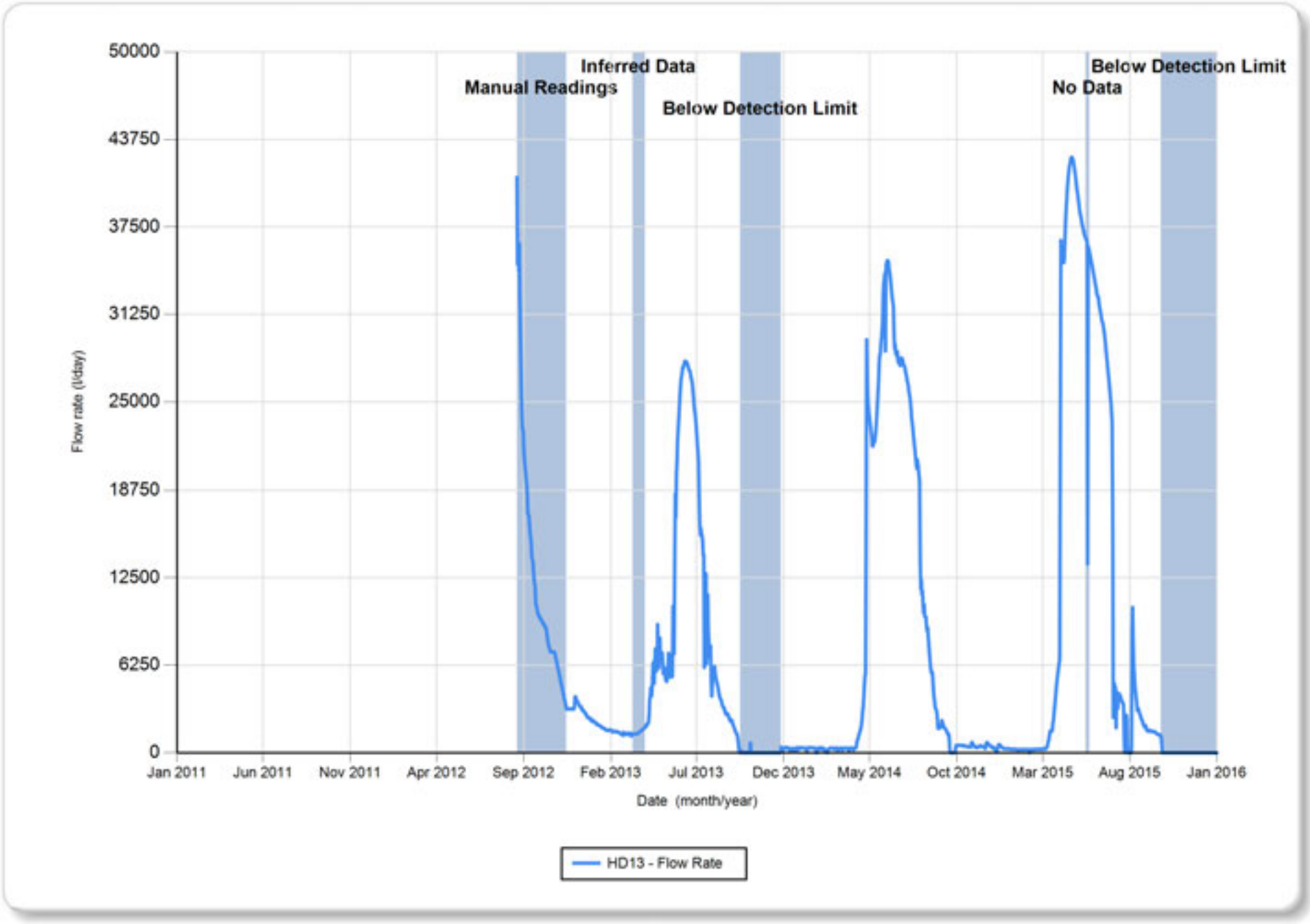
West Quesnel Land Stability Program

HD12 (Station 17) - Daily Flow Rate



West Quesnel Land Stability Program

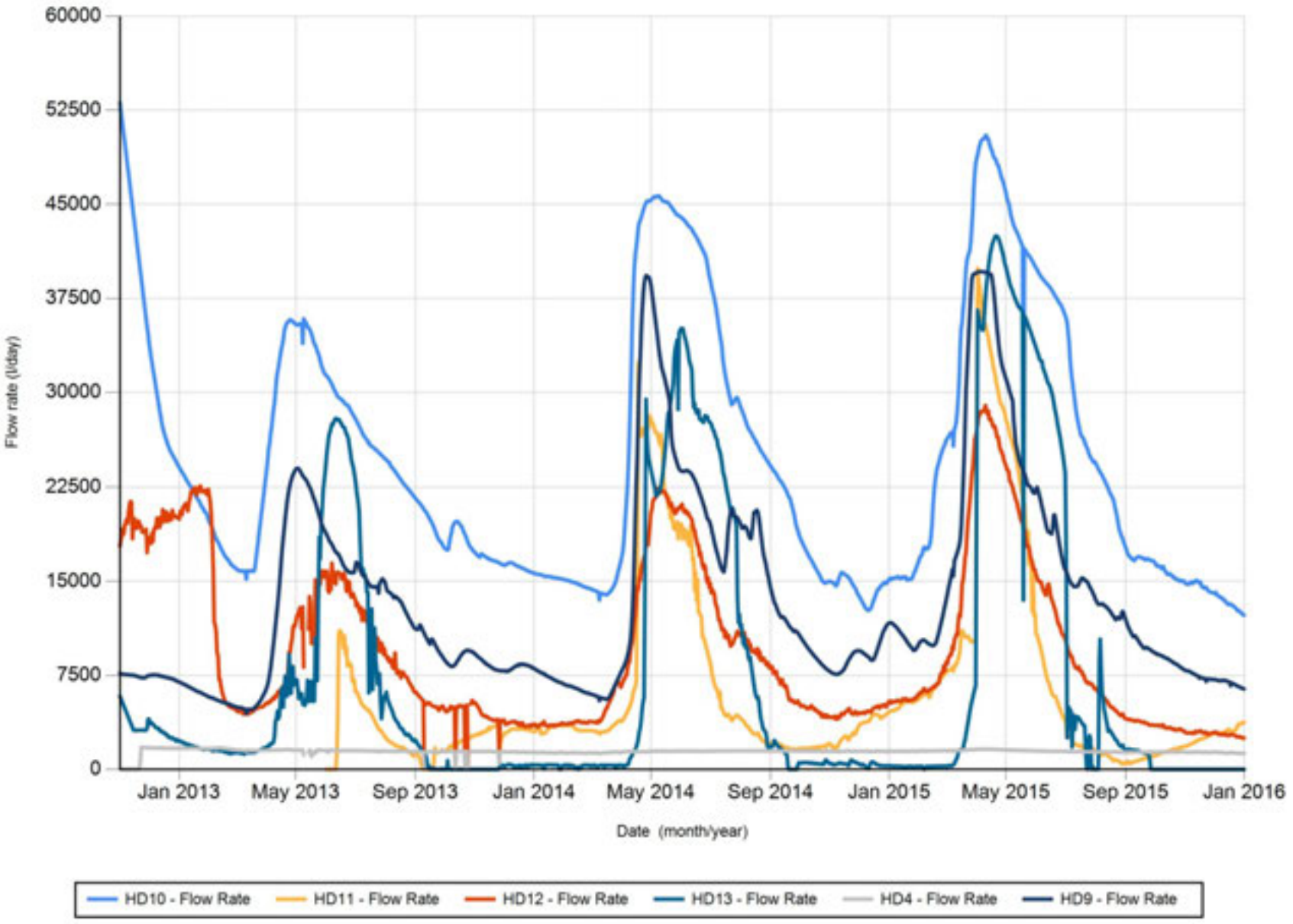
HD13 (Station 27) - Daily Flow Rate

