AMEC Environment & Infrastructure
A division of AMEC Americas Limited
3456 Opie Crescent, Prince George, BC
Canada V2N 2P9
Tel +1 (250) 564-3243
Fax +1 (250) 562-7045
www.amec.com

WEST QUESNEL LAND STABILITY PROGRAM
ANNUAL MONITORING REPORT - 2013

Prepared for:

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

Prepared by:

AMEC Environment & Infrastructure
A division of AMEC Americas Limited
Prince George, BC

11 March 2014

KX0439739

TABLE OF CONTENTS

Page #

1.0 INTRODUCTION 1

2.0 GPS MOVEMENT HUBS 1

3.0 SLOPE INCLINOMETERS 5

4.0 PIEZOMETERS 6

5.0 PUMPING WELLS 8

6.0 HORIZONTAL DRAINS 9

7.0 PRECIPITATION DATA 10

8.0 TRENDS & CORRELATIONS 12
8.1 PRECIPITATION EFFECT ON GROUNDWATER LEVELS 13
8.2 PRECIPITATION EFFECT ON GROUND MOVEMENT 13
8.3 GROUNDWATER LEVEL CORRELATION WITH GROUND MOVEMENT 13

9.0 CLOSURE 16

LIST OF FIGURES

Figure 1 Summary Plan of Ground Movement (GPS Hubs and Slope Inclinometers)
Figure 2 Total Horizontal Movement, September 1998 to December 2013
Figure 3 Total Horizontal Movement, December 2001 to December 2013
Figure 4 Total Horizontal Movement, November 2006 to December 2013
Figure 5 Total Vertical Movement, November 2006 to December 2013
Figure 6 Total 3D Movement, November 2006 to December 2013
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 Site Plan with Piezometers, Pumping Wells and Horizontal Drains

LIST OF TABLES

Table 1 Typical Horizontal Movement (from GPS Hub 98-17) from 1998 to 2013
Table 2 Pumping Wells – Total Annual Flows
Table 3 Horizontal Drains – Total Annual Flows
Table 4 Annual Total Precipitation from 1996 to 2012

LIST OF APPENDICES

Appendix A GPS Movement Hubs - Summary Table and Survey Data (Figure A1)
Appendix B Slope Inclinometers - Summary Table
Appendix C Piezometers - Summary Tables and Groundwater Elevation Plots
Appendix D Pumping Wells - Summary Table and Production Charts
Appendix E Horizontal Drains - Summary Table and Production Chart
Appendix F Historical Precipitation Data Charts for the Quesnel Area (Figures F1 to F4)
Appendix G Data Comparison Charts (Figures G1 to G9)

1.0 INTRODUCTION

AMEC Environment & Infrastructure, a division of AMEC Americas Limited, (AMEC) 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 movements, groundwater conditions and precipitation.

Various sets of Global Positioning System (GPS) ground surface movement hubs have been established in the field and surveyed between 1998 and 2013. Beginning in the year 2000, AMEC installed several phases of slope inclinometers, piezometers, pumping wells and horizontal drains. Urban Systems, from Kamloops, BC, also installed a weather station in West Quesnel, to record local precipitation and temperature data.

This report is intended to summarize the data collected during 2013 for the installed instrumentation and provides an update on observed trends or interpretations that have developed or changed since our 2012 Annual Monitoring Report, dated 2 April 2013.

Please note that beginning in mid 2012 a full scale sub-surface dewatering system was installed and became fully operational during the spring of 2013. The system consists of 14 new pumping wells, 10 new horizontal drain fan locations, 2 new in-place slope inclinometers and 14 new piezometer (monitoring well) locations along with additional data acquisition and telemetry. Monitoring data from these installations has been included in the 2013 annual monitoring report along with data from previously installed instruments. The specific details of the 2012-2013 system installation will be reported on separately.

For detailed background information including geology and project history, the reader is referred to previous AMEC reports, including our previous annual monitoring reports, 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 has been expanded and modified such that a current total of 47 hubs are monitored. During the course of the 2013 monitoring, hubs numbered 98-08 and 98-09 were noted to have been destroyed and were replaced with hubs 13-02 and 13-01 respectively, leaving the total number of active hubs at 47. The monitoring consisted of comparing changes in the specific positions of the defined survey reference points versus time as measured periodically by survey contractors (most recently McElhanney Consultants Limited), retained by both FortisBC and AMEC on behalf of the City of Quesnel. Surveys are typically conducted on a quarterly basis with the results forwarded to AMEC. In 2011 Fortis arranged for installation of some additional closely spaced GPS hubs that are monitored periodically in conjunction with UBC for a research project, and are not generally monitored as part of the West Quesnel Land Stability program nor are reported on herein.

During 2013, quarterly GPS monitoring was carried out in April, July, October and November for the GPS hubs established in 1998, 2001, 2006, and 2008. An initial survey was taken on the new hubs 13-01 and 13-02 during the December monitoring. No new surveys were taken for the FortisBC hubs installed in 2011 (GPS Hubs 11-50, 11-51, 11-52, Baker). For the portion of the GPS monitoring network determined to be within the area of identified landsliding, the rates of

movement and total movement recorded in 2013 were significantly less than those observed in 2012 and on an overall average basis, slightly lower than those observed in 2010 and 2011. Essentially the overall ground movements in 2013 were the lowest observed since recording began in 1998.

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 less 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 minor movement (typically less than 15 mm of total horizontal movement over the life of the survey). While there have been as many as eight benchmark hubs, typically only three (GPS Water Tank: City concrete water tank, GPS 01-38, and GPS 98-23) have been utilized to gauge the accuracy of the 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, total horizontal displacement less than 15-20 mm is interpreted to mean that the location is beyond the active movement toe area. Higher values suggest that the hub is on or very near the toe of the slide.

The third category consists of two hubs that are located at or near the upper west portion of the slide, in order to try to confirm the western extent or crest of the slide. Similar to the toe area, total horizontal displacement less than 15-20 mm have been used as representative areas 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 movements over the course of the 15 years that the 15 oldest hubs have been monitored. The total horizontal movement, measured since September 1998 for these 15 oldest hubs, ranged from 295 to 647 mm.

Following much higher than average movements in 2008 and 2009, movement was relatively limited in 2010 and 2011 but showed an increase in 2012. For 2013, total horizontal displacement ranged up to 17 mm, depending on the hub location. The 2013 movements were significantly less than the typical long term average of approximately 26 to 55 mm per year, and on an overall average basis across all movement hubs, at or below the rates observed in 2010 and 2011. Table 1 presents cumulative, annual, and peak horizontal movement data for a ‘worst-case’ monitoring location in the middle of the study area (GPS Hub 98-17) from 1998 to 2013. Figure A1 reproduced below from Appendix A, graphically shows the cumulative movement data presented in Table 1.

Table 1: Typical Horizontal Movement (from GPS Hub 98-17) from 1998 to 2013

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

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

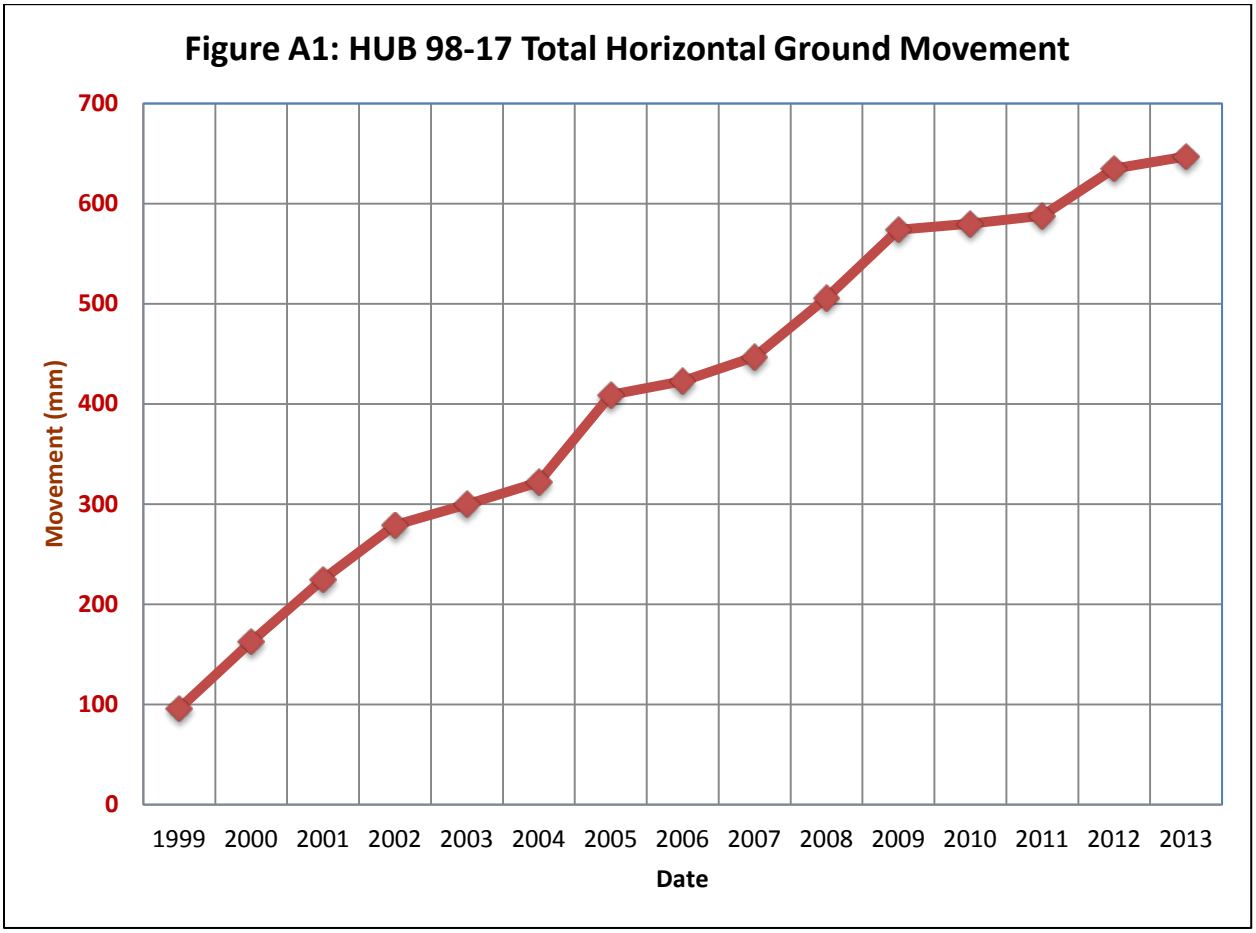


Figure 1 provides an updated plot simplified vector movement map for GPS hubs monitored in the West Quesnel area. The GPS vector plots in Figure 1, show relative magnitude and azimuth of latest total vector. Intermediate movements are approximated. Details for individual GPS movement hubs and intermediate movement vectors are located in Appendix A. In addition, total observed horizontal movements for the SI16 and SI17 in-place inclinometers are plotted in Figure 1.

Figures 2 to 20 show contour plots of total and annual GPS hub movement data selected over different time periods (which also means that only hubs used during the entire time period are included in the contour process) and for different components (i.e. horizontal movement, vertical movement and resultant three dimensional (3D) movement). The ground movement contours were drawn using triangulation in Autodesk Civil 3D (2013). Please note that these are simplified contours, 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 2013, 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 647 mm has now been detected at GPS Hub 98-17 (corner of Bettcher St. and Lark Ave).

Figure 3 shows total horizontal movement between December 2001 and December 2013, for the GPS hubs installed in September 1998 and December 2001.

Figure 4 shows total horizontal movement between November 2006 and December 2013, for the GPS hubs installed in September 1998, December 2001 and November 2006. All three figures show that the greatest horizontal movement has generally occurred in the middle of the slide area.

Figure 5 shows total vertical movement between November 2006 and December 2013. This contour plot shows 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 2013. As in Figure 4, the largest movements have generally been observed in the middle of the slide area.

Figures 7 through 20 show annual horizontal movement and annual 3D movement respectively for the years 2007 through 2013 (2 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 rate was observed again 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 decrease again in 2013 with only a top movement rate of 19 mm for both horizontal and 3D movement (see Figures 19 and 20).

The differences in annual movements between the relatively low activity years of 2007, 2010, 2011 and 2013, as compared to higher movement years of 2008, 2009, and 2012 are attributable to differences in antecedent precipitation that influences the groundwater pressures within the landslide area, although for 2013 the effects of the full scale dewatering program are likely coming into play (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 AMEC 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 AMEC reporting. In mid-2009, the remaining slope inclinometers in this group of fifteen, subject to active movement, sheared off. 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 in 2013.

In 2012, as part of the monitoring package for the full scale 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. 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 measurements were also performed. Both the manual measurements and the collected real time IPI displacement data is presented in Appendix B.

The plots depicting the IPI displacement found in Appendix B have been automatically generated, utilizing AMEC's custom developed data management website for the West Quesnel Land Stability Program. This website is still in final development, and will continue to be modified as needed to allow the users real time information regarding the installed instrumentation system and the performance of various instruments. Currently, the averaged daily displacement is presented in the plots at specified depths along each IPI installation.

The IPI plots show 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 has moved a total of 12 mm since its installation 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 has moved a total of 15 mm since its installation 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 2 major movement events (January 7 through April 29).

4.0 PIEZOMETERS

Two general types of piezometers (with three different installation configurations) have been utilized in West Quesnel to monitor groundwater levels. The predominant type of piezometer used in West Quesnel is a vibrating wire piezometer (VWP), an electronic water pressure sensing device that is installed directly in the ground via grouting in a borehole in order to continually and remotely detect groundwater pressure. Vibrating wire piezometers measure water pressure at the specific depths of their tips and can provide a rapid response to changing conditions. A number of retrofit installations have been created where vibrating wire piezometer sensors have been suspended inside open pipes (standpipes or well casings) for automated electronic detection of water levels.

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

The second type of piezometer is the standpipe type, generally consisting of a vertical pipe (plastic or steel) with openings (slots or screens) at depth that admit groundwater from the surrounding ground. 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 levels were measured manually using a water level dip tape but these readings were discontinued at the end of 2012 as the information was better captured with the addition of the automated VWPs installed during the 2012 full scale dewatering program.

Four standpipes have been retrofitted with vibrating wire piezometer transducers installed inside the standpipes. 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, eight have either dried up or been damaged and are not currently giving reliable measurements, bringing the current number of active VWP instruments to 76. The locations of the various piezometer installations are shown on Figure 21.

All of the vibrating wire piezometer sensors are connected to Campbell Scientific data loggers. 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 AMEC staff.

A summary table listing the various piezometers, along with their groundwater levels (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 levels or 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).

[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, www.geotechnicalnews.com/instrumentation_news.php

Table C1 (Background Piezometers), in Appendix C, presents the individual trends and observations from 2013 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. Note that some VWP's that fell into this category in previous reporting have been affected by the dewatering infrastructure installed in 2012 and have therefore been moved to the appropriate categories.

Table C2 (Piezometers Near Pumping Wells), in 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 (draw down of groundwater level) since pumping started and many have reached a new steady-state level, depending on how productive the well has been. Piezometers that have groundwater pressures remaining at steady-state levels (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 2013 for this set of piezometers there were no significant changes over that seen in late 2012, with steady state groundwater level draw downs continuing where previously influenced by pumping wells. Some instrument locations still indicated slight seasonal or storm event responses. However VWP 3 at BH3 shows a decrease in groundwater level due to the reactivation of nearby pumping well PW2.

Table C3 (Piezometers Near Horizontal Drains), in Appendix C, presents the overall trends and observations from 2013 for piezometers situated above or near the horizontal drain installations. These piezometers have generally been at steady-state since initial draw downs in 2012 when the horizontal drains (HD) were first installed. A number of piezometers in the vicinity of HD8 show a decreasing trend. A couple of these instruments also react to seasonal precipitation.

The plots depicting the groundwater levels found in Appendix C have been automatically generated, utilizing AMEC's custom developed data management website for the West Quesnel Land Stability Program. This website is still in final development, and will continue to be modified as needed to allow the users real time information regarding the installed instrumentation system and the performance of various instruments. Currently the averaged 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 levels within the West Quesnel area have been considered to be generally quite high and detrimental to slope stability. The overall background trend observed in 2013 was relatively constant with temporary seasonal groundwater increases. Groundwater levels 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 levels. The instruments near the 2012 installations initially showed significant response and lowering water levels due to the new horizontal drain and pumping well installations and have since reached a steady state or continue with a slight downward trend. To date approximately 27 of the piezometer installations have registered reductions in groundwater levels that appear to be attributable to the sub-surface dewatering program, with up to approximately 22 other instruments that may also be showing some slight influence from the dewatering system.

5.0 PUMPING WELLS

During the 2012 full scale dewatering program 14 new pumping wells (PW) were drilled and pumps were installed in 13 of them. PW10 was dry on completion of drilling and 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 2013 the pumps were also intermittently turned off to facilitate additional water quality sampling. Figure 21 shows the locations of all of the pumping wells.

During the course of 2013 all the pumping wells with the exception of PW5 were switched over from static water level sensor controlled activation to VWP controlled activation. In this way the VWP tells the pump to turn on when a certain water level is reached in the well and to turn off again when the pump has drawn down the water level to just above the pump head. This change in pump control allowed for easy optimization of the pumping time, better control over the water level in each well and it was noted that the total amount of water withdrawn from each well was increased as compared to when static level sensor controls were used. In addition, in May 2013 the old PW2 pump was replaced. During the replacement it was noted that the well casing had sheared off and as a result the pump was placed at a higher elevation than originally used.

The water pumped from PW1, PW13, and PW19 enters the West Quesnel sanitary sewer while water from PW2, PW4 through PW12 (except PW10) and PW14 through PW18 enters the West Quesnel storm drainage system, and ultimately Baker Creek. Since the pump initiation in April 2013, water quality sampling has been conducted roughly every two weeks on all the wells that discharge to the storm drainage system. Due to this testing, the corresponding well pumps have been routinely shut off for one day about every two weeks prior to the water sampling to allow for enough recharge to enter the wells. This procedure potentially lessens the amount of water removed by these pumping wells.

A summary table of the well details along with charts of well levels and production rates since installation can be found in Appendix D.

The plots depicting the pumping well operations found in Appendix D have been automatically generated, utilizing AMEC's custom developed data management website for the West Quesnel Land Stability Program. This website is still in final development, and will continue to be modified as needed to allow the users real time information regarding the installed instrumentation system and the performance of various instruments. Currently the pumping well flow readings are collected on an hourly basis and are summed to establish a daily flow rate. Water well levels presented are averaged daily values with digital filtering to remove erroneous readings.

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

Table 2: Pumping Wells – Total Annual Flows

Site Name	Total Cumulative Flow Per Year (L)						
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**Total**
PW1	35,182	34,044	30,349	27,738	26,867	25,968	180,148
PW2*	9,063	3,655	Pump Failed			2,668	15,386
PW4	6,261,725	5,233,493	4,663,930	6,145,276	3,810,749	3,052,650	29,167,823
PW5	644	711	615	1,134	1,613	2,685	7,402
PW6	Installed in Fall 2012				35,940	2,766,654	2,802,594
PW7					321	66,372	66,693
PW8					682	347,589	348,271
PW9					949	621,910	622,859
PW10					Dry		
PW11					560	80,110	80,670
PW12					300	502,858	503,158
PW13					288,641	7,592,947	7,881,588
PW14					641	119,548	120,189
PW15					859	244,830	245,689
PW16					532	16,222	16,754
PW17					530	90,417	90,947
PW18					1,123	391,458	392,581
PW19					8,177	98,713	106,890
Total	**6,306,614**	**5,271,903**	**4,694,894**	**6,174,148**	**4,178,484**	**16,023,599**	**42,649,642**

*Note: 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.

During 2013 the pumping wells showed a relatively steady production rate with some variance due to seasonal precipitation. A total of approximately 16 million liters of water was removed from the West Quesnel area by pumping wells during 2013 with an overall total of 42.6 million liters.

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 dewatering program, 64 additional horizontal drains were installed at 10 other sites (see Figure 21). 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 drains can be found in Appendix E, along with production charts for HD4, HD8, HD9, HD10, HD11, HD12, HD13 and HD14. Table 2 presents the total annual flow per site from 2008 to 2013.

The plots depicting the flow rates of the horizontal drains found in Appendix E have been automatically generated, utilizing AMEC's custom developed data management website for the West Quesnel Land Stability Program. This website is still in final development, and will continue to be modified as needed to allow the users real time information regarding the

installed instrumentation system and the performance of various instruments. Currently the flow readings are collected on an hourly basis and are summed to establish daily flow rates. Where flow data gaps exist or an incomplete daily data set is collected, false drops in flow rates are recorded. These are temporary data aberrations and can generally be disregarded, as the horizontal drains always flow regardless if the flow meters are functional or not.

Table 3: Horizontal Drains – Total Annual Flows

Site Name	Total Cumulative Flow Per Year (L)						
	2008	2009	2010	2011	2012	2013	Total
HD1	DRY, Decommissioned						
HD4	1,046,984*	536,559	421,820	432,021	448,443**	535,725	3,421,552
HD5	Installed in Fall of 2012				Dry		
HD6					Dry		
HD7					Dry		
HD8					60,390,352	130,934,967	191,325,319
HD9					2,772,172	4,134,390	6,906,562
HD10					8,682,037	8,326,985	17,009,022
HD11					267,408***	6,291,139	6,558,547
HD12					3,151,386	3,210,809	6,362,195
HD13					1,254,748	1,914,268****	3,169,016
HD14					Dry	2,015,064	2,015,064
Total	**1,046,984**	**536,559**	**421,820**	**432,021**	**76,966,546**	**157,363,347**	**236,767,277**

*Note: HD4 flows for 2008 were interpolated based manual flow readings.
**Note: HD4 plugged due to nearby drilling, and no flow readings were observed between August to mid November 2012.
***Note: 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: 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.

All flows shown in Table 3 represent the measured combined average flows from all the drains installed at each site. The maximum average daily flow rate for all the drains combined, for the year, was recorded at the end of June and beginning of July. The minimum average daily flow rate for all the drains combined, for the year, was recorded during the last week of December. These readings are consistent with the anticipated general seasonal increase in groundwater levels following spring thaw and the subsequent decrease in groundwater levels during the winter freeze. To date, approximately 236.8 million L of water has been removed through the drains.

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) and Quesnel[2] (from June 2010 to present), which are located approximately 6 km north of the project site at the Quesnel Airport. Total monthly and daily precipitation records, including 30 year climate normals, were obtained for the EC station.

[2] Environment Canada, 2013. Canadian Climate Data Search On-line - Canada's National Climate Archive. http://www.climate.weatheroffice.ec.gc.ca/climateData/canadae.html Last visited January 16, 2014.

A secondary planned source of precipitation data was from the custom-installed local weather station on the roof of an apartment building within the West Quesnel Land Stability Program area by Urban Systems Ltd. The intention of installing the custom local weather station was to try to discern if there were significant differences in total precipitation patterns between the EC station and the West Quesnel area. The local weather station has not been reliable to date, and to AMEC's understanding the local weather station has not been replaced. AMEC recommends that the Urban System station be repaired/replaced and returned to service as soon as possible.

From previous data, it appears that while generally both stations recorded the same significant precipitation events, the EC station recorded a higher level of total precipitation. While this discrepancy may suggest that the West Quesnel area is drier than the Quesnel Airport, a significant portion of this difference was due to equipment outages at the Urban Systems station. In addition, the discrepancy may also be due to a non-standard layout for the Urban Systems' equipment (being on an apartment roof, as compared to that used for the EC station), which could affect the capture of both rain and snowfall precipitation. Consequently, AMEC has decided to utilize the more complete EC total precipitation data for analysis of the West Quesnel area for the 2013 monitoring period.

During 2013 Environment Canada published an update for the historical normal[3] for the weather station at the Quesnel Airport. The latest data calculates an annual precipitation over the period from 1981 to 2007 of 536 mm, which differs slightly from the 540 mm for the previously reported period of 1971 to 2000. Total annual precipitation recorded at the EC weather station for 2013 was 404 mm, which is roughly 25% lower than the historical normal (1981 to 2007) which is taken as 536 mm for January to the end of December. Generally, 2013 was wetter than normal in April and May but was drier than normal for the remainder of the year. Table 7, below, presents the annual total precipitation from 1996 to 2013 compared to both the previously reported annual average (540 mm) and the updated annual average (536 mm). Figure F1, in Appendix F, presents total monthly precipitation since January 2009. Figures F2 and F3 show cumulative total monthly precipitation and total monthly precipitation versus the historical normal since 1976, respectively. Figure F4 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, 2013 appeared to represent a continuation of a drying trend noted since 2005.

[3] Environment Canada, 2010. Canadian Climate Normals and Averages 1971-2000 – Canada's National Climate Archive. http://www.climate.weatheroffice.ec.gc.ca/climate_normals/index_e.html Last visited January 30, 2014.

Table 4: Annual Total Precipitation from 1996 to 2013

Year	Annual Total Precipitation (mm)	Difference from Historical Normal (1971 to 2000) (mm)	Difference from Historical Normal (1981 to 2007) (mm)
1996	657	+117	+120
1997	579	+39	+43
1998	488	-52	-48
1999	628	+88	+92
2000	554	+14	+18
2001	554	+14	+18
2002	471	-69	-65
2003	478	-62	-58
2004	692	+152	+156
2005	524	-16	-12
2006	465	-75	-71
2007	541	+1	+5
2008	530	-10	-6
2009	423	-117	-113
2010	315	-225	-221
2011	450	-90	-86
2012	427	-113	-109
2013	404	-136	-132

8.0 TRENDS & CORRELATIONS

Selected typical data from different types of instrumentation was plotted to determine if any general trends or correlations were apparent. While 2007-2013 still represents the early stages of availability of relatively comprehensive data sets across the study area, several trends were visible. Charts of these comparisons can be found in Appendix G.

The comparisons in different types of data, to be discussed below, are as follows:

- Total monthly precipitation vs. groundwater elevation (Figure G1)
- Cumulative total daily precipitation vs. groundwater elevation (Figure G2)
- Incremental ground movement rate vs. total monthly precipitation (Figure G3)
- Incremental ground movement rate vs. total seasonal precipitation (Figure G4)
- Cumulative ground movement vs. total monthly precipitation (Figure G5)
- Incremental ground movement rate vs. cumulative difference total monthly precipitation (Figure G6)
- Incremental ground movement rate vs. groundwater elevation (Figure G7)
- Cumulative ground movement vs. groundwater elevation (Figure G8)
- Horizontal Movement Relative to Precipitation (Figure G9)

8.1 PRECIPITATION EFFECT ON GROUNDWATER LEVELS

On Figure G1, when total monthly precipitation is compared to general groundwater elevation it is apparent that significant seasonal rises in groundwater level occur just after winter each year. These seasonal rises are more obvious on some instruments (BH 9A, BH14A, BH15A), but can also be discerned against a background of generally declining groundwater levels driven by longer term drying trends (BH7B) and/or dewatering efforts (BH10C). Sudden temporary upward spikes (BH9A and BH4) can also be seen, but are usually correlated with water utility leaks.

When these same groundwater elevations are plotted against cumulative total daily precipitation (see Figure G2), a steep rise in the cumulative precipitation curve is often, but not always, followed by a rise in groundwater levels in some of the piezometers. In the other cases, observed rises in groundwater levels are not directly or immediately correlated to preceding rises in the cumulative precipitation plot. There is likely an over-riding and complicated time-lag effect of infiltration of previous rainfall or snow melt (during frozen/non-frozen and dry/saturated ground conditions) on groundwater levels. 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 other slides, the degree of infiltration has been found to vary with slide movement closing and opening tension areas combined with surface water and shallow groundwater flow paths. However, generally for 2013 there was an observed seasonal spring increase in background groundwater levels that likely corresponded with increased precipitation and/or infiltration of snow melt during the early part of the year.

8.2 PRECIPITATION EFFECT ON GROUND MOVEMENT

Cumulative total ground movement and movement rates (as determined from horizontal GPS movement data) were plotted against various precipitation data (see Figures G3 to G6). A general correlation between ground movement and seasonal precipitation patterns can be discerned, with more observed movement generally occurring during or following wetter years or wetter seasons within a given year. The observed reduced rate and amount of movement in 2010 and 2011 (as compared to 2008 and 2009) correlates with generally declining total precipitation, starting around mid 2009. Relatively higher amounts of movement in 2012 appear to follow a short term uptick in precipitation. For 2013, the reduced amount of movement may be partly attributable to a longer term general drying trend but probably also reflects the efforts of the dewatering system gradually activated during 2012 to April 2013.

8.3 GROUNDWATER LEVEL CORRELATION WITH GROUND MOVEMENT

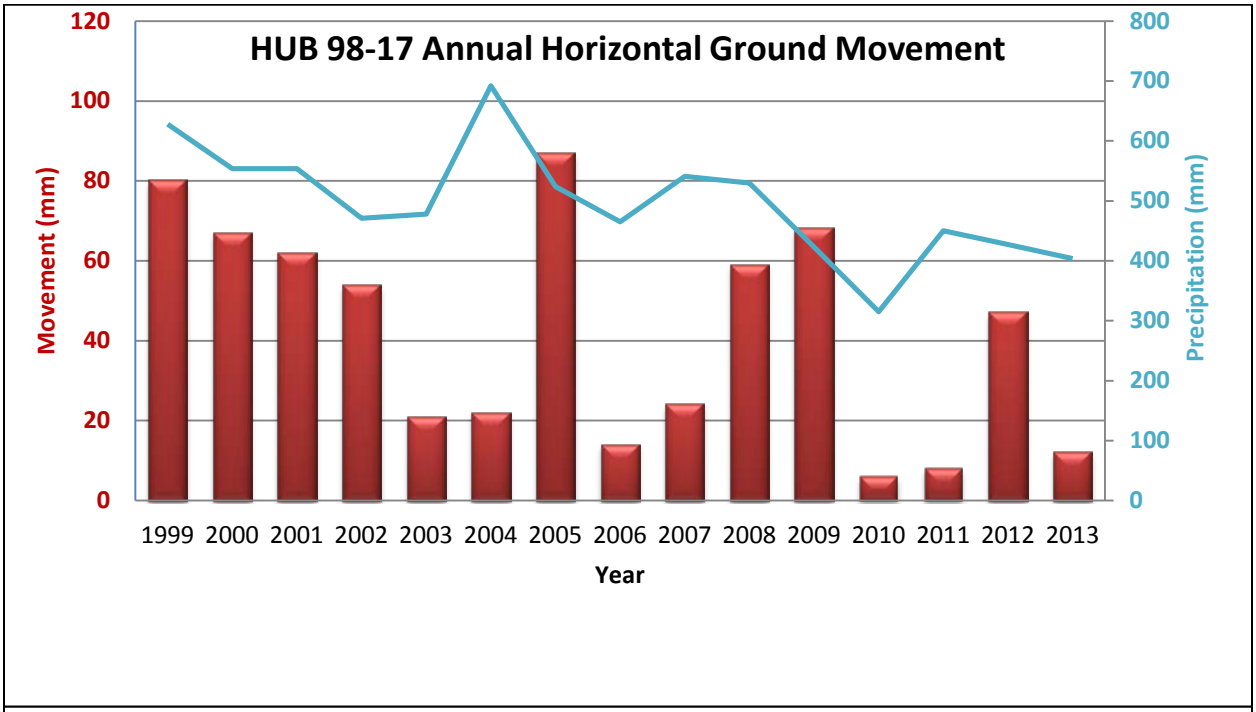
Figure G7 plots groundwater elevation versus ground movement rates (velocity, as determined from horizontal GPS movement data). Peaks in movement rates typically occurred in the late spring. There was a time lag observed between the increase in groundwater levels and the maximum movement rate and this time lag appears relatively consistent (approximately 1.5 to 2 months) within the five years of data plotted. It is important to note that this time lag is not absolute, as the GPS based movement data is collected only quarterly and thus provides only very coarse resolution. In the May 2007 report, AMEC observed that groundwater elevations correlated to slide movement rates. Similar correlations are present in the current data set.

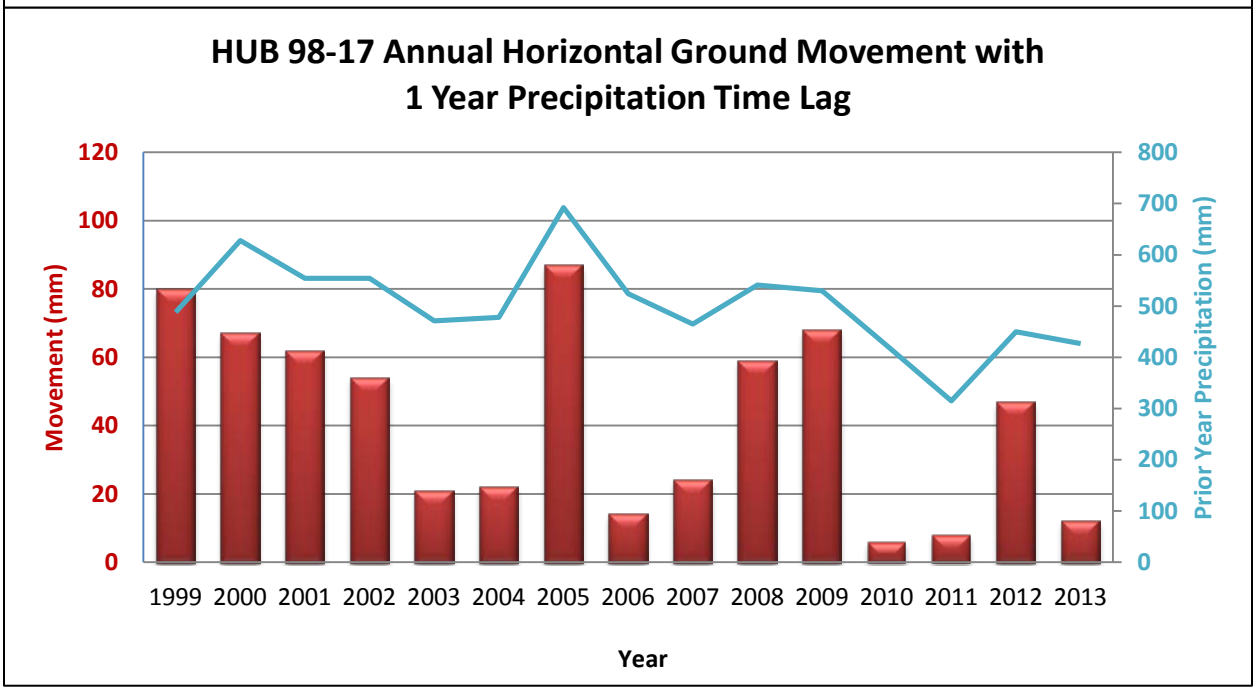
The cumulative ground movement (horizontal movement only) was plotted against groundwater elevation (see Figure G8) using the same piezometer data as in Figure G7. The annual ground movement appears to begin around the same time as the groundwater levels rise (during spring), although the ground movement continues beyond the rise in groundwater levels. As with the previous chart, it is important to note that the time frames are not absolute, as the movement data is collected only quarterly and thus provides only very coarse resolution.

What is apparent from both Figures G7 and G8 is that increased ground movements are strongly correlated with seasonal increases in monitored groundwater levels. The somewhat decreased ground movements observed in 2013 (as compared to the higher movement rate observed in 2012) appear to be attributable to some slightly lower seasonal groundwater pressures experienced in 2012 and early 2013. These lower seasonal groundwater pressures are likely attributed to the total annual precipitation levels being slightly below normal since the end of 2005.

As noted in previous annual reporting there appears to be a time-lag of approximately one year between increased precipitation and increased groundwater pressures and resulting ground movement. Preliminary indications from the data suggest that there is a stronger correlation between the amount of ground movements (and groundwater rises) in any given year with the total precipitation experienced in the period 12 to 24 months prior, rather than with total precipitation experienced in the immediate 12 months prior. Figure G9 (reproduced below from Appendix G) illustrates this time lag effect. For 2013, even though there was a slight fall off in precipitation in the 12 to 24 months preceding, this approximate correlation would predict ground movement rates at or only slightly below the long term average (similar or slightly below those observed in 2012). However, a much reduced amount of movement was actually observed. Although still early, this reduced rate of movement is considered to be attributable to the stabilizing effects (gradual groundwater level drawdown) of the subsurface dewatering program.

Figure G9 - Horizontal Movement Relative to Precipitation





9.0 CLOSURE

This report presents the results of the annual monitoring carried out by AMEC for the 2013 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. AMEC 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 Environment & Infrastructure
A division of AMEC Americas Limited

Reviewed by:

Luke Marquis, EIT
Geotechnical Engineer

D.S. Cavers, M.Eng., P.Eng., P.Geo.
Principal Engineer

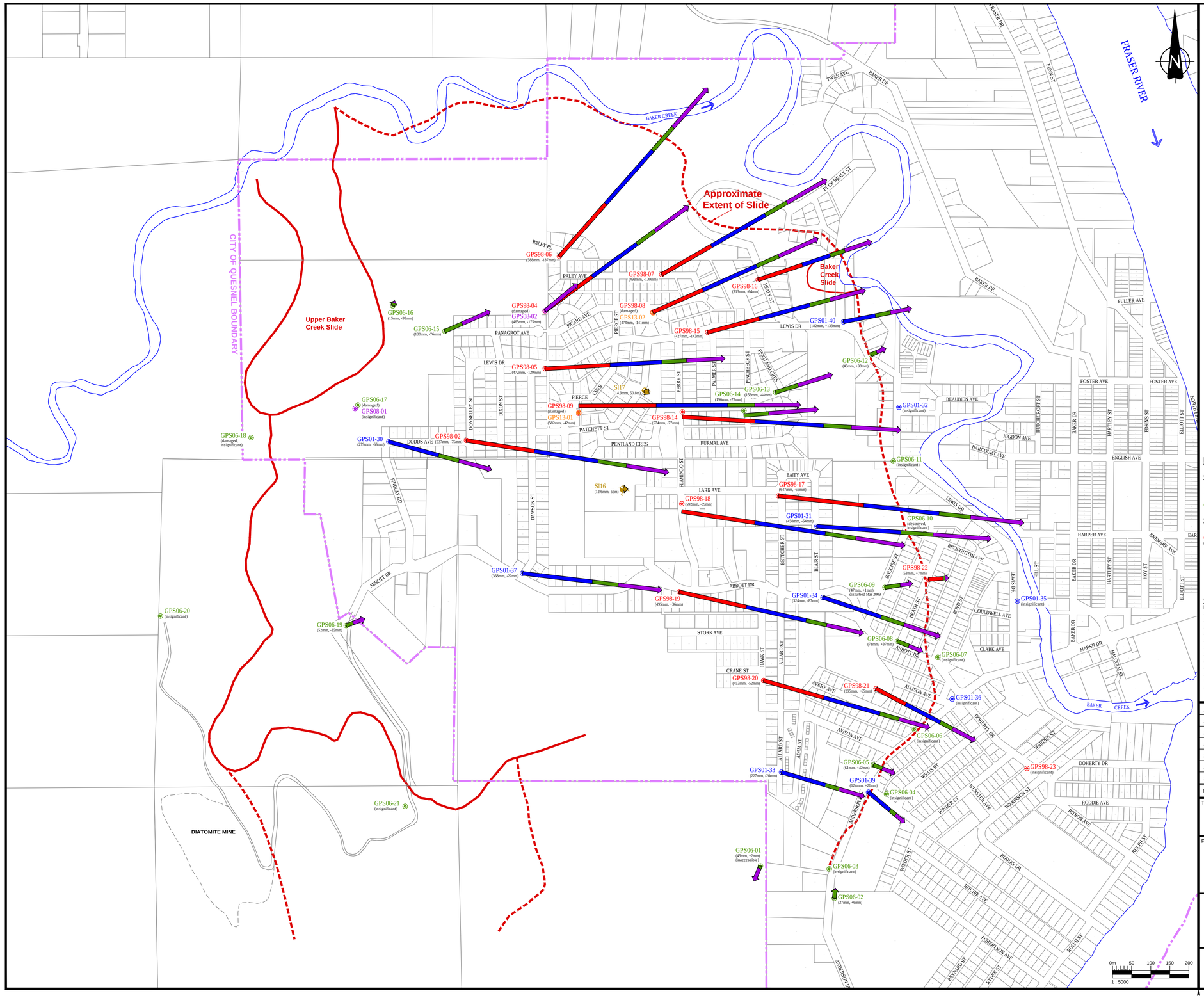
Dmitri Ostritchenko, EIT
Geotechnical Engineer

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
N. C. POLYSOU
12974
11/Mar/2014

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 2013
Figure 3 Total Horizontal Movement, December 2001 to December 2013
Figure 4 Total Horizontal Movement, November 2006 to December 2013
Figure 5 Total Vertical Movement, November 2006 to December 2013
Figure 6 Total 3D Movement, November 2006 to December 2013
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 Site Plan with Piezometers, Pumping Wells and Horizontal Drains



Legend

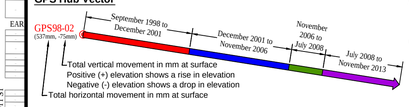
GPS Hubs Installed

GPS98-02 ◉ September 1998
GPS01-30 ◉ December 2001
GPS06-01 ◉ November 2006
GPS08-01 ◉ June 2008
GPS13-01 ◉ November 2013

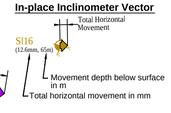
In-place Inclinometer Initialized

SI16 (12.6mm, 65m) (September 20, 2012)
SI17 (14.9mm, 50.8m) (October 16, 2013)

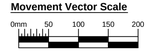
GPS Hub Vector



In-place Inclinometer Vector



Movement Vector Scale



GPS Monitoring Dates

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

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	CAD	APPR.
G	25	02	2014	UPDATED TO NOV 2013 DATA	BB	LM
F	04	01	2013	UPDATED TO DEC 2012 DATA	BB	LM
E	22	12	2011	UPDATED TO NOV 2011 DATA	BB	HC
D	07	12	2010	UPDATED TO NOV 2010 DATA	SR	HC
C	08	12	2009	UPDATED TO NOV 2009 DATA	SR	HC
B	13	01	2009	UPDATED TO NOV 2008 DATA	JF	HC
A	04	05	2007	ISSUED DRAFT	SR	NP

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

PROJECT:
WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

West Quesnel
Land Stability Program

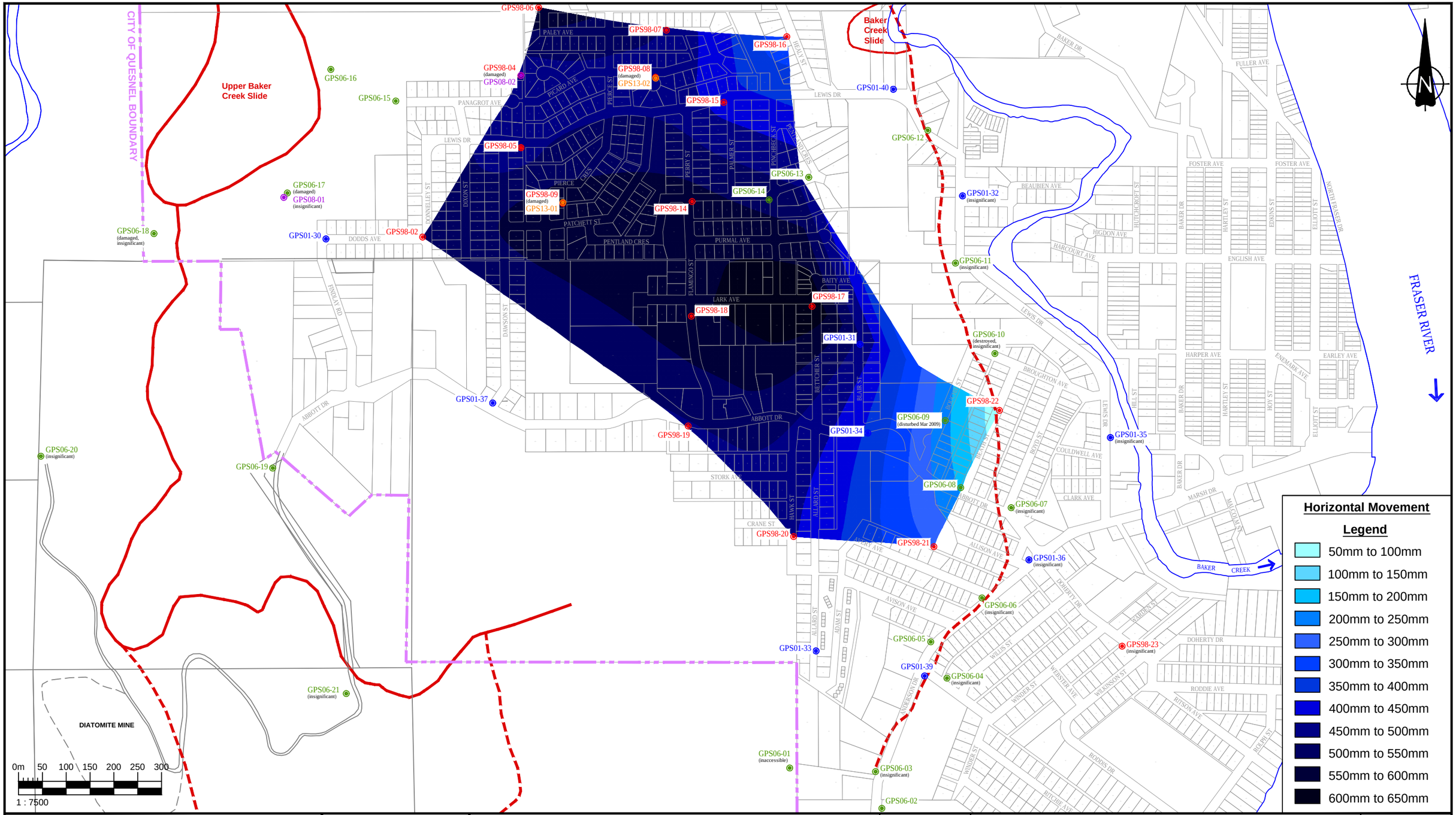
CITY OF QUESNEL

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

PROJECT NO.: KX04397
REVISION NO.: G
DATE: February 2014
FIGURE NO.: FIGURE 1
SHEET NO.: 1 of 1
DATUM: NAD83
PROJECTION: UTM Zone 10
DRAWN BY: BB
REVIEWED BY: LM
ORIGINAL SCALE: 1:5000

This drawing was originally produced in colour.

S:\Admin\KX04397-WQLS-GEN_KX04397\$\KX04397$.Project\Summary\Plan\SlopeMovement\mxd\2013.mxd, Figure1, Date: Apr 28, 2014, 8:40am, John Brown



West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC 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

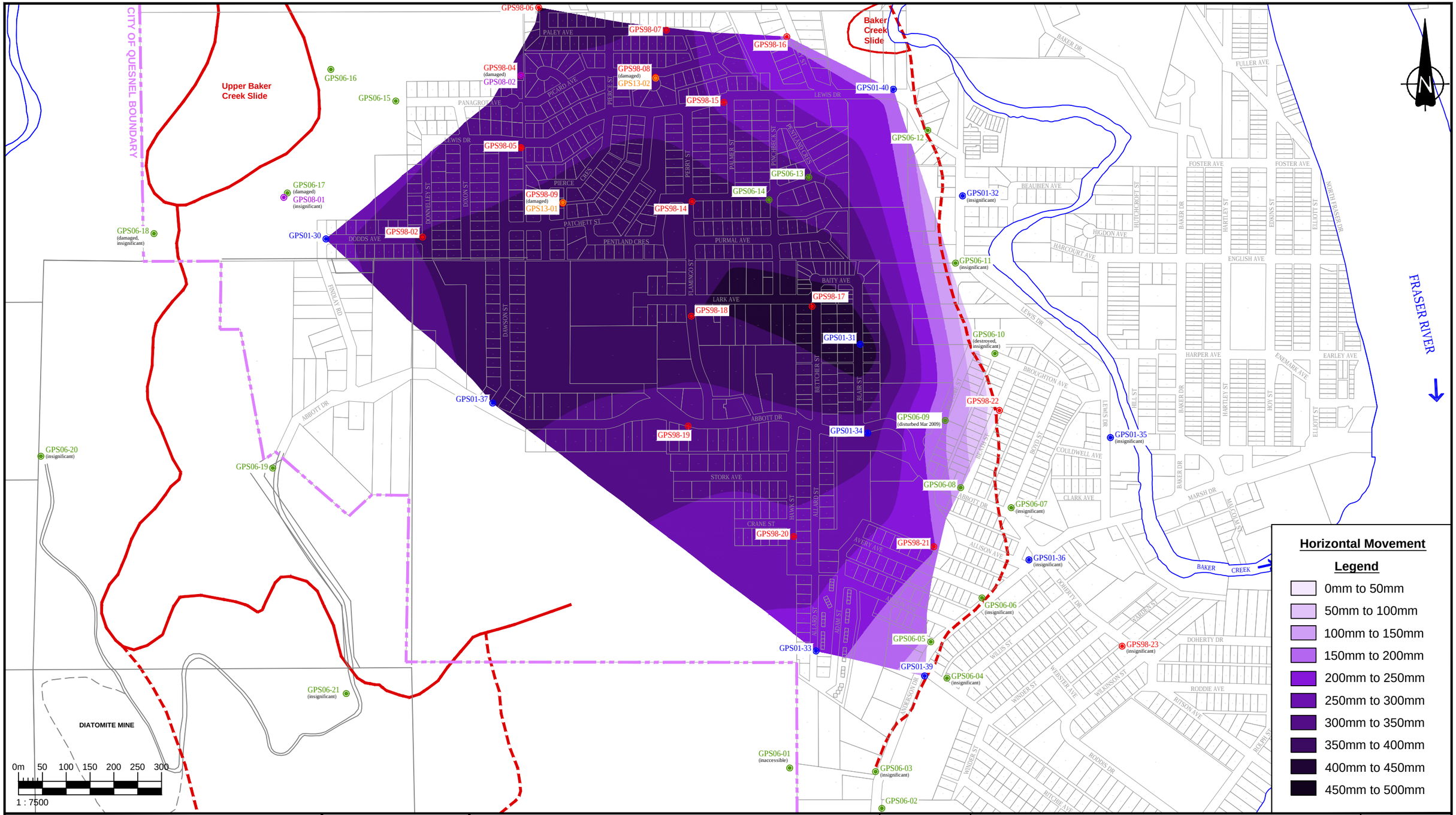
TITLE: TOTAL HORIZONTAL MOVEMENT SEPTEMBER 1998 TO NOVEMBER 2013 FOR THE 1998 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM QUESNEL, BC

DATE: February 2014
PROJECT NO: KX04397
REV. NO.: A
FIGURE No. FIGURE 2

S:\Internal\KX04397-WQLS-GIS\0_KX0439739.6\KX04397-Figure02-H.MOVE-Sept98-Nov13-98hubs.dwg - Figure2 - Feb. 19, 2014 3:55pm - ben.brown

This drawing was originally produced in colour.



West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC 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

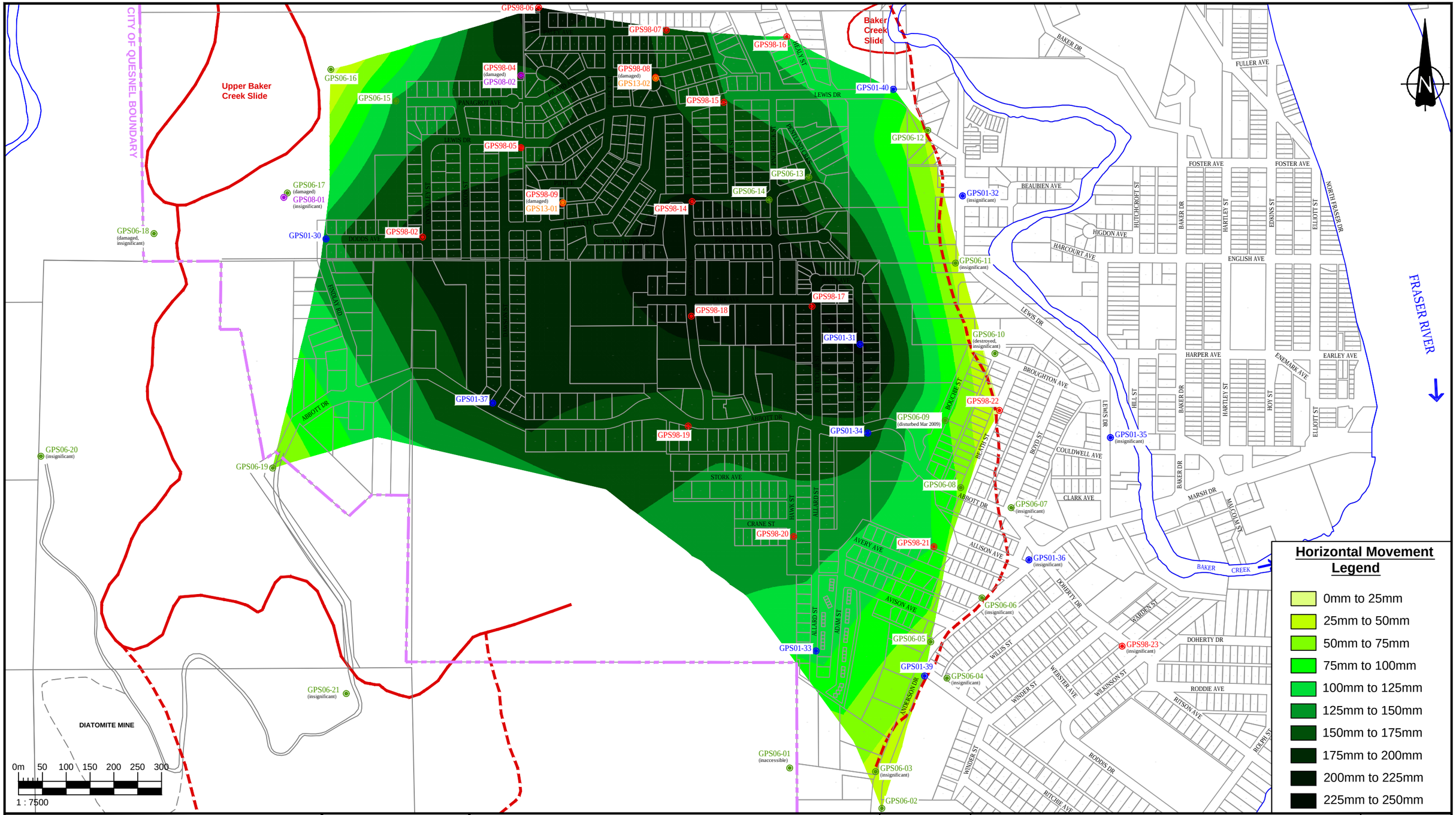
TITLE: TOTAL HORIZONTAL MOVEMENT DECEMBER 2001 TO NOVEMBER 2013 FOR THE 1998 AND 2001 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM QUESNEL, BC

DATE: February 2014
PROJECT NO: KX04397
REV. NO.: A
FIGURE No. FIGURE 3

C:\Users\ben.brown\appdata\local\temp\AcPublish_4916\KX04397-Figure03-H.MOVE-Dec01-Nov13-98.01hubs.dwg - Figure3 - Feb. 19, 2014 4:15pm - ben.brown

This drawing was originally produced in colour.



West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC 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

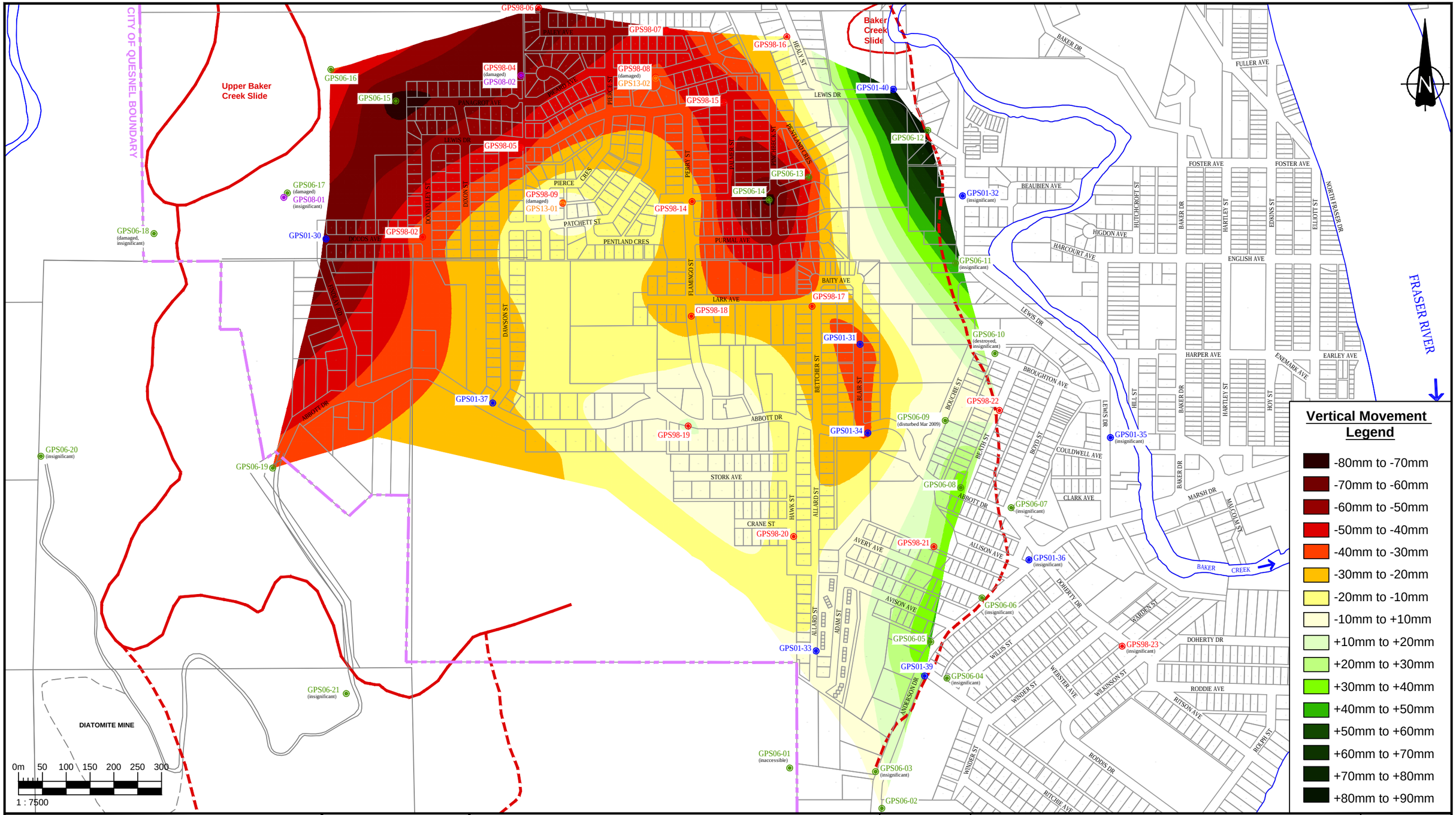
TITLE: TOTAL HORIZONTAL MOVEMENT NOVEMBER 2006 TO NOVEMBER 2013 FOR THE 1998, 2001 AND 2006 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM QUESNEL, BC

DATE:	February 2014
PROJECT NO:	KX04397
REV. NO.:	A
FIGURE No.	FIGURE 4

S:\Internal\KX04397-WQLS-GIS\0_KX0439739.6\KX04397-Figure04-H.MOVE-Nov06-Nov13-allhubs.dwg - Figure4 - Feb. 19, 2014 4:28pm - ben.brown

This drawing was originally produced in colour.



Vertical Movement Legend

- -80mm to -70mm
- -70mm to -60mm
- -60mm to -50mm
- -50mm to -40mm
- -40mm to -30mm
- -30mm to -20mm
- -20mm to -10mm
- -10mm to +10mm
- +10mm to +20mm
- +20mm to +30mm
- +30mm to +40mm
- +40mm to +50mm
- +50mm to +60mm
- +60mm to +70mm
- +70mm to +80mm
- +80mm to +90mm

West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC 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

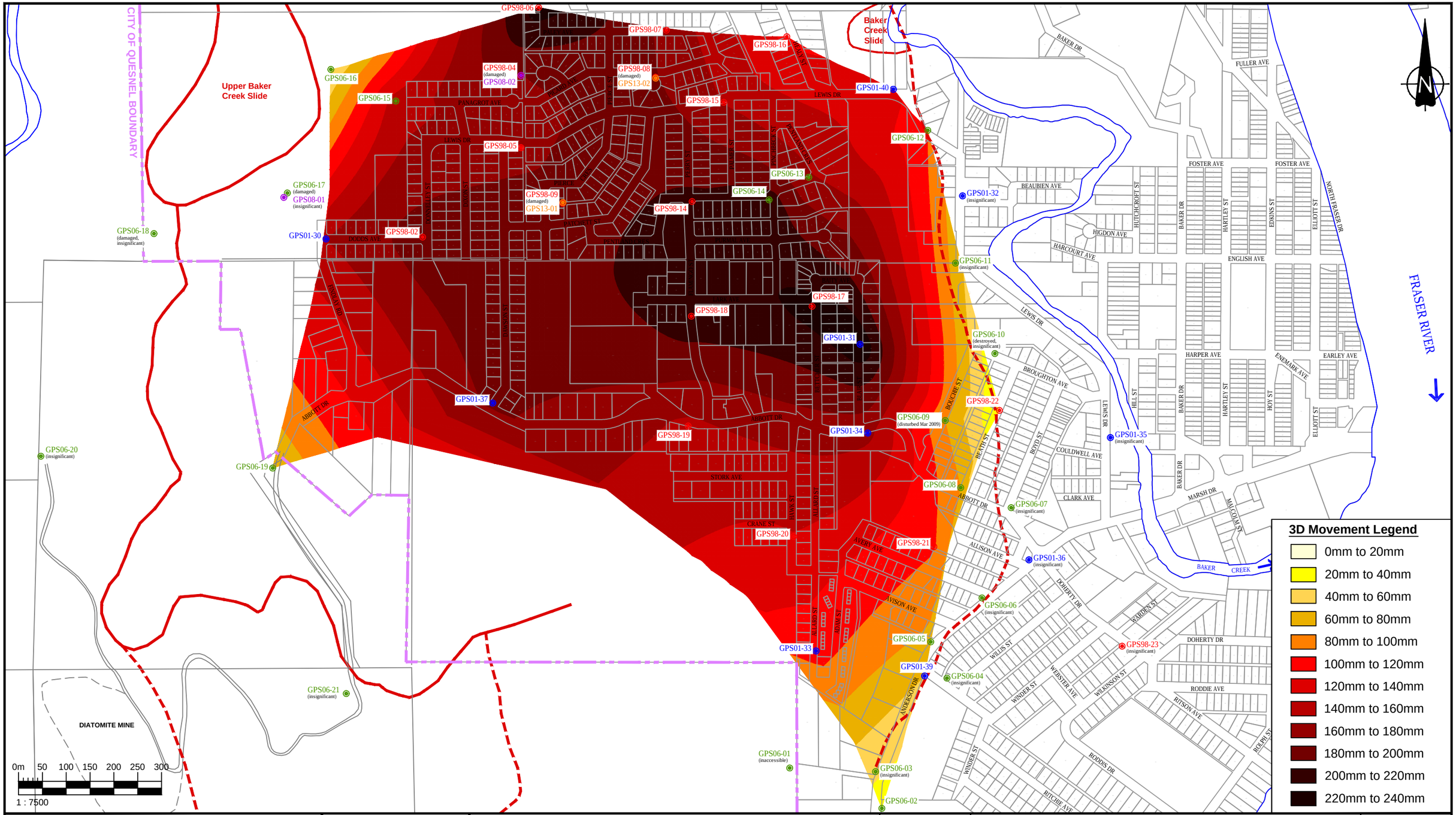
TITLE: TOTAL VERTICAL MOVEMENT NOVEMBER 2006 TO NOVEMBER 2013 FOR THE 1998, 2001 AND 2006 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM QUESNEL, BC

DATE:	February 2014
PROJECT NO:	KX04397
REV. NO.:	A
FIGURE No.	FIGURE 5

C:\Users\ben.brown\appdata\local\temp\AcPublish_5924\KX04397-Figure05-V.MOVE-Nov06-Nov13-allhubs.dwg - Figure5 - Feb. 20, 2014 8:11am - ben.brown

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

West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC 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

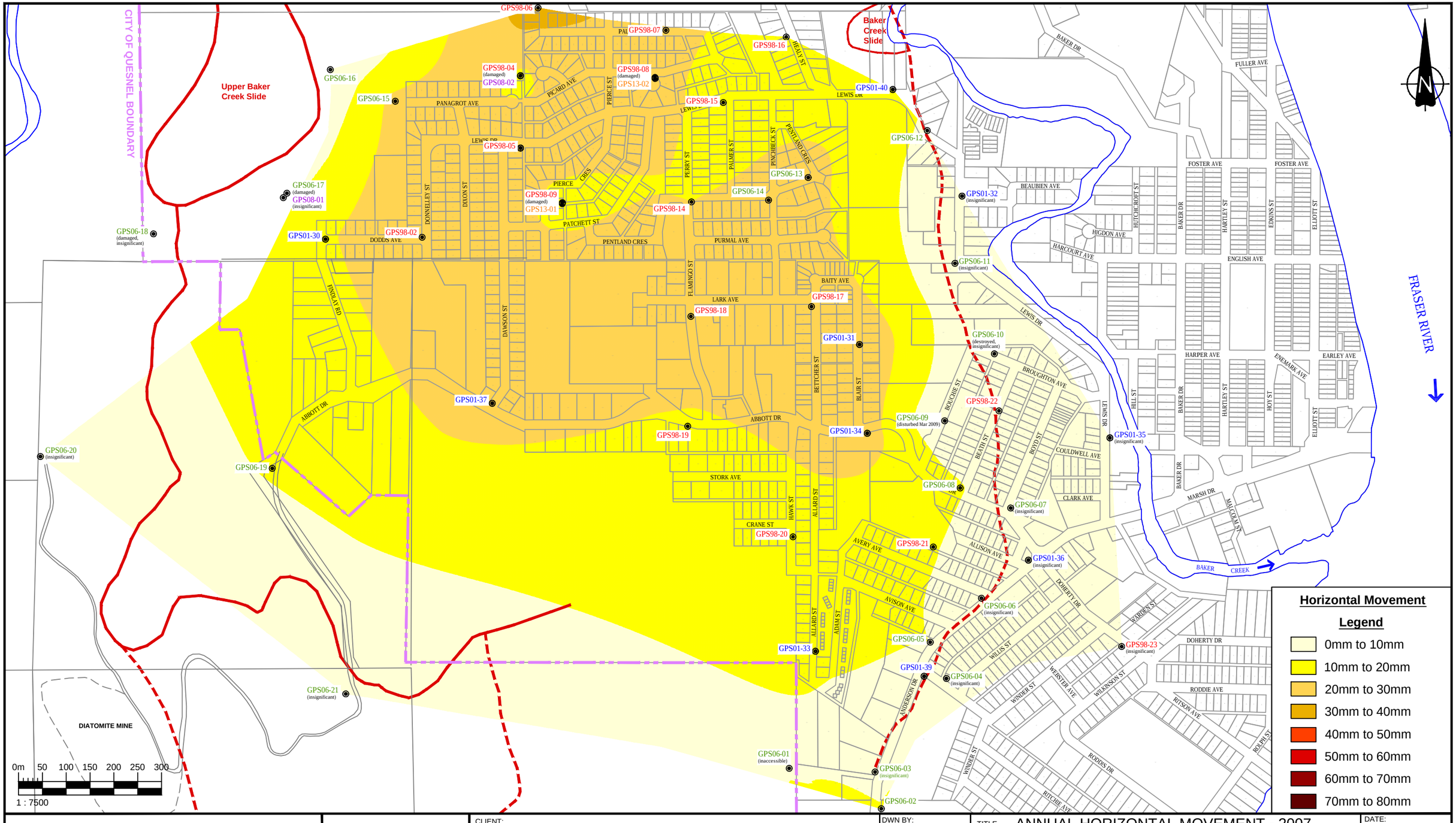
TITLE: TOTAL 3D MOVEMENT
NOVEMBER 2006 TO NOVEMBER 2013
FOR THE 1998, 2001 AND 2006 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	February 2014
PROJECT NO:	KX04397
REV. NO.:	A
FIGURE No.	FIGURE 6

C:\Users\ben.brown\appdata\local\temp\AcPublish_5924\KX04397-Figure06-3D.MOVE-Nov06-Nov13-allhubs.dwg - Figure6 - Feb. 20, 2014 8:57am - ben.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

West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC 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

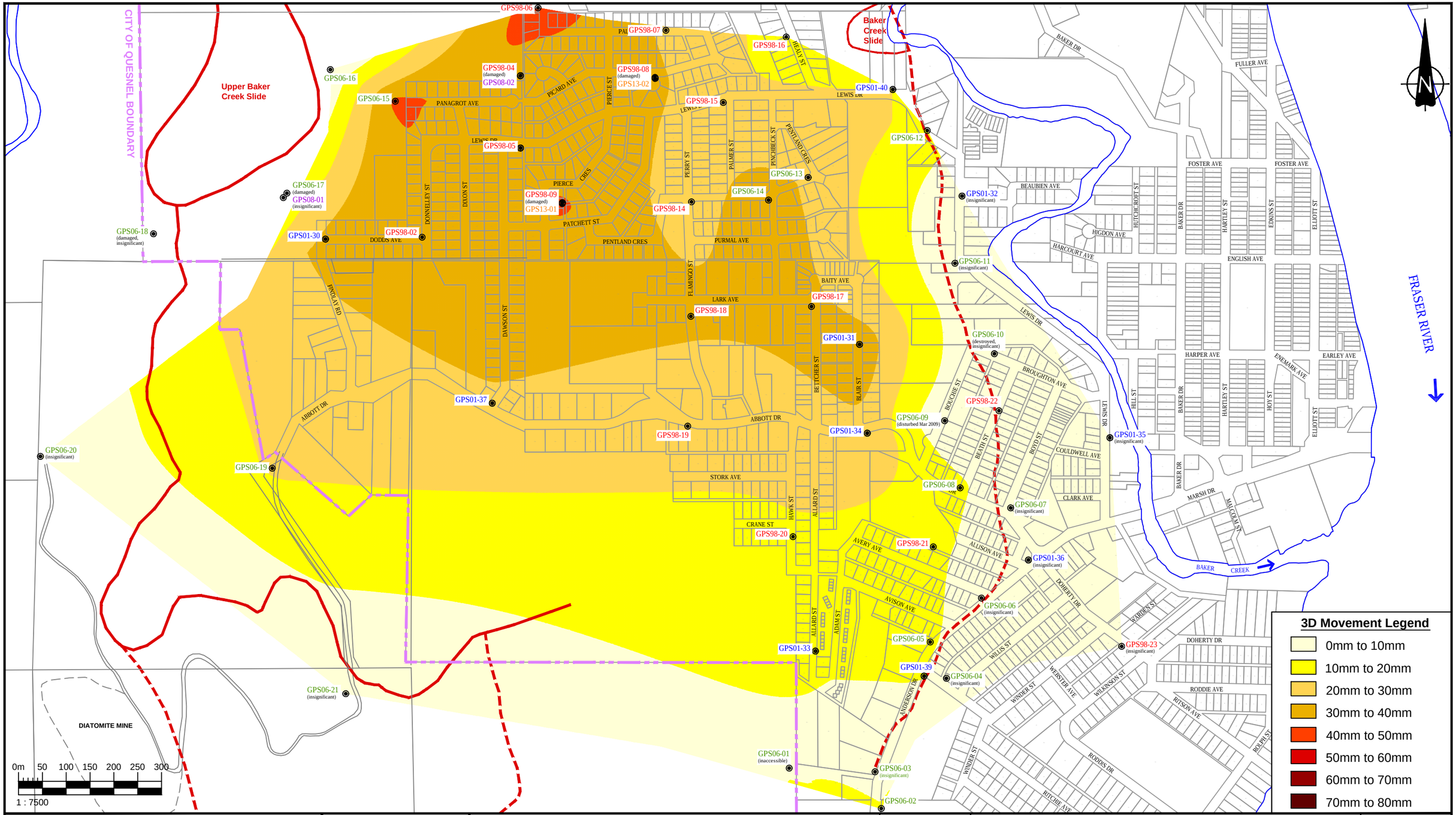
TITLE: ANNUAL HORIZONTAL MOVEMENT - 2007
NOVEMBER 2006 TO DECEMBER 2007
FOR THE 1998, 2001 AND 2006 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	February 2014
PROJECT NO:	KX04397
REV. NO.:	A
FIGURE No.	FIGURE 7

S:\Internal\KX04397-WQLS-GIS\0_KX0439739.6\KX04397-Figure07-H,MOVE-Nov06-Dec07-allhubs.dwg - Figure7 - Feb. 13, 2014 2:30pm - ben.brown

This drawing was originally produced in colour.



West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC 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

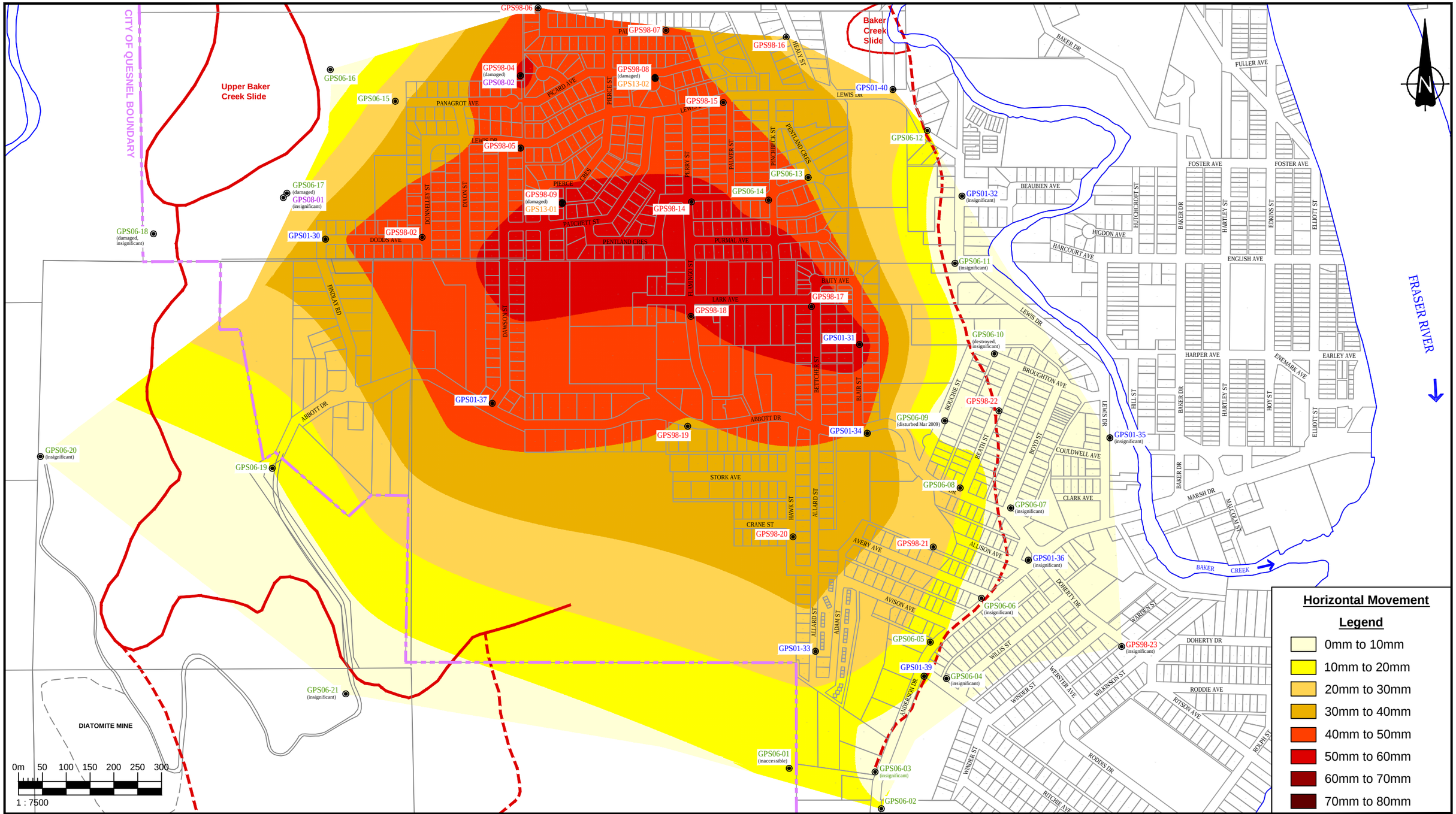
TITLE: ANNUAL 3D MOVEMENT - 2007
NOVEMBER 2006 TO DECEMBER 2007
FOR THE 1998, 2001 AND 2006 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	February 2014
PROJECT NO:	KX04397
REV. NO.:	A
FIGURE No.	FIGURE 8

C:\Users\ben.brown\appdata\local\temp\AcPublish_3344\KX04397-Figure08-3D.MOVE-Nov06-Dec07-allhubs.dwg - Figure8 - Feb. 13, 2014 2:34pm - ben.brown

This drawing was originally produced in colour.



West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC 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

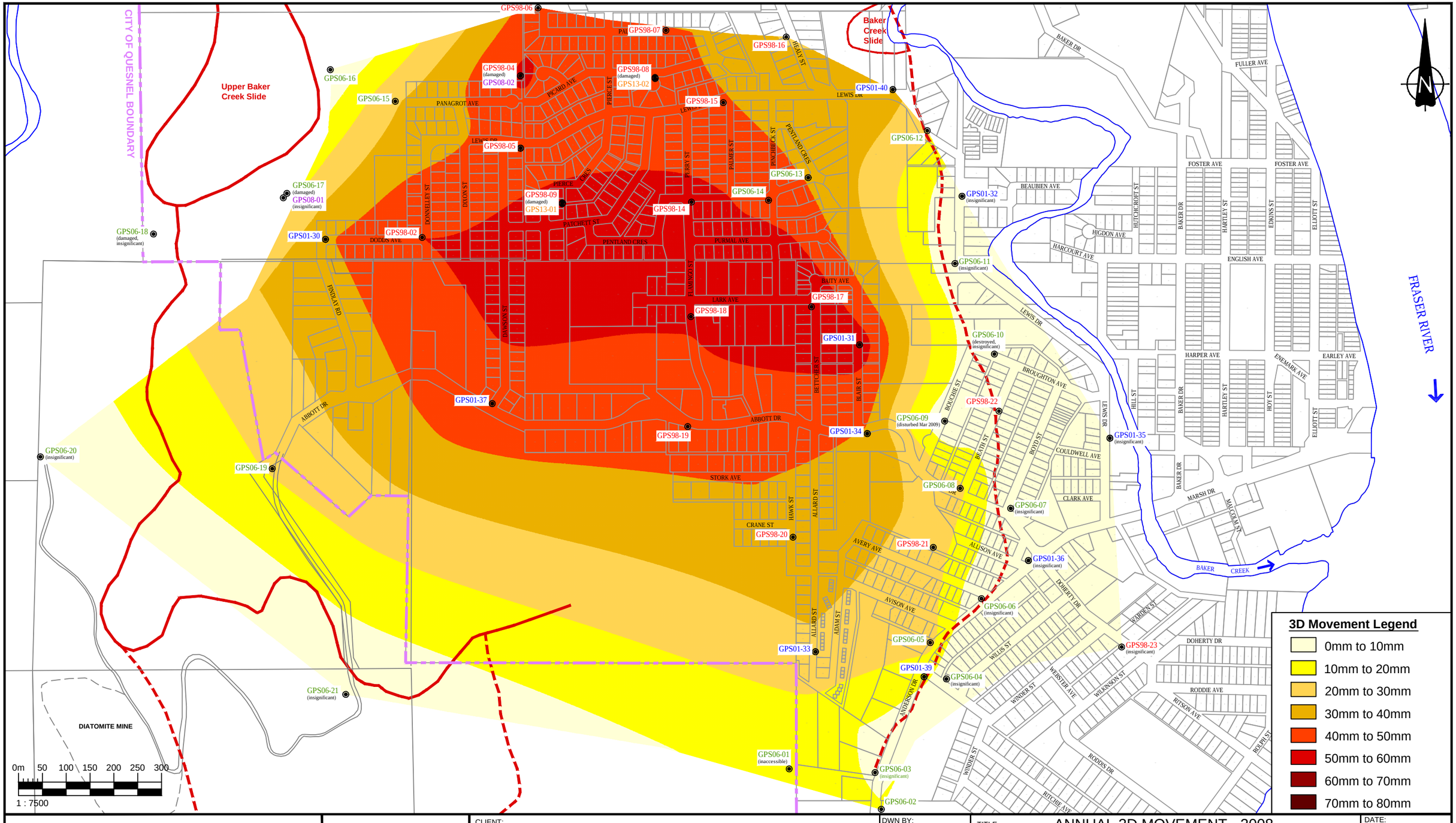
TITLE: ANNUAL HORIZONTAL MOVEMENT - 2008
DECEMBER 2007 TO NOVEMBER 2008
FOR THE 1998, 2001 AND 2006 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE: February 2014
PROJECT NO: KX04397
REV. NO.: A
FIGURE No. FIGURE 9

S:\Internal\KX04397-WQLS-GIS\0_KX0439739.6\KX04397-Figure09-H.MOVE-Dec07-Nov08-allhubs.dwg - Figure9 - Feb. 13, 2014 2:38pm - ben.brown

This drawing was originally produced in colour.



West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC 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

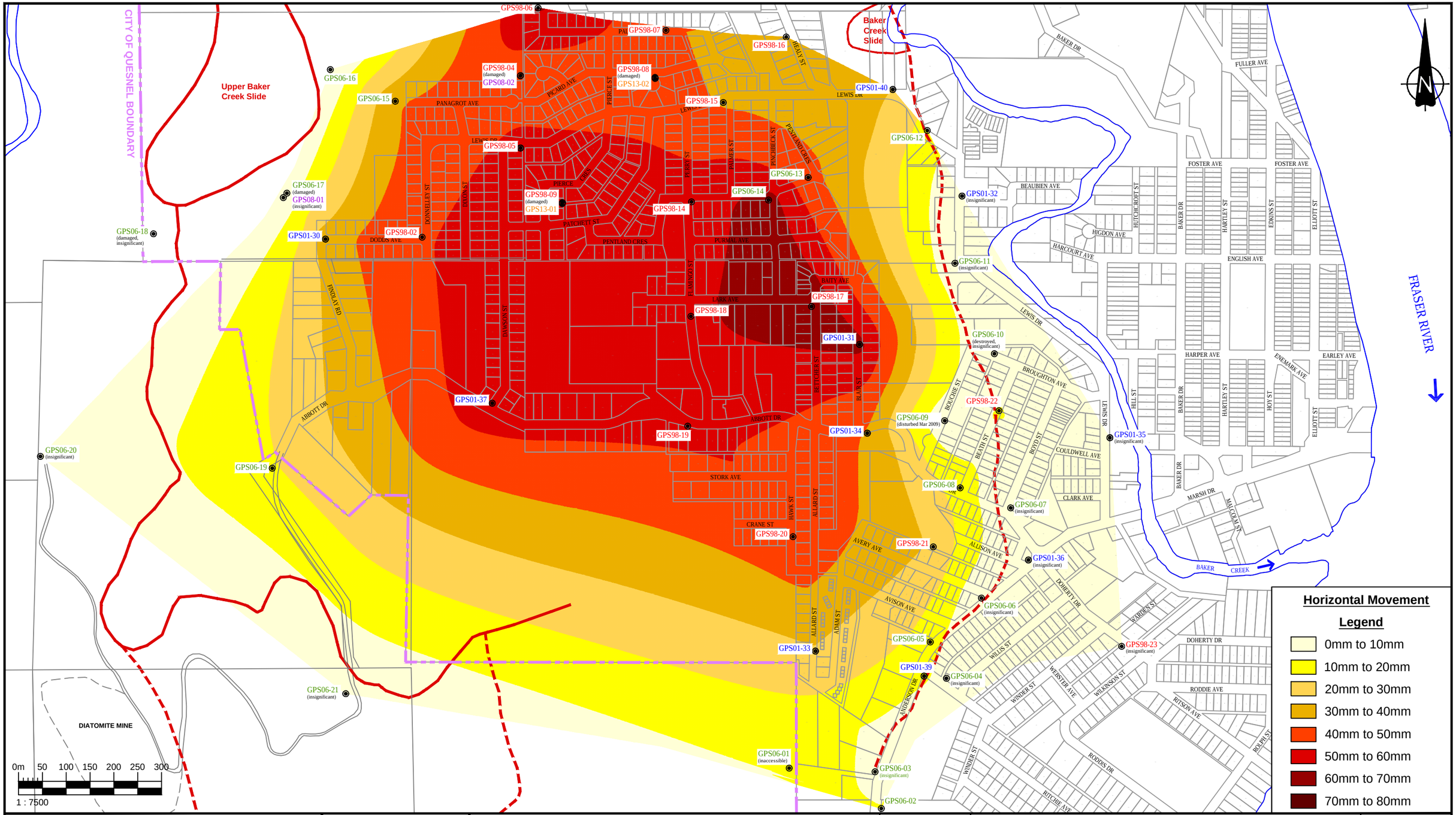
TITLE: ANNUAL 3D MOVEMENT - 2008
DECEMBER 2007 TO NOVEMBER 2008
FOR THE 1998, 2001 AND 2006 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	February 2014
PROJECT NO:	KX04397
REV. NO.:	A
FIGURE No.	FIGURE 10

C:\Users\ben.brown\appdata\local\temp\AcPublish_3344\KX04397-Figure10-3D_MOVE-Dec07-Nov08-allhubs.dwg - Figure10 - Feb. 13, 2014 2:42pm - ben.brown

This drawing was originally produced in colour.



West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC 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

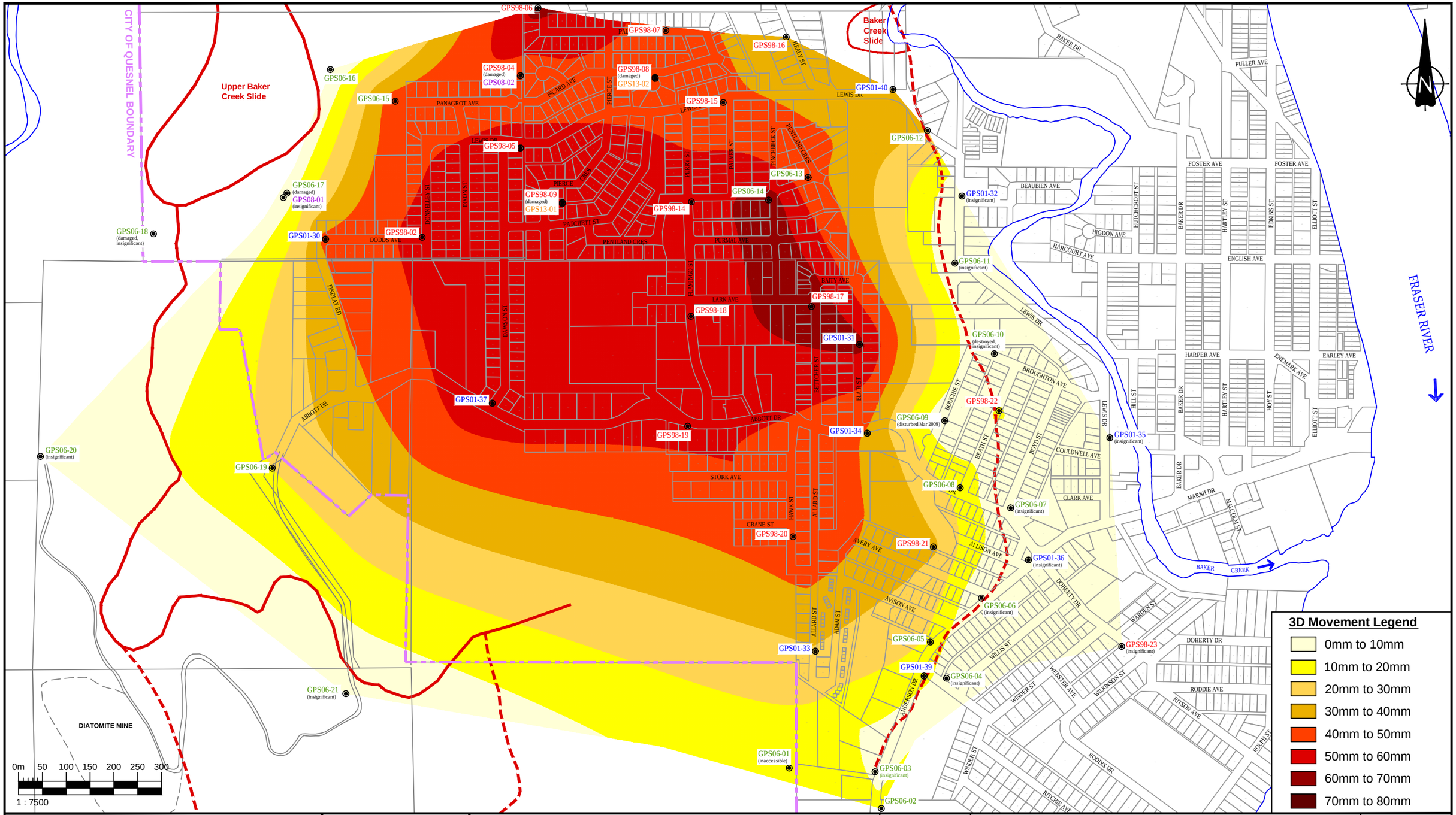
TITLE: ANNUAL HORIZONTAL MOVEMENT - 2009
NOVEMBER 2008 TO NOVEMBER 2009
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE: February 2014
PROJECT NO: KX04397
REV. NO.: A
FIGURE No. FIGURE 11

S:\Internal\KX04397-WQLS-GIS\0_KX0439739.6\KX04397-Figure11-H.MOVE-Nov08-Nov09-allhubs.dwg - Figure11 - Feb. 13, 2014 2:53pm - ben.brown

This drawing was originally produced in colour.



West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC 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

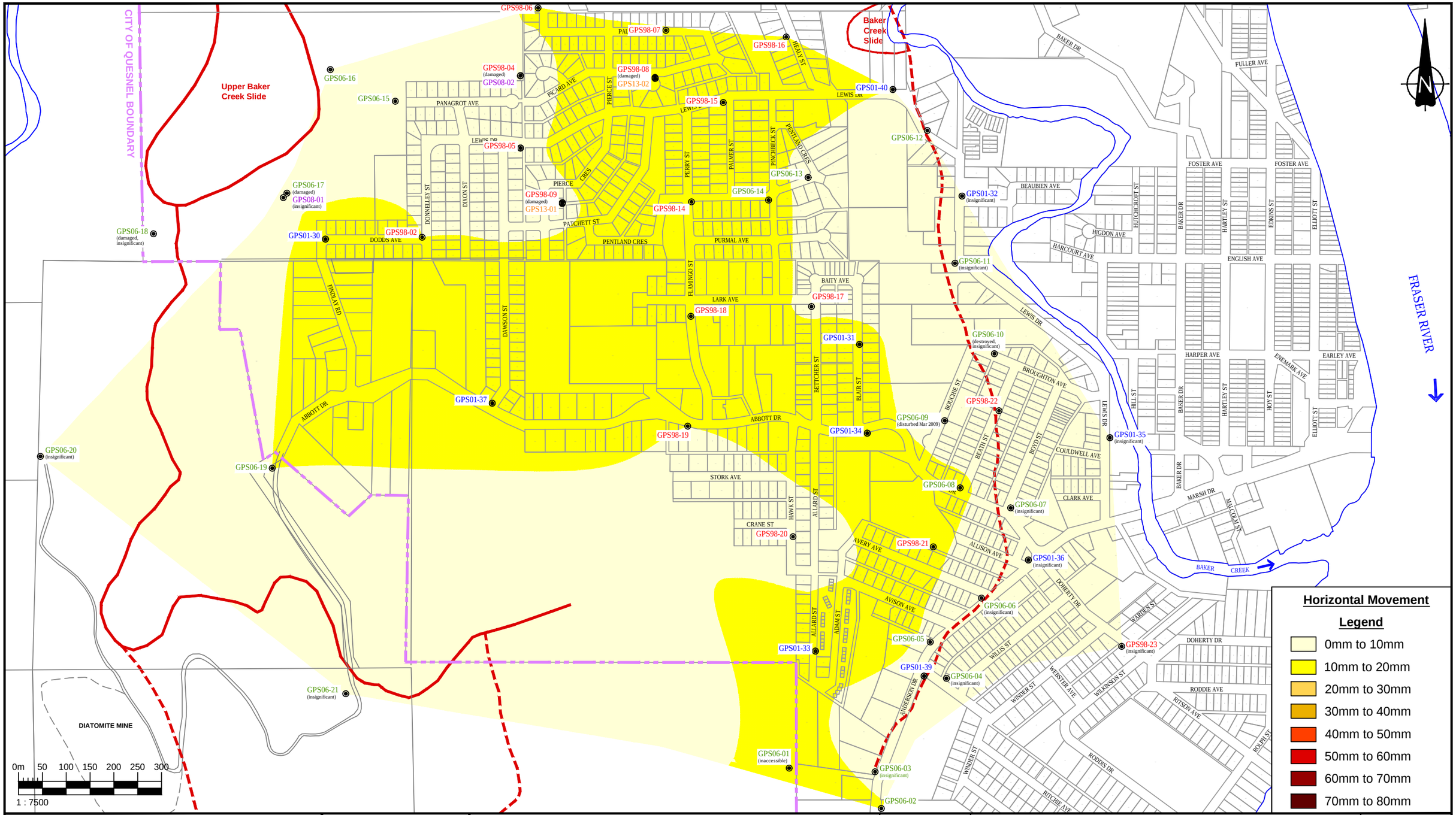
TITLE: ANNUAL 3D MOVEMENT - 2009
NOVEMBER 2008 TO NOVEMBER 2009
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE: February 2014
PROJECT NO: KX04397
REV. NO.: A
FIGURE No. FIGURE 12

S:\Internal\KX04397-WQLS-GIS\0_KX0439739.6\KX04397-Figure12-3D_MOVE-Nov08-Nov09-allhubs.dwg - Figure12 - Feb. 13, 2014 2:57pm - ben.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

West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC 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

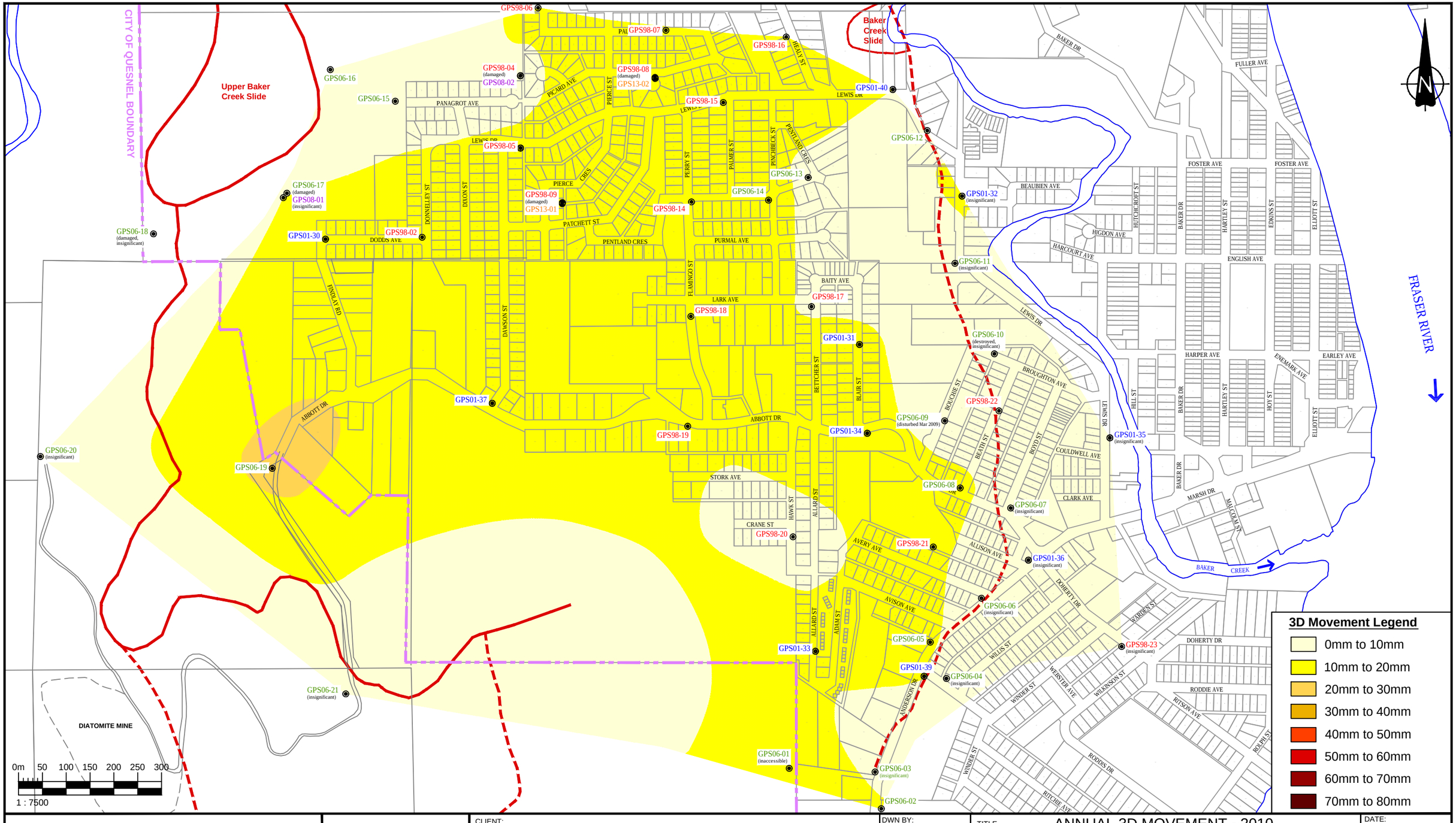
TITLE: ANNUAL HORIZONTAL MOVEMENT - 2010
NOVEMBER 2009 TO NOVEMBER 2010
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE: February 2014
PROJECT NO: KX04397
REV. NO.: A
FIGURE No. FIGURE 13

C:\Users\ben.brown\appdata\local\temp\AcPublish_3344\KX04397-Figure13-H.MOVE-Nov09-Nov10-allhubs.dwg - Figure13 - Feb. 13, 2014 3:01pm - ben.brown

This drawing was originally produced in colour.



West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC 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

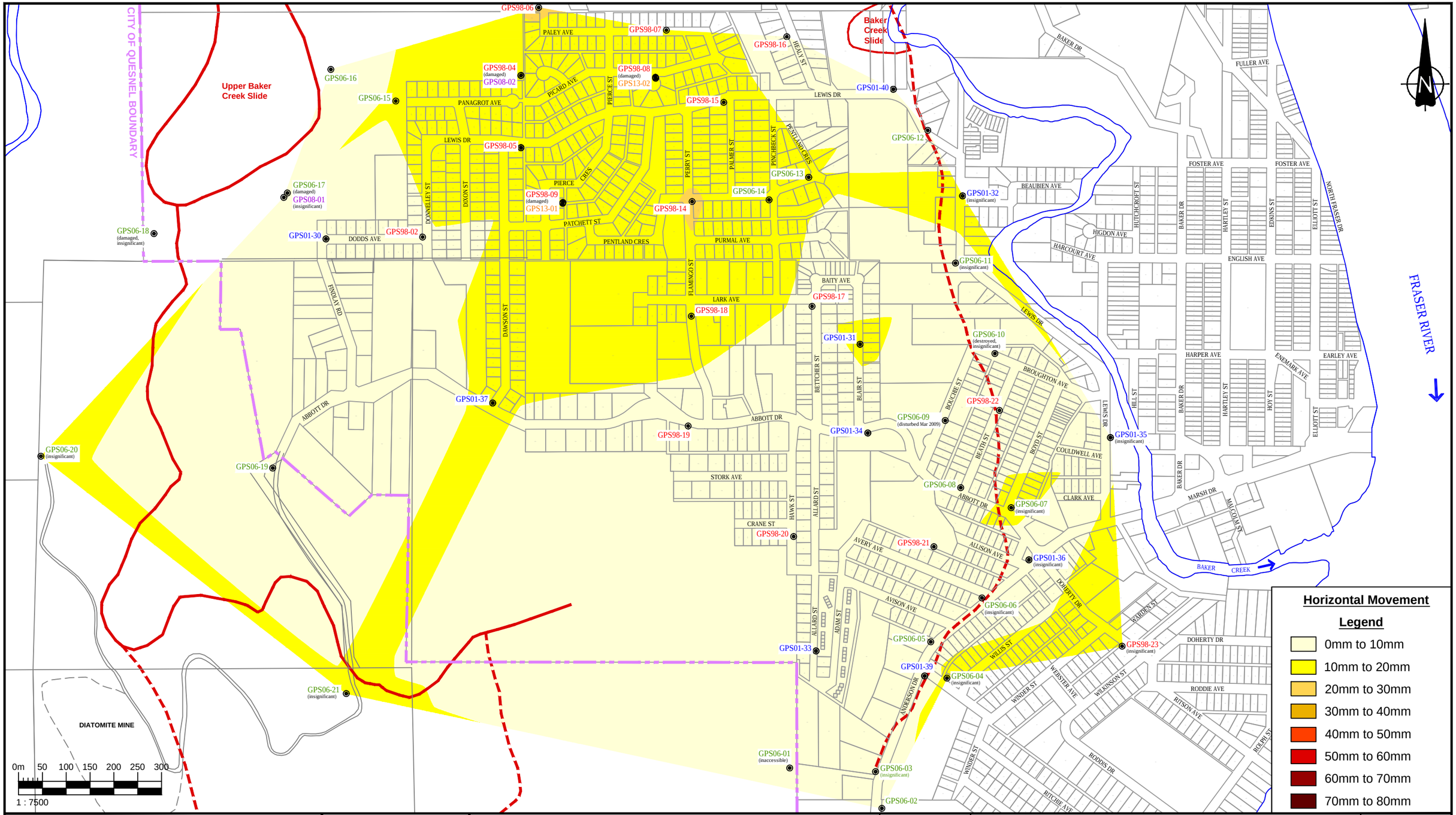
TITLE: ANNUAL 3D MOVEMENT - 2010
NOVEMBER 2009 TO NOVEMBER 2010
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	February 2014
PROJECT NO:	KX04397
REV. NO.:	A
FIGURE No.	FIGURE 14

S:\Internal\KX04397-WQLS-GIS\0_KX0439739.6\KX04397-Figure14-3D_MOVE-Nov09-Nov10-allhubs.dwg - Figure14 - Feb. 13, 2014 3:04pm - ben.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

West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC 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

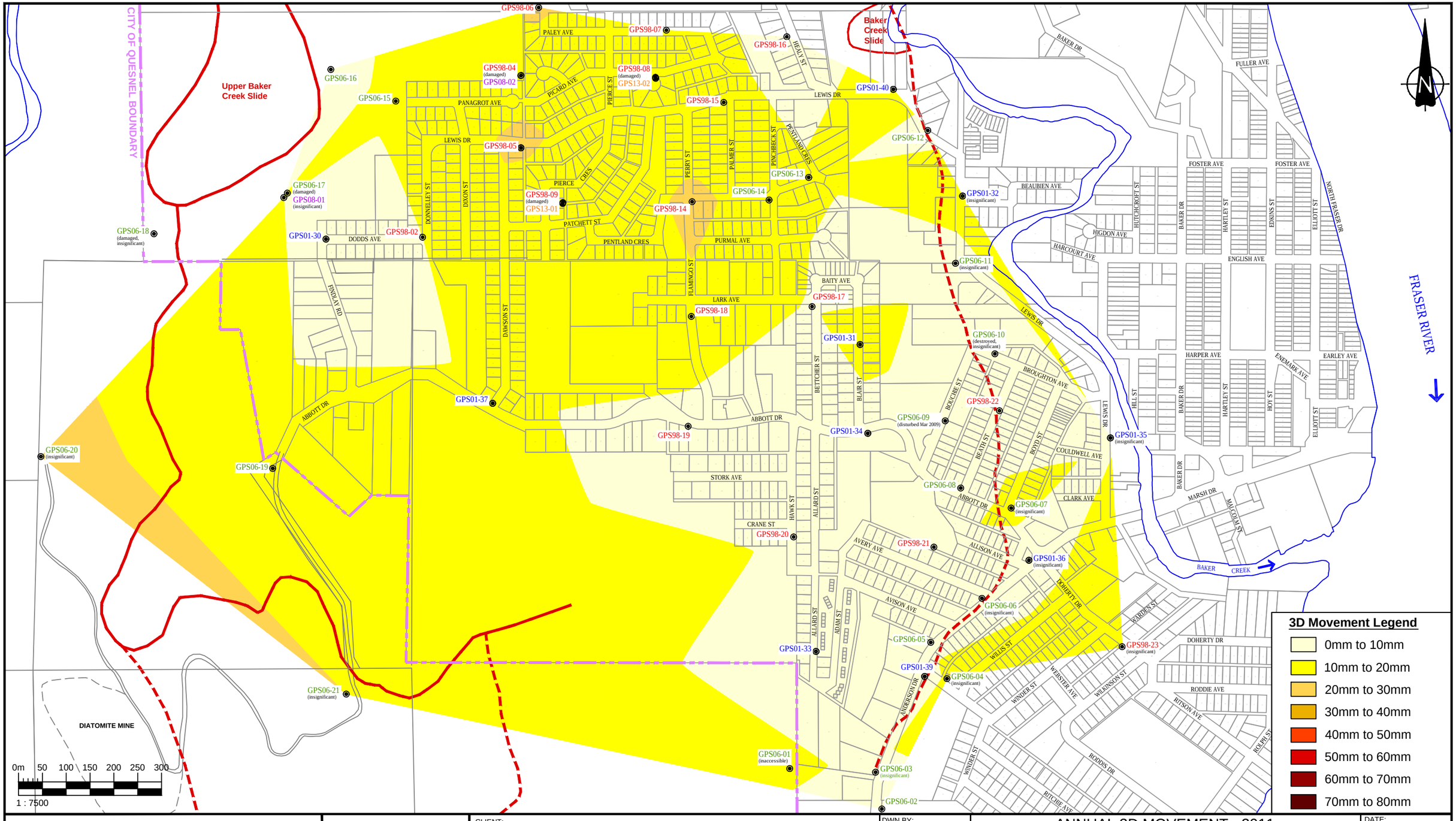
TITLE: ANNUAL HORIZONTAL MOVEMENT - 2011
NOVEMBER 2010 TO NOVEMBER 2011
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE: February 2014
PROJECT NO: KX04397
REV. NO.: A
FIGURE No. FIGURE 15

C:\Users\ben.brown\appdata\local\temp\AcPublish_3344\KX04397-Figure15-H.MOVE-Nov10-Nov11-allhubs.dwg - Figure15 - Feb. 13, 2014 3:07pm - ben.brown

This drawing was originally produced in colour.



West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC 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

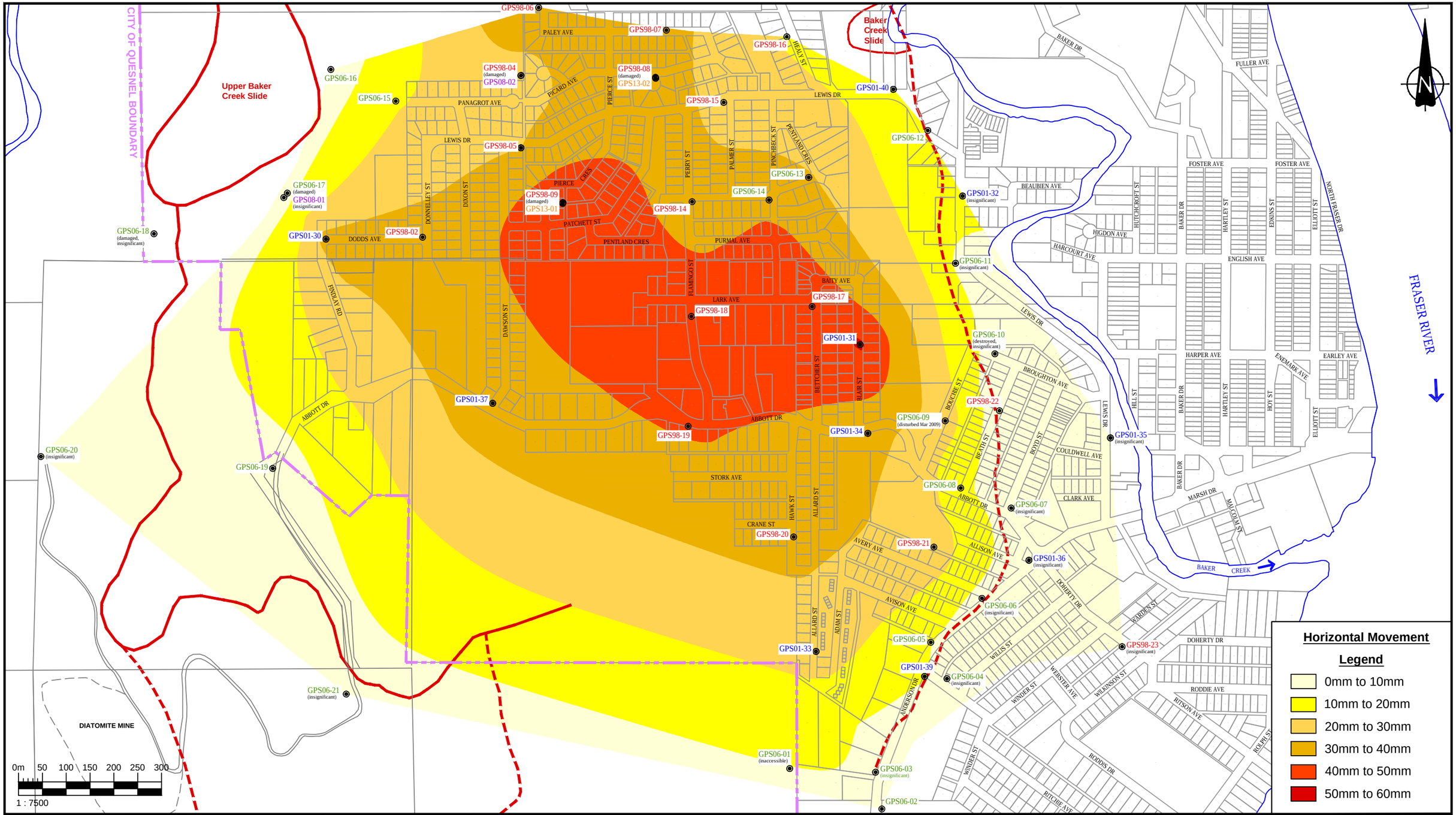
TITLE: ANNUAL 3D MOVEMENT - 2011
NOVEMBER 2010 TO NOVEMBER 2011
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	February 2014
PROJECT NO:	KX04397
REV. NO.:	A
FIGURE No.	FIGURE 16

S:\Internal\KX04397-WQLS-GIS\0_KX0439739,6\KX04397-Figure16-3D_MOVE-Nov10-Nov11-allhubs.dwg - Figure16 - Feb. 13, 2014 3:12pm - ben.brown

This drawing was originally produced in colour.



West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC 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

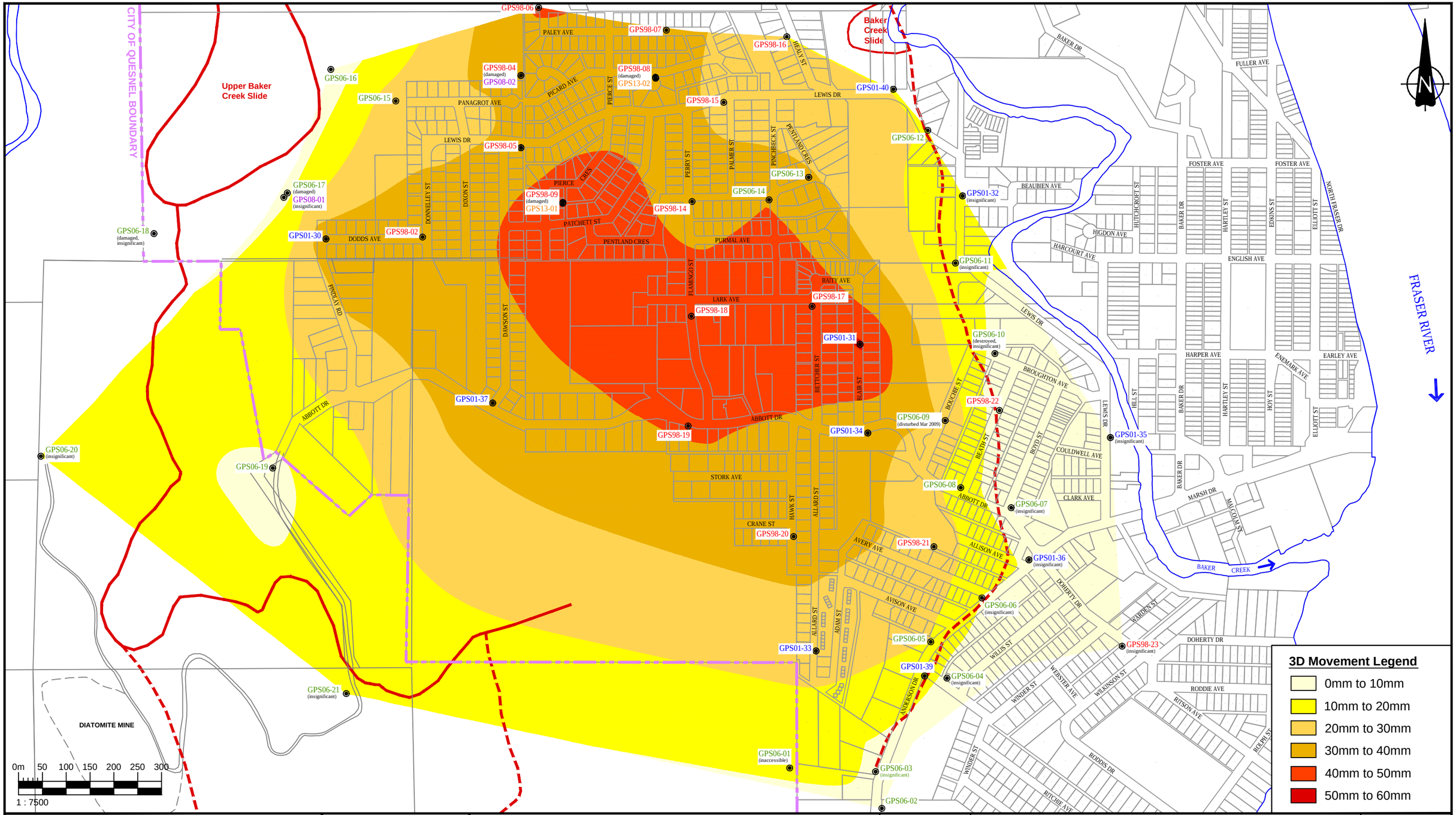
TITLE: ANNUAL HORIZONTAL MOVEMENT - 2012
NOVEMBER 2011 TO DECEMBER 2012
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	February 2014
PROJECT NO:	KX04397
REV. NO.:	A
FIGURE No.	FIGURE 17

S:\Internal\KX04397-WQLS-GIS\0_KX0439739.6\KX04397-Figure17-H.MOVE-Nov11-Dec12-allhubs.dwg - Figure17 - Feb. 13, 2014 3:15pm - ben.brown

This drawing was originally produced in colour.



West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC 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

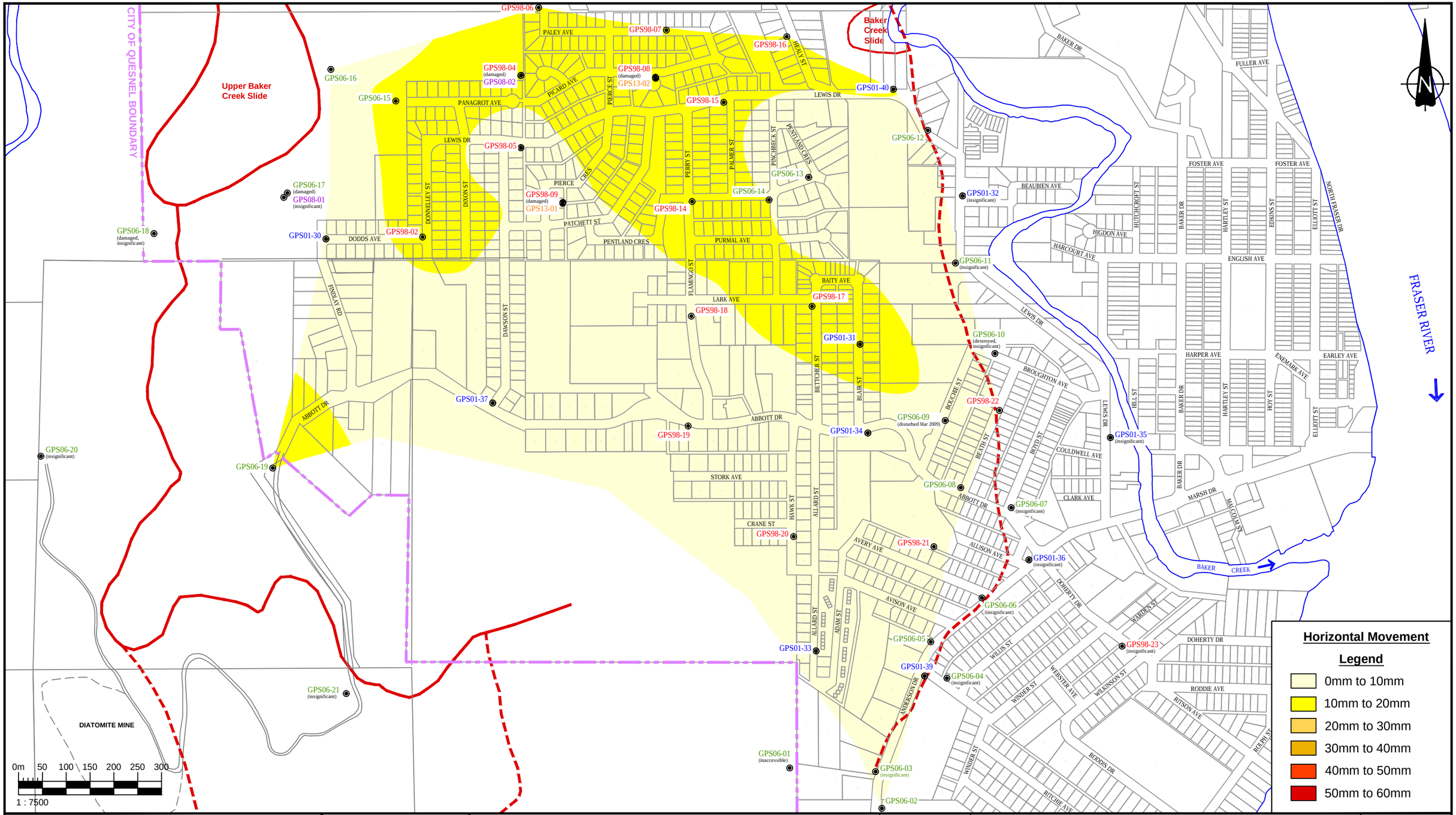
TITLE: ANNUAL 3D MOVEMENT - 2012
NOVEMBER 2011 TO DECEMBER 2012
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	February 2014
PROJECT NO:	KX04397
REV. NO.:	A
FIGURE No.	FIGURE 18

C:\Users\ben.brown\appdata\local\temp\AcPublish_3344\KX04397-Figure18-3D.MOVE-Nov11-Dec12-allhubs.dwg - Figure18 - Feb. 13, 2014 3:18pm - ben.brown

This drawing was originally produced in colour.



West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC 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

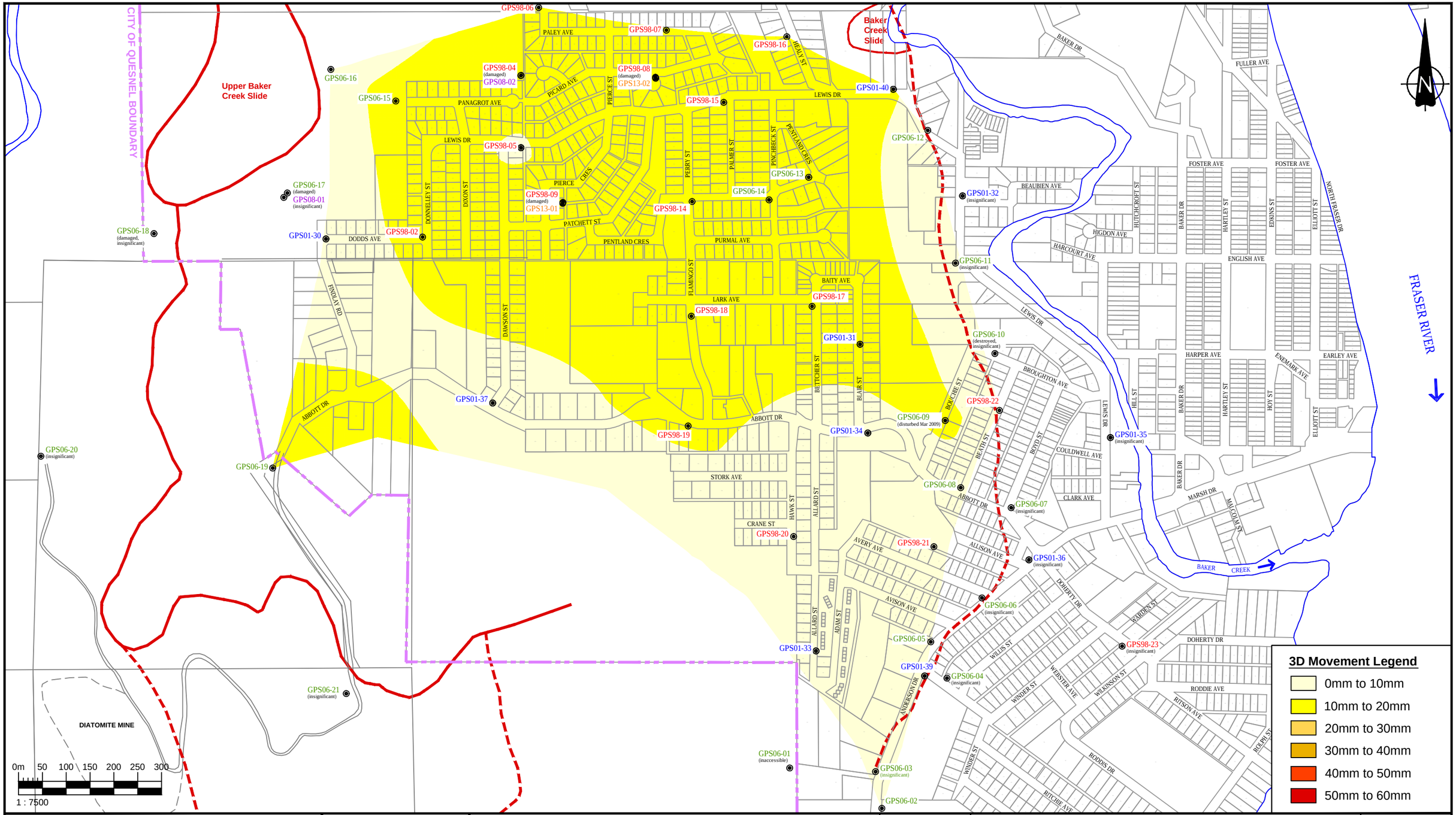
TITLE: ANNUAL HORIZONTAL MOVEMENT - 2013
NOVEMBER 2012 TO NOVEMBER 2013
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE:	February 2014
PROJECT NO:	KX04397
REV. NO.:	A
FIGURE No.	FIGURE 19

S:\Internal\KX04397-WQLS-GIS\0_KX0439739.6\KX04397-Figure19-H.MOVE-Dec12-Nov13-allhubs.dwg - Figure19 - Feb. 20, 2014 9:12am - ben.brown

This drawing was originally produced in colour.



West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC 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

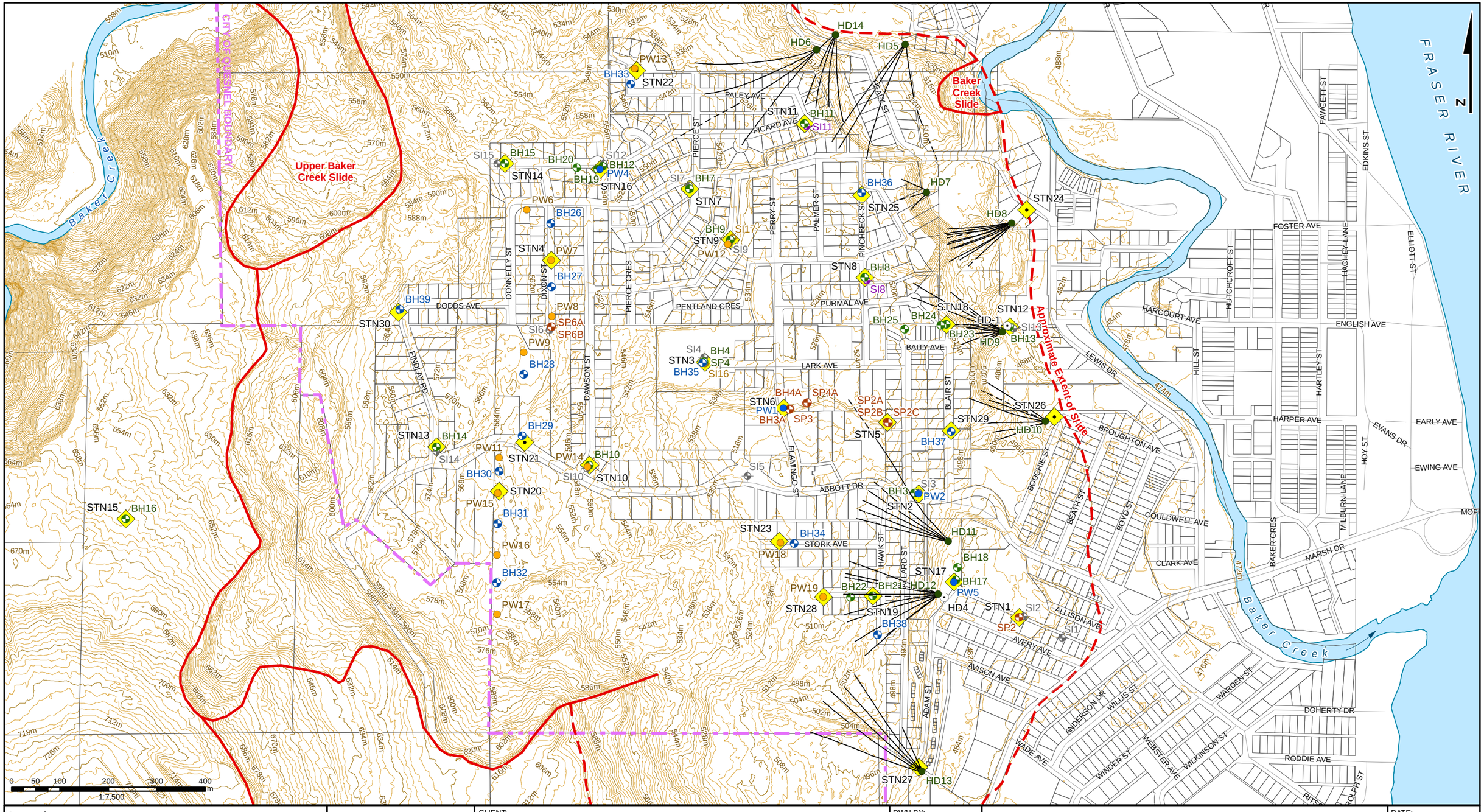
TITLE: ANNUAL 3D MOVEMENT - 2013
NOVEMBER 2012 TO NOVEMBER 2013
FOR THE 1998, 2001, 2006 AND 2008 GPS HUBS

PROJECT: WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE: February 2014
PROJECT NO: KX04397
REV. NO.: A
FIGURE No. FIGURE 20

S:\Internal\KX04397-WQLS-GIS\0_KX0439739.6\KX04397-Figure20-3D.MOVE-Dec12-Nov13-allhubs.dwg - Figure20 - Feb. 21, 2014 9:25am - ben.brown

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)
- Slope Inclinometer (2012)
- Slope Inclinometer (2005)
- Slope Inclinometer (Blocked, 2000-2006)
- Station
- Slide Extent
- Slide Extent (Approximate)
- Surveyed Horizontal Drain Trace
- Approximated Horizontal Drain Trace

West Quesnel Land Stability Program

CLIENT: CITY OF QUESNEL

AMEC Environment & Infrastructure
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9

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

OVERALL INSTRUMENTATION SITE PLAN

WEST QUESNEL LAND STABILITY PROGRAM QUESNEL, BC

DATE: February 2014
PROJECT NO.: KX04397
REV NO.: A

FIGURE 21

S:\Internal\KX04397-WQLS-GIS\0_KX0439739.6\KX0439739.6-Figure21-OverallInstrumentationSitePlan.mxd

This drawing was originally produced in colour.

Appendix A

GPS Movement Hubs - Summary Table and Survey Data

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	Destroyed - replaced by 13-01
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 Finley 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
11-50	South of Abbott Dr. & Hawk St.	June 2011	Not Currently Read
11-51	North End Bouchie St.	June 2011	Not Currently Read
11-52	Lane between Avison & Avery Ave.	June 2011	Not Currently Read
13-01	Lane between Patchett/Pierce	November 2013	Active
13-02	Picard Avenue	November 2013	Active
Baker	Control Point at 2191 Baker Drive	June 2011	Not Currently Read

amec

Data Summary by GPS Movement Hub Number

GPS Hub	Initial				Previous				Most Recent				Total Movement									Incremental Movement						
	Date	Northing m	Easting m	Elevation m	Date	Northing m	Easting m	Elevation m	Date	Northing m	Easting m	Elevation m	Time years	Northing m	Easting m	Horizontal m	Vertical m	Total m	Azimuth °	Plunge °	Rate m/year	Time years	Northing m	Easting m	Horizontal m	Vertical m	Total m	Rate m/year
98-02	15/09/1998	5869992.878	531420.902	563.021	04/10/2013	5869992.797	531421.433	562.962	27/11/2013	5869992.794	531421.432	562.946	15.2	-0.084	0.530	0.537	-0.075	0.542	99.0	-8.0	0.036	0.1	-0.003	-0.001	0.003	-0.016	0.016	-0.021
98-04	15/09/1998	5870331.949	531626.829	557.171	03/06/2008	5870332.147	531627.118	557.060	29/07/2008	5870332.153	531627.120	557.048	9.9	0.204	0.291	0.355	-0.123	0.376	55.0	-19.1	0.038	0.2	0.006	0.002	0.006	-0.012	0.013	0.041
98-05	15/09/1998	5870180.442	531627.209	551.978	04/10/2013	5870180.465	531627.685	551.854	27/11/2013	5870180.469	531627.680	551.849	15.2	0.027	0.471	0.472	-0.129	0.489	86.7	-15.3	0.032	0.1	0.004	-0.005	0.006	-0.005	0.008	-0.043
98-06	15/09/1998	5870474.774	531664.168	539.628	04/10/2013	5870475.212	531664.557	539.442	27/11/2013	5870475.215	531664.557	539.441	15.2	0.441	0.389	0.588	-0.187	0.617	41.4	-17.6	0.041	0.1	0.003	0.000	0.003	-0.001	0.003	0.020
98-07	15/09/1998	5870427.297	531932.241	533.473	04/10/2013	5870427.541	531932.668	533.354	27/11/2013	5870427.545	531932.673	533.343	15.2	0.248	0.432	0.498	-0.130	0.515	60.1	-14.6	0.034	0.1	0.004	0.005	0.006	-0.011	0.013	0.043
98-08	15/09/1998	5870328.580	531909.295	536.943	03/04/2013	5870328.769	531909.718	536.794	12/07/2013	5870328.773	531909.728	536.802	14.8	0.193	0.433	0.474	-0.141	0.495	66.0	-16.6	0.033	0.3	0.004	0.010	0.011	0.008	0.014	0.039
98-09	15/09/1998	5870063.599	531714.863	549.785	12/07/2013	5870063.597	531715.453	549.741	04/10/2013	5870063.601	531715.445	549.743	15.1	0.002	0.582	0.582	-0.042	0.584	89.8	-4.1	0.039	0.2	0.004	-0.008	0.009	0.002	0.009	-0.039
98-14	15/09/1998	5870067.437	531986.027	531.224	04/10/2013	5870067.402	531986.595	531.161	27/11/2013	5870067.402	531986.600	531.147	15.2	-0.035	0.573	0.574	-0.077	0.579	93.5	-7.6	0.038	0.1	0.000	0.005	0.005	-0.014	0.015	0.034
98-15	15/09/1998	5870275.888	532052.513	524.385	04/10/2013	5870275.999	532052.926	524.252	27/11/2013	5870275.998	532052.926	524.242	15.2	0.110	0.413	0.427	-0.143	0.450	75.1	-18.5	0.030	0.1	-0.001	0.000	0.001	-0.010	0.010	-0.007
98-16	15/09/1998	5870413.504	532184.864	509.104	04/10/2013	5870413.610	532185.156	509.061	27/11/2013	5870413.604	532185.161	509.040	15.2	0.100	0.297	0.313	-0.064	0.319	71.4	-11.6	0.021	0.1	-0.006	0.005	0.008	-0.021	0.022	0.053
98-17	15/09/1998	5869847.647	532237.862	519.610	04/10/2013	5869847.575	532238.503	519.554	27/11/2013	5869847.576	532238.505	519.545	15.2	-0.071	0.643	0.647	-0.065	0.650	96.3	-5.7	0.043	0.1	0.001	0.002	0.002	-0.009	0.009	0.015
98-18	15/09/1998	5869826.923	531984.617	524.147	04/10/2013	5869826.835	531985.202	524.080	27/11/2013	5869826.833	531985.202	524.058	15.2	-0.090	0.585	0.592	-0.089	0.599	98.7	-8.5	0.039	0.1	-0.002	0.000	0.002	-0.022	0.022	0.014
98-19	15/09/1998	5869596.532	531978.061	517.225	04/10/2013	5869596.418	531978.547	517.264	27/11/2013	5869596.423	531978.544	517.261	15.2	-0.109	0.483	0.495	0.036	0.496	102.7	4.2	0.033	0.1	0.005	-0.003	0.006	-0.003	0.007	-0.039
98-20	15/09/1998	5869364.259	532199.105	504.356	04/10/2013	5869364.132	532199.545	504.320	27/11/2013	5869364.135	532199.541	504.304	15.2	-0.124	0.436	0.453	-0.052	0.456	105.9	-6.5	0.030	0.1	0.003	-0.004	0.005	-0.016	0.017	-0.034
98-21	15/09/1998	5869342.996	532493.483	485.474	04/10/2013	5869342.860	532493.742	485.550	27/11/2013	5869342.859	532493.744	485.539	15.2	-0.137	0.261	0.295	0.065	0.302	117.7	12.4	0.020	0.1	-0.001	0.002	0.002	-0.011	0.011	0.015
98-22	15/09/1998	5869628.968	532631.086	478.920	04/10/2013	5869628.966	532631.134	478.944	27/11/2013	5869628.972	532631.139	478.927	15.2	0.004	0.053	0.053	0.007	0.053	85.7	7.5	0.003	0.1	0.006	0.005	0.008	-0.017	0.019	0.053
98-24	15/09/1998	5878341.399	531399.210	589.609	30/11/2000	5878341.379	531399.224	589.591	05/05/2001	5878341.388	531399.222	589.575	2.6	-0.011	0.012	0.016	-0.034	0.038	132.5	-64.8	0.014	0.4	0.009	-0.002	0.009	-0.016	0.018	-0.022
98-29	15/09/1998	5870484.887	536304.120	575.014	05/05/2001	5870484.884	536304.133	574.998	12/11/2003	5870484.879	536304.132	574.983	5.2	-0.008	0.012	0.014	-0.031	0.034	123.8	-66.0	0.007	2.5	-0.005	-0.001	0.005	-0.015	0.016	0.002
01-30	15/12/2001	5869989.266	531217.807	575.401	04/10/2013	5869989.191	531218.077	575.348	27/11/2013	5869989.193	531218.076	575.336	12.0	-0.073	0.269	0.279	-0.065	0.286	105.2	-13.1	0.024	0.1	0.002	-0.001	0.002	-0.012	0.012	-0.015
01-31	15/12/2001	5869768.124	532338.411	508.144	04/10/2013	5869768.092	532338.863	508.094	27/11/2013	5869768.091	532338.868	508.080	12.0	-0.033	0.457	0.458	-0.064	0.462	94.1	-8.0	0.039	0.1	-0.001	0.005	0.005	-0.014	0.015	0.034
01-32	15/12/2001	5870079.631	532553.538	481.549	04/10/2013	5870079.617	532553.523	481.600	27/11/2013	5870079.619	532553.543	481.558	12.0	-0.012	0.005	0.013	0.009	0.016	157.4	34.7	0.001	0.1	0.002	0.020	0.020	-0.042	0.047	-0.136
01-33	15/12/2001	5869124.379	532245.960	495.342	04/10/2013	5869124.311	532246.174	495.327	27/11/2013	5869124.315	532246.178	495.316	12.0	-0.064	0.218	0.227	-0.026	0.228	106.4	-6.5	0.019	0.1	0.004	0.004	0.006	-0.011	0.013	0.038
01-34	15/12/2001	5869581.862	532354.652	494.462	04/10/2013	5869581.759	532354.957	494.385	27/11/2013	5869581.759	532354.959	494.375	12.0	-0.103	0.307	0.324	-0.087	0.335	108.5	-15.0	0.028	0.1	0.000	0.002	0.002	-0.010	0.010	0.014
01-35	15/12/2001	5869572.261	532863.710	473.090	04/10/2013	5869572.255	532863.722	473.105	27/11/2013	5869572.262	532863.727	473.088	12.0	0.001	0.017	0.017	-0.002	0.017	86.6	-6.7	0.001	0.1	0.007	0.005	0.009	-0.017	0.019	0.058
01-36	15/12/2001	5869315.625	532692.784	476.837	04/10/2013	5869315.634	532692.795	476.832	27/11/2013	5869315.637	532692.796	476.825	12.0	0.012	0.012	0.017	-0.012	0.021	45.0	-35.2	0.002	0.1	0.003	0.001	0.003	-0.007	0.008	0.021
01-37	15/12/2001	5869644.821	531567.709	545.684	04/10/2013	5869644.773	531568.081	545.688	27/11/2013	5869644.777	531568.074	545.662	12.0	-0.044	0.365	0.368	-0.022	0.369	96.9	-3.4	0.031	0.1	0.004	-0.007	0.008	-0.026	0.027	-0.055
01-39	15/12/2001	5869071.953	532473.937	476.875	04/10/2013	5869071.872	532474.026	476.910	27/11/2013	5869071.873	532474.032	476.896	12.0	-0.080	0.095	0.124	0.021	0.126	130.1	9.6	0.011	0.1	0.001	0.006	0.006	-0.014	0.015	0.041
01-40	15/12/2001	5870303.346	532408.207	493.536	04/10/2013	5870303.379	532408.387	493.694	27/11/2013	5870303.381	532408.386	493.669	12.0	0.035	0.179	0.182	0.133	0.225	78.9	36.2	0.019	0.1	0.002	-0.001	0.002	-0.025	0.025	-0.015
06-01	10/11/2006	5868878.710	532190.793	487.817	03/06/2008	5868878.710	532190.800	487.847	29/08/2008	5868878.670	532190.776	487.819	1.8	-0.040	-0.017	0.043	0.002	0.043	203.0	2.7	0.024	0.2	-0.040	-0.024	0.047	-0.028	0.055	0.196
06-02	10/11/2006	5868793.977	532384.115	473.102	04/10/2013	5868793.998	532384.114	473.116	27/11/2013	5868794.004	532384.118	473.108	7.0	0.027	0.003	0.027	0.006	0.028	6.3	12.5	0.004	0.1	0.006	0.004	0.007	-0.008	0.011	0.049
06-03	10/11/2006	5868871.062	532370.952	474.521	04/10/2013	5868871.063	532370.961	474.534	27/11/2013	5868871.070	532370.957	474.521	7.0	0.008	0.005	0.009	0.000	0.009	32.0	0.0	0.001	0.1	0.007	-0.004	0.008	-0.013	0.015	0.055
06-04	10/11/2006	5869067.298	532520.728	474.933	04/10/2013	5869067.293	532520.717	474.946	27/11/2013	5869067.299	532520.720	474.934	7.0	0.001	-0.008	0.008	0.001	0.008	277.1	7.1	0.001	0.1	0.006	0.003	0.007	-0.012	0.014	-0.045
06-05	10/11/2006	5869143.444	532486.772	478.133	04/10/2013	5869143.421	532486.823	478.183	27/11/2013	5869143.421	532486.829	478.175	7.0	-0.023	0.057	0.061	0.042	0.074	112.0	34.5	0.011	0.1	0.000	0.006	0.006	-0.008	0.010	0.041
06-06	10/11/2006	5869235.696	532594.188	476.641	04/10/2013	5869235.676	532594.198	476.670	27/11/2013	5869235.679	532594.201	476.659	7.0	-0.017	0.013	0.021	0.018	0.028	142.6	40.6	0.004	0.1	0.003	0.003	0.004	-0.011	0.012	-0.029
06-07	10/11/2006	5869425.109	532655.428	477.850	04/10/2013	5869425.097	532655.414	477.865	27/11/2013	5869425.102	532655.417	477.855	7.0	-0.007	-0.011	0.013	0.005	0.014	237.5	21.0	0.002	0.1	0.005	0.003	0.006	-0.010	0.012	-0.039
06-08	10/11/2006	5869467.088	532549.595	480.412	04/10/2013	5869467.055	532549.661	480.452	27/11/2013	5869467.061	532549.661	480.449	7.0	-0.027	0.066	0.071	0.037	0.080	112.2	27.5	0.011	0.1	0.006	0.000	0.006	-0.003	0.007	-0.041
06-09	10/11/2006	5869608.045	532517.087	491.073	04/10/2013	5869608.042	532517.157	491.089	27/11/2013	5869608.047	532517.166	491.083	7.0	0.002	0.079	0.079	0.010	0.080	88.5	7.2	0.011	0.1	0.005	0.009	0.010	-0.006	0.012	0.070
06-10	10/11/2006	5869748.671	532621.351	478.410	23/11/2009	5869748.668	532621.359	478.413	27/03/2010	5869748.669	532621.354	478.406	3.4	-0.002	0.003	0.004	-0.004	0.006	123.7	-45.0	0.002	0.3	0.001	-0.005	0.005	-0.007	0.009	-0.015
06-11	10/11/2006	5869938.491	532538.683	480.061	04/10/2013	5869938.504	532538.680	480.099	27/11/2013	5869938.508	532538.685	480.070	7.0	0.017	0.002	0.017	0.009	0.019	6.7	27.9	0.003	0.1	0.004	0.005	0.006	-0.029	0.030	0.043
06-12	10/11/2006	5870217.210	532480.538	484.776	04/10/2013	5870217.227	532480.583	484.885	27/11/2013	5870217.227	532480.577	484.866	7.0	0.017	0.039	0.043	0.090	0.100	66.4	64.5	0.014	0.1	0.000	-0.006	0.006	-0.019	0.020	-0.041
06-13	10/11/2006	5870118.621	532230.725	527.301	04/10/2013	5870118.665	532230.875	527.273	27/11/2013	5870118.668	532230.874	527.257	7.0	0.047	0.149	0.156	-0.044	0.162	72.5	-15.8	0.023	0.1	0.003	-0.001	0.003	-0.016	0.016	-0.021
06-14	10/11/2006	5870071.251	532147.507	527.150	04/10/2013	5870071.205	532147.729	527.096	27/11/2013	5870071.203	532147.731	527.074	7.0	-0.048	0.224	0.229	-0.076	0.241	102.1	-18.4	0.034	0.1	-0.002	0.002	0.003	-0.022	0.022	0.019
06-15	10/11/2006	5870278.754	531364.331	568.367	04/10/2013	5870278.796	531364.444	568.312	27/11/2013	5870278.806	531364.450	568.291	7.0	0.052	0.119	0.130	-0.076	0.151	66.4	-30.3	0.021	0.1	0.010	0.006	0.012	-0.021	0.024	0.079
06-16	10/11/2006	5870345.023	531228.061	572.222	04/10/2013	5870345.033	531228.063	572.202	27/11/2013	5870345.037	531228.066	572.184	7.0	0.014	0.005	0.015	-0.038	0.041	19.7	-68.5	0.006	0.1	0.004	0.003	0.005	-0.018	0.019	0.034
06-17	10/11/2006	5870085.686	531136.829	595.126	13/12/2007	5870085.709	531136.933	595.049	18/03/2008	5870085.723	531136.990	595.109	1.4	0.037	0.161	0.165	-0.017	0.166	77.1	-5.9	0.123	0.3	0.014	0.057	0.059	0.060	0.084	0.223
06-18	10/11/2006	5870000.421	530856.972	632.066	18/03/2008	5870000.410	530856.974	632.052	03/06/2008	5870000.414	530856.980	632.070	1.6	-0.007	0.008	0.011	0.004	0.012	131.2	20.0	0.008	0.2	0.004	0.006	0.007	0.018	0.019	-0.034
06-19	10/11/2006	5869508.279	531106.114	585.415	04/10/2013	5869508.290	531106.156	585.382	27/11/2013	5869508.297	531106.163	585.380	7.0	0.018	0.049	0.052	-0.035	0.063	69.8	-33.9	0.009	0.1	0.007	0.007	0.010	-0.002	0.010	0.067
06-20	10/11/2006	5869533.109	530619.695	661.719	12/07/2013	5869533.116	530619.694	661.716	04/10/2013	5869533.115	530619.692	661.724	6.9	0.006	-0.003	0.007	0.005	0.009	333.4	35.5	0.001	0.2	-0.001	-0.002	0.002	0.008	0.008	-0.010
06-21	10/11/2006	5869034.916	531260.448	620.924	04/10/2013	5869034.911	531260.446	620.956	27/11/2013	5869034.916	531260.440	620.917	7.0	0.000	-0.008	0.008	-0.007	0.011	270.0	-41.2	0.002	0.1	0.005	-0.006	0.008	-0.039	0.040	0.053
08-01	03/06/2008	5870076.380	531129.361	595.426	04/10/2013	5870076.366	531129.361	595.420	27/11/2013	5870076.371	531129.369	595.398	5.5	-0.009	0.008	0.012	-0.028	0.030	138.4	-66.8	0.005	0.1	0.005	0.008	0.009	-0.022	0.024	-0.064
08-02	29/08/2008	5870332.611	531627.128	557.121	04/10/2013	5870332.691	531627.209	557.107	27/11/2013	5870332.681	531627.213	557.069	5.2	0.070	0.085	0.110	-0.052	0.122	50.5	-25.3	0.023	0.1	-0.010	0.004	0.011	-0.038	0.040	-0.073
13-01	27/11/2013	5870065.732	531714.895	550.036	N/A				27/11/2013	5870065.732	531714.895	550.036							#N/A	#N/A								0.000
13-02	27/11/2013	5870326.711	531909.535	537.074	N/A				27/11/2013	5870326.711	531909.535	537.074																0.000
98-23	15/09/1998	5869134.064	532888.607	475.384	04/10/2013	5869134.063	532888.626	475.380	27/11/2013	5869134.064	532888.629	475.369	15.2	0.000	0.022	0.022	-0.015	0.027	90.0	-34.3	0.002	0.1	0.001	0.003	0.003	-0.011	0.011	0.021
98-26	15/09/1998	5873887.634	533765.361	545.429	24/10/2002	5873887.633	533765.364	545.313	12/11/2003	5873887.630	533765.368	545.325	5.2	-0.004	0.007	0.008	-0.104	0.105	121.2	-85.6	0.020	1.1	-0.003	0.004	0.005	0.012	0.013	0.005
98-28	15/09/1998	5870190.608	537039.418	595.773	30/11/2000	5870190.608	537039.418	595.773	05/05/2001	5870190.608	537039.418	595.773	2.6	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.4	0.000	0.000	0.000	0.000	0.000	0.000
82C256	15/12/1998	5875411.453	533109.702	542.947	15/12/2001	5875411.453	533109.702	542.946	12/11/2003	5875411.453	533109.702	542.946	4.9	0.000	0.000	0.000	-0.001	0.001	0.0	0.0	0.000	1.9	0.000	0.000	0.000	0.000	0.000	0.000
01-38	15/12/2001	5870193.015	537018.228	596.514	04/10/2013	5870193.015	537018.231	596.505	27/11/2013	5870193.013	537018.232	596.503	12.0	-0.002	0.004	0.004	-0.011	0.012	116.6	-70.0	0.001	0.1	-0.002	0.001	0.002	-0.002	0.003	0.015
WaterTank	10/03/2006	5872728.745	532867.388	527.263	04/10/2013	5872728.745	532867.388	527.263	27/11/2013	5872728.745	532867.388	527.263	7.7	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.1	0.000	0.000	0.000	0.000	0.000	0.000

Data Summary by GPS Movement Hub Location

Benchmark Hubs

GPS Hub	Initial				Previous				Most Recent				Total Movement									Incremental Movement						
	Date	Northing m	Easting m	Elevation m	Date	Northing m	Easting m	Elevation m	Date	Northing m	Easting m	Elevation m	Time years	Northing m	Easting m	Horizontal m	Vertical m	Total m	Azimuth °	Plunge °	Hor. Rate m/year	Time years	Northing m	Easting m	Horizontal m	Vertical m	Total m	Hor. Rate m/year
98-23	15/09/1998	5869134.064	532888.607	475.384	04/10/2013	5869134.063	532888.626	475.380	27/11/2013	5869134.064	532888.629	475.369	15.2	0.000	0.022	0.022	-0.015	0.027	90.0	-34.3	0.001	0.1	0.001	0.003	0.003	-0.011	0.011	0.021
98-24	15/09/1998	5878341.399	531399.210	589.609	30/11/2000	5878341.379	531399.224	589.591	05/05/2001	5878341.388	531399.222	589.575	2.6	-0.011	0.012	0.016	-0.034	0.038	132.5	-64.8	0.006	0.4	0.009	-0.002	0.009	-0.016	0.018	-0.022
98-26	15/09/1998	5873887.634	533765.361	545.429	24/10/2002	5873887.633	533765.364	545.313	12/11/2003	5873887.630	533765.368	545.325	5.2	-0.004	0.007	0.008	-0.104	0.105	121.2	-85.6	0.002	1.1	-0.003	0.004	0.005	0.012	0.013	0.005
98-28	15/09/1998	5870190.608	537039.418	595.773	30/11/2000	5870190.608	537039.418	595.773	05/05/2001	5870190.608	537039.418	595.773	2.6	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.4	0.000	0.000	0.000	0.000	0.000	0.000
98-29	15/09/1998	5870484.887	536304.120	575.014	05/05/2001	5870484.884	536304.133	574.998	12/11/2003	5870484.879	536304.132	574.983	5.2	-0.008	0.012	0.014	-0.031	0.034	123.8	-66.0	0.003	2.5	-0.005	-0.001	0.005	-0.015	0.016	0.002
82C256	15/12/1998	5875411.453	533109.702	542.947	15/12/2001	5875411.453	533109.702	542.946	12/11/2003	5875411.453	533109.702	542.946	4.9	0.000	0.000	0.000	-0.001	0.001	0.0	0.0	0.000	1.9	0.000	0.000	0.000	0.000	0.000	0.000
01-38	15/12/2001	5870193.015	537018.228	596.514	04/10/2013	5870193.015	537018.231	596.505	27/11/2013	5870193.013	537018.232	596.503	12.0	-0.002	0.004	0.004	-0.011	0.012	116.6	-70.0	0.000	0.1	-0.002	0.001	0.002	-0.002	0.003	0.015
WaterTank	10/03/2006	5872728.745	532867.388	527.263	04/10/2013	5872728.745	532867.388	527.263	27/11/2013	5872728.745	532867.388	527.263	7.7	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.1	0.000	0.000	0.000	0.000	0.000	0.000
													Average	-0.003	0.007	0.008	-0.025	0.027	73.003	-40.094	0.002	0.847	0.000	0.001	0.003	-0.004	0.008	0.003
													Standard Deviation	0.004	0.008	0.008	0.035	0.035	61.661	36.070	0.002	0.910	0.004	0.002	0.003	0.009	0.008	0.013

Hubs Below Slide Toe or on Slide Toe

GPS Hub	Initial				Previous				Most Recent				Total Movement									Incremental Movement						
	Date	Northing m	Easting m	Elevation m	Date	Northing m	Easting m	Elevation m	Date	Northing m	Easting m	Elevation m	Time years	Northing m	Easting m	Horizontal m	Vertical m	Total m	Azimuth °	Plunge °	Hor. Rate m/year	Time years	Northing m	Easting m	Horizontal m	Vertical m	Total m	Hor. Rate m/year
98-22	15/09/1998	5869628.968	532631.086	478.920	04/10/2013	5869628.966	532631.134	478.944	27/11/2013	5869628.972	532631.139	478.927	15.2	0.004	0.053	0.053	0.007	0.053	85.7	7.5	0.003	0.1	0.006	0.005	0.008	-0.017	0.019	0.053
01-32	15/12/2001	5870079.631	532553.538	481.549	04/10/2013	5870079.617	532553.523	481.600	27/11/2013	5870079.619	532553.543	481.558	12.0	-0.012	0.005	0.013	0.009	0.016	157.4	34.7	0.001	0.1	0.002	0.020	0.020	-0.042	0.047	-0.136
01-35	15/12/2001	5869572.261	532863.710	473.090	04/10/2013	5869572.255	532863.722	473.105	27/11/2013	5869572.262	532863.727	473.088	12.0	0.001	0.017	0.017	-0.002	0.017	86.6	-6.7	0.001	0.1	0.007	0.005	0.009	-0.017	0.019	0.058
01-36	15/12/2001	5869315.625	532692.784	476.837	04/10/2013	5869315.634	532692.795	476.832	27/11/2013	5869315.637	532692.796	476.825	12.0	0.012	0.012	0.017	-0.012	0.021	45.0	-35.2	0.001	0.1	0.003	0.001	0.003	-0.007	0.008	0.021
06-02	10/11/2006	5868793.977	532384.115	473.102	04/10/2013	5868793.998	532384.114	473.116	27/11/2013	5868794.004	532384.118	473.108	7.0	0.027	0.003	0.027	0.006	0.028	6.3	12.5	0.004	0.1	0.006	0.004	0.007	-0.008	0.011	0.049
06-03	10/11/2006	5868871.062	532370.952	474.521	04/10/2013	5868871.063	532370.961	474.534	27/11/2013	5868871.070	532370.957	474.521	7.0	0.008	0.005	0.009	0.000	0.009	32.0	0.0	0.001	0.1	0.007	-0.004	0.008	-0.013	0.015	0.055
06-04	10/11/2006	5869067.298	532520.728	474.933	04/10/2013	5869067.293	532520.717	474.946	27/11/2013	5869067.299	532520.720	474.934	7.0	0.001	-0.008	0.008	0.001	0.008	277.1	7.1	0.001	0.1	0.006	0.003	0.007	-0.012	0.014	-0.045
06-05	10/11/2006	5869143.444	532486.772	478.133	04/10/2013	5869143.421	532486.823	478.183	27/11/2013	5869143.421	532486.829	478.175	7.0	-0.023	0.057	0.061	0.042	0.074	112.0	34.5	0.009	0.1	0.000	0.006	0.006	-0.008	0.010	0.041
06-06	10/11/2006	5869235.696	532594.188	476.641	04/10/2013	5869235.676	532594.198	476.670	27/11/2013	5869235.679	532594.201	476.659	7.0	-0.017	0.013	0.021	0.018	0.028	142.6	40.6	0.003	0.1	0.003	0.003	0.004	-0.011	0.012	-0.029
06-07	10/11/2006	5869425.109	532655.428	477.850	04/10/2013	5869425.097	532655.414	477.865	27/11/2013	5869425.102	532655.417	477.855	7.0	-0.007	-0.011	0.013	0.005	0.014	237.5	21.0	0.002	0.1	0.005	0.003	0.006	-0.010	0.012	-0.039
06-10	10/11/2006	5869748.671	532621.351	478.410	23/11/2009	5869748.668	532621.359	478.413	27/03/2010	5869748.669	532621.354	478.406	3.4	-0.002	0.003	0.004	-0.004	0.006	123.7	-45.0	0.001	0.3	0.001	-0.005	0.005	-0.007	0.009	-0.015
06-11	10/11/2006	5869938.491	532538.683	480.061	04/10/2013	5869938.504	532538.680	480.099	27/11/2013	5869938.508	532538.685	480.070	7.0	0.017	0.002	0.017	0.009	0.019	6.7	27.9	0.002	0.1	0.004	0.005	0.006	-0.029	0.030	0.043
06-12	10/11/2006	5870217.210	532480.538	484.776	04/10/2013	5870217.227	532480.583	484.885	27/11/2013	5870217.227	532480.577	484.866	7.0	0.017	0.039	0.043	0.090	0.100	66.4	64.5	0.006	0.1	0.000	-0.006	0.006	-0.019	0.020	-0.041
													Average	0.002	0.015	0.023	0.013	0.030	106.086	12.576	0.003	0.163	0.004	0.003	0.007	-0.015	0.017	0.001
													Standard Deviation	0.014	0.022	0.018	0.027	0.028	82.790	30.195	0.002	0.053	0.003	0.007	0.004	0.010	0.011	0.058

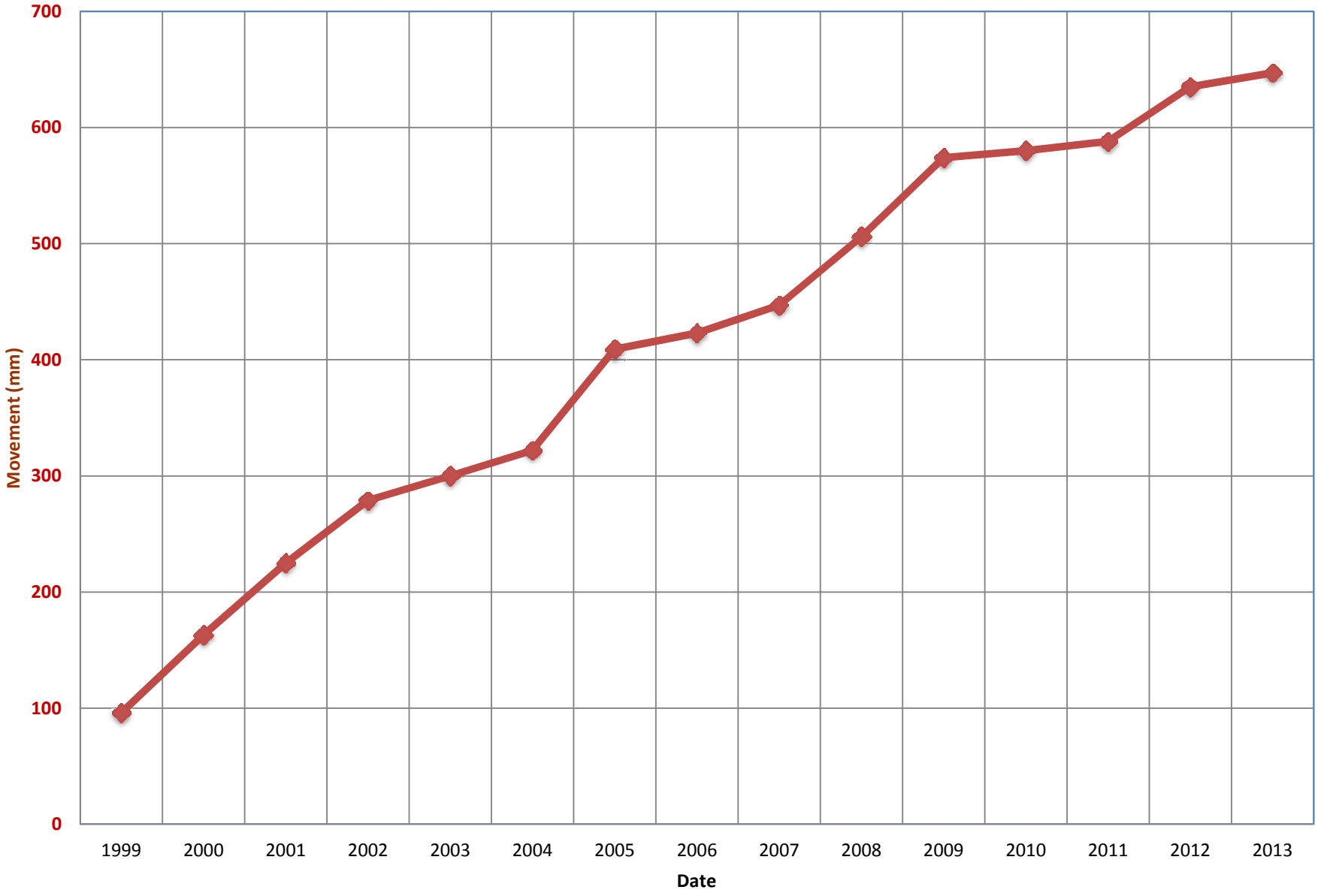
Hubs Above Crest

GPS Hub	Initial				Previous				Most Recent				Total Movement									Incremental Movement						
	Date	Northing m	Easting m	Elevation m	Date	Northing m	Easting m	Elevation m	Date	Northing m	Easting m	Elevation m	Time years	Northing m	Easting m	Horizontal m	Vertical m	Total m	Azimuth °	Plunge °	Hor. Rate m/year	Time years	Northing m	Easting m	Horizontal m	Vertical m	Total m	Rate m/year
06-18	10/11/2006	5870000.421	530856.972	632.066	18/03/2008	5870000.410	530856.974	632.052	03/06/2008	5870000.414	530856.980	632.070	1.6	-0.007	0.008	0.011	0.004	0.012	131.2	20.0	0.007	0.2	0.004	0.006	0.007	0.018	0.019	-0.034
06-20	10/11/2006	5869533.109	530619.695	661.719	12/07/2013	5869533.116	530619.694	661.716	04/10/2013	5869533.115	530619.692	661.724	6.9	0.006	-0.003	0.007	0.005	0.009	333.4	35.5	0.001	0.2	-0.001	-0.002	0.002	0.008	0.008	-0.010
06-21	10/11/2006	5869034.916	531260.448	620.924	04/10/2013	5869034.911	531260.446	620.956	27/11/2013	5869034.916	531260.440	620.917	7.0	0.000	-0.008	0.008	-0.007	0.011	270.0	-41.2	0.001	0.1	0.005	-0.006	0.008	-0.039	0.040	0.053
													Average	0.000	-0.001	0.009	0.001	0.011	244.874	4.778	0.003	0.196	0.003	-0.001	0.006	-0.004	0.022	0.003
													Standard Deviation	0.007	0.008	0.002	0.007	0.002	103.439	40.559	0.003	0.043	0.003	0.006	0.003	0.030	0.016	0.045

