C305 – Eastern Running Tunnels

I&M Close Out Report for Stepney Green

CRL Document Number: C305-DSJ-C2-RGN-CR094_WS108-50008

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Contract MDL reference C08.079

1. Contractor Document Submittal History:

Revision:	Date:	Prepared by:	Checked by:	Approved by:	Reason for Issue:
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2a. Stakeholder Review Required? YES ☐ NO ☒

Stakeholder submission required: LU ☐ RfL ☐ NR ☐ LO ☐ DLR ☐ Other:

Purpose of submission: For no objection ☐ For information ☐

This document has been reviewed by the following individual for coordination, compliance, integration and acceptance and is acceptable for transmission to the above stakeholder for the above stated purpose.

Sign: _____ Role: _____ Name: _____ Date: _____

Sign: _____ Role: _____ Name: _____ Date: _____

2b. Review by Stakeholder (if required):

Stakeholder Organisation	Job Title	Name	Signature	Date	Acceptance
					☐
					☐

3. Acceptance by *Crossrail*:

***Crossrail* Review and Acceptance Decal**

This decal is to be used for submitted documents requiring acceptance by *Crossrail*.

☑	Code 1.	Accepted. Work May Proceed
☐	Code 2.	Not Accepted. Revise and resubmit. Work may proceed subject to incorporation of changes indicated
☐	Code 3.	Not Accepted. Revise and resubmit. Work may not proceed
☐	Code 4.	Received for information only. Receipt is confirmed

[redacted] Print Name: [redacted] Position: [redacted] Date: 28/07/16

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I&M Close Out Report for Stepney Green

C305 Crossrail Eastern Running Tunnels

Current Version of the Documents & Signatures :

Revision:	Date:	Prepared by:	Checked by:	Engineering Approved by:
2.0	12-07-2016	[redacted]	[redacted]	[redacted]

Document History :

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1.0	08-06-2016	[redacted]	[redacted]	[redacted]

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1. CLOSE OUT REPORT PURPOSE

As stated in the specification: C122-OVE-Z4-RSP-CR001-00007 Rev 7.0, the purpose of this close-out report is to summarise the data from the instrumentation included in this document and to relate the recorded movements to the construction activities and dewatering which produce any observed changes. For construction activities it is intended excavation of the C305 twin bored tunnels, shaft construction, SCL works and dewatering; impacts from other CRL contracts are not included in this report.

The long term readings have been used to demonstrate that the subsequent movement has reached an acceptably stable rate within the accuracy of the system in order to decommission and/or that C305 works are no longer impacting the area concerned.

As stated in the specifications the settlement rate of 2 mm/yr has been defined. Where this is not achieved this report seeks agreement from all parties that the rate is acceptably low enough to cease monitoring and decommission.

2. LOCATION OF THE WORKS

The instrumentation included within this report is located in Area 7, Stepney Green Shaft Site, between project chainages 80490 and 80780 on Drive Y, and 80690 to 80780 on Drive Z.

Drawings showing locations of Area 7 instruments are included as Appendix A.

3. DOCUMENTATION SUMMARY

METHOD STATEMENT	Crossrail Number
Method Statement for Instrumentation of Stepney Green Shaft D-Walls	C305-DSJ-C4-GMS-CR094_SH005-50001
Method Statement for Instrumentation of Stepney Green Shaft Area, KTP Requirements	C305-DSJ-C4-GMS-CR094_SH005-50002
Method Statement I&M 5 piezometers in Stepney Green	C305-DSJ-C2-GMS-CR094_WS108-50001
Method Statement of Rod Extensometers for Protection of Sewers around Stepney Green Shaft	C305-DSJ-C-GMS-CR094_SH005-50008
Method Statement for Instrumentation of Stepney Green for Sir John Cass School and General Buildings	C305-DSJ-C4-GMS-CR094_SH005-50003
Method Statement for Instrumentation at Stepney Green of Joseph Stern Synagogue	C305-DSJ-C4-GMS-CR094_SH005-50005
Method Statement for Instrumentation at Stepney Green for Ground Levelling to Monitor Shaft Construction & Holloway Relief Sewer	C305-DSJ-C4-GMS-CR094_SH005-50004
Short Notice Change to Method Statement for Instrumentation at Stepney Green for Ground Levelling to Monitor Shaft Construction & Holloway Relief Sewer	C305-DSJ-C-CCN-CR094_WS108-50002
Short Notice Change I&M Monitoring of Astroturf Pitch- Stepney Green	C305-DSJ-C2-CCN-CR094_WS108-50001
Short Notice Change Strain Gauges Stepney Green Shaft	C305-DSJ-C4-CCN-CR094_SH005-50001
Short Notice Change for Replacement of STG damaged Strain Gauges	C305-DSJ-C4-CCN-CR094_SH005-50003
Short Notice Change Drilling of Additional Extensometers & Inclinometers in STG	C305-DSJ-C-CCN-CR094_WS108-50016
Short Notice Change Borehole in the Astroturf Pitch - Interfaces	C305-DSJ-C2-CCN-CR094_WS108-50003
Short Notice Change I&M: STG Additional Piezos	C305-DSJ-C4-CCN-CR094_SH005-50008
INSTALLATION REPORT	**Crossrail Number**
I&M Installation Report for Stepney Green Site	C305-DSJ-C2-RGN-CR094_WS108-50007
IR for I&M installed as per "Rod Extensometers for Protection of Sewers around Stepney Green Shaft" MS	C305-DSJ-C2-RGN-CRG03-50300
IR for I&M installed as per "Sir John Cass School and General Buildings" MS	C305-DSJ-C2-GMS-CR094_WS108-50004
IR for I&M Installed as per "Instrumentation at Stepney Green of the Joseph Stern Synagogue" MS	C305-DSJ-C4-RGN-CRG094_SH005-50004
IR for I&M installed as per "Stepney Green for Ground Levelling to Monitor the Shaft Construction and Holloway Relief Sewer" MS	C305-DSJ-C2-RGN-CR094_WS108-50002

4. SUMMARY OF INSTALLED INSTRUMENTATION ON SITE

The total number of instruments installed is listed below. For simplicity and clarity, all the instrumentation included in this Close out report has been grouped following the relevant Installation report.

- **I&M Installation Report for Stepney Green Site - C305-DSJ-C2-RGN-CR094_WS108-50007**

  SCL

  - ✓ Levelling Points – 76
  - ✓ Rod Extensometer – 5
  - ✓ Piezometer – 13
  - ✓ Inclinometer – 8
  - ✓ Levelling Points – 70 (paint mark)

  SHAFT

  - ✓ 3D Prisms – 28
  - ✓ Electronic Inclinometer – 8
  - ✓ Manual Inclinometer – 1
  - ✓ Piezometer– 2
  - ✓ Strain Gauge –176

- **IR for I&M installed as per "Stepney Green for Ground Levelling to Monitor the Shaft Construction and Holloway Relief Sewer" MS - C305-DSJ-C2-RGN-CR094_WS108-50002**

  - ✓ Sockets – 14
  - ✓ Levelling Points – 135

- **IR for I&M installed as per "Rod Extensometers for Protection of Sewers around Stepney Green Shaft" C305-DSJ-C2-RGN-CRG03-50300**

  - ✓ Rod Extensometer – 6

- **IR for I&M Installed as per "Instrumentation at Stepney Green of the Joseph Stern Synagogue - C305-DSJ-C4-RGN-CRG094_SH005-50004**

  - ✓ Sockets – 8

- **IR for I&M installed as per "Sir John Cass School and General Buildings" C305-DSJ-C2-GMS-CR094_WS108-50004**

  - ✓ Sockets –48

- **Time–settlement plot of C305-LP064224-LPC305-LP064243** section has been added, these points are located close to Stepney Green within Area 6 from Canary Wharf to Stepney Green.The graph presented shows a history of movemens recorded until 12 February of 2016.

  - ✓ Levelling Points – 20

Detailed information of the installed instrumentation is reported in Appendix B.

The average commissioning readings included in Appendix B have been used to calculate the relative movements provided in the graphs of this report.

5. CONSTRUCTION ACTIVITY

TBM Passage

AREA	DRIVE	RING	PROJECT CHAINAGE	DATE
A6: Canary Wharf to Stepney Green	Eastbound Drive Y	2385-2455	80700-80780	31/10/13-07/11/13
	Westbound Drive Y	2389-2443	80700-80780	28/01/14-01/02/14
A14: Pudding Mill Lane to Stepney Green	Eastbound Drive Z	1637-1691	80690-80780	30/01/14-05/02/14
	Westbound Drive Z	1694-1751	80700-80780	05/06/14-13/06/14
A8: Stepney Green to Whitechapel	Eastbound Drive Y	2456-2509	80490-80560	23/11/13-28/11/13
	Westbound Drive Y	2444-2507	80490-80580	20/02/14-01/03/14

CONSTRUCTION ACTIVITIES

Shaft construction: 21st February 2012 to 22nd January 2013

SCL Works: 24th November 2012 to 11th September 2013

Dewatering: 13th January 2013 to 15th March 2016

Stoppage period:

Westbound Drive-Z Ring 1724 (Project chainage 80742) 07/06/2014 to 09/06/2014

The periods of TBM passage and stoppage are related to the rings located close to the instrumentation included in this close out report.

6. METHODOLOGY

To determine the settlement rate the following methodology has been used. A Linear Regression has been applied for a defined period using long term readings is recorded after TBM construction. This uses the following formula:

$$b = \frac{\sum_{i=1}^{n}(X_i - \bar{X}_i) \cdot (Y_i - \bar{Y}_i)}{\sum_{i=1}^{n}(X_i - \bar{X}_i)^2}$$

Where:

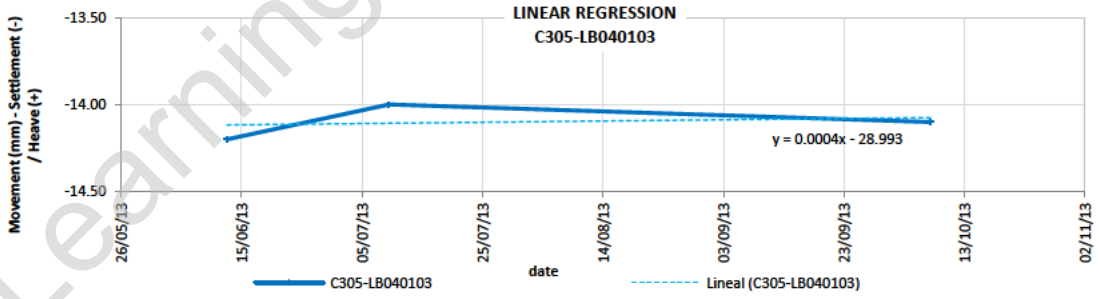
B =gradient
X = date
Y = vertical movement

From this, the settlement rate per day can be calculated and rate per year determined (negative value is for settlement, positive is for heave). For these values, the percentage at or below 2 mm/yr will be used to determine the trend of the section/area being considered. Also for comparison, values at or below 3mm/year are presented to highlight that the rate is close to achieving the 2 mm/yr.

Note the percentages of settlement rate presented in the sections below refer to values rounded to the nearest integer.

One example of this calculation can be seen below for the socket C305-LB040103 and its projection included in this Close Out Report.

	Registered movement (mm)			RATE
	12/06/2013	09/07/2013	07/10/2013	mm/year
C305-LB040103	-14.20	-14.00	-14.10	0.146



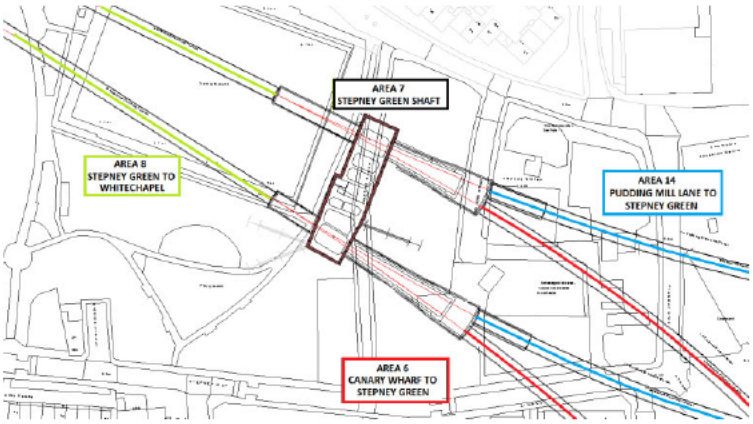
CALCULATION - C305-LB040103

X_i	Y_i	$X_i - \overline{X}_i$	$Y_i - \overline{Y}_i$	$(X_i - \overline{X}_i)^2$	$(X_i - \overline{X}_i) \cdot (Y_i - \overline{Y}_i)$
12/06/2013	-14.2	-47.94	-0.10	2298.67	4.794
09/07/2013	-14	-21.03	0.10	442.17	-2.103
07/10/2013	-14.1	68.97	0.00	4757.17	0.000

$\overline{X}_i$		41485.53	
$\overline{Y}_i$		-14.10	
$\sum_{i=1}^{n} (X_i - \overline{X}_i)^2$		7498.00	(2)
$\sum_{i=1}^{n} (X_i - \overline{X}_i) \cdot (Y_i - \overline{Y}_i)$		2.692	(1)
m (SLOPE)	(1)/(2)	0.0004	
Rate (mm/year)	m * 365	0.146	

7. SUMMARY OF THE DATA

The area covered by this Close Out Report is the Stepney Green Shaft Site and the surroundings.



Area 6: Canary Wharf to Stepney Green

Area 14: Pudding Mill Lane to Stepney Green

Area 7: Stepney Green Shaft Site

Area 8: Stepney Green to Whitechapel

The methodology explained in section 6 for the socket is applied here to levelling points, sockets and rod extensometers.

As described in the C122 I&M Plan (C122-OVE-C2-RGN-CRG01-50070), for levelling points situated in the vicinity of 3rd party utility assets, deflection ratio values are provided in appendix D.

Notes:

- For sake of clarity the monitoring data will be presented in groups according to the relevant installation report as outlined in section 4.
- For the following data plots #N/A refers to instances where readings were not taken for that sensor (e.g. damaged sensor, no access, etc.)
- For the graphs that follow, please see below TBM identification labels:

AREA	TBM	LABEL
A6: Canary Wharf to Stepney Green	Eastbound TBM Drive Y	Eastbound TBM A6
	Westbound TBM Drive Y	Westbound TBM A6
A8: Stepney Green to Whitechapel	Eastbound TBM Drive Y	Eastbound TBM A8
	Westbound TBM Drive Y	Westbound TBM A8
A14: Pudding Mill Lane to Stepney Green	Eastbound TBM Drive Z	Eastbound TBM A14
	Westbound TBM Drive Z	Westbound TBM A14

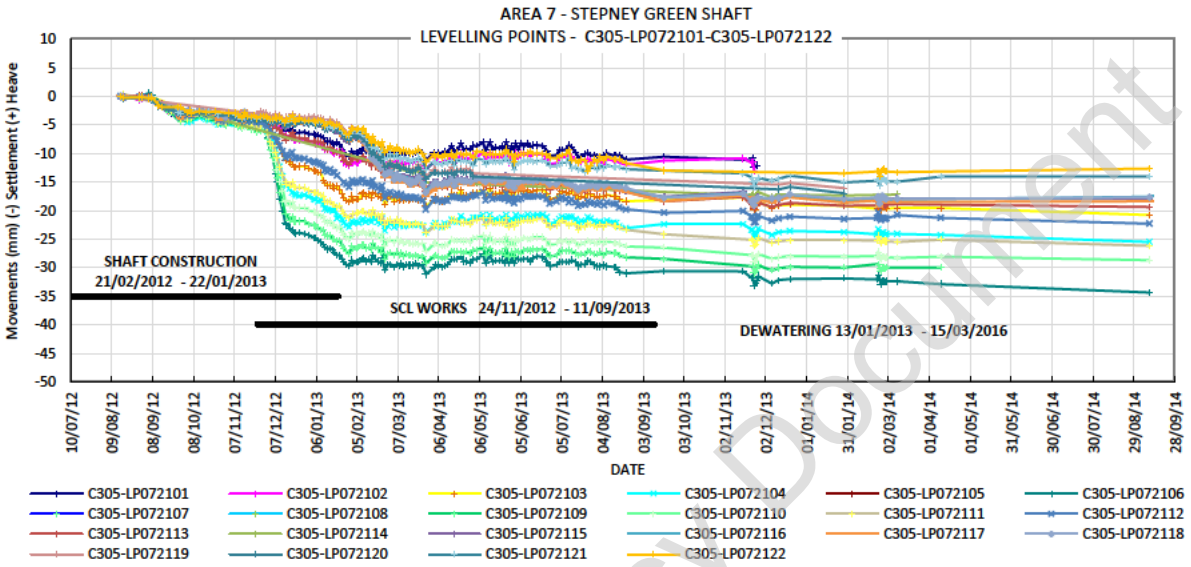
Stepney Green Site - SCL

LEVELLING POINTS

C305-LP072101 TO C305-LP072122

The graph presented below shows a settlement of -29.5 mm in January 2013 after the shaft construction and -30.6 mm in September 2013 after the SCL works.

The maximum settlement of -34.4 mm was recorded in September 2014 during the dewatering.

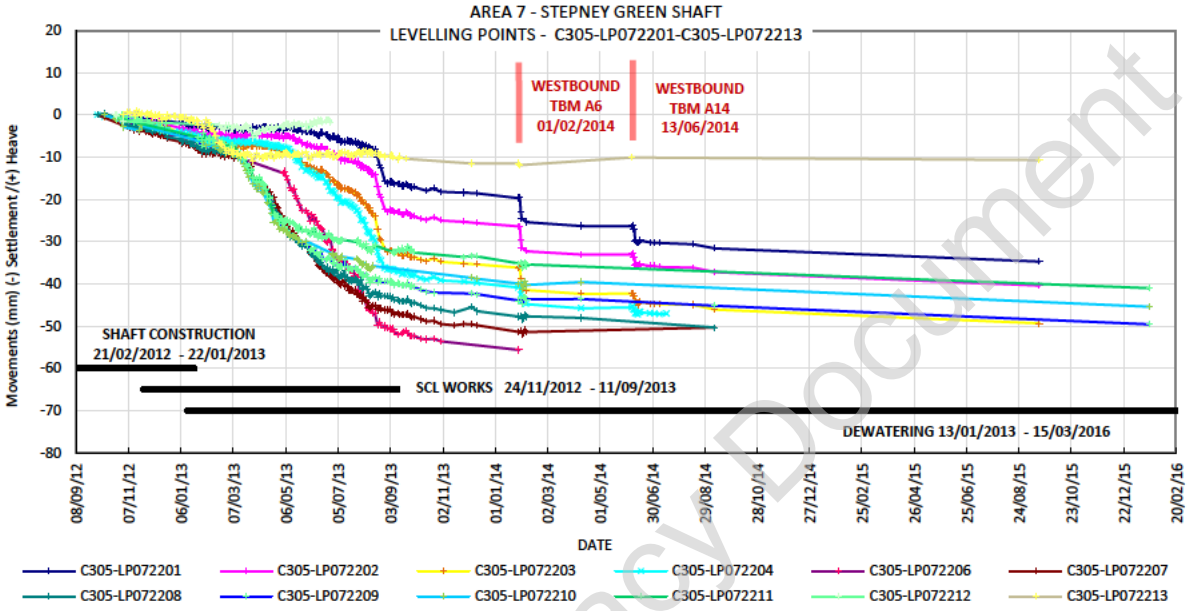


Due to access issues long term readings are not available for these levelling points, and furthermore, the annual settlement rate projection has not been calculated.

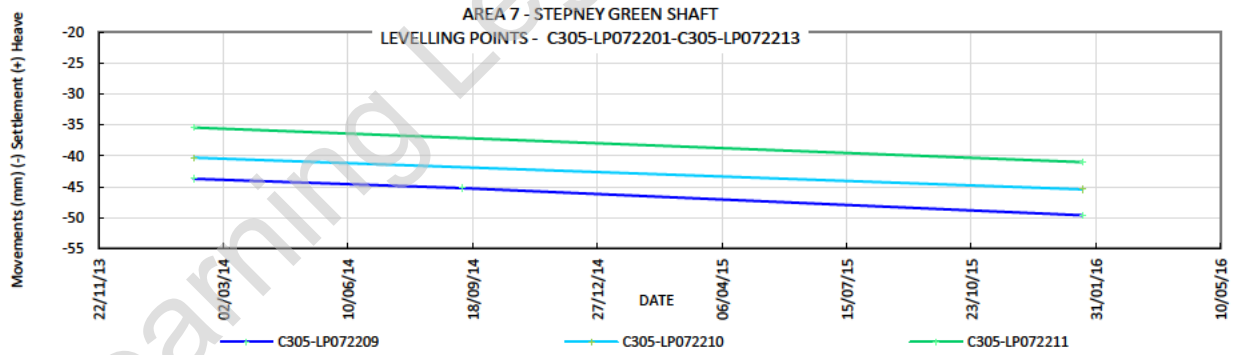
C305-LP072201 TO C305-LP072213

The graph presented below shows a settlement of -8.6 mm in January 2013 after the shaft construction and -52.3 mm in September 2013 after the SCL works.

A settlement of -7 mm was recorded in February 2014 after the westbound TBM transit from Canary Wharf (Area 6 – Canary Wharf to Stepney Green) and -3 mm in June 2014 after the westbound TBM transit from Pudding Mill Lane (Area 14 – Pudding Mill Lane to Stepney Green).



The plot below shows the trend line adjustment for each levelling point with long term readings until Jan 2016:



The table below lists the annual settlement rate for each levelling point:

	Registered movement (mm)					Ratio mm/year
	06/02/2014	15/08/2014	09/09/2014	16/09/2015	20/01/2016	
C305-LP072209	-43.70	#N/A	-45.20	#N/A	-49.60	-3.058
C305-LP072210	-40.30	#N/A	#N/A	#N/A	-45.40	-2.612
C305-LP072211	-35.40	#N/A	#N/A	#N/A	-41.00	-2.869
	Rate less than -2.5 mm/year			Rate less than 2 mm/year		0%
	Rate greater than -3.5 mm/year			Rate less than 3 mm/year		100%

Note: All the movements are in mm. (-) Settlement / (+) Heave

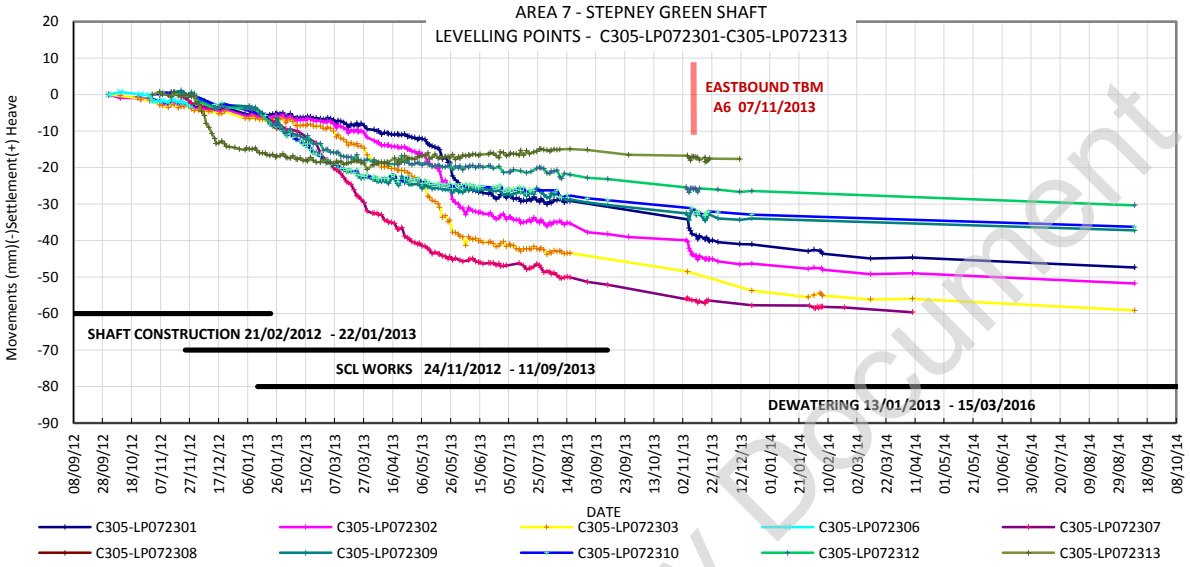
#N/A: No readings

The percentage of the above levelling points with a settlement rate less than 3 mm/year is 100%.

C305-LP072301 TO C305-LP072313

The graph presented below shows a settlement of -8.2 mm in January 2013 after the shaft construction and -53.00 mm in September 2013 after the SCL works.

A settlement of -6 mm was recorded in February 2014 after the westbound TBM transit from Canary Wharf (Area 6 – Canary Wharf to Stepney Green).

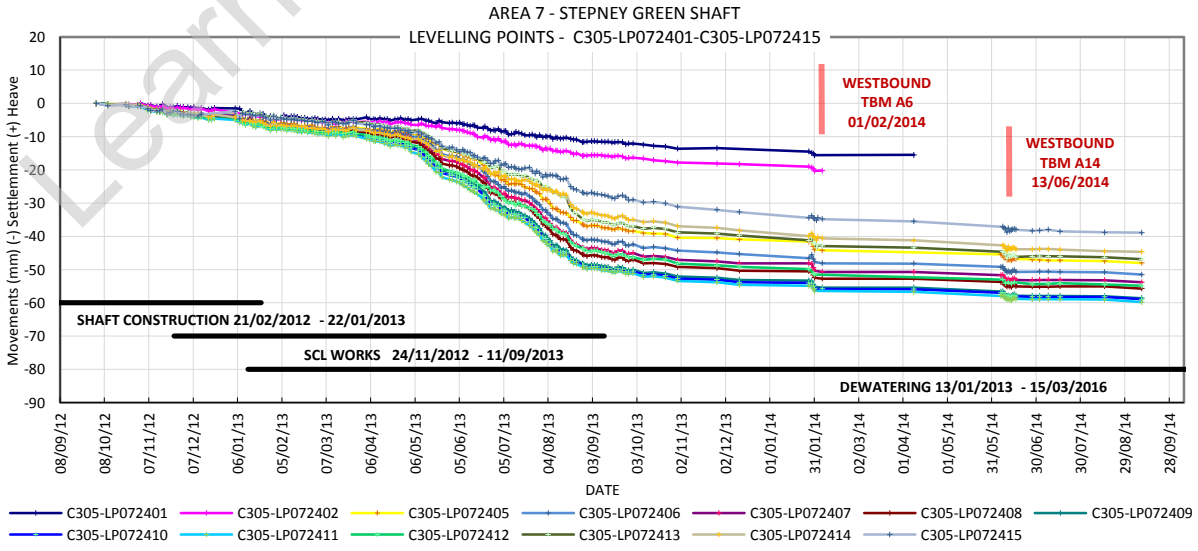


Due to access issues long term readings are not available for these levelling points, and furthermore, the annual settlement rate projection has not been calculated.

C305-LP072401 TO C305-LP072415

The graph presented below shows a settlement of -6.9 mm in January 2013 after the shaft construction and -51.10 mm in September 2013 after the SCL works.

A settlement of -2 mm was recorded in February 2014 after the westbound TBM transit from Canary Wharf (Area 6 – Canary Wharf to Stepney Green) and -2 mm in June 2014 after the westbound TBM transit from Pudding Mill Lane (Area 14 – Pudding Mill Lane to Stepney Green).

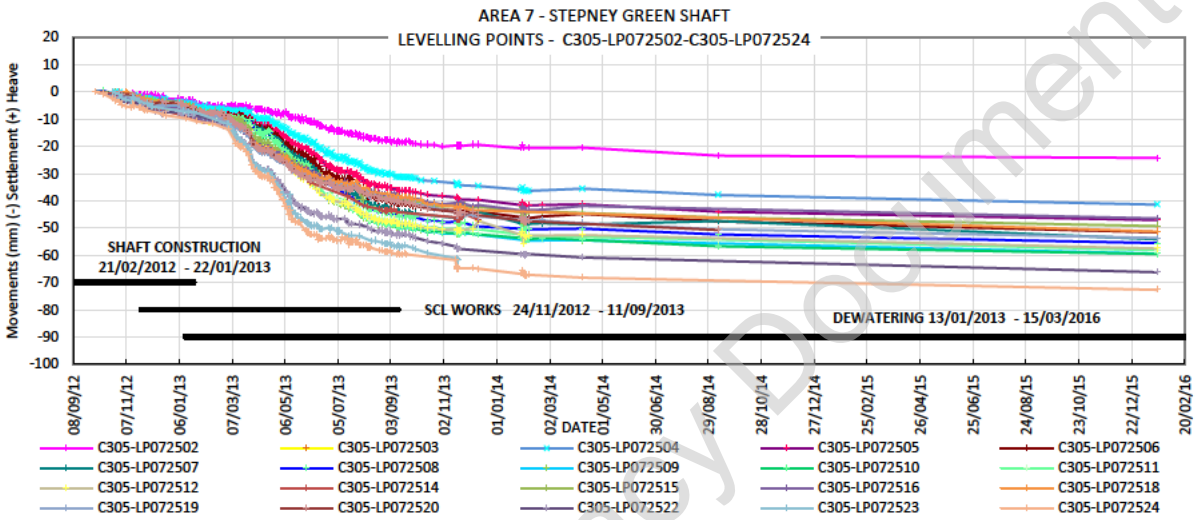


Due to access issues long term readings are not available for these levelling points, and furthermore, the annual settlement rate projection has not been calculated.

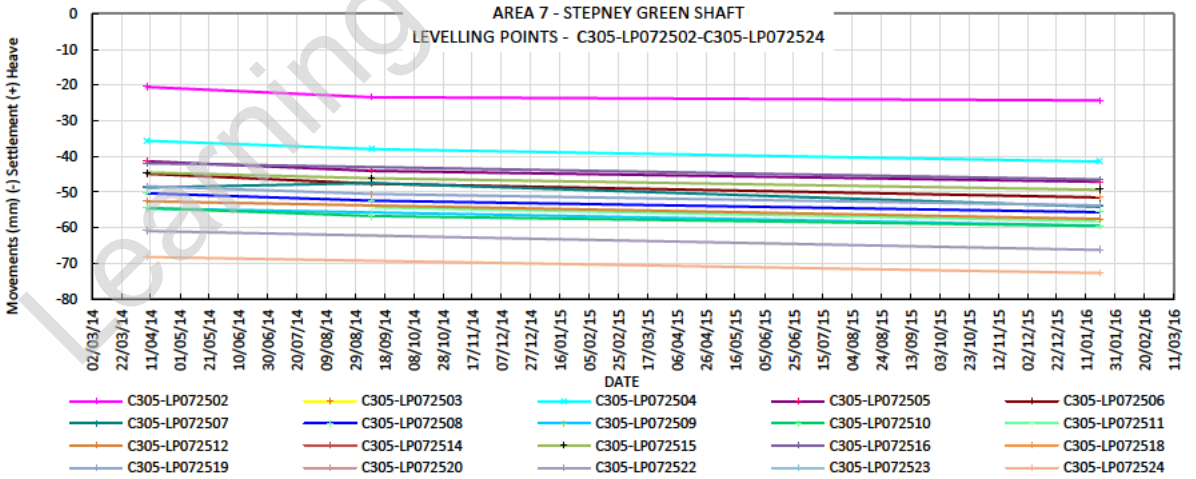
C305-LP072502 TO C305-LP072524

The graph presented below shows a settlement of -10.80 mm in January 2013 after the shaft construction and -59.70 mm in September 2013 after the SCL works.

The maximum settlement of -72.7 mm was recorded in January 2016 during the dewatering.



The plot below shows the trend line adjustment for each levelling point:



The table below lists the annual settlement rate for each levelling point:

	Registered movement (mm)			Rate mm/year
	08/04/2014	09/09/2014	20/01/2016	
C305-LP072502	-20.50	-23.40	-24.30	-1.767
C305-LP072503	#N/A	#N/A	#N/A	-
C305-LP072504	-35.60	-37.90	-41.40	-3.079
C305-LP072505	-41.30	-44.00	-47.10	-3.007
C305-LP072506	-44.80	-47.60	-51.50	-3.531
C305-LP072507	-48.70	-47.40	-54.10	-3.487
C305-LP072508	-50.30	-52.40	-55.60	-2.814
C305-LP072509	-54.50	#N/A	-59.40	-2.743
C305-LP072510	-54.40	-56.70	-59.50	-2.658
C305-LP072511	#N/A	-54.30	-58.10	-2.785
C305-LP072512	-52.60	#N/A	-57.50	-2.743
C305-LP072514	#N/A	#N/A	#N/A	-
C305-LP072515	-44.50	-46.10	-49.30	-2.603
C305-LP072516	-41.90	#N/A	-46.50	-2.575
C305-LP072518	#N/A	#N/A	-51.30	-
C305-LP072519	-48.30	-50.50	-53.70	-2.856
C305-LP072520	#N/A	-50.70	#N/A	-
C305-LP072522	-60.90	#N/A	-66.20	-2.967
C305-LP072523	#N/A	#N/A	#N/A	-
C305-LP072524	-68.20	#N/A	-72.70	-2.519
	Rate less than -2.5 mm/year		% less 2 mm/ year	7%
	Rate greater than -3.5 mm/year		% less 3 mm/ year	73%

Note: All the movements are in mm. (-) Settlement / (+) Heave

#N/A: No readings

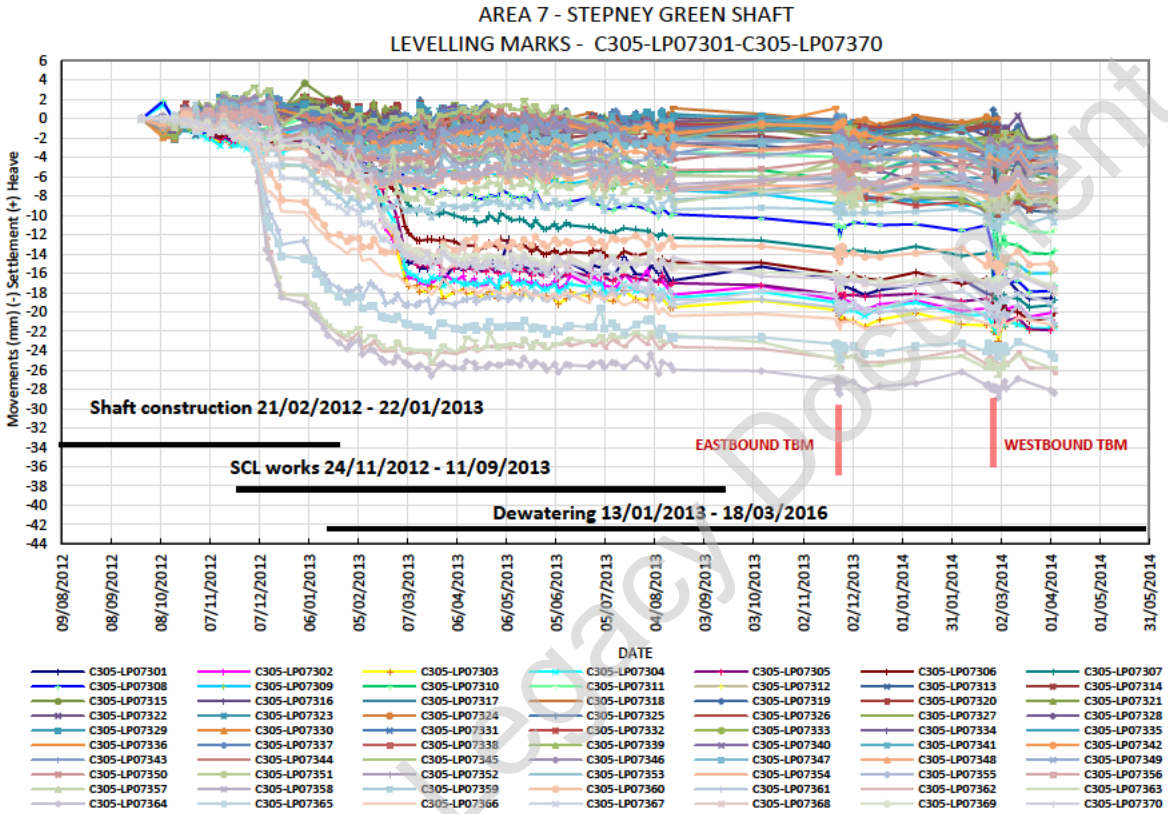
The percentage of the levelling points with a settlement rate less than 2mm/year is 7%, whereas 73% are less than 3mm/year.

C305-LP07301 TO C305-LP07370

The graph presented below shows a settlement of -4.0 mm due to the shaft construction and -25.5 mm after after the SCL works.

A settlement of -2 mm was recorded after Eastbound TBM pass and -1 mm after Westbound TBM pass.

The maximum settlement of -28.1 mm was recorded in April 2014 during the dewatering.



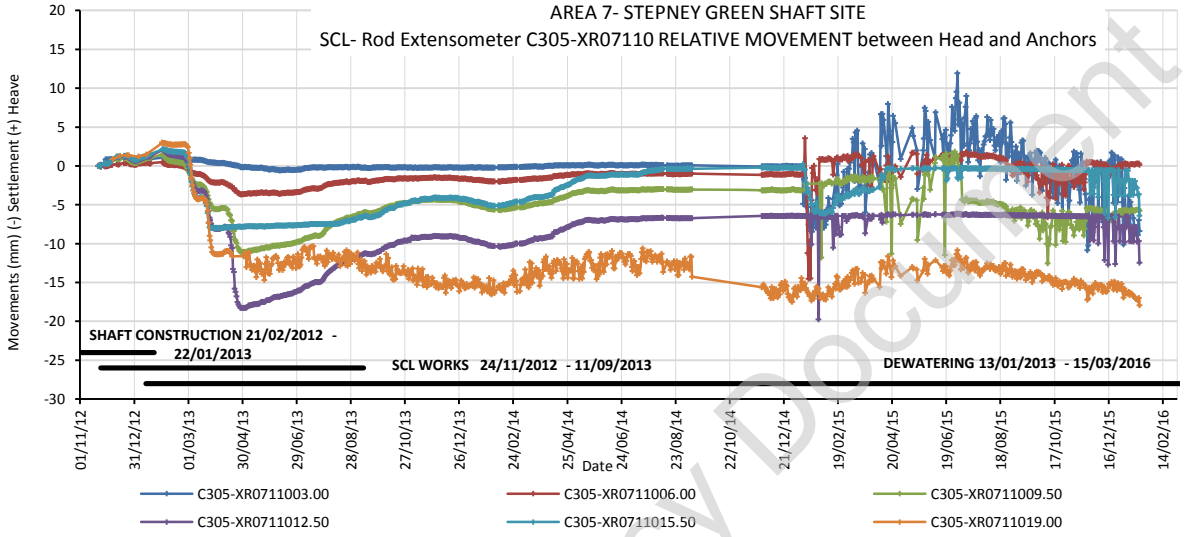
Due to the fact that these monitoring points were destroyed, long term monitoring was not possible. Therefore, annual settlement rate for each levelling point was not calculated.

ROD EXTENSOMETERS

C305-XR07110

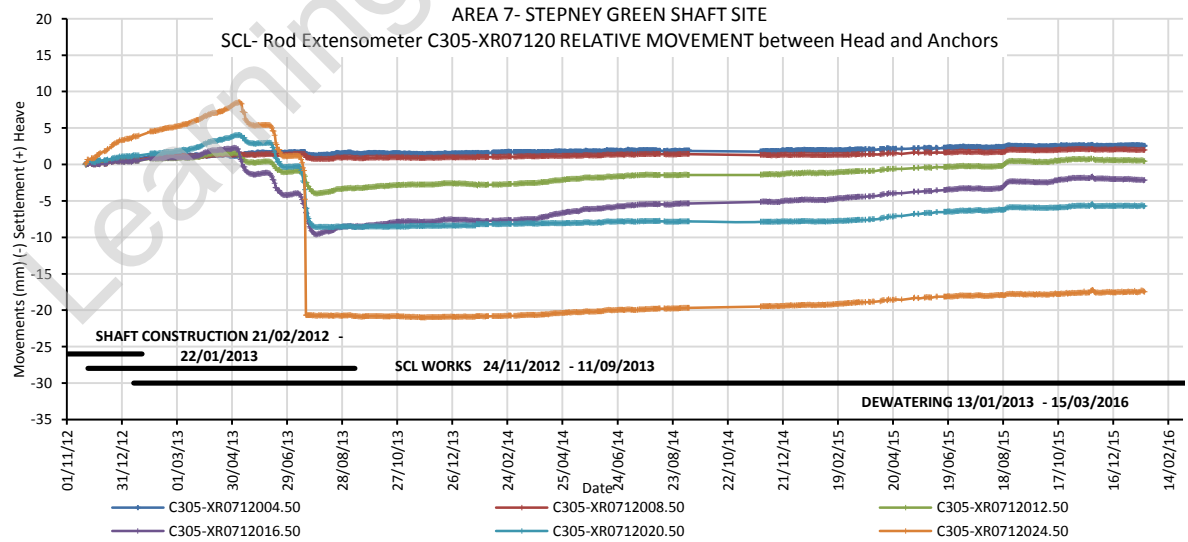
The graph presented below shows the readings of the automatic rod extensometer C305-XR07110. A maximum movement of -18.26 mm (at a depth of 12.50 m) was recorded in April 2013 after the shaft construction and during the SCL works.

From February 2015 to January 2016 the data show spiky readings at different depths.



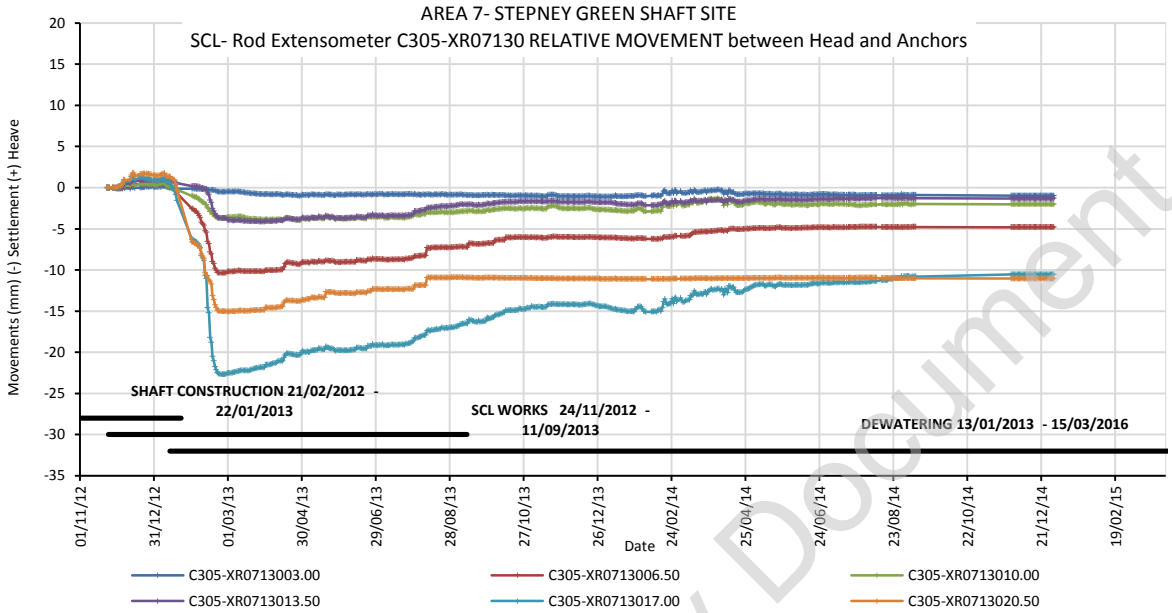
C305-XR07120

The graph presented below shows the readings of the automatic rod extensometer C305-XR07120. A maximum movement of -20.74 mm (at a depth of 24.50 m) was recorded in July 2013 after the shaft construction and during the SCL works.



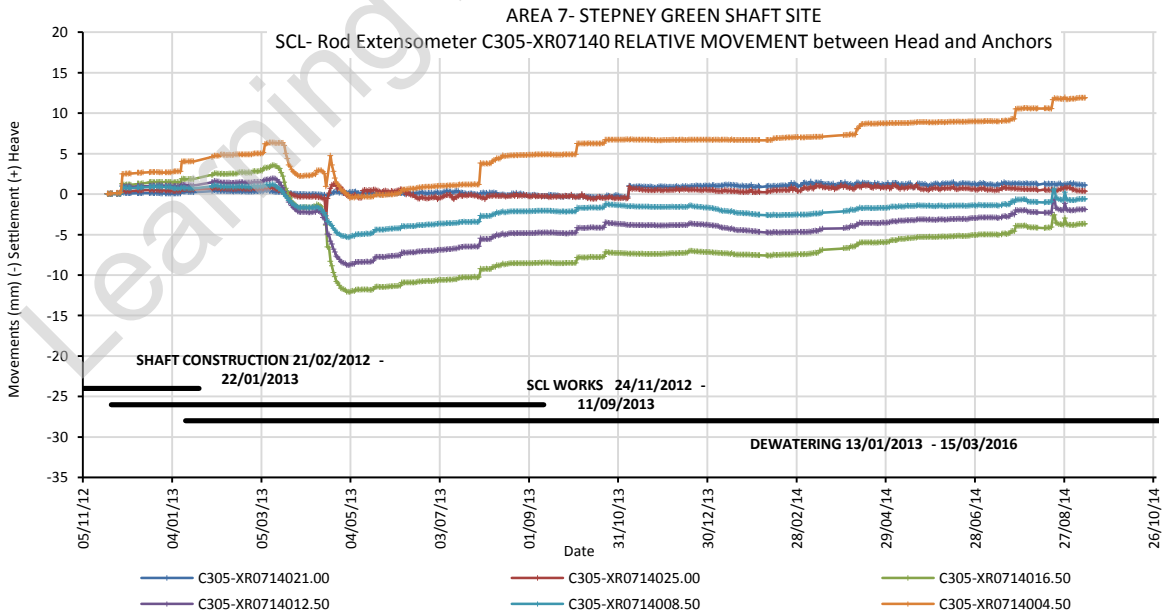
C305-XR07130

The graph presented below shows the readings of the automatic rod extensometer C305-XR07130. A maximum movement of -22.63 mm (at a depth of 17.00 m) was recorded in February 2013 after the shaft construction and during the SCL works.



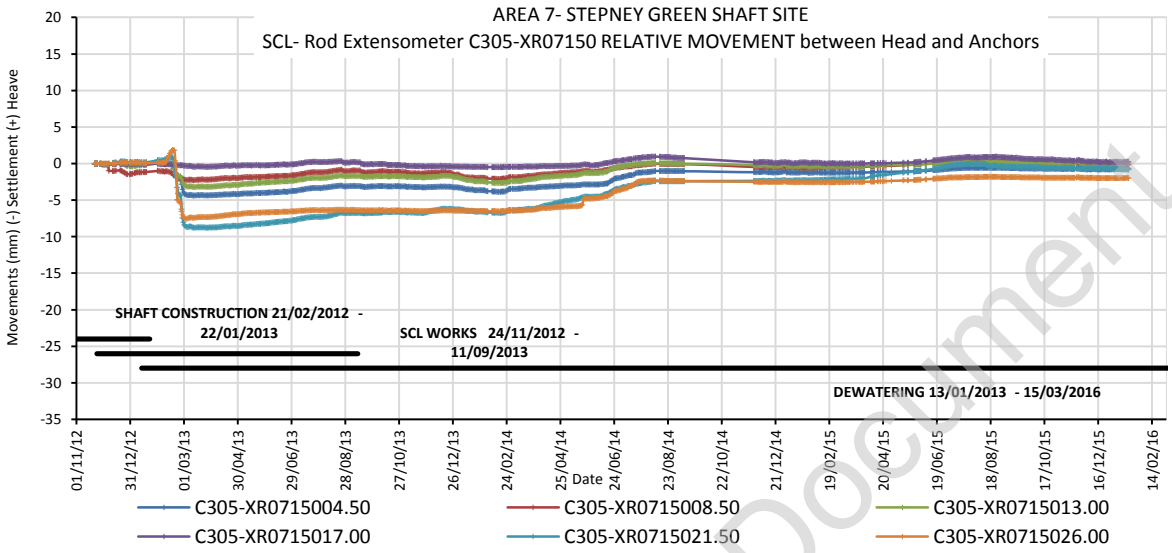
C305-XR07140

The graph presented below shows the readings of the automatic rod extensometer C305-XR07140. A maximum movement of -12.12 mm (at a depth of 16.50 m) was recorded in May 2013 after the shaft construction and during the SCL works.



C305-XR07150

The graph presented below shows the readings of the automatic rod extensometer C305-XR07150. A maximum movement of -8.75 mm (at a depth of 26.00 m) was recorded in March 2013 after the shaft construction and during the SCL works.

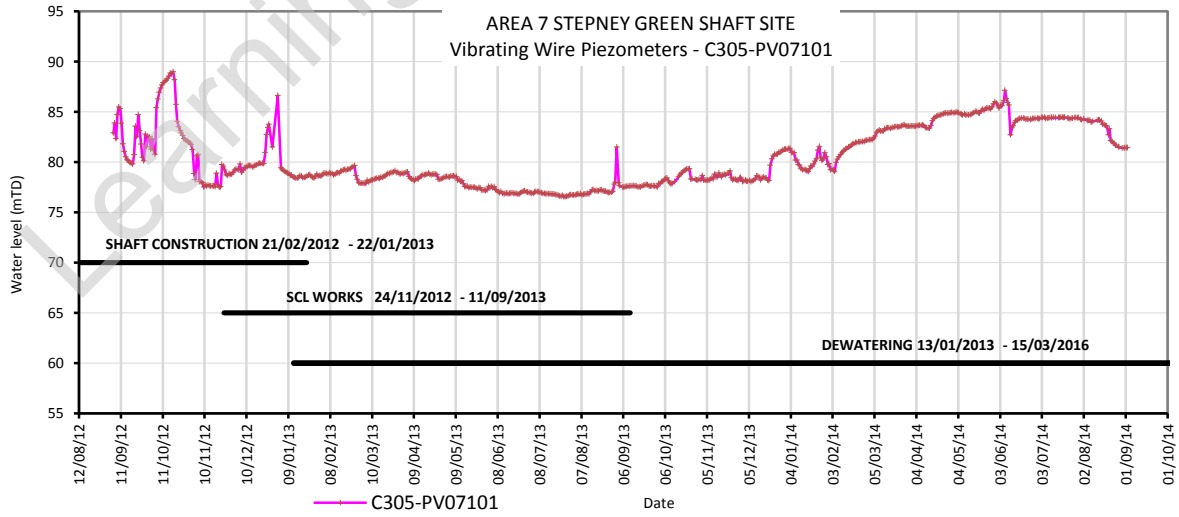


VIBRATING WIRE PIEZOMETER

C305-PV07101

The graph presented below shows the readings of the vibrating wire piezometer C305-PV07101.

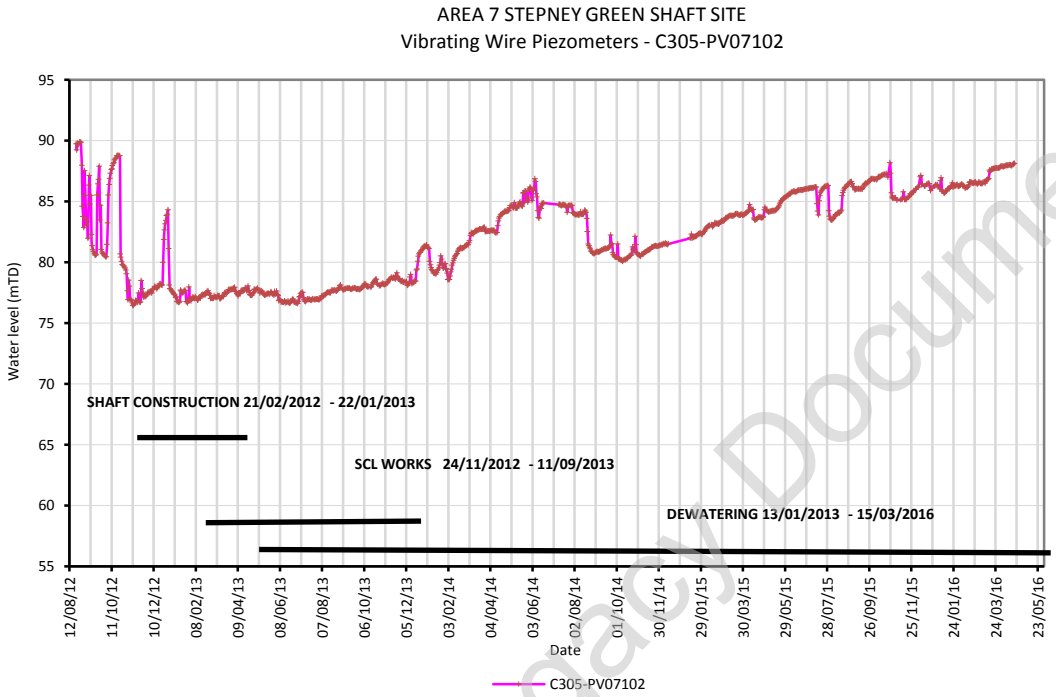
The lowest point of the water level (76.60 m) was recorded in July 2013 after the shaft construction and during the SCL works. Post SCL works staged switch off of various wells took place resulting in a progressive rise of +10 m in the water level.



C305-PV07102

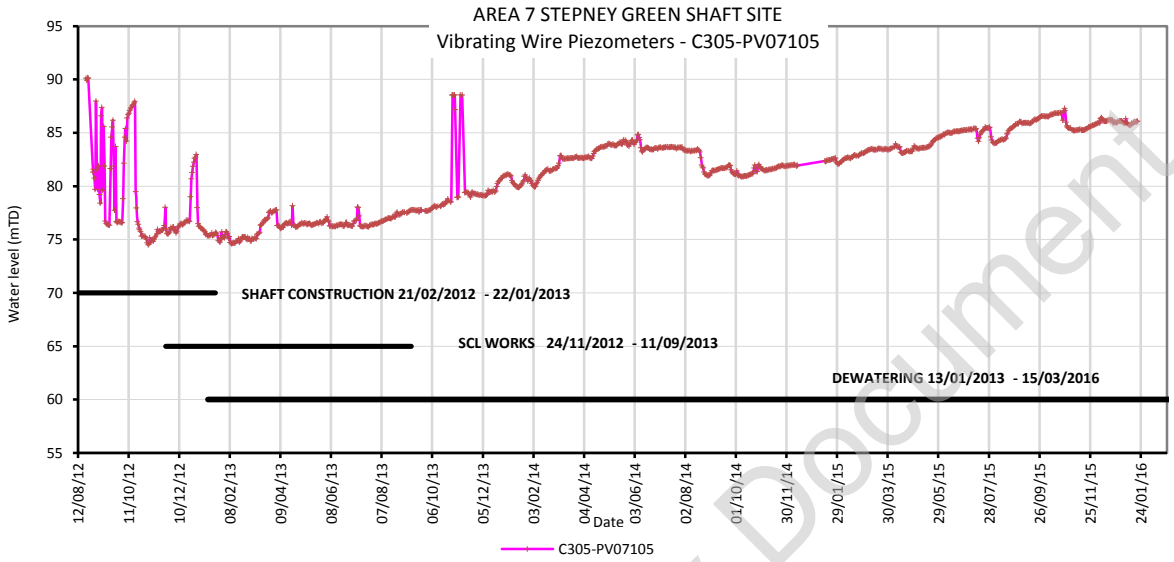
The graph presented below shows the readings of the vibrating wire piezometer C305-PV07102.

The lowest point of the water level (76.60 m) was recorded between November 2012 and August 2013 during the shaft construction and SCL works. Post SCL works staged switch off of various wells took place resulting in a progressive rise of +12 m in the water level.



C305-PV07105

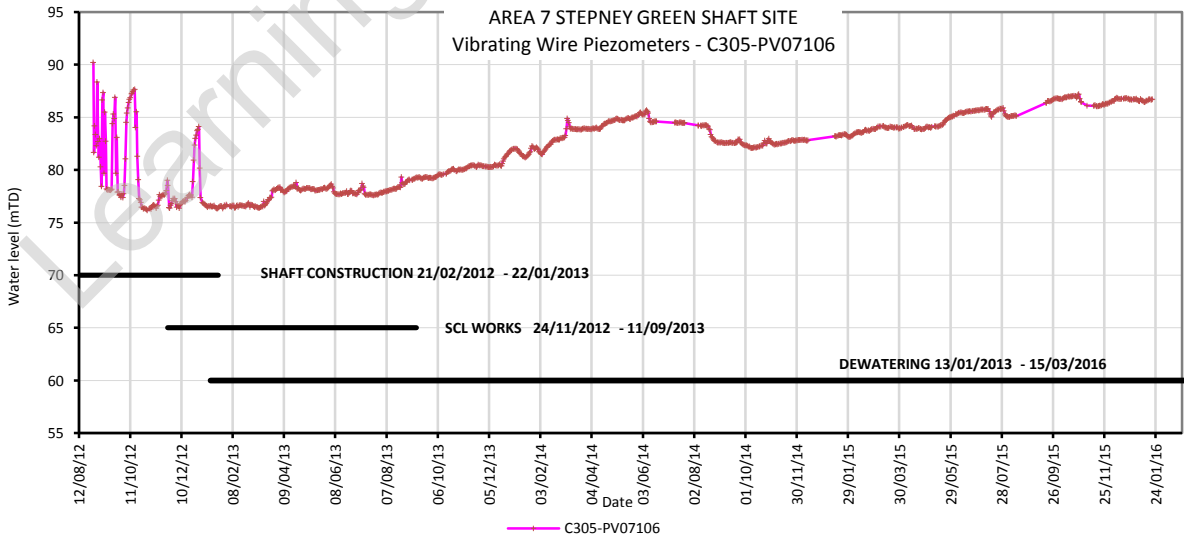
The graph presented below shows the readings of the vibrating wire piezometer C305-PV07105. The lowest point of the water level (74.50 m) was recorded between November 2012 and March 2013 during the shaft construction and SCL works. Post SCL works staged switch off of various wells took place resulting in a progressive rise of +12 m in the water level.



C305-PV07106

The graph presented below shows the readings of the vibrating wire piezometer C305-PV07106.

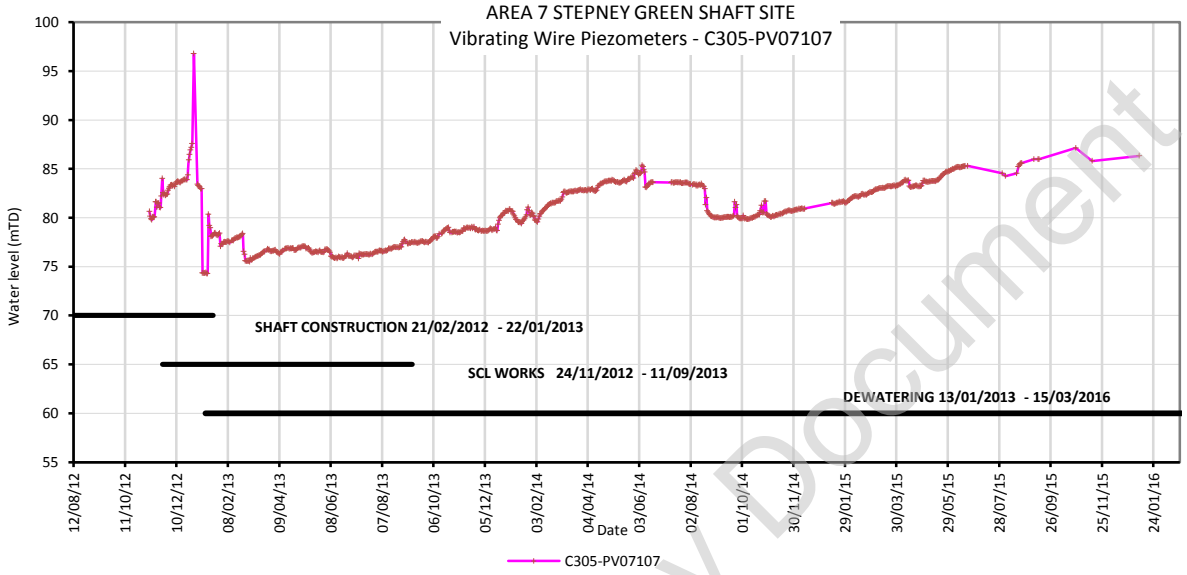
The lowest point of the water level (76.20 m) was recorded between November 2012 and March 2013 during the shaft construction and SCL works. Post SCL works staged switch off of various wells took place resulting in a progressive rise of +10 m in the water level.



C305-PV07107

The graph presented below shows the readings of the vibrating wire piezometer C305-PV07107.

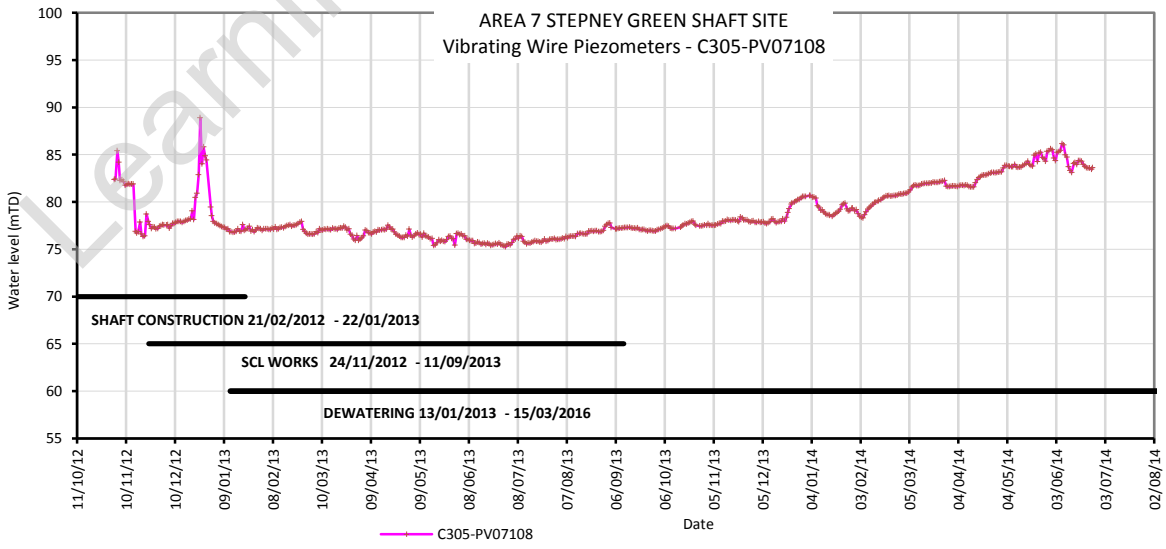
The lowest point of the water level (74.30 m) was recorded between January 2013 and June 2013 during the shaft construction and SCL works. Post SCL works staged switch off of various wells took place resulting in a progressive rise of +12 m in the water level.



C305-PV07108

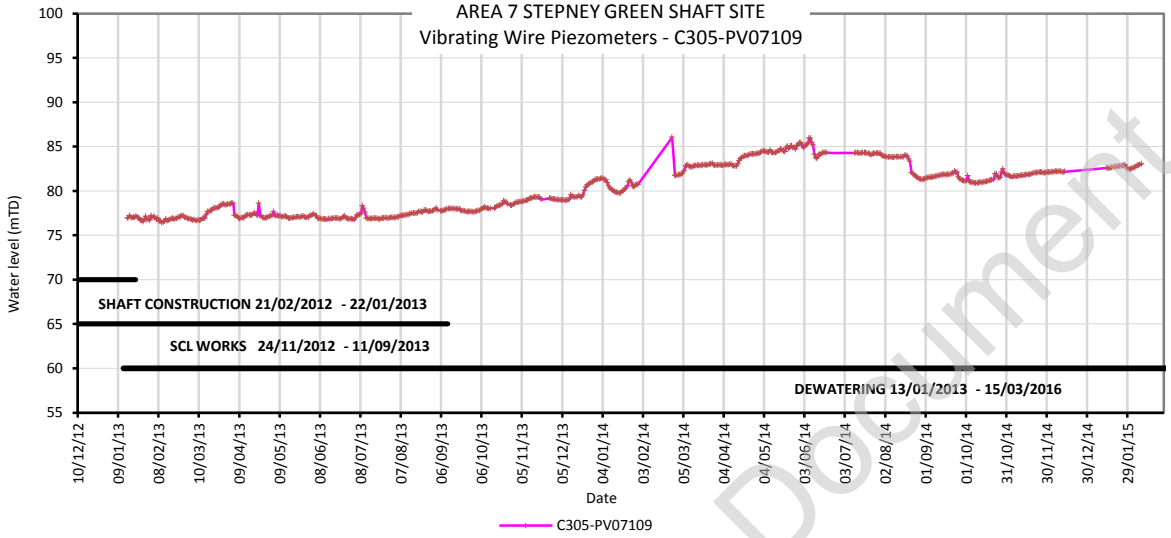
The graph presented below shows the readings of the vibrating wire piezometer C305-PV07108.

The lowest point of the water level (75.24 m) was recorded in June 2013 after the shaft construction and during SCL works. Post SCL works staged switch off of various wells took place resulting in a progressive rise of +12 m in the water level.



C305-PV07109

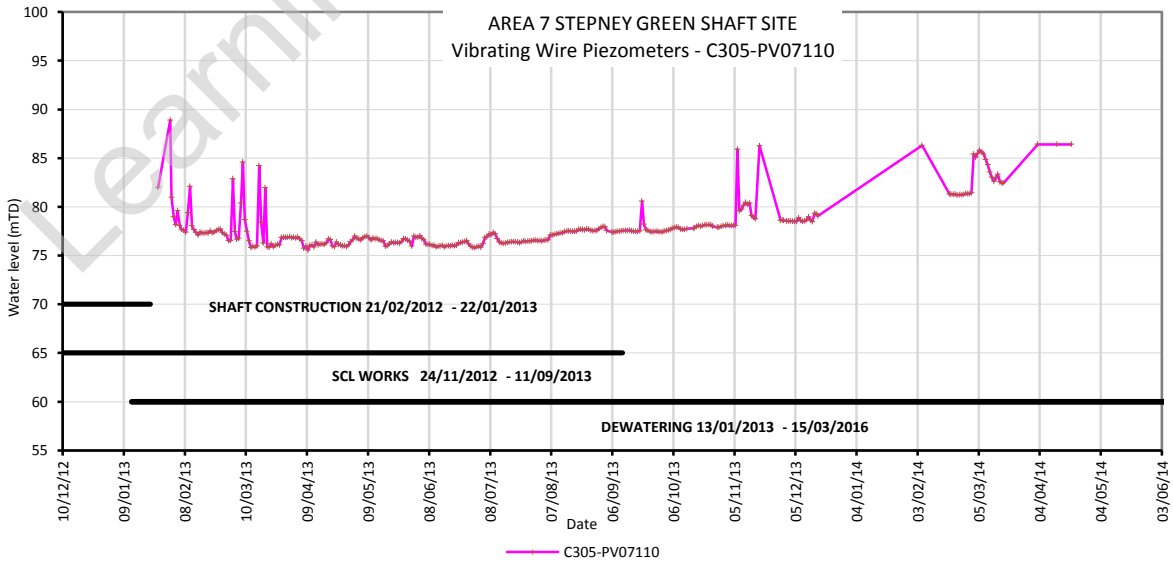
The graph presented below shows the readings of the vibrating wire piezometer C305-PV07109. The lowest point of the water level (76.45 m) was recorded between January 2013 and July 2013 during the shaft construction and SCL works. Post SCL works staged switch off of various wells took place resulting in a progressive rise of +6 m in the water level.



C305-PV07110

The graph presented below shows the readings of the vibrating wire piezometer C305-PV07110.

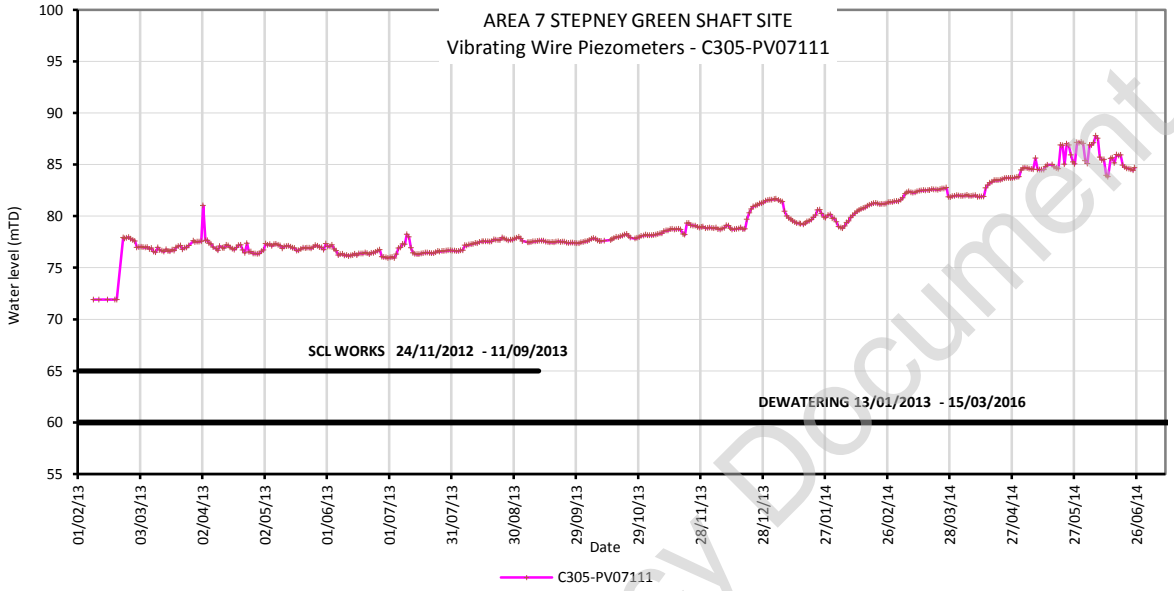
The lowest point of the water level (75.73 m) was recorded between March 2013 and July 2013 during the SCL works. Post SCL works staged switch off of various wells took place resulting in a progressive rise of +9 m in the water level.



C305-PV07111

The graph presented below shows the readings of the vibrating wire piezometer C305-PV07111.

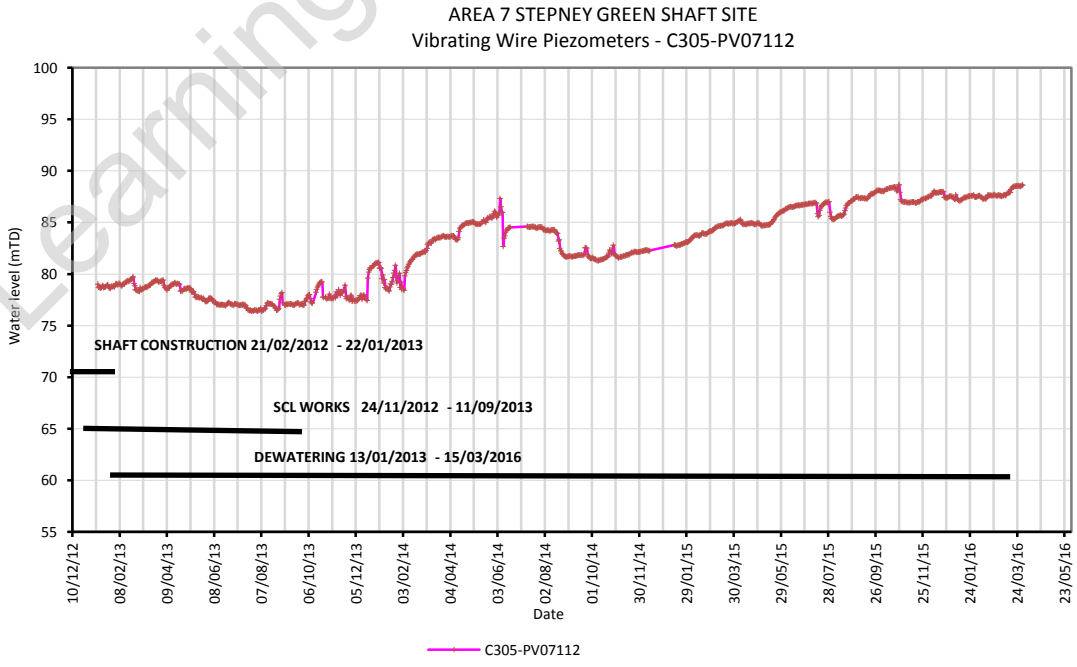
The ground water level of the piezometer shows a steady level at 75.94 m during SCL works between March 2013 and July 2013. Post SCL works staged switch off of various wells took place resulting in a progressive rise of +9 m in the water level.



C305-PV07112

The graph presented below shows the readings of the vibrating wire piezometer C305-PV07112.

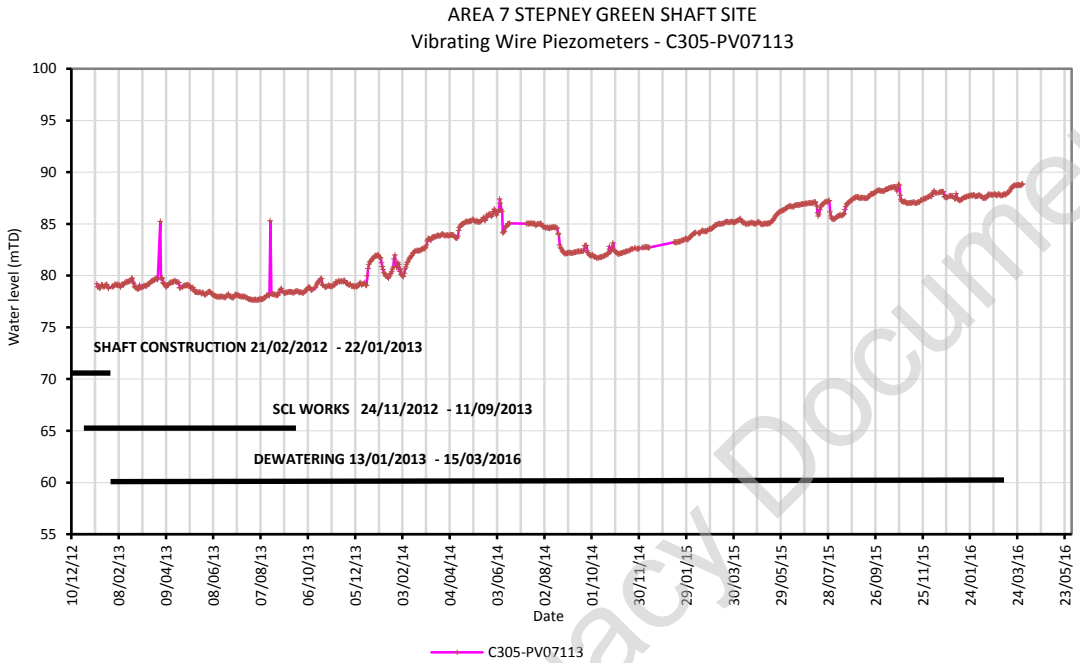
The lowest point of the water level (76.39 m) was recorded in July 2013 during the SCL works. Post SCL works staged switch off of various wells took place resulting in a progressive rise of +11 m in the water level.



C305-PV07113

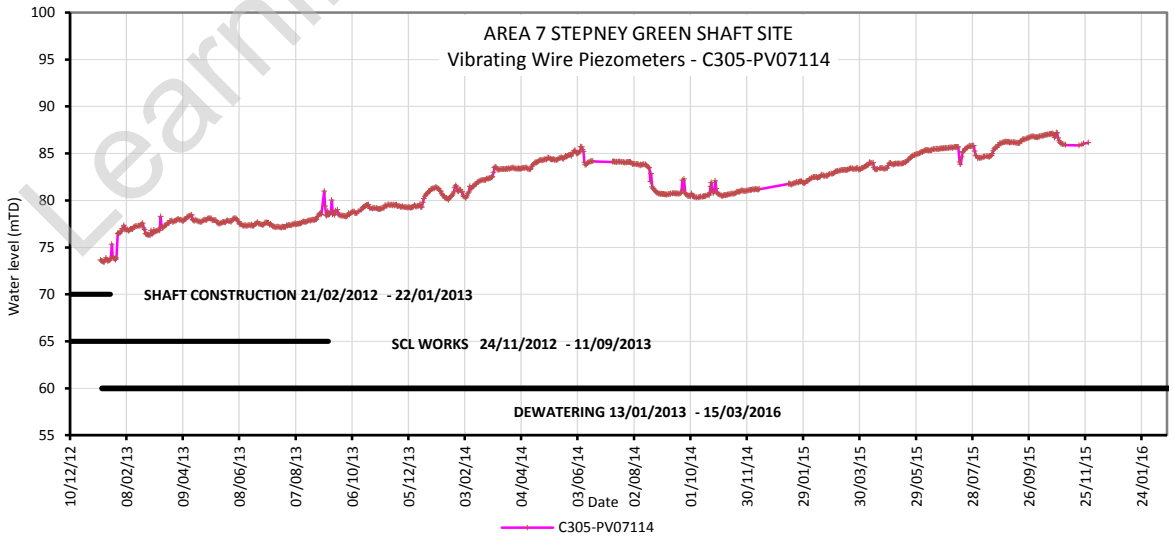
The graph presented below shows the readings of the vibrating wire piezometer C305-PV07113.

The lowest point of the water level (about 77.64 m) was recorded between June 2013 and August 2013 during the SCL works. Post SCL works staged switch off of various wells took place resulting in a progressive rise of +10 m in the water level.



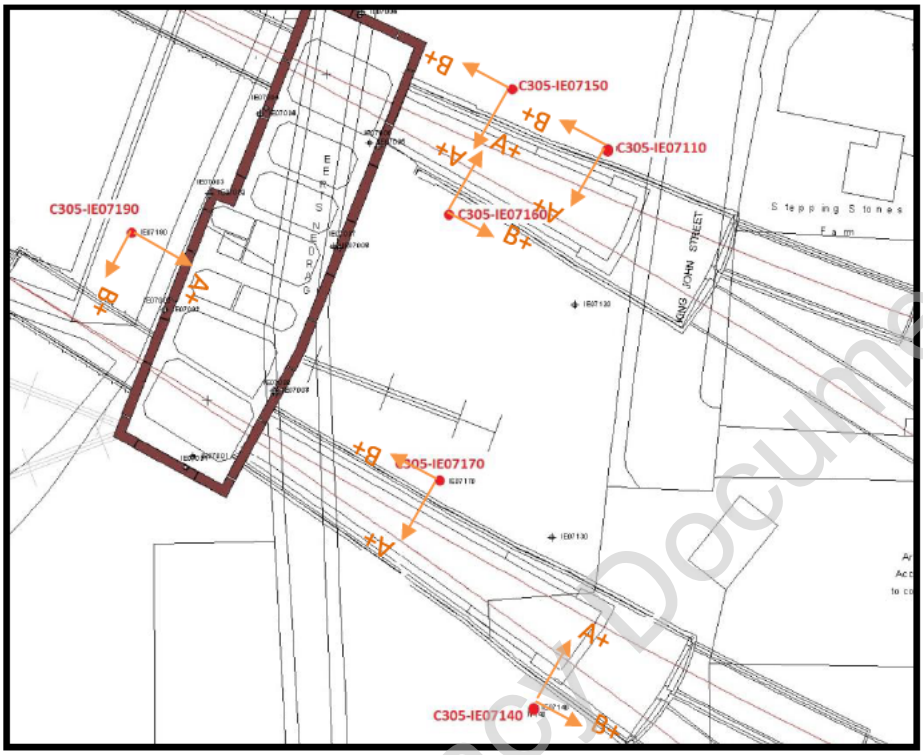
C305-PV07114

The graph presented below shows the readings of the vibrating wire piezometer C305-PV07111.The ground water level of the piezometer shows a steady level at 78.00 m during SCL works between April 2013 and August 2013. Post SCL works staged switch off of various wells took place resulting in a progressive rise of +8 m in the water level.



ELECTRONIC INCLINOMETERS

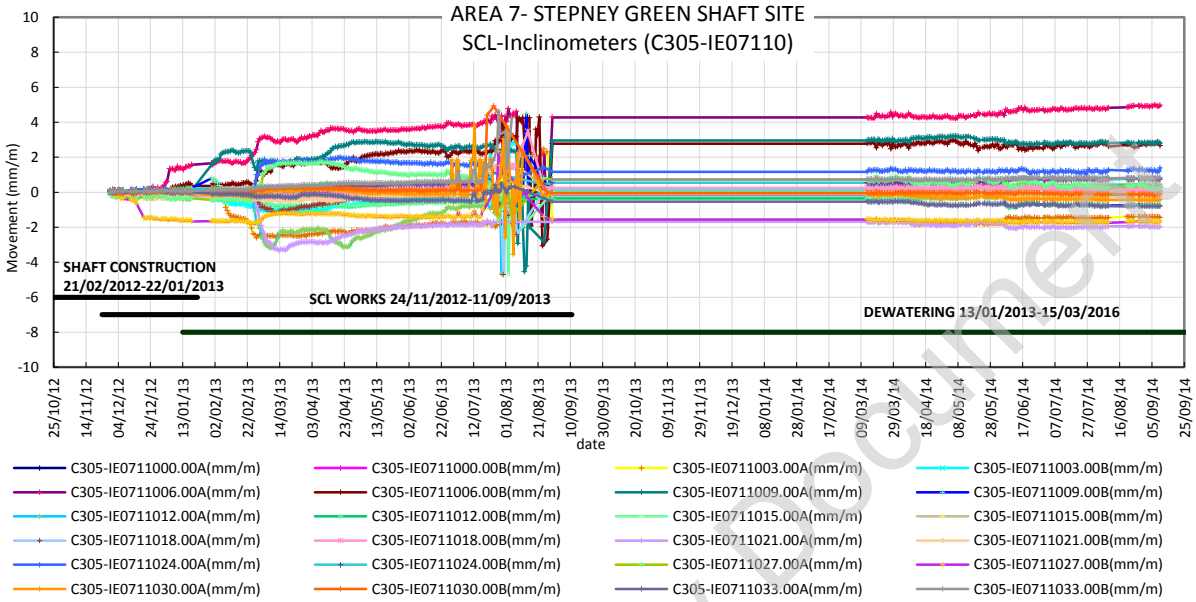
The sketch below shows the location of the electronic inclinometers installed at Stepney Green and their A axis and B axis orientation.

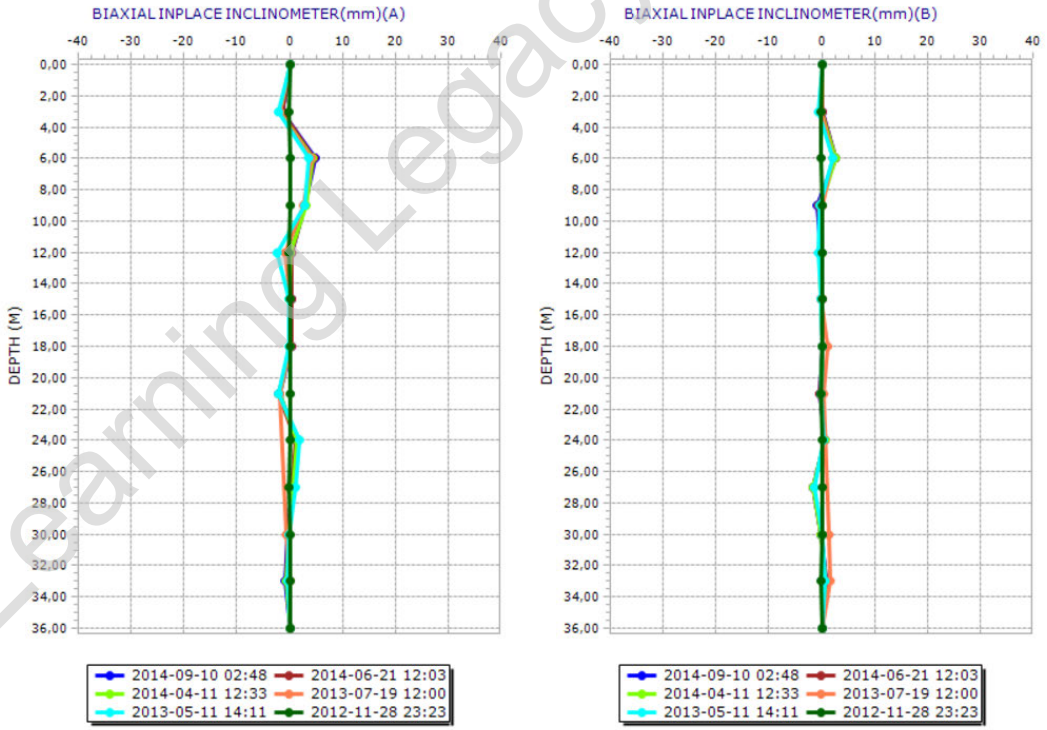


The graphs included in this section show different data gaps due to problems with the power supply. To solve this problem solar panels were installed on site.

C305-IE07110

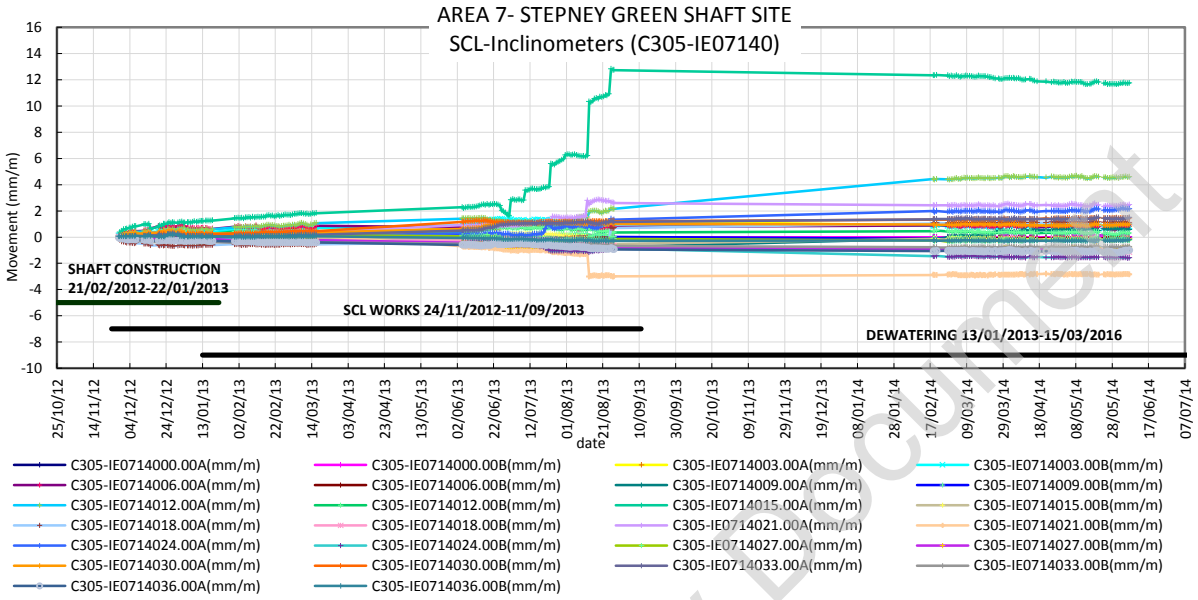
The graph presented below shows the readings of the electronic inclinometer C305-IE07110. A maximum movement of +4.22 mm in A direction (at a depth of 33 m) was recorded in August 2013 after the shaft construction and during the SCL works.

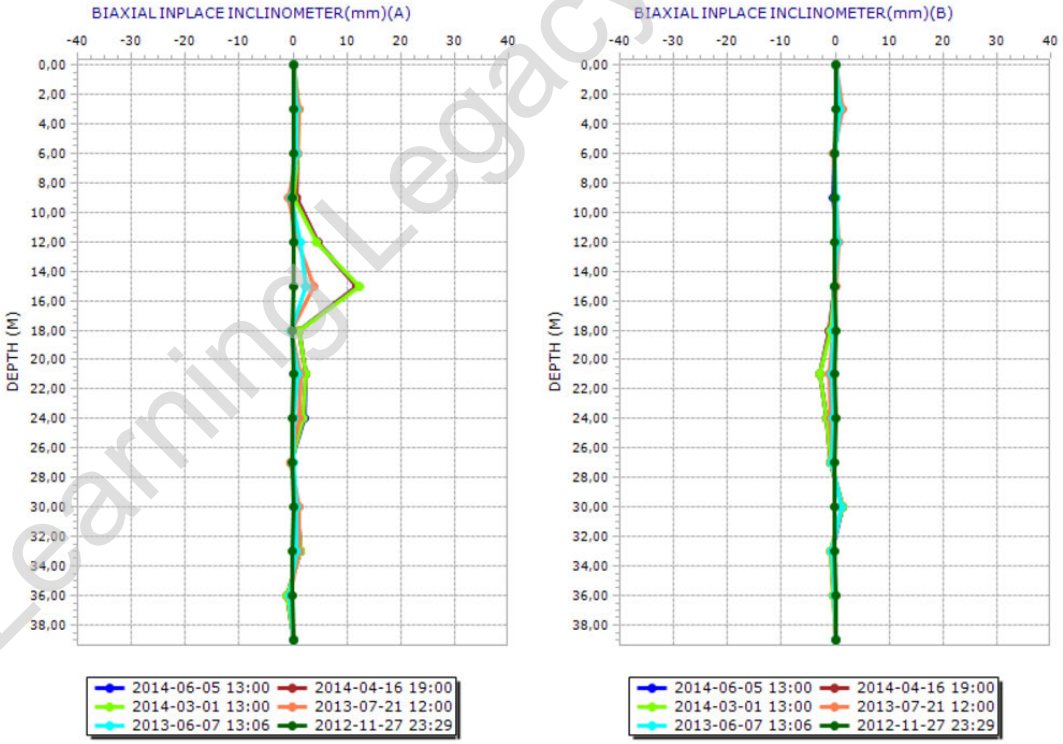




C305-IE07140

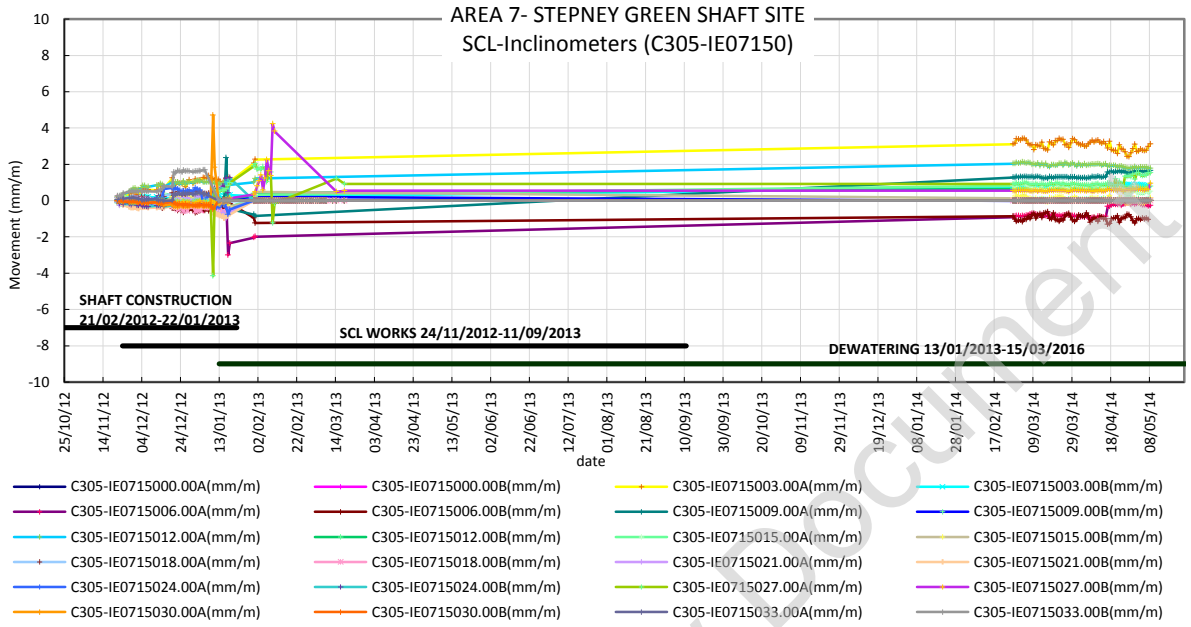
The graph presented below shows the readings of the electronic inclinometer C305-IE07140. A maximum movement of +12.82 mm in A direction (at a depth of 15 m) was recorded in August 2013 after the shaft construction and during the SCL works.

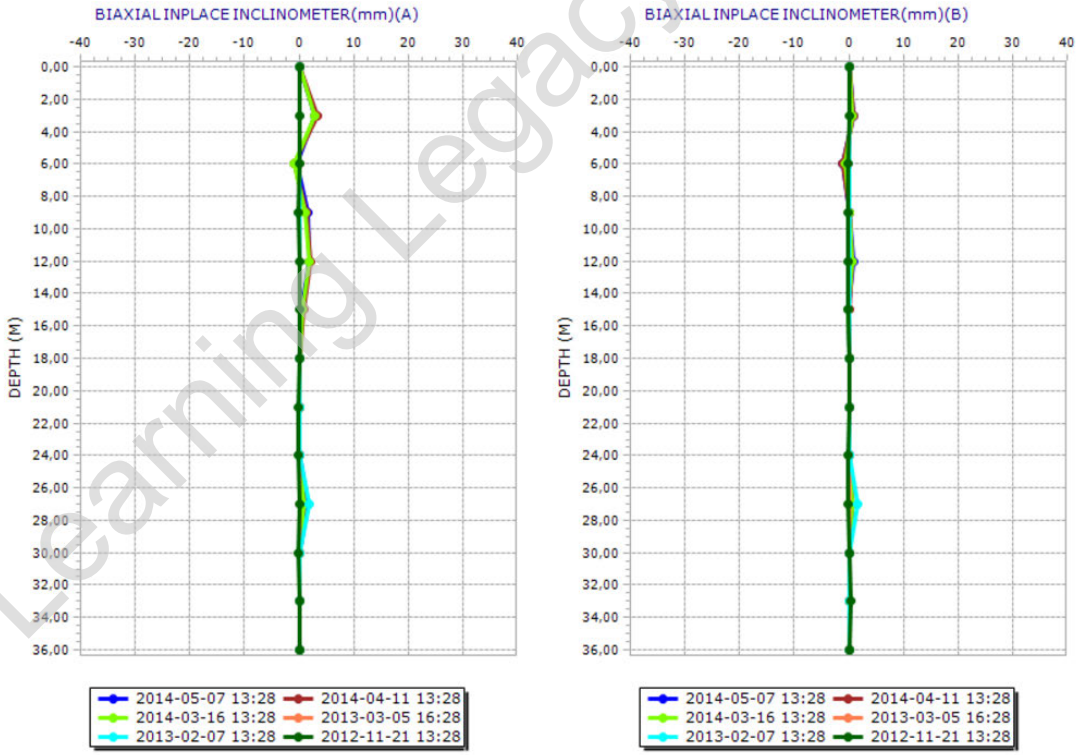




C305-IE07150

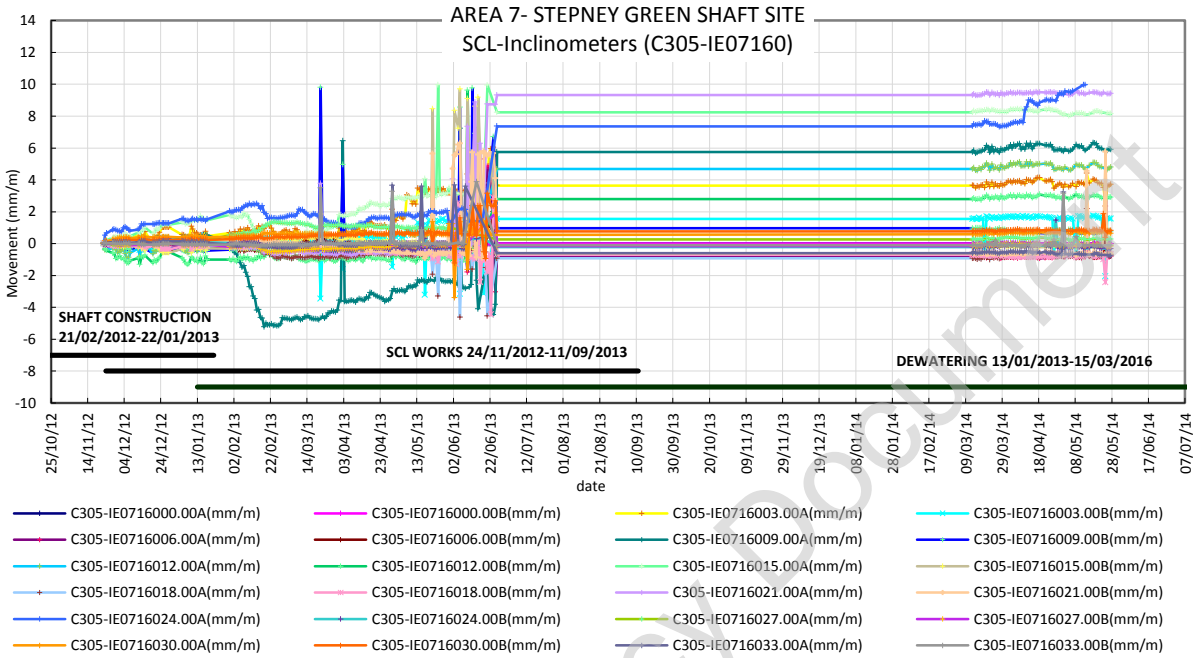
The graph presented below shows the readings of the electronic inclinometer C305-IE07150. No significant movements were recorded during the shaft construction.

