		C310 THAMES TUNNEL REPORT		
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev 2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal			

ORIGINATOR COMPANY NAME	Hochtief Murphy JV
-------------------------	---------------------------

CMDL: C09.006


REVISION	DOCUMENT APPROVAL / REVISION RECORD DETAILS	DATE
1.0	Issued for CRL Acceptance	10/02/2015
2.0	NR and CRL comments incorporated. Issued for Acceptance	07/04/2015

Stakeholder (Network Rail) review required? Yes: No:

This document has been reviewed by [redacted] in the capacity of [redacted] for coordination, compliance, integration, and acceptance as a safe system of work, output, control, sequence. This document is acceptable for transmittal to [redacted] for no objection to the works being executed as described.


Sign: [redacted] Name: [redacted] Date: 17/4/15

Review by Stakeholder (if required):					
Stakeholder organization	Job Title	Name	Signature	Date	Acceptance

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Position:	[redacted]	Date:	15 June 15
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PREPARED BY: HMJV Monitoring Manager Print: [redacted] Sign: [redacted] Date: 07-04-2015	REVIEWED BY: HMJV Technical and Risk Manager Print: [redacted] Sign: [redacted] Date: 07-04-2015
REVIEWED BY: HMJV Construction Manager Tunnels Print: [redacted] Sign: [redacted] Date: 07-04-2015	APPROVED BY: HMJV Project Director Print: [redacted] Sign: [redacted] Date: 07-04-2015

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		C310 THAMES TUNNEL REPORT		
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev 2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal			

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TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal				

CONTENTS

- 1.0 Introduction
- 2.0 Reference Documents
- 3.0 Appendices

Learning Legacy Document

		C310 THAMES TUNNEL REPORT		
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev 2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal			

1.0 INTRODUCTION

The purpose of this report is to compile the individual Network Rail related Close-out reports which summarise the monitoring data from the instrumentation within a monitoring area or of an asset and relates it to the construction activities which have produced any observed movement changes.

The Network Rail related assets are:

- White Hart Road Bridge
- Cathedral Substation and
- The surface next to the Plumstead sidings (no track area) within the Network Rail boundary.

The appendices referring to NR related assets are highlighted in appendix 00.

The monitoring of the North Kent Line and also the track area of the Plumstead sidings was done by Others and is not part of this report.

The data that is presented within the body the individual Close-out report is summarised in a cover sheet. This forms the basis for which the associated monitoring instrumentation is to be decommissioned. The values, comments and conclusions presented in the cover sheet of the individual Close-out report are derived from the monitoring data attached to the individual close-out report.

The content of the Close-out reports complies with what is required as per C122 – M&W Specification KX10 – Instrumentation & Monitoring C122-OVE-Z4-RSP-CR001-00007 Rev.7.0.

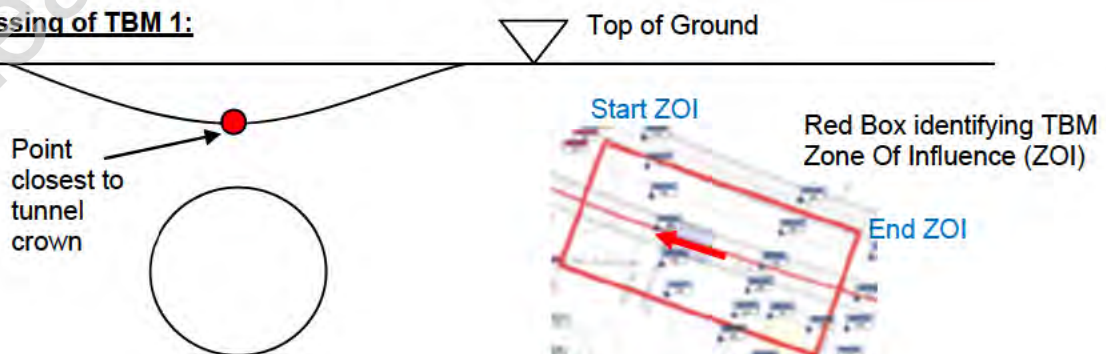
Each individual Close-out report contains


- a cover summary sheet
- monitoring point location plan
- Settlement-time plot and/or monitoring data spreadsheets

The Cover summary sheet entails:

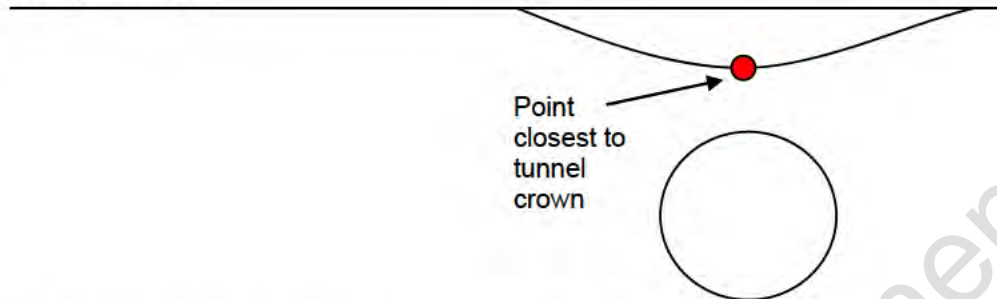
- Information on location of Monitoring area and/or asset
- Reference C310 I&M drawing
- Relevant chainage
- Sensor type
- Trigger values (attached the related appendices from MPCGM C310-HTM-Z-STP-CR148-50058 Rev.15.0 in Appendix 00.1)
- Selected critical monitoring points following the logic illustrated below:

Passing of TBM 1:



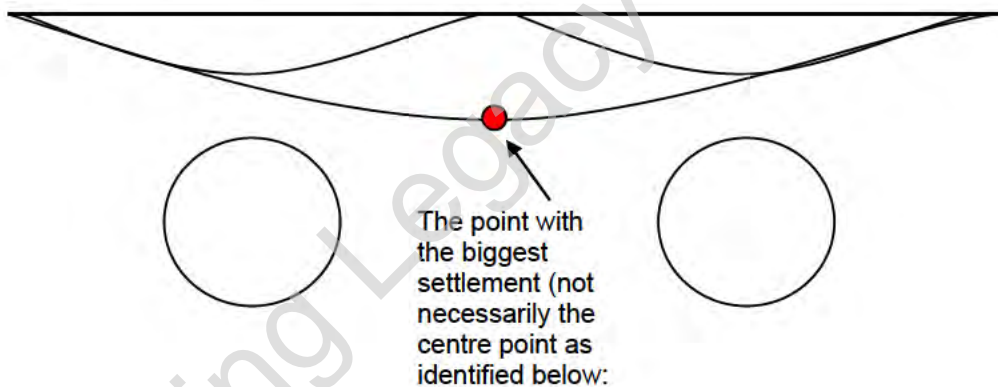
		C310 THAMES TUNNEL REPORT		
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev 2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal			

Passing of TBM 2:




- Start and end date of relevant construction activity (other than TBM-Drive), where applicable.
- Long-term: The monitoring point with the greatest confirmed value of vertical movement of the corresponding monitoring asset.

After Passage of TBM 1 and TBM 2



- Note on possible residual risks
- Supporting comments and conclusions that also focus on Network Rail specific requirements:
 - Deflection ratio for surface monitoring (e.g. ground studs)
 - Movements at shallow datum to be checked with the similar movement trend as the monitoring on the surface.
 - Rate of change in monitoring data to be less than 2mm per annum (suggesting simple settlement-time curves to demonstrate that the settlement is of no further concern).
 - Reasons or explanations to be provided for no requirement to continue monitoring.

All close-out reports identified in the appendices form part of this report.

		C310 THAMES TUNNEL REPORT		
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev 2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal			

2.0 REFERENCE DOCUMENTS

MPCGM C310-HTM-Z-STP-CR148-50058 Rev. 15.0

RICMP C310-HTM-Z-STP-CR148-50026 Rev. 8.0

RIEPP C310-HTM-Z-STP-CR148-50027 Rev. 13.0


HMJV I&M Drawings:

C310-HTM-C-DWG-CR148_PT005-50010 Rev. 9.0

M&W Specification KX10 – Instrumentation & Monitoring / C122-OVE-Z4-RSP-CR001-00007 Rev. 7.0

3.0 APPENDICES

Appendix 00	Overall Register / Close out report
Appendix 00.1	Overview of trigger values extracted from MPCGM C310-HTM-Z-STP-CR148-50058 Rev.15.0
Appendix 06	White Hard Road Bridge – HLC
Appendix 07	White Hard Road Bridge – TM
Appendix 07.1	Dilapidation Report White Hart Road Bridge
Appendix 09	Cathedral Substation – HLC
Appendix 10	Cathedral Substation – TM
Appendix 11	Cathedral Substation – Lev.St.
Appendix 11.1	Dilapidation Report Cathedral Substation
Appendix 12	CS1 – Old Coalyard
Appendix 13	CS2 – Old Coalyard
Appendix 14	CS3 – Old Coalyard
Appendix 15	CS4 – Old Coalyard
Appendix 16	APB Sidings – Old Coalyard
Appendix 18	Geotechnical Cross section 1

 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev	2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal				

APPENDIX 00


Overall Register / Close out report

Learning Legacy Document

Close Out report: processing status

last update: 07/02/2015


Network Rail related						
	No.	Name of Report	Installation Type	Passing with TBM 1	Passing with TBM 2	
Plumstead Portal	1	White Hard Depot Building	Hydrostatic Levelling Cell	destressing of ground anchors - approx. Mar 2015 removal of last props - Feb. 2015		
	2	White Hard Depot Building	Tiltmeter			
	3	APB posts	Levelling Studs			
Tunnel Drive T1 / Westbound & T2 / Eastbound	4	CS1 - Crane Platform / Headwall	Levelling Studs	10.01.2013	20.05.2013	
	5	CS2 - Crane Platform / Headwall	Levelling Studs	18.01.2013	24.05.2013	
	6	White Hard Road Bridge	Hydrostatic Levelling Cell	21.-25.01.2013	25.-27.05.2013	
	7	White Hard Road Bridge	Tiltmeter	21.-25.01.2013	25.-27.05.2013	
	8	White Hard Road	Levelling Studs	23.-25.01.2013	26.-27.05.2013	
	9	Cathedral Substation - HLC	Hydrostatic Levelling Cell	26.-28.01.2013	28.-29.05.2013	
	10	Cathedral Substation - TM	Tiltmeter	26.-28.01.2013	28.-29.05.2013	
	11	Cathedral Substation - Lev.St.	Levelling Studs	26.-28.01.2013	28.-29.05.2013	
	12	CS1 - Old Coalyard	Levelling Studs	30.01.2013	30.05.2013	
	13	CS2 - Old Coalyard	Levelling Studs	03.02.2013	09.06.2013	
	14	CS3 - Old Coalyard	Levelling Studs	25.02.2013	12.06.2013	
	15	CS4 - Old Coalyard	Levelling Studs	02.03.2013	16.06.2013	
	16	APB Sidings - Old Coalyard	Levelling Studs	30.01.-09.03.2013	30.05.-18.06.2013	
	17	Cross Passage 19	Levelling Studs	Excavation Nov.-Dec.2013		
	18	Geotechnical Cross Section 1	Levelling Studs	09.03.2013	18.06.2013	
	19	Southern Outfall Sewer 1	Levelling Studs	12.03.2013	18.06.2013	
	20	Southern Outfall Sewer 2	Levelling Studs	13.03.2013	19.06.2013	
	21	Southern Outfall Sewer 3	Levelling Studs	15.03.2013	21.06.2013	
	22	Southern Outfall Sewer Pumping Station	Levelling Studs	13.03.2013	20.06.2013	
	23	Southern Outfall Sewer Extensometer	Extensometer	17.03.2013	20.06.2013	
	24	CS 5 - Petment Crescent Bridge - Lev.St.	Levelling Studs	24.03.2013	28.6.2013	
	25	Petment Crescent Bridge - HLC	Hydrostatic Levelling Cell	24.-25.03.2013	28.-29.06.2013	
	26	Royal Mail	Hydrostatic Levelling Cell	27.-29.03.2013	30.06.-02.07.2013	
	27	Mc Donald	Hydrostatic Levelling Cell	26.-27.03.2013	30.06.-01.07.2013	
	28	CS6 - Bus Garage	Levelling Studs	29.03.2013	02.07.2013	
	29	Bus Garage	Hydrostatic Levelling Cell	01.-05.04.2013	05.-09.07.2013	
	30	Bus Garage	Tiltmeter	01.-05.04.2013	05.-09.07.2013	
	31	CS7 - Petment Cresent + Subway	Levelling Studs	05.-07.04.2013	09.-11.07.2013	
	32	SOS Plumstead Road South	Levelling Studs	05.04.-02.05.2013	10.07.-01.08.2013	
	33	SOS Plumstead Road North	Levelling Studs	16.04.-07.05.2013	17.07.-07.08.2013	
	34	SOS Plumstead Road Extensometer	Extensometer	20.04.-06.05.2013	20.07.-04.08.2013	
	35	Cross Passage 18	Levelling Studs	Excavation Jan.-Feb.2014		
	36	Gateway Business center	Levelling Studs	07.-16.04.2013	13.07.-17.07.2013	
	37	CS8 - Signature Industries	Levelling Studs	19.04.2013	19.07.2013	
	38	Signatute Industries	Levelling Studs	20.-26.04.2013	20.-24.07.2013	
	39	Geotechnical Cross Section 2	Levelling Studs	28.04.2013	28.07.2013	
	40	CS9 - Wall Marshgate Path	Levelling Studs	28.04.2013	28.07.2013	
	41	Wall Middle Gate House	Levelling Studs	30.04.2013	30.07.2013	
	42	Wall Plumstead Road	Levelling Studs	28.04.-06.05.2013	28.07.-05.08.2013	
	43	Middle Gate House	Hydrostatic Levelling Cell	01.-02.05.2013	30.-31.07.2013	
	44	Middle Gate House	Tiltmeter	01.-02.05.2013	30.-31.07.2013	
	45	DLR Down line Tunnel	Hydrostatic Levelling Cell	01.05.2013	30.07.2013	
	46	DLR Up line Tunnel	Hydrostatic Levelling Cell	02.05.2013	31.07.2013	
	47	CS10 - Footpath MGH to Plumstead Road	Levelling Studs	03.05.2013	01.08.2013	
	48	CS11 - I/O Center	Levelling Studs	05.05.2013	03.08.2013	
	49	I/O Center Building	Levelling Studs	05.-11.05.2013	02.-09.08.2013	
	50	I/O Center Car Park	Levelling Studs	08.-12.05.2013	07.-10.08.2013	
	51	CS12 - Cornwallis Road	Levelling Studs	12.05.2013	10.08.2013	
	52	CS13 - 1200 BH Sewer WSB	Levelling Studs	12.05.2013	10.08.2013	
	Woolwich Station Box	removal of last props - approx. Mar. 2015				

		C310 THAMES TUNNEL REPORT		
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev 2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal			

APPENDIX 00.1

Overview of trigger values extracted from MPCGM C310-HTM-Z-STP-CR148-50058 Rev.15.0

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 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL PLAN			
EMPLOYER	CROSSRAIL	eB No	C310-HTM-Z-STP-CR148-50058	Rev	15.0
TITLE	Management Plan for Control of Ground Movement - TBM Tunnelling from Woolwich Box to North Woolwich Westbound TBM 1 & Cross Passage Construction				


Appendix Y

Trigger Values for Cathedral Substation (during installation of TAM drillings, pre-grouting and Tunneling)

Trigger Level	heave	settlement
Green	+ 2 mm	-4 mm
Amber	+ 3.5 mm	-7 mm
Red	+ 4.5 mm	-9 mm

Trigger Level	slope
Green	1 : 2500
Amber	1 : 1400
Red	1 : 1100

Trigger Level	deflection (max. 0.5 ‰)		deflection (max. 1/2000)	
	from	to	from	to
Green	0.00 ‰	0.35 ‰	-	2857
Amber	0.35 ‰	0.45 ‰	2857	2222
Red	0.45 ‰	> 0.45 ‰	2222	< 2222

 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL PLAN			
EMPLOYER	CROSSRAIL	eB No	C310-HTM-Z-STP-CR148-50058	Rev	15.0
TITLE	Management Plan for Control of Ground Movement - TBM Tunnelling from Woolwich Box to North Woolwich Westbound TBM 1 & Cross Passage Construction				


Appendix Z

Learning Legacy Document

EMPLOYER	CROSSRAIL	eB No	C310-HTM-Z-STP-CR148-50058	Rev	15.0
TITLE	Management Plan for Control of Ground Movement - TBM Tunnelling from Woolwich Box to North Woolwich Westbound TBM 1 & Cross Passage Construction				

Trigger Values for Cathedral Substation during tunnelling

Trigger Values for Cathedral Substation (during installation of TAM drillings and pre-grouting)							
Point No.	Readings		Variation	Trigger Values	heave		settlement
30040221	Baseline average	-0.95		Green	1.4	2	-5.3
	max. Value average	-0.5	0.3	Amber	2.9	3.5	-8.5
	min. Value average	-1.1	-0.3	Red	3.9	4.5	-10.3
30040222	Baseline average	-0.95		Green	1.8	2	-5.7
	max. Value average	-0.2	0.7	Amber	3.3	3.5	-8.7
	min. Value average	-1.6	-0.7	Red	4.3	4.5	-10.7
30040223	Baseline average	-1.21		Green	1.5	2	-5.9
	max. Value average	-0.4	0.7	Amber	3.0	3.5	-8.9
	min. Value average	-1.8	-0.7	Red	4.0	4.5	-10.9
30040224	Baseline average	0.34		Green	2.5	2	-4.3
	max. Value average	0.5	0.4	Amber	4.0	3.5	-7.3
	min. Value average	-0.3	-0.4	Red	5.0	4.5	-9.3
30040225	Baseline average	-0.86		Green	1.5	2	-5.3
	max. Value average	-0.5	0.4	Amber	3.0	3.5	-8.3
	min. Value average	-1.3	-0.4	Red	4.0	4.5	-10.3
30040226	Baseline average	-0.91		Green	1.6	2	-5.4
	max. Value average	-0.4	0.5	Amber	3.1	3.5	-8.4
	min. Value average	-1.4	-0.5	Red	4.1	4.5	-10.4
30040227	Baseline average	-0.82		Green	1.6	2	-5.3
	max. Value average	-0.4	0.5	Amber	3.1	3.5	-8.3
	min. Value average	-1.3	-0.5	Red	4.1	4.5	-10.3
30040228	Baseline average	-0.77		Green	1.6	2	-5.2
	max. Value average	-0.3	0.4	Amber	3.1	3.5	-8.2
	min. Value average	-1.1	-0.4	Red	4.1	4.5	-10.2
30040229	Baseline average	-1.13		Green	1.3	2	-5.5
	max. Value average	-0.6	0.4	Amber	2.8	3.5	-8.5
	min. Value average	-1.4	-0.4	Red	3.8	4.5	-10.5
30040230	Baseline average	-0.85		Green	1.6	2	-5.3
	max. Value average	-0.3	0.5	Amber	3.1	3.5	-8.3
	min. Value average	-1.2	-0.5	Red	4.1	4.5	-10.3
30040231	Baseline average	-0.39		Green	2.1	2	-4.9
	max. Value average	0.2	0.5	Amber	3.6	3.5	-7.9
	min. Value average	-0.8	-0.5	Red	4.6	4.5	-9.9
30040232	Baseline average	-0.93		Green	1.6	2	-5.5
	max. Value average	-0.3	0.6	Amber	3.1	3.5	-8.5
	min. Value average	-1.4	-0.6	Red	4.1	4.5	-10.5
30040233	Baseline average	-1.1		Green	1.4	2	-5.6
	max. Value average	-0.5	0.5	Amber	2.9	3.5	-8.6
	min. Value average	-1.5	-0.5	Red	3.9	4.5	-10.6
30040234	Baseline average	-0.57		Green	1.9	2	-5.1
	max. Value average	0	0.5	Amber	3.4	3.5	-8.1
	min. Value average	-1	-0.5	Red	4.4	4.5	-10.1
30040235	Baseline average	-0.91		Green	1.6	2	-5.5
	max. Value average	-0.3	0.6	Amber	3.1	3.5	-8.5
	min. Value average	-1.4	-0.6	Red	4.1	4.5	-10.5
30040236	Baseline average	-0.88		Green	1.6	2	-5.4
	max. Value average	-0.3	0.5	Amber	3.1	3.5	-8.4
	min. Value average	-1.3	-0.5	Red	4.1	4.5	-10.4
30040237	Baseline average	-0.09		Green	2.3	2	-4.4
	max. Value average	0.3	0.4	Amber	3.8	3.5	-7.4
	min. Value average	-0.4	-0.4	Red	4.8	4.5	-9.4
30040238	Baseline average	-0.51		Green	2.0	2	-5.0
	max. Value average	0.1	0.5	Amber	3.5	3.5	-8.0
	min. Value average	-0.9	-0.5	Red	4.5	4.5	-10.0
30040239	Baseline average	-0.24		Green	2.2	2	-4.6
	max. Value average	0.2	0.4	Amber	3.7	3.5	-7.6
	min. Value average	-0.6	-0.4	Red	4.7	4.5	-9.6

 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL PLAN			
EMPLOYER	CROSSRAIL	eB No	C310-HTM-Z-STP-CR148-50058	Rev	15.0
TITLE	Management Plan for Control of Ground Movement - TBM Tunnelling from Woolwich Box to North Woolwich Westbound TBM 1 & Cross Passage Construction				


APPENDIX AAA

Table B1 – Trigger values for asset protection for all locations accept where a specific set of trigger values apply.

Crossrail Reference Chainage	Description / Area	Maximum settlement trigger values for asset protection (mm)		
		Green	Amber	Red
91800 – 91700	Volume loss control zone ⁶	14	17	21
91700 – 90780	Bored Tunnel Construction	16	20	25
90780 – 90660	Volume loss control zone ⁶	12	15	18
90660 - 90560	Bored Tunnel Construction	22	28	35
90560 – 90230	Woolwich Station ⁶	26 (22)	33 (27)	41 (34)
90230 - 89100	Bored Tunnel Construction	16	20	25
89100 - 88890	Volume loss control zone ⁵	12	15	18
88890 – 88820	North Woolwich Portal ⁶	43 (32)	54 (40)	68 (50)

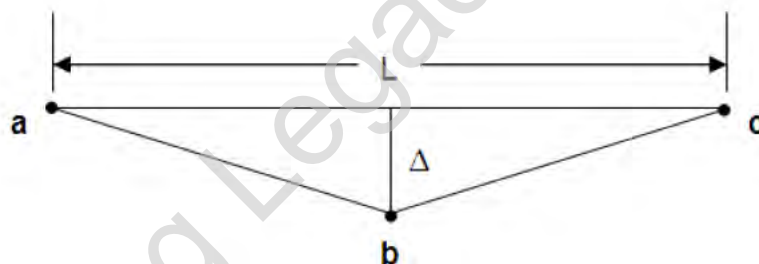
Notes:

1. When any trigger level is breached, the ground settlement profile from the nearest transect(s) shall be established and reviewed with the movement of prisms (on buildings) and sub-surface instruments (for underground assets). The ground slope and deflection ratio shall be calculated and agreed with the Project Manager. Monitored displacements shall be reviewed and compared with damage assessment reports and other relevant information. The need for further action shall be agreed with the Project Manager.
2. Trigger values apply to ground level instrumentation (streets and buildings) throughout all construction stages.
3. Recorded displacements shall be adjusted to exclude thermal and transient load effects (established from baseline readings) prior to calculation of gradients for comparison with trigger values.

		C310 THAMES TUNNEL PLAN			
EMPLOYER	CROSSRAIL	eB No	C310-HTM-Z-STP-CR148-50058	Rev	15.0
TITLE	Management Plan for Control of Ground Movement - TBM Tunnelling from Woolwich Box to North Woolwich Westbound TBM 1 & Cross Passage Construction				


4. Except within Volume Loss Control zones, settlement estimates are based on the default Volume Loss of 1%. These settlement contours are given on drawings "Settlement Contours Final Stage Routewide Plan Sheet 29 – 34 of 38" (C122-OVE-C2-DDA-CR001_Z-21329 – 31034)
5. Settlements over Volume Loss control zones have been estimated based on a maximum allowable volume loss of 0.5%. Where ground treatment works are being carried out within the zone, reduced settlement triggers will apply. These will be specified separately where applicable.
6. Settlements within locations of Stations, Shafts or Portals where applicable, are given both as the total settlements arising from deep excavations and settlements arising from tunnel construction. Estimated settlements arising from tunnel construction are provided in parenthesis.

In addition, an **Amber trigger of 1:2000 applies to deflection ratio** calculated for any three monitoring points; refer to Figure B1. The minimum base length, L is 10m. Monitored points to be agreed with the Project Manager.



- Monitored point
- Δ Vertical deflection of point **b** relative to line **a c**
- Δ/L Deflection ratio (for points **a, b & c**)

Figure B1 – Deflection ratio (Δ/L)

 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev	2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal				

APPENDIX 06

White Hard Road Bridge – HLC

Learning Legacy Document

monitoring asset	White Hard Road Bridge		
reference monitoring drawing:	C310-HTM-C-DWG-CR148-PT005-50010		
name of monitoring section:	White Hard Road Bridge		
sensor type:	Hydrostatic Levelling Cell		
chainage:	91760	point no.:	3004 0181- 3004 0190
trigger values: [mm]	green: +5 -5	amber: +11 -11	red: +17 -17
reference document for trigger values:	Management Plan for Control of Ground Movement		
EB-no.:	C310-HTM-Z-STP-CR148-50058		
Appendix:	AAA		

monitoring data

	date	max. value	point no.	comments
baseline	29/08/12	0		The Reference point for the HLC system is 3004 0181
TBM 1	start ZOI	16/01/13	-0.05	3004 0186
		20/01/13	0.86	3004 0185
	end ZOI	28/01/13	-6.09	3004 0186
		29/01/13	-0.35	3004 0185
breached the green trigger value with point 30040186 after passing with TBM 1, as per RIEPP C310-HTM-Z-STP-CR148-50027 App. D.1 monitoring frequency increased				
TBM 2	start ZOI	24/05/13	-7.33	3004 0186
		25/05/13	-1.20	3004 0185
	end ZOI	29/05/13	-7.76	3004 0186
		30/05/13	-1.76	3004 0185
breached the green trigger value. no more significant settlement due to passing of TBM 2, increased frequency continued				
longterm		13/07/13	-7.44	3004 0186
		13/07/13	-1.54	3004 0185
		13/09/13	4.72	3004 0186
		13/09/13	-1.05	3004 0185
last reading post tunneling, Cross section not longer measurable				

Evaluation of any potential residual risks	<input checked="" type="checkbox"/>	No residual risk since the Works have been completed by HMJV
	<input type="checkbox"/>	Yes, residual risk (see comment below)

summary / comments

As of 13.07.2013 a daily influence of solar radiation due to the removal of the ballast and the cover of the sensors can be observed for the points 3004 0186-3004 0190. In the late afternoon the settlement values go up to +10 mm high and in the early morning hours on 10mm down. The points are all on the eastern side of the bridge. An influence of solar radiation is not dismissed, especially since the phenomenon of fluctuation of +/-10mm is not observed on the western side of the bridge. The stable data / trend for the points on the western side of the bridge are indicating the same for eastern side due to the fact that the trends of both sides showed also similar behaviour before that phenomenon.

After the 13.09.2013 the system was decommissioned in conjunction with the Cathedral Substation monitoring system were this system was linked to and the power supply was delivered from.

Under consideration of temperature differences, the surrounding ground condition and the achievable accuracy of the measurement, HMJV has no concern to cease the monitoring.

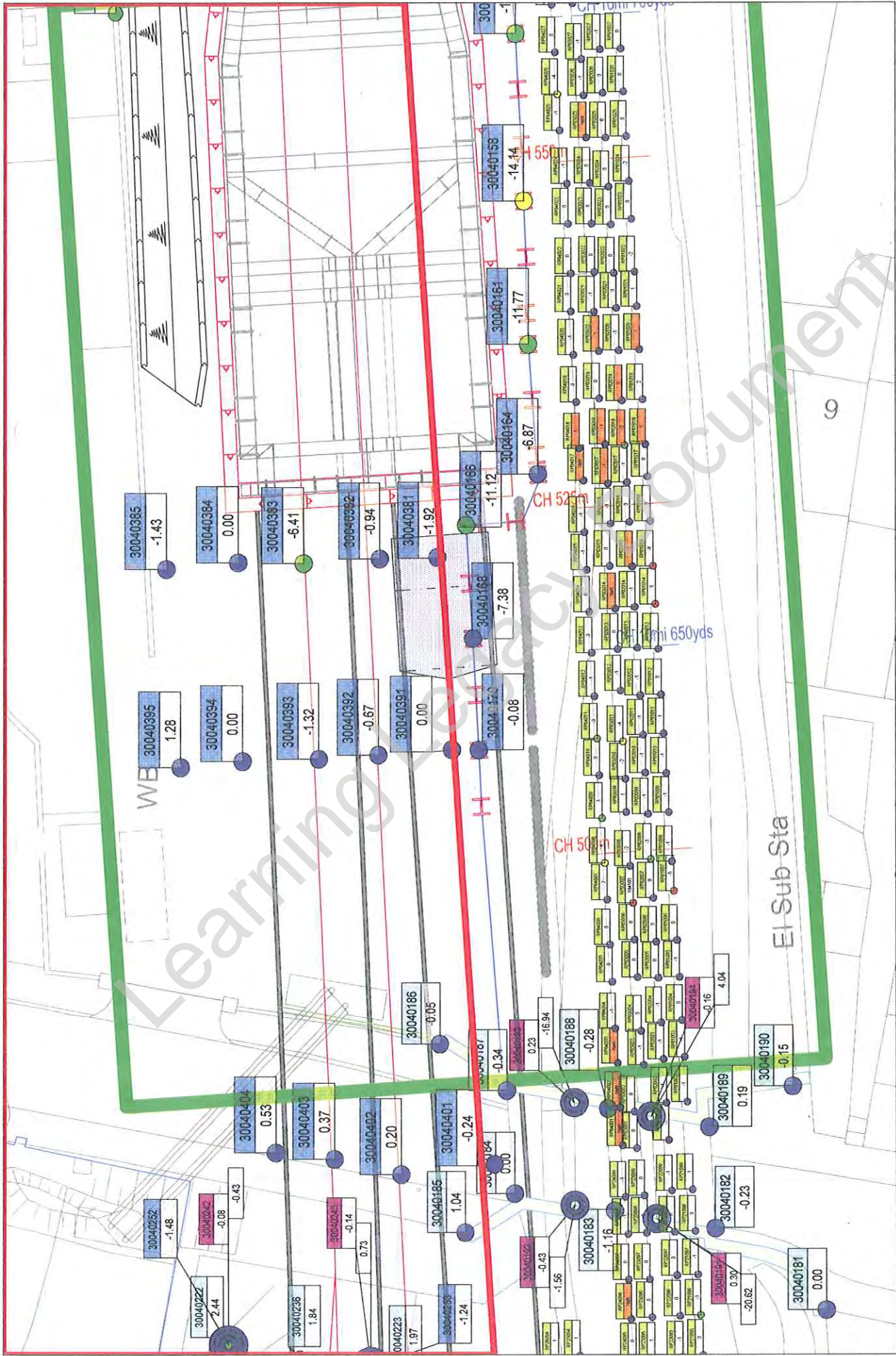
The rate of change in the monitoring data is less than the required standards as per the specifications and drawings up to the time when the instrumentations have been decommissioned.

date / signature: 31/03/2015

print name:

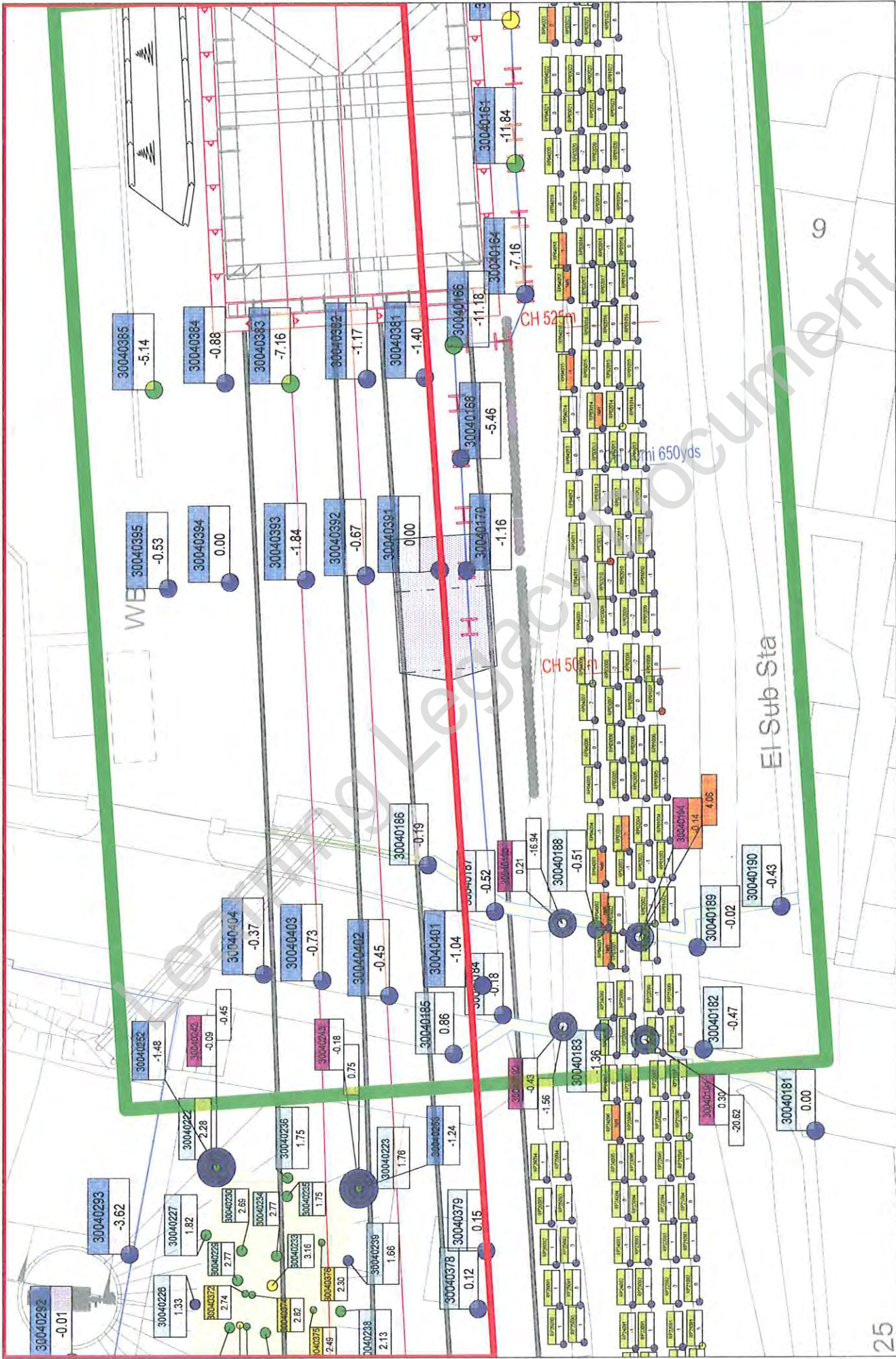
HMJV project role:

Monitoring & Survey engineer



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive, portal excavation, construction base slab, lining walls and grouting
 current values: 16.01.2013 10:05

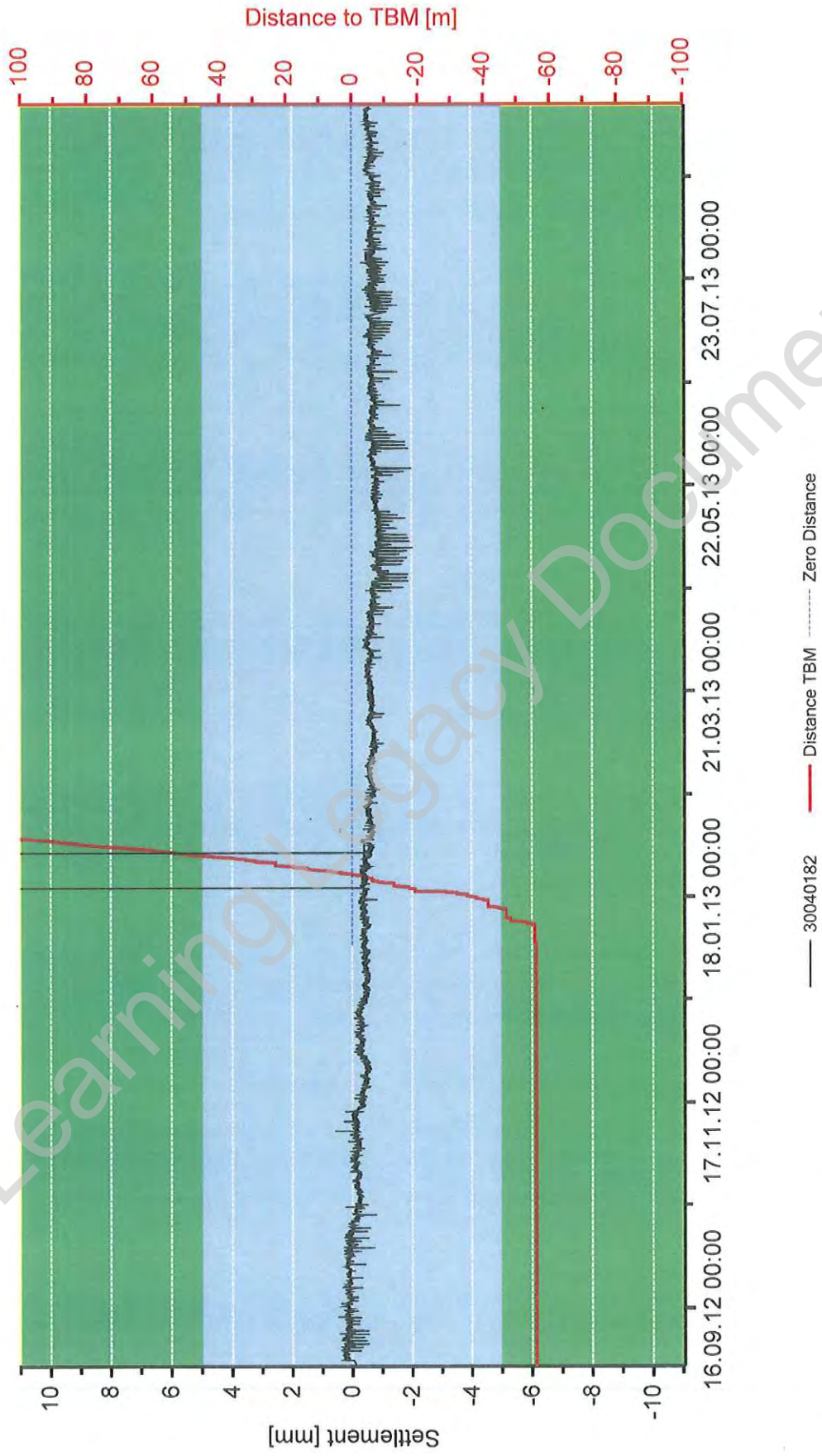




Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive, portal excavation, construction base slab, lining walls and grouting
 current values: 20.01.2013 09:56

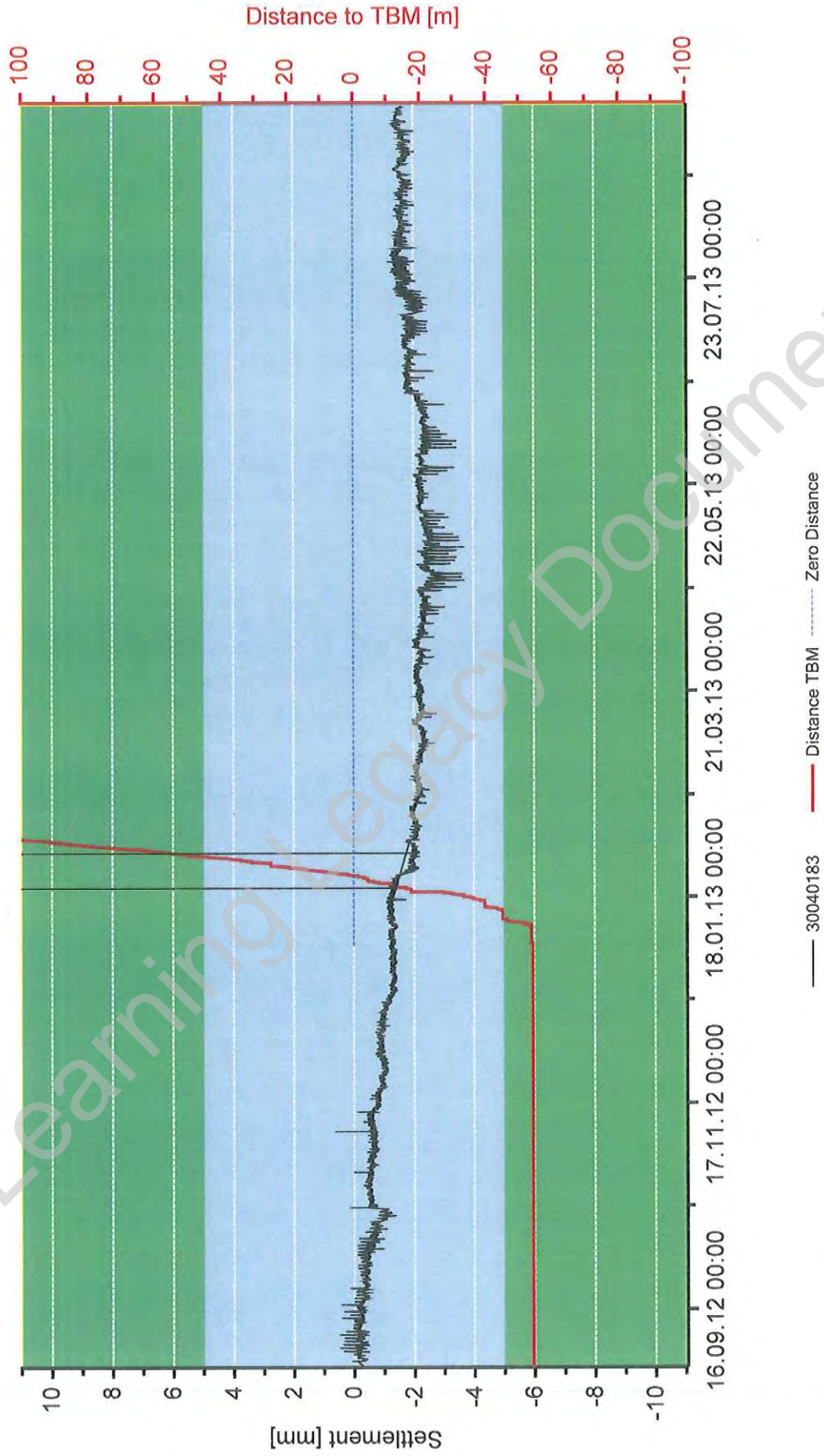


Point: 30040182



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - White Hard Road Bridge (HLC) 29.08.2012 - 13.09.2013
date: 26.06.2014 13:10 current values: 26.06.2014 13:04

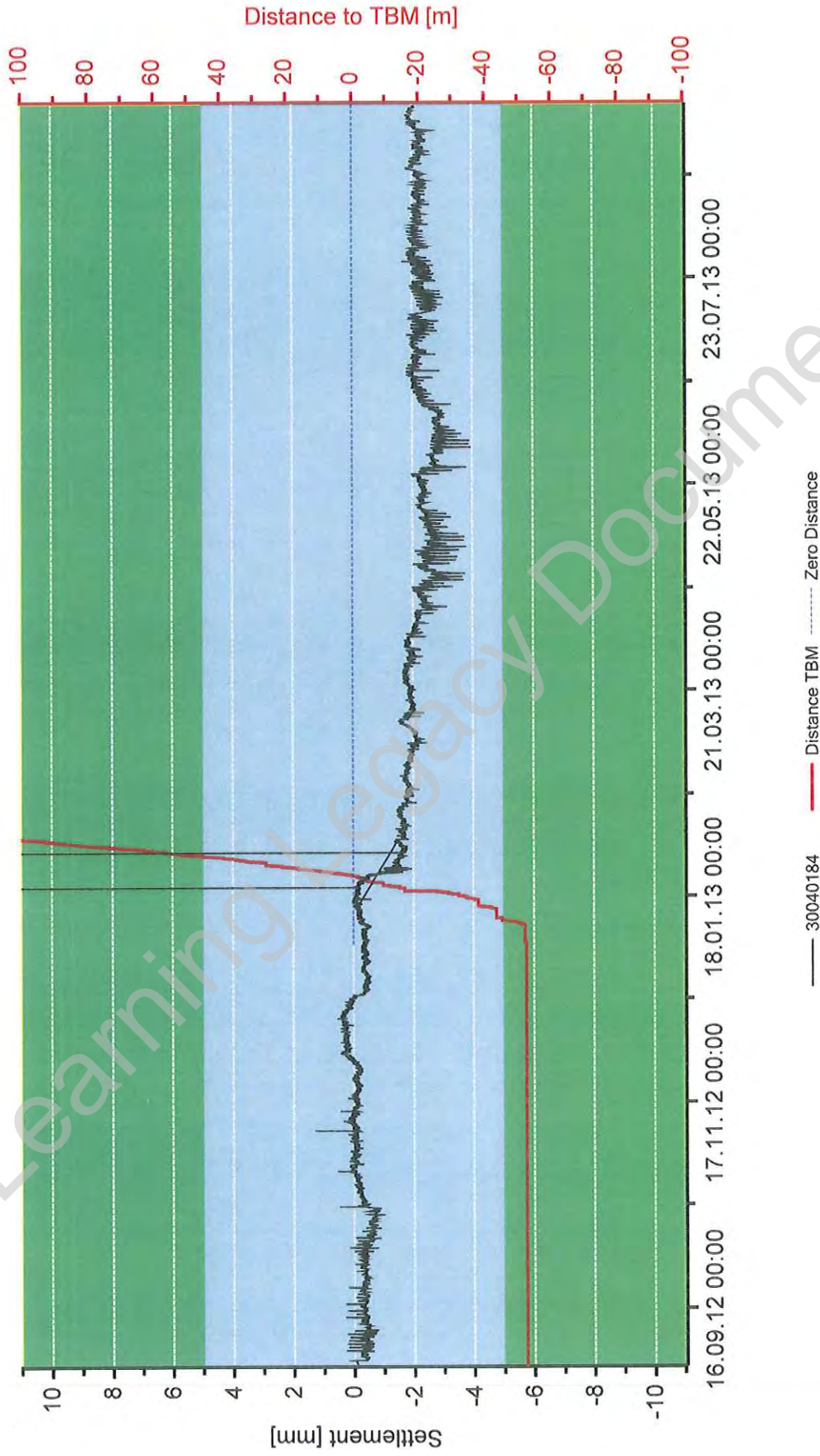
Point: 30040183



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - White Hard Road Bridge (HLC) 29.08.2012 - 13.09.2013
date: 26.06.2014 13:13 current values: 26.06.2014 13:04



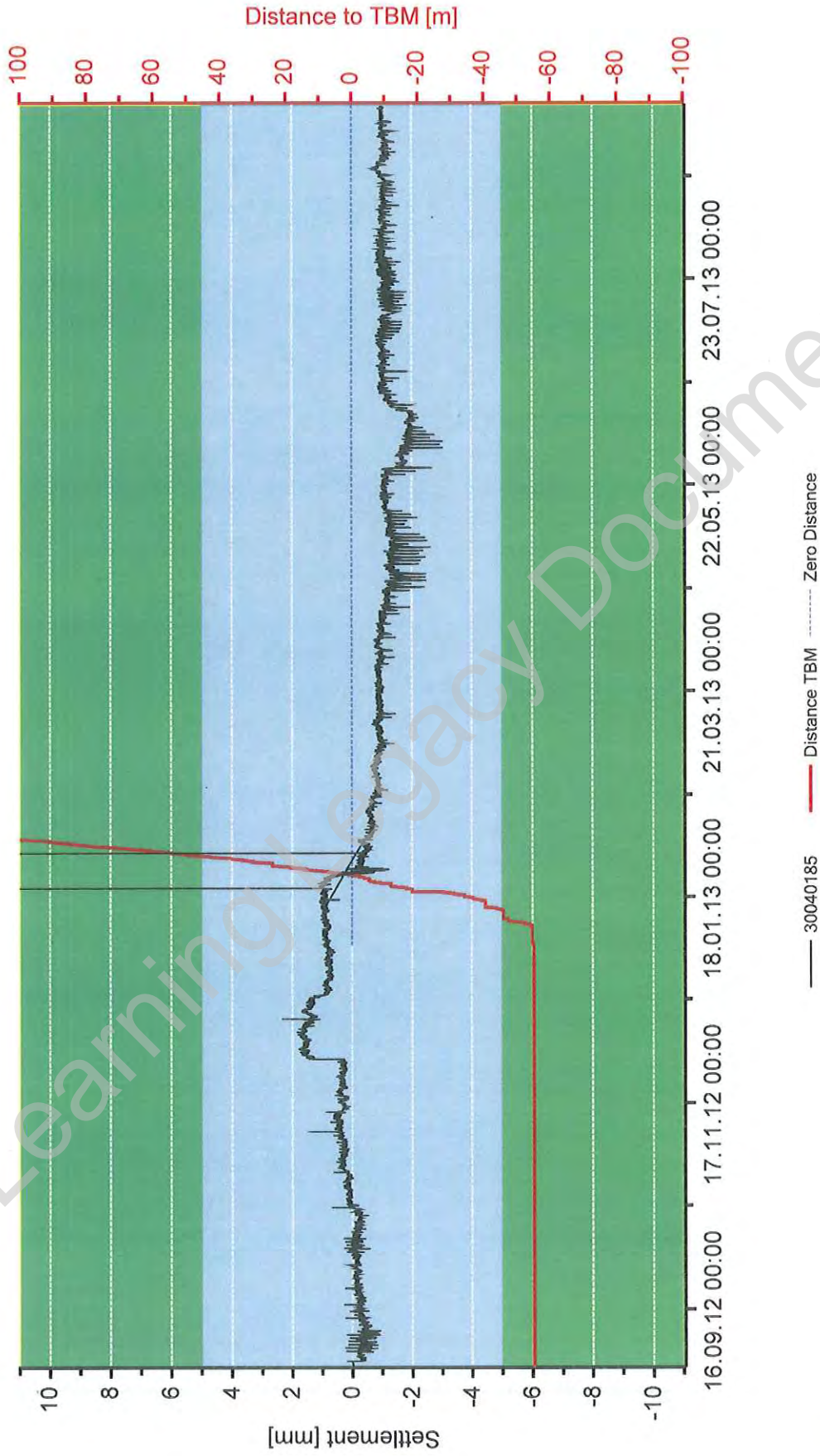
Point: 30040184



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - White Hard Road Bridge (HLC) 29.08.2012 - 13.09.2013
date: 26.06.2014 13:23 current values: 26.06.2014 13:13