Hubs Within Slide

GPS Hub	Initial				Previous				Most Recent				Total Movement									Incremental Movement						
	Date	Northing m	Easting m	Elevation m	Date	Northing m	Easting m	Elevation m	Date	Northing m	Easting m	Elevation m	Time years	Northing m	Easting m	Horizontal m	Vertical m	Total m	Azimuth °	Plunge °	Hor. Rate m/year	Time years	Northing m	Easting m	Horizontal m	Vertical m	Total m	Hor. Rate m/year
98-02	15/09/1998	5869992.878	531420.902	563.021	04/10/2013	5869992.797	531421.433	562.962	27/11/2013	5869992.794	531421.432	562.946	15.2	-0.084	0.530	0.537	-0.075	0.542	99.0	-8.0	0.035	0.1	-0.003	-0.001	0.003	-0.016	0.016	-0.021
98-04	15/09/1998	5870331.949	531626.829	557.171	03/06/2008	5870332.147	531627.118	557.060	29/07/2008	5870332.153	531627.120	557.048	9.9	0.204	0.291	0.355	-0.123	0.376	55.0	-19.1	0.036	0.2	0.006	0.002	0.006	-0.012	0.013	0.041
98-05	15/09/1998	5870180.442	531627.209	551.978	04/10/2013	5870180.465	531627.685	551.854	27/11/2013	5870180.469	531627.680	551.849	15.2	0.027	0.471	0.472	-0.129	0.489	86.7	-15.3	0.031	0.1	0.004	-0.005	0.006	-0.005	0.008	-0.043
98-06	15/09/1998	5870474.774	531664.168	539.628	04/10/2013	5870475.212	531664.557	539.442	27/11/2013	5870475.215	531664.557	539.441	15.2	0.441	0.389	0.588	-0.187	0.617	41.4	-17.6	0.039	0.1	0.003	0.000	0.003	-0.001	0.003	0.020
98-07	15/09/1998	5870427.297	531932.241	533.473	04/10/2013	5870427.541	531932.668	533.354	27/11/2013	5870427.545	531932.673	533.343	15.2	0.248	0.432	0.498	-0.130	0.515	60.1	-14.6	0.033	0.1	0.004	0.005	0.006	-0.011	0.013	0.043
98-08	15/09/1998	5870328.580	531909.295	536.943	03/04/2013	5870328.769	531909.718	536.794	12/07/2013	5870328.773	531909.728	536.802	14.8	0.193	0.433	0.474	-0.141	0.495	66.0	-16.6	0.032	0.3	0.004	0.010	0.011	0.008	0.014	0.039
98-09	15/09/1998	5870063.599	531714.863	549.785	12/07/2013	5870063.597	531715.453	549.741	04/10/2013	5870063.601	531715.445	549.743	15.1	0.002	0.582	0.582	-0.042	0.584	89.8	-4.1	0.039	0.2	0.004	-0.008	0.009	0.002	0.009	-0.039
98-14	15/09/1998	5870067.437	531986.027	531.224	04/10/2013	5870067.402	531986.595	531.161	27/11/2013	5870067.402	531986.600	531.147	15.2	-0.035	0.573	0.574	-0.077	0.579	93.5	-7.6	0.038	0.1	0.000	0.005	0.005	-0.014	0.015	0.034
98-15	15/09/1998	5870275.888	532052.513	524.385	04/10/2013	5870275.999	532052.926	524.252	27/11/2013	5870275.998	532052.926	524.242	15.2	0.110	0.413	0.427	-0.143	0.450	75.1	-18.5	0.028	0.1	-0.001	0.000	0.001	-0.010	0.010	-0.007
98-16	15/09/1998	5870413.504	532184.864	509.104	04/10/2013	5870413.610	532185.156	509.061	27/11/2013	5870413.604	532185.161	509.040	15.2	0.100	0.297	0.313	-0.064	0.319	71.4	-11.6	0.021	0.1	-0.006	0.005	0.008	-0.021	0.022	0.053
98-17	15/09/1998	5869847.647	532237.862	519.610	04/10/2013	5869847.575	532238.503	519.554	27/11/2013	5869847.576	532238.505	519.545	15.2	-0.071	0.643	0.647	-0.065	0.650	96.3	-5.7	0.043	0.1	0.001	0.002	0.002	-0.009	0.009	0.015
98-18	15/09/1998	5869826.923	531984.617	524.147	04/10/2013	5869826.835	531985.202	524.080	27/11/2013	5869826.833	531985.202	524.058	15.2	-0.090	0.585	0.592	-0.089	0.599	98.7	-8.5	0.039	0.1	-0.002	0.000	0.002	-0.022	0.022	0.014
98-19	15/09/1998	5869596.532	531978.061	517.225	04/10/2013	5869596.418	531978.547	517.264	27/11/2013	5869596.423	531978.544	517.261	15.2	-0.109	0.483	0.495	0.036	0.496	102.7	4.2	0.033	0.1	0.005	-0.003	0.006	-0.003	0.007	-0.039
98-20	15/09/1998	5869364.259	532199.105	504.356	04/10/2013	5869364.132	532199.545	504.320	27/11/2013	5869364.135	532199.541	504.304	15.2	-0.124	0.436	0.453	-0.052	0.456	105.9	-6.5	0.030	0.1	0.003	-0.004	0.005	-0.016	0.017	-0.034
98-21	15/09/1998	5869342.996	532493.483	485.474	04/10/2013	5869342.860	532493.742	485.550	27/11/2013	5869342.859	532493.744	485.539	15.2	-0.137	0.261	0.295	0.065	0.302	117.7	12.4	0.019	0.1	-0.001	0.002	0.002	-0.011	0.011	0.015
01-30	15/12/2001	5869989.266	531217.807	575.401	04/10/2013	5869989.191	531218.077	575.348	27/11/2013	5869989.193	531218.076	575.336	12.0	-0.073	0.269	0.279	-0.065	0.286	105.2	-13.1	0.023	0.1	0.002	-0.001	0.002	-0.012	0.012	-0.015
01-31	15/12/2001	5869768.124	532338.411	508.144	04/10/2013	5869768.092	532338.863	508.094	27/11/2013	5869768.091	532338.868	508.080	12.0	-0.033	0.457	0.458	-0.064	0.462	94.1	-8.0	0.038	0.1	-0.001	0.005	0.005	-0.014	0.015	0.034
01-33	15/12/2001	5869124.379	532245.960	495.342	04/10/2013	5869124.311	532246.174	495.327	27/11/2013	5869124.315	532246.178	495.316	12.0	-0.064	0.218	0.227	-0.026	0.228	106.4	-6.5	0.019	0.1	0.004	0.004	0.006	-0.011	0.013	0.038
01-34	15/12/2001	5869581.862	532354.652	494.462	04/10/2013	5869581.759	532354.957	494.385	27/11/2013	5869581.759	532354.959	494.375	12.0	-0.103	0.307	0.324	-0.087	0.335	108.5	-15.0	0.027	0.1	0.000	0.002	0.002	-0.010	0.010	0.014
01-37	15/12/2001	5869644.821	531567.709	545.684	04/10/2013	5869644.773	531568.081	545.688	27/11/2013	5869644.777	531568.074	545.662	12.0	-0.044	0.365	0.368	-0.022	0.369	96.9	-3.4	0.031	0.1	0.004	-0.007	0.008	-0.026	0.027	-0.055
01-39	15/12/2001	5869071.953	532473.937	476.875	04/10/2013	5869071.872	532474.026	476.910	27/11/2013	5869071.873	532474.032	476.896	12.0	-0.080	0.095	0.124	0.021	0.126	130.1	9.6	0.010	0.1	0.001	0.006	0.006	-0.014	0.015	0.041
01-40	15/12/2001	5870303.346	532408.207	493.536	04/10/2013	5870303.379	532408.387	493.694	27/11/2013	5870303.381	532408.386	493.669	12.0	0.035	0.179	0.182	0.133	0.225	78.9	36.2	0.015	0.1	0.002	-0.001	0.002	-0.025	0.025	-0.015
06-01	10/11/2006	5868878.710	532190.793	487.817	03/06/2008	5868878.710	532190.800	487.847	29/08/2008	5868878.670	532190.776	487.819	1.8	-0.040	-0.017	0.043	0.002	0.043	203.0	2.7	0.024	0.2	-0.040	-0.024	0.047	-0.028	0.055	0.196
06-08	10/11/2006	5869467.088	532549.595	480.412	04/10/2013	5869467.055	532549.661	480.452	27/11/2013	5869467.061	532549.661	480.449	7.0	-0.027	0.066	0.071	0.037	0.080	112.2	27.5	0.010	0.1	0.006	0.000	0.006	-0.003	0.007	-0.041
06-09	10/11/2006	5869608.045	532517.087	491.073	04/10/2013	5869608.042	532517.157	491.089	27/11/2013	5869608.047	532517.166	491.083	7.0	0.002	0.079	0.079	0.010	0.080	88.5	7.2	0.011	0.1	0.005	0.009	0.010	-0.006	0.012	0.070
06-13	10/11/2006	5870118.621	532230.725	527.301	04/10/2013	5870118.665	532230.875	527.273	27/11/2013	5870118.668	532230.874	527.257	7.0	0.047	0.149	0.156	-0.044	0.162	72.5	-15.8	0.022	0.1	0.003	-0.001	0.003	-0.016	0.016	-0.021
06-14	10/11/2006	5870071.251	532147.507	527.150	04/10/2013	5870071.205	532147.729	527.096	27/11/2013	5870071.203	532147.731	527.074	7.0	-0.048	0.224	0.229	-0.076	0.241	102.1	-18.4	0.032	0.1	-0.002	0.002	0.003	-0.022	0.022	0.019
06-15	10/11/2006	5870278.754	531364.331	568.367	04/10/2013	5870278.796	531364.444	568.312	27/11/2013	5870278.806	531364.450	568.291	7.0	0.052	0.119	0.130	-0.076	0.151	66.4	-30.3	0.018	0.1	0.010	0.006	0.012	-0.021	0.024	0.079
06-16	10/11/2006	5870345.023	531228.061	572.222	04/10/2013	5870345.033	531228.063	572.202	27/11/2013	5870345.037	531228.066	572.184	7.0	0.014	0.005	0.015	-0.038	0.041	19.7	-68.5	0.002	0.1	0.004	0.003	0.005	-0.018	0.019	0.034
06-17	10/11/2006	5870085.686	531136.829	595.126	13/12/2007	5870085.709	531136.933	595.049	18/03/2008	5870085.723	531136.990	595.109	1.4	0.037	0.161	0.165	-0.017	0.166	77.1	-5.9	0.122	0.3	0.014	0.057	0.059	0.060	0.084	0.223
06-19	10/11/2006	5869508.279	531106.114	585.415	04/10/2013	5869508.290	531106.156	585.382	27/11/2013	5869508.297	531106.163	585.380	7.0	0.018	0.049	0.052	-0.035	0.063	69.8	-33.9	0.007	0.1	0.007	0.007	0.010	-0.002	0.010	0.067
08-01	03/06/2008	5870076.380	531129.361	595.426	04/10/2013	5870076.366	531129.361	595.420	27/11/2013	5870076.371	531129.369	595.398	5.5	-0.009	0.008	0.012	-0.028	0.030	138.4	-66.8	0.002	0.1	0.005	0.008	0.009	-0.022	0.024	-0.064
08-02	29/08/2008	5870332.611	531627.128	557.121	04/10/2013	5870332.691	531627.209	557.107	27/11/2013	5870332.681	531627.213	557.069	5.2	0.070	0.085	0.110	-0.052	0.122	50.5	-25.3	0.021	0.1	-0.010	0.004	0.011	-0.038	0.040	-0.073
13-01	27/11/2013	5870065.732	531714.895	550.036	N/A				27/11/2013	5870065.732	531714.895	550.036							N/A	N/A								0.000
13-02	27/11/2013	5870326.711	531909.535	537.074	N/A				27/11/2013	5870326.711	531909.535	537.074																0.000
													Average*	0.015	0.294	0.316	-0.049	0.326	89.926	-10.831	0.028	0.161	0.001	0.003	0.009	-0.011	0.019	0.019
													Standard Deviation*	0.122	0.197	0.201	0.066	0.200	32.735	20.833	0.021	0.035	0.009	0.012	0.012	0.016	0.016	0.065

Figure A1: HUB 98-17 Total Horizontal Ground Movement



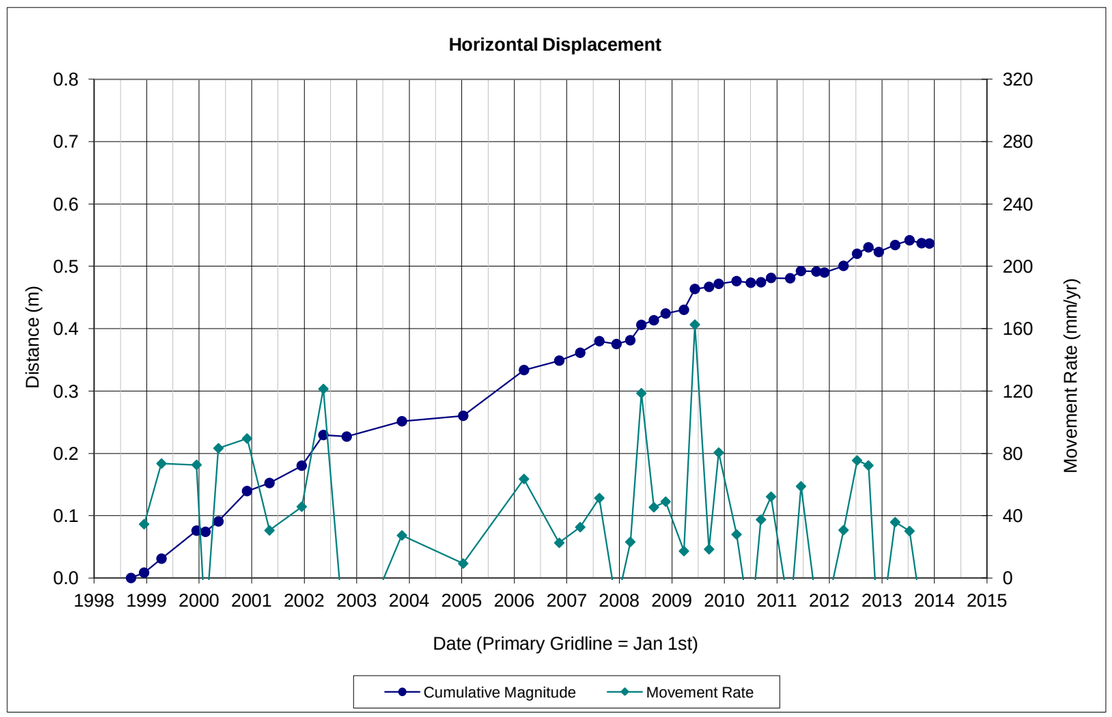
GPS Hubs Individual Data and Movement Plots

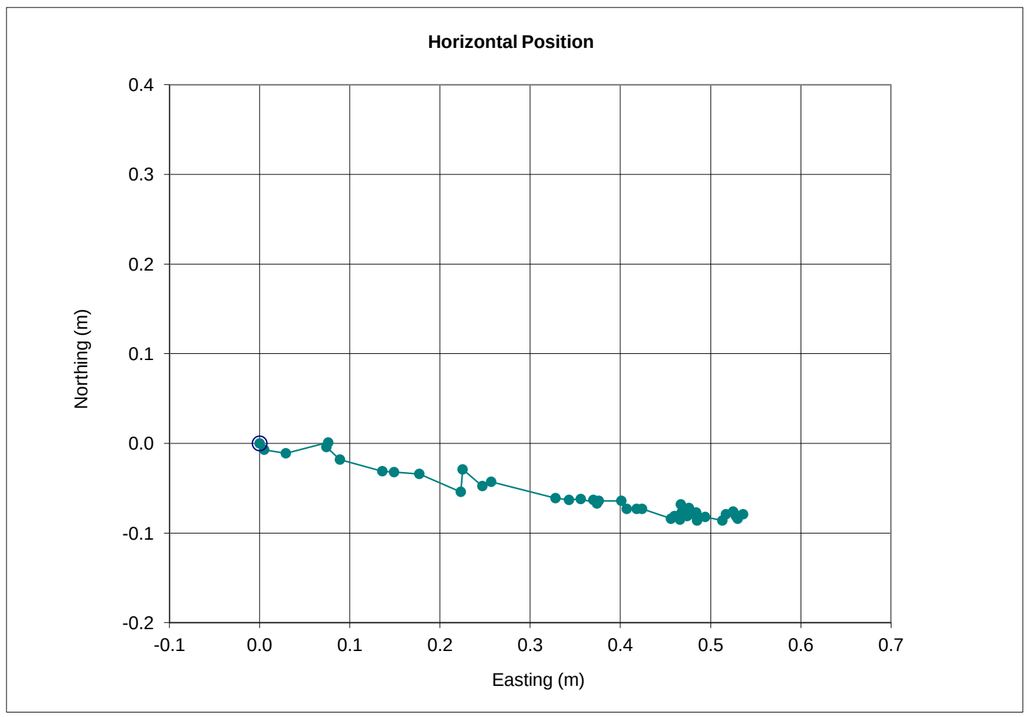
Survey and Displacement Data - Hub 98-02

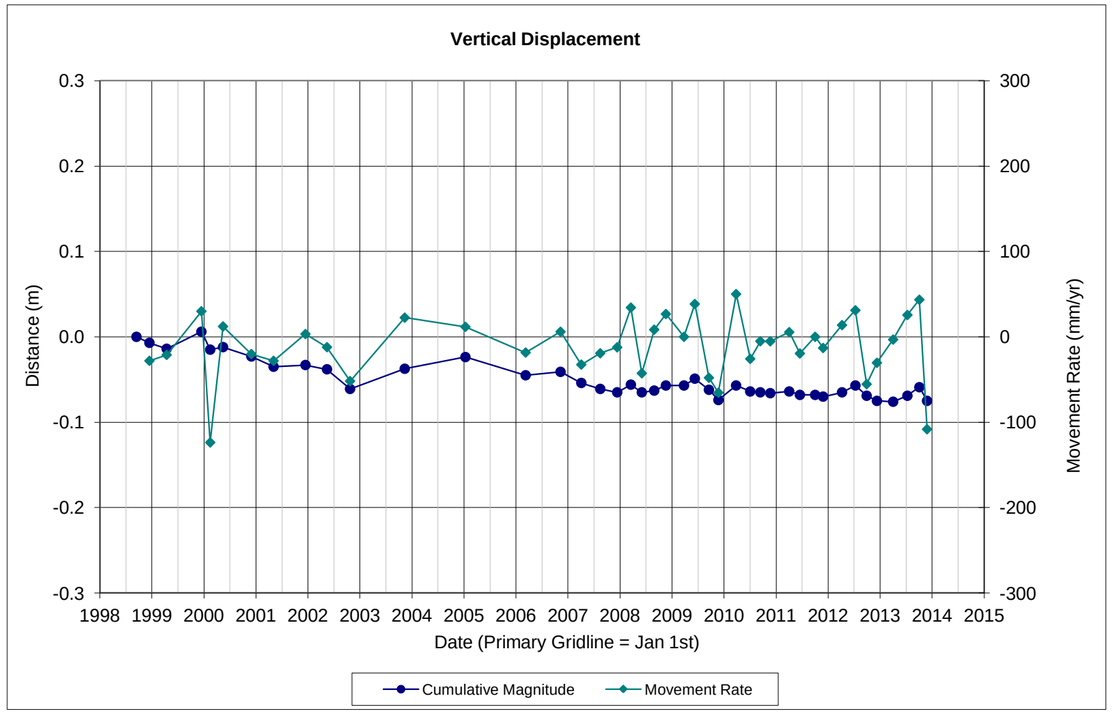
Donnelly/Dodds Intersection

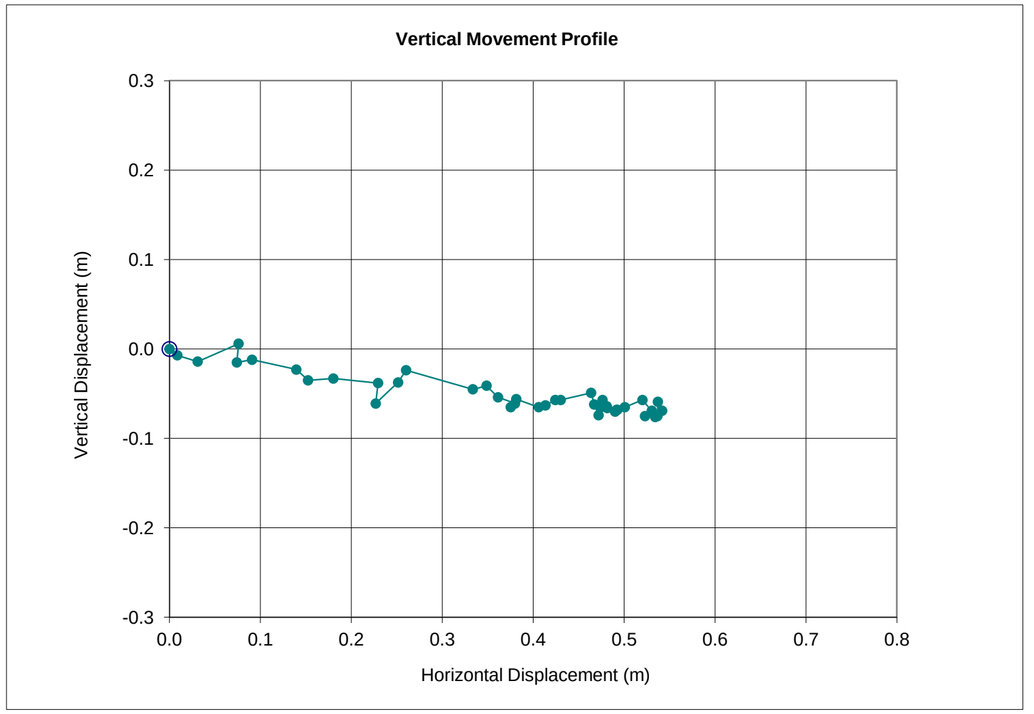
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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
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

Displacement Graphs - Hub 98-02
Donnelly/Dodds Intersection







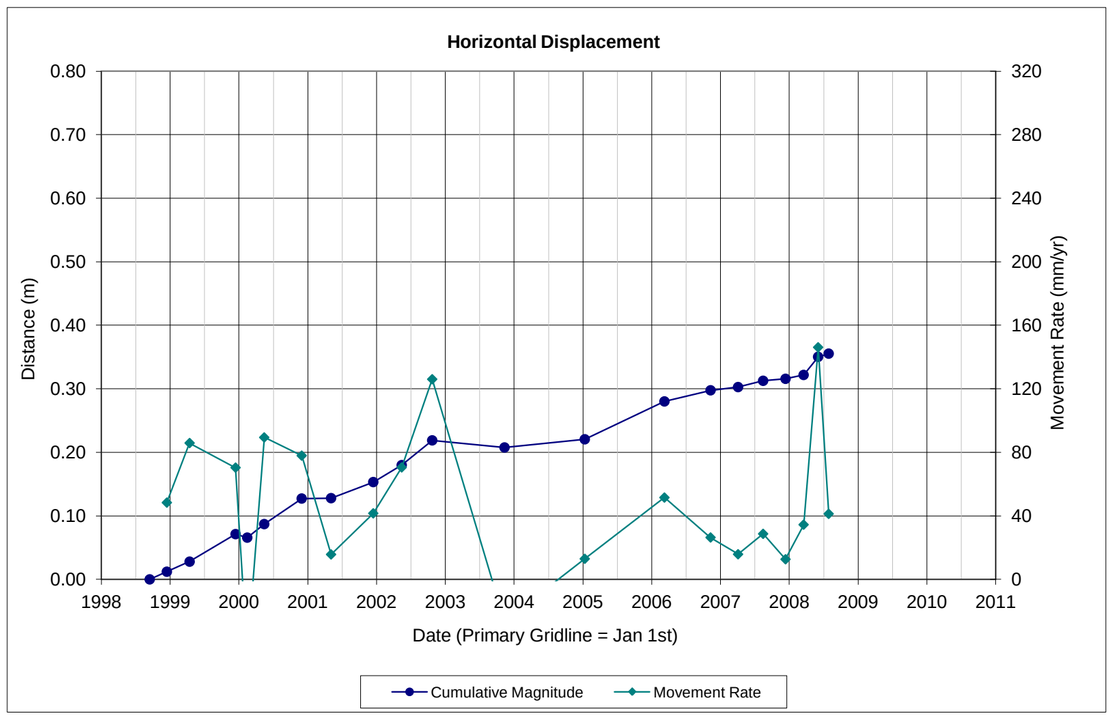


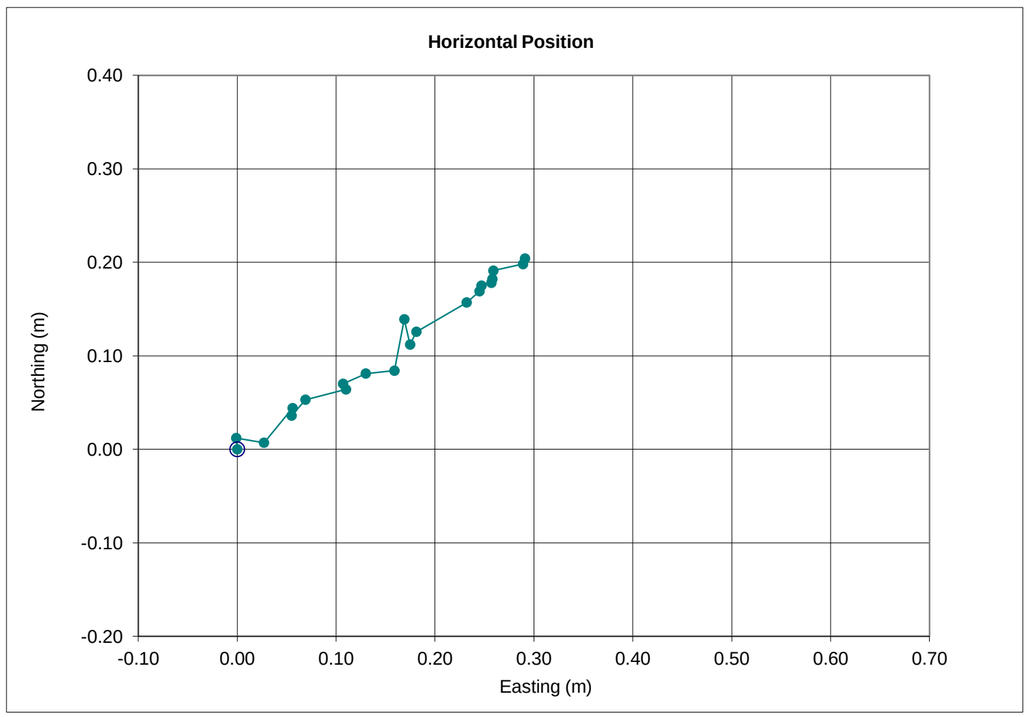
Survey and Displacement Data - Hub 98-04

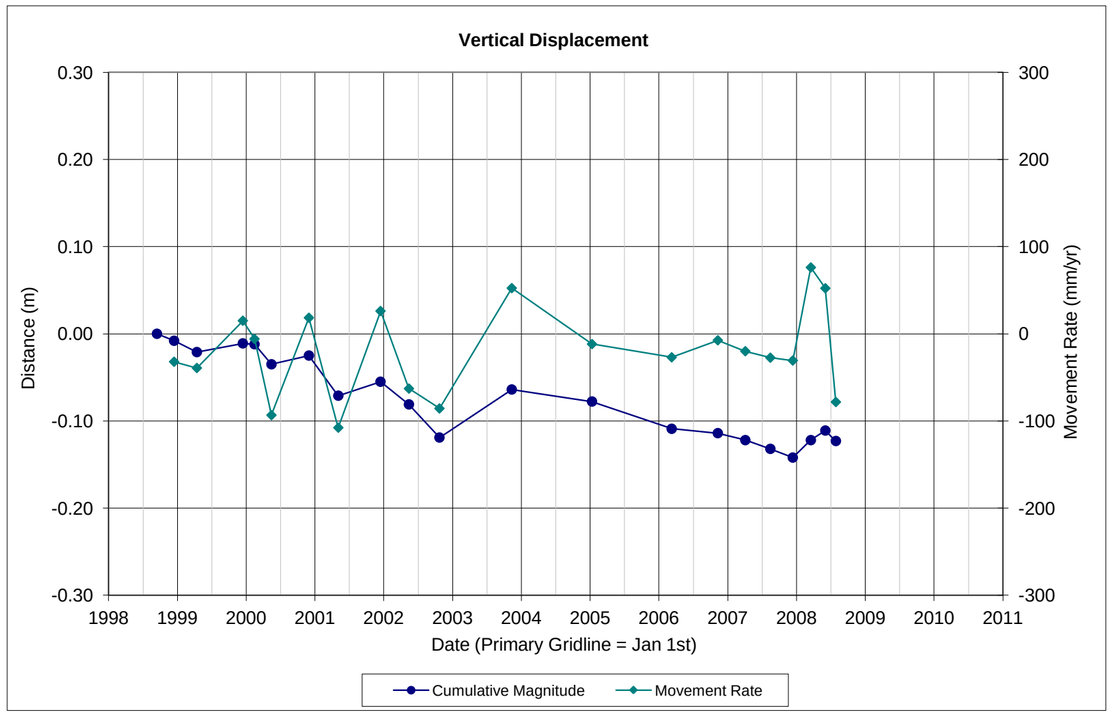
Picard Place (Lane)

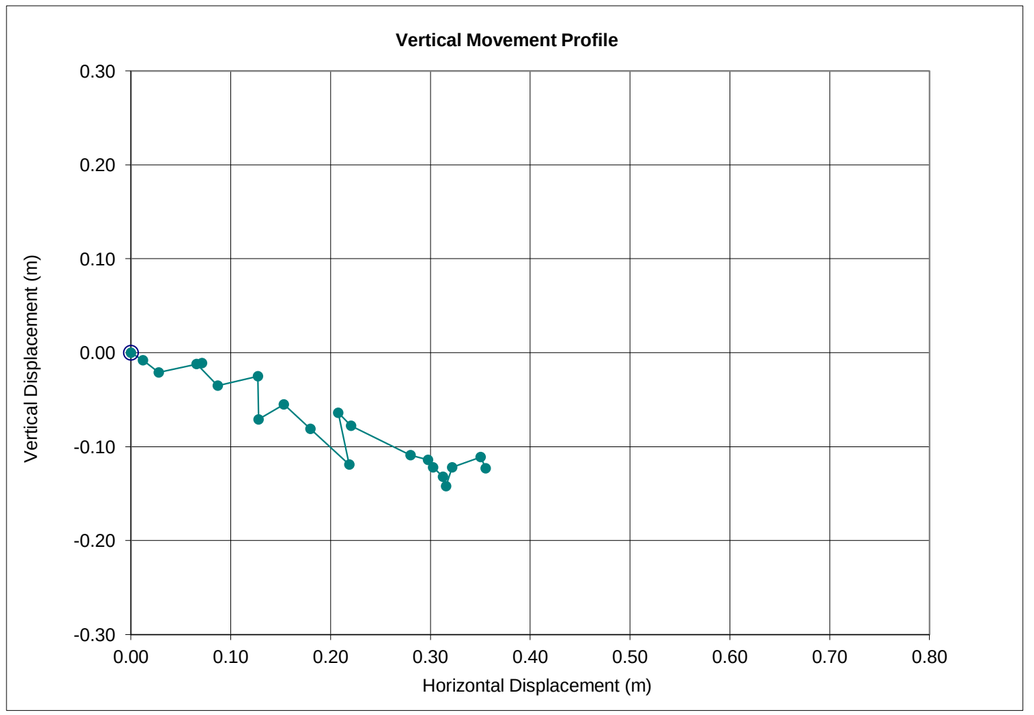
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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		-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		-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		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		-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		-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		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		-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		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		-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		-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		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		-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		-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		-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		-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		-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		-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		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		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		-62.2	41.251	-78.268

Displacement Graphs - Hub 98-04
Picard Place (Lane)







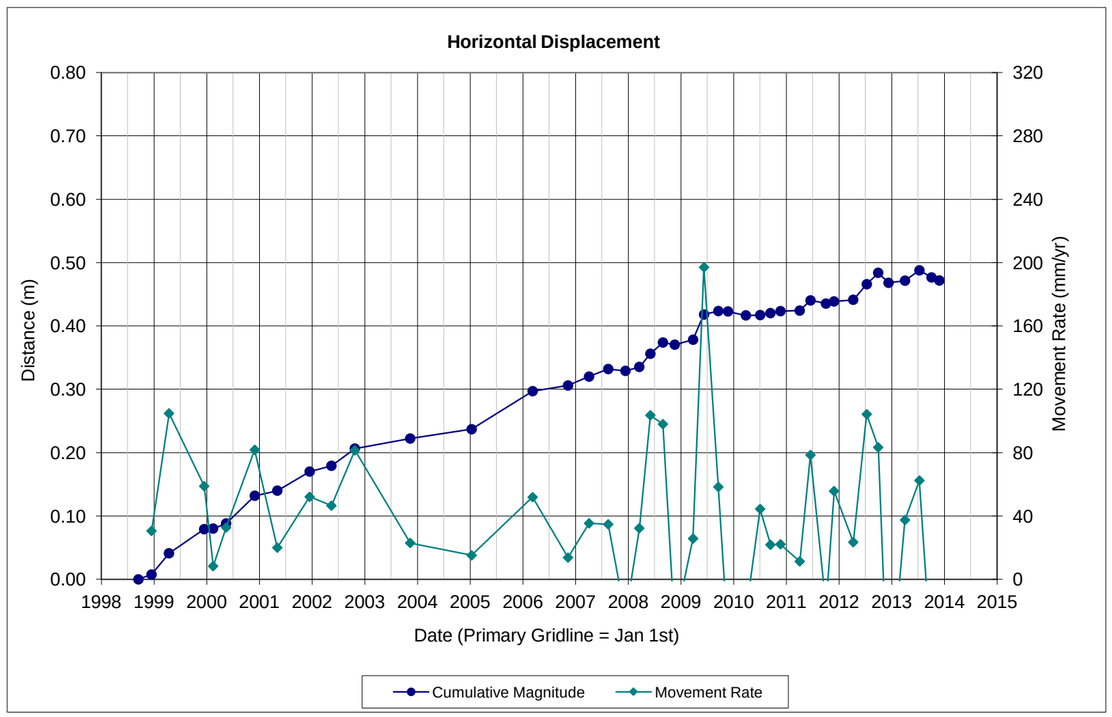


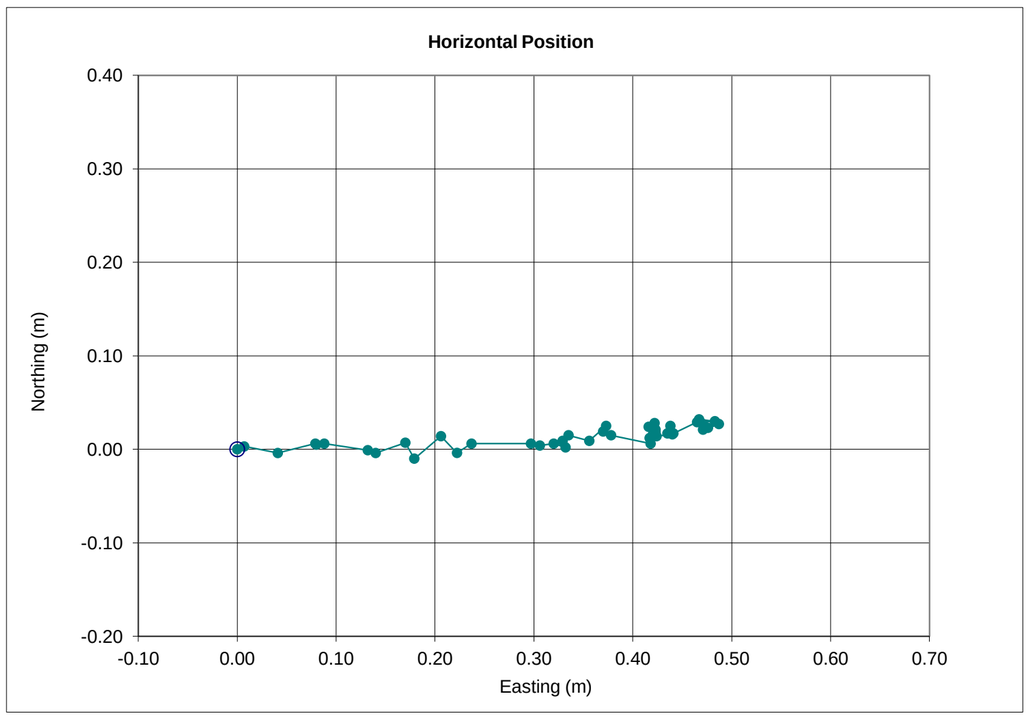
Survey and Displacement Data - Hub 98-05

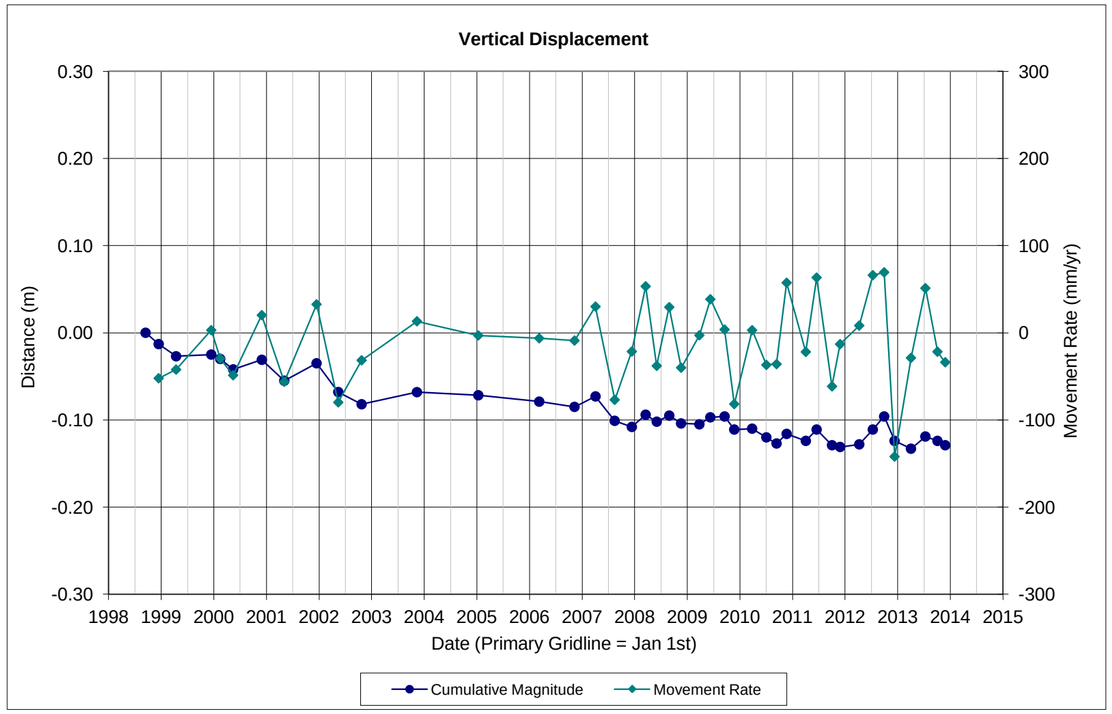
East of Dawson/Lewis Intersection

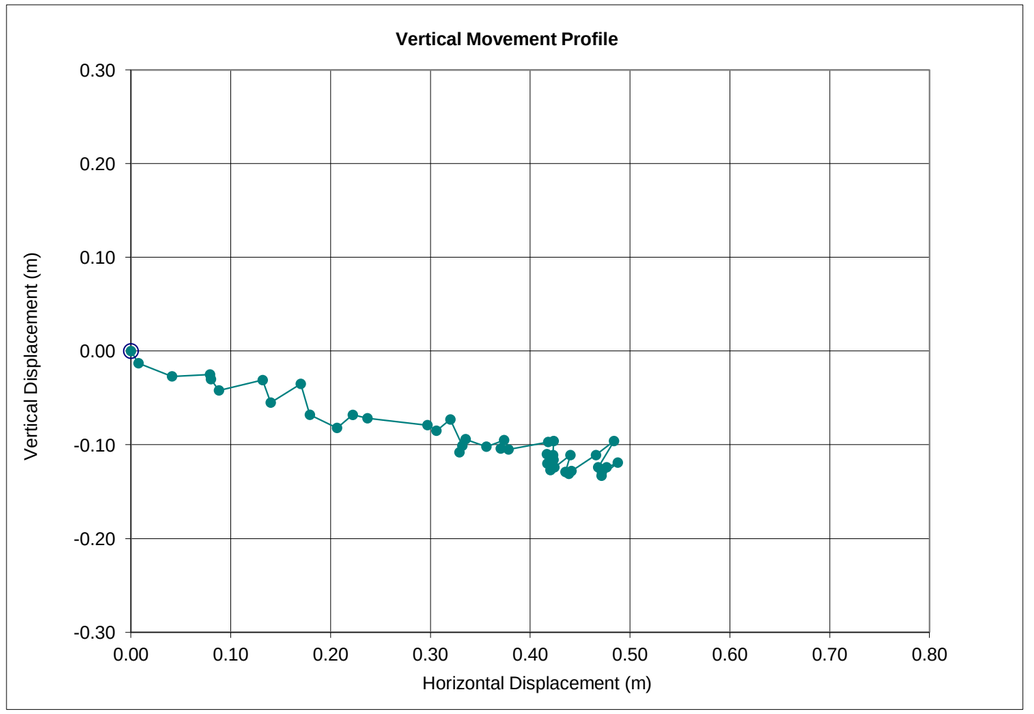
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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
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

Displacement Graphs - Hub 98-05
East of Dawson/Lewis Intersection









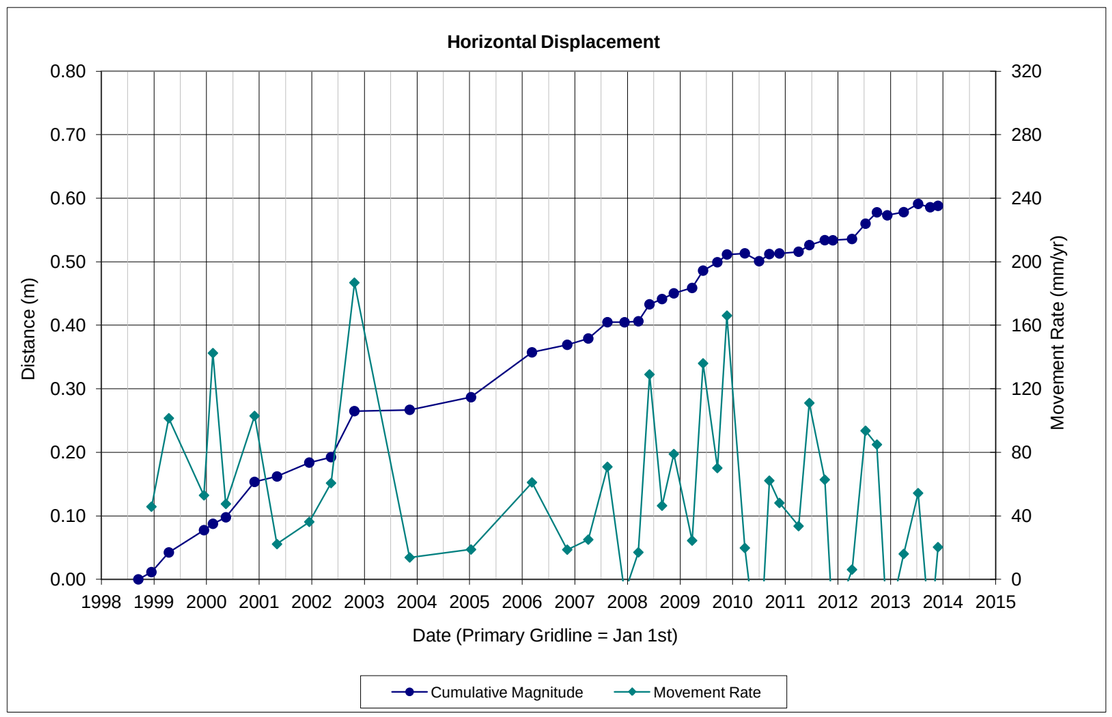
Survey and Displacement Data - Hub 98-06

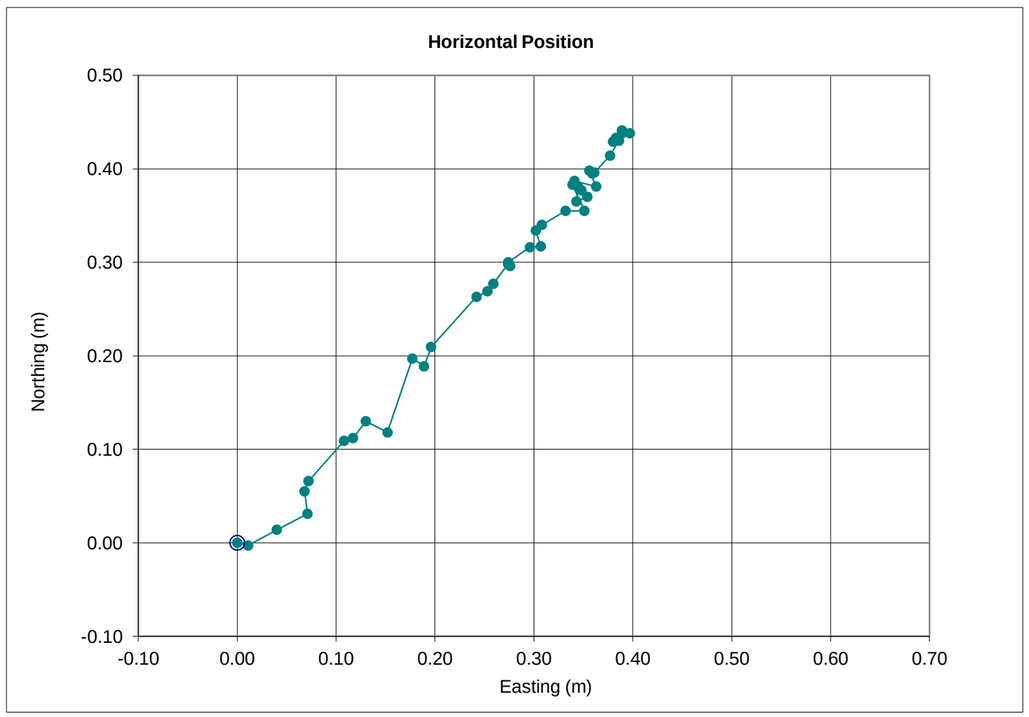
Paley West

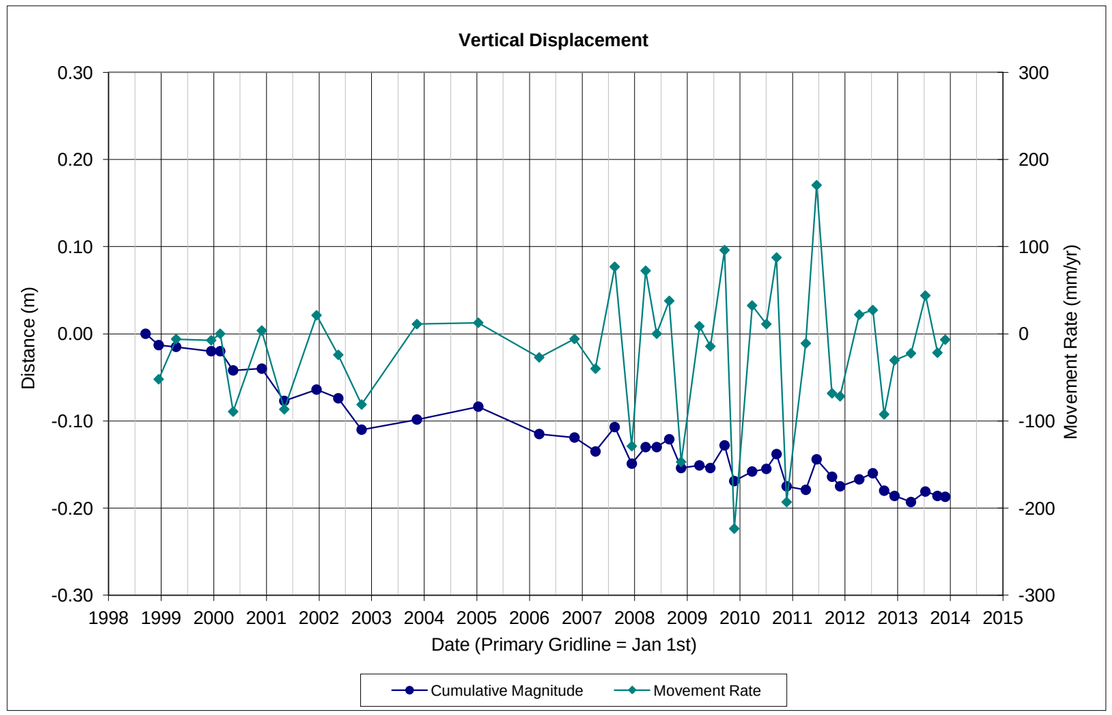
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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
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

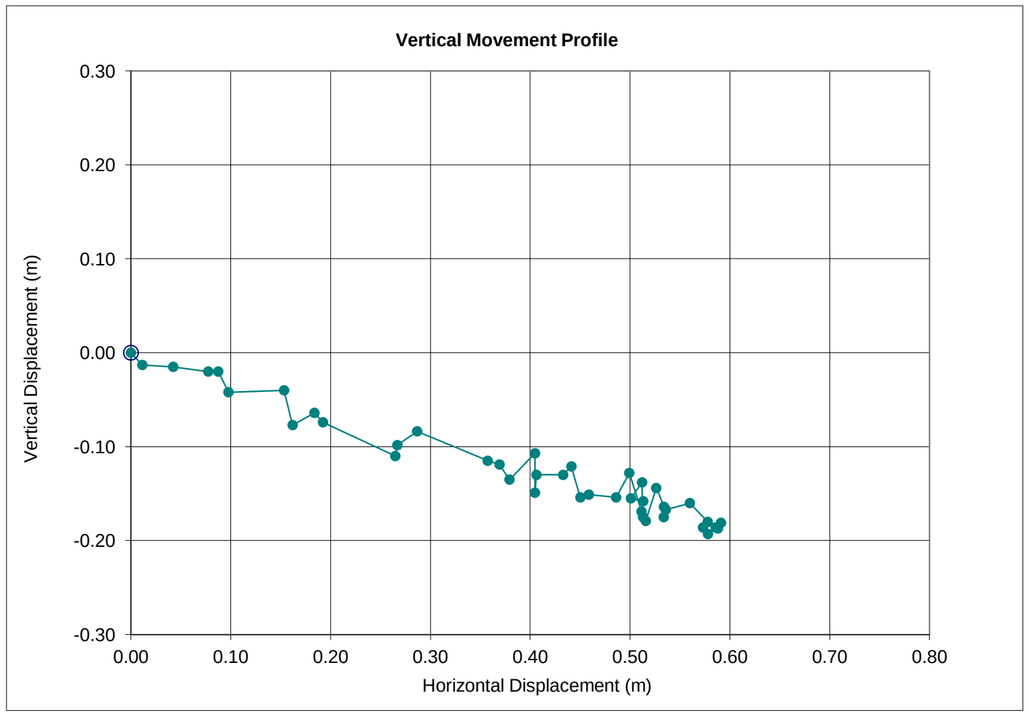
Displacement Graphs - Hub 98-06

Paley West









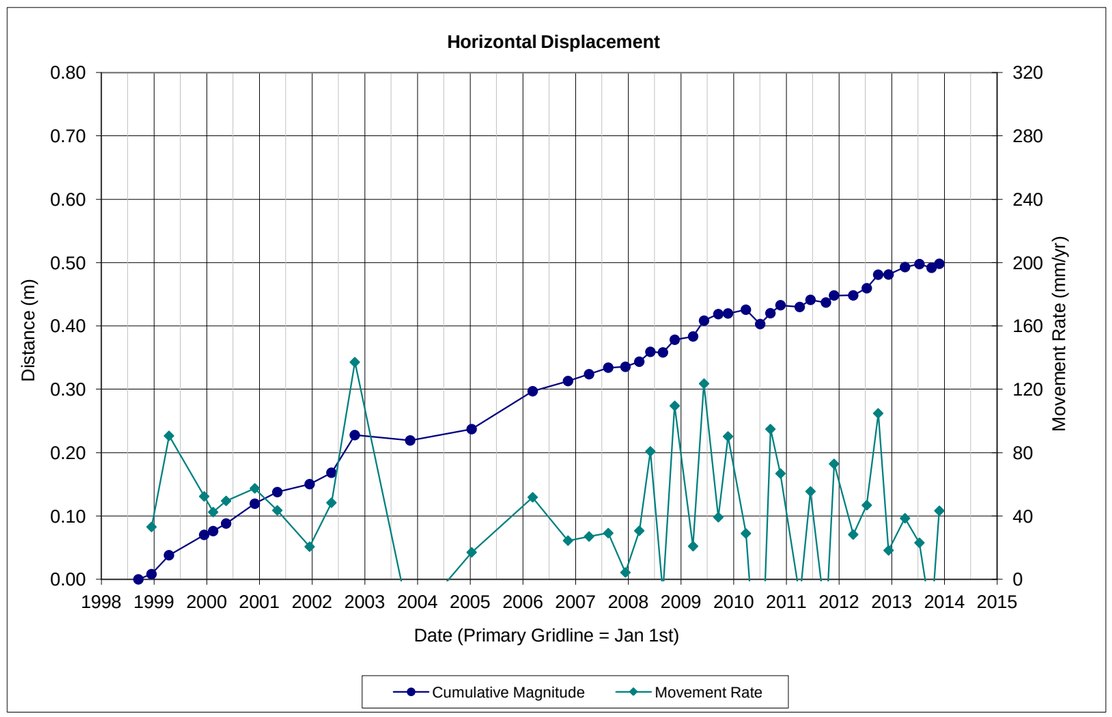
Survey and Displacement Data - Hub 98-07

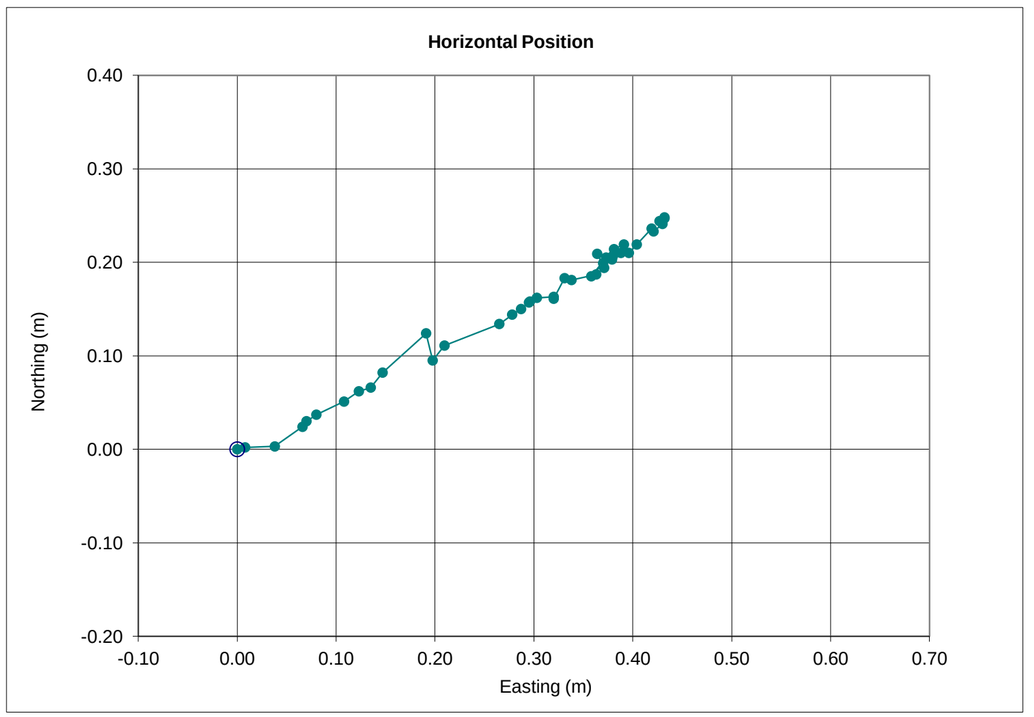
Paley East

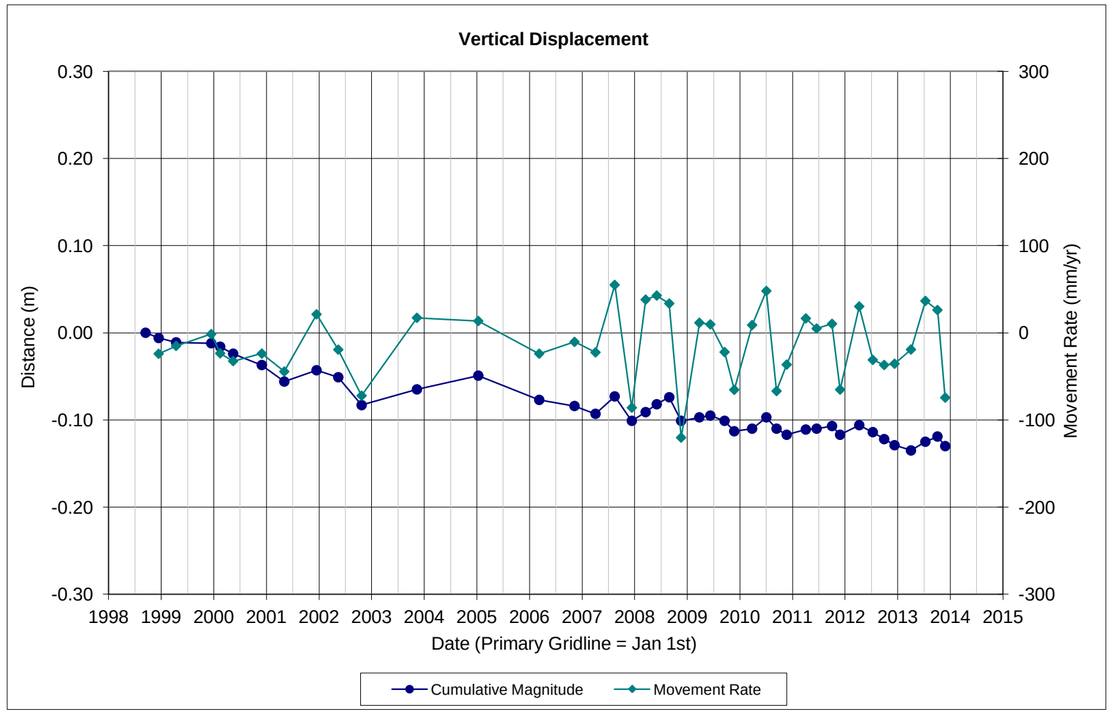
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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
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

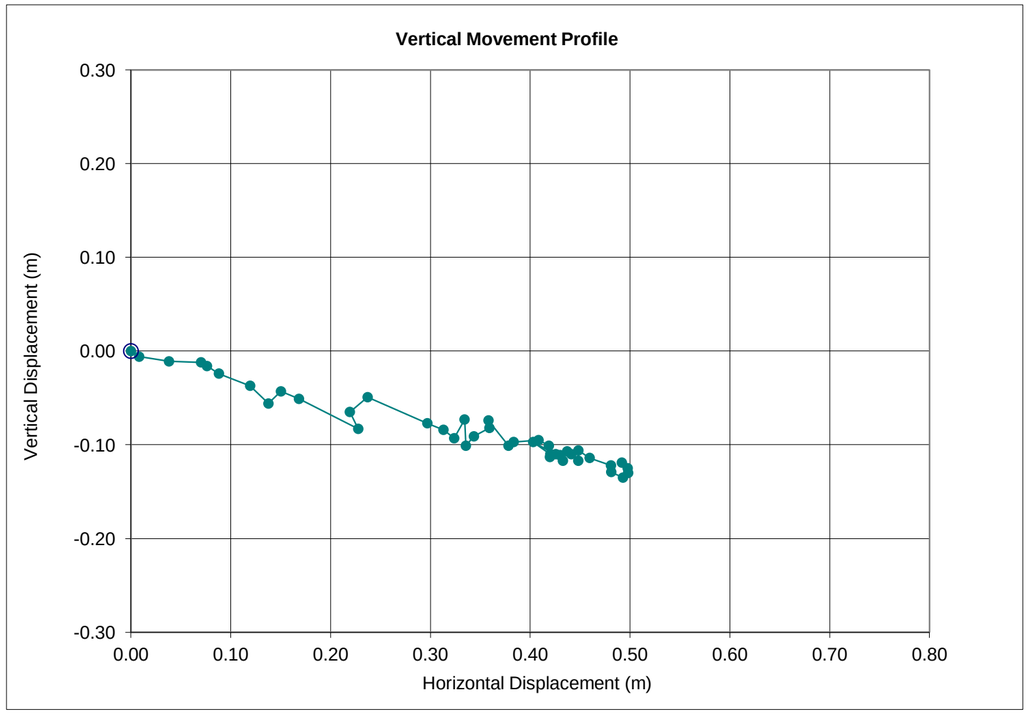
Displacement Graphs - Hub 98-07

Paley East







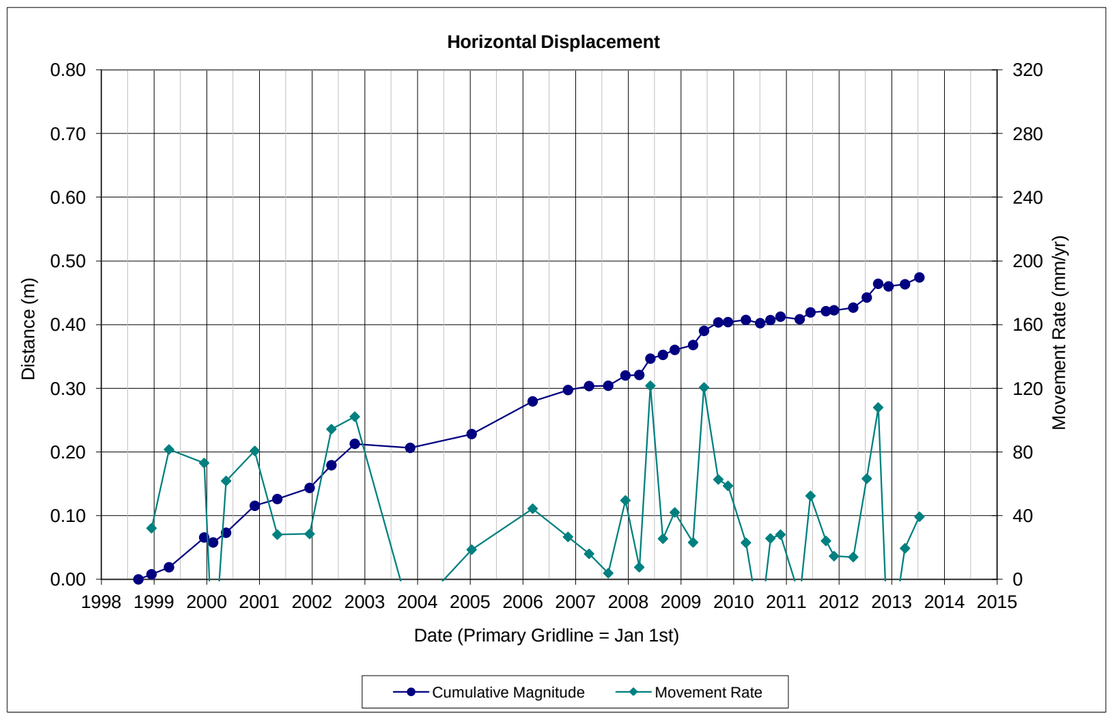


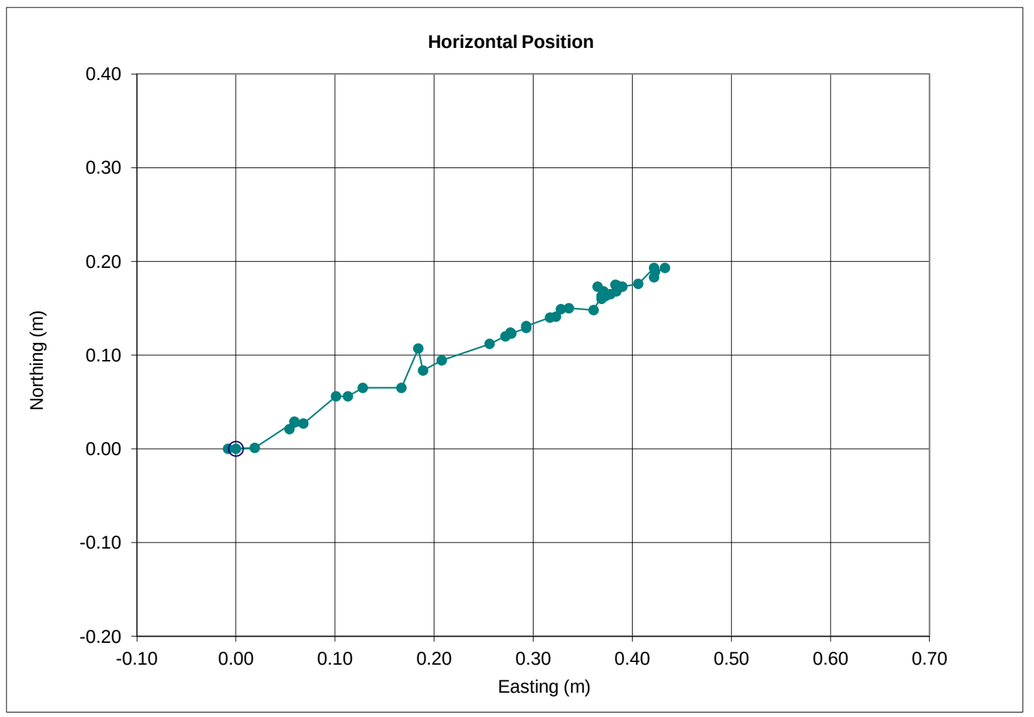
Survey and Displacement Data - Hub 98-08

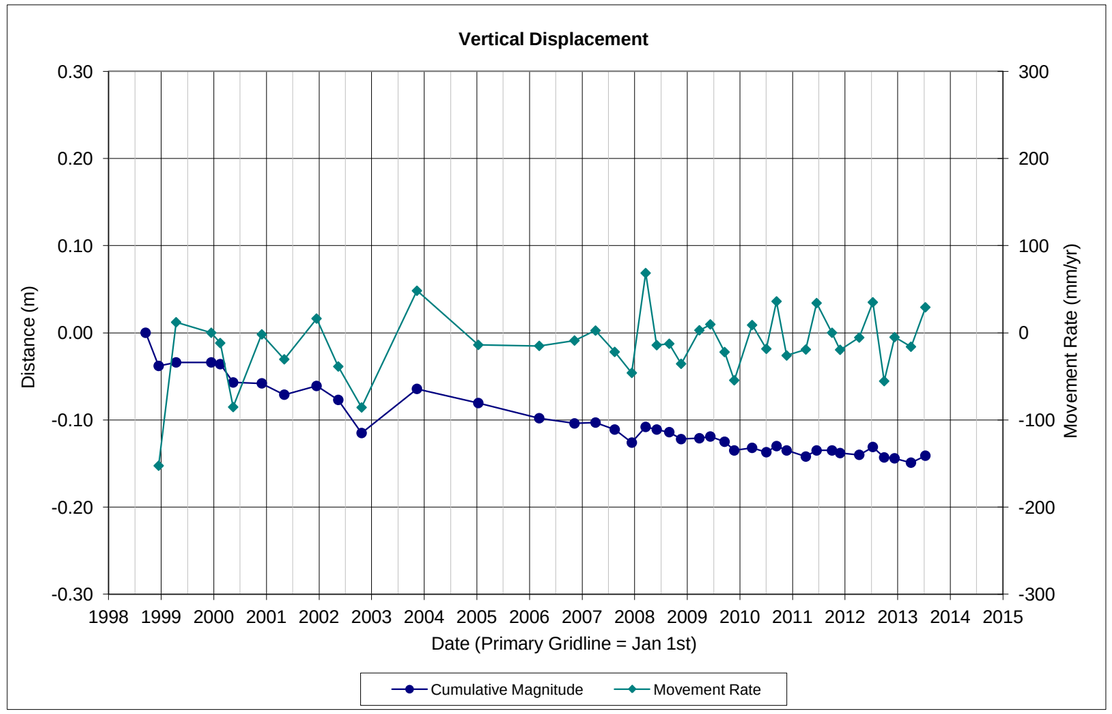
Picard Avenue

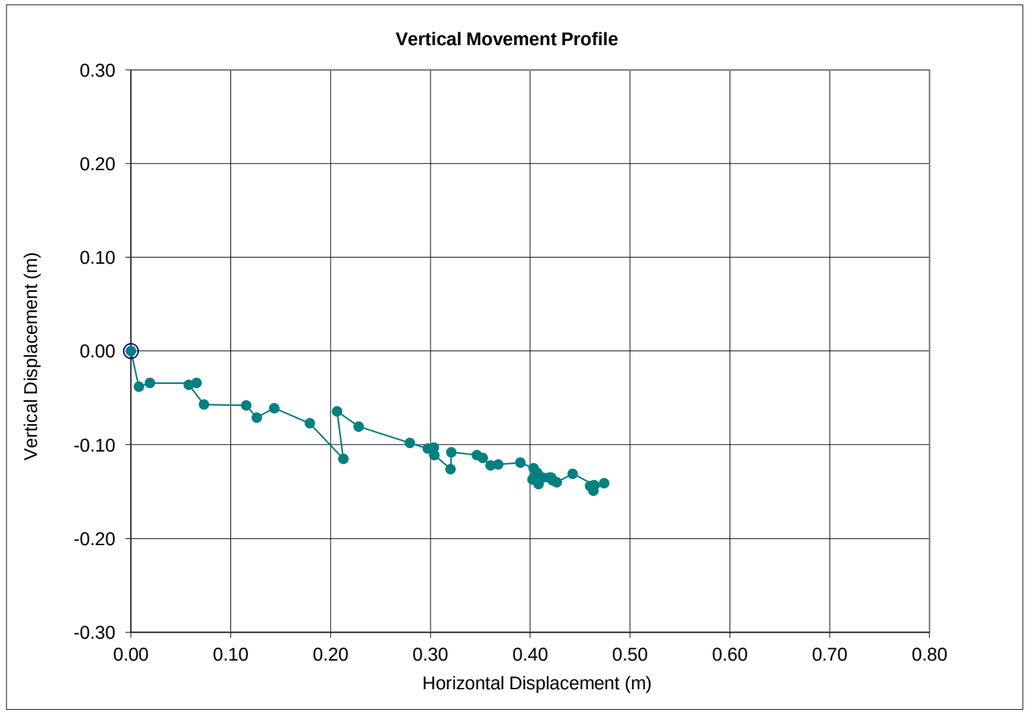
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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
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

Displacement Graphs - Hub 98-08
Picard Avenue







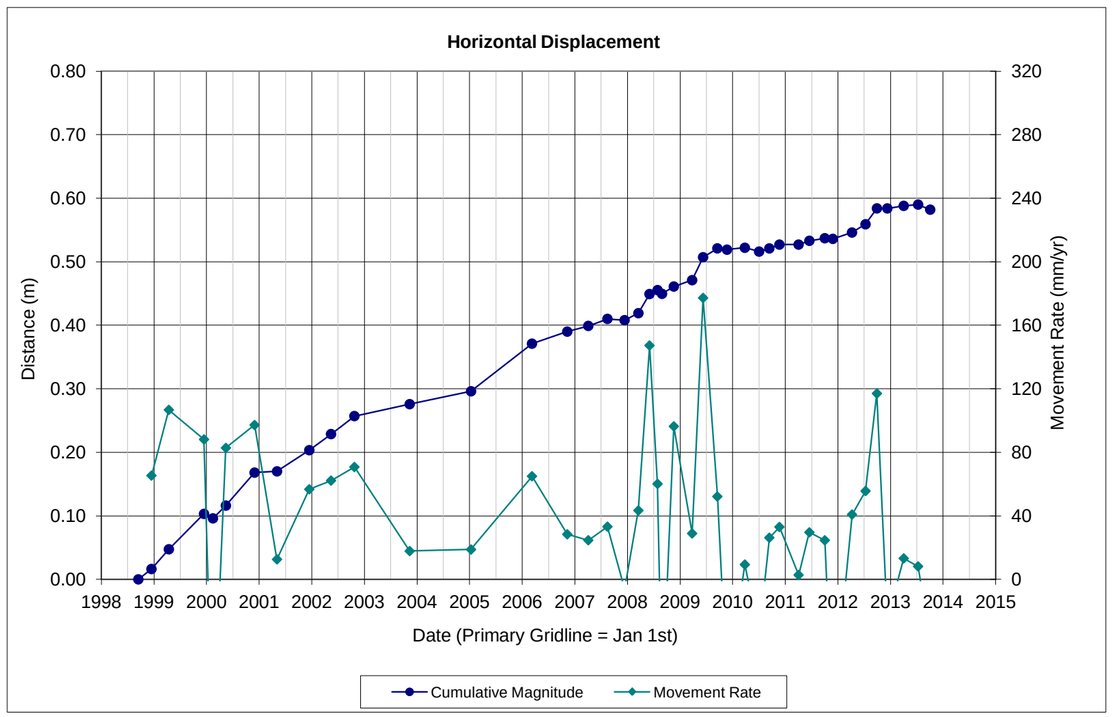


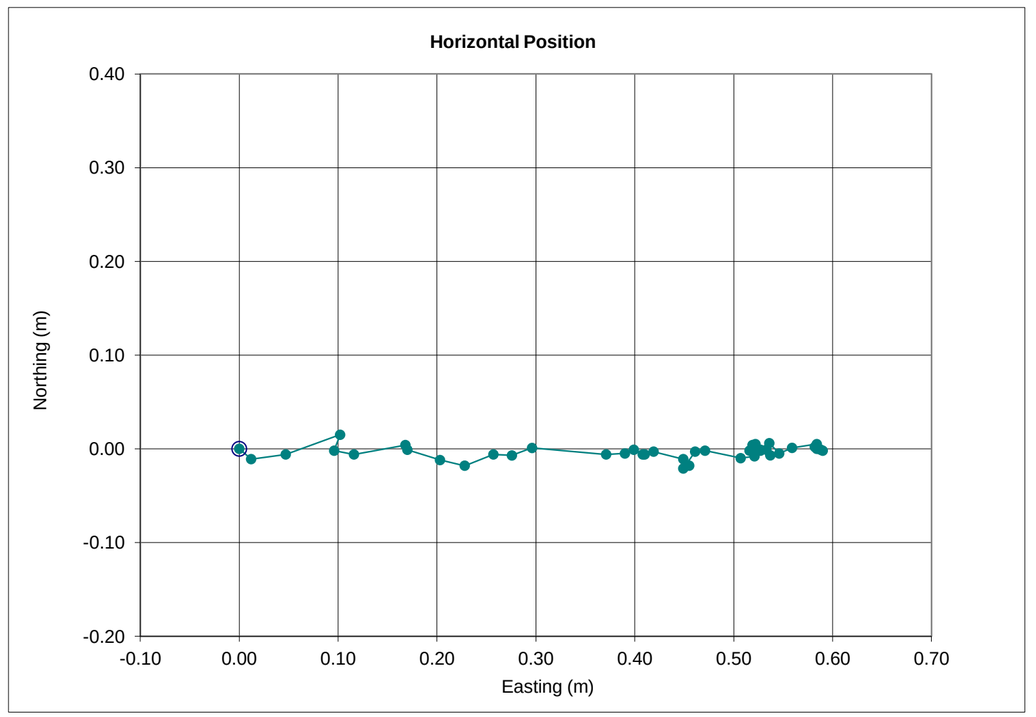
Survey and Displacement Data - Hub 98-09

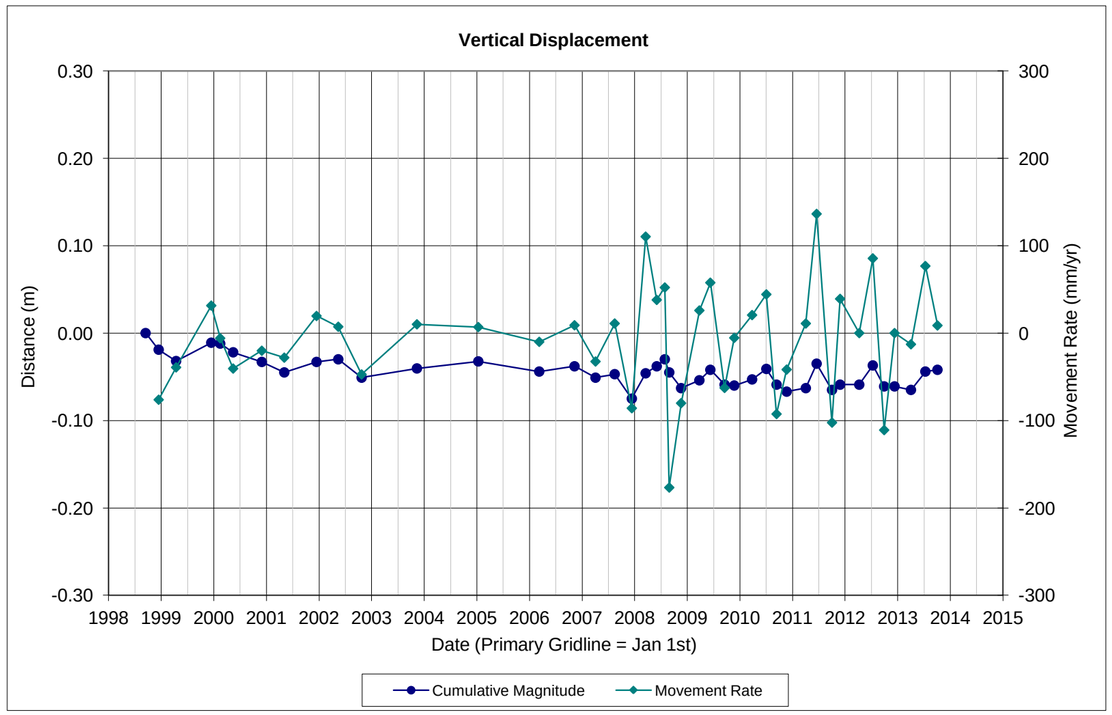
Lane between Patchett/Pierce

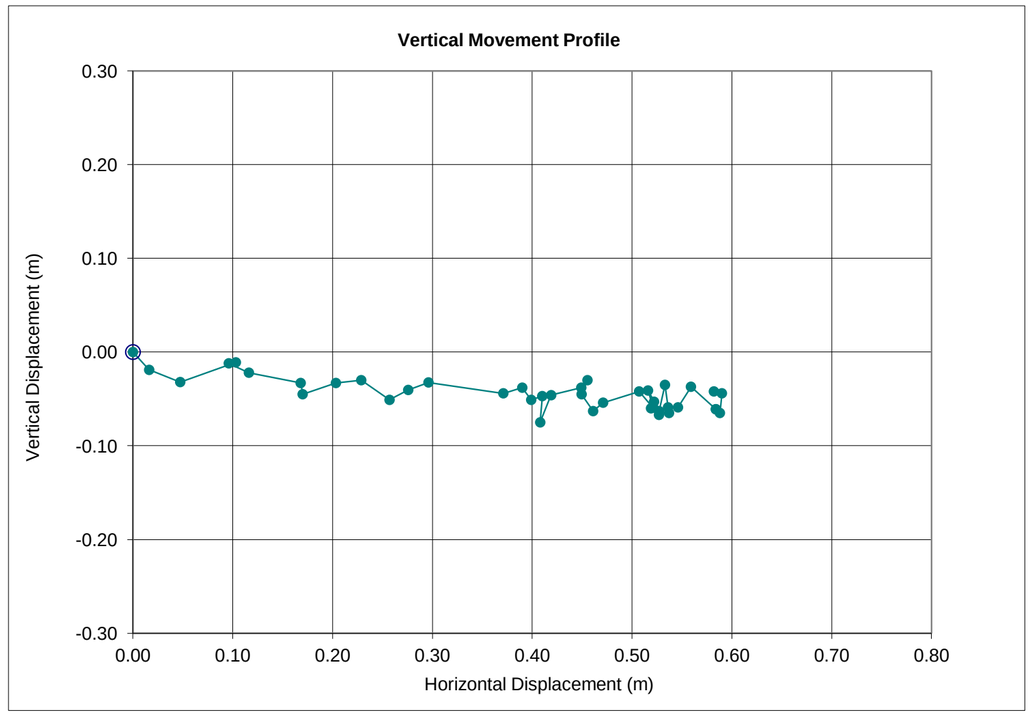
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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
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

Displacement Graphs - Hub 98-09
Lane between Patchett/Pierce







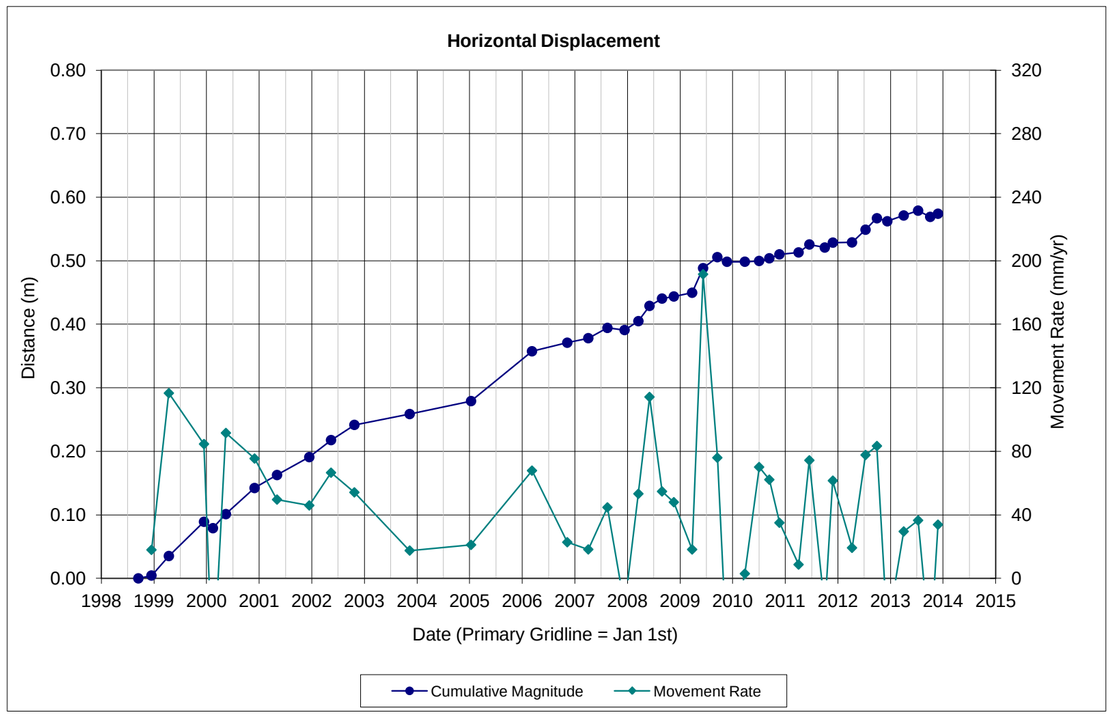


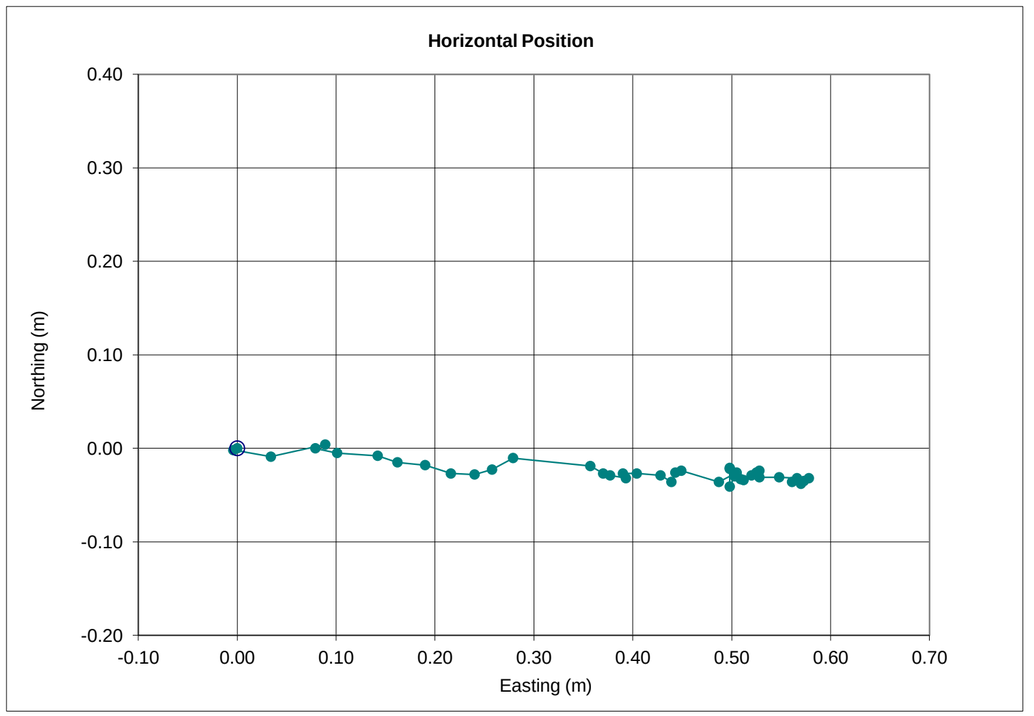
Survey and Displacement Data - Hub 98-14

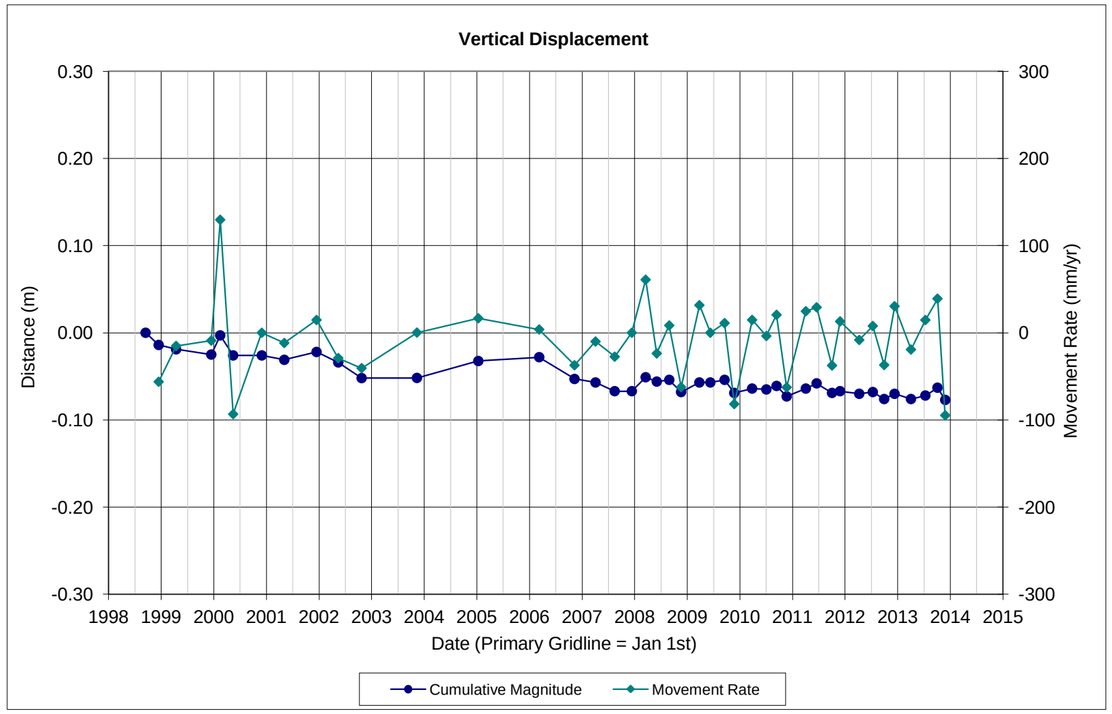
Pentland/Flamingo Intersection

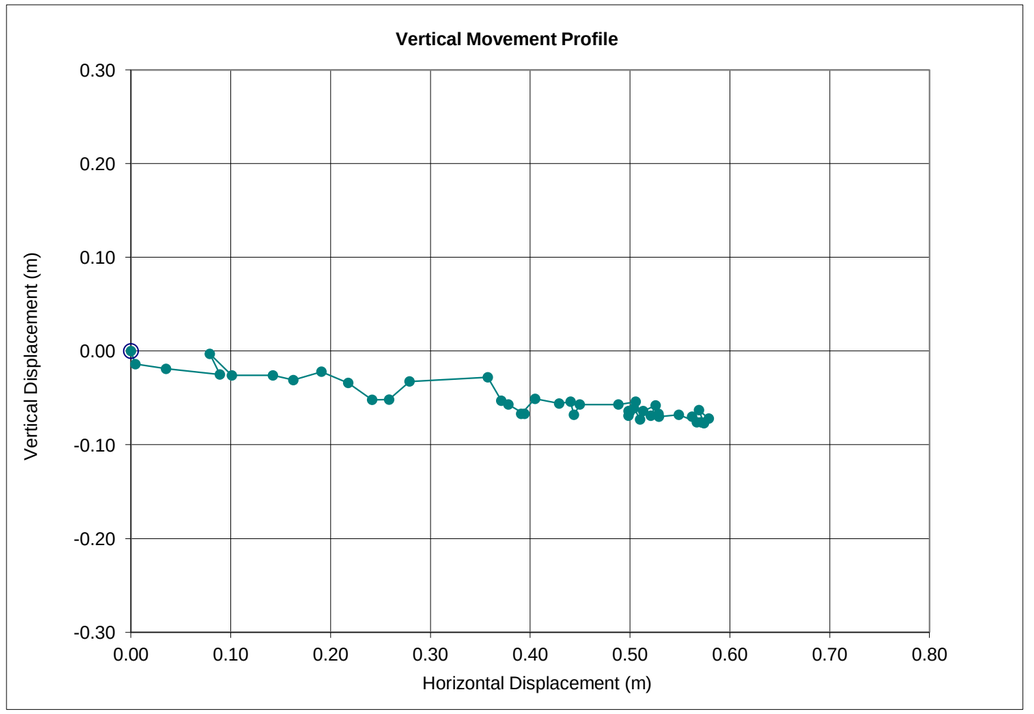
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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
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

Displacement Graphs - Hub 98-14
Pentland/Flamingo Intersection







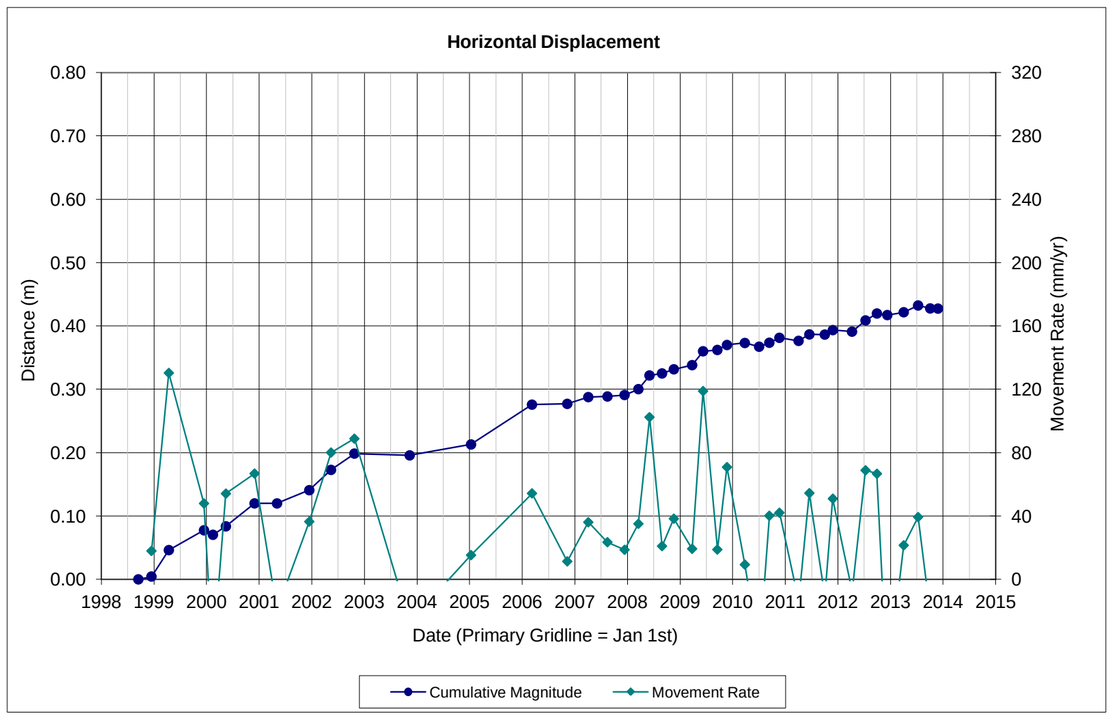


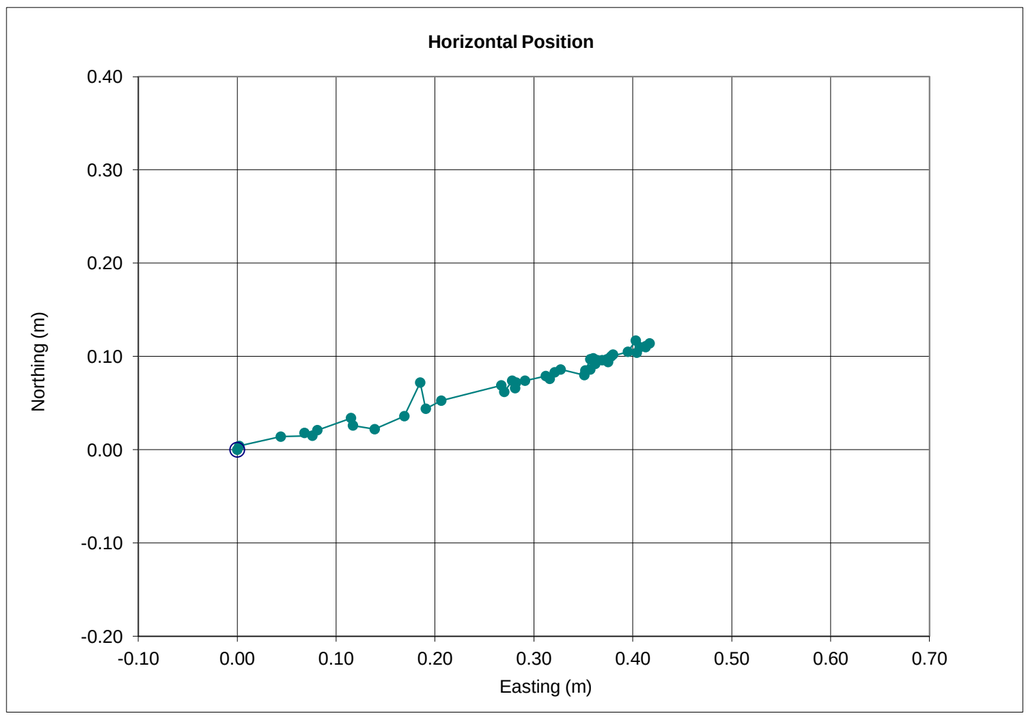
Survey and Displacement Data - Hub 98-15

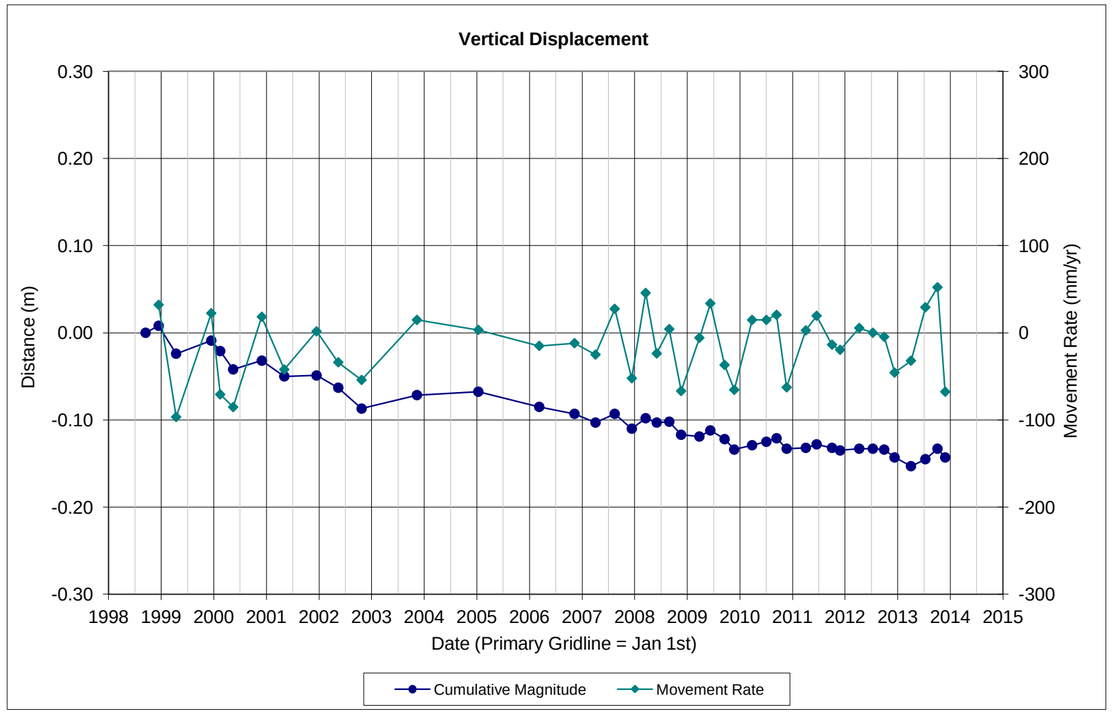
Palmer/Lewis Intersection

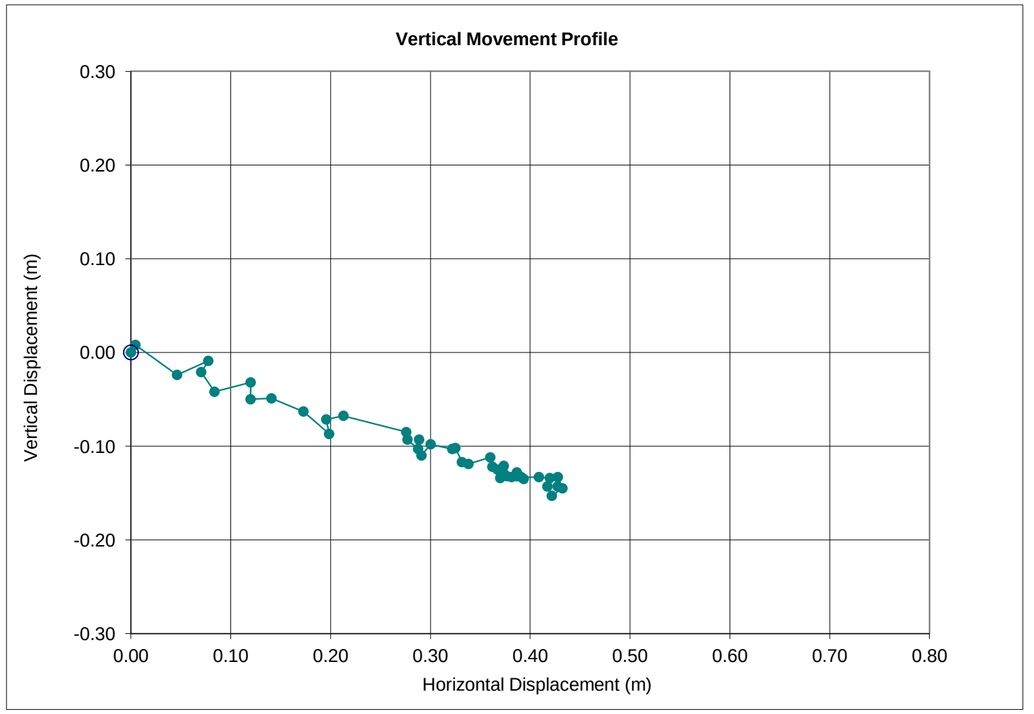
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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
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

Displacement Graphs - Hub 98-15
Palmer/Lewis Intersection









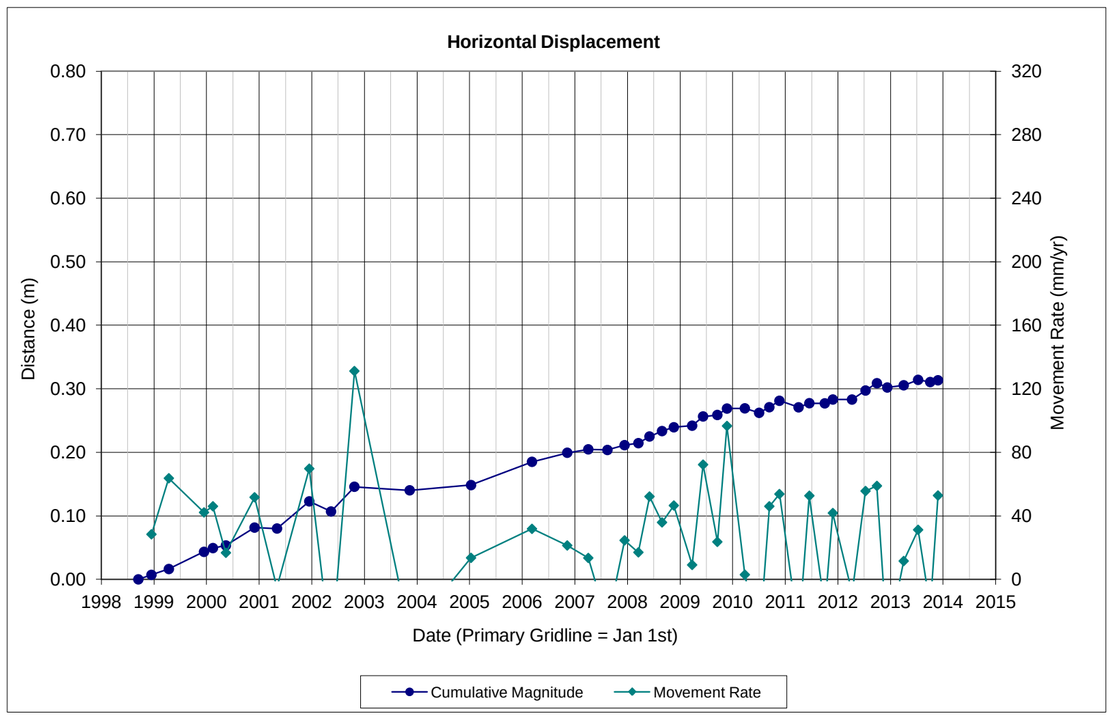
Survey and Displacement Data - Hub 98-16

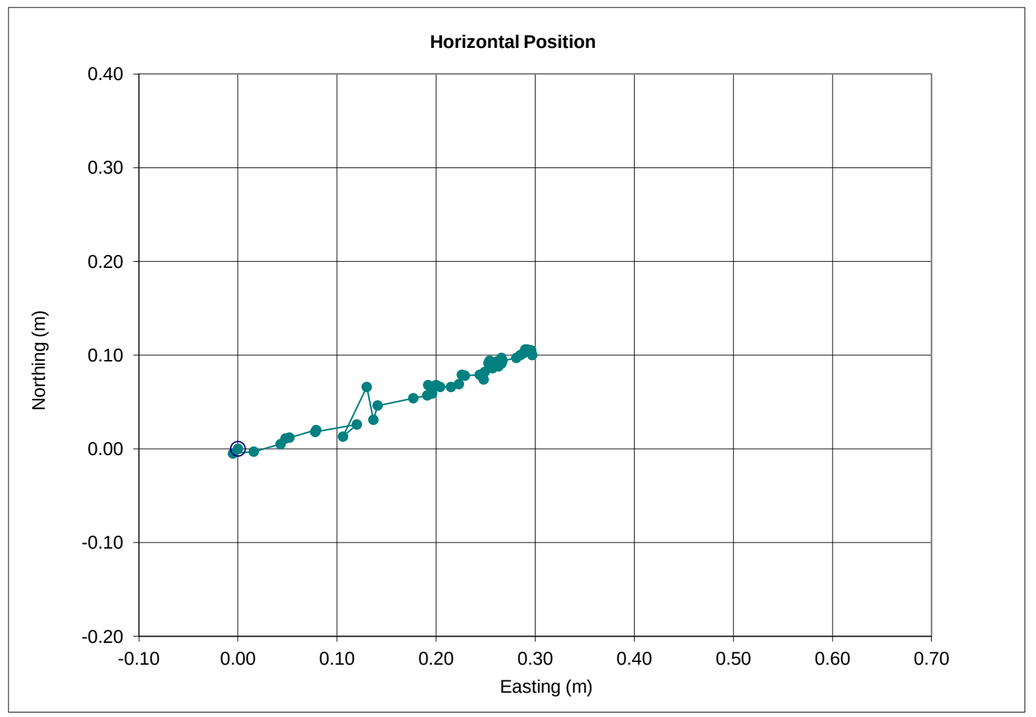
Healy Road

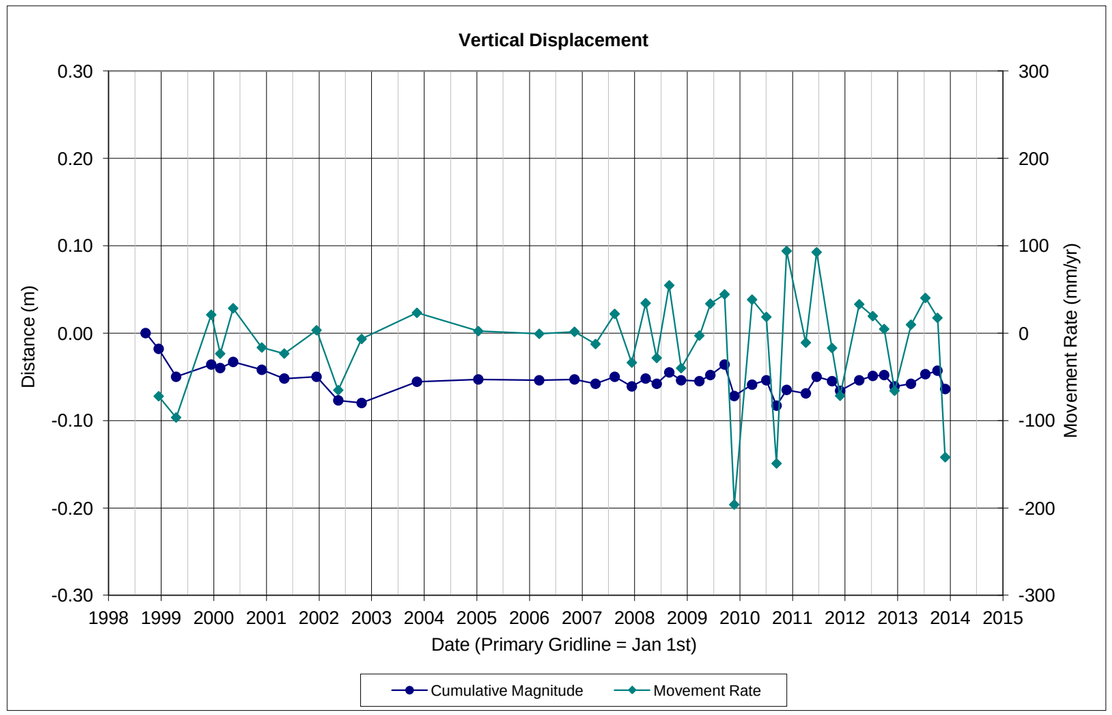
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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
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

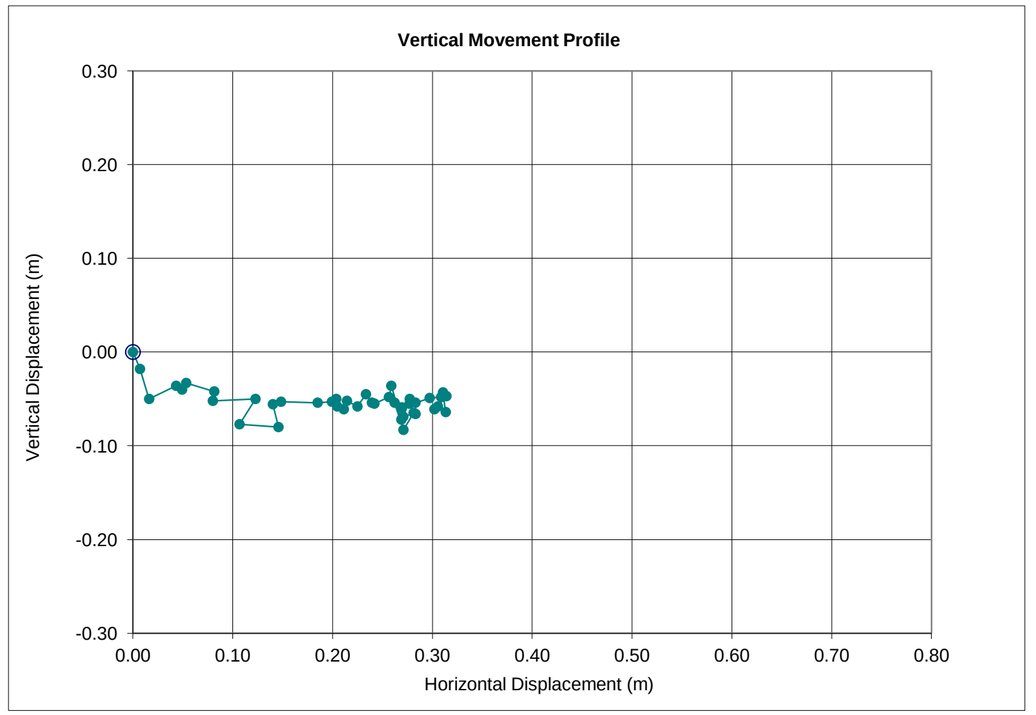
Displacement Graphs - Hub 98-16

Healy Road







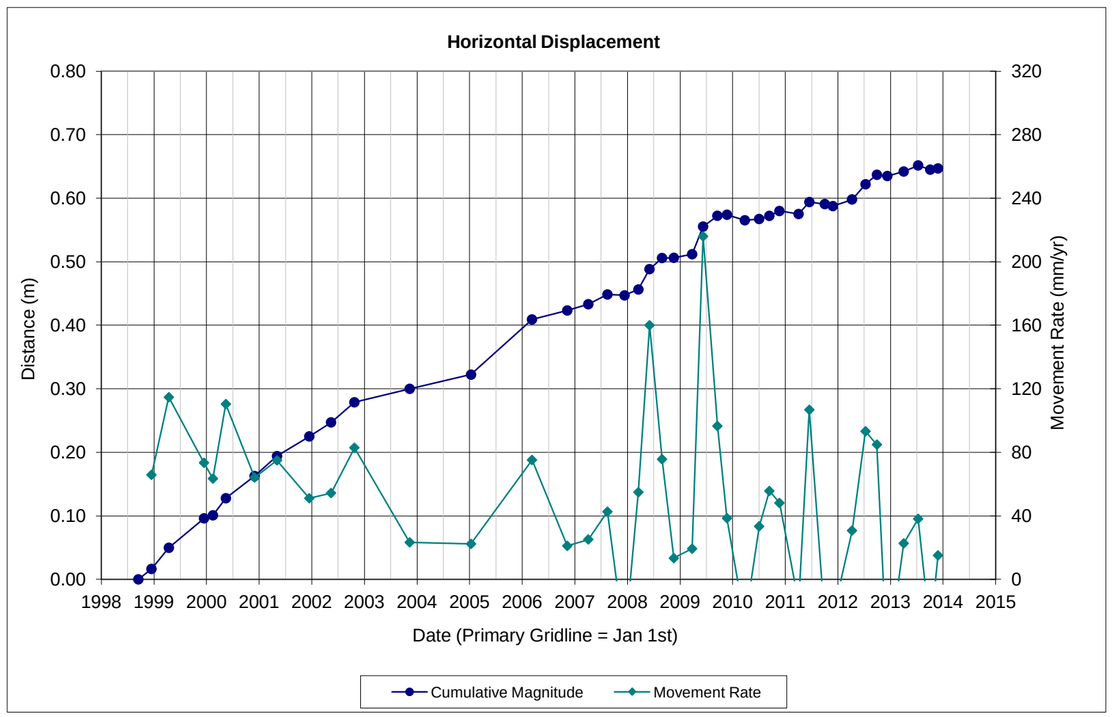


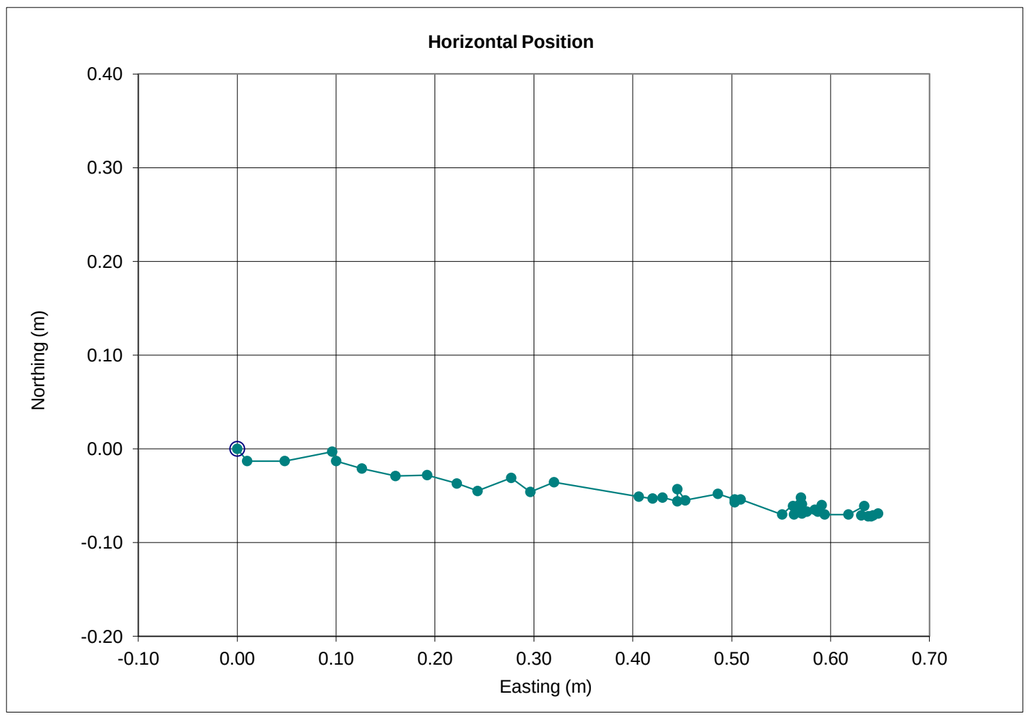
Survey and Displacement Data - Hub 98-17

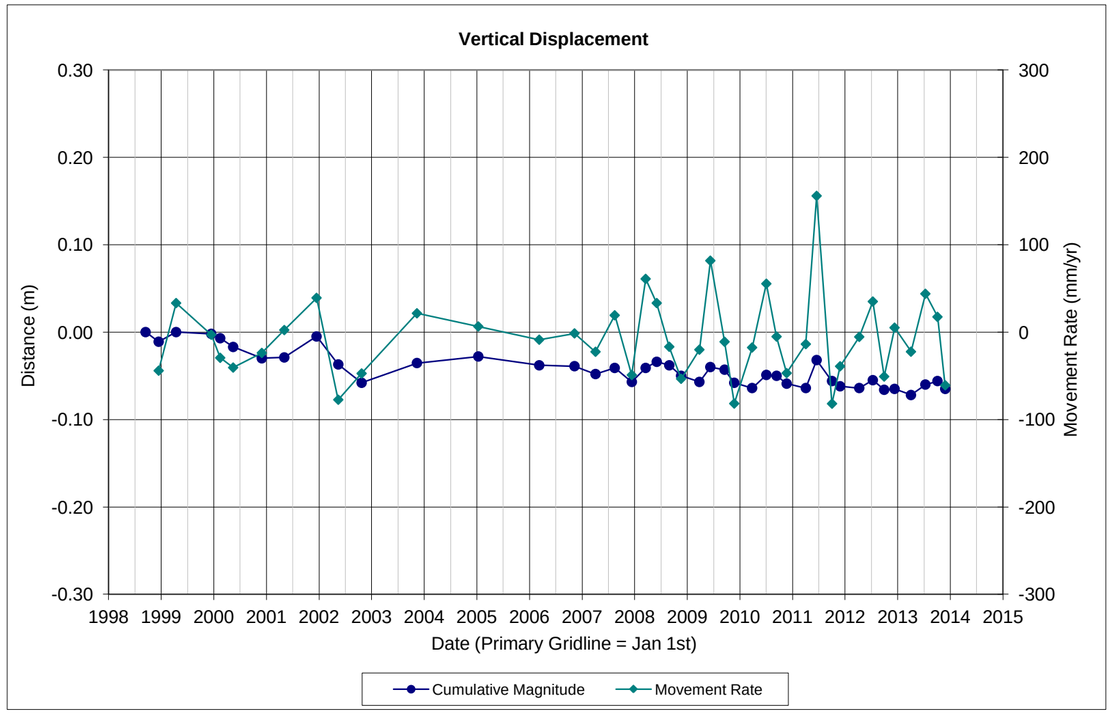
Bettcher/Lark Intersection

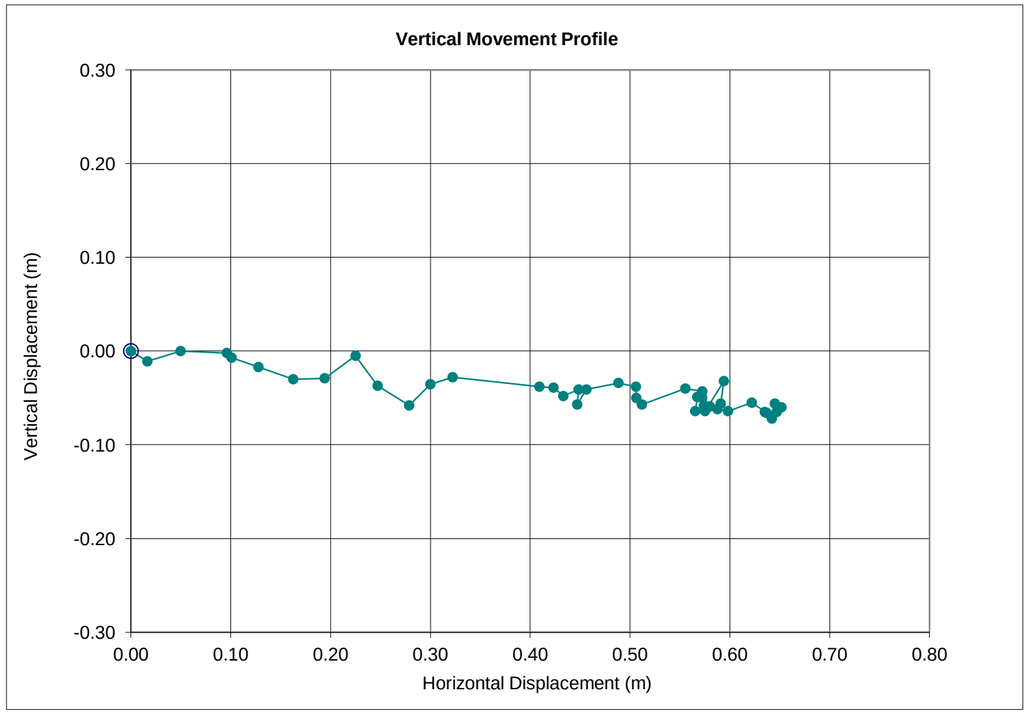
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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
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

Displacement Graphs - Hub 98-17
Bettcher/Lark Intersection







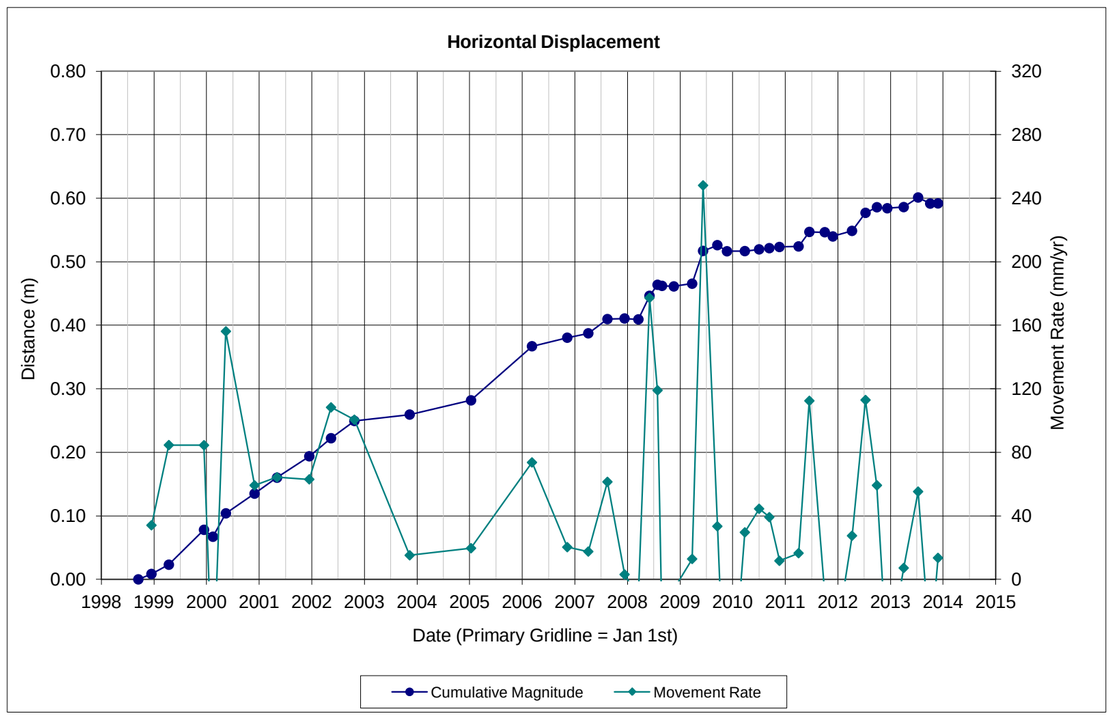


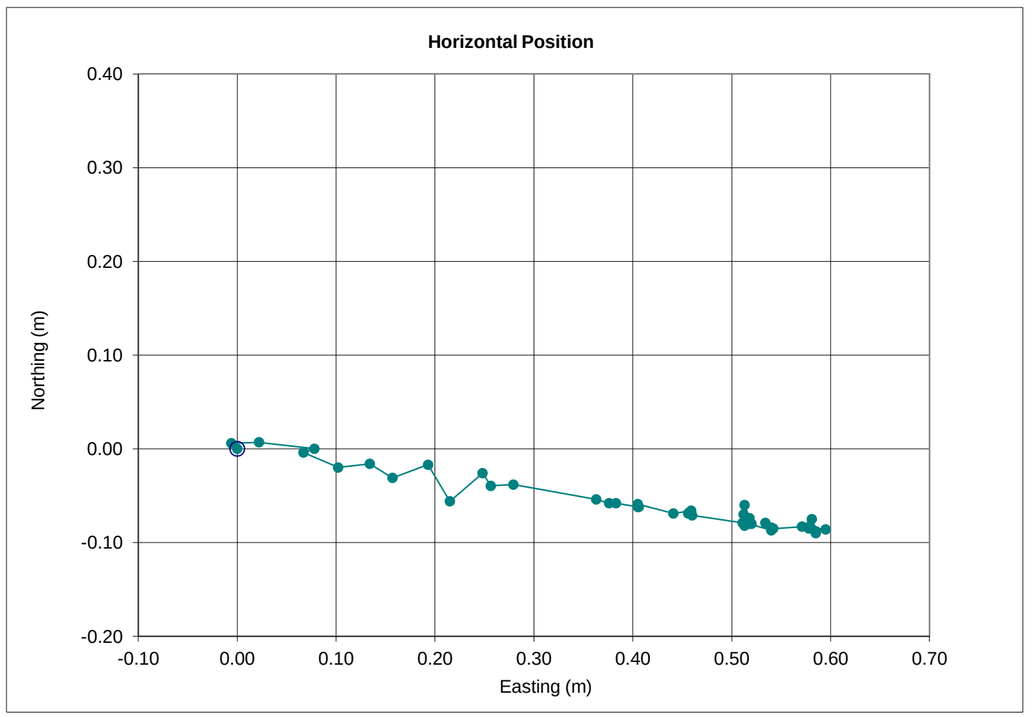
Survey and Displacement Data - Hub 98-18

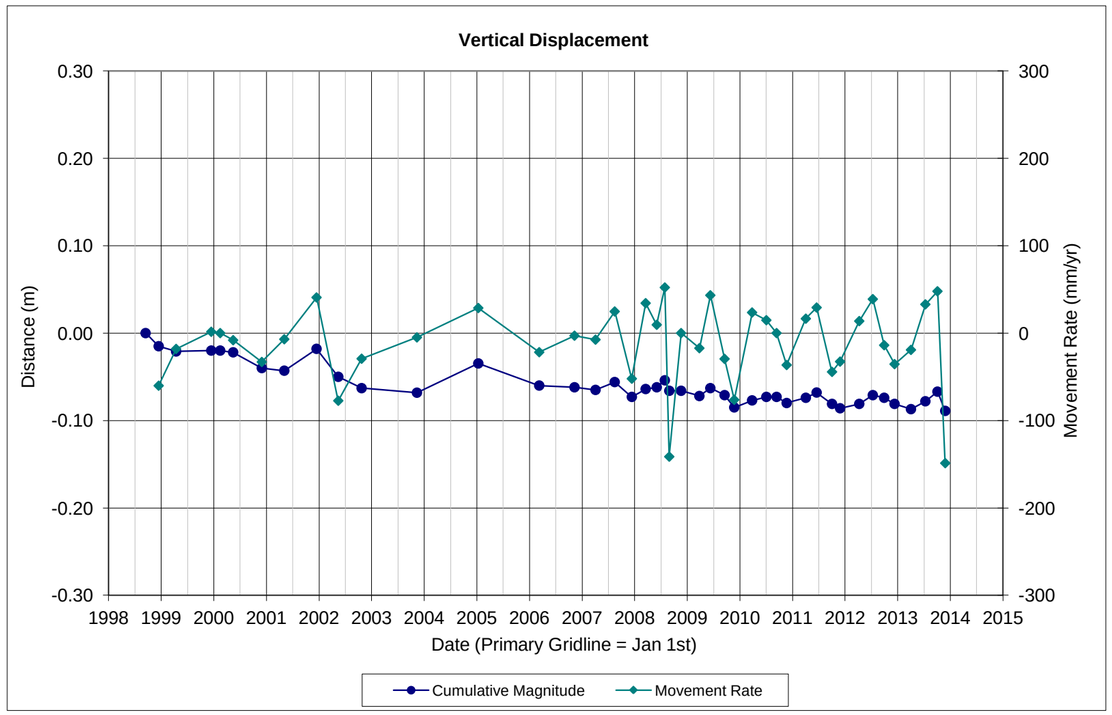
Lark/Flamingo Intersection

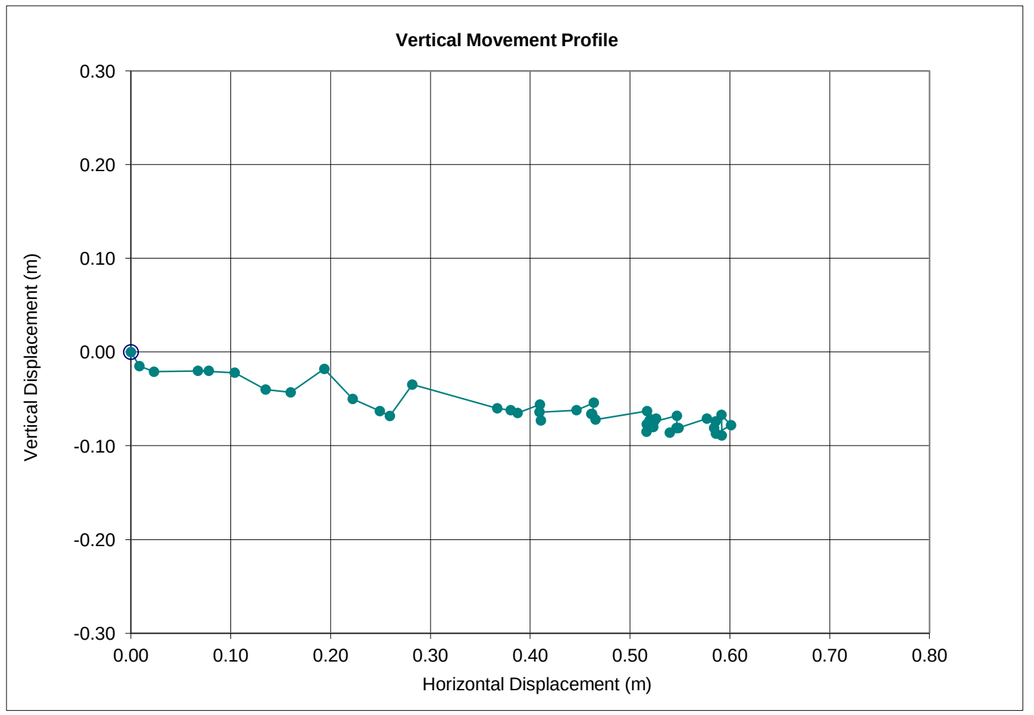
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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
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

Displacement Graphs - Hub 98-18
Lark/Flamingo Intersection







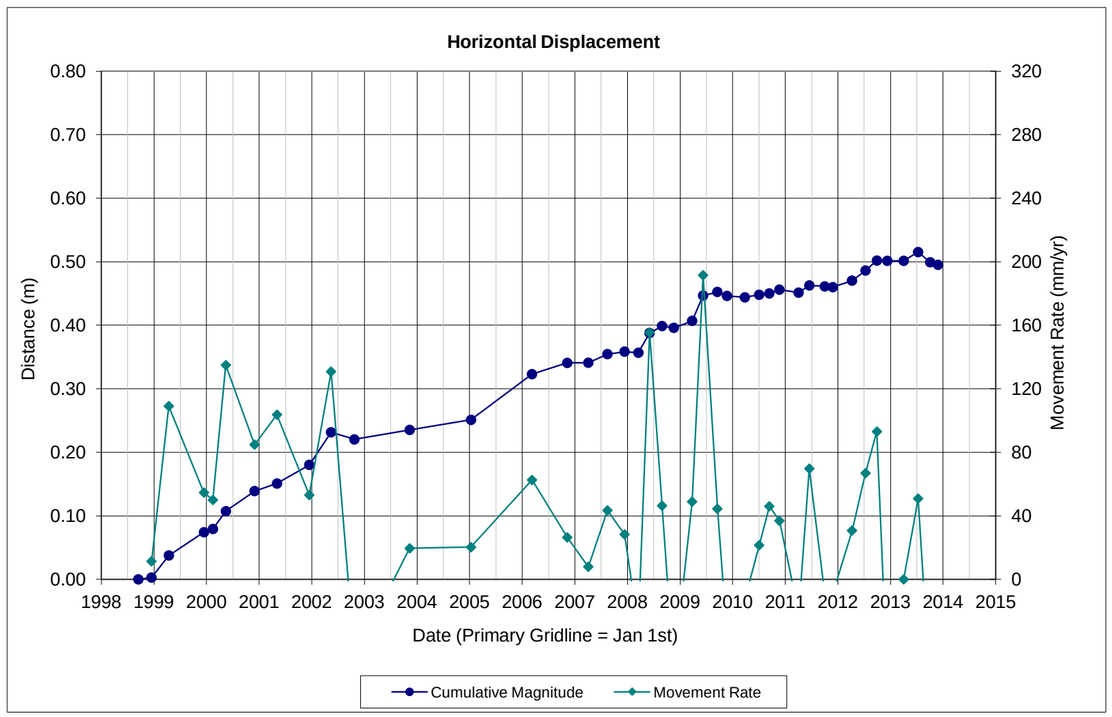


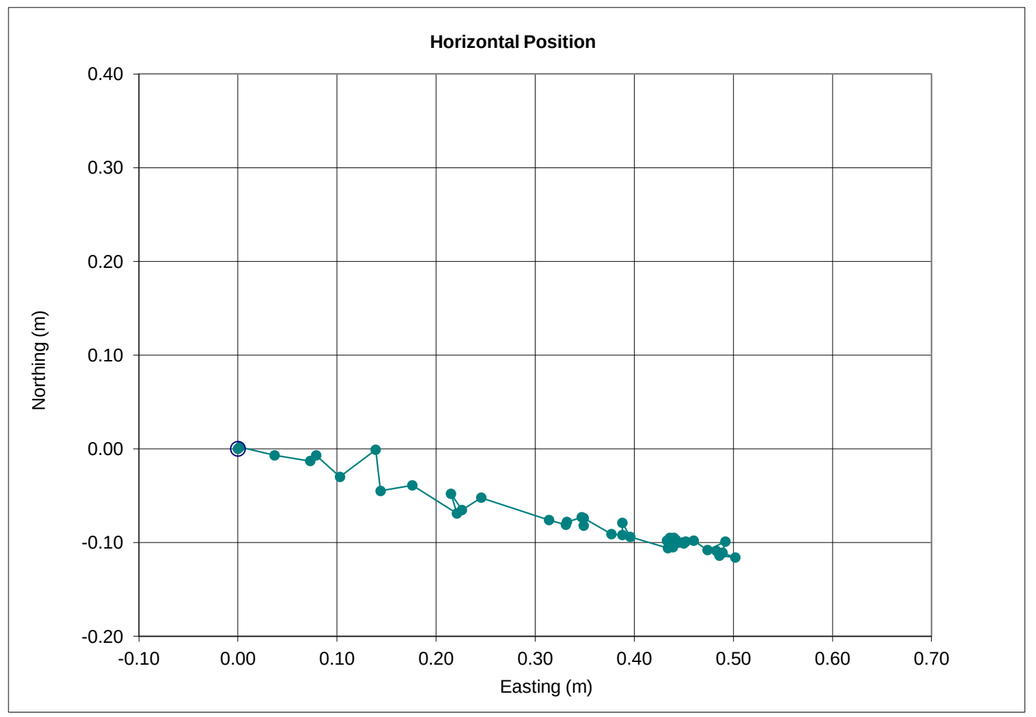
Survey and Displacement Data - Hub 98-19

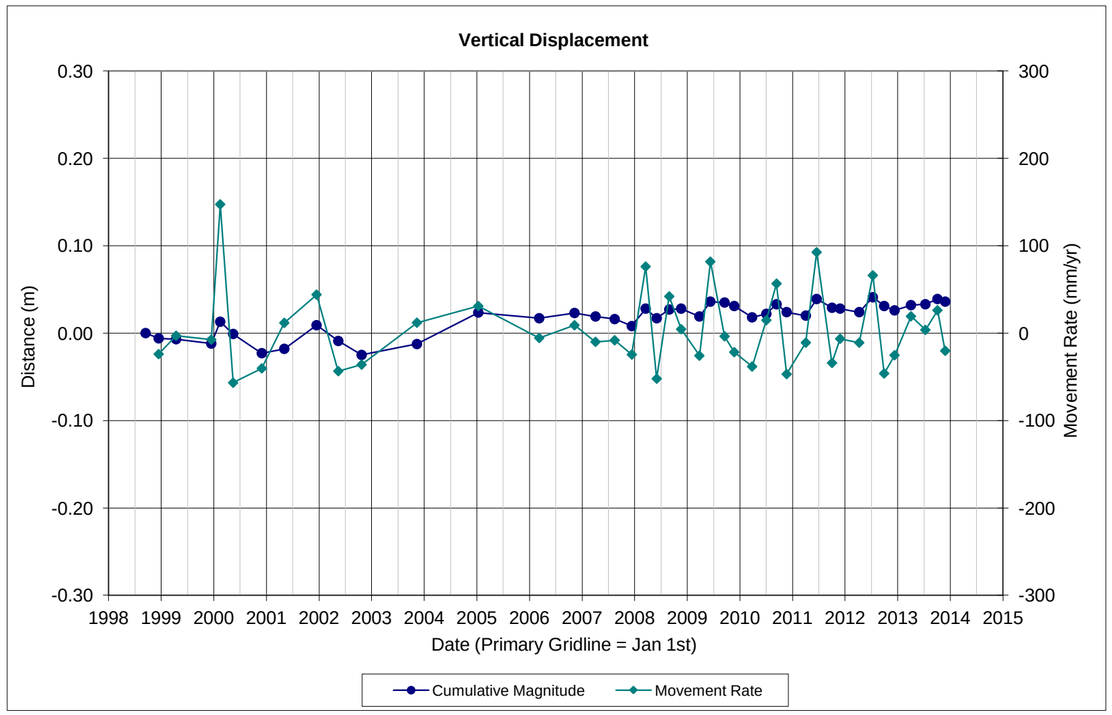
Abbott/Flamingo Intersection

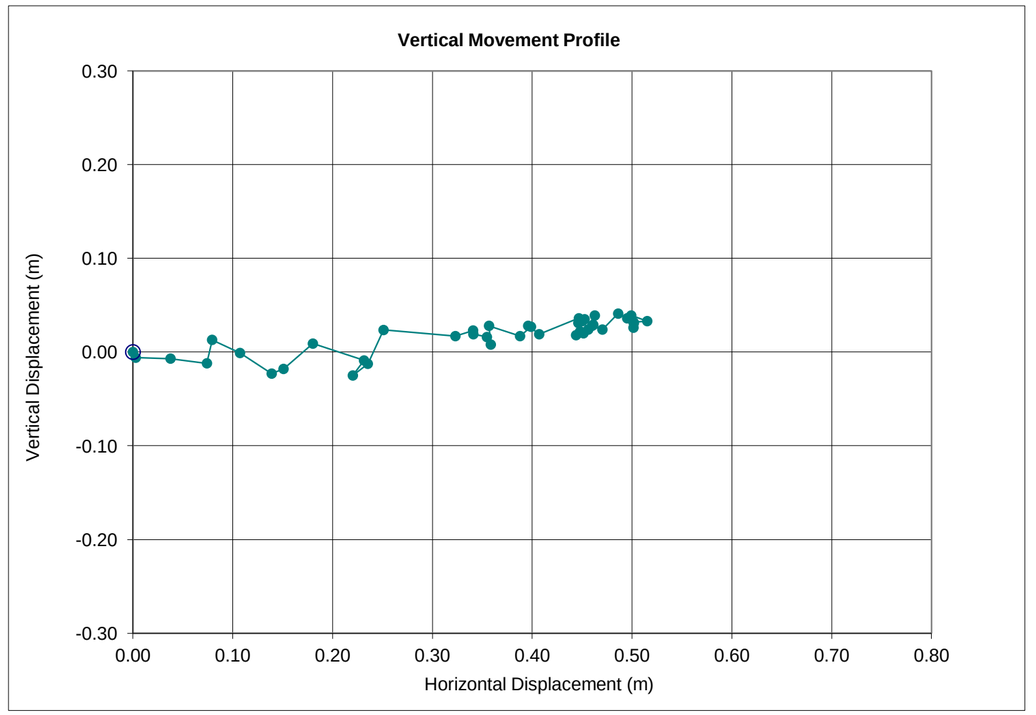
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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
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

Displacement Graphs - Hub 98-19
Abbott/Flamingo Intersection







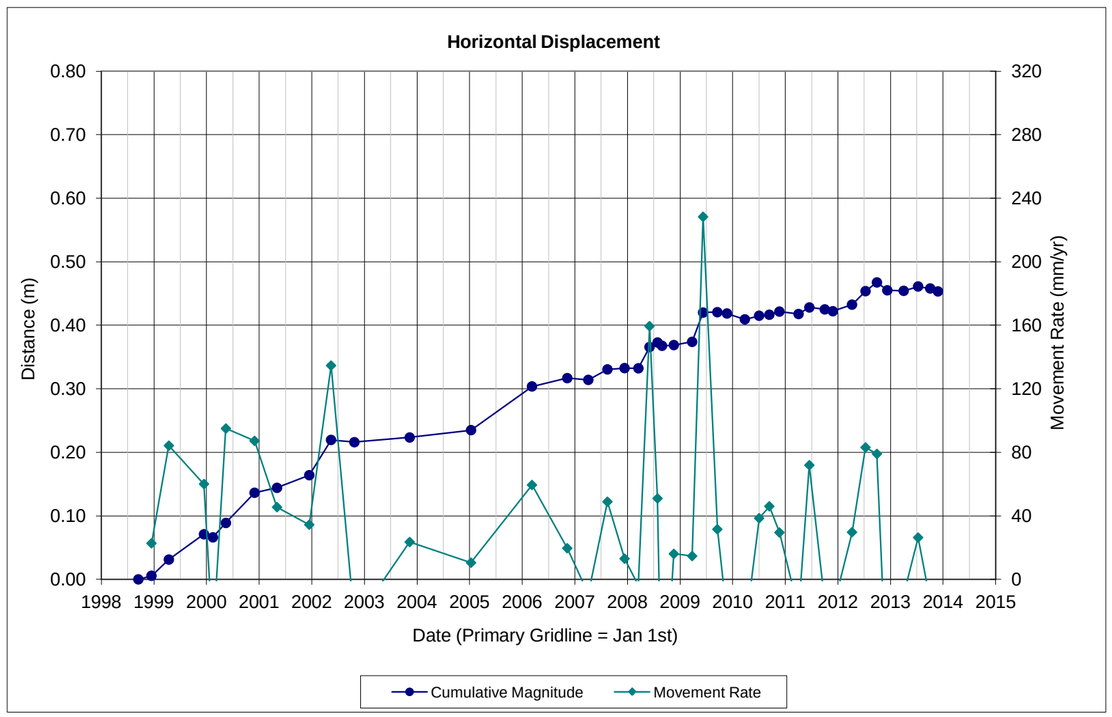


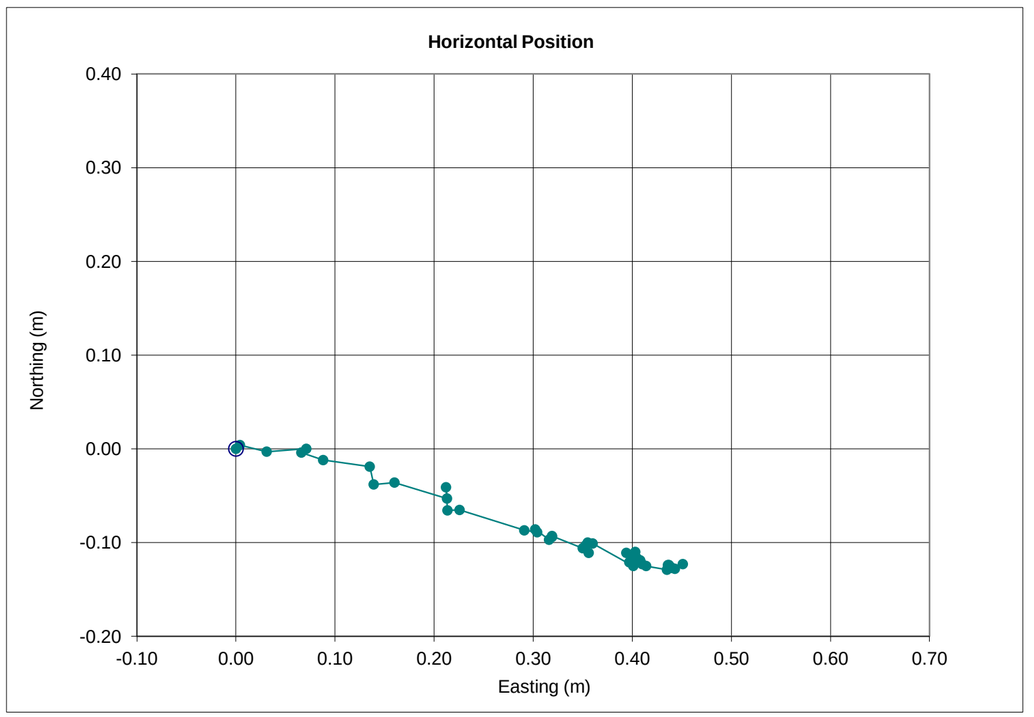
Survey and Displacement Data - Hub 98-20

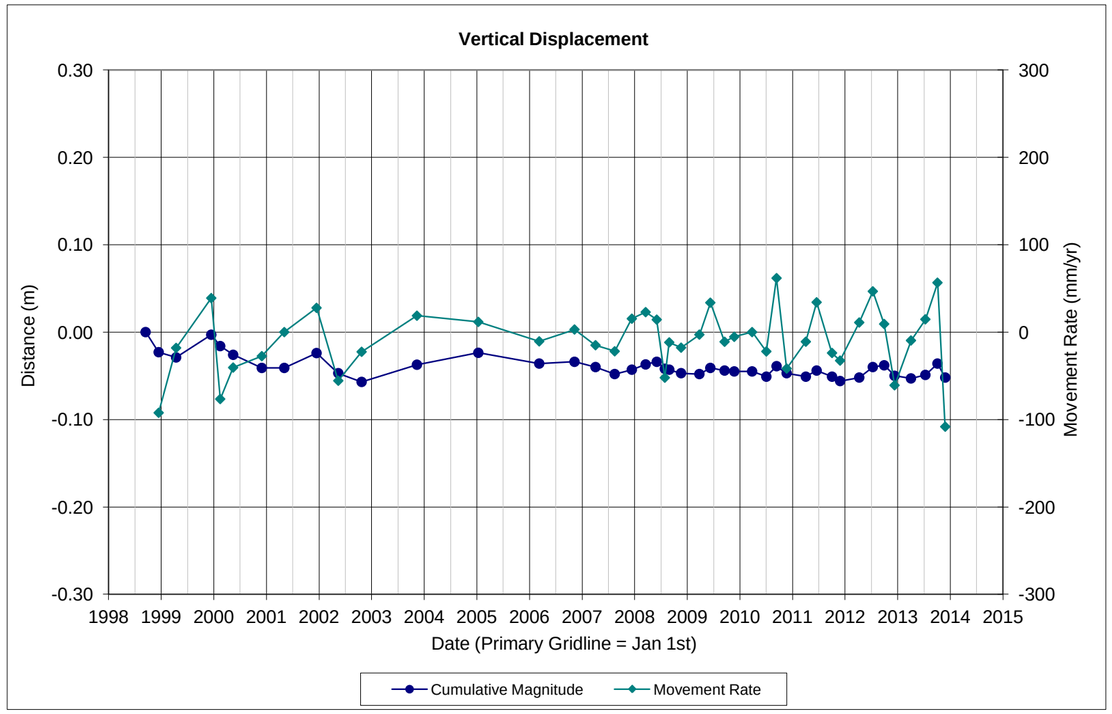
Hawk Street @ Crane Ave.

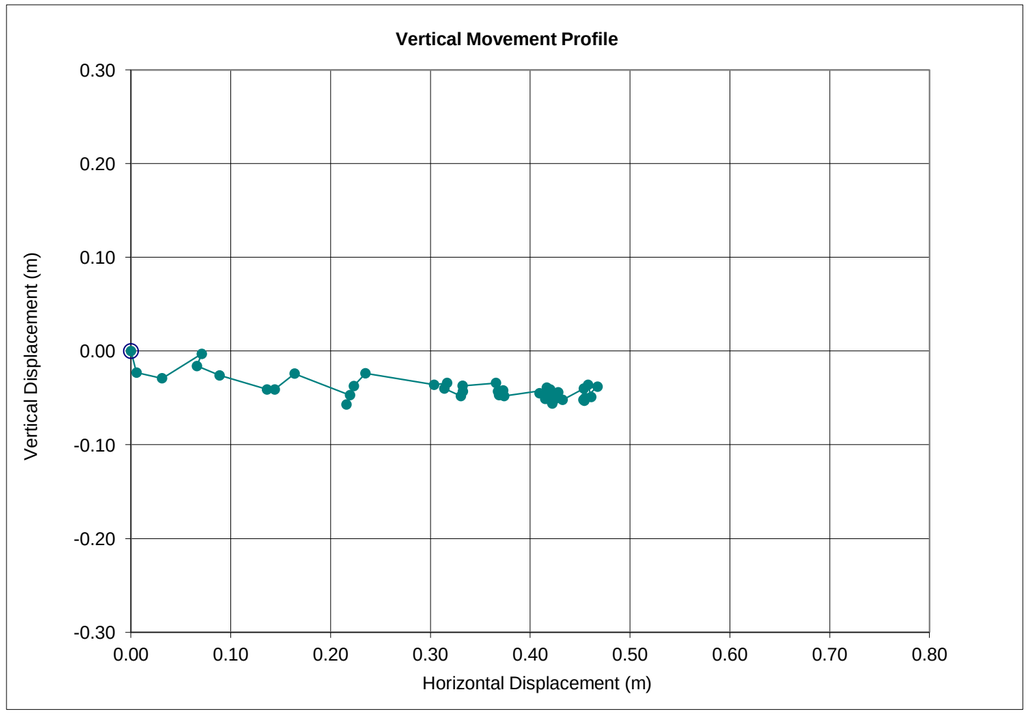
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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
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

Displacement Graphs - Hub 98-20
Hawk Street @ Crane Ave.