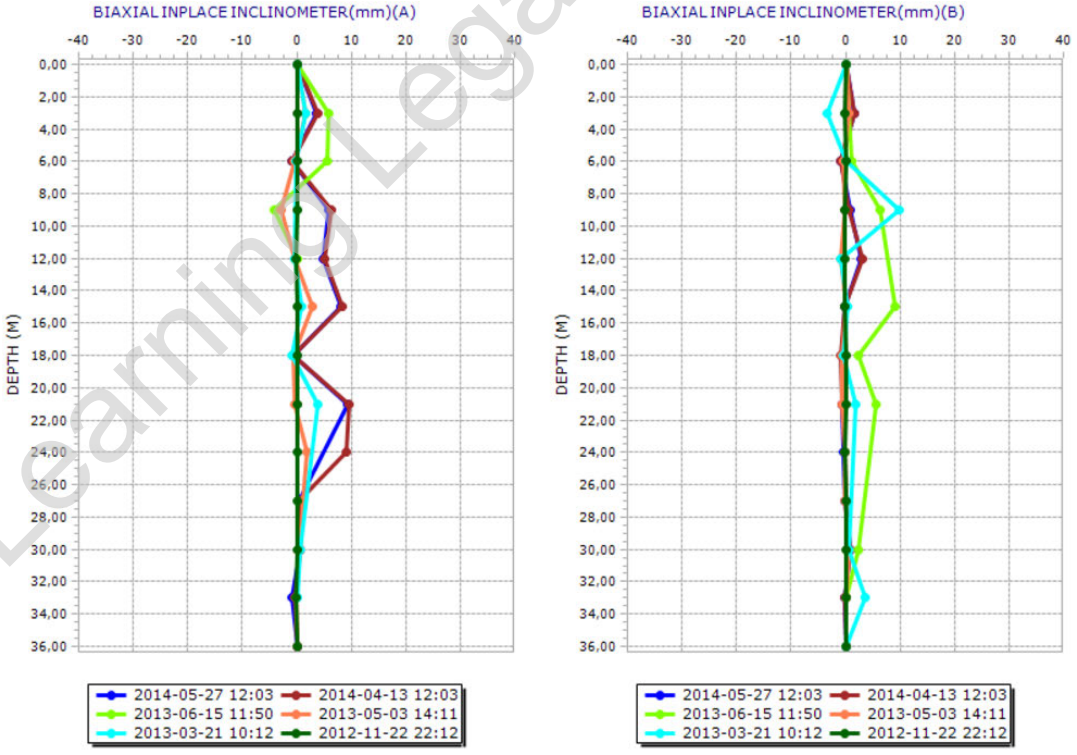




C305-IE07160

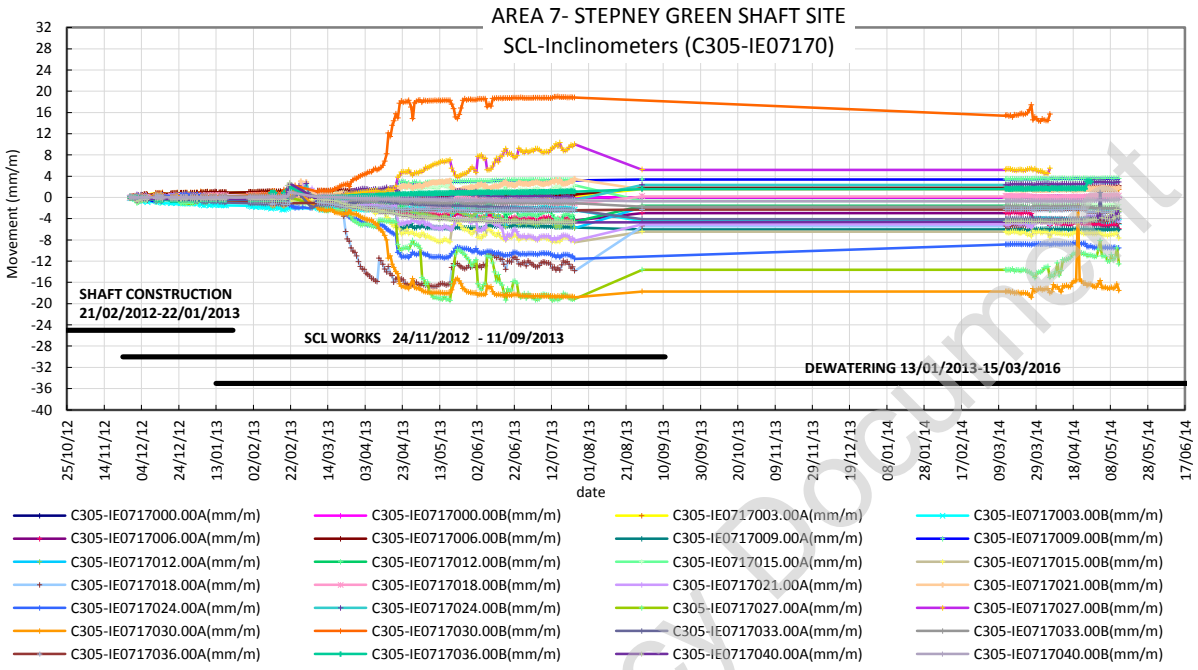
The graph presented below shows the readings of the electronic inclinometer C305-IE07160. A maximum movement of +8.87 mm in A direction (at a depth of 21 m) was recorded in June 2013 after the shaft construction and during the SCL works.

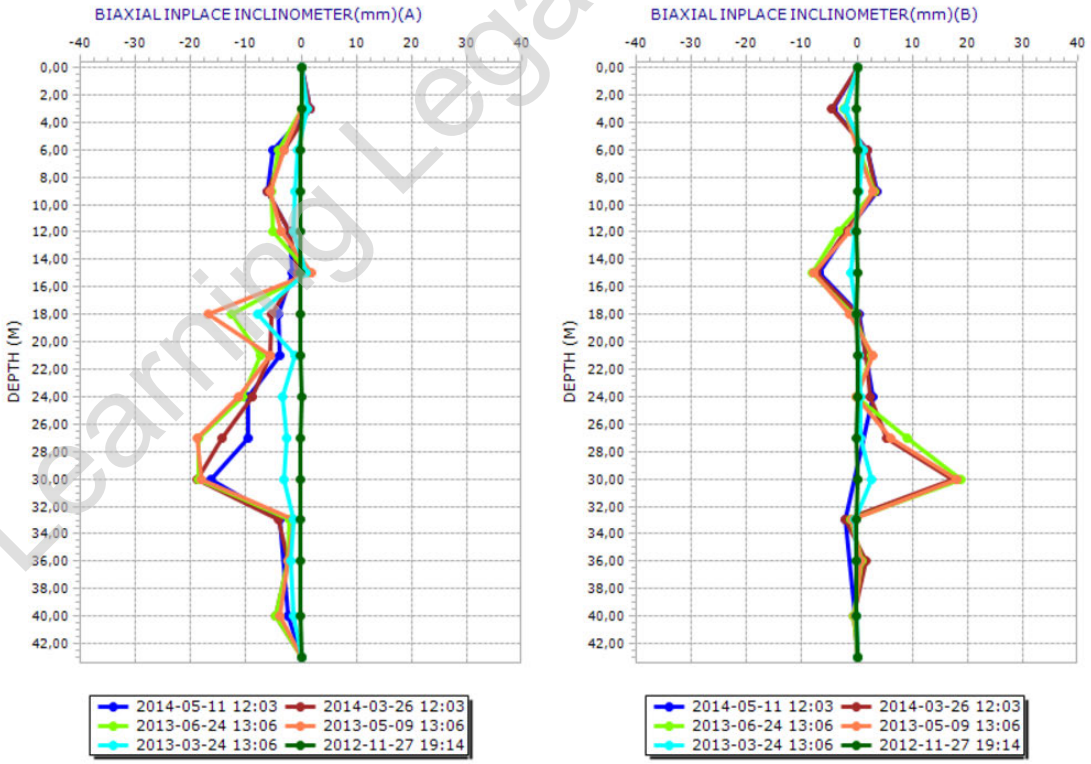




C305-IE07170

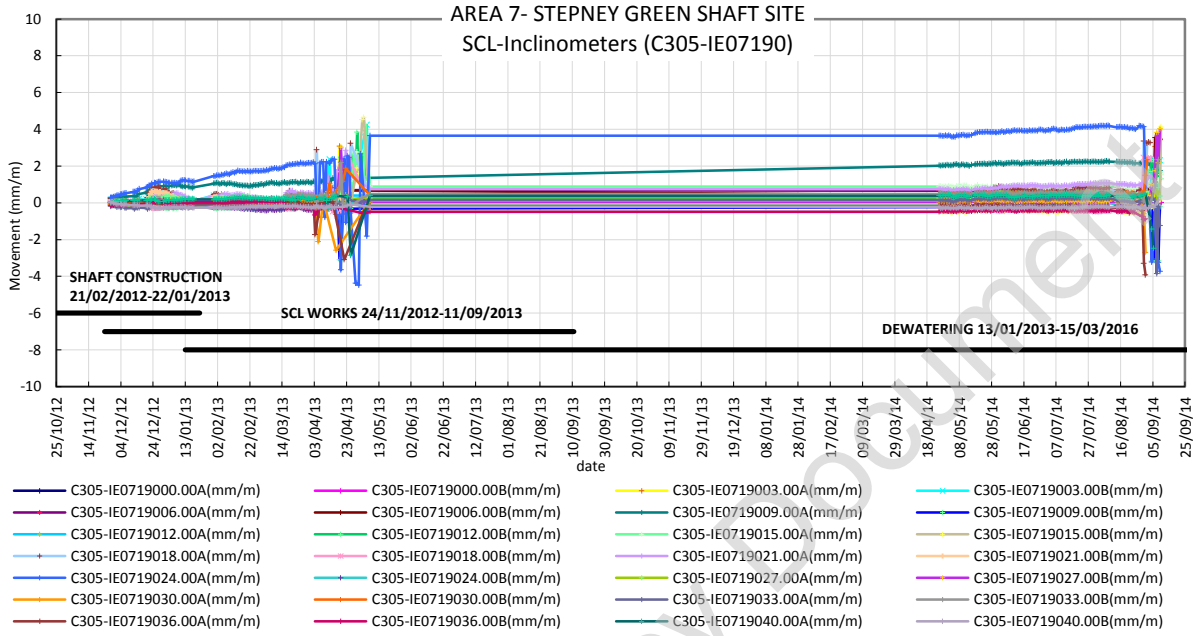
The graph presented below shows the readings of the electronic inclinometer C305-IE07170. A maximum movement of -18.47 mm in A direction (at a depth of 30 m) was recorded in June 2013 after the shaft construction and during the SCL works.

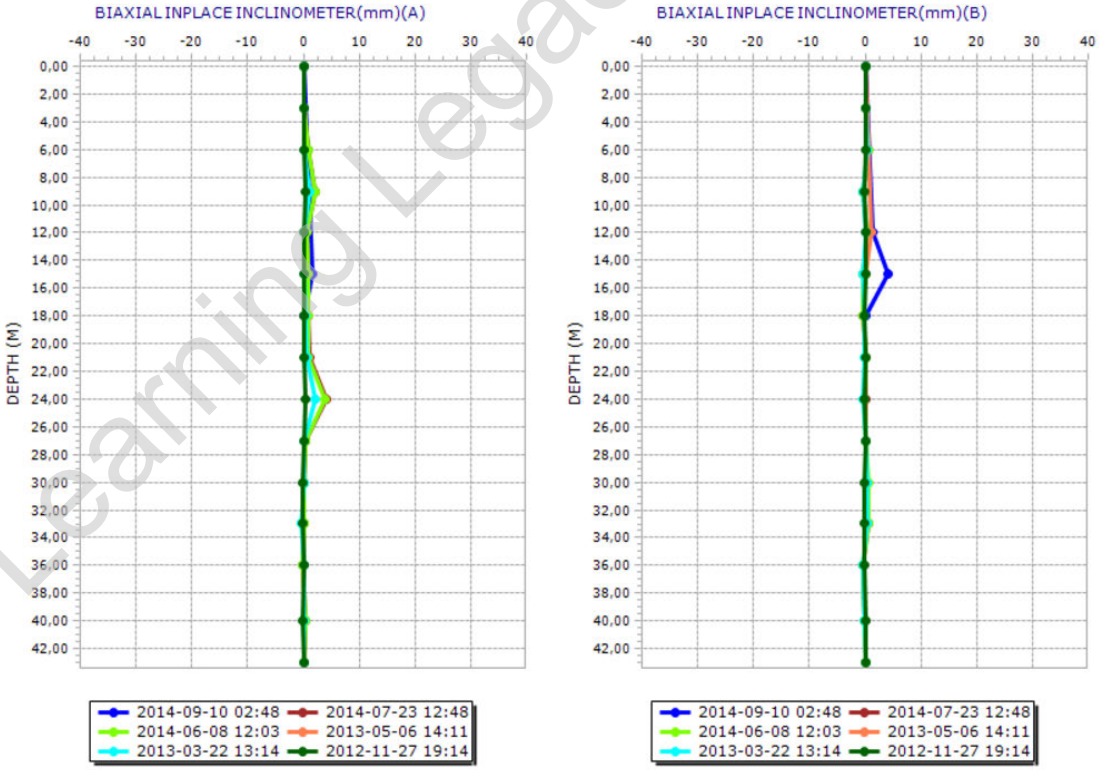




C305-IE07190

The graph presented below shows the readings of the electronic inclinometer C305-IE07190. A maximum movement of +2.13 mm in A direction (at a depth of 24 m) was recorded in March 2013 after the shaft construction and during the SCL works.

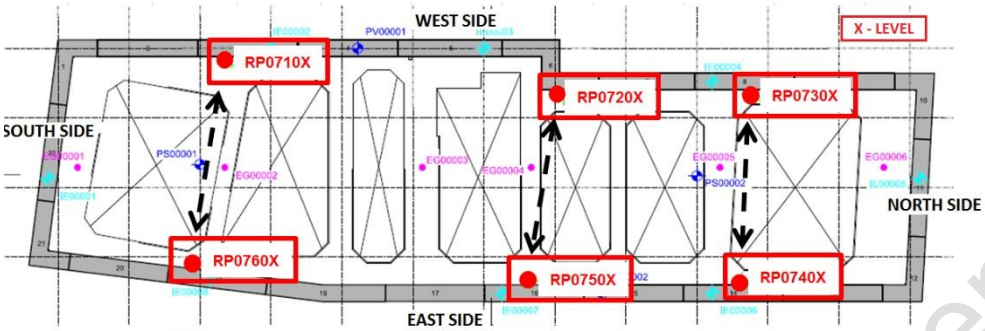




Stepney Green Site - Shaft

3D PRISMS

The sketch below shows the location of the prisms installed at the shaft.

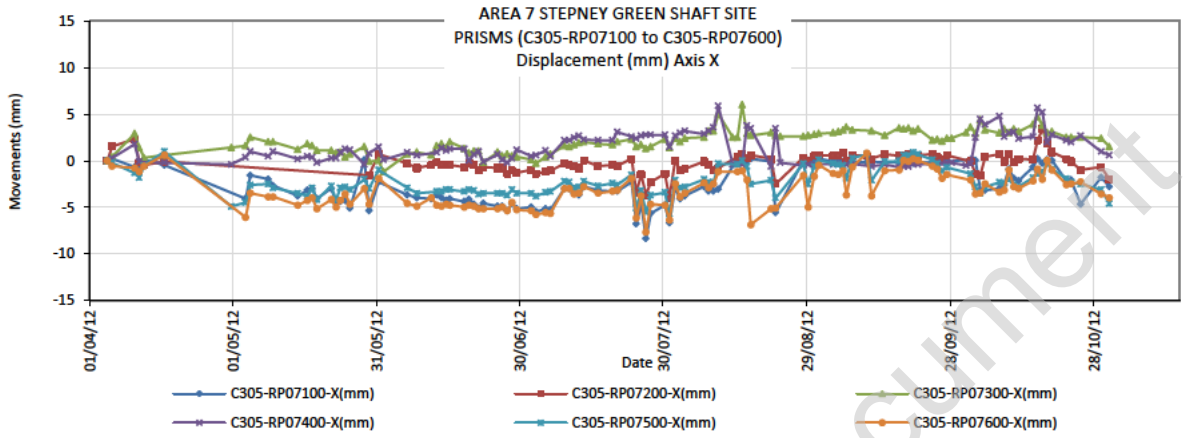


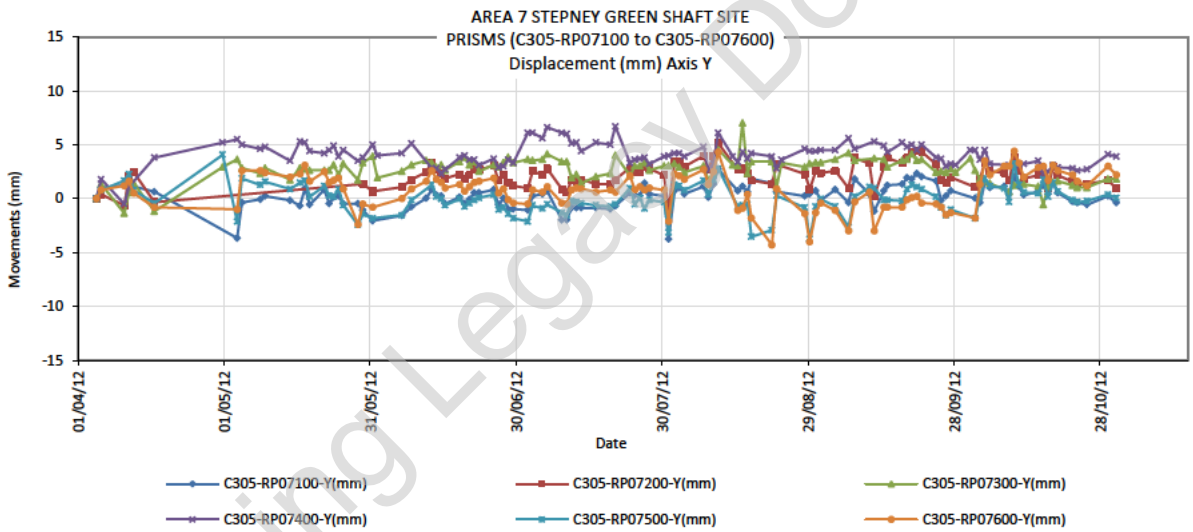
The graphs of the following 3D Prisms indicate the shaft construction between 21st February 2012 and 22nd January 2013.

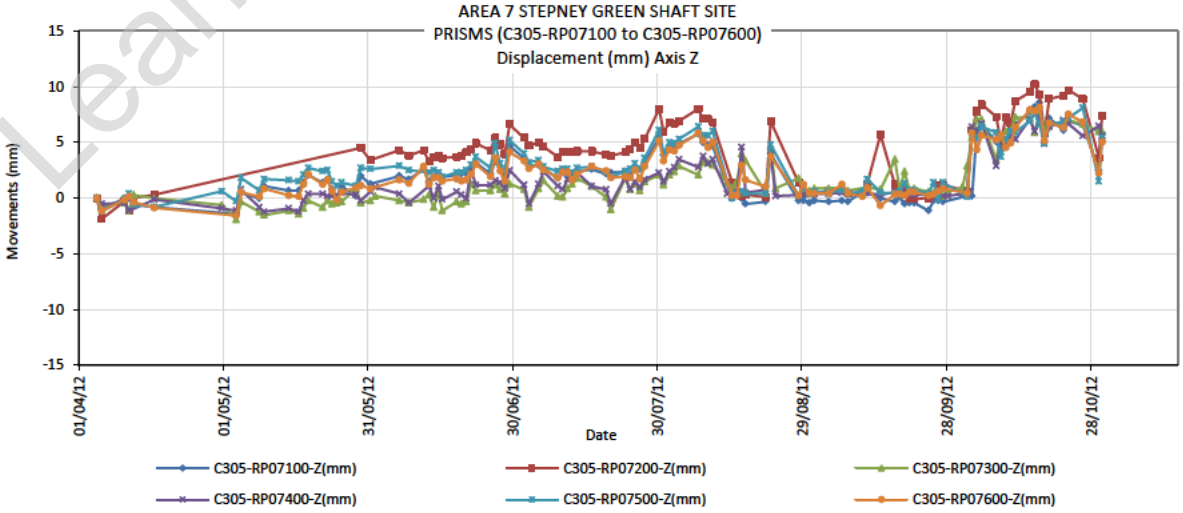
C305-RP07100 TO C305-LP07600

The graphs presented below for the three axes show movements between -5 mm and 5 mm during the shaft construction.

In Z direction, during October 2012, there is a positive movement (heave) between 5 mm and 10 mm.





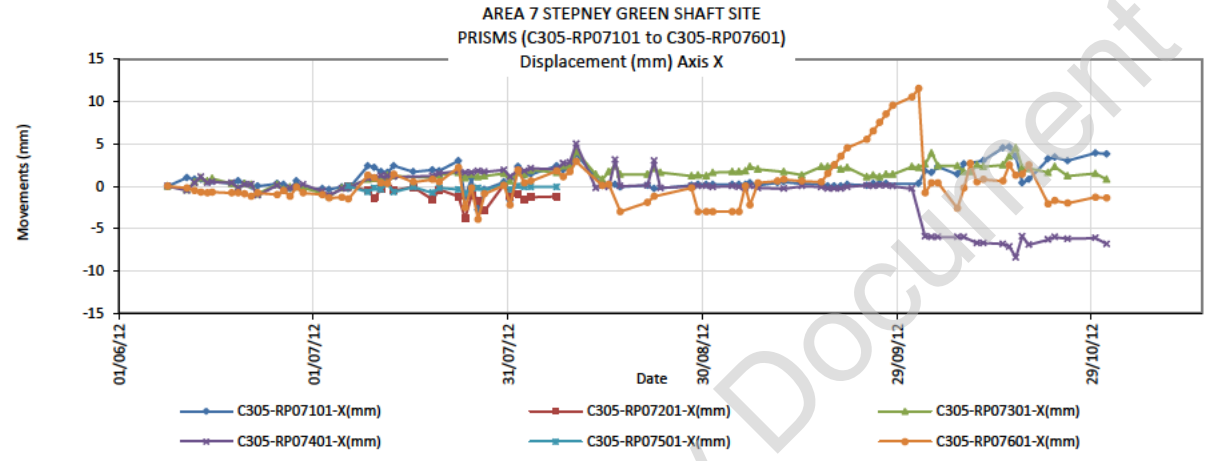


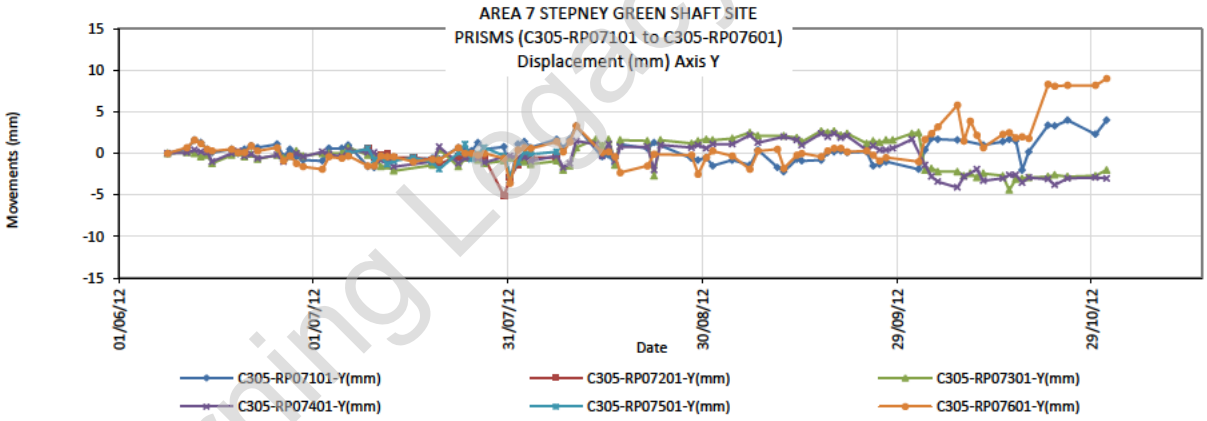
C305-RP07101 TO C305-LP07601

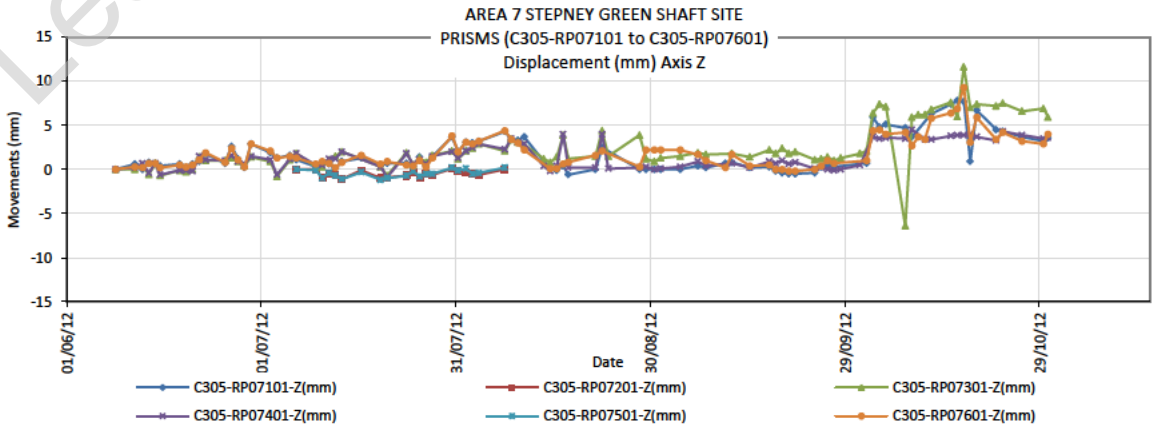
The graphs presented below show no significant movement until October 2012.

In October 2012, prism C305-RP07601 shows a maximum displacement of +11.5 mm (axis X) and prism C305-RP07401 shows a movement of -8.4 mm (axis X).

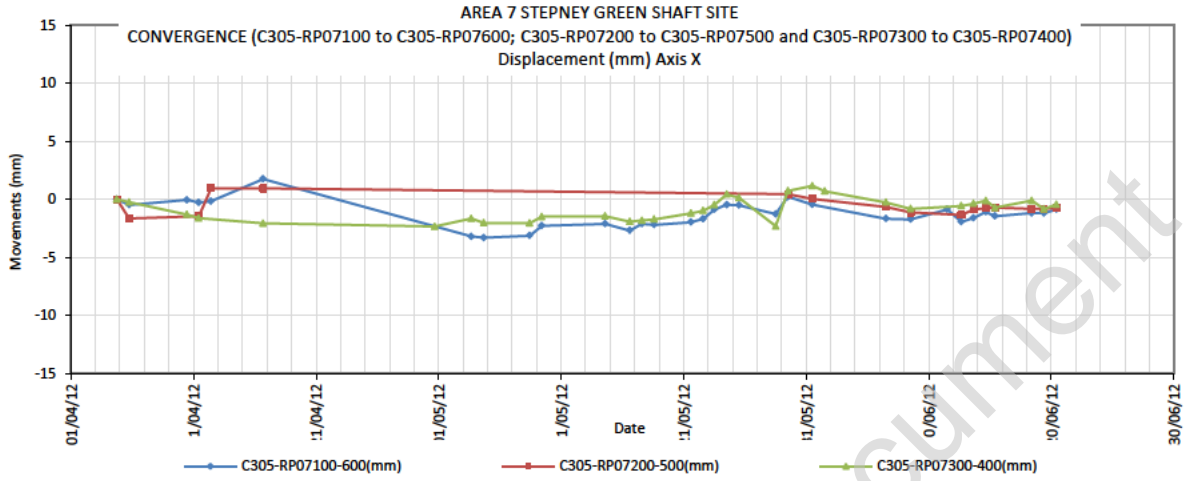
For Y and Z axes, the graphs show a maximum movement of +9 mm and a heave of +11.6 mm, respectively.





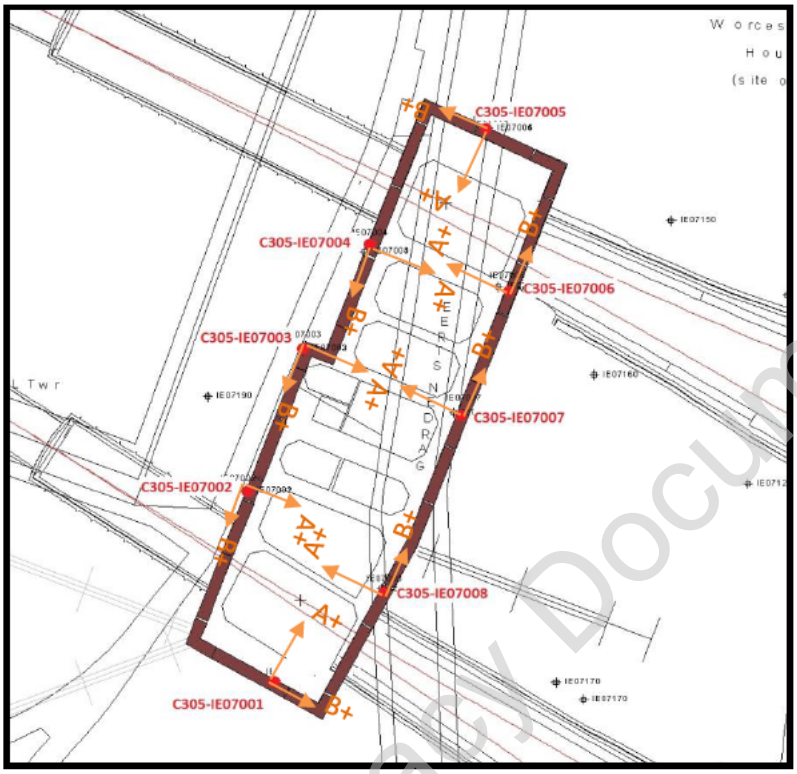


CONVERGENCE (C305-RP07100 to C305-RP07600; C305-RP07200 to C305-RP07500 and C305-RP07300 to C305-RP07400)



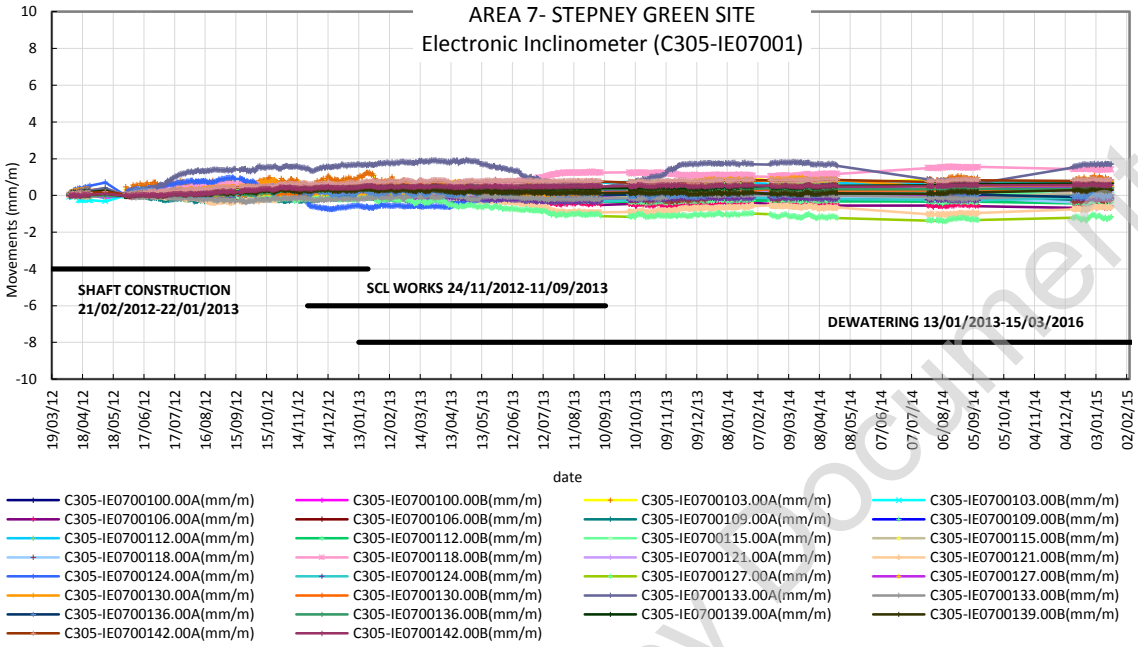
ELECTRONIC INCLINOMETERS

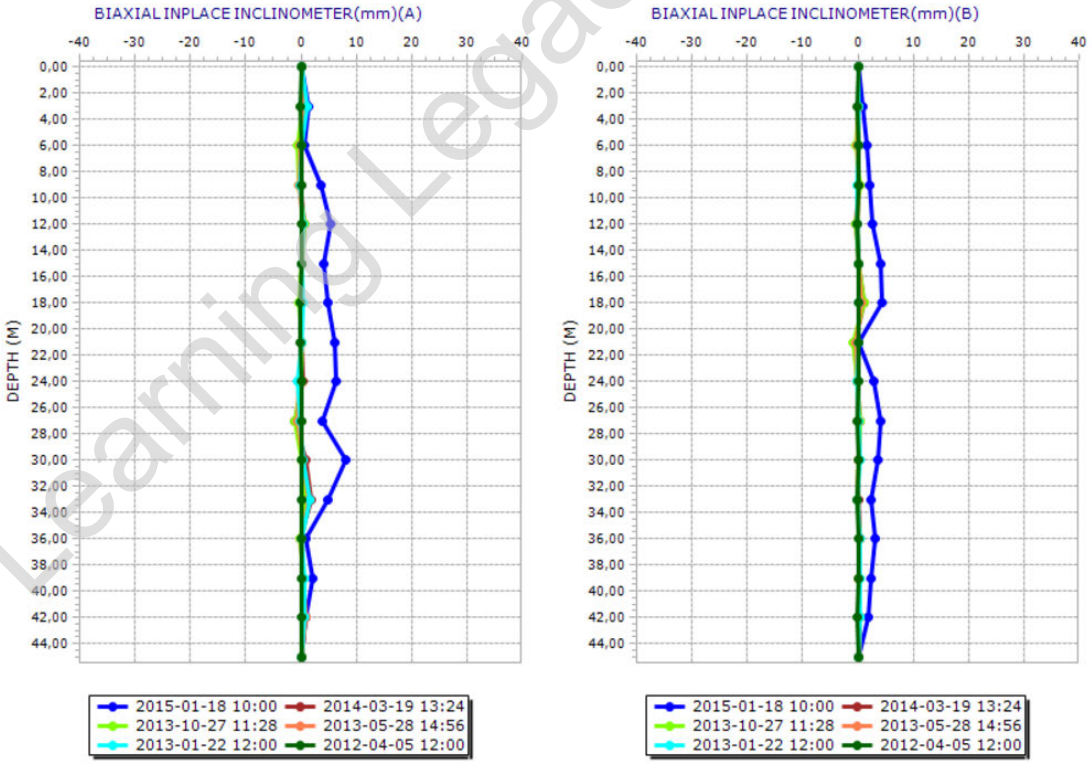
The sketch below shows the location of the electronic inclinometers installed at the shaft and their A axis and B axis orientation.



C305-IE07001

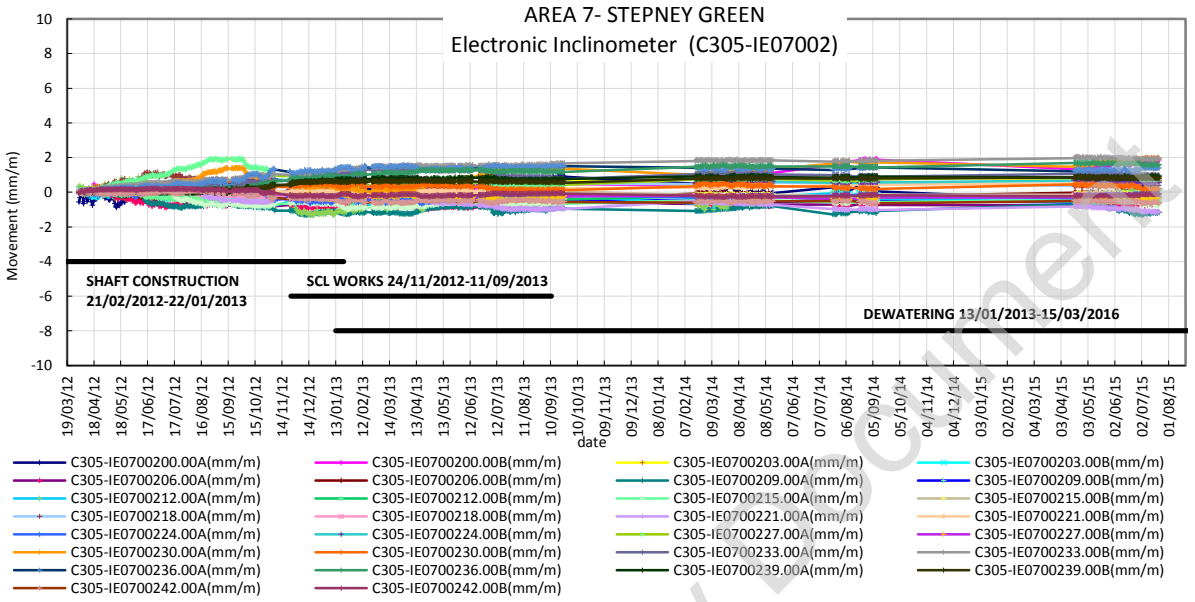
The graph presented below shows the readings of the electronic inclinometer C305-IE07001. A maximum movement of +1.93 mm in A direction (at a depth of 33 m) was recorded in April 2013 after the shaft construction and during the SCL works.

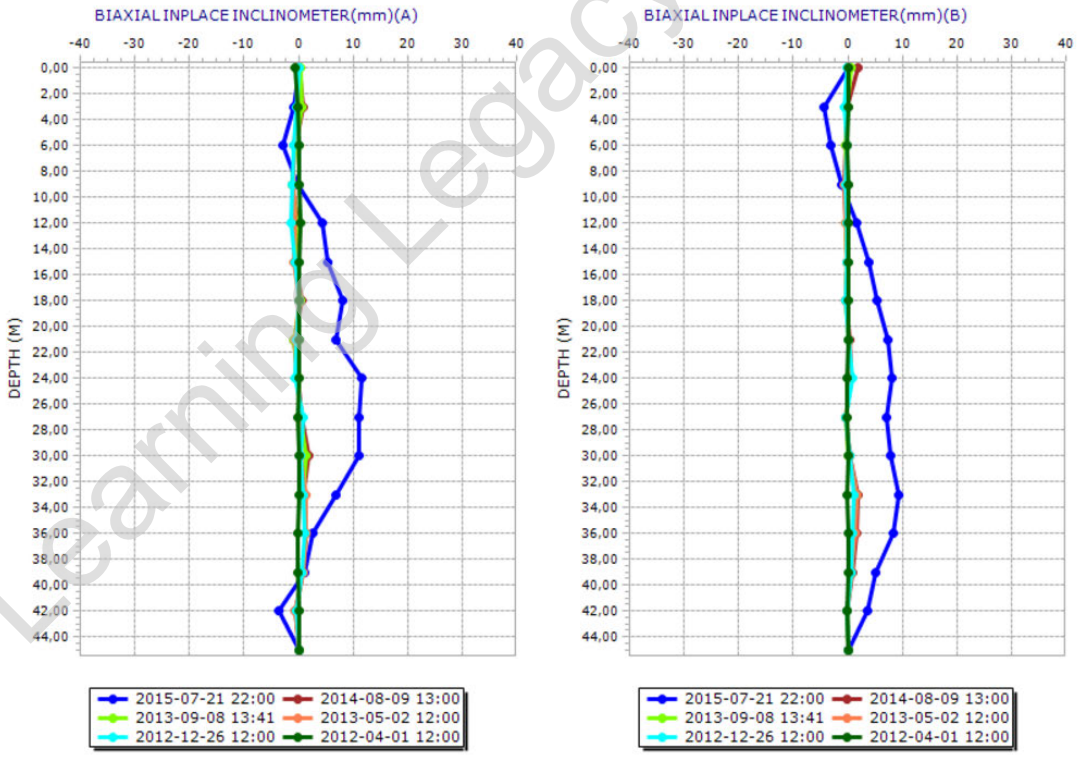




C305-IE07002

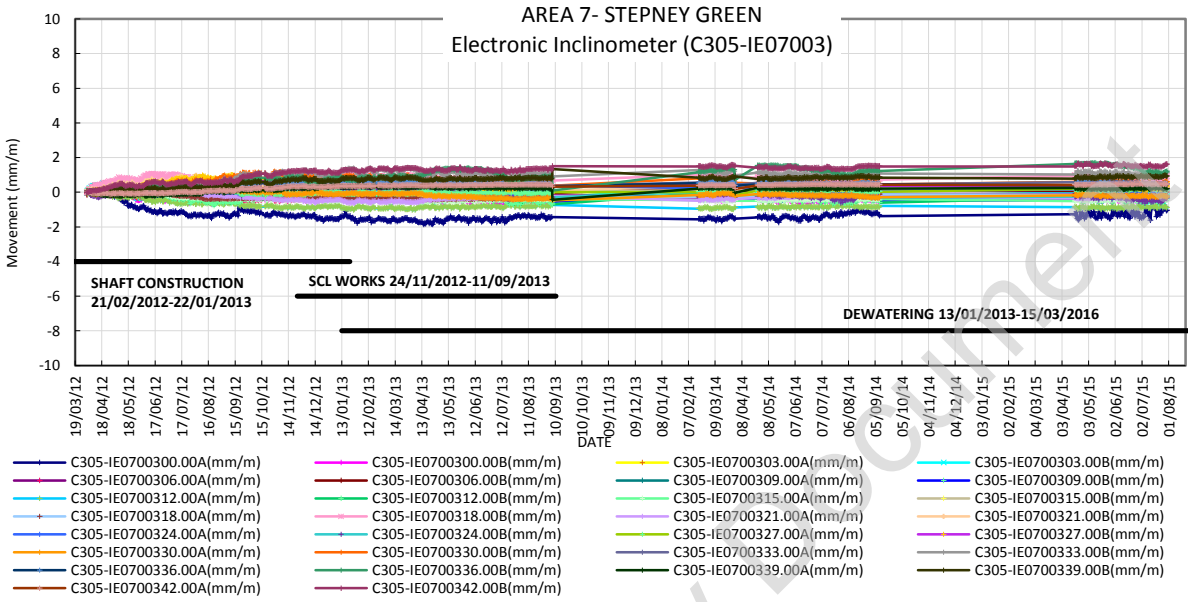
The graph presented below shows the readings of the electronic inclinometer C305-IE07002. A maximum movement of +1.92 mm in A direction (at a depth of 27 m) was recorded in September 2012 during the shaft construction.

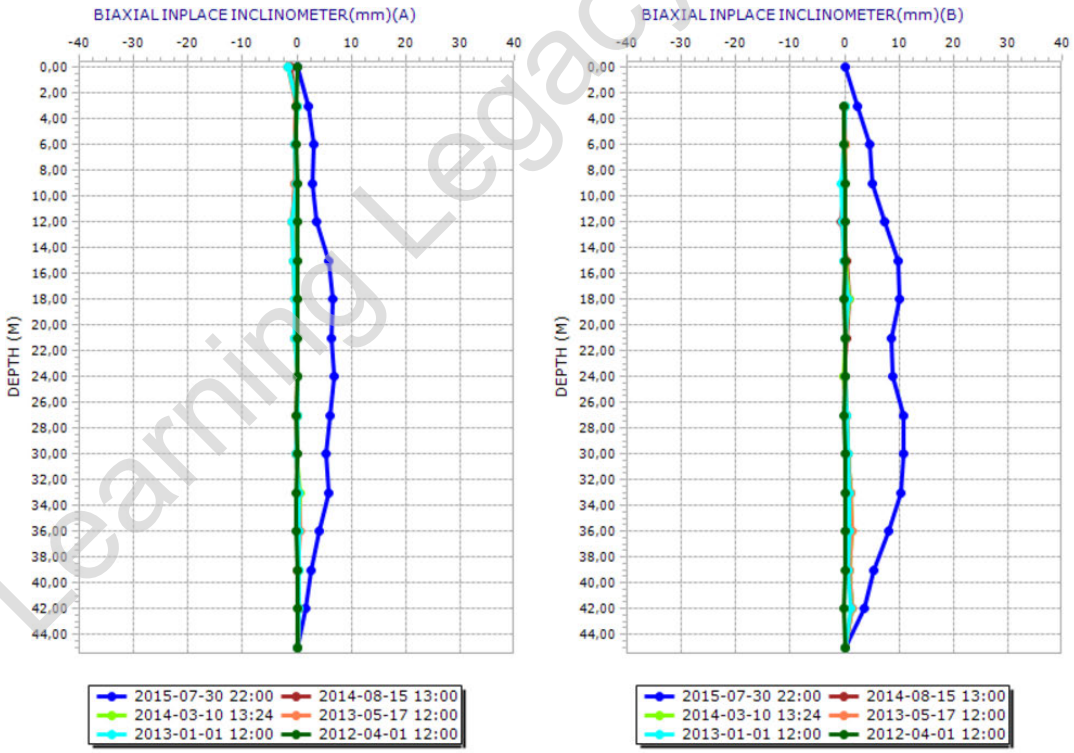




C305-IE07003

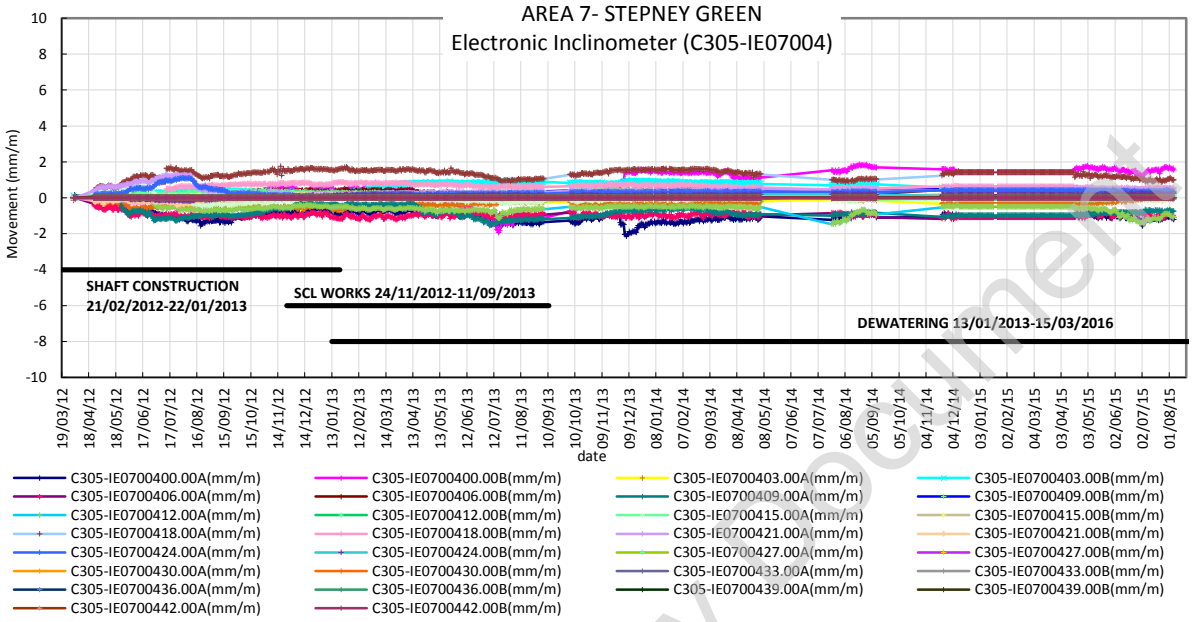
The graph presented below shows the readings of the electronic inclinometer C305-IE07003. A maximum movement of -1.87 mm in A direction (at a depth of 30 m) was recorded in April 2013 after the shaft construction and during the SCL works.

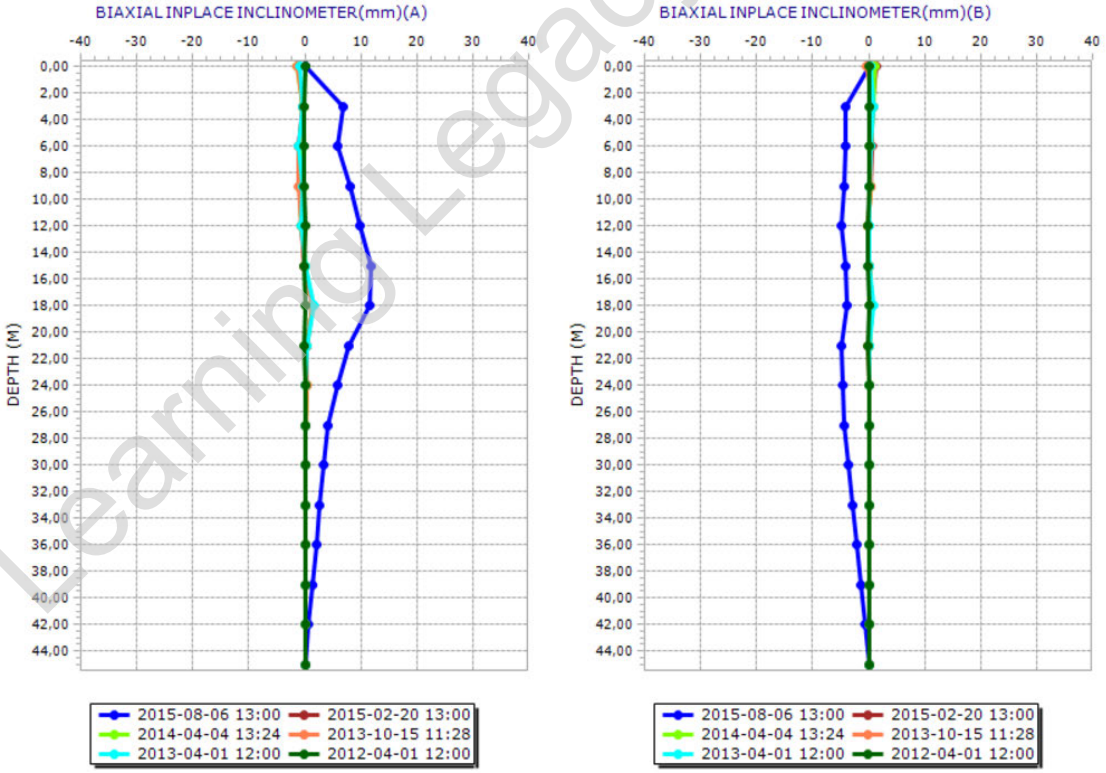




C305-IE07004

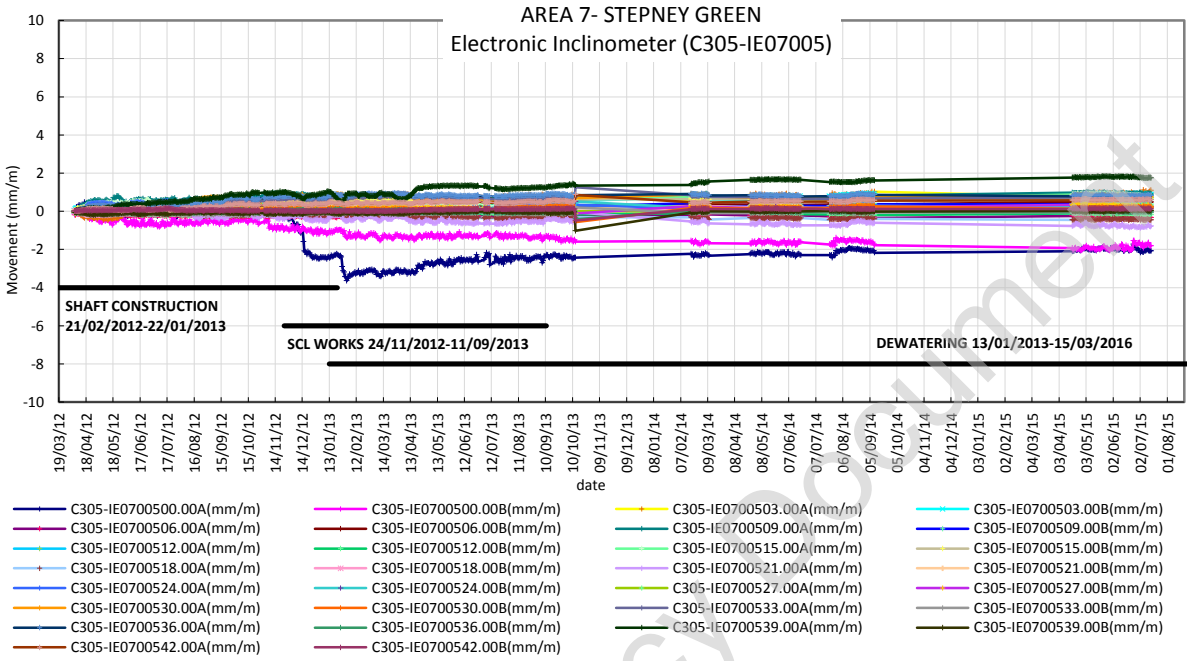
The graph presented below shows the readings of the electronic inclinometer C305-IE07004. A maximum movement of +1.71 mm in A direction (at a depth of 18 m) was recorded in January 2013 after the shaft construction and during the SCL works.

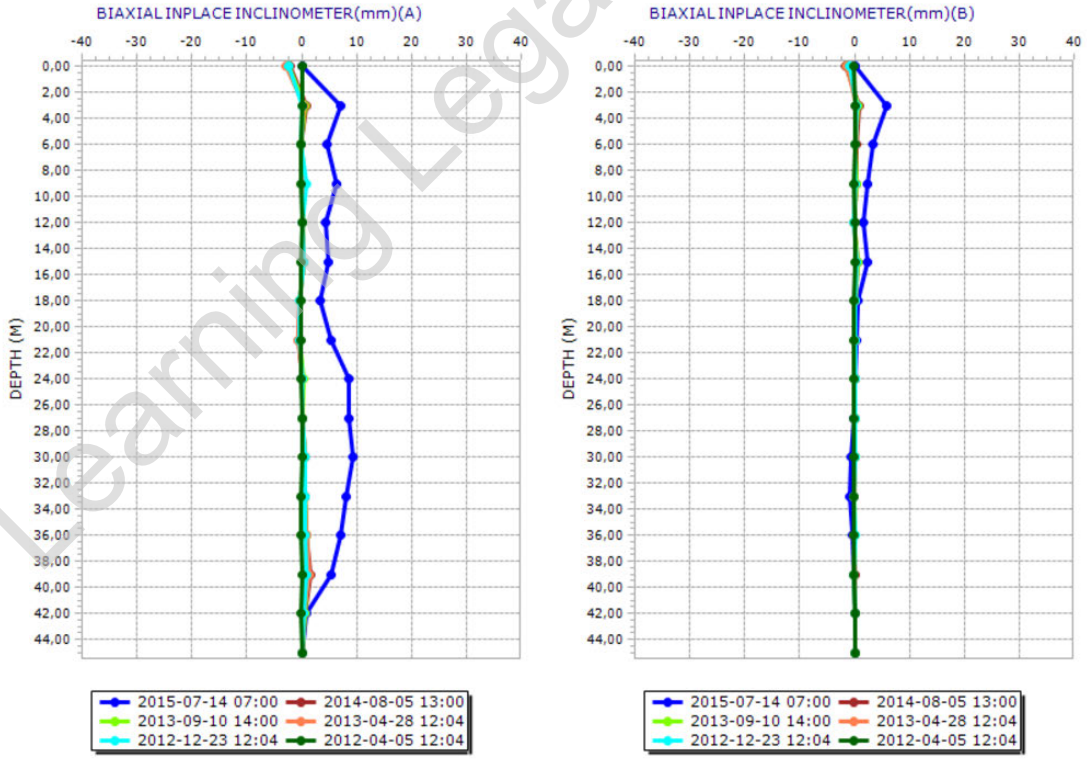




C305-IE07005

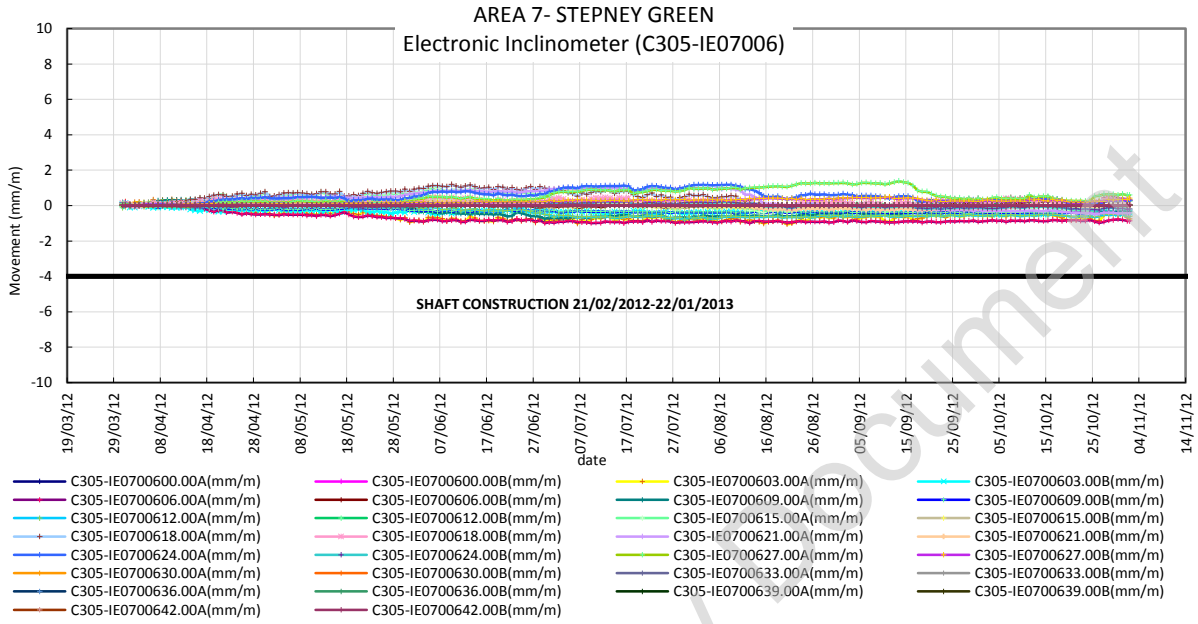
The graph presented below shows the readings of the electronic inclinometer C305-IE07005. A maximum movement of -3.64 mm in A direction and -1.4 mm in B direction (at a depth of 0 m) was recorded in February 2013 after the shaft construction and during the SCL works.

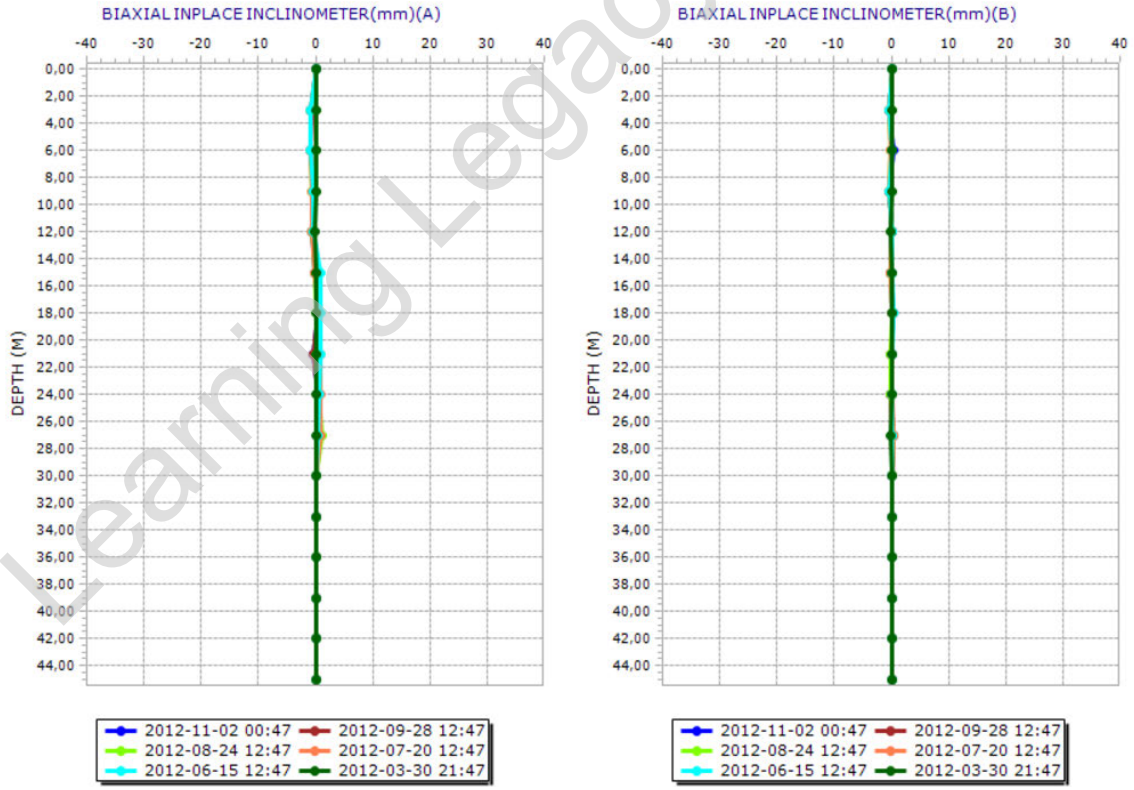




C305-IE07006

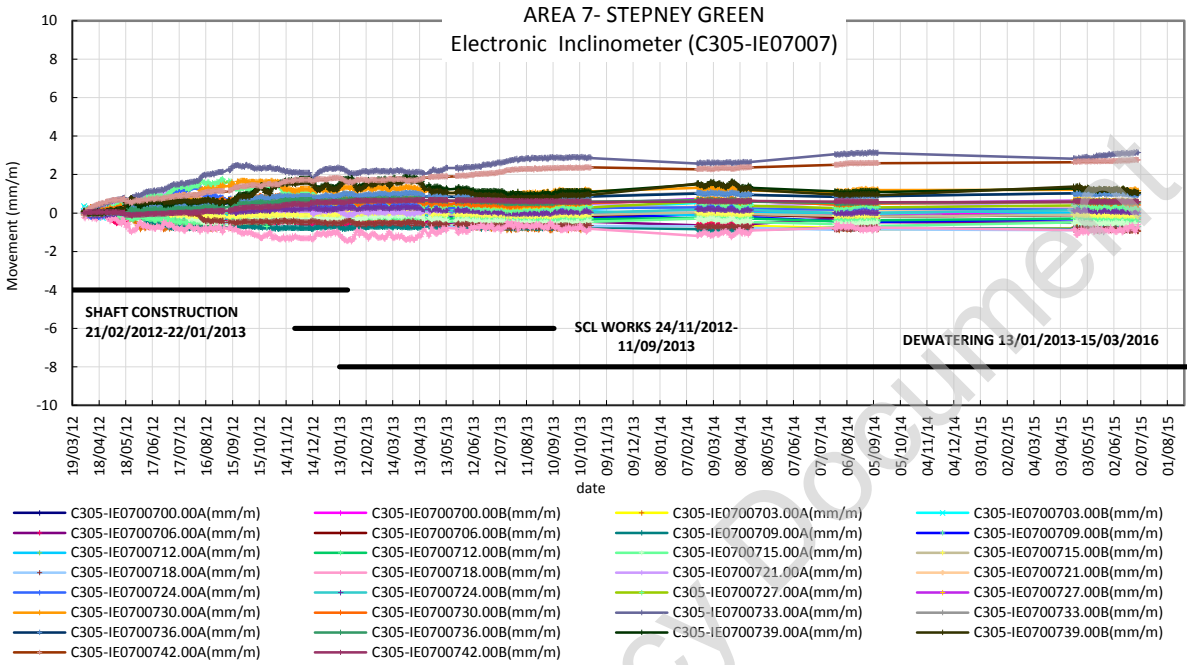
The graph presented below shows the readings of the electronic inclinometer C305-IE07006. A maximum movement of +1.38 mm in A direction (at a depth of 27 m) was recorded in September 2012 during the shaft construction.

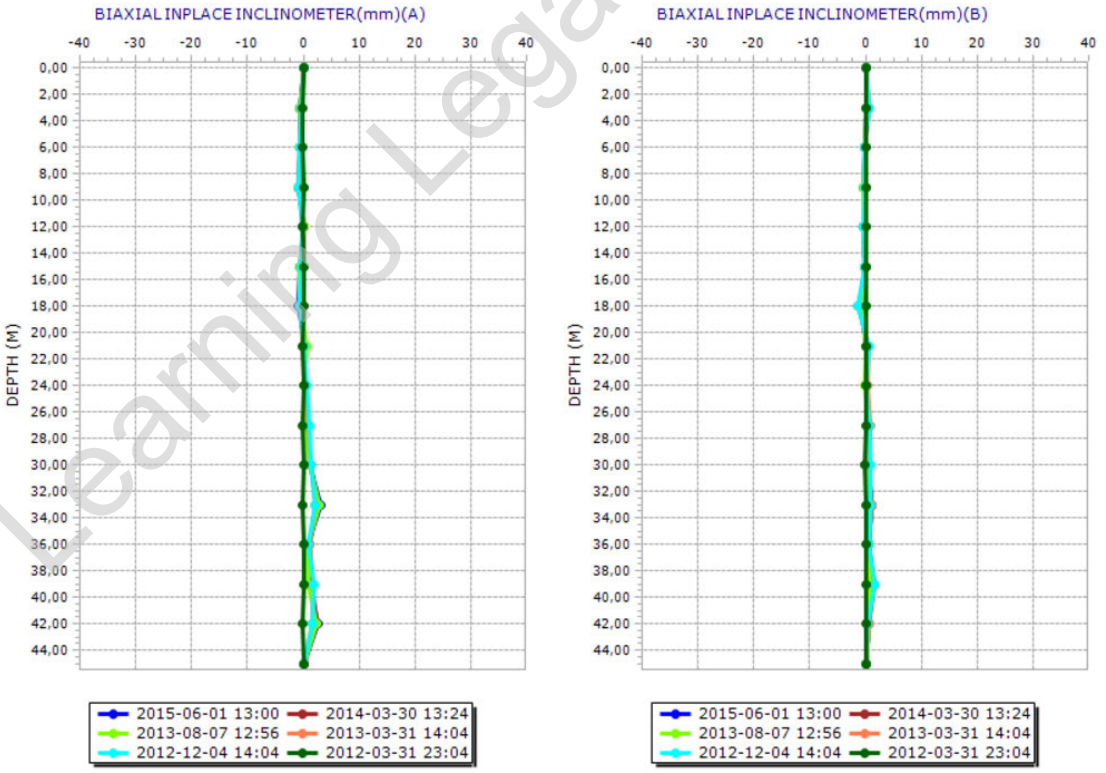




C305-IE07007

The graph presented below shows the readings of the electronic inclinometer C305-IE07007. A maximum movement of + 2.85 mm in A direction (at a depth of 33 m) was recorded in August 2013 after the shaft construction and during the SCL works.

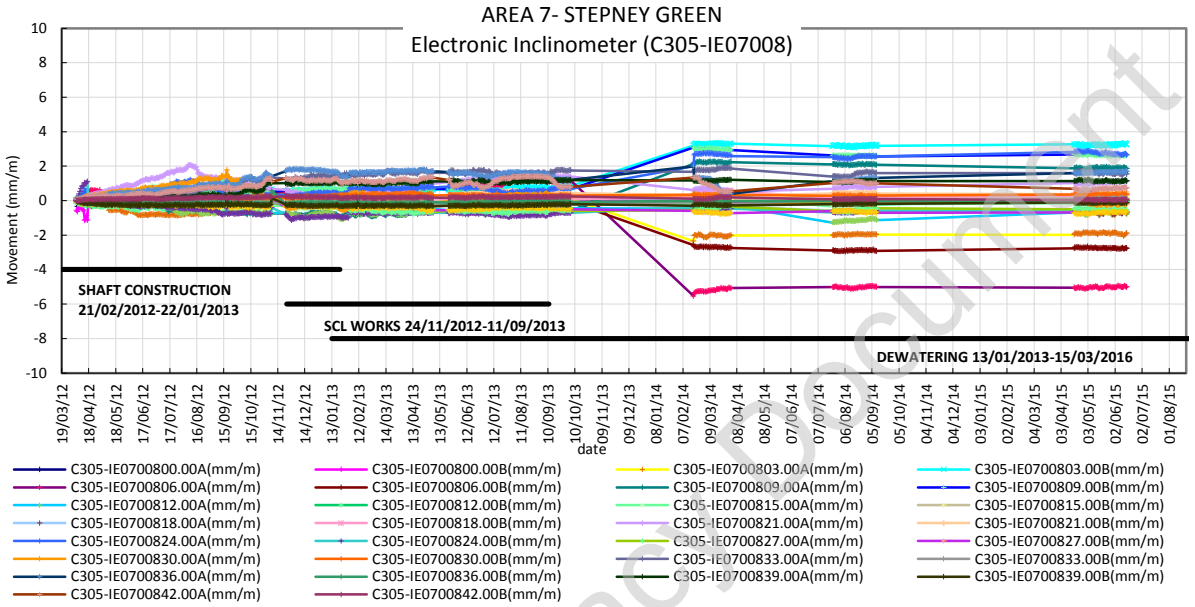


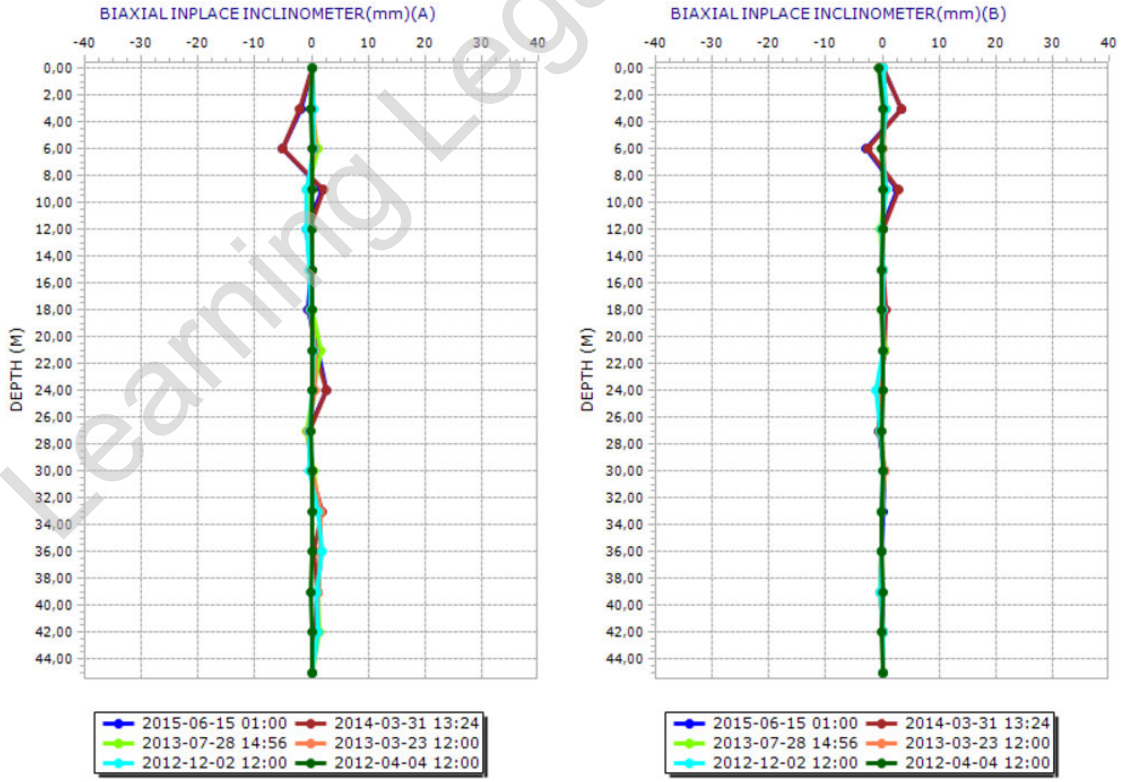


C305-IE07008

The graph presented below shows the readings of the electronic inclinometer C305-IE07008 that was installed close to the Westbound adit. A maximum movement of +2.05 mm in A direction (at a depth of 21 m) was recorded in August 2012 during the shaft construction.

In February 2014, a movement of -5.35 mm in A direction (at a depth of 6m) was recorded during the dewatering.





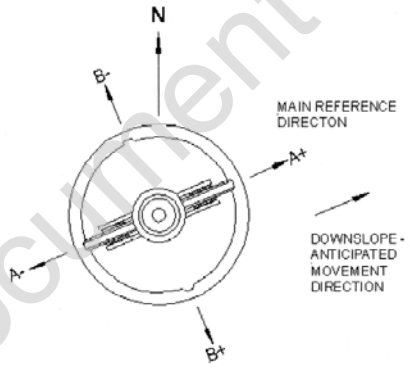
MANUAL INCLINOMETER

One manual inclinometer was installed. The figures below show the orientation of "A" and "B" AXIS and the distance of the instrument from the nearest tunnel drive.

Movements in A+ AXIS are always towards the expected AXIS, ie: towards the tunnel AXIS, and the B+ AXIS is clockwise +90˚ from the A+ axis (see orientation sketch, below right).

Orientation of the probe and casing:

A axis: the direction of the anticipated movement



A+ = the orientation of the casing groove into which the leading wheel of the inclinometer probe is located on the first run of a set of readings. This is also the orientation of the primary sensor

A- = the orientation of the casing groove into which the leading wheel of the inclinometer probe is located on the second run of a set of readings. This is also the orientation of the primary sensor

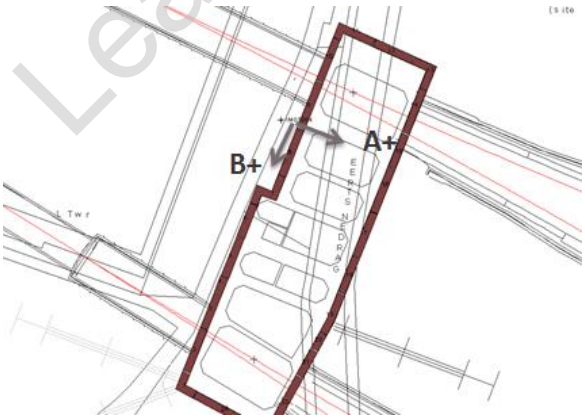
B+ = the orientation of the secondary sensor after the first run of a set of readings.

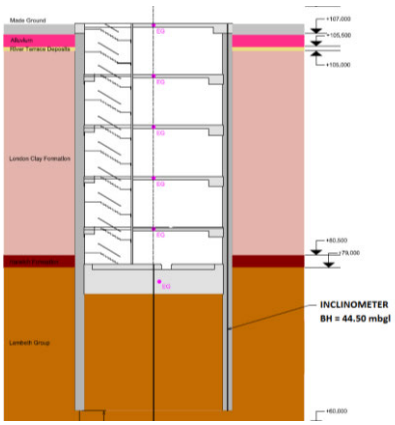
B- = the orientation of the secondary sensor after the second run of a set of readings

The first reading of the baseline was an average of the three commissioning readings taken prior baseline readings.

Corrections were applied to the raw data when using different probes. This correction was calculated thus; an average of the raw readings along the inclinometer was obtained in each case. Then the difference between the average values before and after the change of the probes was calculated. This difference was applied to the readings taken with the different probe in each direction.

C305-IM07004





The dates of the construction activities for Stepney Green are as follows:

- Shaft construction: 21/02/2012-22/01/2013
- SCL works: 24/11/2012-11/09/2013
- Dewatering: 13/01/2013-15/03/2016

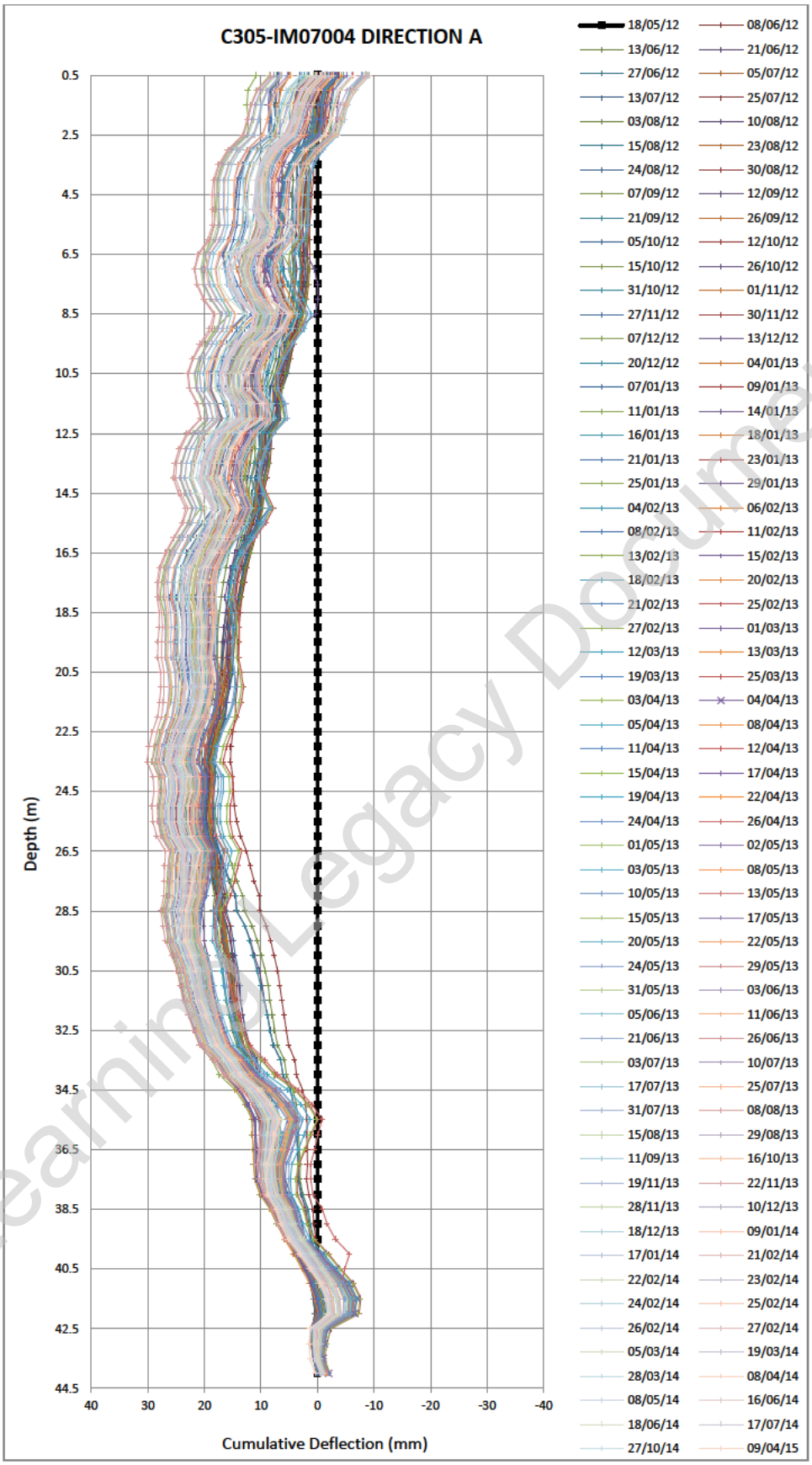
No correction has been applied to the axis probe readings for zero shift. It plays no part in the deflection or profile calculation and has no effect on the accuracy of the probe. No corrections have been applied for systematic errors.

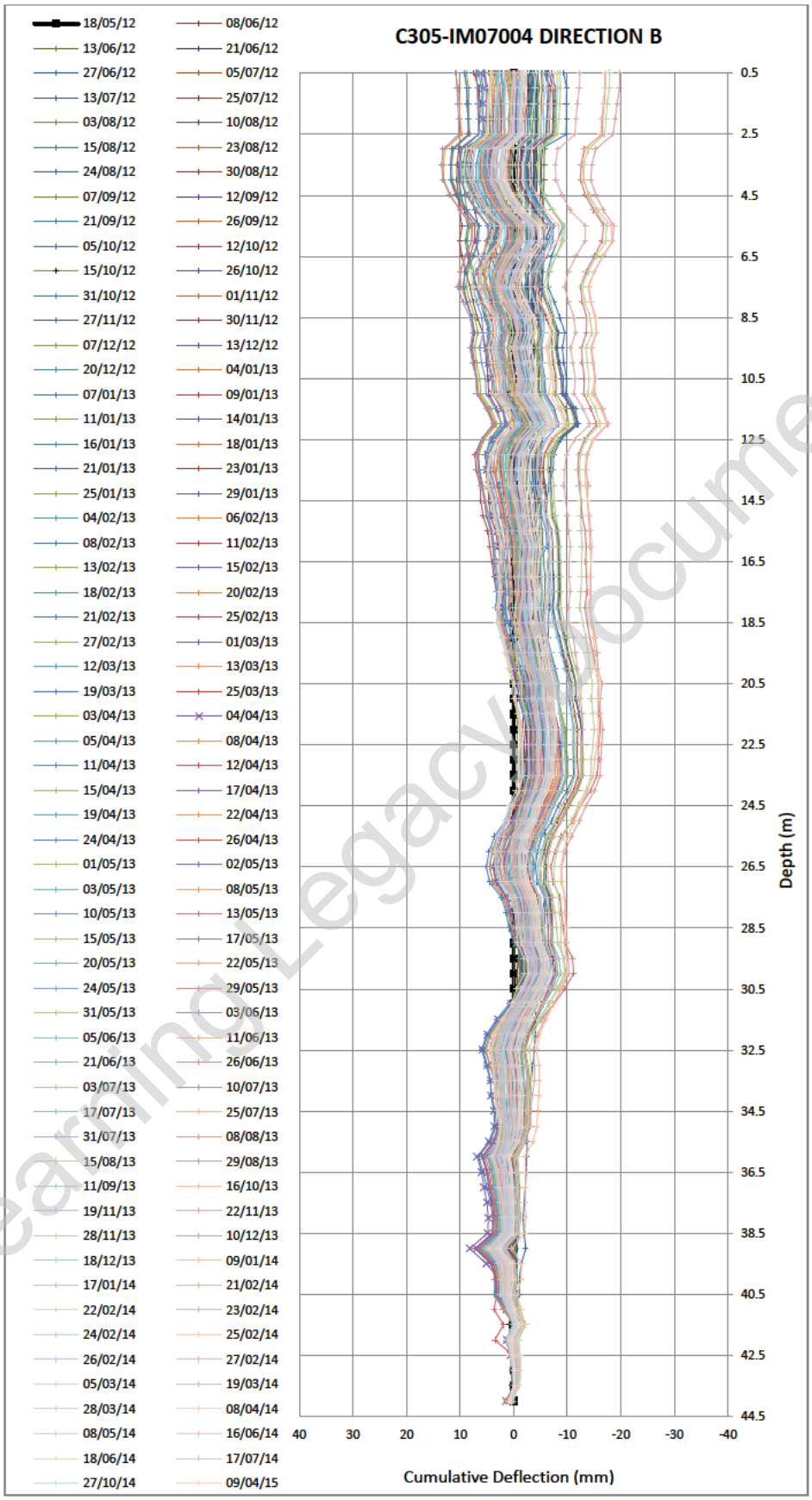
For the inclinometer C305-IM07004 different probes have been used. Related correction factors are presented in the table below:

ID Sensor	C305-IM07004			
Serial number	1032604/1035333	1035333/DI1244	DI1244/DI1217	DI1217/1144940
Date	27/11/2012	25/03/2013	28/11/2013	19/03/2014
A+	-180	46	161	-168
A-	-164	40	158	-180
B+	163	39	-145	154
B-	153	21	-126	142

An evaluation of the data "checksum" has been carried out in order to find errors or erroneous readings. The two values obtained in diametrically opposite directions and at the same depth have been added and checked that these values vary by about +/- 20 digits around the average value. This interval can be larger for the axis B due to the required wheel tolerance in the track. That procedure has been carried out after the course of the survey.

Note: In a meeting between the PM, the Contractor & the Designer, dated 17 March 2016, it was agreed that DSJV will provide a report on inclinometers ("*INCLINOMETERS C-305 CHECKSUM AND TWISTING SPIRAL VERIFICATION: C305-DSJ-C2-RGN-CRG03-50373*"), which will include all raw data on excel sheet with dates of different probes used etc.



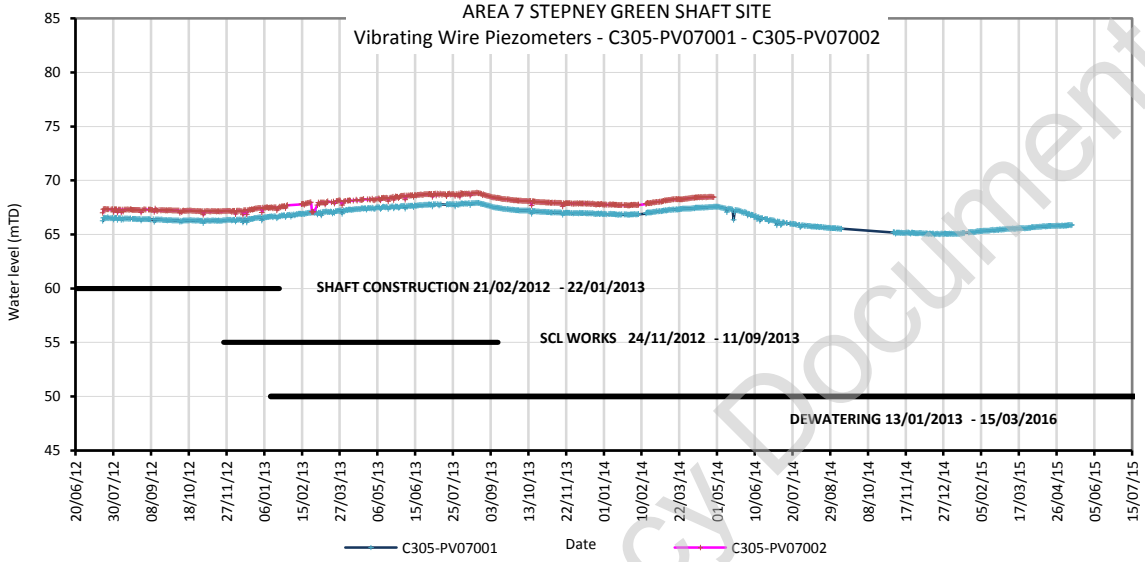


PIEZOMETERS

C305-PV07001- C305-PV07002

The graph presented below shows the readings of the vibrating wire piezometers C305-PV07001 and C305-PV07002. A progressive rise of +2 m in the water level was observed after the shaft construction and during the SCL works.

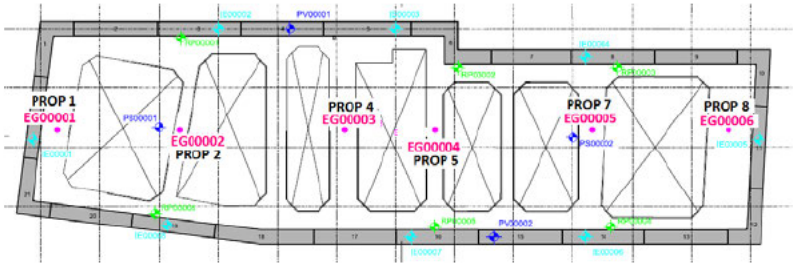
The lowest point of the water level (65.07 m) was recorded in December 2014 during the dewatering.



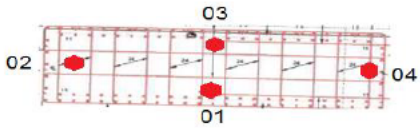
STRAIN GAUGES

VIBRATING WIRE EMBEDMENT STRAIN GAUGES

The strain gauges included in this section were installed on permanent props at different levels of the shaft, as per layout shown below.

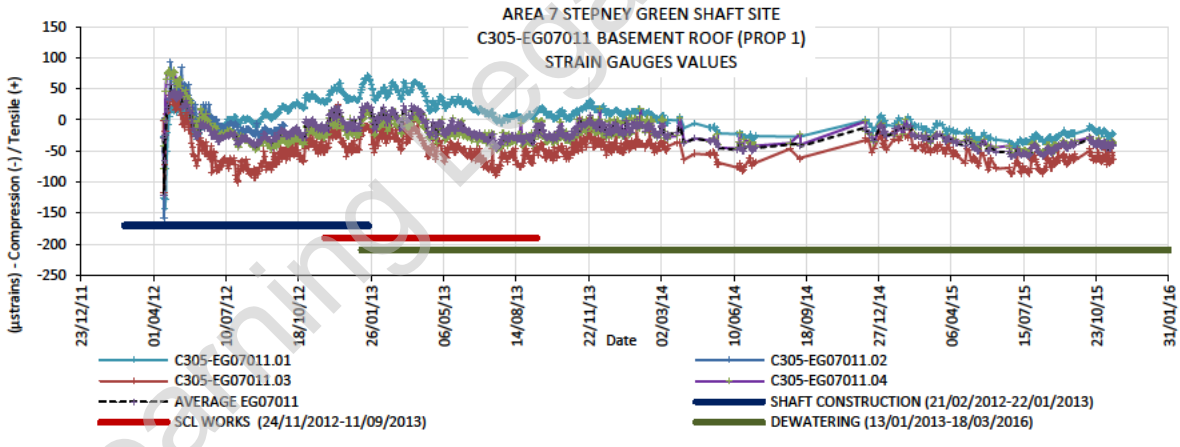


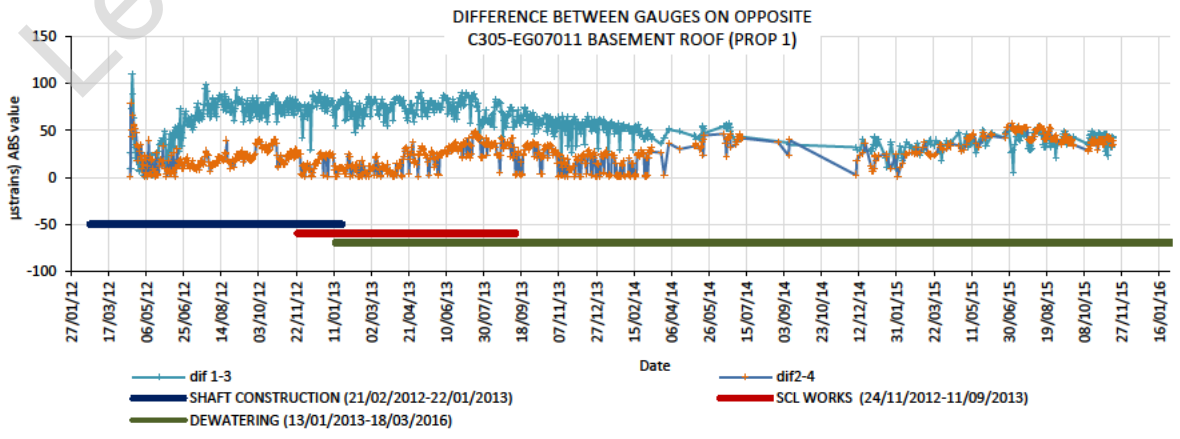
On each prop, four strain gauges were embedded at locations shown in sketch below.



C305-EG07011 BASEMENT ROOF (PROP 1)

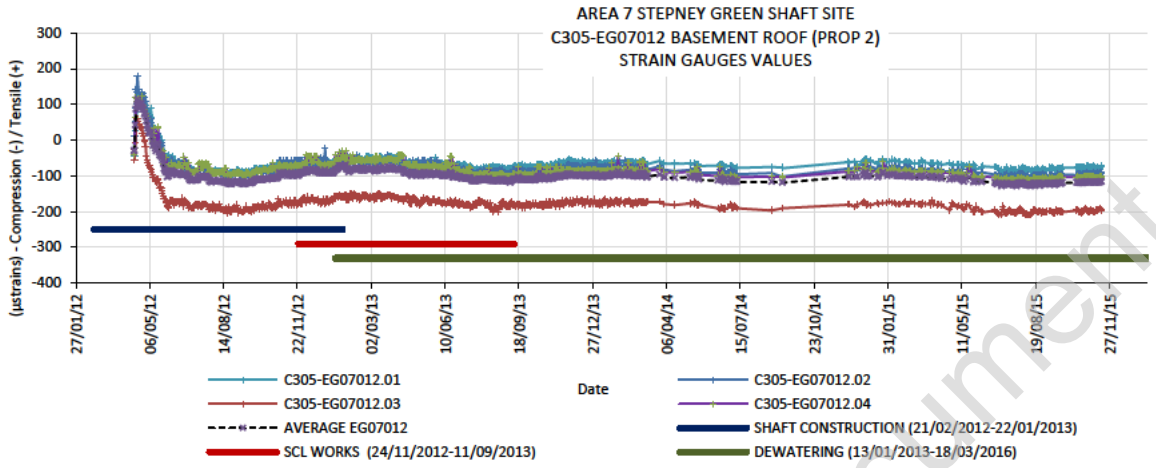
The graphs presented below show a compression of -100 µstrains in July 2012 during the shaft construction and a maximum differential strain of 100 µstrains.