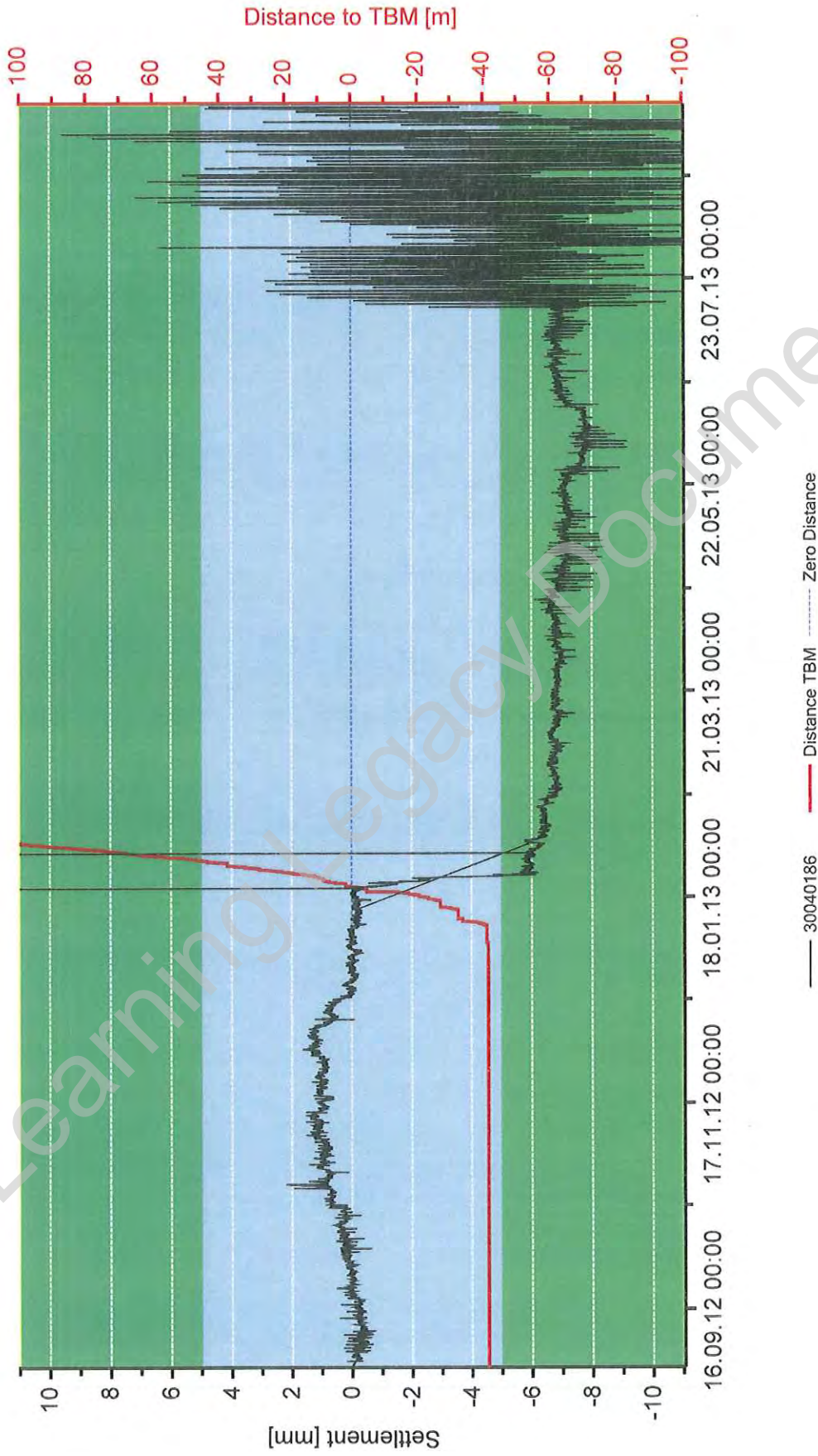


Point: 30040185



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - White Hard Road Bridge (HLC) 29.08.2012 - 13.09.2013
date: 26.06.2014 13:26 current values: 26.06.2014 13:13

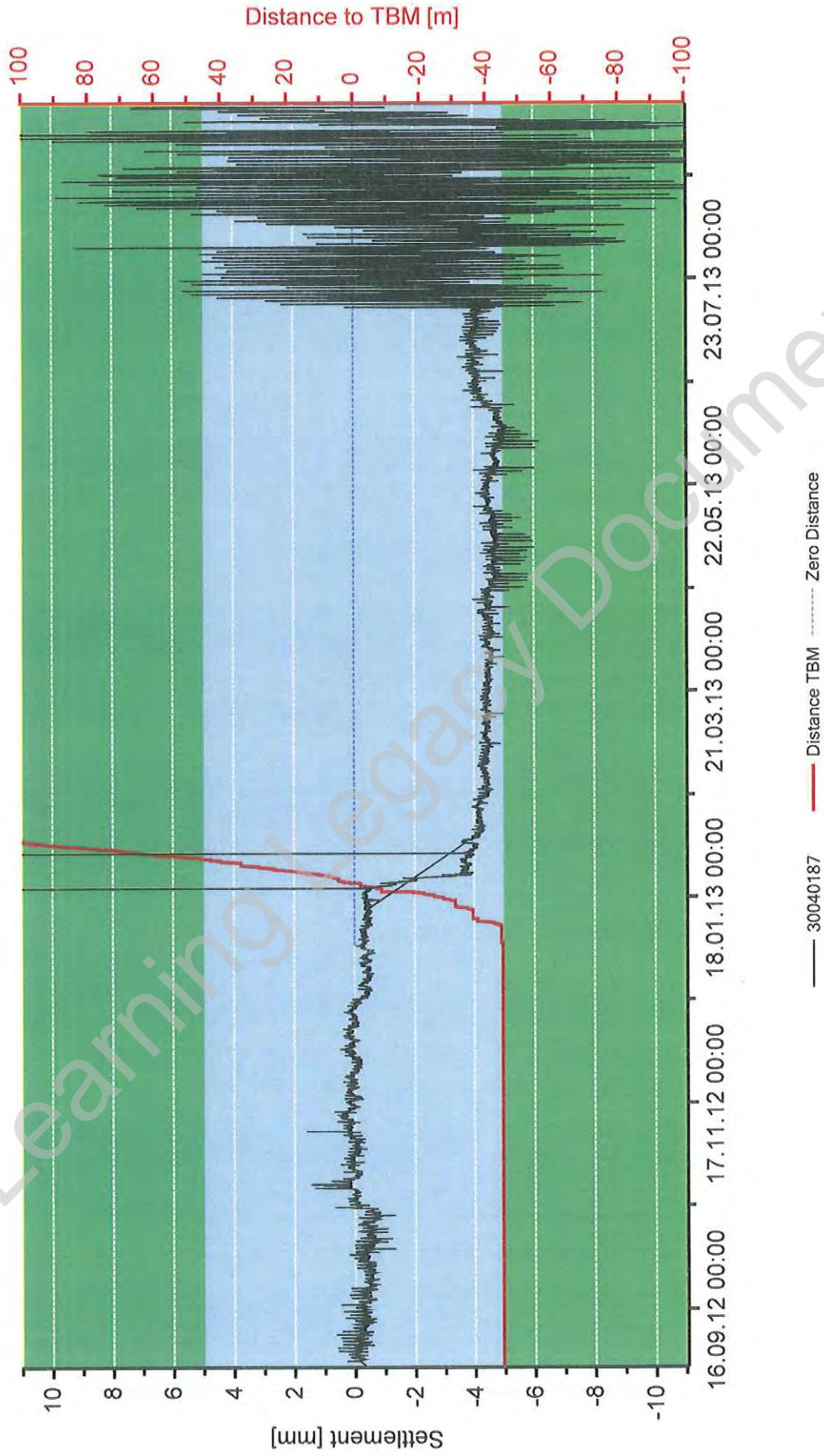
Point: 30040186



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - White Hard Road Bridge (HLC) 29.08.2012 - 13.09.2013
date: 25.06.2014 17:49 current values: 25.06.2014 17:32



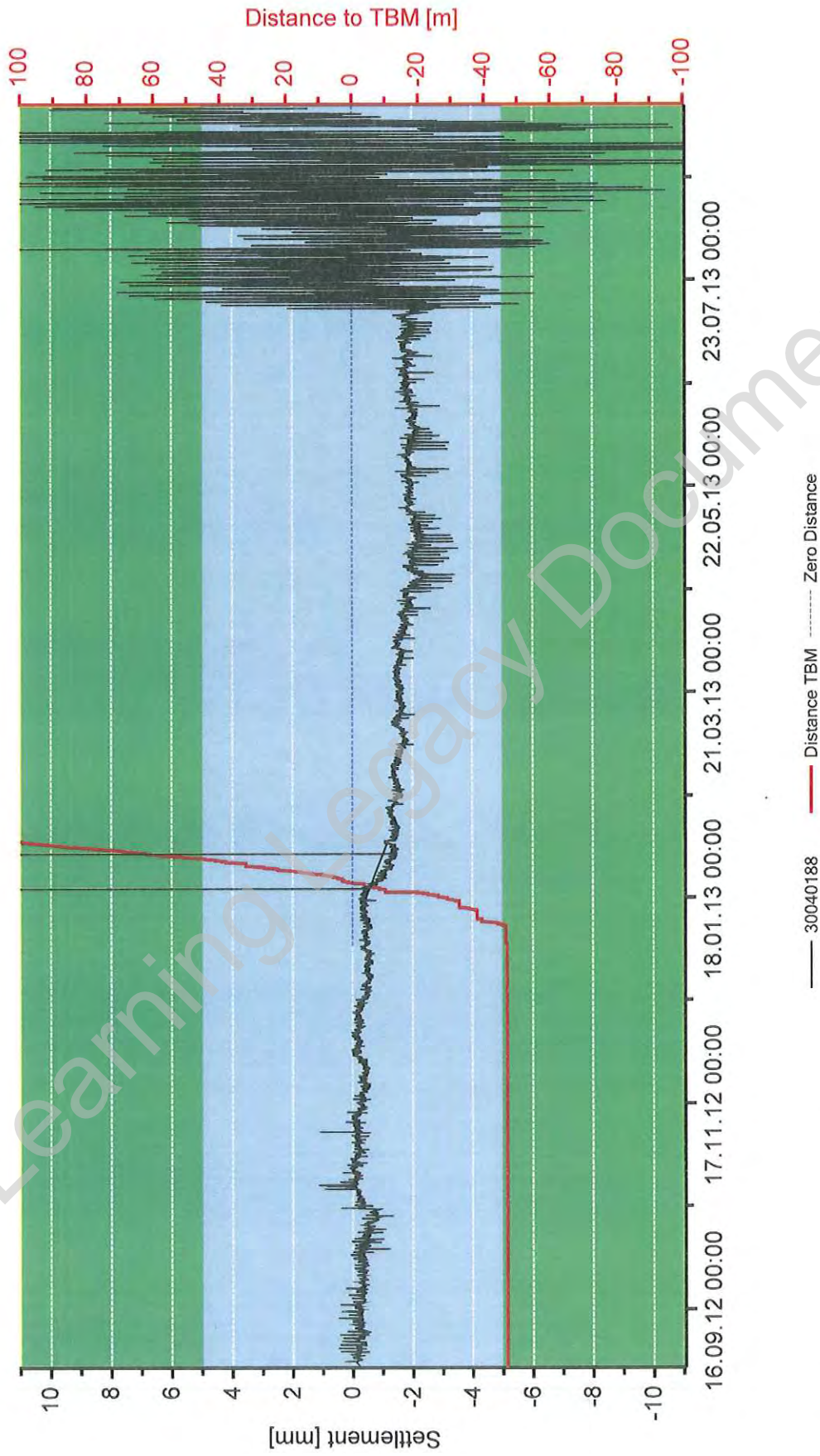
Point: 30040187



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - White Hard Road Bridge (HLC) 29.08.2012 - 13.09.2013
date: 26.06.2014 13:29 current values: 26.06.2014 13:13



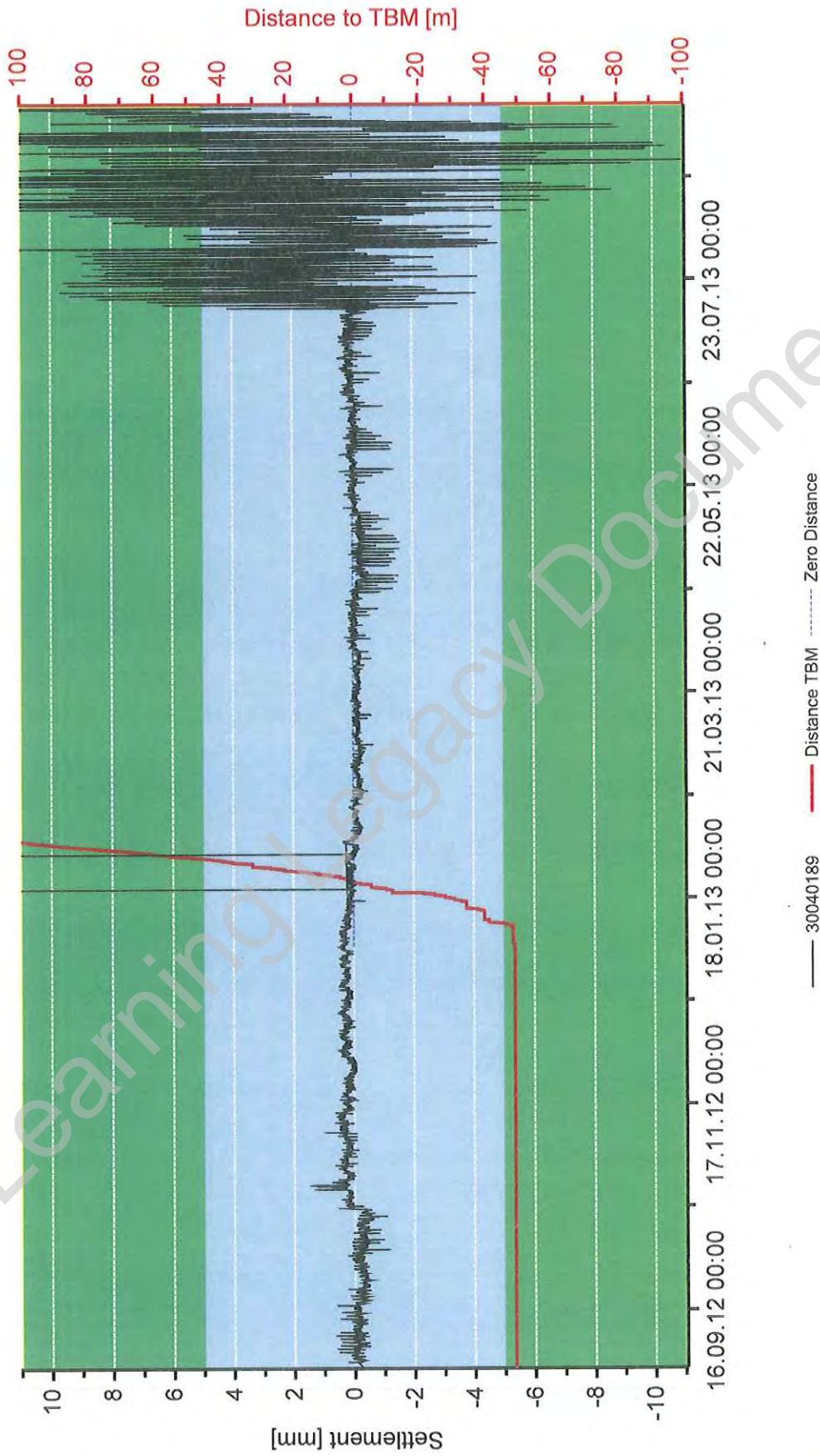
Point: 30040188



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - White Hard Road Bridge (HLC) 29.08.2012 - 13.09.2013
date: 26.06.2014 13:32 current values: 26.06.2014 13:13



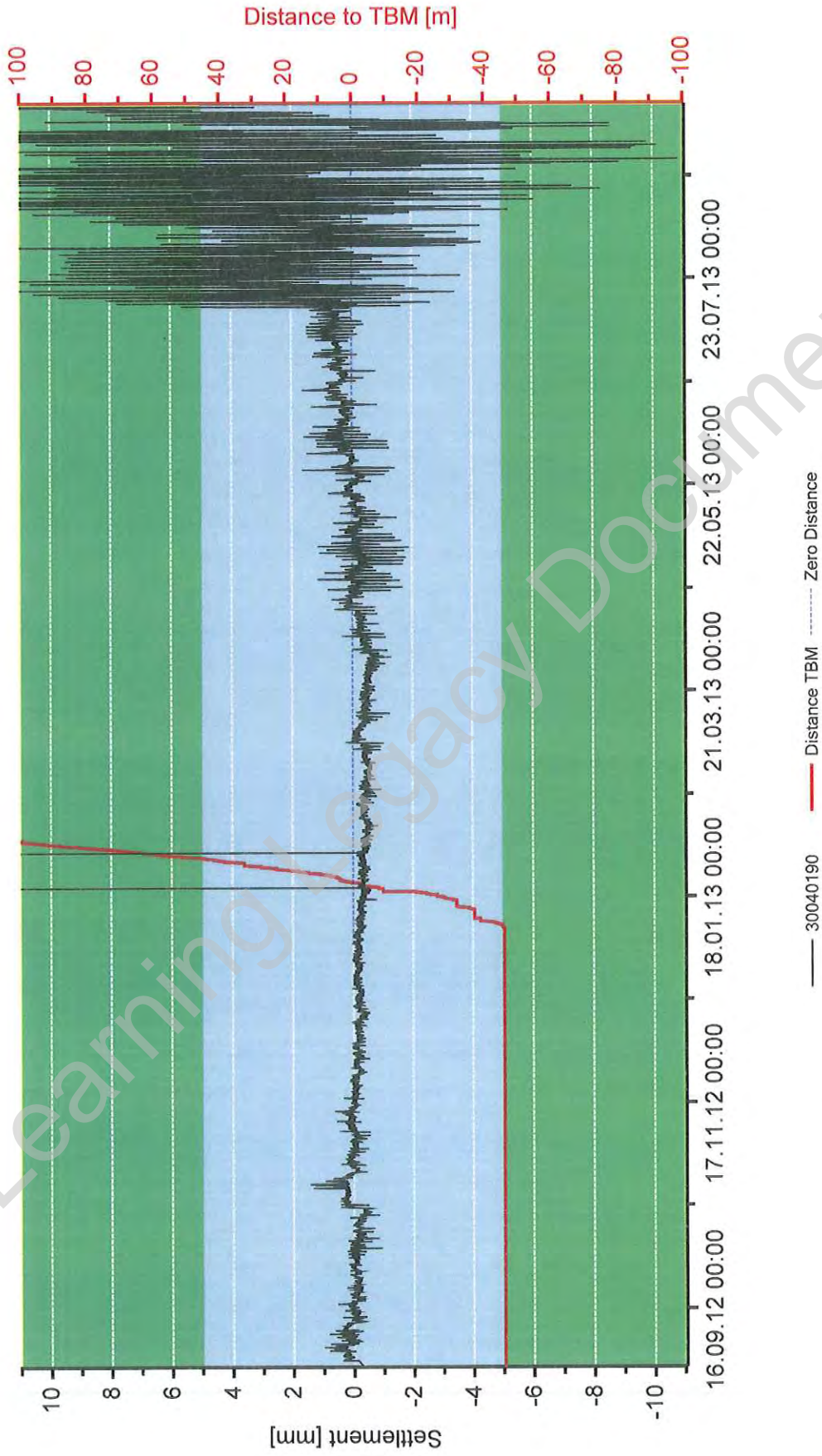
Point: 30040189



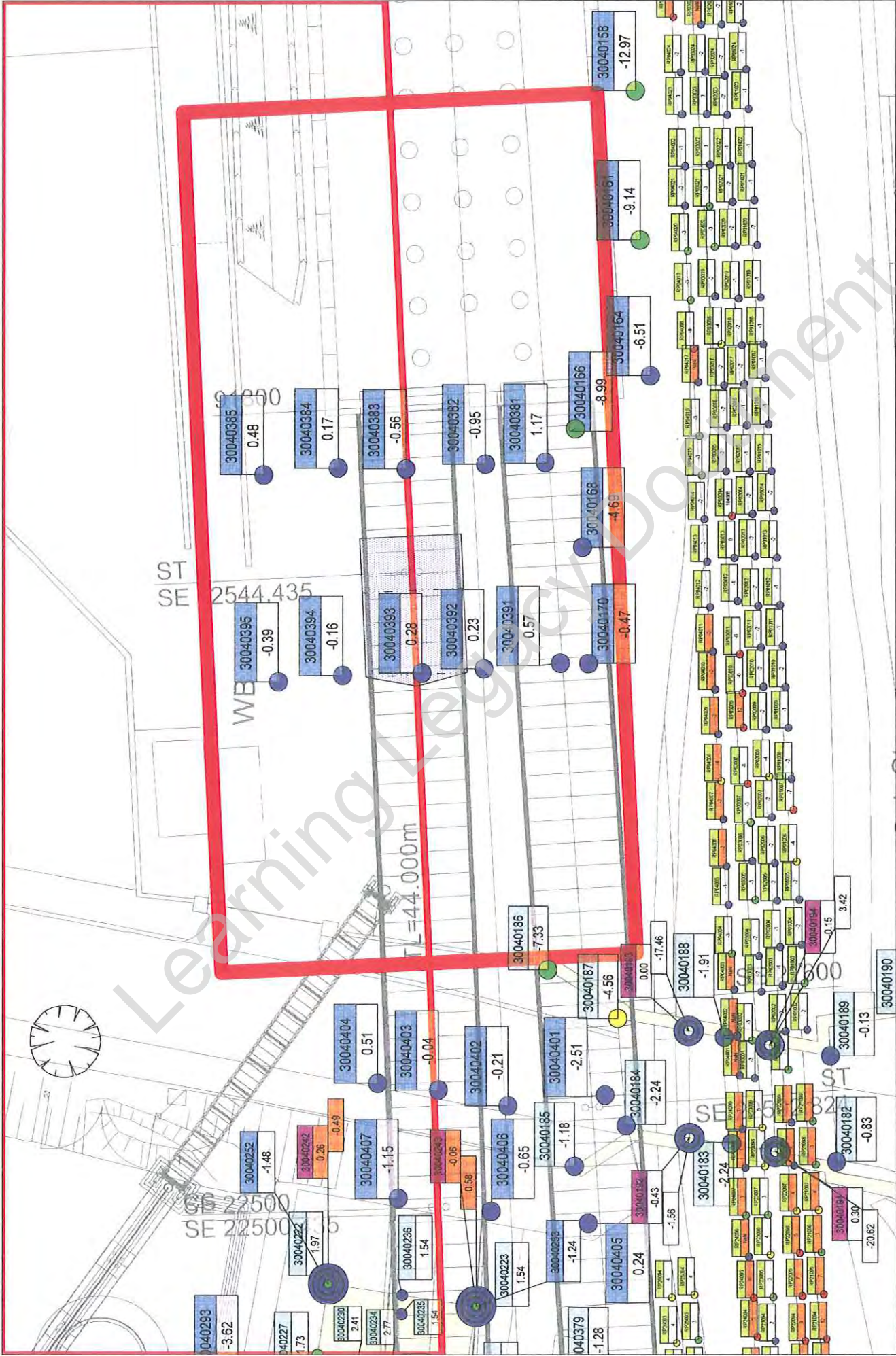
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - White Hard Road Bridge (HLC) 29.08.2012 - 13.09.2013
date: 26.06.2014 13:36 current values: 26.06.2014 13:13



Point: 30040190

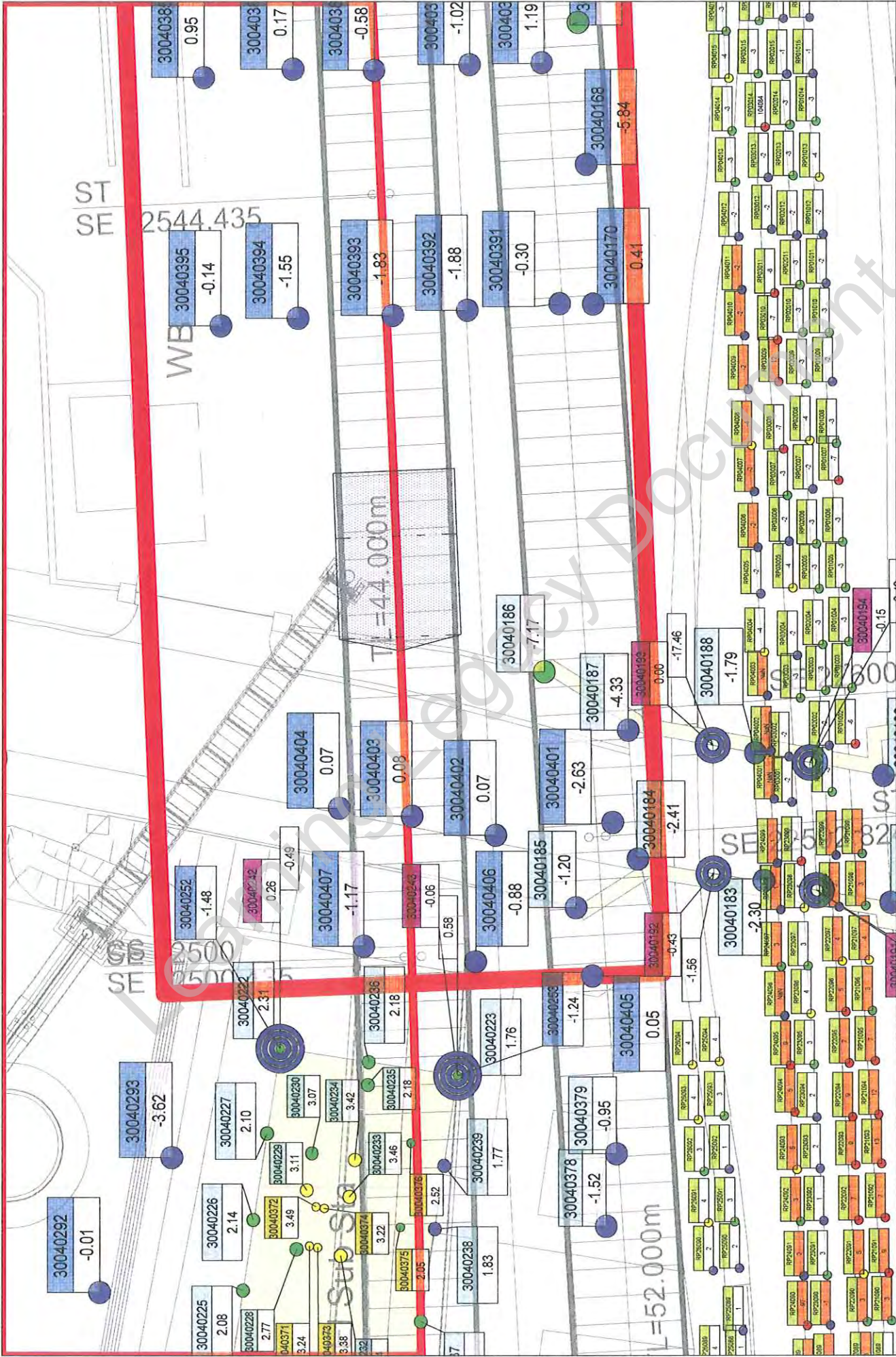


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - White Hard Road Bridge (HLC) 29.08.2012 - 13.09.2013
date: 26.06.2014 13:38 current values: 26.06.2014 13:13



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

working activities: TBM drive
current values: 24.05.2013 09:00

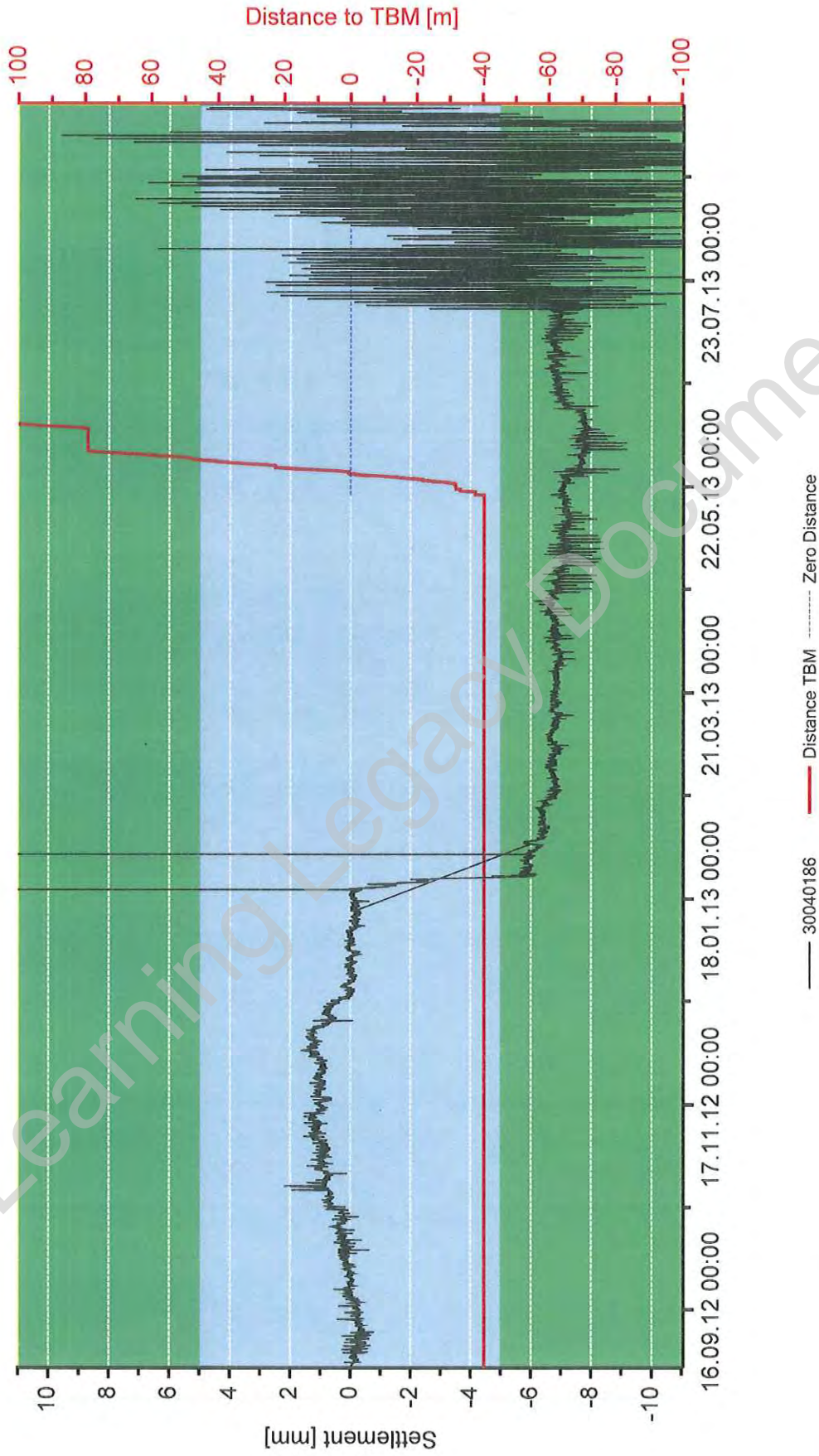


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

working activities: TBM drive


current values: 25.05.2013 17:59

Point: 30040186



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - White Hard Road Bridge (HLC) 29.08.2012 - 13.09.2013
date: 25.06.2014 17:43 current values: 25.06.2014 17:32



		C310 THAMES TUNNEL REPORT		
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev 2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal			

APPENDIX 07

White Hard Road Bridge – TM

Learning Legacy Document

monitoring asset

White Hard Road Bridge

reference monitoring drawing:

C310-HTM-C-DWG-CR148-PT005-50010

name of monitoring section:

White Hard Road Bridge

sensor type:

Tilt Meter

chainage:

91760

point no.:

3004 0191- 3004 0194

trigger values:
[mm]

green: +5
-5

amber: +8
-8

red: +12
-12

reference document for trigger values:

Management Plan for Control of Ground Movement

EB-no.:

C310-HTM-Z-STP-CR148-50058

Appendix:

AAA

monitoring data

		date	max. value	point no.	comments
baseline		29/08/12	0		
TBM 1	start ZOI	16/01/13	0.23	3004 0193	
		20/01/13	-0.43	3004 0192	
	end ZOI	28/01/13	0.04	3004 0193	breached not any trigger value
		29/01/13	-0.43	3004 0192	
TBM 2	start ZOI	24/05/13	0.0	3004 0193	
		25/05/13	-0.43	3004 0192	
	end ZOI	29/05/13	0.0	3004 0193	breached not any trigger value
		30/05/13	-0.43	3004 0192	
longterm		09/07/13	-0.03	3004 0193	last reading post tunneling, sensors destroyed, no more readings available

Evaluation of any potential residual risks



No residual risk
since the Works have been completed by HMJV



Yes, residual risk
(see comment below)

summary / comments

Points 3004 0191 / 3004 0192 got power failure from 19.12. / 25.12.2012 onwards. It was not possible to reinstall the power due to ballasting of the road, there was no access to the Tiltmeter.

During the removal of the ballastion of White Hart road the sensors were destroyed, therefore no more readings after the 09.07.14 were available. Under consideration of temperature differences, the surrounding ground condition and the achievable accuracy of the measurement, HMJV has no concern to cease the monitoring.

The rate of change in the monitoring data is less than the required standards as per the specifications and drawings up to the time when the instrumentations have been decommissioned.

date / signature:

09/01/15

print name:

HMJV project role:

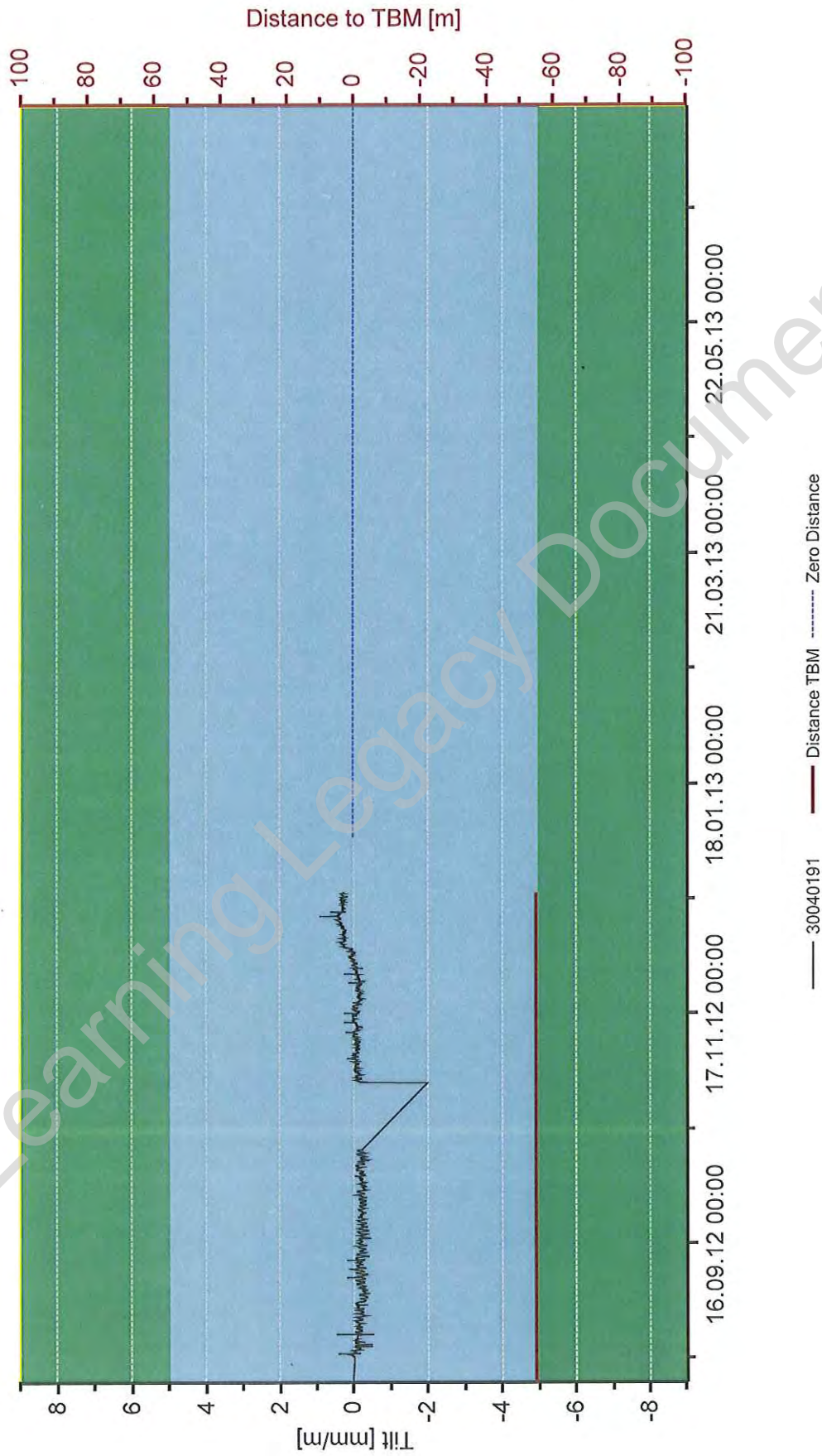
Monitoring & Survey engineer



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive, portal excavation, lining walls and grouting
 current values: 16.01.2013 10:05



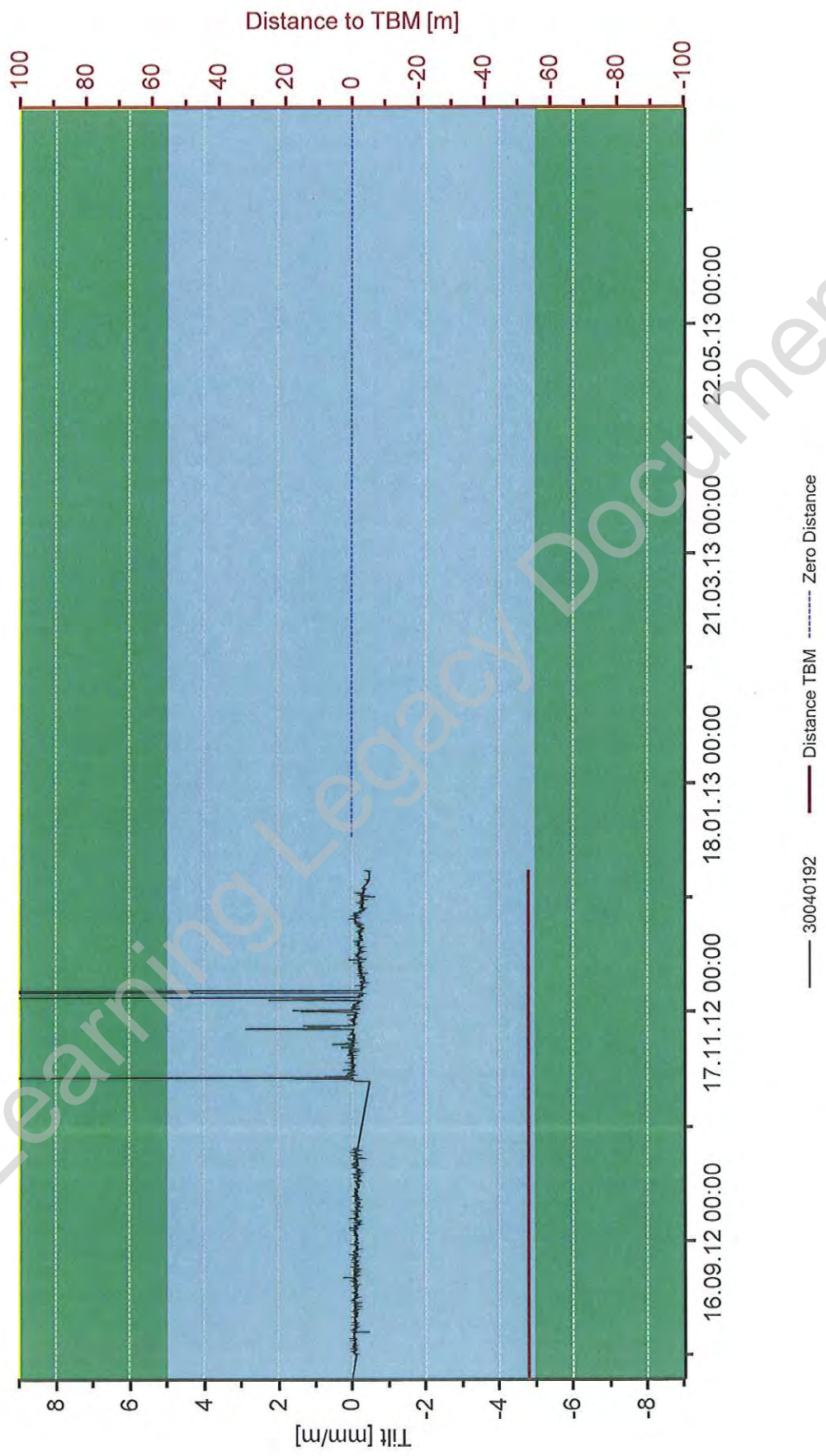
Point: 30040191



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - White Hard Road Bridge (TM) 09.08.2012 - 19.07.2013
date: 30.06.2014 14:37 current values: 30.06.2014 14:34



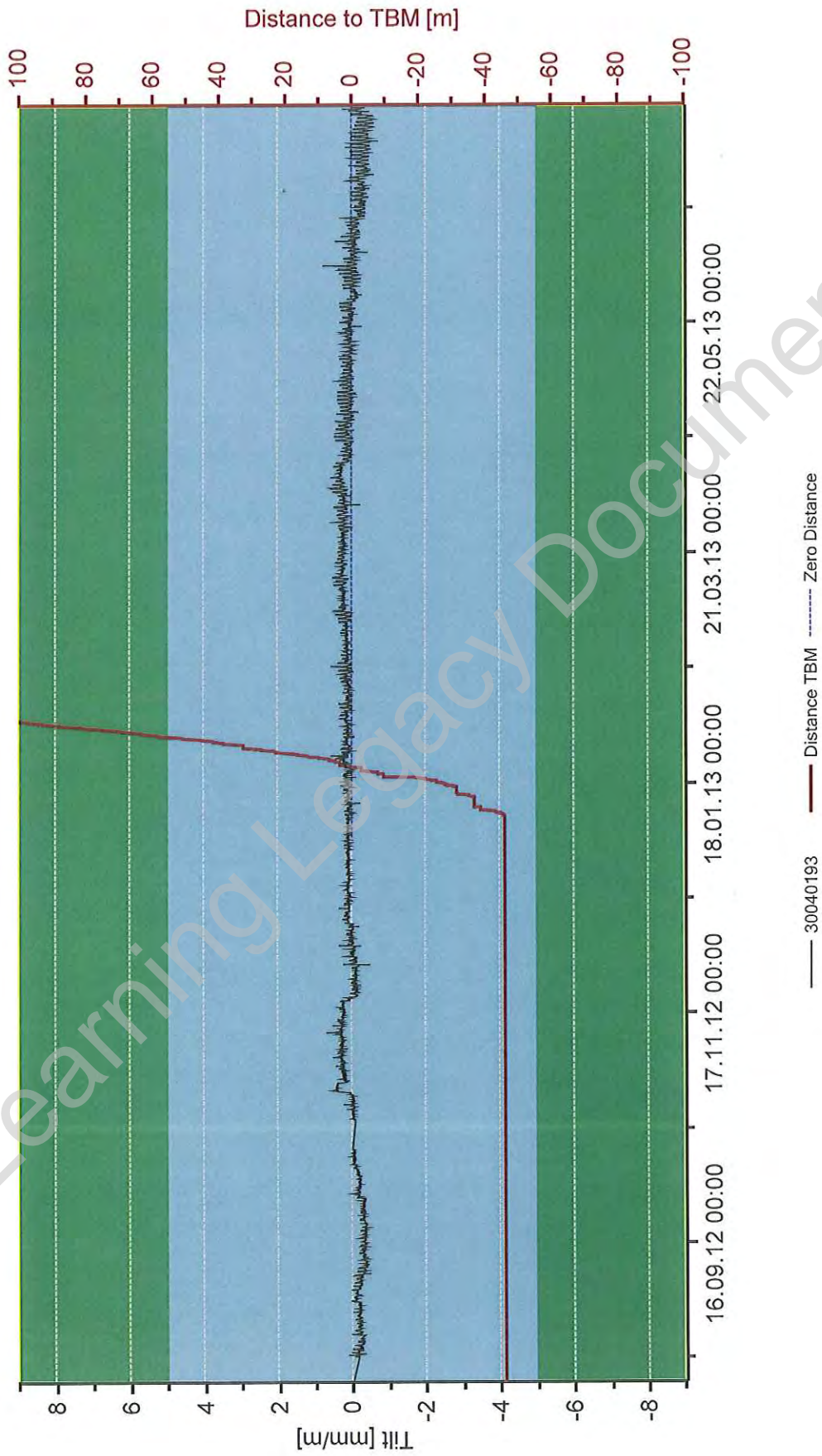
Point: 30040192



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - White Hard Road Bridge (TM) 09.08.2012 - 19.07.2013
date: 30.06.2014 14:41 current values: 30.06.2014 14:34



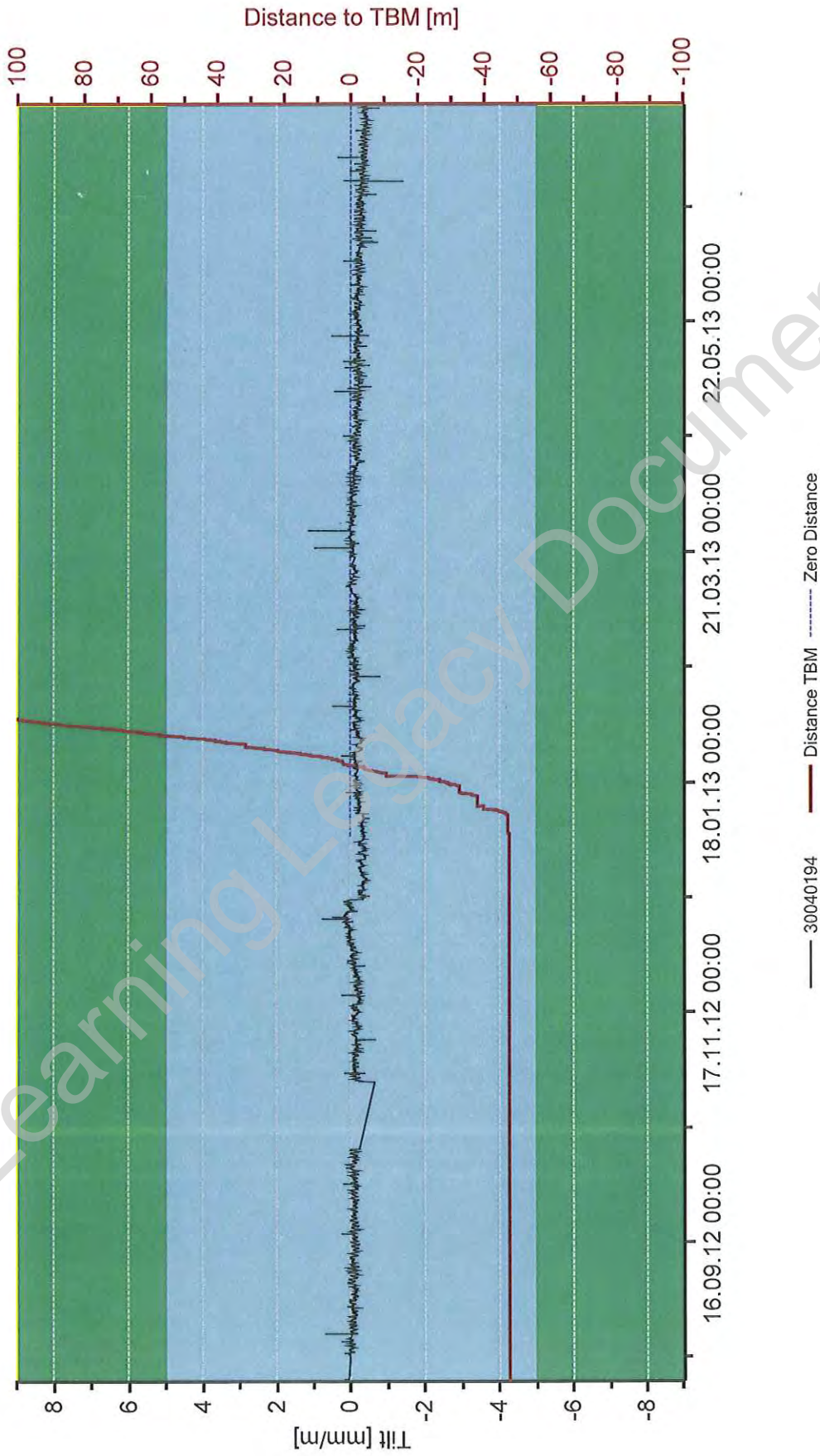
Point: 30040193



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - White Hard Road Bridge (TM) 09.08.2012 - 19.07.2013
date: 29.06.2014 10:40 current values: 29.06.2014 10:33

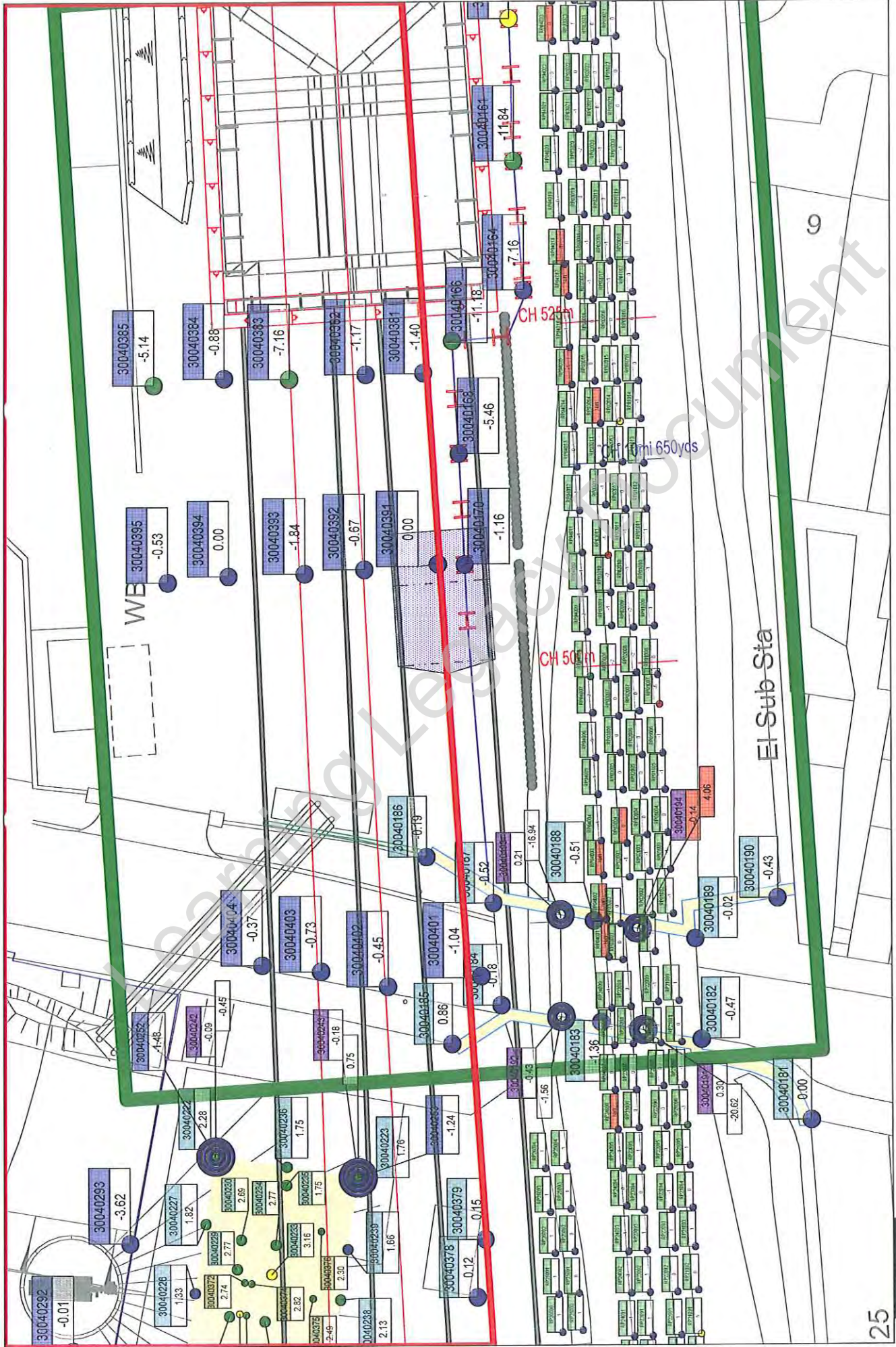


Point: 30040194



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - White Hard Road Bridge (TM) 09.08.2012 - 19.07.2013
date: 30.06.2014 14:44 current values: 30.06.2014 14:39