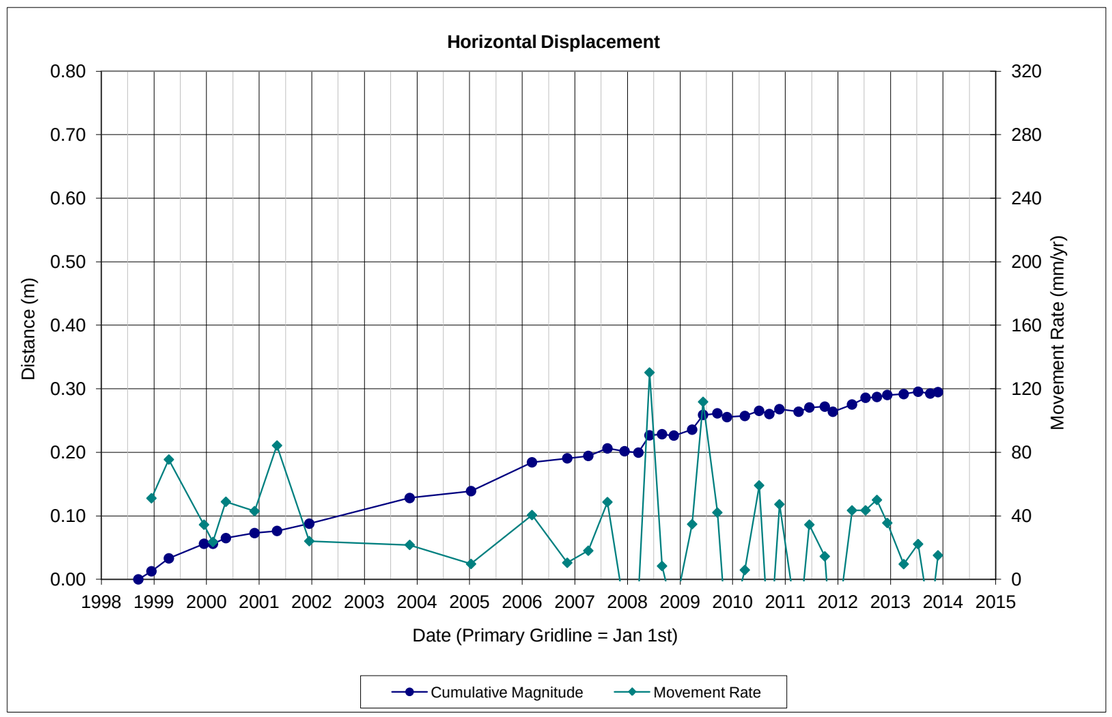


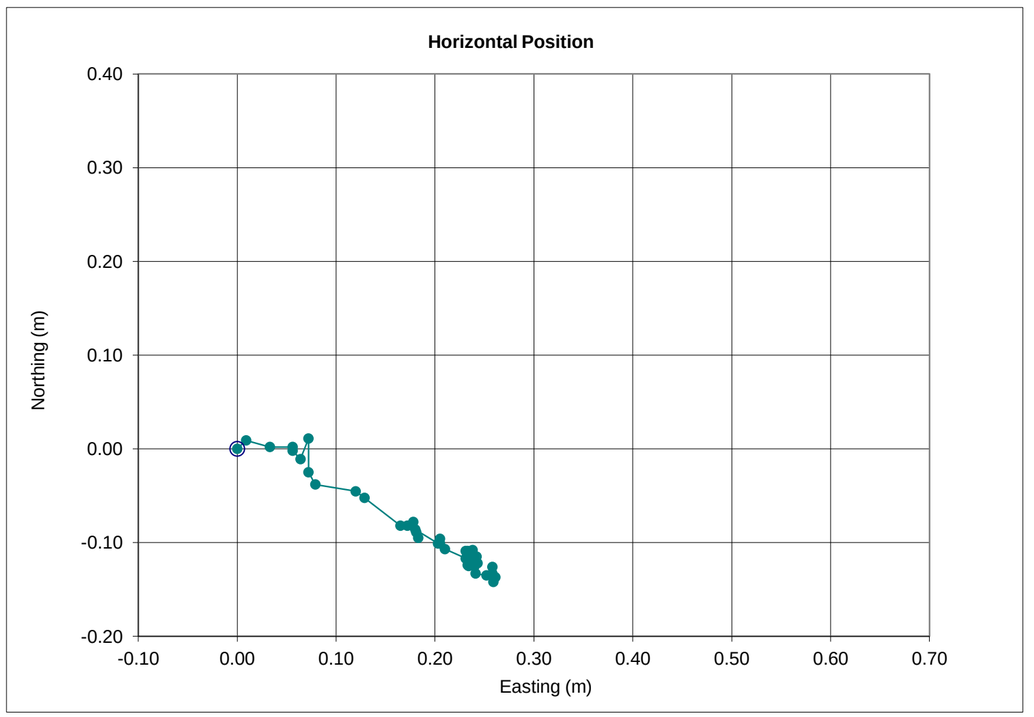
Survey and Displacement Data - Hub 98-21

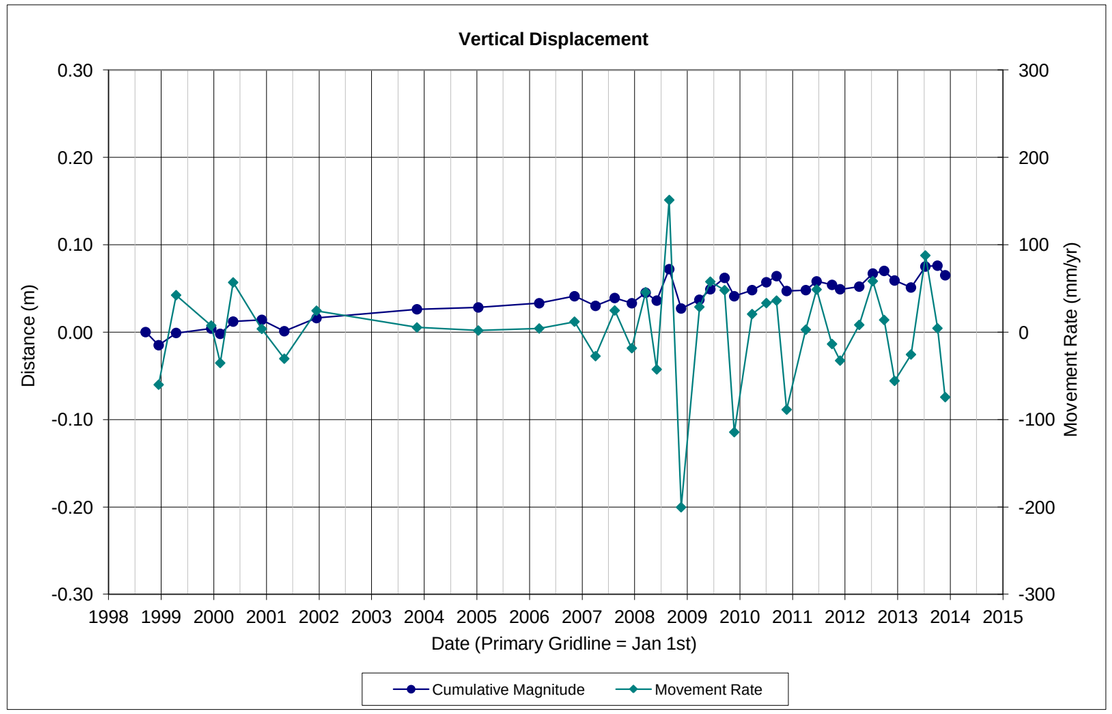
Lane between Avery/Allison

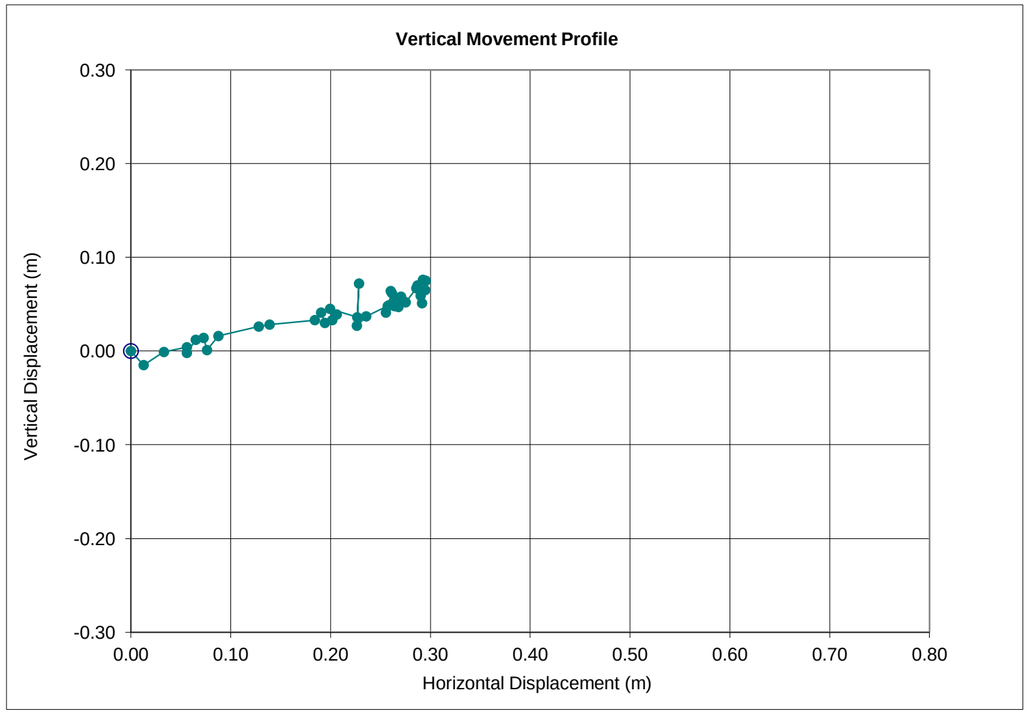
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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
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

Displacement Graphs - Hub 98-21
Lane between Avery/Allison









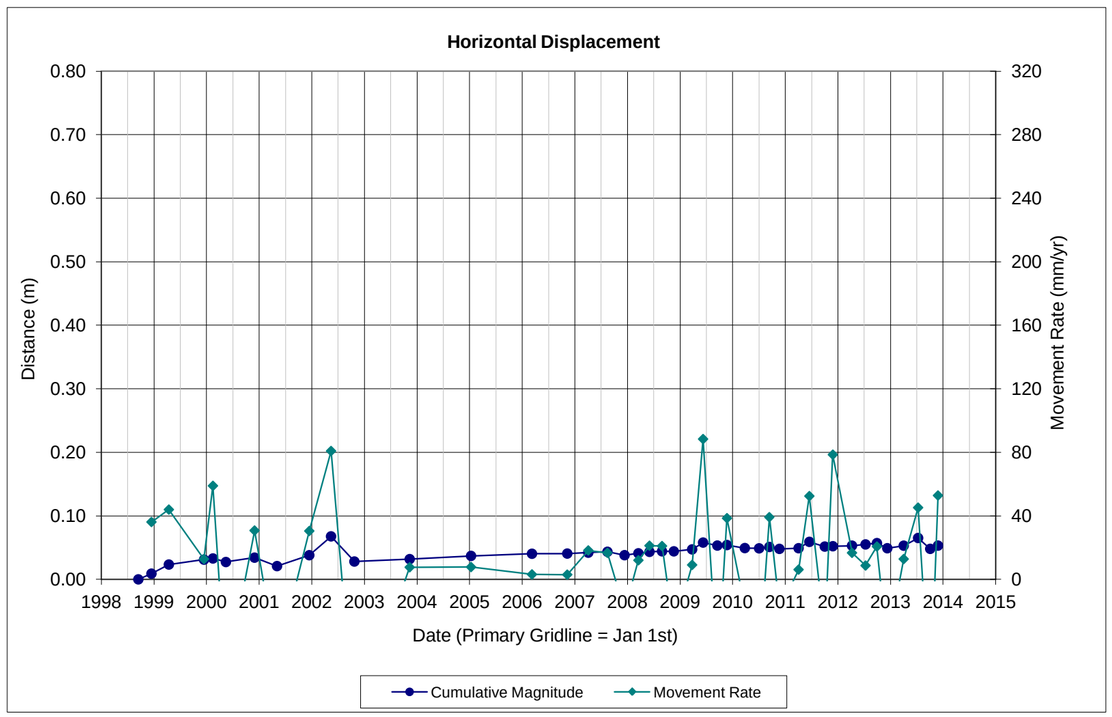
Survey and Displacement Data - Hub 98-22

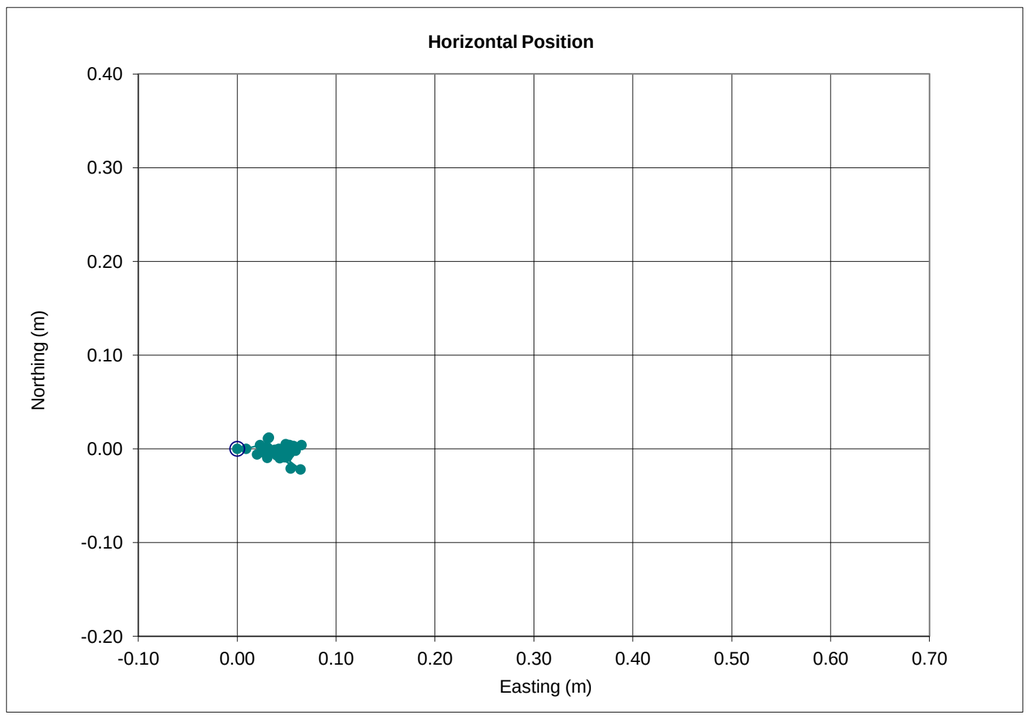
Lane between Beath/Bouchie

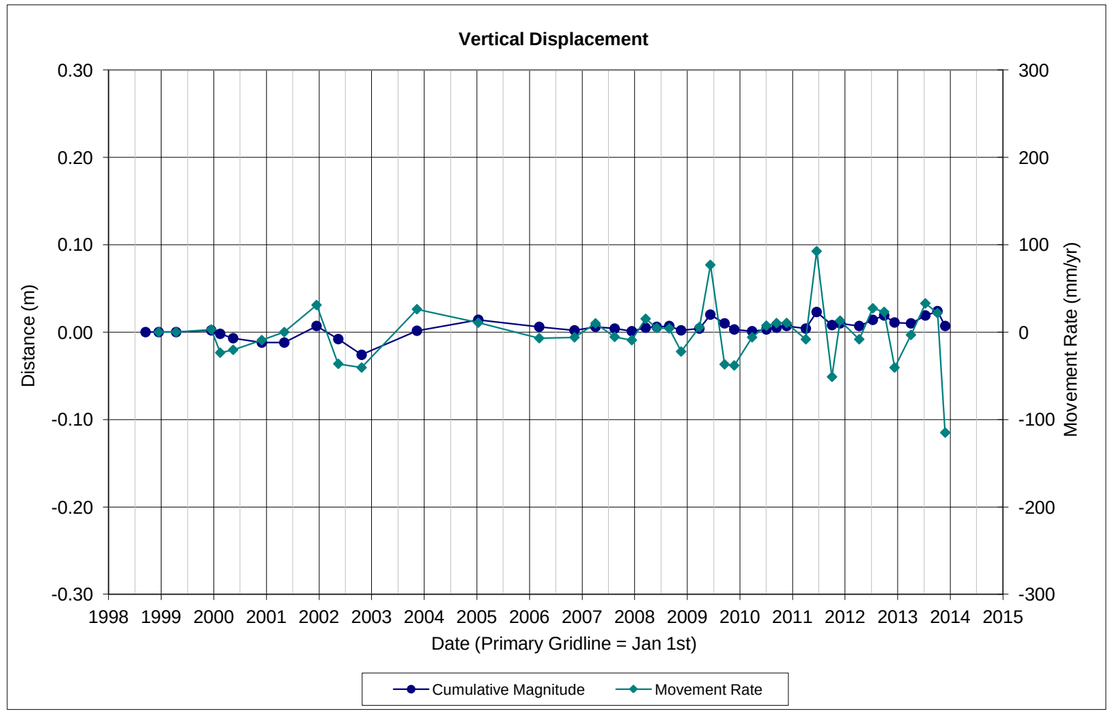
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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
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	32.873
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

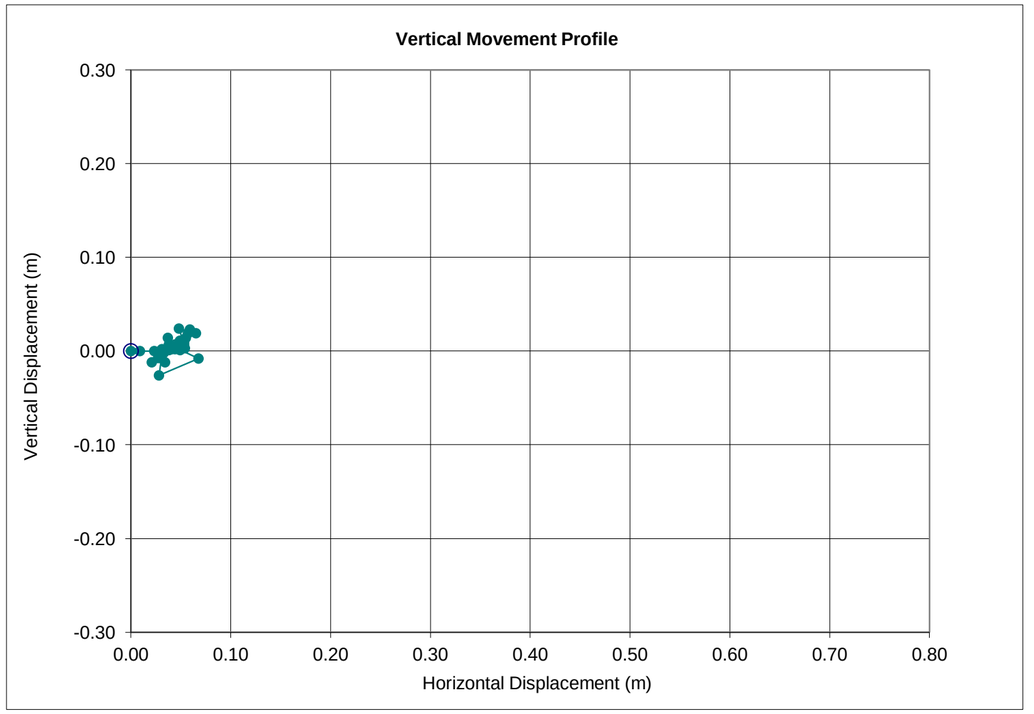
Displacement Graphs - Hub 98-22

Lane between Beath/Bouchie







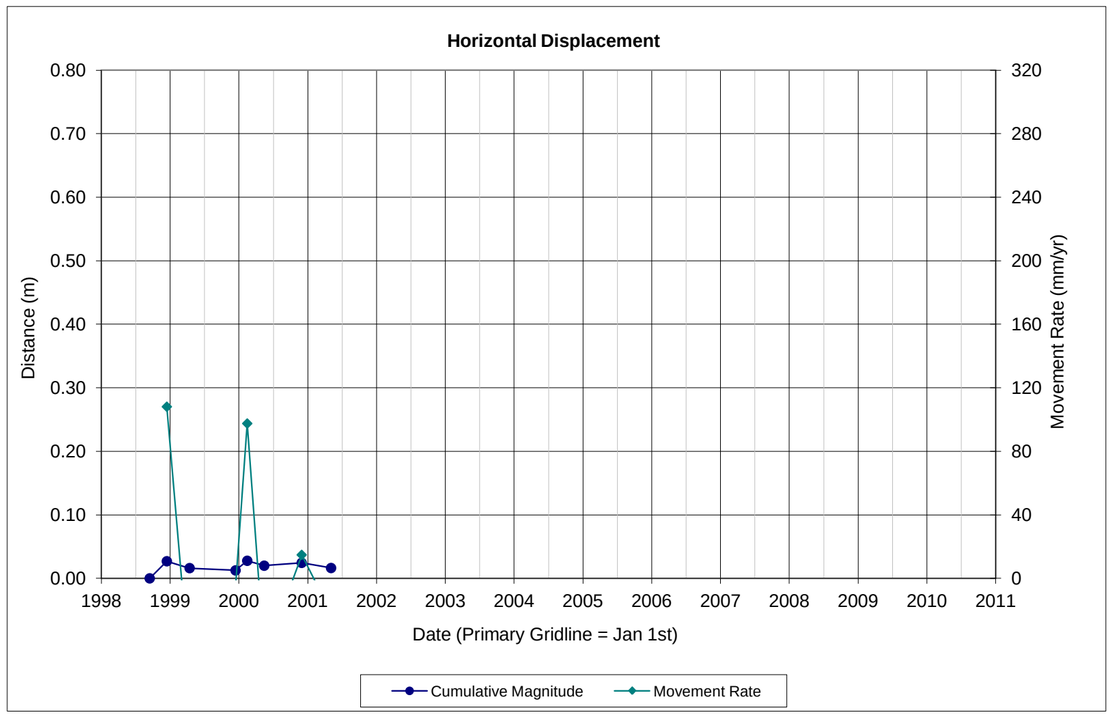


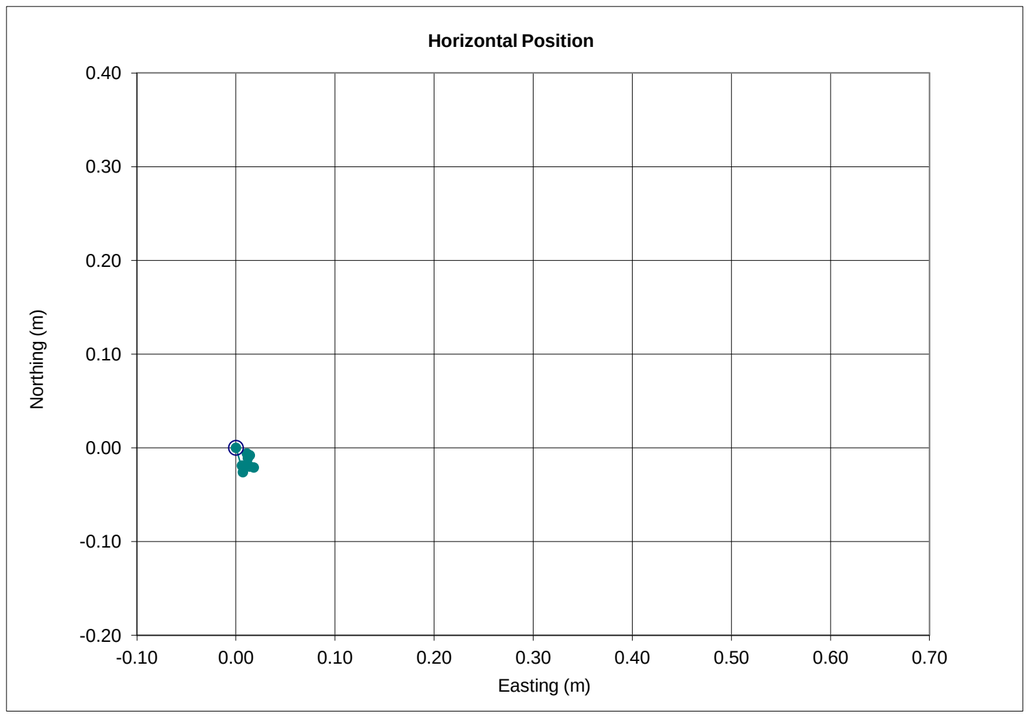
Survey and Displacement Data - Hub 98-24

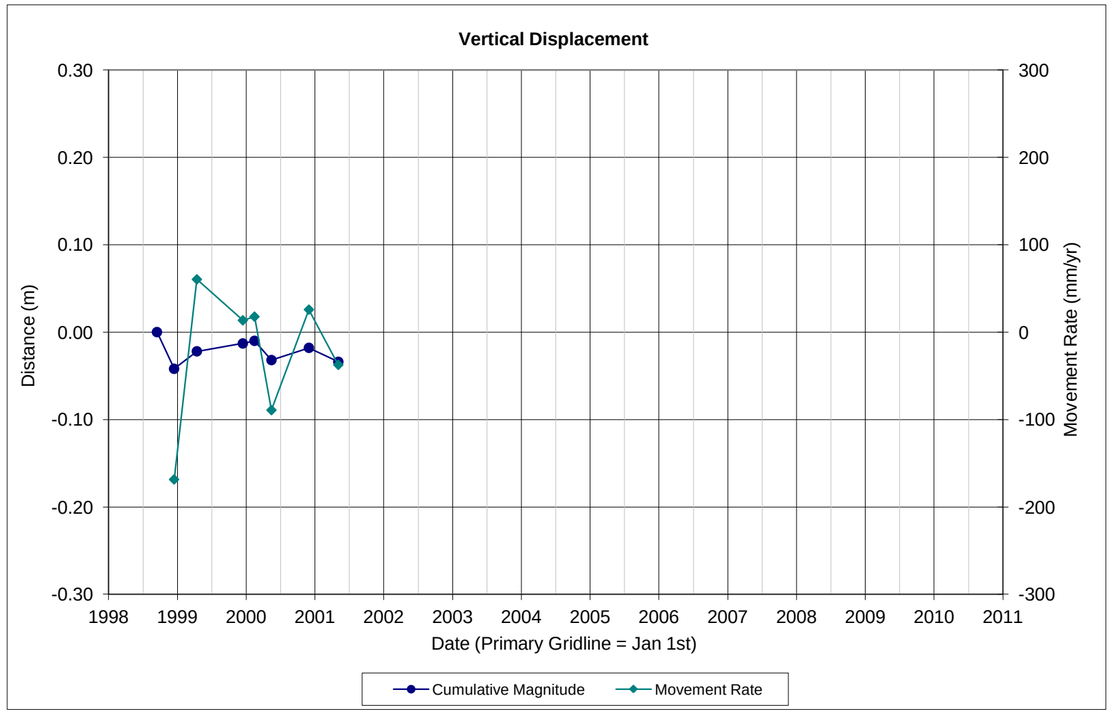
Salton Road (Hixon Road)

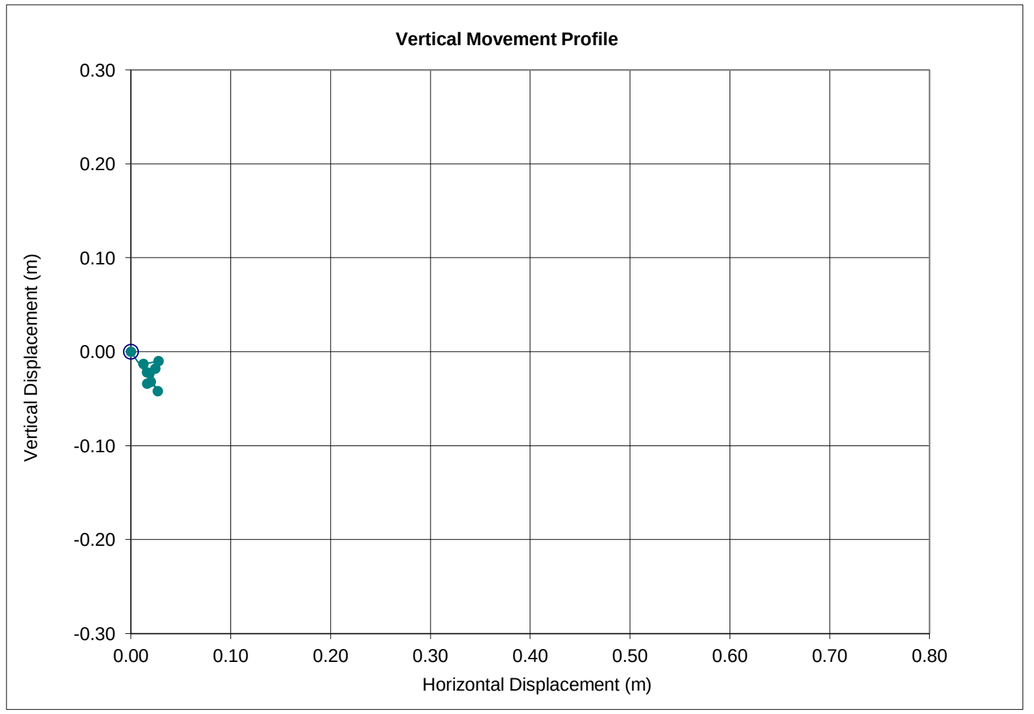
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5878341.399	531399.210	589.609	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		
15/12/1998	5878341.373	531399.217	589.567	0.25	-0.026	0.007	0.027	-0.042	164.9	-57.3	0.108	-0.169	0.25	-0.026	0.007	0.027	-0.042		-57.3	108.073	-168.577
15/04/1999	5878341.391	531399.224	589.587	0.58	-0.008	0.014	0.016	-0.022	119.7	-53.8	0.028	-0.038	0.33	0.018	0.007	0.019	0.020		46.0	-58.299	60.372
15/12/1999	5878341.393	531399.221	589.596	1.25	-0.006	0.011	0.013	-0.013	118.6	-46.1	0.010	-0.010	0.67	0.002	-0.003	0.004	0.009		68.2	-5.397	13.472
15/02/2000	5878341.378	531399.228	589.599	1.42	-0.021	0.018	0.028	-0.010	139.4	-19.9	0.020	-0.007	0.17	-0.015	0.007	0.017	0.003		10.3	97.516	17.673
15/05/2000	5878341.380	531399.216	589.577	1.66	-0.019	0.006	0.020	-0.032	162.5	-58.1	0.012	-0.019	0.25	0.002	-0.012	0.012	-0.022		-61.1	-49.372	-89.283
30/11/2000	5878341.379	531399.224	589.591	2.21	-0.020	0.014	0.024	-0.018	145.0	-36.4	0.011	-0.008	0.54	-0.001	0.008	0.008	0.014		60.1	14.798	25.696
05/05/2001	5878341.388	531399.222	589.575	2.64	-0.011	0.012	0.016	-0.034	132.5	-64.4	0.006	-0.013	0.43	0.009	-0.002	0.009	-0.016		-60.0	-21.586	-37.462

Displacement Graphs - Hub 98-24
Salton Road (Hixon Road)









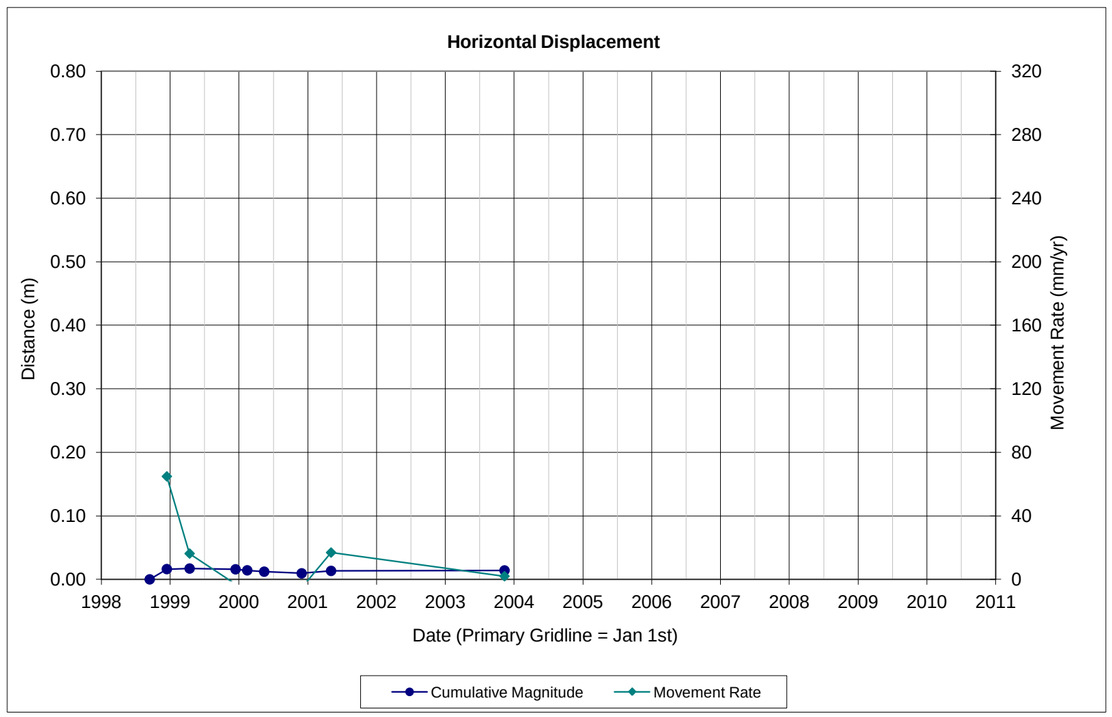
Survey and Displacement Data - Hub 98-29

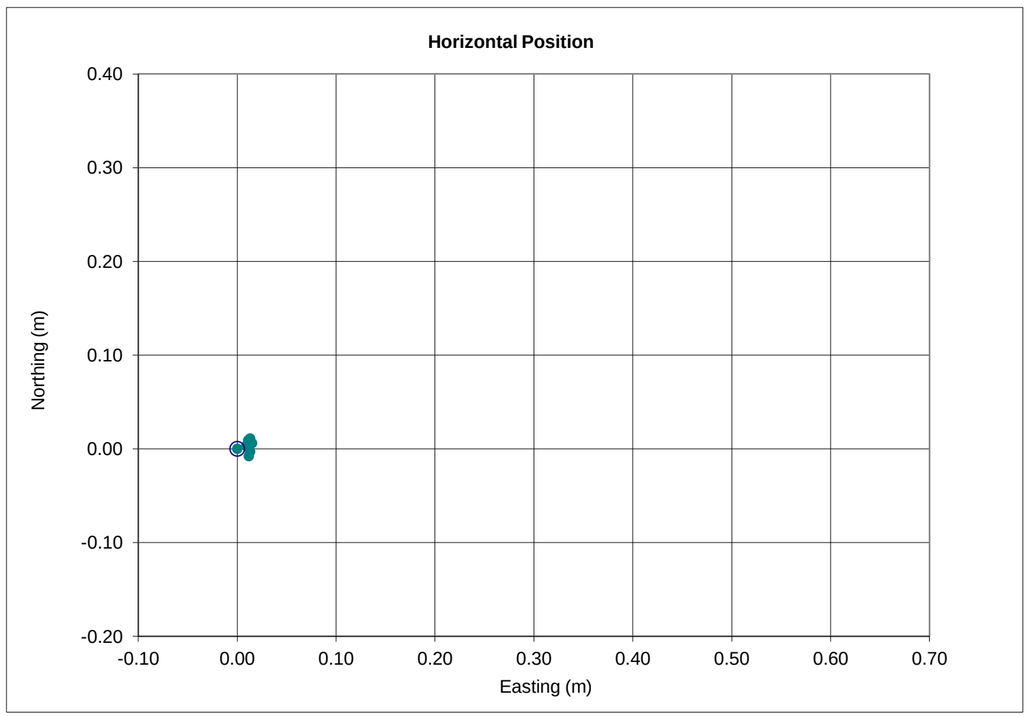
Quesnel Hill

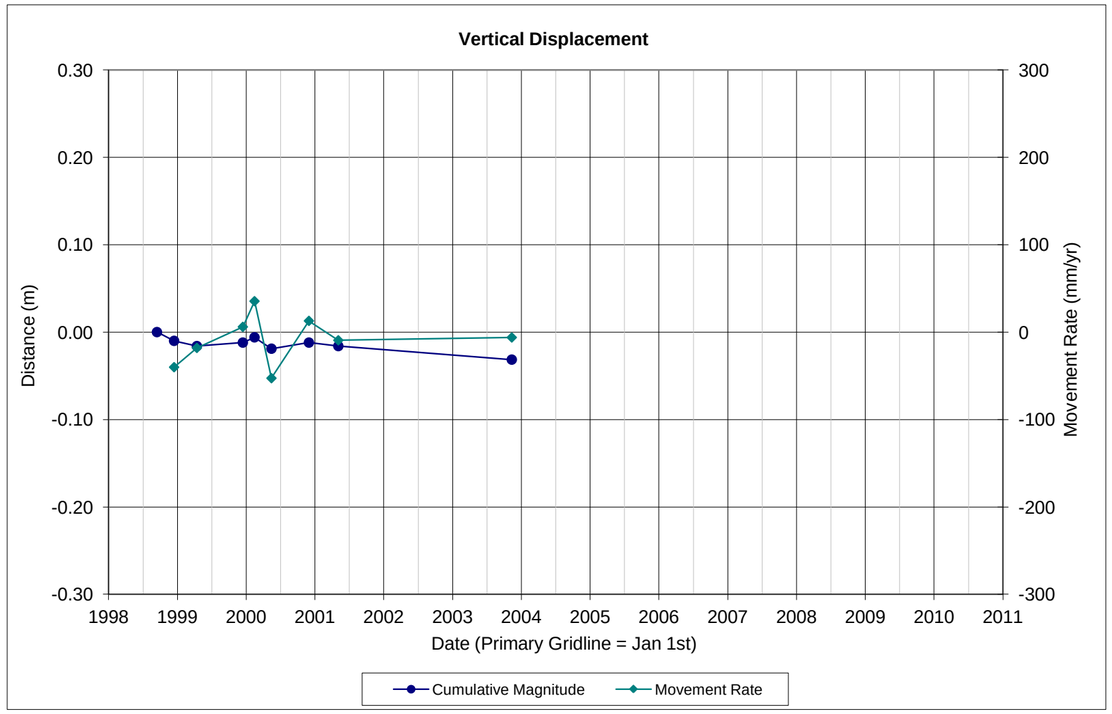
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5870484.887	536304.120	575.014	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		
15/12/1998	5870484.893	536304.135	575.004	0.25	0.006	0.015	0.016	-0.010	68.2	-31.8	0.065	-0.040	0.25	0.006	0.015	0.016	-0.010		-31.8	64.844	-40.137
15/04/1999	5870484.898	536304.133	574.998	0.58	0.011	0.013	0.017	-0.016	49.8	-43.2	0.029	-0.028	0.33	0.005	-0.002	0.005	-0.006		-48.1	16.256	-18.112
15/12/1999	5870484.896	536304.133	575.002	1.25	0.009	0.013	0.016	-0.012	55.3	-37.2	0.013	-0.010	0.67	-0.002	0.000	0.002	0.004		63.4	-2.994	5.988
15/02/2000	5870484.896	536304.131	575.008	1.42	0.009	0.011	0.014	-0.006	50.7	-22.9	0.010	-0.004	0.17	0.000	-0.002	0.002	0.006		71.6	-11.782	35.347
15/05/2000	5870484.892	536304.131	574.995	1.66	0.005	0.011	0.012	-0.019	65.6	-57.5	0.007	-0.011	0.25	-0.004	0.000	0.004	-0.013		-72.9	-16.233	-52.758
30/11/2000	5870484.890	536304.129	575.002	2.21	0.003	0.009	0.009	-0.012	71.6	-51.7	0.004	-0.005	0.54	-0.002	-0.002	0.003	0.007		68.0	-5.191	12.848
05/05/2001	5870484.884	536304.133	574.998	2.64	-0.003	0.013	0.013	-0.016	103.0	-50.2	0.005	-0.006	0.43	-0.006	0.004	0.007	-0.004		-29.0	16.884	-9.365
12/11/2003	5870484.879	536304.132	574.983	5.16	-0.008	0.012	0.014	-0.031	123.8	-66.0	0.003	-0.006	2.52	-0.005	-0.001	0.005	-0.015		-72.1	1.979	-6.143

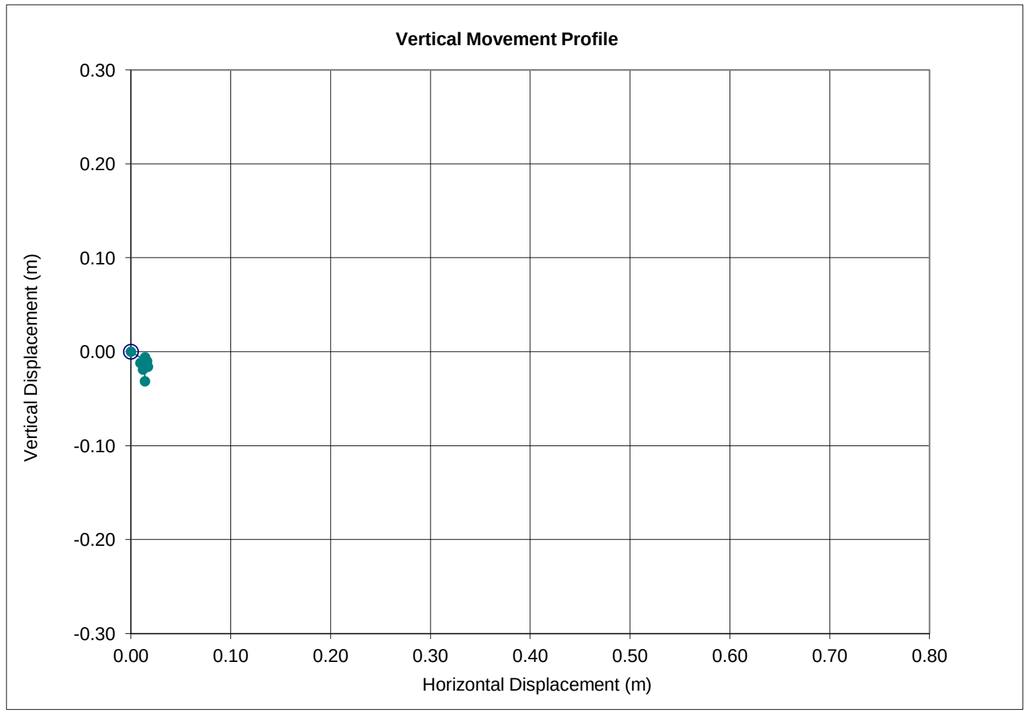
Displacement Graphs - Hub 98-29

Quesnel Hill









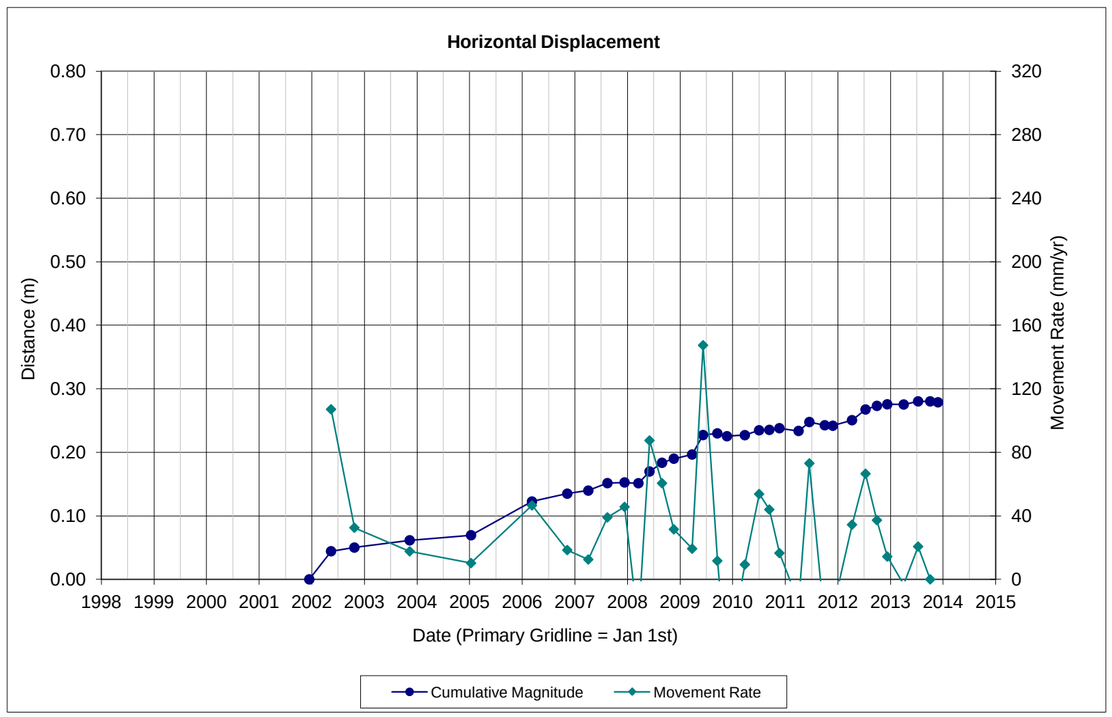
Survey and Displacement Data - Hub 01-30

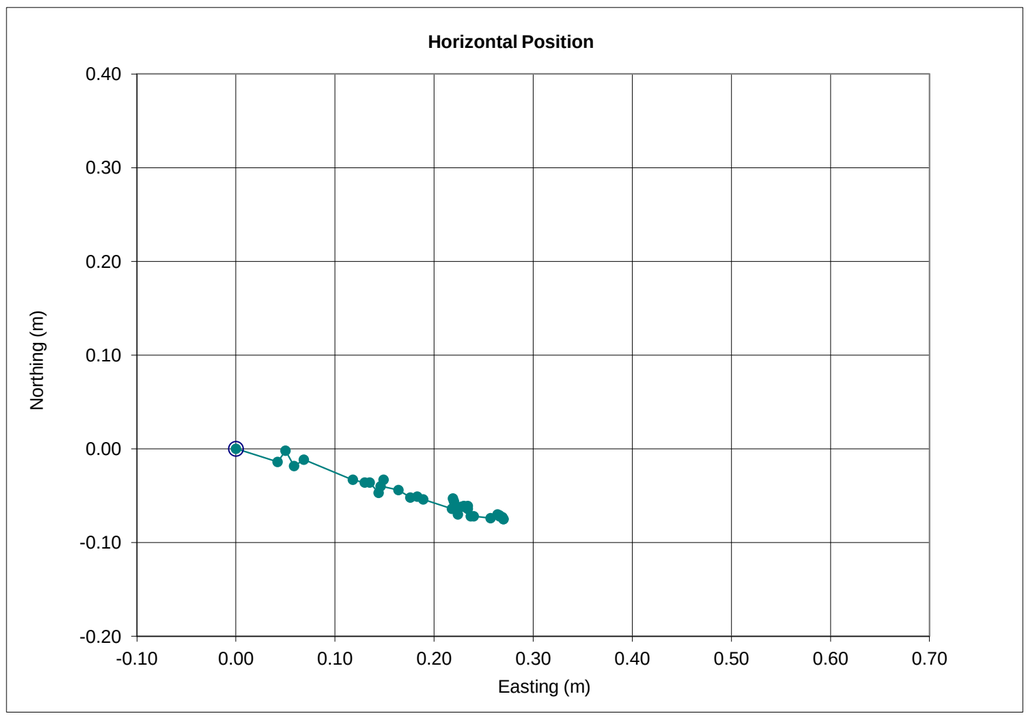
West End of Dodds Avenue at Finley Road

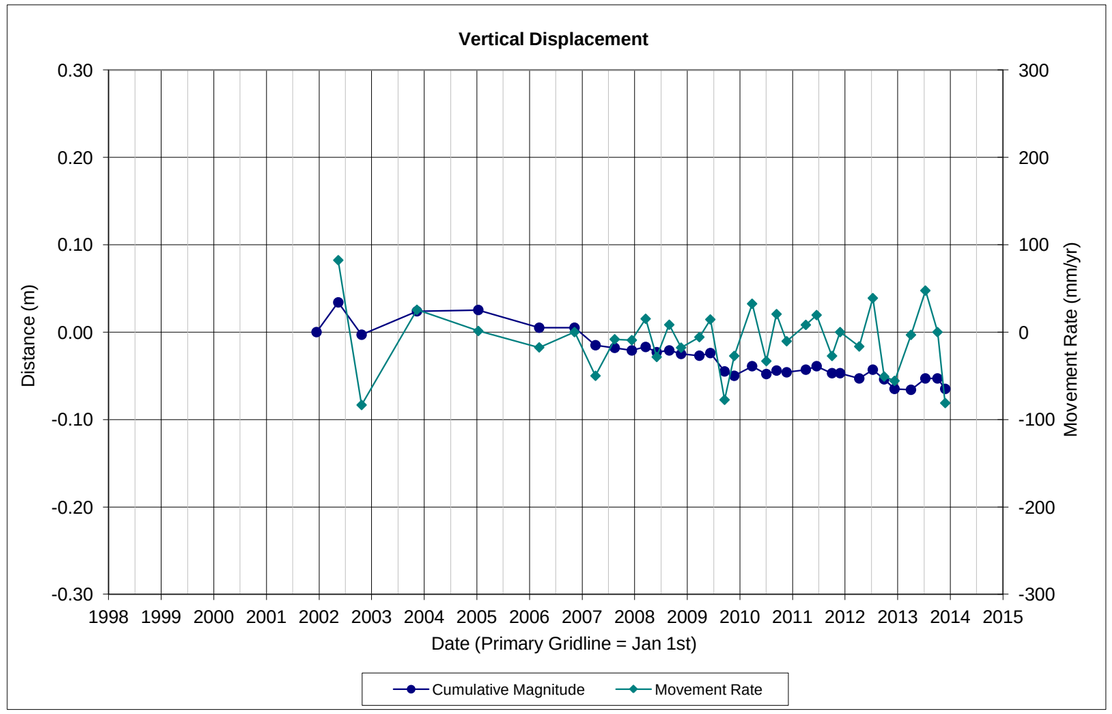
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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	531217.876	575.426	3.07	-0.012	0.068	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

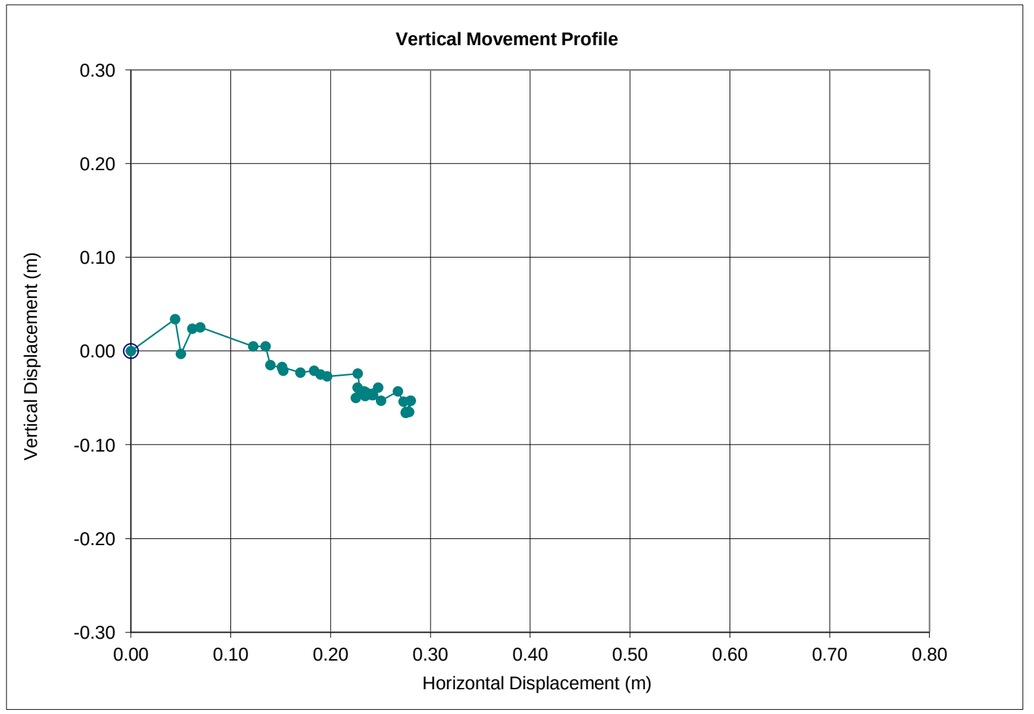
Displacement Graphs - Hub 01-30

West End of Dodds Avenue at Finley Road









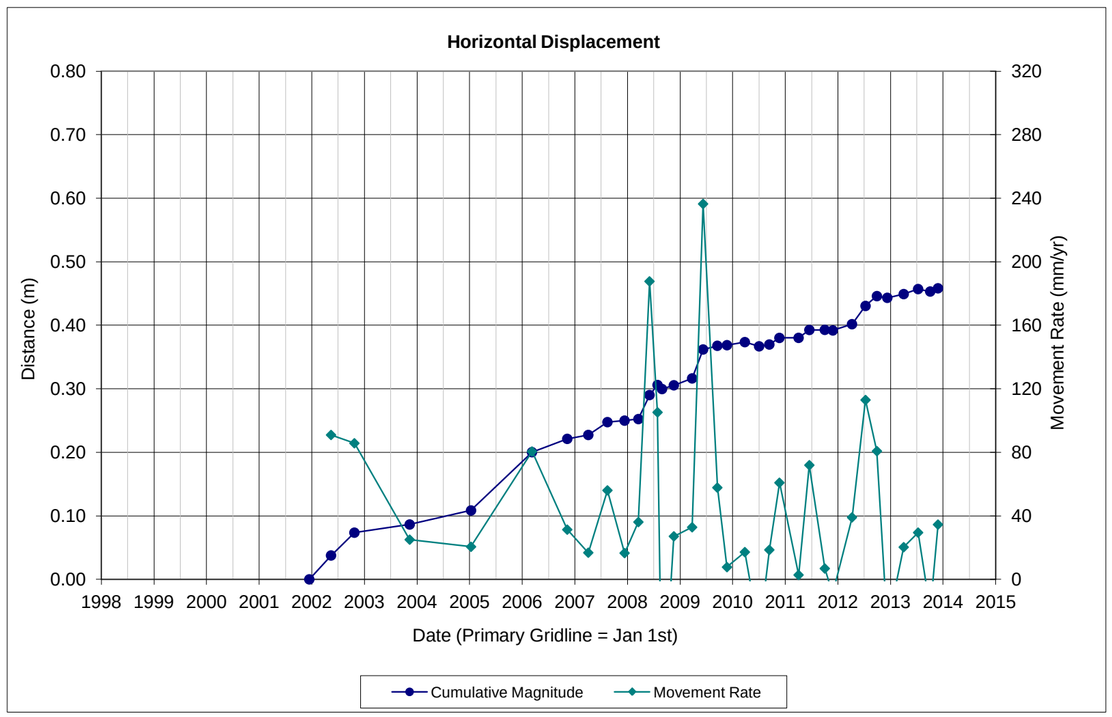
Survey and Displacement Data - Hub 01-31

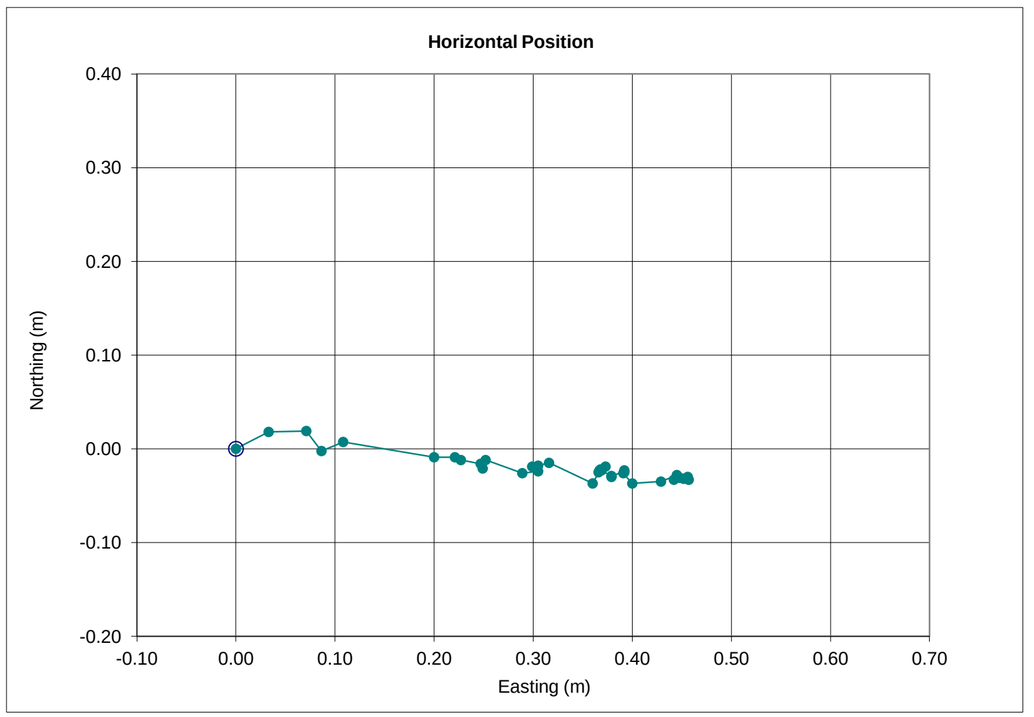
Blair Street

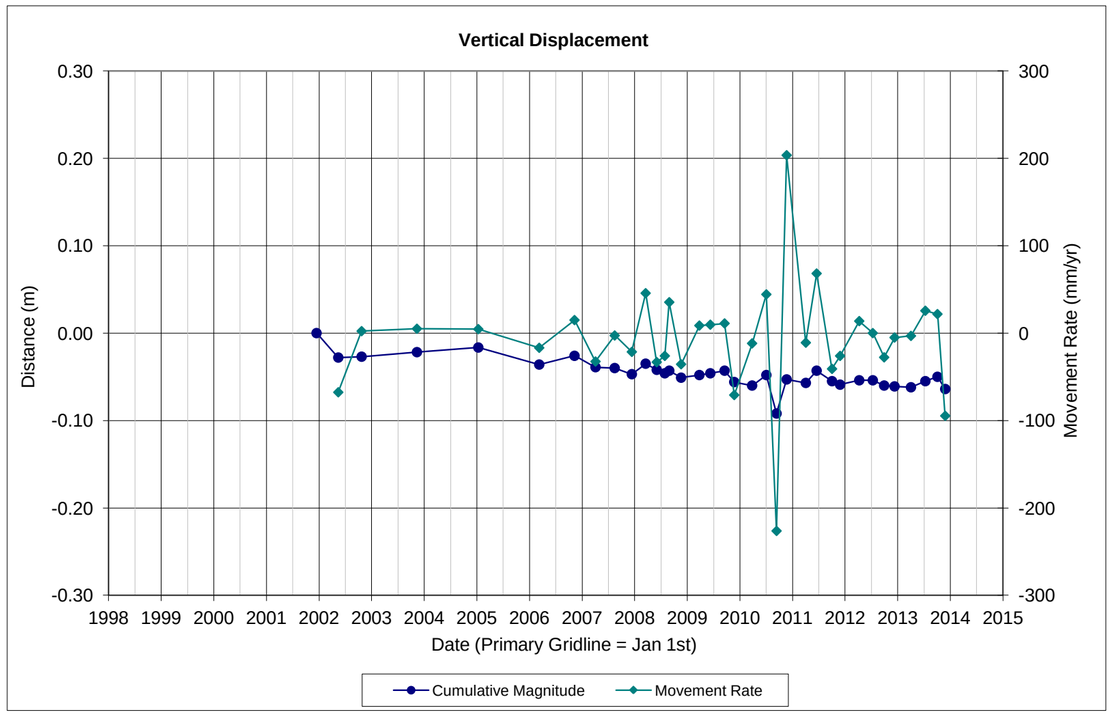
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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	187.653	-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

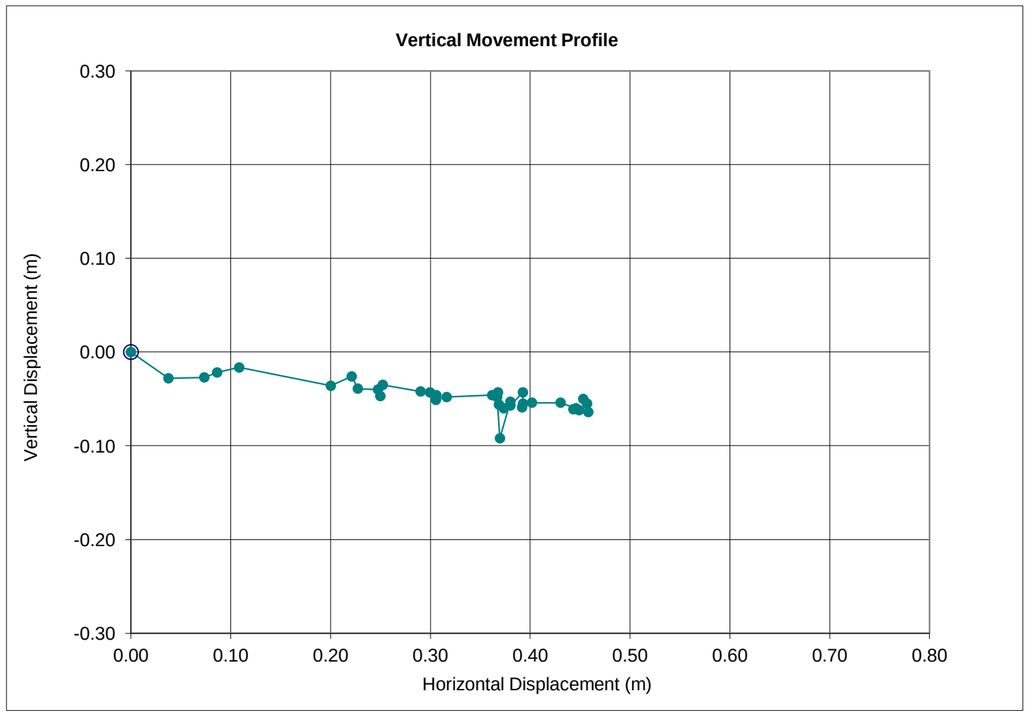
Displacement Graphs - Hub 01-31

Blair Street







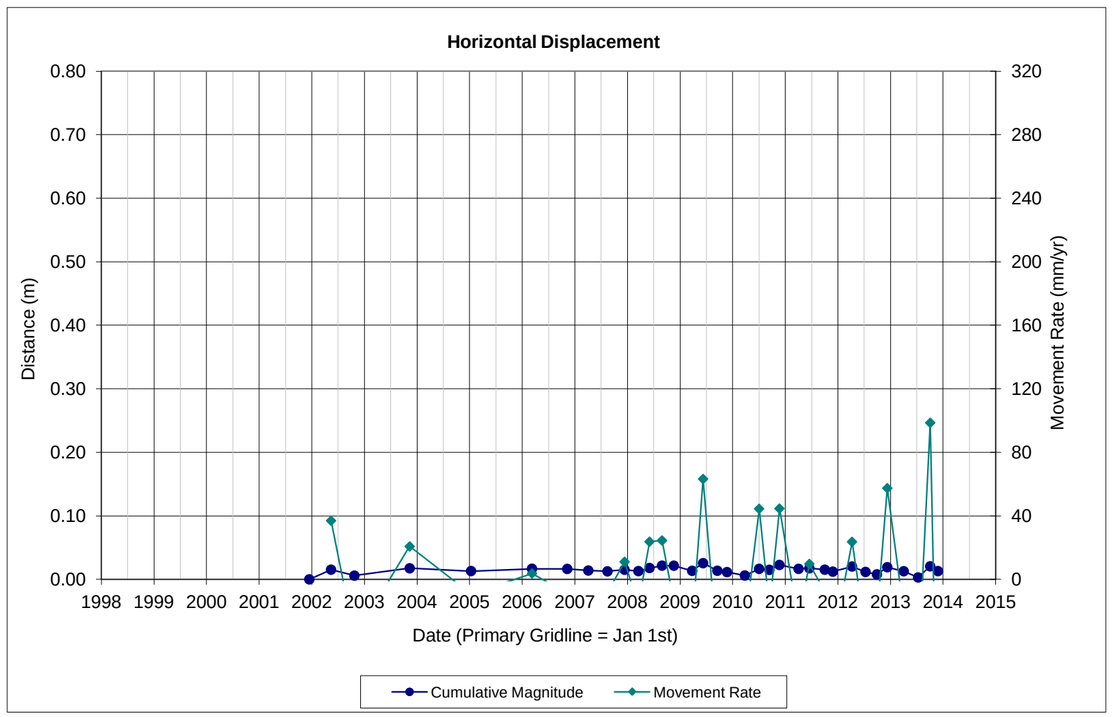


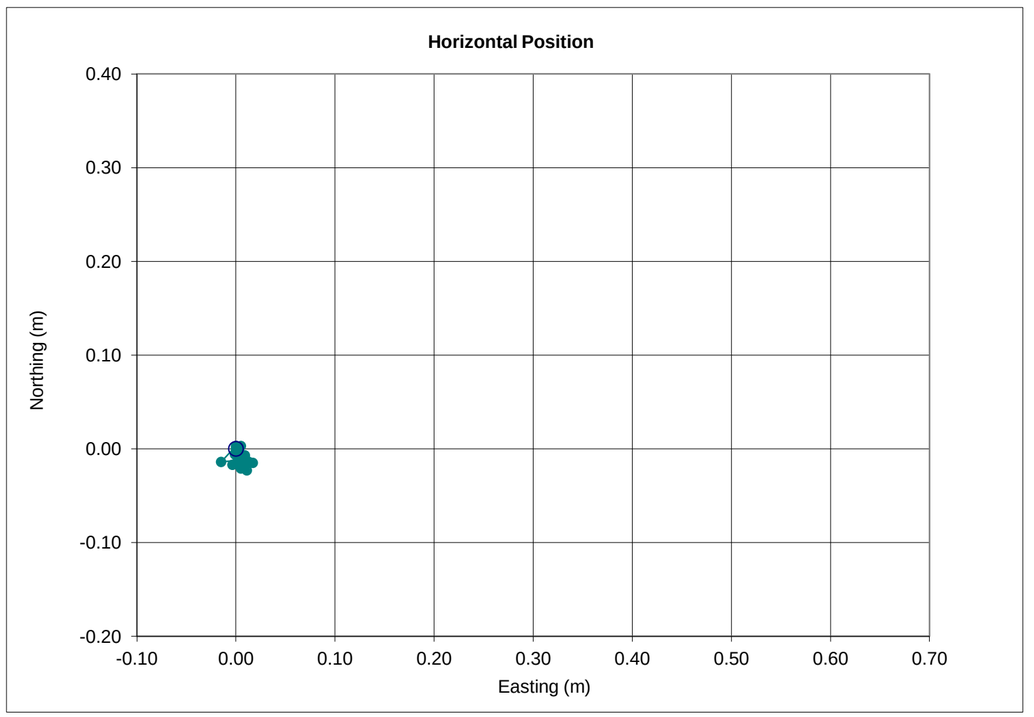
Survey and Displacement Data - Hub 01-32

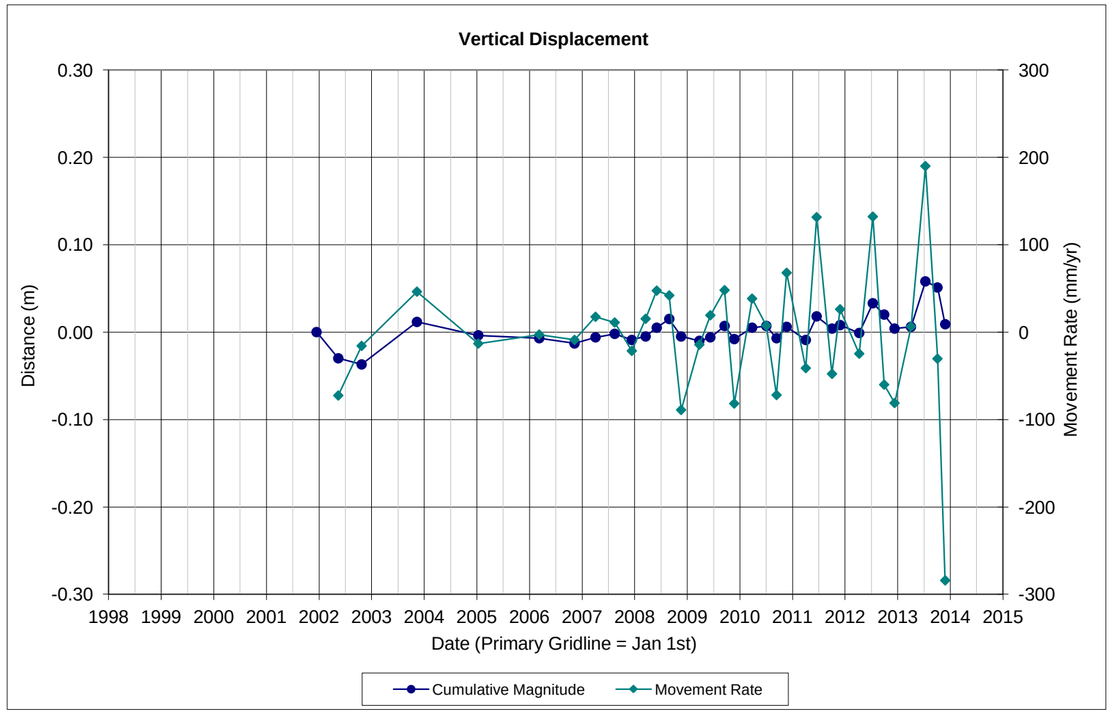
Lewis Drive/Beabien Avenue

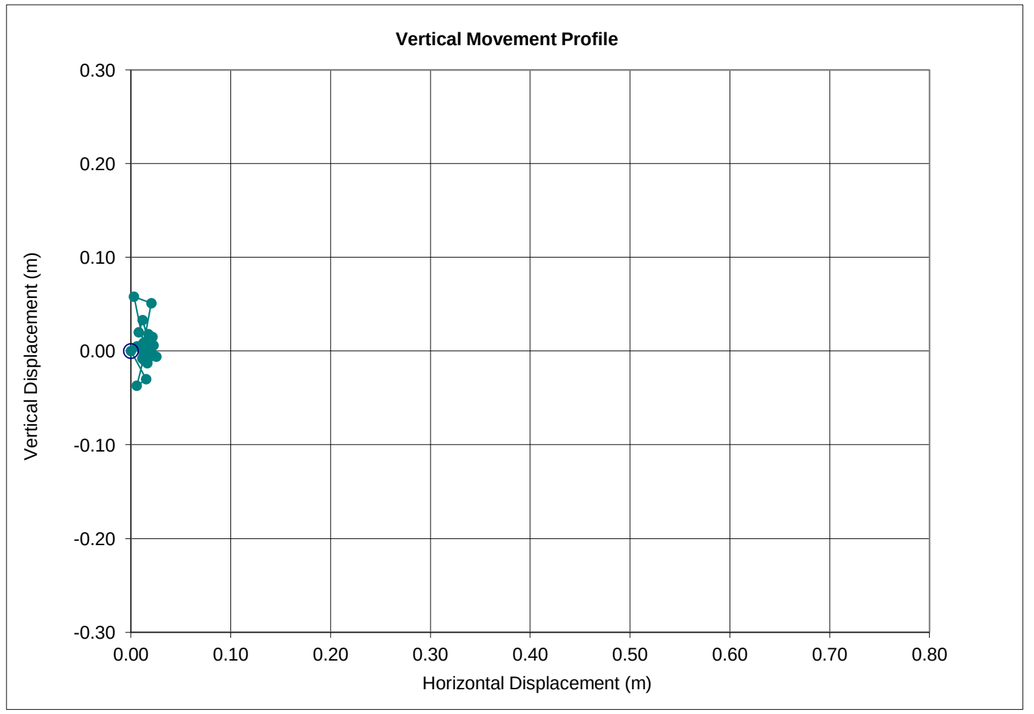
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

Displacement Graphs - Hub 01-32
Lewis Drive/Beabien Avenue







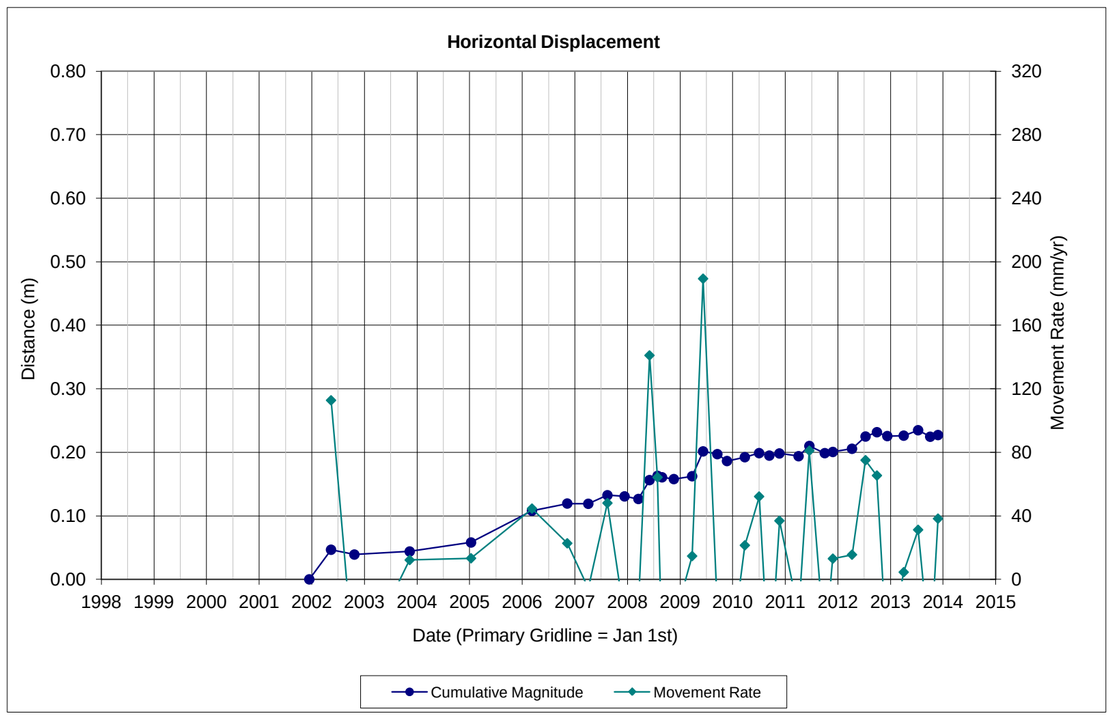


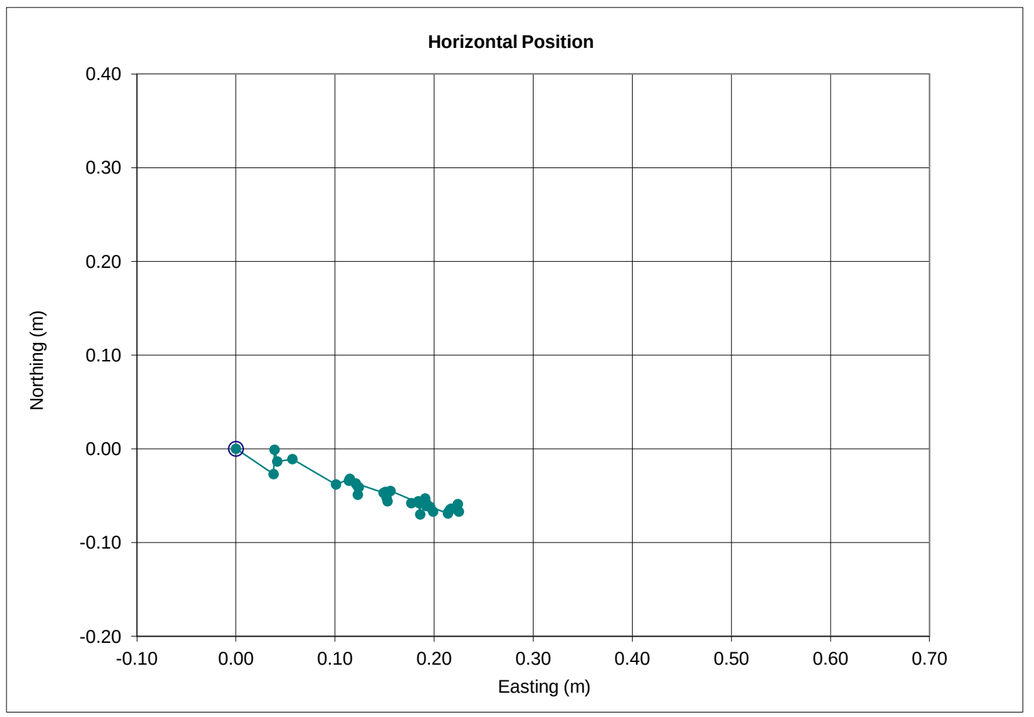
Survey and Displacement Data - Hub 01-33

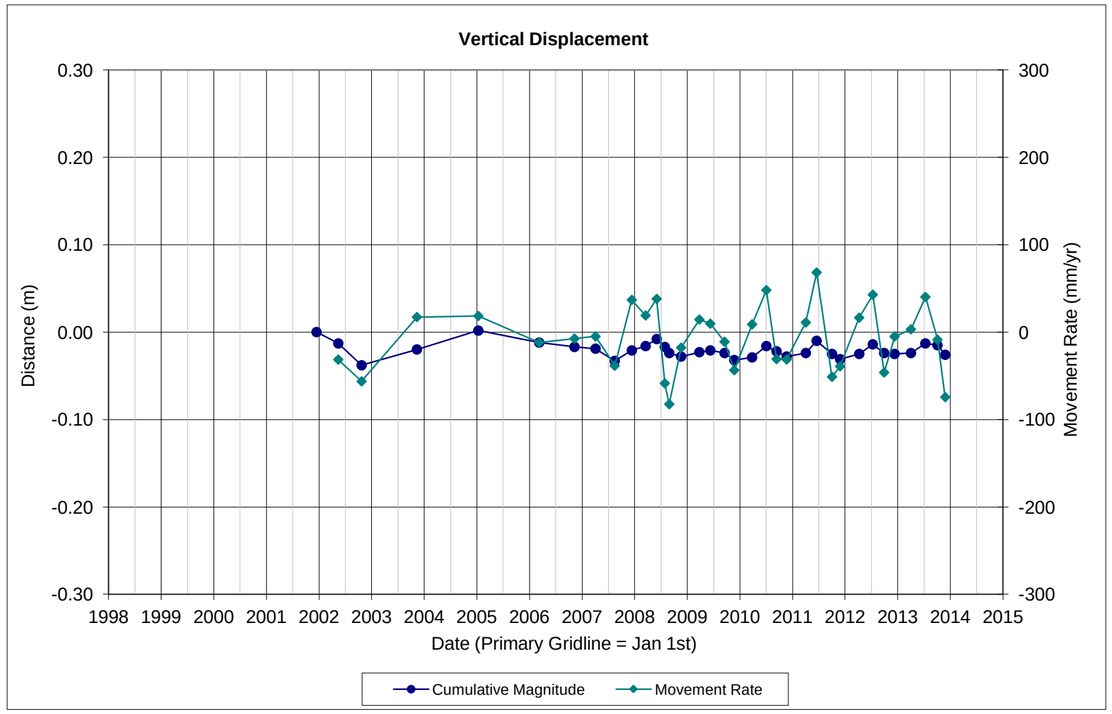
South End of Allard Street

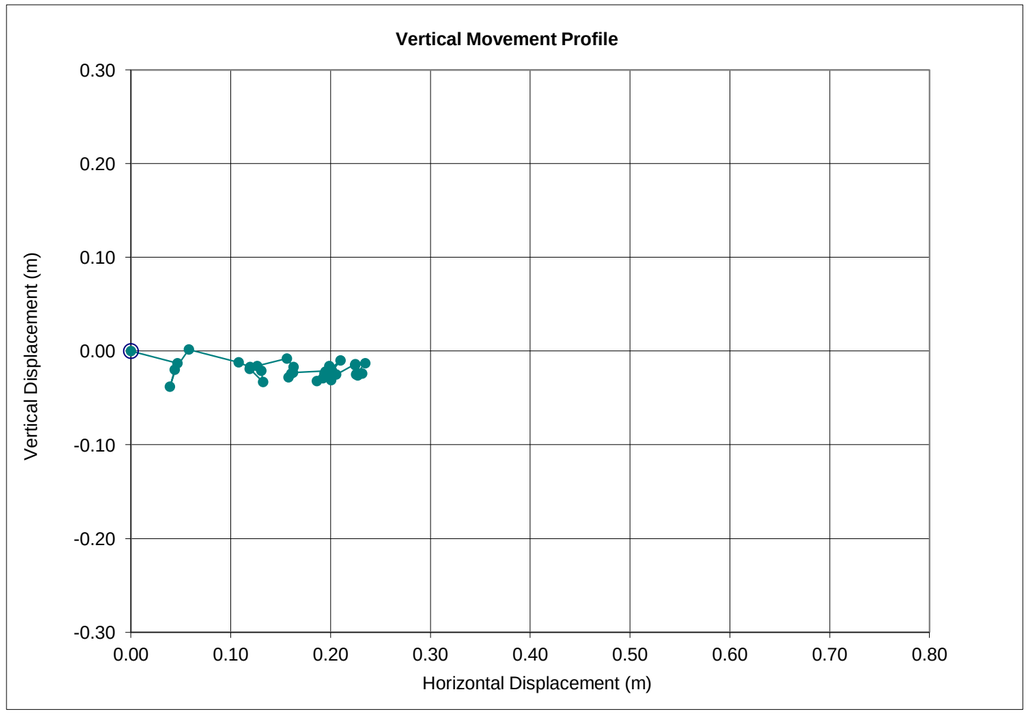
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

Displacement Graphs - Hub 01-33
South End of Allard Street







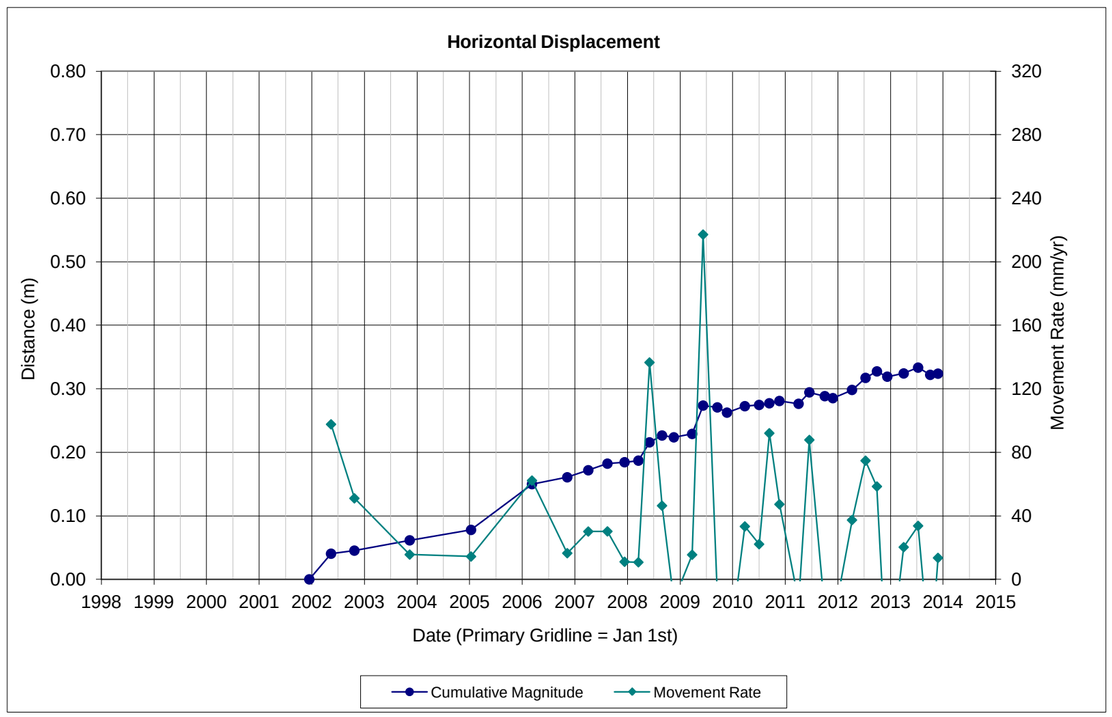


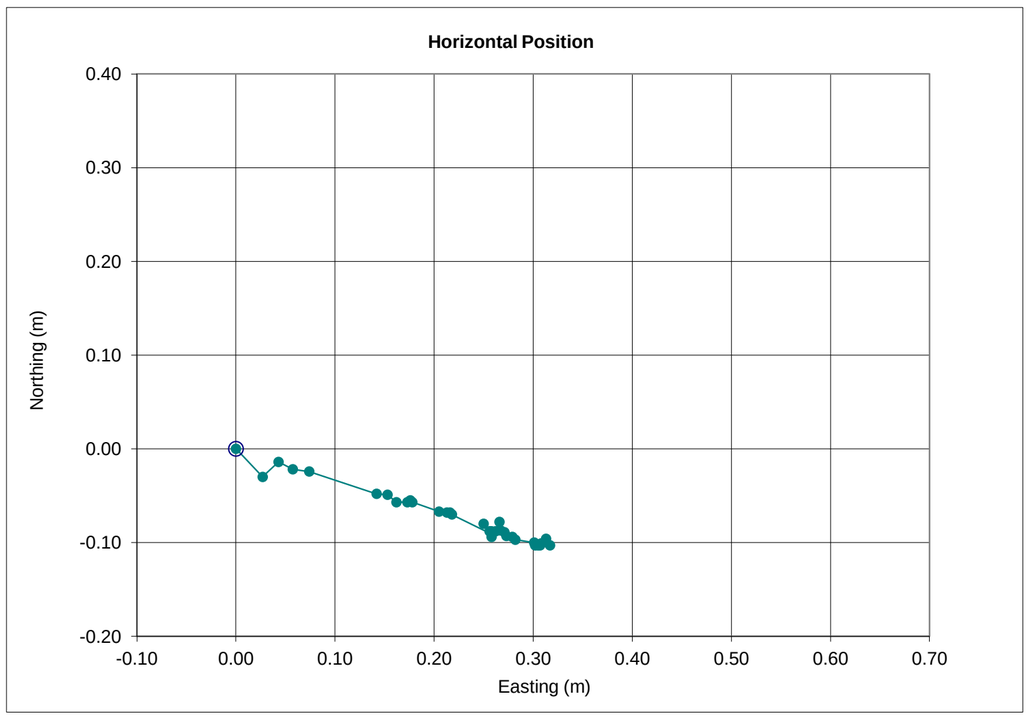
Survey and Displacement Data - Hub 01-34

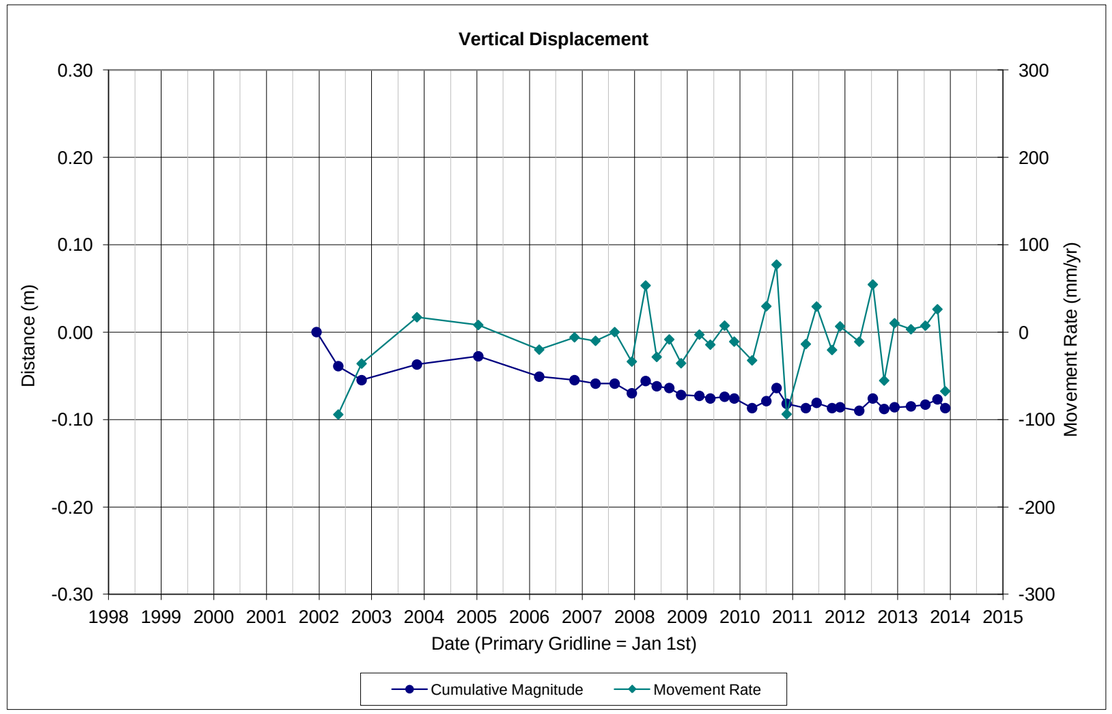
Abbott Road and Blair Street

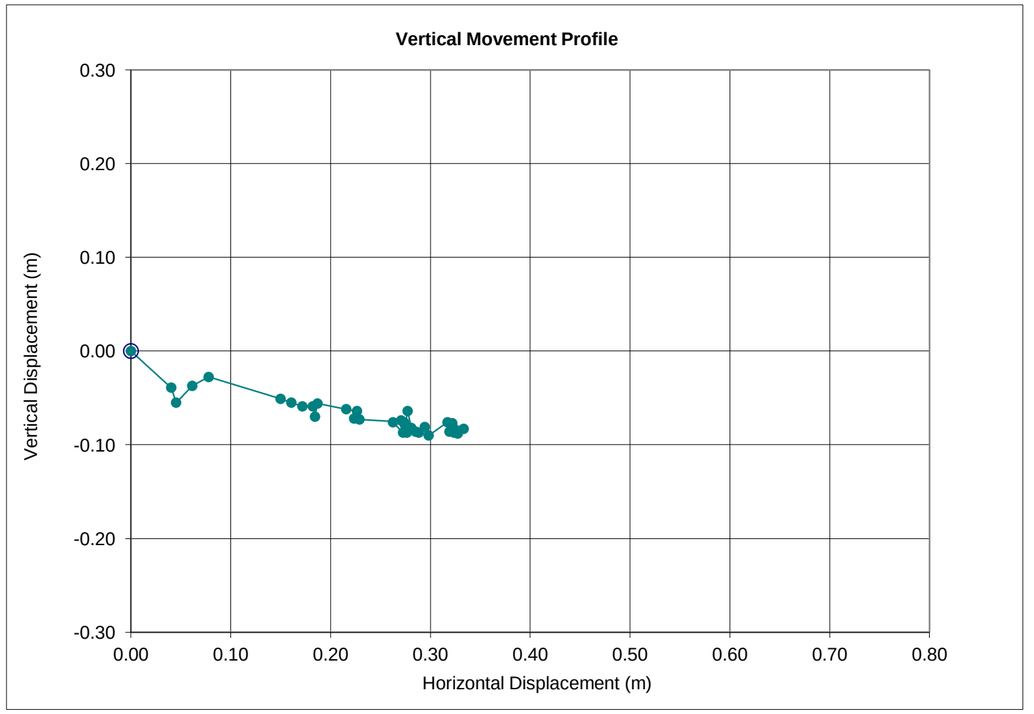
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

Displacement Graphs - Hub 01-34
Abbott Road and Blair Street









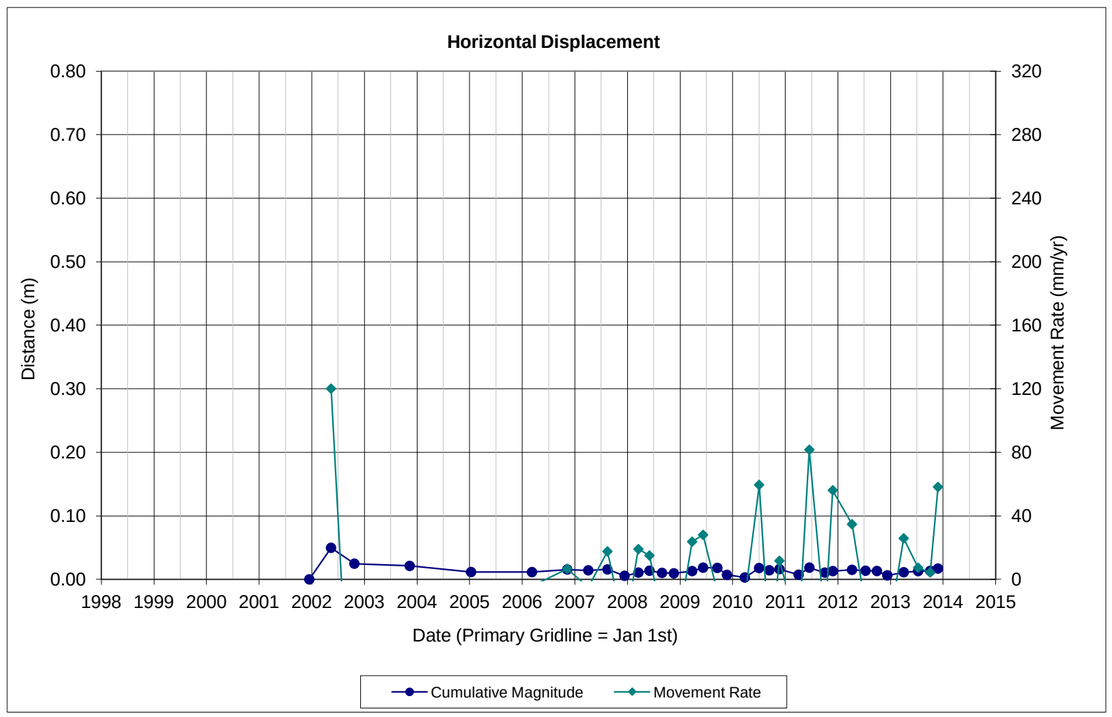
Survey and Displacement Data - Hub 01-35

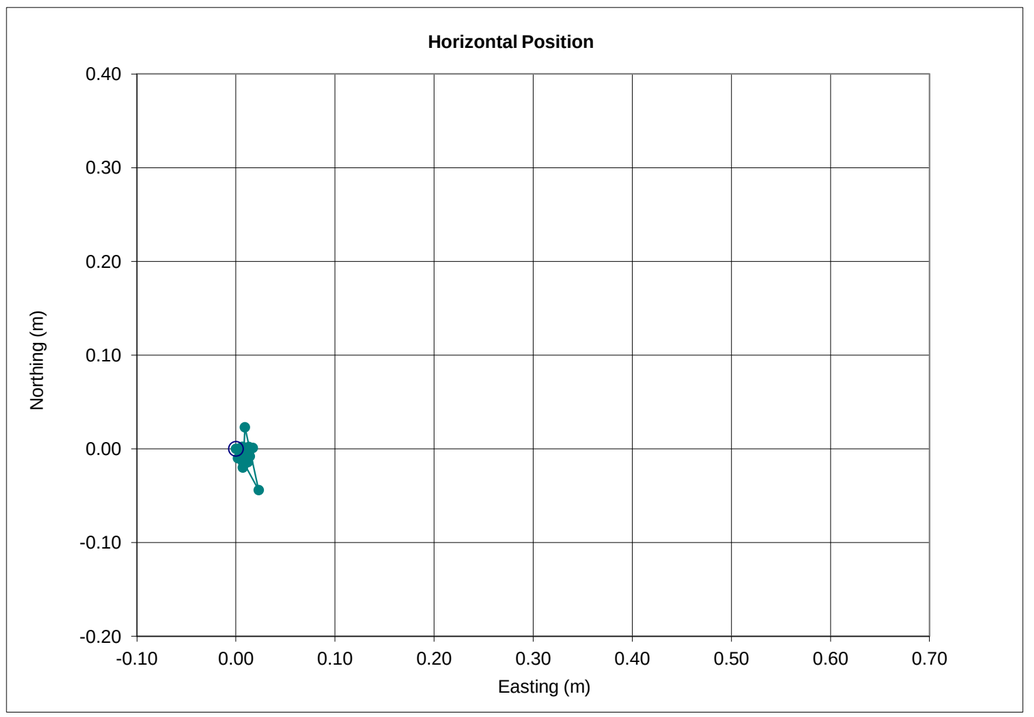
Lewis Drive North of Couldwell Street

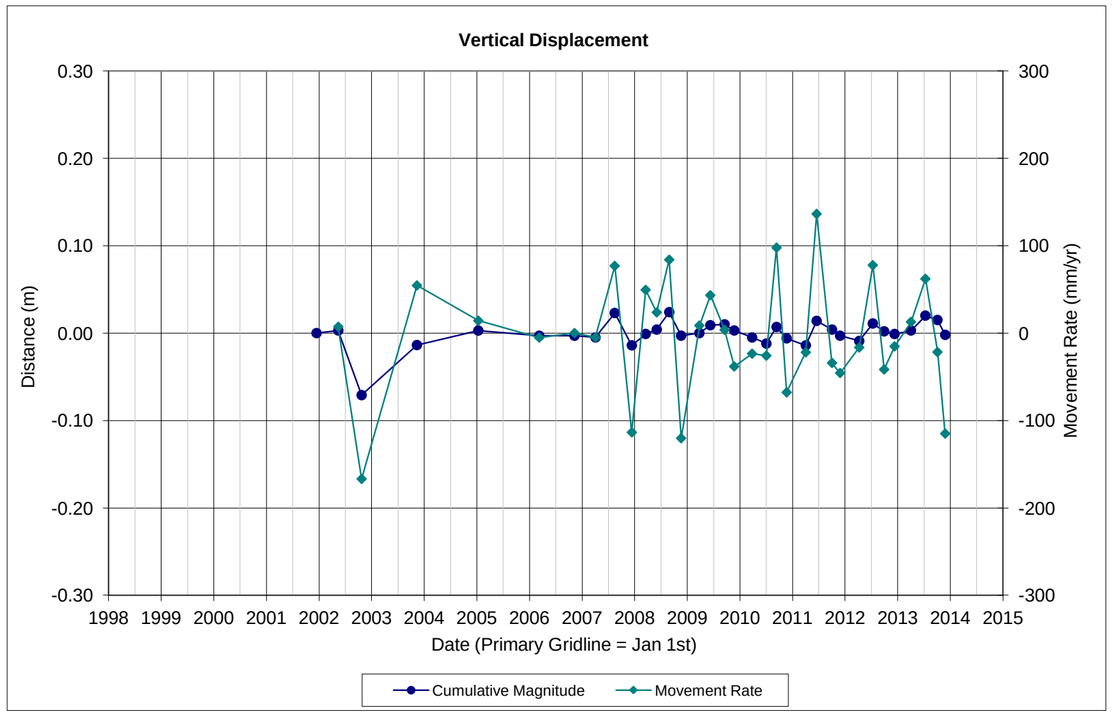
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

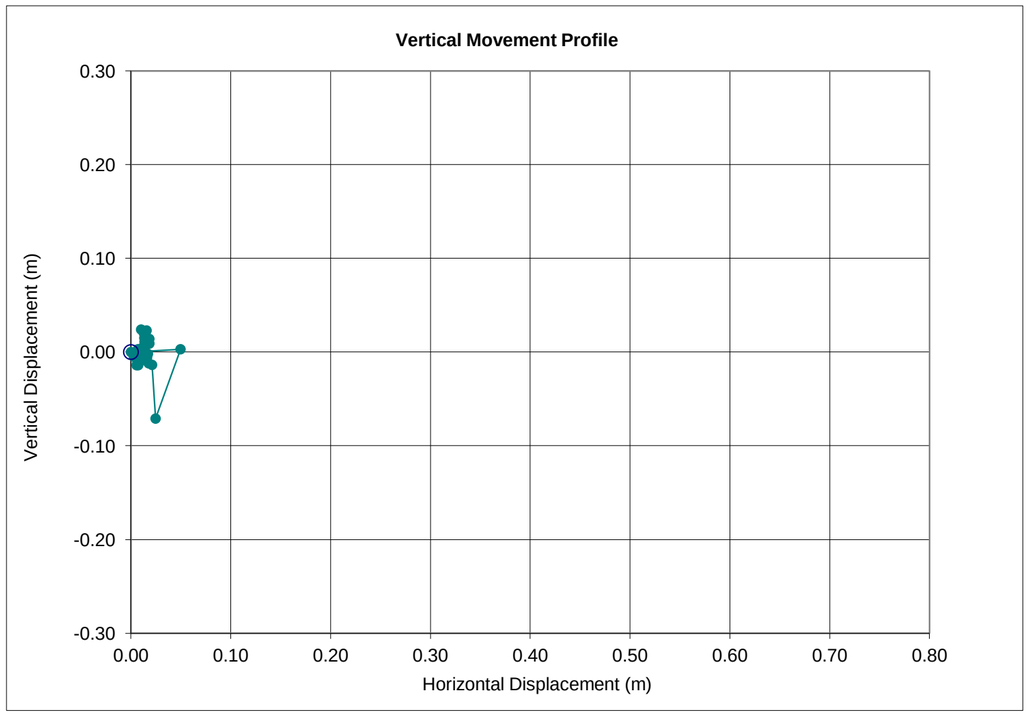
Displacement Graphs - Hub 01-35

Lewis Drive North of Couldwell Street







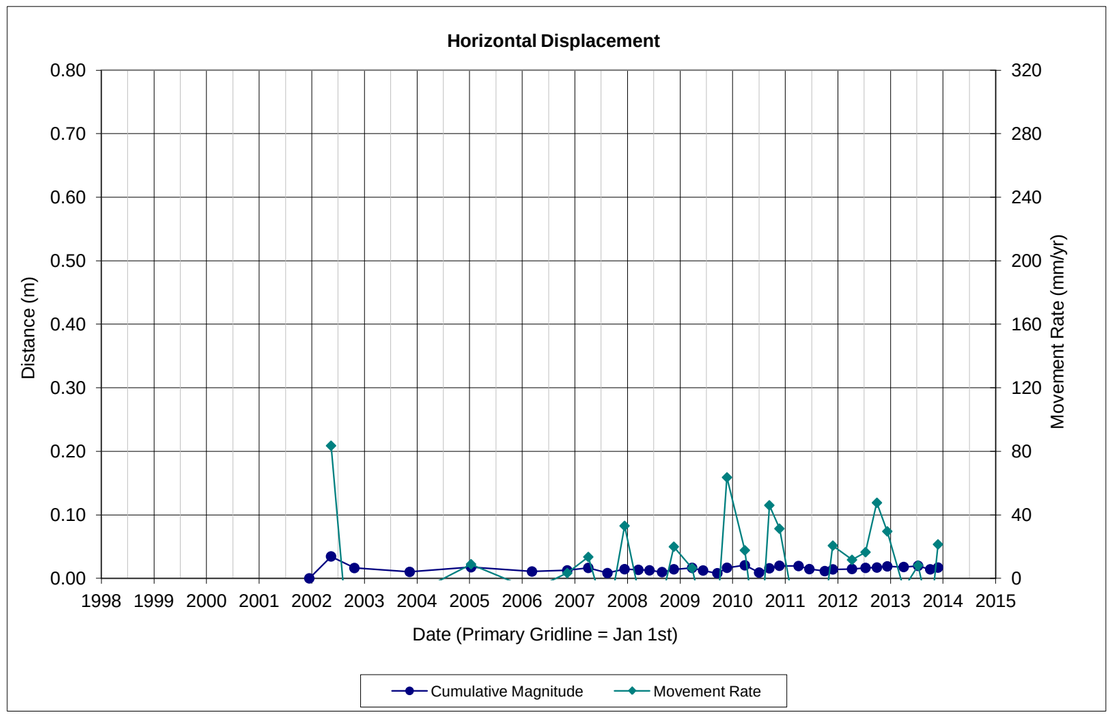


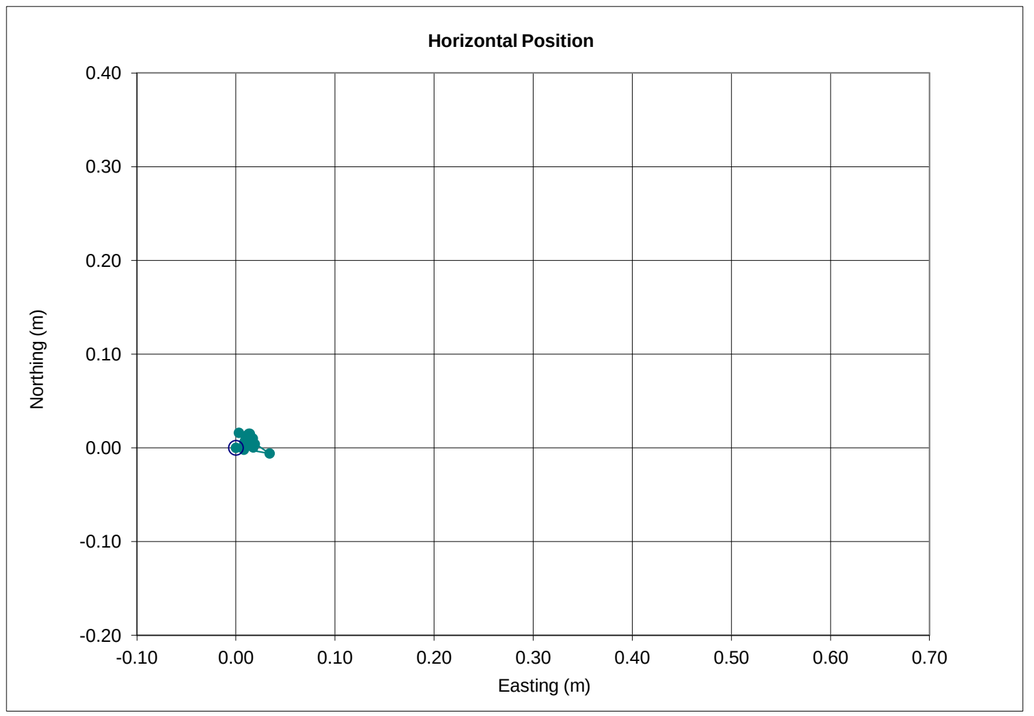
Survey and Displacement Data - Hub 01-36

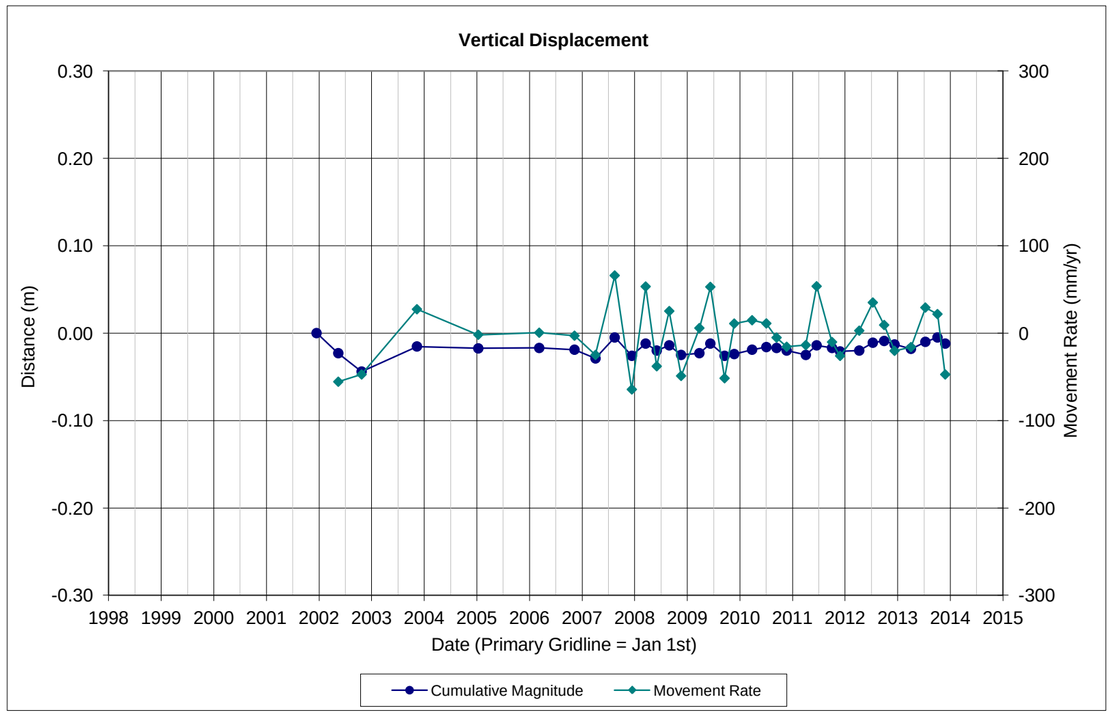
Anderson Drive at Abbott Drive

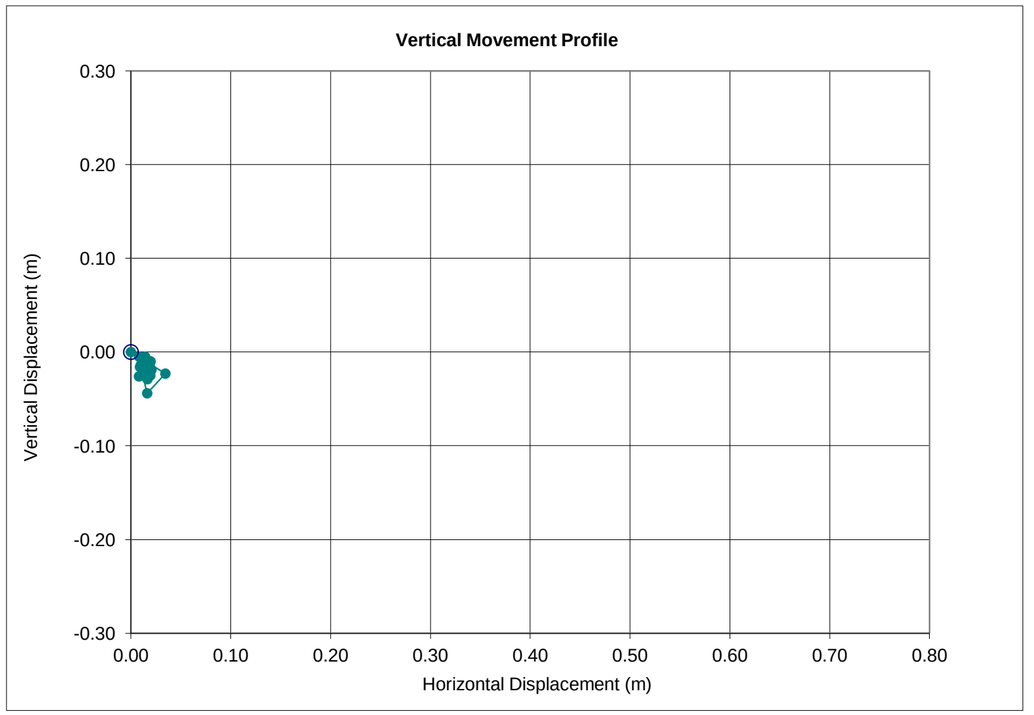
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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	532692.802	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

Displacement Graphs - Hub 01-36
Anderson Drive at Abbott Drive







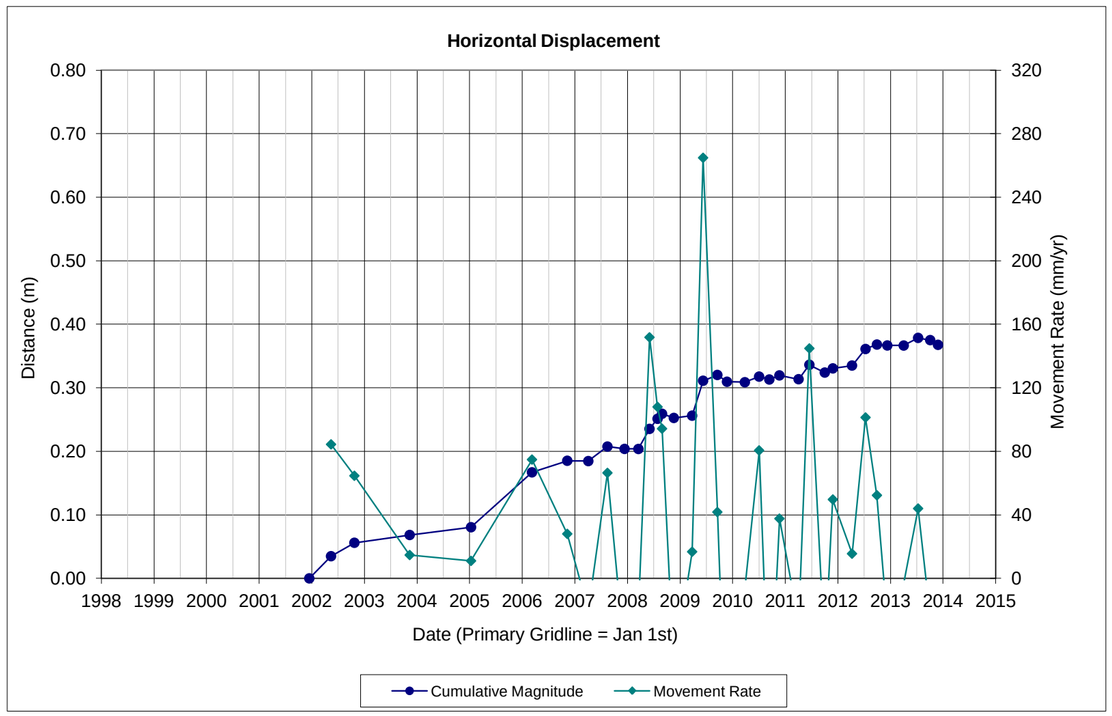


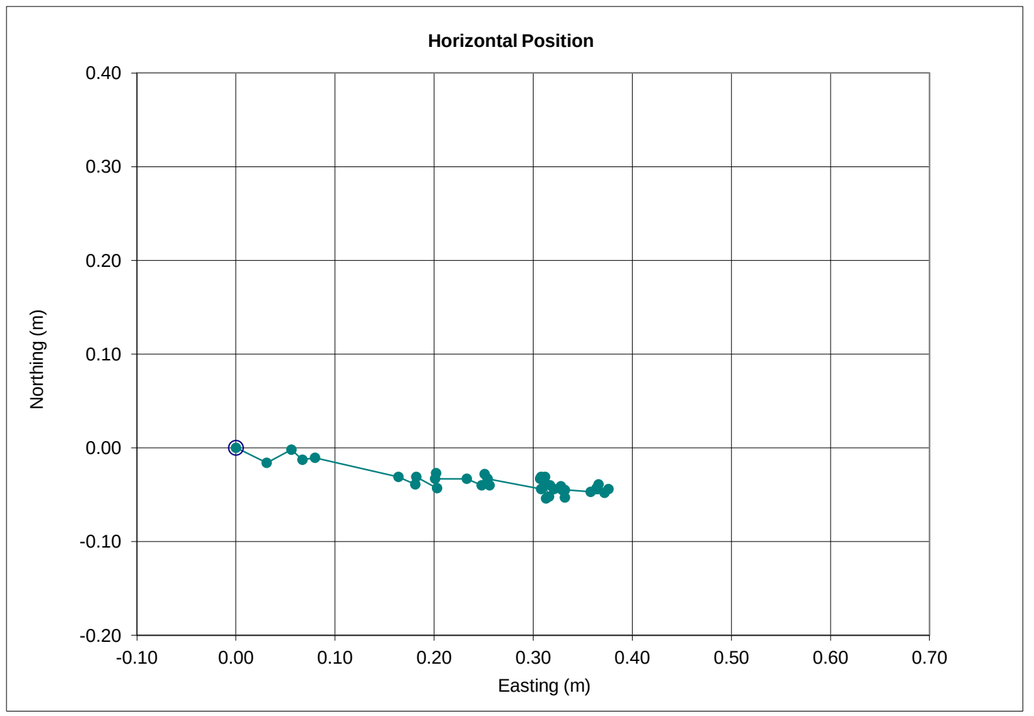
Survey and Displacement Data - Hub 01-37

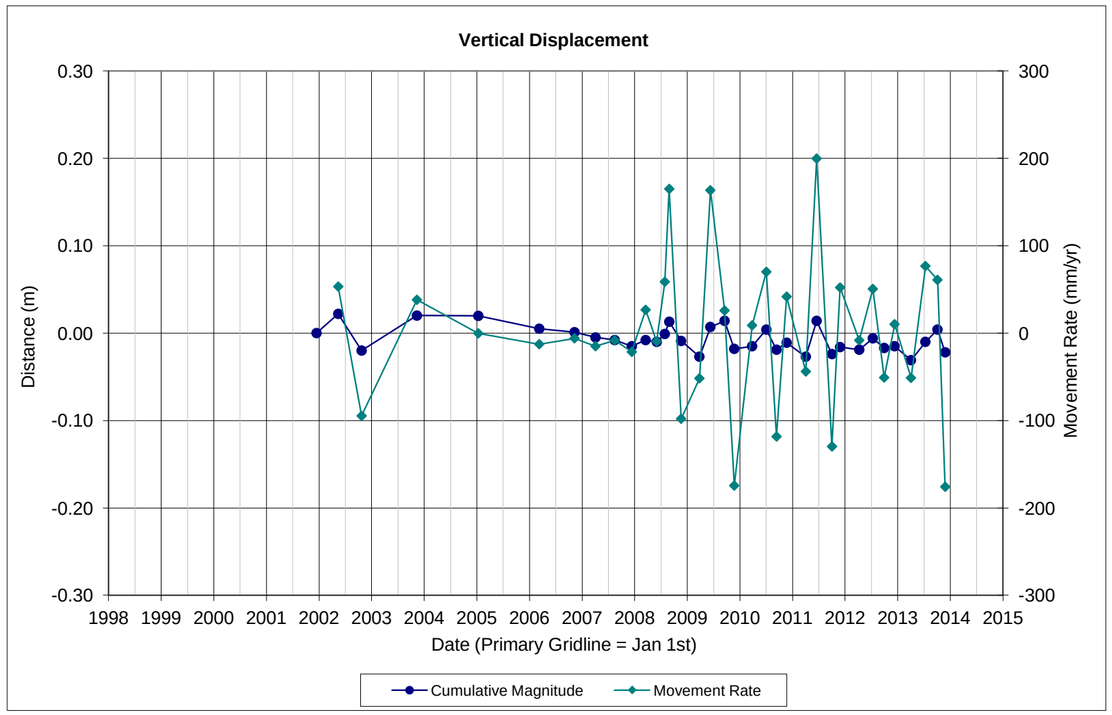
Dawson Street at Abbott Drive

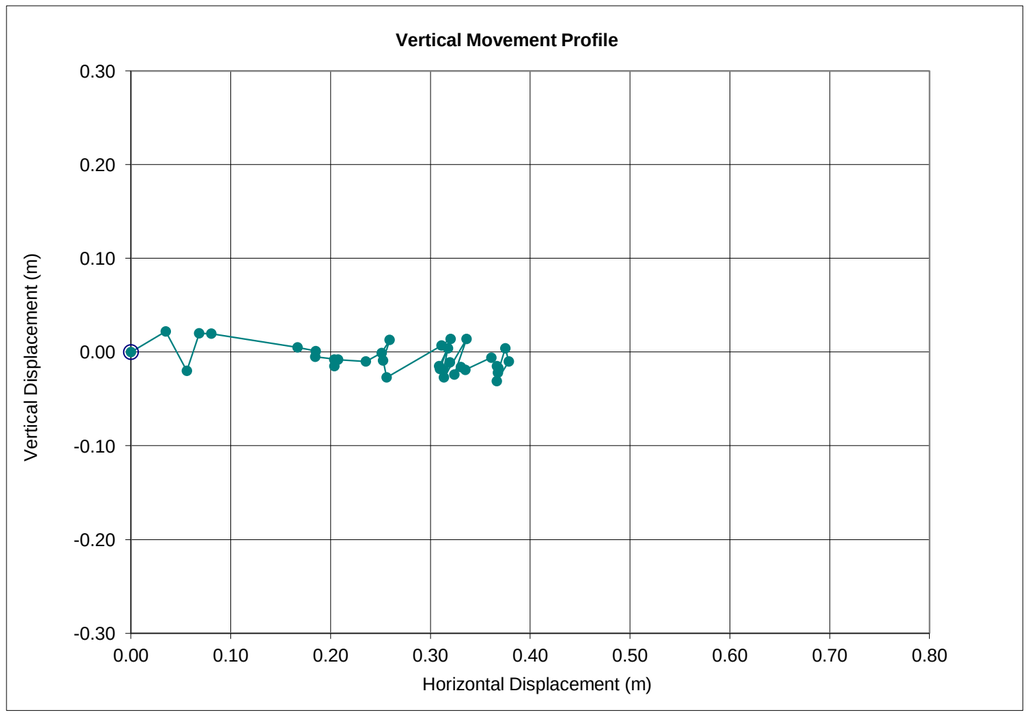
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

Displacement Graphs - Hub 01-37
Dawson Street at Abbott Drive







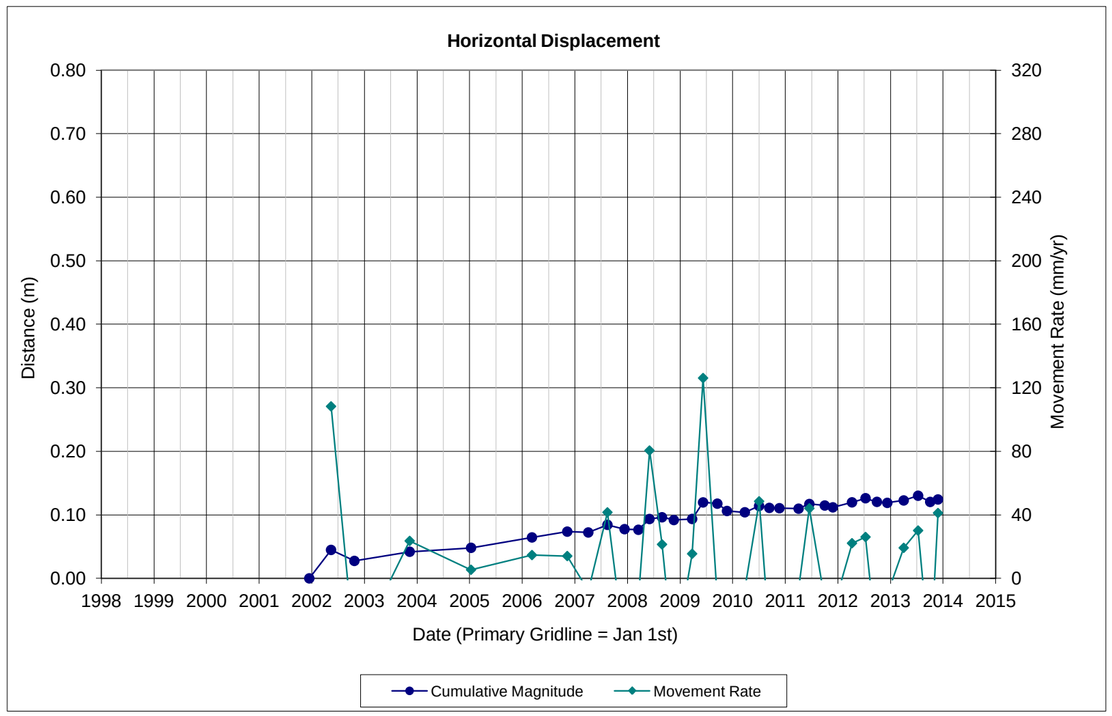


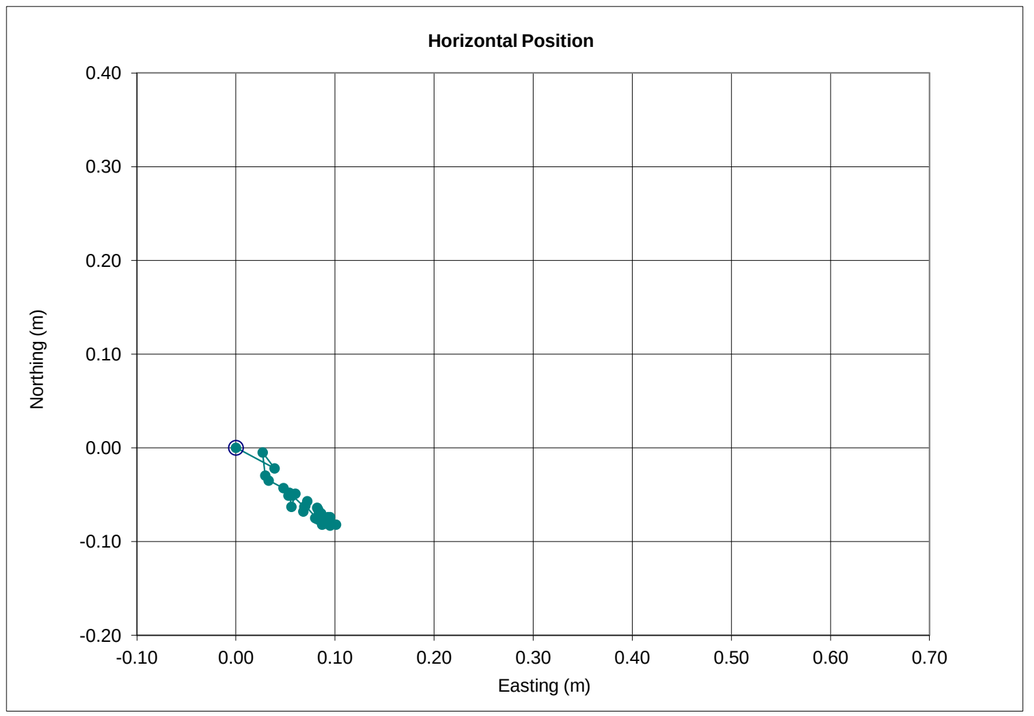
Survey and Displacement Data - Hub 01-39

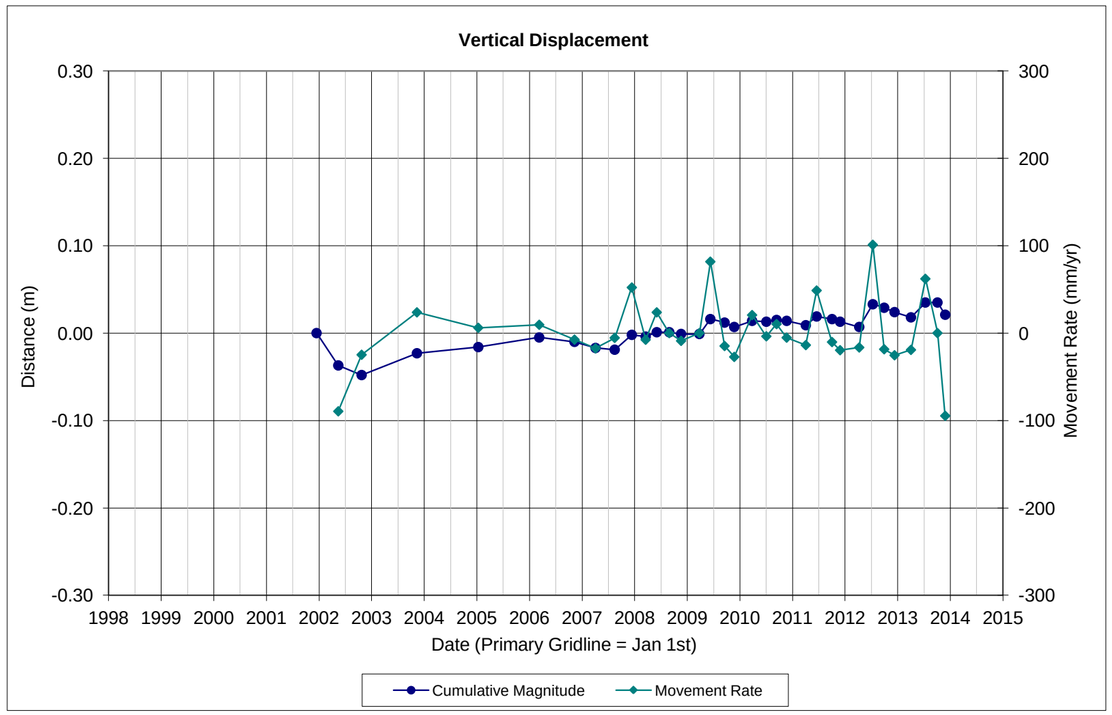
Anderson Avenue at Wade Avenue

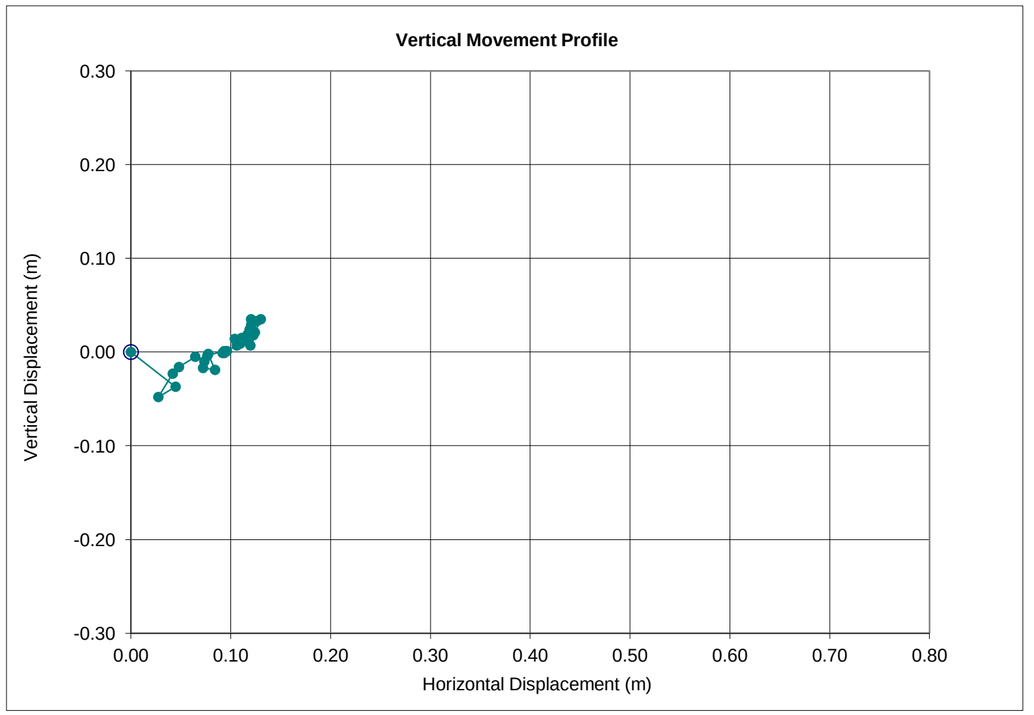
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

Displacement Graphs - Hub 01-39
Anderson Avenue at Wade Avenue







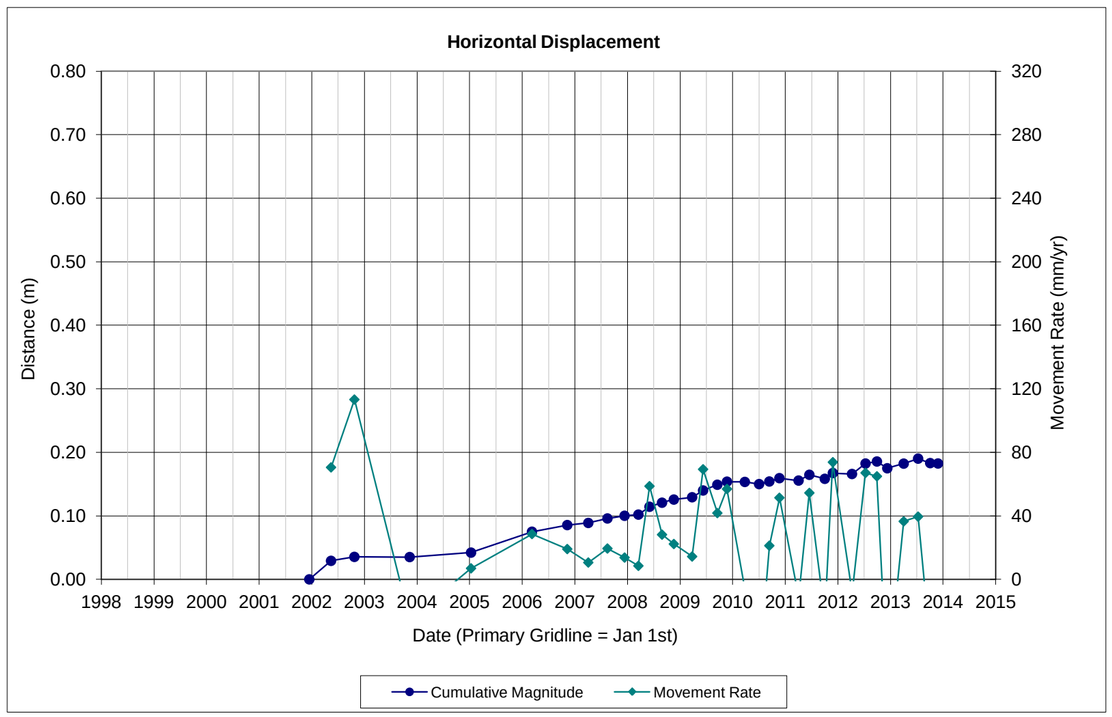


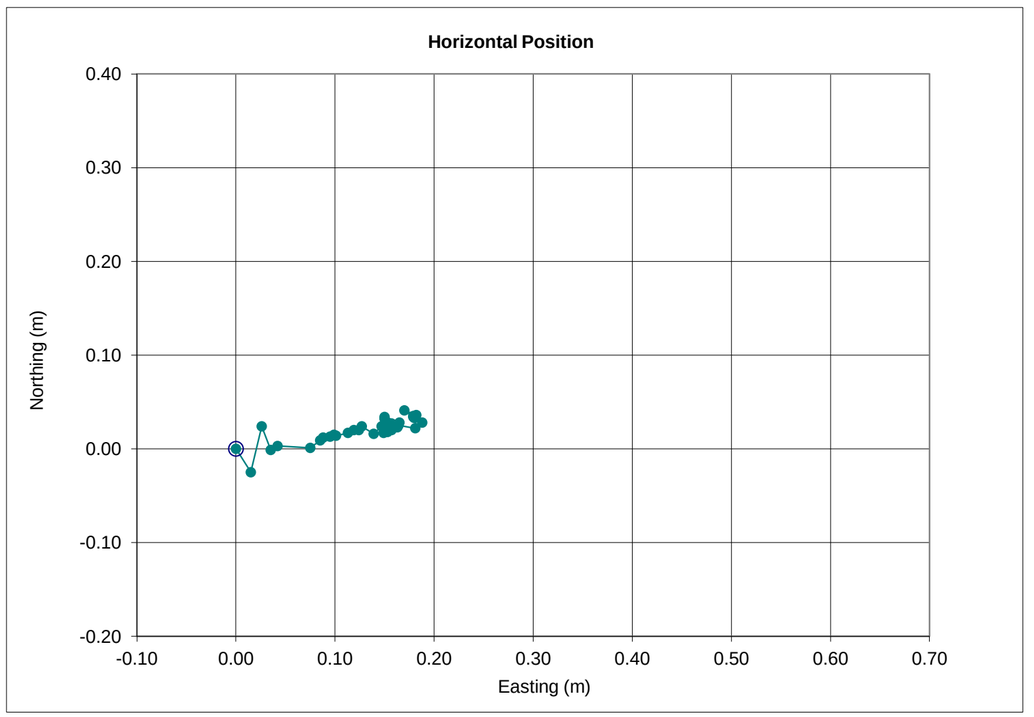
Survey and Displacement Data - Hub 01-40

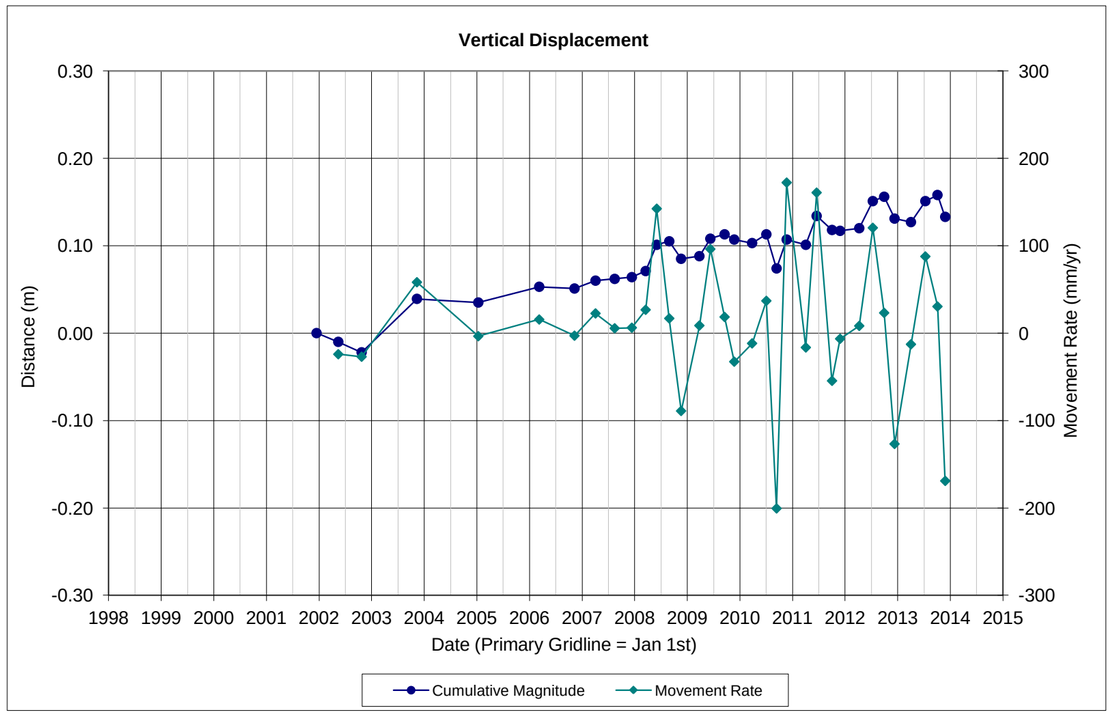
Lewis Drive East of Healy Street

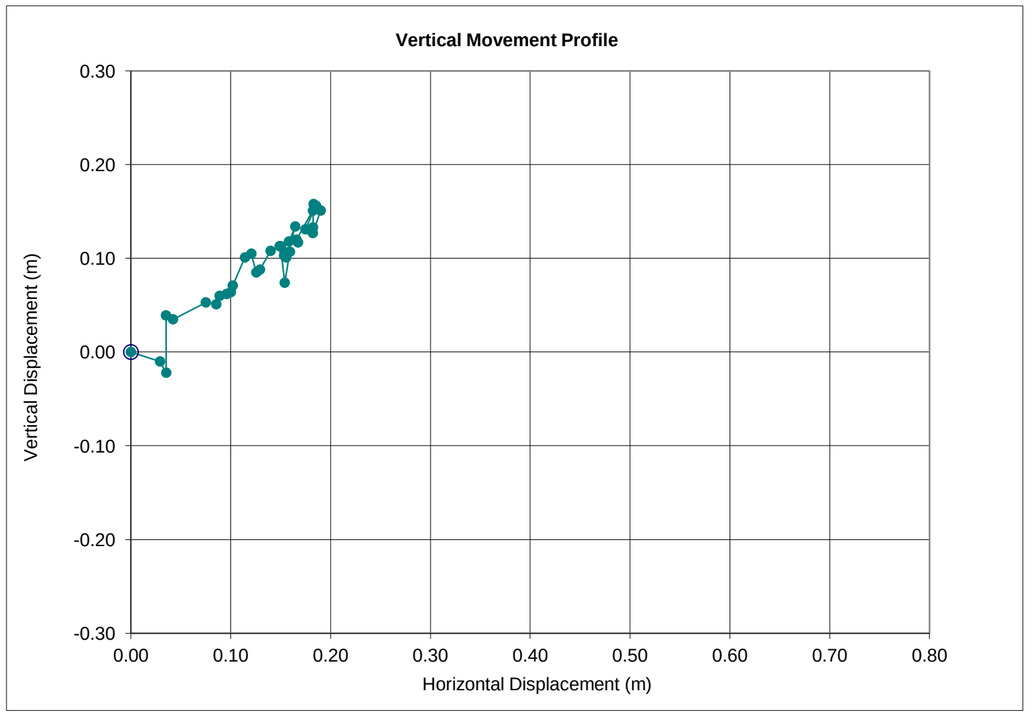
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

Displacement Graphs - Hub 01-40
Lewis Drive East of Healy Street







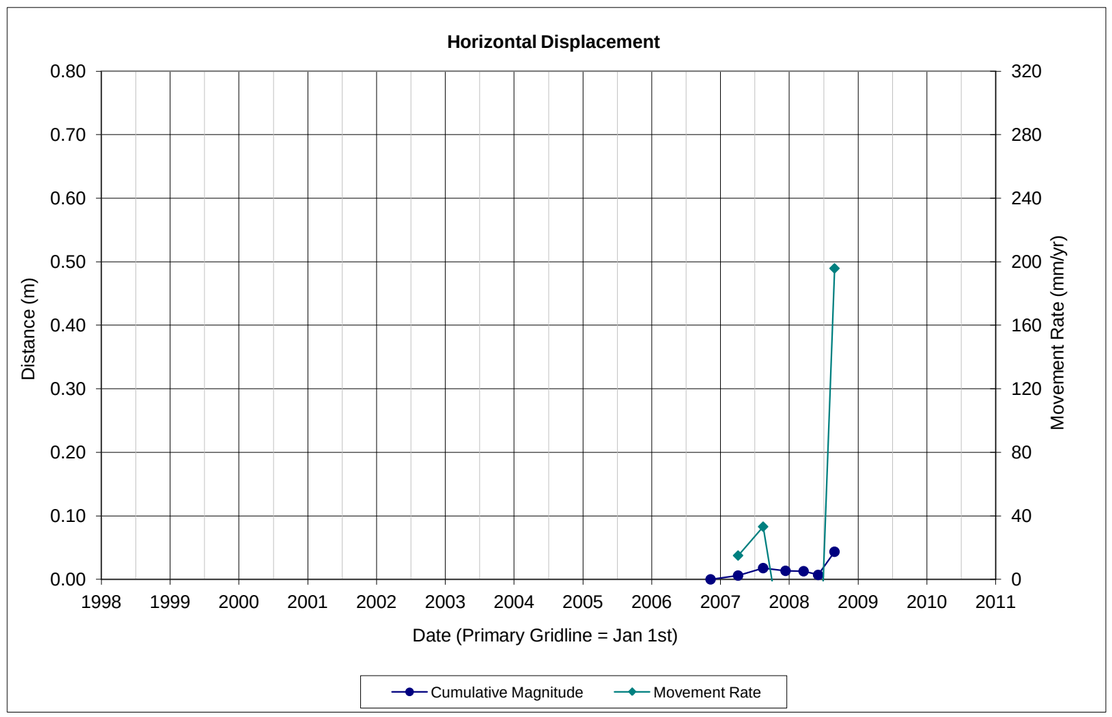


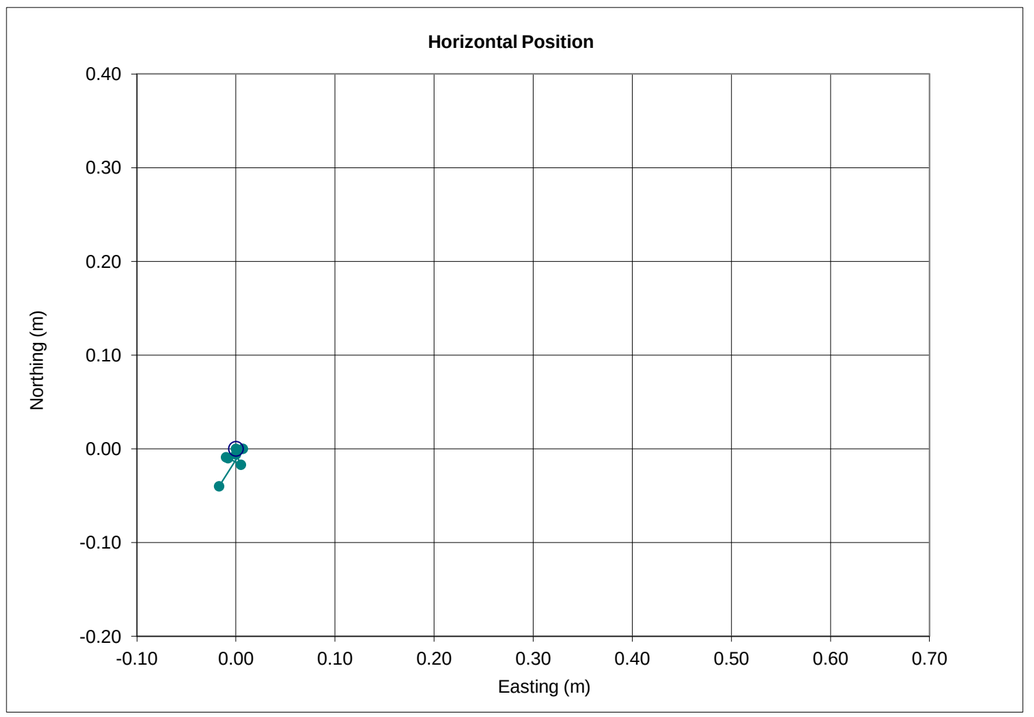
Survey and Displacement Data - Hub 06-01

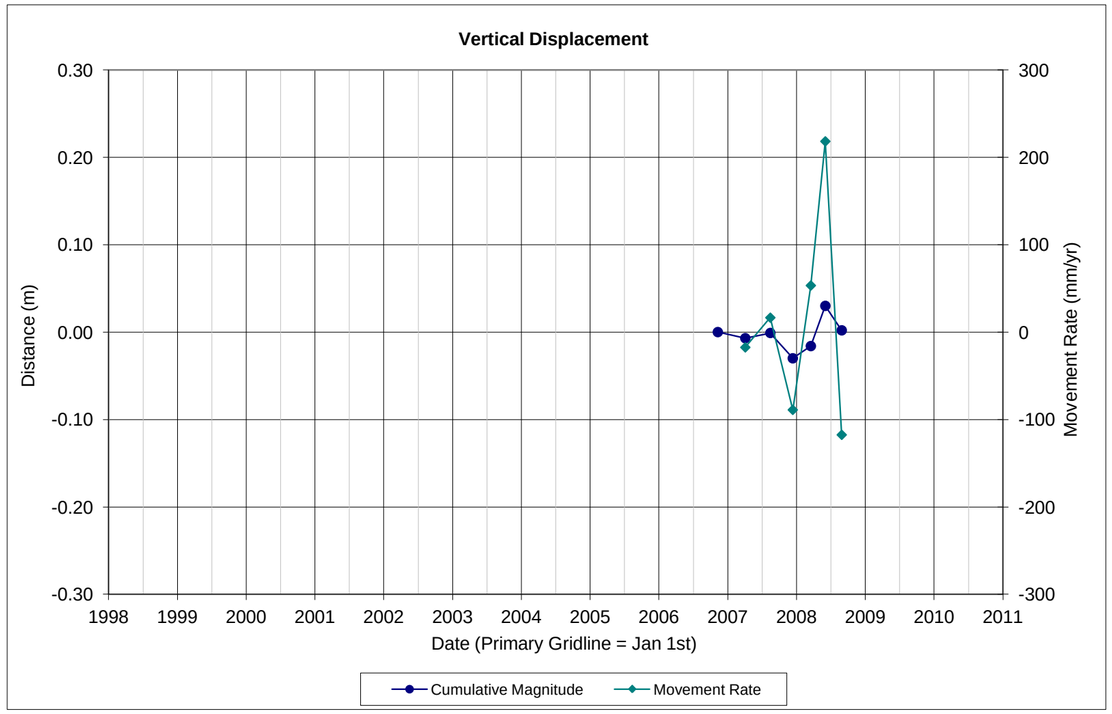
End alley E. of Anderson Dr., opposite school

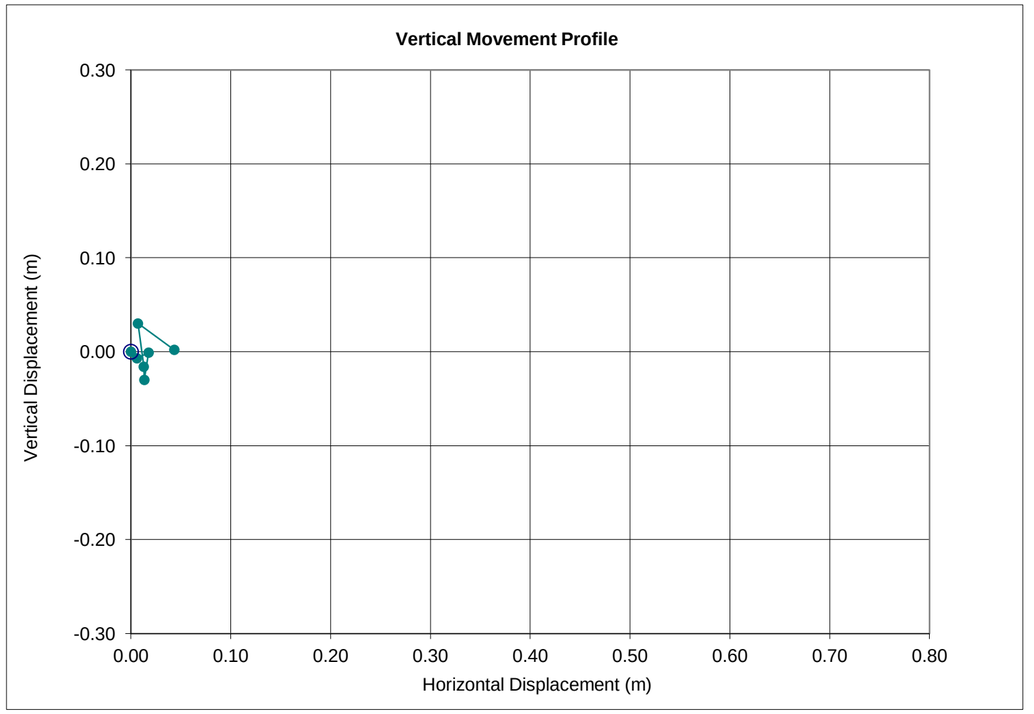
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5868878.710	532190.793	487.817	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		
05/04/2007	5868878.704	532190.793	487.810	0.40	-0.006	0.000	0.006	-0.007	180.0	-49.4	0.015	-0.018	0.40	-0.006	0.000	0.006	-0.007		-49.4	15.010	-17.512
16/08/2007	5868878.693	532190.798	487.816	0.76	-0.017	0.005	0.018	-0.001	163.6	-3.2	0.023	-0.001	0.36	-0.011	0.005	0.012	0.006		26.4	33.183	16.477
13/12/2007	5868878.701	532190.783	487.787	1.09	-0.009	-0.010	0.013	-0.030	228.0	-65.8	0.012	-0.028	0.33	0.008	-0.015	0.017	-0.029		-59.6	-52.179	-89.011
18/03/2008	5868878.700	532190.785	487.801	1.35	-0.010	-0.008	0.013	-0.016	218.7	-51.3	0.009	-0.012	0.26	-0.001	0.002	0.002	0.014		80.9	-8.508	53.266
03/06/2008	5868878.710	532190.800	487.847	1.56	0.000	0.007	0.007	0.030	90.0	76.9	0.004	0.019	0.21	0.010	0.015	0.018	0.046		68.6	-85.515	218.201
29/08/2008	5868878.670	532190.776	487.819	1.80	-0.040	-0.017	0.043	0.002	203.0	2.6	0.024	0.001	0.24	-0.040	-0.024	0.047	-0.028		-31.0	195.840	-117.552

Displacement Graphs - Hub 06-01
End alley E. of Anderson Dr., opposite school









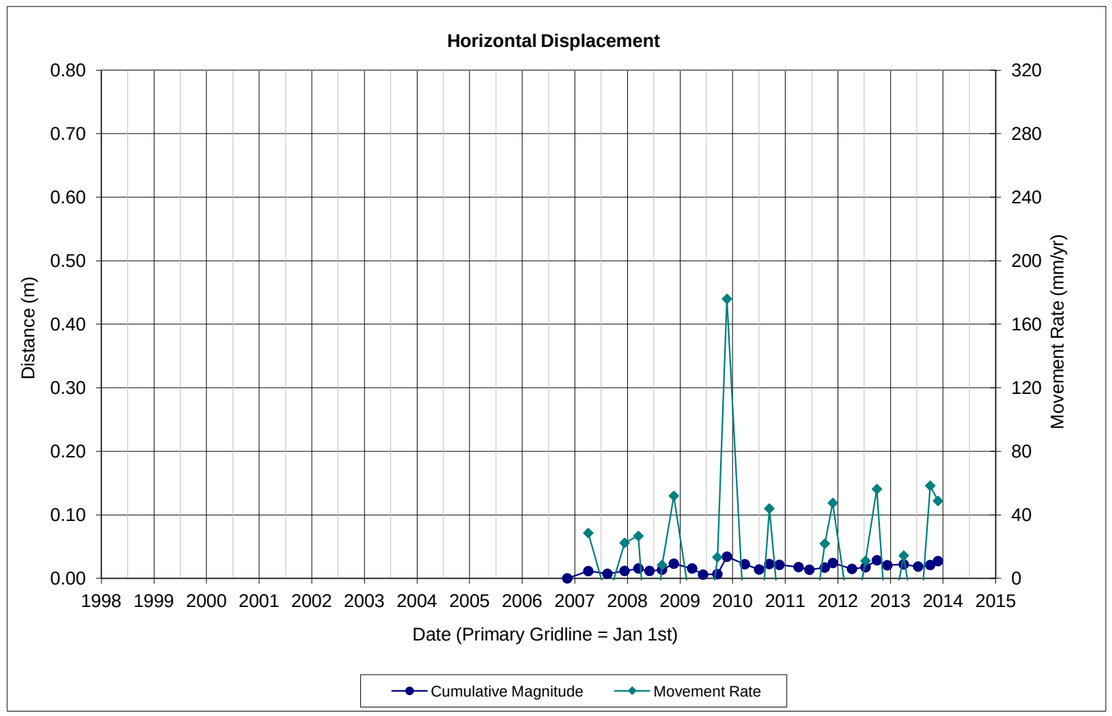
Survey and Displacement Data - Hub 06-02

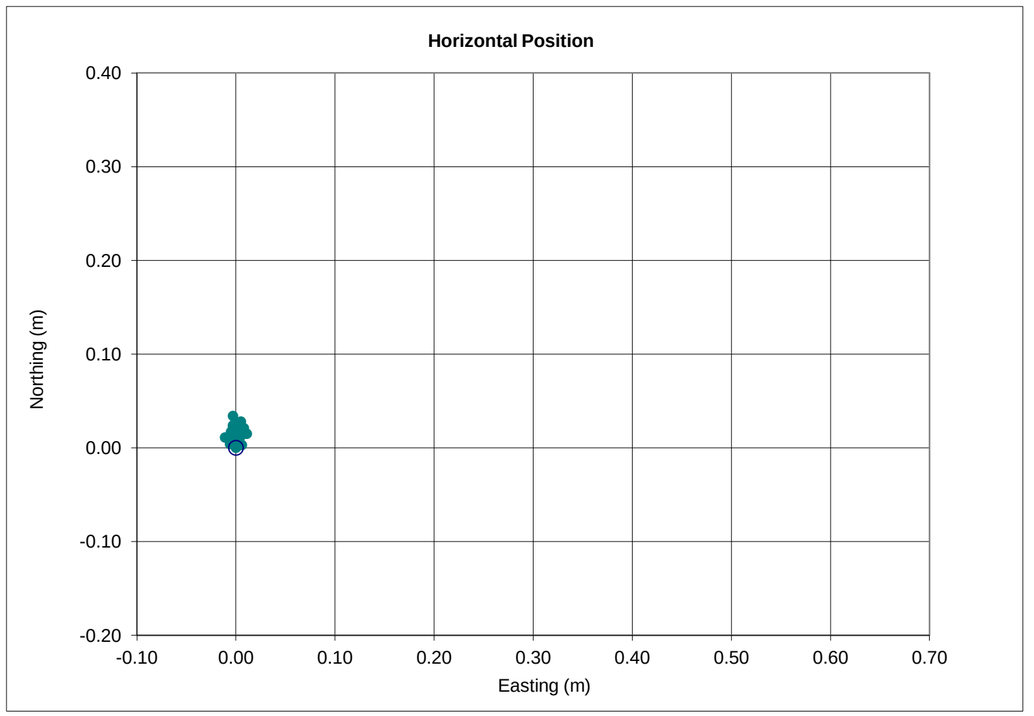
East side Anderson Drive by school

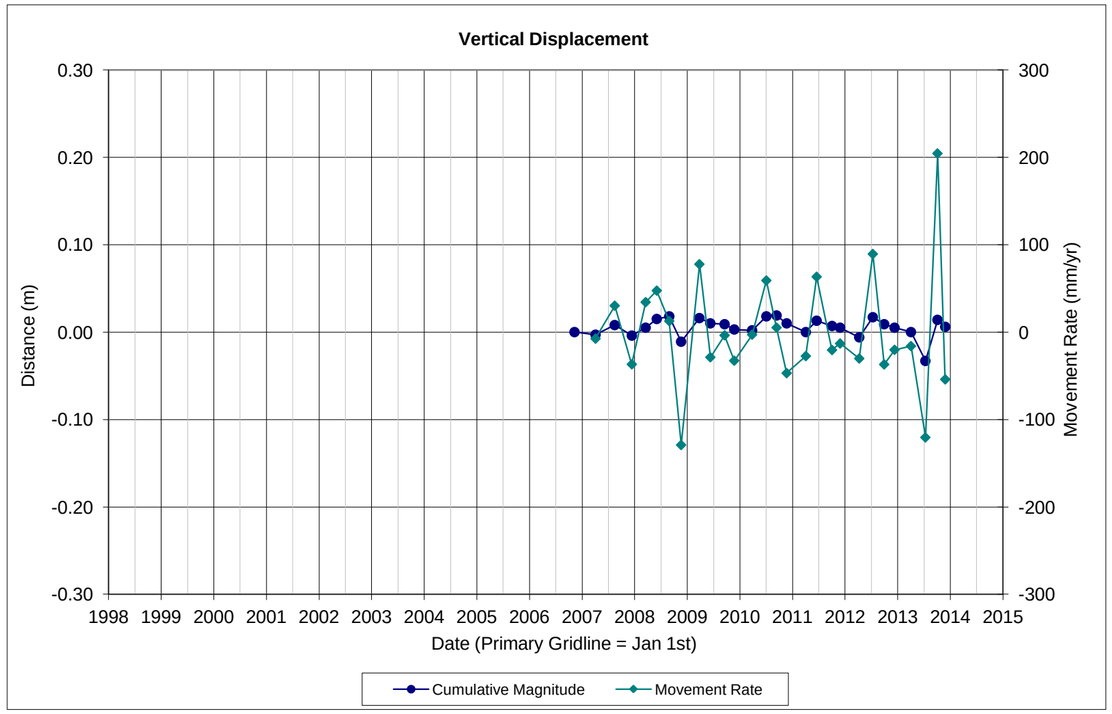
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

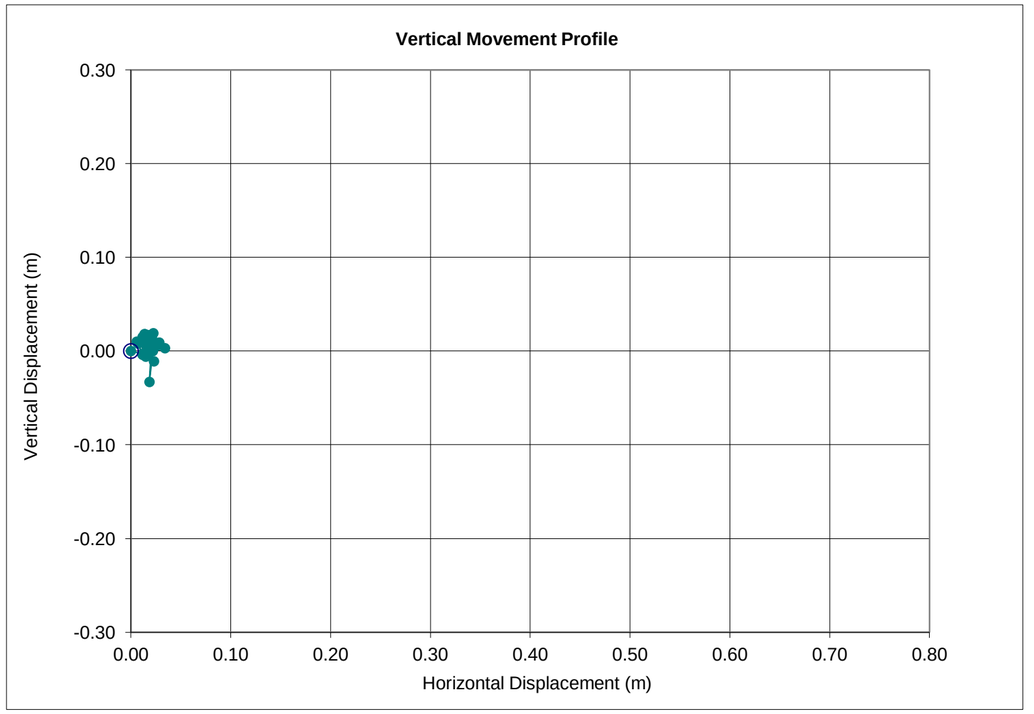
Displacement Graphs - Hub 06-02

East side Anderson Drive by school









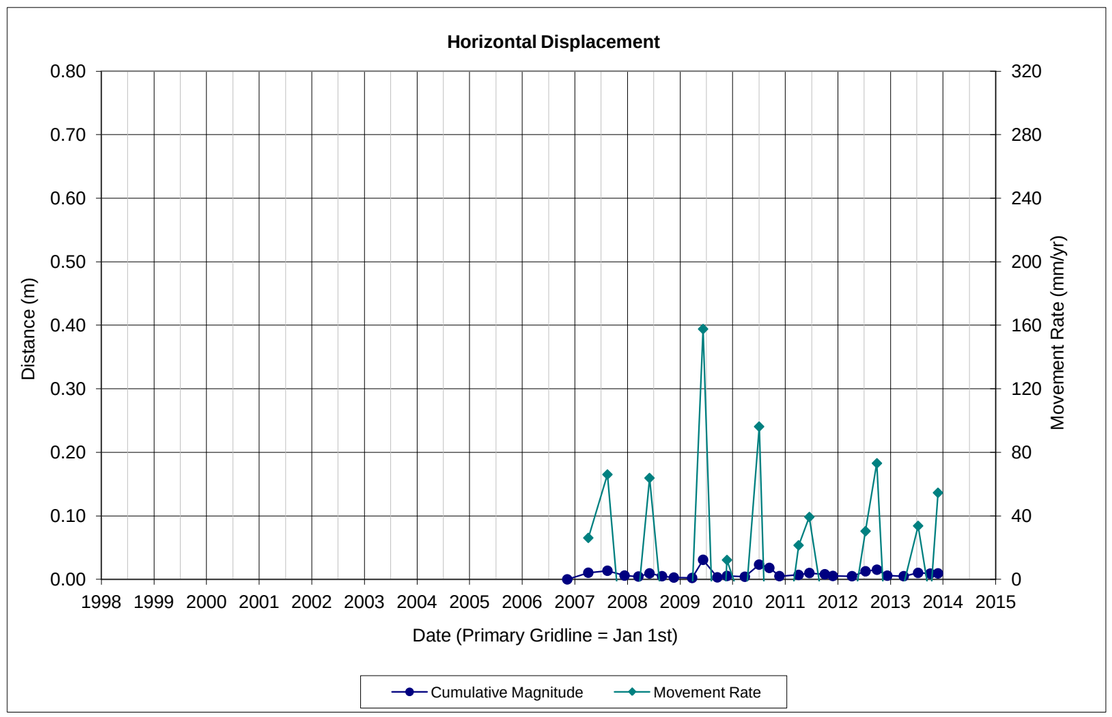
Survey and Displacement Data - Hub 06-03

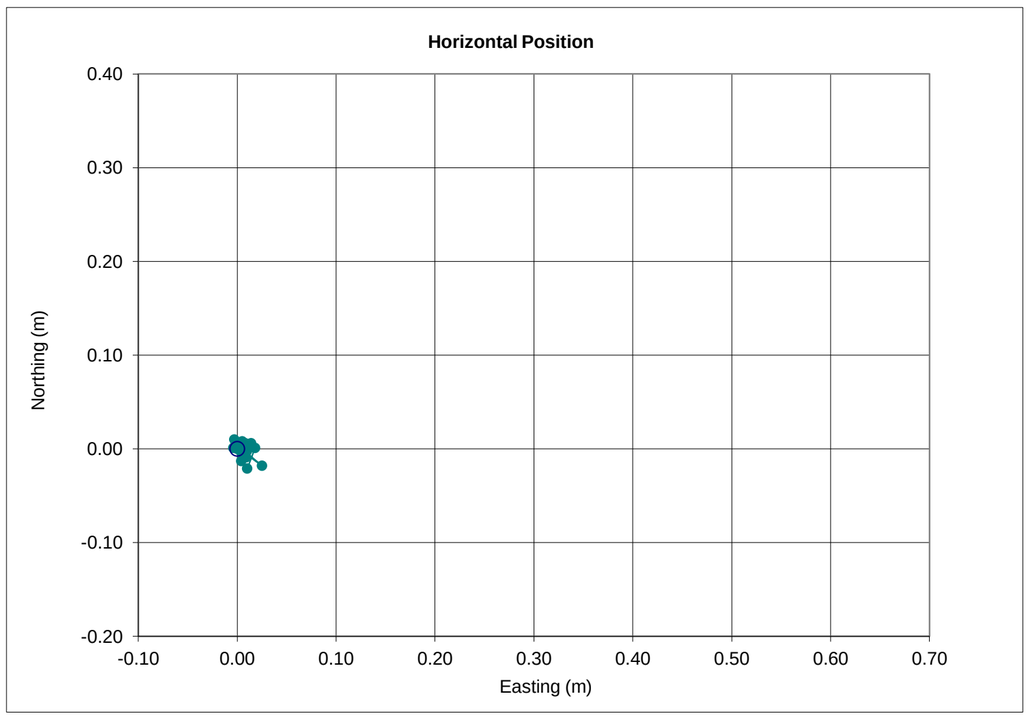
West side Anderson Dr., opposite school yard

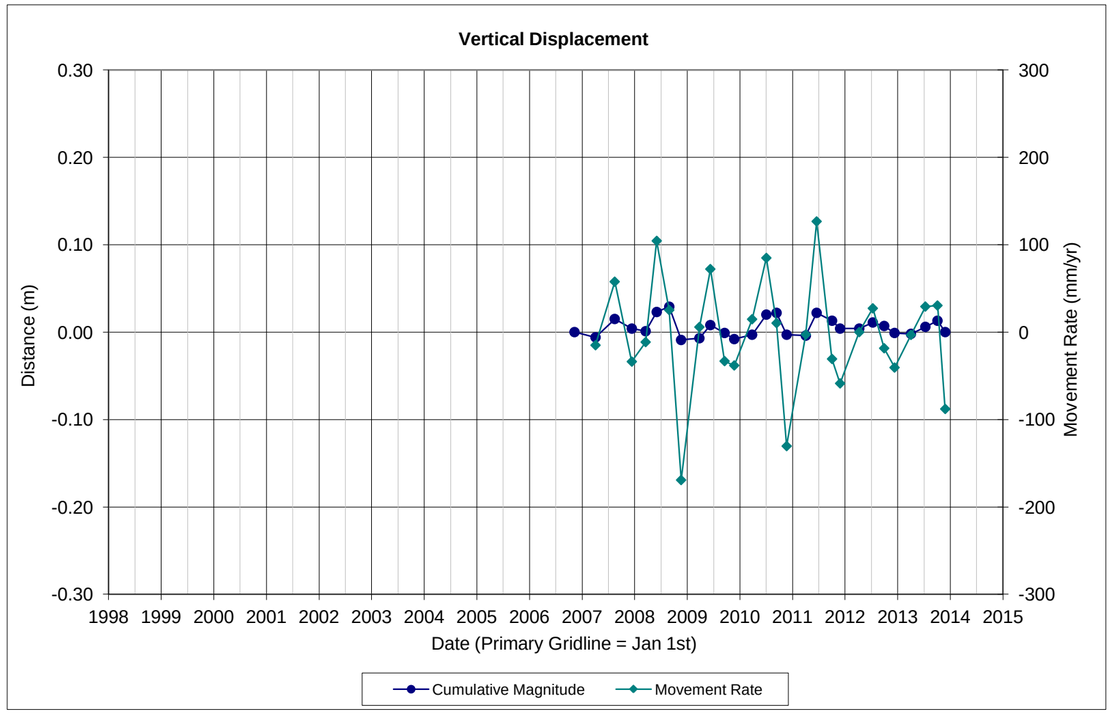
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

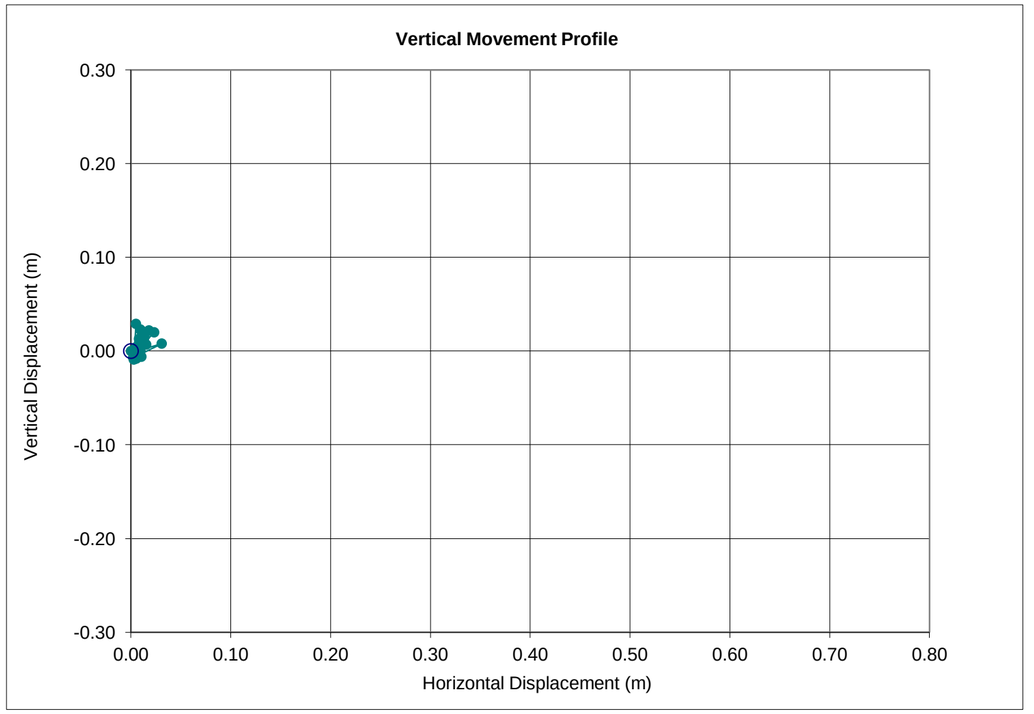
Displacement Graphs - Hub 06-03

West side Anderson Dr., opposite school yard









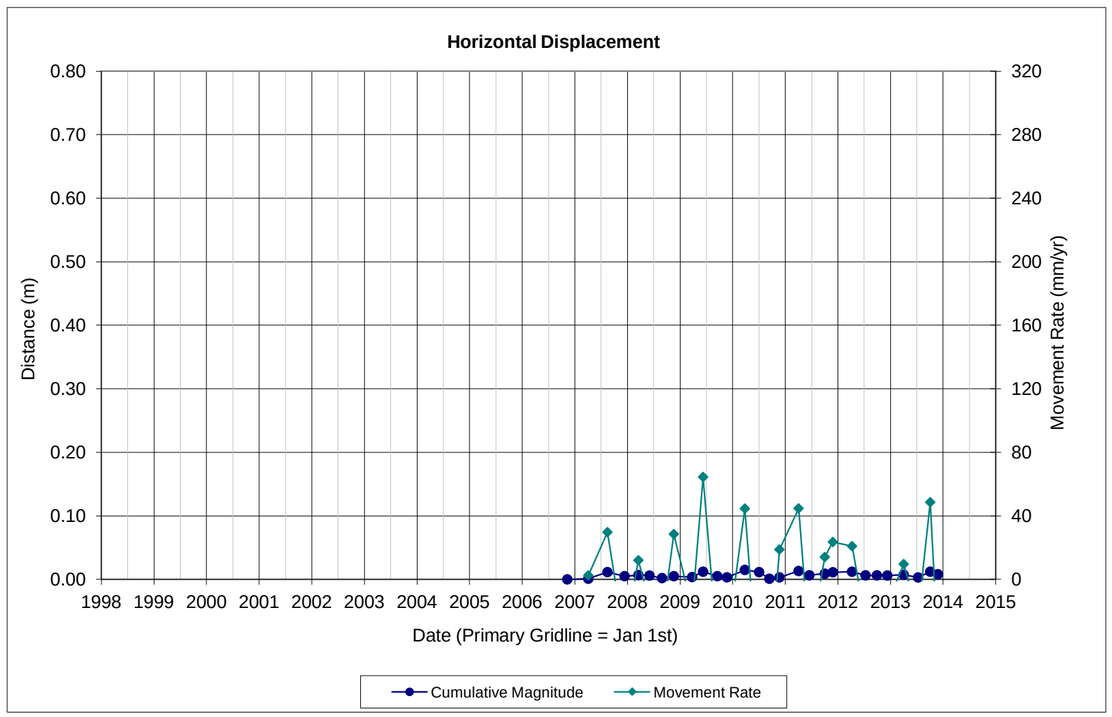
Survey and Displacement Data - Hub 06-04

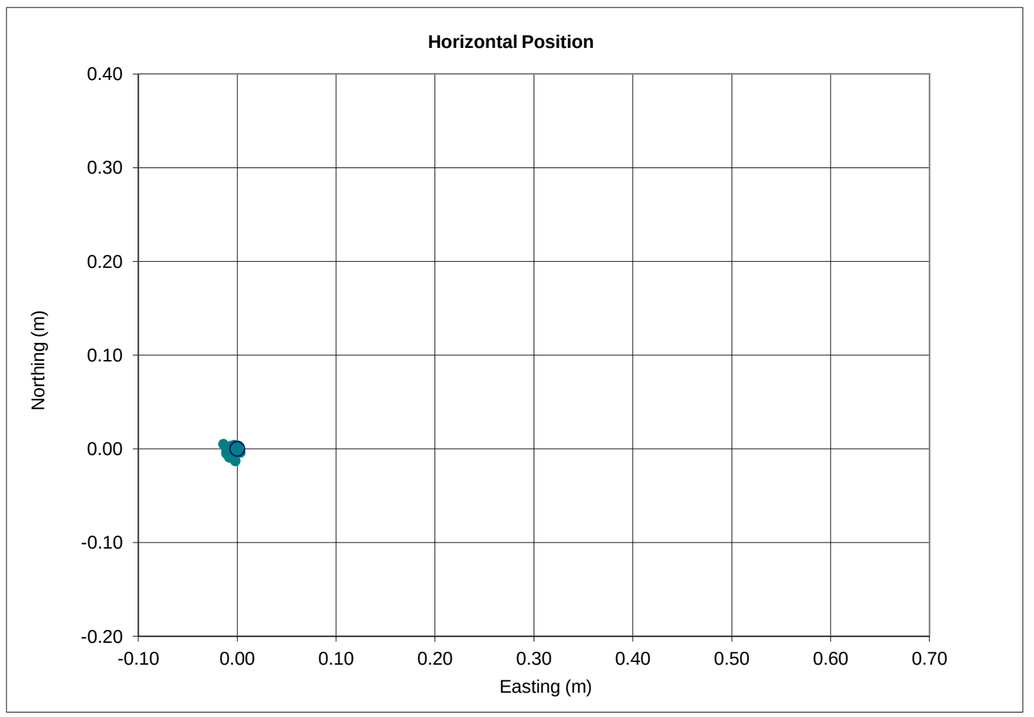
North side Wade Ave, one lot E. Anderson Dr.

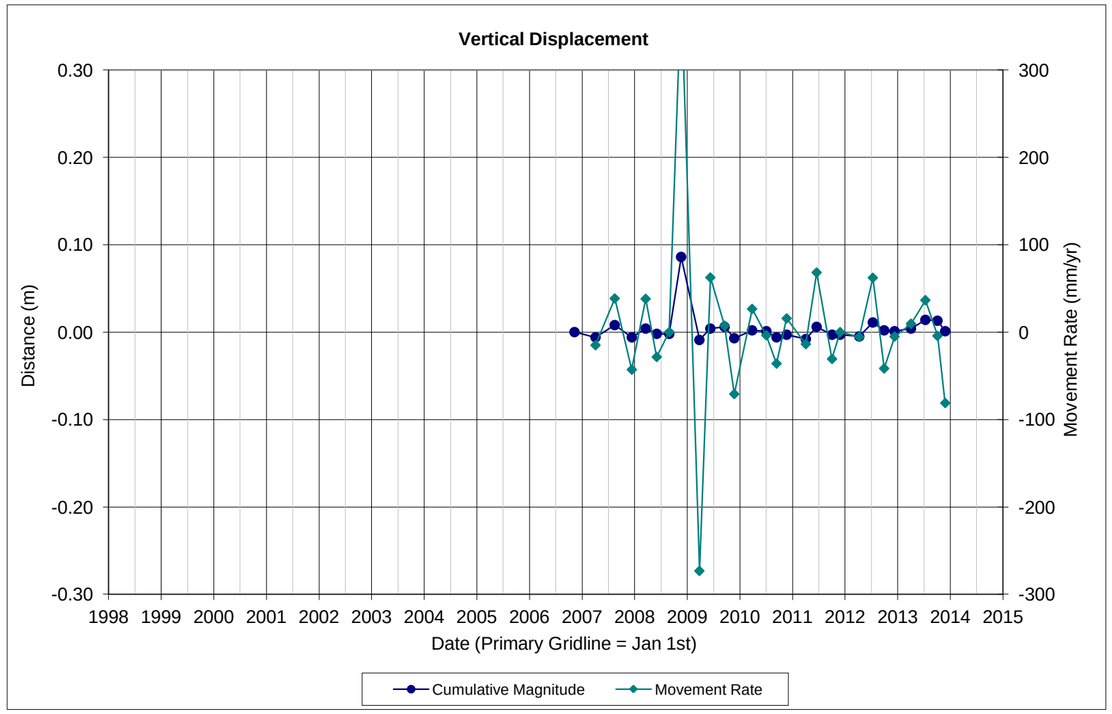
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

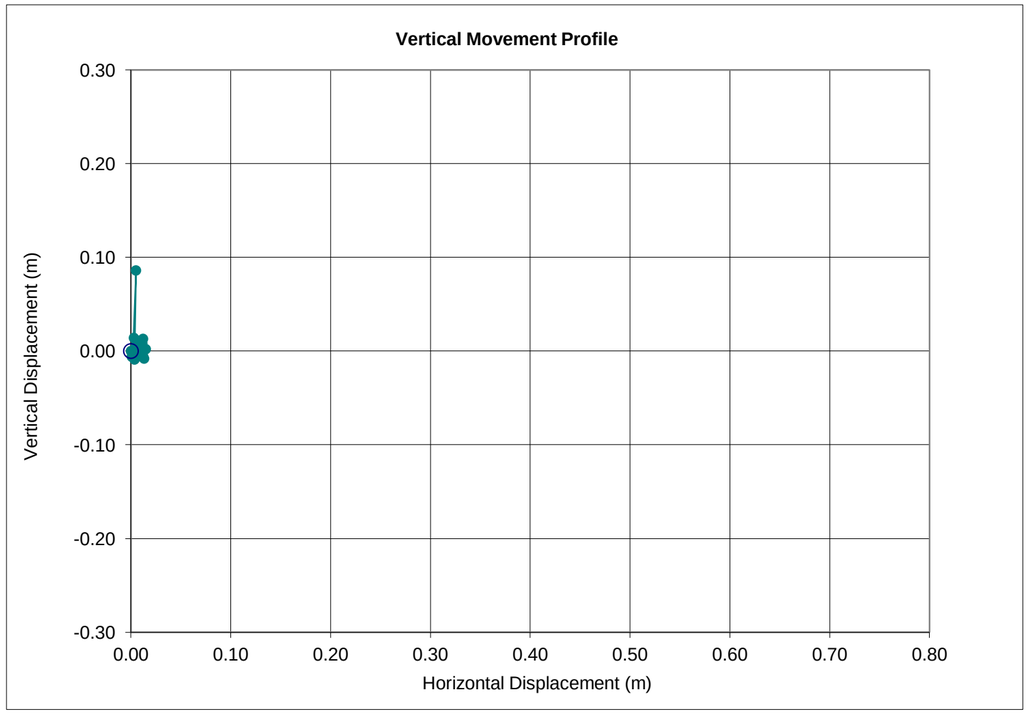
Displacement Graphs - Hub 06-04

North side Wade Ave, one lot E. Anderson Dr.