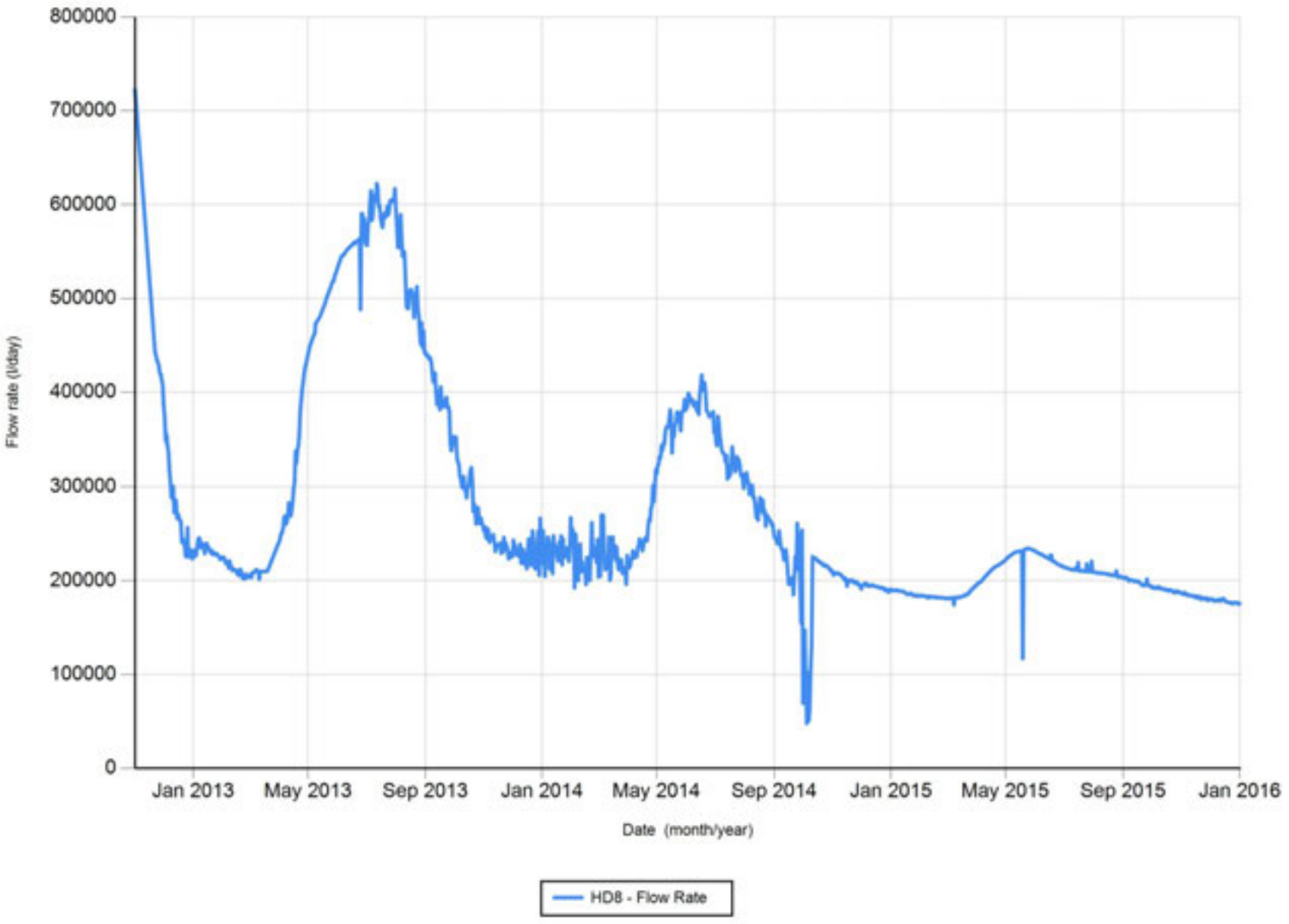


West Quesnel Land Stability Program

Horizontal Drains Flow Rates (Combined)

amec foster wheeler





Appendix F

Historical Precipitation Data Charts for the Quesnel Area
Figures F1 to F3

