



C305– Eastern Running Tunnels

I&M Close out report for Levelling Points Installation from East India to Canary Wharf (Drive Y)

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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: _____

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2b. Review by Stakeholder (if required):

Stakeholder Organisation	Job Title	Name	Signature	Date	Acceptance
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<i>I&M Close out report for Levelling Points Installation from East India to Canary Wharf (Drive Y)</i>				
C305 Crossrail Eastern Running Tunnels				
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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 which produce any observed changes. For construction activities it is intended excavation of the C305 twin bored tunnels and dewatering of cross passages; 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.

The settlement rate of monitoring locations, covered by this close-out report, had generally reached the specified rate of 2mm/year post TBM works but they are located in an area affected by dewatering works associated with cross passage construction. Monitoring of instruments close to the dewatering works is included in this report to provide evidence that settlement due to the dewatering works has now reached the specified rate. Therefore by inference, instruments located in the vicinity of the dewatering would have also reached the specified rate.

2. LOCATION OF THE WORKS

The area is an extensive area covering the installation of all the levelling points falling on the paved areas from the East India Dock Basin all the way to Canary Wharf following the Drive Y on project chainage 84400-83450.

See appendix A for the instrument location.

3. DOCUMENTATION SUMMARY

CROSSRAIL NUMBER	DOCUMENT NAME	REASON FOR ISSUE
C305-DSJ-C-GMS-CR 143-50011	C305 I&M Studs Installation from East India to Canary Wharf (84400-83450)	Main Method statement
C305-DSJ-C2-RGN-CRG03-50208	IR for I&M MS "Studs Installation from East India to Canary Wharf (84400-83450)"	Installation report

4. SUMMARY OF INSTALLED INSTRUMENTATION ON SITE

The total number instruments installed as per method statement and RFI's, comprise:

- Bridge Court: C305-LP040101 - C305-LP040124
- Keel Court: C305-LP040201 - C305-LP040226

- John Smith Mews: C305-LP040301 - C305-LP040330
- Reuters car park: C305-LP040401 - C305-LP040431
- Preston's Road : C305-LP040801 - C305-LP040805
- Ibis Hotel : C305-LP041701 - C305-LP041719
- Poplar Dock Marina. Section 1 : C305-LP041201 - C305-LP041216
- Poplar Dock Marina. Section 3 : C305-LP041241 - C305-LP041250
- Poplar Dock Marina. Section 4 : C305-LP041301 - C305-LP041328
- Boardwalk Place : C305-LP041401 - C305-LP041425
- Trafalgar Way : C305-LP041501 - C305-LP041536

Six levelling points arrays in the Installation Report for "*C305 I&M Studs Installation from East India to Canary Wharf (84400-83450) - C305-DSJ-C2-RGN-CRG03-50208*", have not been included in this close out report. They are located around Cross Passages (CP) 13 and 14 and will be included in the following close out report: *I&M Close out report for Cross Passage 13 (including Blackwall Tunnel and DLR Blackwall Station) Drive Y - C305-DSJ-C2-RGN-CRG03-50374*. For reference these sections are:

- Pilgrim Mews: C305-LP040001 - C305-LP040030 (CP14)
- Blackwall Way : C305-LP040501 - C305-LP040565 (CP13)
- Blackwall Section 1 : C305-LP040701 - C305-LP040734 (CP13)
- Blackwall Section 2 : C305-LP047101 - C305-LP047115 (CP13)
- Preston's Road : C305-LP041101 - C305-LP041135 (CP13)
- Poplar Dock Marina. Section 2 : C305-LP041217 - C305-LP041239 (CP13)

See appendix B for further information of the installed instrumentation.

The average commissioning readings included in appendix B have been used to calculate the relative movements provided in the graphs of this report. In some of them, new values were determined as a baseline according to the requirement of the client in CTC meeting. The dates of the new baselines are as follows:

- Bridge Court: C305-LP040101 - C305-LP040124: 19th March 2013
- Keel Court: C305-LP040201 - C305-LP040226: 7th February 2013
- John Smith Mews: C305-LP040301 - C305-LP040330: 25th March 2013
- Reuters car park: C305-LP040401 - C305-LP040431: 27th March 2013
- Preston's Road: C305-LP040801 - C305-LP040805: 26th March 2013
- Poplar Dock Marina. Section 1: C305-LP041201 - C305-LP041216: 26th March 2013
- Poplar Dock Marina. Section 3: C305-LP041241 - C305-LP041250: 27th April 2013
- Poplar Dock Marina. Section 4: C305-LP041301 - C305-LP041328: 26th March 2013
- Boardwalk Place: C305-LP041401 - C305-LP041425: 11th April 2013
- Trafalgar Way: C305-LP041501 - C305-LP041536: 11th April 2013

5. CONSTRUCTION ACTIVITY

TBM PASSAGE

DRIVE Y	RINGS	PROJECT CHAINAGE	DATES
Eastbound	290 – 898	84400 – 83450	28/03/2013 to 11/05/2013
Westbound	288 – 898	84400 – 83450	14/04/2013 to 01/06/2013

Stoppage period

Eastbound Drive-Y	Ring 865 (Project chainage - 83484)	07/05/2013 to 10/05/2013
Westbound Drive-Z	Ring 680 (Project chainage - 83770)	20/05/2013 to 24/05/2013

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

DEWATERING

Cross passage 13	26 th November 2013 to 3 rd August 2015	
Cross passage 14	16 th December 2013 to 17 th January 2014	
	28 th July 2014 to 27 th July 2015	
	2 nd April 2015 to 28 th July 2015: 14 surface ejectors + 22 tunnel well points	
Limmo	4 th November 2013 to 14 th March 2016	
Canary Wharf	It is understood that Canary Wharf dewatering systems were switched on throughout the monitoring period	

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 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 or slope

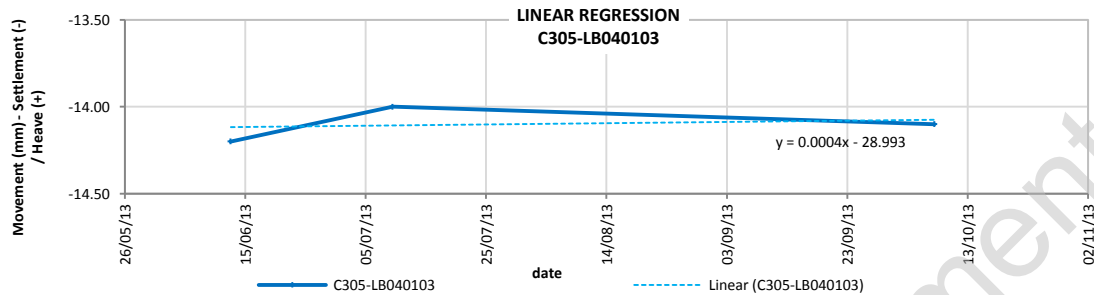
X (independent variable) = date

Y (dependent variable) = 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 one socket and its projection.

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



CALCULATION - C305-LB040103

X_i	Y_i	$X_i - \bar{X}_i$	$Y_i - \bar{Y}_i$	$(X_i - \bar{X}_i)^2$	$(X_i - \bar{X}_i) \cdot (Y_i - \bar{Y}_i)$
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

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

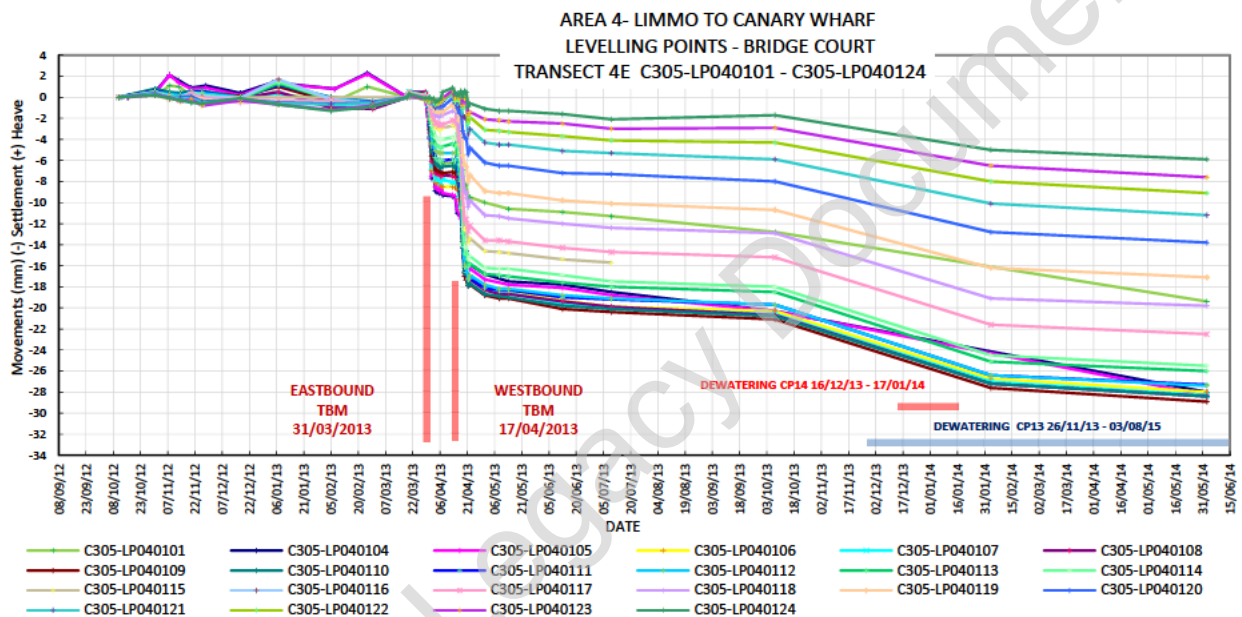
7. SUMMARY OF THE DATA

The methodology described for sockets in section 6 is also applied for the levelling points.

Note: 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). 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.

LEVELLING POINTS

4E C305-LP040101 - C305-LP040124 BRIDGE COURT (22)



The levelling points recorded a maximum settlement of -9.1mm after the eastbound TBM transit and a total maximum settlement of -20.1mm after the westbound TBM transit. A total maximum settlement of -28.9mm was recorded during or after CP13 and CP14 works.

In order to differentiate the movement due to the TBM transit from the dewatering and analyse whether the rate of change in the data has reached an acceptably small rate, the three readings before the dewatering period started were used to calculate the annual projection.

The table below shows the annual rate for the levelling points in this array.

	Registered Movement (mm)			Rate (mm/year)
	13/05/2013	12/06/2013	09/07/2013	
C305-LP040101	-10.600	-10.900	-11.300	-4.481
C305-LP040104	-17.500	-17.800	-18.500	-6.374
C305-LP040105	-17.800	-18.100	-18.800	-6.374
C305-LP040106	-18.400	-19.300	-19.900	-9.657
C305-LP040107	-18.000	-19.600	-20.000	-9.048
C305-LP040108	-18.7000	-19.400	-19.900	-7.722
C305-LP040109	-19.100	-20.100	-20.400	-8.417
C305-LP040110	-19.00	-19.80	-20.10	-7.112
C305-LP040111	-18.30	-19.00	-19.20	-5.829

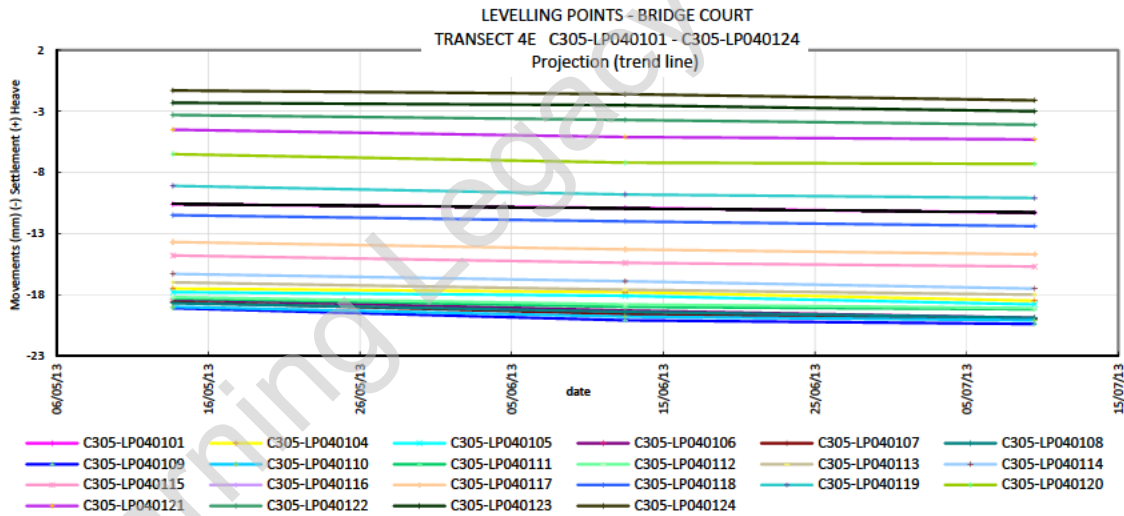
	Registered Movement (mm)			Rate (mm/year)
	13/05/2013	12/06/2013	09/07/2013	
C305-LP040112	-18.20	-18.80	-19.10	-5.807
C305-LP040113	-17.00	-17.60	-18.00	-6.438
C305-LP040114	-16.30	-16.90	-17.50	-7.700
C305-LP040115	-14.80	-15.40	-15.70	-5.807
C305-LP040116	#N/A	#N/A	#N/A	-
C305-LP040117	-13.70	-14.30	-14.70	-6.438
C305-LP040118	-11.50	-12.00	-12.40	-5.786
C305-LP040119	-9.10	-9.80	-10.10	-6.460
C305-LP040120	-6.50	-7.20	-7.30	-5.198
C305-LP040121	-4.50	-5.10	-5.30	-5.176
C305-LP040122	-3.30	-3.70	-4.10	-5.134
C305-LP040123	-2.30	-2.50	-3.00	-4.460
C305-LP040124	-1.30	-1.60	-2.10	-5.112
	Rate less than -2.5 mm/year		% less 2mm/year	0.00%
	Rate greater than -3.5 mm/year		% less 3mm/year	0.00%

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

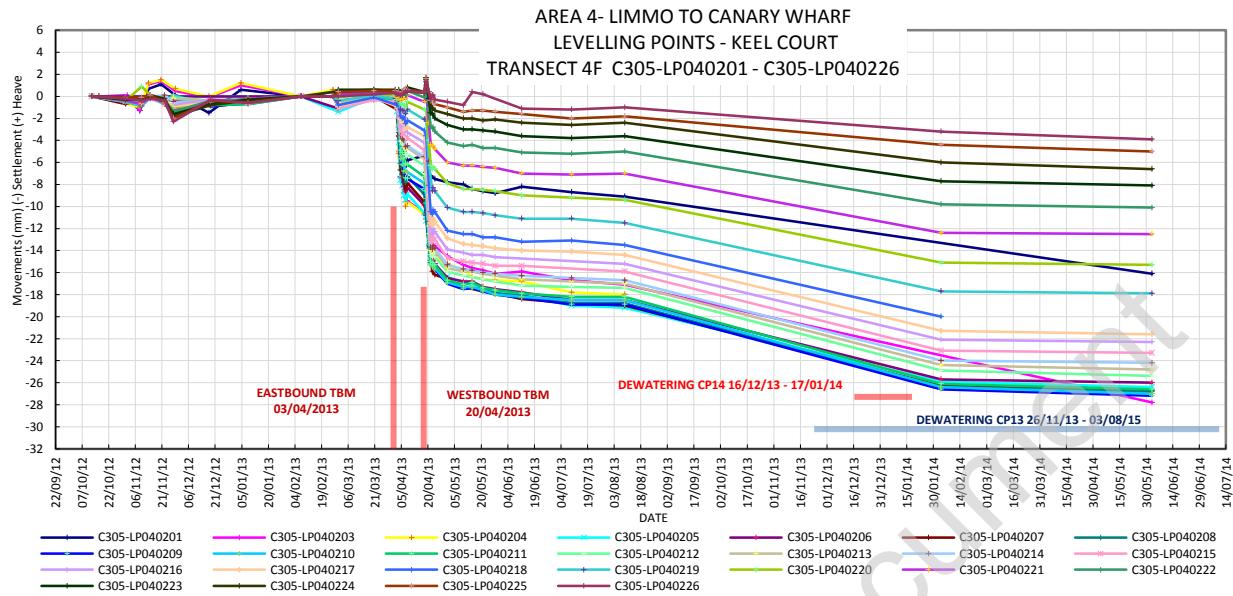
The percentage of the levelling points with a settlement rate less than 2mm/year and 3mm/yr is 0%.

See section 8 Summary of movements related to dewatering activities.

The plot below shows the trend line adjustment for the levelling points in this array.



4F C305-LP040201 - C305-LP040226 KEEL COURT (25)



The levelling points recorded a maximum settlement of -10mm after the eastbound TBM transit and a total maximum settlement of -18.9mm after the westbound TBM transit. A total maximum settlement of -27.8mm was recorded during or after CP13 and CP14 works.

In order to differentiate the movement due to the TBM transit from the dewatering and analyse whether the rate of change in the data has reached an acceptably small rate, the three readings before the dewatering period started were used to calculate the annual projection.

The table below shows the annual rate for the levelling points in this array.

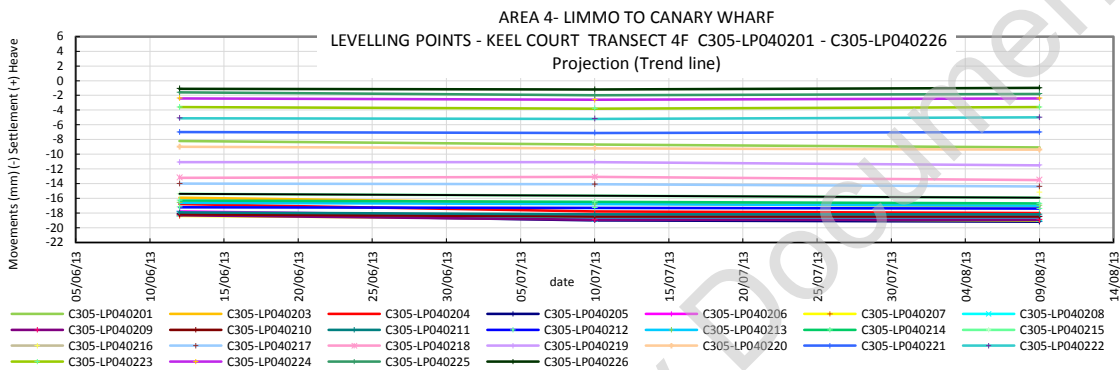
	Registered Movement (mm)			Rate (mm/year)
	12/06/2013	10/07/2013	09/08/2013	
C305-LP040201	-8.20	-8.70	-9.10	-5.654
C305-LP040203	-15.90	-16.70	-17.10	-7.520
C305-LP040204	-16.80	-17.80	-18.00	-7.491
C305-LP040205	-18.10	-19.00	-19.20	-6.869
C305-LP040206	-17.80	-18.50	-18.50	-4.353
C305-LP040207	-18.40	-18.80	-19.00	-3.760
C305-LP040208	-18.10	-18.80	-18.80	-4.353
C305-LP040209	-18.30	-18.90	-18.90	-3.731
C305-LP040210	-18.20	-18.50	-18.50	-1.865
C305-LP040211	-17.90	-18.20	-18.20	-1.865
C305-LP040212	-17.20	-17.30	-17.40	-1.258
C305-LP040213	-16.60	-16.80	-17.00	-2.516
C305-LP040214	-16.30	-16.50	-16.70	-2.516
C305-LP040215	-15.40	#N/A	-15.90	-3.139
C305-LP040216	#N/A	#N/A	-15.20	-
C305-LP040217	-14.00	-14.10	-14.40	-2.531
C305-LP040218	-13.20	-13.10	-13.50	-1.923
C305-LP040219	-11.10	-11.10	-11.50	-2.545
C305-LP040220	-9.00	-9.20	-9.40	-2.516
C305-LP040221	-7.00	-7.10	-7.00	0.014
C305-LP040222	-5.10	-5.20	-5.00	0.651
C305-LP040223	-3.60	-3.80	-3.60	0.029
C305-LP040224	-2.40	-2.60	-2.40	0.029

	Registered Movement (mm)			Rate (mm/year)
	12/06/2013	10/07/2013	09/08/2013	
C305-LP040225	-1.60	-2.00	-1.80	-1.215
C305-LP040226	-1.10	-1.20	-1.00	0.651
	Rate less than -2.5 mm/year		% less 2mm/year	41.67%
	Rate greater than -3.5 mm/year		% less 3mm/year	66.67%

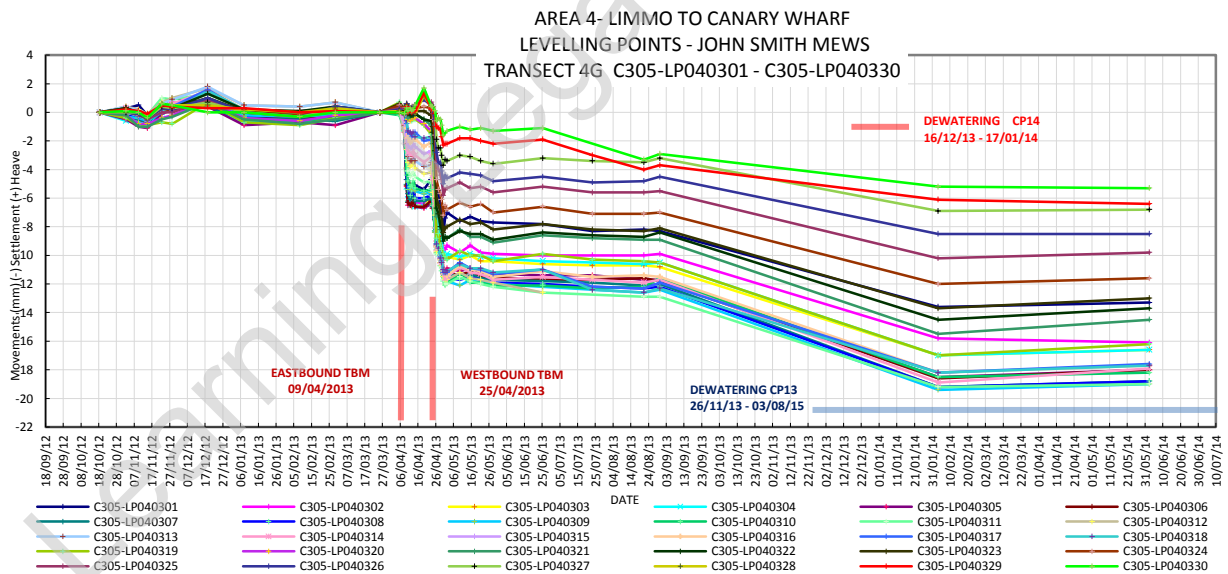
Note: All the movements are in mm. (-) Settlement / (+) Heave

The percentage of the levelling points with a settlement rate less than 2mm/year is 41.67%, whereas 66.67% are less than 3mm/year. Refer to Section 8: Summary of movements related to dewatering activities for further analysis.