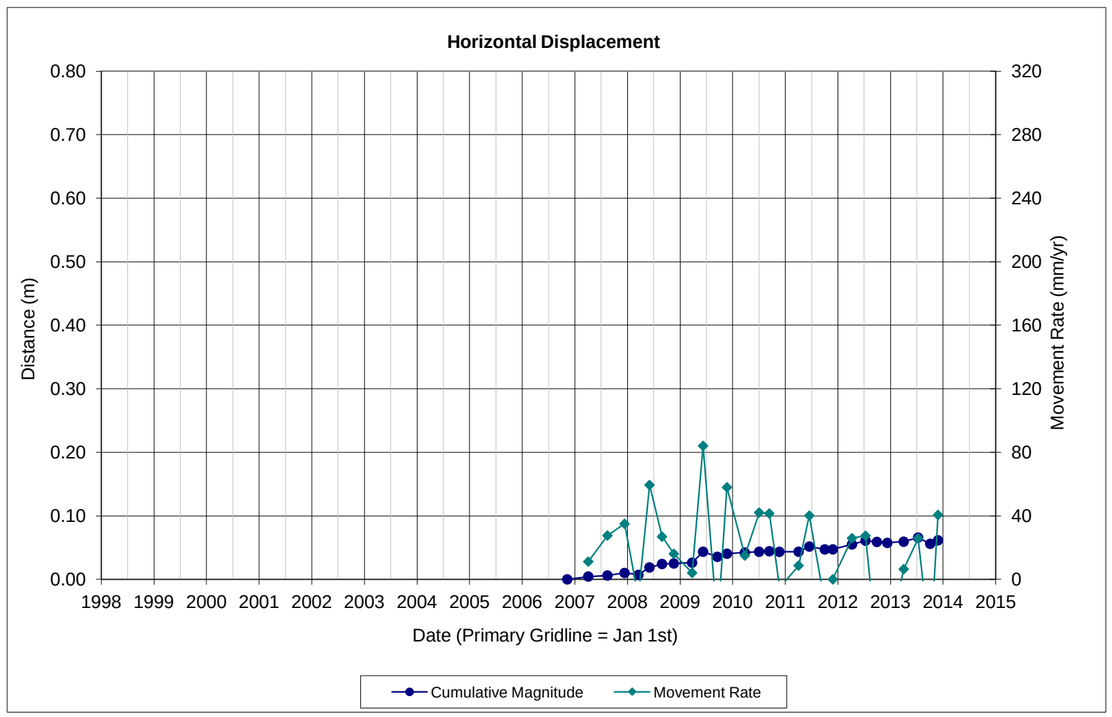
Survey and Displacement Data - Hub 06-05

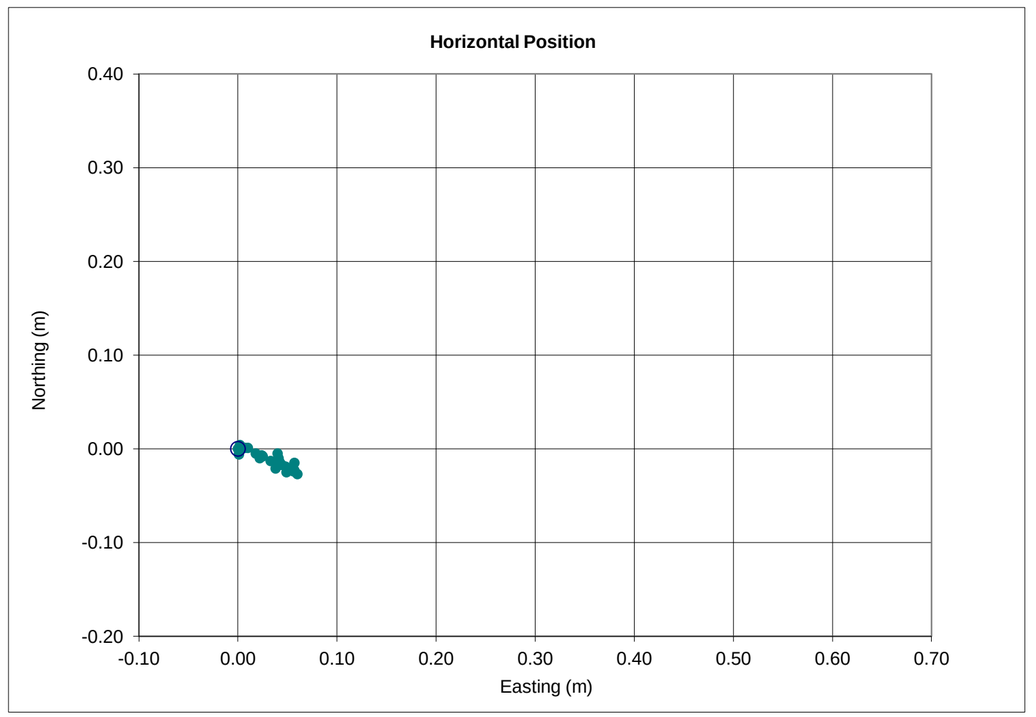
Anderson Drive west side, one lot S. of Avison

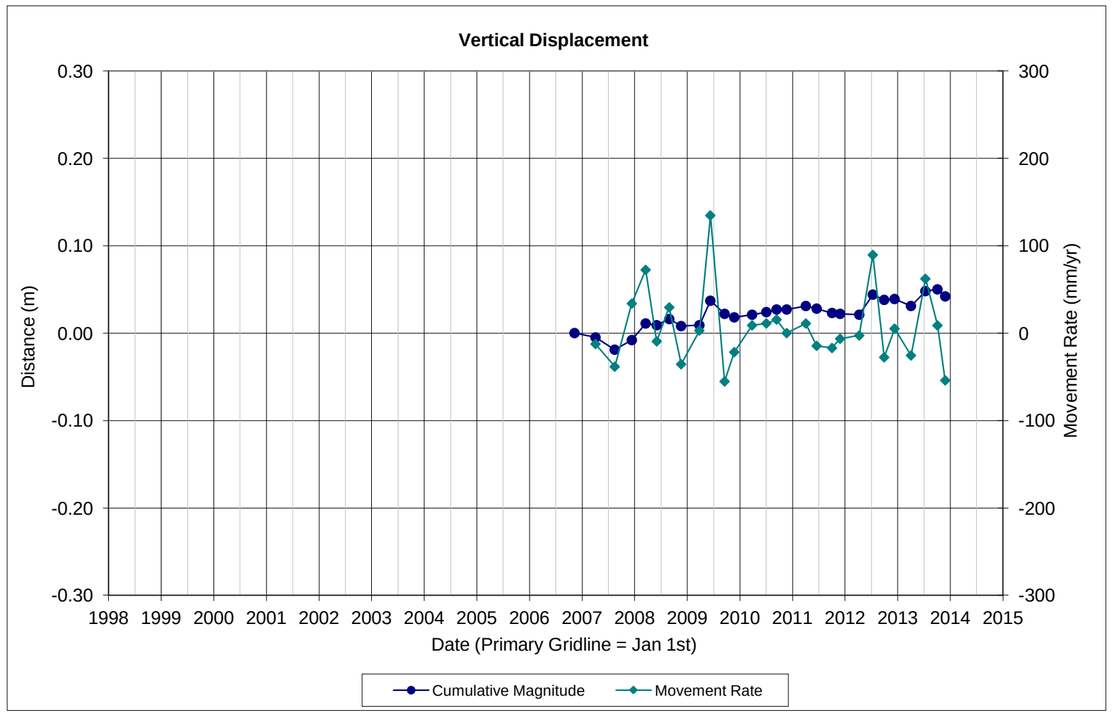
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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	62.092
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

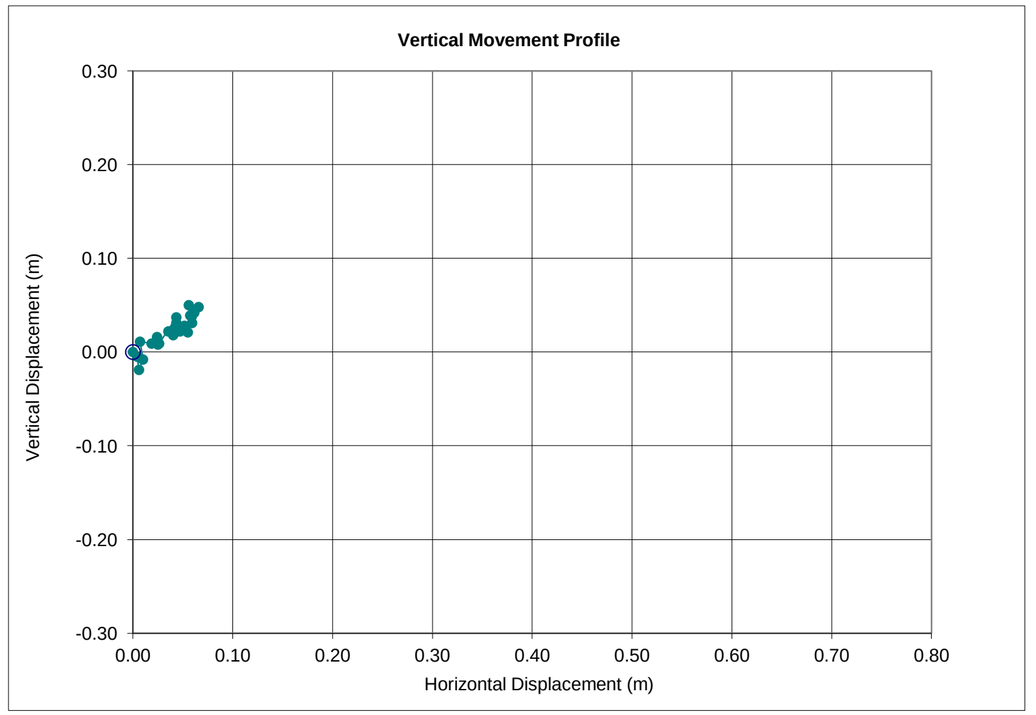
Displacement Graphs - Hub 06-05

Anderson Drive west side, one lot S. of Avison









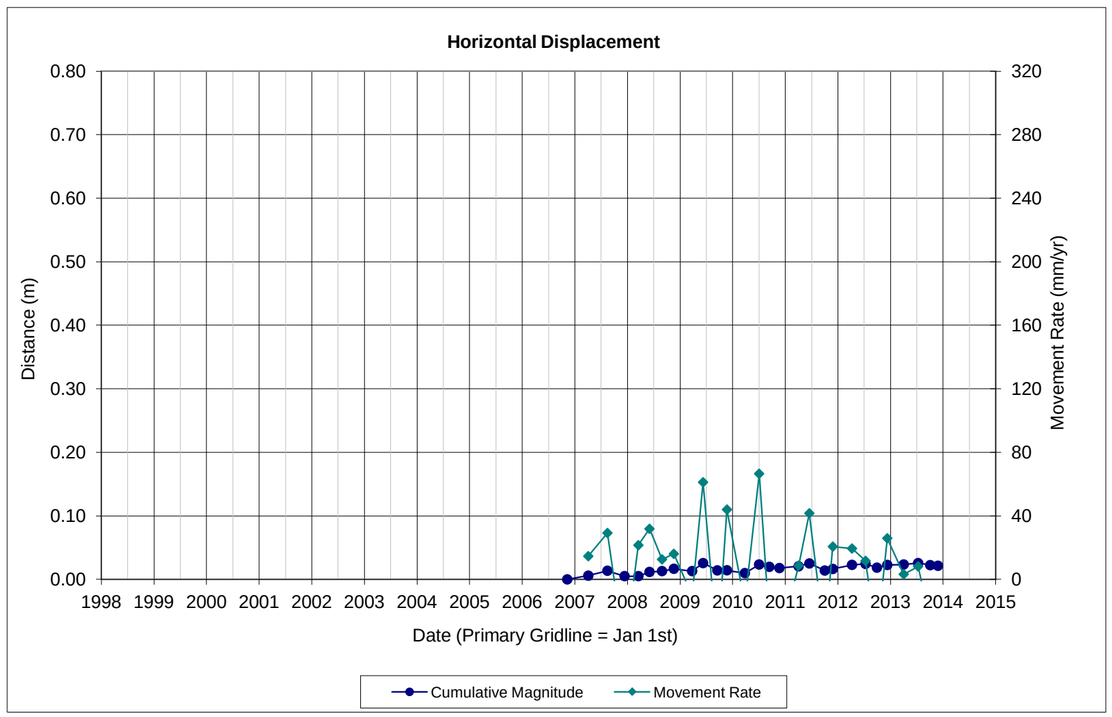
Survey and Displacement Data - Hub 06-06

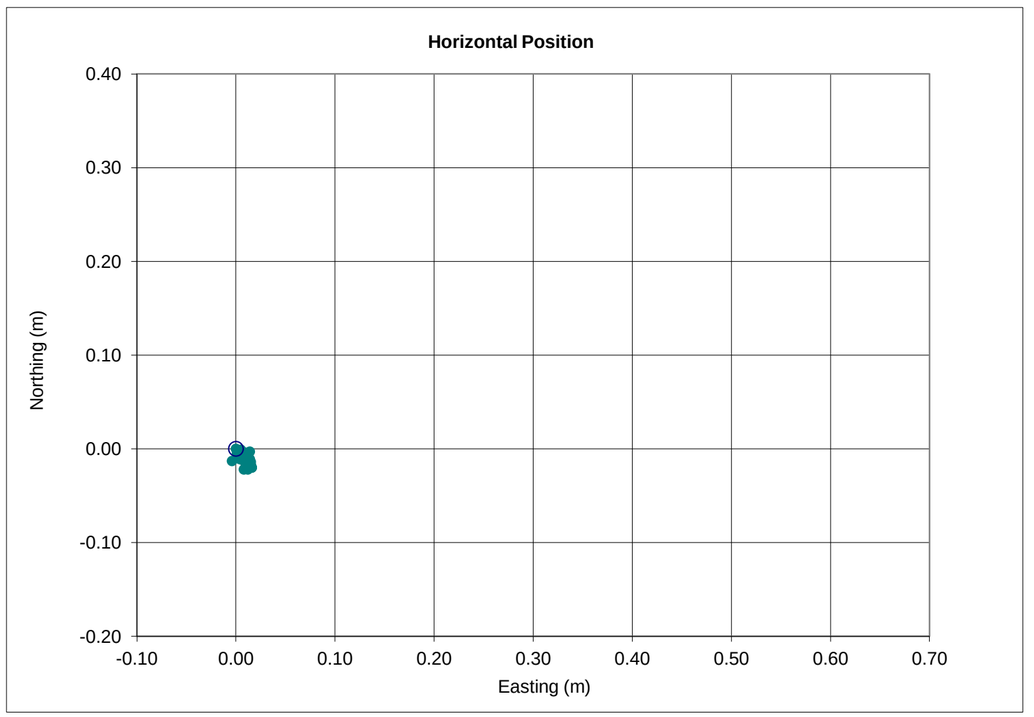
North corner Avery Ave / Anderson Drive

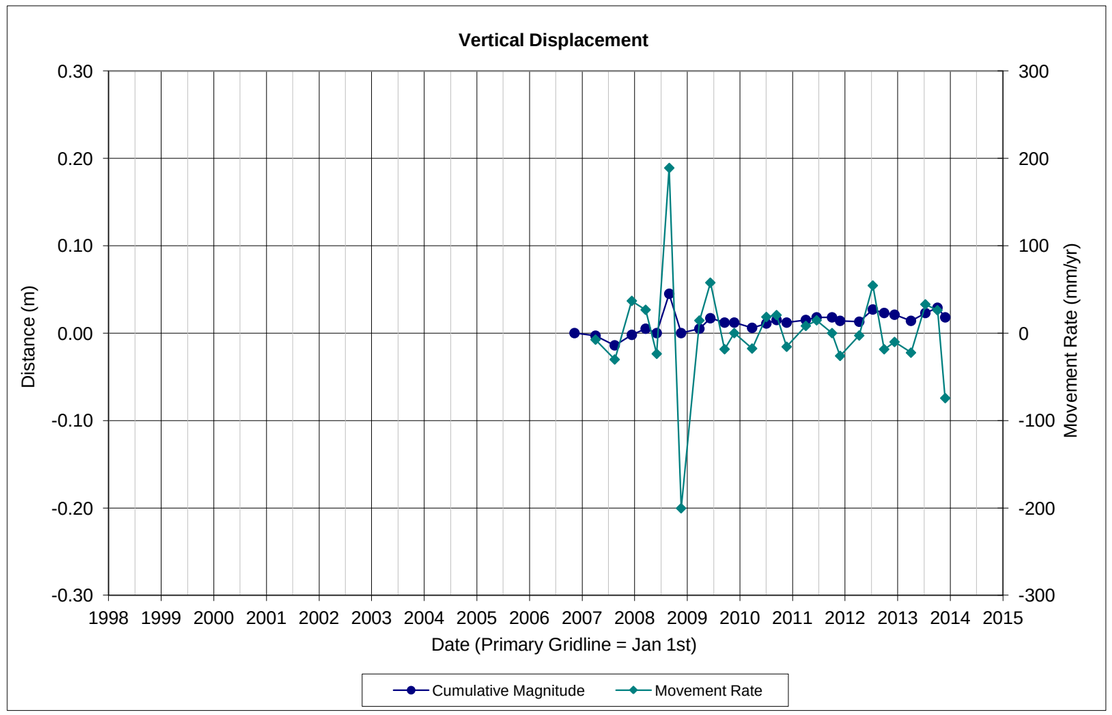
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

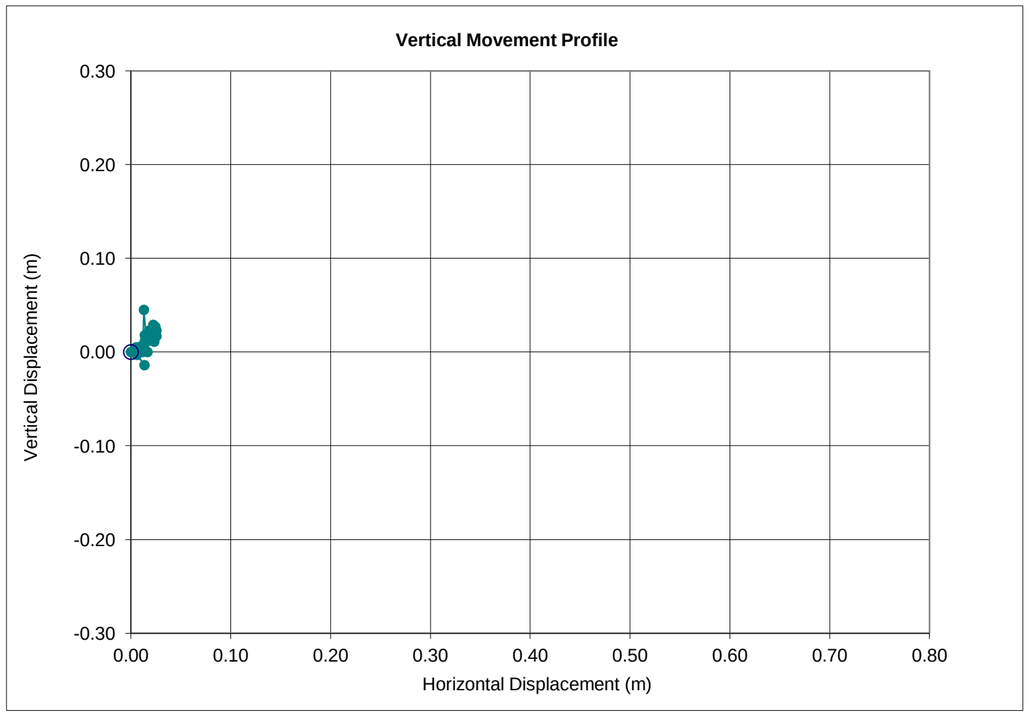
Displacement Graphs - Hub 06-06

North corner Avery Ave / Anderson Drive









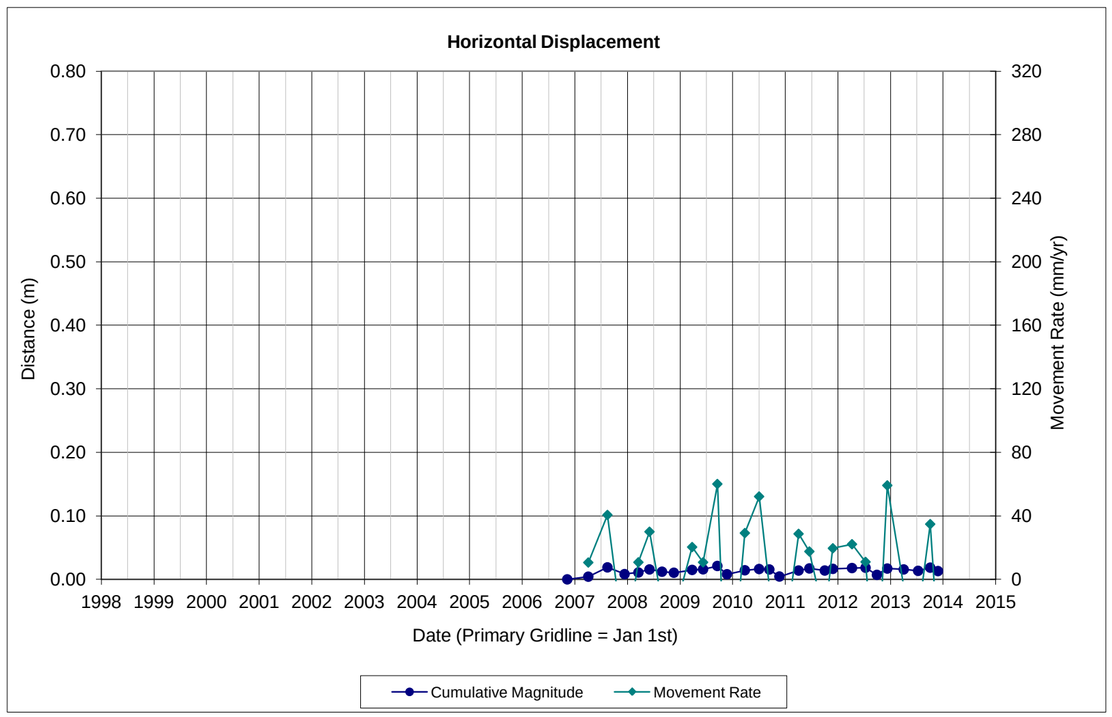
Survey and Displacement Data - Hub 06-07

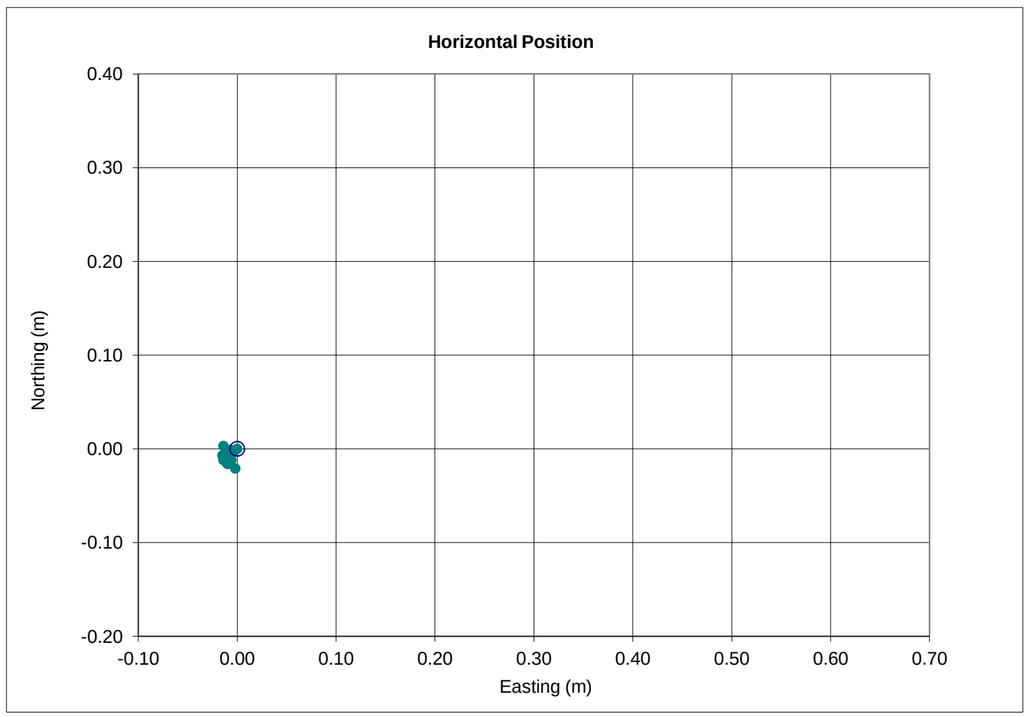
NE. corner Boyd Street / Abbott Rd.

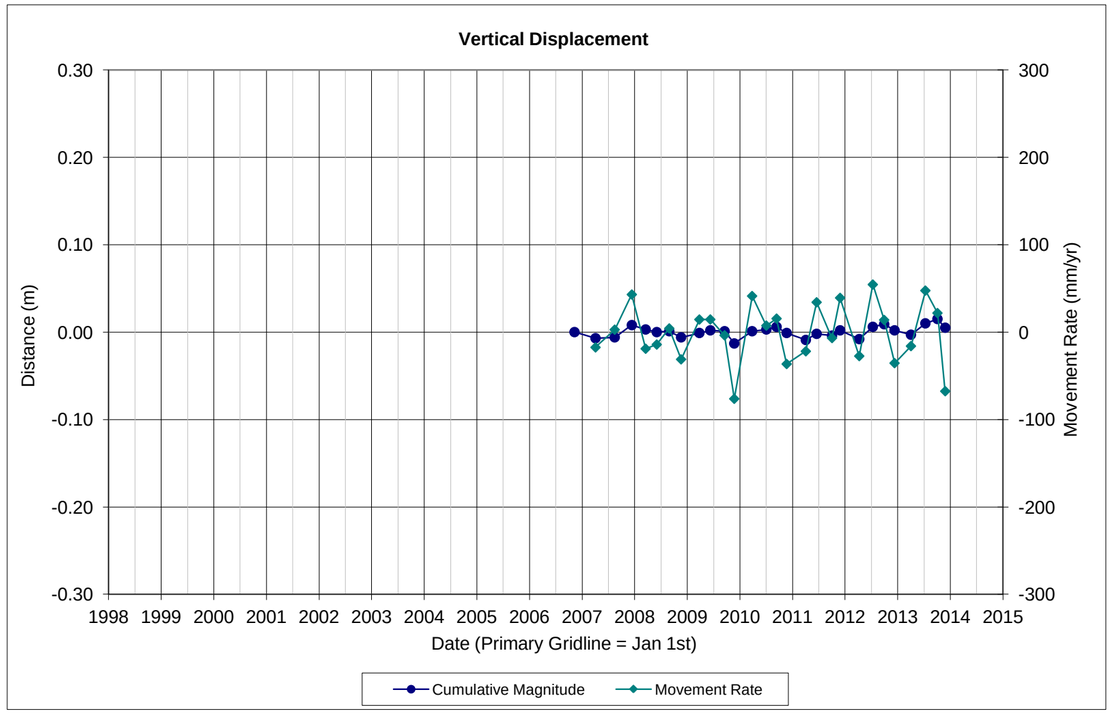
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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	47.483
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

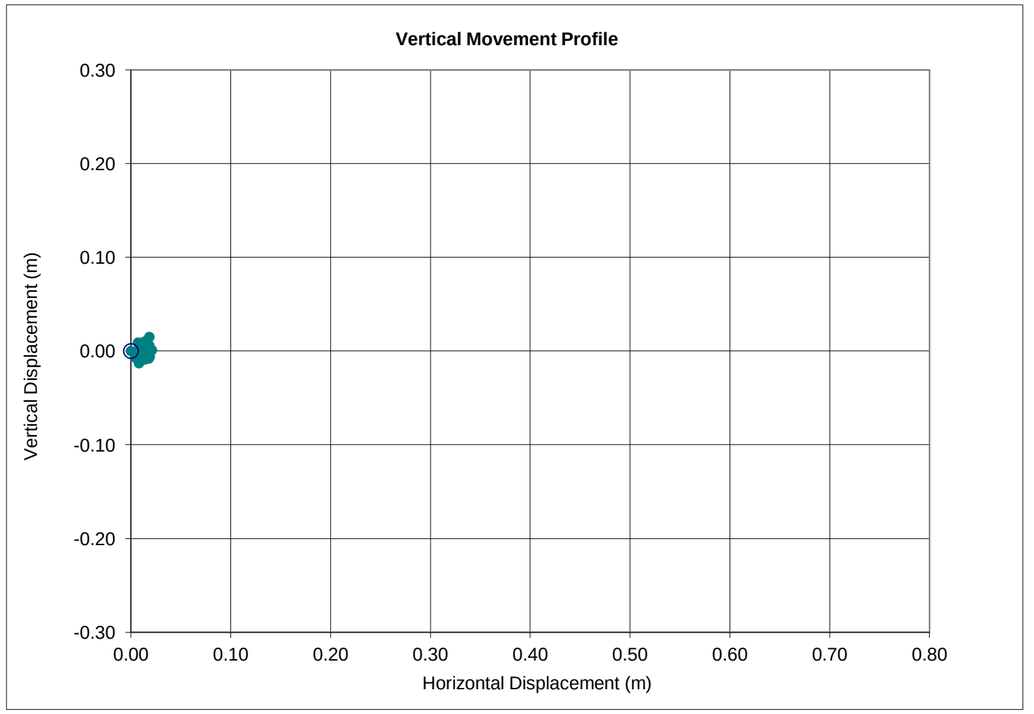
Displacement Graphs - Hub 06-07

NE. corner Boyd Street / Abbott Rd.









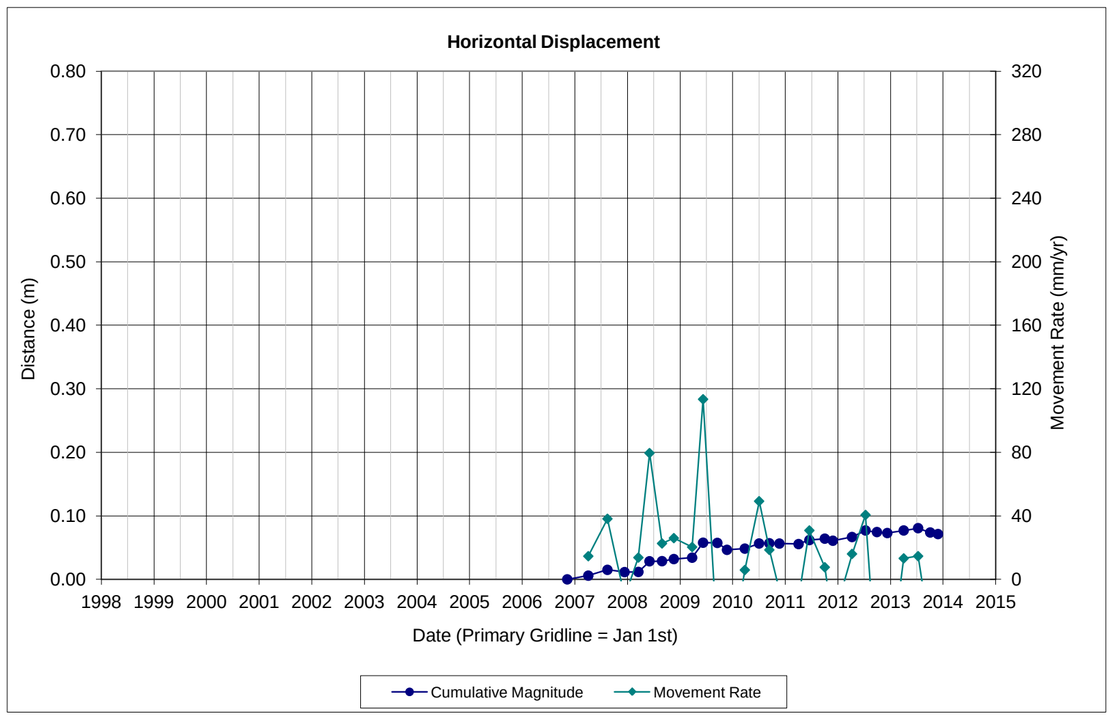
Survey and Displacement Data - Hub 06-08

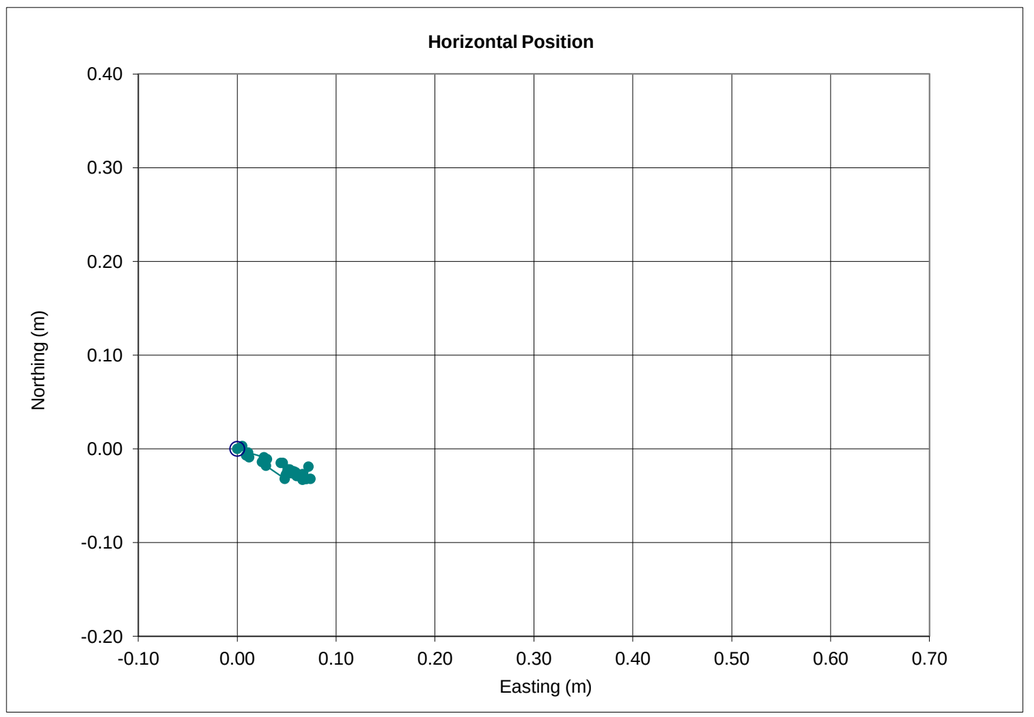
North side Abbott Road., alley E. Beath Street

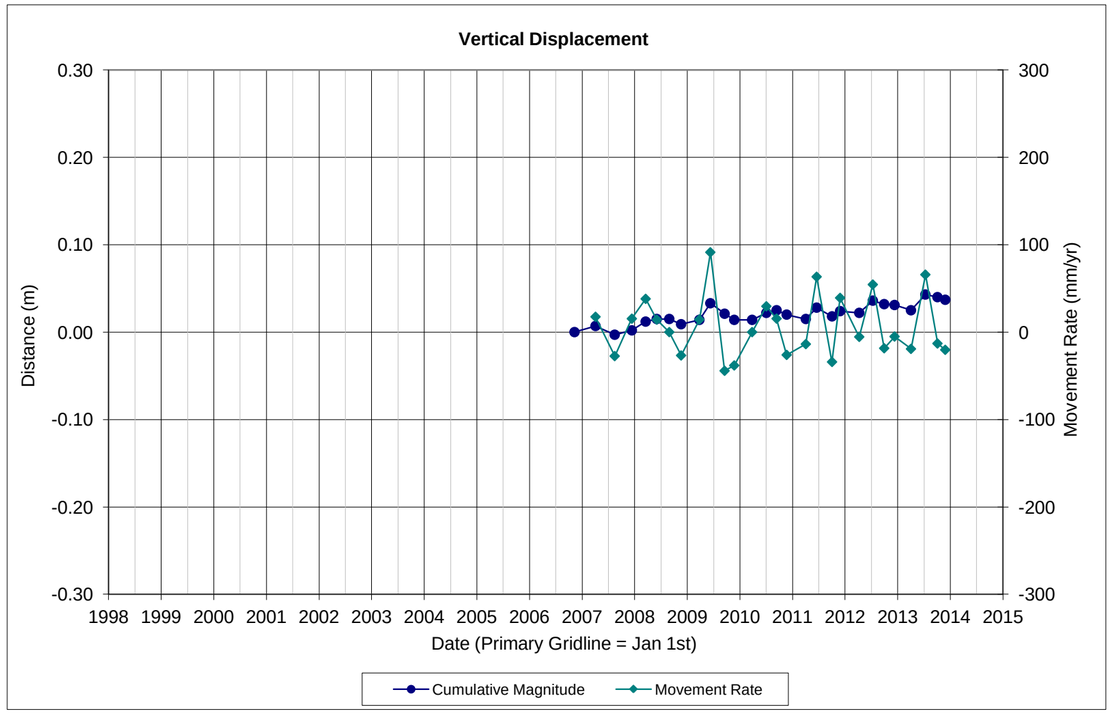
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

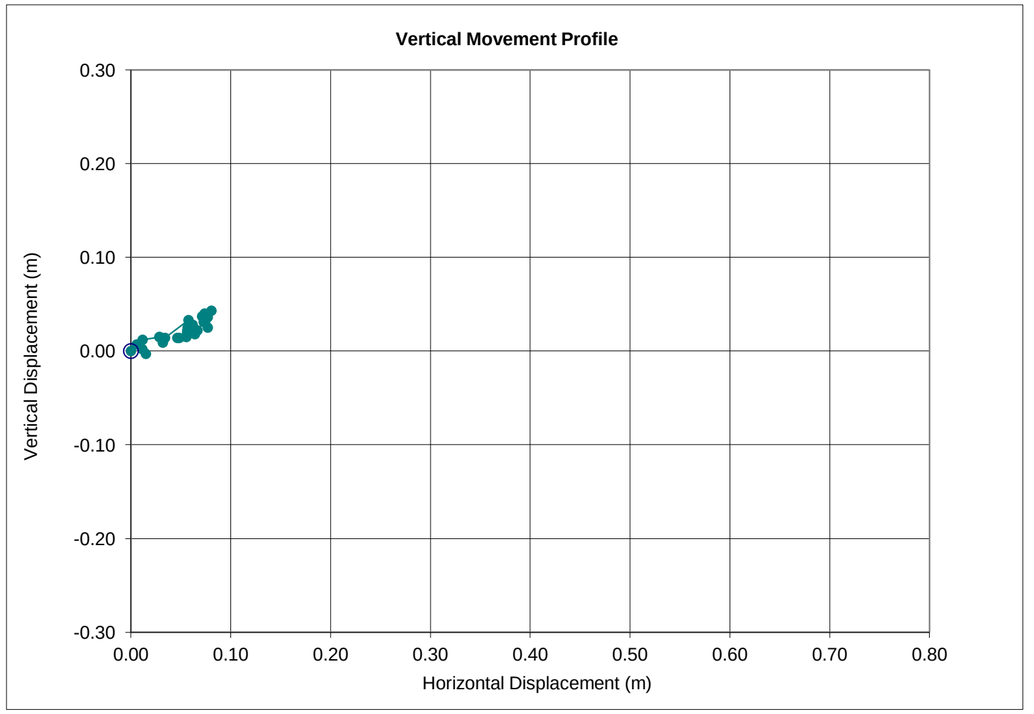
Displacement Graphs - Hub 06-08

North side Abbott Road., alley E. Beath Street







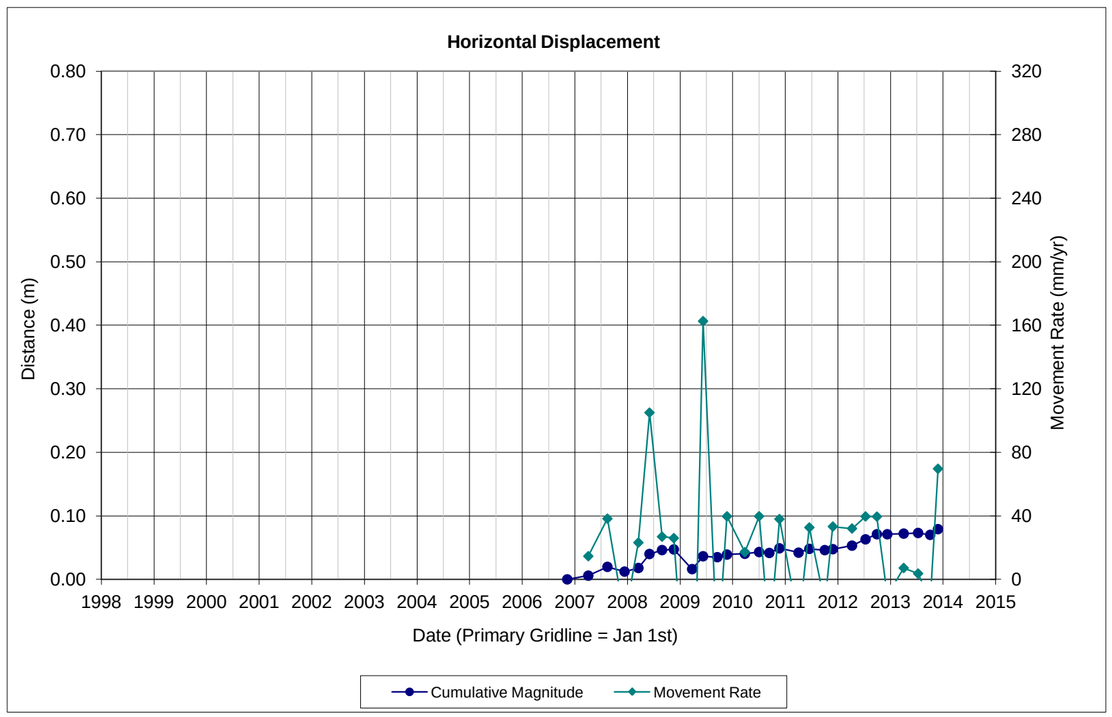


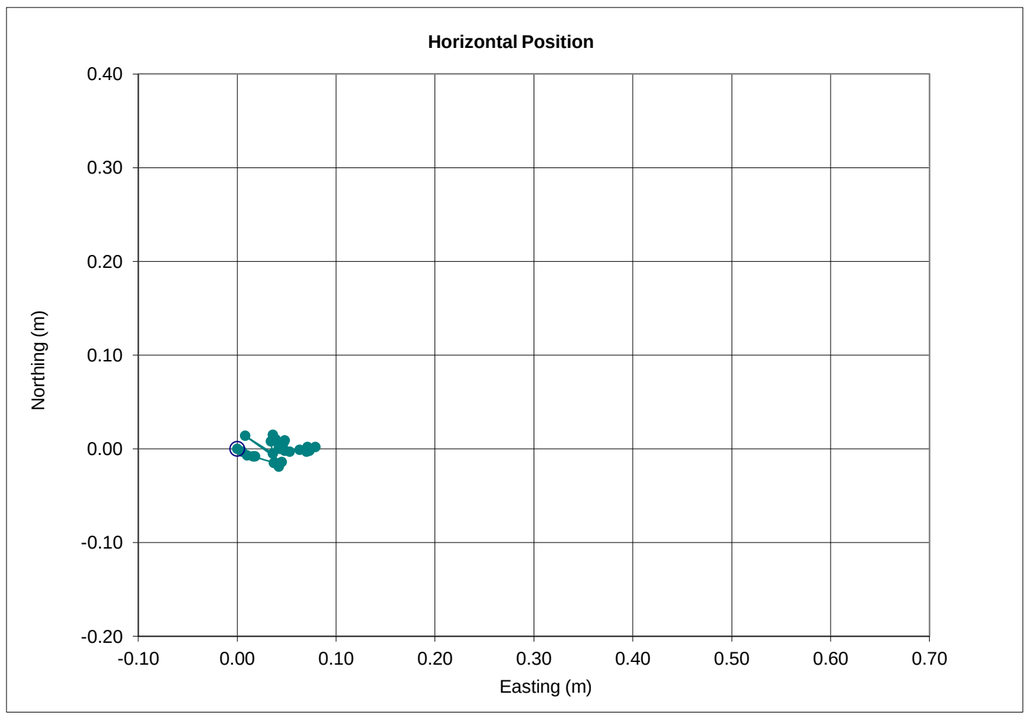
Survey and Displacement Data - Hub 06-09

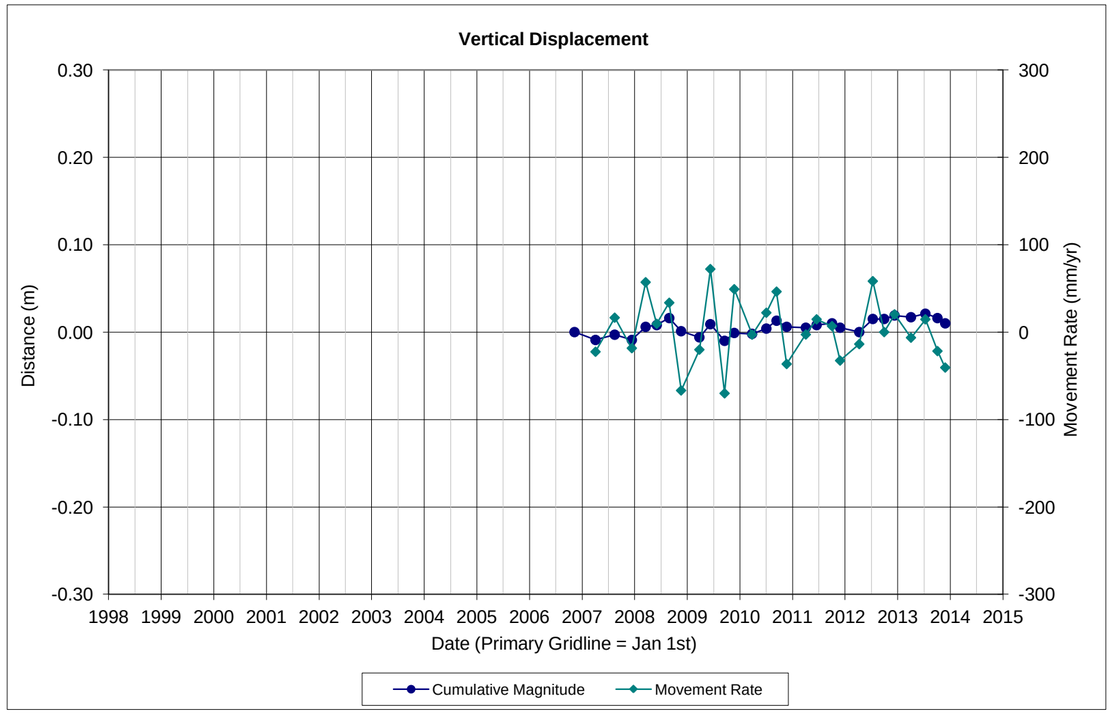
East side Bouchie Street

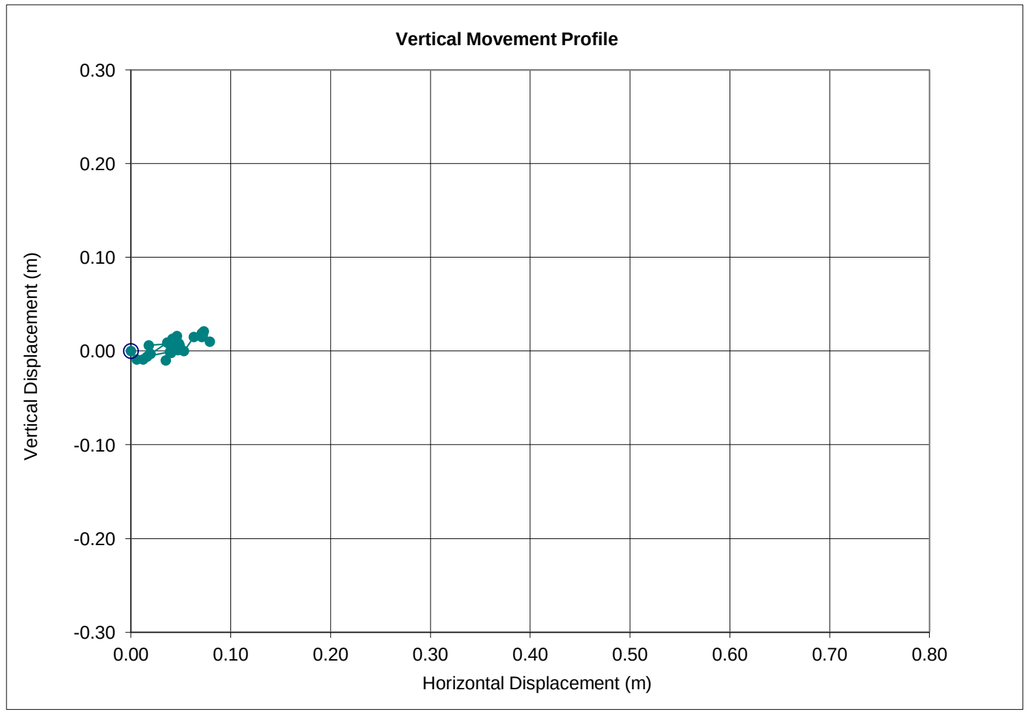
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

Displacement Graphs - Hub 06-09
East side Bouchie Street







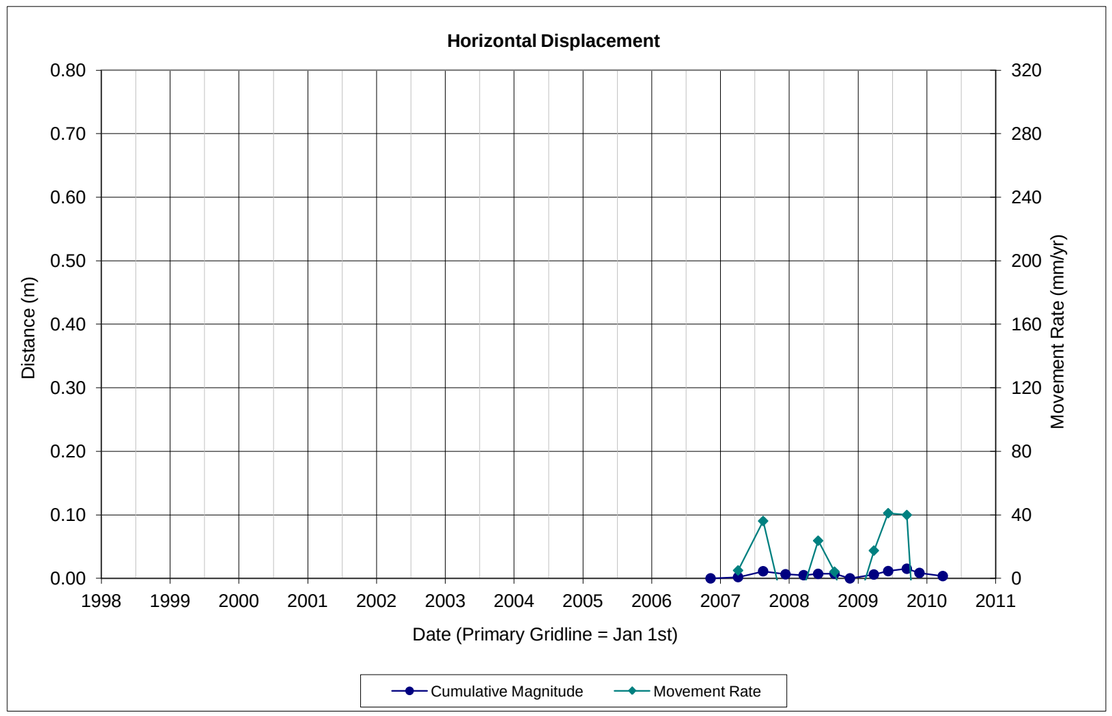


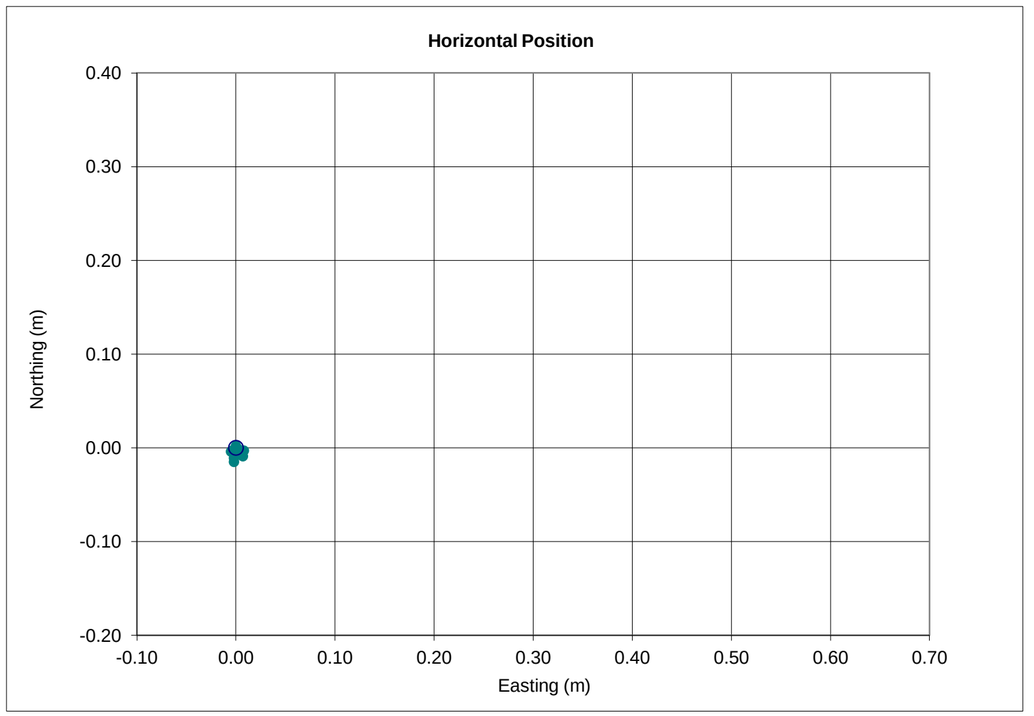
Survey and Displacement Data - Hub 06-10

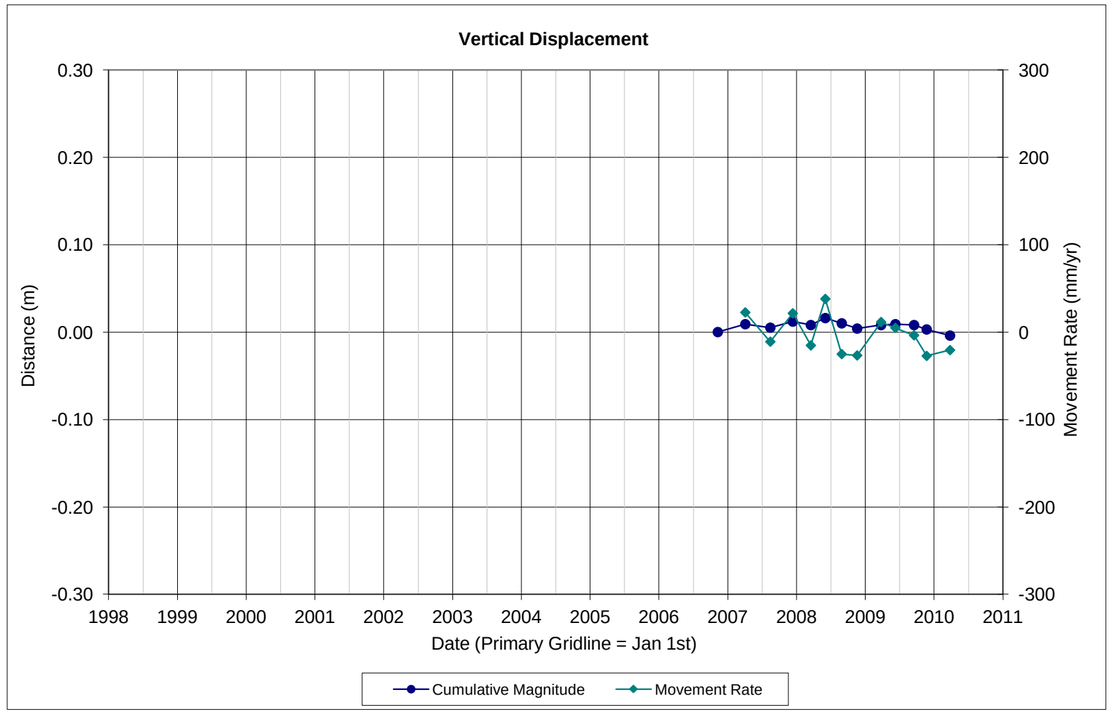
South side Broughton Street

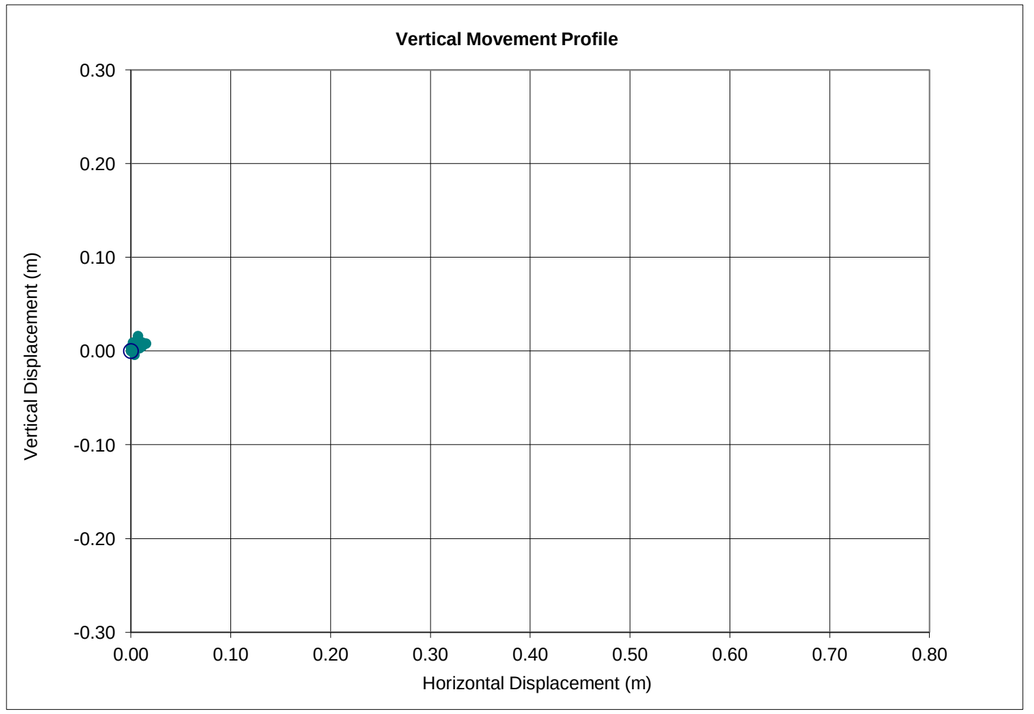
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5869748.671	532621.351	478.410	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		
05/04/2007	5869748.673	532621.351	478.419	0.40	0.002	0.000	0.002	0.009	0.0	77.5	0.005	0.023	0.40	0.002	0.000	0.002	0.009		77.5	5.003	22.515
16/08/2007	5869748.660	532621.349	478.415	0.76	-0.011	-0.002	0.011	0.005	190.3	24.1	0.015	0.007	0.36	-0.013	-0.002	0.013	-0.004		-16.9	36.121	-10.985
13/12/2007	5869748.667	532621.346	478.422	1.09	-0.004	-0.005	0.006	0.012	231.3	61.9	0.006	0.011	0.33	0.007	-0.003	0.008	0.007		42.6	-23.375	21.485
18/03/2008	5869748.668	532621.347	478.418	1.35	-0.003	-0.004	0.005	0.008	233.1	58.0	0.004	0.006	0.26	0.001	0.001	0.001	-0.004		-70.5	-5.381	-15.219
03/06/2008	5869748.664	532621.350	478.426	1.56	-0.007	-0.001	0.007	0.016	188.1	66.2	0.005	0.010	0.21	-0.004	0.003	0.005	0.008		58.0	23.718	37.948
29/08/2008	5869748.664	532621.349	478.420	1.80	-0.007	-0.002	0.007	0.010	195.9	53.9	0.004	0.006	0.24	0.000	-0.001	0.001	-0.006		-80.5	4.198	-25.190
19/11/2008	5869748.671	532621.351	478.414	2.03	0.000	0.000	0.000	0.004	0.0	0.0	0.000	0.002	0.22	0.007	0.002	0.007	-0.006		-39.5	-32.428	-26.726
26/03/2009	5869748.665	532621.350	478.418	2.37	-0.006	-0.001	0.006	0.008	189.5	52.8	0.003	0.003	0.35	-0.006	-0.001	0.006	0.004		33.3	17.494	11.504
10/06/2009	5869748.662	532621.358	478.419	2.58	-0.009	0.007	0.011	0.009	142.1	38.3	0.004	0.003	0.21	-0.003	0.008	0.009	0.001		6.7	41.062	4.806
17/09/2009	5869748.656	532621.349	478.418	2.85	-0.015	-0.002	0.015	0.008	187.6	27.9	0.005	0.003	0.27	-0.006	-0.009	0.011	-0.001		-5.3	39.907	-3.689
23/11/2009	5869748.668	532621.359	478.413	3.04	-0.003	0.008	0.009	0.003	110.6	19.3	0.003	0.001	0.18	0.012	0.010	0.016	-0.005		-17.7	-85.155	-27.257
27/03/2010	5869748.669	532621.354	478.406	3.38	-0.002	0.003	0.004	-0.004	123.7	-48.0	0.001	-0.001	0.34	0.001	-0.005	0.005	-0.007		-53.9	-15.019	-20.619

Displacement Graphs - Hub 06-10
South side Broughton Street









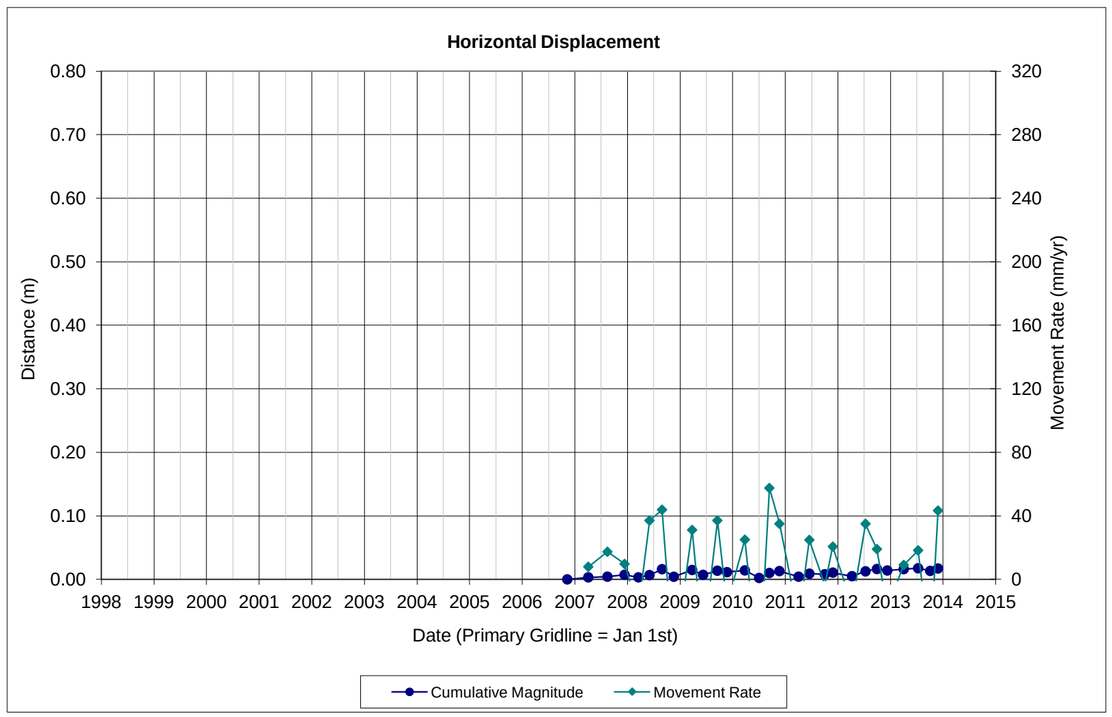
Survey and Displacement Data - Hub 06-11

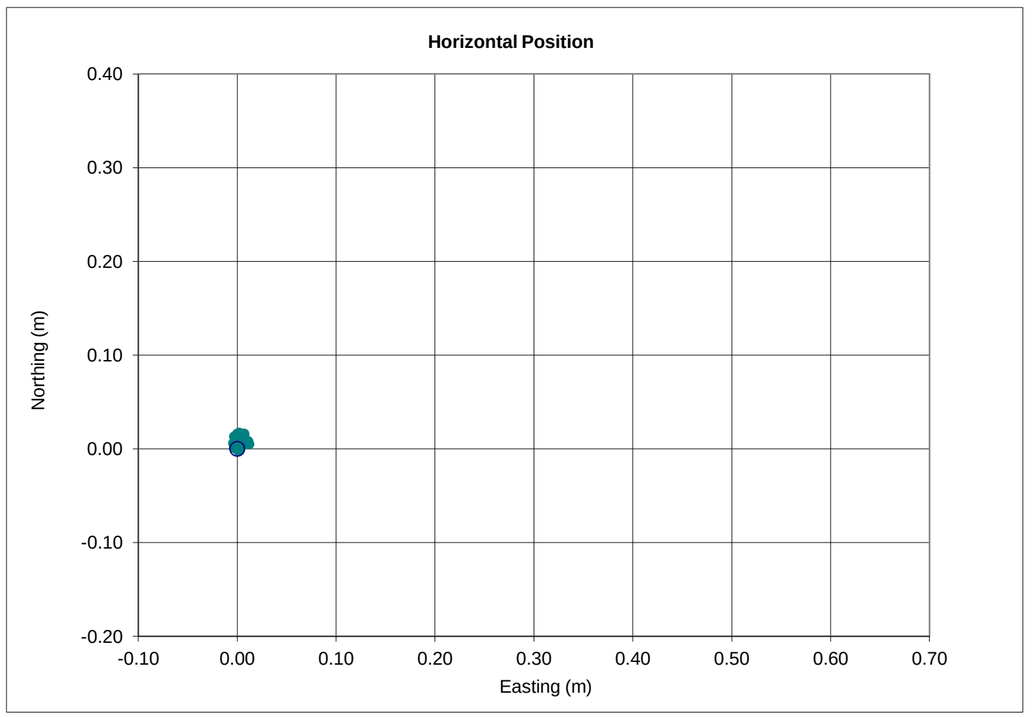
East side Lewis Road, opposite house # 391

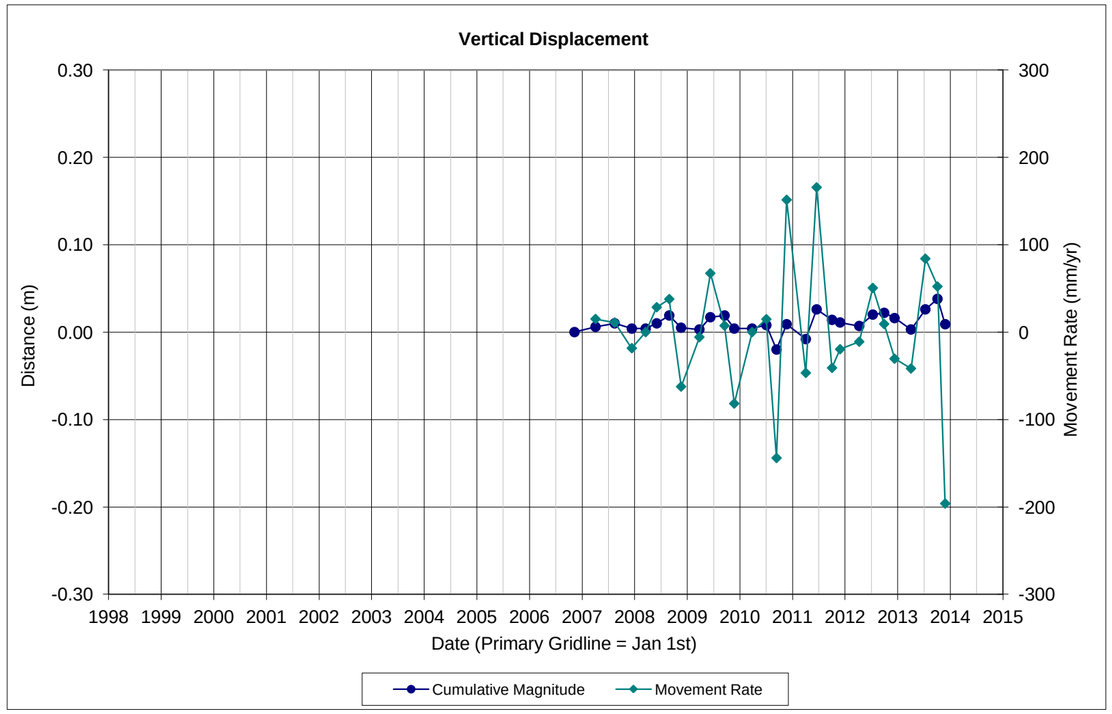
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

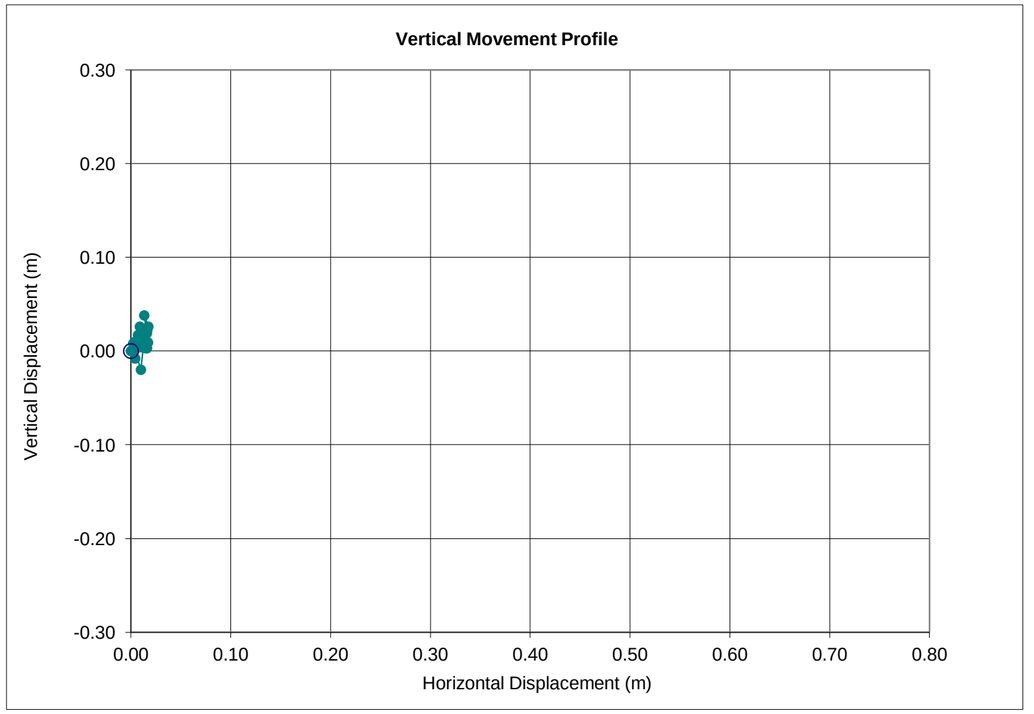
Displacement Graphs - Hub 06-11

East side Lewis Road, opposite house # 391









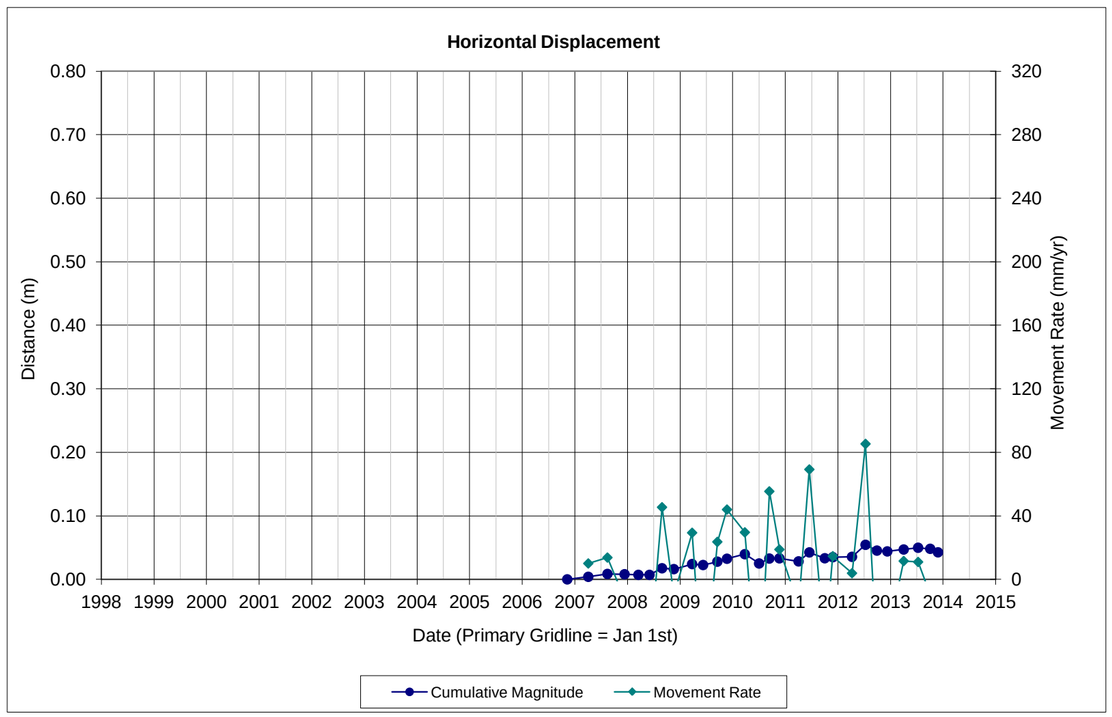
Survey and Displacement Data - Hub 06-12

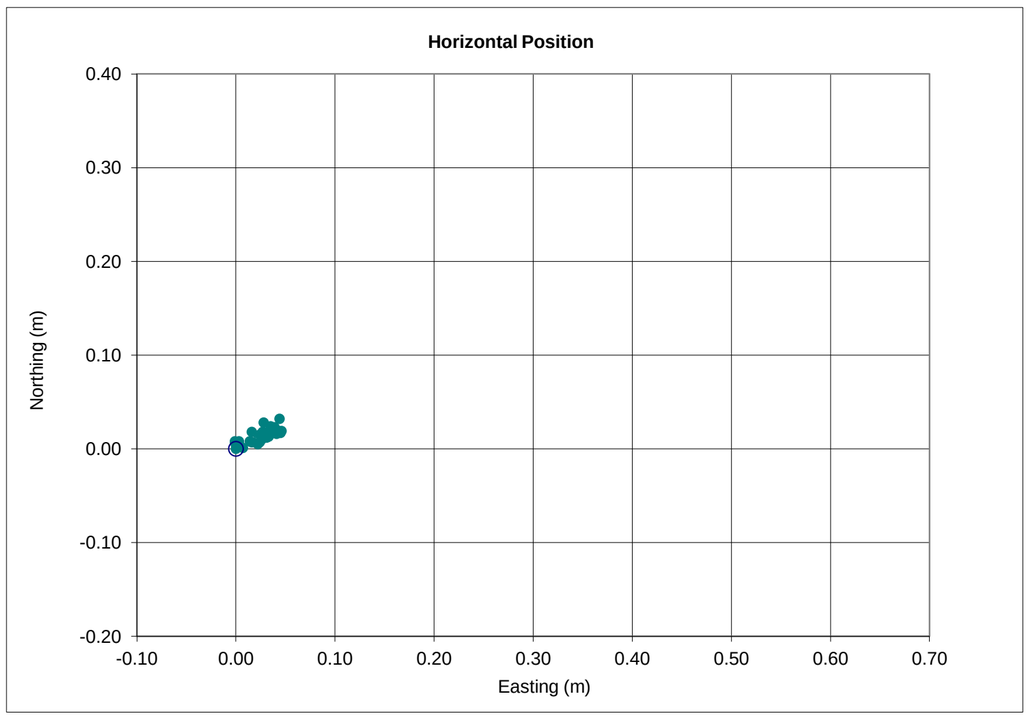
East side Lewis Road, opposite house # 547

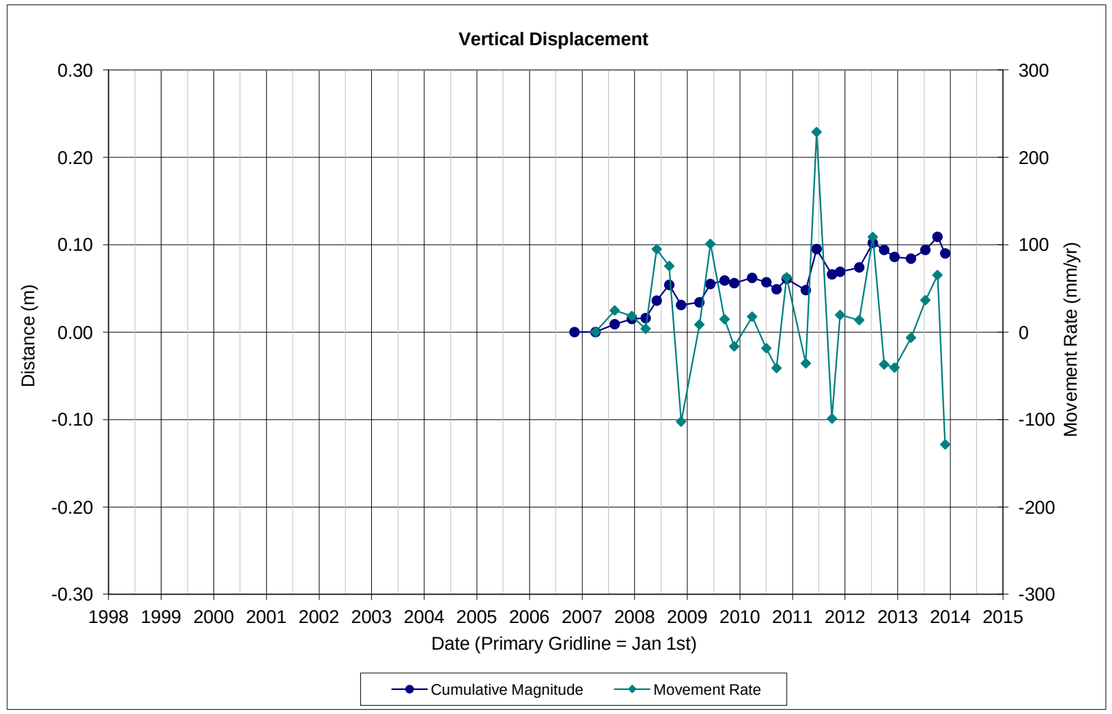
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

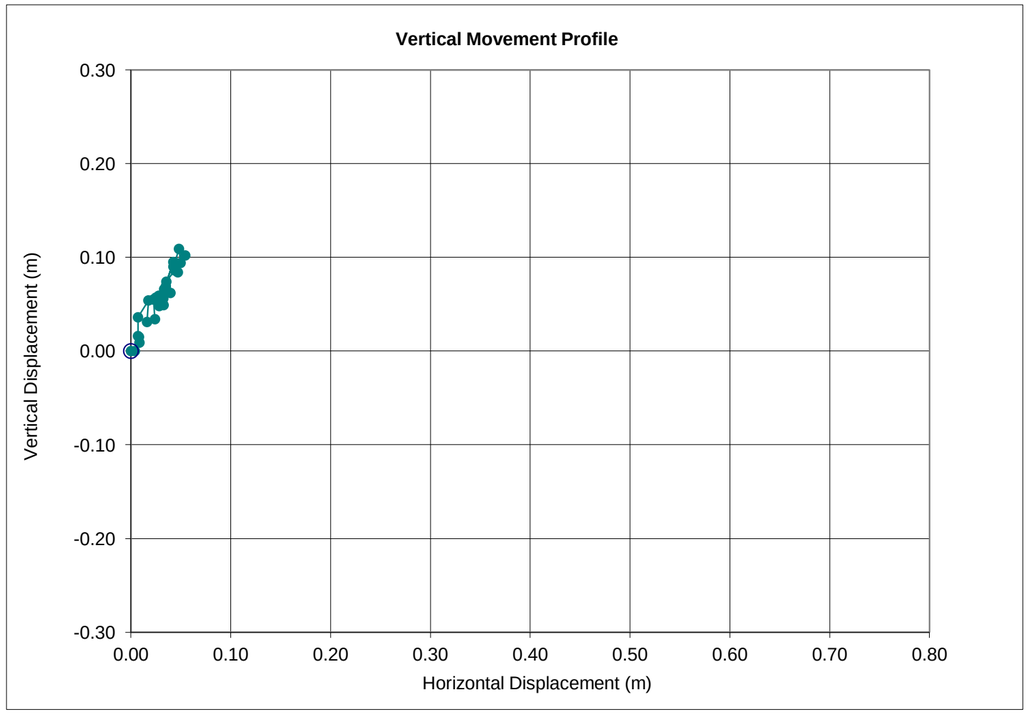
Displacement Graphs - Hub 06-12

East side Lewis Road, opposite house # 547







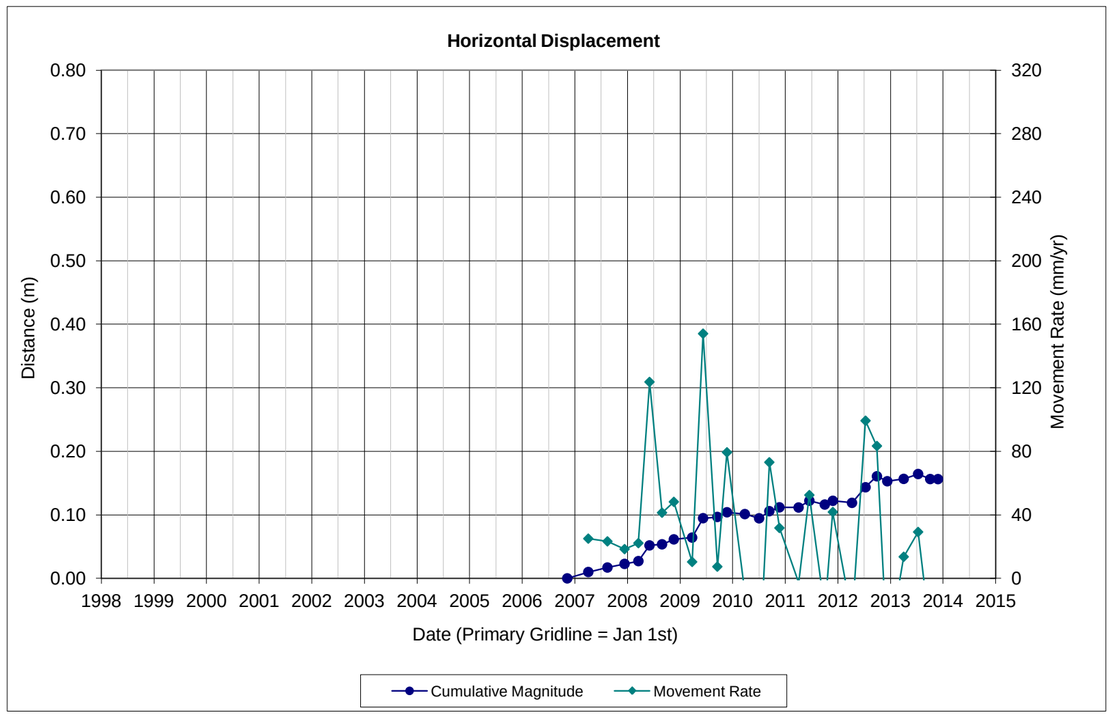


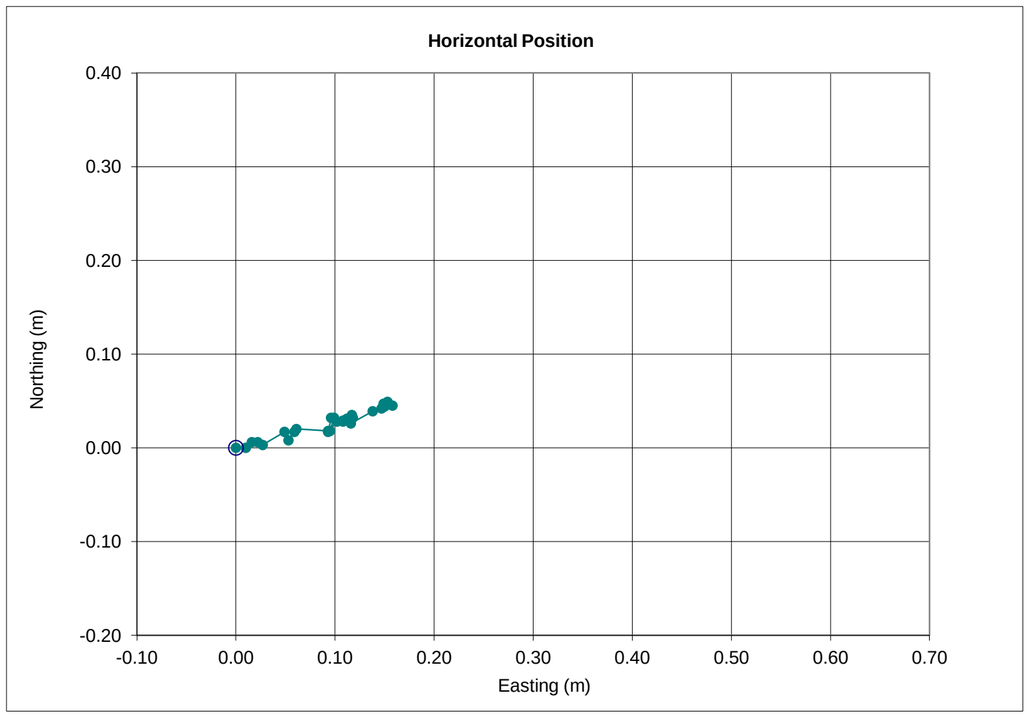
Survey and Displacement Data - Hub 06-13

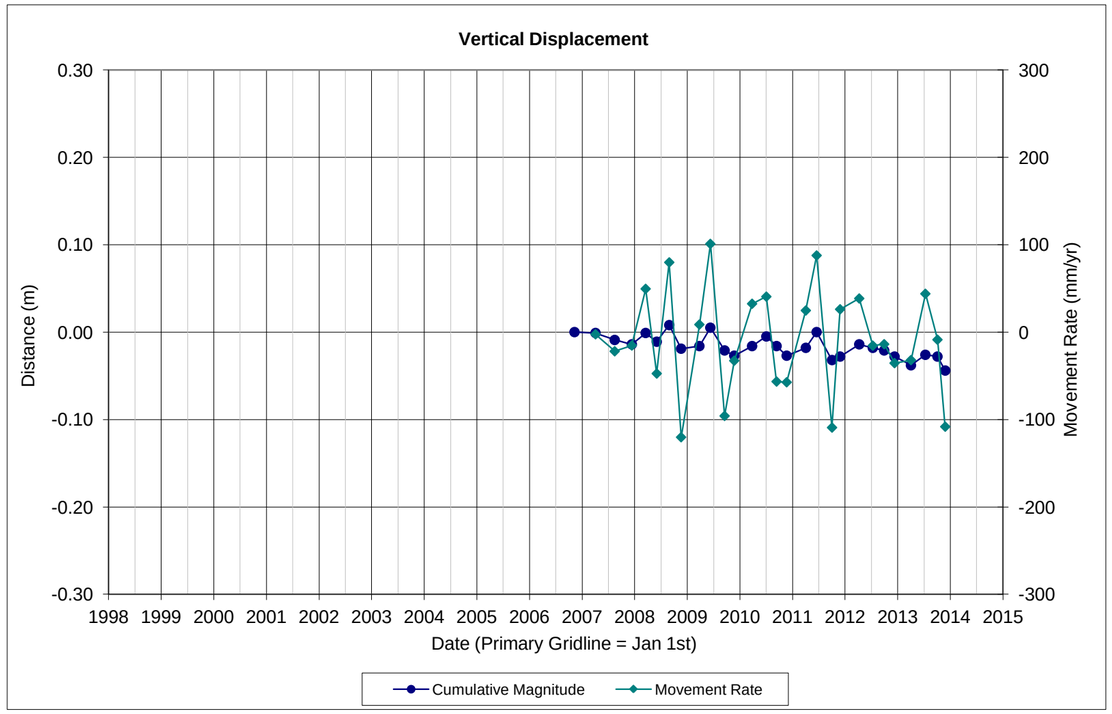
NW. corner Pentland Crescent

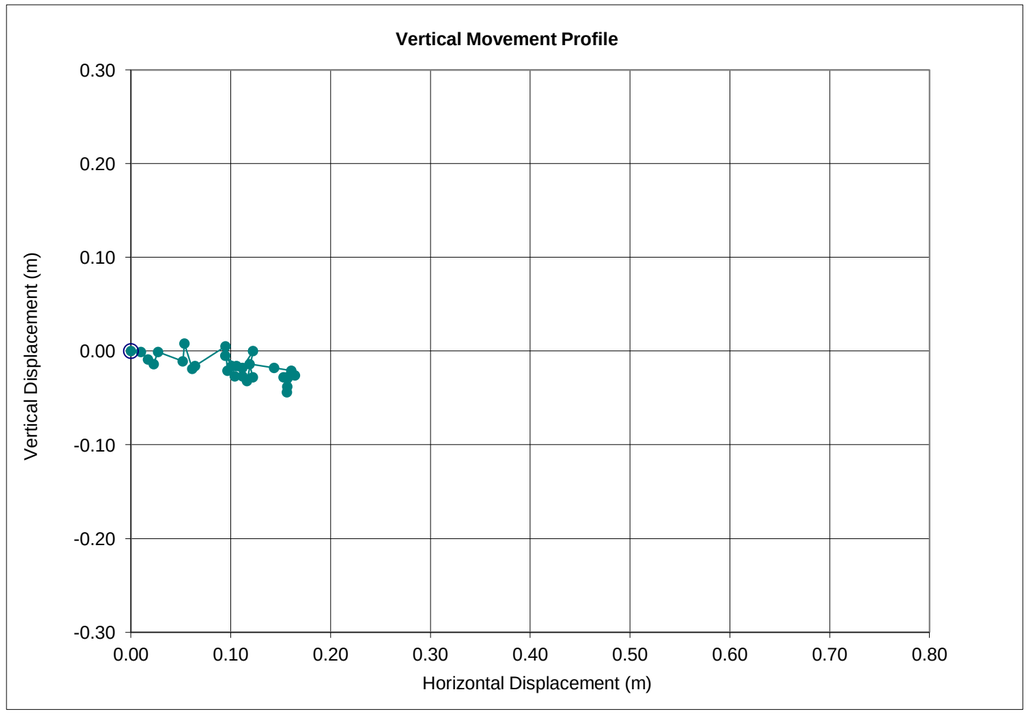
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

Displacement Graphs - Hub 06-13
NW. corner Pentland Crescent









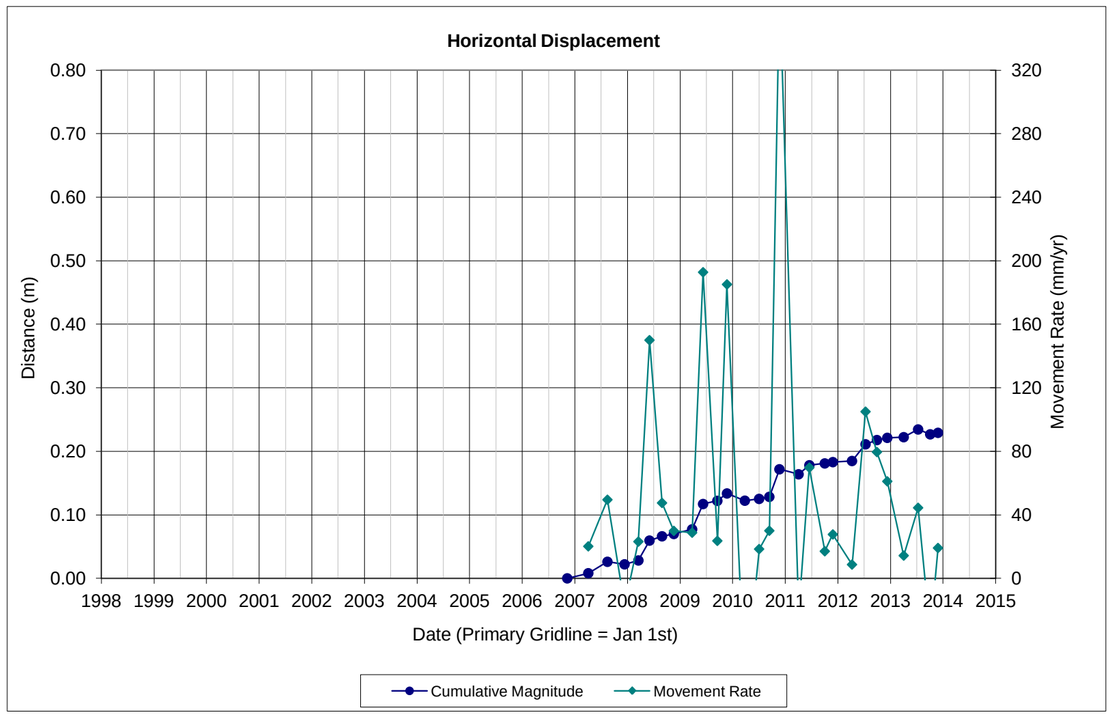
Survey and Displacement Data - Hub 06-14

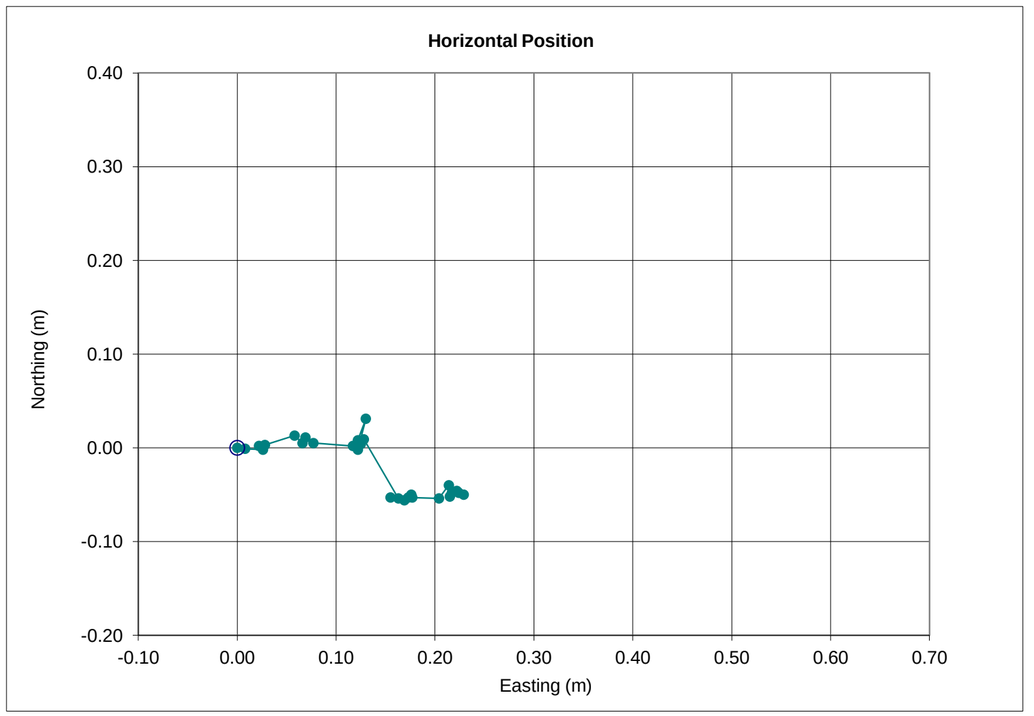
SW. corner Pinchbeck Street / Pentland Crescent

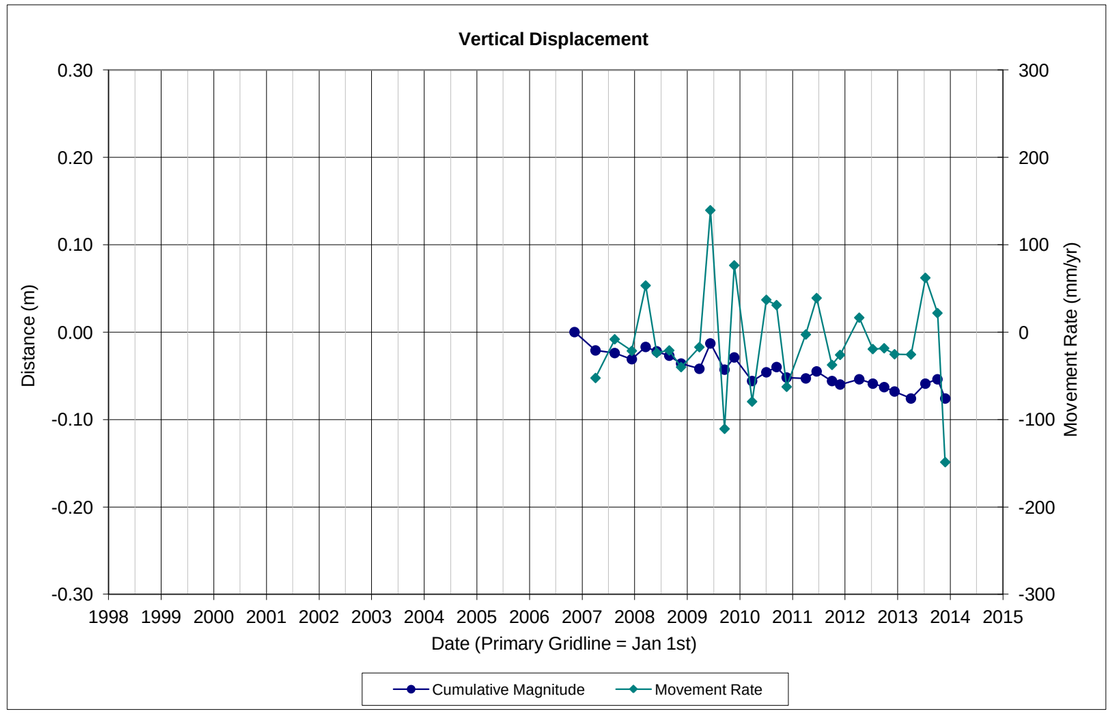
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

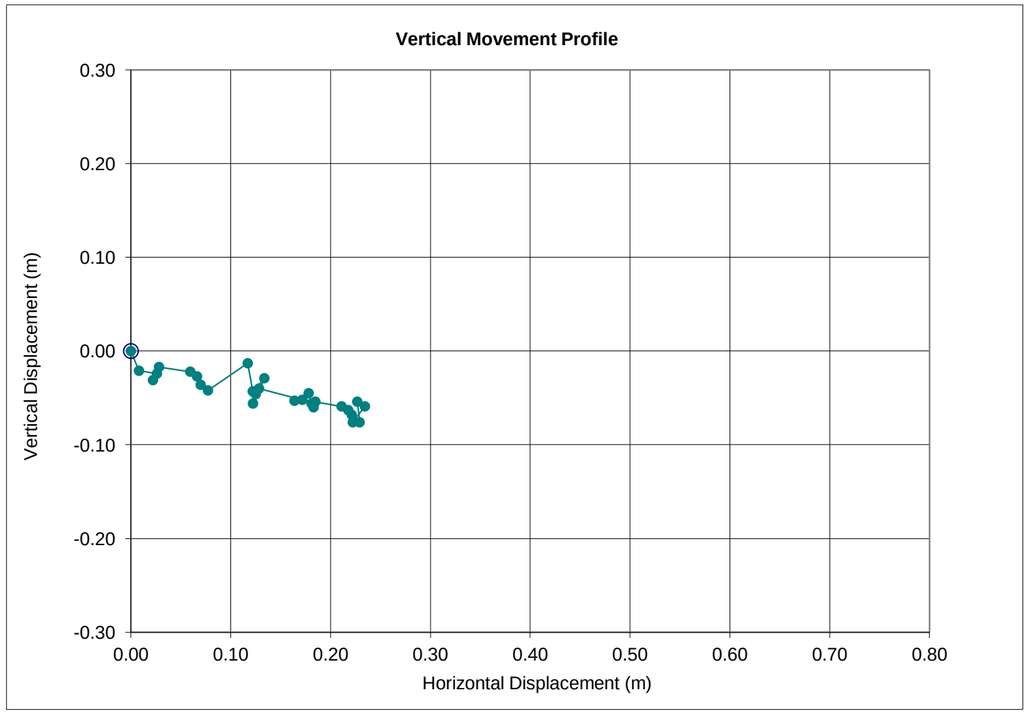
Displacement Graphs - Hub 06-14

SW. corner Pinchbeck Street / Pentland Crescent









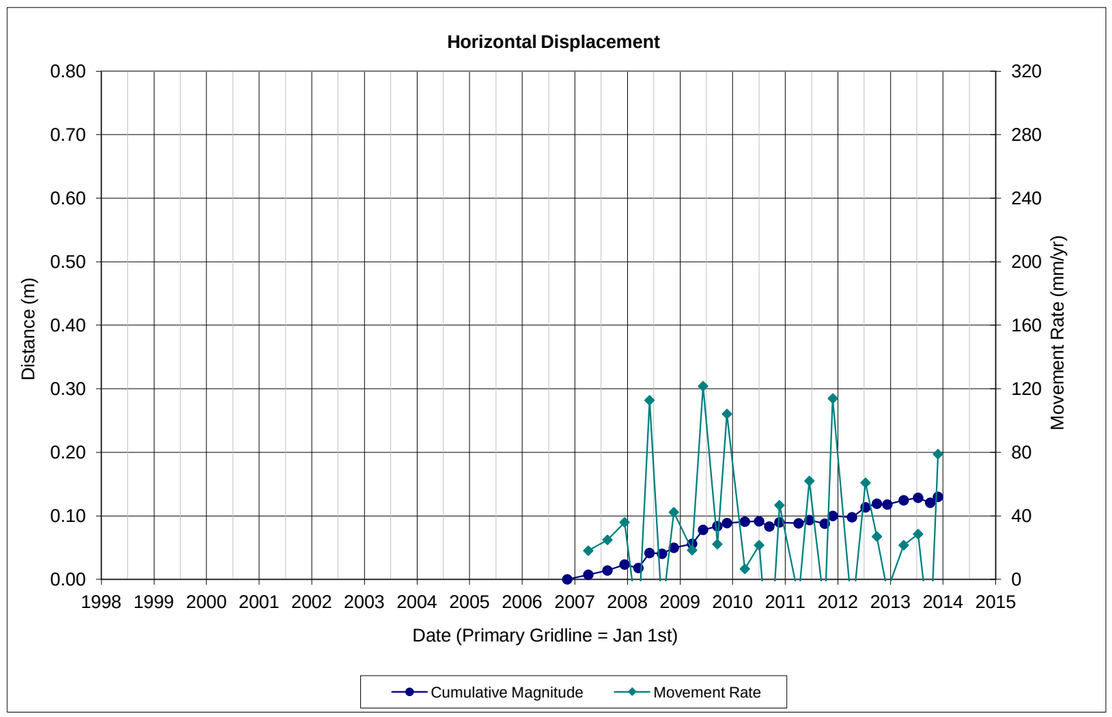
Survey and Displacement Data - Hub 06-15

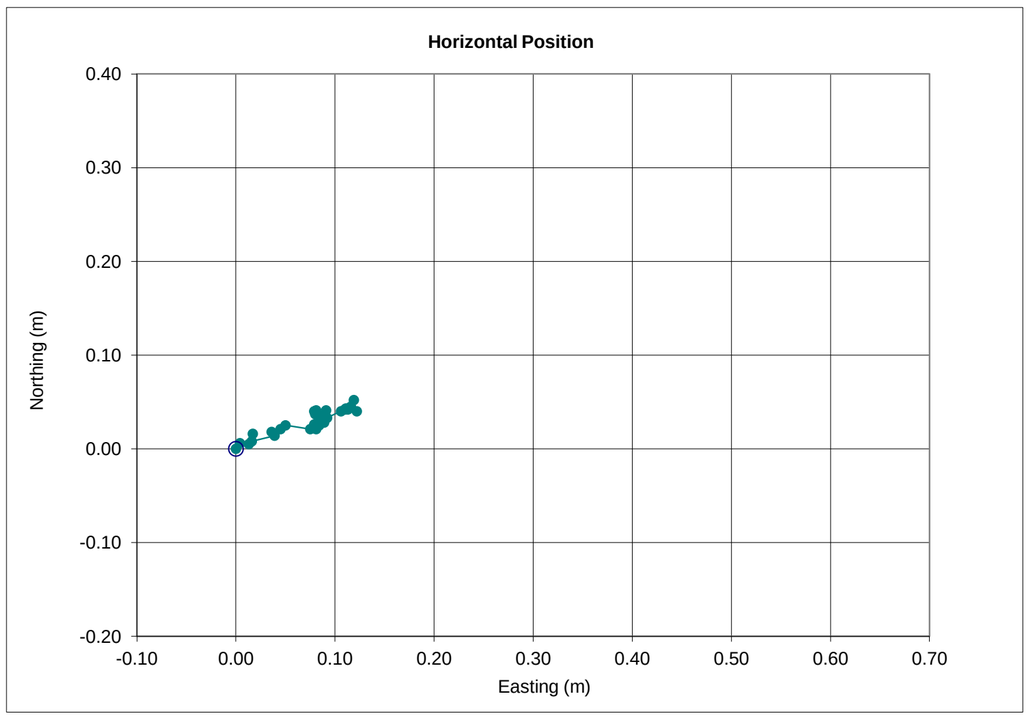
By trail, NW unnamed Rd. N. Dixon St.

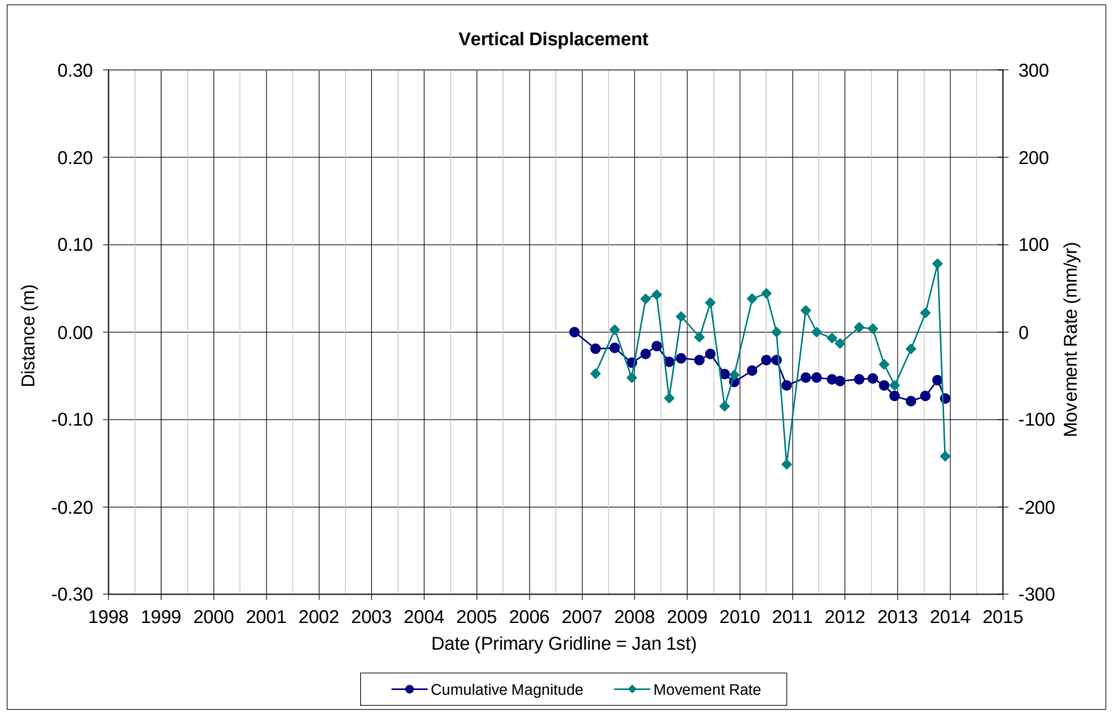
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

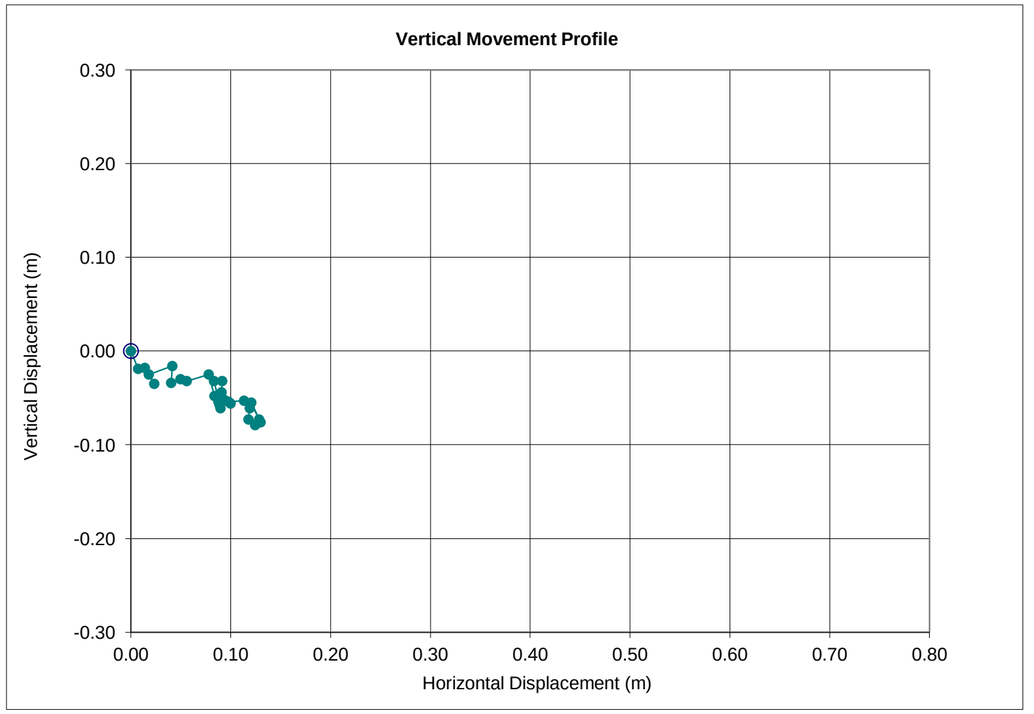
Displacement Graphs - Hub 06-15

By trail, NW unnamed Rd. N. Dixon St.









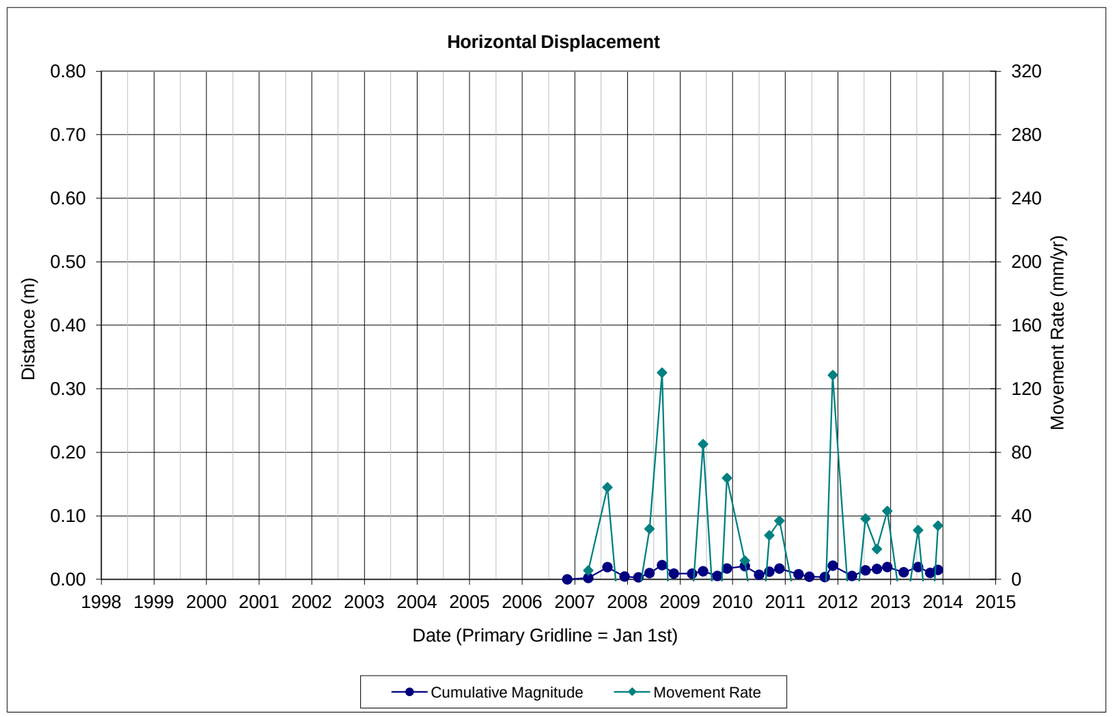
Survey and Displacement Data - Hub 06-16

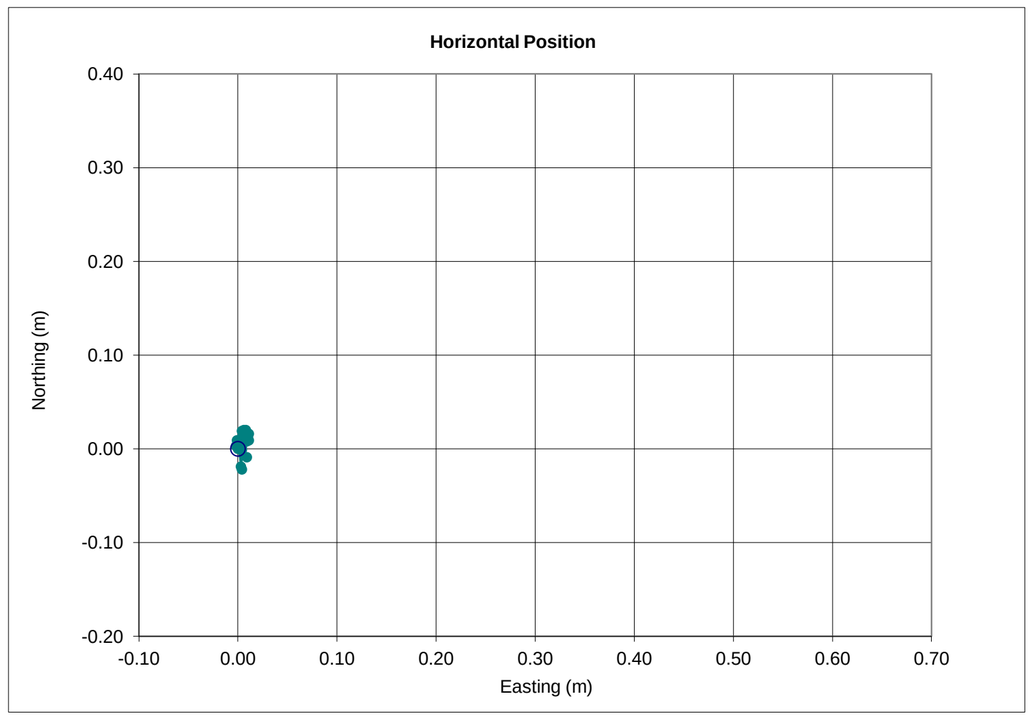
By end trail, NW unnamed road N. Dixon St.

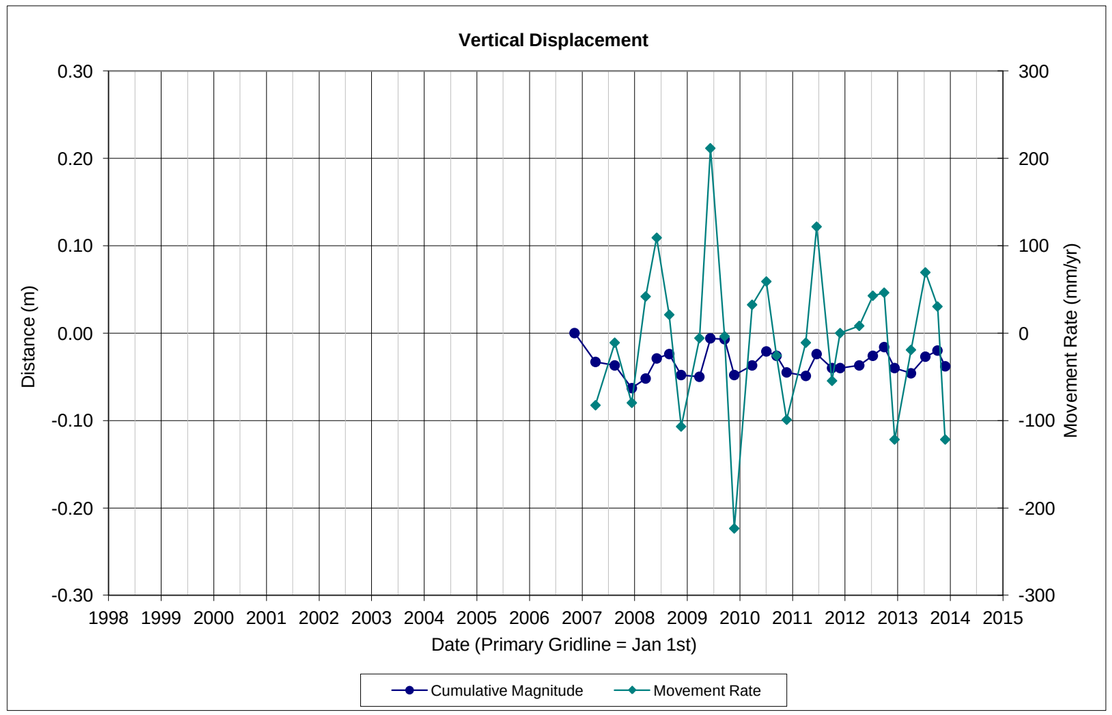
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

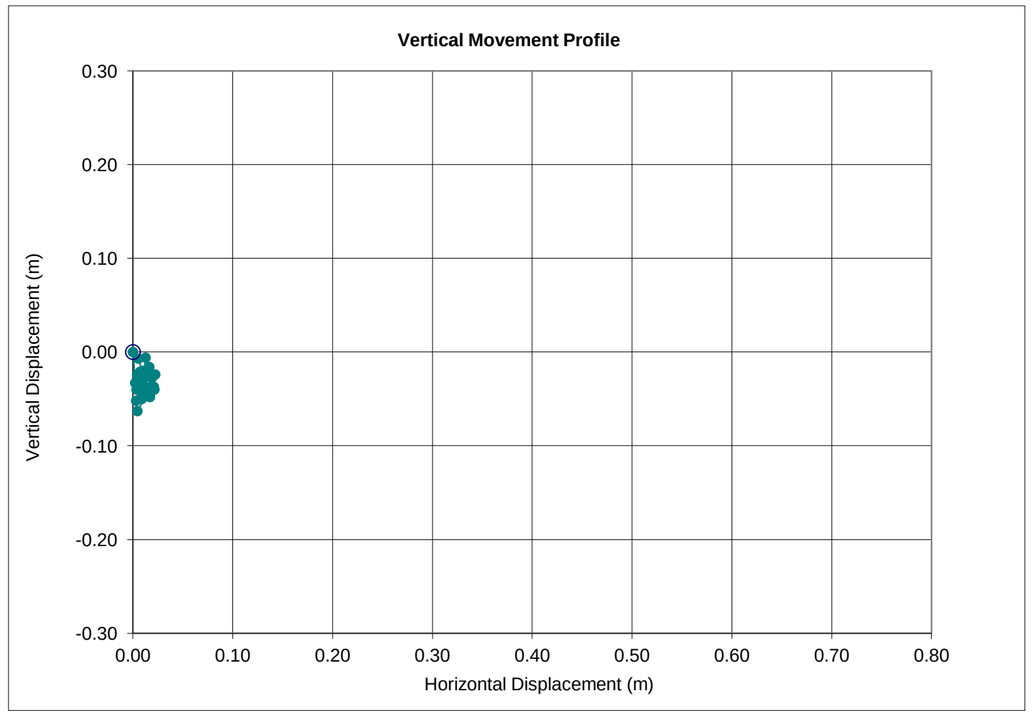
Displacement Graphs - Hub 06-16

By end trail, NW unnamed road N. Dixon St.







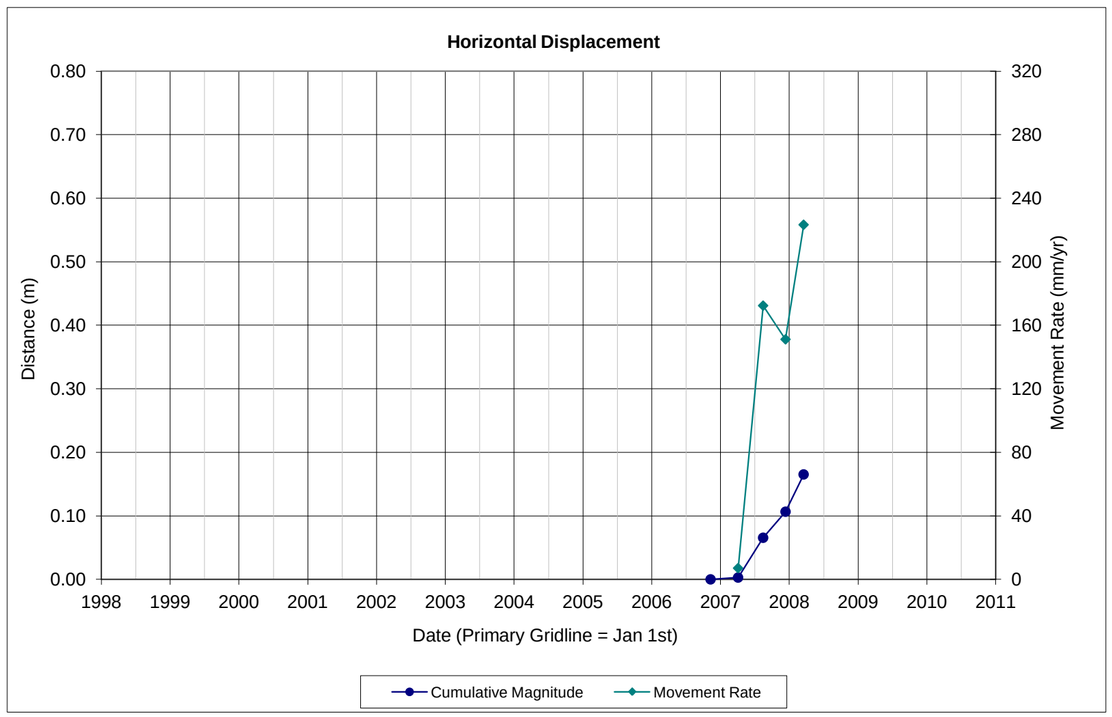


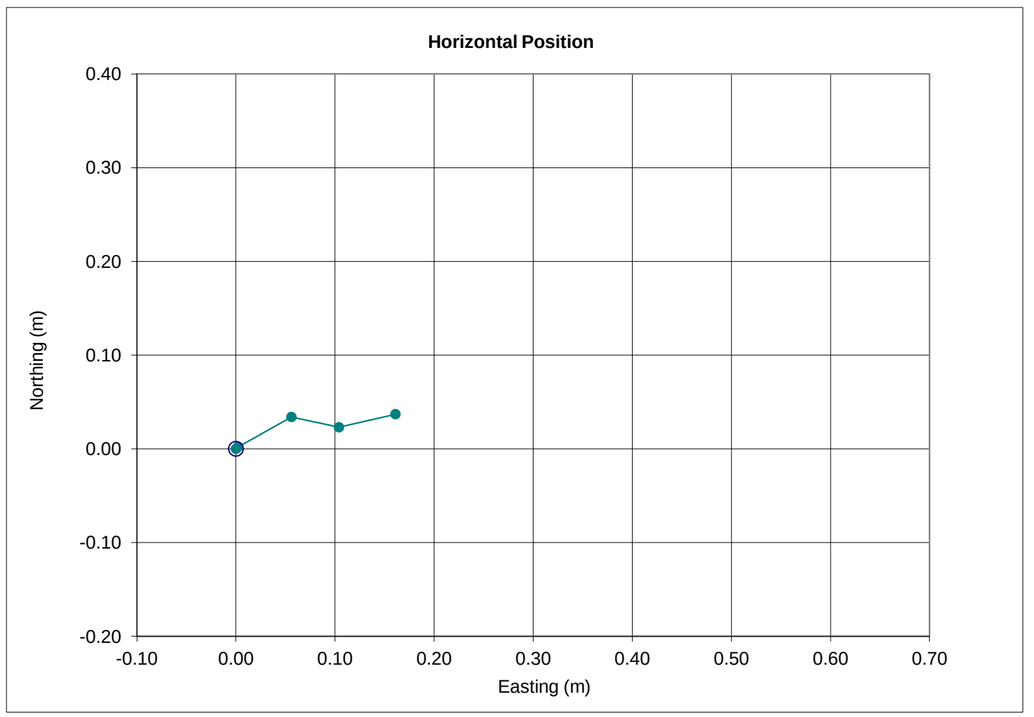
Survey and Displacement Data - Hub 06-17

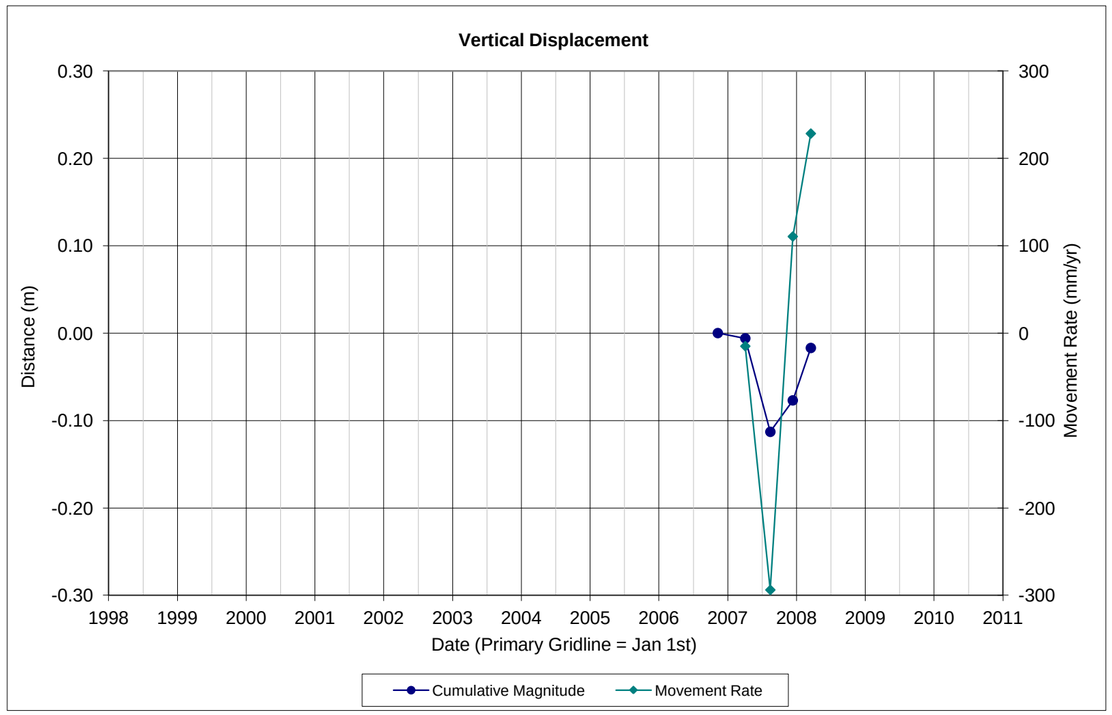
In clearing, NW of end Findlay Road

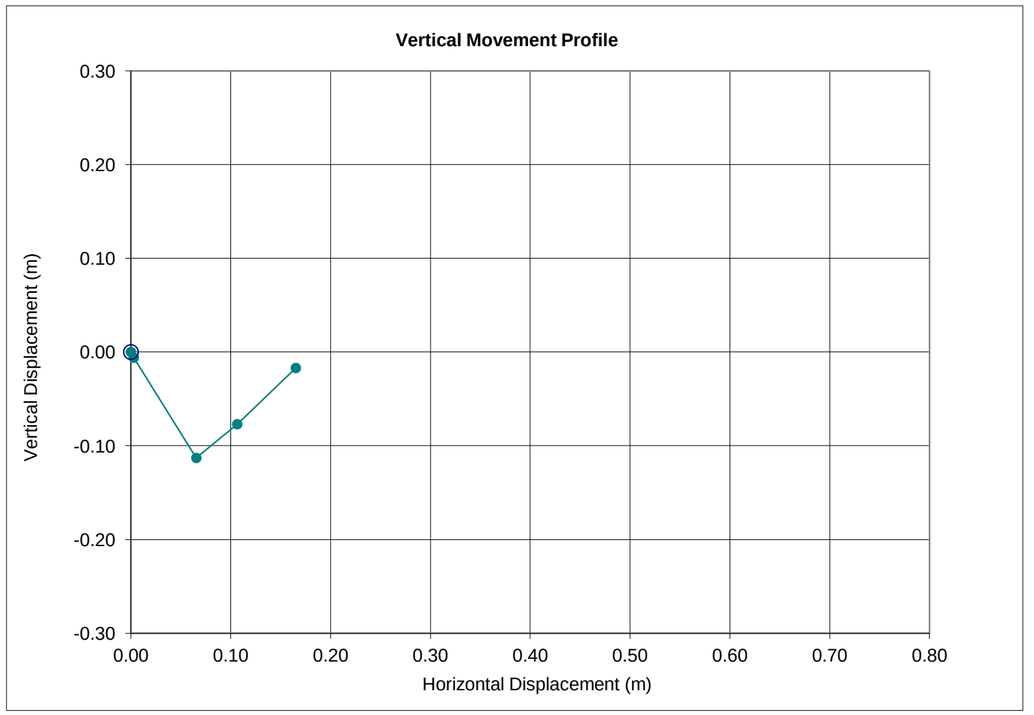
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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		-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		-59.6	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		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		45.6	223.313	228.281

Displacement Graphs - Hub 06-17
In clearing, NW of end Findlay Road









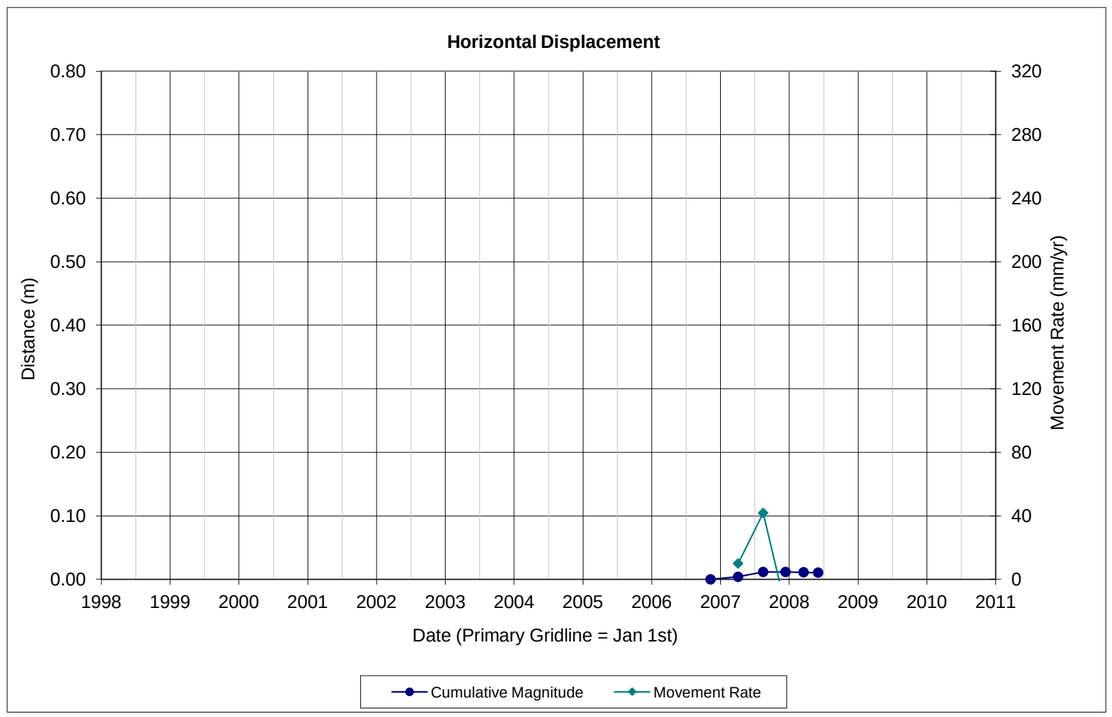
Survey and Displacement Data - Hub 06-18

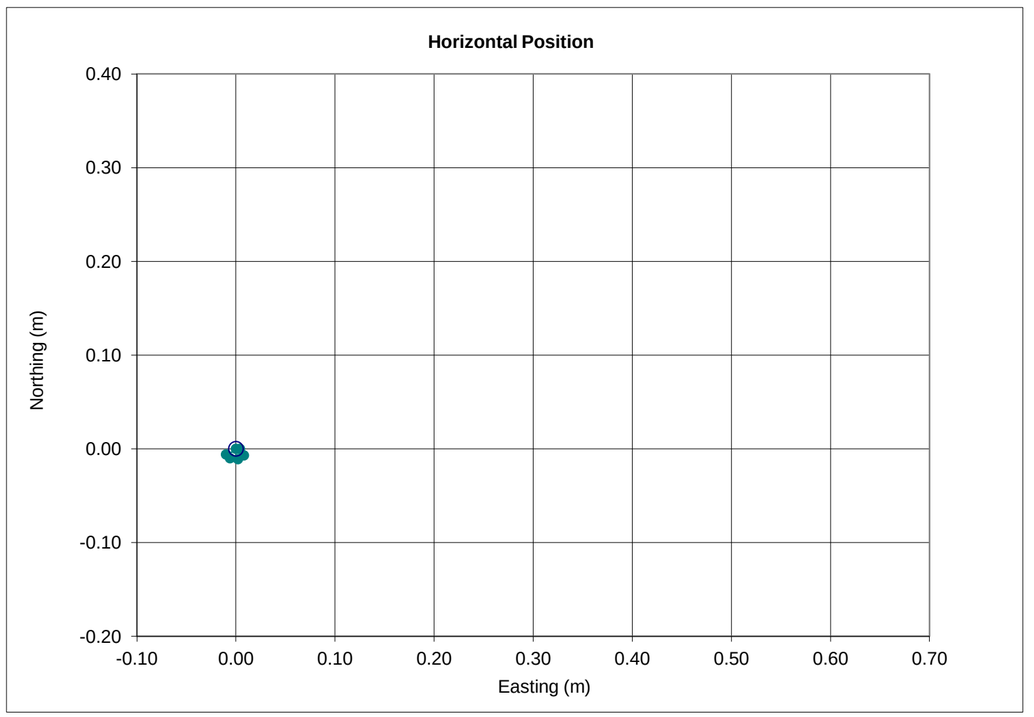
On upper bench by trail, off end Findlay Road

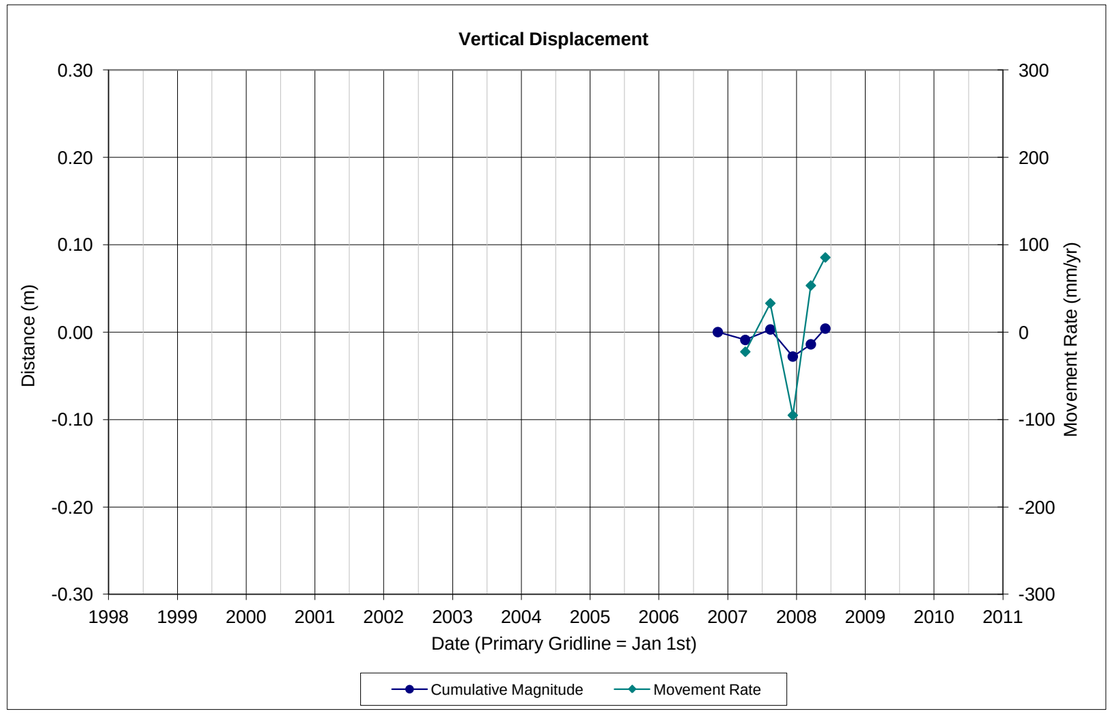
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
10/11/2006	5870000.421	530856.972	632.066	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		
05/04/2007	5870000.421	530856.976	632.057	0.40	0.000	0.004	0.004	-0.009	90.0	-66.0	0.010	-0.023	0.40	0.000	0.004	0.004	-0.009		-66.0	10.007	-22.515
16/08/2007	5870000.415	530856.962	632.069	0.76	-0.006	-0.010	0.012	0.003	239.0	14.4	0.015	0.004	0.36	-0.006	-0.014	0.015	0.012		38.2	41.829	32.955
13/12/2007	5870000.411	530856.966	632.038	1.09	-0.010	-0.006	0.012	-0.028	211.0	-67.4	0.011	-0.026	0.33	-0.004	0.004	0.006	-0.031		-79.7	-17.363	-95.149
18/03/2008	5870000.410	530856.974	632.052	1.35	-0.011	0.002	0.011	-0.014	169.7	-51.4	0.008	-0.010	0.26	-0.001	0.008	0.008	0.014		60.1	-30.674	53.266
03/06/2008	5870000.414	530856.980	632.070	1.56	-0.007	0.008	0.011	0.004	131.2	20.6	0.007	0.003	0.21	0.004	0.006	0.007	0.018		68.2	-34.206	85.383

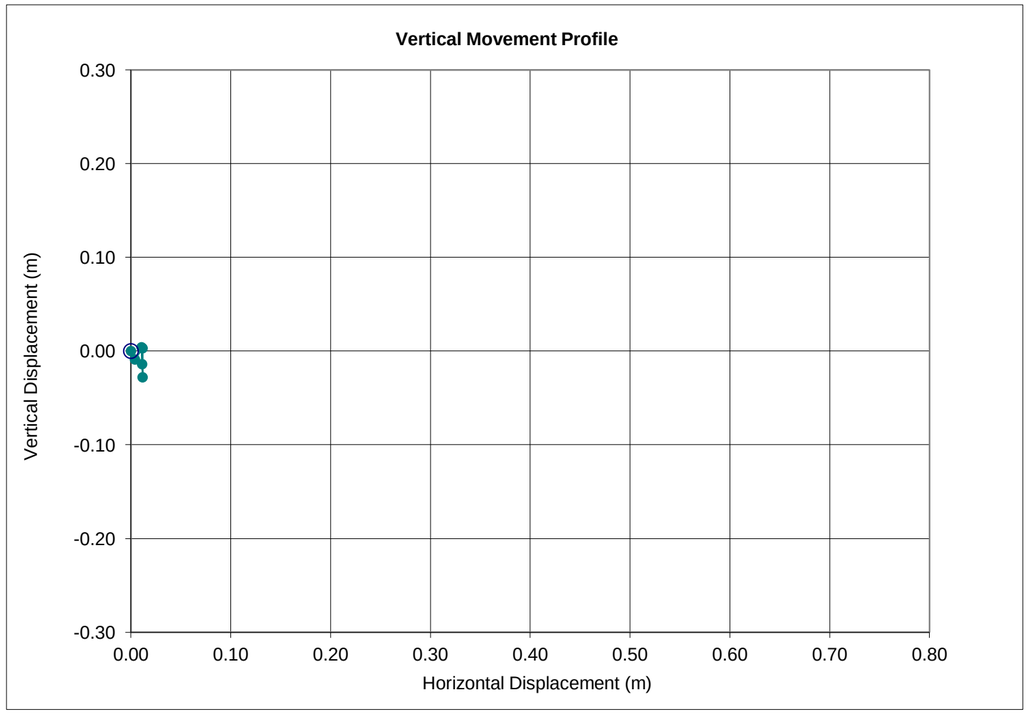
Displacement Graphs - Hub 06-18

On upper bench by trail, off end Findlay Road









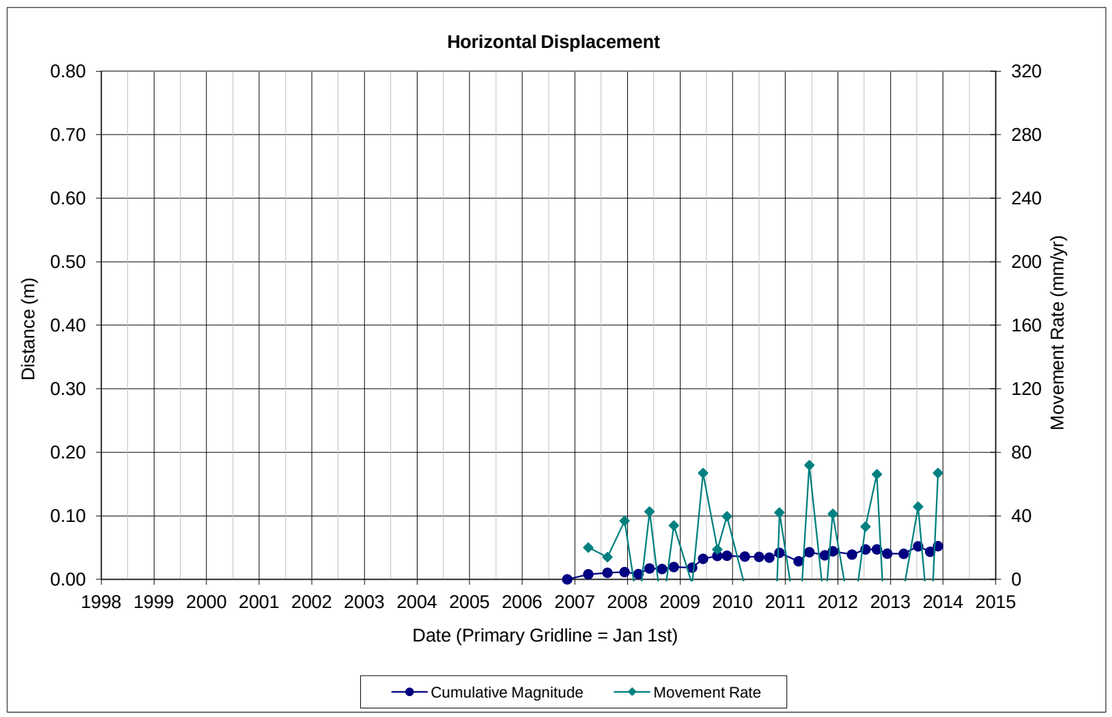
Survey and Displacement Data - Hub 06-19

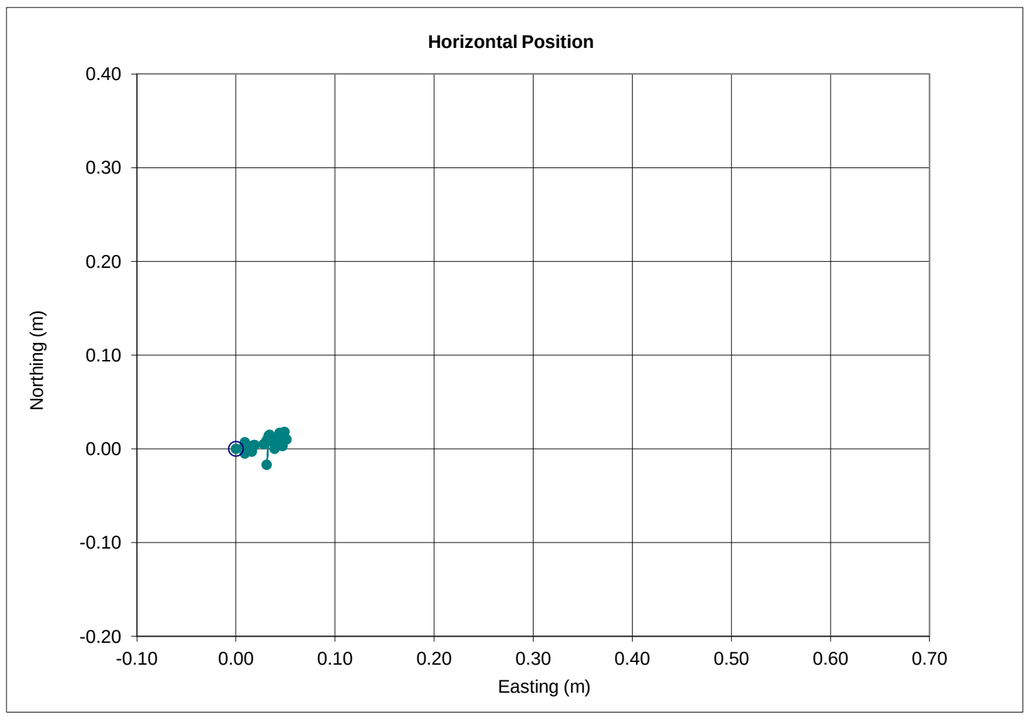
West side Abbott Dr.100m south last house

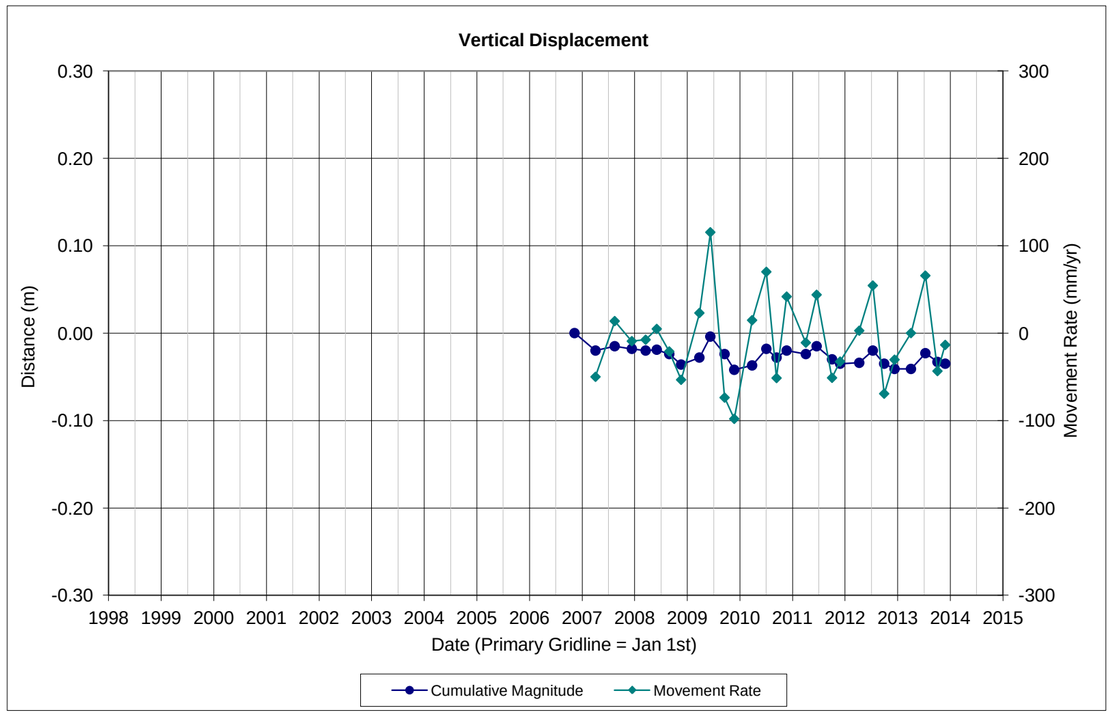
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

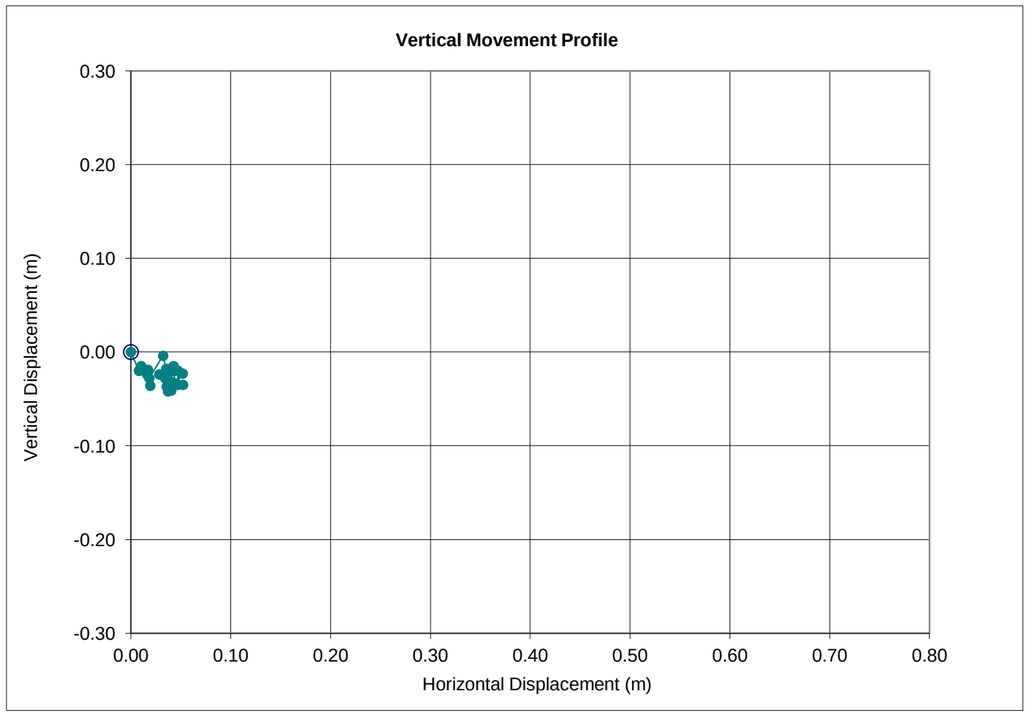
Displacement Graphs - Hub 06-19

West side Abbott Dr.100m south last house









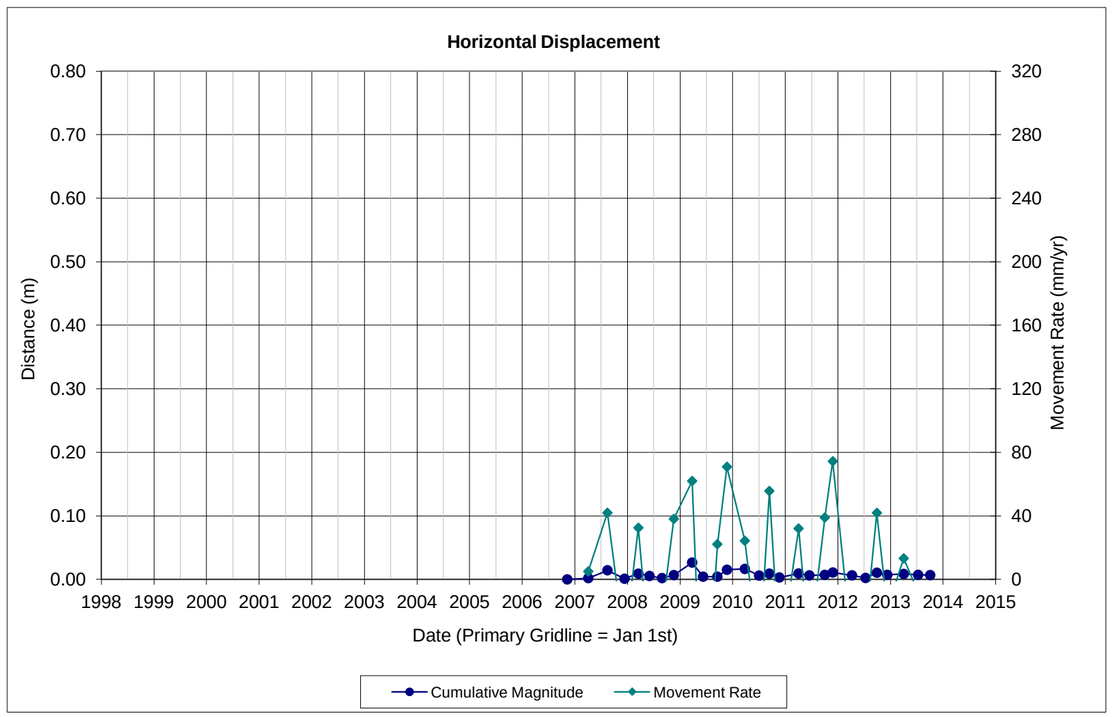
Survey and Displacement Data - Hub 06-20

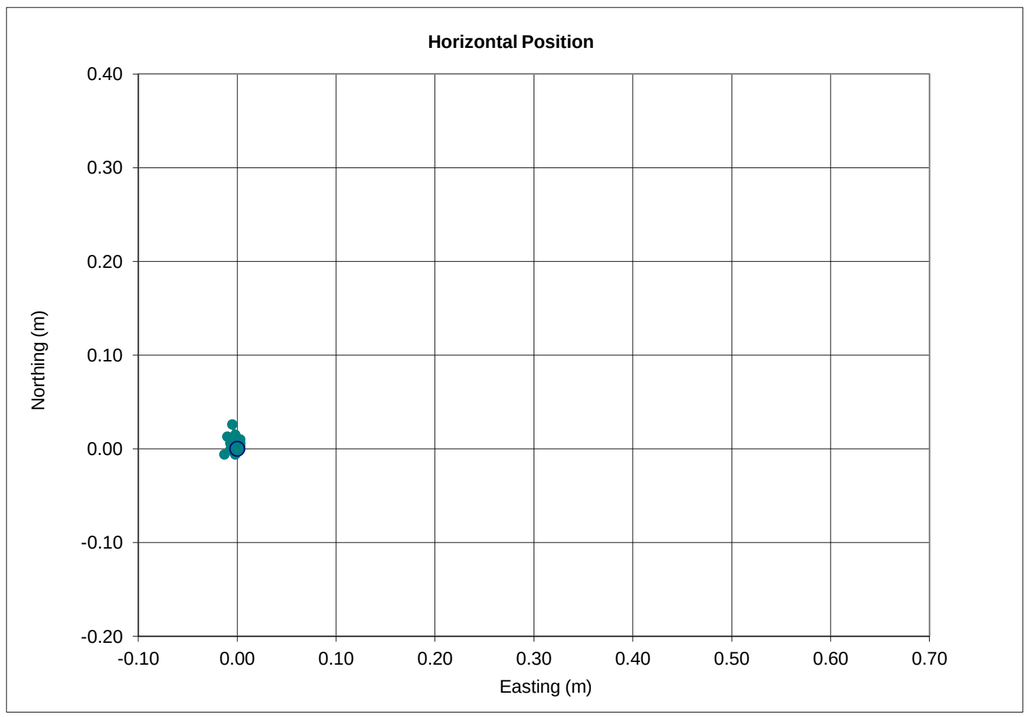
End of trail, by BH 16,off end Abbott Drive

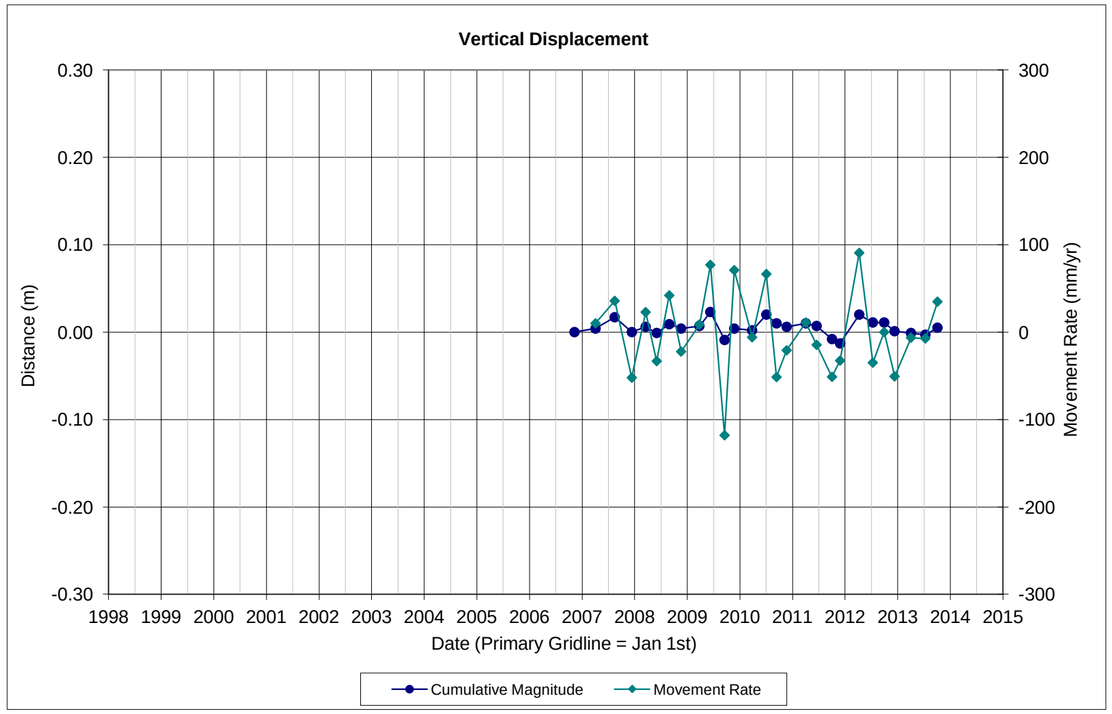
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

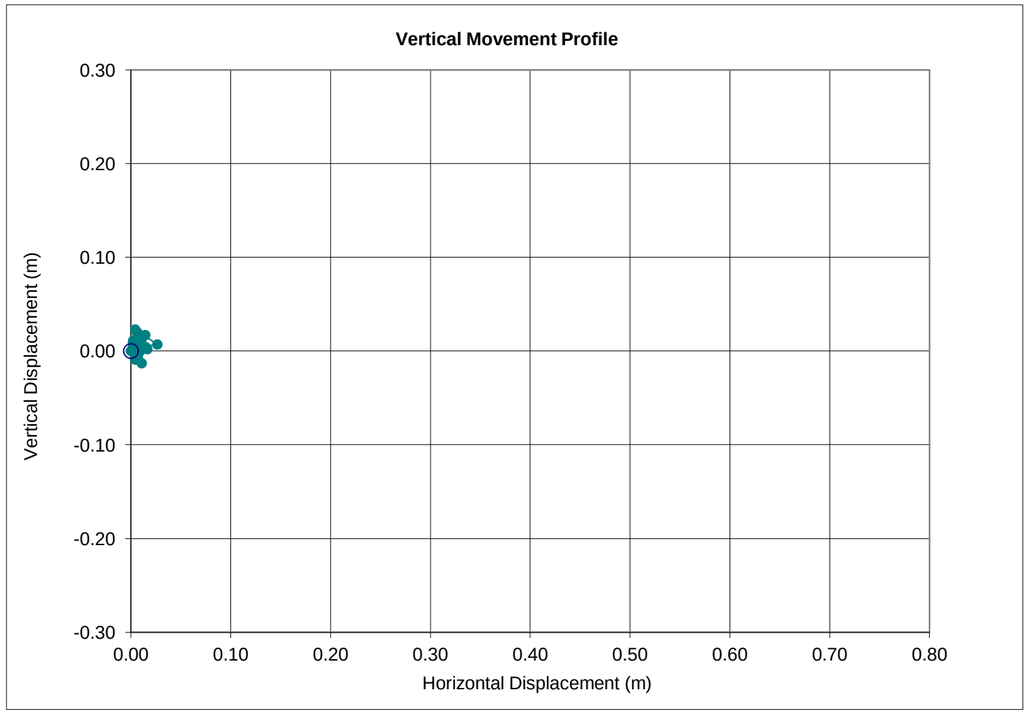
Displacement Graphs - Hub 06-20

End of trail, by BH 16,off end Abbott Drive









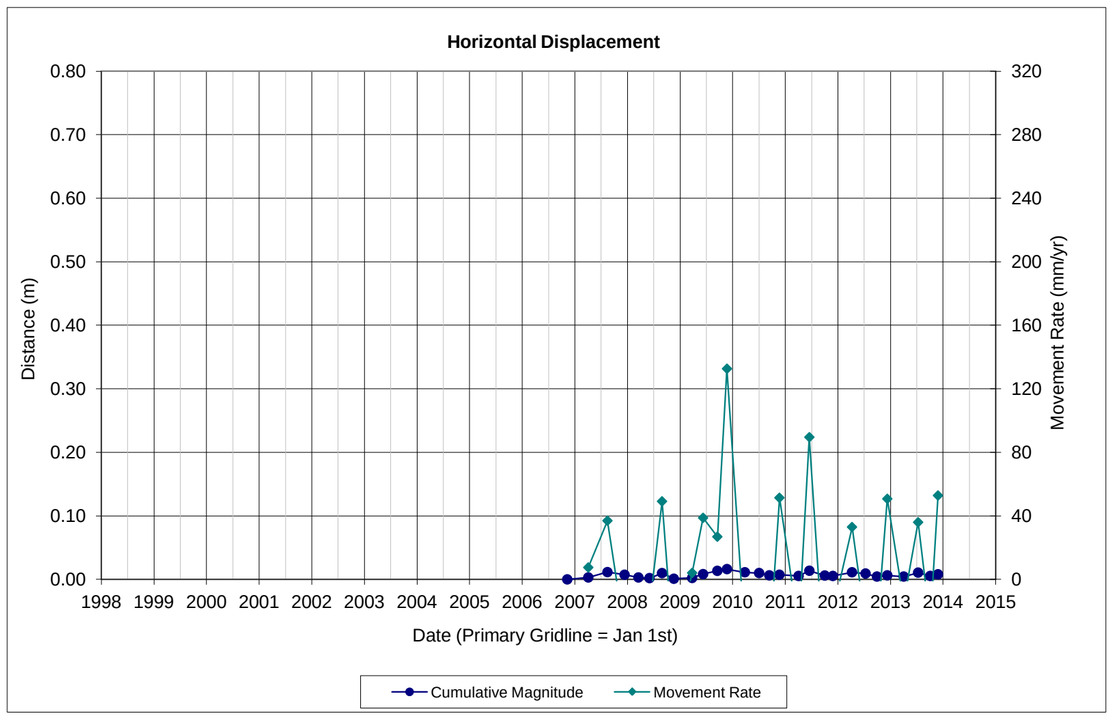
Survey and Displacement Data - Hub 06-21

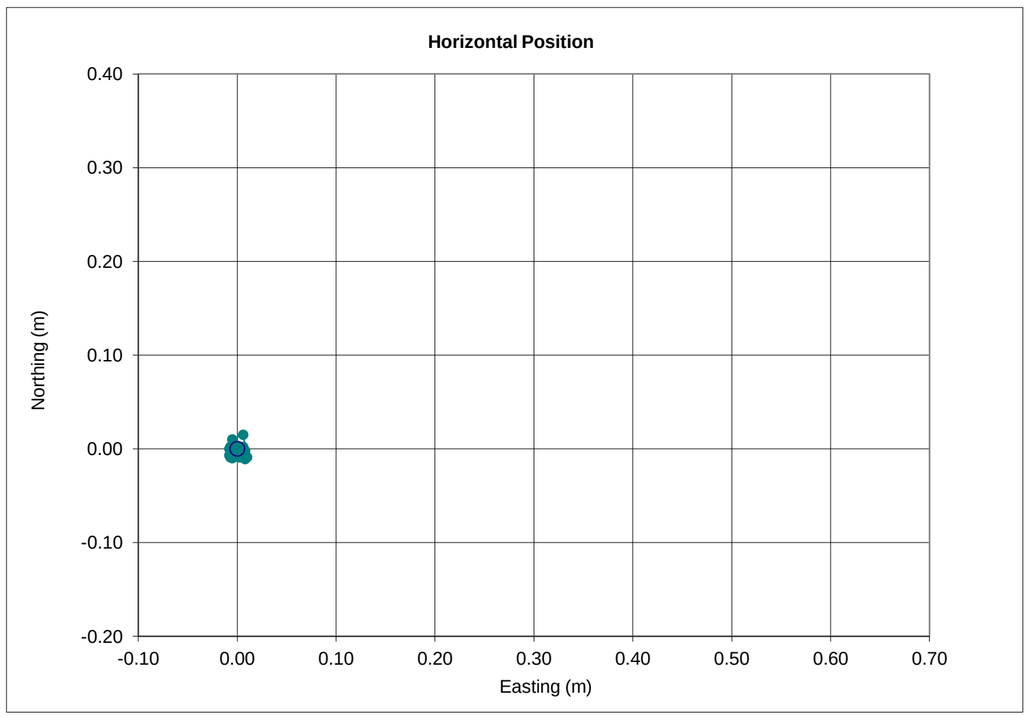
100m past gate, off end Abbott Drive

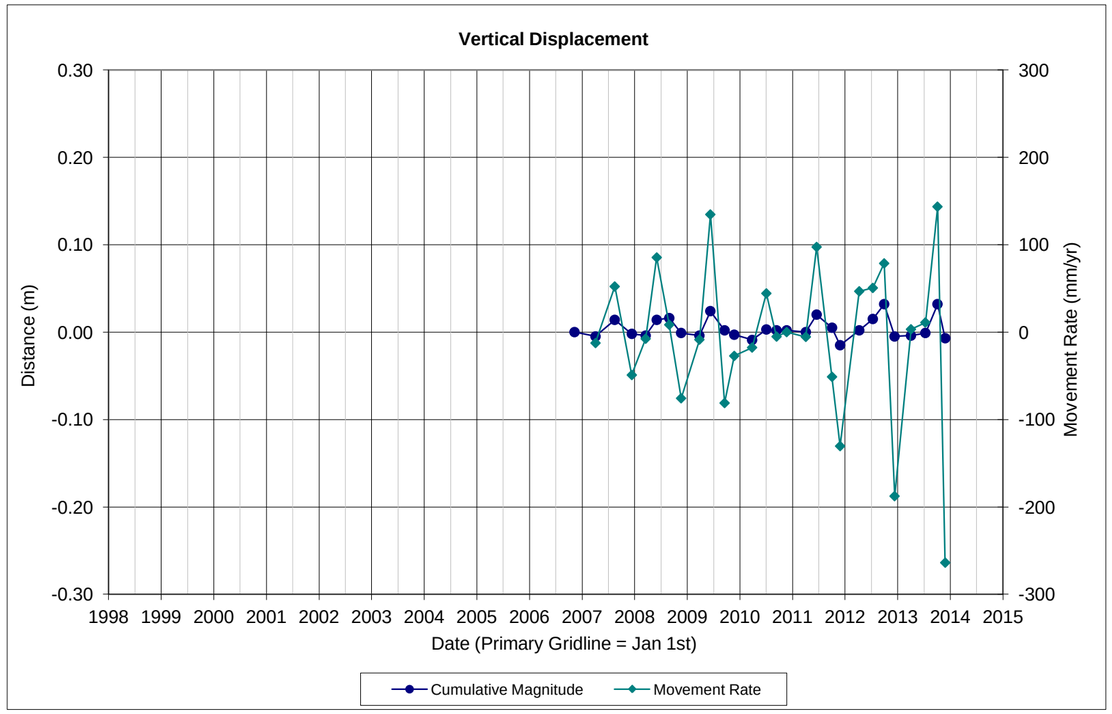
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

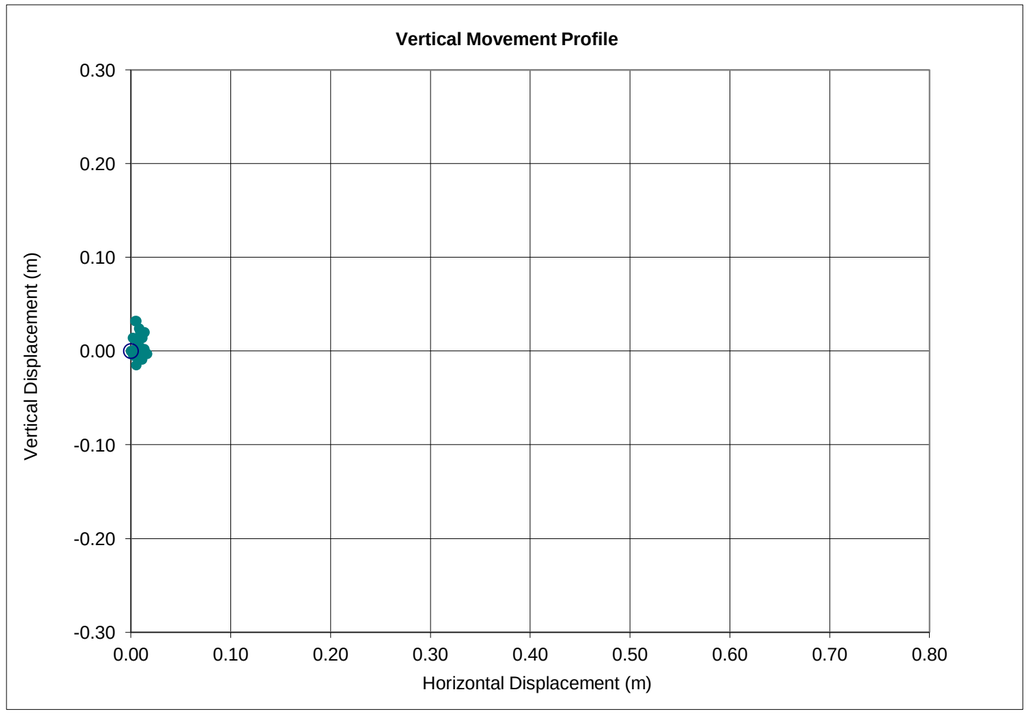
Displacement Graphs - Hub 06-21

100m past gate, off end Abbott Drive







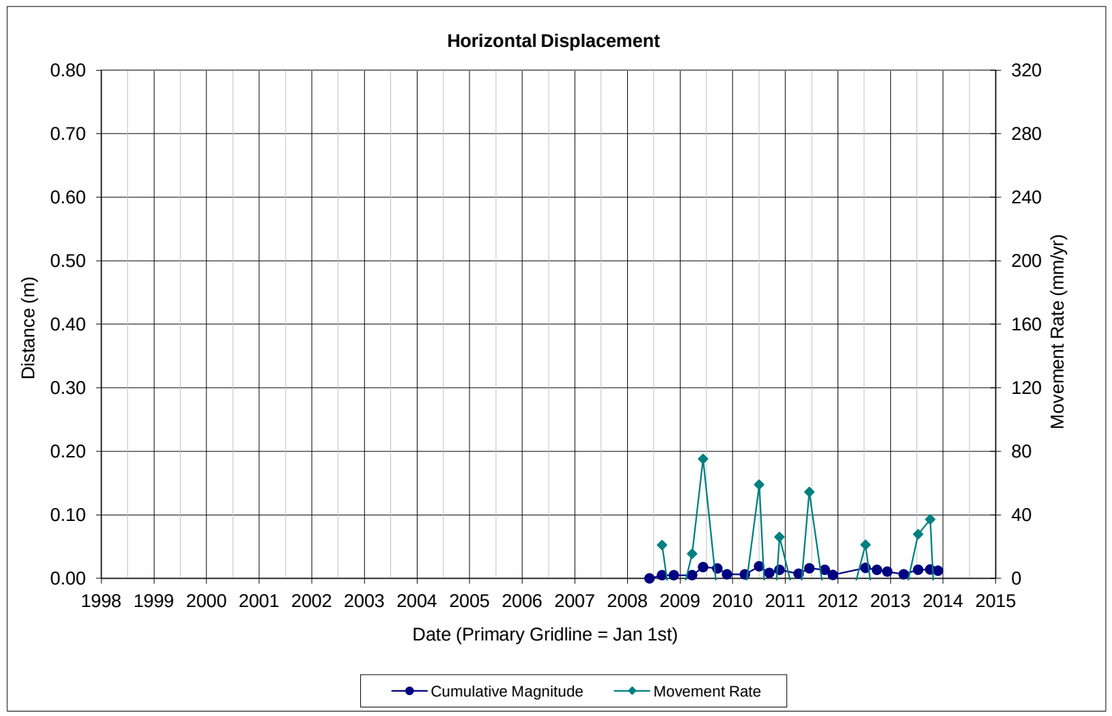


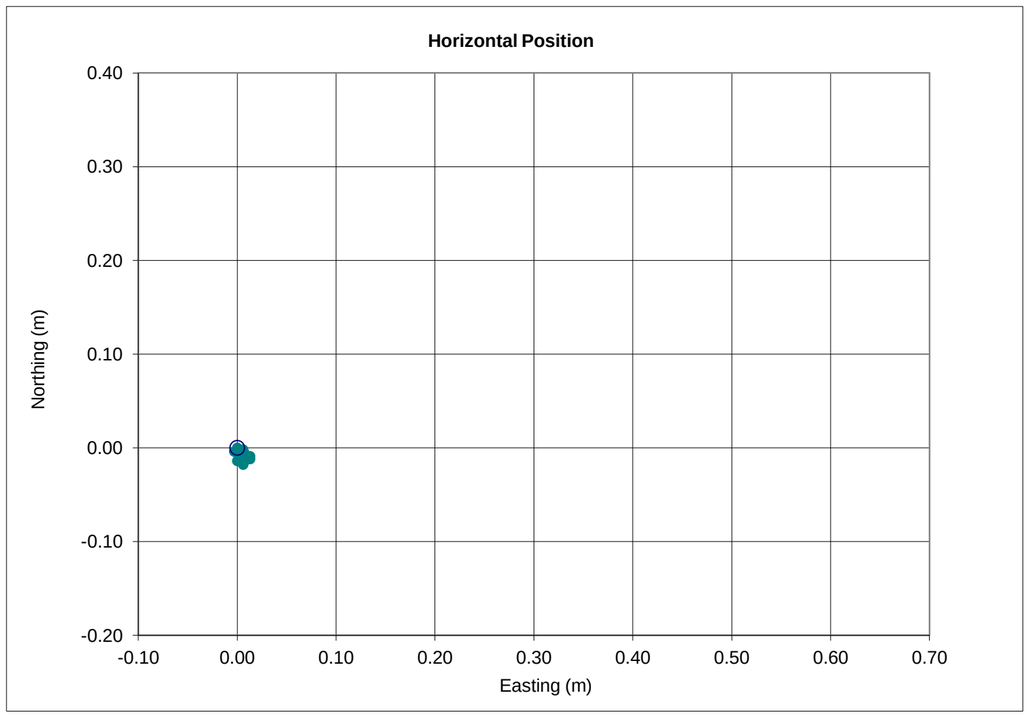
Survey and Displacement Data - Hub 08-01

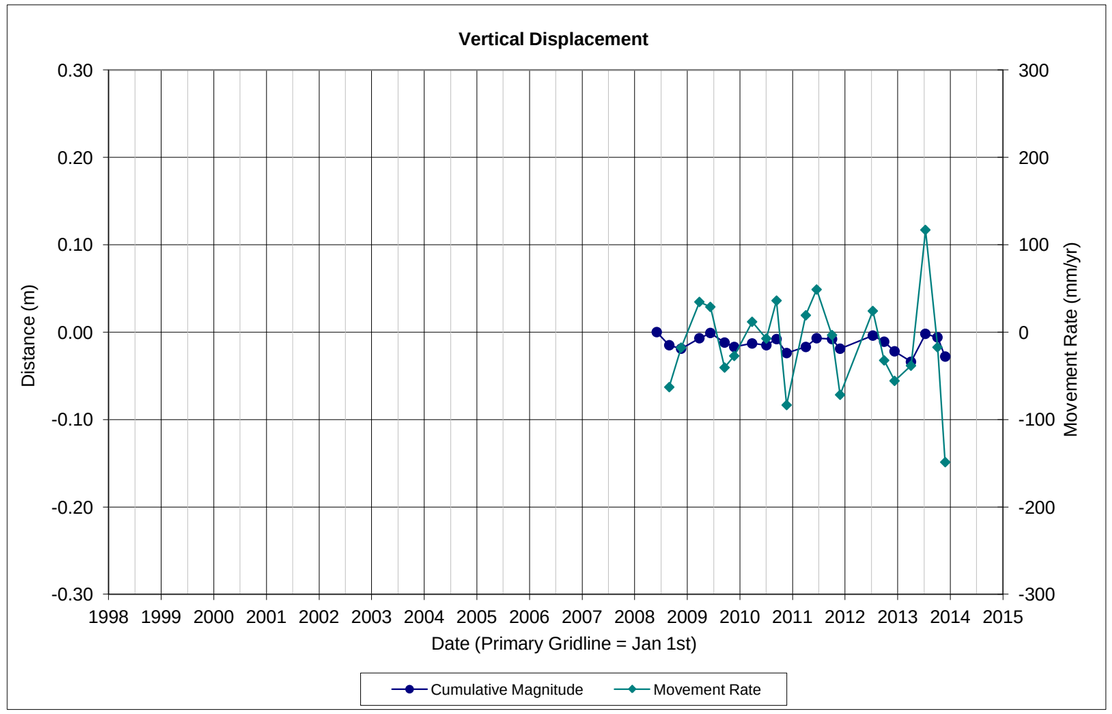
Replacement for 06-17

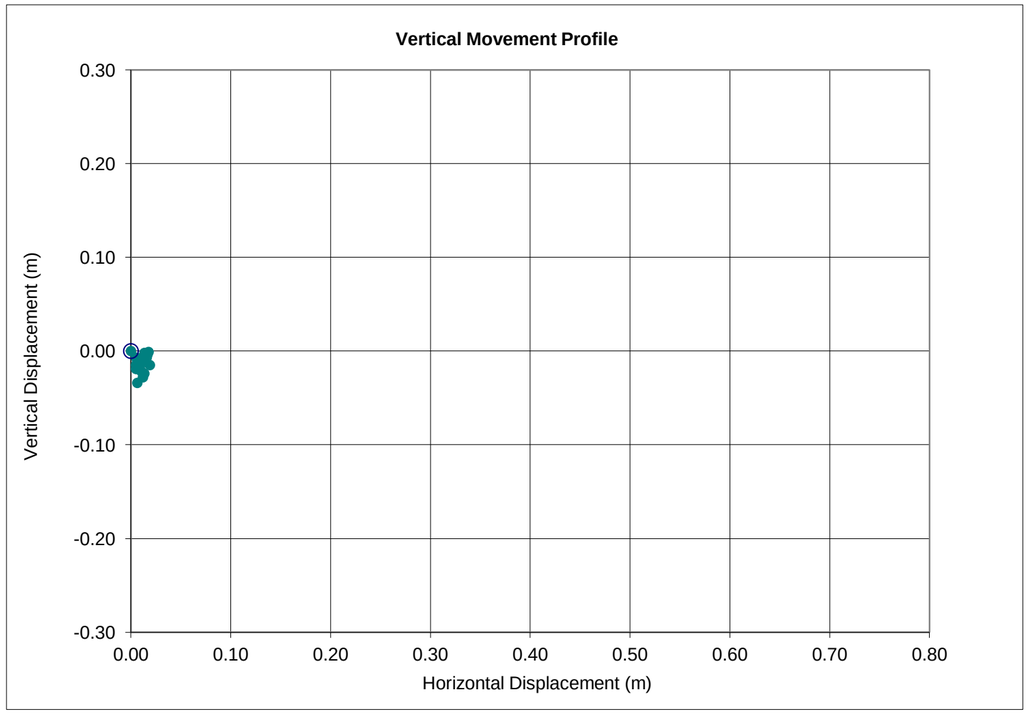
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

