


Filey Town Ground Investigation

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Analysis of cliff monitoring data

Scarborough Borough Council

January 2013



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Halcrow Group Limited

Lyndon House, 62 Hagley Road, Edgbaston, Birmingham
B16 8PE

tel 0121 456 2345 fax 0121 456 1569

halcrow.com

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Document history

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This document has been issued and amended as follows:

Version	Date	Description	Created by	Verified by	Approved by
1.0	11/01/2013		Alex Bellis	Paul Fish	Roger Moore

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1 Monitoring rationale

Filey is located on the North Yorkshire coast approximately 8 km south of Scarborough and 5 km north of Flamborough Head. The town frontage has been developed on coastal cliffs comprised of a variable sequence of glacial sediments. The glacial sediments are deeply incised by ephemeral streams and two large ravines have been formed to the north and south of the town. The town is protected by a sea wall that prevents toe erosion of the coastal cliffs.

The Shoreline Management Plan (SMP) policy for Filey, which was adopted in 1997, was hold the line. To the north and south of Filey town the policy was no active intervention. The SMP recommended that a more detailed study should be carried out and in response the Filey Bay Coastal Defence Strategy Study was completed in October 2002. This study established a management strategy for Filey and Filey Bay for the next 50 years.

The Filey Bay Coastal Defence Strategy Study (Halcrow, 2002) noted that the seawall at Filey is vital to the long term protection of the town and highlighted that should it fail, there could be significant impact on cliff stability and outflanking of existing defences. These recommendations formed the basis for the Filey coastal slope stability and outflanking project. A key component of that study was a ground investigation that was conducted by Allied Exploration Geotechnics (AEG) in March 2011.

Subsequent to completion of the ground investigation, weather and slope monitoring data has been collected from instrumentation on a monthly basis. This information can be used to determine the relationships between rainfall, groundwater levels and ground movement, which is critical information for the management of cliff instability risk.

This document forms one of a series of reports (Table 1) that summarises the results of cliff monitoring and provides the Council with an interpretation of the data.

Table 1. Programme of monitoring and associated analysis report

Date	Activity
March 2011	Filey cliffs ground investigation. Installation of cliff monitoring; inclinometers and piezometers
April 2011 to June 2012	Equilibration of monitoring devices and regular collection of data
July 2012	Interim monitoring report
August 2012	Monthly review and update
September 2012	Monthly review and update
December 2012	Final report and recommendations (this report)



Figure 1. Location of boreholes and in situ monitoring data.

2 Results

2.1 Subsurface ground movement (inclinometers)

Three standard inclinometers were installed during the Allied Exploration & Geotechnics Ltd (AEG) 2011 ground investigation with the inclinometers operational from April 2011. The devices were installed within exploration holes CPBH-03, CPBH-05 and RCBH-07. Details of the depths of these installations are summarised in Table 1 below.

Table 1: Summary of Inclinometer Installations

Exploratory hole	Installation depth (m below ground)
CPBH-03	10.00
CPBH-05	10.00
RCBH-07	20.00

The inclinometers were monitored in April (immediately post-installation), May and December 2011 under the original ground investigation contract. A subsequent agreement with AEG involved monthly data collection. No data could be recorded during April, May, September, November and December 2012 at CPBH-03 as the manhole covers on Coble Landing were blocked by boats and could not be accessed.

Inclinometer data up to December 2012 have been reviewed and the findings are presented in Table 2 below. The data sheets relating to each monitoring visit are included in Appendix A.1.

The reference direction (Axis A) of the inclinometers is aligned in the direction of the slope, with Axis B perpendicular to the slope. Filey has an approximately east facing slope, meaning the A axis is aligned approximately east-west and the B axis, north-south.

Although there may be very slight signs of movement in CPBH-03 and CPBH-05, it is likely that these are due to equilibration/settlement within the installations and/or shrinkage and swelling of clay soils surrounding the installation.

Movements in RCBH-07 appear to be very small and subsequently reversed or halted in later surveys. However, further monitoring of any movement at depth would be valuable.

Table 2: Summary of movement indicated by inclinometer data (m below ground level)

Hole	Apr 2011	May 2011	June - Nov 2011	Dec 2011	Jan 2012	Feb 2012	Mar 2012	Apr 2012	May 2012	Jun 2012	Aug 2012	Sept 2012	Oct 2012	Nov 2012	Dec 2012	Move-ment direction
CPBH-03	None	Negligible movement in upper 1.5m*	No data	Negligible movement in upper 1.5m	Negligible movement in upper 1.5m	Negligible movement in upper 1.5m	Negligible movement in upper 1.5m	No data	No data	Negligible movement in upper 1.5m	Negligible movement in upper 1.5m in opposite direction to previous movement	No reading	No reading	No reading	No reading	Positive B Axis (northerly) Negative B axis (southerly) in between June and August 2012
CPBH-05	None	Negligible movement in upper 1.5m*	No data	Negligible movement in upper 1.5m*	Negligible movement in upper 1.5m*	Negligible movement in upper 1.5m*	Negligible movement in upper 1.5m*	Negligible movement in upper 1.5m*	Negligible movement in upper 1.5m*	Negligible movement in upper 1.5m*	Negligible movement in upper 1.5m*	Negligible movement at ca. 9.5m	No movement	Negligible movement in B axis at 2m depth	Negligible movement in B axis at 2m depth	Negative B Axis (southerly)
RCBH-07	None	None	No data	None	None	None	None	None	None	None	2mm in upper 10m; southerly direction	No movement	No movement	No movement	No movement	Negative B axis (southerly)

Note:

* movement of up to 2 mm is within the range of accuracy of the device and may not represent true ground movement.

Movements coloured **yellow** are at the 2 mm limit of accuracy. Movements coloured **orange** are greater than the 2 mm limit of accuracy (none recorded)

2.2 Groundwater (piezometers)

Seven existing 35mm standpipes in pre-existing exploratory holes were retrofitted with automatic 'divers'. Each of these holes also contained 19mm standpipe piezometers. Details of these installations are summarised in Table 3. The groundwater elevations are presented in relation to ordnance datum (OD).

Results are plotted in Figures A.2.1 to A.2.8 in Appendix A. Figure A.2.1 shows a comparison of all data and Figures A.2.2 to A.2.8 show the data for specific locations. The 35mm standpipes which were retrofitted with divers were all reading as 'dry' until January 2012, when they were reset to read correctly, and therefore only data from this point onwards are shown.

Figure A.2.1 shows how the different installations often encounter very different groundwater levels, which indicates that a series of perched water levels exist within the cliffs. This observation is to be expected with spatially and depth-variable interbedded glacial sediments that form the cliffs.

Groundwater in most instruments has remained relatively constant. Notable exceptions are observed in CPBH-01, which has shown a general rising trend from March 2012 and showing numerous small sharp rises to peak levels of around 35m AOD in December 2012, and CPBH-10 which shows elevated levels of groundwater between late April/early May and late July 2012 before reducing during the autumn and subsequently returning to the highest levels in December 2012.

Table 3: Summary of groundwater levels

Exploratory Hole Ref.	Installation Type	Installation Tip Depth (m AOD)	Ground Level (m AOD)	Groundwater Level		Comments
				Highest recorded (m AOD)	Lowest recorded (m AOD)	
CPBH-01	19mm Standpipe Piezometer	16.93	37.43	17.48 (20/12/12)	16.89 (15/12/11)	No standing water was encountered between January 2012 and May 2012, with the exception of April 2012 with levels at 17.08m AOD. From June to December 2012 groundwater levels varied between dry (September) and 17.48m AOD in December. The average groundwater level to date is 17.16m AOD.

Exploratory Hole Ref.	Installation Type	Installation Tip Depth (m AOD)	Ground Level (m AOD)	Groundwater Level		Comments
				Highest recorded (m AOD)	Lowest recorded (m AOD)	
CPBH-01	35mm Standpipe with Diver	32.63	37.43	35.03 (14/12/2012)	33.15 (Jan-April 2012)	A constant groundwater profile is shown up until the beginning of March 2012, where the groundwater level shows fluctuation around a rising trend, with water levels reaching c. 34.5 m AOD by the end of the current record, with notable short term fluctuations to around 35.0m AOD in November and December 2012. Dip meter readings confirm these results.
CPBH-02	19mm Standpipe Piezometer	1.57	35.97	5.23 (19/04/12)	3.57 (06/09/2012)	The average groundwater level to date is 4.86m AOD.

Exploratory Hole Ref.	Installation Type	Installation Tip Depth (m AOD)	Ground Level (m AOD)	Groundwater Level		Comments
				Highest recorded (m AOD)	Lowest recorded (m AOD)	
CPBH-02	35mm Standpipe with Diver	8.17	35.97	19.96 (07/12/2012)	8.64 (ongoing)	Erroneous data due to equilibration of the instrument to the middle of January 2012 were ignored. Minor fluctuations between c. 8.64m AOD and 9.00m AOD recorded to 19/04/2012 after which the level retains a constant elevation of 8.64-8.65m AOD except for notable very large fluctuations on 06/07/2012 (max 15.62m) and 07/12/2012 (max 19.96m). These are likely to be due to sudden surface water inflow which subsequently dissipates quickly. Minor fluctuations (max 9.66m occur earlier in December).
CPBH-04	19mm Standpipe Piezometer	2.90	32.90	7.33 (19/04/12)	7.02 (06/09/12)	The average groundwater level to date is 7.19m AOD.
CPBH-04	35mm Standpipe with Diver	9.90	32.90	13.58	13.40	Minor fluctuations between around 13.40 -13.58m AOD occur throughout the record with no major fluctuation. Dip meter readings are consistent with the driver data with notable exceptions on 06/09/2012 and 20/12/2012.

Exploratory Hole Ref.	Installation Type	Installation Tip Depth (m AOD)	Ground Level (m AOD)	Groundwater Level		Comments
				Highest recorded (m AOD)	Lowest recorded (m AOD)	
CPBH-06	19mm Standpipe Piezometer	0.13	29.63	20.11 (20/12/2011)	18.85 (27/02/12)	The average groundwater level to date is 19.858m AOD.
CPBH-06	35mm Standpipe with Diver	8.63	29.63	18.86	14.35* (likely error associated with manual readings being taken on 20/03/2012)	The groundwater level has shown minor fluctuation between 18.2m and 18.60m AOD throughout the period of monitoring. A rapid 3m drop between 19/04/12 and 24/05/12 is interpreted as error. Error is also expected for the very short-lived, rapid drops that occur on days when dip meter readings were taken. Dip meter data are consistent with the driver data with one notable exception on 06/09/2012.
CPBH-08	19mm Standpipe Piezometer	17.39	27.39	9.46 (20/12/2012)	8.48 (19/04/12)	The average groundwater level to date is 8.70m AOD. April 2012 shows lowest level, against the trend of the other piezometers

Exploratory Hole Ref.	Installation Type	Installation Tip Depth (m AOD)	Ground Level (m AOD)	Groundwater Level		Comments
				Highest recorded (m AOD)	Lowest recorded (m AOD)	
CPBH-08	35mm Standpipe with Diver	3.49	27.39	17.97	17.90	Possibly erroneous data. The diver data shows a groundwater level of between 17.90 and 17.97m AOD with an increase through time, but dip meter data records this hole as dry throughout the monitoring period.
CPBH-09	19mm Standpipe Piezometer	0.64	30.14	20.98 (06/09/2012)	19.86 (02/08/2012)	The average groundwater level to date is 20.23m AOD.
CPBH-09	35mm Standpipe with Diver	17.74	30.14	20.52	19.87	The groundwater level shows minor fluctuations between 19.87 and 20.52m AOD.
CPBH-10	19mm Standpipe Piezometer	11.92	31.92	Blocked by slip rod		

Exploratory Hole Ref.	Installation Type	Installation Tip Depth (m AOD)	Ground Level (m AOD)	Groundwater Level		Comments
				Highest recorded (m AOD)	Lowest recorded (m AOD)	
CPBH-10	35mm Standpipe with Diver	23.82	31.92	30.66	26.52	The groundwater level fluctuates between 28.50 and 29.00m AOD until late April 2012 when it peaks at around 30.00m AOD. A slightly elevated, fluctuating groundwater level is maintained until mid-July when levels drop to a minimum of around 28.50m AOD until around 22 November 2012 when a sharp rise occurs with levels peaking at 33.66m AOD on 08 December and remaining above 30m AOD to the end of the monitoring period.

2.3 Weather records

A weather station was installed at Flat Cliffs in September 2011 as part of the ground investigation. This site is located approximately 2km to the south of Filey and the data is thought to be representative for the whole of the Filey Bay area.

Meteorological information is collected every 15 minutes and is automatically uploaded to a website, where it can be viewed online or downloaded.

Data from 29 September 2011 to 13 July 2012 has been downloaded and grouped by month. Figure 2 shows total rainfall, Figure 3 shows maximum wind speed and Figure 4 shows maximum, mean and minimum air temperatures.

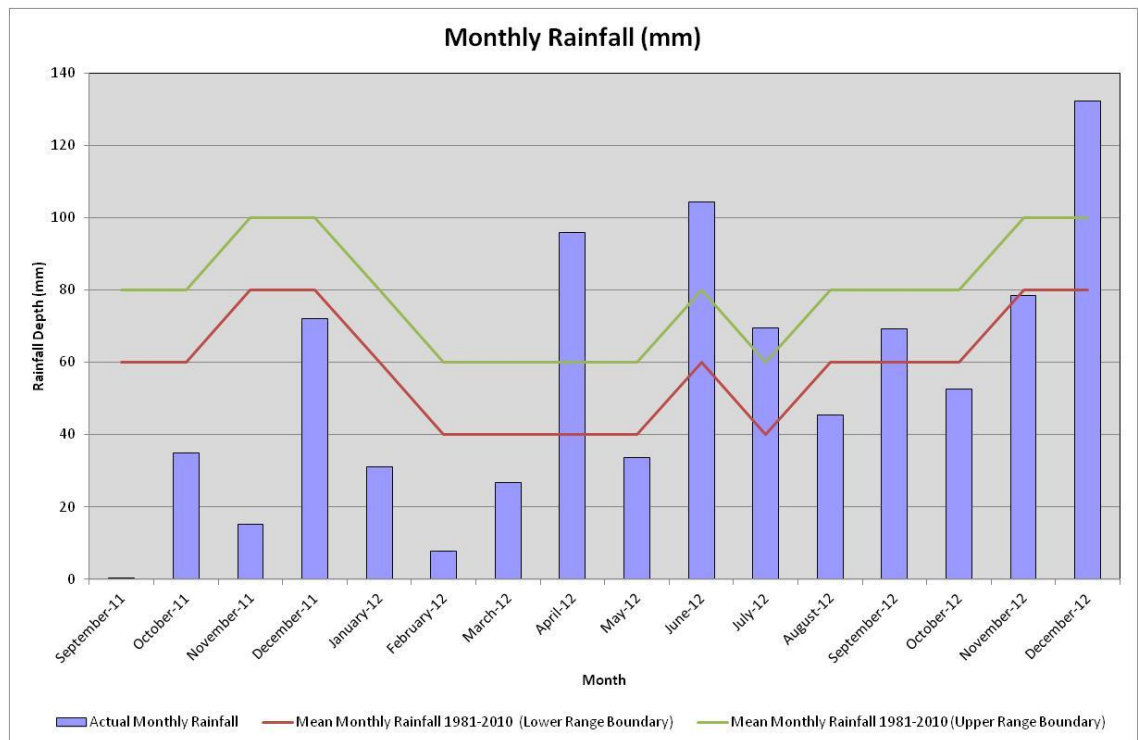


Figure 2. Total actual monthly rainfall (mm), September 2011 to December 2012 and average monthly rainfall (mm) 1981-2010 for Filey Bay. Note: September 2011 data is not for the whole month. Average Monthly rainfall from metoffice.gov.uk/climate/uk/averages/ukmapavg.html.

Figure 2 highlights the monthly recorded rainfall, together with average monthly rainfall for the Filey area over the 30 year period from 1981 to 2010. The graph highlights the very low rainfall received in Autumn 2011 to Spring 2012, where only April 2012 was higher than average and November 2011 and January to March 2012 were particularly dry. Also highlighted are the wet summer, autumn and winter of 2012, where June, July and December were all wetter than average, and September and November being close to average values. December 2012 was particularly wet, receiving around twice the average rainfall for that month. The annual rainfall for 2012 was 747 mm while the average annual rainfall is 600 to 700mm. This indicates rainfall was between 7% and 25% higher than average (depending on whether the upper or lower bound of average rainfall is taken), albeit concentrated in April, June and December 2012. Looking forward, it would be valuable to consider historical monthly rainfall data to understand where the data presented in figure 2 and future monitoring data fits within the overall range of rainfall variability. This may allow a better understanding of potential threshold rainfall conditions that control groundwater levels and potentially, as a consequence, ground movements. Specifically further review after March would be beneficial to understand the relationship between rainfall, groundwater and ground movement over the winter period.

Wind speed is summarised in Figure 3 that shows the maximum speed recorded in each month period and the Beaufort scale storm force thresholds. The peak wind speed recorded over the monitoring period is 15 mph (Storm force 4, Moderate Breeze) in December 2012. Storm force 4 winds were also recorded in October 2011, January 2012 and April 2012. The absence of high velocity winds through the

monitoring period indicates relatively calm conditions were experienced, suggesting that erosion of the cliff toe will have been limited.

Wind direction and speed for the monitoring period are summarised in Figure 4a-g). The data are presented for all of 2012 and for the constituent seasons (where winter is December, January and February; spring is March, April and May; summer is June, July and August; and autumn is September, October and November).

The wind rose for all of 2012 shows that onshore winds, from all directions between north, west and south are most common, but that the strongest winds are from offshore (i.e. from the east), with occasional strong winds coming from the northwest.

There is considerable variation in direction of most frequent and strongest winds when viewed on a seasonal basis. In general, the autumn and winter months were characterised by commonest winds from onshore directions, but with strongest winds coming from both onshore and offshore directions. In contrast, spring and summer winds are most frequent from the northwest (onshore), with a secondary component from the southeast (offshore). The strongest winds again come from both onshore and offshore sources.

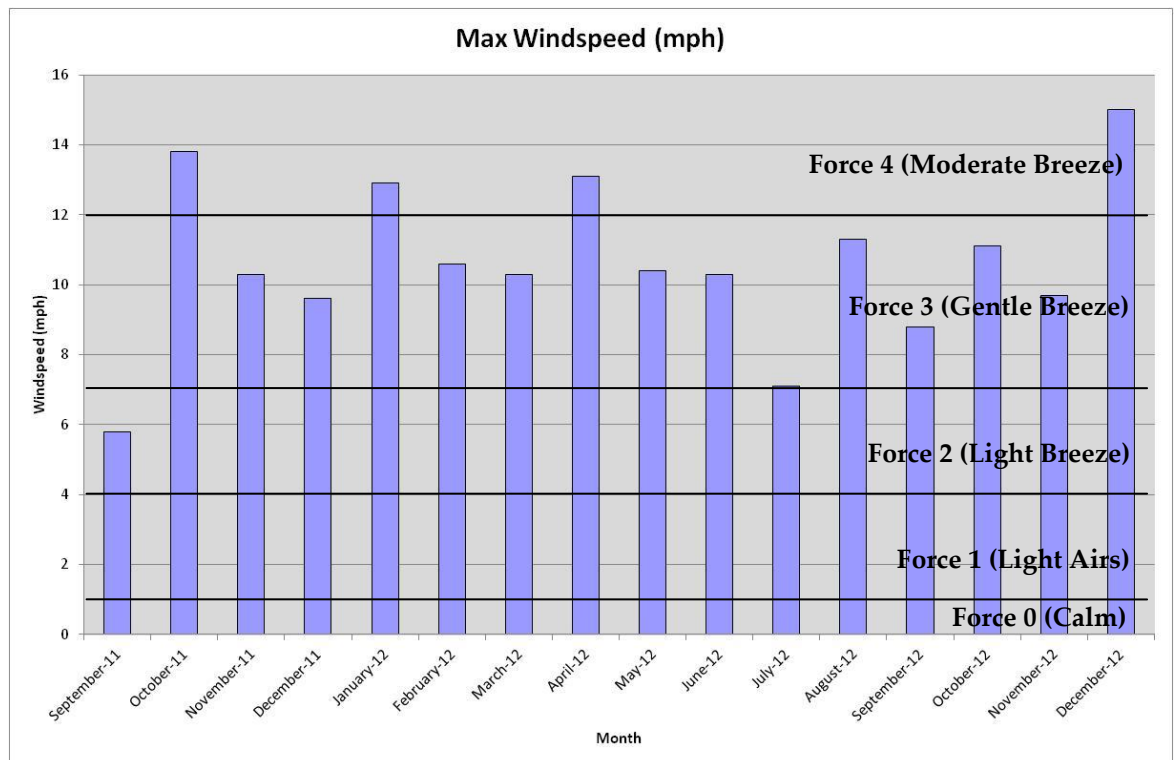


Figure 3. Maximum weekly wind speed (mph), September 2011 to December 2012. NB September 2011 data is partial.

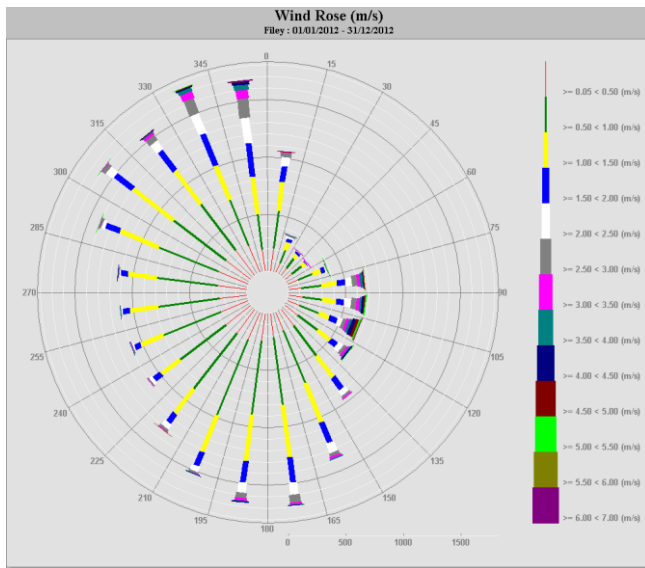


Figure 4a. All wind data, 2012

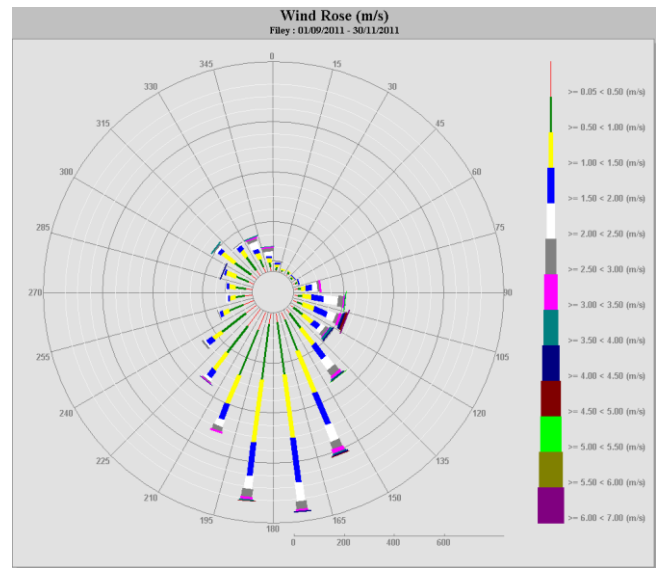


Figure 4b. Wind data, Autumn 2011.