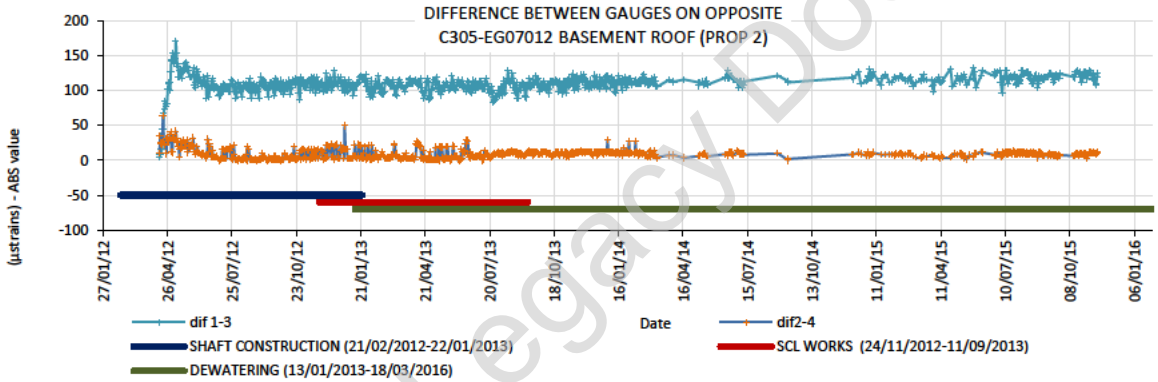




C305-EG07012 BASEMENT ROOF (PROP 2)

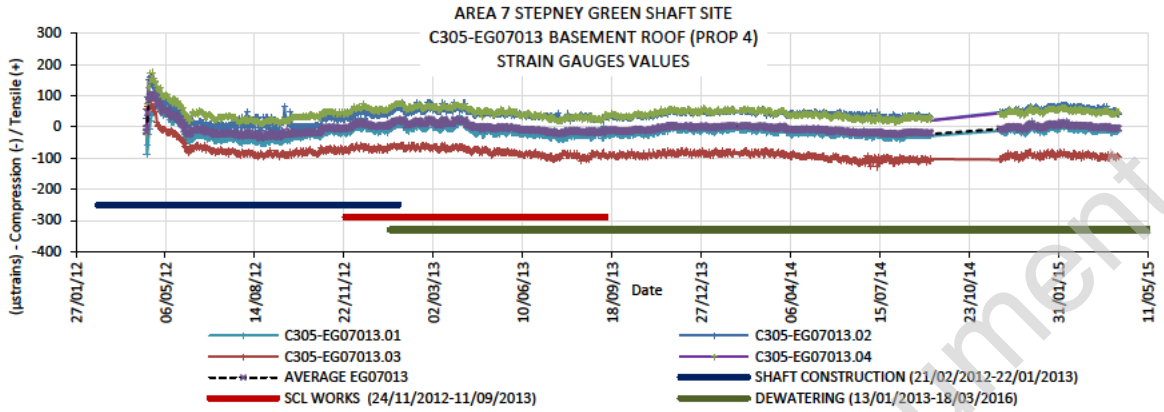
The graphs presented below show a compression of -200 µstrains in August 2012 during the shaft construction and a maximum differential strain of 120 µstrains.

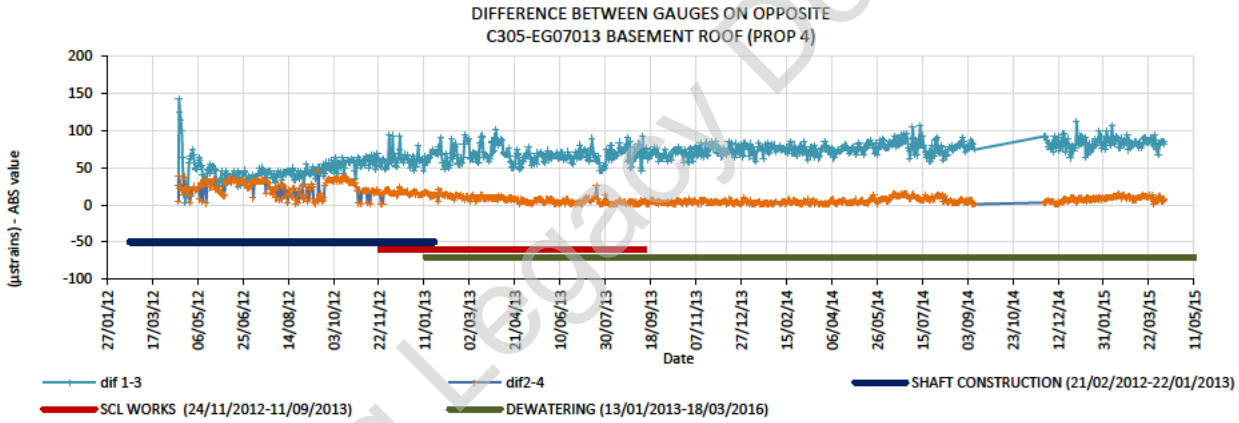




C305-EG07013 BASEMENT ROOF (PROP 4)

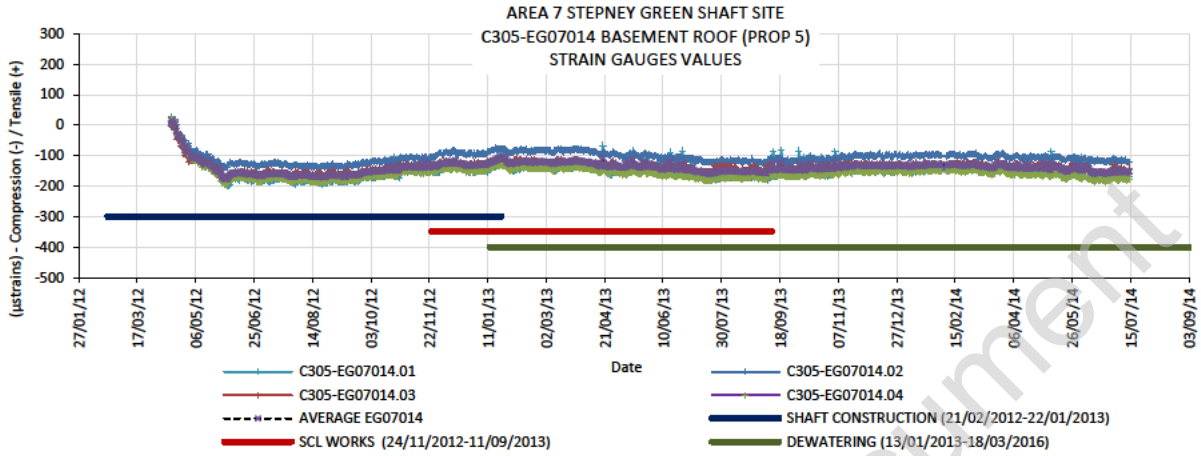
The graphs presented below show a compression of -100 µstrains in August 2012 during the shaft construction and a progressively rise of the differential strain from 42 µstrains to 84 µstrains between June 2012 and March 2015.

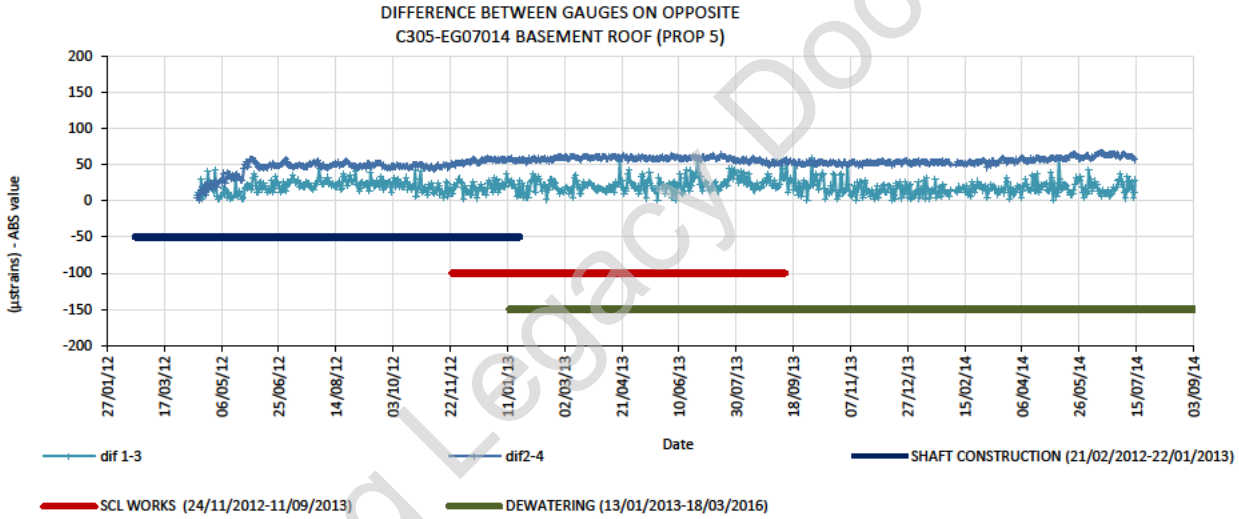




C305-EG07014 BASEMENT ROOF (PROP 5)

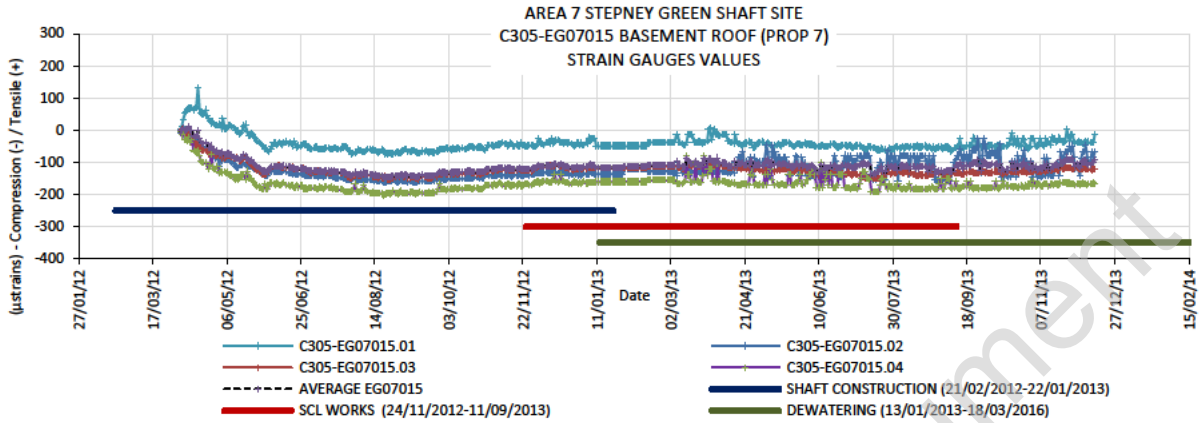
The graphs presented below show a compression of -200 µstrains in June 2012 during the shaft construction and a maximum differential strain of 58 µstrains.

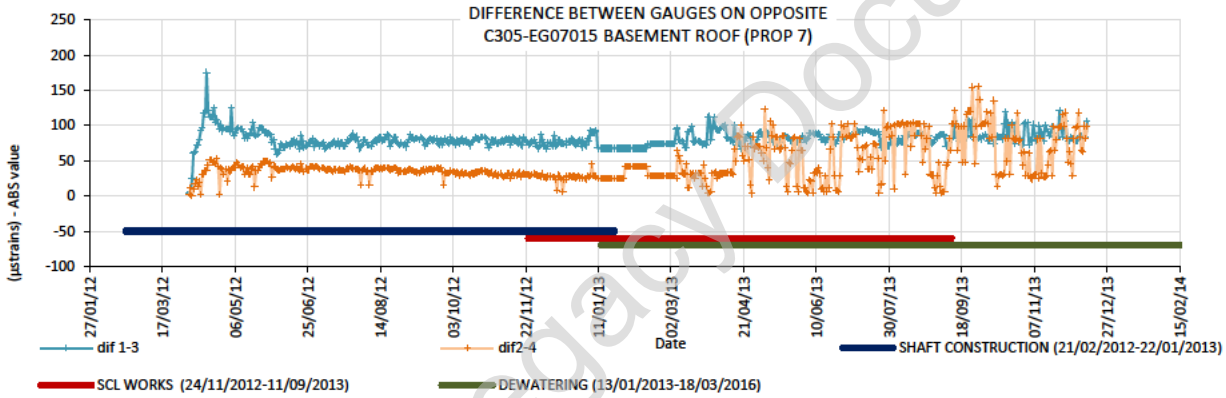




C305-EG07015 BASEMENT ROOF (PROP 7)

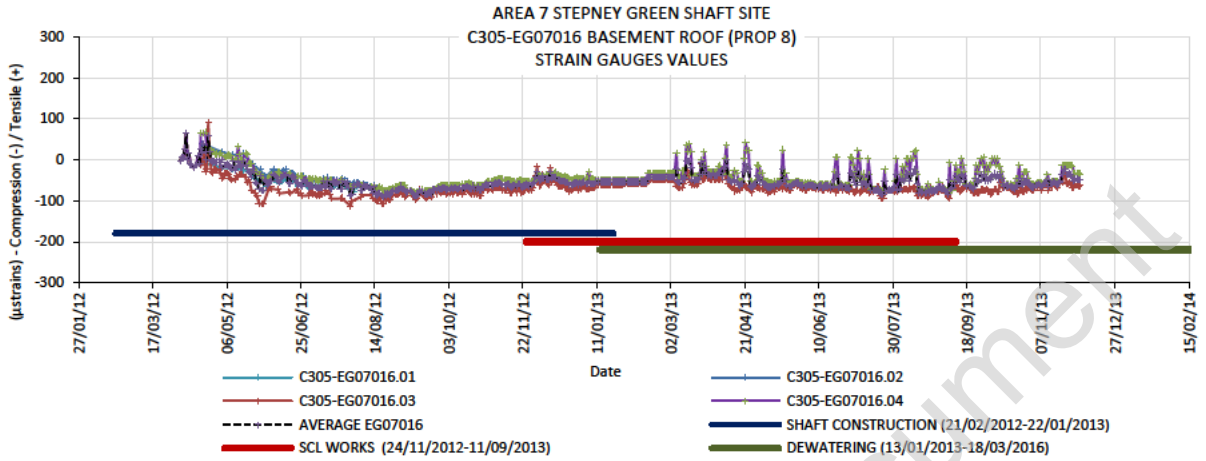
The graphs presented below show a compression of -200 µstrains in August 2012 during the shaft construction and a maximum differential strain of 87 µstrains.

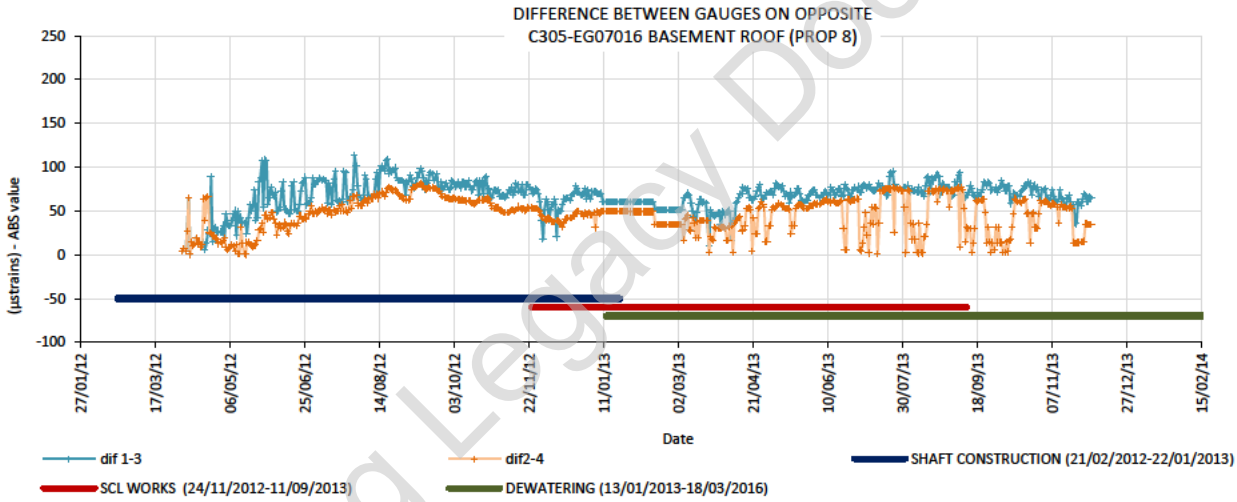




C305-EG07016 BASEMENT ROOF (PROP 8)

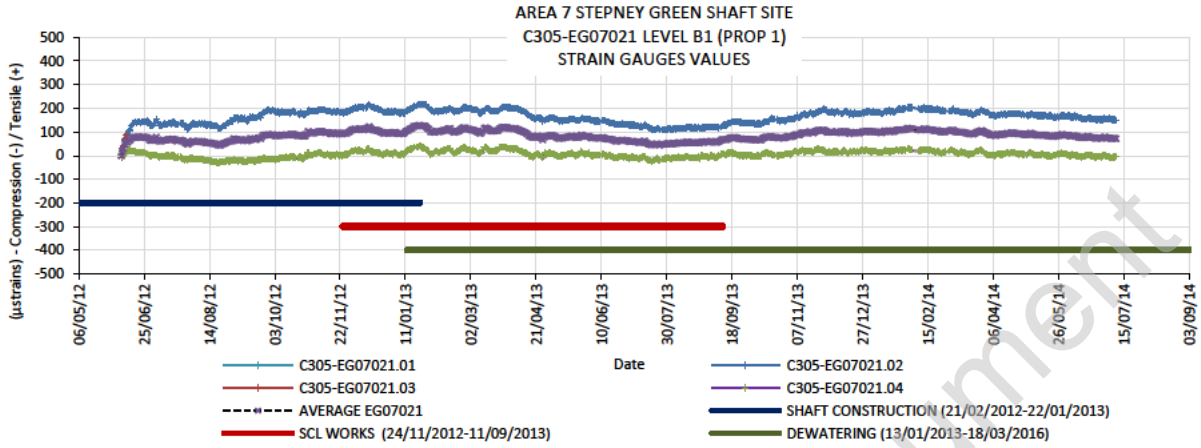
The graphs presented below show a compression of -112 µstrains in July 2012 during the shaft construction and a maximum differential strain of 100 µstrains.

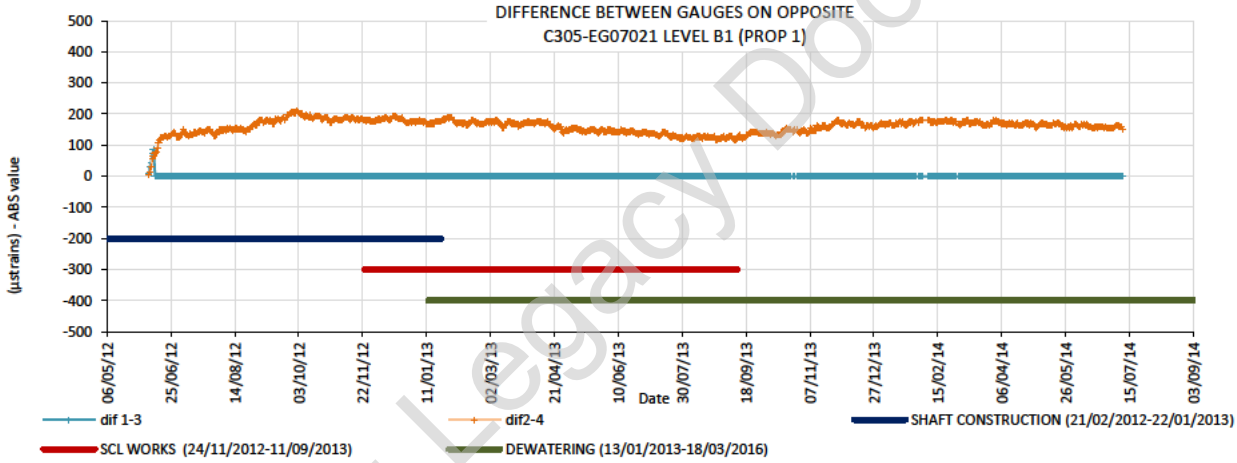




C305-EG07021 LEVEL B1 (PROP 1)

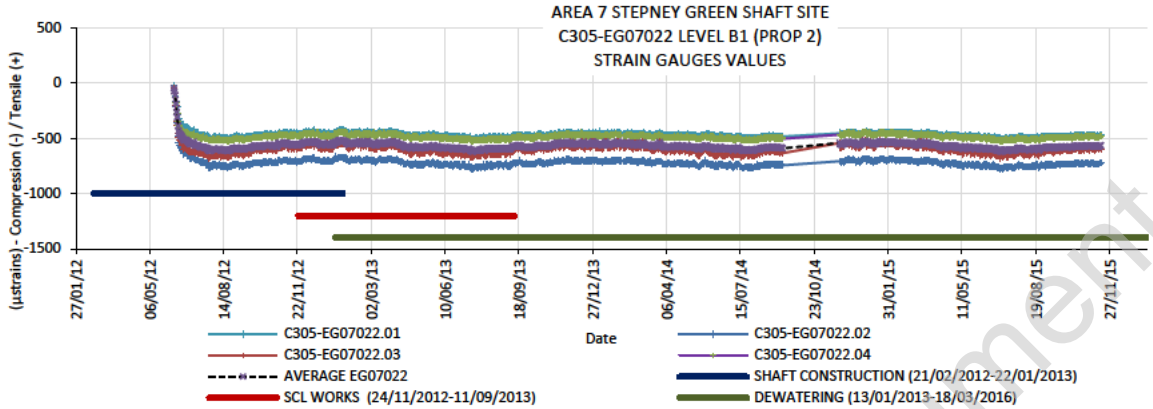
The graphs presented below show a tension of +210 µstrains in January 2013 during the shaft construction and a maximum differential strain of 200 µstrains.

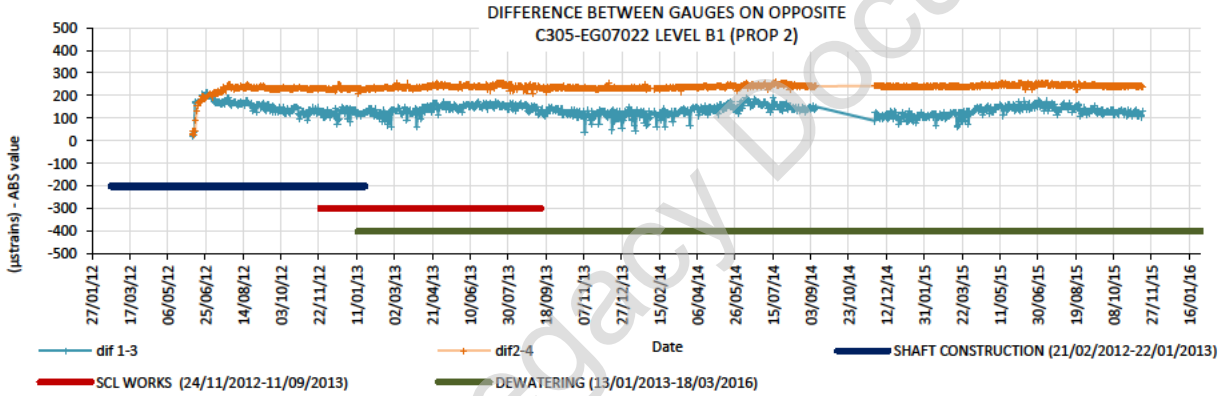




C305-EG07022 LEVEL B1 (PROP 2)

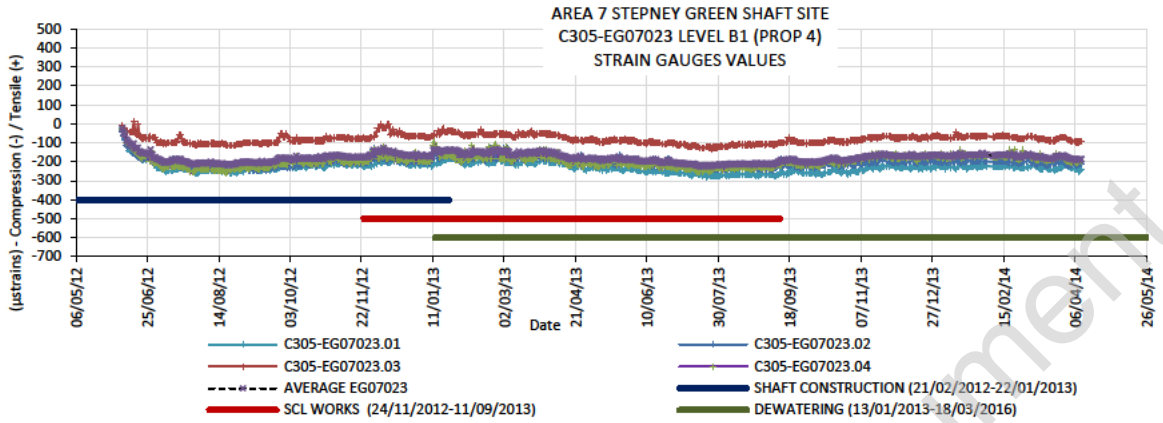
The graphs presented below show a compression of -760 µstrains in July 2012 during the shaft construction and a maximum differential strain of 244 µstrains.

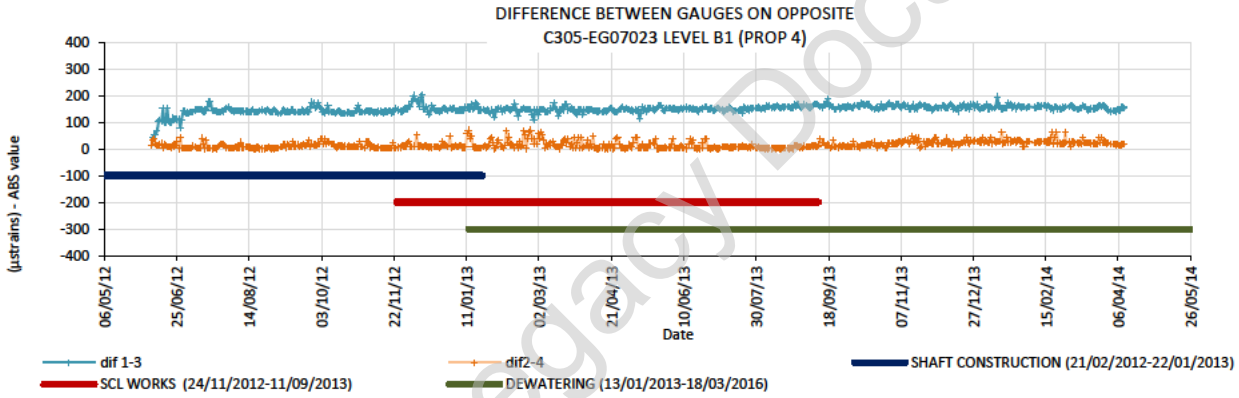




C305-EG07023 LEVEL B1 (PROP 4)

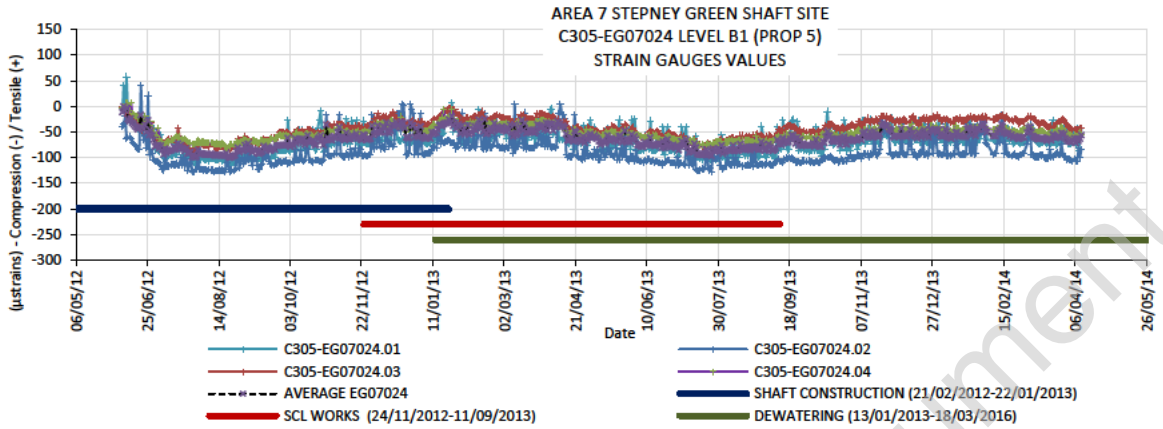
The graphs presented below show a compression of -245 µstrains in July 2012 during the shaft construction and a maximum differential strain of 178 µstrains.

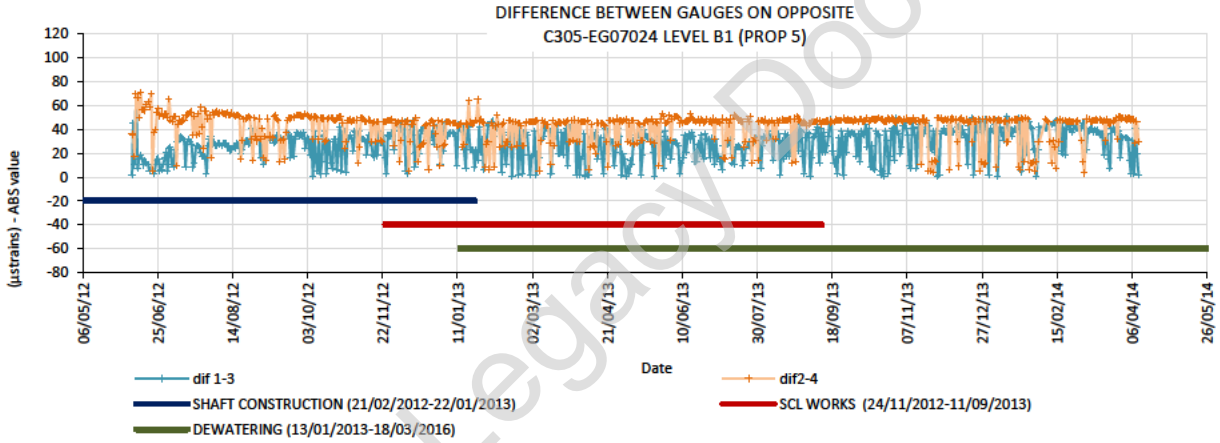




C305-EG07024 LEVEL B1 (PROP 5)

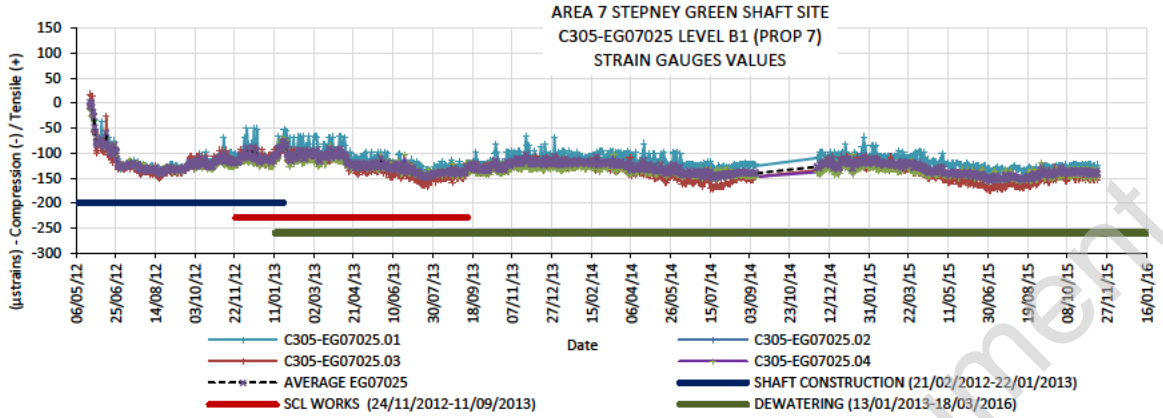
The graphs presented below show a compression of -129 µstrains in July 2012 during the shaft construction and a maximum differential strain of 60 µstrains.

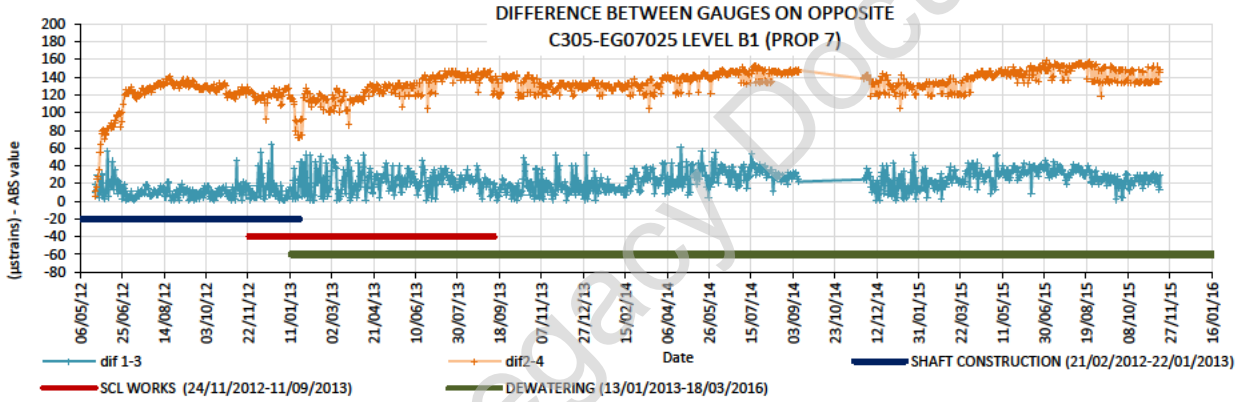




C305-EG07025 LEVEL B1 (PROP 7)

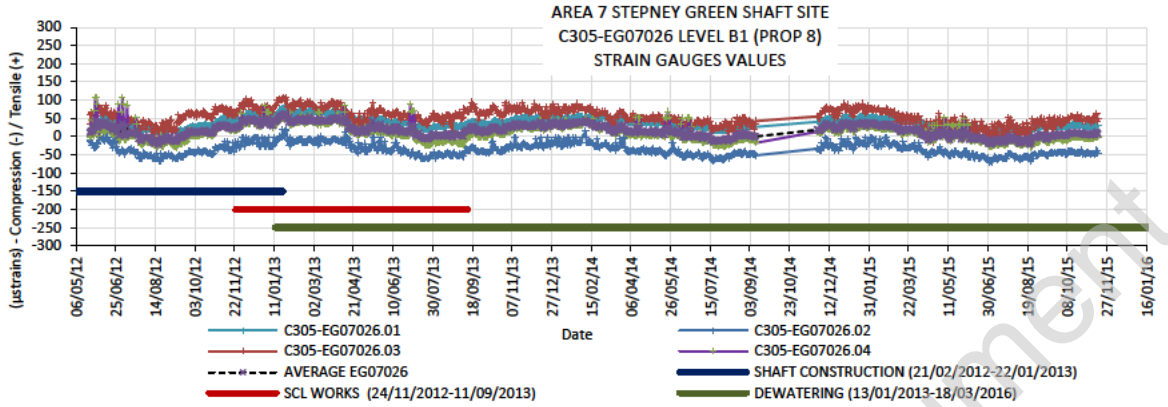
The graphs presented below show a compression of -143 µstrains in August 2012 during the shaft construction and a maximum differential strain of 140 µstrains.

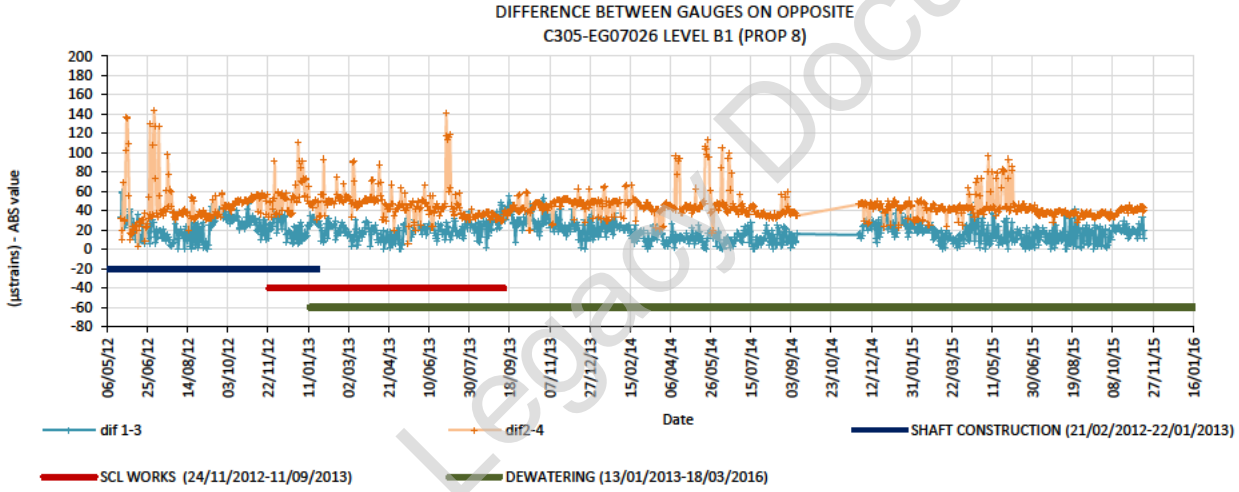




C305-EG07026 LEVEL B1 (PROP 8)

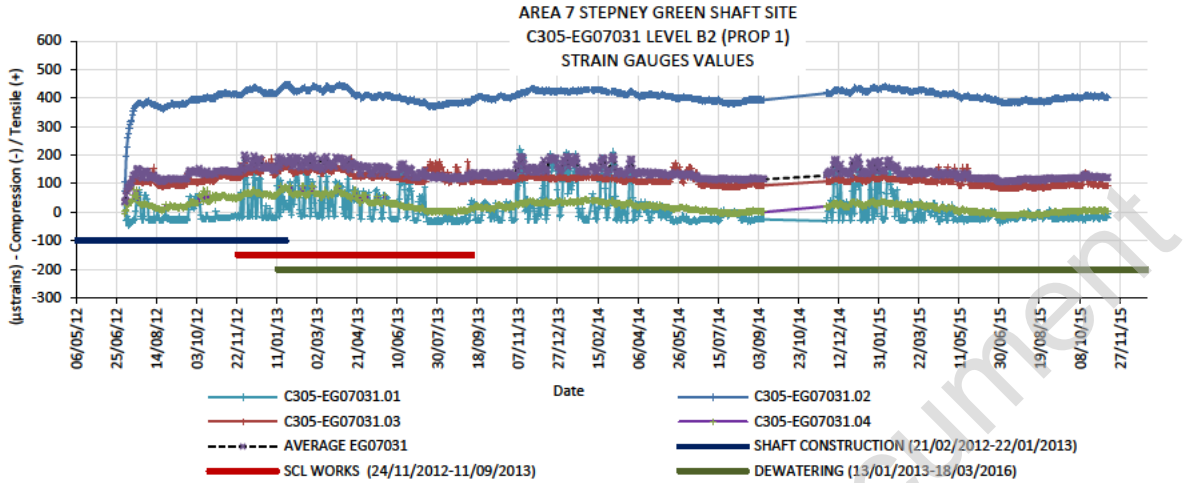
The graphs presented below show a compression of -69 µstrains in August 2012 during the shaft construction and a maximum differential strain of 54 µstrains.

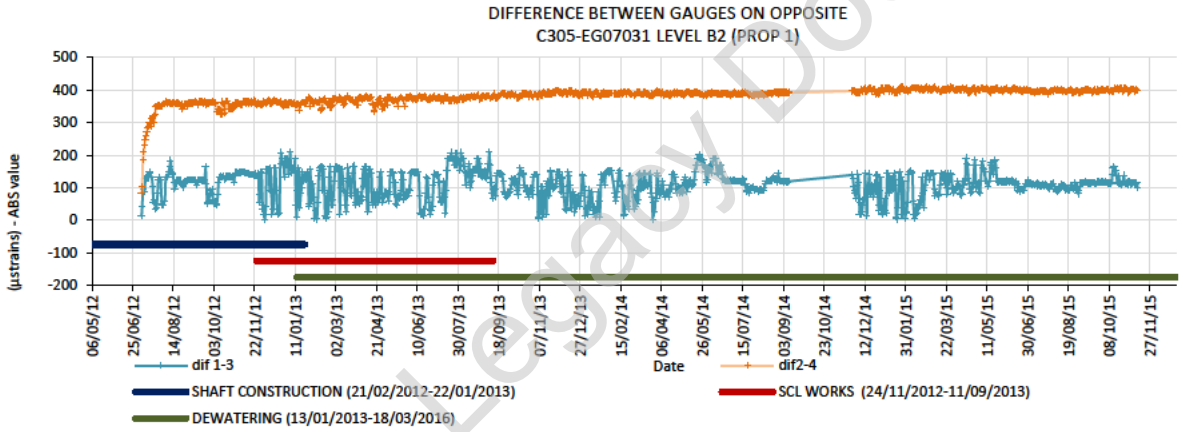




C305-EG07031 LEVEL B2 (PROP 1)

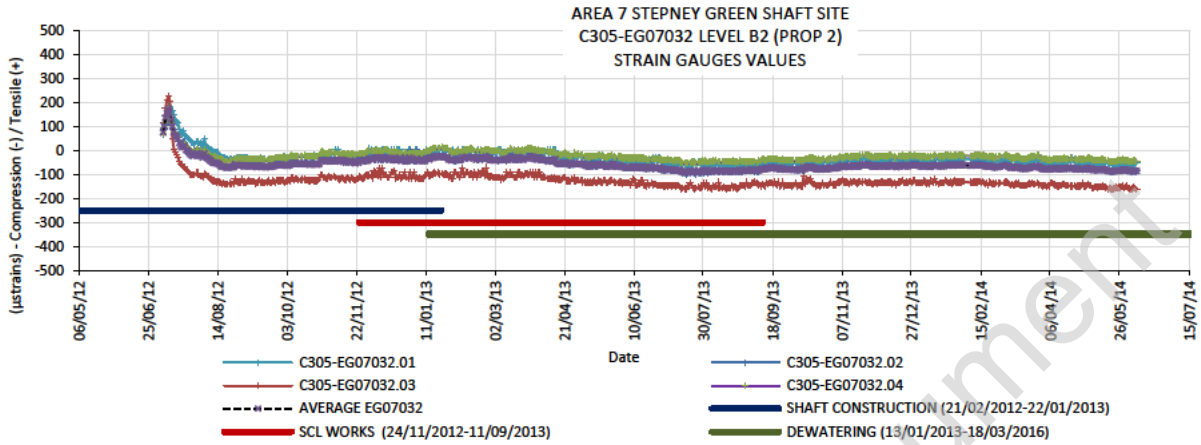
The graphs presented below show a tension of +376 µstrains in July 2012 during the shaft construction and a maximum differential strain of 350 µstrains.

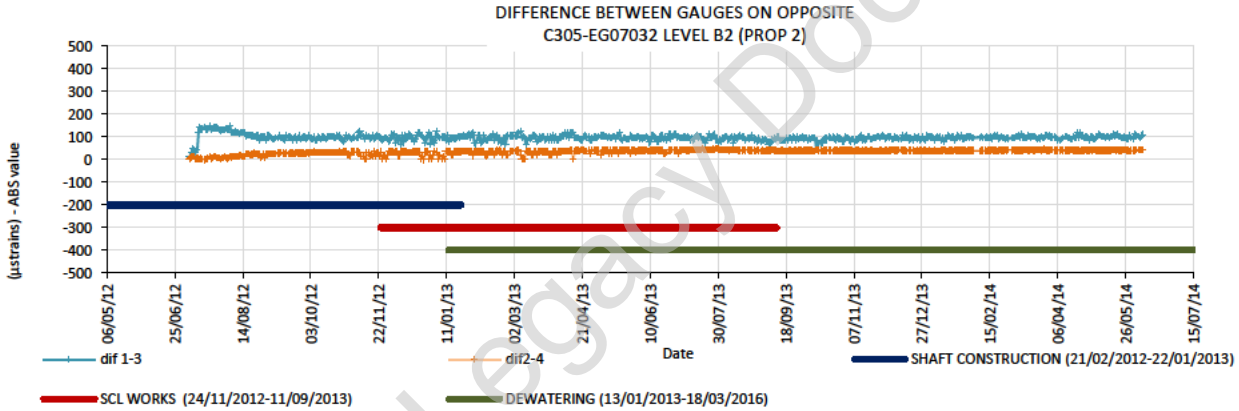




C305-EG07032 LEVEL B2 (PROP 2)

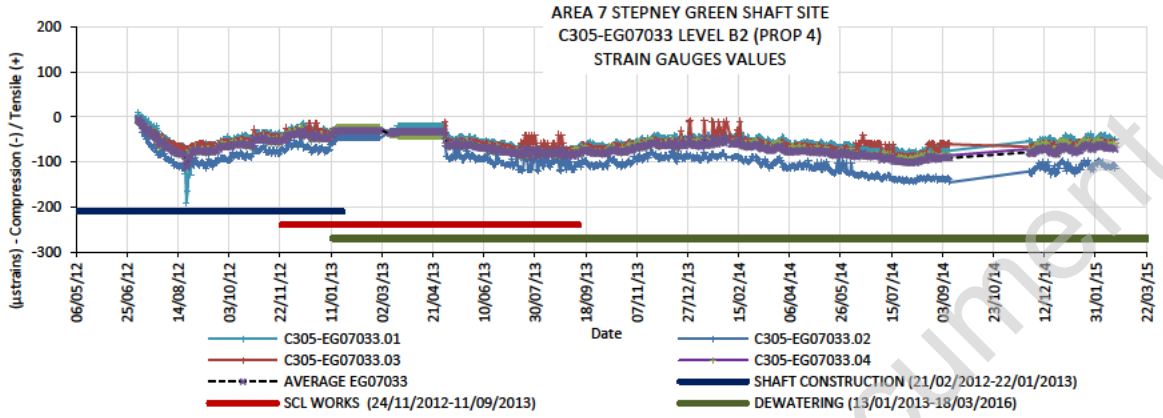
The graphs presented below show a compression of -140 µstrains in August 2012 during the shaft construction and a maximum differential strain of 108 µstrains.

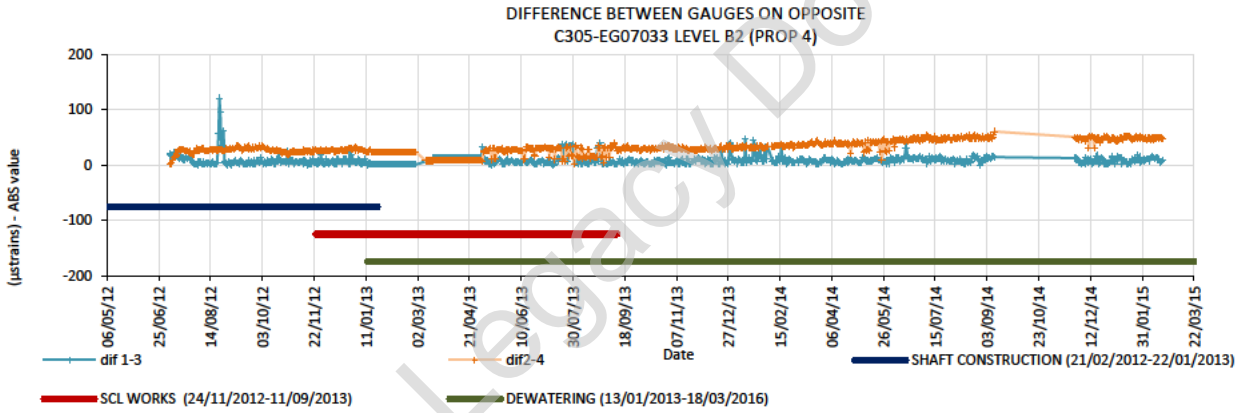




C305-EG07033 LEVEL B2 (PROP 4)

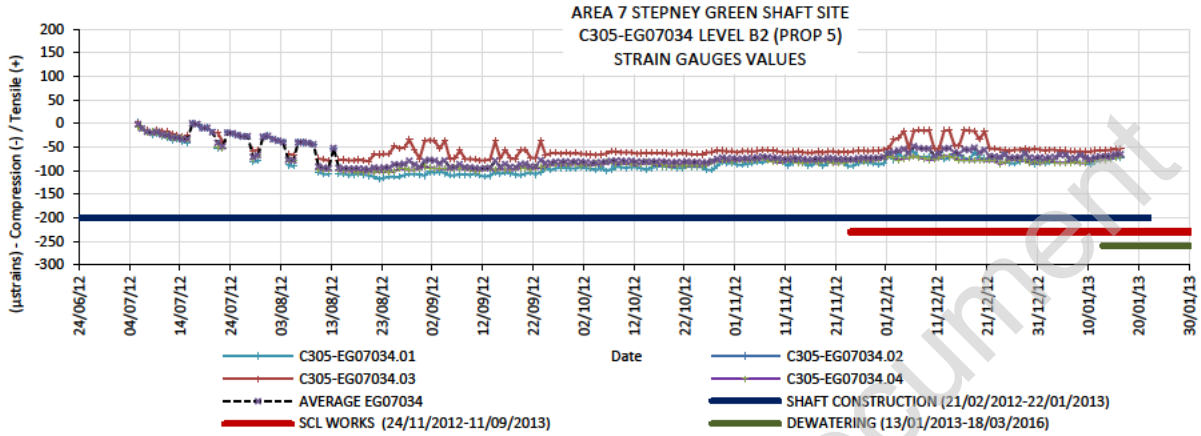
The graphs presented below show a compression of -112 µstrains in August 2012 during the shaft construction and a maximum differential strain of 29 µstrains.

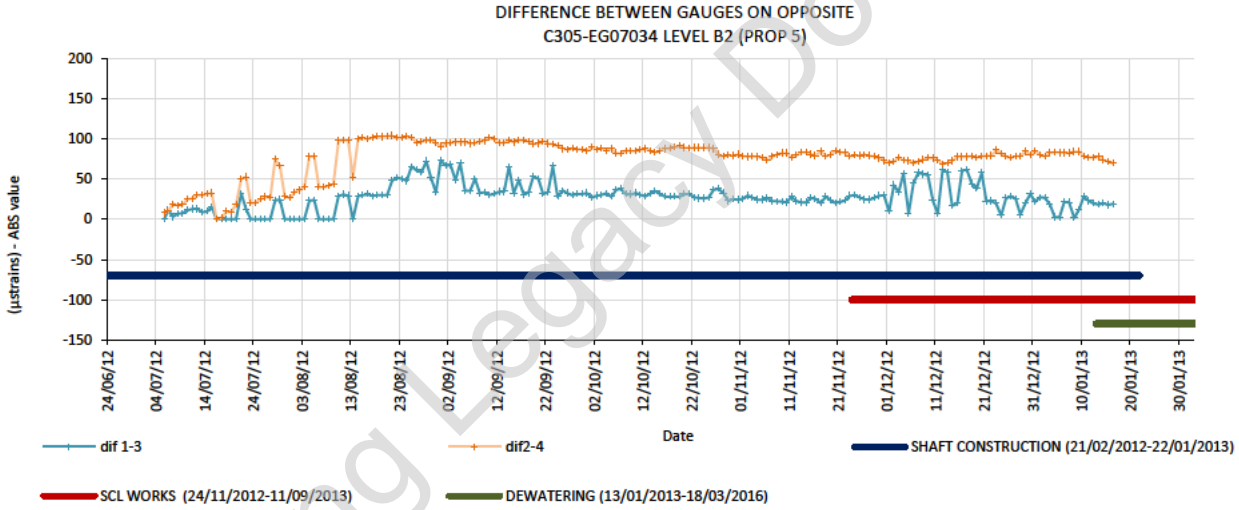




C305-EG07034 LEVEL B2 (PROP 5)

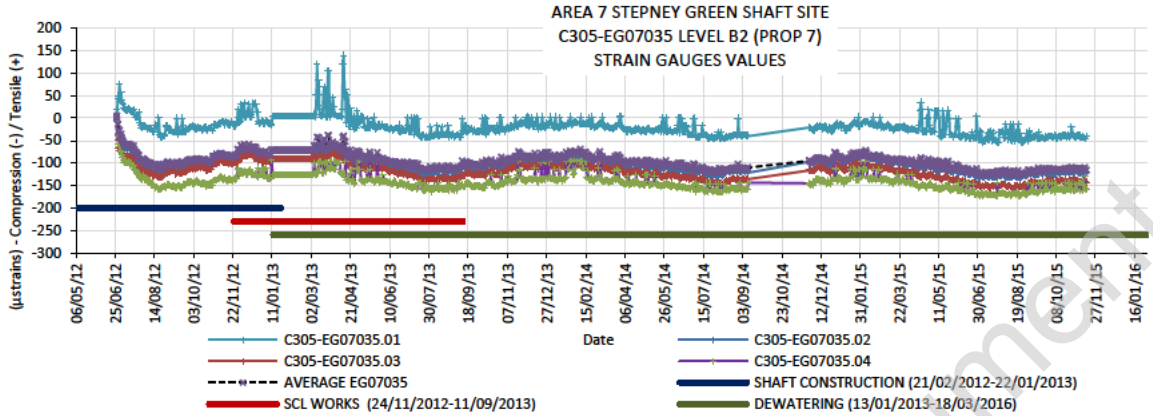
The graphs presented below show a compression of -120 µstrains in August 2012 during the shaft construction and a maximum differential strain of 100 µstrains.

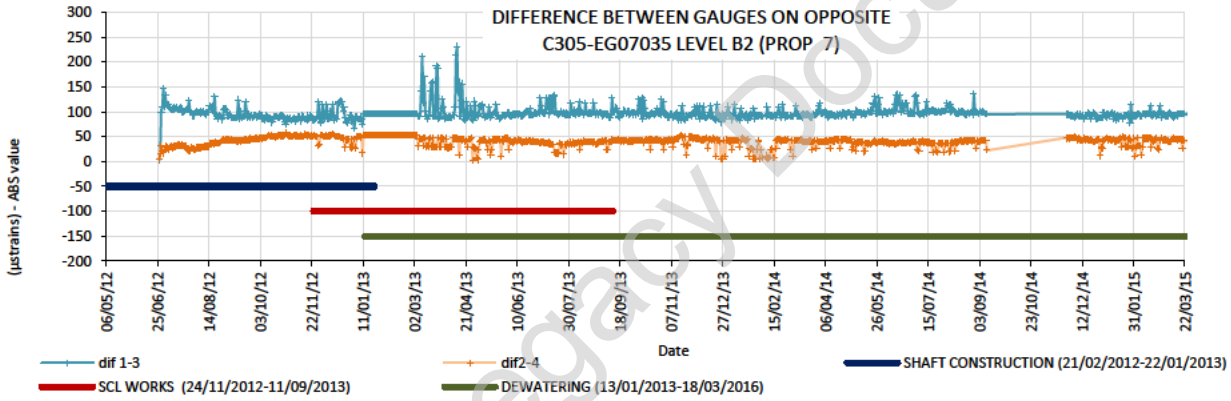




C305-EG07035 LEVEL B2 (PROP 7)

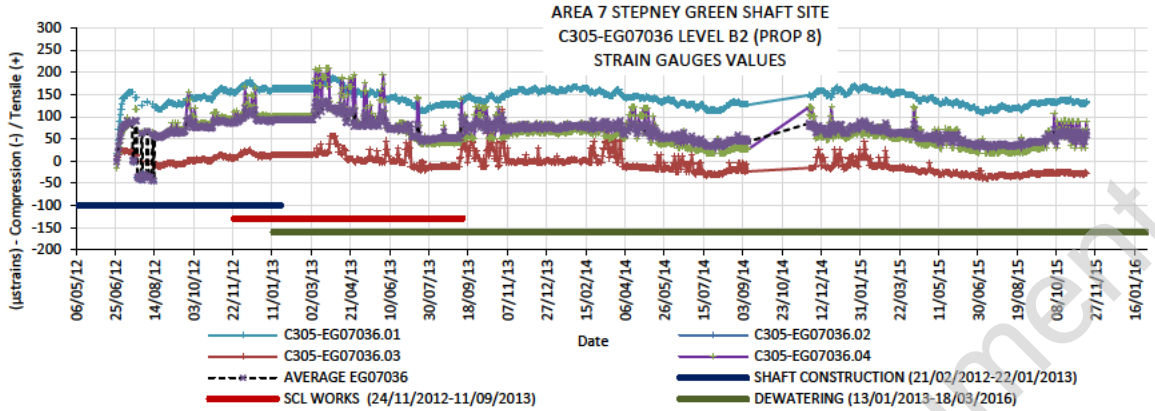
The graphs presented below show a compression of -157 µstrains in August 2012 during the shaft construction and a maximum differential strain of 131 µstrains.

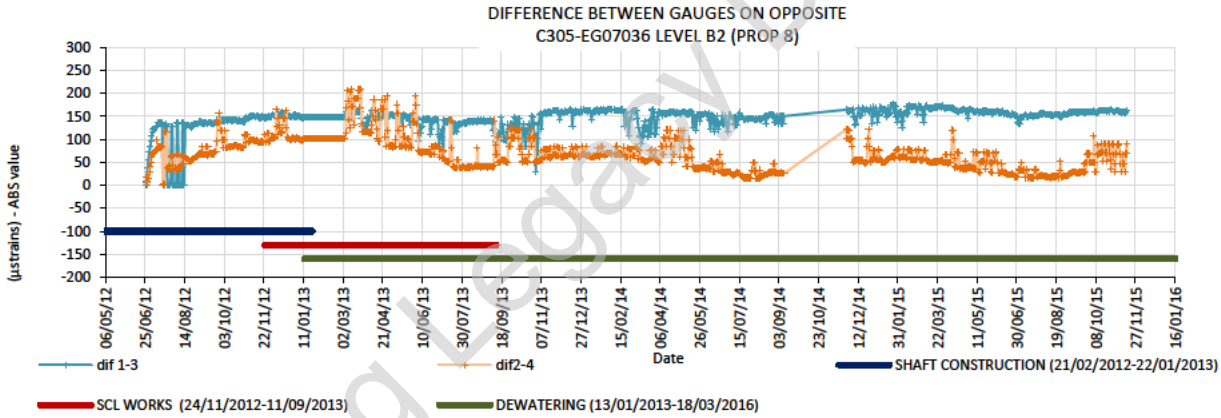




C305-EG07036 LEVEL B2 (PROP 8)

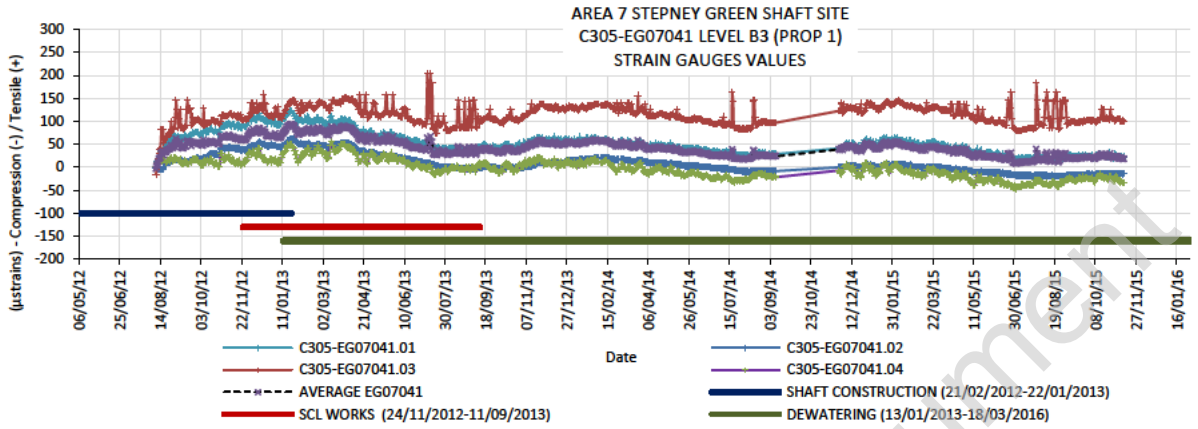
The graphs presented below show a tension of +130 µstrains in August 2012 during the shaft construction and a maximum differential strain of 130 µstrains.

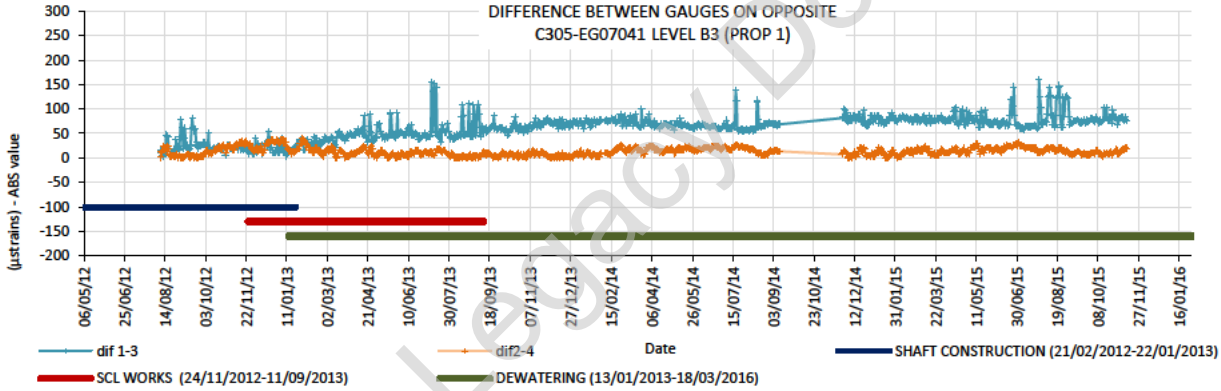




C305-EG07041 LEVEL B3 (PROP 1)

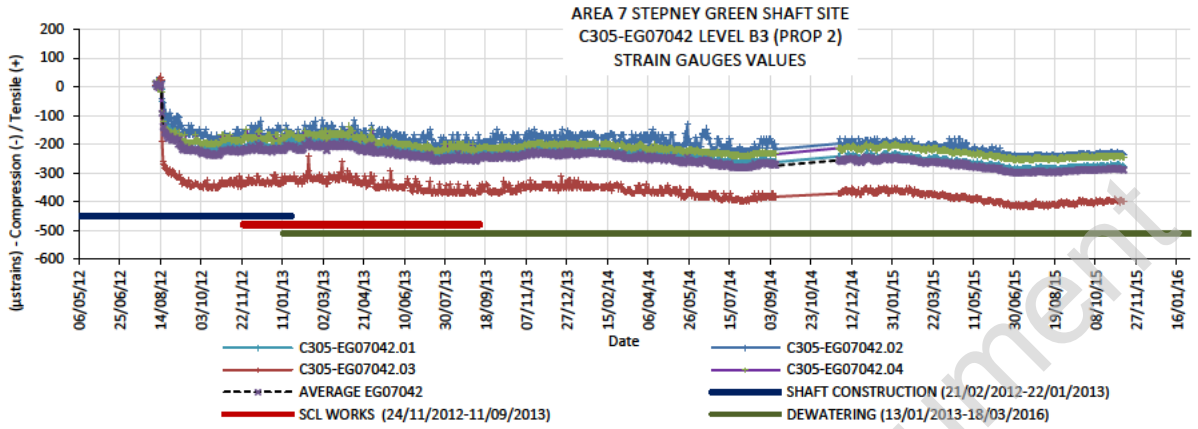
The graphs presented below show a tension of +150 µstrains in December 2012 during the shaft construction and a maximum differential strain of 50 µstrains.

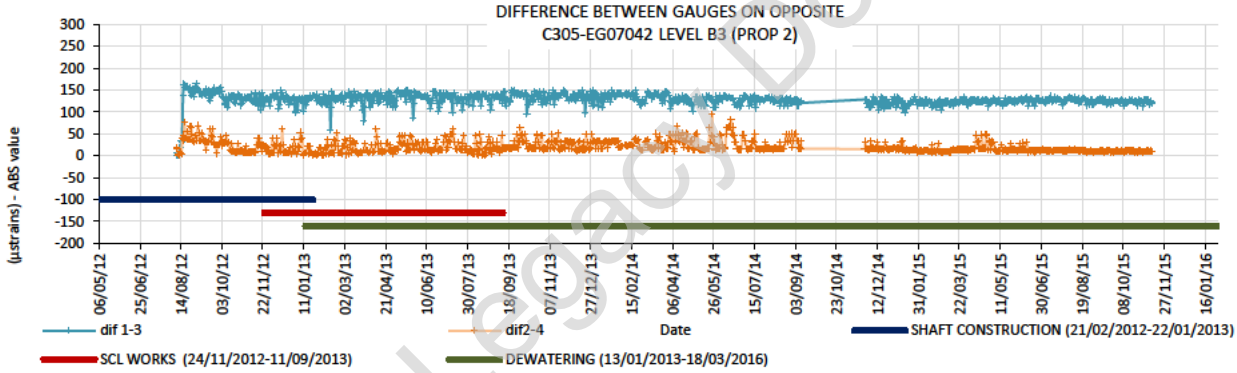




C305-EG07042 LEVEL B3 (PROP 2)

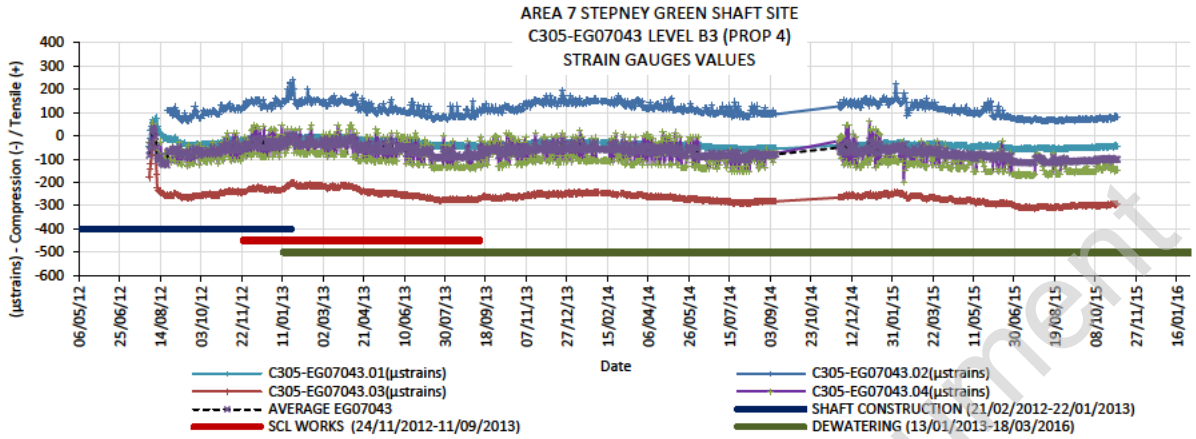
The graphs presented below show a compression of -353 µstrains in August 2012 during the shaft construction and a maximum differential strain of 156 µstrains.

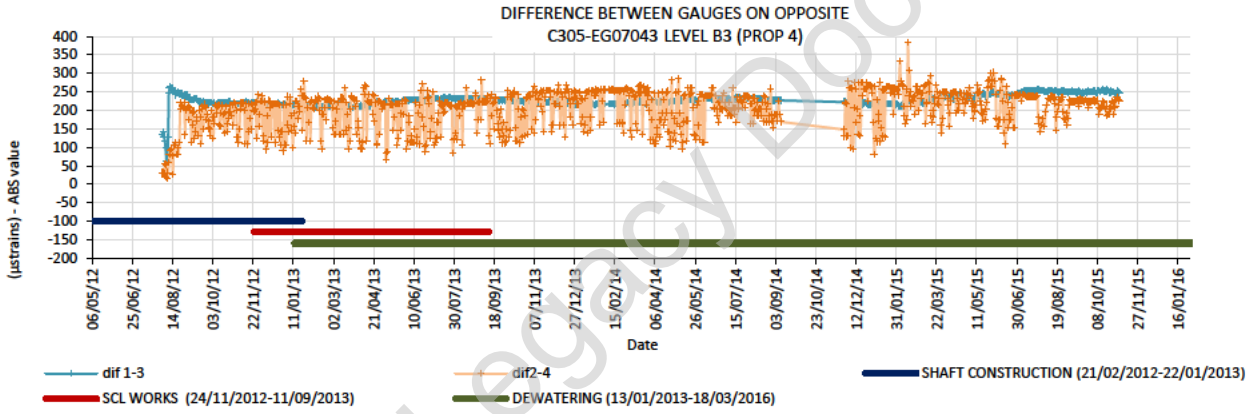




C305-EG07043 LEVEL B3 (PROP 4)

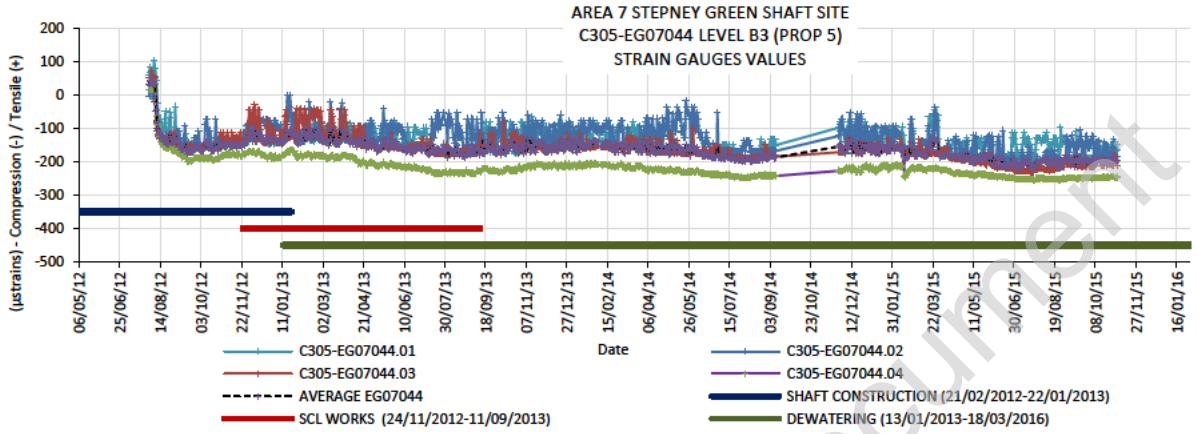
The graphs presented below show a compression of -267 µstrains in August 2012 during the shaft construction and a maximum differential strain of 241 µstrains.

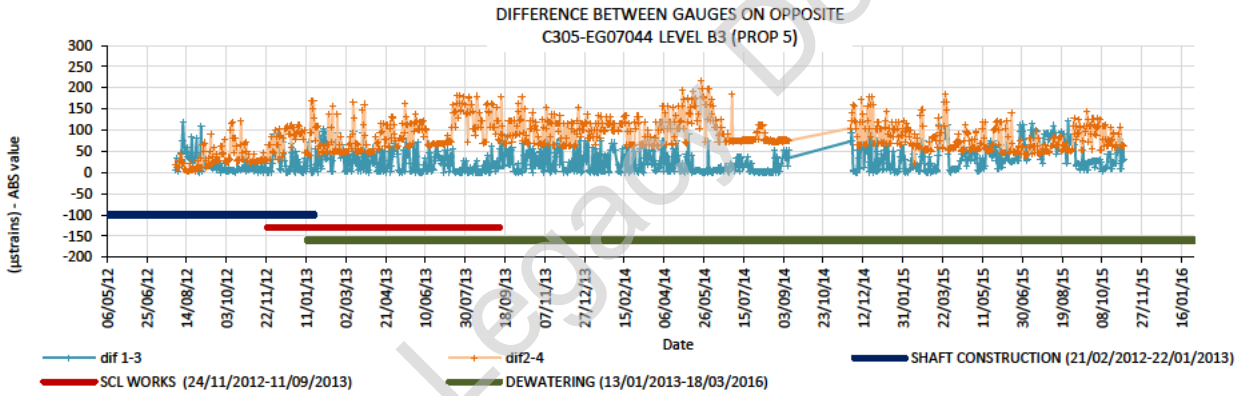




C305-EG07044 LEVEL B3 (PROP 5)

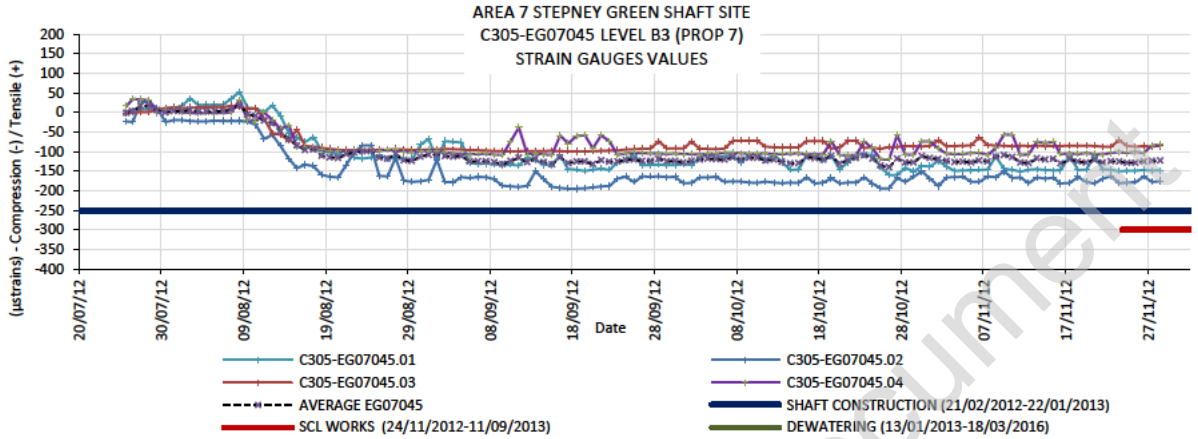
The graphs presented below show a compression of -267 µstrains in August 2012 during the shaft construction and a maximum differential strain of 241 µstrains.

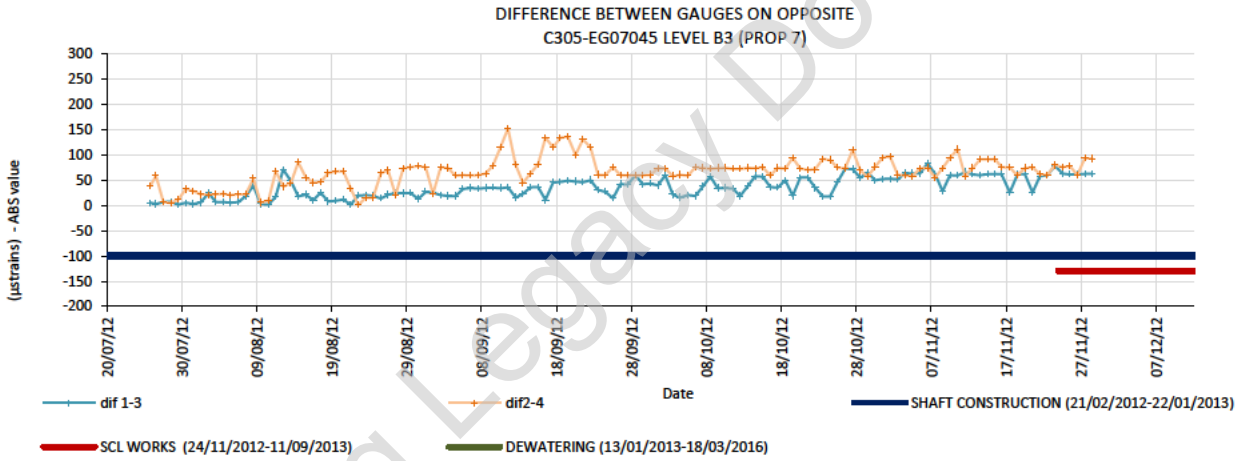




C305-EG07045 LEVEL B3 (PROP 7)

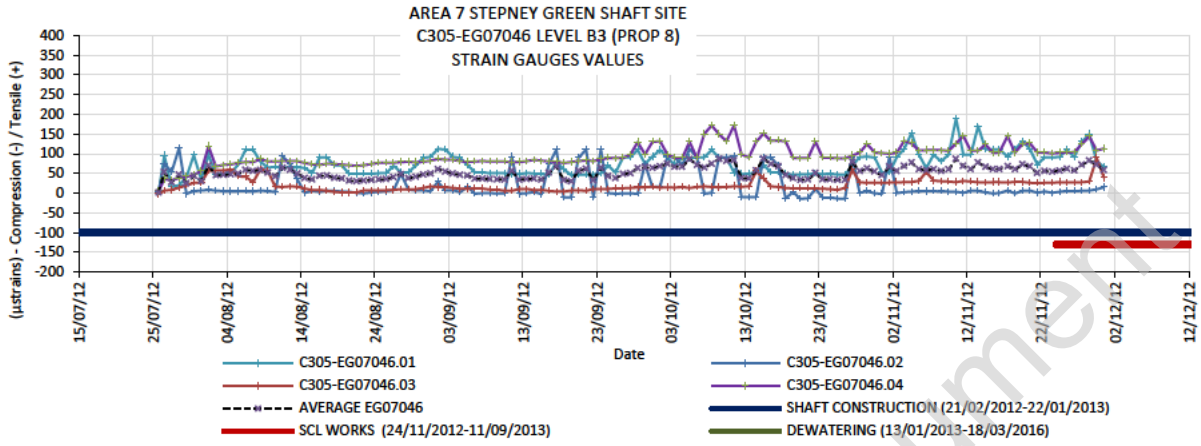
The graphs presented below show a compression of -194 µstrains in September 2012 during the shaft construction and a maximum differential strain of 134 µstrains.

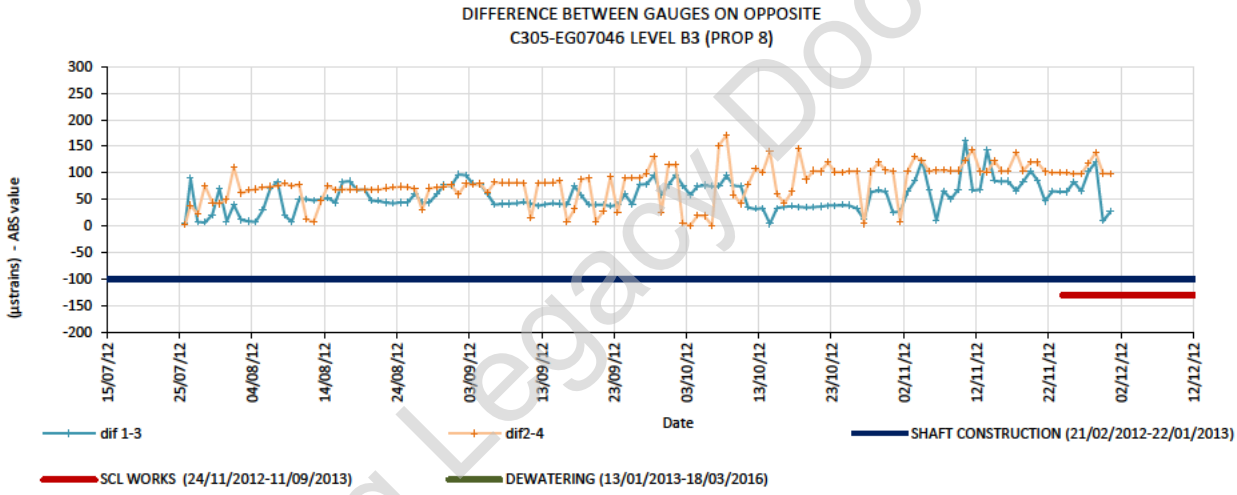




C305-EG07046 LEVEL B3 (PROP 8)

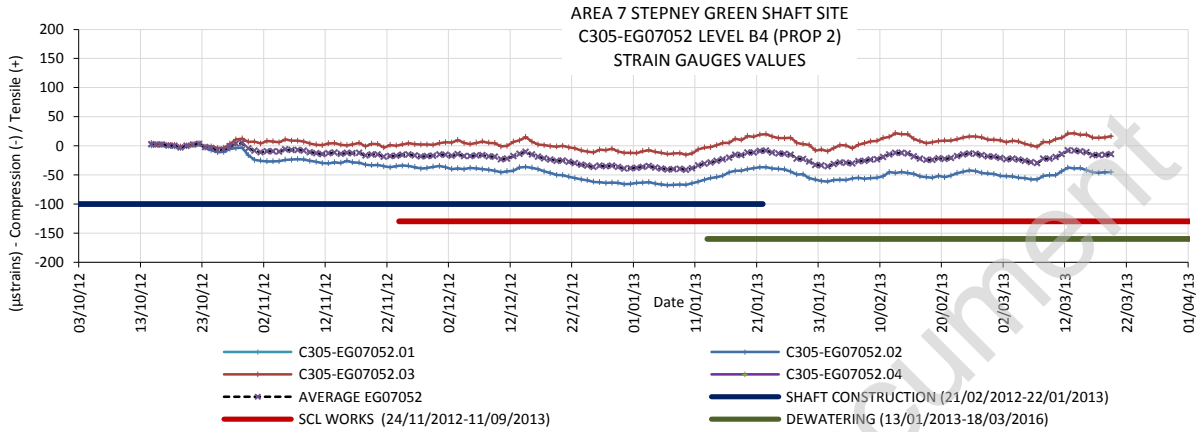
The graphs presented below show a tension of +110 µstrains in September 2012 during the shaft construction and a maximum differential strain of 100 µstrains.

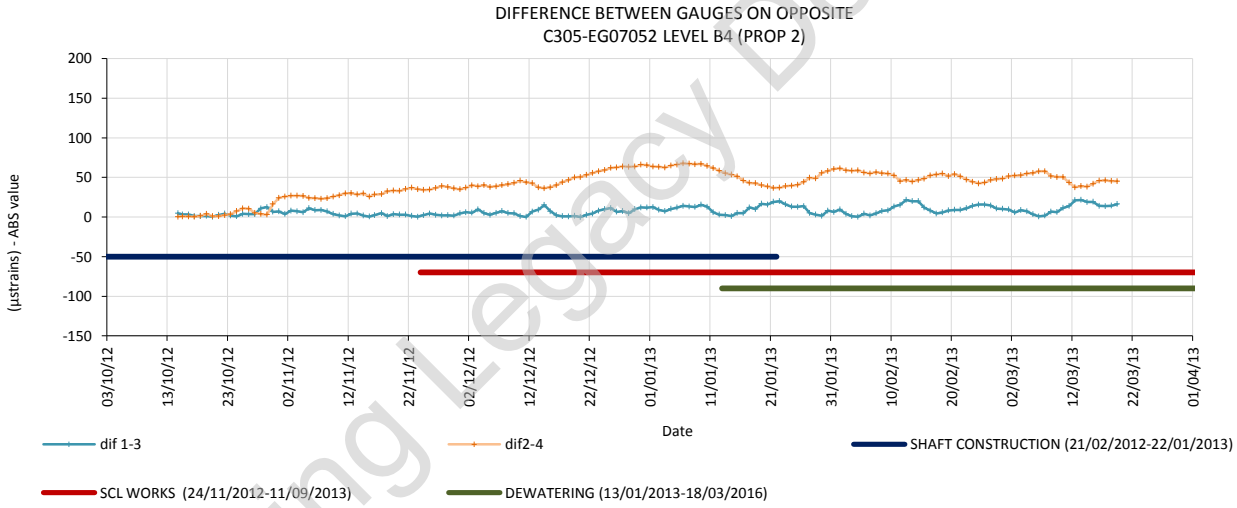




C305-EG07052 LEVEL B4 (PROP 2)

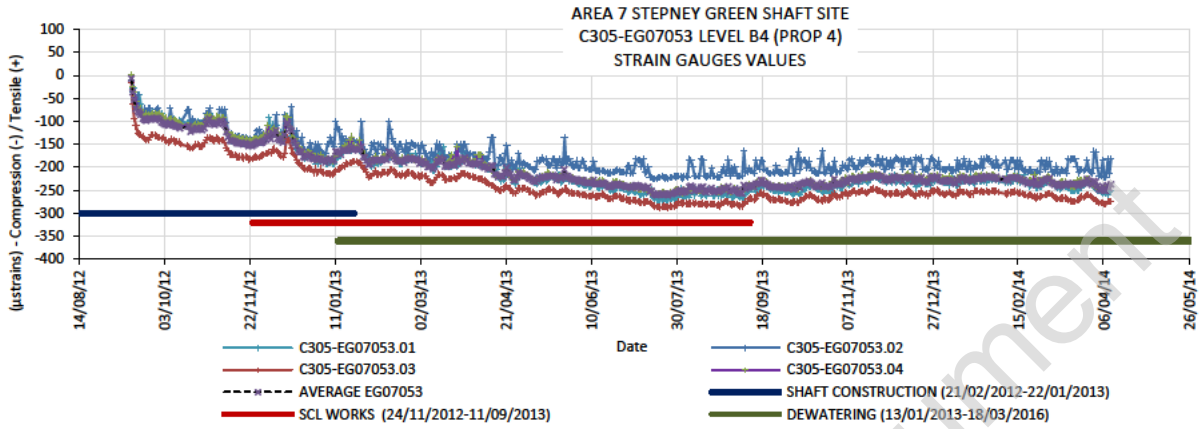
The graphs presented below show a compression of -67 µstrains in January 2013 during the shaft construction and a maximum differential strain of 67 µstrains.

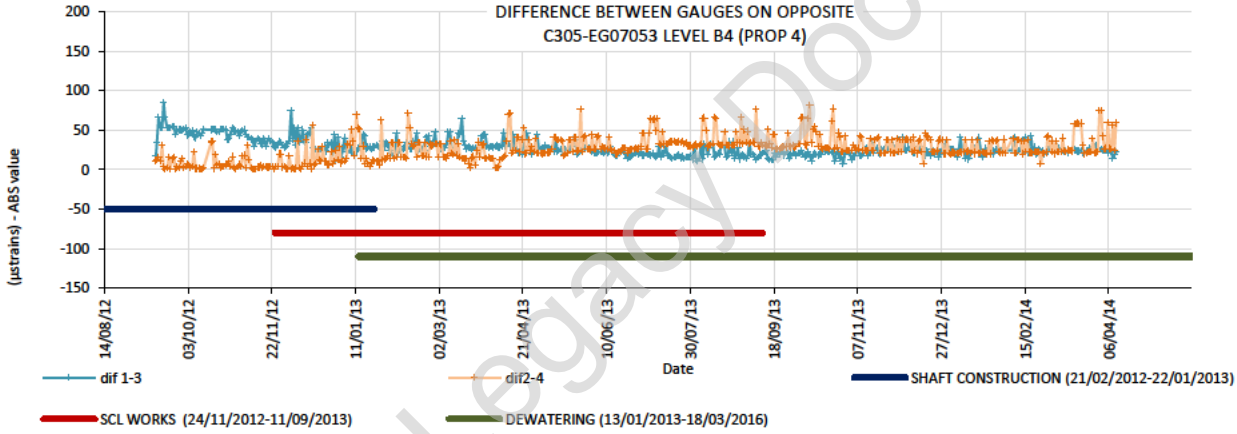




C305-EG07053 LEVEL B4 (PROP 4)

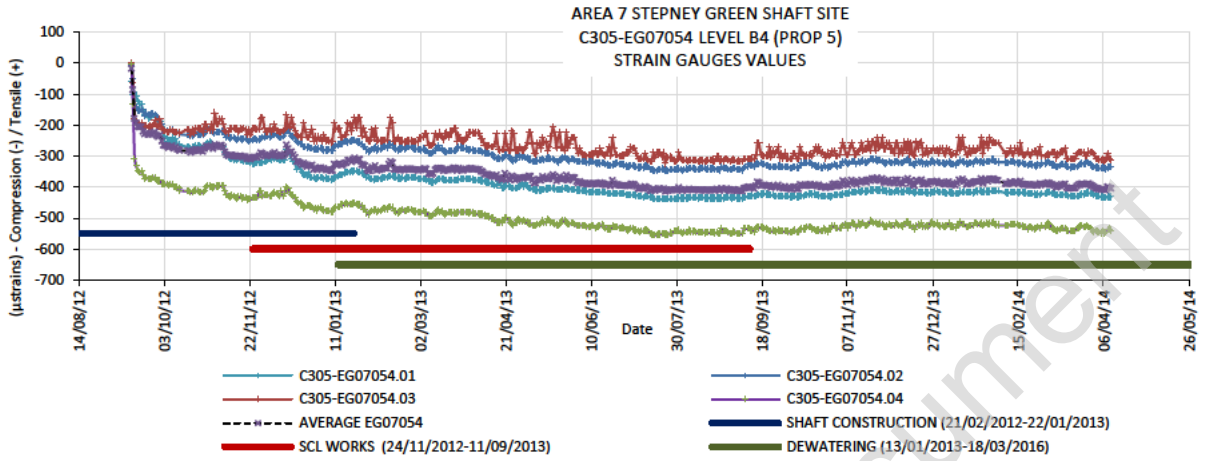
The graphs presented below show a compression of -287 µstrains in July 2013 after the shaft construction and during the SCL works and a maximum differential strain of 64 µstrains.

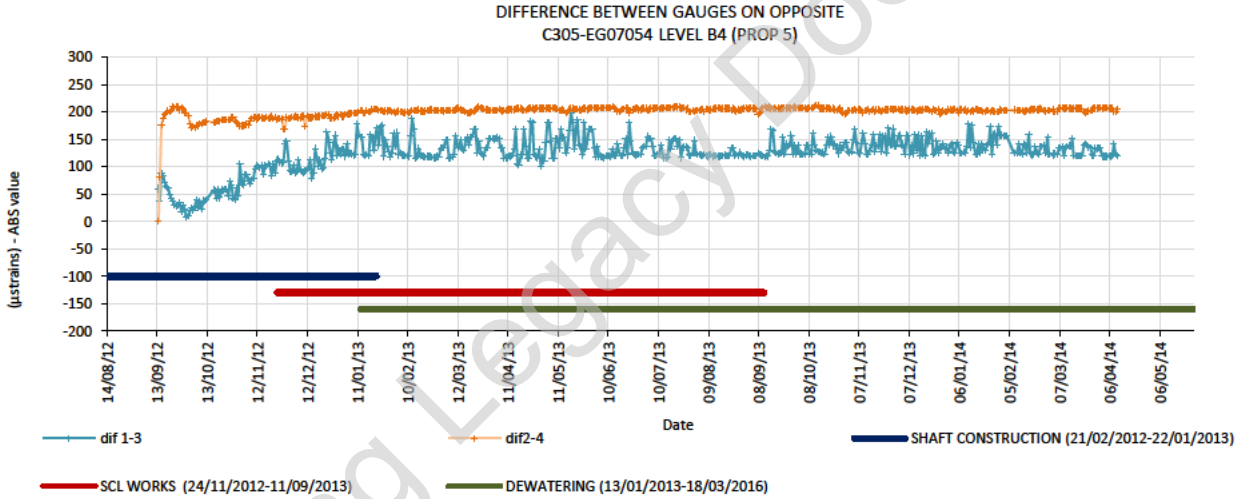




C305-EG07054 LEVEL B4 (PROP 5)

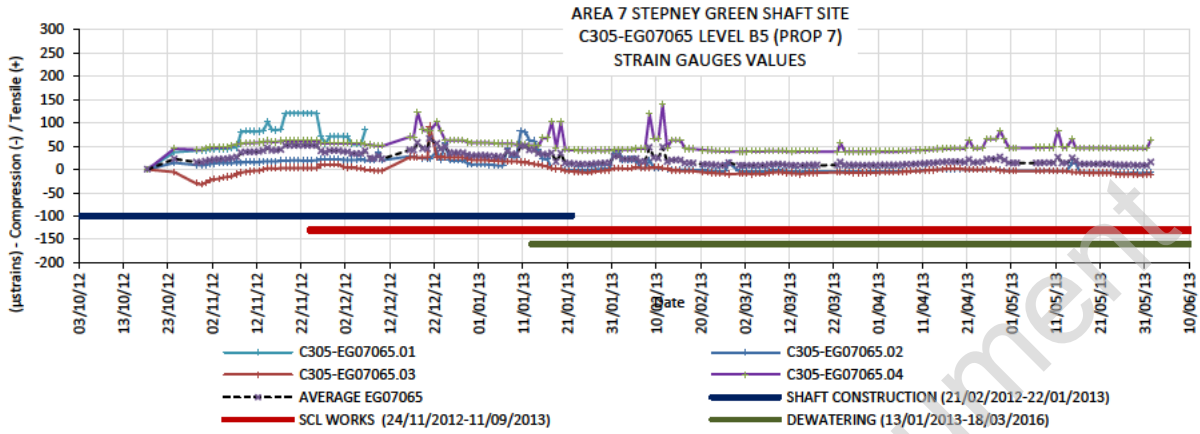
The graphs presented below show a compression of -555 µstrains in July 2013 after the shaft construction and during the SCL works and a maximum differential strain of 206 µstrains.

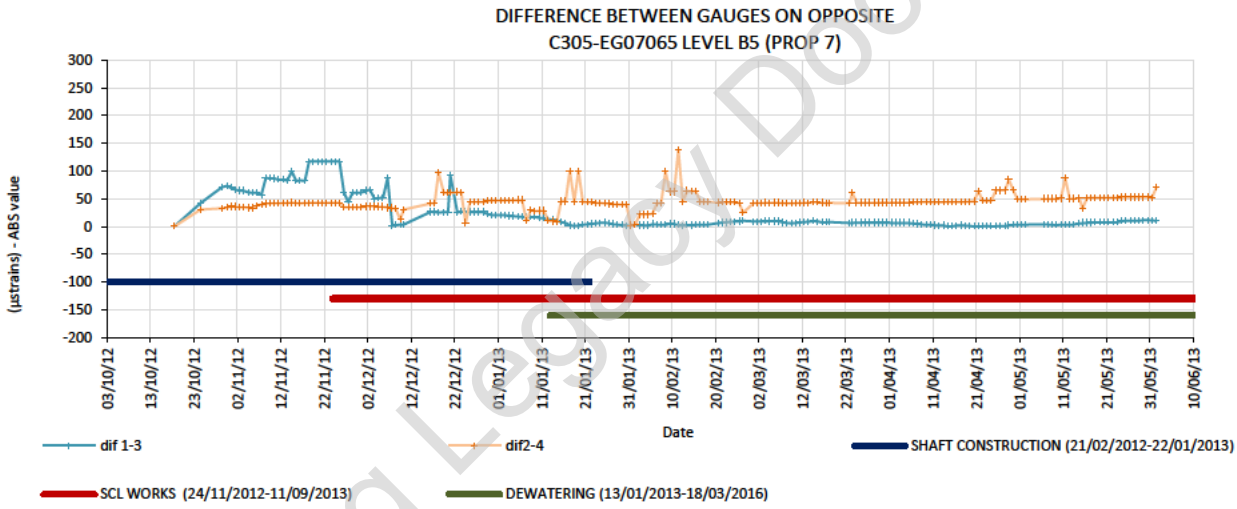




C305-EG07065 LEVEL B5 (PROP 7)

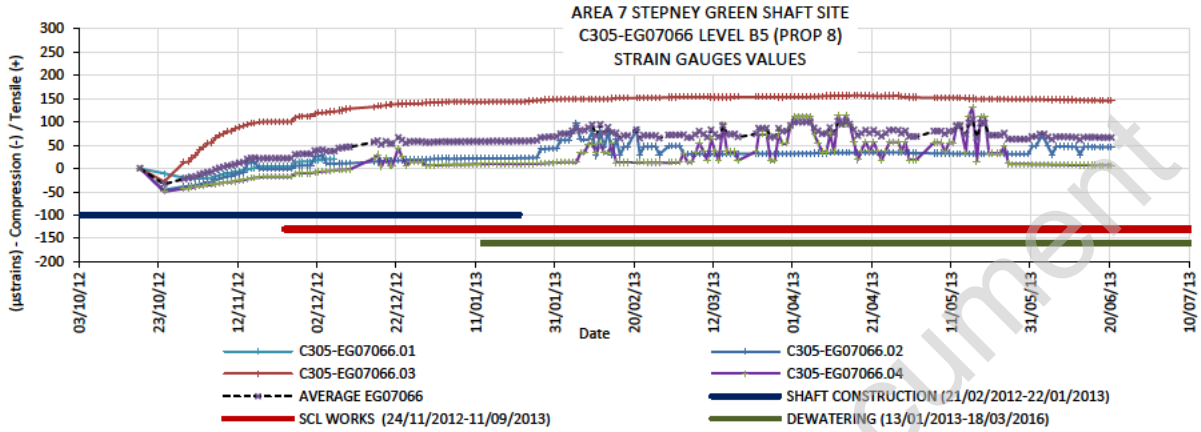
The graphs presented below show a tension of +120 µstrains in November 2012 during the shaft construction and a maximum differential strain of 117 µstrains.

