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**WEST QUESNEL LAND STABILITY PROGRAM
ANNUAL MONITORING REPORT - 2009**

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1.0 INTRODUCTION

AMEC Earth & Environmental, 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 was 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 between 1998 and 2008. Beginning in the year 2000, AMEC has installed several phases of slope inclinometers, piezometers, trial pumping wells and trial horizontal drains. Urban Systems, from Kamloops, BC, has also installed a weather station in West Quesnel, which measures precipitation and temperature data.

This report is intended to summarize the data collected during 2009 and provide an update on any observed trends or interpretations that have developed or changed since the 2008 Monitoring Report, dated 9 March 2009. For detailed background information including geology and project history, the reader is referred to previous AMEC reports including: Trial Dewatering dated May 2008 and West Quesnel Land Stability Study Report dated May 2007.

2.0 GPS MOVEMENT HUBS

Beginning in September 1998, Terasen Gas (formerly 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 52 hubs are monitored. The monitoring consists 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 Terasen and AMEC on behalf of the City of Quesnel. Surveys are typically conducted on a quarterly basis with the results forwarded to AMEC. During 2009, no further hubs were installed. A summary table listing the GPS hub locations and plots of the movements at each hub can be found in Appendix A.

During 2009, quarterly GPS monitoring was carried out in March, June, September, and November. AMEC noted a significant spike or acceleration in movement rates when reviewing the March to June 2009 survey results. This acceleration appeared to be greater than that typically experienced over most previous spring monitoring periods and is similar to the acceleration noted in the spring of 2008. During 2009, there was also some acceleration between the September and November surveys for a select number of the hubs (mainly along or near the north end of the slide area). It is important to note that the rate of movement recorded in the spring of 2008 and 2009 was higher than has been seen in recent years and was approaching that observed during the late 1990's.

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 report discussions of movement refer primarily to horizontal movement information.

The GPS movement hubs can be broken into 4 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 seven hubs in this category, typically only two (GPS Water Tank: City concrete water tank and GPS 01-38: Terasen Pump Station, Red Bluff) are utilized to gauge the tolerance of the survey data.

The second category consists of 14 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 toe area of active movement. Higher values suggest that the hub is on or very near the toe of the slide.

The third category consists of three hubs that are located at or near the upper west portion of the slide, in order to try and confirm the western extent or crest of the slide. Similar to the toe area, total horizontal displacement less than 15-20 mm typically represents areas outside the area of active movement.

The fourth category involves the remaining 33 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 11 years that the fifteen oldest hubs have been monitored. The total horizontal movement, measured since September 1998 for these fifteen oldest hubs, ranged from 255 to 574 mm, with an average rate of movement of up to approximately 52 mm/year, depending on location.

During the spring of 2009, a significant increase in the rate of horizontal movement was observed, with short-term incremental annualized rates of movement in the order of 67 to 264 mm/year recorded, depending on location. Total horizontal displacement for the year ranged up to 64 mm, depending on the hub location. This is typically much more than the long term average or amounts of movements observed in more recent years.

In the fall of 2009, increased rates of horizontal movement were observed in a group of GPS hubs that are mostly north of Dodds Ave., Pentland Cres. and Purmal Ave. Note that not all of the GPS hubs located north of those streets saw an increased in movement rate. Increased precipitation was observed during the fall of 2009 (see Section 7.0 for more details on precipitation data) and may have contributed to this increase in movement as compared to previous fall seasons.

Figure 1 provides an updated vector movement map for GPS hubs monitored in the West Quesnel area. AMEC simplified the GPS vector plots, in Figure 1, to show relative magnitude and azimuth of latest total vector. Details for individual GPS movement hubs are located in Appendix A.

Figures 2 to 12 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 over different planes (i.e. horizontal movement, vertical movement and resultant 3D movement). The ground movement contours were drawn using triangulation in Autodesk Civil 3D (2008, Service Pack 1).

Figure 2 shows total horizontal movement between September 1998 and November 2009, for the GPS hubs installed in September 1998. Movement of over 550 mm has occurred at GPS 98-17 (which is at the corner of Bettcher St. and Lark Ave.). Significant movement has been observed at the GPS hubs within the slide mass since 1998. Figure 3 shows total horizontal movement between December 2001 and November 2009, for the GPS hubs installed in September 1998 and December 2001. Figure 4 shows total horizontal movement between November 2006 and November 2009, for the GPS hubs installed in September 1998, December 2001 and November 2006. All three figures show that the greatest movement occurred in the middle of the slide area.

Figure 5 shows total vertical movement between November 2006 and November 2009. This contour plots shows downwards movement at the top of the slide (mainly the northwest corner, although it should be noted that very few hubs exist along the rest of the slide crest) and some upwards movement (or 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 St.

Figure 6 shows total 3D movement between November 2006 and November 2009. As in Figure 4, the largest 3D slide movements have been observed in the middle of the slide area.

Figures 7 through 12 show annual horizontal movement and annual 3D movement for the years 2007, 2008 and 2009 (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 slightly 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 has accelerated in the last two calendar years, even though reported precipitation levels have remained normal or slightly below normal (see Section 7.0 for more details on precipitation data).

3.0 SLOPE INCLINOMETERS

A total of fifteen 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 are described in previous AMEC reporting. At the beginning of 2009, ten of the original fifteen SI's were non-operational, having been disrupted by ground movement to the point that they could no longer be monitored.

During 2009, quarterly monitoring (April and June) was attempted by AMEC for five surviving installations (SI-8, SI-9, S-11, SI-14 and SI-15). During the April 2009 monitoring, two more SI's (SI-9 and SI-14) were also found to be disrupted at depth and no new readings were able to be recorded in 2009. During the June 2009 monitoring, SI-15 was found to be disrupted at depth. 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. Consequently, SI surveys have been discontinued until further SI's are installed. A summary table of the SI installations can be found in Appendix B. All of the SI data plots from 2009 (including the final plots from SI-9 and SI-14 from November 2008) are also presented in Appendix B. A brief discussion of the monitoring results follows.

SI-8 was measured quarterly in April and June in 2009 and no discernable lateral deflection was noted. It has been interpreted that at approximately 72 m in length, SI-8 is not deep enough to penetrate through the underlying landslide slip surface and as such cannot record any differential movement across the surface.

SI-9 could not be measured in 2009 and likely sheared off at a distinct slip surface previously found at approximately 65.0 m depth. A total of approximately 110 mm of lateral displacement was monitored at this location between installation in April 2005 and November 2008.

SI-11 was measured quarterly in April and June in 2009 and no discernable lateral slip deflection was noted. It has been interpreted that at approximately 72 m in length, SI-11 is not deep enough to penetrate through the underlying landslide slip surface and as such cannot record any differential movement across the surface. However, SI-11 measurements do exhibit a sinusoidal deflection wave that appears to suggest that the casing has undergone some vertical compression loading.

SI-14 could not be measured in 2009 and likely sheared off at a distinct slip surface previously found at approximately 20.0 m depth. A total of approximately 62 mm of lateral displacement was monitored at this location, between installation in August 2006 and November 2008.

SI-15 was measured in April 2009 and was found to be blocked at approximately 18.0 m depth between April and June 2009. This depth likely corresponds with movements along a previously observed lateral slip surface at a depth of approximately 18.0 m depth. A total of approximately 56 mm of lateral displacement was monitored at this location between installation in August 2006 and April 2009. The total lateral displacement observed in early 2009 was approximately 10 mm, which is an increase from 3 mm observed during the same period in early 2008.

In summary, trends based on the SI monitoring results could not be observed in 2009 due to the lack of survey information available after the SI's were blocked by shear movements in late 2008 or early 2009.

Generally, it has been observed that the rates and directions of movement in slope inclinometers were similar to those monitored at nearby surface GPS hubs.

Figure 1 provides an updated vector movement map for the slope inclinometer monitoring.

4.0 PIEZOMETERS

Two general types of piezometers (alternately referred to as monitoring wells), using three different installation procedures, have been utilized in West Quesnel to monitor groundwater levels. There are nine standpipe piezometers, which are read quarterly using a manual water level dip tape. There are four standpipes that have been retrofitted with vibrating wire piezometers (for electronic detection of water pressure) installed inside the standpipes. Another 48 vibrating wire piezometers were grouted directly in the ground at various depths and at 21 different locations (see Figure 13). All of the piezometers in West Quesnel are active and are currently being read, although some intermittently go dry. A summary table of the piezometers, along with the water level plots, can be found in Appendix C.

All of the vibrating wire piezometers (VWP) are connected to Campbell Scientific dataloggers, with the exception of VWP 4B, which is connected to a Slope Indicator MiniLogger. Dataloggers are used to record readings at set intervals and can store large quantities of data, so that near real time data can be collected remotely. The Campbell Scientific dataloggers have been connected to cellular modems and can be accessed directly from AMEC's office in Prince George.

The dataloggers at VWP 9 and 13 both lost about 1 month of data during 2009. At VWP 9, it appears that the batteries were too low. At VWP 13, the power cable became loose and caused data to be lost. During July 2009, VWP 16 was vandalized and daily data collection was stopped at this point. Since then, AMEC has recorded manual values twice. AMEC intends to re-establish this station during 2010. The batteries in the MiniLogger at VWP 4 died between mid-October and early December 2009, so groundwater pressures were not recorded at this location during that period.

The following piezometers are situated near trial pumping wells: BH 3, BH 3 ABC, BH 4 ABC, VWP 12, VWP 17, VWP 18, VWP 19, and VWP 20. Generally, after showing initially declining water levels upon the commencement of pumping at the trial dewatering wells in late 2007, the piezometer water levels nearest the pumping wells started to level off at relatively steady state elevations during 2009. VWP 12 ABC, VWP 17 and VWP 20 have essentially leveled off. BH 3 A continued to show a decrease in water level in response to pumping but BH 3 BC had a slight increase in the early spring, likely due to seasonal groundwater trends, followed by continued decreasing levels due to pumping. The pump in PW 2 stopped working in late May 2009 and for the last half of 2009, the trend in BH 3 has been upwards recovery of the water level towards a nearly steady elevation by mid-July. BH 3 and VWP 17 also showed response to seasonal groundwater trends, as increases in water level were observed in the spring (the increase in water level at BH 3 started before the pump stopped working). For VWP 17, the response to seasonal groundwater trends was not as apparent as in 2008.

The other piezometers near pumping wells, BH 4 ABC, VWP 12 D and VWP 18 did not show a decrease in water level, as they are likely outside of the zone of direct influence of the individual pumping wells. BH 4C, VWP 12 ABD and VWP 18A remained at relatively constant water levels. VWP 12 C and VWP 19 AB have been dry since early to mid 2008. BH 4A and B, near PW1, each observed one sharp spike and drop, in early spring, in water levels during 2009. This may be linked to direct infiltration into the standpipe installation in response to precipitation events and/or more direct hydraulic connection to surface soils or a nearby storm water detention pond. VWP 18B stopped working in early 2009, after showing a gradual but fluctuating rise in water levels towards the ground surface since installation. For a while prior to the sensor stopping working altogether it had been showing erratic results, likely an indication of a malfunctioning device.

VWP 21, 22, 23, 24 and 25 are located in the vicinity of the trial horizontal drain installations HD1 and HD4. Around HD1, VWP 23A, 24 and 25 went dry soon after installation of HD1. After initial declines in 2007-2008, the water level at VWP 23B leveled off to an approximately steady state in 2009. During 2009, VWP 21 and 22, located in the vicinity of HD4, indicated a spike in water level in early spring, followed by a gradual decrease in water level until another slight increase in water level between late October and the end of November.

The remaining piezometers in West Quesnel are in locations that are judged to be unlikely to be affected by trial dewatering efforts, and are more reflective of general subsurface groundwater patterns in West Quesnel. Depending on the local geology, depth of installation, etc., some of these other installations appear sensitive to seasonal snow melt trends and/or individual storm events while others do not.

VWP 7, 8D, 9, 10, 14 and 15A appear to be sensitive to seasonal groundwater trends. These piezometers showed an increase in groundwater levels during spring with a steady decrease in levels until another increase in water levels during November. At VWP 14, the increase during the spring occurred one month later in VWP 14 BC than at VWP 14 A. VWP 15 A appears to be the only piezometer in this group to not see an increase during November 2009. VWP 13 levels had 3 sharp increases and decreases during 2009 (mid-April, mid-May and end of October) but remained relatively constant otherwise. VWP 15 B and C observed a steady, slight decrease in water level during 2009. The water level in standpipe BH 4A has been decreasing since a high in April 2009, which is similar to the trend observed in 2008, but prior to 2008, no consistent trend has been observed in this piezometer. The following piezometers have indicated relatively constant water levels during 2009: BH 2, BH 2 ABC, BH 6A-1 (dry), BH 6A-2, VWP 8 C, VWP 11 BC and VWP 16. VWP 8 A, VWP 8 B and VWP 11 A are alldry.

In 2009, VWP 4B, at Voyageur School, exhibited some anomalous behavior. While groundwater level in VWP 4B had remained fairly constant for several years, during April 2009, the water level rose 4 m and has increased another 1 m between early May and the end of November. The reason for this rise is not readily apparent. There is no obvious equipment malfunction and AMEC has ruled out data computation errors. It is possible that this apparent anomalous rise could represent a local groundwater pressure response due either to ongoing ground movements changing the hydrogeologic regime of this portion of the slide mass or it could be the effect of an undetected water utility leak.

5.0 PUMPING WELLS

Four pumping wells were set up in West Quesnel as part of the 2007-2008 trial dewatering program, reported on by AMEC in May 2008 (see Figure 13). PW1 is on Flamingo Street and has a 75 mm by 0.75 horsepower (hp) pump restricted to 15 L/min. PW2, on Abbott Drive, has a 75 mm by 0.75 hp pump restricted to 15 L/min. PW4, on Panagrot Ave., has a 75 mm 2 hp pump restricted to 75 L/min. PW5 is located on Adam Street, with a 100 mm 0.75 hp pump restricted to 15 L/min. PW1, PW2 and PW5 have electronic level controls to start and stop the pumps. PW4 is controlled by an ammeter that shuts off just prior to the pump cavitating (low head level) and restarts after a pre-set time period (20 min). The water pumped from PW1 enters the West Quesnel sanitary sewer while at PW2, PW4 and PW5, the water pumped enters the West Quesnel storm drainage system. A summary table of the wells can be found in Appendix D.

PW1 has been pumping at a rate of between 44 and 57 L/day during 2009, which is approximately 50% lower than rates observed during 2007-2008. The total volume of water pumped, since installation to the end of November 2009, was approximately 56,400 L. During the summer of 2009, there was not the same relative decrease in pump rates over the summer months, as was observed in the summer of 2008. The water level in the well has mostly remained around 490 m elevation, as defined by the well level controls.

PW2 pumped at a rate of between 23 and 32 L/day between January and May 2009, until the pump stopped working in late May. These were similar to that observed in 2007-2008. The total volume pumped, from October 2007 to May 2009, was approximately 16,000 L. The water level in the well was between approximately 462 to 464 m elevation until the end of May 2009, as defined by the well level controls, and then rose to approximately 500 m by mid-July and has remained at or near that level since.

PW4 has been the most productive well, with average pump rates between 8,000 and 17,000 L/day for 2009, similar to average rates for 2008. During the summer of 2009, the relative pump rates did not decrease, as was observed in the summer of 2008. To the end of November 2009, approximately 11.4 million L of water has been pumped from this well. The water level in the well remained between approximately 528 to 535 m depth, as defined by the well level controls.

PW5 has been the least productive well, with rates averaging below 1 L/day, although in 2009, production occurred at least once in each month, which was not the case in 2008. To date, only 358 L of water has been pumped. The water level in the well remained between 417 to 420 m depth, as defined by the well level controls.

6.0 HORIZONTAL DRAINS

During the fall of 2007, four test horizontal (gravity) drains were installed at two different locations into the slope underlying West Quesnel (see Figure 13). This was part of the 2007-2008 trial dewatering program, reported on by AMEC in May 2008. Two of the drains (HD1a and HD1b) are located adjacent to SI-13 on the utility corridor south of the Sikh Temple, however were dry (at the discharge end) shortly after installation was complete. The other two drains (HD4a and HD4b) were installed west of Adam Street, near PW5. These drains have been producing water since installation. A summary table of the drains can be found in Appendix E, along with a production table for HD4. The production table for HD4 was based on intermittent manual readings taken before January 2009. These readings were averaged to produce the plot and calculate assumed volumes. A magnetic flow meter was installed in mid-December 2008 and provides real-time data. The magnetic flow meter replaced a previously installed paddle-wheel type flow meter that worked only intermittently.

HD4 produced a combined flow from the two drains ranging between approximately 1,300 and 1,800 L/day during 2009, with the maximum flow occurring during May to July. The flow rates observed during 2009 were approximately 50% of that estimated for 2008, which could be simply a result of more accurate flowmeter data in 2009 or due to lower groundwater levels in the slope that have developed due to drainage over time. To date, over 1.7 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 station Quesnel AWOS¹, which is 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. A secondary 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. Daily total precipitation data has been available from the Urban Systems' station only on an intermittent basis since June 2006.

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. Figures F1 and F2, in Appendix F, present comparisons of total daily precipitation for the two weather stations. It appears that while generally both stations record 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 is 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. When one looks at the graphed curves of cumulative precipitation over time for the two stations (over matching serviceable equipment periods available to date) the curves appear close to parallel up to late 2007, suggesting that there may not have been much difference in the overall precipitation patterns for the two areas. However, for 2009, the plotted cumulative precipitation curve for the Urban Systems station has a shallower slope than that for the EC Station, suggesting a possible difference. This difference and shallower slope could also be in part due to the installation layout effects, and a firm conclusion as to differences in weather patterns cannot be drawn. Consequently, AMEC has decided to rely on the more complete EC total precipitation data for analysis of the West Quesnel area for the 2009 monitoring period.

Total precipitation recorded at the EC weather station for 2009 was 423 mm, which is roughly 20% lower than the historical normal² (1971 to 2000) which is 540 mm. Generally, 2009 was drier than previous years from January until September but was a bit wetter than normal through October and drier again through November and December. Overall, the calendar year of 2009 was slightly drier than previous years, particularly those years when significant ground movements were noted (those typically being 1998-2001, 2004-2005, and 2008). Table 1 presents the annual total precipitation from 1996 to 2009. Figure F3 shows total monthly precipitation versus the historical normal. Figure F4 shows the cumulative difference between the actual recorded precipitation and the 30-year normal. Upward slopes in the cumulative difference graph represent wet trends, while downward slopes are drying trends. Normal precipitation is observed when the cumulative difference plot remains relatively constant.

¹ Environment Canada, 2009. Canadian Climate Data Search On-line - Canada's National Climate Archive.
<http://www.climate.weatheroffice.ec.gc.ca/climateData/canadae.html> Last visited December 7, 2009.

² Environment Canada, 2008. 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 December 7, 2009.

Table 1: Annual Total Precipitation from 1996 to 2009

Year	Annual Total Precipitation (mm)	Difference from Historical Normal (mm)
1996	657	+117
1997	579	+39
1998	488	-52
1999	628	+88
2000	554	+14
2001	554	+14
2002	471	-69
2003	478	-62
2004	692	+152
2005	524	-16
2006	465	-75
2007	541	+1
2008	530	-10
2009	423	-117

8.0 TRENDS

Selected data from different types of instrumentation was plotted to determine if any general trends were apparent. While 2007-2009 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 daily precipitation vs. groundwater elevation (Figure G1)
- Cumulative total daily precipitation vs. groundwater elevation (Figure G2)
- Incremental ground movement rate vs. total daily precipitation (Figure G3)
- Incremental ground movement rate vs. total monthly precipitation (Figure G4)
- Incremental ground movement rate vs. total seasonal precipitation (Figure G5)
- Cumulative ground movement vs. total monthly precipitation (Figure G6)
- Incremental ground movement rate vs. cumulative difference total monthly precipitation (Figure G7)
- Incremental ground movement rate vs. groundwater elevation (Figure G8)
- Cumulative ground movement vs. groundwater elevation (Figure G9)

On Figure G1, when total daily precipitation is compared to general groundwater elevation (as determined from selected vibrating wire piezometers unlikely to have been affected by trial dewatering); it is difficult to discern if a specific precipitation event caused any of the changes in water level. However it is apparent that significant seasonal rises in groundwater level do occur just after winter each year. Also, near the start of winter 2007-2008 and again in 2008-2009, a number of high precipitation days occurred and a rise in water level was observed some of the plotted piezometers. As discussed in Section 4.0, VWP 4B experienced a large increase in water level in the spring of 2009 and this was not observed in any other piezometers and does not appear to be connected to a precipitation event.

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 variably infiltration 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.

Cumulative total ground movement and movement rates (as determined from selected representative SI and horizontal GPS movement data) were plotted against various precipitation data (see Figures G3 to G7). In 2009, the data from slope inclinometers was limited due to the casings being sheared off by ground movement. A general correlation between ground movement and seasonal precipitation patterns can be discerned, with more observed movement generally occurring or following wetter years or wetter seasons within a given year. However, for 2009 there appear to have been higher rates and total amounts of movement in a year that had essentially normal or below average precipitation. As shown in Figure G5, precipitation during the spring of 2009 was lower than the summer of 2009 (a similar trend is observed in 2008), but movement mainly occurred in the spring.

Figure G8 plots groundwater elevation versus ground movement rates (velocity, as determined from selected SI and horizontal GPS movement data). Peaks in movement rates 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 three 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 G9) using the same piezometer data as in Figure G8. 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 G8 and G9 is that increased ground movements are strongly correlated with seasonal increases in monitored groundwater levels. However, it is not readily apparent why movements in 2008 and particularly 2009 were significantly more than those observed in 2007, while corresponding groundwater levels were (with the exception of a sustained rise at VWP 4B) generally similar to or even slightly lower than those observed in 2007. It could be that this is a function of a still limited data set that does not yet have enough data to fully reflect the complicated interaction of preceding infiltration of rainfall or snow melt (during frozen/non-frozen and saturated/dry near surface ground conditions) on groundwater levels including time lag implications that also have to be taken into consideration.

One aspect that is difficult to monitor is the effect of lateral pressure in tension cracks as infiltration occurs. Another factor is that over time, as more sustained movement occurs, that the underlying soil is weakening (often referred to as strain softening) and that it takes less groundwater pressure to generate the same amount of observed movement.

Alternately, the higher observed movements starting in 2008 and continuing into 2009 could also be a reflection of the de-stabilizing effect of a significant and as yet unreported water utility leak that may only have been detected in a limited area (e.g. at piezometer VWP 4B in the vicinity of Voyageur School).

9.0 CLOSURE

This report presents the results of the annual monitoring carried out by AMEC for the 2009 calendar year. It is recommended and anticipated that monitoring will continue through 2010 and beyond. AMEC will be providing a work plan and estimate for the 2010 annual monitoring program under separate cover.

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 Earth & Environmental
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Reviewed by:

Hayley Robertson

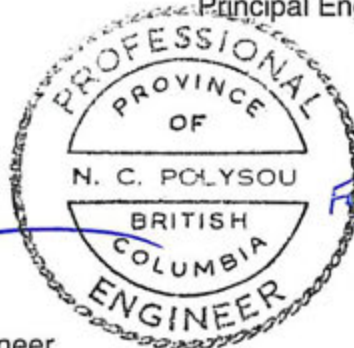
Hayley Robertson, E.I.T.
Geotechnical Engineer

D.S. Cavers

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

Nick C. Polysou

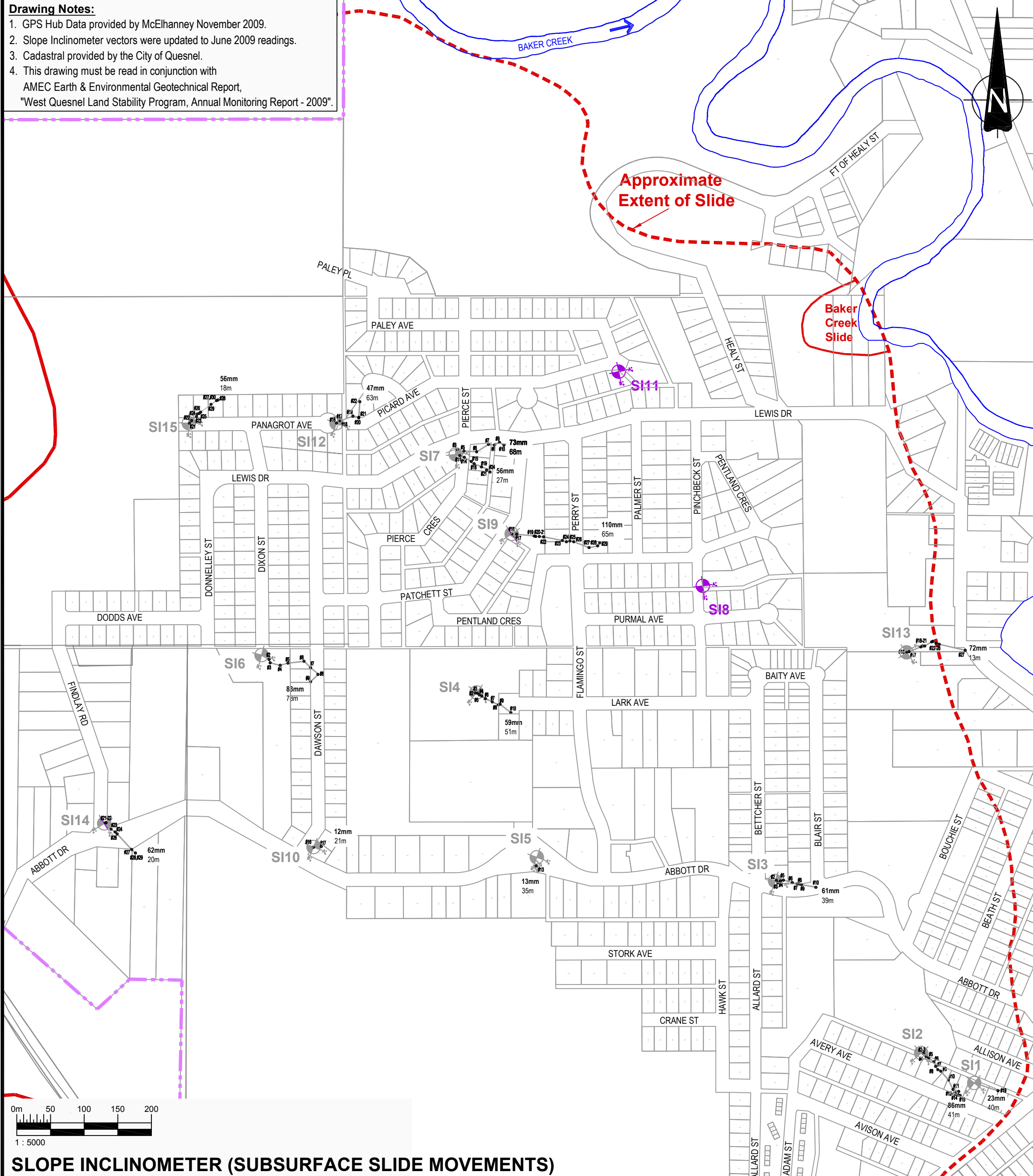
Nick C. Polysou, P.Eng.
Associate Geotechnical Engineer
Regional Manager, Central BC



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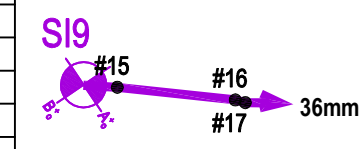
Drawing Notes:
1. GPS Hub Data provided by McElhanney November 2009.
2. Slope Inclinerometer vectors were updated to June 2009 readings.
3. Cadastral provided by the City of Quesnel.
4. This drawing must be read in conjunction with
AMEC Earth & Environmental Geotechnical Report.
"West Quesnel Land Stability Program, Annual Monitoring Report - 2009".



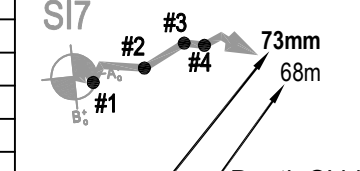
SLOPE INCLINOMETER (SUBSURFACE SLIDE MOVEMENTS)

SI Monitoring Schedule															
Dates	SI1	SI2	SI3	SI4	SI5	SI6	SI7	SI8	SI9	SI10	SI11	SI12	SI13	SI14	SI15
Initial	21 Nov 2000	21 Nov 2000	21 Nov 2000	03 Nov 2000	28 Oct 2000	22 Nov 2000	03 Jun 2005	27 Apr 2005	27 Apr 2005	31 May 2005	28 Apr 2005	28 Apr 2005	28 Apr 2005	08 Nov 2005	09 Nov 2006
#1	07 Dec 2000	07 Dec 2000	06 Dec 2000	24 Nov 2000	24 Nov 2000		06 Dec 2000	07 Dec 2000							
#2	12 Jan 2001	11 Jan 2001	12 Jan 2001	11 Jan 2001	12 Jan 2001	11 Jan 2001	12 Jan 2001	12 Jan 2001							
#3	05 Mar 2001	05 Mar 2001	06 Mar 2001	05 Mar 2001	06 Mar 2001	05 Mar 2001	06 Mar 2001	06 Mar 2001							
#4	02 Apr 2001	02 Apr 2001	03 Apr 2001	02 Apr 2001	03 Apr 2001	02 Apr 2001	03 Apr 2001	03 Apr 2001							
#5	28 Apr 2001	28 Apr 2001	28 Apr 2001	28 Apr 2001	29 Apr 2001	28 Apr 2001	29 Apr 2001	29 Apr 2001							
#6	18 Jun 2001	13 Jun 2001	14 Jun 2001	14 Jun 2001	14 Jun 2001	13 Jun 2001	14 Jun 2001	14 Jun 2001							
#7	04 Oct 2001	04 Oct 2001	04 Oct 2001	04 Oct 2001	04 Oct 2001	26 Sep 2001	04 Oct 2001	04 Oct 2001							
#8	20 Nov 2001	19 Nov 2001	19 Nov 2001	19 Nov 2001	19 Nov 2001	20 Nov 2001	19 Nov 2001	20 Nov 2001							
#9	06 May 2002	06 May 2002	06 May 2002	06 May 2002	06 May 2002	blocked 78m	06 May 2002	06 May 2002							
#10	19 Nov 2002	19 Nov 2002	blocked 39m	blocked 51m	19 Nov 2002	blocked 68m									
#11	15 Aug 2003	15 Aug 2003			15 Aug 2003										
#12	02 Dec 2003	02 Dec 2003			02 Dec 2003										
#13	24 Jun 2004	24 Jun 2004			24 Jun 2004										
#14	10 Nov 2004	10 Nov 2004			10 Nov 2004										
#15	27 Apr 2005	blocked 41m													
#16															
#17															
#18	18 May 2006				18 May 2006	18 May 2006	18 May 2006	18 May 2006							
#19	29 Aug 2006				29 Aug 2006	29 Aug 2006	29 Aug 2006	29 Aug 2006							
#20	08 Nov 2006				08 Nov 2006	08 Nov 2006	08 Nov 2006	08 Nov 2006							
#21	08 Mar 2007				08 Mar 2007	08 Mar 2007	08 Mar 2007	08 Mar 2007							
#22	29 May 2007				29 May 2007	29 May 2007	29 May 2007	29 May 2007							
#23	30 Aug 2007				30 Aug 2007	30 Aug 2007	30 Aug 2007	30 Aug 2007							
#24	22 Nov 2007				22 Nov 2007	22 Nov 2007	22 Nov 2007	22 Nov 2007							
#25	04 April 2008				04 April 2008	04 April 2008	04 April 2008	04 April 2008							
#26	24 June 2008				24 June 2008	24 June 2008	24 June 2008	24 June 2008							
#27	09 Sept 2008				09 Sept 2008	09 Sept 2008	09 Sept 2008	09 Sept 2008							
#28	11 Nov 2008				11 Nov 2008	11 Nov 2008	11 Nov 2008	11 Nov 2008							
#29	16 April 2009				16 April 2009	16 April 2009	16 April 2009	16 April 2009							
#30	30 June 2009				30 June 2009	30 June 2009	30 June 2009	30 June 2009							
#31															

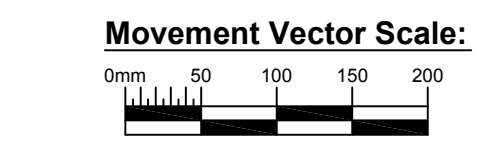
Slope Inclinerometer - Operational



Slope Inclinerometer - Blocked



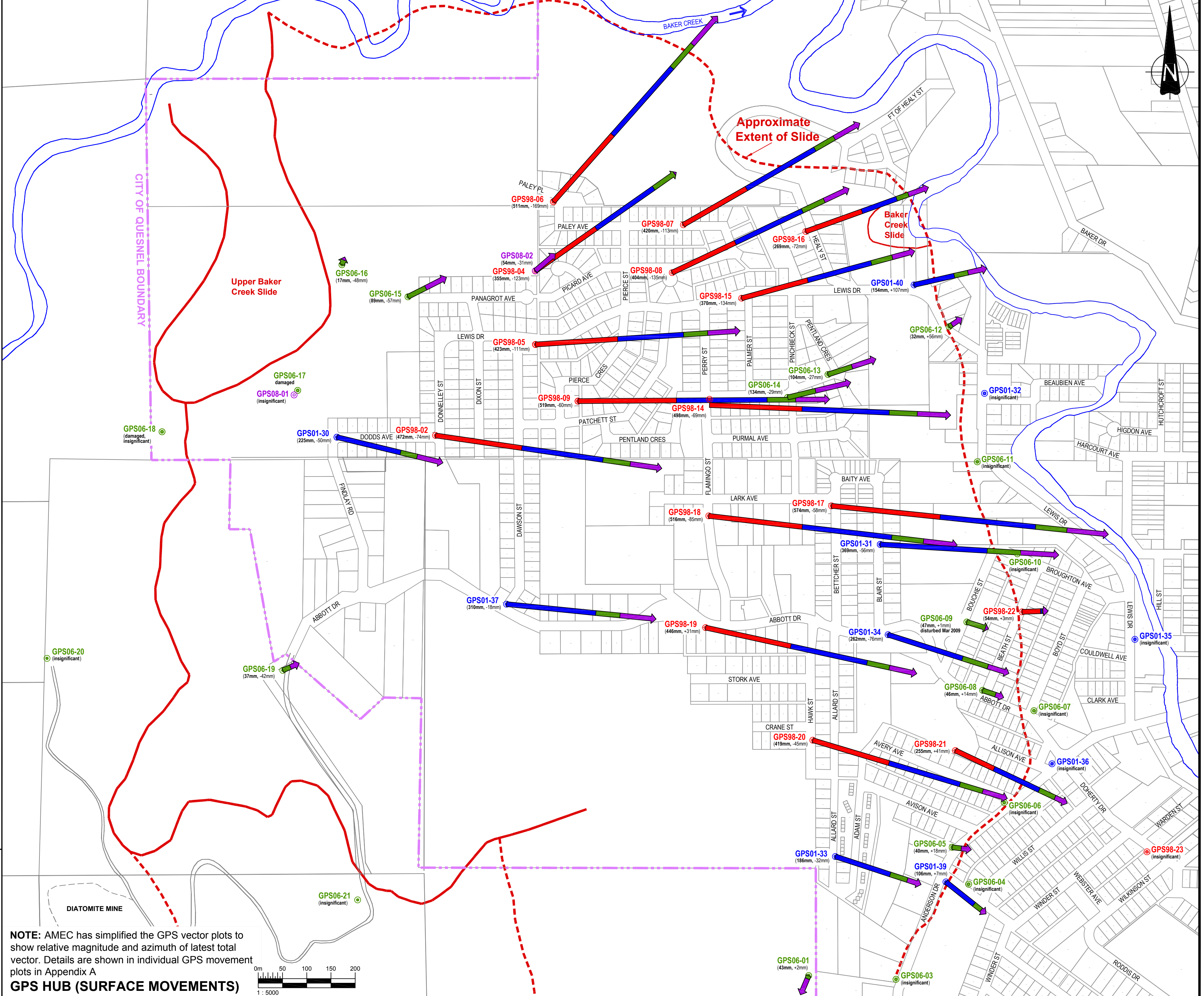
Note: Total shear displacement measured across shear surface, from initial reading to present or until blocked.



Movement Vector Scale:
0mm 50 100 150 200

NOTE: AMEC has simplified the GPS vector plots to show relative magnitude and azimuth of latest total vector. Details are shown in individual GPS movement plots in Appendix A

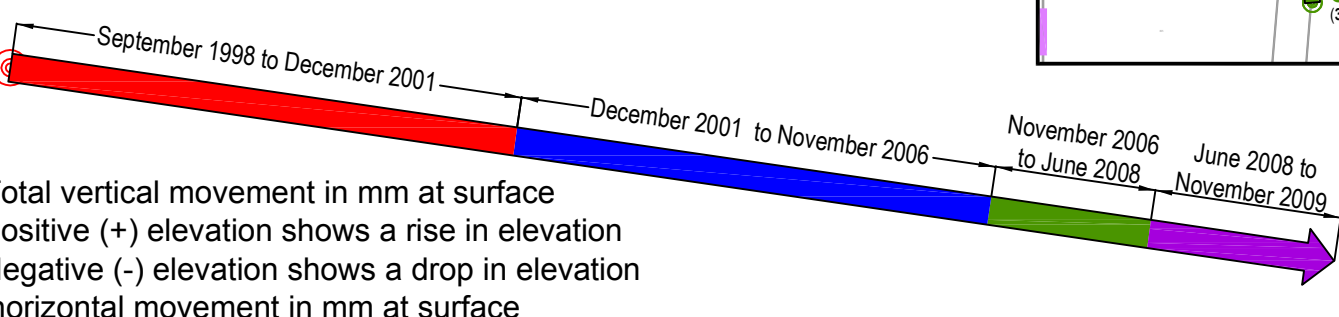
GPS HUB (SURFACE MOVEMENTS)



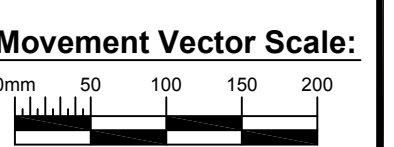
GPS Monitoring Dates				
Initial	September 1998	#13	March 2006	
#1	December 1998	#14	November 2006	
#2	April 1999	#15	April 2007	
#3	December 1999	#16	August 2007	
#4	February 2000	#17	December 2007	
#5	May 2000	#18	March 2008	
#6	December 2000	#19	June 2008	
#7	May 2001	#20	August 2008	
#8	December 2001	#21	November 2008	
#9	May 2002	#22	March 2009	
#10	October 2002	#23	June 2009	
#11	November 2003	#24	September 2009	
#12	January 2005	#25	November 2009	

GPS Hub Vector Legend:

GPS98-02
(472mm, -74mm)



GPS Hubs installed:
GPS98-02 - September 1998
GPS01-30 - December 2001
GPS06-01 - November 2006
GPS08-01 - June 2008



Movement Vector Scale:
0mm 50 100 150 200



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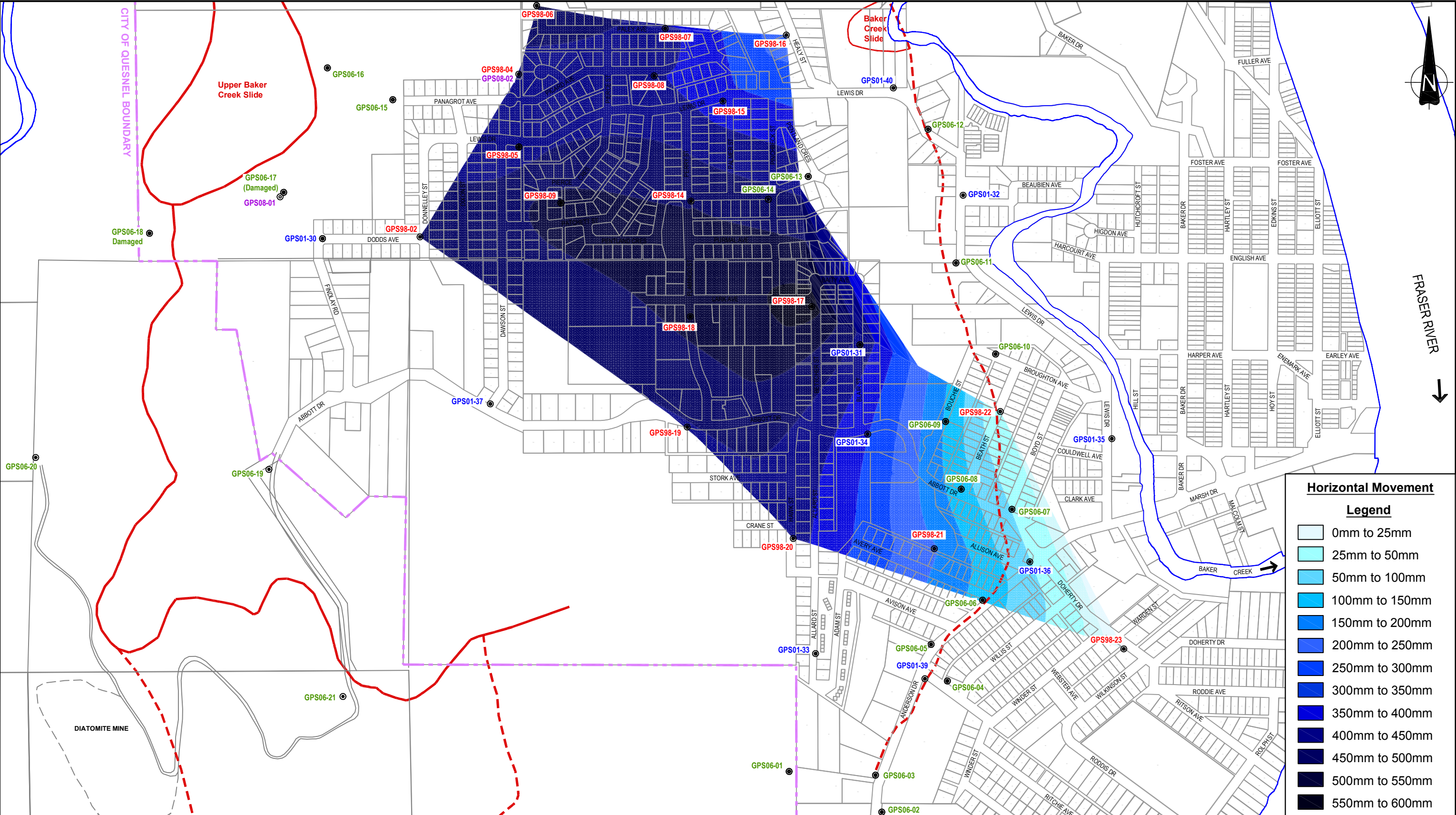
AMEC Earth & Environmental
3456 Opie Crescent
Prince George, B.C. CANADA V2N 2P9
Tel: (250) 564-3243
Fax: (250) 562-7045



DATUM: NAD83
PROJECTION: UTM Zone 10
DRAWN BY: S.Ruiz
REVIEWED BY: S.Kelly
ORIGINAL SCALE: 1:5000

TITLE: SUMMARY PLAN OF GROUND MOVEMENT (GPS HUBS AND SLOPE INCLINOMETERS)
PROJECT: WEST QUESNEL LAND STABILITY PROGRAM QUESNEL, BC

PROJECT NO.: KX04397
REVISION NO.: C
DATE: FEBRUARY 2010
FIGURE NO.: FIGURE 1
SHEET NO.: 1 of 1



Note: Ground Movement contours were drawn based from GPS Hub Survey Data supplied by McElhanney Consulting Services Ltd. Contours were generated with Autodesk Civil 3D 2008, SP1. A smoothing feature of natural neighbor was applied to the point interpolation from the GPS Hub centroids.

0m 50 100 150 200 250 300
1 : 7500



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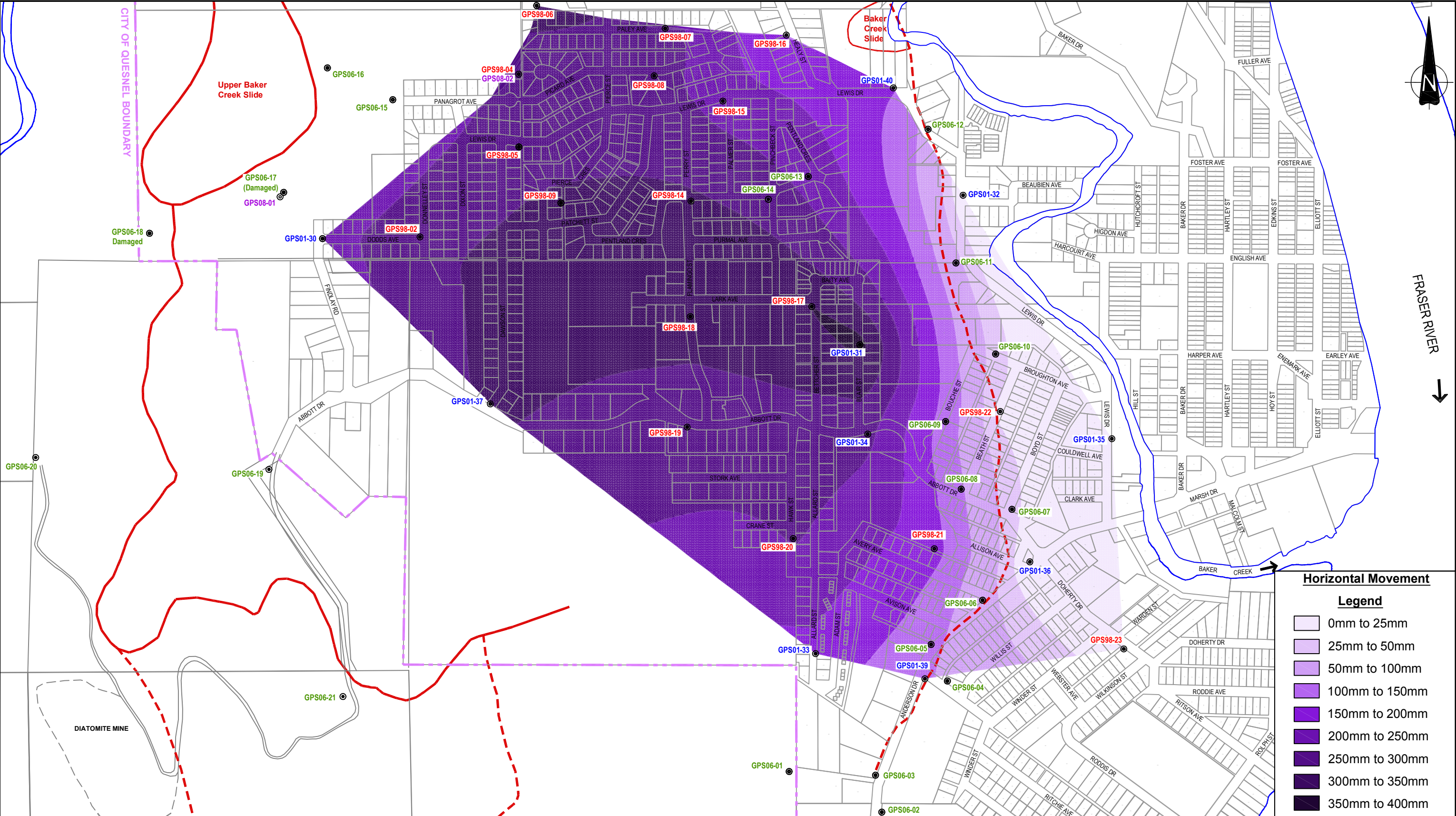


DWN BY: S.Ruiz
CHK'D BY: N.Polysou
DATUM: NAD83
PROJECTION: UTM Zone 10
SCALE: 1:7500

TITLE
**TOTAL HORIZONTAL MOVEMENT
SEPTEMBER 1998 TO NOVEMBER 2009
FOR THE 1998 GPS HUBS**

PROJECT
**WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC**

DATE: FEBRUARY 2010
PROJECT NO: KX04397
REV. NO.: A
FIGURE No. FIGURE 2



Note: Ground Movement contours were drawn based from GPS Hub Survey Data supplied by McElhanney Consulting Services Ltd. Contours were generated with Autodesk Civil 3D 2008, SP1. A smoothing feature of natural neighbor was applied to the point interpolation from the GPS Hub centroids.

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DWN BY: S.Ruiz
CHK'D BY: N.Polysou
DATUM: NAD83
PROJECTION: UTM Zone 10
SCALE: 1:7500

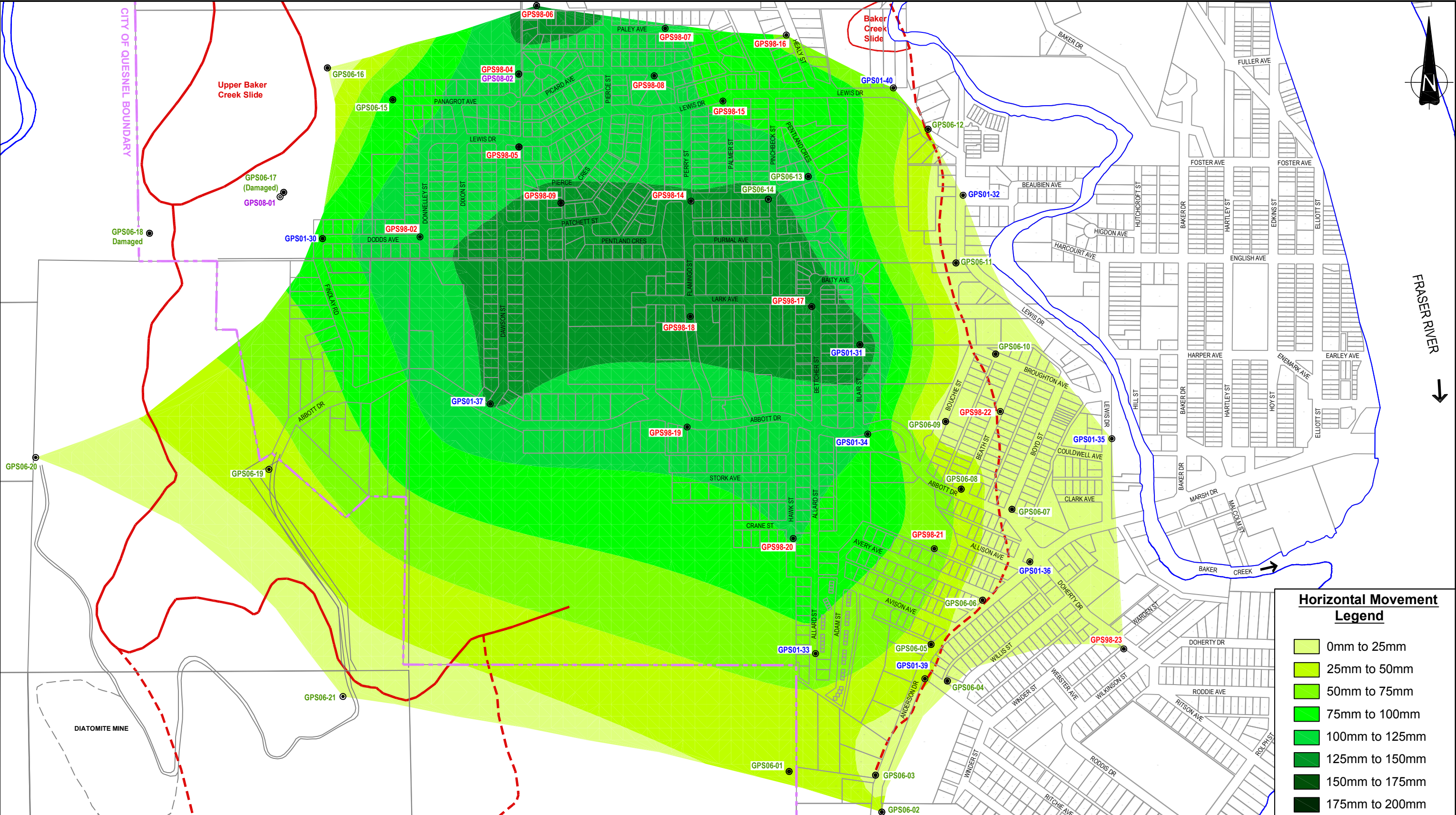
TITLE

TOTAL HORIZONTAL MOVEMENT
DECEMBER 2001 TO NOVEMBER 2009
FOR THE 1998 AND 2001 GPS HUBS

PROJECT

WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE: FEBRUARY 2010
PROJECT NO: KX04397
REV. NO.: A
FIGURE No. FIGURE 3



Note: Ground Movement contours were drawn based from GPS Hub Survey Data supplied by McElhanney Consulting Services Ltd. Contours were generated with Autodesk Civil 3D 2008, SP1. A smoothing feature of natural neighbor was applied to the point interpolation from the GPS Hub centroids.

0m 50 100 150 200 250 300
1 : 7500

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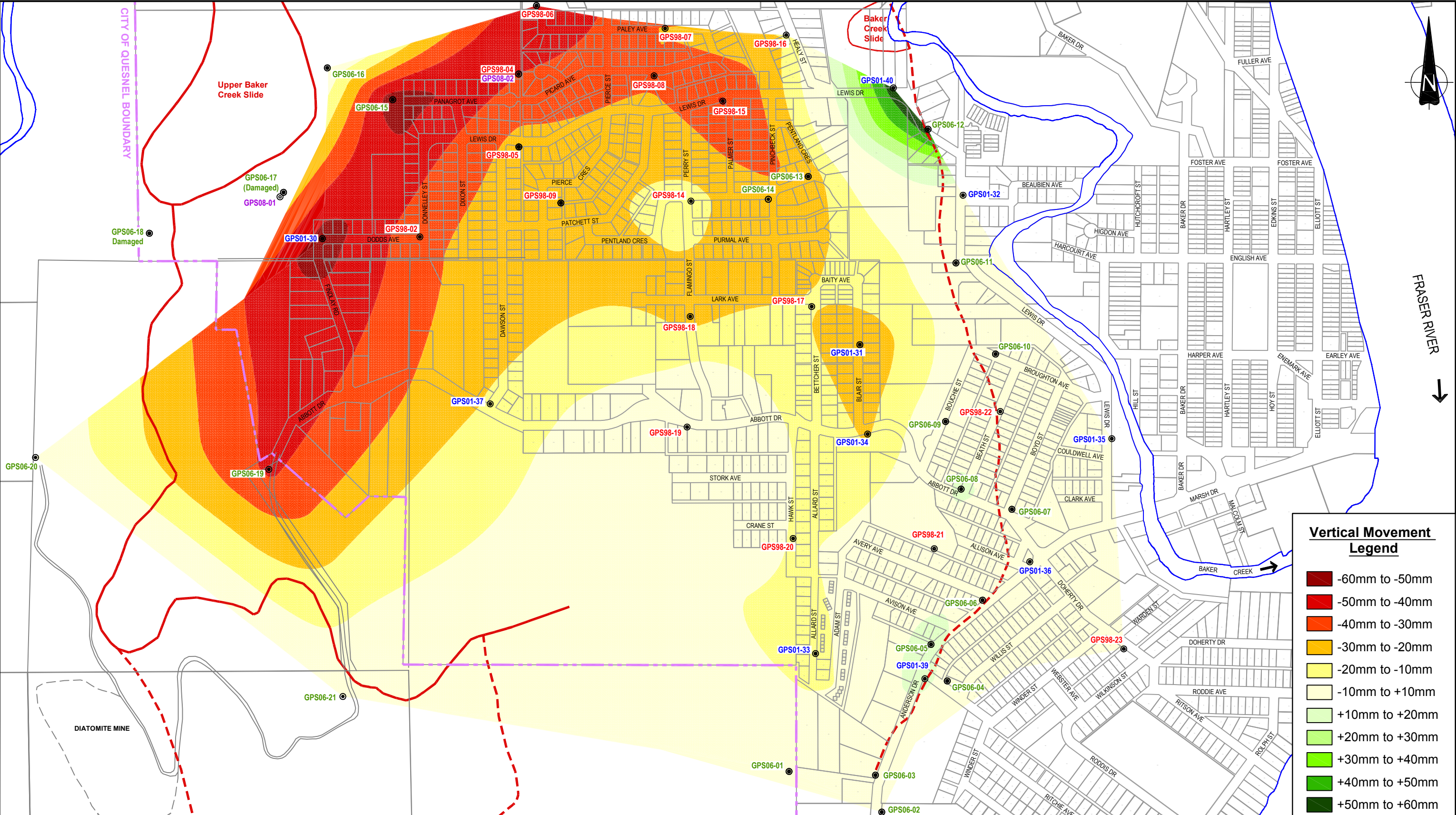


DWN BY: S.Ruiz
CHK'D BY: N.Polysou
DATUM: NAD83
PROJECTION: UTM Zone 10
SCALE: 1:7500

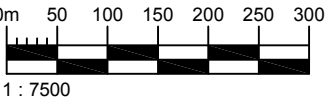
TITLE
TOTAL HORIZONTAL MOVEMENT
NOVEMBER 2006 TO NOVEMBER 2009
FOR THE 1998, 2001 AND 2006 GPS HUBS

PROJECT
WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE: FEBRUARY 2010
PROJECT NO: KX04397
REV. NO.: A
FIGURE No. FIGURE 4



Note: Ground Movement contours were drawn based from GPS Hub Survey Data supplied by McElhanney Consulting Services Ltd. Contours were generated with Autodesk Civil 3D 2008, SP1. A smoothing feature of natural neighbor was applied to the point interpolation from the GPS Hub centroids.



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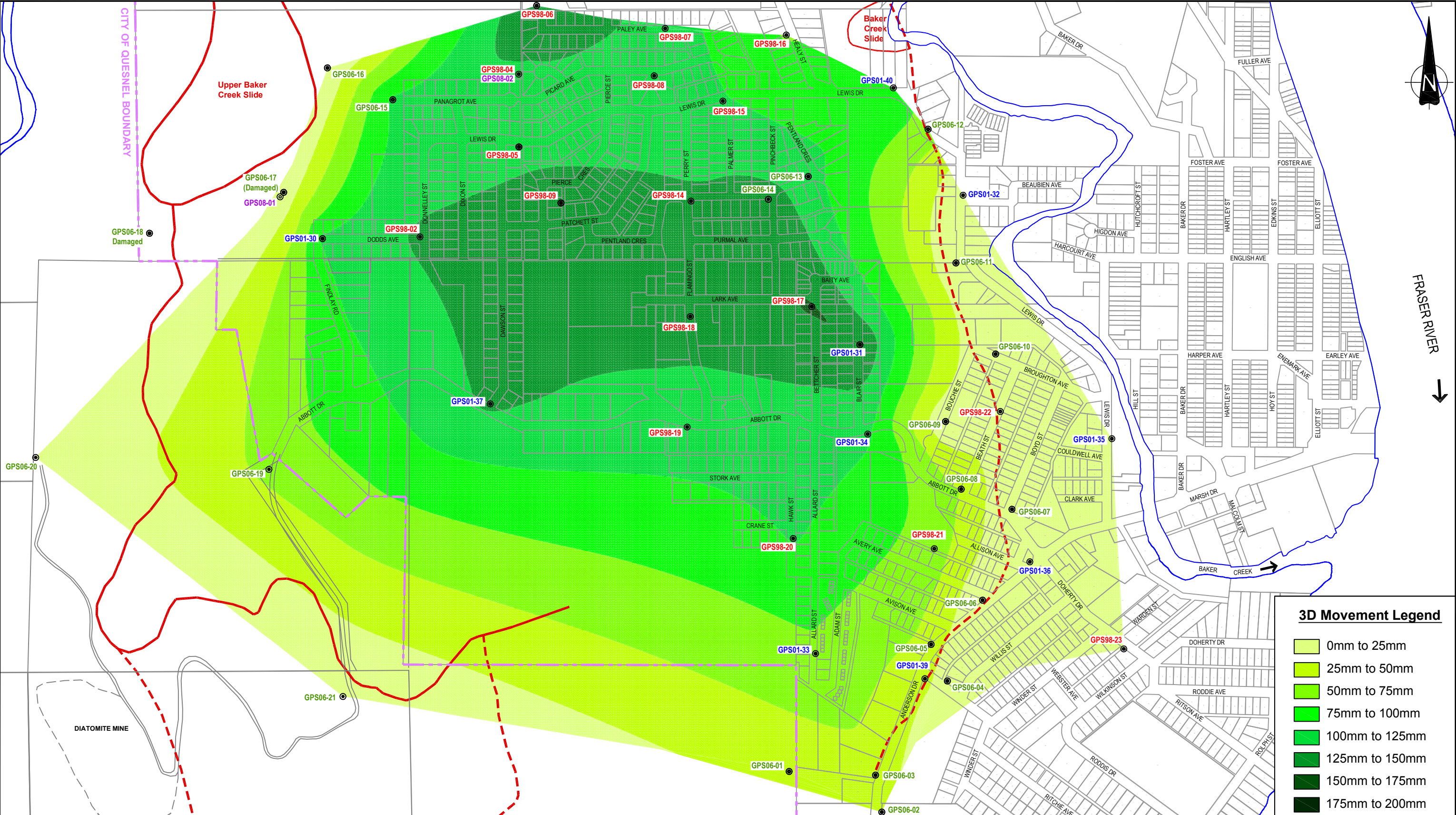


DWN BY: S.Ruiz
CHK'D BY: N.Polysou
DATUM: NAD83
PROJECTION: UTM Zone 10
SCALE: 1:7500

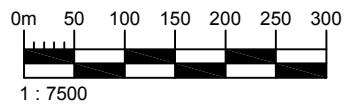
TITLE
**TOTAL VERTICAL MOVEMENT
NOVEMBER 2006 TO NOVEMBER 2009
FOR THE 1998, 2001 AND 2006 GPS HUBS**

PROJECT
**WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC**

DATE: FEBRUARY 2010
PROJECT NO: KX04397
REV. NO.: A
FIGURE No. FIGURE 5



Note: Ground Movement contours were drawn based from GPS Hub Survey Data supplied by McElhanney Consulting Services Ltd. Contours were generated with Autodesk Civil 3D 2008, SP1. A smoothing feature of natural neighbor was applied to the point interpolation from the GPS Hub centroids.



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CHK'D BY: N.Polysou
DATUM: NAD83
PROJECTION: UTM Zone 10
SCALE: 1:7500

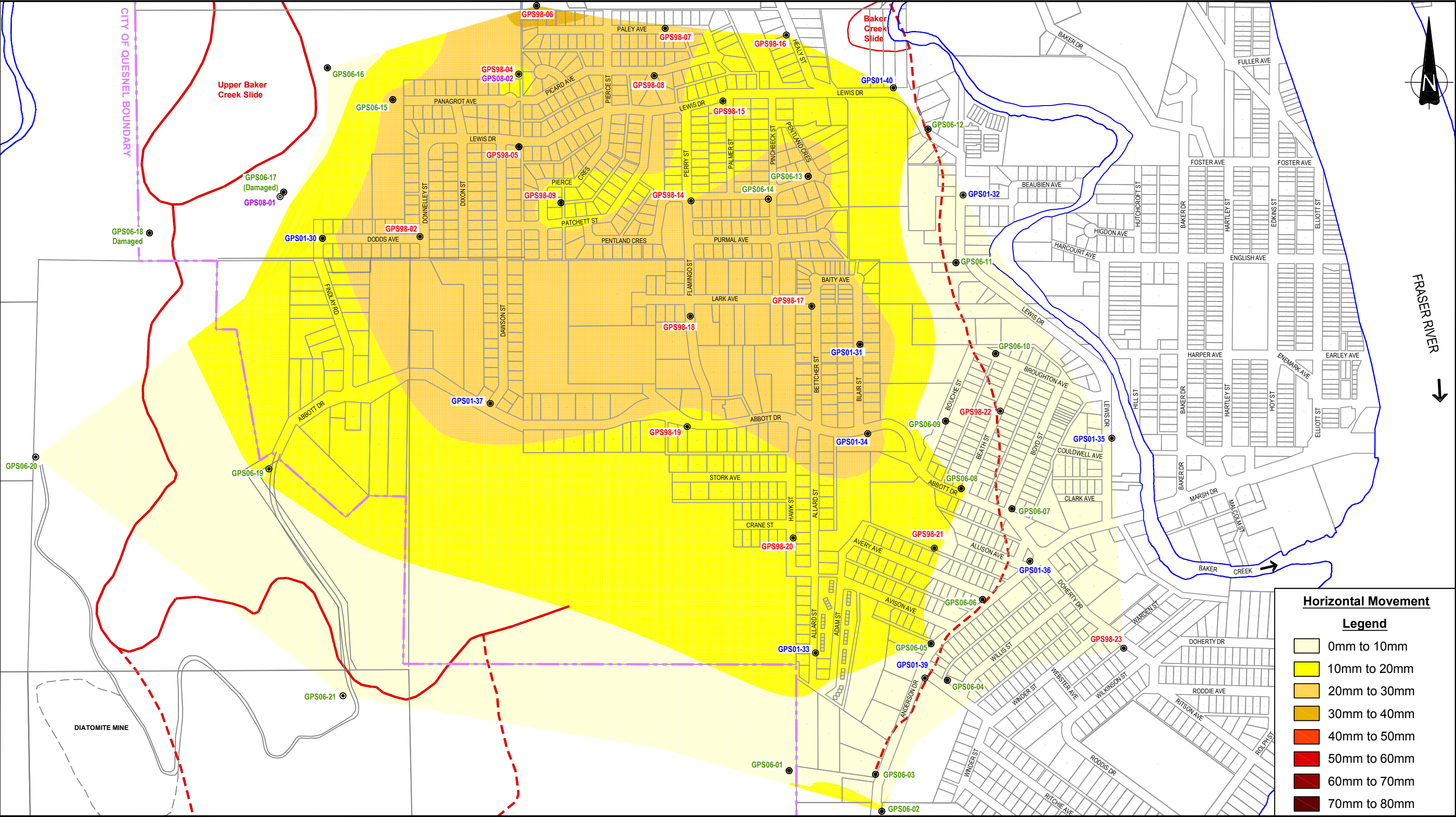
TITLE

TOTAL 3D MOVEMENT
NOVEMBER 2006 TO NOVEMBER 2009
FOR THE 1998, 2001 AND 2006 GPS HUBS

PROJECT

WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE: FEBRUARY 2010
PROJECT NO: KX04397
REV. NO.: A
FIGURE No. FIGURE 6



Note: Ground Movement contours were drawn based from GPS Hub Survey Data supplied by McElhanney Consulting Services Ltd. Contours were generated with Autodesk Civil 3D 2008, SP1. A smoothing feature of natural neighbor was applied to the point interpolation from the GPS Hub centroids.

0m 50 100 150 200 250 300
1 : 7500



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DWN BY: S.Ruiz
CHK'D BY: N.Polysou
DATUM: NAD83
PROJECTION: UTM Zone 10
SCALE: 1:7500

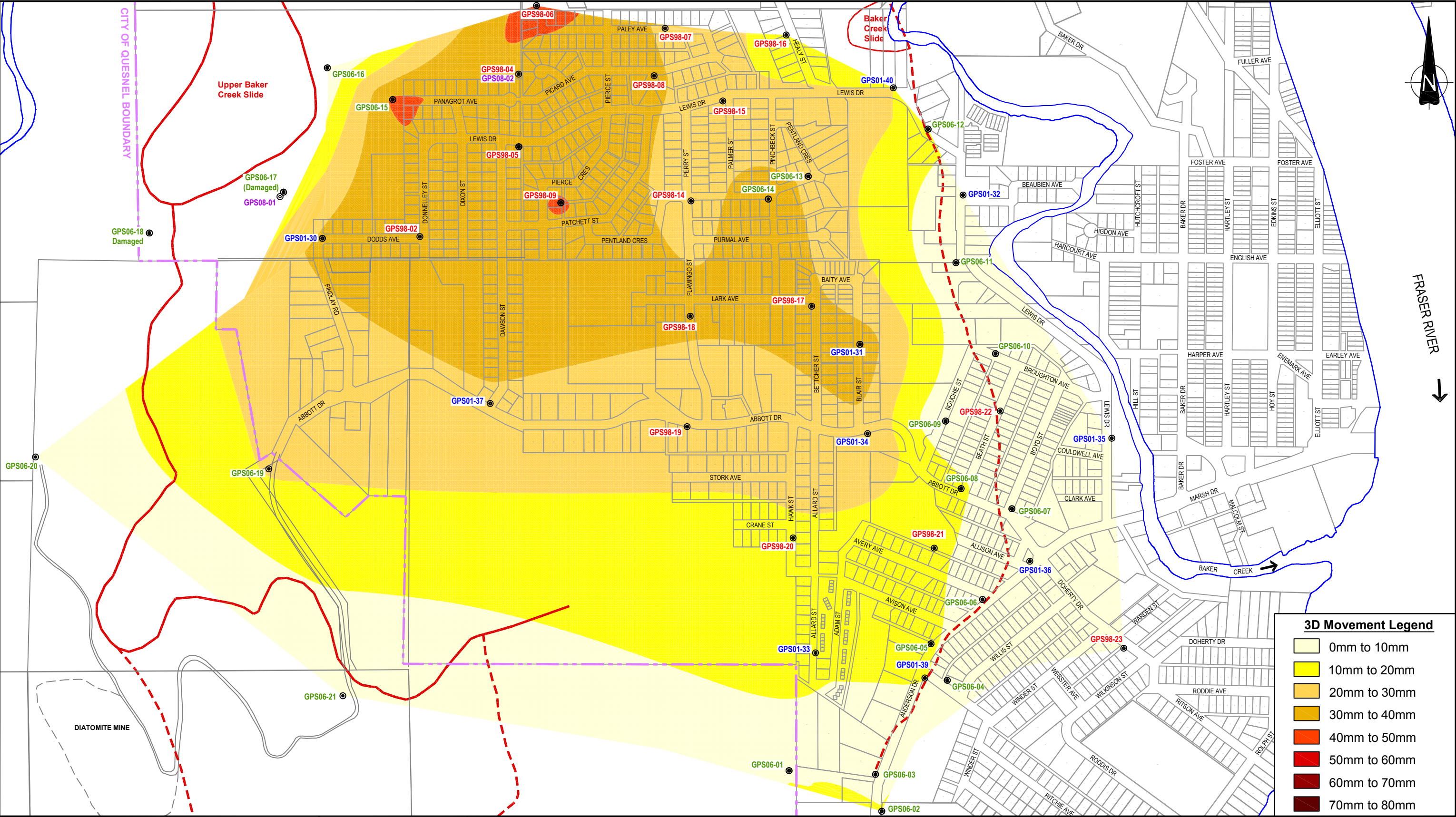
TITLE

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

PROJECT

WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE: FEBRUARY 2010
PROJECT NO: KX04397
REV. NO.: A
FIGURE No. FIGURE 7



Note: Ground Movement contours were drawn based from GPS Hub Survey Data supplied by McElhanney Consulting Services Ltd. Contours were generated with Autodesk Civil 3D 2008, SP1. A smoothing feature of natural neighbor was applied to the point interpolation from the GPS Hub centroids.

0m 50 100 150 200 250 300
1 : 7500



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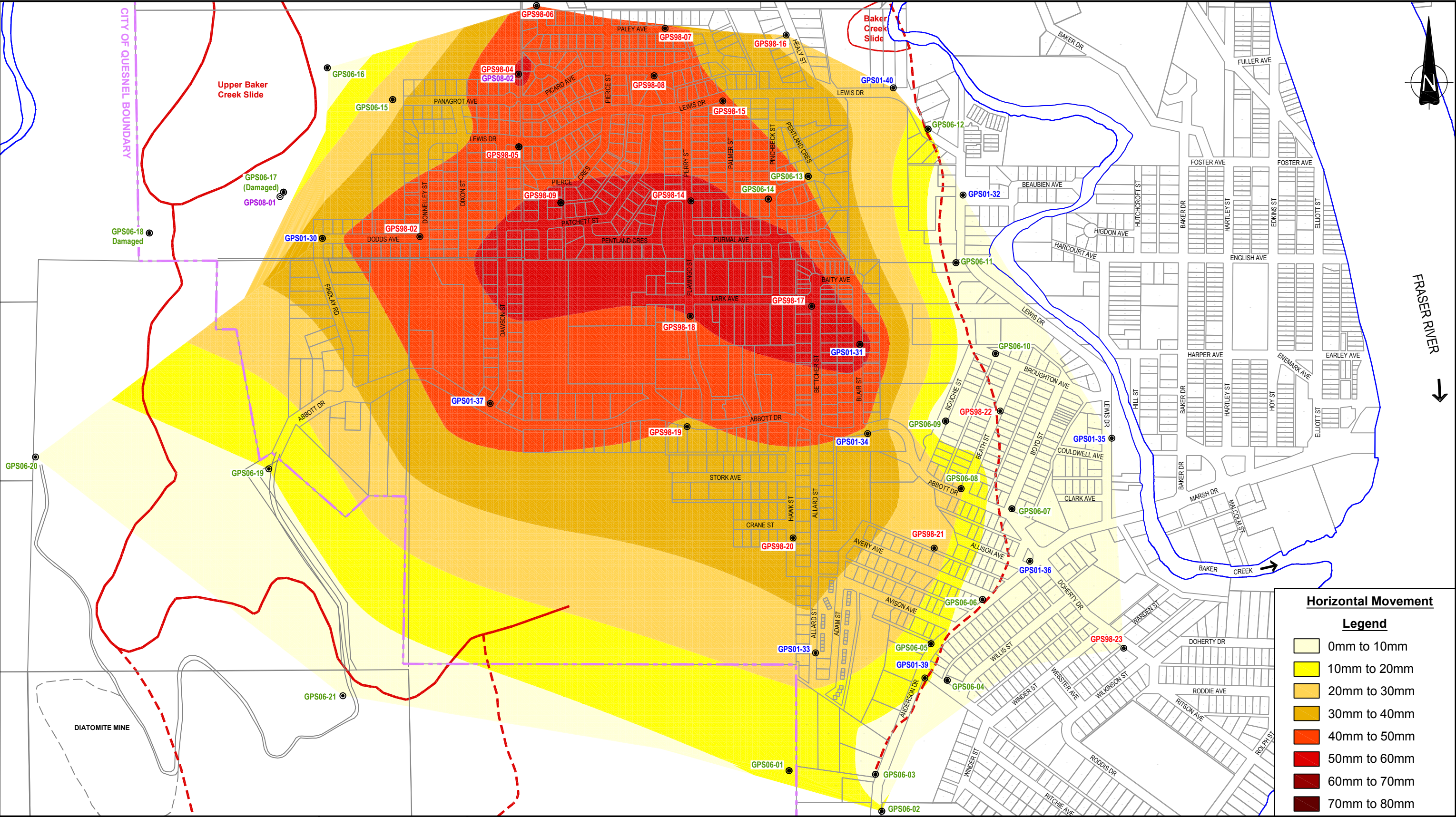


DWN BY: S.Ruiz
CHK'D BY: N.Polysou
DATUM: NAD83
PROJECTION: UTM Zone 10
SCALE: 1:7500

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

PROJECT
**WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC**

DATE: FEBRUARY 2010
PROJECT NO: KX04397
REV. NO.: A
FIGURE No. FIGURE 8



Note: Ground Movement contours were drawn based from GPS Hub Survey Data supplied by McElhanney Consulting Services Ltd. Contours were generated with Autodesk Civil 3D 2008, SP1. A smoothing feature of natural neighbor was applied to the point interpolation from the GPS Hub centroids.

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DWN BY: S.Ruiz

CHK'D BY: N.Polysou

DATUM: NAD83

PROJECTION: UTM Zone 10

SCALE: 1:7500

TITLE

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

PROJECT

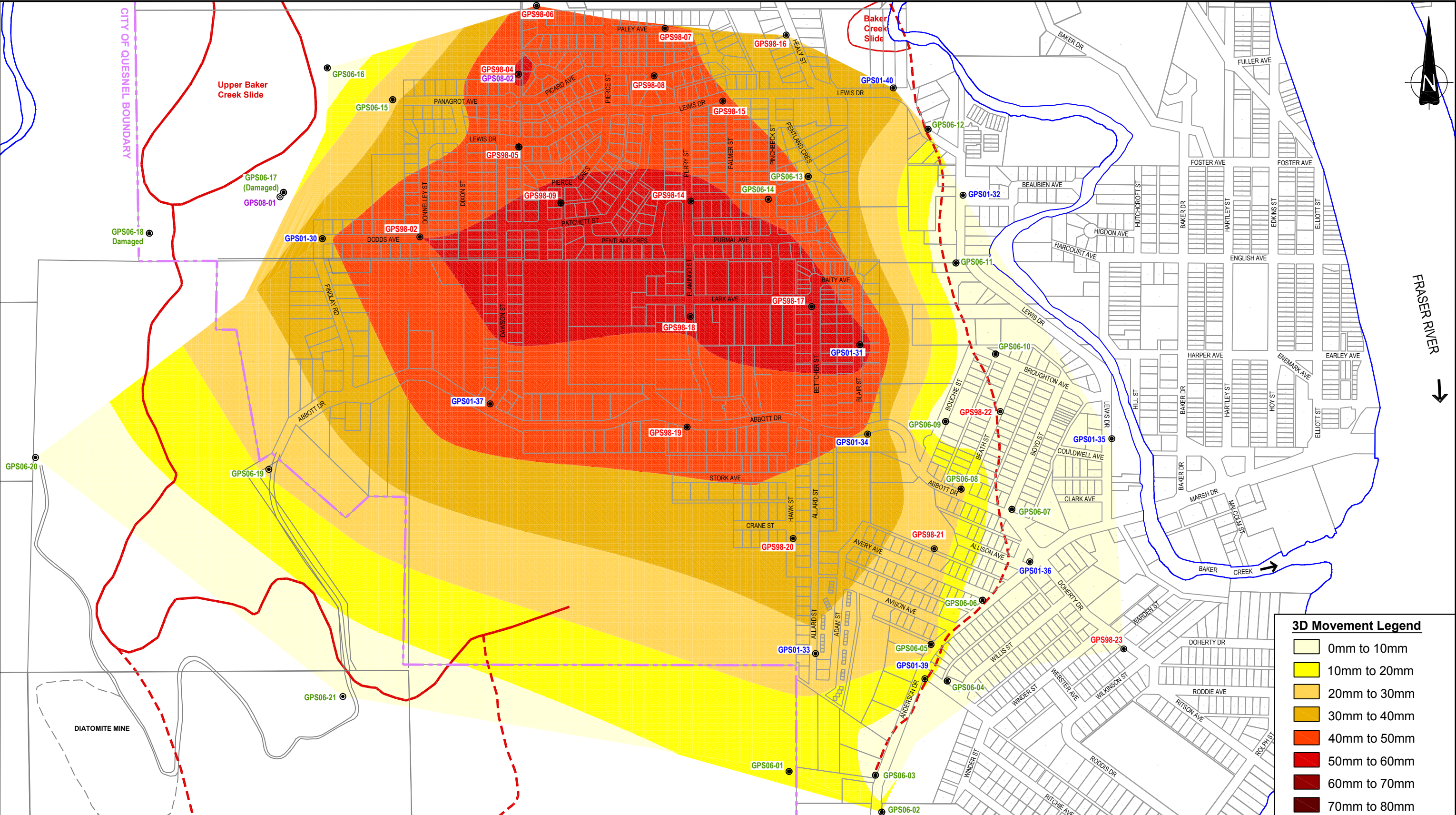
WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE: FEBRUARY 2010

PROJECT NO: KX04397

REV. NO.: A

FIGURE No. FIGURE 9



Note: Ground Movement contours were drawn based from GPS Hub Survey Data supplied by McElhanney Consulting Services Ltd. Contours were generated with Autodesk Civil 3D 2008, SP1. A smoothing feature of natural neighbor was applied to the point interpolation from the GPS Hub centroids.

0m 50 100 150 200 250 300
1 : 7500

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CHK'D BY: N.Polysou

DATUM: NAD83

PROJECTION: UTM Zone 10

SCALE: 1:7500

TITLE

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

PROJECT

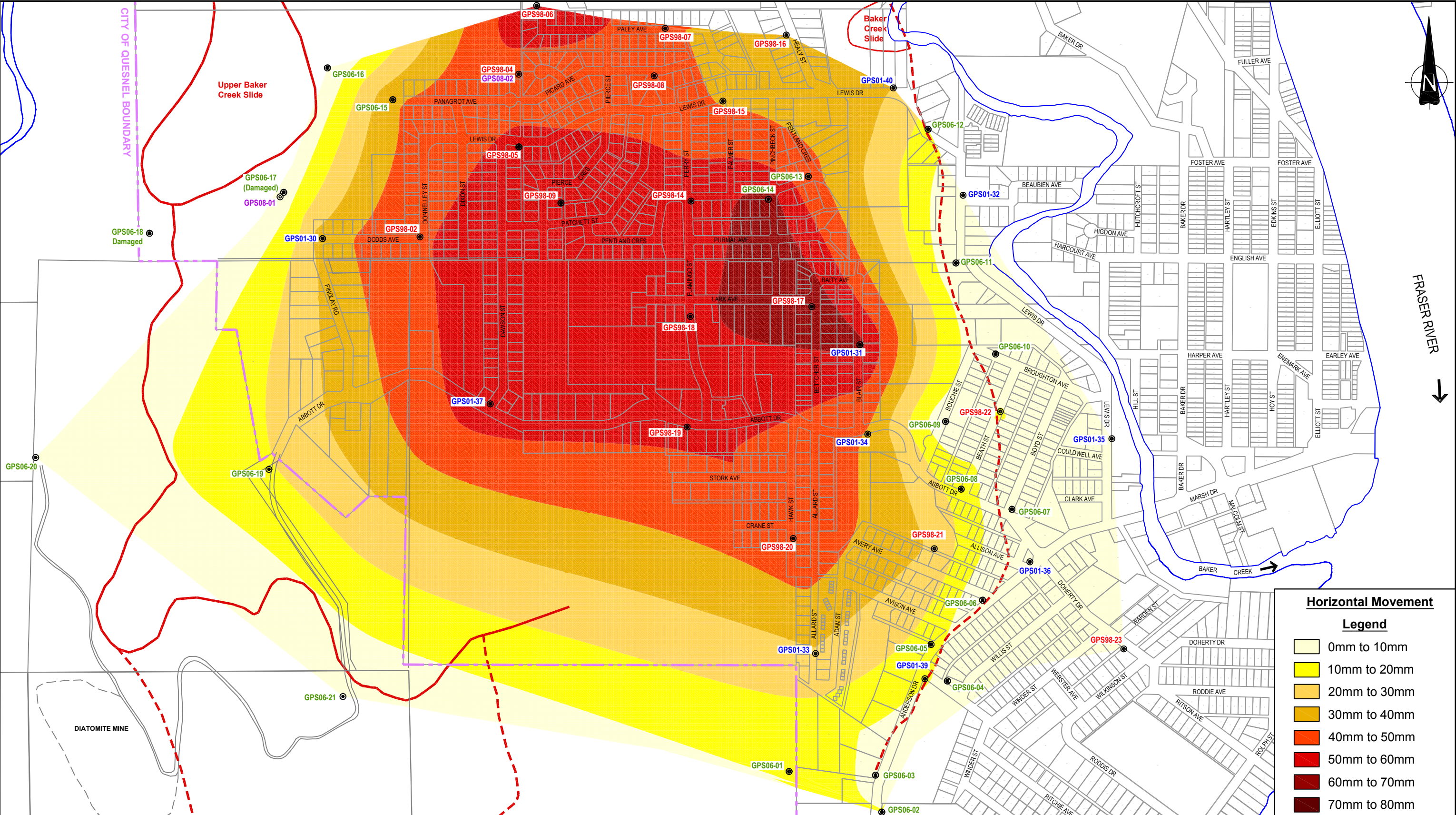
WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE: FEBRUARY 2010

PROJECT NO: KX04397

REV. NO.: A

FIGURE No. FIGURE 10



Note: Ground Movement contours were drawn based from GPS Hub Survey Data supplied by McElhanney Consulting Services Ltd. Contours were generated with Autodesk Civil 3D 2008, SP1. A smoothing feature of natural neighbor was applied to the point interpolation from the GPS Hub centroids.

1 : 7500

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DWN BY: S.Ruiz

CHK'D BY: N.Polysou

DATUM: NAD83

PROJECTION: UTM Zone 10

SCALE: 1:7500

TITLE

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

PROJECT

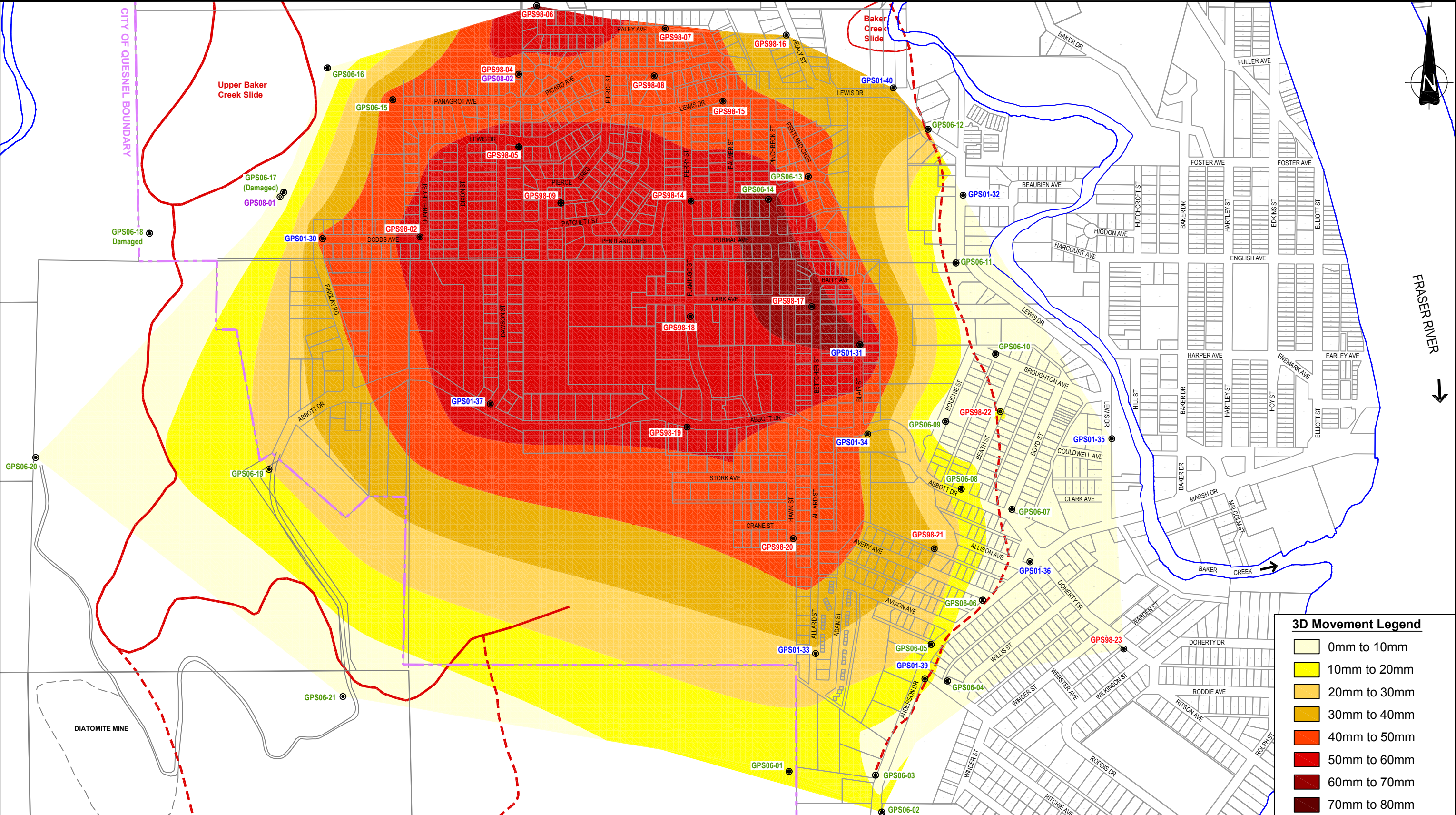
WEST QUESNEL LAND STABILITY PROGRAM
QUESNEL, BC

DATE: FEBRUARY 2010

PROJECT NO: KX04397

REV. NO.: A

FIGURE No. FIGURE 11



Note: Ground Movement contours were drawn based from GPS Hub Survey Data supplied by McElhanney Consulting Services Ltd. Contours were generated with Autodesk Civil 3D 2008, SP1. A smoothing feature of natural neighbor was applied to the point interpolation from the GPS Hub centroids.

0m 50 100 150 200 250 300
1 : 7500

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Land Stability Program

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CITY OF QUESNEL

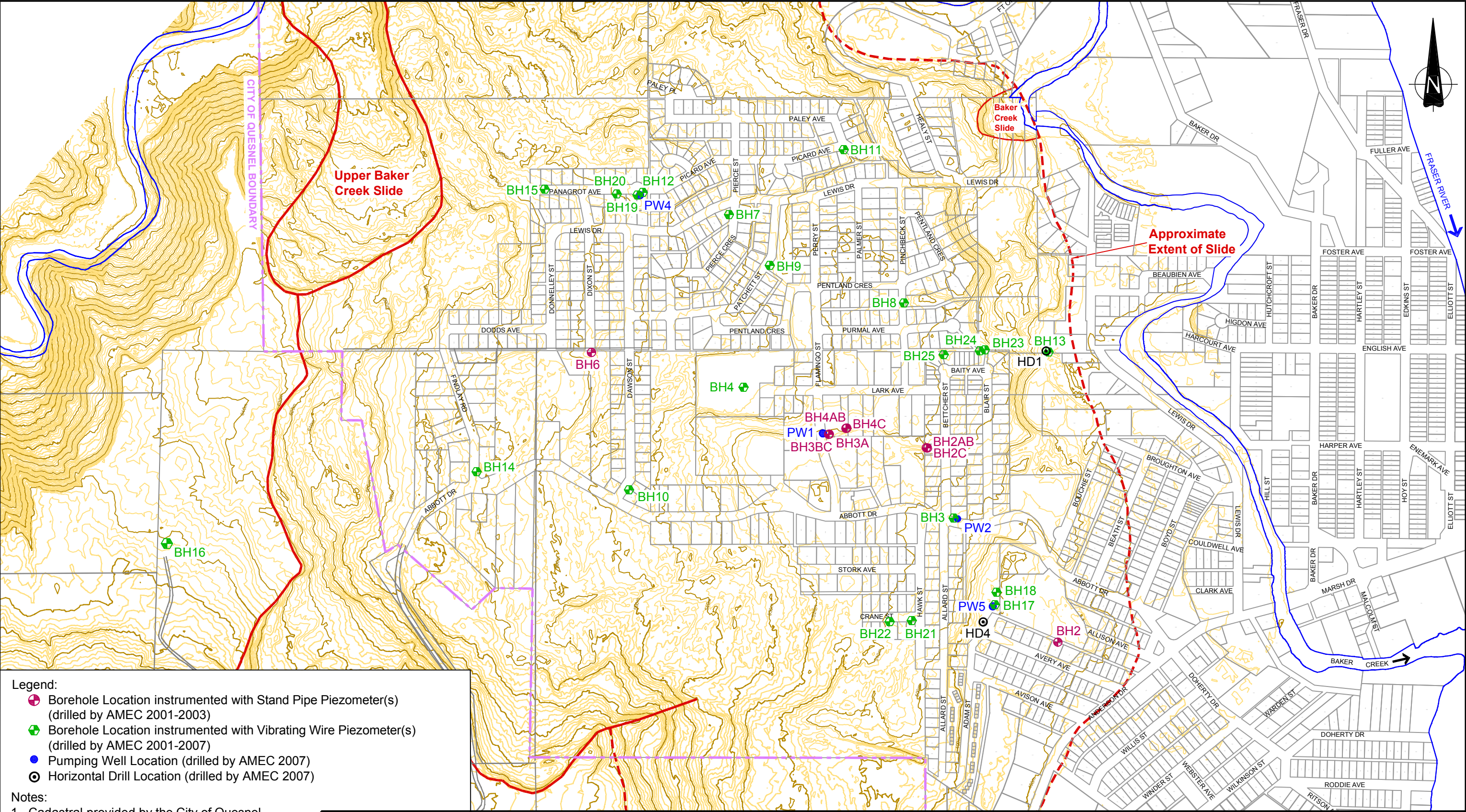
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Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY:	S.Ruiz
CHK'D BY:	N.Polysou
DATUM:	NAD83
PROJECTION:	UTM Zone 10
SCALE:	1:7500

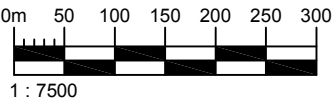
TITLE	ANNUAL 3D MOVEMENT NOVEMBER 2008 TO NOVEMBER 2009 FOR THE 1998, 2001 AND 2006 GPS HUBS
PROJECT	WEST QUESNEL LAND STABILITY PROGRAM QUESNEL, BC

DATE:	FEBRUARY 2010
PROJECT NO:	KX04397
REV. NO.:	A
FIGURE No.	FIGURE 12



- Legend:
- Borehole Location instrumented with Stand Pipe Piezometer(s) (drilled by AMEC 2001-2003)
 - ⊕ Borehole Location instrumented with Vibrating Wire Piezometer(s) (drilled by AMEC 2001-2007)
 - Pumping Well Location (drilled by AMEC 2007)
 - ⊙ Horizontal Drill Location (drilled by AMEC 2007)

- Notes:
- Cadastral provided by the City of Quesnel.
 - This drawing must be read in conjunction with AMEC Earth & Environmental Geotechnical Report, "West Quesnel Land Stability Program, Annual Monitoring Report - 2009".