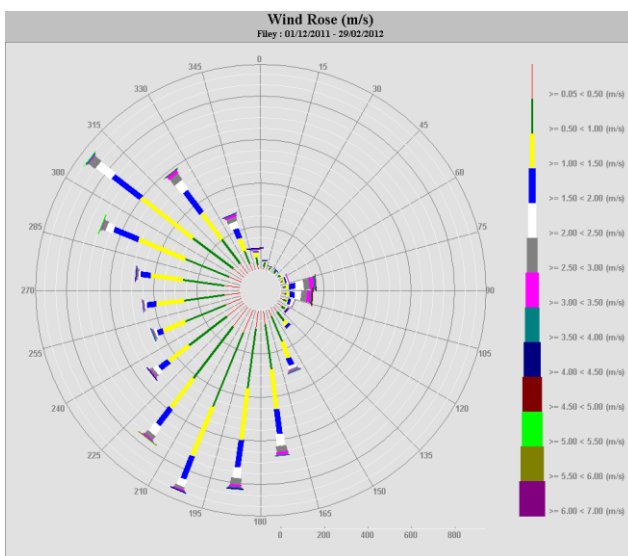


Figure 4c. Wind data, Winter, 2011/12

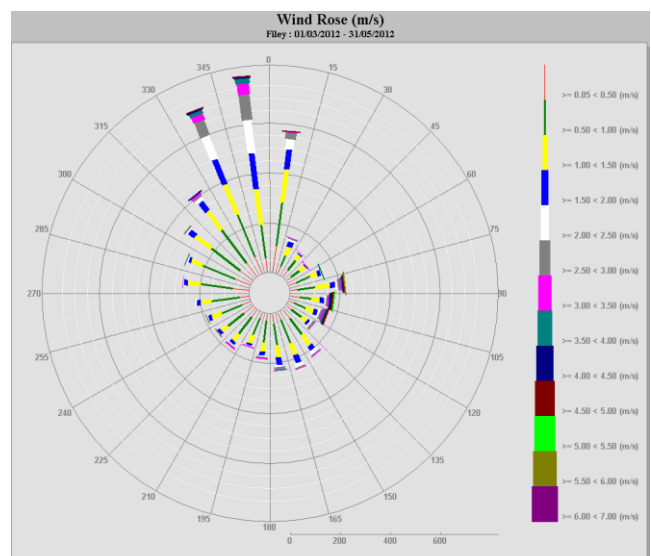


Figure 4d. Wind data, Spring 2012

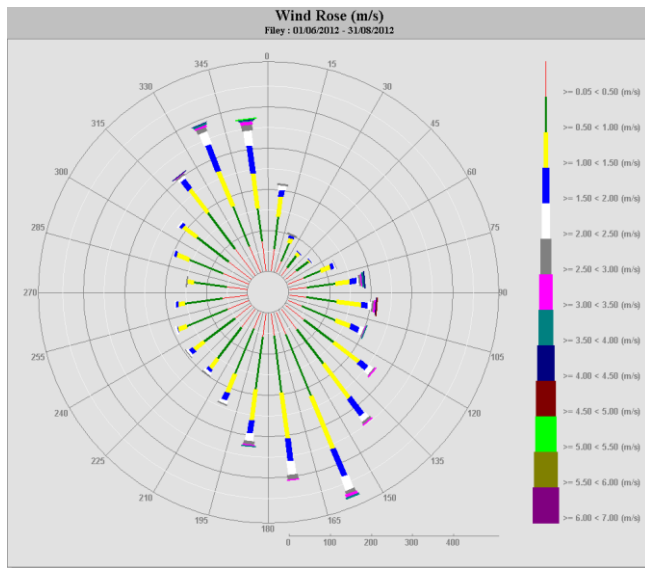


Figure 4e. Wind data, Summer, 2012

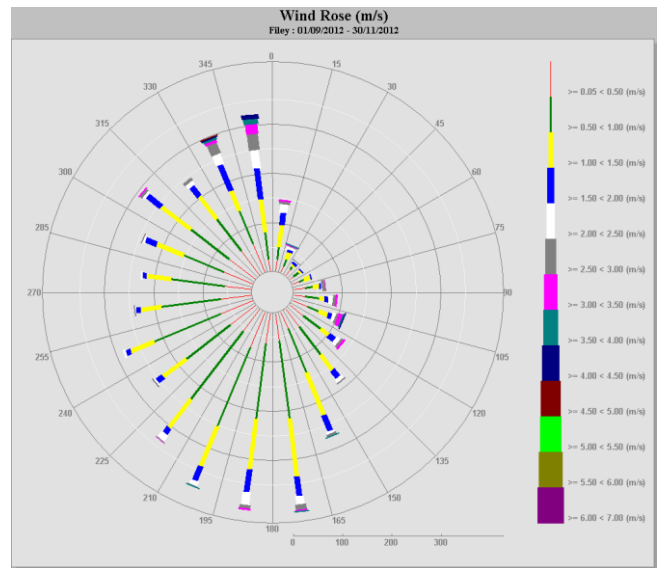


Figure 4f. Wind data, Autumn 2012

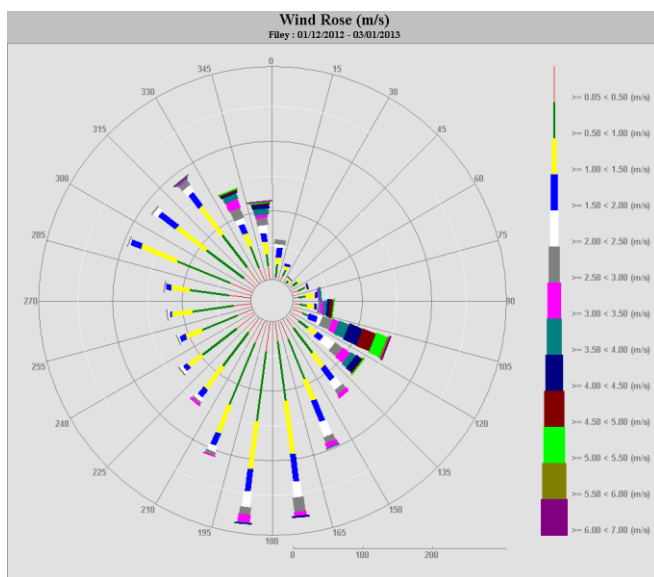


Figure 4g. Wind data, Winter 2012/13 (partial – to 3 Jan 2013)

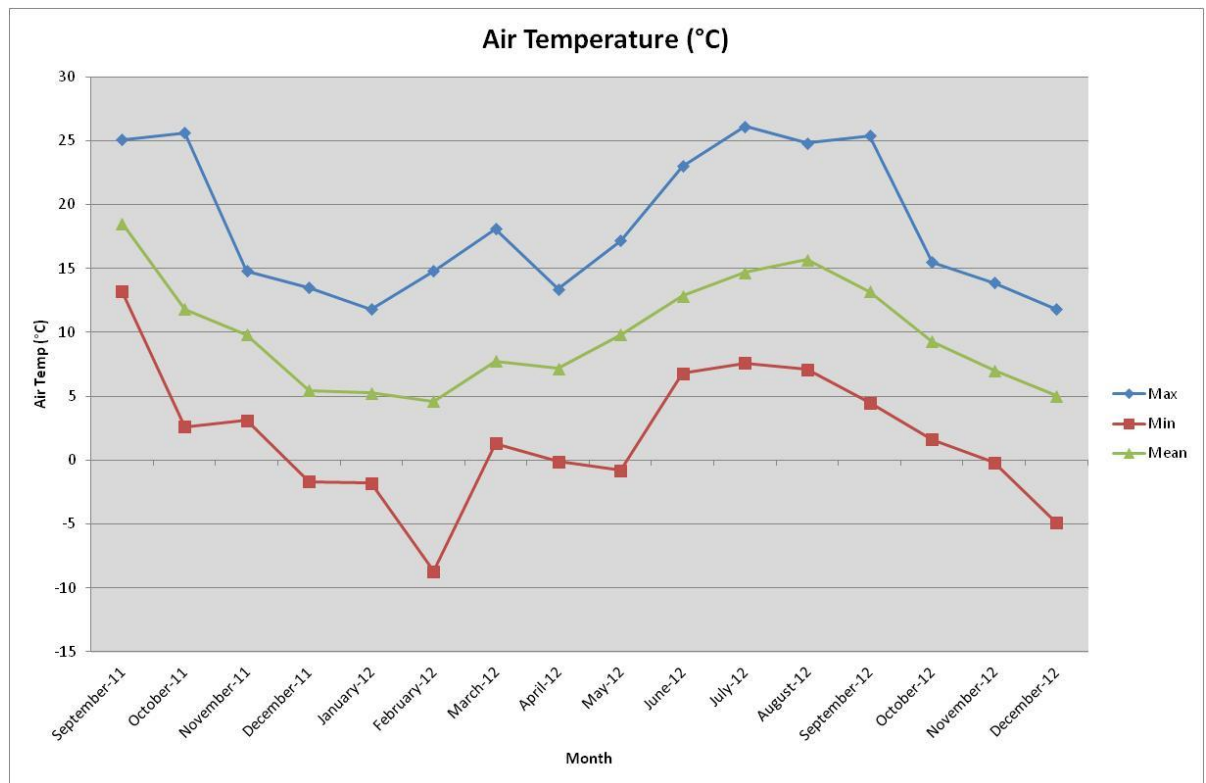


Figure 5. Mean weekly air temperature, September 2011 to July 2012.

Air temperature is presented in Figure 5 that presents the data as minimum, maximum and means for each month. The data highlight the atypically warm autumn of 2011, the mild winter of 2011/12 and the cool spring of 2012.

3 Implications to cliff behaviour

The total rainfall shown on Figure 2 highlights an exceptionally wet spring, summer and winter of 2012, particularly April, June and December. This follows an unusually dry winter period, with only December 2011 approaching average conditions. These data are therefore the opposite of the expected pattern of rainfall of relatively wet winters and relatively dry summers.

The groundwater level measured in the seven installations at Filey was encountered at various elevations. This suggests that perched water tables are present within the cliffs. This is to be expected in complex and variable glacial sediments. Many of the installations have remained constant, with static groundwater levels suggesting that either there is a weak relationship with rainfall and groundwater, or that there is a lag of some months between rainfall and groundwater response. Notable exceptions are CPBH-01 and CPBH-10 which show responses in groundwater level to wetter weather in November and December, and a more muted response to the wet conditions in spring and early summer. The more muted response is likely due to dry antecedent conditions and higher evapotranspiration losses in spring and summer relative to winter.

Less than 2mm of ground movement has been noted in the three inclinometers installed at Filey (CPBH-03, CPBH-05 and RCBH-07). This movement is likely attributable to equilibration/settlement within the installations and/or seasonal shrink-swell behaviour of the clay soils surrounding the inclinometer and is not necessarily indication of slope movement.

In summary the data indicate that the wet period of 2012 has had only a limited impact on groundwater levels and ground movement at Filey. This may reflect the dry autumn and winter period of 2011 resulting in depressed groundwater levels such that the higher rainfall of 2012 has been simply raised groundwater levels to typical levels, instead of raising them to higher levels needed trigger ground movement. It is also likely there is a lag, potentially of many months, between rainfall, rising groundwater and ground movement, meaning the impact of the very wet December of 2012 has not yet occurred. The groundwater response to wetter weather in November and particularly December 2012 is more noticeable in CPBH-01 and CPBH-10, however this groundwater response is not yet reflected as any ground movement response.

The atypical nature of the monitoring period would make further monitoring to better understand the relationship between rainfall, groundwater and ground movement valuable, particularly comparison of antecedent responses with historical data over the winter period between September and March.



Appendix A

Monitoring data – October 2011 to December 2012

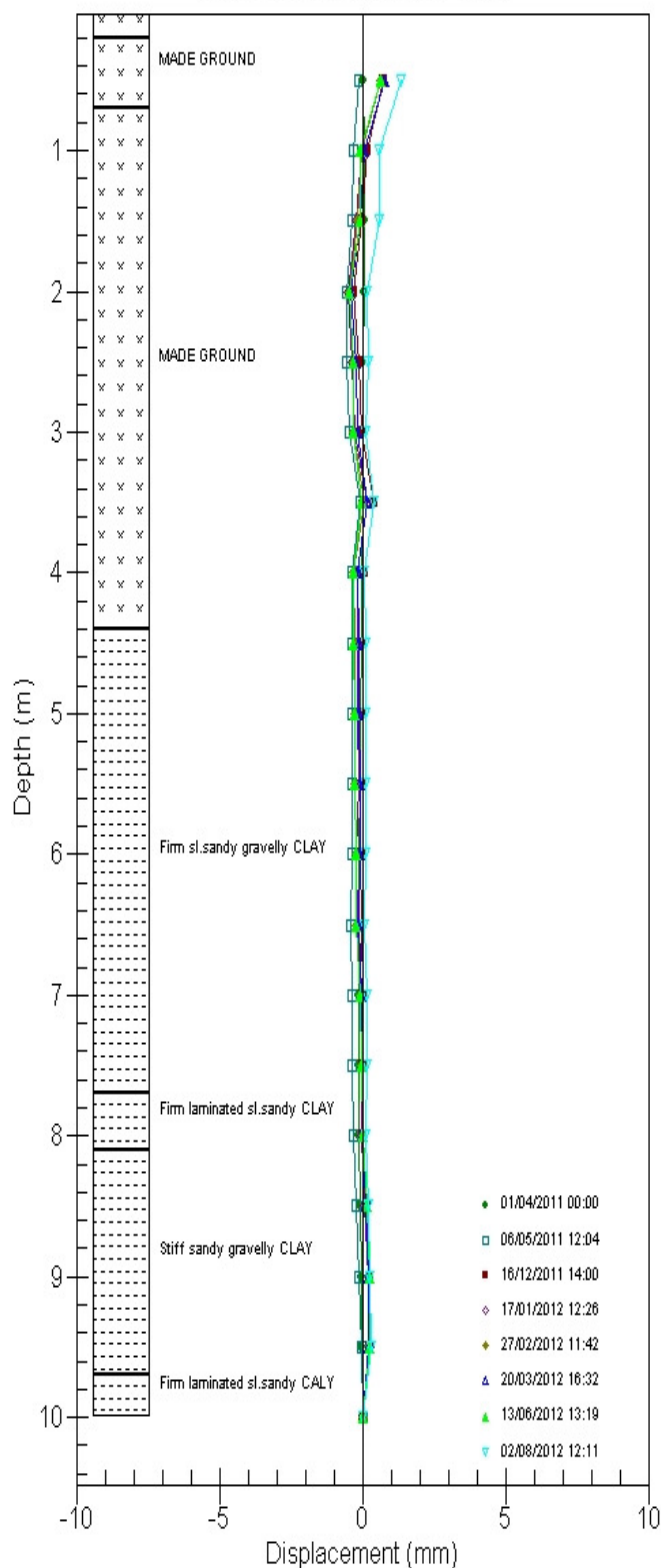
Appendix A Monitoring data – October 2011 to December 2012

A.1 Inclinometer Data

Monitoring results up to December 2012 for CPBH-03, CPBH-05 and RCBH-07 are included in the electronic version of this report.

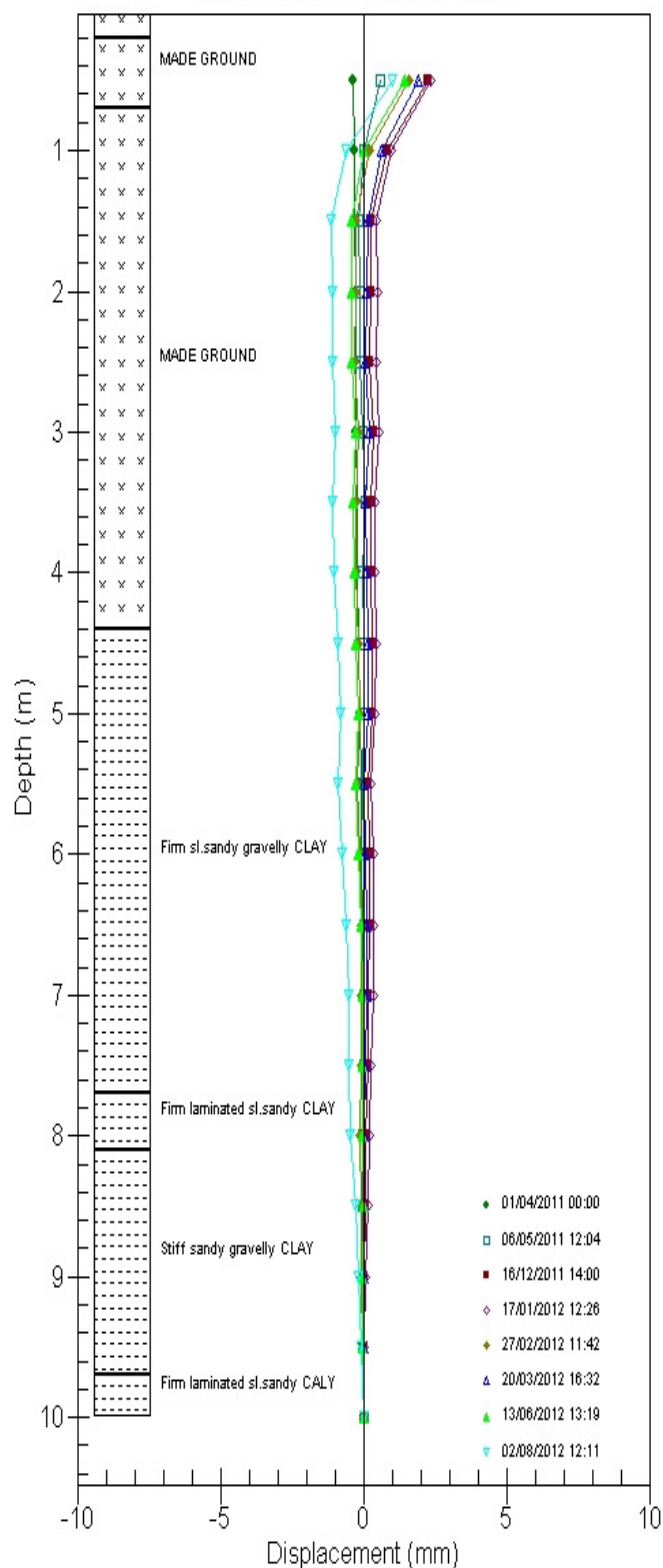
3819:CPBH03 - A Axis Cumulative

Initial survey: 24/03/2011 14:53



3819:CPBH03 - B Axis Cumulative

Initial survey: 24/03/2011 14:53



PROJECT: Filey Coastal Slope Stability: Ground Investigation

SITE: 3819

INSTALLATION: CPBH03

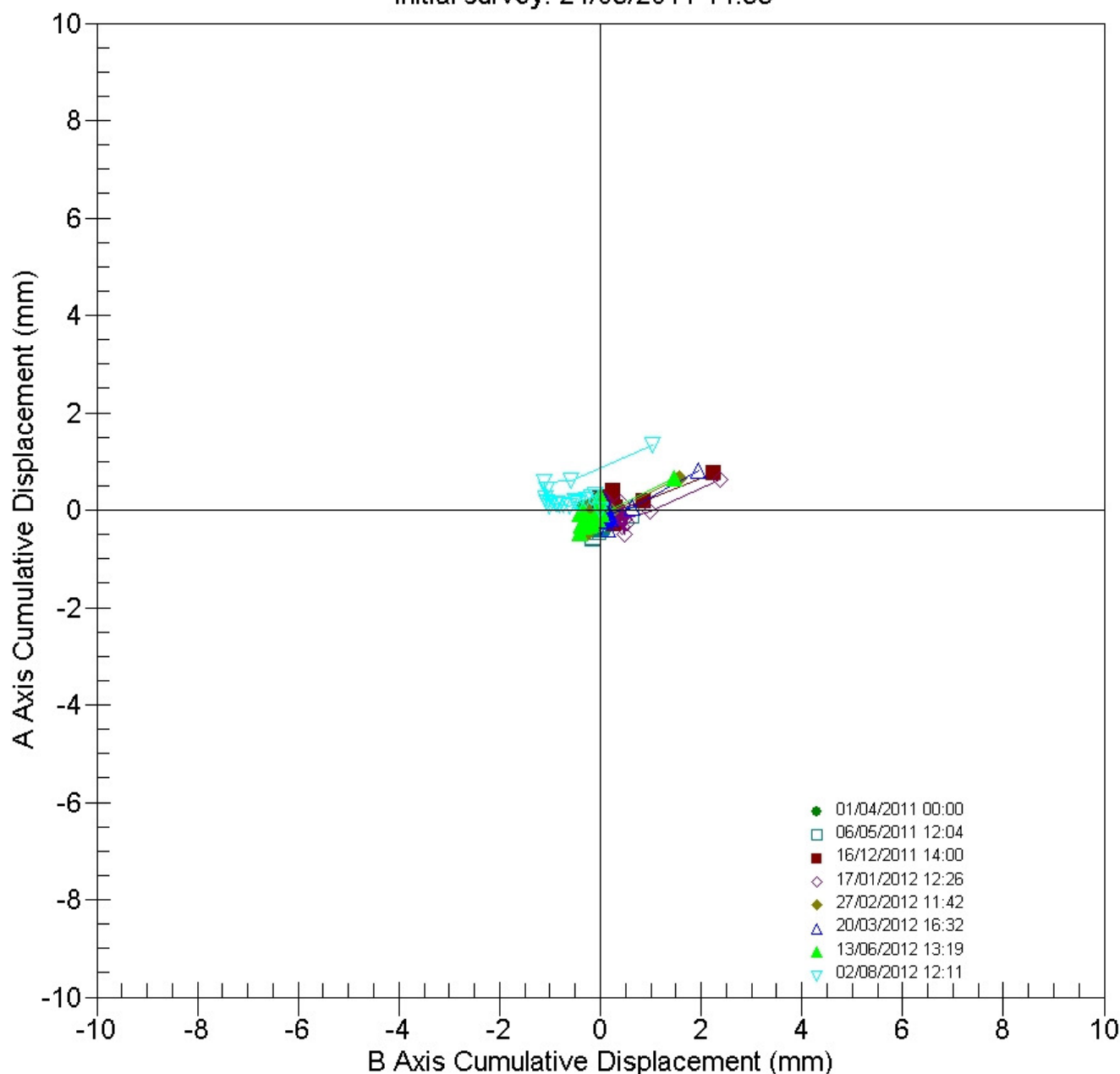
COMPANY: Allied Exploration & Geotechnics Ltd.