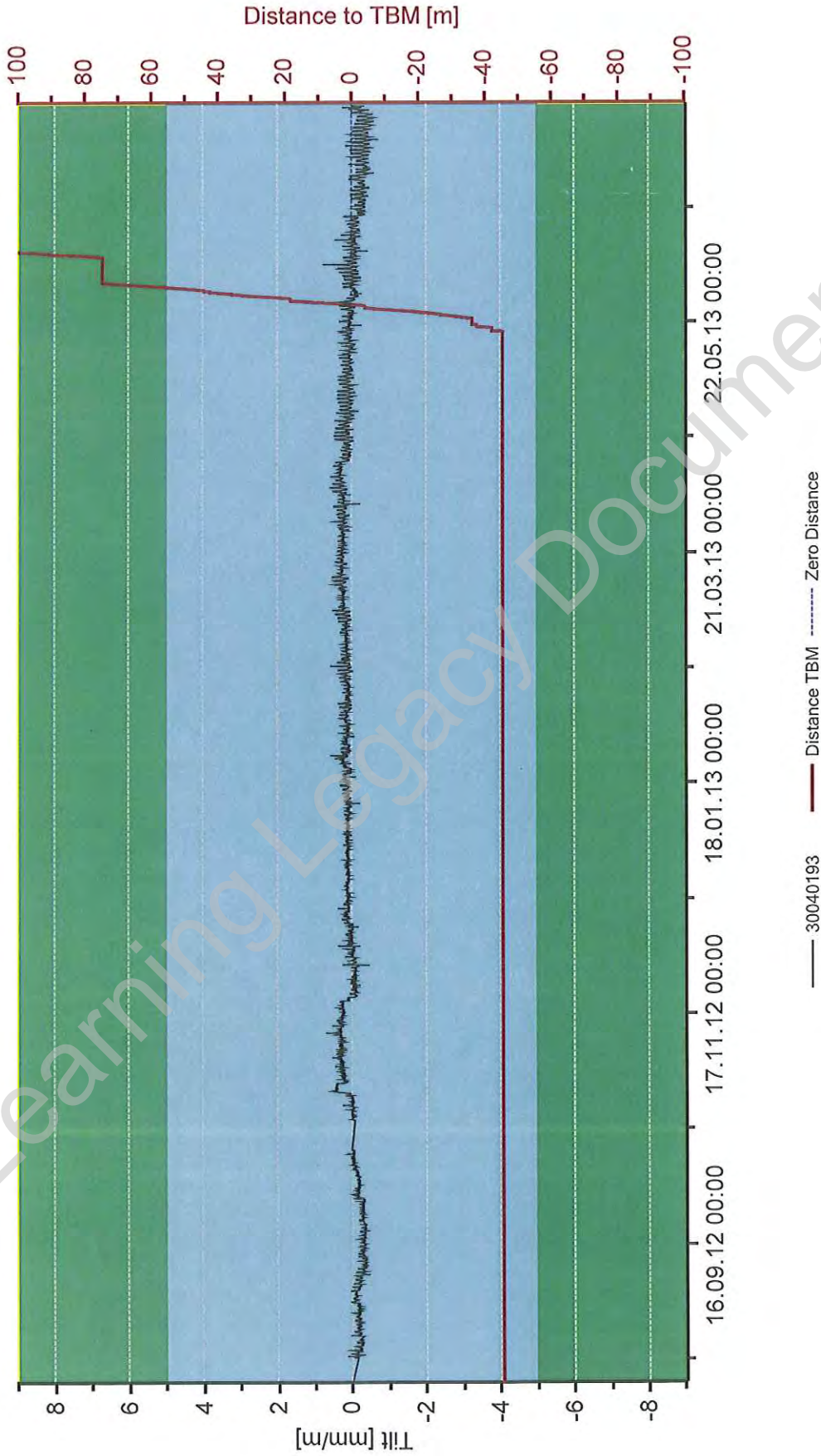






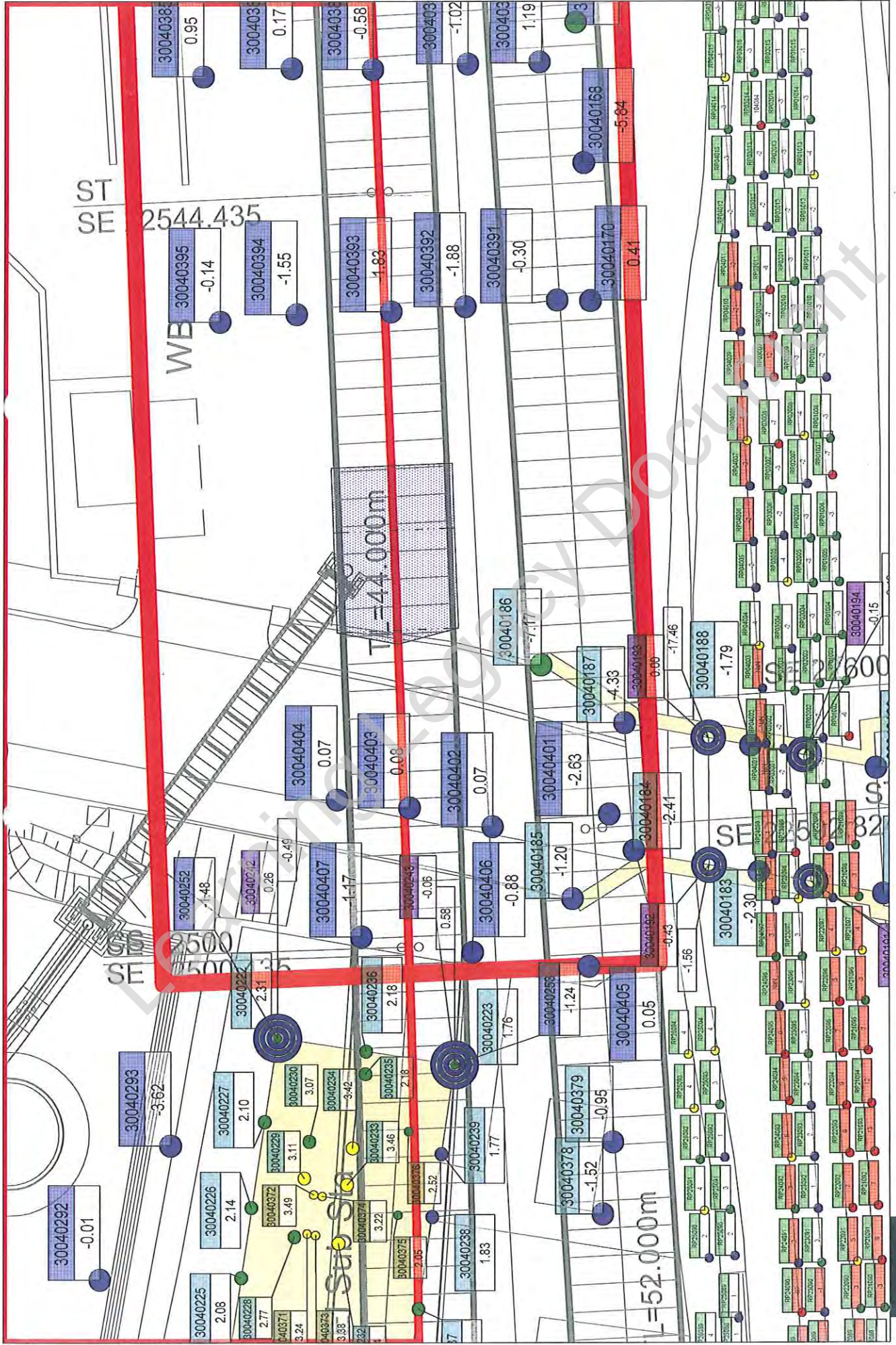
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive
 current values: 24.05.2013 09:00

Point: 30040193



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - White Hard Road Bridge (TM) 09.08.2012 - 19.07.2013
date: 30.06.2014 14:09 current values: 30.06.2014 13:54






Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

working activities: TBM drive

current values: 25.05.2013 17:59


 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev	2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal				

APPENDIX 07.1

Dilapidation Report White Hard Road Bridge

Refer to EB Doc.No.: C310-HTM-R-RGN-CR146_ST004-50002

Learning Legacy Document

 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev	2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal				

APPENDIX 09
Cathedral Substation – HLC

Learning Legacy Document

monitoring asset		Cathedral Substation	
reference monitoring drawing:		C310-HTM-C-DWG-CR148-PT005-50010	
name of monitoring section:		Cathedral Substation	
sensor type:		Hydrostatic Levelling Cell	
chainage:	91730	point no.:	3004 0221 - 3004 0239 3004 0371 - 3004 0376 3004 0378 - 3004 0379
trigger values: [mm]		green: see MPCGM App. Z	red: see MPCGM App. Z
reference document for trigger values:		Management Plan for Control of Ground Movement	
EB-no.:		C310-HTM-Z-STP-CR148-50058	
Appendix:		Y, Z	

monitoring data

	date	max. value	point no.	comments
baseline	29/08/2012	0		The Reference point for the HLC system is 3004 0181
	23/11/2012	0		
	14/01/2013	0		
TBM 1	start ZOI	20/01/13 25/01/13	1.82 2.74	3004 0236 3004 0231
	end ZOI	31/01/13 01/02/13	1.89 2.69	3004 0236 3004 0231
TBM 2	start ZOI	26/05/13 28/05/13	1.50 2.20	3004 0236 3004 0231
	end ZOI	31/05/13 03/06/13	1.83 2.27	3004 0236 3004 0231
longterm	13/09/13	1.82	3004 0236	last reading post tunneling, sensors not any longer working

Evaluation of any potential residual risks	<input checked="" type="checkbox"/>	No residual risk since the Works have been completed by HMJV
	<input type="checkbox"/>	Yes, residual risk (see comment below)

summary / comments

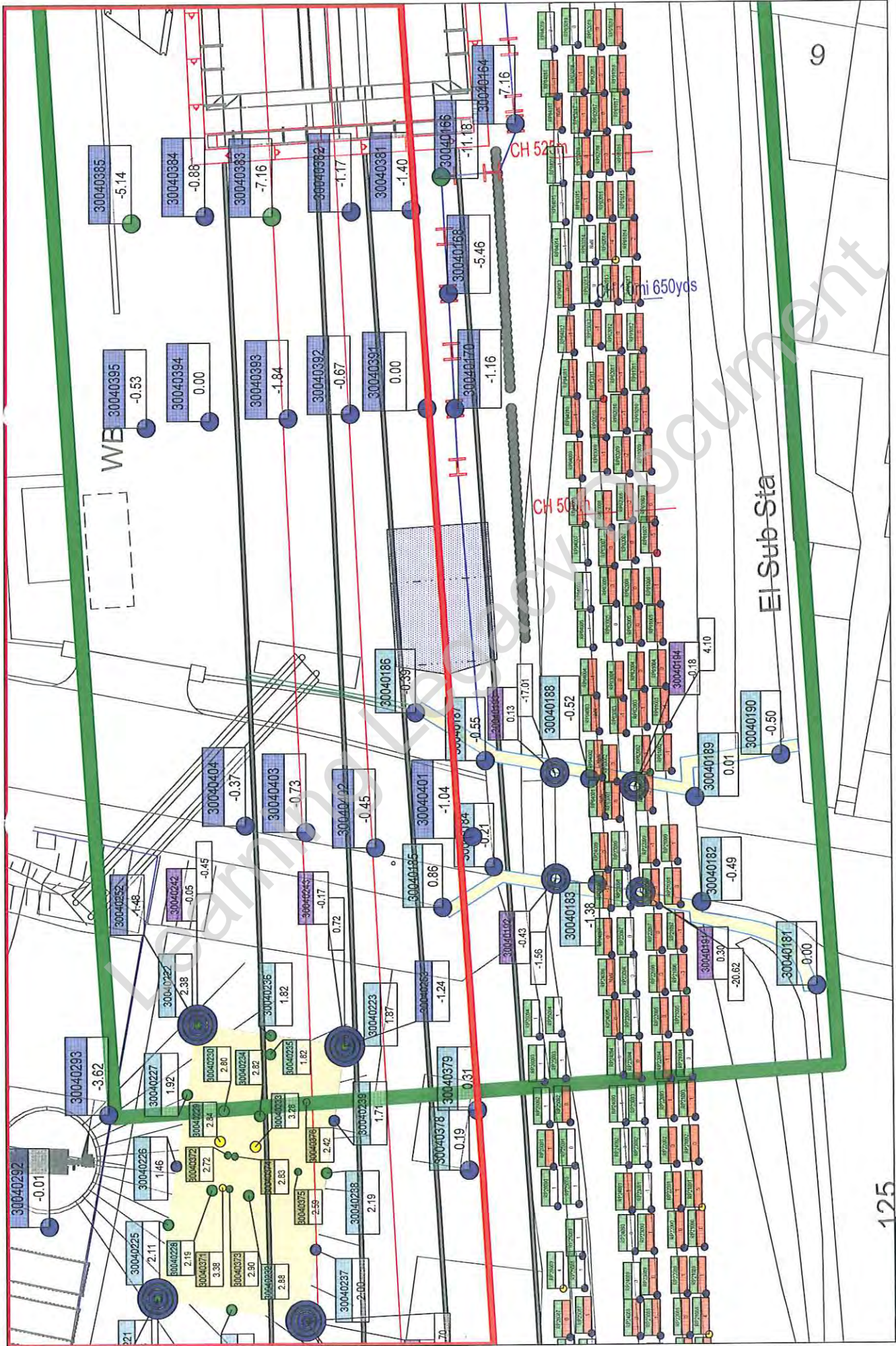
A special trigger value table was created to allow a max. movement (heave / settlement) of each point. As a result of TAM drillings and pre-grouting, from app. 15.10.-18.12.2012, the entire building was lifted up by app. 3-4mm, to compensate the max. of 2mm predicted settlement. To allow a handback of the asset to NR, all monitoring equipment had to be removed. Monitoring data showed no breach of trigger values. This led to NWRs acceptance for C310 to remove the monitoring equipment. The delapidation survey carried out in March 2014 demonstrated that no damage on the building resulting C310 TBM tunnelling work or resulting from removal of monitoring equipment had occurred.

date / signature: 08/04/15

print name:

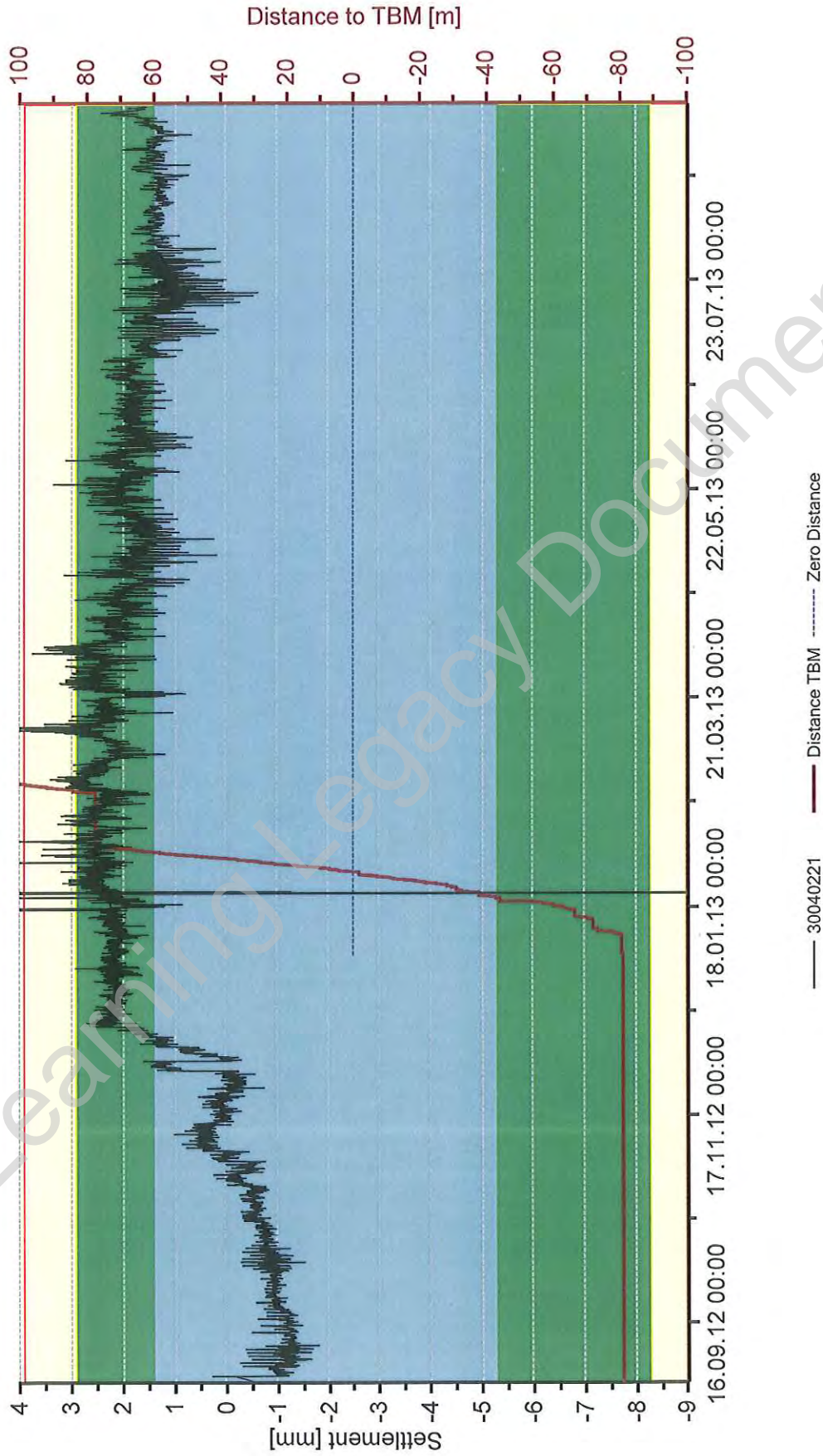
HMJV project role:

Monitoring & Survey engineer



125

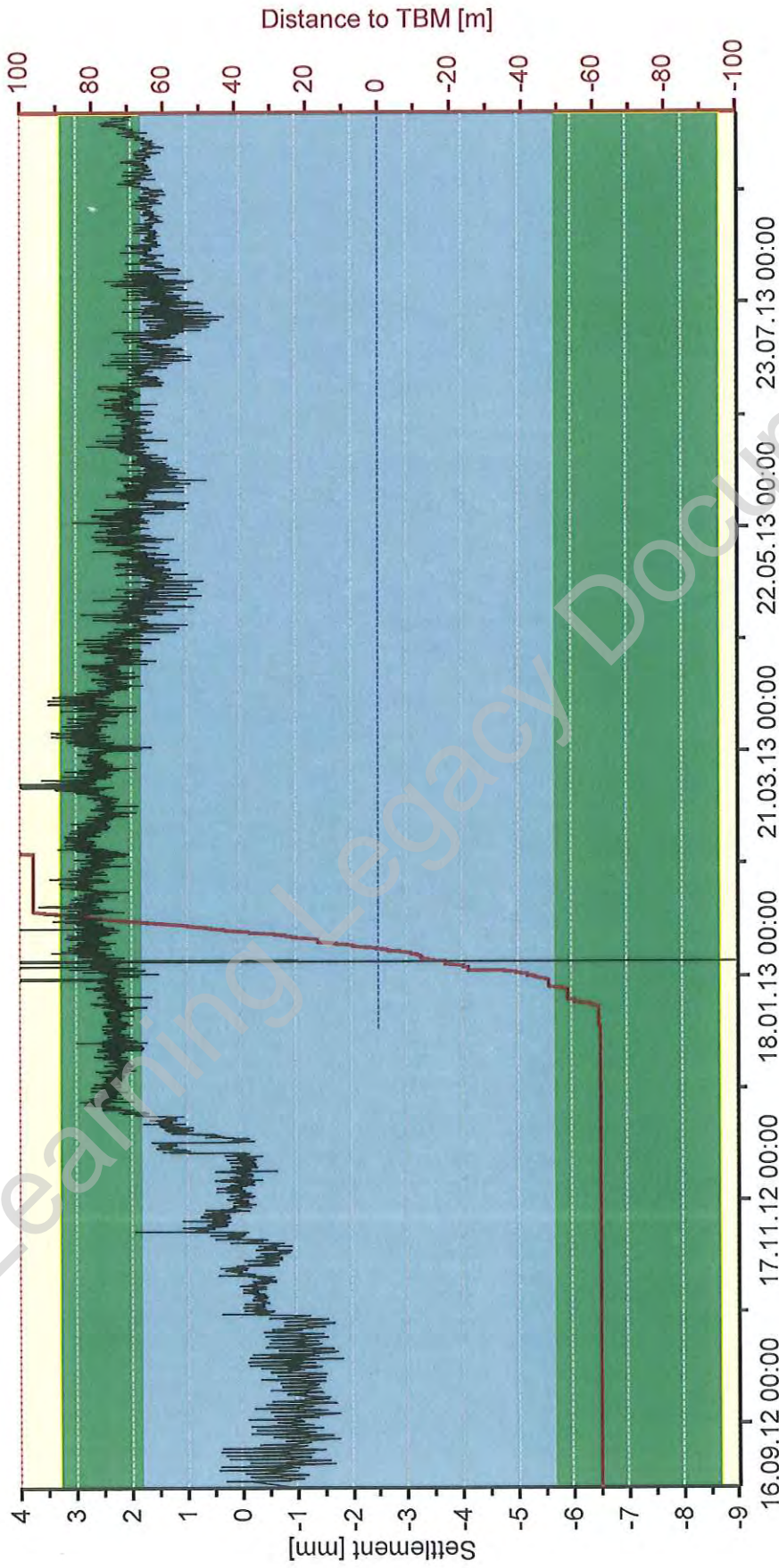
Point: 30040221



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 13:41 current values: 01.07.2014 13:34



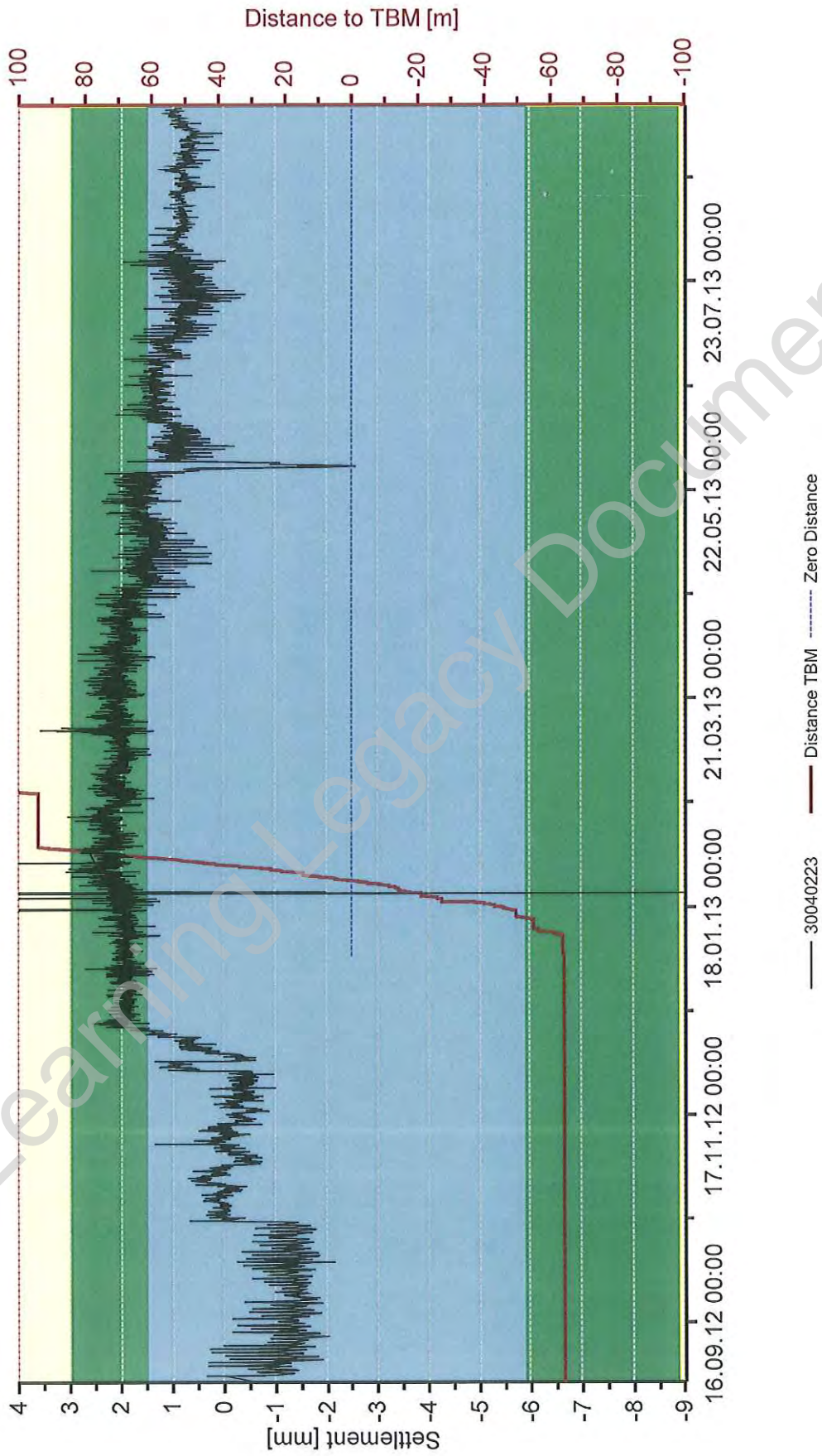
Point: 30040222



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 13:45 current values: 01.07.2014 13:34



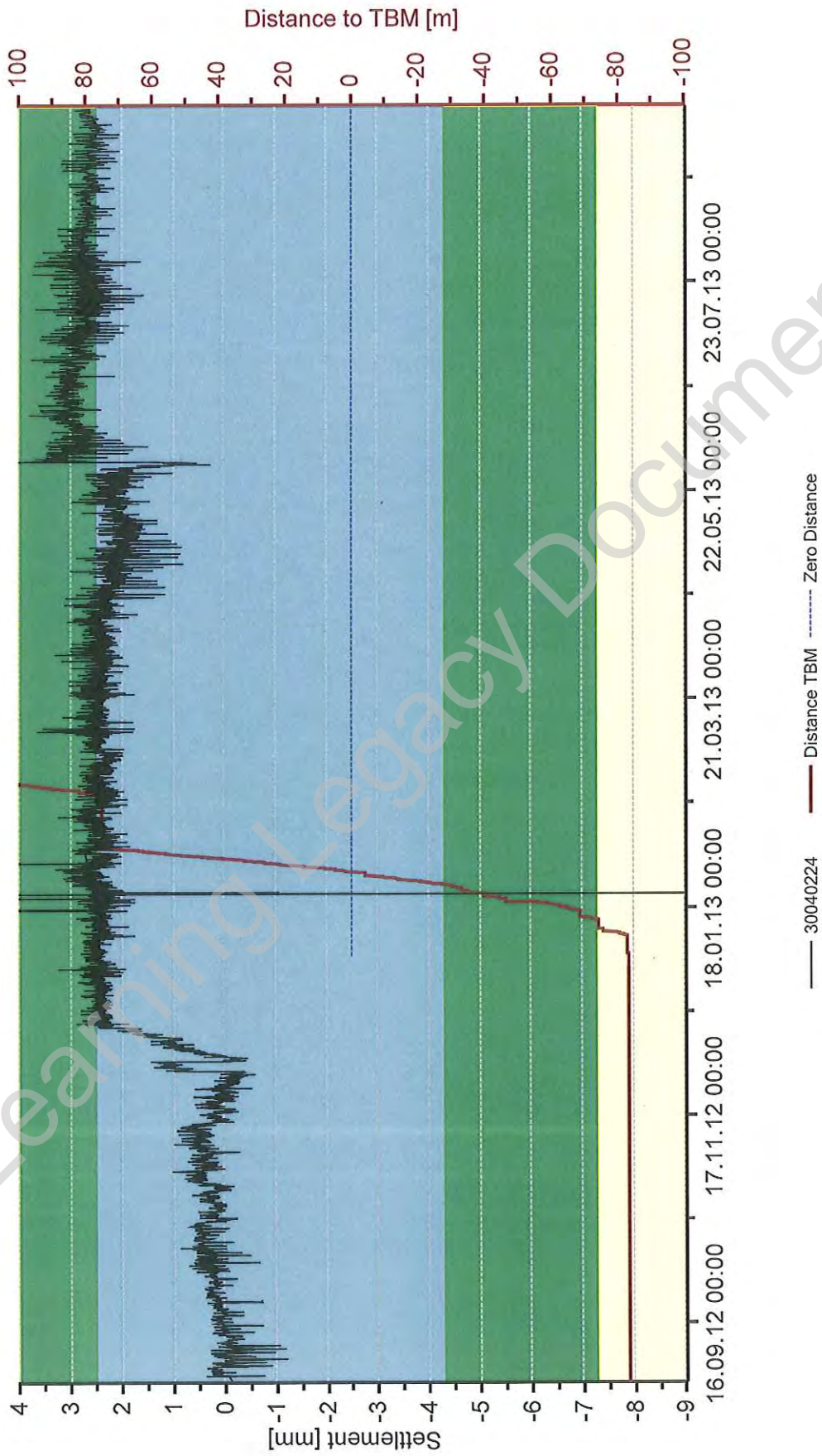
Point: 30040223



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 13:48 current values: 01.07.2014 13:43



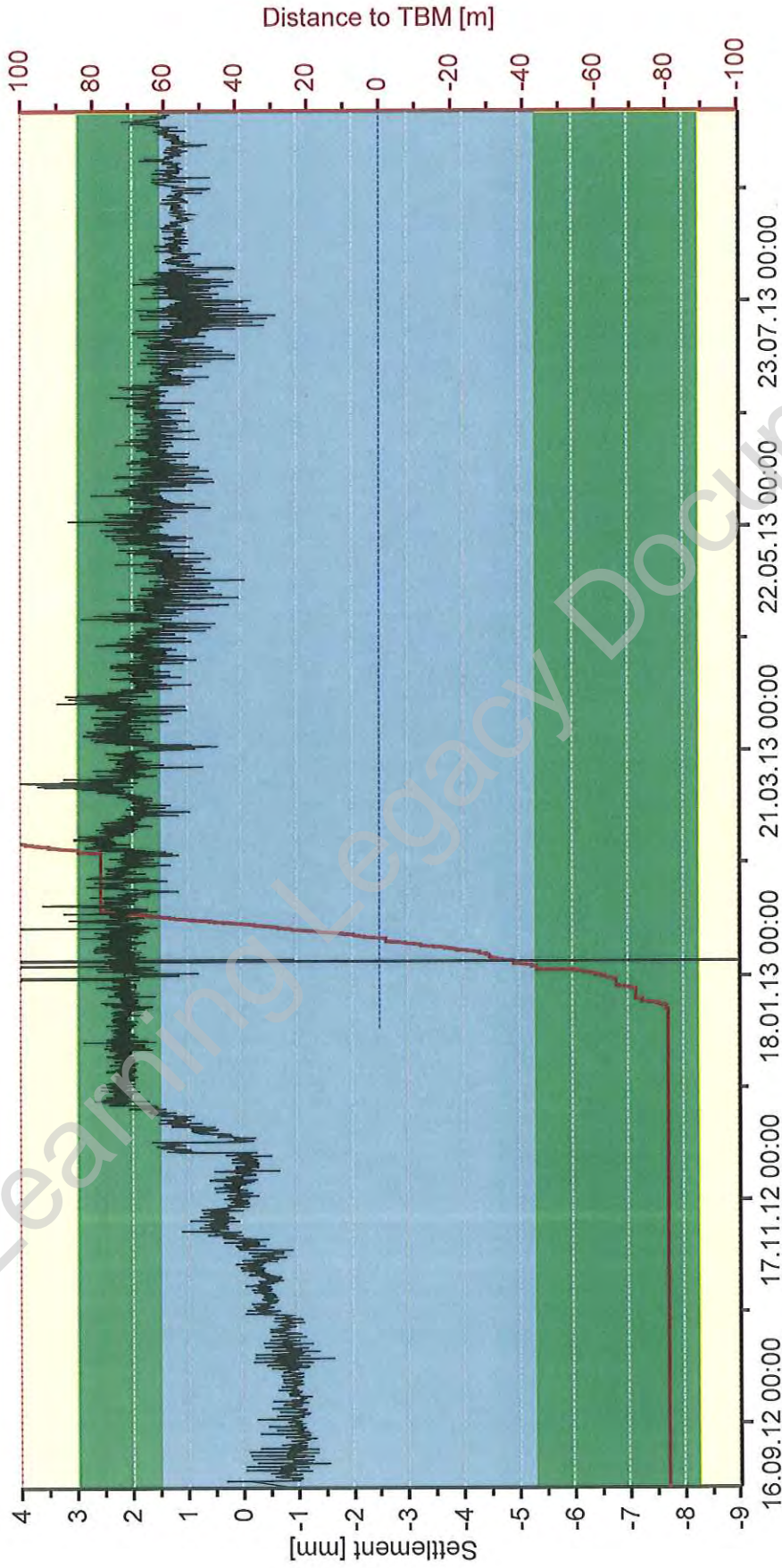
Point: 30040224



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 13:52 current values: 01.07.2014 13:43



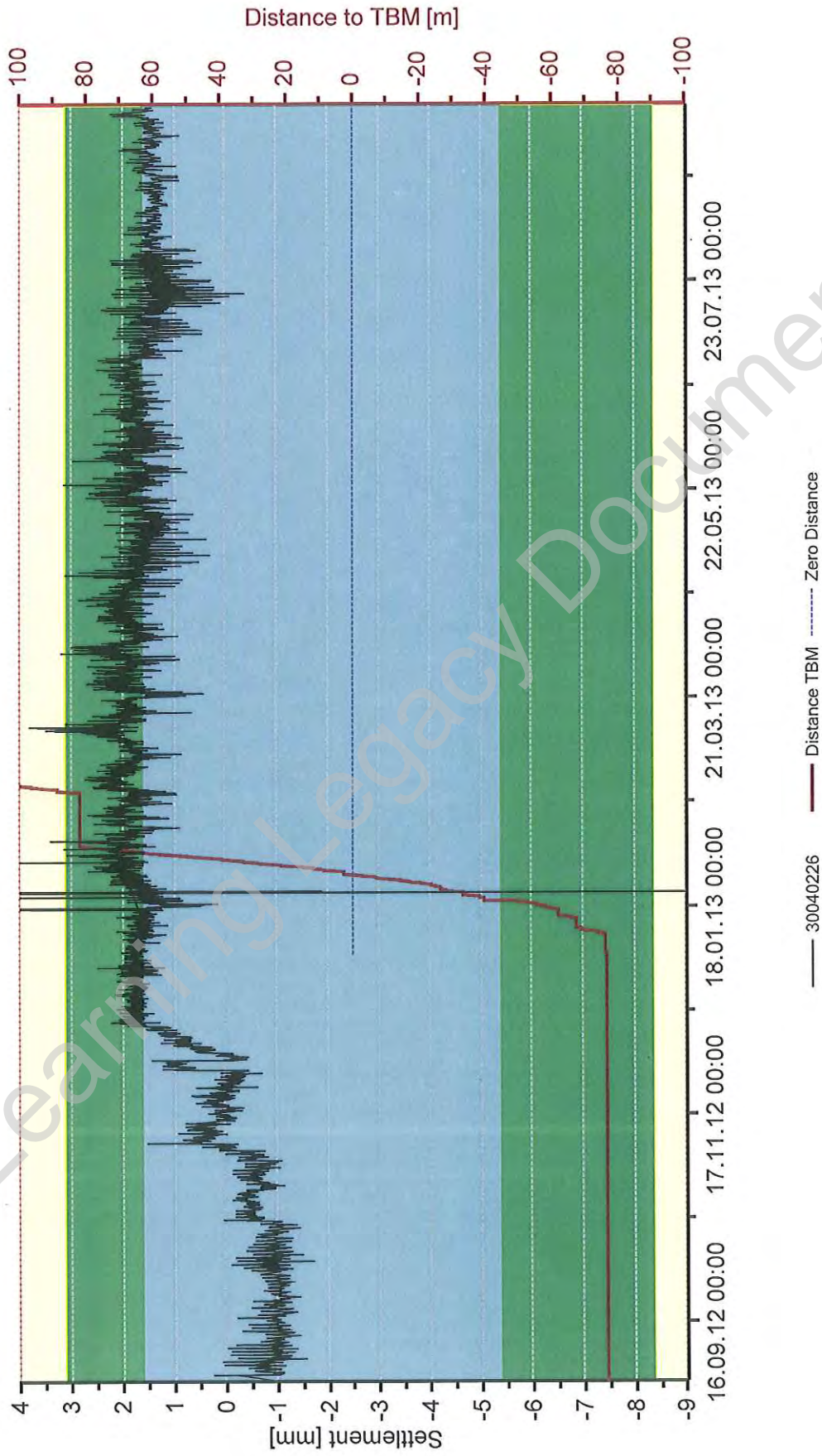
Point: 30040225



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 14:04 current values: 01.07.2014 13:58



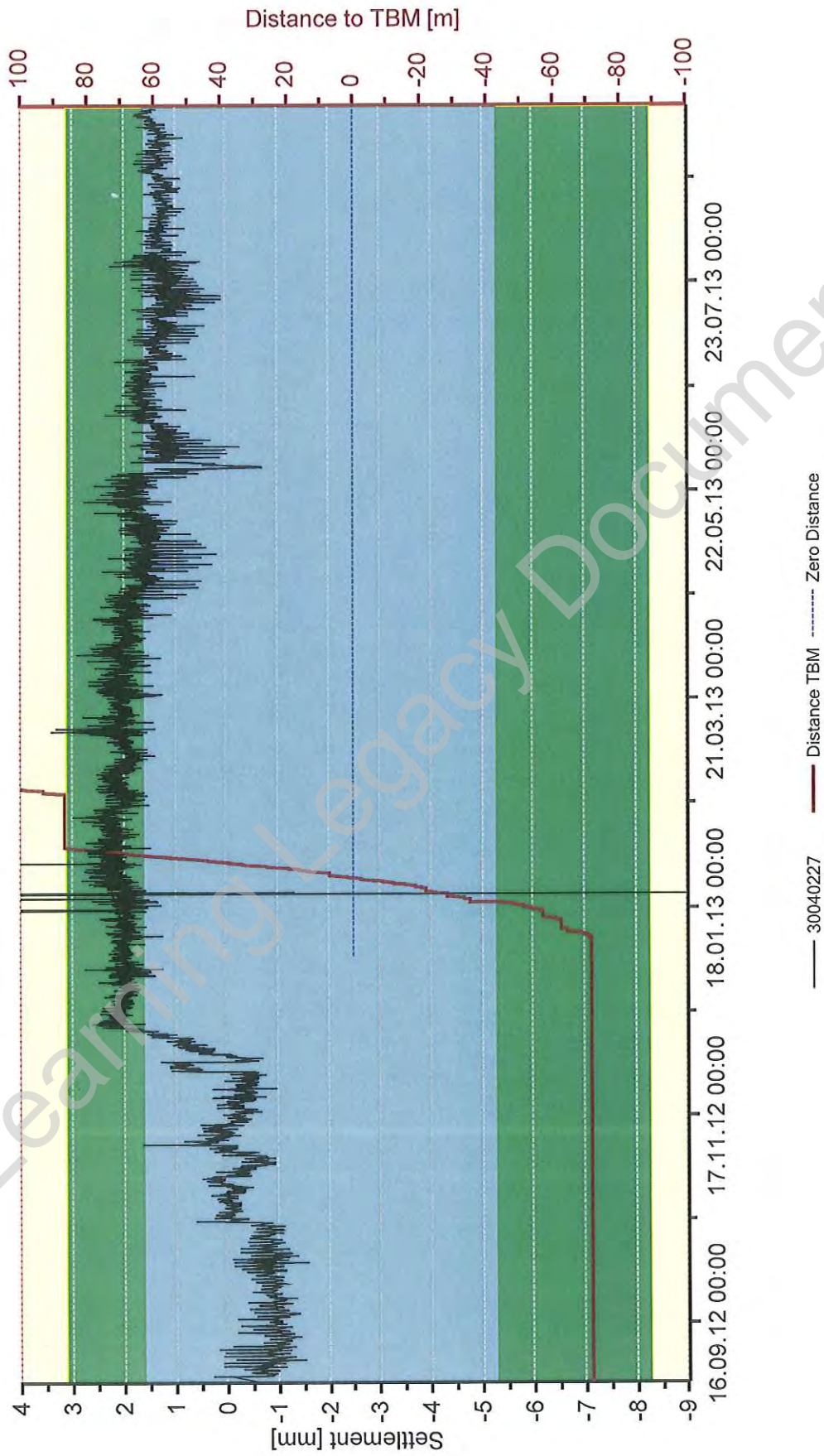
Point: 30040226



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 14:06 current values: 01.07.2014 13:58



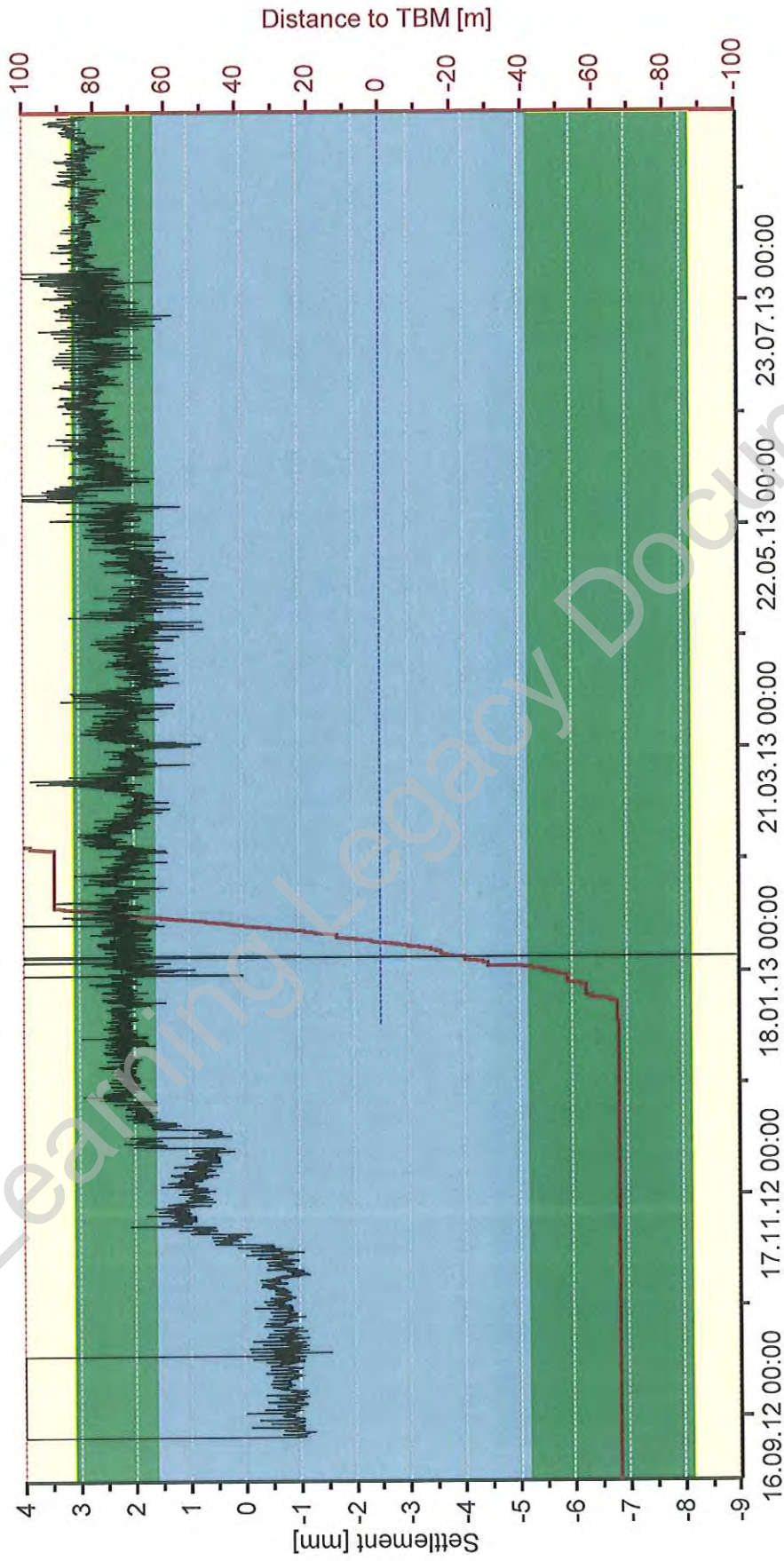
Point: 30040227



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 14:09 current values: 01.07.2014 14:03



Point: 30040228

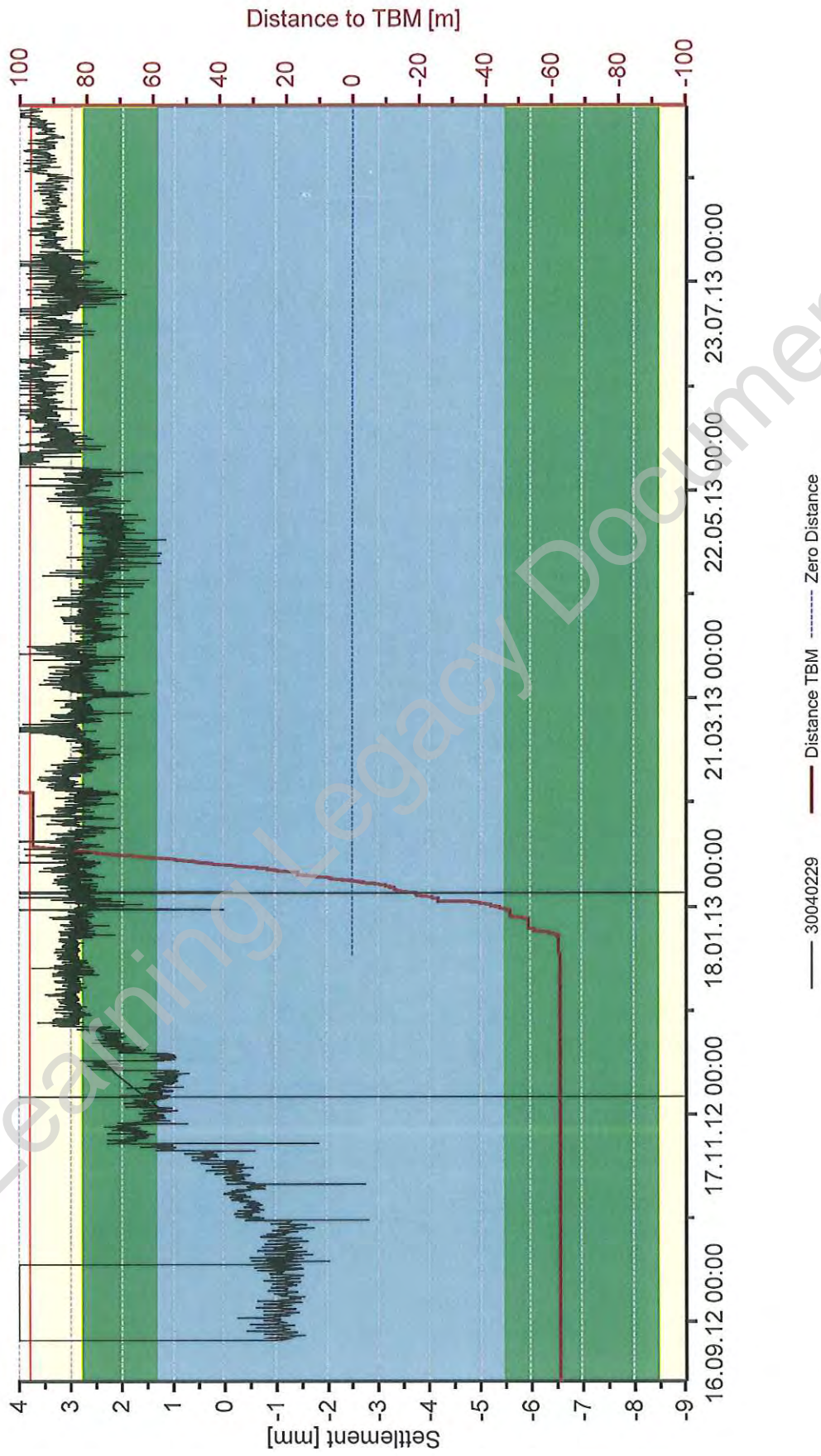


— 30040228 — Distance TBM - - - - - Zero Distance

Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 14:12 current values: 01.07.2014 14:03



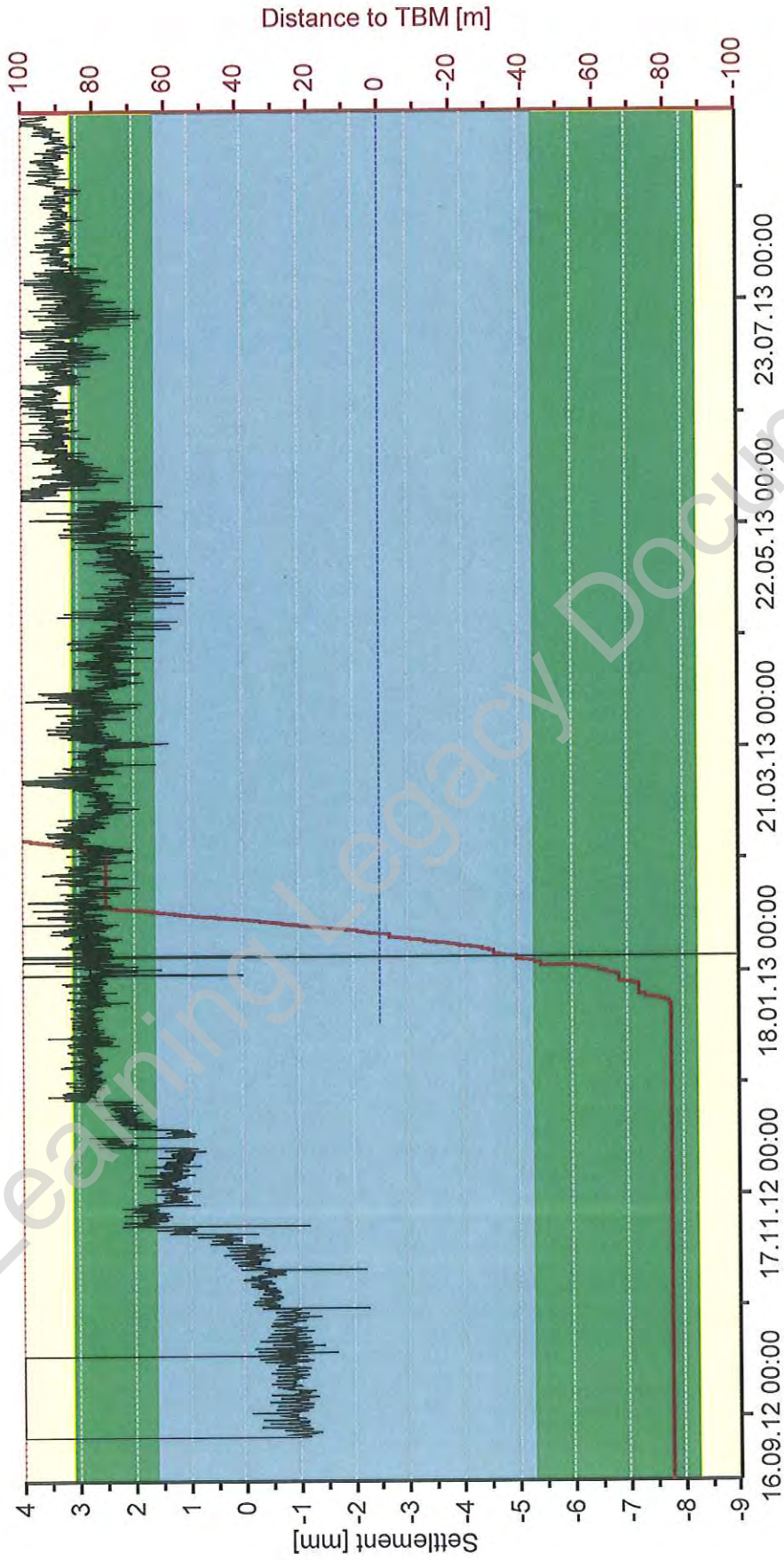
Point: 30040229



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 14:16 current values: 01.07.2014 14:03