Figure F1 - Total Monthly Precipitation - 2011 to 2015
(Environment Canada-Quesnel)

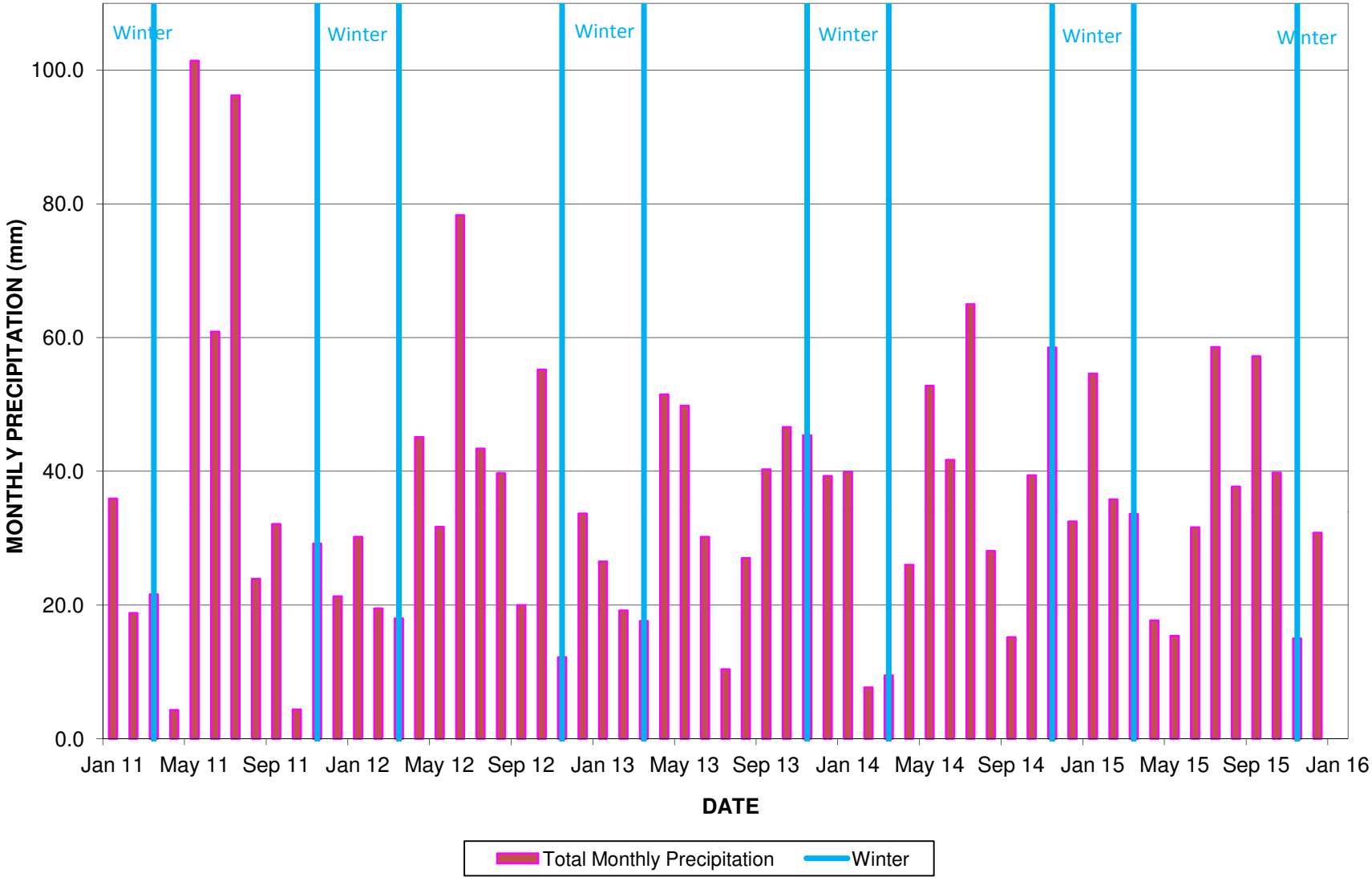


Figure F2 - Total Monthly Precipitation and Historical Normals - 2011 to 2015
(Environment Canada - Quesnel)