CLIENT LOGO  West Quesnel Land Stability Program	CLIENT:		DWN BY:	TITLE	SITE PLAN WITH PIEZOMETERS, PUMPING WELLS AND HORIZONTAL DRAINS	DATE:
	CITY OF QUESNEL		S.Ruiz			FEBRUARY 2010
			CHK'D BY:			PROJECT NO:
			S.Kelly			KX04397
			DATUM:			
AMEC Earth & Environmental			NAD83	PROJECT	WEST QUESNEL LAND STABILITY PROGRAM QUESNEL, BC	REV. NO.:
3456 Opie Crescent Prince George, BC, CANADA V2N 2P9 Tel. (250) 564-3243 Fax (250) 562-7045			PROJECTION:			A
			UTM Zone 10			
			SCALE:			
			1:7500			FIGURE 13

Appendix A

GPS Movement Hubs - Summary Table and Survey Data

APPENDIX A - GPS Movement Hubs Status

Hub	Location	Initial Survey Date	Status
98-02	Donnelly/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	Active
98-09	Lane between Patchett/Pierce	September 1998	Active
98-14	Pentland/Flamingo Intersection	September 1998	Active
98-15	Palmer/Lewis Intersection	September 1998	Active
98-16	Healy Road	September 1998	Active
98-17	Bettcher/Lark Intersection	September 1998	Active
98-18	Lark/Flamingo Intersection	September 1998	Active
98-19	Abbott/Flamingo Intersection	September 1998	Active
98-20	Hawk Street @ Crane Ave.	September 1998	Active
98-21	Lane between Avery/Allison	September 1998	Active
98-22	Lane between Beath/Bouchie	September 1998	Active
98-23	Doherty Dr. - BM	September 1998	Active
98-24	Salton Road (Hixon Road)	September 1998	Not Currently Read
98-26	Benchmark by Airport - BM	September 1998	Not Currently Read
98-28	Red Bluff Pump Station - BM	September 1998	Not Currently Read
98-29	Quesnel Hill	September 1998	Not Currently Read
01-30	West End of Dodds Avenue at 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	Active
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	Active - minor disturbance/deterioration
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
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

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	Rate m/year	Time	Northing	Easting	Horizontal	Vertical	Total	Rate
98-02	9/15/1998	5869992.878	531420.902	563.021	9/17/2009	5869992.797	531421.362	562.959	11/23/2009	5869992.810	531421.369	562.947	11.2	-0.068	0.467	0.472	-0.074	0.478	0.043	0.2	0.013	0.007	0.015	-0.012	0.019	0.080
98-04	9/15/1998	5870331.949	531626.829	557.171	6/3/2008	5870332.147	531627.118	557.060	7/29/2008	5870332.153	531627.120	557.048	9.9	0.204	0.291	0.355	-0.123	0.376	0.038	0.2	0.006	0.002	0.006	-0.012	0.013	0.041
98-05	9/15/1998	5870180.442	531627.209	551.978	9/17/2009	5870180.463	531627.632	551.882	11/23/2009	5870180.470	531627.631	551.867	11.2	0.028	0.422	0.423	-0.111	0.437	0.039	0.2	0.007	-0.001	0.007	-0.015	0.017	-0.039
98-06	9/15/1998	5870474.774	531664.168	539.628	9/17/2009	5870475.129	531664.519	539.500	11/23/2009	5870475.157	531664.507	539.459	11.2	0.383	0.339	0.511	-0.169	0.538	0.048	0.2	0.028	-0.012	0.030	-0.041	0.051	0.166
98-07	9/15/1998	5870427.297	531932.241	533.473	9/17/2009	5870427.491	531932.612	533.372	11/23/2009	5870427.506	531932.605	533.360	11.2	0.209	0.364	0.420	-0.113	0.435	0.039	0.2	0.015	-0.007	0.017	-0.012	0.021	0.090
98-08	9/15/1998	5870328.580	531909.295	536.943	9/17/2009	5870328.743	531909.664	536.818	11/23/2009	5870328.753	531909.660	536.808	11.2	0.173	0.365	0.404	-0.135	0.426	0.038	0.2	0.010	-0.004	0.011	-0.010	0.015	0.059
98-09	9/15/1998	5870063.599	531714.863	549.785	9/17/2009	5870063.591	531715.384	549.726	11/23/2009	5870063.603	531715.382	549.725	11.2	0.004	0.519	0.519	-0.060	0.522	0.047	0.2	0.012	-0.002	0.012	-0.001	0.012	-0.066
98-14	9/15/1998	5870067.437	531986.027	531.224	9/17/2009	5870067.411	531986.532	531.170	11/23/2009	5870067.416	531986.525	531.155	11.2	-0.021	0.498	0.498	-0.069	0.503	0.045	0.2	0.005	-0.007	0.009	-0.015	0.017	-0.047
98-15	9/15/1998	5870275.888	532052.513	524.385	9/17/2009	5870275.973	532052.865	524.263	11/23/2009	5870275.985	532052.870	524.251	11.2	0.097	0.357	0.370	-0.134	0.394	0.035	0.2	0.012	0.005	0.013	-0.012	0.018	0.071
98-16	9/15/1998	5870413.504	532184.864	509.104	9/17/2009	5870413.578	532185.112	509.068	11/23/2009	5870413.595	532185.117	509.032	11.2	0.091	0.253	0.269	-0.072	0.278	0.025	0.2	0.017	0.005	0.018	-0.036	0.040	0.097
98-17	9/15/1998	5869847.647	532237.862	519.610	9/17/2009	5869847.595	532238.432	519.567	11/23/2009	5869847.588	532238.433	519.552	11.2	-0.059	0.571	0.574	-0.058	0.577	0.052	0.2	-0.007	0.001	0.007	-0.015	0.017	0.039
98-18	9/15/1998	5869826.923	531984.617	524.147	9/17/2009	5869826.843	531985.137	524.076	11/23/2009	5869826.863	531985.130	524.062	11.2	-0.060	0.513	0.516	-0.085	0.523	0.047	0.2	0.020	-0.007	0.021	-0.014	0.025	-0.116
98-19	9/15/1998	5869596.532	531978.061	517.225	9/17/2009	5869596.435	531978.503	517.260	11/23/2009	5869596.437	531978.497	517.256	11.2	-0.095	0.436	0.446	0.031	0.447	0.040	0.2	0.002	-0.006	0.006	-0.004	0.007	-0.034
98-20	9/15/1998	5869364.259	532199.105	504.356	9/17/2009	5869364.142	532199.509	504.312	11/23/2009	5869364.139	532199.506	504.311	11.2	-0.120	0.401	0.419	-0.045	0.421	0.038	0.2	-0.003	-0.003	0.004	-0.001	0.004	-0.023
98-21	9/15/1998	5869342.996	532493.483	485.474	9/17/2009	5869342.888	532493.721	485.536	11/23/2009	5869342.887	532493.714	485.515	11.2	-0.109	0.231	0.255	0.041	0.258	0.023	0.2	-0.001	-0.007	0.007	-0.021	0.022	-0.039
98-22	9/15/1998	5869628.968	532631.086	478.920	9/17/2009	5869628.963	532631.139	478.930	11/23/2009	5869628.970	532631.140	478.923	11.2	0.002	0.054	0.054	0.003	0.054	0.005	0.2	0.007	0.001	0.007	-0.007	0.010	0.039
98-24	9/15/1998	5878341.399	531399.210	589.609	11/30/2000	5878341.379	531399.224	589.591	5/5/2001	5878341.388	531399.222	589.575	2.6	-0.011	0.012	0.016	-0.034	0.038	0.014	0.4	0.009	-0.002	0.009	-0.016	0.018	-0.022
98-29	9/15/1998	5870484.887	536304.120	575.014	5/5/2001	5870484.884	536304.133	574.998	11/12/2003	5870484.879	536304.132	574.983	5.2	-0.008	0.012	0.014	-0.031	0.034	0.007	2.5	-0.005	-0.001	0.005	-0.015	0.016	0.002
01-30	12/15/2001	5869989.266	531217.807	575.401	9/17/2009	5869989.203	531218.028	575.356	11/23/2009	5869989.213	531218.026	575.351	7.9	-0.053	0.219	0.225	-0.050	0.230	0.029	0.2	0.010	-0.002	0.010	-0.005	0.011	-0.056
01-31	12/15/2001	5869768.124	532338.411	508.144	9/17/2009	5869768.101	532338.778	508.101	11/23/2009	5869768.102	532338.779	508.088	7.9	-0.022	0.368	0.369	-0.056	0.373	0.047	0.2	0.001	0.001	0.001	-0.013	0.013	0.008
01-32	12/15/2001	5870079.631	532553.538	481.549	9/17/2009	5870079.618	532553.542	481.556	11/23/2009	5870079.624	532553.547	481.541	7.9	-0.007	0.009	0.011	-0.008	0.014	0.002	0.2	0.006	0.005	0.008	-0.015	0.017	-0.043
01-33	12/15/2001	5869124.379	532245.960	495.342	9/17/2009	5869124.323	532246.149	495.318	11/23/2009	5869124.321	532246.137	495.310	7.9	-0.058	0.177	0.186	-0.032	0.189	0.024	0.2	-0.002	-0.012	0.012	-0.008	0.014	-0.066
01-34	12/15/2001	5869581.862	532354.652	494.462	9/17/2009	5869581.774	532354.908	494.388	11/23/2009	5869581.782	532354.902	494.386	7.9	-0.080	0.250	0.262	-0.076	0.273	0.034	0.2	0.008	-0.006	0.010	-0.002	0.010	-0.055
01-35	12/15/2001	5869572.261	532863.710	473.090	9/17/2009	5869572.246	532863.720	473.100	11/23/2009	5869572.262	532863.717	473.093	7.9	0.001	0.007	0.007	0.003	0.008	0.001	0.2	0.016	-0.003	0.016	-0.007	0.017	-0.089
01-36	12/15/2001	5869315.625	532692.784	476.837	9/17/2009	5869315.624	532692.792	476.811	11/23/2009	5869315.634	532692.798	476.813	7.9	0.009	0.014	0.017	-0.024	0.029	0.004	0.2	0.010	0.006	0.012	0.002	0.012	0.064
01-37	12/15/2001	5869644.821	531567.709	545.684	9/17/2009	5869644.769	531568.025	545.698	11/23/2009	5869644.790	531568.017	545.666	7													

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	Hor. Rate m/year	Time years	Northing m	Easting m	Horizontal m	Vertical m	Total m	Hor. Rate m/year	
98-23	9/15/1998	5869134.064	532888.607	475.384	9/17/2009	5869134.057	532888.635	475.361	11/23/2009	5869134.069	532888.636	475.365	11.2	0.005	0.029	0.029	-0.019	0.035	0.003	0.2	0.012	0.001	0.012	0.004	0.013	0.066	
98-24	9/15/1998	5878341.399	531399.210	589.609	11/30/2000	5878341.379	531399.224	589.591	5/5/2001	5878341.388	531399.222	589.575	2.6	-0.011	0.012	0.016	-0.034	0.038	0.006	0.4	0.009	-0.002	0.009	-0.016	0.018	-0.022	
98-26	9/15/1998	5873887.634	533765.361	545.429	10/24/2002	5873887.633	533765.364	545.313	11/12/2003	5873887.630	533765.368	545.325	5.2	-0.004	0.007	0.008	-0.104	0.105	0.002	1.1	-0.003	0.004	0.005	0.012	0.013	0.005	
98-28	9/15/1998	5870190.608	537039.418	595.773	11/30/2000	5870190.608	537039.418	595.773	5/5/2001	5870190.608	537039.418	595.773	2.6	0.000	0.000	0.000	0.000	0.000	0.000	0.4	0.000	0.000	0.000	0.000	0.000	0.000	
98-29	9/15/1998	5870484.887	536304.120	575.014	5/5/2001	5870484.884	536304.133	574.998	11/12/2003	5870484.879	536304.132	574.983	5.2	-0.008	0.012	0.014	-0.031	0.034	0.003	2.5	-0.005	-0.001	0.005	-0.015	0.016	0.002	
82C256	12/15/1998	5875411.453	533109.702	542.947	12/15/2001	5875411.453	533109.702	542.946	11/12/2003	5875411.453	533109.702	542.946	4.9	0.000	0.000	0.000	-0.001	0.001	0.000	1.9	0.000	0.000	0.000	0.000	0.000	0.000	
01-38	12/15/2001	5870193.015	537018.228	596.514	9/17/2009	5870193.011	537018.237	596.504	11/23/2009	5870193.022	537018.236	596.505	7.9	0.007	0.008	0.011	-0.009	0.014	0.001	0.2	0.011	-0.001	0.011	0.001	0.011	0.060	
WaterTank	3/10/2006	5872728.745	532867.388	527.263	9/17/2009	5872728.745	532867.388	527.263	11/23/2009	5872728.745	532867.388	527.263	3.7	0.000	0.000	0.000	0.000	0.000	0.000	0.2	0.000	0.000	0.000	0.000	0.000	0.000	
													Average	-0.001	0.008	0.010	-0.025	0.028	0.002	0.861	0.003	0.000	0.005	-0.002	0.009	0.014	
													Standard Deviation	0.006	0.010	0.010	0.035	0.035	0.002	0.898	0.007	0.002	0.005	0.009	0.008	0.031	

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	Hor. Rate m/year	Time years	Northing m	Easting m	Horizontal m	Vertical m	Total m	Hor. Rate m/year	
98-22	9/15/1998	5869628.968	532631.086	478.920	9/17/2009	5869628.963	532631.139	478.930	11/23/2009	5869628.970	532631.140	478.923	11.2	0.002	0.054	0.054	0.003	0.054	0.005	0.2	0.007	0.001	0.007	-0.007	0.010	0.039	
01-32	12/15/2001	5870079.631	532553.538	481.549	9/17/2009	5870079.618	532553.542	481.556	11/23/2009	5870079.624	532553.547	481.541	7.9	-0.007	0.009	0.011	-0.008	0.014	0.001	0.2	0.006	0.005	0.008	-0.015	0.017	-0.043	
01-35	12/15/2001	5869572.261	532863.710	473.090	9/17/2009	5869572.246	532863.720	473.100	11/23/2009	5869572.262	532863.717	473.093	7.9	0.001	0.007	0.007	0.003	0.008	0.001	0.2	0.016	-0.003	0.016	-0.007	0.017	-0.089	
01-36	12/15/2001	5869315.625	532692.784	476.837	9/17/2009	5869315.624	532692.792	476.811	11/23/2009	5869315.634	532692.798	476.813	7.9	0.009	0.014	0.017	-0.024	0.029	0.002	0.2	0.010	0.006	0.012	0.002	0.012	0.064	
06-02	11/10/2006	5868793.977	532384.115	473.102	9/17/2009	5868793.980	532384.121	473.111	11/23/2009	5868794.011	532384.112	473.105	3.0	0.034	-0.003	0.034	0.003	0.034	0.011	0.2	0.031	-0.009	0.032	-0.006	0.033	0.176	
06-03	11/10/2006	5868871.062	532370.952	474.521	9/17/2009	5868871.065	532370.953	474.520	11/23/2009	5868871.067	532370.954	474.513	3.0	0.005	0.002	0.005	-0.008	0.009	0.002	0.2	0.002	0.001	0.002	-0.007	0.007	0.012	
06-04	11/10/2006	5869067.298	532520.728	474.933	9/17/2009	5869067.294	532520.731	474.939	11/23/2009	5869067.301	532520.729	474.926	3.0	0.003	0.001	0.003	-0.007	0.008	0.001	0.2	0.007	-0.002	0.007	-0.013	0.015	-0.040	
06-05	11/10/2006	5869143.444	532486.772	478.133	9/17/2009	5869143.431	532486.805	478.155	11/23/2009	5869143.439	532486.812	478.151	3.0	-0.005	0.040	0.040	0.018	0.044	0.013	0.2	0.008	0.007	0.011	-0.004	0.012	0.058	
06-06	11/10/2006	5869235.696	532594.188	476.641	9/17/2009	5869235.686	532594.198	476.653	11/23/2009	5869235.693	532594.202	476.653	3.0	-0.003	0.014	0.014	0.012	0.018	0.005	0.2	0.007	0.004	0.008	0.000	0.008	0.044	
06-07	11/10/2006	5869425.109	532655.428	477.850	9/17/2009	5869425.088	532655.426	477.851	11/23/2009	5869425.105	532655.421	477.837	3.0	-0.004	-0.007	0.008	-0.013	0.015	0.003	0.2	0.017	-0.005	0.018	-0.014	0.023	-0.097	
06-10	11/10/2006	5869748.671	532621.351	478.410	9/17/2009	5869748.656	532621.349	478.418	11/23/2009	5869748.668	532621.359	478.413	3.0	-0.003	0.008	0.009	0.003	0.009	0.003	0.2	0.012	0.010	0.016	-0.005	0.017	-0.085	
06-11	11/10/2006	5869938.491	532538.683	480.061	9/17/2009	5869938.499	532538.694	480.080	11/23/2009	5869938.499	532538.691	480.065	3.0	0.008	0.008	0.011	0.004	0.012	0.004	0.2	0.000	-0.003	0.003	-0.015	0.015	-0.016	
06-12	11/10/2006	5870217.210	532480.538	484.776	9/17/2009	5870217.220	532480.564	484.835	11/23/2009	5870217.228	532480.565	484.832	3.0	0.018	0.027	0.032	0.056	0.064	0.011	0.2	0.008	0.001	0.008	-0.003	0.009	0.044	
													Average	0.004	0.013	0.019	0.003	0.024	0.005	0.183	0.010	0.001	0.011	-0.007	0.015	0.005	
													Standard Deviation	0.011	0.017	0.016	0.019	0.019	0.004	0.000	0.008	0.005	0.008	0.006	0.007	0.077	

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	Hor. Rate m/year	Time years	Northing m	Easting m	Horizontal m	Vertical m	Total m	Rate m/year	
06-18	11/10/2006	5870000.421	530856.972	632.066	3/18/2008	5870000.410	530856.974	632.052	6/3/2008	5870000.414	530856.980	632.070	1.6	-0.007	0.008	0.011	0.004	0.012	0.007	0.2	0.004	0.006	0.007	0.018	0.019	-0.034	
06-20	11/10/2006	5869533.109	530619.695	661.719	9/17/2009	5869533.112	530619.698	661.710	11/23/2009	5869533.124	530619.693	661.723	3.0	0.015	-0.002	0.015	0.004	0.016	0.005	0.2	0.012	-0.005	0.013	0.013	0.018	0.071	
06-21	11/10/2006	5869034.916	531260.448	620.924	9/17/2009	5869034.907	531260.458	620.926	11/23/2009	5869034.931	531260.454	620.921	3.0	0.015	0.006	0.016	-0.003	0.016	0.005	0.2	0.024	-0.004	0.024	-0.005	0.025	0.133	
													Average	0.008	0.004	0.014	0.002	0.015	0.006	0.193	0.013	-0.001	0.015	0.009	0.021	0.056	
													Standard Deviation	0.013	0.005	0.003	0.004	0.002	0.001	0.016	0.010	0.006	0.009	0.012	0.004	0.084	

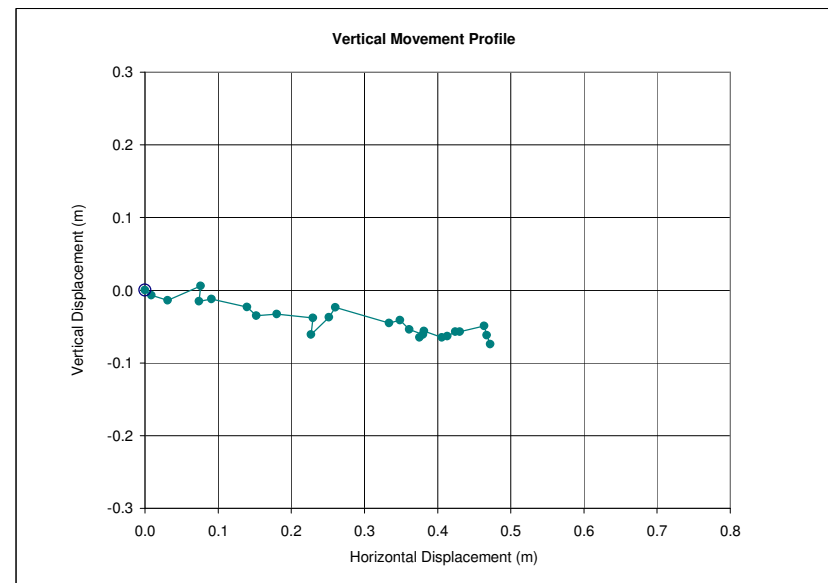
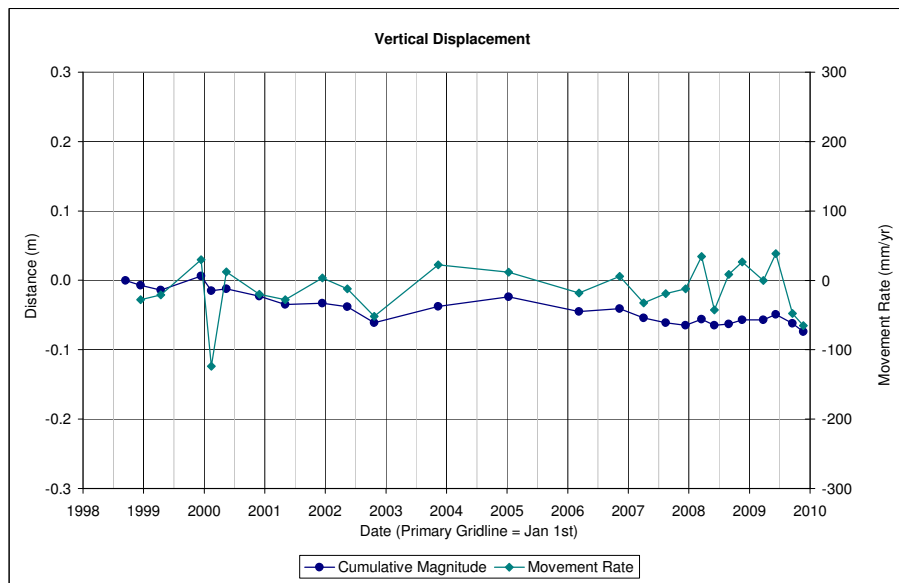
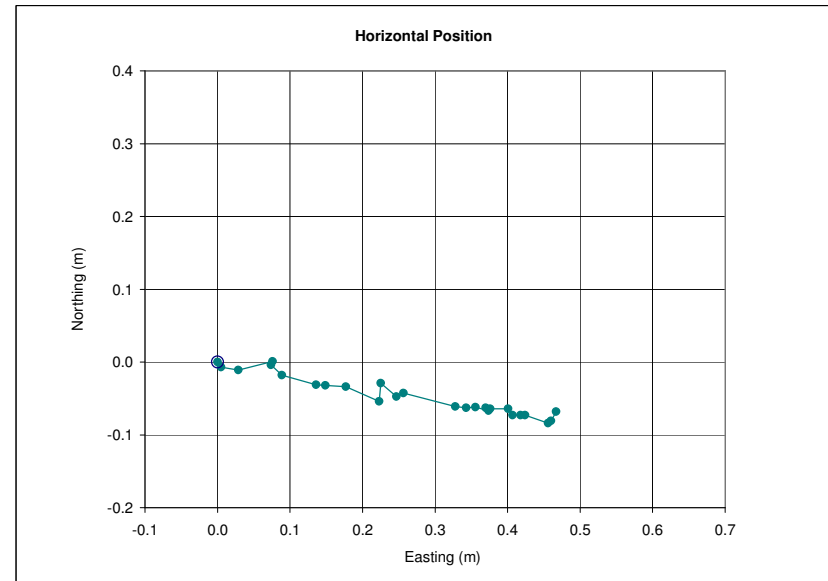
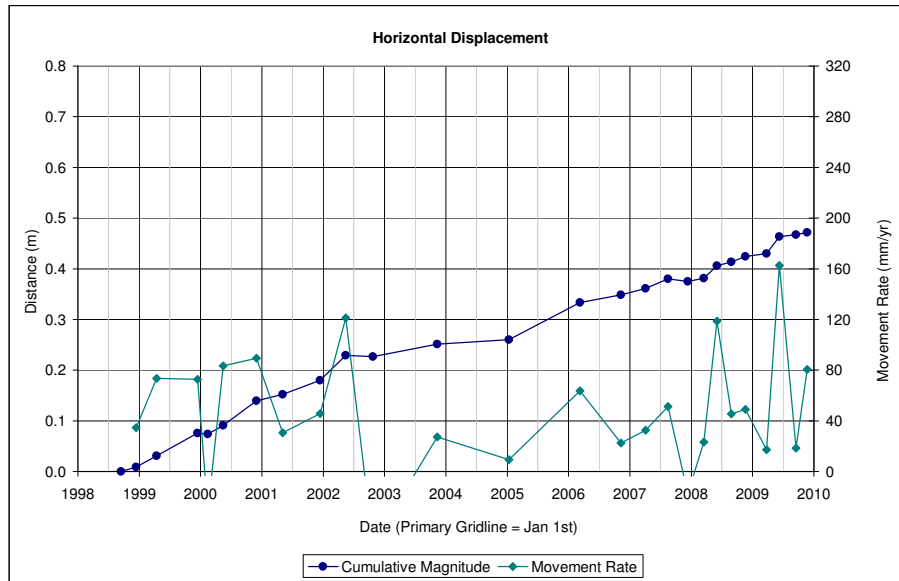


Hubs Within Slide																											
GPS Hub	Initial				Previous				Most Recent				Total Movement							Incremental Movement							
	Date	Northing m	Easting m	Elevation m	Date	Northing m	Easting m	Elevation m	Date	Northing m	Easting m	Elevation m	Time years	Northing m	Easting m	Horizontal m	Vertical m	Total m	Hor. Rate m/year	Time years	Northing m	Easting m	Horizontal m	Vertical m	Total m	Hor. Rate m/year	
98-02	9/15/1998	5869992.878	531420.902	563.021	9/17/2009	5869992.797	531421.362	562.959	11/23/2009	5869992.810	531421.369	562.947	11.2	-0.068	0.467	0.472	-0.074	0.478	0.042	0.2	0.013	0.007	0.015	-0.012	0.019	0.080	
98-04	9/15/1998	5870331.949	531626.829	557.171	6/3/2008	5870332.147	531627.118	557.060	7/29/2008	5870332.153	531627.120	557.048	9.9	0.204	0.291	0.355	-0.123	0.376	0.036	0.2	0.006	0.002	0.006	-0.012	0.013	0.041	
98-05	9/15/1998	5870180.442	531627.209	551.978	9/17/2009	5870180.463	531627.632	551.882	11/23/2009	5870180.470	531627.631	551.867	11.2	0.028	0.422	0.423	-0.111	0.437	0.038	0.2	0.007	-0.001	0.007	-0.015	0.017	-0.039	
98-06	9/15/1998	5870474.774	531664.168	539.628	9/17/2009	5870475.129	531664.519	539.500	11/23/2009	5870475.157	531664.507	539.459	11.2	0.383	0.339	0.511	-0.169	0.538	0.046	0.2	0.028	-0.012	0.030	-0.041	0.051	0.166	
98-07	9/15/1998	5870427.297	531932.241	533.473	9/17/2009	5870427.491	531932.612	533.372	11/23/2009	5870427.506	531932.605	533.360	11.2	0.209	0.364	0.420	-0.113	0.435	0.038	0.2	0.015	-0.007	0.017	-0.012	0.021	0.090	
98-08	9/15/1998	5870328.580	531909.295	536.943	9/17/2009	5870328.743	531909.664	536.818	11/23/2009	5870328.753	531909.660	536.808	11.2	0.173	0.365	0.404	-0.135	0.426	0.036	0.2	0.010	-0.004	0.011	-0.010	0.015	0.059	
98-09	9/15/1998	5870063.599	531714.863	549.785	9/17/2009	5870063.591	531715.384	549.726	11/23/2009	5870063.603	531715.382	549.725	11.2	0.004	0.519	0.519	-0.060	0.522	0.046	0.2	0.012	-0.002	0.012	-0.001	0.012	-0.066	
98-14	9/15/1998	5870067.437	531986.027	531.224	9/17/2009	5870067.411	531986.532	531.170	11/23/2009	5870067.416	531986.525	531.155	11.2	-0.021	0.498	0.498	-0.069	0.503	0.045	0.2	0.005	-0.007	0.009	-0.015	0.017	-0.047	
98-15	9/15/1998	5870275.888	532052.513	524.385	9/17/2009	5870275.973	532052.865	524.263	11/23/2009	5870275.985	532052.870	524.251	11.2	0.097	0.357	0.370	-0.134	0.394	0.033	0.2	0.012	0.005	0.013	-0.012	0.018	0.071	
98-16	9/15/1998	5870413.504	532184.864	509.104	9/17/2009	5870413.578	532185.112	509.068	11/23/2009	5870413.595	532185.117	509.032	11.2	0.091	0.253	0.269	-0.072	0.278	0.024	0.2	0.017	0.005	0.018	-0.036	0.040	0.097	
98-17	9/15/1998	5869847.647	532237.862	519.610	9/17/2009	5869847.595	532238.432	519.567	11/23/2009	5869847.588	532238.433	519.552	11.2	-0.059	0.571	0.574	-0.058	0.577	0.051	0.2	-0.007	0.001	0.007	-0.015	0.017	0.039	
98-18	9/15/1998	5869826.923	531984.617	524.147	9/17/2009	5869826.843	531985.137	524.076	11/23/2009	5869826.863	531985.130	524.062	11.2	-0.060	0.513	0.516	-0.085	0.523	0.046	0.2	0.020	-0.007	0.021	-0.014	0.025	-0.116	
98-19	9/15/1998	5869596.532	531978.061	517.225	9/17/2009	5869596.435	531978.503	517.260	11/23/2009	5869596.437	531978.497	517.256	11.2	-0.095	0.436	0.446	0.031	0.447	0.040	0.2	0.002	-0.006	0.006	-0.004	0.007	-0.034	
98-20	9/15/1998	5869364.259	532199.105	504.356	9/17/2009	5869364.142	532199.509	504.312	11/23/2009	5869364.139	532199.506	504.311	11.2	-0.120	0.401	0.419	-0.045	0.421	0.037	0.2	-0.003	-0.003	0.004	-0.001	0.004	-0.023	
98-21	9/15/1998	5869342.996	532493.483	485.474	9/17/2009	5869342.888	532493.721	485.536	11/23/2009	5869342.887	532493.714	485.515	11.2	-0.109	0.231	0.255	0.041	0.258	0.023	0.2	-0.001	-0.007	0.007	-0.021	0.022	-0.039	
01-30	12/15/2001	5869989.266	531217.807	575.401	9/17/2009	5869989.203	531218.028	575.356	11/23/2009	5869989.213	531218.026	575.351	7.9	-0.053	0.219	0.225	-0.050	0.230	0.028	0.2	0.010	-0.002	0.010	-0.005	0.011	-0.056	
01-31	12/15/2001	5869768.124	532338.411	508.144	9/17/2009	5869768.101	532338.778	508.101	11/23/2009	5869768.102	532338.779	508.088	7.9	-0.022	0.368	0.369	-0.056	0.373	0.046	0.2	0.001	0.001	0.001	-0.013	0.013	0.008	
01-33	12/15/2001	5869124.379	532245.960	495.342	9/17/2009	5869124.323	532246.149	495.318	11/23/2009	5869124.321	532246.137	495.310	7.9	-0.058	0.177	0.186	-0.032	0.189	0.023	0.2	-0.002	-0.012	0.012	-0.008	0.014	-0.066	
01-34	12/15/2001	5869581.862	532354.652	494.462	9/17/2009	5869581.774	532354.908	494.388	11/23/2009	5869581.782	532354.902	494.386	7.9	-0.080	0.250	0.262	-0.076	0.273	0.033	0.2	0.008	-0.006	0.010	-0.002	0.010	-0.055	
01-37	12/15/2001	5869644.821	531567.709	545.684	9/17/2009	5869644.769	531568.025	545.698	11/23/2009	5869644.790	531568.017	545.666	7.9	-0.031	0.308	0.310	-0.018	0.311	0.039	0.2	0.021	-0.008	0.022	-0.032	0.039	-0.123	
01-39	12/15/2001	5869071.953	532473.937	476.875	9/17/2009	5869071.875	532474.025	476.887	11/23/2009	5869071.887	532474.020	476.882	7.9	-0.066	0.083	0.106	0.007	0.106	0.013	0.2	0.012	-0.005	0.013	-0.005	0.014	-0.071	
01-40	12/15/2001	5870303.346	532408.207	493.536	9/17/2009	5870303.370	532408.354	493.649	11/23/2009	5870303.380	532408.357	493.643	7.9	0.034	0.150	0.154	0.107	0.188	0.019	0.2	0.010	0.003	0.010	-0.006	0.012	0.057	
06-01	11/10/2006	5868878.710	532190.793	487.817	6/3/2008	5868878.710	532190.800	487.847	8/29/2008	5868878.670	532190.776	487.819	1.8	-0.040	-0.017	0.043	0.002	0.043	0.024	0.2	-0.040	-0.024	0.047	-0.028	0.055	0.196	
06-08	11/10/2006	5869467.088	532549.595	480.412	9/17/2009	5869467.066	532549.648	480.433	11/23/2009	5869467.073	532549.639	480.426	3.0	-0.015	0.044	0.046	0.014	0.048	0.015	0.2	0.007	-0.009	0.011	-0.007	0.013	-0.062	
06-09	11/10/2006	5869608.045	532517.087	491.073	9/17/2009	5869608.053	532517.121	491.063	11/23/2009	5869608.060	532517.123	491.072	3.0	0.015	0.036	0.039	-0.001	0.039	0.013	0.2	0.007	0.002	0.007	0.009	0.011	0.040	
06-13	11/10/2006	5870118.621	532230.725	527.301	9/17/2009	5870118.639	532230.820	527.280	11/23/2009	5870118.653	532230.824	527.274	3.0	0.032	0.099	0.104	-0.027	0.107	0.034	0.2	0.014	0.004	0.015	-0.006	0.016	0.079	
06-14	11/10/2006	5870071.251	532147.507	527.150	9/17/2009	5870071.249	532147.629	527.107	11/23/2009	5870071.282	532147.637	527.121	3.0	0.031	0.130	0.134	-0.029	0.137	0.044	0.2	0.033	0.008	0.034	0.014	0.037	0.185	
06-15	11/10/2006	5870278.754	531364.331	568.367	9/17/2009	5870278.775	531364.412	568.319	11/23/2009	5870278.794	531364.410	568.310	3.0	0.040	0.079	0.089	-0.057	0.106	0.029	0.2	0.019	-0.002	0.019	-0.009	0.021	0.104	
06-16	11/10/2006	5870345.023	531228.061	572.222	9/17/2009	5870345.028	531228.063	572.215	11/23/2009	5870345.039	531228.067	572.174	3.0	0.016	0.006	0.017	-0.048	0.051	0.006	0.2	0.011	0.004	0.012	-0.041	0.043	0.064	
06-17	11/10/2006	5870085.686	531136.829	595.126	12/13/2007	5870085.709	531136.933	595.049	3/18/2008	5870085.723	531136.990	595.109	1.4	0.037	0.161	0.165	-0.017	0.166	0.122	0.3	0.014	0.057	0.059	0.060	0.084	0.223	
06-19	11/10/2006	5869508.279	531106.114	585.415	9/17/2009	5869508.287	531106.150	585.391	11/23/2009	5869508.294	531106.148	585.373	3.0	0.015	0.034	0.037	-0.042	0.056	0.012	0.2	0.007	-0.002	0.007	-0.018	0.019	0.040	
08-01	6/3/2008	5870076.380	531129.361	595.426	9/17/2009	5870076.368	531129.371	595.414	11/23/2009	5870076.375	531129.365	595.409	1.5	-0.005	0.004	0.006	-0.017	0.018	0.004	0.2	0.007	-0.006	0.009	-0.005	0.010	-0.050	
08-02	8/29/2008	5870332.611	531627.128	5575																							

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Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
9/15/1998	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		
12/15/1998	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
4/15/1999	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
12/15/1999	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
2/15/2000	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
5/15/2000	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
11/30/2000	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
5/5/2001	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
12/15/2001	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
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	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
9/17/2009	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
11/23/2009	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
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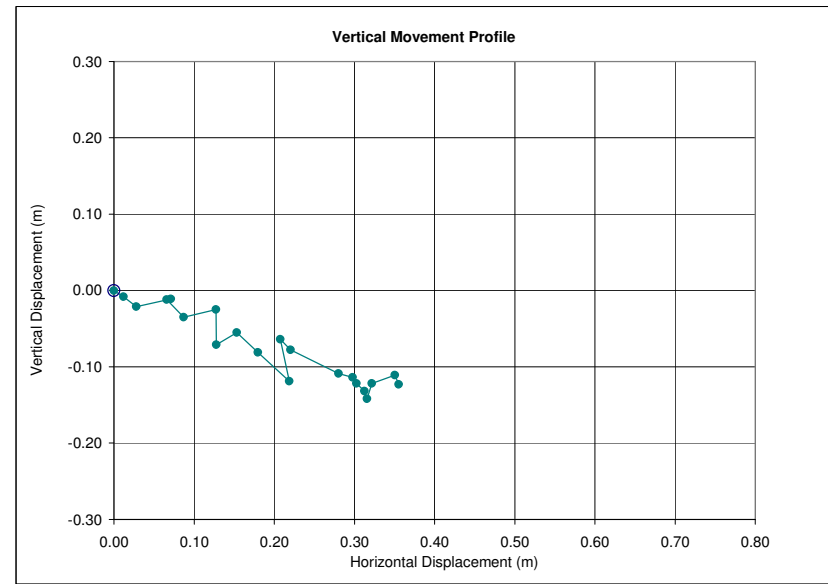
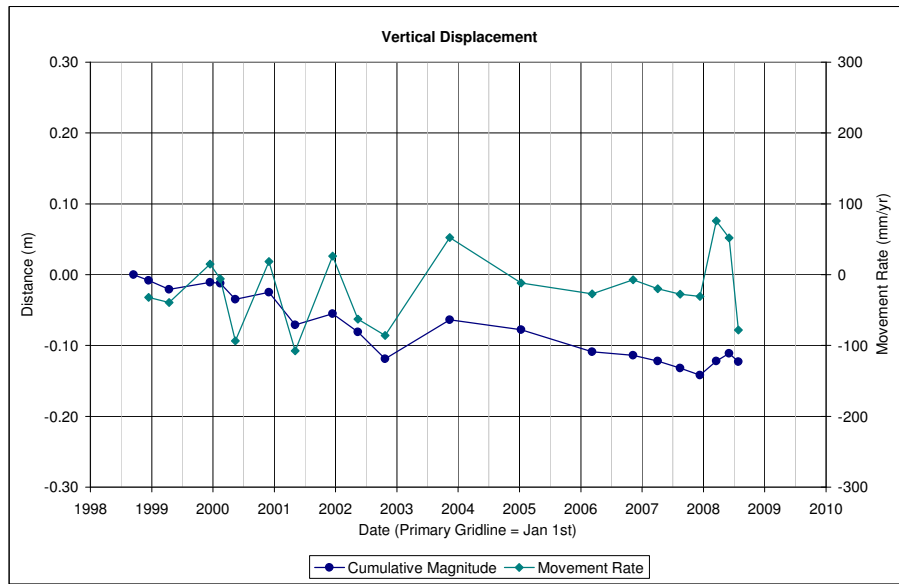
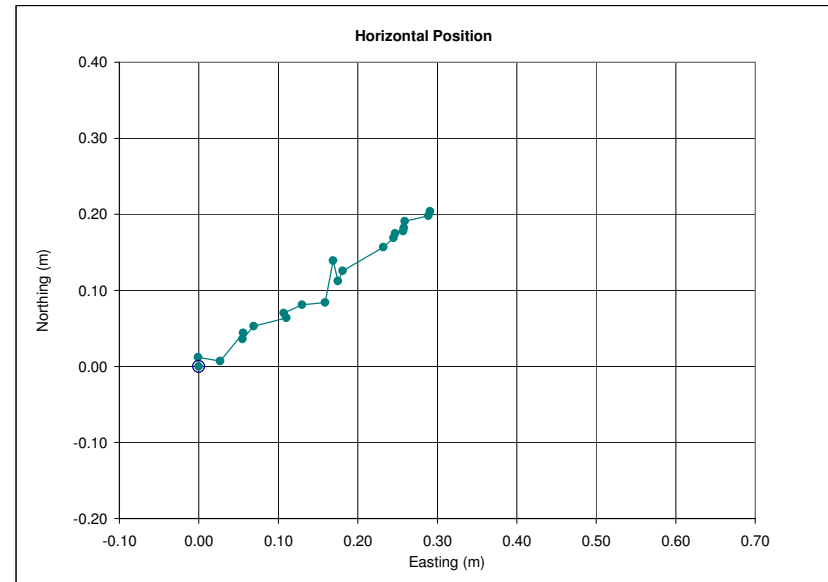
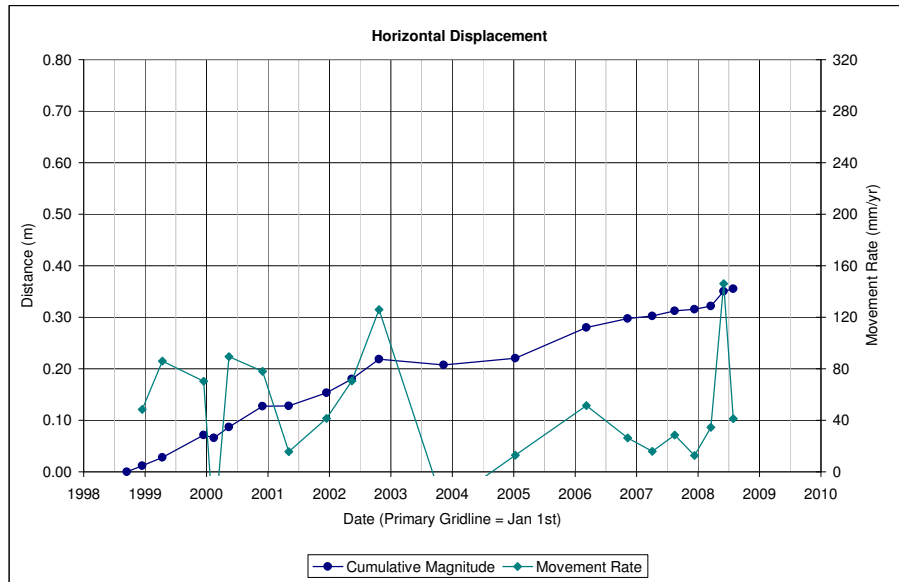
Displacement Graphs - Hub 98-02
Donnelly/Dodds Intersection



amec

Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
9/15/1998	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		
12/15/1998	5870331.961	531626.828	557.163	0.25	0.012	-0.001	0.012	-0.008	355.2	-33.6	0.048	-0.032	0.25	0.012	-0.001	0.012	-0.008	355.2	-33.6	48.332	-32.110
4/15/1999	5870331.956	531626.856	557.150	0.58	0.007	0.027	0.028	-0.021	75.5	-37.0	0.048	-0.036	0.33	-0.005	0.028	0.028	-0.013	100.1	-24.6	85.858	-39.242
12/15/1999	5870331.993	531626.885	557.160	1.25	0.044	0.056	0.071	-0.011	51.8	-8.8	0.057	-0.009	0.67	0.037	0.029	0.047	0.010	38.1	12.0	70.371	14.969
2/15/2000	5870331.985	531626.884	557.159	1.42	0.036	0.055	0.066	-0.012	56.8	-10.3	0.046	-0.008	0.17	-0.008	-0.001	0.008	-0.001	187.1	-7.1	-47.496	-5.891
5/15/2000	5870332.002	531626.898	557.136	1.66	0.053	0.069	0.087	-0.035	52.5	-21.9	0.052	-0.021	0.25	0.017	0.014	0.022	-0.023	39.5	-46.2	89.376	-93.342
11/30/2000	5870332.013	531626.939	557.146	2.21	0.064	0.110	0.127	-0.025	59.8	-11.1	0.058	-0.011	0.54	0.011	0.041	0.042	0.010	75.0	13.3	77.914	18.354
5/5/2001	5870332.019	531626.936	557.100	2.64	0.070	0.107	0.128	-0.071	56.8	-29.0	0.048	-0.027	0.43	0.006	-0.003	0.007	-0.046	333.4	-81.7	15.706	-107.702
12/15/2001	5870332.030	531626.959	557.116	3.25	0.081	0.130	0.153	-0.055	58.1	-19.8	0.047	-0.017	0.61	0.011	0.023	0.025	0.016	64.4	32.1	41.572	26.089
5/15/2002	5870332.033	531626.988	557.090	3.66	0.084	0.159	0.180	-0.081	62.2	-24.2	0.049	-0.022	0.41	0.003	0.029	0.029	-0.026	84.1	-41.7	70.522	-62.891
10/24/2002	5870332.088	531626.998	557.052	4.11	0.139	0.169	0.219	-0.119	50.6	-28.5	0.053	-0.029	0.44	0.055	0.010	0.056	-0.038	10.3	-34.2	126.038	-85.676
11/12/2003	5870332.061	531627.004	557.107	5.16	0.112	0.175	0.208	-0.064	57.4	-17.1	0.040	-0.012	1.05	-0.027	0.006	0.028	0.055	167.8	63.4	-26.278	52.381
1/11/2005	5870332.075	531627.010	557.093	6.32	0.126	0.181	0.221	-0.078	55.3	-19.4	0.035	-0.012	1.17	0.014	0.006	0.015	-0.014	24.9	-42.4	12.947	-11.806
3/10/2006	5870332.106	531627.061	557.062	7.48	0.157	0.232	0.280	-0.109	55.9	-21.3	0.037	-0.015	1.16	0.031	0.051	0.060	-0.031	58.4	-27.7	51.522	-27.027
11/10/2006	5870332.118	531627.074	557.057	8.15	0.169	0.245	0.298	-0.114	55.4	-21.0	0.037	-0.014	0.67	0.012	0.013	0.018	-0.005	47.3	-15.8	26.375	-7.454
4/5/2007	5870332.124	531627.076	557.049	8.55	0.175	0.247	0.303	-0.122	54.7	-22.0	0.035	-0.014	0.40	0.006	0.002	0.006	-0.008	18.4	-51.7	15.822	-20.014
8/16/2007	5870332.127	531627.086	55																		

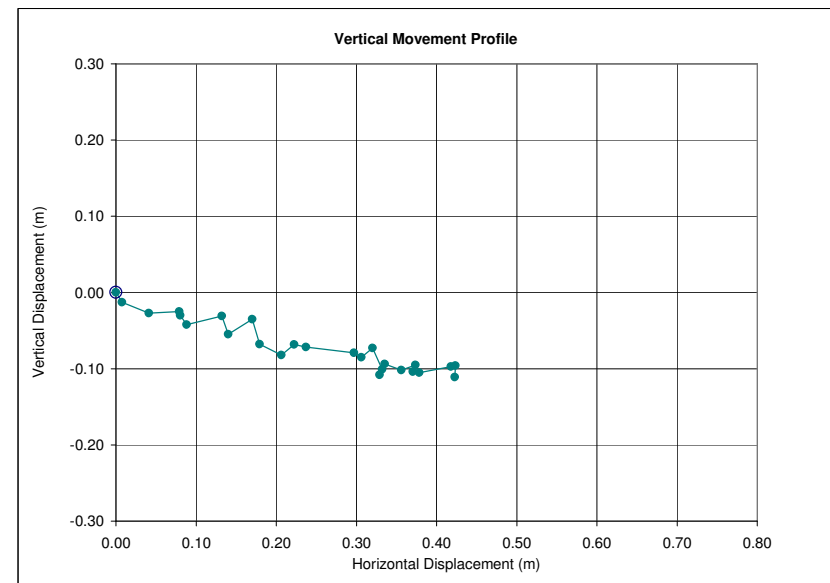
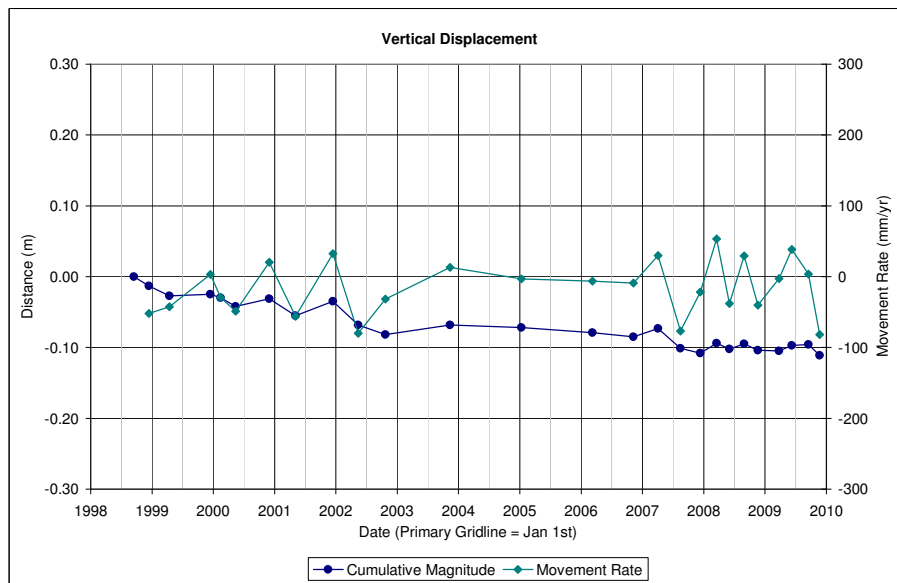
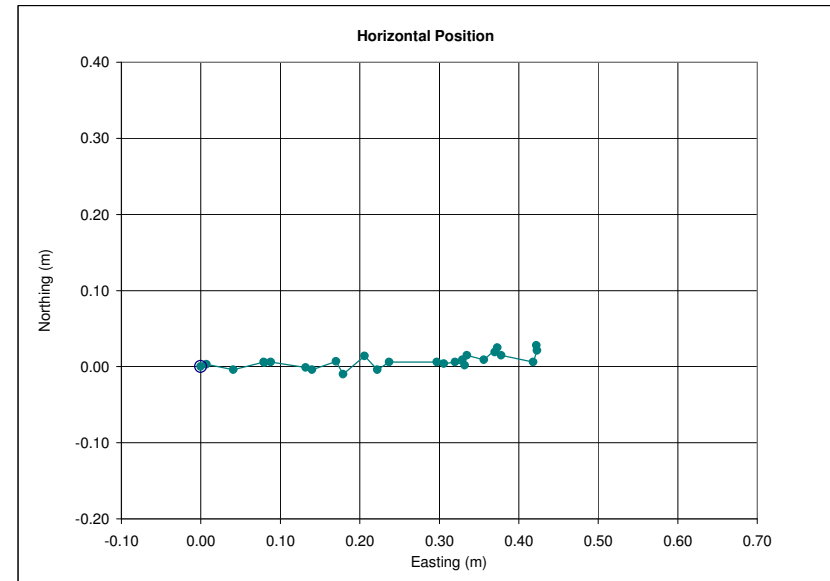
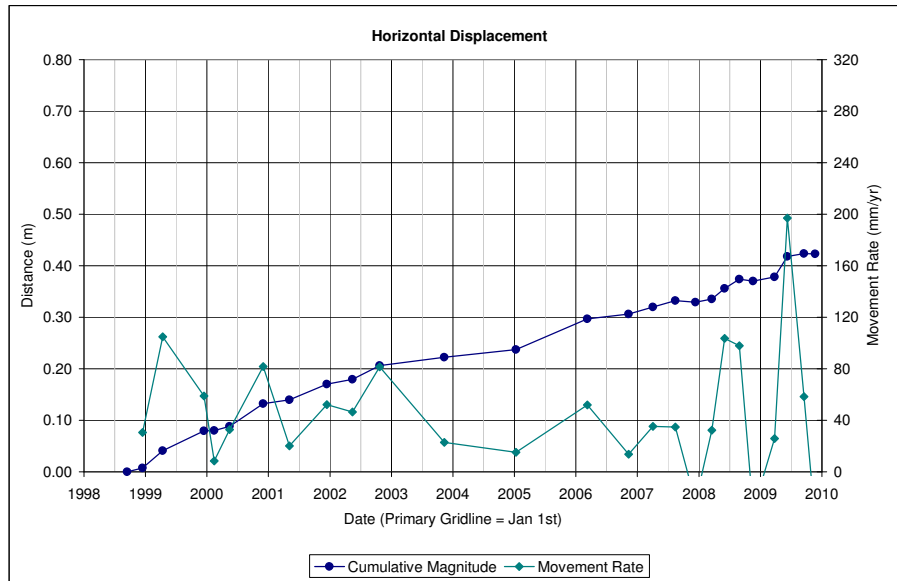
Displacement Graphs - Hub 98-04
Picard Place (Lane)



amec

Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
9/15/1998	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		
12/15/1998	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
4/15/1999	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
12/15/1999	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
2/15/2000	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
5/15/2000	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
11/30/2000	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
5/5/2001	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
12/15/2001	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
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	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
9/17/2009	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
11/23/2009	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

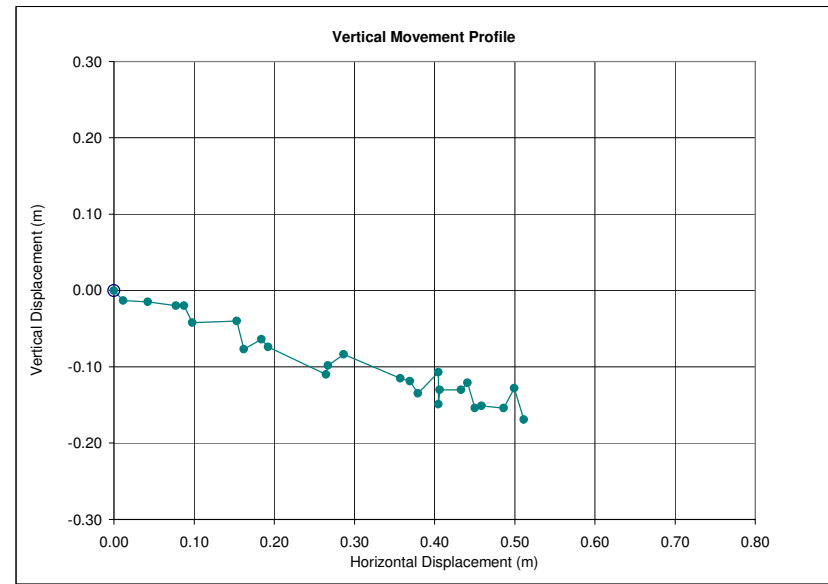
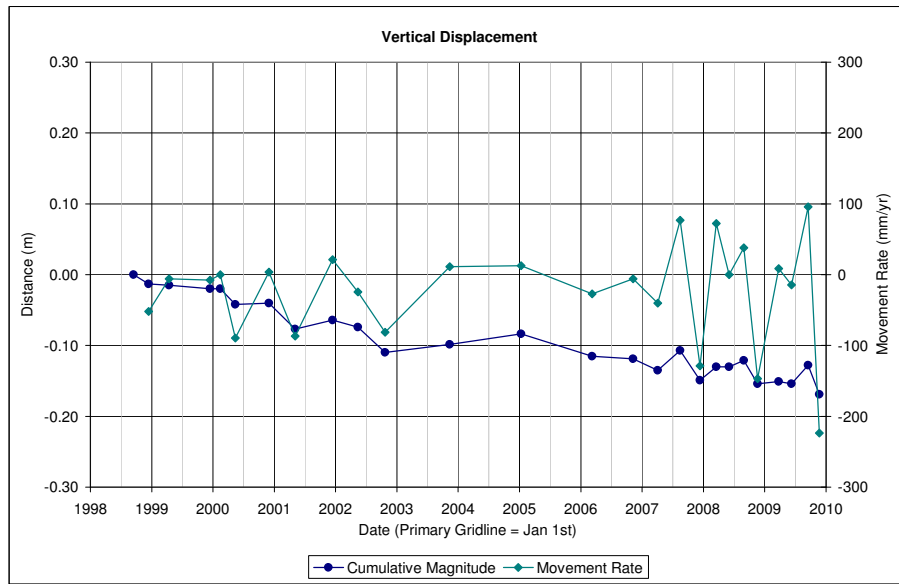
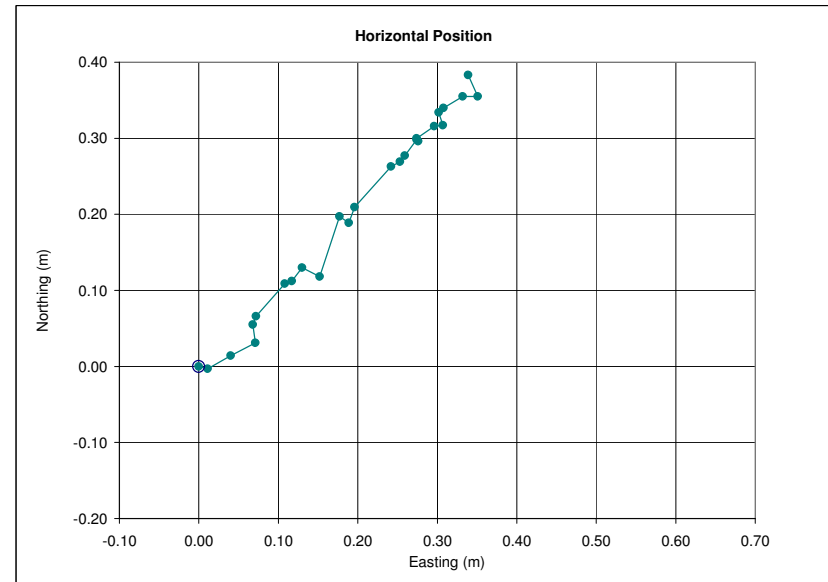
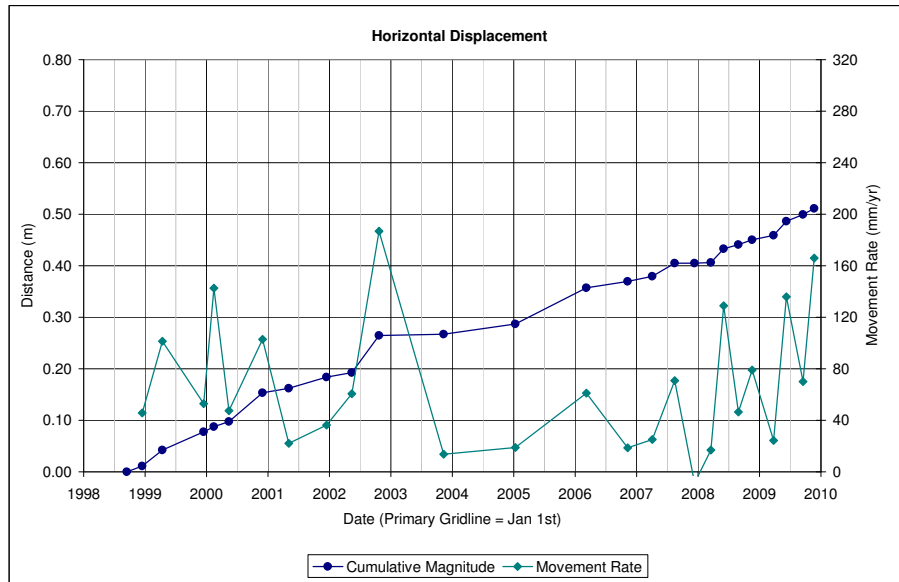
Displacement Graphs - Hub 98-05
East of Dawson/Lewis Intersection



amec

Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
9/15/1998	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		
12/15/1998	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
4/15/1999	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
12/15/1999	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
2/15/2000	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
5/15/2000	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
11/30/2000	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
5/5/2001	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
12/15/2001	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
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	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
9/17/2009	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
11/23/2009	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

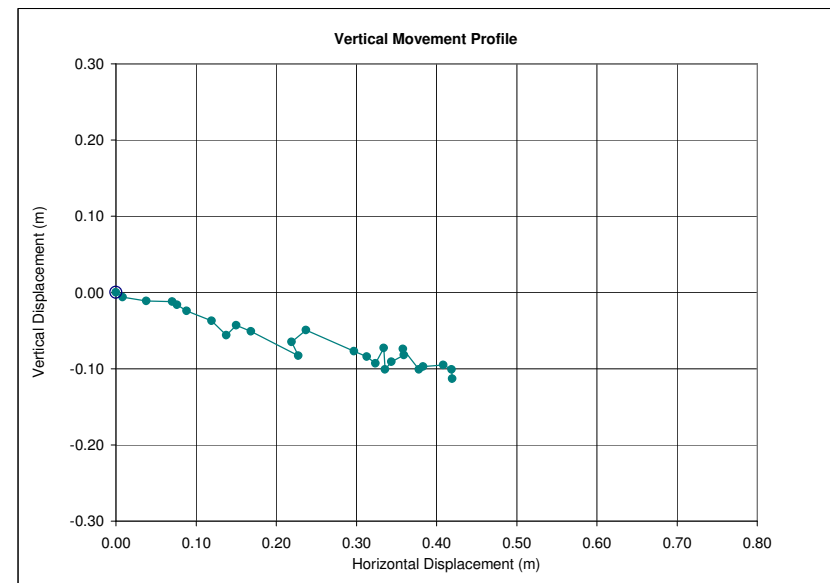
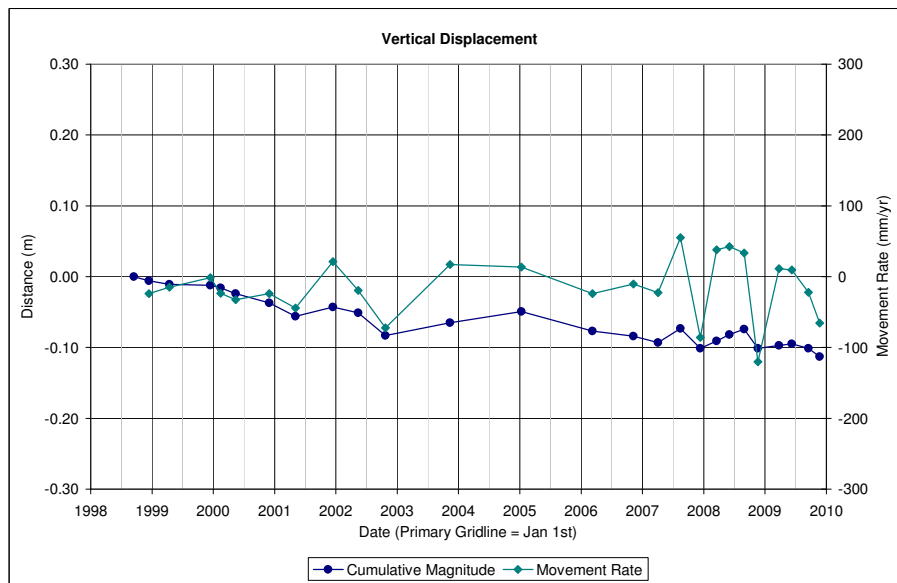
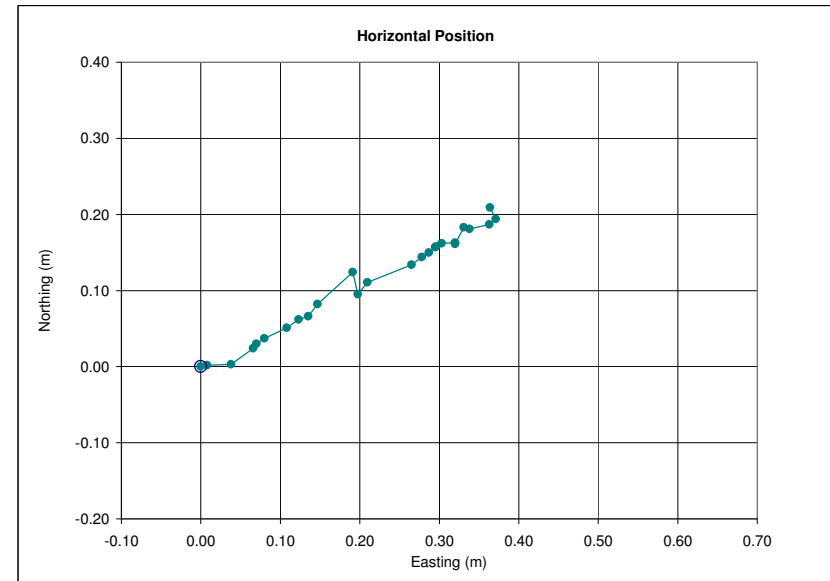
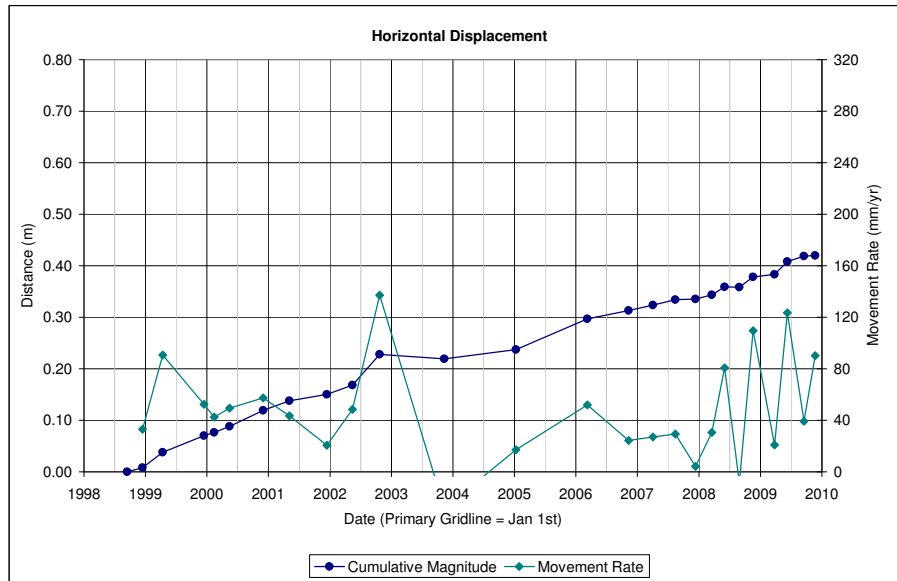
Displacement Graphs - Hub 98-06
Paley West



amec

Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
9/15/1998	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		
12/15/1998	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
4/15/1999	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
12/15/1999	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
2/15/2000	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
5/15/2000	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
11/30/2000	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
5/5/2001	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
12/15/2001	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
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	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
9/17/2009	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
11/23/2009	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

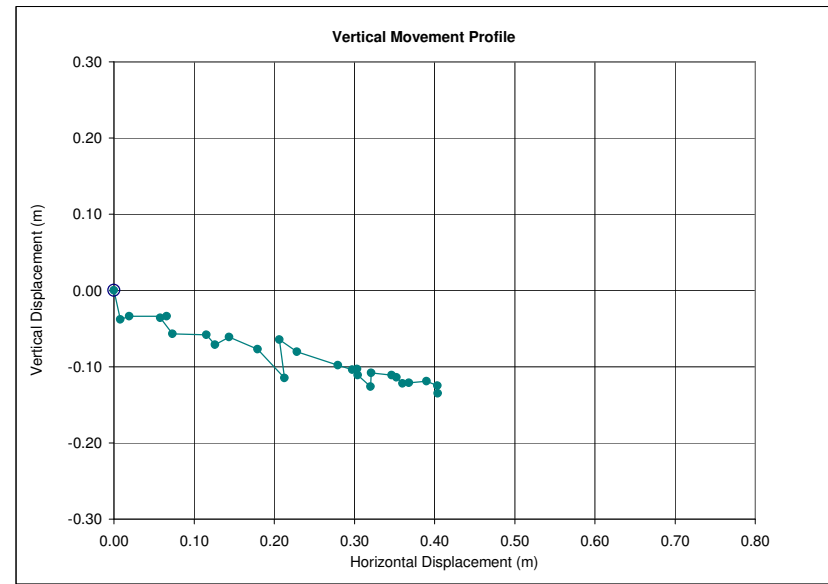
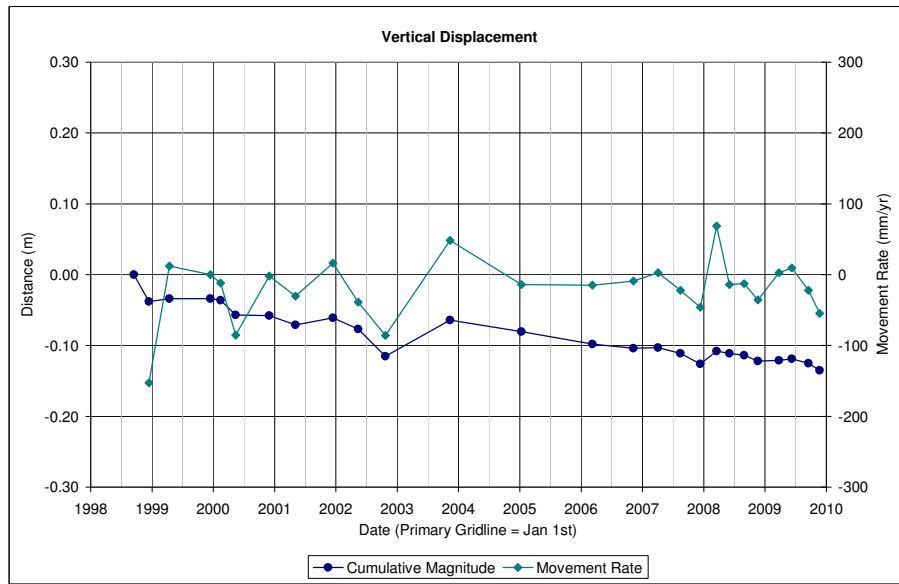
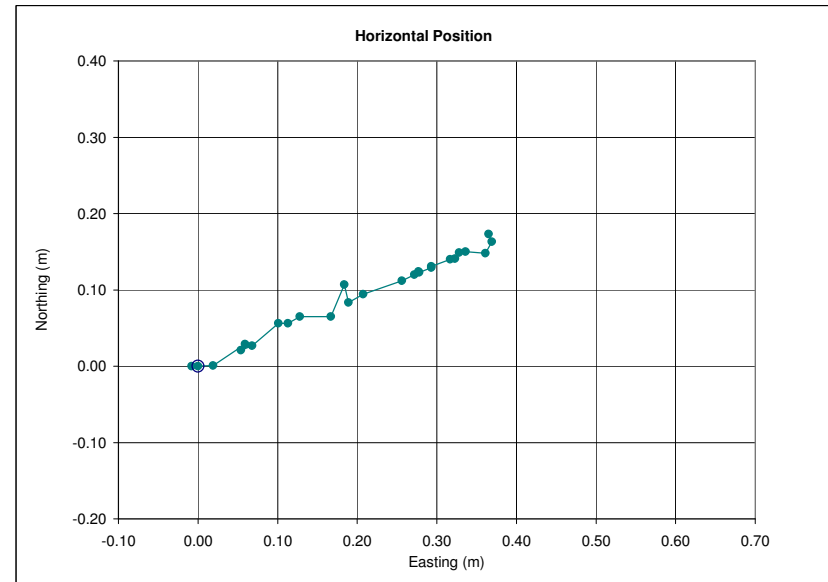
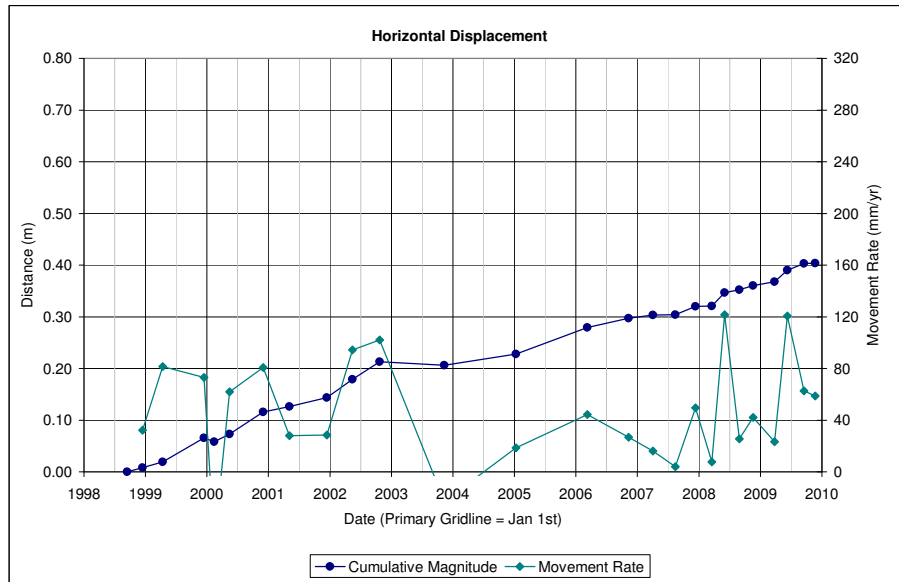
Displacement Graphs - Hub 98-07 Paley East



amec

Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
9/15/1998	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		
12/15/1998	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
4/15/1999	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
12/15/1999	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
2/15/2000	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
5/15/2000	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
11/30/2000	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
5/5/2001	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
12/15/2001	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
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	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
9/17/2009	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
11/23/2009	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

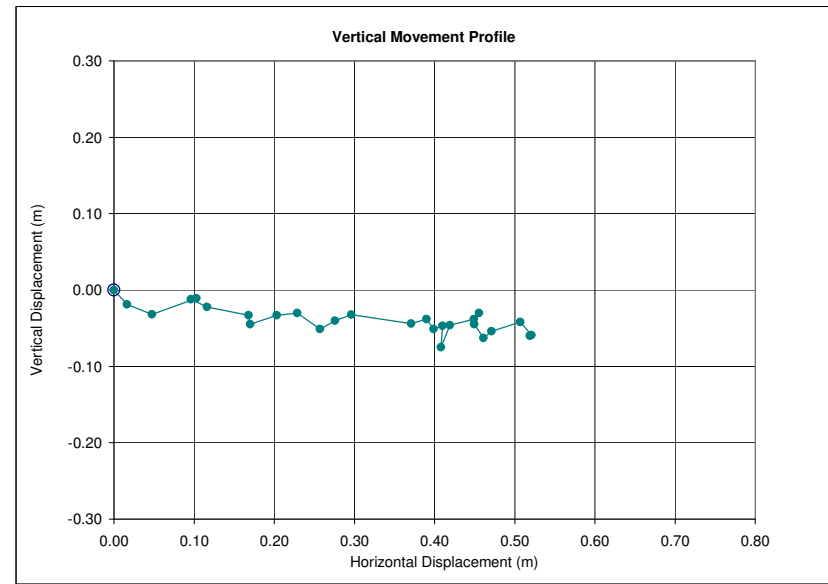
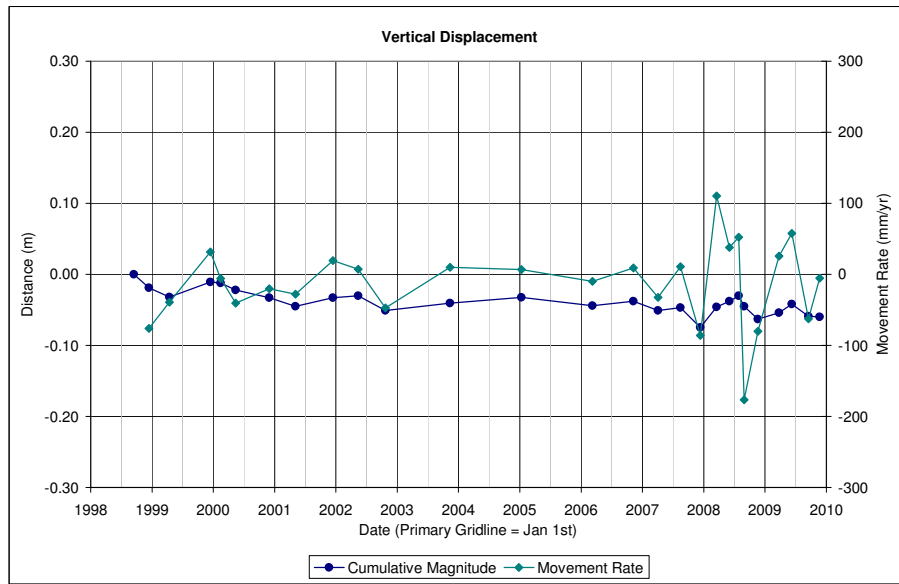
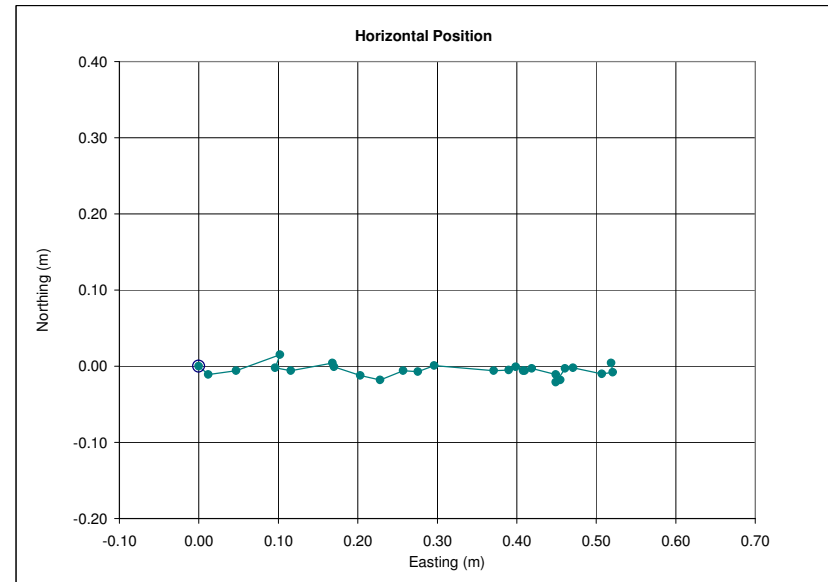
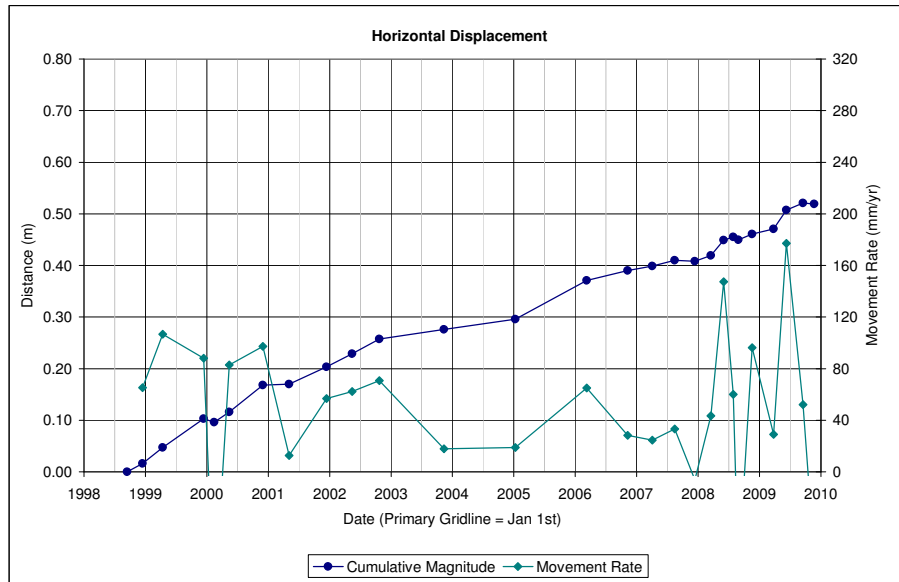
Displacement Graphs - Hub 98-08
Picard Avenue



amec

Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
9/15/1998	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		
12/15/1998	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
4/15/1999	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
12/15/1999	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
2/15/2000	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
5/15/2000	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
11/30/2000	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
5/5/2001	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
12/15/2001	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
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
7/29/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	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
9/17/2009	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
11/23/2009	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
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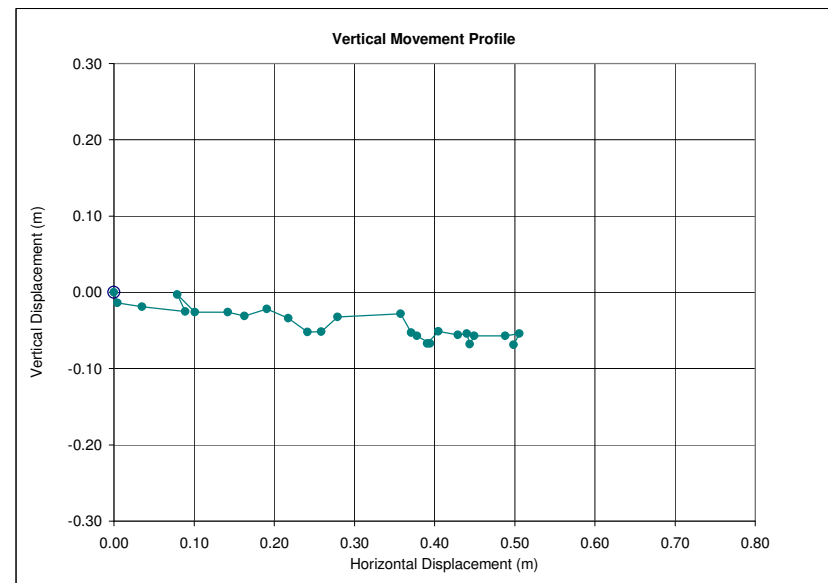
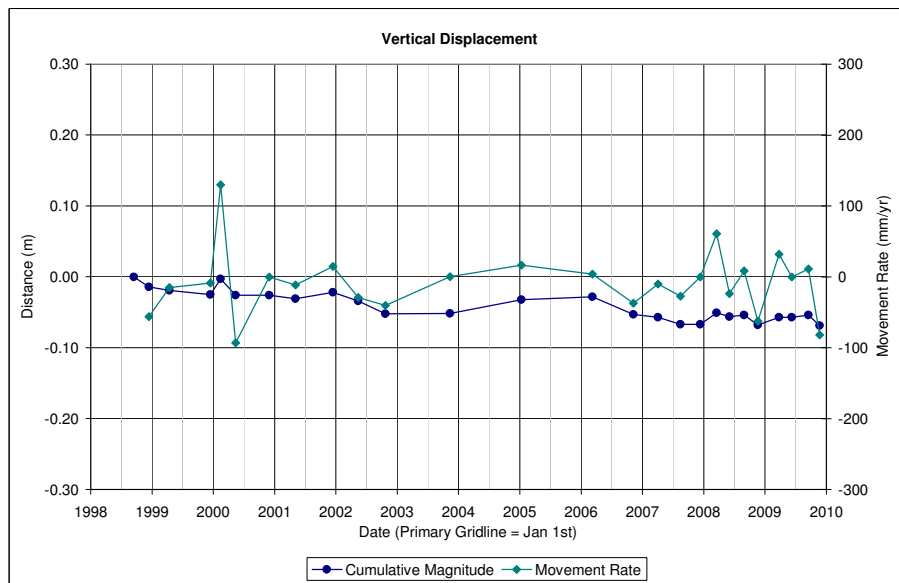
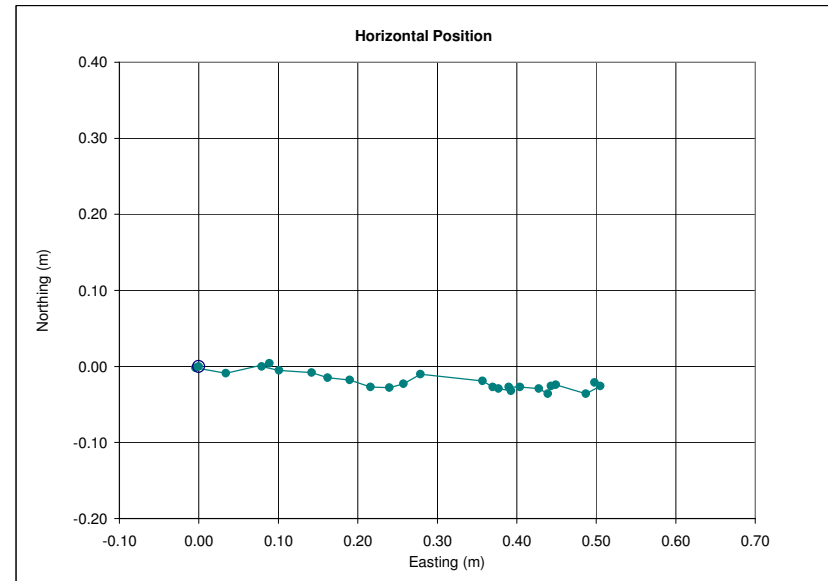
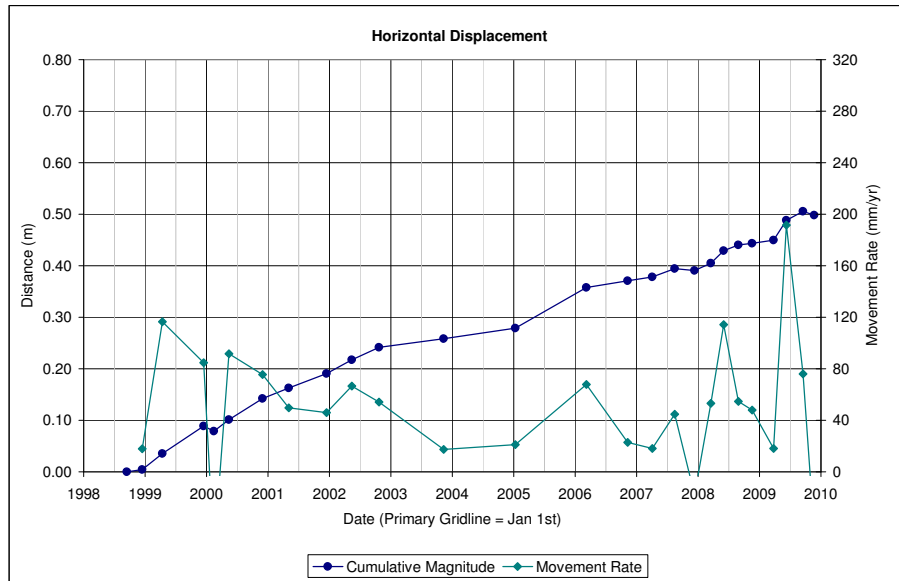
Displacement Graphs - Hub 98-09
Lane between Patchett/Pierce



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Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
9/15/1998	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		
12/15/1998	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
4/15/1999	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
12/15/1999	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
2/15/2000	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
5/15/2000	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
11/30/2000	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
5/5/2001	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
12/15/2001	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
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	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
9/17/2009	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
11/23/2009	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

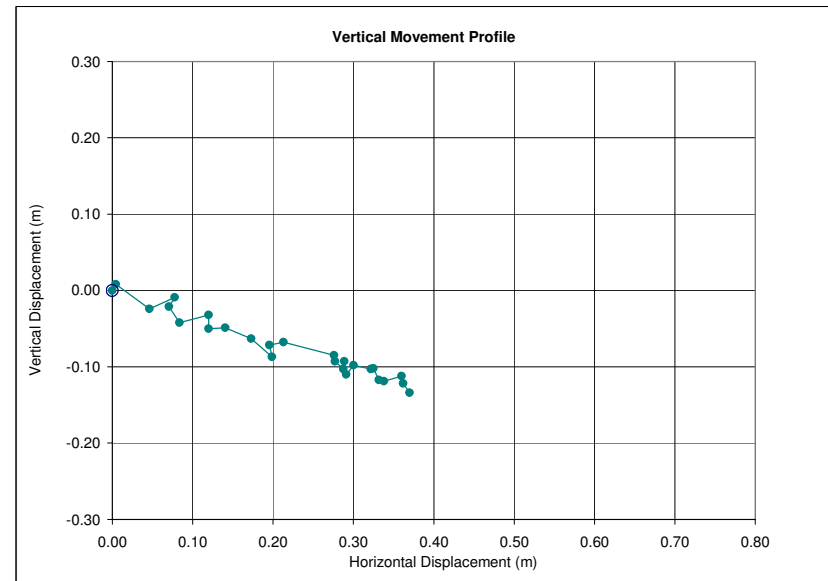
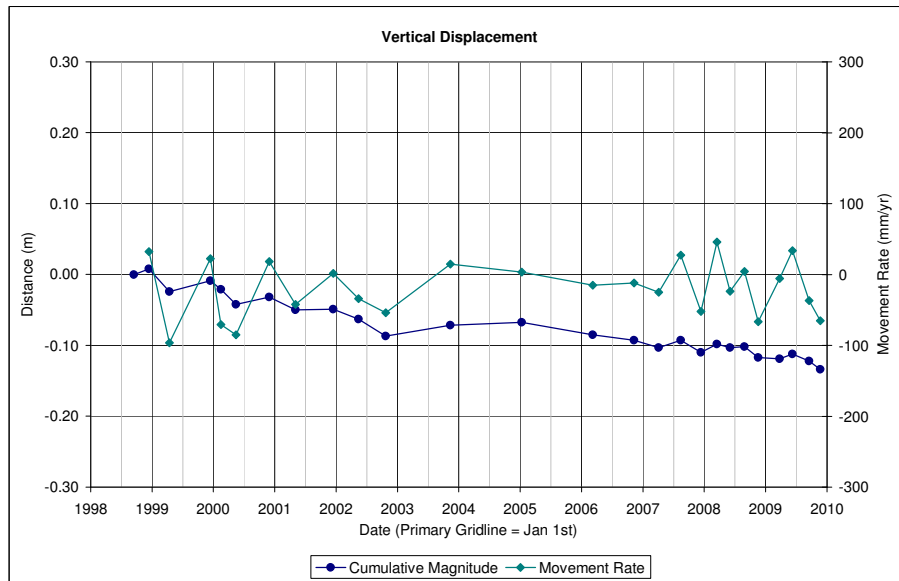
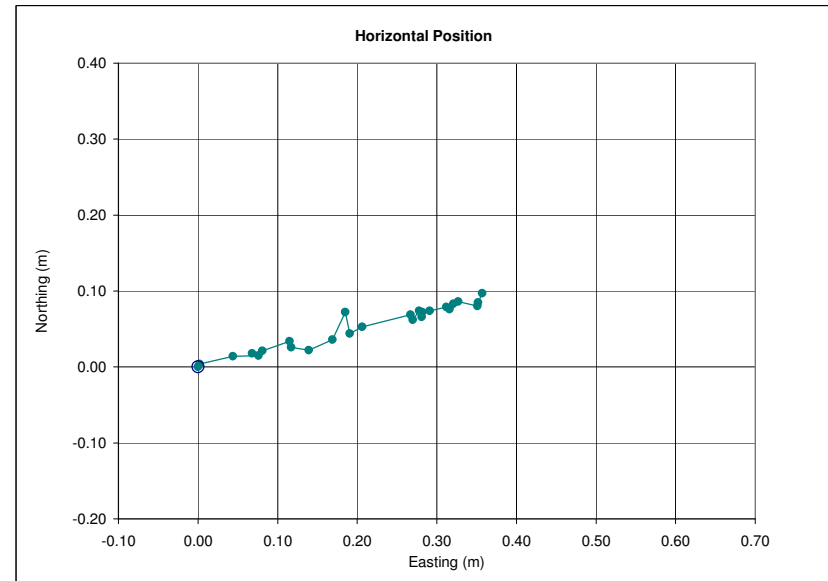
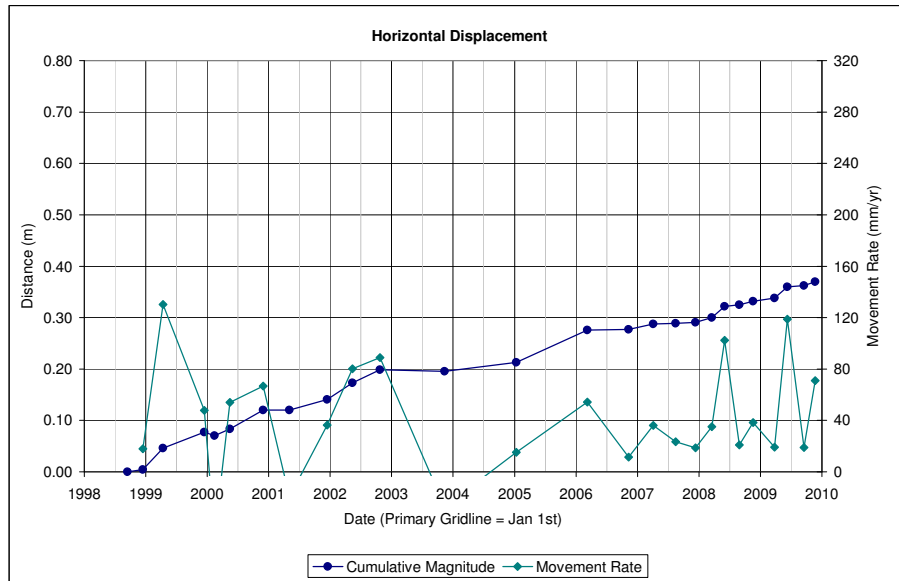
Displacement Graphs - Hub 98-14
Pentland/Flamingo Intersection



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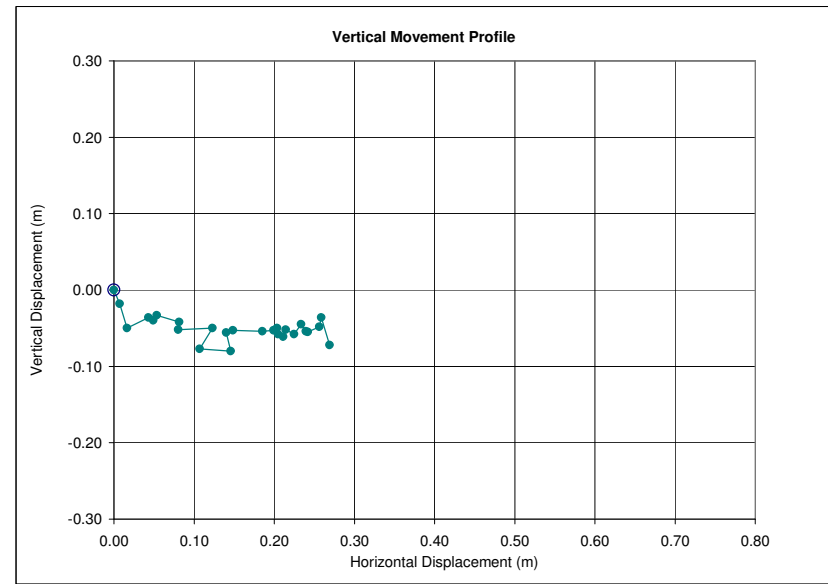
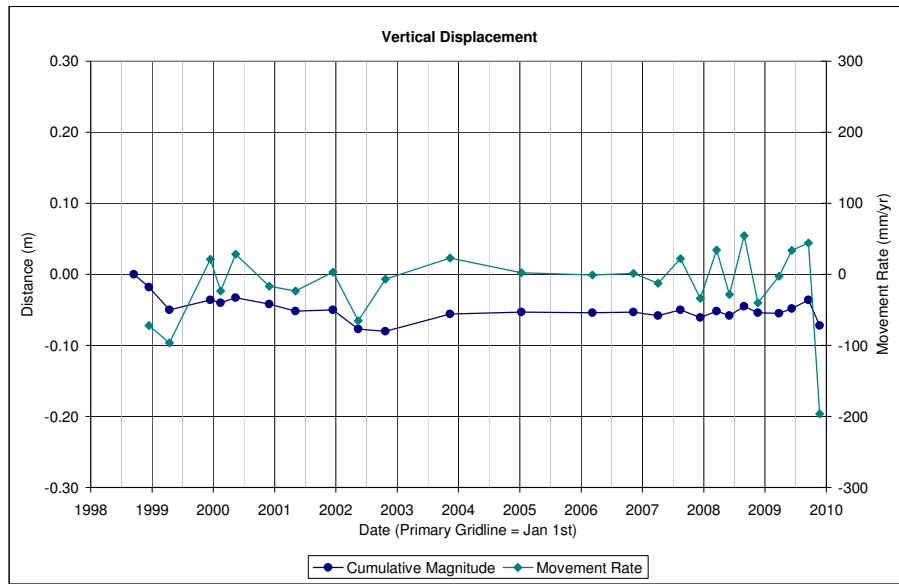
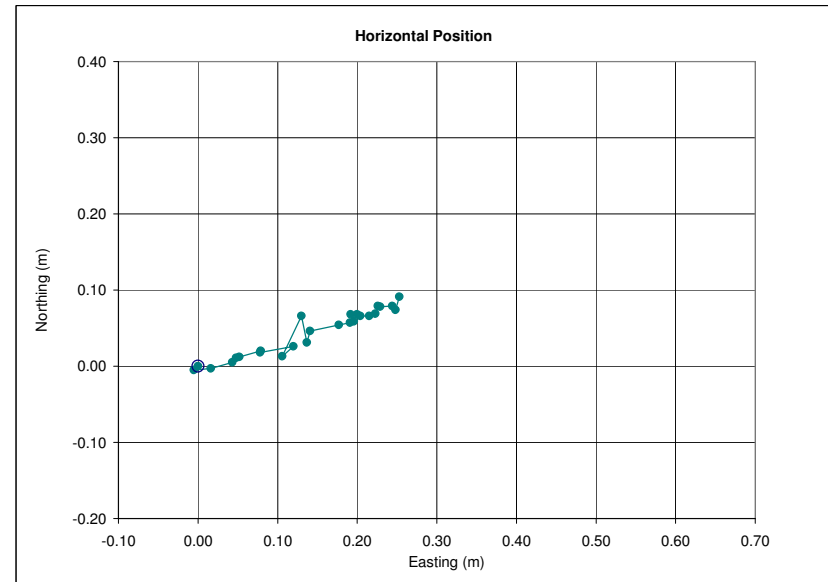
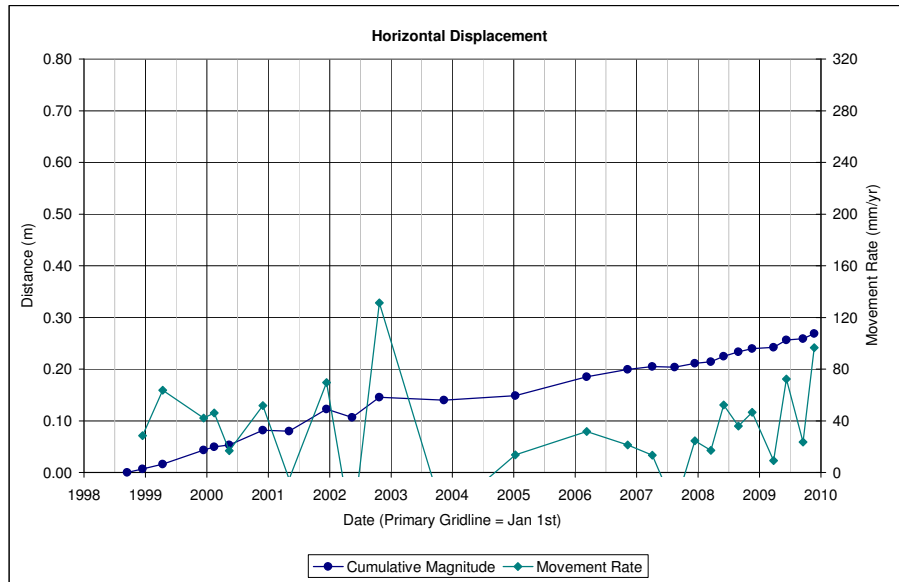
Displacement Graphs - Hub 98-15 Palmer/Lewis Intersection