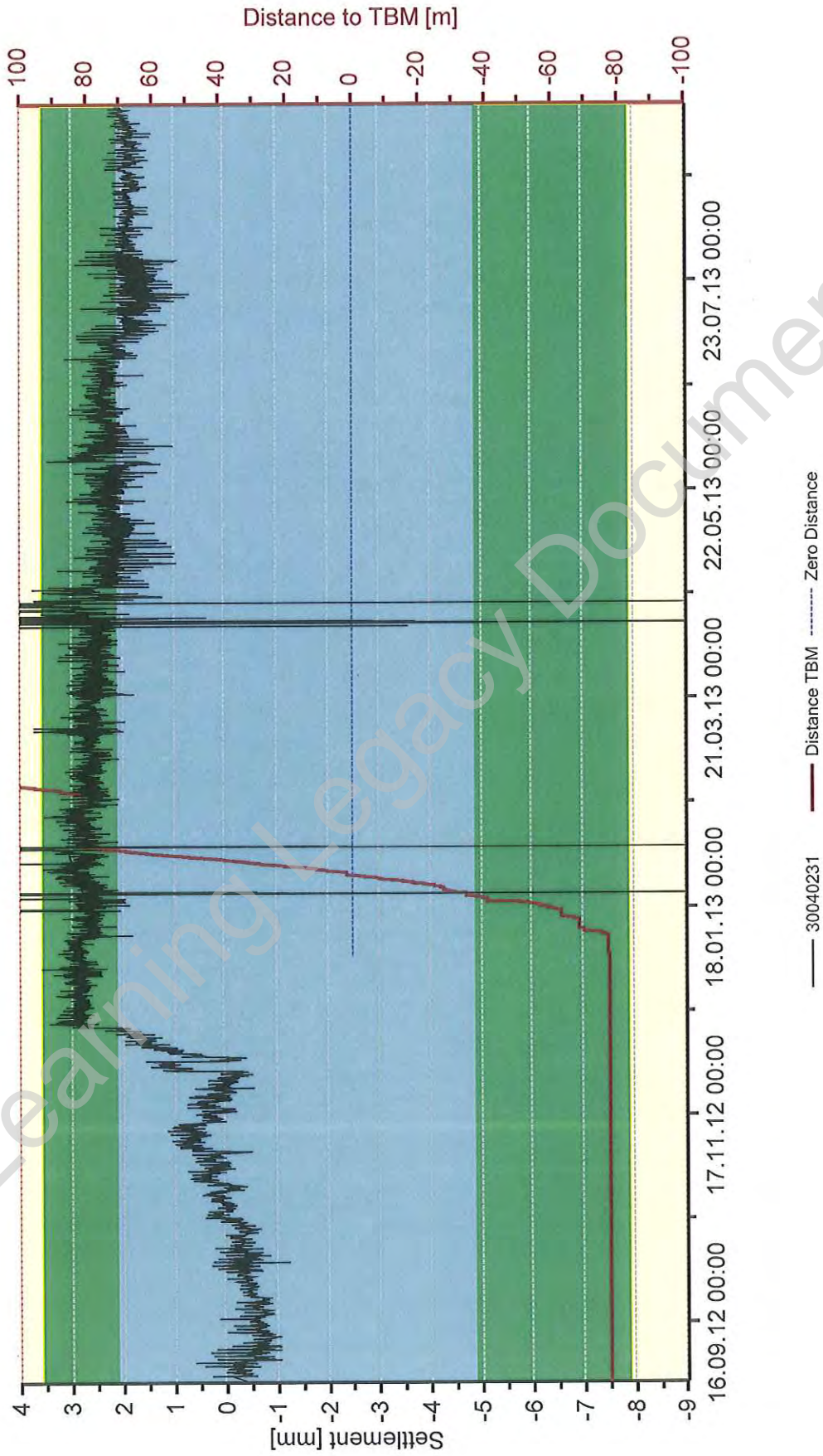
Point: 30040230



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 14:20 current values: 01.07.2014 14:13



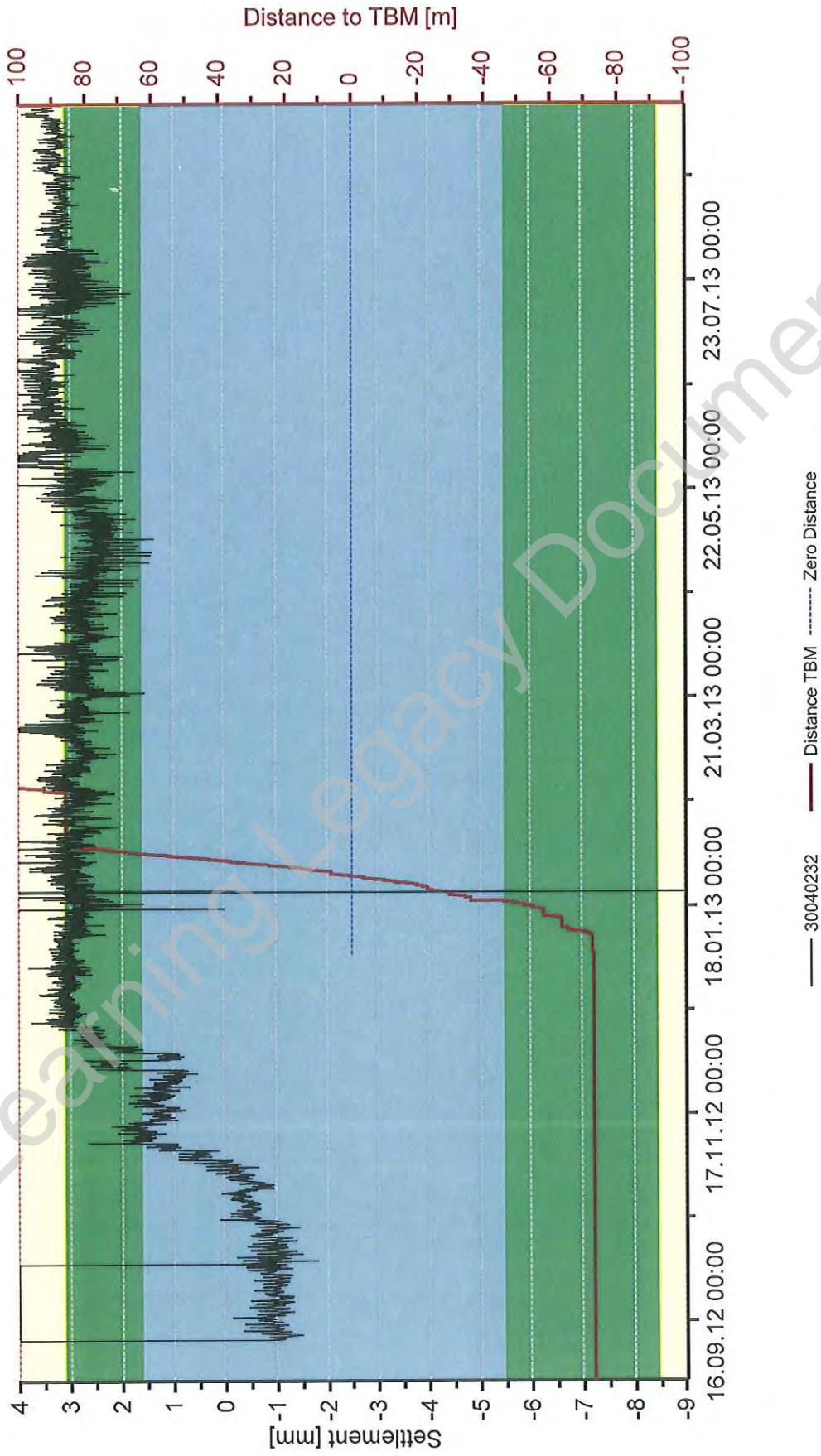
Point: 30040231



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 14:25 current values: 01.07.2014 14:18



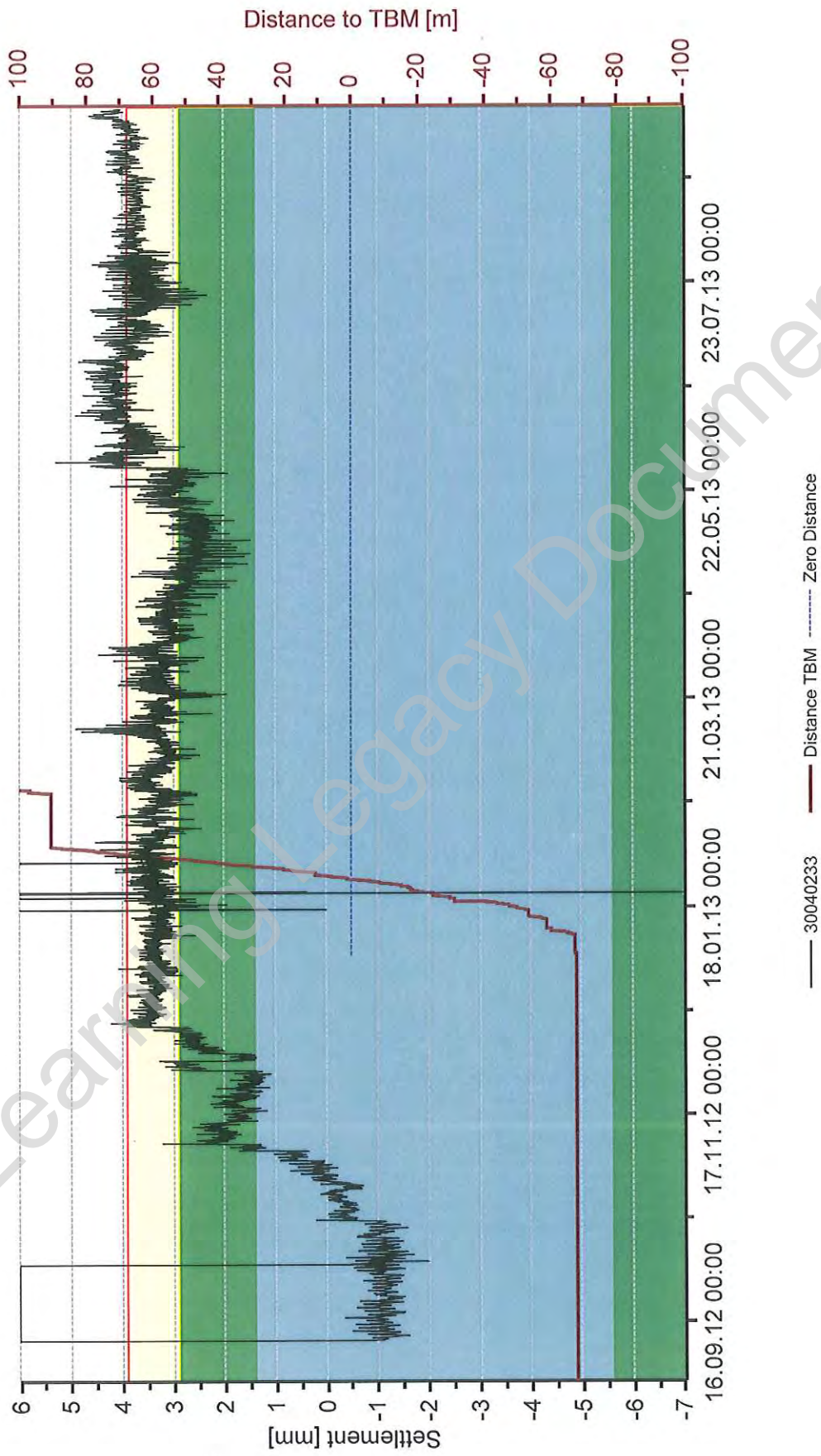
Point: 30040232



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 14:29 current values: 01.07.2014 14:18



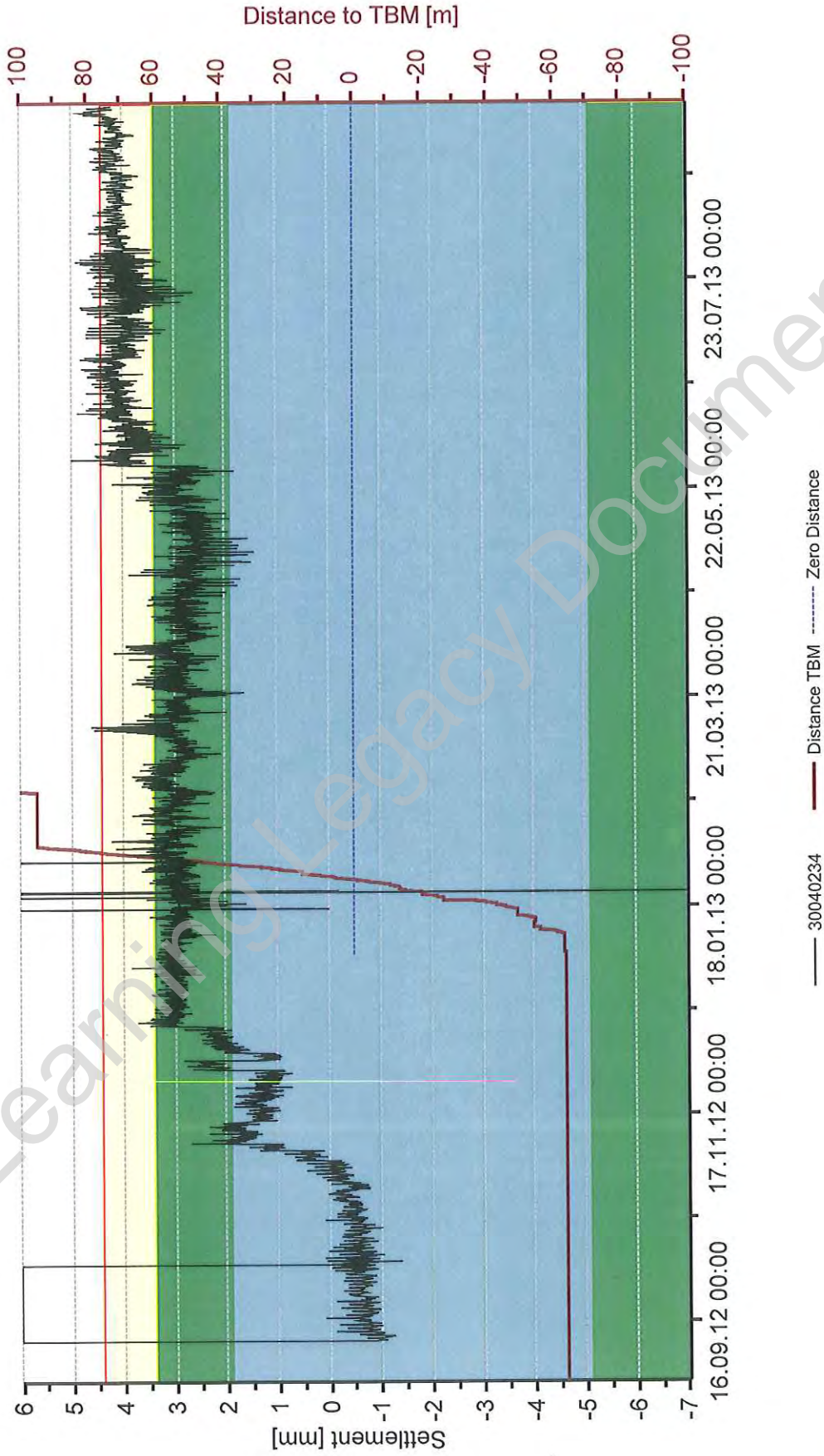
Point: 30040233



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 14:32 current values: 01.07.2014 14:18



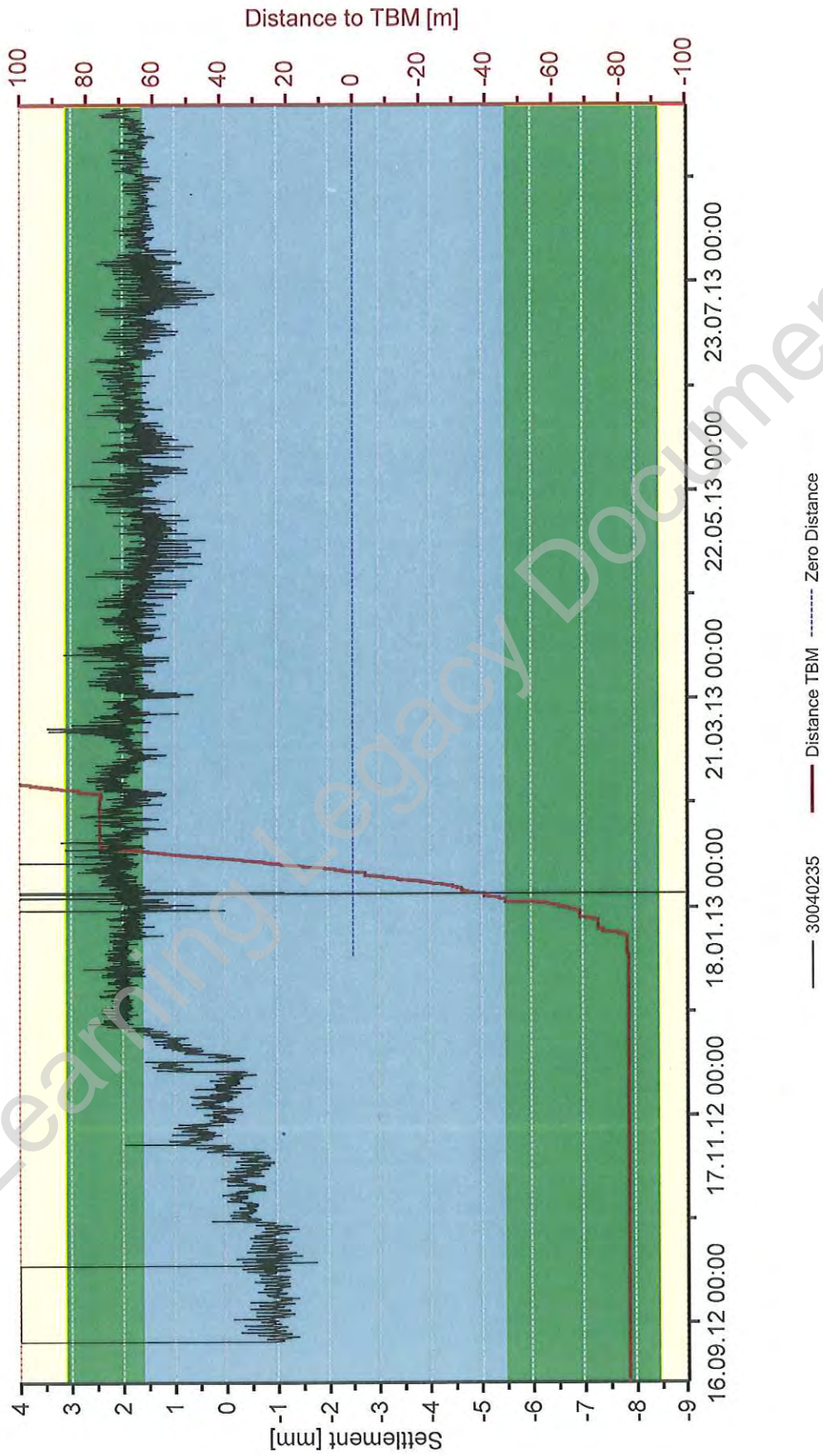
Point: 30040234



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 14:36 current values: 01.07.2014 14:28



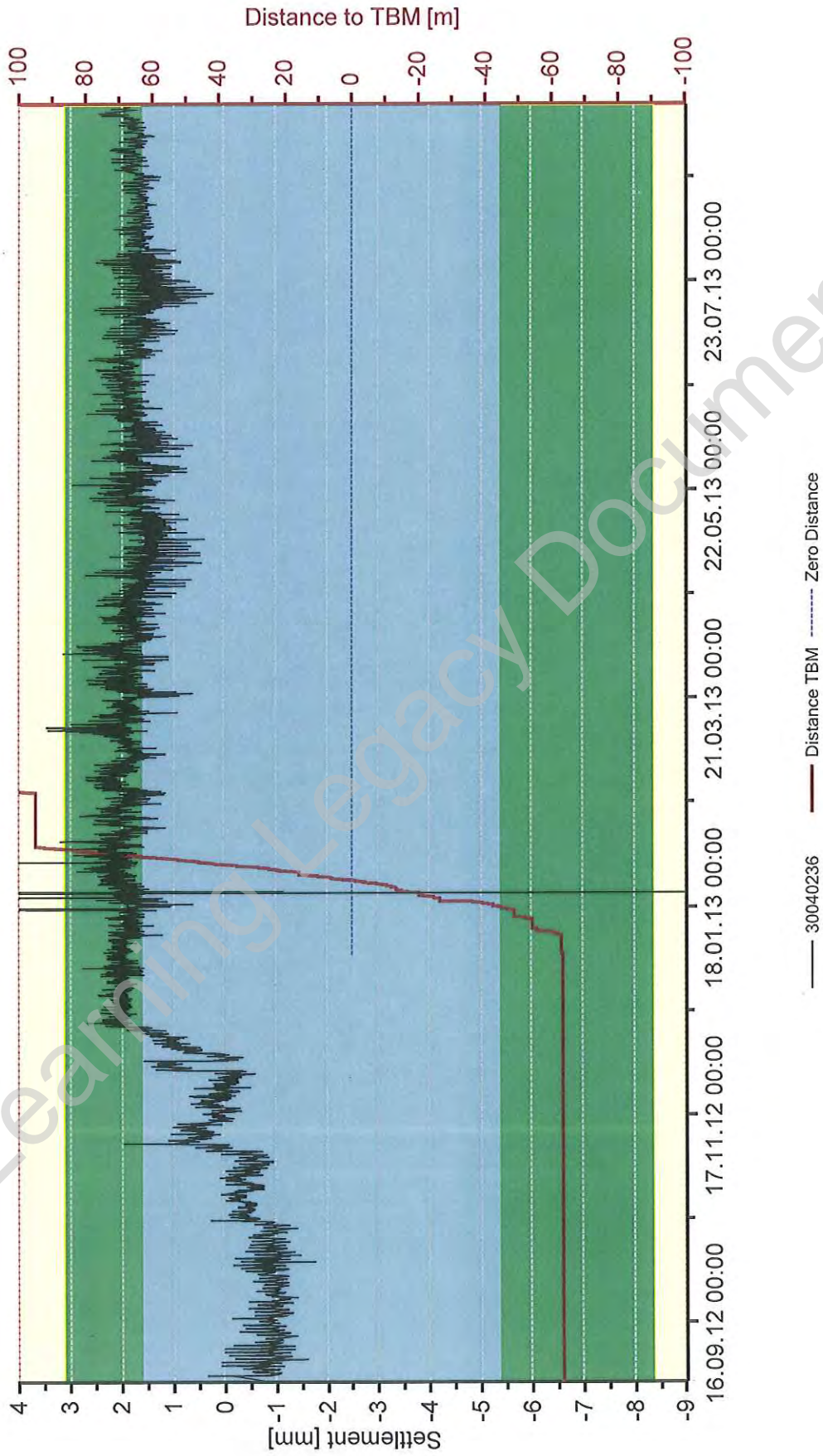
Point: 30040235



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 14:44 current values: 01.07.2014 14:34

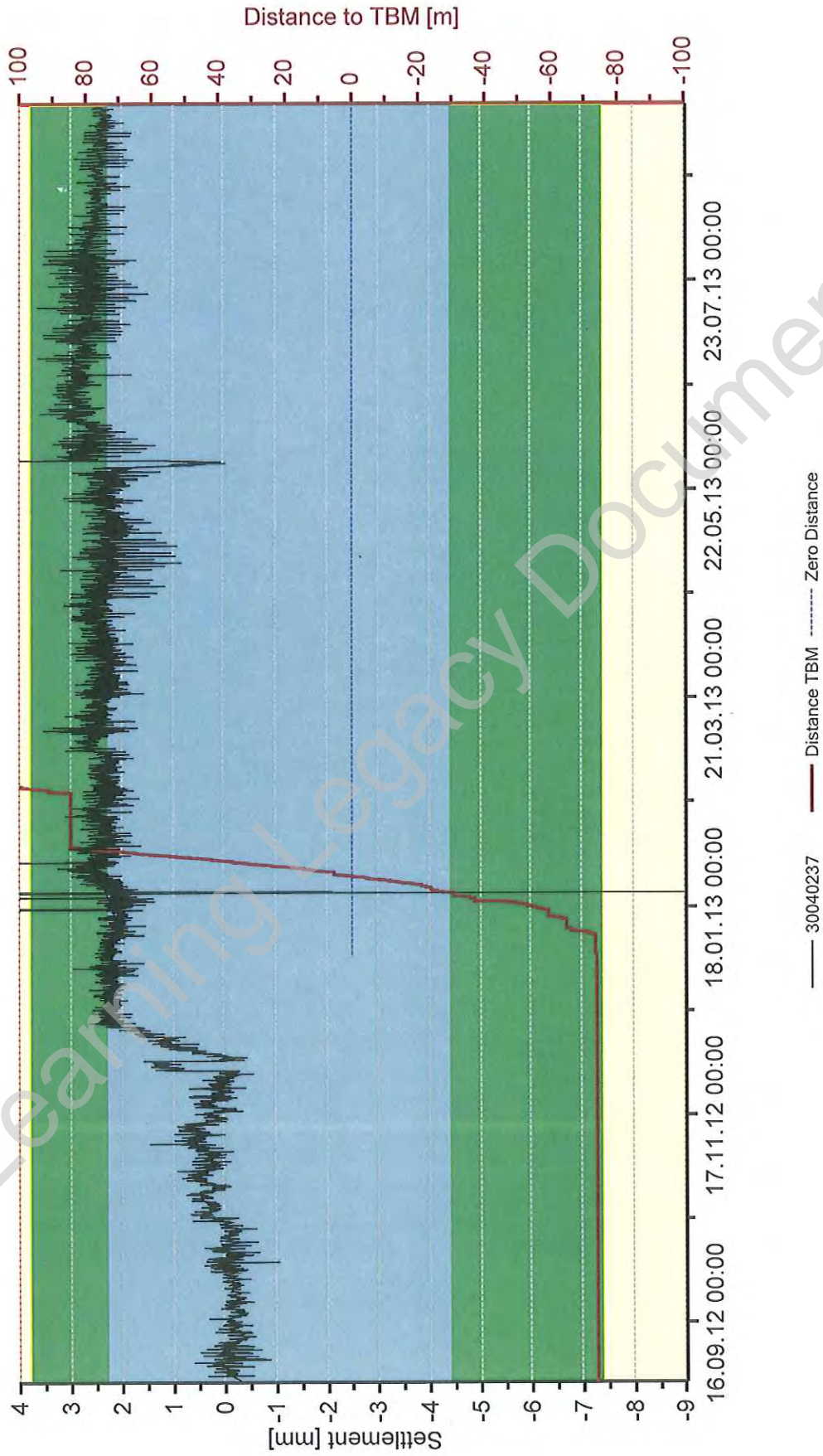


Point: 30040236



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 30.06.2014 17:42 current values: 30.06.2014 17:34

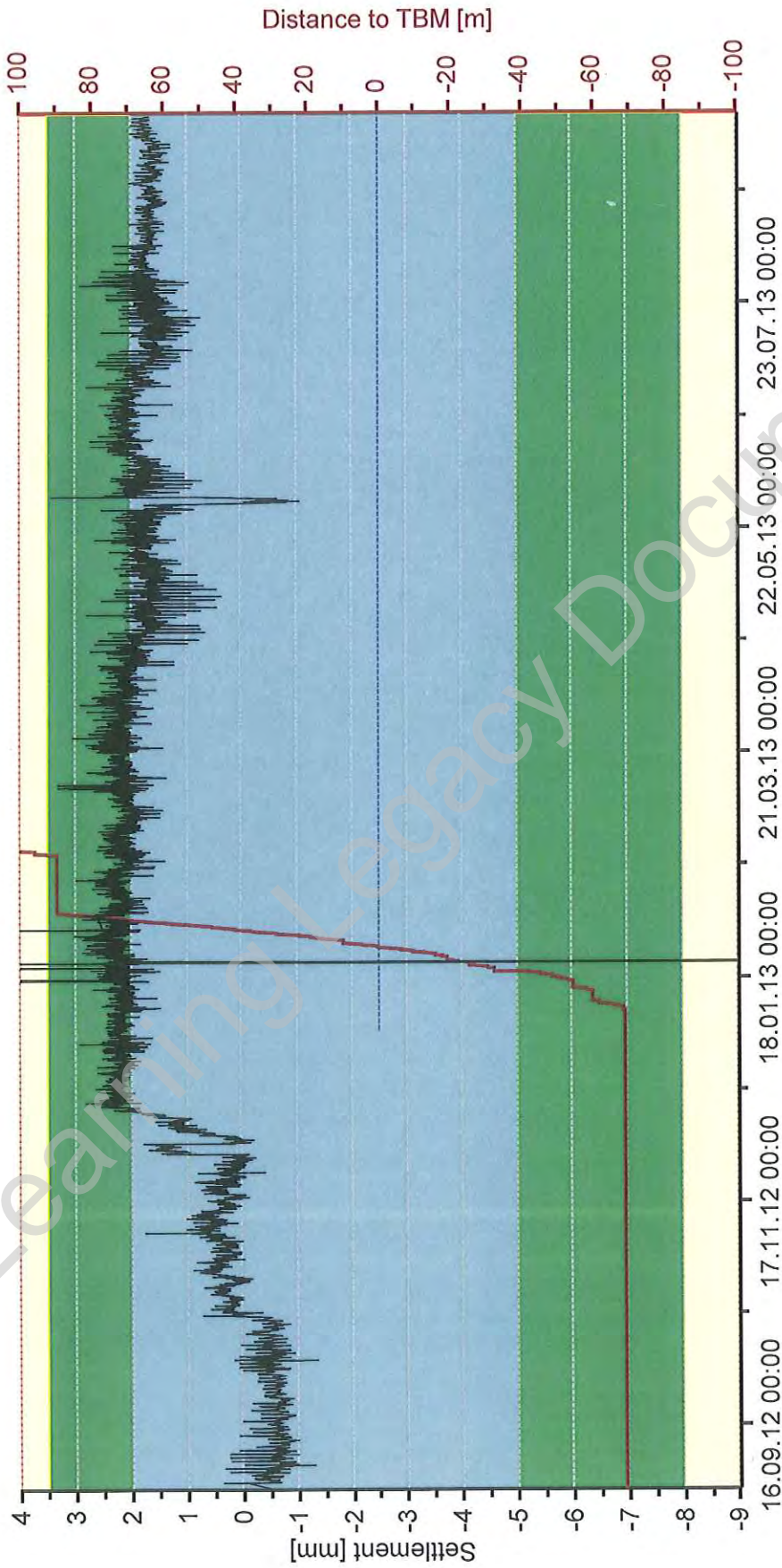
Point: 30040237



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 14:46 current values: 01.07.2014 14:34



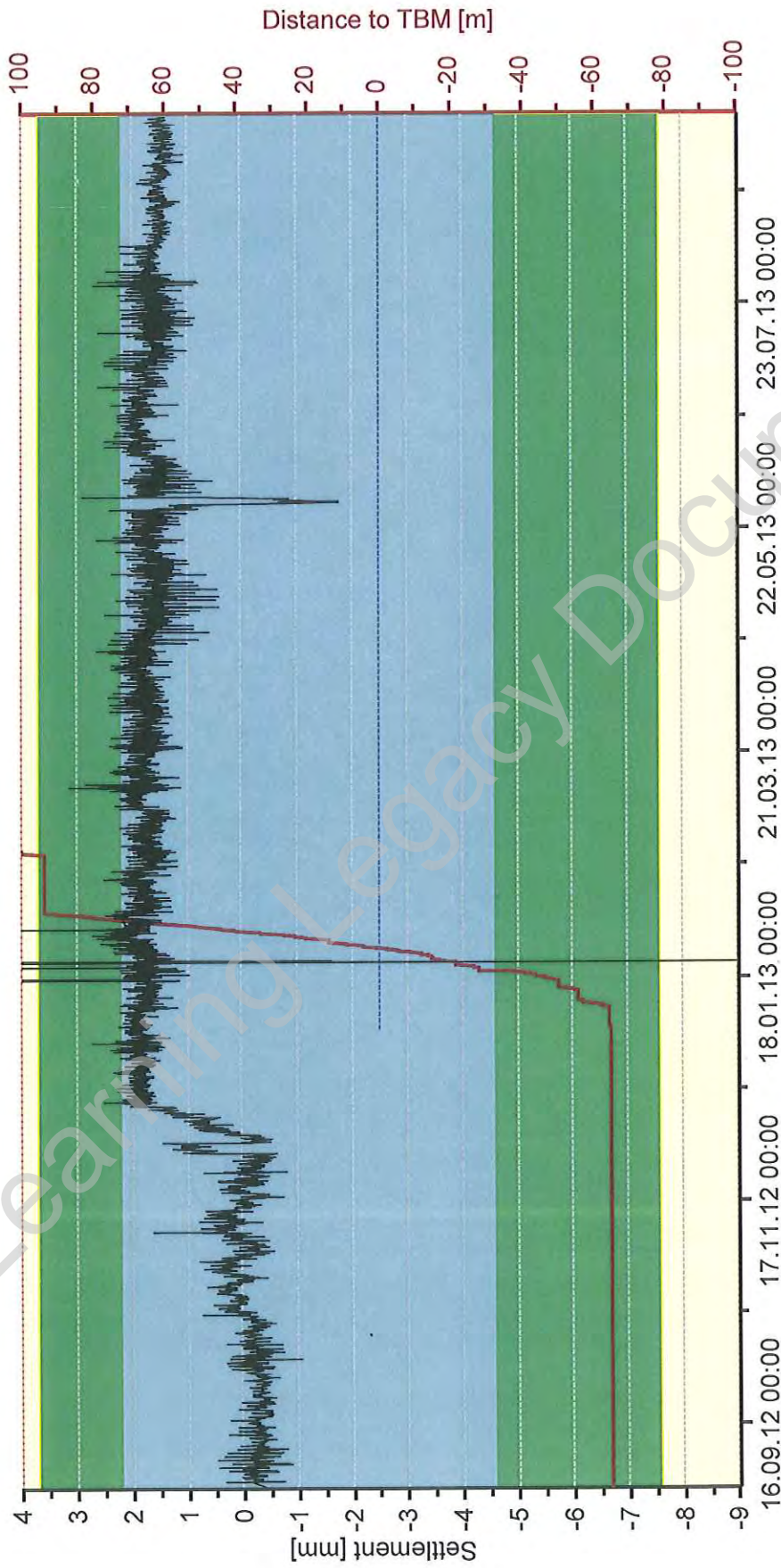
Point: 30040238



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 14:49 current values: 01.07.2014 14:34



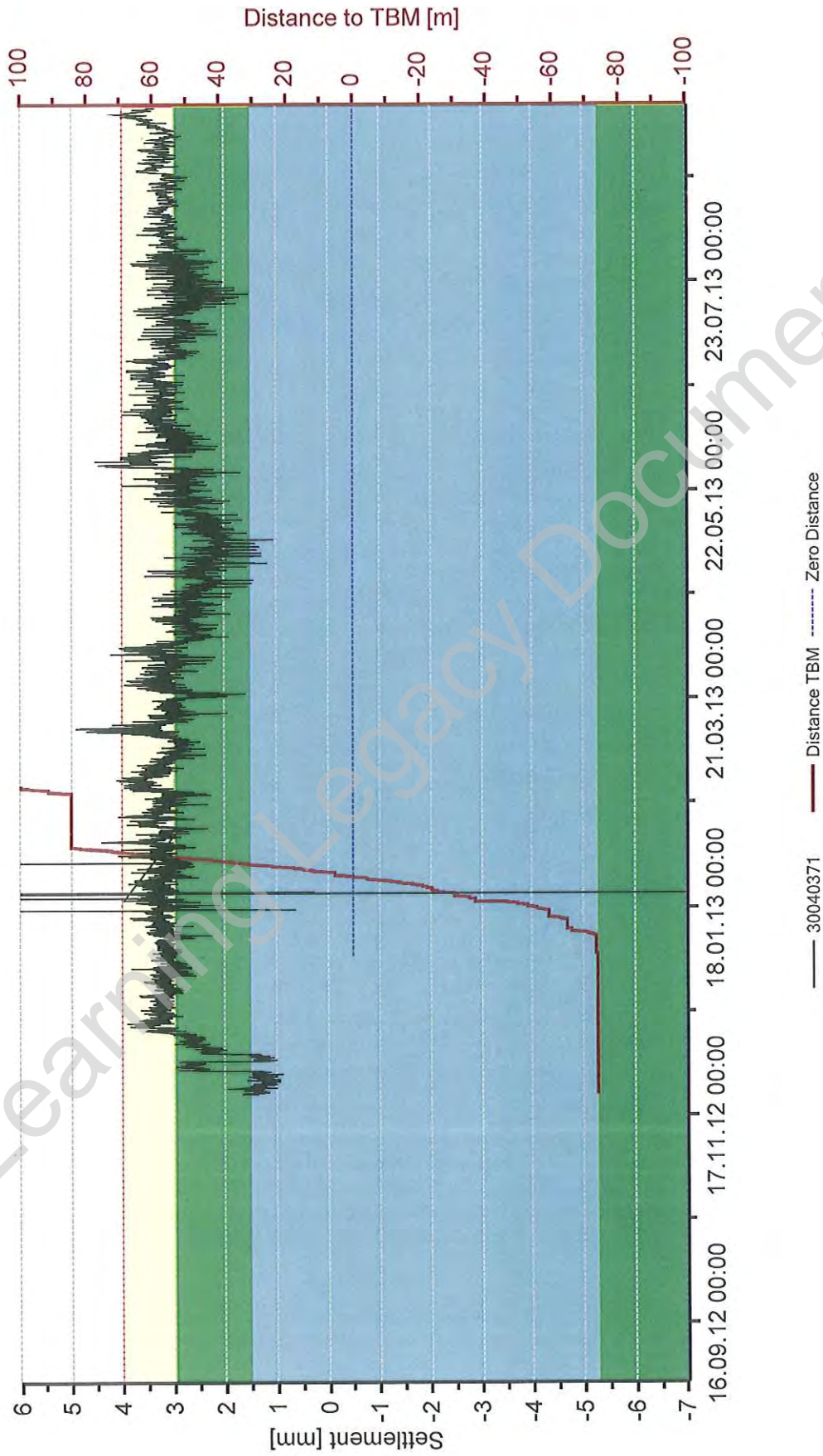
Point: 30040239



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 14:52 current values: 01.07.2014 14:43



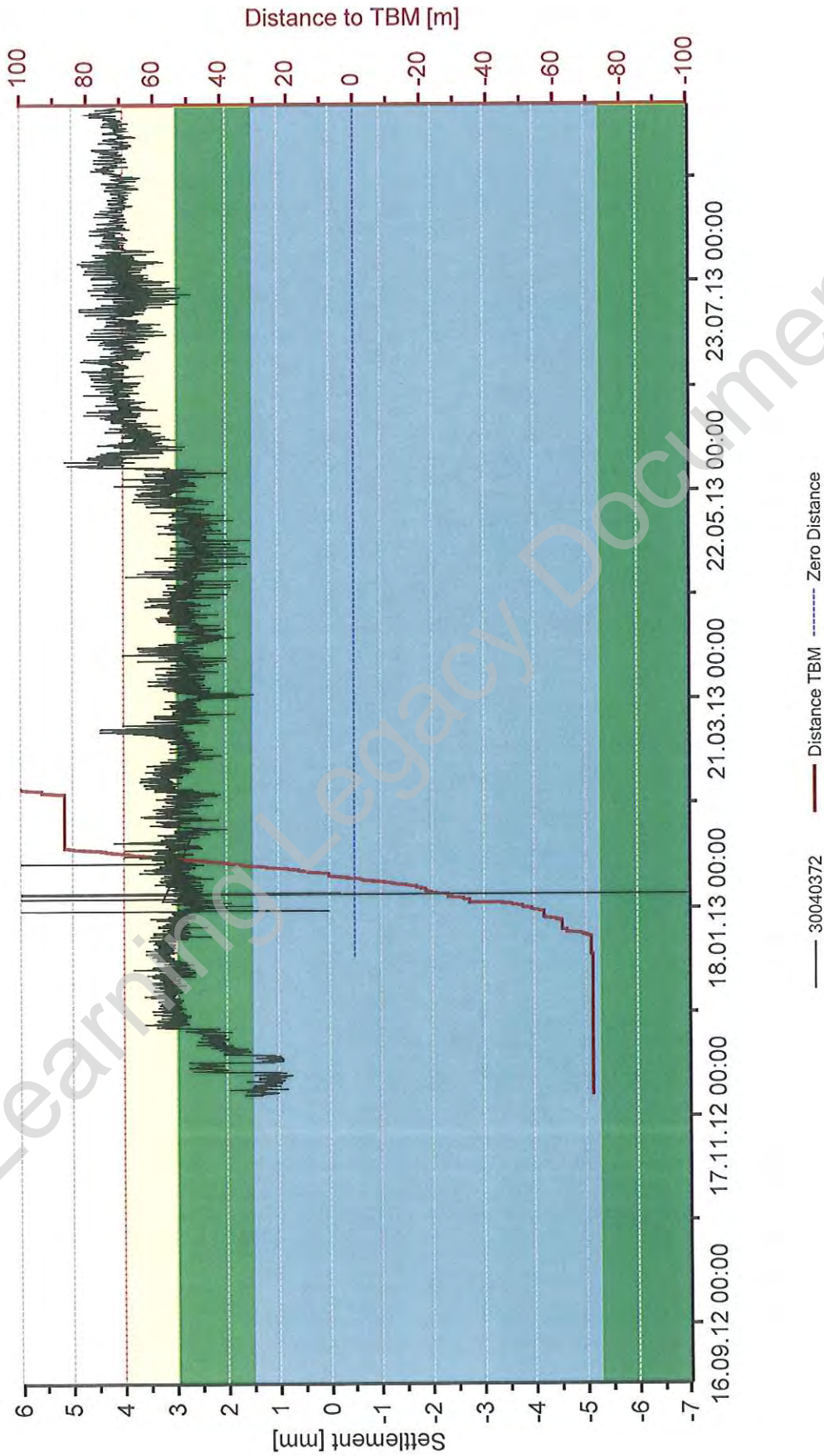
Point: 30040371



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 15:09 current values: 01.07.2014 15:08



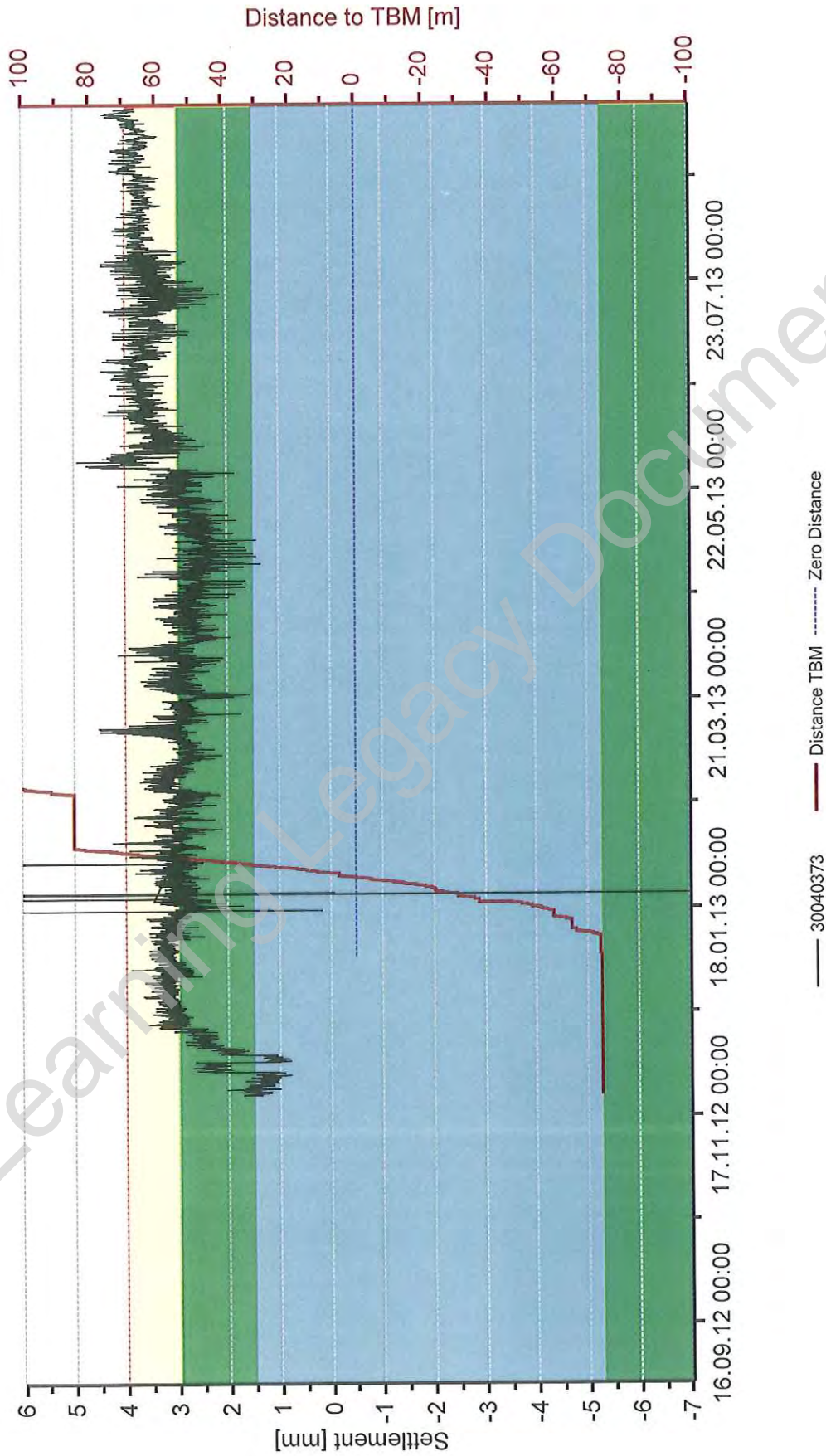
Point: 30040372



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 15:13 current values: 01.07.2014 15:08



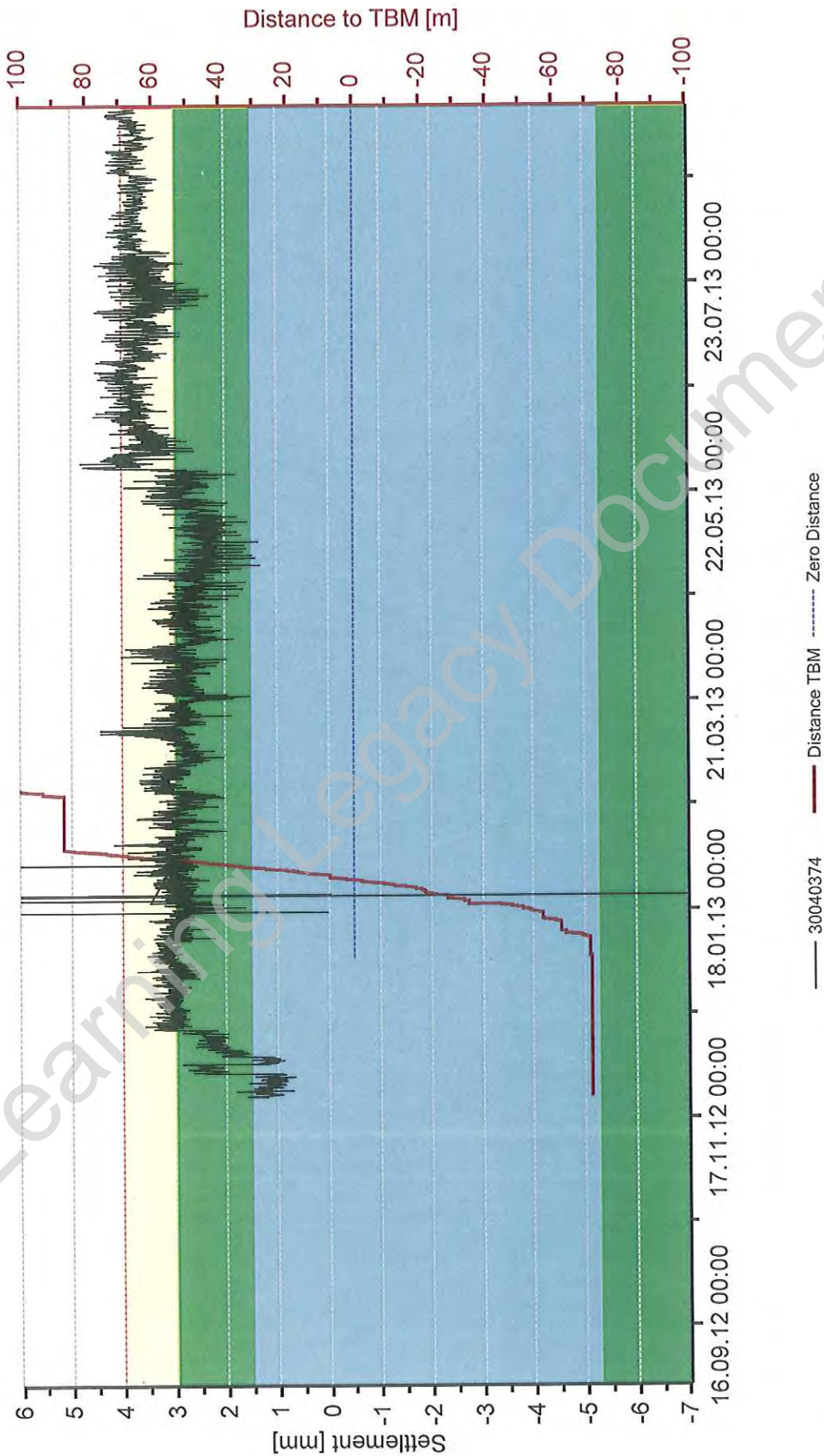
Point: 30040373



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 15:21 current values: 01.07.2014 15:14



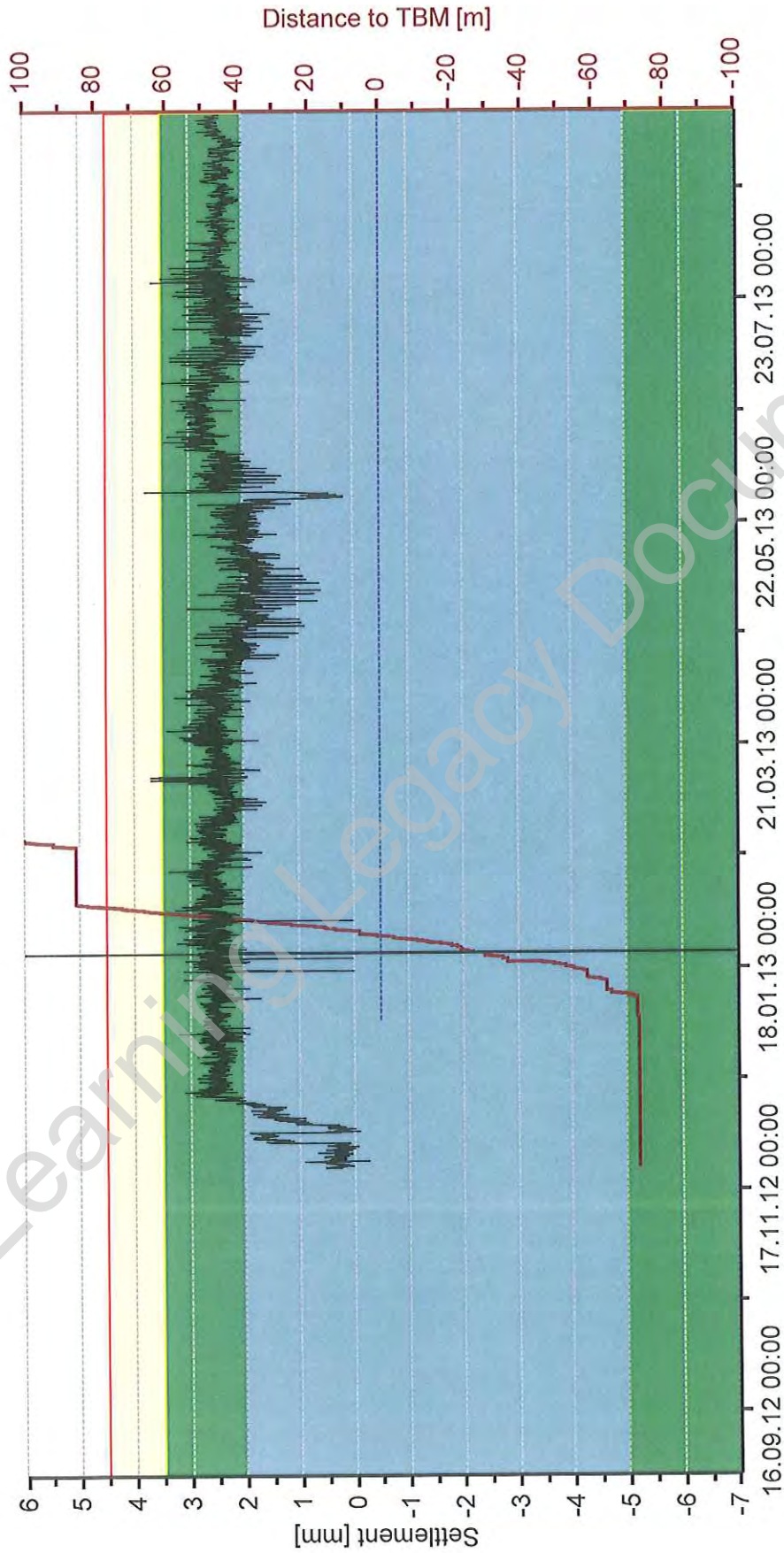
Point: 30040374



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 15:25 current values: 01.07.2014 15:23