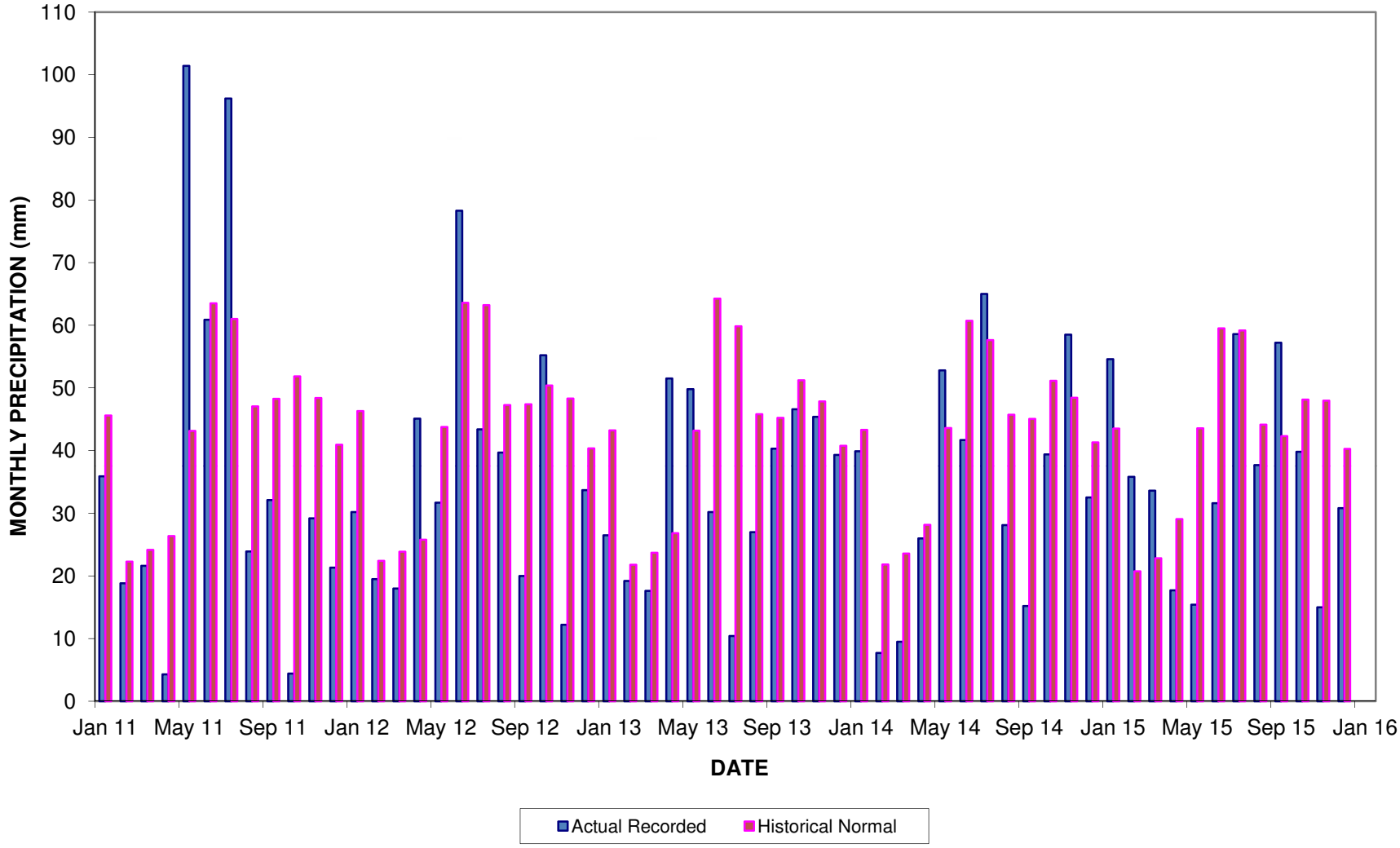
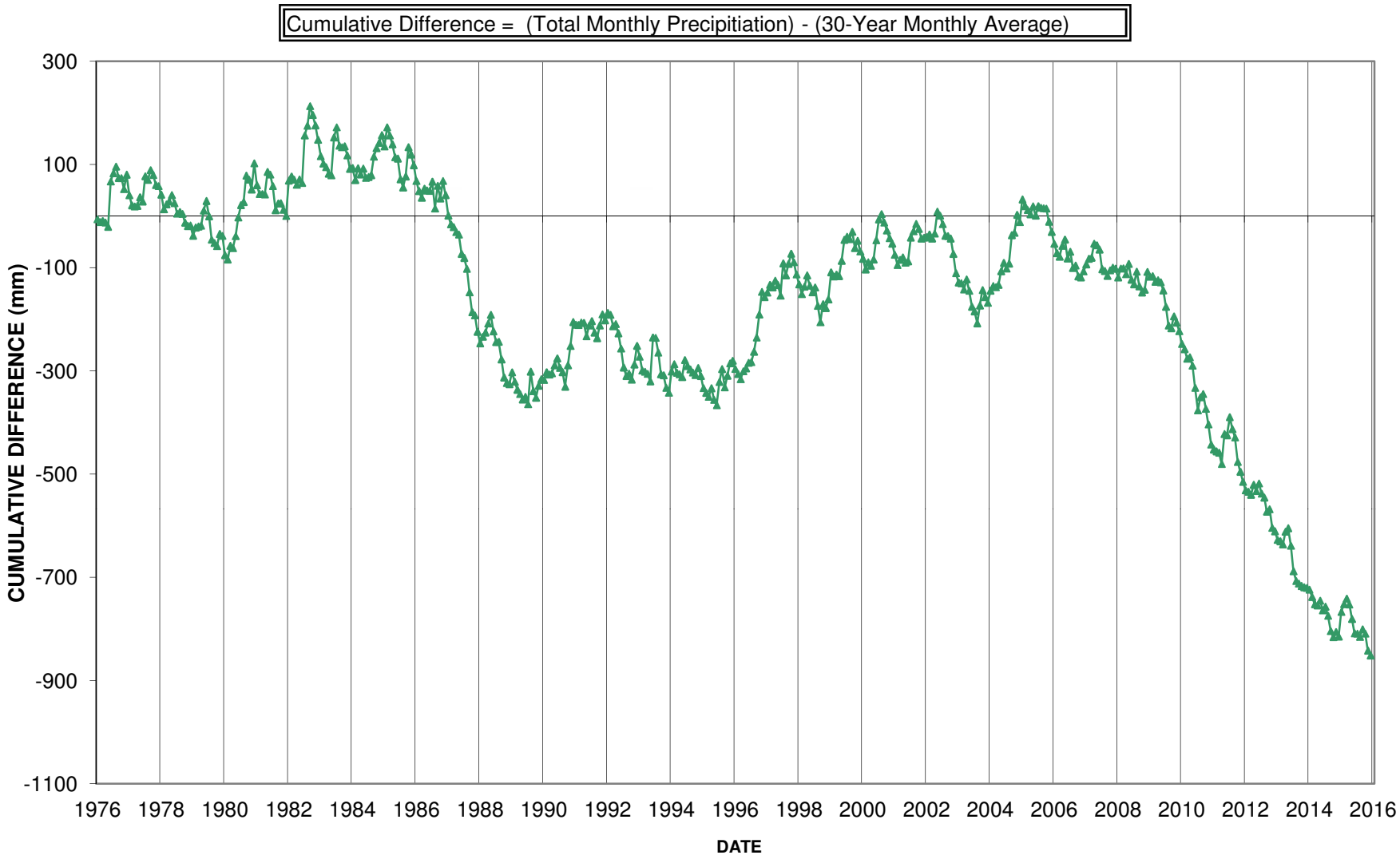