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Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
9/15/1998	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		
12/15/1998	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
4/15/1999	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
12/15/1999	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
2/15/2000	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
5/15/2000	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
11/30/2000	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
5/5/2001	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
12/15/2001	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
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	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
9/17/2009	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
11/23/2009	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
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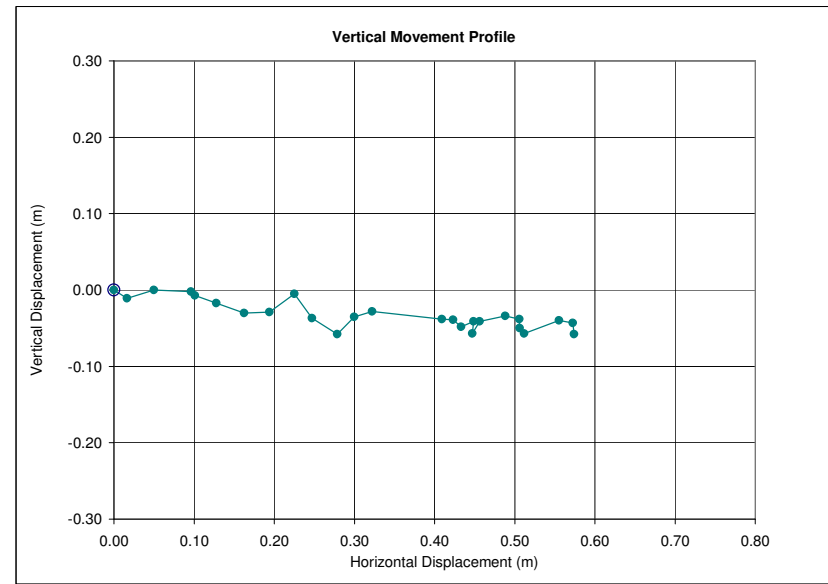
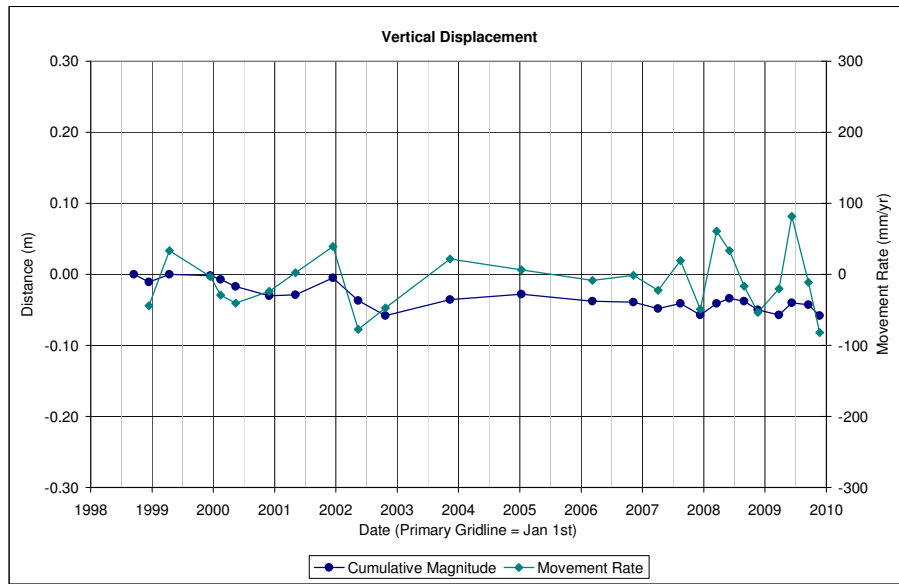
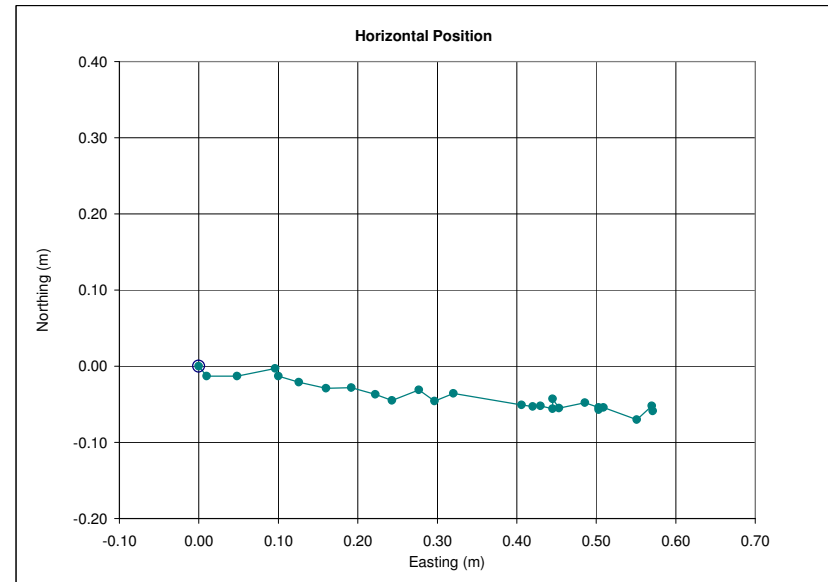
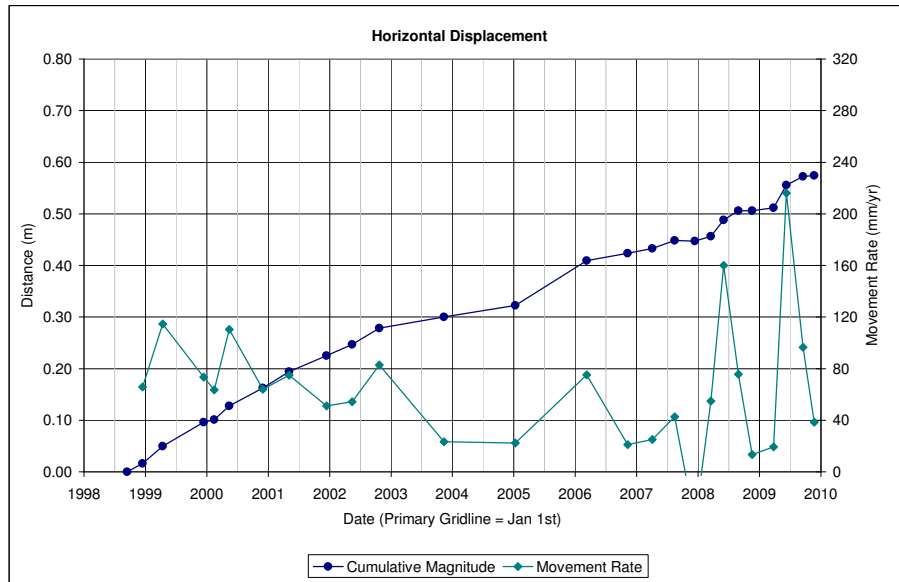
Displacement Graphs - Hub 98-16 Healy Road



amec

Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
9/15/1998	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		
12/15/1998	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
4/15/1999	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
12/15/1999	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
2/15/2000	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
5/15/2000	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
11/30/2000	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
5/5/2001	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
12/15/2001	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
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	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
9/17/2009	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
11/23/2009	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

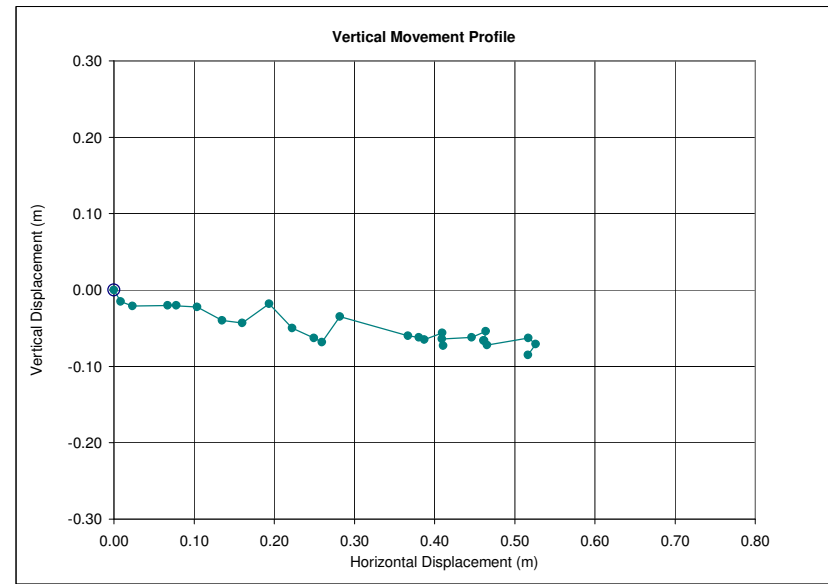
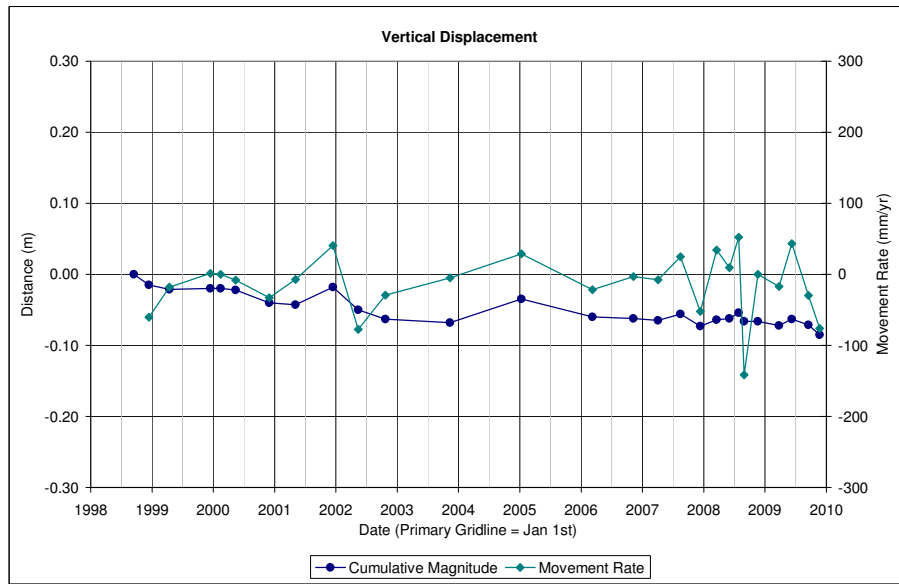
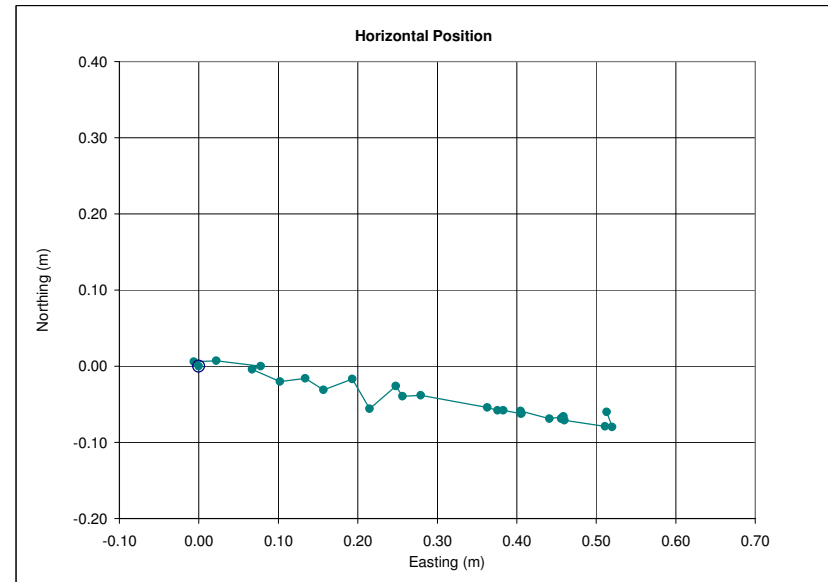
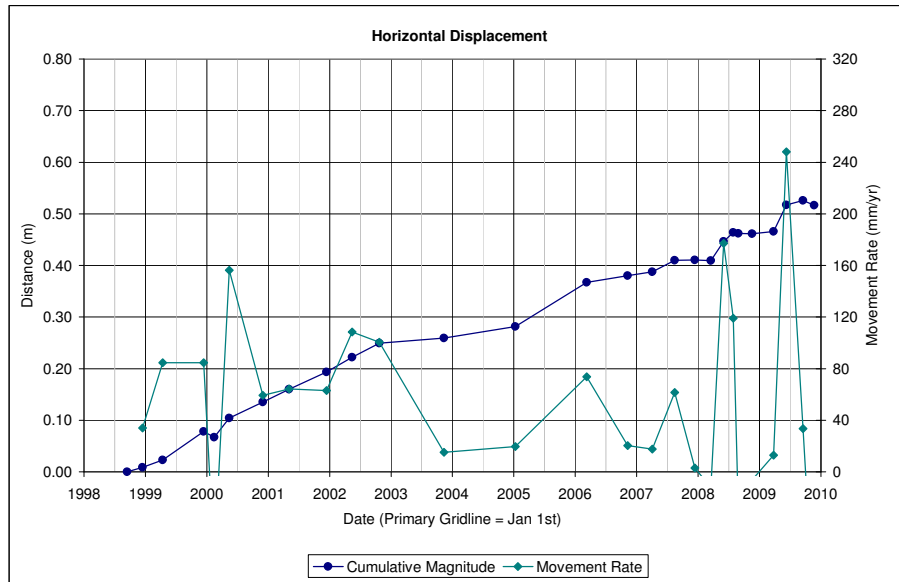
Displacement Graphs - Hub 98-17
Bettcher/Lark Intersection



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Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
9/15/1998	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		
12/15/1998	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
4/15/1999	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
12/15/1999	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
2/15/2000	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
5/15/2000	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
11/30/2000	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
5/5/2001	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
12/15/2001	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
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
7/29/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	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
9/17/2009	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
11/23/2009	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
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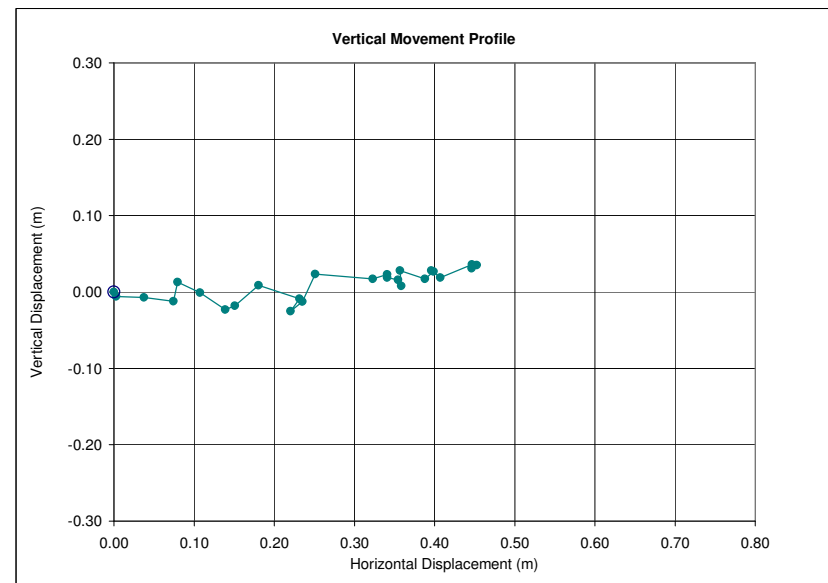
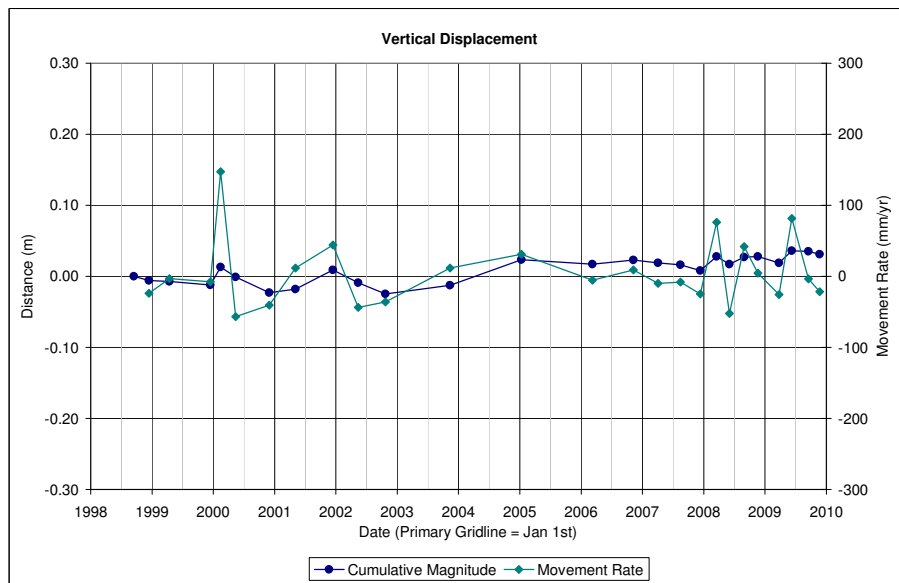
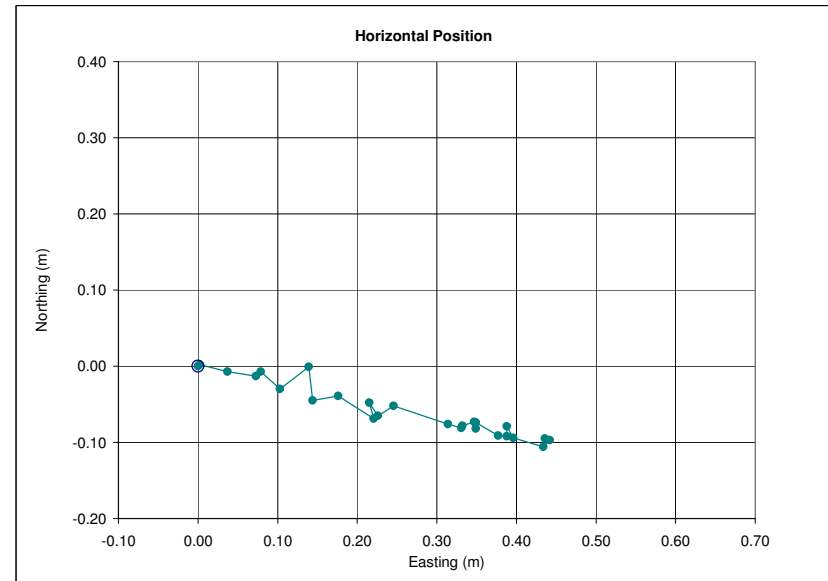
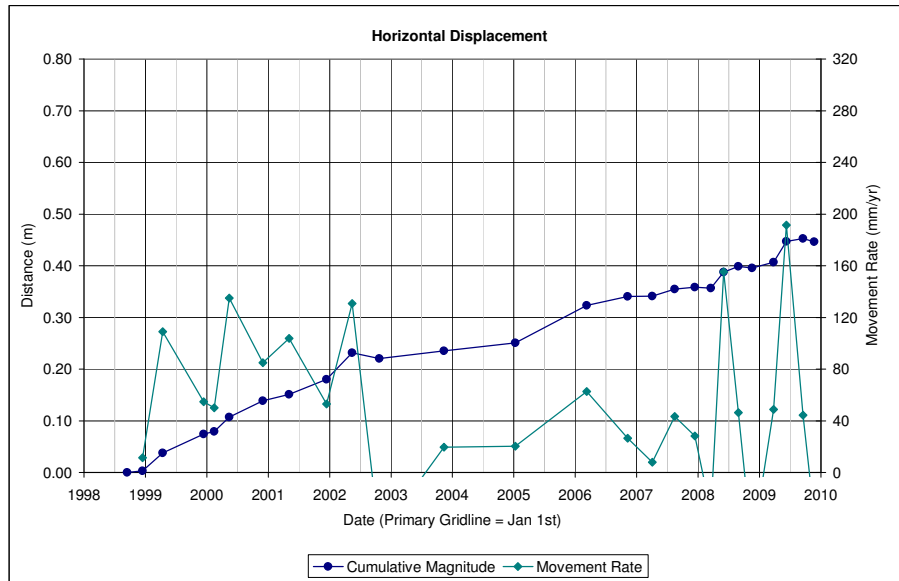
Displacement Graphs - Hub 98-18 Lark/Flamingo Intersection



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Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
9/15/1998	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		
12/15/1998	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
4/15/1999	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
12/15/1999	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
2/15/2000	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
5/15/2000	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
11/30/2000	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
5/5/2001	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
12/15/2001	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
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	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
9/17/2009	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
11/23/2009	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

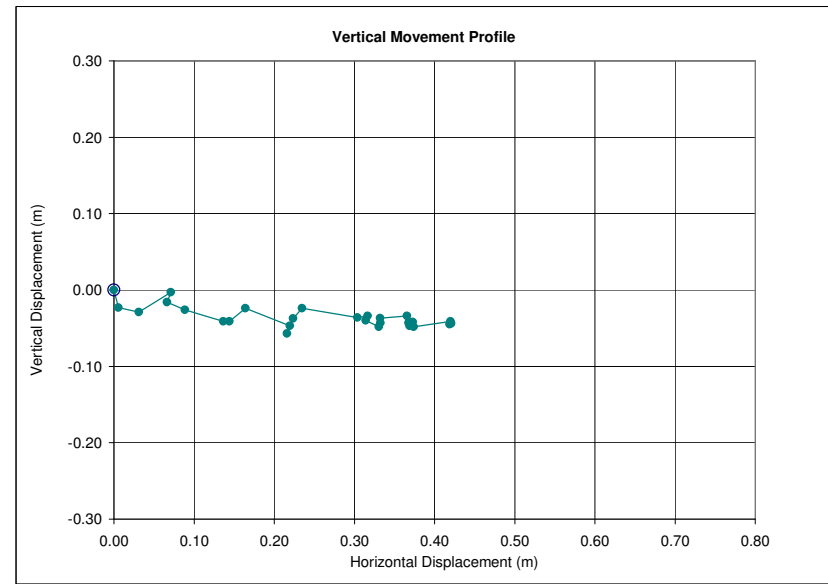
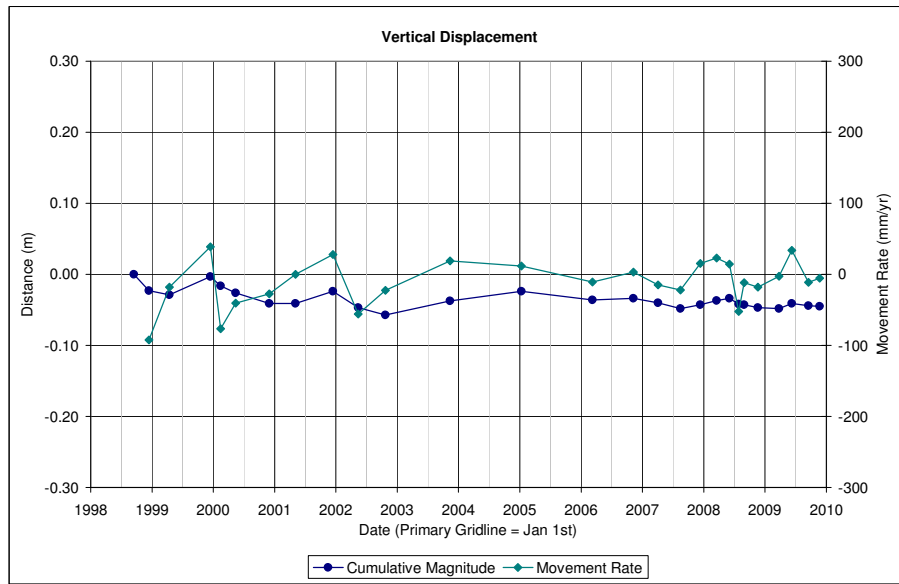
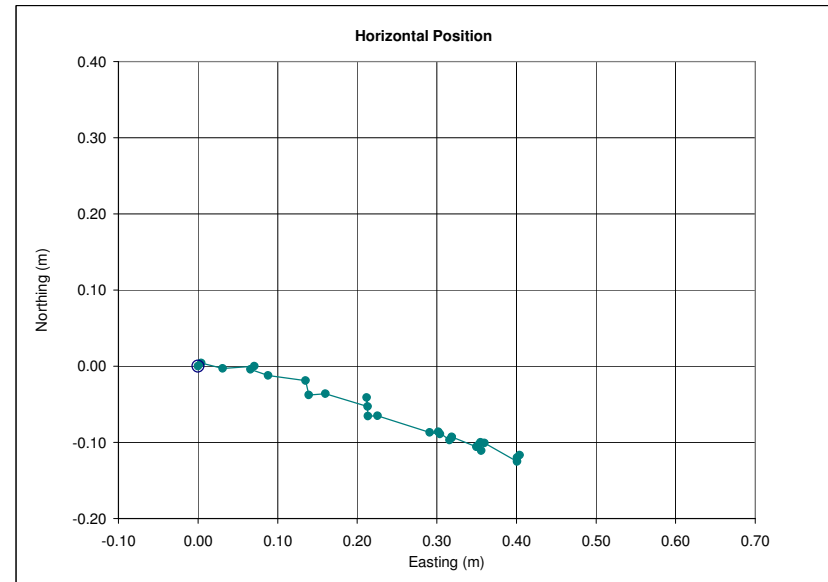
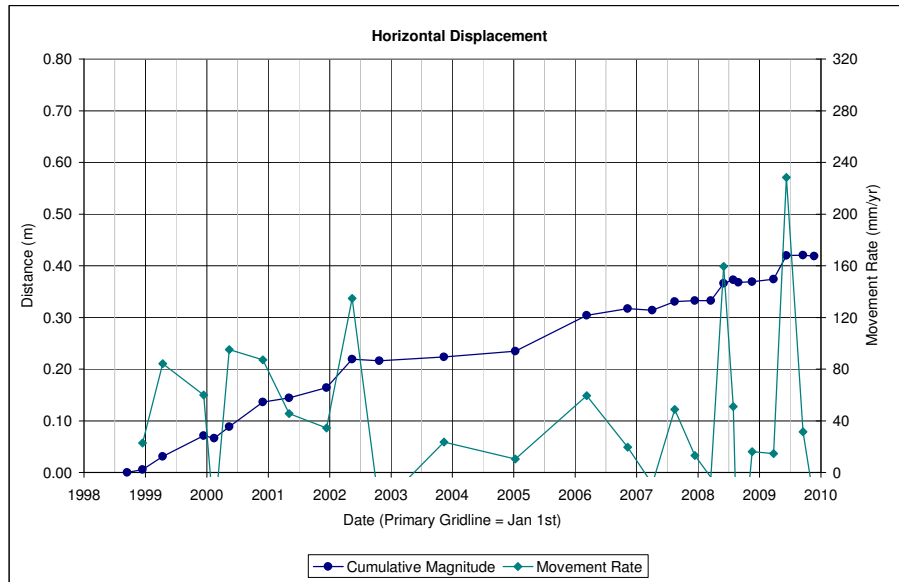
Displacement Graphs - Hub 98-19
Abbott/Flamingo Intersection



amec

Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
9/15/1998	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		
12/15/1998	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
4/15/1999	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
12/15/1999	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
2/15/2000	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
5/15/2000	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
11/30/2000	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
5/5/2001	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
12/15/2001	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
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
7/29/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	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
9/17/2009	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
11/23/2009	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

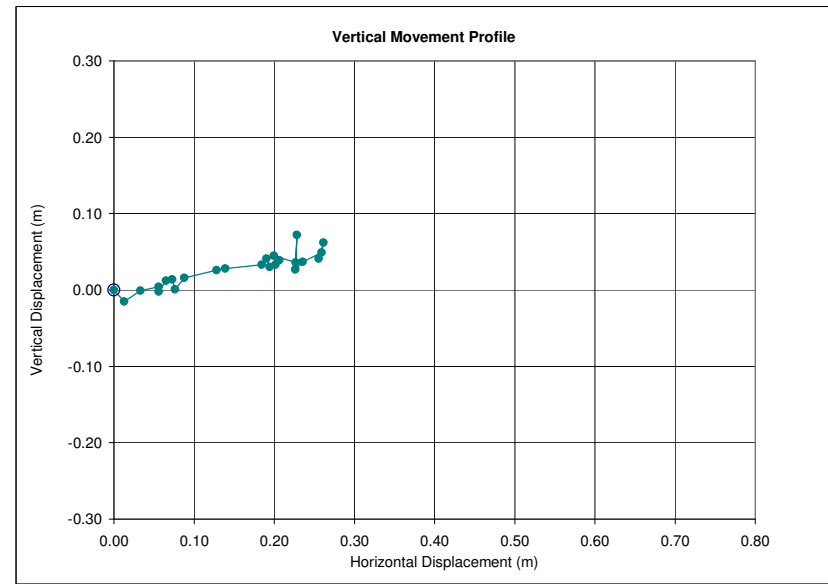
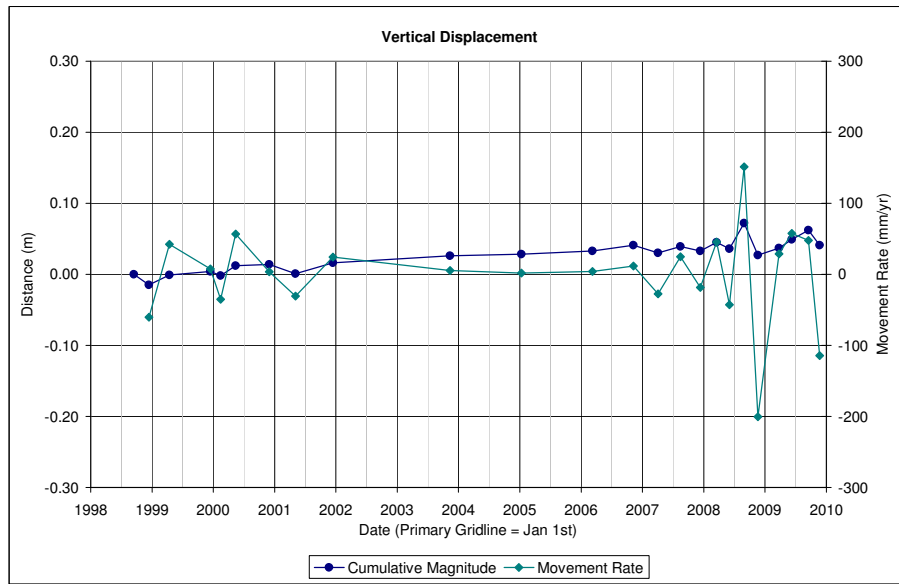
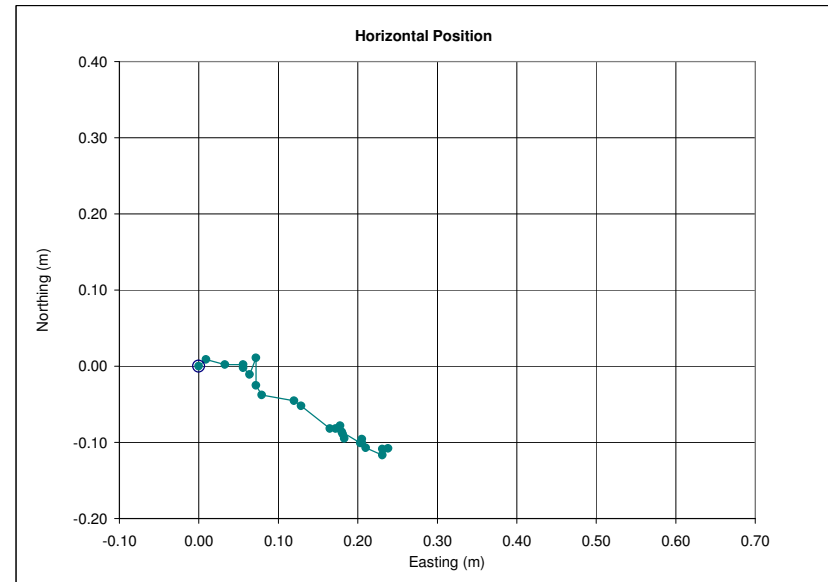
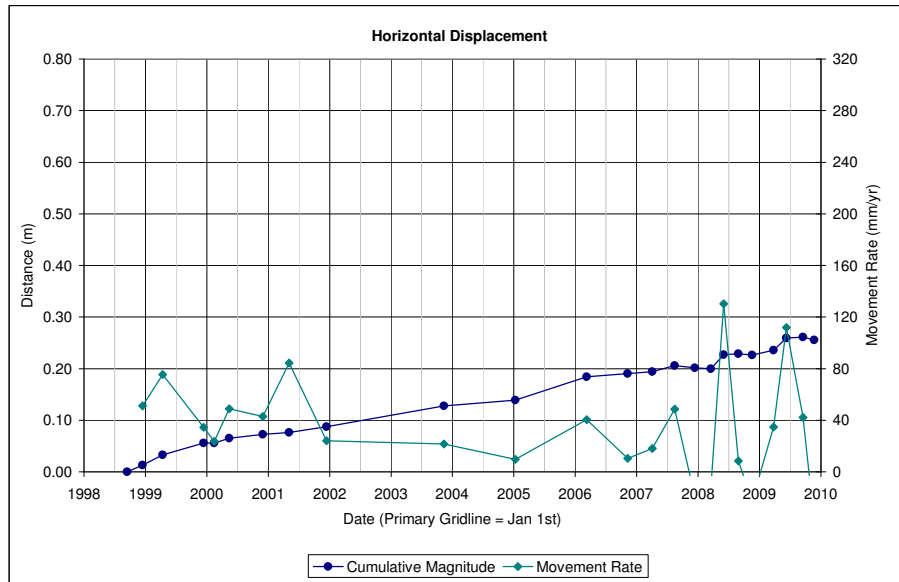
Displacement Graphs - Hub 98-20
Hawk Street @ Crane Ave.



amec

Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
9/15/1998	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		
12/15/1998	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
4/15/1999	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
12/15/1999	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
2/15/2000	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
5/15/2000	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
11/30/2000	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
5/5/2001	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
12/15/2001	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	5869342.910	532493.663	4																		

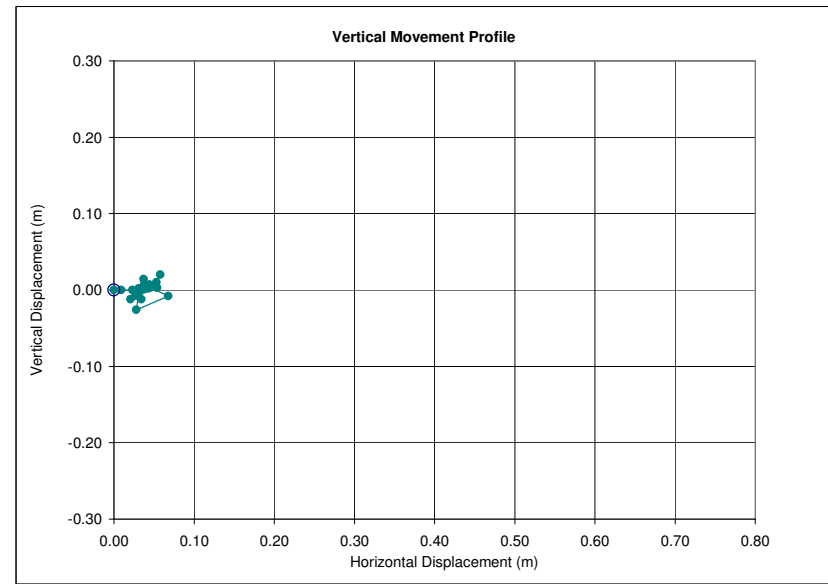
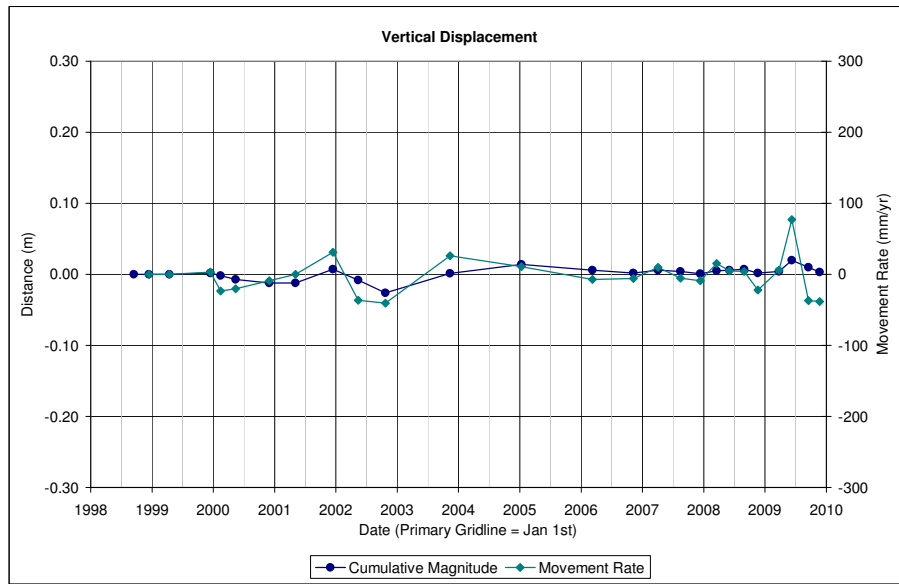
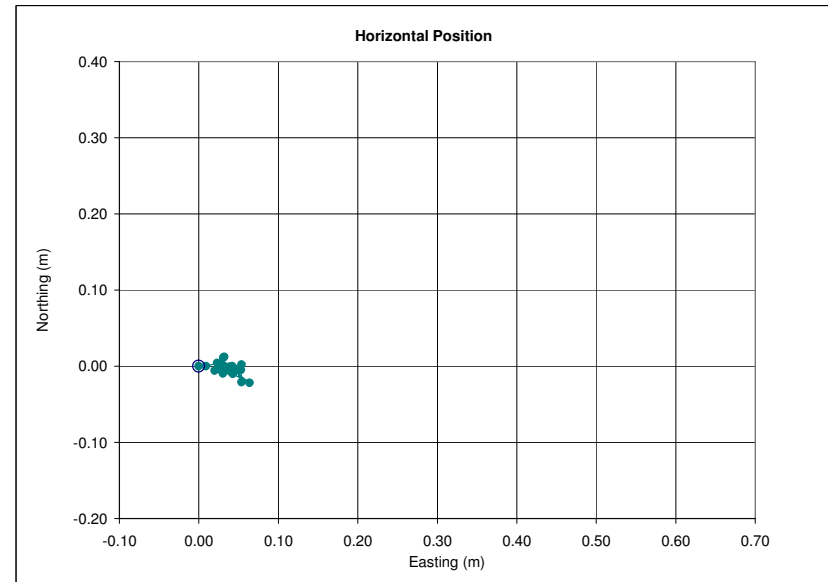
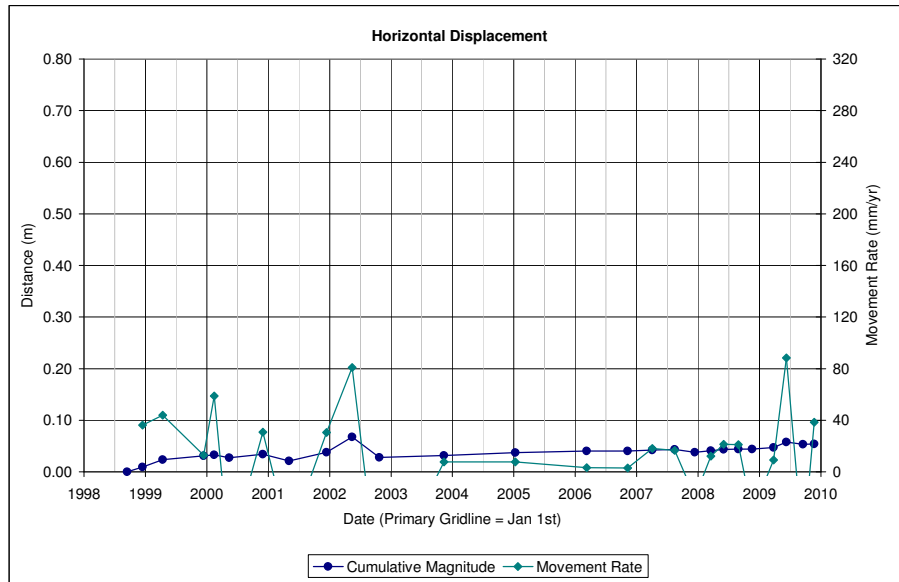
Displacement Graphs - Hub 98-21
Lane between Avery/Allison



amec

Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
9/15/1998	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		
12/15/1998	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
4/15/1999	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
12/15/1999	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
2/15/2000	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
5/15/2000	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
11/30/2000	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
5/5/2001	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
12/15/2001	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
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	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
9/17/2009	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
11/23/2009	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
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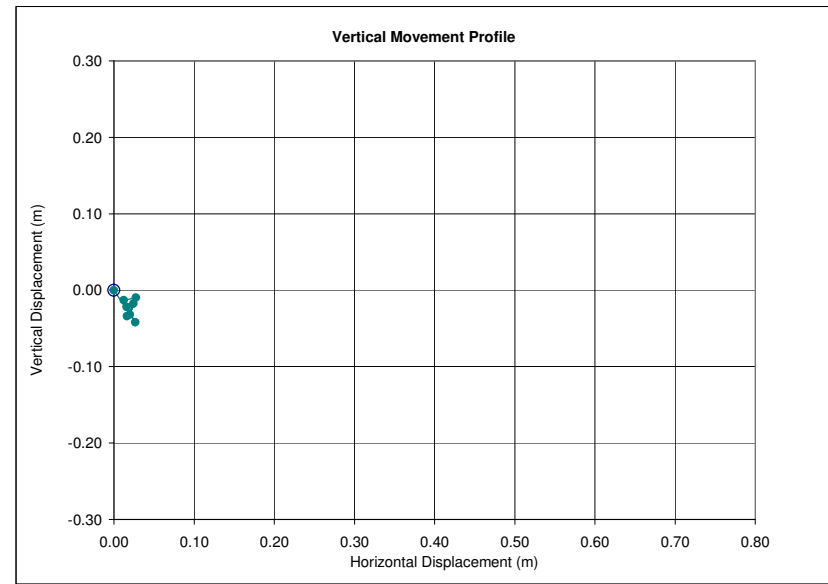
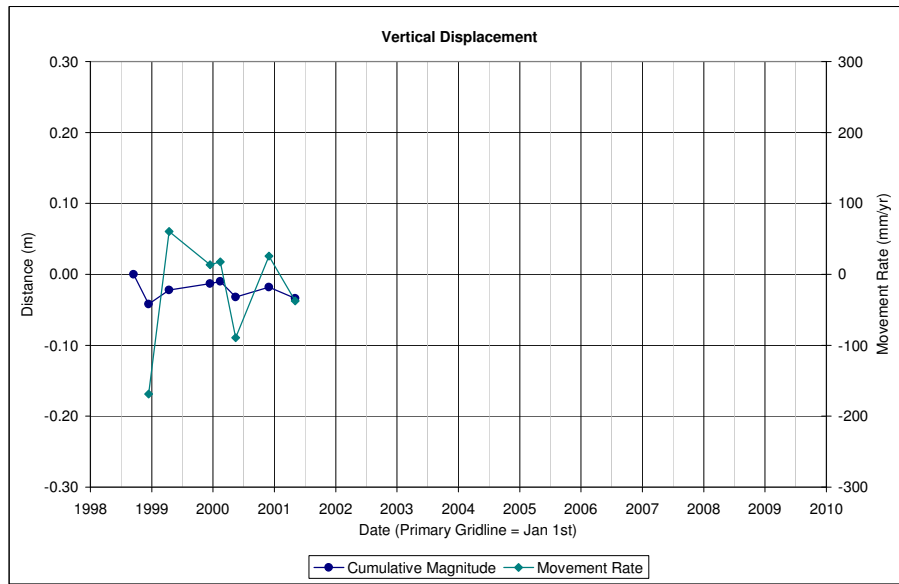
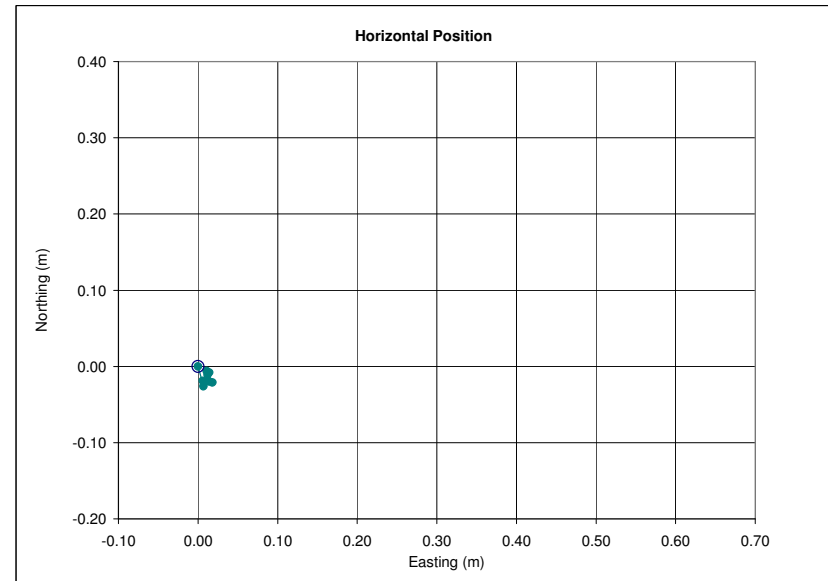
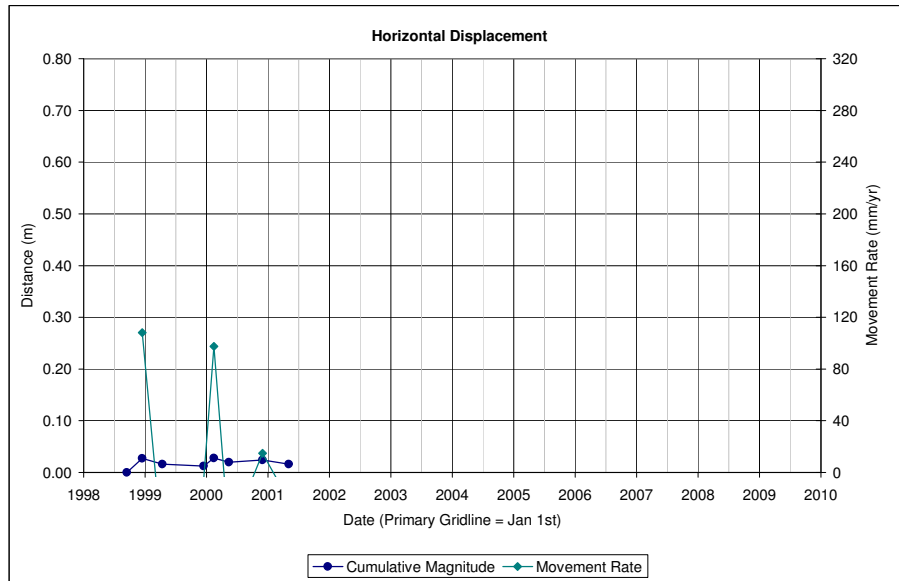
Displacement Graphs - Hub 98-22
Lane between Beath/Bouchie



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[illegible]

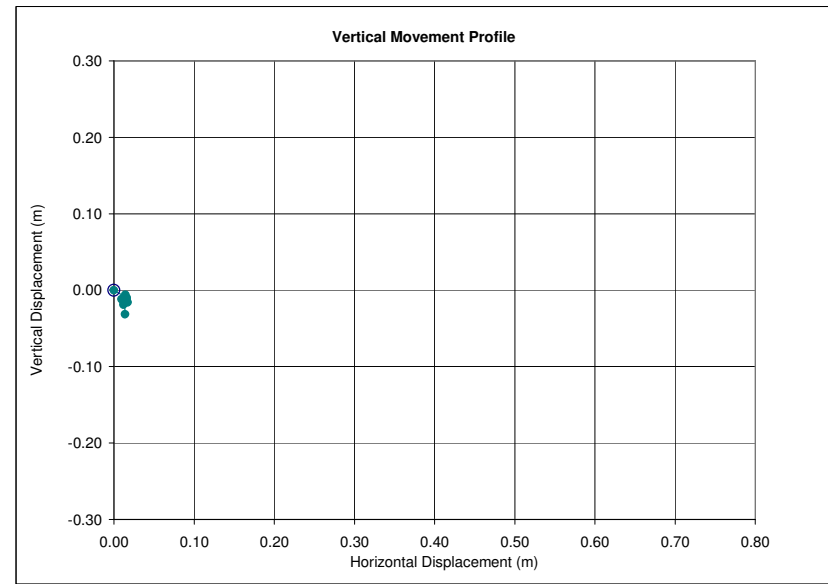
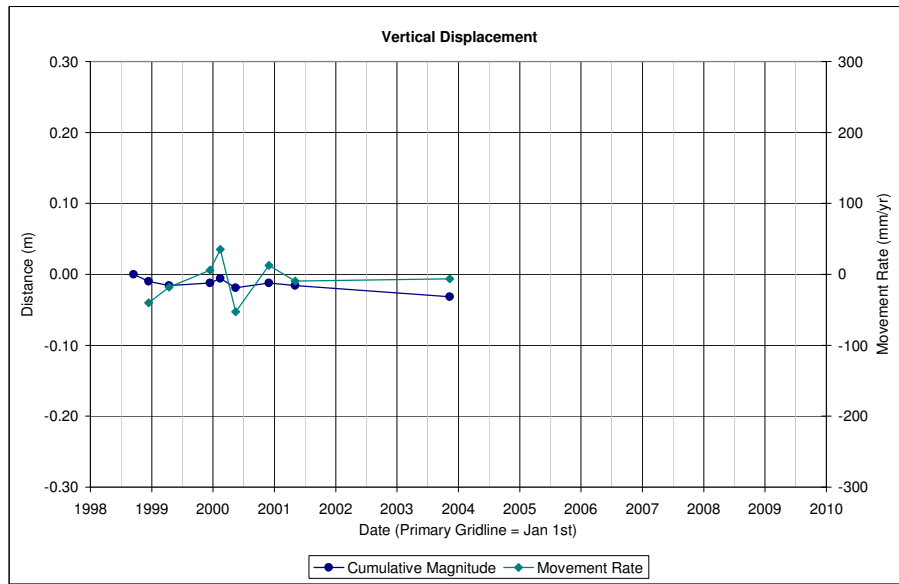
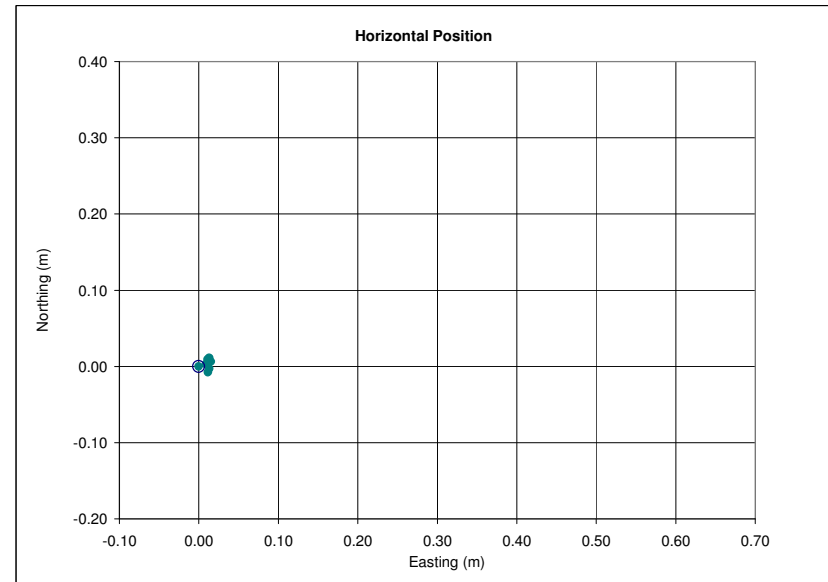
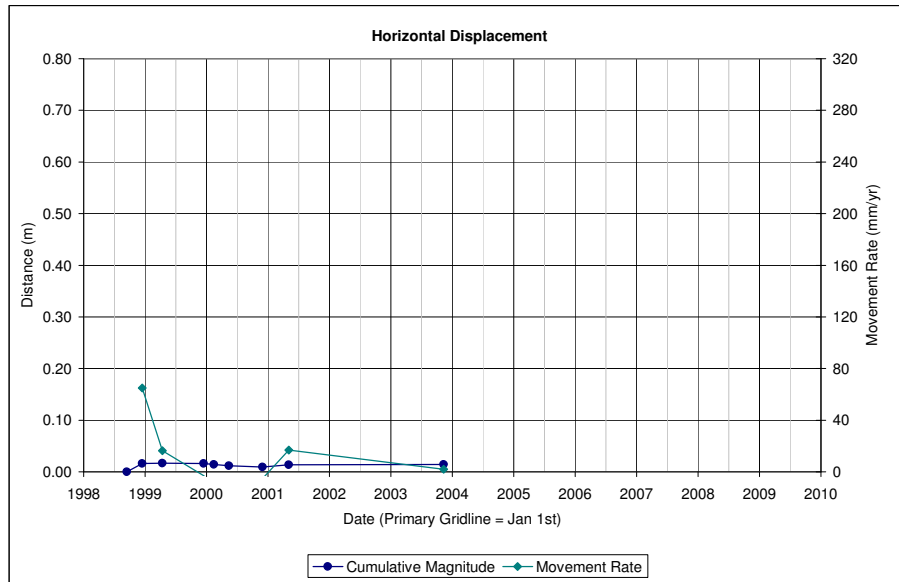
Displacement Graphs - Hub 98-24
Salton Road (Hixon Road)



Quesnel Hill

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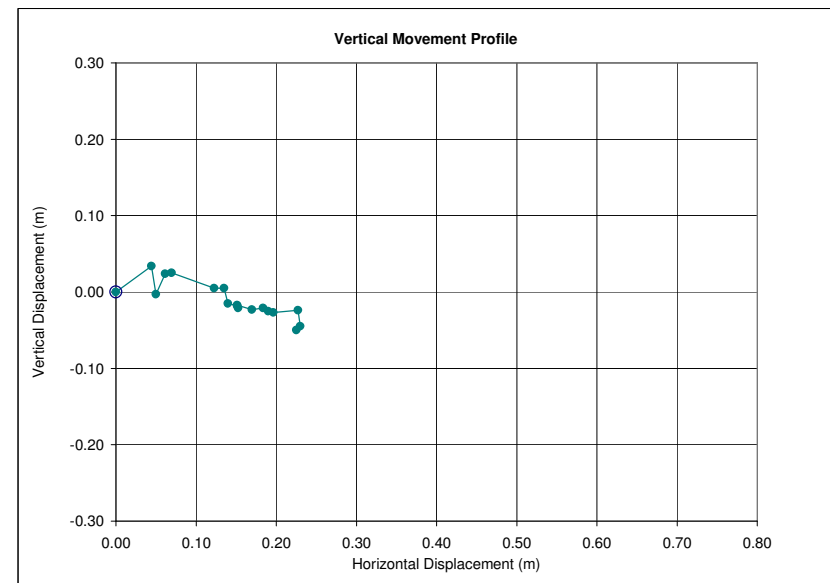
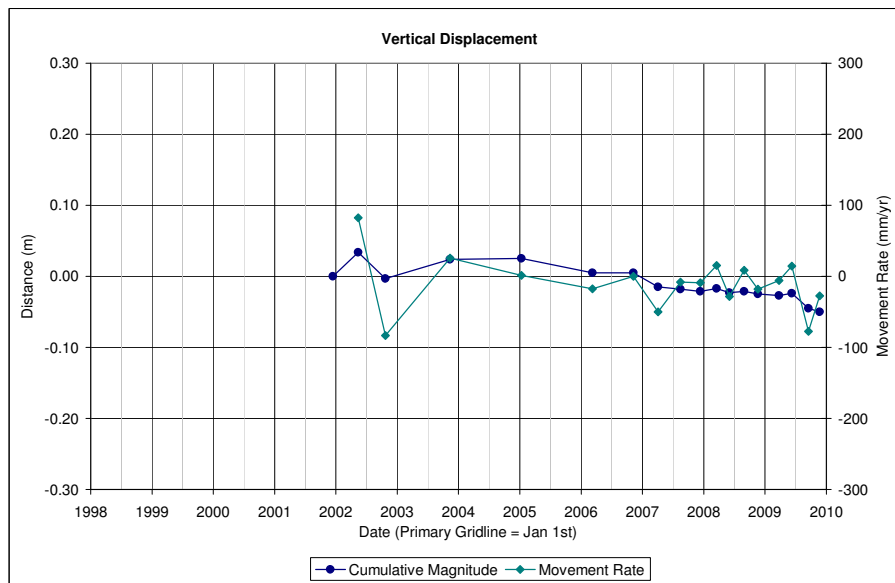
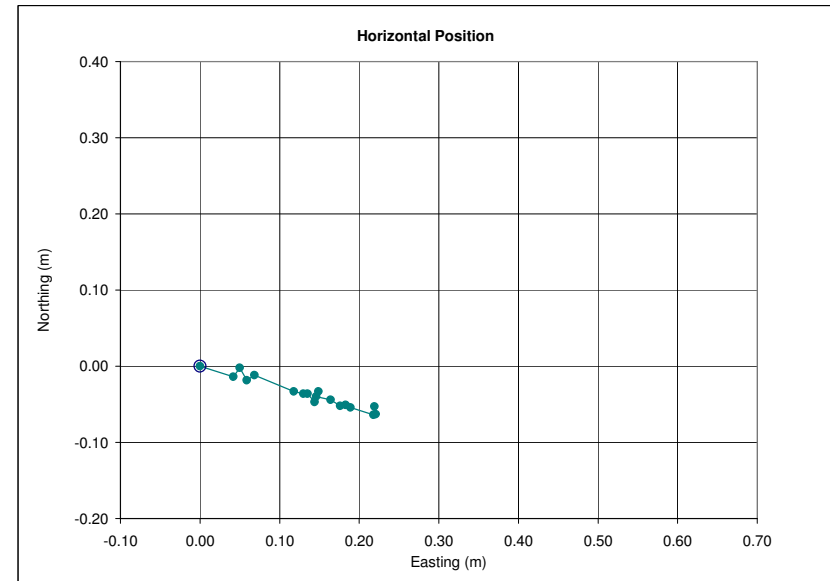
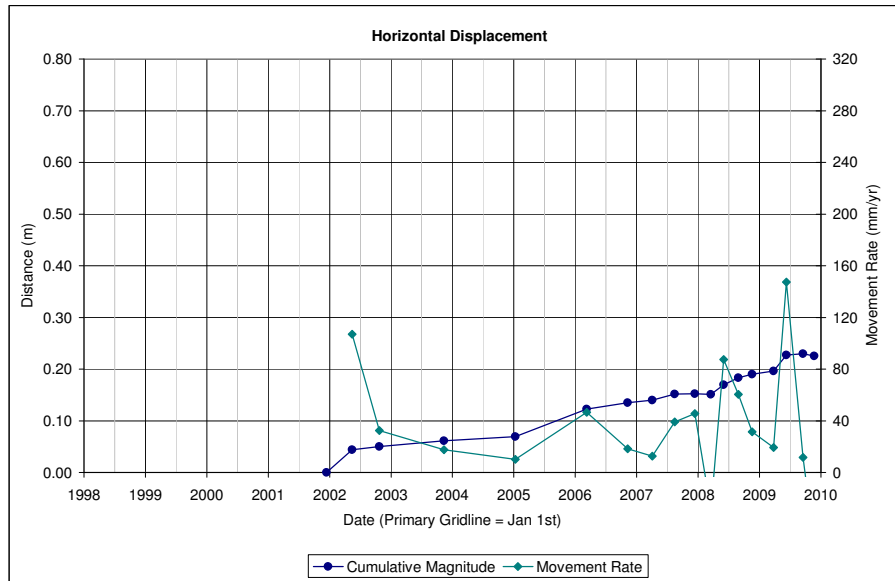
Displacement Graphs - Hub 98-29
Quesnel Hill



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Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
12/15/2001	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		
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	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
9/17/2009	5869989.203	531218.028	575.																		

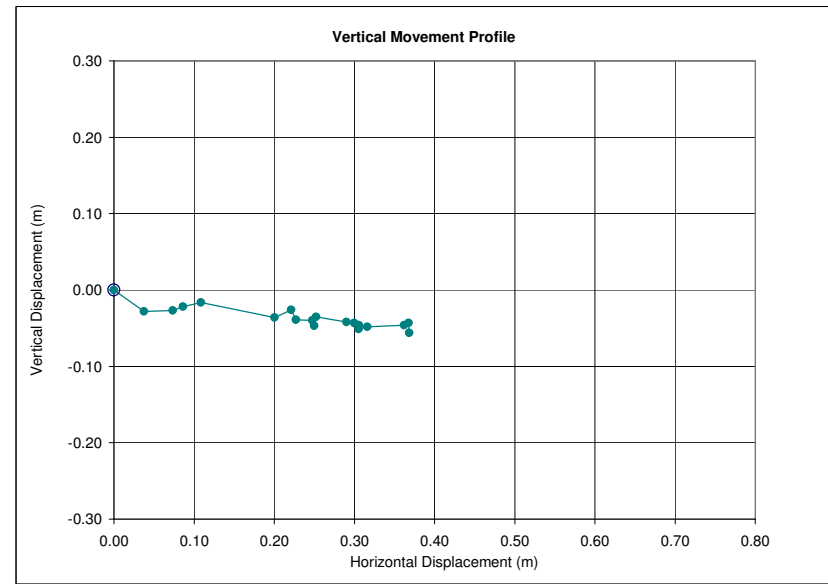
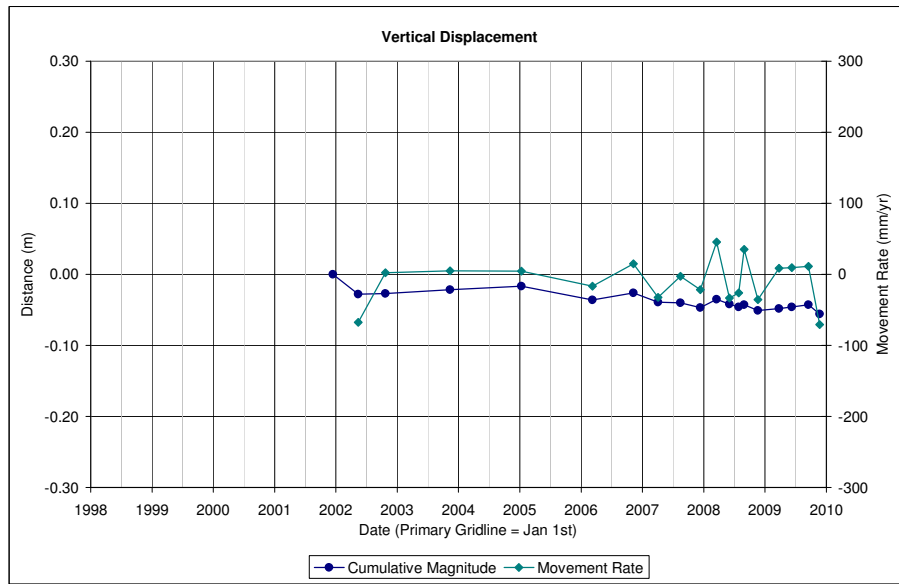
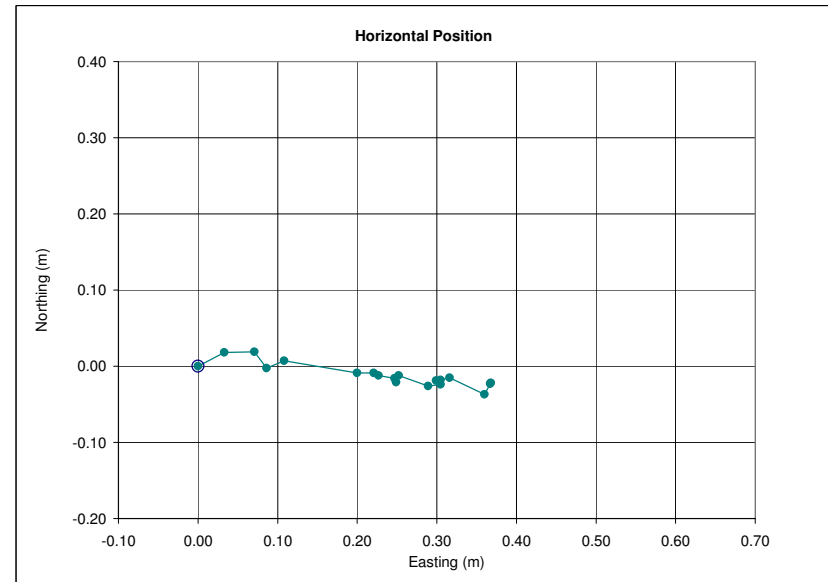
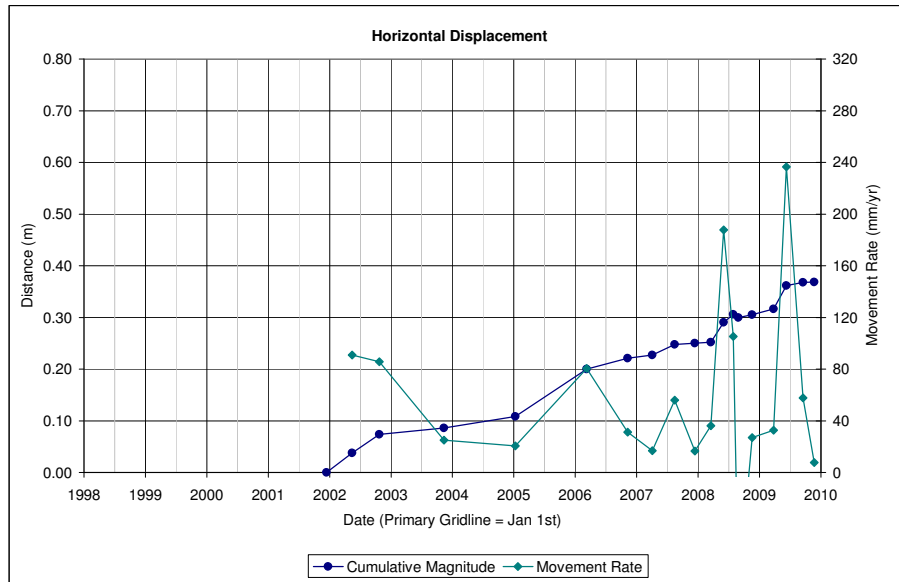
Displacement Graphs - Hub 01-30
West End of Dodds Avenue at Finley Road



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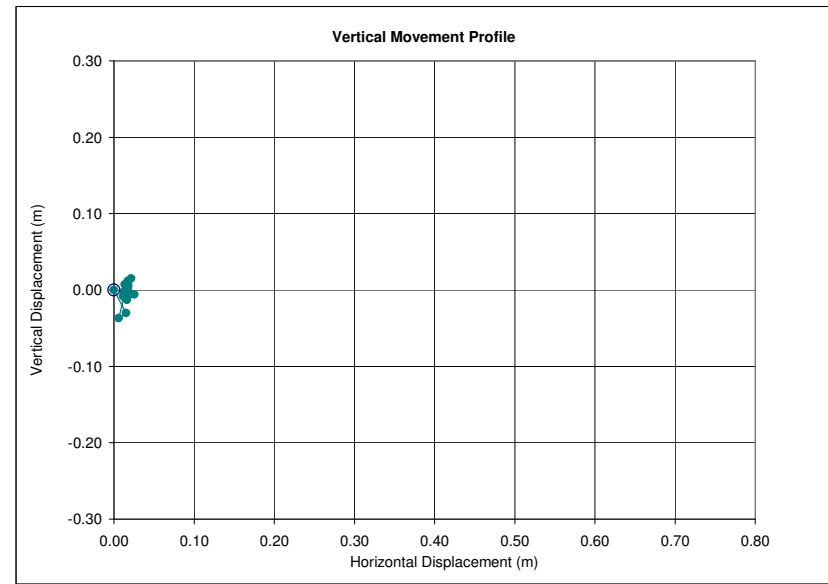
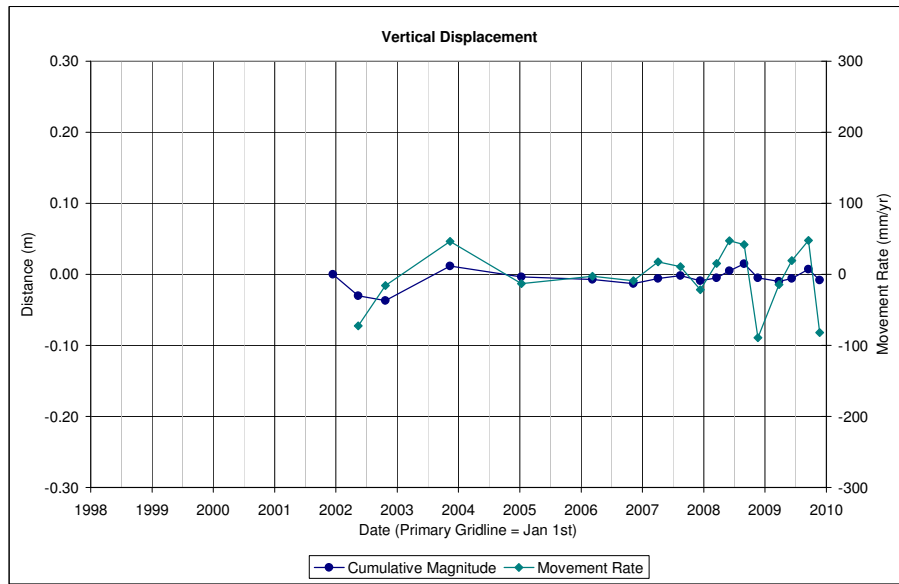
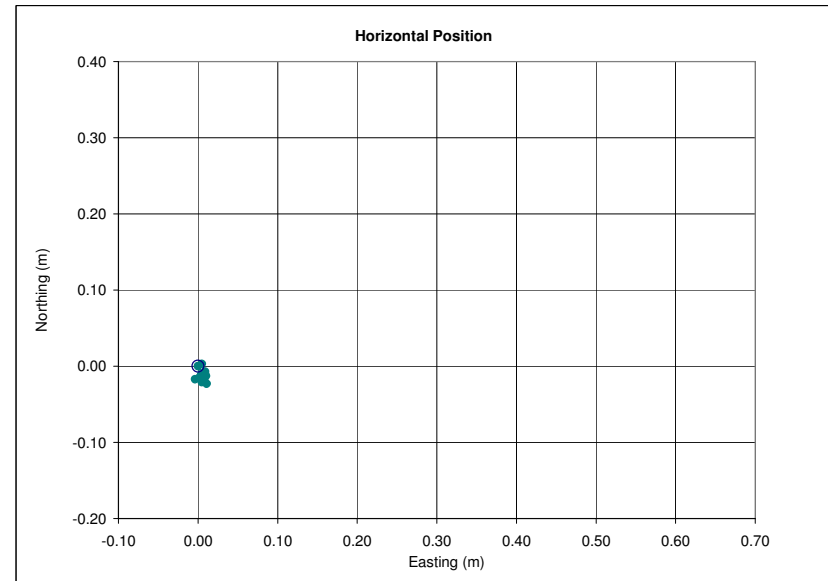
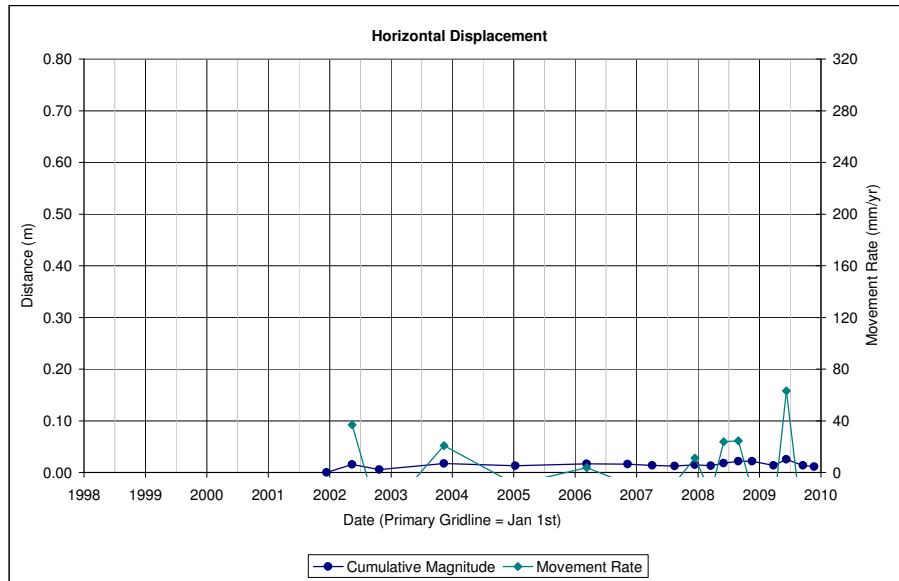
Displacement Graphs - Hub 01-31 Blair Street



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Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position								Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr	
12/15/2001	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			
5/15/2002	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	
10/24/2002	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	
11/12/2003	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	
1/11/2005	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	
3/10/2006	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	
11/10/2006	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	
4/5/2007	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	
8/16/2007	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	
12/13/2007	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	
3/18/2008	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	
6/3/2008	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	
8/29/2008	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	
11/19/2008	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	
3/26/2009	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	
6/10/2009	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	
9/17/2009	5870079.618	532553.																				

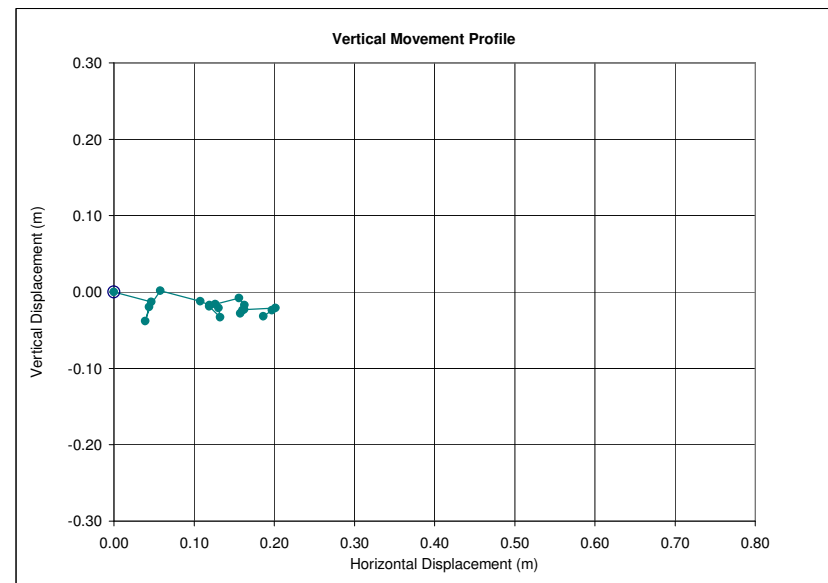
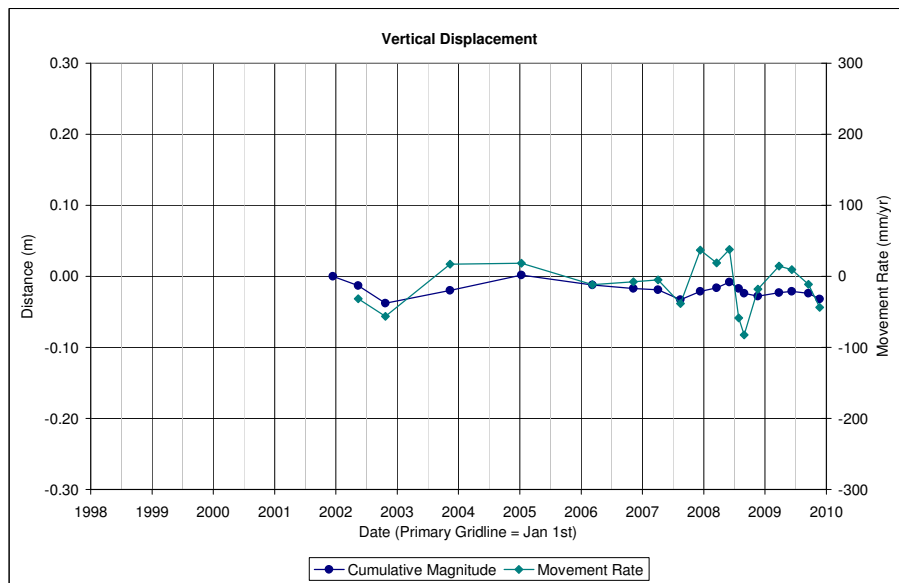
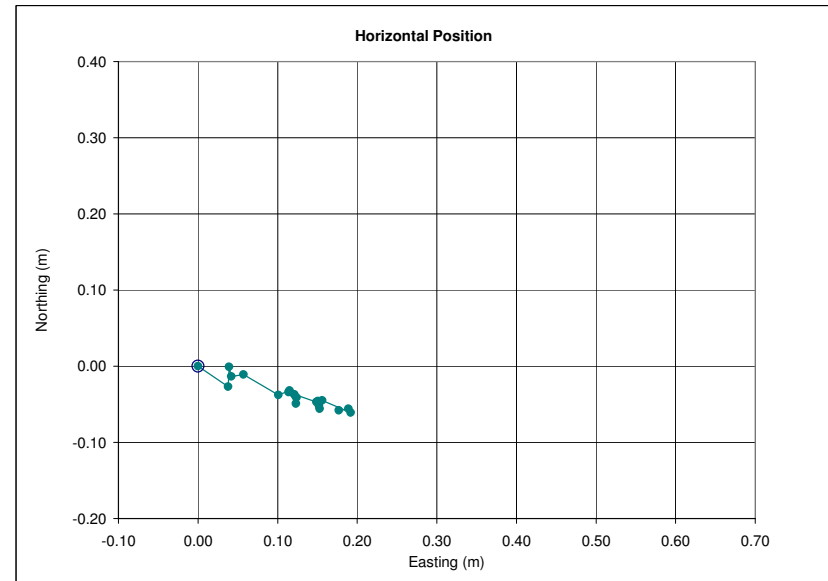
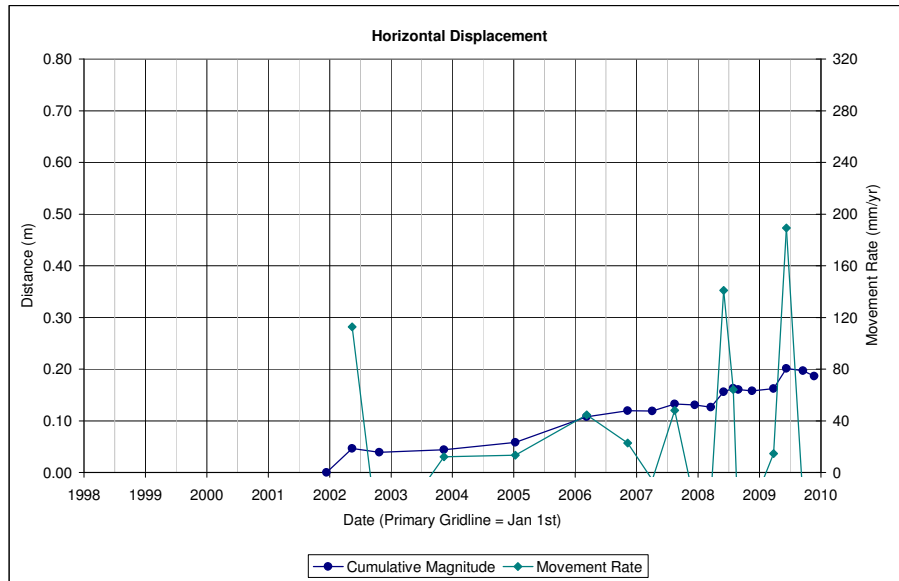
Displacement Graphs - Hub 01-32
Lewis Drive/Beabien Avenue



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Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
12/15/2001	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		
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
7/29/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	5869124.318	532246.152</																			

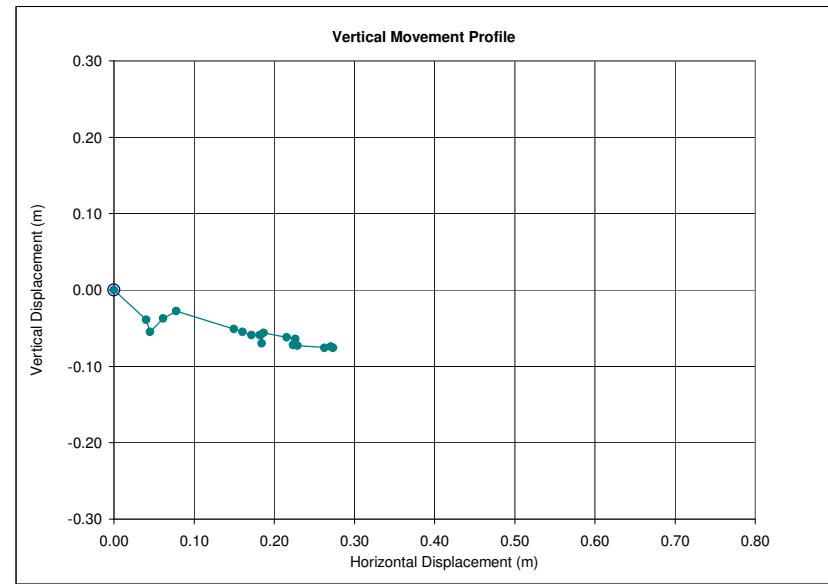
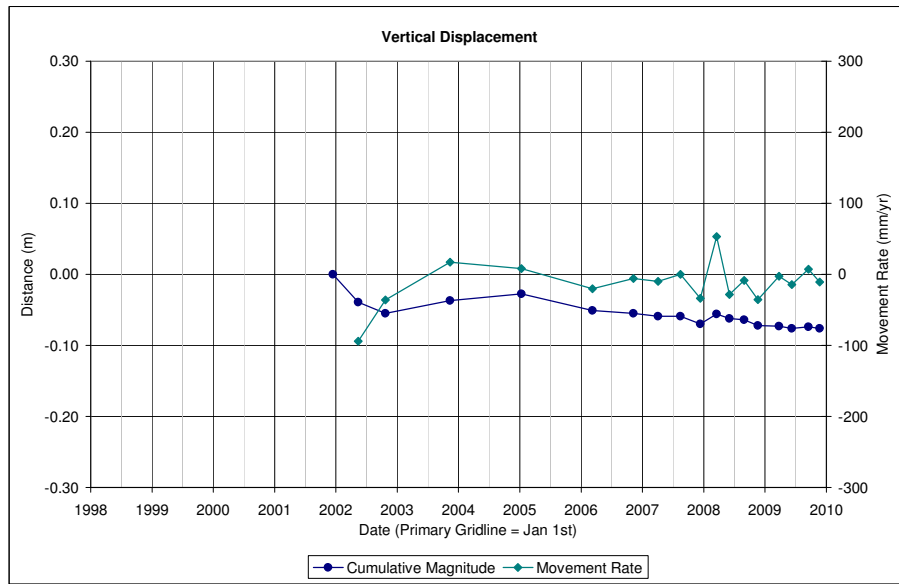
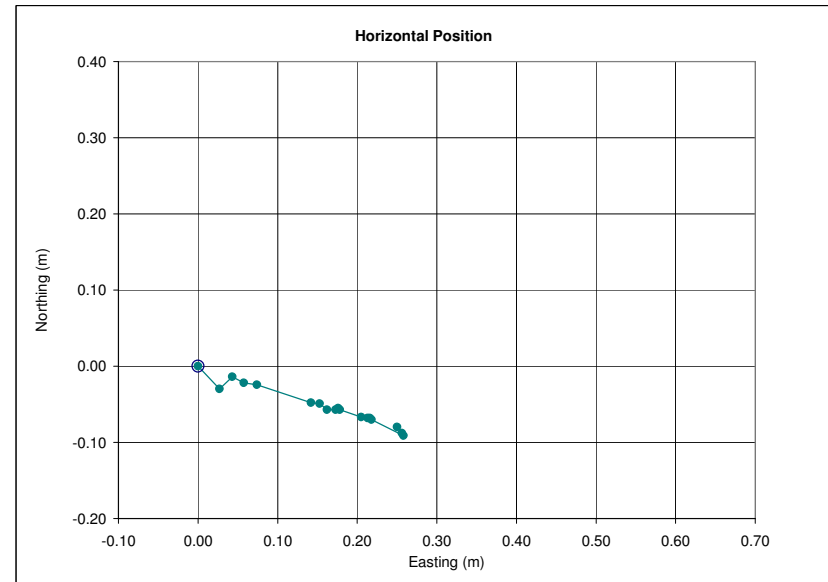
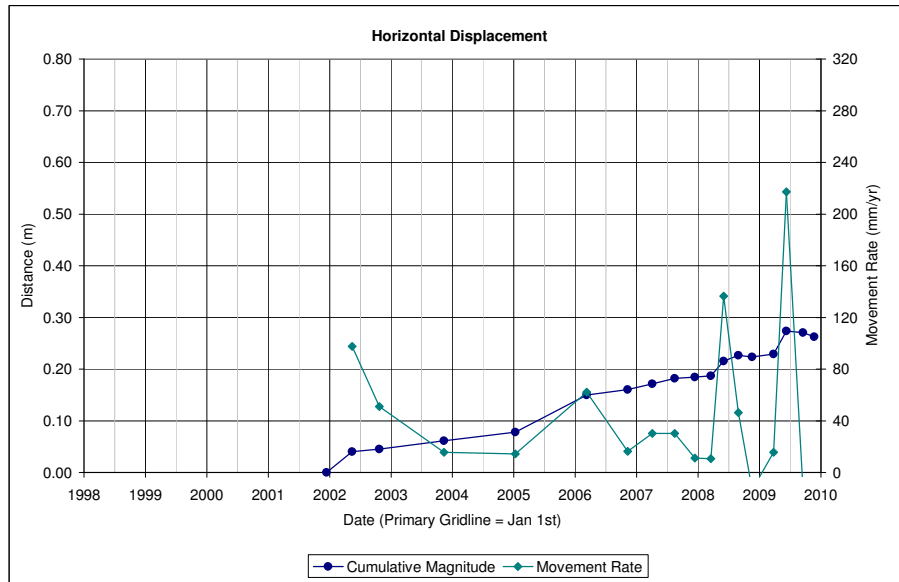
Displacement Graphs - Hub 01-33
South End of Allard Street



amec

Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
12/15/2001	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		
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	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
9/17/2009	5869581.774	532																			

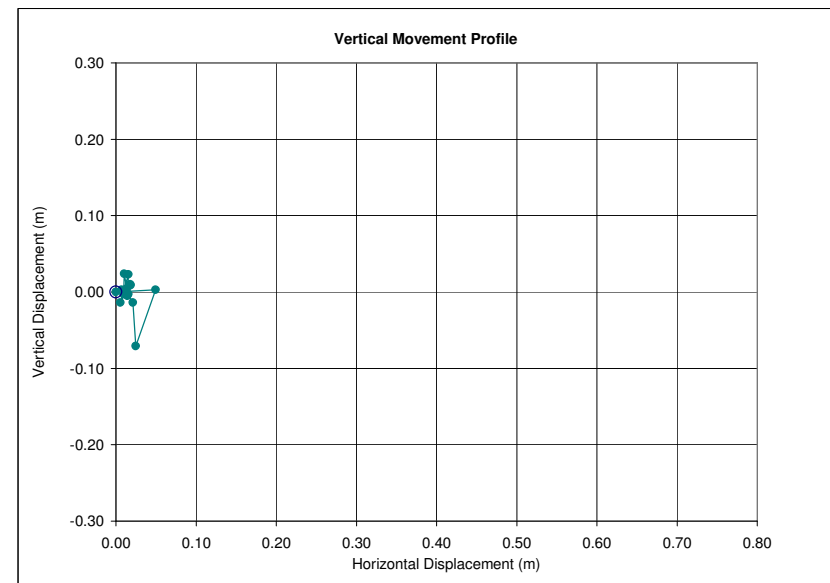
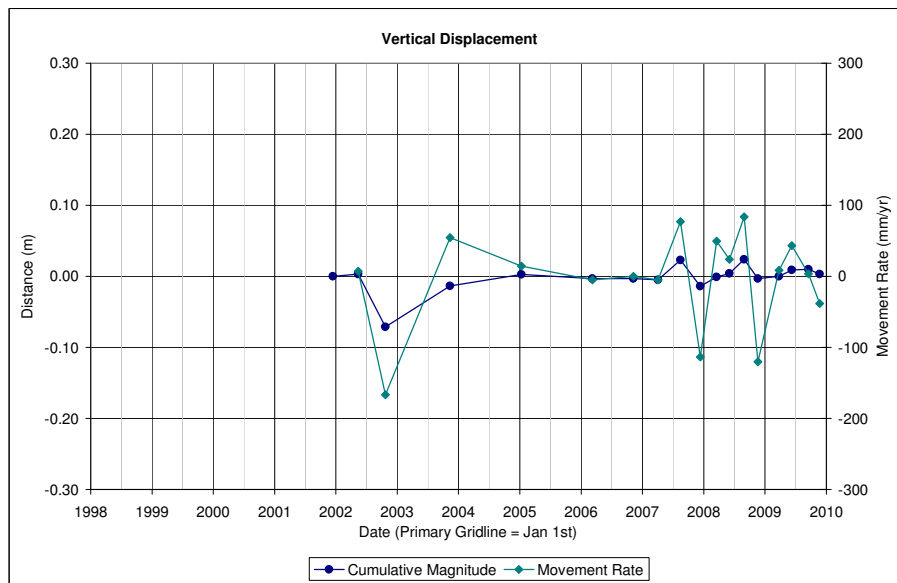
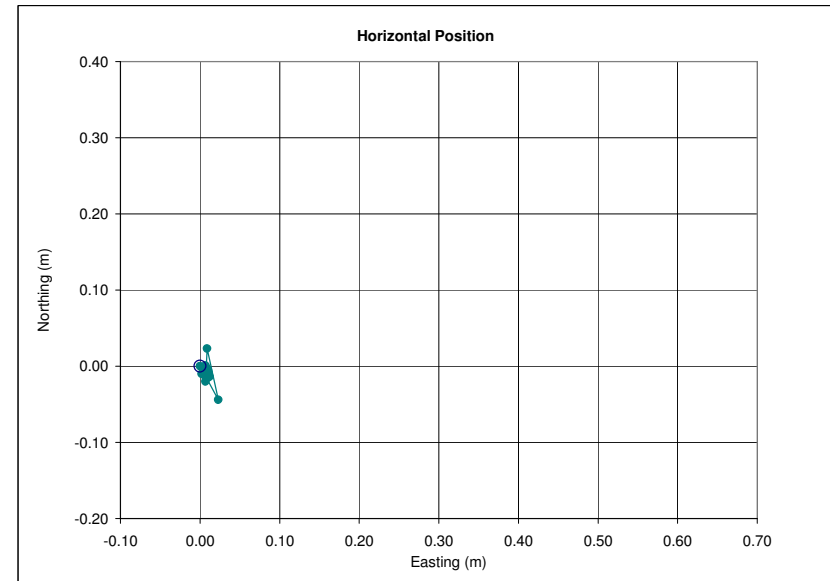
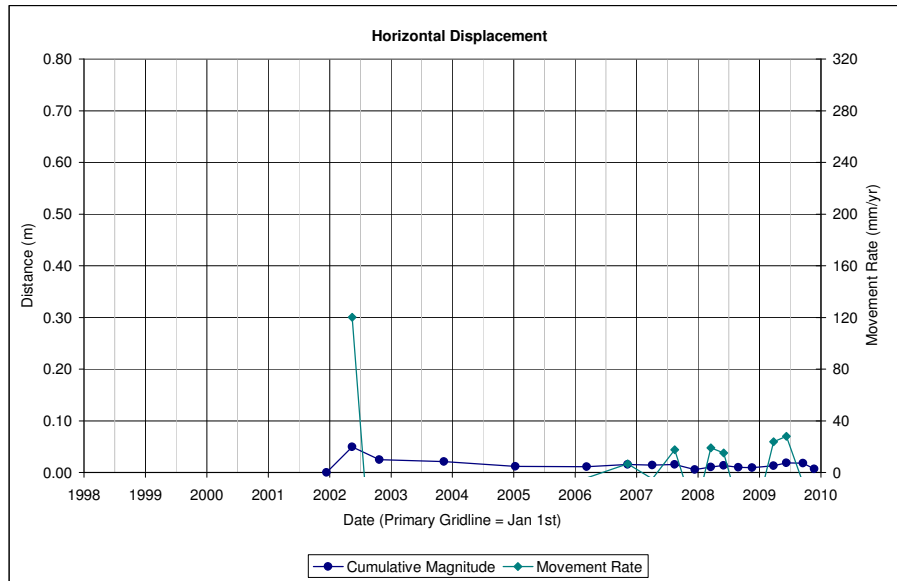
Displacement Graphs - Hub 01-34
Abbott Road and Blair Street



amec

Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
12/15/2001	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		
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	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
9/17/2009	5869572.246	53286																			