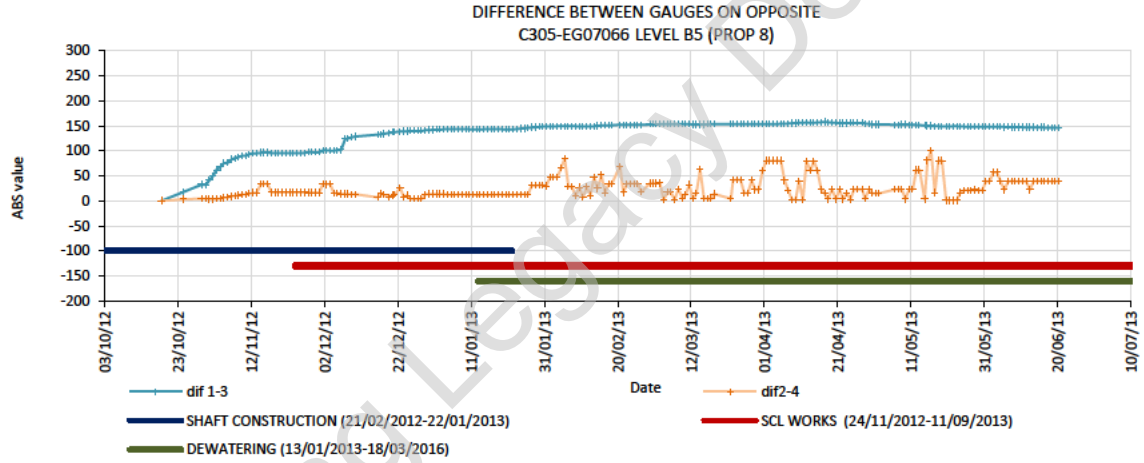




C305-EG07066 LEVEL B5 (PROP 8)

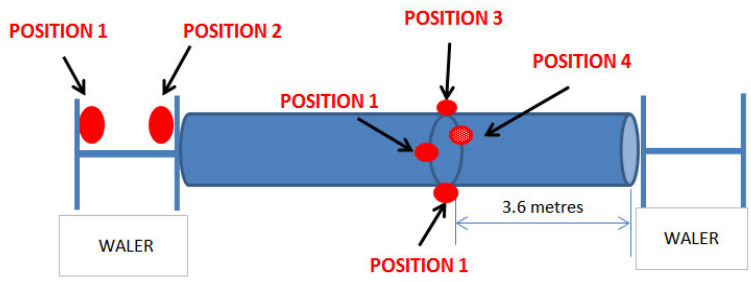
The graphs presented below show a tension of +143 µstrains in January 2013 during the shaft construction and a maximum differential strain of 143 µstrains.





VIBRATING WIRE SPOT WELDABLE STRAIN GAUGES

The strain gauges included in this section were installed on temporary props and walers at different levels of the shaft, as per sketch shown below.

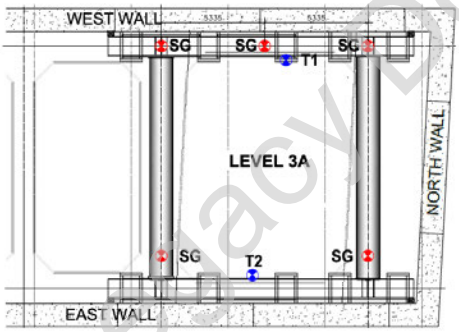


Strain gauges installed on temporary props: they were positioned at the quarter points of the cross section (ie at 3, 6, 9 and 12 o'clock positions)

Strain gauges installed on walers: They were installed on both inside flanges of the top waler.

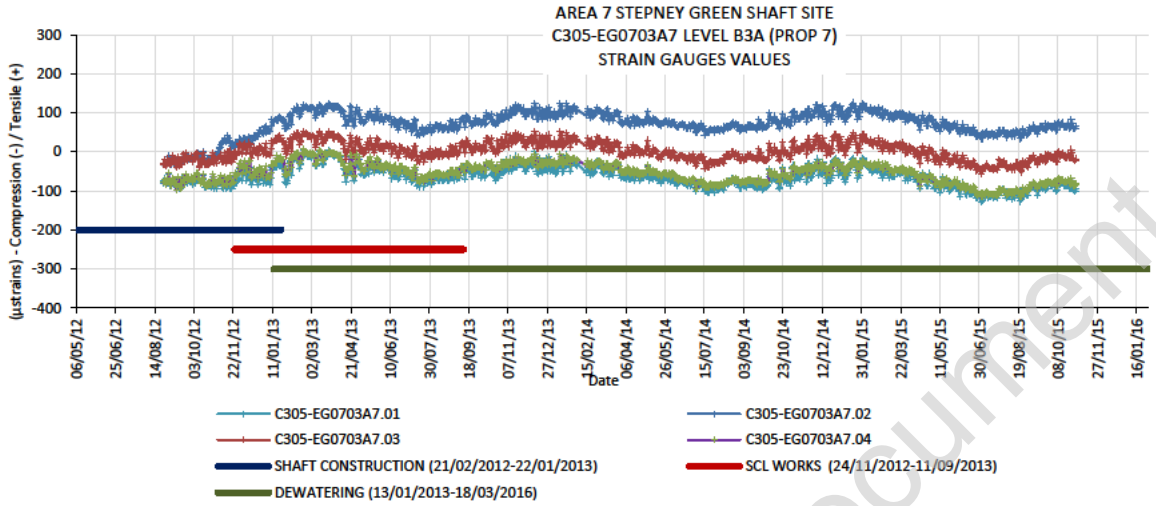
LEVEL 3A

The layout below shows the location of the strain gauges installed at level 3A.



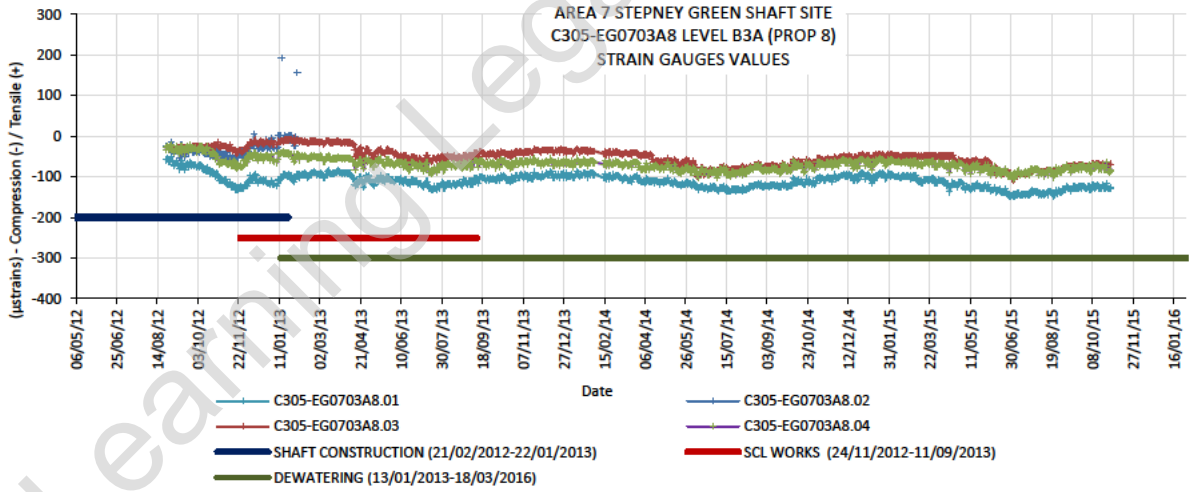
LEVEL 3A - C305-EG0703A7

The graph presented below shows a compression of -98 µstrains in September 2012 during the shaft construction.



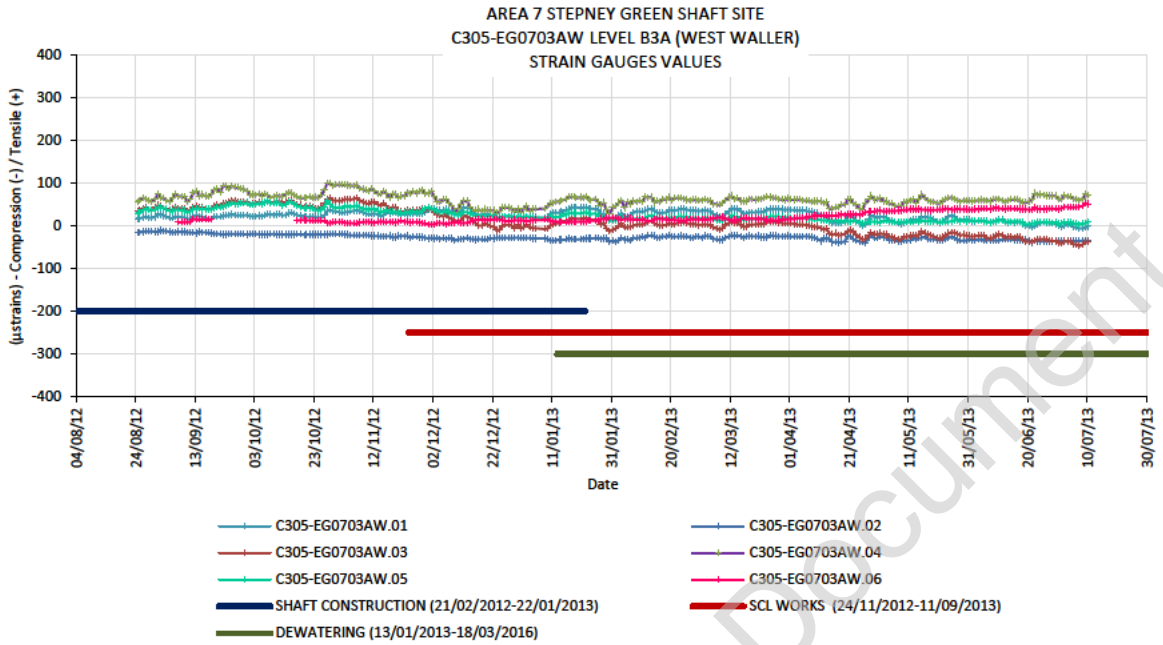
LEVEL 3A - C305-EG0703A8

The graph presented below shows a compression of -132 µstrains in November 2012 during the shaft construction.



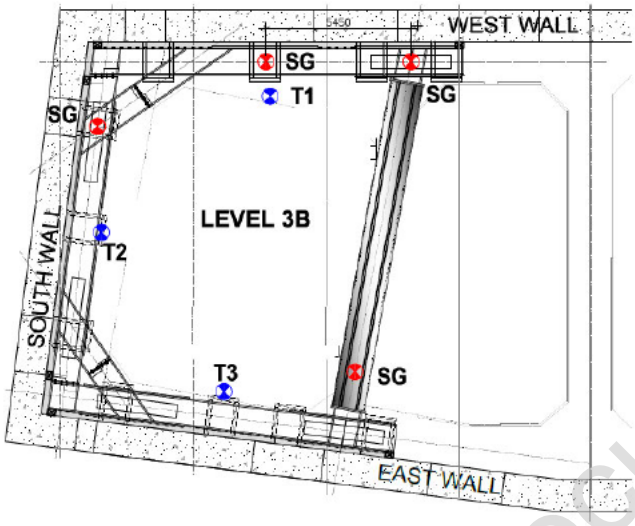
LEVEL 3A - C305-EG0703AW

The graph presented below shows a tension of +95 µstrains in October 2012 during the shaft construction.



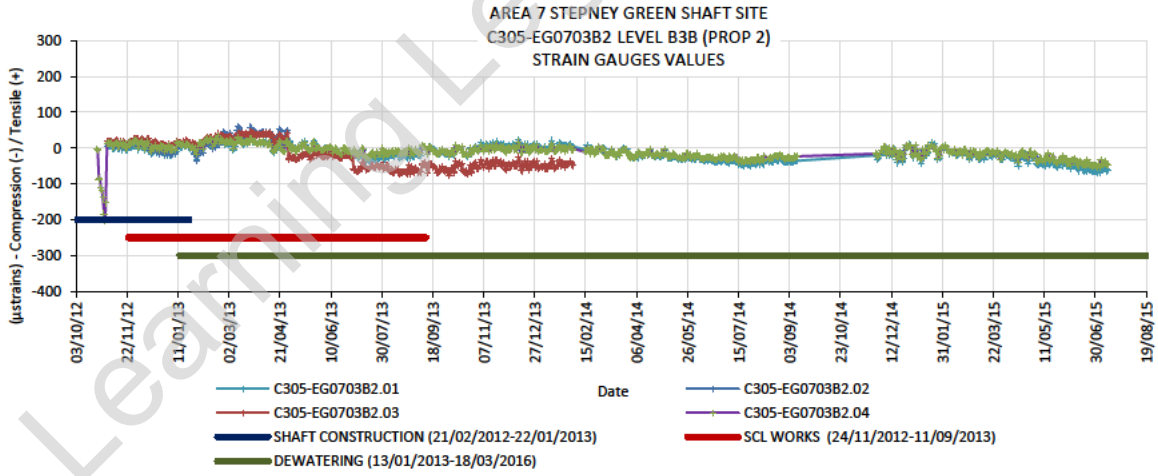
LEVEL 3B

The layout below shows the location of the strain gauges installed at level 3B.



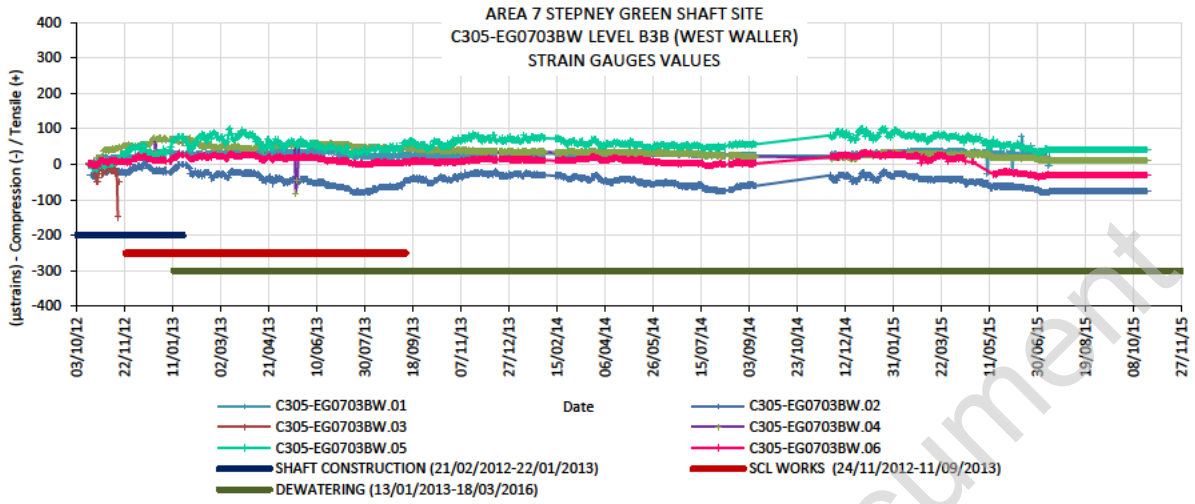
LEVEL 3B - C305-EG0703B2

The graph presented below does not show a significant movement during the shaft construction. A compression of -71 µstrains was recorded in August 2013 during the SCL works.



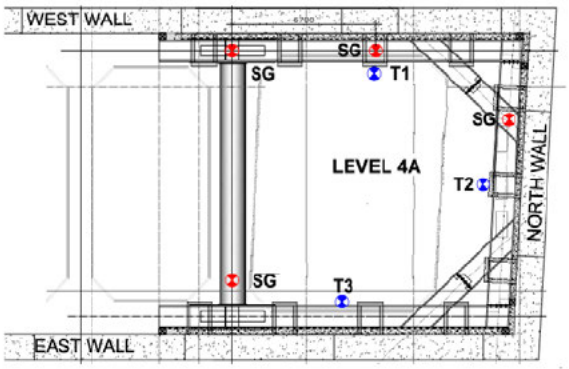
LEVEL 3B - C305-EG0703BW

The graph presented below shows a tension of +61 µstrains in January 2013 during the shaft construction.



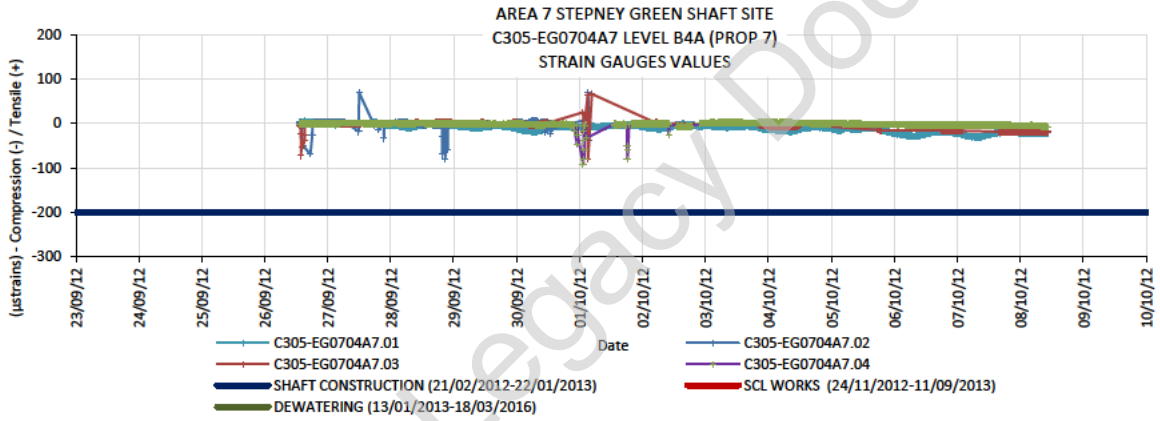
LEVEL 4A

The layout below shows the location of the strain gauges installed at level 4A.



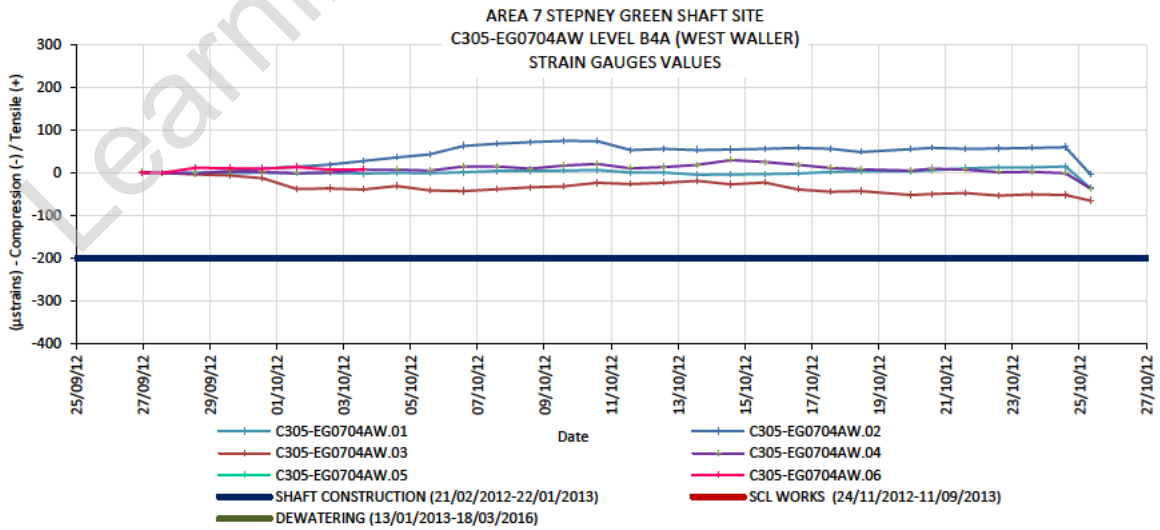
LEVEL 4A - C305-EG0704A7

The graph presented below does not show a significant movement during the shaft construction.



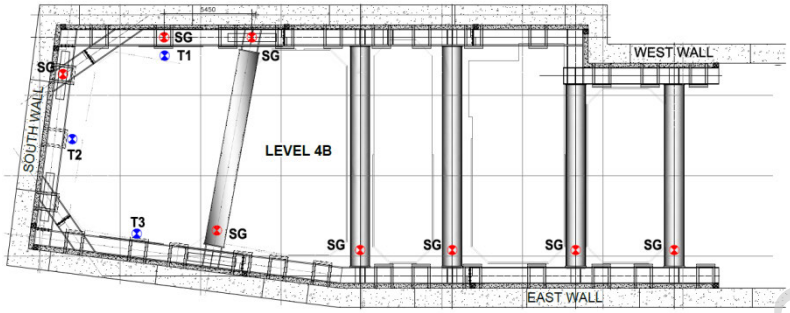
LEVEL 4A - C305-EG0704AW

The graph presented below shows a tension of +74 µstrains in October 2012 during the shaft construction.



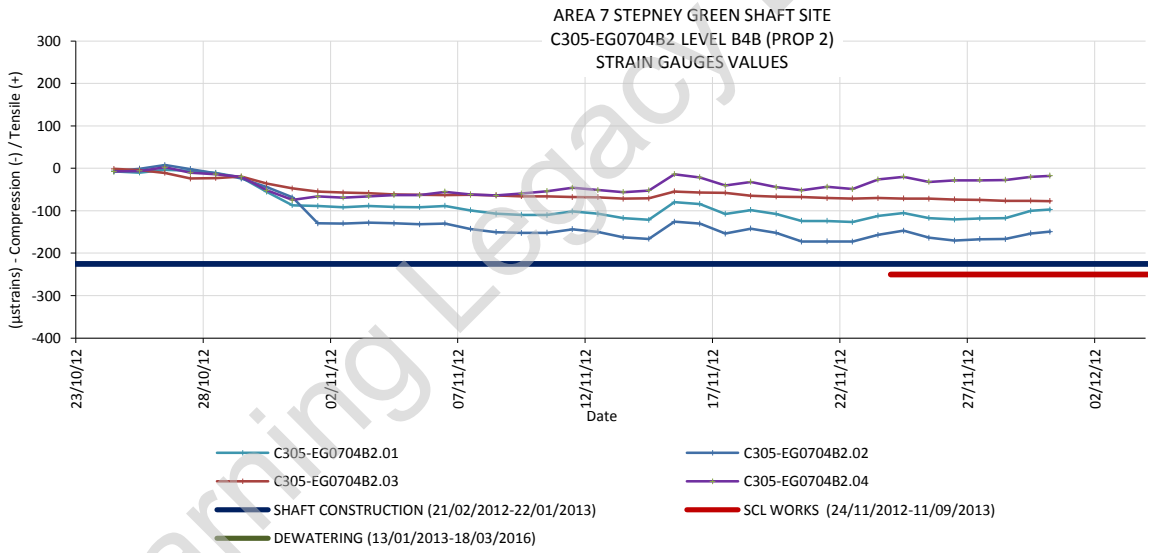
LEVEL 4B

The layout below shows the location of the strain gauges installed at level 4B



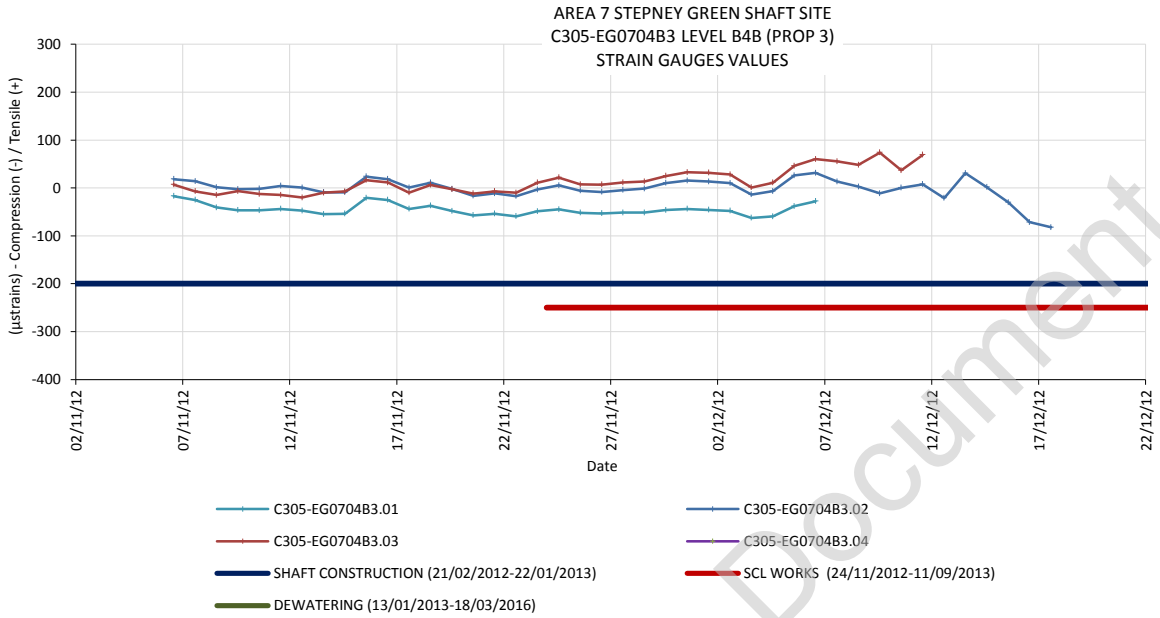
LEVEL 4B - C305-EG0704B2

The graph presented below shows a compression of -173 µstrains in November 2012 during the shaft construction.



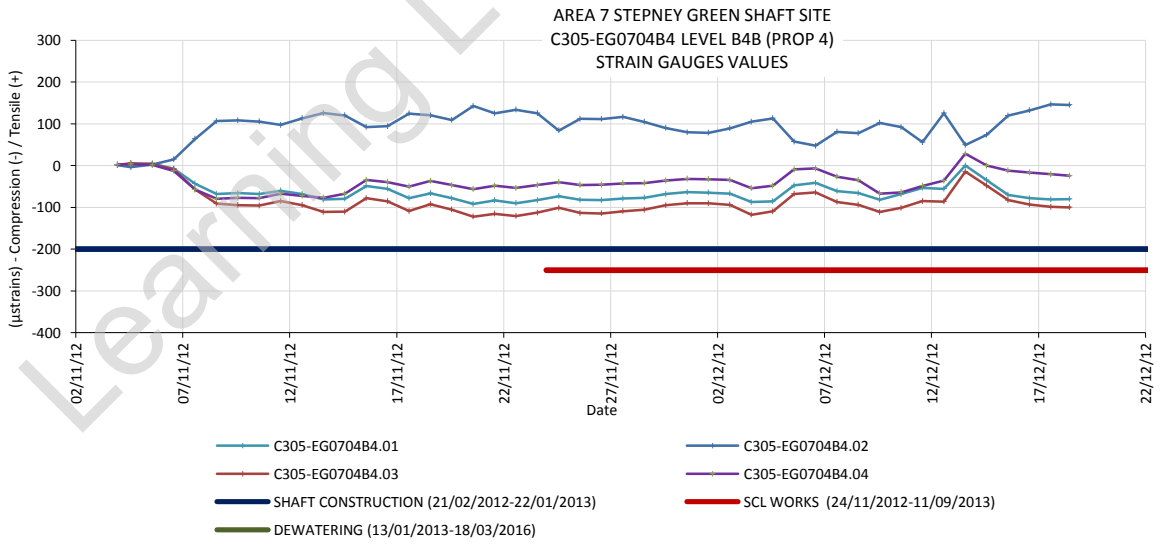
LEVEL 4B - C305-EG0704B3

The graph presented below shows a compression of -62 µstrains in December 2012 during the shaft construction.



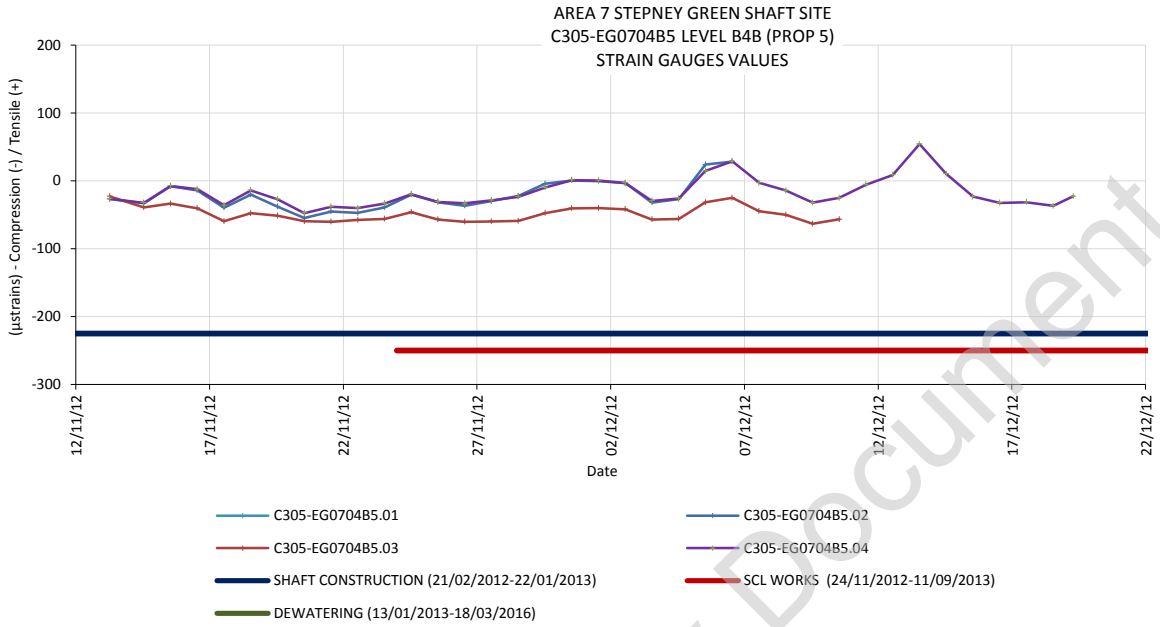
LEVEL 4B - C305-EG0704B4

The graph presented below shows a compression of -122 µstrains in November 2012 during the shaft construction.



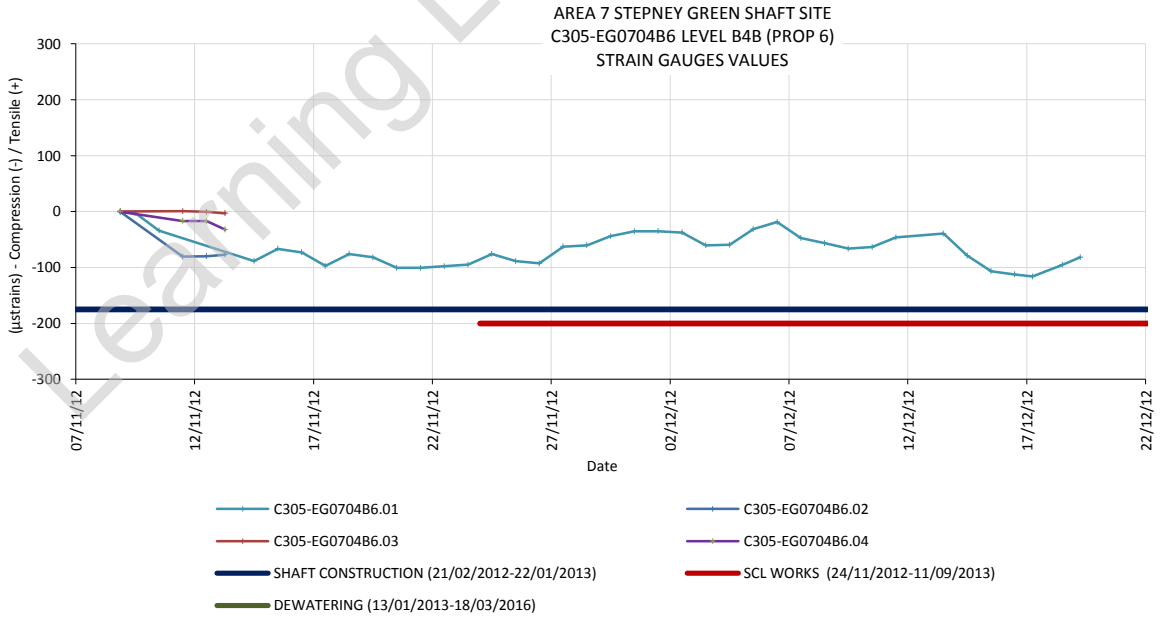
LEVEL 4B - C305-EG0704B5

The graph presented below shows a compression of -64 µstrains in December 2012 during the shaft construction.



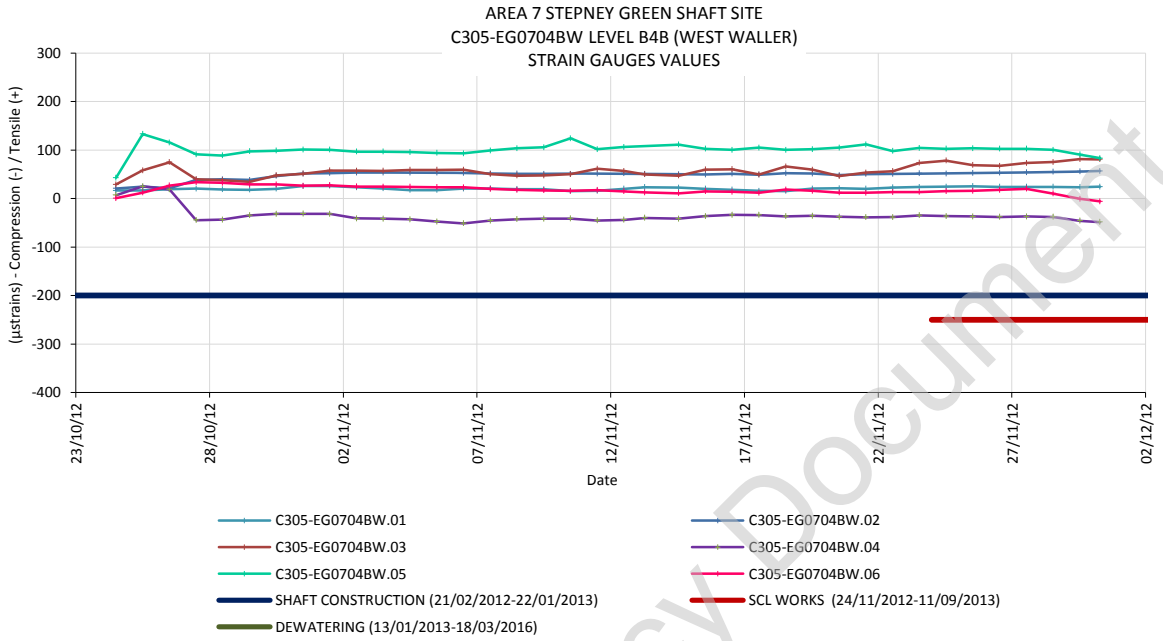
LEVEL 4B - C305-EG0704B6

The graph presented below shows a compression of -116 µstrains in December 2012 during the shaft construction.



LEVEL 4B - C305-EG0704BW

The graph presented below shows a compression of -48 µstrains in November 2012 during the shaft construction.

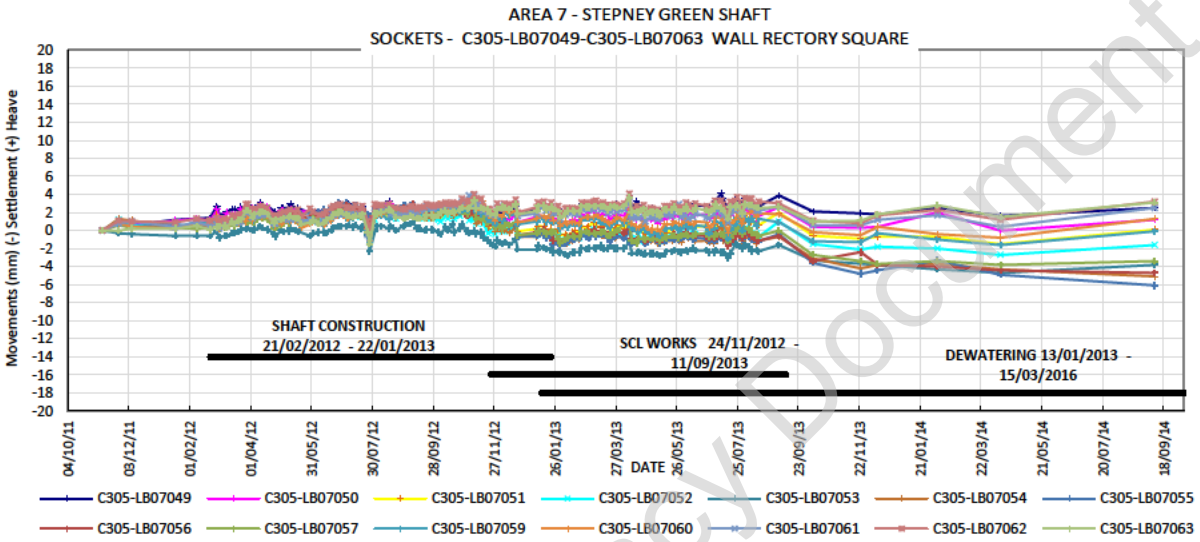


Stepney Green for Ground Levelling to Monitor the Shaft Construction and Holloway Relief Sewer

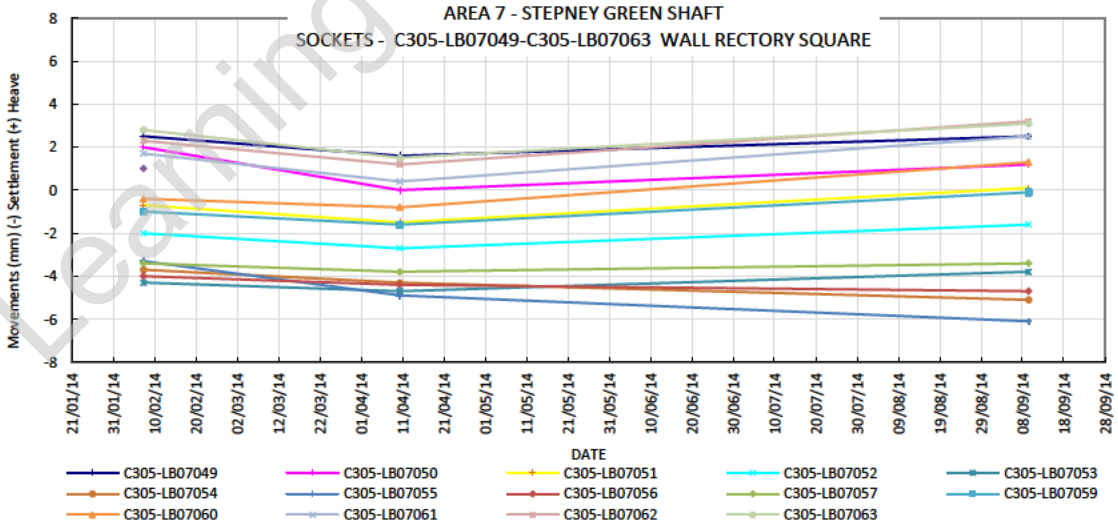
SOCKETS

C305-LB07049-LB07063 WALL RECTORY SQUARE

The graph presented below shows a settlement of -3.1 mm in July 2013 after the shaft construction and during the SCL works. The maximum settlement of -6.1 mm was recorded in September 2014 during the dewatering.



The plot below shows the trend line adjustment for each socket:



The table below lists the annual settlement rate for each socket:

	Registered movement (mm)			Ratio mm/year
	07/02/2014	10/04/2014	09/09/2014	
C305-LB07049	2.50	1.60	2.50	0.406
C305-LB07050	2.00	0.00	1.20	-0.565
C305-LB07051	-0.70	-1.50	0.10	1.829
C305-LB07052	-2.00	-2.70	-1.60	1.050
C305-LB07053	-4.30	-4.70	-3.80	1.098
C305-LB07054	-3.70	-4.30	-5.10	-2.298
C305-LB07055	-3.30	-4.90	-6.10	-4.415
C305-LB07056	-4.00	-4.40	-4.70	-1.104
C305-LB07057	-3.40	-3.80	-3.40	0.181
C305-LB07059	-1.00	-1.60	-0.10	1.923
C305-LB07060	-0.40	-0.80	1.30	3.300
C305-LB07061	1.70	0.40	2.50	2.055
C305-LB07062	2.30	1.20	3.20	2.148
C305-LB07063	2.80	1.50	3.10	1.138
	Rate less than -2.5 mm/year	% less 2 mm/ year		93%
	Rate greater than -3.5 mm/year	% less 3 mm/ year		93%

Note: All the movements are in mm. (-) Settlement / (+) Heave

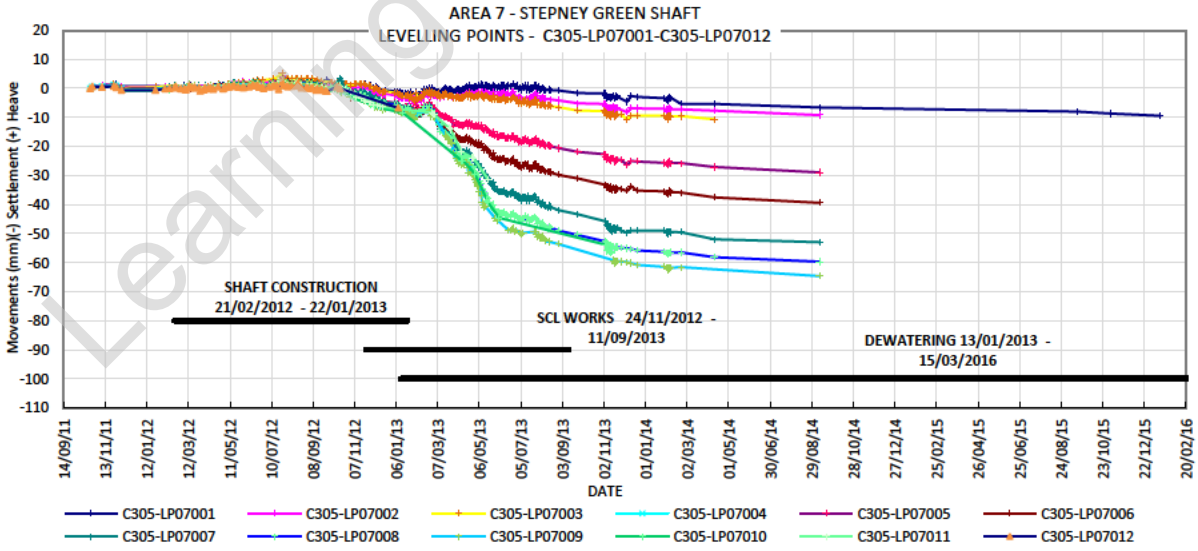
#N/A: No readings

The percentage of the above sockets with a settlement rate less than 2 mm/year is 93%, whereas 93% are less than 3 mm/year.

LEVELLING POINTS

C305-LP07001 TO C305-LP07012

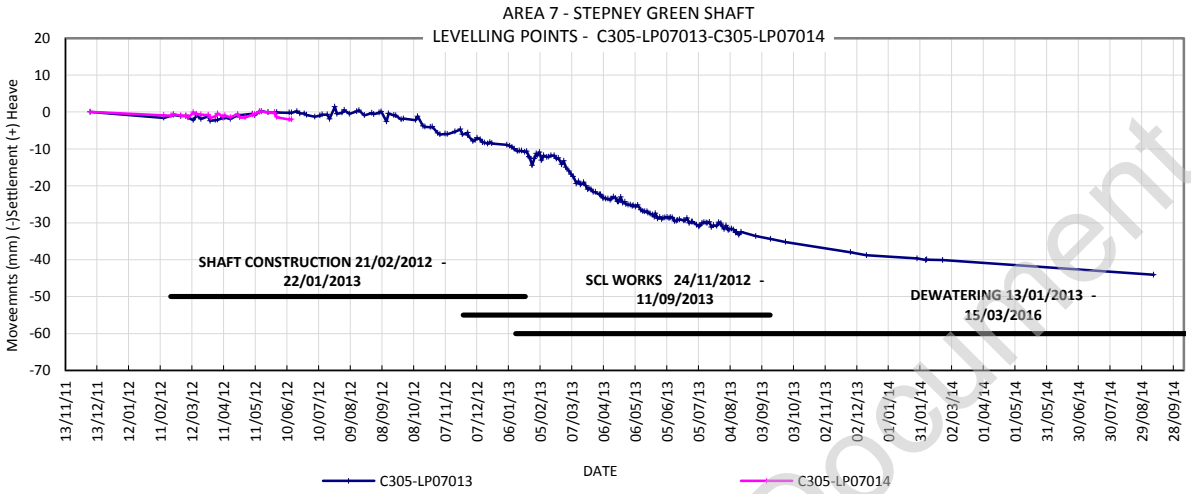
The graph presented below shows a settlement of -55 mm in September 2013 after the SCL works. The maximum settlement of -64.6 mm was recorded in September 2014 during the dewatering.



Due to access issues long term readings are not available for these levelling points, and furthermore, the annual settlement rate projection has not been calculated.

C305-LP07013 TO C305-LP07014

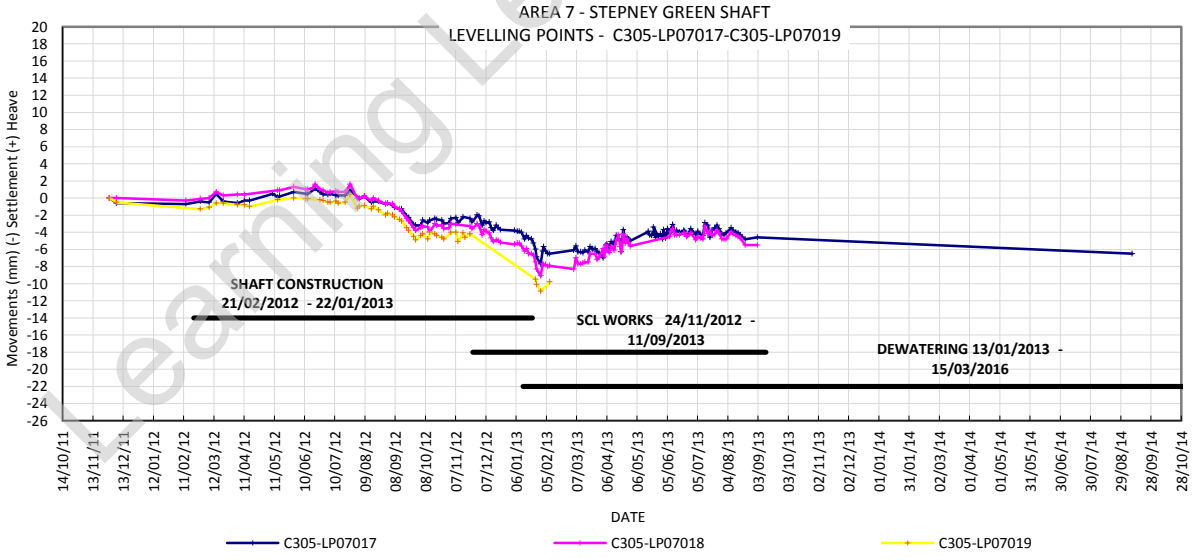
The graph presented below shows a settlement of -35.2 mm in September 2013 after the shaft construction and SCL works. The maximum settlement of -44.1 mm was recorded in September 2014 during the dewatering.



Due to access issues long term readings are not available for these levelling points, and furthermore, the annual settlement rate projection has not been calculated.

C305-LP07017 TO C305-LP07019

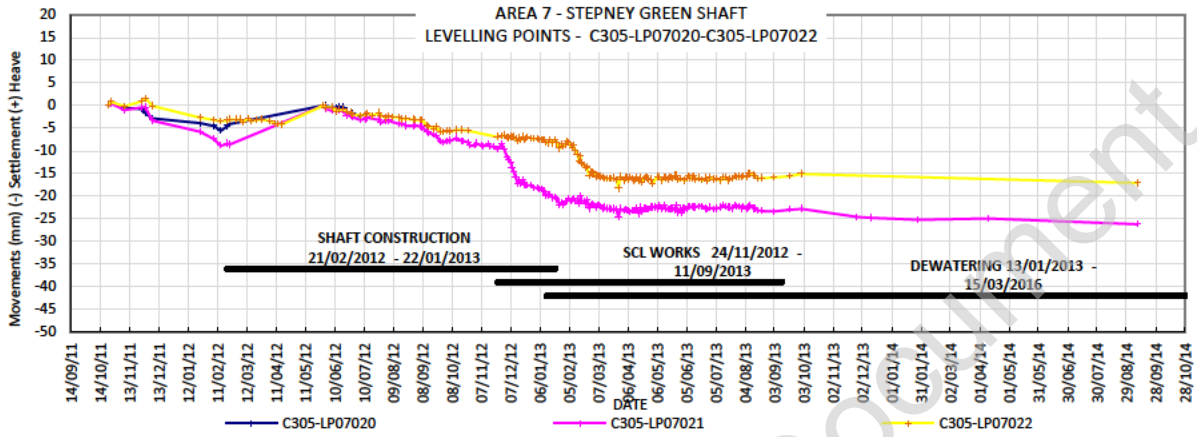
The graph presented below shows a maximum settlement of -10.9 mm in January 2013 after the shaft construction and during SCL works.



Due to access issues long term readings are not available for these levelling points, and furthermore, the annual settlement rate projection has not been calculated.

C305-LP07020 TO C305-LP07022

The graph presented below shows a settlement of -15 mm between November 2012 and March 2013 after the completion of the shaft construction and the commencement of the SCL works and dewatering. The maximum settlement of -26.2 mm was recorded in September 2014 during the dewatering.

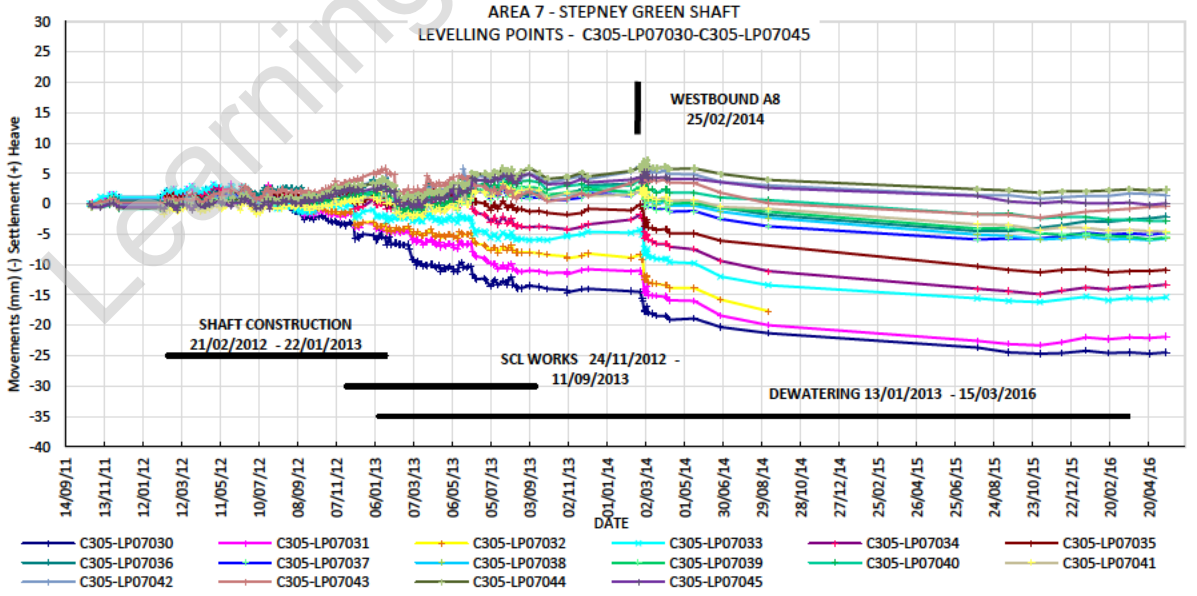


Due to access issues long term readings are not available for these levelling points, and furthermore, the annual settlement rate projection has not been calculated.

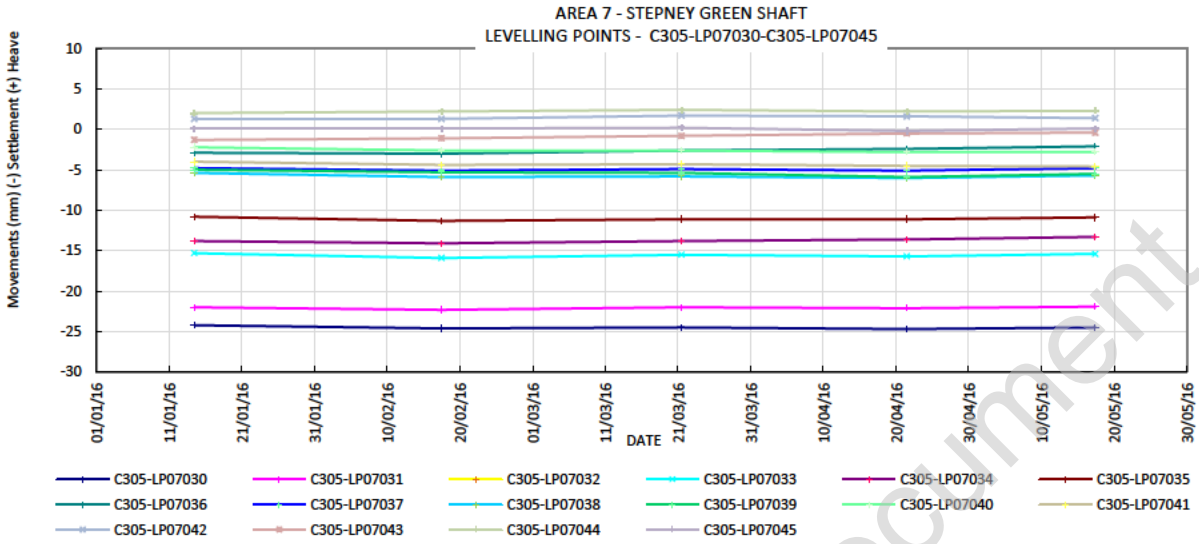
C305-LP07030 TO C305-LP07045

The graph presented below shows a settlement of -13.7 mm in September 2013 during the SCL works. In February 2014, after the Westbound TBM transit (Stepney Green Shaft to Whitechapel), a settlement of -5 mm was recorded.

The maximum settlement of -24.7 mm was recorded in November 2015 during the dewatering.



The plot below shows the trend line adjustment for each levelling point:



The table below lists the annual settlement rate for each levelling point:

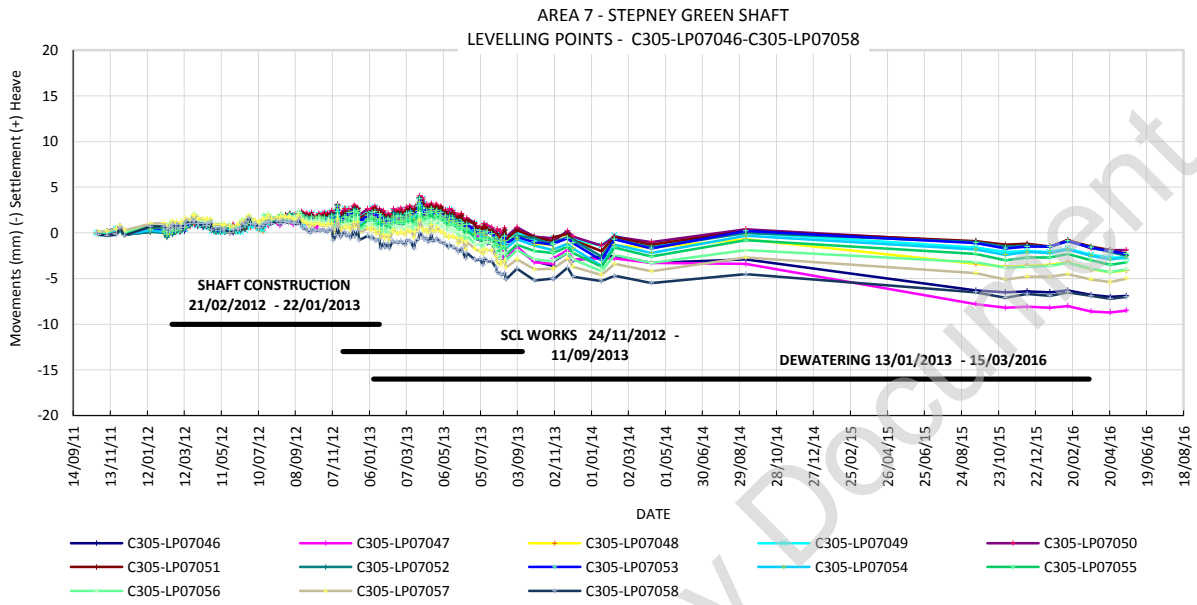
	Registered movement (mm)					Ratio
	14/01/2016	17/02/2016	21/03/2016	21/04/2016	17/05/2016	mm/year
C305-LP07030	-24.20	-24.60	-24.50	-24.70	-24.50	-0.861
C305-LP07031	-22.00	-22.30	-22.00	-22.10	-21.90	0.440
C305-LP07032	#N/A	#N/A	#N/A	#N/A	#N/A	-
C305-LP07033	-15.30	-15.90	-15.50	-15.70	-15.40	-0.054
C305-LP07034	-13.80	-14.10	-13.80	-13.60	-13.30	1.703
C305-LP07035	-10.80	-11.30	-11.10	-11.10	-10.90	-0.052
C305-LP07036	-2.90	-3.00	-2.60	-2.40	-2.10	2.543
C305-LP07037	-4.80	-5.10	-4.90	-5.10	-4.80	-0.041
C305-LP07038	-5.40	-5.90	-5.80	-6.00	-5.70	-0.880
C305-LP07039	-5.00	-5.30	-5.40	-5.90	-5.50	-1.928
C305-LP07040	-2.20	-2.60	-2.60	-2.80	-2.80	-1.661
C305-LP07041	-4.00	-4.40	-4.30	-4.50	-4.60	-1.527
C305-LP07042	1.30	1.30	1.70	1.60	1.40	0.633
C305-LP07043	-1.30	-1.10	-0.80	-0.50	-0.40	2.815
C305-LP07044	2.00	2.20	2.40	2.20	2.30	0.724
C305-LP07045	0.10	0.10	0.20	-0.20	0.10	-0.366
	Rate less than -2.5 mm/year			% less 2 mm/ year		100%
	Rate less than -3.5 mm/year			% less 3 mm/ year		100%

Note: All the movements are in mm. (-) Settlement / (+) Heave
#N/A: No readings

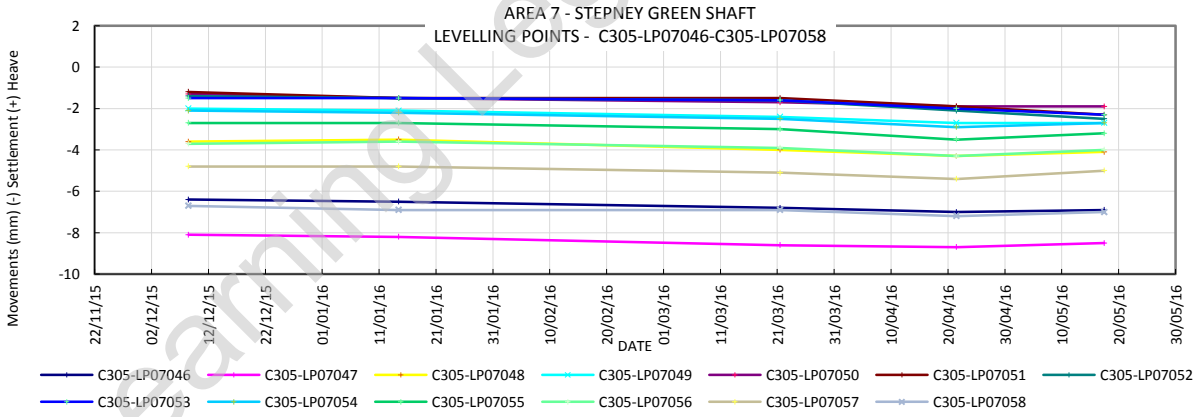
The percentage of the levelling points with a settlement rate less than 2 mm/year is 100%.

C305-LP07046 TO C305-LP07058

The graph presented below shows a settlement of -5.1 mm in August 2013 after the shaft construction and during the SCL works. The maximum settlement of -8.7 mm was recorded in April 2016 during the dewatering.



The plot below shows the trend line adjustment for each levelling point:



The table below lists the annual settlement rate for each levelling point:

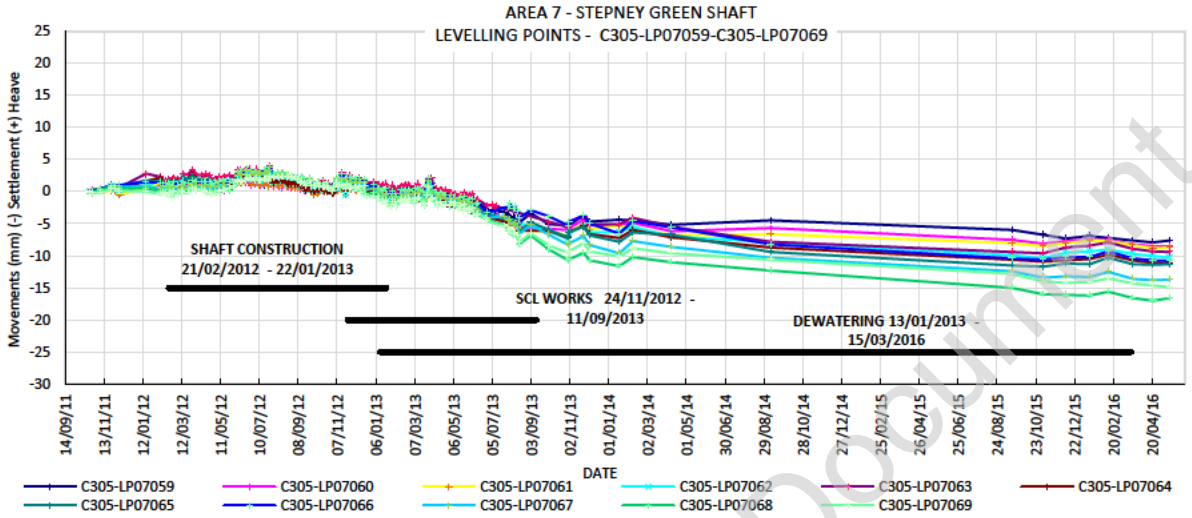
	Registered movement (mm)					Ratio mm/year
	08/12/2015	14/01/2016	21/03/2016	21/04/2016	17/05/2016	
C305-LP07046	-6.40	-6.50	-6.80	-7.00	-6.90	-1.348
C305-LP07047	-8.10	-8.20	-8.60	-8.70	-8.50	-1.233
C305-LP07048	-3.60	-3.50	-4.00	-4.30	-4.10	-1.646
C305-LP07049	-2.00	-2.10	-2.40	-2.70	-2.70	-1.740
C305-LP07050	-1.30	-1.50	-1.70	-1.90	-1.90	-1.394
C305-LP07051	-1.20	-1.50	-1.50	-1.90	-2.30	-2.095
C305-LP07052	-1.40	-1.50	-1.60	-2.10	-2.50	-2.265
C305-LP07053	-1.50	-1.50	-1.60	-2.00	-2.30	-1.697
C305-LP07054	-2.10	-2.20	-2.50	-2.90	-2.70	-1.687
C305-LP07055	-2.70	-2.70	-3.00	-3.50	-3.20	-1.607
C305-LP07056	-3.70	-3.60	-3.90	-4.30	-4.00	-1.187
C305-LP07057	-4.80	-4.80	-5.10	-5.40	-5.00	-0.971
C305-LP07058	-6.70	-6.90	-6.90	-7.20	-7.00	-0.787
	Rate less than -2.5 mm/year			% less 2 mm/ year		100%
	Rate less than -3.5 mm/year			% less 3 mm/ year		100%

Note: All the movements are in mm. (-) Settlement / (+) Heave
#N/A: No readings

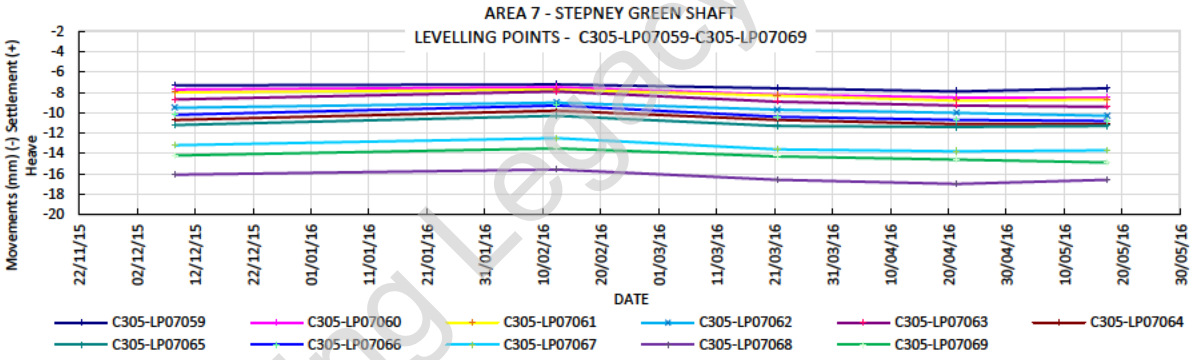
The percentage of the levelling points with a settlement rate less than 2 mm/year is 100%.

C305-LP07059 TO C305-LP07069

The graph presented below shows a settlement of -11.6 mm in January 2014 during the dewatering. The maximum settlement of -17.0 mm was recorded in April 2016 during the dewatering.



The plot below shows the trend line adjustment for each levelling point:



The table below lists the annual settlement rate for each levelling point:

	Registered movement (mm)					Ratio
	08/12/2015	12/02/2016	21/03/2016	21/04/2016	17/05/2016	mm/year
C305-LP07059	-7.30	-7.20	-7.60	-7 90	-7.60	-1.181
C305-LP07060	-7.70	-7.50	-8.20	-8 50	-8.50	-2 264
C305-LP07061	-8.00	-7.70	-8.30	-8 80	-8.70	-2.121
C305-LP07062	-9.50	-9.00	-9.70	-10.00	-10.30	-2 089
C305-LP07063	-8.70	-7.90	-8.90	-9 30	-9.40	-2 217
C305-LP07064	-10.70	-9.80	-10.70	-11.10	-11.10	-1 571
C305-LP07065	-11.20	-10 30	-11.30	-11.40	-11.30	-0 936
C305-LP07066	-10.20	-9.30	-10.40	-10.70	-10.80	-2 028
C305-LP07067	-13.20	-12 50	-13.60	-13.80	-13.70	-1 893
C305-LP07068	-16.10	-15.60	-16.60	-17.00	-16.60	-2 080
C305-LP07069	-14.20	-13 50	-14.30	-14.60	-14.90	-1 938
	Rate less than -2.5 mm/year		% less 2 mm/year			100%
	Rate greater than -3.5 mm/year		% less 3 mm/year			100%

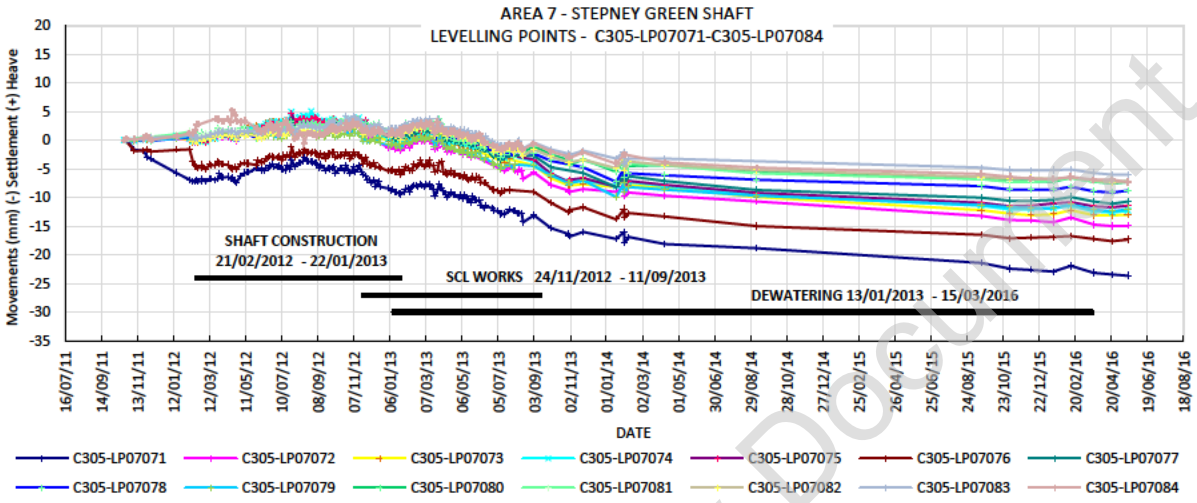
Note: All the movements are in mm. (-) Settlement / (+) Heave

#N/A: No readings

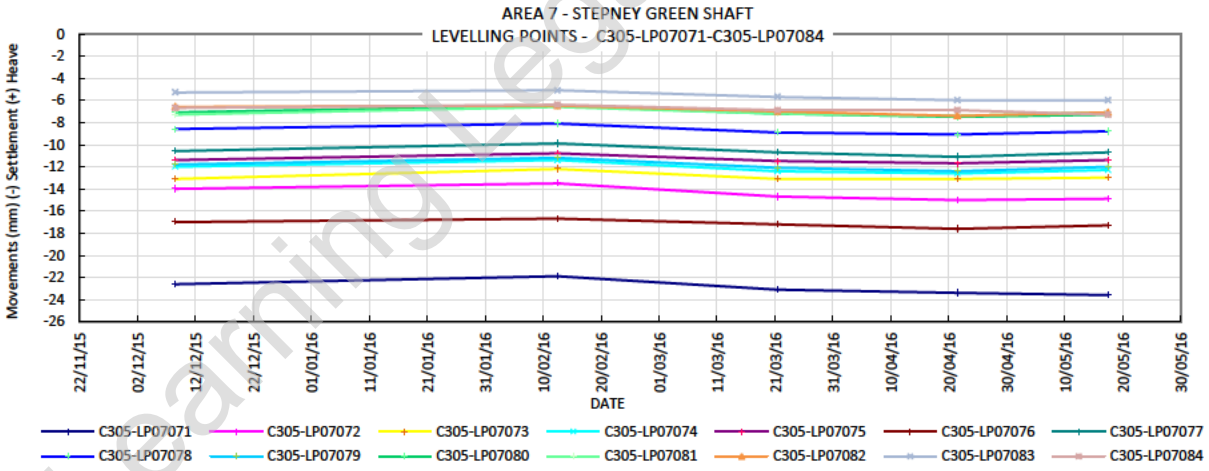
The percentage of the levelling points with a settlement rate less than 2 mm/year is 100%.

C305-LP07071 TO C305-LP07084

The graph presented below shows a settlement of -16.8 mm in October 2013 after the shaft construction and SCL works. The maximum settlement of -23.6 mm was recorded in May 2016 during the dewatering.



The plot below shows the trend line adjustment for each levelling point:



The table below lists the annual settlement rate for each levelling point:

	Registered movement (mm)					Ratio mm/year
	08/12/2015	12/02/2016	21/03/2016	21/04/2016	17/05/2016	
C305-LP07071	-22.60	-21.90	-23.10	-23.40	-23.60	-2.889
C305-LP07072	-14.00	-13.50	-14.70	-15.00	-14.90	-2.850
C305-LP07073	-13.10	-12.20	-13.10	-13.10	-13.00	-0.407
C305-LP07074	-12.00	-11.40	-12.40	-12.60	-12.30	-1.519
C305-LP07075	-11.40	-10.80	-11.50	-11.70	-11.40	-0.688
C305-LP07076	-17.00	-16.70	-17.20	-17.60	-17.30	-1.281
C305-LP07077	-10.60	-9.90	-10.70	-11.10	-10.70	-1.099
C305-LP07078	-8.60	-8.10	-8.90	-9.10	-8.80	-1.179
C305-LP07079	-11.80	-11.20	-12.10	-12.40	-12.00	-1.338
C305-LP07080	-7.10	-6.50	-7.20	-7.50	-7.30	-1.096
C305-LP07081	-7.30	-6.60	-7.20	-7.40	-7.10	-0.198
C305-LP07082	-6.60	-6.50	-7.00	-7.40	-7.10	-1.710
C305-LP07083	-5.30	-5.10	-5.70	-6.00	-6.00	-1.988
C305-LP07084	-6.70	-6.40	-6.90	-6.90	-7.30	-1.365
	Rate less than -2.5 mm/year			% less 2 mm/year		86%
	Rate greater than -3.5 mm/year			% less 3 mm/year		100%

Note: All the movements are in mm. (-) Settlement / (+) Heave
#N/A: No readings

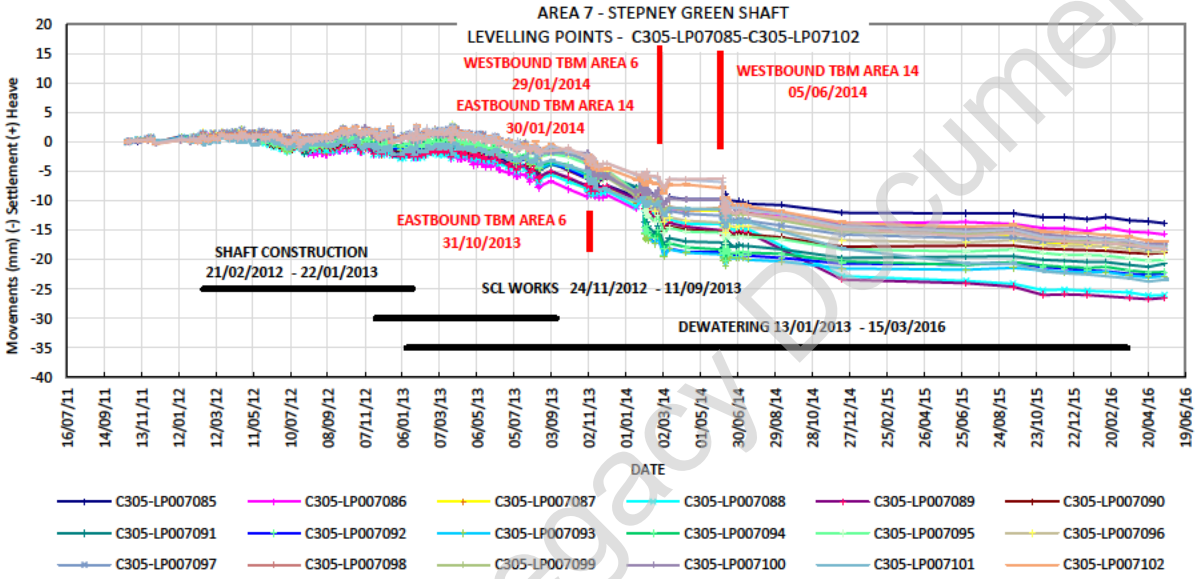
The percentage of the levelling points with a settlement rate less than 2 mm/year is 86%, whereas 100% are less than 3 mm/year.

C305-LP07085 TO C305-LP07102

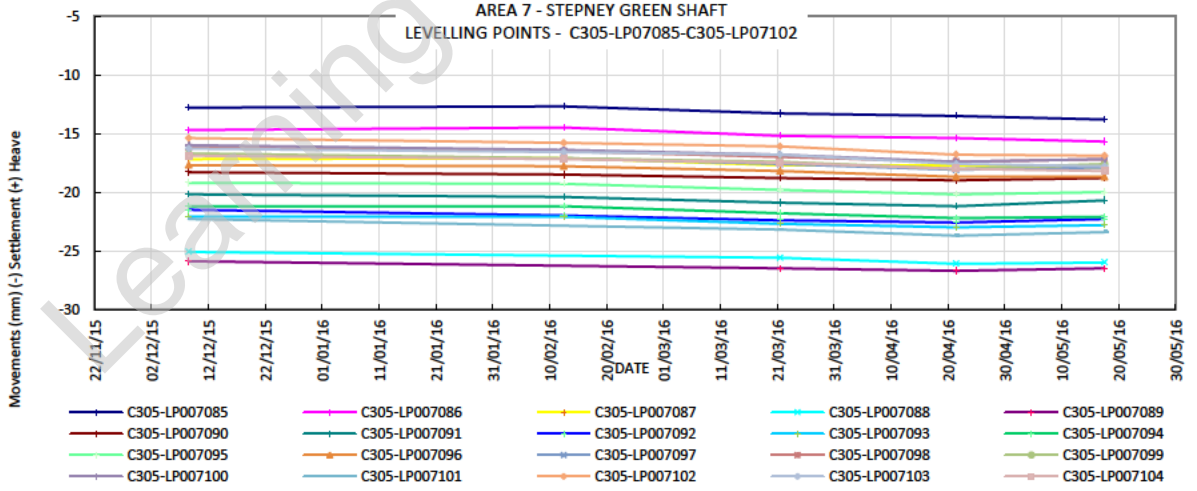
The graph presented below shows a settlement of -8.9 mm in November 2013 after the shaft construction and SCL works.

A settlement of -10 mm was observed in February 2014 after the eastbound TBM transit from Pudding Mill Lane and the westbound TBM transit from Canary Wharf. In June 2014, a settlement of -5 mm was recorded after the westbound TBM transit from Pudding Mill Lane.

The maximum settlement of -26.7 mm was recorded in April 2016 during the dewatering.



The plot below shows the trend line adjustment for each levelling point:



The table below lists the annual settlement rate for each levelling point:

	Registered movement (mm)					Ratio
	08/12/2015	12/02/2016	21/03/2016	21/04/2016	17/05/2016	mm/year
C305-LP007085	-12.80	-12.70	-13.30	-13.50	-13.80	-2.418
C305-LP007086	-14.70	-14.50	-15.20	-15.40	-15.70	-2.480
C305-LP007087	-17.20	-17.10	-17.70	-17.70	-17.90	-1.758
C305-LP007088	-25.10	#N/A	-25.60	-26.10	-26.00	-2.227
C305-LP007089	-25.90	#N/A	-26.50	-26.70	-26.50	-1.643
C305-LP007090	-18.30	-18.50	-18.80	-19.00	-18.80	-1.450
C305-LP007091	-20.20	-20.40	-20.90	-21.20	-20.70	-1.788
C305-LP007092	-21.50	-22.00	-22.40	-22.60	-22.30	-2.213
C305-LP007093	-22.10	-22.10	-22.70	-23.00	-22.80	-2.104
C305-LP007094	-21.20	-21.20	-21.80	-22.20	-22.10	-2.512
C305-LP007095	-19.20	-19.30	-19.80	-20.20	-20.00	-2.293
C305-LP007096	-17.70	-17.80	-18.20	-18.70	-18.70	-2.580
C305-LP007097	#N/A	-17.10	-17.60	-18.10	-17.90	-3.471
C305-LP007098	-16.20	-16.50	-17.00	-17.40	-17.20	-2.722
C305-LP007099	-16.70	-17.10	-17.40	-18.00	-17.60	-2.574
C305-LP007100	-16.00	-16.40	-16.80	-17.40	-17.20	-3.163
C305-LP007101	-22.30	#N/A	-23.20	-23.70	-23.40	-2.920
C305-LP007102	-15.40	-15.80	-16.10	-16.80	-16.90	-3.606
	Rate less than -2.5 mm/year			% less 2 mm/year		56%
	Rate greater than -3.5 mm/year			% less 3 mm/year		94%

Note: All the movements are in mm. (-) Settlement / (+) Heave

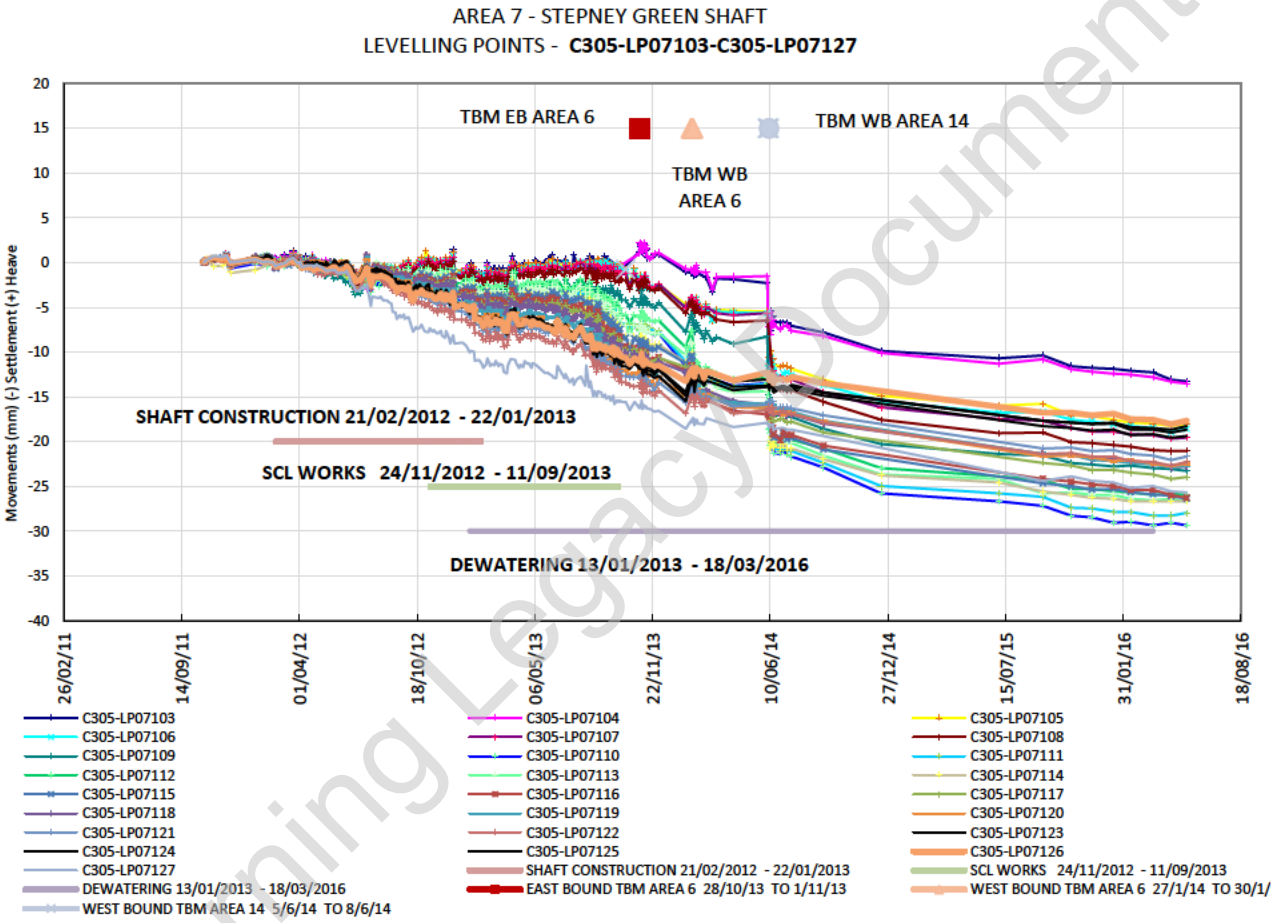
#N/A: No readings

The percentage of the levelling points with a settlement rate less than 2 mm/year is 56%, whereas 94% are less than 3 mm/year.

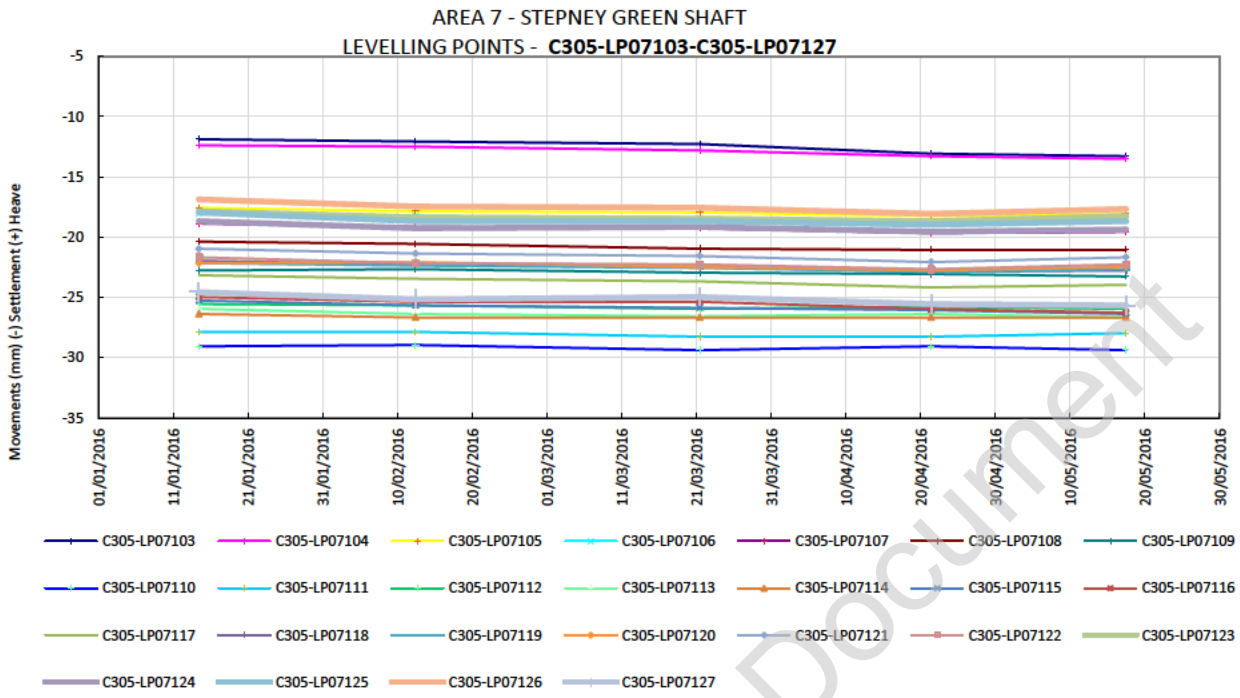
C305-LP07103 TO C305-LP07127

The graph presented below shows a settlement of -15 mm in November 2013 after the shaft construction and SCL works. A maximum settlement of -18 mm was observed in February 2014 after the westbound TBM transit from Canary Wharf and -24 mm in June 2014 after the westbound TBM transit from Pudding Mill Lane.

The maximum settlement of -29 mm was recorded in March 2016 during the dewatering.



The plot below shows the trend line adjustment for each levelling point:



The table below lists the annual settlement rate for each levelling point:

	Registered movement (mm)					Ratio mm/year
	14/01/2016	12/02/2016	21/03/2016	21/04/2016	17/05/2016	
C305-LP07103	-11.88	-12.08	-12.28	-13.08	-13.28	-4 352
C305-LP07104	-12.40	-12.50	-12.80	-13.30	-13.50	-3.448
C305-LP07105	-17.57	-17.87	-17.97	-18.27	-18.07	-1.637
C305-LP07106	-18.07	-18.27	-18.47	-18.97	-18.57	-2 011
C305-LP07107	-18.87	-19.17	-19.27	-19.67	-19.57	-2.199
C305-LP07108	-20.37	-20.57	-20.97	-21.07	-21.07	#N/A
C305-LP07109	-22.77	-22.67	-22.97	-23.07	-23.27	-1.616
C305-LP07110	-29.07	-28.97	-29.37	-29.07	-29.37	-0 818
C305-LP07111	-27.87	-27.87	-28.27	-28.27	-27.97	-0.765
C305-LP07112	-25.57	-25.67	-25.97	-25.77	-25.97	-1 047
C305-LP07113	-25.97	-26.37	-26.57	-26.37	-26.67	-1.601
C305-LP07114	-26.37	-26.67	-26.67	-26.67	-26.67	-0.690
C305-LP07115	-25.27	-25.67	-25.87	-26.07	-26.37	-2 973
C305-LP07116	-24.97	-25.37	-25.37	-25.97	-26.27	-3.634
C305-LP07117	-23.17	-23.47	-23.67	-24.17	-23.97	-2.678
C305-LP07118	-21.97	-22.27	-22.47	-22.87	-22.77	-2 554
C305-LP07119	-22.17	-22.37	-22.57	-22.87	-22.67	-1.762
C305-LP07120	-22.17	-22.07	-22.47	-22.77	-22.47	-1 564
C305-LP07121	-20.97	-21.37	-21.57	-22.07	-21.67	-2.471
C305-LP07122	-21.67	-22.17	-22.27	-22.67	-22.27	-2 003
C305-LP07123	-17.87	-18.37	-18.47	-18.67	-18.27	-1 317
C305-LP07124	-18.67	-19.27	-19.17	-19.57	-19.37	-1 960
C305-LP07125	-17.97	-18.67	-18.67	-18.97	-18.67	-1 984
C305-LP07126	-16.87	-17.47	-17.57	-18.07	-17.67	-2 576
C305-LP07127	-24.57	-25.17	-24.97	-25.57	-25.67	-2 946
	Rate less than -2.5 mm/year			% less 2 mm/year		67%
	Rate greater than -3 5 mm/year			% less 3 mm/year		92%

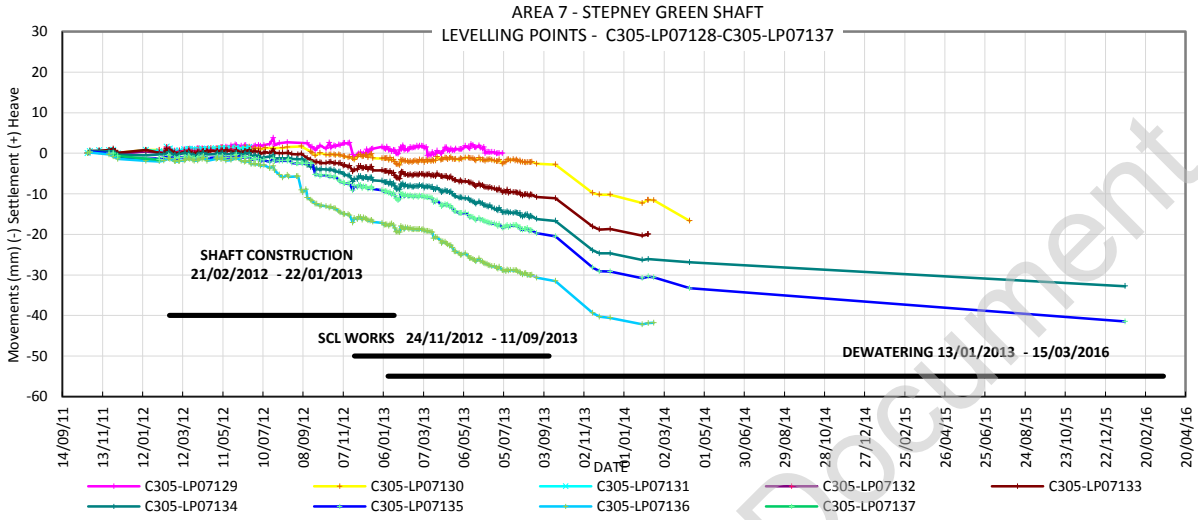
Note: All the movements are in mm. (-) Settlement / (+) Heave

#N/A: No readings

The percentage of the levelling points with a settlement rate less than 3 mm/year is 92%.

C305-LP07128 TO C305-LP07137

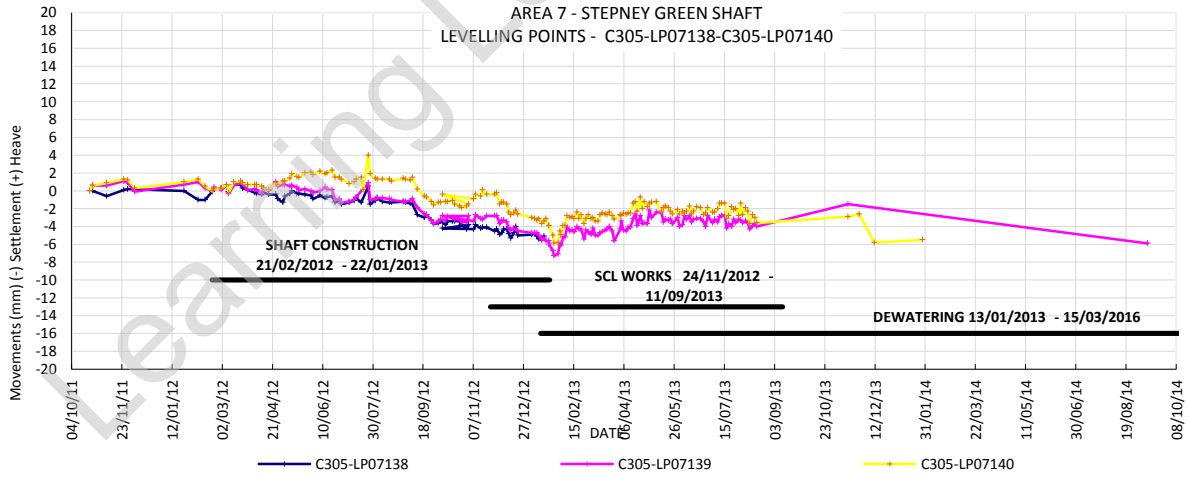
The graph presented below shows a settlement of -42.2 mm in January 2014 after the shaft construction and SCL works, and during the dewatering.



Due to access issues long term readings are not available for these levelling points, and furthermore, the annual settlement rate projection has not been calculated.

C305-LP07138 TO C305-LP07140

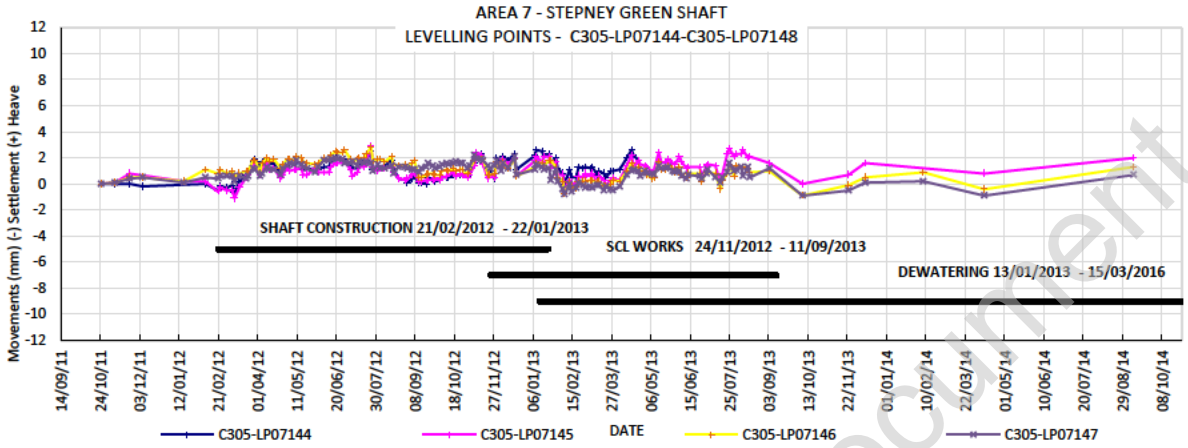
The graph presented below shows a settlement of -7.3 mm in January 2013 after the shaft construction and during the SCL works and dewatering.



Due to access issues long term readings are not available for these levelling points, and furthermore, the annual settlement rate projection has not been calculated.

C305-LP07144 TO C305-LP07147

The graph presented below shows a settlement of -0.9 mm in January 2013 after the shaft construction and during the SCL works and dewatering.



Due to access issues long term readings are not available for these levelling points, and furthermore, the annual settlement rate projection has not been calculated.