Figure F3 - Total Monthly Precipitation - Cumulative Difference - 1976 to 2015
(Environment Canada - Quesnel)



Appendix G

Data Comparison Charts
Figures G1 to G5

Figure G1 - Total Monthly Precipitation & Selected Groundwater Elevations

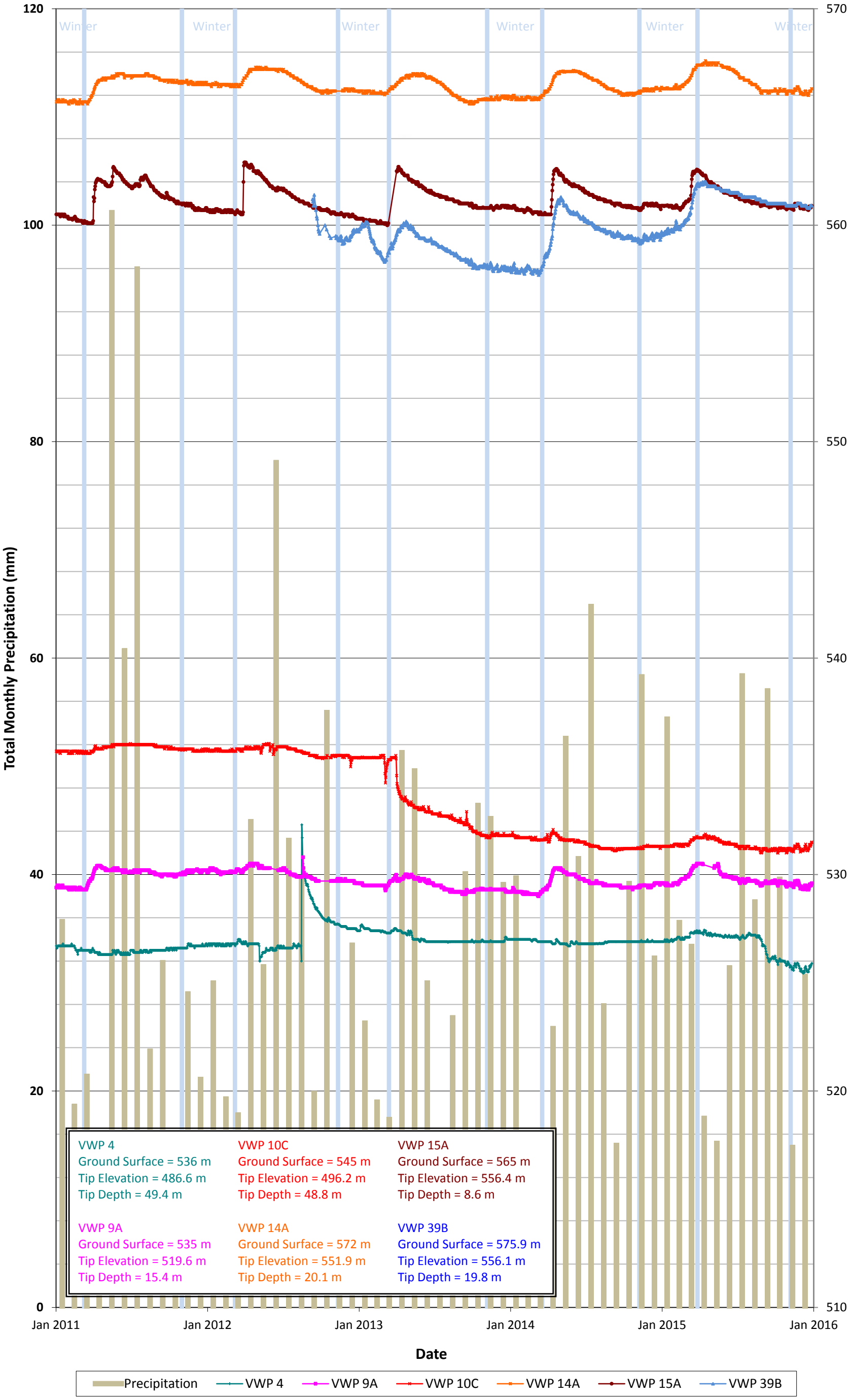
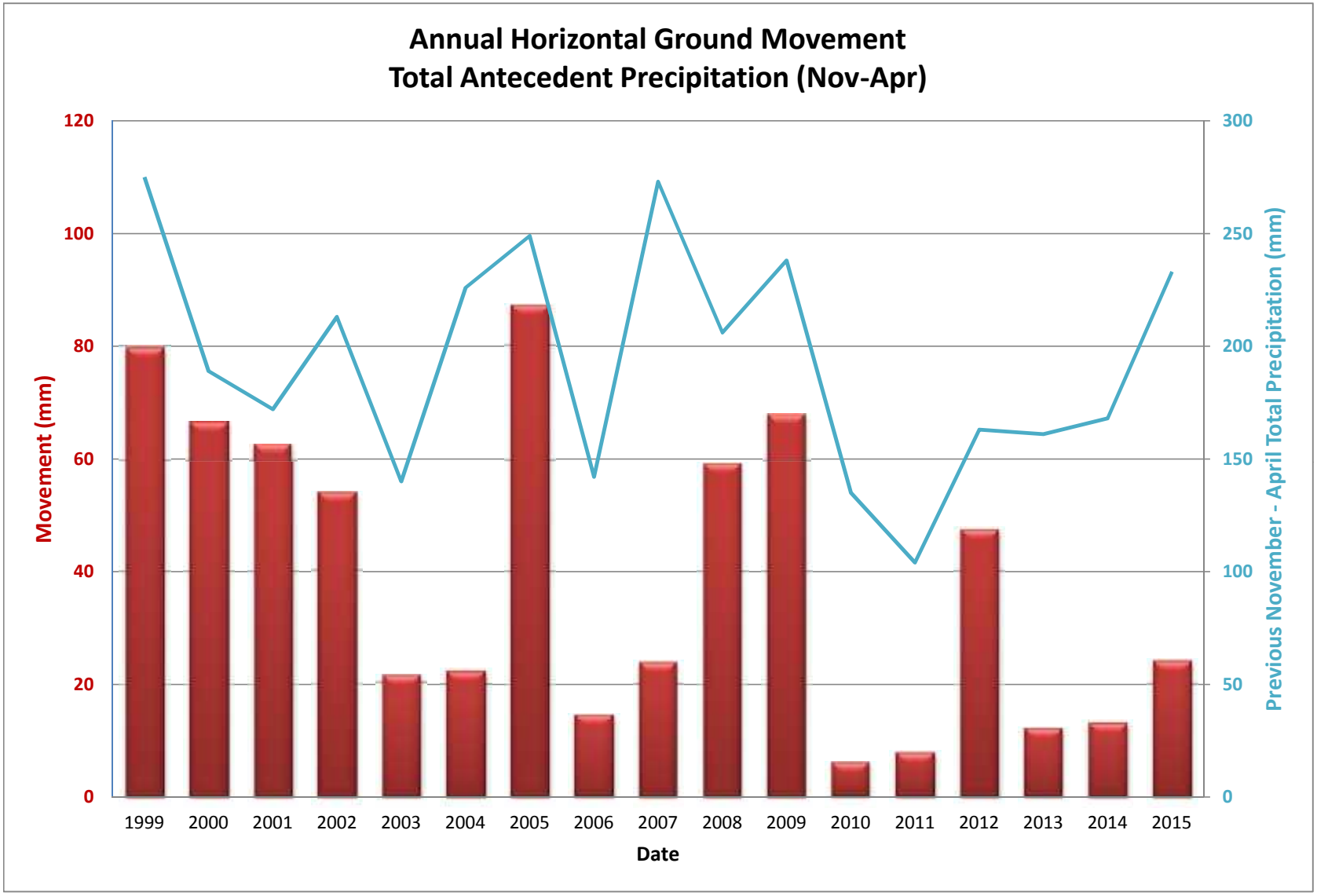
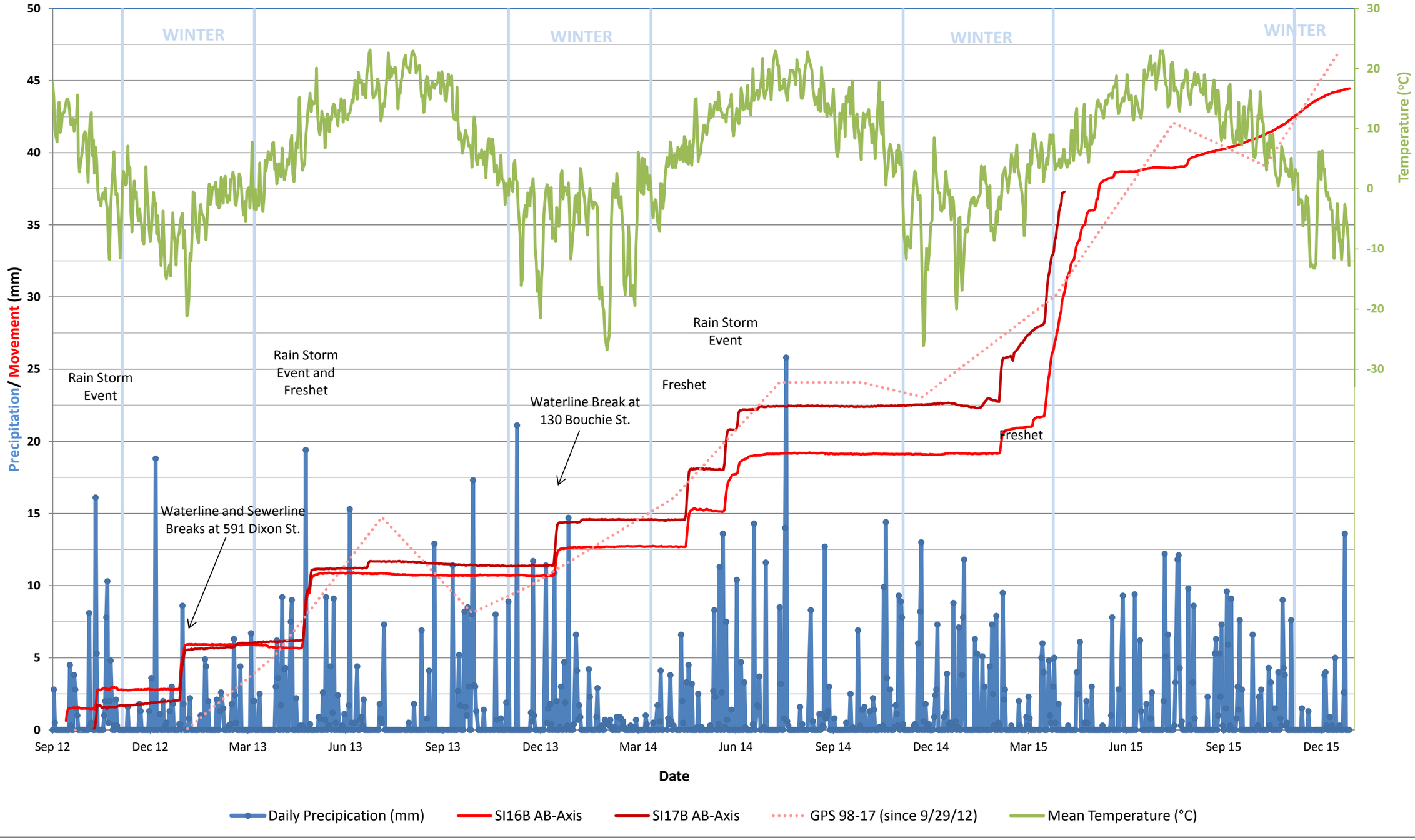