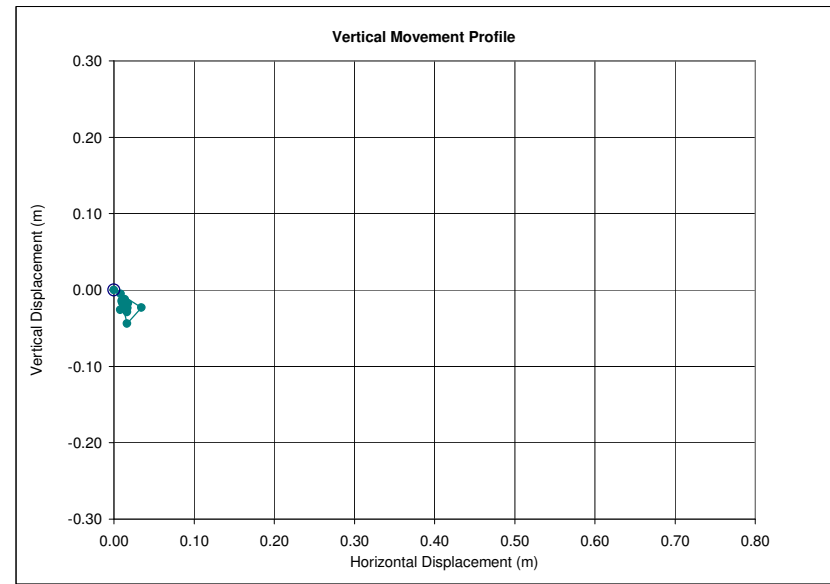
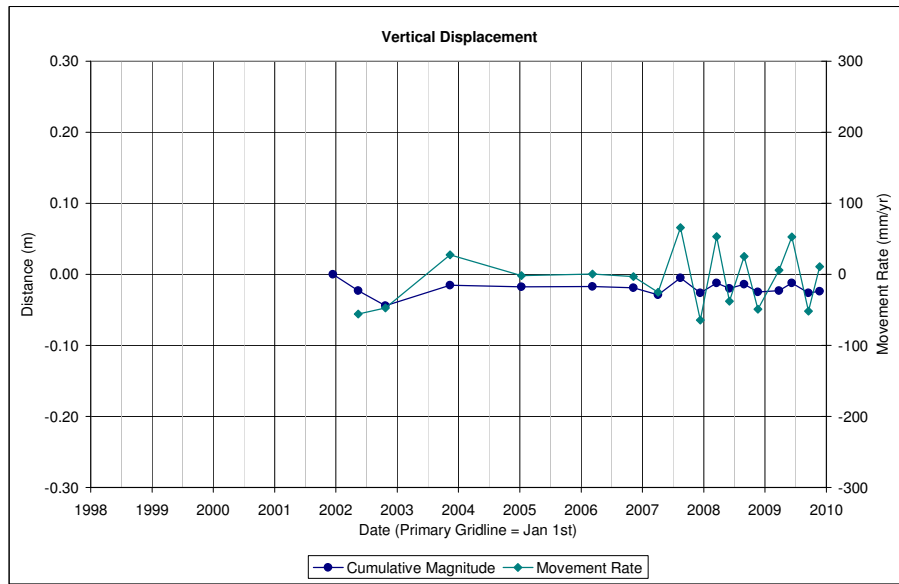
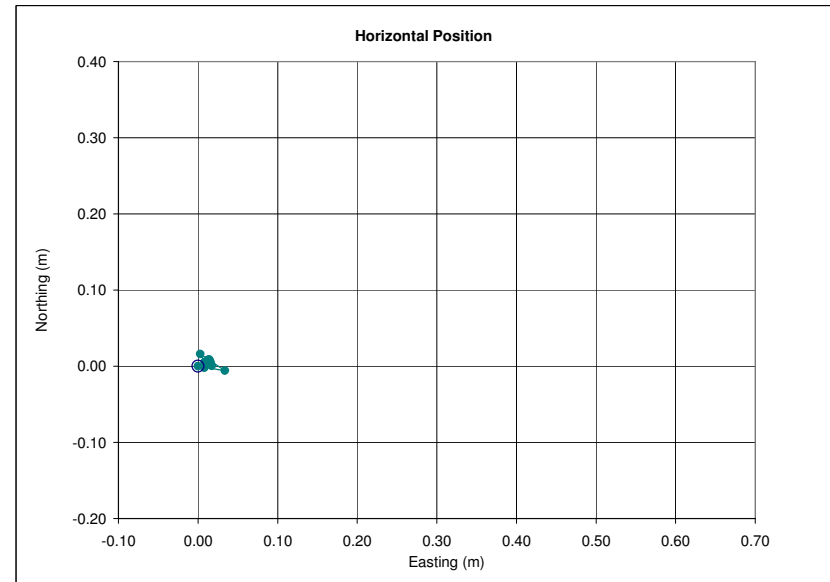
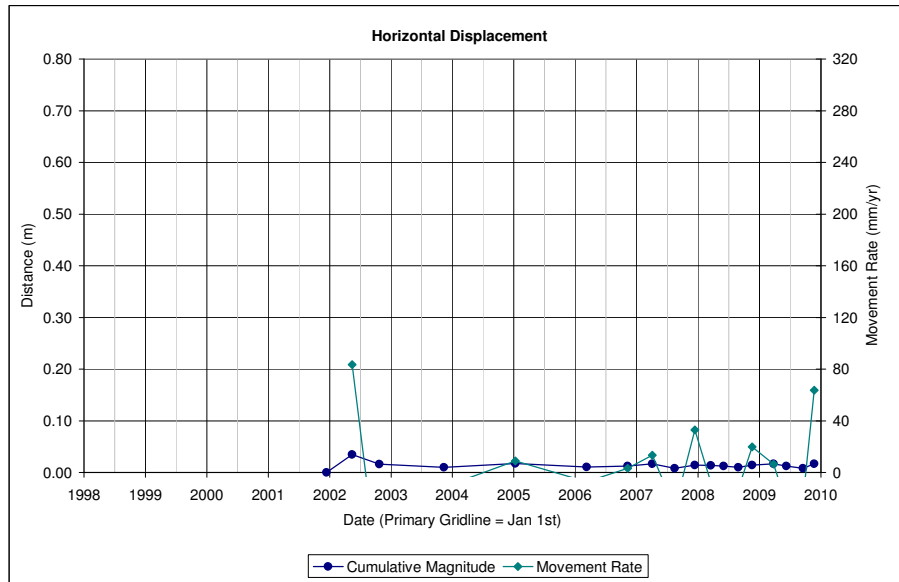
Displacement Graphs - Hub 01-35
Lewis Drive North of Couldwell Street



amec

Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
12/15/2001	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		
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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	53.286
6/3/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	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
9/17/2009	5869315.624	532692.792	476.8																		

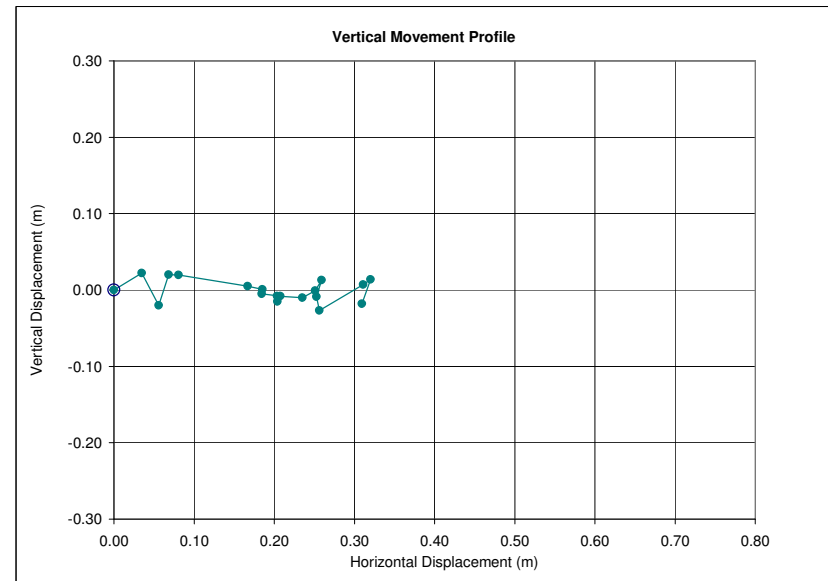
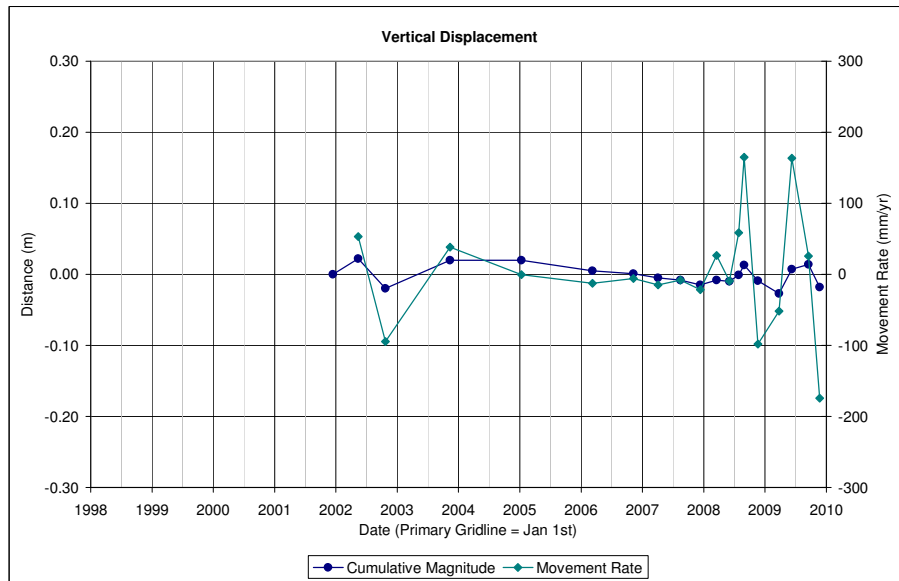
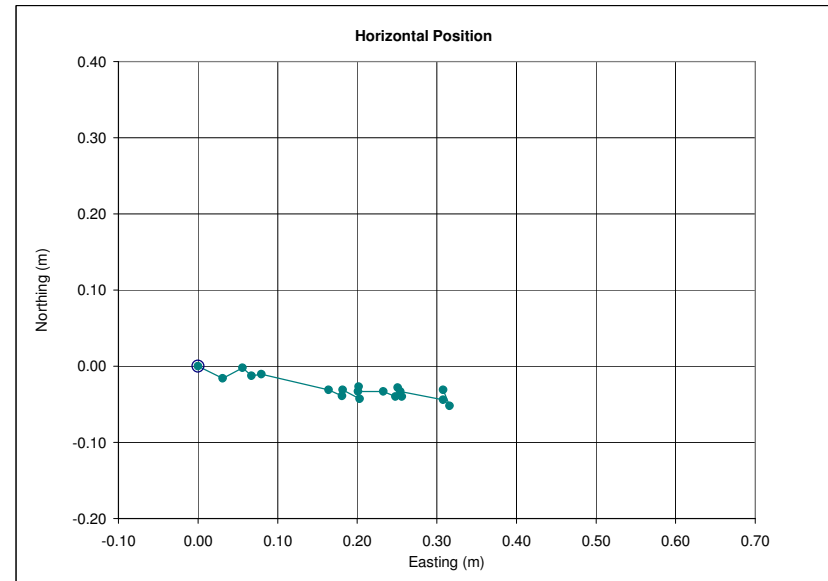
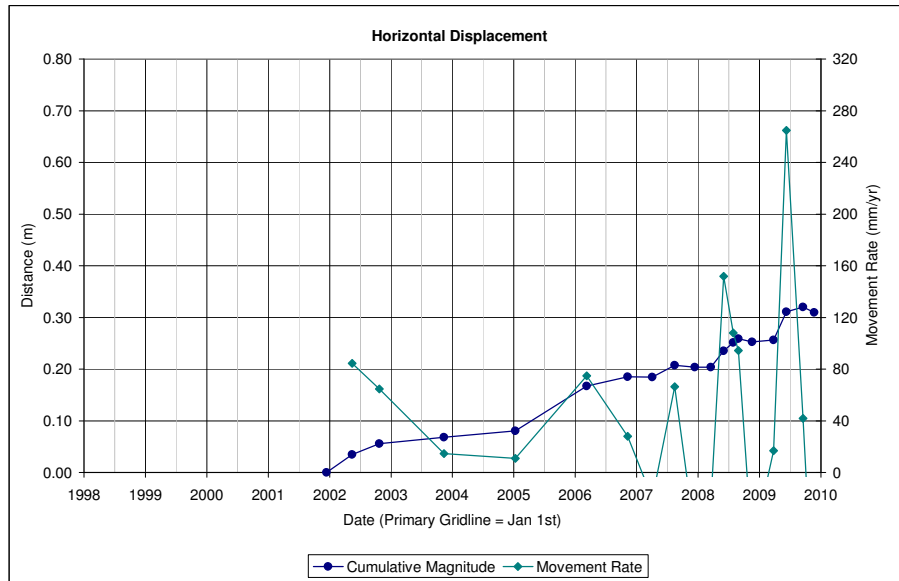
Displacement Graphs - Hub 01-36
Anderson Drive at Abbott Drive



amec

Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
12/15/2001	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		
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
7/29/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	5869644.777	531568.017	545.691																		

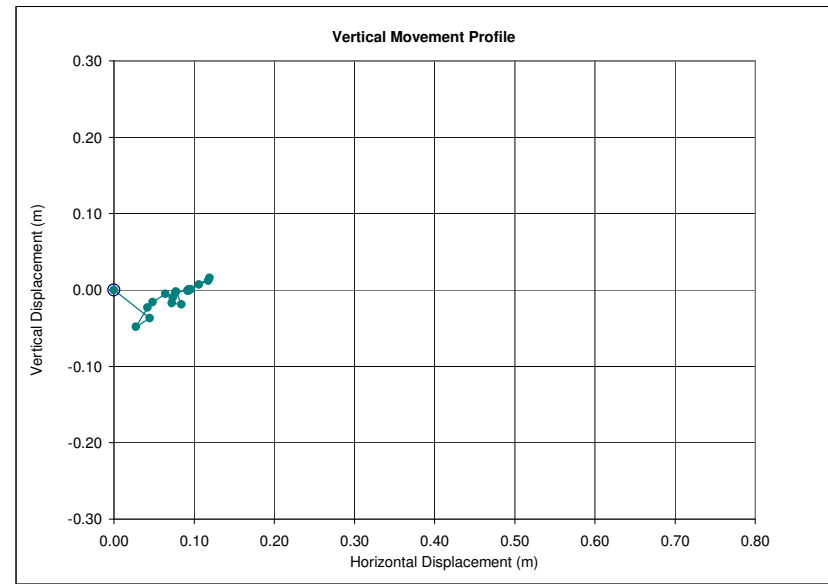
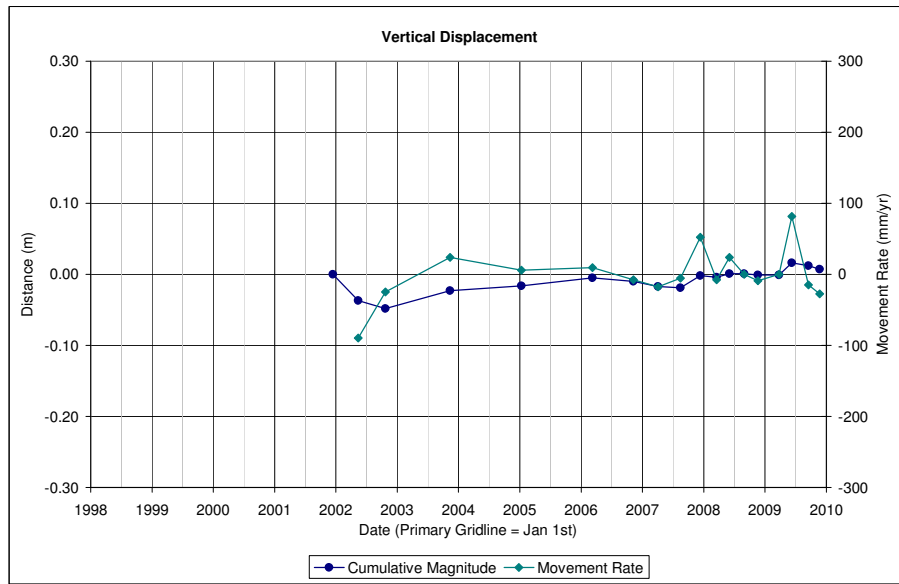
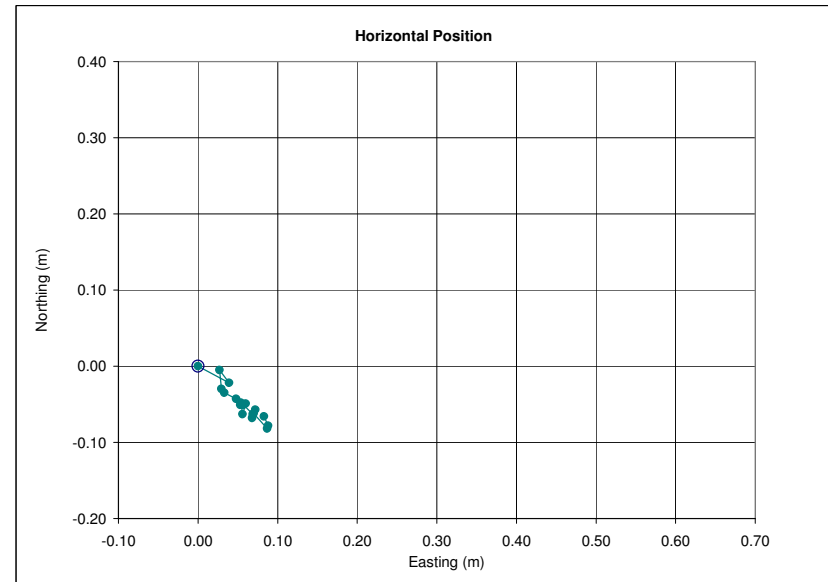
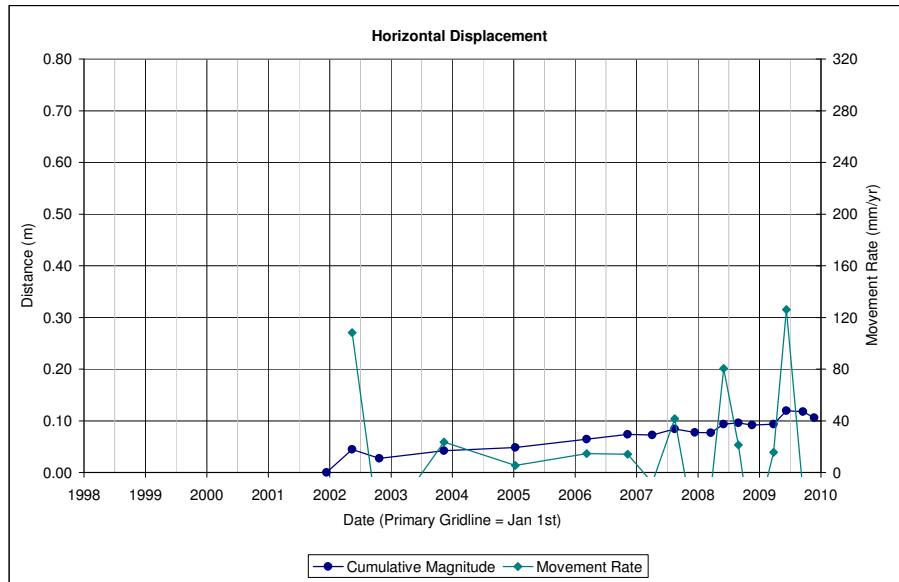
Displacement Graphs - Hub 01-37
Dawson Street at Abbott Drive



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Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
12/15/2001	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		
5/15/2002	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
10/24/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	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
9/17/2009	5869071.875	532474.025	4																		

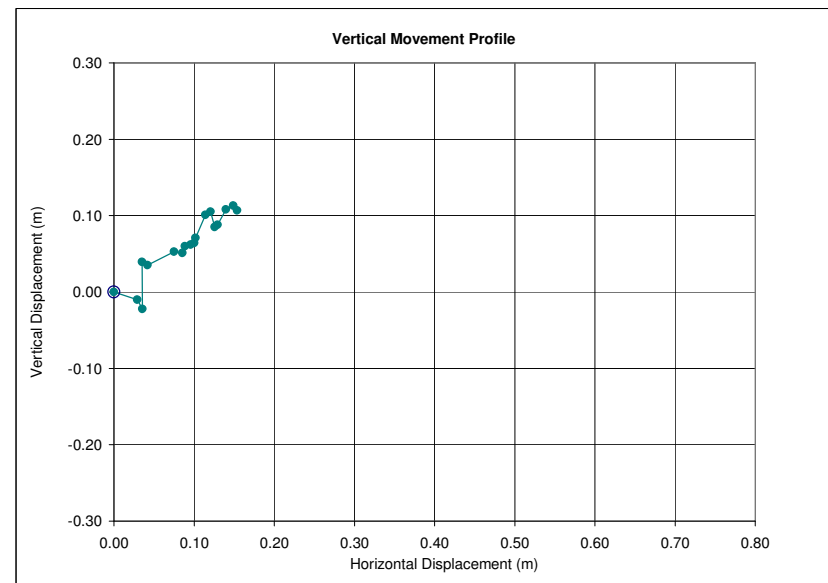
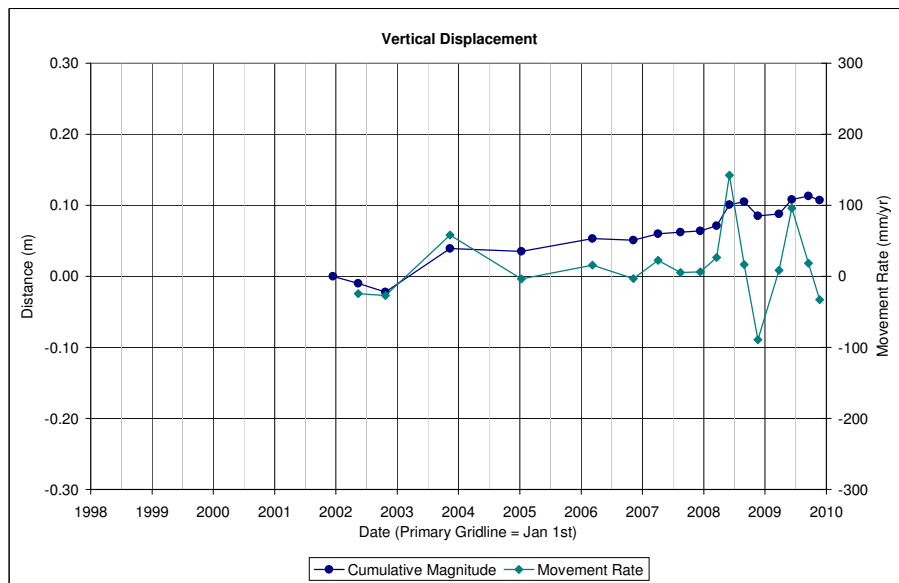
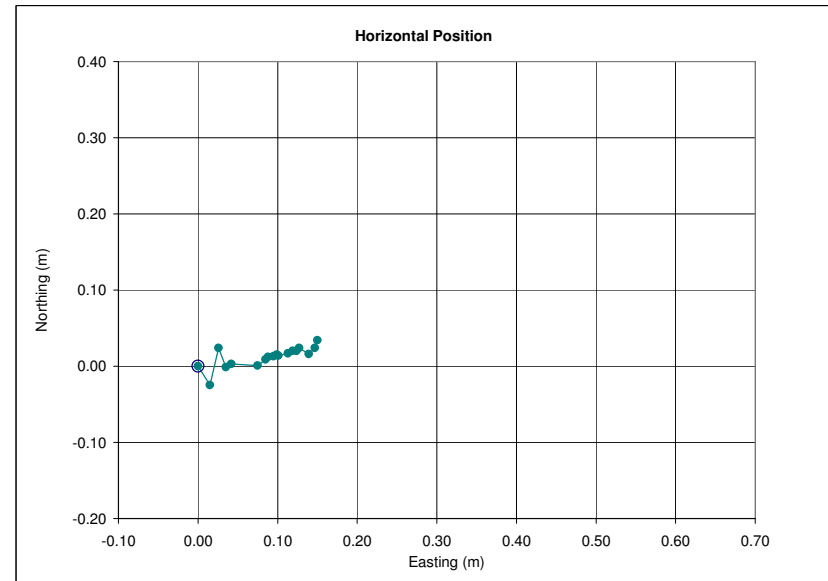
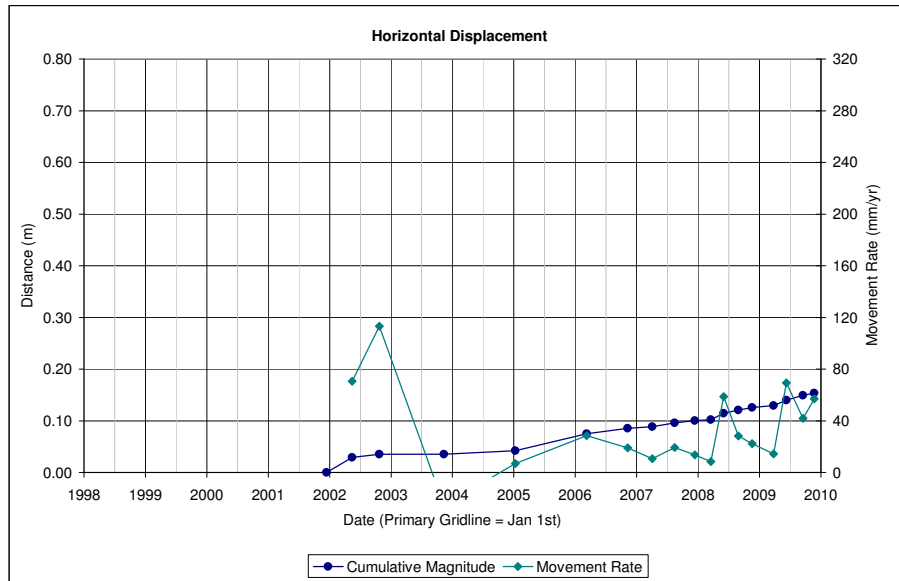
Displacement Graphs - Hub 01-39
Anderson Avenue at Wade Avenue



amec

Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position								Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr	
12/15/2001	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			
5/15/2002	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	
10/24/2002	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	
11/12/2003	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	
1/11/2005	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	
3/10/2006	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	
11/10/2006	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	
4/5/2007	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	
8/16/2007	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	
12/13/2007	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	
3/18/2008	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	
6/3/2008	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	
8/29/2008	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	
11/19/2008	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	
3/26/2009	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	
6/10/2009	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	
9/17/2009	5870303.370	532408.354	493.649</																			

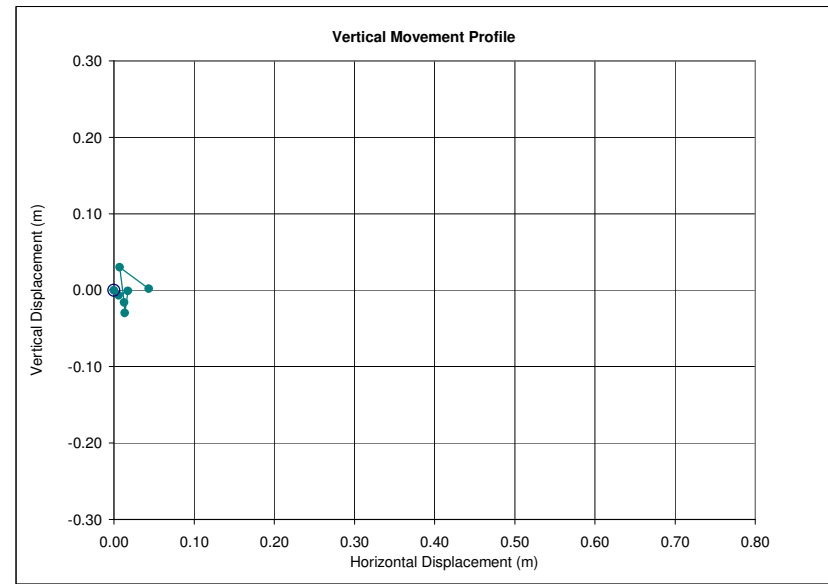
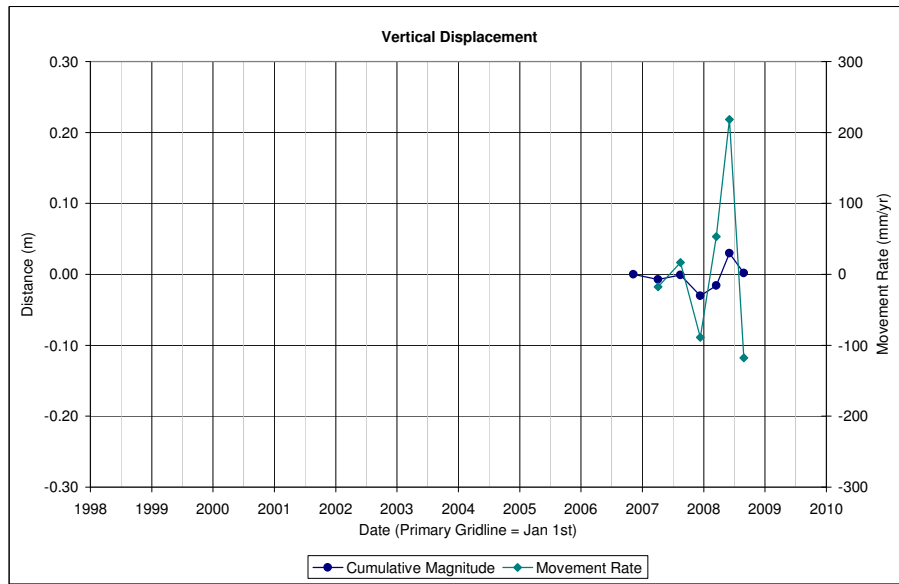
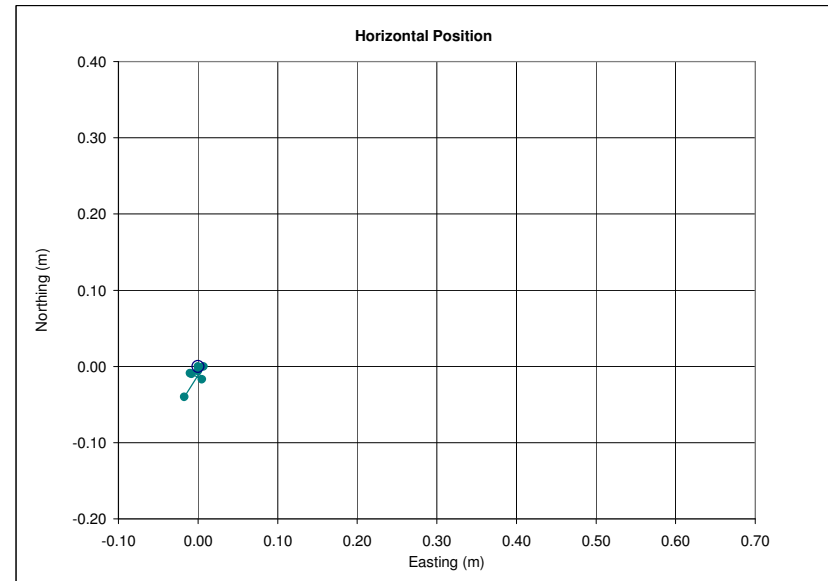
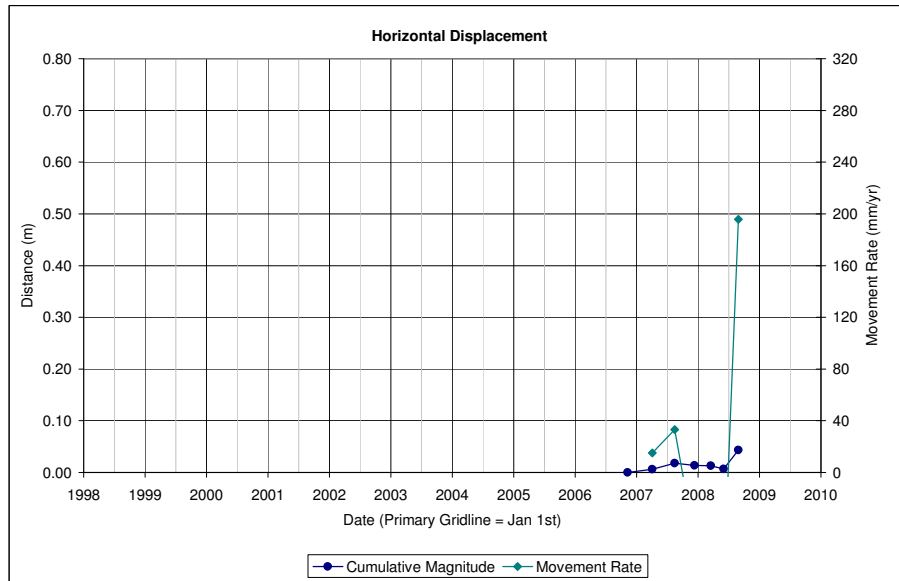
Displacement Graphs - Hub 01-40
Lewis Drive East of Healy Street



Survey and Displacement Data - Hub 06-01
End alley E. of Anderson Dr., opposite school

[illegible]

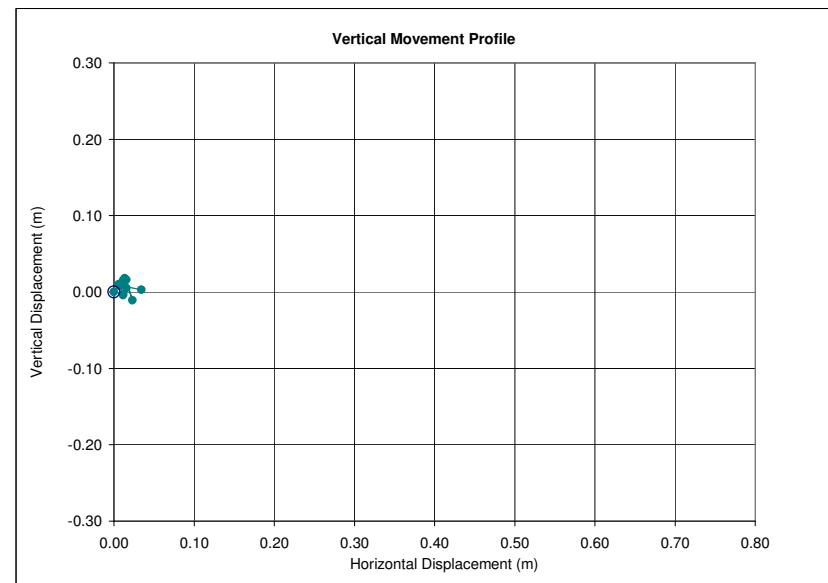
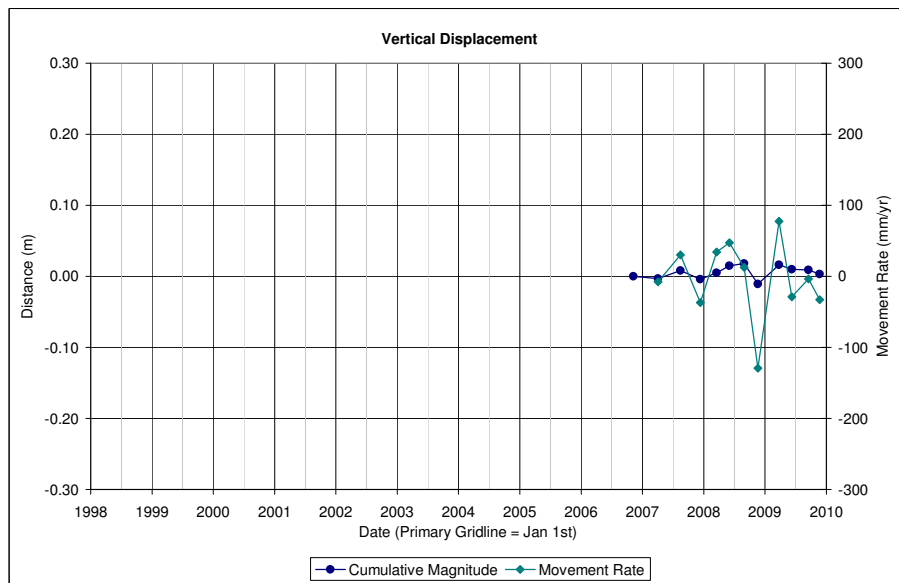
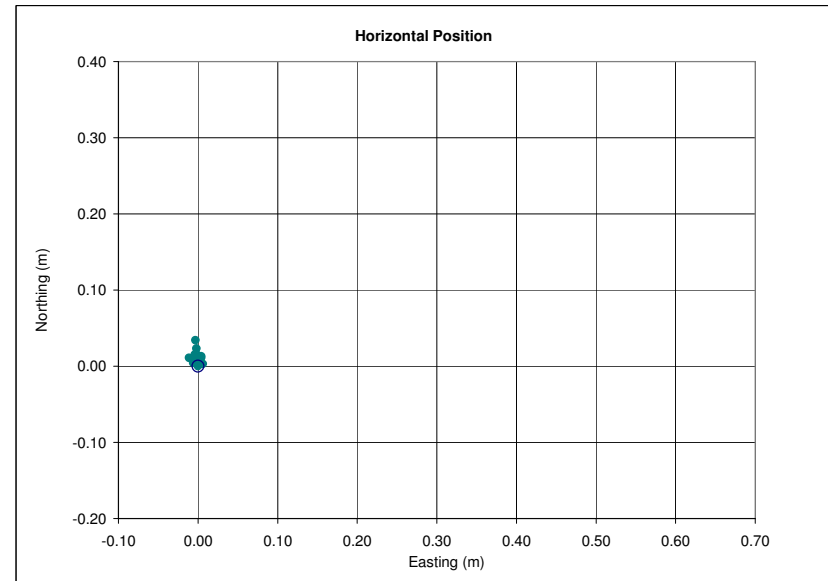
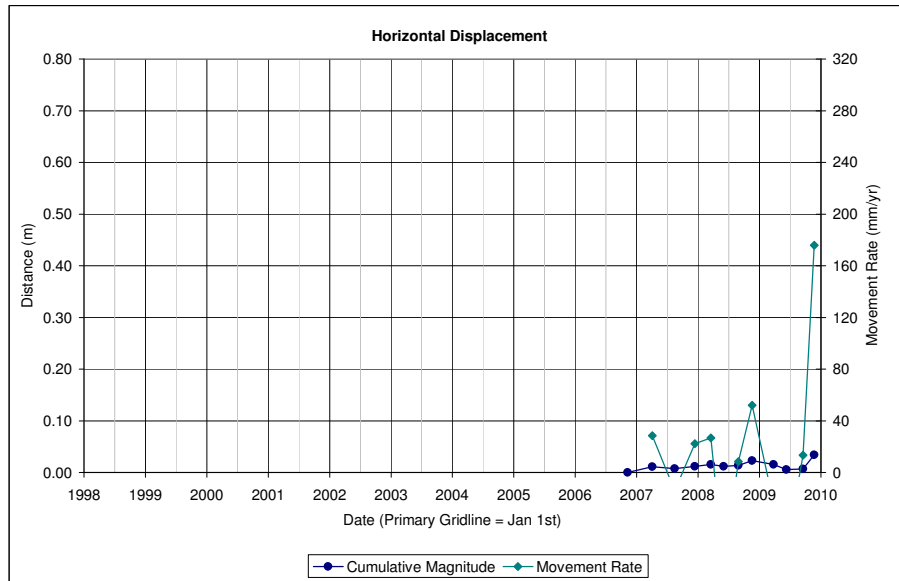
Displacement Graphs - Hub 06-01
End alley E. of Anderson Dr., opposite school



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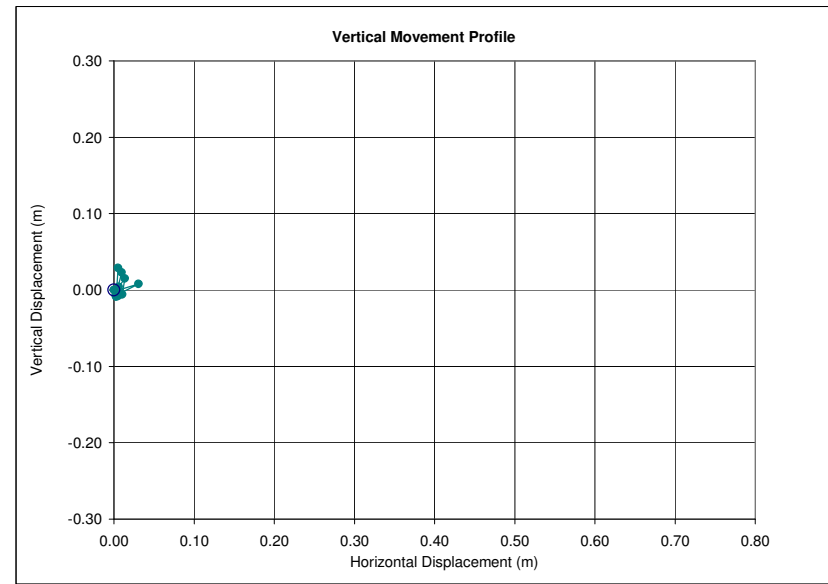
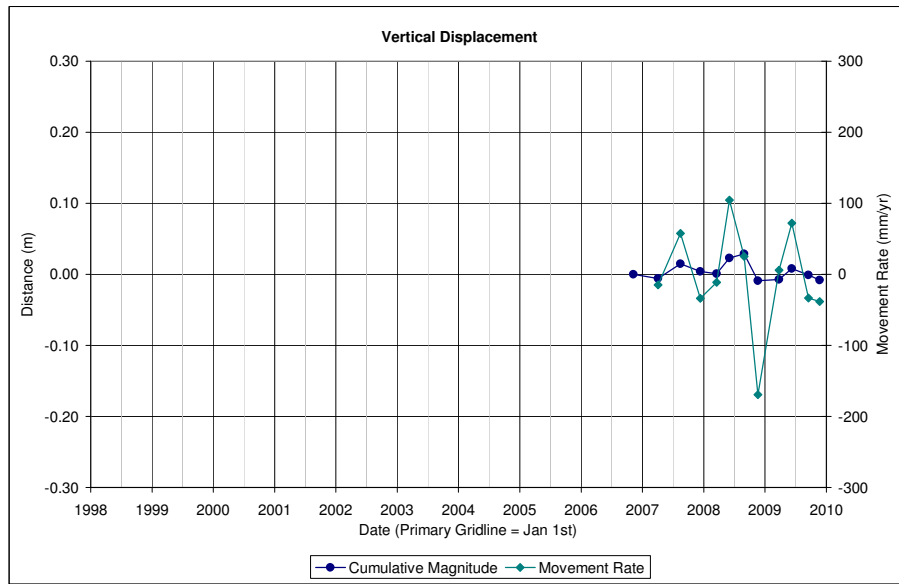
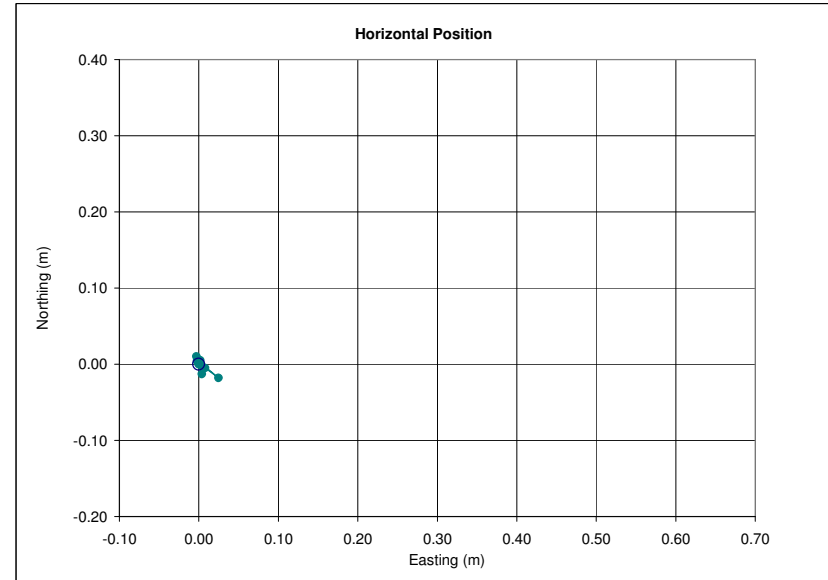
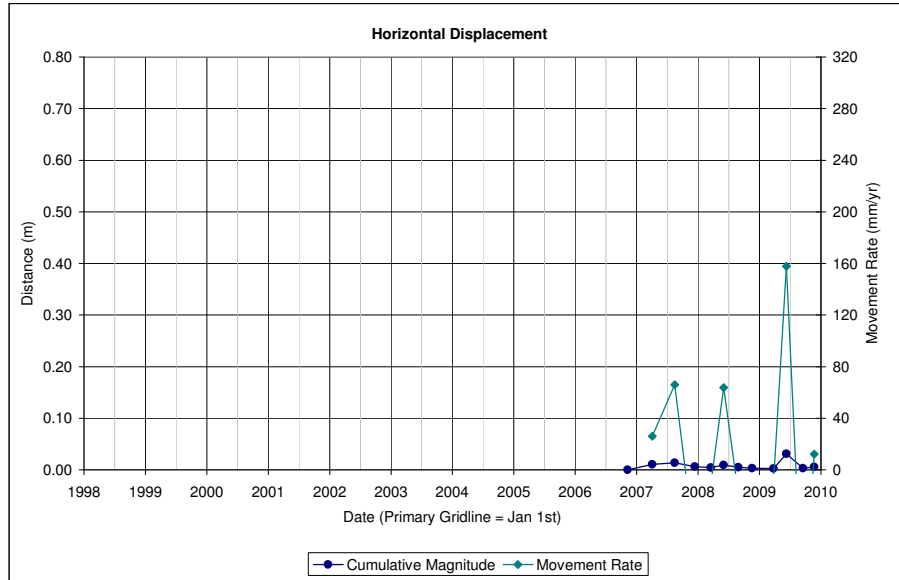
Displacement Graphs - Hub 06-02
East side Anderson Drive by school



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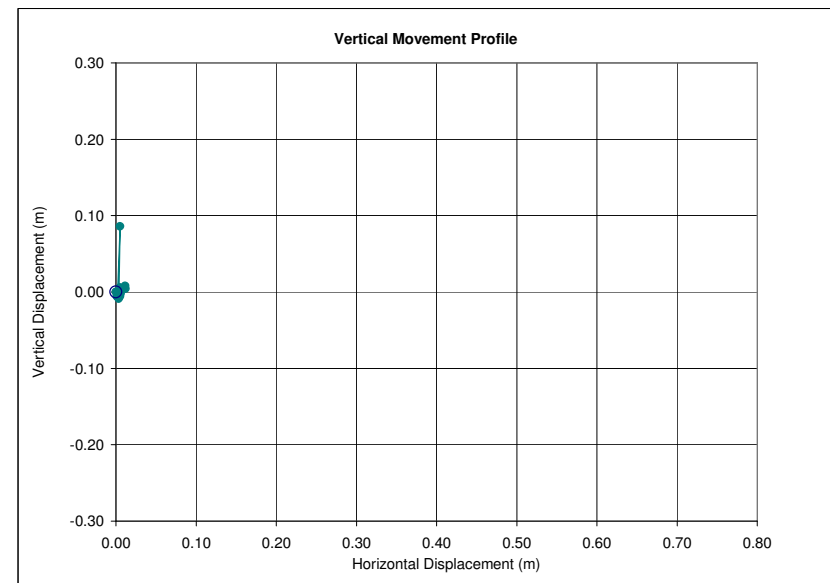
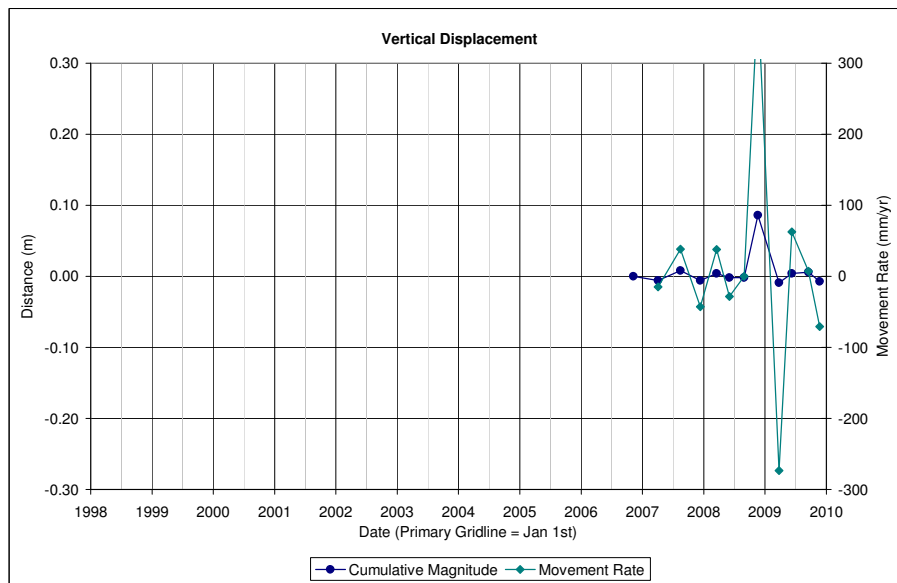
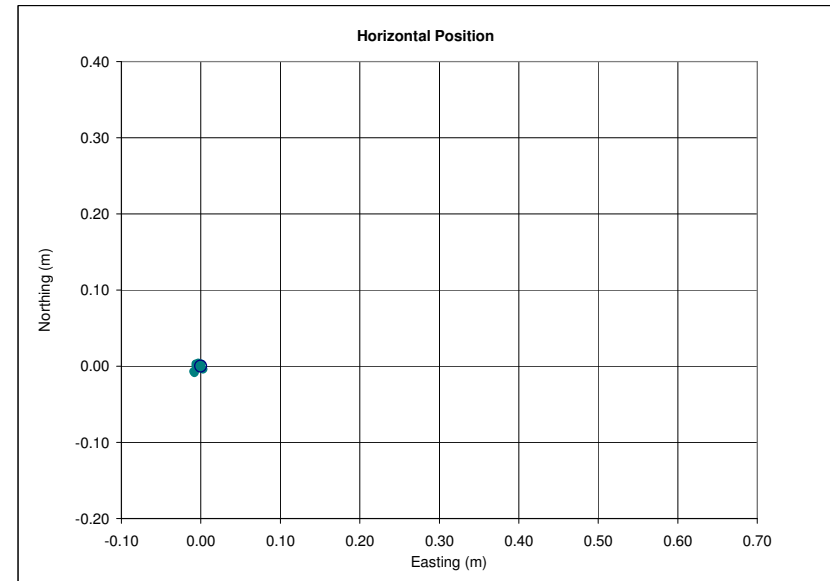
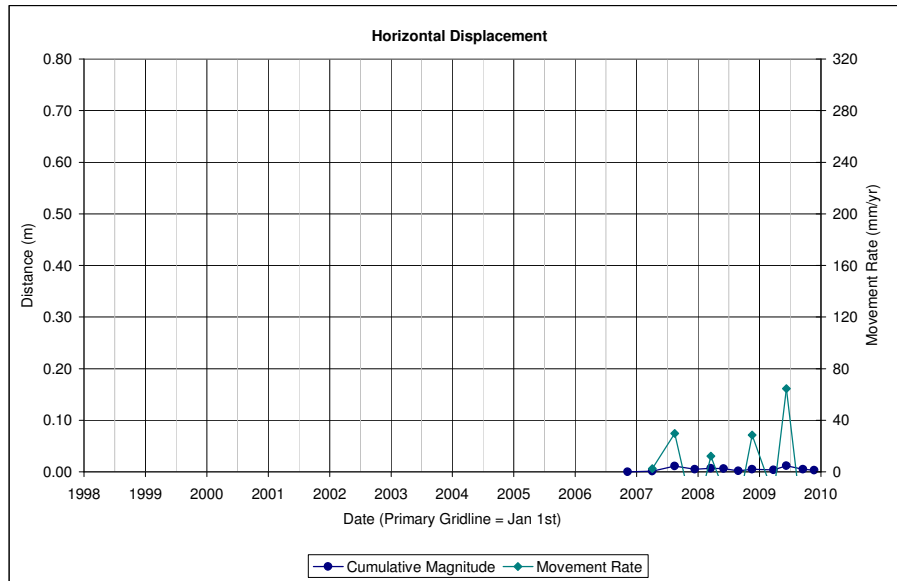
Displacement Graphs - Hub 06-03
West side Anderson Dr., opposite school yard



amec

[illegible]

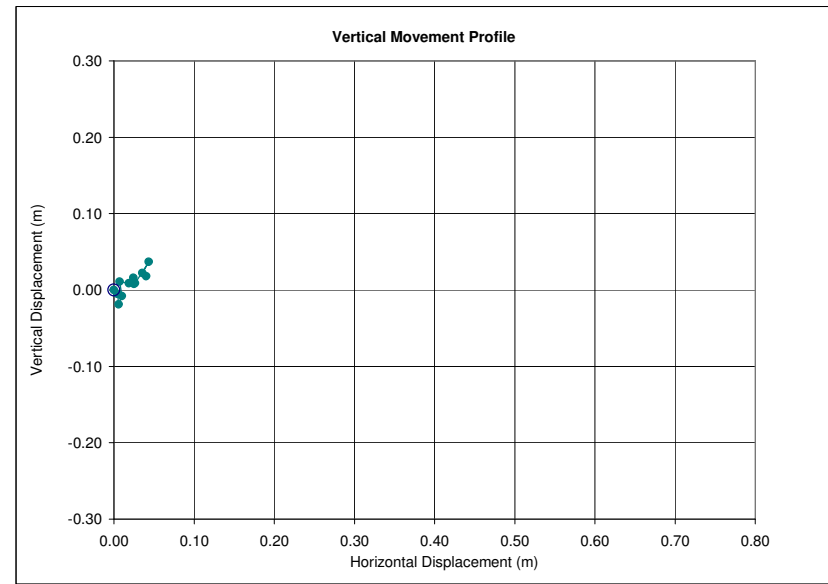
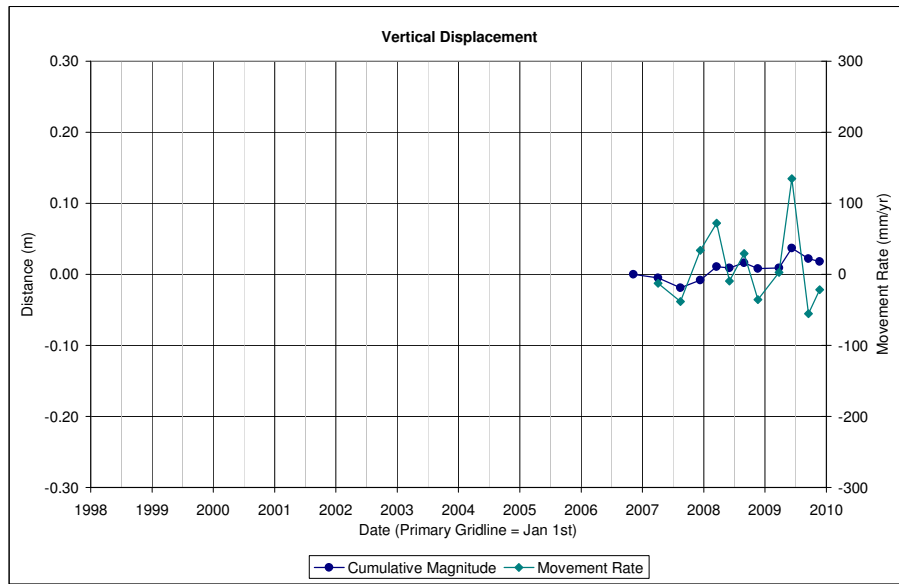
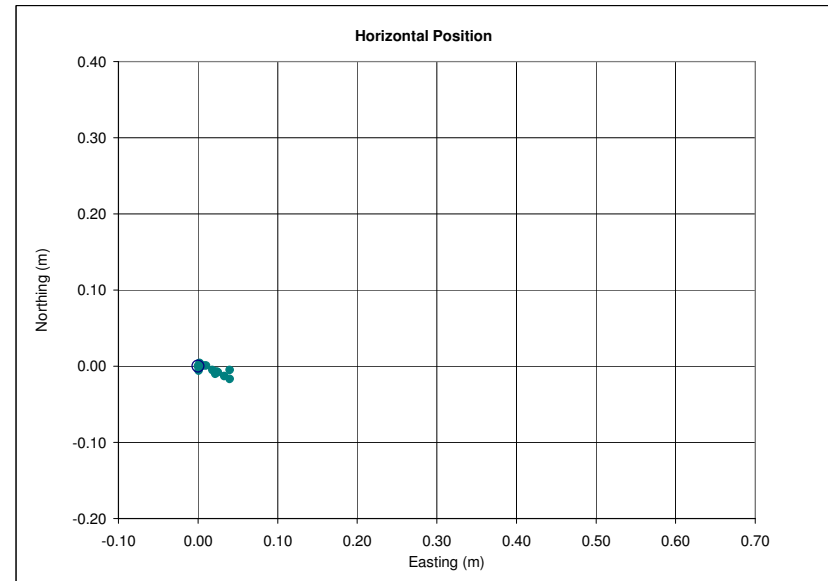
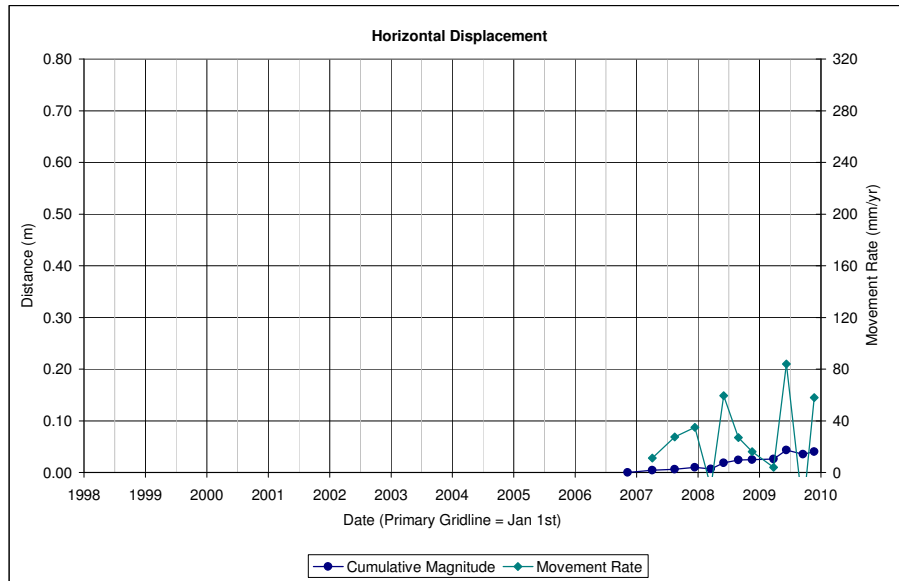
Displacement Graphs - Hub 06-04
North side Wade Ave, one lot E. Anderson Dr.



Survey and Displacement Data - Hub 06-05
Anderson Drive west side, one lot S. of Avison

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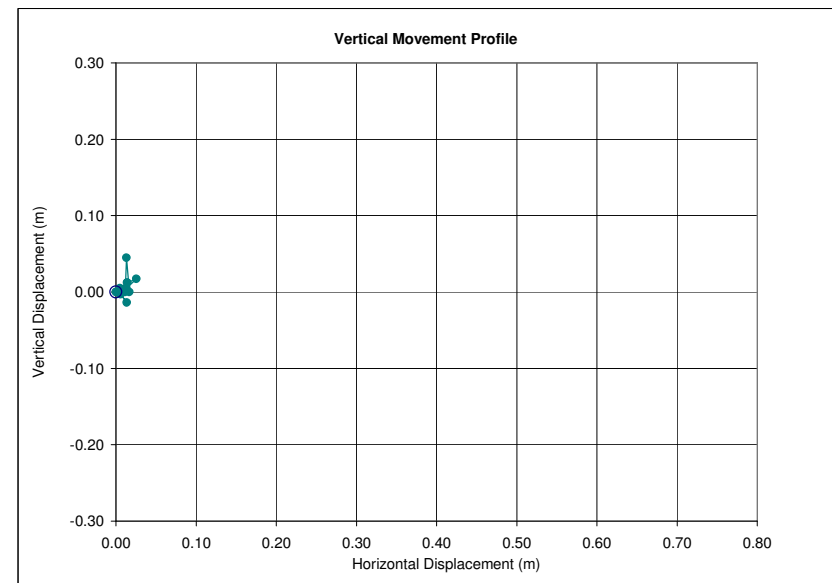
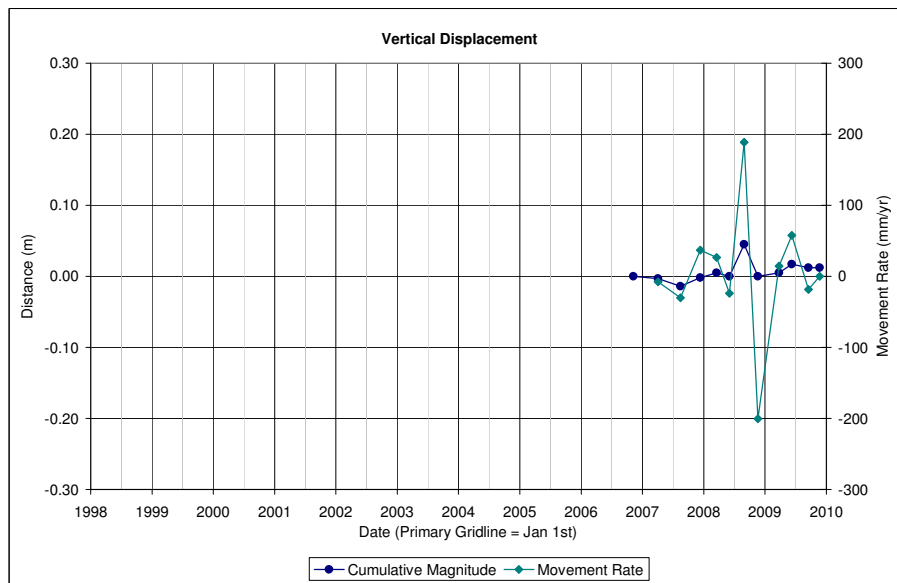
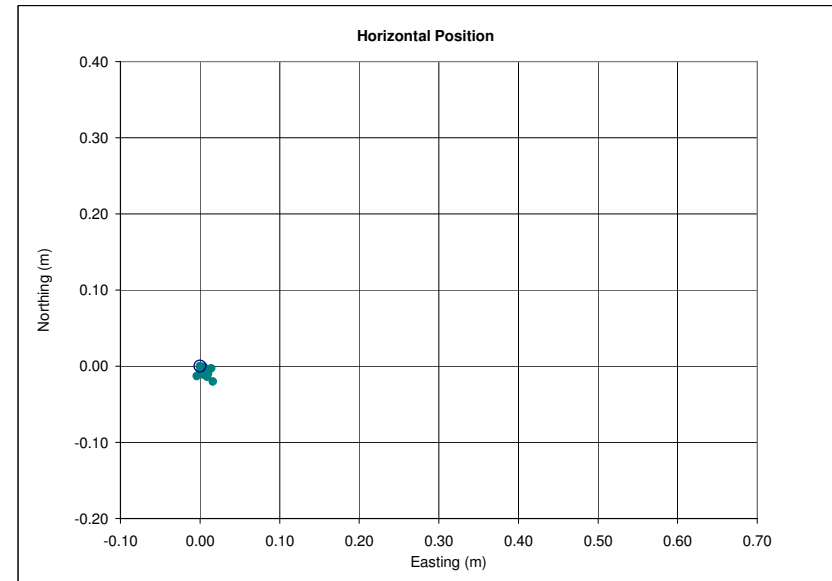
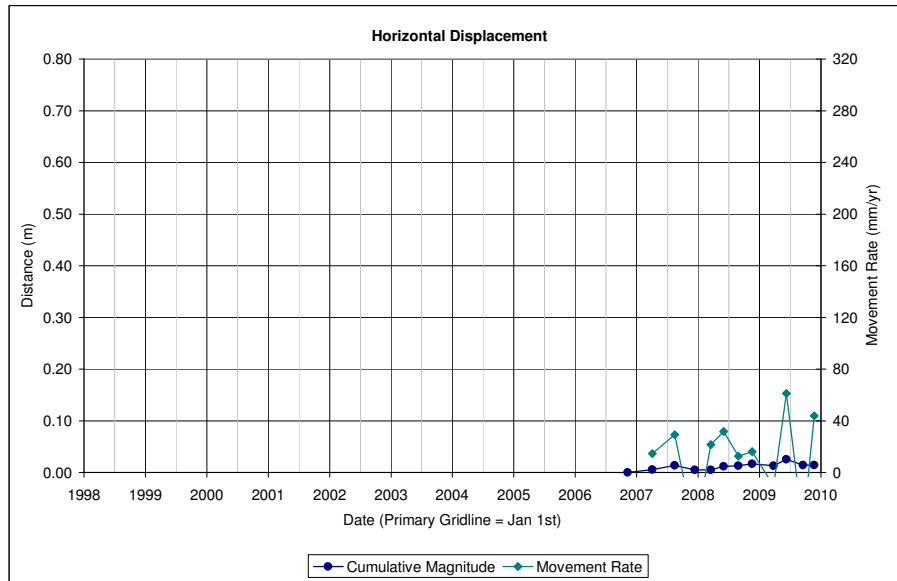
Displacement Graphs - Hub 06-05
Anderson Drive west side, one lot S. of Avison



amec

[illegible]

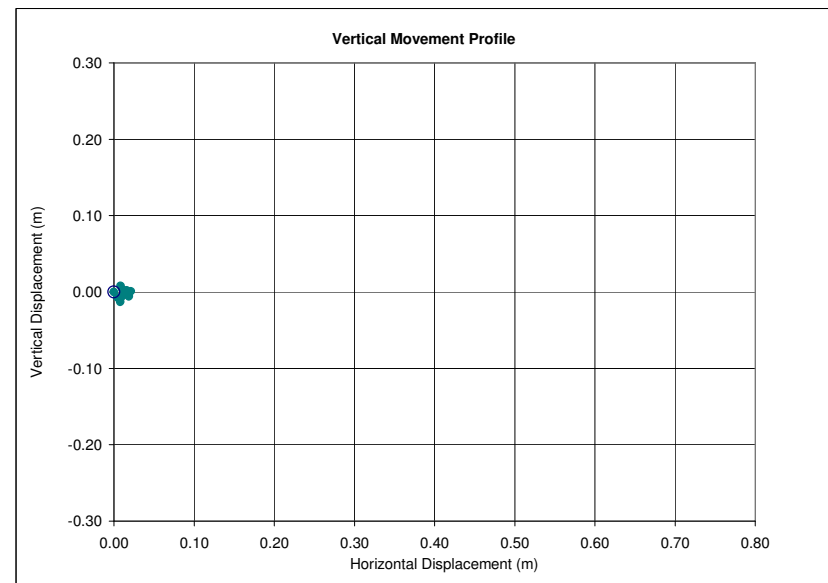
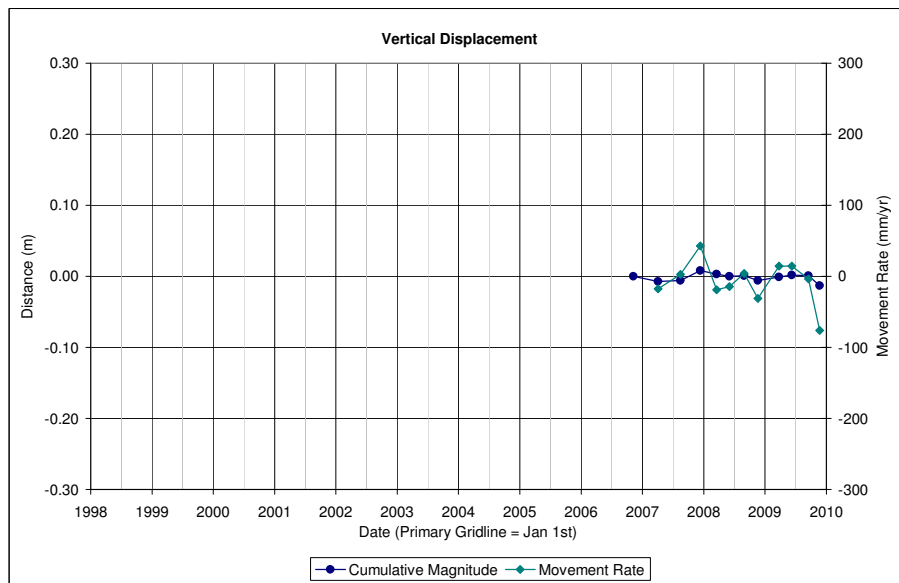
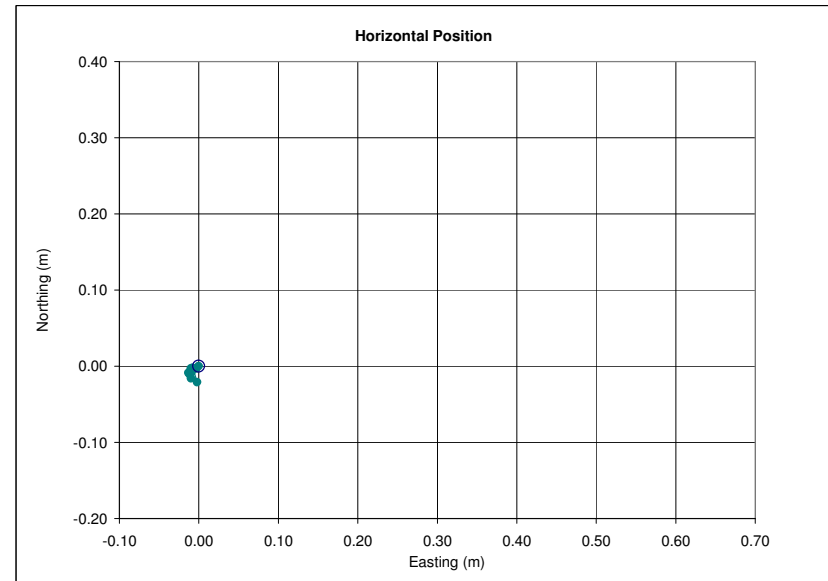
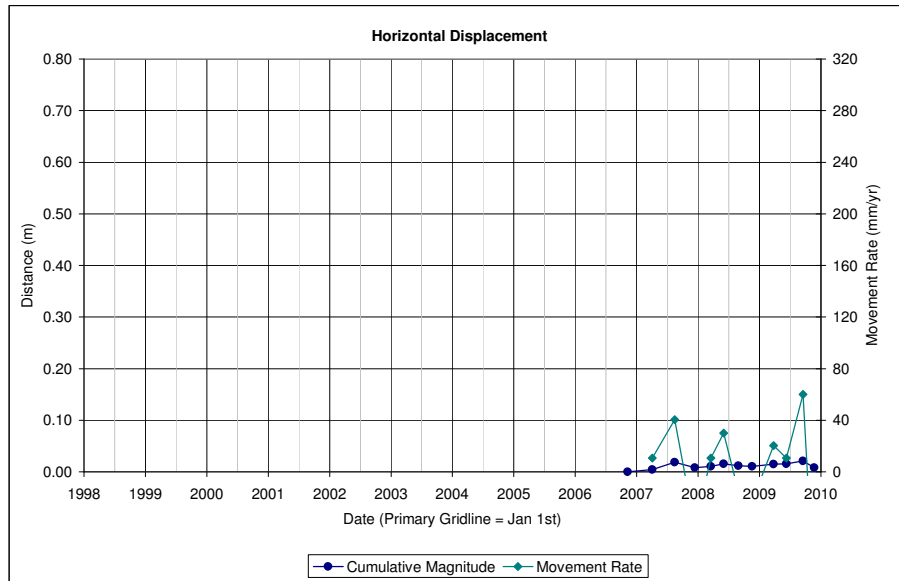
Displacement Graphs - Hub 06-06
North corner Avery Ave / Anderson Drive



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[illegible]

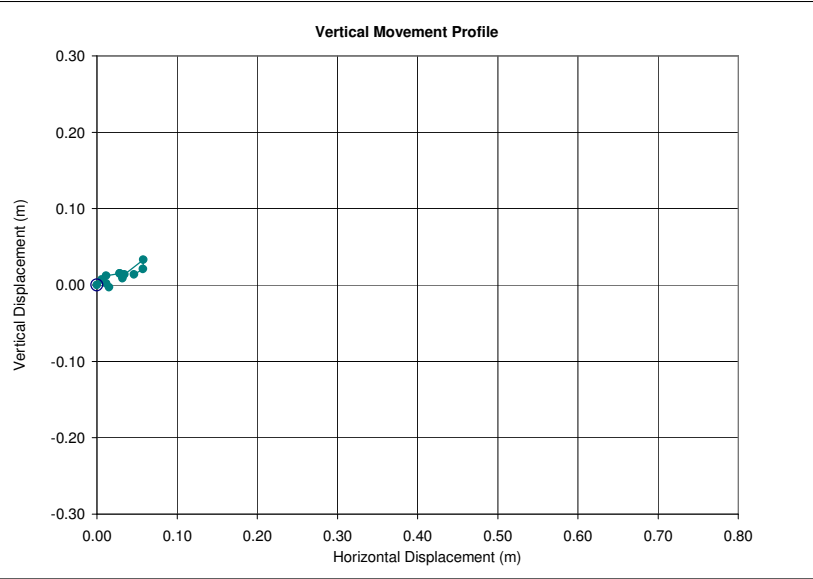
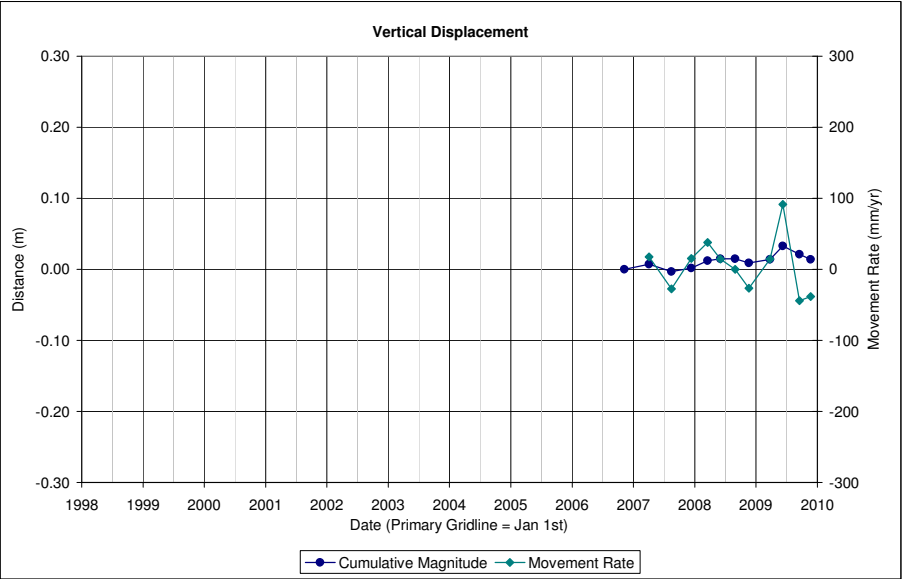
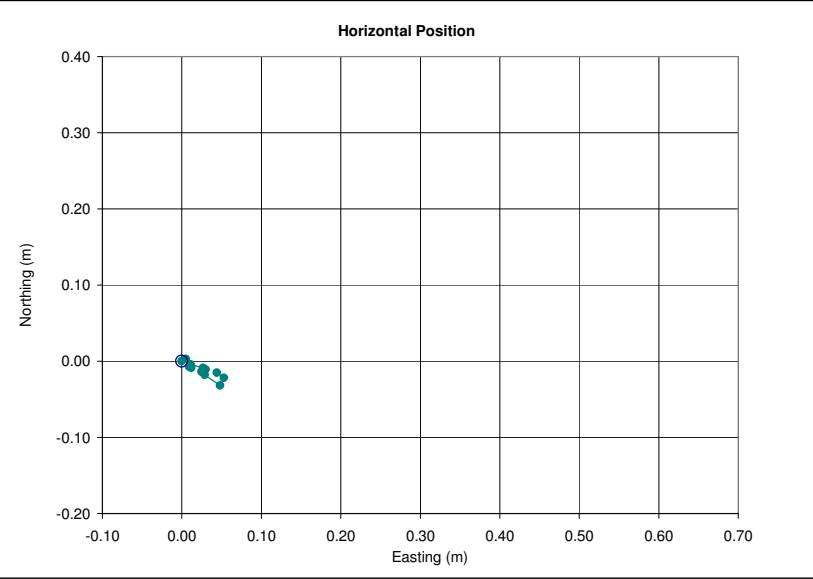
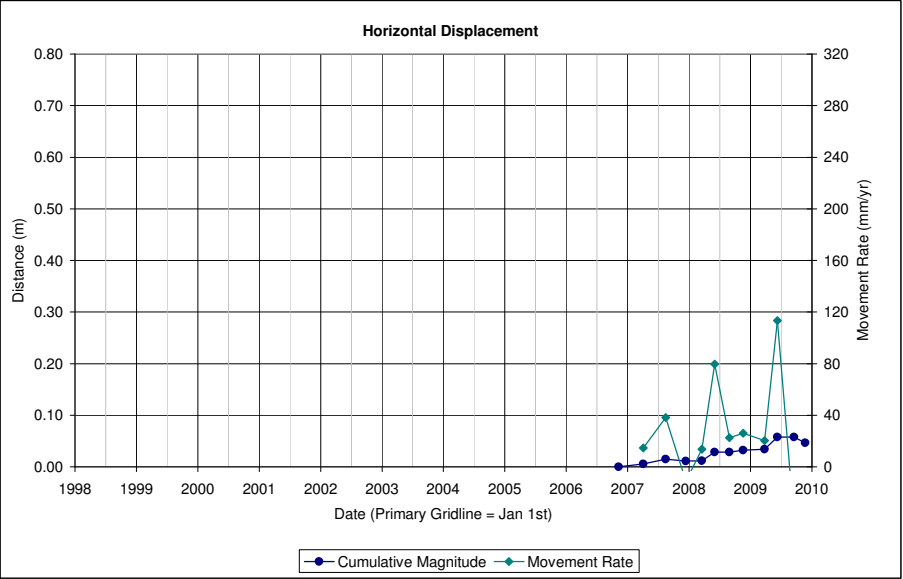
Displacement Graphs - Hub 06-07
NE. corner Boyd Street / Abbott Rd.



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[illegible]

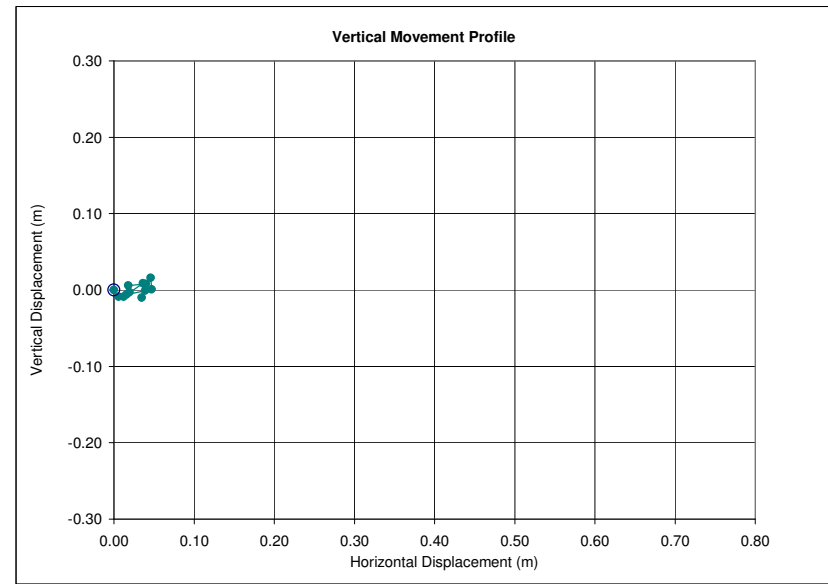
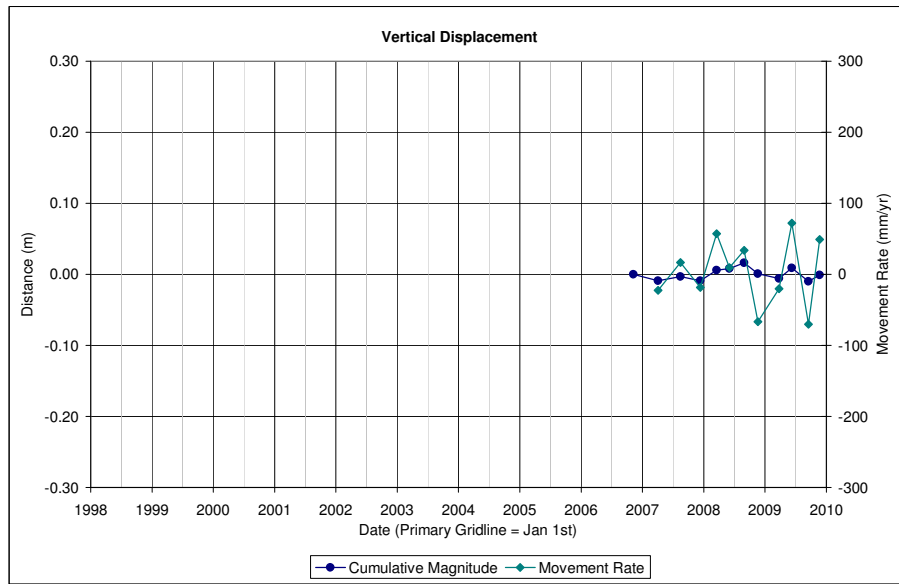
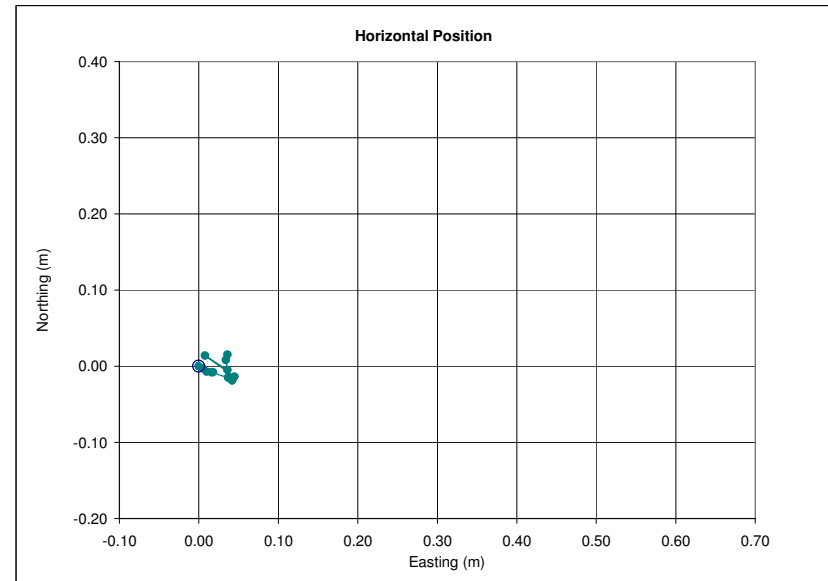
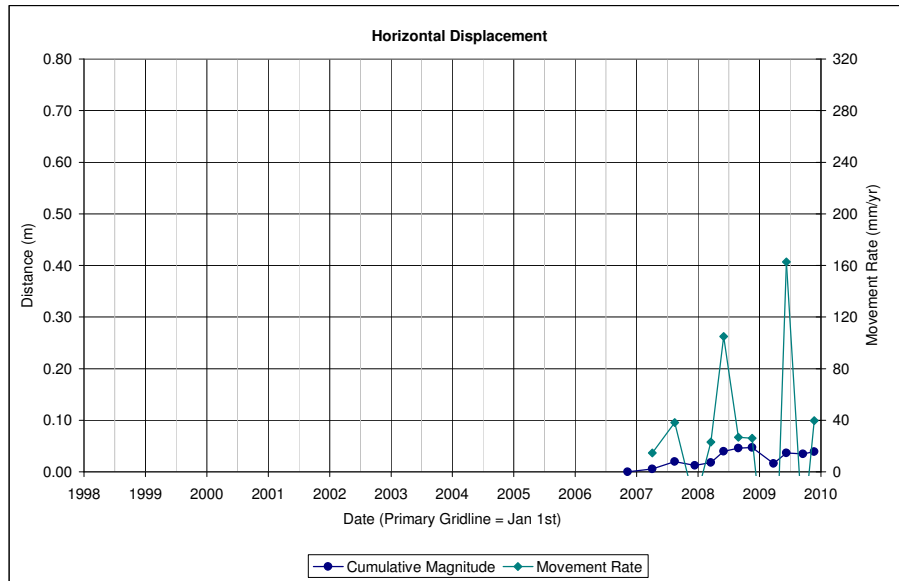
Displacement Graphs - Hub 06-08
North side Abbott Road., alley E. Beath Street



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[illegible]

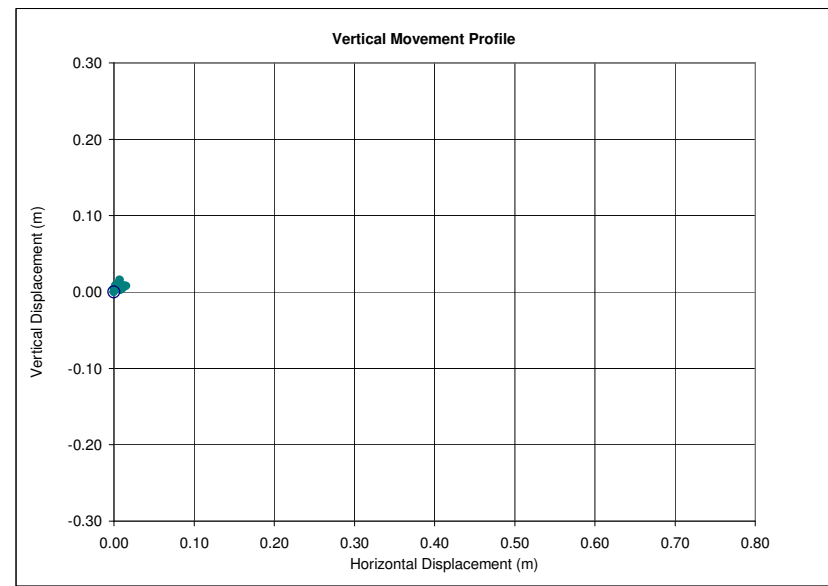
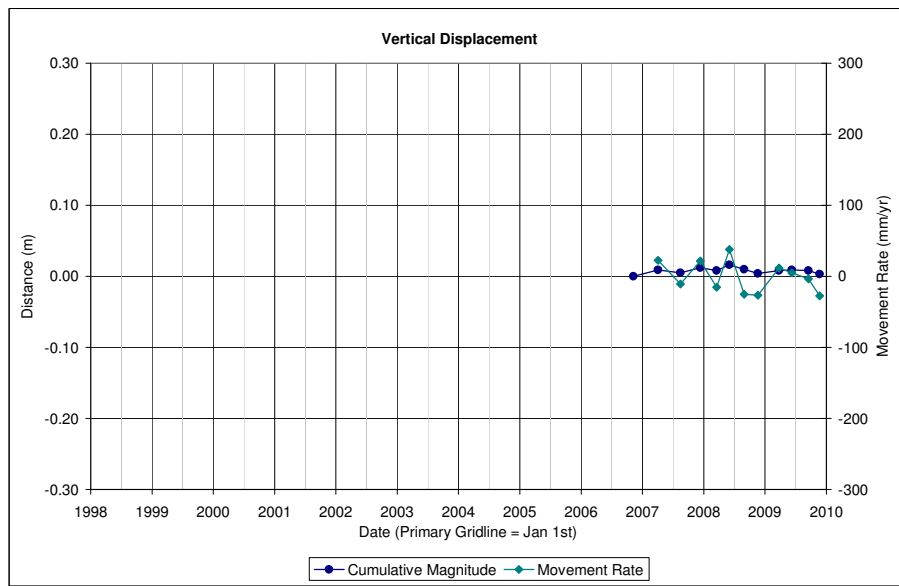
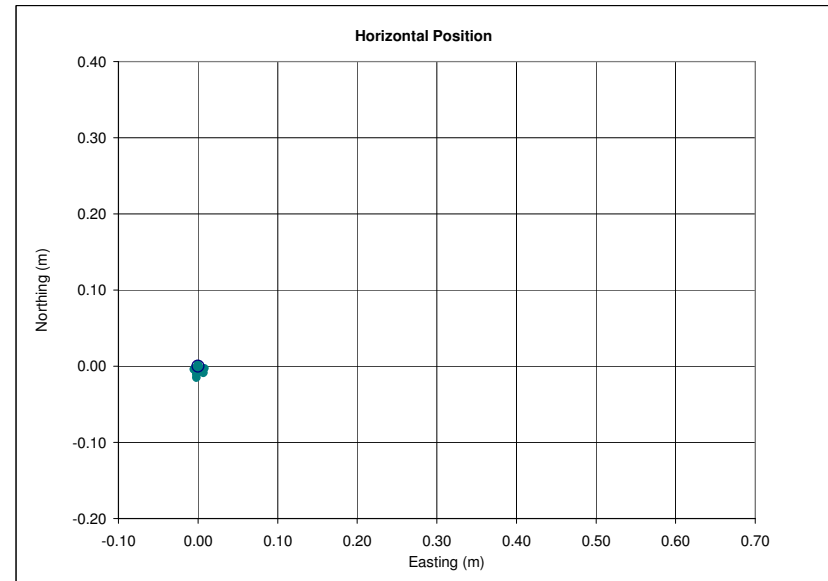
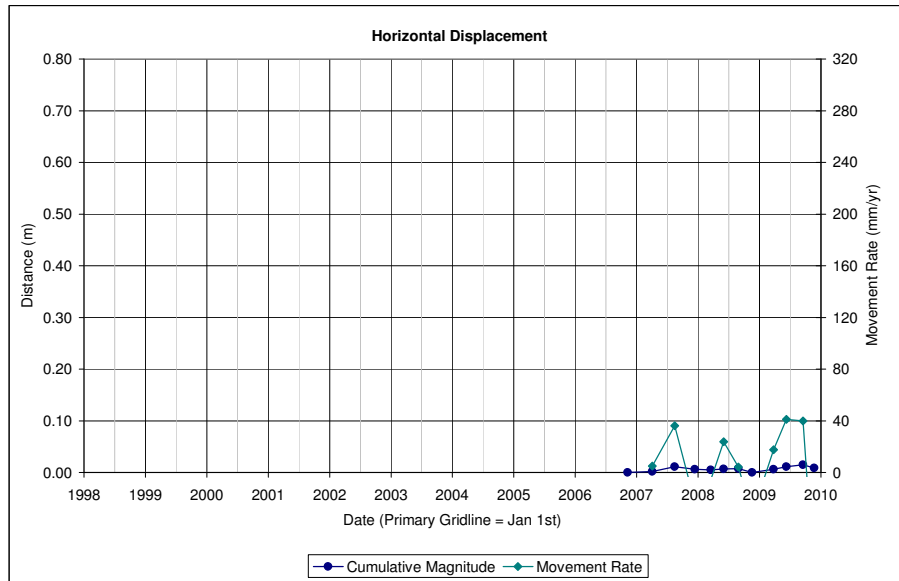
Displacement Graphs - Hub 06-09
East side Bouchie Street



amec

[illegible]

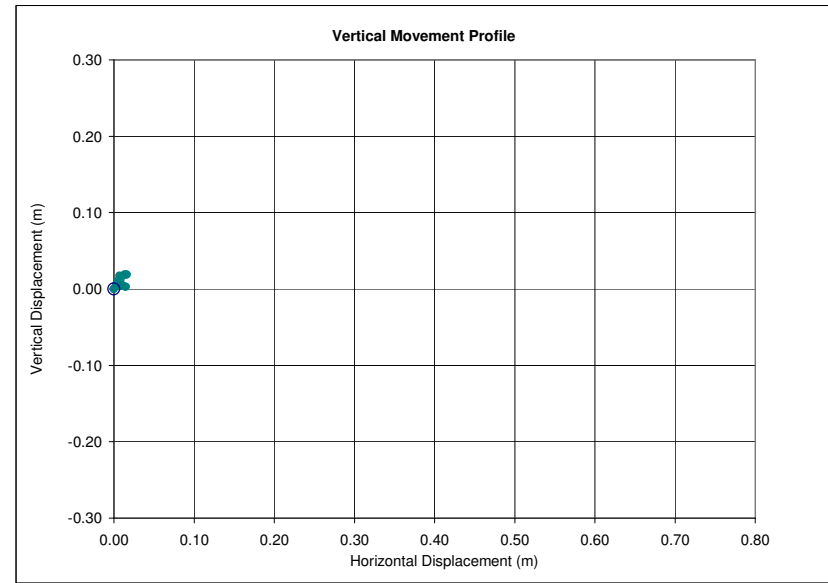
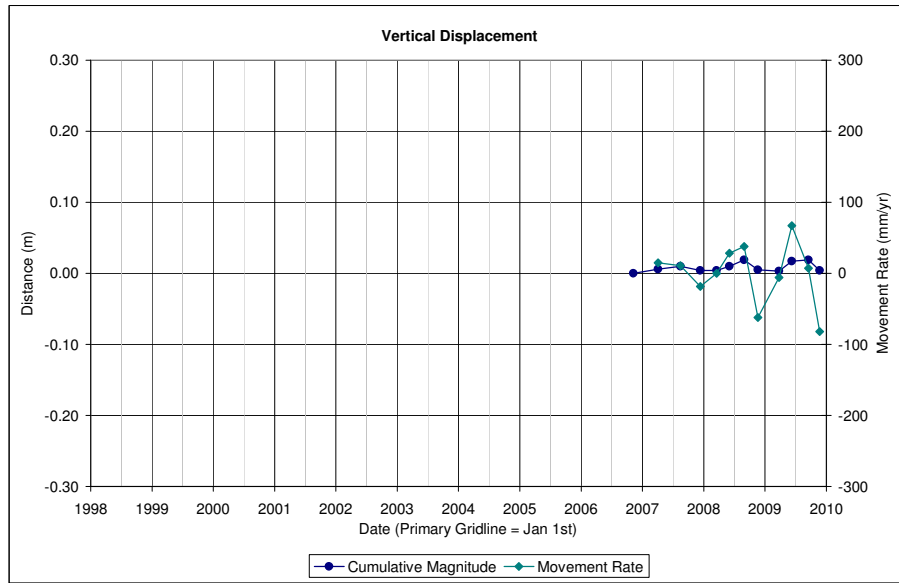
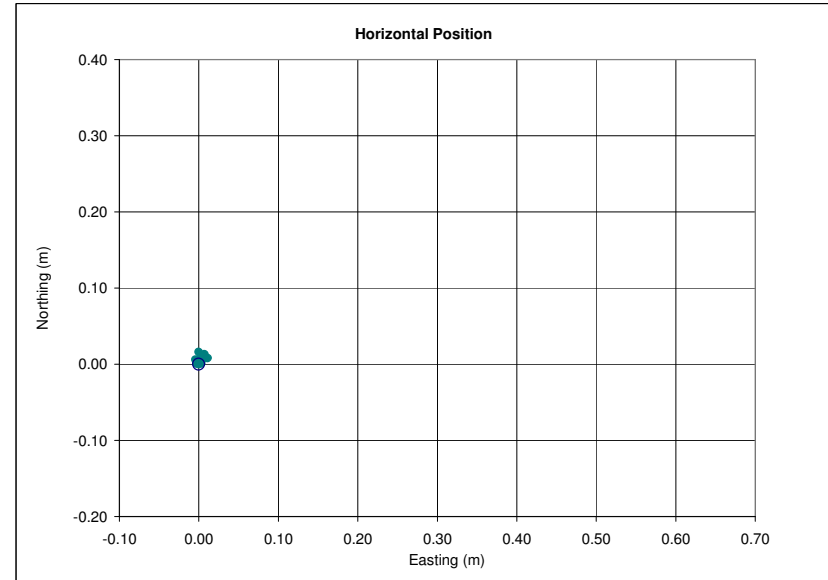
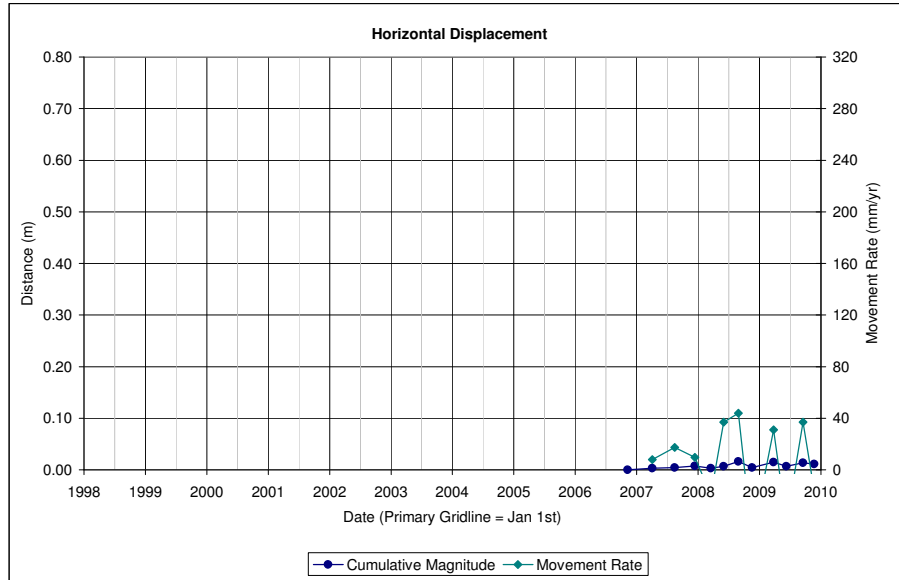
Displacement Graphs - Hub 06-10
South side Broughton Street



amec

[illegible]