Point: 30040375

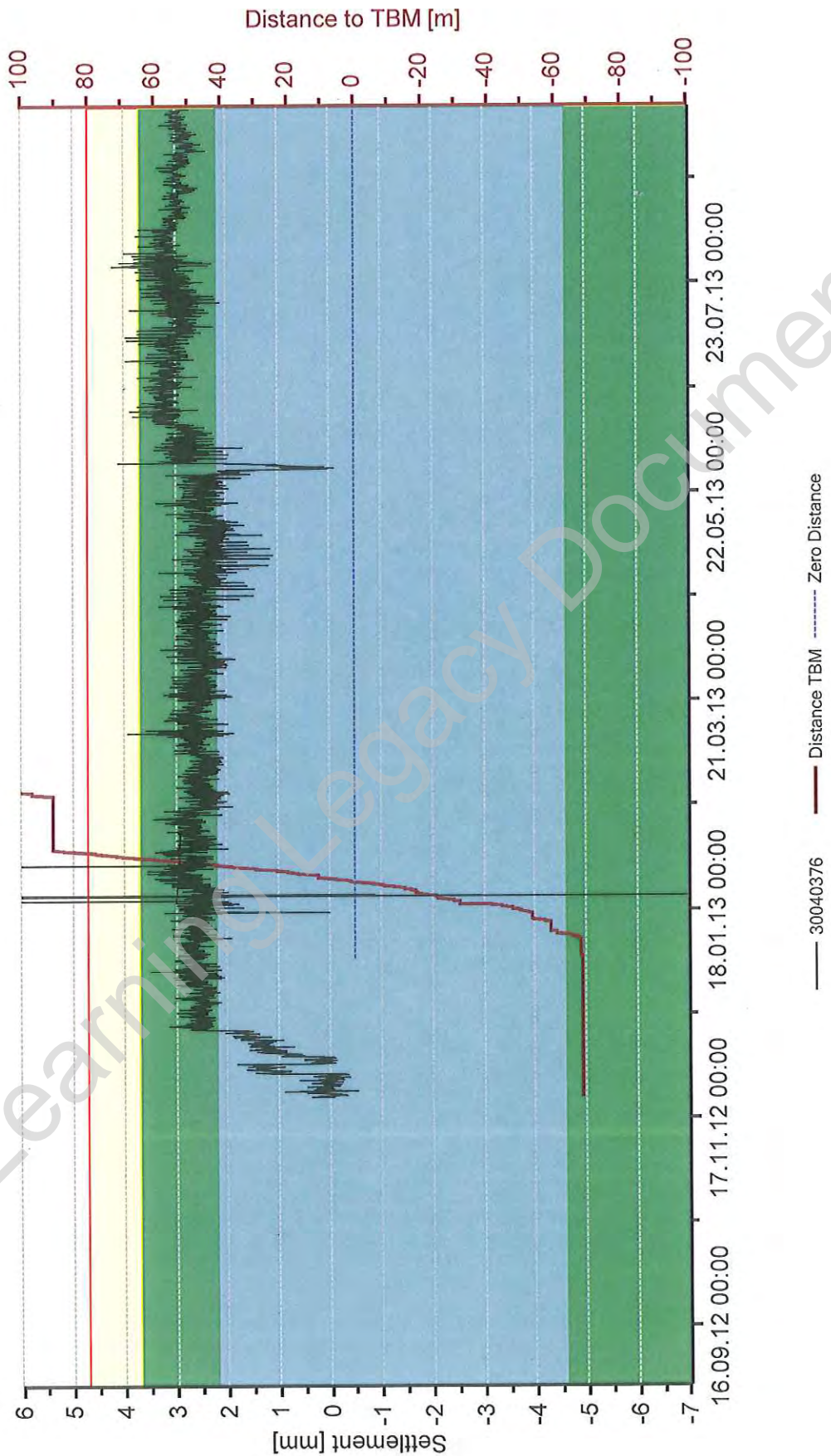


— 30040375 — Distance TBM — Zero Distance

Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 15:28 current values: 01.07.2014 15:23



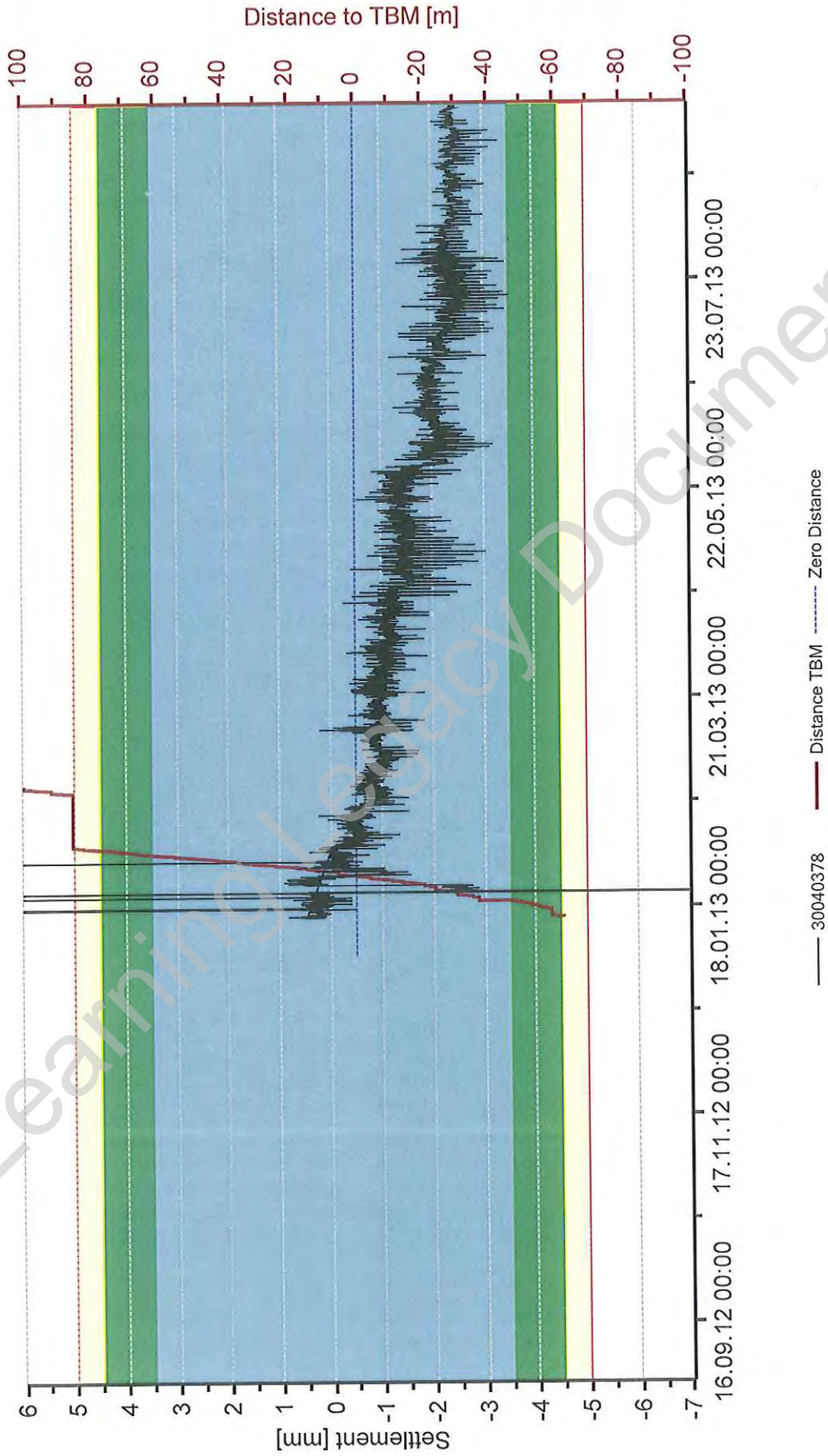
Point: 30040376



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 15:32 current values: 01.07.2014 15:23

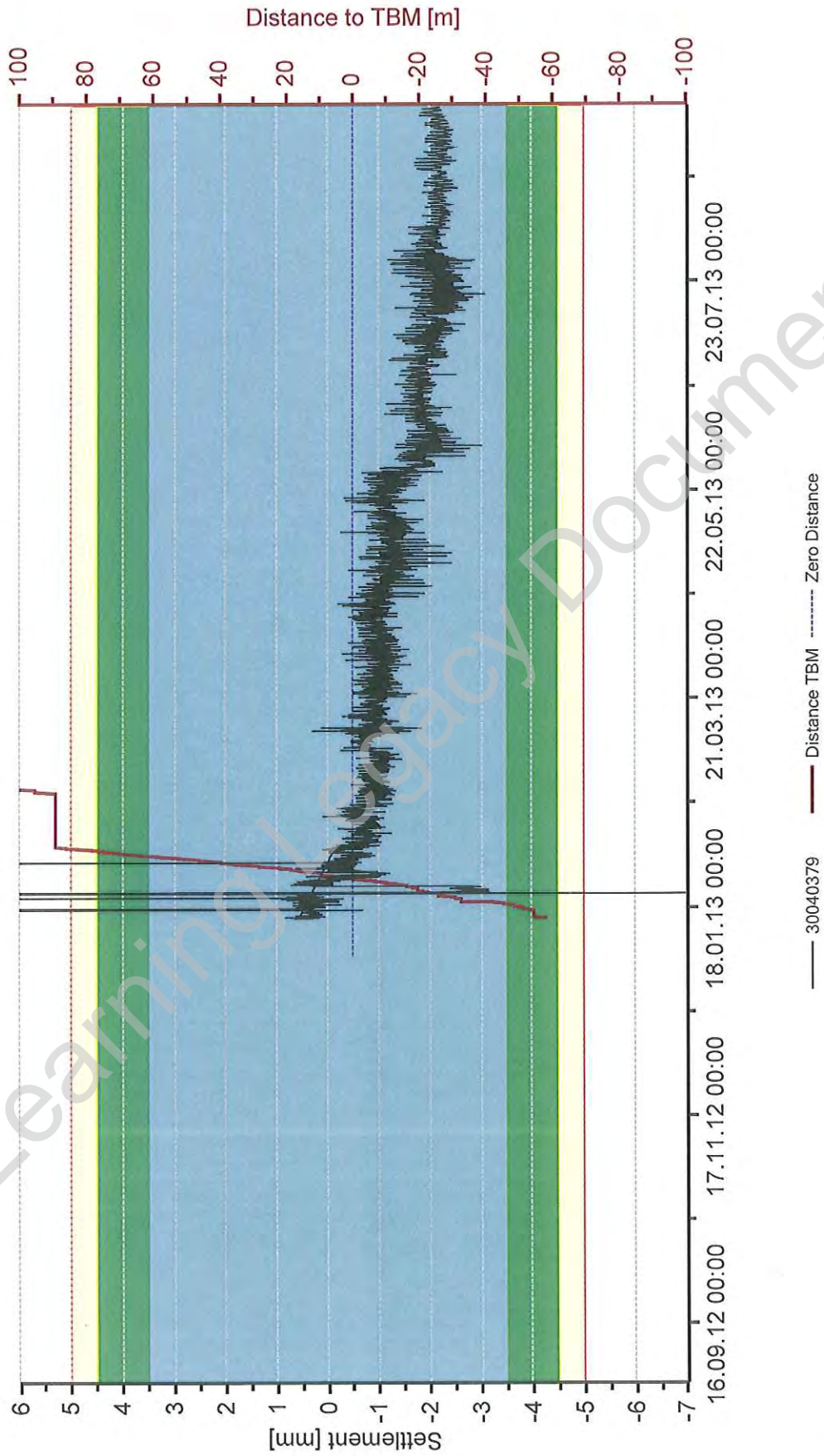


Point: 30040378



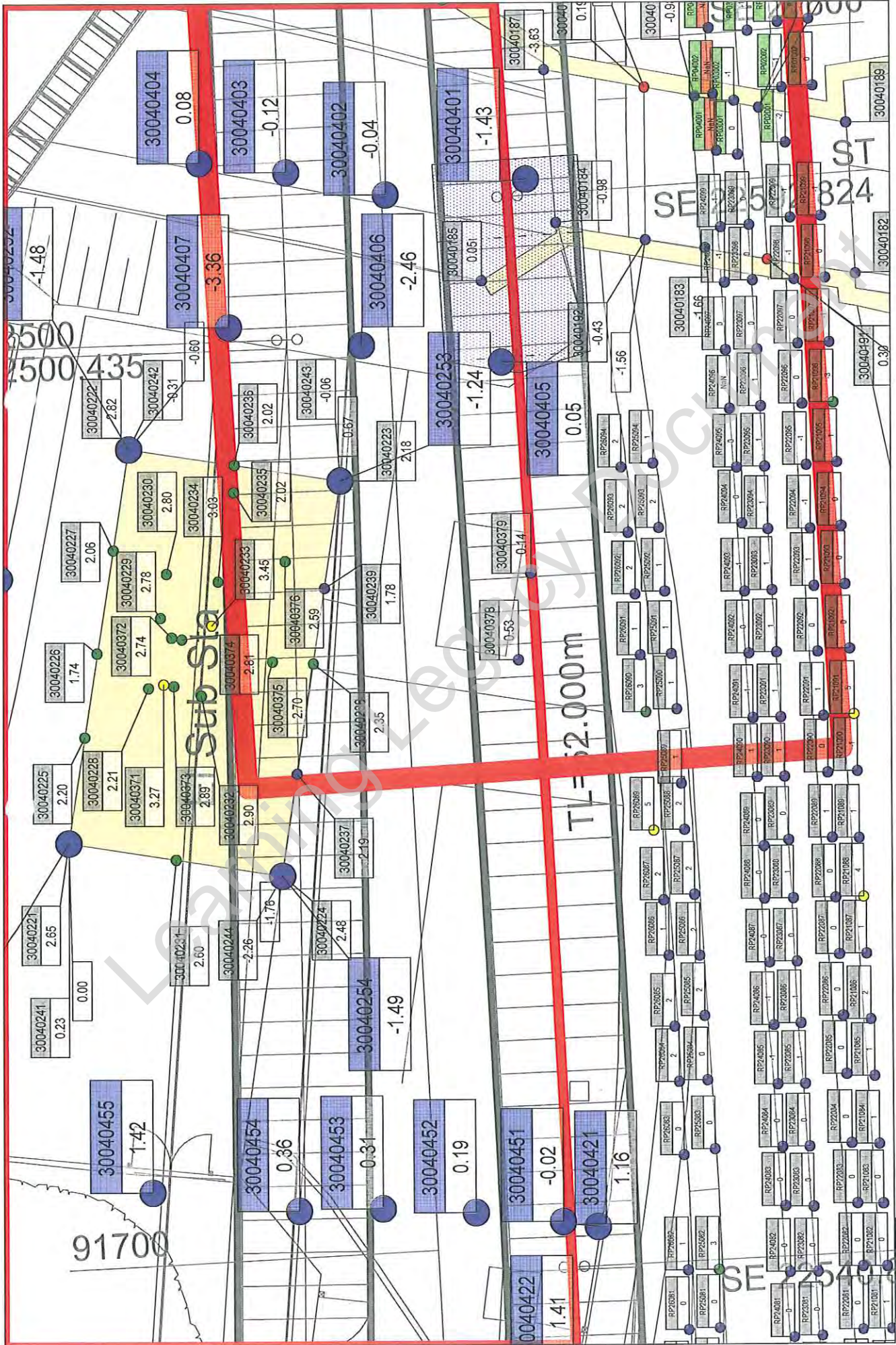
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 15:37 current values: 01.07.2014 15:33

Point: 30040379



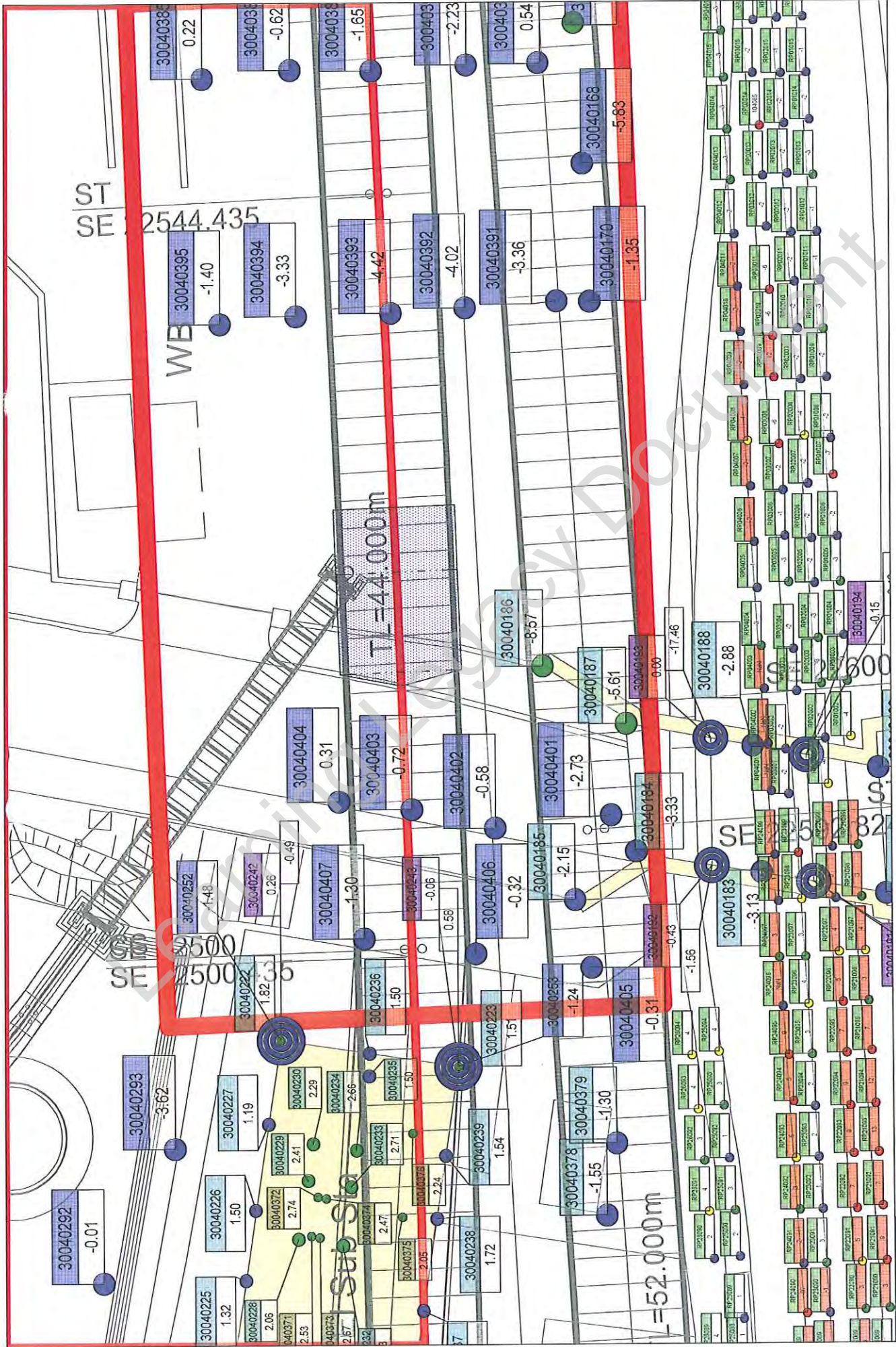
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 15:40 current values: 01.07.2014 15:38





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 25.01.2013 06:59





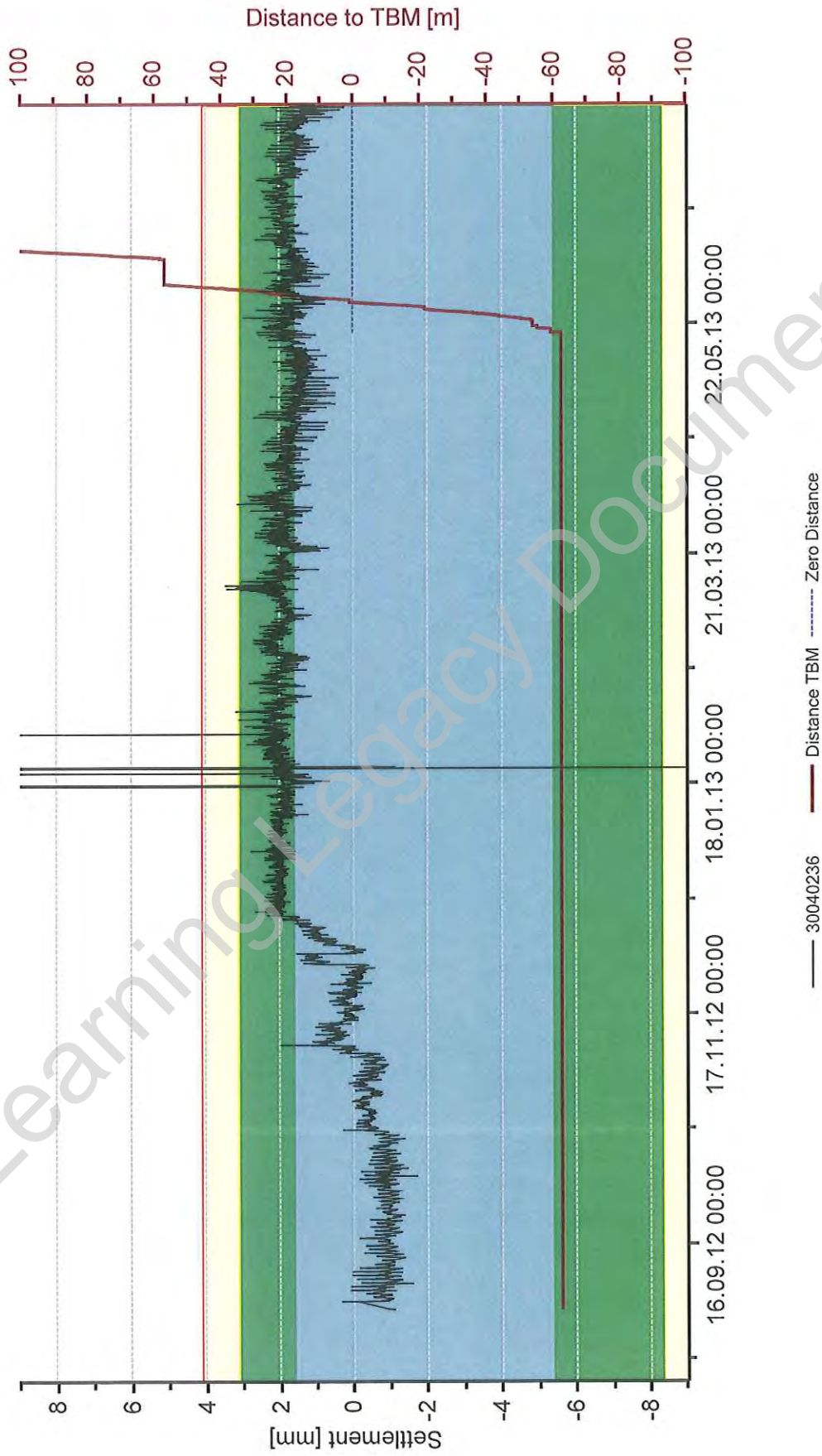
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

working activities: TBM drive

current values: 26.05.2013 09:07

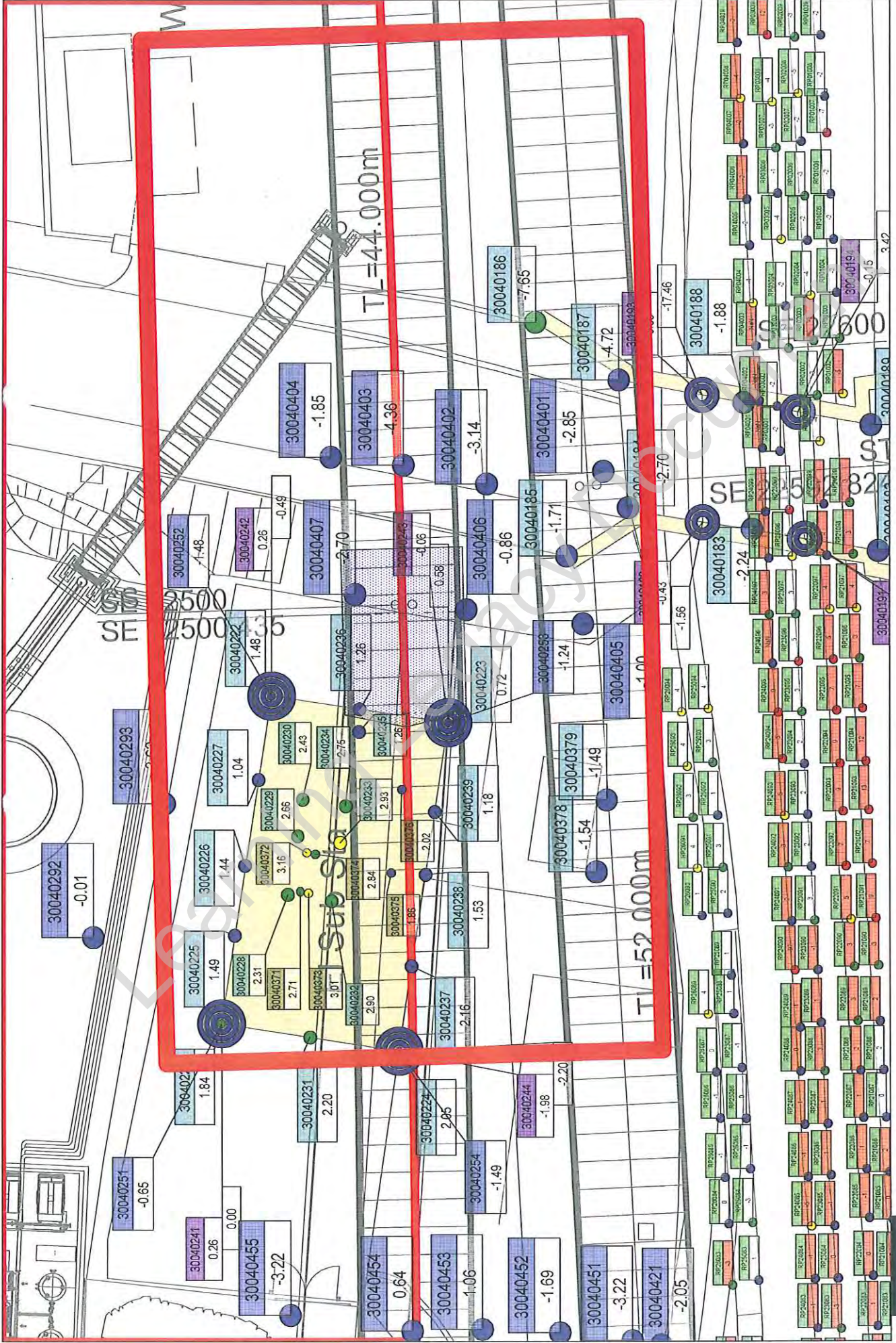


Point: 30040236



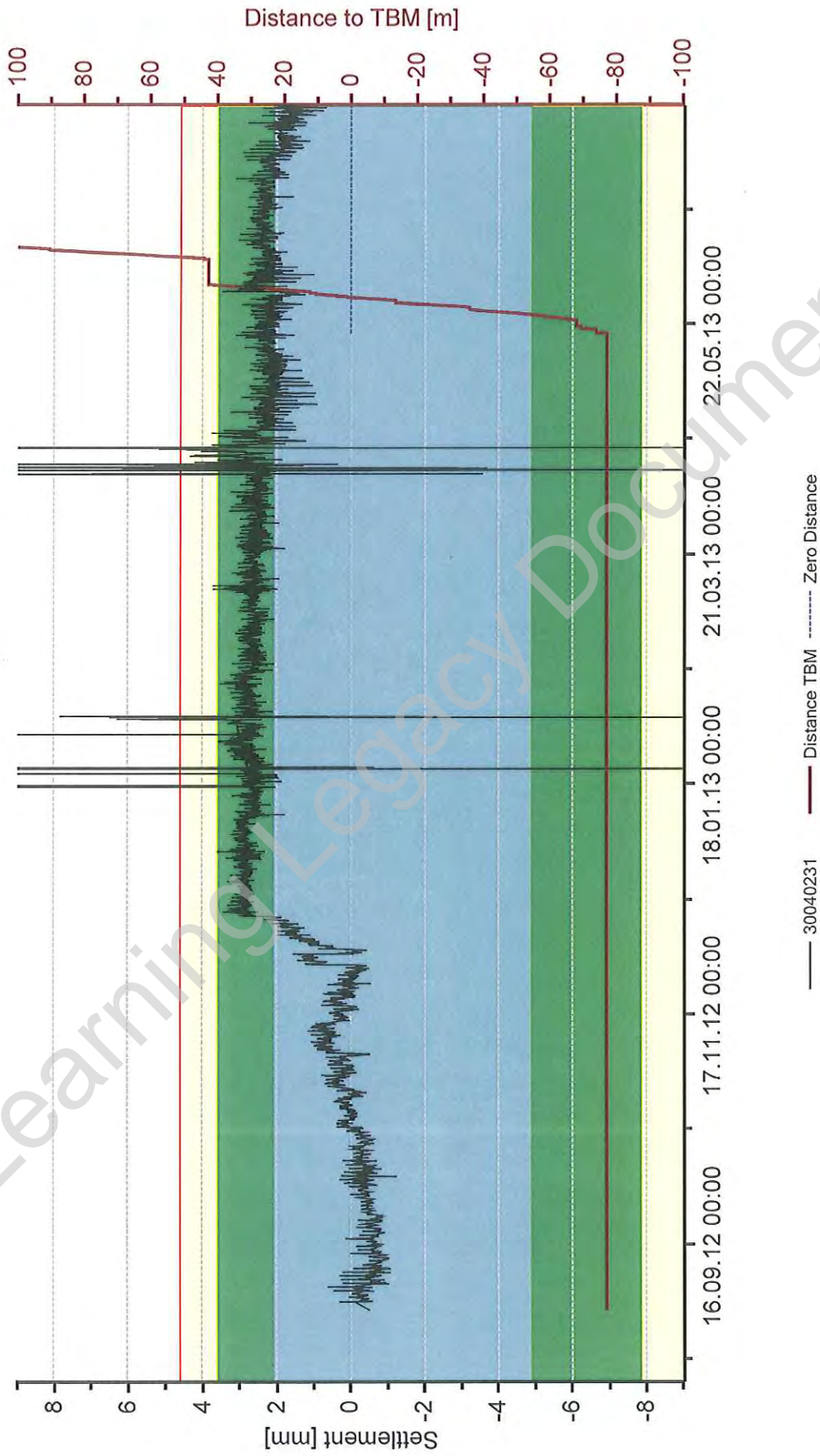
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 16:04 current values: 01.07.2014 15:59






Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive
 current values: 28.05.2013 09:00

Point: 30040231



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Cathedral Substation (HLC) 29.08.2012 - 13.09.2013
date: 01.07.2014 16:06 current values: 01.07.2014 15:59



		C310 THAMES TUNNEL REPORT		
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev 2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal			

APPENDIX 10
Cathedral Substation – TM

Learning Legacy Document

monitoring asset	Cathedral Substation		
reference monitoring drawing:	C310-HTM-C-DWG-CR148-PT005-50010		
name of monitoring section:	Cathedral Substation		
sensor type:	Tilt Meter		
chainage:	91730	point no.:	3004 0241 - 3004 0244
trigger values: [mm]	green: +4 -4	amber: +5 -5	red: +9 -9
reference document for trigger values:	Management Plan for Control of Ground Movement		
EB-no.:	C310-HTM-Z-STP-CR148-50058		
Appendix:	Y		

monitoring data

	date	max. value	point no.	comments
baseline	22/08/12	0		
TBM 1	start ZOI	20/01/13	-0.17	3004 0243
		25/01/13	-2.26	3004 0244
	end ZOI	31/01/13	-0.07	3004 0243
		01/02/13	-2.37	3004 0244
breached not any trigger value				
TBM 2	start ZOI	26/05/13	-0.06	3004 0243
		28/05/13	-1.98	3004 0244
	end ZOI	31/05/13	-0.06	3004 0243
		03/06/13	-1.98	3004 0244
breached not any trigger value				
longterm	19/07/13	0.19	3004 0243	last reading post tunneling, Sensors not any longer working
Evaluation of any potential residual risks	<input checked="" type="checkbox"/>	No residual risk since the Works have been completed by HMJV		
	<input type="checkbox"/>	Yes, residual risk (see comment below)		

summary / comments

There was nearly no movement observed during TAM drilling and pre-grouting (from 15.10.-18.12.2012). Tiltmeter 3004 0241-3004 0243 got signal reference problems in front of the data logger from 19.07.2013 onwards.

The summary of the grouting operation is report ref. C310-HTM-C-RGN-CR146_ST004-50020

Tiltmeter 3004 0244 got power failure from 30.04. onwards.

Tiltmeter 3004 0244 was hit during cleaning works (trees, bushes and plants), therefore movement of around 2mm recorded.

Under consideration of temperature differences and the achievable accuracy of the system, HMJV has no concern to cease the monitoring.

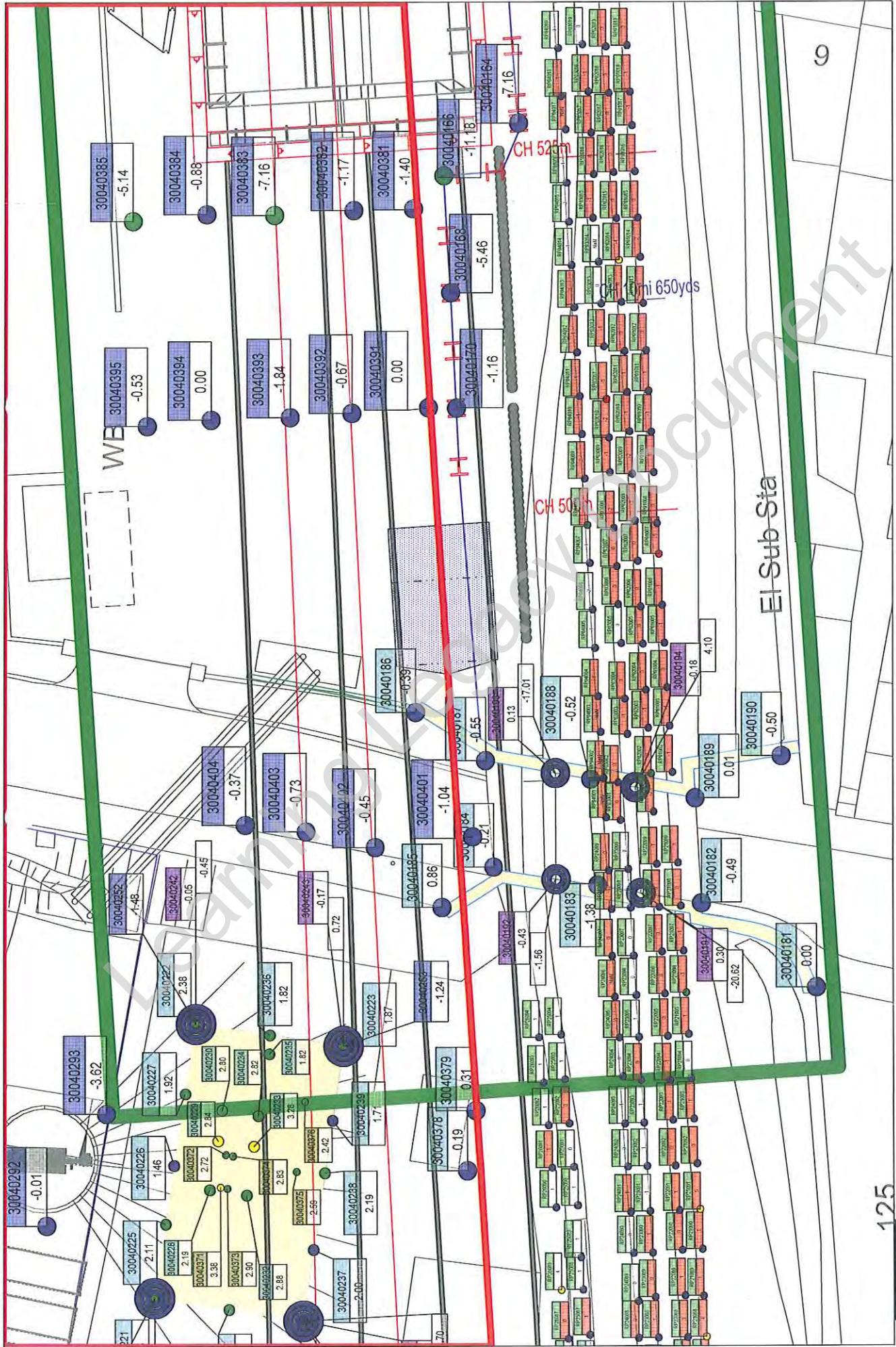
The rate of change in the monitoring data is less than the required standards as per the specifications and drawings up to the time when the instrumentations have been decommissioned.

date / signature: 12/01/2015

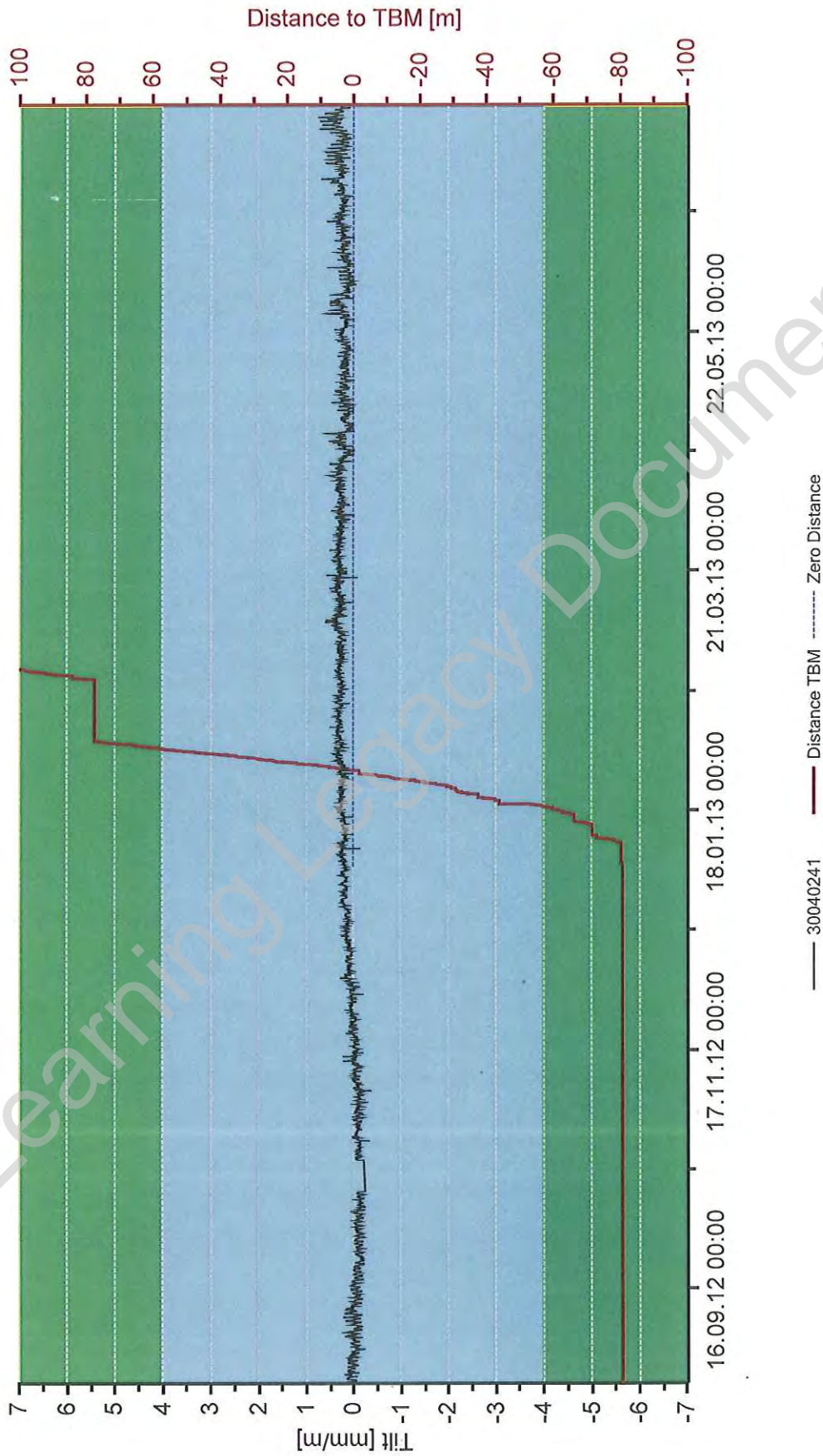
print name:

HMJV project role:

Monitoring & Survey engineer



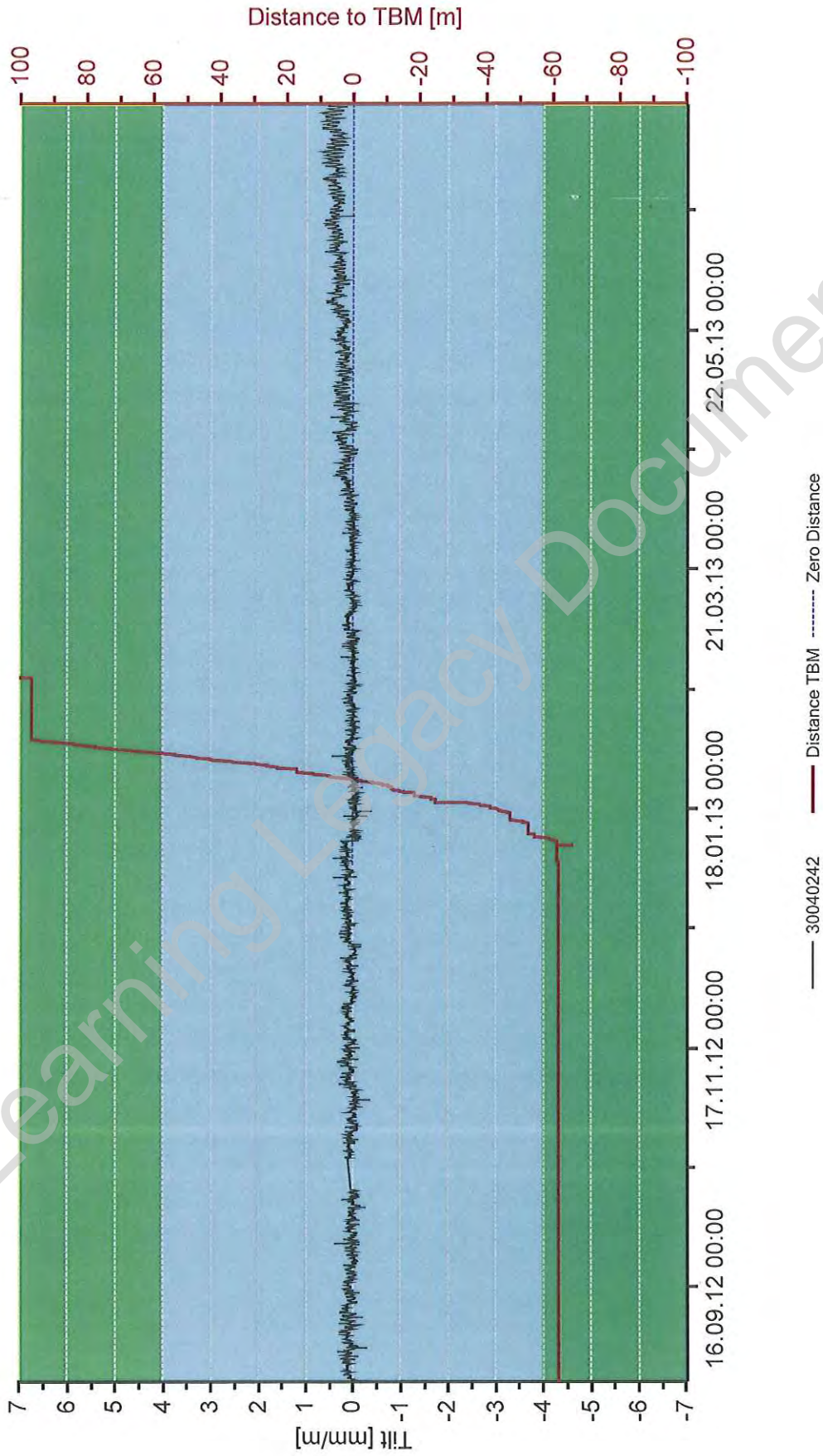
Point: 30040241



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (TM) 22.08.2012 - 19.07.2013
date: 15.07.2014 09:57 current values: 15.07.2014 09:44



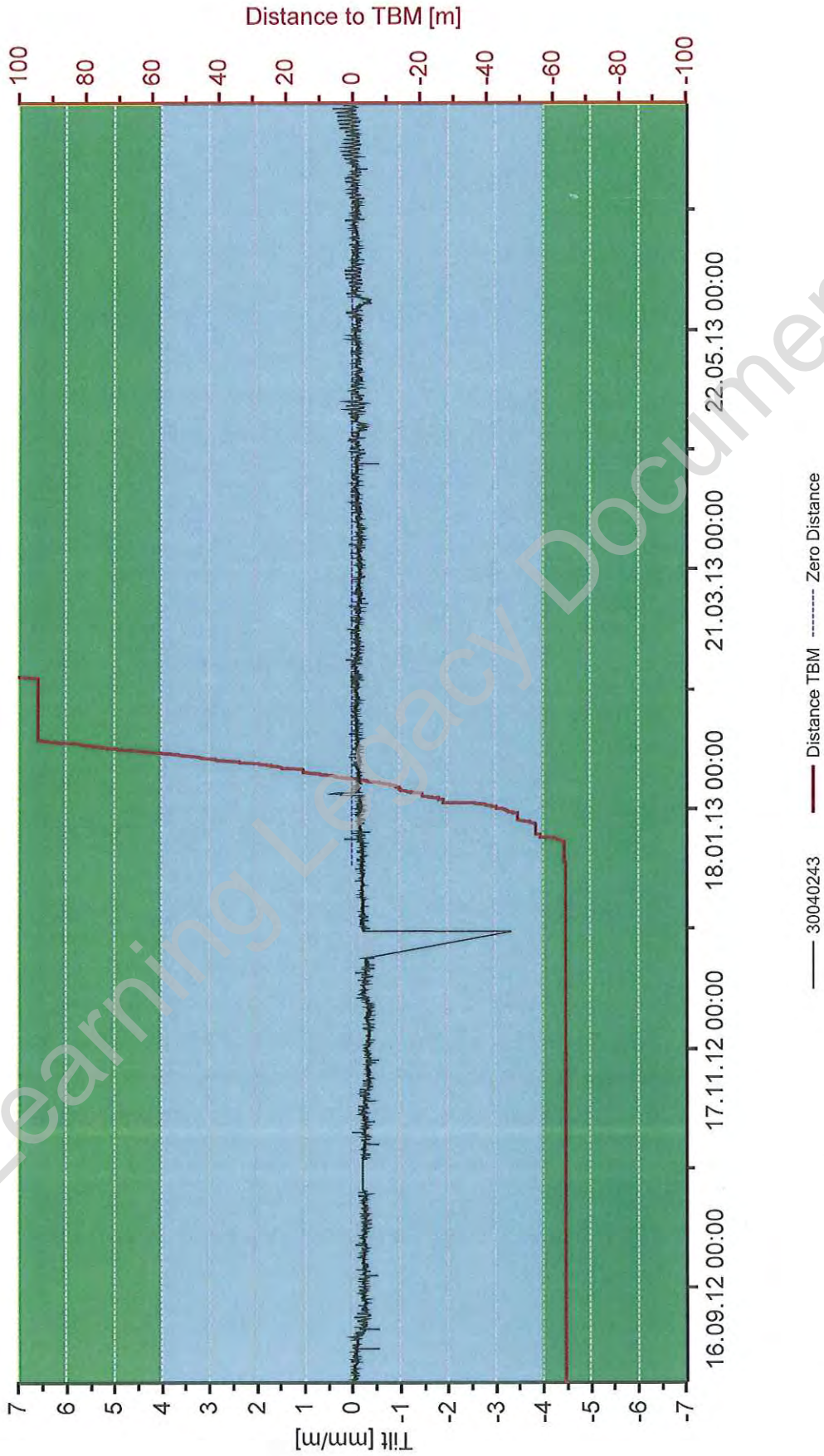
Point: 30040242



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (TM) 22.08.2012 - 19.07.2013
date: 15.07.2014 10:00 current values: 15.07.2014 09:44



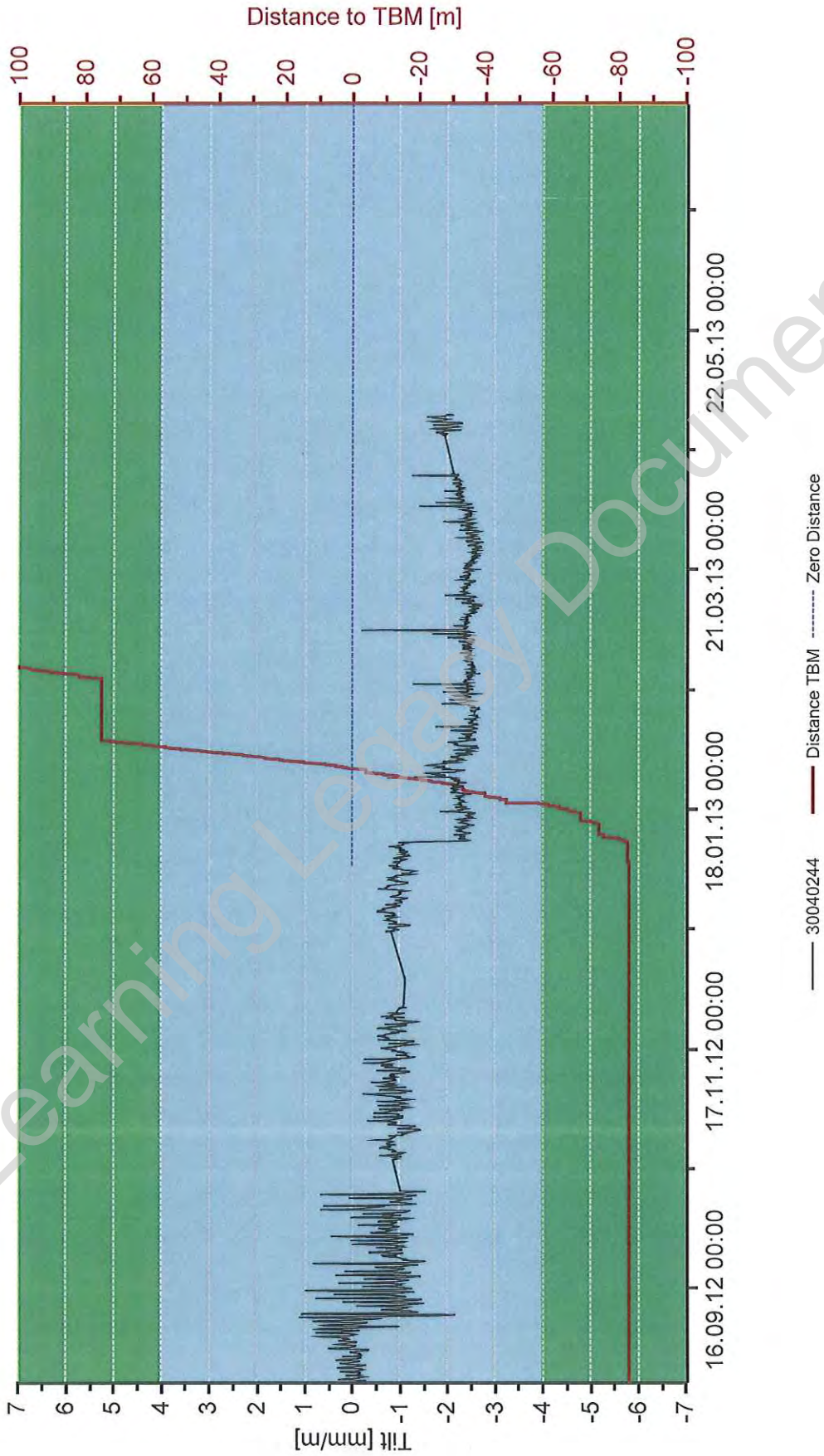
Point: 30040243



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (TM) 22.08.2012 - 19.07.2013
date: 15.07.2014 10:03 current values: 15.07.2014 09:44