CLIENT: Scarborough Borough Council

NOTE: (1) Initial inclinometer survey conducted 24.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes. (2) Installation obstructed by boat on 19.04.2012, 24.05.2012, 07.09.2012, 21.11.2012 & 20.12.2012; no reading taken.

3819:CPBH03 - A Axis vs B Axis

Initial survey: 24/03/2011 14:53



PROJECT: Filey Coastal Slope Stability: Ground Investigation

SITE: 3819

INSTALLATION: CPBH03

COMPANY: Allied Exploration & Geotechnics Ltd.

CLIENT: Scarborough Borough Council

NOTE: (1) Initial inclinometer survey conducted 24.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes. (2) Installation obstructed by boat on 19.04.2012, 24.05.2012, 07.09.2012, 21.11.2012 & 20.12.2012; no reading taken.

PROJECT: Filey Coastal Slope Stability: Ground Investigation
 SITE: 3819
 INSTALLATION: CPBH03
 COMPANY: Allied Exploration & Geotechnics Ltd.
 CLIENT: Scarborough Borough Council
 NOTE: (1) Initial inclinometer survey conducted 24.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes. (2) Installation obstructed by boat on 19.04.2012, 24.05.2012, 07.09.2012, 21.11.2012 & 20.12.2012; no reading taken.

Cumulative Deflection Data in A Axis (mm):

Depth (m)	01/04/2011 00:00 (mm)	06/05/2011 12:04 (mm)	16/12/2011 14:00 (mm)	17/01/2012 12:26 (mm)	27/02/2012 11:42 (mm)	20/03/2012 16:32 (mm)	13/06/2012 13:19 (mm)	02/08/2012 12:11 (mm)
0.5	0.02	-0.12	0.76	0.63	0.65	0.80	0.66	1.35
1.0	0.05	-0.30	0.18	-0.02	-0.02	0.05	-0.09	0.60
1.5	0.06	-0.38	-0.03	-0.20	-0.18	-0.08	-0.09	0.58
2.0	0.05	-0.57	-0.30	-0.51	-0.47	-0.39	-0.47	0.16
2.5	0.04	-0.54	-0.13	-0.35	-0.31	-0.22	-0.32	0.23
3.0	0.03	-0.44	-0.03	-0.25	-0.32	-0.17	-0.33	0.13
3.5	0.02	-0.09	0.40	0.16	0.05	0.19	0.00	0.42
4.0	-0.01	-0.38	0.08	-0.15	-0.29	-0.15	-0.33	0.09
4.5	-0.03	-0.35	0.03	-0.15	-0.28	-0.14	-0.32	0.12
5.0	-0.05	-0.34	0.04	-0.16	-0.28	-0.13	-0.29	0.12
5.5	-0.08	-0.34	0.04	-0.14	-0.26	-0.10	-0.24	0.12
6.0	-0.11	-0.37	0.03	-0.20	-0.22	-0.09	-0.23	0.11
6.5	-0.13	-0.40	-0.04	-0.15	-0.21	-0.10	-0.20	0.09
7.0	-0.13	-0.36	0.00	-0.07	-0.09	-0.01	-0.07	0.18
7.5	-0.11	-0.34	0.01	-0.02	-0.04	0.00	-0.03	0.15
8.0	-0.10	-0.32	0.03	-0.01	0.00	0.01	0.01	0.14
8.5	-0.07	-0.23	0.15	0.07	0.12	0.11	0.15	0.21
9.0	-0.03	-0.11	0.25	0.21	0.20	0.19	0.26	0.26
9.5	0.00	-0.02	0.26	0.28	0.23	0.22	0.27	0.32
10.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

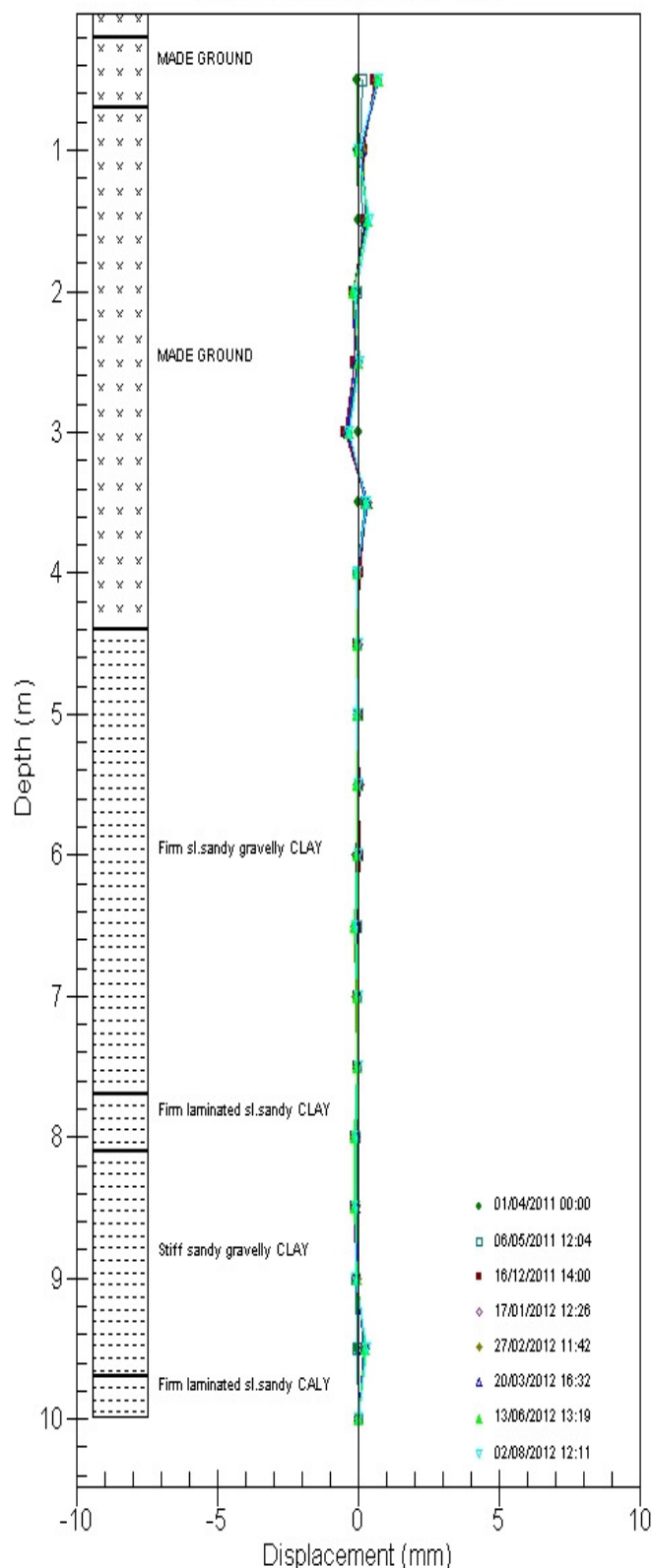
PROJECT: Filey Coastal Slope Stability: Ground Investigation
 SITE: 3819
 INSTALLATION: CPBH03
 COMPANY: Allied Exploration & Geotechnics Ltd.
 CLIENT: Scarborough Borough Council
 NOTE: (1) Initial inclinometer survey conducted 24.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes. (2) Installation obstructed by boat on 19.04.2012, 24.05.2012, 07.09.2012, 21.11.2012 & 20.12.2012; no reading taken.

Cumulative Deflection Data in B Axis (mm):

Depth (m)	01/04/2011 00:00 (mm)	06/05/2011 12:04 (mm)	16/12/2011 14:00 (mm)	17/01/2012 12:26 (mm)	27/02/2012 11:42 (mm)	20/03/2012 16:32 (mm)	13/06/2012 13:19 (mm)	02/08/2012 12:11 (mm)
0.5	-0.34	0.60	2.24	2.38	1.58	1.94	1.47	1.05
1.0	-0.32	0.04	0.86	0.98	0.23	0.64	0.03	-0.59
1.5	-0.29	-0.16	0.27	0.48	-0.27	0.17	-0.41	-1.11
2.0	-0.28	-0.14	0.28	0.48	-0.26	0.14	-0.40	-1.06
2.5	-0.25	-0.14	0.24	0.44	-0.29	0.08	-0.39	-1.10
3.0	-0.25	-0.04	0.34	0.54	-0.19	0.20	-0.26	-0.98
3.5	-0.23	0.08	0.25	0.42	-0.28	0.10	-0.35	-1.05
4.0	-0.20	-0.02	0.27	0.41	-0.24	0.11	-0.32	-1.02
4.5	-0.18	0.04	0.30	0.43	-0.15	0.16	-0.24	-0.87
5.0	-0.14	0.04	0.32	0.43	-0.11	0.16	-0.17	-0.80
5.5	-0.09	-0.02	0.17	0.28	-0.23	0.01	-0.27	-0.88
6.0	-0.06	0.00	0.20	0.34	-0.13	0.08	-0.16	-0.74
6.5	-0.03	0.01	0.21	0.38	-0.07	0.13	-0.05	-0.60
7.0	-0.02	0.00	0.18	0.34	-0.07	0.12	0.00	-0.51
7.5	0.00	0.00	0.15	0.29	-0.08	0.08	0.00	-0.49
8.0	0.00	-0.03	0.09	0.20	-0.12	0.02	-0.02	-0.44
8.5	0.01	-0.03	0.07	0.17	-0.09	0.03	0.00	-0.29
9.0	0.00	-0.03	0.04	0.09	-0.09	0.01	-0.01	-0.19
9.5	0.00	-0.01	0.00	0.03	-0.05	0.00	-0.01	-0.09
10.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

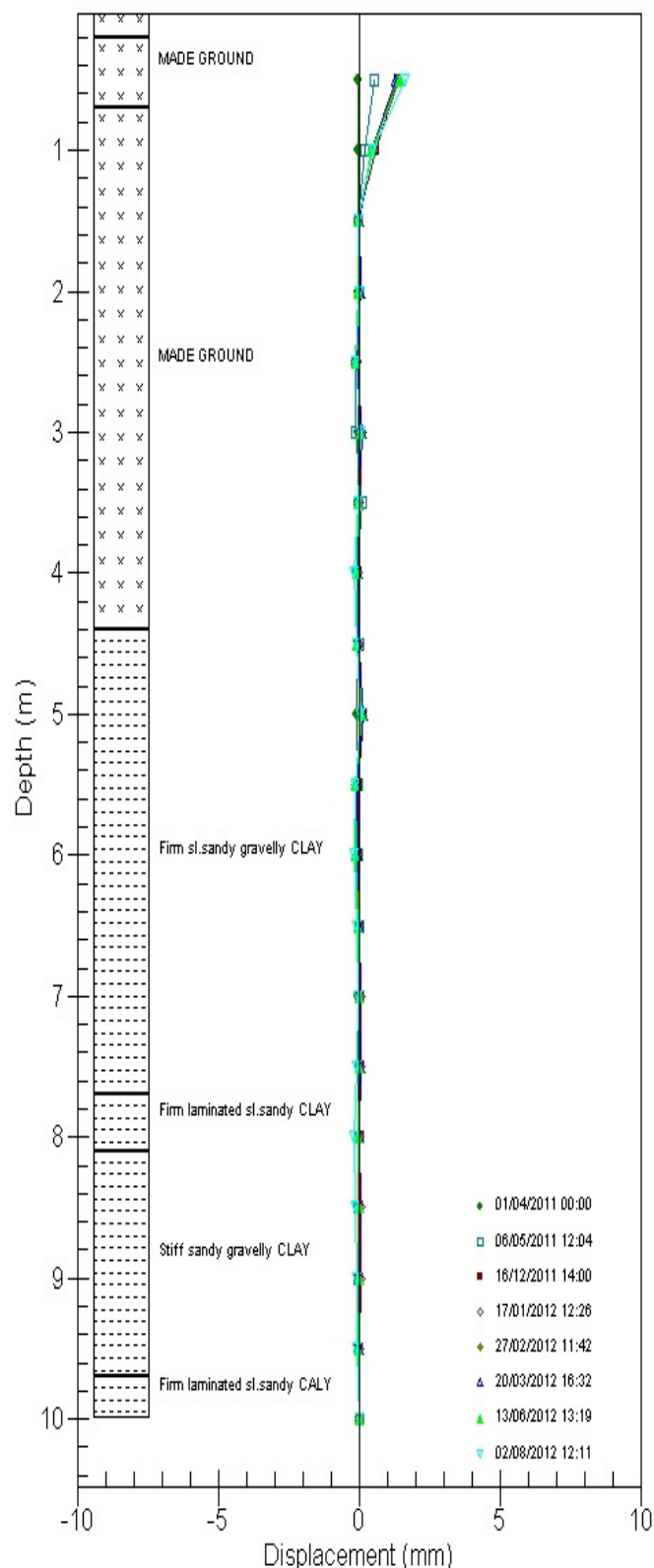
3819:CPBH03 - A Axis Incremental

Initial survey: 24/03/2011 14:53



3819:CPBH03 - B Axis Incremental

Initial survey: 24/03/2011 14:53



PROJECT: Filey Coastal Slope Stability: Ground Investigation

SITE: 3819

INSTALLATION: CPBH03

COMPANY: Allied Exploration & Geotechnics Ltd.

CLIENT: Scarborough Borough Council

NOTE: (1) Initial inclinometer survey conducted 24.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes. (2) Installation obstructed by boat on 19.04.2012, 24.05.2012, 07.09.2012, 21.11.2012 & 20.12.2012; no reading taken.

PROJECT: Filey Coastal Slope Stability: Ground Investigation
 SITE: 3819
 INSTALLATION: CPBH03
 COMPANY: Allied Exploration & Geotechnics Ltd.
 CLIENT: Scarborough Borough Council
 NOTE: (1) Initial inclinometer survey conducted 24.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes. (2) Installation obstructed by boat on 19.04.2012, 24.05.2012, 07.09.2012, 21.11.2012 & 20.12.2012; no reading taken.

Incremental Deflection Data in A Axis (mm):

Depth (m)	01/04/2011 00:00 (mm)	06/05/2011 12:04 (mm)	16/12/2011 14:00 (mm)	17/01/2012 12:26 (mm)	27/02/2012 11:42 (mm)	20/03/2012 16:32 (mm)	13/06/2012 13:19 (mm)	02/08/2012 12:11 (mm)
0.5	-0.03	0.18	0.58	0.64	0.67	0.76	0.74	0.75
1.0	-0.01	0.09	0.20	0.18	0.15	0.13	0.01	0.02
1.5	0.01	0.19	0.27	0.31	0.30	0.32	0.38	0.42
2.0	0.02	-0.03	-0.17	-0.15	-0.17	-0.18	-0.15	-0.07
2.5	0.01	-0.11	-0.10	-0.10	0.01	-0.04	0.01	0.10
3.0	0.01	-0.35	-0.43	-0.41	-0.36	-0.36	-0.32	-0.29
3.5	0.02	0.28	0.32	0.31	0.34	0.34	0.33	0.33
4.0	0.02	-0.03	0.05	0.00	-0.01	-0.01	-0.01	-0.03
4.5	0.02	-0.01	-0.01	0.01	-0.01	-0.02	-0.04	0.01
5.0	0.03	0.00	0.00	-0.02	-0.02	-0.03	-0.05	-0.01
5.5	0.03	0.03	0.01	0.05	-0.04	-0.01	-0.02	0.01
6.0	0.01	0.03	0.07	-0.05	-0.02	0.01	-0.03	0.02
6.5	0.00	-0.04	-0.04	-0.07	-0.11	-0.09	-0.13	-0.08
7.0	-0.01	-0.02	-0.01	-0.05	-0.05	-0.01	-0.05	0.02
7.5	-0.01	-0.03	-0.02	-0.01	-0.05	-0.01	-0.04	0.02
8.0	-0.03	-0.08	-0.11	-0.08	-0.11	-0.10	-0.14	-0.07
8.5	-0.03	-0.12	-0.11	-0.14	-0.08	-0.09	-0.11	-0.05
9.0	-0.03	-0.09	-0.01	-0.07	-0.03	-0.02	-0.02	-0.06
9.5	0.00	-0.02	0.26	0.28	0.23	0.22	0.27	0.32
10.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

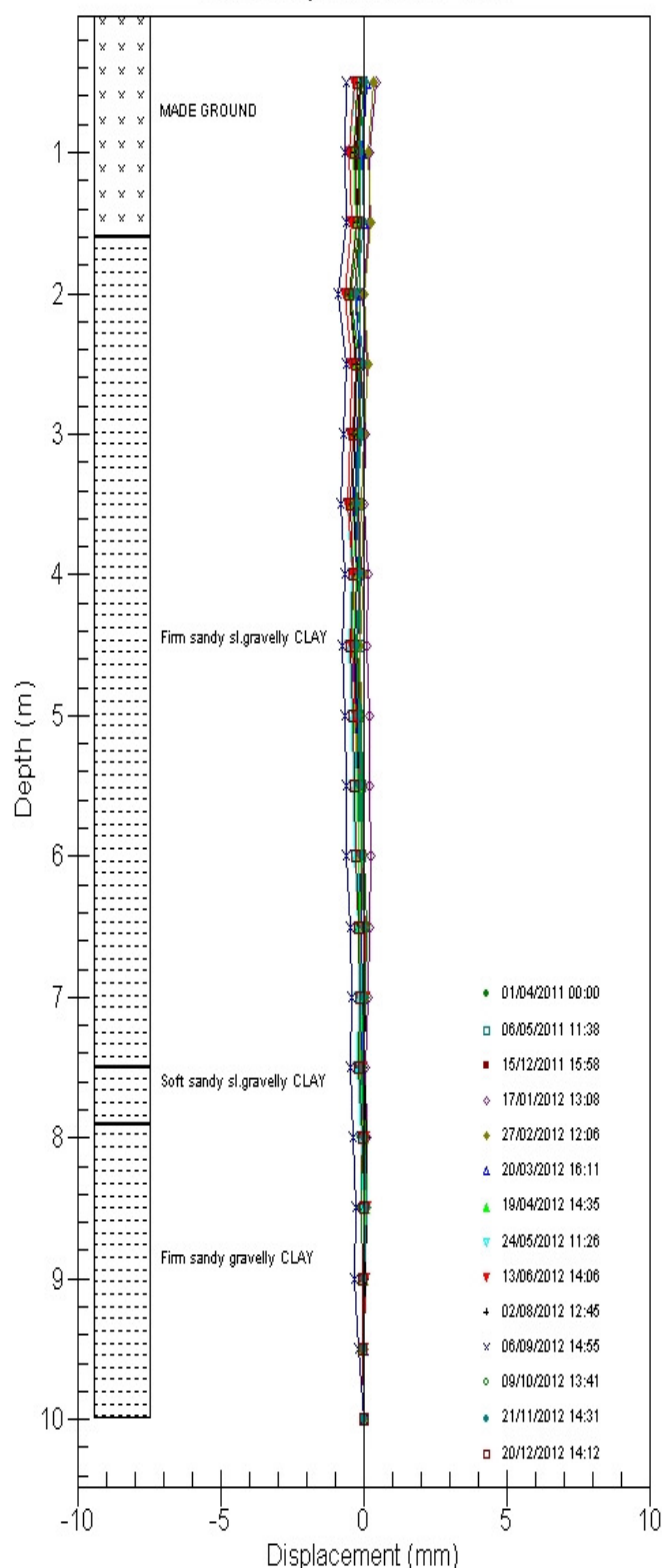
PROJECT: Filey Coastal Slope Stability: Ground Investigation
 SITE: 3819
 INSTALLATION: CPBH03
 COMPANY: Allied Exploration & Geotechnics Ltd.
 CLIENT: Scarborough Borough Council
 NOTE: (1) Initial inclinometer survey conducted 24.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes. (2) Installation obstructed by boat on 19.04.2012, 24.05.2012, 07.09.2012, 21.11.2012 & 20.12.2012; no reading taken.