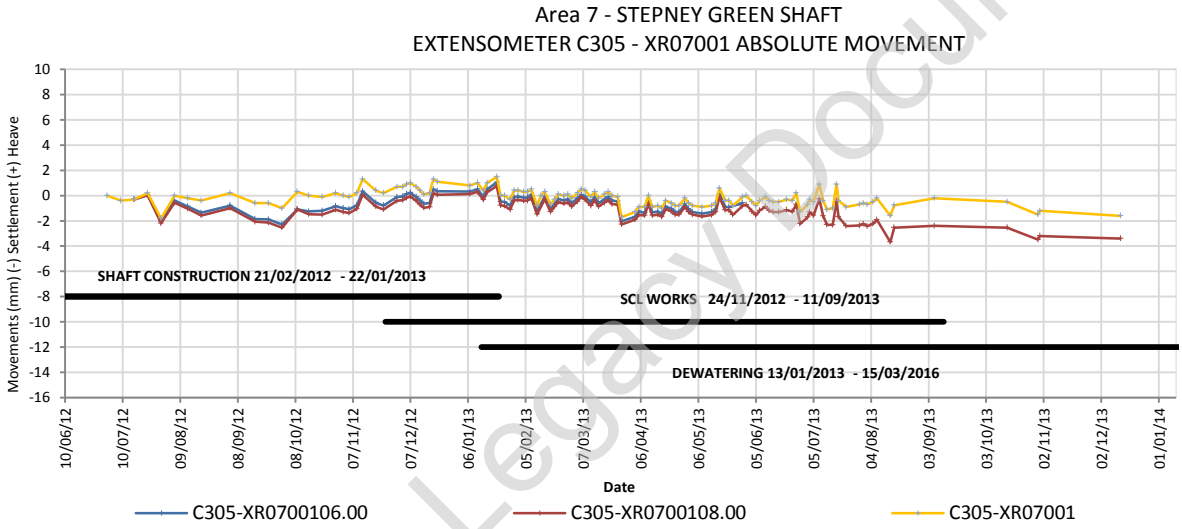
Rod Extensometers for Protection of Sewers around Stepney Green Shaft

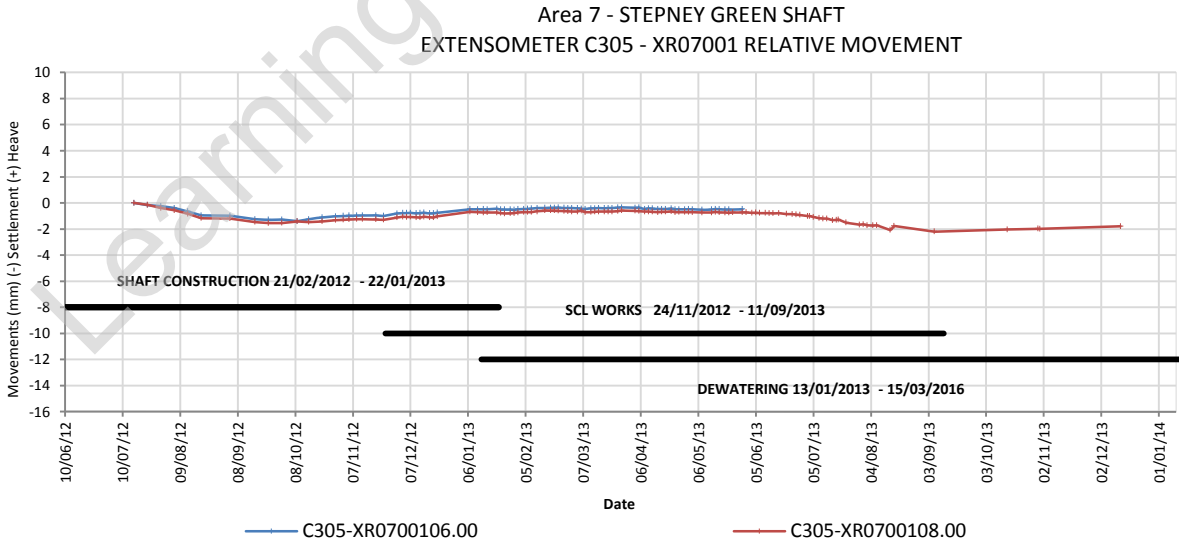
ROD EXTENSOMETERS

For the following rod extensometers two graphs are displayed, showing relative and absolute movements. The relative movement graph represents the movement of the rod extensometers without taking into account the head level elevation whereas in the absolute movement the levelling of the head level has been introduced, adding the value to the relative movement of the rods.

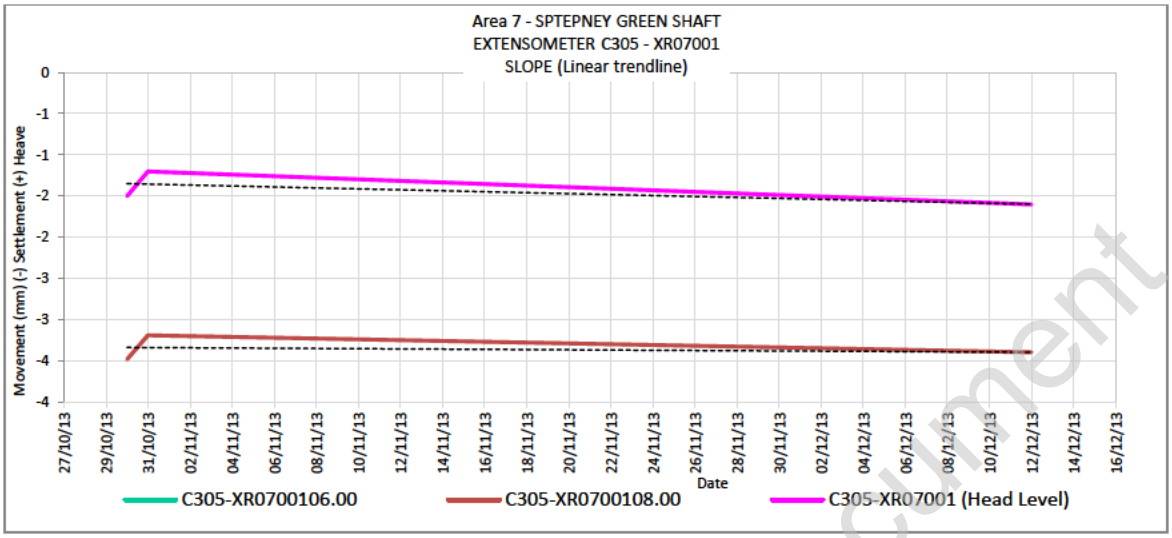
C305-XR07001

The graph presented below shows a range of readings between 0 mm and -2 mm during the shaft construction and SCL works. The maximum settlement of -3.67 mm was recorded in August 2013 during the SCL works and dewatering.





The plot below shows the trend line adjustment for each rod:



The table below lists the annual settlement rate for each rod of the extensometer:

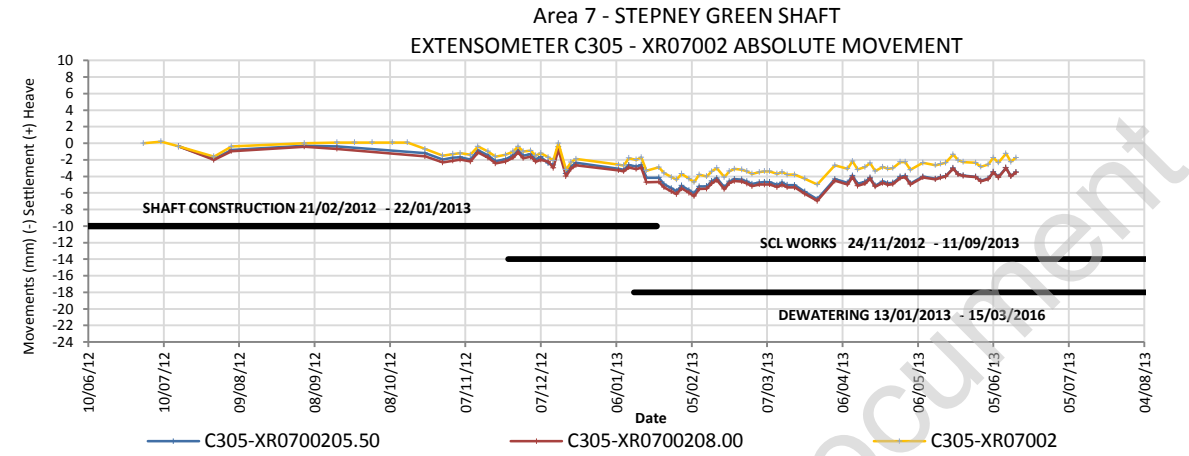
	Registered movement			Rate (mm/year)
	30/10/2013	31/10/2013	12/12/2013	
C305-XR0700106.00	#N/A	#N/A	#N/A	-
C305-XR0700108.00	-3.48	-3.19	-3.40	-0.479
C305-XR07001 (Head Level)	-1.50	-1.20	-1.60	-2.101
	Rate less than -2.5 mm/year		% less 2 mm/ year	100.00%
	Rate greater than -3.5 mm/year		% less 3 mm/ year	100.00%

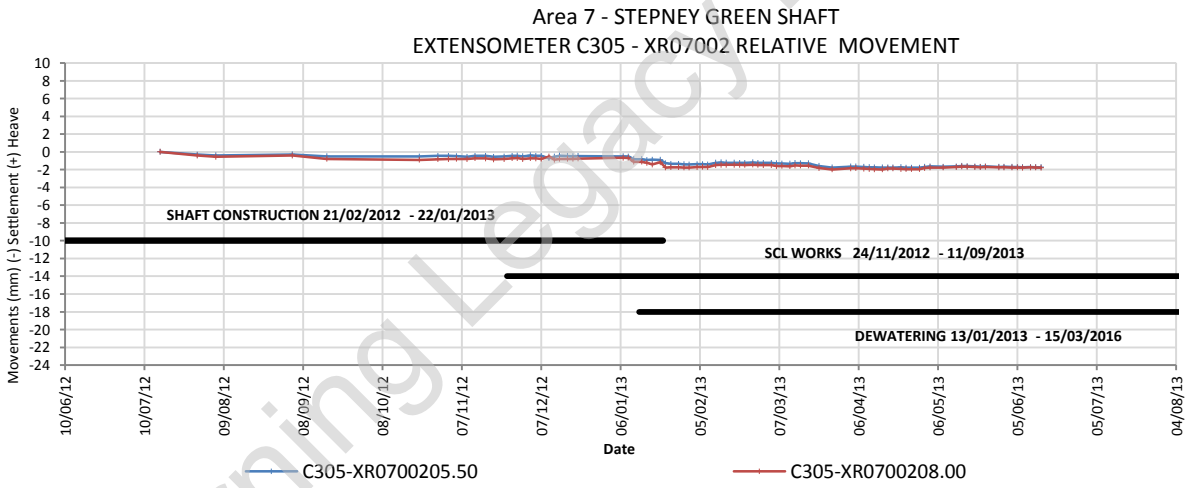
Note: All the movements are in mm. (-) Settlement / (+) Heave
#N/A: No readings

The percentage of the rods with a settlement rate less than 2 mm/year is 100%.

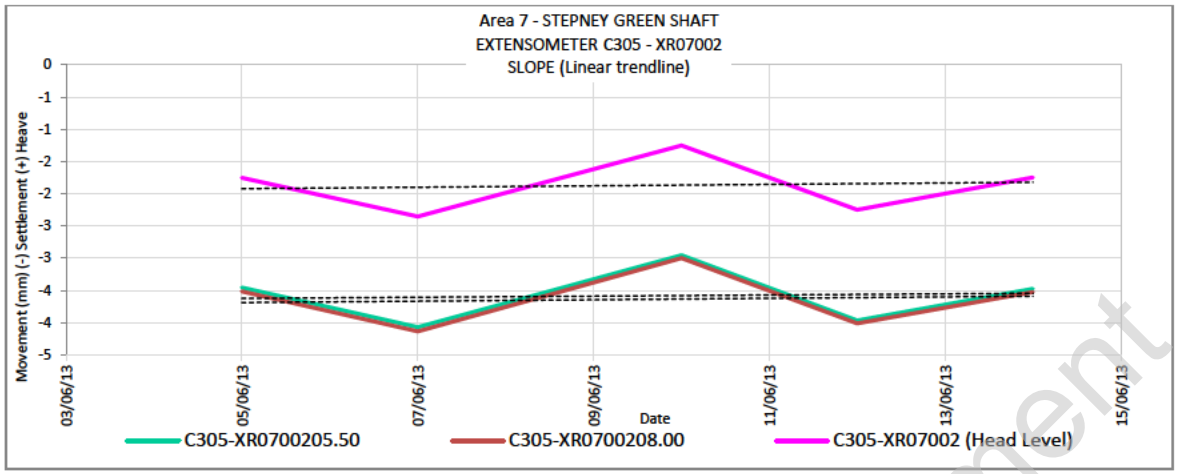
C305-XR07002

The graph presented below shows a settlement of -6.39 mm (at the depth of 8 m) in February 2013 after the shaft construction and during the SCL works. A recovery of this settlement (+2 mm) was recorded until June 2013.





The plot below shows the trend line adjustment for each rod:



The table below lists the annual settlement rate for each rod of the extensometer:

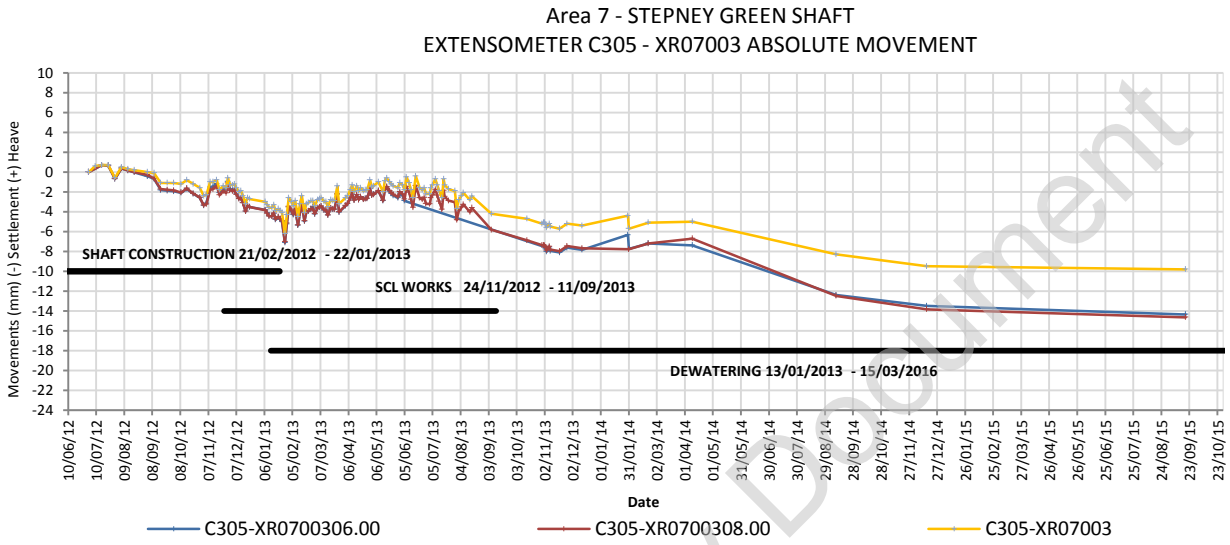
	Registered Movement (mm)					Rate (mm/year)
	05/06/2013	07/06/2013	10/06/2013	12/06/2013	14/06/2013	
C305-XR0700205.50	-3.45	-4.07	-2.95	-3.97	-3.48	3.179
C305-XR0700208.00	-3.52	-4.14	-3.00	-4.01	-3.52	4.086
C305-XR07002 (Head Level)	-1.75	-2.35	-1.25	-2.25	-1.75	3.988
	Rate less than -2.5 mm/year			% less 2 mm/ year		100.00%
	Rate greater than -3.5 mm/year			% less 3 mm/ year		100.00%

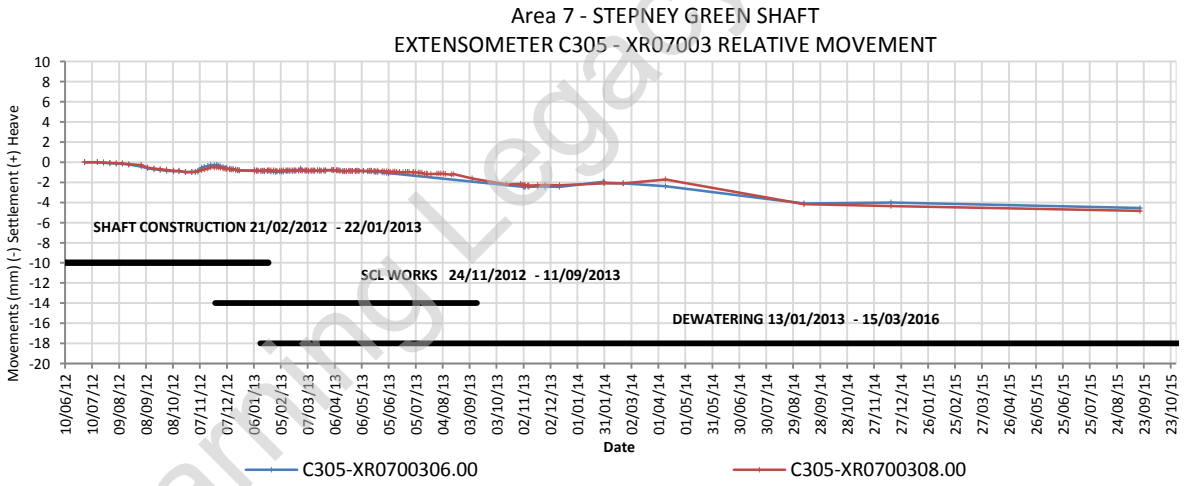
Note: All the movements are in mm. (-) Settlement / (+) Heave
#N/A: No readings

The percentage of the rods with a settlement rate less than 2 mm/year is 100%.

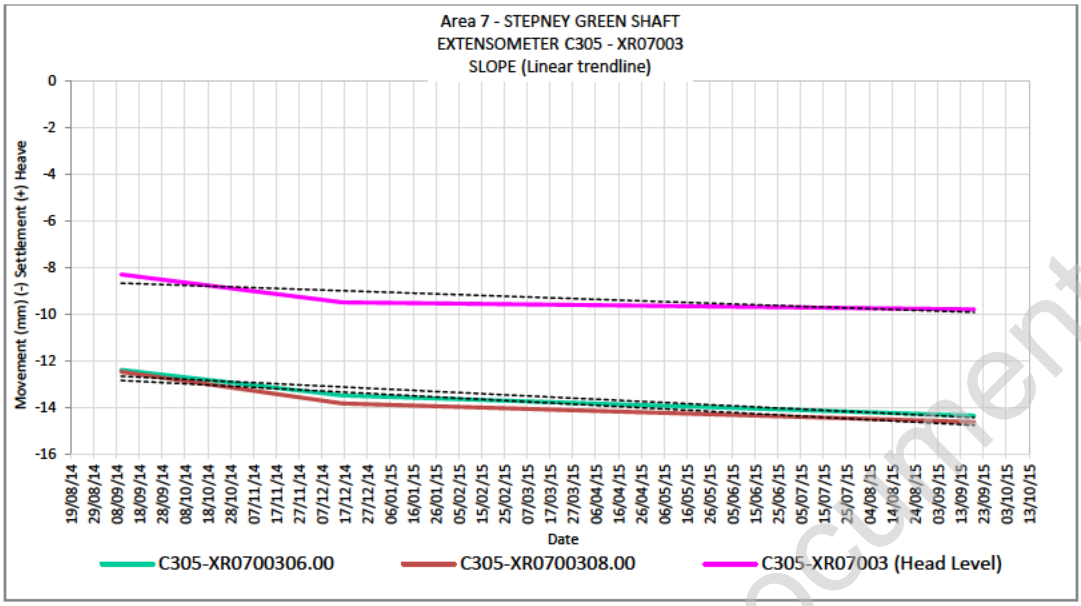
C305-XR07003

The graph presented below shows a settlement of -7.03 mm in January 2013 after the shaft construction and during the SCL works. A recovery of this settlement (+4 mm) was recorded during the SCL works. The maximum settlement of -14.65 mm was recorded in September 2015 during the dewatering.





The plot below shows the trend line adjustment for each rod:



The table below lists the annual settlement rate for each rod of the extensometer:

	Registered Movement (mm)			Rate (mm/year)
	10/09/2014	16/12/2014	19/09/2015	
C305-XR0700306.00	-12.40	-13.50	-14.36	-1.736
C305-XR0700308.00	-12.48	-13.85	-14.65	-1.881
C305-XR07003 (Head Level)	-8.30	-9.50	-9.80	-1.228
	Rate less than -2.5 mm/year	% less 2 mm/ year		100.00%
	Rate greater than -3.5 mm/year	% less 3 mm/ year		100.00%

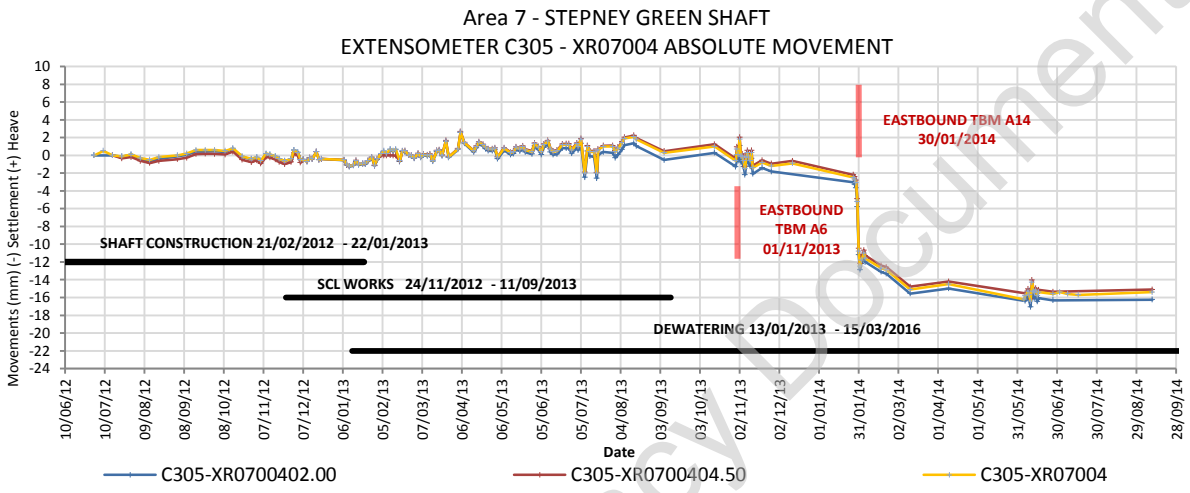
Note: All the movements are in mm. (-) Settlement / (+) Heave
#N/A: No readings

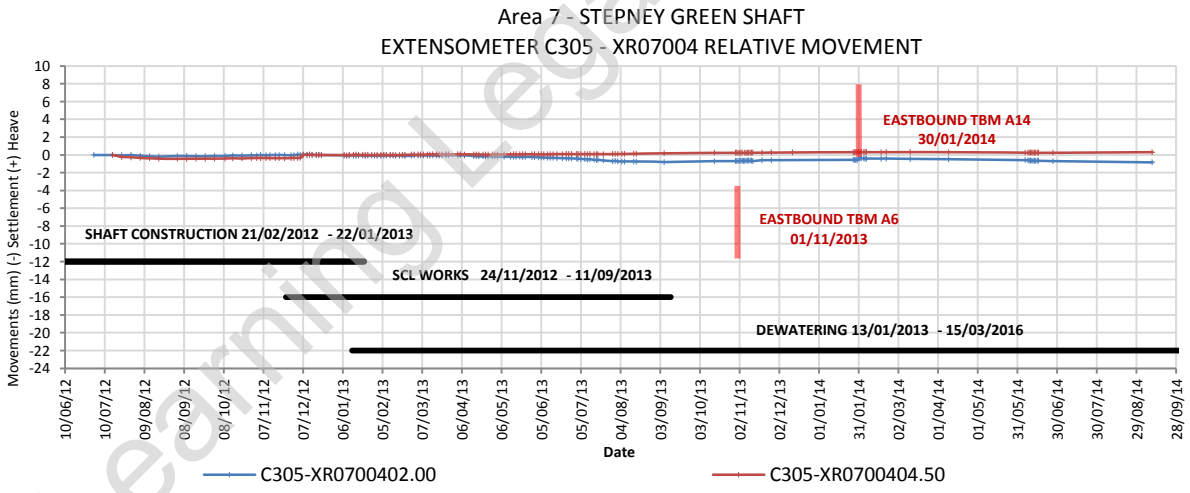
The percentage of the rods with a settlement rate less than 2 mm/year is 100%.

C305-XR07004

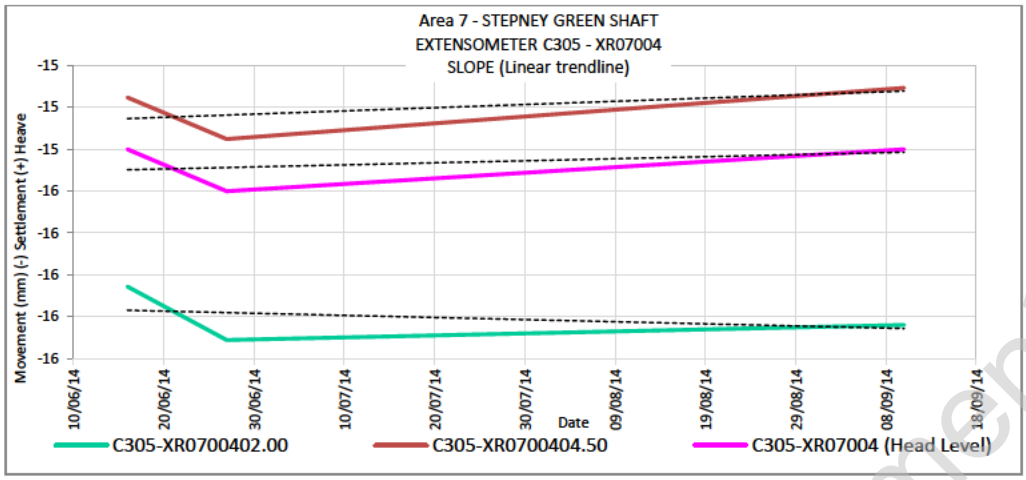
The graph presented below shows a range of readings between 0 mm and +2 mm during the shaft construction and SCL works.

A settlement of -2.17 mm was recorded in November 2013 after the eastbound TBM transit from Canary Wharf (Area 6 – Canary Wharf to Stepney Green) and -12.5 mm in January 2014 after the eastbound TBM transit from Pudding Mill Lane (Area 14 – Pudding Mill Lane to Stepney Green).The maximum settlement of -17.05 mm was recorded in June 2014 during the dewatering.





The plot below shows the trend line adjustment for each rod:



The table below lists the annual settlement rate for each rod of the extensometer:

	Registered Movement (mm)			Rate (mm/year)
	16/06/2014	27/06/2014	10/09/2014	
XR0700402.00	-16.06	-16.31	-16.24	-0.369
XR0700404.50	-15.15	-15.35	-15.11	0.557
XR07004 (Head Level)	-15.40	-15.60	-15.40	0.356
	Rate less than -2.5 mm/year	% less 2 mm/ year		100.00%
	Rate greater than -3.5 mm/year	% less 3 mm/ year		100.00%

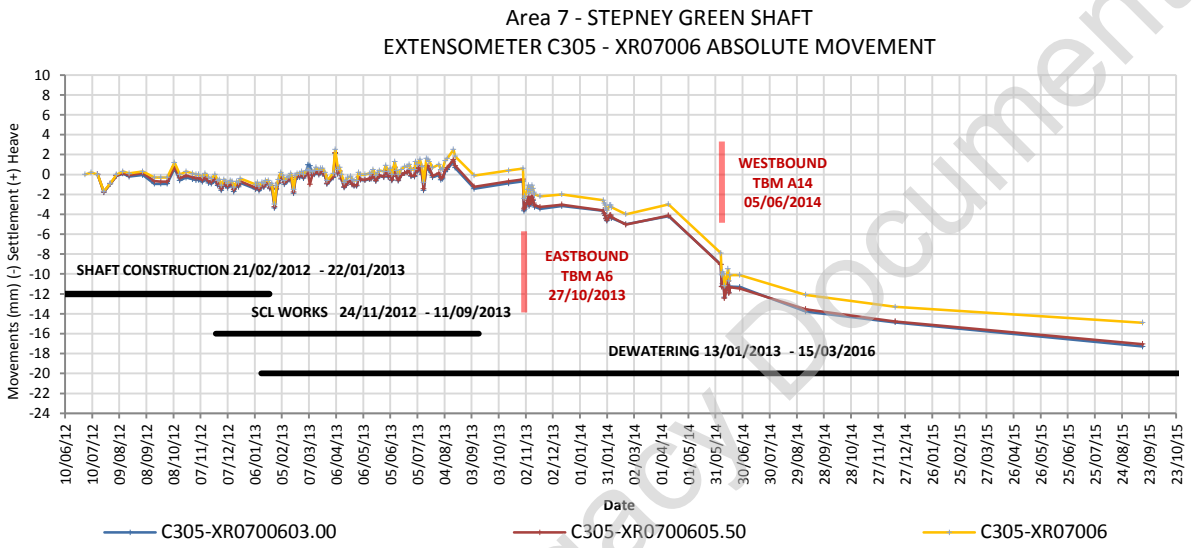
Note: All the movements are in mm. (-) Settlement / (+) Heave
#N/A: No readings

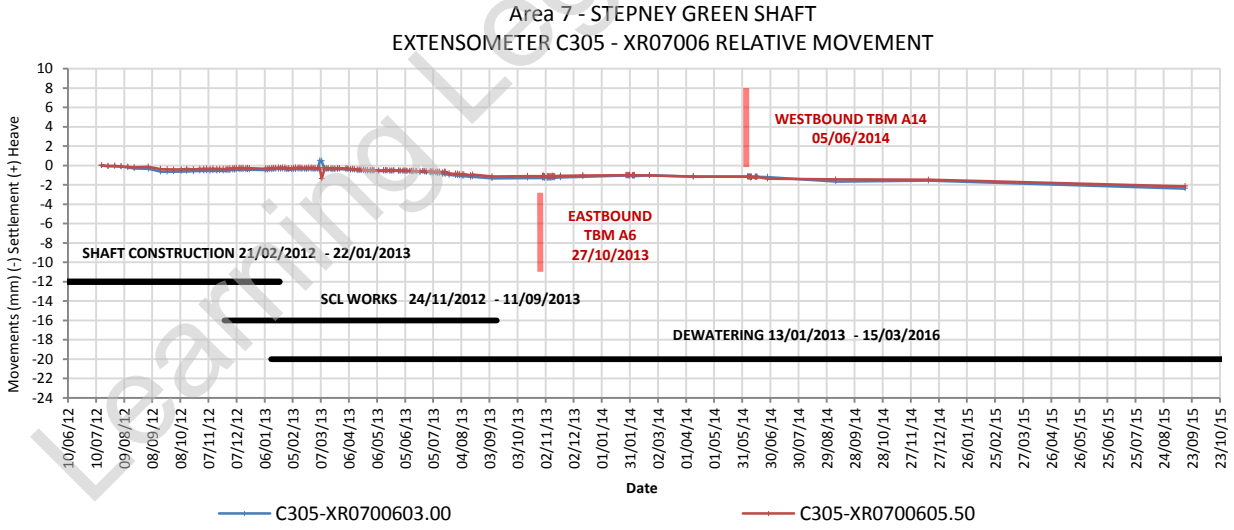
The percentage of the rods with a settlement rate less than 2 mm/year is 100%.

C305-XR07006

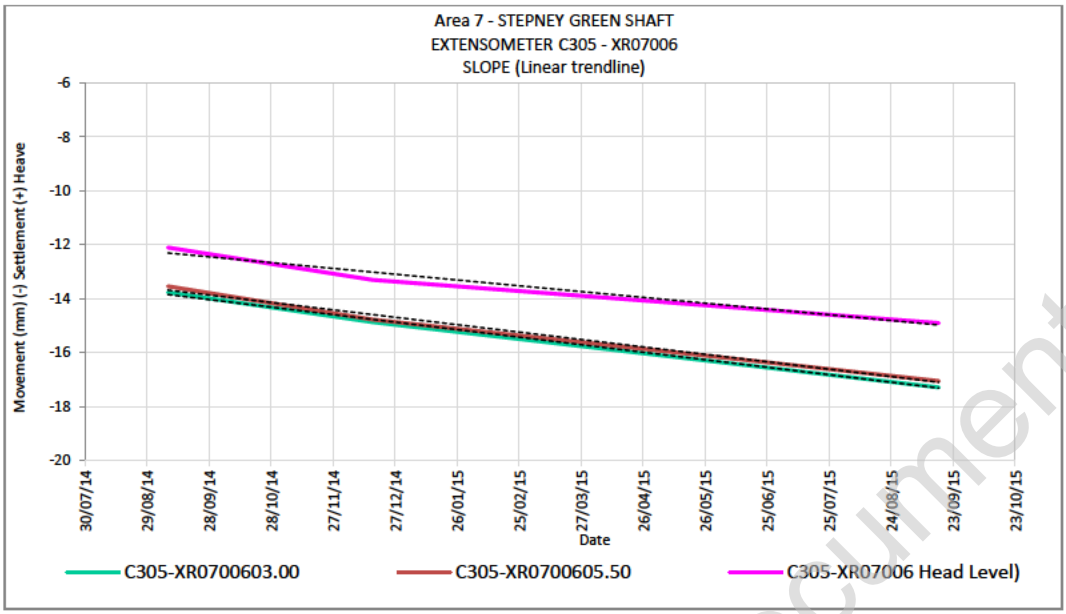
The graph presented below shows a range of readings between -2 mm and +2 mm during the shaft construction and SCL works.

A settlement of -3.47 mm was recorded in November 2013 after the eastbound TBM transit from Canary Wharf (Area 6 – Canary Wharf to Stepney Green) and -12.44 mm in June 2014 after the westbound TBM transit from Pudding Mill Lane (Area 14 – Pudding Mill Lane to Stepney Green). The maximum settlement of -17.05 mm was recorded in September 2015 during the dewatering.





The plot below shows the trend line adjustment for each rod:



The table below lists the annual settlement rate for each rod of the extensometer:

	Registered Movement (mm)			Rate (mm/year)
	08/09/2014	16/12/2014	16/09/2015	
C305-XR0700603.00	-13.77	-14.87	-17.29	-3.397
C305-XR0700605.50	-13.54	-14.77	-17.05	-3.349
C305-XR07006 Head Level)	-12.10	-13.30	-14.90	-2.610
	Rate less than -2.5 mm/year	% less 2 mm/ year		0.00%
	Rate greater than -3.5 mm/year	% less 3 mm/ year		100.00%

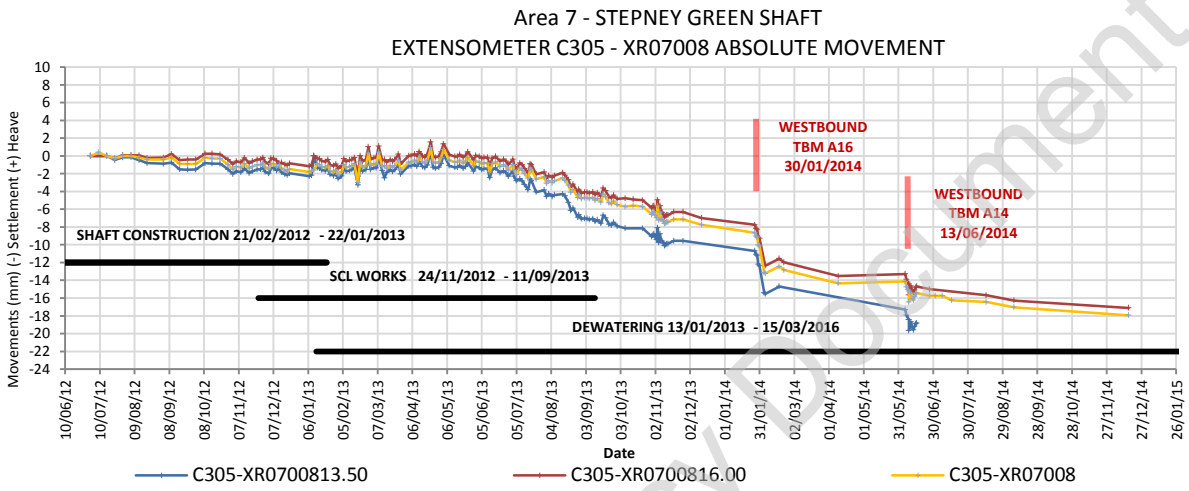
Note: All the movements are in mm. (-) Settlement / (+) Heave
#N/A: No readings

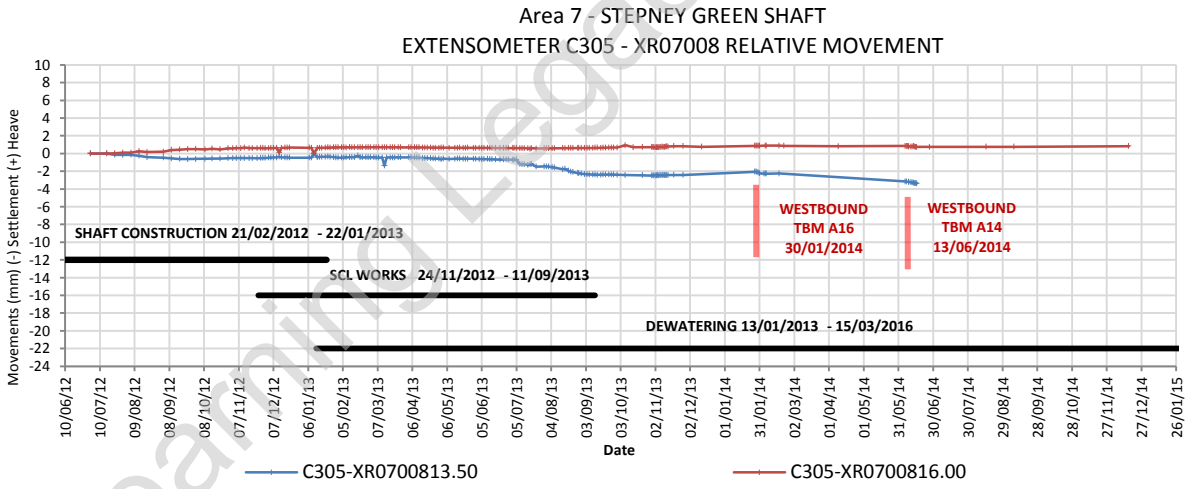
The percentage of the rods with a settlement rate less than 3 mm/year is 100%.

C305-XR07008

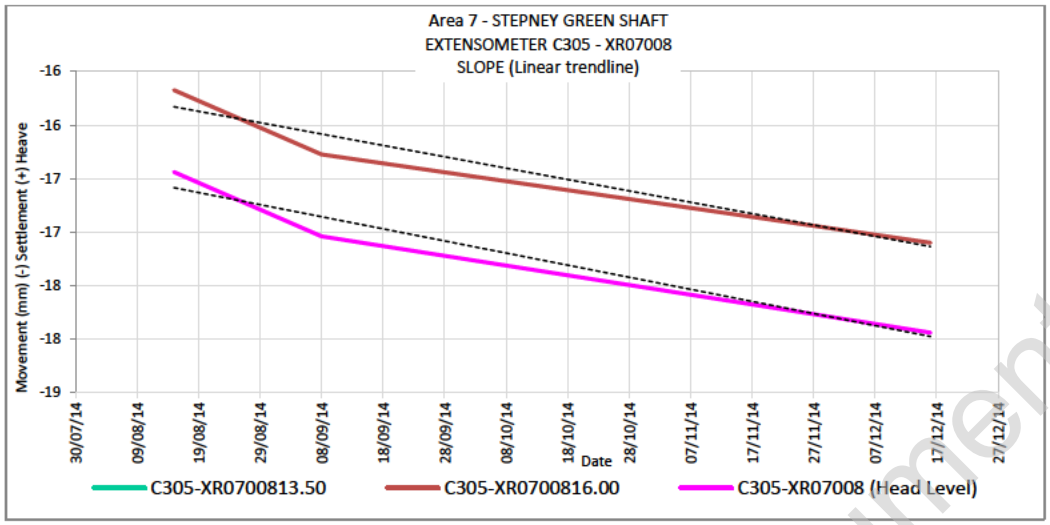
The graph presented below shows a settlement of -8.3 mm in October 2013 after the shaft construction and SCL works

A settlement of -15.52 mm was recorded in February 2014 after the westbound TBM transit from Canary Wharf (Area 6 – Canary Wharf to Stepney Green) and -19.57 mm in June 2014 after the westbound TBM transit from Pudding Mill Lane (Area 14 – Pudding Mill Lane to Stepney Green).





The plot below shows the trend line adjustment for each rod:



The table below lists the annual settlement rate for each rod of the extensometer:

	Registered Movement (mm)			Rate (mm/year)
	15/08/2014	08/09/2014	16/12/2014	
C305-XR0700813.50	#N/A	#N/A	#N/A	-
C305-XR0700816.00	-15.68	-16.28	-17.10	-3.883
C305-XR07008 (Head Level)	-16.44	-17.04	-17.94	-4.121
	Rate less than -2.5 mm/year	% less 2 mm/ year		0.00%
	Rate greater than -3.5 mm/year	% less 3 mm/ year		0.00%

Note: All the movements are in mm. (-) Settlement / (+) Heave
#N/A: No readings

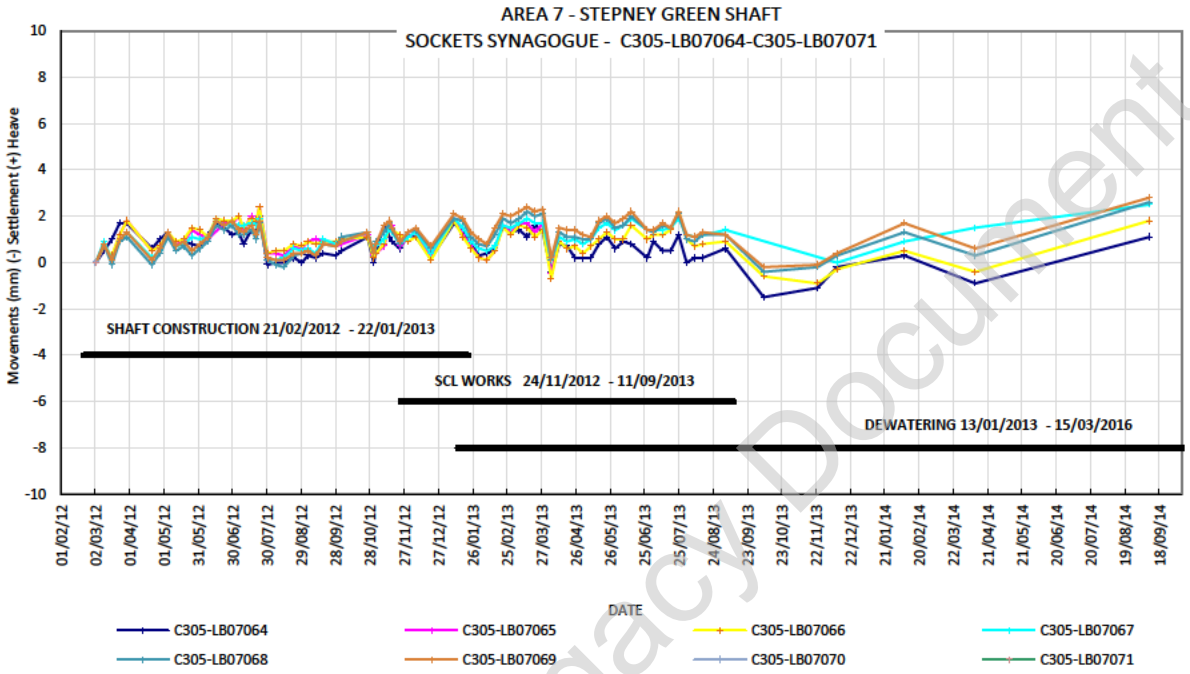
All the rods have a settlement rate greater than 2 mm/year.

Instrumentation at Stepney Green of the Joseph Stern Synagogue

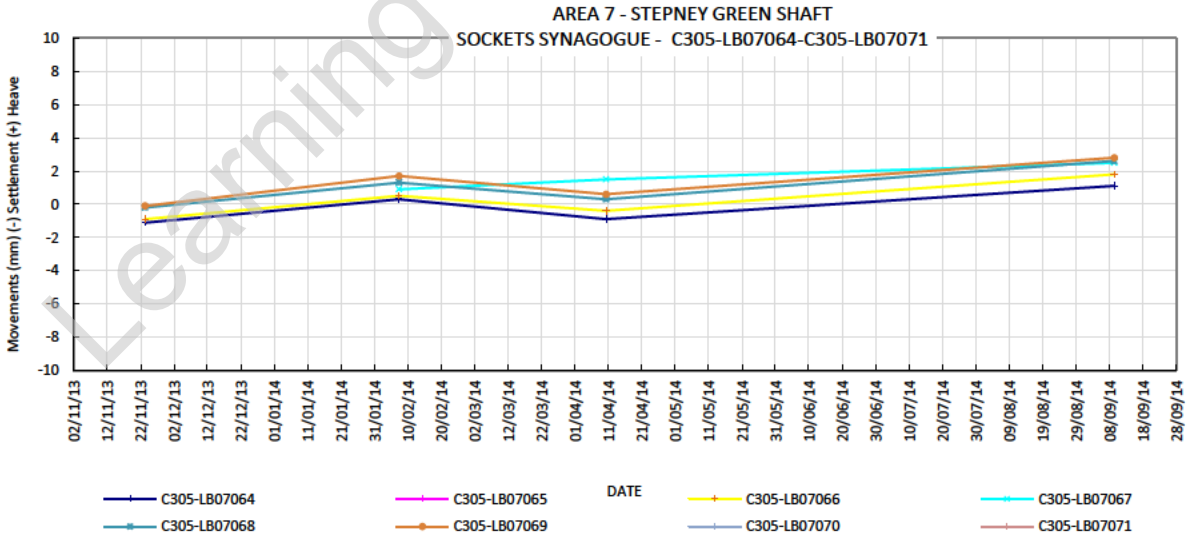
SOCKETS

C305-LB07064 TO C305-LB07071

The graph presented below shows a range of readings between 0 mm and +2 mm during the shaft construction and SCL works. The maximum settlement of -1.5 mm was recorded in October 2013 during the dewatering.



The plot below shows the trend line adjustment for each socket:



The table below lists the annual settlement rate for each socket:

	Registered movement (mm)				Ratio mm/year
	23/11/2013	07/02/2014	10/04/2014	09/09/2014	
C305-LB07064	-1.10	0.30	-0.90	1.10	2.355
C305-LB07065	#N/A	#N/A	#N/A	#N/A	-
C305-LB07066	-0.90	0.50	-0.40	1.80	3.043
C305-LB07067	#N/A	0.90	1.50	2.50	2.665
C305-LB07068	-0.20	1.30	0.30	2.60	3.134
C305-LB07069	-0.10	1.70	0.60	2.80	3.165
C305-LB07070	#N/A	#N/A	#N/A	#N/A	-
C305-LB07071	#N/A	#N/A	#N/A	#N/A	-
	Rate less than -2.5 mm/year			% less 2 mm/ year	100%
	Rate less than -3.5 mm/year			% less 3 mm/ year	100%

Note: All the movements are in mm. (-) Settlement / (+) Heave

#N/A: No readings

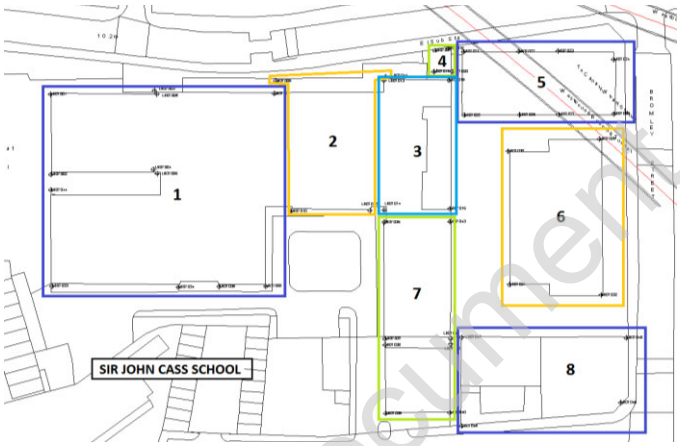
The percentage of the sockets with a settlement rate less than 2 mm/year is 100%.

Sir John Cass School and General Buildings

SOCKETS

The sockets included in this section were installed at Sir John Cass School and were divided into eight different groups of buildings to simplify the report, as per layout and table shown below.

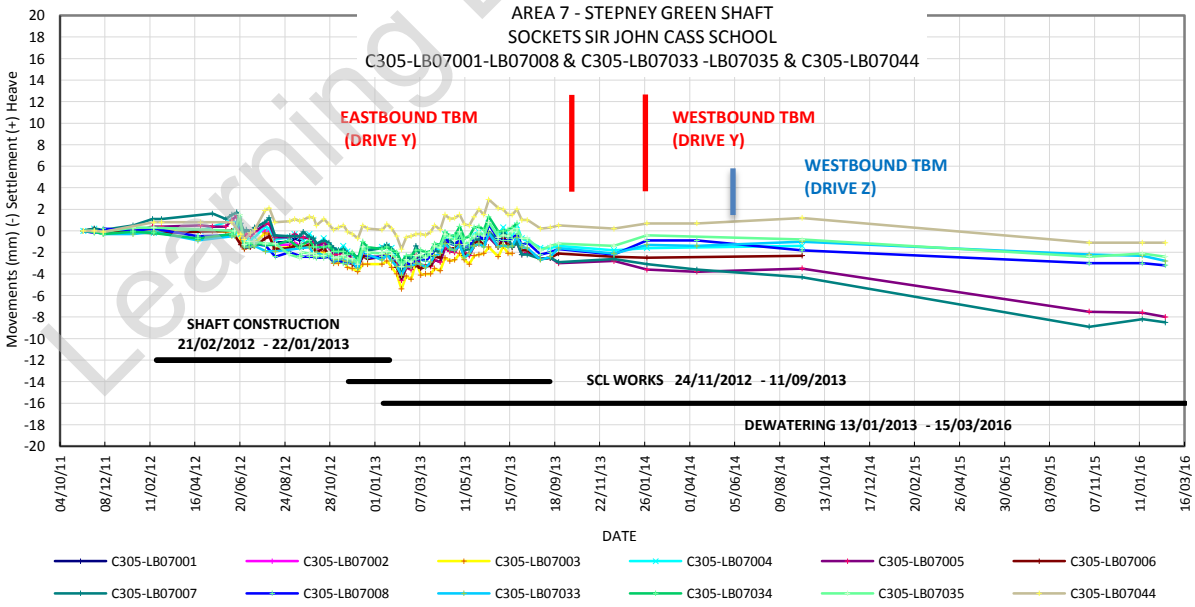
1	C305-LB07001-LB07008 & C305-LB07033 -LB07035 & C305-LB07044
2	C305-LB07009-C305-LB07012
3	C305-LB07013-C305-LB07016
4	C305-LB07017-C305-LB07020
5	C305-LB07021-C305-LB07028
6	C305-LB07029-C305-LB07032
7	C305-LB07036-C305-LB07043
8	C305-LB07045-C305-LB07048



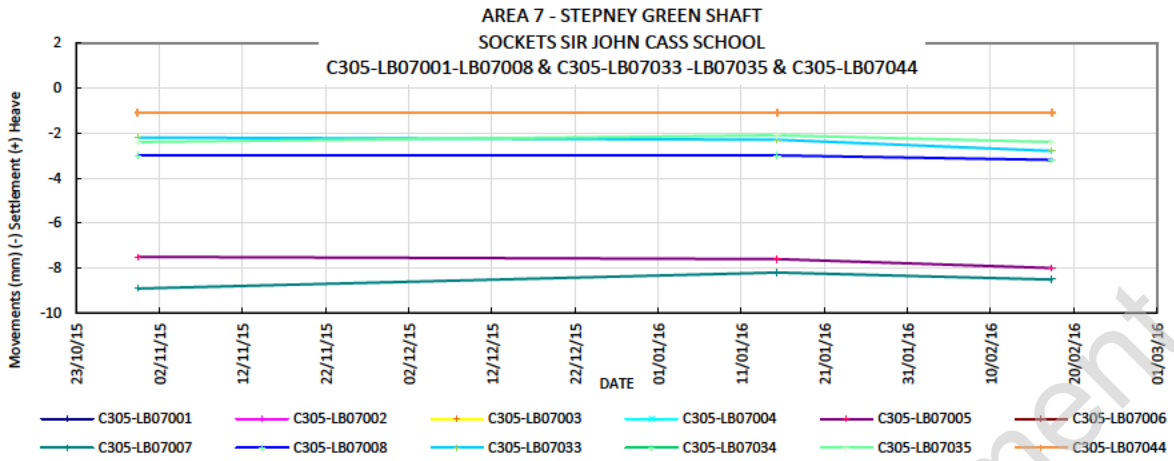
1 -C305-LB07001-LB07008 & C305-LB07033 -LB07035 & C305-LB07044

The graph presented below shows a settlement of -5.4 mm in February 2013 after the shaft construction and during the SCL works. Maximum settlement -2.6 mm was observed in 31/10/2013 after the eastbound TBM (Drive Y) transit and -3.6 mm was observed in 28/01/2014 after the westbound TBM transit (Drive Y). A maximum settlement of -4 mm was observed in 5/06/2014 after the westbound TBM (Drive Z) transit.

The maximum settlement of -8.9 mm was recorded in October 2015 during the dewatering.



The plot below shows the trend line adjustment for each socket:



The table below lists the annual settlement rate for each socket:

	Registered movement (mm)			Ratio mm/year
	30/10/2015	15/01/2016	17/02/2016	
C305-LB07001	#N/A	#N/A	#N/A	-
C305-LB07002	#N/A	#N/A	#N/A	-
C305-LB07003	#N/A	#N/A	#N/A	-
C305-LB07004	#N/A	#N/A	#N/A	-
C305-LB07005	-7.50	-7.60	-8.00	-1.450
C305-LB07006	#N/A	#N/A	#N/A	-
C305-LB07007	-8.90	-8.20	-8.50	1.680
C305-LB07008	-3.00	-3.00	-3.20	-0.546
C305-LB07033	-2.20	-2.30	-2.80	-1.723
C305-LB07034	#N/A	#N/A	#N/A	-
C305-LB07035	-2.40	-2.10	-2.40	0.252
C305-LB07044	-1.10	-1.10	-1.10	0.000
	Rate less than -2.5 mm/year	% less 2 mm/ year		100%
	Rate greater than -3.5 mm/year	% less 3 mm/ year		100%

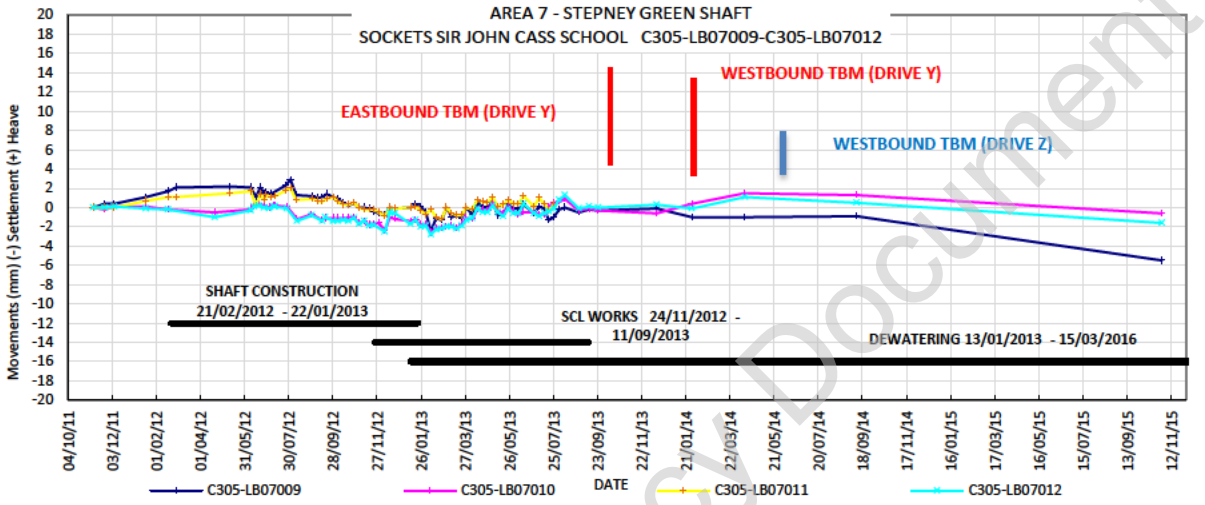
Note: All the movements are in mm. (-) Settlement / (+) Heave

#N/A: No readings

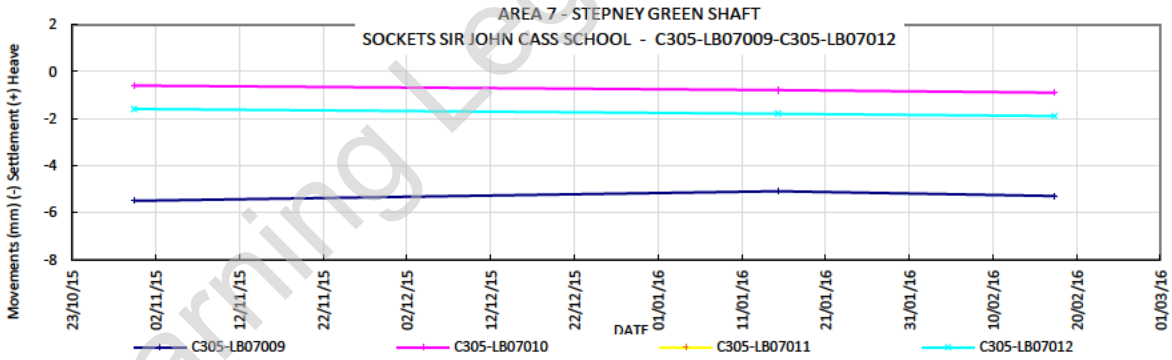
The percentage of the sockets with a settlement rate less than 2 mm/year is 100%.

2- C305-LB07009 TO C305-LB07012

The graph presented below shows settlements of -2.5 mm and -2.8 mm in December 2012 and February 2013, respectively, during the shaft construction and SCL works Maximum settlement -1 mm was observed in 31/10/2013 after the eastbound TBM (Drive Y) transit and -0.9 mm was observed in 28/01/2014 after the westbound TBM transit (Drive Y). A maximum settlement of -2 mm was observed in 5/06/2014 after the westbound TBM (Drive Z) transit. The maximum settlement of -5.5 mm was recorded in October 2015 during the dewatering.



The plot below shows the trend line adjustment for each socket:



The table below lists the annual settlement rate for each socket:

	Registered movement (mm)			Ratio
	30/10/2015	15/01/2016	17/02/2016	mm/year
C305-LB07009	-5 50	-5.10	-5 30	0.882
C305-LB07010	-0.60	-0.80	-0 90	-0.987
C305-LB07011	#N/A	#N/A	#N/A	-
C305-LB07012	-1.60	-1.80	-1 90	-0.987
	Rate less than -2.5 mm/year	% less 2 mm/ year		100%
	Rate greater than -3.5 mm/year	% less 3 mm/ year		100%

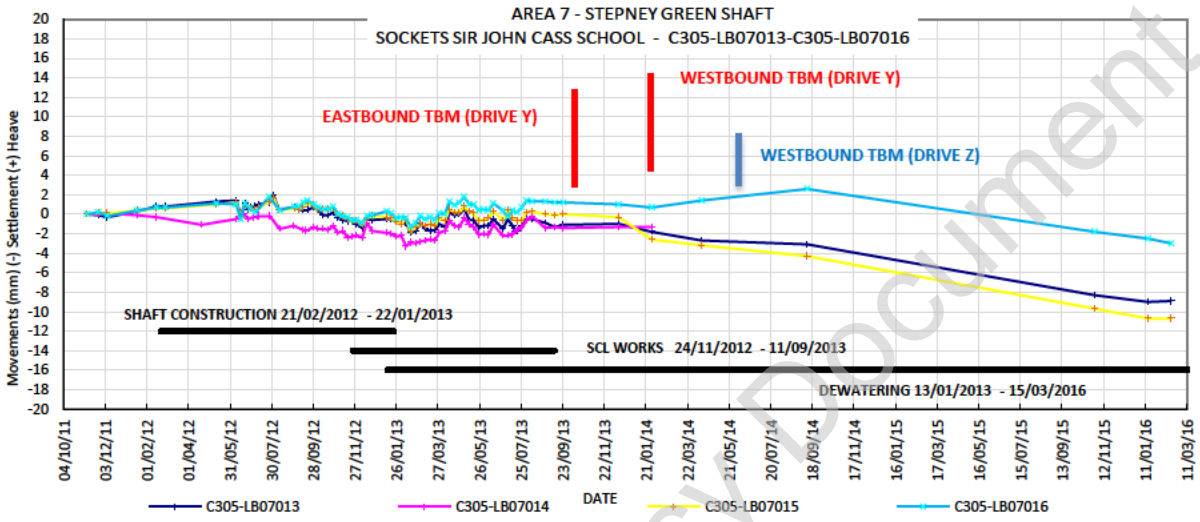
Note: All the movements are in mm. (-) Settlement / (+) Heave

#N/A: No readings

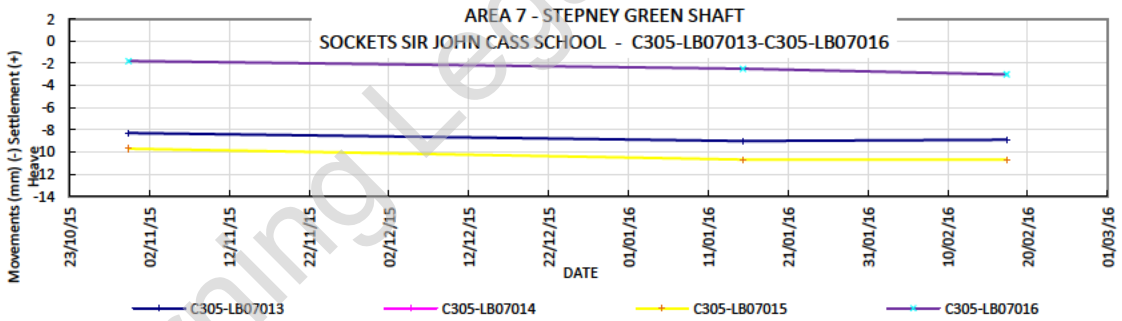
The percentage of the sockets with a settlement rate less than 2 mm/year is 100%.

3- C305-LB07013 TO C305-LB07016

The graph presented below shows a settlement of -3.3 mm in February 2013 after the shaft construction and during the SCL works. Maximum settlement -1.3 mm was observed in 31/10/2013 after the eastbound TBM (Drive Y) transit and -2.6 mm was observed in 28/01/2014 after the westbound TBM transit (Drive Y). A maximum settlement of -4.3 mm was observed in 5/06/2014 after the westbound TBM (Drive Z) transit. The maximum settlement of -10.7 mm was recorded in January 2016 during the dewatering.



The plot below shows the trend line adjustment for each socket:



The table below lists the annual settlement rate for each socket:

	Registered movement (mm)			Ratio
	30/10/2015	15/01/2016	17/02/2016	mm/year
C305-LB07013	-8.30	-9.00	-8.90	-2.226
C305-LB07014	#N/A	#N/A	#N/A	-
C305-LB07015	-9.70	-10.70	-10.70	-3.570
C305-LB07016	-1.80	-2.50	-3.00	-3.865
	Rate less than -2.5 mm/year	% less 2 mm/ year		0%
	Rate greater than -3.5 mm/year	% less 3 mm/ year		33%

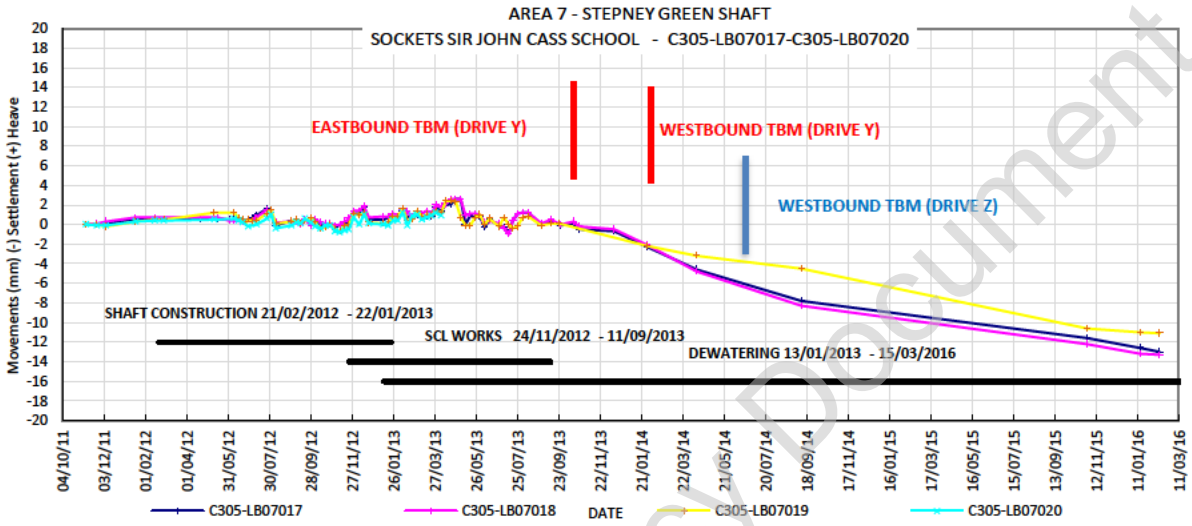
Note: All the movements are in mm. (-) Settlement / (+) Heave

#N/A: No readings

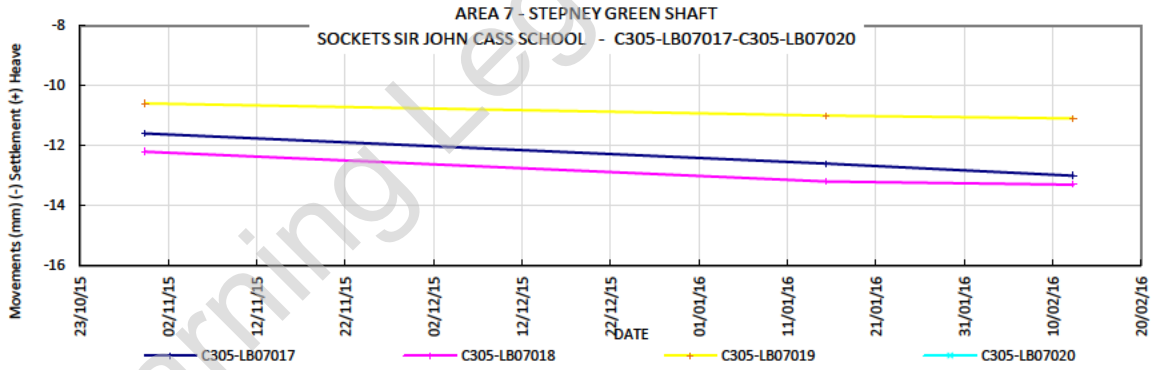
The percentage of the sockets with a settlement rate less than 2 mm/year is 0%, whereas 33% are less than 3 mm/year.

4- C305-LB07017 TO C305-LB07020

The graph presented below shows a settlement of -0.8 mm in November 2012 during the shaft construction and prior to the SCL works. Maximum settlement -0.2 mm was observed in 31/10/2013 after the eastbound TBM (Drive Y) transit and -2.2 mm was observed in 28/01/2014 after the westbound TBM transit (Drive Y). A maximum settlement of -8.3 mm was observed in 5/06/2014 after the westbound TBM (Drive Z) transit. The maximum settlement of -13.3 mm was recorded in February 2016 during the dewatering.



The plot below shows the trend line adjustment for each socket:



The table below lists the annual settlement rate for each socket:

	Registered movement (mm)			Ratio
	30/10/2015	15/01/2016	12/02/2016	mm/year
C305-LB07017	-11.60	-12.60	-13.00	-4.842
C305-LB07018	-12 20	-13.20	-13.30	-4.020
C305-LB07019	-10.60	-11.00	-11.10	-1.772
C305-LB07020	#N/A	#N/A	#N/A	-
	Rate less than -2.5 mm/year	% less 2 mm/ year		33%
	Rate greater than -3.5 mm/year	% less 3 mm/ year		33%

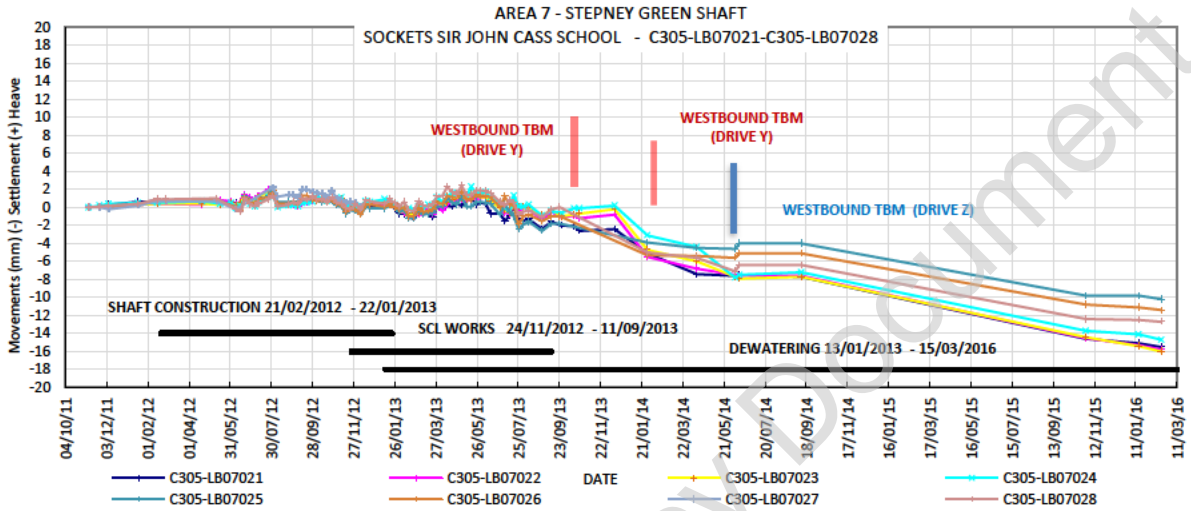
Note: All the movements are in mm. (-) Settlement / (+) Heave

#N/A: No readings

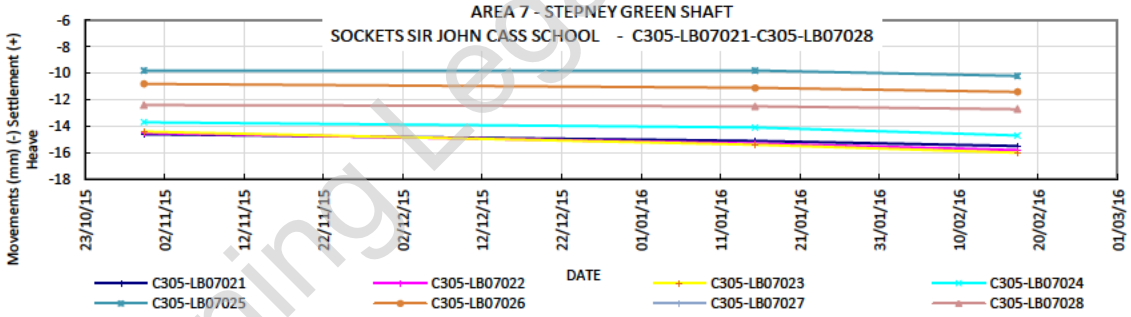
The percentage of the sockets with a settlement rate less than 2 mm/year is 33%, whereas 33% are less than 3 mm/year.

5- C305-LB07021 TO C305-LB07028

The graph presented below shows a settlement of -1.0 mm in February 2013 after the shaft construction and during the SCL works. Maximum settlement -3 mm was observed in 31/10/2013 after the eastbound TBM (Drive Y) transit and -5.8 mm was observed in 28/01/2014 after the westbound TBM transit (Drive Y). A maximum settlement of -8.1 mm was observed in 5/06/2014 after the westbound TBM (Drive Z) transit. The maximum settlement of -16.0 mm was recorded in February 2016 during the dewatering.



The plot below shows the trend line adjustment for each socket:



The table below lists the annual settlement rate for each socket:

	Registered movement (mm)			Ratio
	30/10/2015	15/01/2016	17/02/2016	mm/year
C305-LB07021	-14.60	-15.10	-15 50	-2.878
C305-LB07022	-14.50	-15.30	-15 80	-4.222
C305-LB07023	-14.40	-15.40	-16 00	-5.209
C305-LB07024	-13.70	-14.10	-14.70	-3.067
C305-LB07025	-9.80	-9 80	-10 20	-1.093
C305-LB07026	-10.80	-11.10	-11.40	-1.891
C305-LB07027	#N/A	#N/A	#N/A	-
C305-LB07028	-12.40	-12.50	-12.70	-0.903
	Rate less than -2 5 mm/year	% less 2 mm/ year		43%
	Rate greater than -3.5 mm/year	% less 3 mm/ year		71%

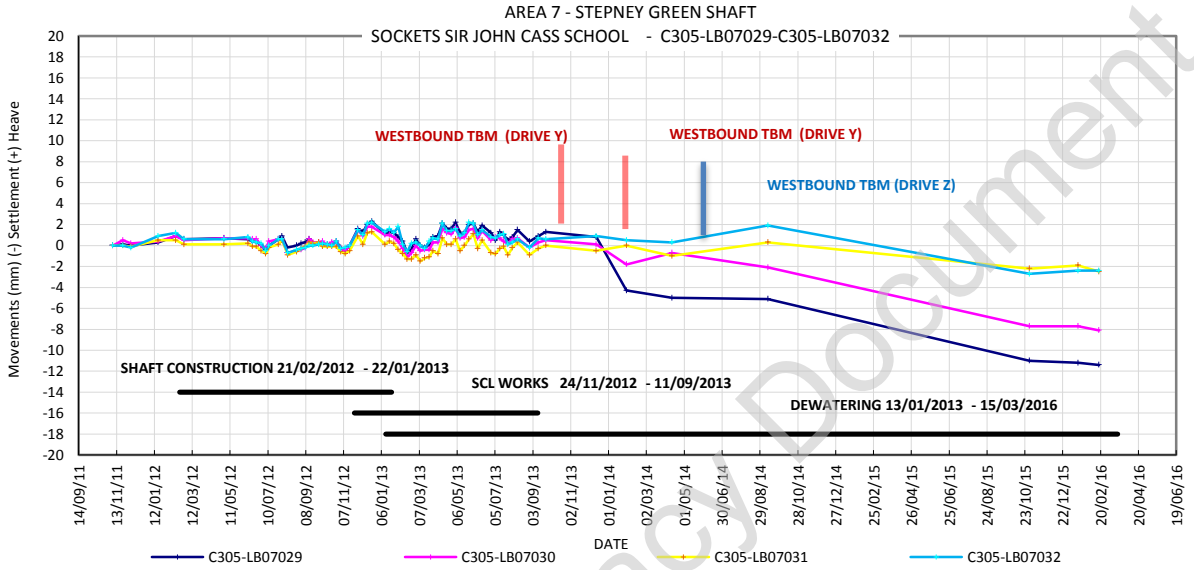
Note: All the movements are in mm. (-) Settlement / (+) Heave

#N/A: No readings

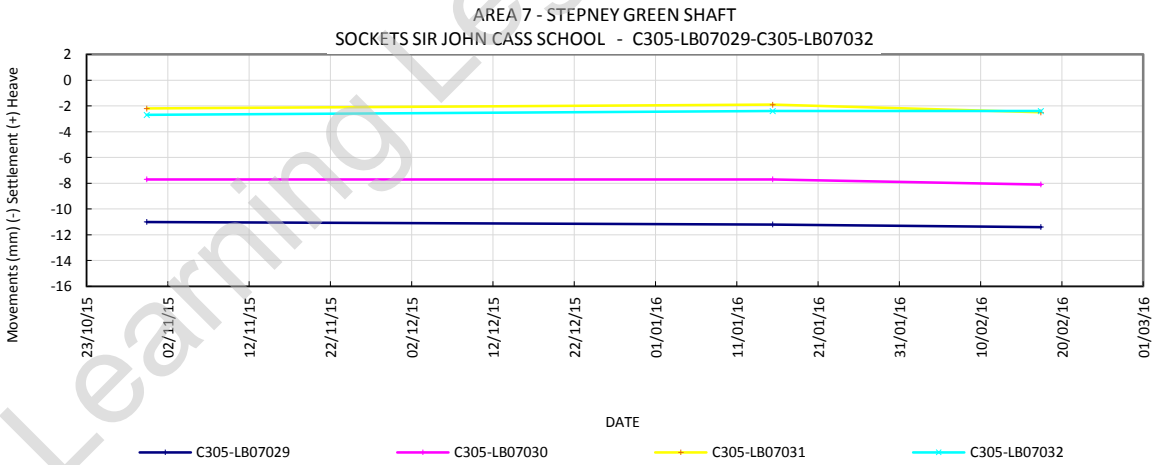
The percentage of the sockets with a settlement rate less than 2 mm/year is 43% and 71% less than 3 mm/year

6- C305-LB07029 TO -C305-LB07032

The graph presented below shows a settlement of -1.5 mm in March 2013 after the shaft construction and during the SCL works. A maximum settlement -0.9 mm was observed in 31/10/2013 after the eastbound TBM (Drive Y) transit and -4.3 mm was observed in 28/01/2014 after the westbound TBM transit (Drive Y). A maximum settlement of -5.1 mm was observed in 5/06/2014 after the westbound TBM (Drive Z) transit. The maximum settlement of -11.4 mm was recorded in February 2016 during the dewatering.



The plot below shows the trend line adjustment for each socket:



The table below lists the annual settlement rate for each socket:

	Registered movement (mm)			Ratio
	30/10/2015	15/01/2016	17/02/2016	mm/year
C305-LB07029	-11.00	-11.20	-11.40	-1.260
C305-LB07030	-7.70	-7.70	-8.10	-1.092
C305-LB07031	-2.20	-1.90	-2.50	-0.567
C305-LB07032	-2.70	-2.40	-2.40	1.071
	Rate less than -2 5 mm/year	% less 2 mm/ year		100%
	Rate greater than -3.5 mm/year	% less 3 mm/ year		100%

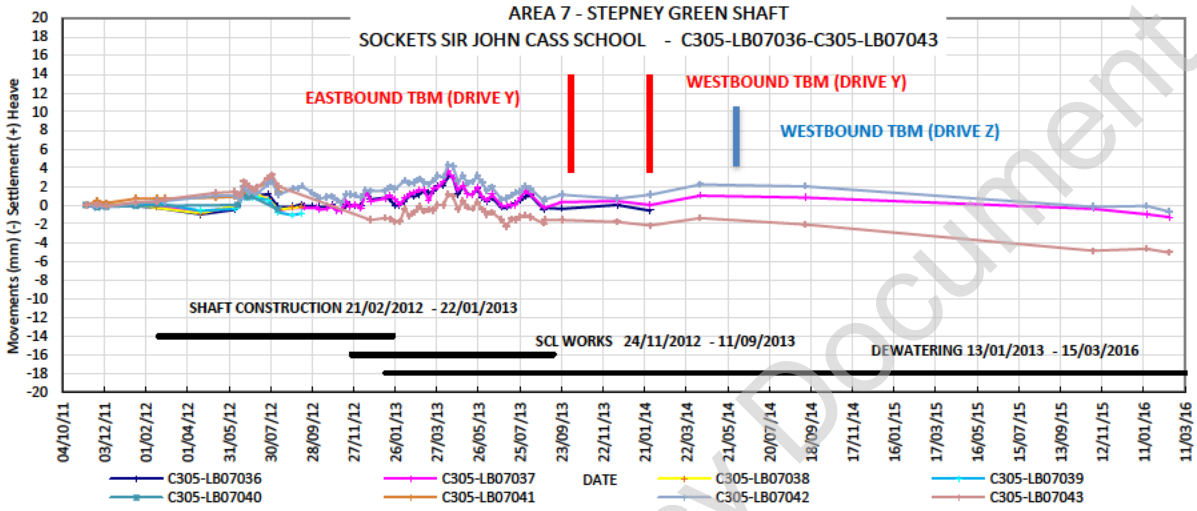
Note: All the movements are in mm. (-) Settlement / (+) Heave

#N/A: No readings

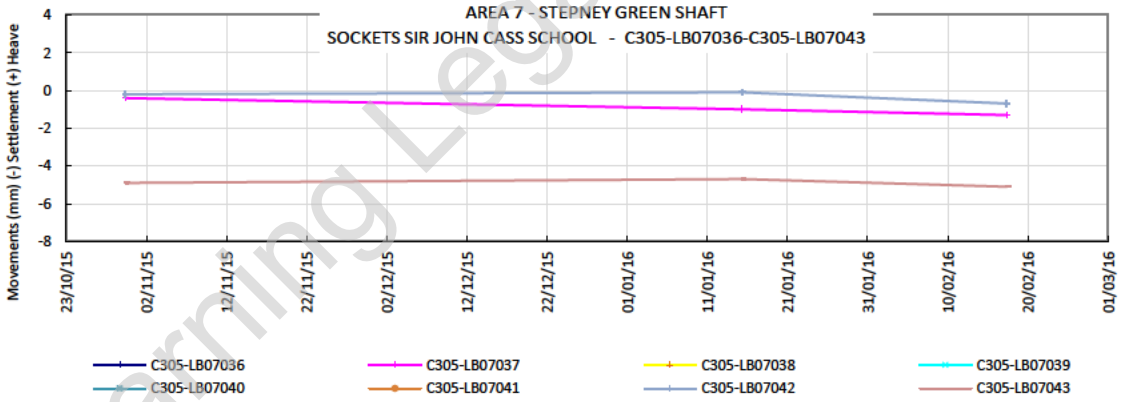
The percentage of the sockets with a settlement rate less than 2 mm/year is 100%.

7- C305-LB07036 TO -C305-LB07043

The graph presented below shows a settlement of -2.3 mm in July 2013 after the shaft construction and during the SCL works. A maximum settlement -1.6 mm was observed in 31/10/2013 after the eastbound TBM (Drive Y) transit and -2.2 mm was observed in 28/01/2014 after the westbound TBM transit (Drive Y). A maximum settlement of -2.1 mm was observed in 5/06/2014 after the westbound TBM (Drive Z) transit. The maximum settlement of -5.1 mm was recorded in February 2016 during the dewatering.



The plot below shows the trend line adjustment for each socket:



The table below lists the annual settlement rate for each socket:

	Registered movement (mm)			Ratio
	30/10/2015	15/01/2016	17/02/2016	mm/year
C305-LB07036	#N/A	#N/A	#N/A	-
C305-LB07037	-0.40	-1.00	-1.30	-2 962
C305-LB07038	#N/A	#N/A	#N/A	-
C305-LB07039	#N/A	#N/A	#N/A	-
C305-LB07040	#N/A	#N/A	#N/A	-
C305-LB07041	#N/A	#N/A	#N/A	-
C305-LB07042	-0.20	-0.10	-0.70	-1 282
C305-LB07043	-4.90	-4.70	-5.10	-0 379
	Rate less than -2.5 mm/year	% less 2 mm/ year		67%
	Rate greater than -3.5 mm/year	% less 3 mm/ year		100%

Note: All the movements are in mm. (-) Settlement / (+) Heave

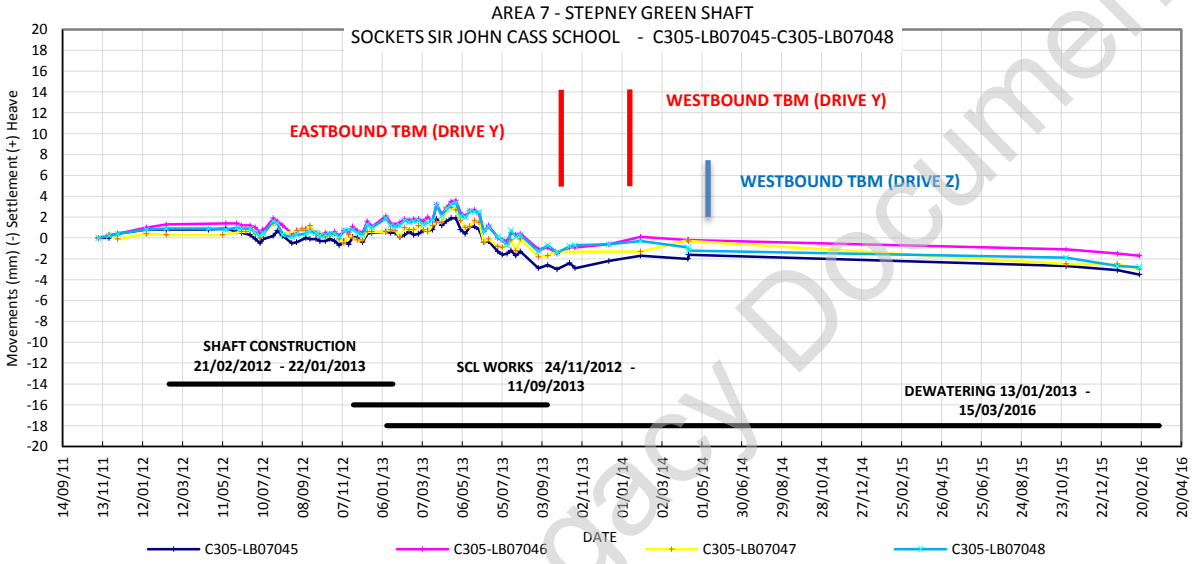
#N/A: No readings

The percentage of the sockets with a settlement rate less than 2 mm/year is 67% and 100% less than 3 mm/year

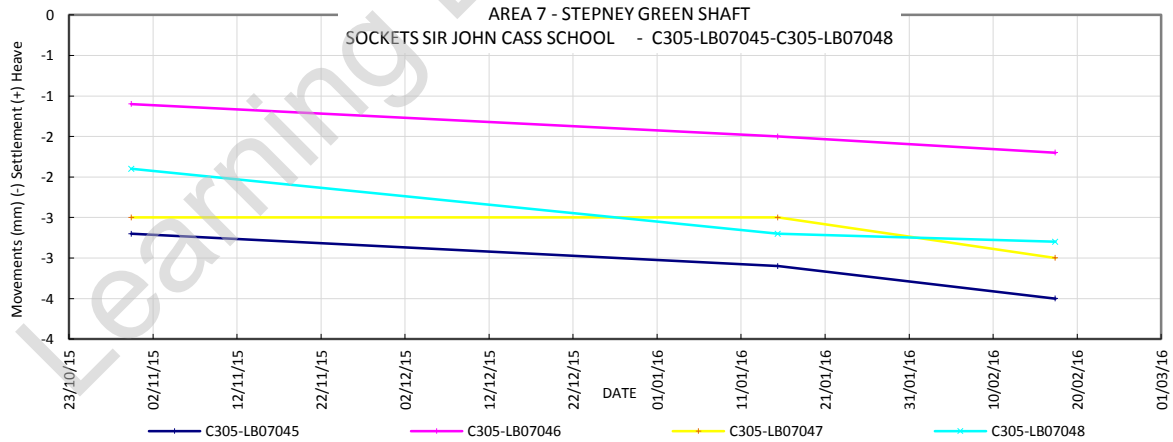
8- C305-LB07045 TO -C305-LB07048

The graph presented below shows a settlement of -3.0 mm in September 2013 after the shaft construction and during the SCL works. A maximum settlement -3 mm was observed in 31/10/2013 after the eastbound TBM (Drive Y) transit and -2 mm was observed in 28/01/2014 after the westbound TBM transit (Drive Y). A maximum settlement of -2 mm was observed in 5/06/2014 after the westbound TBM (Drive Z) transit.

The maximum settlement of -5.1 mm was recorded in February 2016 during the dewatering.



The plot below shows the trend line adjustment for each socket:



The table below lists the annual settlement rate for each socket:

	Registered movement (mm)			Ratio mm/year
	30/10/2015	15/01/2016	17/02/2016	
C305-LB07045	-2.70	-3.10	-3.50	-2.521
C305-LB07046	-1.10	-1.50	-1.70	-1.974
C305-LB07047	-2.50	-2.50	-3.00	-1.366
C305-LB07048	-1.90	-2.70	-2.80	-3.129
	Rate less than -2.5 mm/year	% less 2 mm/ year		50%
	Rate greater than -3.5 mm/year	% less 3 mm/ year		100%

Note: All the movements are in mm. (-) Settlement / (+) Heave

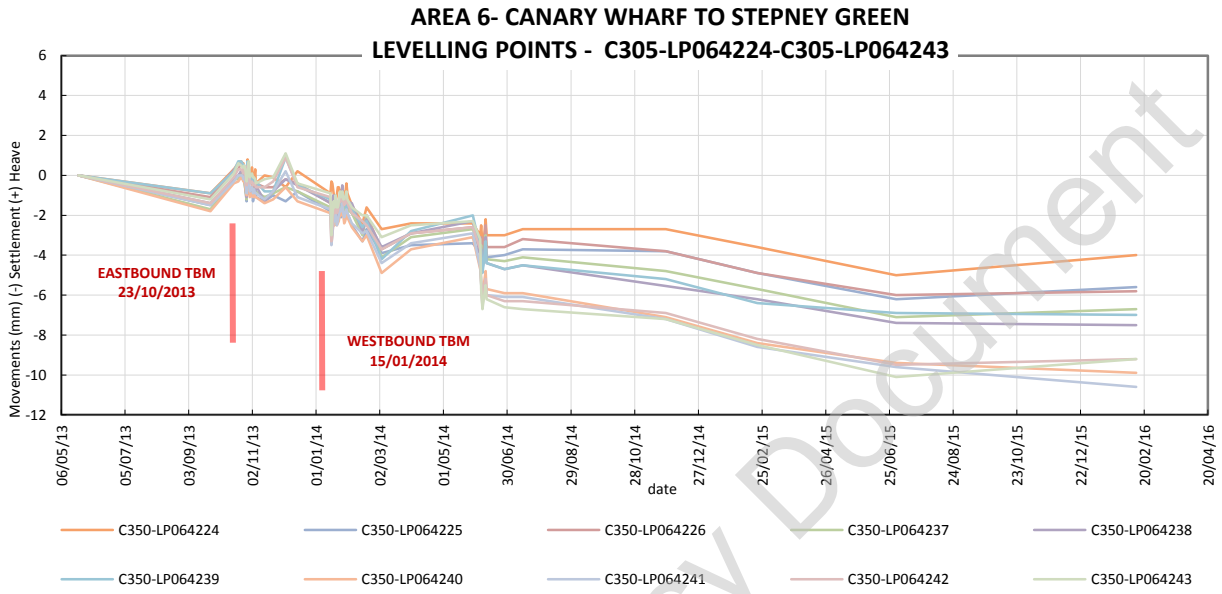
#N/A: No readings

The percentage of the sockets with a settlement rate less than 2 mm/year is 50%, whereas 100% are less than 3 mm/year.

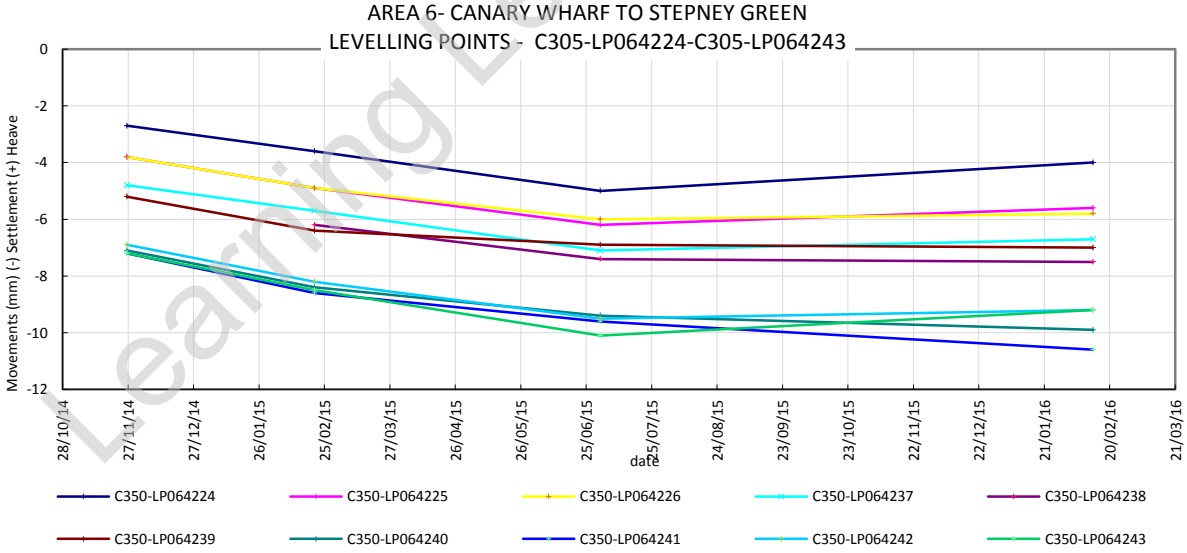
AREA 6 LEVELLING POINTS C305-LP064224-C305-LP064243

C305-LP064224-C305-LP064243

These points are located within Area 6, Canary Wharf to Stepney Green in the vicinity of Stepney Green Shaft. The last set of readings was taken on February 2016. The graph presented below shows a maximum settlement of -10.60.



The plot below shows the trend line adjustment for each levelling point:



The table below lists the annual settlement rate for each levelling point:

	Registered movement (mm)				mm/year
	26/11/2014	20/02/2015	01/07/2015	12/02/2016	
C350-LP064224	-2.70	-3.60	-5.00	-4.00	-1.025
C350-LP064225	-3.80	-4.90	-6.20	-5.60	-1.388
C350-LP064226	-3.80	-4.90	-6.00	-5.80	-1.536
C350-LP064237	-4.80	-5.70	-7.10	-6.70	-1.528
C350-LP064238	#N/A	-6.20	-7.40	-7.50	-1.202
C350-LP064239	-5.20	-6.40	-6.90	-7.00	-1.286
C350-LP064240	-7.10	-8.40	-9.40	-9.90	-2.152
C350-LP064241	-7.20	-8.60	-9.60	-10.60	-2.632
C350-LP064242	-6.90	-8.20	-9.50	-9.20	-1.762
C350-LP064243	-7.20	-8.50	-10.10	-9.20	-1.540
	Rate less than -2.5 mm/year			**% less 2 mm/ year**	90%
	Rate greater than -3.5 mm/year			**% less 3 mm/ year**	100%

Note: All the movements are in mm. (-) Settlement / (+) Heave

#N/A: No readings

The percentage of the levelling points with a settlement rate less than 2mm/year is 90%, whereas 100% are less than 3mm/year.