The plot below shows the trend line adjustment for the levelling points in this array.



4G C305-LP040301 - C305-LP040330 JOHN SMITH MEWS (30)



The levelling points recorded a maximum settlement of -6.6mm after the eastbound TBM transit and a total maximum settlement of -12.9mm after the westbound TBM transit. A total maximum settlement of -19.4mm was recorded during or after CP13 and CP14 works.

In order to differentiate the movement due to the TBM transit from the dewatering and analyse whether the rate of change in the data has reached an acceptably small rate, the four readings before the dewatering period started were used to calculate the annual projection.

The table below shows the annual rate for the levelling points in this array.

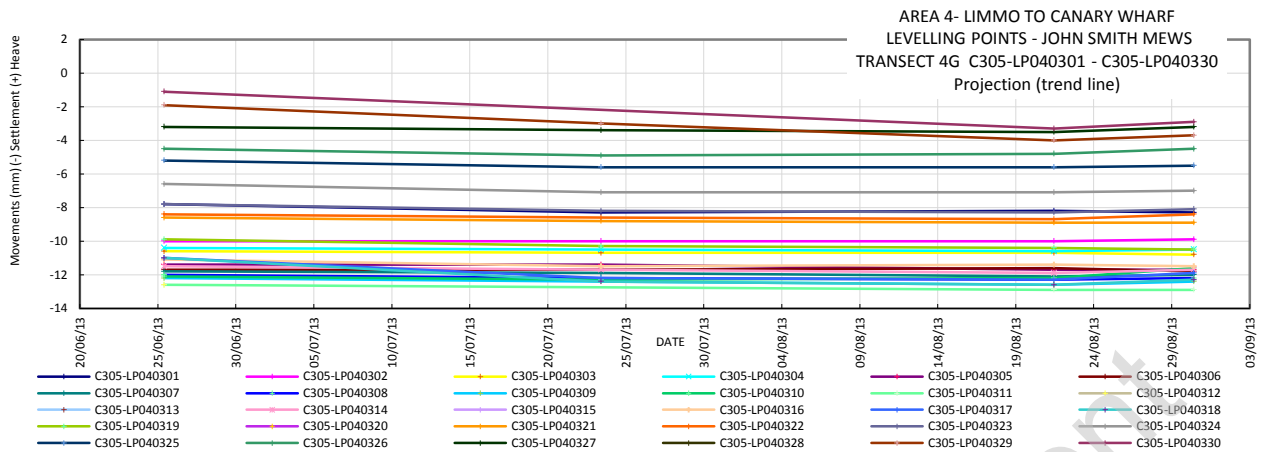
	Registered Movement (mm)				Rate (mm/year)
	25/06/2013	23/07/2013	21/08/2013	30/08/2013	
C305-LP040301	-7.80	-8.30	-8.20	-8.30	-2.300
C305-LP040302	-10.00	-10.00	-10.00	-9.90	0.383
C305-LP040303	-10.60	-10.70	-10.70	-10.80	-0.895
C305-LP040304	-10.40	-10.50	-10.60	-10.50	-0.774
C305-LP040305	-11.40	-11.40	-11.70	-11.70	-1.934
C305-LP040306	-11.70	-11.70	-11.60	-11.80	-0.122
C305-LP040307	-11.80	-11.90	-12.10	-12.00	-1.419
C305-LP040308	-12.00	-12.20	-12.30	-12.20	-1.286
C305-LP040309	-12.20	-12.40	-12.60	-12.40	-1.548
C305-LP040310	-12.10	-12.30	-12.20	-11.60	1.919
C305-LP040311	-12.60	#N/A	-12.90	-12.90	-1.752
C305-LP040312	-12.60	#N/A	#N/A	#N/A	-
C305-LP040313	#N/A	#N/A	#N/A	#N/A	-
C305-LP040314	-11.50	-11.70	-11.90	-11.70	-1.548
C305-LP040315	#N/A	#N/A	#N/A	#N/A	-
C305-LP040316	-11.10	-11.50	-11.40	-11.50	-1.788
C305-LP040317	-11.00	-12.20	-12.30	-11.90	-5.260
C305-LP040318	-11.00	-12.40	-12.60	-12.30	-7.312
C305-LP040319	-9.90	-10.30	-10.40	-10.50	-3.077
C305-LP040320	#N/A	#N/A	#N/A	#N/A	-
C305-LP040321	-8.60	-8.80	-8.90	-8.90	-1.669
C305-LP040322	-8.40	-8.60	-8.70	-8.40	-0.520
C305-LP040323	-7.80	-8.20	-8.30	-8.10	-1.928
C305-LP040324	-6.60	-7.10	-7.10	-7.00	-2.178
C305-LP040325	-5.20	-5.60	-5.60	-5.50	-1.666
C305-LP040326	-4.50	-4.90	-4.80	-4.50	-0.255
C305-LP040327	-3.20	-3.40	-3.50	-3.20	-0.520
C305-LP040328	#N/A	#N/A	#N/A	#N/A	-
C305-LP040329	-1.90	-3.00	-4.00	-3.70	-10.933
C305-LP040330	-1.10	#N/A	-3.30	-2.90	-11.425
	Rate less than -2.5 mm/year			% less 2mm/year	80.00%
	Rate greater than -3.5 mm/year			% less 3mm/year	84.00%

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

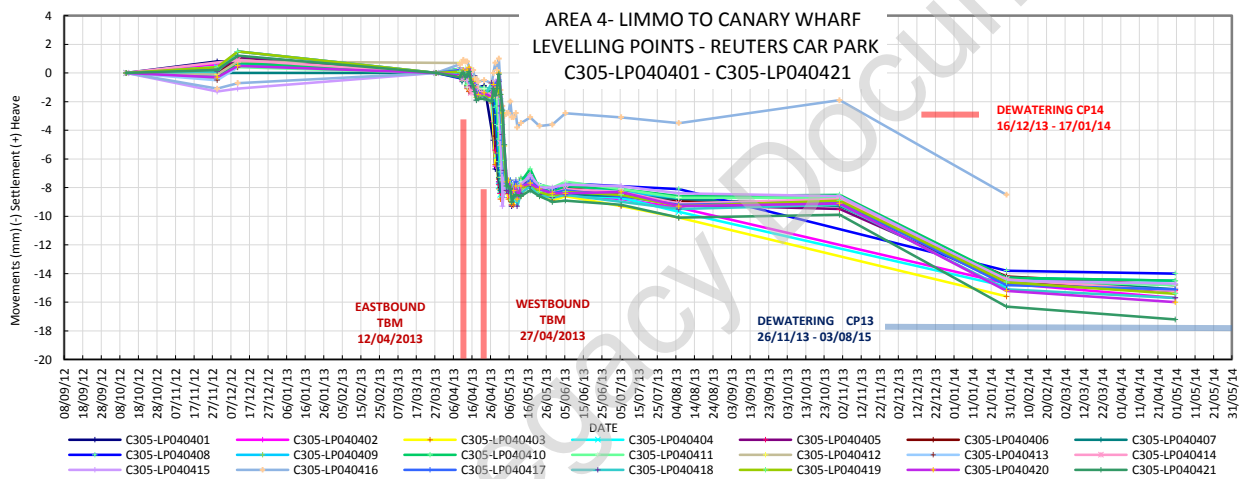
The percentage of the levelling points with a settlement rate less than 2mm/year is 80%, whereas 84% are less than 3mm/year. See section 8 Summary of movements related to dewatering activities.

The plot below shows the trend line adjustment for the levelling points in this array.

I&M CLOSE OUT REPORT FOR LEVELLING POINTS INSTALLATION FROM EAST INDIA TO CANARY WHARF (DRIVE Y)
C305-DSJ-C2-RGN-CR143-50002 REV 2.0



C305-LP040401 - C305-LP040421 REUTERS CAR PARK (21)



The levelling points recorded a maximum settlement of -1.9mm after the eastbound TBM transit and a total maximum settlement of -10.1mm after the westbound TBM transit. A total maximum settlement of -17.2mm was recorded during or after CP13 and CP14 works.

The point C305-LP040416 shows less settlement than the other levelling points within this array; it is thought this is possibly due to some local influence affecting this point.

In order to differentiate the movement due to the TBM transit from the dewatering and analyse whether the rate of change in the data has reached an acceptably small rate, the four readings before the dewatering period started were used to calculate the annual projection.

The table below shows the annual rate for the levelling points in this array.

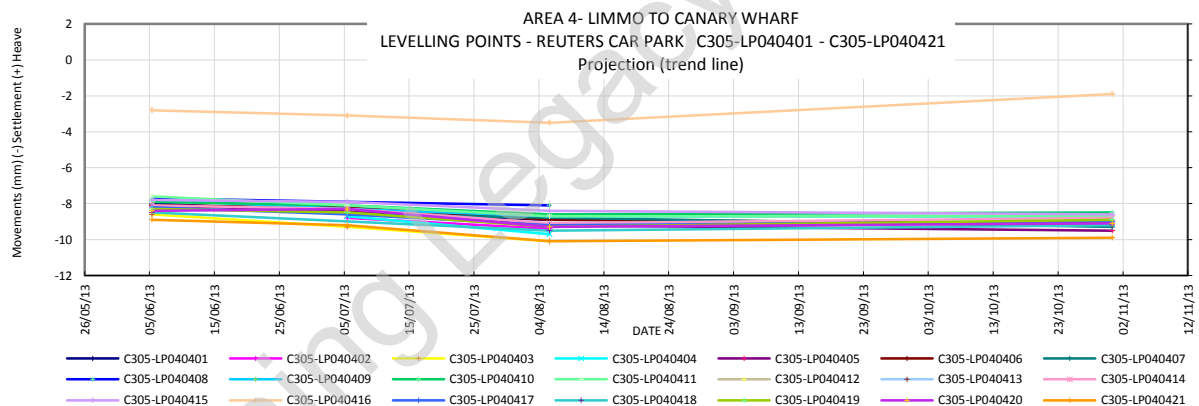
	Registered Movement (mm)				Rate (mm/year)
	05/06/2013	05/07/2013	05/08/2013	31/10/2013	
C305-LP040401	-8.00	-8.50	-8.90	#N/A	-5.366
C305-LP040402	#N/A	-8.80	-9.40	#N/A	-7.045
C305-LP040403	-8.60	-9.30	-10.10	#N/A	-8.943
C305-LP040404	#N/A	-8.70	-9.70	#N/A	-11.717
C305-LP040405	-8.10	-8.40	-9.20	-9.50	-3.462
C305-LP040406	-8.10	-8.20	-8.90	-9.10	-2.575
C305-LP040407	#N/A	-8.60	#N/A	-9.30	-2.154

	Registered Movement (mm)				Rate (mm/year)
	05/06/2013	05/07/2013	05/08/2013	31/10/2013	
C305-LP040408	-7.70	#N/A	-8.10	#N/A	-2.373
C305-LP040409	-7.80	-8.30	-8.70	-8.70	-1.961
C305-LP040410	-7.90	-8.10	-8.60	-8.50	-1.430
C305-LP040411	-7.60	-8.10	-8.70	-8.70	-2.496
C305-LP040412	#N/A	#N/A	#N/A	#N/A	-
C305-LP040413	#N/A	#N/A	#N/A	#N/A	-
C305-LP040414	-8.10	-8.30	-9.10	-8.80	-1.706
C305-LP040415	-7.80	-7.90	-8.40	-8.60	-2.041
C305-LP040416	-2.80	-3.10	-3.50	-1.90	2.603
C305-LP040417	-8.20	-8.60	-9.20	-9.00	-1.791
C305-LP040418	-8.50	#N/A	-9.50	-9.20	-1.533
C305-LP040419	-8.30	-8.50	-9.30	-8.90	-1.443
C305-LP040420	-8.40	-8.30	-9.30	-9.10	-1.968
C305-LP040421	-8.90	-9.20	-10.10	-9.90	-2.415
	Rate less than -2.5 mm/year			% less	68.42%
	Rate greater than -3.5 mm/year			% less	78.95%

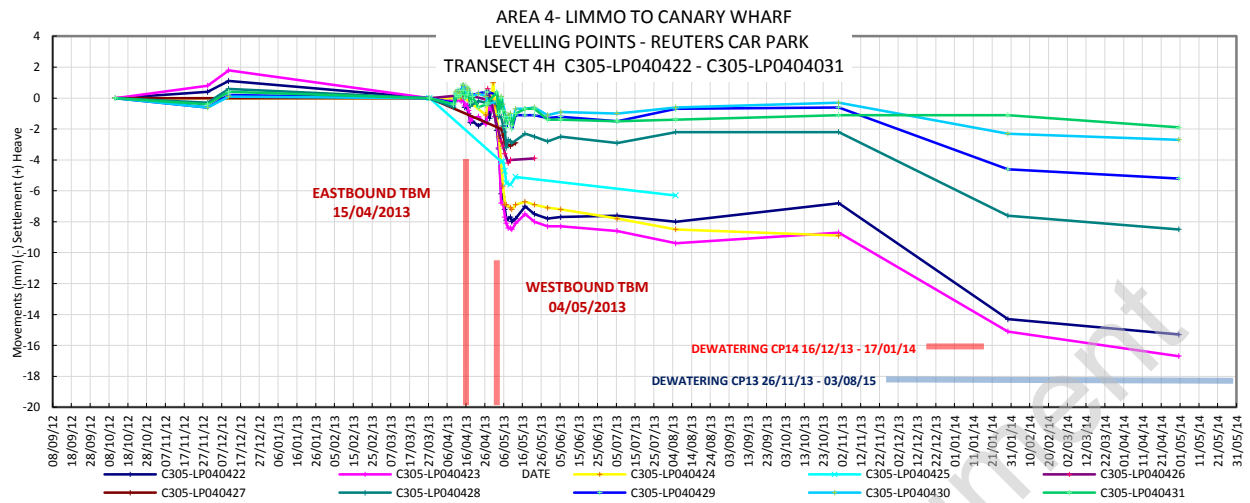
Note: All the movements are in mm. (-) Settlement / (+) Heave

The percentage of the levelling points with a settlement rate less than 2mm/year is 68.42%, whereas 78.95% are less than 3mm/year. See section 8 Summary of movements related to dewatering activities.

The plot below shows the trend line adjustment for the levelling points in this array.



4H C305-LP040422 - C305-LP040431 REUTERS CAR PARK (10)



The levelling points recorded a maximum settlement of -2mm after the eastbound TBM transit and a total maximum settlement of -9.4mm after the westbound TBM transit. A total maximum settlement of -16.7mm was recorded during or after CP13 and CP14 works.

In order to differentiate the movement due to the TBM transit from the dewatering and analyse whether the rate of change in the data has reached an acceptably small rate, the four readings before the dewatering period started were used to calculate the annual projection.

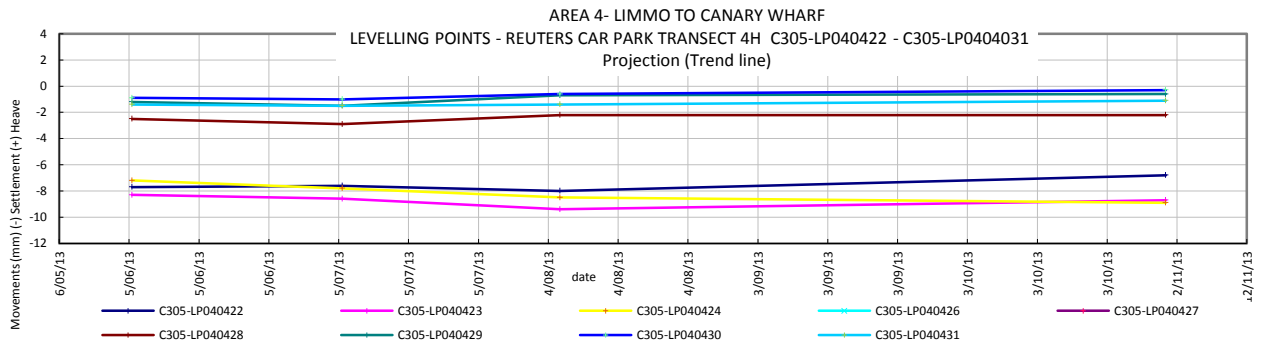
The table below shows the annual rate for the levelling points in this array.

	Registered Movement (mm)				Rate (mm/year)
	05/06/2013	05/07/2013	05/08/2013	31/10/2013	
C305-LP040422	-7.70	-7.60	-8.00	-6.80	2.263
C305-LP040423	-8.30	-8.60	-9.40	-8.70	-0.840
C305-LP040424	-7.20	-7.80	-8.50	-8.90	-3.979
C305-LP040425	#N/A	#N/A	-6.30	#N/A	-
C305-LP040426	#N/A	#N/A	#N/A	#N/A	-
C305-LP040427	#N/A	#N/A	#N/A	#N/A	-
C305-LP040428	-2.50	-2.90	-2.20	-2.20	1.168
C305-LP040429	-1.20	-1.50	-0.70	-0.60	1.862
C305-LP040430	-0.90	-1.00	-0.60	-0.30	1.679
C305-LP040431	-1.40	-1.50	-1.40	-1.10	0.876
	Rate less than -2.5 mm/year			% less 2mm/year	85.71%
	Rate greater than -3.5 mm/year			% less 3mm/year	85.71%

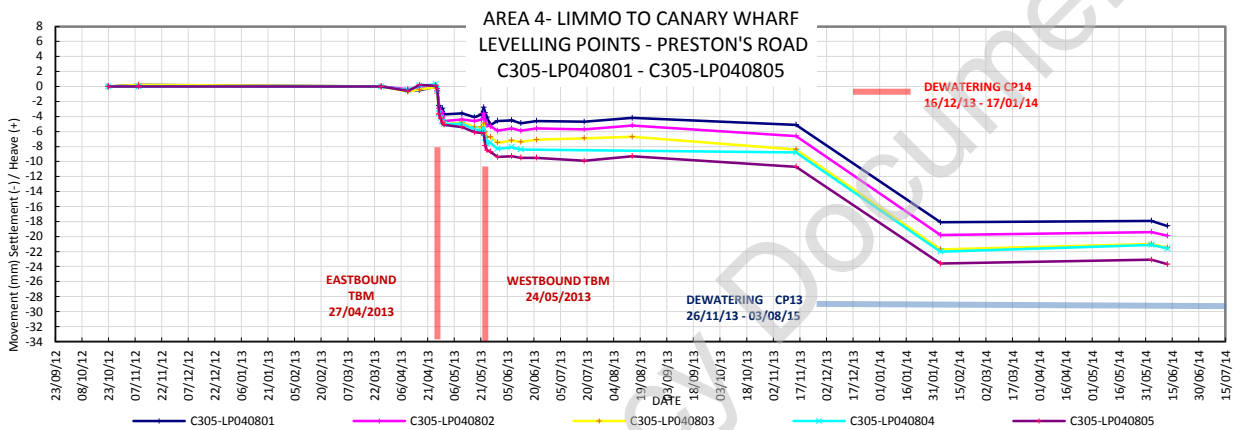
Note: All the movements are in mm. (-) Settlement / (+) Heave

The percentage of the levelling points with a settlement rate less than 2mm/year and 3mm/year is 85.71%. See section 8 Summary of movements related to dewatering activities.

The plot below shows the trend line adjustment for the levelling points in this array.



C305-LP040801 - C305-LP040805 PRESTON'S ROAD (5 shown but 4 in table)



The levelling points recorded a maximum settlement of -6.1mm after the eastbound TBM transit and a total maximum settlement of -9.9mm after the westbound TBM transit. A total maximum settlement of -23.7mm was recorded during or after CP13 and CP14 works.

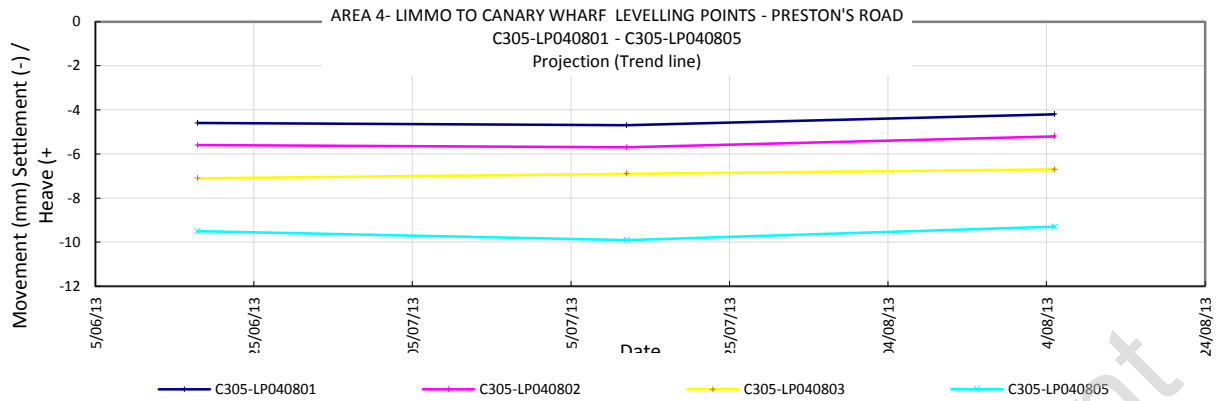
The table below shows the annual rate for the levelling points in this array. The last three readings were used to calculate the annual projection after TBM passage and before dewatering commenced.

	Registered movement (mm)			Rate (mm/year)
	21-06-13	18-07-13	14-08-13	
C305-LP040801	-4.60	-4.70	-4.20	2.701
C305-LP040802	-5.60	-5.70	-5.20	2.701
C305-LP040803	-7.10	-6.90	-6.70	2.702
C305-LP040805	-9.50	-9.90	-9.30	1.349
	Rate less than -2.5 mm/year		% less 2mm/year	100%
	Rate greater than -3.5 mm/year		% less 3mm/year	100%

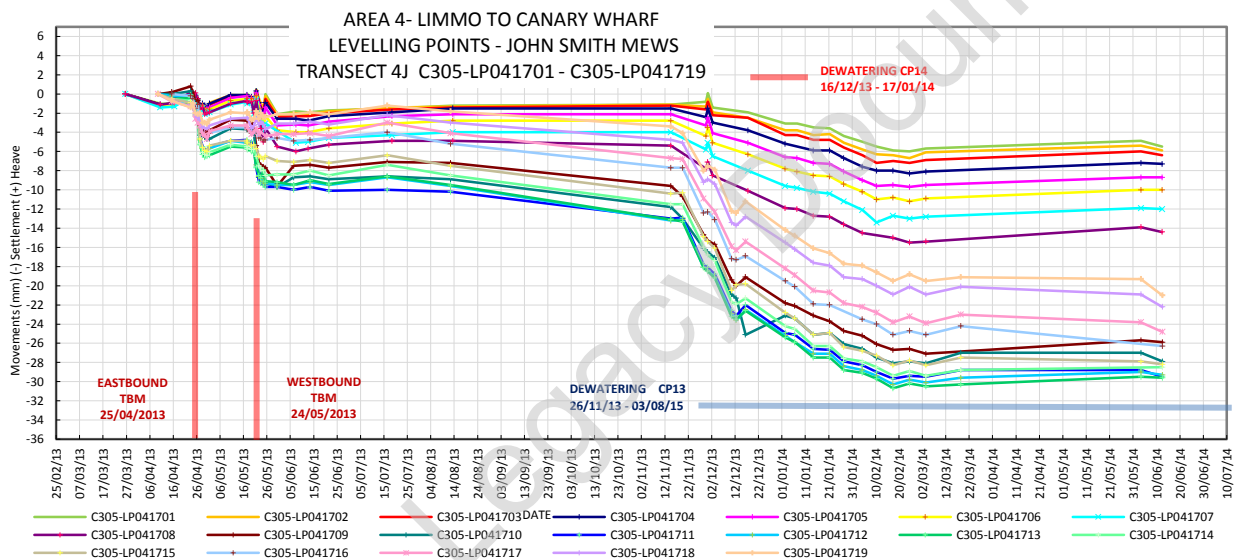
Note: All the movements are in mm. (-) Settlement / (+) Heave

The percentage of the levelling points with a settlement rate less than 2mm/year is 100%. See section 8 Summary of movements related to dewatering activities.