Incremental Deflection Data in B Axis (mm):

Depth (m)	01/04/2011 00:00 (mm)	06/05/2011 12:04 (mm)	16/12/2011 14:00 (mm)	17/01/2012 12:26 (mm)	27/02/2012 11:42 (mm)	20/03/2012 16:32 (mm)	13/06/2012 13:19 (mm)	02/08/2012 12:11 (mm)
0.5	-0.02	0.56	1.39	1.40	1.35	1.30	1.44	1.64
1.0	-0.03	0.20	0.59	0.50	0.50	0.47	0.44	0.52
1.5	-0.01	-0.02	-0.01	-0.01	-0.01	0.03	-0.01	-0.05
2.0	-0.03	0.00	0.04	0.04	0.03	0.06	-0.02	0.03
2.5	0.00	-0.10	-0.10	-0.09	-0.11	-0.12	-0.13	-0.11
3.0	-0.02	-0.12	0.09	0.12	0.09	0.11	0.10	0.07
3.5	-0.03	0.10	-0.02	0.00	-0.04	-0.02	-0.03	-0.04
4.0	-0.02	-0.05	-0.03	-0.02	-0.08	-0.04	-0.08	-0.15
4.5	-0.04	0.00	-0.02	0.01	-0.04	-0.01	-0.07	-0.07
5.0	-0.05	0.06	0.15	0.14	0.12	0.15	0.10	0.08
5.5	-0.03	-0.02	-0.03	-0.06	-0.10	-0.07	-0.11	-0.14
6.0	-0.03	-0.01	-0.01	-0.04	-0.06	-0.05	-0.12	-0.15
6.5	-0.01	0.01	0.03	0.04	-0.01	0.00	-0.05	-0.09
7.0	-0.02	0.00	0.03	0.05	0.01	0.04	0.00	-0.03
7.5	0.00	0.03	0.06	0.09	0.04	0.06	0.02	-0.05
8.0	-0.01	0.01	0.01	0.03	-0.03	-0.01	-0.02	-0.15
8.5	0.01	0.00	0.04	0.08	0.00	0.02	0.01	-0.10
9.0	0.00	-0.01	0.04	0.06	-0.04	0.01	0.00	-0.10
9.5	0.00	-0.01	0.00	0.03	-0.05	0.00	-0.01	-0.09
10.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

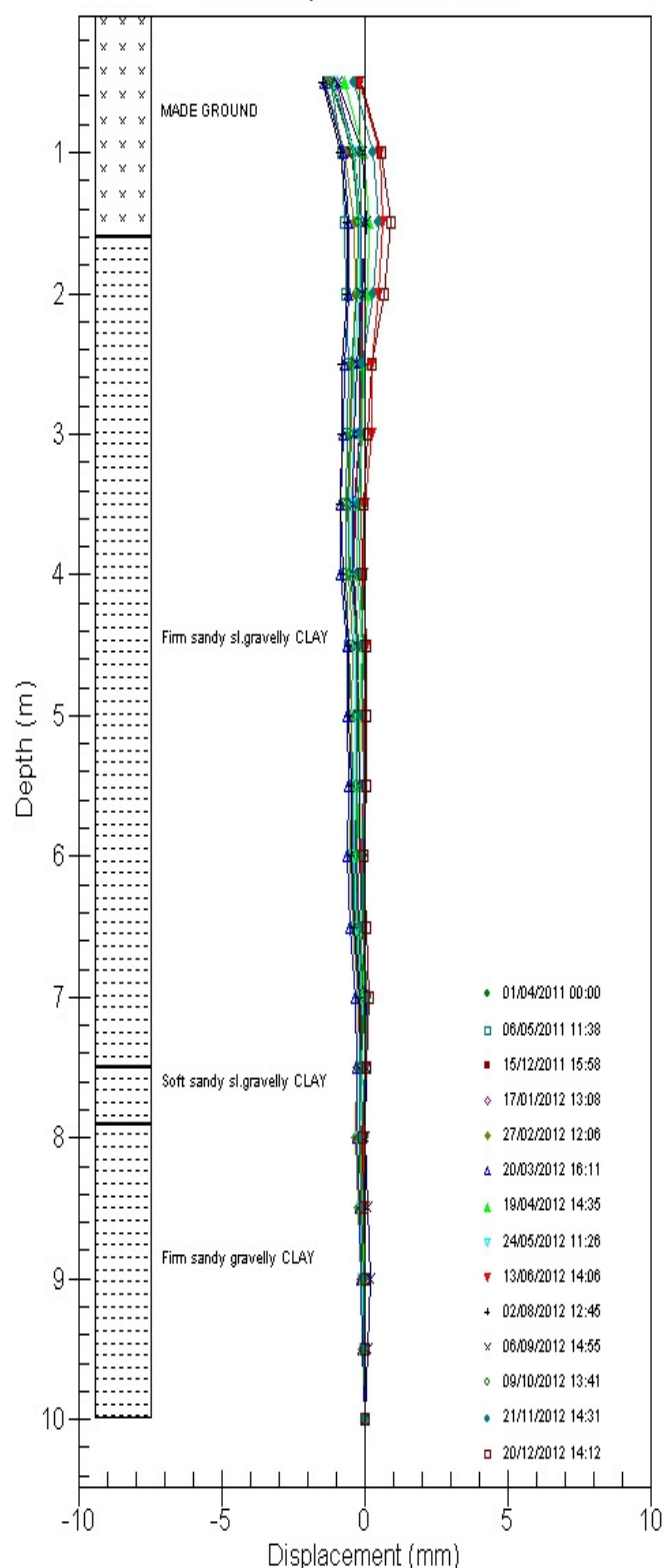
3819:CPBH05 - A Axis Cumulative

Initial survey: 28/03/2011 12:34



3819:CPBH05 - B Axis Cumulative

Initial survey: 28/03/2011 12:34



PROJECT: Filey Coastal Stability: Ground Investigation

SITE: 3819

INSTALLATION: CPBH05

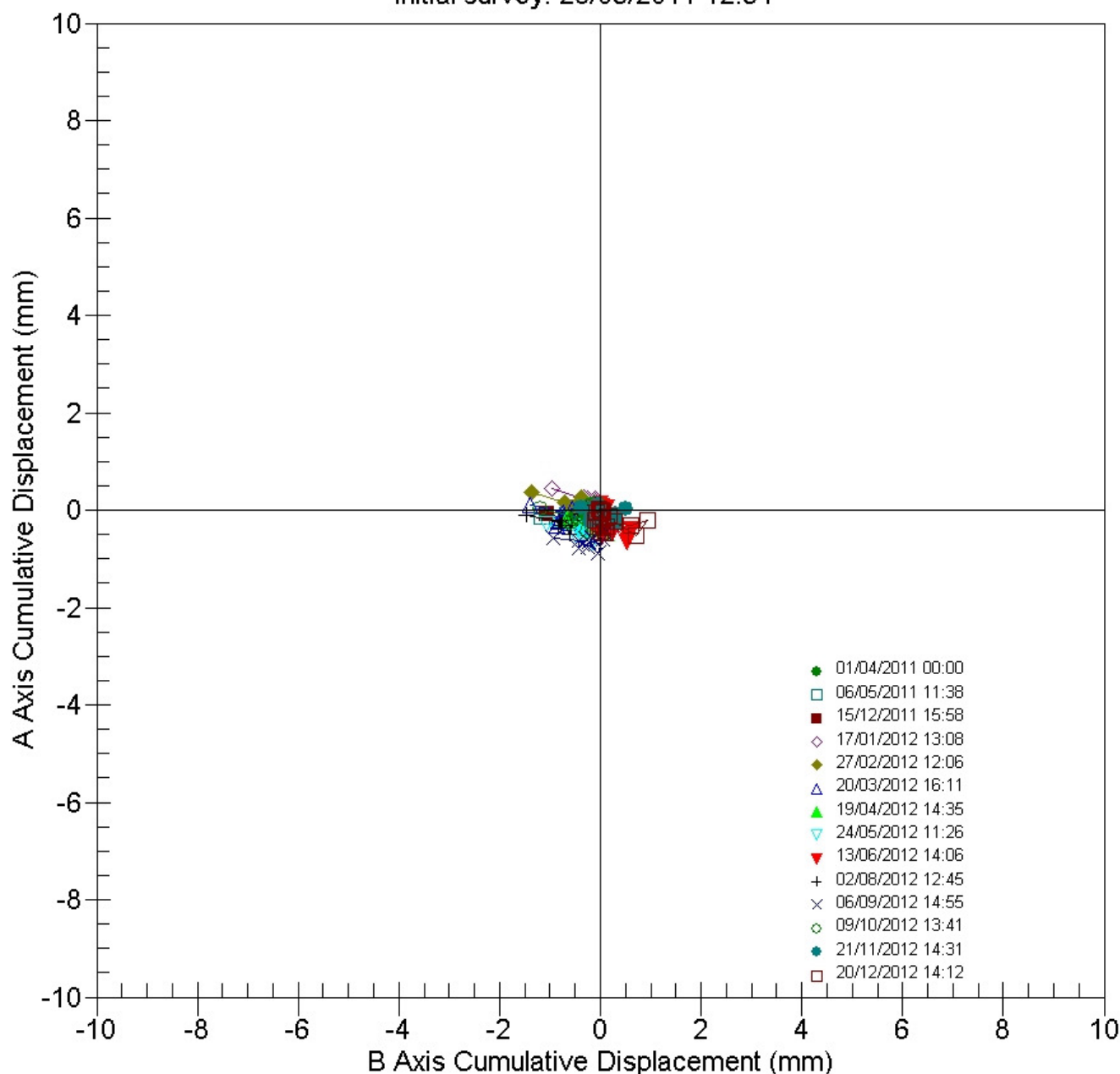
COMPANY: Allied Exploration & Geotechnics Ltd.

CLIENT: Scarborough Borough Council

NOTE: Initial inclinometer survey conducted 28.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

3819:CPBH05 - A Axis vs B Axis

Initial survey: 28/03/2011 12:34



PROJECT: Filey Coastal Stability: Ground Investigation

SITE: 3819

INSTALLATION: CPBH05

COMPANY: Allied Exploration & Geotechnics Ltd.

CLIENT: Scarborough Borough Council

NOTE: Initial inclinometer survey conducted 28.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

PROJECT: Filey Coastal Stability: Ground Investigation
 SITE: 3819
 INSTALLATION: CPBH05
 COMPANY: Allied Exploration & Geotechnics Ltd.
 CLIENT: Scarborough Borough Council
 NOTE: Initial inclinometer survey conducted 28.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

Cumulative Deflection Data in A Axis (mm):

Depth (m)	01/04/2011 00:00 (mm)	06/05/2011 11:38 (mm)	15/12/2011 15:58 (mm)	17/01/2012 13:08 (mm)	27/02/2012 12:06 (mm)	20/03/2012 16:11 (mm)	19/04/2012 14:35 (mm)	24/05/2012 11:26 (mm)
0.5	-0.14	-0.13	-0.09	0.45	0.37	0.11	-0.17	-0.28
1.0	-0.12	-0.15	-0.24	0.22	0.17	-0.04	-0.38	-0.48
1.5	-0.10	-0.11	-0.12	0.23	0.25	0.03	-0.27	-0.40
2.0	-0.11	-0.19	-0.31	-0.02	0.02	-0.26	-0.47	-0.65
2.5	-0.11	-0.15	-0.09	0.14	0.15	-0.10	-0.23	-0.40
3.0	-0.12	-0.18	-0.13	0.08	0.03	-0.23	-0.30	-0.47
3.5	-0.16	-0.17	-0.19	0.03	-0.08	-0.33	-0.37	-0.52
4.0	-0.18	-0.12	-0.08	0.17	0.01	-0.23	-0.25	-0.40
4.5	-0.20	-0.13	-0.20	0.10	-0.11	-0.34	-0.38	-0.48
5.0	-0.20	-0.13	-0.16	0.21	-0.05	-0.27	-0.29	-0.40
5.5	-0.19	-0.08	-0.10	0.22	-0.02	-0.21	-0.24	-0.35
6.0	-0.17	-0.07	-0.09	0.25	-0.02	-0.16	-0.19	-0.29
6.5	-0.15	-0.06	-0.05	0.22	0.04	-0.08	-0.10	-0.18
7.0	-0.14	-0.06	-0.04	0.18	0.05	-0.04	-0.07	-0.15
7.5	-0.11	-0.08	-0.11	0.07	-0.03	-0.08	-0.12	-0.19
8.0	-0.08	-0.03	-0.01	0.10	0.07	0.04	0.00	-0.07
8.5	-0.05	0.00	0.03	0.10	0.12	0.09	0.07	0.01
9.0	-0.03	-0.01	-0.02	0.00	0.05	0.04	0.00	-0.05
9.5	-0.01	-0.01	-0.03	-0.02	0.00	0.00	-0.02	-0.05
10.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT: Filey Coastal Stability: Ground Investigation
 SITE: 3819
 INSTALLATION: CPBH05
 COMPANY: Allied Exploration & Geotechnics Ltd.
 CLIENT: Scarborough Borough Council
 NOTE: Initial inclinometer survey conducted 28.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

Cumulative Deflection Data in A Axis (mm):

Depth (m)	13/06/2012 14:06 (mm)	02/08/2012 12:45 (mm)	06/09/2012 14:55 (mm)	09/10/2012 13:41 (mm)	21/11/2012 14:31 (mm)	20/12/2012 14:12 (mm)
0.5	-0.29	-0.11	-0.58	0.03	0.05	-0.20
1.0	-0.48	-0.25	-0.66	-0.15	-0.07	-0.31
1.5	-0.39	-0.21	-0.59	-0.13	0.02	-0.22
2.0	-0.65	-0.49	-0.88	-0.45	-0.27	-0.52
2.5	-0.39	-0.21	-0.59	-0.11	0.01	-0.24
3.0	-0.47	-0.31	-0.70	-0.19	-0.10	-0.35
3.5	-0.53	-0.37	-0.78	-0.27	-0.23	-0.46
4.0	-0.35	-0.21	-0.64	-0.12	-0.12	-0.34
4.5	-0.43	-0.31	-0.76	-0.21	-0.25	-0.47
5.0	-0.25	-0.21	-0.65	-0.08	-0.15	-0.37
5.5	-0.11	-0.14	-0.61	-0.01	-0.11	-0.32
6.0	-0.07	-0.08	-0.58	0.01	-0.08	-0.27
6.5	0.05	0.03	-0.46	0.10	0.00	-0.15
7.0	0.06	0.07	-0.42	0.09	0.02	-0.12
7.5	-0.01	0.02	-0.47	-0.01	-0.06	-0.18
8.0	0.09	0.11	-0.34	0.09	0.04	-0.04
8.5	0.13	0.13	-0.26	0.12	0.11	0.03
9.0	0.07	0.05	-0.29	0.04	0.04	-0.01
9.5	0.03	-0.02	-0.18	-0.02	0.02	-0.03
10.0	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT: Filey Coastal Stability: Ground Investigation
 SITE: 3819
 INSTALLATION: CPBH05
 COMPANY: Allied Exploration & Geotechnics Ltd.
 CLIENT: Scarborough Borough Council
 NOTE: Initial inclinometer survey conducted 28.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

Cumulative Deflection Data in B Axis (mm):

Depth (m)	01/04/2011 00:00 (mm)	06/05/2011 11:38 (mm)	15/12/2011 15:58 (mm)	17/01/2012 13:08 (mm)	27/02/2012 12:06 (mm)	20/03/2012 16:11 (mm)	19/04/2012 14:35 (mm)	24/05/2012 11:26 (mm)
0.5	-0.18	-1.16	-1.06	-0.96	-1.36	-1.40	-0.67	-1.05
1.0	-0.17	-0.80	-0.47	-0.36	-0.71	-0.74	-0.04	-0.38
1.5	-0.13	-0.67	-0.18	-0.10	-0.37	-0.55	0.16	-0.14
2.0	-0.12	-0.62	-0.16	-0.07	-0.32	-0.56	0.13	-0.16
2.5	-0.13	-0.57	-0.17	-0.09	-0.42	-0.70	-0.02	-0.35
3.0	-0.11	-0.59	-0.19	-0.15	-0.47	-0.72	-0.09	-0.38
3.5	-0.10	-0.64	-0.34	-0.31	-0.55	-0.85	-0.23	-0.47
4.0	-0.09	-0.63	-0.37	-0.35	-0.56	-0.82	-0.24	-0.46
4.5	-0.07	-0.53	-0.21	-0.21	-0.39	-0.61	-0.09	-0.30
5.0	-0.05	-0.47	-0.28	-0.29	-0.44	-0.60	-0.18	-0.33
5.5	-0.04	-0.42	-0.28	-0.30	-0.45	-0.57	-0.18	-0.32
6.0	-0.04	-0.39	-0.30	-0.33	-0.49	-0.59	-0.25	-0.34
6.5	-0.01	-0.29	-0.23	-0.26	-0.42	-0.49	-0.16	-0.27
7.0	-0.01	-0.19	-0.09	-0.10	-0.24	-0.29	0.00	-0.09
7.5	0.01	-0.16	-0.08	-0.09	-0.27	-0.25	0.00	-0.07
8.0	0.01	-0.17	-0.15	-0.17	-0.33	-0.29	-0.10	-0.15
8.5	0.00	-0.11	-0.10	-0.10	-0.21	-0.19	-0.06	-0.12
9.0	0.01	-0.06	-0.05	-0.06	-0.13	-0.12	-0.03	-0.07
9.5	0.00	-0.03	-0.03	-0.03	-0.06	-0.06	-0.01	-0.04
10.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

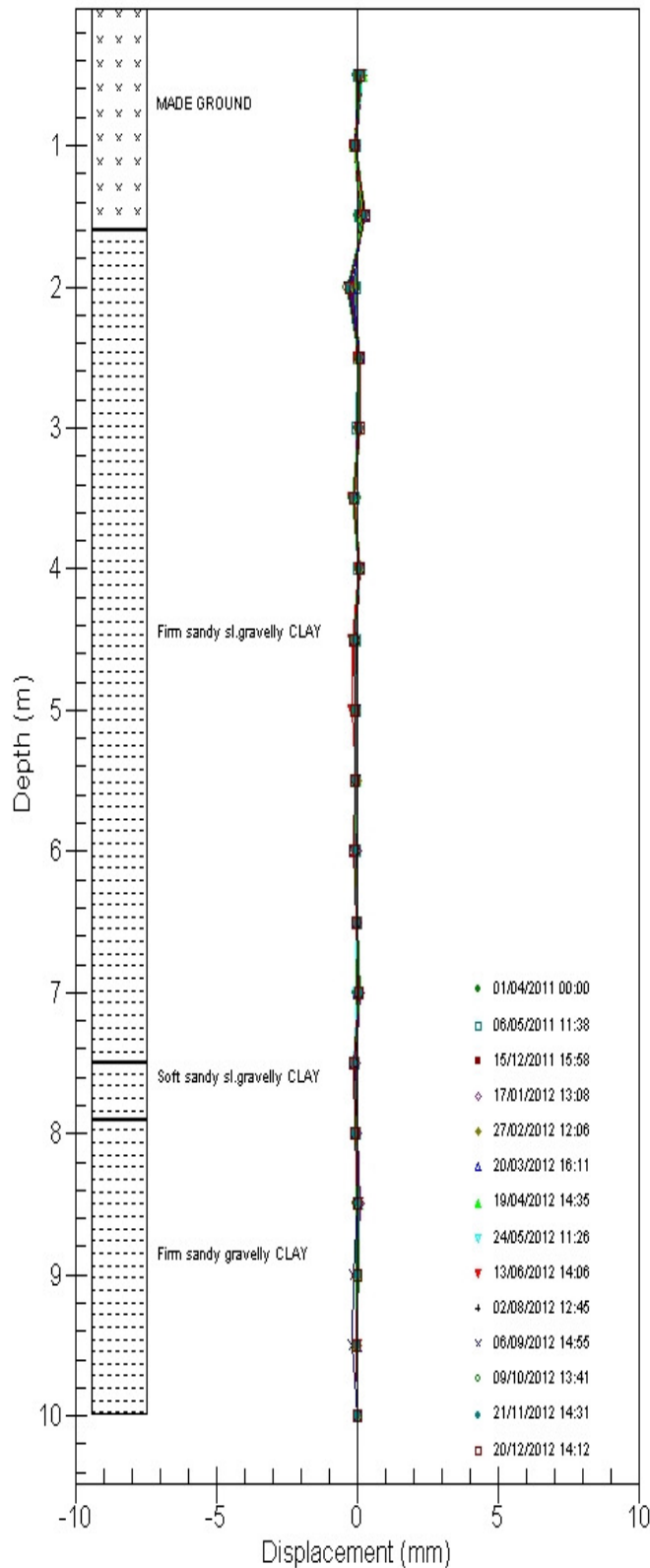
PROJECT: Filey Coastal Stability: Ground Investigation
 SITE: 3819
 INSTALLATION: CPBH05
 COMPANY: Allied Exploration & Geotechnics Ltd.
 CLIENT: Scarborough Borough Council
 NOTE: Initial inclinometer survey conducted 28.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

Cumulative Deflection Data in B Axis (mm):

Depth (m)	13/06/2012 14:06 (mm)	02/08/2012 12:45 (mm)	06/09/2012 14:55 (mm)	09/10/2012 13:41 (mm)	21/11/2012 14:31 (mm)	20/12/2012 14:12 (mm)
0.5	-0.15	-1.46	-0.93	-1.18	-0.38	-0.10
1.0	0.54	-0.81	-0.10	-0.42	0.30	0.60
1.5	0.63	-0.58	0.05	-0.23	0.50	0.93
2.0	0.52	-0.60	-0.06	-0.26	0.32	0.70
2.5	0.28	-0.77	-0.28	-0.44	-0.07	0.27
3.0	0.24	-0.78	-0.35	-0.51	-0.11	0.12
3.5	0.04	-0.83	-0.43	-0.59	-0.20	-0.01
4.0	-0.01	-0.76	-0.42	-0.48	-0.18	-0.06
4.5	0.07	-0.57	-0.26	-0.23	-0.02	0.09
5.0	-0.04	-0.56	-0.23	-0.28	-0.08	0.05
5.5	-0.02	-0.46	-0.16	-0.24	-0.02	0.06
6.0	-0.12	-0.46	-0.15	-0.25	-0.10	-0.01
6.5	-0.06	-0.35	-0.07	-0.18	-0.07	0.05
7.0	0.12	-0.16	0.07	-0.03	0.10	0.18
7.5	0.08	-0.13	0.07	-0.11	0.01	0.05
8.0	-0.05	-0.18	0.04	-0.18	-0.11	-0.07
8.5	0.00	-0.11	0.14	-0.10	-0.05	-0.02
9.0	0.02	-0.04	0.23	-0.02	0.00	0.03
9.5	0.01	-0.03	0.11	-0.02	0.03	0.04
10.0	0.00	0.00	0.00	0.00	0.00	0.00

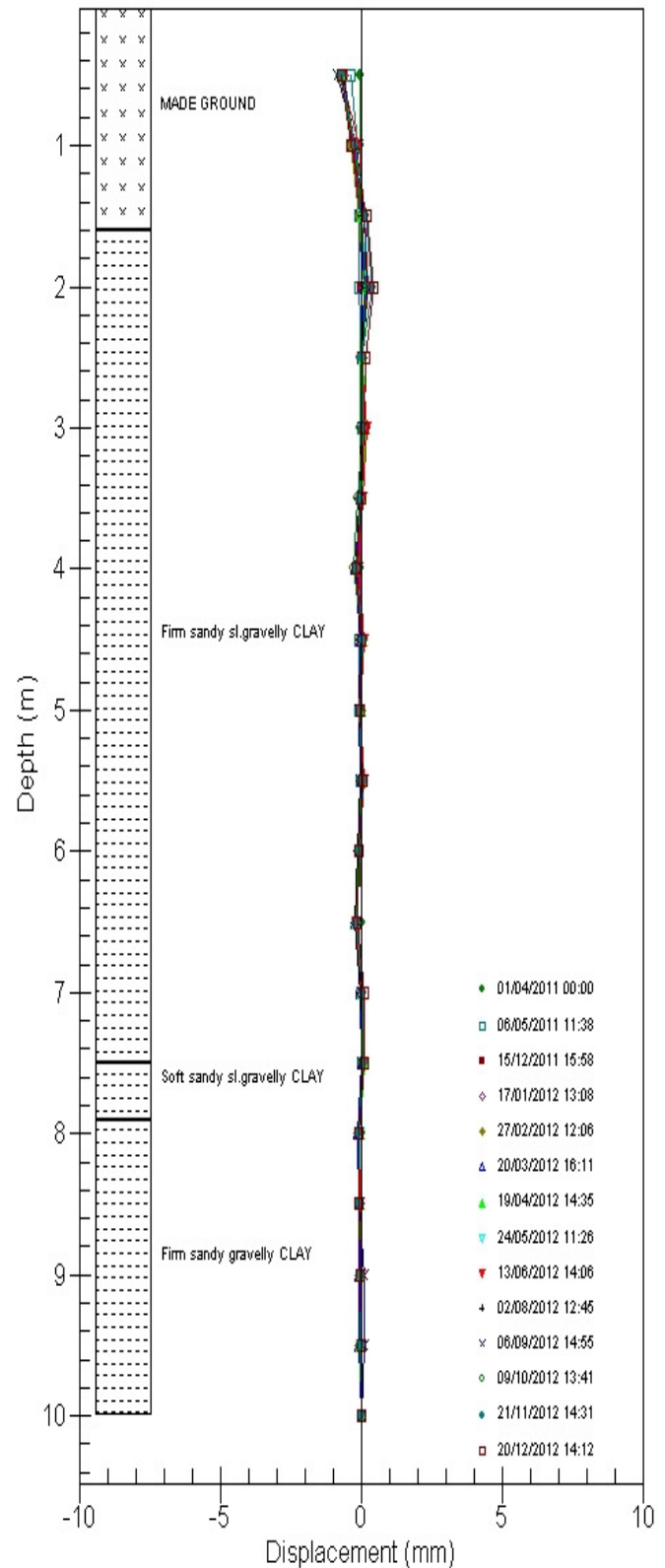
3819:CPBH05 - A Axis Incremental

Initial survey: 28/03/2011 12:34



3819:CPBH05 - B Axis Incremental

Initial survey: 28/03/2011 12:34



PROJECT: Filey Coastal Stability: Ground Investigation

SITE: 3819

INSTALLATION: CPBH05

COMPANY: Allied Exploration & Geotechnics Ltd.