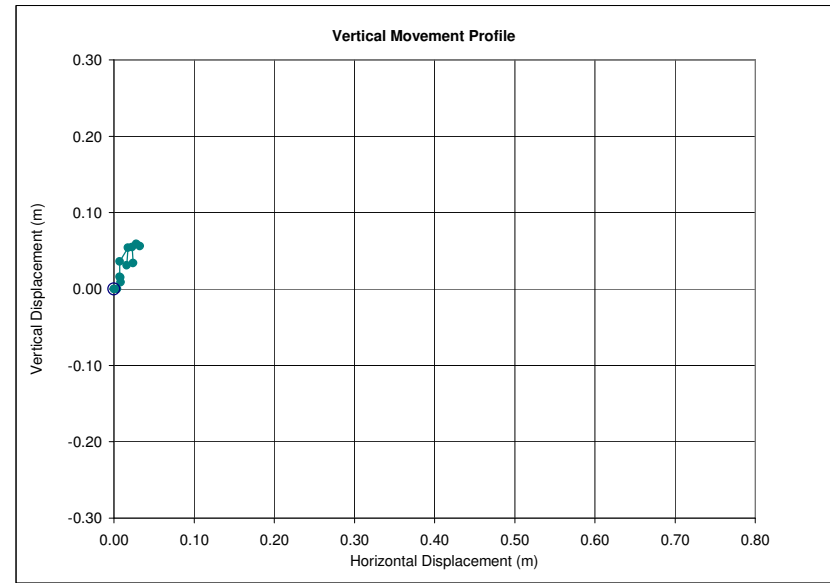
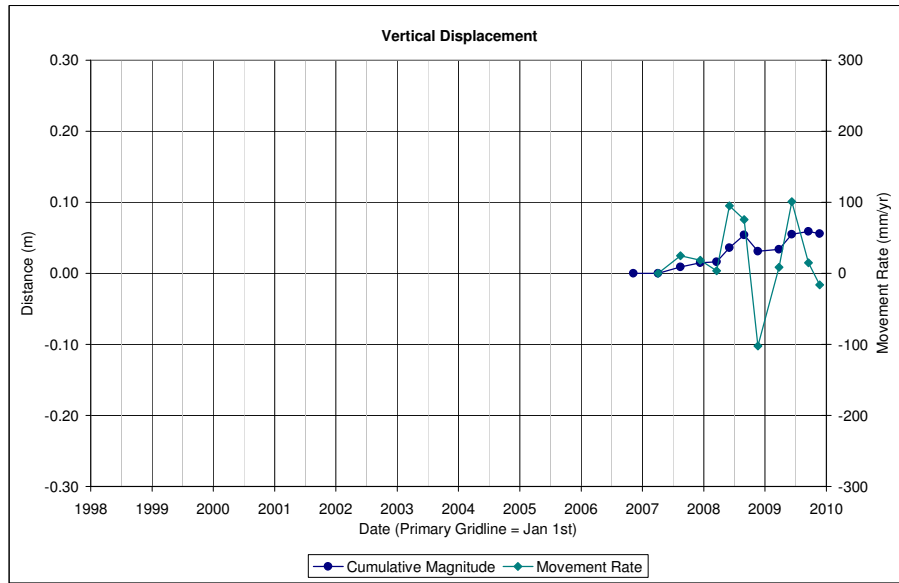
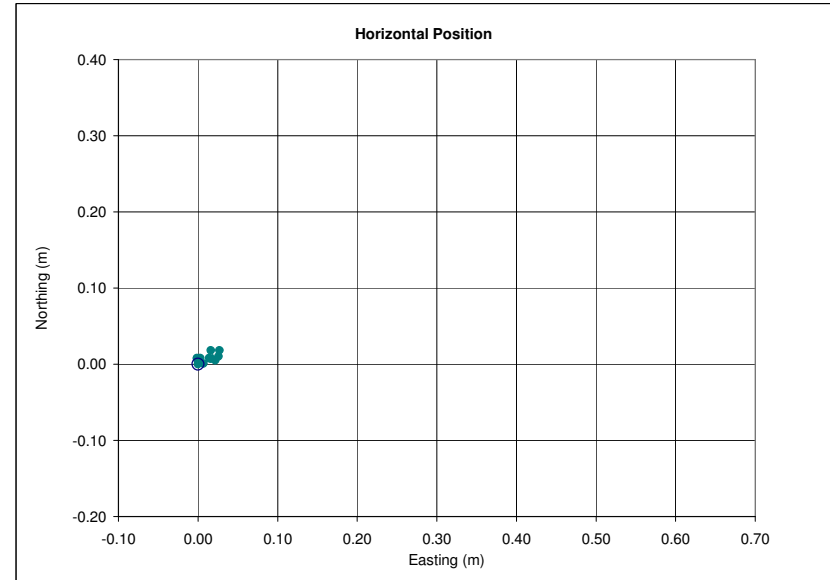
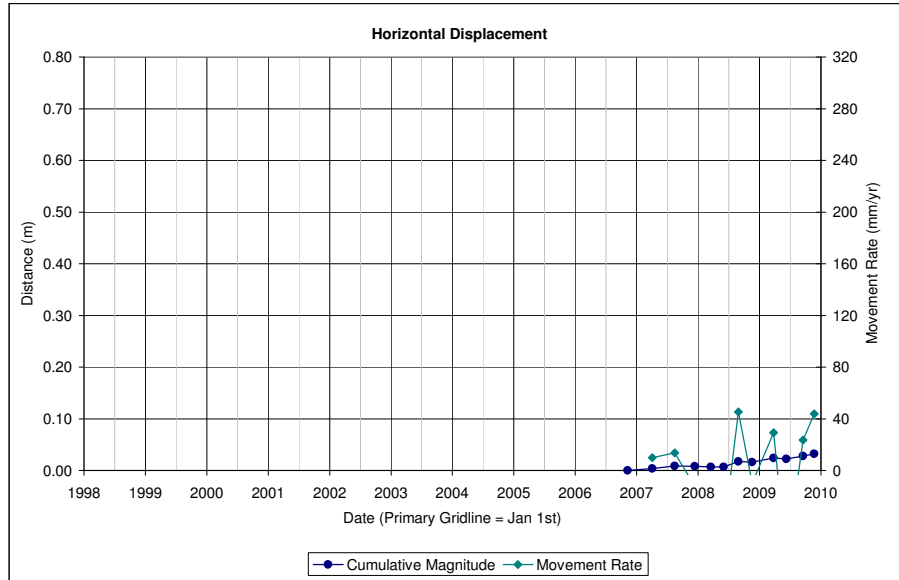
Displacement Graphs - Hub 06-11
East side Lewis Road, opposite house # 391



amec

[illegible]

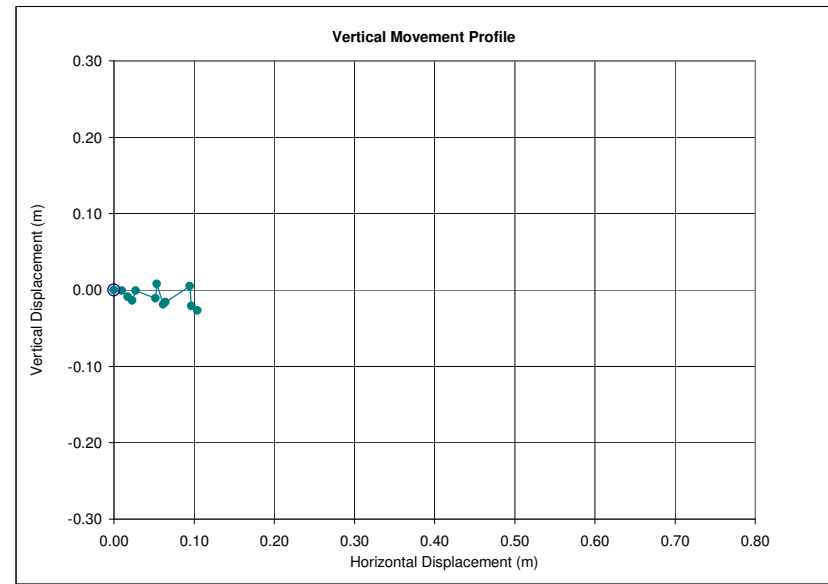
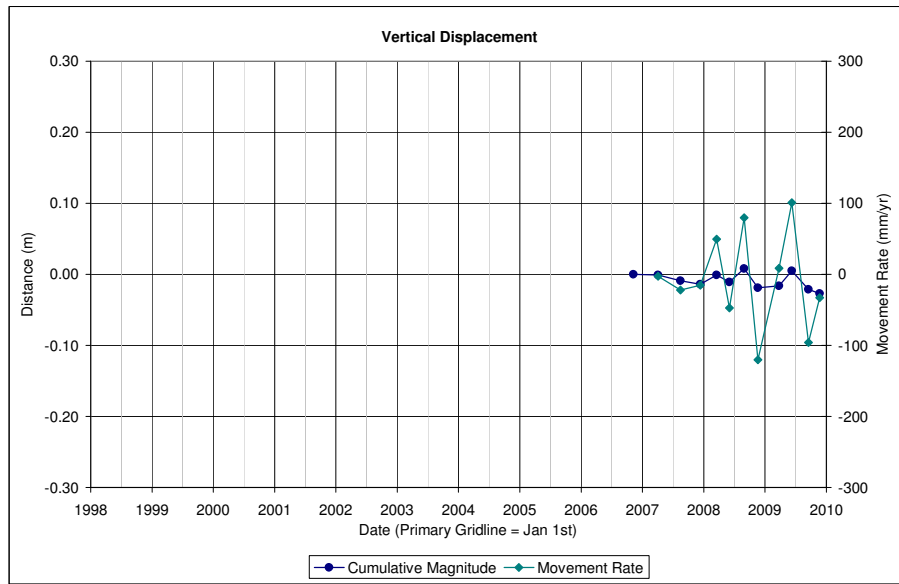
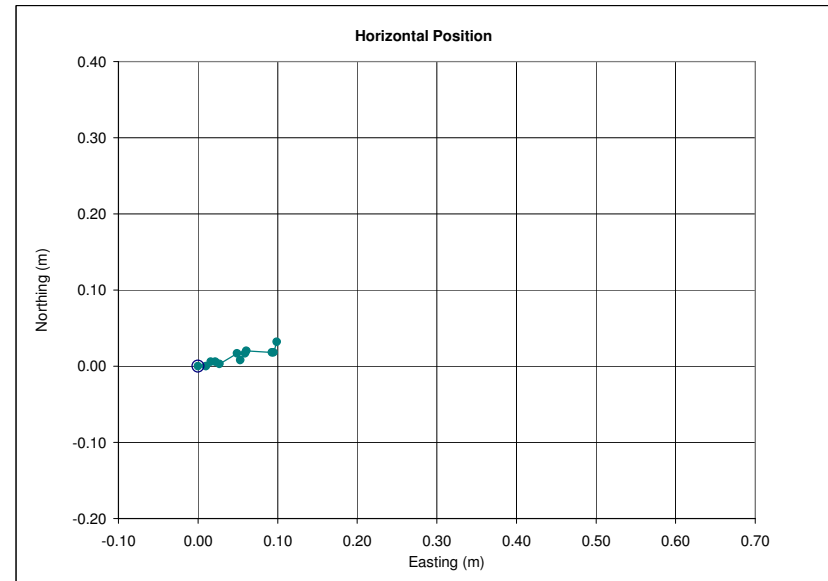
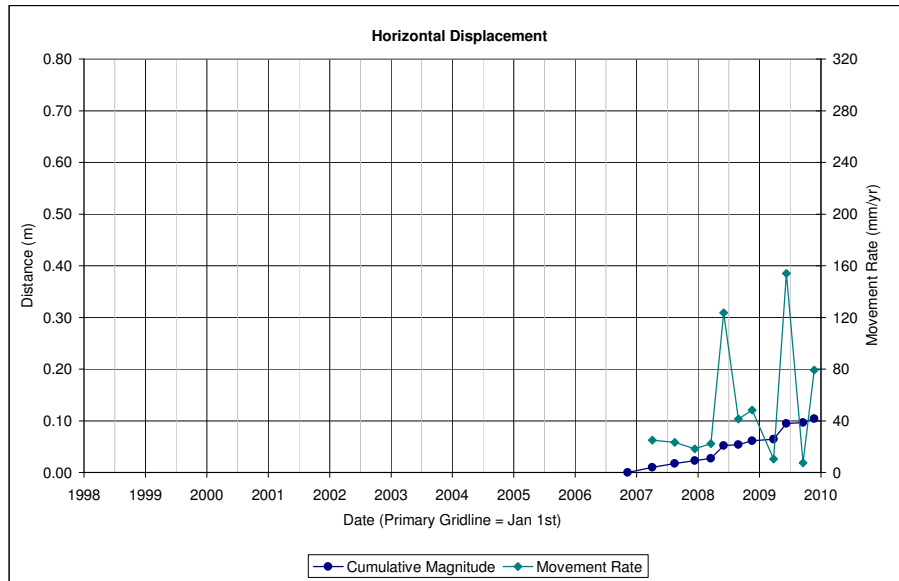
Displacement Graphs - Hub 06-12
East side Lewis Road, opposite house # 547



amec

[illegible]

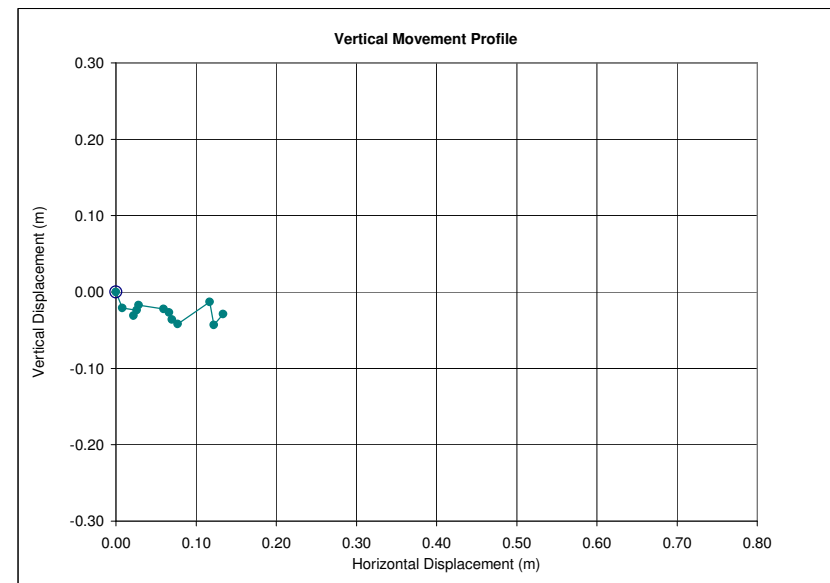
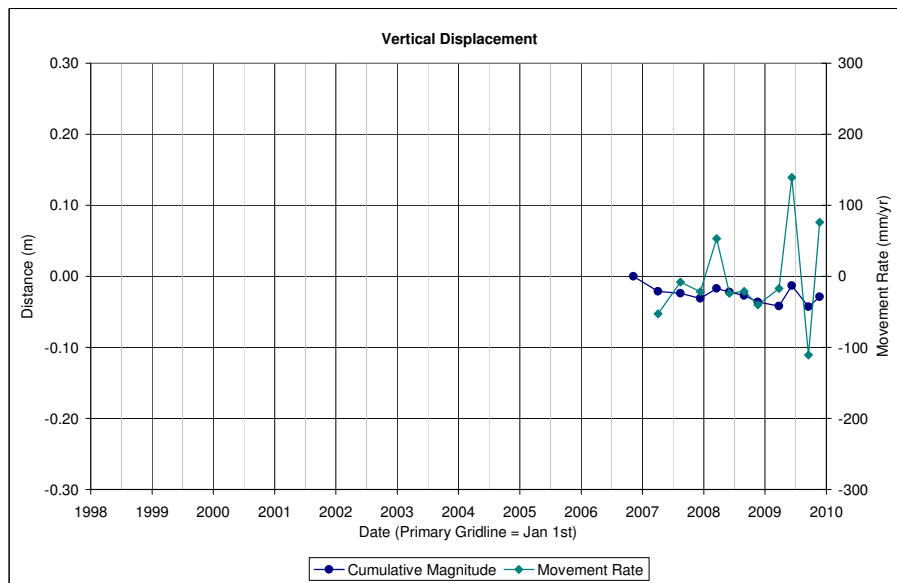
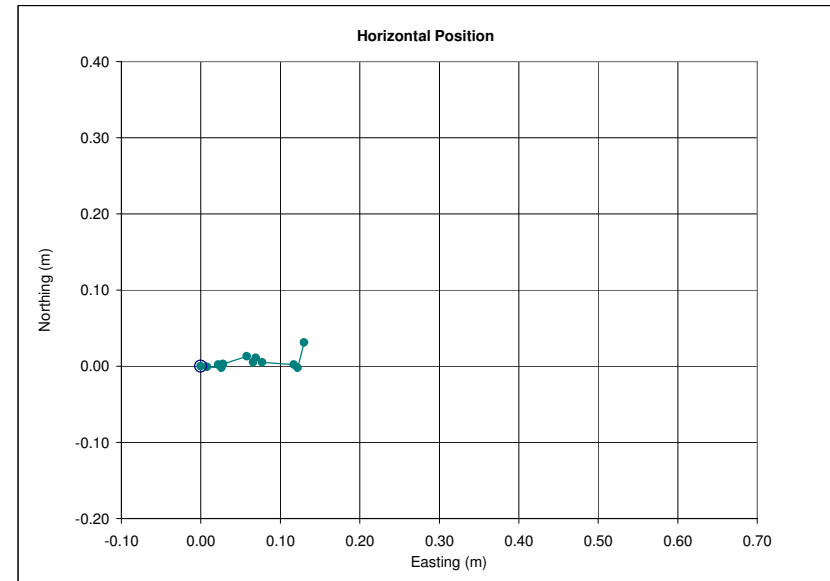
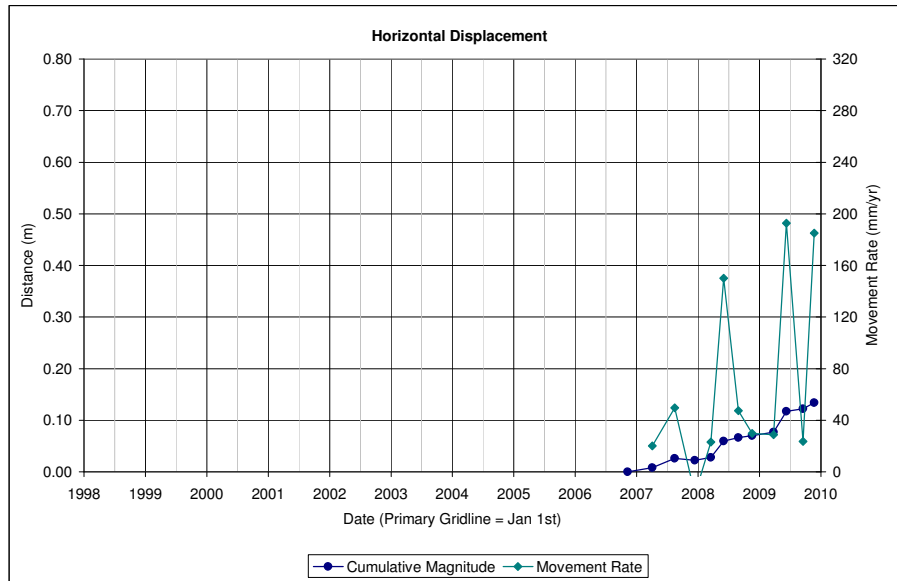
Displacement Graphs - Hub 06-13
NW. corner Pentland Crescent



amec

[illegible]

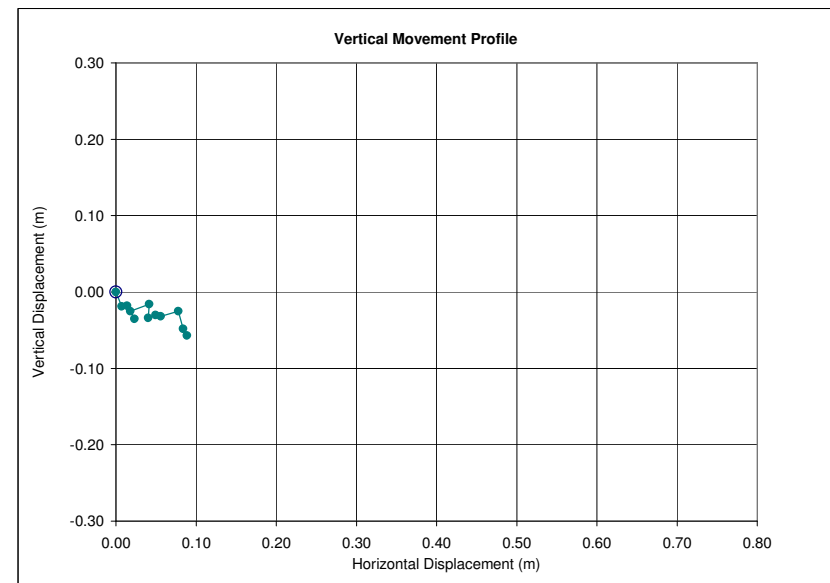
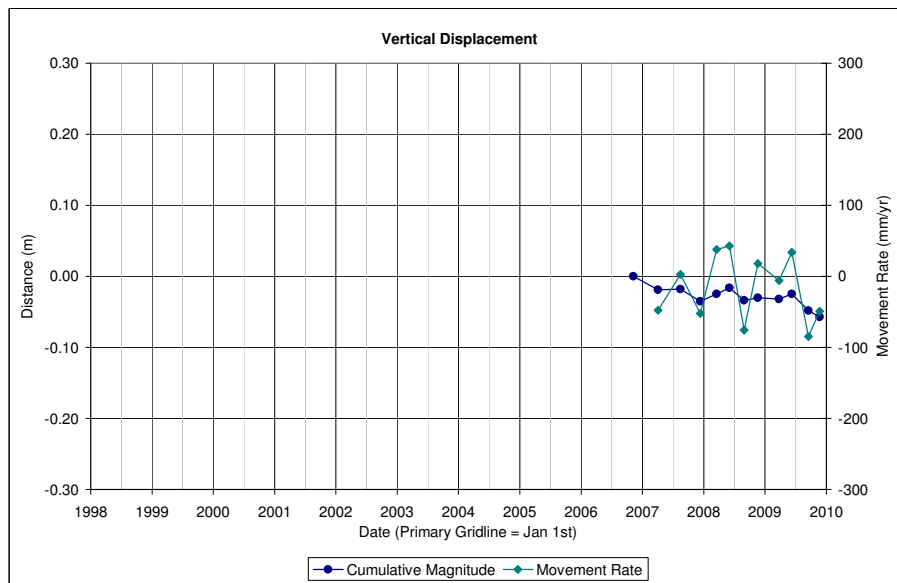
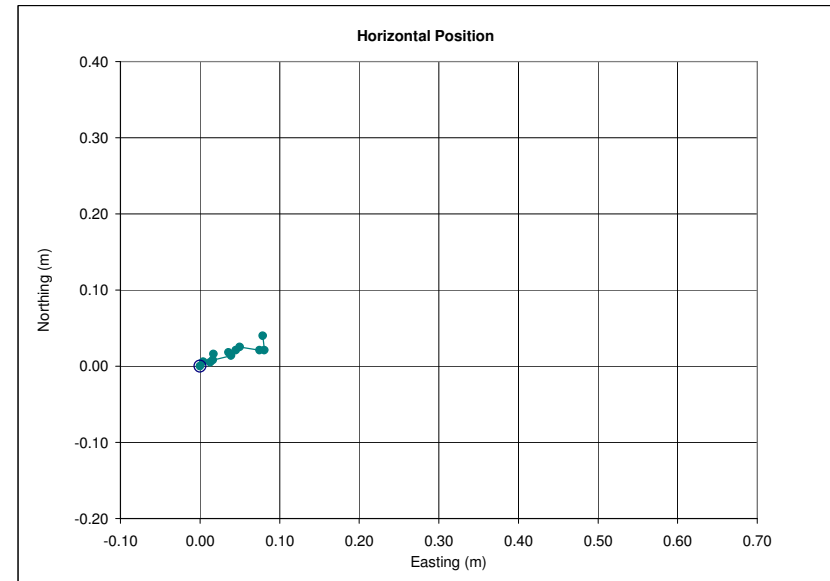
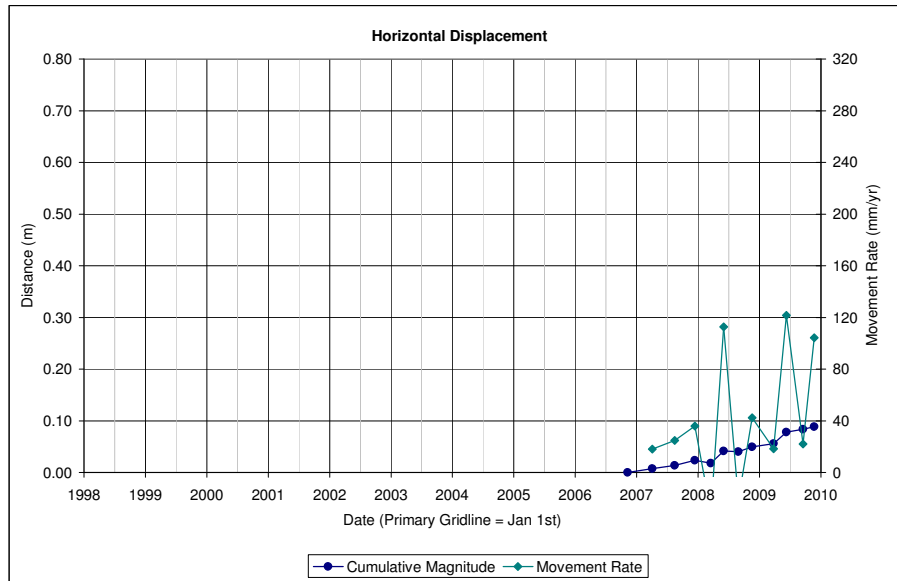
Displacement Graphs - Hub 06-14
SW. corner Pinchbeck Street / Pentland Crescent



amec

[illegible]

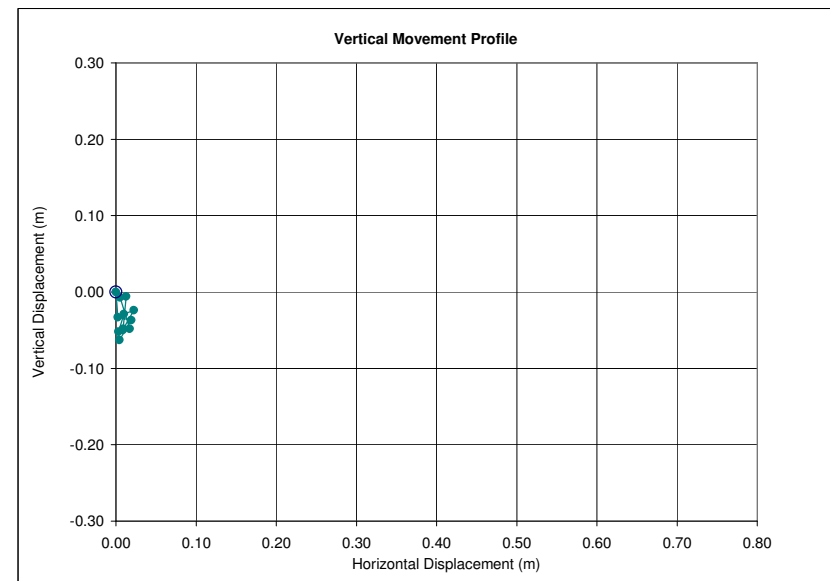
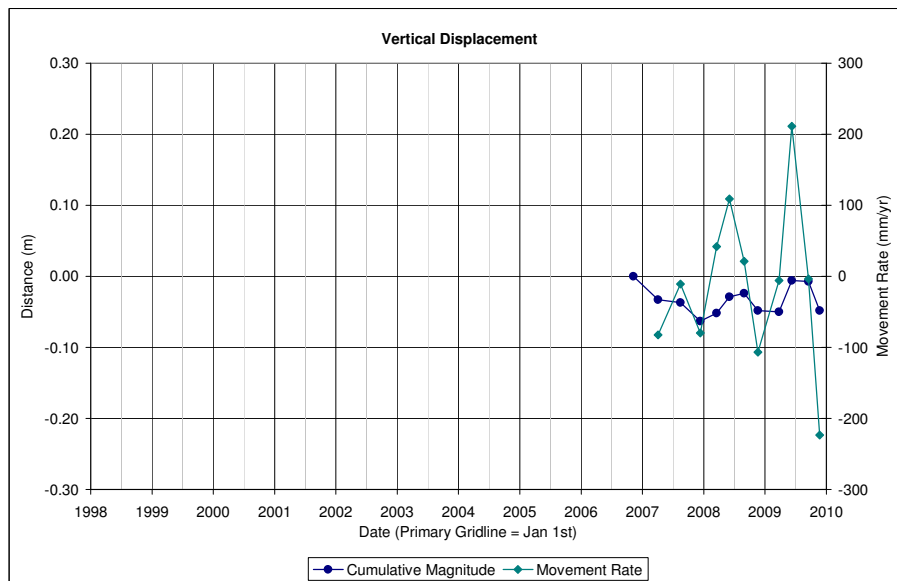
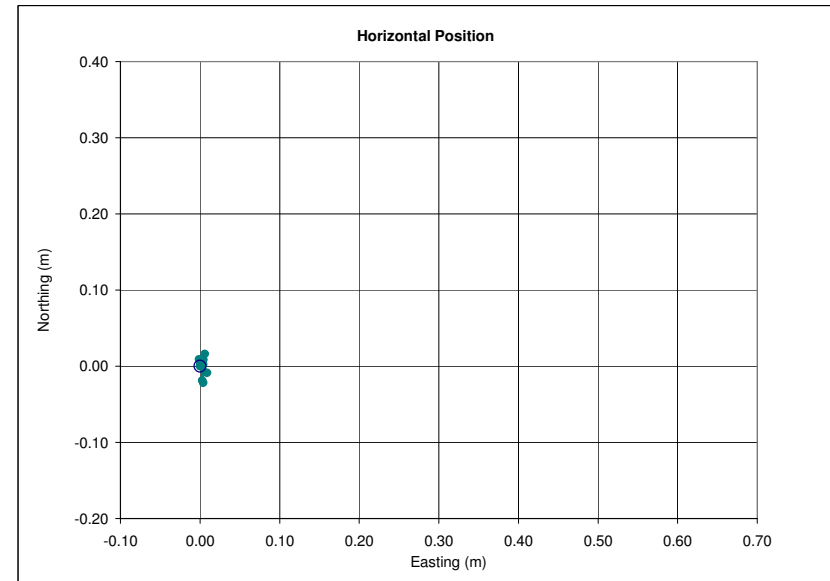
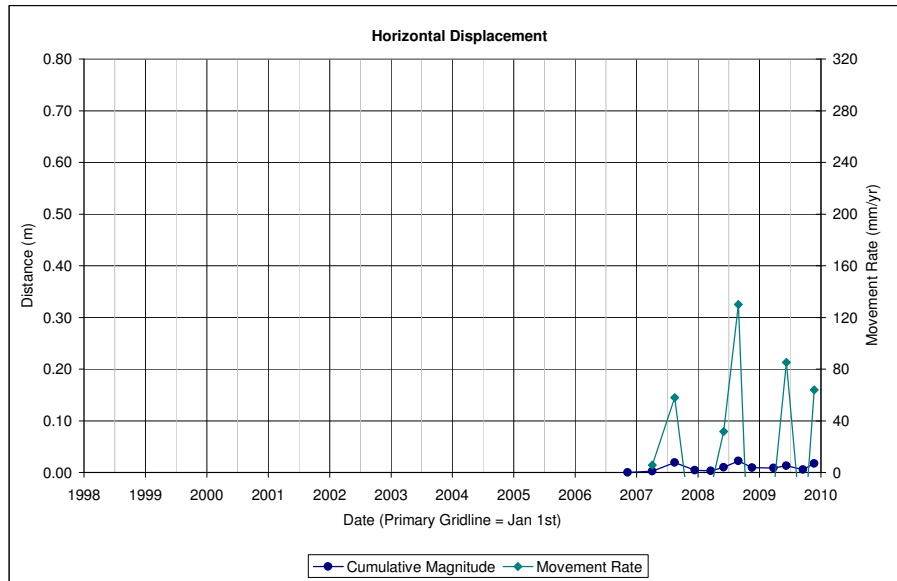
Displacement Graphs - Hub 06-15
By trail, NW unnamed Rd. N. Dixon St.



amec

[illegible]

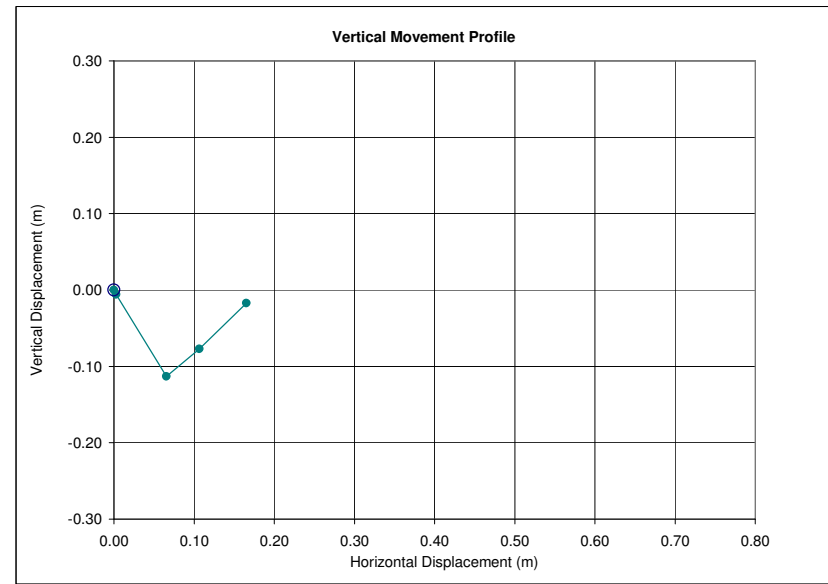
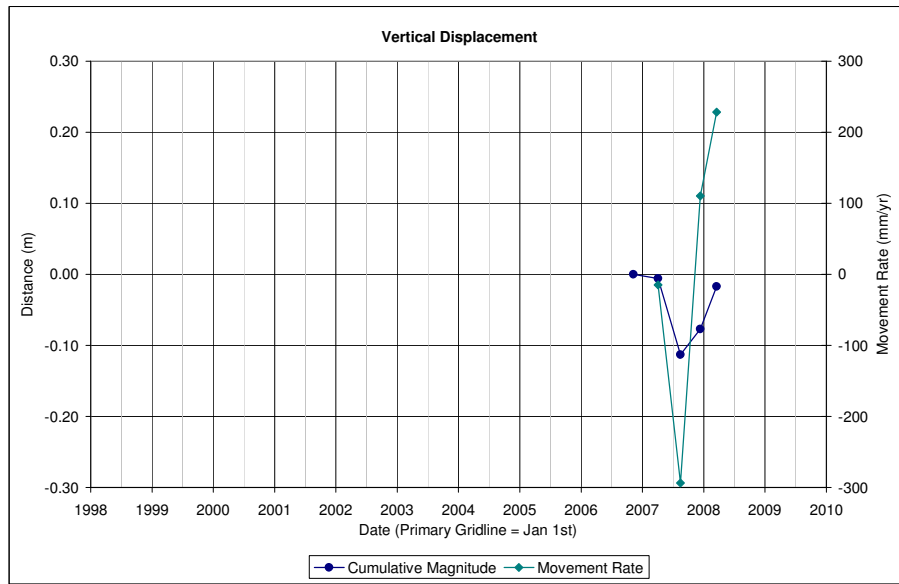
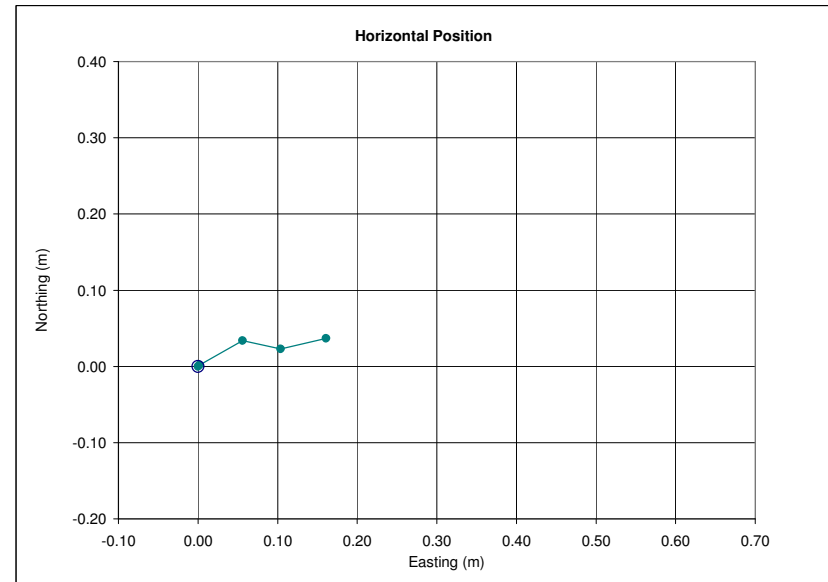
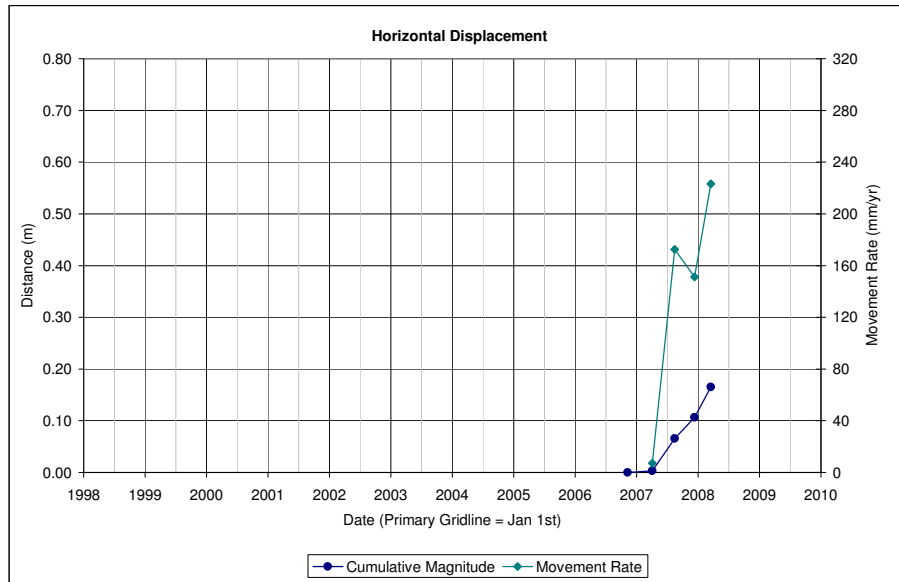
Displacement Graphs - Hub 06-16
By end trail, NW unnamed road N. Dixon St.



amec

[illegible]

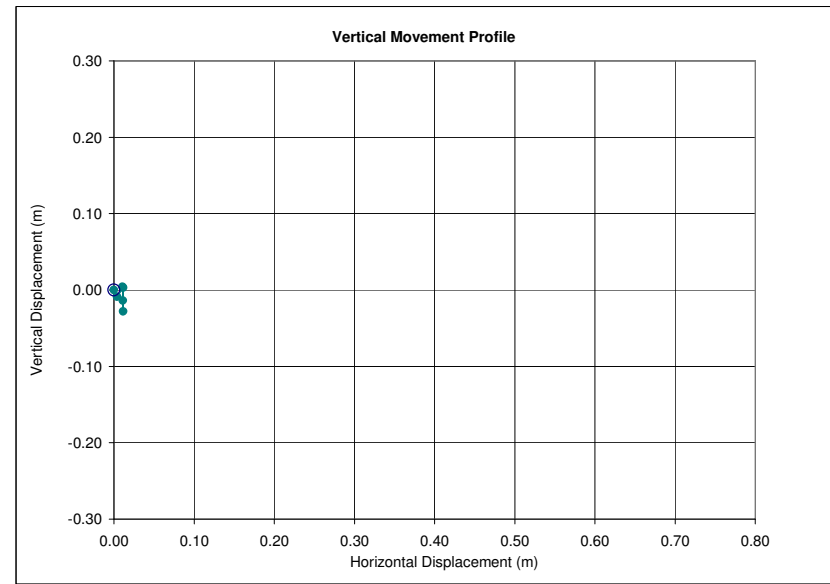
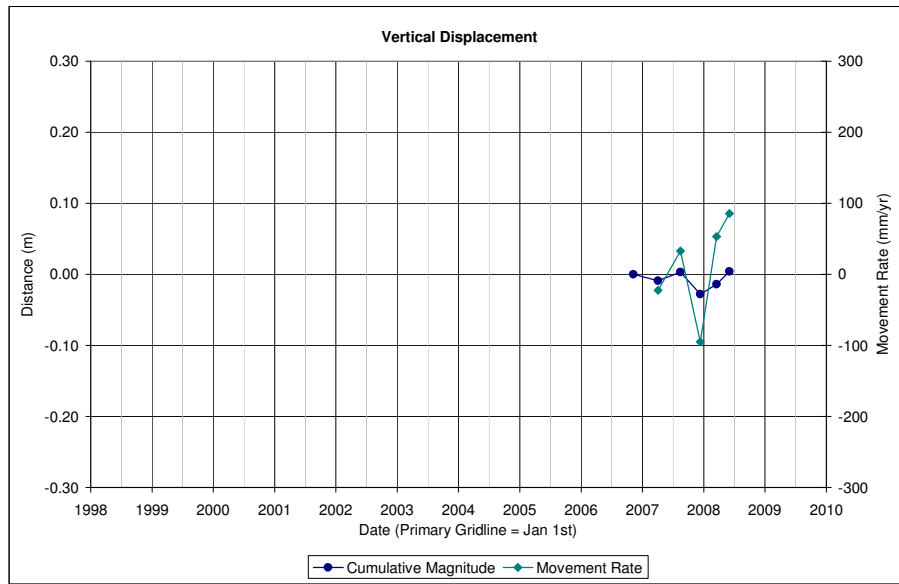
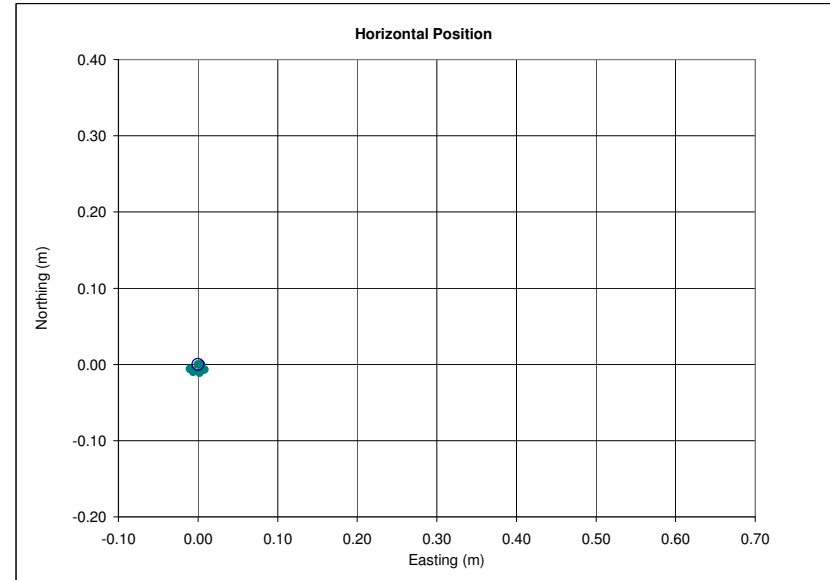
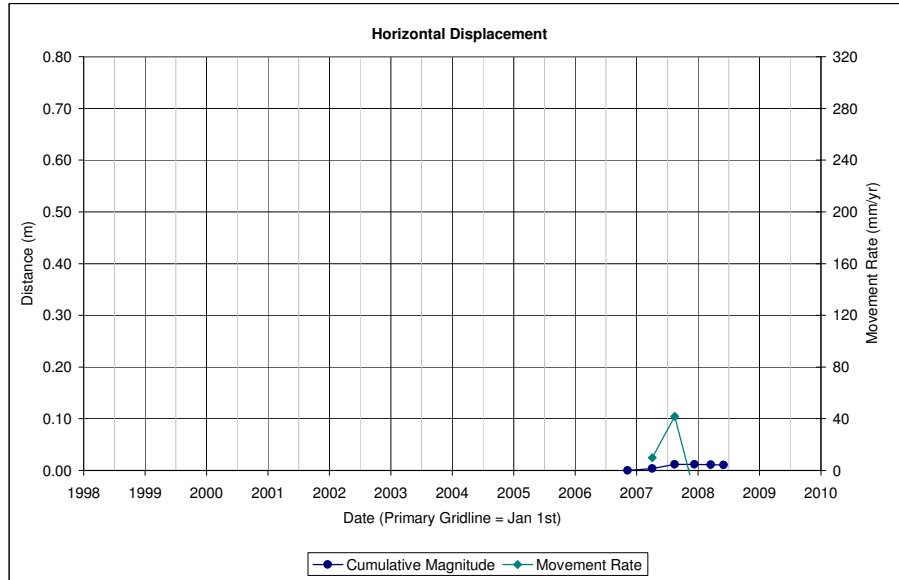
Displacement Graphs - Hub 06-17
In clearing, NW of end Findlay Road



Survey and Displacement Data - Hub 06-18
On upper bench by trail, off end Findlay Road

[illegible]

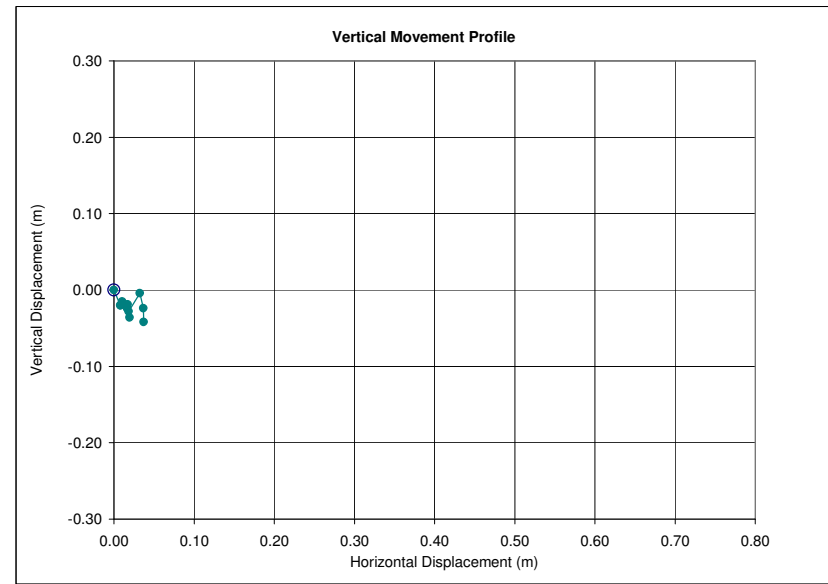
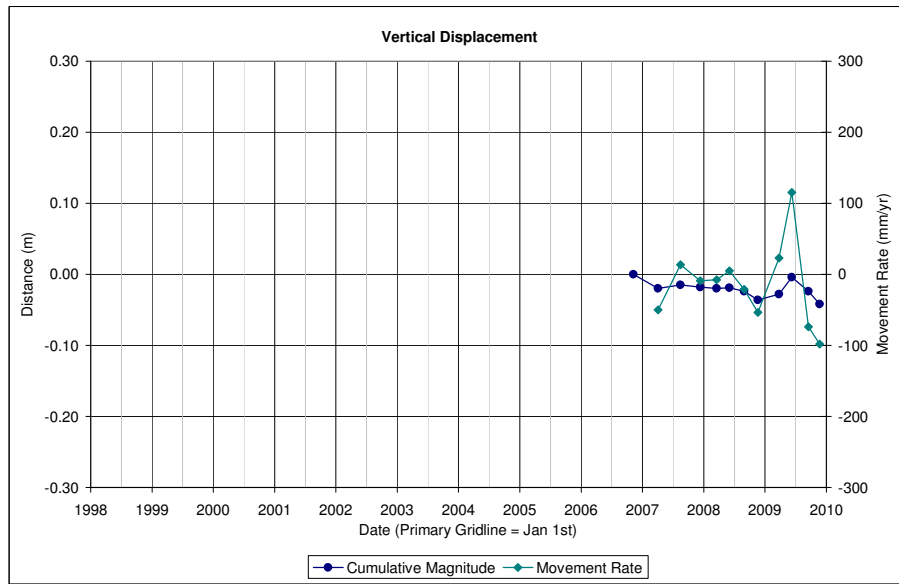
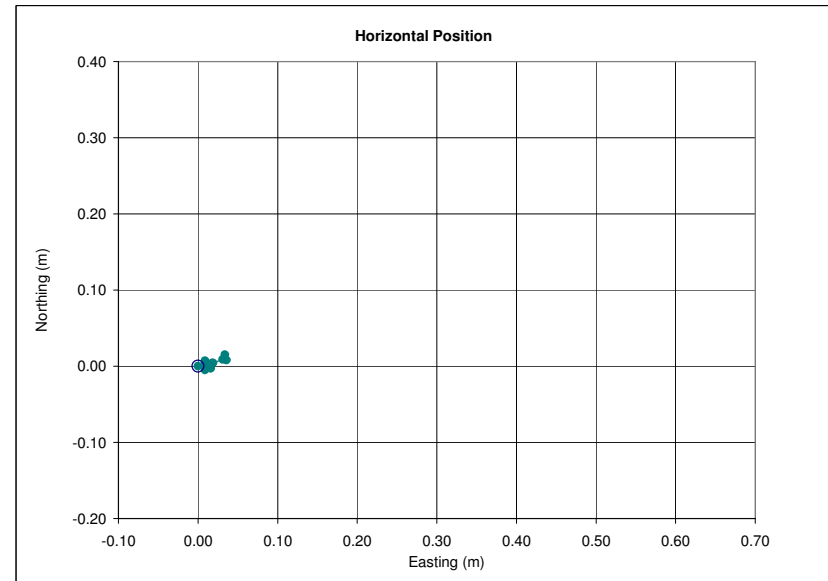
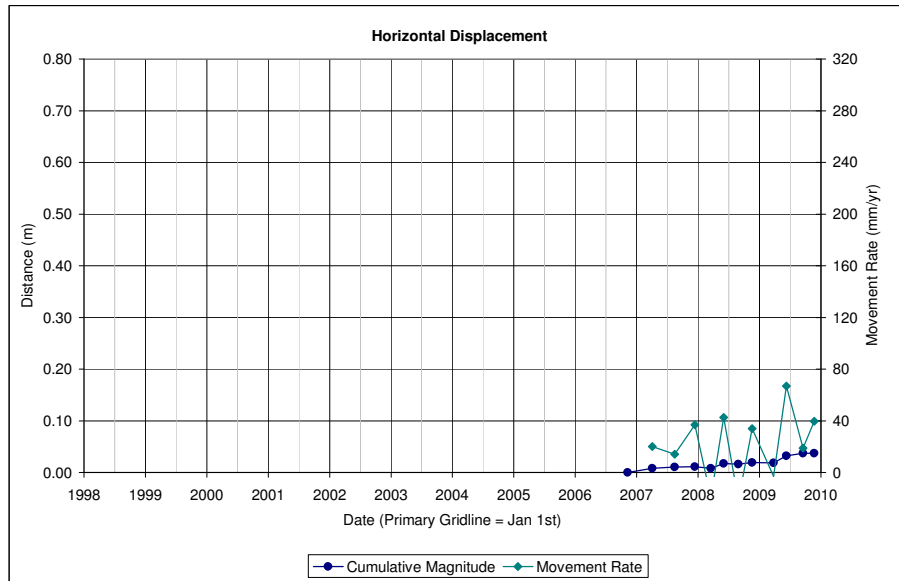
Displacement Graphs - Hub 06-18
On upper bench by trail, off end Findlay Road



amec

[illegible]

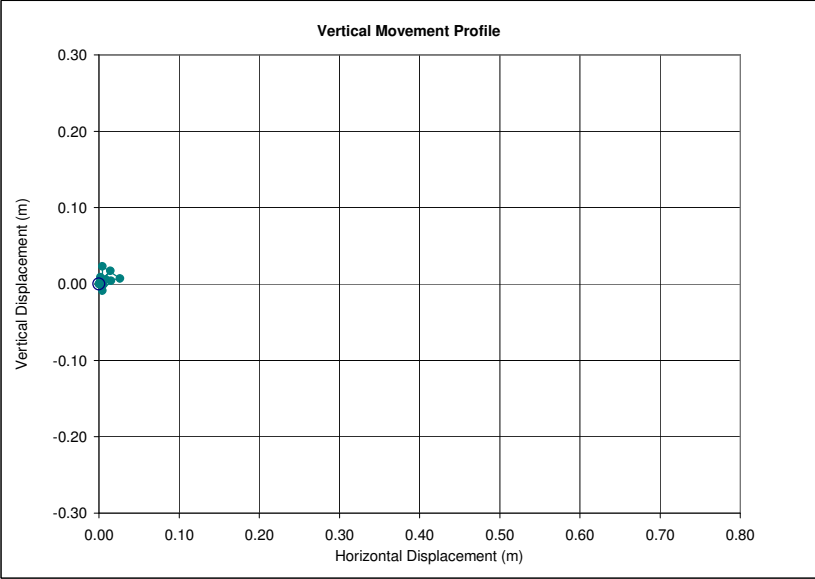
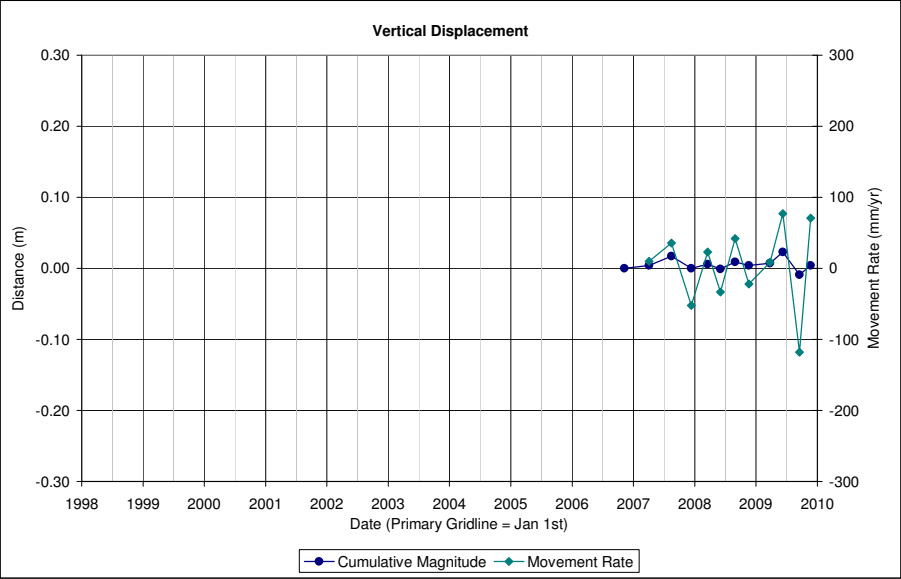
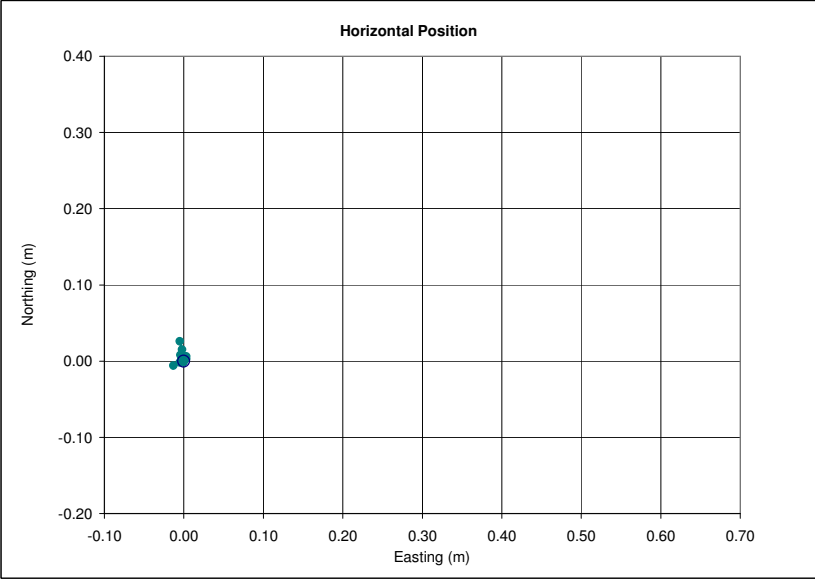
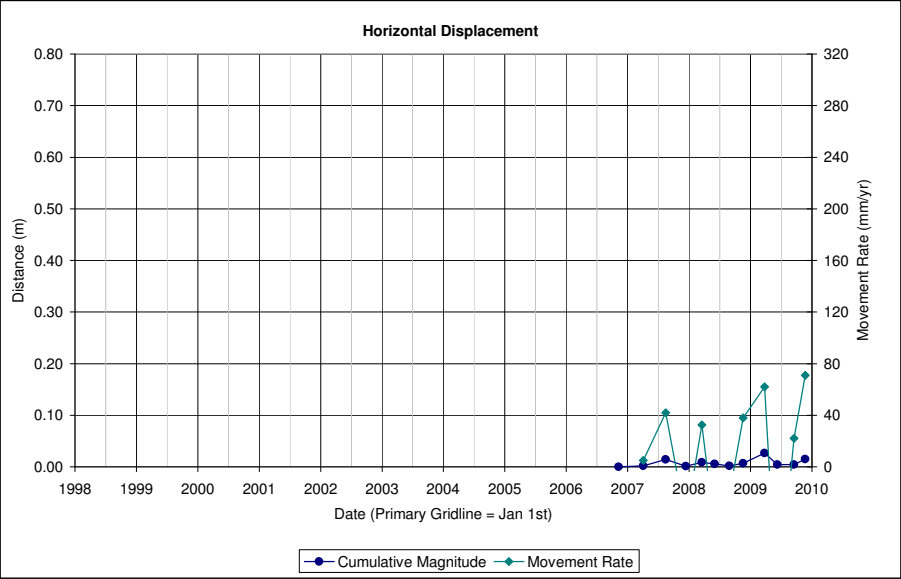
Displacement Graphs - Hub 06-19
West side Abbott Dr. 100m south last house



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[illegible]

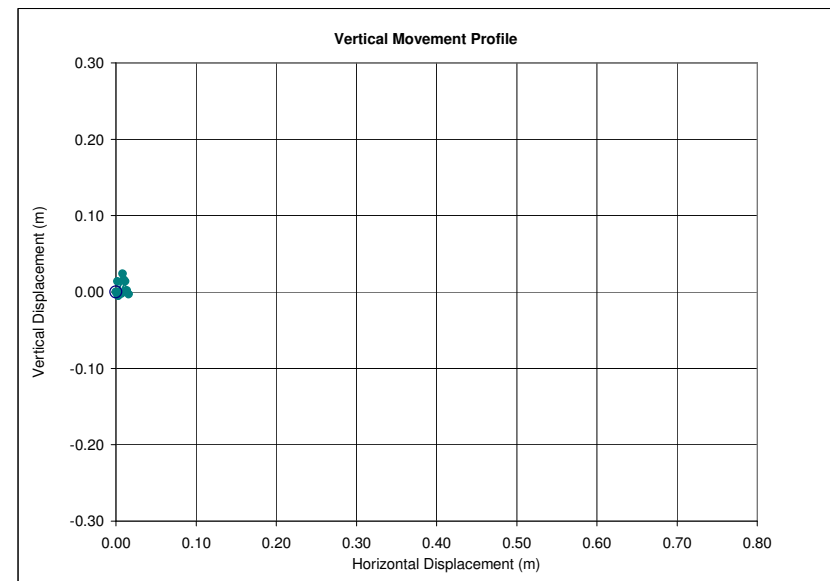
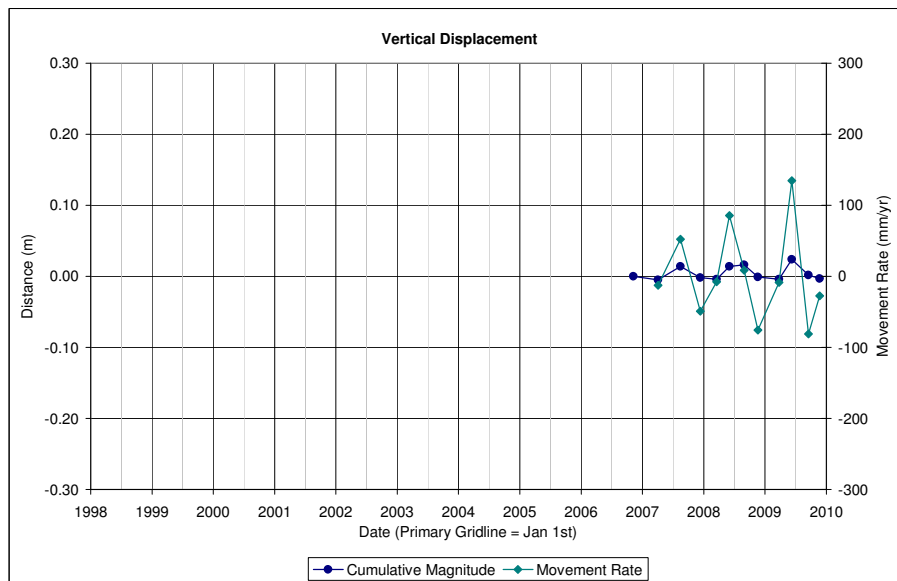
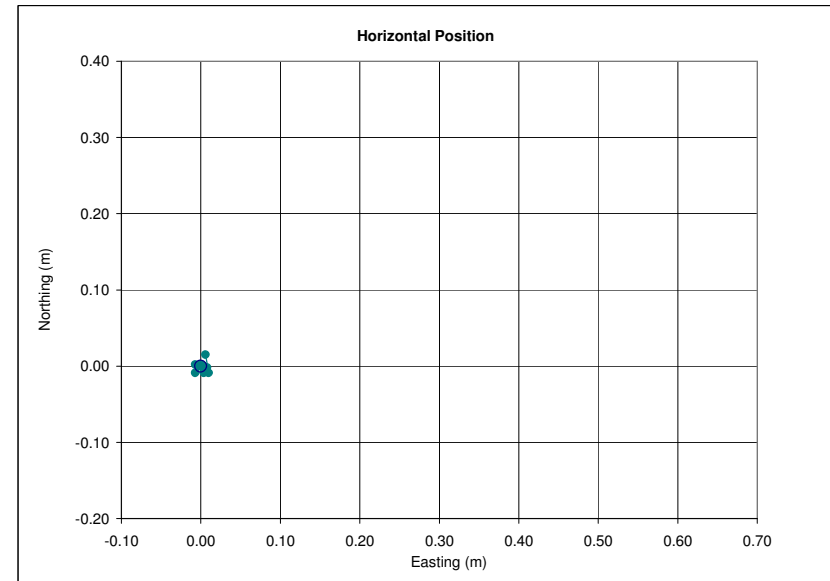
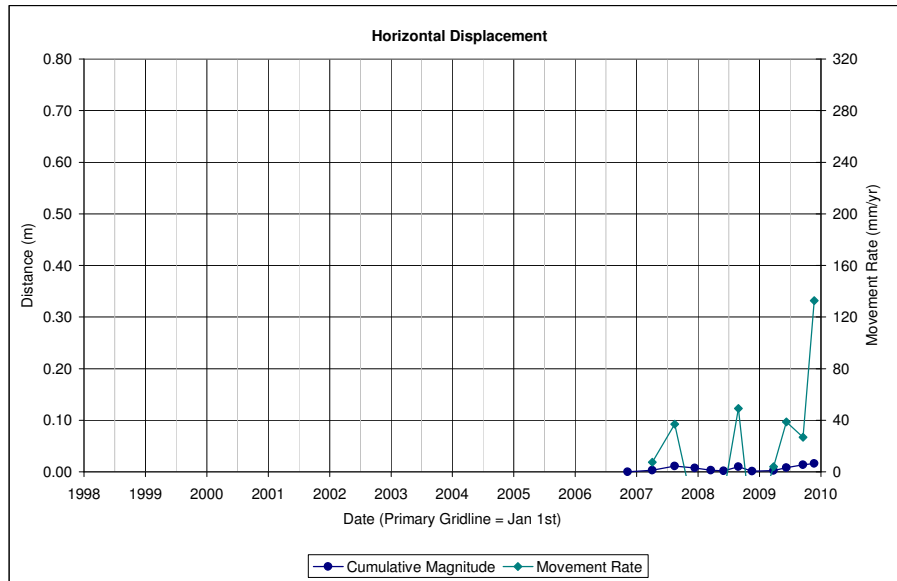
Displacement Graphs - Hub 06-20
End of trail, by BH 16, off end Abbott Drive



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[illegible]

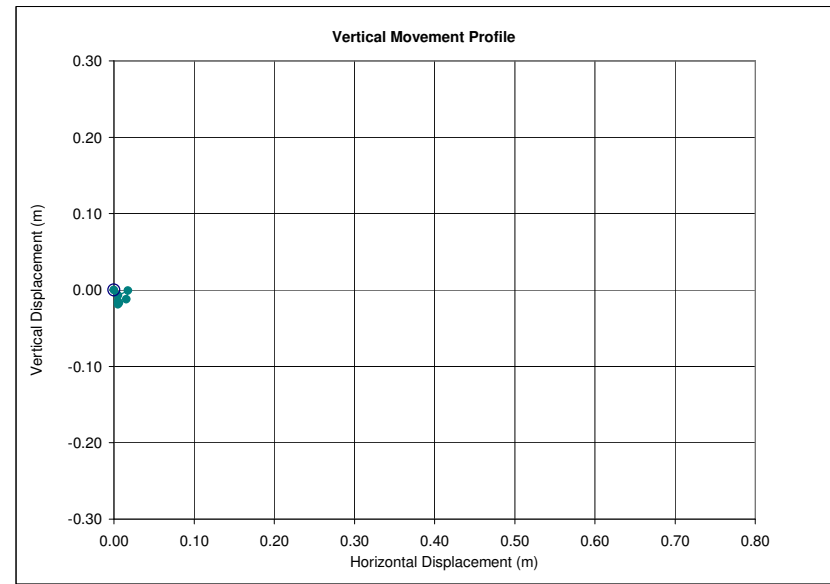
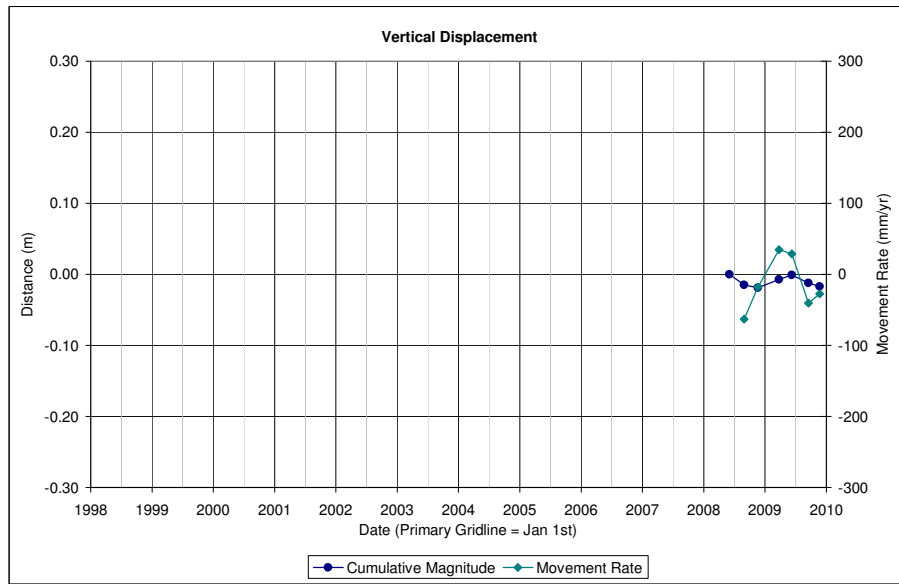
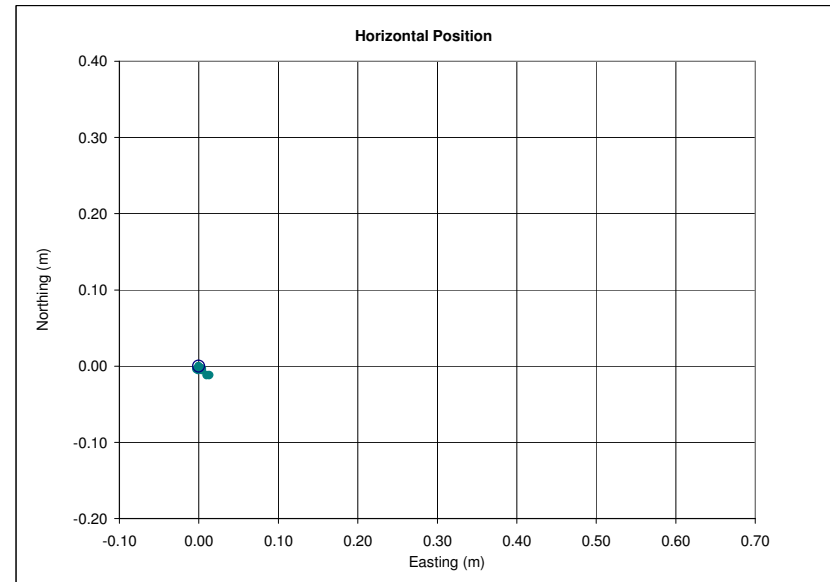
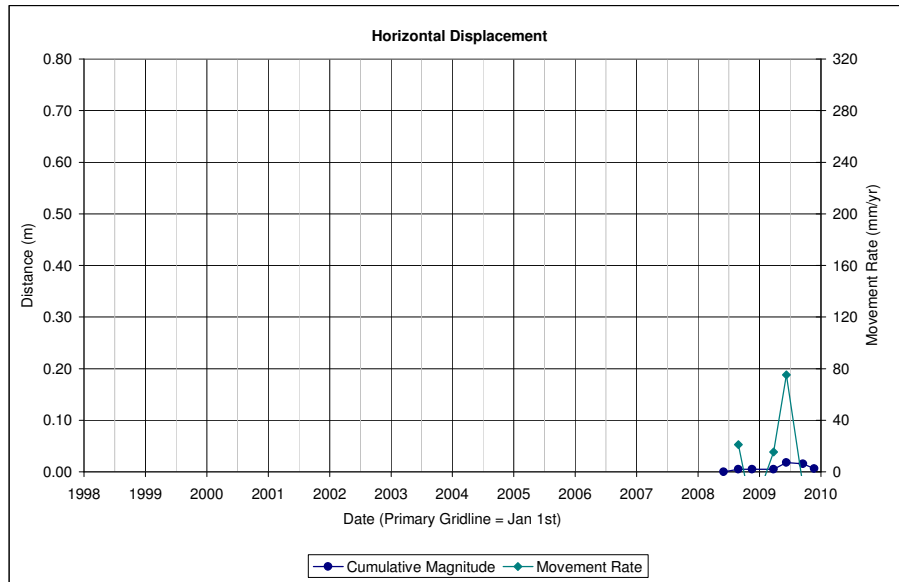
Displacement Graphs - Hub 06-21
100m past gate, off end Abbott Drive



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[illegible]

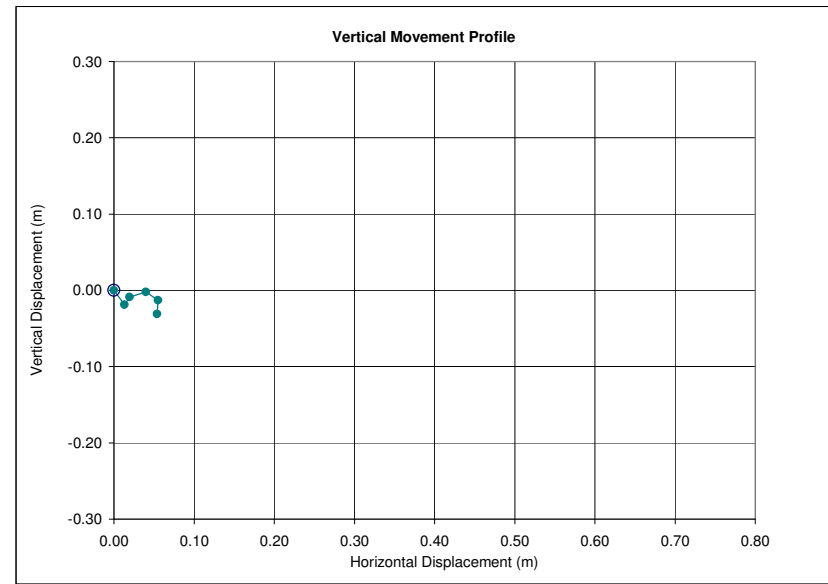
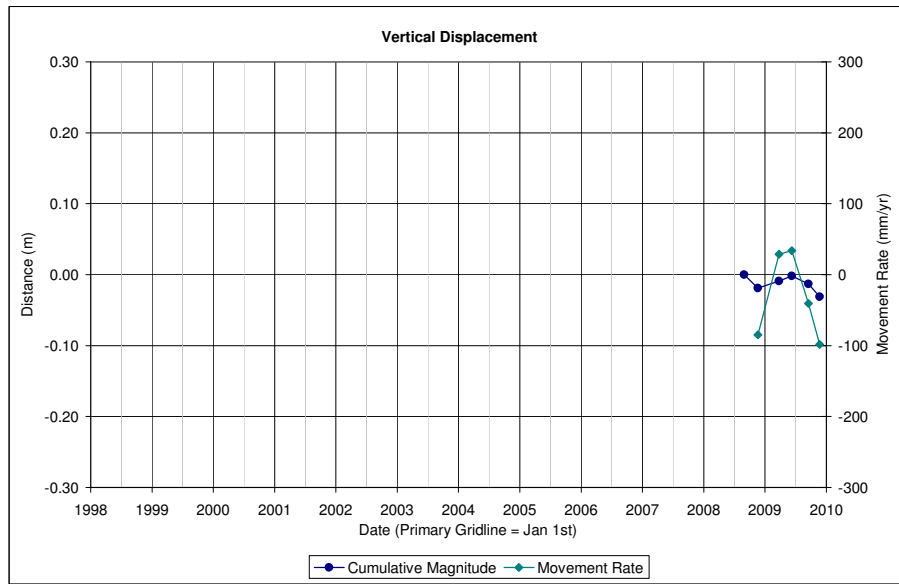
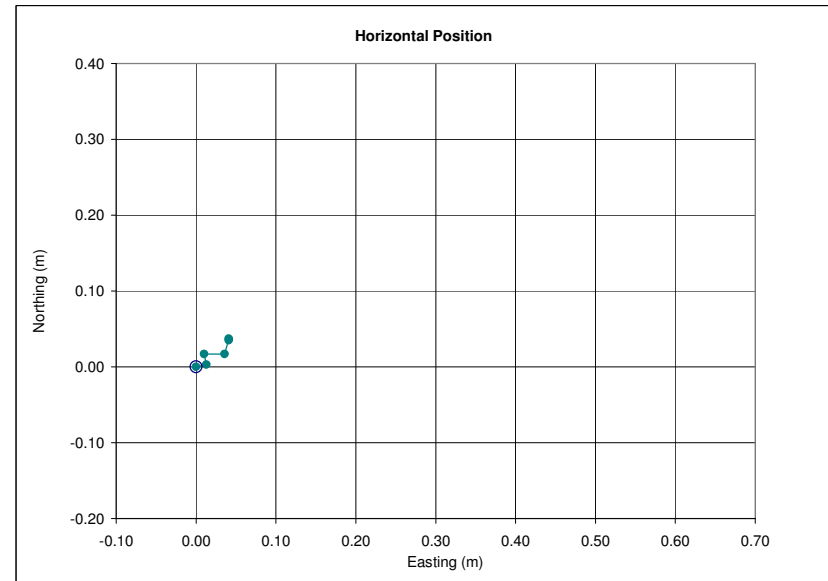
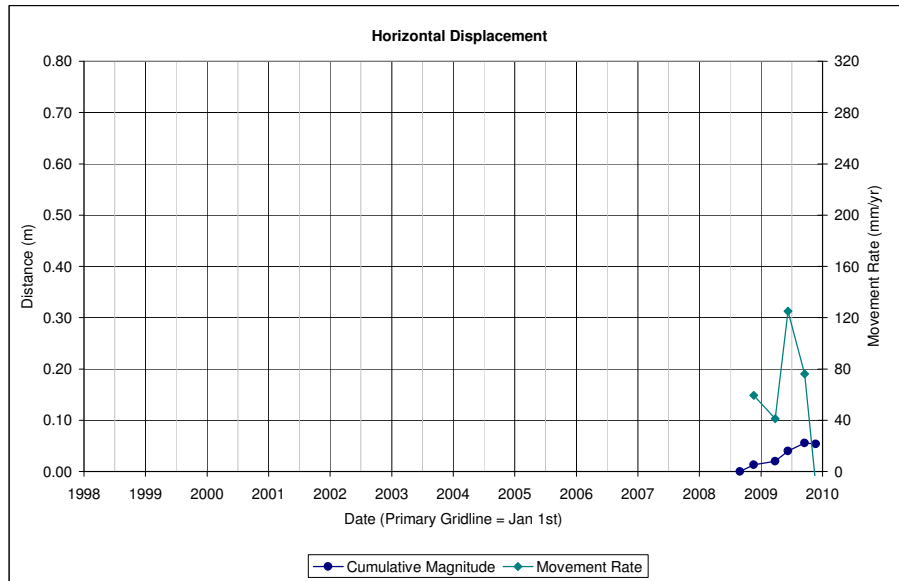
Displacement Graphs - Hub 08-01
Replacement for 06-17



Very near 98-04

[illegible]

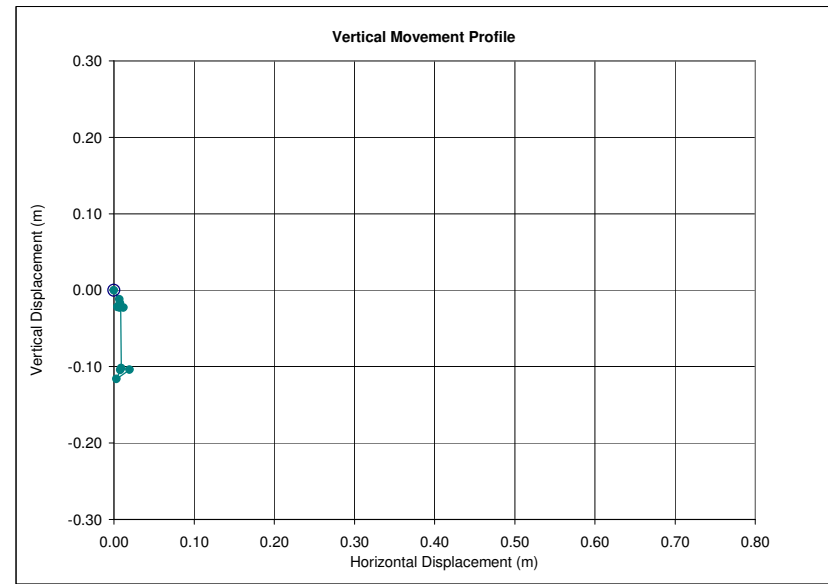
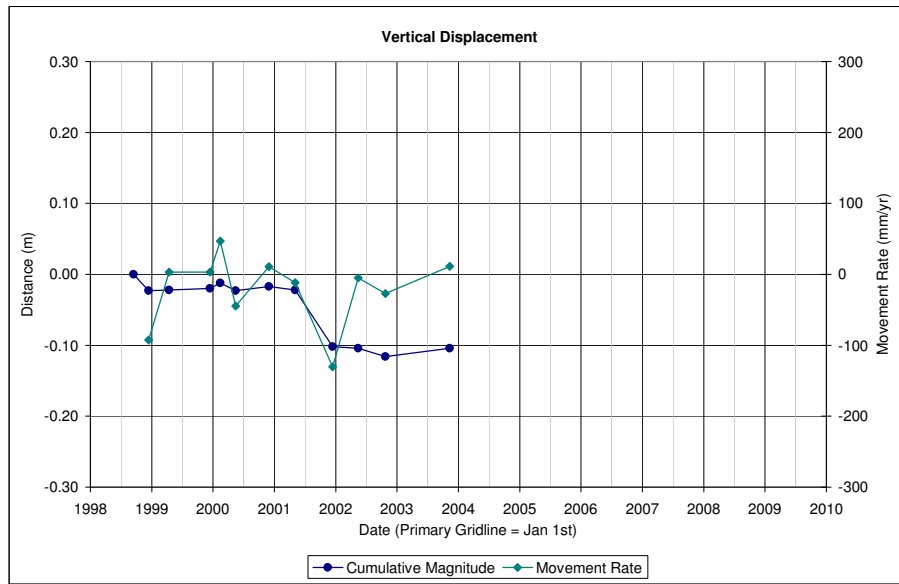
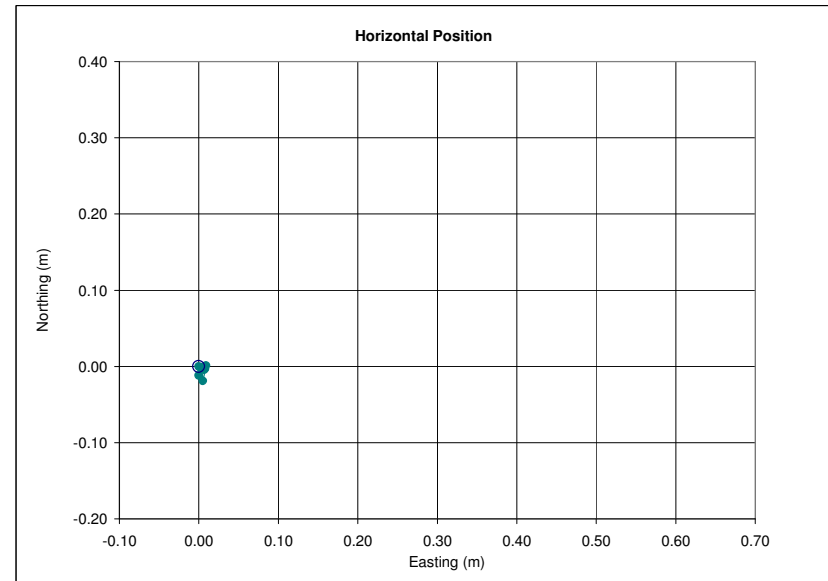
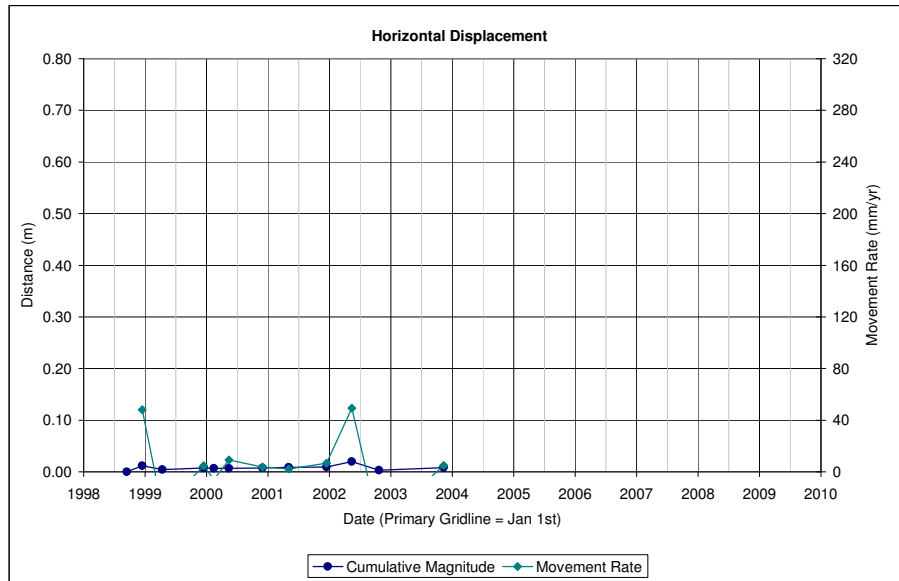
Displacement Graphs - Hub 08-02
Very near 98-04



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[illegible]

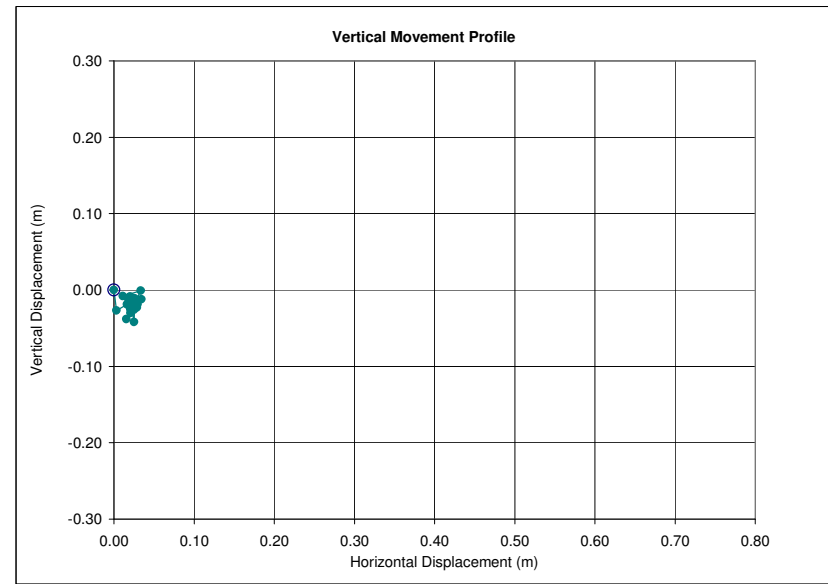
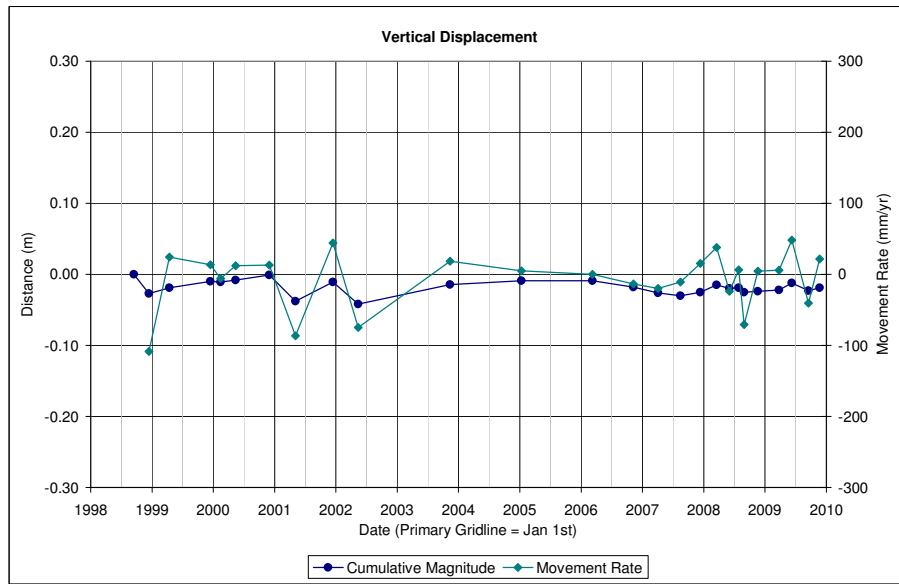
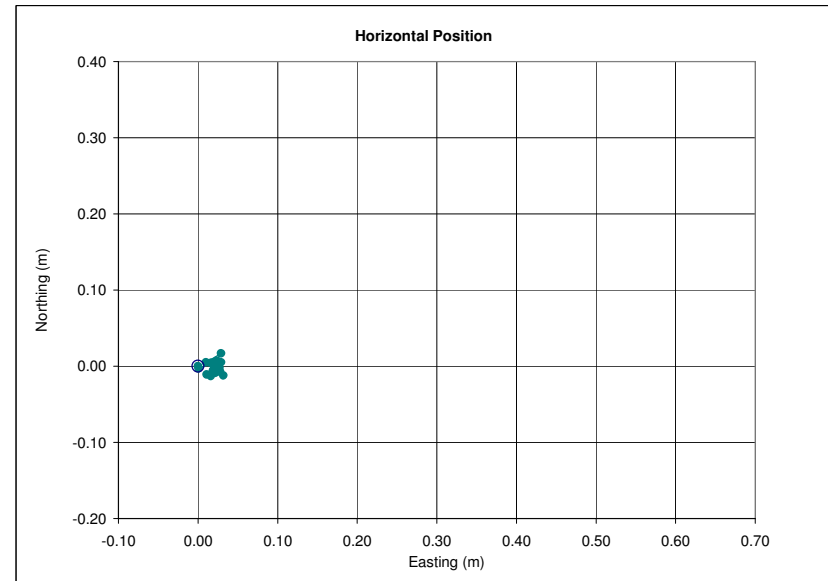
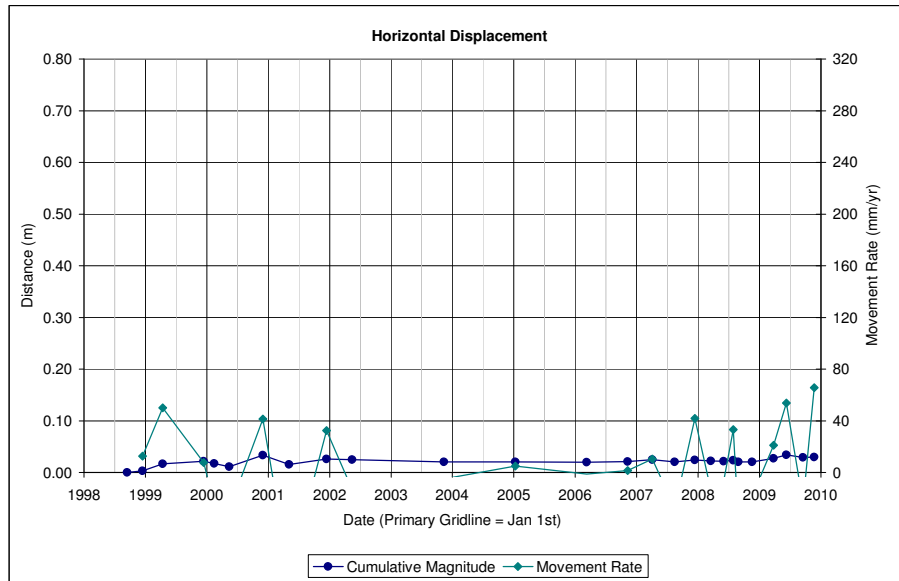
Displacement Graphs - Hub 98-26
Benchmark - Near Quesnel Airport



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Date	Surveyed Position			Total Change in Position							Overall Rates (m/yr)		Incremental Change in Position							Incremental Rates	
	N m	E m	Z m	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal m/yr	Vertical m/yr	Time yrs	N m	E m	Horizontal m	Vertical m	Azimuth °	Plunge °	Horizontal mm/yr	Vertical mm/yr
9/15/1998	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		
12/15/1998	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
4/15/1999	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
12/15/1999	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
2/15/2000	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
5/15/2000	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
11/30/2000	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
5/5/2001	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
12/15/2001	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
5/15/2002	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
11/12/2003	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
1/11/2005	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
3/10/2006	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
11/10/2006	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
4/5/2007	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
8/16/2007	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
12/13/2007	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
3/18/2008	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
6/3/2008	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
7/29/2008	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
8/29/2008	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
11/19/2008	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
3/26/2009	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
6/10/2009	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
9/17/2009	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
11/23/2009	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
																</					