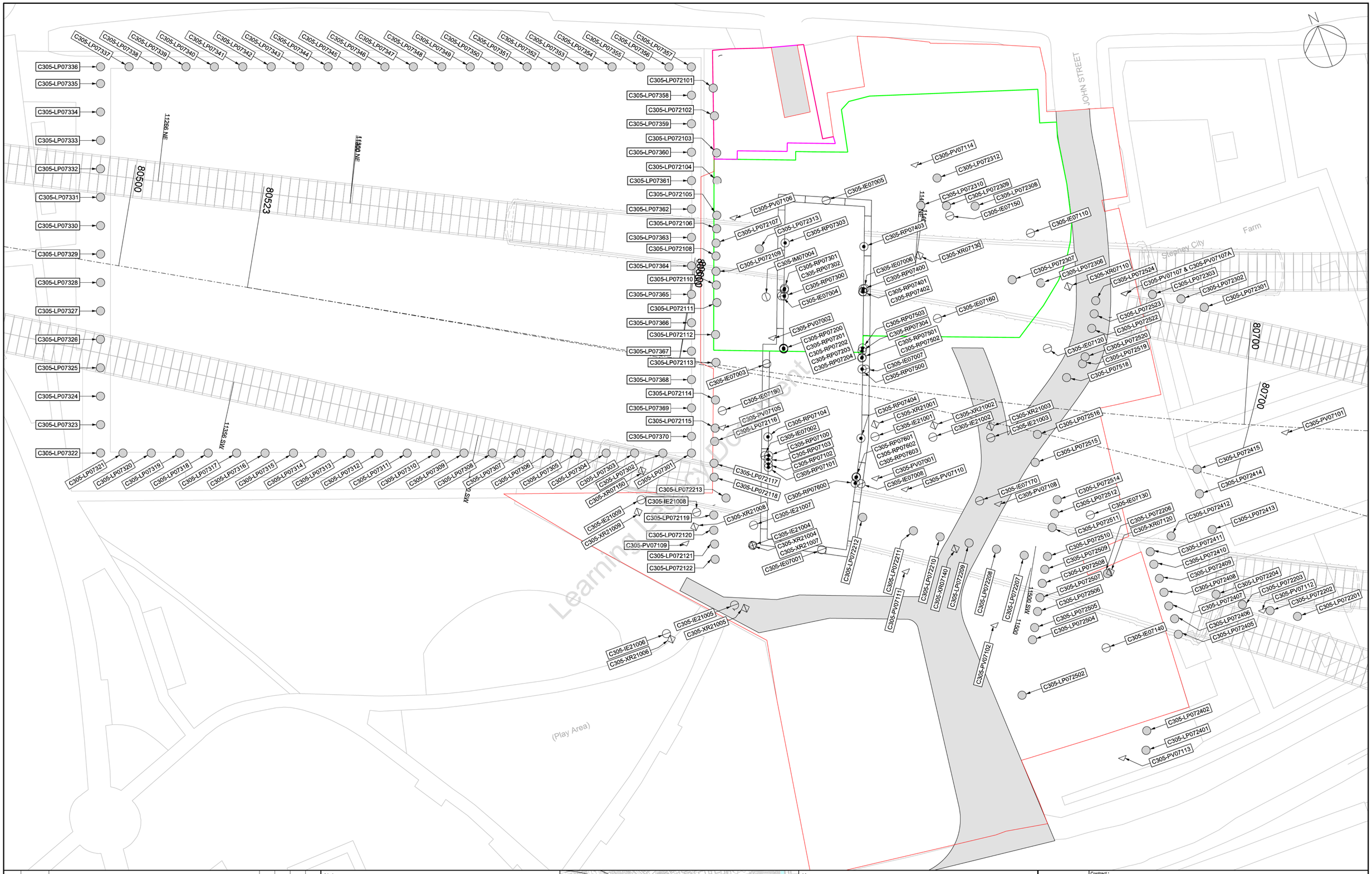
8. SUMMARY STATEMENT

It has been agreed between the Project Manager, the Designer, the Contractor and the Sub Contractor that the instrumentation covered herein, for monitoring ground movement effects of Crossrail works, including long term effects, can be closed out for decommissioning as the trend of the monitoring points was approaching or had achieved the specified 2mm/year settlement rate.

Minutes of the close out review meeting are included as Appendix C.

APPENDIX A:

INSTRUMENT LOCATION



Rev.	Date	Description	By	Chkd	App	Auth
						-
P01	13/05/2016	First Issue	MD	MD	MD	-
P02	24/05/2016	—	MD	MD	MD	-
P03	29/06/2016	—	MD	MD	MD	-
P04	07/07/2016	—	MD	MD	MD	-

Notes
- Levelling Points
- 3D Prisms
- Inclinometers - Electronic
- Inclinometer - Manual
- Rod Extensometers
- Vibrating Wire Piezometers

Key:
- C305 Site Boundary
- Area required for Handover to C360/C610
- Area that will be inaccessible after Handover

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25 Canada Square
Canary Wharf
London
E14 5LQ

www.crossrail.co.uk

Contract : Tunnels East - Drive Y LIM to FAR & Drive Z SGJ to PML & Drive G
Originator : Dragados Sisk Joint Venture
Location : Stepney Green Shaft Worksite
Title : Instrumentation & Monitoring
I&M Installation Report for
Stepney Green Site (Drive Y)
C305-DSJ-C2-RGN-CR094_WS108_50007
By : M.DAVIS
Chk : M.DAVIS
App : M.DAVIS
Auth : —
Scale : NTS@ A1
Drawing and CAD file No : C305-DSJ-C2-DDA-CR094_WS108_1-08073
Rev : P04
Suitability : S4

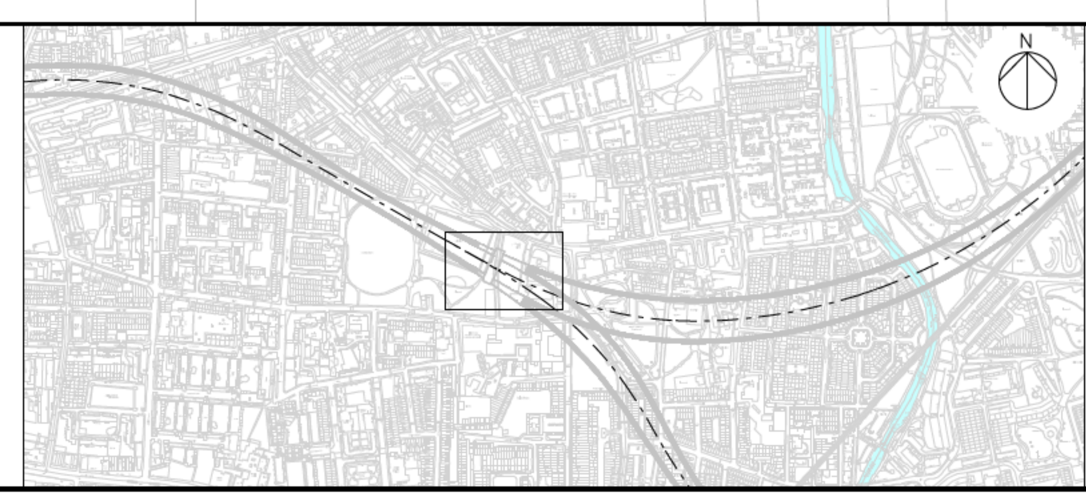
Fit for authorisation

RESTRICTED

Rev.	Date	Description	By	Chkd	App	Auth
						-
						-
						-
P01	13/05/2016	First Issue	MD	MD	MD	-
P02	24/05/2016	—	MD	MD	MD	-

Notes

☐ Strain Gauge



5m 0 5m 10m 15m 20m 25m

1:250 @ A1

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Contract : Tunnels East - Drive Y LIM to FAR & Drive Z SGJ to PML & Drive G

Originator : Dragados Sisk Joint Venture

Location : Stepney Green Shaft

Title : Instrumentation & Monitoring
I&M Installation Report for
Stepney Green Site
C305-DSJ-C2-RGN-CR094_WS108-50007

By : M.DAVIS
Chk : M.DAVIS
App : M.DAVIS
Auth : _

Scale :	Drawing and CAD file No :	Rev :	Suitability :
1:250@ A1	C305-DSJ-C2-DDA-CR094_SH005_Z-08297	P02	S4

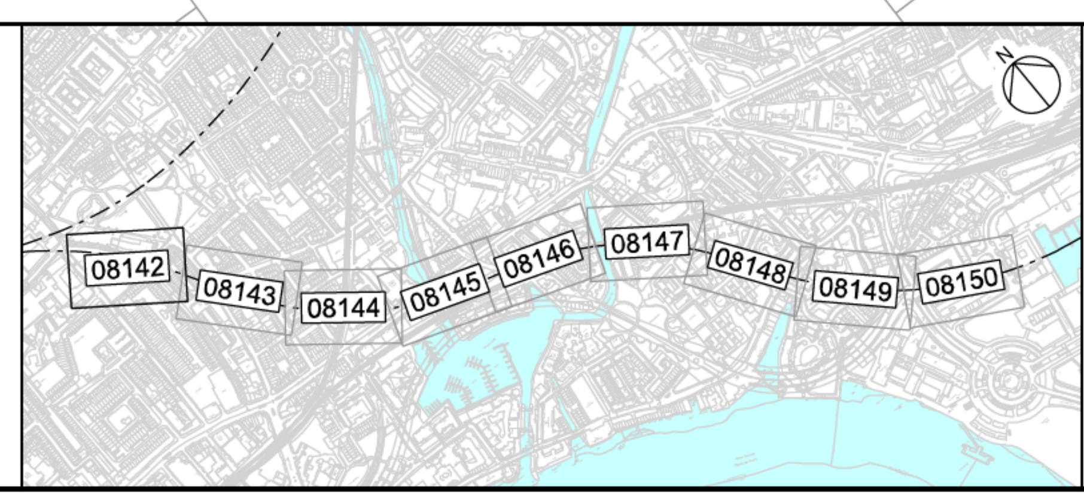
Fit for authorisation

RESTRICTED

Rev.	Date	Description	By	Chkd	App	Auth
P01	01/10/2015	First Issue	MD	RC	RC	-
P02	11/11/2015	—	MD	SD	SD	-

Notes

Levelling Point



5m 0 5m 10m 15m 20m 25m

1:250 @ A1

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Canary Wharf
London
E14 5LQ

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Contract : Tunnels East - Drive Y LIM to FAR & Drive Z SGJ to PML & Drive G

Originator : Dragados Sisk Joint Venture

Location : Crossrail Tunnels - Drive Y (Limmo Peninsula to Farringdon Stn)

Title : Instrumentation & Monitoring
Installation Report for Studs from
Canary Wharf to Stepney Green (Drive Y)
C305-DSJ-C2-RGN-CRG03-50155

By : M.DAVIS
Chk : S.DIRIKWE
App : S.DIRIKWE
Auth : _

Scale : 1:250@ A1
Drawing and CAD file No : C305-DSJ-C2-DDA-CRT00_ST006_1-08142
Rev : P02
Suitability : S4

Fit for authorisation

RESTRICTED

C305-DSJ-C2-DDA-CRT00_ST006_1-08142.dgn 20/11/2015 16:49:48

STEPNEY GREEN

Stepney Green Maths and Computing College

Joseph Stern Hall East London Synagogue

Cycle Hire Station

Sports Ground

Worcester House (site of)

Gas Gov

BEN JONSON RD

Dame Colet House

Community Education Centre

City Farm

GARDEN STREET

BEN JONSON ROAD

STEPNEY HIGH STREET

Playground

DIGGON STREET

Welton House

Manse

COPLEY STREET

Sir John Cass Foundation and Redcoat C of E Secondary School

Church of St Dun and All Sa

C305-LP07046 C305-LP07047 C305-LP07048 C305-LP07049 C305-LP07050 C305-LP07051 C305-LP07052 C305-LP07053 C305-LP07054 C305-LP07055 C305-LP07056 C305-LP07057 C305-LP07058 C305-LP07059 C305-LP07060 C305-LP07061 C305-LB07048 C305-LB07050 C305-LB07051 C305-LP07062 C305-LP07063 C305-LB07052 C305-LP07064 C305-LP07065 C305-LB07053 C305-LP07066 C305-LP07067 C305-LB07054 C305-LP07068 C305-LP07069 C305-LB07055 C305-LP07070 C305-LB07056 C305-LP07071 C305-LP07072 C305-LB07057 C305-LP07073 C305-LP07074 C305-LP07075 C305-LP07076 C305-LP07077 C305-LP07078 C305-LP07079 C305-LP07080 C305-LP07081 C305-LP07082 C305-LP07083 C305-LP07001 C305-LP07002 C305-LP07003 C305-LP07004 C305-LP07005 C305-LP07006 C305-LP07007 C305-LP07008 C305-LP07009 C305-LP07010 C305-LP07011 C305-LP07012 C305-LP07084 C305-LP07085 C305-LP07086 C305-LP07087 C305-LP07088 C305-LP07089 C305-LP07090 C305-LP07091 C305-LP07092 C305-LP07093 C305-LP07094 C305-LP07095 C305-LP07096 C305-LP07097 C305-LP07098 C305-LP07099 C305-LP07100 C305-LP07101 C305-LP07102 C305-LP07103 C305-LP07104 C305-LP07105 C305-LP07106 C305-LP07107 C305-LP07108 C305-LP07109 C305-LP07110 C305-LP07111 C305-LP07112 C305-LP07113 C305-LP07114 C305-LP07115 C305-LP07116 C305-LP07117 C305-LP07118 C305-LP07119 C305-LP07120 C305-LP07121 C305-LP07122 C305-LP07123 C305-LP07124 C305-LP07125 C305-LP07126 C305-LP07127 C305-LP07128 C305-LP07129 C305-LP07130 C305-LP07131 C305-LP07132 C305-LP07133 C305-LP07134 C305-LP07135 C305-LP07136 C305-LP07137 C305-LP07138 C305-LP07139 C305-LP07140 C305-LP07141 C305-LP07142 C305-LP07143 C305-LP07144 C305-LP07145 C305-LP07146 C305-LP07147 C305-LP07001 C305-LP07002 C305-LP07003 C305-LP07004 C305-LP07005 C305-LP07006 C305-LP07007 C305-LP07008 C305-LP07009 C305-LP07010 C305-LP07011 C305-LP07012 C305-LP07013 C305-LP07014 C305-LP07017 C305-LP07018 C305-LP07019 C305-LP07020 C305-LP07021 C305-LP07022 C305-LP07030 C305-LP07031 C305-LP07032 C305-LP07033 C305-LP07034 C305-LP07035 C305-LP07036 C305-LP07037 C305-LP07038 C305-LP07039 C305-LP07040 C305-LP07041 C305-LP07042 C305-LP07043 C305-LP07044 C305-LP07045 C305-LB07058 C305-LB07059 C305-LB07060 C305-LB07061 C305-LB07062 C305-LB07063

L Twr

1:200 @ A1

Notes
- Sockets
- Levelling Points

Rev.	Date	Description	By	Chkd	App	Auth
P01	29/04/2016	First Issue	MD	MD	MD	-
P02	23/05/2016	—	MD	MD	MD	-

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Canary Wharf
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E14 5LQ

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Contract : Tunnels East - Drive Y LIM to FAR & Drive Z SGJ to PML & Drive G
Originator : Dragados Sisk Joint Venture
Location : Stepney Green Shaft Worksite
Title : Instrumentation & Monitoring
IR I&M STG Ground Levelling
(Shaft Construction & Holloway Relief Sewer)
C305-DSJ-C2-RGN-CR094_WS108-50002

By : M.DAVIS
Chk : M.DAVIS
App : M.DAVIS
Auth : _

Scale : 1:500@ A1
Drawing and CAD file No : C305-DSJ-C2-DDA-CR094_WS108_1-08308
Rev : P02
Suitability : S4

Fit for authorisation

RESTRICTED

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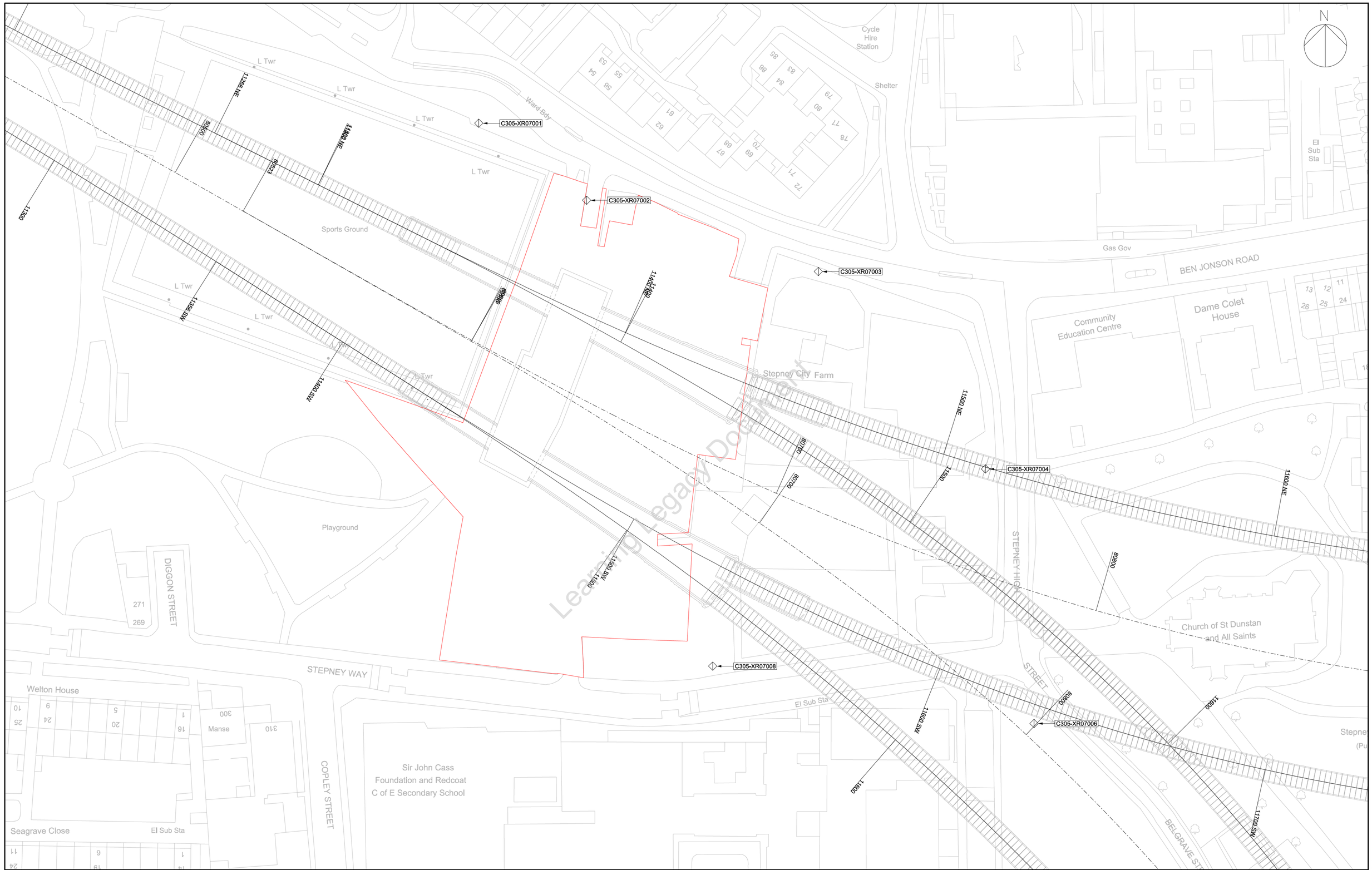

Rev.	Date	Description	By	Chkd	App	Auth
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						-
						-
P01	24/02/2016	First Issue	MD	MD	MD	-

Notes

◇ Rod Extensometers

10m 0 10m 20m 30m 40m 50m
1:500 @ A1

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Contract : Tunnels East - Drive Y LIM to FAR & Drive Z SGJ to PML & Drive G

Originator : Dragados Sisk Joint Venture

Location : Crossrail Tunnels - Drive Y (Limmo Peninsula to Farringdon Stn)

Title : Instrumentation & Monitoring
I&M Installation Report for Rod Extensometers installed for Protection of Sewers around Stepney Green Shaft
C305-DSJ-C2-RGN-CRG03-50300

By : M.DAVIS
Chk : M.DAVIS
App : M.DAVIS
Auth : __

Scale : 1:500@ A1

Drawing and CAD file No : C305-DSJ-C2-DDA-CRT00_ST006_1-08177

Rev : P01

Suitability : S4

Fit for authorisation

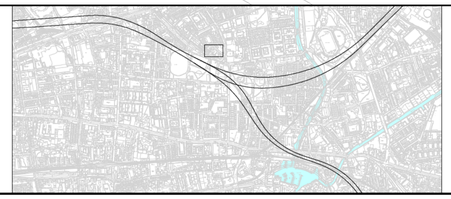
RESTRICTED

C305-DSJ-C2-DDA-CRT00_ST006_1-08177.dgn 03/03/2016 17:22:44

Rev.	Date	Description	By	Chkd	App	Auth
						-
						-
P01	29/04/2016	First Issue	MD	MD	MD	-

Notes

Sockets



4m 0 4m 8m 12m 16m 20m

1:200 @ A1

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E14 5LQ

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Contract : Tunnels East - Drive Y LIM to FAR & Drive Z SGJ to PML & Drive G

Originator : Dragados Sisk Joint Venture

Location : Stepney Green Shaft Worksite

Title : Instrumentation & Monitoring
IR for I&M installed as per "Instrumentation at Stepney Green of the Joseph Stern Synagogue" MS
C305-DSJ-C4-RGN-CRG094_SH005-50004

By : M.DAVIS
Chk : M.DAVIS
App : M.DAVIS
Auth : _

Scale : 1:200@ A1

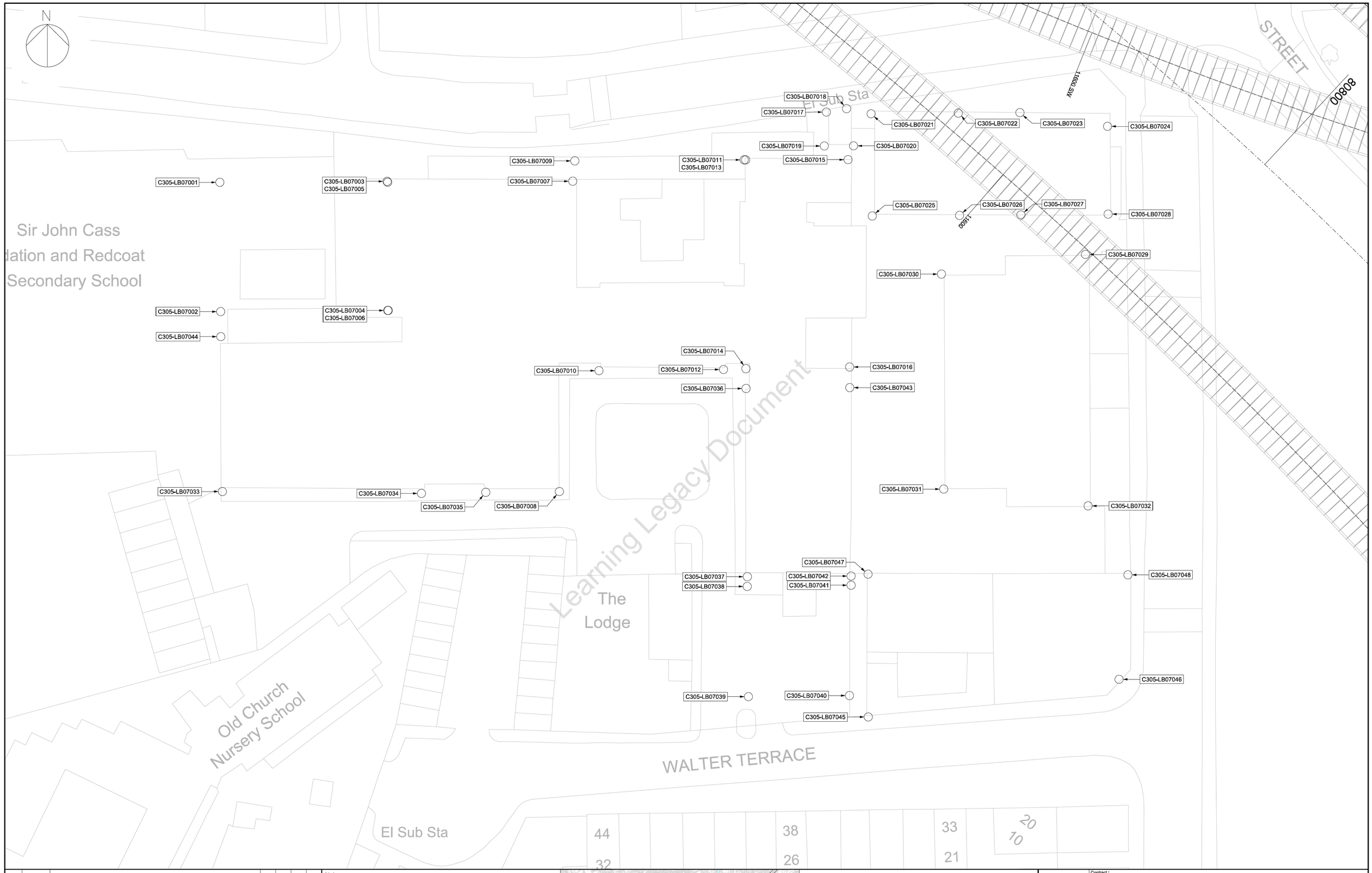
Drawing and CAD file No : C305-DSJ-C2-DDA-CR094_WS108_1-08307

Rev : P01

Suitability : S4

Fit for authorisation

RESTRICTED



Rev.	Date	Description	By	Chkd	App	Auth
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						-
P01	29/04/2016	First Issue	MD	MD	MD	-

Notes

○ Sockets

5m 0 5m 10m 15m 20m 25m

1:250 @ A1

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Contract : Tunnels East - Drive Y LIM to FAR & Drive Z SGJ to PML & Drive G

Originator : Dragados Sisk Joint Venture

Location : Stepney Green Shaft Worksite

Title : Instrumentation & Monitoring
Installation Report for I&M Installed as per
"Sir John Cass School and General Buildings" MS
C305-DSJ-C2-GMS-CR094_WS108-50004

By : M.DAVIS
Chk : M.DAVIS
App : M.DAVIS
Auth : _

Scale : 1:250@ A1

Drawing and CAD file No : C305-DSJ-C2-DDA-CR094_WS108_1-08306

Rev : P01

Suitability : S4

Fit for authorisation

RESTRICTED

C305-DSJ-C2-DDA-CR094_WS108_1-08306.dgn 04/05/2016 11:47:58

APPENDIX B:

SUMMARY OF INSTRUMENTATION INSTALLED ON SITE

IRS Installation Record Sheets – Levelling Points										
Sensor Type	Sensor ID	Date Installation	Status	Sensor Location - GPS Reading			Commisioning Readings (m)			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Average	Elevation Z (mATD)	Elevation Z (mATD)	Elevation Z (mATD)
Levelling Point	**C305-LP064224**	10/04/2013	Installed	86307.858	36124.812	110.858	110.8370	110.8367	110.8375	110.8368
Levelling Point	**C305-LP064225**	10/04/2013	Installed	86305.128	36129.046	110.830	110.8079	110.8075	110.8085	110.8077
Levelling Point	**C305-LP064226**	10/04/2013	Installed	86302.409	36133.260	110.772	110.7779	110.7784	110.7777	110.7776
Levelling Point	**C305-LP064227**	10/04/2013	Installed	86299.673	36137.496	110.759	110.7439	110.7435	110.7442	110.7440
Levelling Point	**C305-LP064228**	10/04/2013	Installed	86296.877	36141.739	110.751	110.7329	110.7326	110.7331	110.7330
Levelling Point	**C305-LP064229**	10/04/2013	Installed	86293.736	36145.687	110.766	110.7469	110.7468	110.7473	110.7466
Levelling Point	**C305-LP064230**	10/04/2013	Installed	86290.029	36149.303	110.751	110.7193	110.7192	110.7199	110.7188
Levelling Point	**C305-LP064231**	10/04/2013	Installed	86286.768	36152.790	110.710	110.6806	110.6809	110.6805	110.6804
Levelling Point	**C305-LP064232**	10/04/2013	Installed	86283.242	36156.364	110.685	110.6699	110.6701	110.6696	110.6700
Levelling Point	**C305-LP064233**	10/04/2013	Installed	86279.660	36159.904	110.624	110.6444	110.6445	110.6439	110.6448
Levelling Point	**C305-LP064234**	10/04/2013	Installed	86276.190	36163.528	110.689	110.6501	110.6498	110.6507	110.6498
Levelling Point	**C305-LP064235**	10/04/2013	Installed	86274.329	36165.216	110.602	110.6335	110.6340	110.6333	110.6332
Levelling Point	**C305-LP064236**	10/04/2013	Installed	86272.548	36167.005	110.644	110.6146	110.6149	110.6143	110.6146
Levelling Point	**C305-LP064237**	10/04/2013	Installed	86270.793	36168.785	110.581	110.5685	110.5689	110.5684	110 5682
Levelling Point	**C305-LP064238**	10/04/2013	Installed	86269.029	36170.560	110.572	110.5461	110.5455	110.5466	110 5462
Levelling Point	**C305-LP064239**	10/04/2013	Installed	86267.253	36172.325	110.553	110.5340	110.5337	110.5346	110 5337
Levelling Point	**C305-LP064240**	10/04/2013	Installed	86265.480	36174.176	110.553	110.5164	110.5159	110.5167	110 5166
Levelling Point	**C305-LP064241**	10/04/2013	Installed	86263.751	36175.975	110.491	110.4814	110.4816	110.4811	110.4815
Levelling Point	**C305-LP064242**	10/04/2013	Installed	86262.000	36177.806	110.458	110.4494	110.4495	110.4488	110.4499
Levelling Point	**C305-LP064243**	10/04/2013	Installed	86260 2790	36179.6070	110.4940	110.4892	110.4893	110.4886	110.4897

Notes: Coordinates for instrument location (Easting, Northing and Elevation) are GPS readings. Commissioning readings are levelling readings. All elevations presented are metres above tunnel datum (mATD).

IRS Installation Record Sheets – Levelling Point										
Sensor Type	Sensor ID	Installation Date	Status	Sensor Location - GPS Reading			Commisioning Readings (m)			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Date	Elevation Z1 (mATD)	Elevation Z2 (mATD)	Elevation Z3 (mATD)
Levelling Point	C305-LP072101	23-07-12	INSTALLED	86118.992	36324.207	109.708	15-08-12	109.544	109.543	109.544
Levelling Point	C305-LP072102	23-07-12	INSTALLED	86117.524	36319.550	109.700	15-08-12	109.584	109.583	109.583
Levelling Point	C305-LP072103	24-07-12	INSTALLED	86115.653	36313.298	110.100	15-08-12	109.939	109.940	109.940
Levelling Point	C305-LP072104	24-07-12	INSTALLED	86114.036	36308.656	110.062	15-08-12	109.912	109.913	109.913
Levelling Point	C305-LP072105	25-07-12	INSTALLED	86111.909	36302.981	110.350	15-08-12	109.825	109.824	109.825
Levelling Point	C305-LP072106	25-07-12	INSTALLED	86111.076	36300.771	110.035	15-08-12	109.840	109.840	109.840
Levelling Point	C305-LP072107	25-07-12	INSTALLED	86110.110	36298.427	110.000	15-08-12	109.704	109.705	109.705
Levelling Point	C305-LP072108	26-07-12	INSTALLED	86109.308	36296.294	110.027	15-08-12	109.827	109.828	109.827
Levelling Point	C305-LP072109	26-07-12	INSTALLED	86108.392	36293.767	110.049	15-08-12	109.887	109.887	109.887
Levelling Point	C305-LP072110	27-07-12	INSTALLED	86107.627	36291.484	110.037	15-08-12	109.836	109.837	109.837
Levelling Point	C305-LP072111	27-07-12	INSTALLED	86106.650	36288.548	110.084	15-08-12	109.866	109.867	109.866
Levelling Point	C305-LP072112	30-07-12	INSTALLED	86104.500	36283.339	110.000	15-08-12	109.811	109.810	109.810
Levelling Point	C305-LP072113	30-07-12	INSTALLED	86102.886	36278.707	110.099	15-08-12	109.941	109.942	109.941
Levelling Point	C305-LP072114	31-07-12	INSTALLED	86100.544	36272.536	110.083	15-08-12	109.941	109.941	109.941
Levelling Point	C305-LP072115	31-07-12	INSTALLED	86098.787	36267.906	110.081	15-08-12	109.901	109.901	109.902
Levelling Point	C305-LP072116	31-07-12	INSTALLED	86097.907	36265.748	110.149	15-08-12	109.954	109.955	109.955
Levelling Point	C305-LP072117	01-08-12	INSTALLED	86096.496	36262.175	110.073	15-08-12	109.895	109.896	109.895
Levelling Point	C305-LP072118	01-08-12	INSTALLED	86095.665	36259.851	110.111	15-08-12	109.927	109.928	109.928
Levelling Point	C305-LP072119	02-08-12	INSTALLED	86093.316	36253.614	110.015	15-08-12	109.850	109.850	109.850
Levelling Point	C305-LP072120	02-08-12	INSTALLED	86092.408	36251.107	110.014	15-08-12	109.866	109.867	109.866
Levelling Point	C305-LP072121	03-08-12	INSTALLED	86091.698	36248.718	109.997	15-08-12	109.900	109.901	109.900
Levelling Point	C305-LP072122	03-08-12	INSTALLED	86090.877	36246.230	110.012	15-08-12	109.889	109.890	109.889
Levelling Point	C305-LP072201	04-09-12	INSTALLED	86183.657	36201.656	110.762	02-10-12	110.545	110.544	110.545
Levelling Point	C305-LP072202	04-09-12	INSTALLED	86179.461	36204.259	110.801	02-10-12	110.655	110.655	110.655
Levelling Point	C305-LP072203	05-09-12	INSTALLED	86175.265	36206.935	110.905	02-10-12	110.763	110.762	110.763
Levelling Point	C305-LP072204	07-09-12	INSTALLED	86171.519	36210.220	111.240	02-10-12	111.133	111.132	111.133

IRS Installation Record Sheets – Levelling Point										
Sensor Type	Sensor ID	Installation Date	Status	Sensor Location - GPS Reading			Commisioning Readings (m)			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Date	Elevation Z1 (mATD)	Elevation Z2 (mATD)	Elevation Z3 (mATD)
Levelling Point	C305-LP072206	25-09-12	INSTALLED	86154.834	36220.207	111.601	30-10-12	111.108	111.109	111.108
Levelling Point	C305-LP072207	21-09-12	INSTALLED	86142.186	36228.242	110.536	02-10-12	110.346	110.345	110.345
Levelling Point	C305-LP072208	20-09-12	INSTALLED	86137.977	36230.932	110.296	02-10-12	110.096	110.095	110.095
Levelling Point	C305-LP072209	20-09-12	INSTALLED	86133.822	36233.599	110.159	30-10-12	109.903	109.904	109.904
Levelling Point	C305-LP072210	27-09-12	INSTALLED	86129.396	36236.300	110.112	30-10-12	109.892	109.892	109.891
Levelling Point	C305-LP072211	27-09-12	INSTALLED	86125.347	36238.968	110.106	25-10-12	109.871	109.871	109.871
Levelling Point	C305-LP072212	27-09-12	INSTALLED	86117.782	36244.251	110.168	02-10-12	109.962	109.962	109.962
Levelling Point	C305-LP072213	27-09-12	INSTALLED	86096.369	36255.708	110.146	30-10-12	109.953	109.952	109.952
Levelling Point	C305-LP072301	08-09-12	INSTALLED	86186.906	36258.353	109.904	02-10-12	109.774	109.775	109.774
Levelling Point	C305-LP072302	08-09-12	INSTALLED	86183.568	36261.141	109.913	02-10-12	109.683	109.683	109.682
Levelling Point	C305-LP072303	08-09-12	INSTALLED	86179.122	36263.613	109.641	02-10-12	109.503	109.503	109.503
Levelling Point	C305-LP072306	18-09-12	INSTALLED	86161.348	36272.246	110.011	02-10-12	109.785	109.784	109.785
Levelling Point	C305-LP072307	20-09-12	INSTALLED	86156.814	36274.515	110.153	02-10-12	109.950	109.951	109.951
Levelling Point	C305-LP072308	18-09-12	INSTALLED	86155.130	36288.902	110.090	06-11-12	109.961	109.962	109.961
Levelling Point	C305-LP072309	20-09-12	INSTALLED	86150.437	36290.691	110.110	06-11-12	109.904	109.905	109.904
Levelling Point	C305-LP072310	20-09-12	INSTALLED	86146.206	36292.290	110.087	01-11-12	109.948	109.947	109.948
Levelling Point	C305-LP072312	01-10-12	INSTALLED	86150.551	36295.839	110.080	14-11-12	109.913	109.912	109.912
Levelling Point	C305-LP072313	01-10-12	INSTALLED	86116.950	36294.859	110.158	30-10-12	109.947	109.946	109.946
Levelling Point	C305-LP072401	30-08-12	INSTALLED	86150.540	36188.669	111.548	02-10-12	111.424	111.423	111.423
Levelling Point	C305-LP072402	30-08-12	INSTALLED	86151.844	36191.855	111.435	02-10-12	111.294	111.294	111.294
Levelling Point	C305-LP072405	30-08-12	INSTALLED	86162.874	36205.879	111.432	02-10-12	111.221	111.222	111.221
Levelling Point	C305-LP072406	31-08-12	INSTALLED	86163.201	36208.684	111.407	02-10-12	111.243	111.244	111.243
Levelling Point	C305-LP072407	31-08-12	INSTALLED	86163.022	36211.145	111.428	02-10-12	111.196	111.196	111.195
Levelling Point	C305-LP072408	31-08-12	INSTALLED	86163.043	36213.682	111.453	02-10-12	111.223	111.225	111.224
Levelling Point	C305-LP072409	03-09-12	INSTALLED	86163.124	36216.268	111.469	02-10-12	111.239	111.239	111.239

IRS Installation Record Sheets – Levelling Point										
Sensor Type	Sensor ID	Installation Date	Status	Sensor Location - GPS Reading			Commisioning Readings (m)			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Date	Elevation Z1 (mATD)	Elevation Z2 (mATD)	Elevation Z3 (mATD)
Levelling Point	C305-LP072410	03-09-12	INSTALLED	86163.064	36218.924	111.427	02-10-12	111.246	111.245	111.246
Levelling Point	C305-LP072411	03-09-12	INSTALLED	86163.218	36221.223	111.384	02-10-12	111.139	111.138	111.139
Levelling Point	C305-LP072412	05-09-12	INSTALLED	86167.631	36222.557	111.295	02-10-12	111.220	111.220	111.221
Levelling Point	C305-LP072413	04-09-12	INSTALLED	86174.814	36221.159	110.263	02-10-12	110.050	110.051	110.051
Levelling Point	C305-LP072414	05-09-12	INSTALLED	86174.859	36227.827	109.867	02-10-12	109.751	109.752	109.751
Levelling Point	C305-LP072415	08-09-12	INSTALLED	86175.957	36232.018	109.767	02-10-12	109.659	109.660	109.659
Levelling Point	C305-LP072502	26-09-12	INSTALLED	86133.381	36205.255	111.191	22-10-12	110.936	110.936	110.937
Levelling Point	C305-LP072504	25-09-12	INSTALLED	86138.460	36213.785	111.406	25-10-12	111.196	111.197	111.197
Levelling Point	C305-LP072505	24-09-12	INSTALLED	86139.545	36215.662	111.363	03-10-12	111.189	111.190	111.190
Levelling Point	C305-LP072506	24-09-12	INSTALLED	86140.997	36218.147	111.277	03-10-12	111.067	111.068	111.067
Levelling Point	C305-LP072507	21-09-12	INSTALLED	86142.213	36220.298	111.193	03-10-12	110.992	110.992	110.991
Levelling Point	C305-LP072508	25-09-12	INSTALLED	86143.470	36222.511	111.095	03-10-12	110.927	110.928	110.928
Levelling Point	C305-LP072509	24-09-12	INSTALLED	86144.733	36224.673	110.923	30-10-12	110.719	110.719	110.720
Levelling Point	C305-LP072510	21-09-12	INSTALLED	86145.967	36226.652	110.813	03-10-12	110.602	110.603	110.603
Levelling Point	C305-LP072511	26-09-12	INSTALLED	86148.484	36231.151	110.663	25-10-12	110.460	110.460	110.460
Levelling Point	C305-LP072512	01-10-12	INSTALLED	86149.718	36233.309	110.577	03-10-12	110.381	110.382	110.382
Levelling Point	C305-LP072514	01-10-12	INSTALLED	86150.988	36235.425	110.505	08-11-12	110.289	110.288	110.290
Levelling Point	C305-LP072515	26-09-12	INSTALLED	86149.601	36242.924	110.521	25-10-12	110.356	110.355	110.356
Levelling Point	C305-LP072516	18-09-12	INSTALLED	86151.659	36247.421	110.483	22-10-12	110.300	110.301	110.300
Levelling Point	C305-LP072518	18-09-12	INSTALLED	86159.907	36255.046	109.961	01-11-12	109.350	109.351	109.351
Levelling Point	C305-LP072519	25-09-12	INSTALLED	86163.373	36256.386	109.641	30-10-12	109.437	109.436	109.437
Levelling Point	C305-LP072520	26-09-12	INSTALLED	86164.229	36257.361	109.543	30-10-12	109.326	109.326	109.326
Levelling Point	C305-LP072522	26-09-12	INSTALLED	86167.039	36261.666	109.264	03-10-12	109.069	109.069	109.070
Levelling Point	C305-LP072523	03-10-12	INSTALLED	86168.315	36263.921	109.236	22-10-12	108.991	108.991	108.991
Levelling Point	C305-LP072524	26-09-12	INSTALLED	86169.364	36265.989	109.283	03-10-12	109.067	109.066	109.067

Notes: Coordinates for instrument location (Easting, Northing and Elevation) are GPS readings. Commissioning readings are levelling readings. All elevations presented are metres above tunnel datum (mATD).

IRS Installation Record Sheets – Levelling Points										
Sensor Type	Sensor ID	Date Installation	Status	Sensor Location - GPS Reading			Commisioning Readings (m)			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Average	Elevation Z1 (mATD)	Elevation Z2 (mATD)	Elevation Z3 (mATD)
Levelling Point (paint mark)	C305-LP07301	26/09/2012	Installed	86093.383	36265.195	109.555	109.488	109.487	109.488	109.488
Levelling Point (paint mark)	C305-LP07302	26/09/2012	Installed	86088.664	36266.919	109.557	109.490	109.490	109.491	109.490
Levelling Point (paint mark)	C305-LP07303	26/09/2012	Installed	86083.984	36268.636	109.561	109.494	109.493	109.494	109.494
Levelling Point (paint mark)	C305-LP07304	26/09/2012	Installed	86079.279	36270.344	109.560	109.493	109.494	109.493	109.493
Levelling Point (paint mark)	C305-LP07305	26/09/2012	Installed	86074.592	36272.066	109.565	109.498	109.498	109.497	109.498
Levelling Point (paint mark)	C305-LP07306	26/09/2012	Installed	86069.889	36273.771	109.570	109.502	109.502	109.502	109.502
Levelling Point (paint mark)	C305-LP07307	26/09/2012	Installed	86065.190	36275.499	109.572	109.503	109.504	109.503	109.503
Levelling Point (paint mark)	C305-LP07308	26/09/2012	Installed	86060.488	36277.204	109.573	109.504	109.505	109.504	109.504
Levelling Point (paint mark)	C305-LP07309	26/09/2012	Installed	86055.798	36278.919	109.568	109.499	109.499	109.499	109.499
Levelling Point (paint mark)	C305-LP07310	26/09/2012	Installed	86051.099	36280.633	109.574	109.504	109.504	109.504	109.504
Levelling Point (paint mark)	C305-LP07311	26/09/2012	Installed	86046.411	36282.344	109.577	109.507	109.507	109.507	109.507
Levelling Point (paint mark)	C305-LP07312	26/09/2012	Installed	86041.700	36284.060	109.579	109.508	109.507	109.508	109.508
Levelling Point (paint mark)	C305-LP07313	26/09/2012	Installed	86037.005	36285.772	109.579	109.509	109.509	109.508	109.509
Levelling Point (paint mark)	C305-LP07314	26/09/2012	Installed	86032.320	36287.500	109.576	109.505	109.505	109.506	109.505
Levelling Point (paint mark)	C305-LP07315	26/09/2012	Installed	86027.622	36289.210	109.569	109.497	109.497	109.497	109.497
Levelling Point (paint mark)	C305-LP07316	26/09/2012	Installed	86022.922	36290.918	109.565	109.494	109.494	109.494	109.494
Levelling Point (paint mark)	C305-LP07317	26/09/2012	Installed	86018.226	36292.648	109.571	109.500	109.500	109.500	109.501
Levelling Point (paint mark)	C305-LP07318	26/09/2012	Installed	86013.533	36294.367	109.573	109.502	109.502	109.502	109.502
Levelling Point (paint mark)	C305-LP07319	26/09/2012	Installed	86008.827	36296.081	109.570	109.500	109.501	109.500	109.500
Levelling Point (paint mark)	C305-LP07320	26/09/2012	Installed	86004.122	36297.802	109.574	109.504	109.504	109.504	109.504
Levelling Point (paint mark)	C305-LP07321	26/09/2012	Installed	85999.442	36299.510	109.585	109.515	109.515	109.516	109.515
Levelling Point (paint mark)	C305-LP07322	26/09/2012	Installed	85995.746	36300.868	109.583	109.514	109.514	109.513	109.514
Levelling Point (paint mark)	C305-LP07323	26/09/2012	Installed	85997.455	36305.557	109.555	109.486	109.486	109.485	109.485
Levelling Point (paint mark)	C305-LP07324	26/09/2012	Installed	85999.164	36310.262	109.547	109.477	109.478	109.477	109.477
Levelling Point (paint mark)	C305-LP07325	26/09/2012	Installed	86000.874	36314.957	109.536	109.466	109.467	109.466	109.466
Levelling Point (paint mark)	C305-LP07326	26/09/2012	Installed	86002.590	36319.657	109.527	109.456	109.457	109.456	109.456
Levelling Point (paint mark)	C305-LP07327	26/09/2012	Installed	86004.313	36324.354	109.524	109.453	109.454	109.453	109.453
Levelling Point (paint mark)	C305-LP07328	26/09/2012	Installed	86006.038	36329.048	109.518	109.448	109.448	109.448	109.448
Levelling Point (paint mark)	C305-LP07329	26/09/2012	Installed	86007.752	36333.743	109.510	109.439	109.440	109.439	109.439
Levelling Point (paint mark)	C305-LP07330	26/09/2012	Installed	86009.462	36338.444	109.496	109.426	109.426	109.426	109.425
Levelling Point (paint mark)	C305-LP07331	26/09/2012	Installed	86011.182	36343.139	109.478	109.407	109.407	109.407	109.407
Levelling Point (paint mark)	C305-LP07332	26/09/2012	Installed	86012.889	36347.839	109.464	109.393	109.392	109.393	109.393
Levelling Point (paint mark)	C305-LP07333	26/09/2012	Installed	86014.605	36352.534	109.456	109.385	109.385	109.384	109.385
Levelling Point (paint mark)	C305-LP07334	26/09/2012	Installed	86016.323	36357.232	109.452	109.381	109.380	109.381	109.381
Levelling Point (paint mark)	C305-LP07335	26/09/2012	Installed	86018.036	36361.916	109.436	109.364	109.364	109.365	109.363
Levelling Point (paint mark)	C305-LP07336	26/09/2012	Installed	86019.059	36364.697	109.418	109.346	109.347	109.346	109.346
Levelling Point (paint mark)	C305-LP07337	26/09/2012	Installed	86023.766	36362.985	109.426	109.354	109.354	109.353	109.353

IRS Installation Record Sheets – Levelling Points										
Sensor Type	Sensor ID	Date Installation	Status	Sensor Location - GPS Reading			Commisioning Readings (m)			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Average	Elevation Z1 (mATD)	Elevation Z2 (mATD)	Elevation Z3 (mATD)
Levelling Point (paint mark)	C305-LP07338	26/09/2012	Installed	86028.471	36361.267	109.427	109.354	109.354	109.354	109.354
Levelling Point (paint mark)	C305-LP07339	26/09/2012	Installed	86033.174	36359.544	109.432	109.360	109.360	109.360	109.359
Levelling Point (paint mark)	C305-LP07340	26/09/2012	Installed	86037.864	36357.826	109.434	109.361	109.362	109.361	109.361
Levelling Point (paint mark)	C305-LP07341	26/09/2012	Installed	86042.564	36356.115	109.431	109.358	109.358	109.359	109.358
Levelling Point (paint mark)	C305-LP07342	26/09/2012	Installed	86047.261	36354.402	109.433	109.360	109.359	109.361	109.360
Levelling Point (paint mark)	C305-LP07343	26/09/2012	Installed	86051.957	36352.691	109.428	109.354	109.355	109.354	109.354
Levelling Point (paint mark)	C305-LP07344	26/09/2012	Installed	86056.657	36350.976	109.427	109.351	109.351	109.352	109.351
Levelling Point (paint mark)	C305-LP07345	26/09/2012	Installed	86061.358	36349.248	109.416	109.338	109.337	109.338	109.338
Levelling Point (paint mark)	C305-LP07346	26/09/2012	Installed	86066.049	36347.532	109.429	109.355	109.355	109.355	109.355
Levelling Point (paint mark)	C305-LP07347	26/09/2012	Installed	86070.744	36345.820	109.426	109.353	109.354	109.353	109.353
Levelling Point (paint mark)	C305-LP07348	26/09/2012	Installed	86075.444	36344.103	109.415	109.342	109.342	109.342	109.342
Levelling Point (paint mark)	C305-LP07349	26/09/2012	Installed	86080.143	36342.381	109.429	109.356	109.356	109.356	109.357
Levelling Point (paint mark)	C305-LP07350	26/09/2012	Installed	86084.827	36340.661	109.424	109.351	109.351	109.352	109.351
Levelling Point (paint mark)	C305-LP07351	26/09/2012	Installed	86089.533	36338.959	109.412	109.340	109.340	109.341	109.340
Levelling Point (paint mark)	C305-LP07352	26/09/2012	Installed	86094.232	36337.235	109.424	109.352	109.352	109.351	109.352
Levelling Point (paint mark)	C305-LP07353	26/09/2012	Installed	86098.891	36335.520	109.420	109.348	109.347	109.348	109.348
Levelling Point (paint mark)	C305-LP07354	26/09/2012	Installed	86103.582	36333.817	109.425	109.354	109.354	109.355	109.354
Levelling Point (paint mark)	C305-LP07355	26/09/2012	Installed	86108.278	36332.089	109.429	109.358	109.358	109.358	109.358
Levelling Point (paint mark)	C305-LP07356	26/09/2012	Installed	86112.981	36330.366	109.422	109.351	109.351	109.352	109.352
Levelling Point (paint mark)	C305-LP07357	26/09/2012	Installed	86116.674	36329.014	109.415	109.345	109.345	109.346	109.345
Levelling Point (paint mark)	C305-LP07358	26/09/2012	Installed	86114.977	36324.333	109.429	109.361	109.362	109.361	109.362
Levelling Point (paint mark)	C305-LP07359	26/09/2012	Installed	86113.255	36319.625	109.441	109.375	109.375	109.375	109.375
Levelling Point (paint mark)	C305-LP07360	26/09/2012	Installed	86111.541	36314.925	109.441	109.380	109.379	109.380	109.379
Levelling Point (paint mark)	C305-LP07361	26/09/2012	Installed	86109.830	36310.226	109.442	109.386	109.385	109.386	109.386
Levelling Point (paint mark)	C305-LP07362	26/09/2012	Installed	86108.119	36305.531	109.445	109.317	109.318	109.317	109.317
Levelling Point (paint mark)	C305-LP07363	26/09/2012	Installed	86106.405	36300.840	109.459	109.314	109.314	109.315	109.314
Levelling Point (paint mark)	C305-LP07364	26/09/2012	Installed	86104.698	36296.140	109.460	109.311	109.310	109.311	109.311
Levelling Point (paint mark)	C305-LP07365	26/09/2012	Installed	86102.979	36291.441	109.470	109.307	109.308	109.307	109.307
Levelling Point (paint mark)	C305-LP07366	26/09/2012	Installed	86101.261	36286.741	109.480	109.304	109.304	109.303	109.304
Levelling Point (paint mark)	C305-LP07367	26/09/2012	Installed	86099.538	36282.045	109.489	109.300	109.300	109.300	109.300
Levelling Point (paint mark)	C305-LP07368	26/09/2012	Installed	86097.826	36277.341	109.515	109.297	109.297	109.297	109.297
Levelling Point (paint mark)	C305-LP07369	26/09/2012	Installed	86096.120	36272.645	109.528	109.293	109.293	109.294	109.293
Levelling Point (paint mark)	C305-LP07370	26/09/2012	Installed	86094.399	36267.959	109.547	109.290	109.290	109.290	109.290

Notes:

* All elevations presented are metres above tunnel datum (mATD).

* Coordinates for instrument location (Easting, Northing and Elevation) are GPS readings. Commissioning readings are levelling readings.

IRS Installation Record Sheets							
Sensor Type	Monitoring ID	Installation date	Status	Sensor location - GPS reading (m)			Depth
				Eastings X	Northings Y	Elevation Z (mATD)	(m bgl)
Rod Extensometer	**C305-XR07110**	13-11-12	Installed	86165.707	36269.984	109.430	19.0
Rod Extensometer	**C305-XR07120**	13-11-12	Installed	86155.399	36220.241	111.595	24.5
Rod Extensometer	**C305-XR07130**	16-11-12	Installed	86142.930	36284.114	110.097	20.5
Rod Extensometer	**C305-XR07140**	15-11-12	Installed	86131.200	36233.477	110.575	26.0
Rod Extensometer	**C305-XR07150**	02-11-12	Installed	86084.137	36265.278	109.587	26.0

Notes: Coordinates for instrument location (Easting, Northing and Elevation) are GPS readings. All elevations presented are metres above tunnel datum (mATD). Borehole depths are metres below ground level.

COMMISSIONING READINGS ROD EXTENSOMETERS						
			21-11-12 7:13	**21-11-12 13:13**	**21-11-12 19:13**	**Units**
Rod Extensometer with displacement transducers	**C305-XR07110**	XR0711018.50	0.370	0.347	0.334	mm
		XR0711015.00	-0.001	-0.005	-0.009	mm
		XR0711012.00	-0.001	-0.003	0.000	mm
		XR0711009.00	-0.017	-0.021	-0.036	mm
		XR0711005.50	0.014	-0.014	-0.026	mm
		XR0711002.50	-0.009	-0.013	-0.040	mm
			21-11-12 7:13	**21-11-12 13:13**	**21-11-12 19:13**	**Units**
Rod Extensometer with displacement transducers	**C305-XR07120**	XR0712024.00	0.016	0.034	0.175	mm
		XR0712020.00	-0.002	-0.005	0.104	mm
		XR0712016.00	-0.003	-0.006	-0.017	mm
		XR0712012.00	0.021	0.004	0.006	mm
		XR0712008.00	-0.002	-0.004	-0.014	mm
		XR0712004.00	0.037	0.043	0.082	mm
			22-11-12 21:27	**23-11-12 15:27**	**24-11-12 15:27**	**Units**
Rod Extensometer with displacement transducers	**C305-XR07130**	XR0713020.00	0.000	0.040	0.040	mm
		XR0713016.50	-0.020	0.010	0.000	mm
		XR0713013.00	0.000	0.000	0.000	mm
		XR0713009.50	0.000	0.000	-0.010	mm

COMMISSIONING READINGS ROD EXTENSOMETERS						
		XR0713006.00	0.000	-0.030	-0.040	mm
		XR0713002.50	0.000	-0.040	-0.070	mm
			21-11-12 13:13	**22-11-12 13:13**	**23-11-12 13:13**	**Units**
Rod Extensometer with displacement transducers	**C305-XR07140**	XR0714025.50	0.010	0.010	0.040	mm
		XR0714021.00	0.010	0.000	0.010	mm
		XR0714016.50	0.010	0.010	0.030	mm
		XR0714012.50	0.020	0.010	0.070	mm
		XR0714008.00	0.000	0.010	0.040	mm
		XR0714004.00	0.010	0.010	0.080	mm
			21-11-12 13:13	**22-11-12 13:13**	**23-11-12 13:13**	**Units**
Rod Extensometer with displacement transducers	**C305-XR07150**	XR0715025.50	0.000	0.000	0.020	mm
		XR0715021.00	0.000	0.000	0.030	mm
		XR0715016.50	-0.010	-0.010	-0.030	mm
		XR0715012.50	0.000	-0.010	0.000	mm
		XR0715008.00	0.000	-0.010	-0.010	mm
		XR0715004.00	0.000	0.000	0.020	mm

Notes: Automatic extensometers record relative movements between head and anchors.

GEOCISA UK

IRS Installation Record Sheets							
Monitoring ID	Installation date	Status	Sensor location - GPS reading (m)			Depth Borehole	Depth Sensor
			Eastings X	Northings Y	Elevation Z (mATD)	(m bgl)	(m bgl)
C305-PV07101	31-08-12	Installed	86192.794	36232.864	109.955	37.0	35.0
C305-PV07102	14-08-12	Installed	86133.140	36218.542	111.162	38.0	35.0
C305-PV07105	07-08-12	Installed	86100.032	36267.637	110.168	37.0	35.0
C305-PV07106	21-08-12	Installed	86114.614	36301.616	110.137	35.0	32.0
C305-PV07107	07-11-12	Installed	86174.653	36265.516	110.100	36.0	35.0
C305-PV07107A	18-01-13	Installed	86174.653	36265.516	110.080	40.9	38.0
C305-PV07108	30-10-12	Installed	86141.061	36238.378	110.098	40.3	36.9
C305-PV07109	09-01-13	Installed	86086.986	36250.724	110.071	40.0	38.0
C305-PV07110	18-01-13	Installed	86126.541	36246.419	110.027	40.0	38.0
C305-PV07111	22-02-13	Installed	86121.698	36232.790	110.052	40.0	38.0
C305-PV07112	10-01-13	Installed	86178.275	36204.782	110.806	40.0	38.0
C305-PV07113	10-01-13	Installed	86146.220	36188.877	111.749	40.1	40.1
C305-PV07114	10-01-13	Installed	86147.723	36299.432	110.089	40.9	38.0

Notes: Depth is referred to meters below ground level. Coordinates for sensor location (Easting, Northing and Elevation) are GPS readings. All elevations presented are metres above tunnel datum (mATD).

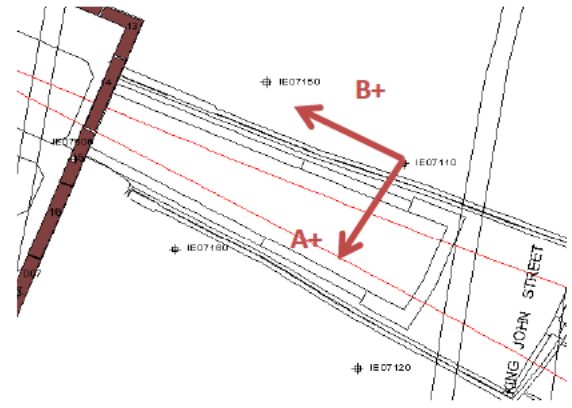
Sensor Type	Monitoring ID	Commissioning readings			
		05-09-12 11:37	**05-09-12 11:42**	**05-09-12 11:47**	Units
Piezometer - Sensor	**C305-PV07101**	82.890	82.890	82.881	m
		21-08-12 18:35	**21-08-12 18:50**	**21-08-12 19:05**	
Piezometer - Sensor	**C305-PV07102**	89.620	89.620	89.653	m
		21-08-12 19:35	**21-08-12 19:50**	**21-08-12 20:05**	
Piezometer - Sensor	**C305-PV07105**	90.042	90.042	90.051	m
		28-08-12 20:14	**28-08-12 20:29**	**28-08-12 20:44**	
Piezometer - Sensor	**C305-PV07106**	90.164	90.170	90.207	m
		08-11-12 9:07	**08-11-12 9:12**	**08-11-12 9:17**	
Piezometer - Sensor	**C305-PV07107**	80.809	80.811	80.812	m
		18-01-13 0:02	**18-01-13 0:07**	**18-01-13 0:12**	
Piezometer - Sensor	**C305-PV07107A**	79.034	79.034	79.032	m
		02-11-12 15:16	**02-11-12 15:17**	**02-11-12 15:18**	
Piezometer - Sensor	**C305-PV07108**	82.468	82.467	82.465	m
		15-01-13 18:58	**15-01-13 19:01**	**15-01-13 19:02**	
Piezometer - Sensor	**C305-PV07109**	76.948	76.951	76.952	m
		25-01-13 13:12	**25-01-13 13:17**	**25-01-13 13:22**	
Piezometer - Sensor	**C305-PV07110**	83.827	83.788	83.740	m
		22-02-13 16:57	**22-02-13 17:02**	**22-02-13 17:07**	
Piezometer - Sensor	**C305-PV07111**	77.951	77.951	77.950	m
		11-01-13 10:49	**11-01-13 10:50**	**11-01-13 10:51**	
Piezometer - Sensor	**C305-PV07112**	78.994	78.995	78.995	m
		11-01-13 10:49	**11-01-13 10:50**	**11-01-13 10:53**	
Piezometer - Sensor	**C305-PV07113**	79.213	79.214	79.213	m
		11-01-13 10:49	**11-01-13 10:50**	**11-01-13 10:51**	
Piezometer - Sensor	**C305-PV07114**	73.650	73.650	73.649	m

Notes: All levels presented are metres above tunnel datum (mATD).

IRS Installation Record Sheets								
Sensor Type	Sensor ID	Installation Date Casing	Installation Date sensor	Status	Location Sensor-GPS readings			Depth borehole (m bgl)
					Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	
Inclinometer	C305-IE07110	04-10-12	26-11-12	Installed	86162.664	36281.099	110.227	35.00
Inclinometer	C305-IE07120	13-10-12	05-12-12	Installed	86158.514	36261.030	110.050	35.00
Inclinometer	C305-IE07130	25-10-12	-	Not installed	86155.540	36230.912	110.719	40.00
Inclinometer	C305-IE07140	28-09-12	27-11-12	Installed	86150.134	36207.994	111.601	40.00
Inclinometer	C305-IE07150	09-10-12	20-11-12	Installed	86150.357	36288.810	110.114	36.00
Inclinometer	C305-IE07160	17-10-12	22-11-12	Installed	86142.143	36272.618	110.140	36.00
Inclinometer	C305-IE07170	23-10-12	20-11-12	Installed	86138.102	36239.943	110.151	41.00
Inclinometer	C305-IE07190	10-10-12	19-11-12	Installed	86101.015	36270.340	110.3330	42.00

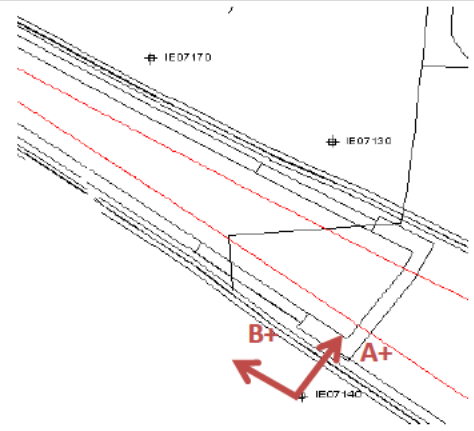
Note: C305-IE07130 it was not possible the installation of the sensor. Depth is referred to meters below ground level. Coordinates for sensor location (Easting, Northing and Elevation) are GPS readings. All elevations presented are metres above tunnel datum (mATD).

C305-IE07110



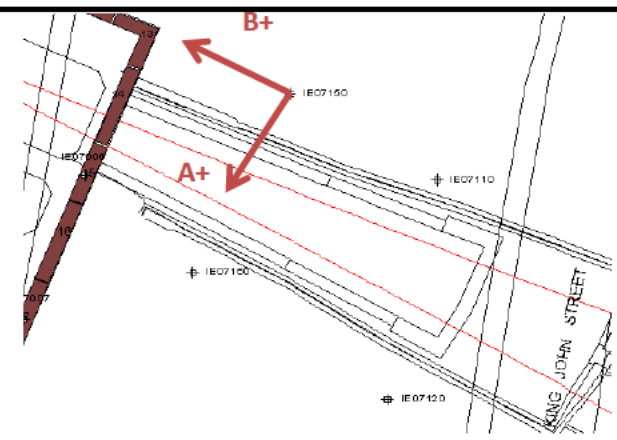
Depth (m)	Sensor Installation Date	Commissionning Reading Date	A (mm)	B (mm)
0.0	26-11-12	28-11-12 23:23	0.0000	0.0000
	26-11-12	29-11-12 14:23	0.0000	0.0000
	26-11-12	30-11-12 14:23	0.0000	0.0000
3.0	26-11-12	28-11-12 23:23	-0.0100	-0.0200
	26-11-12	29-11-12 14:23	-0.0100	-0.0200
	26-11-12	30-11-12 14:23	-0.1300	-0.0600
6.0	26-11-12	28-11-12 23:23	0.0800	-0.0500
	26-11-12	29-11-12 14:23	-0.0700	0.0100
	26-11-12	30-11-12 14:23	-0.1900	0.1400
9.0	26-11-12	28-11-12 23:23	0.0100	0.0100
	26-11-12	29-11-12 14:23	0.0300	-0.0700
	26-11-12	30-11-12 14:23	0.0400	-0.1400
12.0	26-11-12	28-11-12 23:23	-0.0200	0.0000
	26-11-12	29-11-12 14:23	-0.0200	-0.0900
	26-11-12	30-11-12 14:23	0.0200	-0.1300
15.0	26-11-12	28-11-12 23:23	0.0000	0.0300
	26-11-12	29-11-12 14:23	-0.0300	-0.0900
	26-11-12	30-11-12 14:23	-0.0300	-0.0400
18.0	26-11-12	28-11-12 23:23	0.0800	0.0700
	26-11-12	29-11-12 14:23	-0.0800	0.0100
	26-11-12	30-11-12 14:23	-0.1200	-0.0700
21.0	26-11-12	28-11-12 23:23	0.0100	-0.0300
	26-11-12	29-11-12 14:23	-0.0200	0.0400
	26-11-12	30-11-12 14:23	-0.0500	-0.0300
24.0	26-11-12	28-11-12 23:23	0.1000	0.0200
	26-11-12	29-11-12 14:23	-0.1400	-0.0200
	26-11-12	30-11-12 14:23	0.0100	0.0300
27.0	26-11-12	28-11-12 23:23	-0.0200	0.0100
	26-11-12	29-11-12 14:23	-0.2300	-0.0100
	26-11-12	30-11-12 14:23	-0.2000	-0.0700
30.0	26-11-12	28-11-12 23:23	0.0200	0.0000
	26-11-12	29-11-12 14:23	-0.0300	-0.0300
	26-11-12	30-11-12 14:23	0.0300	-0.0800
33.0	26-11-12	28-11-12 23:23	0.0100	-0.0100
	26-11-12	29-11-12 14:23	0.0000	0.0100
	26-11-12	30-11-12 14:23	-0.0300	0.0400

C305-IE07140



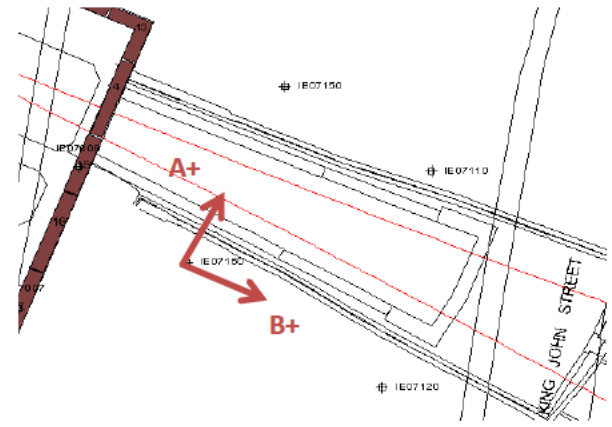
Depth (m)	Sensor Installation Date	Commissionning Reading Date	A (mm)	B (mm)
0.0	27-11-12	27-11-12 23:29	0.0000	0.0000
	27-11-12	28-11-12 14:29	0.0000	0.0000
	27-11-12	29-11-12 14:29	0.0000	0.0000
3.0	27-11-12	27-11-12 23:29	0.0700	0.0900
	27-11-12	28-11-12 14:29	0.1200	0.0900
	27-11-12	29-11-12 14:29	0.1400	0.1200
6.0	27-11-12	27-11-12 23:29	0.1000	-0.0600
	27-11-12	28-11-12 14:29	0.1300	-0.0900
	27-11-12	29-11-12 14:29	0.2500	-0.1600
9.0	27-11-12	27-11-12 23:29	-0.0200	-0.0900
	27-11-12	28-11-12 14:29	0.0000	-0.0100
	27-11-12	29-11-12 14:29	-0.0200	-0.1100
12.0	27-11-12	27-11-12 23:29	0.0600	-0.0100
	27-11-12	28-11-12 14:29	0.0900	0.0000
	27-11-12	29-11-12 14:29	0.1700	0.0000
15.0	27-11-12	27-11-12 23:29	0.1200	-0.0700
	27-11-12	28-11-12 14:29	0.3600	-0.0700
	27-11-12	29-11-12 14:29	0.4600	-0.0200
18.0	27-11-12	27-11-12 23:29	-0.1100	0.0200
	27-11-12	28-11-12 14:29	-0.2100	-0.0100
	27-11-12	29-11-12 14:29	-0.3300	-0.0200
21.0	27-11-12	27-11-12 23:29	0.0200	-0.0100
	27-11-12	28-11-12 14:29	0.0400	-0.0500
	27-11-12	29-11-12 14:29	0.0700	-0.0200
24.0	27-11-12	27-11-12 23:29	-0.0200	0.0000
	27-11-12	28-11-12 14:29	-0.0500	0.0200
	27-11-12	29-11-12 14:29	-0.0300	0.0600
27.0	27-11-12	27-11-12 23:29	-0.0100	-0.0600
	27-11-12	28-11-12 14:29	0.0200	-0.1000
	27-11-12	29-11-12 14:29	0.0100	-0.1900
30.0	27-11-12	27-11-12 23:29	0.0200	-0.0100
	27-11-12	28-11-12 14:29	0.1000	0.0100
	27-11-12	29-11-12 14:29	0.1300	0.0000
33.0	27-11-12	27-11-12 23:29	-0.0100	-0.0500
	27-11-12	28-11-12 14:29	-0.0100	-0.0700
	27-11-12	29-11-12 14:29	0.0200	-0.1000
36.0	27-11-12	27-11-12 23:29	-0.0400	0.0400
	27-11-12	28-11-12 14:29	-0.0900	0.0400
	27-11-12	29-11-12 14:29	-0.1200	0.0600

C305-IE07150



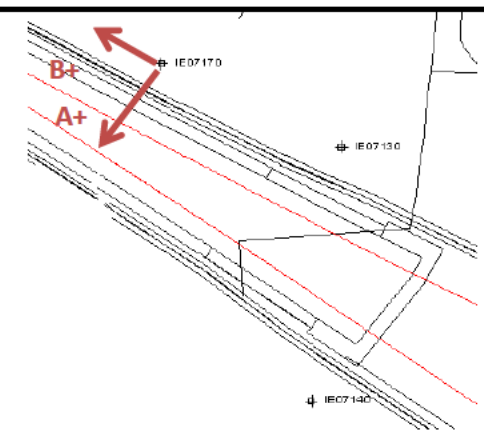
Depth (m)	Sensor Installation Date	Commissionning Reading Date	A (mm)	B (mm)
0.0	20-11-12	21-11-12 13:28	0.0000	0.0000
	20-11-12	22-11-12 13:28	0.0000	0.0000
	20-11-12	23-11-12 13:28	0.0000	0.0000
3.0	20-11-12	21-11-12 13:28	0.1300	0.0200
	20-11-12	22-11-12 13:28	0.0100	0.0000
	20-11-12	23-11-12 13:28	0.1200	0.0400
6.0	20-11-12	21-11-12 13:28	0.0200	-0.0100
	20-11-12	22-11-12 13:28	-0.0500	0.1200
	20-11-12	23-11-12 13:28	-0.0300	0.1100
9.0	20-11-12	21-11-12 13:28	-0.0800	-0.1500
	20-11-12	22-11-12 13:28	-0.0600	-0.2200
	20-11-12	23-11-12 13:28	-0.1100	-0.2100
12.0	20-11-12	21-11-12 13:28	0.2000	-0.0800
	20-11-12	22-11-12 13:28	0.1900	-0.1700
	20-11-12	23-11-12 13:28	0.2800	-0.1200
15.0	20-11-12	21-11-12 13:28	0.0000	-0.0600
	20-11-12	22-11-12 13:28	-0.1700	-0.2400
	20-11-12	23-11-12 13:28	-0.0500	-0.0700
18.0	20-11-12	21-11-12 13:28	0.0100	0.0400
	20-11-12	22-11-12 13:28	-0.1100	0.1700
	20-11-12	23-11-12 13:28	-0.0300	0.0300
21.0	20-11-12	21-11-12 13:28	-0.0900	0.0000
	20-11-12	22-11-12 13:28	-0.2800	-0.0900
	20-11-12	23-11-12 13:28	-0.1400	-0.1100
24.0	20-11-12	21-11-12 13:28	-0.0200	-0.0200
	20-11-12	22-11-12 13:28	-0.1300	-0.1600
	20-11-12	23-11-12 13:28	-0.0200	-0.0900
27.0	20-11-12	21-11-12 13:28	0.0200	-0.0300
	20-11-12	22-11-12 13:28	-0.0300	-0.0200
	20-11-12	23-11-12 13:28	-0.0400	-0.0100
30.0	20-11-12	21-11-12 13:28	-0.0200	0.0000
	20-11-12	22-11-12 13:28	-0.0300	-0.0200
	20-11-12	23-11-12 13:28	0.0000	0.0100
33.0	20-11-12	21-11-12 13:28	0.0500	0.2500
	20-11-12	22-11-12 13:28	0.1700	0.2500
	20-11-12	23-11-12 13:28	0.2100	0.2600

C305-IE07160



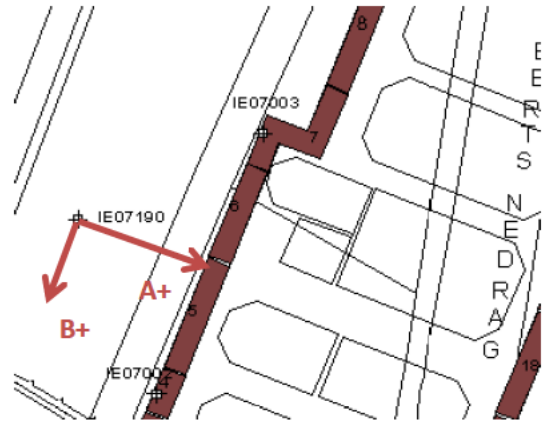
Depth (m)	Sensor Installation Date	Commissionning Reading Date	A (mm)	B (mm)
0.0	22-11-12	22-11-12 22:12	0.0000	0.0000
	22-11-12	23-11-12 13:12	0.0000	0.0000
	22-11-12	24-11-12 10:12	0.0000	0.0000
3.0	22-11-12	22-11-12 22:12	0.0700	-0.0100
	22-11-12	23-11-12 13:12	-0.3400	-0.2200
	22-11-12	24-11-12 10:12	-0.1200	-0.1800
6.0	22-11-12	22-11-12 22:12	0.0300	0.0100
	22-11-12	23-11-12 13:12	-0.0800	0.0100
	22-11-12	24-11-12 10:12	-0.0900	-0.0900
9.0	22-11-12	22-11-12 22:12	0.0000	-0.1100
	22-11-12	23-11-12 13:12	0.1000	-0.2000
	22-11-12	24-11-12 10:12	0.1100	-0.1900
12.0	22-11-12	22-11-12 22:12	-0.1100	-0.1200
	22-11-12	23-11-12 13:12	-0.4100	-0.3400
	22-11-12	24-11-12 10:12	-0.4300	-0.4300
15.0	22-11-12	22-11-12 22:12	0.0000	-0.0500
	22-11-12	23-11-12 13:12	0.2200	0.0400
	22-11-12	24-11-12 10:12	0.2300	0.0700
18.0	22-11-12	22-11-12 22:12	0.0000	0.0200
	22-11-12	23-11-12 13:12	0.0700	-0.0700
	22-11-12	24-11-12 10:12	0.1000	-0.1000
21.0	22-11-12	22-11-12 22:12	0.0300	0.0200
	22-11-12	23-11-12 13:12	0.0200	0.0500
	22-11-12	24-11-12 10:12	0.0500	0.1000
24.0	22-11-12	22-11-12 22:12	0.0500	-0.0100
	22-11-12	23-11-12 13:12	0.5200	-0.0200
	22-11-12	24-11-12 10:12	0.6600	-0.0400
27.0	22-11-12	22-11-12 22:12	0.0300	0.0000
	22-11-12	23-11-12 13:12	0.0100	0.0500
	22-11-12	24-11-12 10:12	0.0400	0.0200
30.0	22-11-12	22-11-12 22:12	0.0200	0.0100
	22-11-12	23-11-12 13:12	0.1700	0.0500
	22-11-12	24-11-12 10:12	0.1700	0.1000
33.0	22-11-12	22-11-12 22:12	-0.0500	0.0200
	22-11-12	23-11-12 13:12	0.0500	0.0400
	22-11-12	24-11-12 10:12	0.0500	0.0300

C305-IE07170



Depth (m)	Sensor Installation Date	Commissionning Reading Date	A (mm)	B (mm)
0.0	20-11-12	27-11-12 19:14	0.0000	0.0000
	20-11-12	28-11-12 13:14	0.0000	0.0000
	20-11-12	29-11-12 13:14	0.0000	0.0000
3.0	20-11-12	27-11-12 19:14	0.0600	-0.1300
	20-11-12	28-11-12 13:14	0.1300	-0.1700
	20-11-12	29-11-12 13:14	0.1900	-0.1600
6.0	20-11-12	27-11-12 19:14	-0.0400	0.0000
	20-11-12	28-11-12 13:14	0.0600	0.0700
	20-11-12	29-11-12 13:14	0.0700	0.1500
9.0	20-11-12	27-11-12 19:14	-0.1400	0.1700
	20-11-12	28-11-12 13:14	-0.0500	-0.0600
	20-11-12	29-11-12 13:14	-0.1100	-0.0700
12.0	20-11-12	27-11-12 19:14	-0.0700	-0.0300
	20-11-12	28-11-12 13:14	-0.0600	0.0300
	20-11-12	29-11-12 13:14	-0.0200	0.0600
15.0	20-11-12	27-11-12 19:14	-0.0700	0.0000
	20-11-12	28-11-12 13:14	-0.0300	0.0000
	20-11-12	29-11-12 13:14	0.0600	0.0000
18.0	20-11-12	27-11-12 19:14	-0.0300	-0.0600
	20-11-12	28-11-12 13:14	0.0300	-0.0200
	20-11-12	29-11-12 13:14	-0.0900	0.0400
21.0	20-11-12	27-11-12 19:14	-0.0500	0.0600
	20-11-12	28-11-12 13:14	0.0700	0.0000
	20-11-12	29-11-12 13:14	0.0200	0.0600
24.0	20-11-12	27-11-12 19:14	0.1400	0.0000
	20-11-12	28-11-12 13:14	-0.0800	0.0200
	20-11-12	29-11-12 13:14	-0.1100	-0.0100
27.0	20-11-12	27-11-12 19:14	-0.2100	-0.0600
	20-11-12	28-11-12 13:14	-0.2000	-0.0900
	20-11-12	29-11-12 13:14	-0.3800	-0.0300
30.0	20-11-12	27-11-12 19:14	-0.0800	0.0700
	20-11-12	28-11-12 13:14	0.0100	-0.0500
	20-11-12	29-11-12 13:14	-0.0800	0.0000
33.0	20-11-12	27-11-12 19:14	-0.0600	-0.0500
	20-11-12	28-11-12 13:14	0.0400	-0.0500
	20-11-12	29-11-12 13:14	-0.1200	-0.1000
36.0	20-11-12	27-11-12 19:14	-0.0300	-0.0400
	20-11-12	28-11-12 13:14	0.0300	-0.0800
	20-11-12	29-11-12 13:14	-0.0700	-0.0600
39.0	20-11-12	27-11-12 19:14	-0.0300	-0.0100
	20-11-12	28-11-12 13:14	-0.1000	0.0300
	20-11-12	29-11-12 13:14	-0.0700	-0.0100

C305-IE07190



Depth (m)	Sensor Installation Date	Commissionning Reading Date	A (mm)	B (mm)
0.0	19-11-12	27-11-12 19:14	0.0000	0.0000
	19-11-12	28-11-12 13:14	0.0000	0.0000
	19-11-12	29-11-12 13:14	0.0000	0.0000
3.0	19-11-12	27-11-12 19:14	0.2000	0.1600
	19-11-12	28-11-12 13:14	0.1400	0.1600
	19-11-12	29-11-12 13:14	0.1200	0.1600
6.0	19-11-12	27-11-12 19:14	0.0400	0.2200
	19-11-12	28-11-12 13:14	0.0200	0.2300
	19-11-12	29-11-12 13:14	0.0500	0.1700
9.0	19-11-12	27-11-12 19:14	0.2500	-0.1100
	19-11-12	28-11-12 13:14	0.2600	-0.0800
	19-11-12	29-11-12 13:14	0.2500	-0.1100
12.0	19-11-12	27-11-12 19:14	0.1400	0.1100
	19-11-12	28-11-12 13:14	0.1700	0.1400
	19-11-12	29-11-12 13:14	0.1100	0.0500
15.0	19-11-12	27-11-12 19:14	0.1300	0.0600
	19-11-12	28-11-12 13:14	0.1400	0.0100
	19-11-12	29-11-12 13:14	0.1300	-0.0500
18.0	19-11-12	27-11-12 19:14	0.2400	-0.0100
	19-11-12	28-11-12 13:14	0.2200	0.0000
	19-11-12	29-11-12 13:14	0.1100	0.0000
21.0	19-11-12	27-11-12 19:14	0.0800	0.0300
	19-11-12	28-11-12 13:14	0.0900	0.0400
	19-11-12	29-11-12 13:14	0.0900	-0.0500
24.0	19-11-12	27-11-12 19:14	0.2800	-0.0900
	19-11-12	28-11-12 13:14	0.2900	-0.1100
	19-11-12	29-11-12 13:14	0.3100	-0.1200
27.0	19-11-12	27-11-12 19:14	0.0400	0.0200
	19-11-12	28-11-12 13:14	0.0400	0.0300
	19-11-12	29-11-12 13:14	0.0400	0.0300
30.0	19-11-12	27-11-12 19:14	-0.1000	-0.0600
	19-11-12	28-11-12 13:14	-0.1100	-0.0200
	19-11-12	29-11-12 13:14	-0.1200	0.0000
33.0	19-11-12	27-11-12 19:14	-0.2000	-0.0400
	19-11-12	28-11-12 13:14	-0.1700	-0.0600
	19-11-12	29-11-12 13:14	-0.1500	-0.0500
36.0	19-11-12	27-11-12 19:14	0.0200	-0.1500
	19-11-12	28-11-12 13:14	0.0000	-0.1400
	19-11-12	29-11-12 13:14	0.0300	-0.1200
40.0	19-11-12	27-11-12 19:14	-0.0100	0.0100
	19-11-12	28-11-12 13:14	0.0100	0.0300
	19-11-12	29-11-12 13:14	0.0500	-0.0100

IRS Installation Record Sheets – 3D Prism										
Sensor Type	Sensor ID	Installation Date	Status	Sensor Location - GPS Reading			Commisioning Readings (m)			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Average	Eastings X (m)	Northings Y (m)	Elevation Z (mATD)
3D Prism	C305-RP07100	04-04-12	Installed	86105.973	36260.149	109.870	Average	86105.9725	36260.1488	109.8696
								86105.9722	36260.1482	109.8695
								86105.9729	36260.1489	109.8699
								86105.9724	36260.1493	109.8694
3D Prism	C305-RP07200	04-04-12	Installed	86114.930	36276.994	109.897	Average	86114.9300	36276.9938	109.8970
								86114.9305	36276.9943	109.8976
								86114.9299	36276.9937	109.8967
								86114.9296	36276.9934	109.8967
3D Prism	C305-RP07300	04-04-12	Installed	86118.1625	36285.5412	109.7628	Average	86118.1625	36285.5412	109.7628
								86118.1628	36285.5410	109.7626
								86118.1619	36285.5415	109.7629
								86118.1628	36285.5411	109.7629
3D Prism	C305-RP07400	04-04-12	Installed	86131.6578	36281.9897	109.8570	Average	86131.6578	36281.9897	109.8570
								86131.6581	36281.9901	109.8567
								86131.6576	36281.9895	109.8575
								86131.6577	36281.9895	109.8568
3D Prism	C305-RP07500	04-04-12	Installed	86126.6219	36268.7987	109.8464	Average	86126.6219	36268.7987	109.8464
								86126.6222	36268.7988	109.8462
								86126.6217	36268.7983	109.8470
								86126.6218	36268.7990	109.8460
3D Prism	C305-RP07600	04-04-12	Installed	86118.6088	36250.3462	109.8196	Average	86118.6088	36250.3462	109.8196
								86118.6090	36250.3467	109.8202
								86118.6087	36250.3456	109.8195
								86118.6087	36250.3463	109.8191
3D Prism	C305-RP07101	08-06-12	Installed	86105.2193	36258.2185	104.0217	Average	86105.2193	36258.2185	104.0217
								86105.2198	36258.2182	104.0221

IRS Installation Record Sheets – 3D Prism										
Sensor Type	Sensor ID	Installation Date	Status	Sensor Location - GPS Reading			Commisioning Readings (m)			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Average	Eastings X (m)	Northings Y (m)	Elevation Z (mATD)
								86105.2188	36258.2189	104.0215
								86105.2193	36258.2184	104.0215
3D Prism	C305-RP07201	06-07-12	Installed	86114.9111	36276.9608	104.0346	Average	86114.9111	36276.9608	104.0346
								86114.9110	36276.9606	104.0345
								86114.9114	36276.9614	104.0347
								86114.9109	36276.9604	104.0346
3D Prism	C305-RP07301	08-06-12	Installed	86118.6674	36286.7862	104.0561	Average	86118.6674	36286.7862	104.0561
								86118.6672	36286.7867	104.0559
								86118.6679	36286.7860	104.0562
								86118.6671	36286.7859	104.0562
3D Prism	C305-RP07401	08-06-12	Installed	86131.4708	36281.5587	104.0545	Average	86131.4708	36281.5587	104.0545
								86131.4705	36281.5589	104.0551
								86131.4710	36281.5582	104.0540
								86131.4709	36281.5590	104.0544
3D Prism	C305-RP07501	06-07-12	Installed	86127.3437	36270.7370	103.9680	Average	86127.3437	36270.7370	103.9680
								86127.3434	36270.7374	103.9684
								86127.3443	36270.7367	103.9676
								86127.3434	36270.7369	103.9680
3D Prism	C305-RP07601	08-06-12	Installed	86119.1013	36251.2898	104.0115	Average	86119.1013	36251.2898	104.0115
								86119.1008	36251.2902	104.0111
								86119.1016	36251.2896	104.0117
								86119.1015	36251.2896	104.0117
3D Prism	C305-RP07102	06-07-12	Installed	86105.4041	36258.7574	97.9028	Average	86105.4041	36258.7574	97.9028
								86105.4038	36258.7577	97.9034
								86105.4047	36258.7572	97.9025
								86105.4038	36258.7573	97.9025
3D Prism	C305-RP07202	06-07-12	Installed	86114.8977	36276.8440	97.8716	Average	86114.8977	36276.8440	97.8716
								86114.8982	36276.8442	97.8711

IRS Installation Record Sheets – 3D Prism										
Sensor Type	Sensor ID	Installation Date	Status	Sensor Location - GPS Reading			Commisioning Readings (m)			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Average	Eastings X (m)	Northings Y (m)	Elevation Z (mATD)
								86114.8976	36276.8435	97.8721
								86114.8973	36276.8443	97.8716
3D Prism	C305-RP07302	06-07-12	Installed	86118.5665	36286.5881	97.8845	Average	86118.5665	36286.5881	97.8845
								86118.5669	36286.5884	97.8839
								86118.5659	36286.5880	97.8849
								86118.5667	36286.5879	97.8847
3D Prism	C305-RP07402	06-07-12	Installed	86131.4024	36281.5169	97.8876	Average	86131.4024	36281.5169	97.8876
								86131.4018	36281.5171	97.8882
								86131.4026	36281.5165	97.8872
								86131.4028	36281.5171	97.8874
3D Prism	C305-RP07502	06-07-12	Installed	86127.2558	36270.6348	97.8952	Average	86127.2558	36270.6348	97.8952
								86127.2562	36270.6344	97.8954
								86127.2552	36270.6351	97.8947
								86127.2560	36270.6349	97.8955
3D Prism	C305-RP07602	06-07-12	Installed	86119.1768	36251.3116	97.8540	Average	86119.1768	36251.3116	97.8540
								86119.1766	36251.3119	97.8539
								86119.1769	36251.3112	97.8544
								86119.1769	36251.3117	97.8537
3D Prism	C305-RP07103	14-08-12	Installed	86105.6609	36259.5528	91.7125	Average	86105.6609	36259.5528	91.7125
								86105.6605	36259.5532	91.7127
								86105.6609	36259.5526	91.7124
								86105.6609	36259.5526	91.7124
3D Prism	C305-RP07203	14-08-12	Installed	86114.8946	36276.8465	91.7867	Average	86114.8946	36276.8465	91.7867
								86114.8945	36276.8459	91.7873
								86114.8948	36276.8470	91.7861
								86114.8945	36276.8466	91.7867
3D Prism	C305-RP07303	14-08-12	Installed	86121.5360	36294.2876	93.6847	Average	86121.5360	36294.2876	93.6847
								86121.5355	36294.2875	93.6844

IRS Installation Record Sheets – 3D Prism										
Sensor Type	Sensor ID	Installation Date	Status	Sensor Location - GPS Reading			Commisioning Readings (m)			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Average	Eastings X (m)	Northings Y (m)	Elevation Z (mATD)
								86121.5364	36294.2879	93.6852
								86121.5361	36294.2874	93.6845
3D Prism	C305-RP07403	14-08-12	Installed	86134.3206	36288.9303	93.6681	Average	86134.3206	36288.9303	93.6681
								86134.3207	36288.9307	93.6678
								86134.3201	36288.9301	93.6683
								86134.3210	36288.9301	93.6682
3D Prism	C305-RP07503	14-08-12	Installed	86127.9853	36272.2445	91.8296	Average	86127.9853	36272.2445	91.8296
								86127.9858	36272.2439	91.8300
								86127.9852	36272.2448	91.8292
								86127.9849	36272.2448	91.8296
3D Prism	C305-RP07603	14-08-12	Installed	86119.1773	36251.2816	91.9046	Average	86119.1773	36251.2816	91.9046
								86119.1769	36251.2812	91.9051
								86119.1775	36251.2819	91.9041
								86119.1769	36251.2817	91.9046
3D Prism	C305-RP07104	28-09-12	Installed	86106.9741	36263.2748	85.6024	Average	86106.9741	36263.2748	85.6024
								86106.9747	36263.2749	85.6028
								86106.9740	36263.2744	85.6021
								86106.9736	36263.2751	85.6023
3D Prism	C305-RP07204	28-09-12	Installed	86114.9074	36276.9052	85.6692	Average	86114.9074	36276.9052	85.6692
								86114.9077	36276.9047	85.6693
								86114.9070	36276.9057	85.6691
								86114.9075	36276.9052	85.6692
3D Prism	C305-RP07304	28-09-12	Installed	86127.7296	36271.7911	85.7206	Average	86127.7296	36271.7911	85.7206
								86127.7291	36271.7908	85.7202
								86127.7302	36271.7913	85.7212
								86127.7295	36271.7912	85.7204
3D Prism	C305-RP07404	28-09-12	Installed	86122.2626	36257.4294	85.6315	Average	86122.2626	36257.4294	85.6315
								86122.2622	36257.4288	85.6320

IRS Installation Record Sheets – 3D Prism										
Sensor Type	Sensor ID	Installation Date	Status	Sensor Location - GPS Reading			Commisioning Readings (m)			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Average	Eastings X (m)	Northings Y (m)	Elevation Z (mATD)
								86122.2630	36257.4296	85.6313
								86122.2626	36257.4298	85.6312

Notes: Coordinates and commissioning readings for instrument location (Easting, Northing and Elevation) are GPS readings. All elevations presented are metres above tunnel datum (mATD).

IRS Installation Record Sheets									
Sensor Type	Sensor ID	Location	Installation Date Casing	Installation Date sensor	Status	Location Sensor-GPS readings (m)			Depth borehole (m bgl)
						Eastings X	Northings Y	Elevation Z (mATD)	
Electronic Inclinometer	C305-IE07001	D-Wall	06-02-12	28-03-12	Installed	86109.0722	36241.3855	110.1523	48.2000
Electronic Inclinometer	C305-IE07002	D-Wall	07-02-12	28-03-12	Installed	86105.3249	36260.3648	110.1936	45.8700
Electronic Inclinometer	C305-IE07003	D-Wall	07-02-12	30-03-12	Installed	86111.2039	36275.4314	110.1550	48.1600
Electronic Inclinometer	C305-IE07004	D-Wall	06-02-12	29-03-12	Installed	86117.7608	36285.7489	110.2068	24.8000
Electronic Inclinometer	C305-IE07005	D-Wall	02-02-12	28-03-12	Installed	86130.8785	36298.8381	110.3065	48.2000
Electronic Inclinometer	C305-IE07006	D-Wall	02-02-12	28-03-12	Installed	86131.9474	36281.9354	110.2256	29.6500
Electronic Inclinometer	C305-IE07007	D-Wall	08-02-12	30-03-12	Installed	86127.2331	36268.5589	110.2455	48.2300
Electronic Inclinometer	C305-IE07008	D-Wall	08-02-12	30-03-12	Installed	86119.5248	36249.9048	110.1709	48.4100

Note: Depth is referred to meters below ground level. Coordinates for sensor location (Easting, Northing and Elevation) are GPS readings. All elevations presented are metres above tunnel datum (mATD).

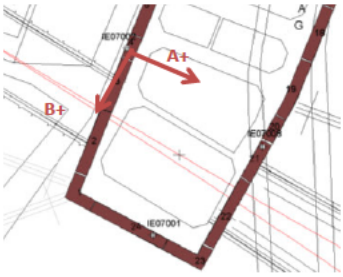
IRS Installation Record Sheets								
Sensor Type	Sensor ID	Location	Installation Date Casing	Status	Location Sensor-GPS readings (m)			Depth borehole (m bgl)
					Eastings X	Northings Y	Elevation Z (mATD)	
Manual Inclinometer	C305-IM07004	D-Wall	07-04-12	Installed	86115.1300	36286.5000	110.1680	44.5000

Note: Depth is referred to meters below ground level. Coordinates for sensor location (Easting, Northing and Elevation) are GPS readings. All elevations presented are metres above tunnel datum (mATD).