CLIENT: Scarborough Borough Council

NOTE: Initial inclinometer survey conducted 28.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

PROJECT: Filey Coastal Stability: Ground Investigation
 SITE: 3819
 INSTALLATION: CPBH05
 COMPANY: Allied Exploration & Geotechnics Ltd.
 CLIENT: Scarborough Borough Council
 NOTE: Initial inclinometer survey conducted 28.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

Incremental Deflection Data in A Axis (mm):

Depth (m)	01/04/2011 00:00 (mm)	06/05/2011 11:38 (mm)	15/12/2011 15:58 (mm)	17/01/2012 13:08 (mm)	27/02/2012 12:06 (mm)	20/03/2012 16:11 (mm)	19/04/2012 14:35 (mm)	24/05/2012 11:26 (mm)
0.5	-0.01	0.03	0.15	0.22	0.20	0.16	0.20	0.20
1.0	-0.02	-0.04	-0.12	0.00	-0.08	-0.07	-0.11	-0.07
1.5	0.01	0.08	0.19	0.24	0.23	0.28	0.20	0.24
2.0	0.01	-0.04	-0.22	-0.16	-0.13	-0.16	-0.24	-0.24
2.5	0.01	0.03	0.04	0.06	0.12	0.13	0.07	0.07
3.0	0.04	-0.01	0.06	0.05	0.11	0.10	0.07	0.06
3.5	0.02	-0.06	-0.11	-0.14	-0.09	-0.10	-0.12	-0.12
4.0	0.02	0.02	0.12	0.07	0.12	0.11	0.13	0.08
4.5	0.00	0.00	-0.04	-0.11	-0.06	-0.07	-0.08	-0.08
5.0	-0.01	-0.05	-0.06	-0.01	-0.03	-0.06	-0.06	-0.05
5.5	-0.02	-0.01	-0.01	-0.02	0.00	-0.04	-0.04	-0.05
6.0	-0.02	0.00	-0.04	0.03	-0.06	-0.08	-0.09	-0.11
6.5	-0.02	0.00	-0.01	0.05	-0.01	-0.04	-0.04	-0.03
7.0	-0.03	0.01	0.07	0.11	0.08	0.04	0.05	0.04
7.5	-0.03	-0.05	-0.10	-0.03	-0.10	-0.12	-0.12	-0.13
8.0	-0.02	-0.03	-0.04	0.00	-0.05	-0.05	-0.07	-0.08
8.5	-0.03	0.01	0.05	0.10	0.07	0.06	0.07	0.06
9.0	-0.02	0.00	0.01	0.02	0.05	0.04	0.02	0.00
9.5	-0.01	-0.01	-0.03	-0.02	0.00	0.00	-0.02	-0.05
10.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT: Filey Coastal Stability: Ground Investigation
 SITE: 3819
 INSTALLATION: CPBH05
 COMPANY: Allied Exploration & Geotechnics Ltd.
 CLIENT: Scarborough Borough Council
 NOTE: Initial inclinometer survey conducted 28.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

Incremental Deflection Data in A Axis (mm):

Depth (m)	13/06/2012 14:06 (mm)	02/08/2012 12:45 (mm)	06/09/2012 14:55 (mm)	09/10/2012 13:41 (mm)	21/11/2012 14:31 (mm)	20/12/2012 14:12 (mm)
0.5	0.19	0.13	0.08	0.18	0.12	0.11
1.0	-0.09	-0.03	-0.07	-0.02	-0.09	-0.09
1.5	0.26	0.28	0.29	0.32	0.29	0.30
2.0	-0.26	-0.28	-0.29	-0.34	-0.28	-0.28
2.5	0.07	0.10	0.11	0.08	0.11	0.11
3.0	0.06	0.06	0.08	0.08	0.13	0.11
3.5	-0.18	-0.16	-0.14	-0.15	-0.11	-0.12
4.0	0.08	0.10	0.12	0.09	0.13	0.14
4.5	-0.18	-0.09	-0.11	-0.13	-0.09	-0.10
5.0	-0.15	-0.07	-0.05	-0.07	-0.04	-0.05
5.5	-0.04	-0.06	-0.03	-0.01	-0.03	-0.05
6.0	-0.11	-0.11	-0.11	-0.09	-0.08	-0.12
6.5	-0.02	-0.04	-0.05	0.01	-0.02	-0.03
7.0	0.07	0.05	0.06	0.11	0.08	0.05
7.5	-0.10	-0.09	-0.13	-0.10	-0.11	-0.14
8.0	-0.04	-0.02	-0.08	-0.03	-0.06	-0.07
8.5	0.06	0.09	0.04	0.09	0.07	0.04
9.0	0.04	0.07	-0.11	0.06	0.01	0.02
9.5	0.03	-0.02	-0.18	-0.02	0.02	-0.03
10.0	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT: Filey Coastal Stability: Ground Investigation
 SITE: 3819
 INSTALLATION: CPBH05
 COMPANY: Allied Exploration & Geotechnics Ltd.
 CLIENT: Scarborough Borough Council
 NOTE: Initial inclinometer survey conducted 28.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

Incremental Deflection Data in B Axis (mm):

Depth (m)	01/04/2011 00:00 (mm)	06/05/2011 11:38 (mm)	15/12/2011 15:58 (mm)	17/01/2012 13:08 (mm)	27/02/2012 12:06 (mm)	20/03/2012 16:11 (mm)	19/04/2012 14:35 (mm)	24/05/2012 11:26 (mm)
0.5	0.00	-0.37	-0.60	-0.60	-0.65	-0.66	-0.63	-0.68
1.0	-0.04	-0.13	-0.29	-0.26	-0.34	-0.20	-0.20	-0.24
1.5	-0.01	-0.05	-0.01	-0.03	-0.05	0.01	0.04	0.02
2.0	0.01	-0.05	0.01	0.02	0.10	0.14	0.15	0.20
2.5	-0.02	0.03	0.03	0.06	0.05	0.03	0.07	0.02
3.0	-0.01	0.05	0.15	0.17	0.08	0.13	0.15	0.10
3.5	-0.02	-0.01	0.02	0.04	0.01	-0.03	0.01	-0.01
4.0	-0.02	-0.10	-0.16	-0.14	-0.17	-0.20	-0.15	-0.17
4.5	-0.02	-0.05	0.07	0.07	0.05	-0.01	0.09	0.03
5.0	-0.01	-0.05	-0.01	0.01	0.01	-0.03	0.01	-0.01
5.5	-0.01	-0.03	0.02	0.03	0.05	0.01	0.07	0.02
6.0	-0.03	-0.09	-0.07	-0.07	-0.07	-0.09	-0.09	-0.07
6.5	0.00	-0.10	-0.14	-0.16	-0.18	-0.20	-0.17	-0.18
7.0	-0.02	-0.03	-0.02	-0.01	0.03	-0.05	0.00	-0.02
7.5	0.00	0.01	0.07	0.08	0.05	0.04	0.11	0.07
8.0	0.01	-0.06	-0.06	-0.07	-0.12	-0.10	-0.04	-0.03
8.5	-0.01	-0.05	-0.05	-0.05	-0.09	-0.07	-0.03	-0.05
9.0	0.01	-0.03	-0.02	-0.03	-0.07	-0.06	-0.03	-0.03
9.5	0.00	-0.03	-0.03	-0.03	-0.06	-0.06	-0.01	-0.04
10.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

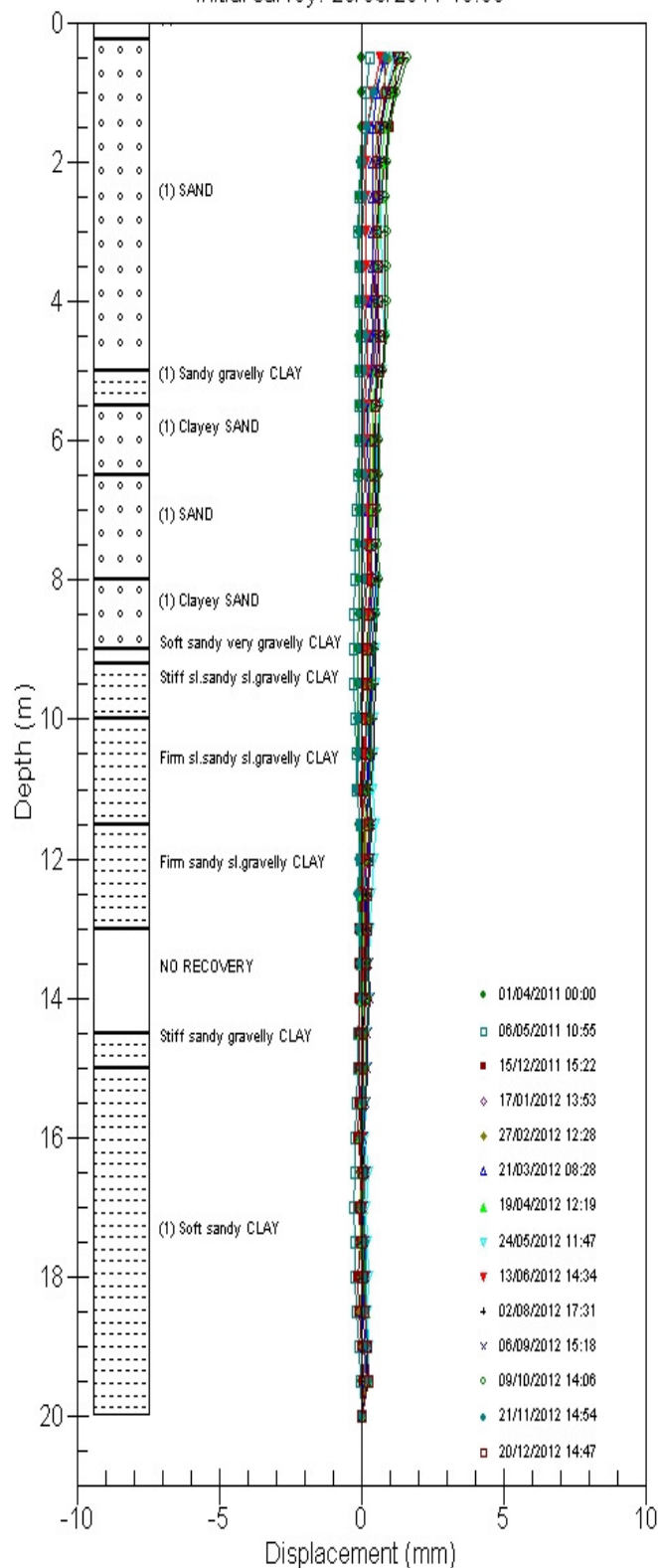
PROJECT: Filey Coastal Stability: Ground Investigation
 SITE: 3819
 INSTALLATION: CPBH05
 COMPANY: Allied Exploration & Geotechnics Ltd.
 CLIENT: Scarborough Borough Council
 NOTE: Initial inclinometer survey conducted 28.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

Incremental Deflection Data in B Axis (mm):

Depth (m)	13/06/2012 14:06 (mm)	02/08/2012 12:45 (mm)	06/09/2012 14:55 (mm)	09/10/2012 13:41 (mm)	21/11/2012 14:31 (mm)	20/12/2012 14:12 (mm)
0.5	-0.68	-0.64	-0.83	-0.76	-0.68	-0.70
1.0	-0.10	-0.24	-0.15	-0.20	-0.20	-0.34
1.5	0.11	0.02	0.11	0.03	0.18	0.23
2.0	0.24	0.18	0.22	0.18	0.40	0.43
2.5	0.04	0.01	0.07	0.07	0.04	0.15
3.0	0.20	0.05	0.07	0.08	0.09	0.14
3.5	0.05	-0.06	-0.01	-0.11	-0.02	0.05
4.0	-0.08	-0.19	-0.16	-0.26	-0.16	-0.15
4.5	0.11	-0.02	-0.03	0.05	0.06	0.04
5.0	-0.02	-0.09	-0.07	-0.03	-0.06	-0.01
5.5	0.10	-0.01	-0.01	0.01	0.07	0.07
6.0	-0.07	-0.11	-0.09	-0.07	-0.03	-0.07
6.5	-0.18	-0.19	-0.14	-0.15	-0.18	-0.13
7.0	0.04	-0.03	0.00	0.08	0.10	0.14
7.5	0.13	0.05	0.03	0.07	0.12	0.11
8.0	-0.05	-0.07	-0.10	-0.08	-0.07	-0.05
8.5	-0.02	-0.07	-0.09	-0.08	-0.05	-0.05
9.0	0.01	-0.01	0.13	0.00	-0.03	-0.01
9.5	0.01	-0.03	0.11	-0.02	0.03	0.04
10.0	0.00	0.00	0.00	0.00	0.00	0.00

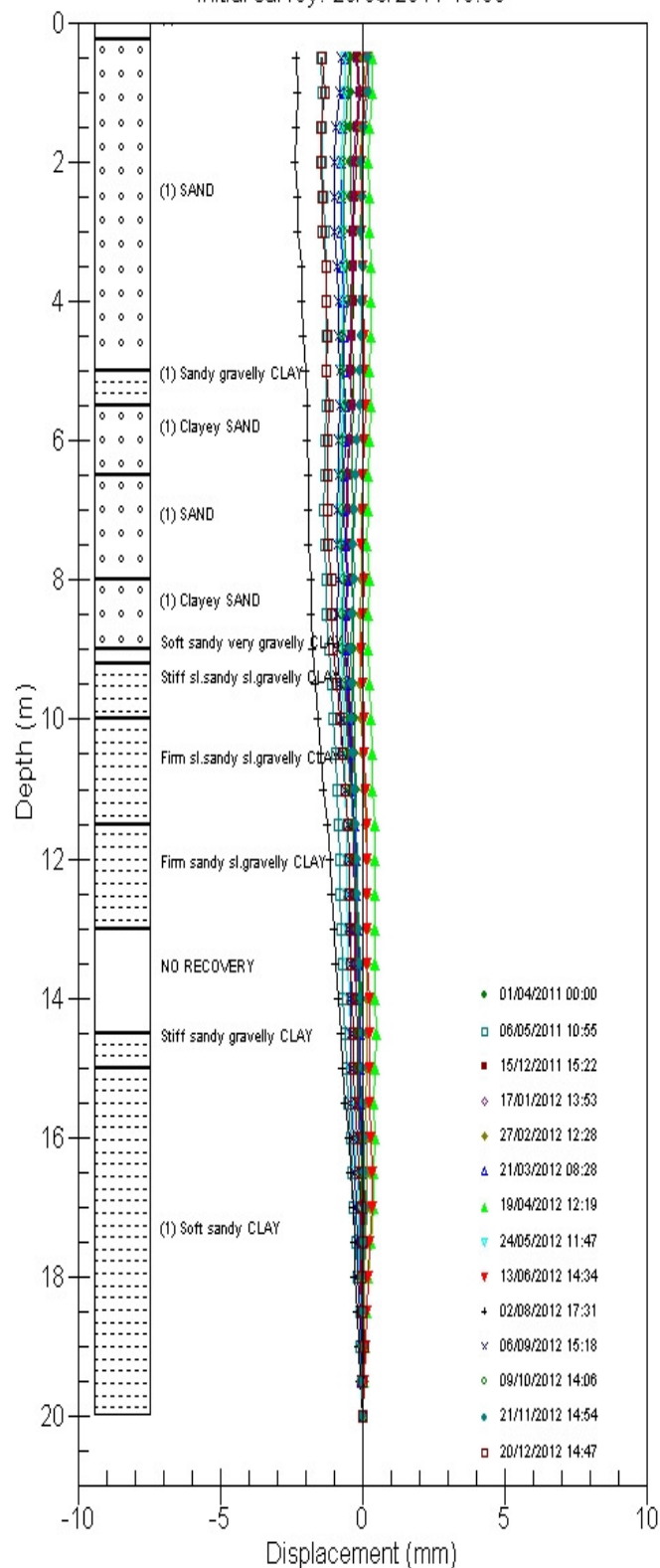
3819:RCBH07 - A Axis Cumulative

Initial survey: 25/03/2011 10:00



3819:RCBH07 - B Axis Cumulative

Initial survey: 25/03/2011 10:00



PROJECT: Filey Coastal Slope Stability: Ground Investigation

SITE: 3819

INSTALLATION: RCBH07

COMPANY: Allied Exploration & Geotechnics Ltd.

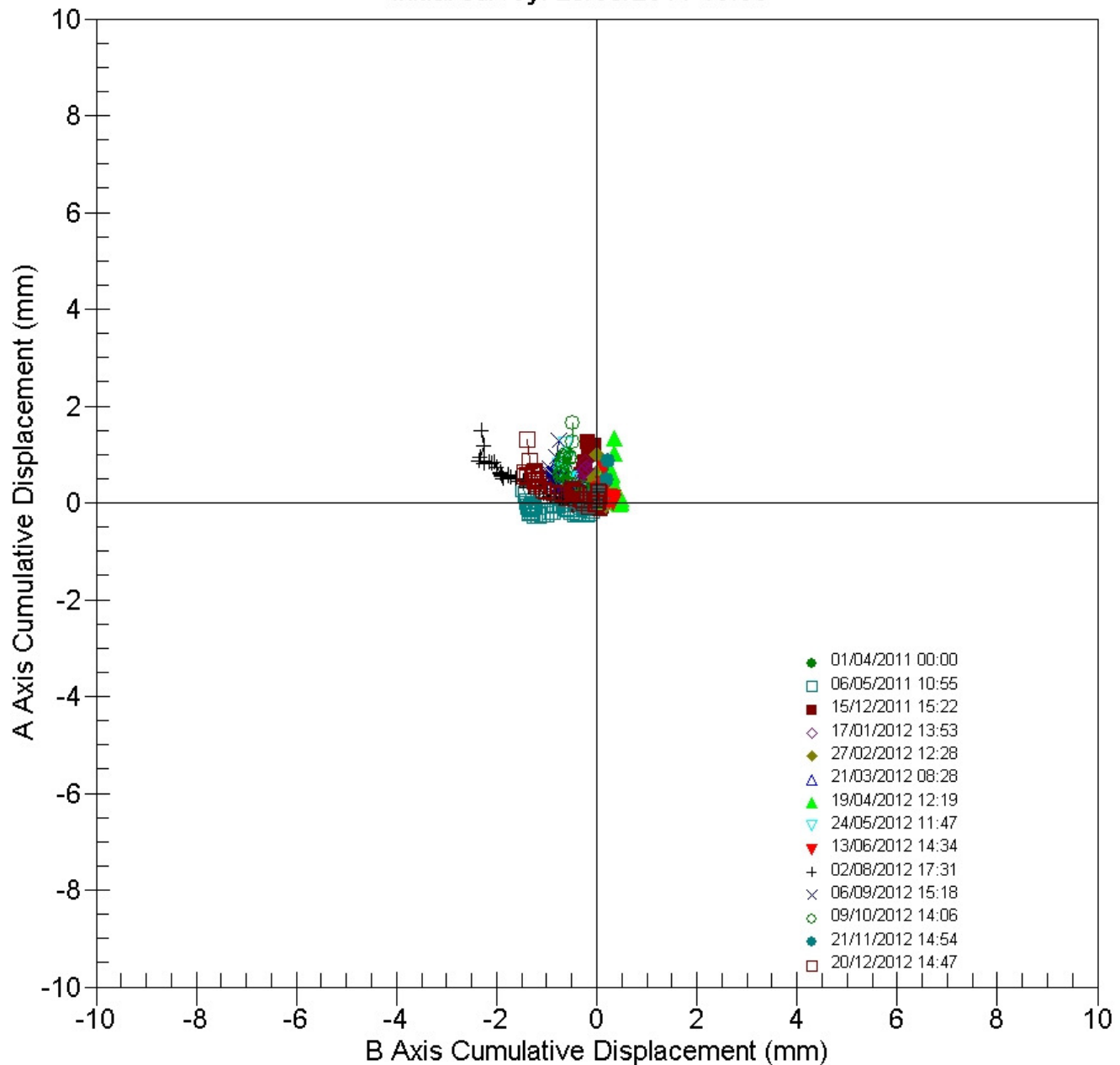
CLIENT: Scarborough Borough Council

NOTE: Initial inclinometer survey conducted 25.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

(1) Description from drillers description using openhole drilling methods.