The plot below shows the trend line adjustment for the levelling points in this array.



C305-LP041701 - C305-LP041719 IBIS HOTEL (19)



The levelling points recorded a maximum settlement of -6.4mm after the eastbound TBM transit and a total maximum settlement of -10.2mm after the westbound TBM transit. A total maximum settlement of -30.7mm was recorded during or after CP13 and CP14 works.

In order to differentiate the movement due to the TBM transit from the dewatering and analyse whether the rate of change in the data has reached an acceptably small rate, the six readings before the dewatering period started were used to calculate the annual projection.

The table below shows the annual rate for the levelling points in this array.

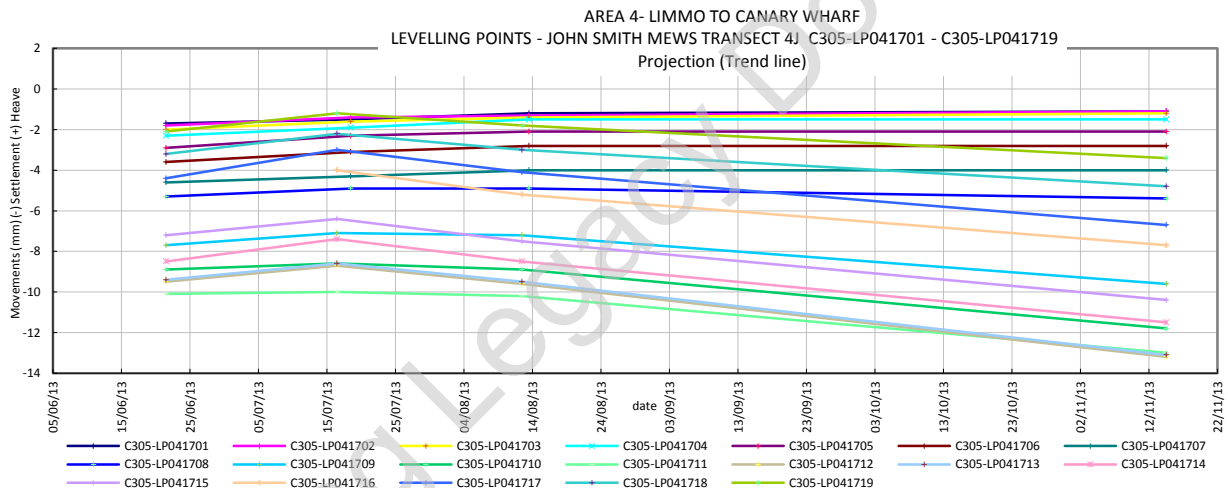
	Registered Movement (mm)						Rate (mm/year)
	21/06/2013	16/07/2013	18/07/2013	12/08/2013	13/08/2013	14/11/2013	
C305-LP041701	-1.70	#N/A	-1.50	#N/A	-1.20	-1.10	1.387
C305-LP041702	-1.80	#N/A	-1.40	#N/A	-1.30	-1.10	1.497
C305-LP041703	-2.00	#N/A	-1.60	#N/A	-1.40	-1.20	1.752
C305-LP041704	-2.30	#N/A	-1.90	#N/A	-1.50	-1.50	1.716
C305-LP041705	-2.90	#N/A	-2.30	#N/A	-2.10	-2.10	1.533
C305-LP041706	-3.60	#N/A	-3.10	#N/A	-2.80	-2.80	1.643
C305-LP041707	-4.60	#N/A	-4.30	#N/A	-4.00	-4.00	1.278
C305-LP041708	-5.30	#N/A	-4.90	#N/A	-4.90	-5.40	-0.657

	Registered Movement (mm)						Rate (mm/year)
	21/06/2013	16/07/2013	18/07/2013	12/08/2013	13/08/2013	14/11/2013	
C305-LP041709	-7.70	-7.10	#N/A	-7.20	#N/A	-9.60	-5.475
C305-LP041710	-8.90	-8.60	#N/A	-8.90	#N/A	-11.80	-8.103
C305-LP041711	-10.10	-10.00	#N/A	-10.20	#N/A	-13.00	-7.884
C305-LP041712	-9.50	-8.70	#N/A	-9.60	#N/A	-13.20	-10.585
C305-LP041713	-9.40	-8.60	#N/A	-9.50	#N/A	-13.10	-10.585
C305-LP041714	-8.50	-7.40	#N/A	-8.50	#N/A	-11.50	-9.089
C305-LP041715	-7.20	-6.40	#N/A	-7.50	#N/A	-10.40	-9.344
C305-LP041716	#N/A	-4.00	#N/A	-5.20	#N/A	-7.70	-10.768
C305-LP041717	-4.40	-3.00	#N/A	-4.10	#N/A	-6.70	-7.519
C305-LP041718	-3.20	-2.20	#N/A	-3.00	#N/A	-4.80	-5.110
C305-LP041719	-2.10	-1.20	#N/A	-1.80	#N/A	-3.40	-4.380
	Rate less than -2.5 mm/year			% less 2mm/year			42.11%
	Rate greater than -3.5 mm/year			% less 3mm/year			42.11%

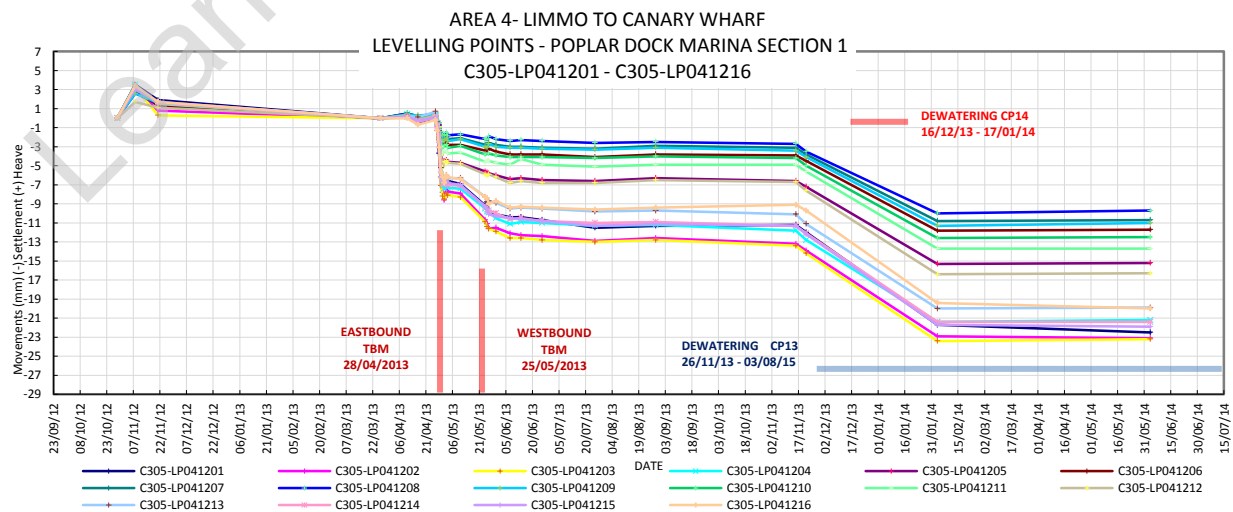
Note: All the movements are in mm. (-) Settlement / (+) Heave

The percentage of the levelling points with a settlement rate less than 2mm/year and 3mm/year is 42.11%. See section 8 Summary of movements related to dewatering activities.

The plot below shows the trend line adjustment for the levelling points in this array.



C305-LP041201 - C305-LP041216 POPLAR DOCK MARINA. SECTION 1 (16)



The levelling points recorded a maximum settlement of -8.5mm after the eastbound TBM transit and a total maximum settlement of -13mm after the westbound TBM transit. A total maximum settlement of -23.4mm was recorded during or after CP13 and CP14 works.

In order to differentiate the movement due to the TBM transit from the dewatering and analyse whether the rate of change in the data has reached an acceptably small rate, the four readings before the dewatering period started were used to calculate the annual projection.

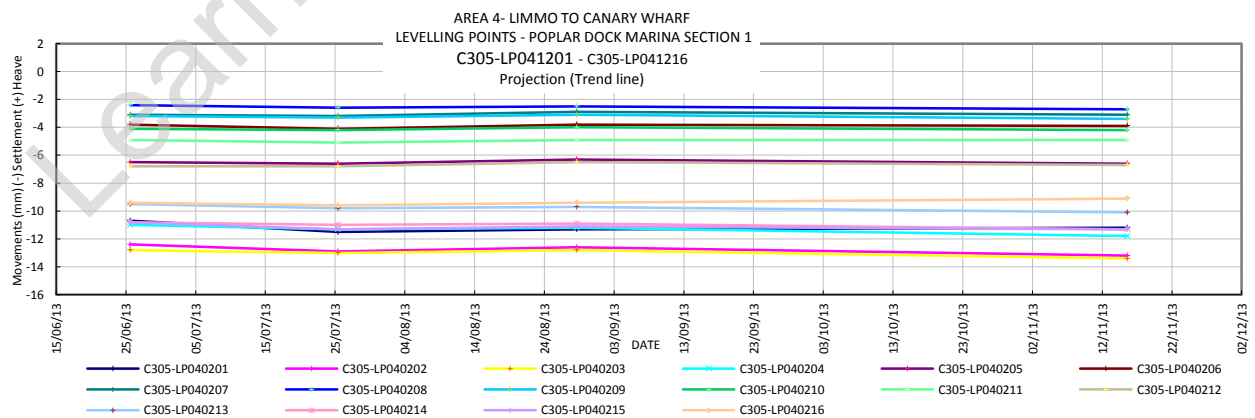
The table below shows the annual rate for the levelling points in this array.

	Registered Movement (mm)				Rate (mm/year)
	25/06/2013	25/07/2013	28/08/2013	15/11/2013	
C305-LP040201	-10.70	-11.50	-11.30	-11.20	-0.694
C305-LP040202	-12.40	-12.90	-12.60	-13.20	-1.716
C305-LP040203	-12.80	-13.00	-12.80	-13.40	-1.424
C305-LP040204	-11.00	-11.30	-11.20	-11.80	-0.329
C305-LP040205	-6.50	-6.60	-6.30	-6.60	-0.146
C305-LP040206	-3.80	-4.10	-3.80	-3.90	0.018
C305-LP040207	-3.10	-3.20	-2.90	-3.10	0.110
C305-LP040208	-2.40	-2.60	-2.50	-2.70	-0.621
C305-LP040209	-3.20	-3.30	-3.10	-3.40	-0.438
C305-LP040210	-4.10	-4.20	-4.00	-4.20	-0.146
C305-LP040211	-4.90	-5.10	-4.90	-4.90	0.183
C305-LP040212	-6.80	-6.80	-6.50	-6.70	0.329
C305-LP040213	-9.50	-9.80	-9.70	-10.10	-0.329
C305-LP040214	-10.80	-11.00	-10.90	-11.30	-1.168
C305-LP040215	-10.80	-11.30	-11.10	-11.30	-0.329
C305-LP040216	-9.40	-9.60	-9.40	-9.10	0.986
	Rate less than -2.5 mm/year			% less 2mm/year	100.00%
	Rate greater than -3.5 mm/year			% less 3mm/year	100.00%

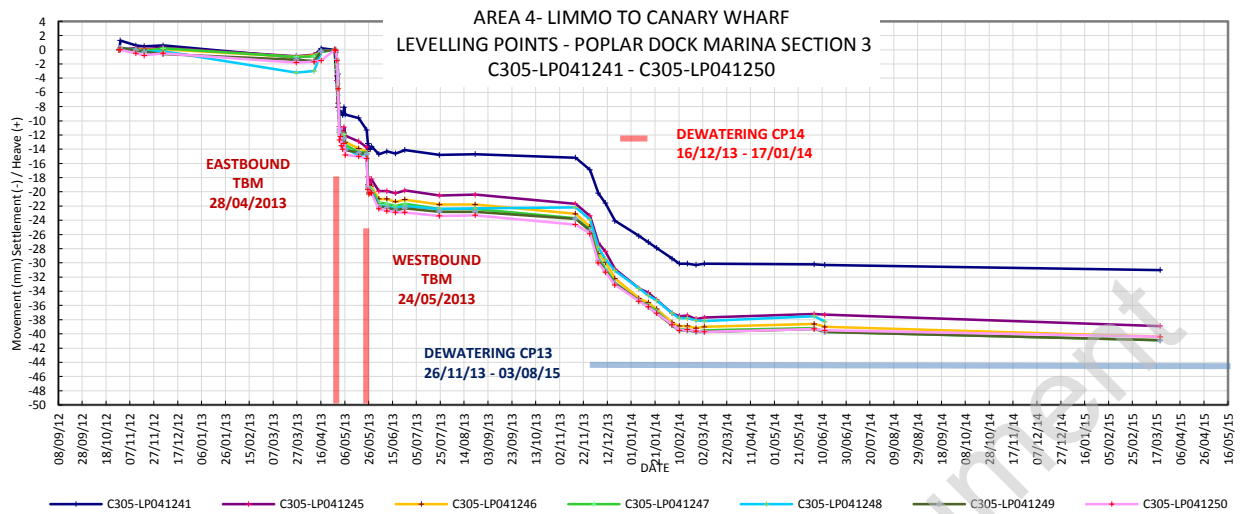
Note: All the movements are in mm. (-) Settlement / (+) Heave

The percentage of the levelling points with a settlement rate less than 2mm/year is 100%. See section 8 Summary of movements related to dewatering activities.

The plot below shows the trend line adjustment for the levelling points in this array.



C305-LP041241 - C305-LP041250 POPLAR DOCK MARINA. SECTION 3 (7)



The levelling points recorded a maximum settlement of -15mm after the eastbound TBM transit and a total maximum settlement of -23.3mm after the westbound TBM transit. A total maximum settlement of -40.4mm was recorded during or after CP13 and CP14 works.

In order to differentiate the movement due to the TBM transit from the dewatering and analyse whether the rate of change in the data has reached an acceptably small rate, the four readings before the dewatering period started were used to calculate the annual projection.

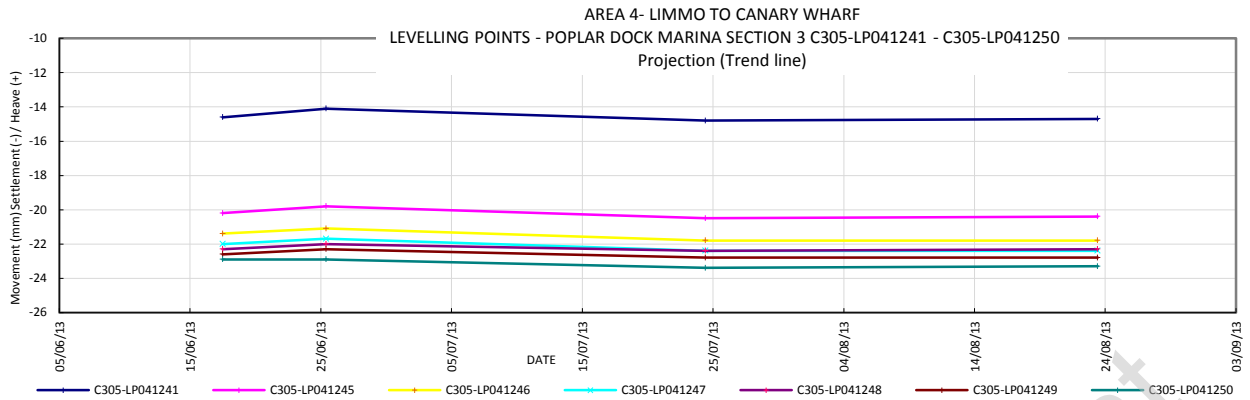
The table below shows the annual rate for the levelling points in this array.

	Registered Movement (mm)				Rate (mm/year)
	17/06/2013	25/06/2013	24/07/2013	23/08/2013	
C305-LP041241	-14.60	-14.10	-14.80	-14.70	-2.061
C305-LP041245	-20.20	-19.80	-20.50	-20.40	-2.428
C305-LP041246	-21.40	-21.10	-21.80	-21.80	-3.306
C305-LP041247	-22.00	-21.70	-22.40	-22.40	-3.306
C305-LP041248	-22.30	-22.00	-22.40	-22.30	-0.906
C305-LP041249	-22.60	-22.30	-22.80	-22.80	-2.047
C305-LP041250	-22.90	-22.90	-23.40	-23.30	-2.635
	Rate less than -2.5 mm/year			% less 2mm/year	57.14%
	Rate greater than -3.5 mm/year			% less 3mm/year	100.00%

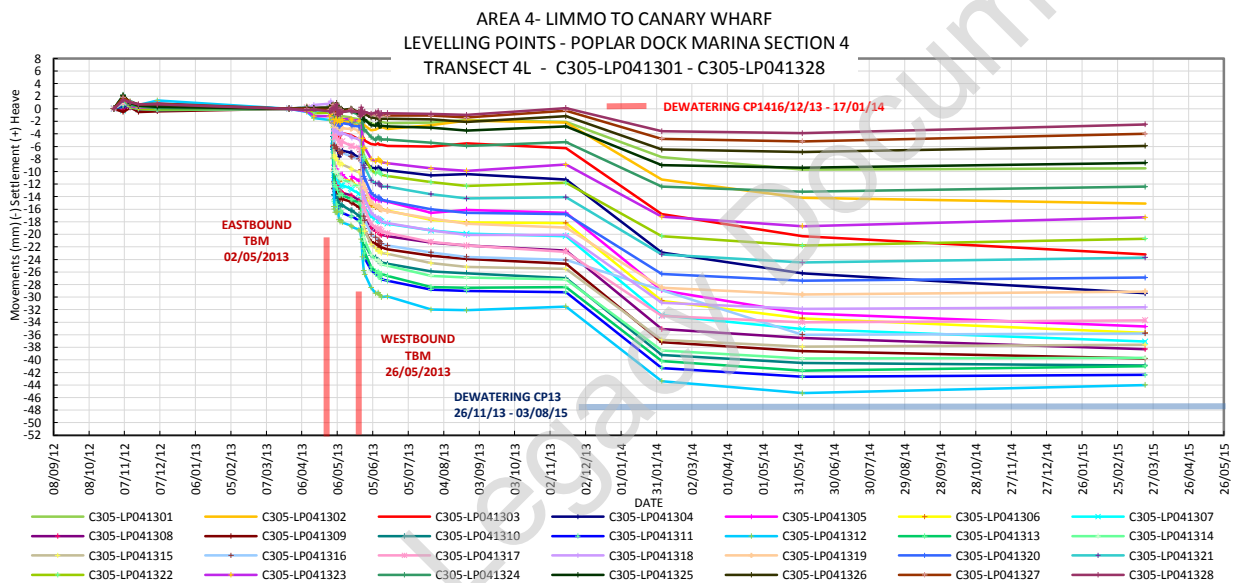
Note: All the movements are in mm. (-) Settlement / (+) Heave

The percentage of the levelling points with a settlement rate less than 2mm/year is 57.14%, whereas 100% are less than 3mm/year. See section 8 Summary of movements related to dewatering activities.

The plot below shows the trend line adjustment for the levelling points in this array.



4L C305-LP041301 - C305-LP041328 POPLAR DOCK MARINA. SECTION 4 (28)



The levelling points recorded a maximum settlement of -18.8mm after the eastbound TBM transit and a total maximum settlement of -32.1mm after the westbound TBM transit. A total maximum settlement of -45.3mm was recorded during or after CP13 and CP14 works.

In order to differentiate the movement due to the TBM transit from the dewatering and analyse whether the rate of change in the data has reached an acceptably small rate, the three readings before the dewatering period started were used to calculate the annual projection.

The table below shows the annual rate for the levelling points in this array.