C305-IE07001

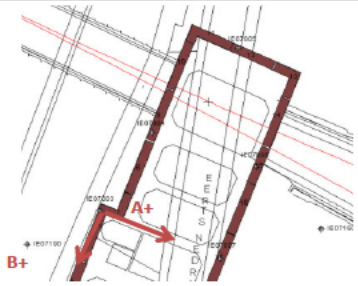
Depth (m)	Sensor Installation Date	Commissionning Reading Date	A (mm)	B (mm)
0.0	28-03-12	05-04-12 12:00	0.0000	0 0000
	28-03-12	06-04-12 12:00	0.0000	0 0000
	28-03-12	07-04-12 12:00	0.0000	0 0000
3.0	28-03-12	05-04-12 12:00	-0.0800	-0.0700
	28-03-12	06-04-12 12:00	0.1000	0 0100
	28-03-12	07-04-12 12:00	-0.0300	-0.0300
6.0	28-03-12	05-04-12 12:00	0.0000	0 0500
	28-03-12	06-04-12 12:00	0.1300	0 0200
	28-03-12	07-04-12 12:00	0.1100	0 0300
9.0	28-03-12	05-04-12 12:00	0.0800	0 0000
	28-03-12	06-04-12 12:00	0.1300	-0.0300
	28-03-12	07-04-12 12:00	0.0800	-0.0400
12.0	28-03-12	05-04-12 12:00	0.0300	-0.0200
	28-03-12	06-04-12 12:00	0.0900	0 0300
	28-03-12	07-04-12 12:00	0.0400	0 0200
15.0	28-03-12	05-04-12 12:00	0.0200	0 0200
	28-03-12	06-04-12 12:00	0.0300	-0.0100
	28-03-12	07-04-12 12:00	0.0400	-0.0100
18.0	28-03-12	05-04-12 12:00	-0.0700	0 0300
	28-03-12	06-04-12 12:00	0.0900	0 0000
	28-03-12	07-04-12 12:00	0.0200	0 0200
21.0	28-03-12	05-04-12 12:00	-0.0100	0 0000
	28-03-12	06-04-12 12:00	0.0400	0 0000
	28-03-12	07-04-12 12:00	0.0000	0 0000
24.0	28-03-12	05-04-12 12:00	0.1000	0 0500
	28-03-12	06-04-12 12:00	0.1500	-0.0200
	28-03-12	07-04-12 12:00	0.1500	0 0000
27.0	28-03-12	05-04-12 12:00	0.0200	-0.0100
	28-03-12	06-04-12 12:00	0.1600	-0.0200
	28-03-12	07-04-12 12:00	0.1000	-0.0100
30.0	28-03-12	05-04-12 12:00	0.1300	0 0100
	28-03-12	06-04-12 12:00	0.1500	0 0300
	28-03-12	07-04-12 12:00	0.1900	0 0600
33.0	28-03-12	05-04-12 12:00	0.0700	-0.0100
	28-03-12	06-04-12 12:00	0.1100	-0.0500
	28-03-12	07-04-12 12:00	0.1500	-0.0300
36.0	28-03-12	05-04-12 12:00	0.0000	0 0400
	28-03-12	06-04-12 12:00	-0.0300	0 0000
	28-03-12	07-04-12 12:00	0.0600	-0.0100
39.0	28-03-12	05-04-12 12:00	0.0100	0 0000
	28-03-12	06-04-12 12:00	0.0800	-0.0200
	28-03-12	07-04-12 12:00	0.1300	0 0200
42.0	28-03-12	05-04-12 12:00	0.0600	-0.0300
	28-03-12	06-04-12 12:00	0.0500	-0.0100
	28-03-12	07-04-12 12:00	0.0800	-0.0200

C305-IE07002



Depth (m)	Sensor Installation Date	Commissionning Reading Date	A (mm)	B (mm)
0.0	28-03-12	01-04-12 12 00	0.0000	0.0400
	28-03-12	02-04-12 12 00	0.0000	-0 0600
	28-03-12	03-04-12 12 00	-0.5800	0.0400
3.0	28-03-12	01-04-12 12 00	-0.0200	0.1200
	28-03-12	02-04-12 12 00	0.0400	0.2300
	28-03-12	03-04-12 12 00	0.0700	0.0800
6.0	28-03-12	01-04-12 12 00	0.0700	-0 0600
	28-03-12	02-04-12 12 00	0.0800	-0 0200
	28-03-12	03-04-12 12 00	0.0800	-0 0400
9.0	28-03-12	01-04-12 12 00	0.0100	0.0400
	28-03-12	02-04-12 12 00	-0.0100	-0 0400
	28-03-12	03-04-12 12 00	0.0300	-0 0400
12.0	28-03-12	01-04-12 12 00	0.3100	0.0100
	28-03-12	02-04-12 12 00	0.3800	-0 0200
	28-03-12	03-04-12 12 00	0.1100	-0 0600
15.0	28-03-12	01-04-12 12 00	0.0200	0.0200
	28-03-12	02-04-12 12 00	0.0800	0.0200
	28-03-12	03-04-12 12 00	0.0400	0.0000
18.0	28-03-12	01-04-12 12 00	0.0100	0.0200
	28-03-12	02-04-12 12 00	0.0200	-0 0100
	28-03-12	03-04-12 12 00	0.0700	0.0200
21.0	28-03-12	01-04-12 12 00	0.0300	0.0000
	28-03-12	02-04-12 12 00	0.0100	0.0400
	28-03-12	03-04-12 12 00	-0.0200	-0 0100
24.0	28-03-12	01-04-12 12 00	0.0200	-0 0100
	28-03-12	02-04-12 12 00	0.0600	0.0100
	28-03-12	03-04-12 12 00	-0.0100	-0 0100
27.0	28-03-12	01-04-12 12 00	-0.0300	-0 0400
	28-03-12	02-04-12 12 00	0.0200	0.0100
	28-03-12	03-04-12 12 00	0.0100	-0 0300
30.0	28-03-12	01-04-12 12 00	0.0100	0.0300
	28-03-12	02-04-12 12 00	0.0100	0.0000
	28-03-12	03-04-12 12 00	0.0200	-0 0100
33.0	28-03-12	01-04-12 12 00	0.0100	-0 0100
	28-03-12	02-04-12 12 00	0.0000	0.0100
	28-03-12	03-04-12 12 00	0.0200	0.0000
36.0	28-03-12	01-04-12 12 00	0.0000	0.0400
	28-03-12	02-04-12 12 00	0.0000	0.0000
	28-03-12	03-04-12 12 00	0.0000	0.0000
39.0	28-03-12	01-04-12 12 00	-0.0200	0.0000
	28-03-12	02-04-12 12 00	0.0100	0.0000
	28-03-12	03-04-12 12 00	0.0100	0.0300
42.0	28-03-12	01-04-12 12 00	0.0700	-0 0500
	28-03-12	02-04-12 12 00	0.0100	-0 0200
	28-03-12	03-04-12 12 00	-0.0100	0.0300

C305-IE07003

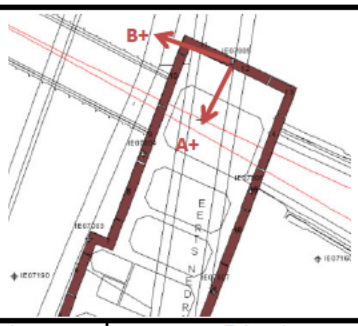


Depth (m)	Sensor Installation Date	Commissionning Reading Date	A (mm)	B (mm)
0.0	30-03-12	01-04-12 12 00	0.0100	NULL
	30-03-12	02-04-12 12 00	0.1200	NULL
	30-03-12	03-04-12 12 00	0.1000	NULL
3.0	30-03-12	01-04-12 12 00	-0.0500	-0.0300
	30-03-12	02-04-12 12 00	0.1100	0.0700
	30-03-12	03-04-12 12 00	0.1000	0.1100
6.0	30-03-12	01-04-12 12 00	-0.0900	-0.1700
	30-03-12	02-04-12 12 00	-0.0900	0.0100
	30-03-12	03-04-12 12 00	-0.0500	0.0700
9.0	30-03-12	01-04-12 12 00	0.0400	0.0500
	30-03-12	02-04-12 12 00	0.0100	0.1400
	30-03-12	03-04-12 12 00	0.0000	0.1700
12.0	30-03-12	01-04-12 12 00	0.0100	0.1600
	30-03-12	02-04-12 12 00	-0.1100	0.0900
	30-03-12	03-04-12 12 00	-0.0800	0.0100
15.0	30-03-12	01-04-12 12 00	0.0500	0.1000
	30-03-12	02-04-12 12 00	-0.0100	0.1400
	30-03-12	03-04-12 12 00	0.0000	0.1500
18.0	30-03-12	01-04-12 12 00	0.0300	-0.0200
	30-03-12	02-04-12 12 00	0.0100	0.0100
	30-03-12	03-04-12 12 00	-0.0600	0.1300
21.0	30-03-12	01-04-12 12 00	0.0500	0.0500
	30-03-12	02-04-12 12 00	0.0000	0.0800
	30-03-12	03-04-12 12 00	-0.0700	0.0300
24.0	30-03-12	01-04-12 12 00	0.0200	-0.0100
	30-03-12	02-04-12 12 00	-0.0100	-0.0200
	30-03-12	03-04-12 12 00	-0.0400	-0.0100
27.0	30-03-12	01-04-12 12 00	-0.0300	0.0300
	30-03-12	02-04-12 12 00	-0.0100	-0.0200
	30-03-12	03-04-12 12 00	0.0200	0.0100
30.0	30-03-12	01-04-12 12 00	0.0400	0.0100
	30-03-12	02-04-12 12 00	-0.0100	-0.0100
	30-03-12	03-04-12 12 00	-0.0600	-0.0400
33.0	30-03-12	01-04-12 12 00	-0.0100	0.0100
	30-03-12	02-04-12 12 00	0.0200	0.0000
	30-03-12	03-04-12 12 00	0.0300	0.0100
36.0	30-03-12	01-04-12 12 00	-0.0100	0.0200
	30-03-12	02-04-12 12 00	-0.0100	-0.0100
	30-03-12	03-04-12 12 00	-0.0300	0.0000
39.0	30-03-12	01-04-12 12 00	0.0400	NULL
	30-03-12	02-04-12 12 00	-0.0100	NULL
	30-03-12	03-04-12 12 00	0.0100	NULL
42.0	30-03-12	01-04-12 12 00	0.0200	-0.0300
	30-03-12	02-04-12 12 00	0.0000	-0.0100
	30-03-12	03-04-12 12 00	-0.0200	-0.0100

C305-IE07004

Depth (m)	Sensor Installation Date	Commissionning Reading Date	A (mm)	B (mm)
0.0	29-03-12	01-04-12 12:00	0.0300	0.0200
	29-03-12	02-04-12 12:00	0.1400	0.0400
	29-03-12	03-04-12 6:00	NULL	-0.0900
3.0	29-03-12	01-04-12 12:00	-0.1400	0.1100
	29-03-12	02-04-12 12:00	0.0700	-0.0100
	29-03-12	03-04-12 6:00	0.0300	0.0000
6.0	29-03-12	01-04-12 12:00	-0.1300	0.0300
	29-03-12	02-04-12 12:00	0.0300	-0.0300
	29-03-12	03-04-12 6:00	0.0000	0.0100
9.0	29-03-12	01-04-12 12:00	-0.0800	0.0100
	29-03-12	02-04-12 12:00	-0.0200	-0.0400
	29-03-12	03-04-12 6:00	0.0800	-0.0500
12.0	29-03-12	01-04-12 12:00	0.0300	-0.0100
	29-03-12	02-04-12 12:00	0.0100	0.0100
	29-03-12	03-04-12 6:00	-0.0100	-0.0200
15.0	29-03-12	01-04-12 12:00	NULL	-0.0100
	29-03-12	02-04-12 12:00	NULL	0.0400
	29-03-12	03-04-12 6:00	NULL	0.0000
18.0	29-03-12	01-04-12 12:00	0.0100	0.0400
	29-03-12	02-04-12 12:00	0.0000	-0.0100
	29-03-12	03-04-12 6:00	-0.0100	-0.0100
21.0	29-03-12	01-04-12 12:00	-0.0700	-0.0400
	29-03-12	02-04-12 12:00	0.0100	0.0200
	29-03-12	03-04-12 6:00	0.0000	-0.0100
24.0	29-03-12	01-04-12 12:00	0.0000	0.0000
	29-03-12	02-04-12 12:00	-0.0100	0.0000
	29-03-12	03-04-12 6:00	-0.0100	0.0000

C305-IE07005

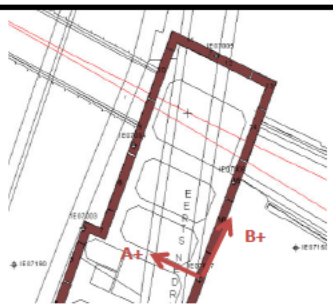


Depth (m)	Sensor Installation Date	Commissionning Reading Date	A (mm)	B (mm)
0.0	28-03-12	05-04-12 12:04	0.0300	-0.1900
	28-03-12	06-04-12 12:04	0.0900	-0.0300
	28-03-12	07-04-12 12:04	0.2100	-0.1400
3.0	28-03-12	05-04-12 12:04	0.0100	0.0200
	28-03-12	06-04-12 12:04	-0.2000	0.0900
	28-03-12	07-04-12 12:04	-0.0700	0.1400
6.0	28-03-12	05-04-12 12:04	-0.0100	0.0000
	28-03-12	06-04-12 12:04	0.0200	-0.0300
	28-03-12	07-04-12 12:04	-0.0300	-0.0300
9.0	28-03-12	05-04-12 12:04	-0.0100	-0.0900
	28-03-12	06-04-12 12:04	0.0300	-0.0700
	28-03-12	07-04-12 12:04	0.1100	-0.0100
12.0	28-03-12	05-04-12 12:04	0.0300	0.0300
	28-03-12	06-04-12 12:04	0.0000	-0.0100
	28-03-12	07-04-12 12:04	0.0700	-0.0900
15.0	28-03-12	05-04-12 12:04	-0.0100	0.0600
	28-03-12	06-04-12 12:04	0.0200	0.0700
	28-03-12	07-04-12 12:04	0.1000	0.1100
18.0	28-03-12	05-04-12 12:04	-0.0400	-0.0100
	28-03-12	06-04-12 12:04	0.0200	0.0100
	28-03-12	07-04-12 12:04	0.0500	-0.0300
21.0	28-03-12	05-04-12 12:04	-0.0400	-0.0200
	28-03-12	06-04-12 12:04	-0.0400	0.0100
	28-03-12	07-04-12 12:04	0.0400	-0.0300
24.0	28-03-12	05-04-12 12:04	-0.0100	-0.0400
	28-03-12	06-04-12 12:04	-0.0100	0.0200
	28-03-12	07-04-12 12:04	0.0300	-0.0600
27.0	28-03-12	05-04-12 12:04	0.0000	-0.0700
	28-03-12	06-04-12 12:04	0.0000	-0.0600
	28-03-12	07-04-12 12:04	0.0000	-0.0900
30.0	28-03-12	05-04-12 12:04	0.0200	-0.0600
	28-03-12	06-04-12 12:04	0.0300	-0.0100
	28-03-12	07-04-12 12:04	0.0400	-0.0600
33.0	28-03-12	05-04-12 12:04	-0.0300	-0.1000
	28-03-12	06-04-12 12:04	-0.0300	-0.0800
	28-03-12	07-04-12 12:04	0.0000	-0.1100
36.0	28-03-12	05-04-12 12:04	-0.0100	-0.0500
	28-03-12	06-04-12 12:04	0.0100	-0.0300
	28-03-12	07-04-12 12:04	0.0300	-0.0400
39.0	28-03-12	05-04-12 12:04	0.0000	-0.0600
	28-03-12	06-04-12 12:04	0.0000	-0.0500
	28-03-12	07-04-12 12:04	0.0000	-0.0900
42.0	28-03-12	05-04-12 12:04	-0.0100	0.0100
	28-03-12	06-04-12 12:04	0.0200	0.0100
	28-03-12	07-04-12 12:04	0.0000	0.0200

C305-IE07006

Depth (m)	Sensor Installation Date	Commissionning Reading Date	A (mm)	B (mm)
0.0	28-03-12	30-03-12 21:47	0.0000	0.0000
	28-03-12	31-03-12 12:47	0.0000	0.0000
	28-03-12	01-04-12 12:47	0.0000	0.0000
3.0	28-03-12	30-03-12 21:47	0.1500	0.0600
	28-03-12	31-03-12 12:47	0.2000	0.1100
	28-03-12	01-04-12 12:47	0.0700	-0.1200
6.0	28-03-12	30-03-12 21:47	0.1300	0.0900
	28-03-12	31-03-12 12:47	0.1800	0.0100
	28-03-12	01-04-12 12:47	0.0200	-0.0500
9.0	28-03-12	30-03-12 21:47	0.0000	0.0900
	28-03-12	31-03-12 12:47	0.0000	0.0900
	28-03-12	01-04-12 12:47	-0.0900	0.0300
12.0	28-03-12	30-03-12 21:47	-0.1400	-0.0600
	28-03-12	31-03-12 12:47	-0.0800	-0.0500
	28-03-12	01-04-12 12:47	-0.0200	-0.0500
15.0	28-03-12	30-03-12 21:47	0.1300	0.0400
	28-03-12	31-03-12 12:47	0.0700	0.0000
	28-03-12	01-04-12 12:47	0.0300	0.0100
18.0	28-03-12	30-03-12 21:47	0.0100	0.1300
	28-03-12	31-03-12 12:47	0.0100	0.1000
	28-03-12	01-04-12 12:47	0.0400	0.0000
21.0	28-03-12	30-03-12 21:47	0.0200	0.0700
	28-03-12	31-03-12 12:47	-0.0300	0.0600
	28-03-12	01-04-12 12:47	0.0000	0.0000
24.0	28-03-12	30-03-12 21:47	0.1500	0.1400
	28-03-12	31-03-12 12:47	0.1100	0.1000
	28-03-12	01-04-12 12:47	0.0300	0.0500
27.0	28-03-12	30-03-12 21:47	0.1100	-0.0200
	28-03-12	31-03-12 12:47	0.0700	-0.0200
	28-03-12	01-04-12 12:47	0.0100	-0.0100

C305-IE07007



Depth (m)	Sensor Installation Date	Commissionning Reading Date	A (mm)	B (mm)
0.0	30-03-12	31-03-12 23 04	0.0000	0.0000
	30-03-12	01-04-12 14 04	0.0000	0.0000
	30-03-12	02-04-12 14 04	0.0000	0.0000
3.0	30-03-12	31-03-12 23 04	-0.0800	0.0900
	30-03-12	01-04-12 14 04	0.1800	0.3400
	30-03-12	02-04-12 14 04	0.3000	0.2300
6.0	30-03-12	31-03-12 23 04	-0.0500	0.0400
	30-03-12	01-04-12 14 04	0.0000	-0.0300
	30-03-12	02-04-12 14 04	0.0400	-0.0400
9.0	30-03-12	31-03-12 23 04	0.0300	0.0300
	30-03-12	01-04-12 14 04	0.0000	0.0700
	30-03-12	02-04-12 14 04	0.0400	0.0500
12.0	30-03-12	31-03-12 23 04	-0.0600	0.0800
	30-03-12	01-04-12 14 04	-0.0100	-0.0300
	30-03-12	02-04-12 14 04	0.0700	-0.0500
15.0	30-03-12	31-03-12 23 04	0.0200	0.0300
	30-03-12	01-04-12 14 04	0.1600	0.0700
	30-03-12	02-04-12 14 04	0.2100	0.0300
18.0	30-03-12	31-03-12 23 04	0.0400	0.0600
	30-03-12	01-04-12 14 04	0.1400	-0.2400
	30-03-12	02-04-12 14 04	0.0700	-0.2900
21.0	30-03-12	31-03-12 23 04	-0.0600	0.0500
	30-03-12	01-04-12 14 04	-0.0200	0.1300
	30-03-12	02-04-12 14 04	-0.0100	0.1000
24.0	30-03-12	31-03-12 23 04	0.0700	0.0500
	30-03-12	01-04-12 14 04	0.1600	0.0200
	30-03-12	02-04-12 14 04	0.1200	0.0200
27.0	30-03-12	31-03-12 23 04	-0.0200	0.0600
	30-03-12	01-04-12 14 04	0.1100	0.0800
	30-03-12	02-04-12 14 04	0.1100	0.0000
30.0	30-03-12	31-03-12 23 04	0.0000	-0.0900
	30-03-12	01-04-12 14 04	0.0300	0.0000
	30-03-12	02-04-12 14 04	0.0900	0.0200
33.0	30-03-12	31-03-12 23 04	-0.1100	0.0500
	30-03-12	01-04-12 14 04	-0.0200	0.0500
	30-03-12	02-04-12 14 04	0.0500	0.0100
36.0	30-03-12	31-03-12 23 04	0.0600	0.0300
	30-03-12	01-04-12 14 04	0.0200	0.0000
	30-03-12	02-04-12 14 04	0.0200	0.0000
39.0	30-03-12	31-03-12 23 04	0.0700	0.0900
	30-03-12	01-04-12 14 04	0.0800	0.0700
	30-03-12	02-04-12 14 04	0.0300	0.0000
42.0	30-03-12	31-03-12 23 04	-0.1400	0.0100
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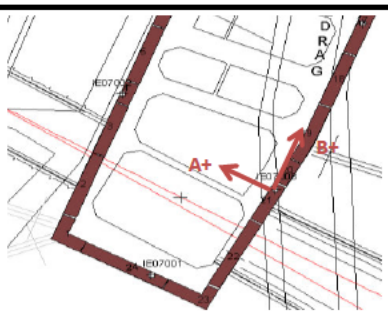
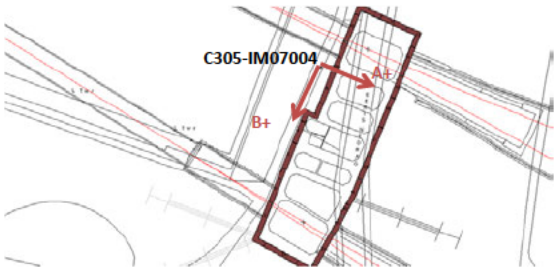
	30-03-12	02-04-12 14 04	0.0100	0.0000

C305-IE07008



Depth (m)	Sensor Installation Date	Commissionning Reading Date	A (mm)	B (mm)
0.0	30-03-12	04-04-12 12:00	0.0700	-0.5700
	30-03-12	05-04-12 12:00	-0.3500	-0.6400
	30-03-12	06-04-12 12:00	-0.0200	-0.5000
3.0	30-03-12	04-04-12 12:00	-0.0700	0.0400
	30-03-12	05-04-12 12:00	-0.0900	-0.0500
	30-03-12	06-04-12 12:00	0.0000	0.0500
6.0	30-03-12	04-04-12 12:00	0.1300	-0.0200
	30-03-12	05-04-12 12:00	0.1200	-0.0900
	30-03-12	06-04-12 12:00	0.2500	-0.1300
9.0	30-03-12	04-04-12 12:00	0.1600	0.0500
	30-03-12	05-04-12 12:00	0.0000	-0.0700
	30-03-12	06-04-12 12:00	0.1700	-0.0400
12.0	30-03-12	04-04-12 12:00	0.0600	0.0300
	30-03-12	05-04-12 12:00	0.0200	-0.0300
	30-03-12	06-04-12 12:00	0.0200	-0.0700
15.0	30-03-12	04-04-12 12:00	0.1000	-0.0300
	30-03-12	05-04-12 12:00	0.0100	-0.0400
	30-03-12	06-04-12 12:00	0.1200	-0.0800
18.0	30-03-12	04-04-12 12:00	0.0800	-0.0100
	30-03-12	05-04-12 12:00	-0.0200	0.0100
	30-03-12	06-04-12 12:00	0.0400	-0.0100
21.0	30-03-12	04-04-12 12:00	0.0600	0.0100
	30-03-12	05-04-12 12:00	0.0800	0.0200
	30-03-12	06-04-12 12:00	0.0700	-0.0100
24.0	30-03-12	04-04-12 12:00	0.0100	0.0500
	30-03-12	05-04-12 12:00	-0.0400	0.0500
	30-03-12	06-04-12 12:00	0.0200	0.1600
27.0	30-03-12	04-04-12 12:00	-0.0800	-0.0800
	30-03-12	05-04-12 12:00	-0.1900	-0.0600
	30-03-12	06-04-12 12:00	-0.1500	-0.0800
30.0	30-03-12	04-04-12 12:00	0.0700	0.0300
	30-03-12	05-04-12 12:00	0.0800	-0.0100
	30-03-12	06-04-12 12:00	0.0700	0.0400
33.0	30-03-12	04-04-12 12:00	0.0200	-0.0100
	30-03-12	05-04-12 12:00	-0.0400	-0.0600
	30-03-12	06-04-12 12:00	-0.0100	-0.0800
36.0	30-03-12	04-04-12 12:00	0.0600	-0.0100
	30-03-12	05-04-12 12:00	0.0600	-0.0100
	30-03-12	06-04-12 12:00	0.0800	-0.0500
39.0	30-03-12	04-04-12 12:00	-0.0100	0.0100
	30-03-12	05-04-12 12:00	-0.0200	-0.0800
	30-03-12	06-04-12 12:00	-0.0100	-0.0300
42.0	30-03-12	04-04-12 12:00	0.0200	-0.0100
	30-03-12	05-04-12 12:00	0.0400	0.0000
	30-03-12	06-04-12 12:00	0.0500	0.0000

C305-IM07004

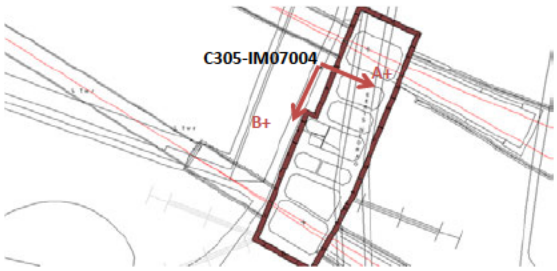


Serial number probe: 1032604

18-5-12 11:00

Depth (m)	A+	A-	B+	B-	A (mm)	B (mm)	Cumulative A (mm)	Cumulative B (mm)
0.5	-465	244	1021	-979	-8.863	25.000	63.787	1147.288
1	-326	106	995	-955	-5.400	24.375	72.650	1122.288
1.5	-77	-131	989	-946	0.675	24.188	78.050	1097.913
2	146	-365	993	-948	6.388	24.263	77.375	1073.725
2.5	125	-343	680	-611	5.850	16.138	70.987	1049.463
3	-100	-92	-73	117	-0.100	-2.375	65.137	1033.325
3.5	-208	-4	-163	208	-2.550	-4.638	65.237	1035.700
4	-338	128	-212	252	-5.825	-5.800	67.787	1040.338
4.5	-423	213	-212	255	-7.950	-5.838	73.612	1046.138
5	-507	291	-166	212	-9.975	-4.725	81.562	1051.975
5.5	-551	332	-167	217	-11.038	-4.800	91.537	1056.700
6	-483	275	-308	342	-9.475	-8.125	102.575	1061.500
6.5	-282	67	-136	172	-4.363	-3.850	112.050	1069.625
7	44	-256	93	-59	3.750	1.900	116.413	1073.475
7.5	251	-468	328	-293	8.988	7.763	112.663	1071.575
8	354	-566	576	-531	11.500	13.838	103.675	1063.813
8.5	189	-402	787	-747	7.388	19.175	92.175	1049.975
9	-82	-126	1014	-974	0.550	24.850	84.787	1030.800
9.5	-159	-50	1074	-1032	-1.363	26.325	84.237	1005.950
10	-198	-22	1126	-1083	-2.200	27.613	85.600	979.625
10.5	-312	99	1141	-1097	-5.138	27.975	87.800	952.013
11	-457	245	1185	-1142	-8.775	29.088	92.937	924.038
11.5	-365	148	1312	-1271	-6.413	32.288	101.713	894.950
12	13	-235	1131	-1071	3.100	27.525	108.125	862.663
12.5	168	-380	698	-649	6.850	16.838	105.025	835.138
13	193	-404	450	-401	7.463	10.638	98.175	818.300
13.5	144	-357	219	-178	6.263	4.963	90.712	807.663
14	108	-324	67	-11	5.400	0.975	84.450	802.700
14.5	244	-455	18	58	8.738	-0.500	79.050	801.725
15	72	-284	48	28	4.450	0.250	70.312	802.225
15.5	-280	64	162	-112	-4.300	3.425	65.862	801.975
16	-453	249	284	-240	-8.775	6.550	70.162	798.550
16.5	-517	303	365	-318	-10.250	8.538	78.937	792.000
17	-572	370	388	-334	-11.775	9.025	89.187	783.463
17.5	-730	522	327	-262	-15.650	7.363	100.963	774.438
18	-703	492	267	-224	-14.938	6.138	116.613	767.075
18.5	-595	369	387	-359	-12.050	9.325	131.550	760.938
19	-519	319	549	-514	-10.475	13.288	143.600	751.613
19.5	-446	221	697	-655	-8.338	16.900	154.075	738.325
20	-337	134	815	-780	-5.888	19.938	162.413	721.425
20.5	-111	-91	906	-849	-0.250	21.938	168.300	701.488
21	98	-310	950	-914	5.100	23.300	168.550	679.550
21.5	34	-244	1019	-978	3.475	24.963	163.450	656.250
22	-66	-142	1073	-1029	0.950	26.275	159.975	631.288
22.5	-58	-144	1155	-1111	1.075	28.325	159.025	605.013
23	-45	-172	1227	-1189	1.588	30.200	157.950	576.688
23.5	141	-365	1196	-1157	6.325	29.413	156.363	546.488
24	477	-685	951	-897	14.525	23.100	150.038	517.075
24.5	545	-758	602	-552	16.288	14.425	135.513	493.975
25	555	-765	271	-223	16.500	6.175	119.225	479.550
25.5	541	-758	-31	81	16.238	-1.400	102.725	473.375
26	576	-791	-174	218	17.088	-4.900	86.488	474.775
26.5	578	-782	-268	317	17.000	-7.313	69.400	479.675
27	384	-588	41	27	12.150	0.175	52.400	486.988

C305-IM07004

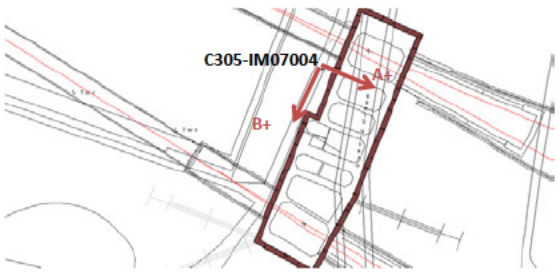


Serial number probe: 1032604

18-5-12 11:00

Depth (m)	A+	A-	B+	B-	A (mm)	B (mm)	Cumulative A (mm)	Cumulative B (mm)
27.5	172	-393	372	-324	7.063	8.700	40.250	486.813
28	-44	-167	561	-530	1.538	13.638	33.188	478.113
28.5	-244	47	748	-709	-3.638	18.213	31.650	464.475
29	-424	202	1074	-1033	-7.825	26.338	35.288	446.263
29.5	-433	224	1402	-1355	-8.213	34.463	43.113	419.925
30	-396	179	1383	-1333	-7.188	33.950	51.325	385.463
30.5	-441	226	1075	-1019	-8.338	26.175	58.513	351.513
31	-423	220	704	-646	-8.038	16.875	66.850	325.338
31.5	-396	182	394	-339	-7.225	9.163	74.888	308.463
32	-348	137	155	-108	-6.063	3.288	82.113	299.300
32.5	-368	154	133	-90	-6.525	2.788	88.175	296.013
33	-248	42	302	-253	-3.625	6.938	94.700	293.225
33.5	-91	-121	401	-357	0.375	9.475	98.325	286.288
34	211	-422	444	-399	7.913	10.538	97.950	276.813
34.5	555	-764	594	-546	16.488	14.250	90.038	266.275
35	779	-998	511	-465	22.213	12.200	73.550	252.025
35.5	793	-996	279	-224	22.363	6.288	51.338	239.825
36	498	-712	118	-74	15.125	2.400	28.975	233.538
36.5	234	-444	237	-188	8.475	5.313	13.850	231.138
37	-7	-206	310	-265	2.488	7.188	5.375	225.825
37.5	-189	-20	379	-331	-2.113	8.875	2.888	218.638
38	-256	43	381	-333	-3.738	8.925	5.000	209.763
38.5	-288	80	164	-104	-4.600	3.350	8.738	200.838
39	-299	87	100	-65	-4.825	2.063	13.338	197.488
39.5	-200	-14	495	-459	-2.325	11.925	18.163	195.425
40	52	-255	493	-448	3.838	11.763	20.488	183.500
40.5	266	-485	594	-552	9.388	14.325	16.650	171.738
41	491	-696	860	-825	14.838	21.063	7.263	157.413
41.5	601	-804	874	-839	17.563	21.413	-7.575	136.350
42	108	-328	901	-847	5.450	21.850	-25.138	114.938
42.5	-291	78	957	-908	-4.613	23.313	-30.588	93.088
43	-406	188	1076	-1028	-7.425	26.300	-25.975	69.775
43.5	-443	224	925	-875	-8.338	22.500	-18.550	43.475
44	-514	303	863	-815	-10.213	20.975	-10.213	20.975
Reference Point (44.5m)							0.000	0.000

C305-IM07004

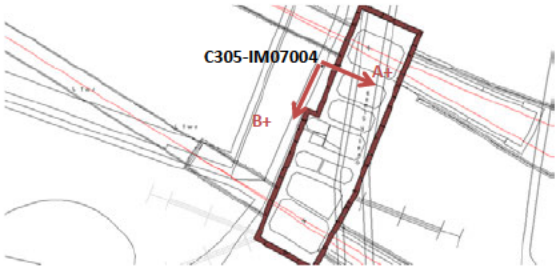


Serial number probe: 1035333

17-5-12 11:00

Depth (m)	A+	A-	B+	B-	A (mm)	B (mm)	Cumulative A (mm)	Cumulative B (mm)
0.5	-645	77	1185	-828	-9.025	25.163	47.663	1158.275
1	-503	-57	1160	-802	-5.575	24.525	56.688	1133.113
1.5	-253	-286	1150	-795	0.413	24.313	62.263	1108.588
2	-36	-528	1157	-796	6.150	24.413	61.850	1084.275
2.5	-52	-507	843	-452	5.688	16.188	55.700	1059.863
3	-285	-257	91	265	-0.350	-2.175	50.013	1043.675
3.5	-383	-171	6	363	-2.650	-4.463	50.363	1045.850
4	-519	-29	-46	404	-6.125	-5.625	53.013	1050.313
4.5	-600	48	-43	405	-8.100	-5.600	59.138	1055.938
5	-690	127	-3	361	-10.213	-4.550	67.238	1061.538
5.5	-730	165	-1	366	-11.188	-4.588	77.450	1066.088
6	-657	112	-140	501	-9.613	-8.013	88.638	1070.675
6.5	-466	-91	26	332	-4.688	-3.825	98.250	1078.688
7	-137	-429	260	101	3.650	1.988	102.938	1082.513
7.5	72	-636	487	-143	8.850	7.875	99.288	1080.525
8	170	-730	744	-378	11.250	14.025	90.438	1072.650
8.5	9	-574	953	-587	7.288	19.250	79.188	1058.625
9	-256	-299	1171	-822	0.538	24.913	71.900	1039.375
9.5	-340	-221	1237	-878	-1.488	26.438	71.363	1014.463
10	-378	-186	1293	-923	-2.400	27.700	72.850	988.025
10.5	-493	-57	1307	-941	-5.450	28.100	75.250	960.325
11	-638	75	1345	-988	-8.913	29.163	80.700	932.225
11.5	-540	-20	1476	-1122	-6.500	32.475	89.613	903.063
12	-167	-398	1298	-924	2.888	27.775	96.113	870.588
12.5	-14	-543	865	-490	6.613	16.938	93.225	842.813
13	11	-560	613	-254	7.138	10.838	86.613	825.875
13.5	-36	-519	381	-29	6.038	5.125	79.475	815.038
14	-71	-485	234	141	5.175	1.163	73.438	809.913
14.5	66	-621	175	208	8.588	-0.413	68.263	808.750
15	-106	-452	208	189	4.325	0.238	59.675	809.163
15.5	-457	-105	323	35	-4.400	3.600	55.350	808.925
16	-635	78	447	-93	-8.913	6.750	59.750	805.325
16.5	-701	143	532	-161	-10.550	8.663	68.663	798.575
17	-756	209	553	-182	-12.063	9.188	79.213	789.913
17.5	-912	367	492	-104	-15.988	7.450	91.275	780.725
18	-877	323	427	-69	-15.000	6.200	107.263	773.275
18.5	-773	213	552	-200	-12.325	9.400	122.263	767.075
19	-703	162	706	-353	-10.813	13.238	134.588	757.675
19.5	-630	51	861	-506	-8.513	17.088	145.400	744.438
20	-522	-28	984	-625	-6.175	20.113	153.913	727.350
20.5	-291	-251	1071	-696	-0.500	22.088	160.088	707.238
21	-78	-480	1107	-761	5.025	23.350	160.588	685.150
21.5	-142	-416	1186	-819	3.425	25.063	155.563	661.800
22	-244	-310	1231	-870	0.825	26.263	152.138	636.738
22.5	-237	-300	1316	-961	0.788	28.463	151.313	610.475
23	-228	-341	1389	-1041	1.413	30.375	150.525	582.013
23.5	-33	-520	1363	-997	6.088	29.500	149.113	551.638
24	294	-854	1120	-740	14.350	23.250	143.025	522.138
24.5	369	-926	765	-400	16.188	14.563	128.675	498.888
25	370	-931	436	-68	16.263	6.300	112.488	484.325
25.5	357	-921	130	238	15.975	-1.350	96.225	478.025
26	401	-952	-9	378	16.913	-4.838	80.250	479.375
26.5	402	-946	-104	476	16.850	-7.250	63.338	484.213
27	201	-750	204	182	11.888	0.275	46.488	491.463

C305-IM07004

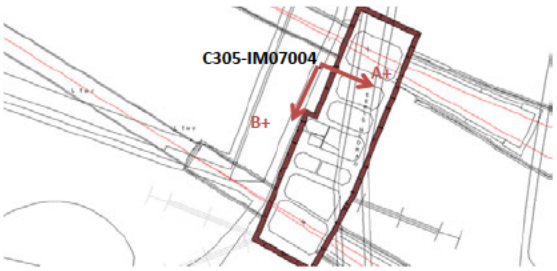


Serial number probe: 1035333

17-5-12 11:00

Depth (m)	A+	A-	B+	B-	A (mm)	B (mm)	Cumulative A (mm)	Cumulative B (mm)
27.5	-4	-560	538	-177	6.950	8.938	34.600	491.188
28	-221	-327	730	-373	1.325	13.788	27.650	482.250
28.5	-427	-113	917	-550	-3.925	18.338	26.325	468.463
29	-599	47	1232	-886	-8.075	26.475	30.250	450.125
29.5	-612	69	1563	-1204	-8.513	34.588	38.325	423.650
30	-574	6	1549	-1175	-7.250	34.050	46.838	389.063
30.5	-619	55	1236	-868	-8.425	26.300	54.088	355.013
31	-598	47	870	-490	-8.063	17.000	62.513	328.713
31.5	-570	9	552	-190	-7.238	9.275	70.575	311.713
32	-527	-29	320	44	-6.225	3.450	77.813	302.438
32.5	-542	-17	293	65	-6.563	2.850	84.038	298.988
33	-428	-119	462	-98	-3.863	7.000	90.600	296.138
33.5	-274	-290	563	-206	0.200	9.613	94.463	289.138
34	35	-587	612	-247	7.775	10.738	94.263	279.525
34.5	380	-933	761	-399	16.413	14.500	86.488	268.788
35	601	-1169	679	-317	22.125	12.450	70.075	254.288
35.5	615	-1166	440	-63	22.263	6.288	47.950	241.838
36	324	-879	276	82	15.038	2.425	25.688	235.550
36.5	59	-599	403	-34	8.225	5.463	10.650	233.125
37	-182	-364	476	-111	2.275	7.338	2.425	227.663
37.5	-364	-185	547	-180	-2.238	9.088	0.150	220.325
38	-437	-112	544	-181	-4.063	9.063	2.388	211.238
38.5	-462	-89	331	48	-4.663	3.538	6.450	202.175
39	-483	-69	269	96	-5.175	2.163	11.113	198.638
39.5	-376	-174	662	-304	-2.525	12.075	16.288	196.475
40	-134	-425	655	-297	3.638	11.900	18.813	184.400
40.5	89	-648	751	-395	9.213	14.325	15.175	172.500
41	316	-853	1026	-669	14.613	21.188	5.963	158.175
41.5	415	-968	1035	-691	17.288	21.575	-8.650	136.988
42	-66	-499	1066	-693	5.413	21.988	-25.938	115.413
42.5	-468	-87	1122	-750	-4.763	23.400	-31.350	93.425
43	-591	19	1240	-875	-7.625	26.438	-26.588	70.025
43.5	-619	51	1085	-724	-8.375	22.613	-18.963	43.588
44	-699	148	1021	-657	-10.588	20.975	-10.588	20.975
Reference Point (44.5m)							0.000	0.000

C305-IM07004



Serial number probe: 1032604

18-5-12 13:54

Depth (m)	A+	A-	B+	B-	A (mm)	B (mm)	Cumulative A (mm)	Cumulative B (mm)
0.5	-492	208	1031	-975	-8.750	25.075	56.775	1147.525
1	-370	76	1002	-950	-5.575	24.400	65.525	1122.450
1.5	-132	-161	994	-945	0.363	24.238	71.100	1098.050
2	100	-396	1002	-944	6.200	24.325	70.738	1073.813
2.5	79	-374	681	-609	5.663	16.125	64.538	1049.488
3	-164	-142	-67	123	-0.275	-2.375	58.875	1033.363
3.5	-247	-35	-160	221	-2.650	-4.763	59.150	1035.738
4	-380	95	-204	255	-5.938	-5.738	61.800	1040.500
4.5	-464	183	-210	262	-8.088	-5.900	67.738	1046.238
5	-545	258	-161	216	-10.038	-4.713	75.825	1052.138
5.5	-592	302	-159	220	-11.175	-4.738	85.863	1056.850
6	-523	243	-296	349	-9.575	-8.063	97.038	1061.588
6.5	-324	38	-127	178	-4.525	-3.813	106.613	1069.650
7	3	-291	103	-55	3.675	1.975	111.138	1073.463
7.5	212	-501	333	-288	8.913	7.763	107.463	1071.488
8	315	-602	578	-527	11.463	13.813	98.550	1063.725
8.5	156	-441	792	-745	7.463	19.213	87.088	1049.913
9	-140	-165	1018	-968	0.313	24.825	79.625	1030.700
9.5	-204	-88	1083	-1023	-1.450	26.325	79.313	1005.875
10	-238	-55	1131	-1074	-2.288	27.563	80.763	979.550
10.5	-351	63	1148	-1093	-5.175	28.013	83.050	951.988
11	-494	210	1191	-1139	-8.800	29.125	88.225	923.975
11.5	-405	117	1312	-1261	-6.525	32.163	97.025	894.850
12	-31	-268	1113	-1074	2.963	27.338	103.550	862.688
12.5	133	-417	704	-643	6.875	16.838	100.588	835.350
13	156	-442	454	-407	7.475	10.763	93.713	818.513
13.5	109	-396	223	-168	6.313	4.888	86.238	807.750
14	72	-360	69	-13	5.400	1.025	79.925	802.863
14.5	207	-495	15	52	8.775	-0.463	74.525	801.838
15	33	-324	50	36	4.463	0.175	65.750	802.300
15.5	-320	26	171	-106	-4.325	3.463	61.288	802.125
16	-493	215	287	-237	-8.850	6.550	65.613	798.663
16.5	-559	265	365	-314	-10.300	8.488	74.463	792.113
17	-613	334	392	-338	-11.838	9.125	84.763	783.625
17.5	-773	483	328	-258	-15.700	7.325	96.600	774.500
18	-741	456	288	-230	-14.963	6.475	112.300	767.175
18.5	-636	331	400	-355	-12.088	9.438	127.263	760.700
19	-557	281	551	-513	-10.475	13.300	139.350	751.263
19.5	-487	185	707	-655	-8.400	17.025	149.825	737.963
20	-376	95	819	-772	-5.888	19.888	158.225	720.938
20.5	-177	-148	907	-844	-0.363	21.888	164.113	701.050
21	56	-349	964	-908	5.063	23.400	164.475	679.163
21.5	-9	-285	1030	-977	3.450	25.088	159.413	655.763
22	-111	-186	1084	-1029	0.938	26.413	155.963	630.675
22.5	-101	-185	1162	-1110	1.050	28.400	155.025	604.263
23	-83	-209	1237	-1182	1.575	30.238	153.975	575.863
23.5	103	-404	1196	-1157	6.338	29.413	152.400	545.625
24	434	-725	955	-890	14.488	23.063	146.063	516.213
24.5	501	-795	604	-550	16.200	14.425	131.575	493.150
25	512	-800	275	-220	16.400	6.188	115.375	478.725
25.5	498	-794	-29	88	16.150	-1.463	98.975	472.538
26	534	-828	-171	220	17.025	-4.888	82.825	474.000
26.5	535	-819	-264	328	16.925	-7.400	65.800	478.888
27	343	-627	48	38	12.125	0.125	48.875	486.288

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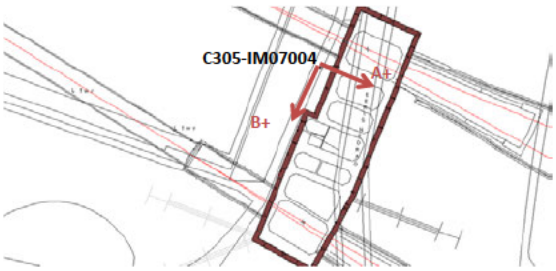


Serial number probe: 1032604

18-5-12 13:54

Depth (m)	A+	A-	B+	B-	A (mm)	B (mm)	Cumulative A (mm)	Cumulative B (mm)
27.5	128	-429	368	-320	6.963	8.600	36.750	486.163
28	-89	-204	563	-522	1.438	13.563	29.788	477.563
28.5	-283	13	742	-701	-3.700	18.038	28.350	464.000
29	-467	172	1074	-1020	-7.988	26.175	32.050	445.963
29.5	-472	187	1405	-1352	-8.238	34.463	40.038	419.788
30	-441	145	1384	-1327	-7.325	33.888	48.275	385.325
30.5	-485	189	1076	-1016	-8.425	26.150	55.600	351.438
31	-466	183	702	-646	-8.113	16.850	64.025	325.288
31.5	-439	145	395	-335	-7.300	9.125	72.138	308.438
32	-391	102	157	-112	-6.163	3.363	79.438	299.313
32.5	-411	116	135	-86	-6.588	2.763	85.600	295.950
33	-290	5	308	-257	-3.688	7.063	92.188	293.188
33.5	-154	-164	406	-358	0.125	9.550	95.875	286.125
34	169	-461	449	-398	7.875	10.588	95.750	276.575
34.5	513	-805	599	-545	16.475	14.300	87.875	265.988
35	735	-1037	512	-457	22.150	12.113	71.400	251.688
35.5	747	-1031	274	-216	22.225	6.125	49.250	239.575
36	453	-746	123	-69	14.988	2.400	27.025	233.450
36.5	189	-483	237	-193	8.400	5.375	12.038	231.050
37	-52	-243	316	-266	2.388	7.275	3.638	225.675
37.5	-236	-57	382	-333	-2.238	8.938	1.250	218.400
38	-301	3	377	-329	-3.800	8.825	3.488	209.463
38.5	-335	43	160	-101	-4.725	3.263	7.288	200.638
39	-349	47	119	-72	-4.950	2.388	12.013	197.375
39.5	-244	-52	501	-455	-2.400	11.950	16.963	194.988
40	7	-299	492	-445	3.825	11.713	19.363	183.038
40.5	226	-526	590	-555	9.400	14.313	15.538	171.325
41	448	-737	853	-830	14.813	21.038	6.138	157.013
41.5	551	-843	869	-831	17.425	21.250	-8.675	135.975
42	48	-358	904	-841	5.075	21.813	-26.100	114.725
42.5	-339	40	957	-911	-4.738	23.350	-31.175	92.913
43	-457	151	1070	-1026	-7.600	26.200	-26.438	69.563
43.5	-491	184	921	-867	-8.438	22.350	-18.838	43.363
44	-564	268	863	-818	-10.400	21.013	-10.400	21.013
Reference Point (44.5m)							0.000	0.000

C305-IM07004

Serial number probe: 1035333

17-5-12 13:00

Depth (m)	A+	A-	B+	B-	A (mm)	B (mm)	Cumulative A (mm)	Cumulative B (mm)
0.5	-672	42	1199	-820	-8.925	25.238	39.525	1158.600
1	-547	-91	1169	-804	-5.700	24.663	48.450	1133.363
1.5	-307	-322	1150	-793	0.188	24.288	54.150	1108.700
2	-79	-554	1173	-782	5.938	24.438	53.963	1084.413
2.5	-98	-542	841	-449	5.550	16.125	48.025	1059.975
3	-346	-310	88	285	-0.450	-2.463	42.475	1043.850
3.5	-430	-205	0	369	-2.813	-4.613	42.925	1046.313
4	-565	-68	-35	416	-6.213	-5.638	45.738	1050.925
4.5	-648	22	-42	417	-8.375	-5.738	51.950	1056.563
5	-725	99	5	374	-10.300	-4.613	60.325	1062.300
5.5	-774	132	3	372	-11.325	-4.613	70.625	1066.913
6	-700	76	-135	495	-9.700	-7.875	81.950	1071.525
6.5	-506	-126	42	337	-4.750	-3.688	91.650	1079.400
7	-180	-456	271	104	3.450	2.088	96.400	1083.088
7.5	36	-663	496	-144	8.738	8.000	92.950	1081.000
8	139	-761	735	-372	11.250	13.838	84.213	1073.000
8.5	-24	-610	961	-595	7.325	19.450	72.963	1059.163
9	-316	-327	1184	-809	0.138	24.913	65.638	1039.713
9.5	-384	-250	1241	-865	-1.675	26.325	65.500	1014.800
10	-422	-223	1291	-927	-2.488	27.725	67.175	988.475
10.5	-529	-105	1305	-942	-5.300	28.088	69.663	960.750
11	-672	44	1355	-986	-8.950	29.263	74.963	932.663
11.5	-586	-48	1479	-1110	-6.725	32.363	83.913	903.400
12	-214	-432	1274	-925	2.725	27.488	90.638	871.038
12.5	-45	-588	867	-490	6.788	16.963	87.913	843.550
13	-22	-605	621	-250	7.288	10.888	81.125	826.588
13.5	-69	-556	380	-11	6.088	4.888	73.838	815.700
14	-110	-519	239	138	5.113	1.263	67.750	810.813
14.5	27	-658	171	205	8.563	-0.425	62.638	809.550
15	-145	-488	216	183	4.288	0.413	54.075	809.975
15.5	-504	-145	336	39	-4.488	3.713	49.788	809.563
16	-668	53	448	-88	-9.013	6.700	54.275	805.850
16.5	-741	97	533	-159	-10.475	8.650	63.288	799.150
17	-796	165	551	-186	-12.013	9.213	73.763	790.500
17.5	-953	325	493	-113	-15.975	7.575	85.775	781.288
18	-918	287	447	-74	-15.063	6.513	101.750	773.713
18.5	-819	164	570	-205	-12.288	9.688	116.813	767.200
19	-738	110	722	-363	-10.600	13.563	129.100	757.513
19.5	-663	16	864	-508	-8.488	17.150	139.700	743.950
20	-560	-66	990	-619	-6.175	20.113	148.188	726.800
20.5	-362	-318	1076	-698	-0.550	22.175	154.363	706.688
21	-126	-507	1123	-757	4.763	23.500	154.913	684.513
21.5	-184	-443	1194	-828	3.238	25.275	150.150	661.013
22	-289	-356	1250	-876	0.838	26.575	146.913	635.738
22.5	-282	-352	1327	-961	0.875	28.600	146.075	609.163
23	-268	-369	1393	-1035	1.263	30.350	145.200	580.563
23.5	-79	-575	1352	-997	6.200	29.363	143.938	550.213
24	257	-895	1123	-741	14.400	23.300	137.738	520.850
24.5	321	-954	774	-397	15.938	14.638	123.338	497.550
25	334	-964	446	-63	16.225	6.363	107.400	482.913
25.5	322	-953	133	246	15.938	-1.413	91.175	476.550
26	354	-989	-12	378	16.788	-4.875	75.238	477.963
26.5	355	-980	-103	480	16.688	-7.288	58.450	482.838
27	165	-789	207	197	11.925	0.125	41.763	490.125

C305-IM07004

Serial number probe: 1035333

17-5-12 13:00

Depth (m)	A+	A-	B+	B-	A (mm)	B (mm)	Cumulative A (mm)	Cumulative B (mm)
27.5	-54	-589	530	-175	6.688	8.813	29.838	490.000
28	-268	-363	726	-370	1.188	13.700	23.150	481.188
28.5	-460	-155	899	-548	-3.813	18.088	21.963	467.488
29	-649	14	1243	-862	-8.288	26.313	25.775	449.400
29.5	-650	25	1575	-1200	-8.438	34.688	34.063	423.088
30	-616	-17	1552	-1166	-7.488	33.975	42.500	388.400
30.5	-664	29	1243	-854	-8.663	26.213	49.988	354.425
31	-650	19	861	-484	-8.363	16.813	58.650	328.213
31.5	-614	-24	553	-185	-7.375	9.225	67.013	311.400
32	-573	-63	326	46	-6.375	3.500	74.388	302.175
32.5	-586	-43	292	59	-6.788	2.913	80.763	298.675
33	-472	-155	469	-97	-3.963	7.075	87.550	295.763
33.5	-336	-330	561	-209	-0.075	9.625	91.513	288.688
34	-13	-624	606	-247	7.638	10.663	91.588	279.063
34.5	337	-965	759	-384	16.275	14.288	83.950	268.400
35	553	-1200	682	-308	21.913	12.375	67.675	254.113
35.5	569	-1200	440	-67	22.113	6.338	45.763	241.738
36	273	-908	292	77	14.763	2.688	23.650	235.400
36.5	13	-650	398	-31	8.288	5.363	8.888	232.713
37	-230	-410	477	-109	2.250	7.325	0.600	227.350
37.5	-418	-218	553	-180	-2.500	9.163	-1.650	220.025
38	-477	-163	547	-175	-3.925	9.025	0.850	210.863
38.5	-510	-125	324	54	-4.813	3.375	4.775	201.838
39	-533	-117	277	72	-5.200	2.563	9.588	198.463
39.5	-422	-210	656	-303	-2.650	11.988	14.788	195.900
40	-178	-459	658	-300	3.513	11.975	17.438	183.913
40.5	46	-696	748	-401	9.275	14.363	13.925	171.938
41	265	-908	1012	-668	14.663	21.000	4.650	157.575
41.5	372	-1002	1040	-675	17.175	21.438	-10.013	136.575
42	-133	-516	1072	-680	4.788	21.900	-27.188	115.138
42.5	-523	-130	1119	-752	-4.913	23.388	-31.975	93.238
43	-633	-15	1226	-882	-7.725	26.350	-27.063	69.850
43.5	-675	24	1076	-714	-8.738	22.375	-19.338	43.500
44	-745	103	1028	-662	-10.600	21.125	-10.600	21.125
Reference Point (44.5m)							0.000	0.000

C305-IM07004

Serial number probe: 1032604

18-5-12 12:00

Depth (m)	A+	A-	B+	B-	A (mm)	B (mm)	Cumulative A (mm)	Cumulative B (mm)
0.5	-465	220	1023	-997	-8.563	25.250	61.525	1148.775
1	-336	101	995	-951	-5.463	24.325	70.088	1123.525
1.5	-85	-134	992	-941	0.613	24.163	75.550	1099.200
2	139	-370	990	-942	6.363	24.150	74.938	1075.038
2.5	121	-351	692	-617	5.900	16.363	68.575	1050.888
3	-111	-118	-76	118	0.088	-2.425	62.675	1034.525
3.5	-219	-14	-165	213	-2.563	-4.725	62.588	1036.950
4	-349	116	-211	253	-5.813	-5.800	65.150	1041.675
4.5	-432	204	-213	261	-7.950	-5.925	70.963	1047.475
5	-517	281	-161	215	-9.975	-4.700	78.913	1053.400
5.5	-560	324	-171	214	-11.050	-4.813	88.888	1058.100
6	-492	264	-306	349	-9.450	-8.188	99.938	1062.913
6.5	-290	62	-132	178	-4.400	-3.875	109.388	1071.100
7	33	-264	102	-58	3.713	2.000	113.788	1074.975
7.5	240	-476	332	-292	8.950	7.800	110.075	1072.975
8	344	-575	576	-531	11.488	13.838	101.125	1065.175
8.5	178	-415	790	-749	7.413	19.238	89.638	1051.338
9	-95	-136	1018	-974	0.513	24.900	82.225	1032.100
9.5	-170	-59	1074	-1028	-1.388	26.275	81.713	1007.200
10	-211	-27	1126	-1081	-2.300	27.588	83.100	980.925
10.5	-325	91	1144	-1100	-5.200	28.050	85.400	953.338
11	-470	235	1188	-1144	-8.813	29.150	90.600	925.288
11.5	-377	147	1317	-1263	-6.550	32.250	99.413	896.138
12	5	-241	1115	-1082	3.075	27.463	105.963	863.888
12.5	158	-387	697	-653	6.813	16.875	102.888	836.425
13	181	-413	450	-410	7.425	10.750	96.075	819.550
13.5	132	-368	216	-172	6.250	4.850	88.650	808.800
14	97	-333	62	-4	5.375	0.825	82.400	803.950
14.5	234	-468	14	61	8.775	-0.588	77.025	803.125
15	58	-301	51	29	4.488	0.275	68.250	803.713
15.5	-293	52	166	-113	-4.313	3.488	63.763	803.438
16	-465	239	285	-241	-8.800	6.575	68.075	799.950
16.5	-528	291	368	-319	-10.238	8.588	76.875	793.375
17	-584	361	385	-340	-11.813	9.063	87.113	784.788
17.5	-745	510	324	-267	-15.688	7.388	98.925	775.725
18	-708	482	271	-232	-14.875	6.288	114.613	768.338
18.5	-608	360	397	-355	-12.100	9.400	129.488	762.050
19	-526	306	553	-516	-10.400	13.363	141.588	752.650
19.5	-457	214	703	-654	-8.388	16.963	151.988	739.288
20	-343	131	811	-776	-5.925	19.838	160.375	722.325
20.5	-123	-115	907	-851	-0.100	21.975	166.300	702.488
21	88	-321	963	-915	5.113	23.475	166.400	680.513
21.5	21	-256	1029	-974	3.463	25.038	161.288	657.038
22	-77	-154	1080	-1031	0.963	26.388	157.825	632.000
22.5	-71	-157	1158	-1115	1.075	28.413	156.863	605.613
23	-57	-182	1237	-1192	1.563	30.363	155.788	577.200
23.5	135	-371	1199	-1163	6.325	29.525	154.225	546.838
24	464	-695	951	-901	14.488	23.150	147.900	517.313
24.5	532	-770	601	-558	16.275	14.488	133.413	494.163
25	543	-778	271	-222	16.513	6.163	117.138	479.675
25.5	528	-769	-33	80	16.213	-1.413	100.625	473.513
26	565	-802	-173	212	17.088	-4.813	84.413	474.925
26.5	565	-797	-268	319	17.025	-7.338	67.325	479.738
27	368	-605	34	28	12.163	0.075	50.300	487.075

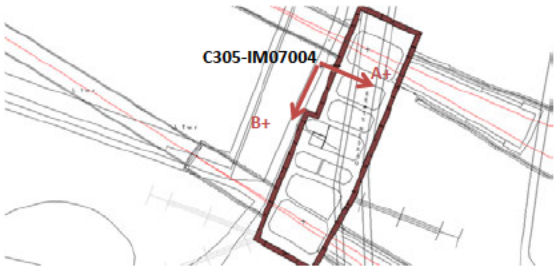
C305-IM07004

Serial number probe: 1032604

18-5-12 12:00

Depth (m)	A+	A-	B+	B-	A (mm)	B (mm)	Cumulative A (mm)	Cumulative B (mm)
27.5	152	-404	383	-325	6.950	8.850	38.138	487.000
28	-56	-179	565	-527	1.538	13.650	31.188	478.150
28.5	-258	31	746	-708	-3.613	18.175	29.650	464.500
29	-441	193	1081	-1020	-7.925	26.263	33.263	446.325
29.5	-445	217	1402	-1354	-8.275	34.450	41.188	420.063
30	-410	170	1383	-1334	-7.250	33.963	49.463	385.613
30.5	-454	214	1072	-1023	-8.350	26.188	56.713	351.650
31	-435	210	701	-652	-8.063	16.913	65.063	325.463
31.5	-410	168	391	-342	-7.225	9.163	73.125	308.550
32	-362	127	154	-111	-6.113	3.313	80.350	299.388
32.5	-381	144	132	-86	-6.563	2.725	86.463	296.075
33	-262	33	305	-252	-3.688	6.963	93.025	293.350
33.5	-103	-131	400	-356	0.350	9.450	96.713	286.388
34	203	-434	448	-397	7.963	10.563	96.363	276.938
34.5	543	-773	600	-549	16.450	14.363	88.400	266.375
35	766	-1009	508	-465	22.188	12.163	71.950	252.013
35.5	776	-1008	271	-225	22.300	6.200	49.763	239.850
36	481	-726	119	-74	15.088	2.413	27.463	233.650
36.5	216	-456	244	-188	8.400	5.400	12.375	231.238
37	-23	-219	313	-261	2.450	7.175	3.975	225.838
37.5	-208	-31	384	-333	-2.213	8.963	1.525	218.663
38	-270	32	380	-331	-3.775	8.888	3.738	209.700
38.5	-303	71	158	-103	-4.675	3.263	7.513	200.813
39	-315	80	113	-63	-4.938	2.200	12.188	197.550
39.5	-216	-22	506	-458	-2.425	12.050	17.125	195.350
40	38	-267	494	-443	3.813	11.713	19.550	183.300
40.5	259	-496	594	-554	9.438	14.350	15.738	171.588
41	479	-706	862	-826	14.813	21.100	6.300	157.238
41.5	586	-813	876	-835	17.488	21.388	-8.513	136.138
42	76	-333	902	-846	5.113	21.850	-26.000	114.750
42.5	-309	69	958	-909	-4.725	23.338	-31.113	92.900
43	-426	182	1071	-1027	-7.600	26.225	-26.388	69.563
43.5	-454	216	923	-872	-8.375	22.438	-18.788	43.338
44	-537	296	858	-814	-10.413	20.900	-10.413	20.900
Reference Point (44.5m)							0.000	0.000

C305-IM07004

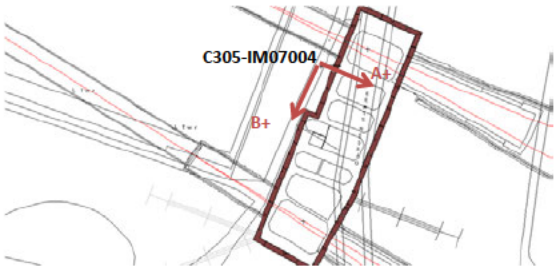


Serial number probe: 1035333

17-5-12 12:00

Depth (m)	A+	A-	B+	B-	A (mm)	B (mm)	Cumulative A (mm)	Cumulative B (mm)
0.5	-646	61	1181	-837	-8.838	25.225	42.925	1159.263
1	-518	-65	1151	-805	-5.663	24.450	51.762	1134.038
1.5	-262	-292	1150	-784	0.375	24.175	57.425	1109.588
2	-36	-531	1150	-790	6.188	24.250	57.050	1085.413
2.5	-56	-523	861	-461	5.838	16.525	50.862	1061.163
3	-288	-283	91	276	-0.063	-2.313	45.025	1044.638
3.5	-407	-183	-6	370	-2.800	-4.700	45.087	1046.950
4	-537	-54	-47	401	-6.038	-5.600	47.887	1051.650
4.5	-606	34	-53	415	-8.000	-5.850	53.925	1057.250
5	-702	110	8	370	-10.150	-4.525	61.925	1063.100
5.5	-748	161	-6	373	-11.363	-4.738	72.075	1067.625
6	-677	93	-144	507	-9.625	-8.138	83.437	1072.363
6.5	-473	-102	25	328	-4.638	-3.788	93.062	1080.500
7	-147	-424	272	90	3.463	2.275	97.700	1084.288
7.5	67	-642	496	-135	8.863	7.888	94.237	1082.013
8	172	-734	733	-382	11.325	13.938	85.375	1074.125
8.5	-4	-573	954	-591	7.113	19.313	74.050	1060.188
9	-273	-302	1175	-818	0.363	24.913	66.937	1040.875
9.5	-354	-230	1235	-881	-1.550	26.450	66.575	1015.963
10	-383	-183	1290	-923	-2.500	27.663	68.125	989.513
10.5	-498	-76	1307	-952	-5.275	28.238	70.625	961.850
11	-650	71	1349	-997	-9.013	29.325	75.900	933.613
11.5	-551	-14	1486	-1103	-6.713	32.363	84.912	904.288
12	-169	-411	1272	-925	3.025	27.463	91.625	871.925
12.5	-27	-552	859	-504	6.563	17.038	88.600	844.463
13	9	-585	606	-250	7.425	10.700	82.037	827.425
13.5	-48	-526	381	-22	5.975	5.038	74.612	816.725
14	-83	-494	230	154	5.138	0.950	68.637	811.688
14.5	58	-637	184	207	8.688	-0.288	63.500	810.738
15	-128	-462	210	182	4.175	0.350	54.812	811.025
15.5	-473	-107	325	37	-4.575	3.600	50.637	810.675
16	-638	73	449	-85	-8.888	6.675	55.212	807.075
16.5	-716	134	530	-172	-10.625	8.775	64.100	800.400
17	-772	203	553	-185	-12.188	9.225	74.725	791.625
17.5	-930	341	494	-120	-15.888	7.675	86.912	782.400
18	-884	318	440	-79	-15.025	6.488	102.800	774.725
18.5	-789	192	562	-203	-12.263	9.563	117.825	768.238
19	-699	136	722	-364	-10.438	13.575	130.088	758.675
19.5	-630	58	873	-505	-8.600	17.225	140.525	745.100
20	-520	-31	977	-616	-6.113	19.913	149.125	727.875
20.5	-300	-277	1077	-691	-0.288	22.100	155.238	707.963
21	-95	-483	1122	-755	4.850	23.463	155.525	685.863
21.5	-167	-418	1197	-821	3.138	25.225	150.675	662.400
22	-263	-322	1240	-875	0.738	26.438	147.538	637.175
22.5	-249	-320	1322	-955	0.888	28.463	146.800	610.738
23	-245	-341	1395	-1038	1.200	30.413	145.913	582.275
23.5	-52	-543	1368	-1017	6.138	29.813	144.713	551.863
24	291	-864	1109	-749	14.438	23.225	138.575	522.050
24.5	350	-934	762	-402	16.050	14.550	124.138	498.825
25	371	-938	436	-69	16.363	6.313	108.088	484.275
25.5	346	-941	125	239	16.088	-1.425	91.725	477.963
26	387	-963	-17	358	16.875	-4.688	75.638	479.388
26.5	383	-962	-100	466	16.813	-7.075	58.763	484.075
27	187	-768	196	179	11.938	0.213	41.950	491.150

C305-IM07004



Serial number probe: 1035333

17-5-12 12:00

Depth (m)	A+	A-	B+	B-	A (mm)	B (mm)	Cumulative A (mm)	Cumulative B (mm)
27.5	-36	-562	545	-166	6.575	8.888	30.013	490.938
28	-241	-338	724	-367	1.213	13.638	23.438	482.050
28.5	-436	-133	902	-559	-3.788	18.263	22.225	468.413
29	-626	34	1244	-863	-8.250	26.338	26.013	450.150
29.5	-633	51	1568	-1197	-8.550	34.563	34.263	423.813
30	-594	12	1543	-1187	-7.575	34.125	42.813	389.250
30.5	-642	49	1236	-873	-8.638	26.363	50.388	355.125
31	-613	45	865	-496	-8.225	17.013	59.025	328.763
31.5	-586	5	551	-182	-7.388	9.163	67.250	311.750
32	-538	-38	322	35	-6.250	3.588	74.638	302.588
32.5	-567	-27	296	66	-6.750	2.875	80.888	299.000
33	-436	-125	465	-104	-3.888	7.113	87.638	296.125
33.5	-281	-287	570	-207	0.075	9.713	91.525	289.013
34	16	-591	609	-249	7.588	10.725	91.450	279.300
34.5	360	-941	765	-397	16.263	14.525	83.863	268.575
35	582	-1178	677	-311	22.000	12.350	67.600	254.050
35.5	590	-1168	432	-70	21.975	6.275	45.600	241.700
36	303	-894	275	78	14.963	2.463	23.625	235.425
36.5	30	-617	401	-31	8.088	5.400	8.663	232.963
37	-202	-386	476	-107	2.300	7.288	0.575	227.563
37.5	-383	-189	546	-187	-2.425	9.163	-1.725	220.275
38	-453	-135	548	-176	-3.975	9.050	0.700	211.113
38.5	-480	-94	326	46	-4.825	3.500	4.675	202.063
39	-492	-87	277	97	-5.063	2.250	9.500	198.563
39.5	-403	-186	672	-298	-2.713	12.125	14.563	196.313
40	-137	-423	652	-288	3.575	11.750	17.275	184.188
40.5	87	-657	750	-403	9.300	14.413	13.700	172.438
41	297	-862	1023	-671	14.488	21.175	4.400	158.025
41.5	402	-971	1044	-688	17.163	21.650	-10.088	136.850
42	-110	-490	1063	-692	4.750	21.938	-27.250	115.200
42.5	-493	-103	1119	-759	-4.875	23.475	-32.000	93.263
43	-612	13	1235	-874	-7.813	26.363	-27.125	69.788
43.5	-642	57	1081	-719	-8.738	22.500	-19.313	43.425
44	-712	134	1018	-656	-10.575	20.925	-10.575	20.925
Reference Point (44.5m)							0.000	0.000

GEOKON 48 Spencer St. Lebanon, N.H. 03766 USA

Model 6100-1M Inclinometer Calibration Report

Date of Calibration: October 29, 2010
Calibration Instruction: CI-6100 Inclinometer

Inclinometer S/N: 1032604
Technician: ER

Please Note:

Measured 40,000sinθ = (Measured 20,000sin+θ) - (Measured 20,000sin-θ)
System Accuracy = ((Measured 40,000sinθ)-(Ideal 40,000sinθ) / 20,000) x 100

When using this probe in conjunction with a GK-603 Readout the Internal Bias may be entered in the Probe Configuration as the "A Axis Zero Shift" and the "B Axis Zero Shift". The Gage Factors may also be applied in the Probe Configuration.

When an Inclinometer Probe and a GK-603 are supplied together the Internal Biases and the Gage Factors are entered at the Geokon facility:

Inclinometer Probe S/N:	1032604
A Axis Zero Offset:	30
B Axis Zero Offset:	20
A Axis Gage Factor:	0.6268
B Axis Gage Factor:	0.6274

The instrument above was found to be in tolerance in all operating ranges.

Calibration Issued By: [redacted] Date: 11-4-10

QA Manager: [redacted] Date: 11-8-10

The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z-540-1

Geokon UK
Contract: 2048

C. R. No.: 1032604
Model: 6100-1M
Revision Date: 08 November 2011
Recall Date: 08 November 2012

Authorised by: [redacted] (signature) [redacted]

GEOKON 48 Spencer St. Lebanon, N.H. 03766 USA

Model 6100-1M Inclinometer Calibration Report

Date of Calibration: November 8, 2010
Calibration Instruction: CI-6100 Inclinometer

Inclinometer S/N: 1035333
Technician: ER

Please Note:

Measured 40,000sinθ = (Measured 20,000sin+θ) - (Measured 20,000sin-θ)
System Accuracy = ((Measured 40,000sinθ)-(Ideal 40,000sinθ) / 20,000) x 100

When using this probe in conjunction with a GK-603 Readout the Internal Bias may be entered in the Probe Configuration as the "A Axis Zero Shift" and the "B Axis Zero Shift". The Gage Factors may also be applied in the Probe Configuration.

When an Inclinometer Probe and a GK-603 are supplied together the Internal Biases and the Gage Factors are entered at the Geokon facility:

Inclinometer Probe S/N:	1035333
A Axis Zero Offset:	40
B Axis Zero Offset:	20
A Axis Gage Factor:	0.6258
B Axis Gage Factor:	0.6264

The instrument above was found to be in tolerance in all operating ranges.

Calibration Issued By: [redacted] Date: November 08, 2010

QA Manager: [redacted] Date: November 08, 2010

The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z-540-1

Geokon UK
Contract: 2048

C. R. No.: 1035333
Model: 6100-1M
Revision Date: 08 November 2011
Recall Date: 08 November 2012

Authorised by: [redacted] (signature) [redacted]

IRS Installation Record Sheets							
Monitoring ID	Installation date	Status	Sensor location - GPS reading (m)			Depth Borehole	Depth Sensor
			Eastings X	Northings Y	Elevation Z (mATD)	(m bgl)	(m bgl)
C305-PV07001	13-07-12	Installed	86122.301	36250.008	110.171	50.0	50.0
C305-PV07002	14-07-12	Installed	86113.743	36279.439	110.168	50.0	50.0

Notes: Depth is referred to meters below ground level. Coordinates for sensor location (Easting, Northing and Elevation) are GPS readings. All elevations presented are metres above tunnel datum (mATD).

Sensor Type	Monitoring ID	Commissioning readings			
		18-07-12 23:24	**19-07-12 2:24**	**19-07-12 5:24**	
Piezometer - Sensor	**C305-PV07001**	66.254	66.514	66.548	m
		18-07-12 23:24	**19-07-12 2:24**	**19-07-12 5:24**	
Piezometer - Sensor	**C305-PV07002**	67.014	67.230	67.282	m

Notes: All levels presented are metres above tunnel datum (mATD).

IRS Installation Record Sheets										
Sensor Type	Sensor ID	Installation Date	Sub-area		SENSOR Location - GPS reading (m)			Commissioning Readings (Hz)		
				Status	Eastings X (m)	Northings Y (m)	Elevation Z (mATD)			
								15-05-12 21:32	16-05-12 0:32	16-05-12 3:32
Strain Gauge	**C305-EG07011.01**	11-04-12	Stepney Green Shaft Basement Level. Prop 1. Sensor 1	Installed	86108.0260	36243.8770	107.6000	935.756	935.760	935.765
Strain Gauge	**C305-EG07011.02**	11-04-12	Stepney Green Shaft Basement Level. Prop 1. Sensor 2	Installed	86108.0260	36243.8770	107.6000	919.813	919.248	919.239
Strain Gauge	**C305-EG07011.03**	11-04-12	Stepney Green Shaft Basement Level. Prop 1. Sensor 3	Installed	86108.0260	36243.8770	107.6000	930.582	930.657	930.766
Strain Gauge	**C305-EG07011.04**	11-04-12	Stepney Green Shaft Basement Level. Prop 1. Sensor 4	Installed	86108.0260	36243.8770	107.6000	909.636	909.672	909.747
								15-05-12 21:32	16-05-12 0:32	16-05-12 3:32
Strain Gauge	**C305-EG07012.01**	10-04-12	Stepney Green Shaft Basement Level. Prop 2. Sensor 1	Installed	86111.4000	36251.9000	107.6000	901.804	901.752	901.756
Strain Gauge	**C305-EG07012.02**	10-04-12	Stepney Green Shaft Basement Level. Prop 2. Sensor 2	Installed	86111.4000	36251.9000	107.6000	894.913	895.042	895.124
Strain Gauge	**C305-EG07012.03**	10-04-12	Stepney Green Shaft Basement Level. Prop 2. Sensor 3	Installed	86111.4000	36251.9000	107.6000	933.023	933.066	933.149
Strain Gauge	**C305-EG07012.04**	10-04-12	Stepney Green Shaft Basement Level. Prop 2. Sensor 4	Installed	86111.4000	36251.9000	107.6000	916.595	916.680	916.815
								15-05-12 21:32	16-05-12 0:32	16-05-12 3:32
Strain Gauge	**C305-EG07013.01**	10-04-12	Stepney Green Shaft Basement Level. Prop 4. Sensor 1	Installed	86116.9000	36264.0000	107.6000	895.666	895.622	895.594
Strain Gauge	**C305-EG07013.02**	10-04-12	Stepney Green Shaft Basement Level. Prop 4. Sensor 2	Installed	86116.9000	36264.0000	107.6000	915.943	916.117	916.235
Strain Gauge	**C305-EG07013.03**	10-04-12	Stepney Green Shaft Basement Level. Prop 4. Sensor 3	Installed	86116.9000	36264.0000	107.6000	918.448	918.544	918.684
Strain Gauge	**C305-EG07013.04**	10-04-12	Stepney Green Shaft Basement Level. Prop 4. Sensor 4	Installed	86116.9000	36264.0000	107.6000	918.764	918.706	918.730
								15-05-12 21:32	16-05-12 0:32	16-05-12 3:32
Strain Gauge	**C305-EG07014.01**	04-04-12	Stepney Green Shaft Basement Level. Prop 5. Sensor 1	Installed	86120.8000	36270.8000	107.6000	936.557	936.468	936.427

IRS Installation Record Sheets										
Sensor Type	Sensor ID	Installation Date	Sub-area	Status	SENSOR Location - GPS reading (m)			Commissioning Readings (Hz)		
					Eastings X (m)	Northings Y (m)	Elevation Z (mATD)			
Strain Gauge	**C305-EG07014.02**	04-04-12	Stepney Green Shaft Basement Level. Prop 5. Sensor 2	Installed	86120.8000	36270.8000	107.6000	942.240	942.596	942.760
Strain Gauge	**C305-EG07014.03**	04-04-12	Stepney Green Shaft Basement Level. Prop 5. Sensor 3	Installed	86120.8000	36270.8000	107.6000	929.116	929.052	929.022
Strain Gauge	**C305-EG07014.04**	04-04-12	Stepney Green Shaft Basement Level. Prop 5. Sensor 4	Installed	86120.8000	36270.8000	107.6000	928.971	929.173	929.321
								05-05-12 14:59	05-05-12 17:59	05-05-12 20:59
Strain Gauge	**C305-EG07015.01**	26-03-12	Stepney Green Shaft Basement Level. Prop 7. Sensor 1	Installed	86126.2000	36284.4000	107.6000	913.634	913.777	913.737
Strain Gauge	**C305-EG07015.02**	26-03-12	Stepney Green Shaft Basement Level. Prop 7. Sensor 2	Installed	86126.2000	36284.4000	107.6000	923.724	923.570	923.485
Strain Gauge	**C305-EG07015.03**	26-03-12	Stepney Green Shaft Basement Level. Prop 7. Sensor 3	Installed	86126.2000	36284.4000	107.6000	933.585	933.608	933.621
Strain Gauge	**C305-EG07015.04**	26-03-12	Stepney Green Shaft Basement Level. Prop 7. Sensor 4	Installed	86126.2000	36284.4000	107.6000	946.576	946.441	946.409
								05-05-12 14:59	05-05-12 17:59	05-05-12 20:59
Strain Gauge	**C305-EG07016.01**	15-03-12	Stepney Green Shaft Basement Level. Prop 8. Sensor 1	Installed	86130.0800	36295.6500	107.6000	damaged	damaged	damaged
Strain Gauge	**C305-EG07016.02**	15-03-12	Stepney Green Shaft Basement Level. Prop 8. Sensor 2	Installed	86130.0800	36295.6500	107.6000	damaged	damaged	damaged
Strain Gauge	**C305-EG07016.03**	15-03-12	Stepney Green Shaft Basement Level. Prop 8. Sensor 3	Installed	86130.0800	36295.6500	107.6000	922.066	921.938	921.887
Strain Gauge	**C305-EG07016.04**	15-03-12	Stepney Green Shaft Basement Level. Prop 8. Sensor 4	Installed	86130.0800	36295.6500	107.6000	914.282	914.314	914.311
								08-07-12 15:05	08-07-12 18:05	08-07-12 21:05
Strain Gauge	**C305-EG07021.01**	30-05-12	Stepney Green Shaft Level B-1. Prop 1. Sensor 1	Installed	86108.0260	36243.8770	101.4800	damaged	damaged	damaged
Strain Gauge	**C305-EG07021.02**	30-05-12	Stepney Green Shaft Level B-1. Prop 1. Sensor 2	Installed	86108.0260	36243.8770	101.4800	1008.854	1008.921	1008.935
Strain Gauge	**C305-EG07021.03**	30-05-12	Stepney Green Shaft Level B-1. Prop 1. Sensor 3	Installed	86108.0260	36243.8770	101.4800	damaged	damaged	damaged

IRS Installation Record Sheets										
Sensor Type	Sensor ID	Installation Date	Sub-area	Status	SENSOR Location - GPS reading (m)			Commissioning Readings (Hz)		
					Eastings X (m)	Northings Y (m)	Elevation Z (mATD)			
Strain Gauge	**C305-EG07021.04**	30-05-12	Stepney Green Shaft Level B-1. Prop 1. Sensor 4	Installed	86108.0260	36243.8770	101.4800	927.238	927.250	927.244
								08-07-12 15:05	08-07-12 18:05	08-07-12 21:05
Strain Gauge	**C305-EG07022.01**	30-05-12	Stepney Green Shaft Level B-1. Prop 2. Sensor 1	Installed	86111.4000	36251.9000	101.4800	953.100	953.237	953.217
Strain Gauge	**C305-EG07022.02**	30-05-12	Stepney Green Shaft Level B-1. Prop 2. Sensor 2	Installed	86111.4000	36251.9000	101.4800	1015.348	1015.230	1015.143
Strain Gauge	**C305-EG07022.03**	30-05-12	Stepney Green Shaft Level B-1. Prop 2. Sensor 3	Installed	86111.4000	36251.9000	101.4800	990.101	989.814	989.759
Strain Gauge	**C305-EG07022.04**	30-05-12	Stepney Green Shaft Level B-1. Prop 2. Sensor 4	Installed	86111.4000	36251.9000	101.4800	971.902	971.918	971.814
								08-07-12 15:05	08-07-12 18:05	08-07-12 21:05
Strain Gauge	**C305-EG07023.01**	21-05-12	Stepney Green Shaft Level B-1. Prop 4. Sensor 1	Installed	86116.9000	36264.0000	101.4800	938.332	938.387	938.391
Strain Gauge	**C305-EG07023.02**	21-05-12	Stepney Green Shaft Level B-1. Prop 4. Sensor 2	Installed	86116.9000	36264.0000	101.4800	962.048	961.987	961.944
Strain Gauge	**C305-EG07023.03**	21-05-12	Stepney Green Shaft Level B-1. Prop 4. Sensor 3	Installed	86116.9000	36264.0000	101.4800	931.733	931.730	931.682
Strain Gauge	**C305-EG07023.04**	21-05-12	Stepney Green Shaft Level B-1. Prop 4. Sensor 4	Installed	86116.9000	36264.0000	101.4800	989.880	990.433	989.853
								08-07-12 15:05	08-07-12 18:05	08-07-12 21:05
Strain Gauge	**C305-EG07024.01**	18-05-12	Stepney Green Shaft Level B-1. Prop 5. Sensor 1	Installed	86120.8000	36270.8000	101.4800	912.831	912.925	912.936
Strain Gauge	**C305-EG07024.02**	18-05-12	Stepney Green Shaft Level B-1. Prop 5. Sensor 2	Installed	86120.8000	36270.8000	101.4800	924.885	924.781	924.606
Strain Gauge	**C305-EG07024.03**	18-05-12	Stepney Green Shaft Level B-1. Prop 5. Sensor 3	Installed	86120.8000	36270.8000	101.4800	927.190	927.275	927.260
Strain Gauge	**C305-EG07024.04**	18-05-12	Stepney Green Shaft Level B-1. Prop 5. Sensor 4	Installed	86120.8000	36270.8000	101.4800	910.985	910.984	910.948
								23-06-12 16:29	23-06-12 19:29	23-06-12 22:29
Strain Gauge	**C305-EG07025.01**	13-05-12	Stepney Green Shaft Level B-1. Prop 7. Sensor 1	Installed	86126.2000	36284.4000	101.4800	883.117	882.975	882.875
Strain Gauge	**C305-EG07025.02**	13-05-12	Stepney Green Shaft Level B-1. Prop 7. Sensor 2	Installed	86126.2000	36284.4000	101.4800	damaged	damaged	damaged
Strain Gauge	**C305-EG07025.03**	13-05-12	Stepney Green Shaft Level B-1. Prop 7. Sensor 3	Installed	86126.2000	36284.4000	101.4800	924.249	924.079	924.103

IRS Installation Record Sheets											
Sensor Type	Sensor ID	Installation Date	Sub-area		SENSOR Location - GPS reading (m)			Commissioning Readings (Hz)		
				Status	Eastings X (m)	Northings Y (m)	Elevation Z (mATD)			
Strain Gauge	**C305-EG07025.04**	13-05-12	Stepney Green Shaft Level B-1. Prop 7. Sensor 4	Installed	86126.2000	36284.4000	101.4800	884.066	883.924	883.832
								23-06-12 16:29	23-06-12 19:29	23-06-12 22:29
Strain Gauge	**C305-EG07026.01**	12-05-12	Stepney Green Shaft Level B-1. Prop 8. Sensor 1	Installed	86130.0800	36295.6500	101.4800	874.153	874.070	874.018
Strain Gauge	**C305-EG07026.02**	12-05-12	Stepney Green Shaft Level B-1. Prop 8. Sensor 2	Installed	86130.0800	36295.6500	101.4800	906.294	906.116	906.020
Strain Gauge	**C305-EG07026.03**	12-05-12	Stepney Green Shaft Level B-1. Prop 8. Sensor 3	Installed	86130.0800	36295.6500	101.4800	888.572	889.086	889.273
Strain Gauge	**C305-EG07026.04**	12-05-12	Stepney Green Shaft Level B-1. Prop 8. Sensor 4	Installed	86130.0800	36295.6500	101.4800	914.774	914.735	914.698
								05-08-12 12:56	05-08-12 15:56	05-08-12 18:56
Strain Gauge	**C305-EG07031.01**	26-06-12	Stepney Green Shaft Level B-2. Prop 1. Sensor 1	Installed	86108.0260	36243.8770	95.3600	481.944	481.937	481.933
Strain Gauge	**C305-EG07031.02**	26-06-12	Stepney Green Shaft Level B-2. Prop 1. Sensor 2	Installed	86108.0260	36243.8770	95.3600	899.543	899.545	899.548
Strain Gauge	**C305-EG07031.03**	26-06-12	Stepney Green Shaft Level B-2. Prop 1. Sensor 3	Installed	86108.0260	36243.8770	95.3600	899.660	899.655	899.650
Strain Gauge	**C305-EG07031.04**	26-06-12	Stepney Green Shaft Level B-2. Prop 1. Sensor 4	Installed	86108.0260	36243.8770	95.3600	907.391	907.379	907.356
								05-08-12 12:56	05-08-12 15:56	05-08-12 18:56
Strain Gauge	**C305-EG07032.01**	02-07-12	Stepney Green Shaft Level B-2. Prop 2. Sensor 1	Installed	86111.4000	36251.9000	95.3600	884.251	884.281	884.289
Strain Gauge	**C305-EG07032.02**	02-07-12	Stepney Green Shaft Level B-2. Prop 2. Sensor 2	Installed	86111.4000	36251.9000	95.3600	902.808	903.309	902.753
Strain Gauge	**C305-EG07032.03**	02-07-12	Stepney Green Shaft Level B-2. Prop 2. Sensor 3	Installed	86111.4000	36251.9000	95.3600	905.461	905.166	905.257
Strain Gauge	**C305-EG07032.04**	02-07-12	Stepney Green Shaft Level B-2. Prop 2. Sensor 4	Installed	86111.4000	36251.9000	95.3600	912.245	912.312	912.403
								05-08-12 12:56	05-08-12 15:56	05-08-12 18:56
Strain Gauge	**C305-EG07033.01**	20-06-12	Stepney Green Shaft Level B-2. Prop 4. Sensor 1	Installed	86116.9000	36264.0000	95.3600	914.394	914.438	914.463
Strain Gauge	**C305-EG07033.02**	20-06-12	Stepney Green Shaft Level B-2. Prop 4. Sensor 2	Installed	86116.9000	36264.0000	95.3600	911.650	911.699	911.677
Strain Gauge	**C305-EG07033.03**	20-06-12	Stepney Green Shaft Level B-2. Prop 4. Sensor 3	Installed	86116.9000	36264.0000	95.3600	943.309	943.229	943.184

IRS Installation Record Sheets										
Sensor Type	Sensor ID	Installation Date	Sub-area		SENSOR Location - GPS reading (m)			Commissioning Readings (Hz)		
				Status	Eastings X (m)	Northings Y (m)	Elevation Z (mATD)			
Strain Gauge	**C305-EG07033.04**	20-06-12	Stepney Green Shaft Level B-2. Prop 4. Sensor 4	Installed	86116.9000	36264.0000	95.3600	921.396	921.448	921.445
								05-08-12 12:56	05-08-12 15:56	05-08-12 18:56
Strain Gauge	**C305-EG07034.01**	17-06-12	Stepney Green Shaft Level B-2. Prop 5. Sensor 1	Installed	86120.8000	36270.8000	95.3600	919.240	919.288	919.378
Strain Gauge	**C305-EG07034.02**	17-06-12	Stepney Green Shaft Level B-2. Prop 5. Sensor 2	Installed	86120.8000	36270.8000	95.3600	damaged	damaged	damaged
Strain Gauge	**C305-EG07034.03**	17-06-12	Stepney Green Shaft Level B-2. Prop 5. Sensor 3	Installed	86120.8000	36270.8000	95.3600	912.816	912.851	912.874
Strain Gauge	**C305-EG07034.04**	17-06-12	Stepney Green Shaft Level B-2. Prop 5. Sensor 4	Installed	86120.8000	36270.8000	95.3600	909.449	909.498	909.518
								27-07-12 20:02	27-07-12 23:02	28-07-12 2:02
Strain Gauge	**C305-EG07035.01**	13-06-12	Stepney Green Shaft Level B-2. Prop 7. Sensor 1	Installed	86126.2000	36284.4000	95.3600	894.744	894.702	894.630
Strain Gauge	**C305-EG07035.02**	13-06-12	Stepney Green Shaft Level B-2. Prop 7. Sensor 2	Installed	86126.2000	36284.4000	95.3600	895.822	895.785	895.748
Strain Gauge	**C305-EG07035.03**	13-06-12	Stepney Green Shaft Level B-2. Prop 7. Sensor 3	Installed	86126.2000	36284.4000	95.3600	914.995	914.994	915.009
Strain Gauge	**C305-EG07035.04**	13-06-12	Stepney Green Shaft Level B-2. Prop 7. Sensor 4	Installed	86126.2000	36284.4000	95.3600	913.333	913.302	913.259
								27-07-12 20:02	27-07-12 23:02	28-07-12 2:02
Strain Gauge	**C305-EG07036.01**	17-06-12	Stepney Green Shaft Level B-2. Prop 8. Sensor 1	Installed	86130.0800	36295.6500	95.3600	914.238	914.218	914.191
Strain Gauge	**C305-EG07036.02**	17-06-12	Stepney Green Shaft Level B-2. Prop 8. Sensor 2	Installed	86130.0800	36295.6500	95.3600	damaged	damaged	damaged
Strain Gauge	**C305-EG07036.03**	17-06-12	Stepney Green Shaft Level B-2. Prop 8. Sensor 3	Installed	86130.0800	36295.6500	95.3600	890.705	890.718	890.735
Strain Gauge	**C305-EG07036.04**	17-06-12	Stepney Green Shaft Level B-2. Prop 8. Sensor 4	Installed	86130.0800	36295.6500	95.3600	925.598	925.595	925.578
								08-09-12 19:25	08-09-12 22:25	09-09-12 1:25
Strain Gauge	**C305-EG07041.01**	31-07-12	Stepney Green Shaft Level B-3. Prop 1. Sensor 1	Installed	86108.0260	36243.8770	89.2400	933.005	933.004	933.013
Strain Gauge	**C305-EG07041.02**	31-07-12	Stepney Green Shaft Level B-3. Prop 1. Sensor 2	Installed	86108.0260	36243.8770	89.2400	896.091	896.085	896.081
Strain Gauge	**C305-EG07041.03**	31-07-12	Stepney Green Shaft Level B-3. Prop 1. Sensor 3	Installed	86108.0260	36243.8770	89.2400	913.572	914.119	913.551

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IRS Installation Record Sheets										
Sensor Type	Sensor ID	Installation Date	Sub-area		SENSOR Location - GPS reading (m)			Commissioning Readings (Hz)		
				Status	Eastings X (m)	Northings Y (m)	Elevation Z (mATD)			
Strain Gauge	**C305-EG07041.04**	31-07-12	Stepney Green Shaft Level B-3. Prop 1. Sensor 4	Installed	86108.0260	36243.8770	89.2400	921.815	921.800	921.798
								08-09-12 19:25	08-09-12 22:25	09-09-12 1:25
Strain Gauge	**C305-EG07042.01**	02-08-12	Stepney Green Shaft Level B-3. Prop 2. Sensor 1	Installed	86111.4000	36251.9000	89.2400	897.230	897.197	897.122
Strain Gauge	**C305-EG07042.02**	02-08-12	Stepney Green Shaft Level B-3. Prop 2. Sensor 2	Installed	86111.4000	36251.9000	89.2400	901.209	901.162	901.110
Strain Gauge	**C305-EG07042.03**	02-08-12	Stepney Green Shaft Level B-3. Prop 2. Sensor 3	Installed	86111.4000	36251.9000	89.2400	925.304	925.797	925.339
Strain Gauge	**C305-EG07042.04**	02-08-12	Stepney Green Shaft Level B-3. Prop 2. Sensor 4	Installed	86111.4000	36251.9000	89.2400	926.756	926.696	926.645
								31-08-12 10:53	31-08-12 13:53	31-08-12 16:53
Strain Gauge	**C305-EG07043.01**	23-07-12	Stepney Green Shaft Level B-3. Prop 4. Sensor 1	Installed	86116.9000	36264.0000	89.2400	897.432	897.375	897.401
Strain Gauge	**C305-EG07043.02**	23-07-12	Stepney Green Shaft Level B-3. Prop 4. Sensor 2	Installed	86116.9000	36264.0000	89.2400	925.404	925.386	925.360
Strain Gauge	**C305-EG07043.03**	23-07-12	Stepney Green Shaft Level B-3. Prop 4. Sensor 3	Installed	86116.9000	36264.0000	89.2400	960.624	960.593	960.581
Strain Gauge	**C305-EG07043.04**	23-07-12	Stepney Green Shaft Level B-3. Prop 4. Sensor 4	Installed	86116.9000	36264.0000	89.2400	919.642	920.122	919.599
								31-08-12 10:08	31-08-12 13:08	31-08-12 16:08
Strain Gauge	**C305-EG07044.01**	23-08-12	Stepney Green Shaft Level B-3. Prop 5. Sensor 1	Installed	86120.8000	36270.8000	89.2400	907.036	907.148	906.204
Strain Gauge	**C305-EG07044.02**	23-08-12	Stepney Green Shaft Level B-3. Prop 5. Sensor 2	Installed	86120.8000	36270.8000	89.2400	918.519	918.505	918.442
Strain Gauge	**C305-EG07044.03**	23-08-12	Stepney Green Shaft Level B-3. Prop 5. Sensor 3	Installed	86120.8000	36270.8000	89.2400	926.787	926.779	926.758
Strain Gauge	**C305-EG07044.04**	23-08-12	Stepney Green Shaft Level B-3. Prop 5. Sensor 4	Installed	86120.8000	36270.8000	89.2400	917.920	917.924	917.915
								25-08-12 15:53	25-08-12 18:53	25-08-12 21:53
Strain Gauge	**C305-EG07045.01**	10-07-12	Stepney Green Shaft Level B-3. Prop 7. Sensor 1	Installed	86126.2000	36284.4000	89.2400	881.555	881.914	881.378
Strain Gauge	**C305-EG07045.02**	10-07-12	Stepney Green Shaft Level B-3. Prop 7. Sensor 2	Installed	86126.2000	36284.4000	89.2400	919.132	919.009	919.009
Strain Gauge	**C305-EG07045.03**	10-07-12	Stepney Green Shaft Level B-3. Prop 7. Sensor 3	Installed	86126.2000	36284.4000	89.2400	923.949	923.744	923.786