Displacement Graphs - Hub 08-01
Replacement for 06-17









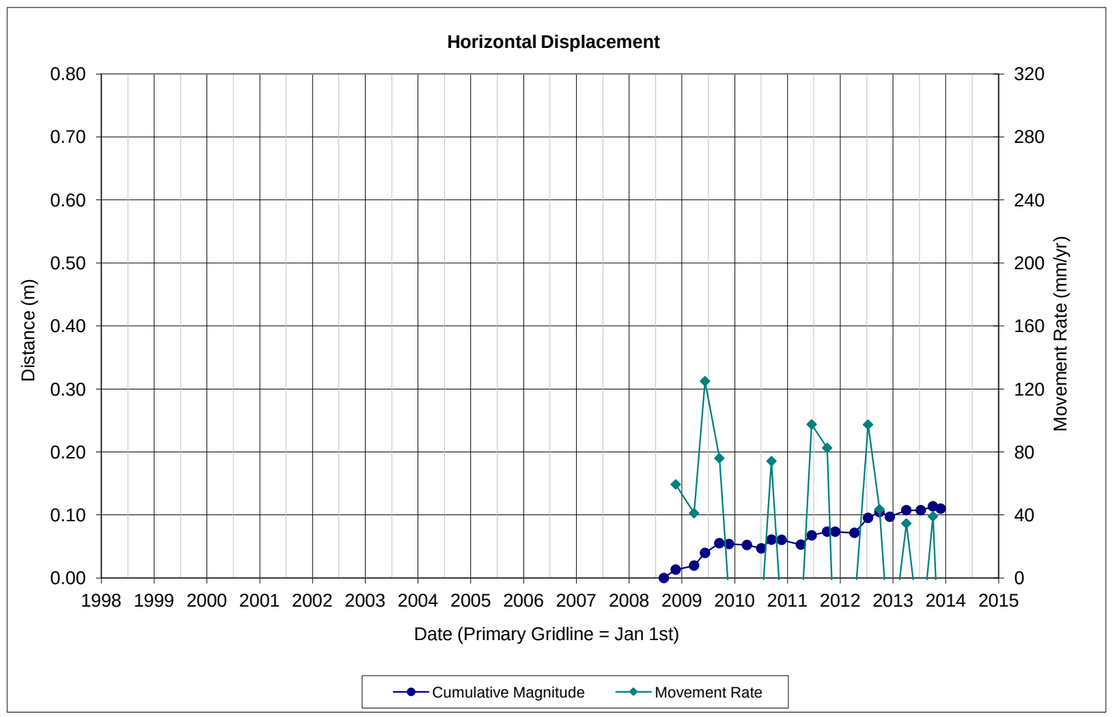
Survey and Displacement Data - Hub 08-02

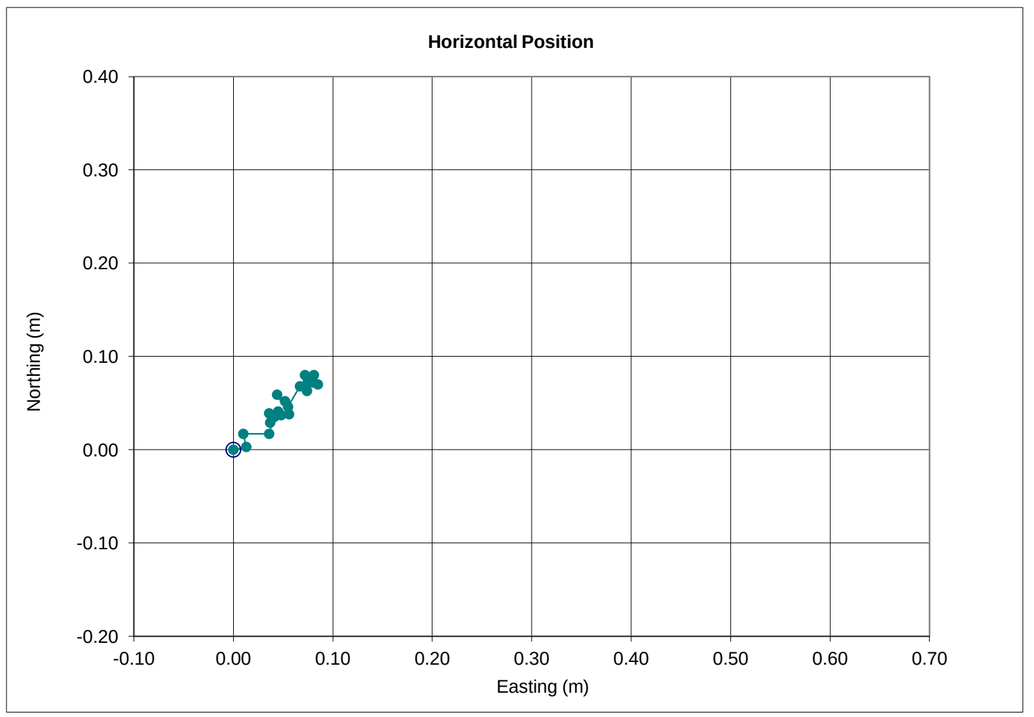
Very near 98-04

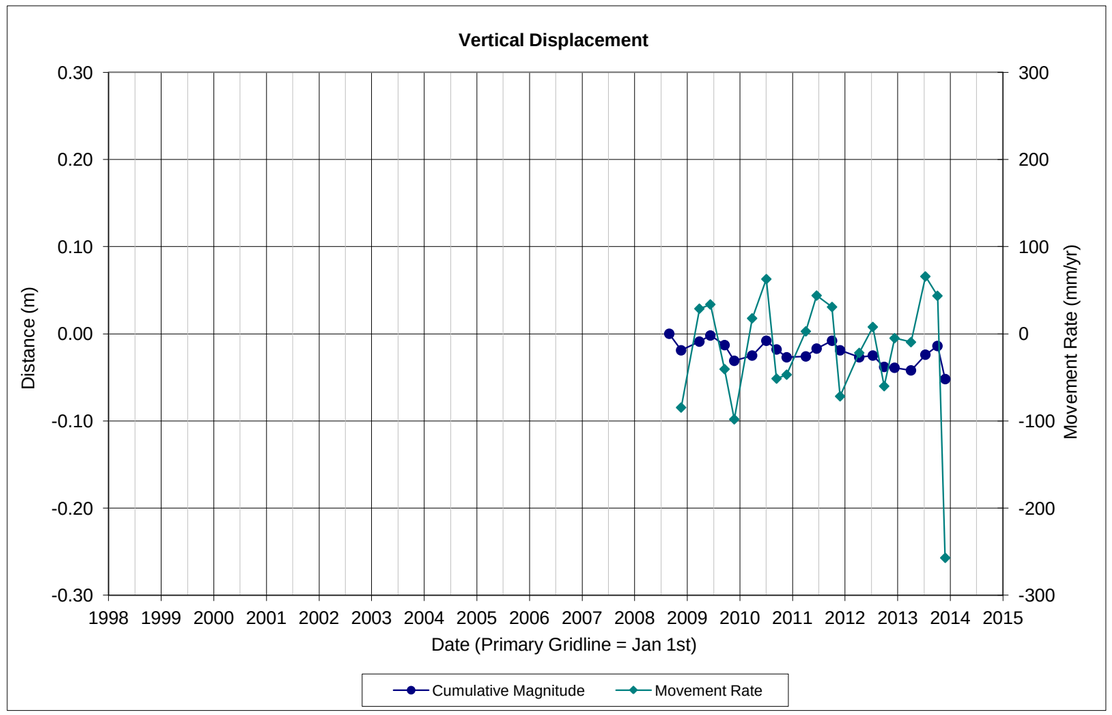
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	m/yr	m/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		
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

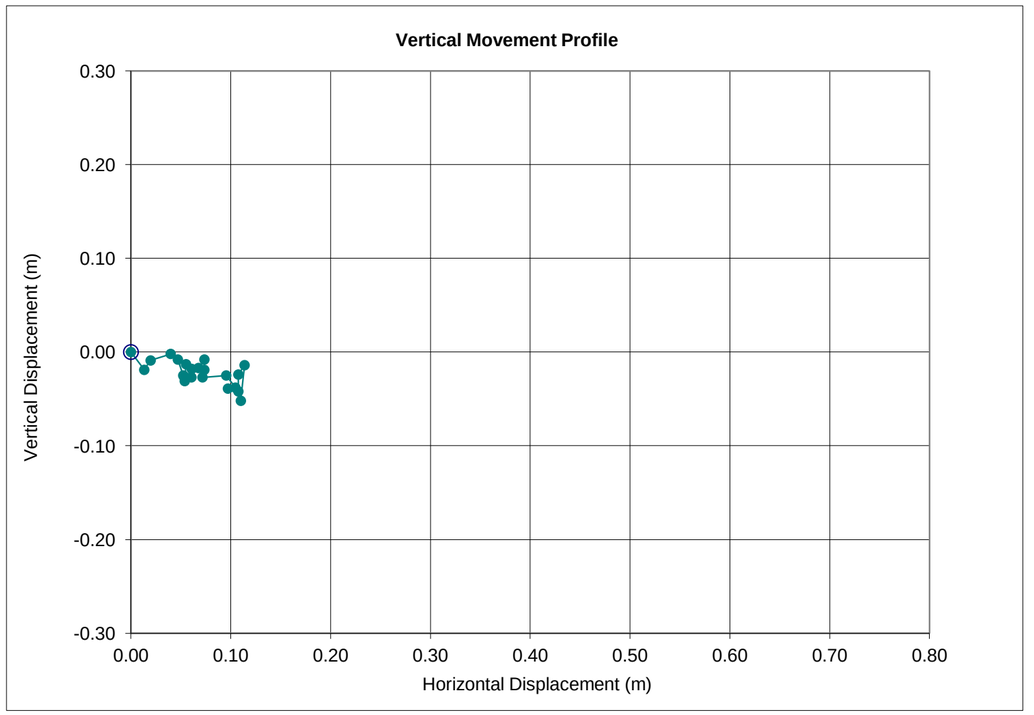
Displacement Graphs - Hub 08-02

Very near 98-04









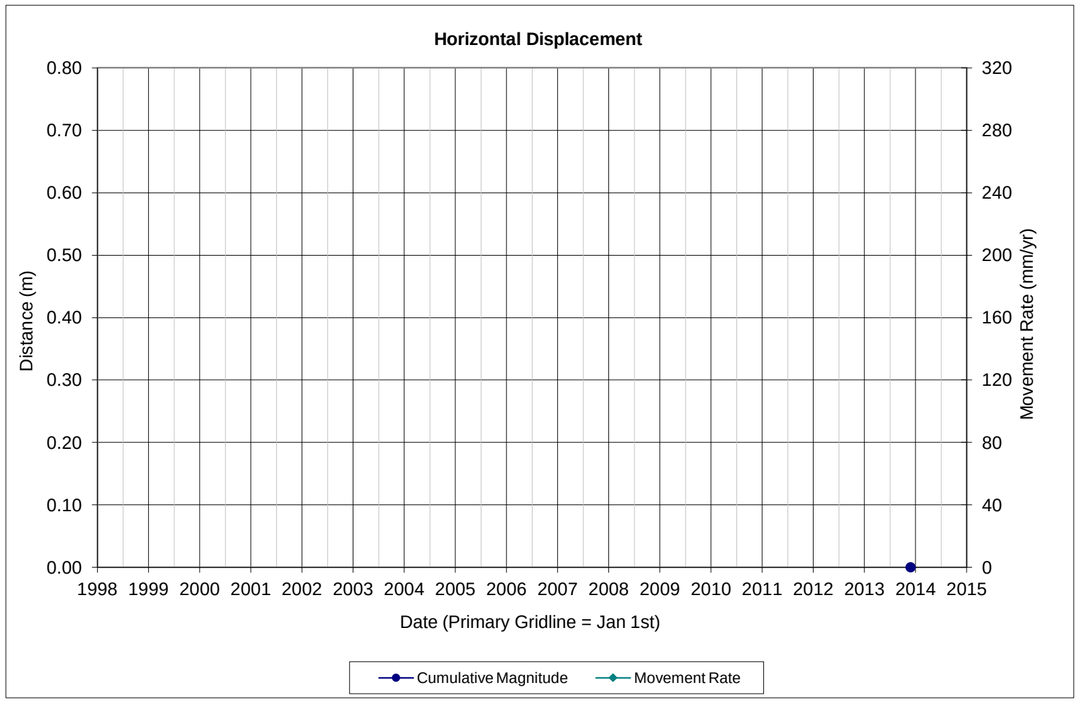
Survey and Displacement Data - Hub 13-01

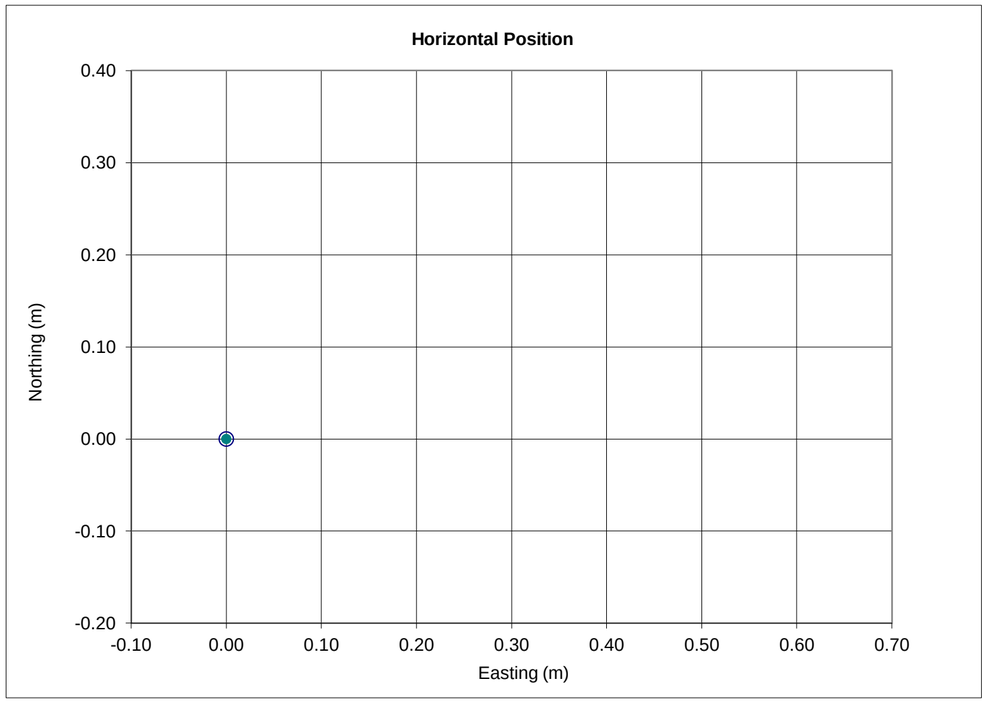
Replaces 98-09

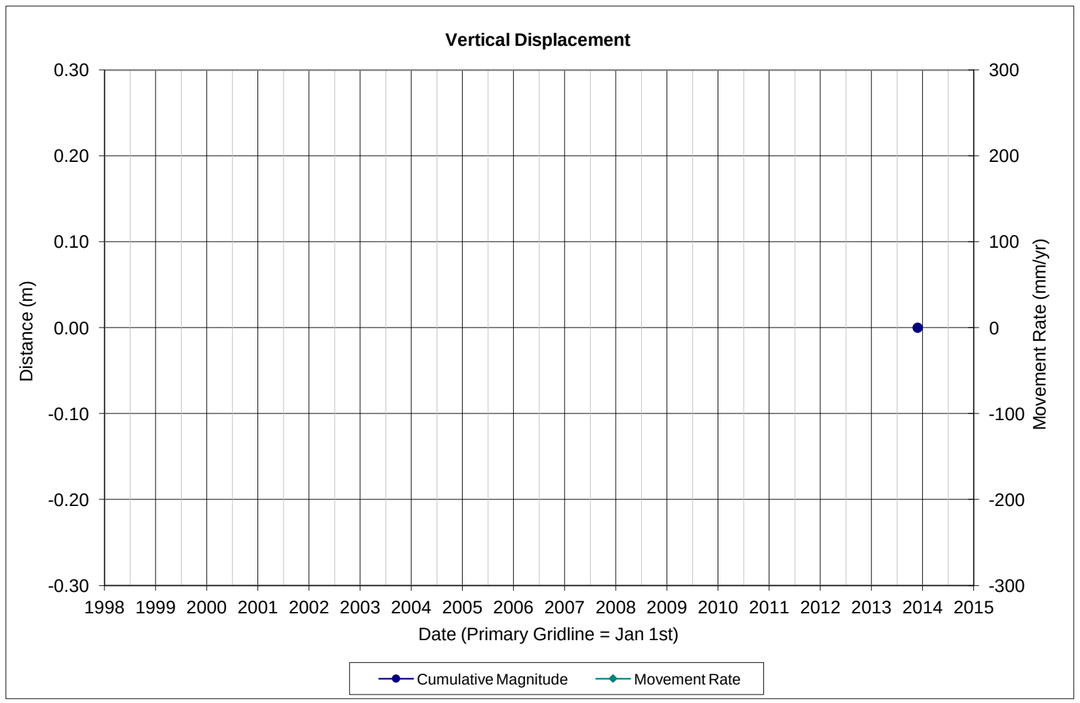
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
27/11/2013	5870065.732	531714.895	550.036	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		

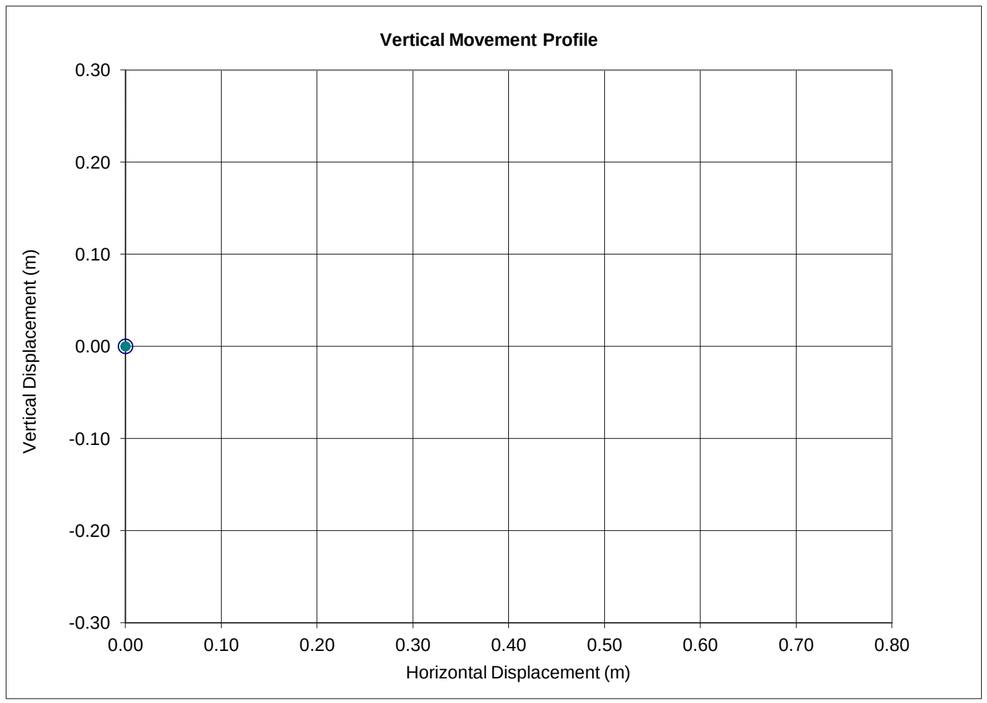
Displacement Graphs - Hub 11-56

Replaces 98-09









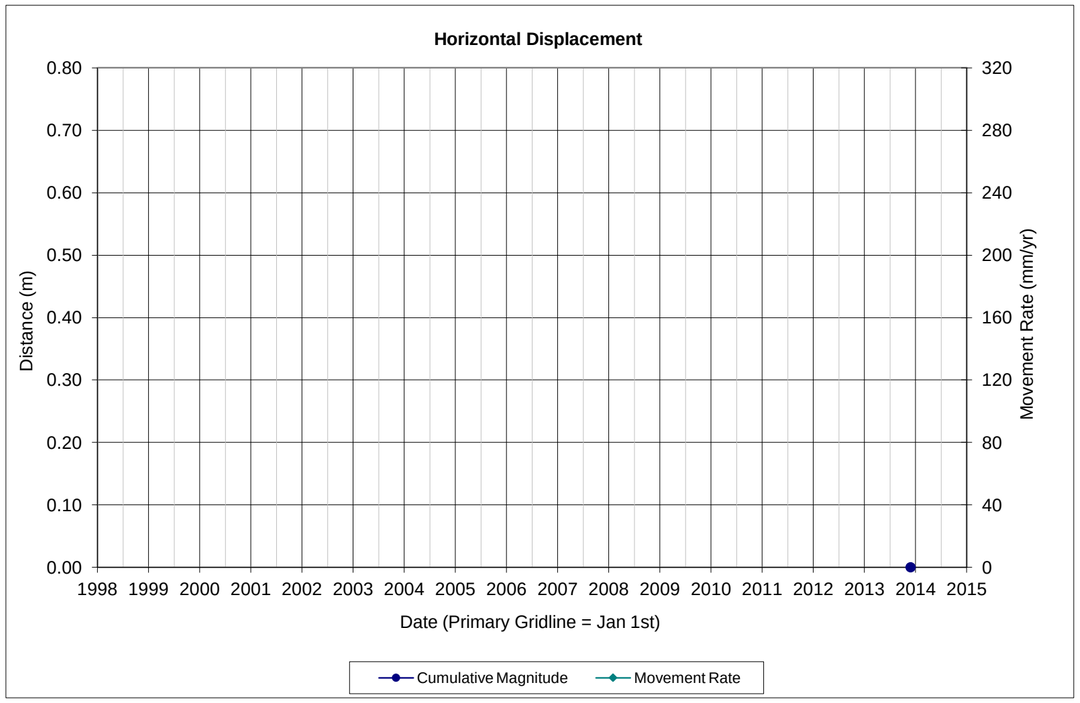
Survey and Displacement Data - Hub 13-02

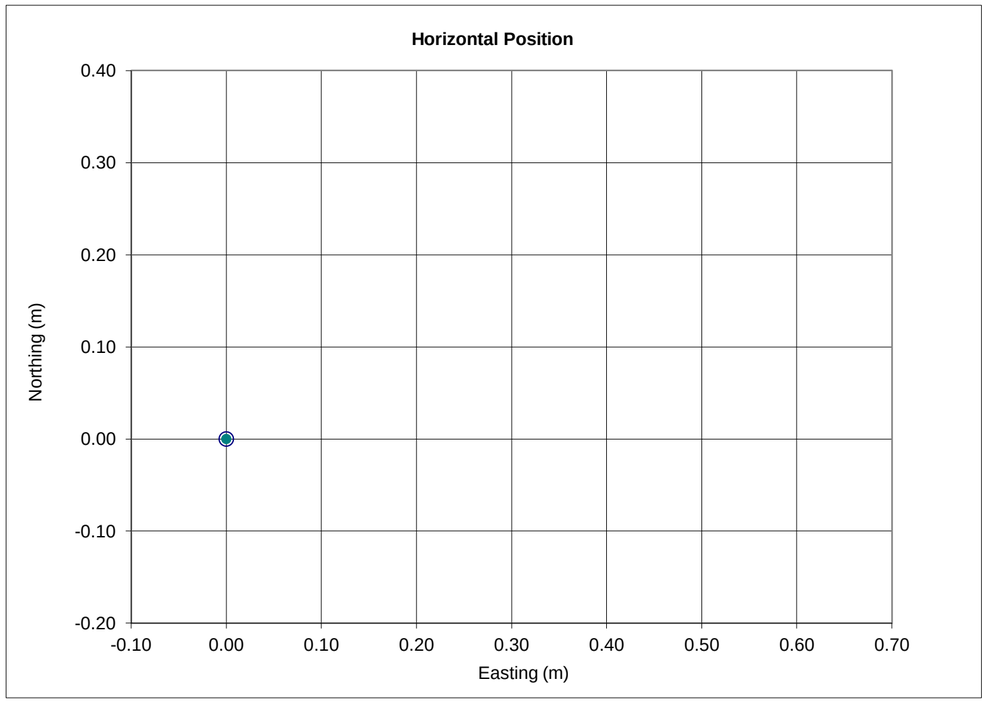
Replaces 98-08

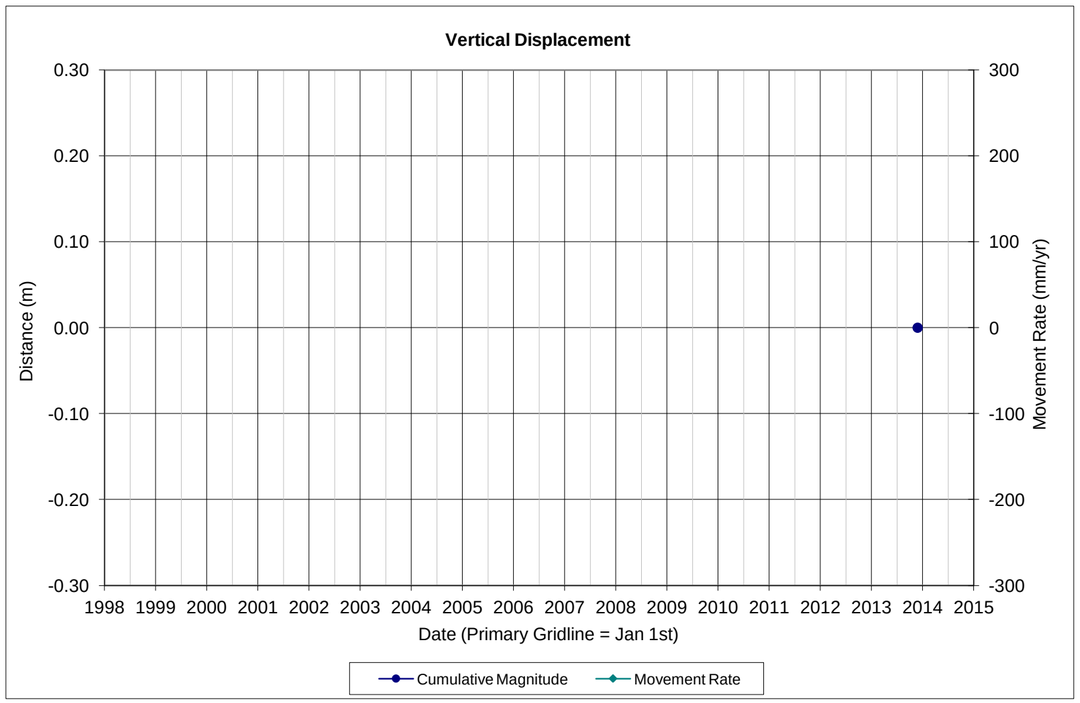
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		

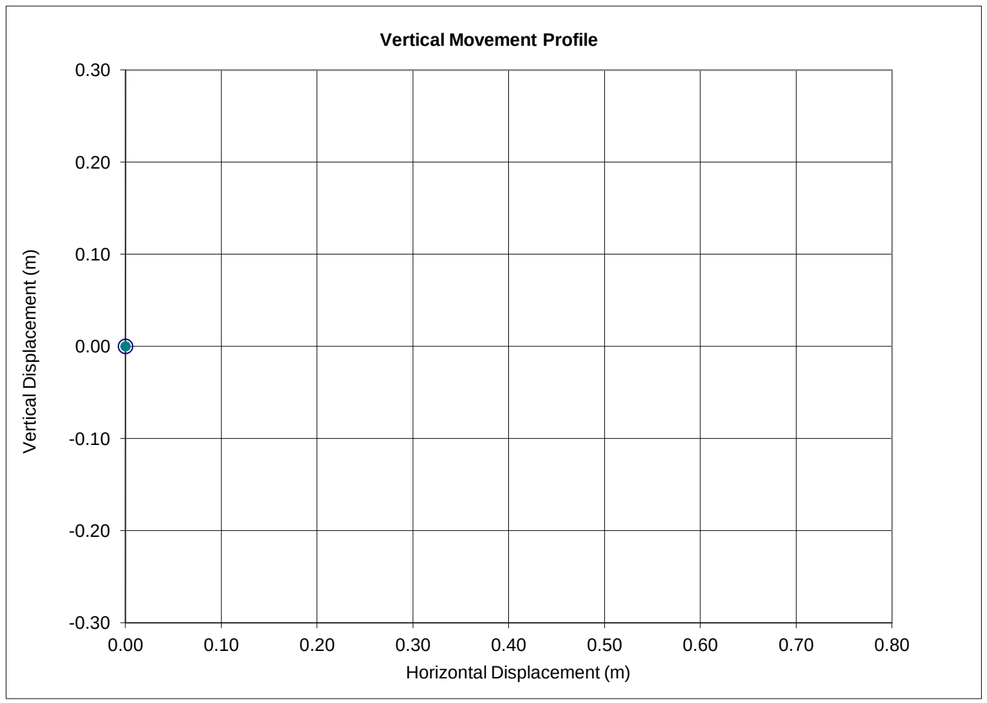
Displacement Graphs - Hub 11-56

Replaces 98-08







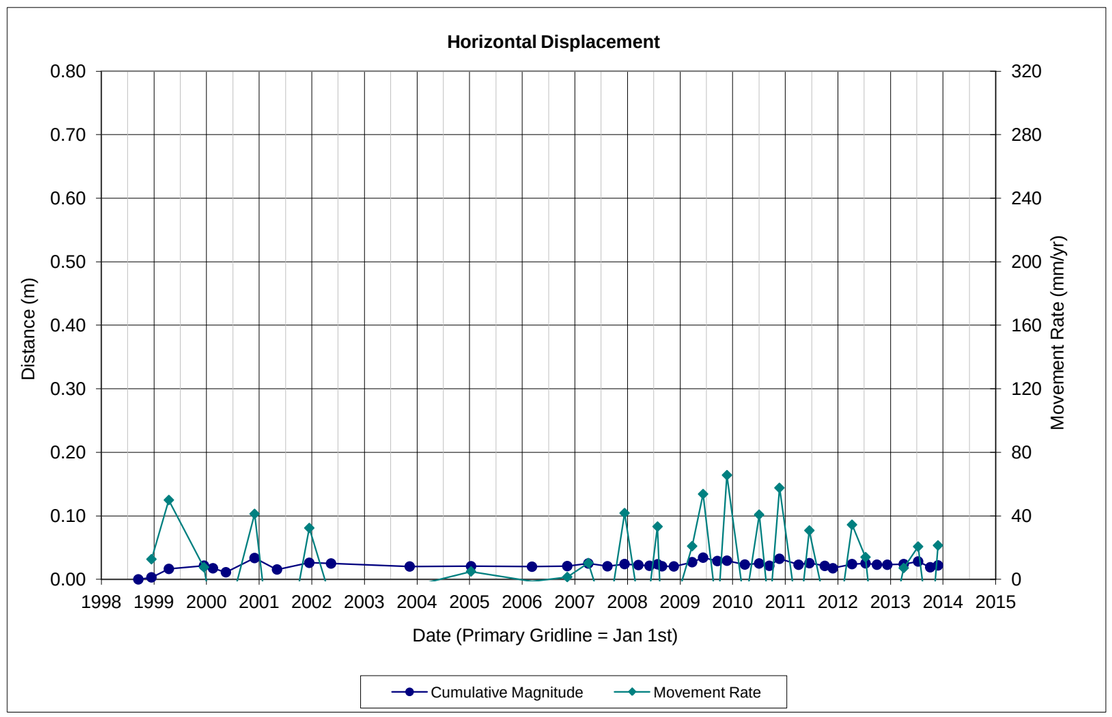


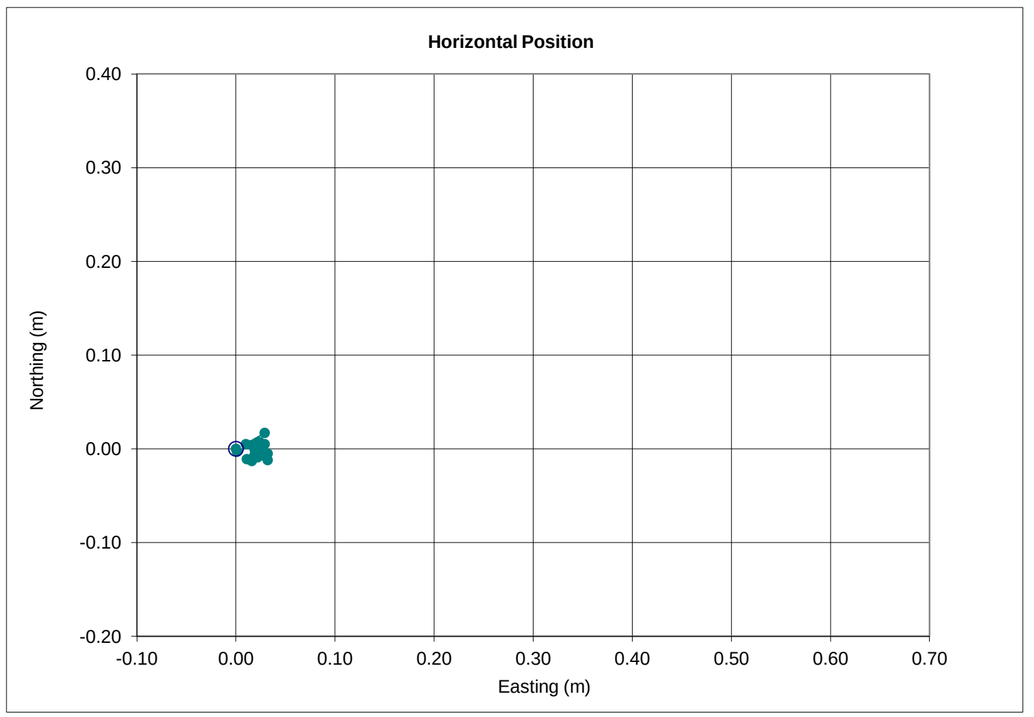
Survey and Displacement Data - Hub 98-23

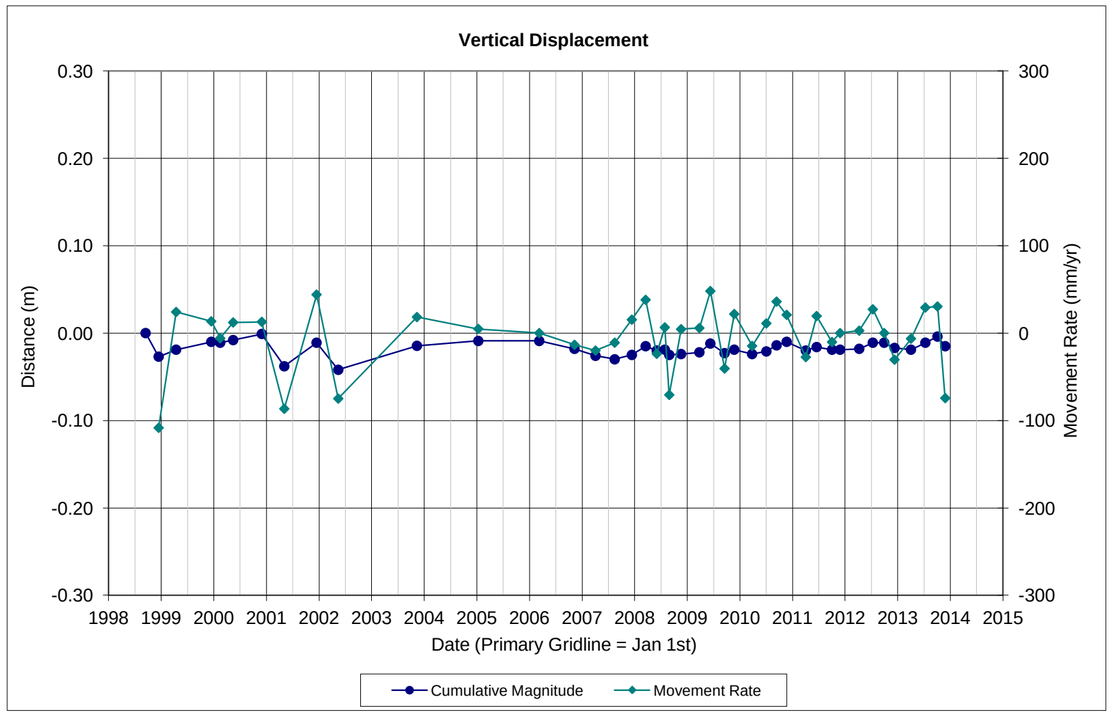
Benchmark - Doherty Dr.

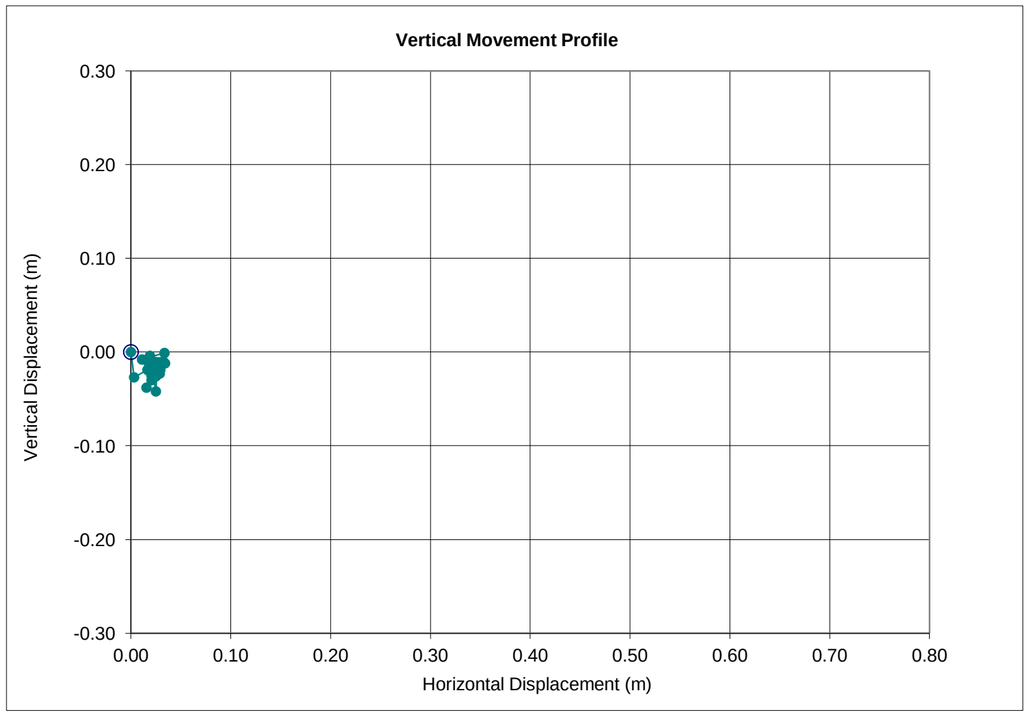
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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
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

Displacement Graphs - Hub 98-23
Benchmark - Doherty Dr.







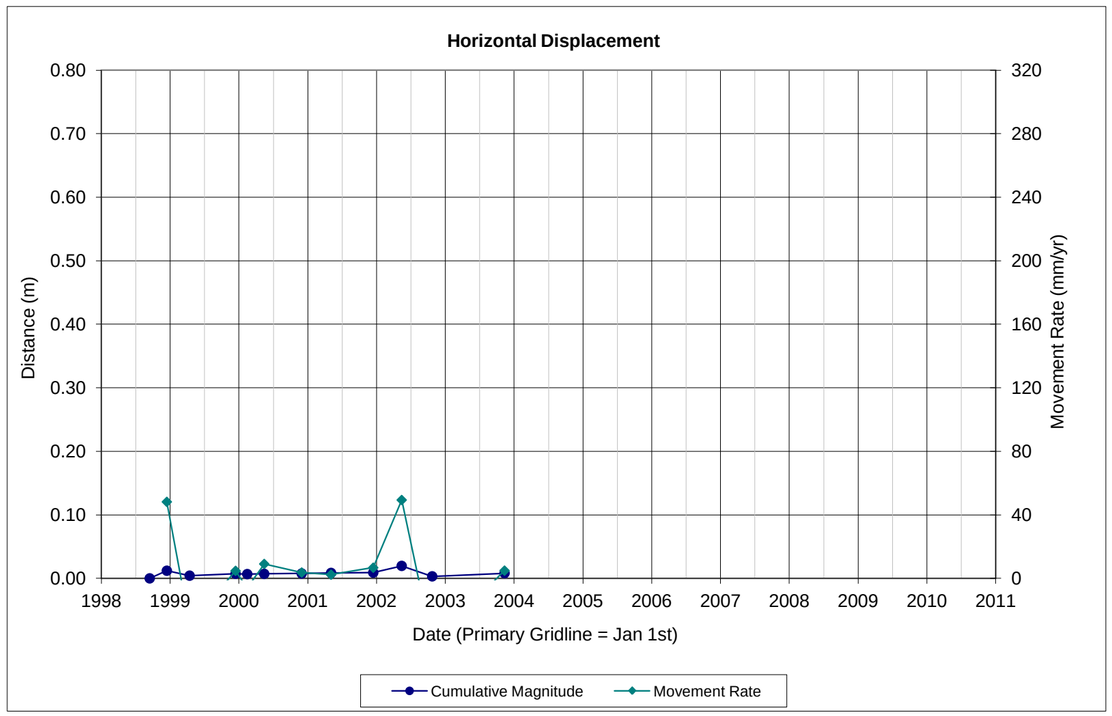


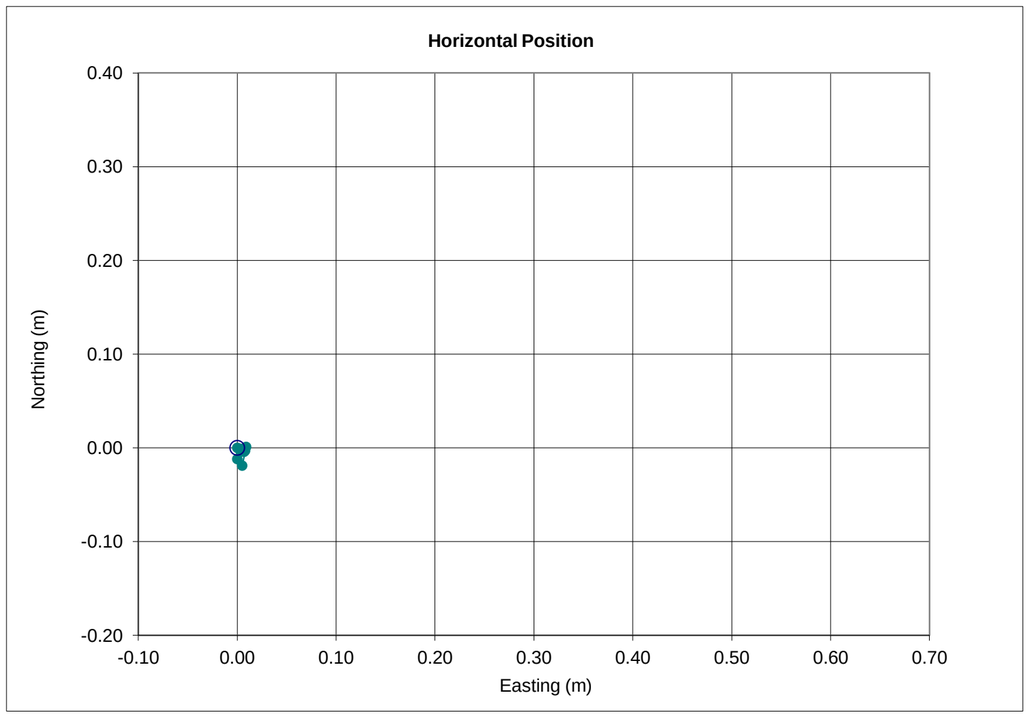
Survey and Displacement Data - Hub 98-26

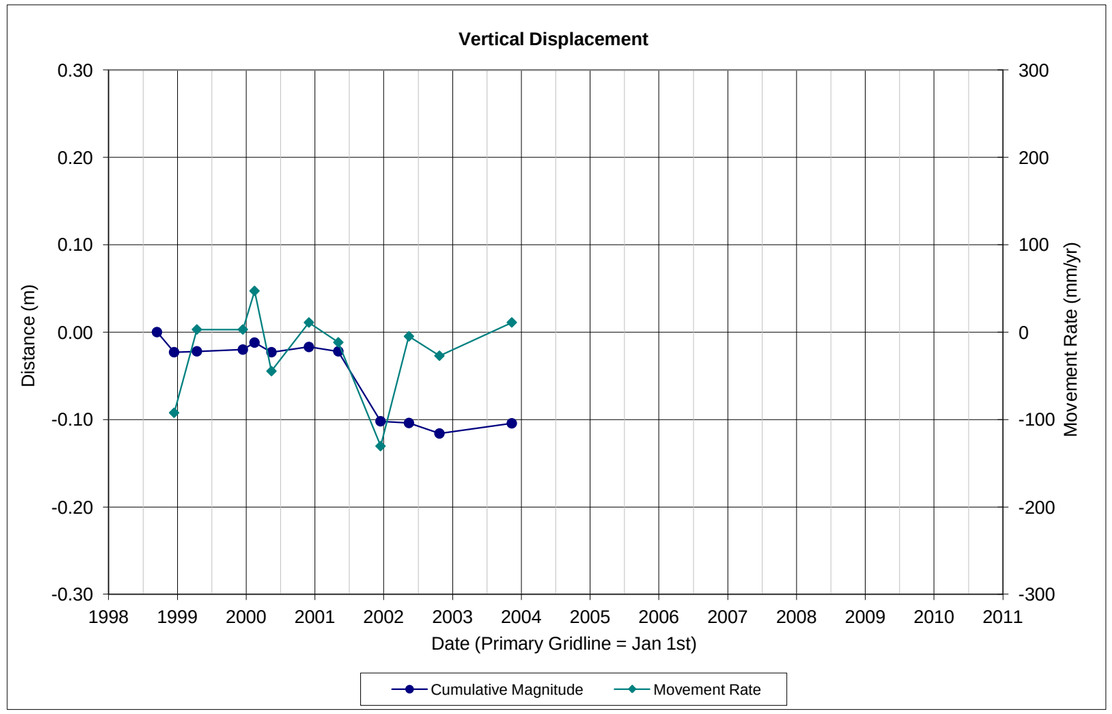
Benchmark - Near Quesnel Airport

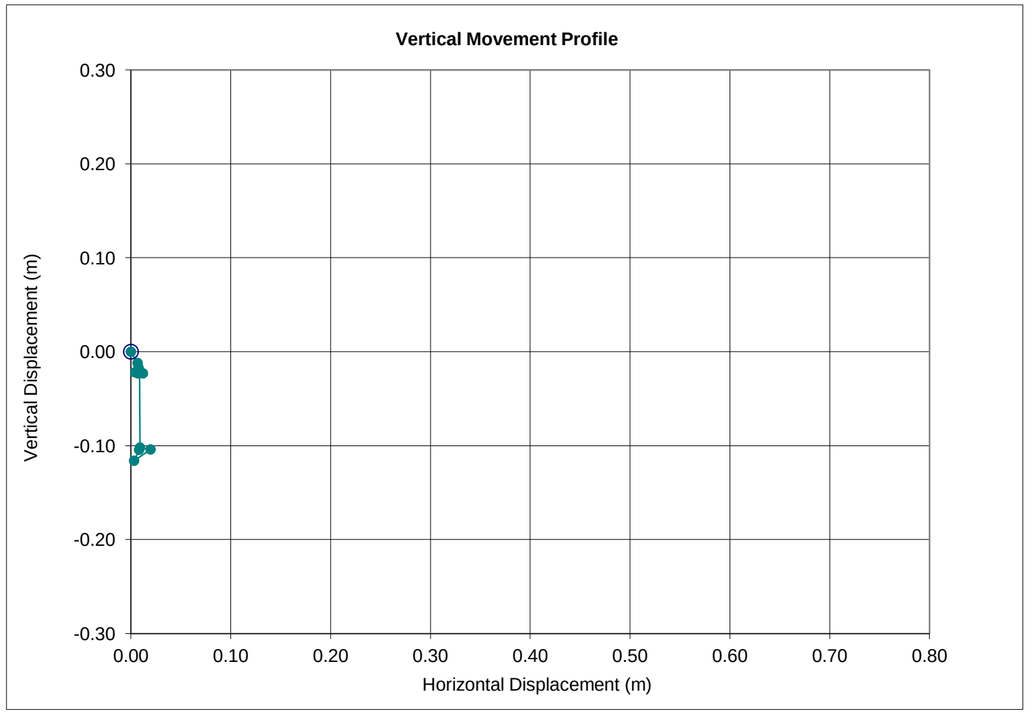
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5873887.634	533765.361	545.429	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		
15/12/1998	5873887.622	533765.361	545.406	0.25	-0.012	0.000	0.012	-0.023	180.0	-62.4	0.048	-0.092	0.25	-0.012	0.000	0.012	-0.023		-62.4	48.165	-92.316
15/04/1999	5873887.631	533765.364	545.407	0.58	-0.003	0.003	0.004	-0.022	135.0	-79.1	0.007	-0.038	0.33	0.009	0.003	0.009	0.001		6.0	-28.637	3.019
15/12/1999	5873887.630	533765.367	545.409	1.25	-0.004	0.006	0.007	-0.020	123.7	-70.2	0.006	-0.016	0.67	-0.001	0.003	0.003	0.002		32.3	4.734	2.994
15/02/2000	5873887.631	533765.367	545.417	1.42	-0.003	0.006	0.007	-0.012	116.6	-60.8	0.005	-0.008	0.17	0.001	0.000	0.001	0.008		82.9	-5.891	47.129
15/05/2000	5873887.633	533765.368	545.406	1.66	-0.001	0.007	0.007	-0.023	98.1	-72.9	0.004	-0.014	0.25	0.002	0.001	0.002	-0.011		-78.5	9.075	-44.642
30/11/2000	5873887.631	533765.368	545.412	2.21	-0.003	0.007	0.008	-0.017	113.2	-65.9	0.003	-0.008	0.54	-0.002	0.000	0.002	0.006		71.6	3.671	11.013
05/05/2001	5873887.631	533765.369	545.407	2.64	-0.003	0.008	0.009	-0.022	110.6	-68.8	0.003	-0.008	0.43	0.000	0.001	0.001	-0.005		-78.7	2.341	-11.707
15/12/2001	5873887.635	533765.370	545.327	3.25	0.001	0.009	0.009	-0.102	83.7	-84.9	0.003	-0.031	0.61	0.004	0.001	0.004	-0.080		-87.0	6.723	-130.446
15/05/2002	5873887.615	533765.366	545.325	3.66	-0.019	0.005	0.020	-0.104	165.3	-79.3	0.005	-0.028	0.41	-0.020	-0.004	0.020	-0.002		-5.6	49.336	-4.838
24/10/2002	5873887.633	533765.364	545.313	4.11	-0.001	0.003	0.003	-0.116	108.4	-88.4	0.001	-0.028	0.44	0.018	-0.002	0.018	-0.012		-33.5	-40.833	-27.056
12/11/2003	5873887.630	533765.368	545.325	5.16	-0.004	0.007	0.008	-0.104	121.2	-85.5	0.002	-0.020	1.05	-0.003	0.004	0.005	0.012		66.2	4.869	11.062

Displacement Graphs - Hub 98-26
Benchmark - Near Quesnel Airport







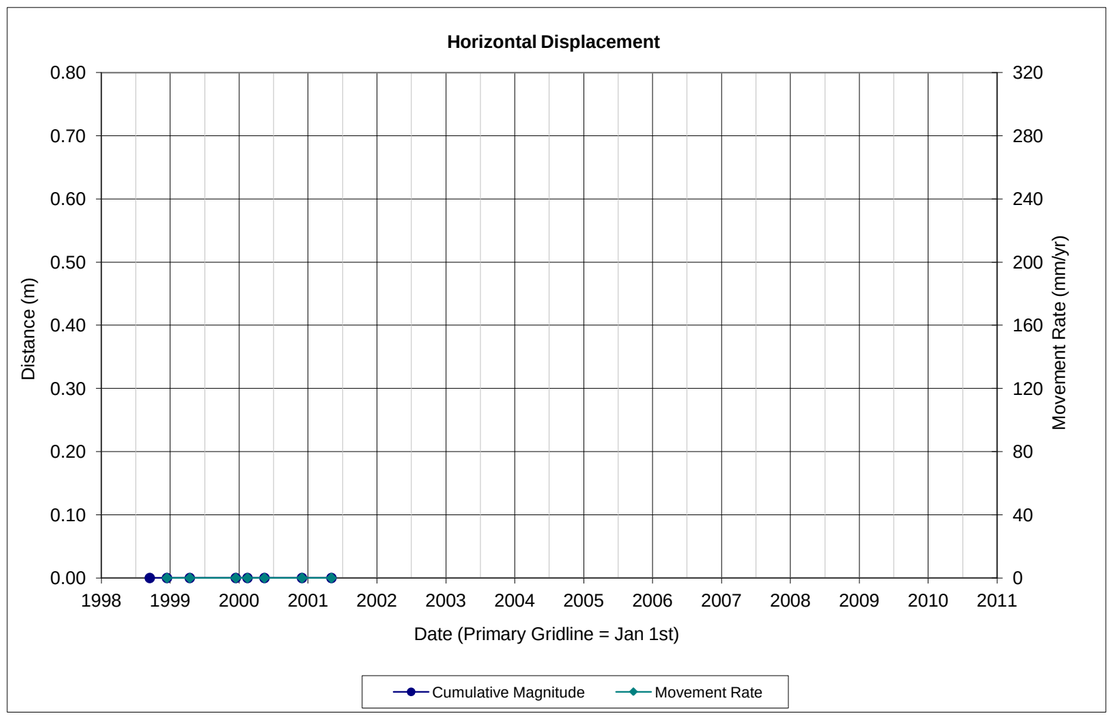


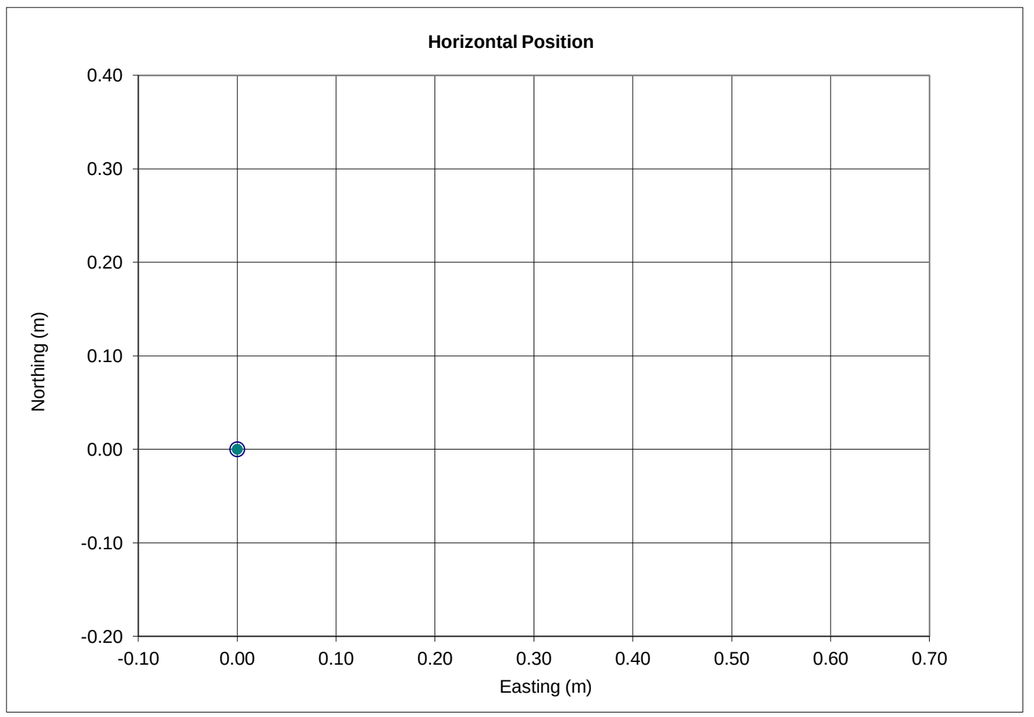
Survey and Displacement Data - Hub 98-28

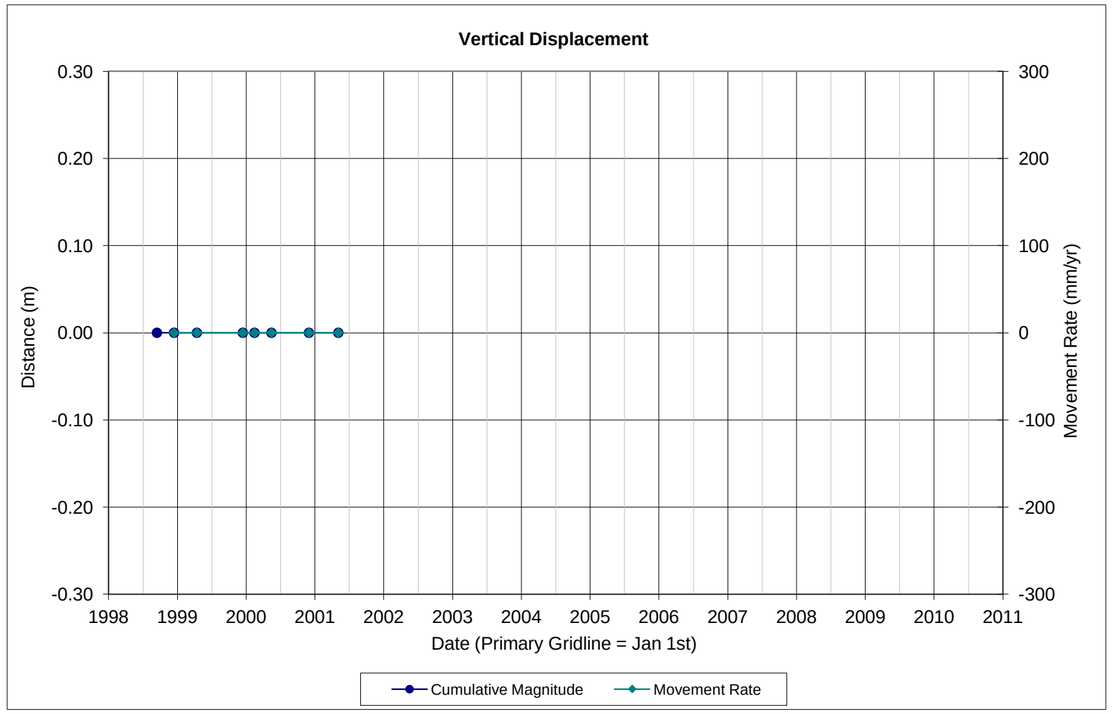
Benchmark - Red Bluff Pump Station

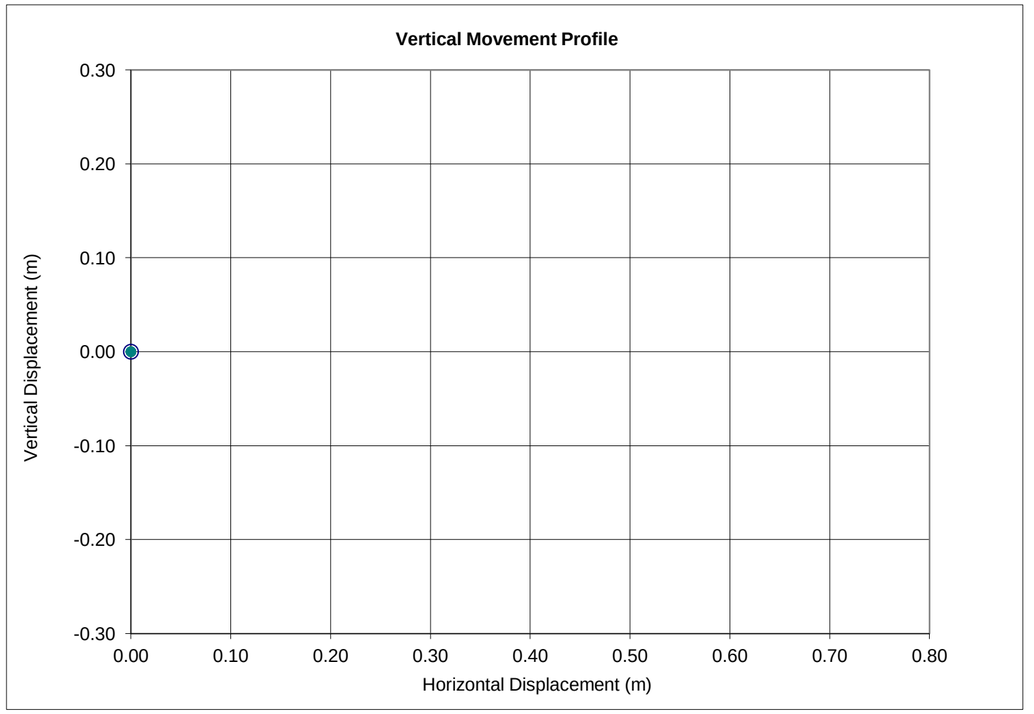
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/09/1998	5870190.608	537039.418	595.773	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		
15/12/1998	5870190.608	537039.418	595.773	0.25	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.25	0.000	0.000	0.000	0.000		0.0	0.000	0.000
15/04/1999	5870190.608	537039.418	595.773	0.58	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.33	0.000	0.000	0.000	0.000		0.0	0.000	0.000
15/12/1999	5870190.608	537039.418	595.773	1.25	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	0.000	0.000
15/02/2000	5870190.608	537039.418	595.773	1.42	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.17	0.000	0.000	0.000	0.000		0.0	0.000	0.000
15/05/2000	5870190.608	537039.418	595.773	1.66	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.25	0.000	0.000	0.000	0.000		0.0	0.000	0.000
30/11/2000	5870190.608	537039.418	595.773	2.21	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.54	0.000	0.000	0.000	0.000		0.0	0.000	0.000
05/05/2001	5870190.608	537039.418	595.773	2.64	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.43	0.000	0.000	0.000	0.000		0.0	0.000	0.000

Displacement Graphs - Hub 98-28
Benchmark - Red Bluff Pump Station









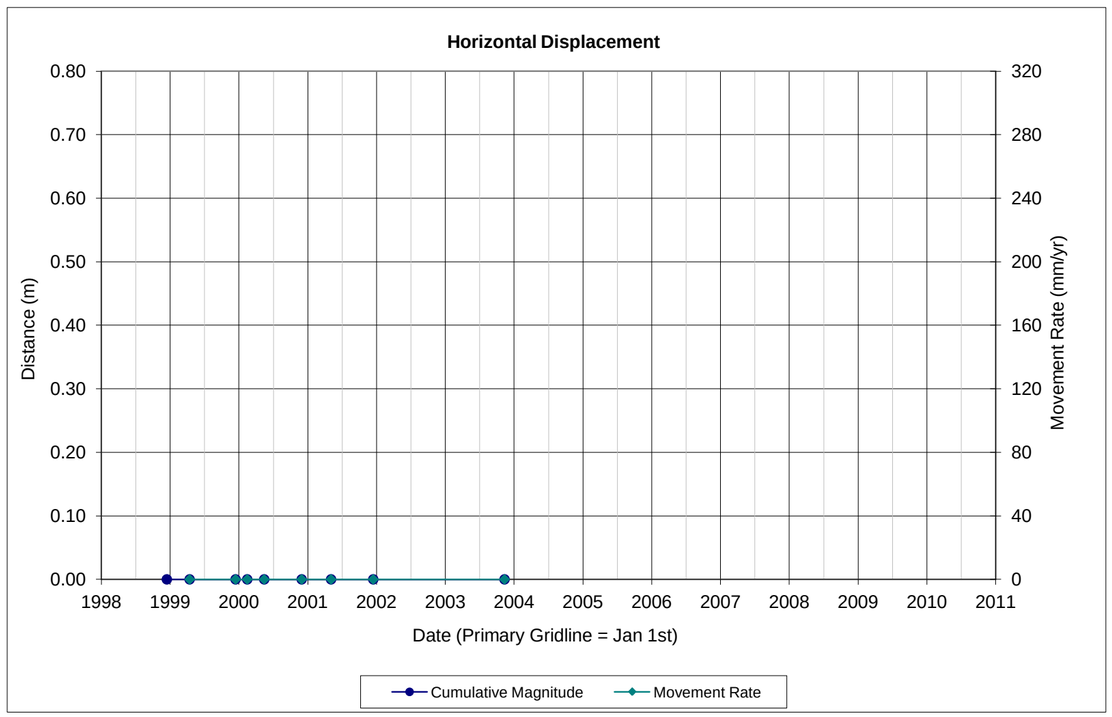
Survey and Displacement Data - Hub 82C256

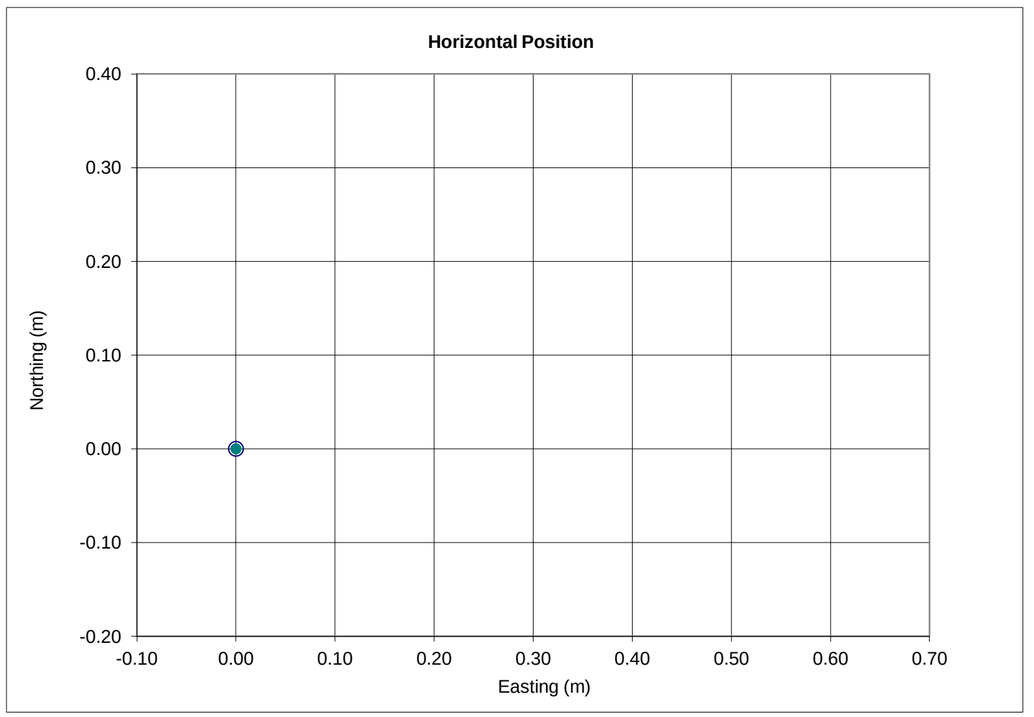
Benchmark - Gov't Monument at Quesnel Airport

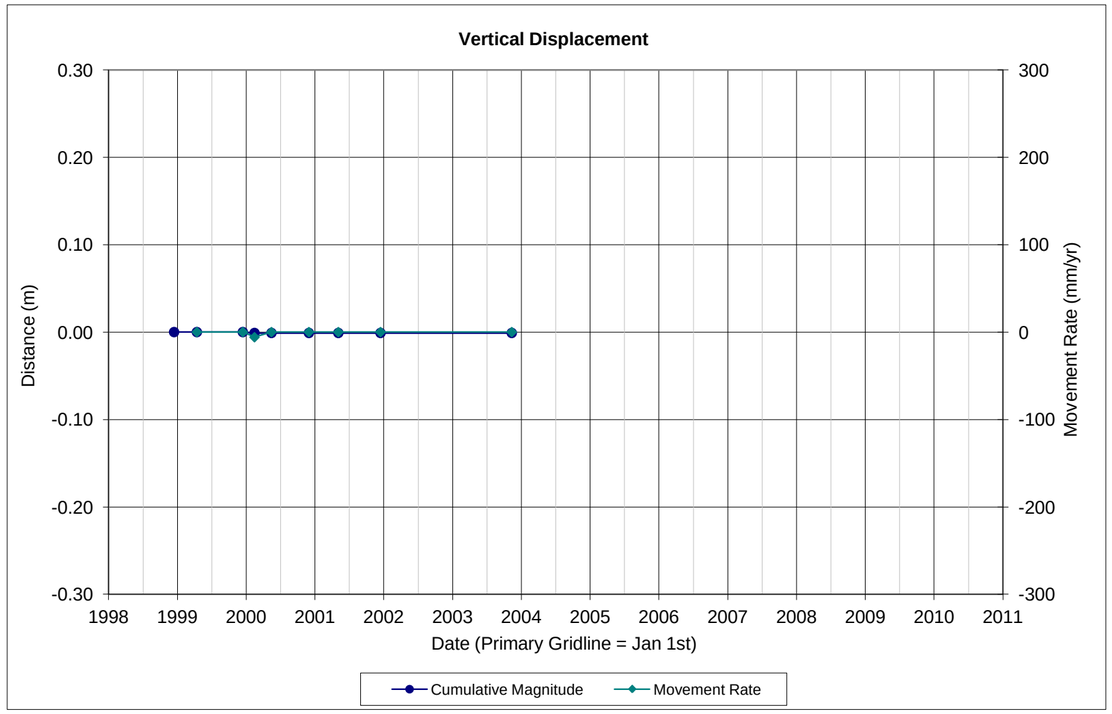
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	yrs	m	m	m	m	°	°	mm/yr	mm/yr
15/12/1998	5875411.453	533109.702	542.947	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		
15/04/1999	5875411.453	533109.702	542.947	0.33	0.000	0.000	0.000	0.000	0.0	0.0	0.000	0.000	0.33	0.000	0.000	0.000	0.000		0.0	0.000	0.000
15/12/1999	5875411.453	533109.702	542.947	1.00	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	0.000	0.000
15/02/2000	5875411.453	533109.702	542.946	1.17	0.000	0.000	0.000	-0.001	0.0	0.0	0.000	-0.001	0.17	0.000	0.000	0.000	-0.001		0.0	0.000	-5.891
15/05/2000	5875411.453	533109.702	542.946	1.42	0.000	0.000	0.000	-0.001	0.0	0.0	0.000	-0.001	0.25	0.000	0.000	0.000	0.000		0.0	0.000	0.000
30/11/2000	5875411.453	533109.702	542.946	1.96	0.000	0.000	0.000	-0.001	0.0	0.0	0.000	-0.001	0.54	0.000	0.000	0.000	0.000		0.0	0.000	0.000
05/05/2001	5875411.453	533109.702	542.946	2.39	0.000	0.000	0.000	-0.001	0.0	0.0	0.000	0.000	0.43	0.000	0.000	0.000	0.000		0.0	0.000	0.000
15/12/2001	5875411.453	533109.702	542.946	3.00	0.000	0.000	0.000	-0.001	0.0	0.0	0.000	0.000	0.61	0.000	0.000	0.000	0.000		0.0	0.000	0.000
12/11/2003	5875411.453	533109.702	542.946	4.91	0.000	0.000	0.000	-0.001	0.0	0.0	0.000	0.000	1.91	0.000	0.000	0.000	0.000		0.0	0.000	0.000

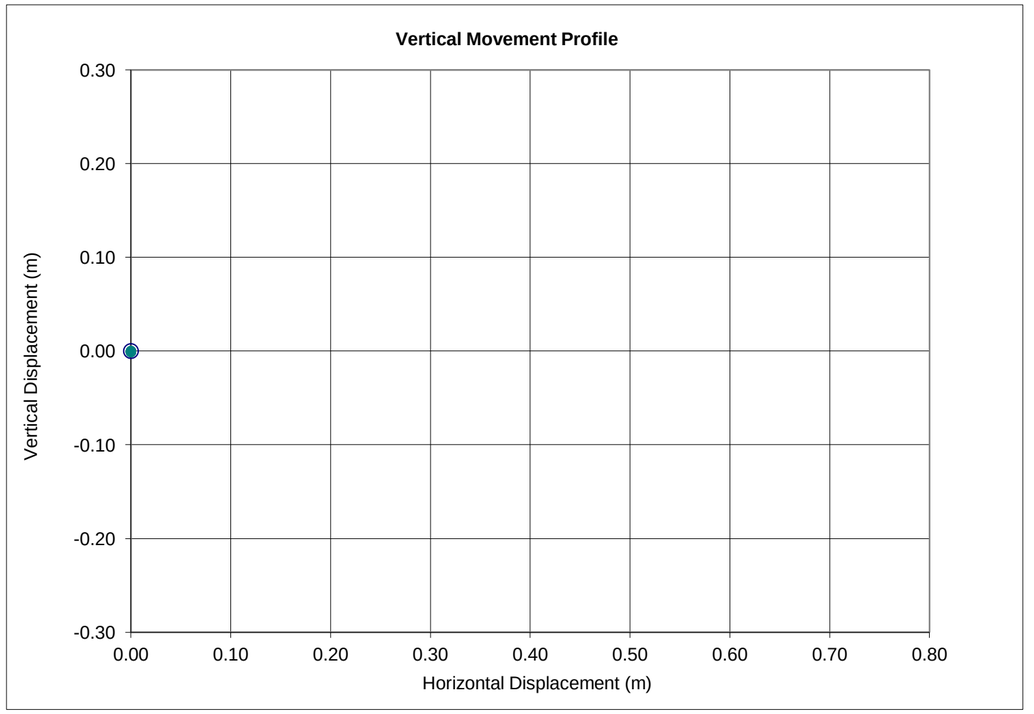
Displacement Graphs - Hub 82C256

Benchmark - Gov't Monument at Quesnel Airport







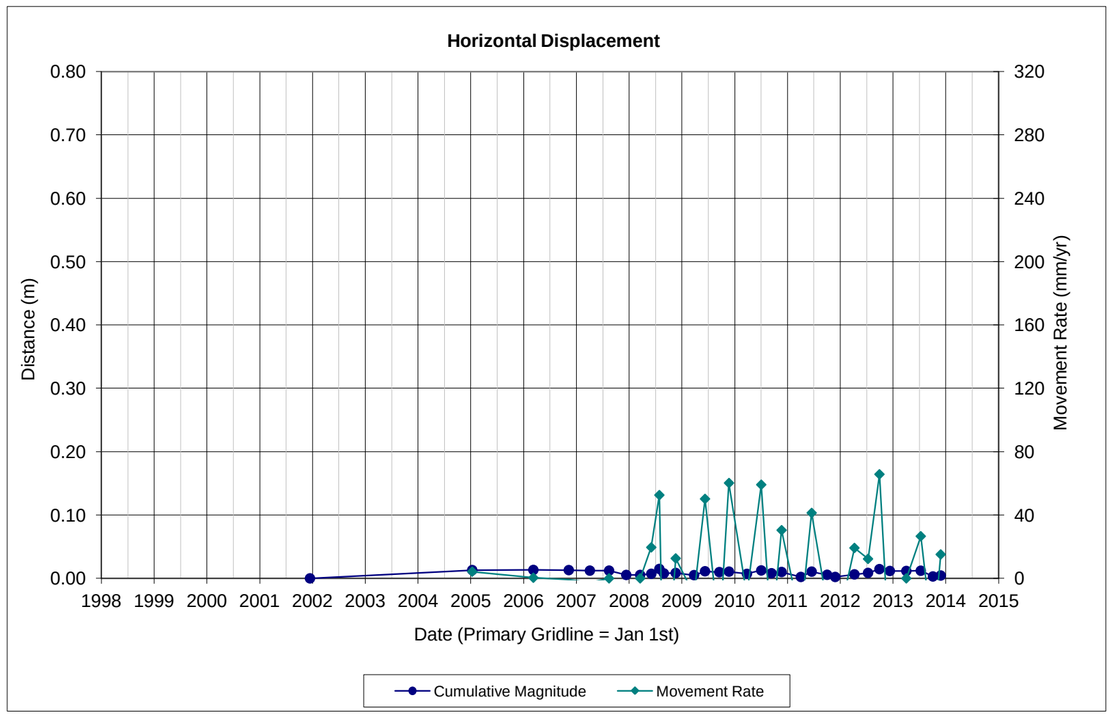


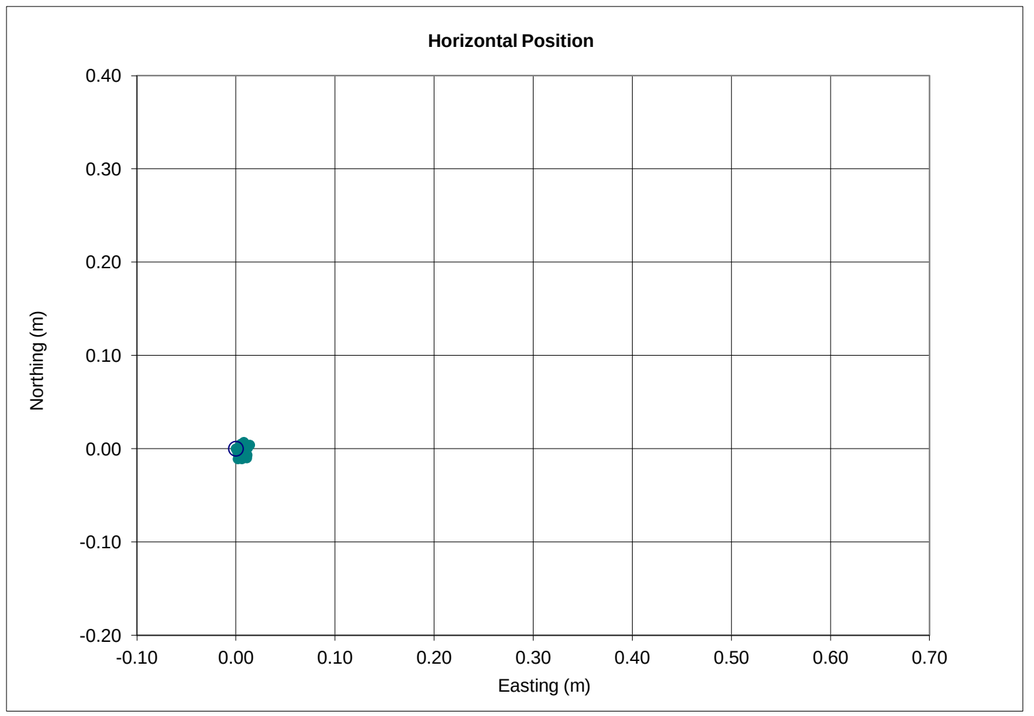
Survey and Displacement Data - Hub 01-38

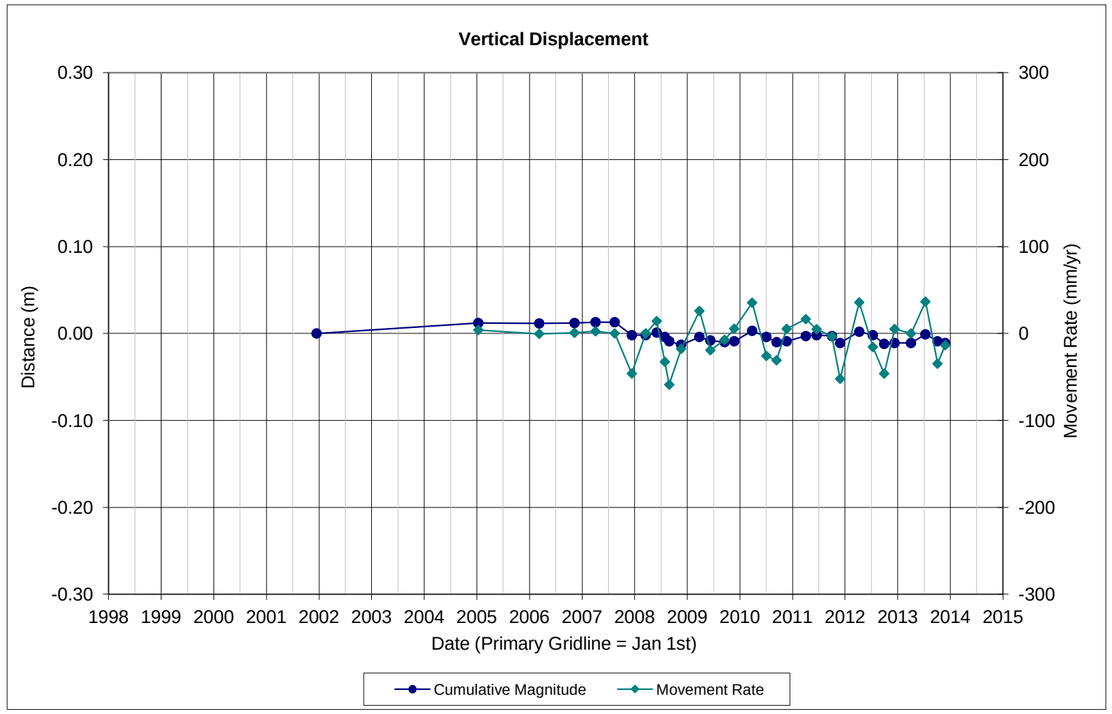
Benchmark - Quesnel No. 1 Station

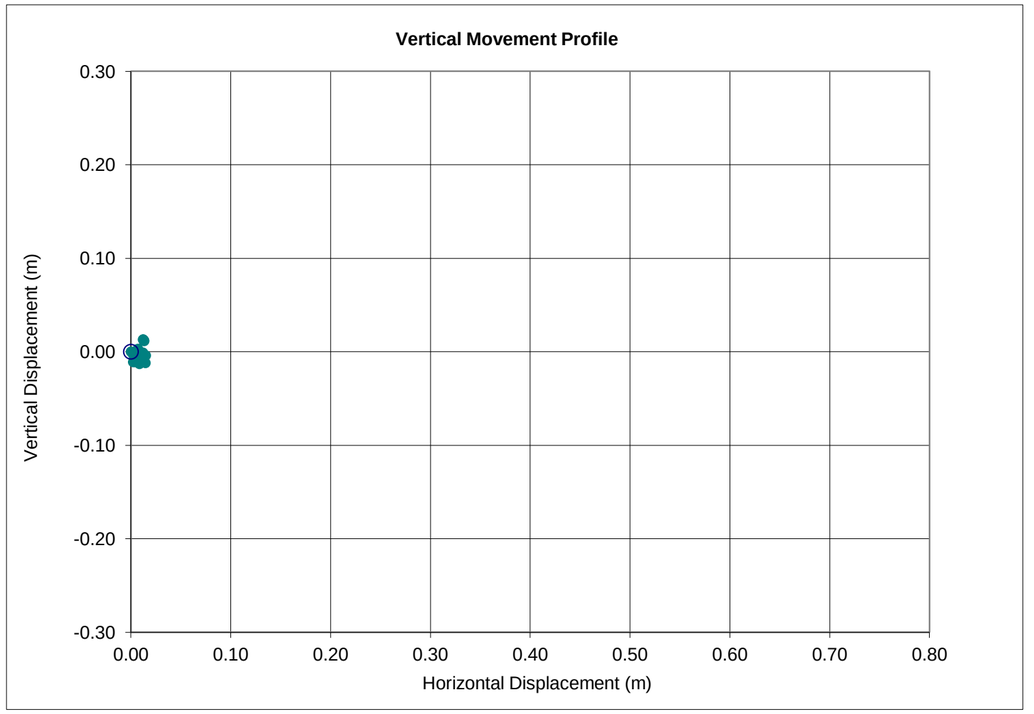
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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	596.526	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

Displacement Graphs - Hub 01-38
Benchmark - Quesnel No. 1 Station









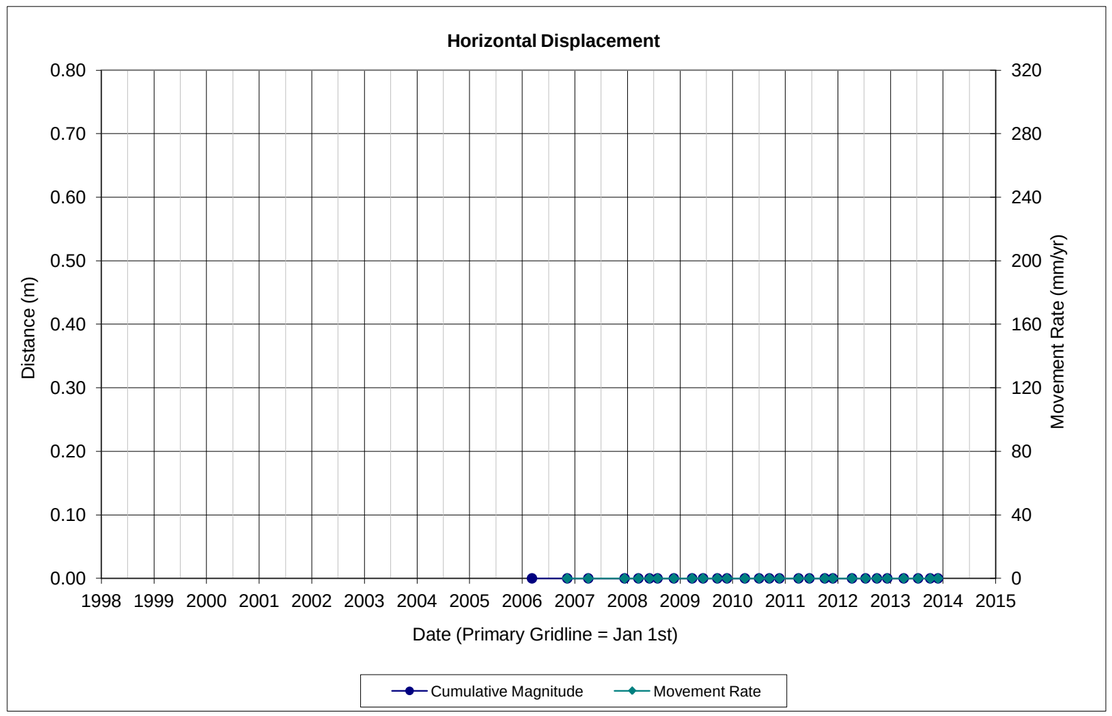
Survey and Displacement Data - Hub WaterTank

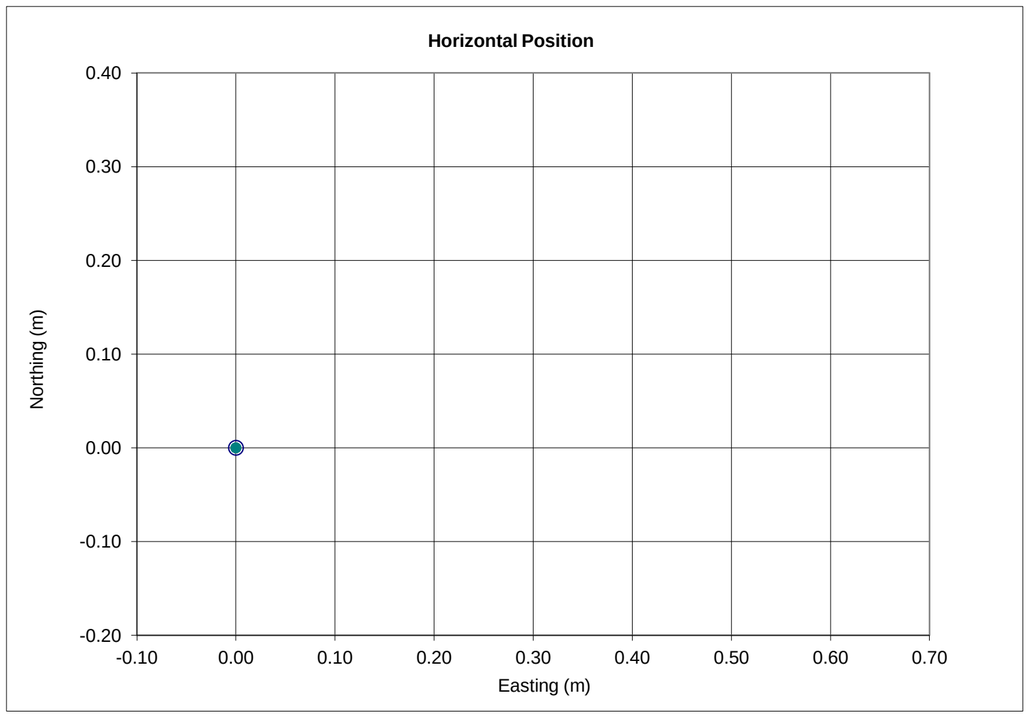
Benchmark - Water Tank

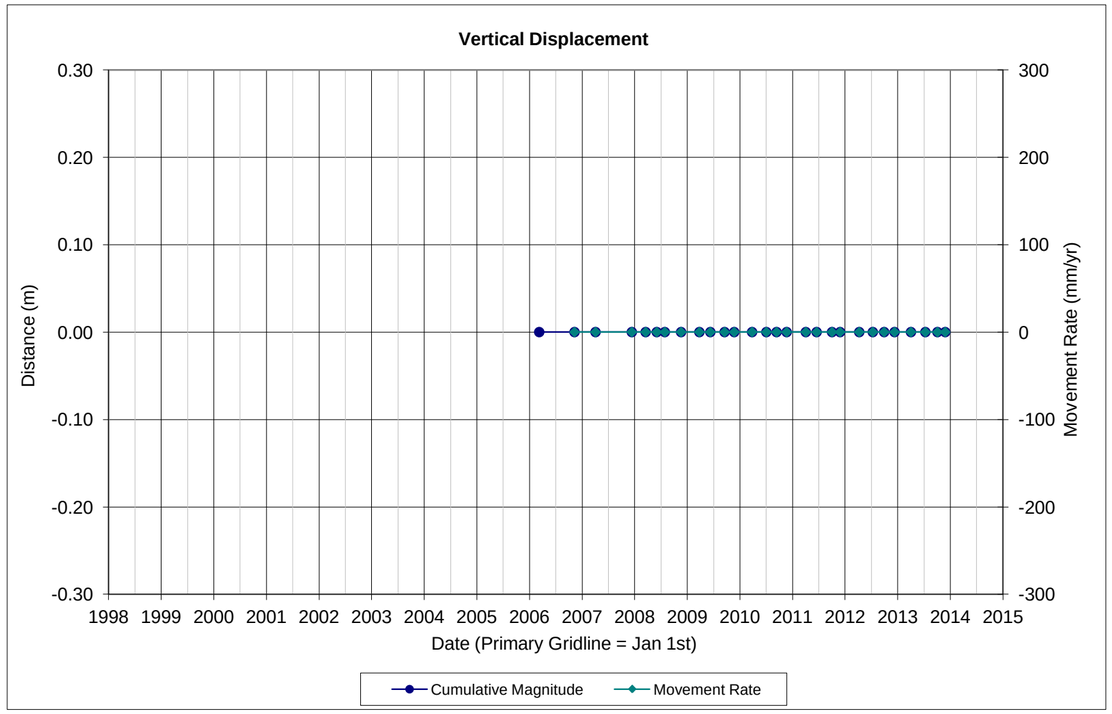
Date	Surveyed Position			Total Change in Position							Overal Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N	E	Z	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical	Time	N	E	Horizontal	Vertical	Azimuth	Plunge	Horizontal	Vertical
	m	m	m	yrs	m	m	m	m	°	°	m/yr	m/yr	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		
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

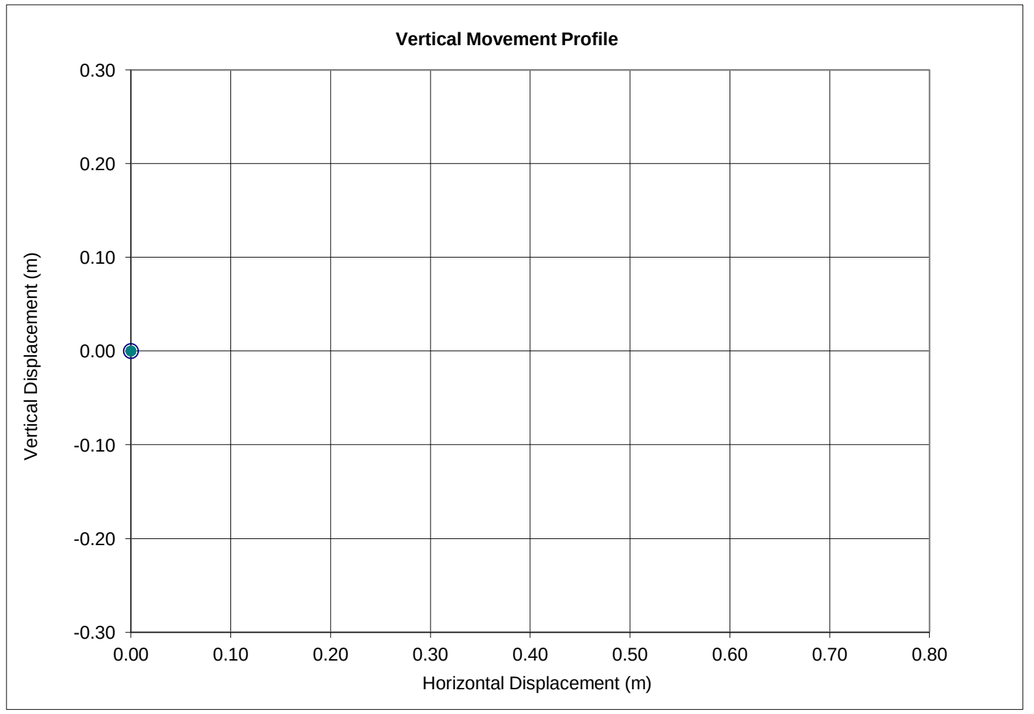
Displacement Graphs - Hub WaterTank

Benchmark - Water Tank









Appendix B

Slope Inclinometers - Summary Table

West Quesnel Land Stability Program

amec

APPENDIX B - Slope Inclinometer Status

SI	Location	Initital Reading Date	Status	Displacement
SI-1	Avery Lane	November 2000	Blocked at 40m between Apr-June 2008	23mm*
SI-2	Avery Lane	November 2000	Blocked at 41m between Nov. 04-Apr. 05	86mm*
SI-3	Abbott Dr. & Bettcher St.	November 2000	Blocked at 39m between May-Nov. 2002	61mm*
SI-4	Voyager School	November 2000	Blocked at 51m between May-Nov. 2002	59mm*
SI-5	Abbott Dr. (near Flamingo)	October 2000	Blocked at 35m between Dec. 03-June 04	13mm*
SI-6	Dixon St.	November 2000	Blocked at 78m between Nov 01-May 02	83mm*
SI-7	Pierce Cres.	November 2000	Blocked at 68m between May-Nov. 2002	73mm*
SI-8	Pinchbeck St.	June 2005	Active - no movement (SI not deep enough)	0mm
SI-9	Patchett St.	April 2005	Blocked at 65m between Nov. 08-Apr. 09	110mm*
SI-10	Dawson St.	April 2005	Blocked at 21m between June 05-May 06	12mm*
SI-11	Picard Ave.	May 2005	Active - no movement (SI not deep enough)	0mm
SI-12	Panagrot Ave. (east end)	April 2005	Blocked at 63m between Mar.-May 2007	47mm*
SI-13	Lewis Dr. (at Sikh Temple)	April 2005	Blocked at 13m between June-Sept. 2008	72mm*
SI-14	Findlay Rd.	November 2006	Blocked at 20m between Nov. 08-Apr. 09	62mm*
SI-15	Panagrot Ave. (west end)	November 2006	Blocked at 18m between Apr.-June 09	56mm*
SI-16	Voyager School	September 2012	Active - with real time monitoring	
SI-17	Uplands Park	October 2012	Active - with real time monitoring	

* Displacements are reported from last reading before SI blocked

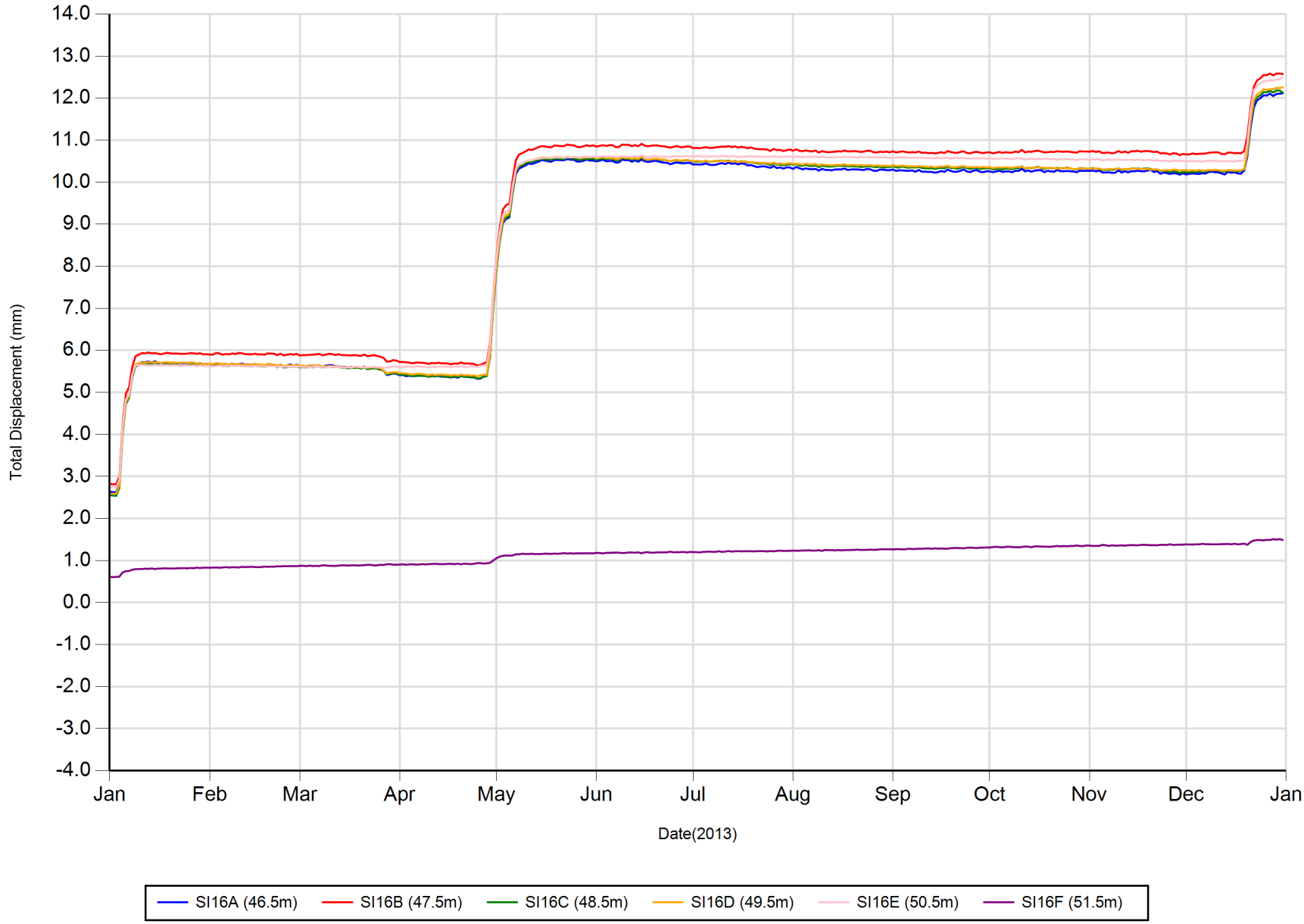
West Quesnel
Land Stability Program

Slope Inclinometer Trends for 2013

West Quesnel Land Stability Program

SI16 (Station 3) AB-Axis

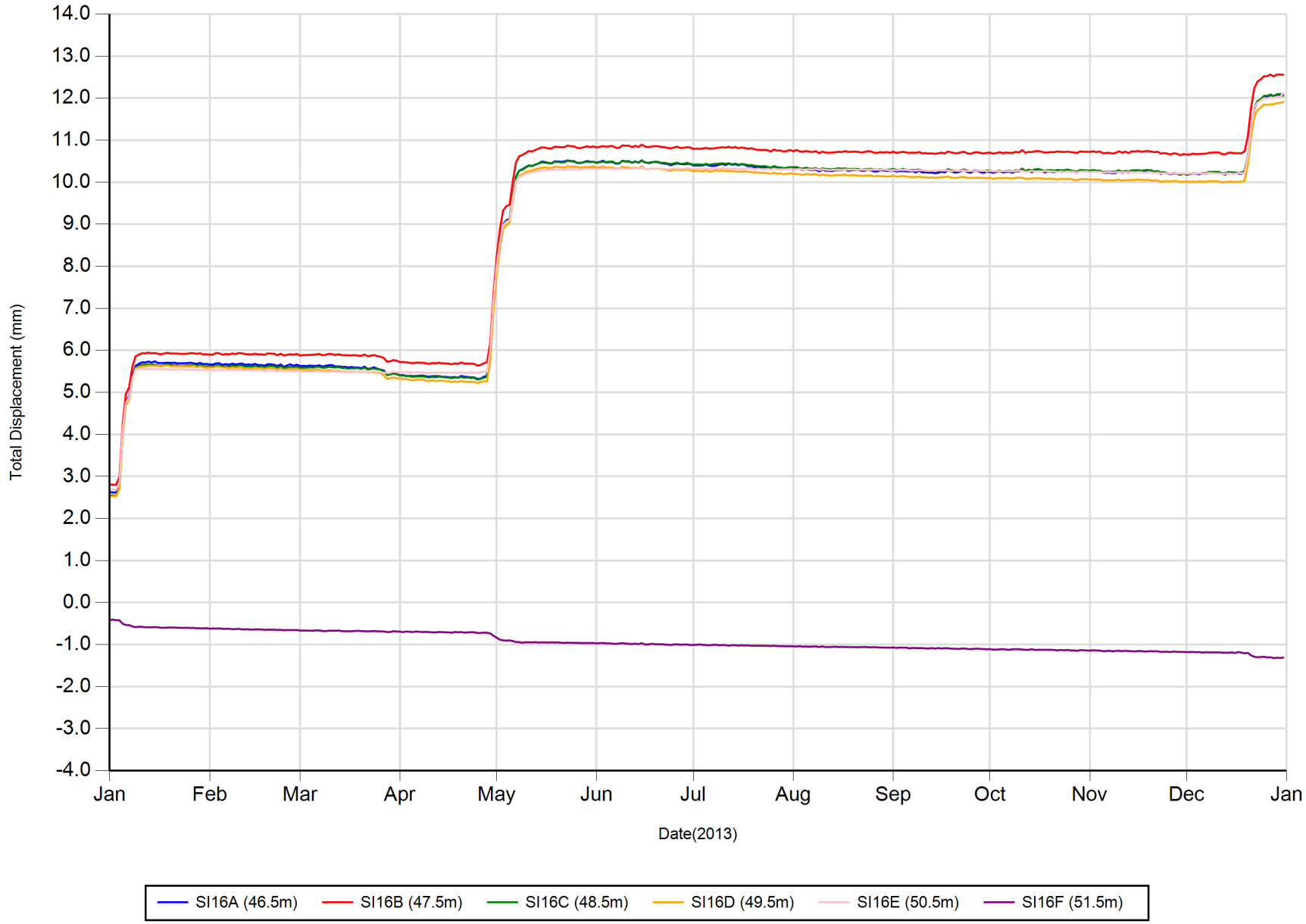
amec



West Quesnel Land Stability Program

SI16 (Station 3) A-Axis

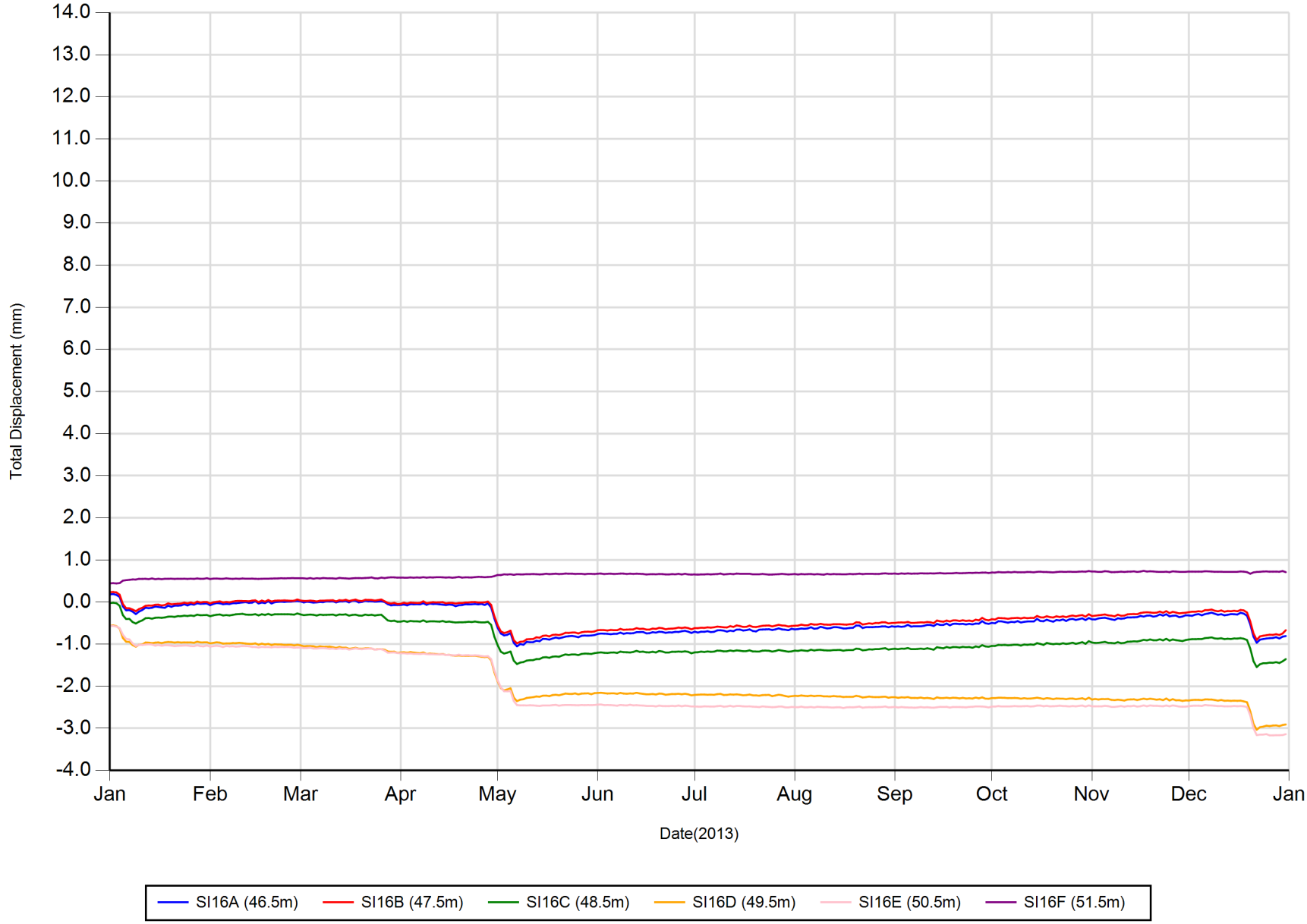
amec



West Quesnel Land Stability Program

SI16 (Station 3) B-Axis

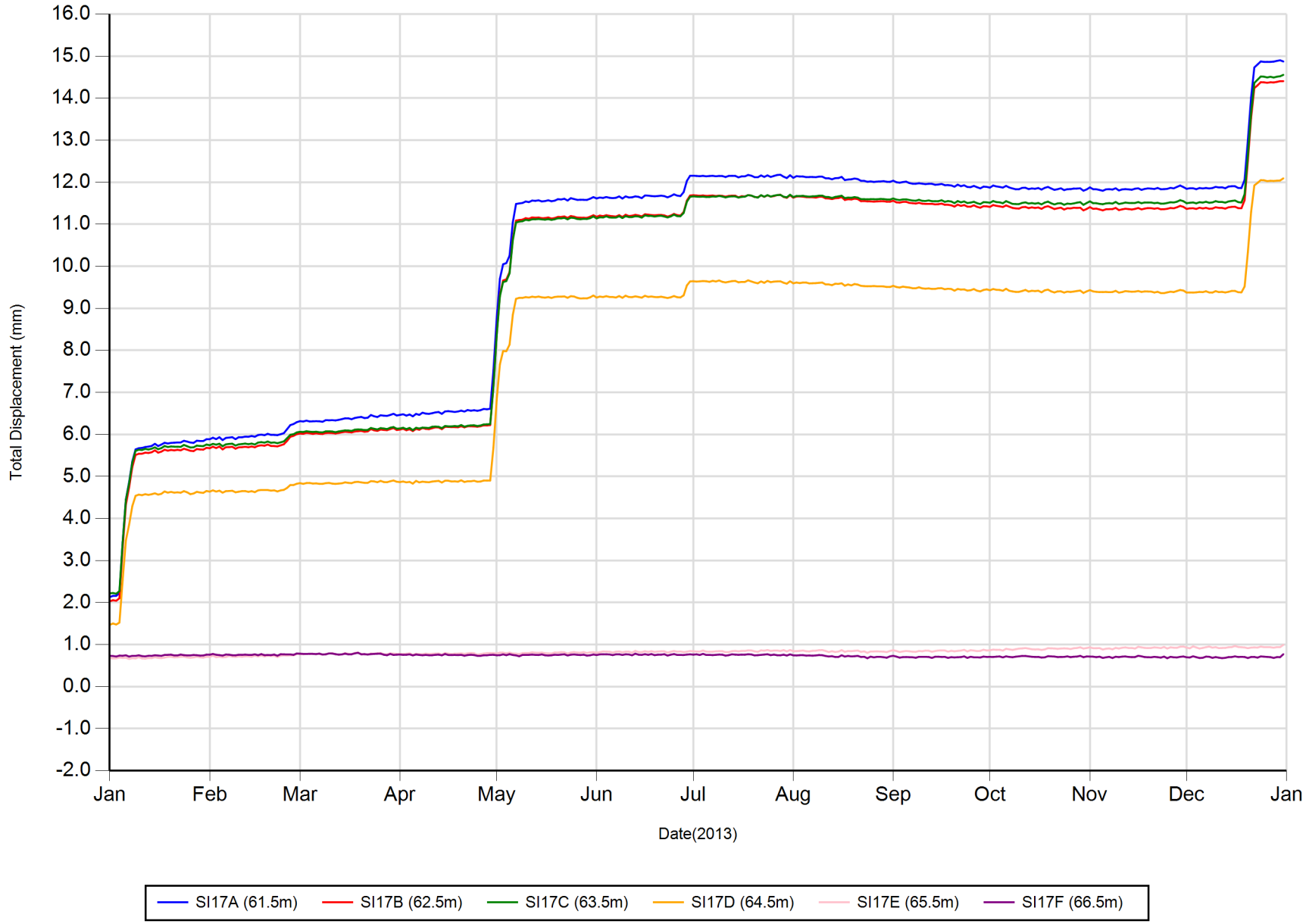
amec



West Quesnel Land Stability Program

SI17(Station 9) AB-Axis

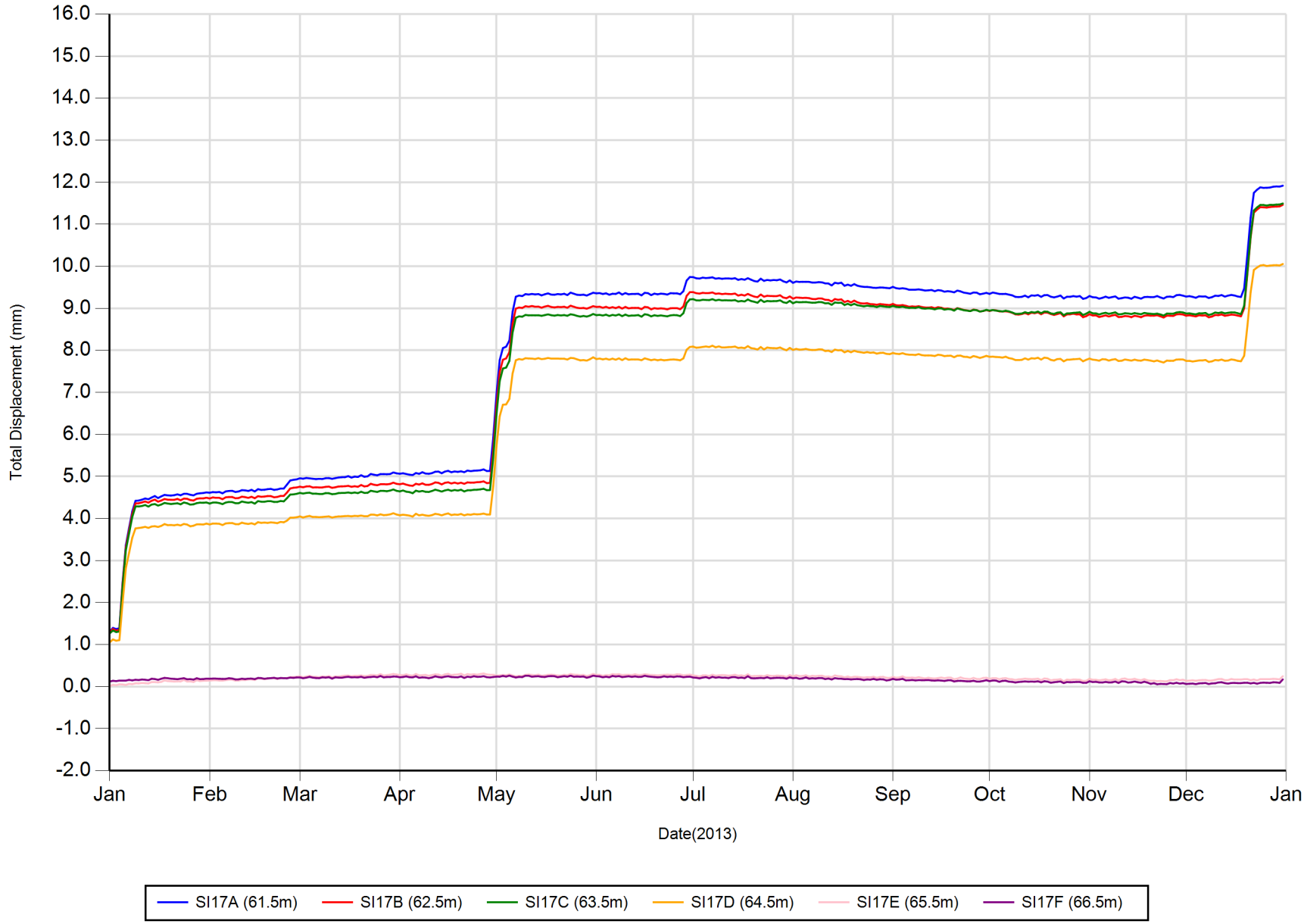
amec



West Quesnel Land Stability Program

SI17(Station 9) A-Axis

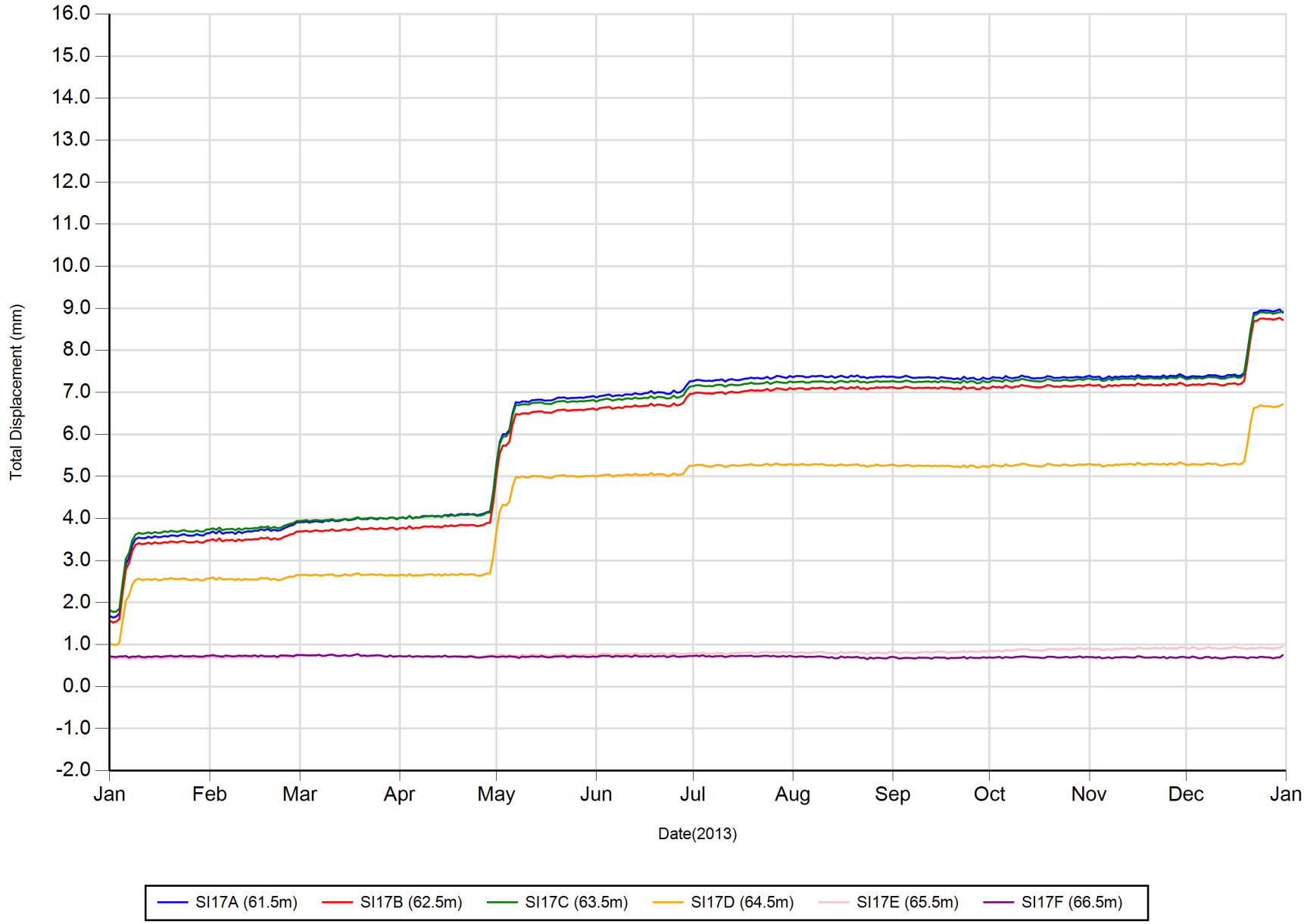
amec



West Quesnel Land Stability Program

SI17(Station 9) B-Axis

amec



West Quesnel
Land Stability Program

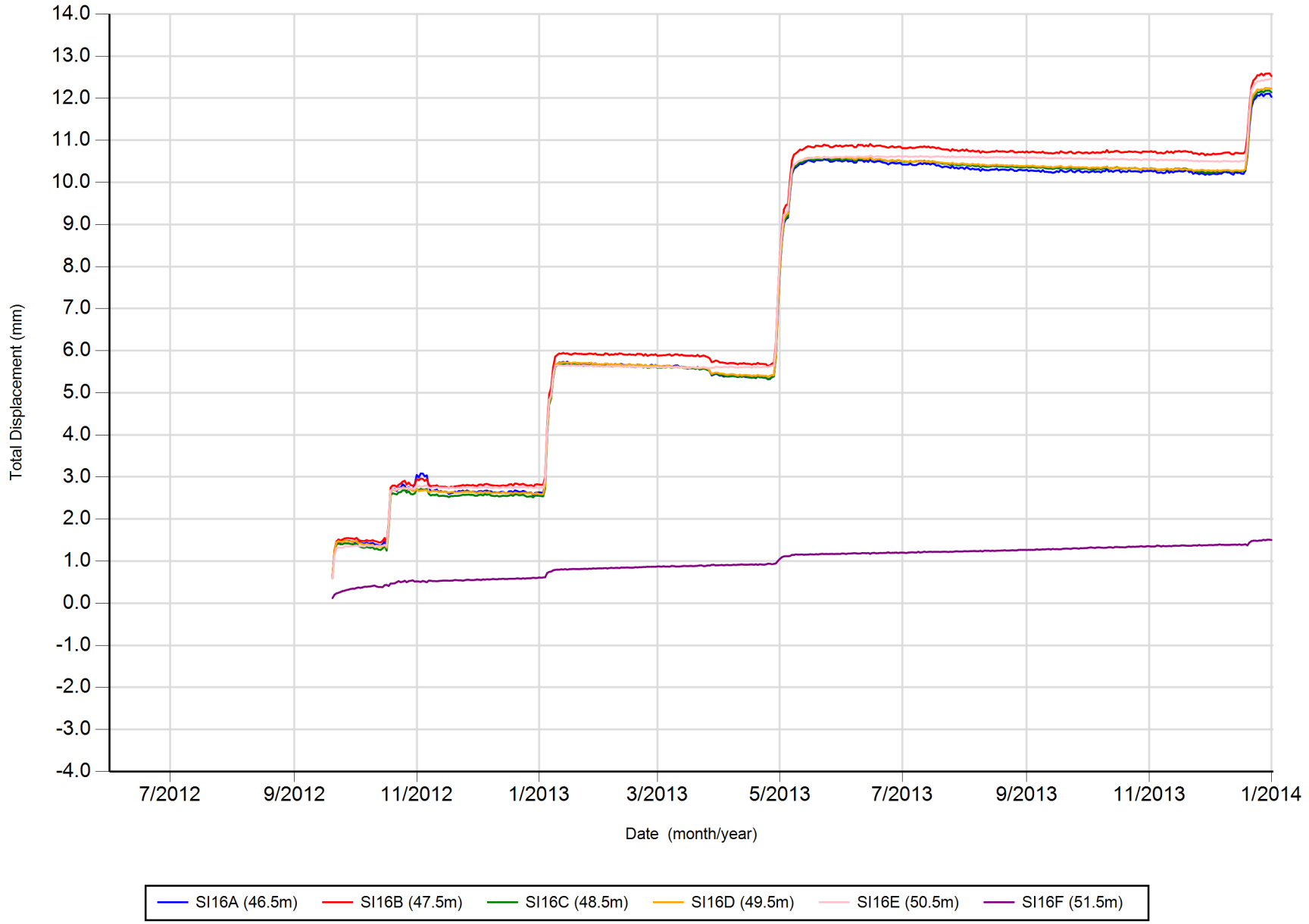
amec

Long Term Slope Inclinometer Trends

West Quesnel Land Stability Program

SI16 (Station 3) AB-Axis

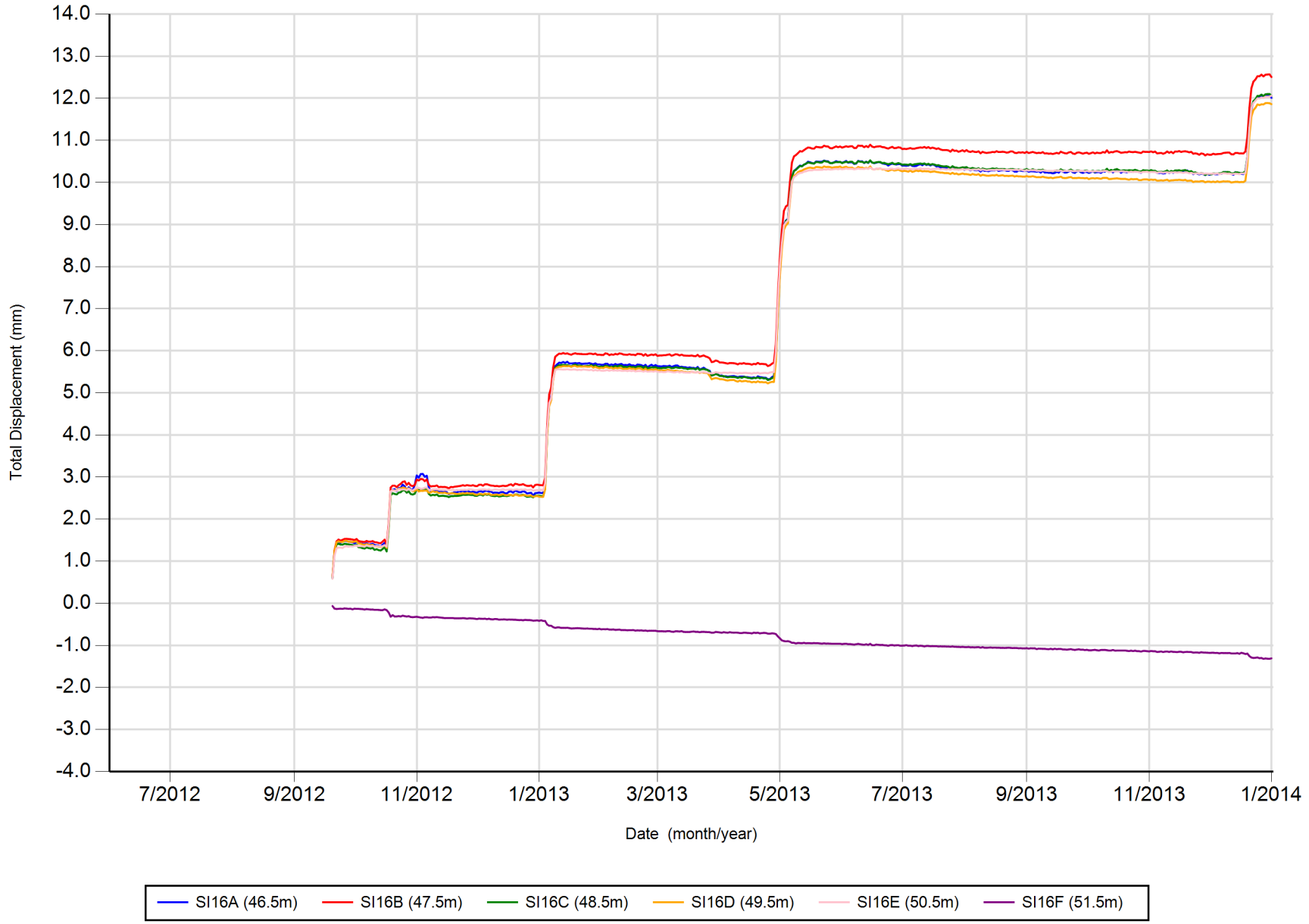
amec



West Quesnel Land Stability Program

SI16 (Station 3) A-Axis

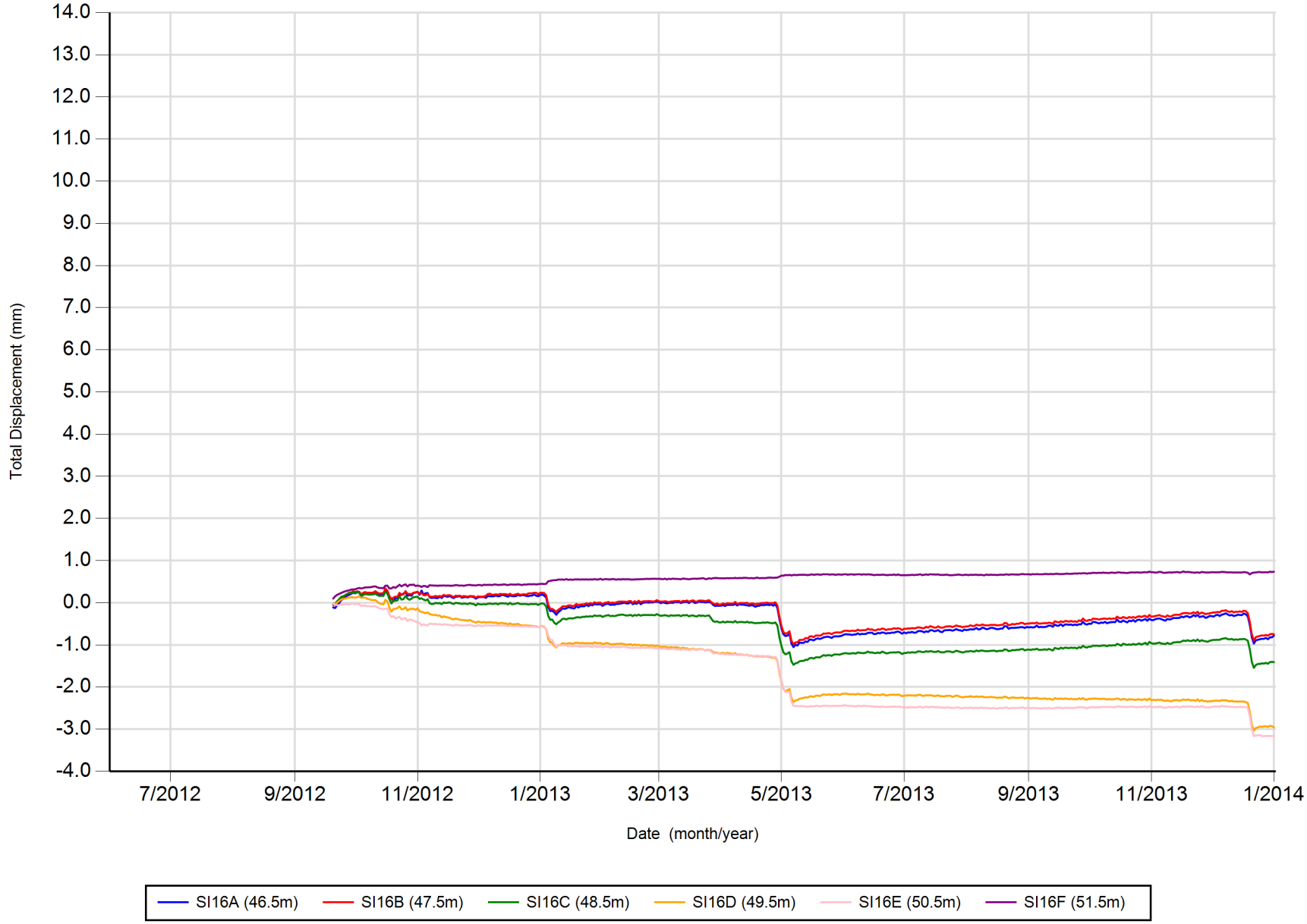
amec



West Quesnel Land Stability Program

amec

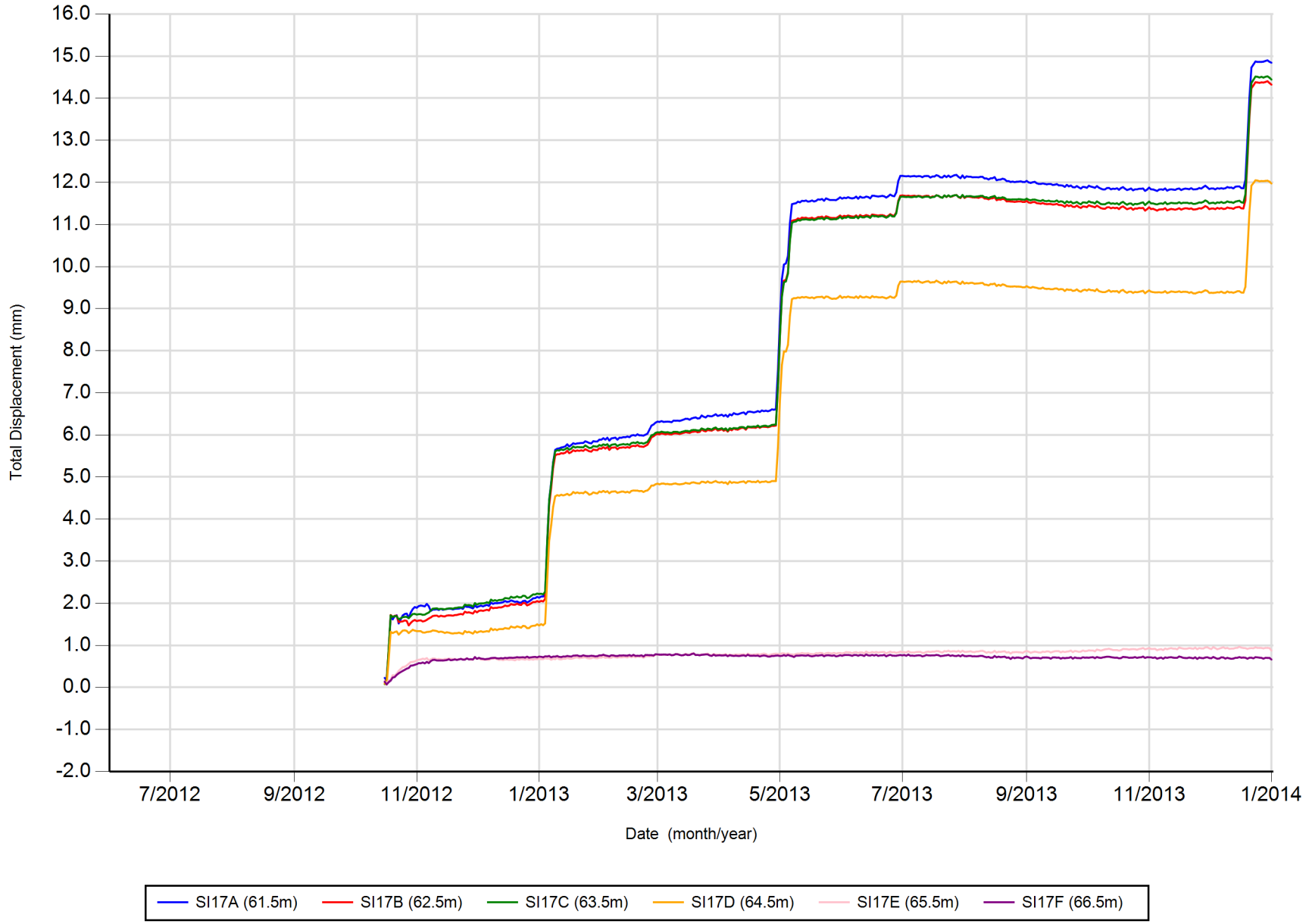
SI16 (Station 3) B-Axis



West Quesnel Land Stability Program

SI17(Station 9) AB-Axis

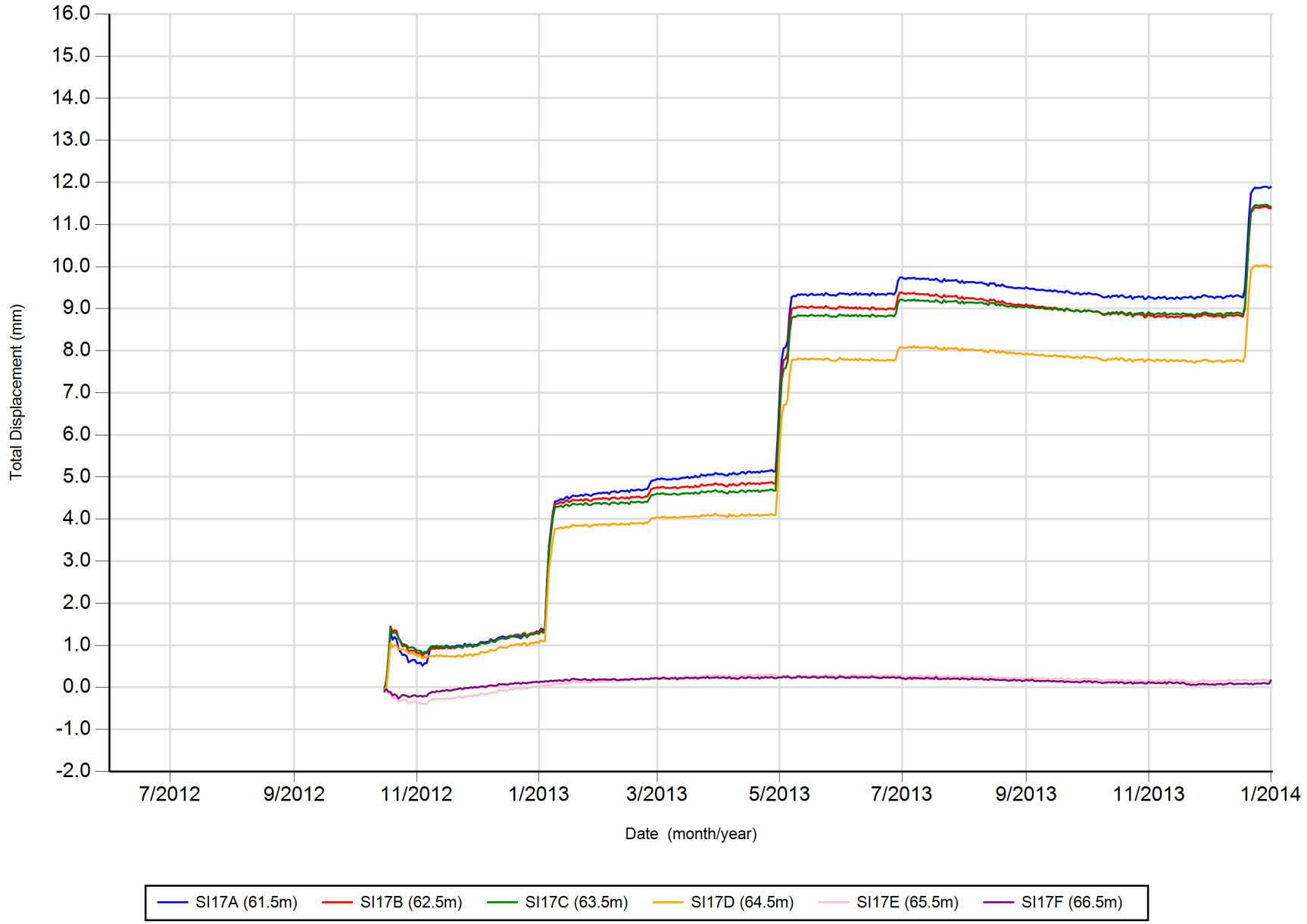
amec



West Quesnel Land Stability Program

SI17(Station 9) A-Axis

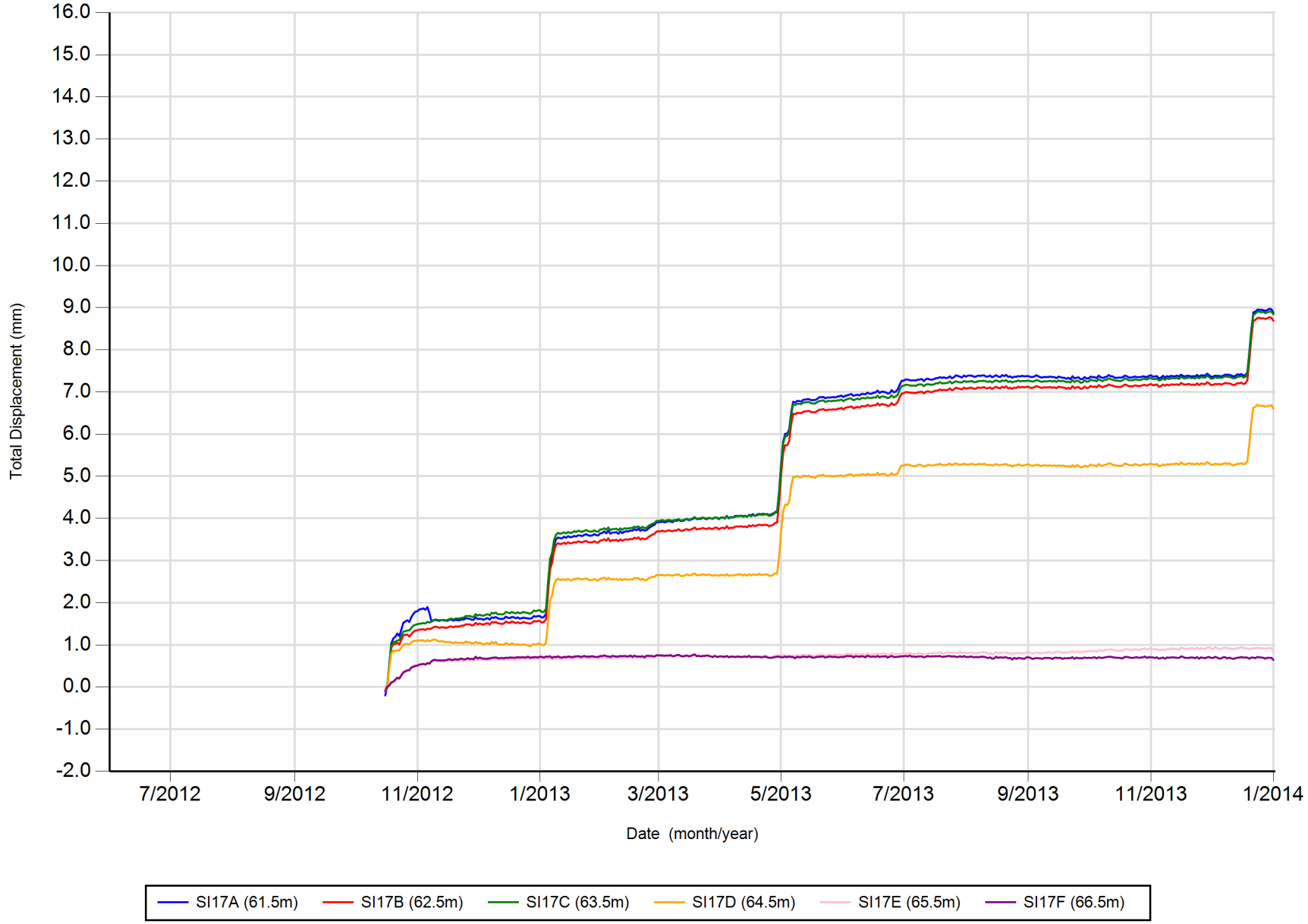
amec



West Quesnel Land Stability Program

SI17(Station 9) B-Axis

amec



Appendix C

Piezometers - Summary Table and Groundwater Elevation 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	Active
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
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

(Previous Name)

Vibrating Wire Piezometers cont.					
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	Dry
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 2013 Observations

Instrument	Background Groundwater Condition	2013 Observations
VWP 4	Steady-state at 521 m elevation until sharp rise to 526 m elevation in April 2009 and a spike to 531.8 during BH 35 installation during summer of 2012	Steady-state near 527 m with slight seasonal groundwater response
VWP 7A	Varies, 537 m to 537.5 m elevation	Slight seasonal groundwater response to 537.5 m in spring, then decreased to 537 m
VWP 7B	Varies, 535 m to 536 m elevation	Steady-state near 535 m with slight seasonal groundwater response
VWP 8A	Steady-state at 513 m elevation, intermittently dry	Dry
VWP 8B	Steady-state at 513 m elevation, intermittently dry	Dry
VWP 8C	Steady-state at 511 m elevation	Steady-state near 510.5 m
VWP 8D	Gradual decline from 508 m to 505 m elevation, with slight seasonal precipitation response	No seasonal response, decreased to 504 m
VWP 11A	Steady-state at 517 m elevation	No significant change, possibly dry
VWP 11B	Steady-state at 515.5 m elevation	Steady state near 515.5 m with slight seasonal precipitation response
VWP 11C	Slight decline 515 m to 514 m elevation	Steady state near 514 m with slight seasonal precipitation response
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
VWP 13B	Varies, generally between 481 m to 482 m elevation	Seasonal groundwater responses, varied between 481 m and 482 m
VWP 14A	Varies, 566 m to 568 m elevation, with seasonal precipitation response	Seasonal groundwater responses, varied between 566 and 567 m
VWP 14B	Varies, 530 m to 531 m elevation, with minimal seasonal precipitation response	Steady state near 530 m
VWP 14C	Varies, 529 m to 530 m elevation, with minimal seasonal precipitation response	Steady state near 529 m
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
VWP 15B	Gradual decline from 540 m to 537.5 m elevation	Gradual decrease to 537 m
VWP 15C	Gradual decline from 538 m to 535 m elevation	Gradual decrease to 534 m
BH16A	Gradual rise from 645 m to steady-state near 647 m elevation	Steady state near 647 m
BH16B	Increasing from 580 to 589 m elevation until August 2010, steady state until May 2012, then decreasing to near 587 m.	Steady state near 587 m
BH16C	Steady-state near 550 m elevation	Steady state near 550 m
BH16D	Slight variation, near 550 m elevation	Steady state near 550 m

Table C1: Background Piezometers – Overall Trend and 2013 Observations cont'd

Instrument	Background Groundwater Condition	2013 Observations
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 532.5 m. Dissipated to 531 m
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. Dissipated to 530 m
VWP 35C	Gradual decrease from 532 m near 529 m elevation	Steady state near 529 m
VWP 39A	Gradual decrease from 564 m to just below 562 m elevation, intermittently dry	Varied between 561.5 m and 563 m, intermittently dry
VWP 39B	Decrease from 568 m to near 559 m elevation	Seasonal groundwater responses, varied between 558 m and 560 m

Table C2: Piezometers Near Pumping Wells – Overall Trend and 2013 Observations

Instrument	Overall Groundwater Trend	2013 Observations
VWP 3 (near PW2)	Groundwater level generally varied between 500 to 501 m elevation with seasonal precipitation response; level began to decrease from near 501 m following horizontal drain installation in 2012	Continued decrease, to near 496 m; 5 m drawdown to date
VWP 3A (near PW1)	Decreased from start of pump trials in Nov. 2007 until mid-2009, from 518.5 to 504 m elevation	Steady state near 504 m; 14.5m drawdown to date
VWP 3B (near PW1)	Decreasing from start of pump trials in Nov. 2007, from 518.5 to 506 m elevation	Steady state near 506 m; 12.5 m drawdown to date
VWP 4A (near PW1)	Steady-state near 516 m elevation with spikes due to precipitation events, no apparent influence from pumping	No significant change
VWP 4B (near PW1)	Steady-state near 516 m elevation with spikes due to precipitation events, no apparent influence from pumping	No significant change
VWP 9A (near PW12)	Varies, 529.5 m to 530.5 m elevation, with seasonal precipitation response	Slight seasonal groundwater rise to 530 m in the spring, then gradual decrease to near 529 m; possible 1 m of drawdown to date
VWP 9B (near 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; 2 m drawdown to date
VWP 9C (near 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 drawdown to date
VWP 10A (near 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; 2 m of drawdown to date
VWP 10B (near PW14)	Varies, 541 m to 543 m elevation, with seasonal precipitation response	Decreased from near 542 m to near 534 m, following activation of PW14 in April 2013; 8 m of drawdown to date
VWP 10C (near PW14)	At or near 536 m elevation, slightly decreasing over time	Decreased from near 536 m to near 532 m, following activation of PW14 in April 2013; 4 m of drawdown to date
VWP 12A (near PW4)	Decreased from start of pump trials in Oct. 2007 until early 2008 from 545 to near 538 m elevation, dry	Dry; 7 m drawdown to date
VWP 12B (near PW4)	Decreased from start of pump trials in Oct. 2007 until early 2008, from 545 to 537 m elevation, steady-state since then	Steady State; 8 m drawdown to date
VWP 12C (near PW4)	Decreased from start of pump trials in Oct. 2007 until early 2008, from 537 to below 530 m elevation. Intermittently dry.	Seasonal groundwater response in the spring, from 530 m to 531 m. Dissipated to 530 m 7 m of drawdown to date
VWP 12D (near PW4)	Steady-state near 526 m elevation, no apparent influence from pumping or seasonal precipitation response	No significant change

Table C2: Piezometers Near Pumping Wells – Overall Trend and 2013 Observations, cont'd

Instrument	Overall Groundwater Trend	2013 Observations
VWP 17A (near PW5)	Gradual decrease from start of pump trials in Oct. 2007 until present, from 484 to 483 m elevation, with slight seasonal precipitation response	No significant change; possible drawdown of 1 m to date
VWP 17B (near PW5)	Gradual decrease from start of pump trials in Oct. 2007 until present, from 483 to 482 m elevation, with slight seasonal precipitation response	No significant change; possible drawdown of 1 m to date
VWP 18A (near PW5)	Gradual decrease from start of pump trials in Oct. 2007 until present from 481 to 479.5 m elevation	No significant change; possible drawdown of 1.5 m to date
VWP 18B (near PW5)	Not working	n/a
VWP 19A (near 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 of drawdown to date
VWP 19B (near 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 of drawdown to date
VWP 20 (near 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; possible drawdown of 3 m to date
VWP 26A (between 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 552.5 m to 553 m. Dissipated to 552 m
VWP 26B (between PW6 and PW7)	Decreasing from near 555 m to near 553 m elevation since installation	Slight decrease from 553 m to 552 m
VWP 27A (between 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. Dissipated to 552.5 m
VWP 27B (between PW7 and PW8)	Steady-state near 551.5 m elevation, no apparent influence from pumping	No significant change
VWP 28A (near PW9)	Decreasing from near 551 m to 550.5 m elevation since installation	Slight decrease from 550.5 m to near 549.5 m
VWP 28B (near PW9)	Decreasing from near 551 m to 550 m elevation since installation	Slight decrease from 550 m to near 549 m
VWP 29A (near PW11)	Decreasing from near 555 m to near 552 m elevation since installation	Seasonal groundwater response in the late spring, from 552 m to 552.5 m. Dissipated to 551 m
VWP 29B (near PW11)	Decreasing from near 556 m to near 552 m elevation since installation	Seasonal groundwater response in the late spring, from 552 m to 552.5 m. Dissipated to 551 m
VWP 30A (between PW11 and PW15)	Decreasing from near 558 m to near 556 m elevation since installation	Seasonal groundwater response in the late spring, from 556 m to 557.5 m. Dissipated to near 555 m
VWP 30B (between PW11 and PW15)	Decreasing from near 558 m to near 556 m elevation since installation	Seasonal groundwater response in the late spring, from 556 m to 557 m. Dissipated to 554.5 m

Table C2: Piezometers Near Pumping Wells – Overall Trend and 2013 Observations, cont'd

Instrument	Overall Groundwater Trend	2013 Observations
VWP 31A (between PW15 and PW16)	Decreasing from near 558.5 m to near 557.5 m elevation since installation	Seasonal groundwater response in the late spring, from 557.5 m to 558.5 m. Dissipated to 557 m
VWP 31B (between 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 m. Dissipated to 550 m
VWP 32A (between PW16 and PW17)	Decreasing from near 560.5 m to near 559.5 m elevation since installation	Seasonal groundwater response in the late spring, from 559.5 m to 561 m. Dissipated to 559 m
VWP 32B (between PW16 and PW17)	Decreasing from near 560.5 m to near 559.5 m elevation since installation	Seasonal groundwater response in the late spring, from 559.5 m to 560.5 m. Dissipated to 559 m
VWP 33A (near PW13)	Dry	Dry
VWP 33B (near 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; 3.5 m of drawdown to date
VWP 33C (near PW13)	Gradual decrease from near 530 m to near 519 m elevation since installation	Steady decrease from 519 m to near 515 m
VWP 34A (near 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. Dissipated to 511.5 m
VWP 34B (near 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. Dissipated to 511.5 m
VWP 34C (near PW18)	Varies, near 512 m elevation, with seasonal precipitation response	Seasonal groundwater response in the spring, from 512 m to 513 m. Dissipated to 511.5 m

Table C3: Piezometers Near Horizontal Drains – Overall Trend and 2013 Observations

Instrument	Overall Groundwater Trend	2013 Observations
VWP 21A (near 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 499.5 m, dissipated to 498 m; approximately 2 m of drawdown to date
VWP 21B (near 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; approximately 9 m of drawdown to date
VWP 22 (near HD4/HD12)	Varied, 504.5 m to 505.5 m elevation, with seasonal precipitation response, large drop to 497.5 after HD12 install in summer of 2012	Seasonal increase to 498 m in the spring, dissipated to near 497.5; approximately 7.5 m of drawdown to date
VWP 23A (near HD9)	Steady-state near 495 m elevation, no apparent seasonal or influence from horizontal drains	No significant change
VWP 23B (near 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	Steady state near 489 m; approximately 6 m of drawdown to date
VWP 24 (near HD9)	Decreased upon installation of trial HD1 in Nov. 2007 from 501 m to below 492 m elevation, dry	Dry; approximately 9 m of drawdown to date
VWP 25A (near HD9)	Varies, 500 to 501 m elevation, very slight seasonal precipitation response, no apparent influence from horizontal drains	Steady state near 500 m
VWP 25B (near HD9)	Steady-state near 498 m elevation, no apparent seasonal or influence from horizontal drains	No significant change
VWP 36A (near HD8)	Dry	Dry
VWP 36B (near HD8)	Decreasing from near 502 m to 498 m elevation since installation	Gradual decrease from 498 m to near 496 m; approximately 6 m of drawdown to date
VWP 36C (near HD8)	Decreasing from near 501 m to 497 m elevation since installation	Gradual decrease from 497 m to near 493 m; approximately 8 m of drawdown to date
VWP 37A (near HD10)	Dry	Dry
VWP 37B (near HD10)	Decreasing from near 507 m to near 495 m elevation since installation	Gradual decrease from 495 m to near 493 m; approximately 14 m of drawdown to date
VWP 38A (near HD4/HD12)	Decreasing from near 494 m to 492 m elevation, with seasonal precipitation response	Seasonal increase to 494 m in the spring, dissipated to near 492.5 m
VWP 38B (near HD4/HD12)	Decreasing from near 500 m to near 491 m elevation since installation	Seasonal increase to 492 m, dissipating to near 489 m; approximately 11 m of drawdown to date

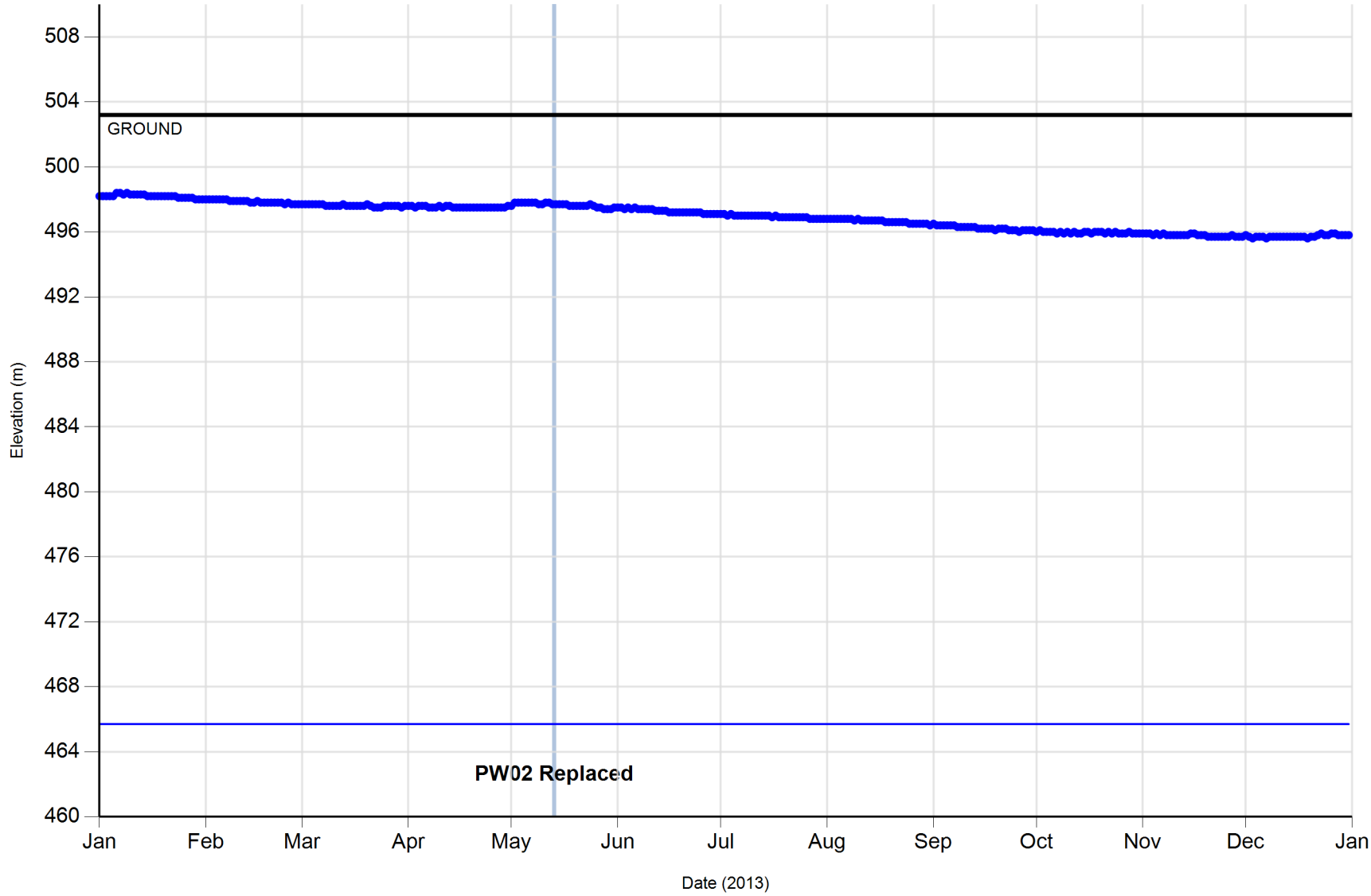
West Quesnel
Land Stability Program

VWP Trends for 2013

West Quesnel Land Stability Program

VWP 3 (Station 02)

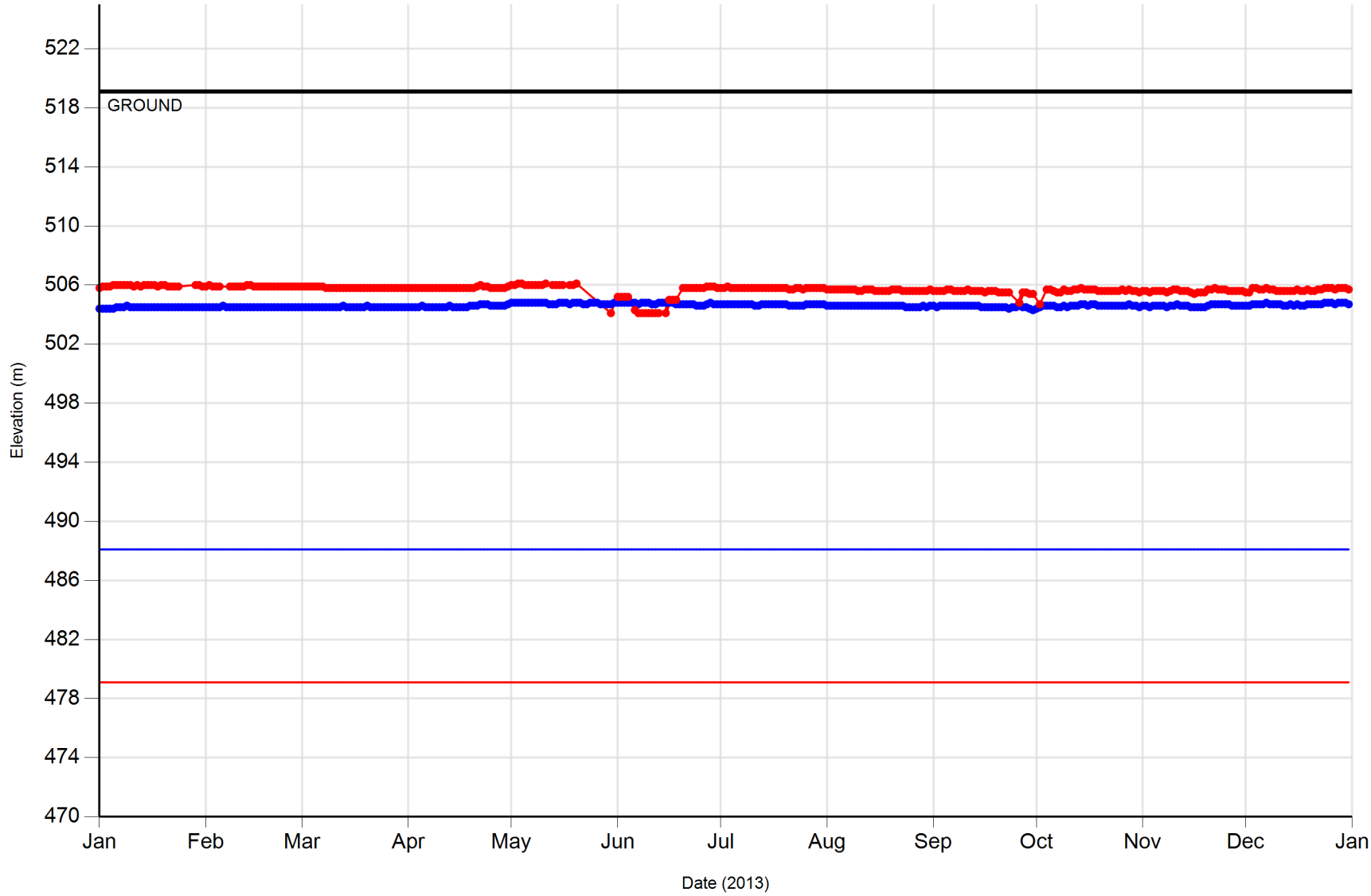
amec



West Quesnel Land Stability Program

VWP 3A and B (Station 06)

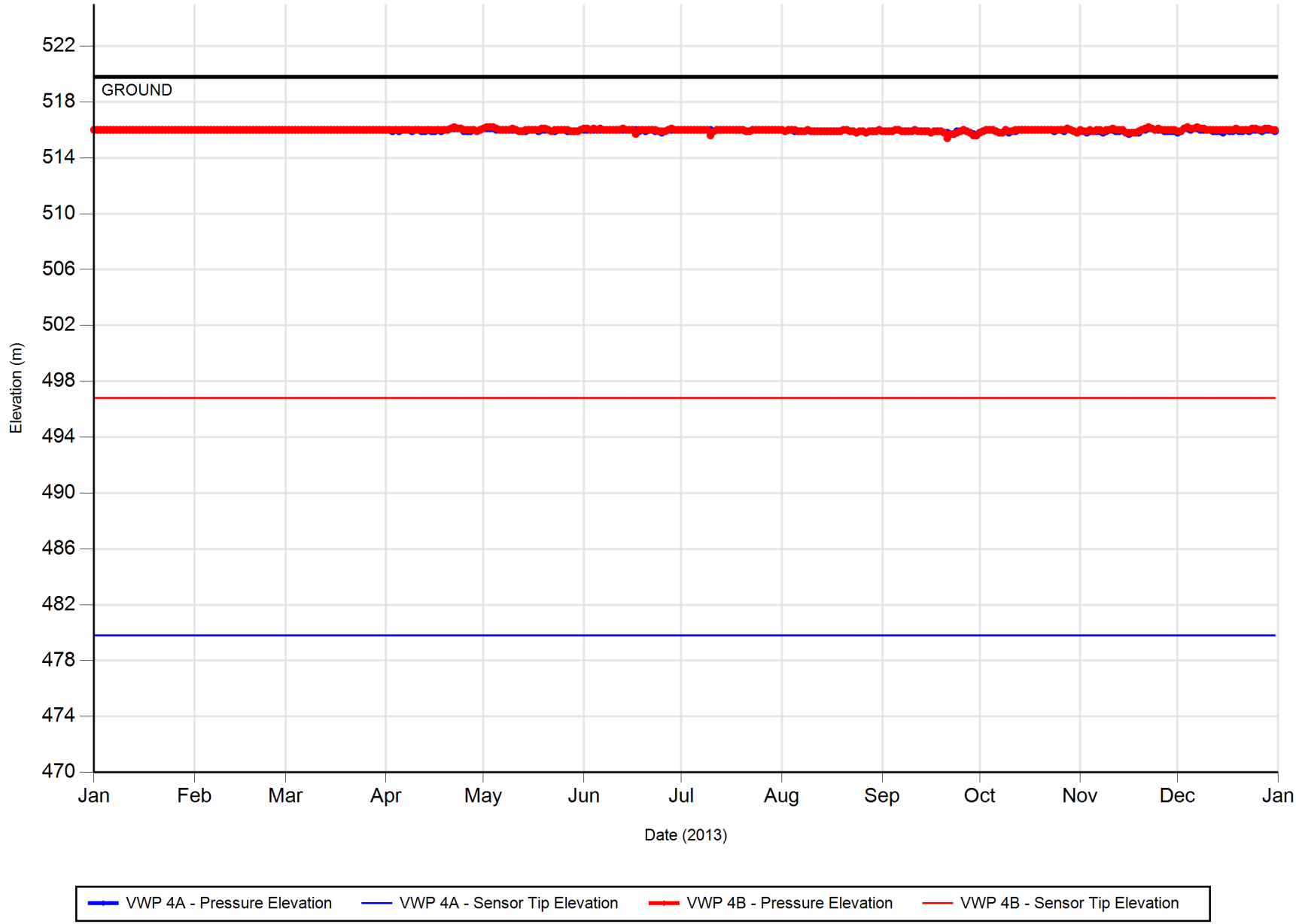
amec



West Quesnel Land Stability Program

VWP 4A and B (Station 06)

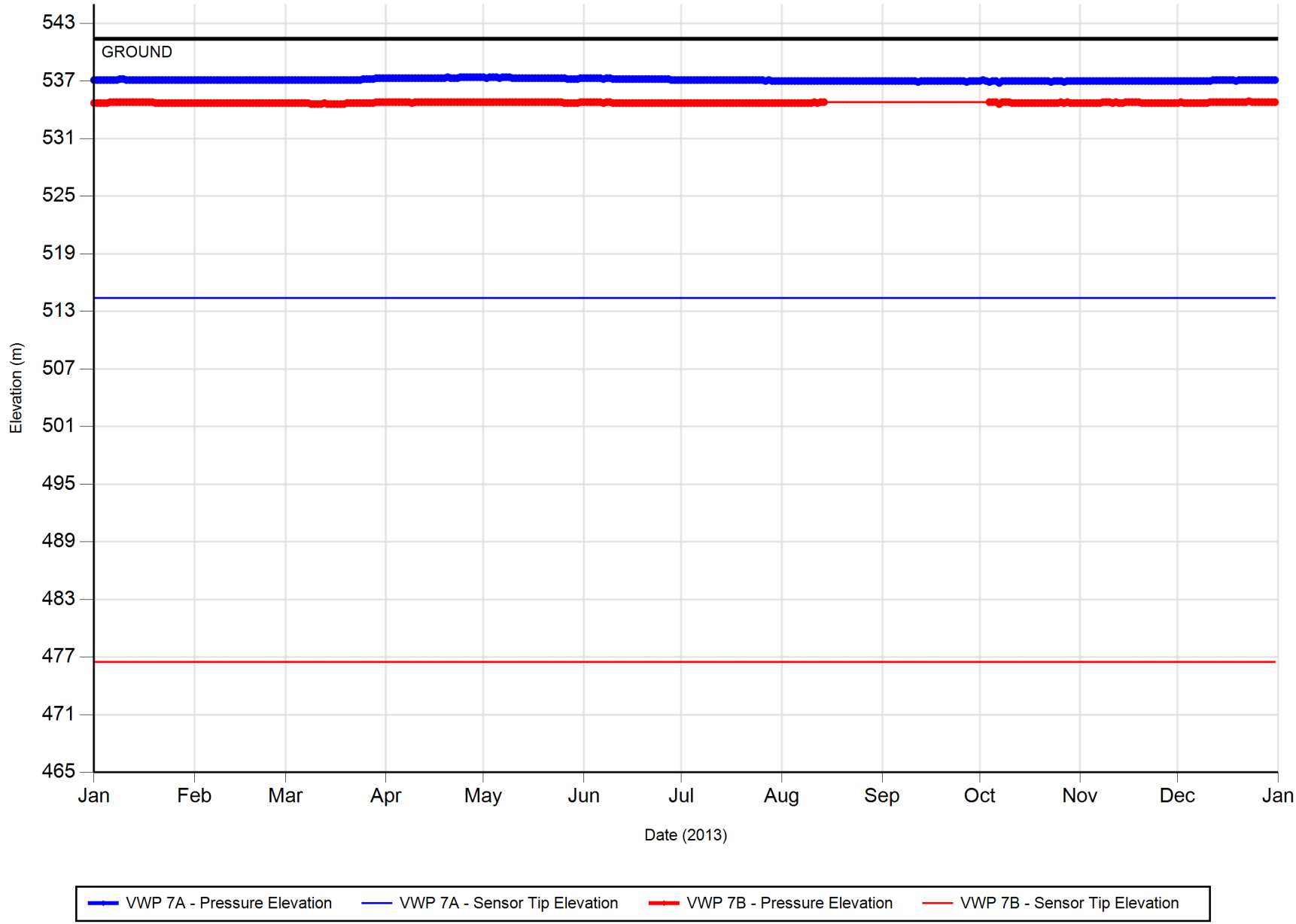
amec



West Quesnel Land Stability Program

VWP 7A and B (Station 07)