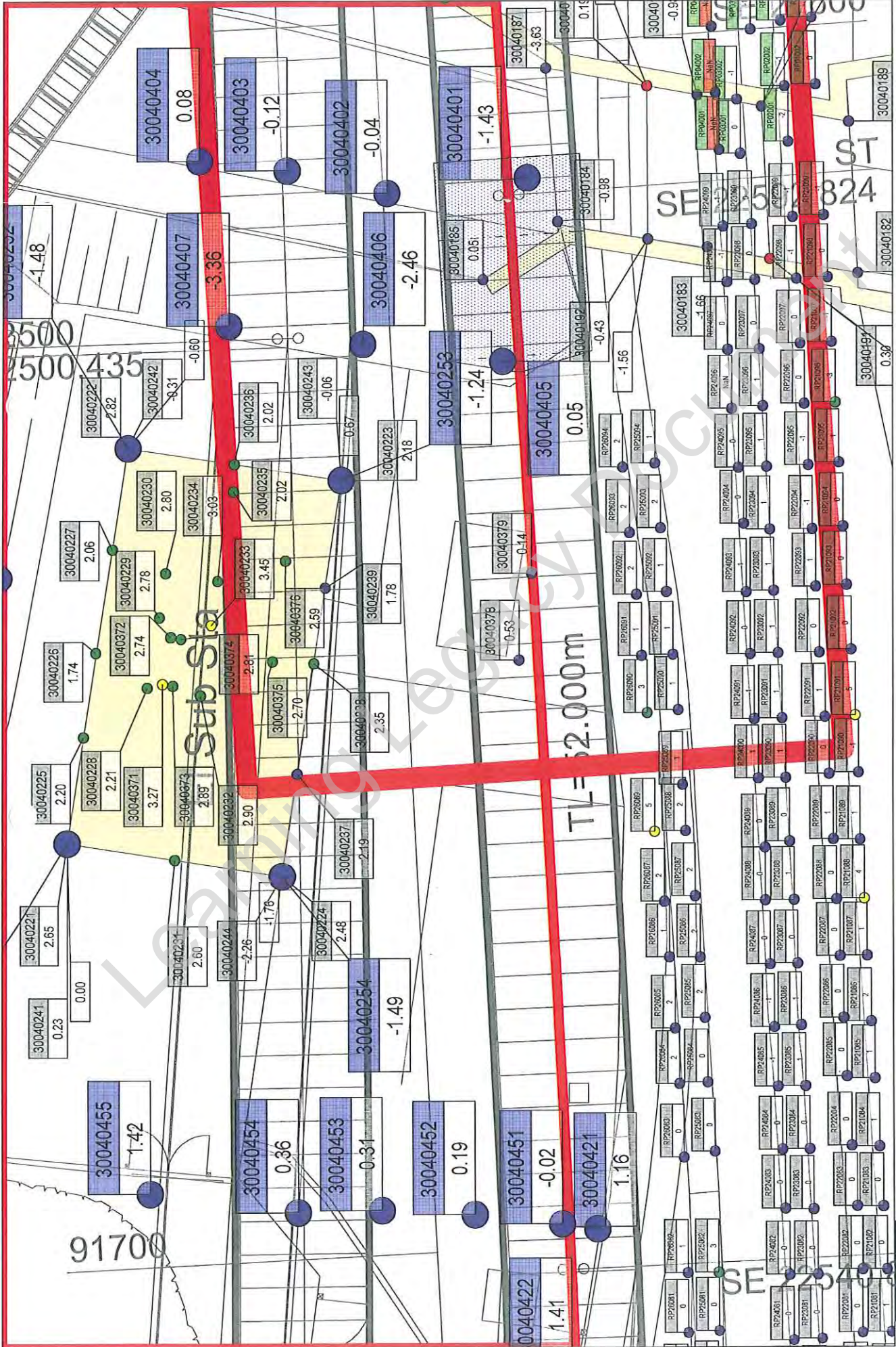


Point: 30040244



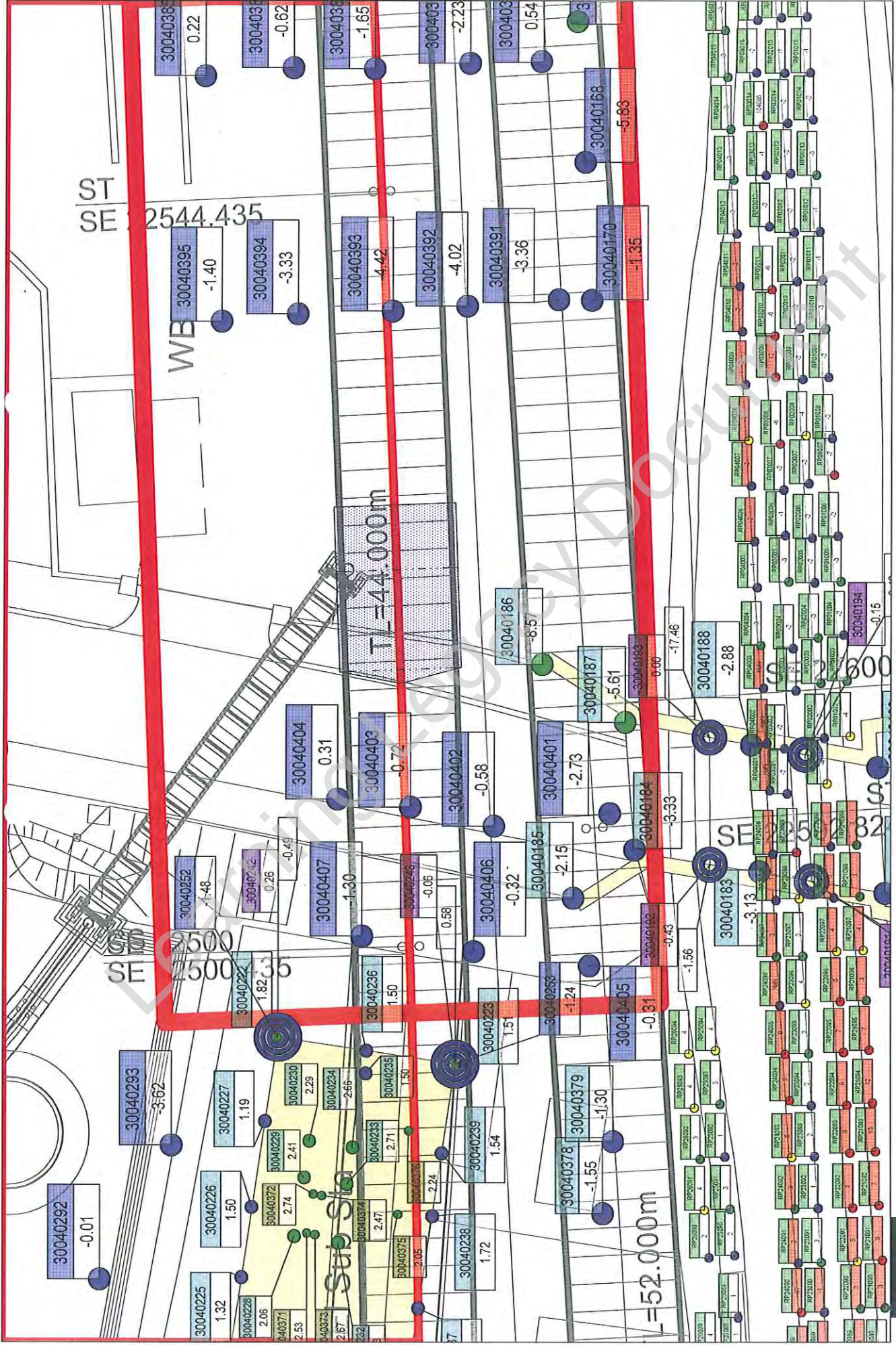
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (TM) 22.08.2012 - 19.07.2013
date: 15.07.2014 10:05 current values: 15.07.2014 09:44



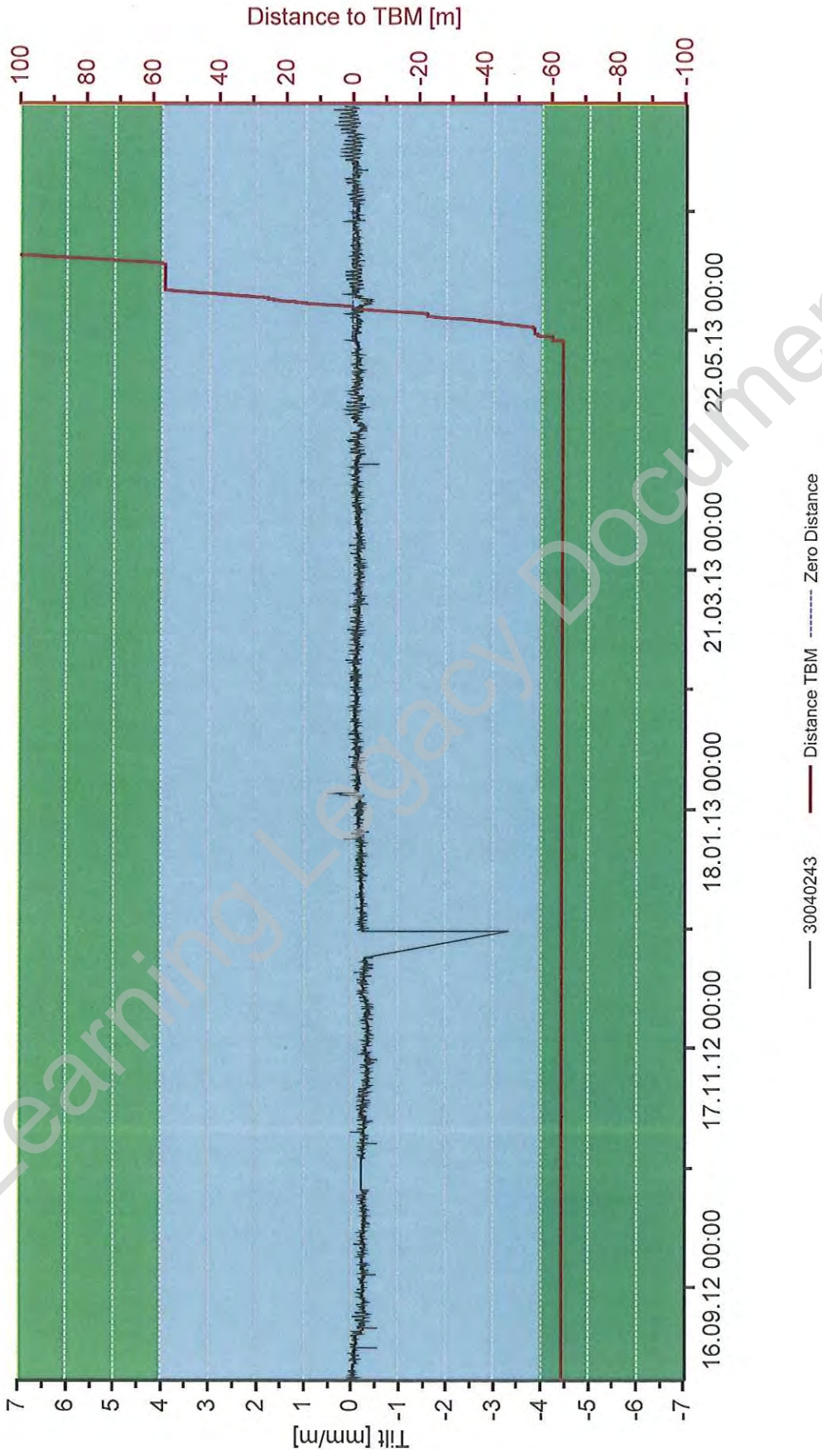


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 25.01.2013 06:59





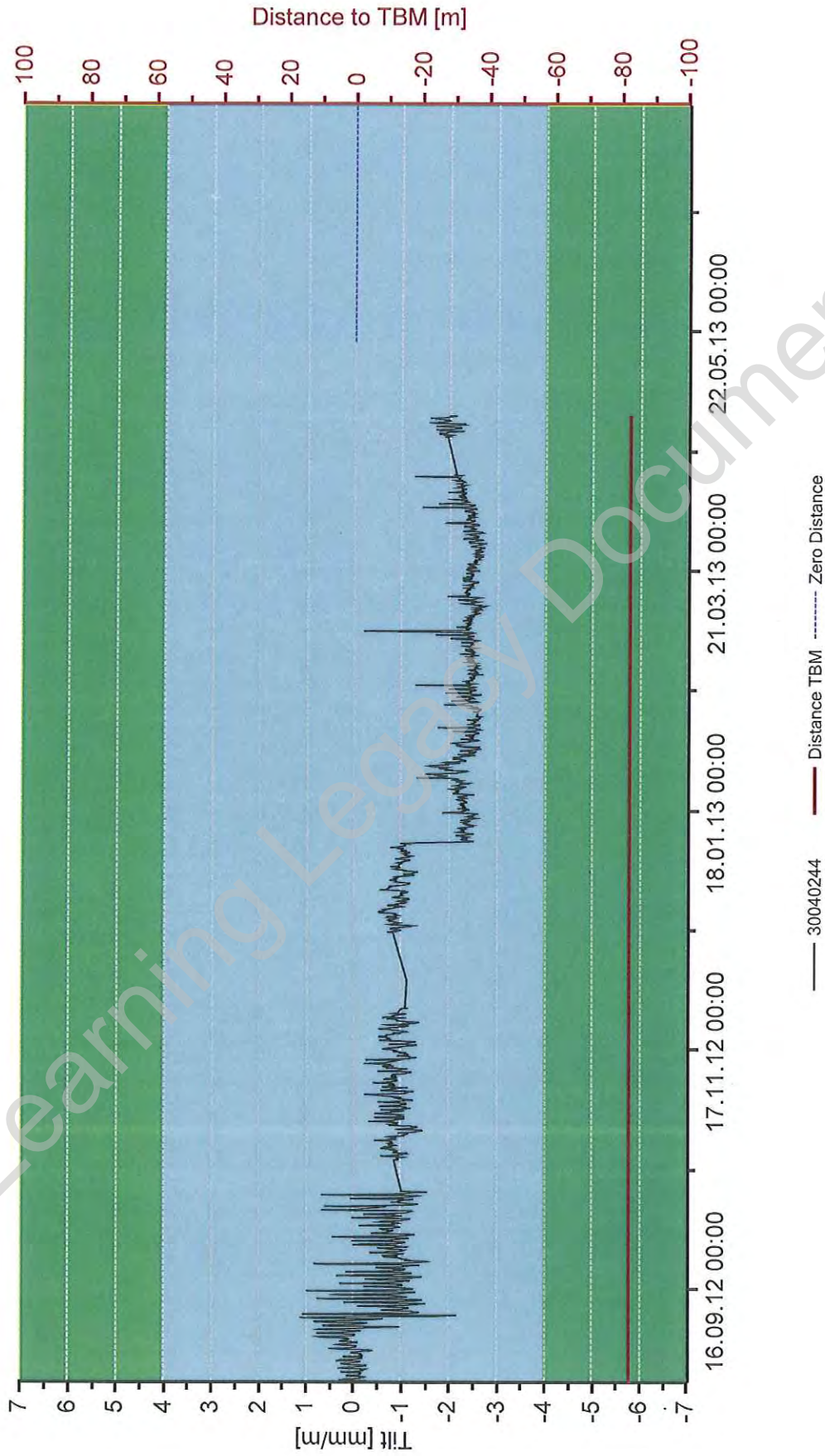
Point: 30040243



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Cathedral Substation (TM) 22.08.2012 - 19.07.2013
date: 15.07.2014 10:11 current values: 15.07.2014 09:59

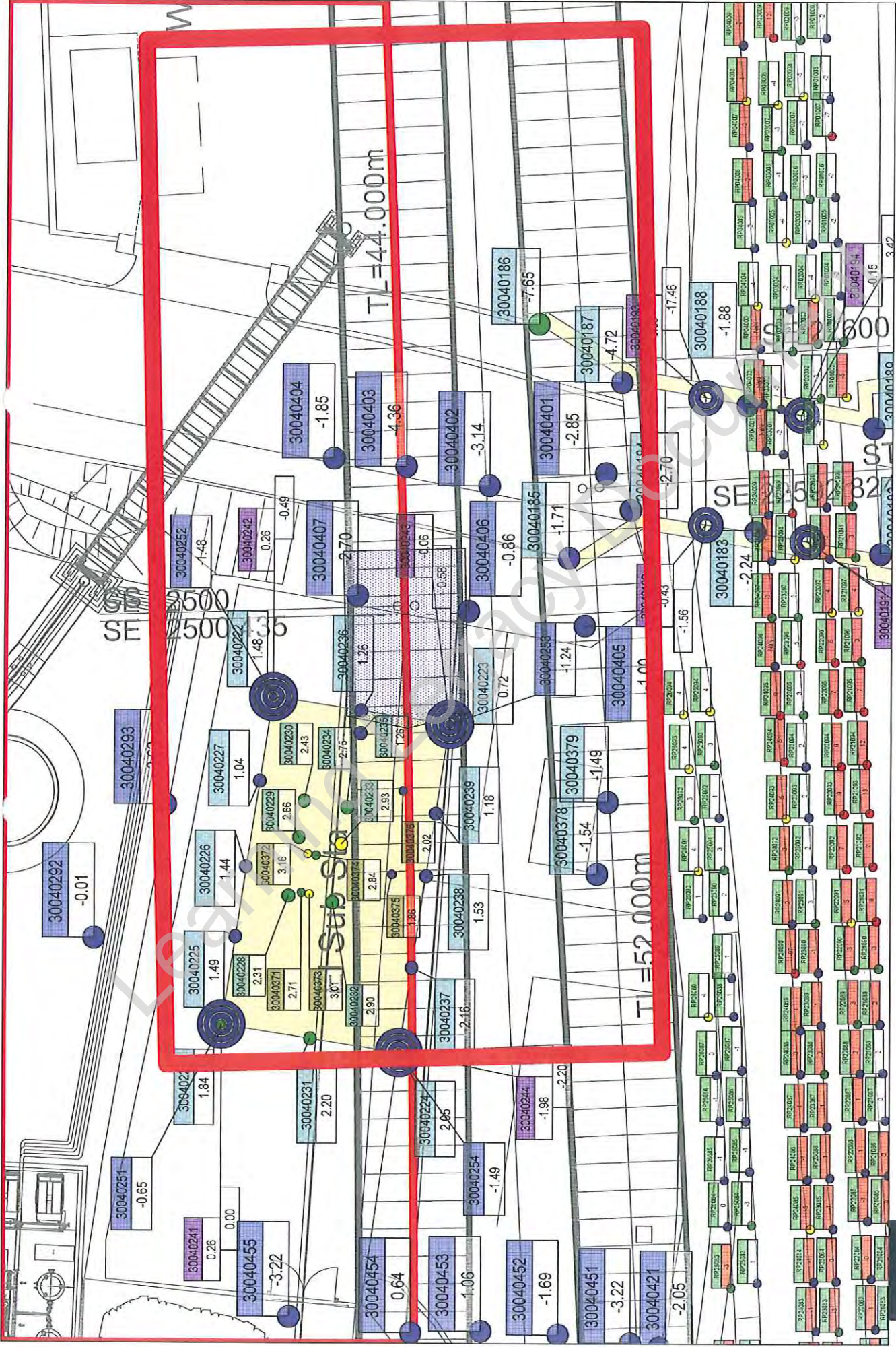


Point: 30040244




Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Cathedral Substation (TM) 22.08.2012 - 19.07.2013
date: 15.07.2014 10:14 current values: 15.07.2014 09:59





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive
 current values: 28.05.2013 09:00

		C310 THAMES TUNNEL REPORT		
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev 2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal			

APPENDIX 11

Cathedral Substation – Lev.St.

Learning Legacy Document

monitoring asset		Cathedral Substation	
reference monitoring drawing:		C310-HTM-C-DWG-CR148-PT005-50010	
name of monitoring section:		Cathedral Substation	
sensor type:		Levelling Studs	
chainage:	91730	point no.:	3004 0251 - 3004 0254
trigger values: [mm]		green: +4 -4	amber: +5 -5
			red: +6 -6
reference document for trigger values:		Management Plan for Control of Ground Movement	
EB-no.:		C310-HTM-Z-STP-CR148-50058	
Appendix:		Y, AAA	

monitoring data

	date	max. value	point no.	comments	
baseline	07/04/12	0			
TBM 1	start ZOI	20/01/13 25/01/13		During TBM drive no readings taken, due to automated HLC system in operation.	
	end ZOI	31/01/13 01/02/13			
TBM 2	start ZOI	26/05/13 28/05/13			
	end ZOI	31/05/13 03/06/13			
longterm	26/09/13	3.54	3004 0253		last reading post tunneling
Evaluation of any potential residual risks		<input checked="" type="checkbox"/>	No residual risk since the Works have been completed by HMJV		
		<input type="checkbox"/>	Yes, residual risk (see comment below)		

summary / comments

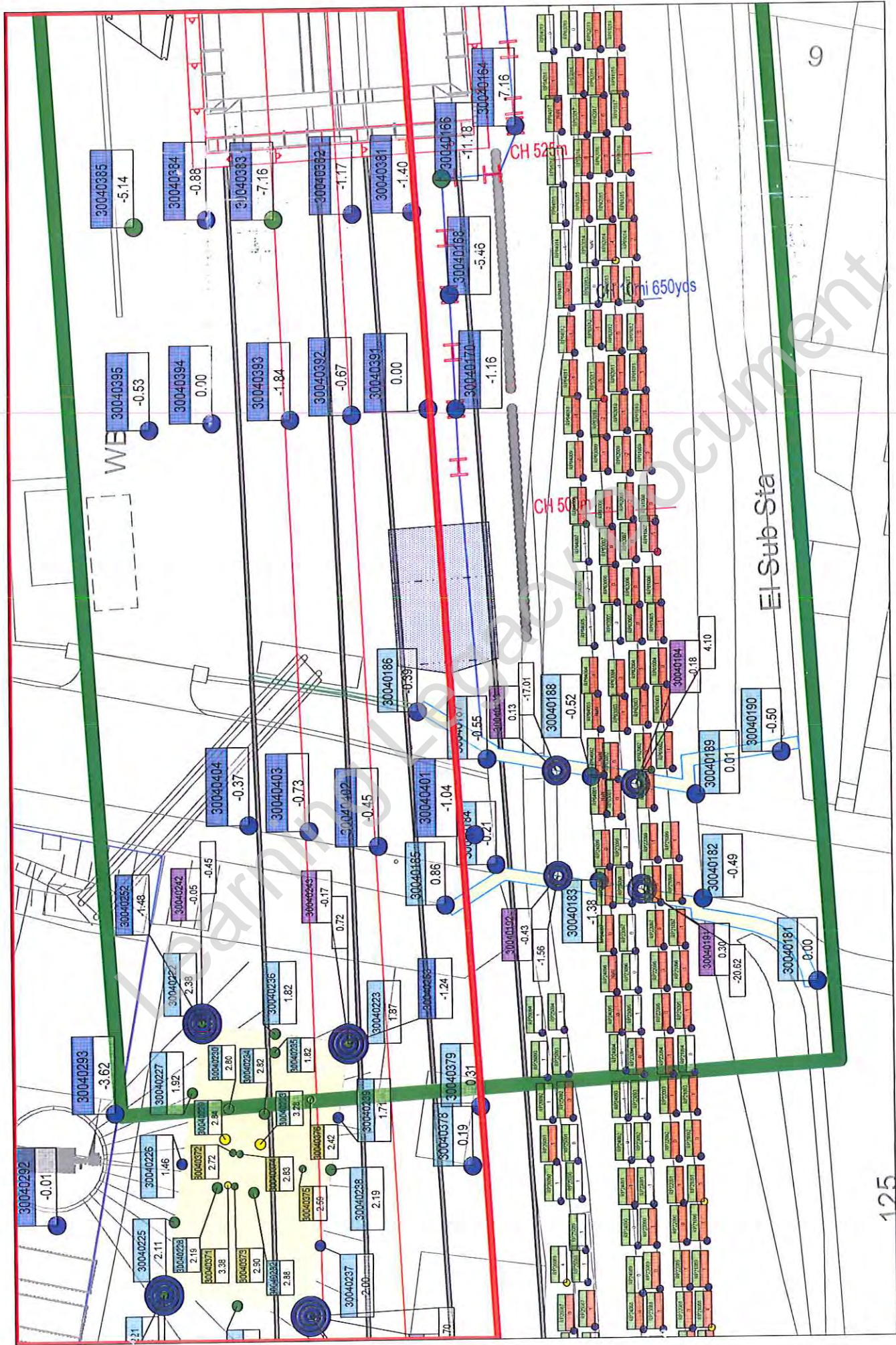
The levelling studs 3004 0251-3004 0254 are only a backup in case there is an total damage on the HLC system. The points are installed at each corner of the building adjacent to the HLC 3004 0221-3004 0224. As a result of TAM drillings and pre-grouting, from app. 15.10.-18.12.2012, the entire building was lifted up by app. 3-4mm, to compensate the max. of 2mm predicted settlement. Final readings were made after HLC and Tiltmeter were dismantled, to have a baseline in place in case any further manual monitoring of the building is required. The values of the studs showed similar deviation as the hydrostatic levelling cells. The summary of the grouting operation is report ref. C310-HTM-C-RGN-CR146_ST004-50020. Under consideration of temperature differences, the surrounding ground condition and the achievable accuracy of the measurement, HMJV has no concern to cease the monitoring. The rate of change in the monitoring data is less than the required standards as per the specifications and drawings.

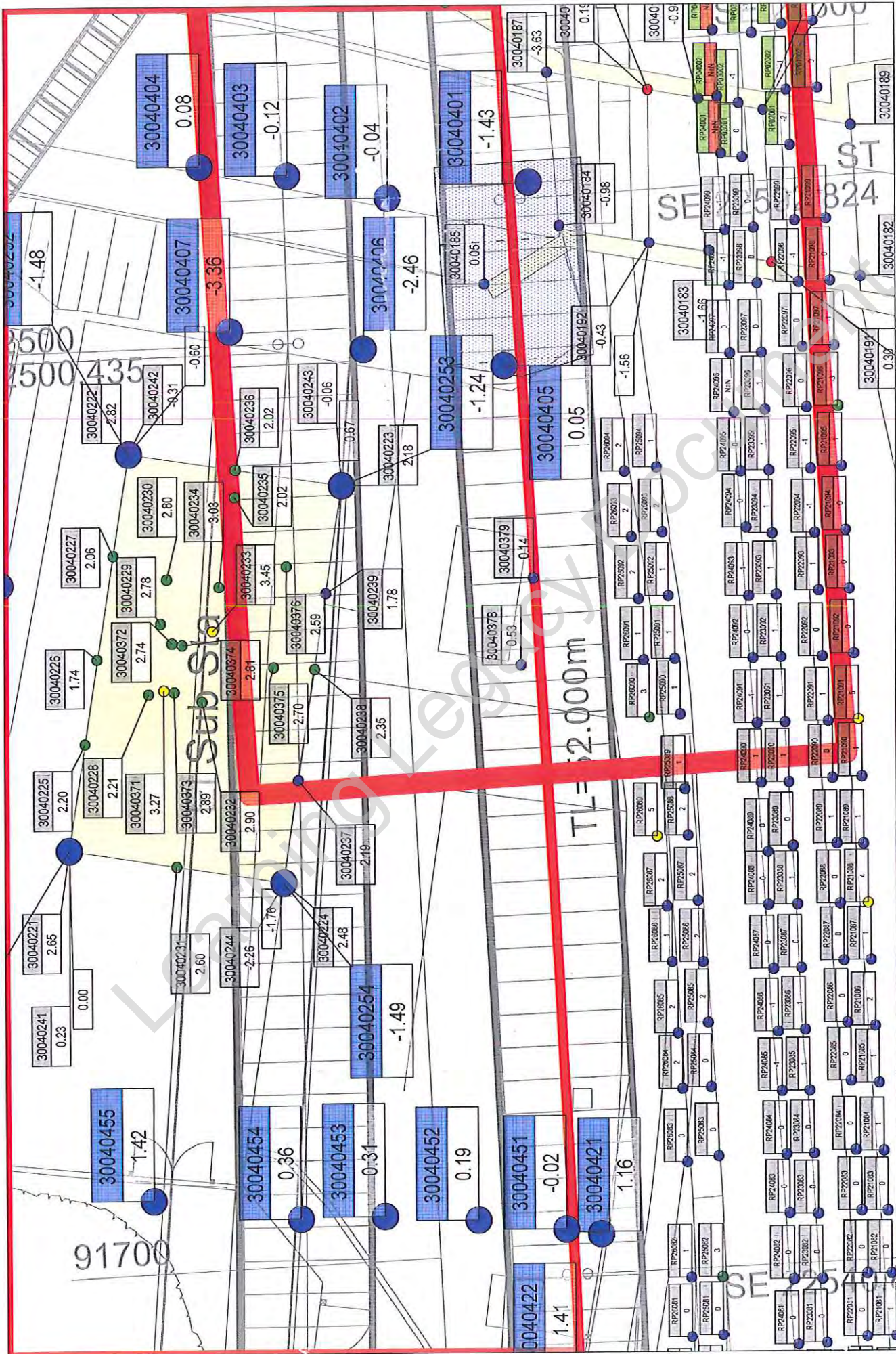
date / signature: 31/03/2015

print name:

HMJV project role:

Monitoring & Survey engineer



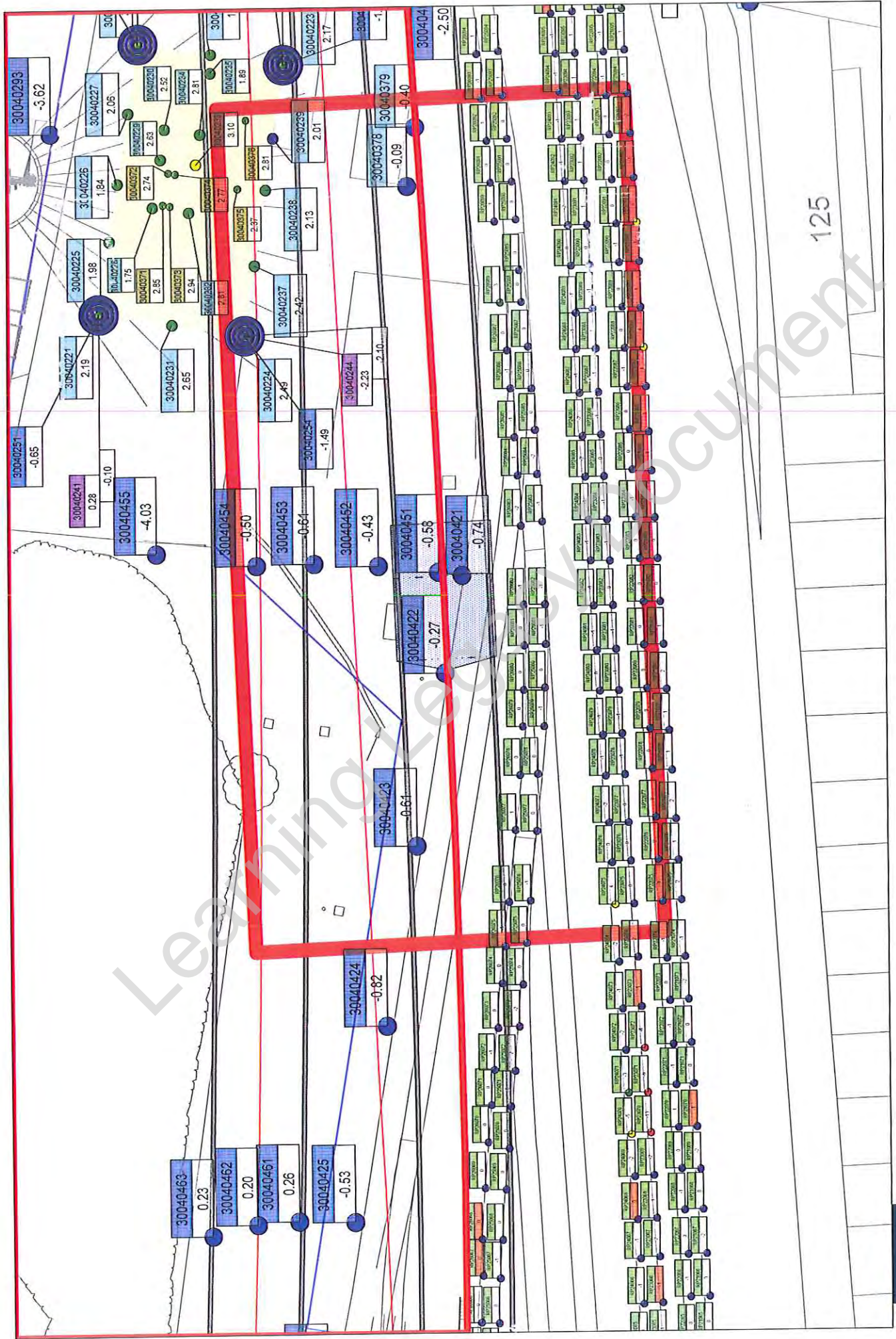


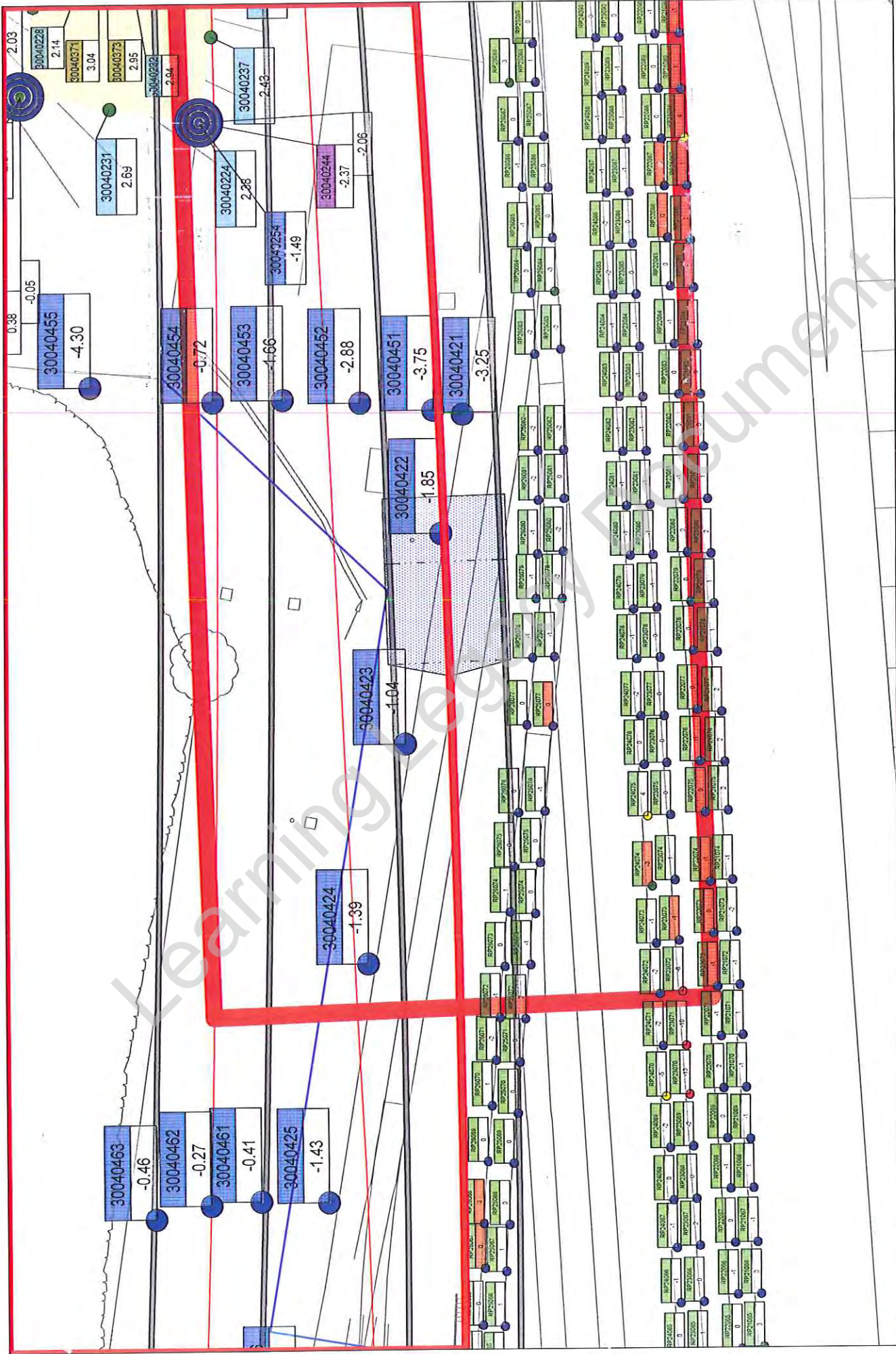
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

working activities: TBM drive WB

current values: 25.01.2013 06:59

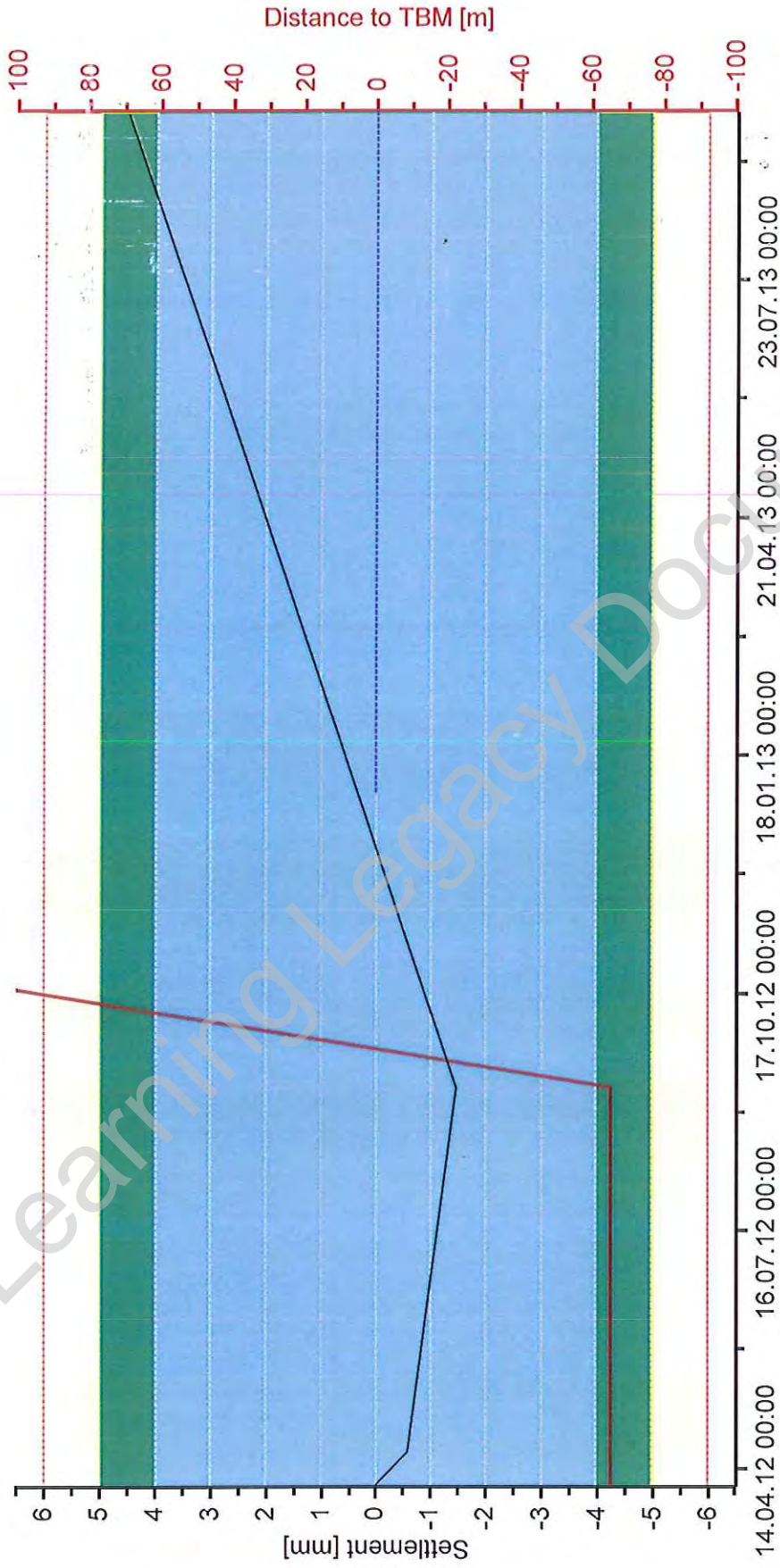






Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive, portal excavation, construction base slab, lining walls and grouting
 current values: 01.02.2013 06:59

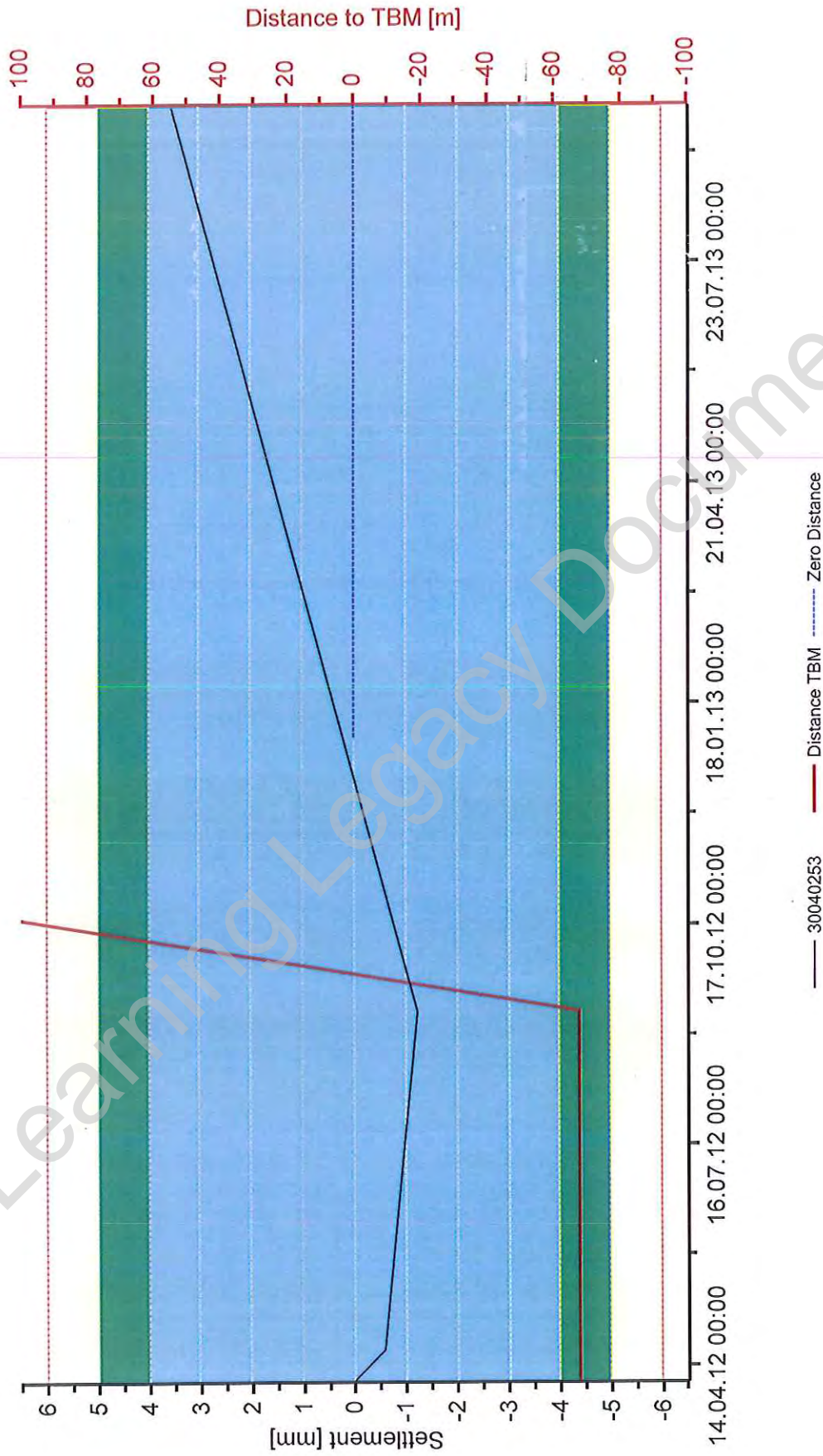
Point: 30040252



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (Lev.St.) 07.04.2012 - 26.09.2013
date: 15.07.2014 11:45 current values: 15.07.2014 11:29



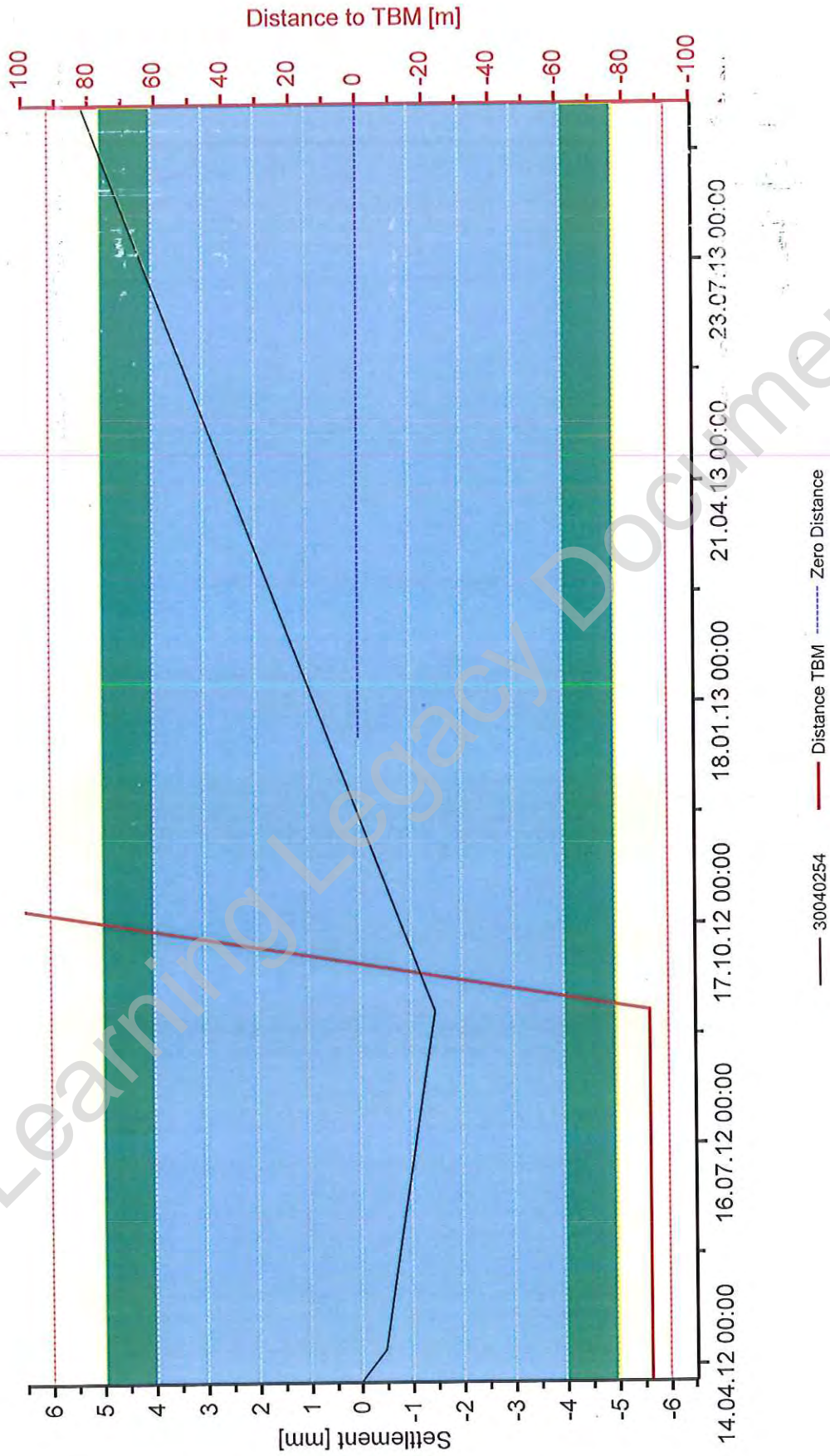
Point: 30040253



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (Lev.St.) 07.04.2012 - 26.09.2013
date: 15.07.2014 11:48 current values: 15.07.2014 11:29

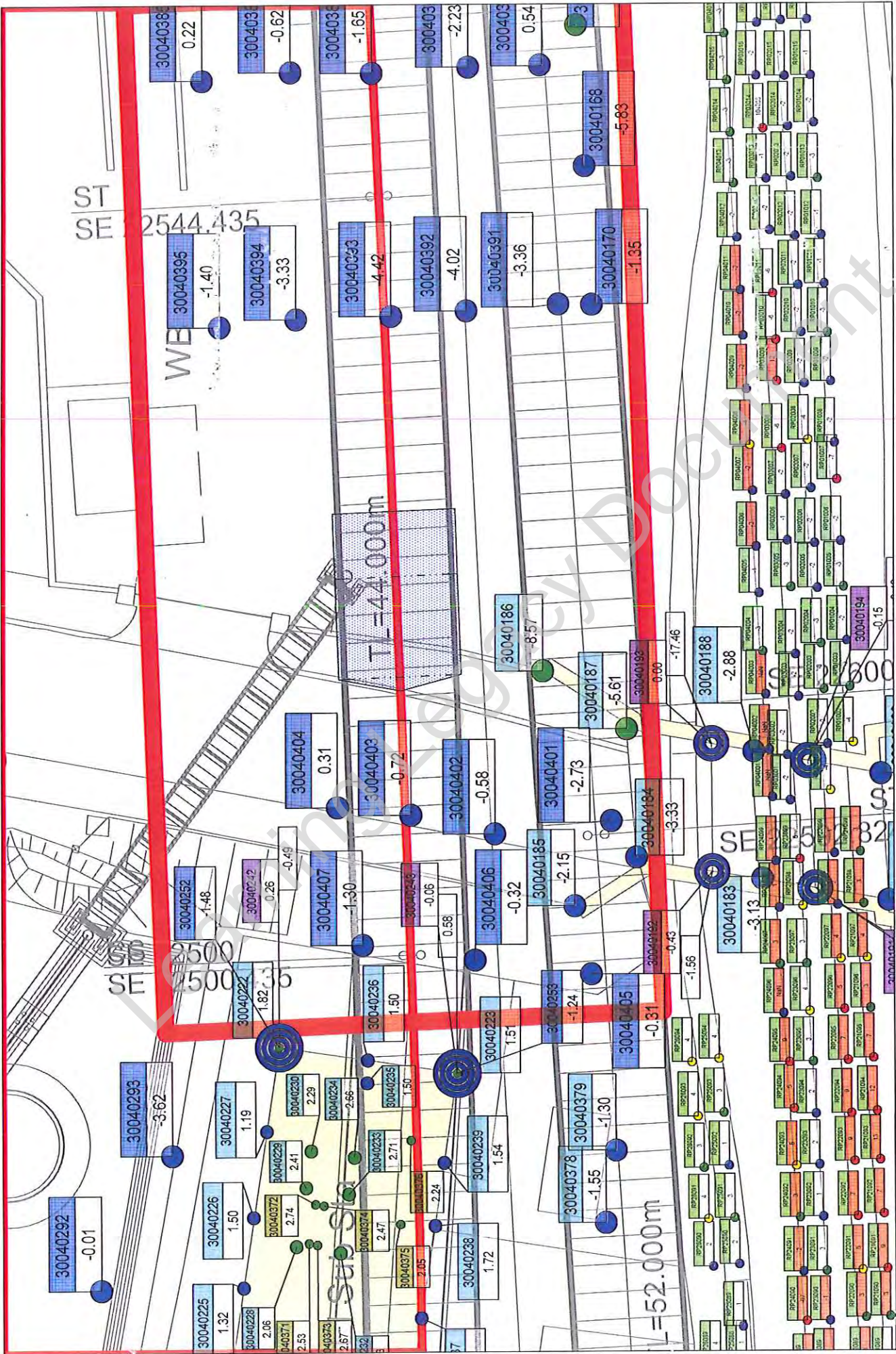


Point: 30040254



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (Lev.St.) 07.04.2012 - 26.09.2013
date: 15.07.2014 11:56 current values: 15.07.2014 11:29