Figure G2 - Horizontal Movement Relative to Precipitation



G3 - Cumulative Ground Movement & Daily Precipitation



G4 - Cumulative Ground Movement & Daily Precipitation & Typical Groundwater Elevations

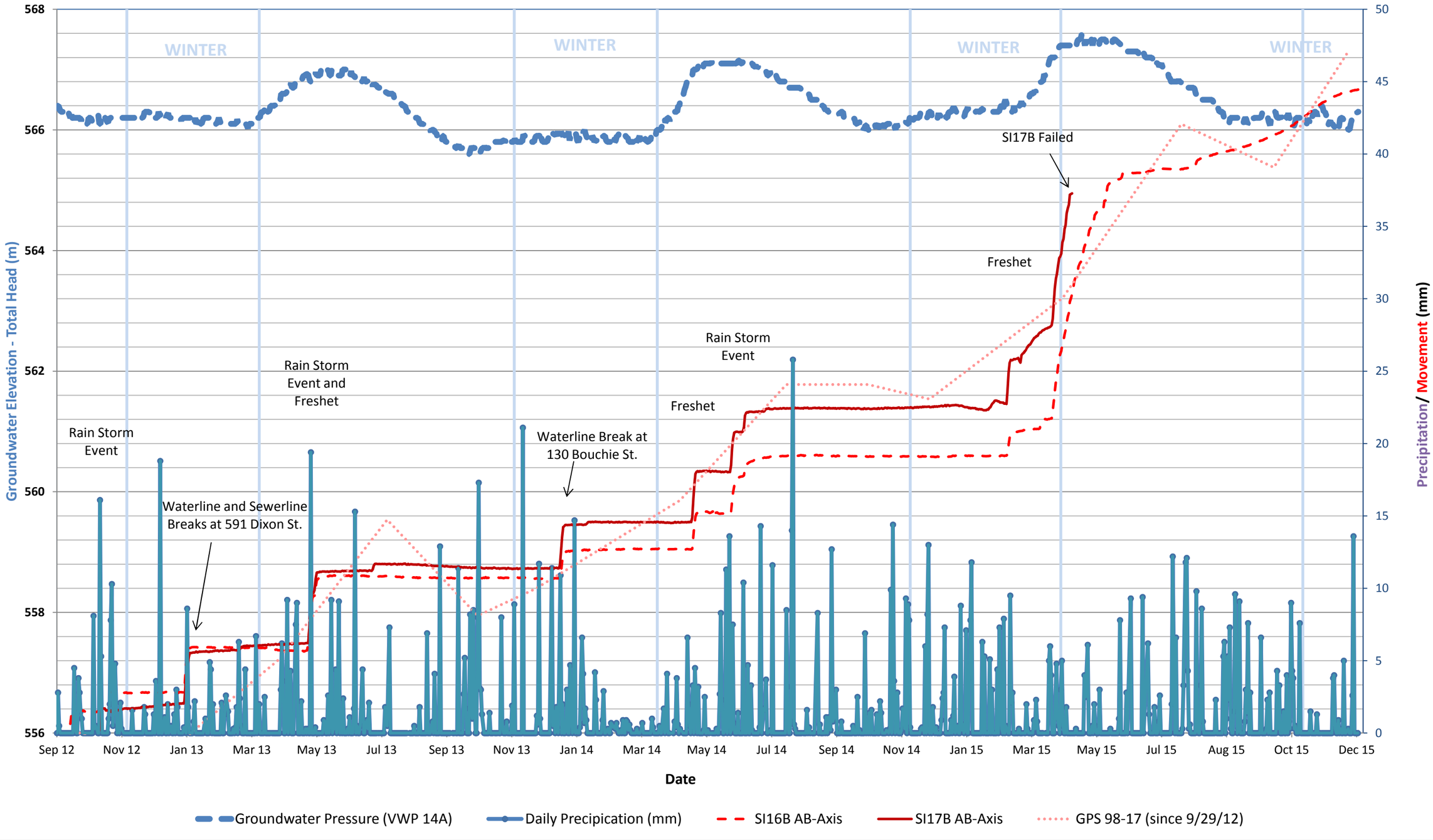
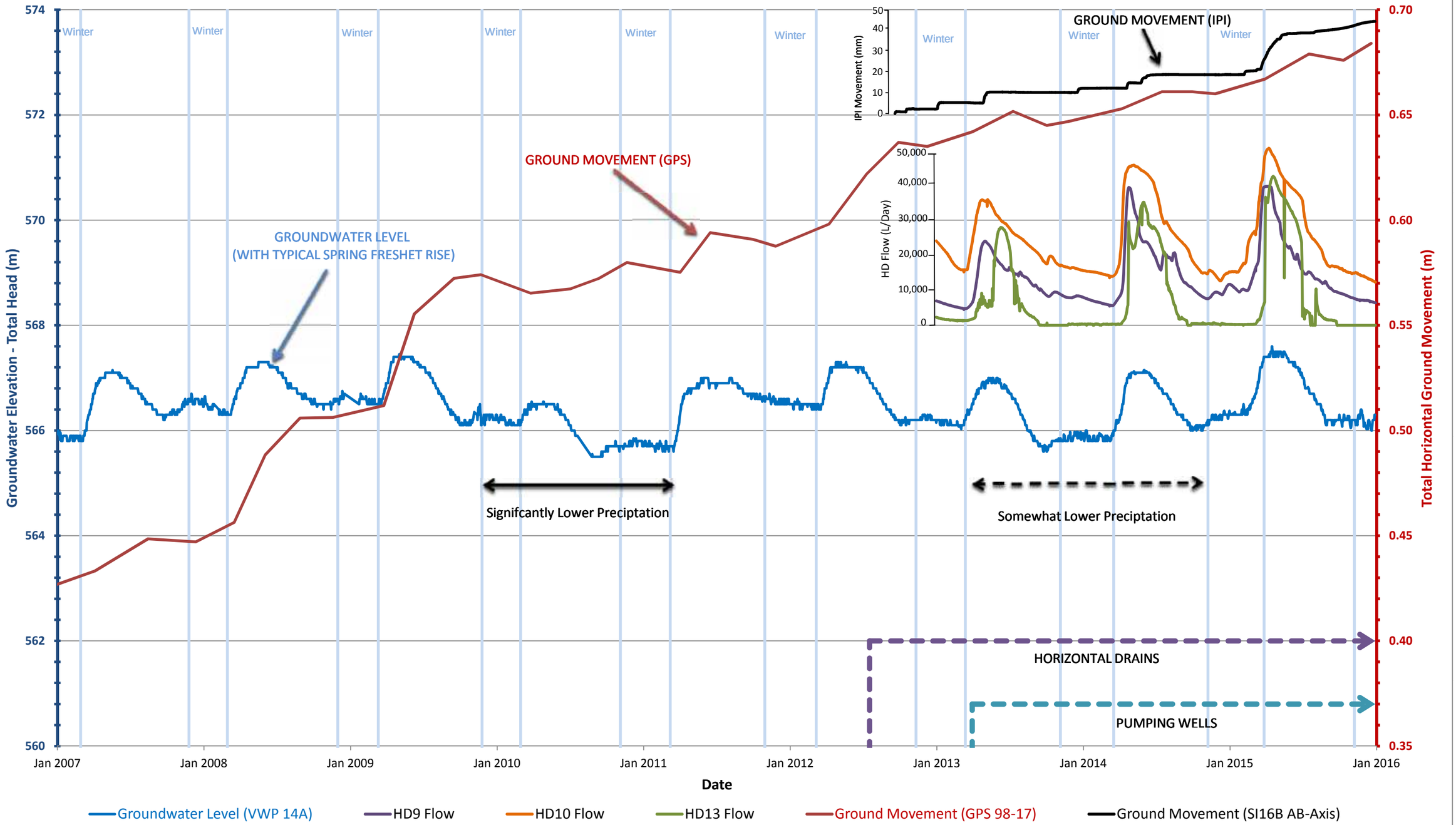



Figure G5 - Cumulative Ground Movement & Typical Background Groundwater Elevation