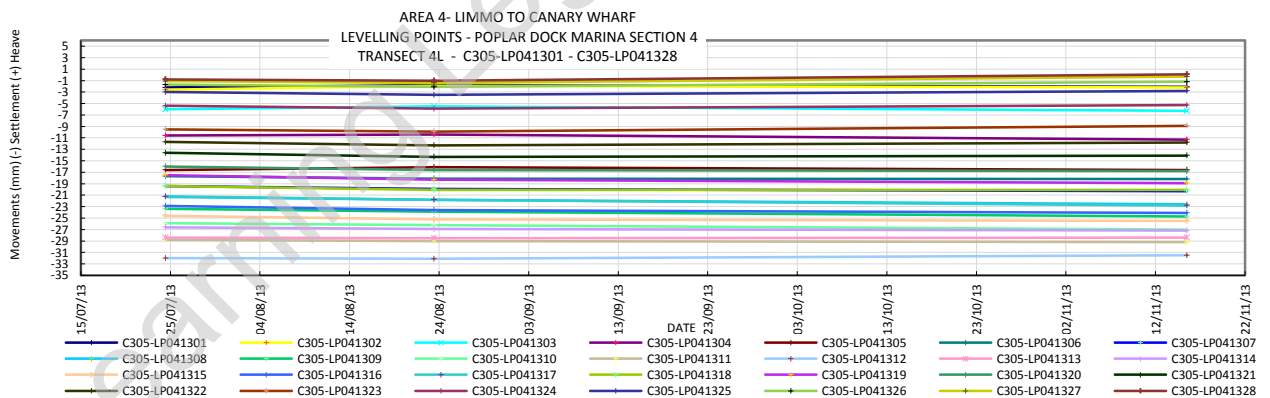
	Registered Movement (mm)			Rate (mm/year)
	24/07/2013	23/08/2013	15/11/2013	
C305-LP041301	-2.20	-1.80	-2.10	-0.031
C305-LP041302	-2.60	-1.90	-2.20	0.721
C305-LP041303	-6.00	-5.50	-6.30	-1.505
C305-LP041304	-10.60	-10.40	-11.30	-2.602
C305-LP041305	-16.60	-16.10	-16.60	-0.470
C305-LP041306	-17.70	-18.10	-18.20	-1.348
C305-LP041307	-19.40	-19.90	-20.30	-2.633
C305-LP041308	-21.30	-21.80	-22.60	-4.012

	Registered Movement (mm)			Rate (mm/year)
	24/07/2013	23/08/2013	15/11/2013	
C305-LP041309	-23.40	-23.90	-24.70	-4.012
C305-LP041310	-25.90	-26.20	-27.00	-3.511
C305-LP041311	-28.80	-29.00	-29.20	-1.191
C305-LP041312	-32.00	-32.10	-31.50	1.818
C305-LP041313	-28.40	-28.50	-28.40	0.094
C305-LP041314	-26.60	-26.90	-27.20	-1.787
C305-LP041315	-24.60	-25.20	-25.50	-2.539
C305-LP041316	-22.90	-23.60	-24.10	-3.479
C305-LP041317	-21.20	-21.80	-22.80	-4.952
C305-LP041318	-19.40	-20.10	-20.10	-1.755
C305-LP041319	-17.50	-18.30	-18.90	-4.075
C305-LP041320	-16.00	-16.60	-16.80	-2.194
C305-LP041321	-13.60	-14.30	-14.10	-1.066
C305-LP041322	-11.70	-12.30	-11.80	0.220
C305-LP041323	-9.50	-9.90	-8.90	2.445
C305-LP041324	-5.40	-5.90	-5.30	0.815
C305-LP041325	-3.00	-3.50	-2.80	1.160
C305-LP041326	-1.70	-2.10	-1.20	2.100
C305-LP041327	-1.10	-1.40	-0.30	3.041
C305-LP041328	-0.80	-1.00	0.10	3.291
	Rate less than -2.5 mm/year		% less	67.86%
	Rate greater than -3.5 mm/year		% less	82.14%

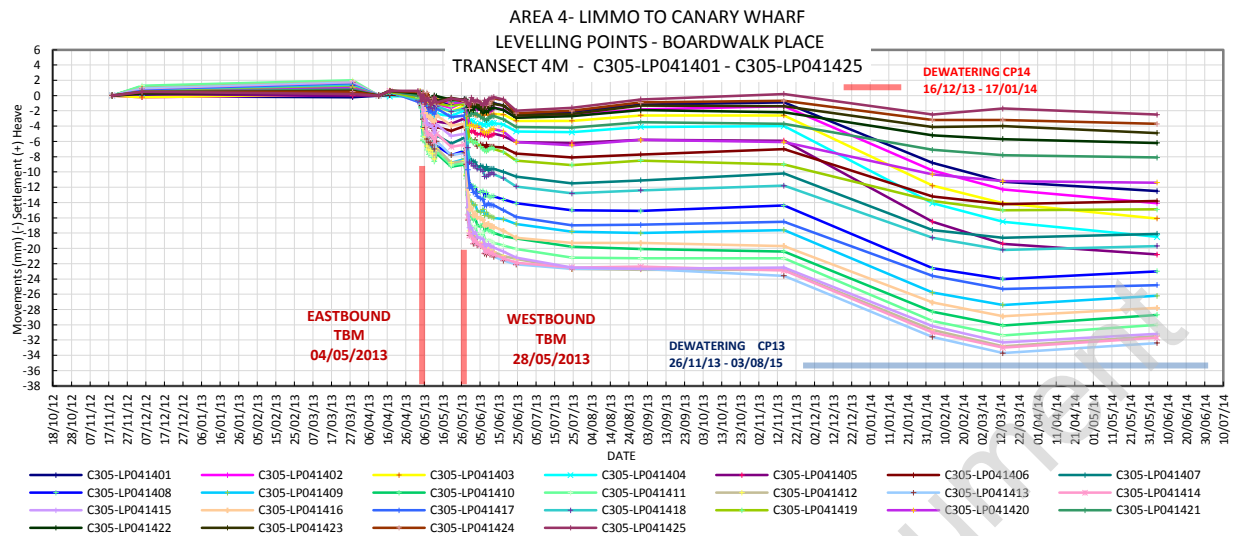
Note: All the movements are in mm. (-) Settlement / (+) Heave

The percentage of the levelling points with a settlement rate less than 2mm/year is 67.86%, whereas 82.14% are less than 3mm/year. See section 8 Summary of movements related to dewatering activities.

The plot below shows the trend line adjustment for the levelling points in this array.



4M C305-LP041401 - C305-LP041425 BOARDWALK PLACE (25)



The levelling points recorded a maximum settlement of -8.8mm after the eastbound TBM transit and a total maximum settlement of -22.7mm after the westbound TBM transit. A total maximum settlement of -33.7mm was recorded during or after CP13 and CP14 works.

In order to differentiate the movement due to the TBM transit from the dewatering and analyse whether the rate of change in the data has reached an acceptably small rate, the three readings before the dewatering period started were used to calculate the annual projection.

The table below shows the annual rate for the levelling points in this array.

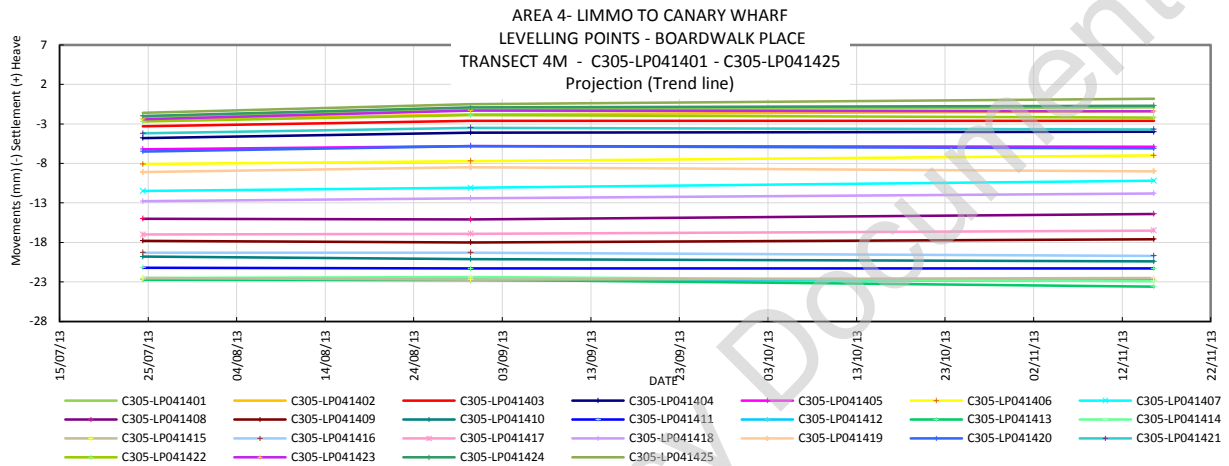
	Registered Movement (mm)			Rate (mm/year)
	24/07/2013	30/08/2013	15/11/2013	
C305-LP041401	-2.10	-1.20	-0.90	3.468
C305-LP041402	-2.50	-1.80	-1.40	3.468
C305-LP041403	-3.30	-2.60	-2.60	1.898
C305-LP041404	-4.80	-4.10	-4.00	2.227
C305-LP041405	-6.20	-5.80	-5.90	0.730
C305-LP041406	-8.10	-7.70	-7.00	3.468
C305-LP041407	-11.50	-11.10	-10.20	4.161
C305-LP041408	-15.00	-15.10	-14.40	2.117
C305-LP041409	-17.80	-18.00	-17.60	0.840
C305-LP041410	-19.80	-20.10	-20.40	-1.825
C305-LP041411	-21.20	-21.30	-21.30	-0.256
C305-LP041412	-22.70	-22.80	-22.80	-0.256
C305-LP041413	-22.70	-22.70	-23.60	-0.310
C305-LP041414	-22.50	-22.40	-22.90	-1.460
C305-LP041415	-22.50	-22.70	-22.50	0.146
C305-LP041416	-19.30	-19.30	-19.70	-1.387
C305-LP041417	-17.00	-16.90	-16.50	1.643
C305-LP041418	-12.80	-12.40	-11.80	3.139
C305-LP041419	-9.10	-8.50	-9.00	0.073
C305-LP041420	-6.50	-5.80	-6.10	0.876
C305-LP041421	-4.20	-3.50	-3.70	1.205
C305-LP041422	-2.70	-1.90	-2.20	1.132
C305-LP041423	-2.40	-1.30	-1.40	2.628
C305-LP041424	-2.00	-0.90	-0.70	3.650

	Registered Movement (mm)			Rate (mm/year)
	24/07/2013	30/08/2013	15/11/2013	
C305-LP041425	-1.60	-0.50	0.20	5.366
	Rate less than -2.5 mm/year		% less	100.00%
	Rate greater than -3.5 mm/year		% less	100.00%

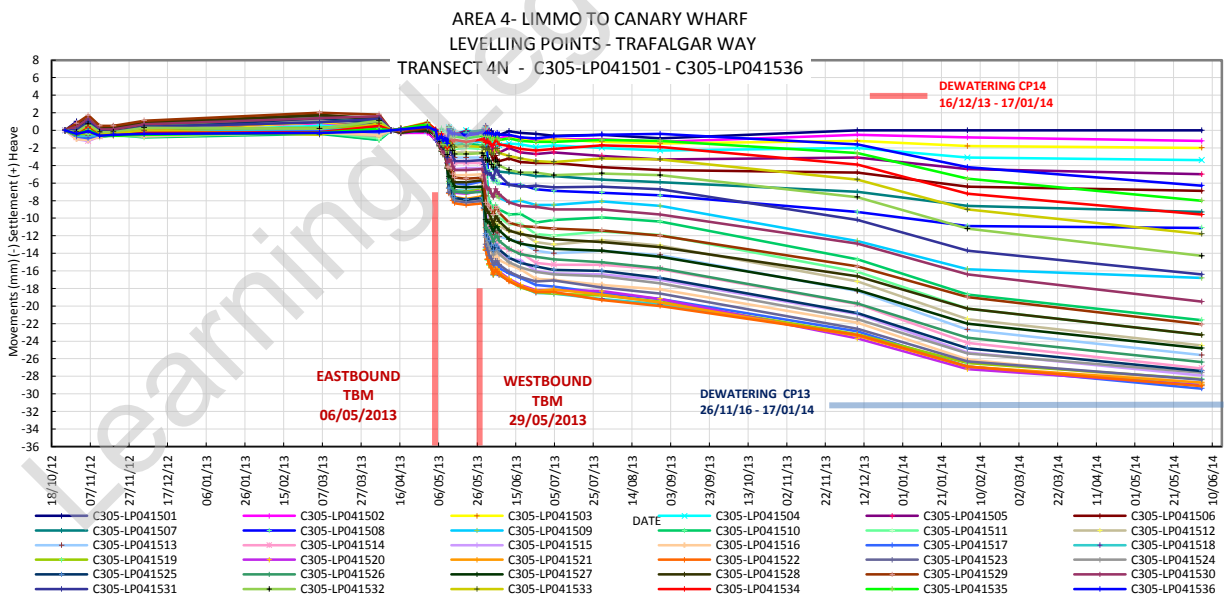
Note: All the movements are in mm. (-) Settlement / (+) Heave

The percentage of the levelling points with a settlement rate less than 2mm/year is 100%. See section 8 Summary of movements related to dewatering activities.

The plot below shows the trend line adjustment for the levelling points in this array.



4N C305-LP041501 - C305-LP041536 TRAFALGAR WAY (36)



The levelling points recorded a maximum settlement of -7.9mm after the eastbound TBM transit and a total maximum settlement of -20mm after the westbound TBM transit. A total maximum settlement of -29.4mm was recorded during or after CP13 and CP14 works.

In order to differentiate the movement due to the TBM transit from the dewatering and analyse whether the rate of change in the data has reached an acceptably small rate, the three readings before the dewatering period started were used to calculate the annual projection.

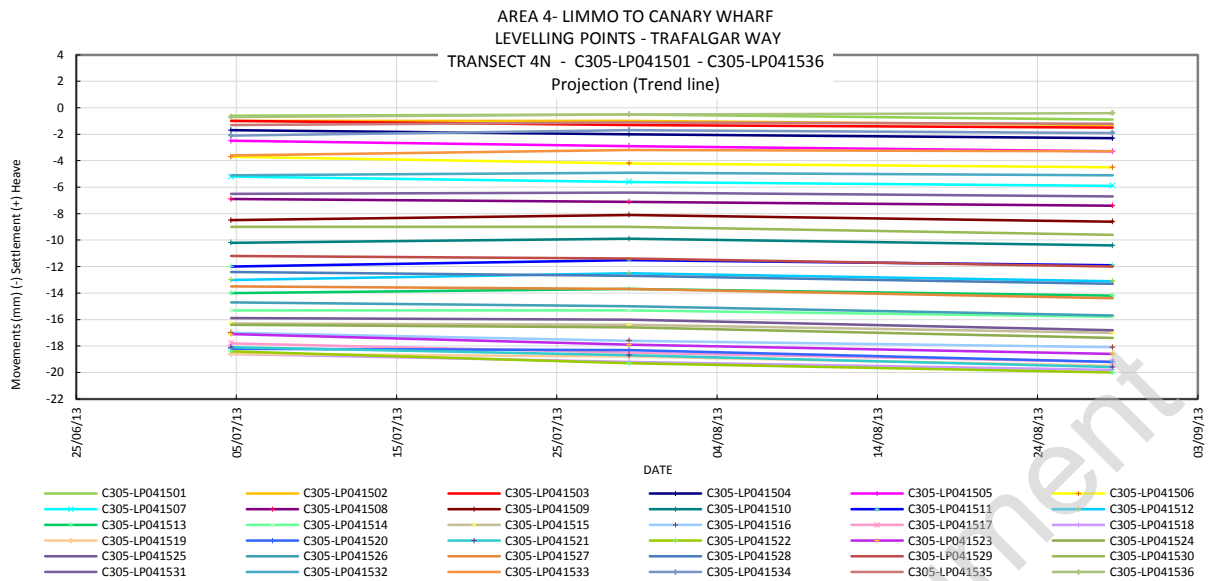
The table below shows the annual rate for the levelling points in this array.

	Registered Movement (mm)			Rate (mm/year)
	04/07/2013	29/07/2013	28/08/2013	
C305-LP041501	-0.60	-0.50	-0.90	-2.081
C305-LP041502	-1.00	-1.00	-1.30	-2.044
C305-LP041503	-1.00	-1.30	-1.50	-3.285
C305-LP041504	-1.70	-2.00	-2.30	-3.979
C305-LP041505	-2.50	-2.90	-3.30	-5.293
C305-LP041506	-3.70	-4.20	-4.50	-5.256
C305-LP041507	-5.20	-5.60	-5.90	-4.599
C305-LP041508	-6.90	-7.10	-7.40	-3.322
C305-LP041509	-8.50	-8.10	-8.60	-0.840
C305-LP041510	-10.20	-9.90	-10.40	-1.497
C305-LP041511	-12.00	-11.50	-11.90	-0.475
C305-LP041512	-13.00	-12.50	-13.10	-0.913
C305-LP041513	-14.00	-13.70	-14.20	-1.497
C305-LP041514	-15.30	-15.30	-15.80	-3.431
C305-LP041515	-16.30	-16.40	-17.00	-4.745
C305-LP041516	-17.00	-17.60	-18.10	-7.264
C305-LP041517	-17.80	-18.50	-19.20	-9.271
C305-LP041518	-18.60	-19.20	-19.80	-7.921
C305-LP041519	-18.60	-18.80	-19.50	-6.059
C305-LP041520	-18.20	-18.30	-19.20	-6.789
C305-LP041521	-18.10	-18.70	-19.60	-10.001
C305-LP041522	-18.40	-19.30	-20.00	-10.549
C305-LP041523	-17.10	-17.90	-18.60	-9.892
C305-LP041524	-16.40	-16.60	-17.40	-6.753
C305-LP041525	-15.90	-16.00	-16.80	-6.096
C305-LP041526	-14.70	-15.00	-15.70	-6.716
C305-LP041527	-13.50	-13.70	-14.40	-6.059
C305-LP041528	-12.40	-12.70	-13.30	-6.023
C305-LP041529	-11.20	-11.40	-12.00	-5.366
C305-LP041530	-9.00	-9.00	-9.60	-4.088
C305-LP041531	-6.50	-6.40	-6.70	-1.424
C305-LP041532	-5.10	-4.90	-5.10	-1.168
C305-LP041533	-3.60	-3.20	-3.30	1.862
C305-LP041534	-2.10	-1.70	-1.90	1.205
C305-LP041535	-1.30	-1.10	-1.20	1.278
C305-LP041536	-0.70	-0.50	-0.40	1.971
	Rate less than -2.5 mm/year			% less 36.11%
	Rate greater than -3.5 mm/year			% less 44.44%

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

The percentage of the levelling points with a settlement rate less than 2mm/year is 36.11%, whereas 44.44% are less than 3mm/year. See section 8 Summary of movements related to dewatering activities.

The plot below shows the trend line adjustment for the levelling points in this array.



8. SUMMARY OF MOVEMENTS RELATED TO DEWATERING ACTIVITIES

The effect of dewatering systems being switched on is clearly illustrated in the graphs presented in section 7 above.

Where possible, the monitoring data sets used to calculate the settlement projections in this report were selected before this stage of works (ie: they do not include the periods affected by dewatering activities). In some instances the period from which the data sets were used to calculate the settlement projections was two months. In some instances this limited monitoring period has resulted in slightly higher settlement ratios. Furthermore, for some areas it is evident that dewatering systems were switched on before ground movements could be demonstrated to have stabilised after TBM works.

Monitoring data graphs from transects installed to monitor the dewatering activities have been included in this section. The description and location and monitoring period of these transects are presented below.

Notes:

- Transect 4D (C305-LP040001-C305-LP040030) is not covered by this close out report. It was used to monitor for Cross Passage 14 works. The data will be summarised in a separate Close out report: *I&M Close out report for Cross Passages: Phase I - C305-DSJ-C2-RGN-CRG03-50374*.
- Transect 4I (C305-LP047107-C305-LP047115 and C305-LP040723-C305-LP040734) is not covered by this close out report. It was used to monitor for Cross Passage 13 works. The data will be summarised in a separate Close out report: *I&M Close out report for Cross Passages: Phase I - C305-DSJ-C2-RGN-CRG03-50374*.

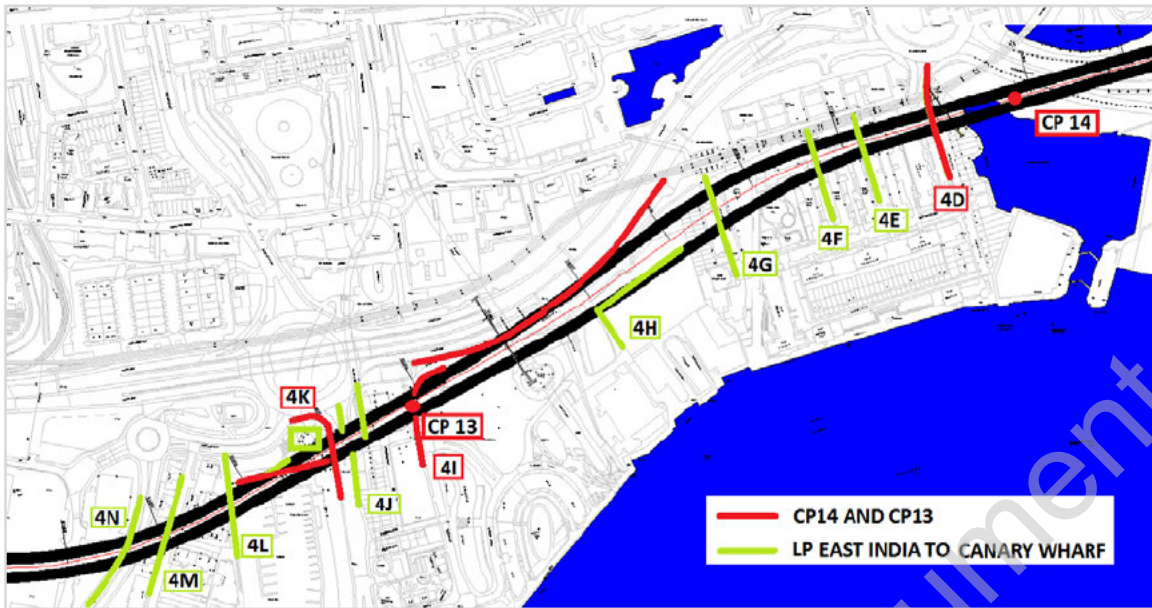
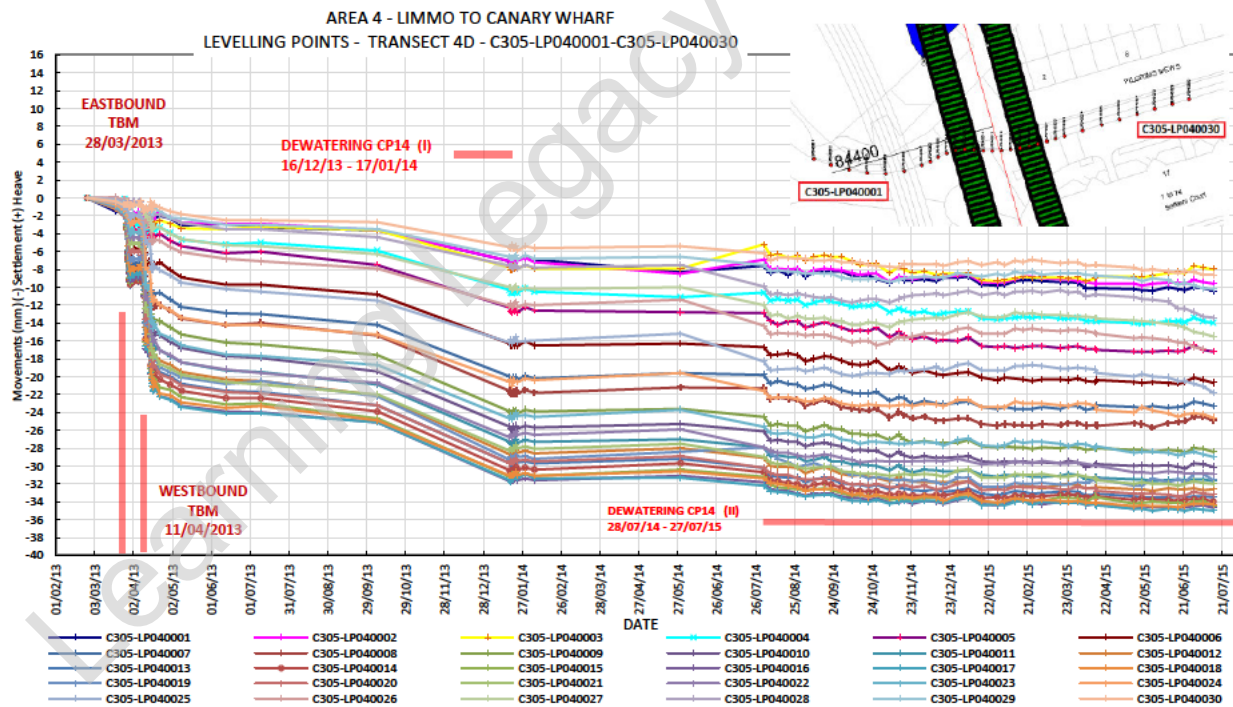


Figure 1: Levelling points East India to Canary Wharf and Cross Passages sections 4D and 4I

TRANSECT 4D C305-LP040001 to C305-LP040030 (CROSS PASSAGE 14) (30)

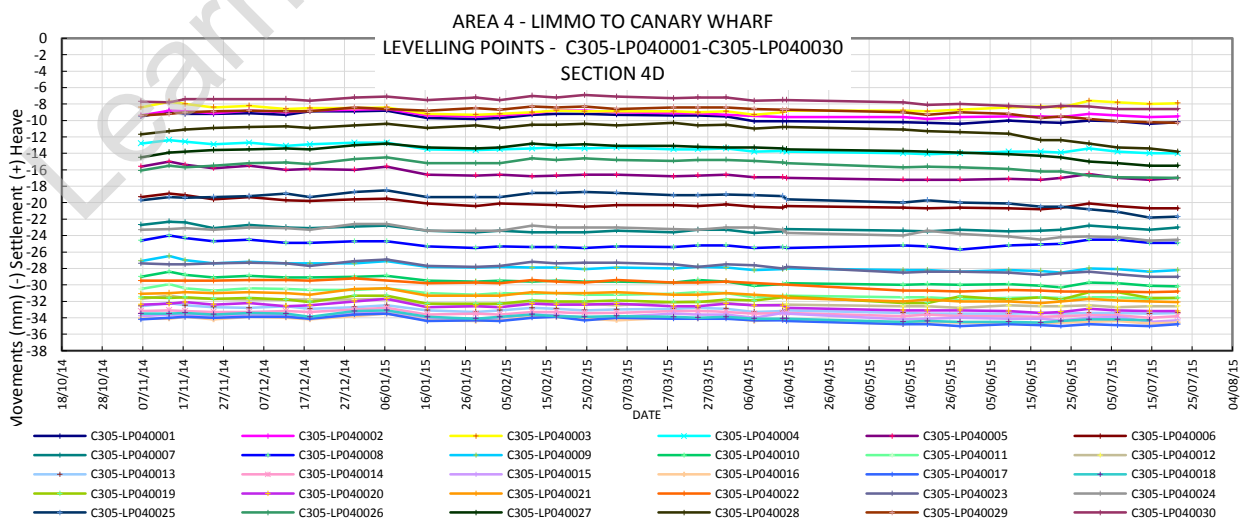


These levelling points which are close to the area covered in this close out report shows the annual settlement rate less than 2mm/year is 100%.