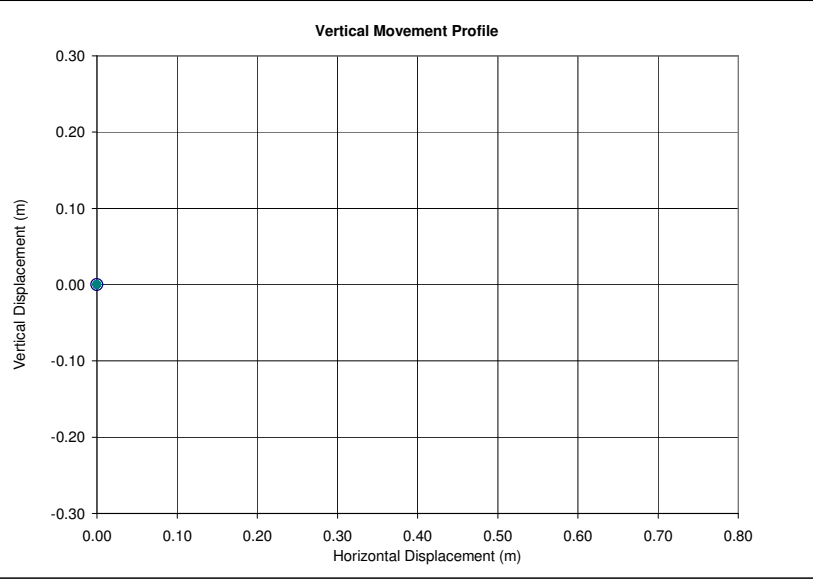
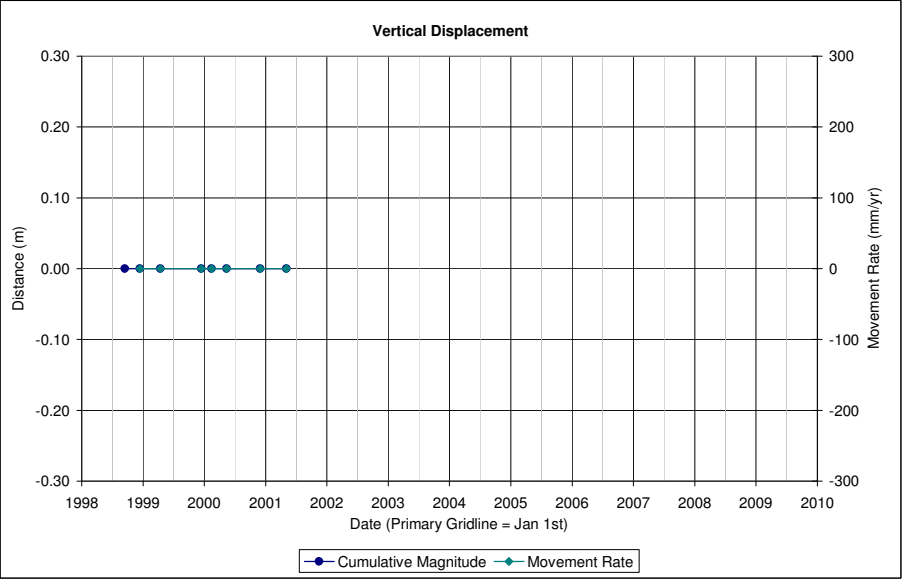
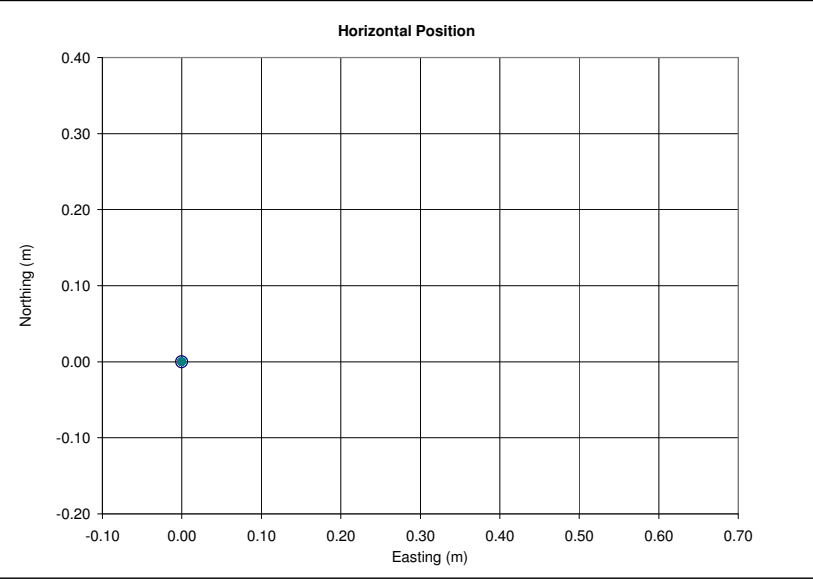
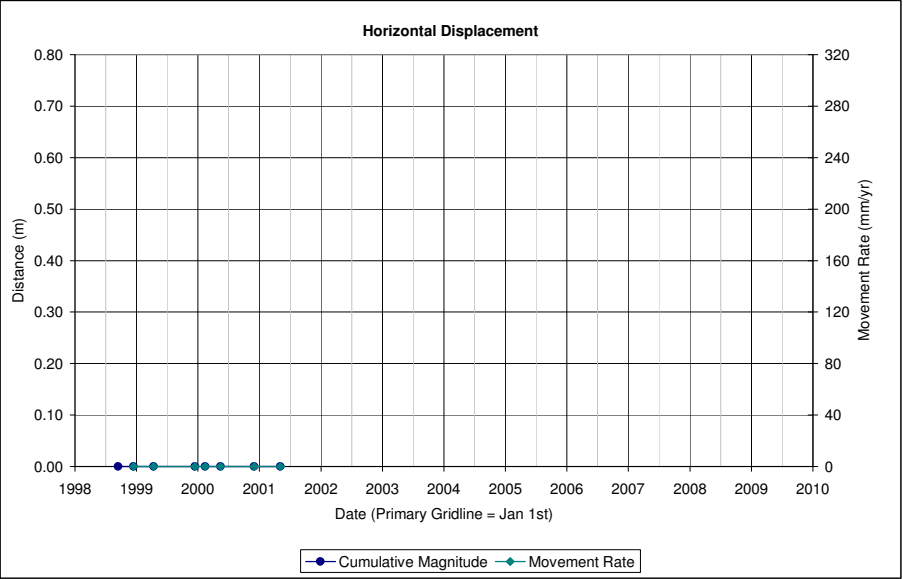
Displacement Graphs - Hub 98-23
Benchmark - Doherty Dr.



amec

[illegible]

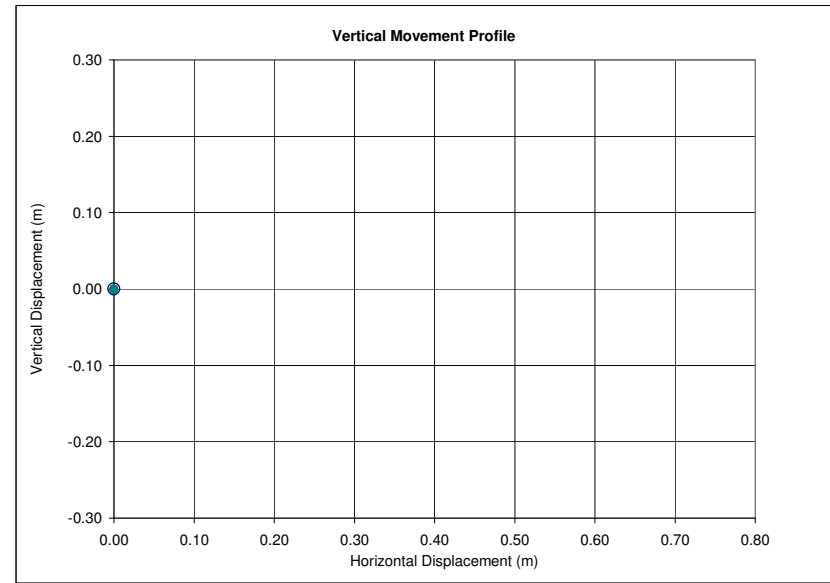
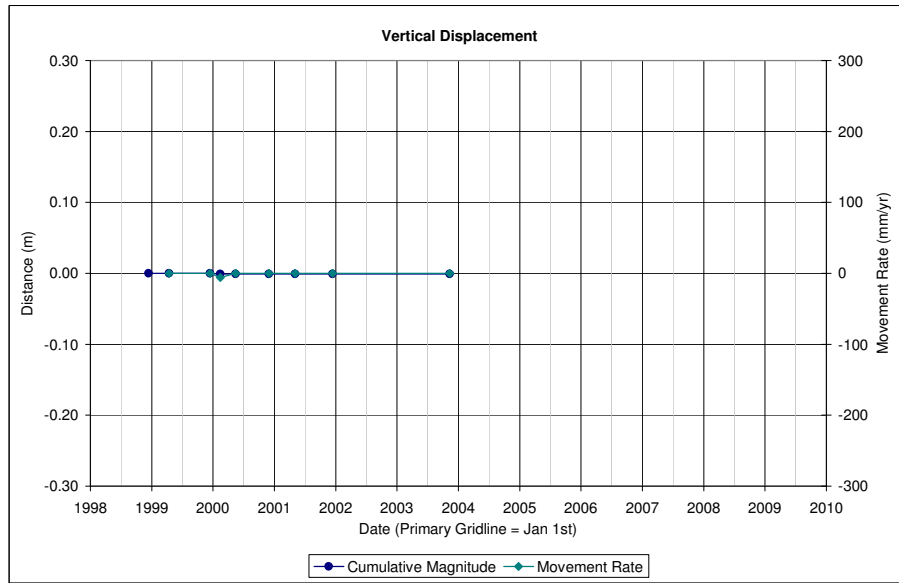
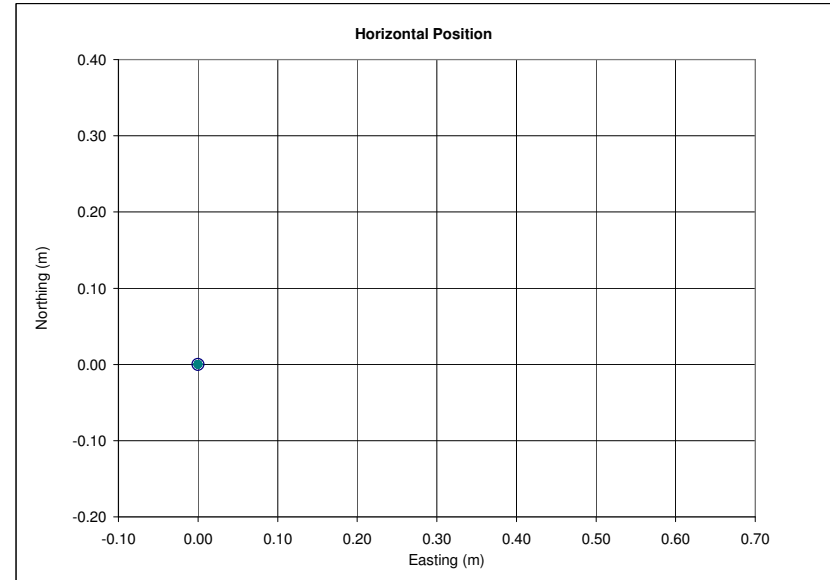
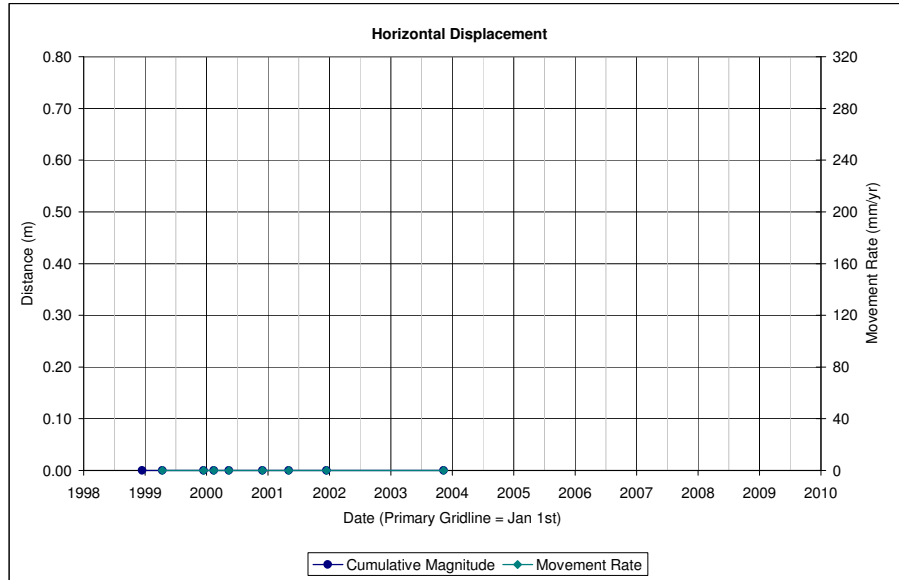
Displacement Graphs - Hub 98-28
Benchmark - Red Bluff Pump Station



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[illegible]

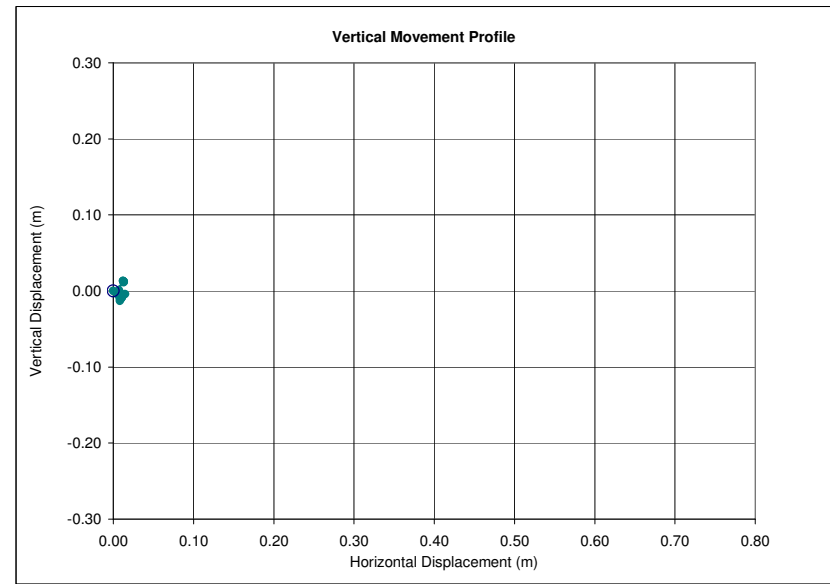
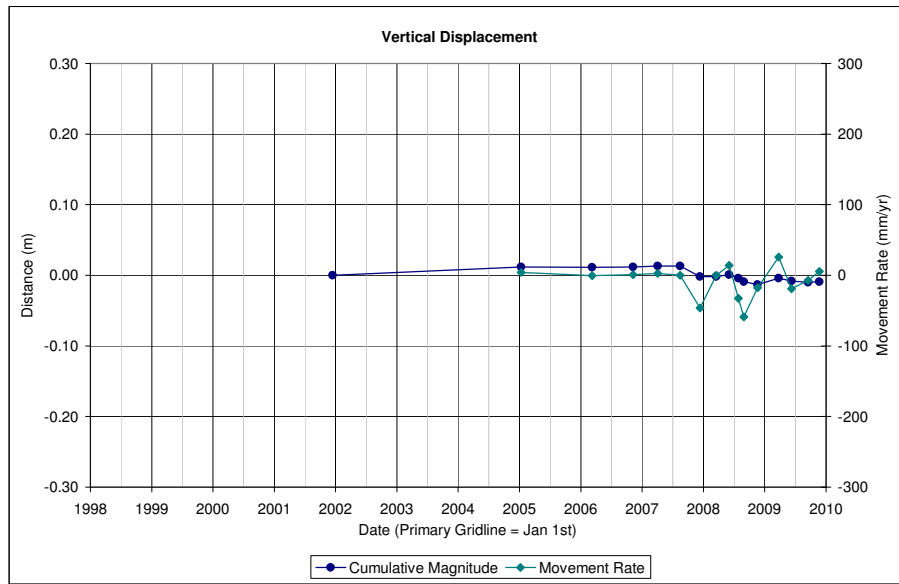
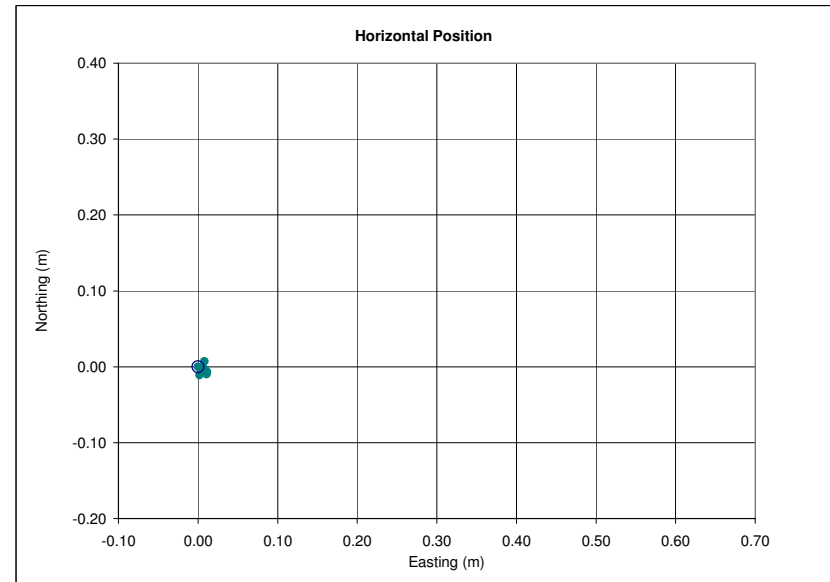
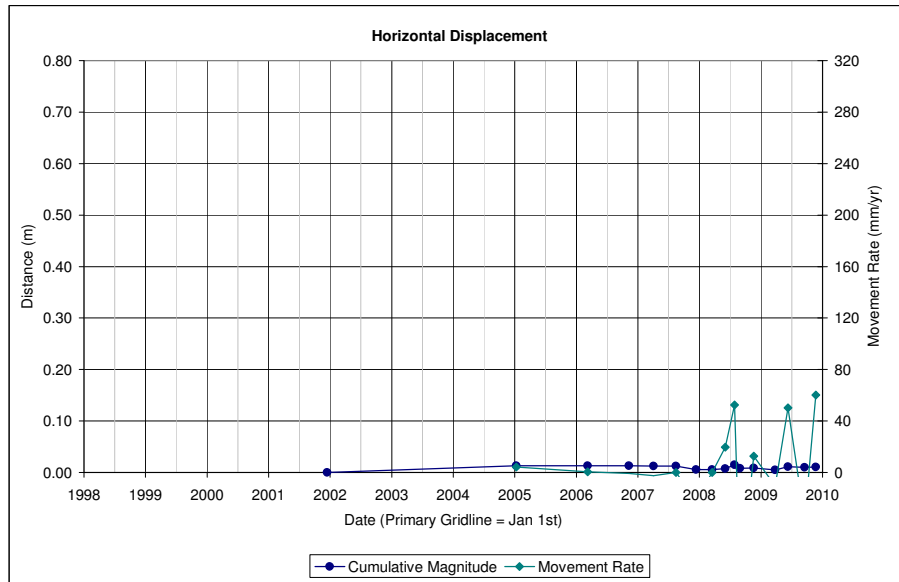
Displacement Graphs - Hub 82C256
Benchmark - Gov't Monument at Quesnel Airport



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[illegible]

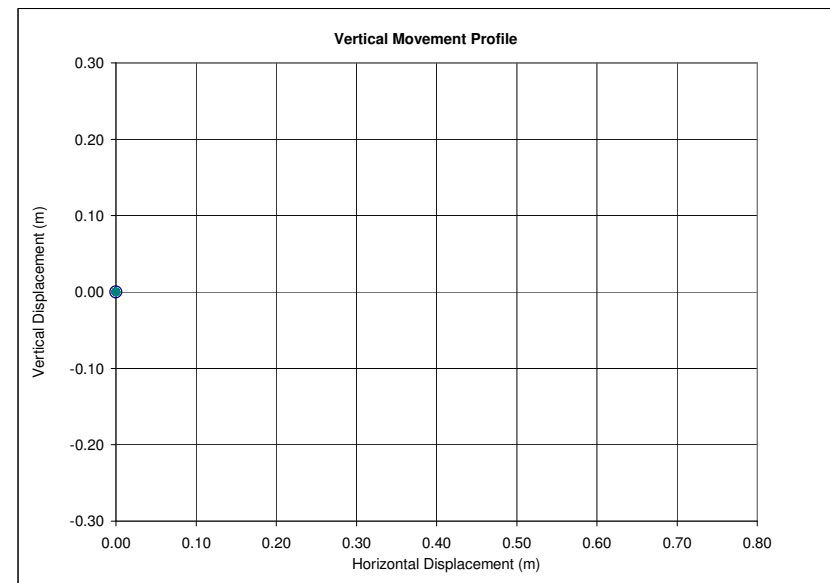
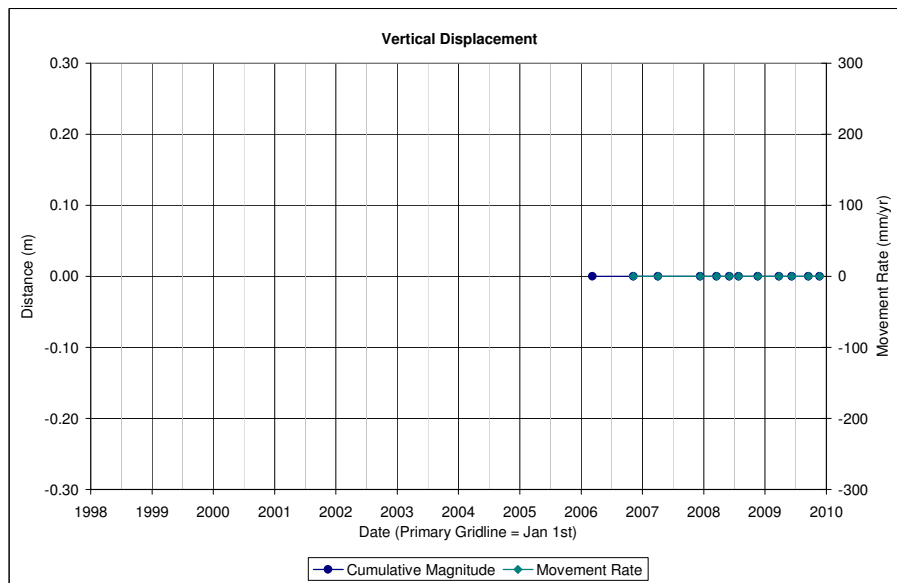
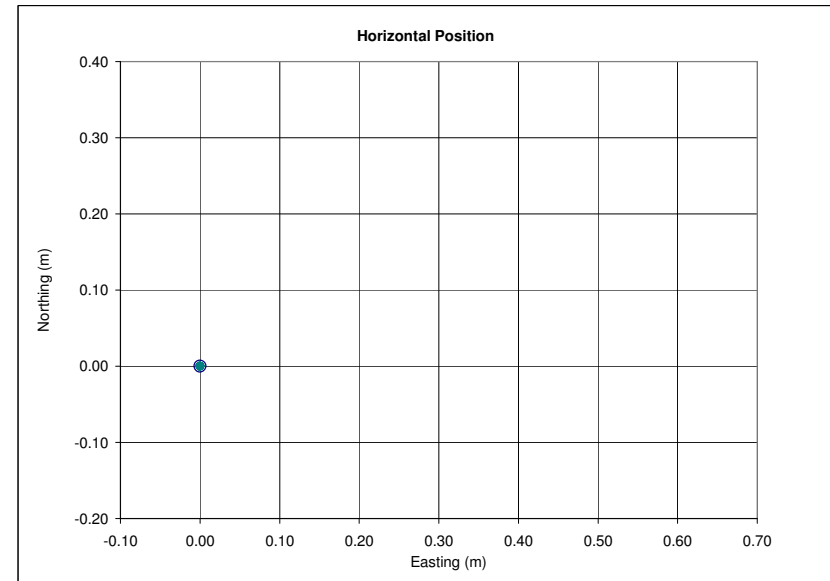
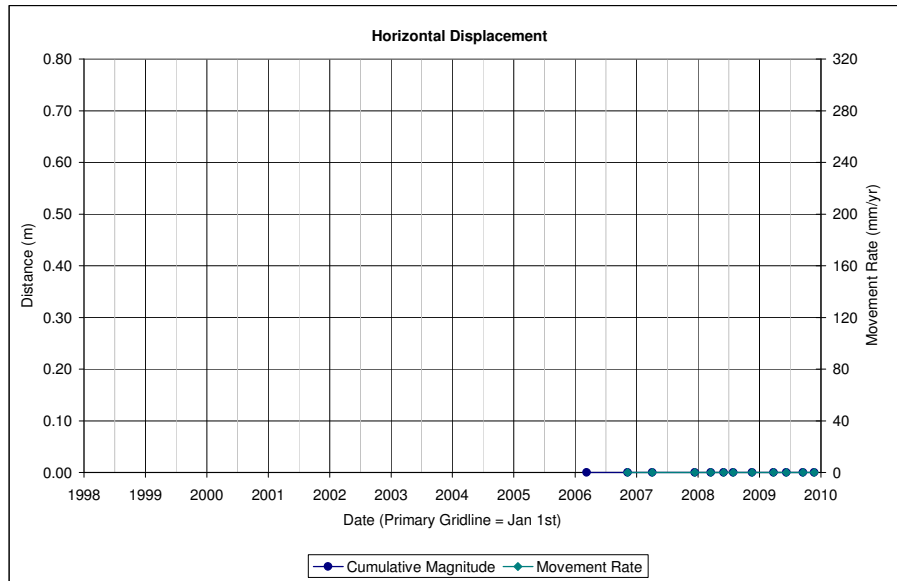
Displacement Graphs - Hub 01-38
 Benchmark - Quesnel No. 1 Station



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[illegible]

Displacement Graphs - Hub WaterTank
Benchmark - Water Tank



Appendix B

Slope Inclinometers - Summary Table and Survey Plots

APPENDIX B - Slope Inclinometer Status

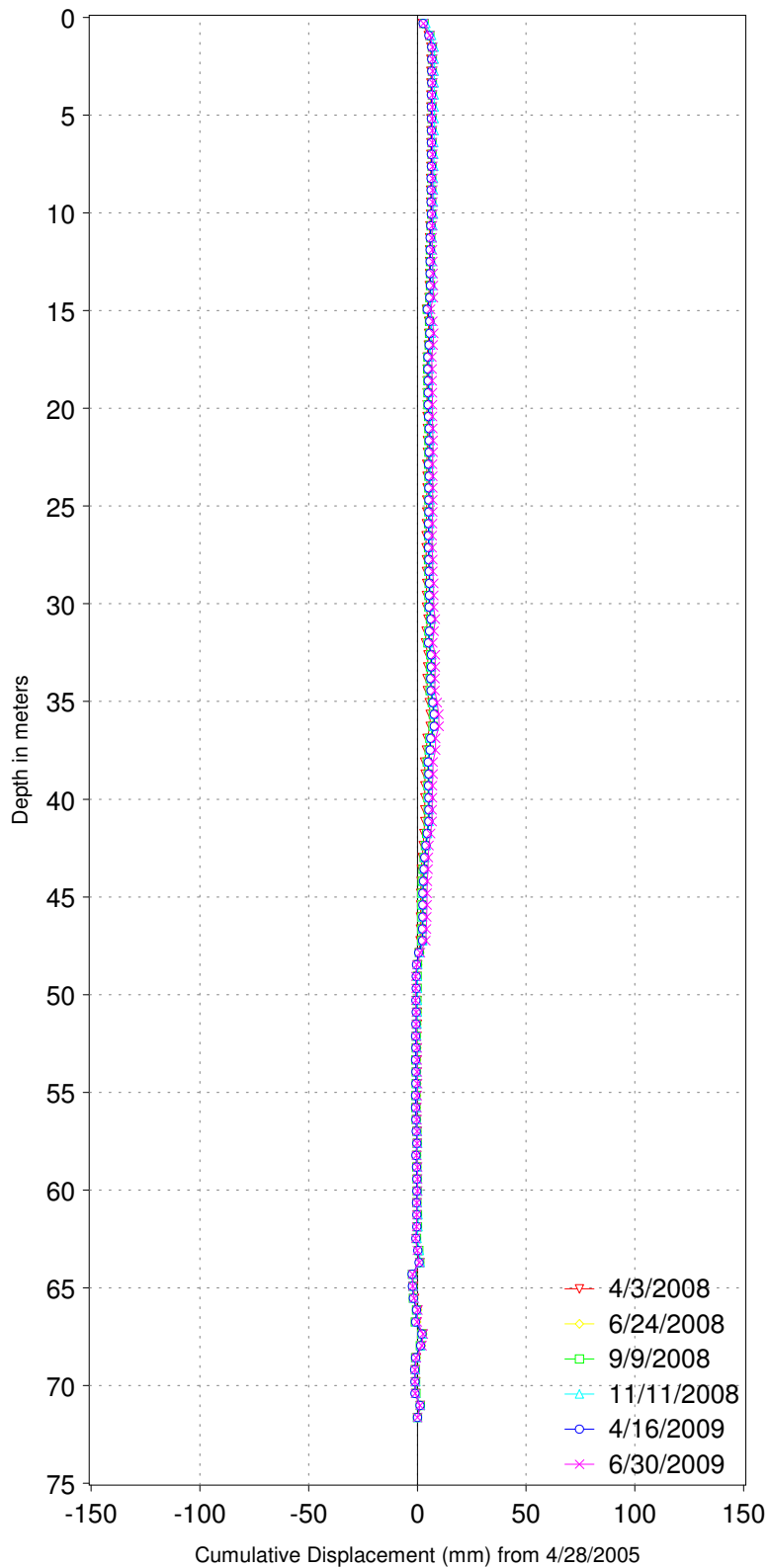
SI	Location	Initial Reading Date	Status	Displacement
SI-1	Avery Lane	November 2000	Blocked at 40m between Apr-June 2008	23mm*
SI-2	Avery Lane	November 2000	Blocked at 41m between Nov. 04-Apr. 05	86mm*
SI-3	Abbott Dr. & Bettcher St.	November 2000	Blocked at 39m between May-Nov. 2002	61mm*
SI-4	Voyager 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*

* Displacements are reported from last reading before SI blocked

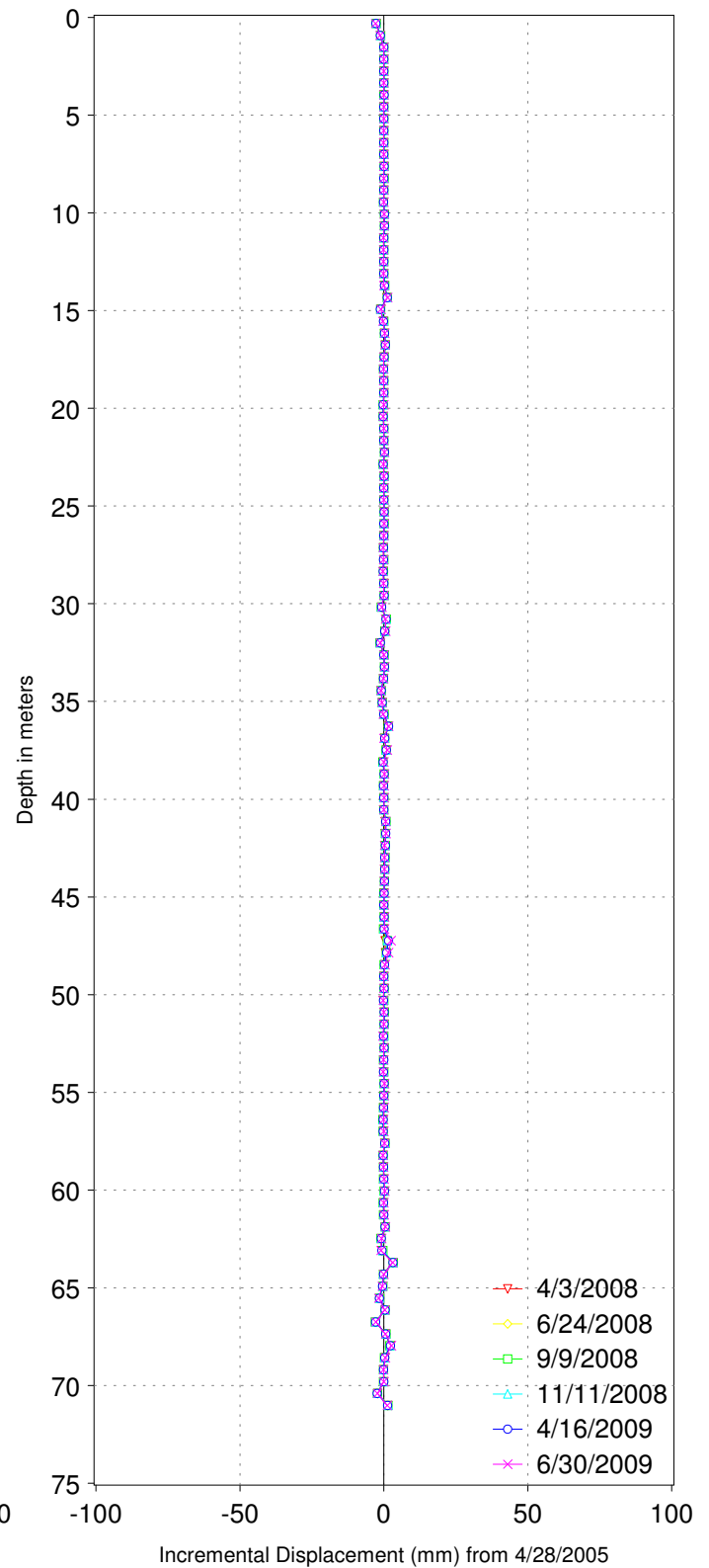
KX04397
WEST QUESNEL LAND STABILITY MONITORING
CUMMULATIVE & INCREMENTAL DISPLACEMENTS
SI-8



SI-8, A-Axis, Cumulative



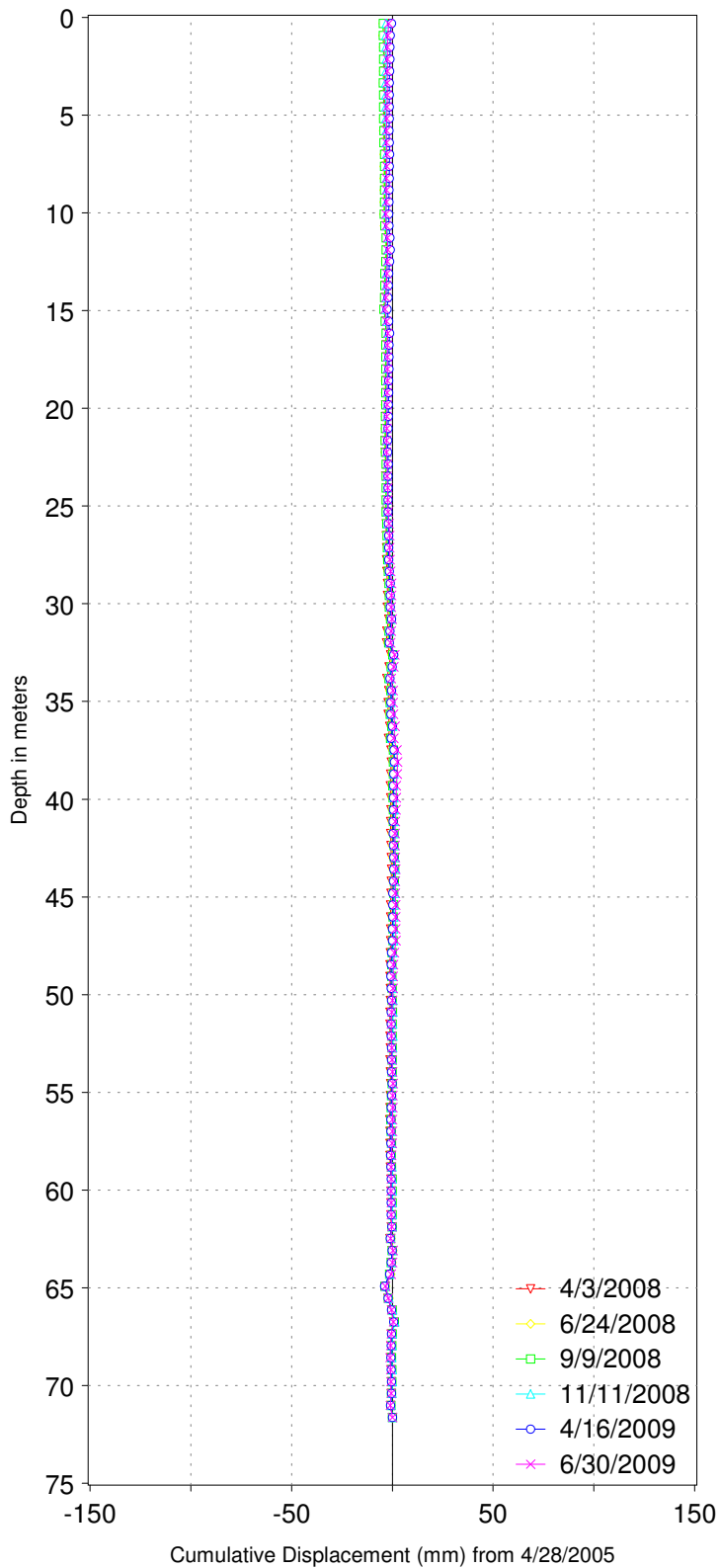
SI8, A-Axis, Incremental



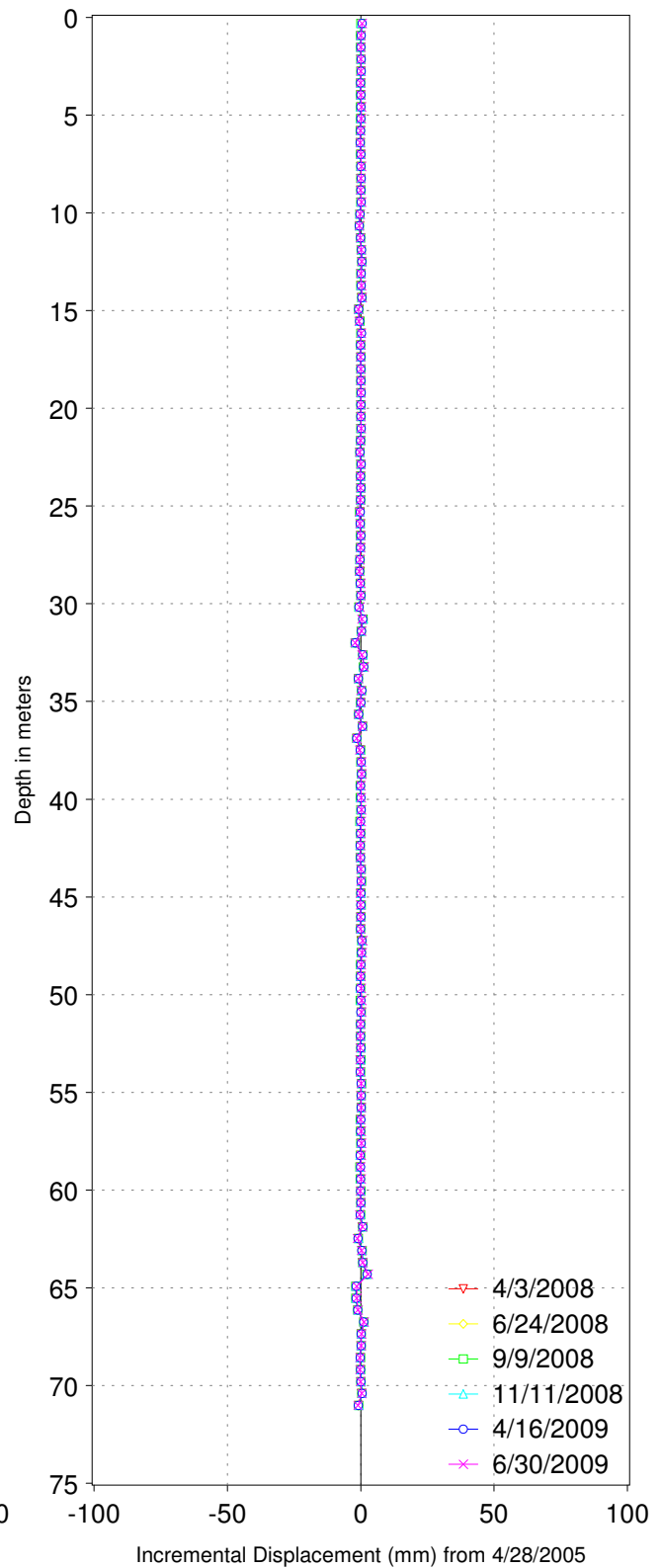
KX04397
 WEST QUESNEL LAND STABILITY Study
 CUMULATIVE & INCREMENTAL DISPLACEMENTS
SI8



SI8, B-Axis, Cumulative



SI8, B-Axis, Incremental



KX09397

WEST QUESNEL LAND STABILITY STUDY

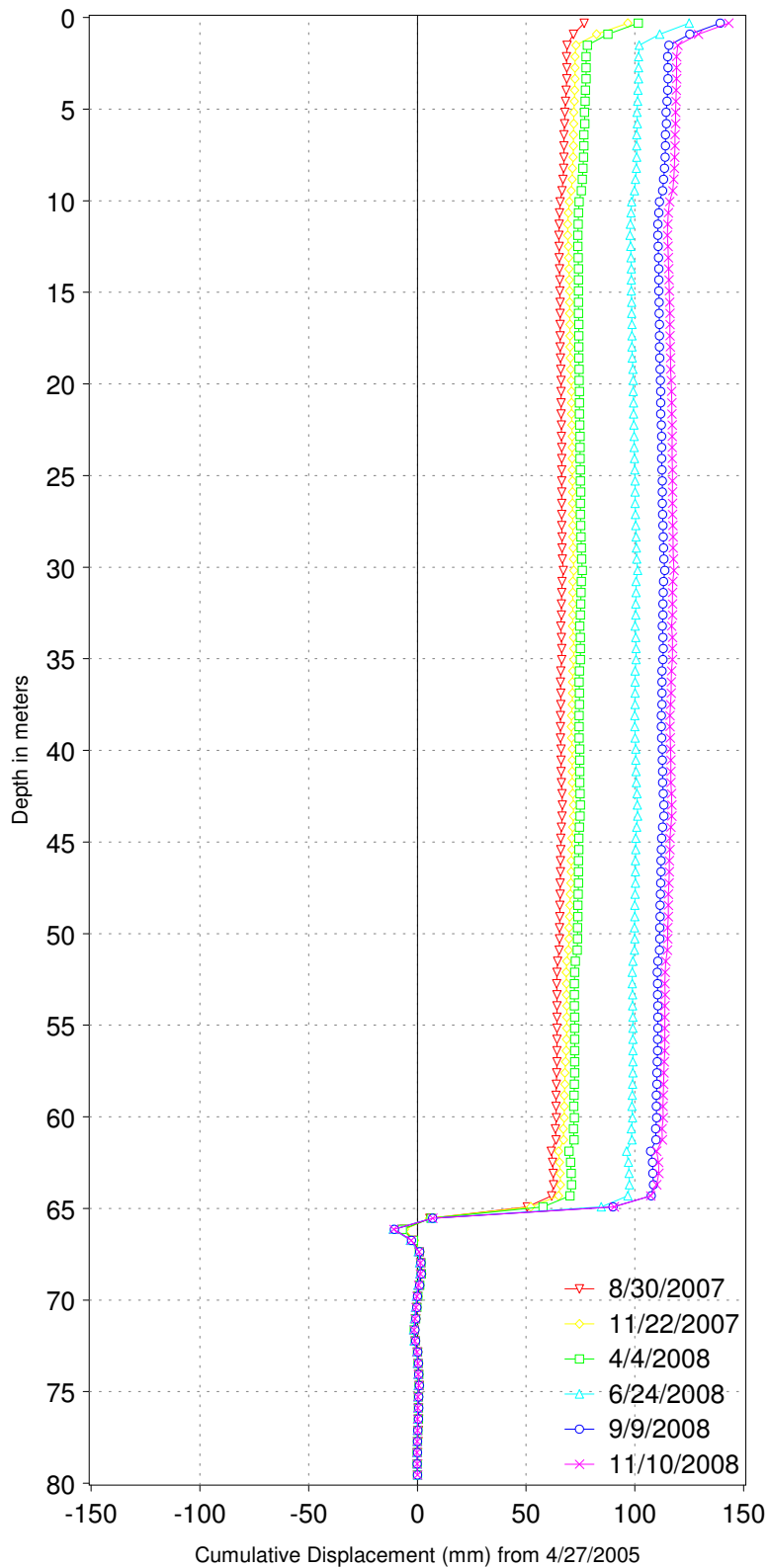
CUMULATIVE & INCREMENTAL DISPLACEMENTS

SI9

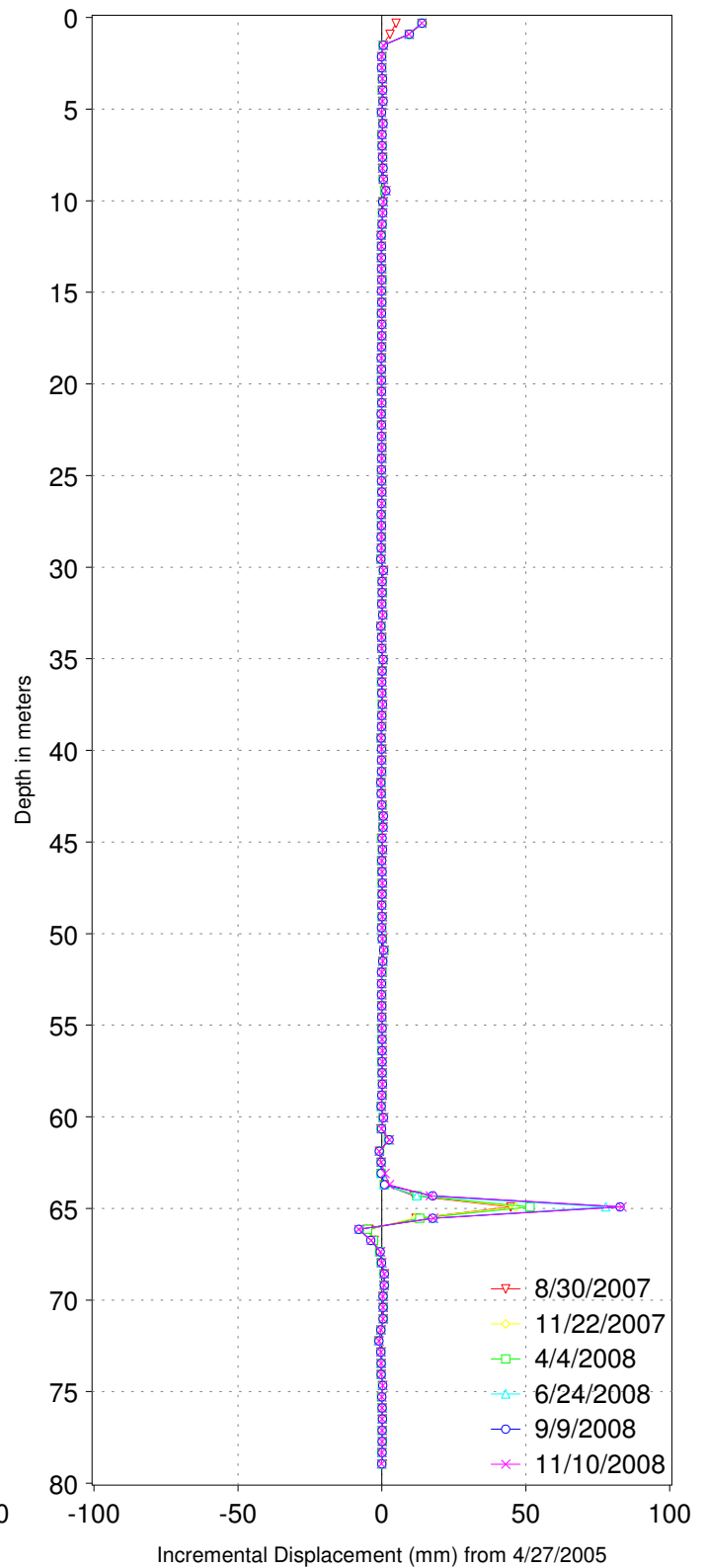
BLOCKED AT 65 m BETWEEN NOVEMBER 10 2008 AND APRIL 15 2009



SI9, A-Axis, Cumulative



SI9, A-Axis, Incremental



KX09397

WEST QUESNEL LAND STABILITY STUDY

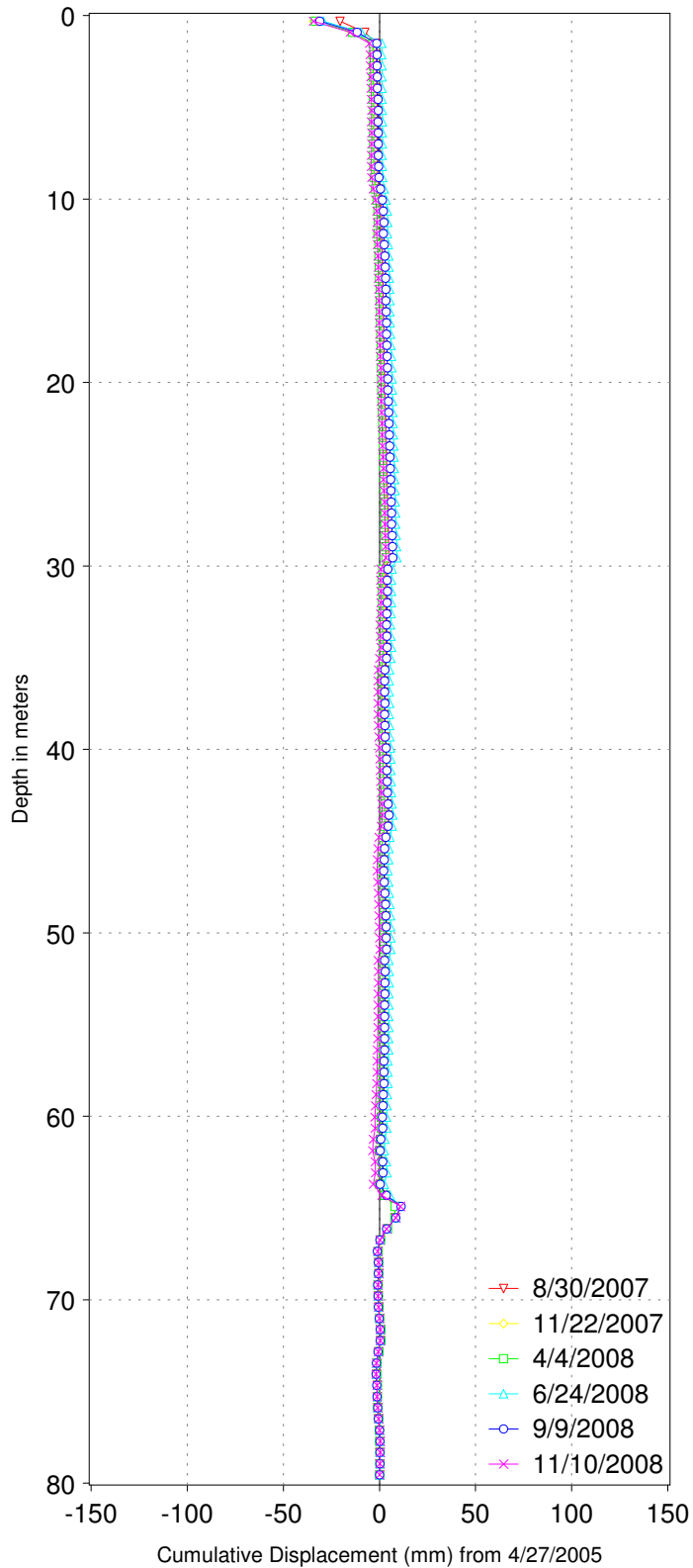
CUMULATIVE & INCREMENTAL DISPLACEMENTS

SI9

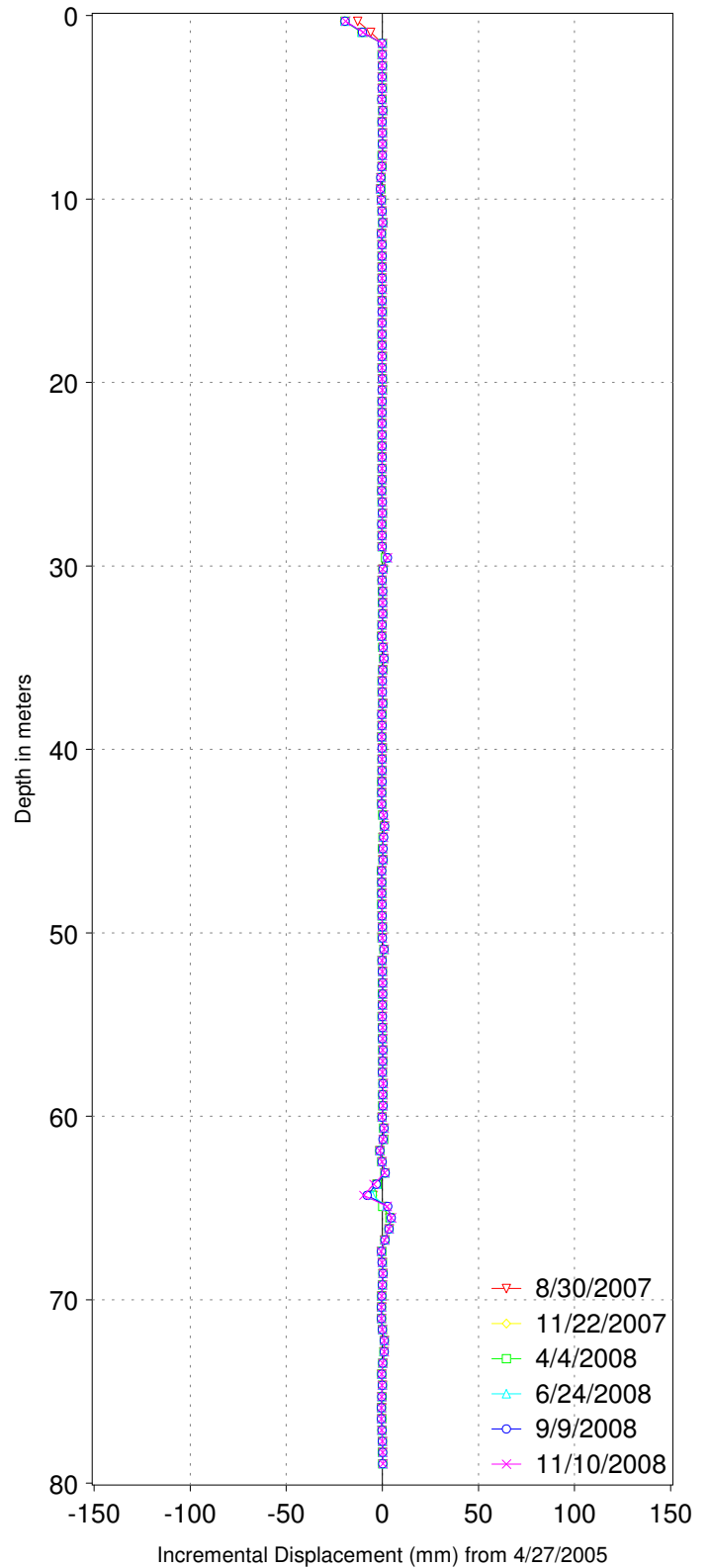
BLOCKED AT 65 m BETWEEN NOVEMBER 10 2008 AND APRIL 15 2009



SI9, B-Axis, Cumulative



SI9, B-Axis, Incremental



KX04397

WEST QUESNEL LAND STABILITY MONITORING

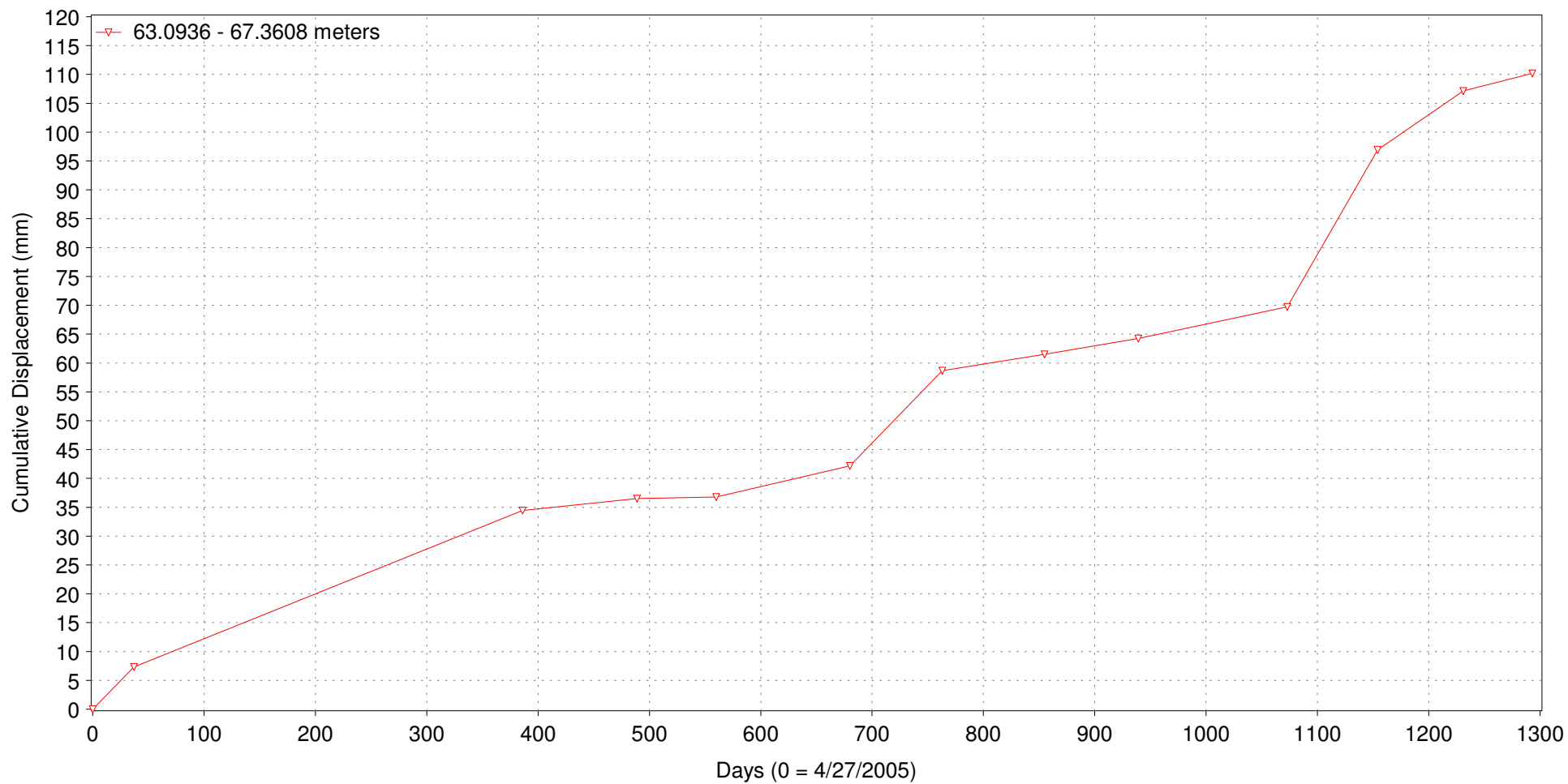
TIME DISPLACEMENT (METRIC)

SI-9

BLOCKED AT 65 m BETWEEN NOVEMBER 10 2008 AND APRIL 15 2009



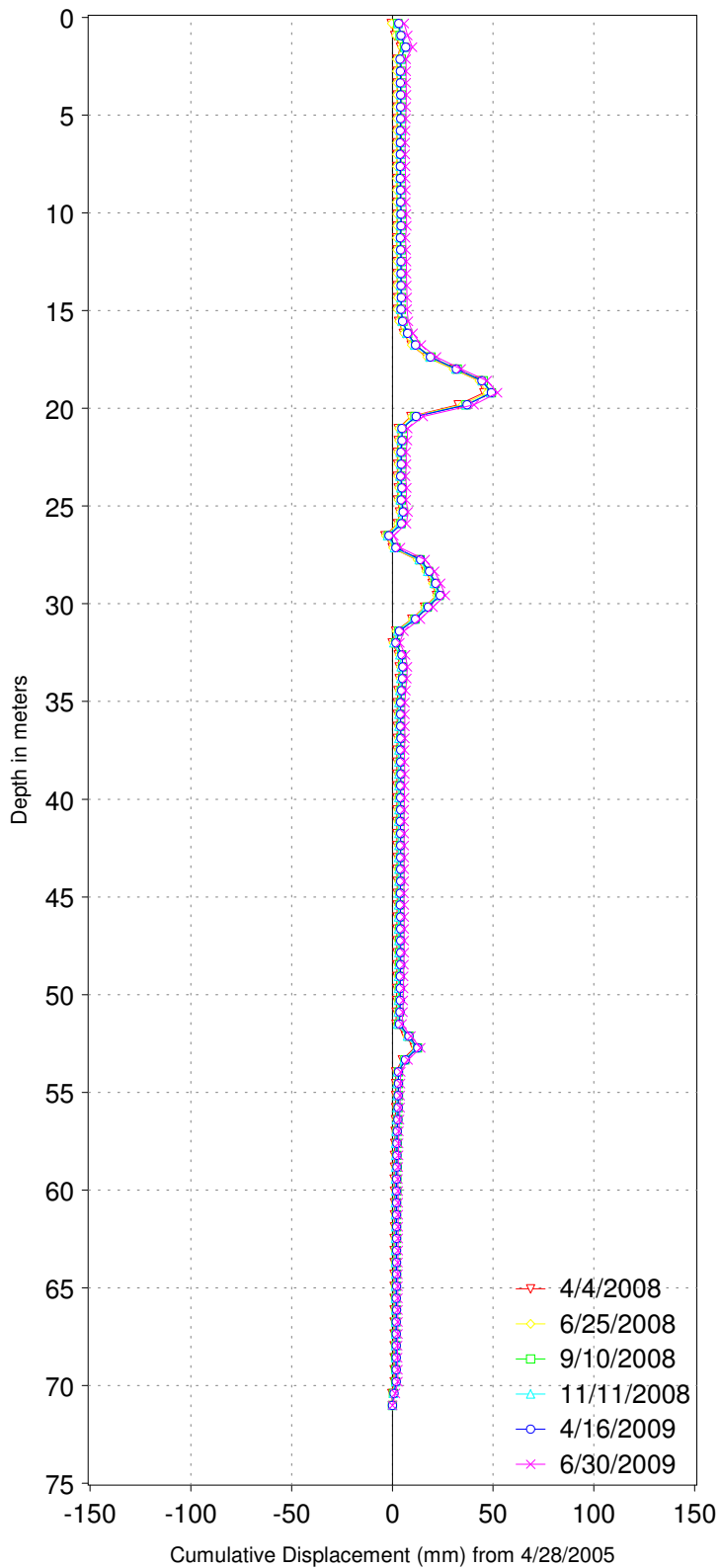
QUES SI-9, A-Axis



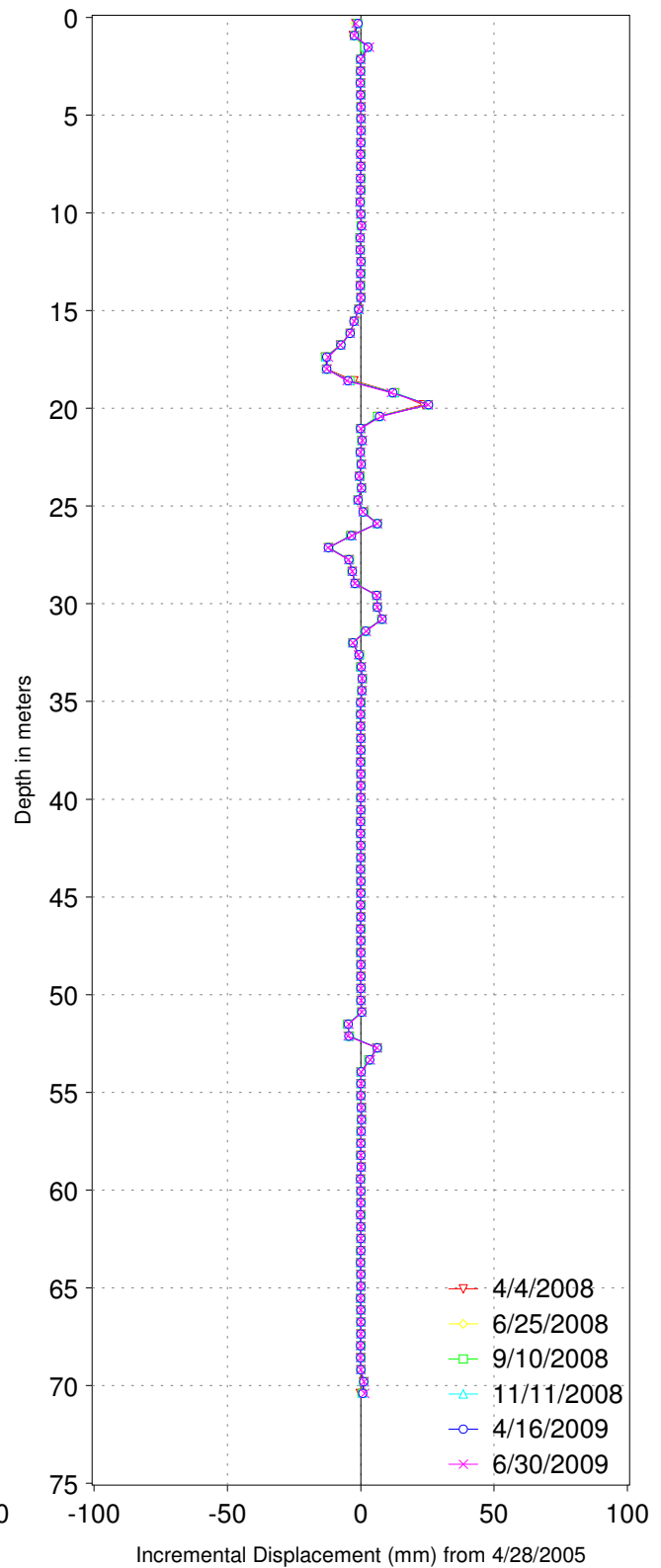
KX04397
 WEST QUESNEL LAND STABILITY STABILITY
 CUMULATIVE & INCREMENTAL DISPLACEMENTS
SI11



SI11, A-Axis, Cumulative



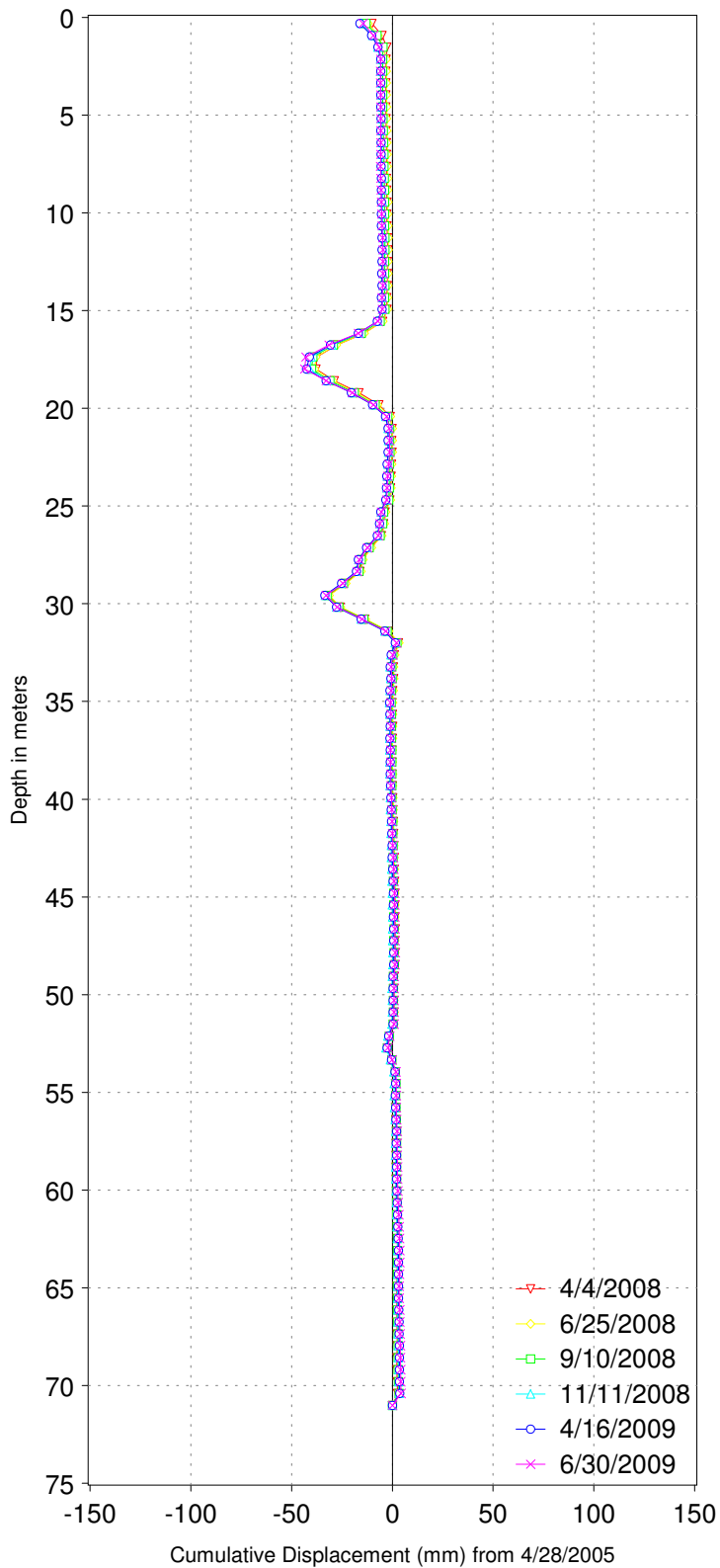
SI11, A-Axis, Incremental



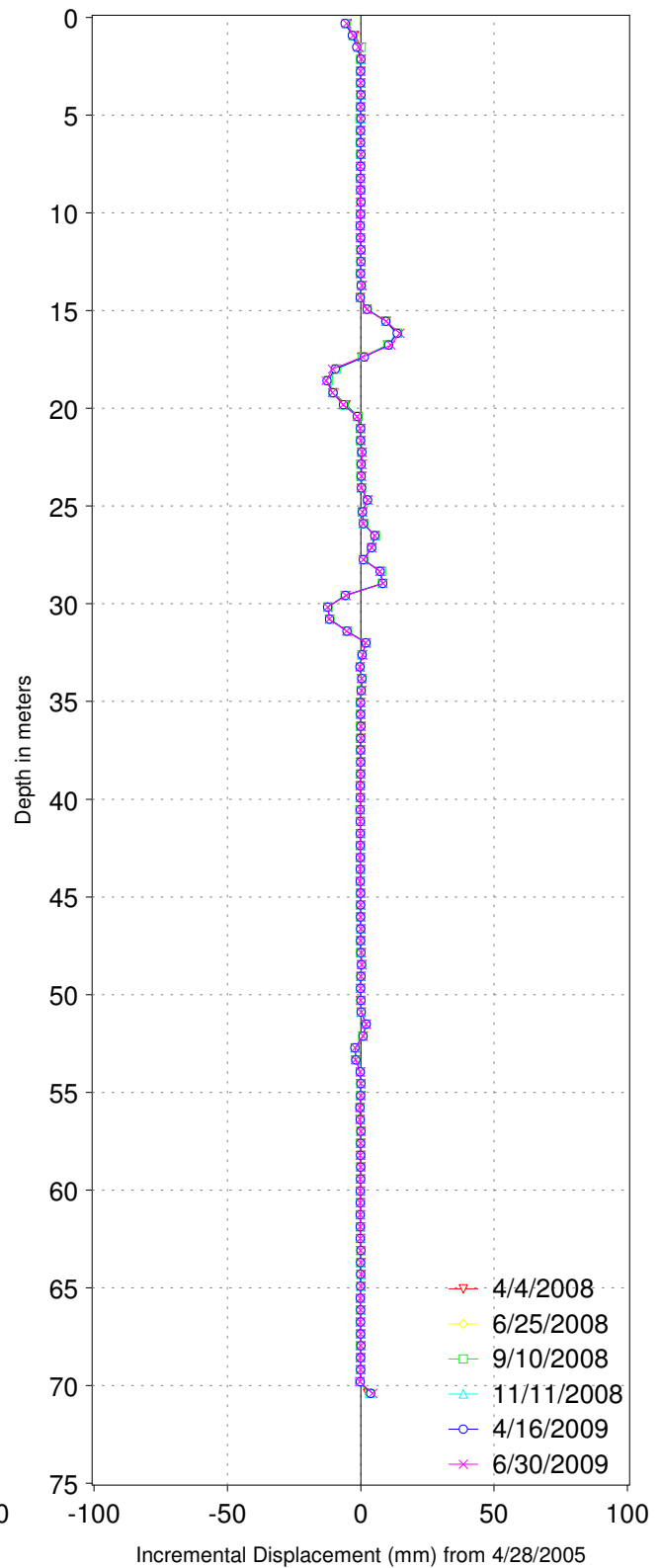
KX04397
WEST QUESNEL LAND STABILITY STUDY
CUMULATIVE & INCREMENTAL DISPLACEMENTS
SI11



SI11, B-Axis, Cumulative



SI11, B-Axis, Incremental



KX04397

WEST QUESNEL STABILITY STUDY

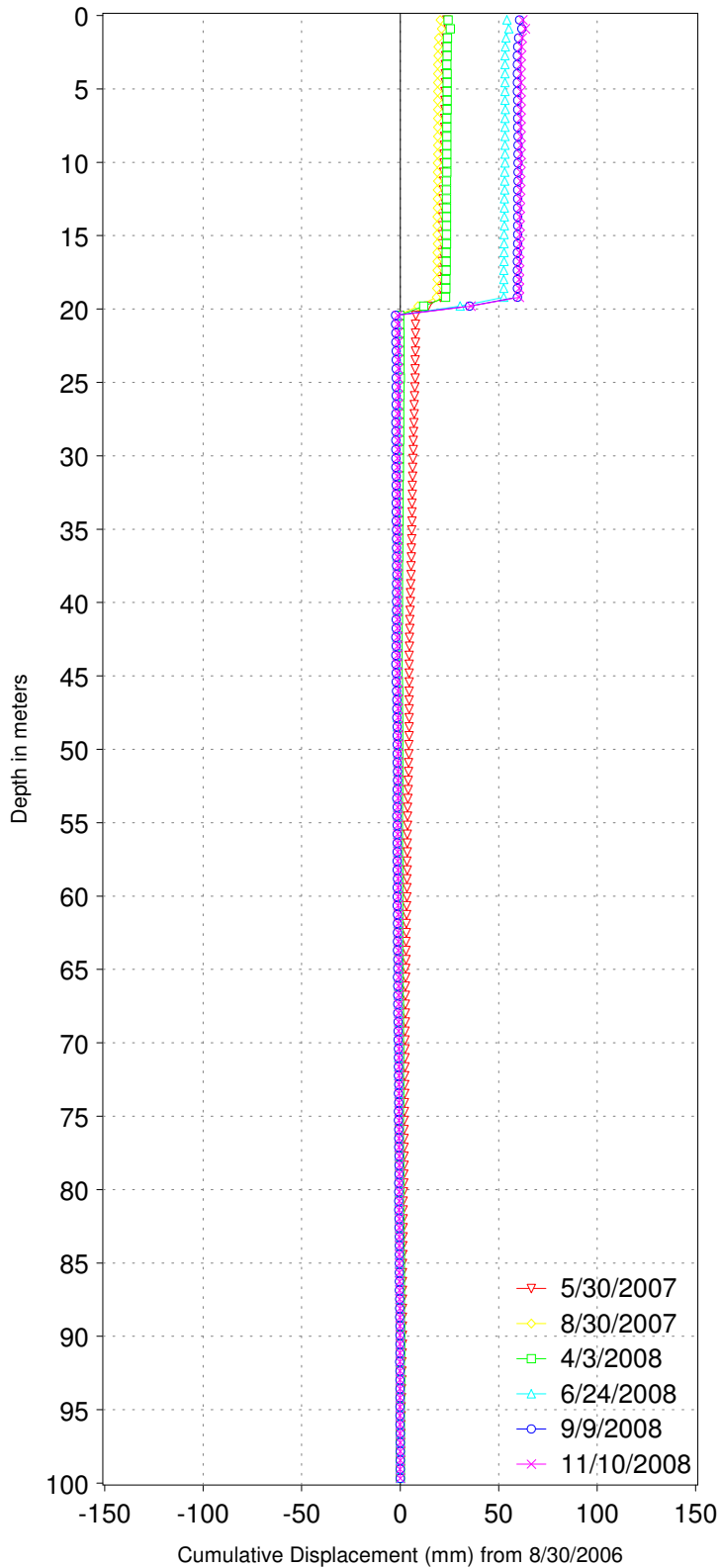
CUMULATIVE & INCREMENTAL DISPLACEMENTS

SI14

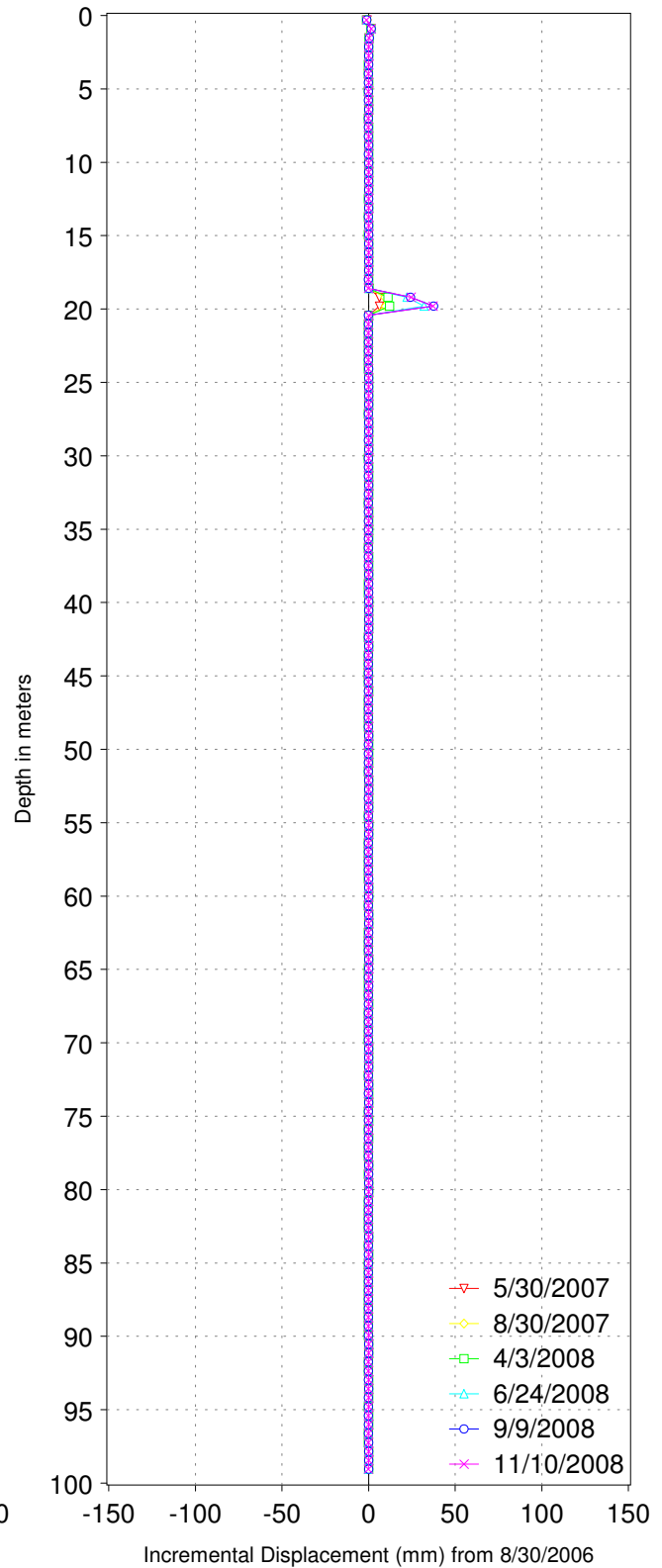
BLOCKED AT 20 m BETWEEN NOVEMBER 10 2008 AND APRIL 15 2009



SI14, A-Axis, Cumulative



SI14, A-Axis, Incremental



KX04397

WEST QUESNEL STABILITY STUDY

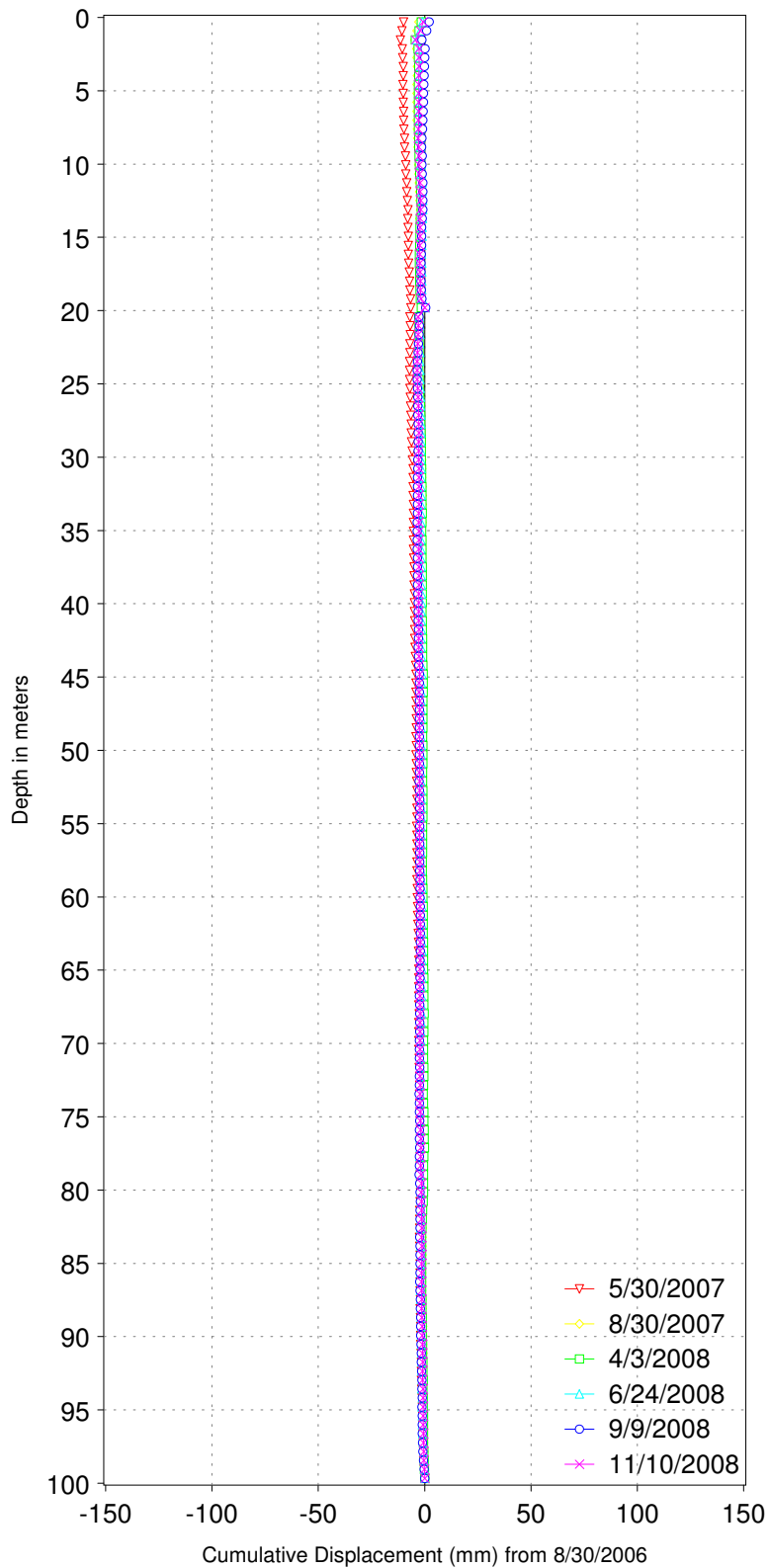
CUMULATIVE & INCREMENTAL DISPLACEMENTS

SI14

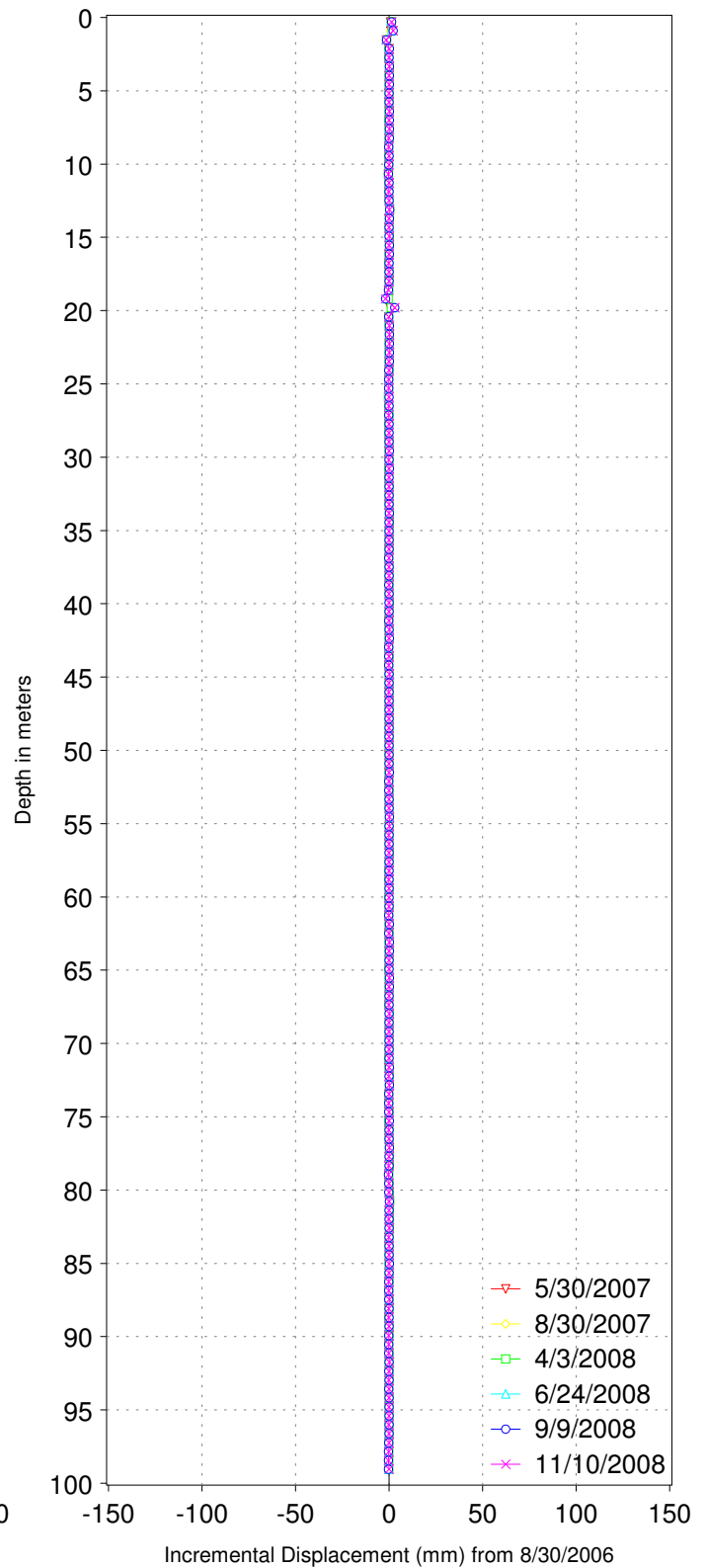
BLOCKED AT 20 m BETWEEN NOVEMBER 10 2008 AND APRIL 15 2009



SI14, B-Axis, Cumulative



SI14, B-Axis, Incremental



KX04397

WEST QUESNEL LAND STABILITY MONITORING

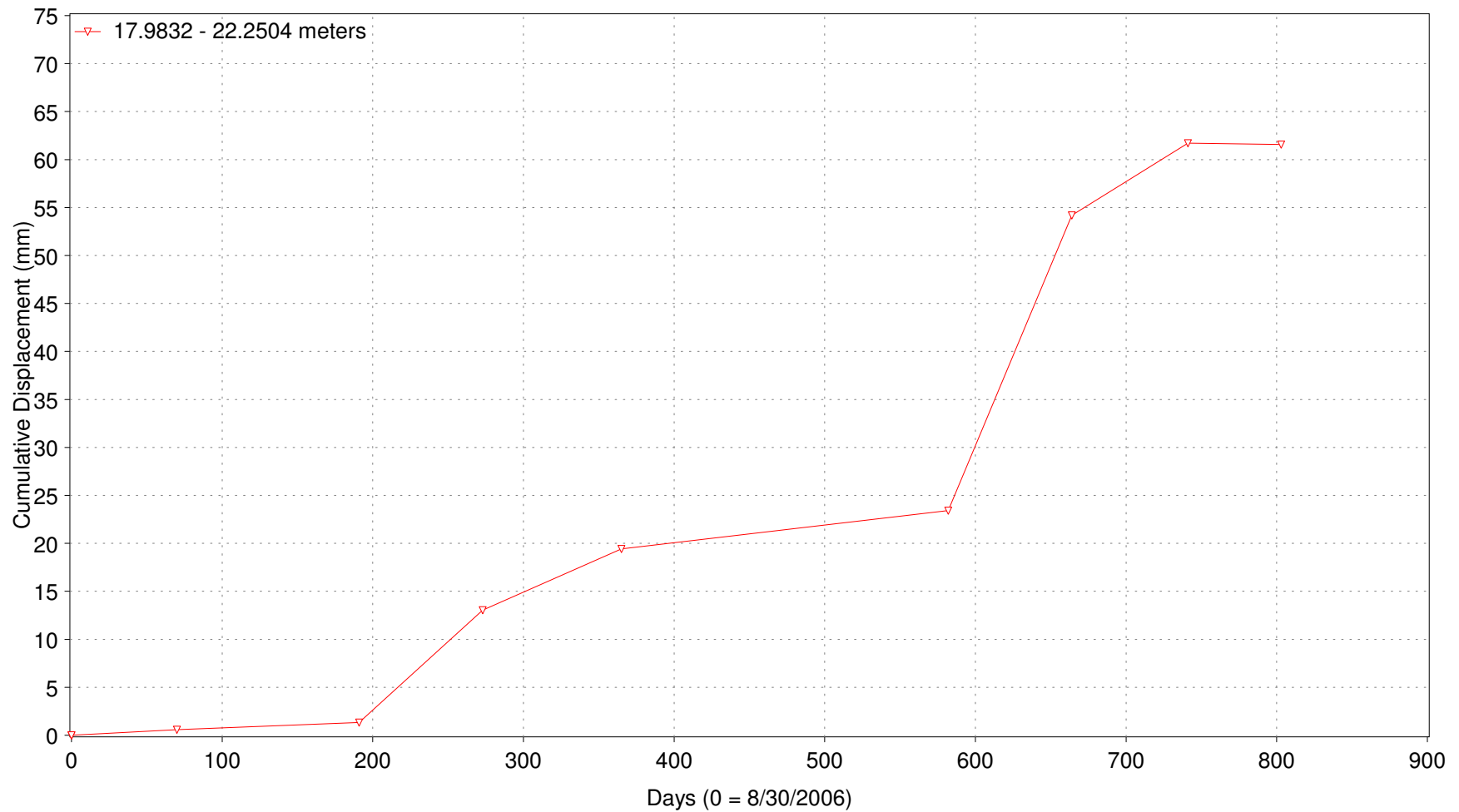
TIME DISPLACEMENT (METRIC)

SI-14

BLOCKED AT 20 m BETWEEN NOVEMBER 10 2008 AND APRIL 15 2009



QUES SI-14, A-Axis



KX04397

WEST QUESNEL LAND STABILITY STUDY

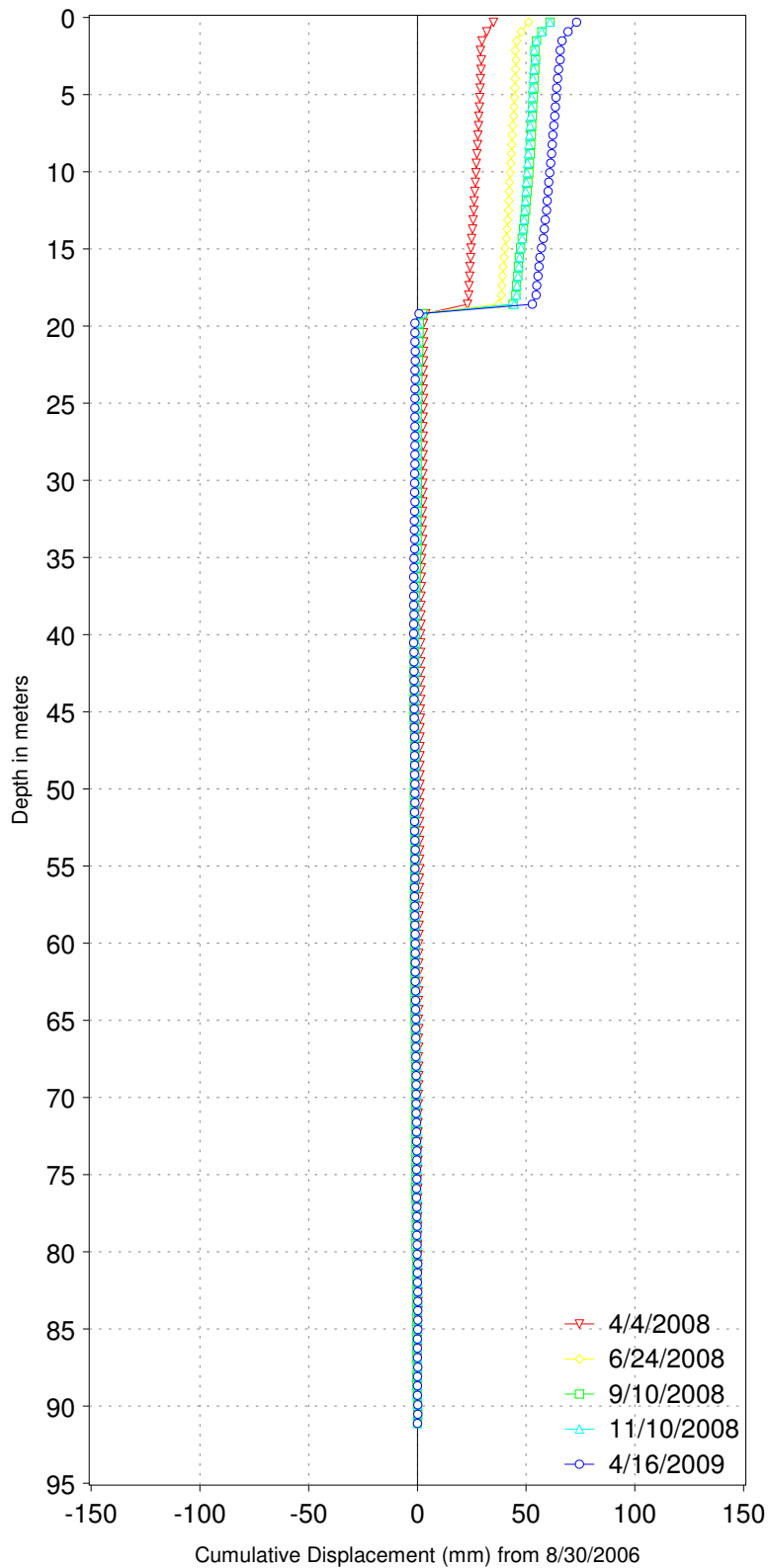
CUMULATIVE & INCREMENTAL DISPLACEMENTS

SI15

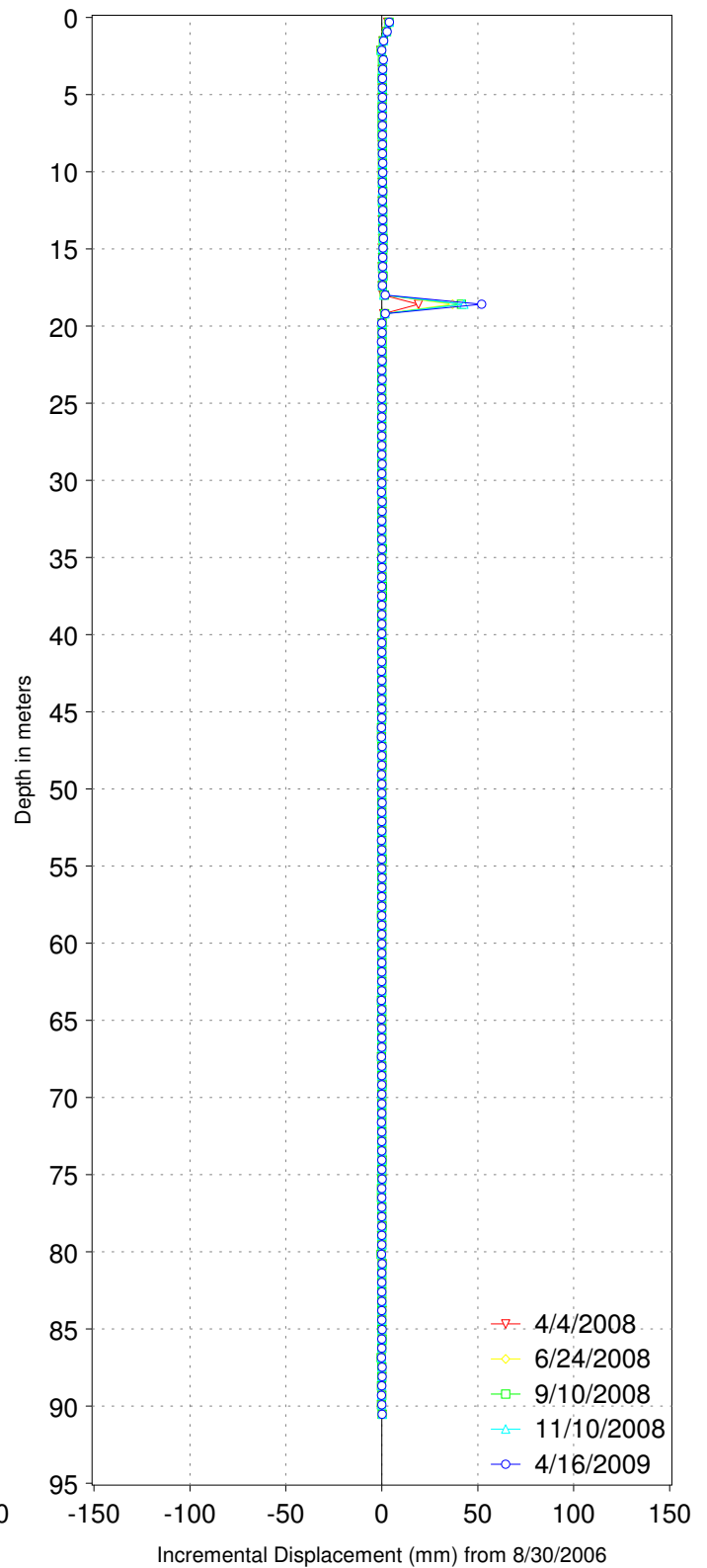
BLOCKED AT 18 m BETWEEN APRIL 16 AND JUNE 30 2009