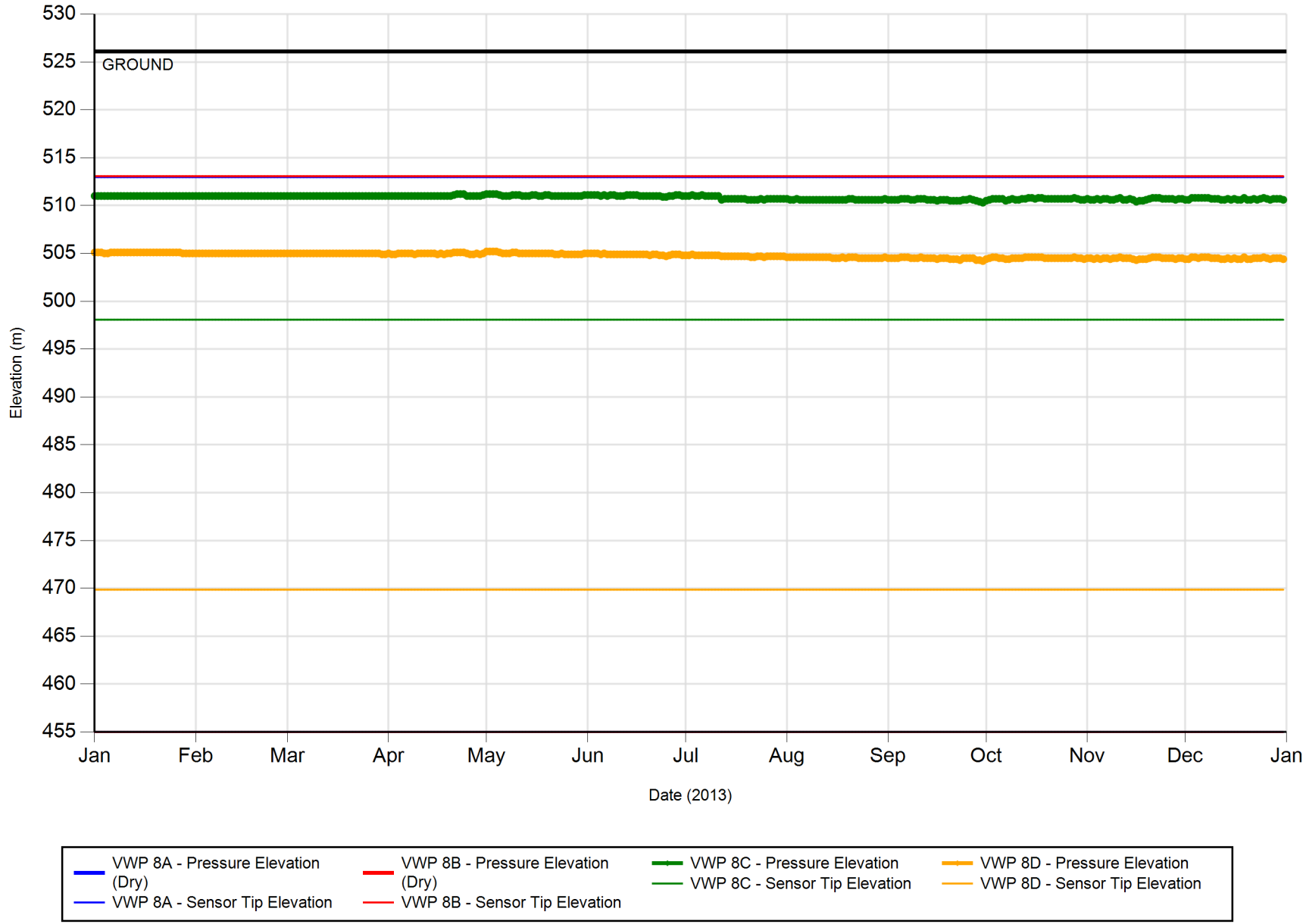
amec



West Quesnel Land Stability Program

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

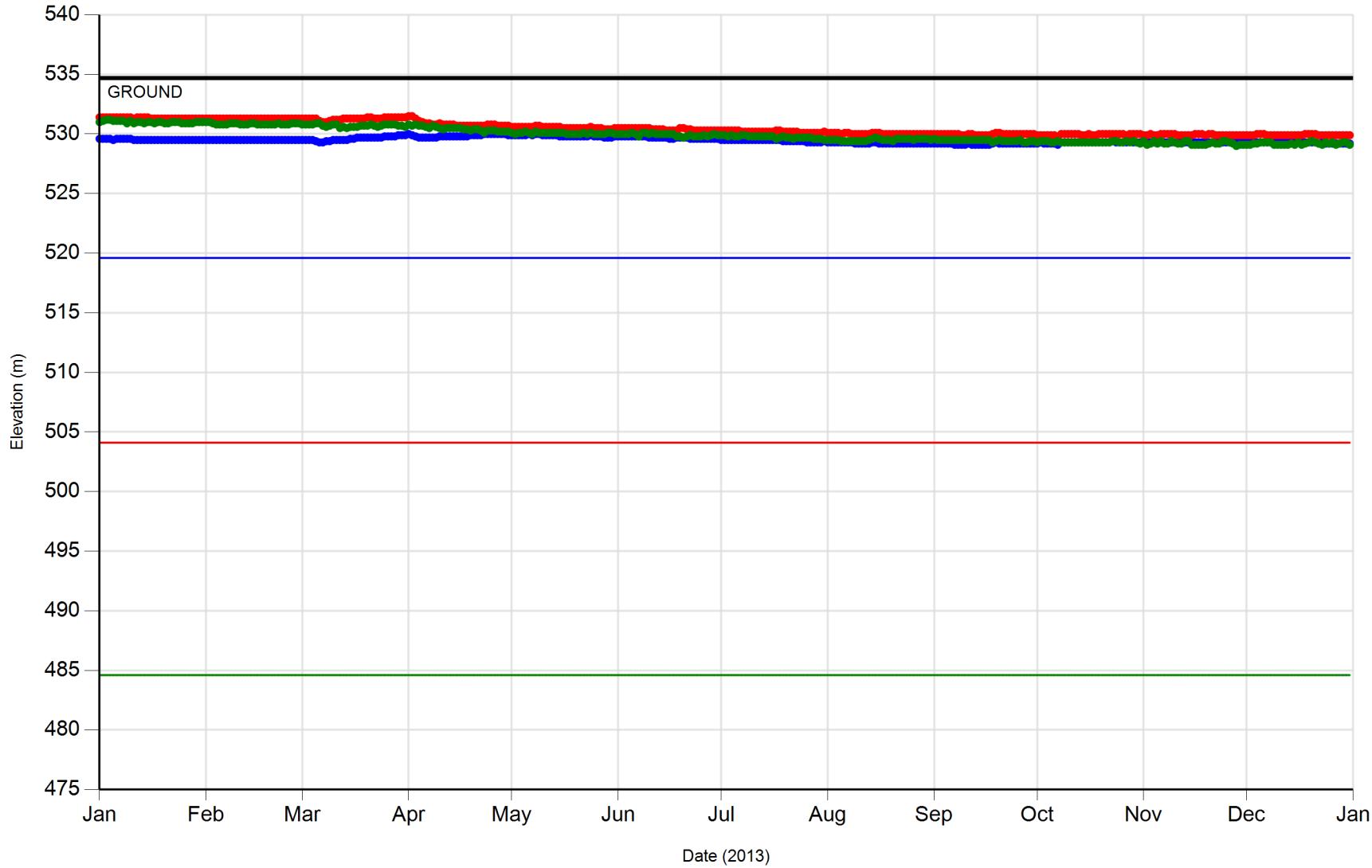
amec



West Quesnel Land Stability Program

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

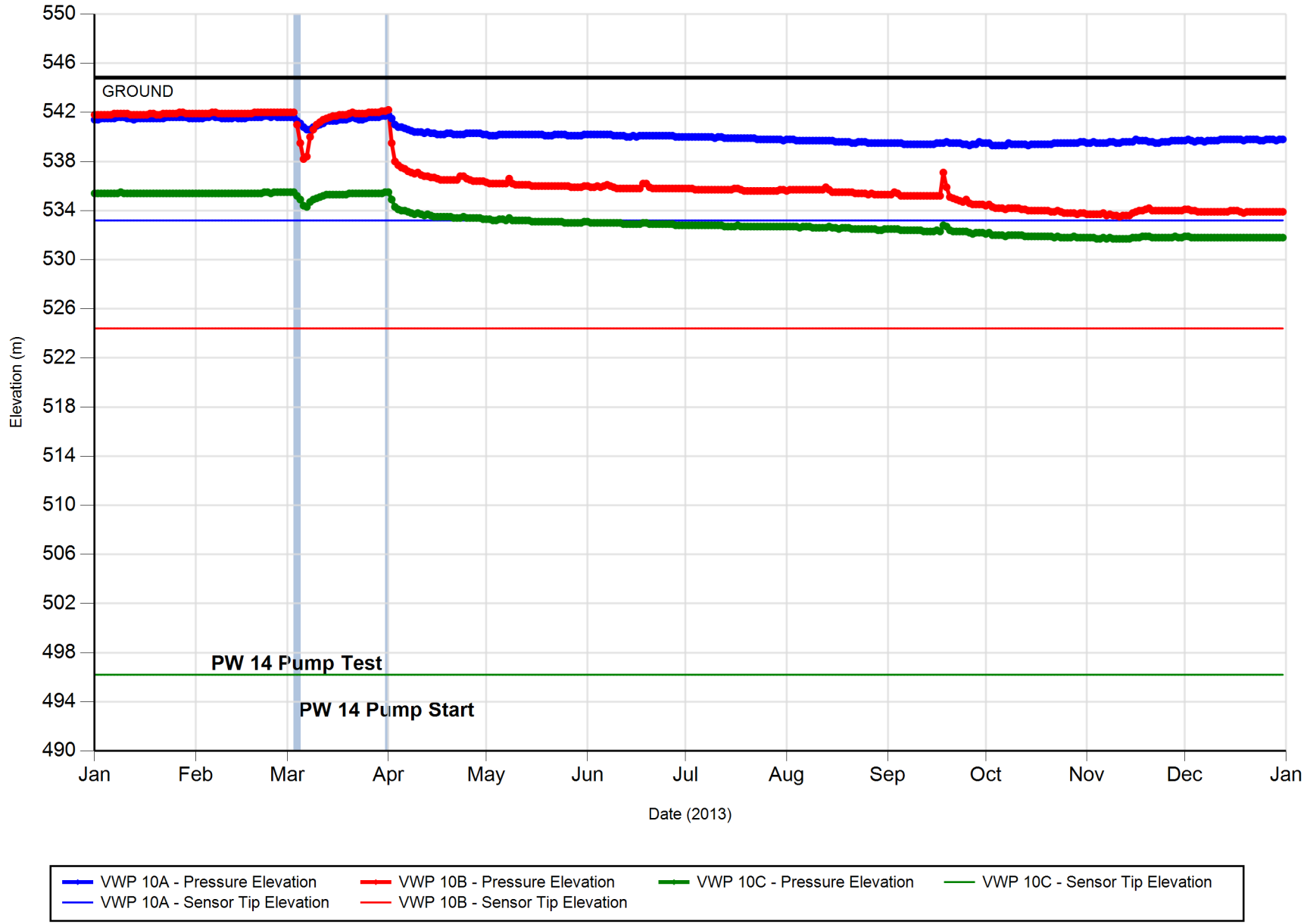
amec



West Quesnel Land Stability Program

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

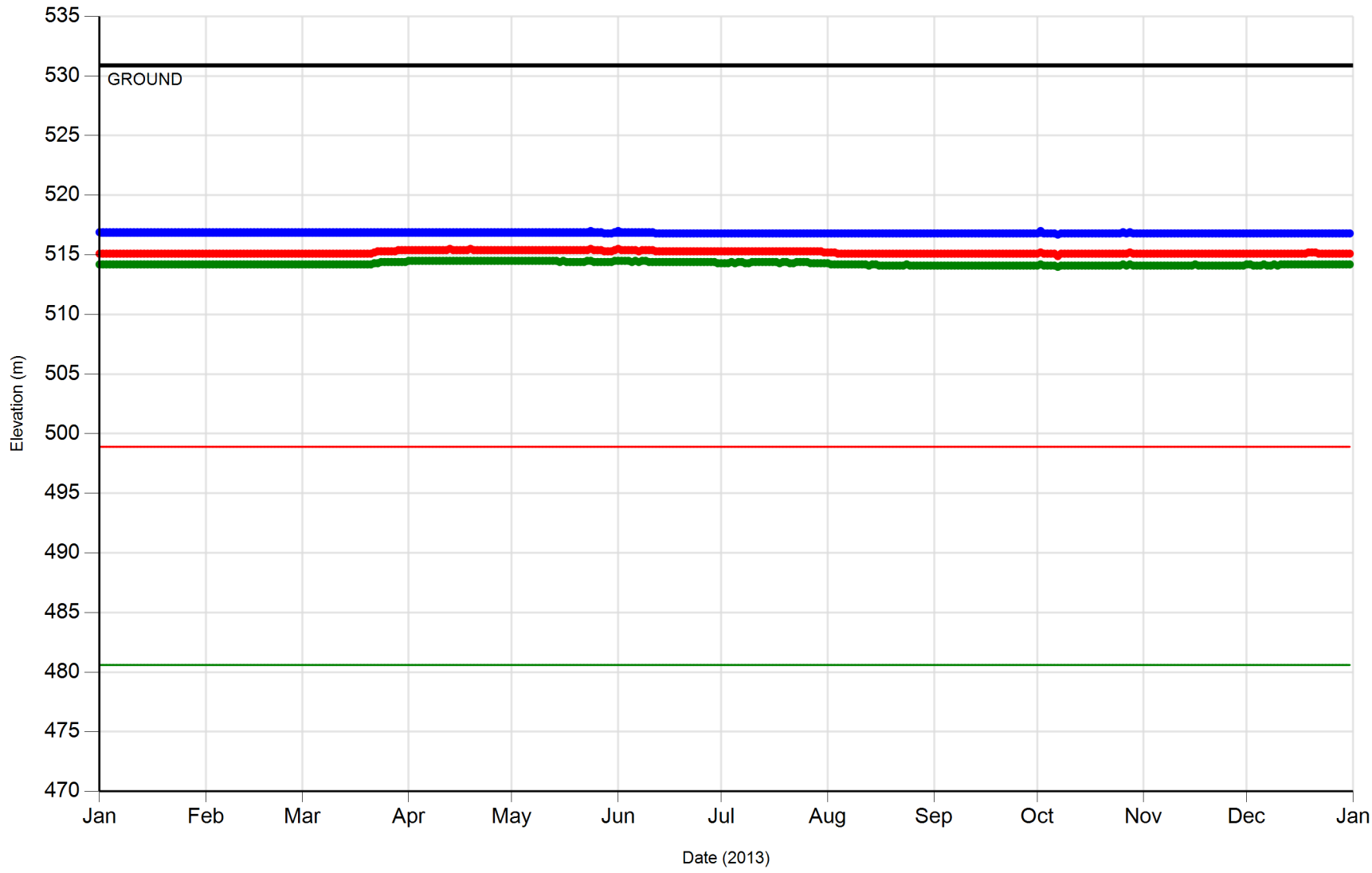
amec



West Quesnel Land Stability Program

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

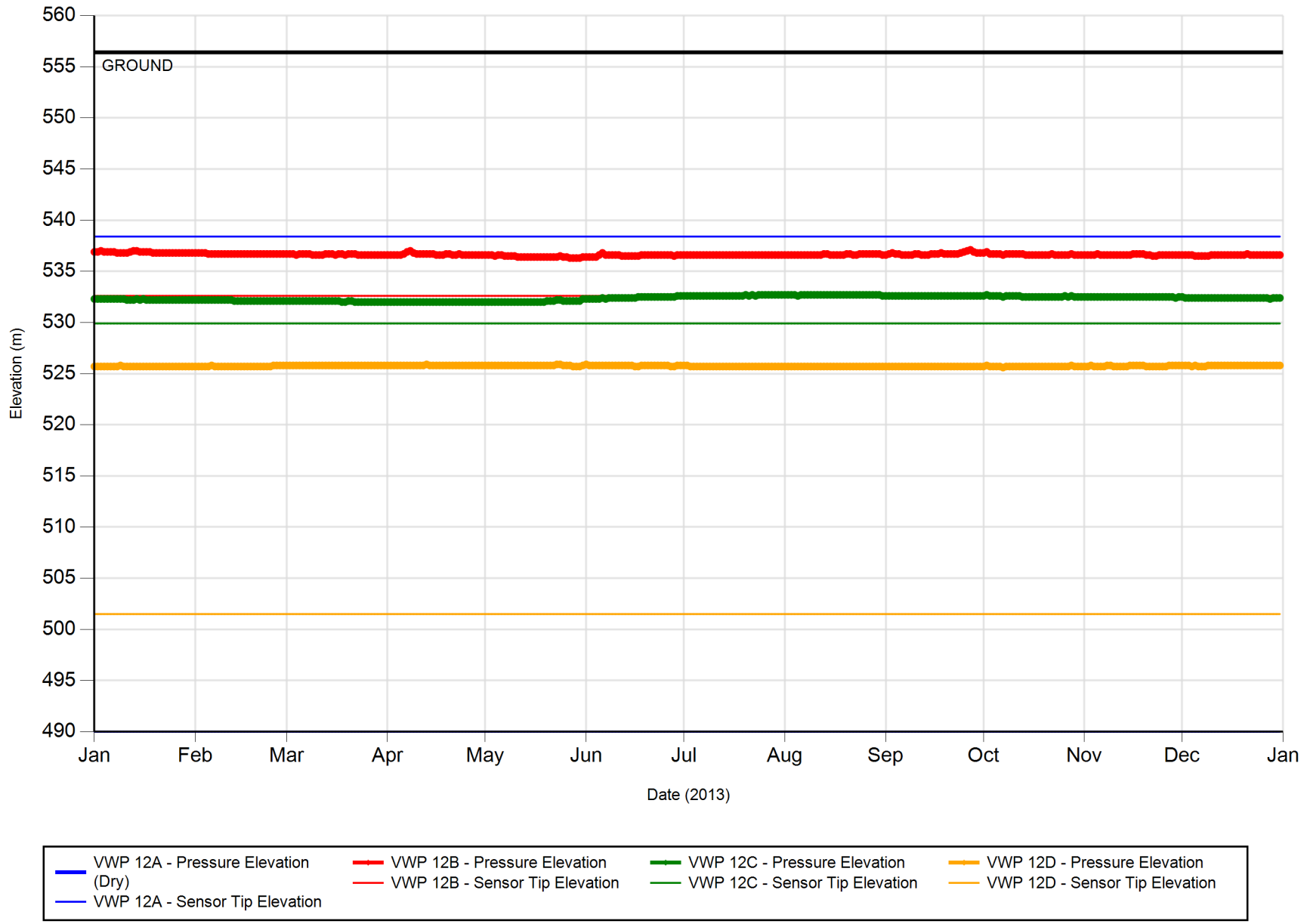
amec



West Quesnel Land Stability Program

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

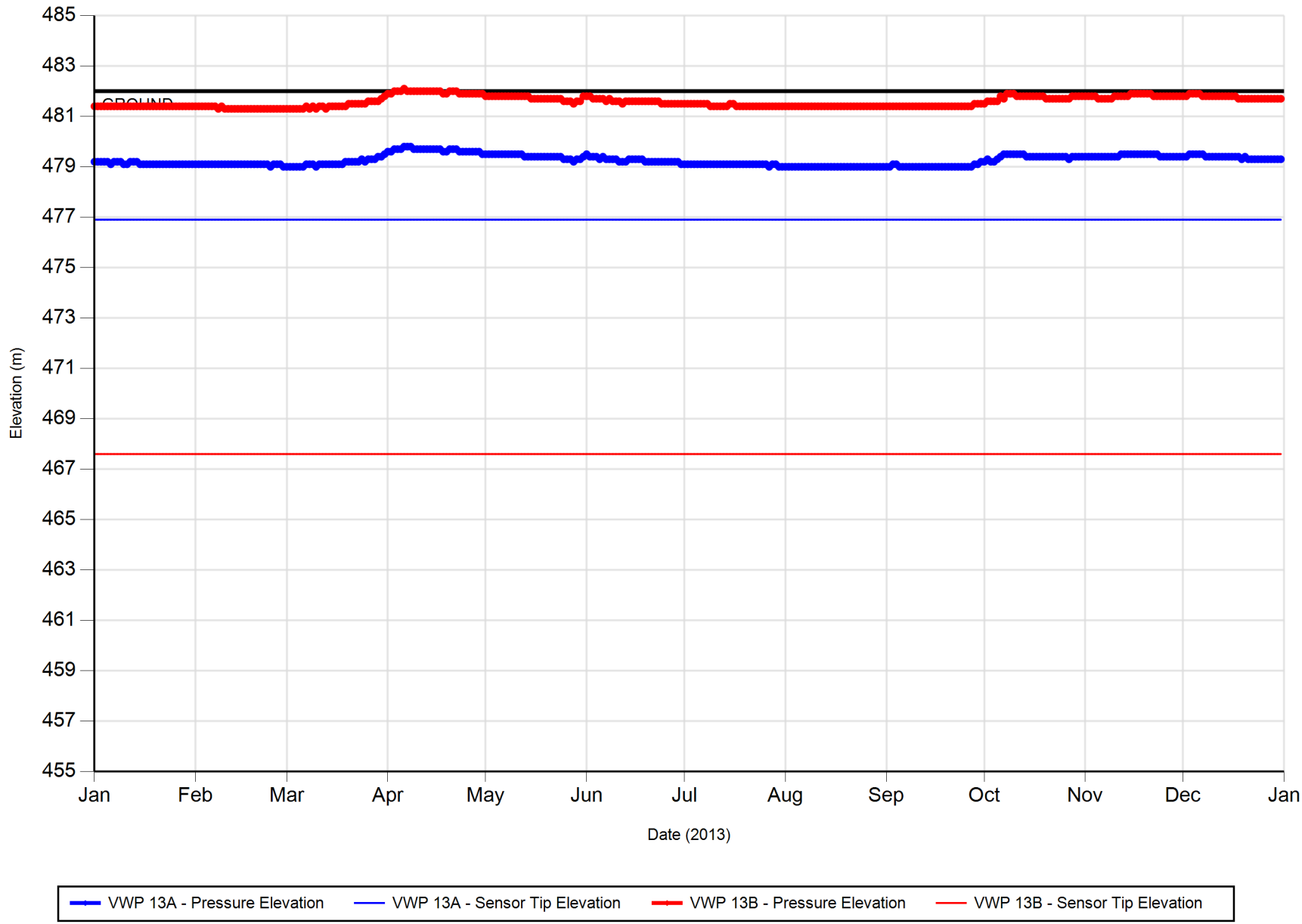
amec



West Quesnel Land Stability Program

VWP 13A and B (Station 12)

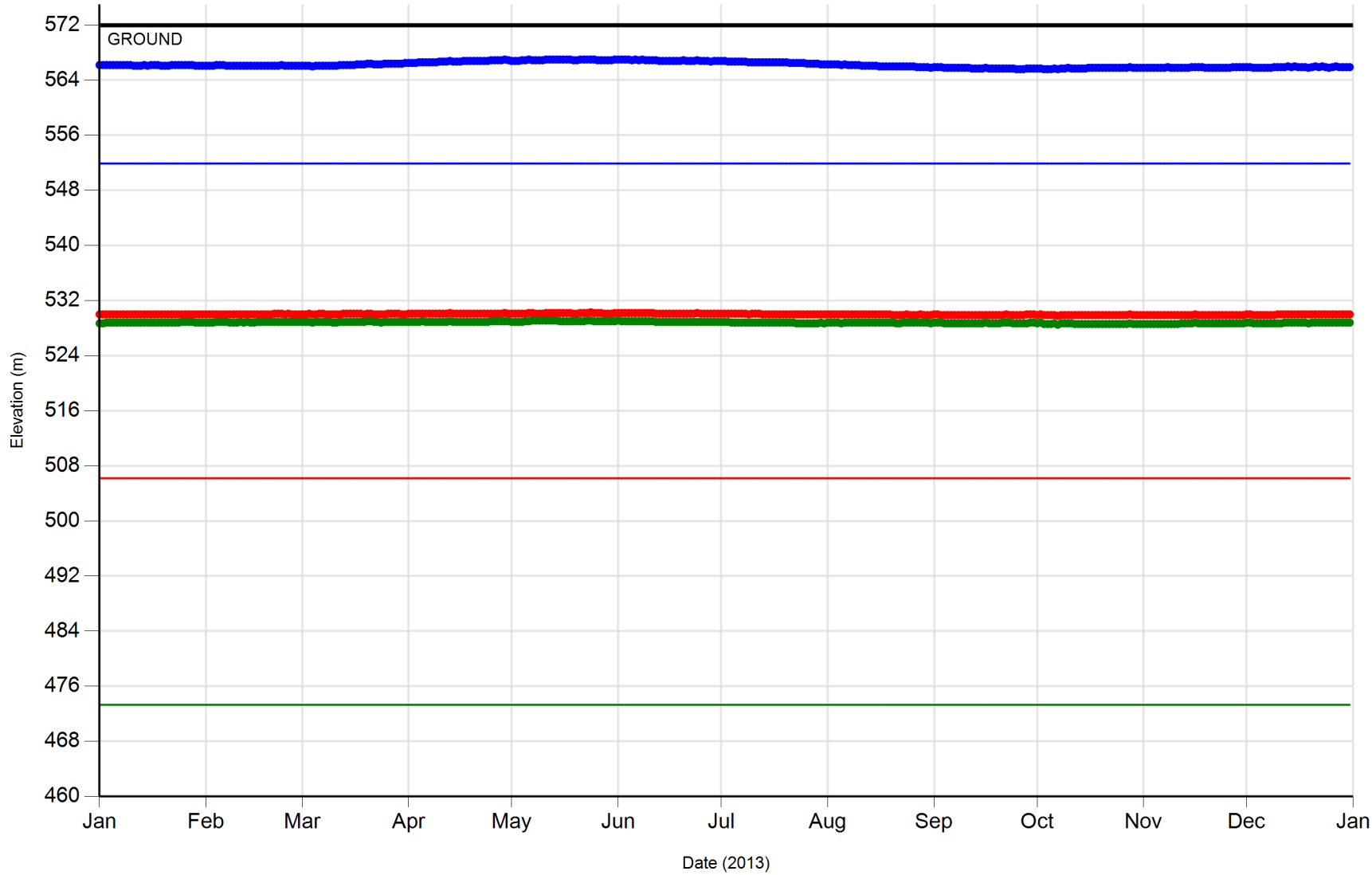
amec



West Quesnel Land Stability Program

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

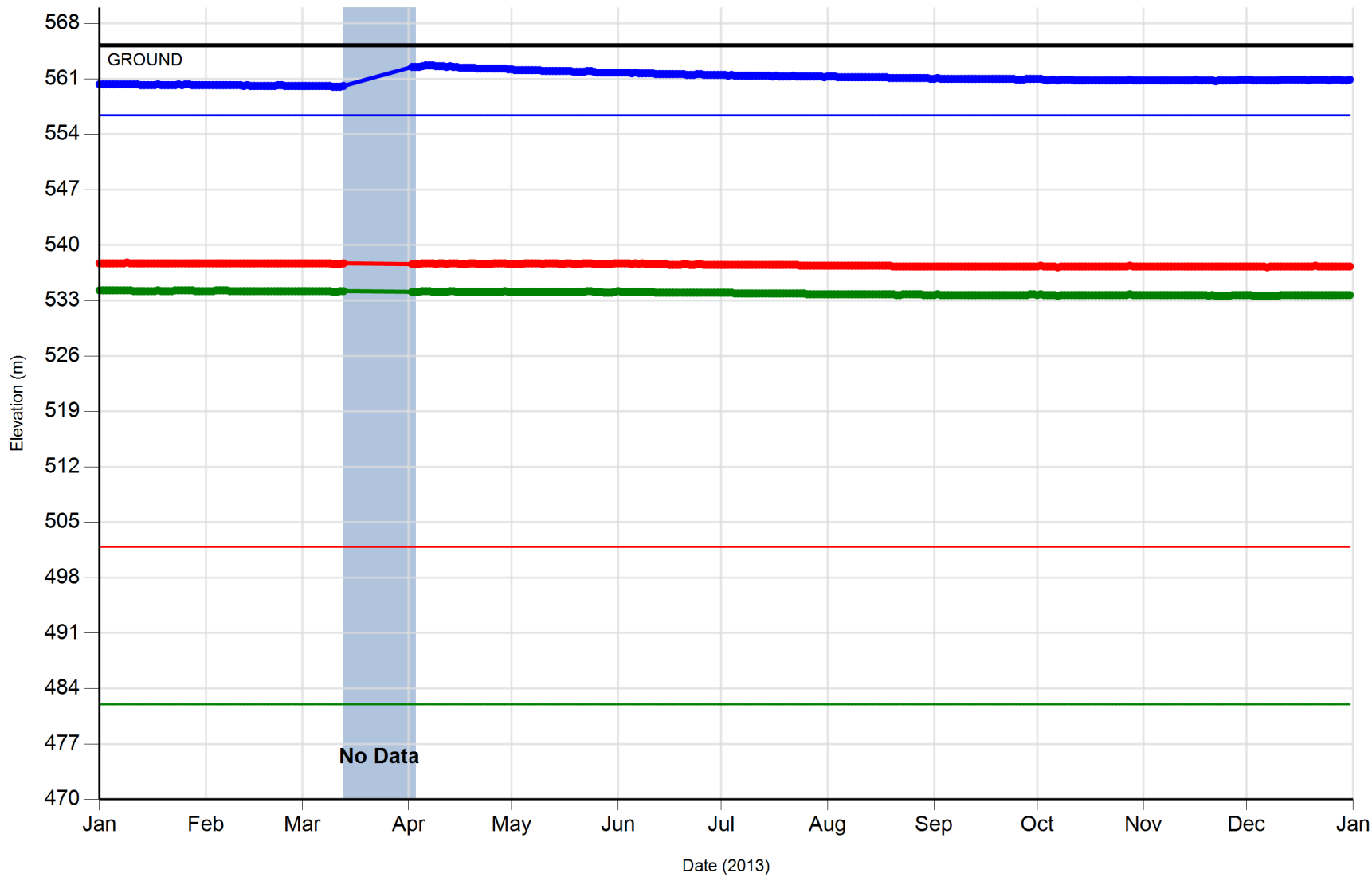
amec



West Quesnel Land Stability Program

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

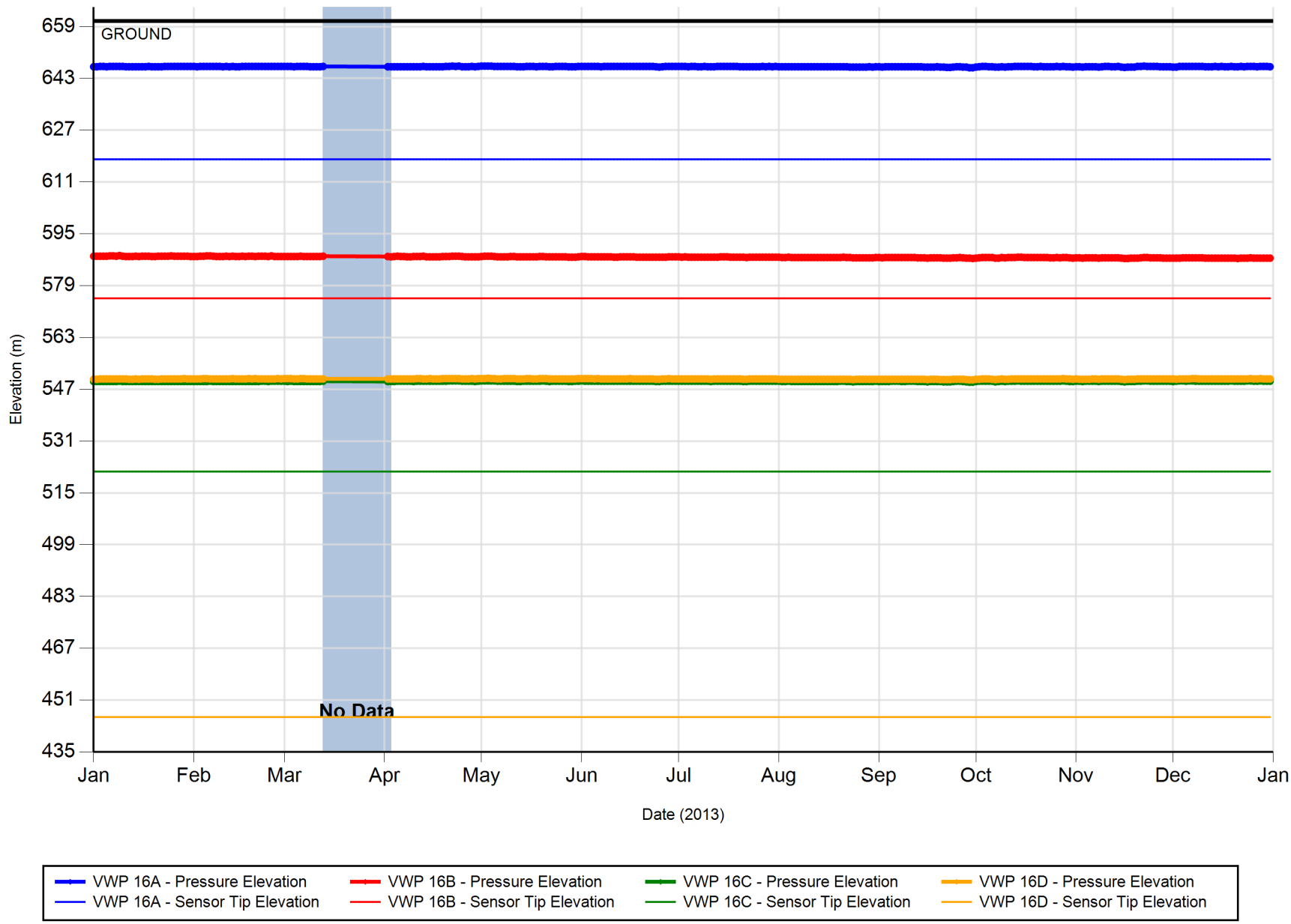
amec



West Quesnel Land Stability Program

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

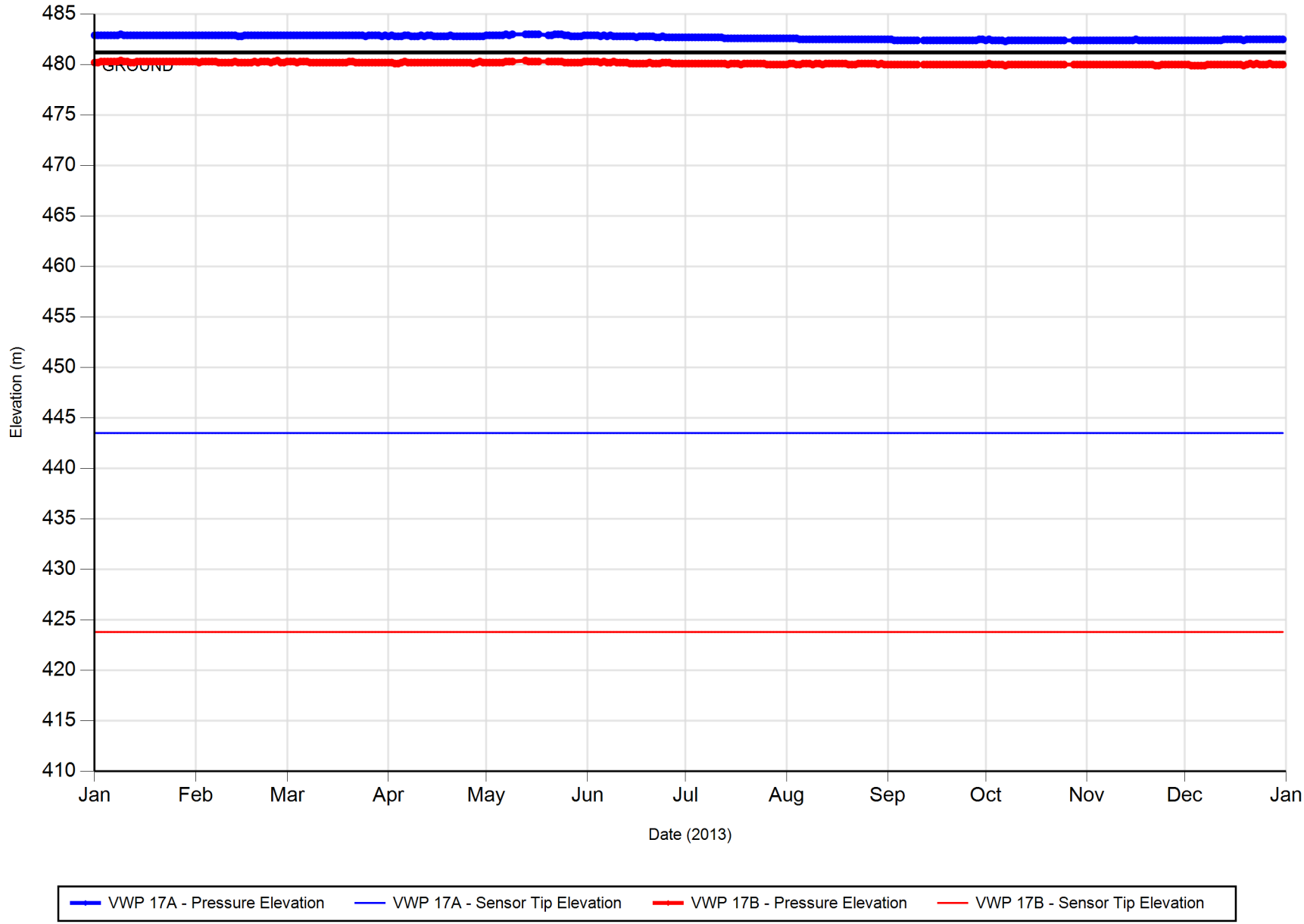
amec



West Quesnel Land Stability Program

VWP 17A and B (Station 17)

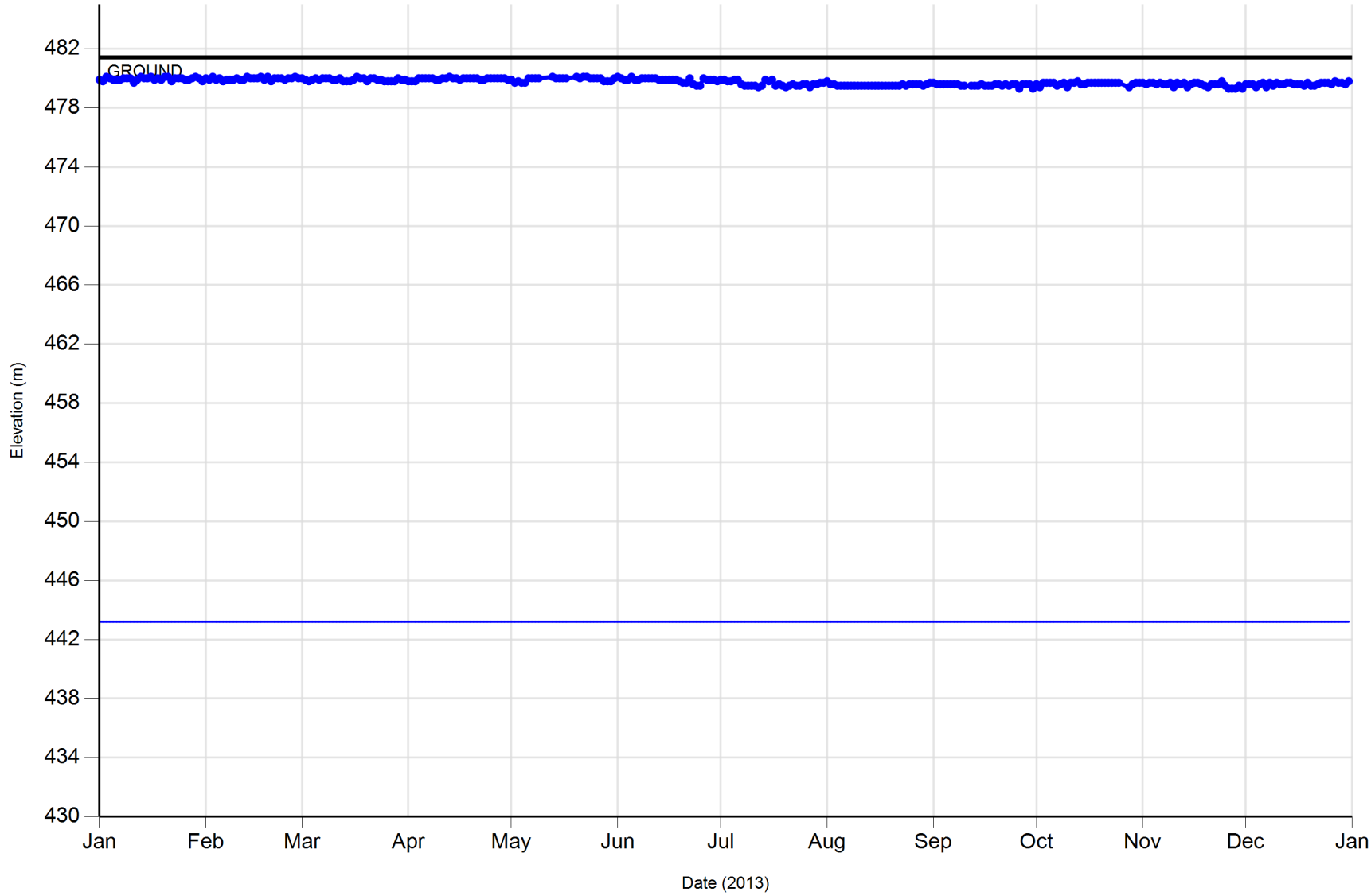
amec



West Quesnel Land Stability Program

VWP 18A (Station 17)

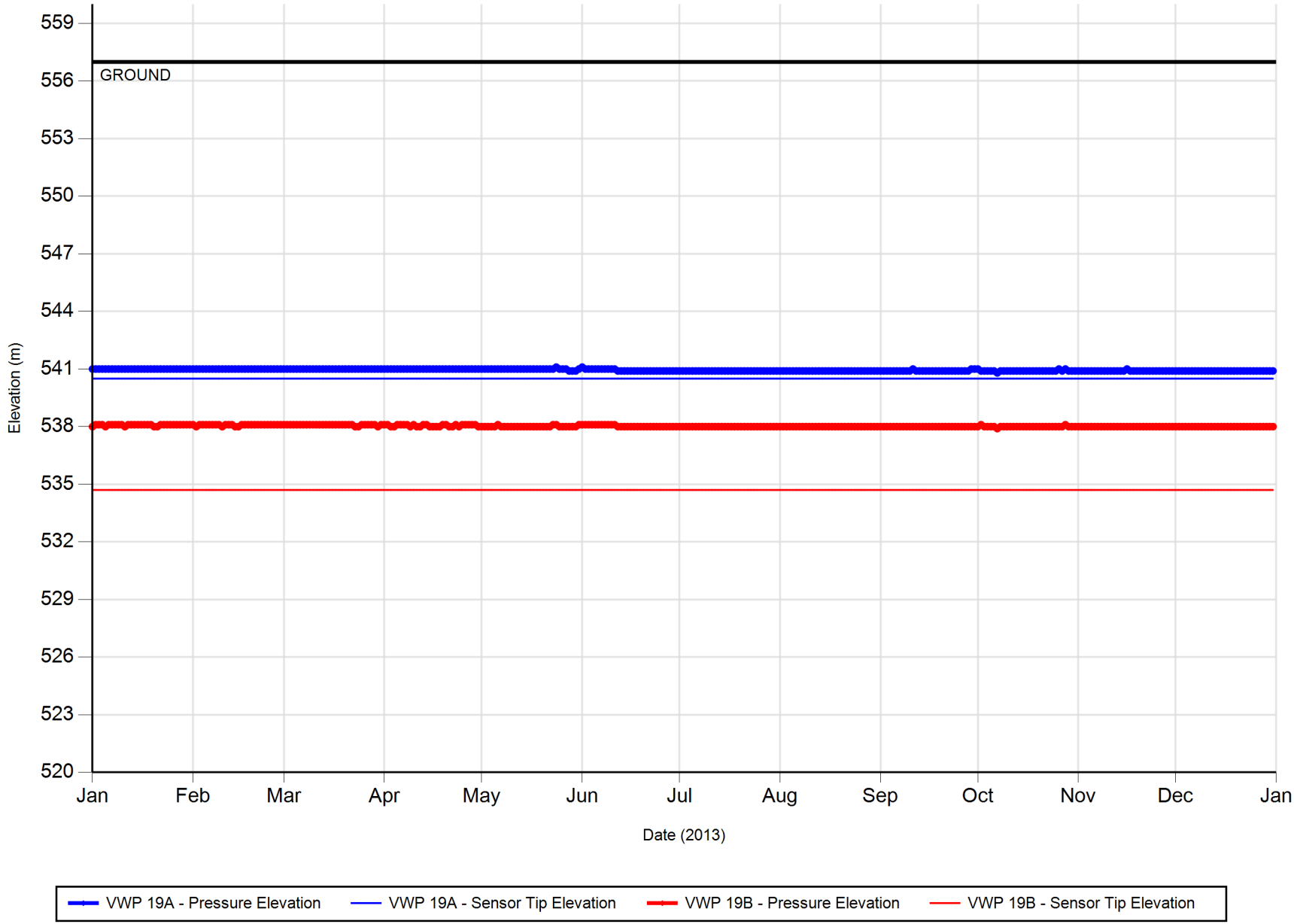
amec



West Quesnel Land Stability Program

VWP 19A and B (Station 16)

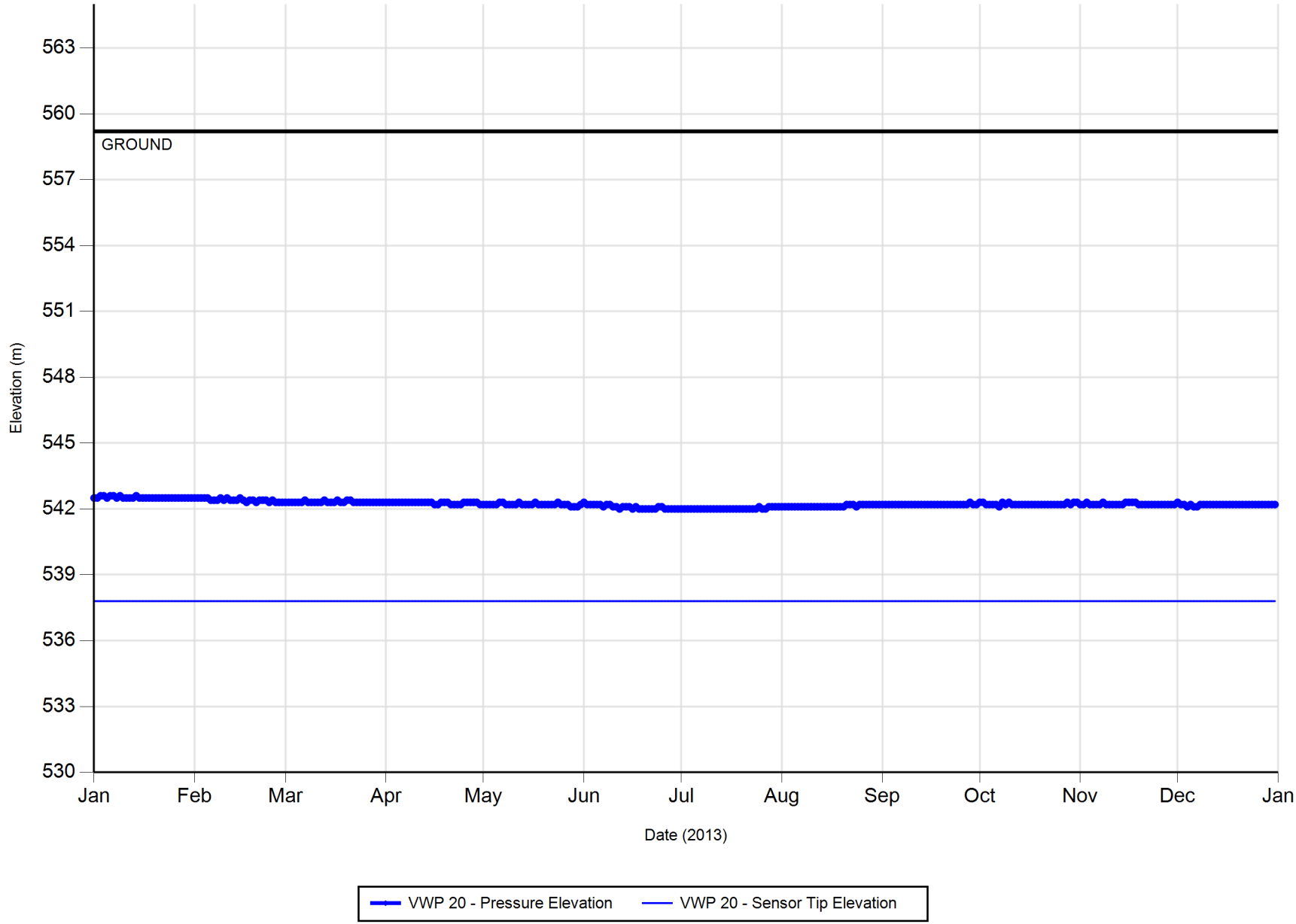
amec



West Quesnel Land Stability Program

VWP 20 (Station 16)

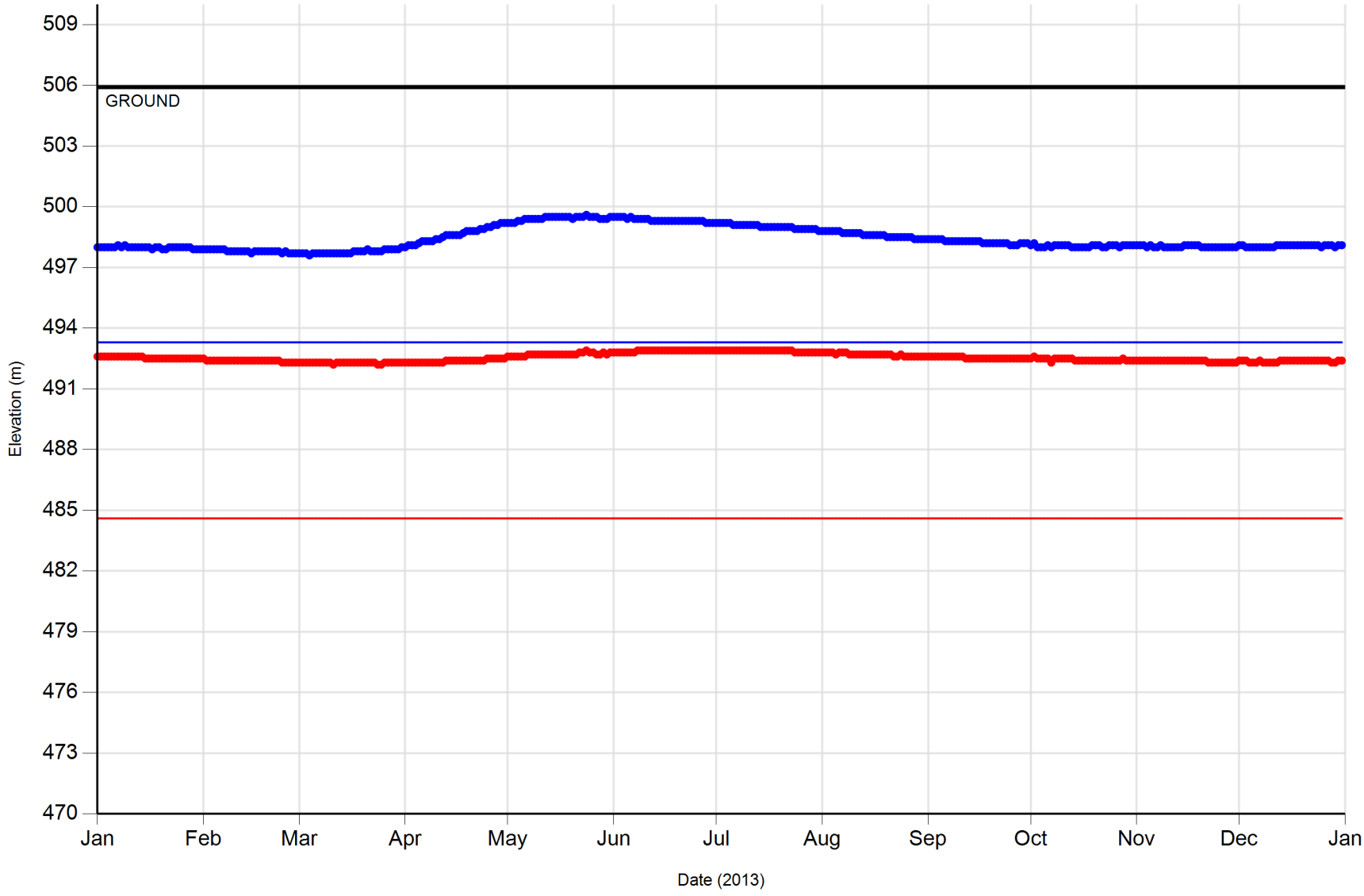
amec



West Quesnel Land Stability Program

VWP 21A and B (Station 19)

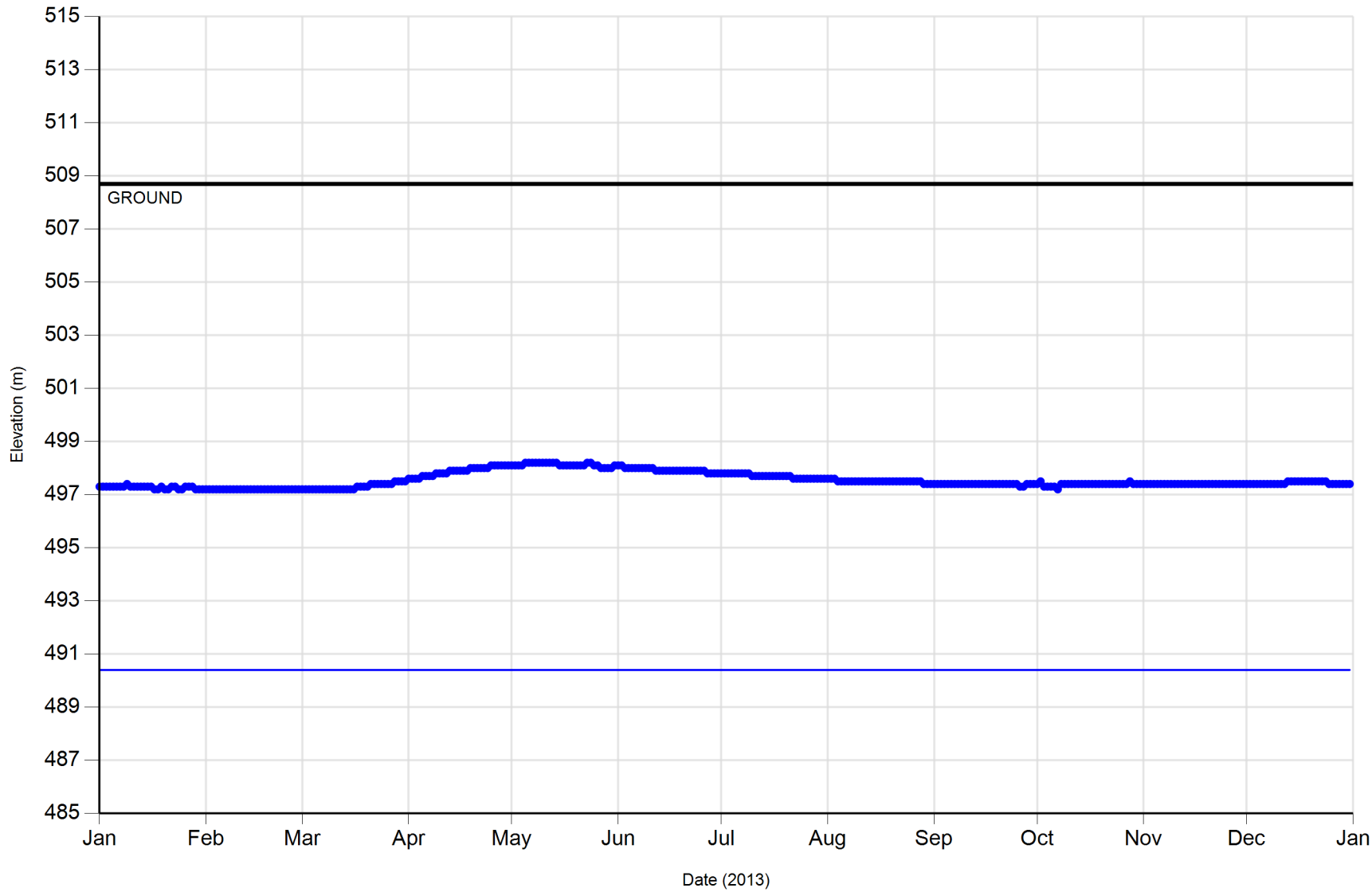
amec



West Quesnel Land Stability Program

VWP 22 (Station 19)

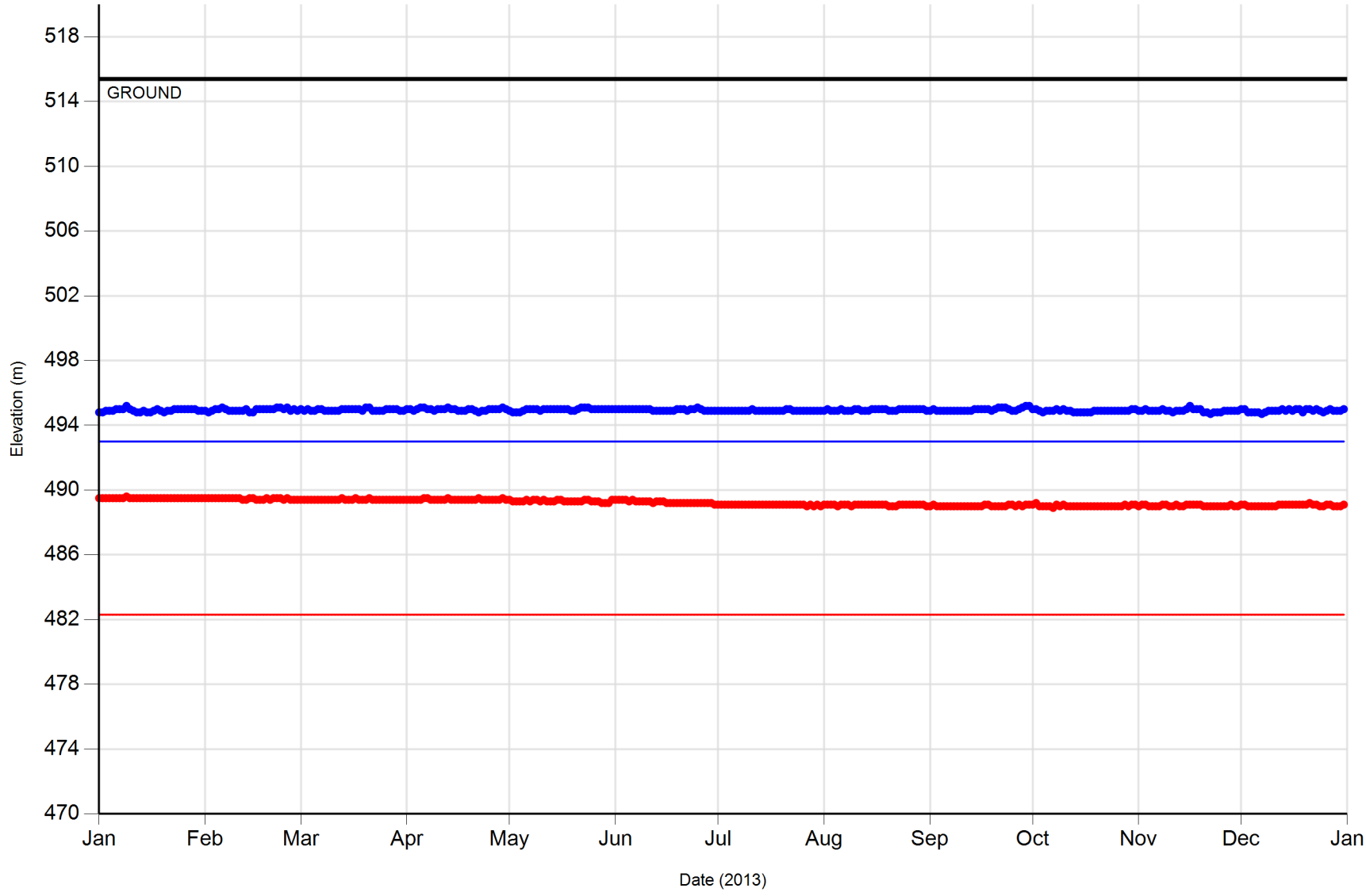
amec



West Quesnel Land Stability Program

VWP 23A and B (Station 18)

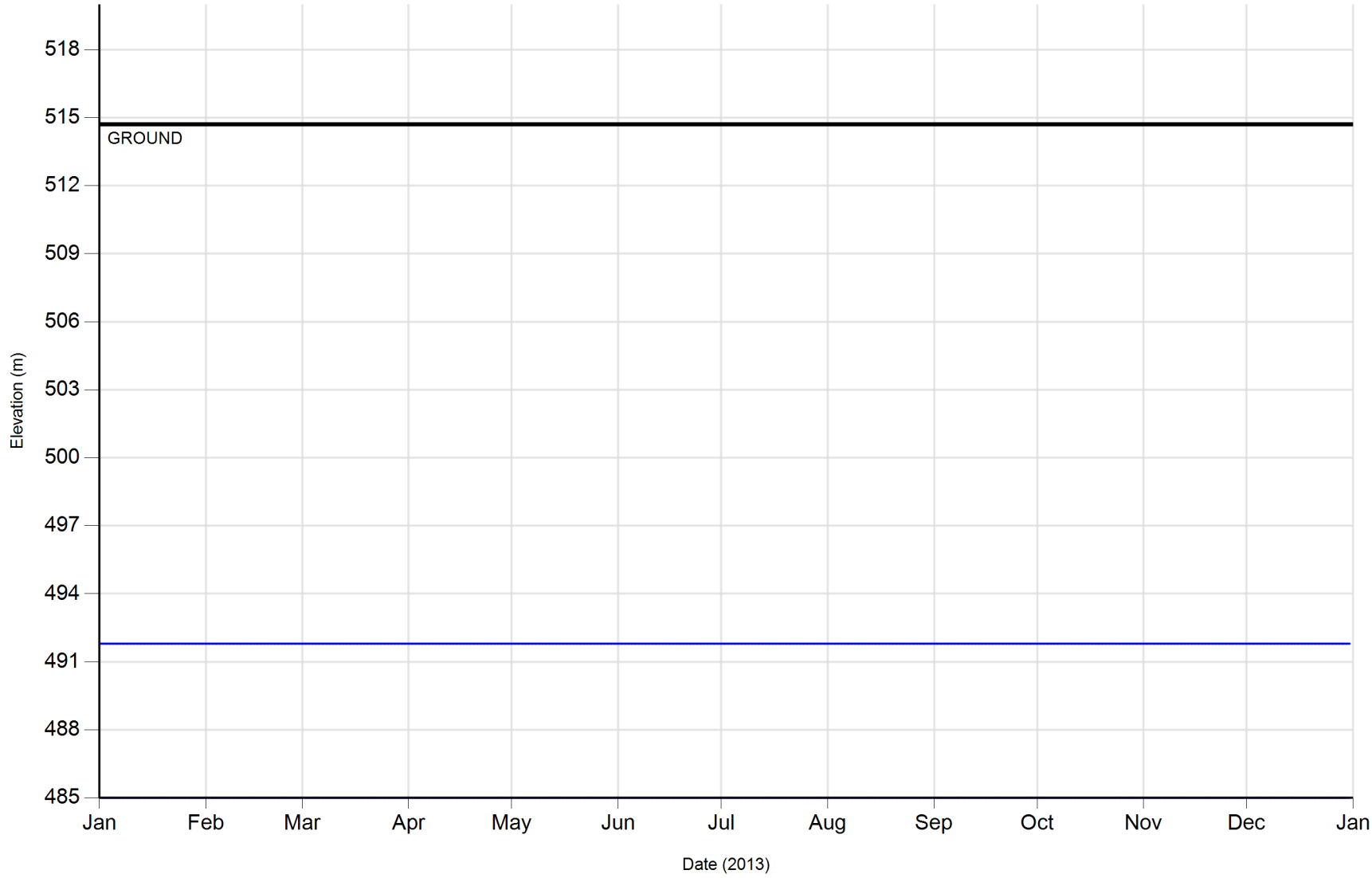
amec



West Quesnel Land Stability Program

VWP 24 (Station 18)

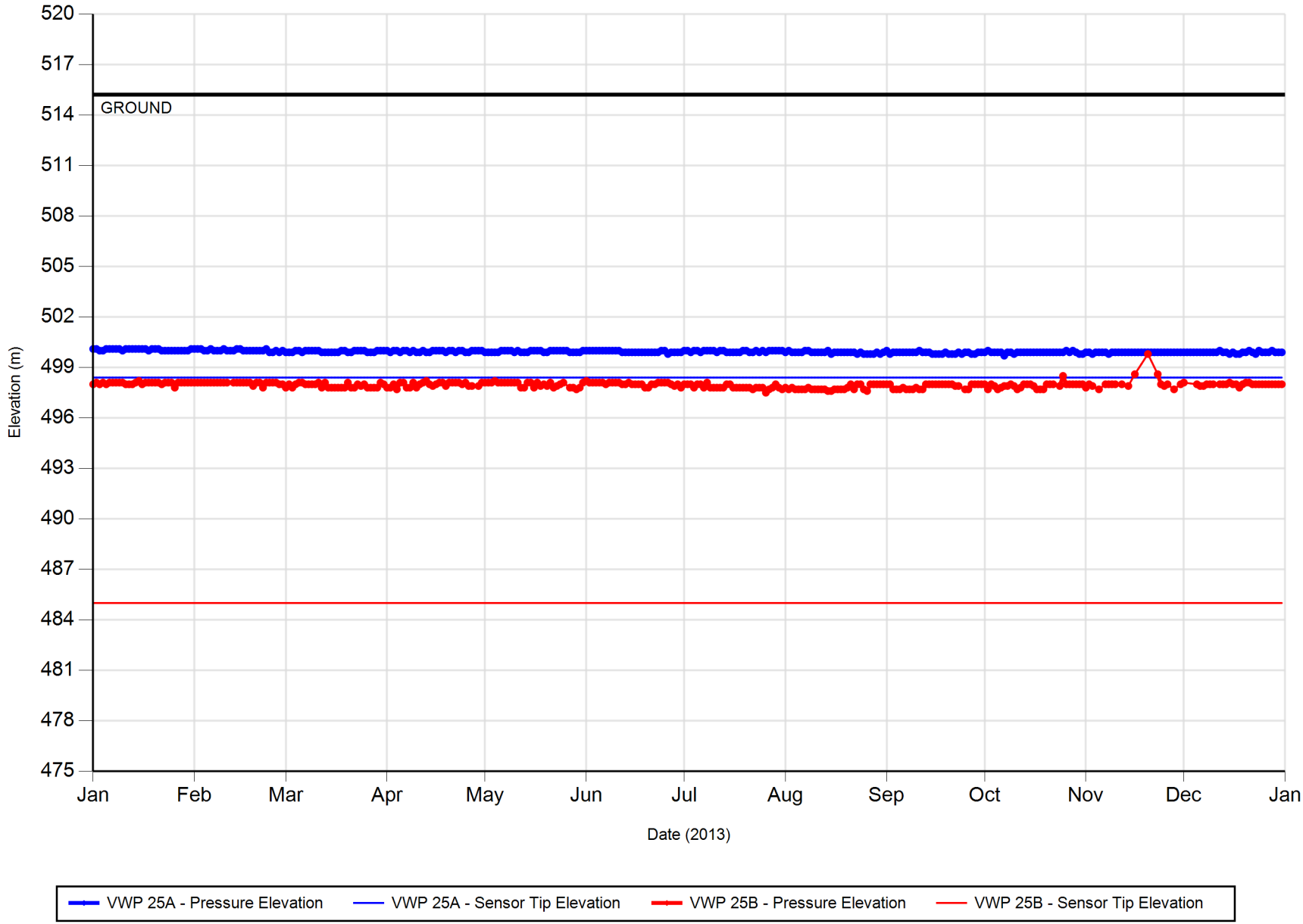
amec



West Quesnel Land Stability Program

VWP 25A and B(Station 18)

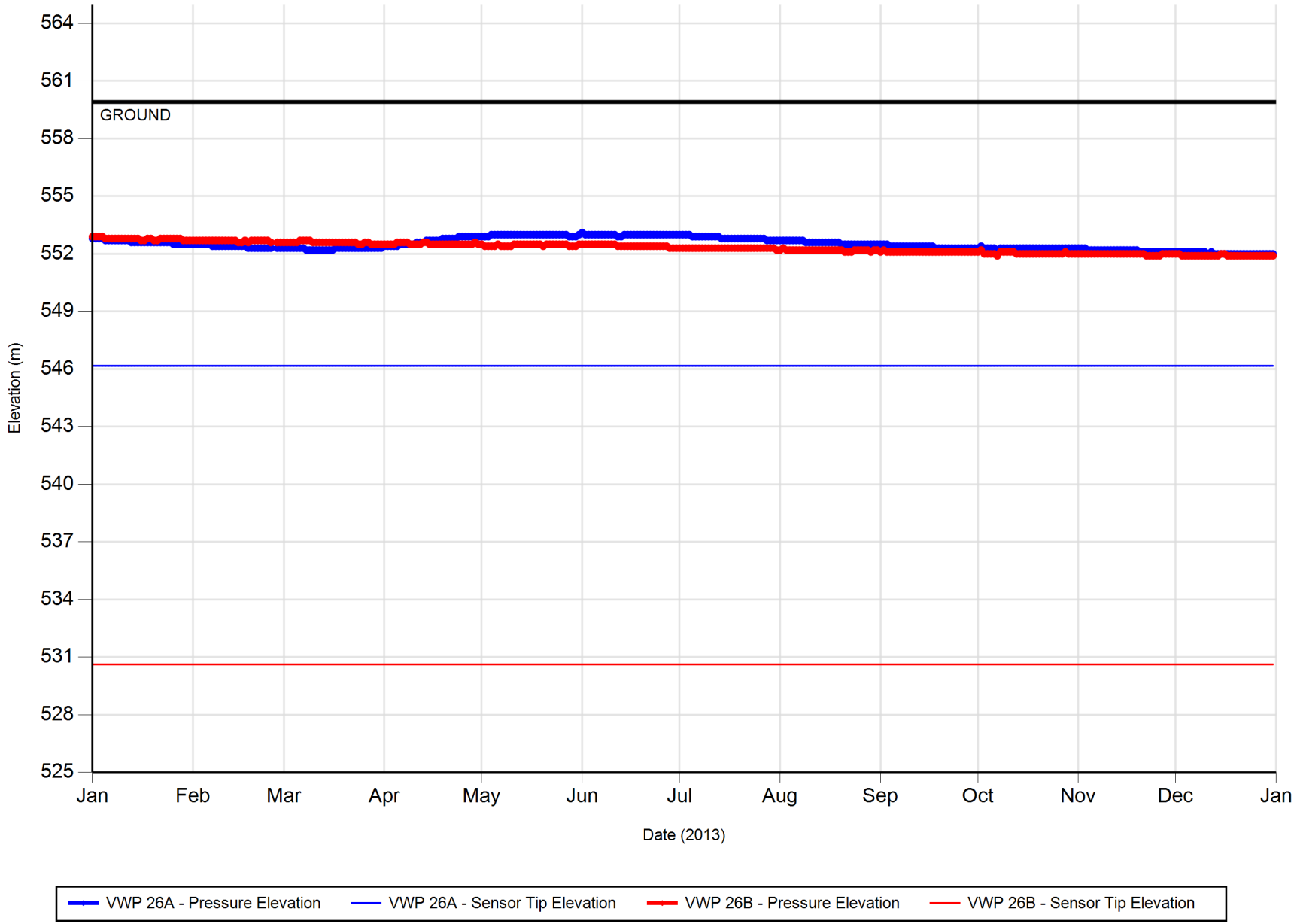
amec



West Quesnel Land Stability Program

VWP 26A and B (Station 04)

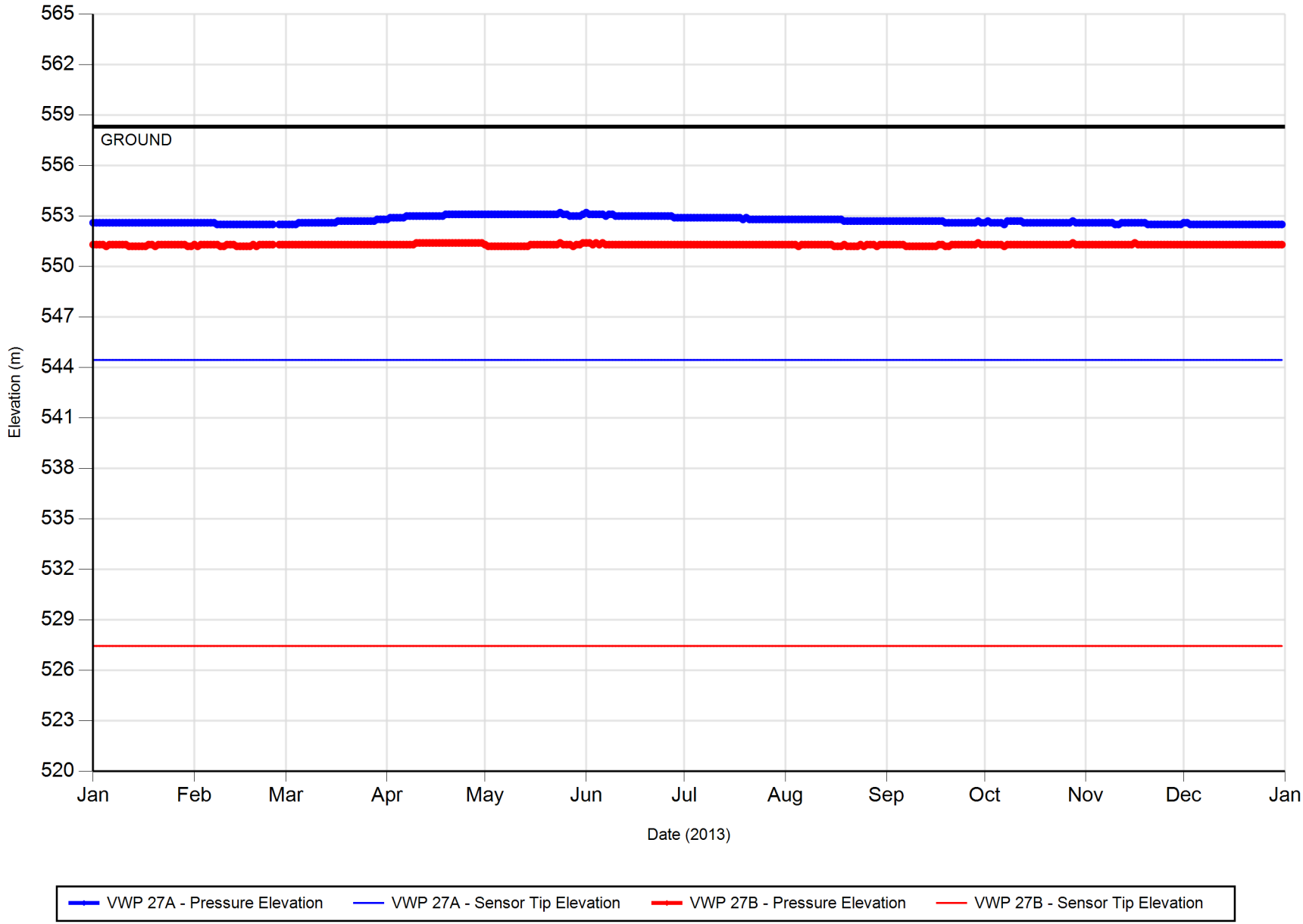
amec



West Quesnel Land Stability Program

VWP 27A and B (Station 04)

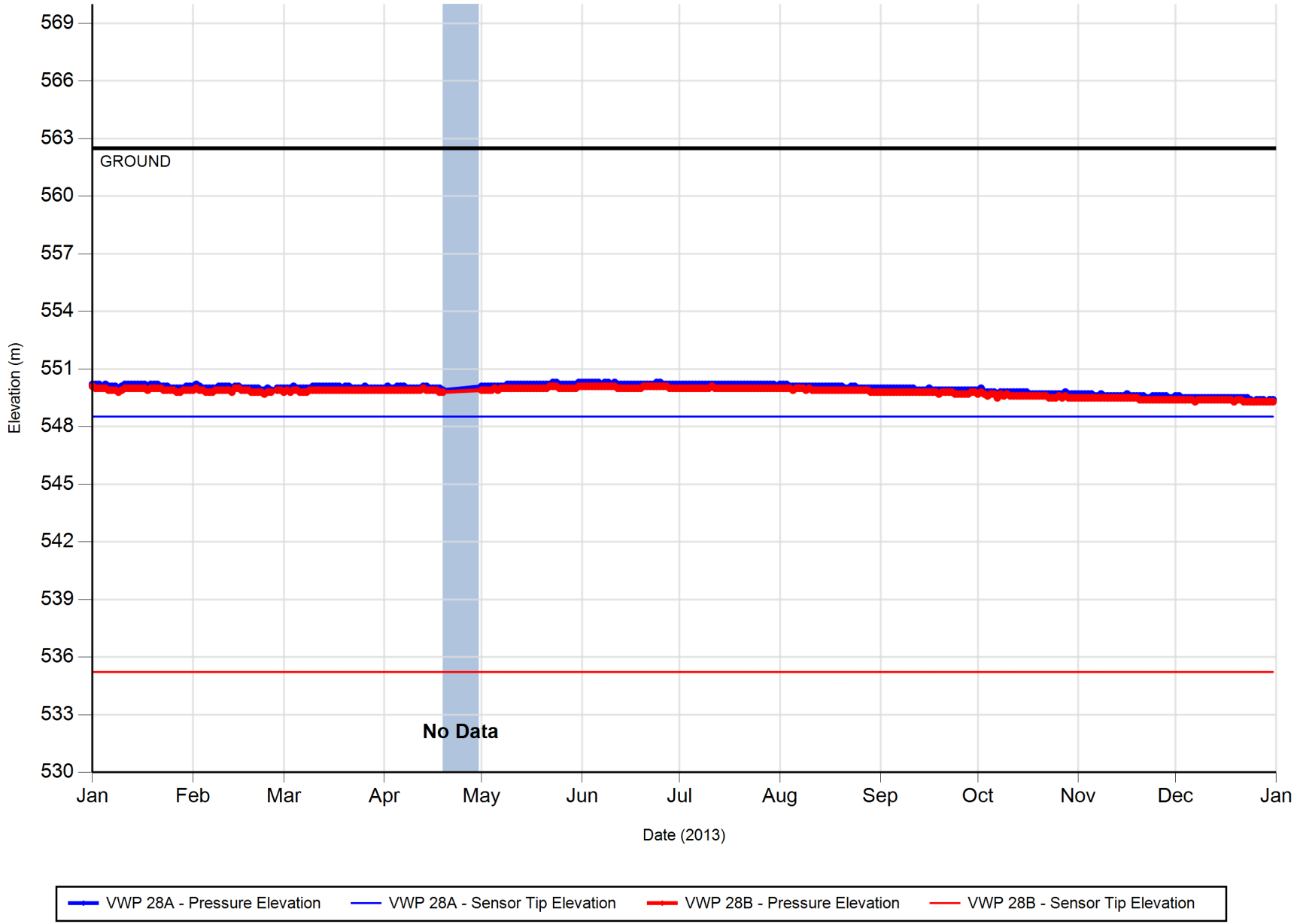
amec



West Quesnel Land Stability Program

VWP 28A and B (Station 21)

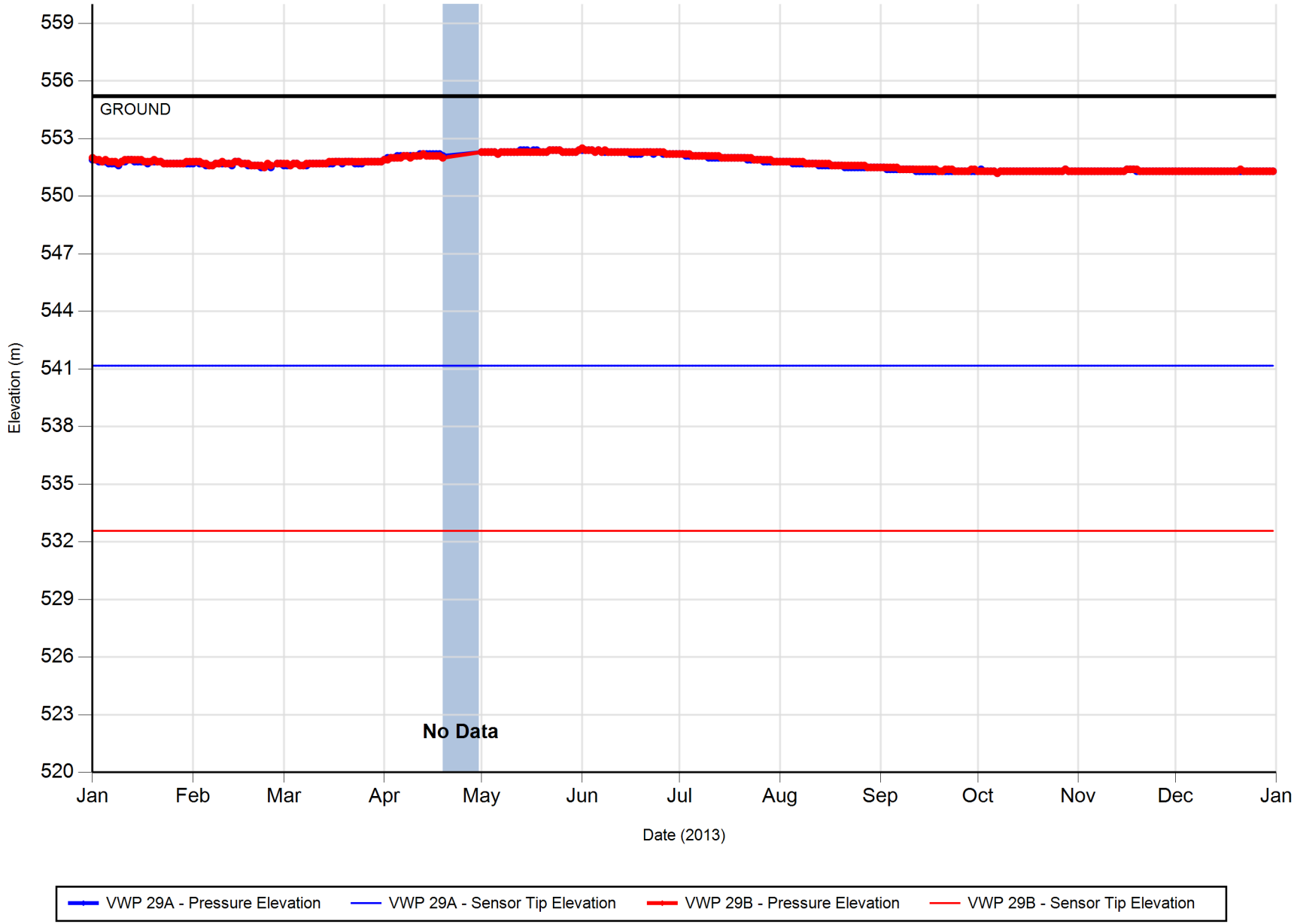
amec



West Quesnel Land Stability Program

VWP 29A and B (Station 21)

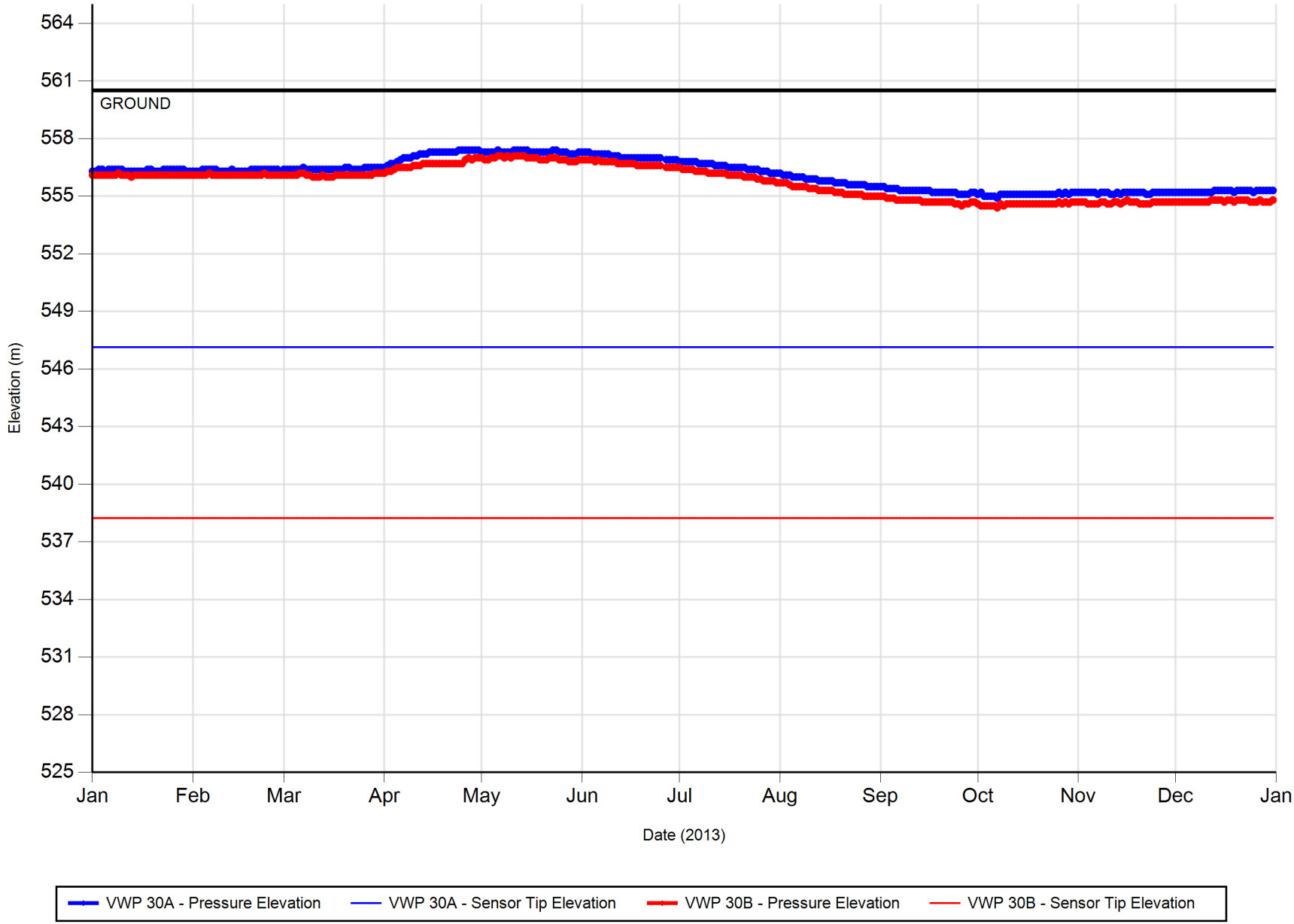
amec



West Quesnel Land Stability Program

VWP 30A and B (Station 20)

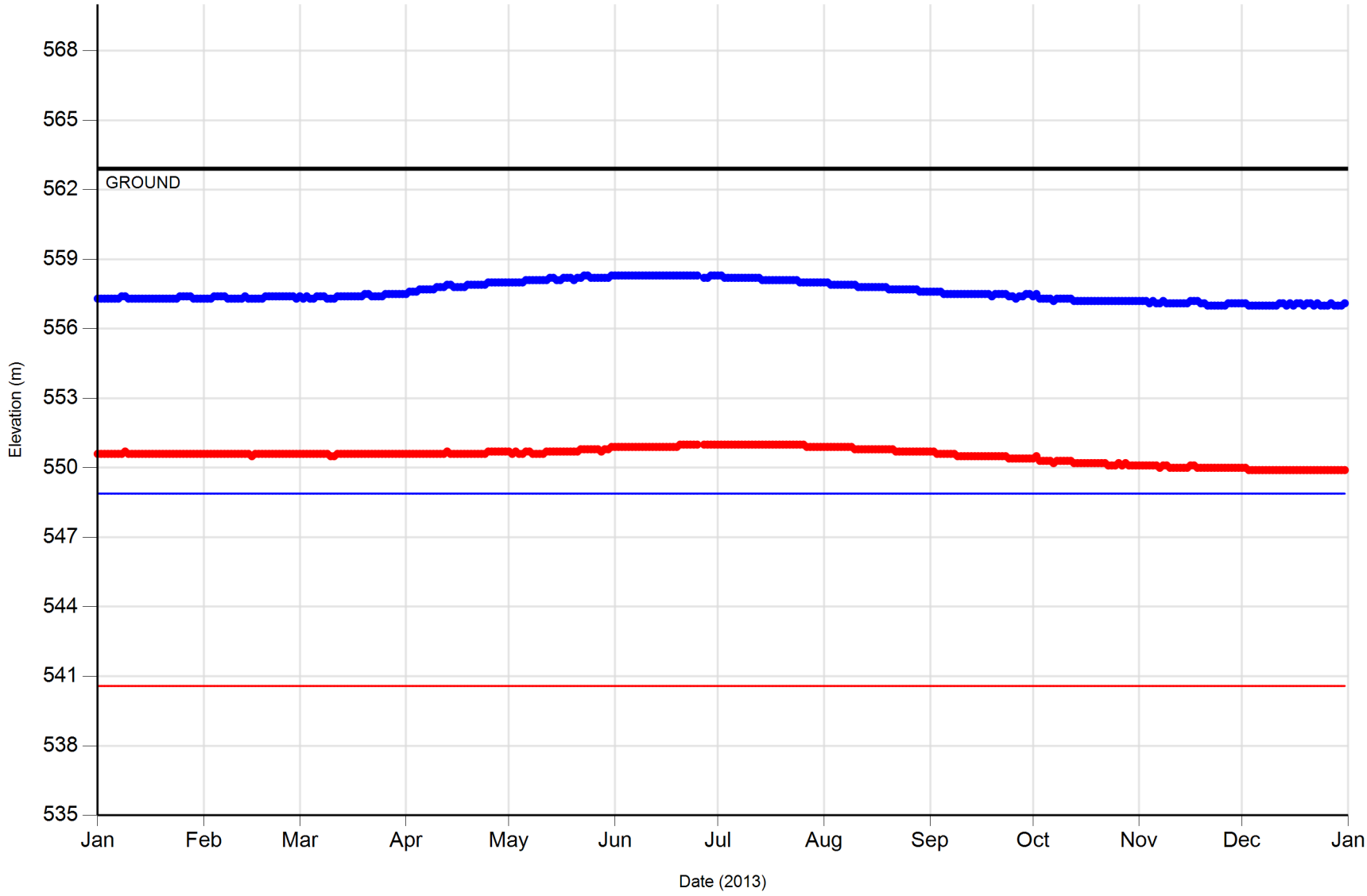
amec



West Quesnel Land Stability Program

VWP 31A and B (Station 20)

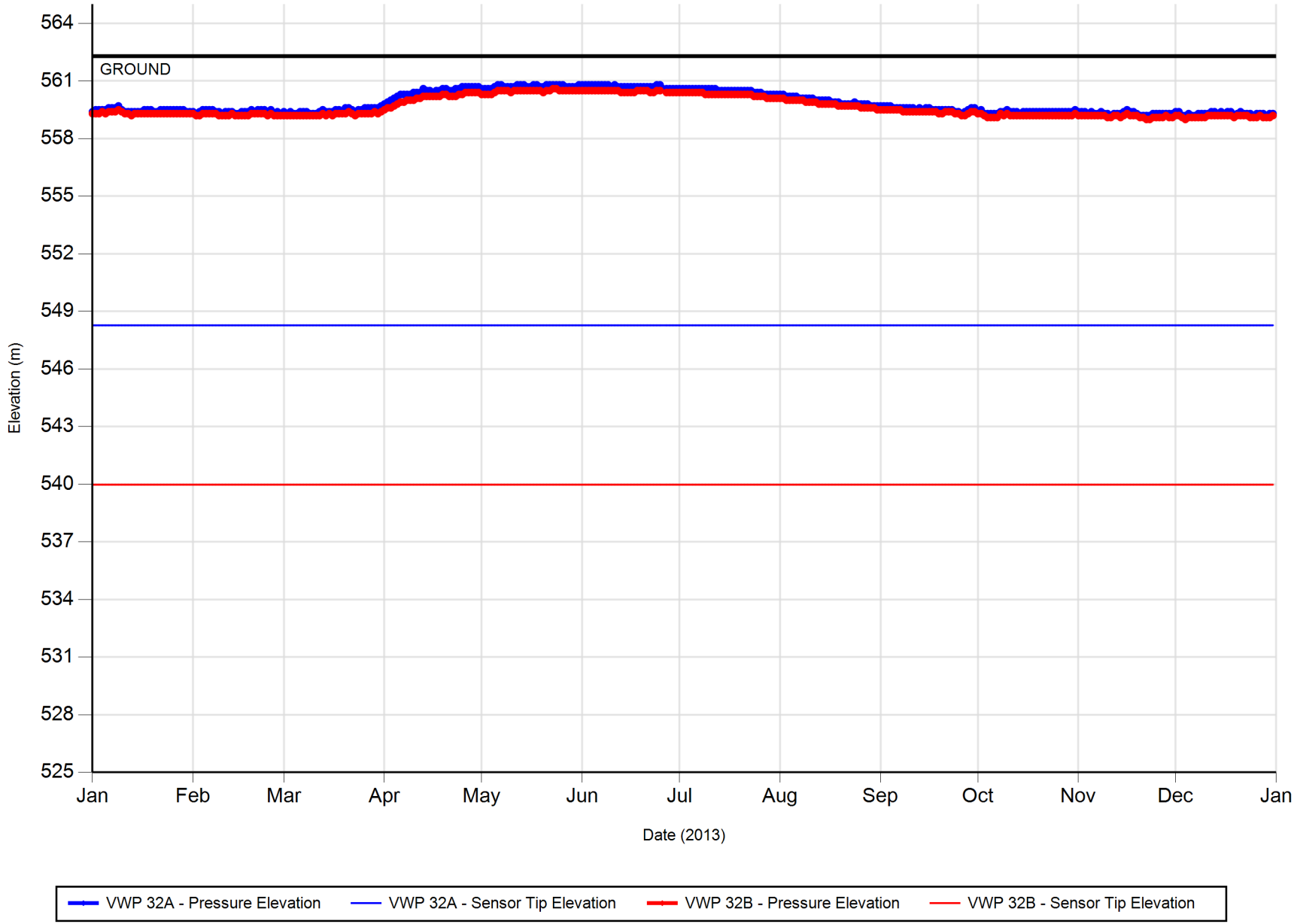
amec



West Quesnel Land Stability Program

VWP 32A and B (Station 20)

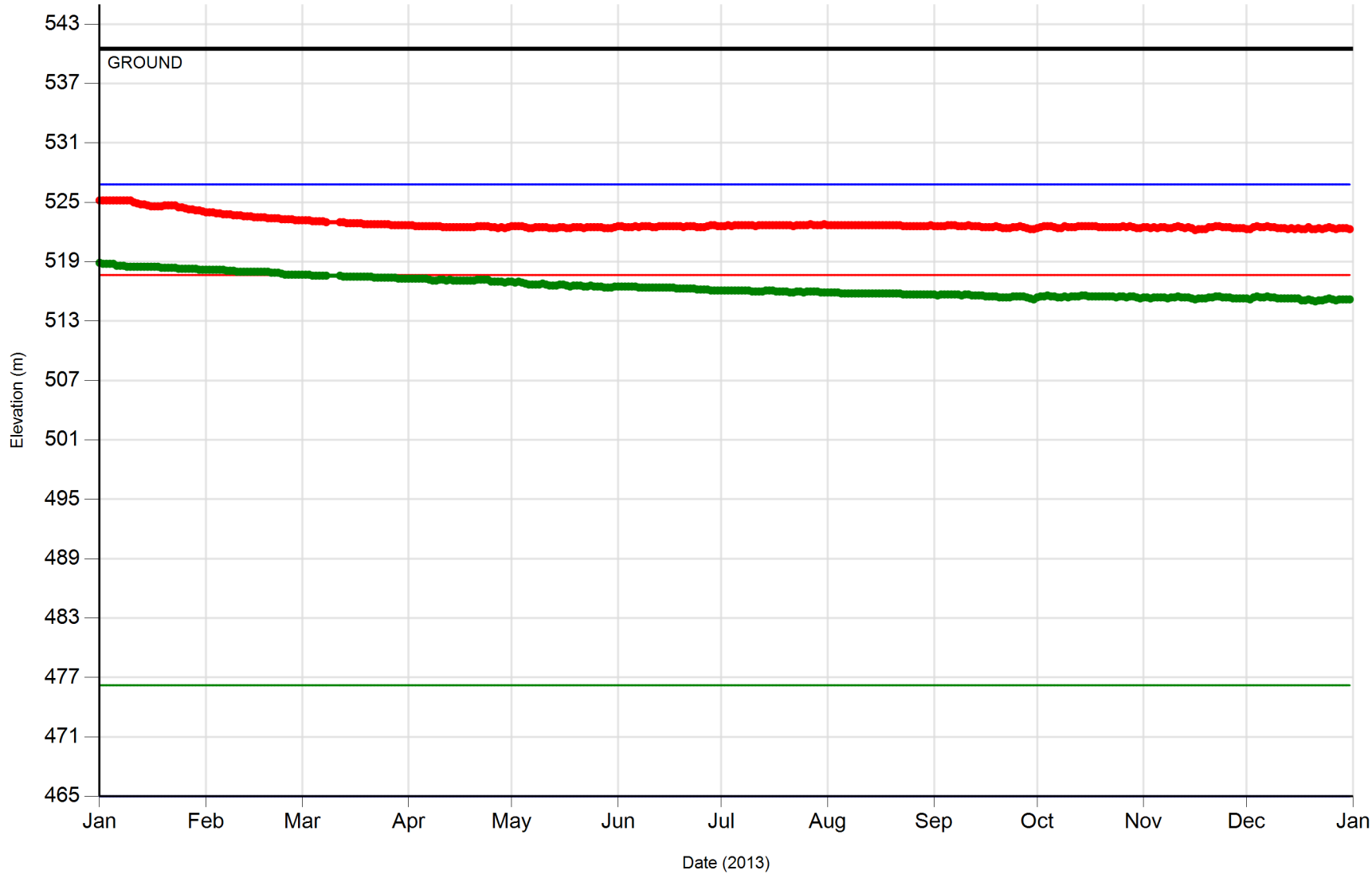
amec



West Quesnel Land Stability Program

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

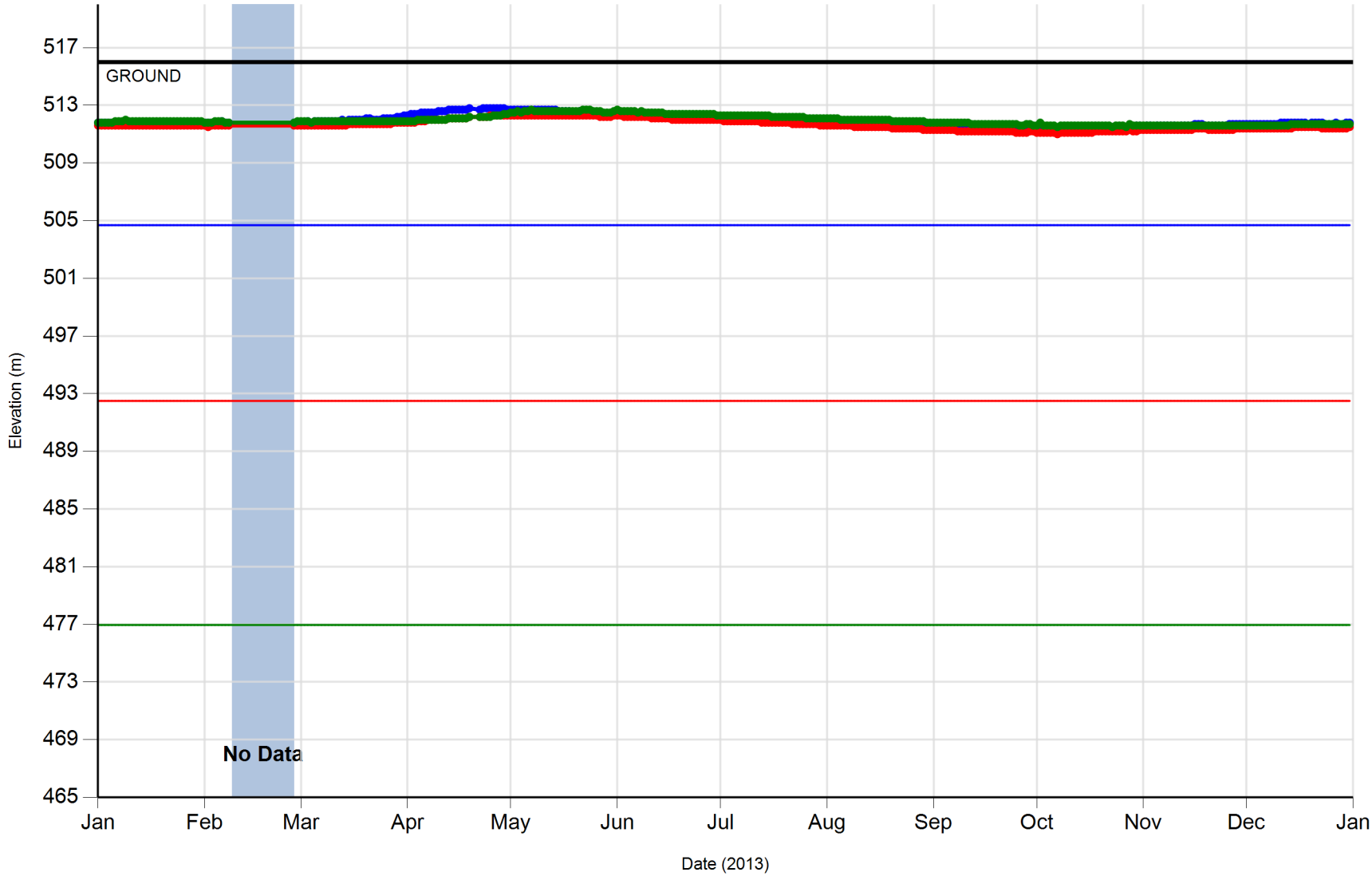
amec



West Quesnel Land Stability Program

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

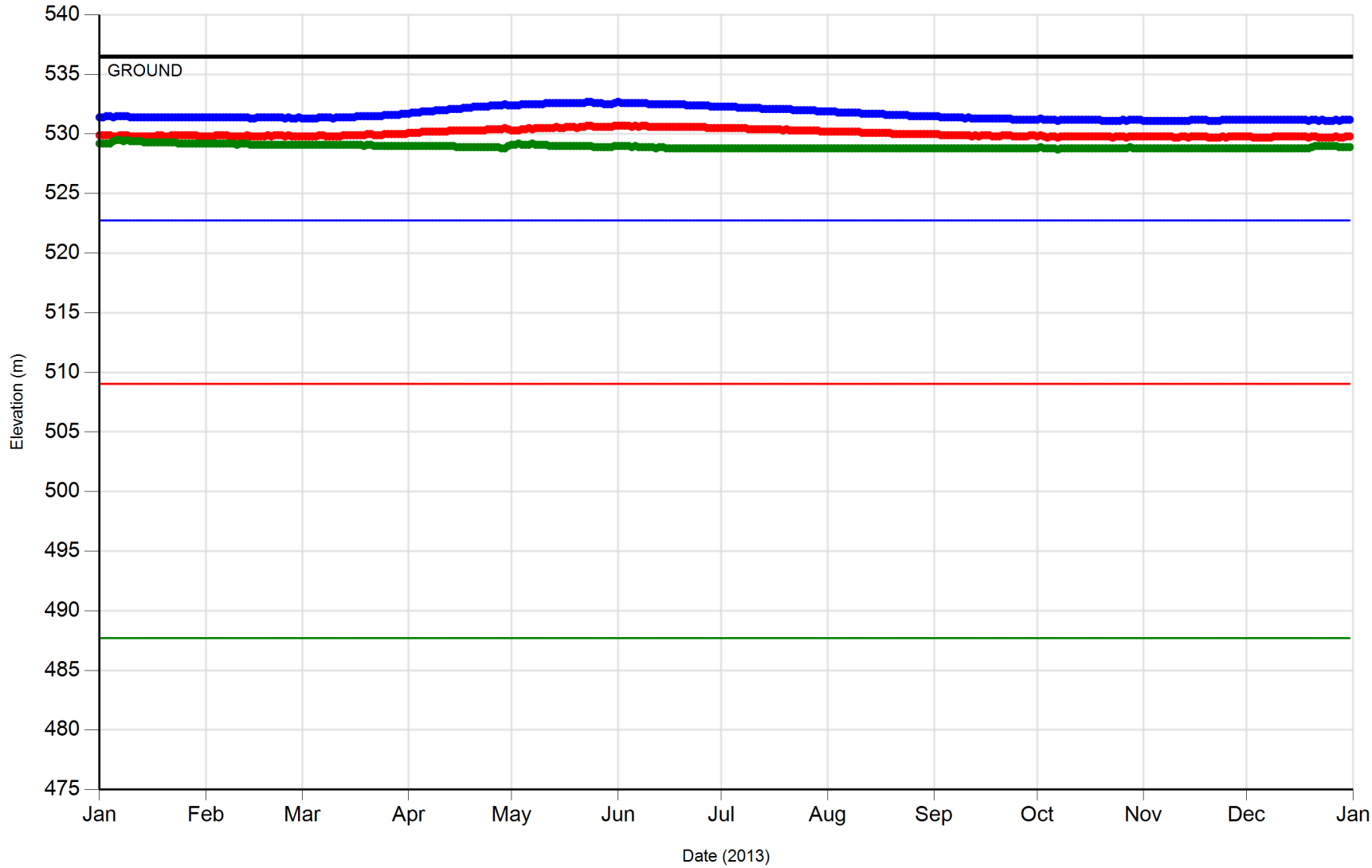
amec



West Quesnel Land Stability Program

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

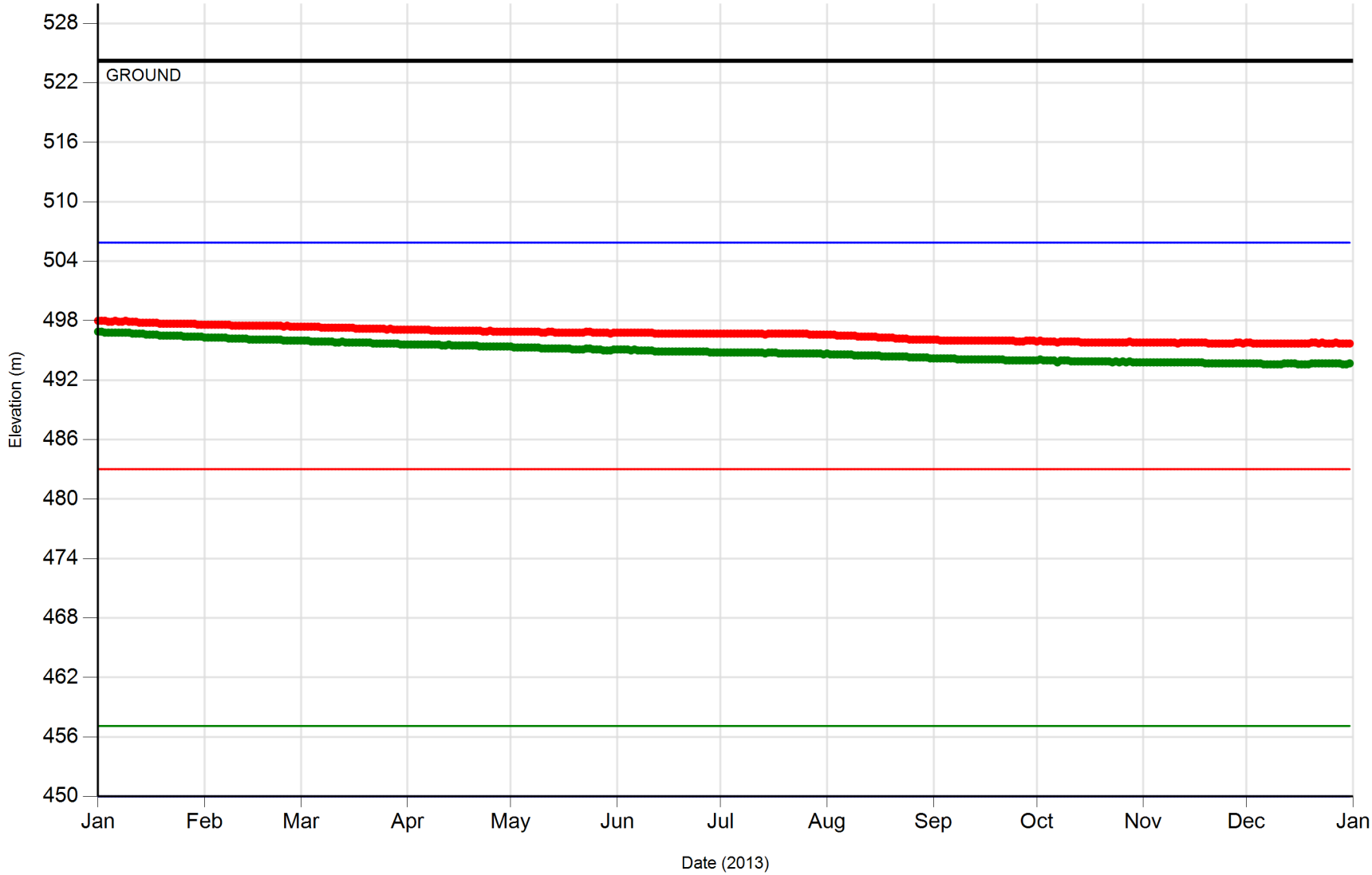
amec



West Quesnel Land Stability Program

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

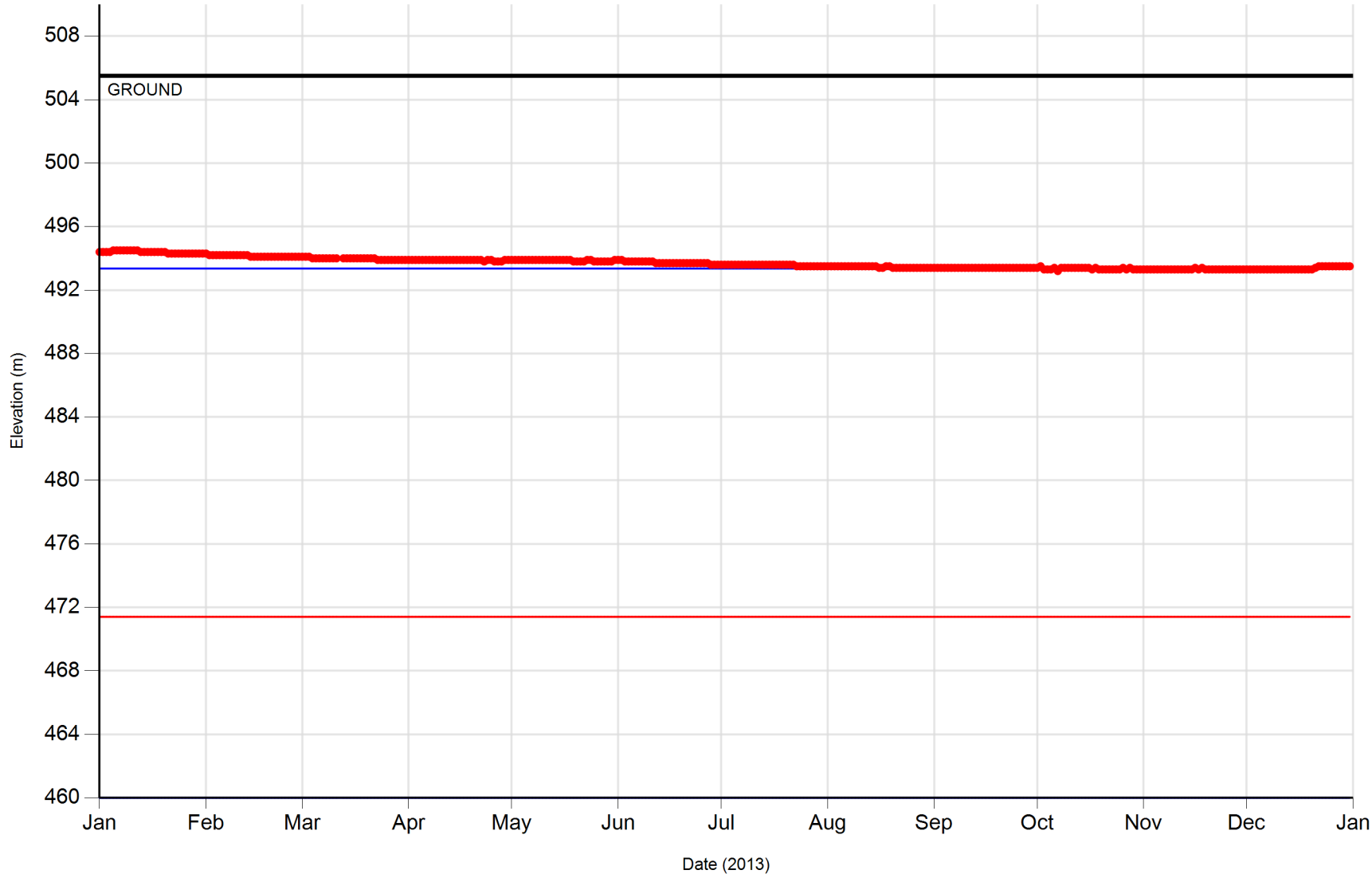
amec



West Quesnel Land Stability Program

VWP 37A and B (Station 29)

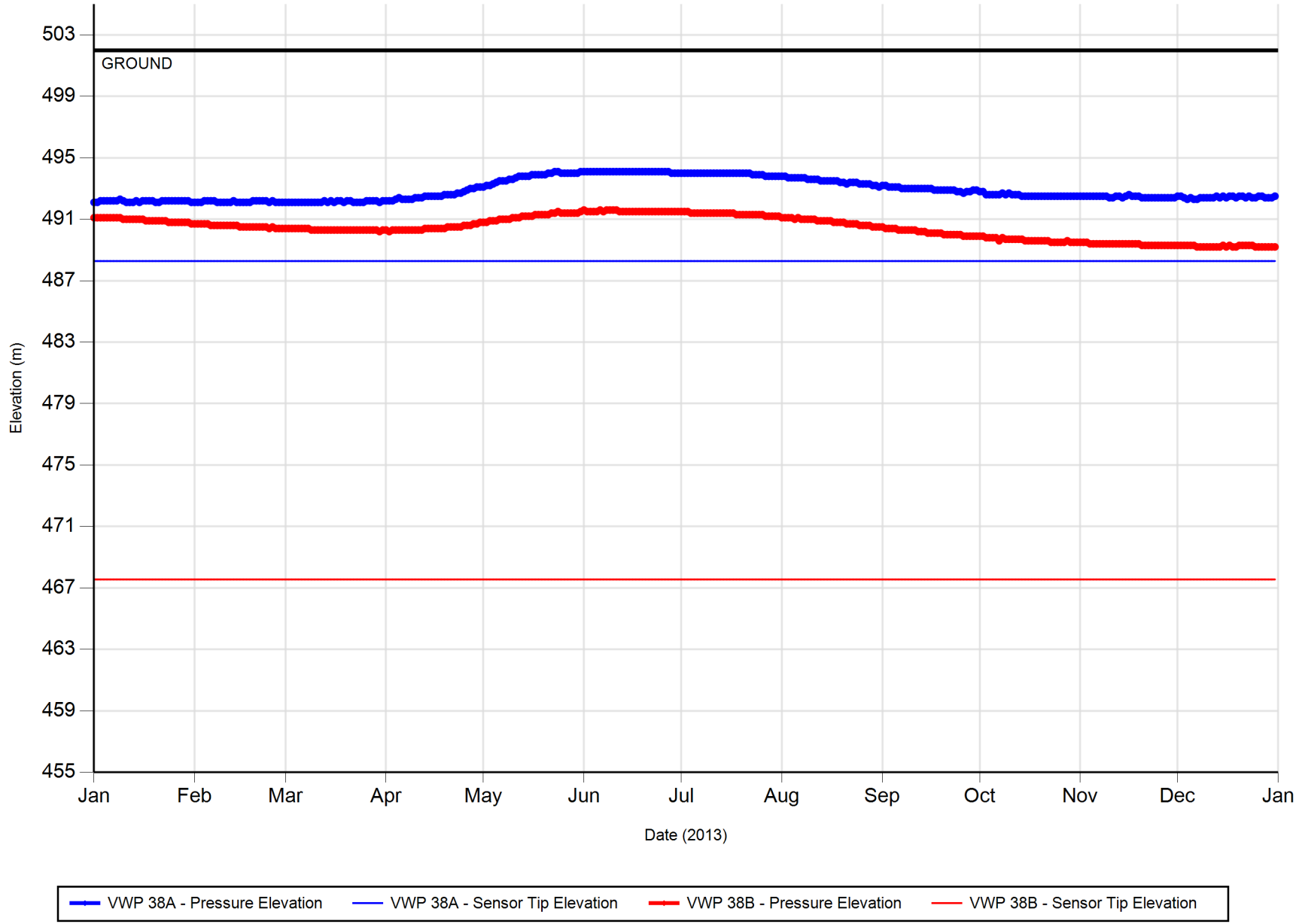
amec



West Quesnel Land Stability Program

VWP 38A and B (Station 19)

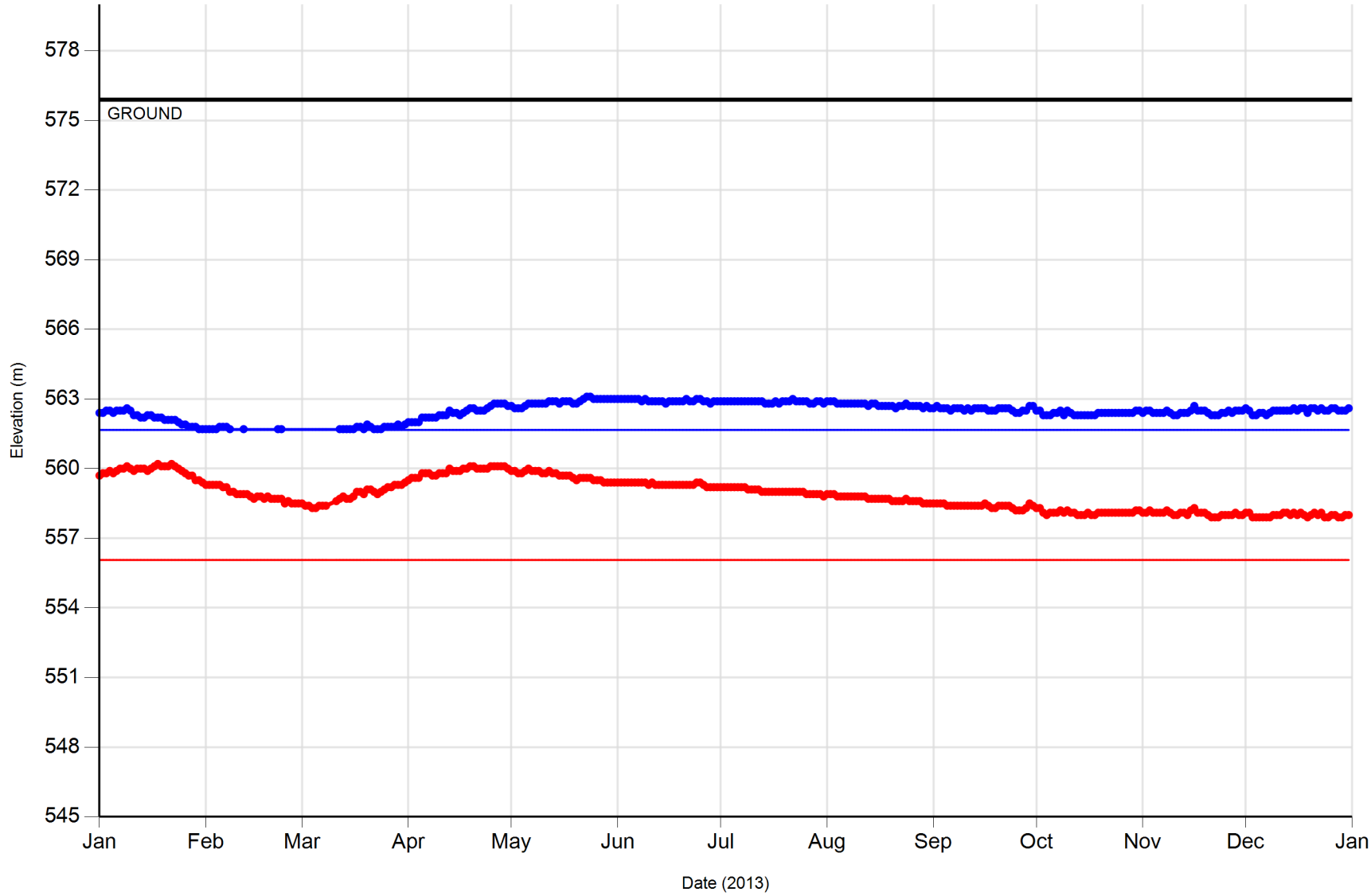
amec



West Quesnel Land Stability Program

VWP 39A and B (Station 30)

amec



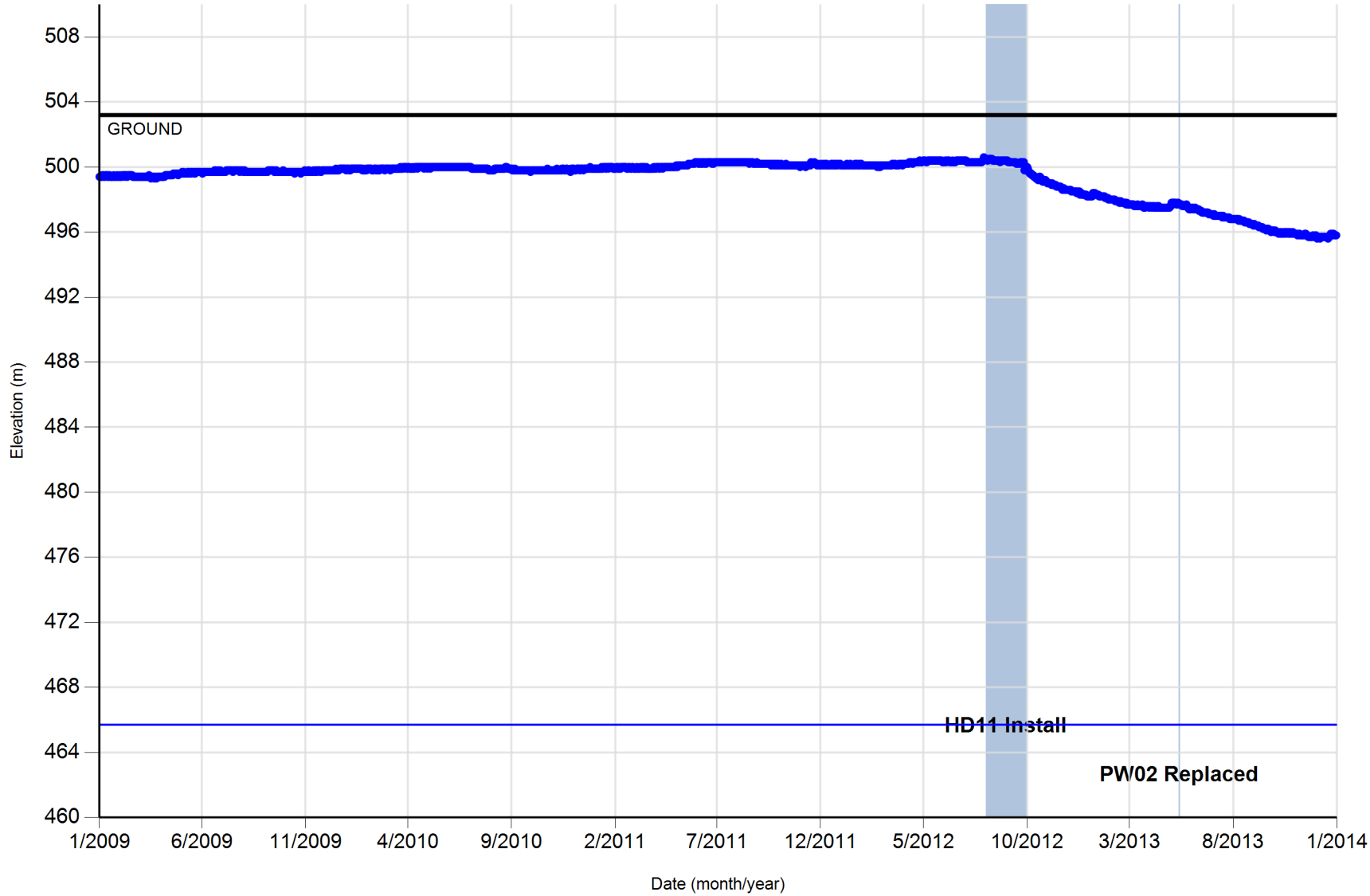
West Quesnel
Land Stability Program

Long Term VWP Trends

West Quesnel Land Stability Program

VWP 3 (Station 02)

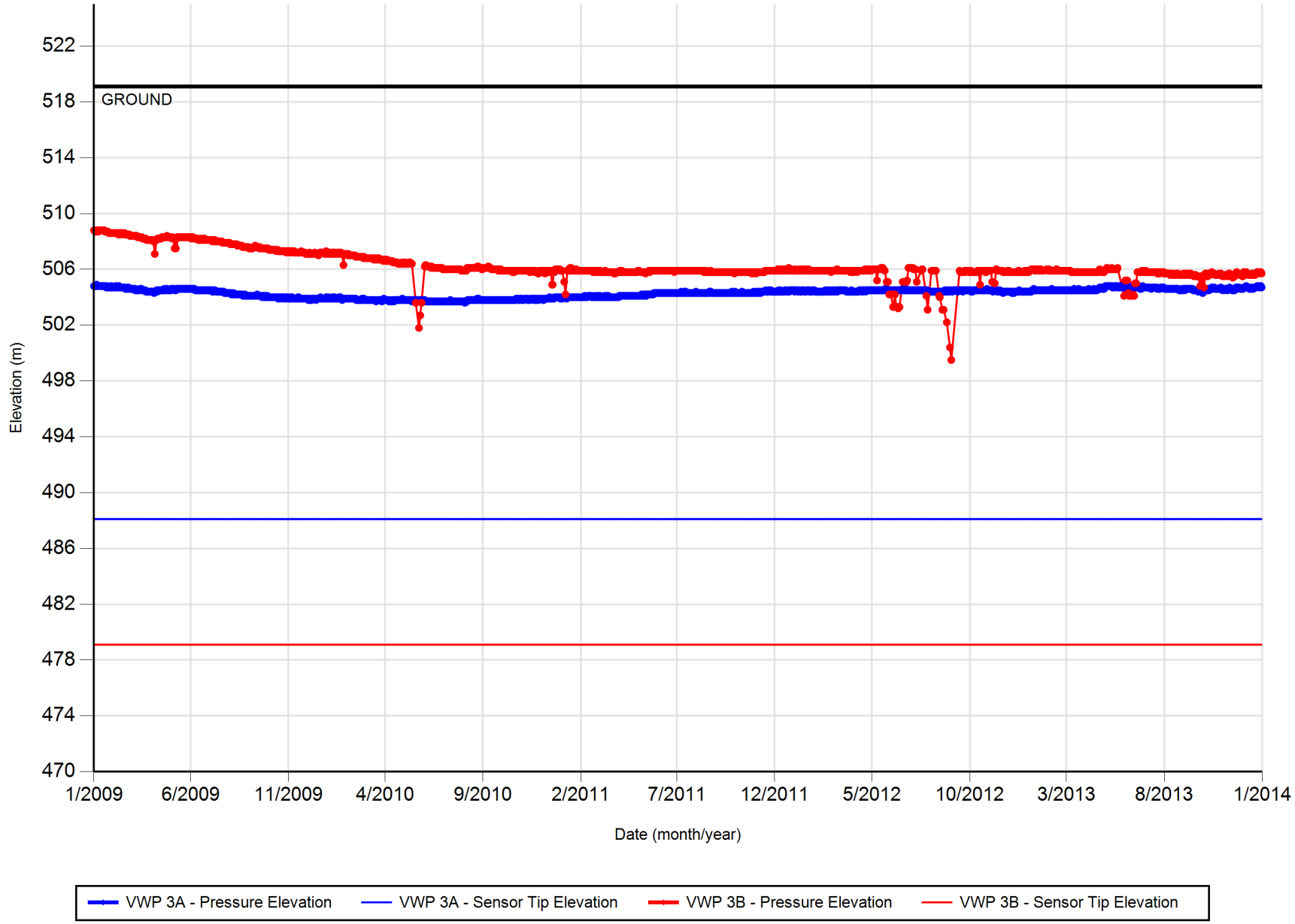
amec



West Quesnel Land Stability Program

VWP 3A and B (Station 06)

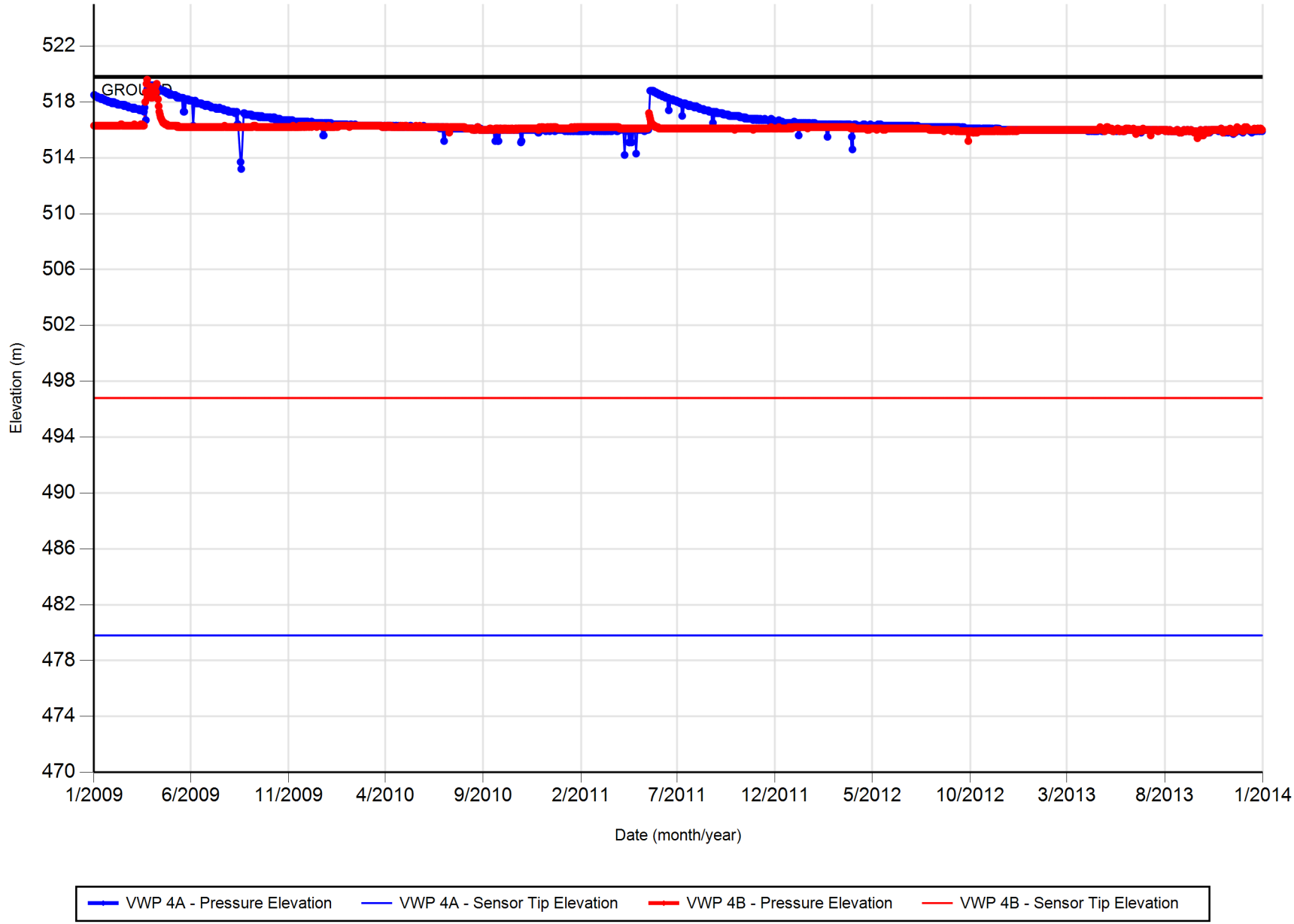
amec



West Quesnel Land Stability Program

VWP 4A and B (Station 06)

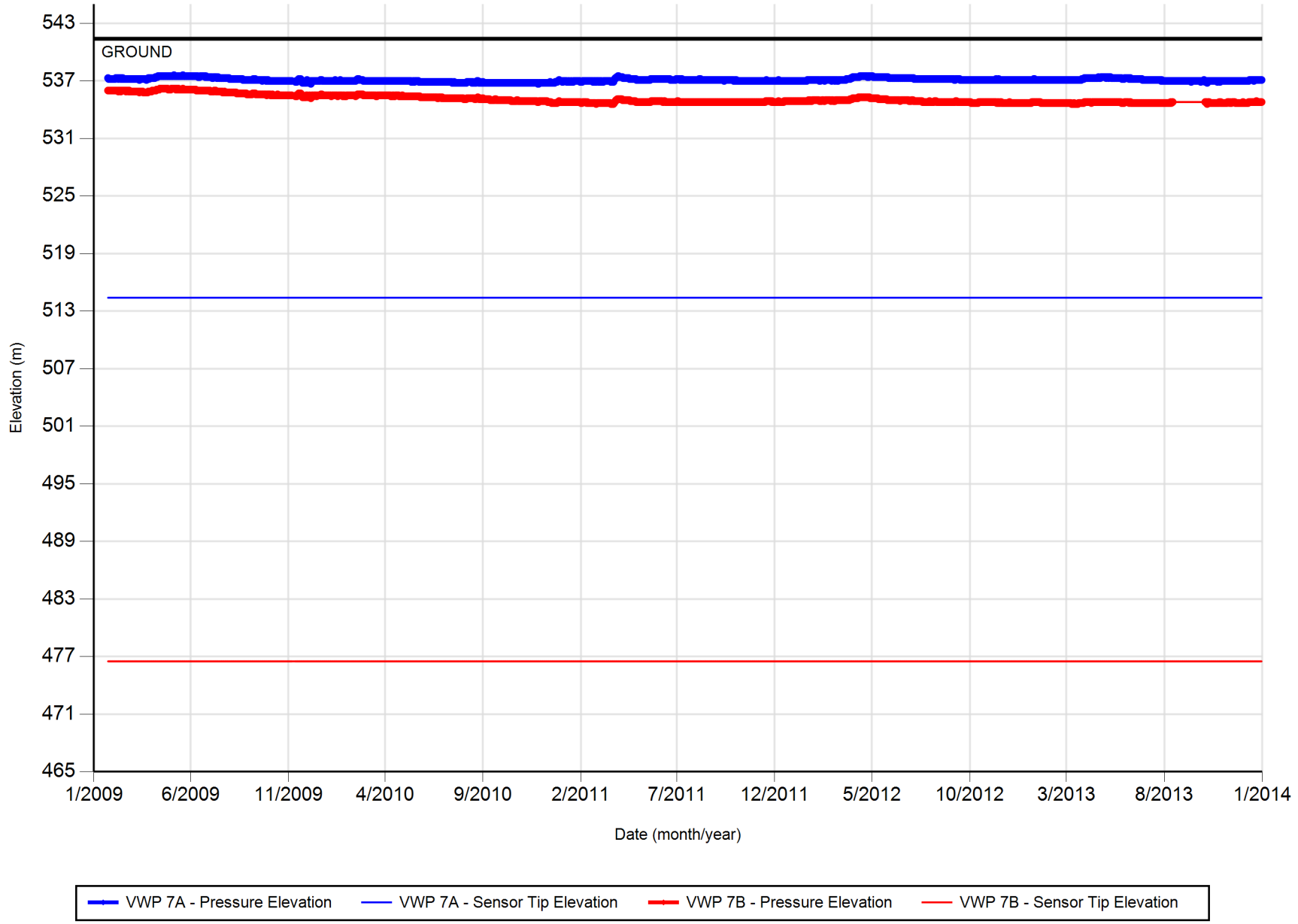
amec



West Quesnel Land Stability Program

VWP 7A and B (Station 07)

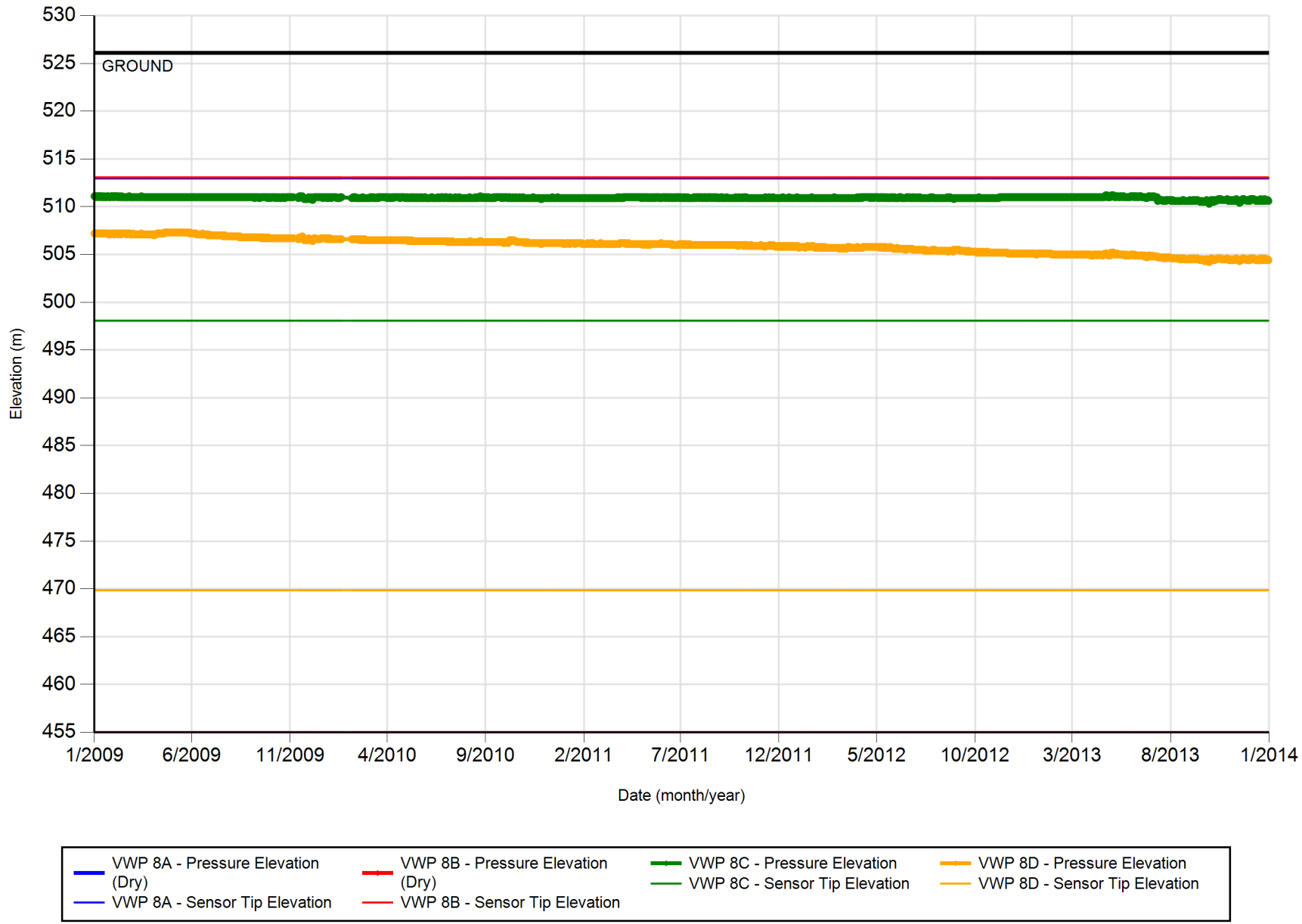
amec



West Quesnel Land Stability Program

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

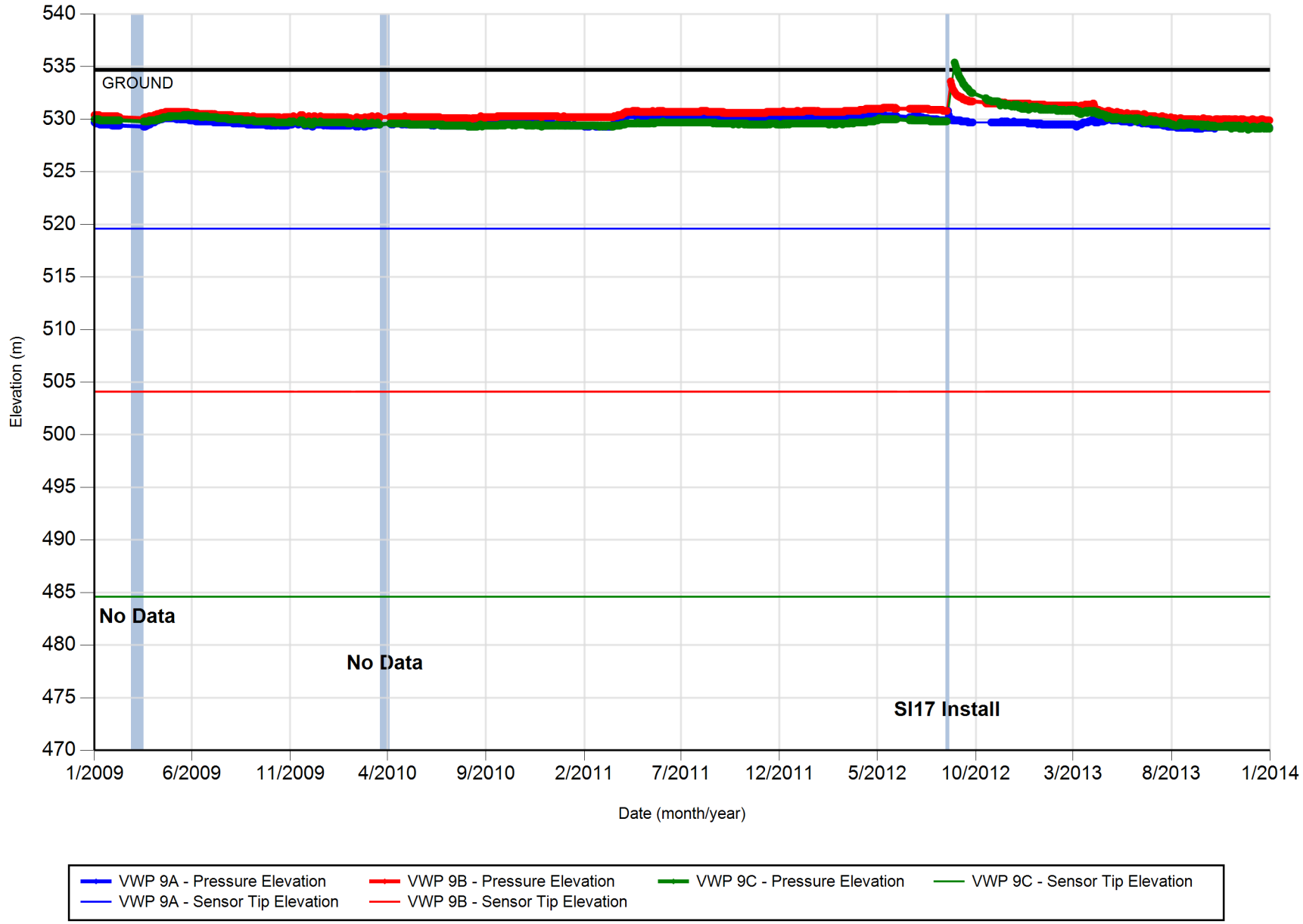
amec



West Quesnel Land Stability Program

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

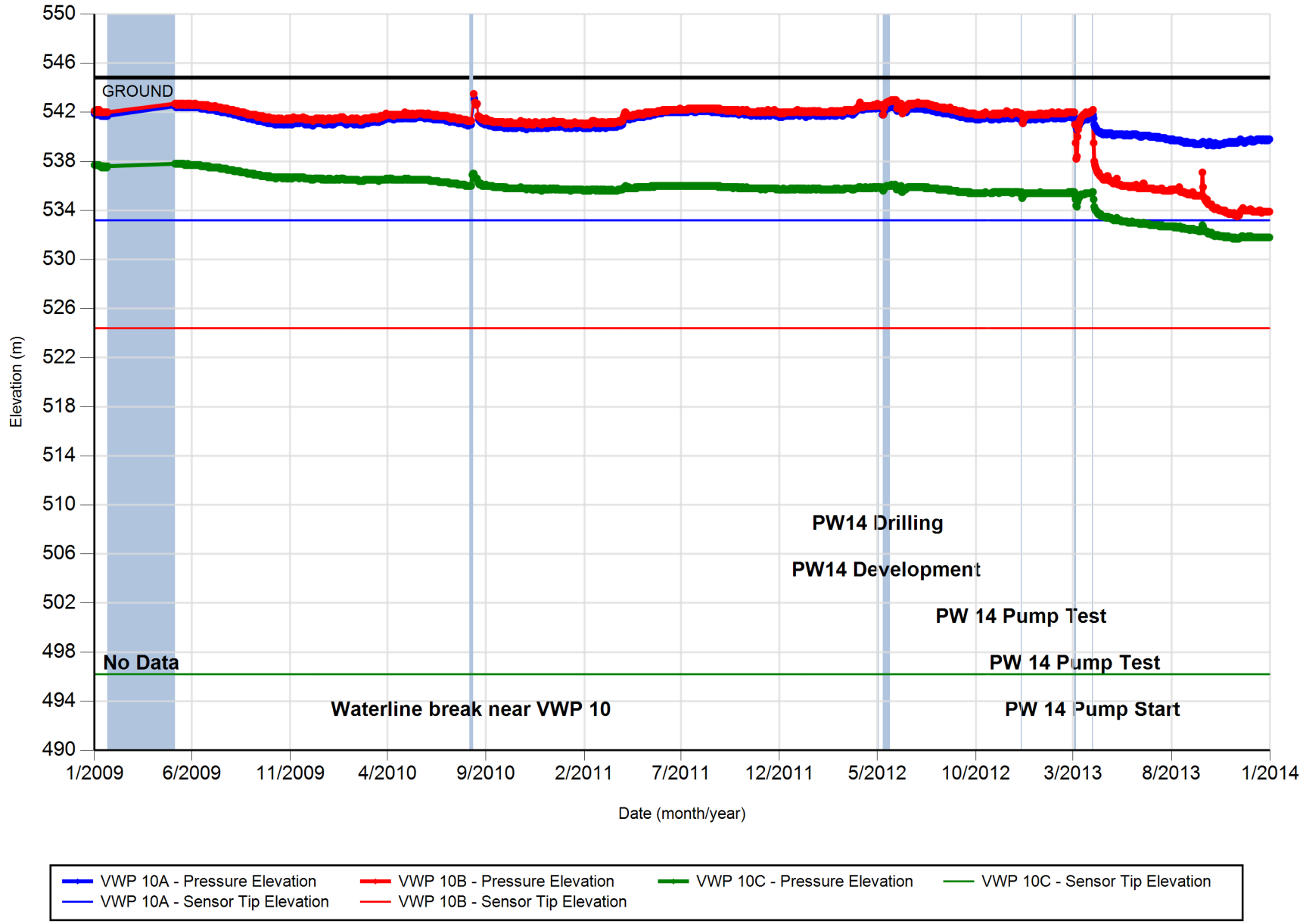
amec



West Quesnel Land Stability Program

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

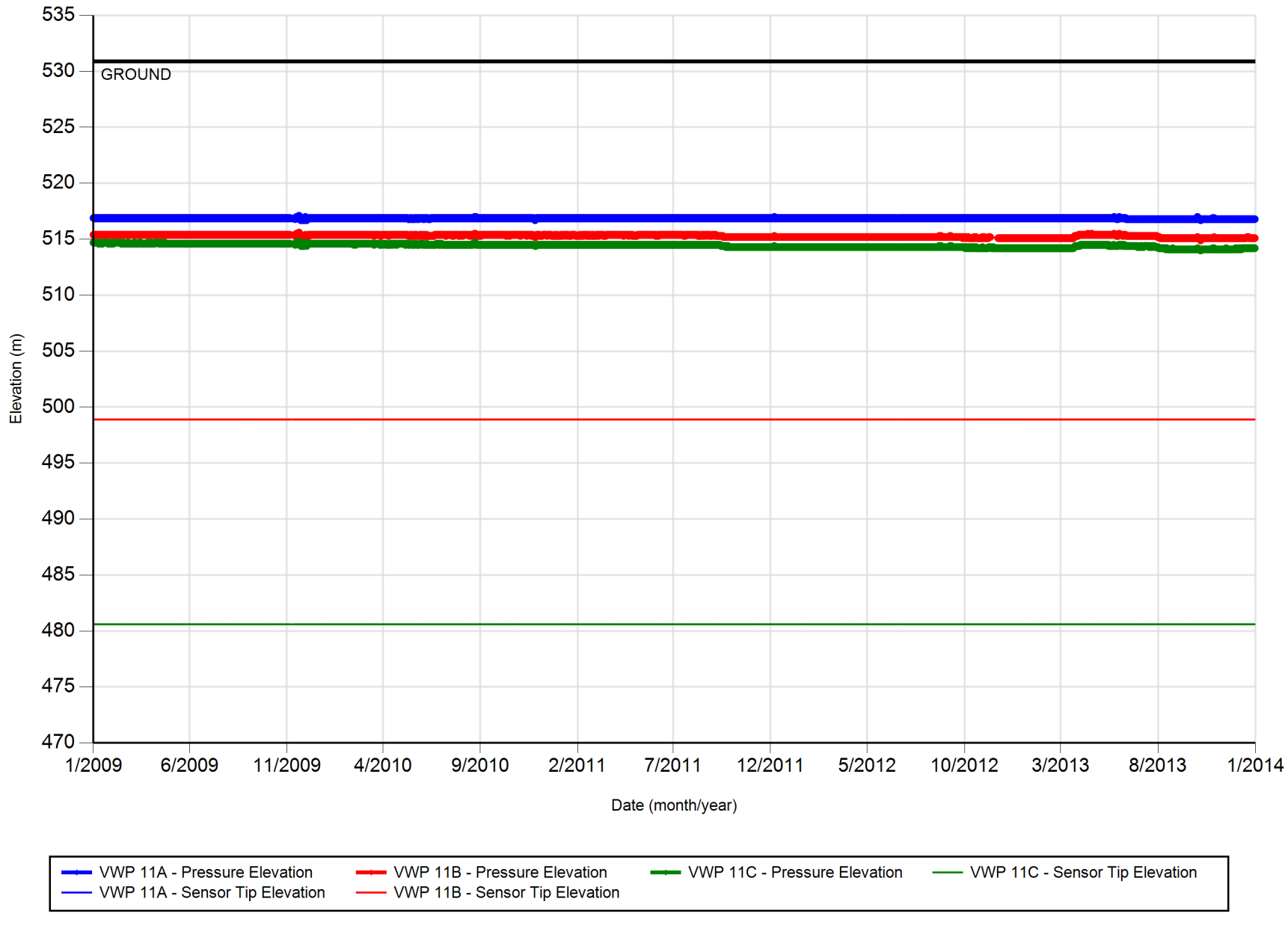
amec



West Quesnel Land Stability Program

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

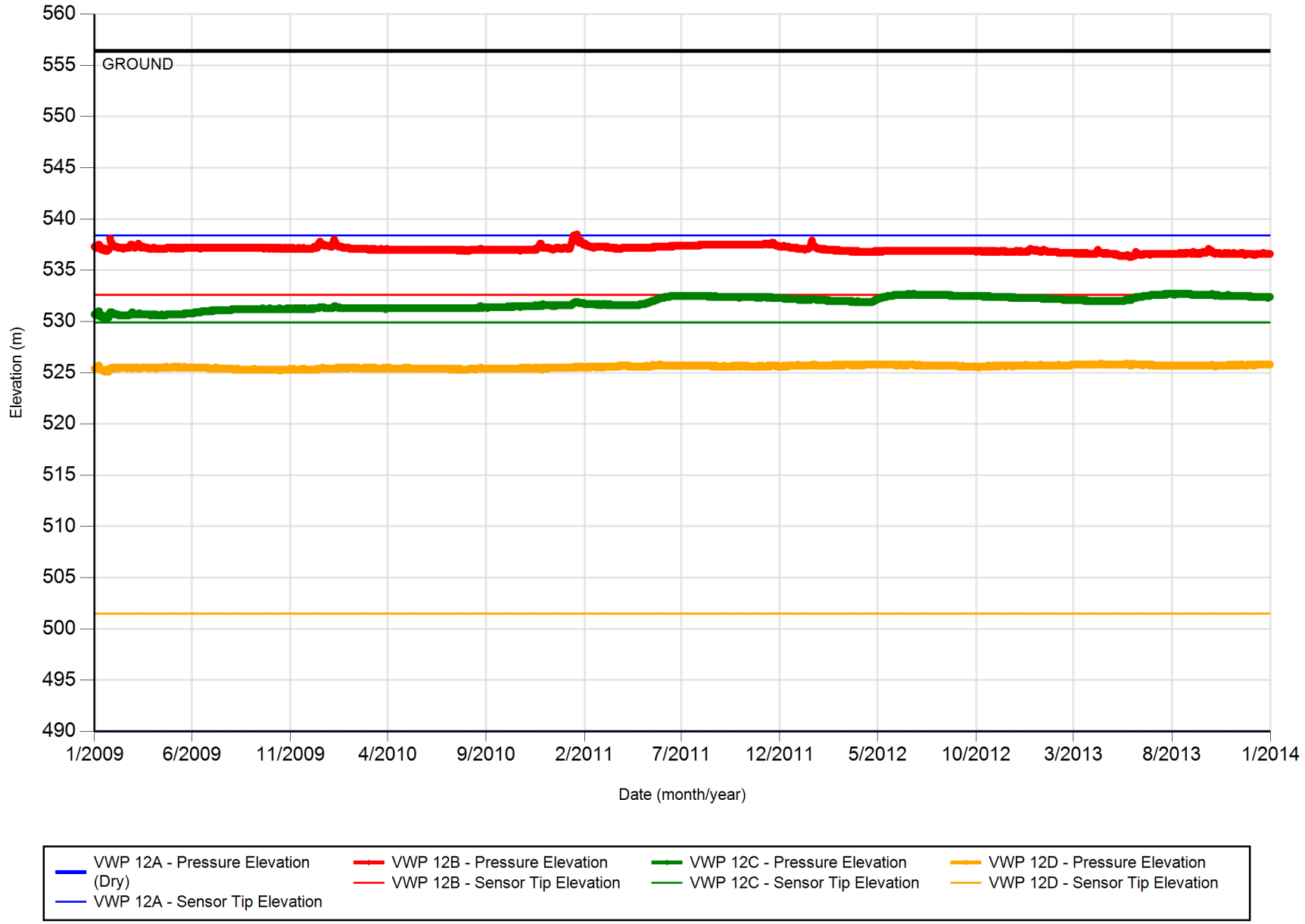
amec



West Quesnel Land Stability Program

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

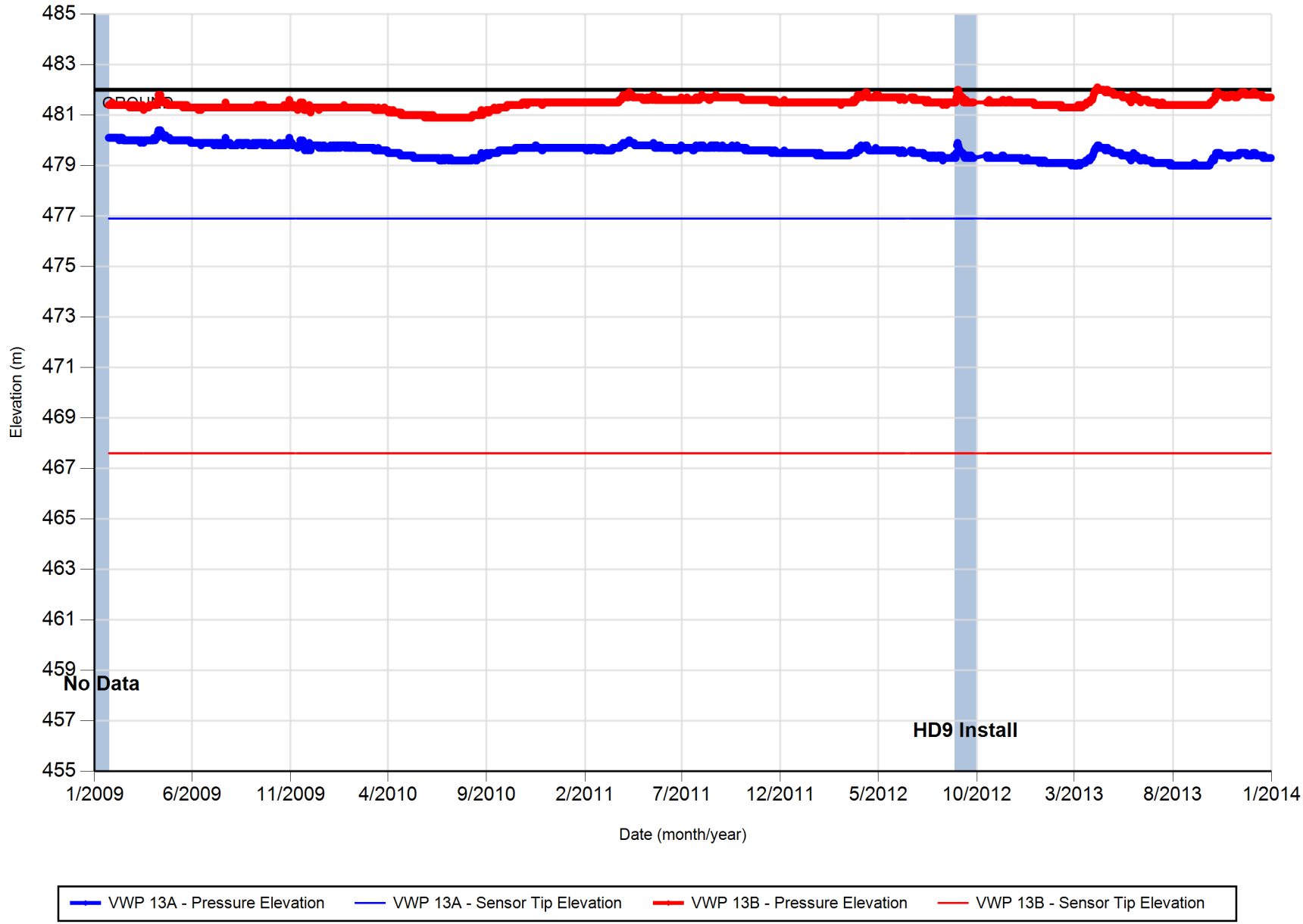
amec



West Quesnel Land Stability Program

VWP 13A and B (Station 12)

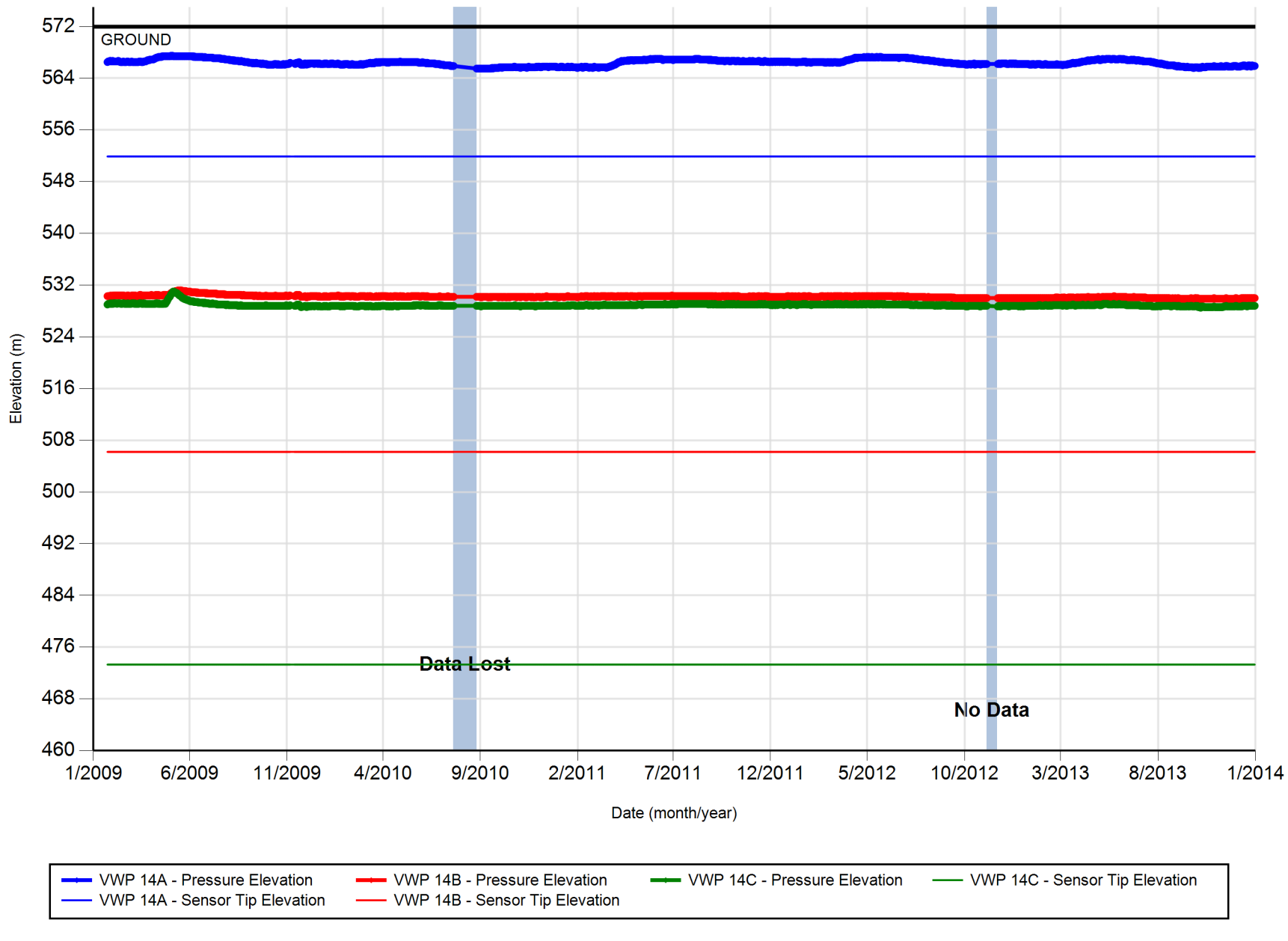
amec



West Quesnel Land Stability Program

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

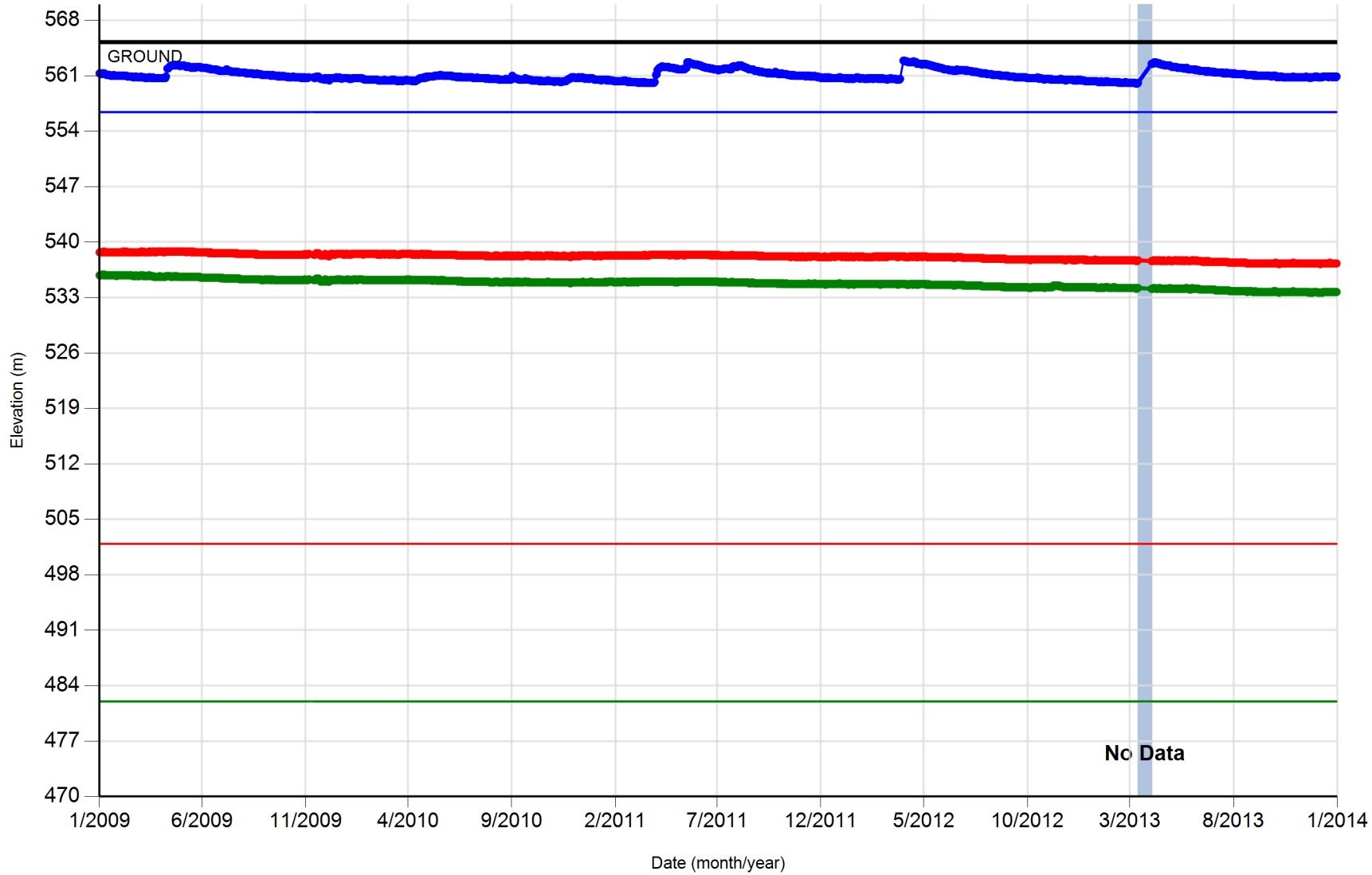
amec



West Quesnel Land Stability Program

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

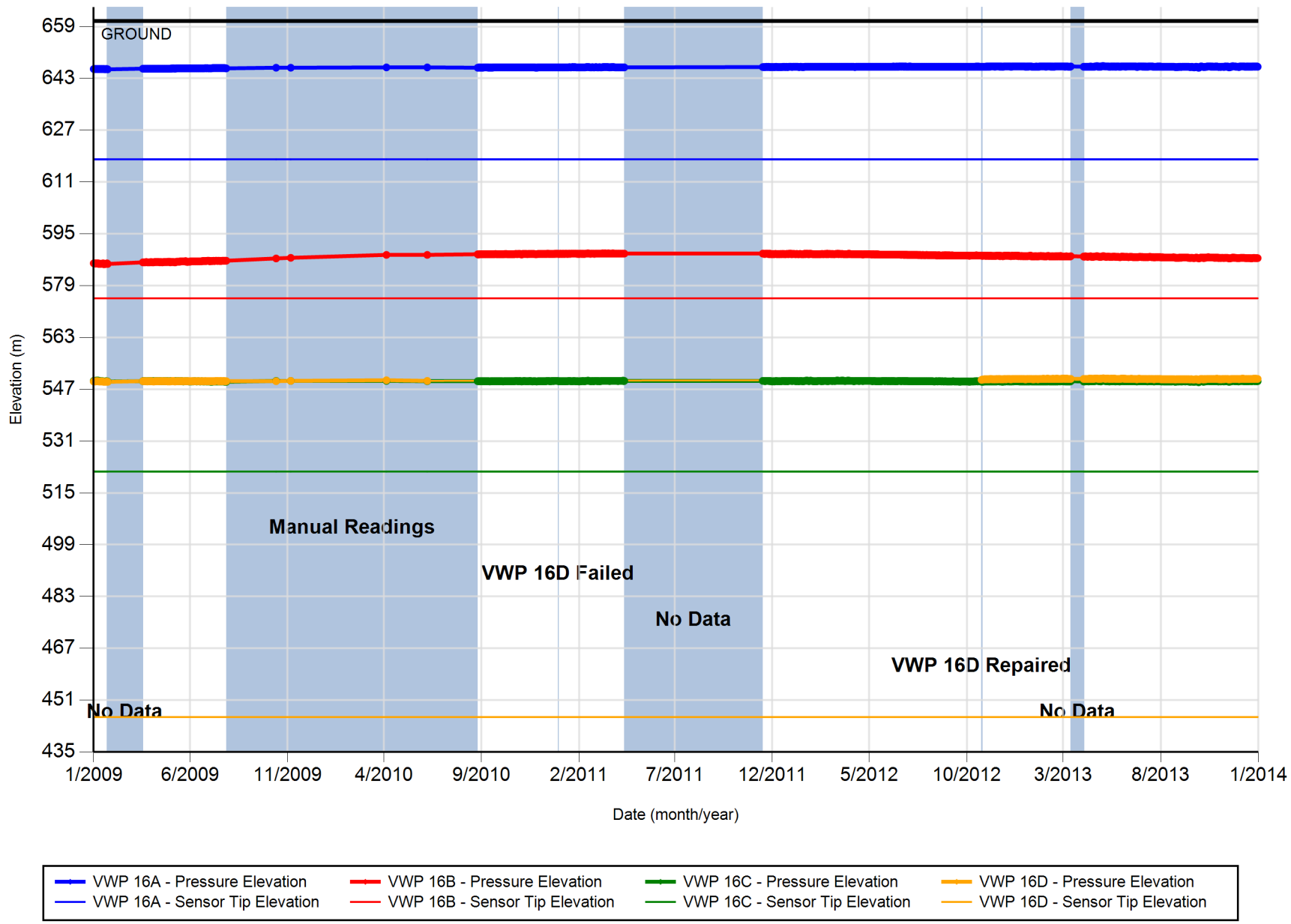
amec



West Quesnel Land Stability Program

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

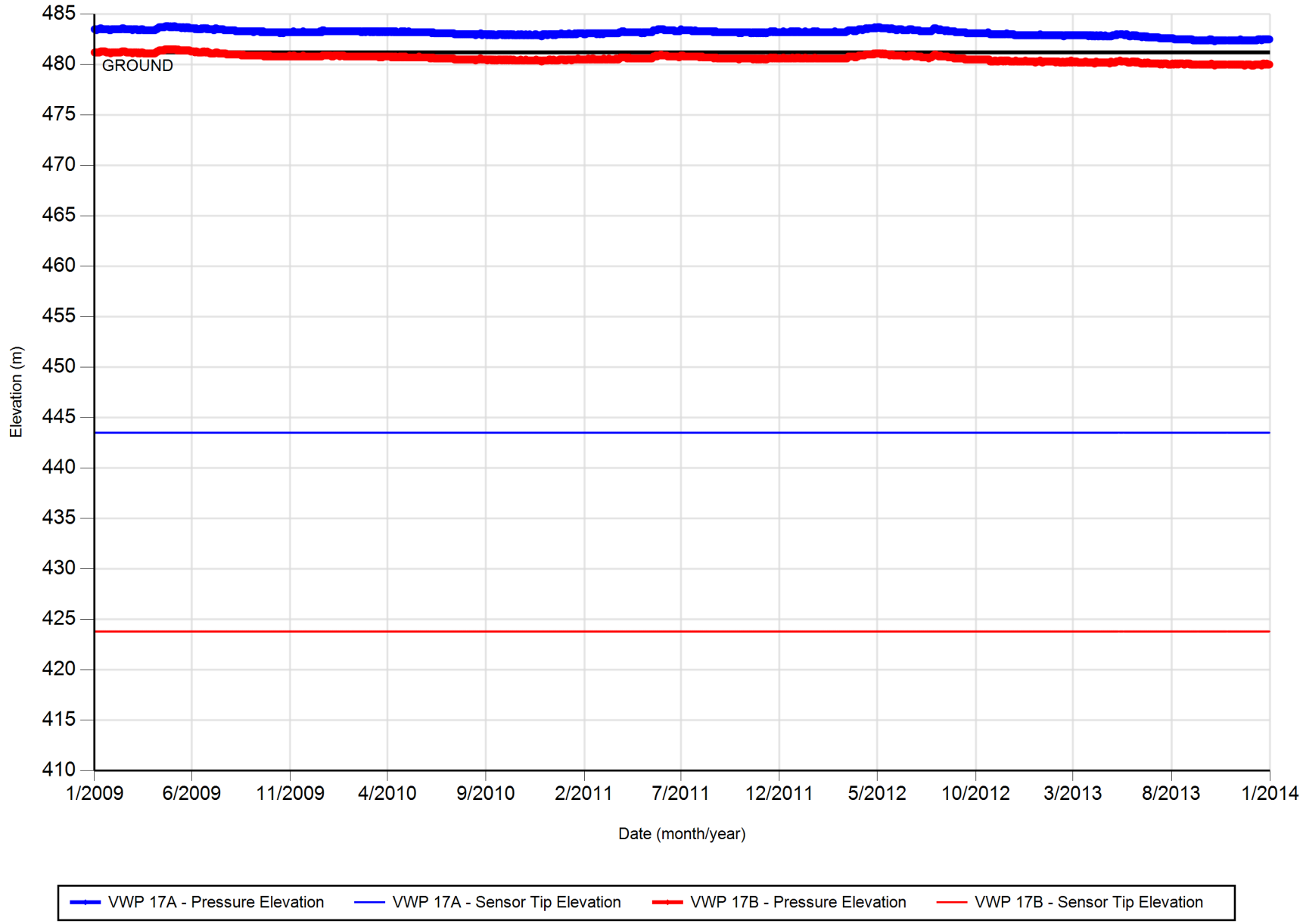
amec



West Quesnel Land Stability Program

VWP 17A and B (Station 17)