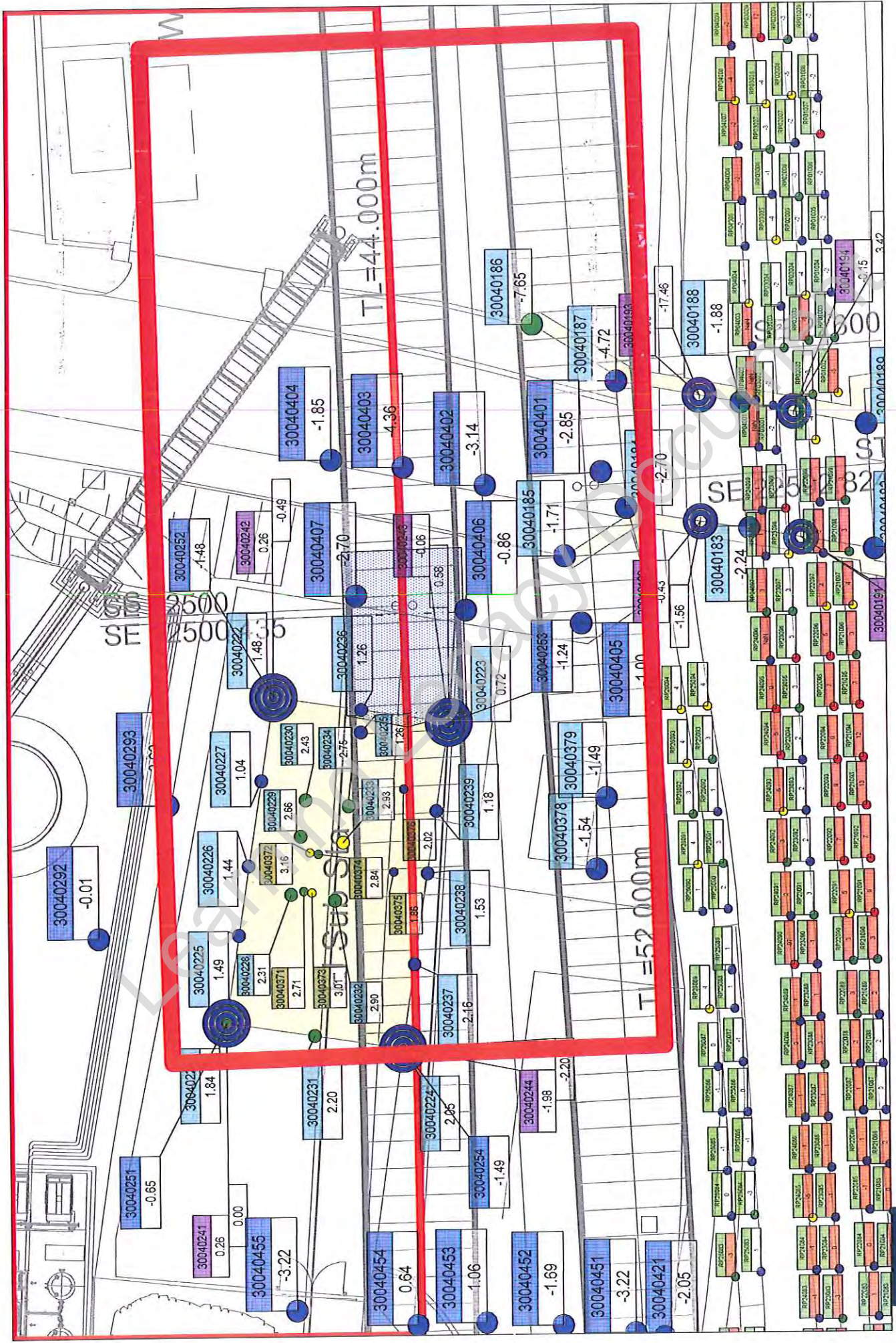
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

working activities: TBM drive

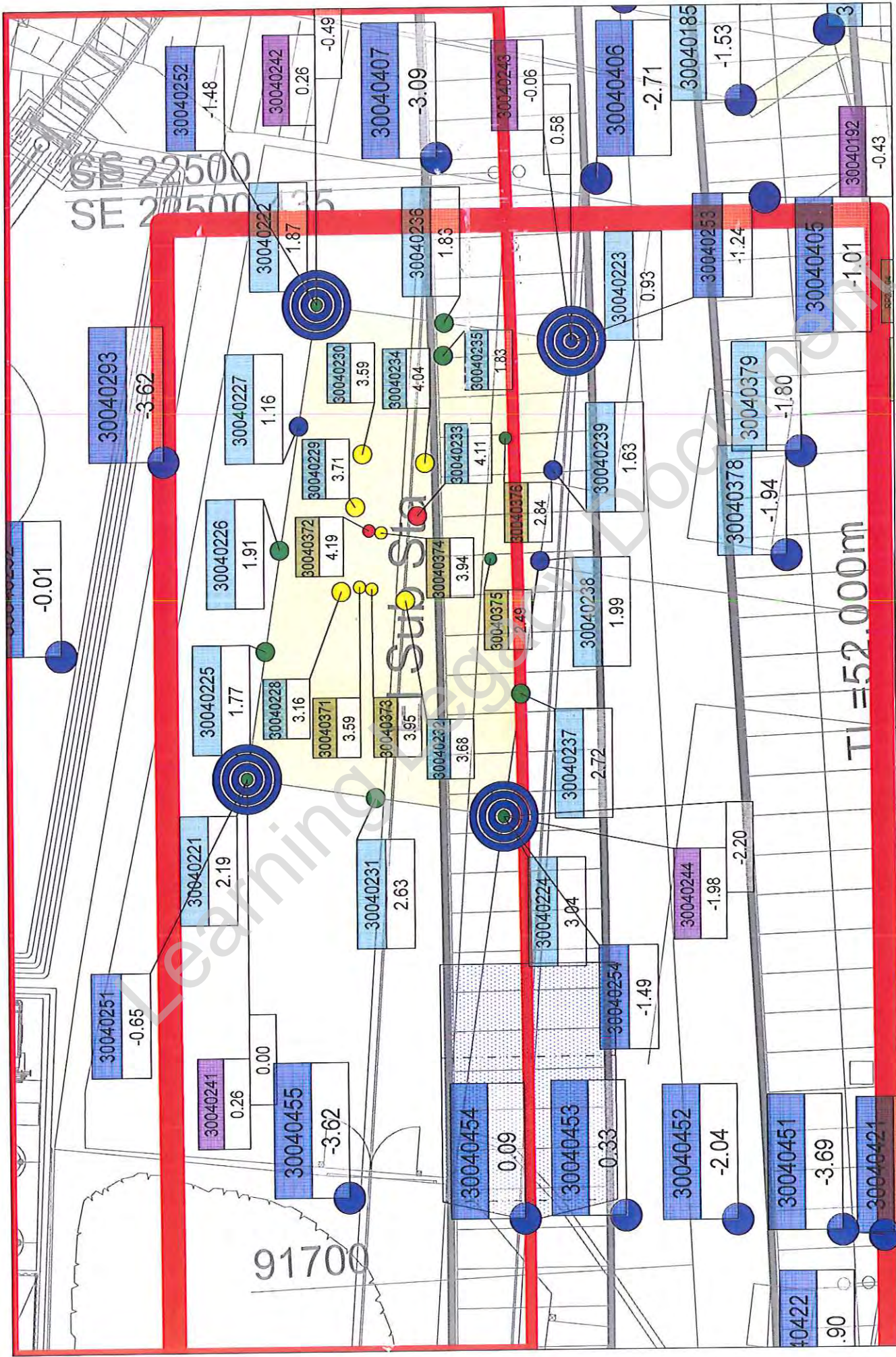
current values: 26.05.2013 09:07



Joint Venture

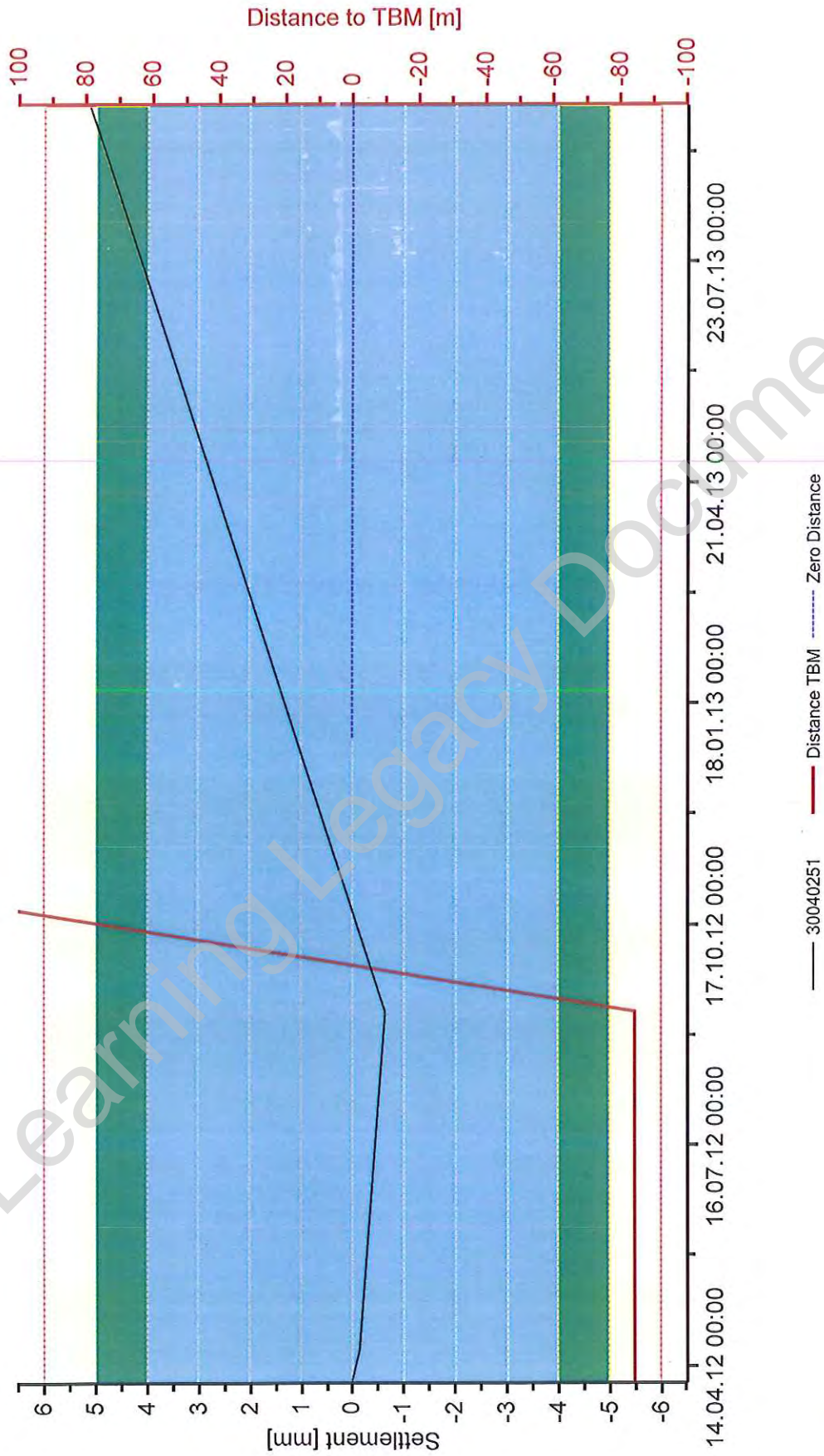


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive
 current values: 28.05.2013 09:00



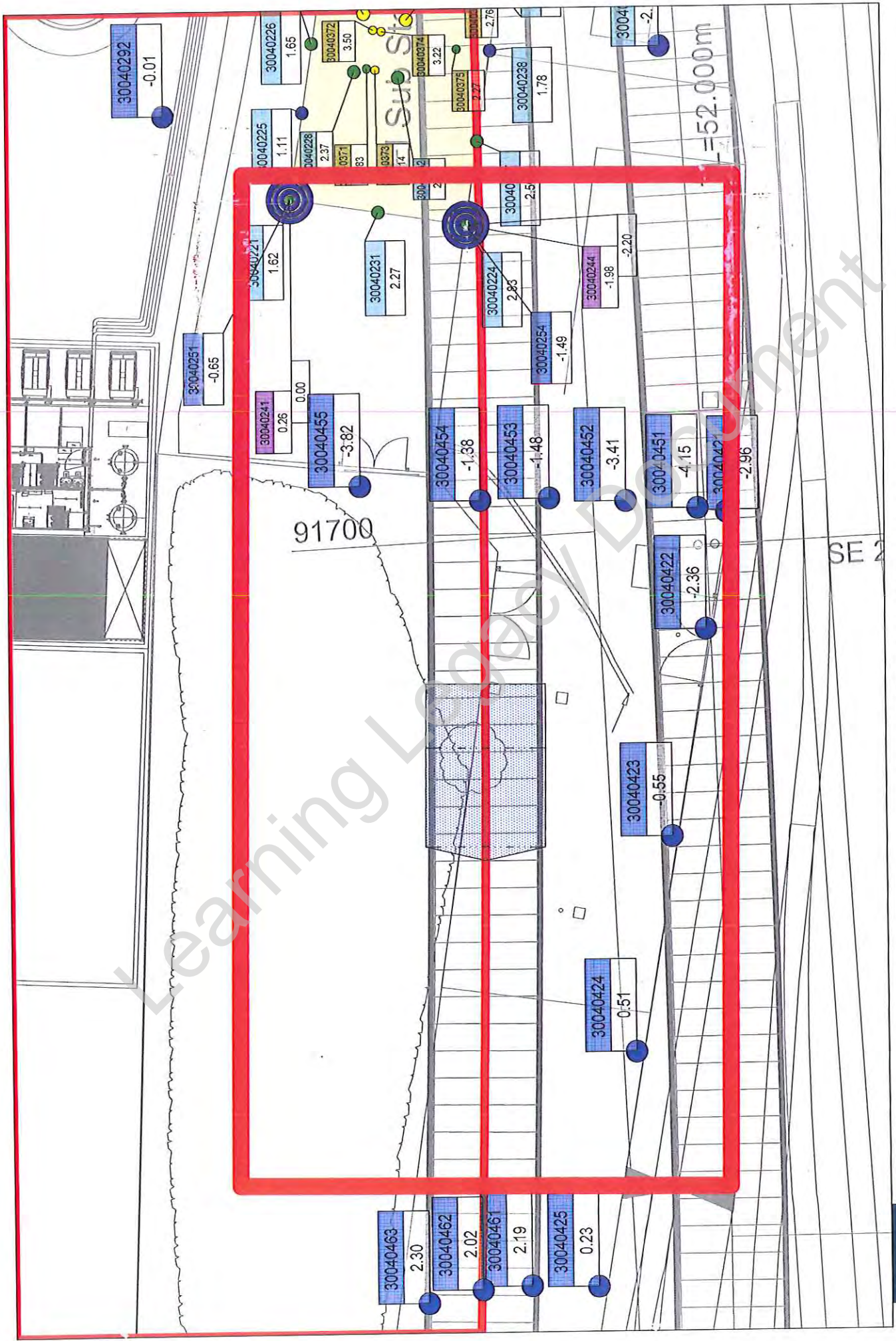
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: portal excavation, construction base slab and capping beam
 current values: 31.05.2013 08:59

Point: 30040251



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Cathedral Substation (Lev.St.) 07.04.2012 - 26.09.2013
date: 15.07.2014 11:40 current values: 15.07.2014 11:29

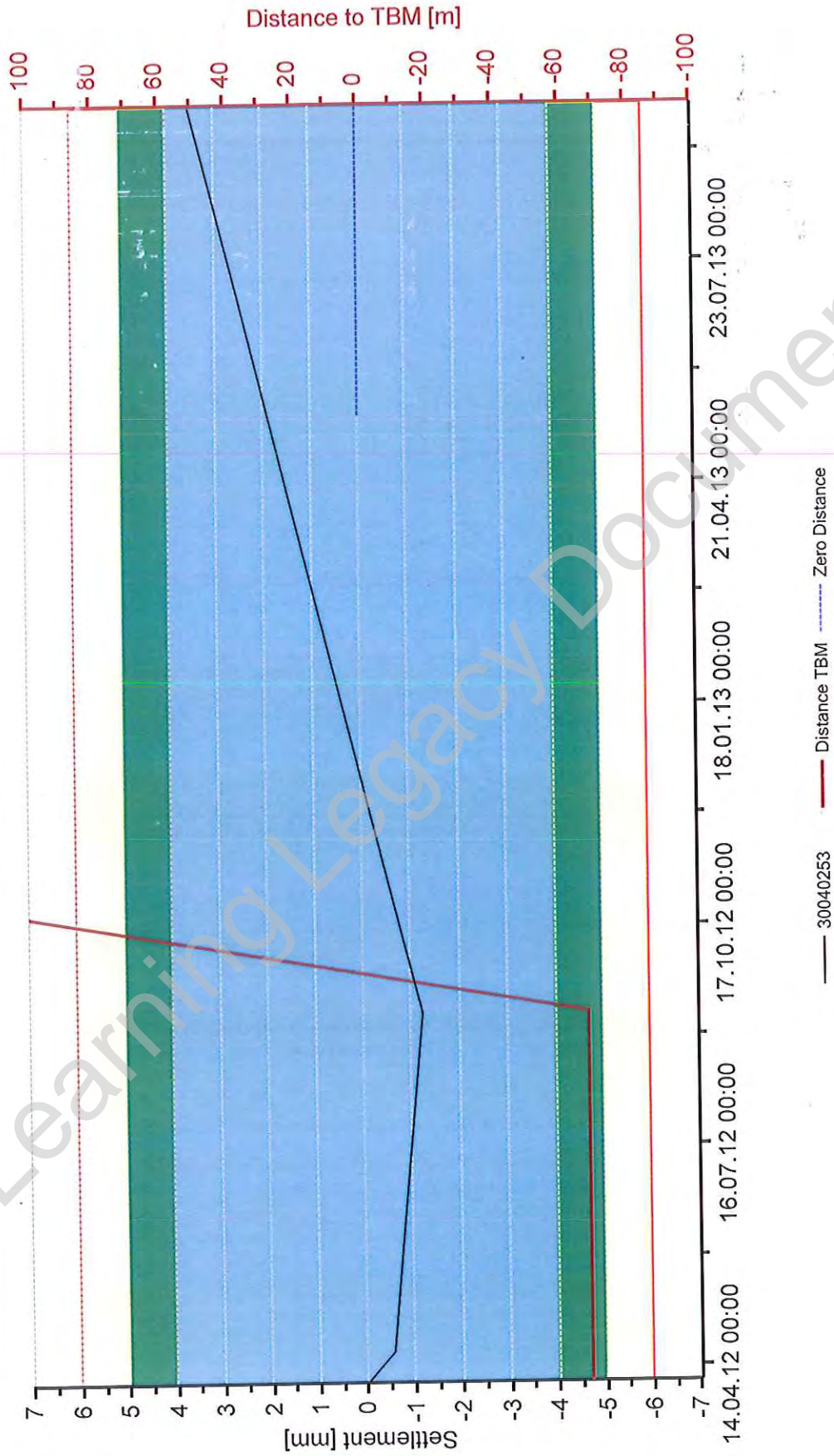




Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 03.06.2013 09:00



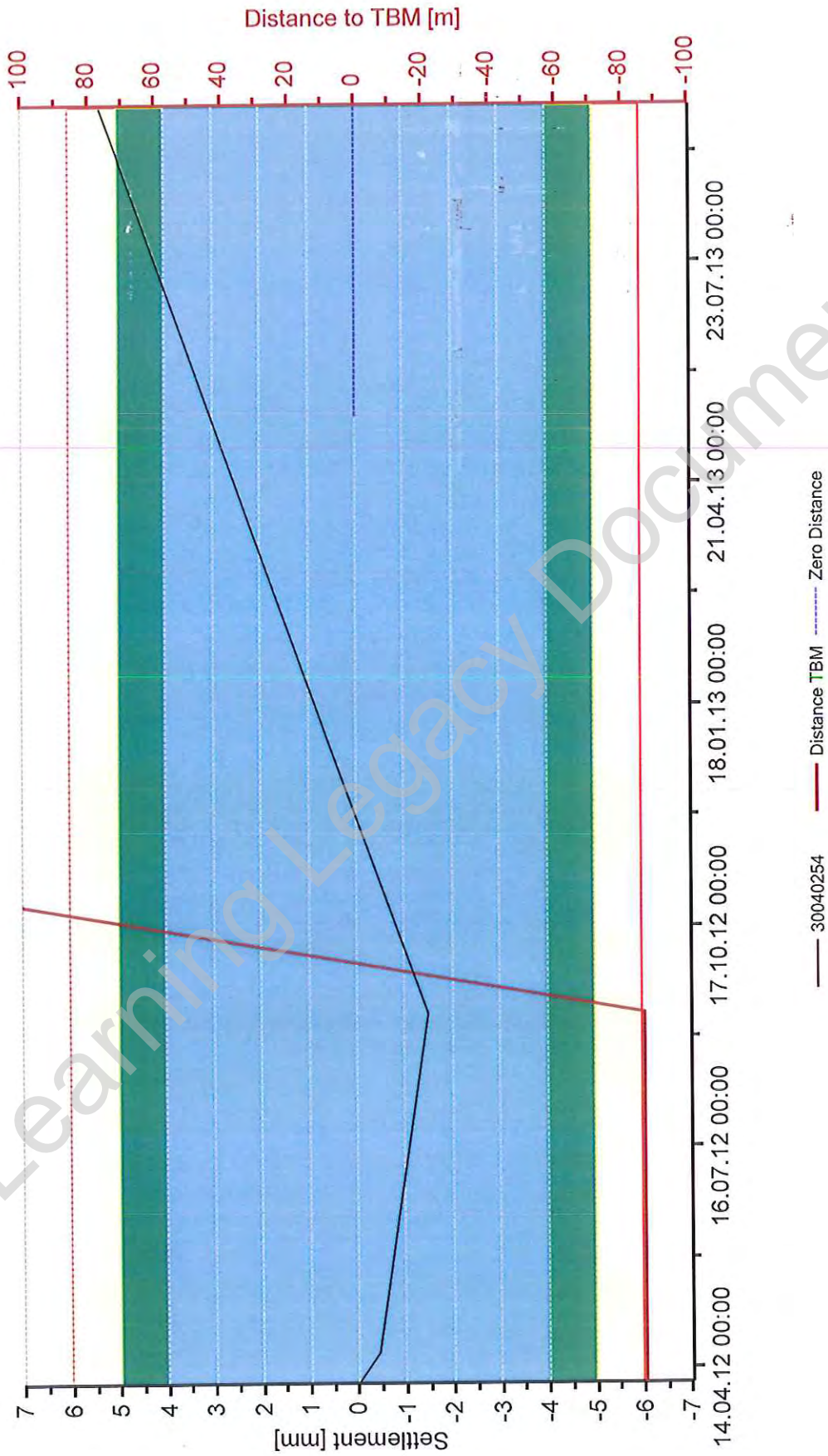
Point: 30040253



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Cathedral Substation (Lev.St.) 07.04.2012 - 26.09.2013
date: 15.07.2014 12:28 current values: 15.07.2014 12:14




Point: 30040254



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Cathedral Substation (Lev.St.) 07.04.2012 - 26.09.2013
date: 15.07.2014 12:31 current values: 15.07.2014 12:14




 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev	2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal				

APPENDIX 11.1

Dilapidation Report Cathedral Substation

Refer to EB Doc.No.: C310-HTM-R-RGN-CR146_ST004-50001

Learning Legacy Document

 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev	2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal				

APPENDIX 12
CS1 – Old Coal Yard

Learning Legacy Document

monitoring asset	Area of Old Coalyard		
reference monitoring drawing:	C310-HTM-C-DWG-CR148-PT005-50010		
name of monitoring section:	CS1- Old Coalyard area		
sensor type:	manual levelling studs		
chainage:	91700	point no.:	3004 0451 - 3004 0455
trigger values: [mm]	green: +16 -16	amber: +20 -20	red: +25 -25
reference document for trigger values:	Management Plan for Control of Ground Movement		
EB-no.:	C310-HTM-Z-STP-CR148-50058		
Appendix:	AAA		

monitoring data

	date		max. value	point no.	comments
baseline	15/12/12		0.00		
TBM 1	start ZOI	26/01/13	1.06	3004 0453	
	end ZOI	03/02/13	-4.20	3004 0451	breached not any trigger value
TBM 2	start ZOI	28/05/13	-3.22	3004 0451	
	end ZOI	09/06/13	-4.04	3004 0451	breached not any trigger value
longterm		24/09/13	-5.34	3004 0451	last reading 3 month post tunneling, Cross section not longer measurable

Evaluation of any potential residual risks	<input checked="" type="checkbox"/>	No residual risk since the Works have been completed by HMJV
	<input type="checkbox"/>	Yes, residual risk (see comment below)

summary / comments

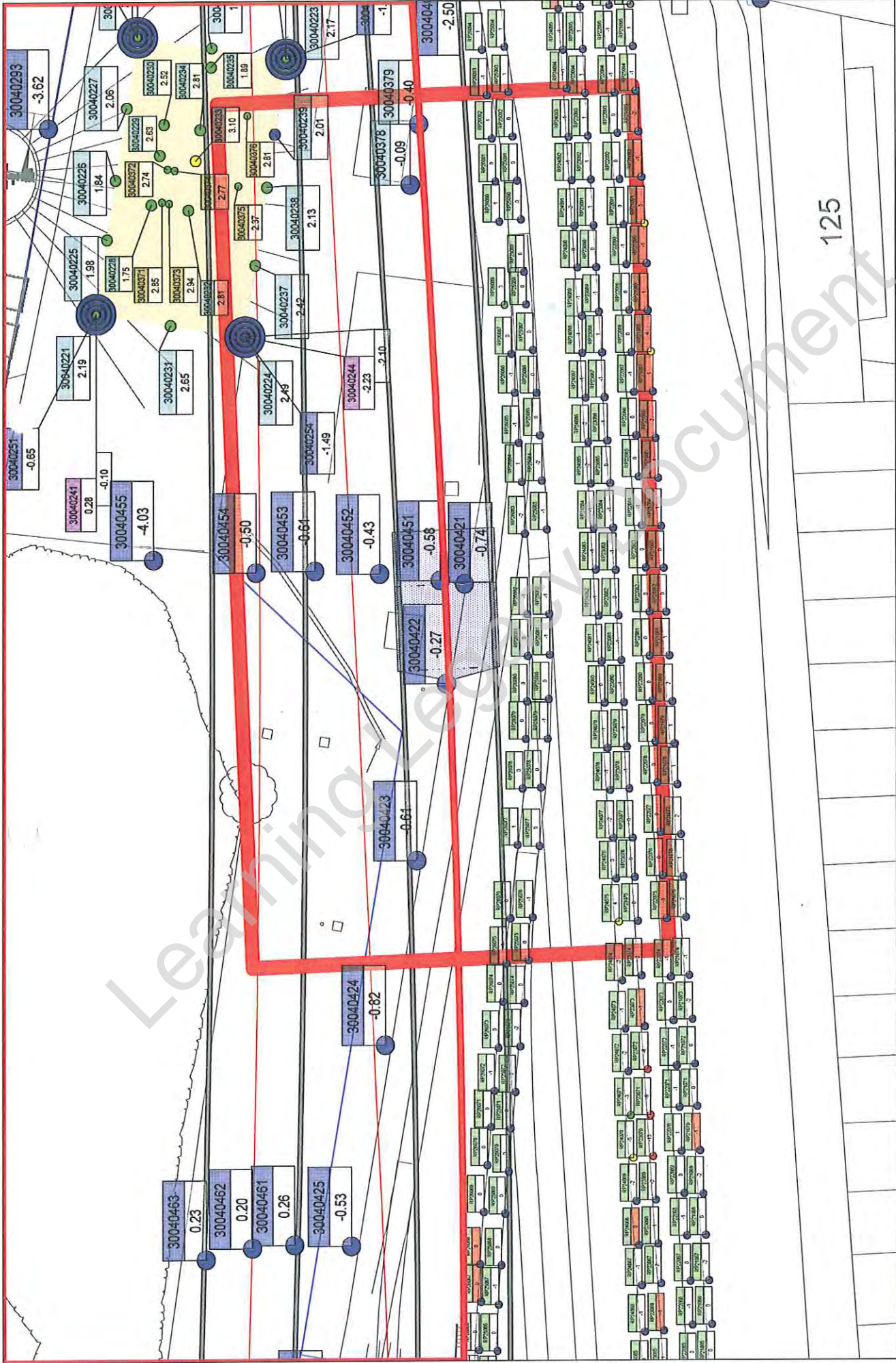
Cross section was no longer measureable due to no access (NR siding & CSS area)
 Under consideration of temperature differences, the surrounding ground condition and the achievable accuracy of the measurement, HMJV has no concern to cease the monitoring.
 The rate of change in the monitoring data is less than the required standards as per the specifications and drawings.

date / signature: 08/01/14

print name:

HMJV project role:

Monitoring & Survey engineer

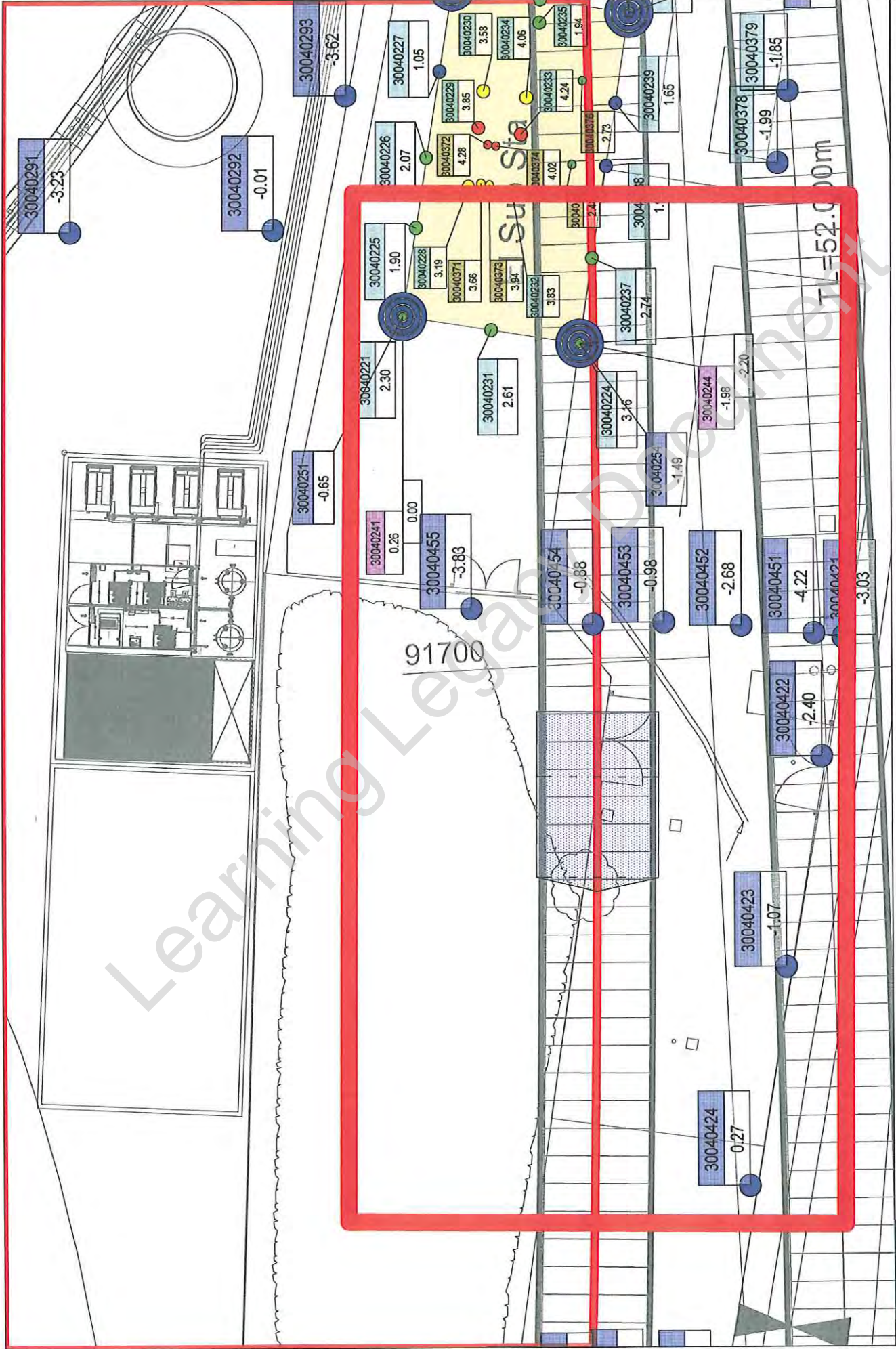


Point: 30040451



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - CS1 (Old Coalyard) 15.12.2012 - 24.09.2013
date: 03.06.2014 13:57 current values: 03.06.2014 13:46





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 01.06.2013 09:00

Point: 30040451



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - CS1 (Old Coalyard) 15.12.2012 - 24.09.213
date: 03.06.2014 13:49 current values: 03.06.2014 13:40



monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	baseline		1. following		2. following		3. following		4. following		5. following		6. following						
	date	elevation	12/01/2013	deviation from last/ baseline	26/01/2013	elevation	deviation from last/ baseline	27/01/2013	elevation	deviation from last/ baseline	28/01/2013	elevation	deviation from last/ baseline	29/01/2013	elevation	deviation from last/ baseline	30/01/2013		
Point No.		elevation																	
3004 0451		103.885		0	103.886	1	1	103.884	-2	-1	103.885	1	0	103.886	1	0	103.885	-1	-1
3004 0452		103.884		0	103.885	1	1	103.883	-1	-1	103.884	0	0	103.884	1	0	103.883	-1	0
3004 0453		103.711		0	103.712	1	1	103.710	-1	0	103.711	0	0	103.711	1	0	103.710	-1	-1
3004 0454		103.431		0	103.432	0	0	103.431	-1	-1	103.431	1	0	103.432	1	1	103.431	-1	-1
3004 0455		103.224		1	103.224	-1	0	103.221	-3	-3	103.221	0	-2	103.222	0	-2	103.220	-2	-4
3004 0461		103.597		1	103.599	0	1	103.597	-2	-1	103.597	0	0	103.598	1	0	103.598	0	0
3004 0462		103.540		1	103.541	0	1	103.539	-2	-1	103.539	1	0	103.540	1	0	103.540	0	0
3004 0463		103.590		1	103.591	0	1	103.590	-1	-1	103.590	0	0	103.591	1	0	103.591	0	0
3004 0471		103.807		-1	103.807	0	-1	103.806	-1	-1	103.806	0	-1	103.806	0	-1	103.806	0	-1
3004 0472		103.528		0	103.529	1	1	103.527	-2	-2	103.528	2	0	103.528	0	0	103.528	-1	0
3004 0473		103.361		1	103.362	0	0	103.361	-1	0	103.362	1	1	103.362	0	0	103.360	-1	-1
3004 0474		103.174		0	103.173	-1	-1	103.172	-1	-2	103.172	0	-1	103.172	0	-1			
3004 0475		103.047		0															
3004 0481		103.321		1															
3004 0482		103.217		0															
3004 0483		103.164		0															
3004 0484		103.137		0															
3004 0485		103.115		0															
3004 0486		103.110		-1															
3004 0487		103.093		0															

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	baseline		7. following		8. following		9. following		10. following		11. following		12. following	
	date	elevation	31/01/2013	deviation from last/ baseline	01/02/2013	deviation from last/ baseline	02/02/2013	deviation from last/ baseline	03/02/2013	deviation from last/ baseline	04/02/2013	deviation from last/ baseline	05/02/2013	deviation from last/ baseline
Point No.		elevation												
3004 0451		103.885	103.882	-3	103.881	-1	-4	103.881	0	-4	103.881	0	-4	
3004 0452		103.884	103.881	-2	103.881	0	-3	103.881	1	-3	103.881	0	-3	
3004 0453		103.711	103.709	-1	103.709	0	-1	103.710	1	-1	103.710	0	-1	
3004 0454		103.431	103.431	0	103.430	0	-1	103.431	1	0	103.432	1	0	
3004 0455		103.224	103.219	0	103.219	0	-4	103.220	1	-4	103.221	1	-3	
3004 0461		103.597	103.597	-1	103.597	0	0	103.598	1	1	103.599	1	1	
3004 0462		103.540	103.539	0	103.539	0	0	103.540	1	1	103.541	1	1	
3004 0463		103.590	103.590	-1	103.590	0	0	103.591	1	1	103.592	1	2	
3004 0471		103.807	103.805	-1	103.806	0	-2	103.806	1	-1	103.807	1	0	
3004 0472		103.528	103.527	0	103.528	1	0	103.529	1	1	103.529	0	1	
3004 0473		103.361	103.361	0	103.361	0	0	103.362	1	0	103.362	0	1	
3004 0474		103.174												
3004 0475		103.047												
3004 0481		103.321			103.319	-2	-1							
3004 0482		103.217			103.215	-2	-2							
3004 0483		103.164												
3004 0484		103.137			103.135	-2	-2							
3004 0485		103.115												
3004 0486		103.110												
3004 0487		103.093												

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	15/12/12		13. following		14. following		15. following		16. following		17. following		18. following	
	baseline	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
date			05/02/2013		07/02/2013		08/02/2013		09/02/2013		10/02/2013		11/02/2013	
Point No.	elevation		elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885		103.883	1 -3	103.883	1 -3								
3004 0452	103.884		103.883	2 -1	103.883	2 -1								
3004 0453	103.711		103.712	2 1	103.712	2 1								
3004 0454	103.431		103.433	1 2	103.433	1 2								
3004 0455	103.224		103.222	1 -2	103.222	1 -2								
3004 0461	103.597		103.599	1 1	103.599	0 2	103.599	0 2	103.600	1 2	103.599	-1 2	103.600	0 2
3004 0462	103.540		103.541	1 1	103.541	0 2	103.541	0 2	103.542	1 3	103.541	-1 1	103.542	1 2
3004 0463	103.590		103.592	1 2	103.592	0 2	103.592	0 2	103.593	1 2	103.592	-1 2	103.592	0 2
3004 0471	103.807		103.807	0 -1	103.807	1 0	103.807	0 0	103.808	1 0	103.808	0 0	103.808	1 1
3004 0472	103.528		103.529	0 1	103.529	0 1	103.529	0 1	103.530	1 2	103.530	-1 2	103.530	1 2
3004 0473	103.361		103.362	1 1	103.363	1 1	103.362	0 1	103.363	1 2	103.363	-1 1	103.363	1 2
3004 0474	103.174													
3004 0475	103.047													
3004 0481	103.321		103.321	2 0	103.321	0 0								
3004 0482	103.217		103.217	2 1	103.217	0 1								
3004 0483	103.164													
3004 0484	103.137		103.137	2 0	103.137	0 0								
3004 0485	103.115													
3004 0486	103.110													
3004 0487	103.093													

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	baseline		19. following		20. following		21. following		22. following		23. following		24. following		
	date	elevation	12/02/2013	deviation from last/ baseline	13/02/2013	deviation from last/ baseline	14/02/2013	elevation	deviation from last/ baseline	15/02/2013	elevation	deviation from last/ baseline	16/02/2013	elevation	deviation from last/ baseline
Point No.		elevation		deviation from last/ baseline		deviation from last/ baseline		elevation	deviation from last/ baseline		elevation	deviation from last/ baseline		elevation	deviation from last/ baseline
3004 0451		103.885	103.882	0	-3										
3004 0452		103.884	103.882	0	-1										
3004 0453		103.711	103.712	0	1										
3004 0454		103.431	103.432	0	1										
3004 0455		103.224	103.221	-1	-2										
3004 0461		103.597	103.599	0	2	103.600	0	2	103.597	-3	103.597	0	-1	103.597	0
3004 0462		103.540	103.542	0	2	103.542	0	2	103.539	-3	103.539	0	0	103.539	-1
3004 0463		103.590	103.593	0	2	103.593	0	2	103.590	-3	103.590	0	0	103.590	0
3004 0471		103.807	103.808	0	1	103.808	0	1	103.806	-2	103.805	0	-2	103.805	0
3004 0472		103.528	103.530	-1	2	103.530	1	2	103.528	-3	103.527	0	-1	103.527	0
3004 0473		103.361	103.363	-1	1	103.363	1	2	103.361	-3	103.360	-1	-1	103.360	0
3004 0474		103.174													
3004 0475		103.047													
3004 0481		103.321	103.320	-1	0										
3004 0482		103.217	103.216	-1	0										
3004 0483		103.164													
3004 0484		103.137	103.137	-1	-1										
3004 0485		103.115													
3004 0486		103.110													
3004 0487		103.093													

monitoring table



Joint Venture

project: C310 Thames Tunnel

No. of reading	structure: Cross Section 1 - 4 Area NR + Old Coalyard												
	baseline	25. following		26. following		27. following		28. following		29. following		30. following	
date	15/12/12	19/02/2013		19/02/2013		20/02/2013		21/02/2013		22/02/2013		23/02/2013	
Point No.	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885												
3004 0452	103.884												
3004 0453	103.711												
3004 0454	103.431												
3004 0455	103.224												
3004 0461	103.597	103.597	0	-1	103.596	0	-1	103.596	0	-1	103.596	0	-1
3004 0462	103.540	103.539	0	-1	103.538	0	-1	103.539	0	-1	103.539	0	-1
3004 0463	103.590	103.590	0	0	103.589	0	-1	103.590	0	-1	103.590	0	-1
3004 0471	103.807	103.805	0	-2	103.805	0	-3	103.804	0	-3	103.805	0	-3
3004 0472	103.528	103.527	0	-1	103.527	0	-2	103.527	0	-2	103.527	0	-2
3004 0473	103.361	103.360	-1	-2	103.360	1	-1	103.360	0	-1	103.360	0	-2
3004 0474	103.174												
3004 0475	103.047												
3004 0481	103.321					103.321	0	0					
3004 0482	103.217					103.217	0	0					
3004 0483	103.164												
3004 0484	103.137					103.137	0	0					
3004 0485	103.115												
3004 0486	103.110												
3004 0487	103.093												

monitoring table



Joint Venture

project: C310 Thames Tunnel

		structure: Cross Section 1 - 4 Area NR + Old Coalyard											
No. of reading	baseline	31. following		32. following		33. following		34. following		35. following		36. following	
	date	15/12/12	24/02/2013	25/02/2013	25/02/2013	25/02/2013	27/02/2013	27/02/2013	27/02/2013	28/02/2013	28/02/2013	01/03/2013	01/03/2013
Point No.	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885									103.879	0		
3004 0452	103.884									103.879	0		
3004 0453	103.711									103.709	0		
3004 0454	103.431									103.429	0		
3004 0455	103.224									103.218	0		
3004 0461	103.597		-1							103.596	0		
3004 0462	103.540		-1							103.539	0		
3004 0463	103.590		-1							103.590	0		
3004 0471	103.807		0	103.805	0	103.806	1	103.804	-2	103.804	0	103.806	2.35
3004 0472	103.528		1	103.527	-1	103.528	1	103.527	-1	103.526	0	103.529	2.32
3004 0473	103.361		0	103.360	0	103.362	1	103.360	-1	103.360	0	103.361	1.28
3004 0474	103.174												
3004 0475	103.047												
3004 0481	103.321												
3004 0482	103.217												
3004 0483	103.164												
3004 0484	103.137												
3004 0485	103.115												
3004 0486	103.110												
3004 0487	103.093												
								103.214	-3	103.214	0	103.213	0
								103.156	-7	103.156	0	103.156	0
								103.135	-3	103.135	0	103.132	-3
								103.118	3	103.118	0	103.111	-7
								103.104	-6	103.104	0	103.104	0

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	baseline		37. following		38. following		39. following		40. following		41. following		42. following		
	date	elevation	02/03/2013	deviation from last/ baseline	03/03/2013	deviation from last/ baseline	04/03/2013	deviation from last/ baseline	05/03/2013	deviation from last/ baseline	06/03/2013	deviation from last/ baseline	07/03/2013	deviation from last/ baseline	
Point No.		elevation		deviation from last/ baseline		deviation from last/ baseline		deviation from last/ baseline		deviation from last/ baseline		deviation from last/ baseline		deviation from last/ baseline	
3004 0451		103.885											103.880	0	-6
3004 0452		103.884											103.880	1	-4
3004 0453		103.711											103.709	0	-2
3004 0454		103.431											103.430	1	-1
3004 0455		103.224											103.219	1	-5
3004 0461		103.597											103.597	0	-1
3004 0462		103.540											103.539	0	-1
3004 0463		103.590											103.590	0	-1
3004 0471		103.807											103.806	0	-1
3004 0472		103.528											103.527	-1	-1
3004 0473		103.361											103.362	1	1
3004 0474		103.174													
3004 0475		103.047													
3004 0481		103.321													
3004 0482		103.217	103.213	0	-3	103.212	-1	-5	103.212	0	-5	103.212	0	-5	
3004 0483		103.164	103.156	0	-8	103.155	-1	-9	103.155	0	-9	103.155	0	-9	-9
3004 0484		103.137	103.132	0	-6	103.131	-1	-6	103.131	0	-7	103.131	0	-6	-6
3004 0485		103.115	103.111	0	-4	103.110	0	-5	103.110	0	-5	103.110	0	-5	-5
3004 0486		103.110	103.104	0	-6	103.104	0	-6	103.104	0	-7	103.103	-1	-7	-10
3004 0487		103.093													

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	43. following		44. following		45. following		46. following		47. following		48. following	
	date	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	21/05/2013
3004 0451	15/12/12	103.885										
3004 0452		103.884								103.880	1	103.882
3004 0453		103.711								103.881	1	103.882
3004 0454		103.431								103.710	1	103.711
3004 0455		103.224								103.431	1	103.432
3004 0461		103.597								103.219	0	103.220
3004 0462		103.540			103.597	0	-1	103.596	0	103.598	2	103.599
3004 0463		103.590			103.539	0	-1	103.538	-1	103.540	2	103.541
3004 0471		103.807			103.590	0	0	103.589	-1	103.591	2	103.593
3004 0472		103.528			103.804	-2	-3	103.804	0	103.806	2	103.805
3004 0473		103.361			103.527	-1	-1	103.526	-1	103.529	2	103.529
3004 0474		103.174			103.361	-1	0	103.360	-1	103.362	2	103.363
3004 0475		103.047										103.143
3004 0481		103.321										103.115
3004 0482		103.217										103.211
3004 0483		103.164			103.213	1	-4	103.212	-1	103.170		reinstalled and ebaselined
3004 0484		103.137			103.155	1	-8	103.155	-1	103.155	0	103.127
3004 0485		103.115			103.132	0	-6	103.131	-1	103.131	0	103.107
3004 0486		103.110			103.110	0	-5	103.109	-1			103.094
3004 0487		103.093			103.099	-1	-11			103.098	-1	-12

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	baseline		49. following		50. following		51. following		52. following		53. following		54. following		
	date	elevation	28/05/2013	deviation from last/ baseline	29/05/2013	deviation from last/ baseline	30/05/2013	elevation	deviation from last/ baseline	31/05/2013	elevation	deviation from last/ baseline	01/06/2013	elevation	deviation from last/ baseline
Point No.		elevation		deviation from last/ baseline		deviation from last/ baseline		elevation	deviation from last/ baseline		elevation	deviation from last/ baseline		elevation	deviation from last/ baseline
3004 0451	15/12/12	103.885	103.882	0	103.882	0	103.882	0	103.881	-1	103.881	0	103.881	103.881	0
3004 0452		103.884	103.882	0	103.882	0	103.882	0	103.881	-1	103.881	1	103.881	103.881	0
3004 0453		103.711	103.712	1	103.711	-1	103.711	0	103.710	-1	103.710	0	103.709	103.709	-1
3004 0454		103.431	103.432	0	103.431	-1	103.431	0	103.430	-1	103.430	0	103.430	103.430	-1
3004 0455		103.224	103.220	0	103.220	-1	103.220	0	103.219	-1	103.220	1	103.220	103.220	0
3004 0461		103.597							103.599	0	103.599	0	103.598	103.598	0
3004 0462		103.540							103.541	0	103.541	0	103.541	103.541	0
3004 0463		103.590							103.592	-1	103.592	0	103.592	103.592	0
3004 0471		103.807							103.804	-1	103.804	0	103.805	103.805	0
3004 0472		103.528							103.529	0	103.529	0	103.529	103.529	0
3004 0473		103.361							103.362	-1	103.362	0	103.362	103.362	0
3004 0474		103.174							103.141	-2	103.142	0	103.142	103.142	0
3004 0475		103.047							destroyed						
3004 0481		103.321													
3004 0482		103.217													
3004 0483		103.164													
3004 0484		103.137													
3004 0485		103.115													
3004 0486		103.110													
3004 0487		103.093													

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	baseline	55. following		56. following		57. following		58. following		59. following		60. following		
		date	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
		15/12/12												
				03/06/2013		04/06/2013		05/06/2013		06/06/2013		07/06/2013		08/06/2013
Point No.	elevation		elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885		103.881	0 -4	103.880	-1 -5	103.881	0 -5	103.881	0 -4	103.881	0 -4	103.881	1 -4
3004 0452	103.884		103.880	0 -3	103.880	-1 -4	103.880	0 -4	103.880	1 -3	103.880	0 -4	103.881	1 -2
3004 0453	103.711		103.709	0 -1	103.708	-1 -2	103.709	0 -2	103.709	0 -2	103.709	1 -2	103.710	1 -1
3004 0454	103.431		103.430	0 -1	103.429	-1 -2	103.429	0 -2	103.429	0 -2	103.429	0 -2	103.430	1 -1
3004 0455	103.224		103.220	0 -4	103.219	-1 -5	103.219	0 -5	103.219	0 -4	103.219	0 -4	103.220	1 -4
3004 0461	103.597		103.600	1 2	103.599	0 1	103.599	0 1	103.599	1 2	103.599	0 2	103.600	1 2
3004 0462	103.540		103.542	1 2	103.541	0 1	103.541	0 1	103.541	0 1	103.541	0 2	103.542	1 2
3004 0463	103.590		103.593	1 2	103.592	0 2	103.592	0 2	103.593	1 2	103.592	0 2	103.593	1 3
3004 0471	103.807		103.805	1 -2									103.806	0 -2
3004 0472	103.528		103.530	1 1									103.530	0 2
3004 0473	103.361		103.364	1 2									103.364	1 3
3004 0474	103.174				103.142	1 -2	103.142	0 -2	103.143	1 -2	103.143	0 0		
3004 0475	103.047													
3004 0481	103.321				103.213						103.213	-0.41 0		
3004 0482	103.217				103.150						103.150	-0.21 0		
3004 0483	103.164				103.120						103.120	-0.08 0		
3004 0484	103.137				103.102						103.102	-0.42 0		
3004 0485	103.115				103.090						103.090	-0.01 0		
3004 0486	103.110													
3004 0487	103.093													

Reinstalled

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	baseline		61. following		62. following		63. following		64. following		65. following		66. following						
	15/12/12	elevation	09/06/2013	deviation from last/ baseline	10/06/2013	elevation	deviation from last/ baseline	11/06/2013	elevation	deviation from last/ baseline	12/06/2013	elevation	deviation from last/ baseline	13/06/2013	elevation	deviation from last/ baseline	14/06/2013		
Point No.	elevation																		
3004 0451	103.885	103.881	0	-4															
3004 0452	103.884	103.881	0	-3															
3004 0453	103.711	103.710	0	-1															
3004 0454	103.431	103.430	0	-1															
3004 0455	103.224	103.220	0	-3															
3004 0461	103.597	103.599	1	2	103.598	-2	0	103.598	0	0	103.598	0	1	103.598	0	0			
3004 0462	103.540	103.542	1	2	103.540	-1	0	103.541	1	1	103.540	-1	0	103.540	0	1			
3004 0463	103.590	103.593	1	3	103.592	-2	1	103.592	0	1	103.591	0	1	103.591	0	1			
3004 0471	103.807	103.806	0	-2	103.805	0	-2	103.805	0	-2	103.805	0	-3	103.804	-1	-4	103.803	0	-4
3004 0472	103.528	103.529	0	1	103.529	0	1	103.529	0	1	103.529	-1	1	103.527	-1	-1	103.527	0	-1
3004 0473	103.361	103.363	-1	2	103.363	0	2	103.364	1	3	103.362	-2	1	103.361	-1	-1	103.360	0	-1
3004 0474	103.174	103.142	-1	-2	103.142	0	-3	103.142	0	-2	103.142	0	-1	103.141	-1	-2	103.140	-1	-3.1
3004 0475	103.047																		
3004 0481	103.321																		
3004 0482	103.217																		
3004 0483	103.164																		
3004 0484	103.137																		
3004 0485	103.115																		
3004 0486	103.110																		
3004 0487	103.093																		