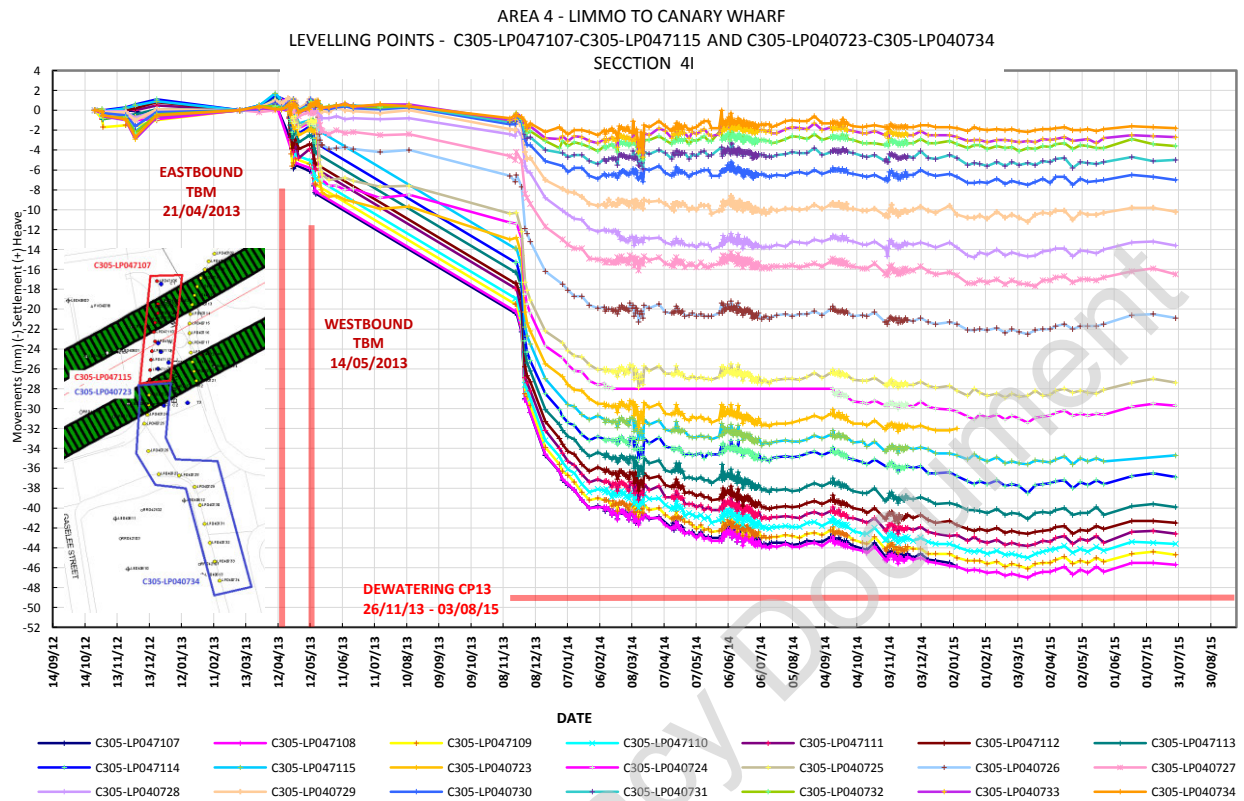
Below, the graph and the table show the data from November 2014 to July 2015 and the annual rate calculated for each levelling point.

	Registered movement (mm)		Rate mm/Year
C305-LP040001			-2.0
C305-LP040002			-1.0
C305-LP040003			0.10
C305-LP040004			-1.9
C305-LP040005			-2.5
C305-LP040006			-2.1
C305-LP040007			-0.8
C305-LP040008			-0.7
C305-LP040009			-2.0
C305-LP040010			-1.9
C305-LP040011			-2.0
C305-LP040012			-1.6
C305-LP040013			-1.5
C305-LP040014			-1.0
C305-LP040015	READINGS FROM 06/11/2014 TO 14/07/2015 WERE TAKEN FROM THE GRAPH ILLUSTRATED BELOW		-0.7
C305-LP040016			-1.0
C305-LP040017			-1.7
C305-LP040018			-1.6
C305-LP040019			0.3
C305-LP040020			-1.5
C305-LP040021			-1.8
C305-LP040022			-2.4
C305-LP040023			-2.2
C305-LP040024			-1.9
C305-LP040025			-2.5
C305-LP040026			-1.4
C305-LP040027			-1.7
C305-LP040028			-2.4
C305-LP040029			-1.2
C305-LP040030			-1.5
	Rate less than -2.5 mm/year	% less 2mm/year	100.00%
	Rate greater than -3.5 mm/year	% less 3mm/year	100.00%

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



**TRANSECT 4I: C305-LP047107 – C305-LP047115 and C305-LP040723 – C305-LP040734 (CROSS
 PASSAGE 13) (9 and 12)**

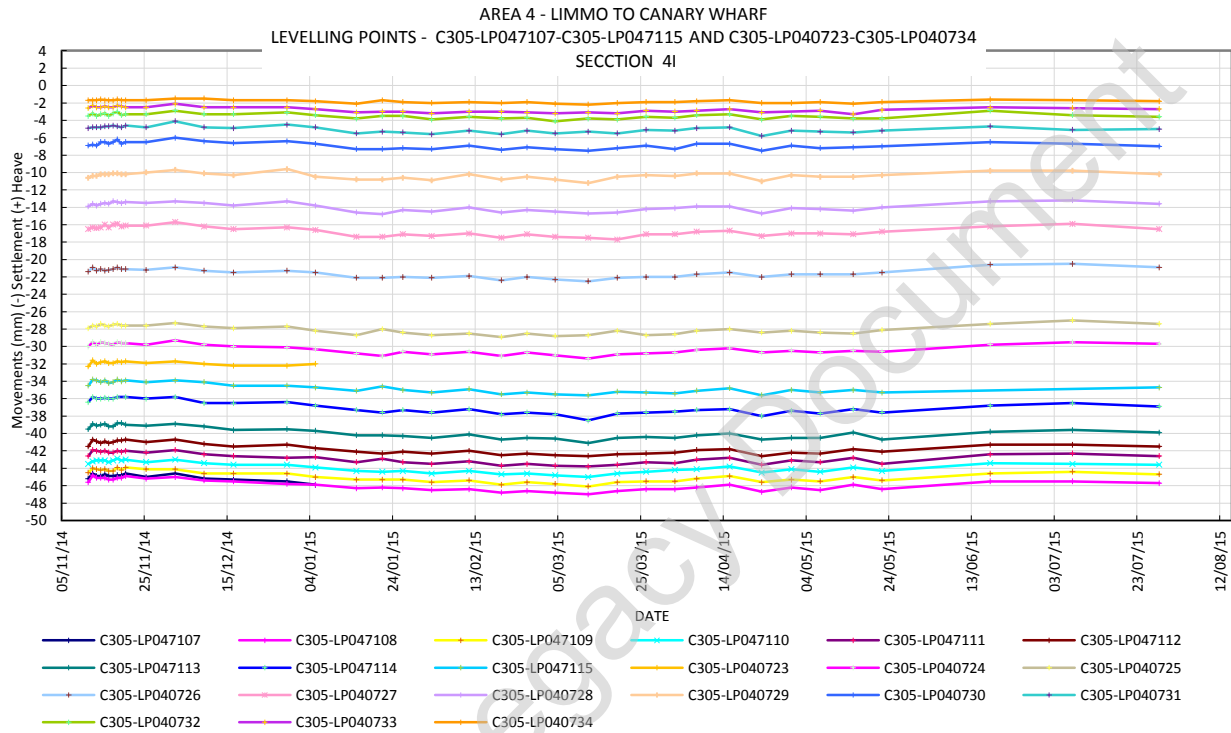


These levelling points which are close to the area covered in this close out report shows the annual settlement rate less than 2mm/year is 100%.

Below, the graph and the table show the data for the period November 2014 to July 2015 and the annual rate calculated for the levelling points in this array.

	Registered movement (mm)	Rate mm/Year
C305-LP047107		-
C305-LP047108		-1.7
C305-LP047109		-1.7
C305-LP047110		-1.5
C305-LP047111		-1.5
C305-LP047112		-1.7
C305-LP047113		-2.2
C305-LP047114	EADINGS FROM 11/11/2014 TO 28/07/2015 WERE TAKEN FROM THE GRAPH ILLUSTRATED BELOW	-2.3
C305-LP047115		-2.4
C305-LP040723		-
C305-LP040724		-1.1
C305-LP040725		-0.6
C305-LP040726		-0.4
C305-LP040727		-1.1
C305-LP040728		-0.7
C305-LP040729		-0.1
C305-LP040730		-0.8
C305-LP040731		-0.8

	Registered movement (mm)		Rate mm/Year
C305-LP040732			-0.5
C305-LP040733			-0.8
C305-LP040734			-0.4
	Rate less than -2.5 mm/year	% less 2mm/year	100.00%
	Rate greater than -3.5 mm/year	% less 3mm/year	100.00%



The graphs and tables of settlement rates presented above for both transects show that settlement rate due to dewatering works are less than 2 mm/year. As the instruments in this report are located close to, and between, these two transects it is inferred they behave in a similar manner and hence their settlement rate will also be less than the 2mm/year rate specification.

9. SUMMARY STATEMENT

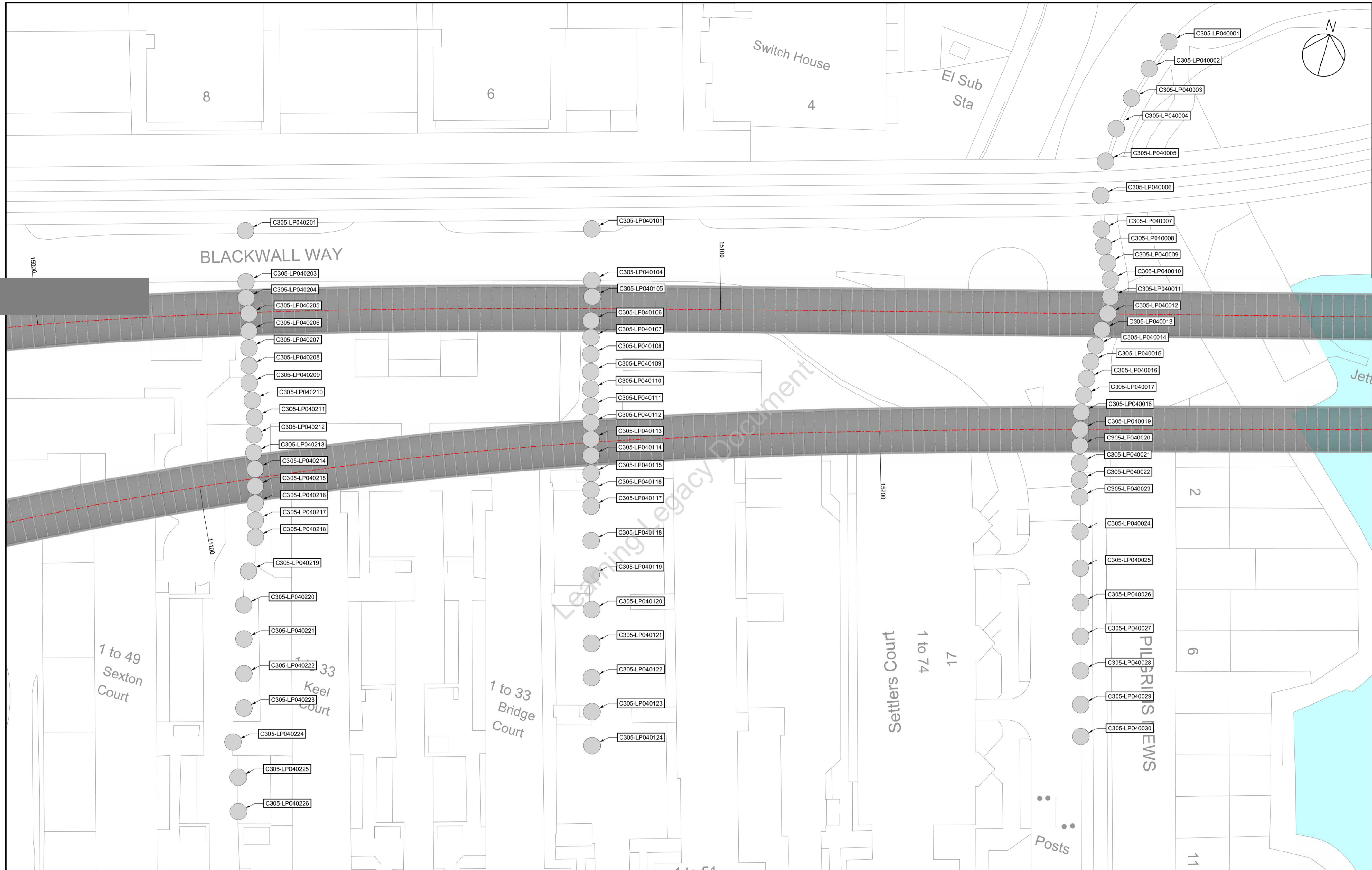
It has been agreed between the Project Manager, the Designer, the Contractor and the Sub-contractor that the instrumentation covered herein, for monitoring ground movement effects of Crossrail works, including long term effects, but which have been subsequently affected by dewatering of cross passages, stations or shafts, prior to the achievement of 12 months 'post-TBM' long term monitoring, can be closed out for decommissioning as the following criteria has been met:

- The trends of the monitoring points, prior to commencement of dewatering, are approaching or have achieved the specified 2mm/year settlement rate; and
- Local monitoring of the effects of dewatering, directly around the Cross passage 14 and 13, shows that ground movement has stabilised to an acceptable rate (<2 mm/year) for a period of at least three months.

Minutes of the Close Out meeting are included in appendix C.

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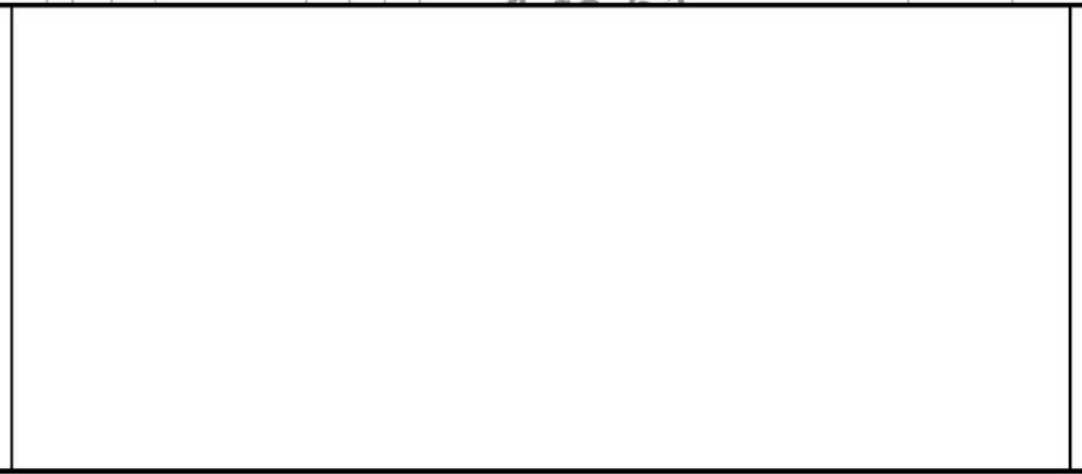
APPENDIX A: INSTRUMENT LOCATION



Rev	Date	Description	By	Chkd	App	Auth
P01	23/04/2015	First Issue	MD	RC	RC	-
P02	25/09/2015	---	MD	RC	RC	-

Notes

● Levelling Point



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 I&M Studs Installation East India to Canary Wharf (84400-84350)
 C305-DSJ-C-GMS-CR143-50011

By: M.DAVIS
 Chk: R.CULLEN
 App: R.CULLEN
 Auth: ...

Scale: 1:250 @ A1
 Drawing and CAD file No.: C305-DSJ-C2-DDA-CRT00_ST006_1-08137
 Rev: P02
 Suitability: S4

Crossrail

Crossrail Limited
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 Canary Wharf
 London
 E14 5LQ

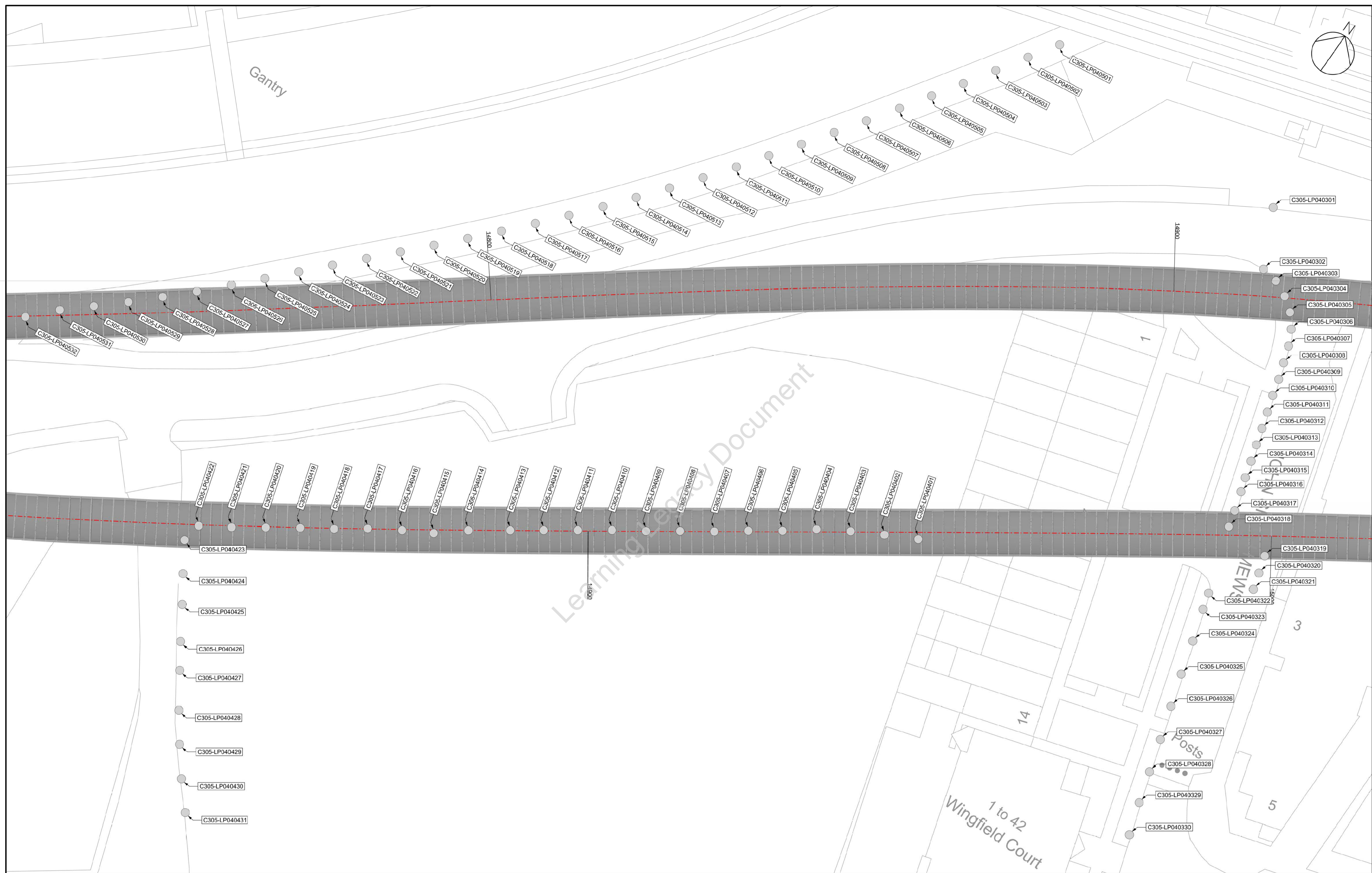
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Fit for authorisation

RESTRICTED



Gantry



Rev	Date	Description	By	Chkd	App	Auth
P01	23/04/2015	First Issue	MD	RC	RC	-
P02	25/09/2015	---	MD	RC	RC	-