3819:RCBH07 - A Axis vs B Axis

Initial survey: 25/03/2011 10:00



PROJECT: Filey Coastal Slope Stability: Ground Investigation

SITE: 3819

INSTALLATION: RCBH07

COMPANY: Allied Exploration & Geotechnics Ltd.

CLIENT: Scarborough Borough Council

NOTE: Initial inclinometer survey conducted 25.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

(1) Description from drillers description using openhole drilling methods.

PROJECT: Filey Coastal Slope Stability: Ground Investigation

SITE: 3819

INSTALLATION: RCBH07

COMPANY: Allied Exploration & Geotechnics Ltd.

CLIENT: Scarborough Borough Council

NOTE: Initial inclinometer survey conducted 25.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

(1) Description from drillers description using openhole drilling methods.

Cumulative Deflection Data in A Axis (mm):

Depth (m)	01/04/2011 00:00 (mm)	06/05/2011 10:55 (mm)	15/12/2011 15:22 (mm)	17/01/2012 13:53 (mm)	27/02/2012 12:28 (mm)	21/03/2012 08:28 (mm)	19/04/2012 12:19 (mm)	24/05/2012 11:47 (mm)
0.5	0.05	0.29	1.25	0.83	0.99	0.78	1.34	1.19
1.0	0.04	0.19	1.18	0.81	0.75	0.56	1.03	0.88
1.5	0.04	0.15	1.00	0.71	0.57	0.40	0.80	0.69
2.0	0.00	0.03	0.85	0.63	0.52	0.39	0.73	0.65
2.5	-0.06	-0.07	0.69	0.61	0.50	0.42	0.68	0.68
3.0	-0.08	-0.10	0.57	0.54	0.44	0.39	0.61	0.68
3.5	-0.08	-0.07	0.49	0.52	0.42	0.39	0.59	0.73
4.0	-0.07	-0.05	0.41	0.48	0.40	0.37	0.57	0.75
4.5	-0.06	-0.03	0.43	0.49	0.43	0.42	0.61	0.81
5.0	-0.08	-0.06	0.40	0.44	0.39	0.34	0.54	0.76
5.5	-0.06	-0.08	0.20	0.24	0.25	0.23	0.42	0.63
6.0	-0.06	-0.08	0.24	0.31	0.30	0.23	0.39	0.57
6.5	-0.05	-0.12	0.19	0.28	0.31	0.24	0.39	0.54
7.0	-0.05	-0.17	0.21	0.23	0.30	0.26	0.37	0.52
7.5	-0.05	-0.20	0.20	0.25	0.31	0.30	0.36	0.52
8.0	-0.06	-0.21	0.20	0.32	0.35	0.38	0.38	0.57
8.5	-0.08	-0.26	0.13	0.32	0.29	0.35	0.31	0.52
9.0	-0.10	-0.26	0.09	0.32	0.24	0.33	0.27	0.50
9.5	-0.10	-0.24	0.07	0.31	0.22	0.31	0.24	0.49
10.0	-0.11	-0.22	0.04	0.29	0.15	0.25	0.20	0.46
10.5	-0.10	-0.17	0.08	0.30	0.13	0.24	0.19	0.47
11.0	-0.11	-0.17	-0.05	0.18	0.04	0.17	0.10	0.39
11.5	-0.08	-0.03	0.07	0.26	0.12	0.24	0.18	0.49
12.0	-0.09	-0.01	0.07	0.22	0.10	0.21	0.15	0.45
12.5	-0.09	-0.04	-0.02	0.13	0.02	0.14	0.09	0.35
13.0	-0.09	-0.03	-0.09	0.13	0.03	0.14	0.09	0.33
13.5	-0.08	-0.03	-0.09	0.09	0.02	0.11	0.07	0.28
14.0	-0.08	-0.03	-0.05	0.09	0.06	0.14	0.07	0.27
14.5	-0.06	-0.10	-0.08	0.02	0.01	0.08	0.01	0.18
15.0	-0.06	-0.12	-0.06	0.01	0.02	0.09	0.02	0.18
15.5	-0.05	-0.18	-0.05	0.00	0.01	0.09	0.01	0.17
16.0	-0.04	-0.23	-0.11	-0.04	-0.04	0.03	-0.03	0.11
16.5	-0.02	-0.20	0.01	0.07	0.03	0.12	0.11	0.25
17.0	-0.01	-0.24	-0.06	0.04	-0.04	0.03	0.06	0.16
17.5	0.00	-0.23	-0.04	0.03	-0.02	0.04	0.09	0.22
18.0	0.01	-0.21	-0.13	0.05	0.00	0.06	0.13	0.24
18.5	0.01	-0.16	-0.07	0.06	-0.01	0.05	0.16	0.22
19.0	0.01	-0.09	0.01	0.11	0.06	0.14	0.23	0.27
19.5	0.01	-0.02	0.09	0.15	0.16	0.20	0.25	0.26
20.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT: Filey Coastal Slope Stability: Ground Investigation

SITE: 3819

INSTALLATION: RCBH07

COMPANY: Allied Exploration & Geotechnics Ltd.

CLIENT: Scarborough Borough Council

NOTE: Initial inclinometer survey conducted 25.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

(1) Description from drillers description using openhole drilling methods.

Cumulative Deflection Data in A Axis (mm):

Depth (m)	13/06/2012 14:34 (mm)	02/08/2012 17:31 (mm)	06/09/2012 15:18 (mm)	09/10/2012 14:06 (mm)	21/11/2012 14:54 (mm)	20/12/2012 14:47 (mm)
0.5	0.71	1.49	1.28	1.66	0.88	1.30
1.0	0.41	1.16	0.93	1.24	0.47	0.86
1.5	0.23	0.93	0.70	0.99	0.20	0.62
2.0	0.18	0.87	0.65	0.93	0.09	0.55
2.5	0.18	0.87	0.64	0.90	0.10	0.58
3.0	0.15	0.82	0.56	0.93	0.03	0.53
3.5	0.17	0.83	0.57	0.93	0.03	0.57
4.0	0.18	0.81	0.56	0.92	0.07	0.59
4.5	0.23	0.82	0.60	0.87	0.17	0.66
5.0	0.21	0.74	0.57	0.79	0.14	0.63
5.5	0.12	0.62	0.48	0.65	0.07	0.50
6.0	0.14	0.59	0.49	0.63	0.08	0.47
6.5	0.18	0.57	0.49	0.63	0.11	0.43
7.0	0.21	0.54	0.49	0.60	0.10	0.38
7.5	0.23	0.50	0.48	0.58	0.10	0.34
8.0	0.30	0.58	0.51	0.62	0.11	0.34
8.5	0.25	0.55	0.45	0.54	0.06	0.26
9.0	0.22	0.52	0.40	0.43	0.01	0.22
9.5	0.21	0.49	0.35	0.41	0.00	0.20
10.0	0.15	0.45	0.30	0.35	-0.07	0.15
10.5	0.14	0.43	0.30	0.36	-0.06	0.18
11.0	0.05	0.32	0.22	0.24	-0.17	0.09
11.5	0.14	0.36	0.34	0.31	-0.04	0.26
12.0	0.13	0.30	0.32	0.28	-0.07	0.27
12.5	0.07	0.19	0.26	0.21	-0.14	0.21
13.0	0.11	0.17	0.27	0.22	-0.08	0.22
13.5	0.09	0.14	0.26	0.21	-0.03	0.17
14.0	0.13	0.14	0.29	0.24	0.04	0.18
14.5	0.07	0.07	0.22	0.16	0.02	0.07
15.0	0.07	0.07	0.22	0.14	0.03	0.05
15.5	0.06	0.08	0.17	0.12	0.06	0.00
16.0	0.00	0.03	0.07	0.03	0.02	-0.08
16.5	0.10	0.14	0.19	0.15	0.18	0.06
17.0	0.03	0.06	0.08	0.02	0.08	-0.03
17.5	0.07	0.11	0.14	0.06	0.15	0.04
18.0	0.12	0.15	0.16	0.11	0.16	0.09
18.5	0.14	0.15	0.16	0.13	0.15	0.13
19.0	0.24	0.21	0.24	0.23	0.24	0.22
19.5	0.25	0.23	0.24	0.27	0.24	0.24
20.0	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT: Filey Coastal Slope Stability: Ground Investigation

SITE: 3819

INSTALLATION: RCBH07

COMPANY: Allied Exploration & Geotechnics Ltd.

CLIENT: Scarborough Borough Council

NOTE: Initial inclinometer survey conducted 25.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

(1) Description from drillers description using openhole drilling methods.

Cumulative Deflection Data in B Axis (mm):

Depth (m)	01/04/2011 00:00 (mm)	06/05/2011 10:55 (mm)	15/12/2011 15:22 (mm)	17/01/2012 13:53 (mm)	27/02/2012 12:28 (mm)	21/03/2012 08:28 (mm)	19/04/2012 12:19 (mm)	24/05/2012 11:47 (mm)
0.5	-0.41	-1.48	-0.18	-0.23	0.00	-0.60	0.35	-0.61
1.0	-0.41	-1.43	-0.05	-0.11	0.11	-0.57	0.35	-0.61
1.5	-0.42	-1.43	-0.15	-0.22	0.00	-0.67	0.24	-0.70
2.0	-0.41	-1.40	-0.23	-0.30	-0.06	-0.73	0.21	-0.73
2.5	-0.40	-1.36	-0.25	-0.31	-0.03	-0.72	0.25	-0.69
3.0	-0.38	-1.32	-0.31	-0.37	-0.05	-0.74	0.24	-0.71
3.5	-0.37	-1.28	-0.30	-0.36	0.00	-0.67	0.30	-0.66
4.0	-0.35	-1.28	-0.33	-0.38	0.02	-0.66	0.30	-0.68
4.5	-0.34	-1.28	-0.36	-0.40	0.05	-0.64	0.31	-0.70
5.0	-0.33	-1.28	-0.41	-0.44	0.05	-0.64	0.28	-0.73
5.5	-0.33	-1.29	-0.36	-0.37	0.12	-0.58	0.32	-0.69
6.0	-0.33	-1.32	-0.46	-0.47	0.05	-0.61	0.26	-0.76
6.5	-0.33	-1.32	-0.53	-0.52	0.01	-0.63	0.23	-0.78
7.0	-0.33	-1.34	-0.54	-0.52	-0.01	-0.62	0.21	-0.79
7.5	-0.34	-1.33	-0.57	-0.53	-0.03	-0.62	0.19	-0.79
8.0	-0.34	-1.29	-0.51	-0.50	-0.01	-0.56	0.26	-0.70
8.5	-0.33	-1.24	-0.53	-0.57	-0.08	-0.60	0.20	-0.74
9.0	-0.32	-1.17	-0.52	-0.58	-0.09	-0.59	0.20	-0.74
9.5	-0.29	-1.08	-0.47	-0.55	-0.05	-0.52	0.25	-0.67
10.0	-0.27	-1.01	-0.42	-0.52	-0.01	-0.46	0.31	-0.64
10.5	-0.26	-0.94	-0.38	-0.48	0.01	-0.42	0.34	-0.62
11.0	-0.24	-0.89	-0.35	-0.40	0.06	-0.35	0.37	-0.60
11.5	-0.22	-0.83	-0.30	-0.33	0.12	-0.26	0.43	-0.55
12.0	-0.19	-0.79	-0.29	-0.30	0.14	-0.23	0.45	-0.54
12.5	-0.16	-0.78	-0.28	-0.27	0.15	-0.21	0.44	-0.54
13.0	-0.12	-0.74	-0.25	-0.23	0.18	-0.17	0.47	-0.50
13.5	-0.10	-0.71	-0.25	-0.21	0.18	-0.14	0.47	-0.49
14.0	-0.07	-0.67	-0.22	-0.20	0.19	-0.12	0.47	-0.45
14.5	-0.07	-0.61	-0.15	-0.15	0.19	-0.09	0.49	-0.41
15.0	-0.06	-0.57	-0.13	-0.16	0.16	-0.10	0.47	-0.39
15.5	-0.04	-0.51	-0.09	-0.16	0.13	-0.10	0.42	-0.35
16.0	-0.02	-0.42	0.00	-0.09	0.17	-0.02	0.46	-0.25
16.5	-0.02	-0.38	0.00	-0.12	0.15	-0.02	0.42	-0.21
17.0	-0.01	-0.30	0.05	-0.08	0.16	0.01	0.41	-0.14
17.5	-0.02	-0.21	0.05	-0.07	0.13	0.00	0.33	-0.13
18.0	-0.02	-0.16	0.07	-0.06	0.09	-0.02	0.22	-0.14
18.5	-0.02	-0.09	0.09	0.00	0.09	0.01	0.18	-0.06
19.0	-0.02	-0.05	0.09	0.01	0.09	0.00	0.14	-0.04
19.5	-0.01	-0.03	0.05	0.02	0.06	-0.01	0.07	-0.02
20.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT: Filey Coastal Slope Stability: Ground Investigation

SITE: 3819

INSTALLATION: RCBH07

COMPANY: Allied Exploration & Geotechnics Ltd.

CLIENT: Scarborough Borough Council

NOTE: Initial inclinometer survey conducted 25.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

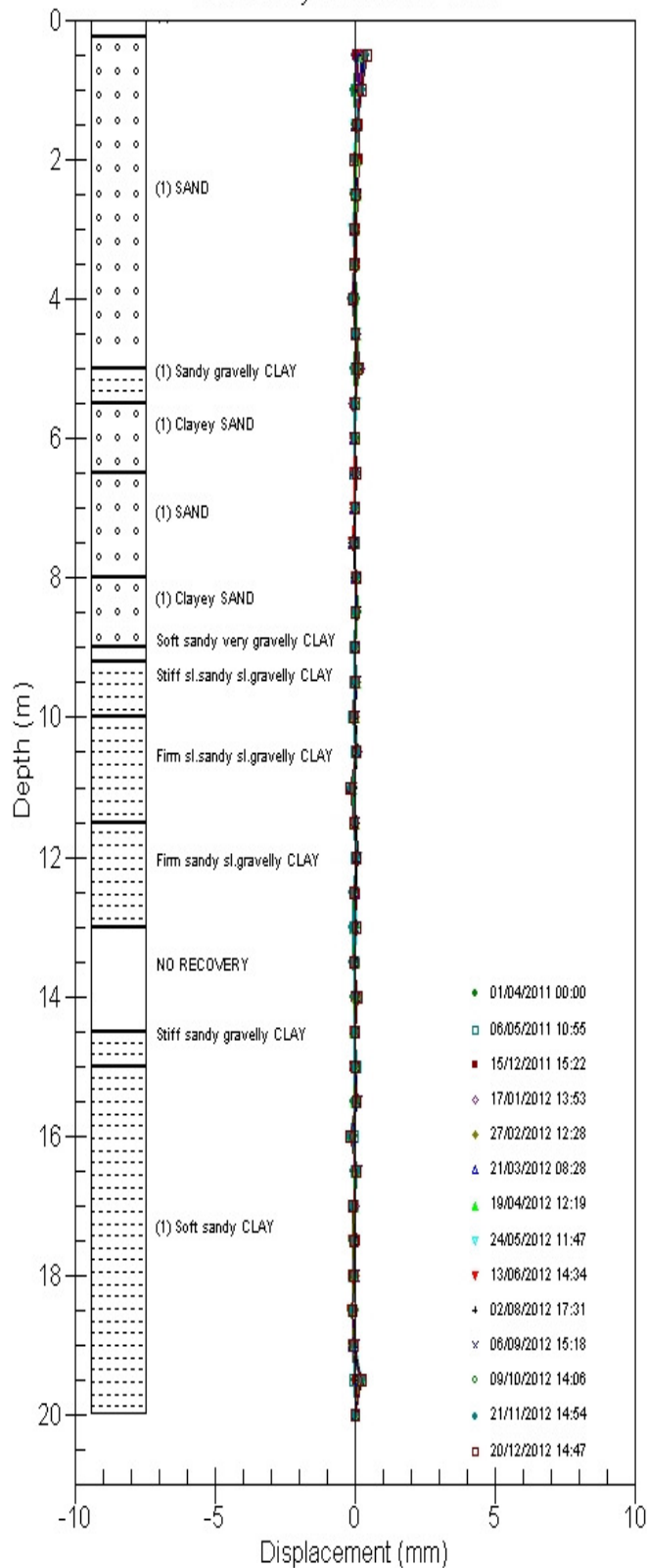
(1) Description from drillers description using openhole drilling methods.

Cumulative Deflection Data in B Axis (mm):

Depth (m)	13/06/2012 14:34 (mm)	02/08/2012 17:31 (mm)	06/09/2012 15:18 (mm)	09/10/2012 14:06 (mm)	21/11/2012 14:54 (mm)	20/12/2012 14:47 (mm)
0.5	0.14	-2.30	-0.75	-0.48	0.23	-1.39
1.0	0.13	-2.26	-0.81	-0.48	0.21	-1.33
1.5	0.02	-2.32	-0.94	-0.60	0.06	-1.43
2.0	-0.04	-2.34	-0.99	-0.65	-0.01	-1.45
2.5	-0.02	-2.26	-0.96	-0.63	0.00	-1.39
3.0	-0.03	-2.25	-0.97	-0.64	-0.02	-1.39
3.5	0.04	-2.14	-0.86	-0.53	0.03	-1.28
4.0	0.04	-2.11	-0.84	-0.52	0.00	-1.25
4.5	0.06	-2.05	-0.81	-0.69	-0.02	-1.23
5.0	0.06	-2.00	-0.81	-0.68	-0.07	-1.26
5.5	0.12	-1.91	-0.77	-0.62	-0.06	-1.16
6.0	0.05	-1.92	-0.83	-0.68	-0.16	-1.22
6.5	0.03	-1.89	-0.86	-0.69	-0.23	-1.23
7.0	0.01	-1.89	-0.87	-0.71	-0.28	-1.22
7.5	-0.01	-1.88	-0.89	-0.73	-0.33	-1.20
8.0	0.07	-1.78	-0.83	-0.66	-0.29	-1.08
8.5	0.01	-1.77	-0.88	-0.70	-0.37	-1.07
9.0	-0.01	-1.73	-0.87	-0.70	-0.40	-1.01
9.5	0.03	-1.62	-0.79	-0.61	-0.37	-0.87
10.0	0.06	-1.55	-0.72	-0.54	-0.34	-0.77
10.5	0.07	-1.47	-0.68	-0.49	-0.33	-0.69
11.0	0.11	-1.36	-0.61	-0.41	-0.27	-0.61
11.5	0.14	-1.24	-0.51	-0.30	-0.21	-0.52
12.0	0.16	-1.14	-0.48	-0.24	-0.18	-0.48
12.5	0.15	-1.07	-0.47	-0.21	-0.15	-0.47
13.0	0.18	-1.00	-0.43	-0.17	-0.10	-0.43
13.5	0.19	-0.93	-0.43	-0.16	-0.07	-0.41
14.0	0.25	-0.82	-0.39	-0.12	-0.01	-0.36
14.5	0.26	-0.74	-0.40	-0.12	0.00	-0.32
15.0	0.26	-0.68	-0.42	-0.14	0.01	-0.29
15.5	0.26	-0.59	-0.41	-0.14	0.01	-0.26
16.0	0.33	-0.47	-0.32	-0.06	0.08	-0.16
16.5	0.34	-0.40	-0.27	-0.04	0.07	-0.11
17.0	0.34	-0.32	-0.20	0.00	0.10	-0.03
17.5	0.29	-0.28	-0.17	0.00	0.07	0.02
18.0	0.20	-0.26	-0.17	-0.04	0.01	-0.01
18.5	0.18	-0.17	-0.07	0.00	0.03	0.05
19.0	0.13	-0.10	-0.04	0.01	0.01	0.05
19.5	0.06	-0.05	-0.01	0.00	0.00	0.03
20.0	0.00	0.00	0.00	0.00	0.00	0.00

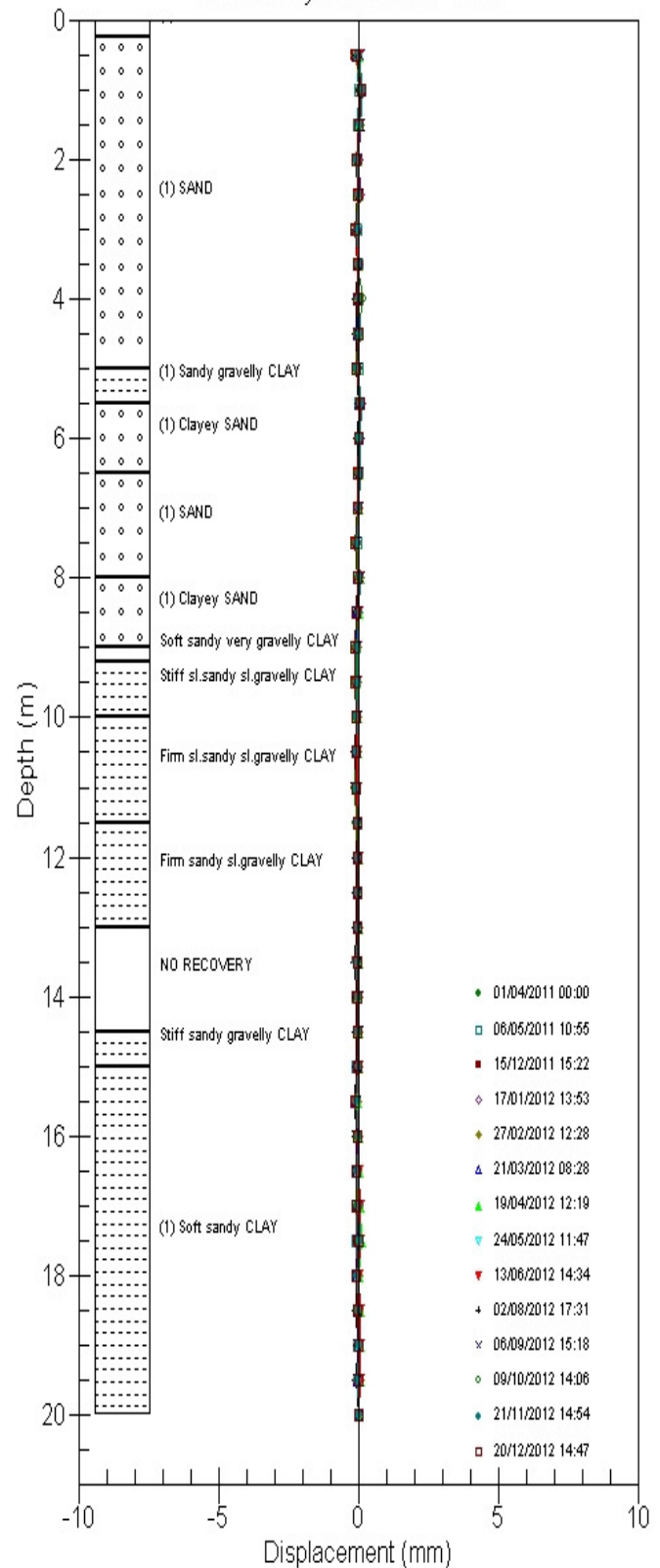
3819:RCBH07 - A Axis Incremental

Initial survey: 25/03/2011 10:00



3819:RCBH07 - B Axis Incremental

Initial survey: 25/03/2011 10:00



PROJECT: Filey Coastal Slope Stability: Ground Investigation

SITE: 3819

INSTALLATION: RCBH07

COMPANY: Allied Exploration & Geotechnics Ltd.