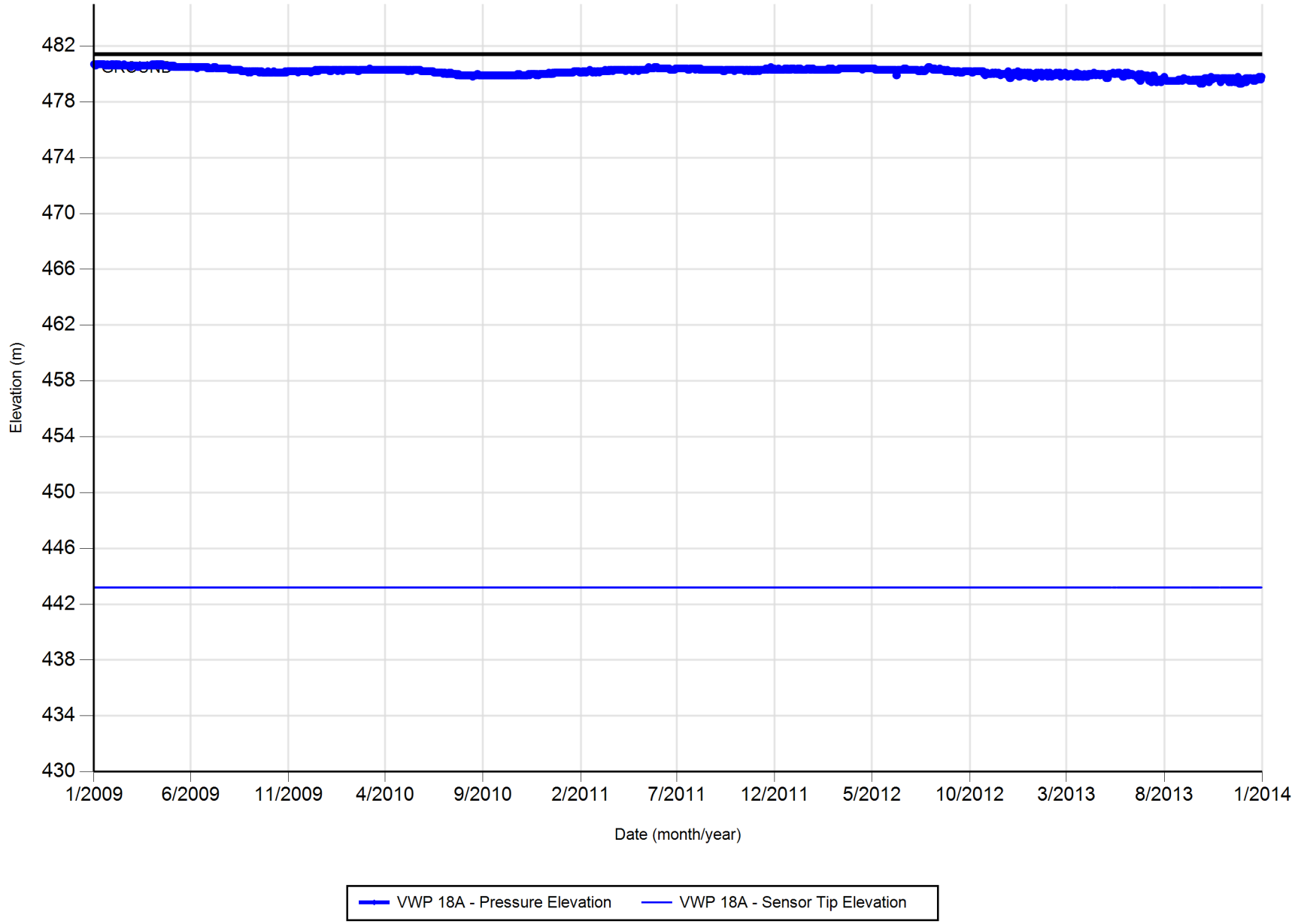
amec



West Quesnel Land Stability Program

VWP 18A (Station 17)

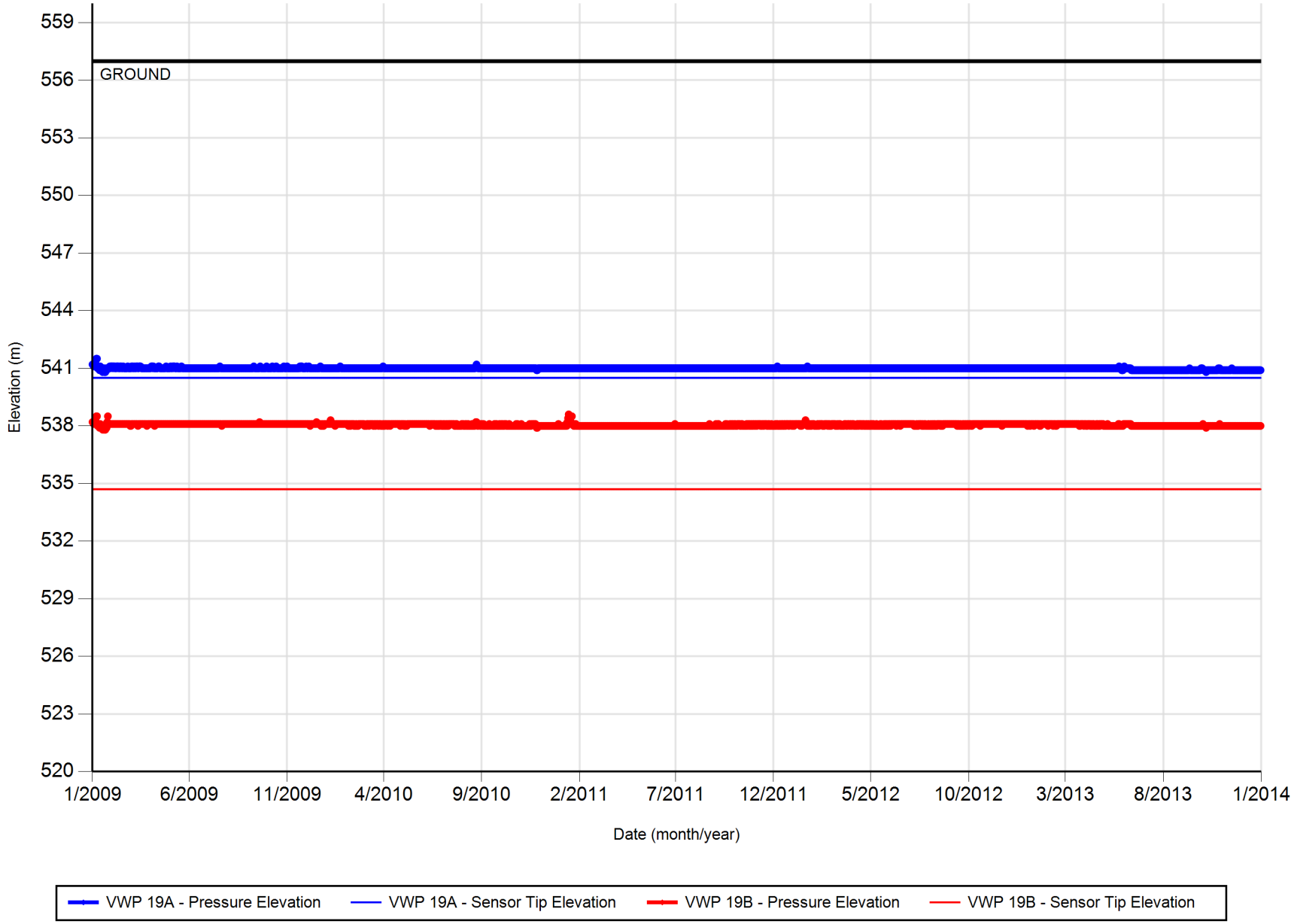
amec



West Quesnel Land Stability Program

VWP 19A and B (Station 16)

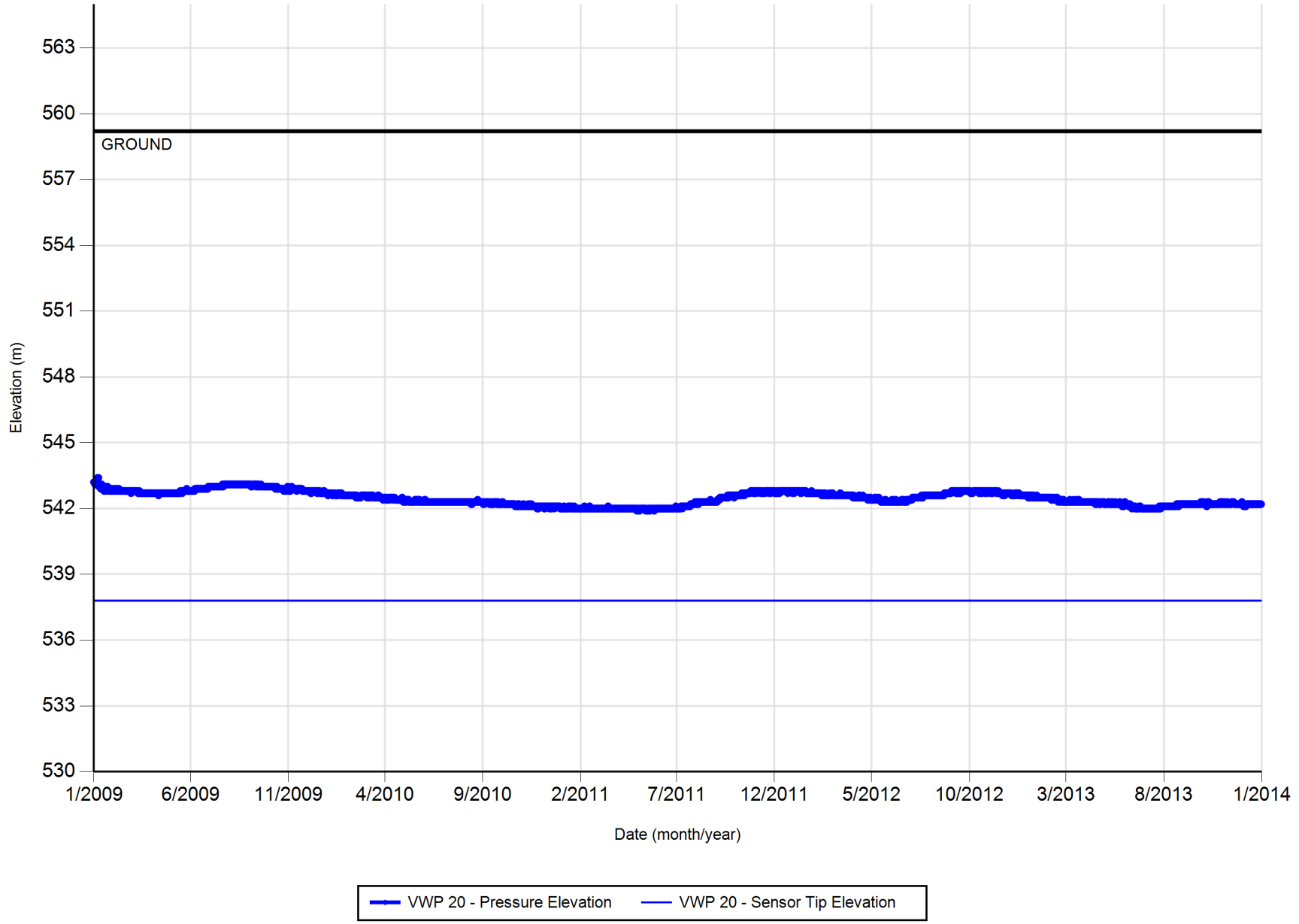
amec



West Quesnel Land Stability Program

VWP 20 (Station 16)

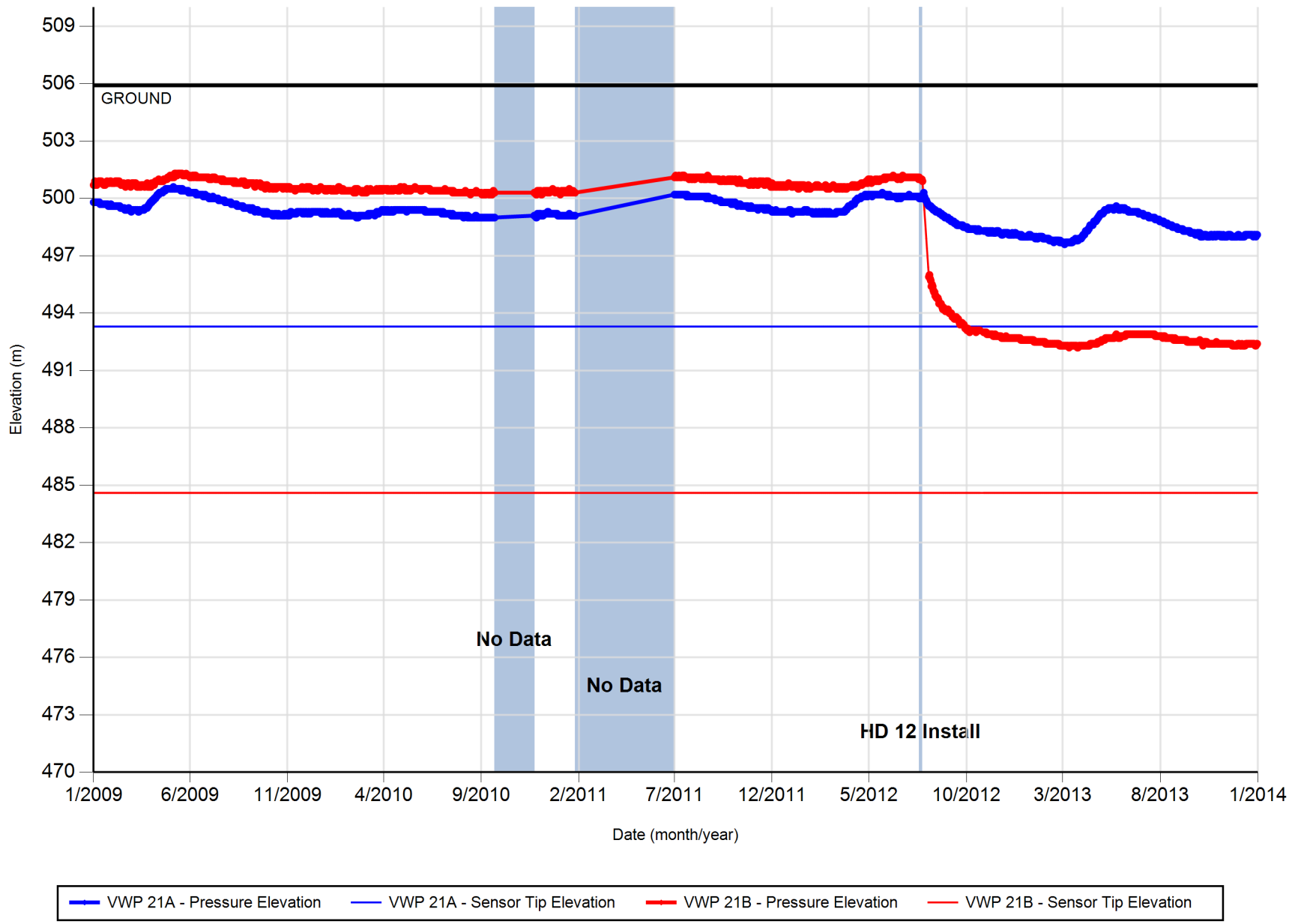
amec



West Quesnel Land Stability Program

VWP 21A and B (Station 19)

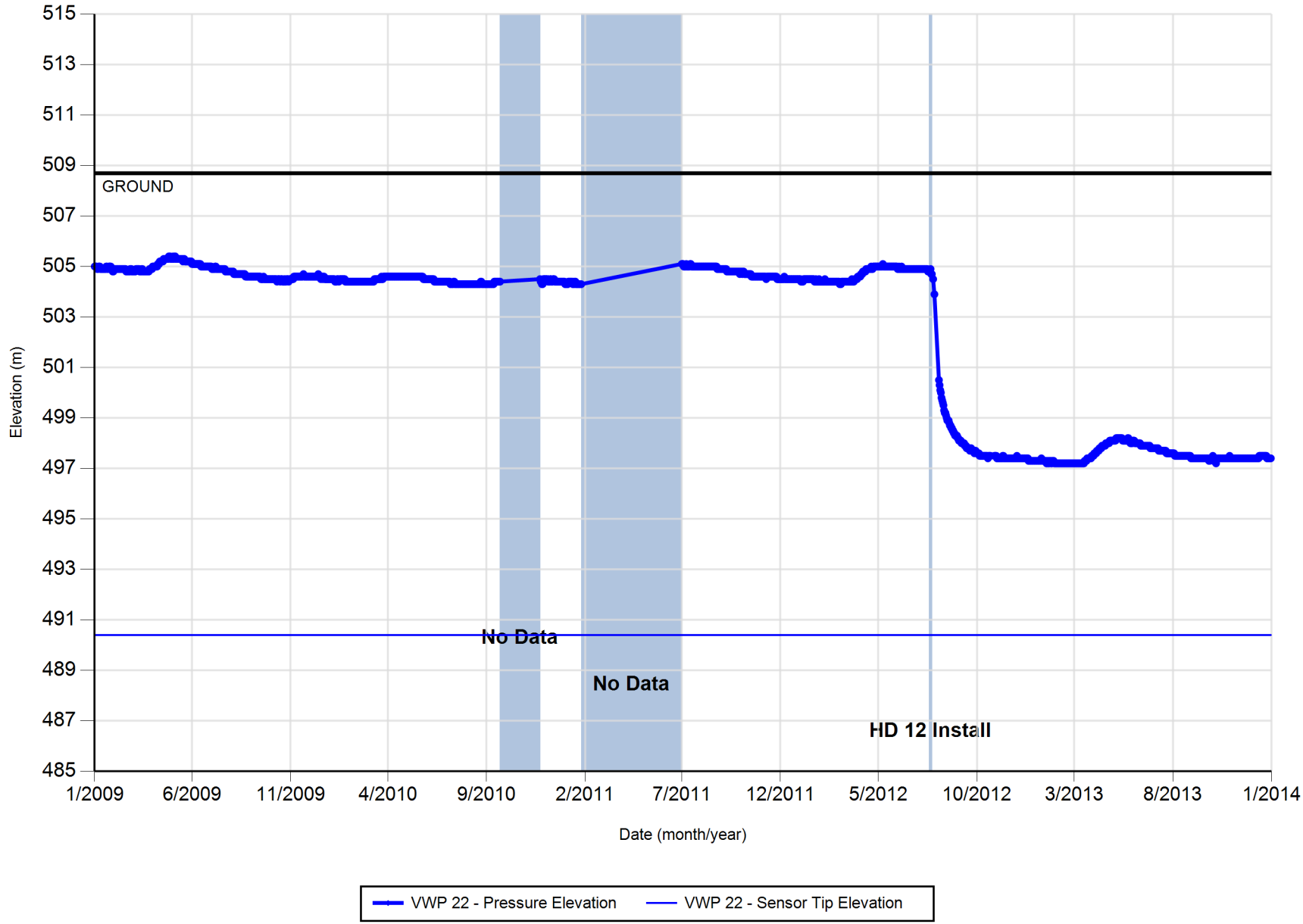
amec



West Quesnel Land Stability Program

VWP 22 (Station 19)

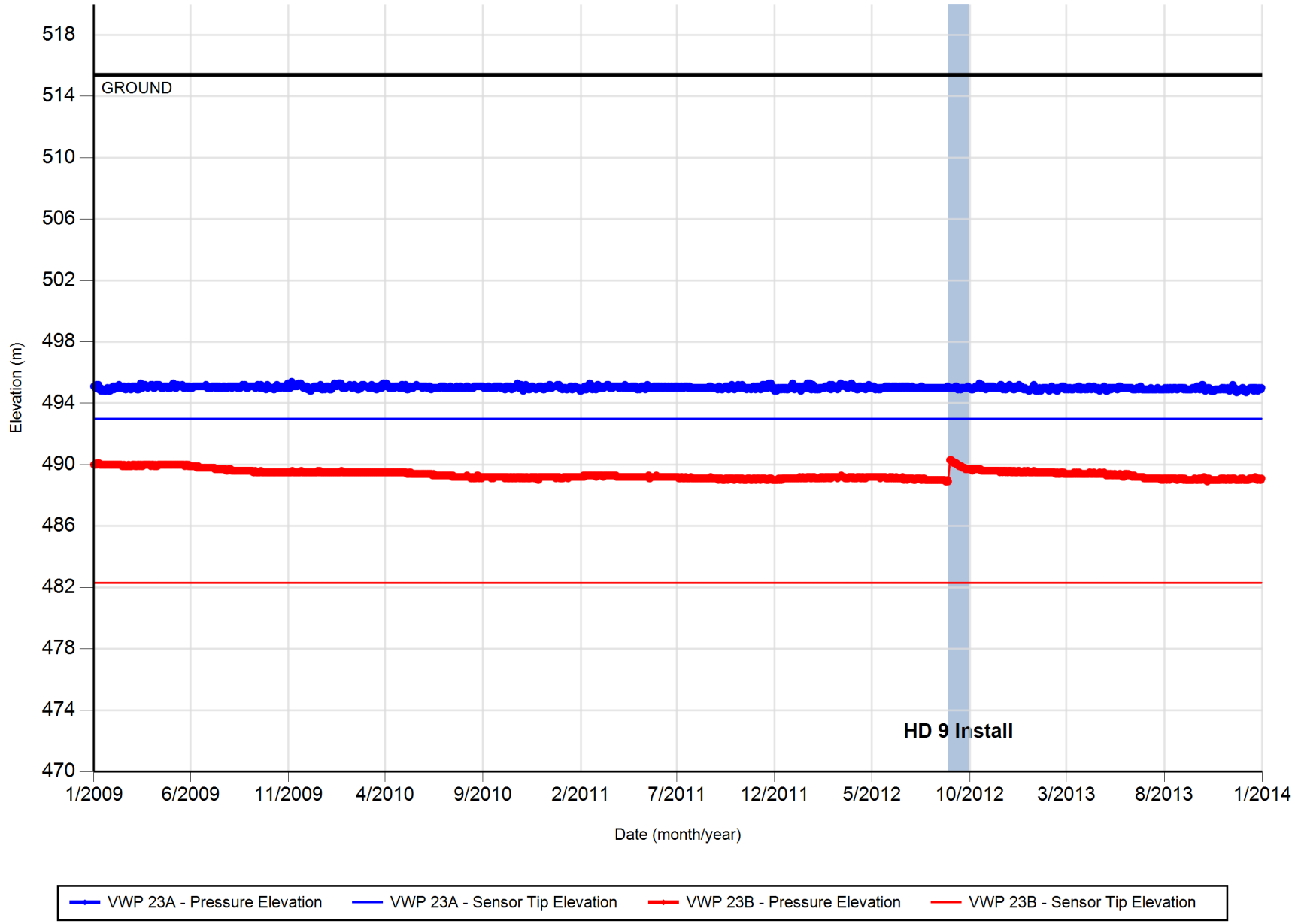
amec



West Quesnel Land Stability Program

VWP 23A and B (Station 18)

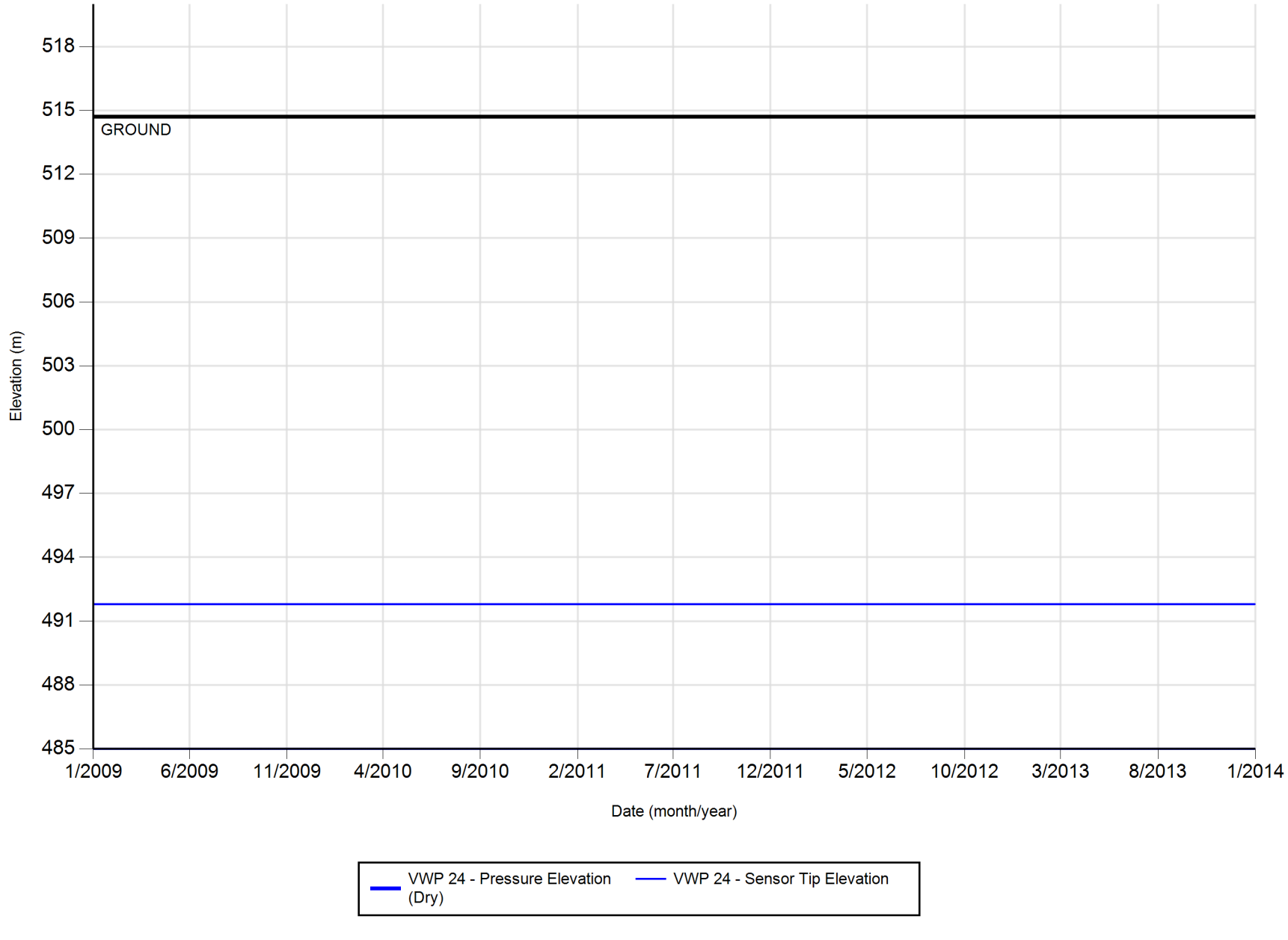
amec



West Quesnel Land Stability Program

VWP 24 (Station 18)

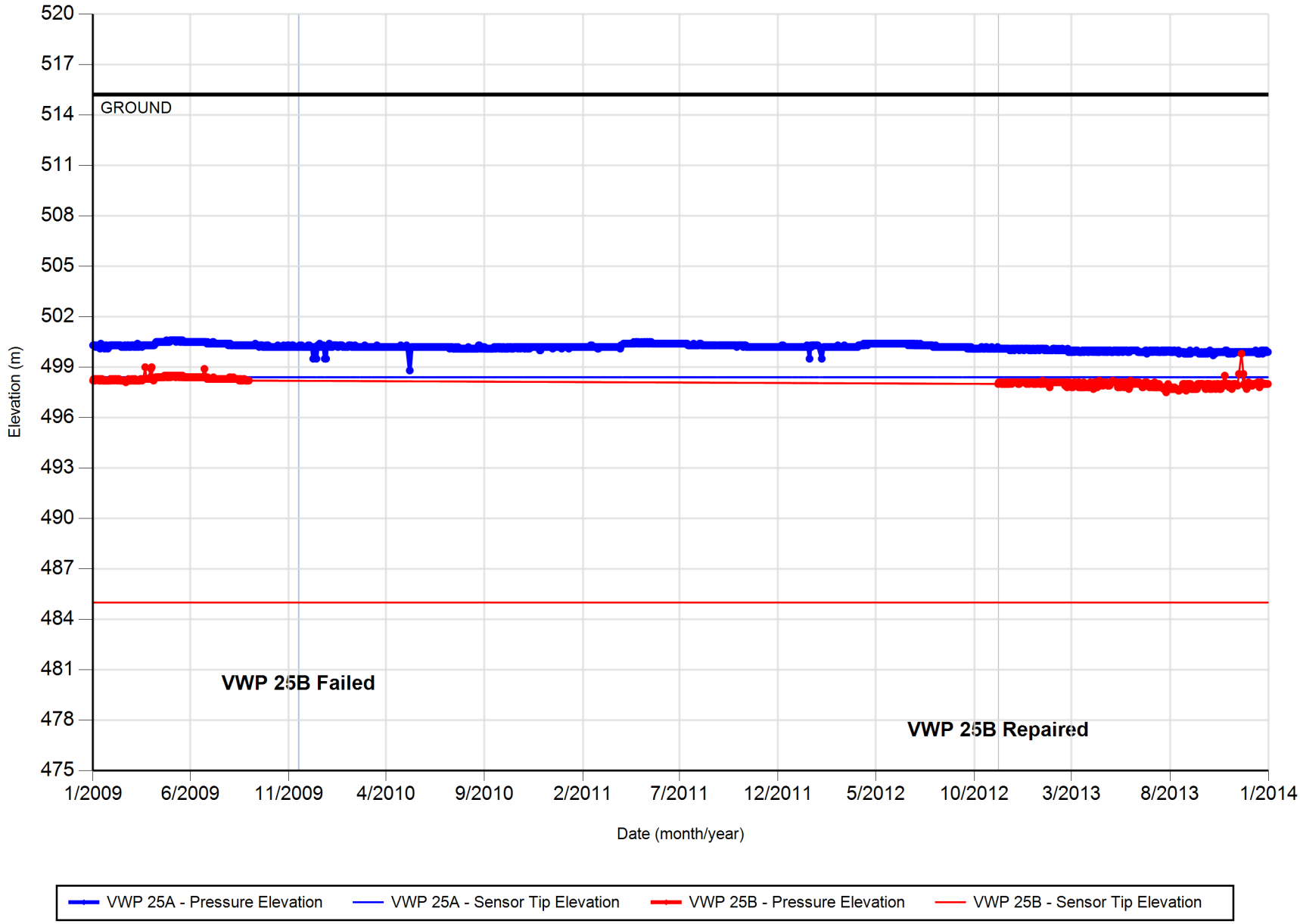
amec



West Quesnel Land Stability Program

VWP 25A and B(Station 18)

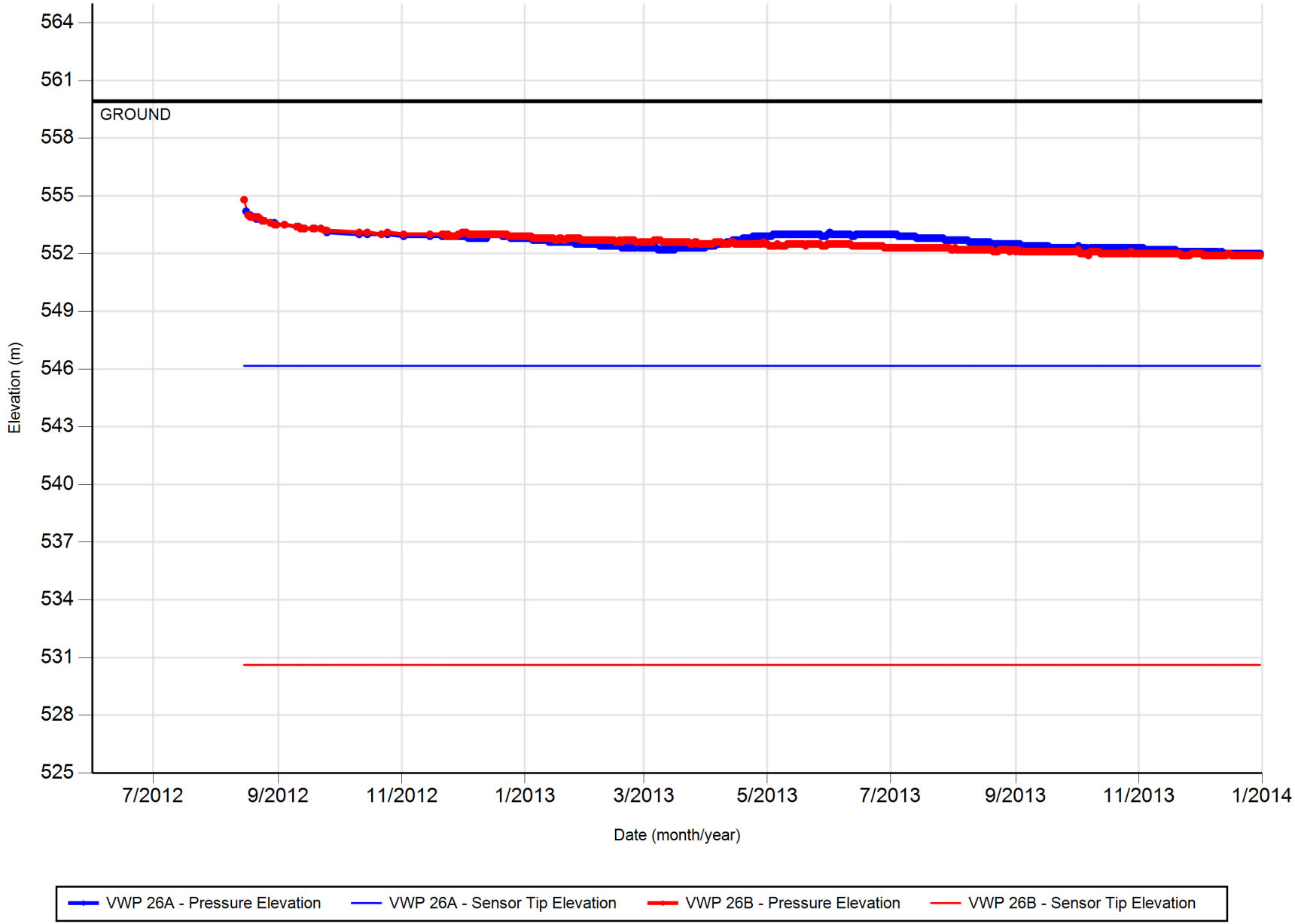
amec



West Quesnel Land Stability Program

VWP 26A and B (Station 04)

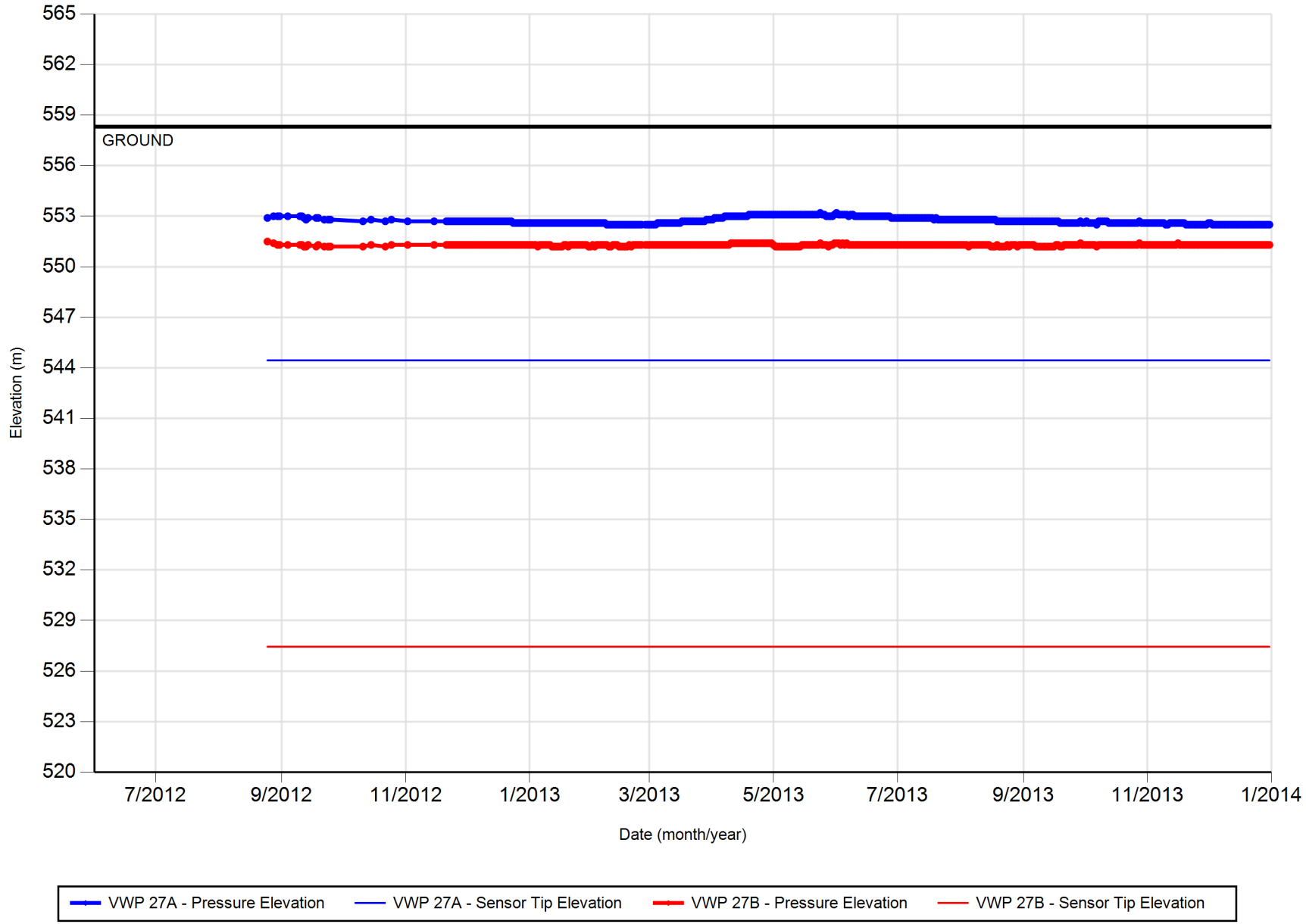
amec



West Quesnel Land Stability Program

VWP 27A and B (Station 04)

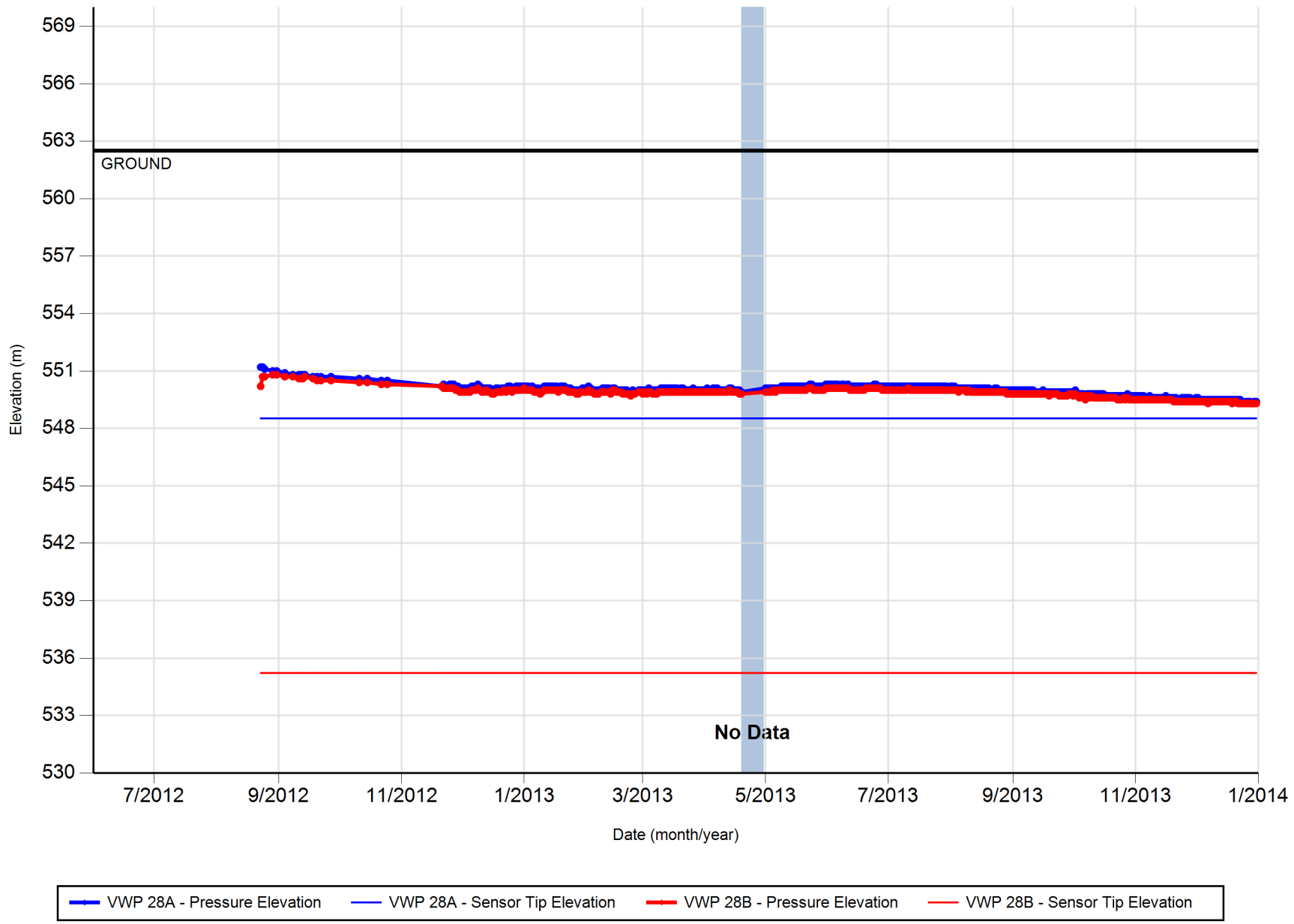
amec



West Quesnel Land Stability Program

VWP 28A and B (Station 21)

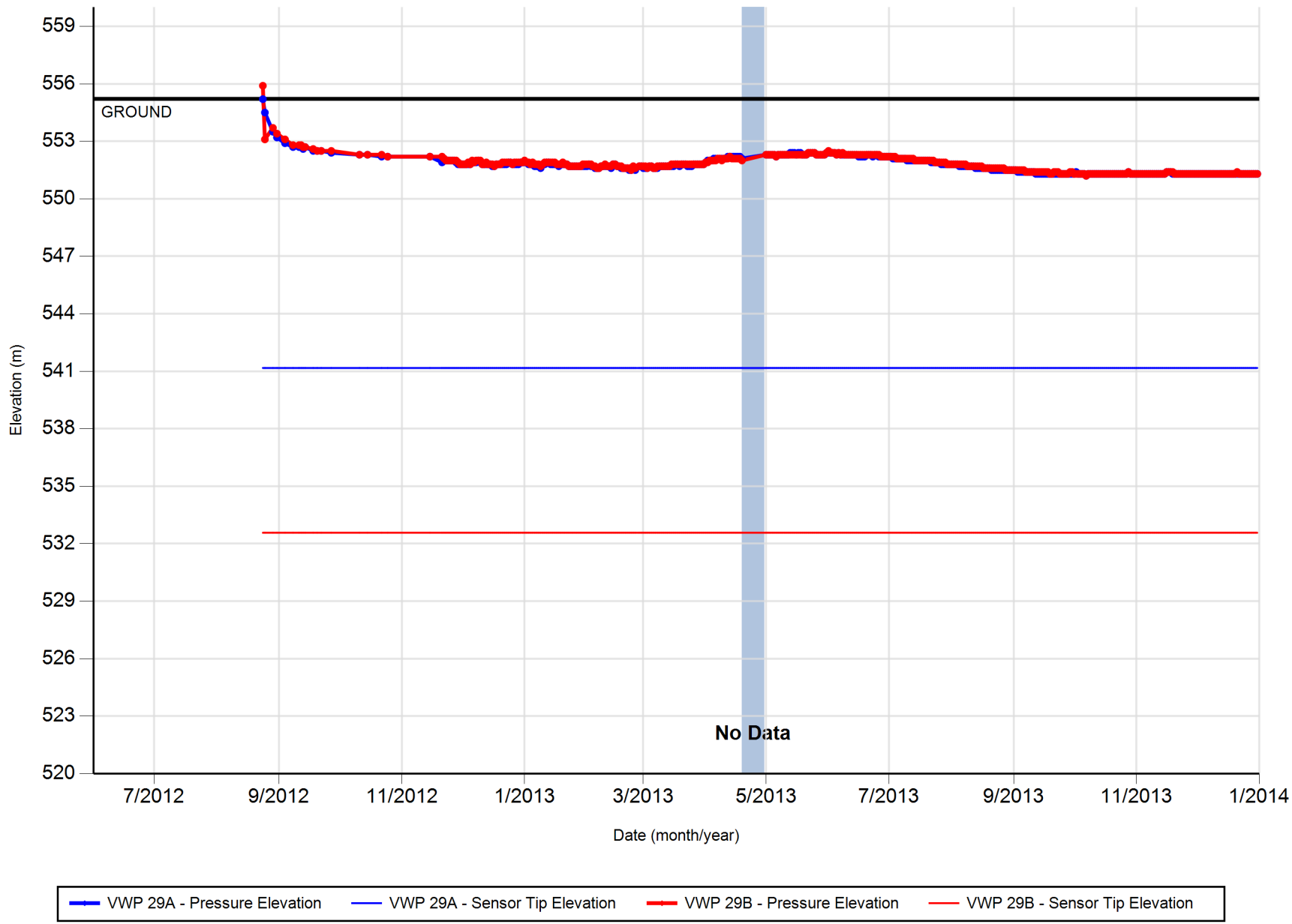
amec



West Quesnel Land Stability Program

VWP 29A and B (Station 21)

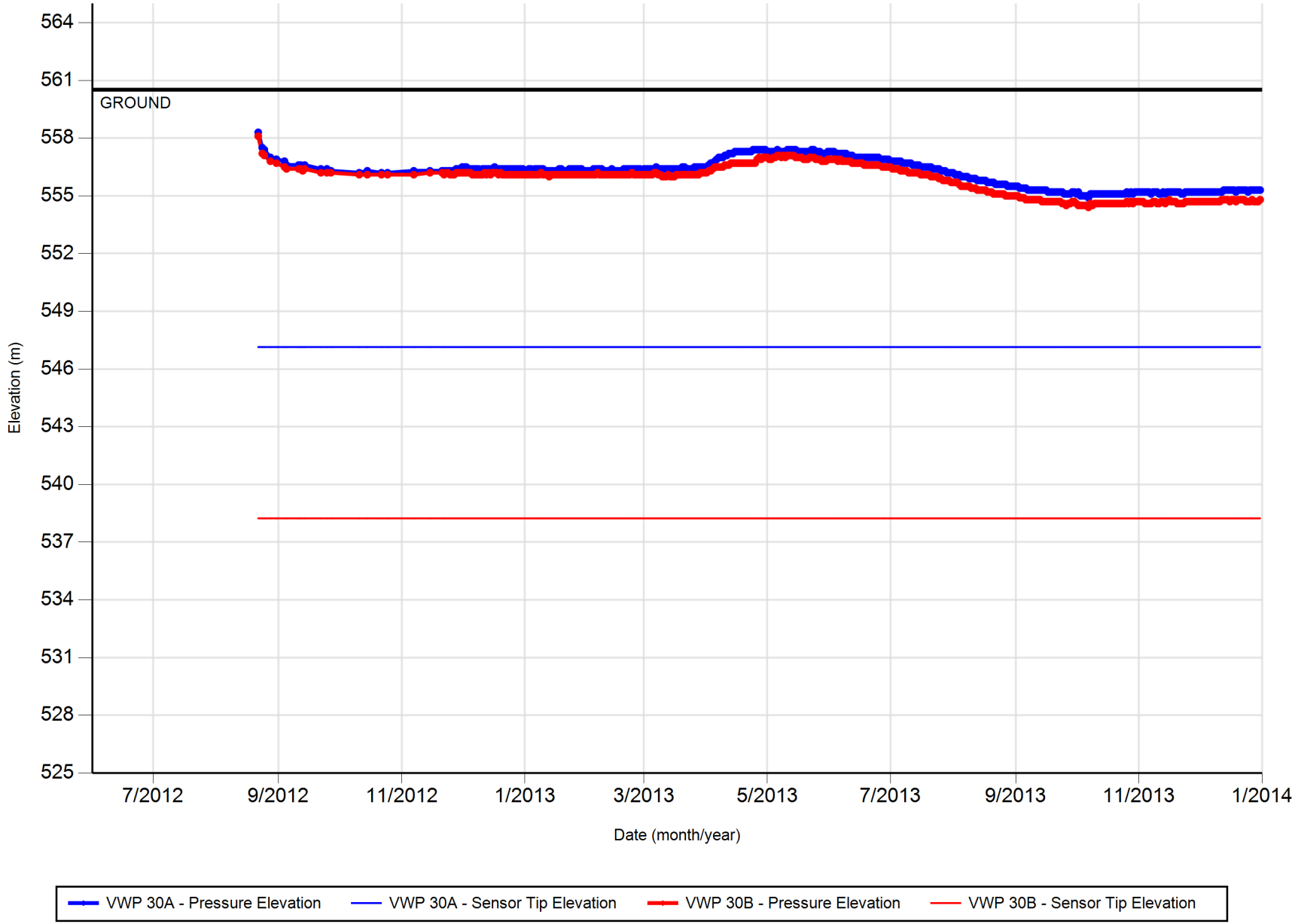
amec



West Quesnel Land Stability Program

VWP 30A and B (Station 20)

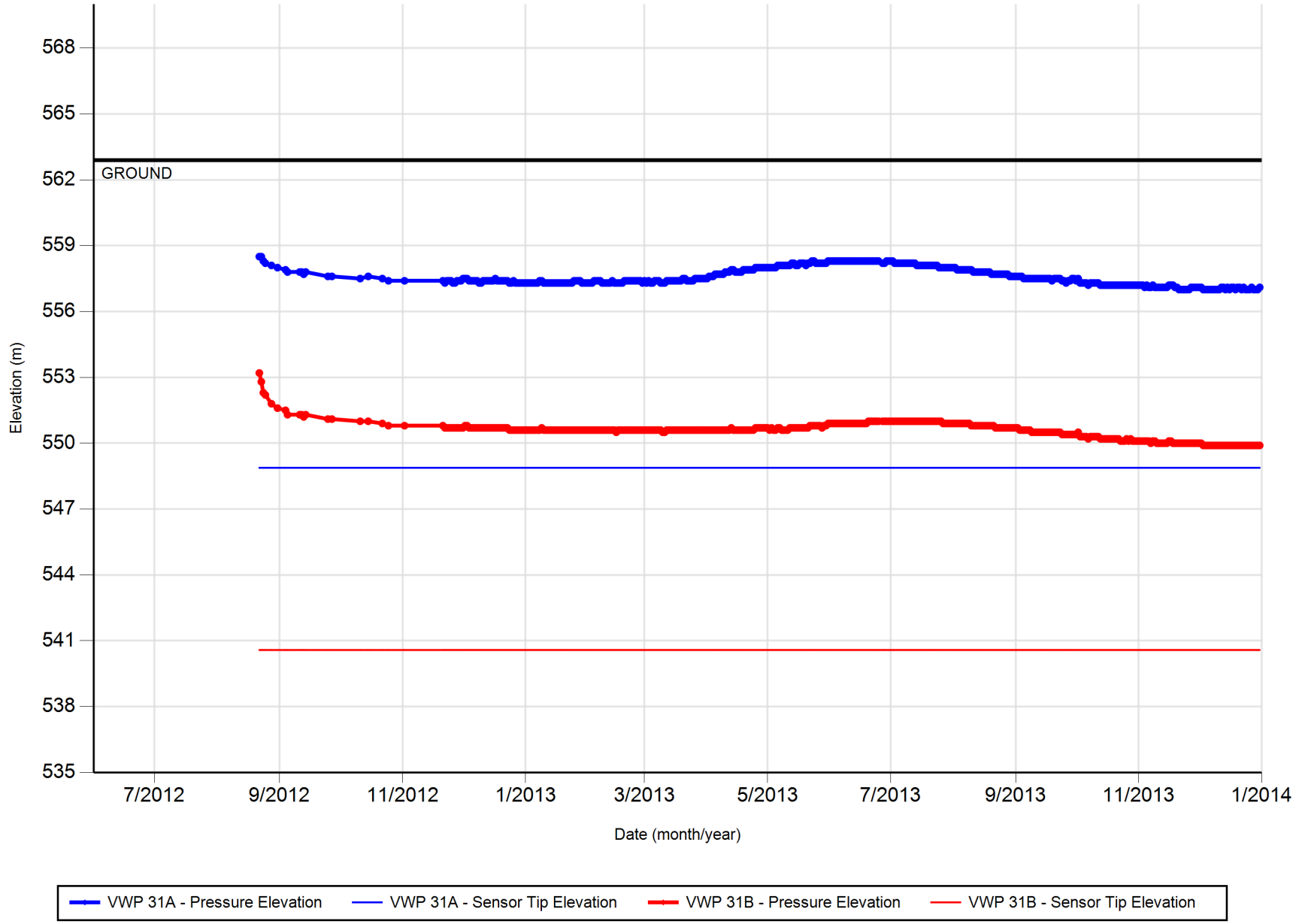
amec



West Quesnel Land Stability Program

VWP 31A and B (Station 20)

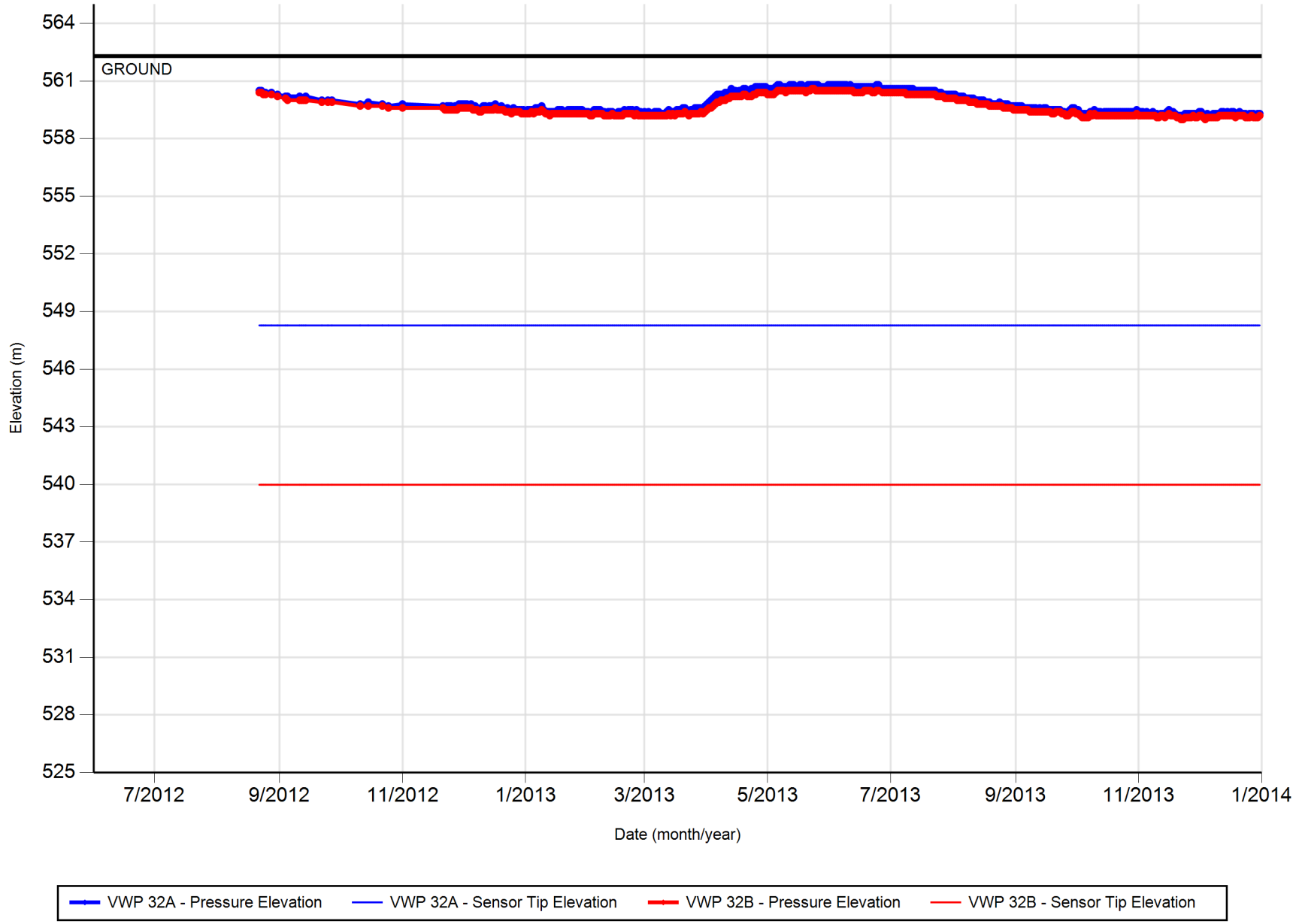
amec



West Quesnel Land Stability Program

VWP 32A and B (Station 20)

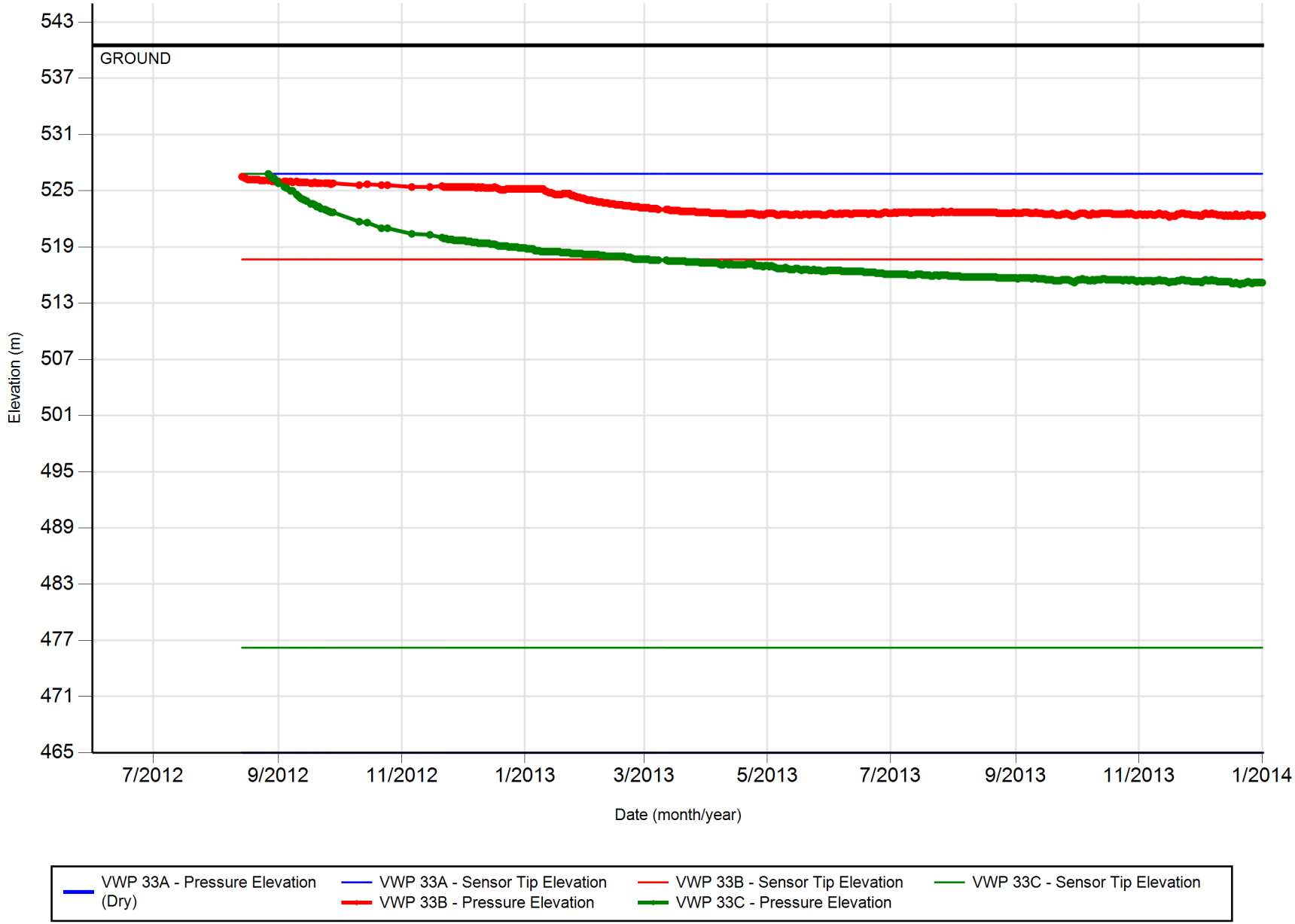
amec



West Quesnel Land Stability Program

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

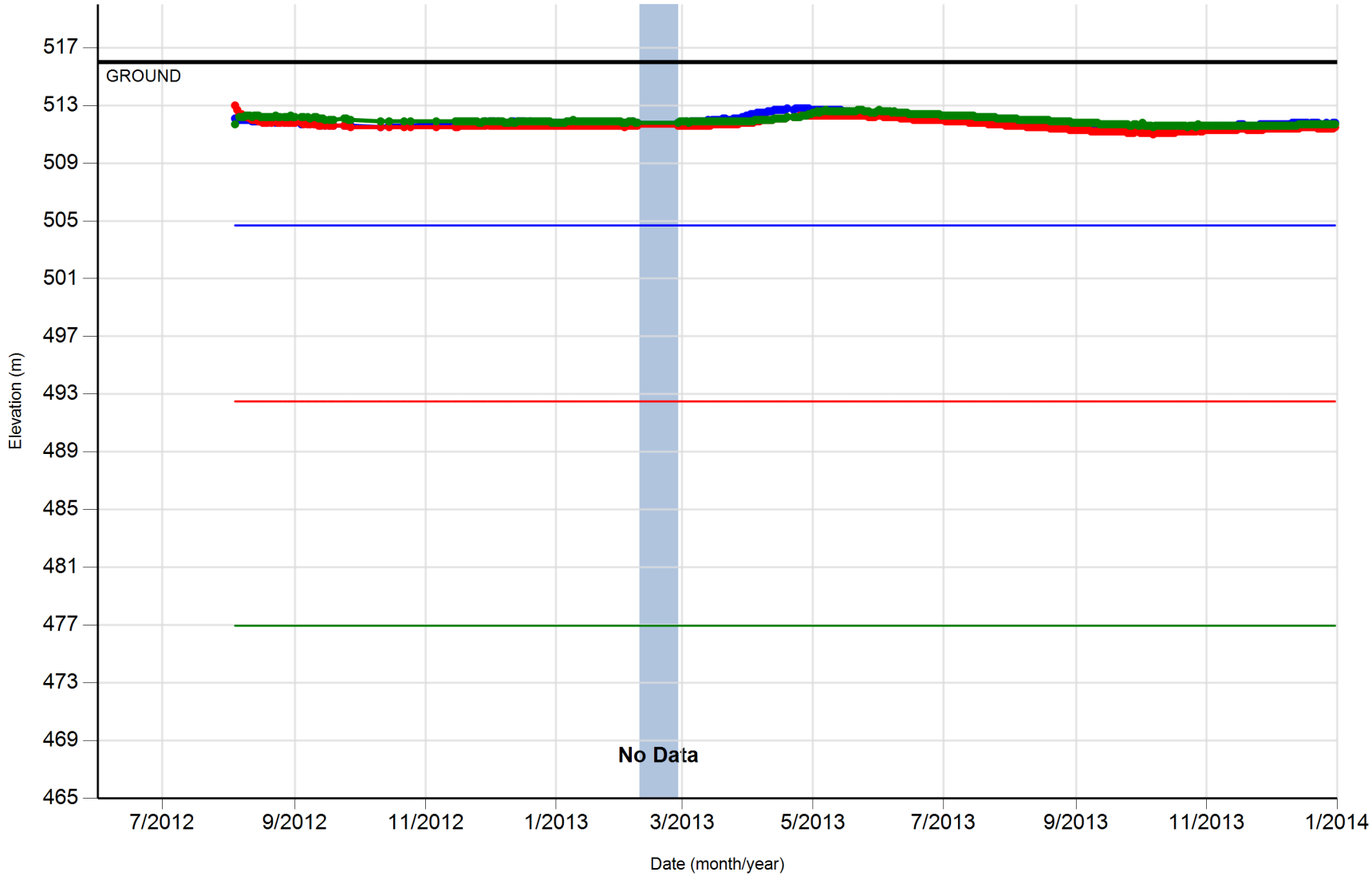
amec



West Quesnel Land Stability Program

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

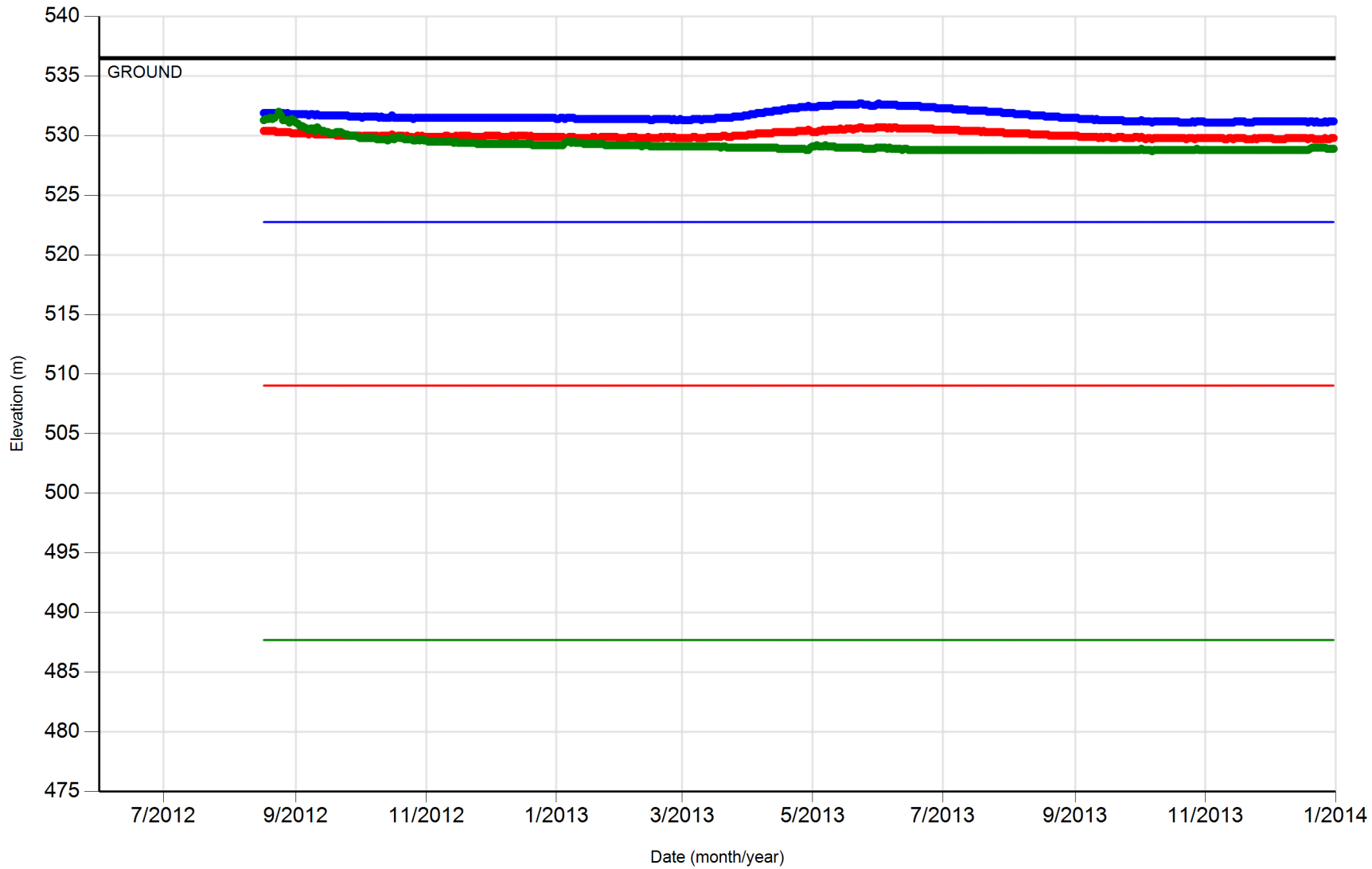
amec



West Quesnel Land Stability Program

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

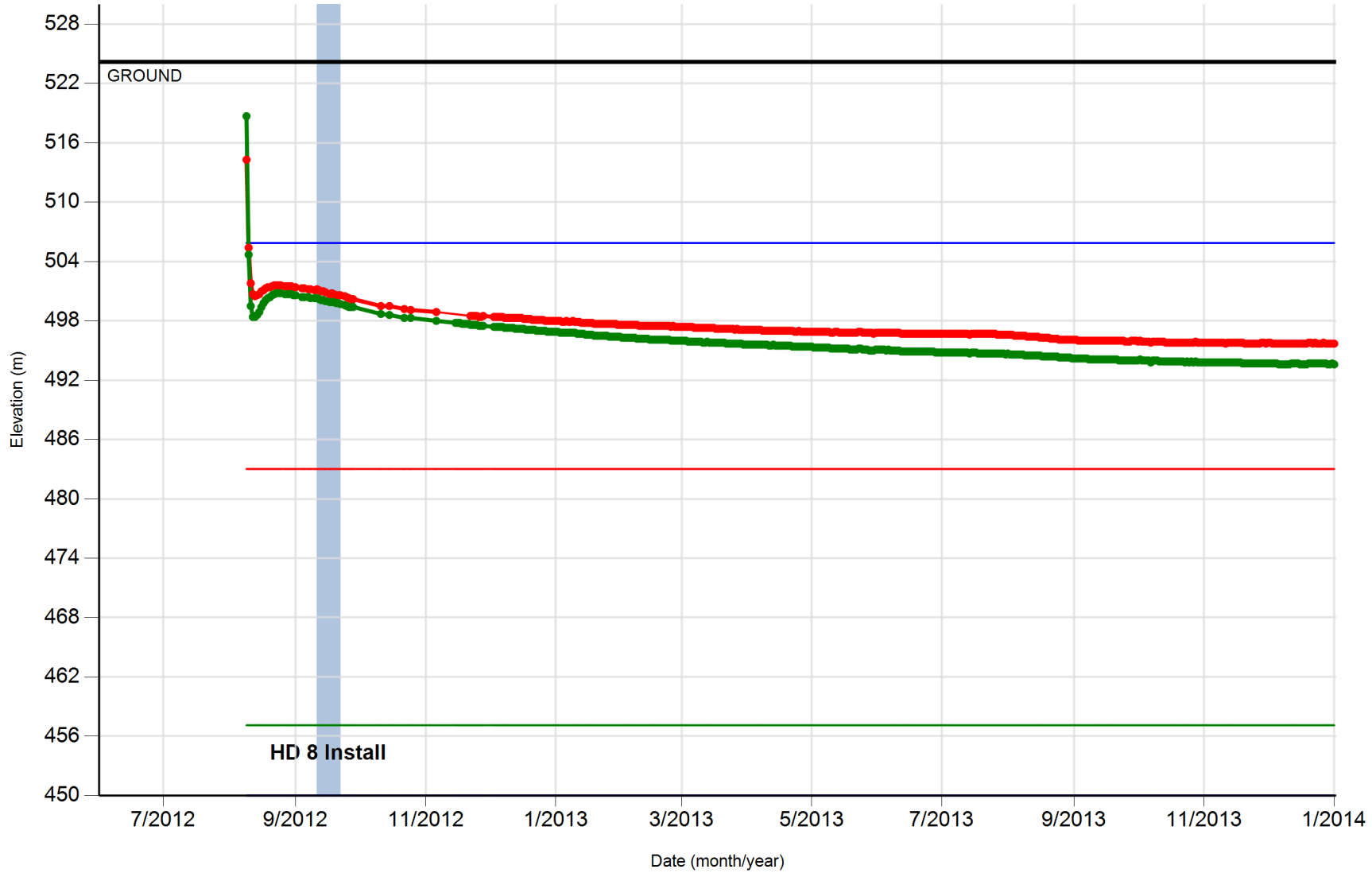
amec



West Quesnel Land Stability Program

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

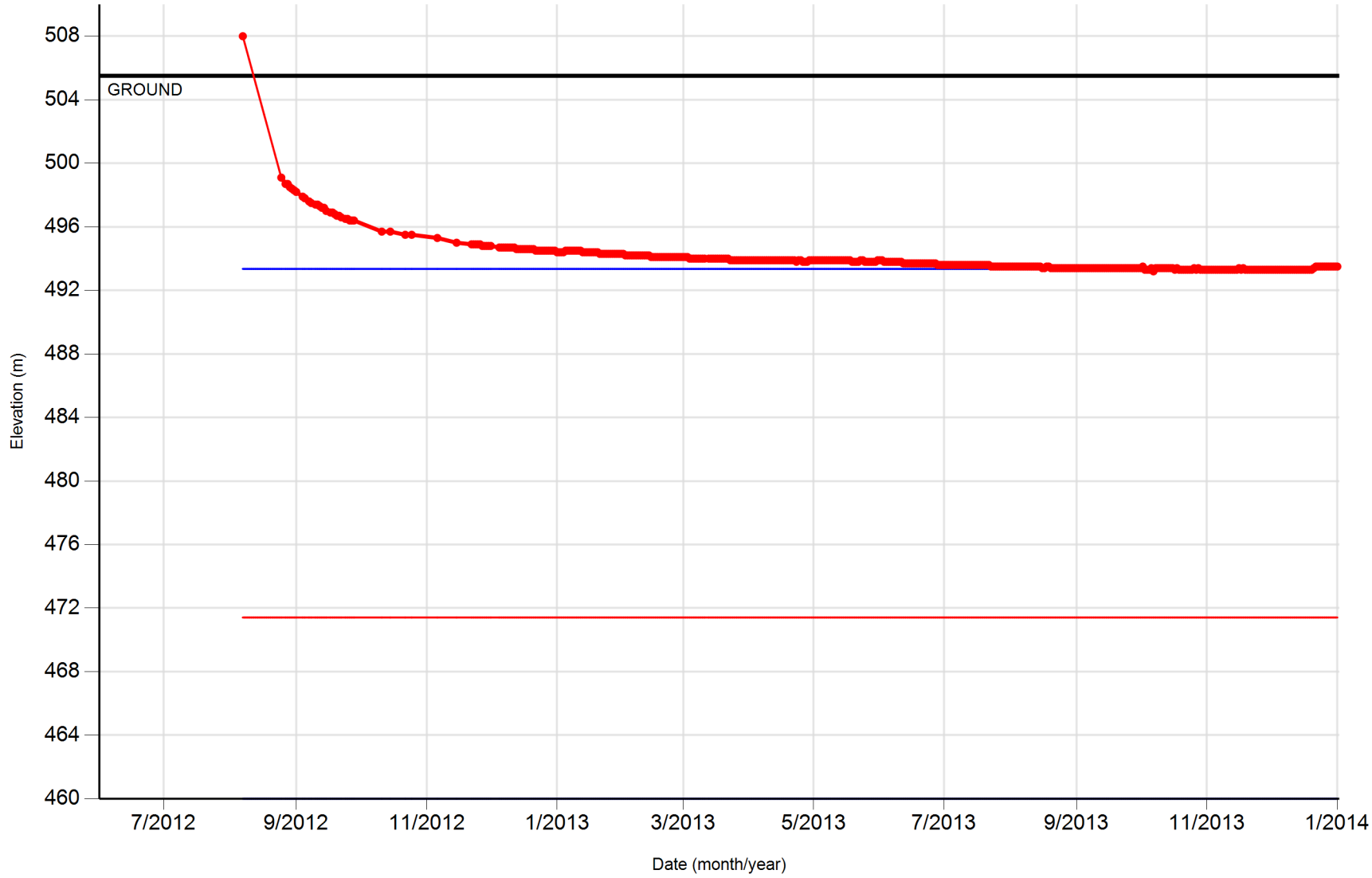
amec



West Quesnel Land Stability Program

VWP 37A and B (Station 29)

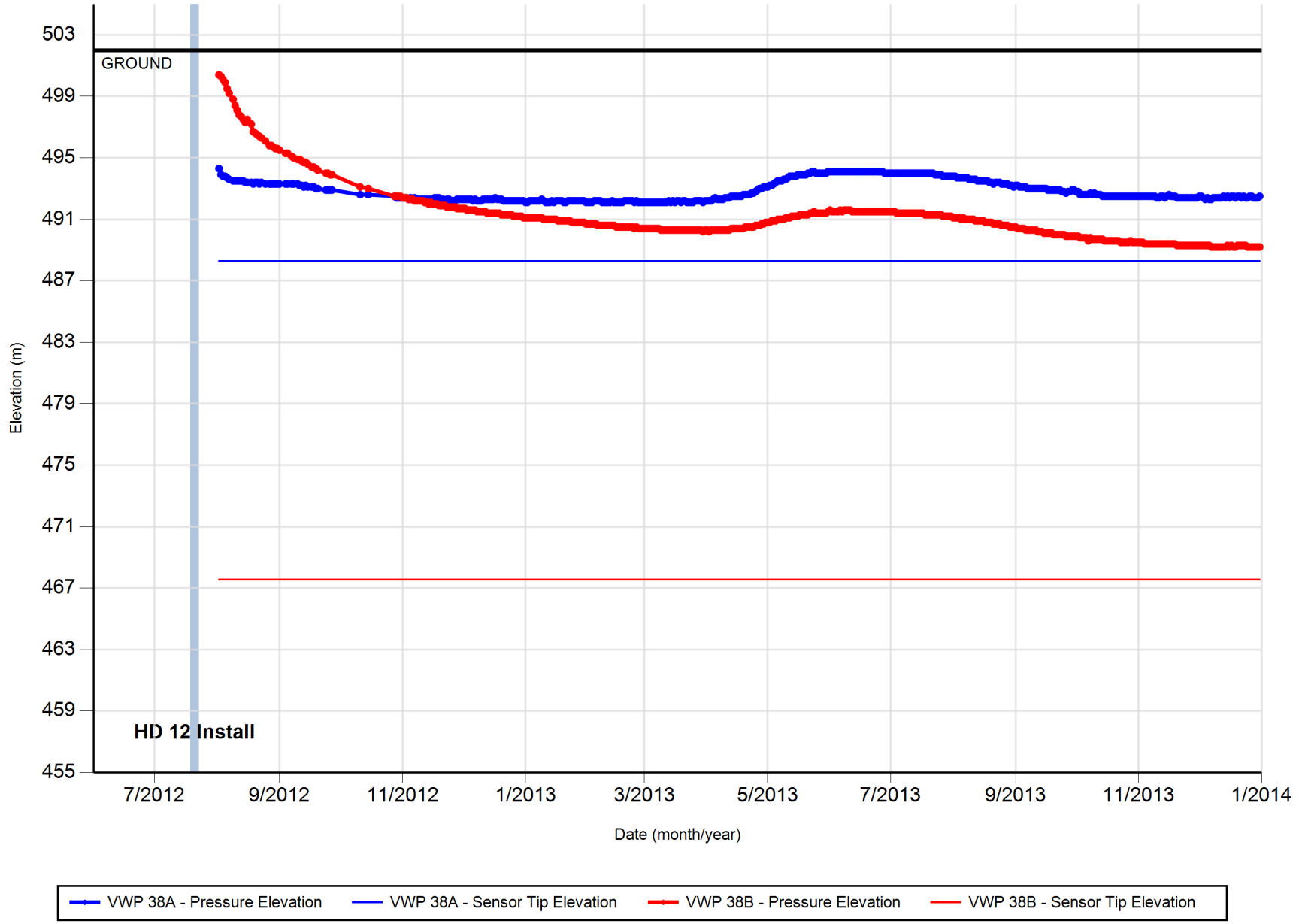
amec



West Quesnel Land Stability Program

VWP 38A and B (Station 19)

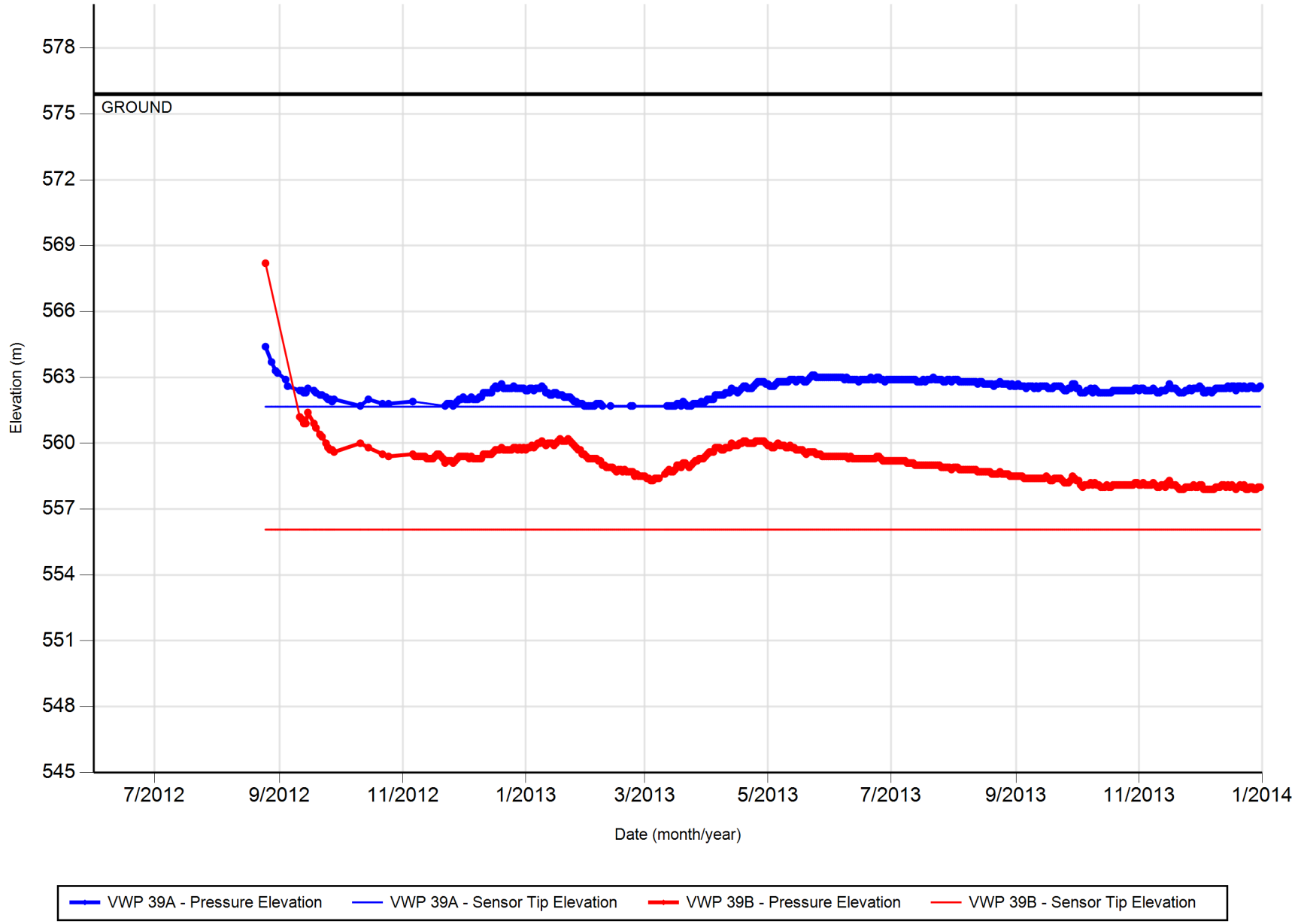
amec



West Quesnel Land Stability Program

VWP 39A and B (Station 30)

amec



Appendix D

Trial Pumping Wells - Summary 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	8.3-32.7m	31.7m	29.9m	VWP 26A&B	Active - VWP dynamic controls
PW7	Dixon St.	October 2012	8.4-32.8m	32.8m	32m	VWP 26A&B, VWP 27A&B	Active - VWP dynamic controls
PW8	Dixon St.	October 2012	8.5-32.9m	32.7m	31.9m	VWP 27A&B	Active - VWP dynamic controls
PW9	South of Dixon St.	October 2012	8.7-39.2m	39.2m	38.7m	VWP 28A&B	Active - VWP dynamic controls
PW10	South of Dixon St.	NA	NA	NA	NA	NA	Inactive - Pump not installed (dry)
PW11	South of Abbot Dr.	October 2012	8.7-33.1m	32.8m	32.0m	VWP 30A&B	Active - VWP dynamic controls
PW12	Uplands Park	October 2012	10.5-71.5m	71.5m	70.7m	VWP 9A,B&C	Active - VWP dynamic controls
PW13	Paley Ave.	October 2012	8.6-69.6m	68.1m	67.3m	VWP 33A,B&C	Active - VWP dynamic controls
PW14	Dawson St.	October 2012	8.5-32.9m	32.8m	32.0m	VWP 10A,B&C	Active - VWP dynamic controls
PW15	South of Abbot Dr.	October 2012	8.5-32.9m	32.8m	32.0m	VWP 30A&B, VWP 31A&B	Active - VWP dynamic controls
PW16	South of Abbot Dr.	October 2012	8.6-33.0m	32.8m	32.0m	VWP 31A&B, VWP 31A&B	Active - VWP dynamic controls
PW17	South of Abbot Dr.	October 2012	4.1-28.5m	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

Pumping Well Trends for 2013

West Quesnel Land Stability Program

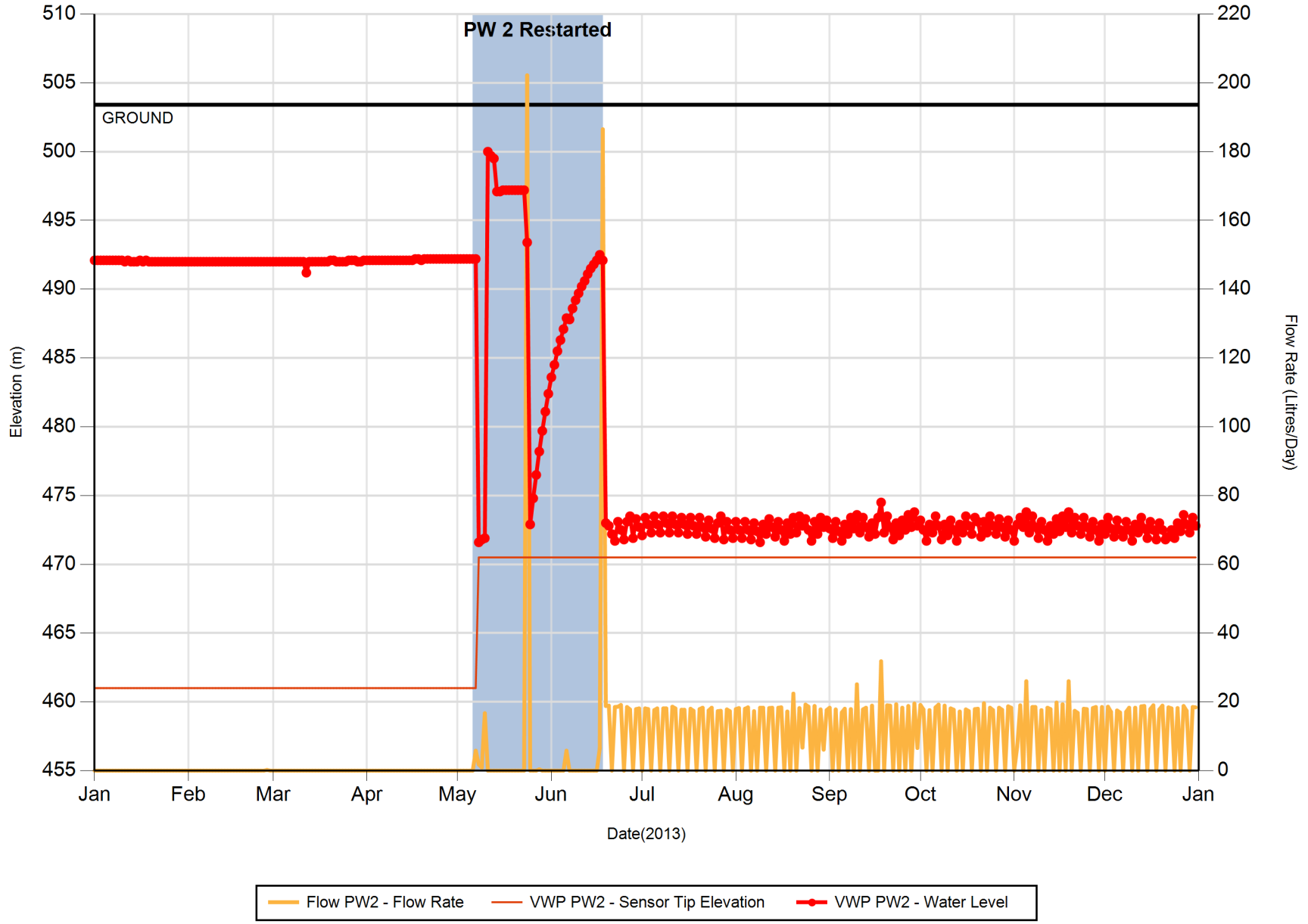
PW1 (Station 06) - Daily Flow and Well Level

amec

West Quesnel Land Stability Program

PW2 (Station 02)- Daily Flow and Well Level

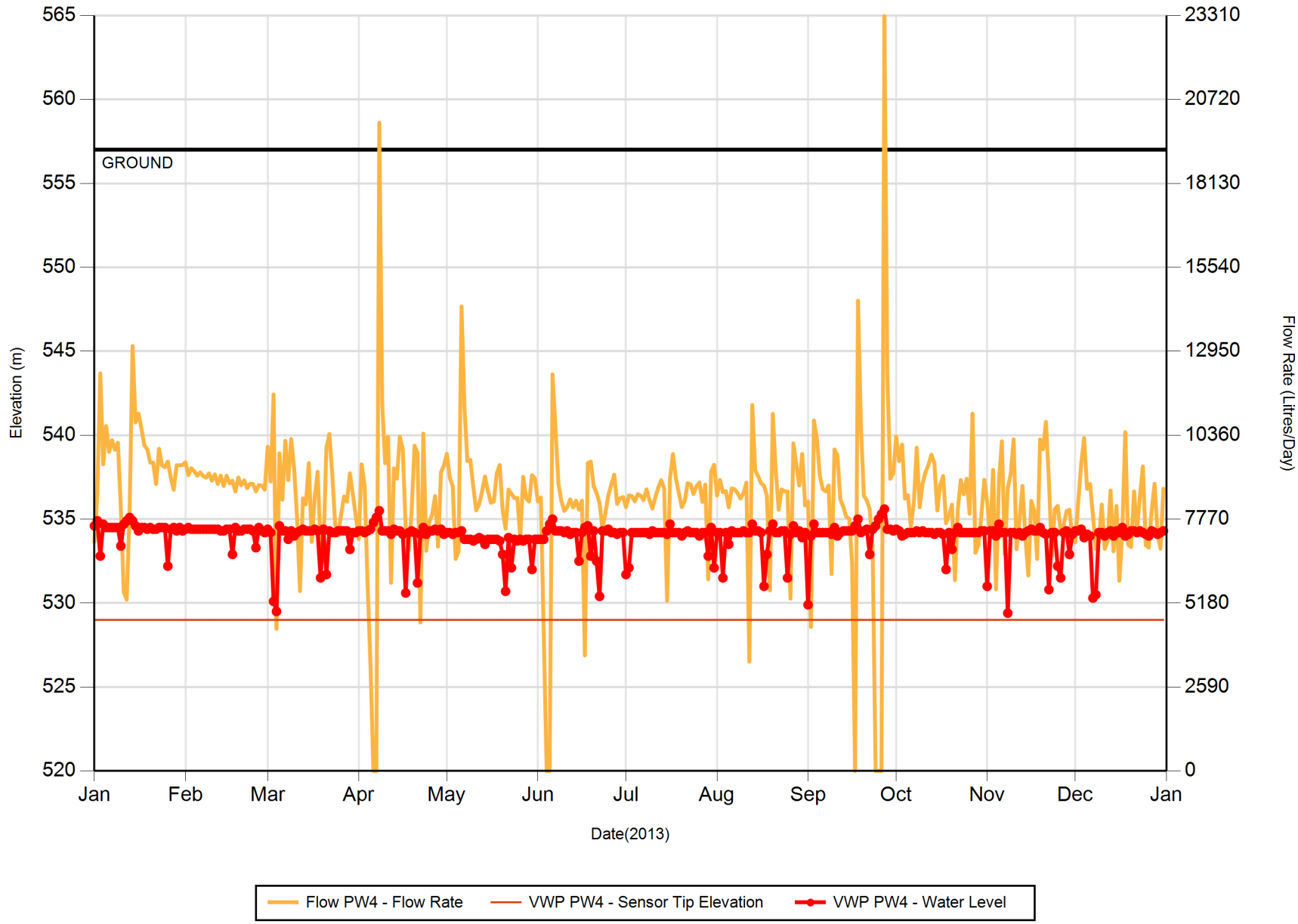
amec



West Quesnel Land Stability Program

PW4 (Station 16) - Daily Flow and Well Level

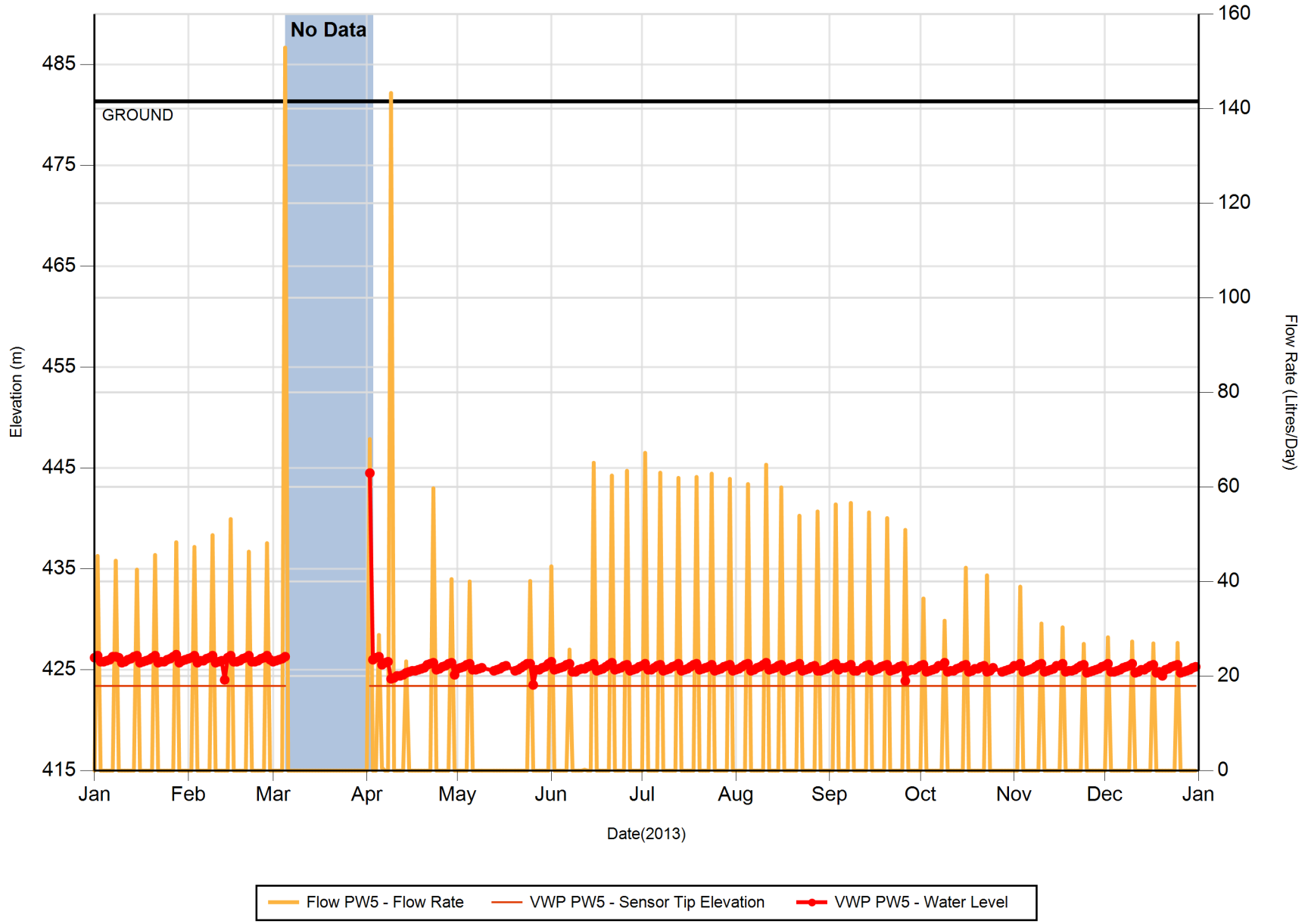
amec



West Quesnel Land Stability Program

PW5 (Station 17) - Daily Flow and Well Level

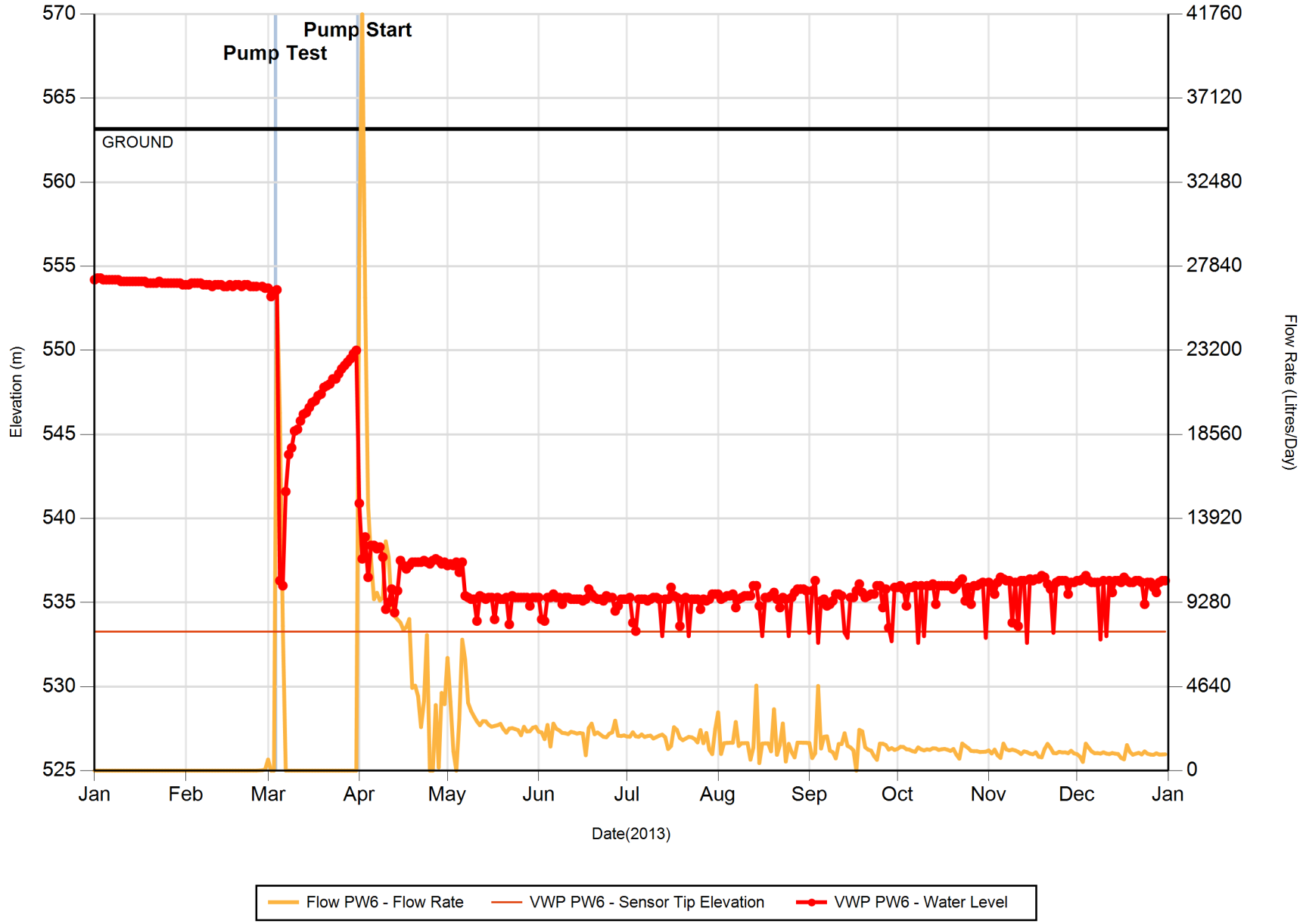
amec



West Quesnel Land Stability Program

PW6 (Station 04) - Daily Flow and Well Level

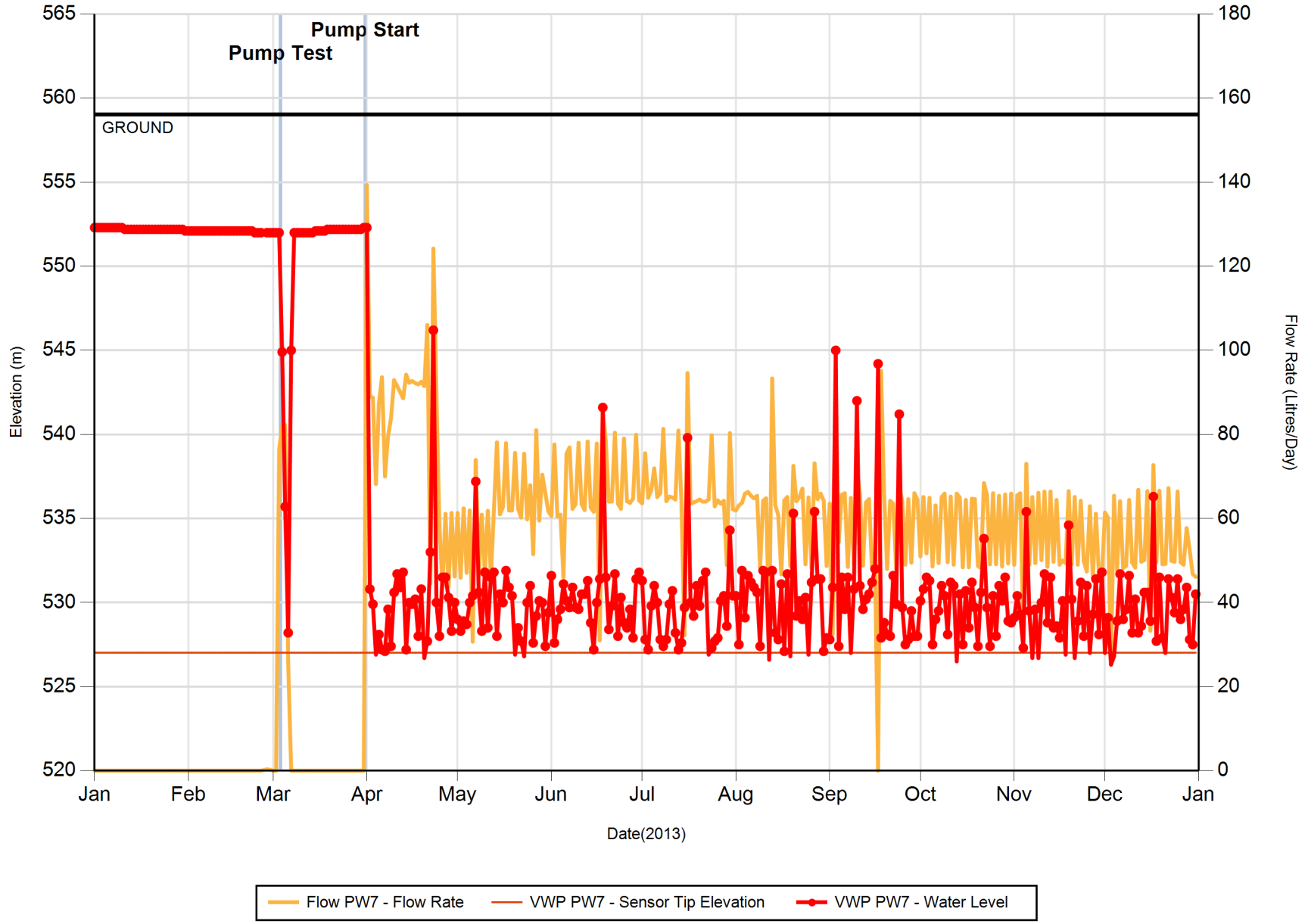
amec



West Quesnel Land Stability Program

PW7 (Station 04) - Daily Flow and Well Level

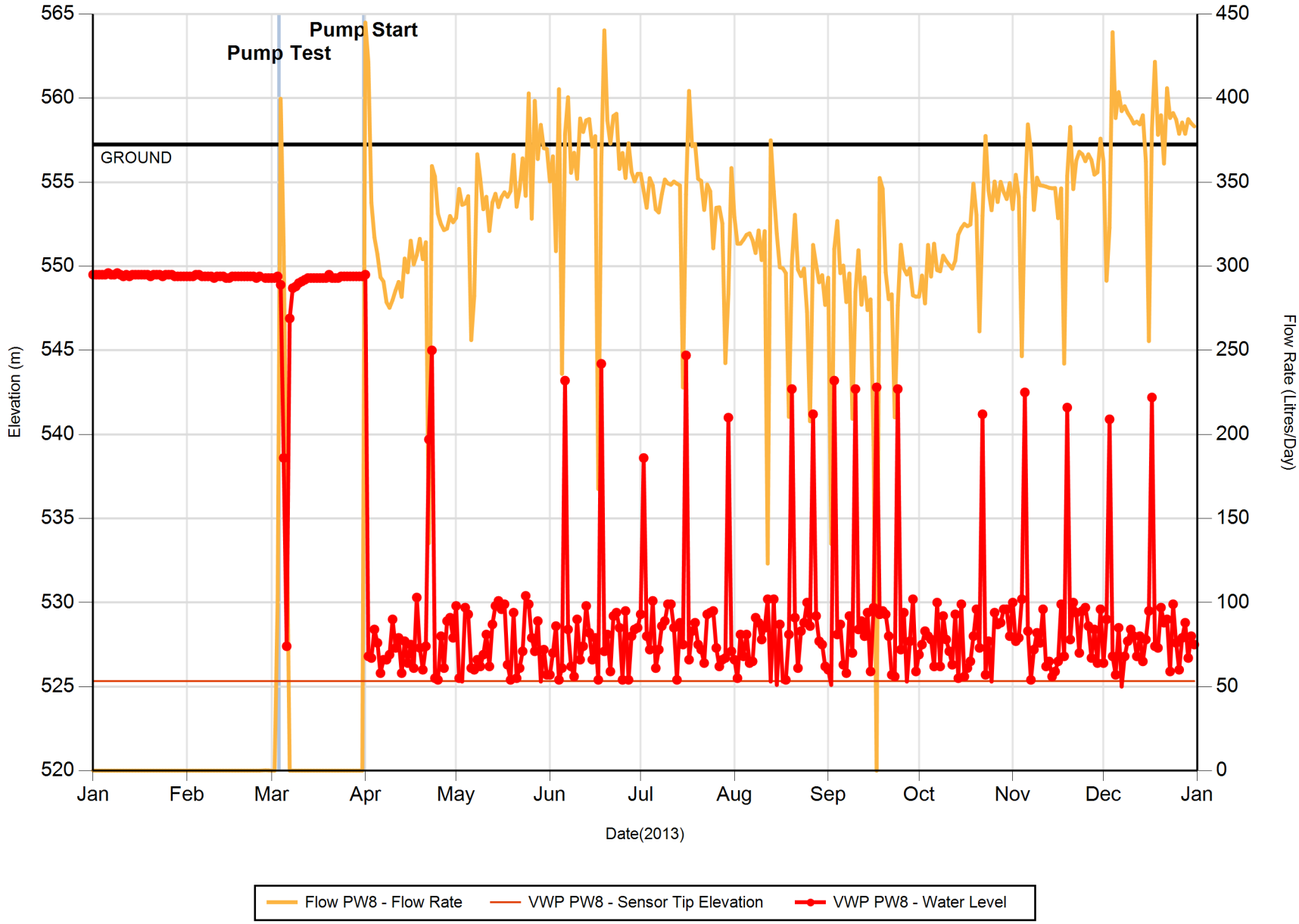
amec



West Quesnel Land Stability Program

PW8 (Station 04) - Daily Flow and Well Level

amec



West Quesnel Land Stability Program

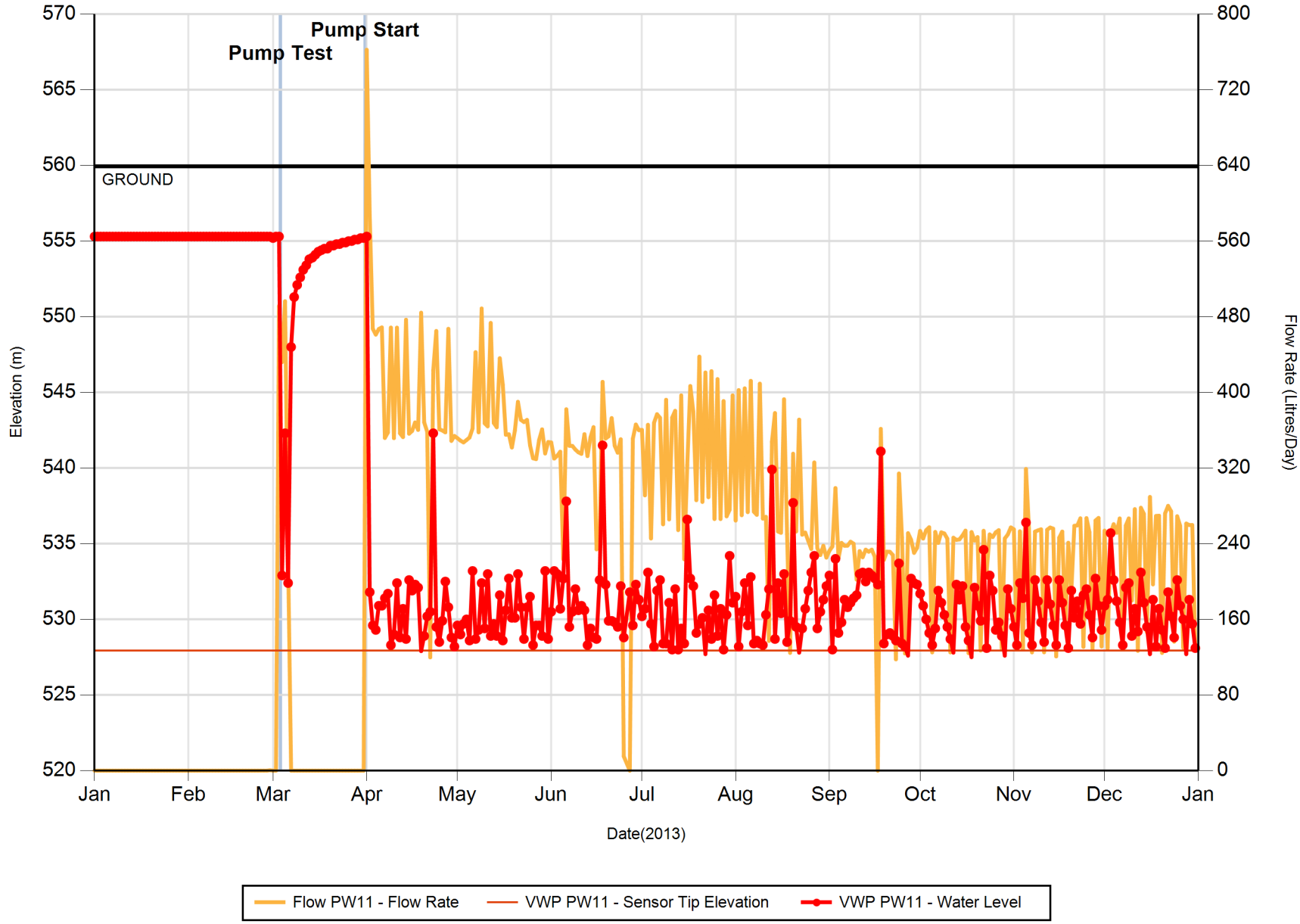
PW9 (Station 21) - Daily Flow and Well Level