Notes

- Levelling Point



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 I&M Studs Installation
 East India to Canary Wharf (84400-84350)
 C305-DSJ-C-GMS-CR143-50011

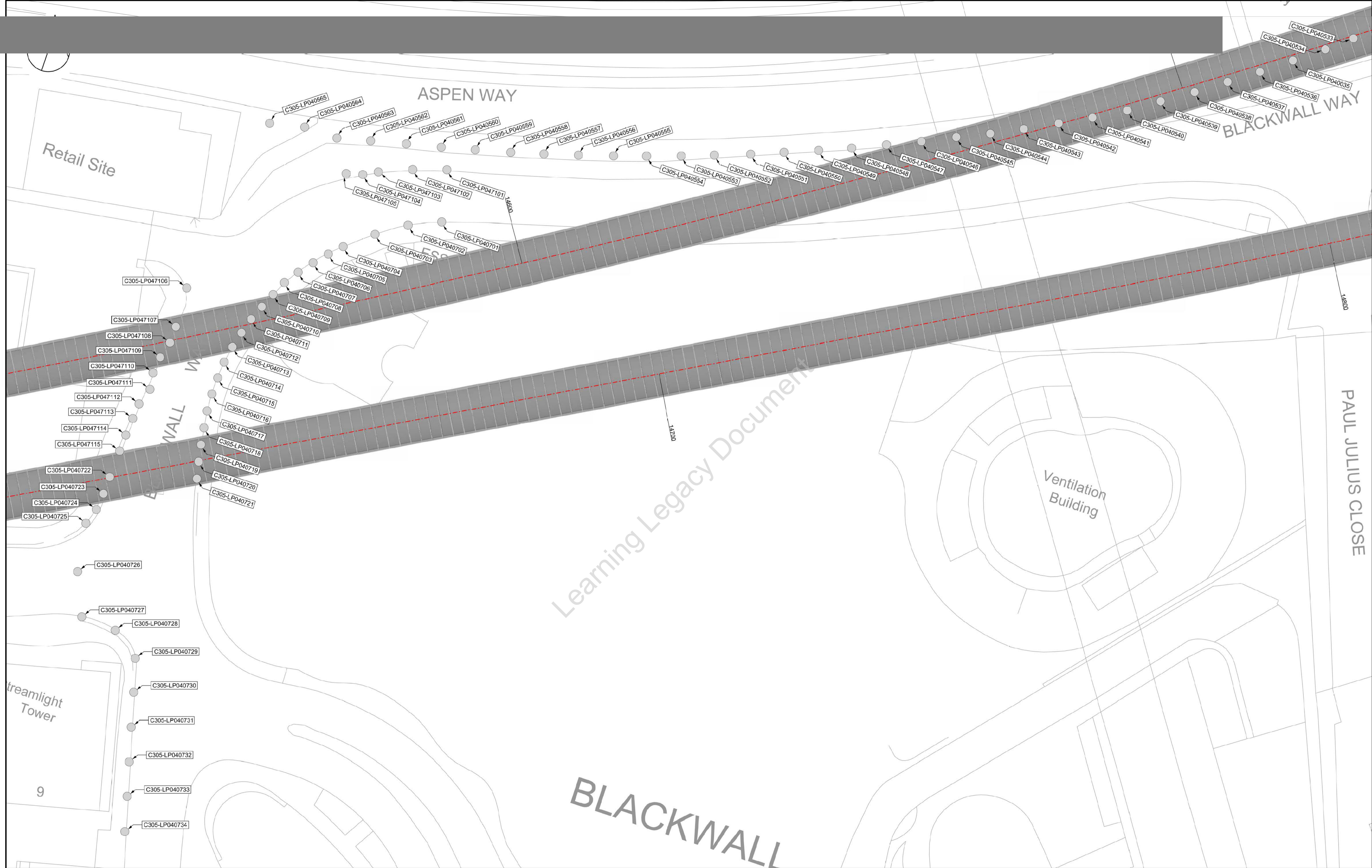
By: M.DAVIS
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 App: R.CULLEN
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Scale: 1:250 @ A1
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 Originator: Dragados Sisk Joint Venture
 Location: Crossrail Tunnels - Drive Y (Limmo Peninsula to Farringdon Stn)
 Title: Instrumentation & Monitoring Installation Report for I&M Studs Installation
 East India to Canary Wharf (84400-84350)
 C305-DSJ-C-GMS-CR143-50011

By: M.DAVIS
 Chk: R.CULLEN
 App: R.CULLEN
 Auth: ...

Scale: 1:250 @ A1
 Drawing and CAD file No.: C305-DSJ-C2-DDA-CRT00_ST006_1-08139
 Rev: P02
 Suitability: S4

SEPLYS

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TRAFALGAR WAY

Subway

FB

BAFFIN WAY

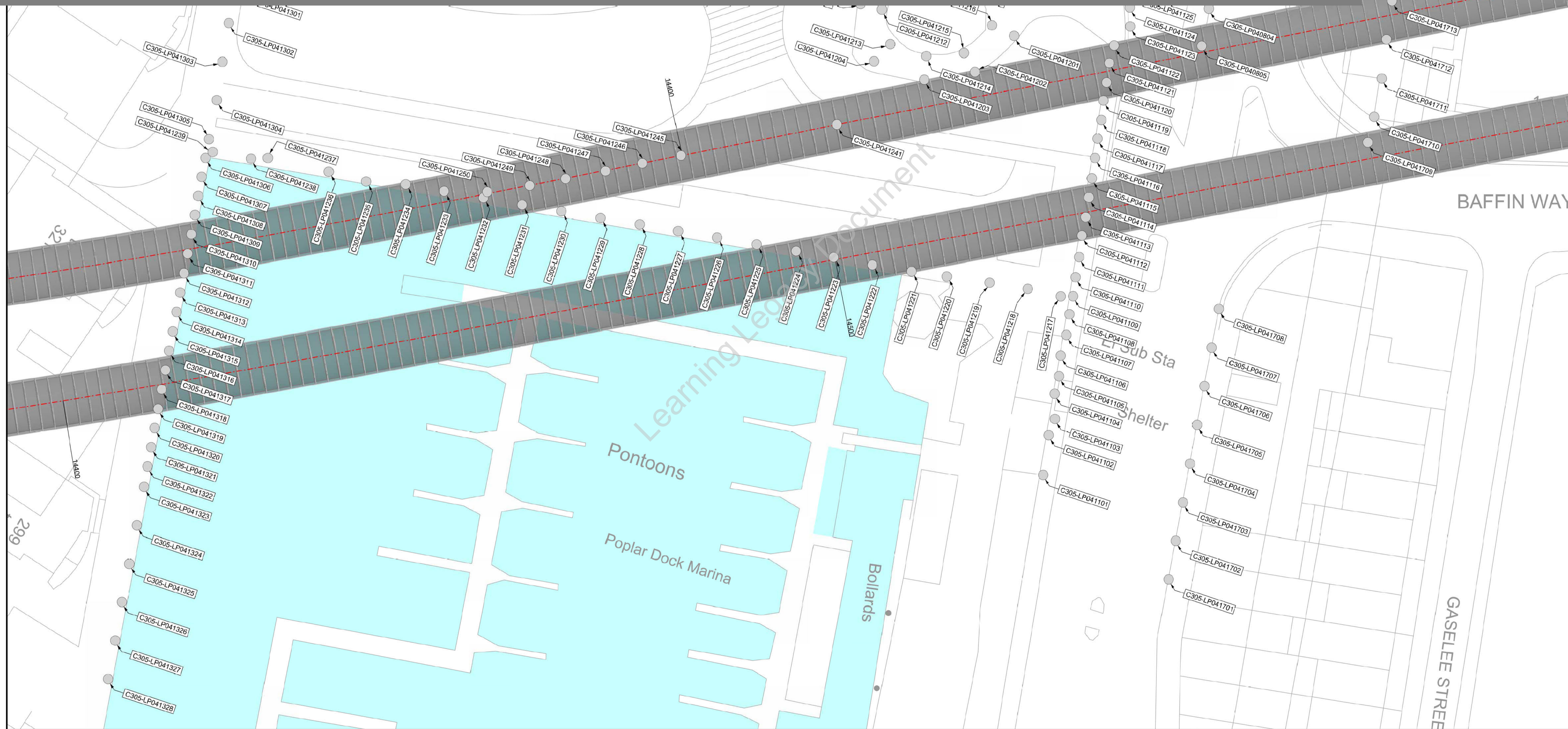
Pontoons

Poplar Dock Marina

Bollards

Sub Sta Shelter

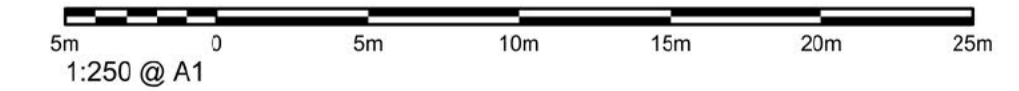
GASELEE STREET



Rev.	Date	Description	By	Chkd	App	Autl
P01	23/04/2015	First Issue	MD	RC	RC	-
P02	25/08/2015	---	MD	RC	RC	-

Notes

- Levelling Point



Crossrail

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 I&M Studs Installation East India to Canary Wharf (84400-84350)
 C305-DSJ-C-GMS-CR143-50011

By: M.DAVIS
 Chk: R.CULLEN
 App: R.CULLEN
 Auth: ...

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 Drawing and CAD file No.: C305-DSJ-C2-DDA-CRT00_ST006_1-08140
 Rev: P02
 Suitability: S4

S:\Projects

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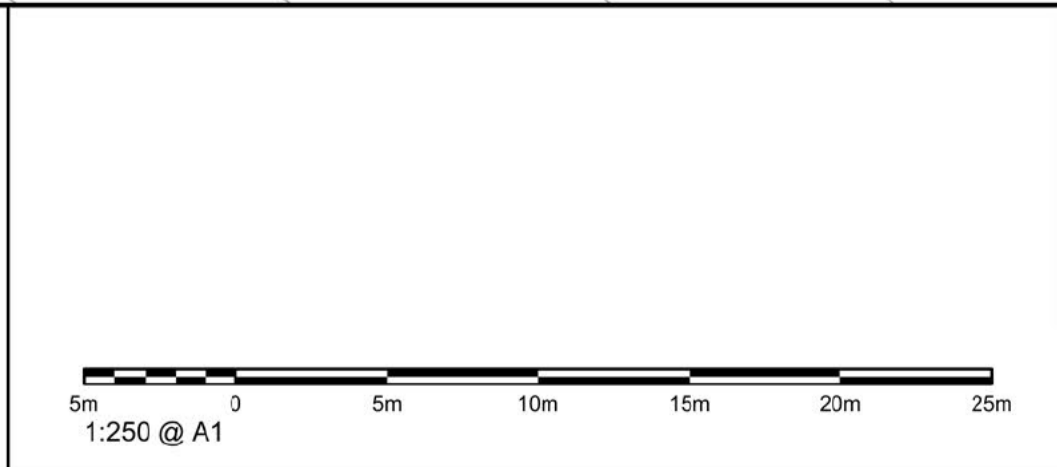


Rev	Date	Description	By	Chkd	App	Auth
P01	23/04/2015	First Issue	MD	RC	RC	-
P02	25/09/2015		MD	RC	RC	-

Notes

- Levelling Point

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<p>Crossrail Limited 25 Canada Square Canary Wharf London E14 5LQ</p> <p>© Crossrail www.crossrail.co.uk</p>	<p>Contract: Tunnels East - Drive Y LIM to FAR & Drive Z SGJ to PML & Drive G</p> <p>Originator: Dragados Sisk Joint Venture</p> <p>Location: Crossrail Tunnels - Drive Y (Limmo Peninsula to Farringdon Stn)</p>	<p>By: M.DAVIS</p> <p>Chk: R.CULLEN</p> <p>App: R.CULLEN</p> <p>Auth: ...</p>	
	<p>Title: Instrumentation & Monitoring Installation Report for I&M Studs Installation East India to Canary Wharf (84400-84350) C305-DSJ-C-GMS-CR143-50011</p>	<p>Scale: 1:250 @ A1</p>	<p>Rev: P02</p>
	<p>Drawing and CAD file No.: C305-DSJ-C2-DDA-CRT00_ST006_1-08141</p>	<p>Suitability: S4</p>	<p>Fit for authorisation</p>
	<p>RESTRICTED</p>		

APPENDIX B: SUMMARY OF INSTRUMENTATION INSTALLED ON SITE

Learning Legacy Document

IRS Installation Record Sheets – LEVELLING POINTS

Sensor Type	Sensor ID	Sub-Area	Installation Date	Status	Location SENSOR			Commissioning Readings (m)			
					Eastings X	Northings Y	Elevation Z (mATD)	Average	11/10/2012	11/10/2012	11/10/2012
Levelling Point	C305-LP040101	Bridge Court	14/09/2012	Installed	89208.936	35409.403	106.493	106.4803	106.4809	106.4797	106.4803
Levelling Point	C305-LP040104	Bridge Court	14/09/2012	Installed	89211.063	35402.193	106.558	106.5032	106.5035	106.5028	106.5033
Levelling Point	C305-LP040105	Bridge Court	14/09/2012	Installed	89211.770	35399.929	106.592	106.5534	106.5528	106.5534	106.5540
Levelling Point	C305-LP040106	Bridge Court	14/09/2012	Installed	89212.593	35396.518	107.561	107.5362	107.5368	107.5358	107.5360
Levelling Point	C305-LP040107	Bridge Court	14/09/2012	Installed	89213.267	35394.149	107.513	107.4608	107.4611	107.4602	107.4611
Levelling Point	C305-LP040108	Bridge Court	14/09/2012	Installed	89213.941	35391.796	107.432	107.3932	107.3935	107.3931	107.3930
Levelling Point	C305-LP040109	Bridge Court	14/09/2012	Installed	89214.639	35389.325	107.400	107.3315	107.3310	107.3316	107.3319
Levelling Point	C305-LP040110	Bridge Court	14/09/2012	Installed	89215.346	35386.900	107.334	107.2661	107.2660	107.2664	107.2659
Levelling Point	C305-LP040111	Bridge Court	14/09/2012	Installed	89216.060	35384.505	107.283	107.2148	107.2152	107.2143	107.2149
Levelling Point	C305-LP040112	Bridge Court	14/09/2012	Installed	89216.747	35382.149	107.240	107.1703	107.1701	107.1708	107.1700
Levelling Point	C305-LP040113	Bridge Court	14/09/2012	Installed	89217.450	35379.866	107.319	107.2621	107.2618	107.2626	107.2619
Levelling Point	C305-LP040114	Bridge Court	14/09/2012	Installed	89218.139	35377.521	107.441	107.3782	107.3783	107.3776	107.3787
Levelling Point	C305-LP040115	Bridge Court	14/09/2012	Installed	89218.872	35375.037	107.383	107.3354	107.3349	107.3359	107.3354
Levelling Point	C305-LP040116	Bridge Court	14/09/2012	Installed	89219.536	35372.689	107.448	107.3814	107.3812	107.3819	107.3811
Levelling Point	C305-LP040117	Bridge Court	14/09/2012	Installed	89220.239	35370.388	107.470	107.4192	107.4187	107.4194	107.4195
Levelling Point	C05-LP040118	Bridge Court	14/09/2012	Installed	89221.639	35365.572	107.603	107.5325	107.5320	107.5326	107.5329
Levelling Point	C305-LP040119	Bridge Court	14/09/2012	Installed	89223.062	35360.740	107.747	107.6710	107.6711	107.6709	107.6710
Levelling Point	C305-LP040120	Bridge Court	14/09/2012	Installed	89224.523	35355.913	107.833	107.7804	107.7808	107.7800	107.7804
Levelling Point	C305-LP040121	Bridge Court	14/09/2012	Installed	89225.918	35351.158	107.928	107.8947	107.8951	107.8941	107.8949
Levelling Point	C305-LP040122	Bridge Court	14/09/2012	Installed	89227.333	35346.353	108.037	107.9820	107.9815	107.9825	107.9820
Levelling Point	C305-LP040123	Bridge Court	14/09/2012	Installed	89228.752	35341.571	108.120	108.0439	108.0441	108.0433	108.0443
Levelling Point	C305-LP040124	Bridge Court	14/09/2012	Installed	89230.177	35336.794	108.129	108.0955	108.0960	108.0950	108.0955
								Average	12/10/2012	12/10/2012	12/10/2012
Levelling Point	C305-LP040201	Keel Court	13/09/2012	Installed	89160.361	35394.958	106.476	106.4094	106.4088	106.4099	106.4095

I&M CLOSE OUT REPORT FOR LEVELLING POINTS INSTALLATION FROM EAST INDIA TO CANARY WHARF (DRIVE Y)
C305-DSJ-C2-RGN-CR143-50002 REV 2.0

Sensor Type	Sensor ID	Sub-Area	Installation Date	Status	Location SENSOR			Commissioning Readings (m)			
					Eastings X	Northings Y	Elevation Z (mATD)				
Levelling Point	C305-LP040203	Keel Court	13/09/2012	Installed	89162.523	35387.812	106.493	106.4346	106.4342	106.4350	106.4346
Levelling Point	C305-LP040204	Keel Court	13/09/2012	Installed	89163.156	35385.571	106.561	106.4919	106.4925	106.4917	106.4915
Levelling Point	C305-LP040205	Keel Court	13/09/2012	Installed	89164.222	35383.470	108.237	108.1915	108.1918	108.1911	108.1916
Levelling Point	C305-LP040206	Keel Court	13/09/2012	Installed	89164.946	35381.023	108.269	108.2331	108.2336	108.2326	108.2331
Levelling Point	C305-LP040207	Keel Court	13/09/2012	Installed	89165.638	35378.632	108.336	108.2792	108.2796	108.2787	108.2793
Levelling Point	C305-LP040208	Keel Court	13/09/2012	Installed	89166.375	35376.179	108.381	108.3259	108.3256	108.3265	108.3256
Levelling Point	C305-LP040209	Keel Court	13/09/2012	Installed	89167.115	35373.712	108.325	108.2835	108.2836	108.2832	108.2837
Levelling Point	C305-LP040210	Keel Court	13/09/2012	Installed	89168.237	35371.415	108.382	108.3312	108.3316	108.3309	108.3311
Levelling Point	C305-LP040211	Keel Court	13/09/2012	Installed	89169.242	35369.136	108.387	108.3791	108.3788	108.3797	108.3788
Levelling Point	C305-LP040212	Keel Court	13/09/2012	Installed	89169.938	35366.611	108.402	108.3817	108.3814	108.3821	108.3816
Levelling Point	C305-LP040213	Keel Court	13/09/2012	Installed	89170.617	35364.072	108.313	108.3303	108.3300	108.3306	108.3303
Levelling Point	C305-LP040214	Keel Court	13/09/2012	Installed	89171.499	35361.832	108.367	108.3310	108.3304	108.3316	108.3310
Levelling Point	C305-LP040215	Keel Court	13/09/2012	Installed	89172.216	35359.433	108.413	108.3552	108.3553	108.3547	108.3556
Levelling Point	C305-LP040216	Keel Court	13/09/2012	Installed	89172.926	35357.038	108.391	108.3406	108.3409	108.3405	108.3404
Levelling Point	C305-LP040217	Keel Court	13/09/2012	Installed	89173.644	35354.632	108.360	108.3161	108.3156	108.3164	108.3163
Levelling Point	C305-LP040218	Keel Court	13/09/2012	Installed	89174.338	35352.280	108.389	108.3215	108.3218	108.3213	108.3214
Levelling Point	C305-LP040219	Keel Court	13/09/2012	Installed	89174.742	35347.224	108.441	108.3816	108.3818	108.3812	108.3818
Levelling Point	C305-LP040220	Keel Court	13/09/2012	Installed	89175.473	35342.278	108.315	108.2929	108.2926	108.2930	108.2931
Levelling Point	C305-LP040221	Keel Court	13/09/2012	Installed	89176.889	35337.508	108.314	108.2718	108.2721	108.2717	108.2716
Levelling Point	C305-LP040222	Keel Court	13/09/2012	Installed	89178.311	35332.643	108.306	108.2791	108.2792	108.2789	108.2792
Levelling Point	C305-LP040223	Keel Court	13/09/2012	Installed	89179.727	35327.800	108.289	108.2669	108.2663	108.2671	108.2673
Levelling Point	C305-LP040224	Keel Court	13/09/2012	Installed	89179.600	35322.576	108.396	108.3294	108.3297	108.3290	108.3295
Levelling Point	C305-LP040225	Keel Court	13/09/2012	Installed	89181.754	35317.862	108.371	108.3223	108.3229	108.3222	108.3218
Levelling Point	C305-LP040226	Keel Court	13/09/2012	Installed	89183.191	35313.022	108.291	108.2678	108.2683	108.2673	108.2678
								Average	18/10/2012	18/10/2012	18/10/2012
Levelling Point	C305-LP040301	John Smith Mews	07/09/2012	Installed	89050.741	35346.989	105.701	105.6490	105.6494	105.6489	105.6487