CLIENT: Scarborough Borough Council

NOTE: Initial inclinometer survey conducted 25.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

(1) Description from drillers description using openhole drilling methods.

PROJECT: Filey Coastal Slope Stability: Ground Investigation

SITE: 3819

INSTALLATION: RCBH07

COMPANY: Allied Exploration & Geotechnics Ltd.

CLIENT: Scarborough Borough Council

NOTE: Initial inclinometer survey conducted 25.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

(1) Description from drillers description using openhole drilling methods.

Incremental Deflection Data in A Axis (mm):

Depth (m)	01/04/2011 00:00 (mm)	06/05/2011 10:55 (mm)	15/12/2011 15:22 (mm)	17/01/2012 13:53 (mm)	27/02/2012 12:28 (mm)	21/03/2012 08:28 (mm)	19/04/2012 12:19 (mm)	24/05/2012 11:47 (mm)
0.5	0.01	0.11	0.07	0.02	0.24	0.22	0.31	0.32
1.0	0.00	0.04	0.18	0.10	0.18	0.16	0.24	0.19
1.5	0.05	0.12	0.16	0.09	0.05	0.02	0.07	0.04
2.0	0.05	0.09	0.16	0.02	0.02	-0.03	0.05	-0.03
2.5	0.03	0.04	0.13	0.07	0.06	0.03	0.07	0.00
3.0	0.00	-0.03	0.08	0.02	0.03	0.01	0.02	-0.05
3.5	-0.01	-0.01	0.09	0.04	0.02	0.02	0.02	-0.02
4.0	-0.01	-0.03	-0.03	-0.01	-0.03	-0.05	-0.04	-0.06
4.5	0.01	0.03	0.03	0.05	0.04	0.07	0.07	0.05
5.0	-0.02	0.02	0.20	0.19	0.14	0.11	0.13	0.13
5.5	0.01	0.00	-0.04	-0.07	-0.05	0.01	0.03	0.06
6.0	-0.01	0.04	0.05	0.03	-0.01	-0.01	0.01	0.03
6.5	-0.01	0.05	-0.02	0.05	0.01	-0.03	0.02	0.02
7.0	0.01	0.03	0.01	-0.02	-0.01	-0.04	0.01	0.01
7.5	0.01	0.01	0.00	-0.07	-0.04	-0.08	-0.01	-0.05
8.0	0.02	0.04	0.07	0.00	0.06	0.03	0.06	0.05
8.5	0.02	0.00	0.05	0.00	0.05	0.03	0.05	0.01
9.0	0.00	-0.02	0.02	0.01	0.03	0.02	0.02	0.01
9.5	0.01	-0.02	0.03	0.02	0.07	0.07	0.05	0.03
10.0	-0.01	-0.05	-0.04	-0.01	0.02	0.01	0.01	-0.01
10.5	0.01	0.01	0.14	0.12	0.09	0.06	0.09	0.08
11.0	-0.03	-0.14	-0.12	-0.08	-0.07	-0.07	-0.09	-0.10
11.5	0.01	-0.02	-0.01	0.03	0.02	0.03	0.03	0.04
12.0	0.01	0.03	0.09	0.09	0.07	0.07	0.06	0.10
12.5	0.00	-0.01	0.07	0.00	-0.01	0.00	-0.01	0.02
13.0	-0.01	-0.01	0.00	0.05	0.01	0.03	0.02	0.05
13.5	0.00	0.00	-0.05	-0.01	-0.04	-0.03	0.00	0.01
14.0	-0.02	0.07	0.03	0.07	0.05	0.05	0.06	0.08
14.5	-0.01	0.03	-0.01	0.01	-0.01	-0.01	-0.01	0.00
15.0	-0.01	0.06	-0.01	0.02	0.01	0.00	0.01	0.01
15.5	-0.01	0.05	0.06	0.03	0.05	0.06	0.04	0.06
16.0	-0.01	-0.02	-0.11	-0.10	-0.07	-0.09	-0.14	-0.14
16.5	-0.02	0.04	0.07	0.03	0.07	0.09	0.05	0.09
17.0	-0.01	-0.01	-0.02	0.01	-0.01	-0.01	-0.03	-0.05
17.5	-0.01	-0.01	0.09	-0.02	-0.02	-0.02	-0.05	-0.02
18.0	-0.01	-0.05	-0.06	-0.01	0.01	0.01	-0.03	0.02
18.5	0.00	-0.07	-0.07	-0.05	-0.07	-0.09	-0.07	-0.05
19.0	0.01	-0.07	-0.09	-0.04	-0.09	-0.06	-0.02	0.01
19.5	0.01	-0.02	0.09	0.15	0.16	0.20	0.25	0.26
20.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT: Filey Coastal Slope Stability: Ground Investigation

SITE: 3819

INSTALLATION: RCBH07

COMPANY: Allied Exploration & Geotechnics Ltd.

CLIENT: Scarborough Borough Council

NOTE: Initial inclinometer survey conducted 25.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

(1) Description from drillers description using openhole drilling methods.

Incremental Deflection Data in A Axis (mm):

Depth (m)	13/06/2012 14:34 (mm)	02/08/2012 17:31 (mm)	06/09/2012 15:18 (mm)	09/10/2012 14:06 (mm)	21/11/2012 14:54 (mm)	20/12/2012 14:47 (mm)
0.5	0.30	0.32	0.34	0.42	0.40	0.44
1.0	0.18	0.23	0.23	0.25	0.28	0.25
1.5	0.05	0.07	0.06	0.07	0.11	0.07
2.0	0.00	-0.01	0.01	0.03	-0.01	-0.03
2.5	0.03	0.06	0.07	-0.03	0.08	0.05
3.0	-0.02	-0.01	-0.01	0.00	0.00	-0.04
3.5	-0.01	0.02	0.01	0.01	-0.04	-0.01
4.0	-0.05	-0.01	-0.04	0.06	-0.10	-0.08
4.5	0.02	0.08	0.03	0.07	0.03	0.03
5.0	0.09	0.12	0.09	0.15	0.07	0.14
5.5	-0.02	0.03	-0.01	0.01	-0.01	0.03
6.0	-0.05	0.01	-0.01	0.01	-0.03	0.03
6.5	-0.03	0.03	0.00	0.03	0.01	0.05
7.0	-0.03	0.04	0.01	0.01	0.00	0.05
7.5	-0.07	-0.08	-0.02	-0.04	-0.01	0.00
8.0	0.04	0.03	0.06	0.08	0.05	0.08
8.5	0.03	0.03	0.05	0.11	0.05	0.04
9.0	0.02	0.03	0.05	0.02	0.01	0.03
9.5	0.05	0.05	0.05	0.06	0.07	0.04
10.0	0.01	0.01	0.00	-0.01	-0.01	-0.02
10.5	0.10	0.11	0.08	0.11	0.10	0.09
11.0	-0.09	-0.04	-0.12	-0.06	-0.13	-0.17
11.5	0.01	0.06	0.01	0.03	0.03	-0.02
12.0	0.06	0.11	0.07	0.07	0.07	0.06
12.5	-0.04	0.02	-0.02	-0.01	-0.06	-0.01
13.0	0.01	0.03	0.01	0.01	-0.05	0.05
13.5	-0.03	-0.01	-0.03	-0.03	-0.07	-0.01
14.0	0.06	0.07	0.07	0.08	0.02	0.11
14.5	-0.01	0.00	0.00	0.01	-0.01	0.02
15.0	0.01	-0.01	0.05	0.03	-0.02	0.05
15.5	0.06	0.05	0.11	0.09	0.04	0.09
16.0	-0.10	-0.11	-0.13	-0.12	-0.17	-0.14
16.5	0.07	0.09	0.11	0.13	0.10	0.09
17.0	-0.04	-0.05	-0.06	-0.04	-0.06	-0.07
17.5	-0.05	-0.03	-0.02	-0.05	-0.01	-0.05
18.0	-0.02	0.00	0.00	-0.02	0.01	-0.04
18.5	-0.10	-0.06	-0.08	-0.10	-0.09	-0.09
19.0	-0.01	-0.02	0.00	-0.03	-0.01	-0.02
19.5	0.25	0.23	0.24	0.27	0.24	0.24
20.0	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT: Filey Coastal Slope Stability: Ground Investigation

SITE: 3819

INSTALLATION: RCBH07

COMPANY: Allied Exploration & Geotechnics Ltd.

CLIENT: Scarborough Borough Council

NOTE: Initial inclinometer survey conducted 25.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

(1) Description from drillers description using openhole drilling methods.

Incremental Deflection Data in B Axis (mm):

Depth (m)	01/04/2011 00:00 (mm)	06/05/2011 10:55 (mm)	15/12/2011 15:22 (mm)	17/01/2012 13:53 (mm)	27/02/2012 12:28 (mm)	21/03/2012 08:28 (mm)	19/04/2012 12:19 (mm)	24/05/2012 11:47 (mm)
0.5	0.00	-0.05	-0.13	-0.12	-0.11	-0.03	0.00	-0.01
1.0	0.01	0.00	0.11	0.11	0.11	0.10	0.11	0.09
1.5	-0.01	-0.02	0.08	0.08	0.06	0.06	0.03	0.03
2.0	-0.01	-0.04	0.01	0.01	-0.03	-0.01	-0.05	-0.04
2.5	-0.02	-0.04	0.06	0.06	0.02	0.03	0.01	0.02
3.0	-0.01	-0.03	0.00	-0.01	-0.05	-0.07	-0.06	-0.04
3.5	-0.02	0.00	0.03	0.02	-0.02	-0.02	0.00	0.02
4.0	-0.01	0.00	0.03	0.02	-0.02	-0.01	-0.01	0.02
4.5	-0.01	0.00	0.05	0.04	0.00	0.00	0.03	0.03
5.0	0.01	0.01	-0.05	-0.07	-0.07	-0.06	-0.04	-0.03
5.5	0.00	0.03	0.10	0.10	0.06	0.03	0.06	0.07
6.0	0.00	0.01	0.07	0.05	0.04	0.02	0.03	0.02
6.5	0.00	0.02	0.01	0.00	0.02	0.00	0.03	0.01
7.0	0.01	-0.01	0.03	0.01	0.03	-0.01	0.02	0.00
7.5	-0.01	-0.05	-0.06	-0.03	-0.03	-0.06	-0.07	-0.09
8.0	-0.01	-0.05	0.02	0.07	0.07	0.05	0.05	0.04
8.5	-0.01	-0.07	-0.01	0.01	0.01	-0.01	0.01	-0.01
9.0	-0.03	-0.09	-0.05	-0.03	-0.04	-0.07	-0.05	-0.07
9.5	-0.02	-0.08	-0.05	-0.04	-0.04	-0.06	-0.06	-0.04
10.0	-0.02	-0.07	-0.04	-0.04	-0.03	-0.05	-0.03	-0.02
10.5	-0.02	-0.06	-0.03	-0.08	-0.05	-0.07	-0.04	-0.02
11.0	-0.02	-0.06	-0.05	-0.07	-0.07	-0.09	-0.06	-0.05
11.5	-0.03	-0.04	-0.01	-0.03	-0.02	-0.04	-0.02	-0.01
12.0	-0.02	-0.01	-0.01	-0.03	0.00	-0.01	0.01	0.00
12.5	-0.04	-0.03	-0.03	-0.05	-0.03	-0.05	-0.03	-0.03
13.0	-0.02	-0.03	-0.01	-0.01	0.00	-0.03	0.00	-0.01
13.5	-0.04	-0.04	-0.03	-0.01	-0.01	-0.03	0.00	-0.04
14.0	0.00	-0.07	-0.07	-0.05	0.00	-0.03	-0.02	-0.04
14.5	-0.01	-0.04	-0.03	0.01	0.03	0.01	0.02	-0.02
15.0	-0.02	-0.05	-0.03	0.00	0.03	0.00	0.05	-0.04
15.5	-0.02	-0.09	-0.10	-0.07	-0.04	-0.08	-0.04	-0.10
16.0	0.00	-0.05	0.00	0.03	0.03	0.00	0.04	-0.04
16.5	-0.01	-0.08	-0.05	-0.04	-0.02	-0.03	0.01	-0.07
17.0	0.02	-0.09	0.00	-0.01	0.03	0.02	0.08	-0.02
17.5	0.00	-0.05	-0.02	-0.01	0.04	0.02	0.11	0.01
18.0	0.00	-0.06	-0.02	-0.05	0.00	-0.03	0.03	-0.08
18.5	-0.01	-0.04	0.00	-0.02	0.00	0.01	0.05	-0.02
19.0	0.00	-0.02	0.04	-0.01	0.03	0.02	0.07	-0.02
19.5	-0.01	-0.03	0.05	0.02	0.06	-0.01	0.07	-0.02
20.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT: Filey Coastal Slope Stability: Ground Investigation

SITE: 3819

INSTALLATION: RCBH07

COMPANY: Allied Exploration & Geotechnics Ltd.

CLIENT: Scarborough Borough Council

NOTE: Initial inclinometer survey conducted 25.03.2011; two data readings taken then averaged in the set named 01/04/2011 00:00:00 for baseline purposes.

(1) Description from drillers description using openhole drilling methods.

Incremental Deflection Data in B Axis (mm):

Depth (m)	13/06/2012 14:34 (mm)	02/08/2012 17:31 (mm)	06/09/2012 15:18 (mm)	09/10/2012 14:06 (mm)	21/11/2012 14:54 (mm)	20/12/2012 14:47 (mm)
0.5	0.01	-0.03	0.05	0.01	0.02	-0.05
1.0	0.11	0.06	0.13	0.11	0.15	0.10
1.5	0.06	0.02	0.06	0.06	0.08	0.02
2.0	-0.02	-0.08	-0.03	-0.02	-0.01	-0.06
2.5	0.01	-0.01	0.01	0.01	0.02	0.00
3.0	-0.07	-0.10	-0.10	-0.10	-0.04	-0.10
3.5	-0.01	-0.04	-0.03	-0.01	0.03	-0.03
4.0	-0.02	-0.05	-0.02	0.17	0.02	-0.02
4.5	0.01	-0.05	0.00	0.00	0.06	0.03
5.0	-0.06	-0.09	-0.04	-0.07	-0.01	-0.09
5.5	0.06	0.00	0.06	0.06	0.10	0.06
6.0	0.03	-0.02	0.03	0.02	0.07	0.01
6.5	0.02	0.00	0.02	0.02	0.05	-0.01
7.0	0.02	-0.01	0.02	0.02	0.05	-0.01
7.5	-0.08	-0.10	-0.07	-0.07	-0.04	-0.13
8.0	0.05	-0.01	0.05	0.04	0.08	-0.01
8.5	0.03	-0.04	-0.01	0.00	0.03	-0.07
9.0	-0.05	-0.11	-0.08	-0.09	-0.03	-0.13
9.5	-0.03	-0.08	-0.08	-0.07	-0.03	-0.11
10.0	-0.02	-0.08	-0.04	-0.06	-0.02	-0.08
10.5	-0.04	-0.11	-0.07	-0.08	-0.06	-0.08
11.0	-0.03	-0.12	-0.10	-0.11	-0.07	-0.09
11.5	-0.02	-0.10	-0.03	-0.06	-0.03	-0.04
12.0	0.01	-0.07	0.00	-0.03	-0.03	0.00
12.5	-0.03	-0.07	-0.04	-0.04	-0.05	-0.05
13.0	-0.01	-0.07	-0.01	-0.01	-0.03	-0.02
13.5	-0.06	-0.12	-0.04	-0.04	-0.06	-0.05
14.0	-0.01	-0.08	0.01	0.00	-0.02	-0.04
14.5	-0.01	-0.07	0.02	0.01	-0.01	-0.03
15.0	0.00	-0.08	-0.01	0.01	0.00	-0.03
15.5	-0.07	-0.12	-0.09	-0.08	-0.07	-0.10
16.0	-0.01	-0.08	-0.05	-0.02	0.01	-0.05
16.5	0.00	-0.08	-0.08	-0.04	-0.03	-0.08
17.0	0.06	-0.04	-0.03	0.00	0.03	-0.05
17.5	0.09	-0.02	-0.01	0.04	0.07	0.02
18.0	0.02	-0.09	-0.10	-0.05	-0.03	-0.05
18.5	0.05	-0.07	-0.03	-0.01	0.02	-0.01
19.0	0.08	-0.05	-0.03	0.02	0.02	0.03
19.5	0.06	-0.05	-0.01	0.00	0.00	0.03
20.0	0.00	0.00	0.00	0.00	0.00	0.00

A.2 Piezometer Data

Figure A.2.1: Summary of continuous and periodic recorded groundwater data at Filey.

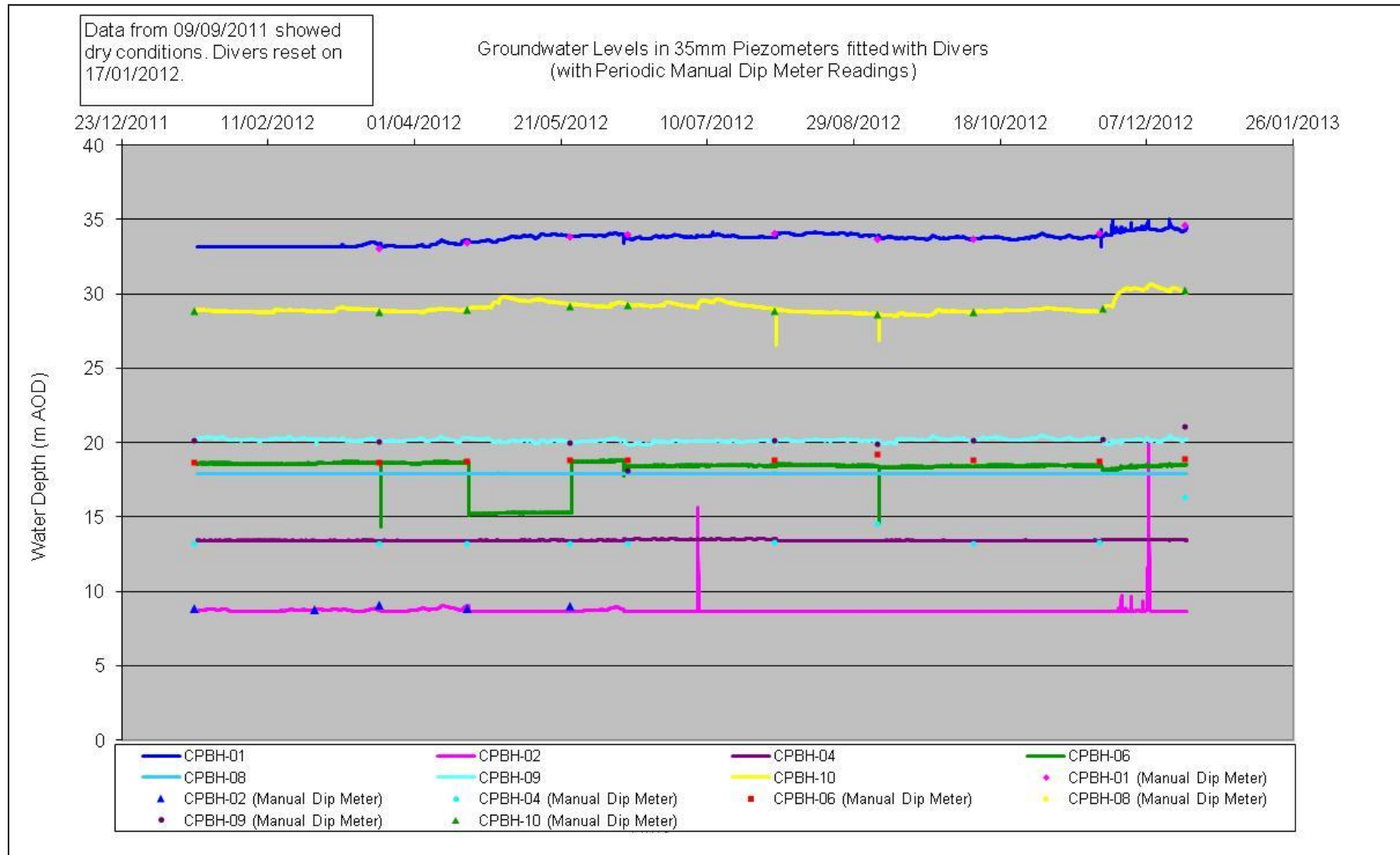


Figure A.2.2: Groundwater response from continuous recorded Diver piezometer data in CPBH-01