SI15, A-Axis, Cumulative



SI15, A-Axis, Incremental



KX04397

WEST QUESNEL LAND STABILITY STUDY

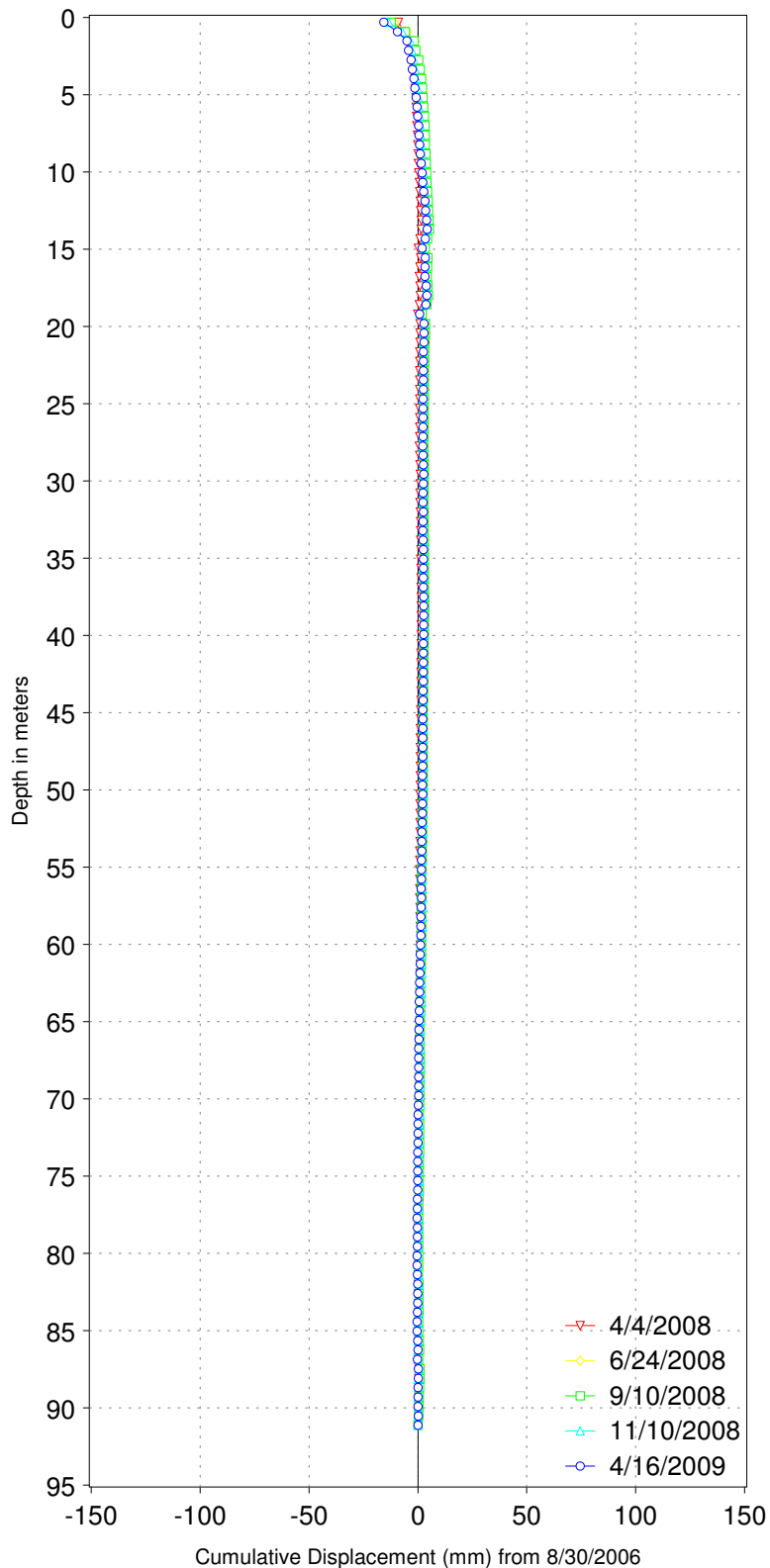
CUMULATIVE & INCREMENTAL DISPLACEMENTS

SI15

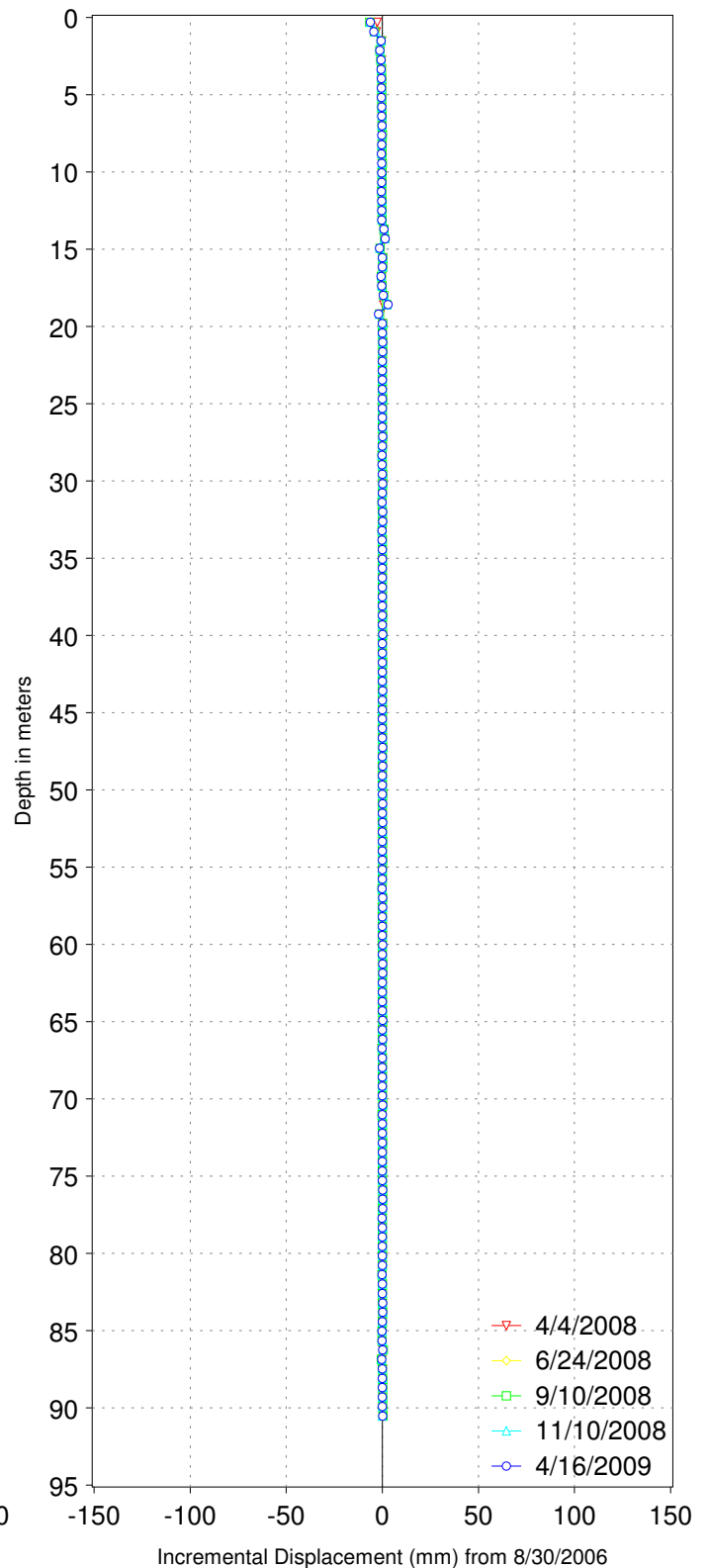
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SI15, B-Axis, Cumulative



SI15, B-Axis, Incremental



KX04397

WEST QUESNEL LAND STABILITY MONITORING

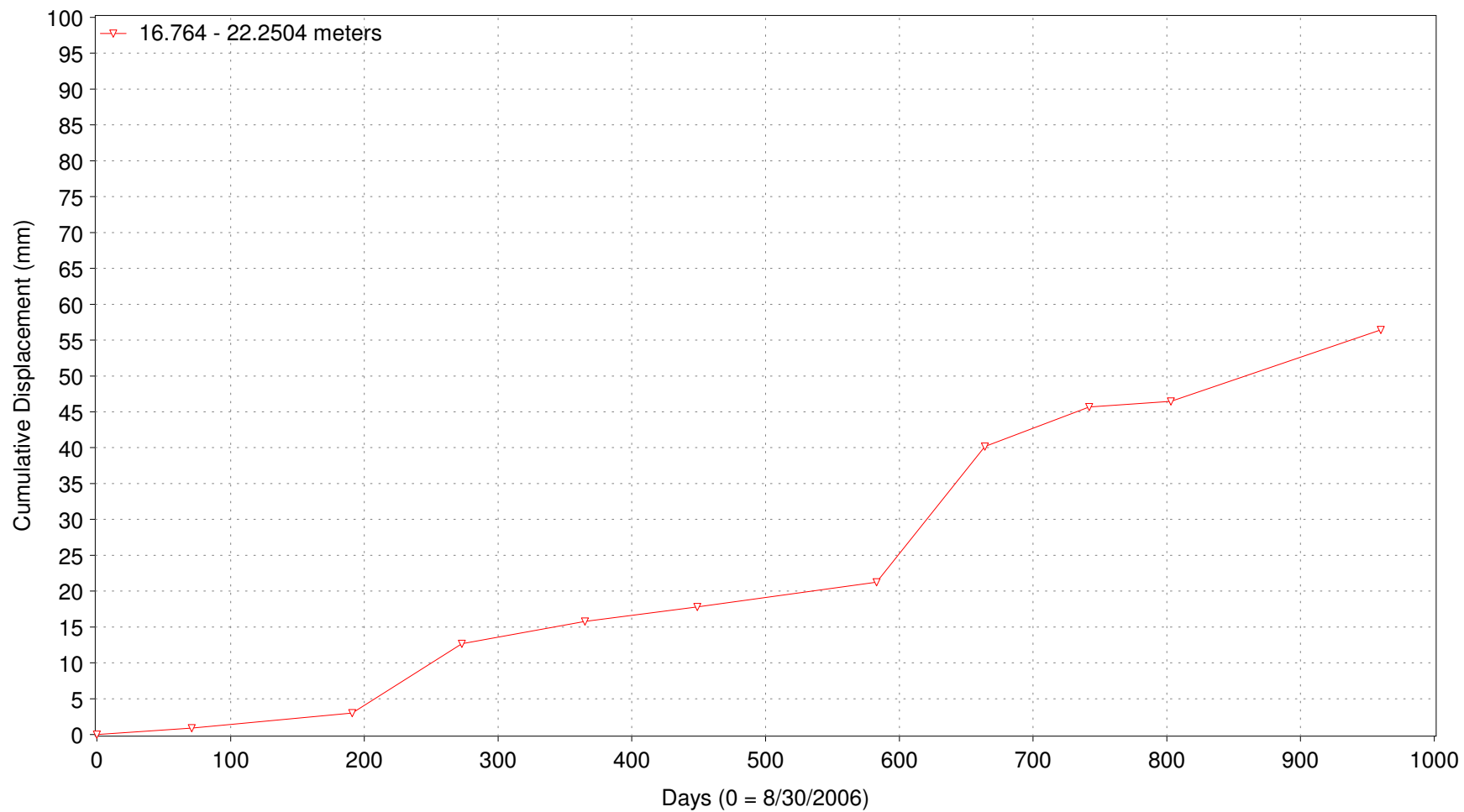
TIME DISPLACEMENT (METRIC)

SI-15

BLOCKED AT 18 m BETWEEN APRIL 16 AND JUNE 30 2009



QUES SI-15, A-Axis



Appendix C

Piezometers - Summary Table and Groundwater Elevation Plots

APPENDIX C - Piezometer Status

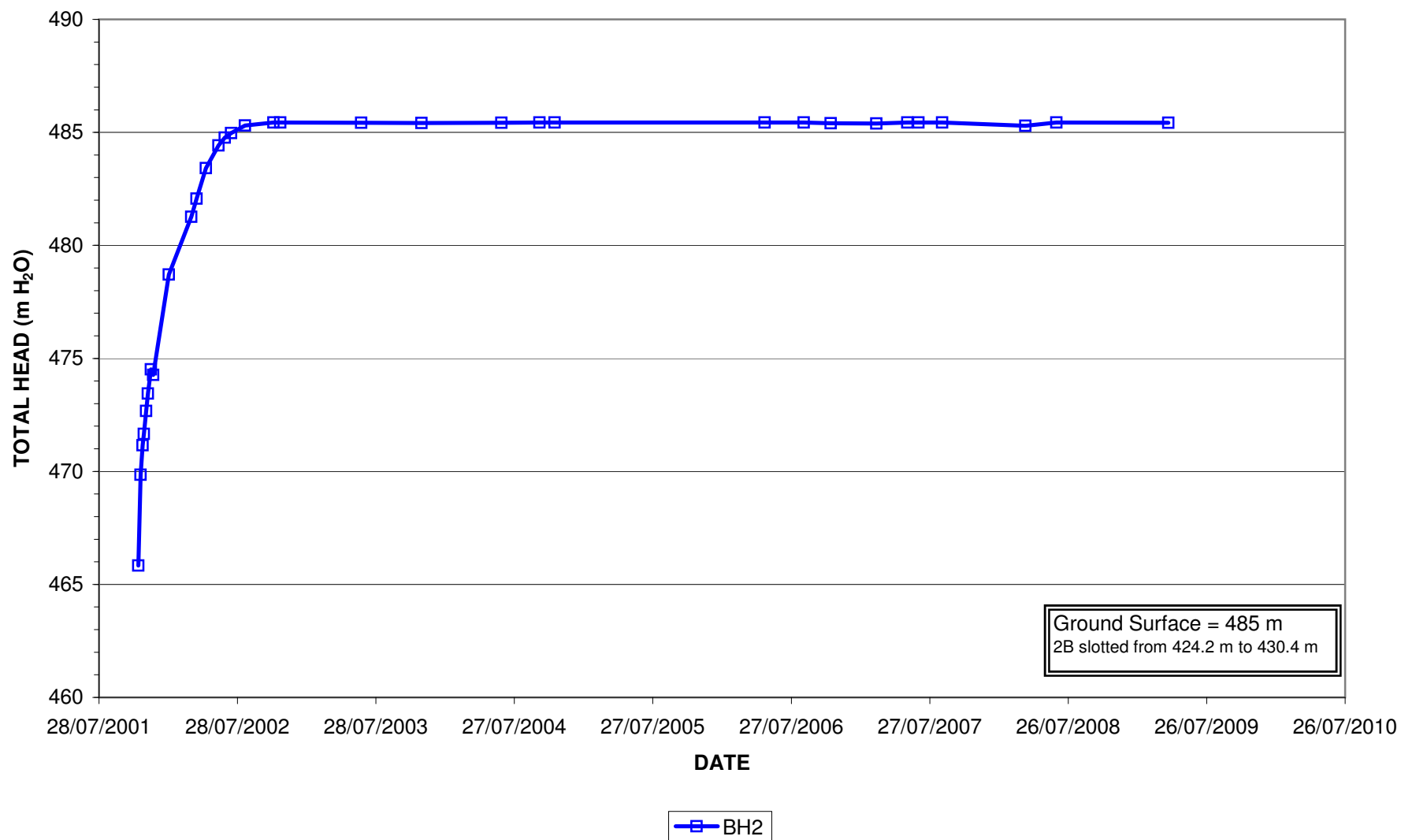
Standpipe Piezometers				
Piezometer	Location	Installation Date	Depth (screen)	Status
BH2	Avery Lane	November 2001	54.2 to 60.2m	Active
BH2a	Bettcher St.	August 2003	86.9-88.4m	Active
BH2b	Bettcher St.	August 2003	47.4-48.2m	Active
BH2c	Bettcher St.	August 2003	25.3-25.9m	Active
BH3a	Flamingo St.	July 2003	50.0-50.6m	Active
BH4c	Flamingo St.	July 2003	22.9-23.5m	Active
BH4-a	Voyager School	December 2001	39.6-39.9m	Active
BH6a-1	Dixon St.	December 2001	44.0-45.2m	Active - standpipe dry
BH6b-1	Dixon St.	December 2001	26.4-27.8m	Active

Standpipe Piezometers with Vibrating Wires				
Piezometer	Location	Installation Date	Depth (tip)	Status
BH3b	Flamingo St.	August 2003	40.0m	Connected to PW1 datalogger
BH3c	Flamingo St.	August 2003	31.0m	Connected to PW1 datalogger
BH4a	Flamingo St.	July 2003	40.0m	Connected to PW1 datalogger
BH4b	Flamingo St.	July 2003	23.0m	Connected to PW1 datalogger

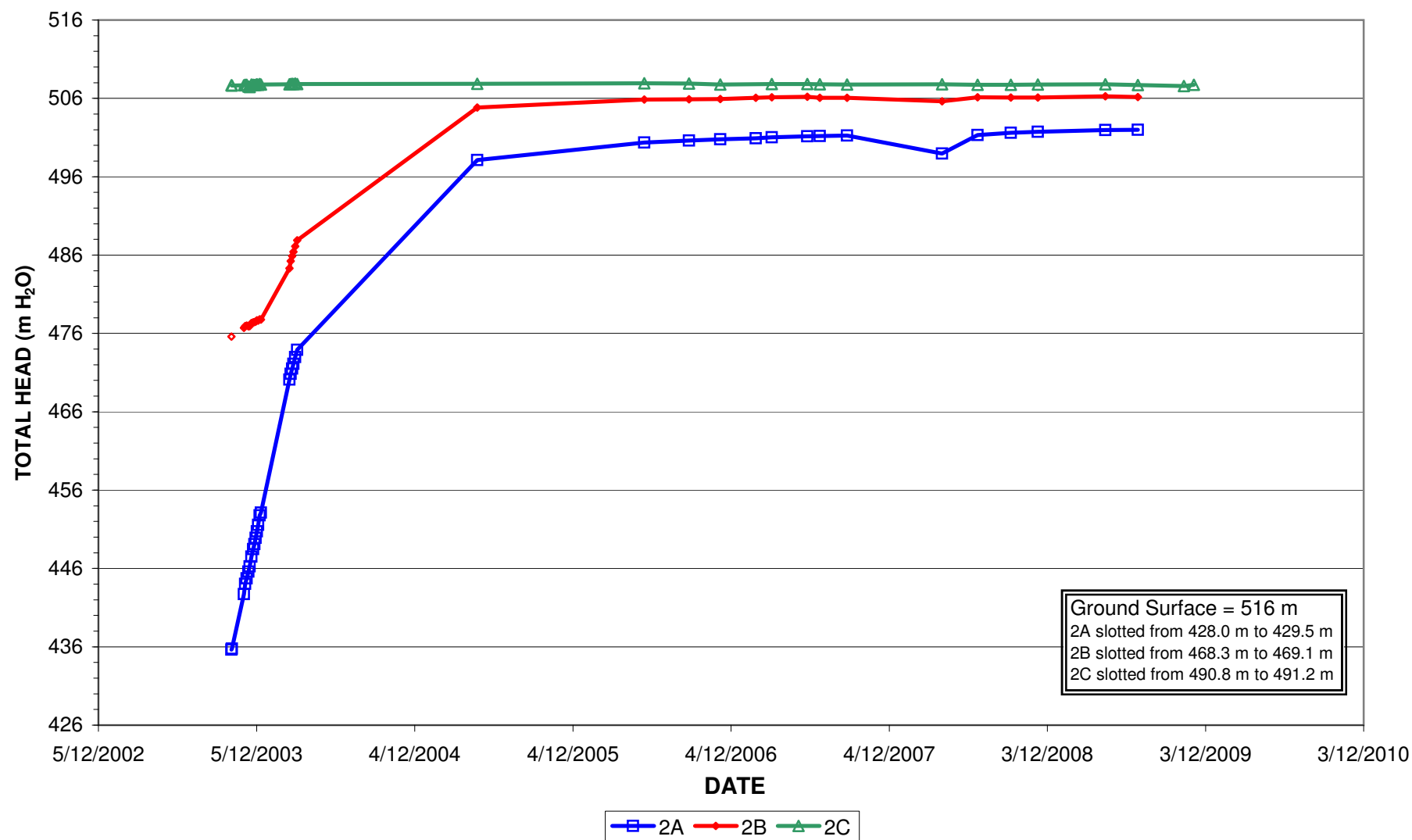
Vibrating Wire Piezometers				
Piezometer	Location	Installation Date	Depth (tip)	Status
BH3	Abbott Dr.	November 2001	37.5m	Connected to PW2 datalogger
BH4-b	Voyager School	December 2001	49.0m	Connected to a minilogger
BH7a	Pierce Cres.	July 2005	27.0m	Connected to BH7 datalogger
BH7b	Pierce Cres.	July 2005	64.9m	Connected to BH7 datalogger
BH8a	Pinchbeck St.	June 2005	13.1m	Connected to BH8 datalogger VW tip above phreatic surface
BH8b	Pinchbeck St.	June 2005	13.0m	Connected to BH8 datalogger VW tip above phreatic surface
BH8c	Pinchbeck St.	June 2005	28.0m	Connected to BH8 datalogger
BH8d	Pinchbeck St.	June 2005	56.2m	Connected to BH8 datalogger
BH9a	Patchett St.	June 2005	15.1m	Connected to BH9 datalogger
BH9b	Patchett St.	June 2005	30.6m	Connected to BH9 datalogger
BH9c	Patchett St.	June 2005	50.1m	Connected to BH9 datalogger
BH10a	Dawson St.	July 2005	11.6m	Connected to BH10 datalogger
BH10b	Dawson St.	July 2005	20.4m	Connected to BH10 datalogger
BH10c	Dawson St.	July 2005	48.6m	Connected to BH10 datalogger
BH11a	Picard Ave.	June 2005	14.3m	Connected to BH11 datalogger VW tip above phreatic surface
BH11b	Picard Ave.	June 2005	32.0m	Connected to BH11 datalogger
BH11c	Picard Ave.	June 2005	50.3m	Connected to BH11 datalogger
BH12a	Panagrot Ave. (east end)	June 2005	18.0m	Connected to PW4 datalogger
BH12b	Panagrot Ave. (east end)	June 2005	22.9m	Connected to PW4 datalogger
BH12c	Panagrot Ave. (east end)	June 2005	26.5m	Connected to PW4 datalogger VW tip above phreatic surface
BH12d	Panagrot Ave. (east end)	June 2005	54.9m	Connected to PW4 datalogger
BH13a	Lewis Dr. (at Sikh Temple)	July 2005	51.m	Connected to BH13 datalogger
BH13b	Lewis Dr. (at Sikh Temple)	July 2005	14.4m	Connected to BH13 datalogger
BH14a	Findlay Rd.	June 2006	20.1m	Connected to BH14 datalogger
BH14b	Findlay Rd.	June 2006	65.9m	Connected to BH14 datalogger

Vibrating Wire Piezometers cont.				
BH14c	Findlay Rd.	June 2006	98.7m	Connected to BH14 datalogger
BH15a	Panagrot Ave. (west end)	July 2006	8.8m	Connected to BH15 datalogger
BH15b	Panagrot Ave. (west end)	July 2006	63.3m	Connected to BH15 datalogger
BH15c	Panagrot Ave. (west end)	July 2006	83.2m	Connected to BH15 datalogger
BH16a	Diatomite Mine	October 2006	42.7m	Connected to BH16 datalogger
BH16b	Diatomite Mine	October 2006	85.5m	Connected to BH16 datalogger
BH16c	Diatomite Mine	October 2006	139.1m	Connected to BH16 datalogger
BH16d	Diatomite Mine	October 2006	214.9m	Connected to BH16 datalogger
BH17a	Adams St.	July 2007	37.7m	Connected to PW5 datalogger
BH17b	Adams St.	July 2007	57.4m	Connected to PW5 datalogger
BH18a	Adams St.	July 2007	38.2m	Connected to PW5 datalogger Not currently giving readings
BH18b	Adams St.	July 2007	60.1m	Connected to PW5 datalogger
BH19a	Panagrot Ave. (east end)	July 2007	16.5m	Connected to PW4 datalogger VW tip above phreatic surface
BH19b	Panagrot Ave. (east end)	July 2007	22.3m	Connected to PW4 datalogger VW tip above phreatic surface
BH20	Panagrot Ave. (east end)	July 2007	21.4m	Connected to PW4 datalogger
BH21a	Crane St.	July 2007	12.6m	Connected to HD4 datalogger
BH21b	Crane St.	July 2007	21.3m	Connected to HD4 datalogger
BH22	Crane St.	July 2007	18.3m	Connected to HD4 datalogger
BH23a	Baity Ave.	July 2007	22.4m	Connected to HD1 datalogger VW tip above phreatic surface
BH23b	Baity Ave.	July 2007	33.1m	Connected to HD1 datalogger
BH24	Baity Ave.	July 2007	22.9m	Connected to HD1 datalogger VW tip above phreatic surface
BH25a	Baity Ave.	July 2007	16.8m	Connected to HD1 datalogger VW tip above phreatic surface
BH25b	Baity Ave.	July 2007	30.2m	Connected to HD1 datalogger Piezometer not working

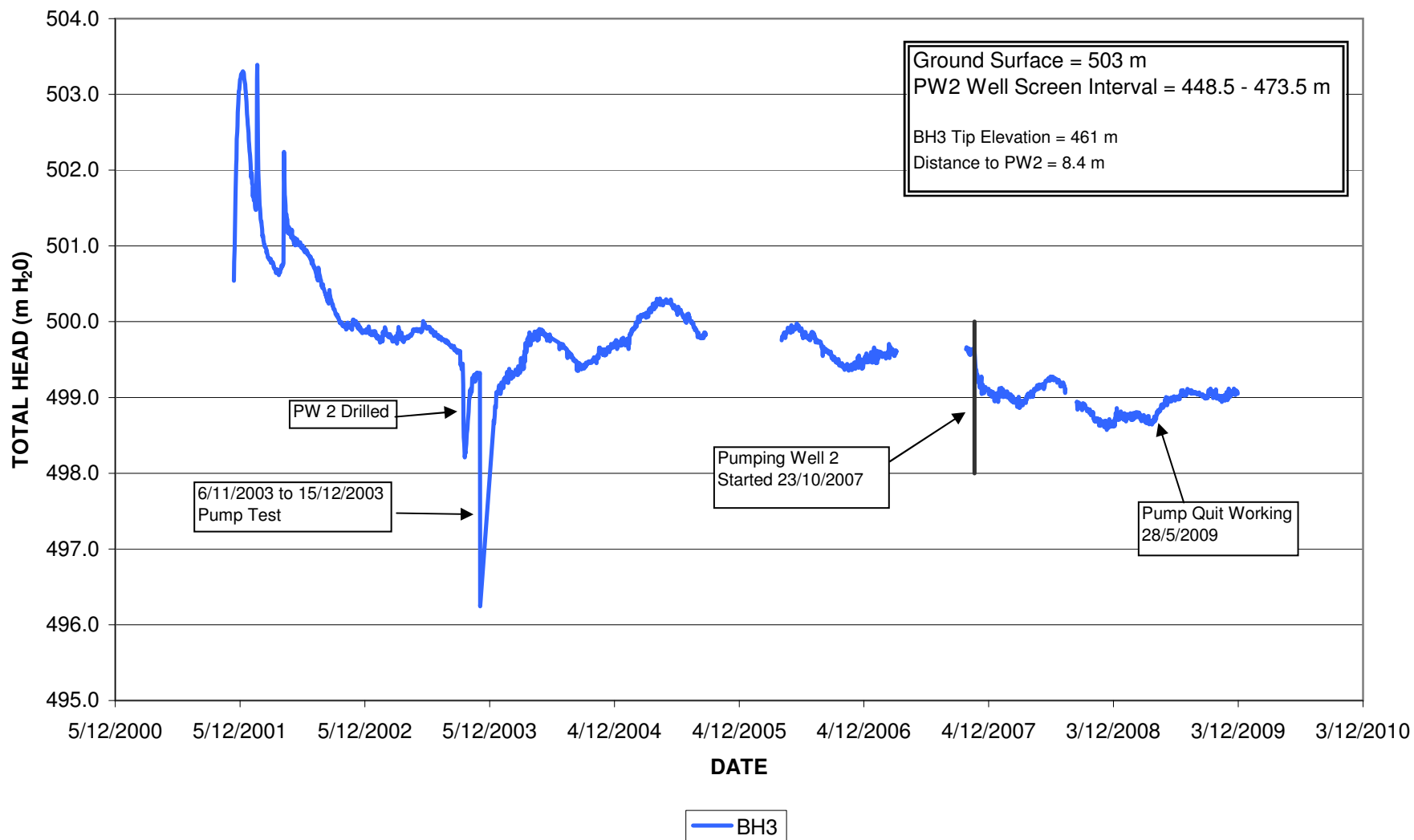
Groundwater Monitoring TOTAL HEAD - BH2 STANDPIPE



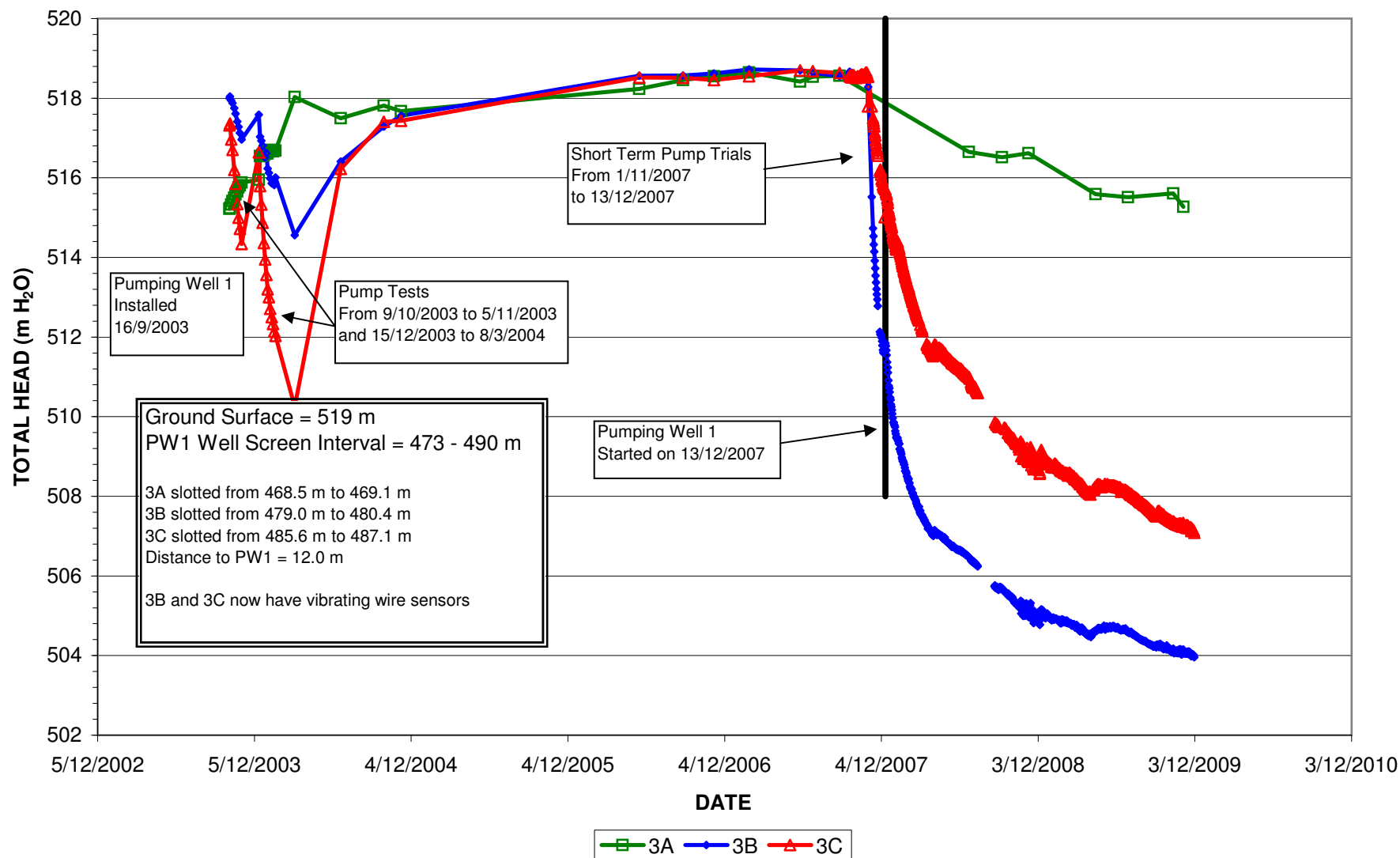
Groundwater Monitoring TOTAL HEAD - BH2A, B, C STANDPIPES



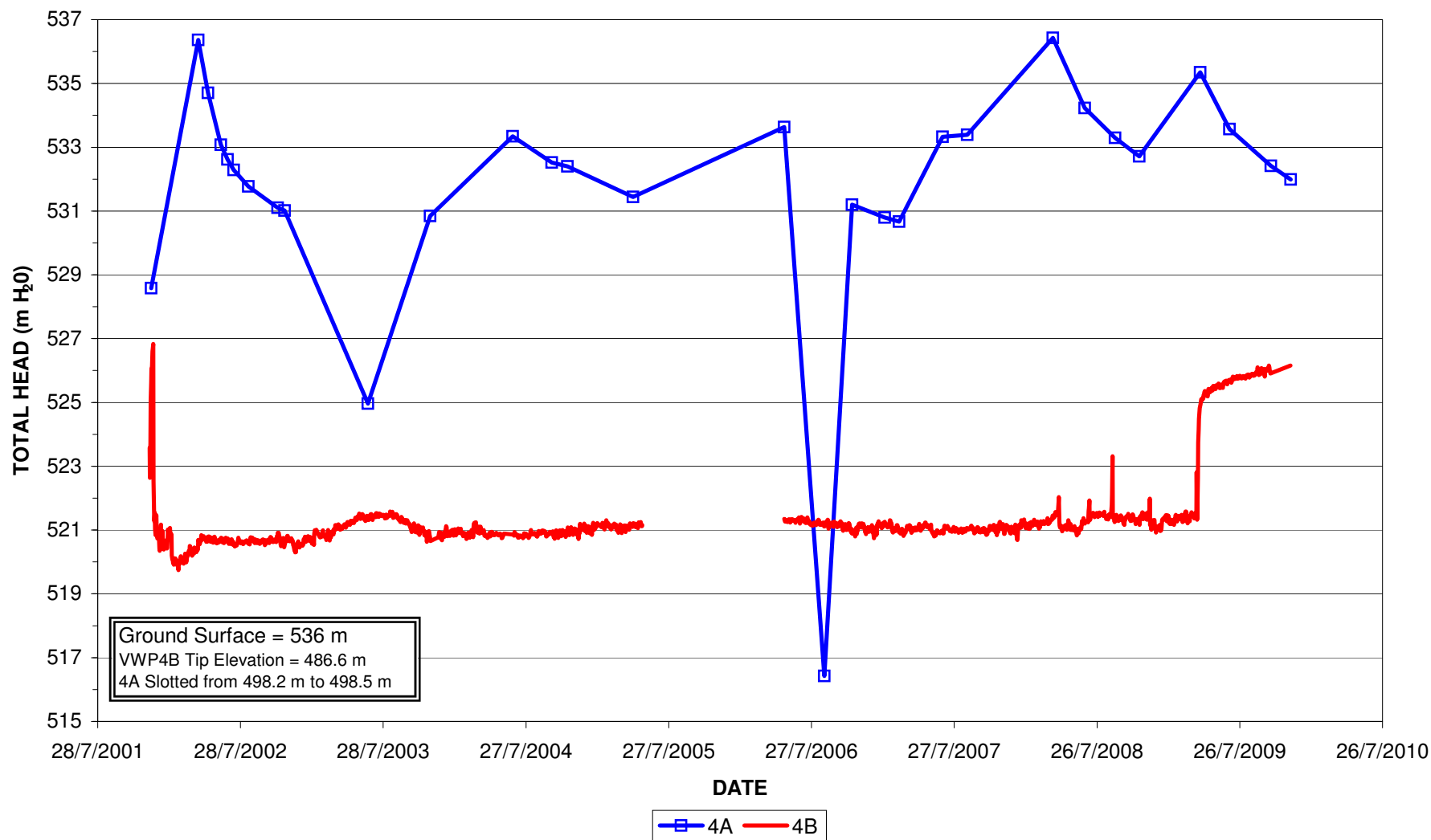
Groundwater Monitoring TOTAL HEAD - BH3 (near PW2)



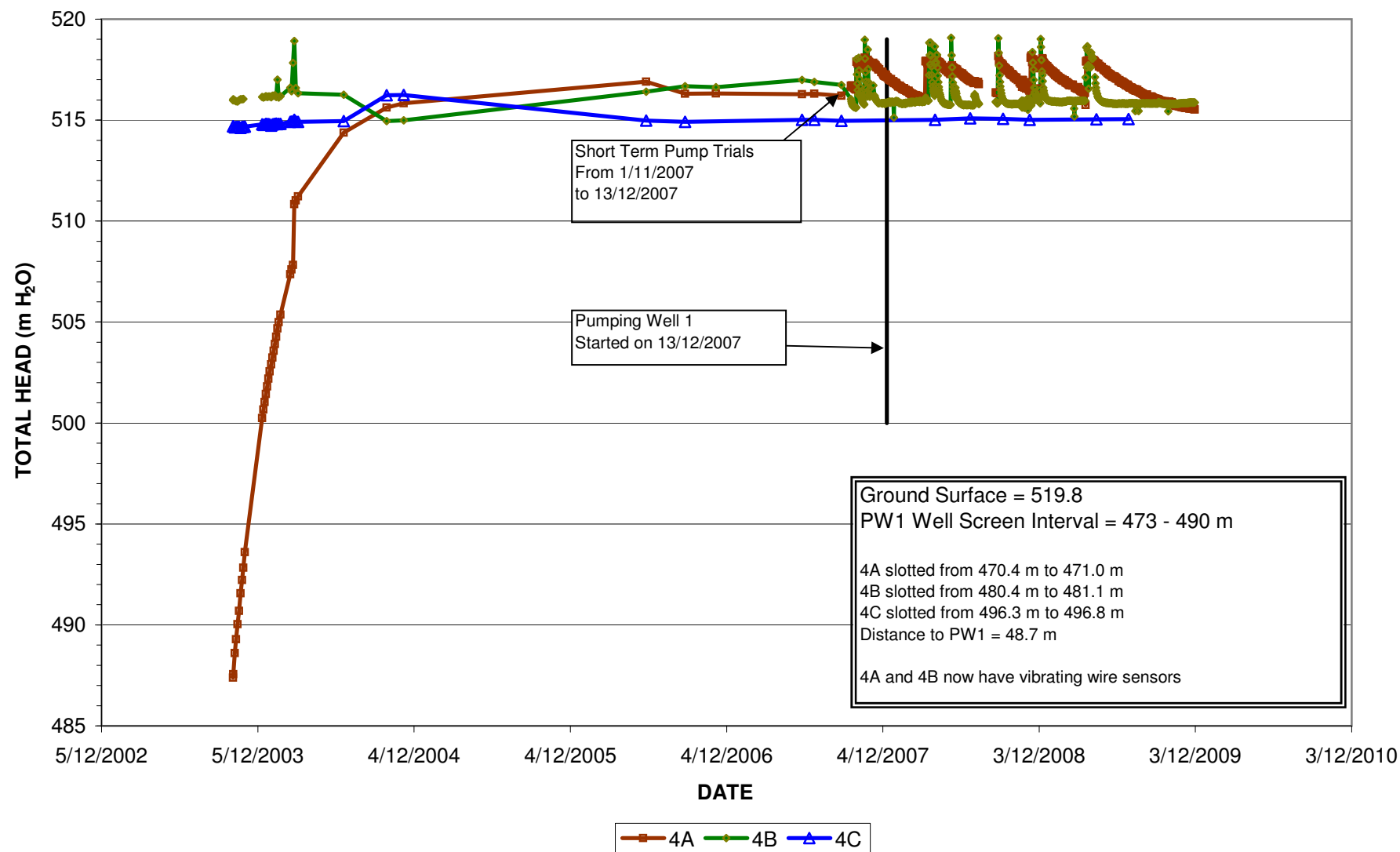
Groundwater Monitoring TOTAL HEAD - BH3A, B and C STANDPIPES (near PW1)



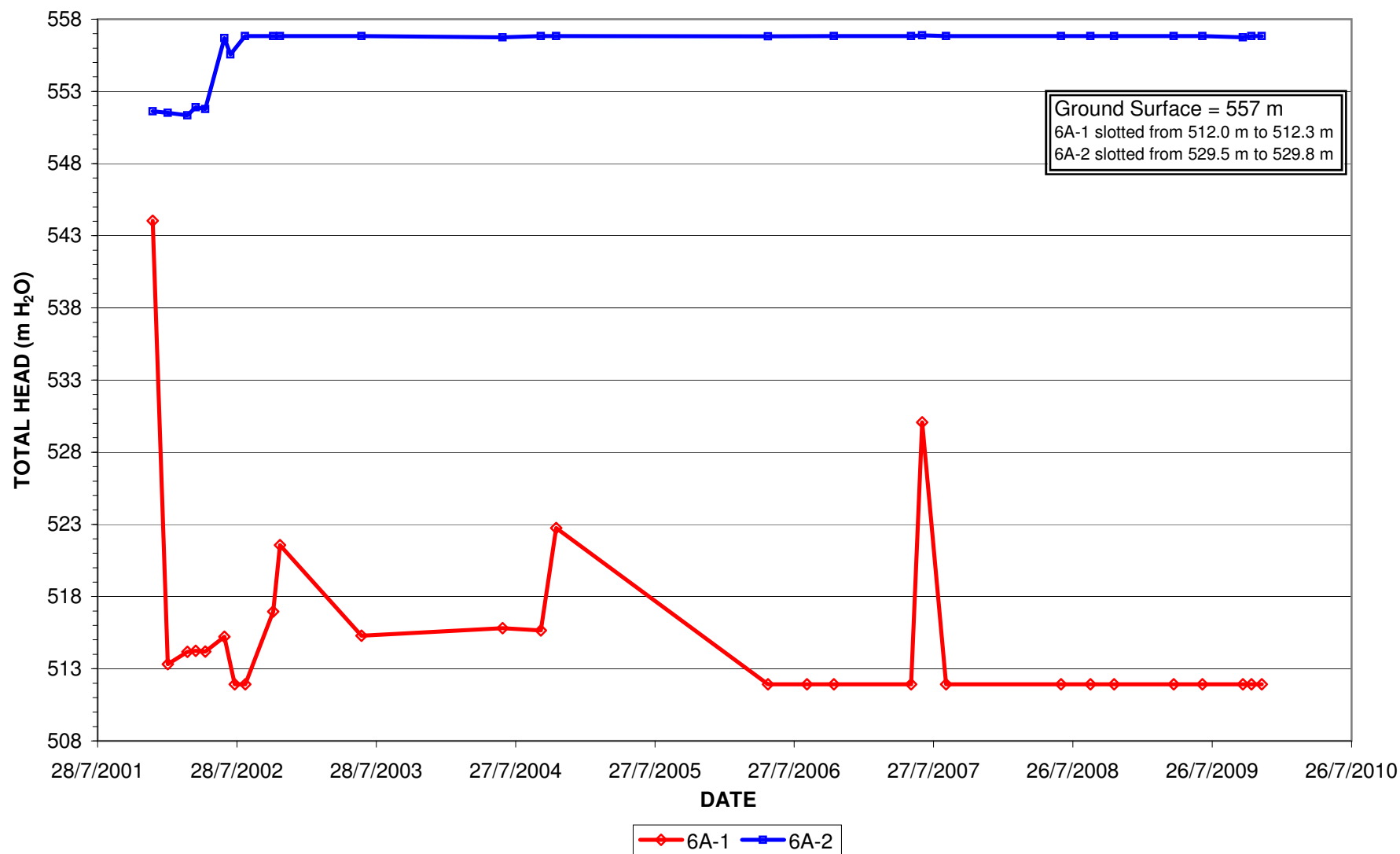
Groundwater Monitoring TOTAL HEAD - BH4A STANDPIPE / VWP 4B



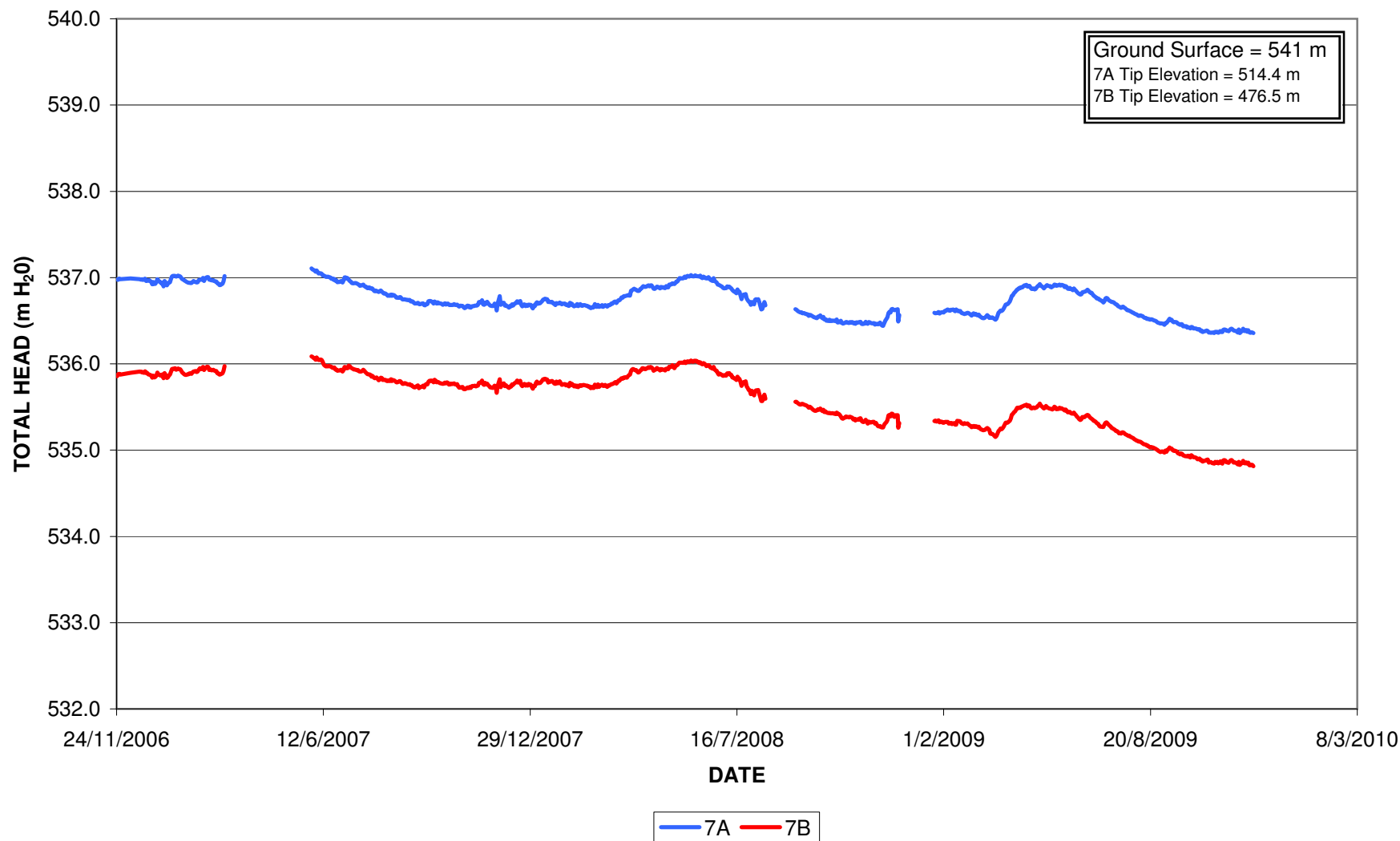
Groundwater Monitoring TOTAL HEAD - BH4A, B and C STANDPIPES (near PW1)



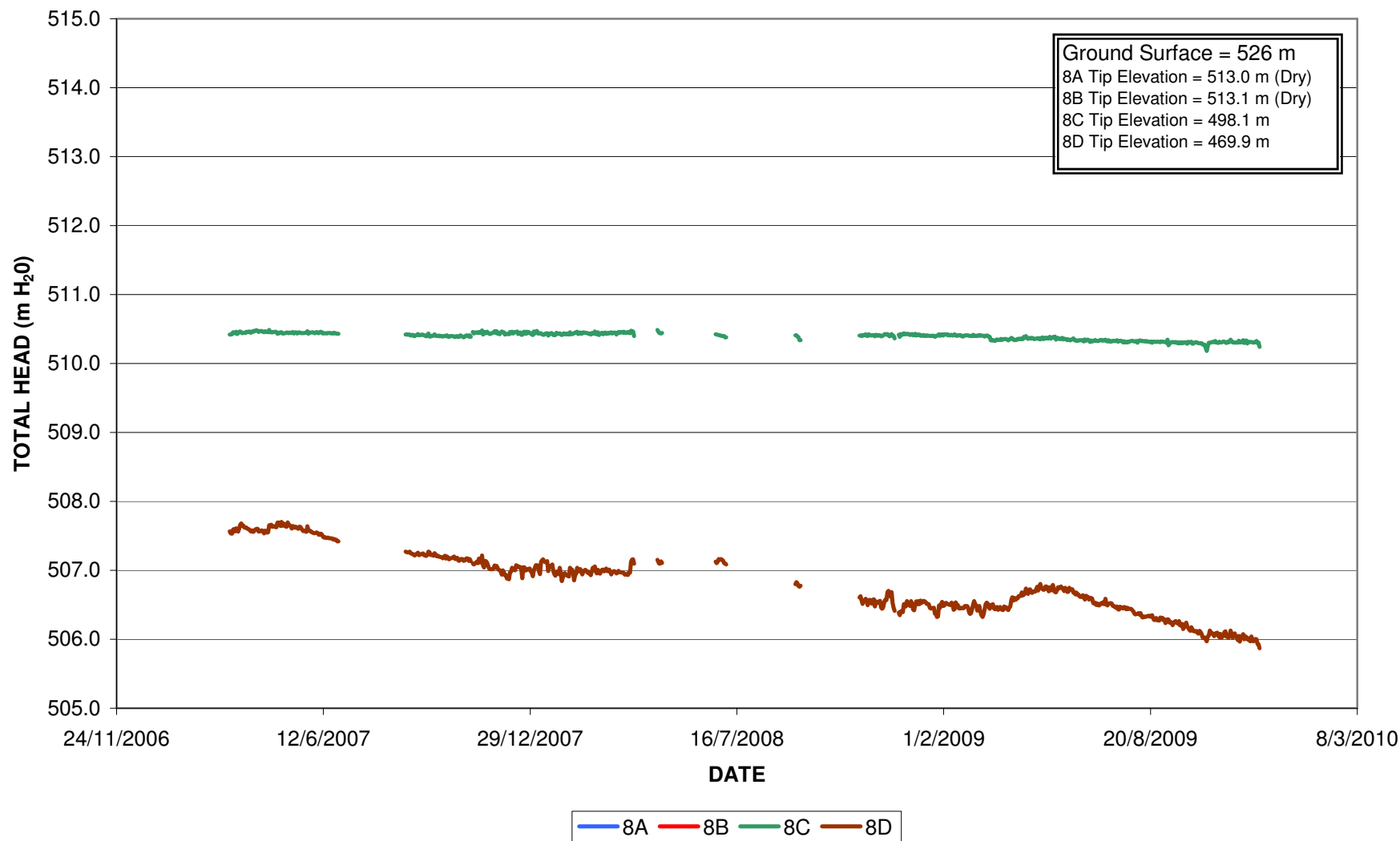
Groundwater Monitoring TOTAL HEAD - BH6 STANDPIPES



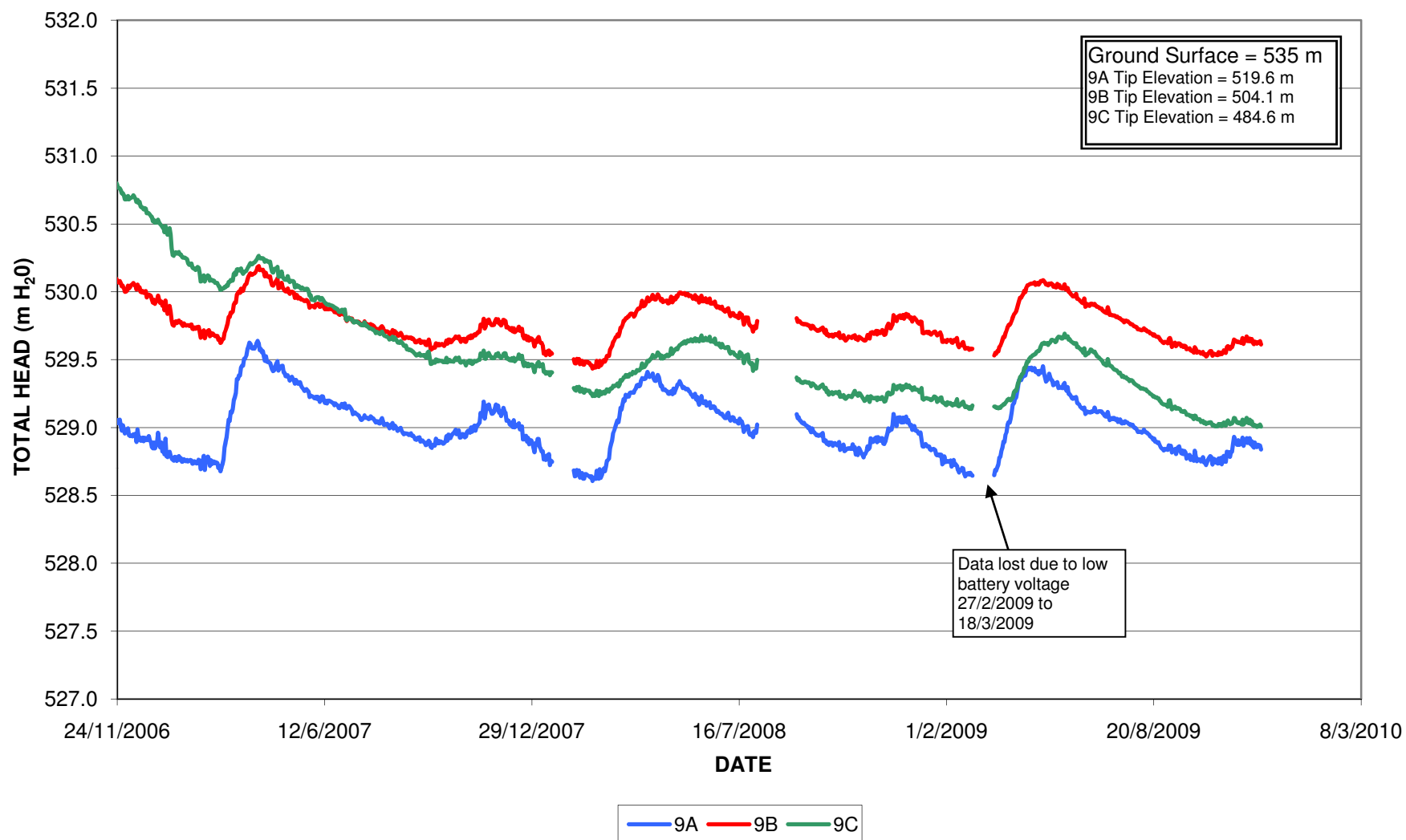
Groundwater Monitoring TOTAL HEAD - VWP7



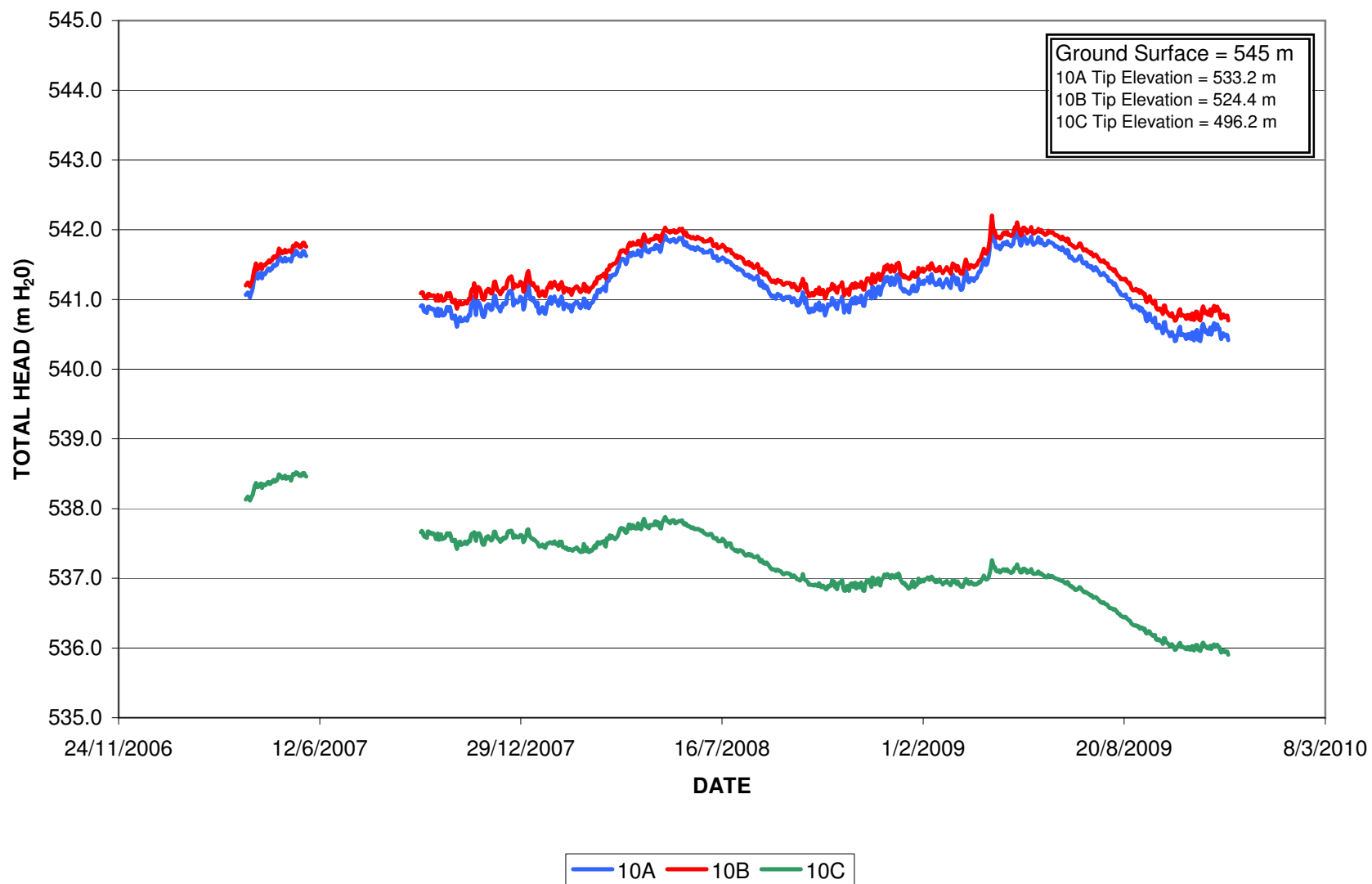
Groundwater Monitoring TOTAL HEAD - VWP8



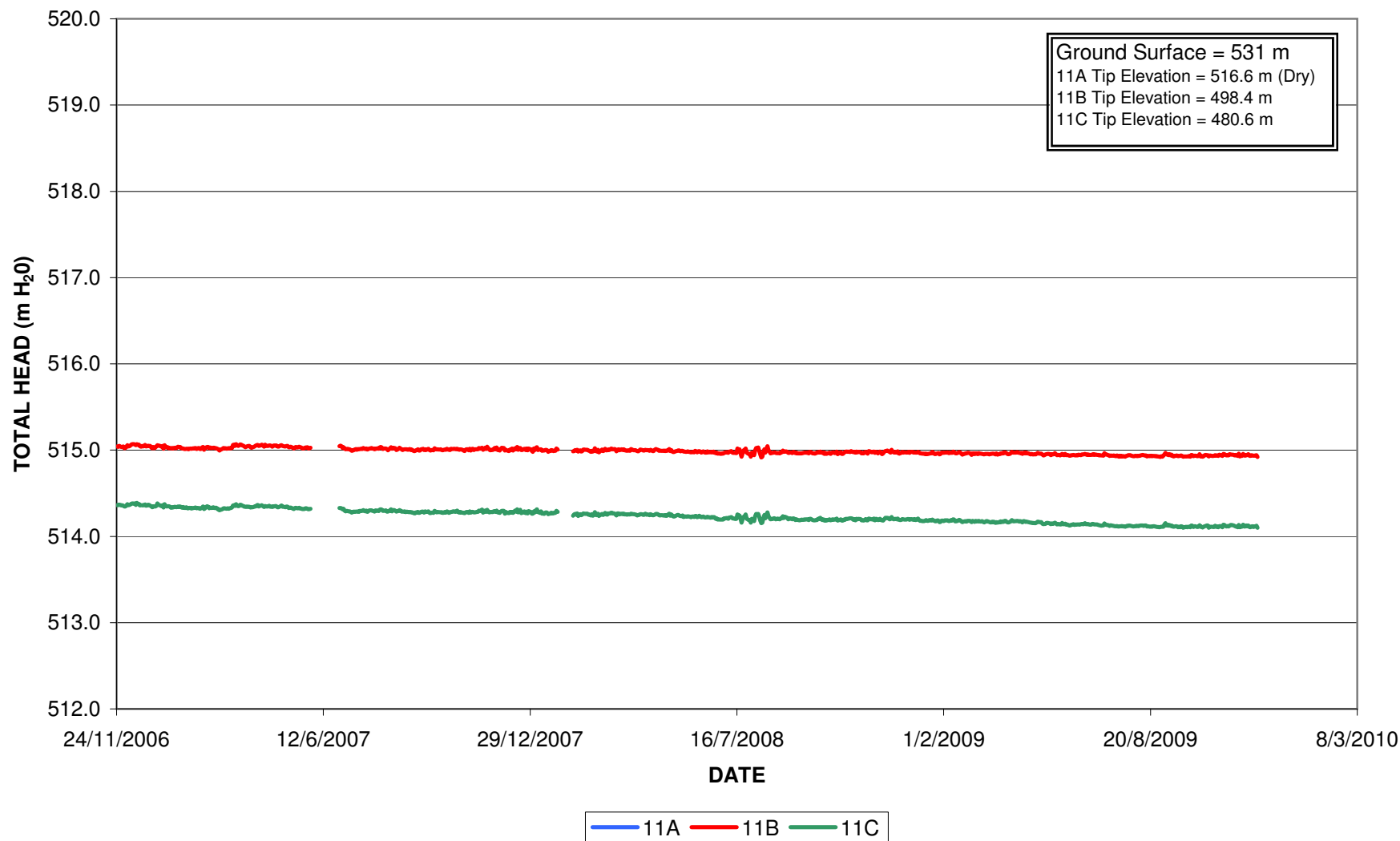
Groundwater Monitoring TOTAL HEAD - VWP9



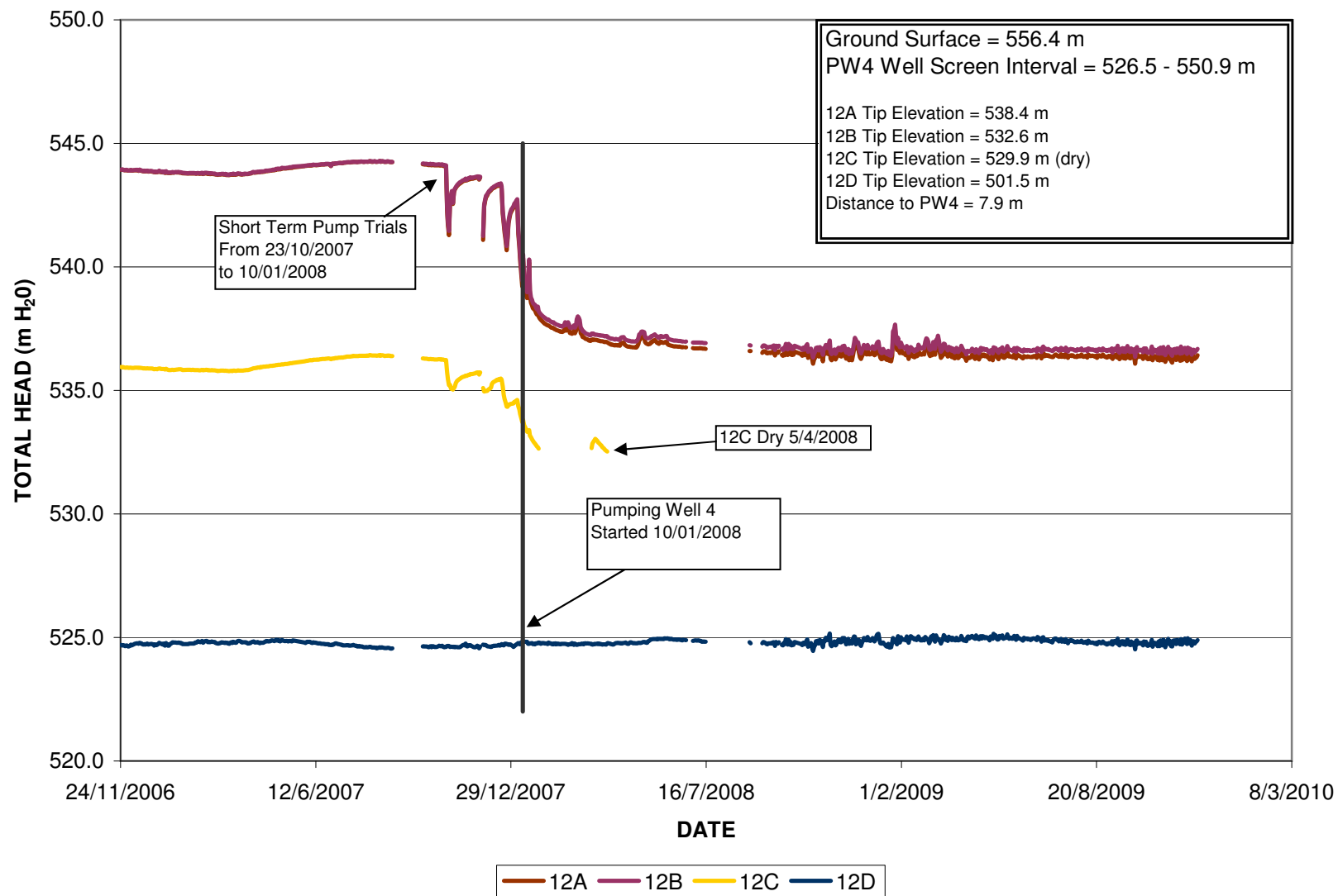
Groundwater Monitoring TOTAL HEAD - VWP10



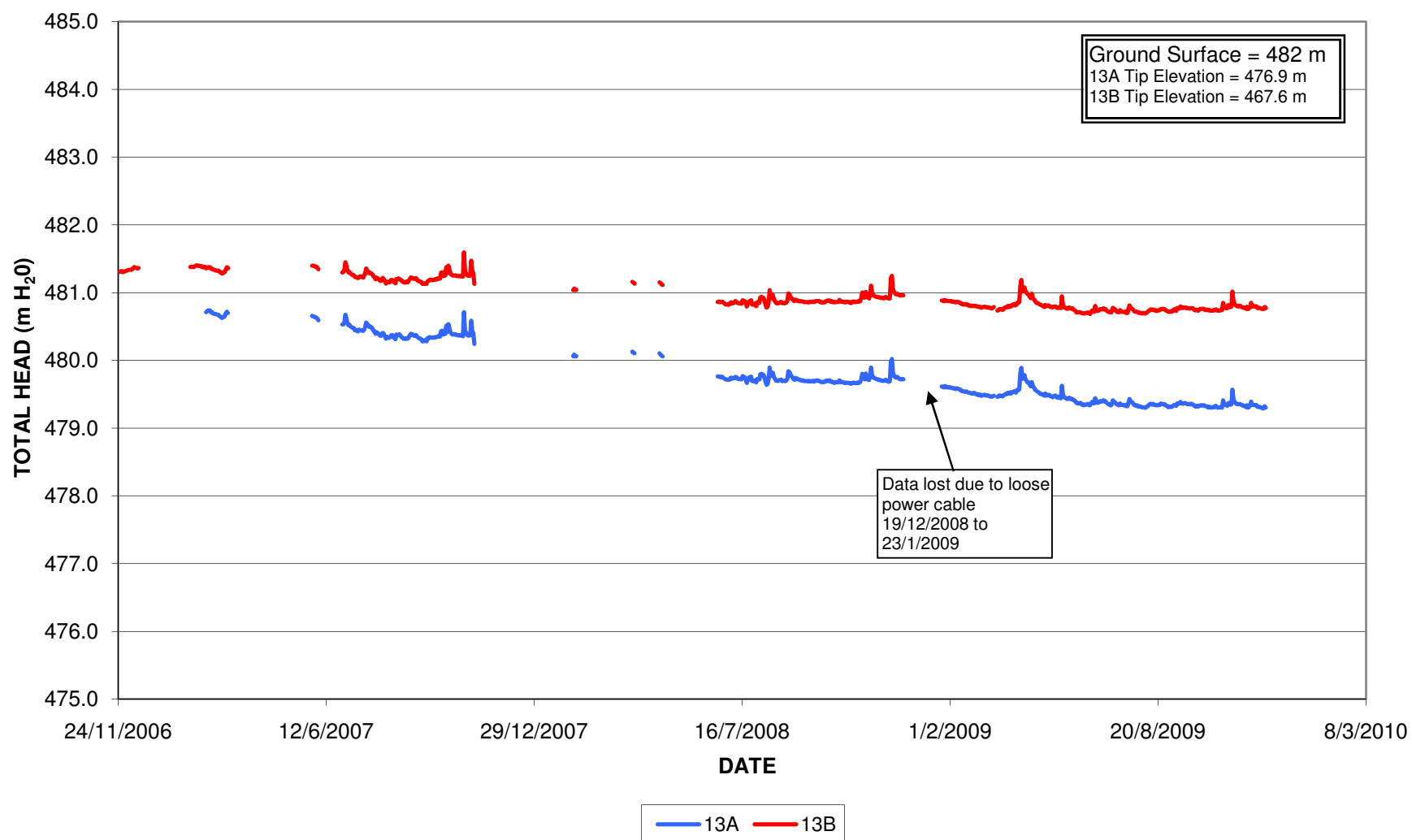
Groundwater Monitoring TOTAL HEAD - VWP11



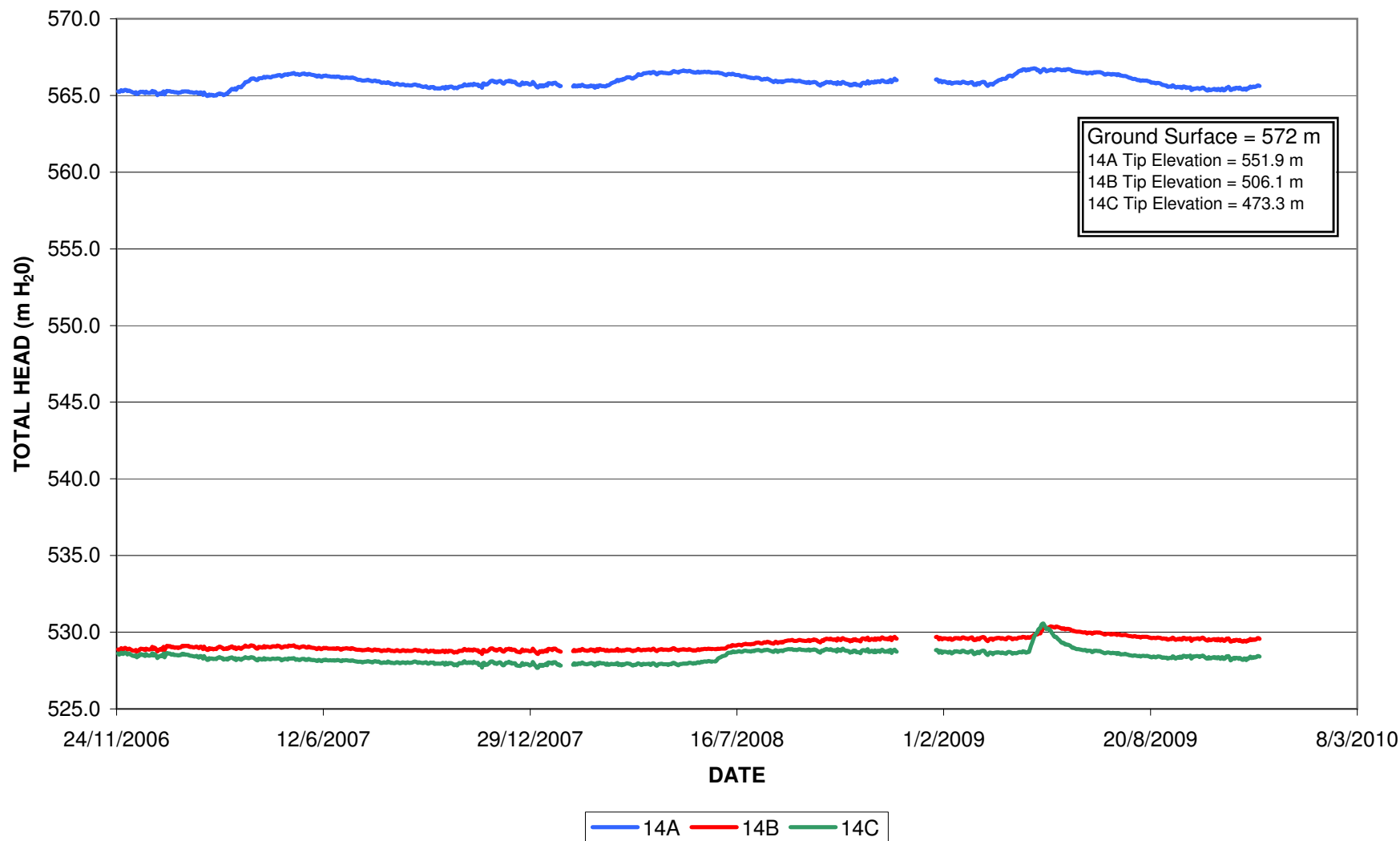
Groundwater Monitoring TOTAL HEAD - VWP12 (near PW4)



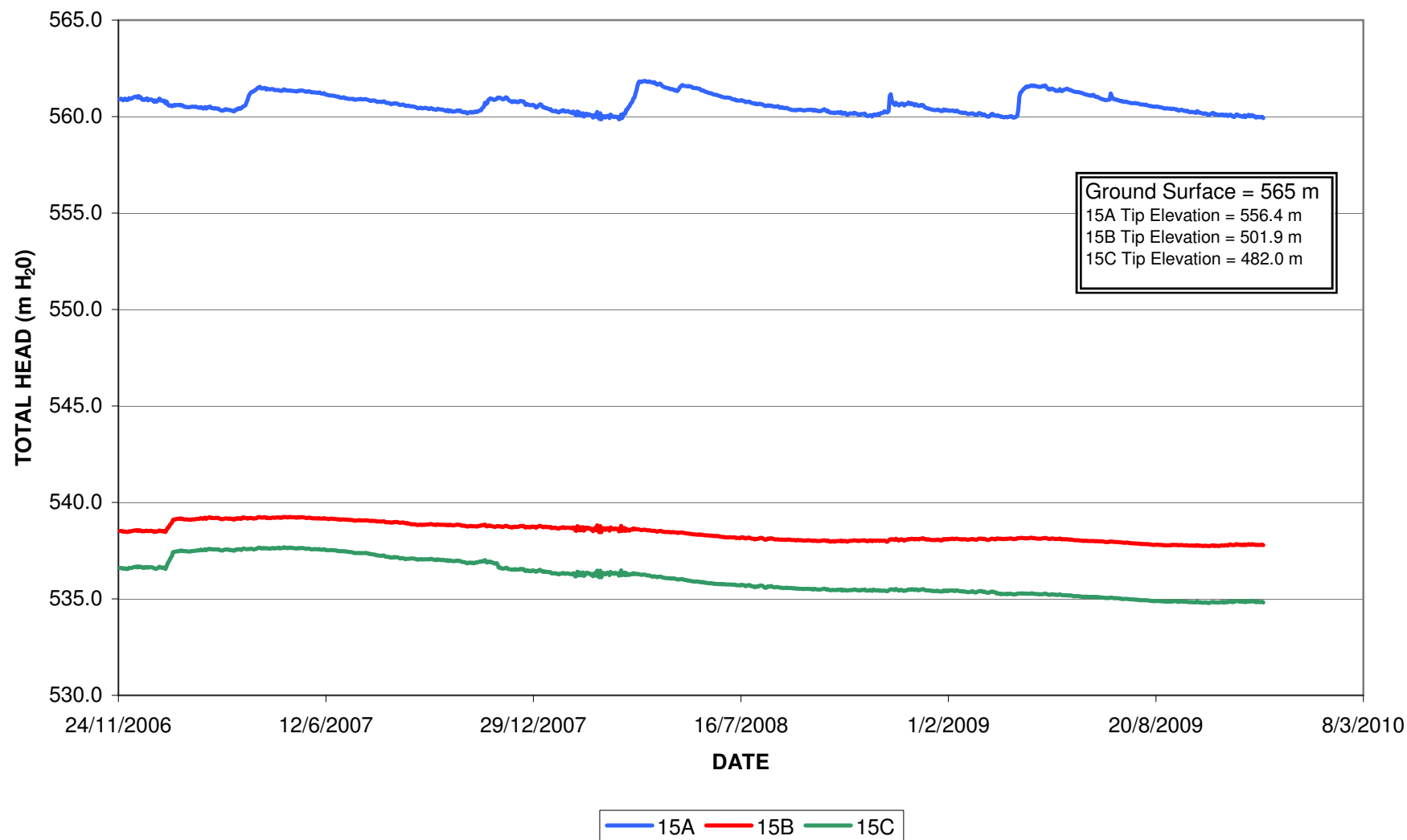
Groundwater Monitoring TOTAL HEAD - VWP13



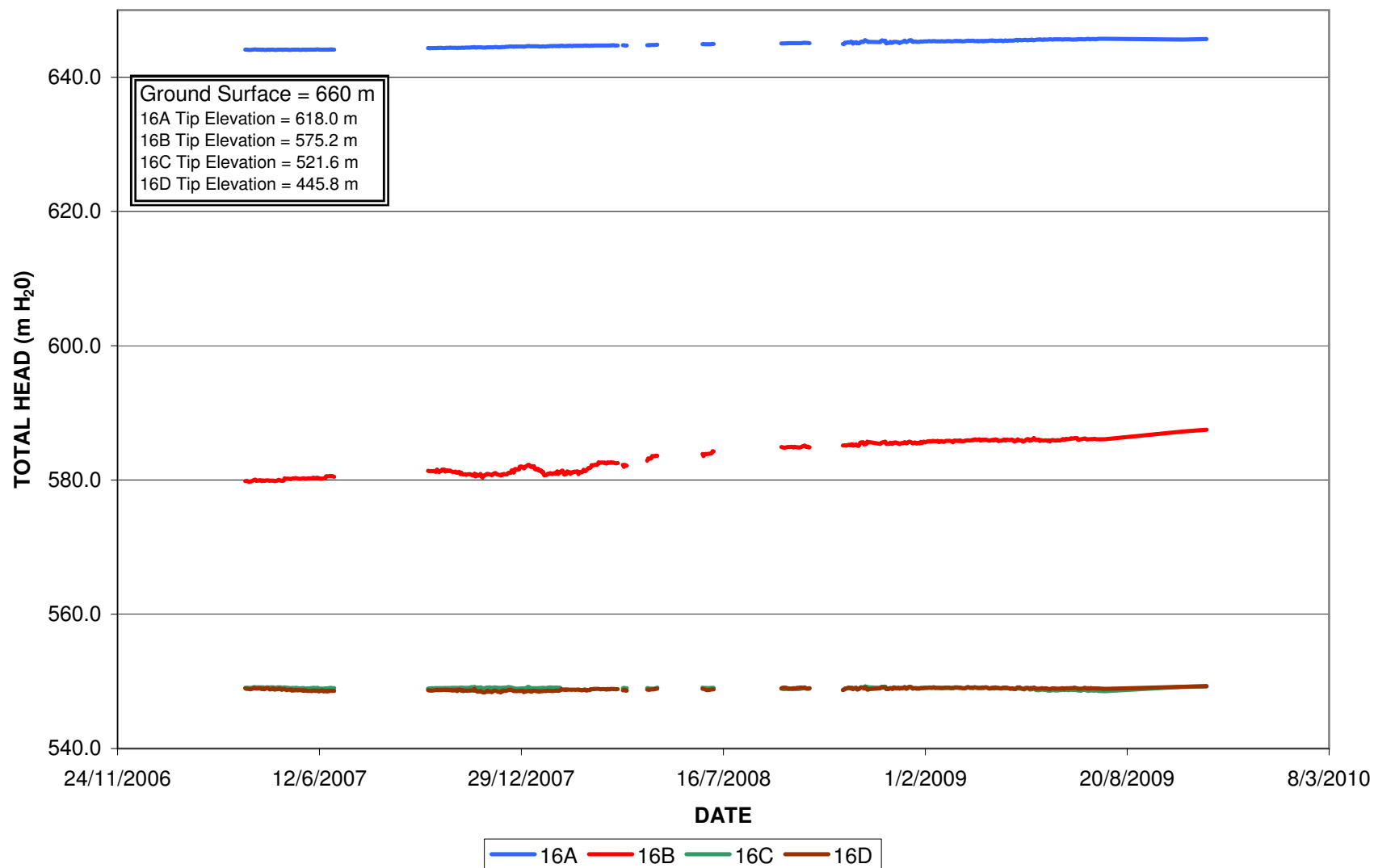
Groundwater Monitoring TOTAL HEAD - VWP14



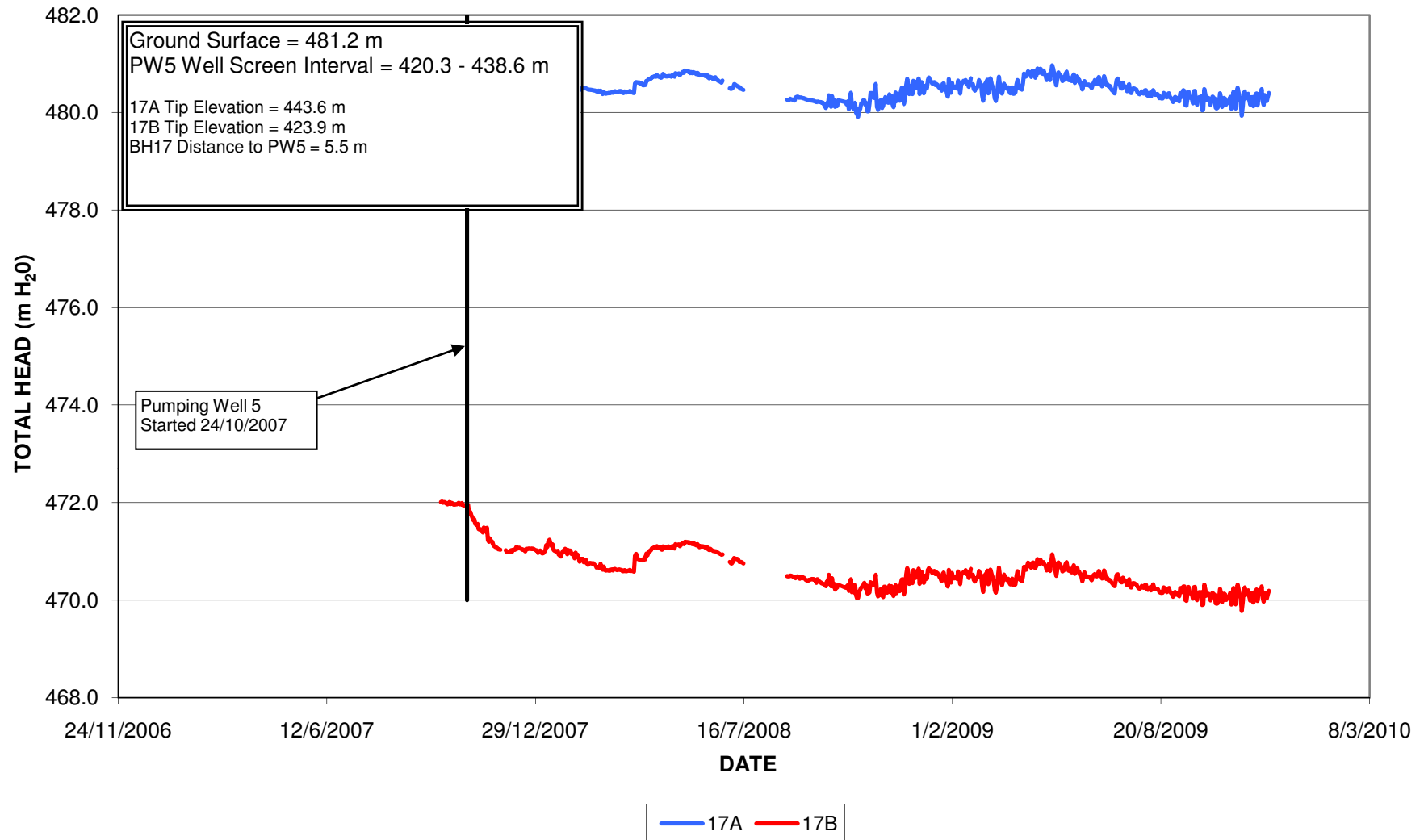
Groundwater Monitoring TOTAL HEAD - VWP15



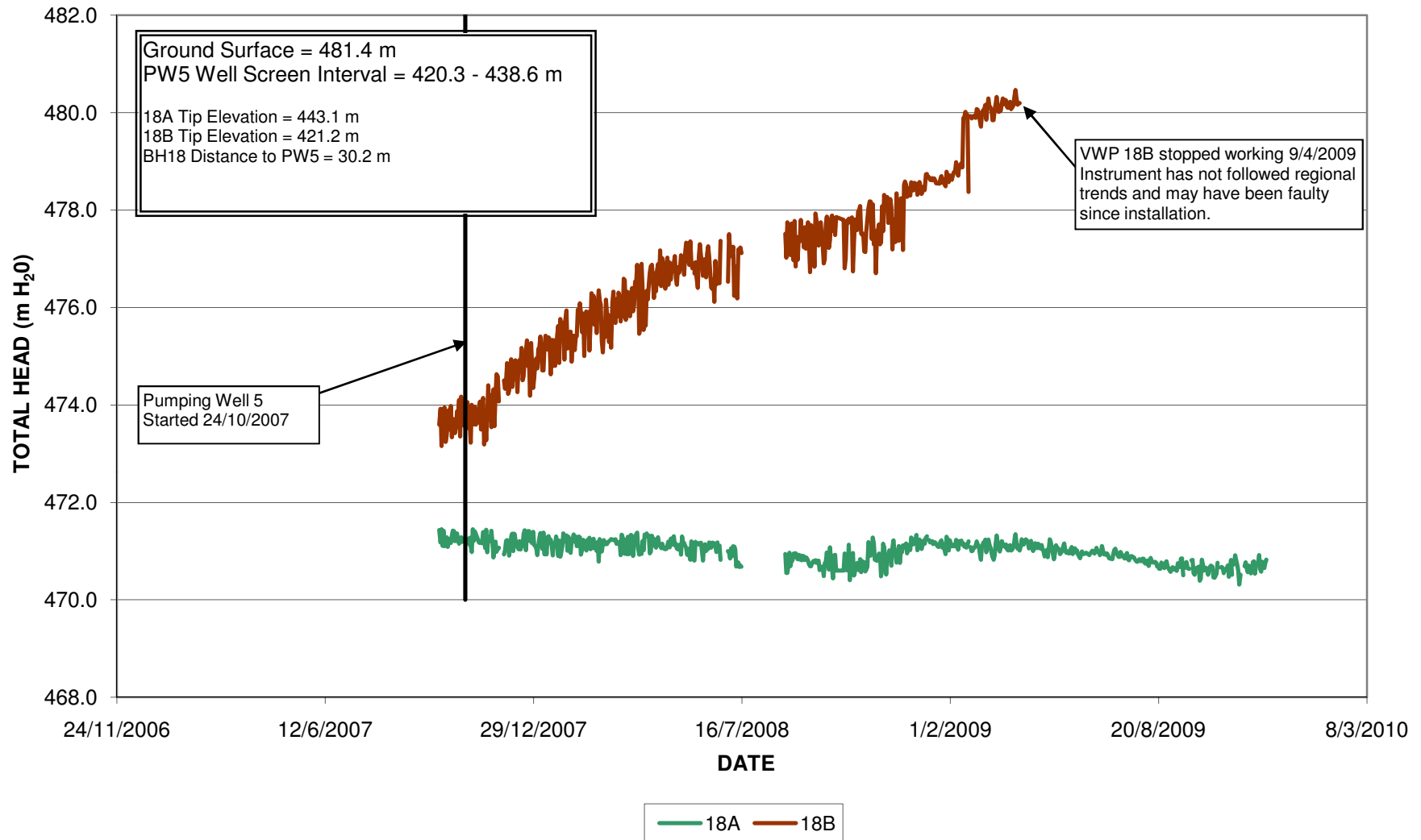
Groundwater Monitoring TOTAL HEAD - VWP16



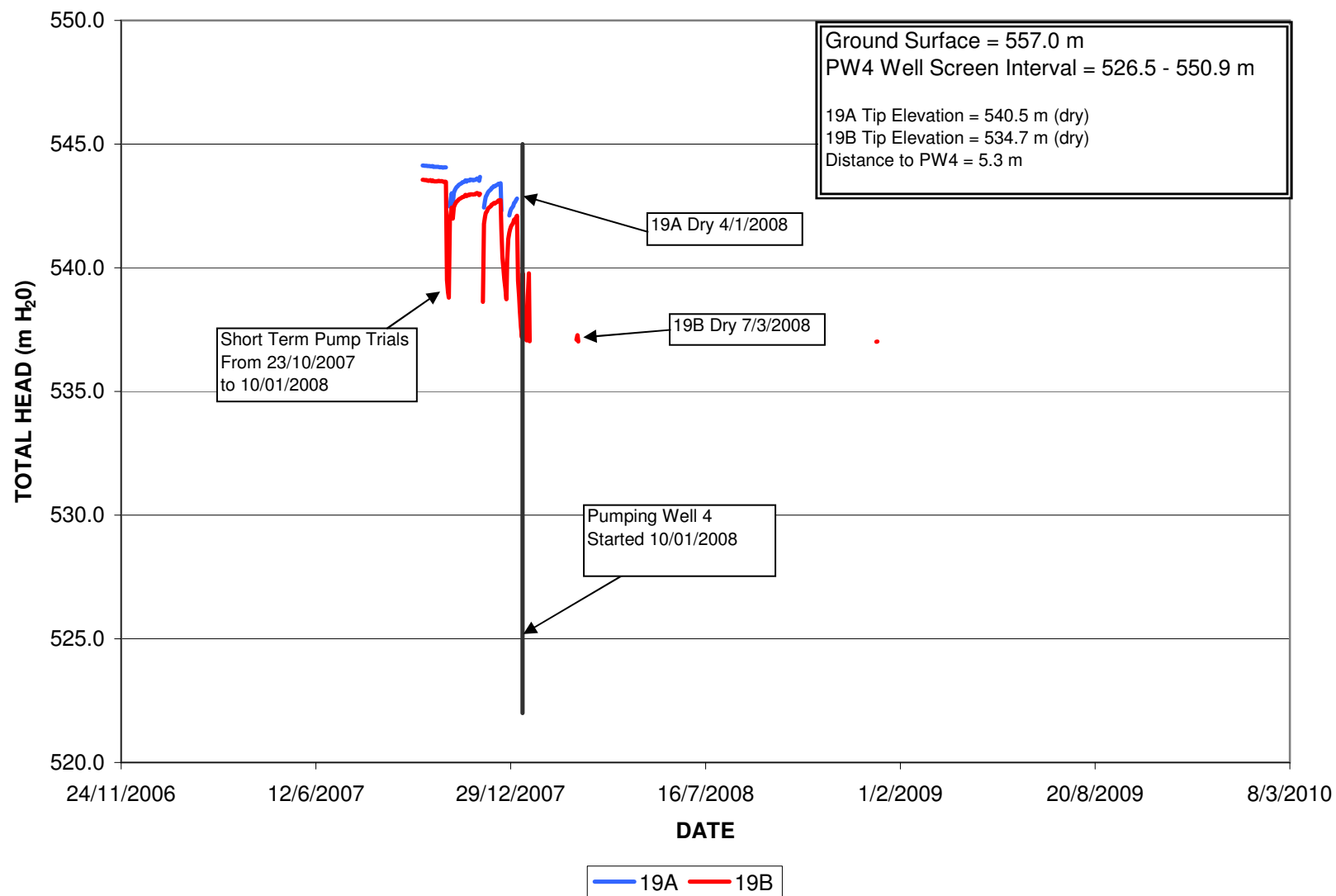
Groundwater Monitoring TOTAL HEAD - VWP17 (near PW5)