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					Eastings X	Northings Y	Elevation Z (mATD)				
Levelling Point	C305-LP040302	John Smith Mews	07/09/2012	Installed	89054.694	35338.754	105.426	105.3941	105.3942	105.3935	105.3946
Levelling Point	C305-LP040303	John Smith Mews	07/09/2012	Installed	89057.167	35338.382	105.381	105.3487	105.3492	105.3481	105.3488
Levelling Point	C305-LP040304	John Smith Mews	07/09/2012	Installed	89059.486	35337.299	105.229	105.1764	105.1760	105.1770	105.1762
Levelling Point	C305-LP040305	John Smith Mews	07/09/2012	Installed	89061.486	35335.792	105.249	105.1989	105.1985	105.1995	105.1987
Levelling Point	C305-LP040306	John Smith Mews	07/09/2012	Installed	89063.040	35333.852	105.195	105.1425	105.1430	105.1422	105.1423
Levelling Point	C305-LP040307	John Smith Mews	07/09/2012	Installed	89064.117	35331.607	105.165	105.1023	105.1024	105.1018	105.1027
Levelling Point	C305-LP040308	John Smith Mews	07/09/2012	Installed	89064.911	35329.181	105.103	105.0595	105.0601	105.0594	105.0590
Levelling Point	C305-LP040309	John Smith Mews	07/09/2012	Installed	89065.689	35326.789	104.937	104.9235	104.9232	104.9240	104.9233
Levelling Point	C305-LP040310	John Smith Mews	07/09/2012	Installed	89066.317	35324.327	105.024	105.0215	105.0213	105.0219	105.0213
Levelling Point	C305-LP040311	John Smith Mews	07/09/2012	Installed	89067.036	35321.882	105.008	105.0044	105.0047	105.0041	105.0044
Levelling Point	C305-LP040312	John Smith Mews	07/09/2012	Installed	89067.751	35319.470	105.023	105.0195	105.0190	105.0196	105.0199
Levelling Point	C305-LP040313	John Smith Mews	07/09/2012	Installed	89068.460	35317.005	105.126	105.0601	105.0602	105.0597	105.0604
Levelling Point	C305-LP040314	John Smith Mews	07/09/2012	Installed	89069.211	35314.583	105.098	105.0948	105.0946	105.0949	105.0949
Levelling Point	C305-LP040315	John Smith Mews	07/09/2012	Installed	89069.879	35312.142	105.192	105.1261	105.1264	105.1255	105.1264
Levelling Point	C305-LP040316	John Smith Mews	07/09/2012	Installed	89070.530	35310.086	105.218	105.1631	105.1628	105.1634	105.1631
Levelling Point	C305-LP040317	John Smith Mews	07/09/2012	Installed	89071.372	35307.251	105.267	105.2013	105.2012	105.2017	105.2010
Levelling Point	C305-LP040318	John Smith Mews	07/09/2012	Installed	89071.965	35304.861	105.308	105.2463	105.2467	105.2458	105.2464
Levelling Point	C305-LP040319	John Smith Mews	07/09/2012	Installed	89078.723	35304.303	105.267	105.1998	105.2000	105.1995	105.1999
Levelling Point	C305-LP040320	John Smith Mews	07/09/2012	Installed	89079.443	35301.760	105.281	105.2777	105.2783	105.2772	105.2776
Levelling Point	C305-LP040321	John Smith Mews	07/09/2012	Installed	89080.132	35299.349	105.430	105.3654	105.3649	105.3655	105.3658
Levelling Point	C305-LP040322	John Smith Mews	07/09/2012	Installed	89075.045	35295.175	105.631	105.5693	105.5688	105.5695	105.5696
Levelling Point	C305-LP040323	John Smith Mews	07/09/2012	Installed	89075.719	35292.751	105.748	105.6838	105.6832	105.6843	105.6839
Levelling Point	C305-LP040324	John Smith Mews	07/09/2012	Installed	89077.164	35288.078	105.993	105.9368	105.9370	105.9367	105.9367
Levelling Point	C305-LP040325	John Smith Mews	07/09/2012	Installed	89078.511	35283.154	106.263	106.1983	106.1977	106.1986	106.1986
Levelling Point	C305-LP040326	John Smith Mews	07/09/2012	Installed	89079.942	35278.414	106.523	106.4605	106.4604	106.4610	106.4601
Levelling Point	C305-LP040327	John Smith Mews	07/09/2012	Installed	89081.439	35273.547	106.752	106.7024	106.7026	106.7022	106.7024

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					Eastings X	Northings Y	Elevation Z (mATD)				
Levelling Point	C305-LP040328	John Smith Mews	07/09/2012	Installed	89082.793	35268.754	107.026	106.9636	106.9634	106.9642	106.9632
Levelling Point	C305-LP040329	John Smith Mews	07/09/2012	Installed	89084.122	35264.158	107.270	107.2047	107.2053	107.2045	107.2043
Levelling Point	C305-LP040330	John Smith Mews	07/09/2012	Installed	89085.632	35259.495	107.462	107.4720	107.4726	107.4718	107.4716
								Average	11/10/2012	11/10/2012	11/10/2012
Levelling Point	C305-LP040401	Reuters Car Park	14/09/2012	Installed	89035.600	35277.517	105.622	105.5835	105.5836	105.5833	105.5836
Levelling Point	C305-LP040402	Reuters Car Park	14/09/2012	Installed	89031.173	35275.229	105.521	105.4985	105.4983	105.4991	105.4981
Levelling Point	C305-LP040403	Reuters Car Park	14/09/2012	Installed	89026.813	35272.836	105.528	105.4898	105.4903	105.4896	105.4895
Levelling Point	C305-LP040404	Reuters Car Park	14/09/2012	Installed	89022.545	35270.234	105.611	105.5686	105.5688	105.5682	105.5688
Levelling Point	C305-LP040405	Reuters Car Park	14/09/2012	Installed	89018.559	35267.222	105.705	105.6300	105.6301	105.6299	105.6300
Levelling Point	C305-LP040406	Reuters Car Park	14/09/2012	Installed	89014.458	35264.393	105.627	105.5643	105.5638	105.5647	105.5644
Levelling Point	C305-LP040407	Reuters Car Park	14/09/2012	Installed	89010.399	35261.462	105.558	105.5009	105.5011	105.5005	105.5011
Levelling Point	C305-LP040408	Reuters Car Park	14/09/2012	Installed	89006.245	35258.673	105.483	105.4255	105.4252	105.4259	105.4254
Levelling Point	C305-LP040409	Reuters Car Park	14/09/2012	Installed	89002.164	35255.833	105.514	105.4611	105.4606	105.4615	105.4612
Levelling Point	C305-LP040410	Reuters Car Park	14/09/2012	Installed	88997.983	35253.114	105.716	105.6483	105.6485	105.6477	105.6487
Levelling Point	C305-LP040411	Reuters Car Park	14/09/2012	Installed	88993.876	35250.255	105.680	105.6185	105.6190	105.6183	105.6182
Levelling Point	C305-LP040412	Reuters Car Park	14/09/2012	Installed	88989.763	35247.413	105.650	105.5950	105.5955	105.5949	105.5946
Levelling Point	C305-LP040413	Reuters Car Park	14/09/2012	Installed	88985.754	35244.633	105.622	105.5858	105.5857	105.5859	105.5858
Levelling Point	C305-LP040414	Reuters Car Park	14/09/2012	Installed	88980.705	35241.129	105.617	105.5683	105.5679	105.5685	105.5685
Levelling Point	C305-LP040415	Reuters Car Park	14/09/2012	Installed	88976.759	35237.922	105.640	105.5799	105.5802	105.5794	105.5801
Levelling Point	C305-LP040416	Reuters Car Park	14/09/2012	Installed	88972.727	35235.645	105.636	105.5758	105.5754	105.5760	105.5760
Levelling Point	C305-LP040417	Reuters Car Park	14/09/2012	Installed	88968.437	35232.974	105.568	105.5289	105.5291	105.5288	105.5288
Levelling Point	C305-LP040418	Reuters Car Park	14/09/2012	Installed	88964.429	35230.142	105.614	105.5573	105.5575	105.5568	105.5576
Levelling Point	C305-LP040419	Reuters Car Park	14/09/2012	Installed	88960.233	35227.433	105.580	105.5345	105.5341	105.5349	105.5345
Levelling Point	C305-LP040420	Reuters Car Park	14/09/2012	Installed	88956.078	35224.628	105.565	105.4955	105.4949	105.4956	105.4960
Levelling Point	C305-LP040421	Reuters Car Park	14/09/2012	Installed	88951.929	35221.811	105.598	105.5242	105.5243	105.5238	105.5245
Levelling Point	C305-LP040422	Reuters Car Park	14/09/2012	Installed	88947.844	35219.246	105.683	105.6053	105.6056	105.6050	105.6053

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					Eastings X	Northings Y	Elevation Z (mATD)				
Levelling Point	C305-LP040423	Reuters Car Park	14/09/2012	Installed	88947.316	35216.358	105.680	105.6041	105.6040	105.6046	105.6037
Levelling Point	C305-LP040424	Reuters Car Park	14/09/2012	Installed	88949.950	35212.168	105.559	105.5017	105.5022	105.5011	105.5018
Levelling Point	C305-LP040425	Reuters Car Park	14/09/2012	Installed	88952.402	35208.427	105.609	105.5526	105.5520	105.5530	105.5528
Levelling Point	C305-LP040426	Reuters Car Park	14/09/2012	Installed	88955.295	35203.793	105.592	105.5345	105.5345	105.5340	105.5350
Levelling Point	C305-LP040427	Reuters Car Park	14/09/2012	Installed	88957.585	35200.254	105.520	105.4811	105.4806	105.4813	105.4814
Levelling Point	C305-LP040428	Reuters Car Park	14/09/2012	Installed	88960.801	35195.384	105.520	105.4787	105.4781	105.4791	105.4789
Levelling Point	C305-LP040429	Reuters Car Park	14/09/2012	Installed	88963.723	35191.325	105.534	105.5026	105.5032	105.5020	105.5026
Levelling Point	C305-LP040430	Reuters Car Park	14/09/2012	Installed	88966.816	35187.364	105.524	105.4925	105.4922	105.4930	105.4923
Levelling Point	C305-LP040431	Reuters Car Park	14/09/2012	Installed	88970.097	35183.586	105.509	105.4609	105.4610	105.4603	105.4614
								Average	23/10/2012	23/10/2012	23/10/2012
Levelling Point	C305-LP040801	Preston's Road	20/09/2012	Installed	88681.969	35111.820	103.407	103.3573	103.3576	103.3568	103.3575
Levelling Point	C305-LP040802	Preston's Road	20/09/2012	Installed	88682.563	35106.825	103.320	103.2725	103.2727	103.2720	103.2728
Levelling Point	C305-LP040803	Preston's Road	20/09/2012	Installed	88683.178	35101.806	103.220	103.1771	103.1777	103.1767	103.1769
Levelling Point	C305-LP040804	Preston's Road	20/09/2012	Installed	88683.902	35096.874	103.143	103.1152	103.1153	103.1147	103.1156
Levelling Point	C305-LP040805	Preston's Road	20/09/2012	Installed	88654.512	35092.059	103.110	103.0508	103.0504	103.0513	103.0507
								Average	26/03/2013	26/03/2013	26/03/2013
Levelling Point	C305-LP041701	Ibis Hotel	11/03/2013	Installed	88701.667	35026.184	102.165	102.1656	102.1660	102.1652	102.1656
Levelling Point	C305-LP041702	Ibis Hotel	11/03/2013	Installed	88700.999	35031.132	102.197	102.1973	102.1967	102.1978	102.1974
Levelling Point	C305-LP041703	Ibis Hotel	11/03/2013	Installed	88700.346	35036.093	102.249	102.2489	102.2495	102.2488	102.2484
Levelling Point	C305-LP041704	Ibis Hotel	11/03/2013	Installed	88699.662	35041.056	102.306	102.3058	102.3062	102.3055	102.3057
Levelling Point	C305-LP041705	Ibis Hotel	11/03/2013	Installed	88698.980	35046.060	102.363	102.3630	102.3628	102.3631	102.3631
Levelling Point	C305-LP041706	Ibis Hotel	11/03/2013	Installed	88698.340	35051.022	102.403	102.4034	102.4036	102.4029	102.4037
Levelling Point	C305-LP041707	Ibis Hotel	11/03/2013	Installed	88697.676	35055.975	102.459	102.4587	102.4589	102.4586	102.4586
Levelling Point	C305-LP041708	Ibis Hotel	11/03/2013	Installed	88697.026	35060.932	102.488	102.4879	102.4880	102.4876	102.4881
Levelling Point	C305-LP041709	Ibis Hotel	16/11/2012	Installed	88708.428	35087.014	102.933	102.8765	102.8759	102.8766	102.8770
Levelling Point	C305-LP041710	Ibis Hotel	16/11/2012	Installed	88708.179	35090.318	103.053	102.9916	102.9919	102.9913	102.9916

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					Eastings X	Northings Y	Elevation Z (mATD)				
Levelling Point	C305-LP041711	Ibis Hotel	16/11/2012	Installed	88707.576	35095.282	102.867	102.8171	102.8167	102.8174	102.8172
Levelling Point	C305-LP041712	Ibis Hotel	16/11/2012	Installed	88706.605	35100.191	102.899	102.8403	102.8399	102.8406	102.8404
Levelling Point	C305-LP041713	Ibis Hotel	16/11/2012	Installed	88705.757	35105.083	102.936	102.8718	102.8713	102.8723	102.8718
Levelling Point	C305-LP041714	Ibis Hotel	16/11/2012	Installed	88704.917	35110.018	102.988	102.9301	102.9302	102.9298	102.9303
Levelling Point	C305-LP041715	Ibis Hotel	16/11/2012	Installed	88704.087	35114.958	103.026	102.9785	102.9788	102.9781	102.9786
Levelling Point	C305-LP041716	Ibis Hotel	16/11/2012	Installed	88703.214	35119.887	103.079	103.0219	103.0218	103.0222	103.0217
Levelling Point	C305-LP041717	Ibis Hotel	16/11/2012	Installed	88702.436	35124.754	103.143	103.1466	103.1467	103.1460	103.1471
Levelling Point	C305-LP041718	Ibis Hotel	16/11/2012	Installed	88701.631	35129.700	103.314	103.2561	103.2563	103.2558	103.2562
Levelling Point	C305-LP041719	Ibis Hotel	16/11/2012	Installed	88702.179	35134.688	103.084	103.0288	103.0286	103.0289	103.0289
								Average	29/10/2012	29/10/2012	29/10/2012
Levelling Point	C305-LP041201	Poplar Dock Marina Sect. 1	06/09/2012	Installed	88661.404	35085.840	101.925	101.8556	101.8557	101.8554	101.8557
Levelling Point	C305-LP041202	Poplar Dock Marina Sect. 1	06/09/2012	Installed	88658.075	35079.910	101.464	101.3948	101.3952	101.3946	101.3946
Levelling Point	C305-LP041203	Poplar Dock Marina Sect. 1	06/09/2012	Installed	88652.261	35076.981	101.186	101.1170	101.1171	101.1164	101.1175
Levelling Point	C305-LP041204	Poplar Dock Marina Sect. 1	06/09/2012	Installed	88645.464	35077.217	100.750	100.6812	100.6806	100.6814	100.6816
Levelling Point	C305-LP041205	Poplar Dock Marina Sect. 1	06/09/2012	Installed	88641.555	35083.609	100.377	100.3085	100.3090	100.3081	100.3084
Levelling Point	C305-LP041206	Poplar Dock Marina Sect. 1	06/09/2012	Installed	88643.631	35090.100	99.937	99.8680	99.8682	99.8679	99.8679
Levelling Point	C305-LP041207	Poplar Dock Marina Sect. 1	06/09/2012	Installed	88647.582	35093.403	99.667	99.5977	99.5981	99.5976	99.5974
Levelling Point	C305-LP041208	Poplar Dock Marina Sect. 1	06/09/2012	Installed	88650.046	35096.832	99.302	99.2330	99.2332	99.2326	99.2332
Levelling Point	C305-LP041209	Poplar Dock Marina Sect. 1	06/09/2012	Installed	88652.620	35095.288	99.382	99.3133	99.3130	99.3137	99.3132
Levelling Point	C305-LP041210	Poplar Dock Marina Sect. 1	06/09/2012	Installed	88649.592	35091.415	99.688	99.6193	99.6188	99.6197	99.6194
Levelling Point	C305-LP041211	Poplar Dock Marina Sect. 1	06/09/2012	Installed	88645.791	35088.381	99.910	99.8407	99.8411	99.8403	99.8407
Levelling Point	C305-LP041212	Poplar Dock Marina Sect. 1	06/09/2012	Installed	88644.353	35083.788	100.333	100.2638	100.2642	100.2633	100.2639
Levelling Point	C305-LP041213	Poplar Dock Marina Sect. 1	06/09/2012	Installed	88646.732	35079.905	100.661	100.5915	100.5913	100.5918	100.5914
Levelling Point	C305-LP041214	Poplar Dock Marina Sect. 1	06/09/2012	Installed	88651.577	35079.901	101.115	101.0458	101.0453	101.0464	101.0457
Levelling Point	C305-LP041215	Poplar Dock Marina Sect. 1	06/09/2012	Installed	88655.995	35081.771	101.409	101.3398	101.3400	101.3394	101.3400
Levelling Point	C305-LP041216	Poplar Dock Marina Sect. 1	06/09/2012	Installed	88658.303	35086.244	101.866	101.7970	101.7973	101.7968	101.7969

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					Eastings X	Northings Y	Elevation Z (mATD)	Average	29/10/2012	29/10/2012	29/10/2012
Levelling Point	C305-LP041241	Poplar Dock Marina Sect. 3	06/09/2012	Installed	88643.458	35068.071	105.825	105.7621	105.7625	105.7617	105.7621
Levelling Point	C305-LP041245	Poplar Dock Marina Sect. 3	06/09/2012	Installed	88625.801	35058.144	105.714	105.6476	105.6475	105.6482	105.6471
Levelling Point	C305-LP041246	Poplar Dock Marina Sect. 3	06/09/2012	Installed	88621.433	35055.666	105.623	105.5548	105.5546	105.5552	105.5546
Levelling Point	C305-LP041247	Poplar Dock Marina Sect. 3	06/09/2012	Installed	88617.289	35053.257	105.502	105.4365	105.4367	105.4362	105.4366
Levelling Point	C305-LP041248	Poplar Dock Marina Sect. 3	06/09/2012	Installed	88612.767	35050.748	105.446	105.3903	105.3899	105.3905	105.3905
Levelling Point	C305-LP041249	Poplar Dock Marina Sect. 3	06/09/2012	Installed	88608.706	35048.493	105.377	105.3250	105.3255	105.3247	105.3248
Levelling Point	C305-LP041250	Poplar Dock Marina Sect. 3	06/09/2012	Installed	88603.795	35046.050	105.354	105.2844	105.2838	105.2849	105.2845
								Average	29/10/2012	29/10/2012	29/10/2012
Levelling Point	C305-LP041301	Poplar Dock Marina Sect.4	06/09/2012	Installed	88565.171	35061.033	105.636	105.6152	105.6158	105.6150	105.6148
Levelling Point	C305-LP041302	Poplar Dock Marina Sect.4	06/09/2012	Installed	88565.830	35056.215	105.702	105.6728	105.6727	105.6733	105.6724
Levelling Point	C305-LP041303	Poplar Dock Marina Sect.4	06/09/2012	Installed	88566.588	35051.279	105.574	105.5527	105.5529	105.5522	105.5530
Levelling Point	C305-LP041304	Poplar Dock Marina Sect.4	06/09/2012	Installed	88567.428	35046.407	105.431	105.4072	105.4077	105.4070	105.4069
Levelling Point	C305-LP041305	Poplar Dock Marina Sect.4	06/09/2012	Installed	88568.023	35041.384	105.302	105.2859	105.2860	105.2855	105.2862
Levelling Point	C305-LP041306	Poplar Dock Marina Sect.4	06/09/2012	Installed	88568.342	35038.980	105.284	105.2672	105.2674	105.2670	105.2672
Levelling Point	C305-LP041307	Poplar Dock Marina Sect.4	06/09/2012	Installed	88568.635	35036.514	105.291	105.2744	105.2741	105.2750	105.2741
Levelling Point	C305-LP041308	Poplar Dock Marina Sect.4	06/09/2012	Installed	88568.985	35034.084	105.292	105.2751	105.2757	105.2748	105.2748
Levelling Point	C305-LP041309	Poplar Dock Marina Sect.4	06/09/2012	Installed	88569.346	35051.657	105.292	105.2751	105.2747	105.2754	105.2752
Levelling Point	C305-LP041310	Poplar Dock Marina Sect.4	06/09/2012	Installed	88569.678	35029.175	105.293	105.2760	105.2761	105.2755	105.2764
Levelling Point	C305-LP041311	Poplar Dock Marina Sect.4	06/09/2012	Installed	88570.016	35026.684	105.296	105.2784	105.2788	105.2778	105.2786
Levelling Point	C305-LP041312	Poplar Dock Marina Sect.4	06/09/2012	Installed	88570.337	35024.184	105.302	105.2839	105.2834	105.2843	105.2840
Levelling Point	C305-LP041313	Poplar Dock Marina Sect.4	06/09/2012	Installed	88570.651	35021.684	105.305	105.2872	105.2877	105.2867	105.2872
Levelling Point	C305-LP041314	Poplar Dock Marina Sect.4	06/09/2012	Installed	88570.976	35019.192	105.298	105.2798	105.2793	105.2801	105.2800
Levelling Point	C305-LP041315	Poplar Dock Marina Sect.4	06/09/2012	Installed	88571.295	35016.677	105.303	105.2847	105.2848	105.2844	105.2849
Levelling Point	C305-LP041316	Poplar Dock Marina Sect.4	06/09/2012	Installed	88571.600	35014.204	105.307	105.2891	105.2894	105.2885	105.2894
Levelling Point	C305-LP041317	Poplar Dock Marina Sect.4	06/09/2012	Installed	88571.934	35011.715	105.307	105.2888	105.2887	105.2893	105.2884

I&M CLOSE OUT REPORT FOR LEVELLING POINTS INSTALLATION FROM EAST INDIA TO CANARY WHARF (DRIVE Y)
C305-DSJ-C2-RGN-CR143-50002 REV 2.0

Sensor Type	Sensor ID	Sub-Area	Installation Date	Status	Location SENSOR			Commissioning Readings (m)			
					Eastings X	Northings Y	Elevation Z (mATD)				
Levelling Point	C305-LP041318	Poplar Dock Marina Sect.4	06/09/2012	Installed	88572.230	35009.222	105.305	105.2870	105.2867	105.2871	105.2872
Levelling Point	C305-LP041319	Poplar Dock Marina Sect.4	06/09/2012	Installed	88572.563	35006.750	105.311	105.2928	105.2932	105.2923	105.2929
Levelling Point	C305-LP041320	Poplar Dock Marina Sect.4	06/09/2012	Installed	88572.905	35004.285	105.315	105.2969	105.2967	105.2971	105.2969
Levelling Point	C305-LP041321	Poplar Dock Marina Sect.4	06/09/2012	Installed	88573.253	35001.819	105.312	105.2940	105.2944	105.2937	105.2939
Levelling Point	C305-LP041322	Poplar Dock Marina Sect.4	06/09/2012	Installed	88573.575	34999.338	105.315	105.2961	105.2965	105.2958	105.2960
Levelling Point	C305-LP041323	Poplar Dock Marina Sect.4	06/09/2012	Installed	88573.960	34996.745	105.322	105.3028	105.3031	105.3024	105.3029
Levelling Point	C305-LP041324	Poplar Dock Marina Sect.4	06/09/2012	Installed	88574.632	34991.749	105.310	105.2933	105.2927	105.2935	105.2937
Levelling Point	C305-LP041325	Poplar Dock Marina Sect.4	06/09/2012	Installed	88575.255	34986.799	105.314	105.2971	105.2965	105.2977	105.2971
Levelling Point	C305-LP041326	Poplar Dock Marina Sect.4	06/09/2012	Installed	88575.890	34981.894	105.321	105.2953	105.2954	105.2952	105.2953
Levelling Point	C305-LP041327	Poplar Dock Marina Sect.4	06/09/2012	Installed	88576.608	34976.970	105.311	105.2820	105.2820	105.2817	105.2823
Levelling Point	C305-LP041328	Poplar Dock Marina Sect.4	06/09/2012	Installed	88577.258	34972.035	105.301	105.2841	105.2840	105.2847	105.2836
								Average	19/11/2012	19/11/2012	19/11/2012
Levelling Point	C305-LP041401	Boardwalk Place	16/11/2012	Installed	88522.437	35044.492	106.209	106.1486	106.1488	106.1481	106.1489
Levelling Point	C305-LP041402	Boardwalk Place	16/11/2012	Installed	88521.073	35039.708	106.229	106.1873	106.1877	106.1872	106.1870
Levelling Point	C305-LP041403	Boardwalk Place	16/11/2012	Installed	88519.731	35034.888	106.235	106.1749	106.1744	106.1754	106.1749
Levelling Point	C305-LP041404	Boardwalk Place	16/11/2012	Installed	88518.423	35030.083	106.237	106.1655	106.1661	106.1650	106.1654
Levelling Point	C305-LP041405	Boardwalk Place	16/11/2012	Installed	88517.102	35025.273	106.302	106.2417	106.2420	106.2414	106.2417
Levelling Point	C305-LP041406	Boardwalk Place	16/11/2012	Installed	88515.741	35020.452	106.463	106.3982	106.3986	106.3979	106.3981
Levelling Point	C305-LP041407	Boardwalk Place	16/11/2012	Installed	88514.404	35015.619	106.492	106.4350	106.4348	106.4351	106.4351
Levelling Point	C305-LP041408	Boardwalk Place	16/11/2012	Installed	88513.081	35010.812	106.497	106.4445	106.4443	106.4448	106.4444
Levelling Point	C305-LP041409	Boardwalk Place	16/11/2012	Installed	88511.744	35005.990	106.437	106.3903	106.3901	106.3904	106.3904
Levelling Point	C305-LP041410	Boardwalk Place	16/11/2012	Installed	88510.424	35001.202	106.469	106.4003	106.4001	106.4005	106.4003
Levelling Point	C305-LP041411	Boardwalk Place	16/11/2012	Installed	88509.126	34996.370	106.559	106.4976	106.4975	106.4977	106.4976
Levelling Point	C305-LP041412	Boardwalk Place	16/11/2012	Installed	88507.790	34991.557	106.619	106.5682	106.5680	106.5685	106.5681
Levelling Point	C305-LP041413	Boardwalk Place	16/11/2012	Installed	88506.473	34986.736	106.624	106.5962	106.5960	106.5964	106.5962
Levelling Point	C305-LP041414	Boardwalk Place	16/11/2012	Installed	88505.166	34981.908	106.708	106.6345	106.6349	106.6342	106.6344