amec

West Quesnel Land Stability Program

PW11 (Station 20) - Daily Flow and Well Level

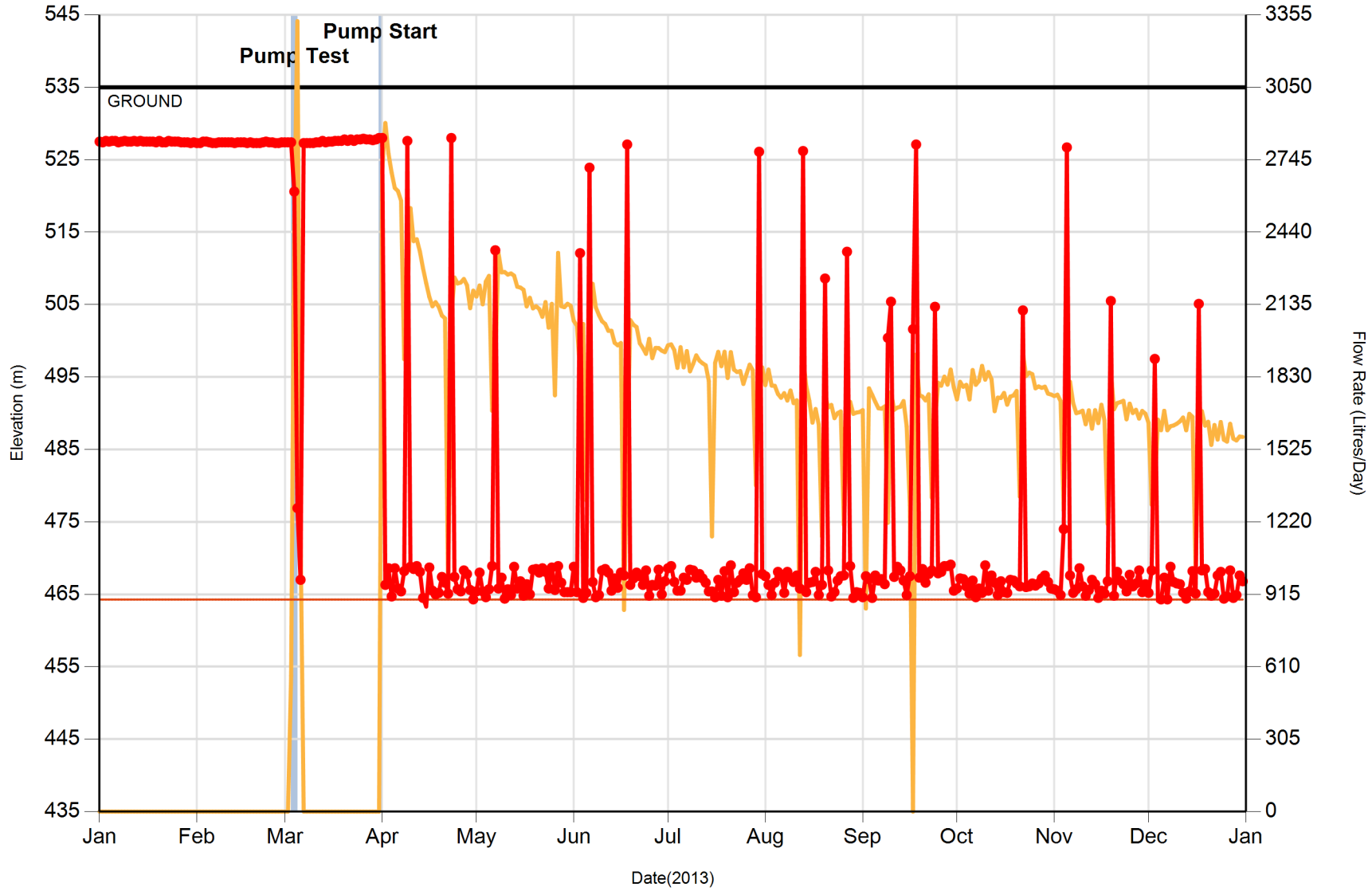
amec



West Quesnel Land Stability Program

PW12 (Station 09) - Daily Flow and Well Level

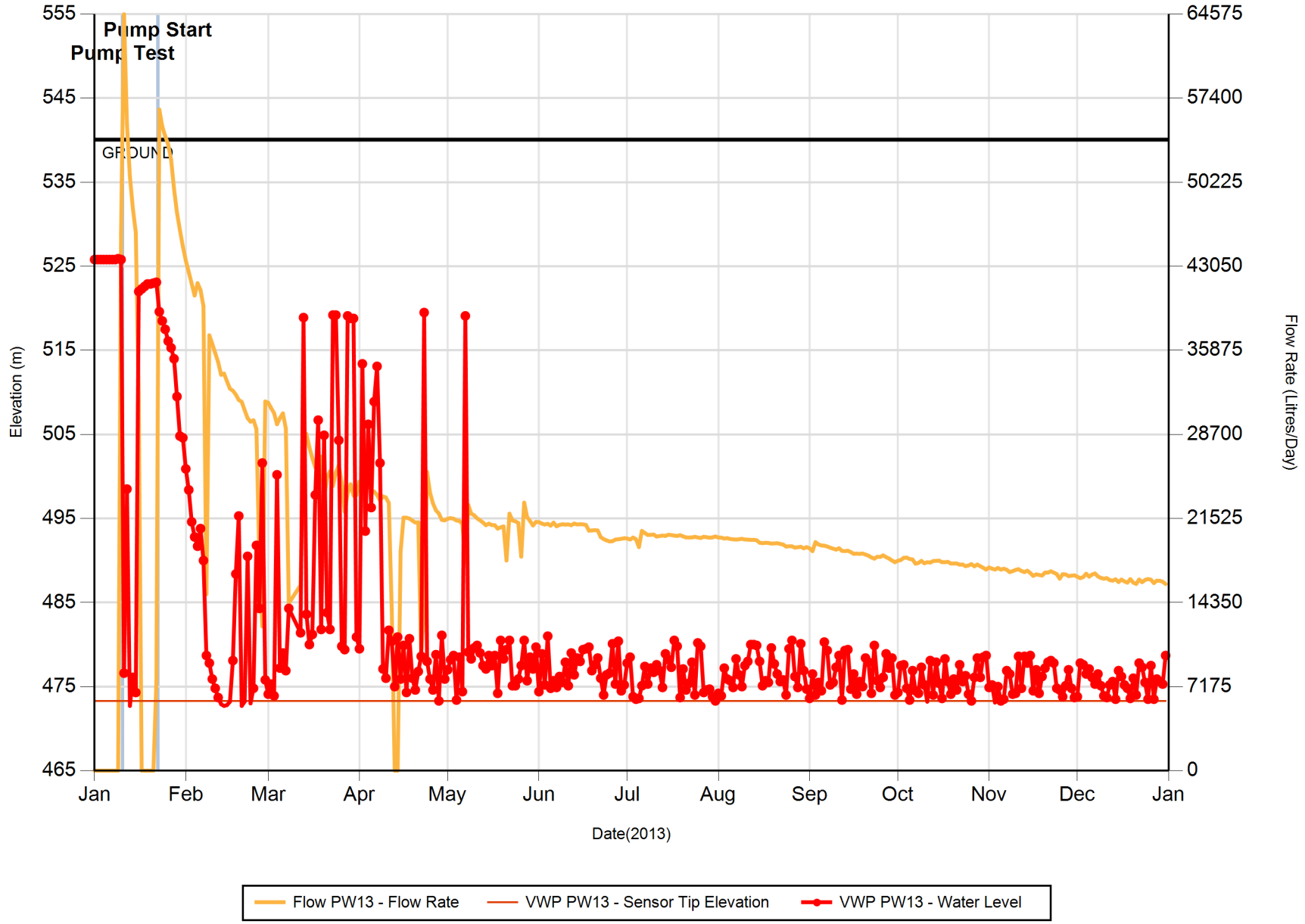
amec



West Quesnel Land Stability Program

PW13 (Station 22) - Daily Flow and Well Level

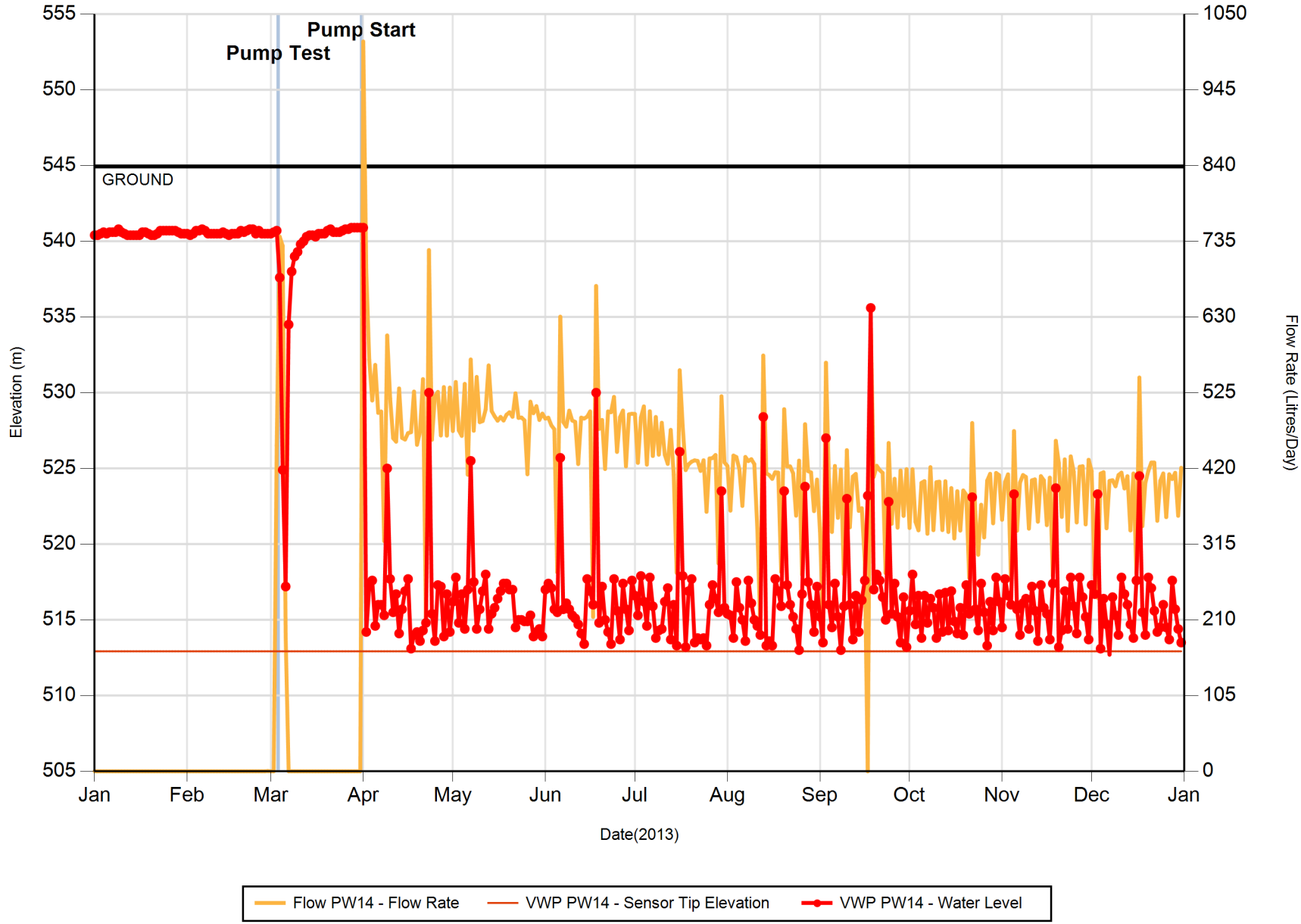
amec



West Quesnel Land Stability Program

PW14 (Station 10) - Daily Flow and Well Level

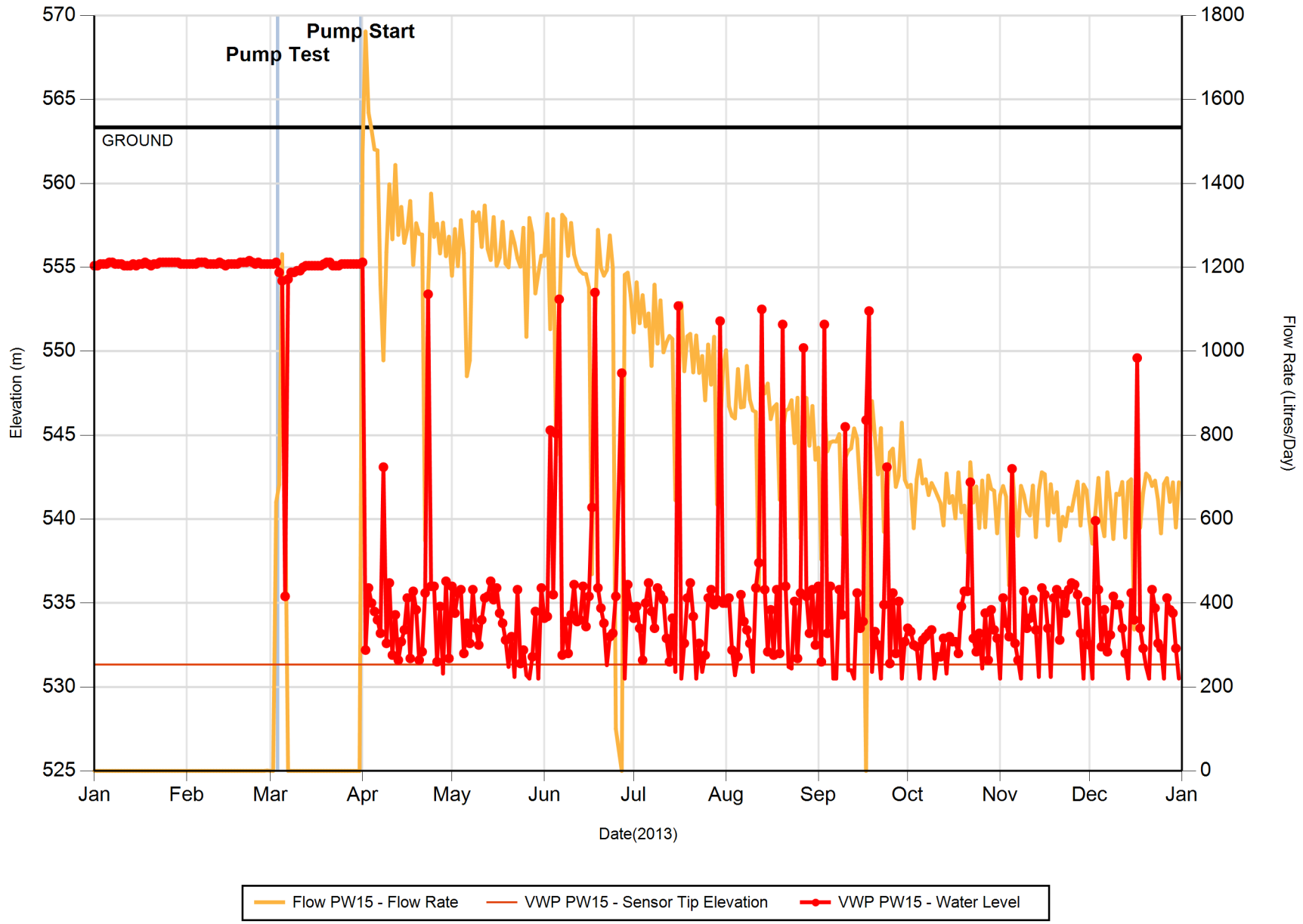
amec



West Quesnel Land Stability Program

PW15 (Station 20) - Daily Flow and Well Level

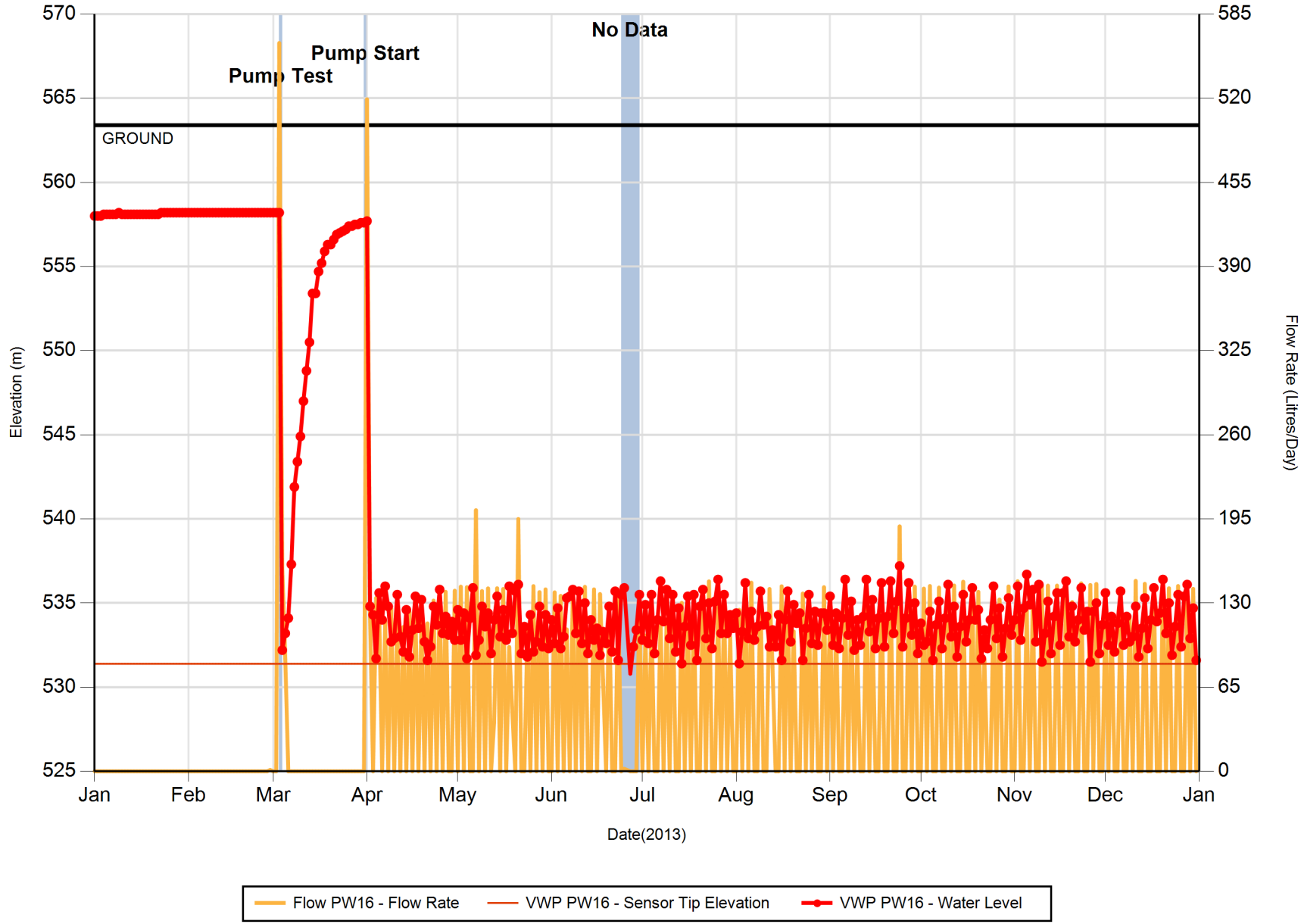
amec



West Quesnel Land Stability Program

PW16 (Station 20) - Daily Flow and Well Level

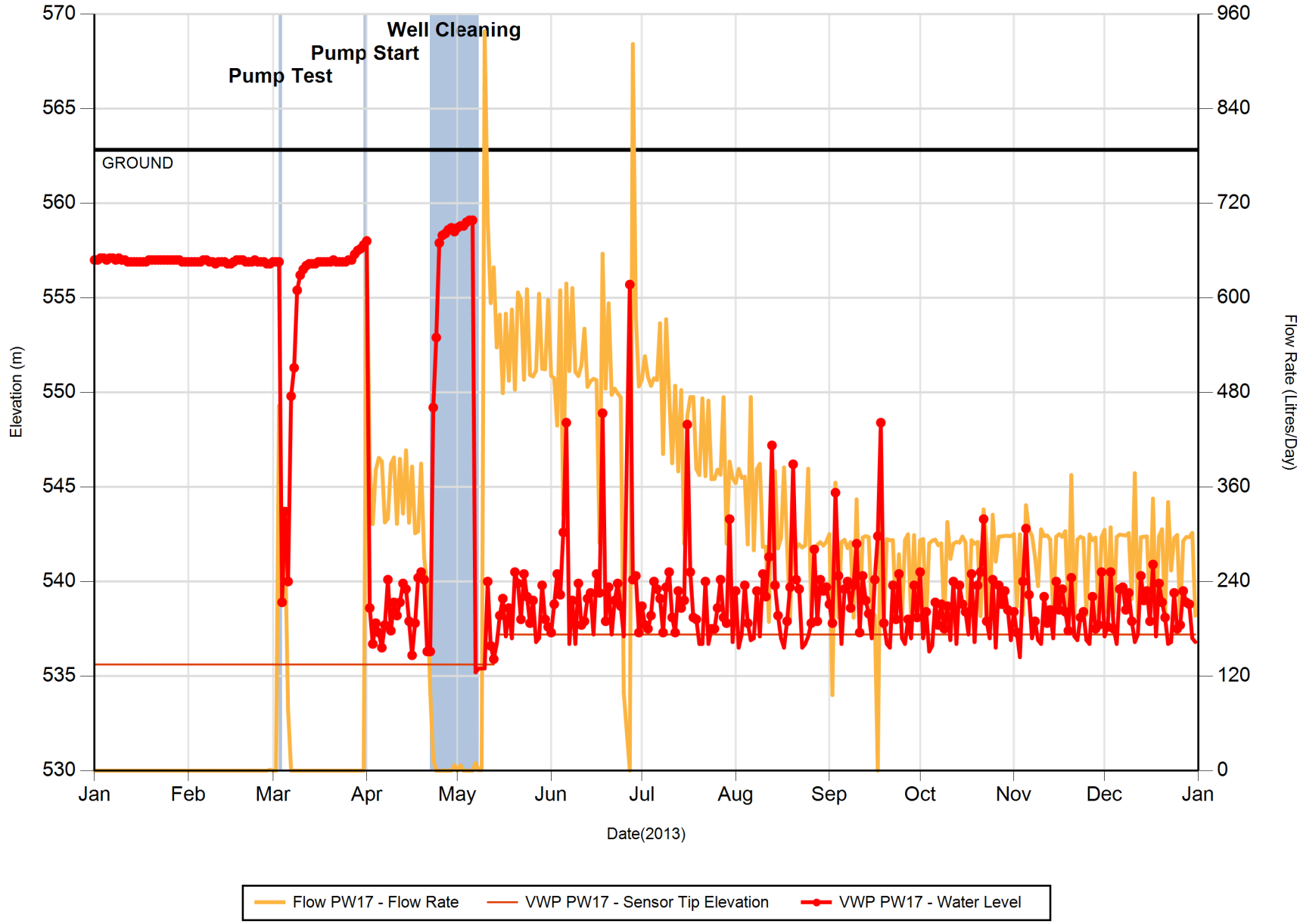
amec



West Quesnel Land Stability Program

PW17 (Station 20) - Daily Flow and Well Level

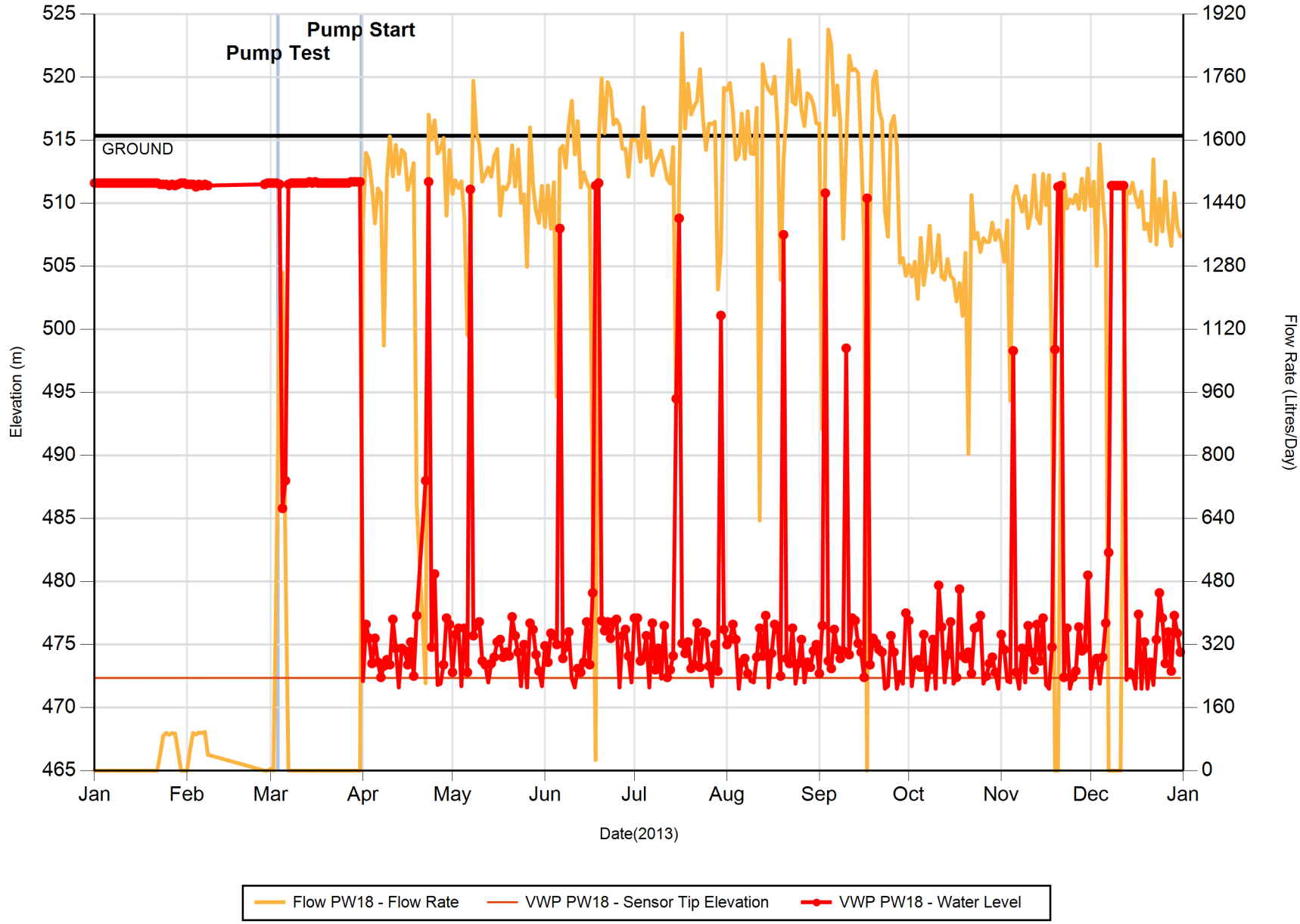
amec



West Quesnel Land Stability Program

PW18 (Station 23) - Daily Flow and Well Level

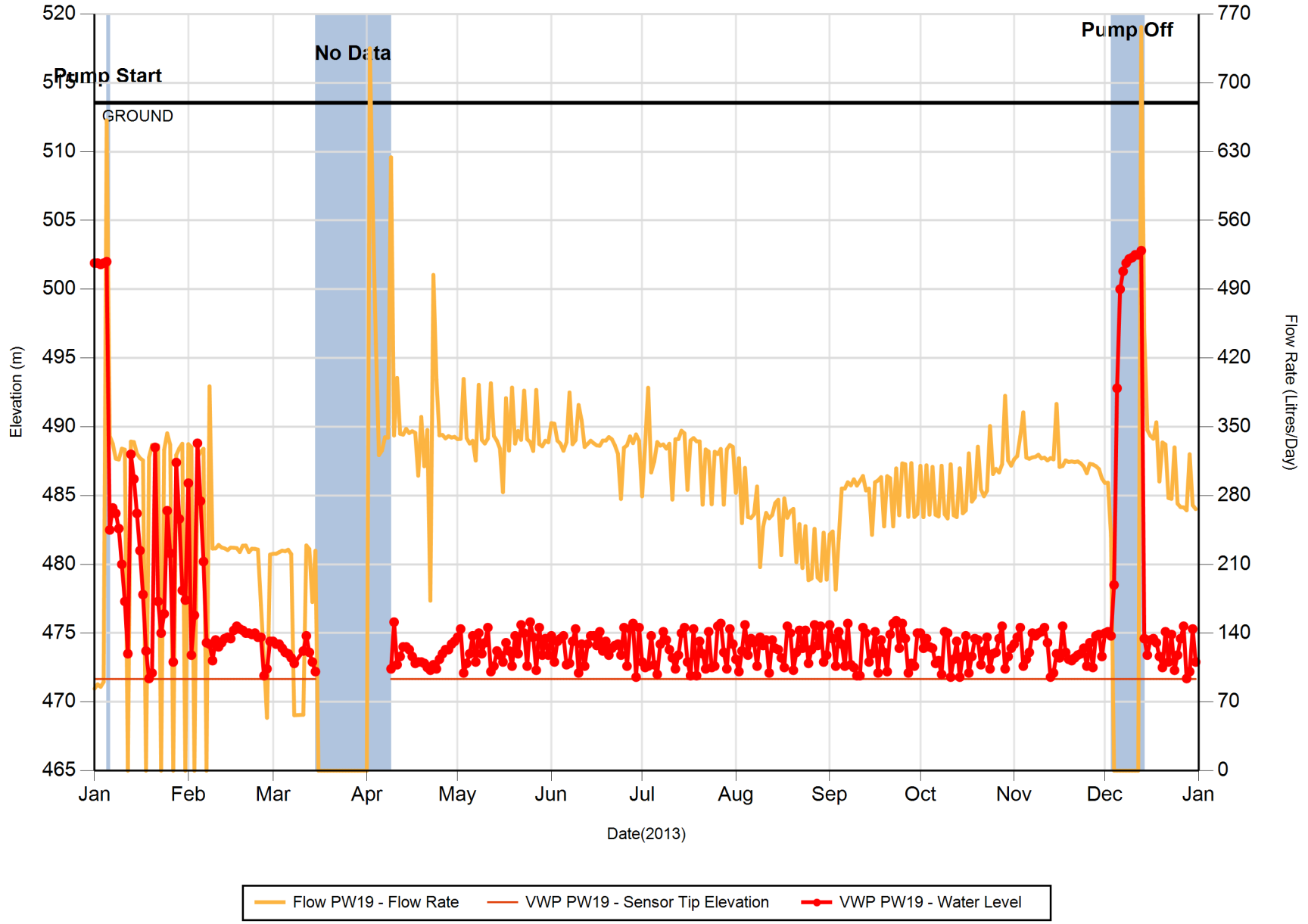
amec



West Quesnel Land Stability Program

PW19 (Station 28) - Daily Flow and Well Level

amec



West Quesnel
Land Stability Program

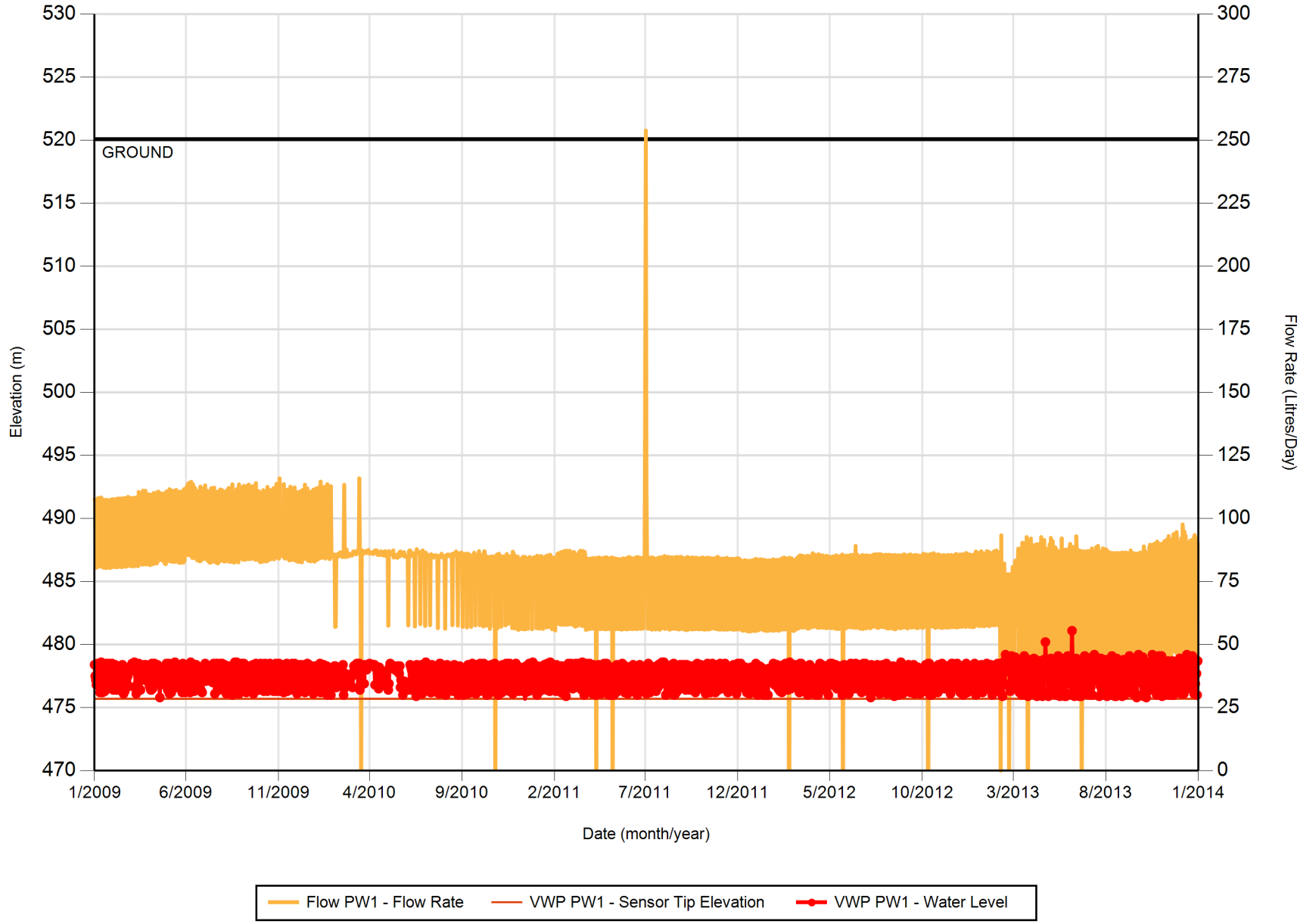
amec

Long Term Pumping Well Trends

West Quesnel Land Stability Program

PW1 (Station 06) - Daily Flow and Well Level

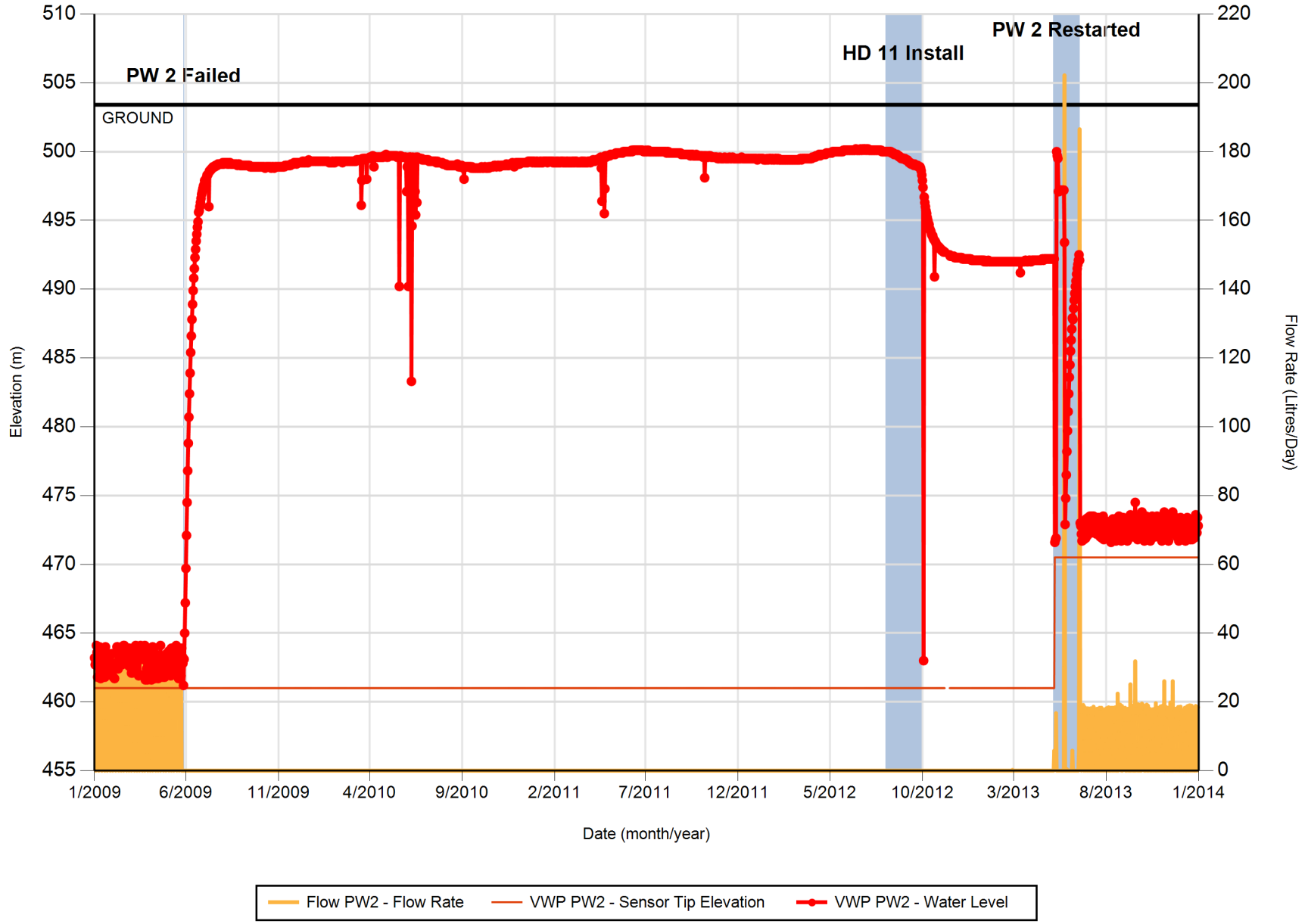
amec



West Quesnel Land Stability Program

PW2 (Station 02)- Daily Flow and Well Level

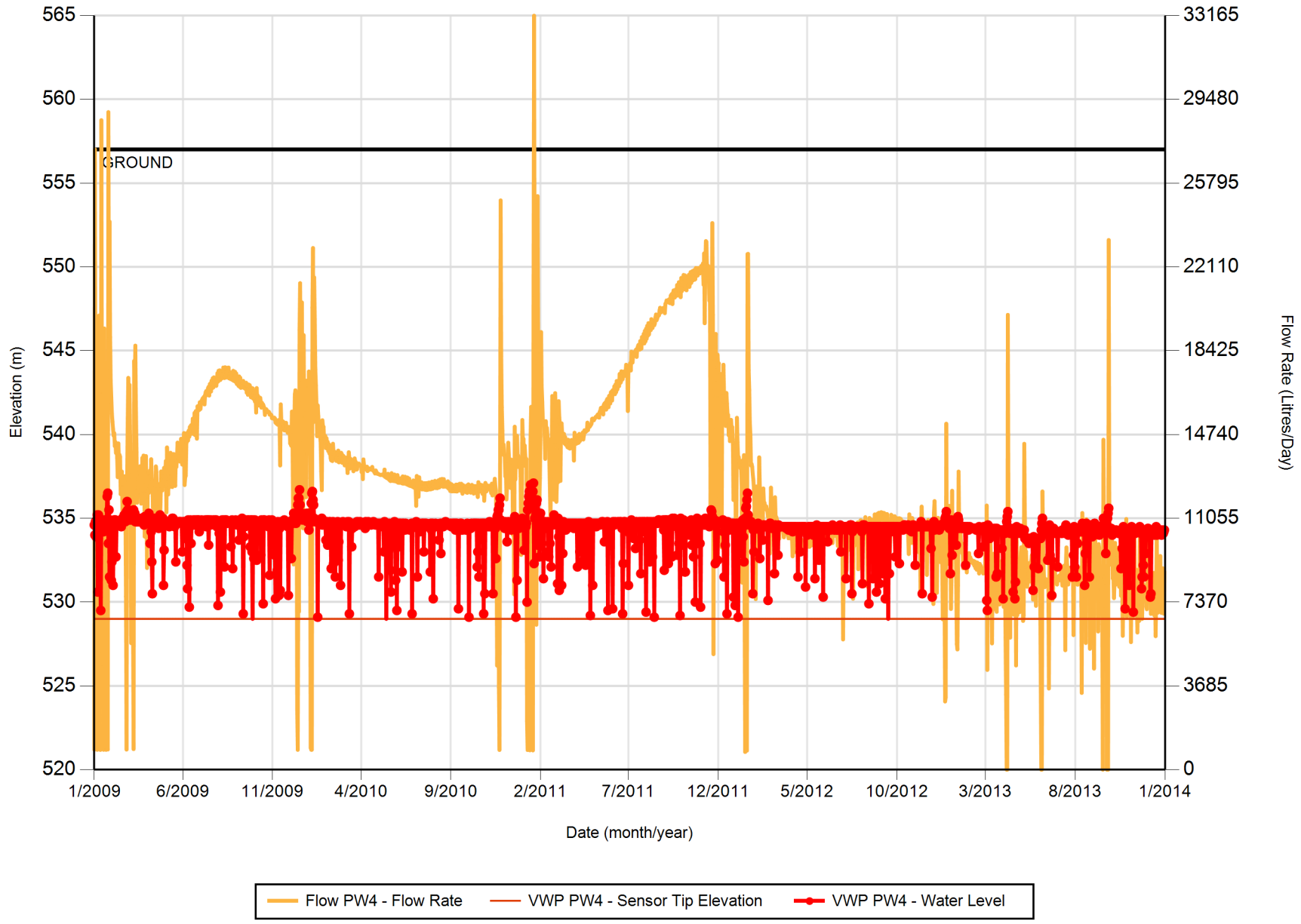
amec



West Quesnel Land Stability Program

PW4 (Station 16) - Daily Flow and Well Level

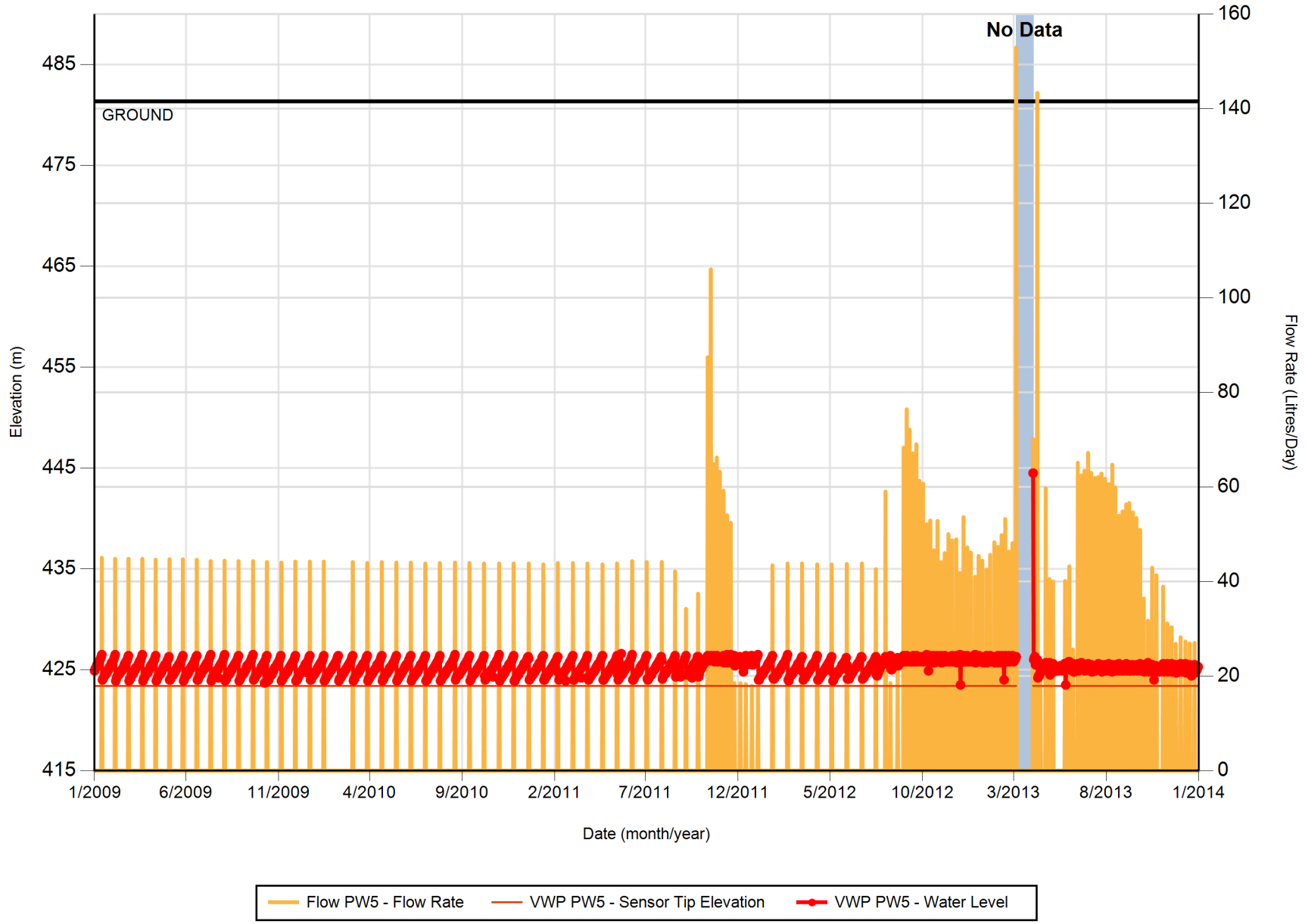
amec



West Quesnel Land Stability Program

PW5 (Station 17) - Daily Flow and Well Level

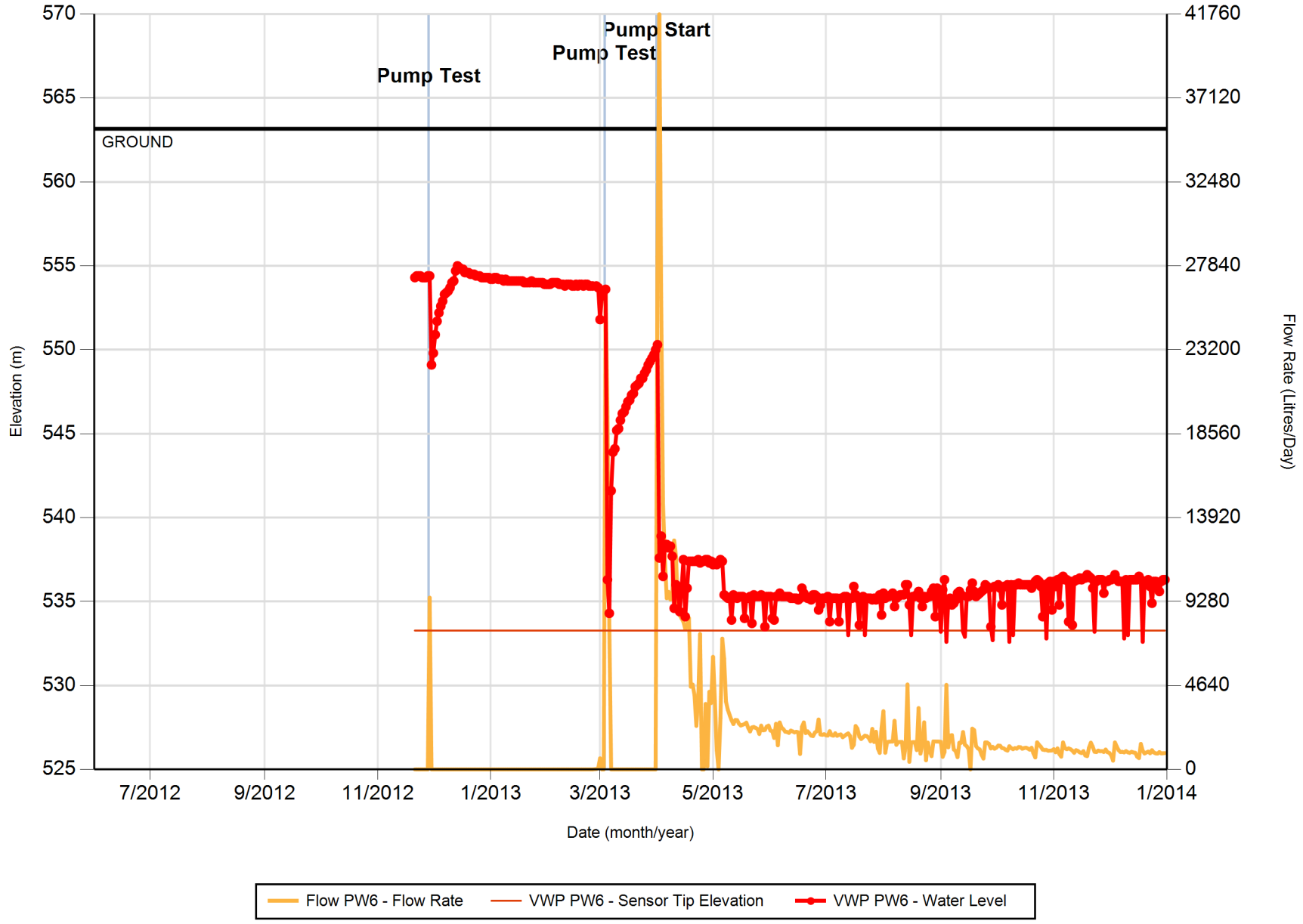
amec



West Quesnel Land Stability Program

PW6 (Station 04) - Daily Flow and Well Level

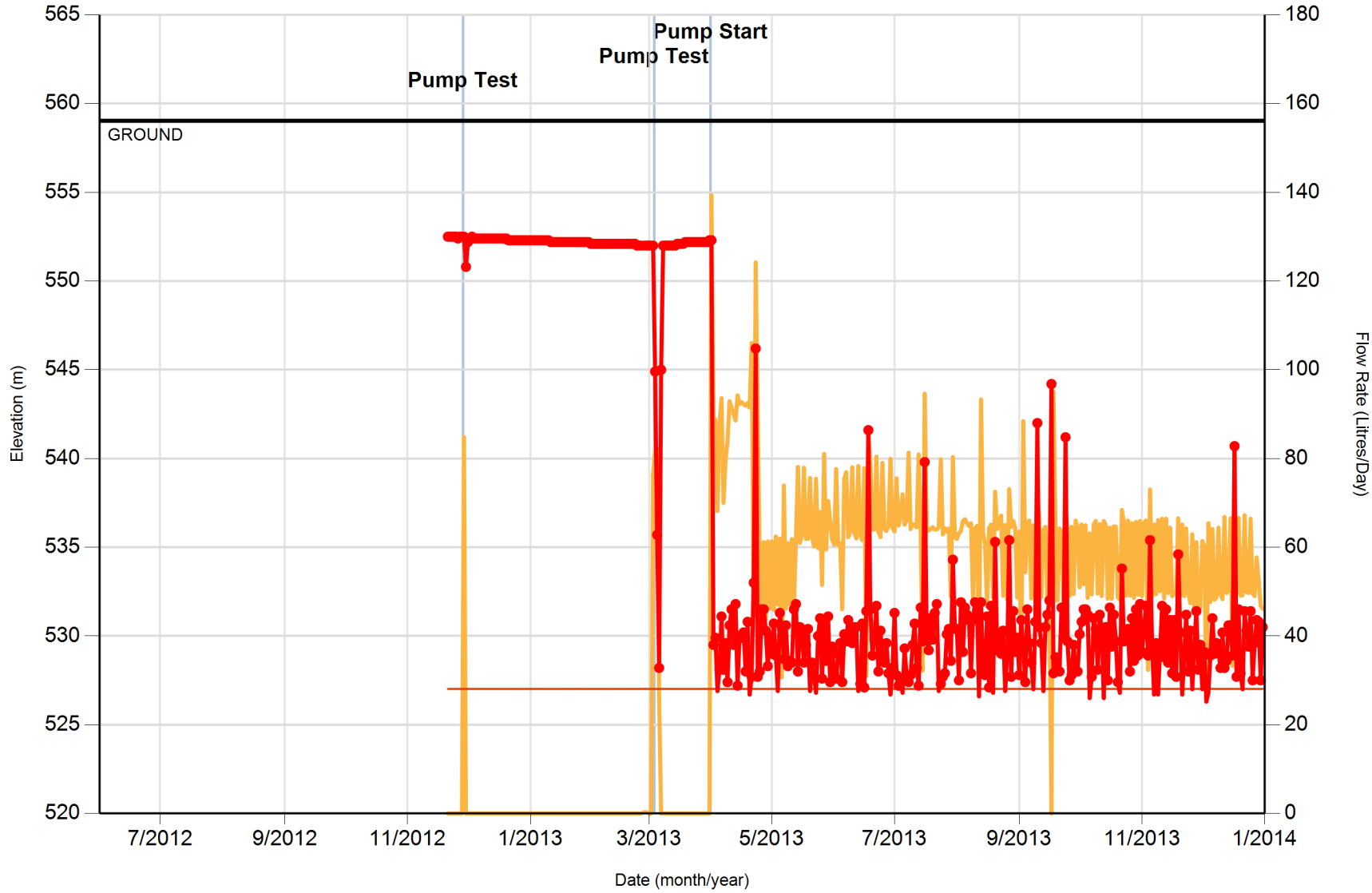
amec



West Quesnel Land Stability Program

PW7 (Station 04) - Daily Flow and Well Level

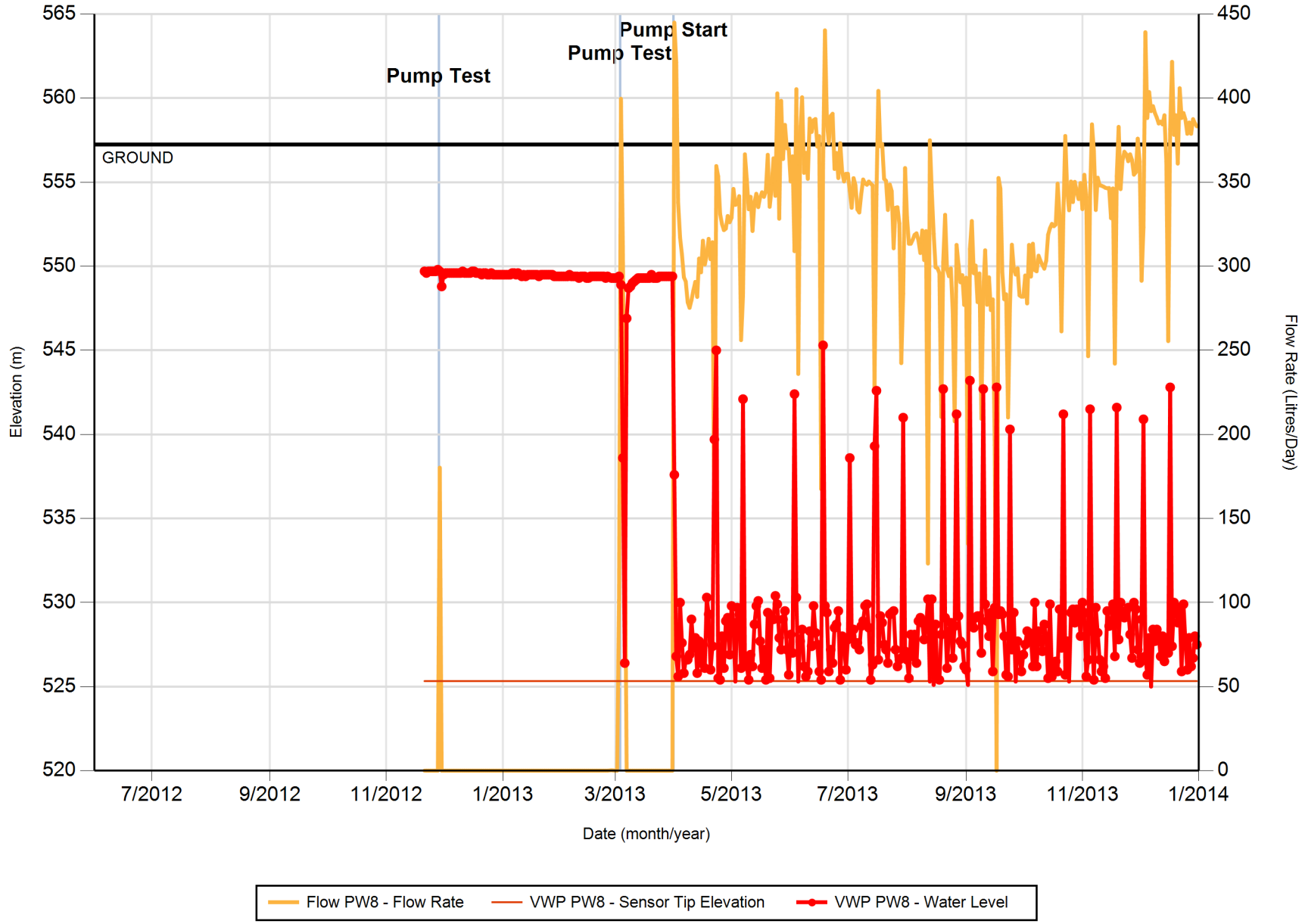
amec



West Quesnel Land Stability Program

PW8 (Station 04) - Daily Flow and Well Level

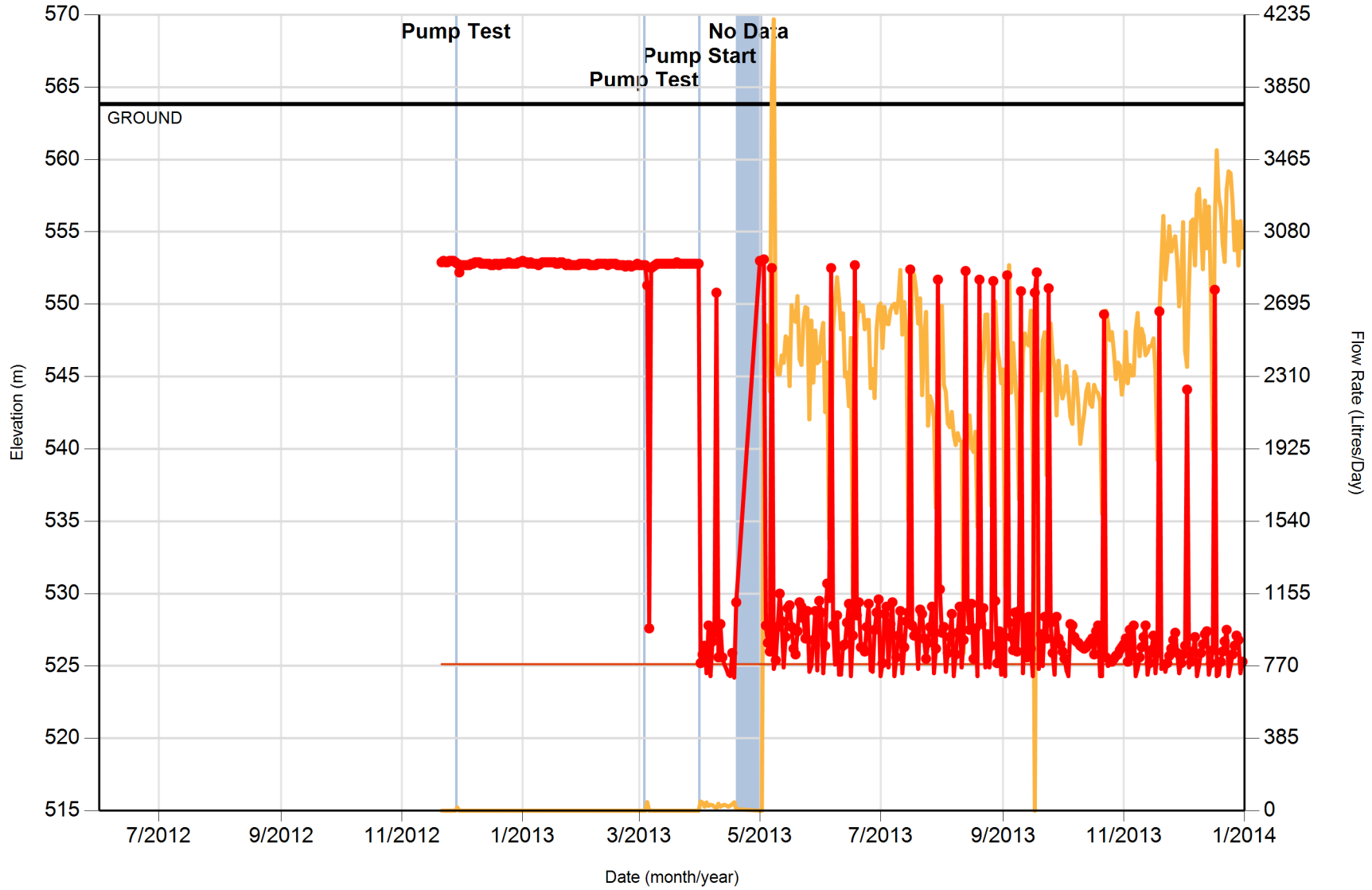
amec



West Quesnel Land Stability Program

PW9 (Station 21) - Daily Flow and Well Level

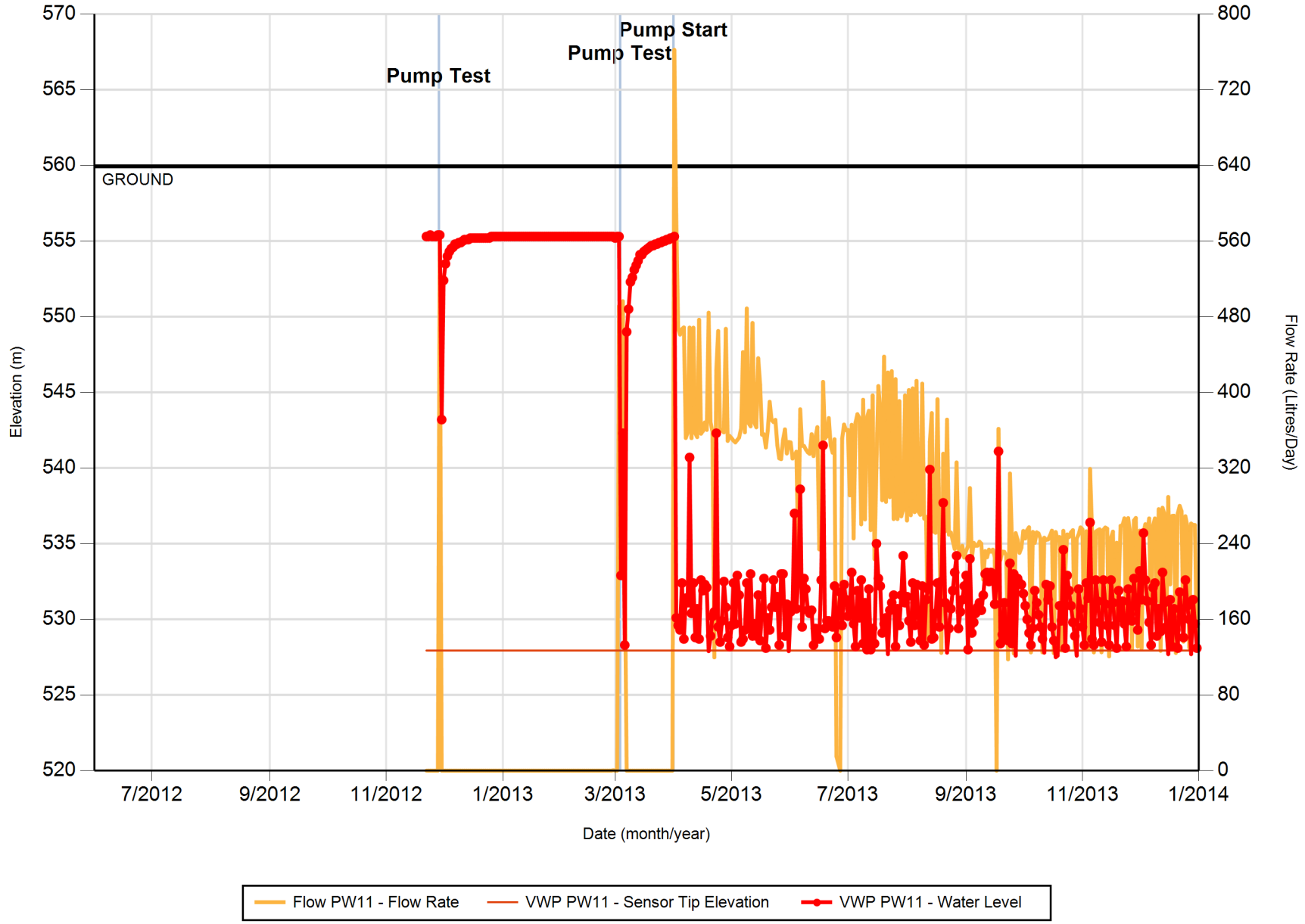
amec



West Quesnel Land Stability Program

PW11 (Station 20) - Daily Flow and Well Level

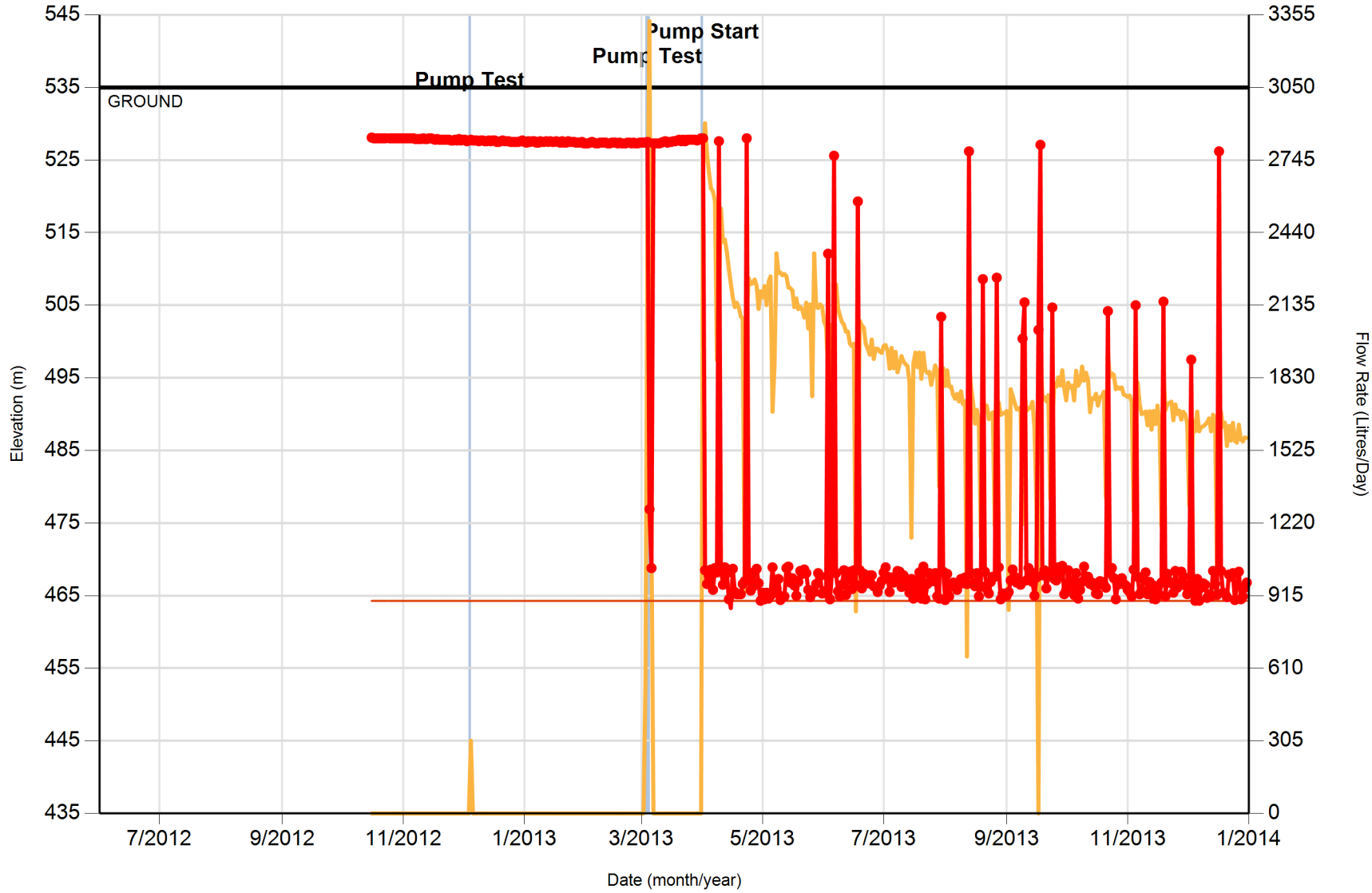
amec



West Quesnel Land Stability Program

PW12 (Station 09) - Daily Flow and Well Level

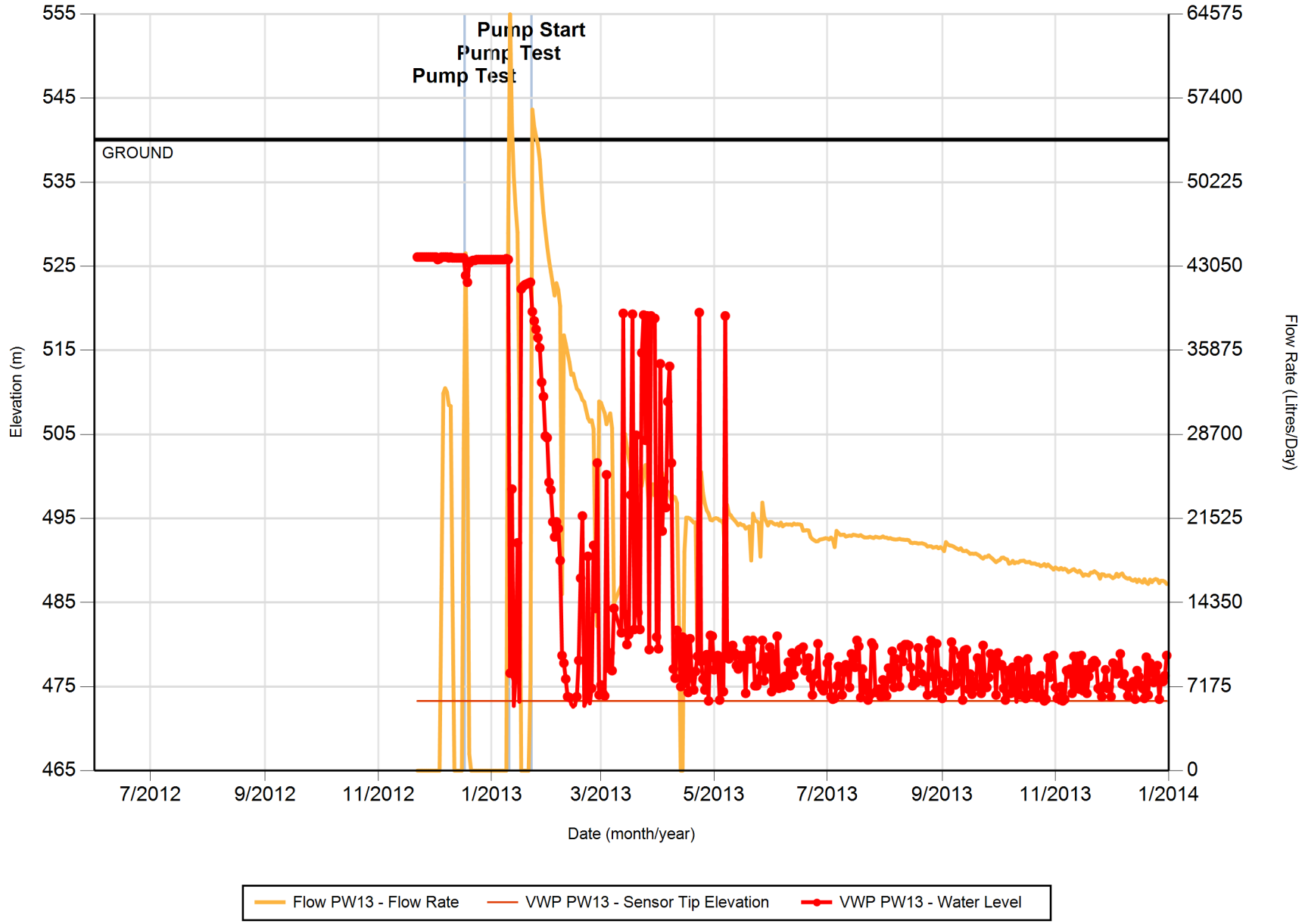
amec



West Quesnel Land Stability Program

PW13 (Station 22) - Daily Flow and Well Level

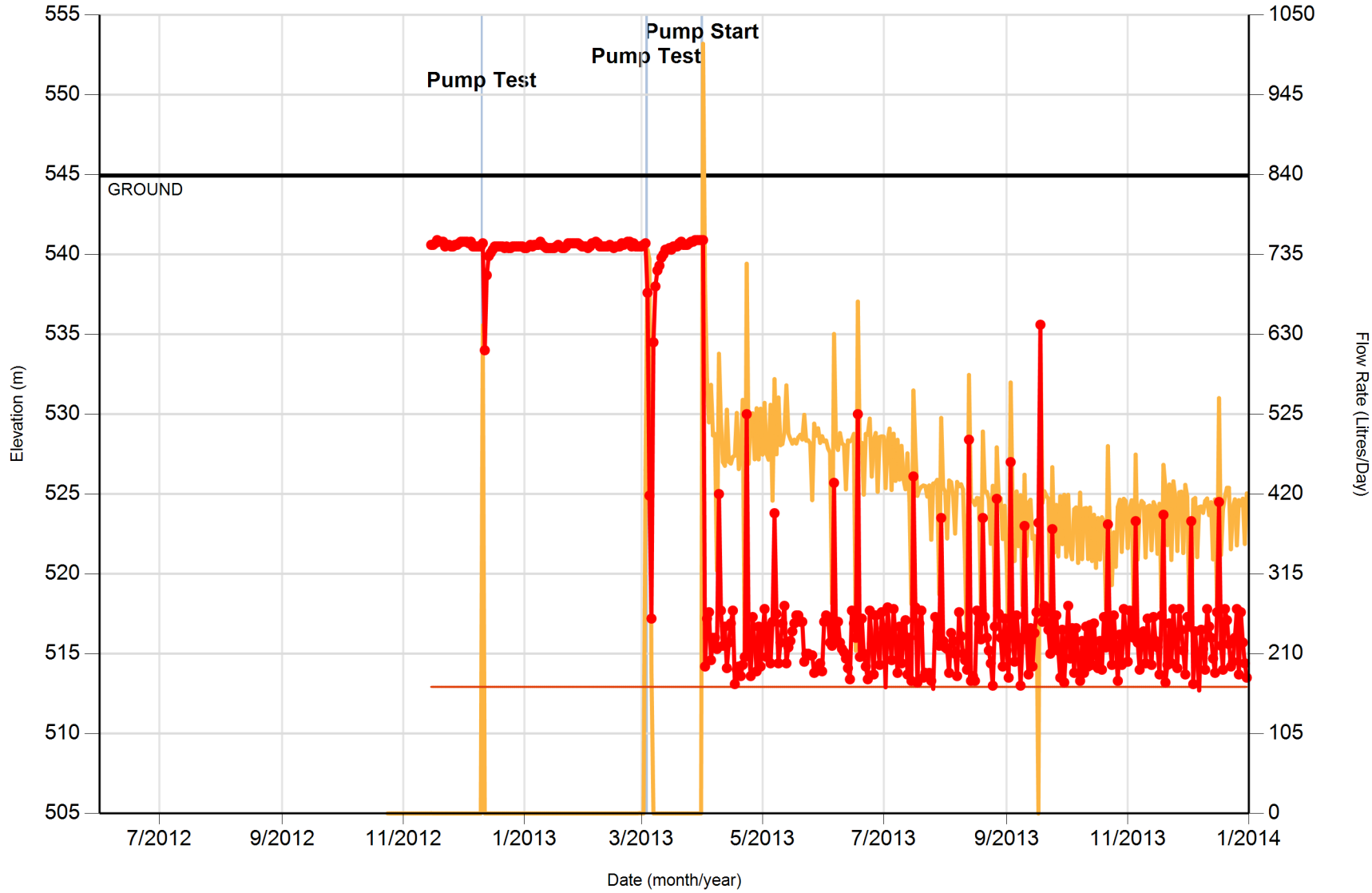
amec



West Quesnel Land Stability Program

PW14 (Station 10) - Daily Flow and Well Level

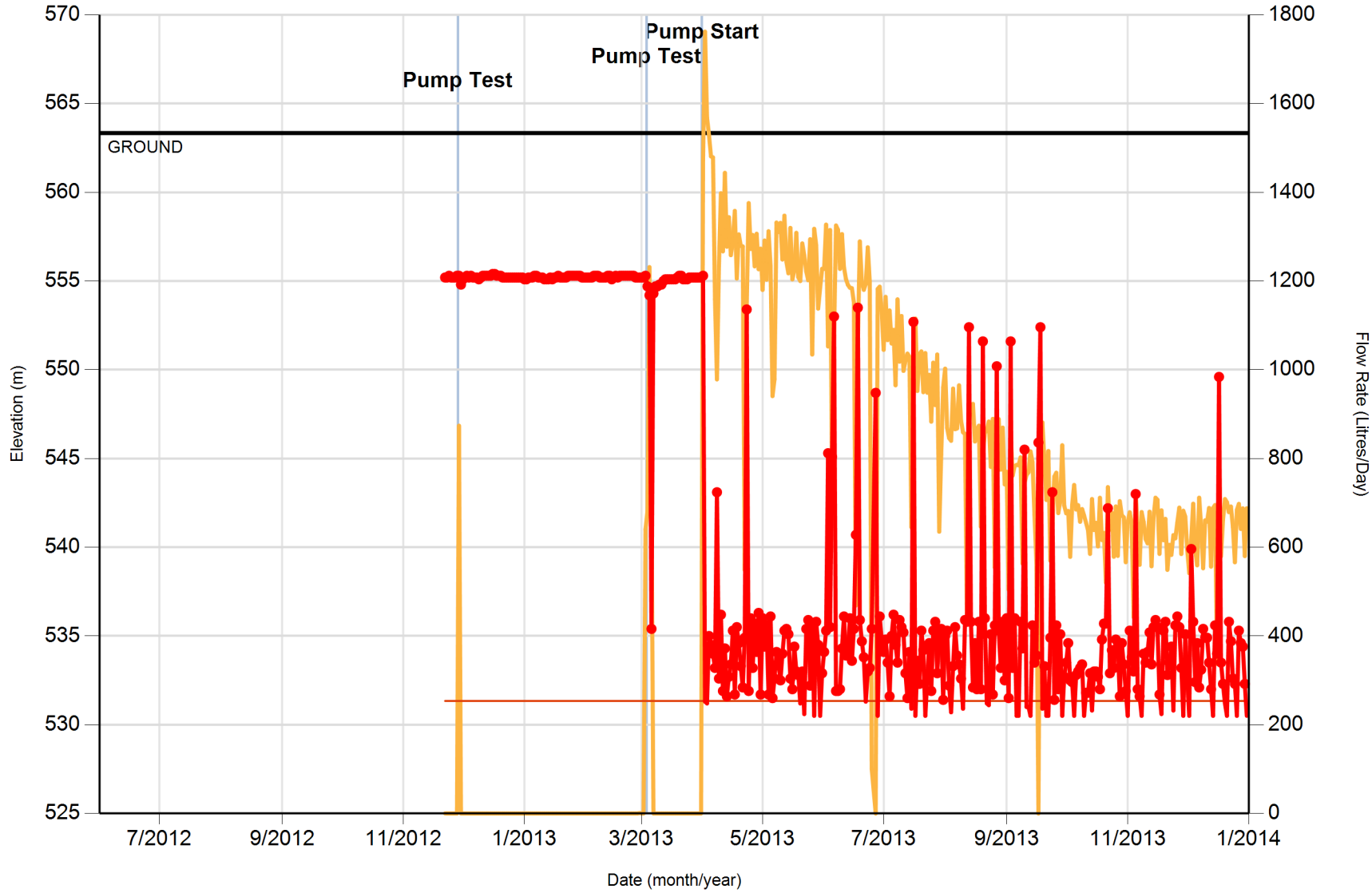
amec



West Quesnel Land Stability Program

PW15 (Station 20) - Daily Flow and Well Level

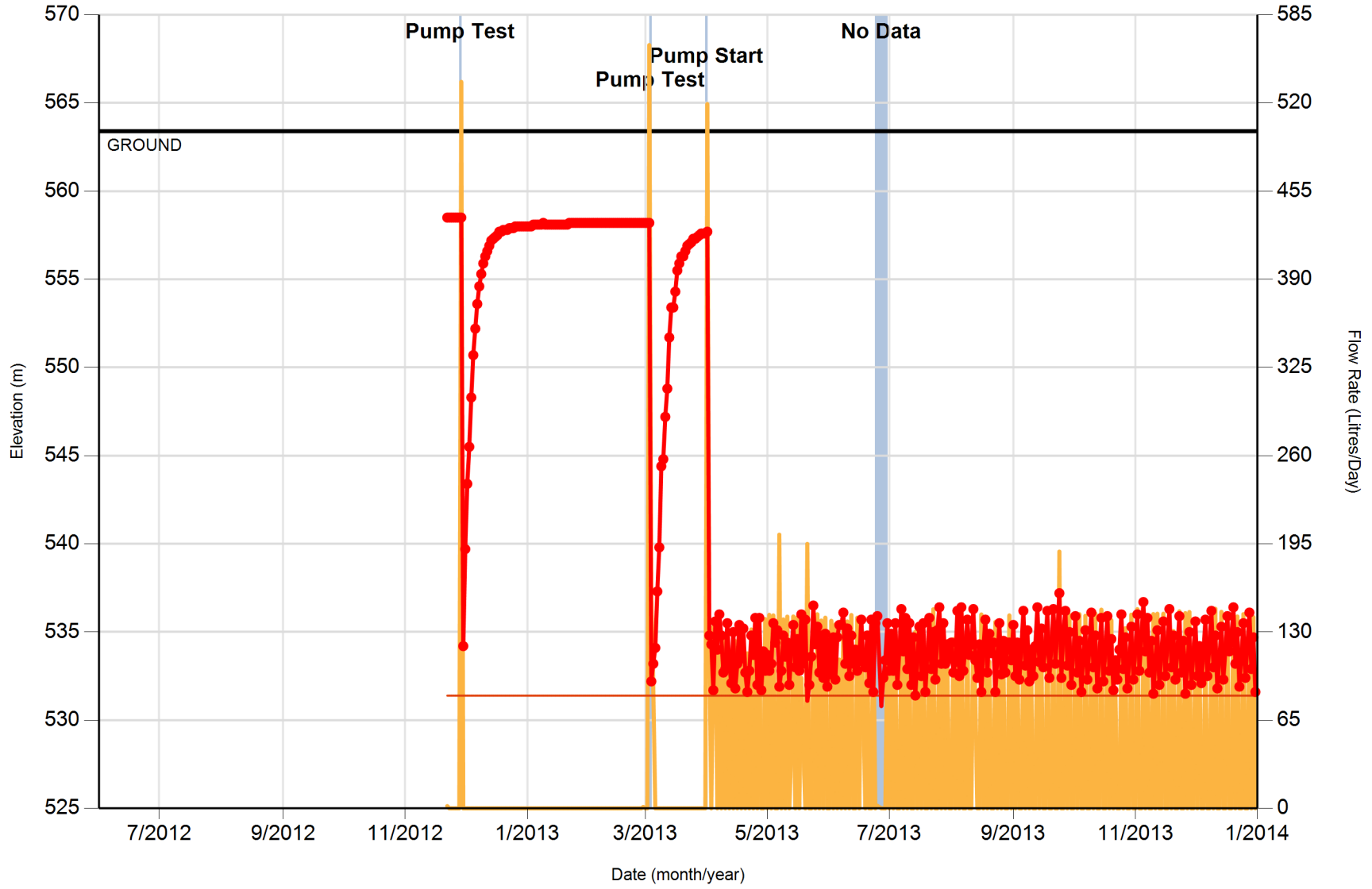
amec



West Quesnel Land Stability Program

PW16 (Station 20) - Daily Flow and Well Level

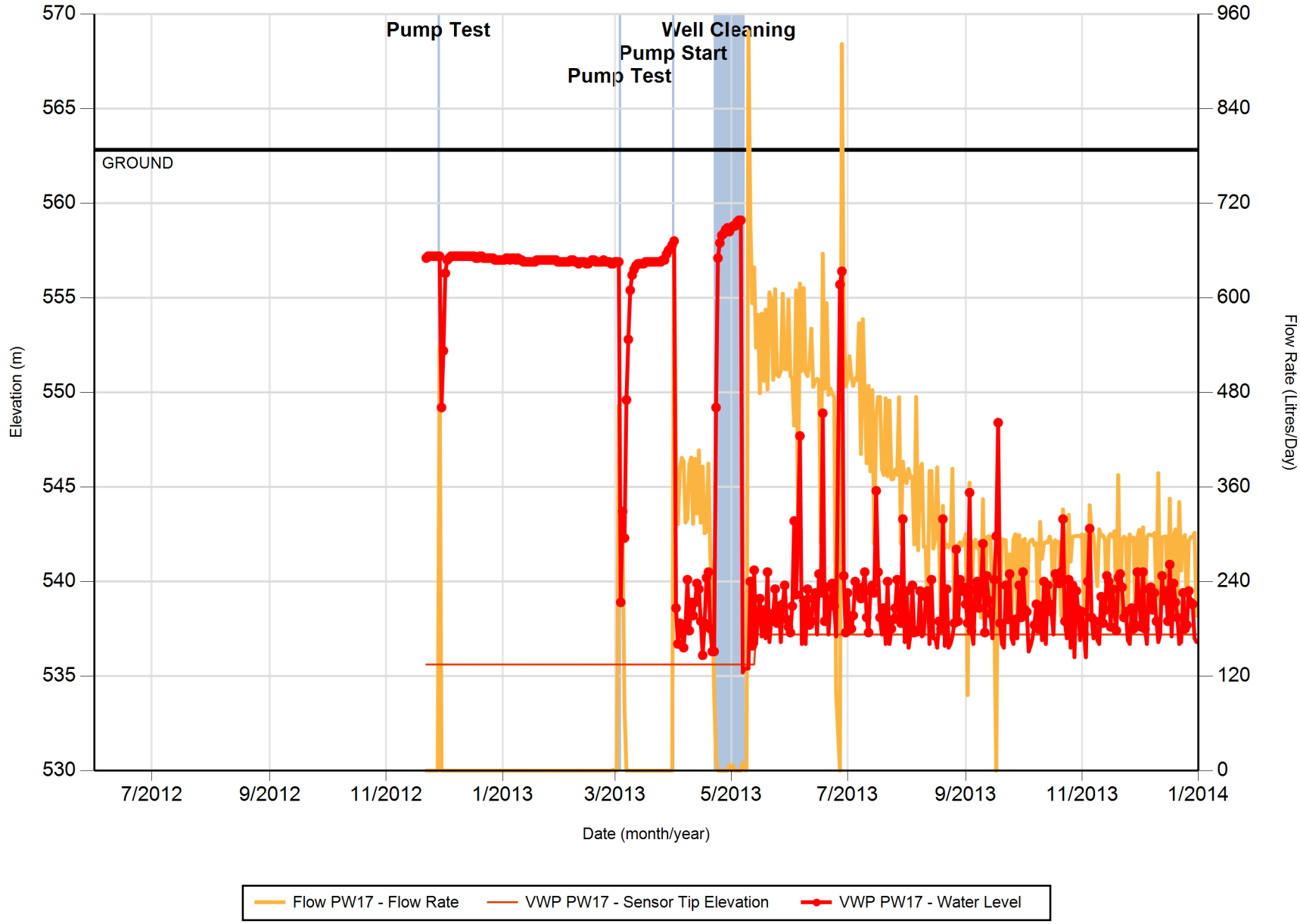
amec



West Quesnel Land Stability Program

PW17 (Station 20) - Daily Flow and Well Level

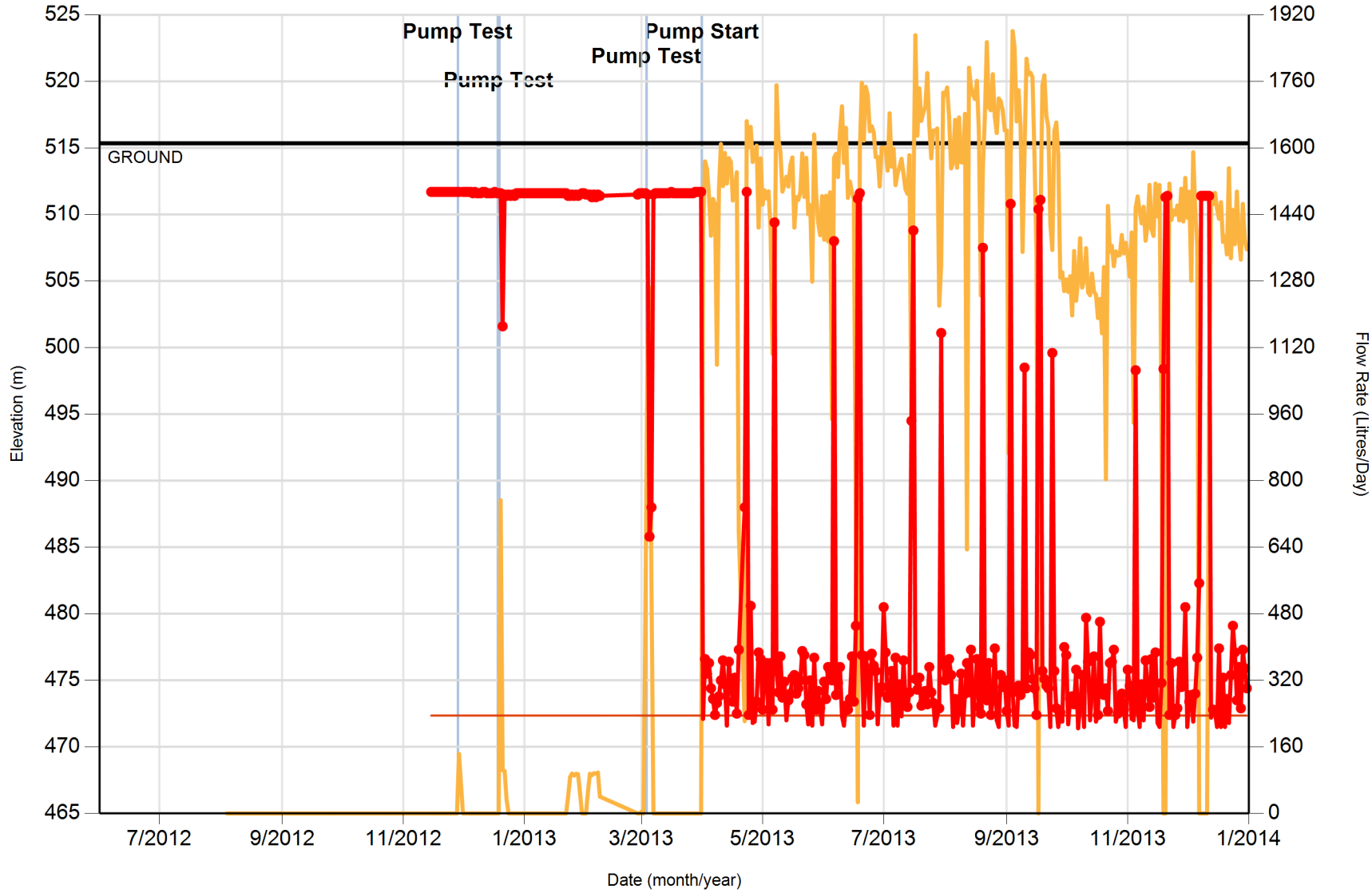
amec



West Quesnel Land Stability Program

PW18 (Station 23) - Daily Flow and Well Level

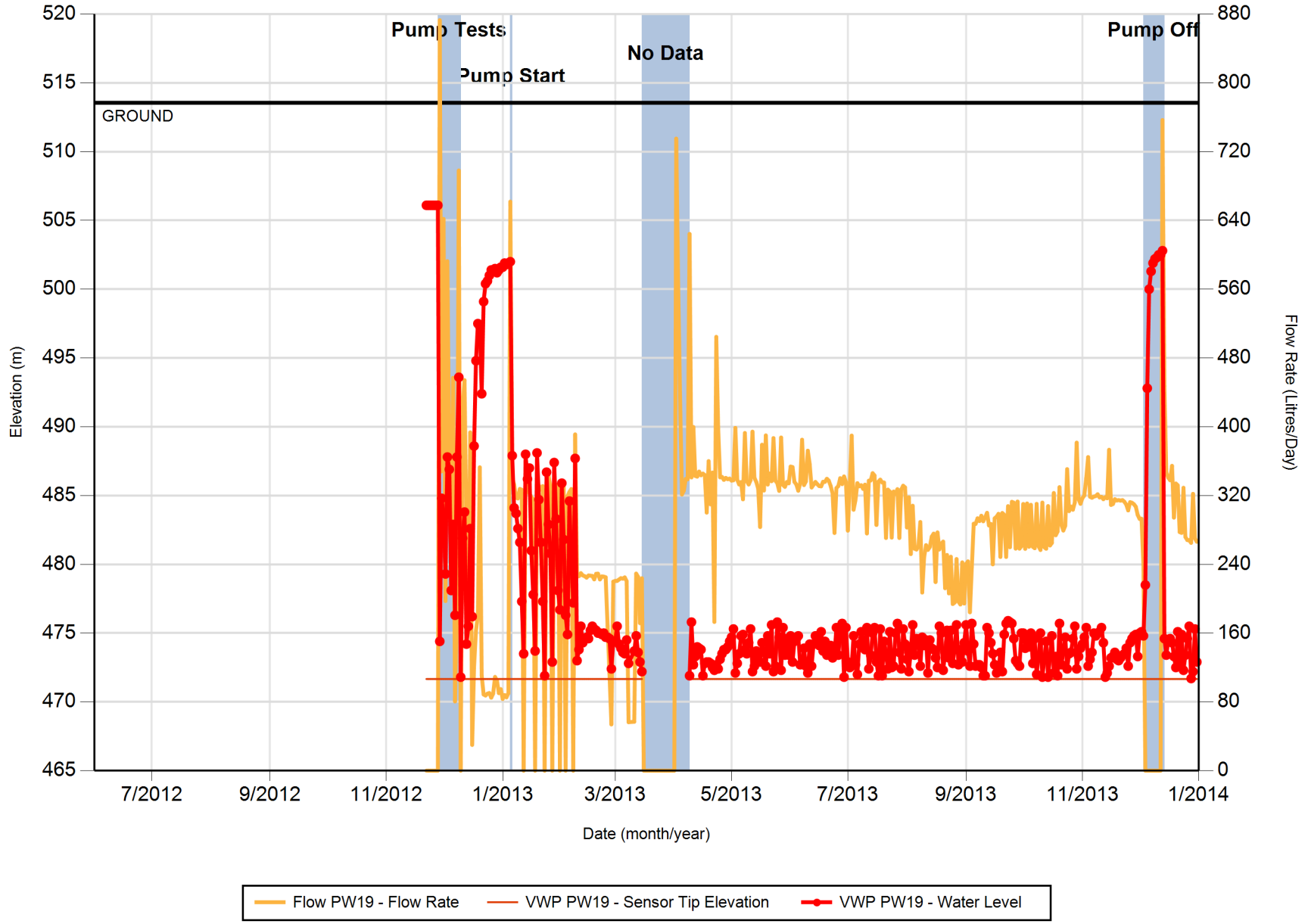
amec



West Quesnel Land Stability Program

PW19 (Station 28) - Daily Flow and Well Level

amec



Appendix E

Trial Horizontal Drains - Summary Table and Production Chart

APPENDIX E - Horizontal Drain Status

HD	Location	Drilled Date	Length (total/slotted)	Azimuth	Inclination	Monitoring Well VWPs	Status
HD1a	Lewis Dr. (at Sikh Temple)	November 2007	64.0m/57.9m	271	+2°	VWP 23A&B, VWP 24, VWP 25A&B	Inactive - dry
HD1b	Lewis Dr. (at Sikh Temple)	November 2007	48.8m/42.7m	241	+1°	VWP 23A&B, VWP 24, VWP 25A&B	Inactive - dry
HD4a	Adam St.	October 2007	135.6m/129.5m	271	+2°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD4b	Adam St.	November 2007	45.7m/39.6m	271	-2°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD5a	Below Healy St.	August 2012	251.5m/245.4m	220	0°	VWP 11A,B&C	Inactive - dry
HD5b	Below Healy St.	August 2012	251.5m/245.4m	210	-1°	VWP 11A,B&C	Inactive - dry
HD5c	Below Healy St.	August 2012	251.5m/245.4m	200	+0.5°	VWP 11A,B&C	Inactive - dry
HD5d	Below Healy St.	August 2012	251.5m/245.4m	175	-2°	VWP 11A,B&C	Inactive - dry
HD6a	Healy St.	August 2012	250.9m/244.8m	216	0°	VWP 11A,B&C	Inactive - dry
HD6b	Healy St.	August 2012	251.2m/245.1m	240	-2°	VWP 11A,B&C	Inactive - dry
HD6c	Healy St.	August 2012	251.5m/245.4m	226	-0.5°	VWP 11A,B&C	Inactive - dry
HD7a	Below Pentland Cres.	August 2012	15.2m/15.2m	252	0°	VWP 36A,B&C	Inactive - dry
HD7b	Below Pentland Cres.	August 2012	47.2m/32.0m	212	-2°	VWP 36A,B&C	Inactive - dry
HD7c	Below Pentland Cres.	August 2012	56.1m/48.8m	292	-2°	VWP 36A,B&C	Inactive - dry
HD8a	Below Pentland Cres.	September 2012	137.2m/134.1m	250	0°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8b	Below Pentland Cres.	September 2012	137.2m/134.1m	260	-1°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8c	Below Pentland Cres.	September 2012	140.2m/137.2m	240	-2°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8d	Below Pentland Cres.	September 2012	140.2m/137.2m	252	-1°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8e	Below Pentland Cres.	September 2012	134.1m/131.1m	254	-3°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8f	Below Pentland Cres.	September 2012	137.2m/134.1m	248	-2.5°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8g	Below Pentland Cres.	September 2012	137.2m/134.1m	238	-2°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8h	Below Pentland Cres.	September 2012	132.6m/131.1m	228	0°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8i	Below Pentland Cres.	September 2012	153.9m/152.4m	225	+1°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8j	Below Pentland Cres.	September 2012	134.1m/131.1m	222	-2°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD8k	Below Pentland Cres.	September 2012	128.0m/125.0m	218	0°	VWP 8A,B,C&D VWP 36A,B&C	Active
HD9a	Lewis Dr. (at Sikh Temple)	August 2012	208.8m/204.2m	290	-5°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD9b	Lewis Dr. (at Sikh Temple)	August 2012	202.7m/199.6m	280	-2°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD9c	Lewis Dr. (at Sikh Temple)	August 2012	71.6m/67.1m	270	0°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD9d	Lewis Dr. (at Sikh Temple)	August 2012	105.2m/97.5m	260	-1.8°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD9e	Lewis Dr. (at Sikh Temple)	August 2012	99.1m/94.5m	250	-2°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD9f	Lewis Dr. (at Sikh Temple)	August 2012	50.3m/45.2m	230	-2°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD9g	Lewis Dr. (at Sikh Temple)	August 2012	135.6m/134.1m	300	-1°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD9h	Lewis Dr. (at Sikh Temple)	August 2012	77.7m/73.2m	290	+0.5°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD9i	Lewis Dr. (at Sikh Temple)	August 2012	74.7m/70.1m	265	-1.5°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD9j	Lewis Dr. (at Sikh Temple)	August 2012	47.2m/42.7m	265	-1°	VWP 23A&B, VWP 24, VWP 25A&B	Active
HD10a	Bouchie St.	September 2012	134.1m/131.1m	265	-0.5°	VWP 37A&B	Active
HD10b	Bouchie St.	September 2012	146.3m/143.3m	305	0°	VWP 37A&B	Active
HD10c	Bouchie St.	September 2012	146.3m/143.3m	295	-1.5°	VWP 37A&B	Active
HD10d	Bouchie St.	September 2012	125.0m/121.9m	285	+0.1°	VWP 37A&B	Active
HD10e	Bouchie St.	September 2012	164.6m/161.5m	275	-1.7°	VWP 37A&B	Active
HD10f	Bouchie St.	September 2012	109.7m/106.7m	255	+1°	VWP 37A&B	Active
HD10g	Bouchie St.	September 2012	121.9m/118.9m	244	+.8°	VWP 37A&B	Active

Horizontal Drains Cont.							
HD11a	Below Allard St.	August 2012	196.6m/190.5m	315	-1.5°	VWP 3, VWP 34A,B&C	Active
HD11b	Below Allard St.	August 2012	196.6m/190.5m	305	-2.2°	VWP 3, VWP 34A,B&C	Active
HD11c	Below Allard St.	August 2012	196.6m/190.5m	295	-1.5°	VWP 3, VWP 34A,B&C	Active
HD11d	Below Allard St.	August 2012	196.6m/190.5m	285	-2.2°	VWP 3, VWP 34A,B&C	Active
HD11e	Below Allard St.	August 2012	196.6m/190.5m	275	-1.5°	VWP 3, VWP 34A,B&C	Active
HD11f	Below Allard St.	August 2012	365.8m/362.8m	315	+0.2°	VWP 3, VWP 34A,B&C	Active
HD12a	Adam St.	July 2012	198.1m/190.5m	258	0°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD12b	Adam St.	July 2012	198.1m/190.5m	240	0°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD12c	Adam St.	July 2012	132.6m/131.1m	230	0°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD12d	Adam St.	July 2012	196.6m/190.5m	260	0°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD12e	Adam St.	July 2012	196.6m/190.5m	278	0°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD12f	Adam St.	July 2012	196.6m/190.5m	250	0°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD12g	Adam St.	July 2012	196.6m/190.5m	230	-1.5°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD12h	Adam St.	July 2012	196.6m/190.5m	286	-0.5°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD12i	Adam St.	July 2012	196.6m/190.5m	292	-1°	VWP 21A&B, VWP22, VWP 38A&B	Active
HD13a	Below Adam St.	August 2012	245.4m/239.3m	330	0°	VWP 38A&B	Active
HD13b	Below Adam St.	August 2012	251.5m/245.4m	320	-0.5°	VWP 38A&B	Active
HD13c	Below Adam St.	August 2012	251.5m/245.4m	310	-0.5°	VWP 38A&B	Active
HD13d	Below Adam St.	August 2012	251.5m/245.4m	300	0°	VWP 38A&B	Active
HD13e	Below Adam St.	August 2012	99.1m/92.0m	340	-2°	VWP 38A&B	Active
HD13f	Below Adam St.	August 2012	245.4m/239.3m	290	0°	VWP 38A&B	Active
HD14a	Below Healy St.	September 2012	150.9m/147.9m	218	-1.5°	VWP 11A,B&C	Inactive - dry
HD14b	Below Healy St.	September 2012	157.0m/154.0m	205	+0.5°	VWP 11A,B&C	Inactive - dry
HD14c	Below Healy St.	September 2012	157.0m/154.0m	192	+2°	VWP 11A,B&C	Inactive - dry
HD14d	Below Healy St.	September 2012	181.4m/178.4m	180	0°	VWP 11A,B&C	Inactive - dry
HD14e	Below Healy St.	September 2012	403.9m/400.9m	230	+1°	VWP 11A,B&C	Inactive - dry

West Quesnel
Land Stability Program

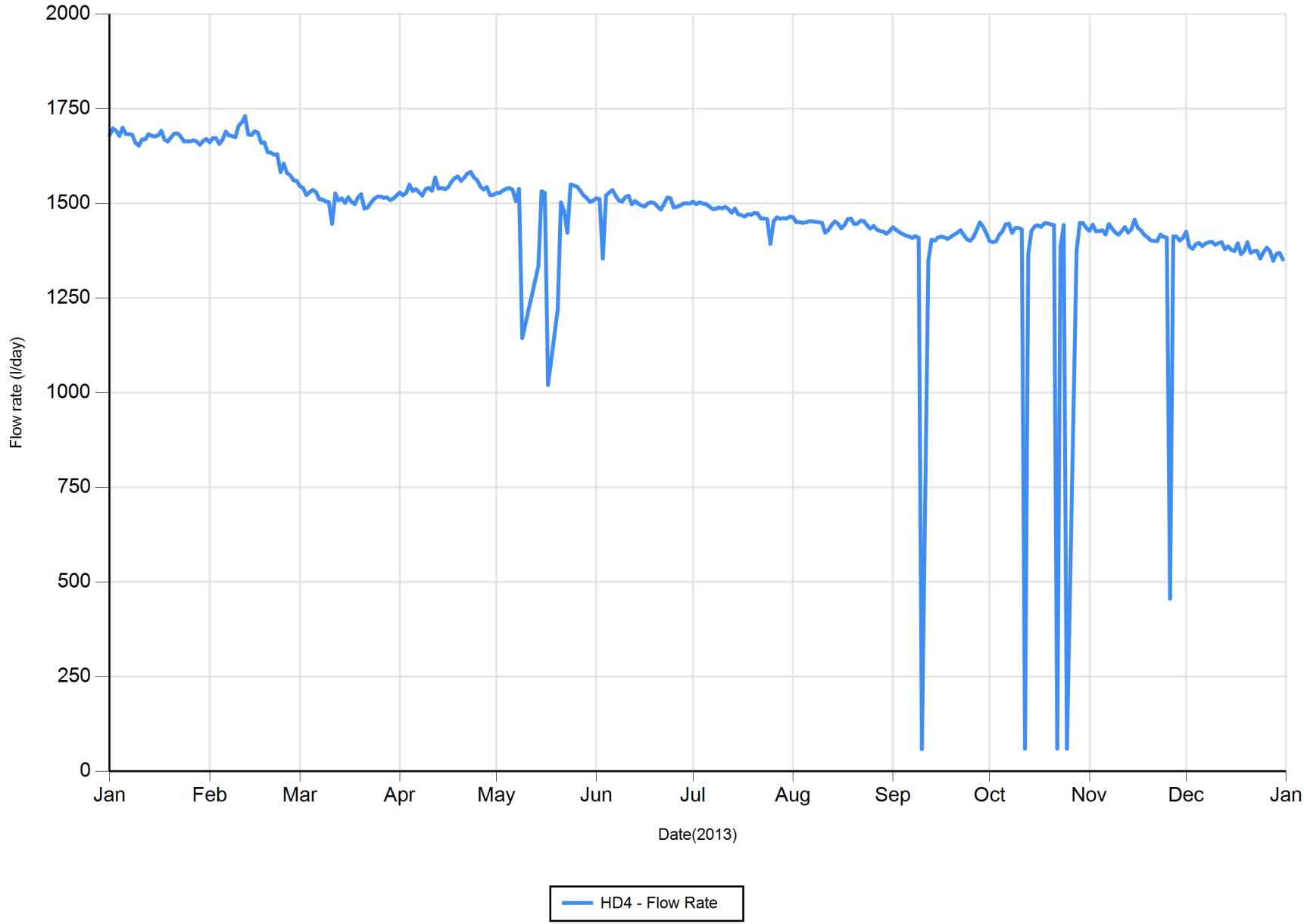
amec

Horizontal Drain Trends for 2013

West Quesnel Land Stability Program

HD4 (Station 17) - Daily Flow Rate

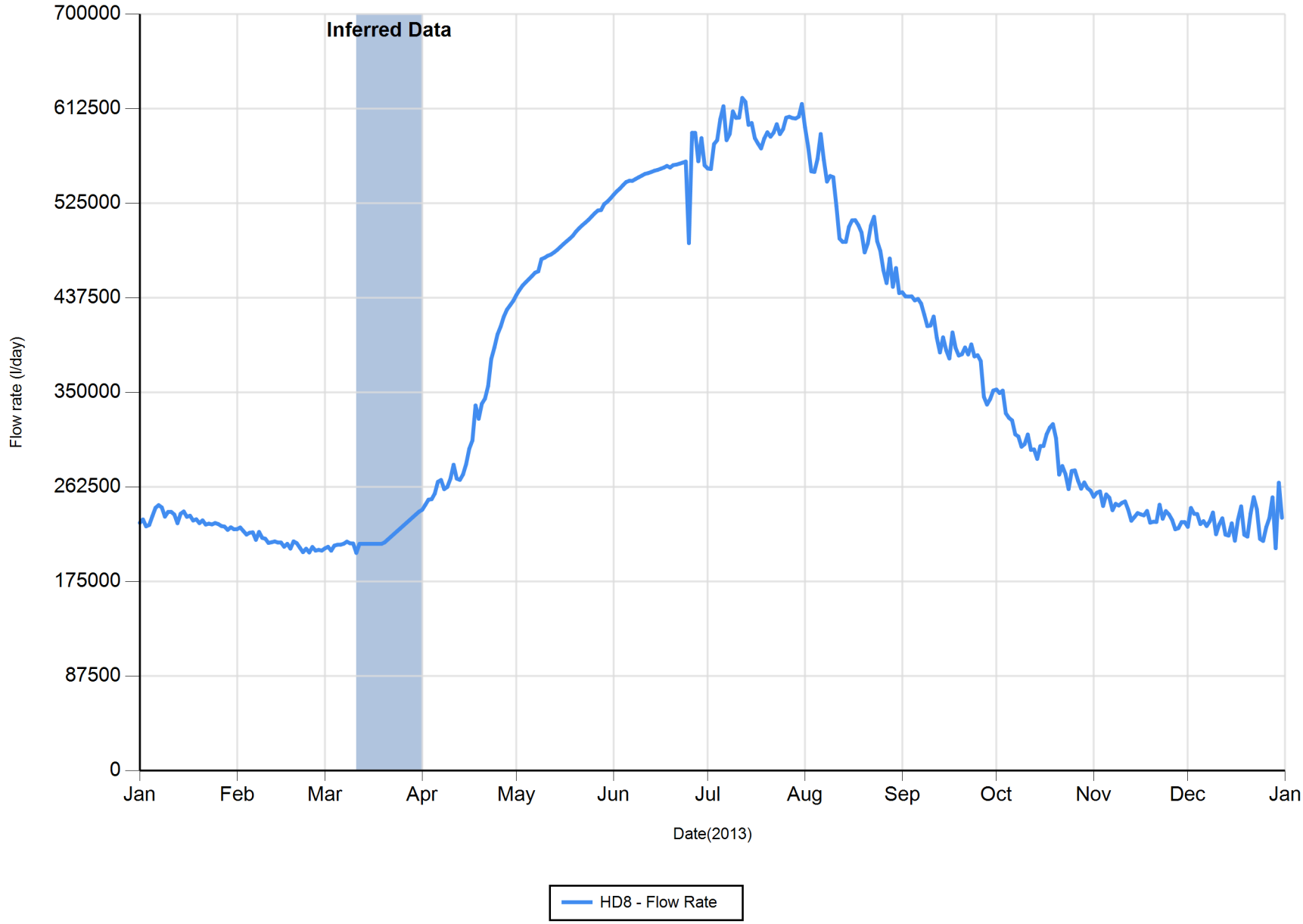
amec



West Quesnel Land Stability Program

HD8 (Station 24) - Daily Flow Rate

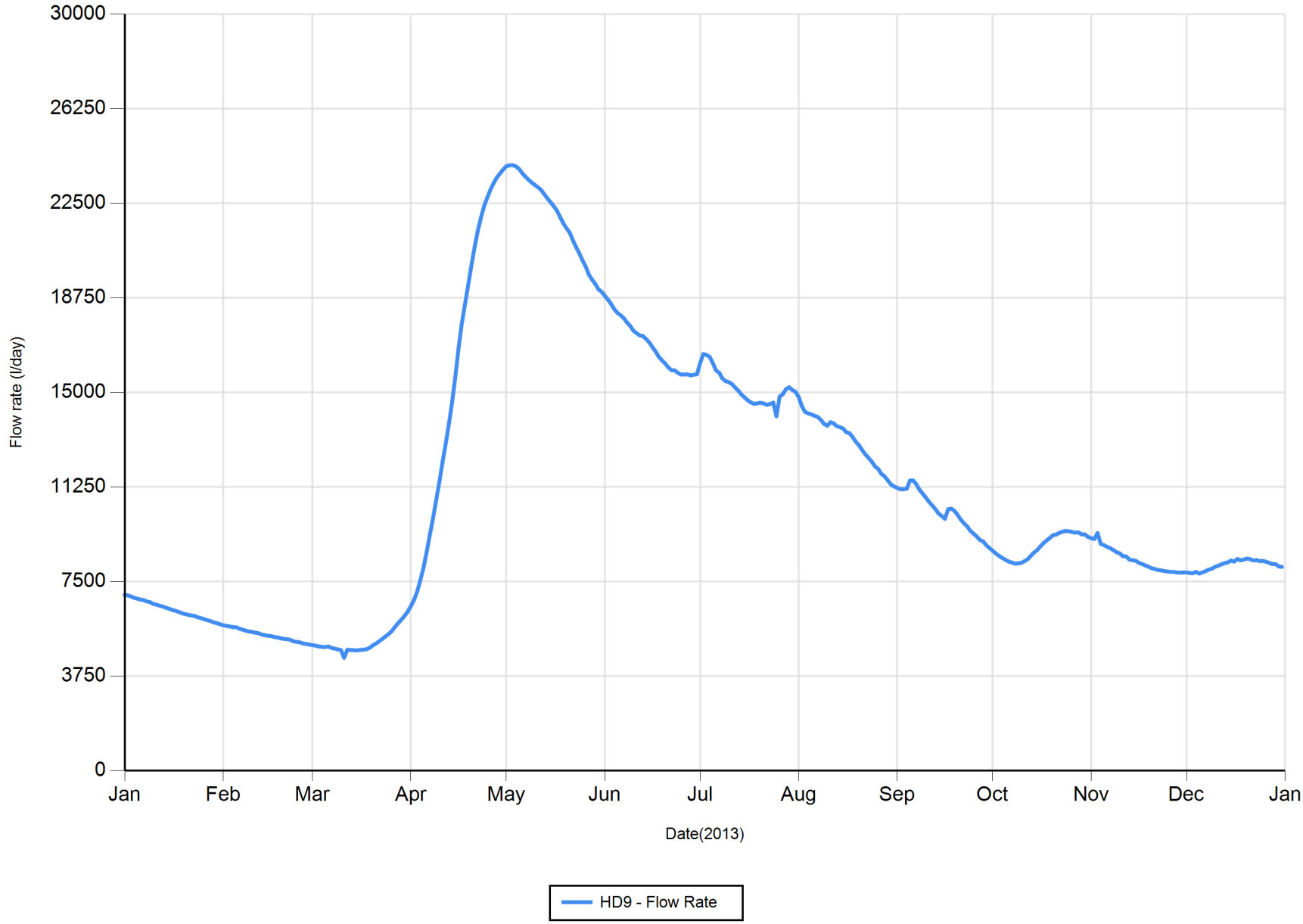
amec



West Quesnel Land Stability Program

HD9 (Station 12) - Daily Flow Rate

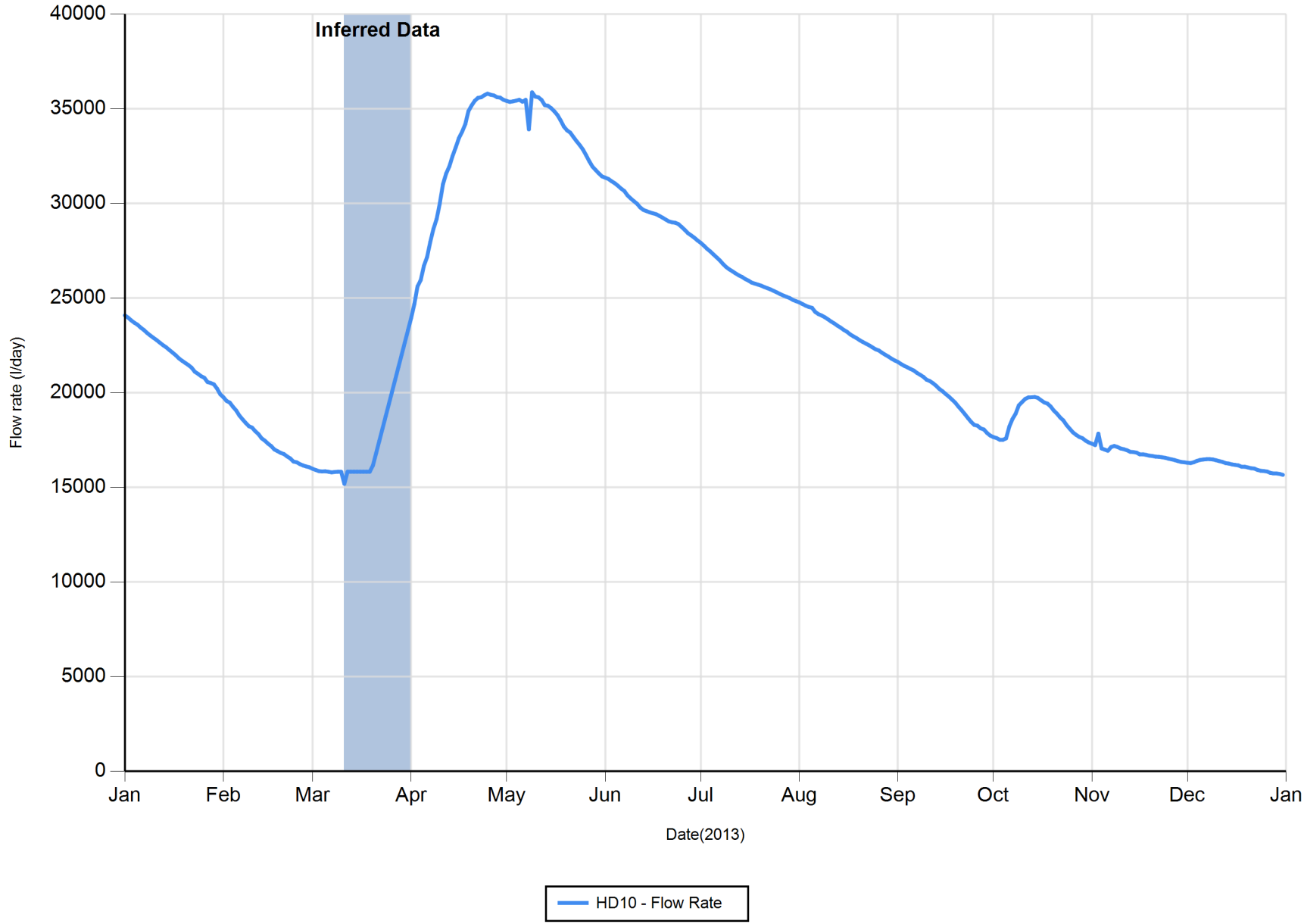
amec



West Quesnel Land Stability Program

HD10 (Station 26) - Daily Flow Rate

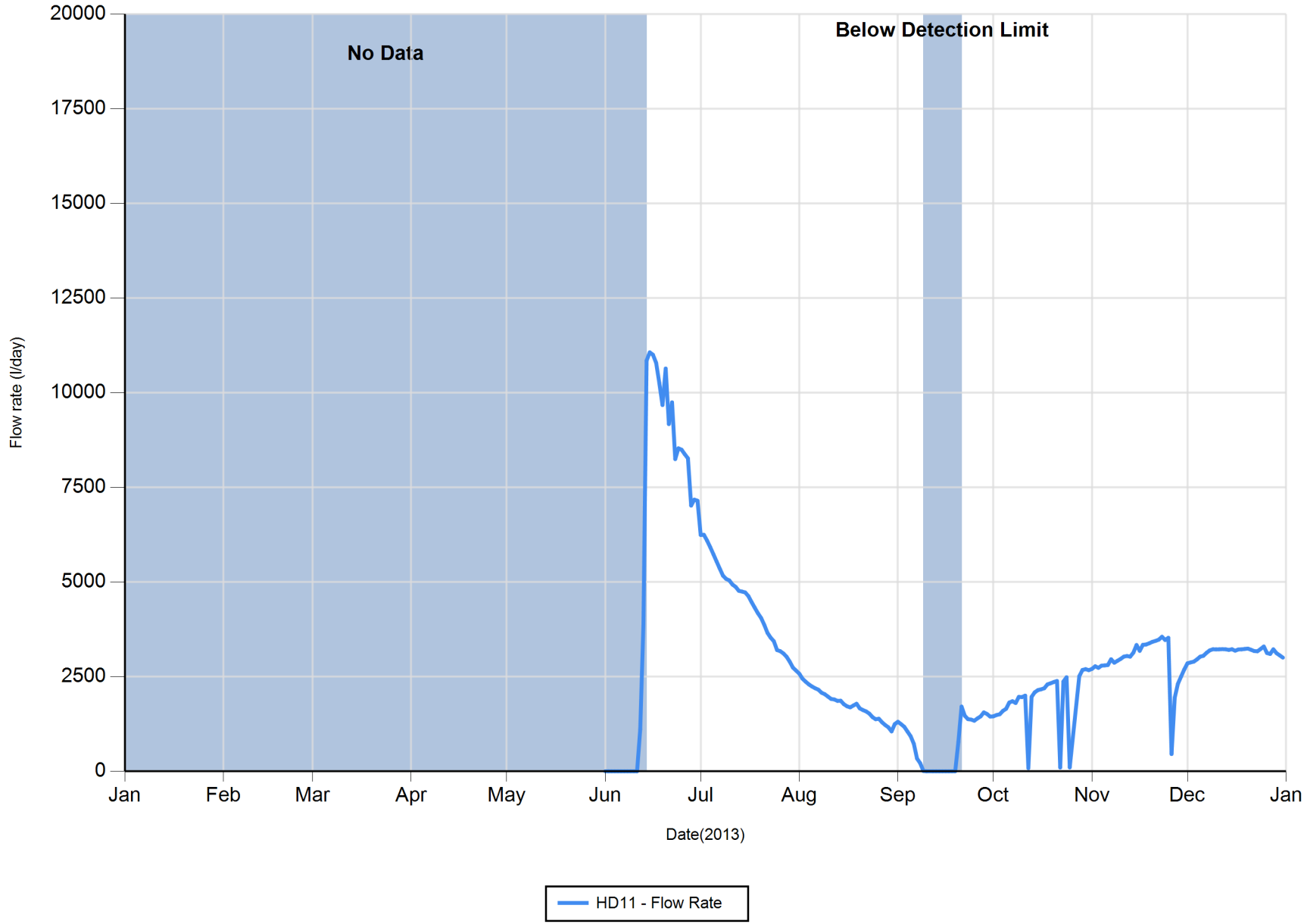
amec



West Quesnel Land Stability Program

HD11 (Station 17) - Daily Flow Rate

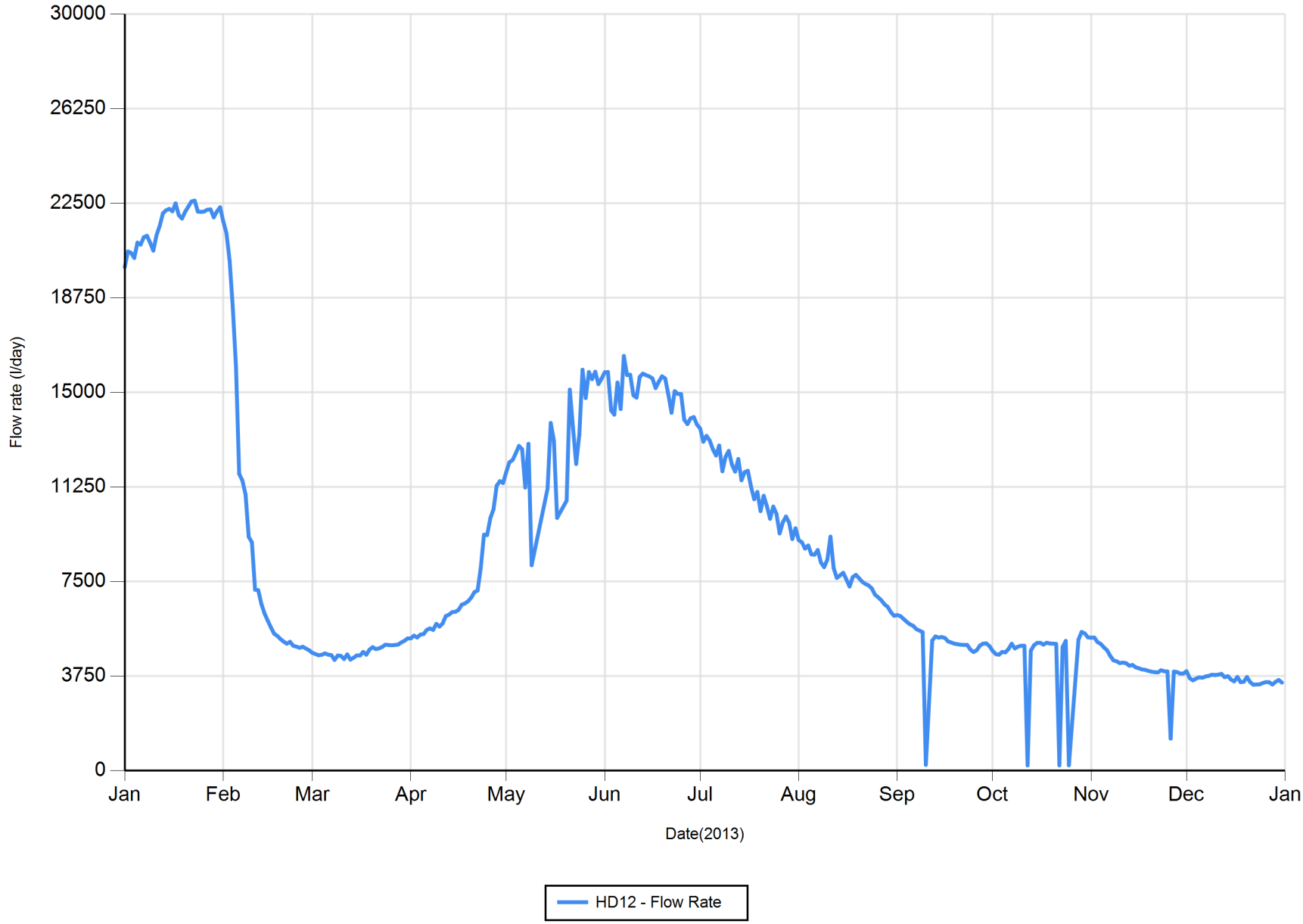
amec



West Quesnel Land Stability Program

HD12 (Station 17) - Daily Flow Rate

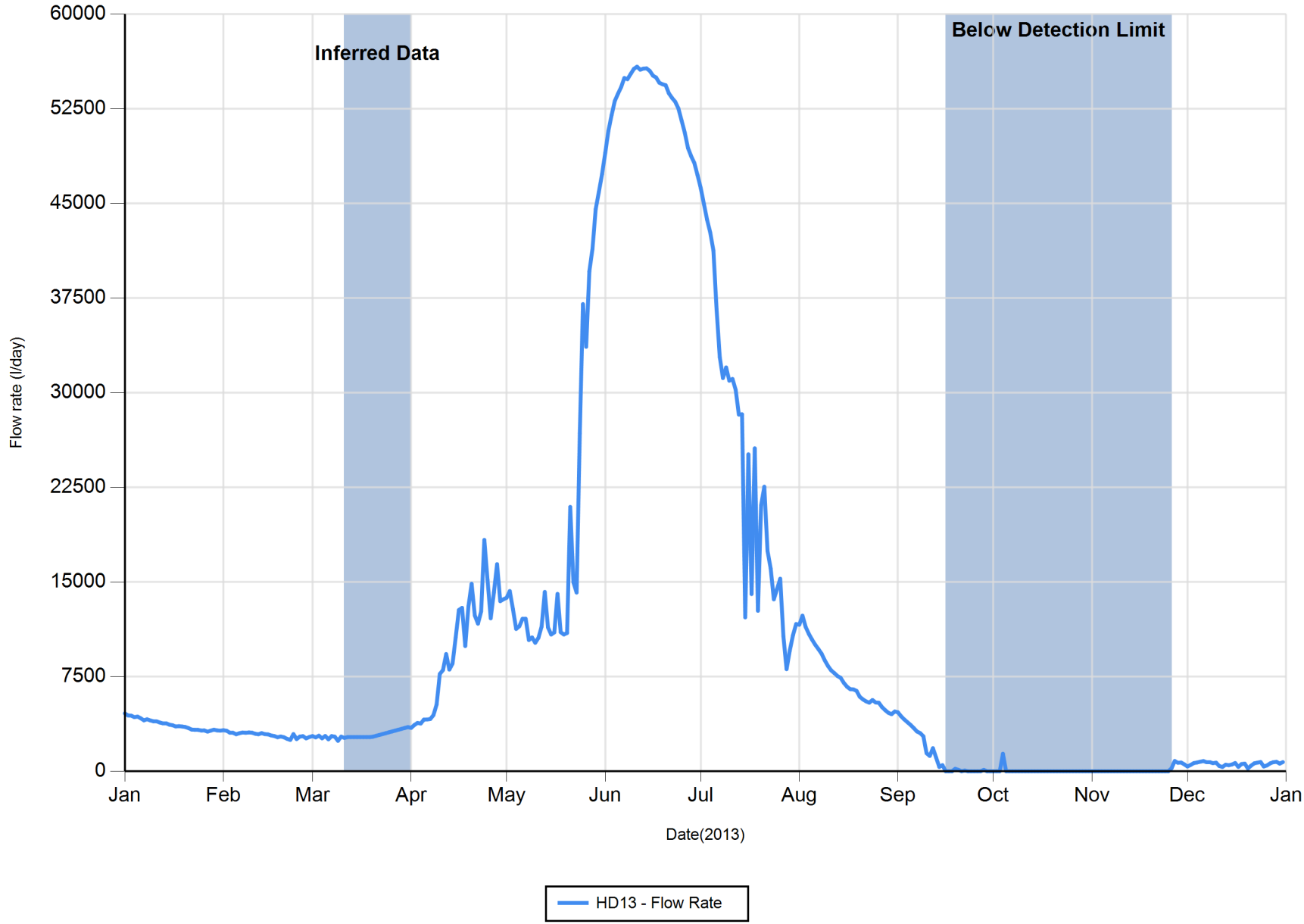
amec



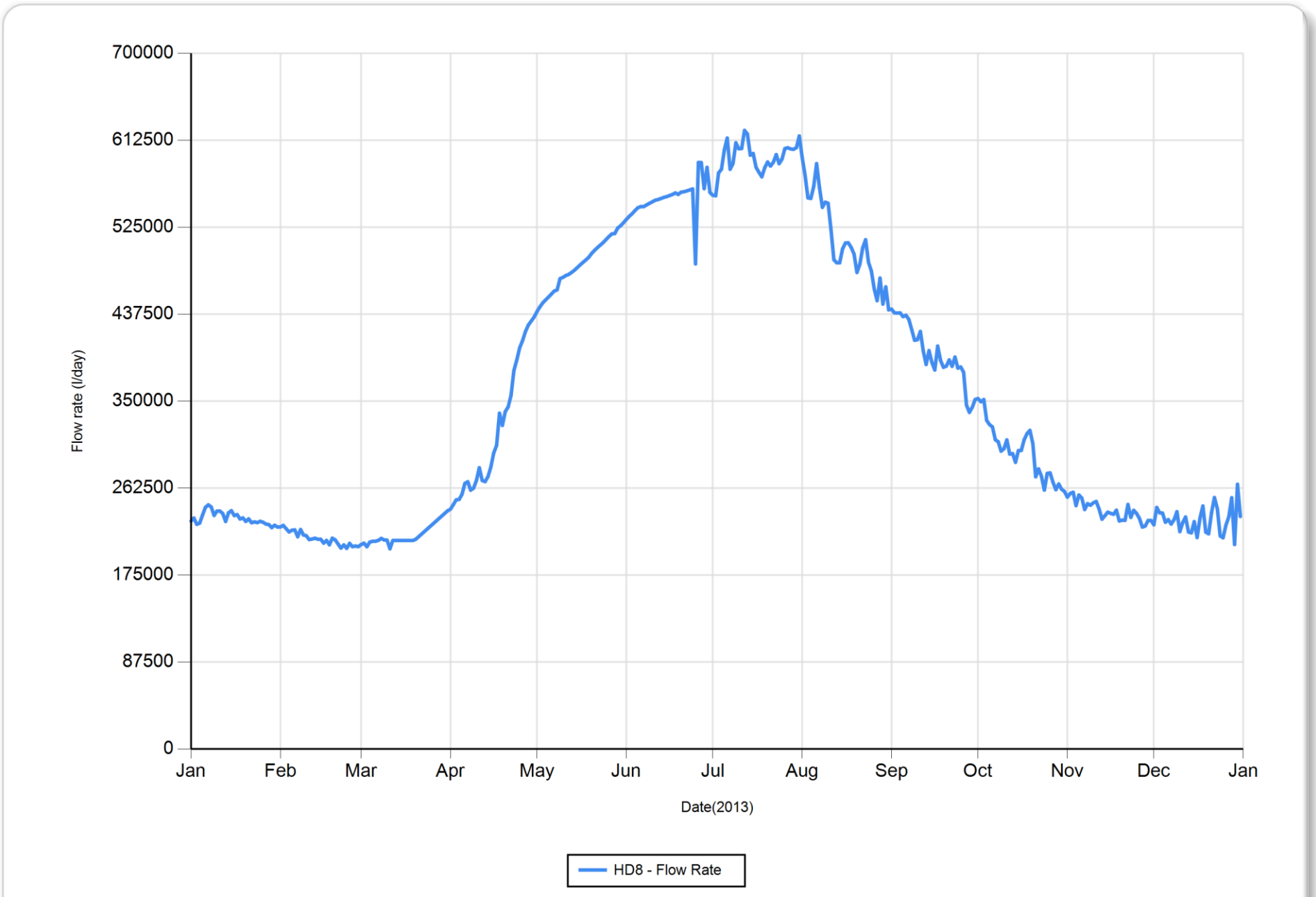
West Quesnel Land Stability Program

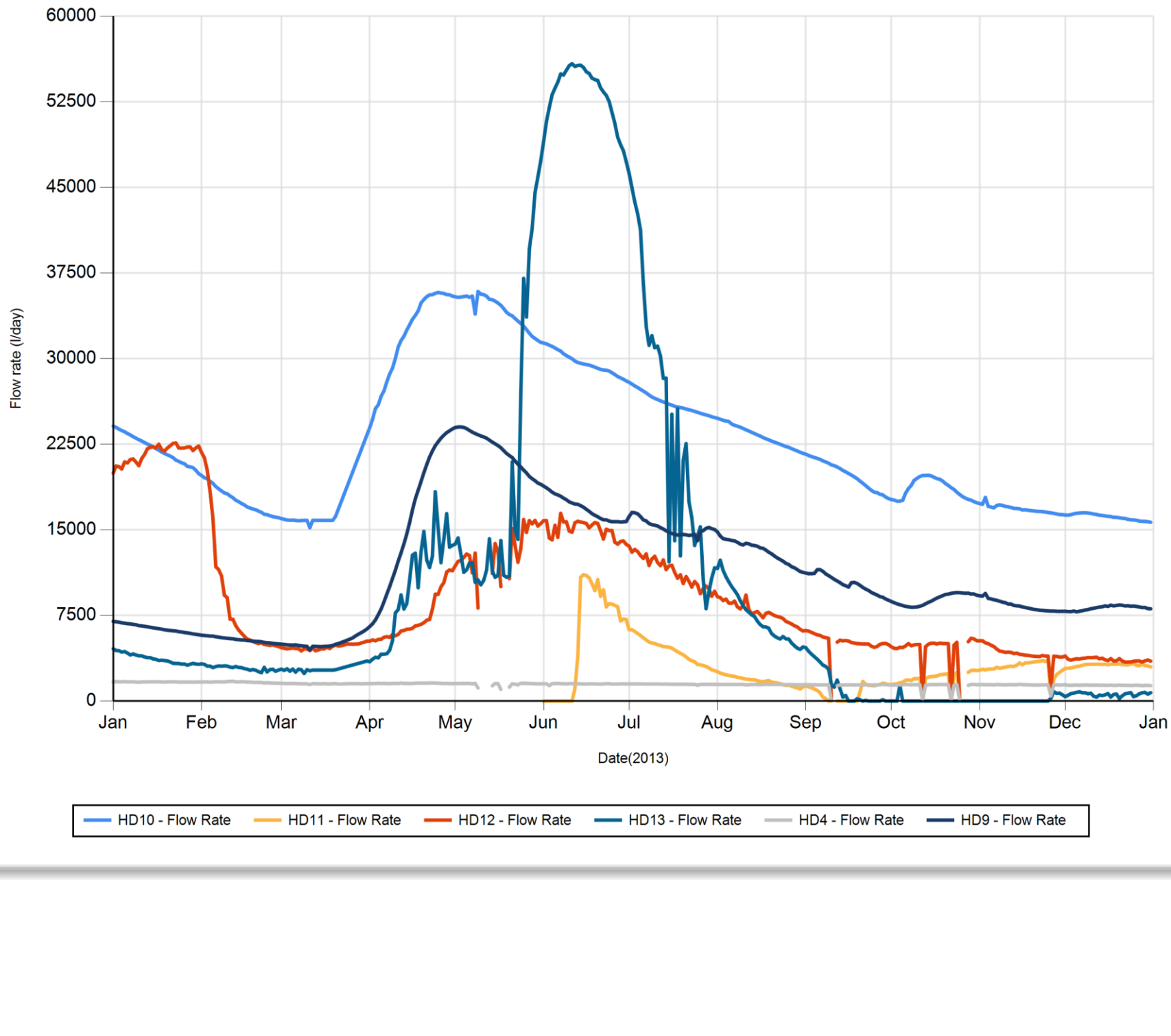
HD13 (Station 27) - Daily Flow Rate

amec



Horizontal Drains Flow Rates (Combined)





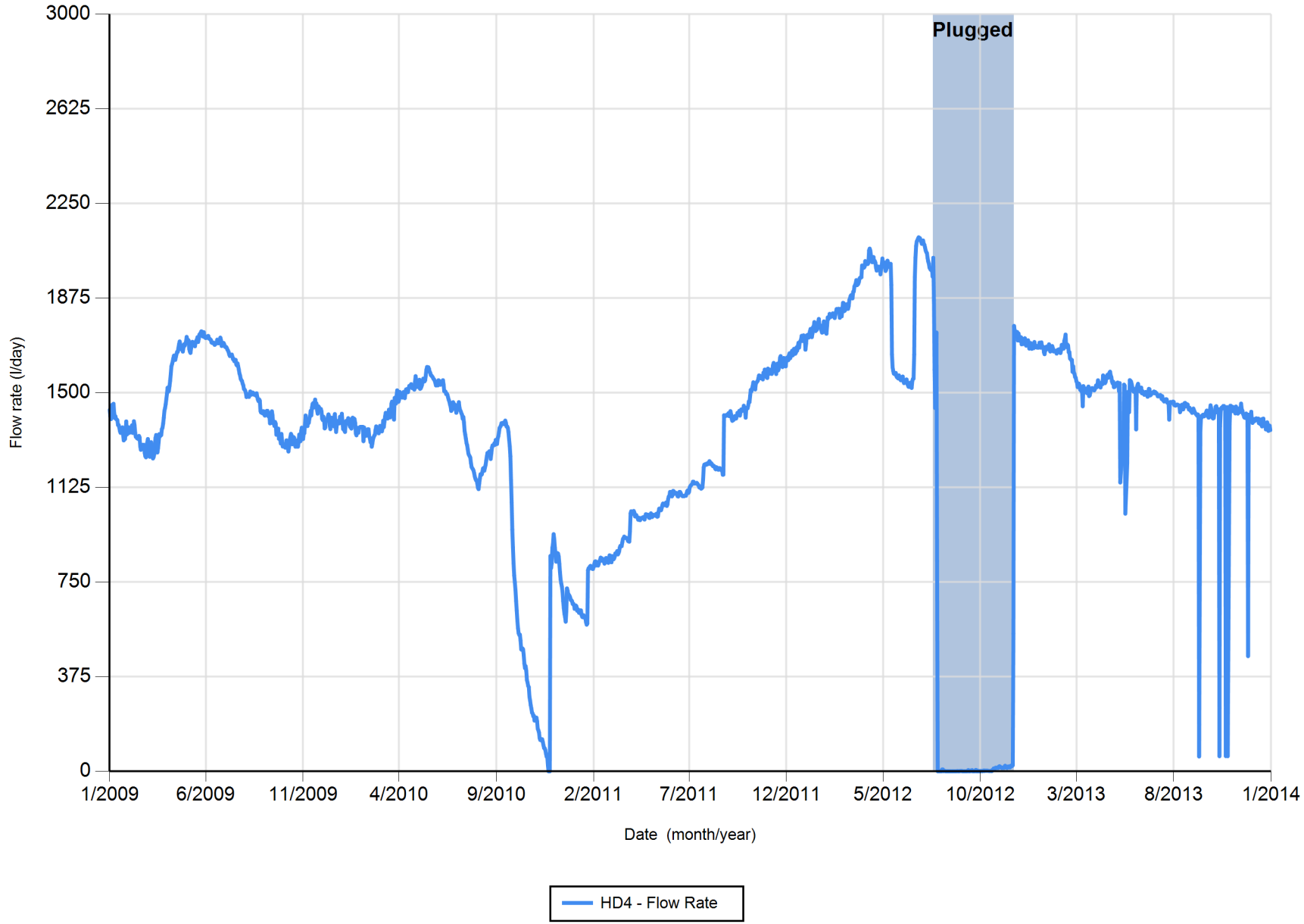
West Quesnel
Land Stability Program

Long Term Horizontal Drain Trends

West Quesnel Land Stability Program

HD4 (Station 17) - Daily Flow Rate

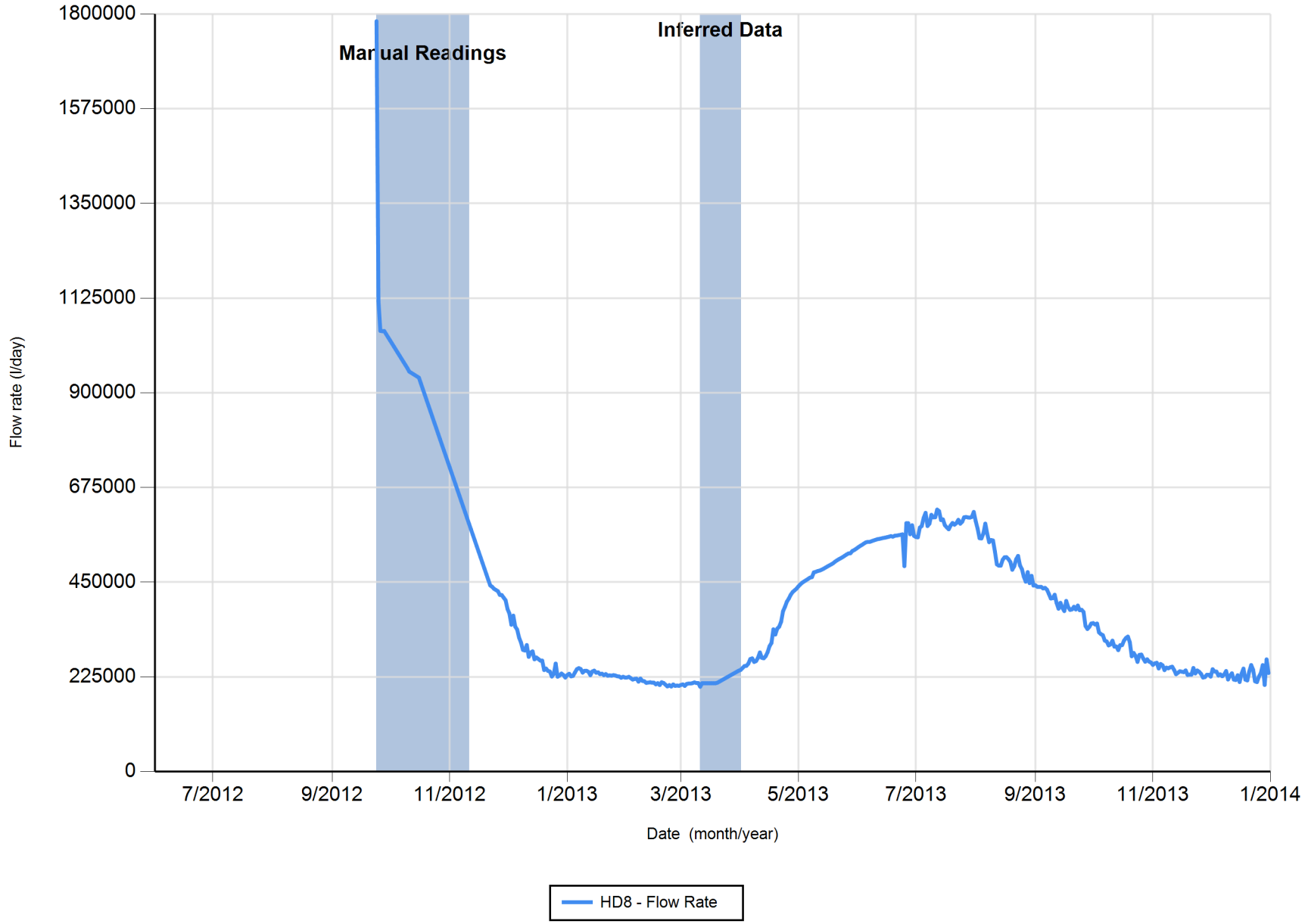
amec



West Quesnel Land Stability Program

HD8 (Station 24) - Daily Flow Rate

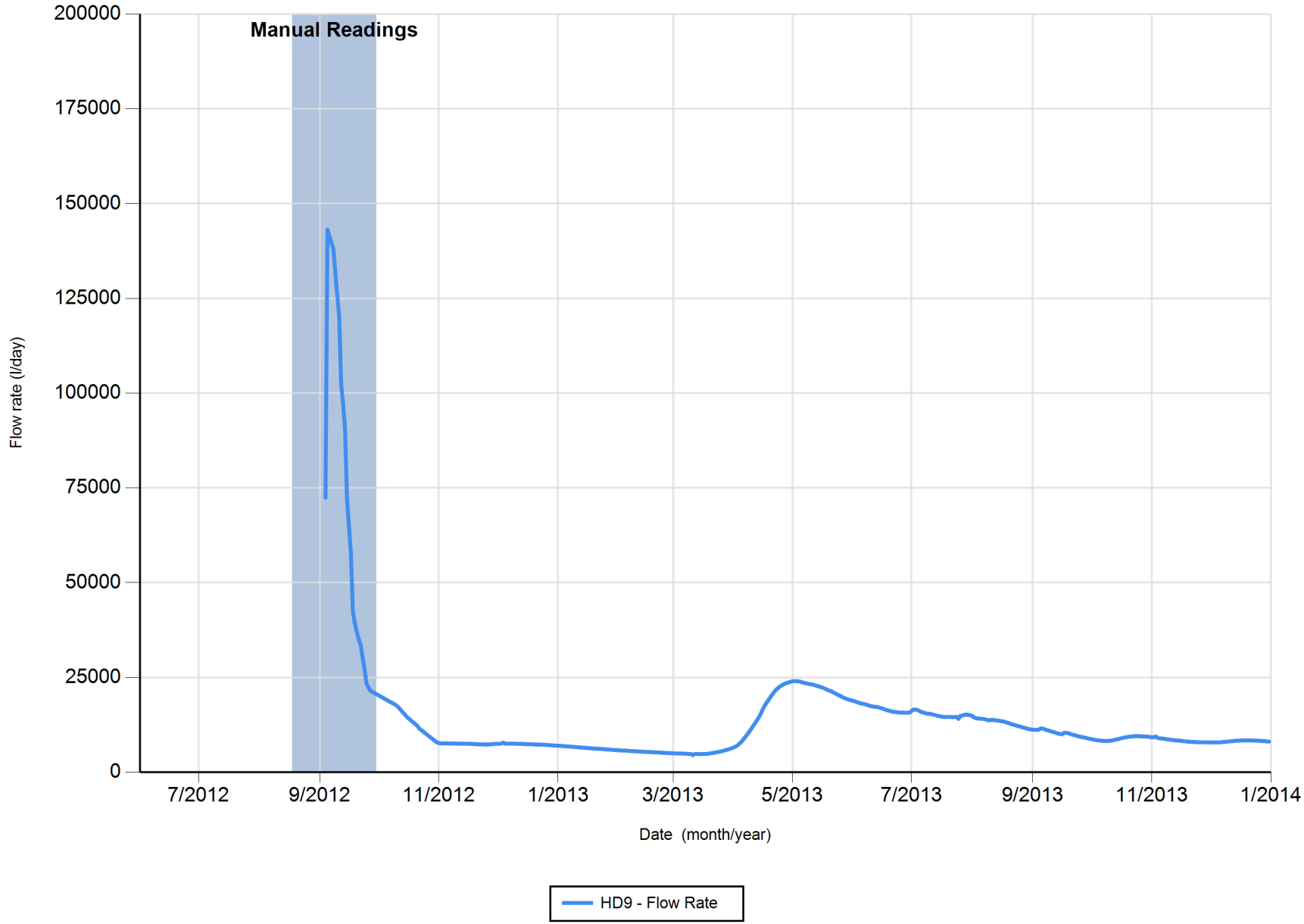
amec



West Quesnel Land Stability Program

HD9 (Station 12) - Daily Flow Rate

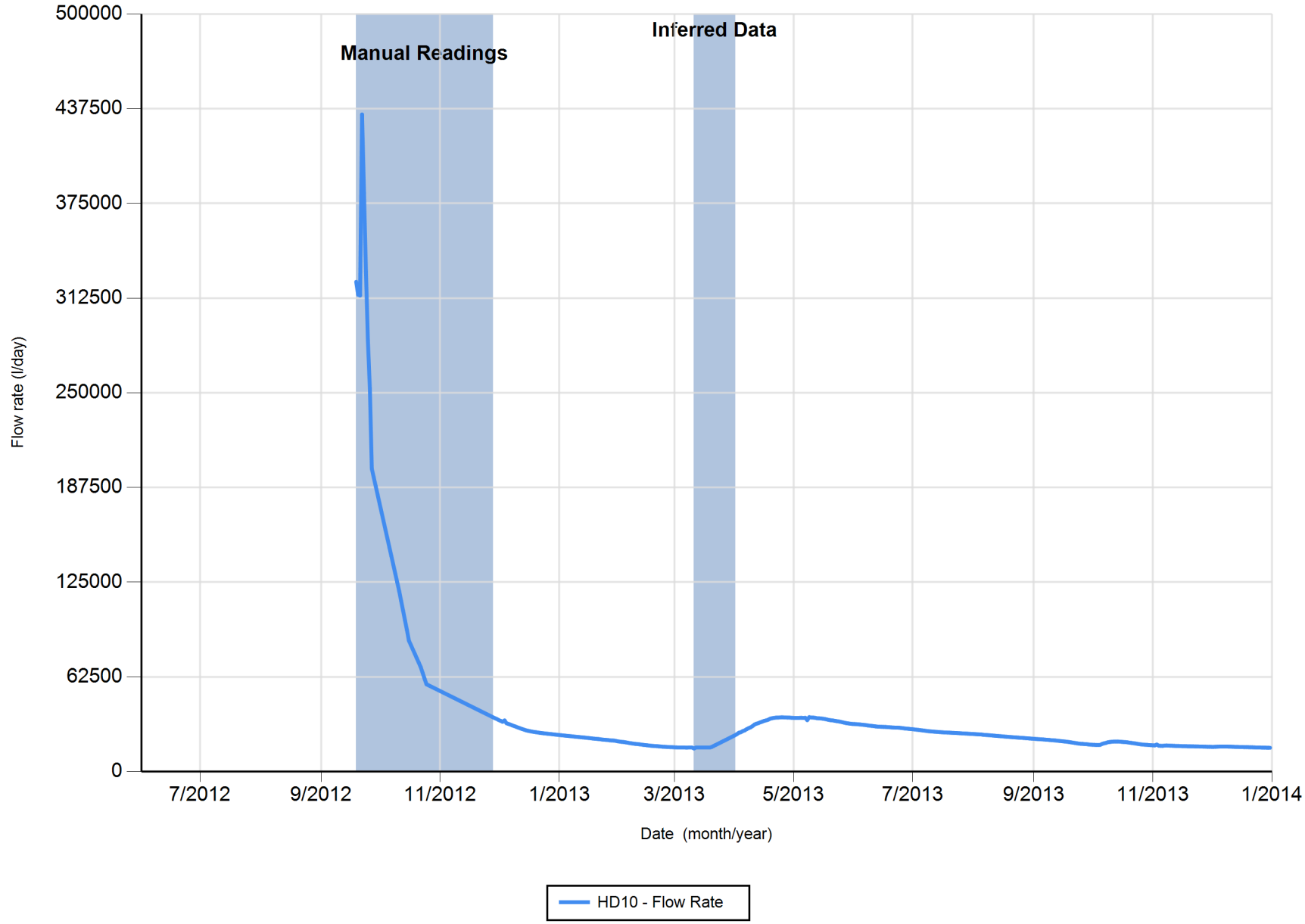
amec



West Quesnel Land Stability Program

HD10 (Station 26) - Daily Flow Rate

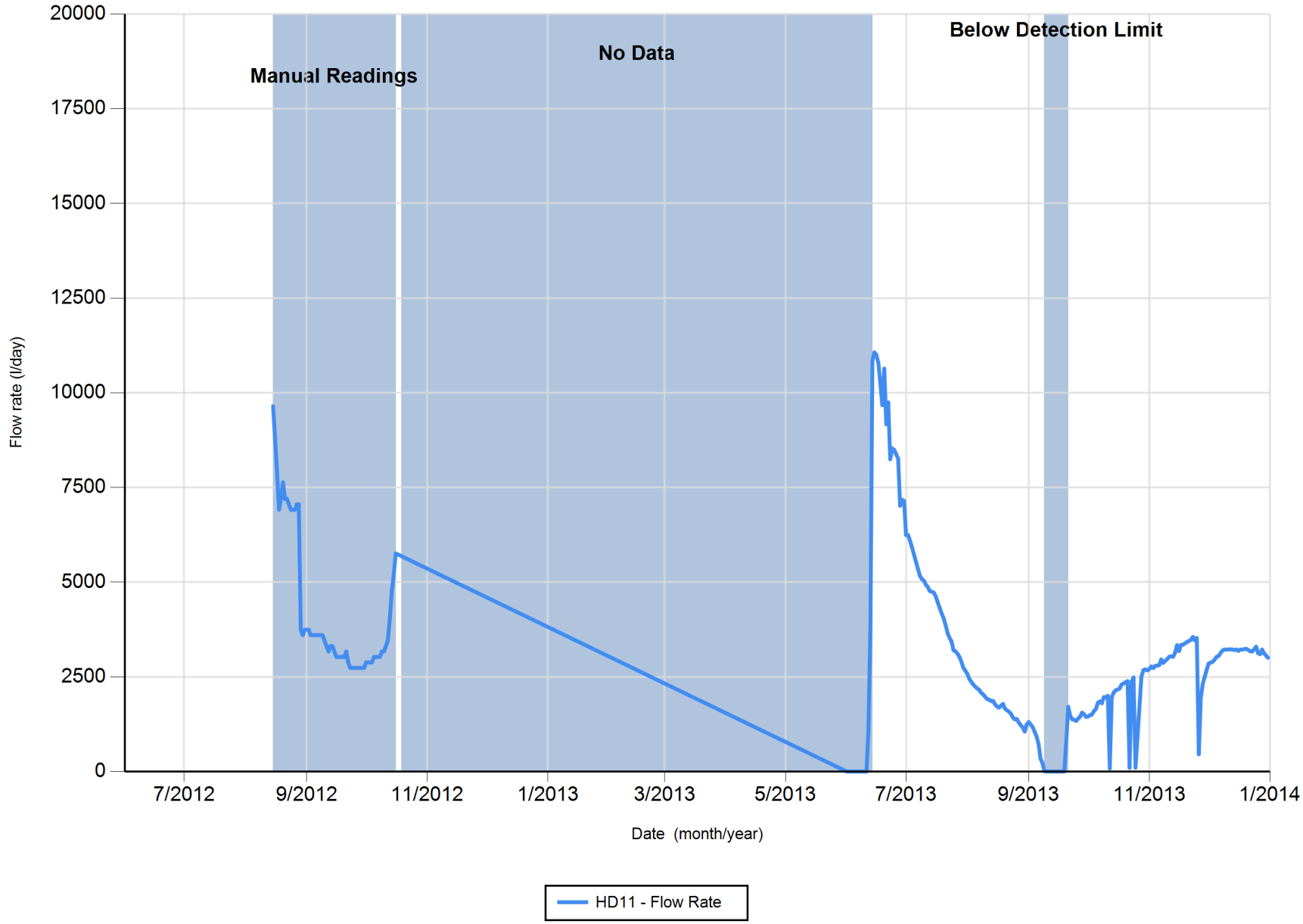
amec



West Quesnel Land Stability Program

HD11 (Station 17) - Daily Flow Rate

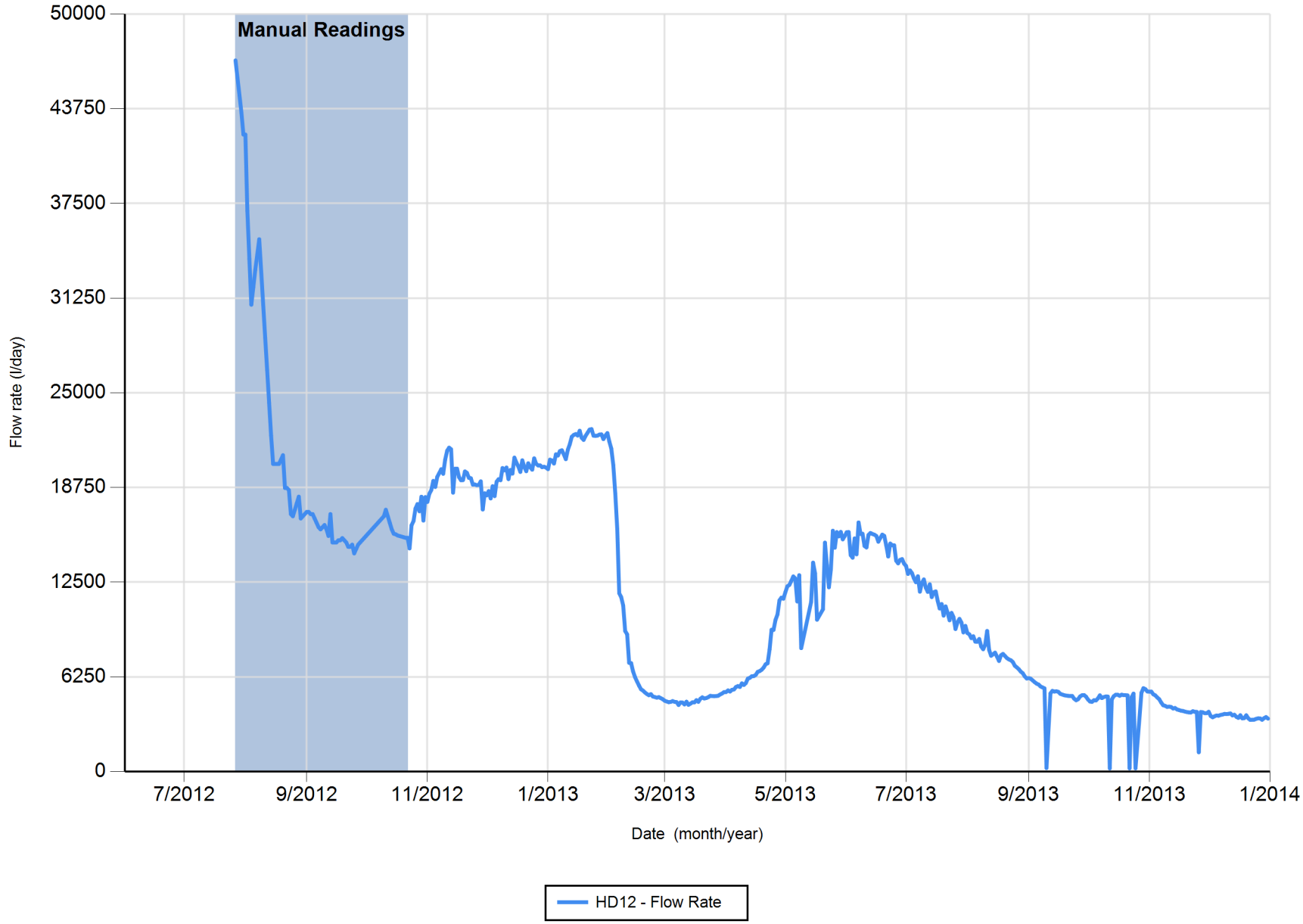
amec



West Quesnel Land Stability Program

HD12 (Station 17) - Daily Flow Rate

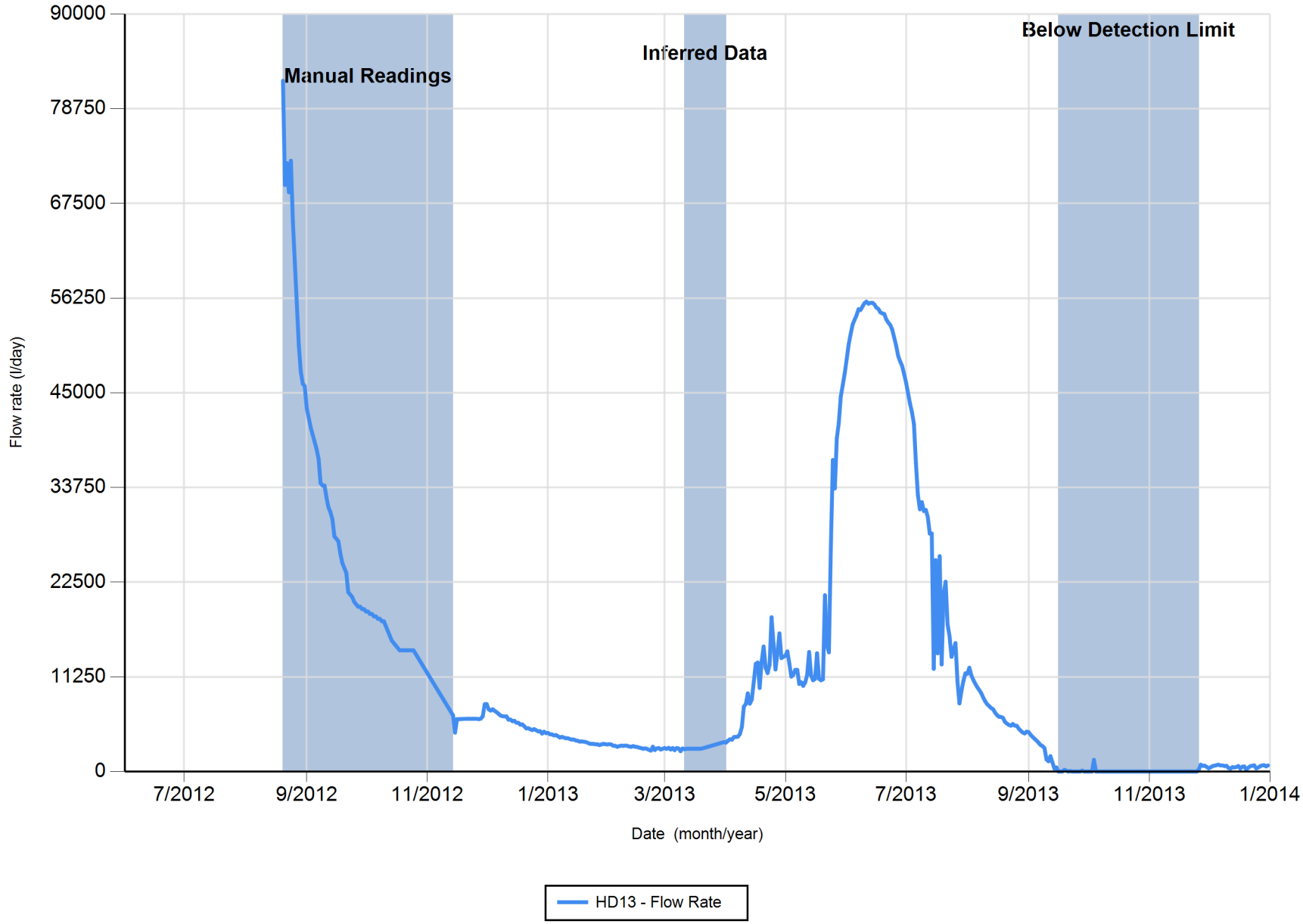
amec



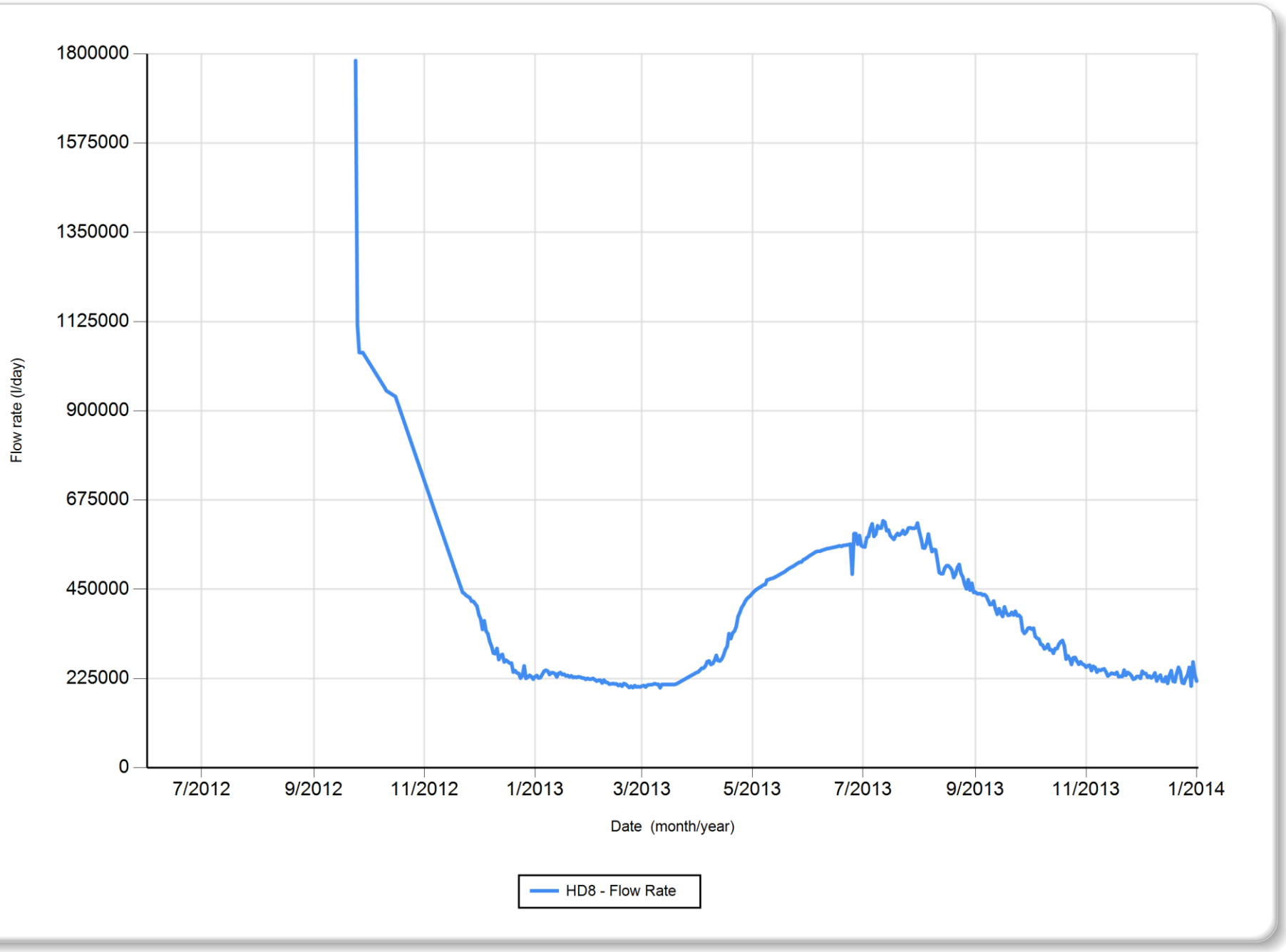
West Quesnel Land Stability Program

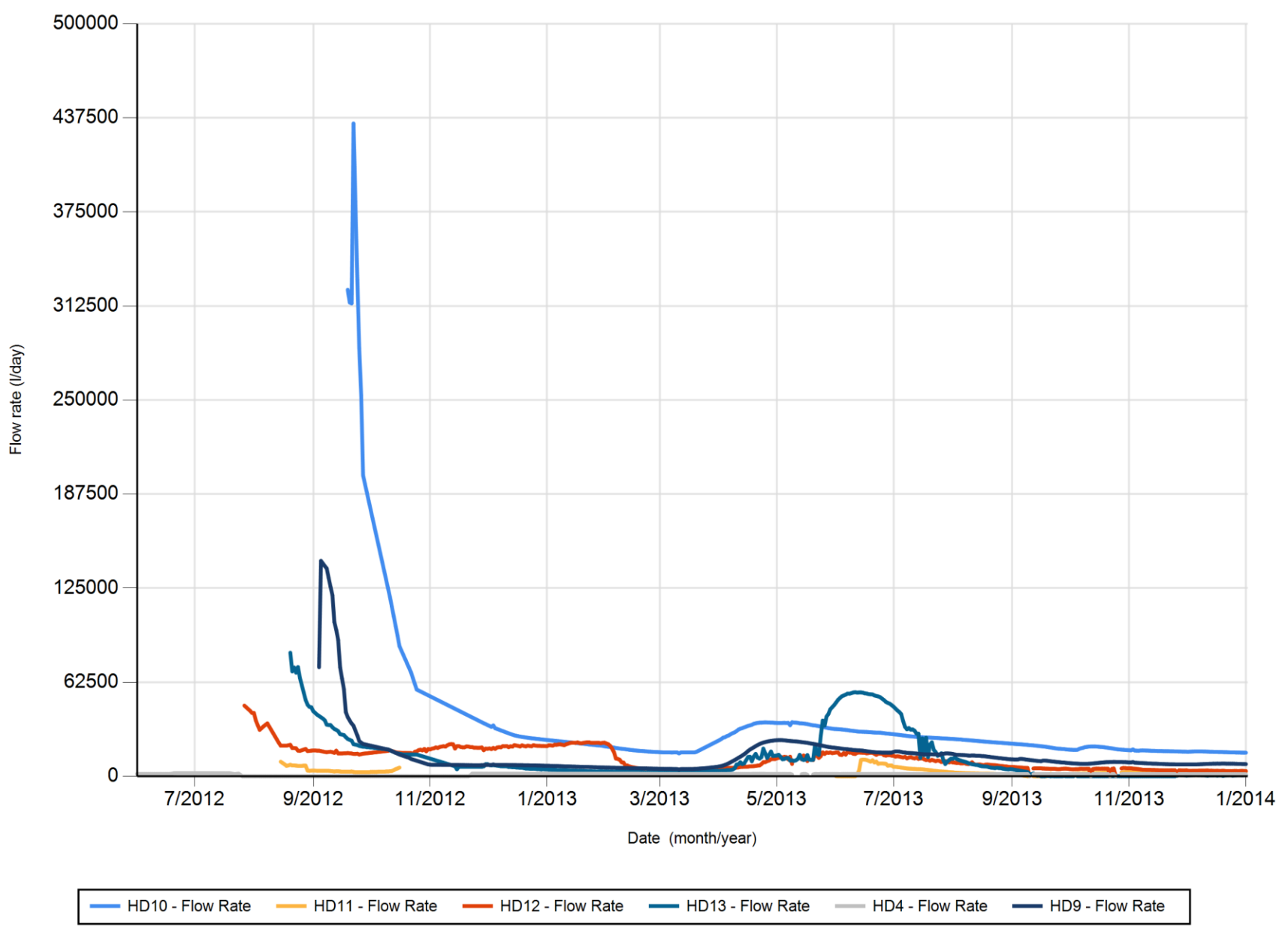
HD13 (Station 27) - Daily Flow Rate

amec



Horizontal Drains Flow Rates (Combined)





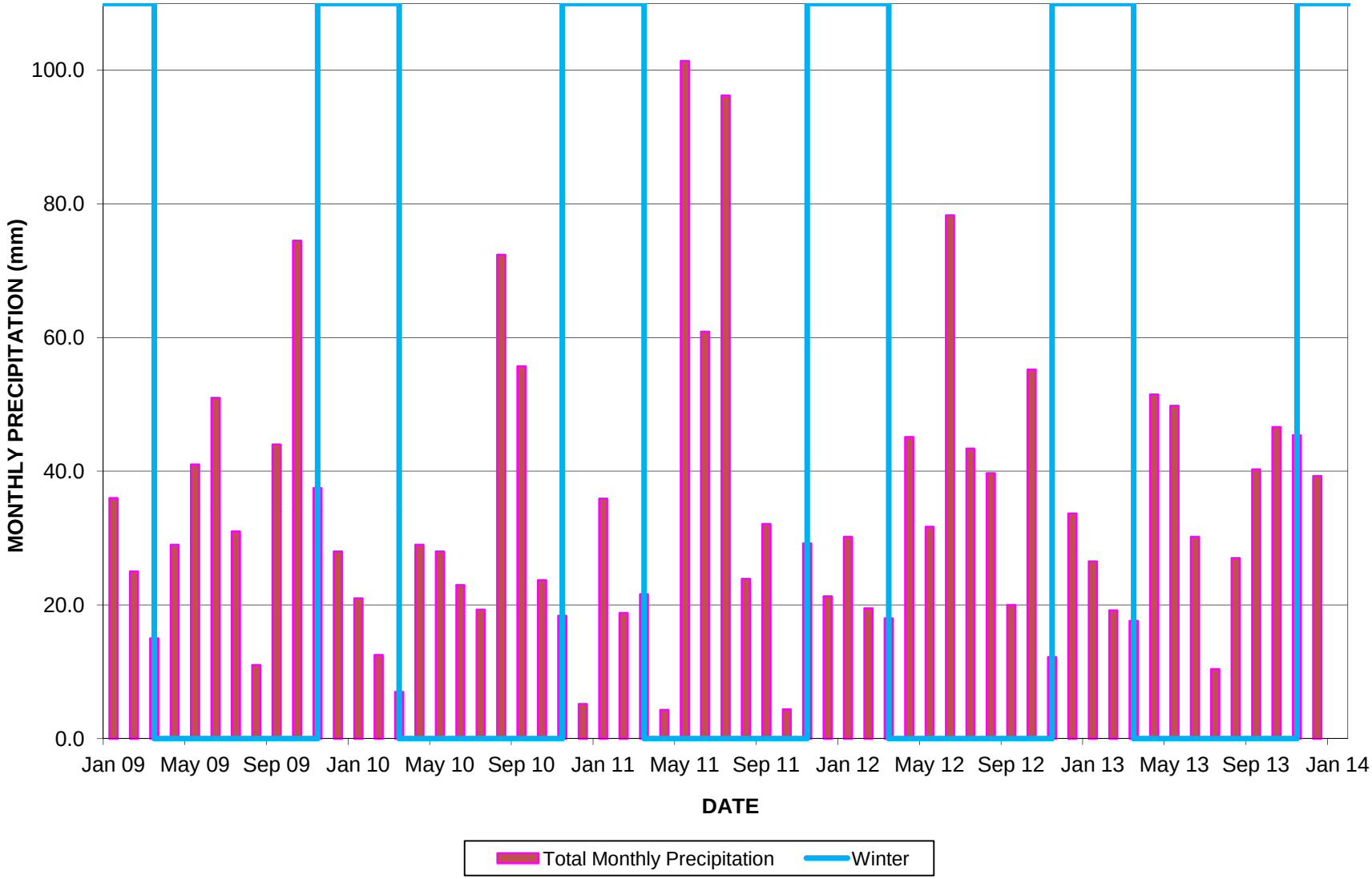
Appendix F

Historical Precipitation Data Charts for the Quesnel Area
Figures F1 to F4

West Quesnel Land Stability Program

amec

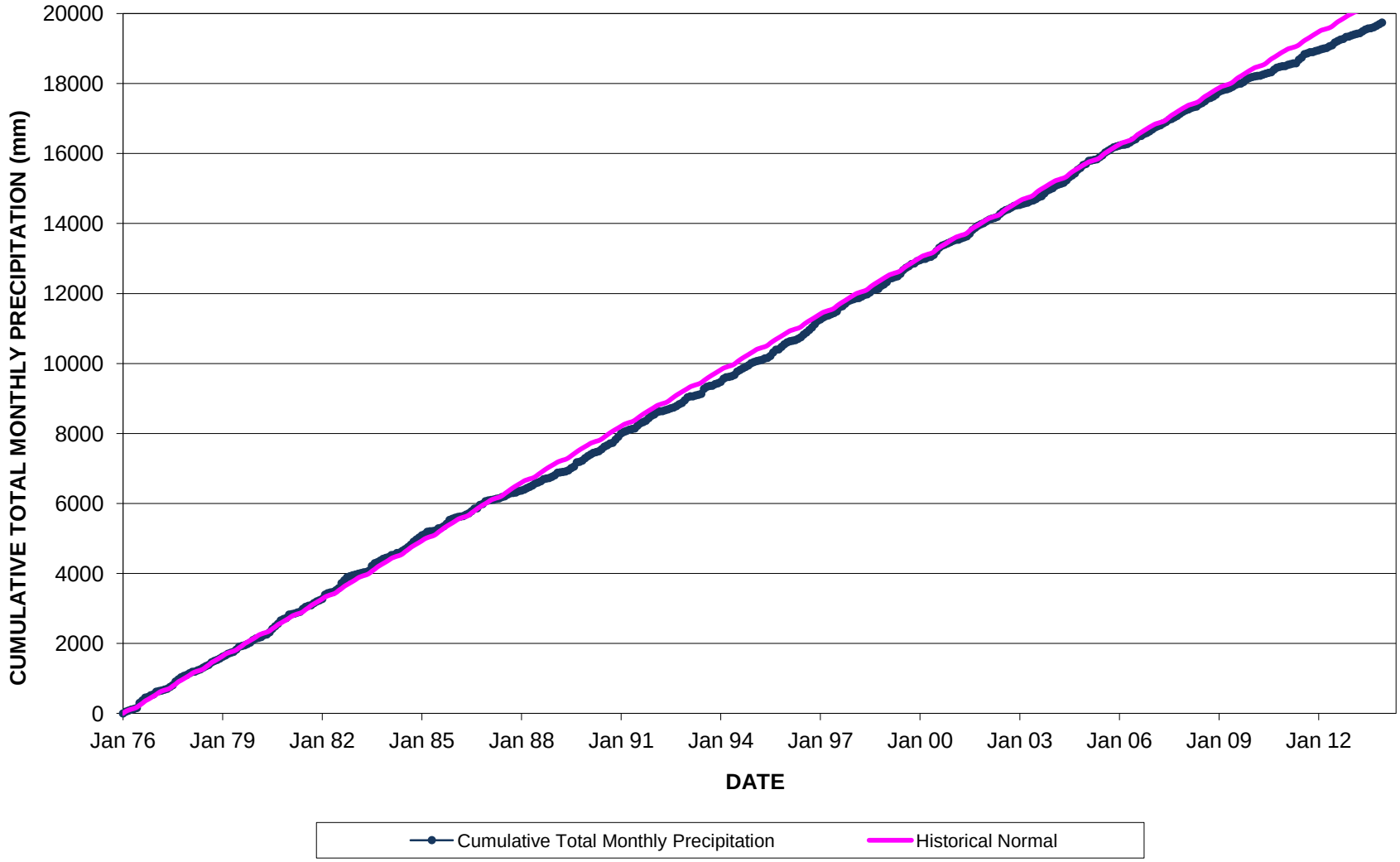
Figure F1 - Total Monthly Precipitation
(Environment Canada-Quesnel Station)



West Quesnel Land Stability Program

amec

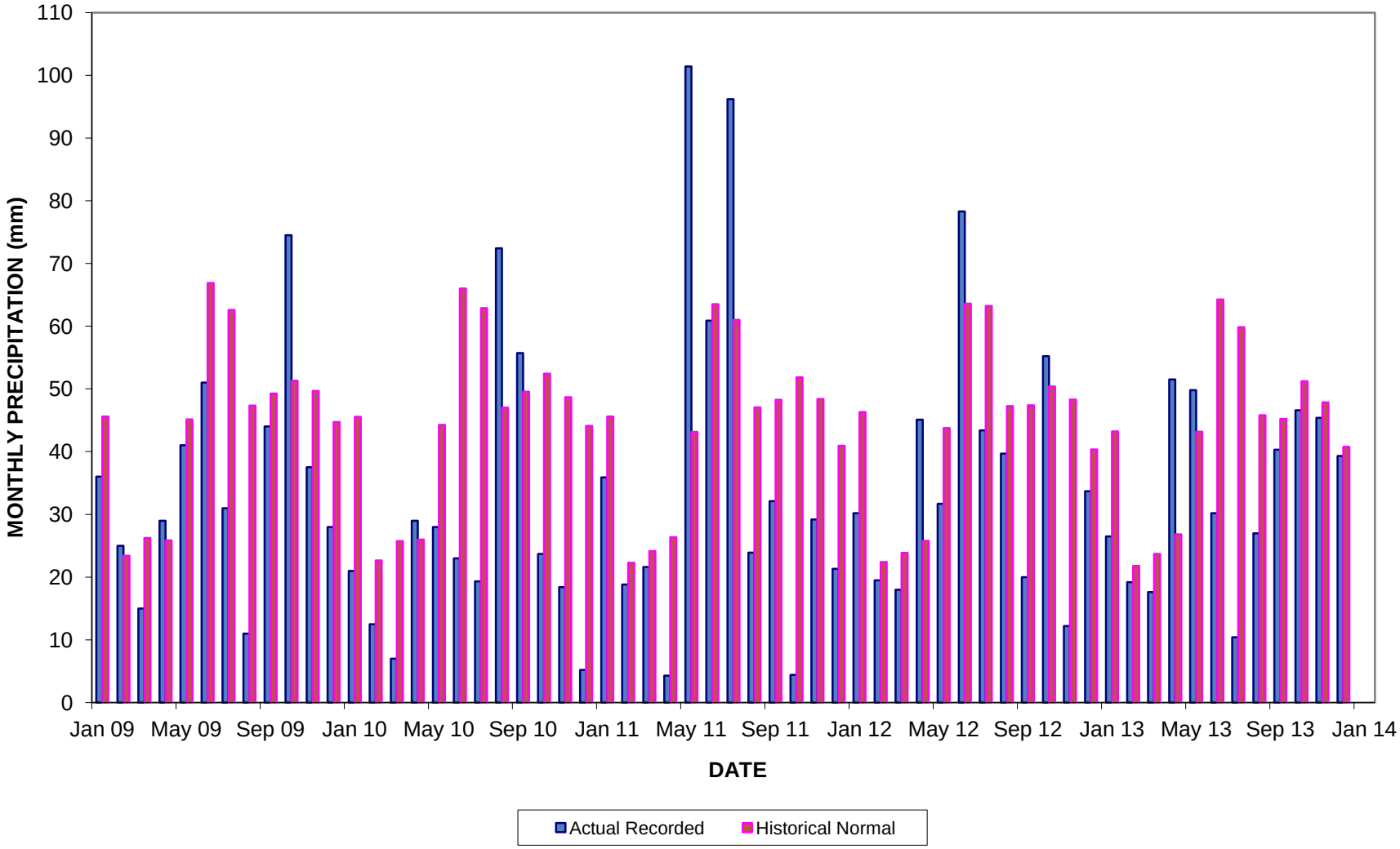
Figure F2 - Cumulative Total Monthly Precipitation
(Environment Canada-Quesnel Station)



West Quesnel Land Stability Program

amec

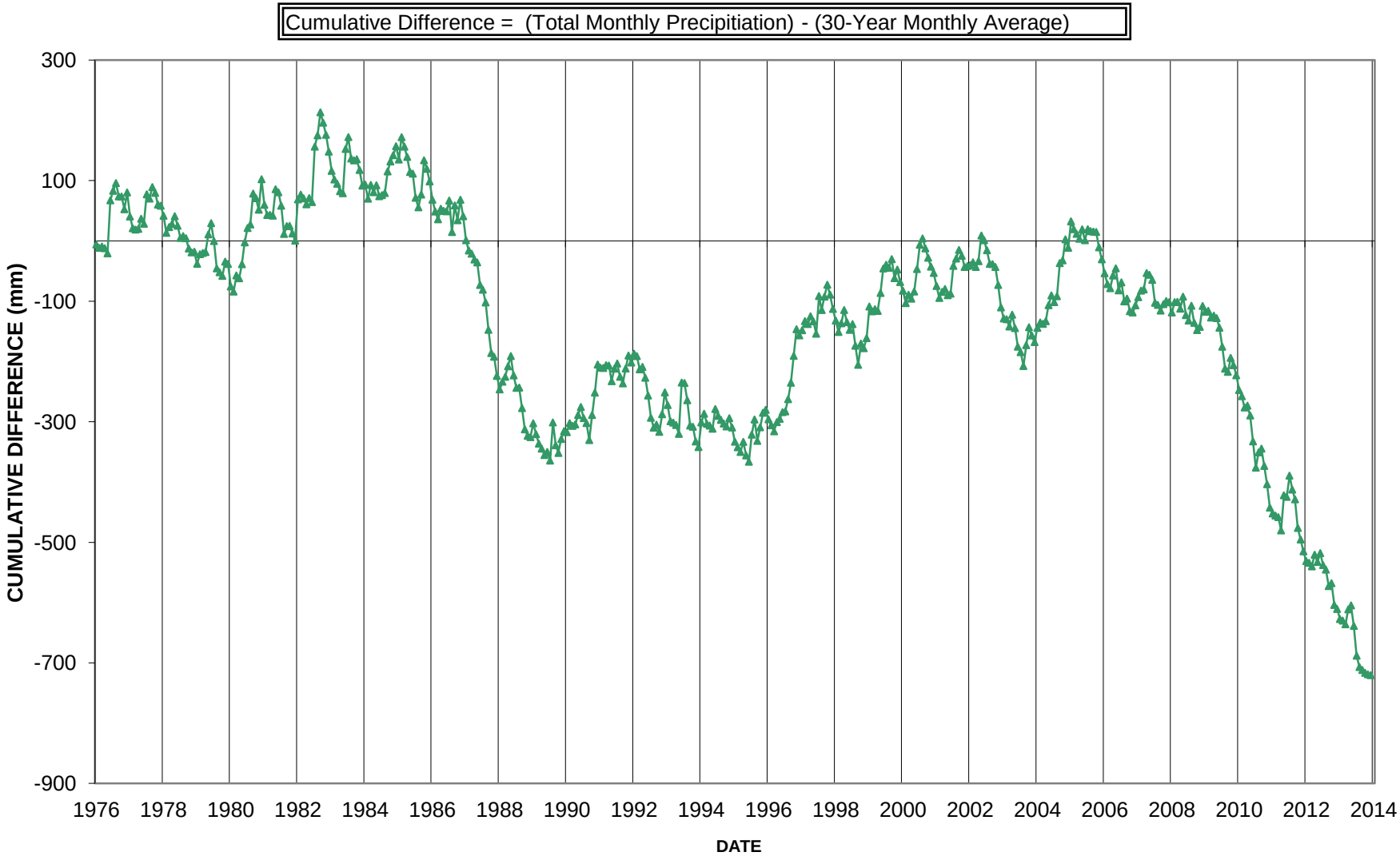
Figure F3 - Total Monthly Precipitation - 2008 to 2013
(Environment Canada - Quesnel)



West Quesnel Land Stability Program

amec

Figure F4 - Total Monthly Precipitation - Cumulative Difference - 1976 to 2013
(Environment Canada - Quesnel)



Appendix G

Data Comparison Charts
Figures G1 to G9

Figure G1 - Total Monthly Precipitation (Quesnel) vs. Groundwater Elevation

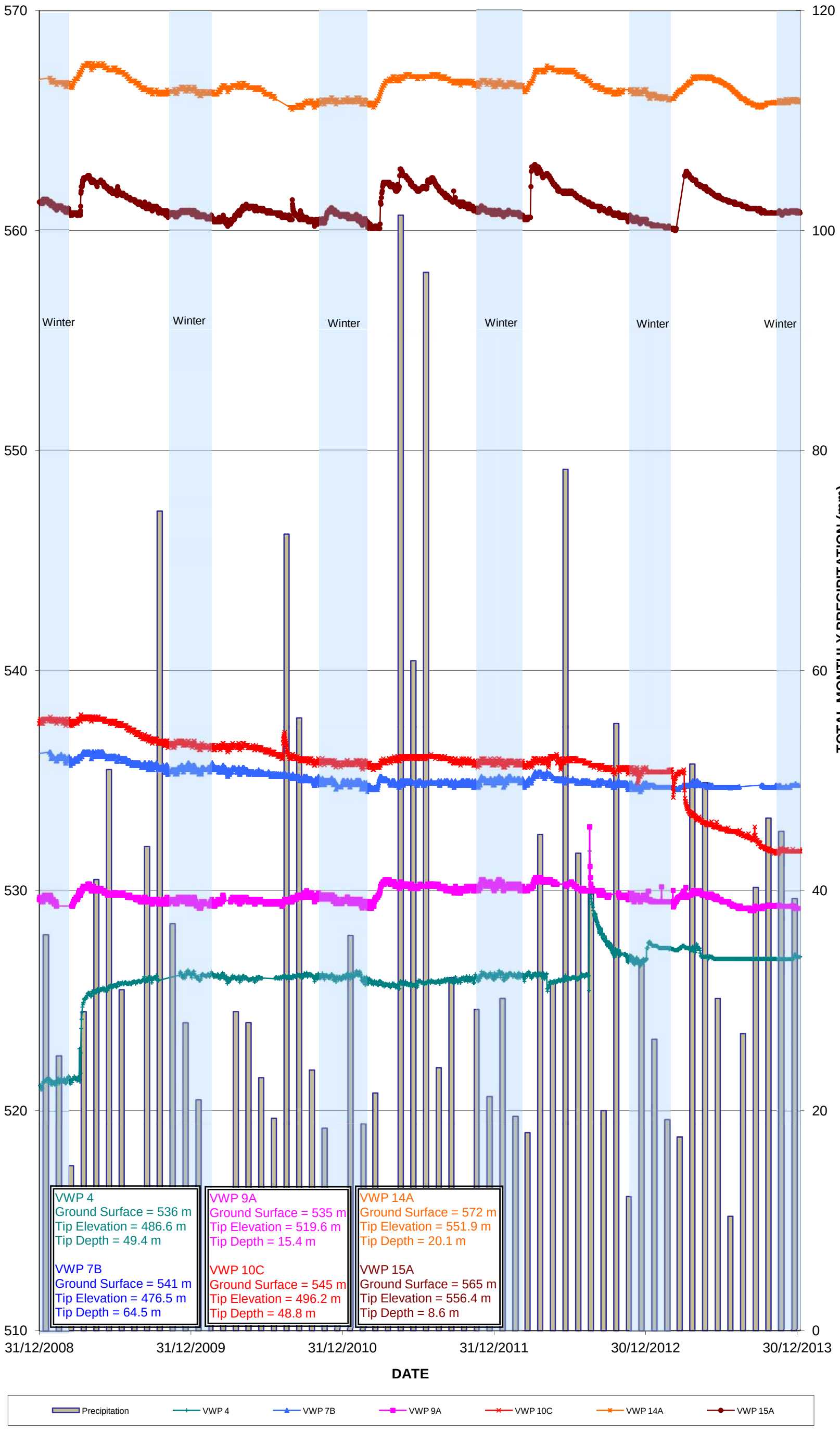


Figure G2 - Cumulative Total Daily Precipitation (Quesnel) vs. Groundwater Elevation

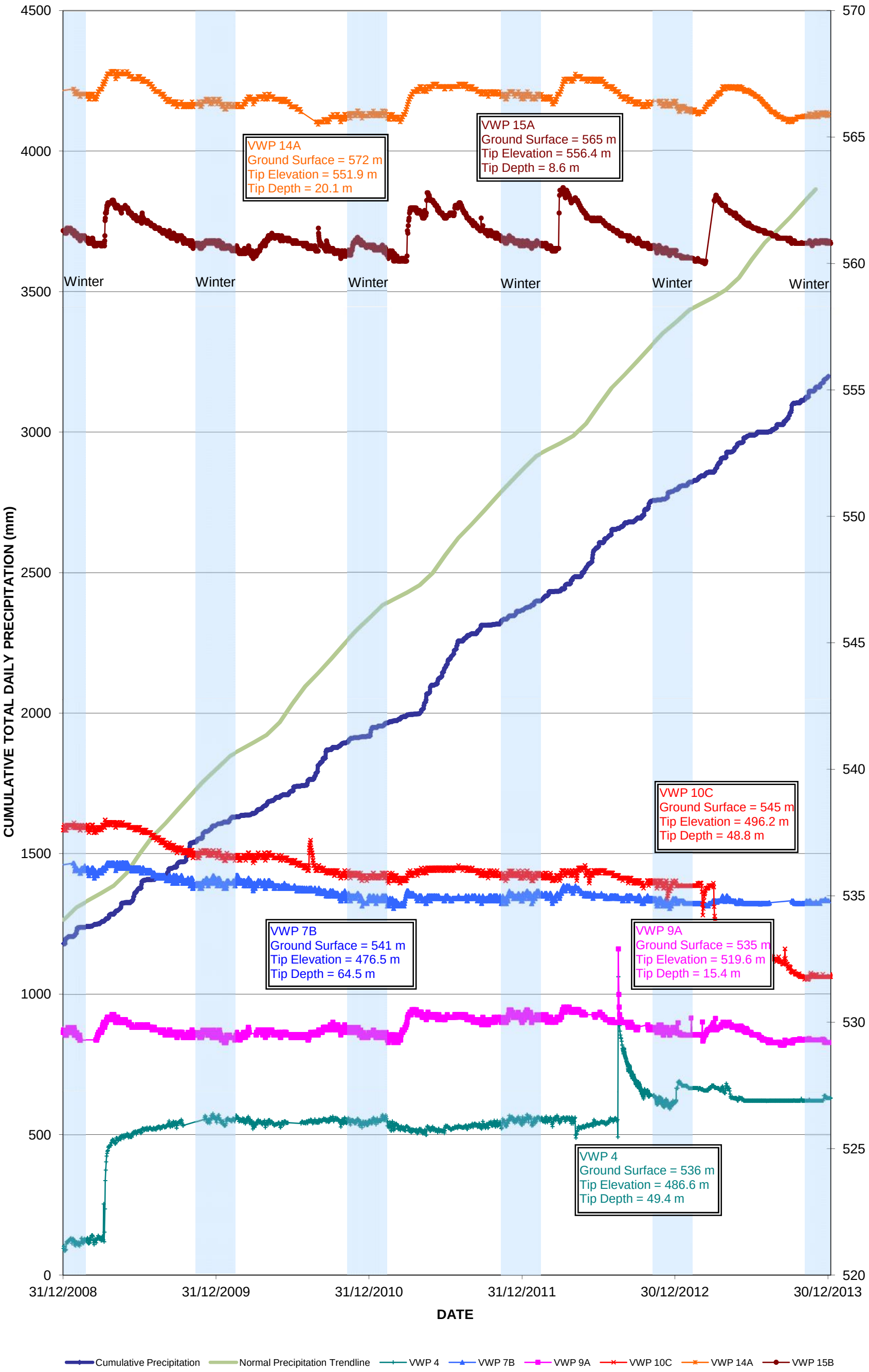


Figure G3 - Incremental Ground Movement Rate vs. Total Monthly Precipitation (Quesnel)

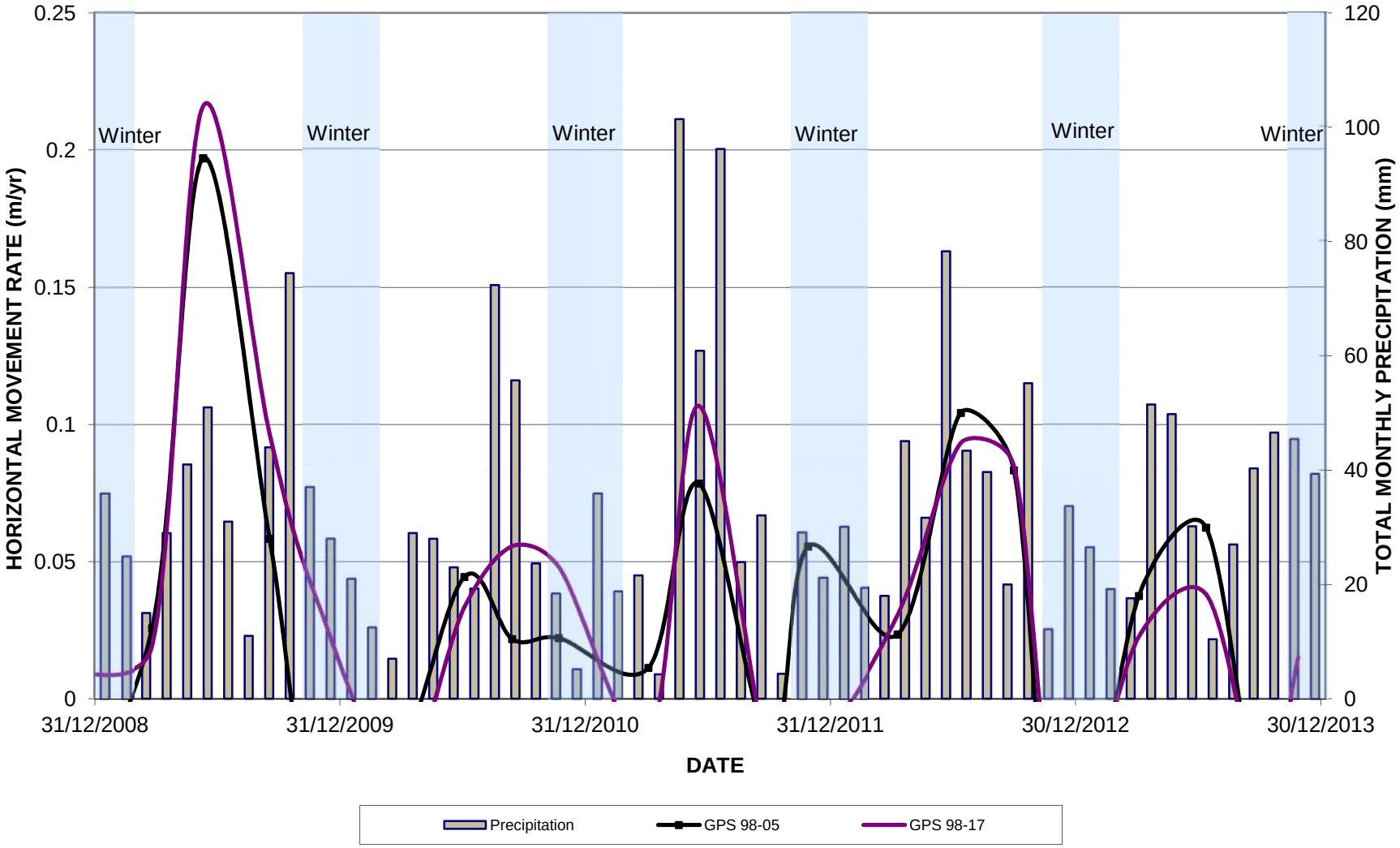


Figure G4 - Incremental Ground Movement Rate vs. Total Seasonal Precipitation (Quesnel)

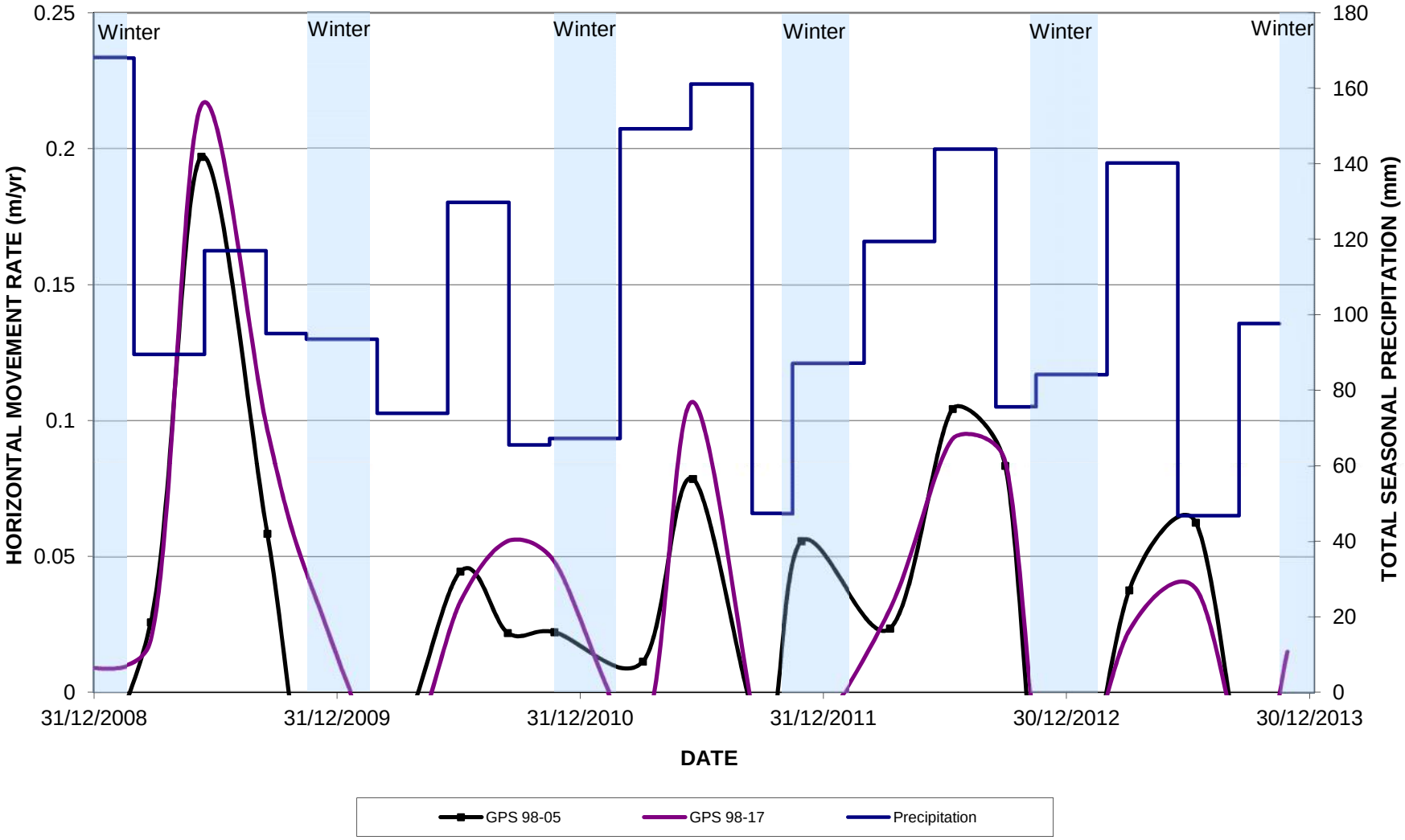


Figure G5 - Cumulative Ground Movement vs. Total Monthly Precipitation (Quesnel)

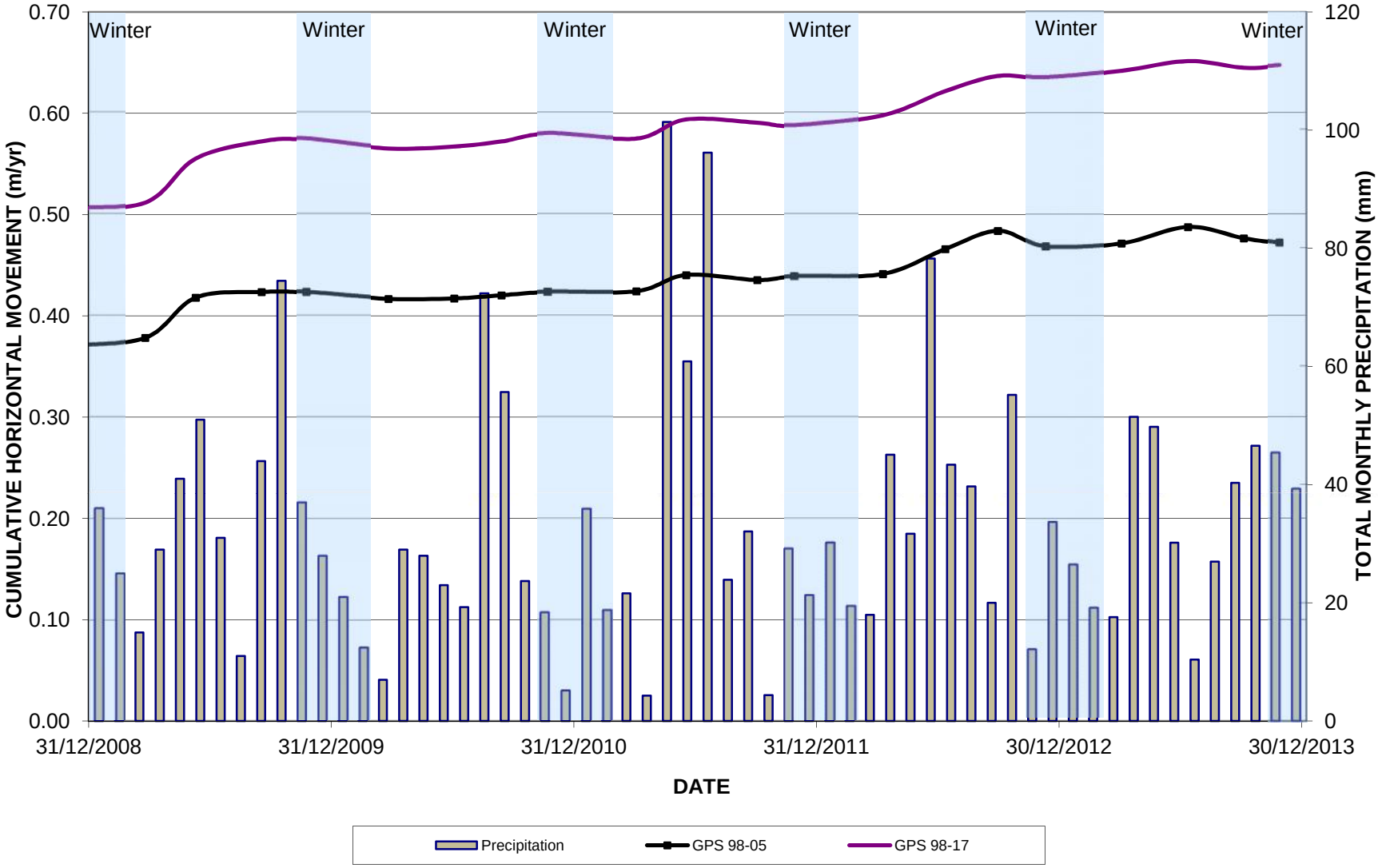


**Figure G6 - Incremental Ground Movement Rate vs.
Cumulative Difference - Total Monthly Precipitation (Quesnel)**

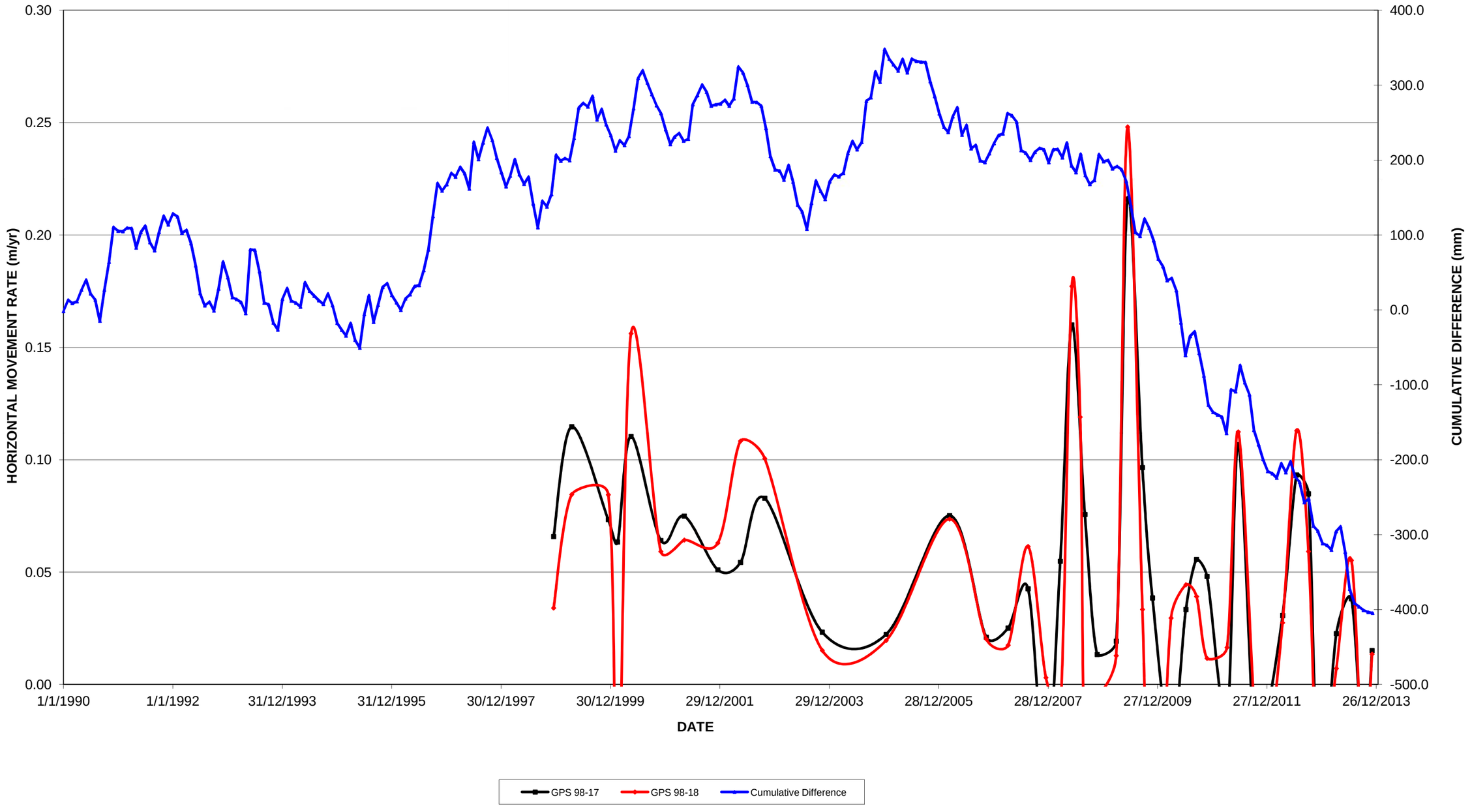


Figure G7 - Incremental Ground Movement Rate vs. Groundwater Elevation

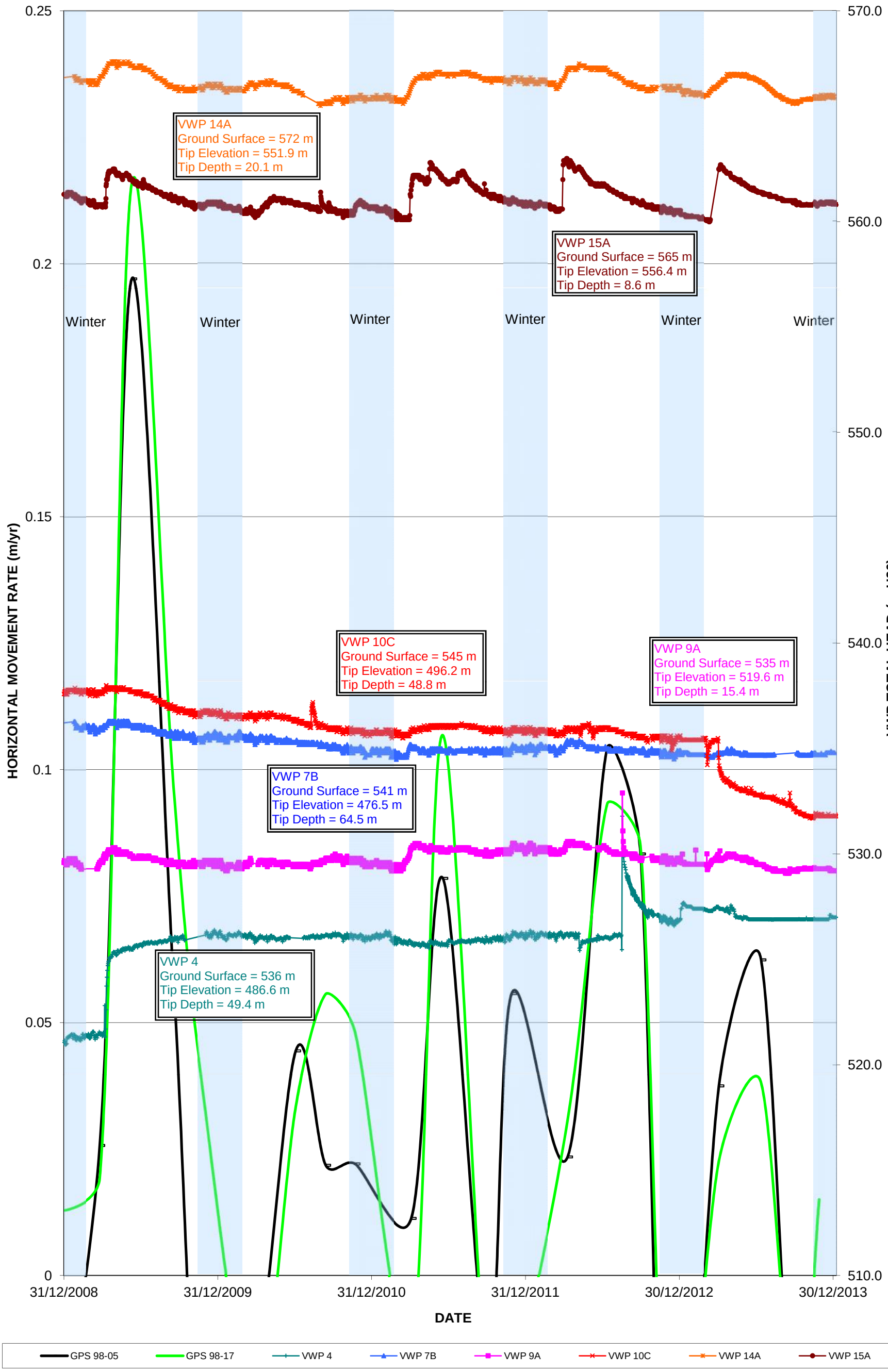


Figure G8 - Cumulative Ground Movement vs. Groundwater Elevation

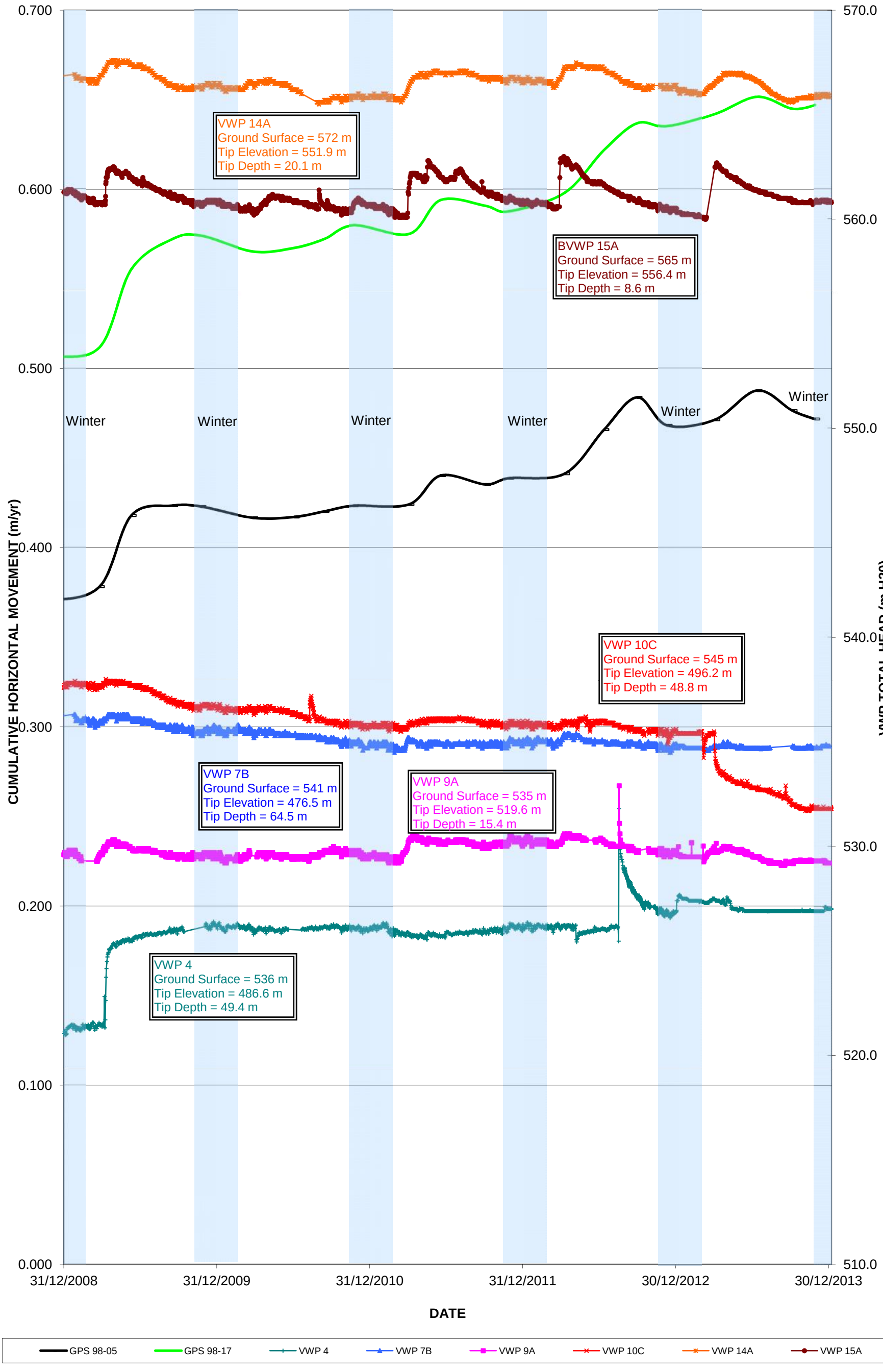


Figure G9 - Horizontal Movement Relative to Precipitation