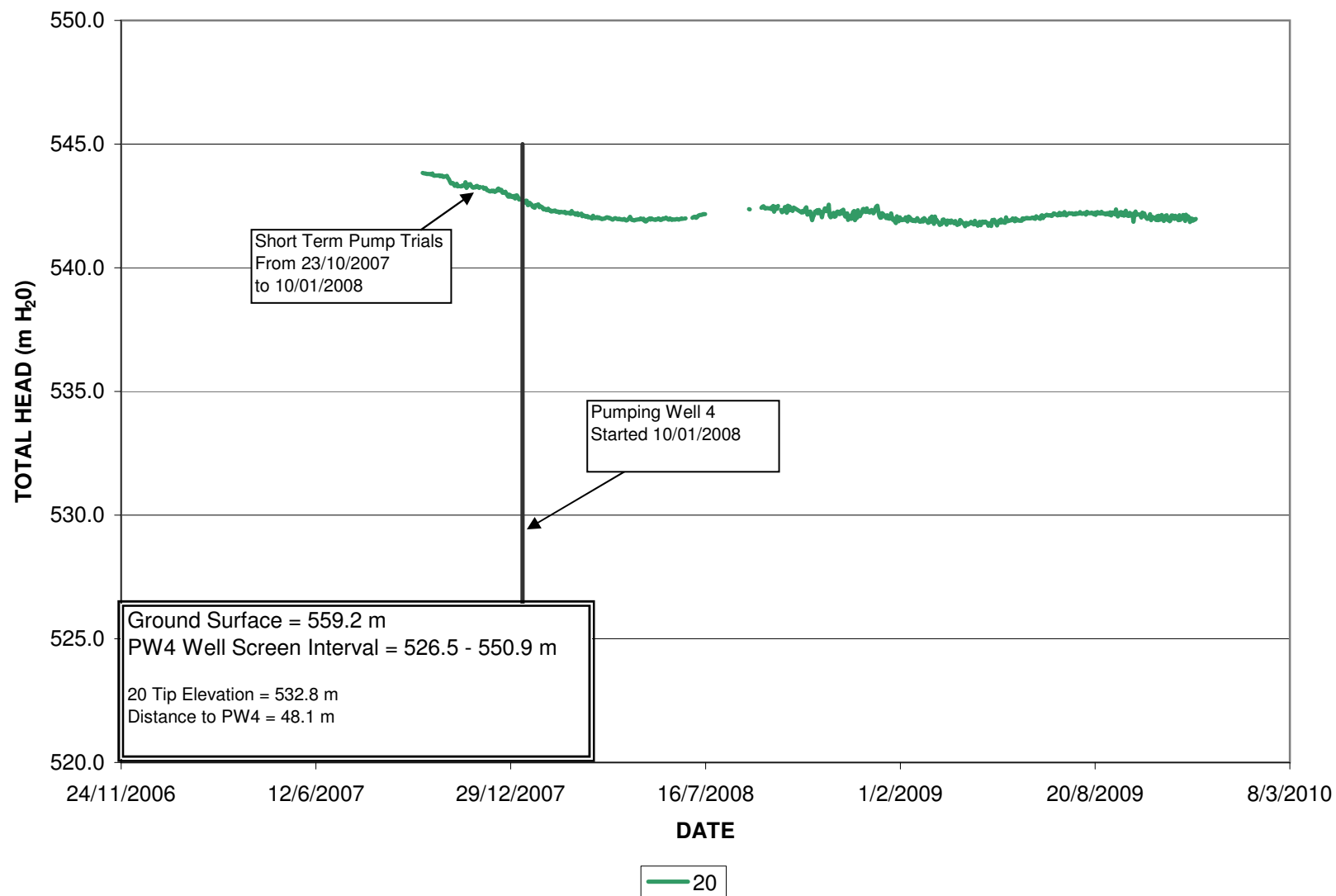
Groundwater Monitoring TOTAL HEAD - VWP18 (near PW5)



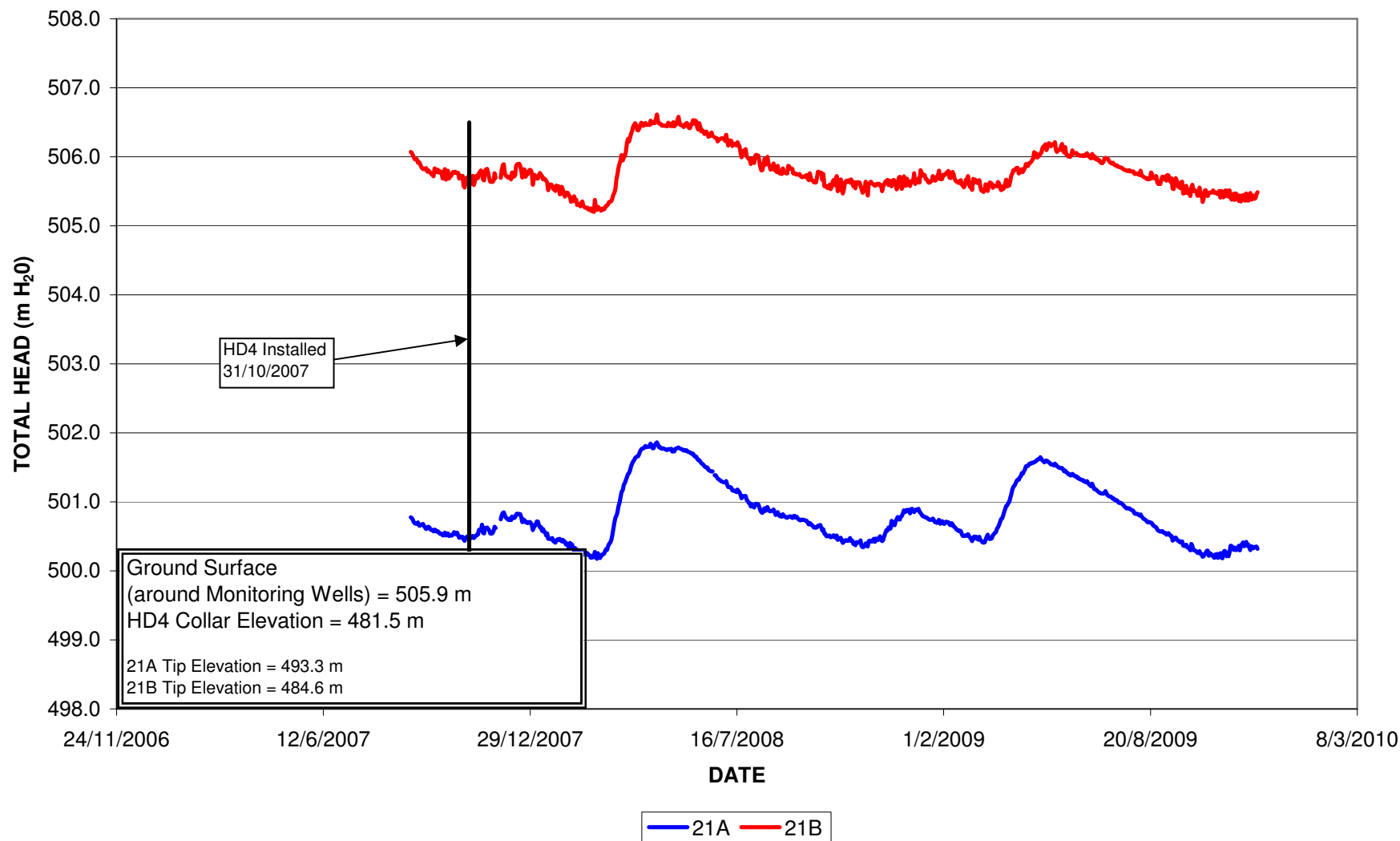
Groundwater Monitoring TOTAL HEAD - VWP19 (near PW4)



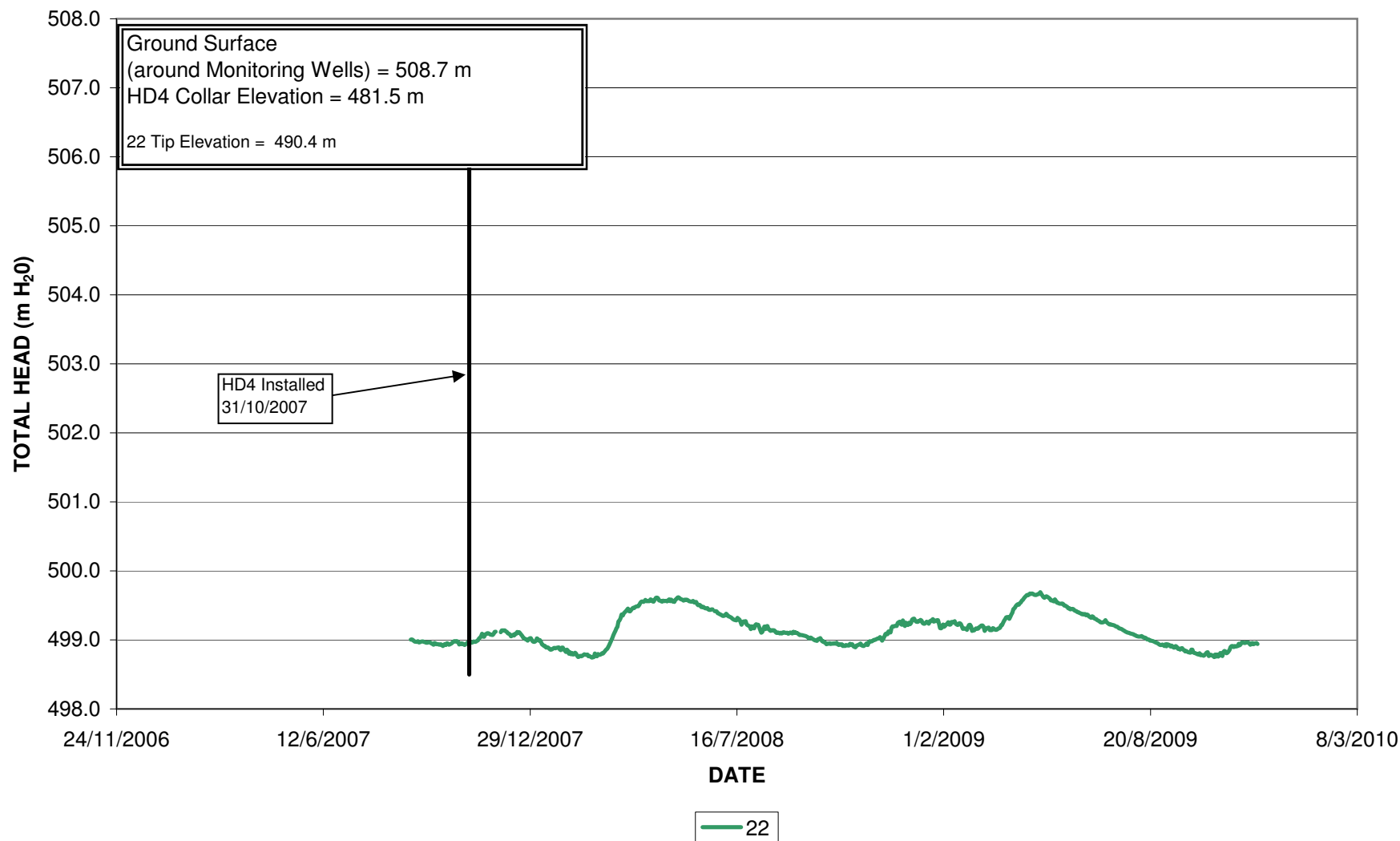
Groundwater Monitoring TOTAL HEAD - VWP20 (near PW4)



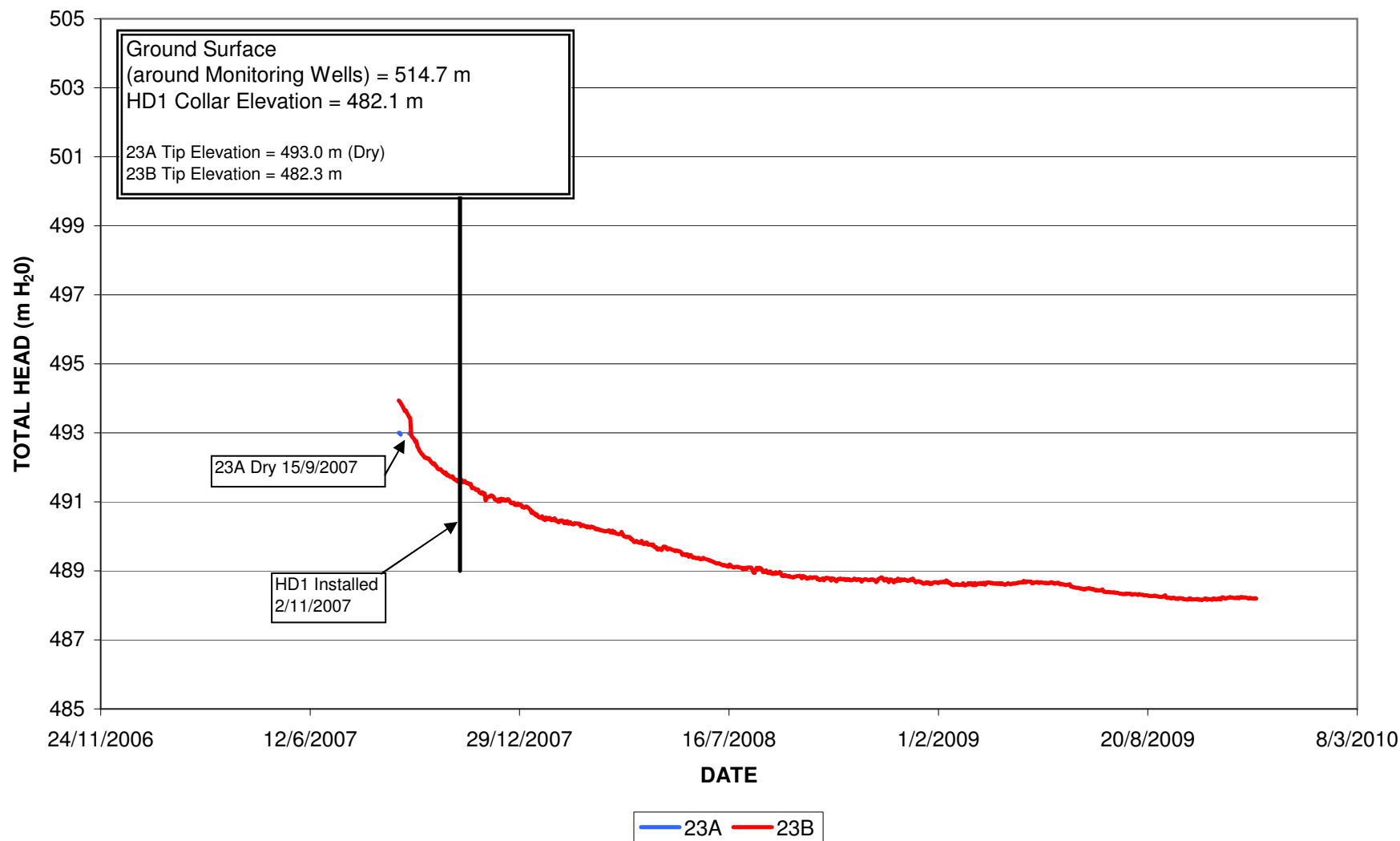
Groundwater Monitoring TOTAL HEAD - VWP21 (near HD4)



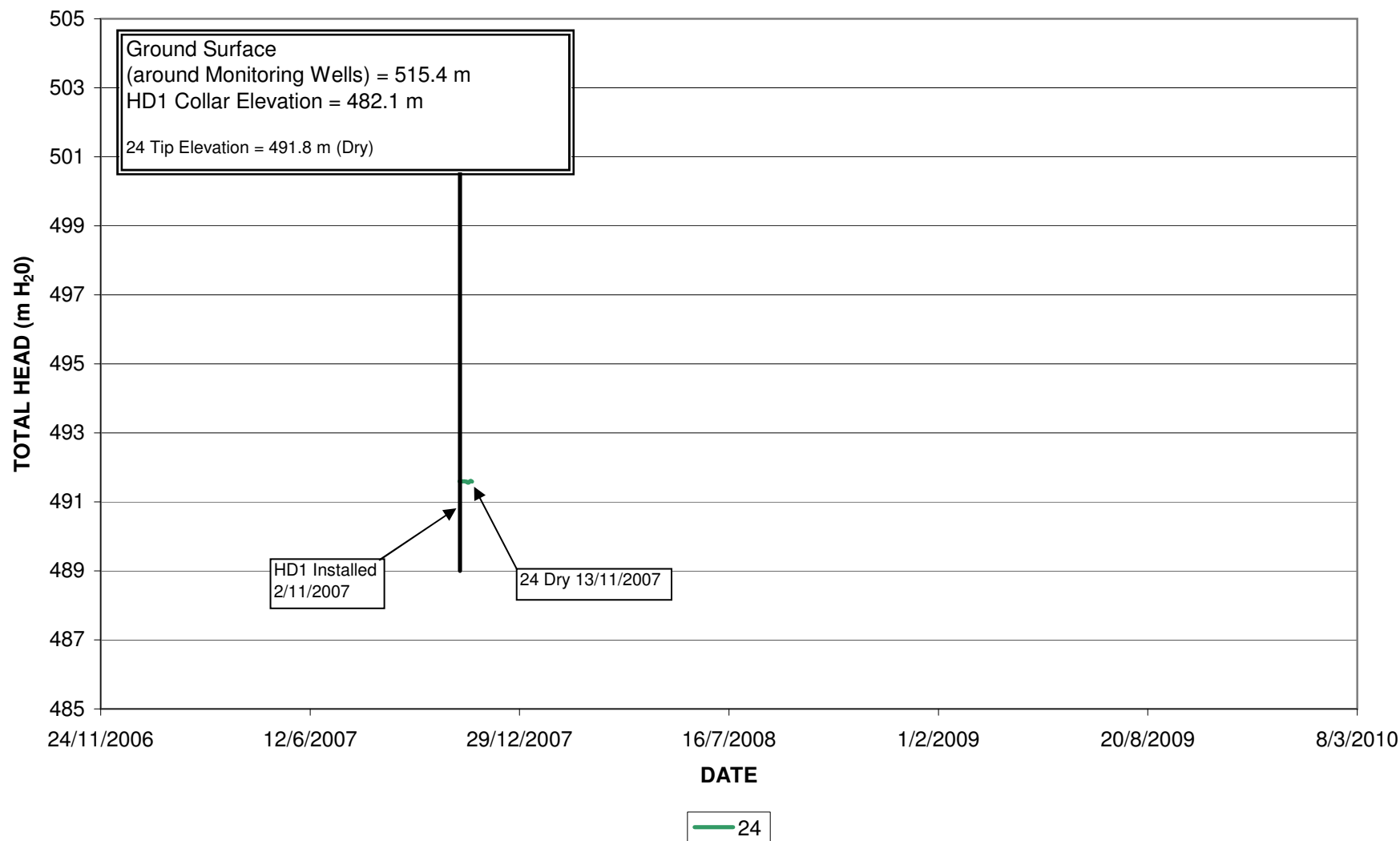
Groundwater Monitoring TOTAL HEAD - VWP22 (near HD4)



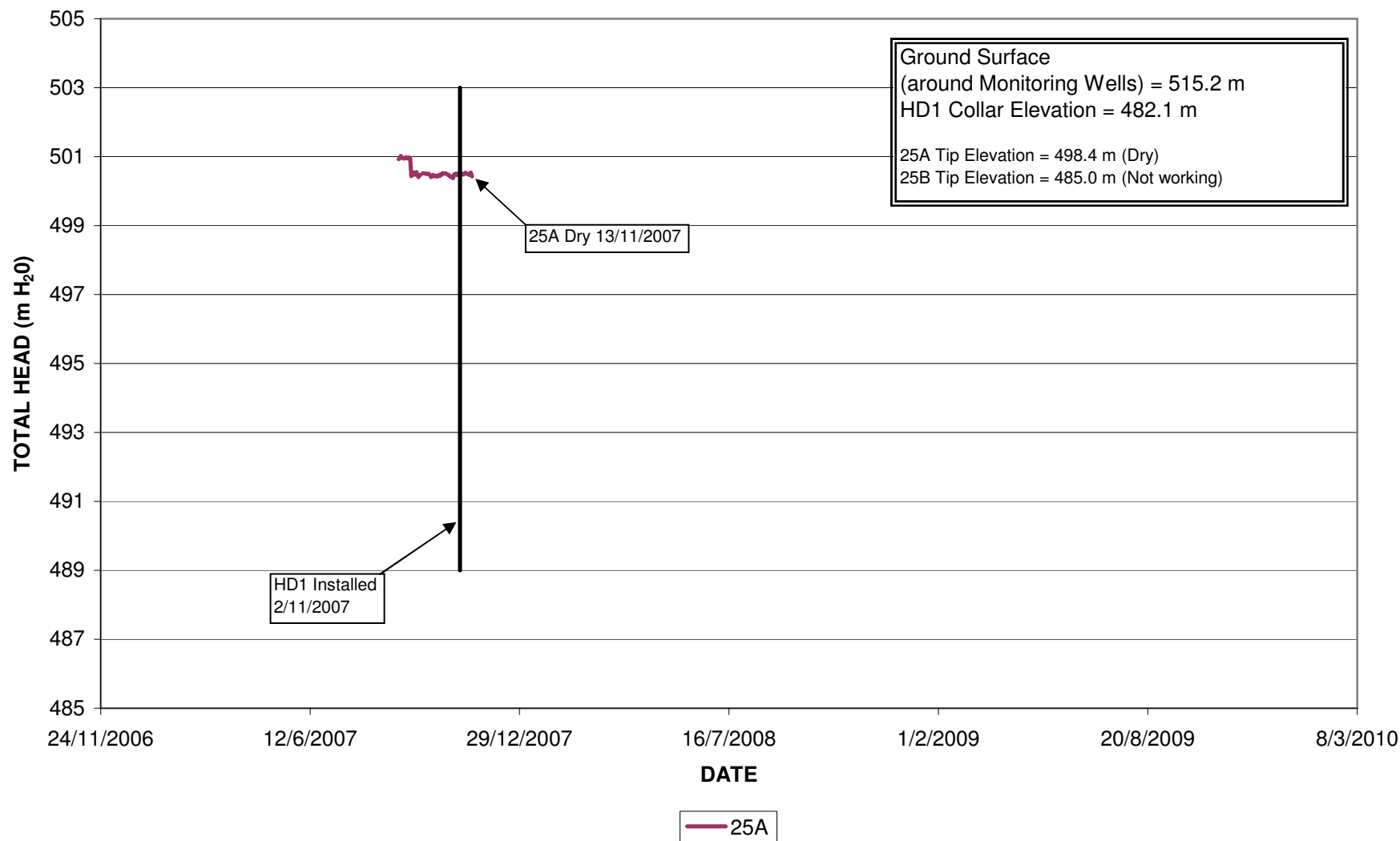
Groundwater Monitoring TOTAL HEAD - VWP23 (near HD1)



Groundwater Monitoring TOTAL HEAD - VWP24 (near HD1)



Groundwater Monitoring TOTAL HEAD - VWP25 (near HD1)



Appendix D

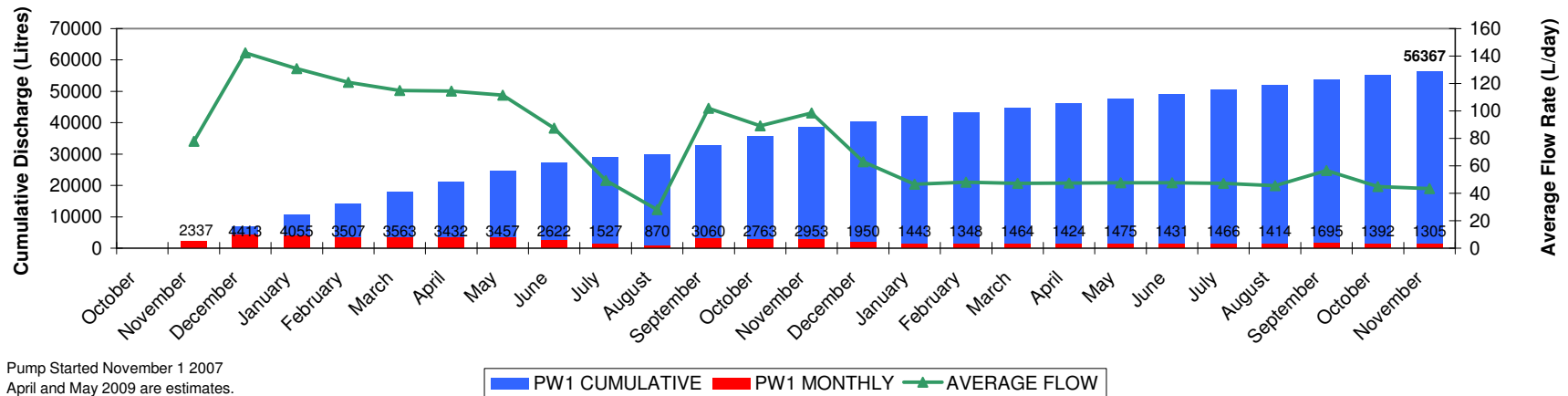
Pumping Wells - Summary Table and Production Charts

APPENDIX D - Pumping Well Status

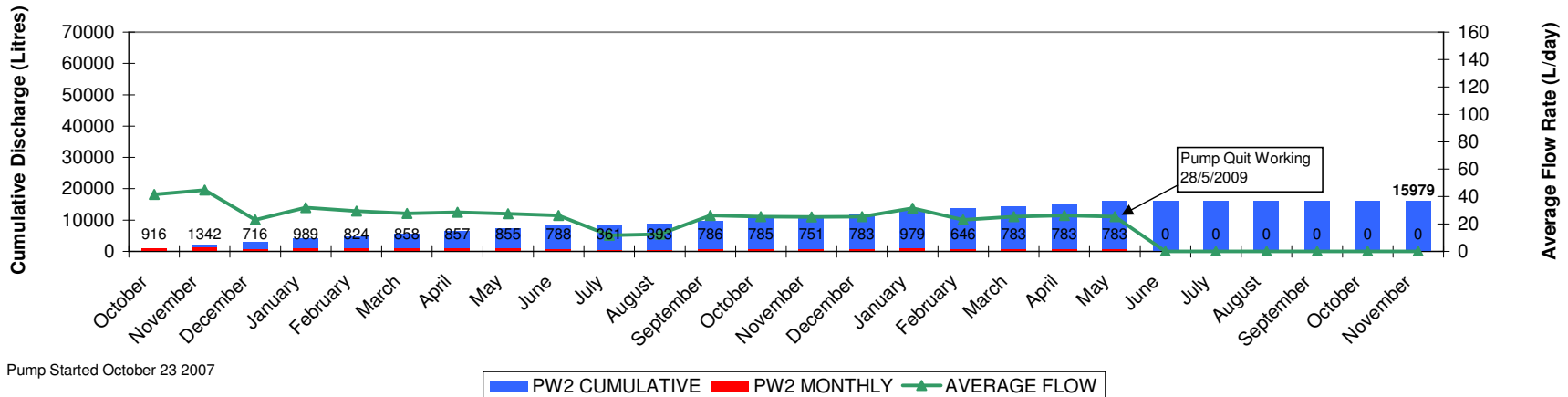
Well	Location	Installation Date	Depth (Screen)	Depth (Pump)	Depth (VW tip)	Monitoring Wells	Status
PW1	Flamingo St.	September 2003	29.9-47.5m	45.0m	44.3m	BH3bc, BH4ab	Active - water controls at 39.5m and 42.0m
PW2	Abbott Dr.	September 2003	30.0-55.0m	43.0m	42.4m	BH3	Inactive - pump not working
PW4	Panagrot Ave. (east end)	June 2007	6.1-30.5m	29.0m	28.3m	BH12, BH19, BH20	Active - pump controlled by ammeter
PW5	Adam St.	June 2007	42.7-61.0m	58.5m	57.9m	BH17, BH18	Active - water controls at 61.6m and 64.1m

Pumping Well Flow vs. Time

Cumulative, Monthly Discharge and Average Discharge for PW1

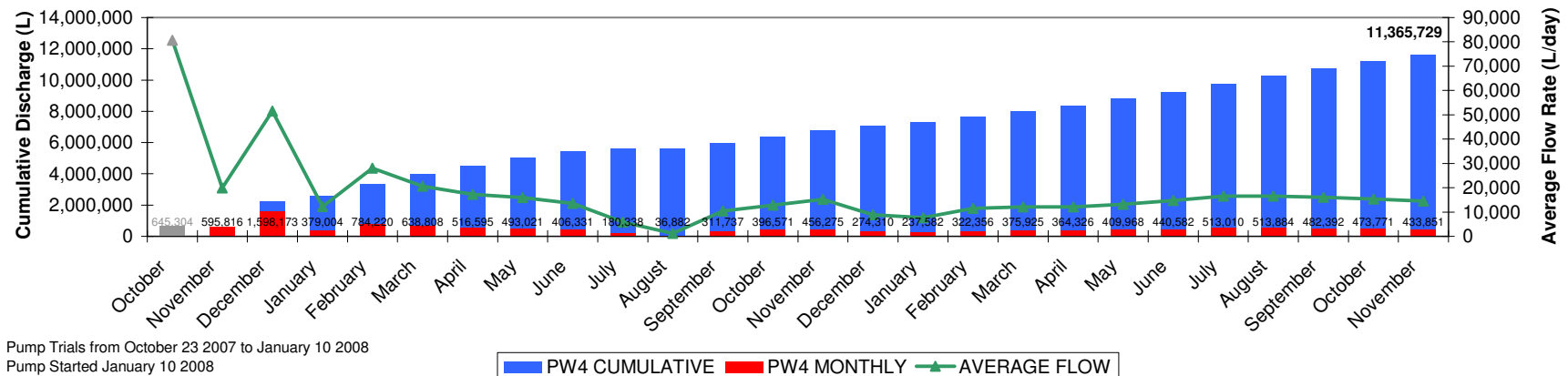


Cumulative, Monthly Discharge and Average Discharge for PW2

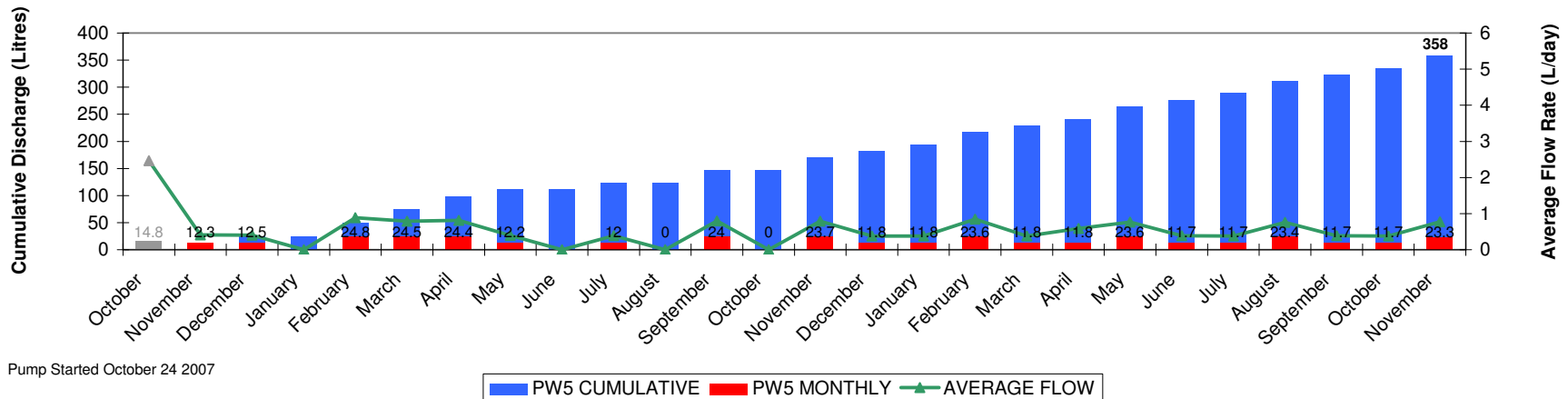


Pumping Well Flow vs. Time

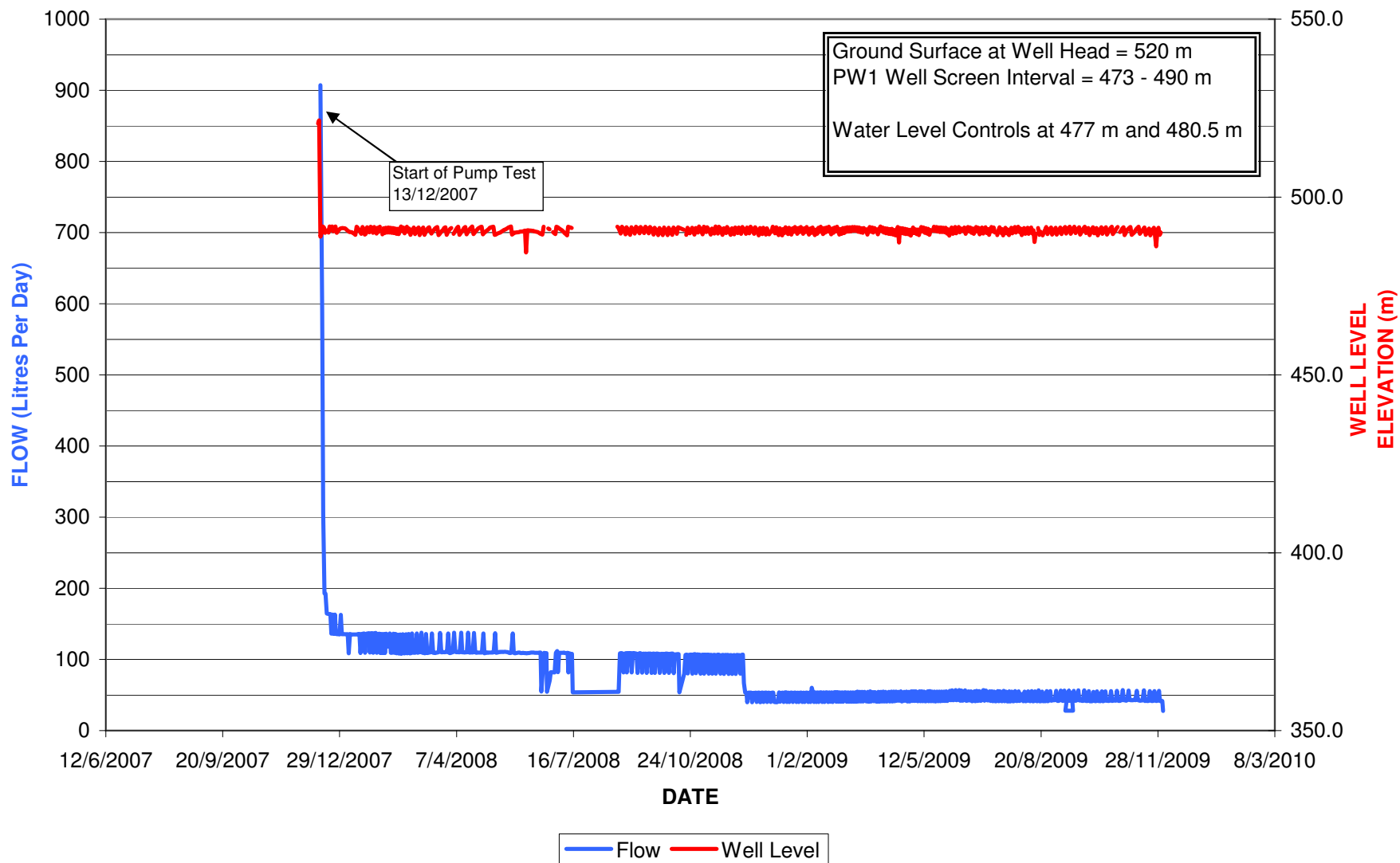
Cumulative, Monthly Discharge and Average Discharge for PW4



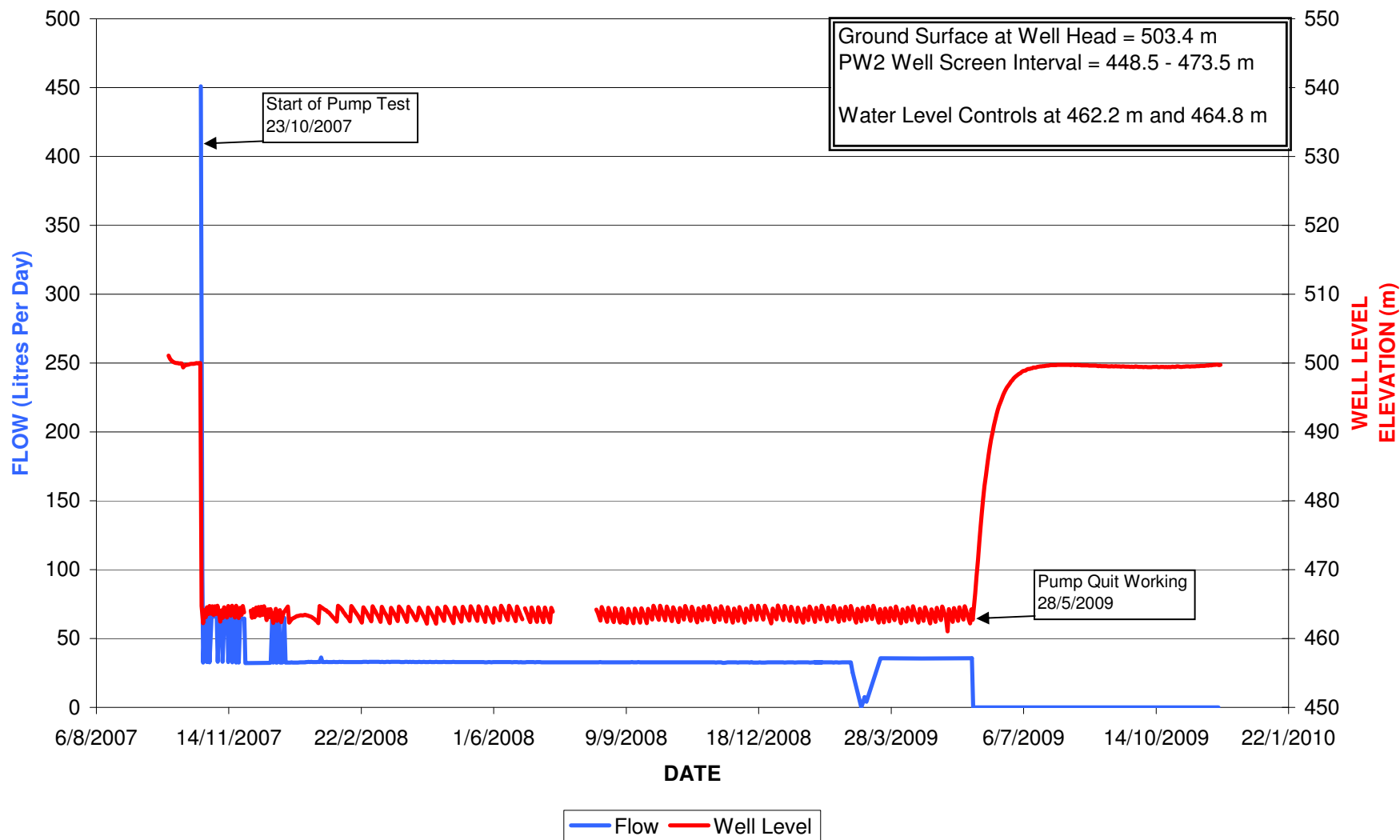
Cumulative, Monthly Discharge and Average Discharge for PW5



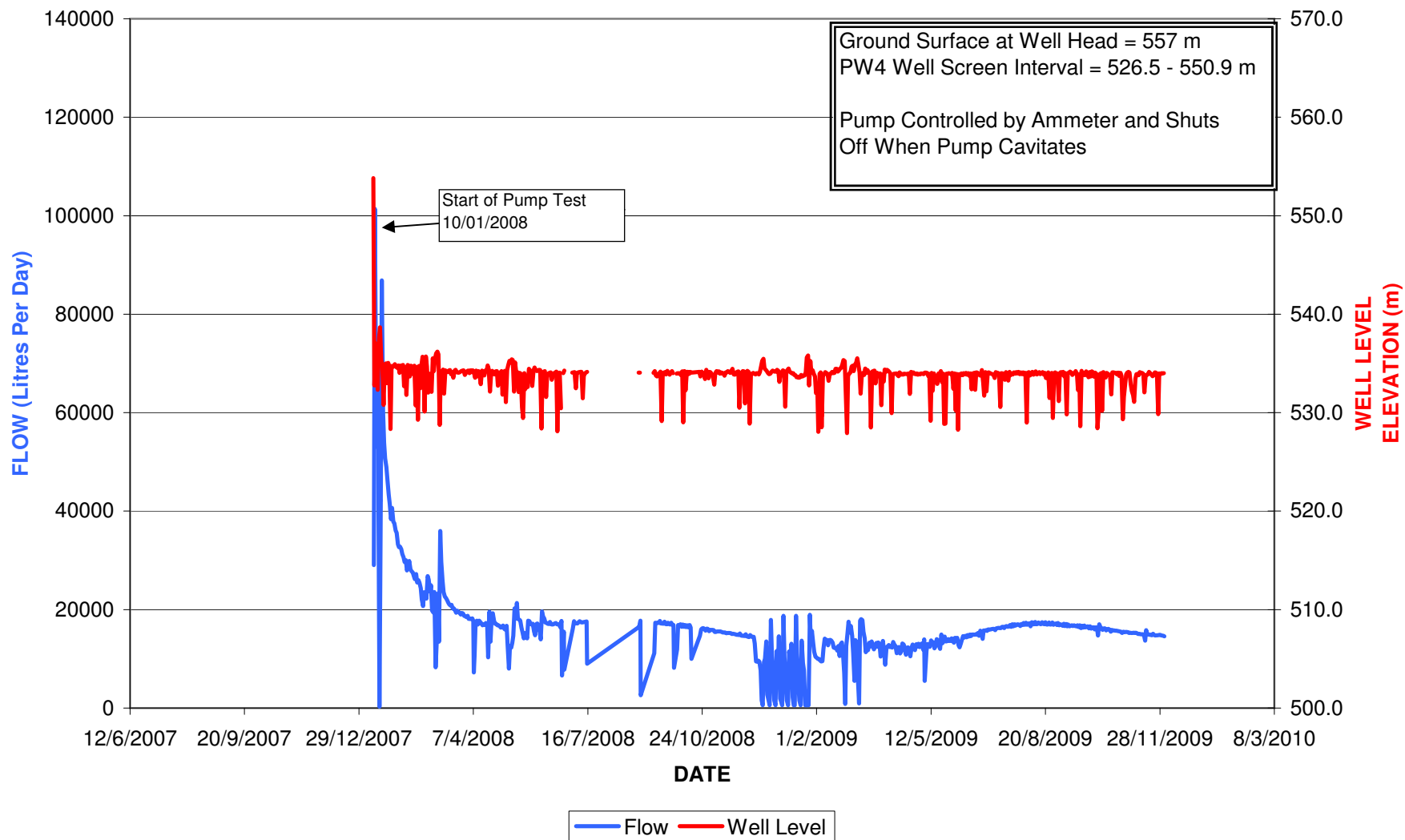
Test Well Monitoring PW1 - TOTAL DAILY FLOW AND WELL LEVEL



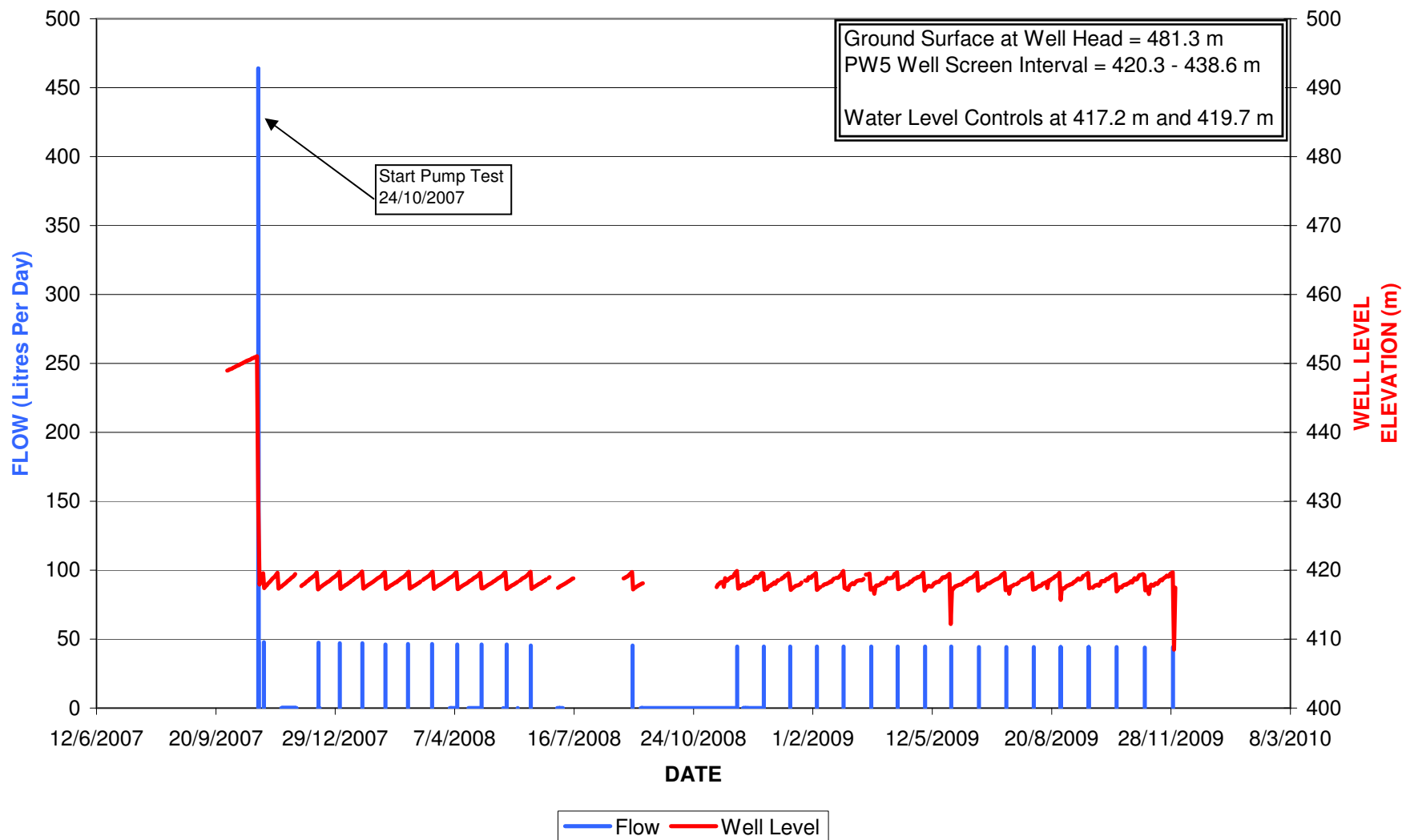
Test Well Monitoring PW2 - TOTAL DAILY FLOW AND WELL LEVEL



Test Well Monitoring PW4 - TOTAL DAILY FLOW AND WELL LEVEL



Test Well Monitoring PW5 - TOTAL DAILY FLOW AND WELL LEVEL



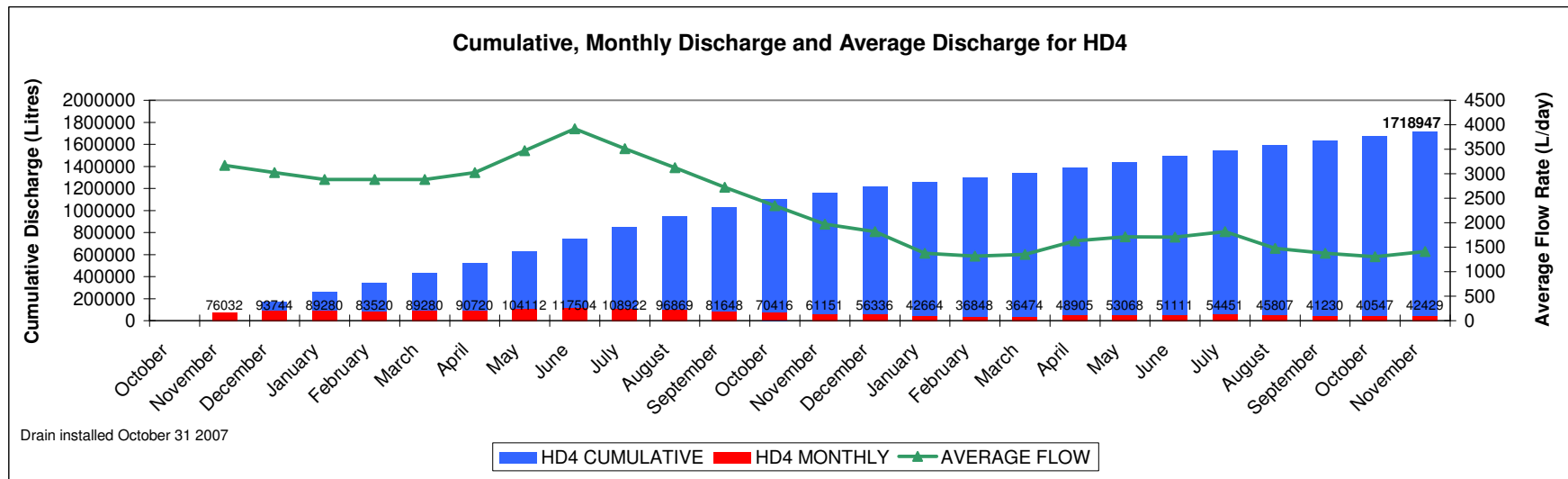
Appendix E

Horizontal Drains - Summary Table and Production Chart

APPENDIX E - Horizontal Drain Status

HD	Location	Installation Date	Length (total/slotted)	Azimuth	Inclination	Monitoring Wells	Status
HD1a	Lewis Dr. (at Sikh Temple)	November 2007	64.0m/57.9m	271	+2°	BH23, BH24, BH25	Active - dry
HD1b	Lewis Dr. (at Sikh Temple)	November 2007	48.8m/42.7m	241	+1°	BH23, BH24, BH26	Active - dry
HD4a	Adam St.	October 2007	135.6m/129.5m	271	+2°	BH21, BH22	Active
HD4b	Adam St.	November 2007	45.7m/39.6m	271	-2°	BH21, BH22	Active

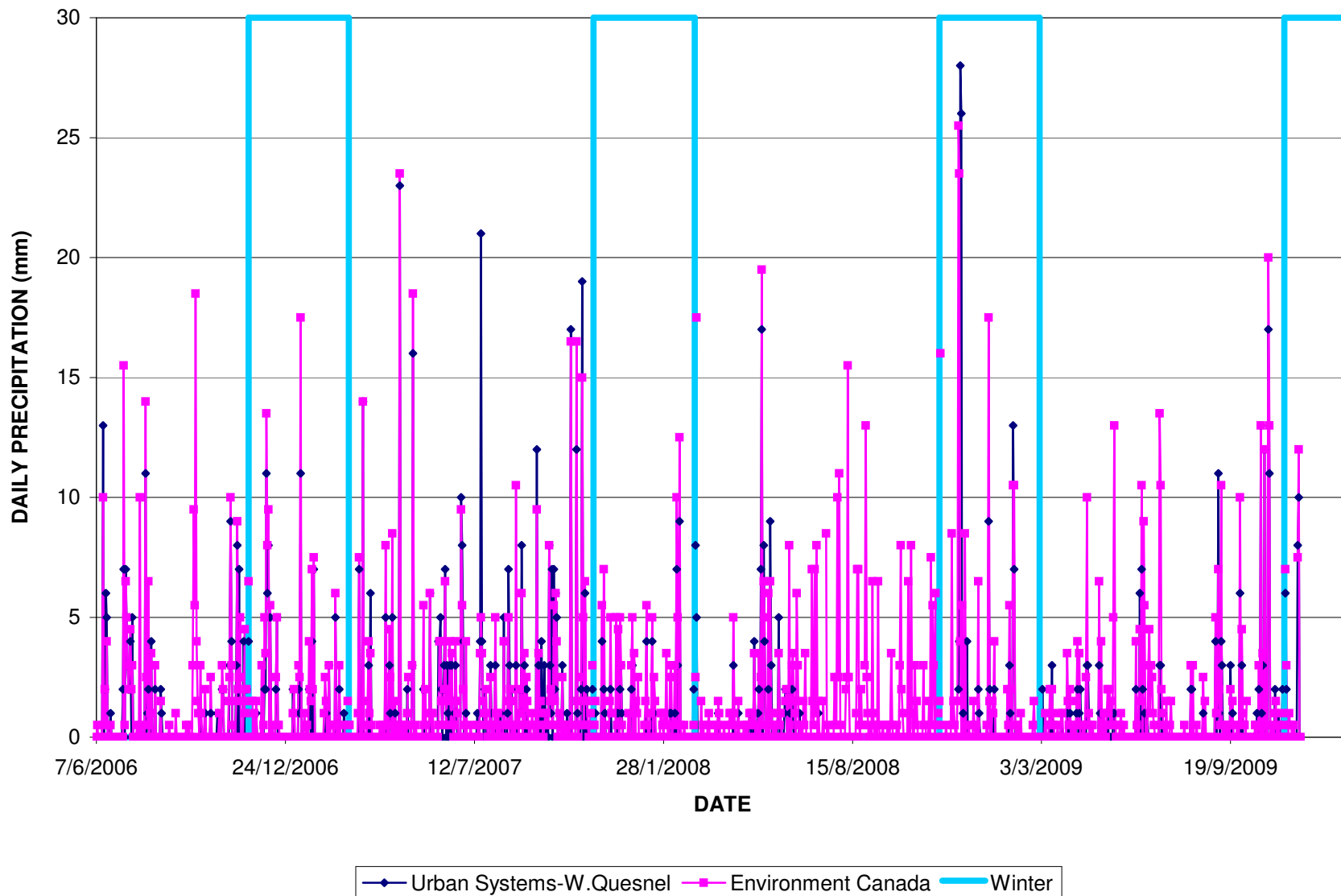
Horizontal Drain Flow vs. Time



Appendix F

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

**Figure F1 - Total Daily Precipitation
(Urban Systems-West Quesnel vs. Environment Canada-Quesnel AWOS Stations)**



**Figure F2 - Cumulative Total Daily Precipitation
(Urban Systems-West Quesnel vs. Environment Canada-Quesnel AWOS Stations)**

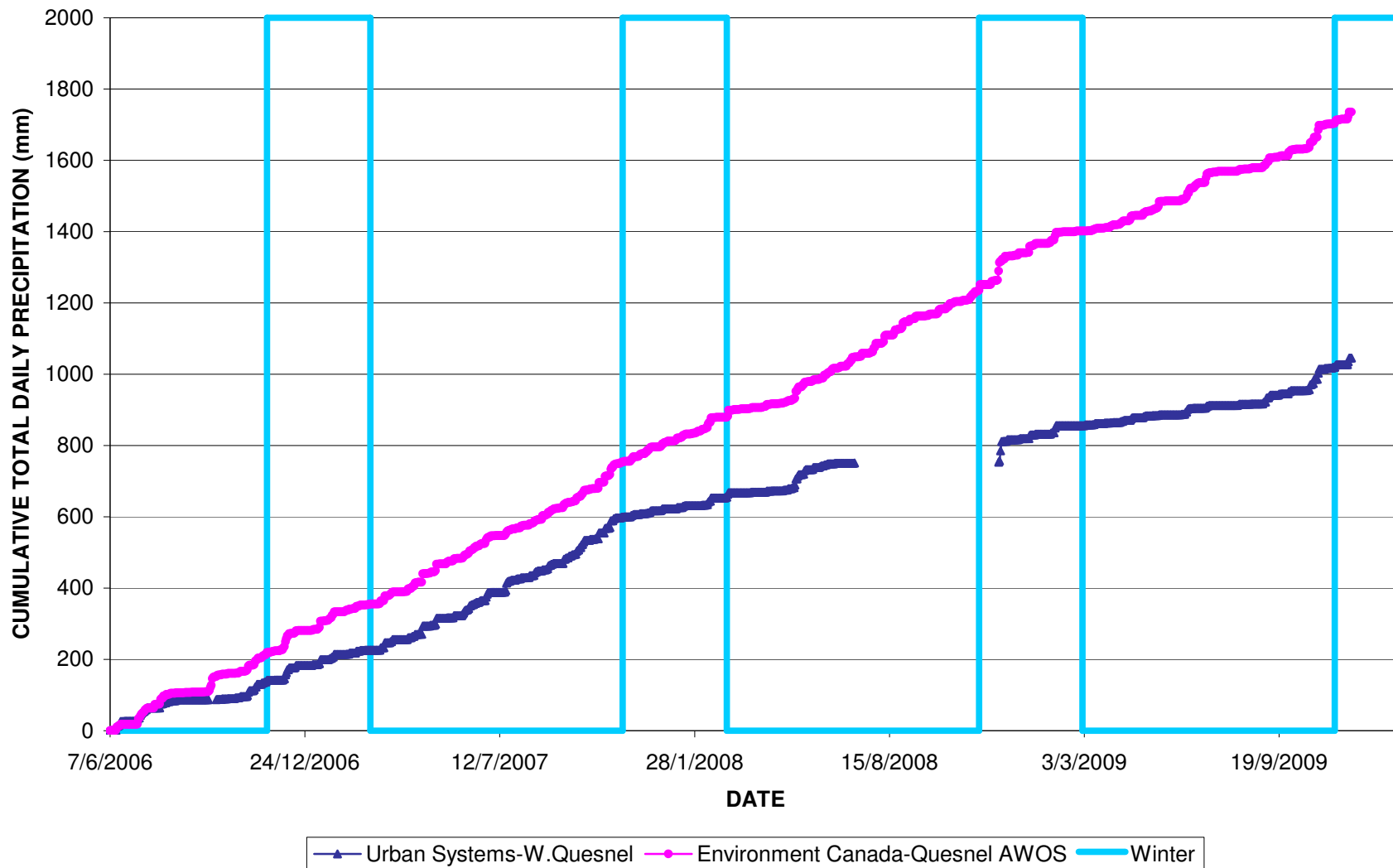
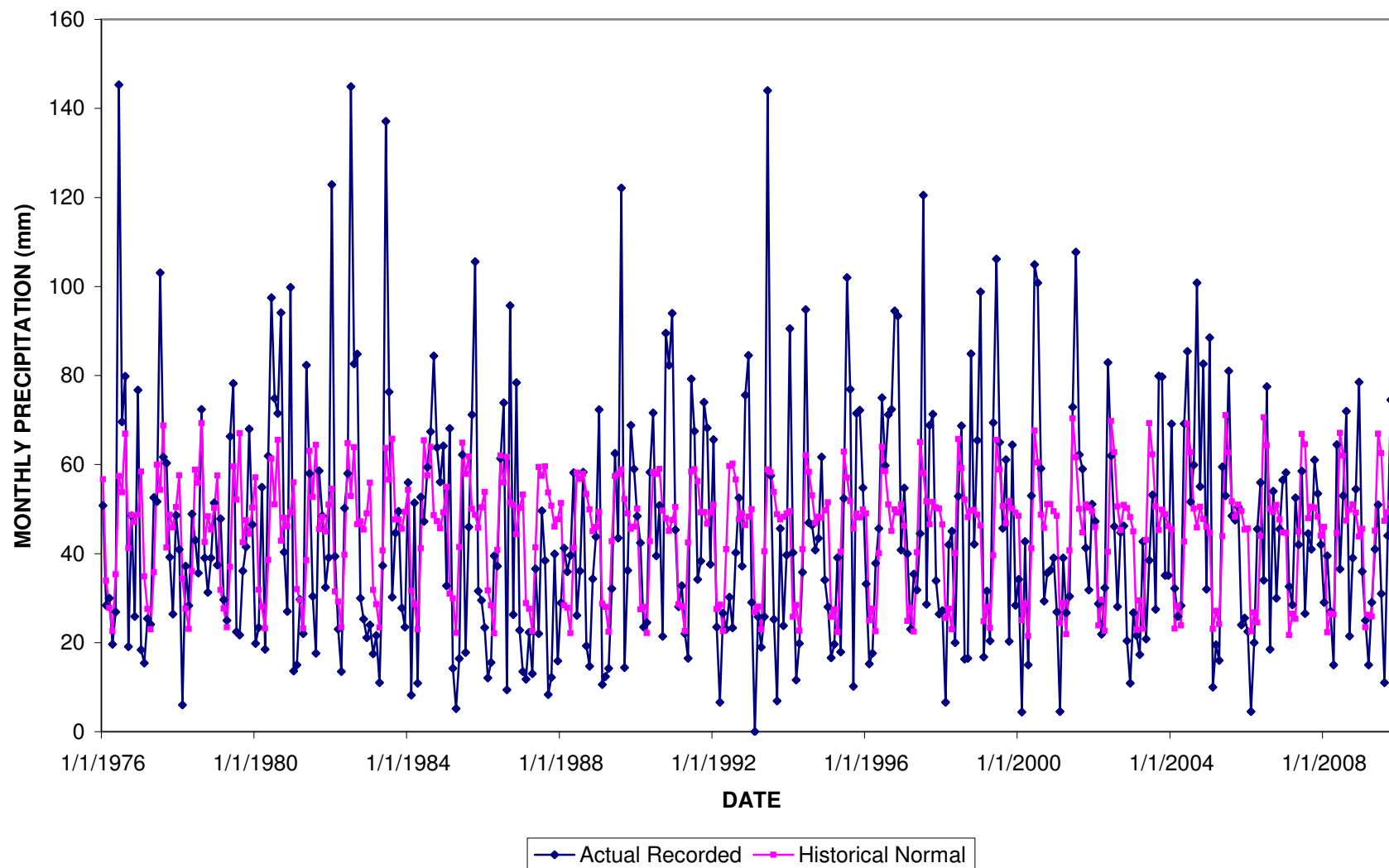
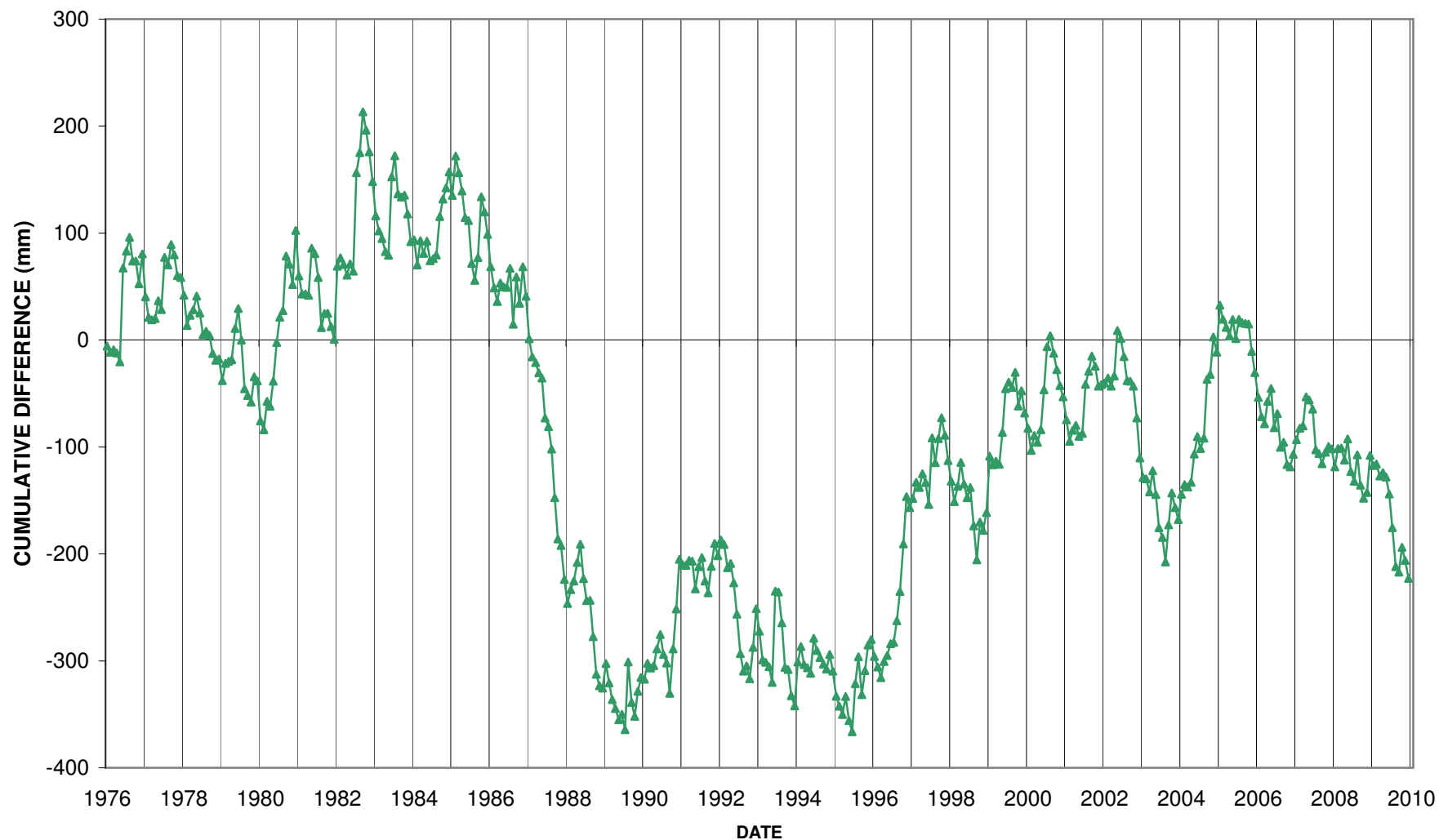


Figure F3 - Total Monthly Precipitation - 1976 to 2009
(Environment Canada - Quesnel AWOS)



**Figure F4 - Total Monthly Precipitation - Cumulative Difference - 1976 to 2009
(Environment Canada - Quesnel AWOS)**



Appendix G

Data Comparison Charts Figures G1 to G9

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

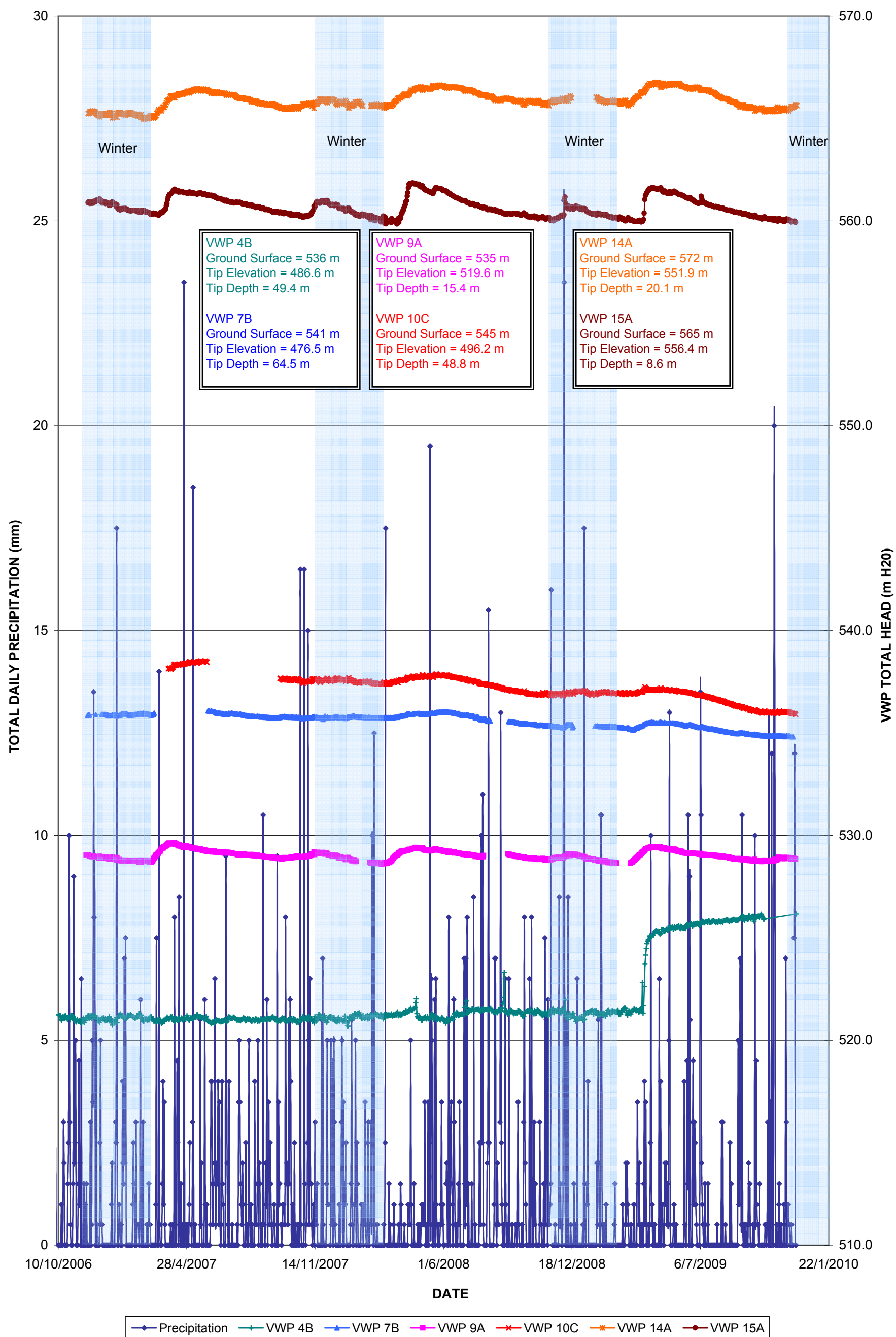


Figure G2 - Cumulative Total Daily Precipitation (Quesnel AWOS) vs. Groundwater Elevation

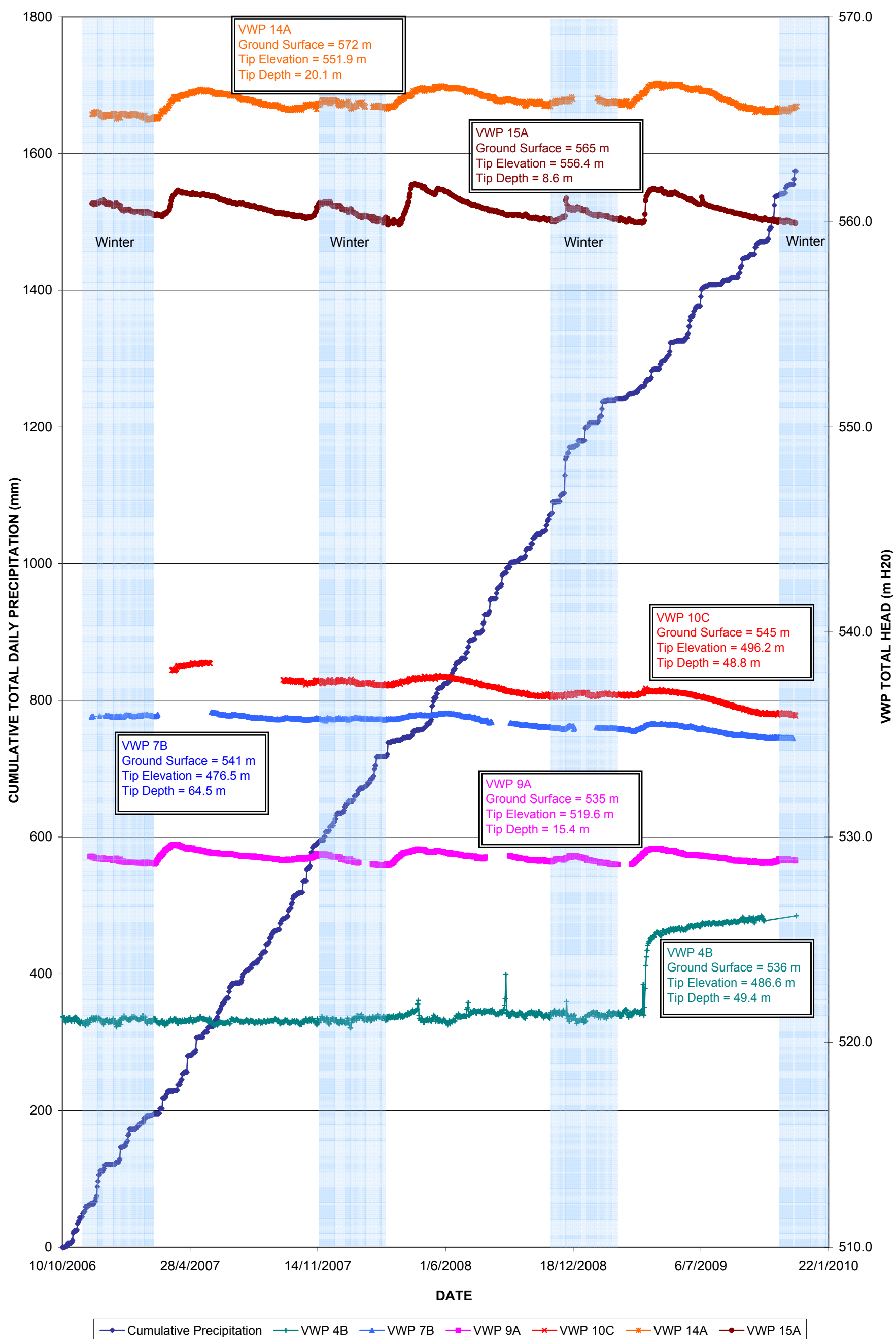
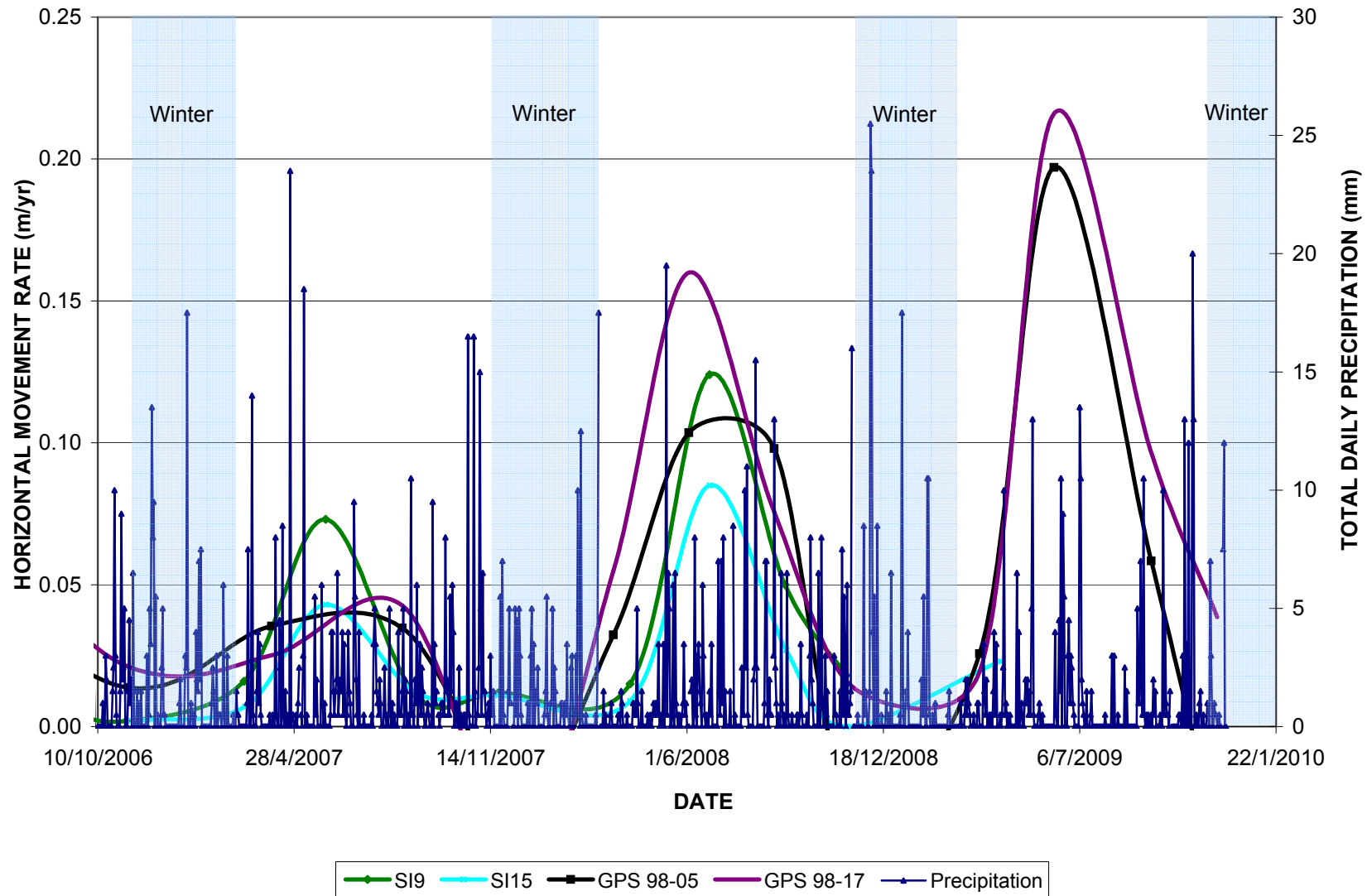
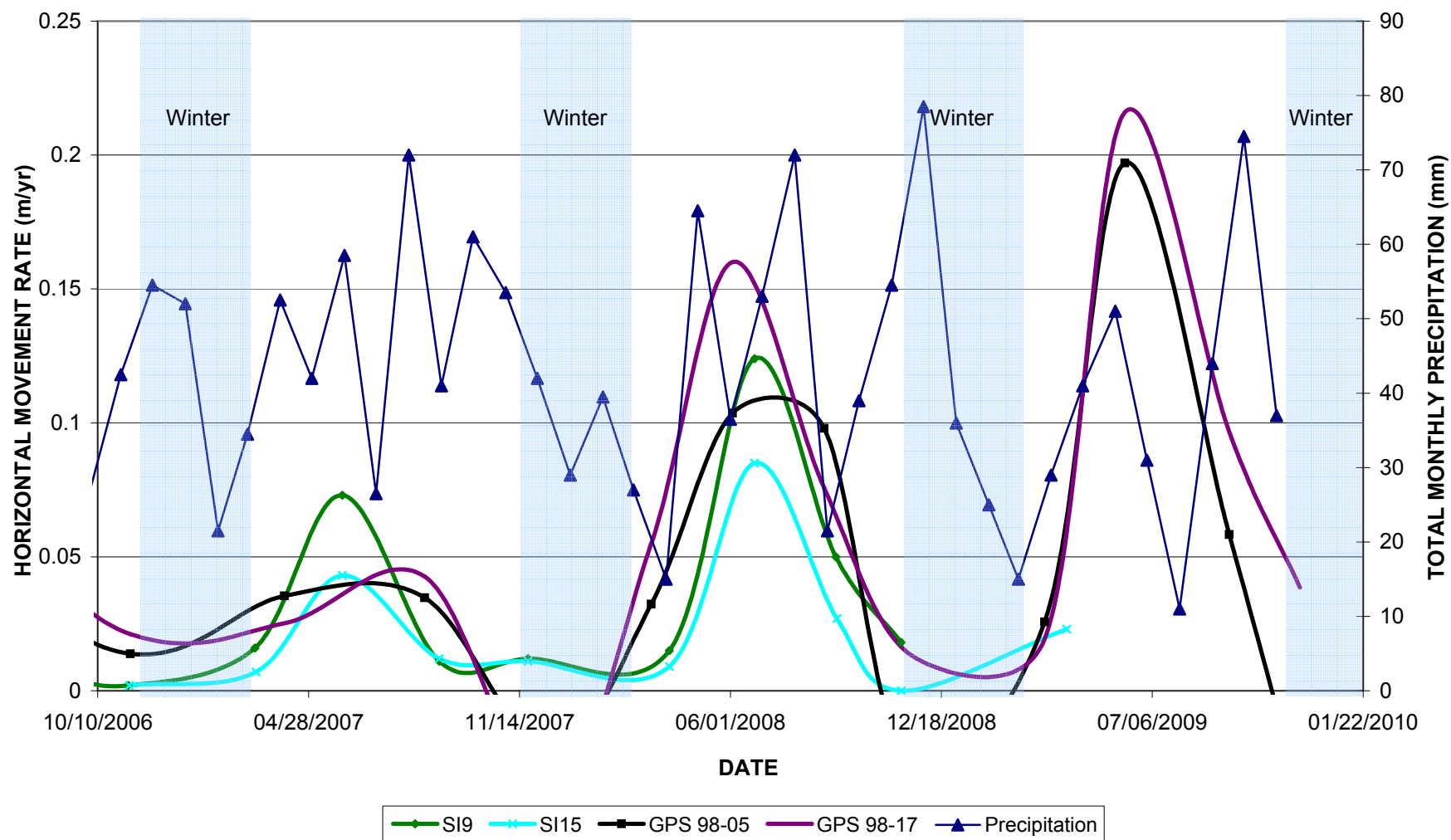


Figure G3 - Incremental Ground Movement Rate vs. Total Daily Precipitation (Quesnel AWOS)



**Figure G4 - Incremental Ground Movement Rate vs.
Total Monthly Precipitation (Quesnel AWOS)**



**Figure G5 - Incremental Ground Movement Rate vs.
Total Seasonal Precipitation (Quesnel AWOS)**

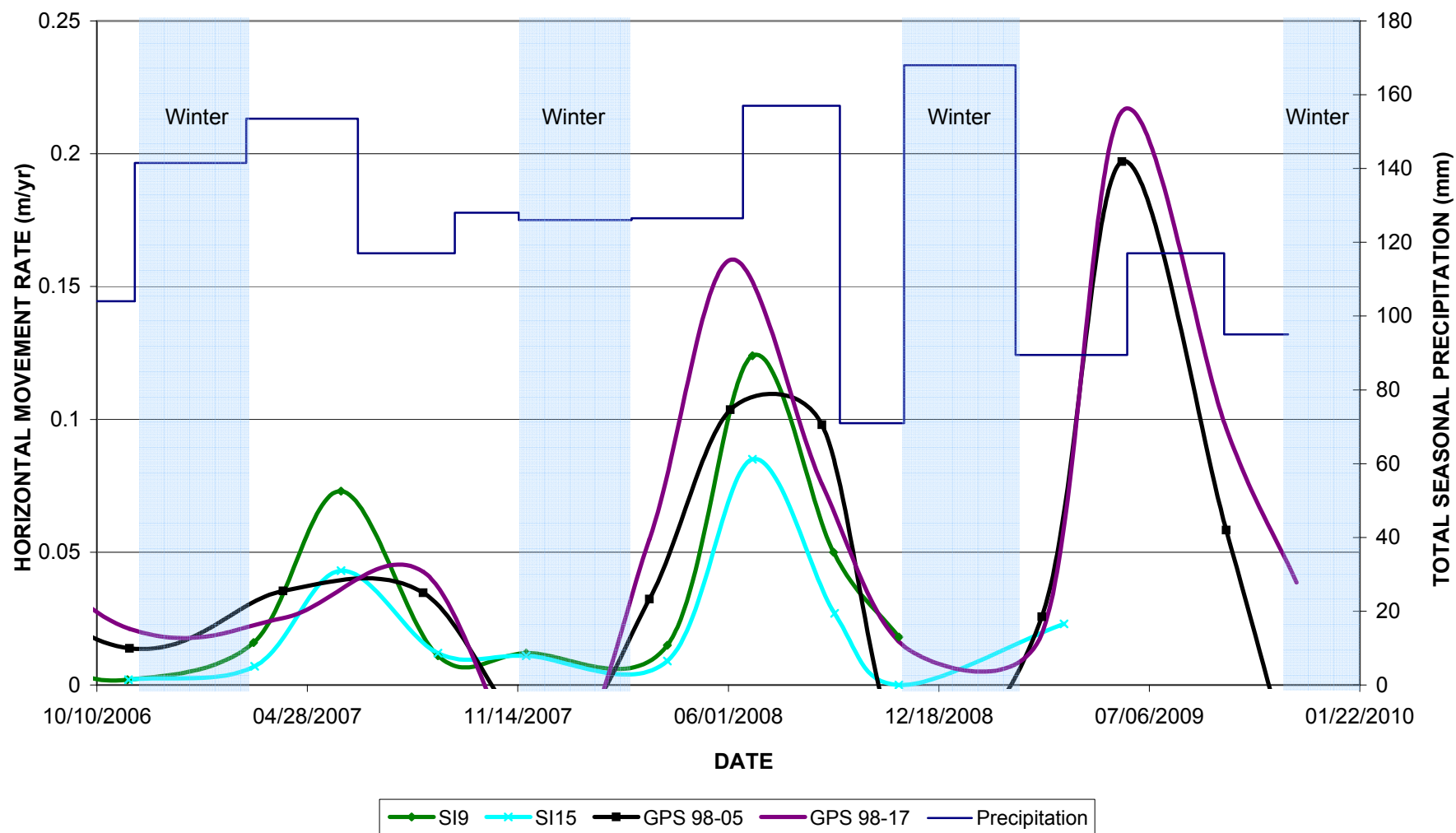
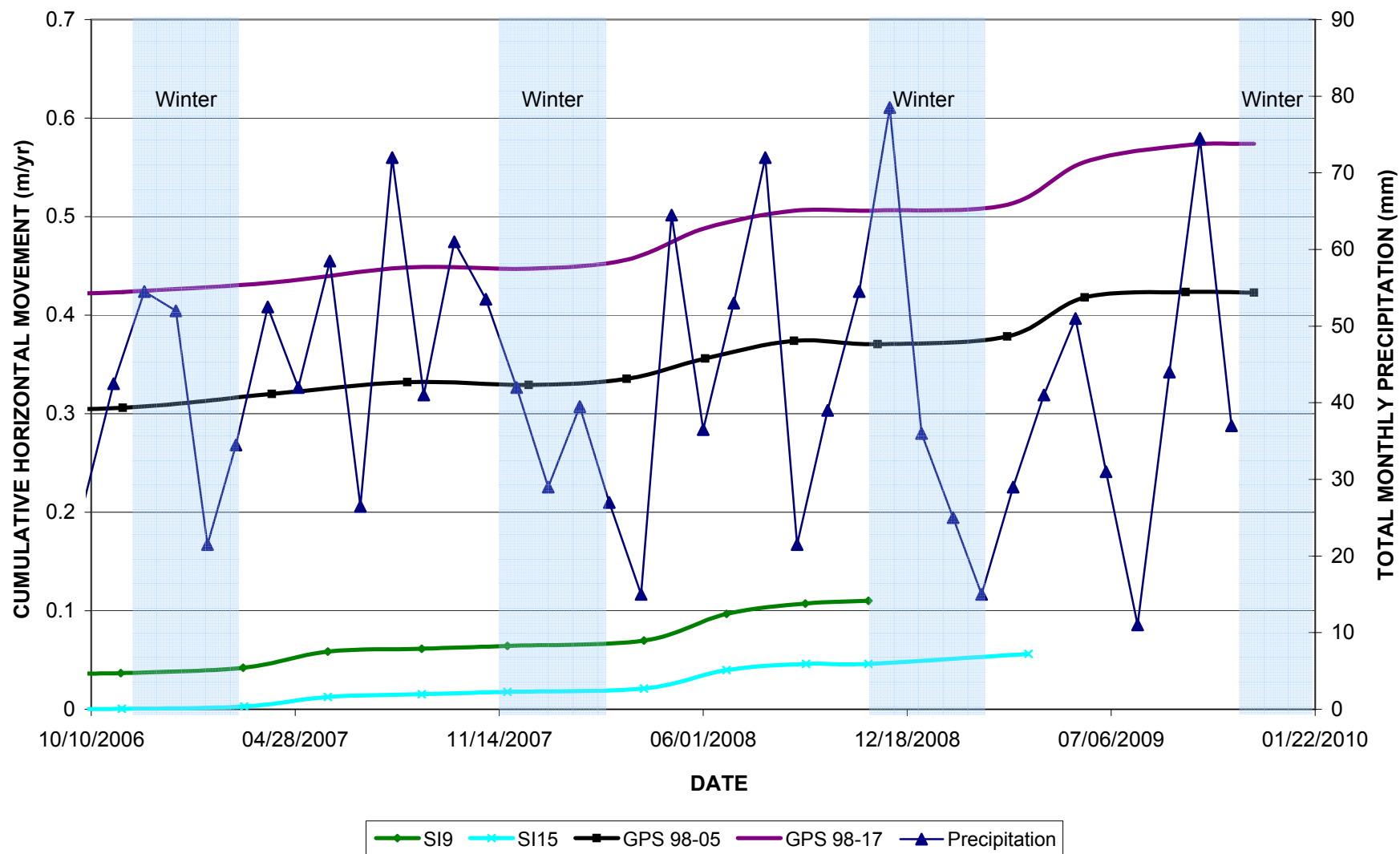
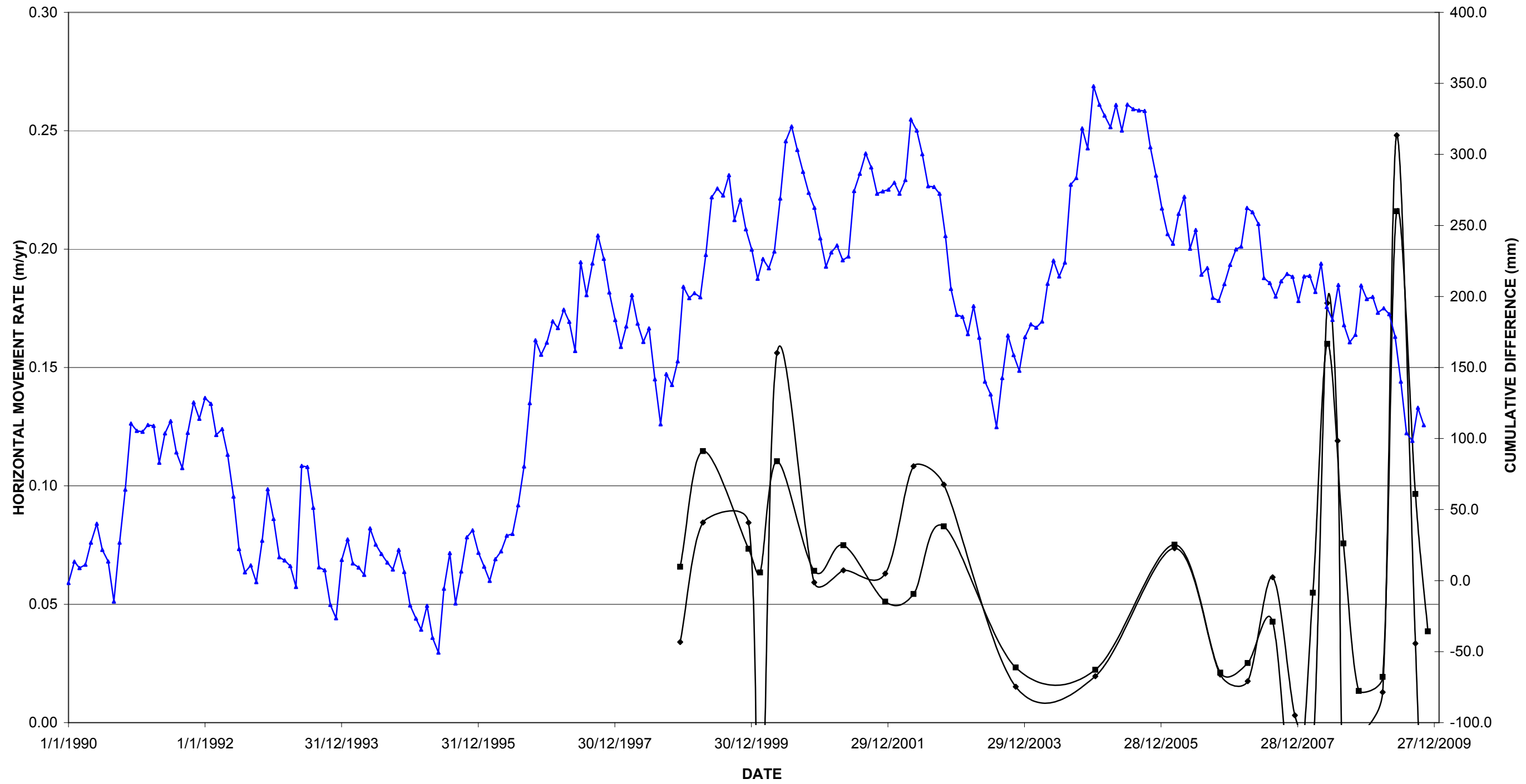


Figure G6 - Cumulative Ground Movement vs. Total Monthly Precipitation (Quesnel AWOS)



**Figure G7 - Incremental Ground Movement Rate vs.
Cumulative Difference - Total Monthly Precipitation (Quesnel AWOS)**



■ GPS 98-17 ◆ GPS 98-18 — Cumulative Difference

Figure G8 - Incremental Ground Movement Rate vs. Groundwater Elevation

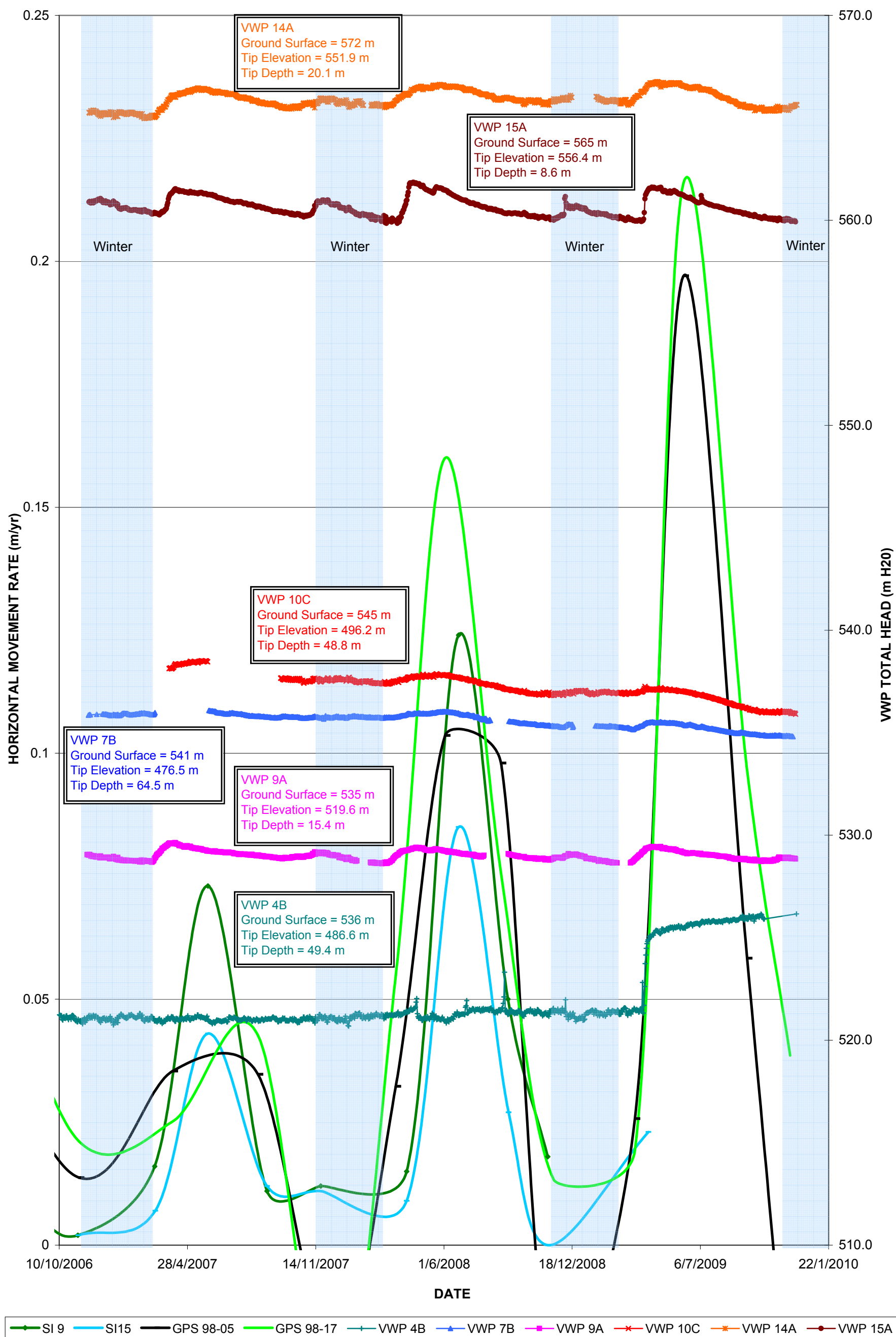


Figure G9 - Cumulative Ground Movement vs. Groundwater Elevation