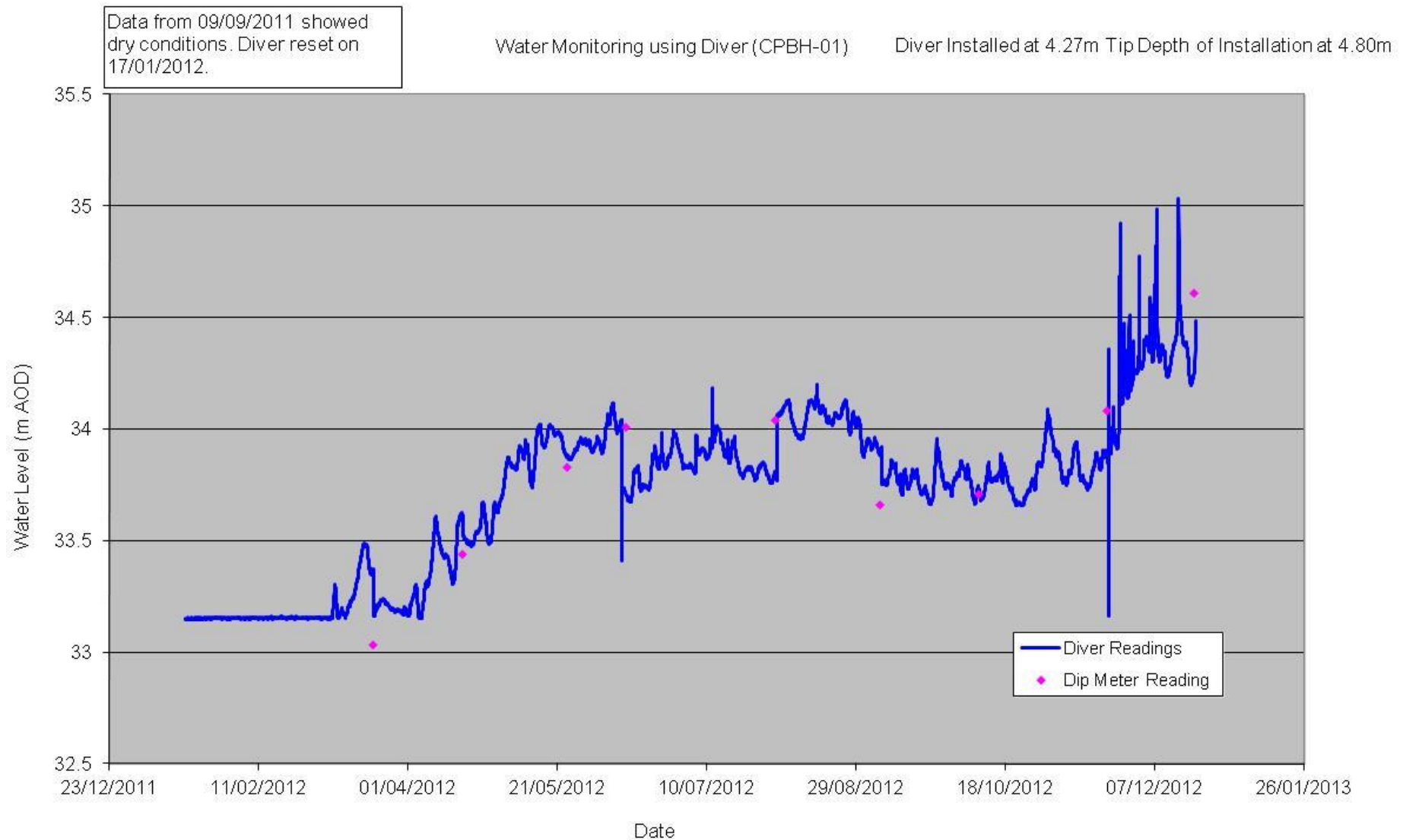


Figure A.2.3: Groundwater response from continuous recorded Diver piezometer data in CPBH-02

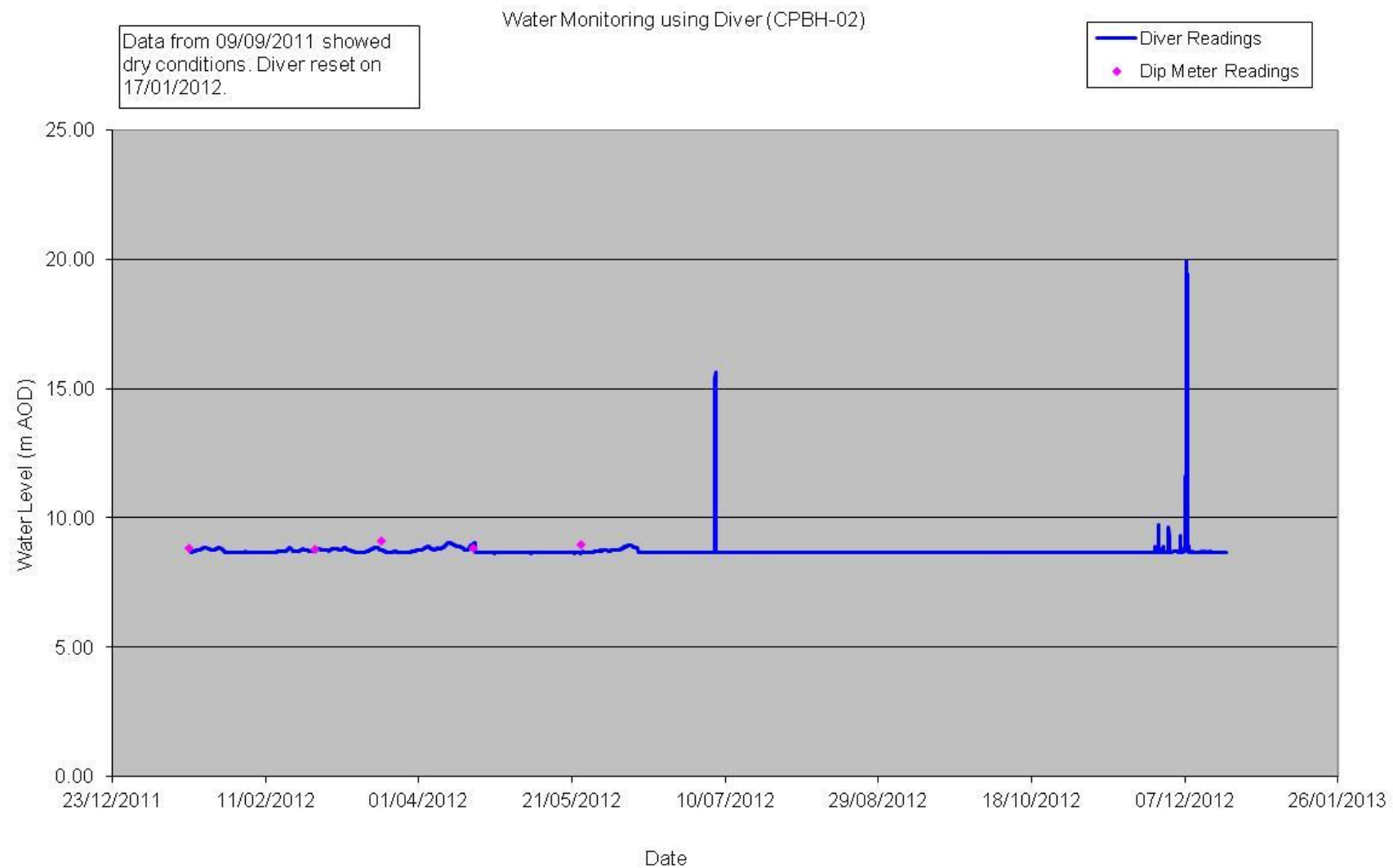


Figure A.2.4: Groundwater response from continuous recorded Diver piezometer data in CPBH-04

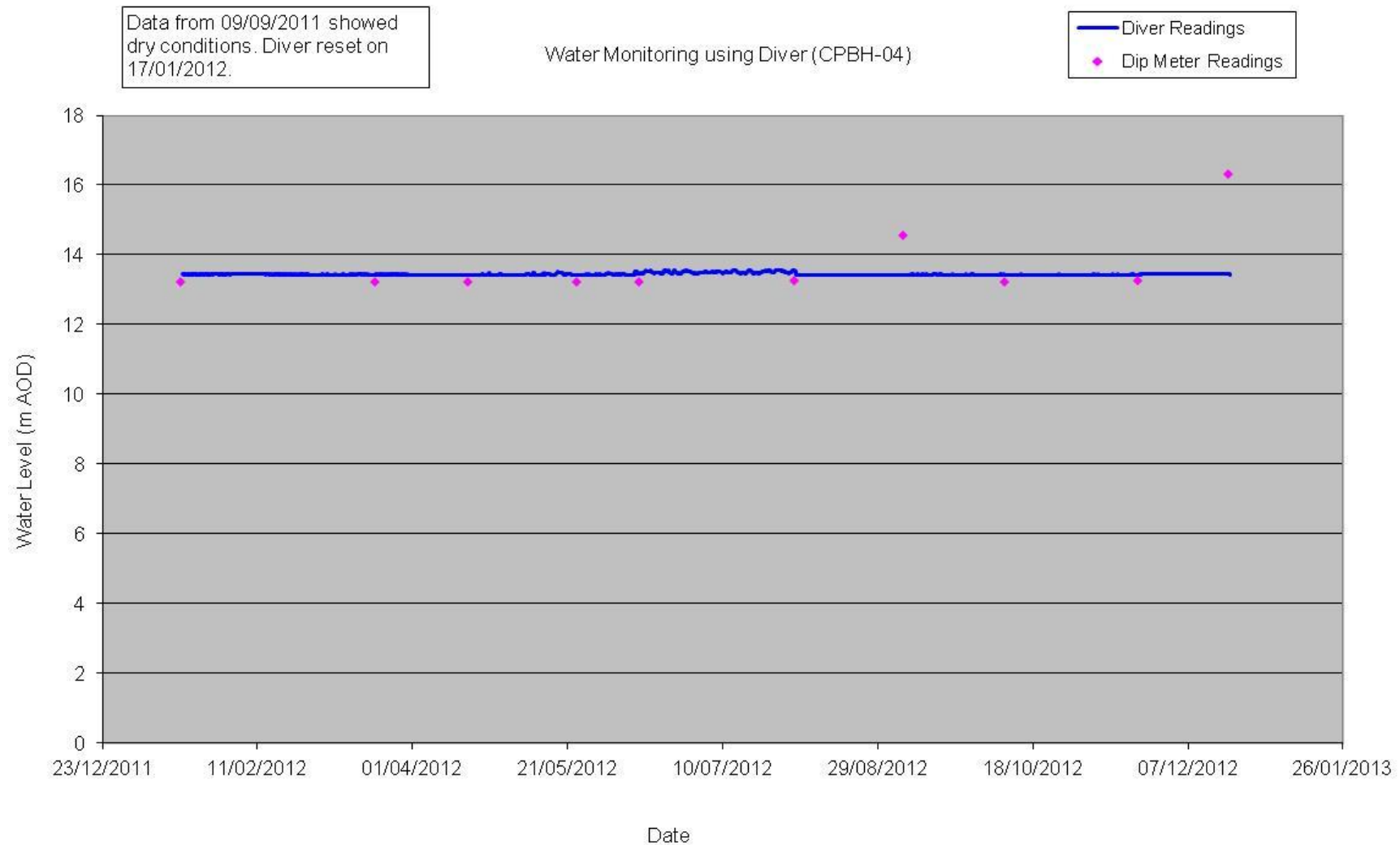


Figure A.2.5: Groundwater response from continuous recorded Diver piezometer data in CPBH-06

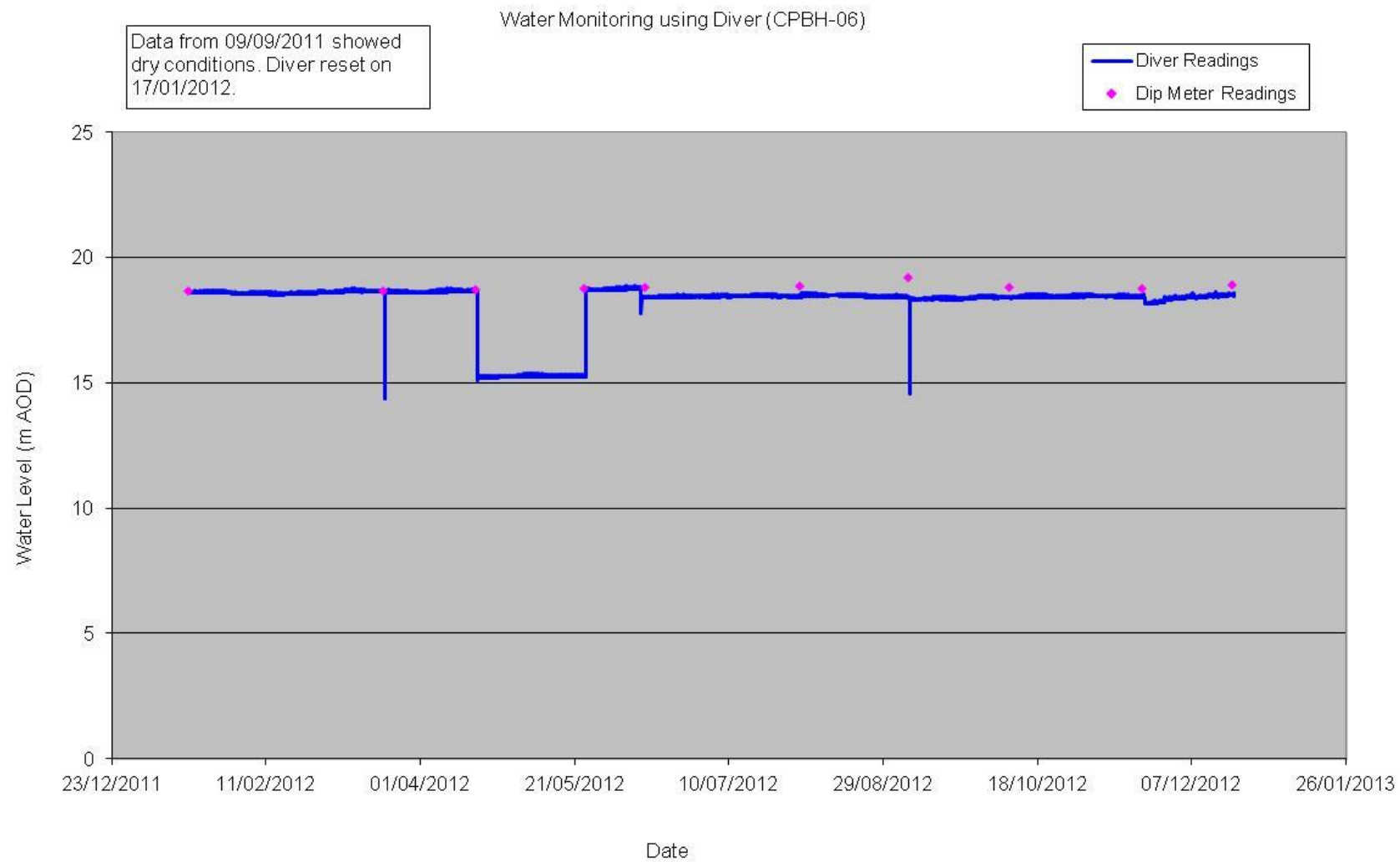


Figure A.2.6: Groundwater response from continuous recorded Diver piezometer data in CPBH-08

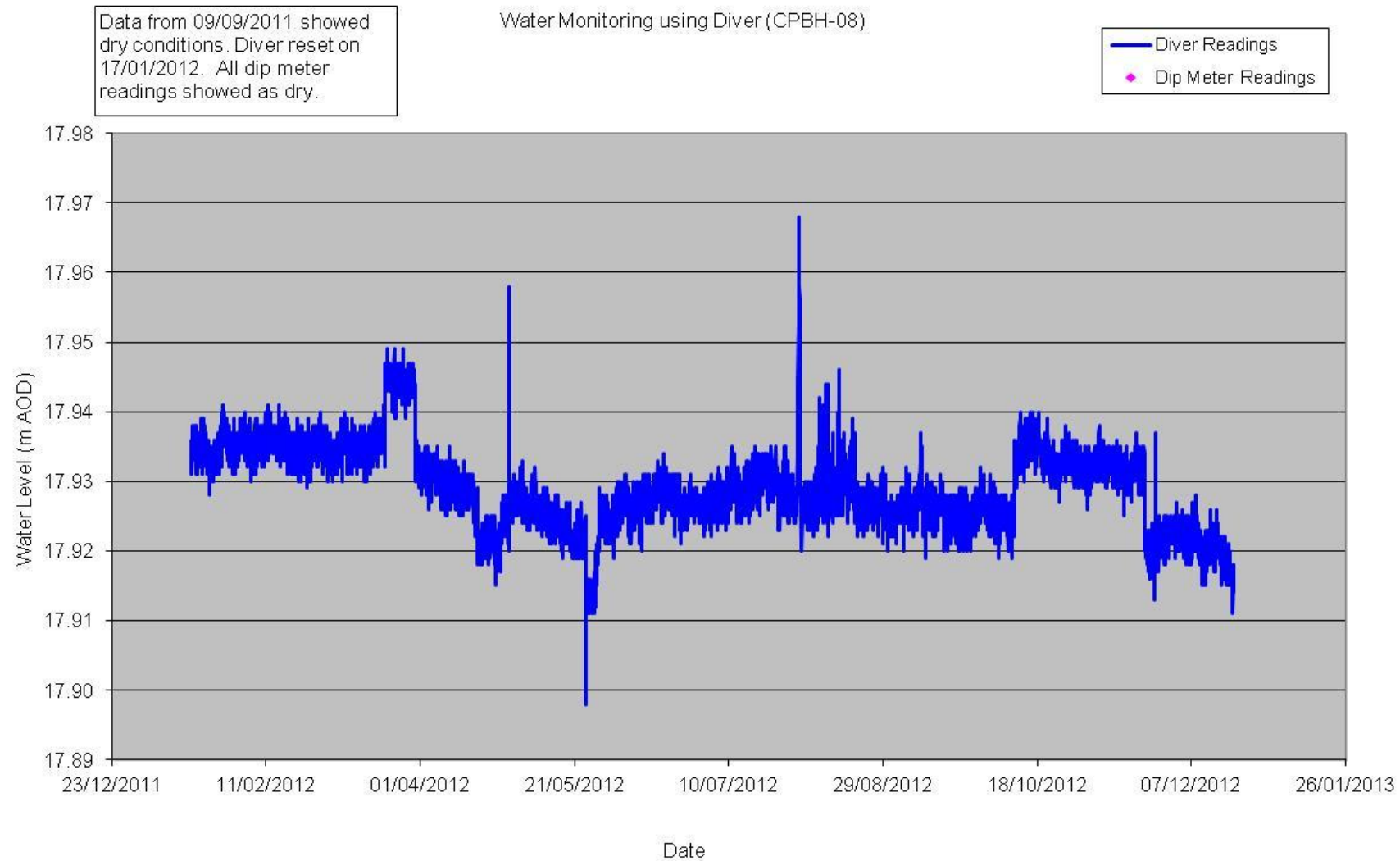


Figure A.2.7: Groundwater response from continuous recorded Diver piezometer data in CPBH-09

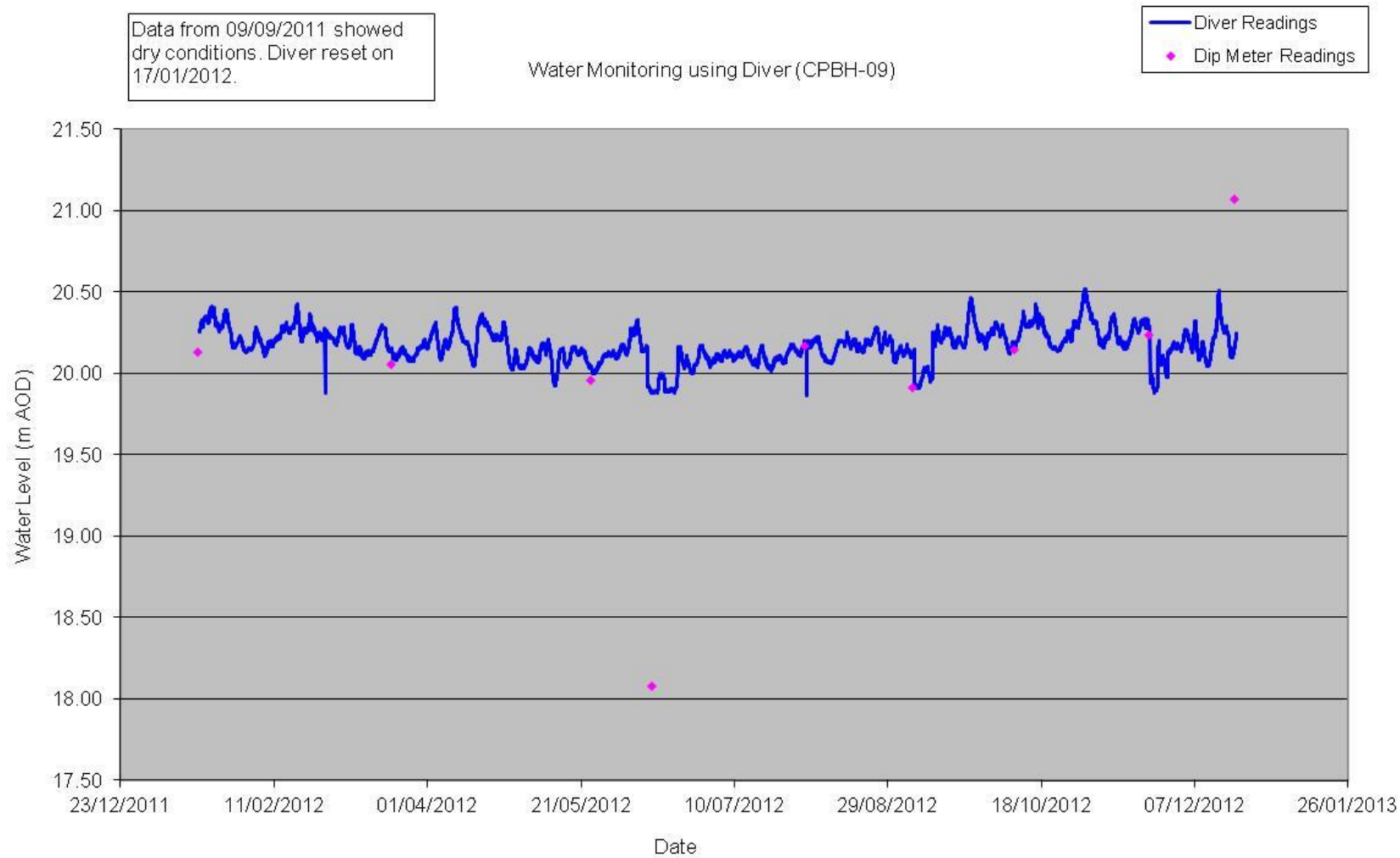


Figure A.2.8: Groundwater response from continuous recorded Diver piezometer data in CPBH-10