I&M CLOSE OUT REPORT FOR LEVELLING POINTS INSTALLATION FROM EAST INDIA TO CANARY WHARF (DRIVE Y)
C305-DSJ-C2-RGN-CR143-50002 REV 2.0

Sensor Type	Sensor ID	Sub-Area	Installation Date	Status	Location SENSOR			Commissioning Readings (m)			
					Eastings X	Northings Y	Elevation Z (mATD)				
Levelling Point	C305-LP041415	Boardwalk Place	16/11/2012	Installed	88503.858	34977.085	106.636	106.5641	106.5636	106.5643	106.5644
Levelling Point	C305-LP041416	Boardwalk Place	16/11/2012	Installed	88502.550	34972.268	106.644	106.5765	106.5770	106.5761	106.5764
Levelling Point	C305-LP041417	Boardwalk Place	16/11/2012	Installed	88501.198	34967.473	106.774	106.7090	106.7094	106.7088	106.7088
Levelling Point	C305-LP041418	Boardwalk Place	16/11/2012	Installed	88499.881	34962.646	106.804	106.7434	106.7437	106.7428	106.7437
Levelling Point	C305-LP041419	Boardwalk Place	16/11/2012	Installed	88498.540	34957.857	106.805	106.7517	106.7521	106.7512	106.7518
Levelling Point	C305-LP041420	Boardwalk Place	16/11/2012	Installed	88497.176	34953.062	106.761	106.7062	106.7060	106.7067	106.7059
Levelling Point	C305-LP041421	Boardwalk Place	16/11/2012	Installed	88495.823	34948.268	106.626	106.5808	106.5809	106.5803	106.5812
Levelling Point	C305-LP041422	Boardwalk Place	16/11/2012	Installed	88494.475	34943.419	106.605	106.5505	106.5500	106.5511	106.5504
Levelling Point	C305-LP041423	Boardwalk Place	16/11/2012	Installed	88493.143	34938.626	106.681	106.6043	106.6048	106.6042	106.6039
Levelling Point	C305-LP041424	Boardwalk Place	16/11/2012	Installed	88491.815	34933.779	106.632	106.5706	106.5707	106.5703	106.5708
Levelling Point	C305-LP041425	Boardwalk Place	16/11/2012	Installed	88490.481	34928.962	106.596	106.5365	106.5359	106.5366	106.5370
								Average	25/10/2012	25/10/2012	25/10/2012
Levelling Point	C305-LP041501	Trafalgar Way	07/09/2012	Installed	88426.384	34920.094	109.710	109.6461	109.6456	109.6462	109.6465
Levelling Point	C305-LP041502	Trafalgar Way	07/09/2012	Installed	88429.367	34923.810	109.516	109.4393	109.4397	109.4388	109.4394
Levelling Point	C305-LP041503	Trafalgar Way	07/09/2012	Installed	88432.315	34927.576	109.302	109.2311	109.2317	109.2305	109.2311
Levelling Point	C305-LP041504	Trafalgar Way	07/09/2012	Installed	88435.311	34931.460	109.083	109.0115	109.0116	109.0114	109.0115
Levelling Point	C305-LP041505	Trafalgar Way	07/09/2012	Installed	88438.192	34935.293	108.880	108.8128	108.8133	108.8127	108.8124
Levelling Point	C305-LP041506	Trafalgar Way	07/09/2012	Installed	88441.078	34939.220	108.659	108.5900	108.5895	108.5906	108.5899
Levelling Point	C305-LP041507	Trafalgar Way	07/09/2012	Installed	88443.881	34943.158	108.466	108.3999	108.3996	108.4001	108.4000
Levelling Point	C305-LP041508	Trafalgar Way	07/09/2012	Installed	88446.602	34947.139	108.259	108.1913	108.1917	108.1912	108.1910
Levelling Point	C305-LP041509	Trafalgar Way	07/09/2012	Installed	88449.265	34951.300	108.055	107.9862	107.9857	107.9868	107.9861
Levelling Point	C305-LP041510	Trafalgar Way	07/09/2012	Installed	88450.527	34953.297	107.955	107.8857	107.8858	107.8854	107.8859
Levelling Point	C305-LP041511	Trafalgar Way	07/09/2012	Installed	88451.719	34955.275	107.874	107.7981	107.7977	107.7984	107.7982
Levelling Point	C305-LP041512	Trafalgar Way	07/09/2012	Installed	88452.942	34957.359	107.789	107.7168	107.7172	107.7163	107.7169
Levelling Point	C305-LP041513	Trafalgar Way	07/09/2012	Installed	88454.165	34959.403	107.704	107.6375	107.6379	107.6371	107.6375
Levelling Point	C305-LP041514	Trafalgar Way	07/09/2012	Installed	88455.332	34961.465	107.640	107.5711	107.5706	107.5717	107.5710

I&M CLOSE OUT REPORT FOR LEVELLING POINTS INSTALLATION FROM EAST INDIA TO CANARY WHARF (DRIVE Y)
C305-DSJ-C2-RGN-CR143-50002 REV 2.0

Sensor Type	Sensor ID	Sub-Area	Installation Date	Status	Location SENSOR			Commissioning Readings (m)			
					Eastings X	Northings Y	Elevation Z (mATD)				
Levelling Point	C305-LP041515	Trafalgar Way	07/09/2012	Installed	88456.462	34963.507	107.559	107.5033	107.5034	107.5027	107.5038
Levelling Point	C305-LP041516	Trafalgar Way	07/09/2012	Installed	88457.616	34965.681	107.497	107.4435	107.4434	107.4441	107.4430
Levelling Point	C305-LP041517	Trafalgar Way	07/09/2012	Installed	88458.793	34967.903	107.450	107.3924	107.3918	107.3930	107.3924
Levelling Point	C305-LP041518	Trafalgar Way	07/09/2012	Installed	88459.905	34970.150	107.421	107.3513	107.3510	107.3519	107.3510
Levelling Point	C305-LP041519	Trafalgar Way	08/09/2012	Installed	88461.006	34972.384	107.361	107.2961	107.2967	107.2960	107.2956
Levelling Point	C305-LP041520	Trafalgar Way	07/09/2012	Installed	88462.031	34974.636	107.309	107.2433	107.2434	107.2432	107.2433
Levelling Point	C305-LP041521	Trafalgar Way	07/09/2012	Installed	88463.105	34976.894	107.273	107.2045	107.2047	107.2044	107.2044
Levelling Point	C305-LP041522	Trafalgar Way	07/09/2012	Installed	88464.145	34979.161	107.224	107.1585	107.1581	107.1591	107.1583
Levelling Point	C305-LP041523	Trafalgar Way	07/09/2012	Installed	88465.172	34981.432	107.164	107.1018	107.1023	107.1017	107.1014
Levelling Point	C305-LP041524	Trafalgar Way	07/09/2012	Installed	88466.134	34983.703	107.126	107.0552	107.0558	107.0547	107.0551
Levelling Point	C305-LP041525	Trafalgar Way	07/09/2012	Installed	88467.067	34986.018	107.077	107.0088	107.0091	107.0083	107.0090
Levelling Point	C305-LP041526	Trafalgar Way	07/09/2012	Installed	88468.002	34988.378	107.046	106.9736	106.9741	106.9732	106.9735
Levelling Point	C305-LP041527	Trafalgar Way	07/09/2012	Installed	88468.883	34990.724	106.998	106.9373	106.9369	106.9374	106.9376
Levelling Point	C305-LP041528	Trafalgar Way	07/09/2012	Installed	88469.741	34993.009	106.983	106.9222	106.9228	106.9221	106.9217
Levelling Point	C305-LP041529	Trafalgar Way	07/09/2012	Installed	88470.569	34995.340	106.965	106.9014	106.9019	106.9009	106.9014
Levelling Point	C305-LP041530	Trafalgar Way	07/09/2012	Installed	88472.200	35000.139	106.912	106.8504	106.8499	106.8507	106.8506
Levelling Point	C305-LP041531	Trafalgar Way	07/09/2012	Installed	88473.601	35004.745	106.874	106.8103	106.8100	106.8108	106.8101
Levelling Point	C305-LP041532	Trafalgar Way	07/09/2012	Installed	88474.935	35009.453	106.826	106.7686	106.7689	106.7682	106.7687
Levelling Point	C305-LP041533	Trafalgar Way	07/09/2012	Installed	88476.201	35014.195	106.805	106.7351	106.7349	106.7354	106.7350
Levelling Point	C305-LP041534	Trafalgar Way	07/09/2012	Installed	88477.352	35018.833	106.776	106.7058	106.7061	106.7055	106.7058
Levelling Point	C305-LP041535	Trafalgar Way	07/09/2012	Installed	88478.352	35023.521	106.729	106.6623	106.6629	106.6620	106.6620
Levelling Point	C305-LP041536	Trafalgar Way	07/09/2012	Installed	88479.251	35028.325	106.690	106.6147	106.6150	106.6141	106.6150

Note: The difference between Commissioning readings and Location sensor (elevation Z) is due to the use of GPS for the installation and the manual levelling to take the commissioning reading.

All elevations or levels presented in this document are meters above tunnel datum (mATD)

APPENDIX C: MINUTES OF THE CLOSE-OUT MEETINGS

Learning Legacy Document



I&M Close Out Meeting

Date & Time		15/07/2015 09:00		
Meeting No.		1		
The purpose of this document is to record agreement to cease monitoring long term monitoring and decommission based on review of the data against the requirements. 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:				
Data Reviewed				
Monitoring References	Location	Settlement rate	Cease Monitoring?	Decommission/ prepare report?
Levelling Points Area 4 Limmo to Canary Wharf Station				
LP045100-LP045147	Area 4 - River Lea River West Bank Wall (4A)	74% at 2mm/year 80% at 3mm/year	Yes	Yes
LP040101-LP040124	Area 4 - Bridge Court	0% at 2mm/year 0% at 3mm/year	Yes - CP13/14	Yes
LP040201-LP040226	Area 4 - Keel Court	40% at 2mm/year 68% at 3mm/year	Yes - CP13/14	Yes
LP040301-LP040330	Area 4 - John Smith Mews	73% at 2mm/year 83% at 3mm/year	Yes - CP13/14	Yes
LP040422-LP040431	Area 4 - Reuters Car Park	90% at 2mm/year 90% at 3mm/year		
LP041301-LP041328	Area 4 - Poplar Dock	68% at 2mm/year 82% at 3mm/year		
LP041401-LP041425	Area 4 - Boardwalk Place	100% at 2mm/year 100% at 3mm/year		
LP041501-LP041536	Area 4 - Trafalgar Way	36% at 2mm/year 44% at 3mm/year		
LP042301-LP042327	Area 4 - Billingsgate Market	96% at 2mm/year 100% at 3mm/year		
LP04472-LP04477	Area 4 - Lower Lea Crossing	50% at 2mm/year 83% at 3mm/year	Yes - CP14	Yes
LP04301-LP04310	Area 4 - Bow Creek River Wall	90% at 2mm/year 100% at 3mm/year	Yes - CP14	Yes
LP043201-LP043210	Area 4 - Orchard Place	20% at 2mm/year 20% at 3mm/year	Yes - temporary studs due to storage	Yes.
LP042050-LP042078	Area 4 - East India Dock	79% at 2mm/year 90% at 3mm/year	Yes - CP13/14	Yes
LP040801-LP040805	Area 4 - Prestons Road	100% at 2mm/year 100% at 3mm/year		
LP040201-LP040216	Area 4 - Aspen Way Underpass	100% at 2mm/year 100% at 3mm/year		
LP041701-LP041719	Area 4 - Prestons Road	95% at 2mm/year 95% at 3mm/year		
LP042001-LP042007	Area 4 - East India Dock	100% at 2mm/year 100% at 3mm/year	Yes - CP13/14	Yes
LP042201-LP042211	Area 4 - Billingsgate Market	64% at 2mm/year 82% at 3mm/year		
LP042401-LP042440	Area 4 - Billingsgate Market	67% at 2mm/year 78% at 3mm/year		
LP43201-LP43227	Area 4 - Blackwall Tunnel NB	89% at 2mm/year 100% at 3mm/year		
LP04478-LP04483	Area 4 - Lower Lea Crossing	??% at 2mm/year ??% at 3mm/year		
LP045301-LP045321		52% at 2mm/year		
LP045201-LP045212	Area 4 - Orchard Place (4B)	59% at 3mm/year	Yes	Yes

LPO41241-LPO41249	Area 4 - Poplar Dock	67% at 2mm/year 100% at 3mm/year		
Sockets Area 4 Limmo to Canary Wharf Station				
LB04301-LB04312	Area 4 - Orchard Place	83% at 2mm/year 92% at 3mm/year	Yes	Yes
LB040101-LB040110	Area 4 - Sail Court	100% at 2mm/year 100% at 3mm/year	Yes - CP13/CP14	Yes
LB040201-LB040211	Area 4 - Bridge/Keel Court	100% at 2mm/year 100% at 3mm/year	Yes - CP13/CP14	Yes
LB040301-LB040304	Area 4 - Sexton Court	75% at 2mm/year 100% at 3mm/year	Yes - CP13/14	Yes
LB040401-LB040412	Area 4 - John Smith Mews	80% at 2mm/year 90% at 3mm/year	Yes - CP13/14	Yes
LB040501-LB040506	Area 4 - Proton/Neutron Towers	100% at 2mm/year 100% at 3mm/year	Yes - CP13/14	Yes
LB040701-LB040706	Area 4 - Billingsgate Market	100% at 2mm/year 100% at 3mm/year		
LB041101-LB041110	Area 4 - Boardwalk Place	20% at 2mm/year 50% at 3mm/year		
LB041201-LB041210	Area 4 - Boardwalk Place	20% at 2mm/year 60% at 3mm/year		
LB041301-LB041308	Area 4 - Boardwalk Place	100% at 2mm/year 100% at 3mm/year		
LB041401-LB041410	Area 4 - Boardwalk Place	90% at 2mm/year 100% at 3mm/year		
LB044101-LB044105	Area 4 - Blackwall Tunnel Ventilation Tower (SB)	80% at 2mm/year 100% at 3mm/year		
Notes				
<p>-Cells in yellow indicate data review needs amending. <i>to included for rounding.</i></p> <p>-Limmo dewatering switch on 04/11/13, CP13 dewatering switch on 26/11/13.</p> <p>* -include CP13/CP14 data to demonstrate area is stable after last TBW readings in close out reports affected by dewatering works. Next meeting tomorrow after CTC.</p>				
Sign off				
DSJV	Geosira	Crossrail	C122	

I&M Close Out Template - 13th July 2015



I&M Close Out Meeting

Date & Time		16/07/2015 13:00		
Meeting No.		2		
The purpose of this document is to record agreement to cease monitoring long term monitoring and decommission based on review of the data against the requirements. 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:				
Data Reviewed				
Monitoring References	Location	Settlement rate	Cease Monitoring?	Decommission/ prepare report?
Levelling Points Area 4 Limmo to Canary Wharf Station				
LP040422-LP040431	Area 4 - Reuters Car Park	90% at 2mm/year 90% at 3mm/year	Yes - CPI3	Yes - CPI3
LP041301-LP041328	Area 4 - Poplar Dock (4L)	68% at 2mm/year 82% at 3mm/year	Yes - CPI3	Yes - CPI3 + feedbacks in June '15
LP041401-LP041425	Area 4 - Boardwalk Place	100% at 2mm/year 100% at 3mm/year	Yes - CPI3	Yes - CPI3
LP041501-LP041536	Area 4 - Trafalgar Way	36% at 2mm/year 44% at 3mm/year	Yes - CPI3	Yes - CPI3
LP042301-LP042327	Area 4 - Billingsgate Market	96% at 2mm/year 100% at 3mm/year	Yes	Yes
LP040801-LP040805	Area 4 - Prestons Road	100% at 2mm/year 100% at 3mm/year	Yes	Yes
LP040201-LP040216	Area 4 - Aspen Way Underpass	100% at 2mm/year 100% at 3mm/year	Yes	Yes
LP041701-LP041719	Area 4 - Prestons Road	95% at 2mm/year 95% at 3mm/year	Yes	Yes
LP042201-LP042211	Area 4 - Billingsgate Market	64% at 2mm/year 82% at 3mm/year	Yes	Yes
LP042401-LP042440	Area 4 - Billingsgate Market	67% at 2mm/year 78% at 3mm/year	Yes	Yes
LP43201-LP43227	Area 4 - Blackwall Tunnel NB	89% at 2mm/year 100% at 3mm/year	No - Review with CPI3 post.	Post CPI3
LP04478-LP04483	Area 4 - Lower Lea Crossing	??% at 2mm/year ??% at 3mm/year	Yes	Yes
LP041241-LP041249	Area 4 - Poplar Dock	67% at 2mm/year 100% at 3mm/year	Yes - CPI3	Yes
Sockets Area 4 Limmo to Canary Wharf Station				
LB040701-LB040706	Area 4 - Billingsgate Market	100% at 2mm/year 100% at 3mm/year	Yes	Yes
LB041101-LB041110	Area 4 - Boardwalk Place	20% at 2mm/year 50% at 3mm/year	Yes - 4L	Yes
LB041201-LB041210	Area 4 - Boardwalk Place	20% at 2mm/year 60% at 3mm/year	Yes - 4L	Yes
LB041301-LB041308	Area 4 - Boardwalk Place	100% at 2mm/year 100% at 3mm/year	Yes - 4L	Yes
LB041401-LB041410	Area 4 - Boardwalk Place	90% at 2mm/year 100% at 3mm/year	Yes - 4L	Yes
LB044101-LB044105	Area 4 - Blackwall Tunnel Ventilation Tower (SB)	80% at 2mm/year 100% at 3mm/year	No - Review with CPI3 post.	Post CPI3
Notes				

-Cells in yellow indicate data review needs amending.
 -Limmo dewatering switch on 04/11/13, CP13 dewatering switch on 26/11/13.
 * -For CP dewatering effects plot representative points from CP monitoring alongside data on same graph for comparison.

Sign off			
DSJV	Geocisa	Crosstail	C122

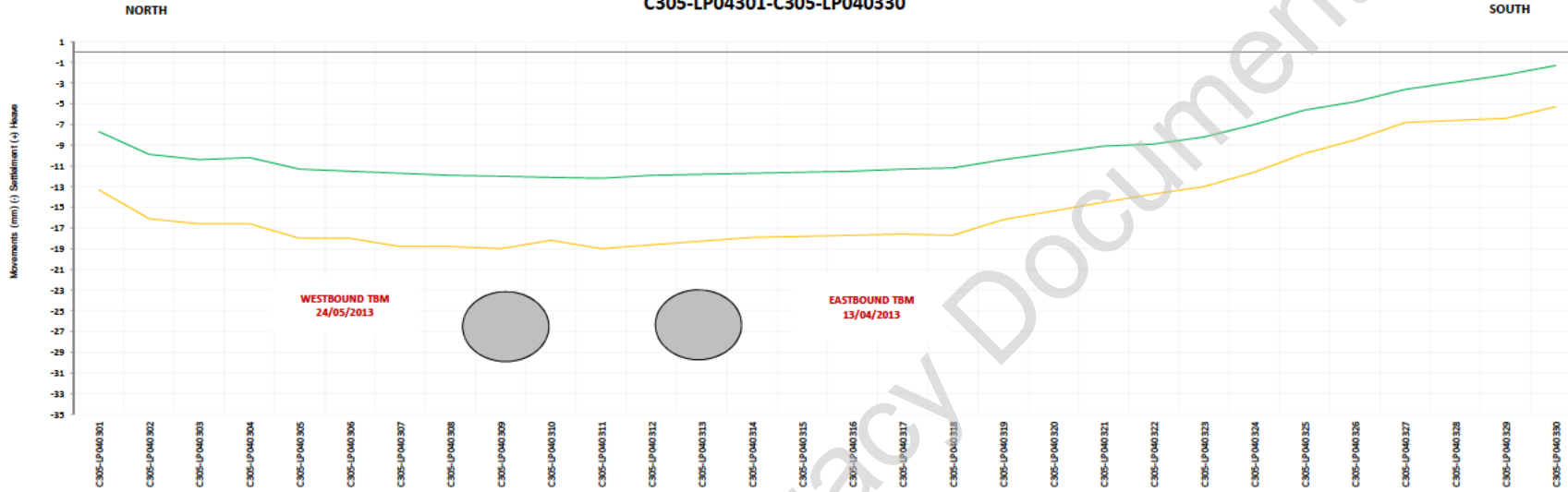
I&M Close Out Template - 13th July 2015

Learning Legacy Document

APPENDIX D: DEFLECTION RATIOS

Learning Legacy Document

**AREA 4 JOHN SMITH MEW PROFILE
C305-LP04301-C305-LP04330**



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

TRANSECT	ALERT VALUE	MAX DEFLECTION RATIO	
		TBMs Passage	Long Term
JOHN SMITH MEW PROFILE	1/2600	1/8333	1/5000

— 28/05/2013 AFTER TBMs TRANSIT
— 02/06/2014 LONG TERM