IRS Installation Record Sheets										
Sensor Type	Sensor ID	Installation Date	Sub-area		SENSOR Location - GPS reading (m)			Commissioning Readings (Hz)		
				Status	Eastings X (m)	Northings Y (m)	Elevation Z (mATD)			
Strain Gauge	**C305-EG07045.04**	10-07-12	Stepney Green Shaft Level B-3. Prop 7. Sensor 4	Installed	86126.2000	36284.4000	89.2400	929.812	929.763	929.794
								25-08-12 15:53	25-08-12 18:53	25-08-12 21:53
Strain Gauge	**C305-EG07046.01**	10-07-12	Stepney Green Shaft Level B-3. Prop 8. Sensor 1	Installed	86130.0800	36295.6500	89.2400	902.714	902.666	902.670
Strain Gauge	**C305-EG07046.02**	10-07-12	Stepney Green Shaft Level B-3. Prop 8. Sensor 2	Installed	86130.0800	36295.6500	89.2400	945.405	945.320	945.297
Strain Gauge	**C305-EG07046.03**	10-07-12	Stepney Green Shaft Level B-3. Prop 8. Sensor 3	Installed	86130.0800	36295.6500	89.2400	915.519	915.479	915.491
Strain Gauge	**C305-EG07046.04**	10-07-12	Stepney Green Shaft Level B-3. Prop 8. Sensor 4	Installed	86130.0800	36295.6500	89.2400	942.247	942.215	942.195
								14-11-12 13:03	14-11-12 16:03	14-11-12 19:03
Strain Gauge	**C305-EG07052.01**	02-08-12	Stepney Green Shaft Level B-4. Prop 2. Sensor 1	Installed	86111.4000	36251.9000	83.1200	#N/A	#N/A	#N/A
Strain Gauge	**C305-EG07052.02**	02-08-12	Stepney Green Shaft Level B-4. Prop 2. Sensor 2	Installed	86111.4000	36251.9000	83.1200	891.683	891.709	891.729
Strain Gauge	**C305-EG07052.03**	02-08-12	Stepney Green Shaft Level B-4. Prop 2. Sensor 3	Installed	86111.4000	36251.9000	83.1200	890.130	890.161	890.159
Strain Gauge	**C305-EG07052.04**	02-08-12	Stepney Green Shaft Level B-4. Prop 2. Sensor 4	Installed	86111.4000	36251.9000	83.1200	#N/A	#N/A	#N/A
								16-10-12 19:19	16-10-12 22:19	17-10-12 1:19
Strain Gauge	**C305-EG07053.01**	17-09-12	Stepney Green Shaft Level B-4. Prop 4. Sensor 1	Installed	86116.9000	36264.0000	83.1200	886.532	886.504	886.464
Strain Gauge	**C305-EG07053.02**	17-09-12	Stepney Green Shaft Level B-4. Prop 4. Sensor 2	Installed	86116.9000	36264.0000	83.1200	918.545	919.073	918.557
Strain Gauge	**C305-EG07053.03**	17-09-12	Stepney Green Shaft Level B-4. Prop 4. Sensor 3	Installed	86116.9000	36264.0000	83.1200	886.579	886.557	886.528
Strain Gauge	**C305-EG07053.04**	17-09-12	Stepney Green Shaft Level B-4. Prop 4. Sensor 4	Installed	86116.9000	36264.0000	83.1200	919.307	919.287	919.284
								16-10-12 17:49	16-10-12 20:49	16-10-12 23:49
Strain Gauge	**C305-EG07054.01**	14-09-12	Stepney Green Shaft Level B-4. Prop 5. Sensor 1	Installed	86120.8000	36270.8000	83.1200	930.937	930.936	930.931
Strain Gauge	**C305-EG07054.02**	14-09-12	Stepney Green Shaft Level B-4. Prop 5. Sensor 2	Installed	86120.8000	36270.8000	83.1200	936.100	936.078	936.065
Strain Gauge	**C305-EG07054.03**	14-09-12	Stepney Green Shaft Level B-4. Prop 5. Sensor 3	Installed	86120.8000	36270.8000	83.1200	911.286	911.795	911.805

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IRS Installation Record Sheets										
Sensor Type	Sensor ID	Installation Date	Sub-area	Status	SENSOR Location - GPS reading (m)			Commissioning Readings (Hz)		
					Eastings X (m)	Northings Y (m)	Elevation Z (mATD)			
Strain Gauge	**C305-EG07054.04**	14-09-12	Stepney Green Shaft Level B-4. Prop 5. Sensor 4	Installed	86120.8000	36270.8000	83.1200	972.895	972.886	972.868
								18-11-12 13:00	18-11-12 16:00	18-11-12 19:00
Strain Gauge	**C305-EG07065.01**	10-11-12	Stepney Green Shaft Level B-5. Prop 7. Sensor 1	Installed	86126.2000	36284.4000	77.0000	881.712	881.712	881.712
Strain Gauge	**C305-EG07065.02**	10-11-12	Stepney Green Shaft Level B-5. Prop 7. Sensor 2	Installed	86126.2000	36284.4000	77.0000	924.267	924.267	924.267
Strain Gauge	**C305-EG07065.03**	10-11-12	Stepney Green Shaft Level B-5. Prop 7. Sensor 3	Installed	86126.2000	36284.4000	77.0000	940.606	940.606	940.606
Strain Gauge	**C305-EG07065.04**	10-11-12	Stepney Green Shaft Level B-5. Prop 7. Sensor 4	Installed	86126.2000	36284.4000	77.0000	915.168	915.168	915.168
								18-11-12 13:00	18-11-12 16:00	18-11-12 19:00
Strain Gauge	**C305-EG07066.01**	10-11-12	Stepney Green Shaft Level B-5. Prop 8. Sensor 1	Installed	86130.0800	36295.6500	77.0000	907.444	907.444	907.444
Strain Gauge	**C305-EG07066.02**	10-11-12	Stepney Green Shaft Level B-5. Prop 8. Sensor 2	Installed	86130.0800	36295.6500	77.0000	895.860	895.860	895.860
Strain Gauge	**C305-EG07066.03**	10-11-12	Stepney Green Shaft Level B-5. Prop 8. Sensor 3	Installed	86130.0800	36295.6500	77.0000	881.169	881.169	881.169
Strain Gauge	**C305-EG07066.04**	10-11-12	Stepney Green Shaft Level B-5. Prop 8. Sensor 4	Installed	86130.0800	36295.6500	77.0000	933.958	933.958	933.958
								24-09-12 18:35	24-09-12 21:35	25-09-12 0:35
Strain Gauge	**C305-EG0703A7.01**	09-08-12	Stepney Green Shaft Level 3A. Section 7. Sensor 1	Installed	86130.6583	36282.5341	91.1900	2457.459	2456.345	2457.199
Strain Gauge	**C305-EG0703A7.02**	09-08-12	Stepney Green Shaft Level 3A. Section 7. Sensor 2	Installed	86130.6583	36282.5341	91.1900	2517.969	2517.700	2518.527
Strain Gauge	**C305-EG0703A7.03**	09-08-12	Stepney Green Shaft Level 3A. Section 7. Sensor 3	Installed	86130.6583	36282.5341	91.1900	2314.183	2313.904	2315.694
Strain Gauge	**C305-EG0703A7.04**	09-08-12	Stepney Green Shaft Level 3A. Section 7. Sensor 4	Installed	86130.6583	36282.5341	91.1900	2438.353	2437.743	2438.919
								24-09-12 18:35	24-09-12 21:35	25-09-12 0:35
Strain Gauge	**C305-EG0703A8.01**	09-08-12	Stepney Green Shaft Level 3A. Section 8. Sensor 1	Installed	86135.1509	36291.4463	91.1900	2578.910	2578.218	2578.452
Strain Gauge	**C305-EG0703A8.02**	09-08-12	Stepney Green Shaft Level 3A. Section 8. Sensor 2	Installed	86135.1509	36291.4463	91.1900	2533.374	2533.114	2533.311
Strain Gauge	**C305-EG0703A8.03**	09-08-12	Stepney Green Shaft Level 3A. Section 8. Sensor 3	Installed	86135.1509	36291.4463	91.1900	2471.448	2471.412	2471.259

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IRS Installation Record Sheets										
Sensor Type	Sensor ID	Installation Date	Sub-area		SENSOR Location - GPS reading (m)			Commissioning Readings (Hz)		
				Status	Eastings X (m)	Northings Y (m)	Elevation Z (mATD)			
Strain Gauge	**C305-EG0703A8.04**	09-08-12	Stepney Green Shaft Level 3A. Section 8. Sensor 4	Installed	86135.1509	36291.4463	91.1900	2598.497	2597.921	2598.191
								24-09-12 18:35	24-09-12 21:35	25-09-12 0:35
Strain Gauge	**C305-EG0703AW.01**	07-08-12	Stepney Green Shaft Level 3A. Section W. Sensor 1	Installed	86119.5060	36285.2543	91.1900	2469.002	2469.128	2469.128
Strain Gauge	**C305-EG0703AW.02**	07-08-12	Stepney Green Shaft Level 3A. Section W. Sensor 2	Installed	86119.5060	36285.2543	91.1900	2822.464	2822.626	2822.536
Strain Gauge	**C305-EG0703AW.03**	07-08-12	Stepney Green Shaft Level 3A. Section W. Sensor 3	Installed	86122.2190	36292.6790	91.1900	2859.162	2859.495	2859.892
Strain Gauge	**C305-EG0703AW.04**	07-08-12	Stepney Green Shaft Level 3A. Section W. Sensor 4	Installed	86122.2190	36292.6790	91.1900	2640.796	2640.859	2641.246
Strain Gauge	**C305-EG0703AW.05**	07-08-12	Stepney Green Shaft Level 3A. Section W. Sensor 5	Installed	86123.972	36297.0630	91.1900	2503.429	2503.591	2503.627
Strain Gauge	**C305-EG0703AW.06**	07-08-12	Stepney Green Shaft Level 3A. Section W. Sensor 6	Installed	86123.972	36297.0630	91.1900	2027.756	2027.828	2028.251
								23-11-12 16:55	23-11-12 19:55	23-11-12 22:55
Strain Gauge	**C305-EG0703B2.01**	16-10-12	Stepney Green Shaft Level 3B. Section 2. Sensor 1	Installed	86115.8163	36249.0669	86.0400	2463.101	2463.272	2464.001
Strain Gauge	**C305-EG0703B2.02**	16-10-12	Stepney Green Shaft Level 3B. Section 2. Sensor 2	Installed	86115.8163	36249.0669	86.0400	2648.817	2649.015	2649.744
Strain Gauge	**C305-EG0703B2.03**	16-10-12	Stepney Green Shaft Level 3B. Section 2. Sensor 3	Installed	86115.8163	36249.0669	86.0400	2400.760	2401.111	2401.678
Strain Gauge	**C305-EG0703B2.04**	16-10-12	Stepney Green Shaft Level 3B. Section 2. Sensor 4	Installed	86115.8163	36249.0669	86.0400	2509.879	2510.500	2511.688
								17-11-12 4:55	17-11-12 7:55	17-11-12 10:55
Strain Gauge	**C305-EG0703BW.01**	16-10-12	Stepney Green Shaft Level 3B. Section W. Sensor 1	Installed	86105.0806	36255.6535	86.0400	2383.582	2383.564	2383.627
Strain Gauge	**C305-EG0703BW.02**	16-10-12	Stepney Green Shaft Level 3B. Section W. Sensor 2	Installed	86105.0806	36255.6535	86.0400	2680.963	2680.999	2681.026
Strain Gauge	**C305-EG0703BW.03**	16-10-12	Stepney Green Shaft Level 3B. Section W. Sensor 3	Installed	86103.5766	36252.0231	86.0400	2594.765	2592.994	2591.537
Strain Gauge	**C305-EG0703BW.04**	16-10-12	Stepney Green Shaft Level 3B. Section W. Sensor 4	Installed	86103.5766	36252.0231	86.0400	2558.939	2559.119	2559.218
Strain Gauge	**C305-EG0703BW.05**	16-10-12	Stepney Green Shaft Level 3B. Section W. Sensor 5	Installed	86102.8470	36245.8730	86.0400	2277.178	2277.088	2276.890
Strain Gauge	**C305-EG0703BW.06**	16-10-12	Stepney Green Shaft Level 3B. Section W. Sensor 6	Installed	86102.8470	36245.8730	86.0400	2496.287	2496.512	2496.629

IRS Installation Record Sheets										
Sensor Type	Sensor ID	Installation Date	Sub-area	Status	SENSOR Location - GPS reading (m)			Commissioning Readings (Hz)		
					Eastings X (m)	Northings Y (m)	Elevation Z (mATD)			
								25-09-12 14:07	25-09-12 23:07	26-09-12 2:07
Strain Gauge	**C305-EG0704A7.01**	15-09-12	Stepney Green Shaft Level 4A. Section 7. Sensor 1	Installed	86130.6583	36282.5341	83.3700	2378.204	2376.899	2375.541
Strain Gauge	**C305-EG0704A7.02**	15-09-12	Stepney Green Shaft Level 4A. Section 7. Sensor 2	Installed	86130.6583	36282.5341	83.3700	2547.146	2548.802	2548.892
Strain Gauge	**C305-EG0704A7.03**	15-09-12	Stepney Green Shaft Level 4A. Section 7. Sensor 3	Installed	86130.6583	36282.5341	83.3700	2623.528	2621.269	2620.964
Strain Gauge	**C305-EG0704A7.04**	15-09-12	Stepney Green Shaft Level 4A. Section 7. Sensor 4	Installed	86130.6583	36282.5341	83.3700	2550.814	2551.300	2551.390
								26-09-12 20:07	26-09-12 23:07	27-09-12 2:07
Strain Gauge	**C305-EG0704AW.01**	14-09-12	Stepney Green Shaft Level 4A. Section W. Sensor 1	Installed	86119.5060	36285.2543	83.3700	2651.118	2651.145	2651.271
Strain Gauge	**C305-EG0704AW.02**	14-09-12	Stepney Green Shaft Level 4A. Section W. Sensor 2	Installed	86119.5060	36285.2543	83.3700	2507.203	2507.401	2507.491
Strain Gauge	**C305-EG0704AW.03**	14-09-12	Stepney Green Shaft Level 4A. Section W. Sensor 3	Installed	86122.5066	36293.7209	83.3700	2625.051	2625.564	2625.726
Strain Gauge	**C305-EG0704AW.04**	14-09-12	Stepney Green Shaft Level 4A. Section W. Sensor 4	Installed	86122.5066	36293.7209	83.3700	2605.542	2606.694	2607.279
Strain Gauge	**C305-EG0704AW.05**	14-09-12	Stepney Green Shaft Level 4A. Section W. Sensor 5	Installed	86129.5881	36297.7144	83.3700	#N/A	#N/A	#N/A
Strain Gauge	**C305-EG0704AW.06**	14-09-12	Stepney Green Shaft Level 4A. Section W. Sensor 6	Installed	86129.5881	36297.7144	83.3700	2270.830	2270.686	2270.497
								24-11-12 3:03	24-11-12 6:03	24-11-12 9:03
Strain Gauge	**C305-EG0704B2.01**	19-10-12	Stepney Green Shaft Level 4B. Section 2. Sensor 1	Installed	86115.8163	36249.0669	80.2000	2406.091	2407.886	2411.045
Strain Gauge	**C305-EG0704B2.02**	19-10-12	Stepney Green Shaft Level 4B. Section 2. Sensor 2	Installed	86115.8163	36249.0669	80.2000	2142.808	2145.075	2149.134
Strain Gauge	**C305-EG0704B2.03**	19-10-12	Stepney Green Shaft Level 4B. Section 2. Sensor 3	Installed	86115.8163	36249.0669	80.2000	2439.726	2439.519	2439.475
Strain Gauge	**C305-EG0704B2.04**	19-10-12	Stepney Green Shaft Level 4B. Section 2. Sensor 4	Installed	86115.8163	36249.0669	80.2000	2572.160	2573.788	2574.696
								07-12-12 1:55	07-12-12 4:55	07-12-12 7:55
Strain Gauge	**C305-EG0704B3.01**	01-11-12	Stepney Green Shaft Level 4B. Section 3. Sensor 1	Installed	86119.6541	36257.0538	80.2000	2611.041	2611.265	2611.724
Strain Gauge	**C305-EG0704B3.02**	01-11-12	Stepney Green Shaft Level 4B. Section 3. Sensor 2	Installed	86119.6541	36257.0538	80.2000	2512.255	2512.642	2513.254

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IRS Installation Record Sheets										
Sensor Type	Sensor ID	Installation Date	Sub-area		SENSOR Location - GPS reading (m)			Commissioning Readings (Hz)		
				Status	Eastings X (m)	Northings Y (m)	Elevation Z (mATD)			
Strain Gauge	**C305-EG0704B3.03**	01-11-12	Stepney Green Shaft Level 4B. Section 3. Sensor 3	Installed	86119.6541	36257.0538	80.2000	2139.830	2140.298	2140.902
Strain Gauge	**C305-EG0704B3.04**	01-11-12	Stepney Green Shaft Level 4B. Section 3. Sensor 4	Installed	86119.6541	36257.0538	80.2000	#N/A	#N/A	#N/A
								04-12-12 19:55	04-12-12 22:55	05-12-12 1:55
Strain Gauge	**C305-EG0704B4.01**	26-10-12	Stepney Green Shaft Level 4B. Section 4. Sensor 1	Installed	86122.5585	36262.2401	80.2000	2532.647	2538.226	2542.755
Strain Gauge	**C305-EG0704B4.02**	26-10-12	Stepney Green Shaft Level 4B. Section 4. Sensor 2	Installed	86122.5585	36262.2401	80.2000	2411.008	2404.552	2397.927
Strain Gauge e	**C305-EG0704B4.03**	26-10-12	Stepney Green Shaft Level 4B. Section 4. Sensor 3	Installed	86122.5585	36262.2401	80.2000	2420.854	2426.159	2432.310
Strain Gauge	**C305-EG0704B4.04**	26-10-12	Stepney Green Shaft Level 4B. Section 4. Sensor 4	Installed	86122.5585	36262.2401	80.2000	2325.385	2330.940	2337.351
								11-12-12 19:06	11-12-12 22:06	12-12-12 1:06
Strain Gauge	**C305-EG0704B5.01**	05-11-12	Stepney Green Shaft Level 4B. Section 5. Sensor 1	Installed	86125.2553	36269.5009	80.2000	#N/A	#N/A	#N/A
Strain Gauge	**C305-EG0704B5.02**	05-11-12	Stepney Green Shaft Level 4B. Section 5. Sensor 2	Installed	86125.2553	36269.5009	80.2000	#N/A	#N/A	#N/A
Strain Gauge	**C305-EG0704B5.03**	05-11-12	Stepney Green Shaft Level 4B. Section 5. Sensor 3	Installed	86125.2553	36269.5009	80.2000	#N/A	#N/A	#N/A
Strain Gauge	**C305-EG0704B5.04**	05-11-12	Stepney Green Shaft Level 4B. Section 5. Sensor 4	Installed	86125.2553	36269.5009	80.2000	2562.071	2564.437	2566.542
								09-12-12 18:01	09-12-12 21:01	10-12-12 0:01
Strain Gauge	**C305-EG0704B6.01**	05-11-12	Stepney Green Shaft Level 4B. Section 6. Sensor 1	Installed	86127.6410	36275.4652	80.2000	2560.972	2560.352	2560.766
Strain Gauge	**C305-EG0704B6.02**	05-11-12	Stepney Green Shaft Level 4B. Section 6. Sensor 2	Installed	86127.6410	36275.4652	80.2000	#N/A	#N/A	#N/A
Strain Gauge	**C305-EG0704B6.03**	05-11-12	Stepney Green Shaft Level 4B. Section 6. Sensor 3	Installed	86127.6410	36275.4652	80.2000	2498.883	2498.892	2499.243
Strain Gauge	**C305-EG0704B6.04**	05-11-12	Stepney Green Shaft Level 4B. Section 6. Sensor 4	Installed	86127.6410	36275.4652	80.2000	2482.049	2482.076	2482.390
								24-11-12 1:06	24-11-12 4:06	24-11-12 7:06
Strain Gauge	**C305-EG0704BW.01**	19-10-12	Stepney Green Shaft Level 4B. Section W. Sensor 1	Installed	86105.0806	36255.6535	80.2000	2521.110	2522.058	2523.275
Strain Gauge	**C305-EG0704BW.02**	19-10-12	Stepney Green Shaft Level 4B. Section W. Sensor 2	Installed	86105.0806	36255.6535	80.2000	2546.778	2547.021	2547.111

IRS Installation Record Sheets										
Sensor Type	Sensor ID	Installation Date	Sub-area	Status	SENSOR Location - GPS reading (m)			Commissioning Readings (Hz)		
					Eastings X (m)	Northings Y (m)	Elevation Z (mATD)			
Strain Gauge	**C305-EG0704BW.03**	19-10-12	Stepney Green Shaft Level 4B. Section W. Sensor 3	Installed	86103.5766	36252.0231	80.2000	2185.674	2187.188	2189.073
Strain Gauge	**C305-EG0704BW.04**	19-10-12	Stepney Green Shaft Level 4B. Section W. Sensor 4	Installed	86103.5766	36252.0231	80.2000	2345.604	2345.829	2345.676
Strain Gauge	**C305-EG0704BW.05**	19-10-12	Stepney Green Shaft Level 4B. Section W. Sensor 5	Installed	86102.8470	36245.8730	80.2000	2548.723	2548.669	2548.245
Strain Gauge	**C305-EG0704BW.06**	19-10-12	Stepney Green Shaft Level 4B. Section W. Sensor 6	Installed	86102.8470	36245.8730	80.2000	2542.827	2543.367	2543.979

Notes: Coordinates for sensor location (Easting, Northing and Elevation) are GPS readings. All elevations presented are metres above tunnel datum (mATD).

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IRS Installation Record Sheets							
Sensor Type	Monitoring ID	Installation date	Status	Sensor location - GPS reading			Depth
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	(m bgl)
Rod Extensometer	**C305-XR21001**	06-03-12	Installed	86125.4645	36258.8495	110.3349	46.0
Rod Extensometer	**C305-XR21002**	06-03-12	Installed	86135.1225	36255.1557	110.0263	45.0
Rod Extensometer	**C305-XR21003**	07-03-12	Not installed	86144.3627	36251.5387	110.1320	44.5
Rod Extensometer	**C305-XR21004**	06-03-12	Installed	86097.9305	36246.2594	109.5015	44.0
Rod Extensometer	**C305-XR21005**	06-03-12	Installed	86092.9084	36236.3148	110.1758	44.0
Rod Extensometer	**C305-XR21006**	06-03-12	Installed	86078.8100	36235.6620	110.0710	44.0
Rod Extensometer	**C305-XR21007**	07-03-12	Installed	86097.9348	36246.2696	109.4972	44.0
Rod Extensometer	**C305-XR21008**	07-03-12	Installed	86089.4633	36252.8428	109.9483	44.0
Rod Extensometer	**C305-XR21009**	07-03-12	Installed	86081.0054	36258.6844	110.0103	44.0

Note: Coordinates for sensor location (Easting, Northing and Elevation) are GPS readings. Depht is referred to the borehole and meters below ground level, except where the sensor type is specified. In the C305-XR21003 it was not possible the installation of the sensor.

COMMISSIONING READINGS ROD EXTENSOMETERS						
			10-06-12 13:00	**10-06-12 13:10**	**10-06-12 13:20**	**Units**
Rod Extensometer with displacement transducers	**C305-XR21001**	XR2100144.00	-0.634	-0.634	-0.635	mm
		XR2100137.00	-0.030	-0.030	-0.030	mm
		XR2100130.00	-0.778	-0.778	-0.778	mm
		XR2100123.00	0.733	0.733	0.733	mm
		XR2100116.00	0.021	0.021	0.020	mm
		XR2100109.00	0.614	0.614	0.614	mm
			10-06-12 16:40	**10-06-12 16:50**	**10-06-12 17:00**	**Units**
Rod Extensometer with displacement transducers	**C305-XR21002**	XR2100244.00	-0.412	-0.412	-0.412	mm
		XR2100237.00	-0.101	-0.101	-0.101	mm
		XR2100230.00	0.033	0.032	0.032	mm
		XR2100223.00	-0.210	-0.210	-0.210	mm
		XR2100216.00	-0.060	-0.060	-0.060	mm
		XR2100209.00	0.220	0.220	0.220	mm

COMMISSIONING READINGS ROD EXTENSOMETERS						
			10-06-12 20:40	**10-06-12 20:50**	**10-06-12 21:00**	**Units**
Rod Extensometer with displacement transducers	**C305-XR21004**	XR2100444.00	-3.359	-3.359	-3.358	mm
		XR2100437.00	2.448	2.449	2.450	mm
		XR2100430.00	-0.687	-0.687	-0.686	mm
		XR2100423.00	0.295	0.296	0.296	mm
			23-06-12 22:10	**30-06-12 10:50**	**07-07-12 9:20**	**Units**
		XR2100416.00	-1.083	-1.652	-1.182	mm
			17-06-12 6:20	**23-06-12 22:10**	**30-06-12 10:50**	**Units**
		XR2100409.00	-2.853	-2.304	-3.036	mm
			10-06-12 16:40	**10-06-12 16:50**	**10-06-12 17:00**	**Units**
Rod Extensometer with displacement transducers	**C305-XR21005**	XR2100544.00	2.007	2.007	2.007	mm
		XR2100537.00	-2.574	-2.574	-2.575	mm
		XR2100530.00	NULL	NULL	NULL	mm
		XR2100523.00	NULL	NULL	NULL	mm
		XR2100516.00	3.117	3.118	3.118	mm
		XR2100509.00	-1.912	-1.911	-1.911	mm
			10-06-12 16:40	**10-06-12 16:50**	**10-06-12 17:00**	**Units**
Rod Extensometer with displacement transducers	**C305-XR21006**	XR2100644.00	2.260	2.260	2.259	mm
		XR2100637.00	-3.802	-3.801	-3.802	mm
		XR2100630.00	-3.305	-3.305	-3.303	mm
		XR2100623.00	3.376	3.376	3.377	mm
		XR2100616.00	3.842	3.842	3.842	mm
		XR2100609.00	-2.232	-2.231	-2.229	mm
			10-06-12 23:10	**10-06-12 23:20**	**10-06-12 23:30**	**Units**
Rod Extensometer with displacement transducers	**C305-XR21007**	XR2100744.00	-0.005	-0.004	-0.004	mm
		XR2100737.00	0.307	0.308	0.310	mm
		XR2100730.00	-0.457	-0.456	-0.456	mm
		XR2100723.00	-0.349	-0.345	-0.345	mm
		XR2100716.00	-0.051	-0.050	-0.049	mm
		XR2100709.00	-0.001	0.002	0.003	mm
			10-06-12 16:40	**10-06-12 16:50**	**10-06-12 17:00**	**Units**

COMMISSIONING READINGS ROD EXTENSOMETERS						
Rod Extensometer with displacement transducers	**C305-XR21008**	XR2100844.00	-2.798	-2.798	-2.798	mm
		XR2100837.00	-0.906	-0.906	-0.905	mm
		XR2100830.00	0.397	0.397	0.397	mm
		XR2100823.00	-1.412	-1.412	-1.412	mm
		XR2100816.00	0.339	0.338	0.337	mm
		XR2100809.00	1.859	1.859	1.859	mm
			10-06-12 16:40	**10-06-12 16:50**	**10-06-12 17:00**	**Units**
Rod Extensometer with displacement transducers	**C305-XR21009**	XR2100944.00	-0.245	-0.246	-0.246	mm
		XR2100937.00	-0.080	-0.080	-0.080	mm
		XR2100930.00	-2.973	-2.973	-2.973	mm
		XR2100923.00	-0.113	-0.114	-0.114	mm
		XR2100916.00	0.996	0.996	0.996	mm
		XR2100909.00	0.642	0.641	0.641	mm

Notes: Automatic extensometers record relative movements between head and anchors.

IRS Installation Record Sheets								
Sensor Type	Sensor ID	Installation Date Casing	Installation Date sensor	Status	Location Sensor-GPS readings (m)			Depth borehole (m bgl)
					Eastings X	Northings Y	Elevation Z (mATD)	
Inclinometer	**C305-IE21001**	01-02-12	19-03-12	Installed	86124.6786	36256.8518	109.8892	51.0000
Inclinometer	**C305-IE21002**	08-02-12	22-03-12	Installed	86134.2270	36253.2762	110.0237	45.5000
Inclinometer	**C305-IE21003**	26-01-12	27-03-12	Installed	86143.7501	36249.6788	110.1679	44.5000
Inclinometer	**C305-IE21004**	18-01-12	05-04-12	Installed	86097.9305	36246.2594	109.5015	50.0000
Inclinometer	**C305-IE21005**	13-12-11	21-03-12	Installed	86091.3198	36237.5027	110.1565	44.0000
Inclinometer	**C305-IE21006**	19-12-11	17-03-12	Installed	86078.3460	36236.8840	110.0520	44.0000
Inclinometer	**C305-IE21007**	15-02-12	05-04-12	Installed	86099.2949	36249.5569	109.8328	51.0000
Inclinometer	**C305-IE21008**	25-11-11	12-03-12	Installed	86090.6520	36255.1130	109.7460	44.0000
Inclinometer	**C305-IE21009**	16-11-11	15-03-12	Installed	86082.2370	36260.5210	109.7860	44.0000

Note: Depth is referred to meters below ground level. Coordinates for sensor location (Easting, Northing and Elevation) are GPS readings. All elevations presented are metres above tunnel datum (mATD).

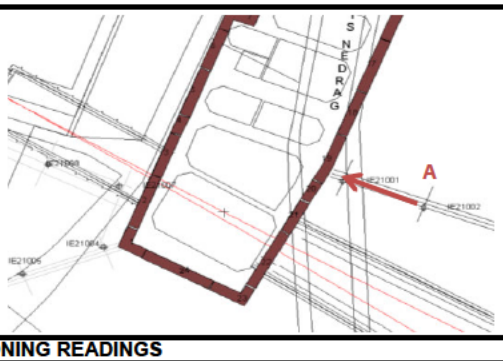
C305-IE21001

UNIAXIAL INCLINOMETER

	COMMISSIONING READINGS		
	12-06-12 11:50	18-06-12 11:50	24-06-12 11:50
Depth (m)	A (mm)	A (mm)	A (mm)
0.0	1.225	1.213	1.209
3.0	0.761	0.759	0.758
6.0	-2.013	-2.020	-2.022
9.0	-0.537	-0.551	-0.552
12.0	-1.380	-1.392	-1.392
15.0	-0.077	-0.064	-0.062
18.0	-0.295	-0.287	-0.286
21.0	-0.908	-0.900	-0.898
24.0	0.006	0.015	0.014
27.0	0.947	0.952	0.952
30.0	0.315	0.325	0.325
33.0	0.094	0.101	0.102
36.0	1.357	1.354	1.352
39.0	0.555	0.559	0.561
42.0	1.941	1.947	1.949
45.0	-0.733	-0.733	-0.732
48.0	-1.260	-1.257	-1.258

C305-IE21002

UNIAXIAL INCLINOMETER



	COMMISSIONING READINGS		
	16-06-12 11:30	22-06-12 11:30	28-06-12 11:30
Depth (m)	A (mm)	A (mm)	A (mm)
0.0	0.016	0.036	0.037
3.0	-0.023	-0.006	-0.007
6.0	-0.013	-0.004	-0.004
9.0	-0.005	0.000	0.001
12.0	-0.010	0.006	0.003
15.0	-0.004	0.009	0.007
18.0	-0.016	-0.007	-0.010
21.0	0.001	0.011	0.010
24.0	-0.003	0.009	0.004
27.0	0.002	0.009	0.011
30.0	-0.010	0.007	0.003
33.0	NULL	NULL	NULL
36.0	-0.006	0.006	0.006
39.0	NULL	NULL	NULL
42.0	-0.008	0.007	0.005

C305-IE21003

UNIAXIAL INCLINOMETER

	COMMISSIONING READINGS		
	16-06-12 11 30	22-06-12 11 30	28-06-12 21 30
Depth (m)	A (mm)	A (mm)	A (mm)
0.0	0.008	0.007	0 007
3.0	-0.005	-0.006	0 000
6.0	-0.008	0.007	0 007
9.0	-0.011	-0.005	-0.012
12.0	0.001	0.008	0 008
15.0	0.005	0.002	0 006
18.0	0.000	0.001	0 001
21.0	0.010	0.007	0 009
24.0	0.009	0.012	0 020
27.0	0.001	0.001	0 000
30.0	0.001	0.001	0 000
33.0	0.005	0.001	0 002
36.0	-0.005	-0.017	-0.007
39.0	-0.004	-0.008	-0.005
42.0	0.001	-0.004	-0.003

C305-IE21004

UNIAXIAL INCLINOMETER

	COMMISSIONING READINGS		
	12-06-12 15:00	18-06-12 15:00	24-06-12 15:00
Depth (m)	A (mm)	A (mm)	A (mm)
0.0	-0.016	-0.019	-0.022
3.0	-0.005	-0.010	-0.013
6.0	-0.004	-0.015	-0.017
9.0	-0.002	-0.002	-0.003
12.0	0.007	0.002	0.001
15.0	NULL	NULL	NULL
18.0	-0.001	-0.004	-0.003
21.0	0.001	-0.002	-0.005
24.0	0.004	0.002	0.001
27.0	0.000	0.001	0.000
30.0	0.001	0.000	-0.001
33.0	0.002	-0.001	-0.002
36.0	0.000	-0.004	-0.006
39.0	-0.002	-0.003	-0.003
42.0	0.010	0.015	0.017
45.0	-0.002	-0.003	-0.004
48.0	0.001	0.001	0.002

C305-IE21005

UNIAXIAL INCLINOMETER

	COMMISSIONING READINGS		
	12-06-12 15:10	18-06-12 15:10	24-06-12 15:10
Depth (m)	A (mm)	A (mm)	A (mm)
0.0	-0.024	-0.012	-0.021
3.0	0.008	0.013	0.014
6.0	-0.001	-0.001	0.000
9.0	0.001	0.000	0.001
12.0	-0.008	-0.006	-0.009
15.0	0.000	0.005	0.000
18.0	0.004	0.009	0.008
21.0	-0.004	0.002	-0.005
24.0	-0.006	-0.002	-0.011
27.0	-0.003	0.000	-0.020
30.0	0.007	0.009	0.010
33.0	0.005	0.004	0.005
36.0	0.002	0.004	0.002
39.0	0.008	0.009	0.002
42.0	-0.002	-0.003	-0.003

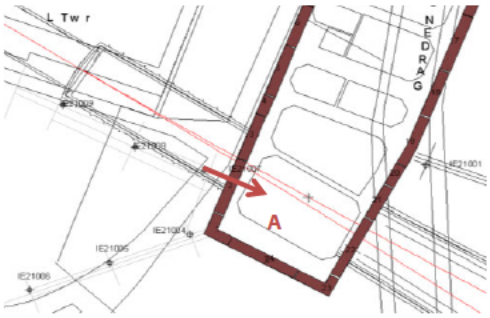
C305-IE21006

UNIAXIAL INCLINOMETER

	COMMISSIONING READINGS		
	12-06-12 15:10	18-06-12 15:10	24-06-12 15:10
Depth (m)	A (mm)	A (mm)	A (mm)
0.0	NULL	NULL	NULL
3.0	NULL	NULL	NULL
6.0	NULL	NULL	NULL
9.0	-0.017	-0.009	-0.010
12.0	-0.013	-0.011	-0.016
15.0	NULL	NULL	NULL
18.0	-0.010	-0.010	-0.015
21.0	-0.002	0.009	0.006
24.0	0.061	0.073	0.072
27.0	-0.012	-0.008	-0.012
30.0	-0.020	-0.012	-0.016
33.0	-0.026	-0.024	-0.151
36.0	-0.022	-0.024	-0.030
39.0	-0.015	-0.015	-0.020
42.0	-0.014	-0.014	-0.019

C305-IE21007

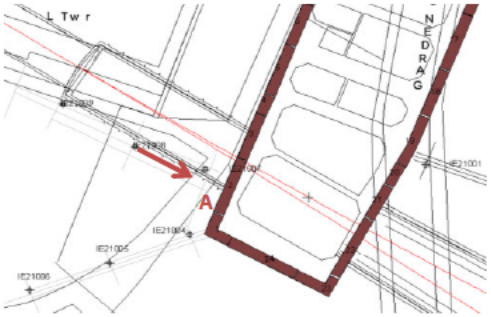
UNIAXIAL INCLINOMETER



	COMMISSIONING READINGS		
	12-06-12 16:50	18-06-12 16:50	24-06-12 16:50
Depth (m)	A (mm)	A (mm)	A (mm)
0.0	-0.020	-0.022	-0.026
3.0	-0.014	-0.016	-0.014
6.0	0.007	0.003	0.000
9.0	0.007	0.006	0.004
12.0	-0.008	-0.013	-0.017
15.0	-0.002	-0.004	-0.003
18.0	-0.005	-0.006	-0.005
21.0	-0.004	-0.004	-0.002
24.0	-0.007	-0.009	-0.009
27.0	-0.024	-0.027	-0.027
30.0	-0.002	-0.001	-0.001
33.0	-0.005	-0.006	-0.006
36.0	-0.008	-0.008	-0.008
39.0	-0.007	-0.008	-0.008
42.0	-0.006	-0.006	-0.006
45.0	-0.002	-0.002	-0.002
48.0	-0.005	-0.005	-0.006

C305-IE21008

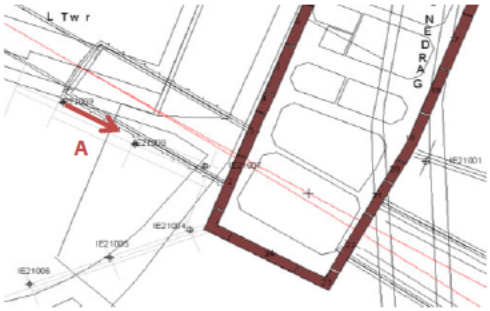
UNIAXIAL INCLINOMETER



	COMMISSIONING READINGS		
	12-06-12 16:50	18-06-12 16:50	24-06-12 16:50
Depth (m)	A (mm)	A (mm)	A (mm)
0.0	-0.008	-0.009	-0.010
3.0	0.002	-0.002	-0.004
6.0	-0.002	-0.003	-0.005
9.0	-0.007	-0.006	-0.008
12.0	-0.007	-0.011	-0.012
15.0	-0.006	-0.006	-0.007
18.0	0.021	0.024	0.027
21.0	-0.001	0.000	-0.002
24.0	0.002	0.005	0.002
27.0	0.004	0.004	0.004
30.0	0.009	0.009	0.007
33.0	0.008	0.007	0.007
36.0	0.018	0.019	0.015
39.0	0.000	0.000	0.006
42.0	-0.050	-0.051	-0.060

C305-IE21009

UNIAXIAL INCLINOMETER



	COMMISSIONING READINGS		
	12-06-12 16:50	18-06-12 16:50	24-06-12 16:50
Depth (m)	A (mm)	A (mm)	A (mm)
0.0	-0.008	0.001	-0.012
3.0	-0.022	-0.008	-0.018
6.0	-0.022	-0.034	-0.050
9.0	-0.014	-0.010	-0.029
12.0	-0.023	-0.014	-0.029
15.0	-0.013	-0.003	-0.011
18.0	0.021	0.000	0.022
21.0	-0.003	0.011	0.004
24.0	-0.018	0.000	-0.014
27.0	0.034	0.014	0.035
30.0	0.006	0.024	0.021
33.0	-0.010	0.000	-0.010
36.0	-0.230	-0.169	-0.241
39.0	0.010	0.011	0.012
42.0	-0.004	-0.004	-0.006

IR for I&M installed as per "Stepney Green for Ground Levelling to Monitor the Shaft Construction and Holloway Relief Sewer" MS - C305-DSJ-C2-RGN-CR094_WS108-50002

Sensor Type	Sensor ID	Installation Date	Status	Sensor Location - GPS Reading			Commisioning Readings (m)			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Date	Elevation Z1 (mATD)	Elevation Z2 (mATD)	Elevation Z3 (mATD)
Sockets	C305-LB07049	27/10/2011	INSTALLED	86128.384	36350.199	110.023	07/11/2011	110.022	110.023	110.023
Sockets	C305-LB07050	27/10/2011	INSTALLED	86136.536	36344.532	110.033	07/11/2011	110.033	110.032	110.033
Sockets	C305-LB07051	27/10/2011	INSTALLED	86144.006	36340.090	110.036	07/11/2011	110.035	110.036	110.036
Sockets	C305-LB07052	27/10/2011	INSTALLED	86152.669	36335.133	110.101	07/11/2011	110.101	110.101	110.101
Sockets	C305-LB07053	27/10/2011	INSTALLED	86161.583	36330.380	110.128	07/11/2011	110.128	110.128	110.129
Sockets	C305-LB07054	27/10/2011	INSTALLED	86170.148	36325.653	110.159	07/11/2011	110.158	110.159	110.158
Sockets	C305-LB07055	27/10/2011	INSTALLED	86179.250	36321.546	110.153	07/11/2011	110.153	110.152	110.153
Sockets	C305-LB07056	27/10/2011	INSTALLED	86188.747	36318.125	110.177	07/11/2011	110.176	110.177	110.177
Sockets	C305-LB07057	27/10/2011	INSTALLED	86198.146	36314.947	110.112	07/11/2011	110.112	110.112	110.113
Sockets	C305-LB07059	27/10/2011	INSTALLED	86211.921	36330.481	110.387	07/11/2011	110.386	110.388	110.387
Sockets	C305-LB07060	27/10/2011	INSTALLED	86213.544	36345.360	110.410	07/11/2011	110.411	110.410	110.411
Sockets	C305-LB07061	27/10/2011	INSTALLED	86209.427	36357.109	110.623	07/11/2011	110.623	110.623	110.623
Sockets	C305-LB07062	27/10/2011	INSTALLED	86198.708	36364.469	110.633	07/11/2011	110.633	110.633	110.632
Sockets	C305-LB07063	27/10/2011	INSTALLED	86188.395	36371.563	110.614	07/11/2011	110.613	110.614	110.613
Levelling Point	C305-LP07001	04/10/2011	INSTALLED	86184.164	36305.762	109.114	22/10/2011	109.143	109.066	109.127
Levelling Point	C305-LP07002	04/10/2011	INSTALLED	86182.943	36300.938	109.127	22/10/2011	109.092	109.132	109.154
Levelling Point	C305-LP07003	04/10/2011	INSTALLED	86181.769	36295.679	109.204	22/10/2011	109.159	109.188	109.158
Levelling Point	C305-LP07004	04/10/2011	INSTALLED	86179.224	36291.728	109.180	22/10/2011	109.216	109.167	109.154
Levelling Point	C305-LP07005	04/10/2011	INSTALLED	86177.093	36287.198	109.205	22/10/2011	109.199	109.233	109.181
Levelling Point	C305-LP07006	04/10/2011	INSTALLED	86175.780	36282.383	109.231	22/10/2011	109.222	109.236	109.236
Levelling Point	C305-LP07007	04/10/2011	INSTALLED	86174.271	36277.589	109.295	22/10/2011	109.262	109.312	109.313
Levelling Point	C305-LP07008	04/10/2011	INSTALLED	86172.807	36272.826	109.290	22/10/2011	109.285	109.286	109.285
Levelling Point	C305-LP07009	04/10/2011	INSTALLED	86171.768	36267.946	109.317	22/10/2011	109.335	109.284	109.329
Levelling Point	C305-LP07010	04/10/2011	INSTALLED	86170.973	36263.027	109.336	22/10/2011	109.360	109.326	109.310
Levelling Point	C305-LP07011	04/10/2011	INSTALLED	86170.491	36258.201	109.334	22/10/2011	109.390	109.332	109.307
Levelling Point	C305-LP07012	04/10/2011	INSTALLED	86169.581	36252.910	109.345	22/10/2011	109.314	109.383	109.377
Levelling Point	C305-LP07013	04/10/2011	INSTALLED	86170.096	36285.972	110.018	22/10/2011	110.015	110.016	110.015
Levelling Point	C305-LP07014	04/10/2011	INSTALLED	86162.608	36272.194	109.550	22/10/2011	110.100	110.148	110.067

Sensor Type	Sensor ID	Installation Date	Status	Sensor Location - GPS Reading			Commisioning Readings (m)			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Date	Elevation Z1 (mATD)	Elevation Z2 (mATD)	Elevation Z3 (mATD)
Levelling Point	C305-LP07017	04/10/2011	INSTALLED	86135.169	36323.396	109.240	29/11/2011	109.245	109.246	109.246
Levelling Point	C305-LP07018	04/10/2011	INSTALLED	86134.203	36317.593	109.278	29/11/2011	109.284	109.285	109.284
Levelling Point	C305-LP07019	04/10/2011	INSTALLED	86133.392	36312.963	109.316	29/11/2011	109.318	109.319	109.318
Levelling Point	C305-LP07020	04/10/2011	INSTALLED	86113.811	36307.801	110.153	22/10/2011	110.164	110.162	110.163
Levelling Point	C305-LP07021	04/10/2011	INSTALLED	86105.602	36285.917	110.093	22/10/2011	110.131	110.069	110.115
Levelling Point	C305-LP07022	04/10/2011	INSTALLED	86093.993	36255.951	109.755	22/10/2011	109.726	109.803	109.752
Levelling Point	C305-LP07030	04/10/2011	INSTALLED	86059.623	36270.647	109.494	22/10/2011	109.500	109.500	109.500
Levelling Point	C305-LP07031	04/10/2011	INSTALLED	86054.922	36272.349	109.497	22/10/2011	109.505	109.504	109.504
Levelling Point	C305-LP07032	04/10/2011	INSTALLED	86050.182	36274.072	109.488	22/10/2011	109.493	109.494	109.493
Levelling Point	C305-LP07033	04/10/2011	INSTALLED	86045.455	36275.798	109.467	22/10/2011	109.474	109.473	109.474
Levelling Point	C305-LP07034	04/10/2011	INSTALLED	86040.849	36277.504	109.417	22/10/2011	109.426	109.425	109.425
Levelling Point	C305-LP07035	04/10/2011	INSTALLED	86036.155	36279.231	109.438	22/10/2011	109.448	109.449	109.448
Levelling Point	C305-LP07036	04/10/2011	INSTALLED	86031.380	36280.912	109.477	22/10/2011	109.485	109.485	109.485
Levelling Point	C305-LP07037	04/10/2011	INSTALLED	86026.656	36282.677	109.485	22/10/2011	109.496	109.496	109.496
Levelling Point	C305-LP07038	04/10/2011	INSTALLED	86021.976	36284.384	109.504	22/10/2011	109.514	109.513	109.513
Levelling Point	C305-LP07039	04/10/2011	INSTALLED	86017.452	36286.009	109.513	22/10/2011	109.521	109.522	109.522
Levelling Point	C305-LP07040	04/10/2011	INSTALLED	86012.799	36287.710	109.529	22/10/2011	109.534	109.534	109.534
Levelling Point	C305-LP07041	04/10/2011	INSTALLED	86008.064	36289.420	109.507	22/10/2011	109.514	109.513	109.514
Levelling Point	C305-LP07042	04/10/2011	INSTALLED	86003.361	36291.111	109.489	22/10/2011	109.496	109.495	109.496
Levelling Point	C305-LP07043	04/10/2011	INSTALLED	85998.721	36292.872	109.476	22/10/2011	109.481	109.482	109.481
Levelling Point	C305-LP07044	04/10/2011	INSTALLED	85994.028	36294.559	109.479	22/10/2011	109.484	109.485	109.485
Levelling Point	C305-LP07045	04/10/2011	INSTALLED	85989.387	36296.297	109.454	22/10/2011	109.458	109.458	109.458
Levelling Point	C305-LP07046	04/10/2011	INSTALLED	86064.463	36363.421	109.555	22/10/2011	109.553	109.554	109.553
Levelling Point	C305-LP07047	04/10/2011	INSTALLED	86068.762	36360.651	109.502	22/10/2011	109.500	109.499	109.499
Levelling Point	C305-LP07048	04/10/2011	INSTALLED	86073.228	36358.286	109.505	22/10/2011	109.504	109.505	109.504
Levelling Point	C305-LP07049	04/10/2011	INSTALLED	86077.895	36356.873	109.526	22/10/2011	109.527	109.527	109.527
Levelling Point	C305-LP07050	04/10/2011	INSTALLED	86082.799	36356.232	109.558	22/10/2011	109.555	109.556	109.556
Levelling Point	C305-LP07051	04/10/2011	INSTALLED	86088.020	36355.653	109.510	22/10/2011	109.568	109.569	109.568
Levelling Point	C305-LP07052	04/10/2011	INSTALLED	86092.795	36355.285	109.567	22/10/2011	109.571	109.571	109.571
Levelling Point	C305-LP07053	04/10/2011	INSTALLED	86097.830	36354.629	109.568	22/10/2011	109.571	109.570	109.570
Levelling Point	C305-LP07054	04/10/2011	INSTALLED	86102.638	36352.909	109.534	22/10/2011	109.535	109.536	109.536

Sensor Type	Sensor ID	Installation Date	Status	Sensor Location - GPS Reading			Commisioning Readings (m)			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Date	Elevation Z1 (mATD)	Elevation Z2 (mATD)	Elevation Z3 (mATD)
Levelling Point	C305-LP07055	04/10/2011	INSTALLED	86106.800	36350.022	109.500	22/10/2011	109.495	109.495	109.494
Levelling Point	C305-LP07056	04/10/2011	INSTALLED	86110.681	36346.845	109.448	22/10/2011	109.446	109.445	109.445
Levelling Point	C305-LP07057	04/10/2011	INSTALLED	86114.640	36343.584	109.375	22/10/2011	109.371	109.371	109.371
Levelling Point	C305-LP07058	04/10/2011	INSTALLED	86118.468	36340.449	109.329	23/10/2011	109.326	109.325	109.325
Levelling Point	C305-LP07059	04/10/2011	INSTALLED	86122.640	36337.789	109.129	22/10/2011	109.128	109.128	109.128
Levelling Point	C305-LP07060	04/10/2011	INSTALLED	86127.009	36335.538	109.239	22/10/2011	109.239	109.240	109.239
Levelling Point	C305-LP07061	04/10/2011	INSTALLED	86131.462	36333.182	109.151	22/10/2011	109.150	109.150	109.150
Levelling Point	C305-LP07062	04/10/2011	INSTALLED	86140.158	36329.249	109.169	22/10/2011	109.165	109.166	109.165
Levelling Point	C305-LP07063	04/10/2011	INSTALLED	86144.801	36327.110	109.150	22/10/2011	109.150	109.150	109.150
Levelling Point	C305-LP07064	04/10/2011	INSTALLED	86149.373	36325.066	109.142	22/10/2011	109.143	109.142	109.143
Levelling Point	C305-LP07065	04/10/2011	INSTALLED	86154.010	36322.988	109.156	22/10/2011	109.157	109.157	109.157
Levelling Point	C305-LP07066	04/10/2011	INSTALLED	86158.599	36320.920	109.176	22/10/2011	109.177	109.176	109.176
Levelling Point	C305-LP07067	04/10/2011	INSTALLED	86163.118	36318.884	109.211	22/10/2011	109.211	109.210	109.211
Levelling Point	C305-LP07068	04/10/2011	INSTALLED	86167.761	36316.832	109.221	22/10/2011	109.221	109.220	109.221
Levelling Point	C305-LP07069	04/10/2011	INSTALLED	86172.287	36314.811	109.215	22/10/2011	109.214	109.215	109.215
Levelling Point	C305-LP07070	04/10/2011	INSTALLED	86175.806	36311.059	109.140	22/10/2011	109.157	109.156	109.156
Levelling Point	C305-LP07071	04/10/2011	INSTALLED	86186.093	36308.893	109.058	22/10/2011	109.056	109.056	109.056
Levelling Point	C305-LP07072	04/10/2011	INSTALLED	86190.862	36307.367	109.043	22/10/2011	109.038	109.039	109.038
Levelling Point	C305-LP07073	04/10/2011	INSTALLED	86195.593	36305.768	109.005	22/10/2011	109.005	109.004	109.004
Levelling Point	C305-LP07074	04/10/2011	INSTALLED	86200.326	36304.098	108.969	22/10/2011	108.972	108.971	108.971
Levelling Point	C305-LP07075	04/10/2011	INSTALLED	86204.983	36302.474	108.956	22/10/2011	108.955	108.956	108.955
Levelling Point	C305-LP07076	04/10/2011	INSTALLED	86209.744	36300.827	108.967	22/10/2011	108.964	108.965	108.964
Levelling Point	C305-LP07077	04/10/2011	INSTALLED	86214.540	36299.280	108.993	22/10/2011	108.993	108.994	108.994
Levelling Point	C305-LP07078	04/10/2011	INSTALLED	86219.443	36298.437	108.975	22/10/2011	108.975	108.975	108.975
Levelling Point	C305-LP07079	04/10/2011	INSTALLED	86224.440	36297.764	109.011	22/10/2011	109.009	109.010	109.009
Levelling Point	C305-LP07080	04/10/2011	INSTALLED	86229.343	36296.830	108.995	22/10/2011	108.994	108.994	108.994
Levelling Point	C305-LP07081	04/10/2011	INSTALLED	86234.207	36295.710	108.959	22/10/2011	108.961	108.959	108.960
Levelling Point	C305-LP07082	04/10/2011	INSTALLED	86239.227	36295.066	108.977	22/10/2011	108.974	108.975	108.974
Levelling Point	C305-LP07083	04/10/2011	INSTALLED	86244.151	36293.882	108.974	22/10/2011	108.979	108.979	108.979
Levelling Point	C305-LP07084	04/10/2011	INSTALLED	86247.456	36287.065	108.843	22/10/2011	108.851	108.852	108.852

Sensor Type	Sensor ID	Installation Date	Status	Sensor Location - GPS Reading			Commisioning Readings (m)			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Date	Elevation Z1 (mATD)	Elevation Z2 (mATD)	Elevation Z3 (mATD)
Levelling Point	C305-LP07085	04/10/2011	INSTALLED	86248.519	36282.112	108.880	22/10/2011	108.887	108.887	108.887
Levelling Point	C305-LP07086	04/10/2011	INSTALLED	86249.487	36277.285	108.931	22/10/2011	108.941	108.940	108.941
Levelling Point	C305-LP07087	04/10/2011	INSTALLED	86250.431	36272.404	109.021	22/10/2011	109.031	109.032	109.031
Levelling Point	C305-LP07088	04/10/2011	INSTALLED	86251.268	36267.451	109.087	22/10/2011	109.096	109.095	109.095
Levelling Point	C305-LP07089	04/10/2011	INSTALLED	86251.784	36262.429	109.159	22/10/2011	109.169	109.169	109.170
Levelling Point	C305-LP07090	04/10/2011	INSTALLED	86252.155	36257.430	109.279	22/10/2011	109.286	109.287	109.286
Levelling Point	C305-LP07091	04/10/2011	INSTALLED	86252.439	36252.356	109.355	22/10/2011	109.362	109.364	109.363
Levelling Point	C305-LP07092	04/10/2011	INSTALLED	86252.791	36247.320	109.432	22/10/2011	109.441	109.441	109.442
Levelling Point	C305-LP07093	04/10/2011	INSTALLED	86253.114	36242.328	109.498	22/10/2011	109.509	109.508	109.509
Levelling Point	C305-LP07094	04/10/2011	INSTALLED	86253.384	36237.330	109.512	22/10/2011	109.519	109.518	109.519
Levelling Point	C305-LP07095	04/10/2011	INSTALLED	86253.452	36232.438	109.668	22/10/2011	109.677	109.676	109.676
Levelling Point	C305-LP07096	04/10/2011	INSTALLED	86253.483	36227.525	109.744	22/10/2011	109.751	109.750	109.750
Levelling Point	C305-LP07097	04/10/2011	INSTALLED	86253.356	36222.397	109.822	22/10/2011	109.831	109.831	109.831
Levelling Point	C305-LP07098	04/10/2011	INSTALLED	86253.304	36217.523	109.895	22/10/2011	109.902	109.902	109.902
Levelling Point	C305-LP07099	04/10/2011	INSTALLED	86253.212	36212.404	109.976	22/10/2011	109.989	109.989	109.989
Levelling Point	C305-LP07100	04/10/2011	INSTALLED	86252.930	36207.211	110.074	22/10/2011	110.082	110.083	110.082
Levelling Point	C305-LP07101	04/10/2011	INSTALLED	86252.829	36202.228	110.161	22/10/2011	110.168	110.168	110.168
Levelling Point	C305-LP07102	04/10/2011	INSTALLED	86252.681	36197.261	110.316	22/10/2011	110.303	110.302	110.302
Levelling Point	C305-LP07103	04/10/2011	INSTALLED	86252.070	36192.192	110.445	22/10/2011	110.456	110.457	110.456
Levelling Point	C305-LP07104	04/10/2011	INSTALLED	86247.767	36191.130	110.512	22/10/2011	110.519	110.518	110.518
Levelling Point	C305-LP07105	04/10/2011	INSTALLED	86242.834	36190.541	110.564	22/10/2011	110.575	110.576	110.576
Levelling Point	C305-LP07106	04/10/2011	INSTALLED	86237.918	36189.986	110.630	22/10/2011	110.640	110.639	110.640
Levelling Point	C305-LP07107	04/10/2011	INSTALLED	86232.824	36189.323	110.657	22/10/2011	110.671	110.671	110.670
Levelling Point	C305-LP07108	04/10/2011	INSTALLED	86227.791	36189.499	110.658	22/10/2011	110.668	110.669	110.669
Levelling Point	C305-LP07109	04/10/2011	INSTALLED	86220.307	36187.903	110.726	22/10/2011	110.734	110.735	110.734
Levelling Point	C305-LP07110	04/10/2011	INSTALLED	86215.337	36187.025	110.759	22/10/2011	110.766	110.765	110.765
Levelling Point	C305-LP07111	04/10/2011	INSTALLED	86210.237	36186.428	110.834	22/10/2011	110.844	110.844	110.844
Levelling Point	C305-LP07112	04/10/2011	INSTALLED	86205.130	36185.746	110.887	22/10/2011	110.895	110.895	110.896
Levelling Point	C305-LP07113	04/10/2011	INSTALLED	86200.127	36184.999	110.919	22/10/2011	110.926	110.925	110.926
Levelling Point	C305-LP07114	04/10/2011	INSTALLED	86195.181	36184.300	110.923	22/10/2011	110.921	110.921	110.920
Levelling Point	C305-LP07115	04/10/2011	INSTALLED	86190.255	36183.492	110.978	22/10/2011	110.982	110.982	110.981
Levelling Point	C305-LP07116	04/10/2011	INSTALLED	86185.186	36182.760	110.941	22/10/2011	110.945	110.945	110.945

Sensor Type	Sensor ID	Installation Date	Status	Sensor Location - GPS Reading			Commisioning Readings (m)			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Date	Elevation Z1 (mATD)	Elevation Z2 (mATD)	Elevation Z3 (mATD)
Levelling Point	C305-LP07117	04/10/2011	INSTALLED	86180.189	36182.010	110.896	22/10/2011	110.898	110.899	110.898
Levelling Point	C305-LP07118	04/10/2011	INSTALLED	86175.213	36181.224	110.854	22/10/2011	110.854	110.853	110.853
Levelling Point	C305-LP07119	04/10/2011	INSTALLED	86170.374	36180.473	110.784	22/10/2011	110.791	110.791	110.790
Levelling Point	C305-LP07120	04/10/2011	INSTALLED	86165.400	36179.777	110.734	22/10/2011	110.741	110.742	110.742
Levelling Point	C305-LP07121	04/10/2011	INSTALLED	86160.428	36179.121	110.648	22/10/2011	110.655	110.655	110.655
Levelling Point	C305-LP07122	04/10/2011	INSTALLED	86155.453	36178.633	110.604	22/10/2011	110.610	110.611	110.611
Levelling Point	C305-LP07123	04/10/2011	INSTALLED	86150.534	36178.447	110.564	22/10/2011	110.570	110.569	110.570
Levelling Point	C305-LP07124	04/10/2011	INSTALLED	86145.441	36178.482	110.519	22/10/2011	110.524	110.524	110.524
Levelling Point	C305-LP07125	04/10/2011	INSTALLED	86140.429	36178.616	110.488	22/10/2011	110.493	110.494	110.493
Levelling Point	C305-LP07126	04/10/2011	INSTALLED	86135.421	36178.818	110.433	22/10/2011	110.439	110.440	110.439
Levelling Point	C305-LP07127	04/10/2011	INSTALLED	86130.304	36179.907	110.228	23/10/2011	110.235	110.235	110.235
Levelling Point	C305-LP07128	04/10/2011	INSTALLED	86122.530	36181.757	110.089	22/10/2011	110.096	110.096	110.097
Levelling Point	C305-LP07129	05/10/2011	INSTALLED	86122.395	36186.862	110.106	23/10/2011	110.117	110.116	110.116
Levelling Point	C305-LP07130	06/10/2011	INSTALLED	86122.189	36191.847	110.019	24/10/2011	110.025	110.025	110.025
Levelling Point	C305-LP07131	07/10/2011	INSTALLED	86121.887	36196.850	110.005	25/10/2011	109.991	109.992	109.992
Levelling Point	C305-LP07132	08/10/2011	INSTALLED	86121.636	36201.816	109.925	26/10/2011	109.931	109.931	109.931
Levelling Point	C305-LP07133	09/10/2011	INSTALLED	86121.265	36206.791	109.865	27/10/2011	109.870	109.871	109.870
Levelling Point	C305-LP07134	10/10/2011	INSTALLED	86122.395	36212.075	109.758	28/10/2011	109.763	109.761	109.762
Levelling Point	C305-LP07135	11/10/2011	INSTALLED	86122.116	36217.044	109.710	29/10/2011	109.718	109.717	109.717
Levelling Point	C305-LP07136	12/10/2011	INSTALLED	86121.876	36220.818	109.695	30/10/2011	109.702	109.700	109.701
Levelling Point	C305-LP07137	13/10/2011	INSTALLED	86121.654	36224.649	110.100	31/10/2011	110.093	110.106	110.091
Levelling Point	C305-LP07138	04/10/2011	INSTALLED	86090.251	36236.543	110.690	22/10/2011	110.696	110.697	110.696
Levelling Point	C305-LP07139	04/10/2011	INSTALLED	86122.120	36328.465	109.927	22/10/2011	109.928	109.927	109.928
Levelling Point	C305-LP07140	04/10/2011	INSTALLED	86158.122	36314.418	109.871	22/10/2011	109.873	109.872	109.873
Levelling Point	C305-LP07144	04/10/2011	INSTALLED	86161.842	36361.154	108.894	25/10/2011	108.894	108.895	108.895
Levelling Point	C305-LP07145	04/10/2011	INSTALLED	86171.250	36353.547	108.877	25/10/2011	108.877	108.878	108.877
Levelling Point	C305-LP07146	04/10/2011	INSTALLED	86180.976	36345.226	109.009	25/10/2011	109.009	109.009	109.009
Levelling Point	C305-LP07147	04/10/2011	INSTALLED	86190.621	36336.668	108.984	25/10/2011	108.985	108.984	108.984

IR for I&M installed as per "Rod Extensometers for Protection of Sewers around Stepney Green Shaft" C305-DSJ-C2-RGN-CRG03-50300

Sensor Type	Sensor ID	Date Installation Start	Date Installation Completion	Depth b.g.l (m)	SENSOR Location - GPS reading			Commissioning Readings Head Level (m, mATD) Commissioning Readings Rod Extensometers (Hz)			
					Eastings X (m)	Northings Y (m)	Elevation Z (mATD)				
								02/07/2012	02/07/2012	02/07/2012	AVERAGE
Rod Extensometer	C305-XR07001	09/05/2012	29/06/2012	Head Level	86099.115	36345.187	109.474	108.929	108.928	108.928	108.928
				6.5				2235.120	2235.092	2235.088	2235.100
				8.5				2235.288	2235.304	2235.308	2235.300
								02/07/2012	02/07/2012	02/07/2012	AVERAGE
Rod Extensometer	C305-XR07002	20/04/2012	12/07/2012	Head Level	86130.75	36322.586	109.182	108.720	108.720	108.721	108.720
				6.0				2232.780	2232.808	2232.812	2232.800
				8.5				2233.516	2233.476	2233.508	2233.500
								02/07/2012	02/07/2012	02/07/2012	AVERAGE
Rod Extensometer	C305-XR07003	19/04/2012	02/07/2012	Head Level	86198.739	36301.662	109.417	108.920	108.920	108.920	108.920
				6.5				2235.376	2235.420	2235.404	2235.400
				8.5				2237.180	2237.220	2237.200	2237.200
								02/07/2012	02/07/2012	02/07/2012	AVERAGE
Rod Extensometer	C305-XR07004	04/05/2012	02/07/2012	Head Level	86247.777	36243.733	109.808	109.248	109.248	109.248	109.248
				2.5				2239.320	2239.292	2239.288	2239.300
				5.0				2233.984	2234.024	2233.992	2234.000
								02/07/2012	02/07/2012	02/07/2012	AVERAGE
Rod Extensometer	C305-XR07006	01/05/2012	04/07/2012	Head Level	86262.032	36169.066	110.91	110.370	110.371	110.371	110.371
				3.5				2233.104	2233.092	2233.104	2233.100
				6.0				2233.876	2233.908	2233.916	2233.900
								02/07/2012	02/07/2012	02/07/2012	AVERAGE
Rod Extensometer	C305-XR07008	26/04/2012	02/07/2012	Head Level	86167.759	36185.905	111.116	110.586	110.585	110.585	110.585
				14				2238.188	2238.224	2238.188	2238.200
				16.5				1478.796	1478.820	1478.784	1478.800

Note: Depth is below ground level. Length in SAI and monitoring has 0.5 m less

IR for I&M Installed as per "Instrumentation at Stepney Green of the Joseph Stern Synagogue - C305-DSJ-C4-RGN-CRG094_SH005-50004

Sensor Type	Sensor ID	Installation Date	Status	Sensor Location - GPS Reading			Commisioning Readings			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Date	Elevation Z1 (mATD)	Elevation Z2 (mATD)	Elevation Z3 (mATD)
Socket	C305-LB07064	04/10/2011	INSTALLED	86171.830	36379.912	110.715	02/03/2012	110.716	110.715	110.716
Socket	C305-LB07065	04/10/2011	INSTALLED	86161.997	36389.474	110.826	02/03/2012	110.826	110.826	110.827
Socket	C305-LB07066	04/10/2011	INSTALLED	86160.120	36387.637	110.857	02/03/2012	110.857	110.856	110.856
Socket	C305-LB07067	04/10/2011	INSTALLED	86145.056	36402.257	110.784	02/03/2012	110.784	110.784	110.784
Socket	C305-LB07068	04/10/2011	INSTALLED	86141.205	3609.311	110.705	02/03/2012	110.705	110.705	110.706
Socket	C305-LB07069	04/10/2011	INSTALLED	86136.037	36403.991	110.700	02/03/2012	110.700	110.700	110.700
Socket	C305-LB07070	04/10/2011	INSTALLED	86132.161	36391.921	109.943	02/03/2012	109.944	109.943	109.943
Socket	C305-LB07071	04/10/2011	INSTALLED	86149.346	36375.283	109.058	02/03/2012	109.575	109.580	109.585

IR for I&M installed as per "Sir John Cass School and General Buildings" C305-DSJ-C2-GMS-CR094_WS108-50004

Sensor Type	Sensor ID	Installation Date	Status	Sensor Location - GPS Reading			Commisioning Readings			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Date	Elevation Z1 (mATD)	Elevation Z2 (mATD)	Elevation Z3 (mATD)
Socket	C305-LB07001	31/10/2011	INSTALLED	86106.445	36163.172	112.338	07/11/2011	111.765	111.765	111.765
Socket	C305-LB07002	31/10/2011	INSTALLED	86106.566	36144.204	112.349	07/11/2011	111.758	111.759	111.758
Socket	C305-LB07003	31/10/2011	INSTALLED	86130.980	36163.312	112.332	07/11/2011	111.743	111.744	111.743
Socket	C305-LB07004	31/10/2011	INSTALLED	86131.080	36144.374	112.387	07/11/2011	111.798	111.799	111.799
Socket	C305-LB07005	31/10/2011	INSTALLED	86131.076	36163.188	112.340	07/11/2011	111.751	111.751	111.751
Socket	C305-LB07006	31/10/2011	INSTALLED	86131.147	36144.372	112.388	07/11/2011	111.798	111.799	111.799
Socket	C305-LB07007	31/10/2011	INSTALLED	86158.218	36163.339	112.386	07/11/2011	111.796	111.796	111.796
Socket	C305-LB07008	31/10/2011	INSTALLED	86156.253	36117.794	112.268	07/11/2011	111.680	111.680	111.680

Sensor Type	Sensor ID	Installation Date	Status	Sensor Location - GPS Reading			Commisioning Readings			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Date	Elevation Z1 (mATD)	Elevation Z2 (mATD)	Elevation Z3 (mATD)
Socket	C305-LB07009	31/10/2011	INSTALLED	86158.517	36166.319	112.419	07/11/2011	111.829	111.828	111.828
Socket	C305-LB07010	31/10/2011	INSTALLED	86162.070	36135.535	112.283	07/11/2011	111.697	111.698	111.698
Socket	C305-LB07011	31/10/2011	INSTALLED	86183.368	36166.474	112.447	07/11/2011	111.855	111.856	111.856
Socket	C305-LB07012	31/10/2011	INSTALLED	86180.337	36135.706	112.294	07/11/2011	111.708	111.708	111.708
Socket	C305-LB07013	31/10/2011	INSTALLED	86183.583	36166.472	112.450	07/11/2011	111.860	111.859	111.860
Socket	C305-LB07014	31/10/2011	INSTALLED	86183.627	36135.820	112.364	07/11/2011	111.780	111.779	111.780
Socket	C305-LB07015	31/10/2011	INSTALLED	86198.603	36166.498	112.397	07/11/2011	111.810	111.811	111.811
Socket	C305-LB07016	31/10/2011	INSTALLED	86198.836	36136.079	112.385	07/11/2011	111.798	111.798	111.798
Socket	C305-LB07017	31/10/2011	INSTALLED	86195.430	36173.481	112.600	07/11/2011	112.012	112.012	112.012
Socket	C305-LB07018	31/10/2011	INSTALLED	86198.385	36173.981	112.602	07/11/2011	112.013	112.014	112.014
Socket	C305-LB07019	31/10/2011	INSTALLED	86195.124	36168.515	112.402	07/11/2011	111.812	111.811	111.812
Socket	C305-LB07020	31/10/2011	INSTALLED	86199.406	36168.529	112.387	07/11/2011	111.800	111.801	111.800
Socket	C305-LB07021	31/10/2011	INSTALLED	86201.988	36173.228	112.484	07/11/2011	111.895	111.894	111.894
Socket	C305-LB07022	31/10/2011	INSTALLED	86214.780	36173.326	112.422	07/11/2011	111.832	111.832	111.832
Socket	C305-LB07023	31/10/2011	INSTALLED	86223.816	36173.402	112.421	07/11/2011	111.831	111.832	111.832
Socket	C305-LB07024	31/10/2011	INSTALLED	86236.673	36171.392	112.436	07/11/2011	111.847	111.848	111.847
Socket	C305-LB07025	31/10/2011	INSTALLED	86202.163	36158.236	112.404	07/11/2011	111.817	111.816	111.817
Socket	C305-LB07026	31/10/2011	INSTALLED	86214.963	36158.323	112.439	07/11/2011	111.853	111.852	111.852
Socket	C305-LB07027	31/10/2011	INSTALLED	86223.969	36158.399	112.439	07/11/2011	111.852	111.852	111.852
Socket	C305-LB07028	31/10/2011	INSTALLED	86236.766	36158.510	112.463	07/11/2011	111.877	111.877	111.878
Socket	C305-LB07029	31/10/2011	INSTALLED	86233.431	36152.594	112.442	07/11/2011	111.850	111.851	111.850
Socket	C305-LB07030	31/10/2011	INSTALLED	86212.311	36149.704	112.439	07/11/2011	111.852	111.851	111.852
Socket	C305-LB07031	31/10/2011	INSTALLED	86212.639	36118.157	112.440	07/11/2011	111.850	111.851	111.851
Socket	C305-LB07032	31/10/2011	INSTALLED	86233.821	36115.693	112.444	07/11/2011	111.855	111.856	111.856
Socket	C305-LB07033	31/10/2011	INSTALLED	86106.825	36117.795	112.373	07/11/2011	111.783	111.783	111.783
Socket	C305-LB07034	31/10/2011	INSTALLED	86136.027	36117.523	112.379	07/11/2011	111.820	111.820	111.820
Socket	C305-LB07035	31/10/2011	INSTALLED	86145.458	36117.681	112.303	07/11/2011	111.716	111.715	111.716

Sensor Type	Sensor ID	Installation Date	Status	Sensor Location - GPS Reading			Commisioning Readings			
				Eastings X (m)	Northings Y (m)	Elevation Z (mATD)	Date	Elevation Z1 (mATD)	Elevation Z2 (mATD)	Elevation Z3 (mATD)
Socket	C305-LB07036	31/10/2011	INSTALLED	86183.642	36132.921	112.317	07/11/2011	111.730	111.731	111.730
Socket	C305-LB07037	31/10/2011	INSTALLED	86183.837	36105.304	112.280	07/11/2011	111.691	111.692	111.691
Socket	C305-LB07038	31/10/2011	INSTALLED	86183.818	36103.871	112.288	07/11/2011	111.700	111.699	111.699
Socket	C305-LB07039	31/10/2011	INSTALLED	86183.990	36087.698	112.259	07/11/2011	111.669	111.668	111.669
Socket	C305-LB07040	31/10/2011	INSTALLED	86198.813	36087.855	112.299	07/11/2011	111.710	111.710	111.709
Socket	C305-LB07041	31/10/2011	INSTALLED	86199.054	36104.049	112.346	07/11/2011	111.763	111.764	111.764
Socket	C305-LB07042	31/10/2011	INSTALLED	86199.057	36105.396	112.346	07/11/2011	111.757	111.758	111.757
Socket	C305-LB07043	31/10/2011	INSTALLED	86198.853	36133.044	112.424	07/11/2011	111.836	111.837	111.836
Socket	C305-LB07044	31/10/2011	INSTALLED	86106.590	36140.528	112.303	07/11/2011	111.714	111.713	111.713
Socket	C305-LB07045	31/10/2011	INSTALLED	86201.574	36084.717	112.070	07/11/2011	111.484	111.483	111.484
Socket	C305-LB07046	31/10/2011	INSTALLED	86238.357	36090.240	112.561	07/11/2011	111.975	111.974	111.974
Socket	C305-LB07047	31/10/2011	INSTALLED	86201.546	36105.669	112.351	07/11/2011	111.763	111.762	111.762
Socket	C305-LB07048	31/10/2011	INSTALLED	86239.668	36105.571	112.513	07/11/2011	111.926	111.927	111.926

APPENDIX C:

MINUTES CLOSE OUT MEETING AREA 7

I&M Close Out Meeting

Date & Time	29/01/2016 10:00
Meeting No.	9

The purpose of this document is to record review of the monitoring data, and agreement to decommission based on cessation of long term monitoring by DSJV. Agreement from this meeting is then considered acceptance from all parties that the Close Out Report can then be produced based on the data shown and this will be acceptable to the Project Manager.

Attendees:

[redacted]

[redacted]

Data Reviewed

Monitoring References	Location	Settlement rate	Agreeement to decommission
Area 7 - Stepney Green Shaft			
INSIDE STEPNEY GREEN CONSTRUCTION SITE			
SHAFT - INCLINOMETERS			
C305-IE07001	d-wall	max displacement is 2-3mm	YES. Not for asset protection.
C305-IE07002	d-wall		YES. Not for asset protection.
C305-IE07003	d-wall		YES. Not for asset protection.
C305-IE07004	d-wall		YES. Not for asset protection.
C305-IE07005	d-wall		YES. Not for asset protection.
C305-IE07006	d-wall		YES. Not for asset protection.
C305-IE07007	d-wall		YES. Not for asset protection.
C305-IE07008	d-wall	max displacement is 6mm	YES. Not for asset protection.
SHAFT - STRAIN GAUGES			
C305-EG07011	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07012	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07013	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07014	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07015	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07016	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07021	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07022	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07023	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07024	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07025	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.

Monitoring References	Location	Settlement rate	Agreeement to decommission
C305-EG07026	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07031	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07032	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07033	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07034	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07035	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07036	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07041	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07042	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07043	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07044	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07045	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07046	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07052	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07053	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07054	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07065	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG07066	permanent propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG0703A7	temporary propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG0703A8	temporary propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG0703AW	temporary propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG0703B3	temporary propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG0704B6	temporary propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG0703BW	temporary propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG0704BW	temporary propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG0704B5	temporary propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG0704B4	temporary propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG0704B3	temporary propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG0704B7	temporary propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
C305-EG0704AW	temporary propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.

Monitoring References	Location	Settlement rate	Agreeement to decommission
C305-EG0704B2	temporary propping	N/A	YES. Not for asset protection. Chart handed over to JQ for C123.
SHAFT - PRISMS			
C305-RP07100-600	d-wall	damaged	YES. Not for asset protection.
C305-RP07101-601	d-wall	damaged	YES. Not for asset protection.
C305-RP07200-500	d-wall	damaged	YES. Not for asset protection.
C305-RP07300-400	d-wall	damaged	YES. Not for asset protection.
SCL WORKS - ROD EXTENSOMETERS			
C305-XR07110	above EB cavern	automatic readings. relative movement shown.	YES. Not for asset protection.
C305-XR07120	above WB cavern	automatic readings. relative movement shown.	YES. Not for asset protection.
C305-XR07130	above EB cavern	automatic readings. relative movement shown.	YES. Not for asset protection.
C305-XR07140	above WB cavern	automatic readings. relative movement shown.	YES. Not for asset protection.
C305-XR07150	above WB launch adit	automatic readings. relative movement shown.	YES. Not for asset protection.
SCL WORKS - INCLINOMETERS			
C305-IE07110	along EB cavern	max displacement is 5mm	YES. Not for asset protection.
C305-IE07140	along WB cavern	max displacement is 15mm	YES. Not for asset protection.
C305-IE07150	along EB cavern	max displacement is <5mm	YES. Not for asset protection.
C305-IE07160	along EB cavern	max displacement is 10mm	YES. Not for asset protection.
C305-IE07170	along WB cavern	max displacement is 25mm	YES. Not for asset protection.
C305-IE07190	along WB launch adit	max displacement is <5mm	YES. Not for asset protection.
LEVELLING POINTS			
C305-LP07001-012	STG yard		YES. Not for asset protection.
C305-LP07013-016	STG yard		YES. Not for asset protection.
C305-LP07017-019	STG yard		YES. Not for asset protection.
C305-LP07020-023	STG yard		YES. Not for asset protection.
C305-LP072101-122	STG yard		YES. Not for asset protection.
C305-LP072201-213	STG yard		YES. Not for asset protection.
C305-LP072301-312	STG yard		YES. Not for asset protection.
C305-LP072401-415	STG yard		YES. Not for asset protection.
C305-LP072501-524	STG yard		YES. Not for asset protection.
OUTSIDE STEPNEY GREEN CONSTRUCTION SITE			
ROD EXTENSOMETERS			
C305-XR07001		absolute movement shown. no recent readings.	investigate location / access for any further readings
C305-XR07002		absolute movement shown. no recent readings. damaged.	YES

Monitoring References	Location	Settlement rate	Agreeement to decommission
C305-XR07003		absolute movement shown.	YES
C305-XR07004		absolute movement shown. damaged after drive Z EB TBM transit.	YES
C305-XR07006	Belgrave Park	absolute movement shown.	YES
C305-XR07008		absolute movement shown. no recent readings. damaged.	YES
SOCKETS			
C305-LB07001-08, LB07033-35, LB07044	Sir John Cass school		take one more reading a month after the last one (mid Feb 2016 onwards)
C305-LB07009-012	Sir John Cass school		take one more reading a month after the last one (mid Feb 2016 onwards)
C305-LB07013-016	Sir John Cass school		take one more reading a month after the last one (mid Feb 2016 onwards)
C305-LB07017-020	Sir John Cass school		take one more reading a month after the last one (mid Feb 2016 onwards)
C305-LB07021-028	Sir John Cass school		take one more reading a month after the last one (mid Feb 2016 onwards)
C305-LB07029-032	Sir John Cass school		take one more reading a month after the last one (mid Feb 2016 onwards)
C305-LB07036-043	Sir John Cass school		take one more reading a month after the last one (mid Feb 2016 onwards)
C305-LB07045-048	Sir John Cass school		take one more reading a month after the last one (mid Feb 2016 onwards)
C305-LB07049-063	Rectory square wall	max settl 6mm	YES
C305-LB07064-070	Synagogue	negligible settl	YES
C305-LB148001-033	St Dunstan church		YES but take one more reading now and one before decommissioning
LEVELLING POINTS			
C305-LP07030-045			No requirement for ongoing monitoring (cf RFI-2489)
C305-LP07046-058			continue with monthly readings
C305-LP07059-069			continue with monthly readings
C305-LP07071-084			continue with monthly readings
C305-LP07085-104			continue with monthly readings
C305-LP07105-114			continue with monthly readings
C305-LP07115-127			continue with monthly readings
C305-LP07128-137			No requirement for ongoing monitoring (cf RFI-2489)
C305-LP07301-370		destroyed. (pitch re-turfed by Council)	
C305-LP07138-140		no recent readings. damaged.	
C305-LP07144-148			No requirement for ongoing monitoring, last read in 2014
C305-LP064224-243	Area 6		continue with monthly readings
PIEZOMETERS			
C305-PV07001	d-wall	N/A	YES

Monitoring References	Location	Settlement rate	Agreeement to decommission
C305-PV07002	d-wall	damaged	YES
C305-PV07101		N/A	YES
C305-PV07102		N/A	continue with readings until depressurization is switched off. then decommission. *
C305-PV07105		N/A	YES
C305-PV07106		N/A	YES
C305-PV07107		N/A	YES
C305-PV07108		N/A	check why stopped taking readings in 2014. if ok, continue with readings until depress is switched off. then decommission. *
C305-PV07109		N/A	YES
C305-PV07110		N/A	YES
C305-PV07111		N/A	YES
C305-PV07112		N/A	continue with readings until depressurization is switched off. then decommission. *
C305-PV07113		N/A	continue with readings until depressurization is switched off. then decommission. *
C305-PV07114		N/A	YES
SG8R		N/A	already decommissioned
SG23R		N/A	damaged and decommissioned
SG33		N/A	damaged
SG34R		N/A	damaged
SG39R		N/A	damaged

Notes

Sign off			
DSJV	Geocisa	Crossrail	C122
[redacted]			[redacted]

* Pick 1no. Piezo and continue monitoring until GWL reaches original level, then decommission. All others can be decommissioned when system is switched off (C305-PV07102 maybe the best). ~~Will~~ This caveat to be reviewed at time of switch off.

I&M Close Out Meeting

Date & Time	01/03/2016 14:00
Meeting No.	N/A

The purpose of this document is to record review of the monitoring data, and agreement to decommission based on cessation of long term monitoring by DSJV. Agreement from this meeting is then considered acceptance from all parties that the Close Out Report can then be produced based on the data shown and this will be acceptable to the Project Manager.
This document contains data from instruments not reviewed before and will be appended to the minutes of the I&M Close Out Meeting #9, held on 29/01/2016.

Attendees:

[redacted] [redacted]

Data Reviewed

Monitoring References	Location	Settlement rate	Agreeement to decommission
Area 7 - Stepney Green Shaft			
INSIDE STEPNEY GREEN CONSTRUCTION SITE			
MANUAL INCLINOMETERS			
C305-IM07004	by d-wall, next to inclinometer C305-IE07004	max displacement is approx 30mm	YES. Not for asset protection.

Notes

Sign off

DSJV	Geocisa	Crossrail	C122
[redacted]			[redacted]

APPENDIX D:

DEFLECTION RATIO

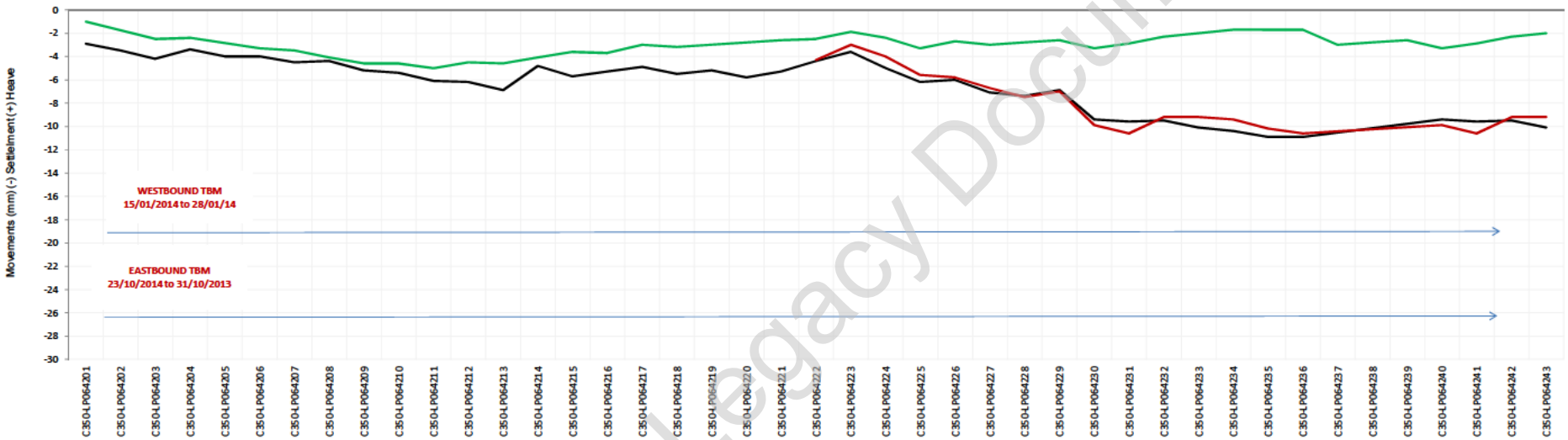
GEOCISA UK

CONTRACT C305

DSJV Crossrail DRAGADOS SISK

AREA 6 Belgrave Street PROFILE
C305-LP064201-C305-LP064243

SOUTH NORTH



NOTE: x axis is of monitoring points and is not a scaled distance

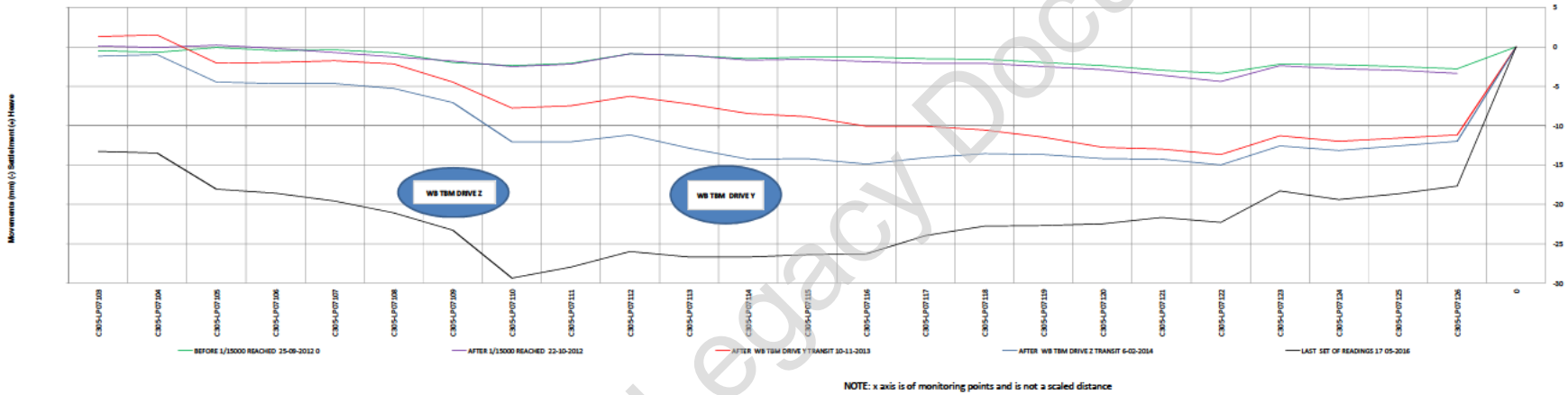
TRANSECT	ALERT VALUE	MAX DEFLECTION RATIO		
		TBMs Passage	Long Term	Last Reading
Belgrave St.	1/4700	1/17772	1/8412	1/7746

	13/02/2014	AFTER TBMs TRANSIT
	01/07/2015	LONG TERM
	12/02/2016	LAST READING

GEOCISA UK

CONTRACT C305

AREA 7 Stepney Way Setion PROFILE
C305-LP07103-C305-LP07126

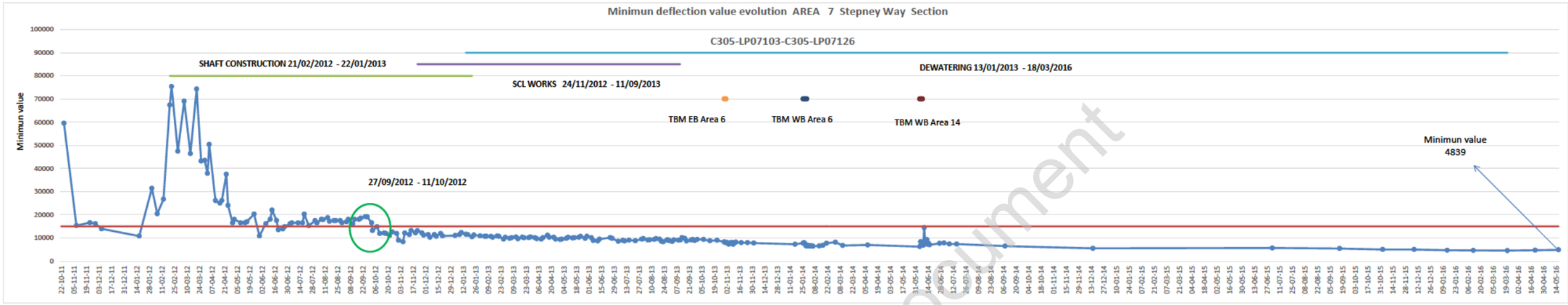


NOTE: x axis is of monitoring points and is not a scaled distance

TRANSECT	ALERT VALUE	MIN DEFLECTION RATIO		
		AFTER WESBOUND TBM DRIVE Y TRANSI	ESBOUND TBM DRIVE Z	LAST SET OF READINGS
Stepney Way	1/15000	1/7911	1/6351	1/4839

- Note The deflection ratio alert value has been exceeded and is being investigated by Crossrail.

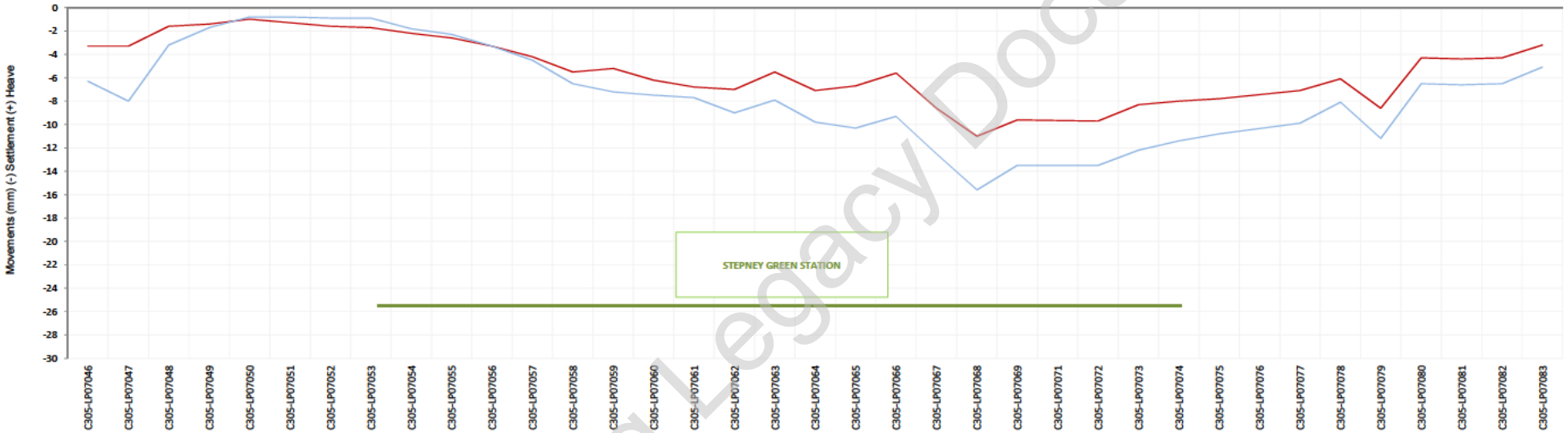
25-09-12	BEFORE 1/15000 REACHED 25-09-2012
22-10-12	AFTER 1/15000 REACHED 22-10-2012
11-11-13	AFTER WESBOUND TBM DRIVE Y TRANSIT
06-02-14	AFTER WESBOUND TBM DRIVE Y TRANSIT
17-05-16	LAST SET OF READINGS 17-05-2016



GEOCISA UK

CONTRACT C305

AREA 7 Stepney Green PROFILE
C305-LP07046 - C305-LP07083



TRANSECT	ALERT VALUE	MAX DEFLECTION RATIO	
		Mid Term	Long Term
Stepney Green	1/4700	1/6000	1/4981

08/04/2014 MID TERM

12/02/2016 LONG TERM

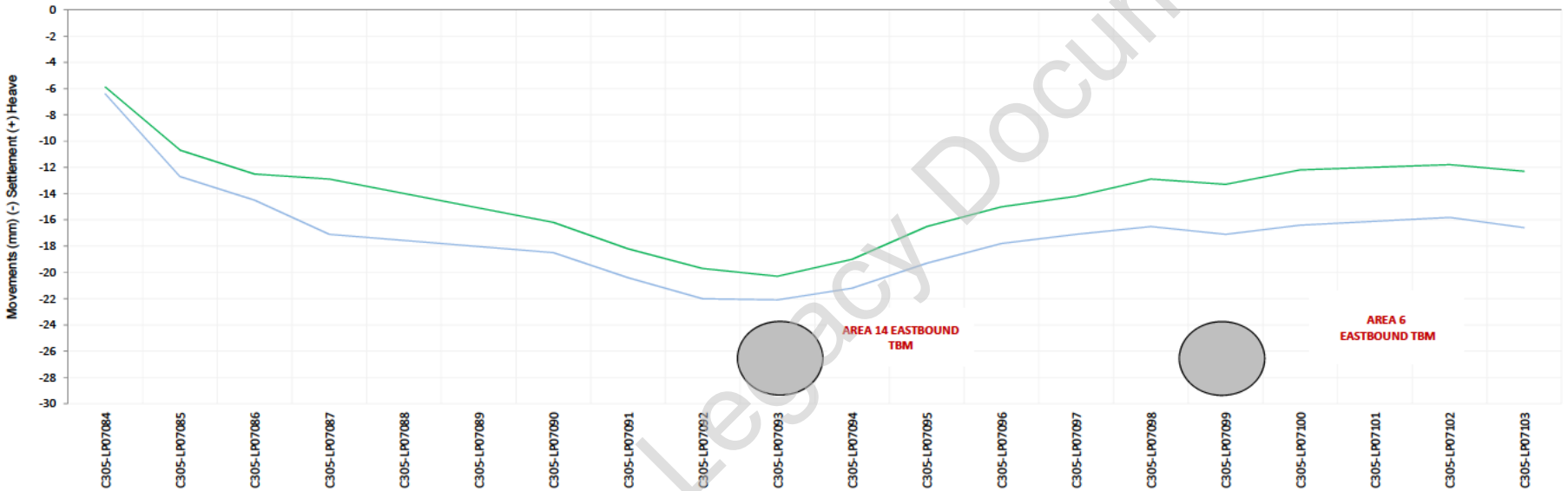
GEOCISA UK

CONTRACT C305

AREA 7 Stepney High Street PROFILE
C305-LP07084 - C305-LP07103

NORTH

SOUTH



NOTE: x axis is of monitoring points and is not a scaled distance

TRANSECT	ALERT VALUE	MAX DEFLECTION RATIO	
		TBMs Passage	Long Term
Stepney High St.	1/4700	1/15199	1/17390

08/09/2014 AFTER TBMs TRANSIT

12/02/2016 LONG TERM