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	67. following		68. following		69. following		70. following		71. following		72. following		
	baseline	15/06/2013	15/06/2013	15/06/2013	17/06/2013	18/06/2013	18/06/2013	25/06/2013	25/06/2013	02/07/2013	02/07/2013	02/07/2013	
Point No.	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885									103.880	-1	103.881	0
3004 0452	103.884									103.879	-2	103.880	1
3004 0453	103.711									103.708	-2	103.709	1
3004 0454	103.431									103.429	-1	103.429	0
3004 0455	103.224									103.219	-1	103.220	1
3004 0461	103.597									103.597	-1	103.598	1
3004 0462	103.540									103.540	0	103.540	0
3004 0463	103.590									103.591	0	103.592	1
3004 0471	103.807									103.804	0	103.804	0
3004 0472	103.528		-3							103.527	0	103.528	0
3004 0473	103.361		-1							103.360	-2	103.361	0
3004 0474	103.174		0							103.139	-2		-1
3004 0475	103.047		-2										
3004 0481	103.321		0							103.212	-1	103.210	-4
3004 0482	103.217		0							103.148	-1		
3004 0483	103.164		0							103.118	0		
3004 0484	103.137		0							103.118	-2		
3004 0485	103.115		-1							103.100	0		
3004 0486	103.110		0							103.089	-1		
3004 0487	103.093		0							103.089	0		

monitoring table



Joint Venture

project: C310 Thames Tunnel


structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	73. following		74. following		75. following		76. following		77. following	
	baseline	04/09/2013	27/08/2013	28/08/2013	24/09/2013	06/02/2014	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
Point No.	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885	0 -4	103.881	0 -4	103.880	-1 -5				
3004 0452	103.884	0 -3	103.881	0 -3	103.880	-1 -4				
3004 0453	103.711	1 -1	103.710	0 -1	103.708	-2 -3				
3004 0454	103.431	1 -1	103.431	1 0	103.429	-2 -3				
3004 0455	103.224	1 -3	103.221	0 -3	103.219	-2 -5				
3004 0461	103.597	0 0	103.598	0 1	103.596	-2 -2				
3004 0462	103.540	0 0	103.540	0 0	103.538	-2 -2				
3004 0463	103.590	0 2	103.593	1 3	103.590	-2 0				
3004 0471	103.807	-1 -4	103.803	0 -4	103.801	-2 -6				
3004 0472	103.528	0 0	103.528	0 0	103.527	-1 -2				
3004 0473	103.361	0 0	103.361	0 -1	103.360	-1 -1				
3004 0474	103.174		103.137	-2 -6	103.130	-6 -13				
3004 0475	103.047		destroyed	destroyed	destroyed	destroyed				
3004 0481	103.321	1 -2	103.210	-1 -3	103.210	0 -3				
3004 0482	103.217	-3 -5	103.146	-1 -6	103.145	0 -5				
3004 0483	103.164	483-485 lost due to	103.113	-5 -8	103.113	0 -7				
3004 0484	103.137	frontloading shovel	103.095	-4 -7	103.095	0 -7				
3004 0485	103.115	scraping surface	103.086	-3 -4	103.087	0 -3				
3004 0486	103.110				destroyed	destroyed				
3004 0487	103.093									

point No.474 damaged

point No.471 damaged

point No.471 damaged

		C310 THAMES TUNNEL REPORT		
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev 2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal			

APPENDIX 13
CS2 – Old Coal Yard

Learning Legacy Document

monitoring asset	Area of Old Coalyard		
reference monitoring drawing:	C310-HTM-C-DWG-CR148-PT005-50010		
name of monitoring section:	CS2- Old Coalyard area		
sensor type:	manual levelling studs		
chainage:	91650	point no.:	3004 0461 - 3004 0463
trigger values: [mm]	green: +16 -16	amber: +20 -20	red: +25 -25
reference document for trigger values:	Management Plan for Control of Ground Movement		
EB-no.:	C310-HTM-Z-STP-CR148-50058		
Appendix:	AAA		

monitoring data

	date	max. value	point no.	comments
baseline	15/12/12	0.00		
TBM 1	start ZOI	02/02/13	0.81	3004 0461
	end ZOI	24/02/13	-1.38	3004 0461
TBM 2	start ZOI	08/06/13	2.13	3004 0462
	end ZOI	11/06/13	1.02	3004 0462
longterm	24/09/13	-1.85	3004 0462	last reading 3 month post tunneling, Cross section not longer measurable

Evaluation of any potential residual risks	<input checked="" type="checkbox"/>	No residual risk since the Works have been completed by HMJV
	<input type="checkbox"/>	Yes, residual risk (see comment below)

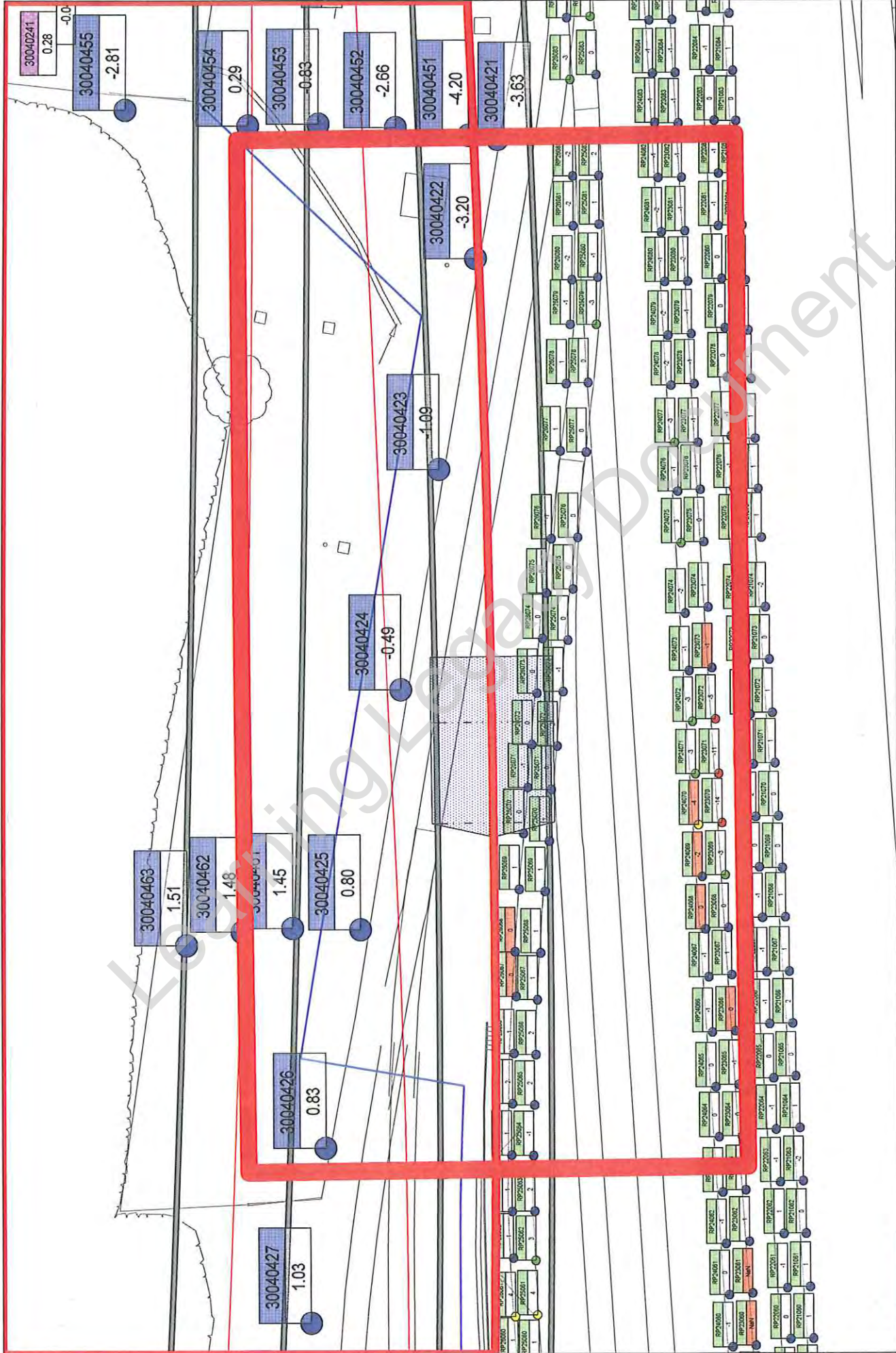
summary / comments

Cross section no longer measureable due to no access (NR siding & CSS area)
 Under consideration of temperature differences, the surrounding ground condition and the achievable accuracy of the measurement, HMJV has no concern to cease the monitoring.
 The rate of change in the monitoring data is less than the required standards as per the specifications and drawings.

date / signature: 05/01/15

print name: [Redacted]

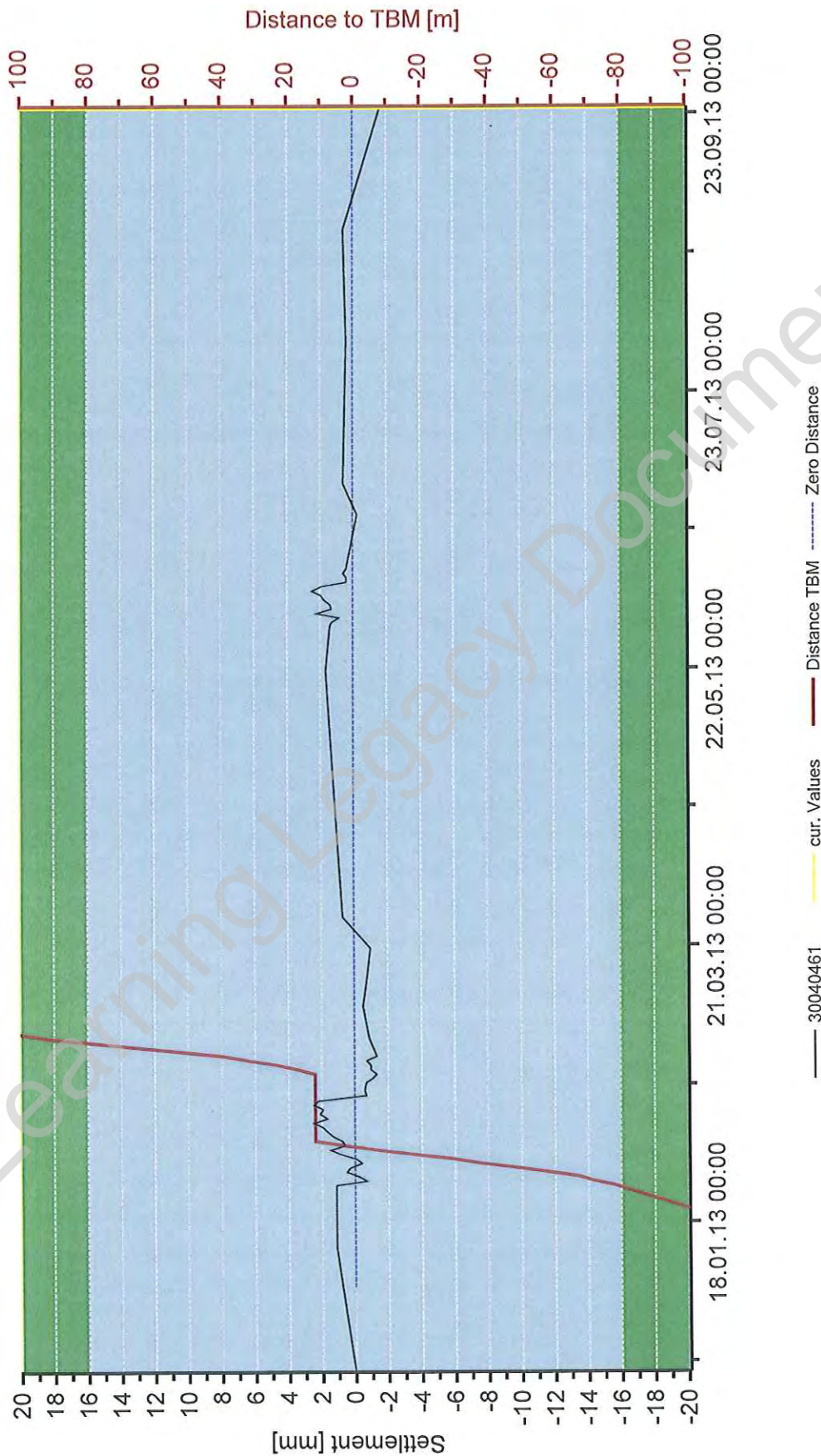
HMJV project role: Monitoring & Survey engineer



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive, portal excavation, construction base slab, lining walls and grouting
 current values: 03.02.2013 10:48

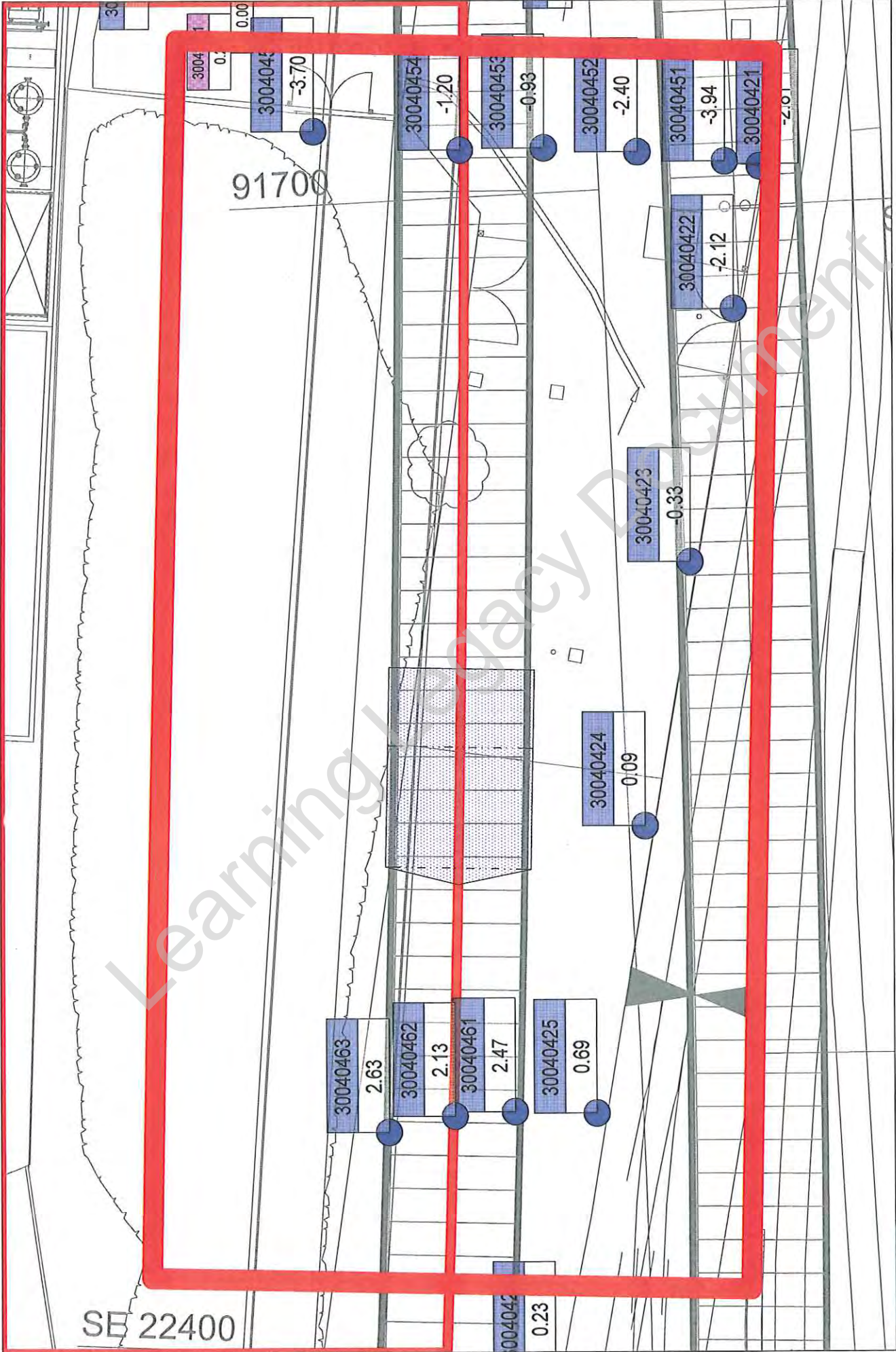


Point: 30040461



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - CS2 (Old Coalyard) 15.12.2012 - 24.09.2013
date: 17.06.2014 11:40 current values: 17.06.2014 11:30

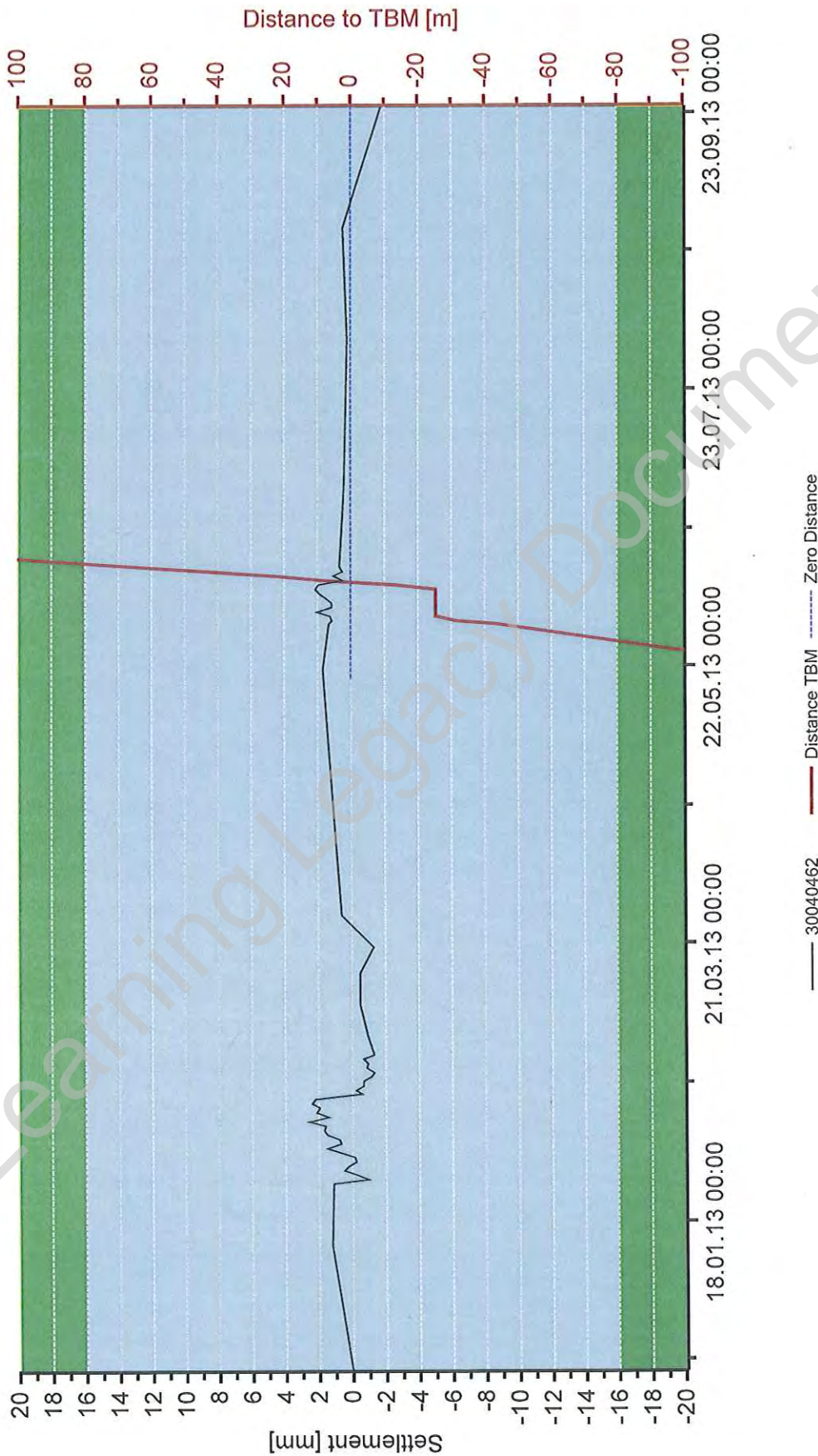




Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
current values: 01.08.2013 09:00



Point: 30040462



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - CS2 (Old Coalyard) 15.12.2012 - 24.09.213
date: 17.06.2014 11:46 current values: 17.06.2014 11:30



monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	15/12/12		12/01/2013		26/01/2013		27/01/2013		28/01/2013		29/01/2013		30/01/2013	
	baseline	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
Point No.														
3004 0451	103.885	103.885	103.886	1	103.884	-2	103.885	1	103.885	1	103.886	1	103.885	-1
3004 0452	103.884	103.884	103.885	1	103.883	-1	103.884	0	103.884	0	103.884	1	103.883	-1
3004 0453	103.711	103.711	103.712	1	103.710	-1	103.711	0	103.711	0	103.711	1	103.710	-1
3004 0454	103.431	103.432	103.432	0	103.431	-1	103.431	1	103.431	1	103.432	1	103.431	-1
3004 0455	103.224	103.225	103.224	-1	103.221	-3	103.221	0	103.222	0	103.222	0	103.220	-2
3004 0461	103.597	103.599	103.599	0	103.597	-2	103.597	0	103.597	0	103.598	1	103.598	0
3004 0462	103.540	103.541	103.541	0	103.539	-2	103.539	1	103.539	1	103.540	1	103.540	0
3004 0463	103.590	103.592	103.591	0	103.590	-1	103.590	0	103.590	0	103.591	1	103.591	0
3004 0471	103.807	103.807	103.807	-1	103.806	-1	103.806	0	103.806	0	103.806	0	103.806	0
3004 0472	103.528	103.528	103.529	1	103.527	-2	103.528	2	103.528	2	103.528	0	103.528	0
3004 0473	103.361	103.362	103.362	0	103.361	-1	103.362	1	103.362	1	103.362	0	103.362	0
3004 0474	103.174	103.174	103.173	-1	103.172	-1	103.172	0	103.172	0	103.172	0	103.172	-1
3004 0475	103.047	103.047		0										
3004 0481	103.321	103.322		1										
3004 0482	103.217	103.217		0										
3004 0483	103.164	103.164		0										
3004 0484	103.137	103.138		0										
3004 0485	103.115	103.115		0										
3004 0486	103.110	103.109		-1										
3004 0487	103.093	103.093		0										

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old CoalYard

No. of reading	baseline		7. following		8. following		9. following		10. following		11. following		12. following	
	date	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
	15/12/12													
Point No.		elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451		103.885	103.882	-3	103.881	-1	103.881	0	103.881	0	103.881	0	103.881	0
3004 0452		103.884	103.881	-2	103.891	0	103.881	1	103.881	0	103.881	0	103.881	0
3004 0453		103.711	103.709	-1	103.709	0	103.710	1	103.710	0	103.710	0	103.710	0
3004 0454		103.431	103.431	0	103.430	0	103.431	1	103.432	1	103.432	1	103.432	1
3004 0455		103.224	103.219	0	103.219	0	103.220	1	103.221	1	103.221	1	103.221	1
3004 0461		103.597	103.597	-1	103.597	0	103.598	1	103.599	1	103.599	1	103.598	-1
3004 0462		103.540	103.539	0	103.539	0	103.540	1	103.541	1	103.541	1	103.540	-1
3004 0463		103.590	103.590	-1	103.590	0	103.591	1	103.592	1	103.592	1	103.591	-1
3004 0471		103.807	103.805	-1	103.806	0	103.806	1	103.807	1	103.807	1	103.806	-1
3004 0472		103.528	103.527	0	103.528	1	103.529	1	103.529	0	103.529	0	103.528	-1
3004 0473		103.361	103.361	0	103.361	0	103.362	1	103.362	0	103.362	0	103.361	-1
3004 0474		103.174												
3004 0475		103.047												
3004 0481		103.321			103.319	-2								
3004 0482		103.217			103.215	-2								
3004 0483		103.164												
3004 0484		103.137			103.135	-2								
3004 0485		103.115												
3004 0486		103.110												
3004 0487		103.093												

monitoring table



Joint Venture

project: C310 Thames Tunnel

No. of reading	structure: Cross Section 1 - 4 Area NR + Old Coalyard												
	baseline	13. following		14. following		15. following		16. following		17. following		18. following	
date	15/12/12	06/02/2013		07/02/2013		08/02/2013		09/02/2013		10/02/2013		11/02/2013	
Point No.	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885			103.883	1	-3							
3004 0452	103.884			103.883	2	-1							
3004 0453	103.711			103.712	2	1							
3004 0454	103.431			103.433	1	2							
3004 0455	103.224			103.222	1	-2							
3004 0461	103.597	103.599	1	1	103.599	0	2	103.599	0	2	103.600	1	2
3004 0462	103.540	103.541	1	1	103.541	0	2	103.541	0	2	103.542	1	3
3004 0463	103.590	103.592	1	2	103.592	0	2	103.592	0	2	103.593	1	2
3004 0471	103.807	103.807	0	-1	103.807	1	0	103.807	0	0	103.808	1	0
3004 0472	103.528	103.529	0	1	103.529	0	1	103.529	0	1	103.530	1	2
3004 0473	103.361	103.362	1	1	103.363	1	1	103.362	0	1	103.363	1	2
3004 0474	103.174												
3004 0475	103.047												
3004 0481	103.321	103.321	2	0	103.321	0	0						
3004 0482	103.217	103.217	2	1	103.217	0	1						
3004 0483	103.164												
3004 0484	103.137	103.137	2	0	103.137	0	0						
3004 0485	103.115												
3004 0486	103.110												
3004 0487	103.093												

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old CoalYard

No. of reading date	15/12/12		19. following 12/02/2013		20. following 13/02/2013		21. following 14/02/2013		22. following 15/02/2013		23. following 16/02/2013		24. following 17/02/2013	
	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885	0	103.882	-3	103.600	2	103.600	0	103.597	-3	103.597	0	103.597	0
3004 0452	103.884	0	103.882	-1	103.542	2	103.542	0	103.539	-3	103.539	0	103.539	-1
3004 0453	103.711	0	103.712	1	103.593	2	103.593	0	103.590	-3	103.590	0	103.590	0
3004 0454	103.431	0	103.432	1	103.808	1	103.808	0	103.806	-2	103.805	0	103.805	0
3004 0455	103.224	0	103.221	-2	103.530	2	103.530	0	103.528	-3	103.527	0	103.527	0
3004 0461	103.597	0	103.599	2	103.363	1	103.363	0	103.361	-3	103.360	-1	103.360	0
3004 0462	103.540	0	103.542	2										
3004 0463	103.590	0	103.593	3										
3004 0471	103.807	0	103.808	1										
3004 0472	103.528	0	103.530	2										
3004 0473	103.361	0	103.363	2										
3004 0474	103.174	0												
3004 0475	103.047	0												
3004 0481	103.321	-1	103.320	-1										
3004 0482	103.217	-1	103.216	-1										
3004 0483	103.164	0												
3004 0484	103.137	-1	103.137	-1										
3004 0485	103.115	0												
3004 0486	103.110	0												
3004 0487	103.093	0												

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	baseline		25. following		26. following		27. following		28. following		29. following		30. following		
	date	elevation	18/02/2013	deviation from last/ baseline	19/02/2013	deviation from last/ baseline	20/02/2013	elevation	deviation from last/ baseline	21/02/2013	elevation	deviation from last/ baseline	22/02/2013	elevation	deviation from last/ baseline
Point No.															
3004 0451	15/12/12	103.885													
3004 0452		103.884													
3004 0453		103.711													
3004 0454		103.431													
3004 0455		103.224													
3004 0461		103.597													
3004 0462		103.540													
3004 0463		103.590													
3004 0471		103.807													
3004 0472		103.528													
3004 0473		103.361													
3004 0474		103.174													
3004 0475		103.047													
3004 0481		103.321													
3004 0482		103.217													
3004 0483		103.164													
3004 0484		103.137													
3004 0485		103.115													
3004 0486		103.110													
3004 0487		103.093													

monitoring table



Joint Venture

project: C310 Thames Tunnel

No. of reading		structure: Cross Section 1 - 4 Area NR + Old Coalyard											
date	baseline	31. following		32. following		33. following		34. following		35. following		36. following	
	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885									103.879	0		
3004 0452	103.884									103.879	0		
3004 0453	103.711									103.709	0		
3004 0454	103.431									103.429	0		
3004 0455	103.224									103.218	0		
3004 0461	103.597	103.596	-1							103.596	0		
3004 0462	103.540	103.538	-1							103.539	0		
3004 0463	103.590	103.589	-1							103.590	0		
3004 0471	103.807	103.805	0	103.805	0	103.806	1	103.804	-2	103.804	0	103.806	2.35
3004 0472	103.528	103.528	1	103.527	-1	103.528	1	103.527	-1	103.527	0	103.529	2.32
3004 0473	103.361	103.361	0	103.360	0	103.362	1	103.360	-1	103.360	0	103.361	1.28
3004 0474	103.174												
3004 0475	103.047												
3004 0481	103.321												
3004 0482	103.217							103.214	-3	103.214	0	103.213	0
3004 0483	103.164							103.156	-7	103.156	0	103.156	0
3004 0484	103.137							103.135	-3	103.135	0	103.132	-3
3004 0485	103.115							103.118	3	103.118	0	103.111	-7
3004 0486	103.110							103.104	-6	103.104	0	103.104	0
3004 0487	103.093												

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	37. following		38. following		39. following		40. following		41. following		42. following		
	baseline	02/03/2013	03/03/2013	04/03/2013	05/03/2013	06/03/2013	07/03/2013	08/03/2013	09/03/2013	10/03/2013	11/03/2013	12/03/2013	
Point No.	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885											103.880	0
3004 0452	103.884											103.880	1
3004 0453	103.711											103.709	0
3004 0454	103.431											103.430	1
3004 0455	103.224											103.219	1
3004 0461	103.597											103.597	0
3004 0462	103.540											103.539	0
3004 0463	103.590											103.590	0
3004 0471	103.807											103.806	0
3004 0472	103.528											103.527	-1
3004 0473	103.361											103.362	1
3004 0474	103.174												
3004 0475	103.047												
3004 0481	103.321												
3004 0482	103.217	103.213	0	-3	103.212	-1	-5	103.212	0	-5	103.212	0	-5
3004 0483	103.164	103.156	0	-8	103.155	-1	-9	103.155	0	-9	103.155	0	-9
3004 0484	103.137	103.132	0	-6	103.131	-1	-6	103.131	0	-6	103.131	0	-6
3004 0485	103.115	103.111	0	-4	103.110	0	-5	103.111	0	-5	103.110	0	-5
3004 0486	103.110	103.104	0	-6	103.104	0	-6	103.104	0	-6	103.103	-1	-7
3004 0487	103.093												

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	43. following		44. following		45. following		46. following		47. following		48. following		
	date	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
	15/12/12												
	08/03/2013												
Point No.		elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451		103.885								103.880	1	103.882	1
3004 0452		103.884								103.881	1	103.882	1
3004 0453		103.711								103.710	1	103.711	2
3004 0454		103.431								103.431	1	103.432	1
3004 0455		103.224								103.219	0	103.220	1
3004 0461		103.597			103.597	0	-1	103.596	0	103.596	2	103.599	1
3004 0462		103.540			103.539	0	-1	103.538	-1	103.540	2	103.541	1
3004 0463		103.590			103.590	0	0	103.589	-1	103.591	2	103.593	2
3004 0471		103.807			103.804	-2	-3	103.804	0	103.806	2	103.805	-1
3004 0472		103.528			103.527	-1	-1	103.526	-1	103.529	2	103.529	2
3004 0473		103.361			103.361	-1	0	103.360	-1	103.362	2	103.363	1
3004 0474		103.174										103.143	-1
3004 0475		103.047										103.115	0
3004 0481		103.321										103.211	0
3004 0482		103.217	1	-4	103.213	1	-4	103.212	-1	-5		103.170	-5
3004 0483		103.164	0	-8	103.155	1	-8	103.155	-1	-9	103.155	0	-9
3004 0484		103.137	0	-6	103.131	0	-6	103.131	-1	-7	103.131	0	-7
3004 0485		103.115	0	-5	103.110	0	-5					103.107	-7
3004 0486		103.110	-1	-11								103.094	-6
3004 0487		103.093								103.098	-1		

reinstalled and

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading date	49. following 28/05/2013		50. following 29/05/2013		51. following 30/05/2013		52. following 31/05/2013		53. following 01/06/2013		54. following 02/06/2013	
	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
Point No.												
3004 0451	103.885	0	103.882	0	103.882	0	103.881	-1	103.881	0	103.881	0
3004 0452	103.884	0	103.882	0	103.882	0	103.881	-1	103.881	1	103.881	0
3004 0453	103.711	1	103.711	-1	103.711	0	103.710	-1	103.710	0	103.709	-1
3004 0454	103.431	0	103.431	-1	103.431	0	103.430	-1	103.430	0	103.430	-1
3004 0455	103.224	0	103.220	-1	103.220	0	103.219	-1	103.220	1	103.220	0
3004 0461	103.597						103.599	0	103.599	0	103.598	0
3004 0462	103.540						103.541	0	103.541	0	103.541	0
3004 0463	103.590						103.592	-1	103.592	0	103.592	0
3004 0471	103.807						103.804	-1	103.804	0	103.805	0
3004 0472	103.528						103.529	0	103.529	0	103.529	0
3004 0473	103.361						103.362	-1	103.362	0	103.362	0
3004 0474	103.174						103.141	-2	103.142	0	103.142	0
3004 0475	103.047						destroyed					
3004 0481	103.321											
3004 0482	103.217											
3004 0483	103.164											
3004 0484	103.137											
3004 0485	103.115											
3004 0486	103.110											
3004 0487	103.093											

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	55. following		56. following		57. following		58. following		59. following		60. following		
	baseline	03/05/2013	04/06/2013	05/06/2013	06/06/2013	07/06/2013	08/06/2013	09/06/2013	10/06/2013	11/06/2013	12/06/2013	13/06/2013	
date	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885	103.881	0	-4	103.880	-1	-5	103.881	0	-5	103.881	0	-4
3004 0452	103.884	103.880	0	-3	103.880	-1	-4	103.880	0	-4	103.880	0	-4
3004 0453	103.711	103.709	0	-1	103.708	-1	-2	103.709	0	-2	103.709	1	-2
3004 0454	103.431	103.430	0	-1	103.429	-1	-2	103.429	0	-2	103.429	0	-2
3004 0455	103.224	103.220	0	-4	103.219	-1	-5	103.219	0	-5	103.219	0	-4
3004 0461	103.597	103.600	1	2	103.599	0	1	103.599	0	1	103.599	0	2
3004 0462	103.540	103.542	1	2	103.541	0	1	103.541	0	1	103.541	0	2
3004 0463	103.590	103.593	1	2	103.592	0	2	103.592	0	2	103.592	0	2
3004 0471	103.807	103.805	1	-2									
3004 0472	103.528	103.530	1	1									
3004 0473	103.361	103.364	1	2									
3004 0474	103.174				103.142	1	-2	103.142	0	-2	103.143	1	-2
3004 0475	103.047												
3004 0481	103.321				103.213						103.213	-0.41	0
3004 0482	103.217				103.150						103.150	-0.21	0
3004 0483	103.164				103.120						103.120	-0.08	0
3004 0484	103.137				103.102						103.102	-0.42	0
3004 0485	103.115				103.090						103.090	-0.01	0
3004 0486	103.110												
3004 0487	103.093												

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	baseline		61. following		62. following		63. following		64. following		65. following		66. following			
	date	elevation	09/05/2013	deviation from last/ baseline	10/05/2013	deviation from last/ baseline	11/05/2013	deviation from last/ baseline	12/05/2013	deviation from last/ baseline	13/05/2013	deviation from last/ baseline	14/05/2013	deviation from last/ baseline		
Point No.	elevation	elevation	deviation from last/ baseline	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline		
3004 0451	103.885	103.881	0	-4	103.598	-2	0	103.598	0	0	103.598	0	1	103.598	0	0
3004 0452	103.884	103.881	0	-3	103.540	-1	0	103.541	1	1	103.540	-1	0	103.540	0	1
3004 0453	103.711	103.710	0	-1	103.592	-2	1	103.592	0	1	103.591	0	1	103.591	0	1
3004 0454	103.431	103.430	0	-1	103.805	0	-2	103.805	0	-2	103.805	0	-3	103.804	-1	-4
3004 0455	103.224	103.220	0	-3	103.529	0	1	103.529	0	1	103.529	-1	1	103.527	-1	-1
3004 0461	103.597	103.599	1	2	103.363	0	2	103.364	1	3	103.362	-2	1	103.361	-1	-1
3004 0462	103.540	103.542	1	2	103.142	0	-3	103.142	0	-2	103.142	0	-1	103.141	-1	-2
3004 0463	103.590	103.593	1	3												
3004 0471	103.807	103.806	0	-2												
3004 0472	103.528	103.529	0	1												
3004 0473	103.361	103.363	-1	2												
3004 0474	103.174	103.142	-1	-2												
3004 0475	103.047															
3004 0481	103.321															
3004 0482	103.217															
3004 0483	103.164															
3004 0484	103.137															
3004 0485	103.115															
3004 0486	103.110															
3004 0487	103.093															

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	67. following		68. following		69. following		70. following		71. following		72. following		
	baseline	15/06/2013	16/06/2013	17/06/2013	18/06/2013	25/06/2013	02/07/2013	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
	15/12/12												
Point No.	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	
3004 0451	103.885								103.880	-1	103.881	0	-5
3004 0452	103.884							103.879	-2	103.880	1	-3	
3004 0453	103.711							103.708	-2	103.709	1	-2	
3004 0454	103.431							103.429	-1	103.429	0	-2	
3004 0455	103.224							103.219	-1	103.220	1	-4	
3004 0461	103.597							103.597	-1	103.598	1	1	
3004 0462	103.540							103.540	0	103.540	0	0	
3004 0463	103.590							103.591	0	103.592	1	2	
3004 0471	103.807							103.804	0	103.804	0	-4	
3004 0472	103.528	1	-3					103.527	0	103.528	0	0	
3004 0473	103.361	1	-1					103.360	-2	103.361	1	-1	
3004 0474	103.174	0	-2					103.139	-2				
3004 0475	103.047												
3004 0481	103.321	0	0	103.212	0	-1	103.212	-1	-2	103.211	0	-2	
3004 0482	103.217	0	0	103.150	0	-1	103.149	-1	-1	103.148	-1	-2	
3004 0483	103.164	0	0	103.120	0	0	103.118	-2	-2	103.118	0	-3	
3004 0484	103.137	0	-1	103.102	0	0	103.100	-2	-2	103.100	0	-2	
3004 0485	103.115	0	0	103.090	0	0	103.089	-1	-1	103.089	0	-1	
3004 0486	103.110									103.083	-6	-7	
3004 0487	103.093												

monitoring table



Joint Venture


project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	73. following		74. following		75. following		76. following		77. following	
	baseline	04/09/2013	27/09/2013	28/09/2013	24/09/2013	06/02/2014	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
	15/12/12	04/09/2013	27/09/2013	28/09/2013	24/09/2013	06/02/2014				
Point No.	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation
3004 0451	103.885	103.881	0 -4	103.881	0 -4	103.880	-1 -5			
3004 0452	103.884	103.881	0 -3	103.881	0 -3	103.880	-1 -4			
3004 0453	103.711	103.710	1 -1	103.710	0 -1	103.708	-2 -3			
3004 0454	103.431	103.430	1 -1	103.431	1 0	103.429	-2 -3			
3004 0455	103.224	103.221	1 -3	103.221	0 -3	103.219	-2 -5			
3004 0461	103.597	103.598	0 0	103.598	0 1	103.596	-2 -2			
3004 0462	103.540	103.540	0 0	103.540	0 0	103.538	-2 -2			
3004 0463	103.590	103.592	0 2	103.593	1 3	103.590	-2 0			
3004 0471	103.807	103.803	-1 -4	103.803	0 -4	103.801	-2 -6			
3004 0472	103.528	103.528	0 0	103.528	0 0	103.527	-1 -2	103.796	-6 -11.82	
3004 0473	103.361	103.361	0 0	103.361	0 -1	103.360	-1 -1	103.526	0 -1.93	
3004 0474	103.174			103.137	-2 -6	103.130	-6 -13	103.359	-1 -1.83	
3004 0475	103.047			destroyed	destroyed	destroyed	destroyed			
3004 0481	103.321	103.211	1 -2	103.210	-1 -3	103.210	0 -3			
3004 0482	103.217	103.146	-3 -5	103.145	-1 -6	103.145	0 -5			
3004 0483	103.164	Tops of survey points 483-485 lost due to frontloading shovel		103.113	-5 -8	103.113	0 -7			
3004 0484	103.137	scraping surface		103.095	-4 -7	103.095	0 -7			destroyed
3004 0485	103.115			103.086	-3 -4	103.087	0 -3			
3004 0486	103.110									
3004 0487	103.093									

point No.474 damaged

point No.471 damaged

		C310 THAMES TUNNEL REPORT		
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev 2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal			

APPENDIX 14
CS3 – Old Coal Yard

Learning Legacy Document

monitoring asset	Area of Old Coalyard		
reference monitoring drawing:	C310-HTM-C-DWG-CR148-PT005-50010		
name of monitoring section:	CS3- Old Coalyard area		
sensor type:	manual levelling studs		
chainage:	91600	point no.:	3004 0471 - 3004 0475
trigger values: [mm]	green: +16 -16	yellow: +20 -20	red: +25 -25
reference document for trigger values:	Management Plan for Control of Ground Movement		
EB-no.:	C310-HTM-Z-STP-CR148-50058		
Appendix:	AAA		

monitoring data

	date	max. value	point no.	comments	
baseline	15/12/12	0.00			
TBM 1	start ZOI	22/02/13	-3.03	3004 0471	
	end ZOI	28/02/13	-3.42	3004 0471	breached not any trigger value
TBM 2	start ZOI	11/06/13	2.25	3004 0473	
	end ZOI	15/06/13	0.45	3004 0473	breached not any trigger value
longterm	24/09/13	-1.93	3004 0472		

Evaluation of any potential residual risks	<input checked="" type="checkbox"/>	No residual risk since the Works have been completed by HMJV
	<input type="checkbox"/>	Yes, residual risk (see comment below)

summary / comments

3004 0474 destroyed from 30.01.2013
 3004 0475 destroyed from 26.01.2013
 3004 0474-0475 reinstalled and rebaselined on 21.05.2013
 3004 0475 2.nd time destroyed from 31.05.2013
 3004 0471 damaged 24.09.2013 (not useable for longterm value)
 Under consideration of temperature differences, the surrounding ground condition and the achievable accuracy of the measurement, HMJV has no concern to cease the monitoring.
 The rate of change in the monitoring data is less than the required standards as per the specifications and drawings.

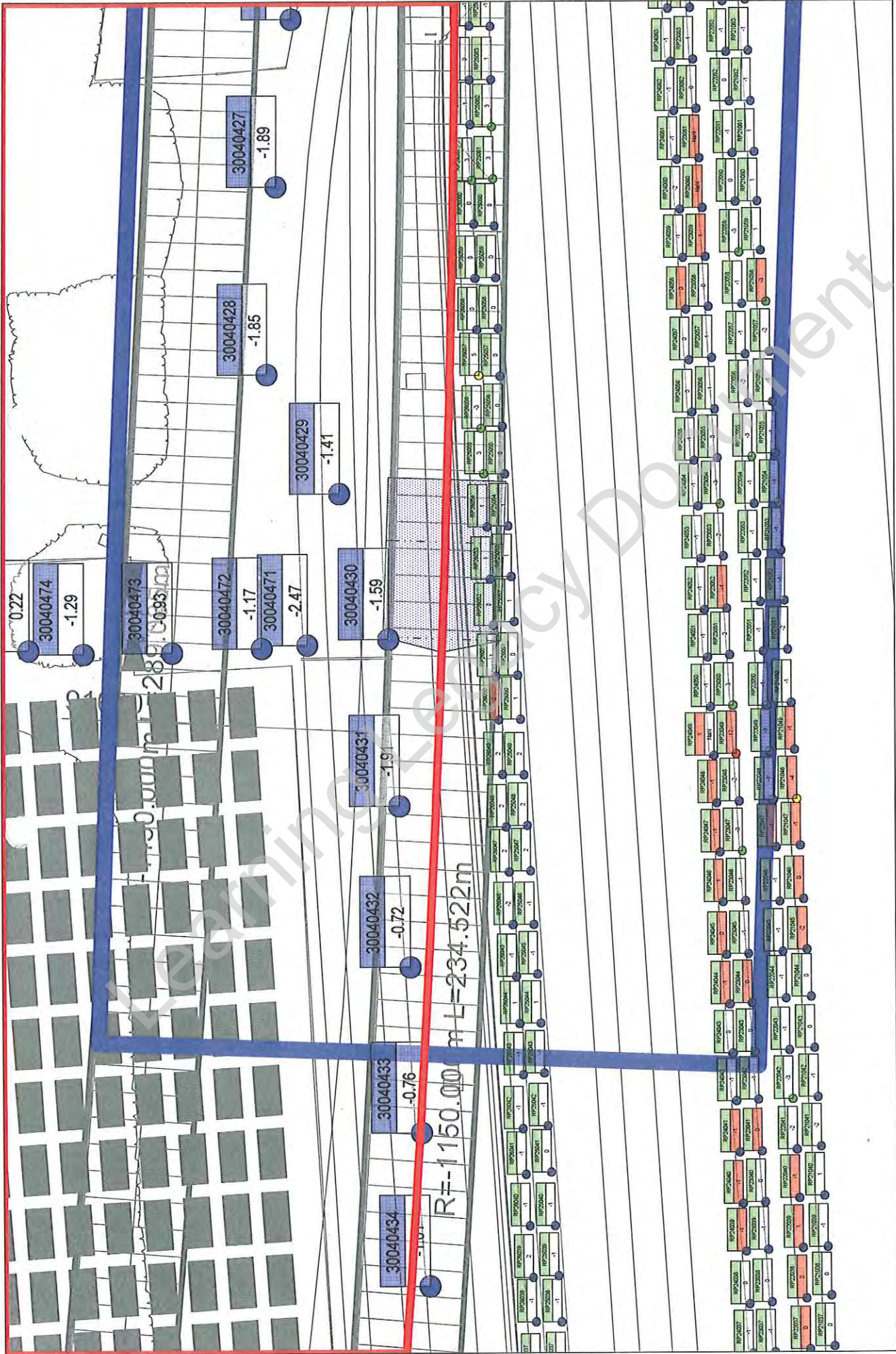
date / signature:

09/01/15

print name:

HMJV project role:

Monitoring & Survey engineer



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive, portal excavation, construction base slab, lining walls and grouting
 current values: 25.02.2013 10:39



Point: 30040471

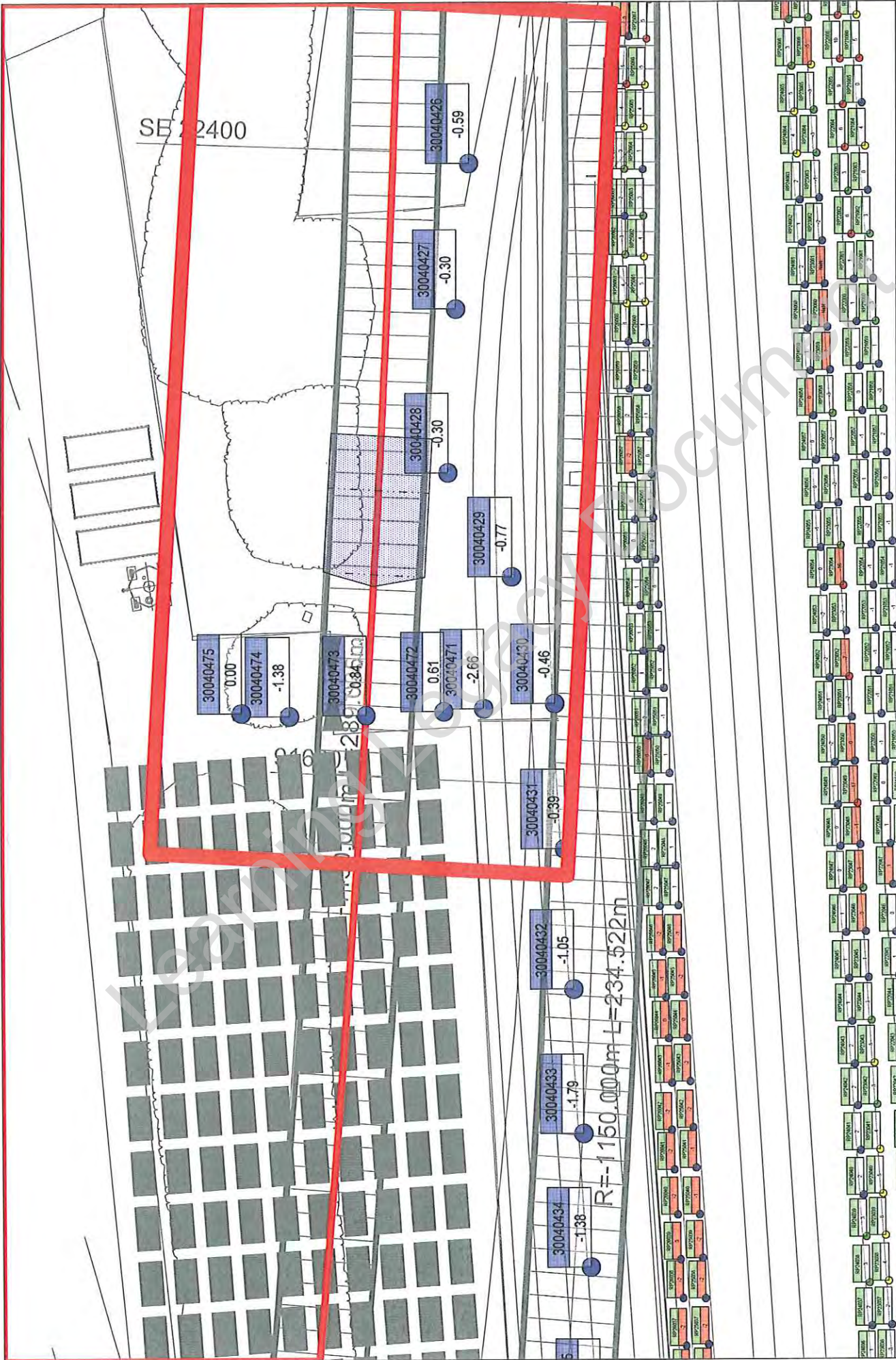


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

Close Out Report: WB Tunnel - CS3 (Old Coalyard) 15.12.2012 - 24.09.2013

date: 17.06.2014 13:21 current values: 17.06.2014 13:00





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 12.06.2013 09:00



Point: 30040473



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

Close Out Report: EB Tunnel - CS3 (Old Coalyard) 15.12.2012 - 24.09.213

date: 17.06.2014 13:32 current values: 17.06.2014 13:22



monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	baseline		1. following		2. following		3. following		4. following		5. following		6. following	
	date	elevation	12/01/2013	deviation from last/ baseline	26/01/2013	deviation from last/ baseline	27/01/2013	deviation from last/ baseline	28/01/2013	deviation from last/ baseline	29/01/2013	deviation from last/ baseline	30/01/2013	deviation from last/ baseline
3004 0451	15/12/12	103.885	103.885	0	103.886	1	103.884	-2	103.885	1	103.886	1	103.885	-1
3004 0452		103.884	103.884	0	103.885	1	103.883	-1	103.884	0	103.884	1	103.883	-1
3004 0453		103.711	103.711	0	103.712	1	103.710	-1	103.711	0	103.711	1	103.710	-1
3004 0454		103.431	103.432	0	103.432	0	103.431	-1	103.431	1	103.432	1	103.431	-1
3004 0455		103.224	103.225	1	103.224	-1	103.221	-3	103.221	0	103.222	0	103.220	-2
3004 0461		103.597	103.599	1	103.599	0	103.597	-2	103.597	0	103.598	1	103.598	0
3004 0462		103.540	103.541	1	103.541	0	103.539	-2	103.539	1	103.540	1	103.540	0
3004 0463		103.590	103.592	1	103.591	0	103.590	-1	103.590	0	103.591	1	103.591	0
3004 0471		103.807	103.807	-1	103.807	0	103.806	-1	103.806	0	103.806	0	103.806	0
3004 0472		103.528	103.528	0	103.529	1	103.527	-2	103.528	2	103.528	0	103.528	-1
3004 0473		103.361	103.362	1	103.362	0	103.361	-1	103.362	1	103.362	0	103.362	-1
3004 0474		103.174	103.174	0	103.173	-1	103.172	-1	103.172	0	103.172	0	103.172	-1
3004 0475		103.047	103.047	0										
3004 0481		103.321	103.322	1										
3004 0482		103.217	103.217	0										
3004 0483		103.164	103.164	0										
3004 0484		103.137	103.138	0										
3004 0485		103.115	103.115	0										
3004 0486		103.110	103.109	-1										
3004 0487		103.093	103.093	0										

monitoring table



Joint Venture

project: C310 Thames Tunnel

No. of reacting date	structure: Cross Section 1 - 4 Area NR + Old Coalyard															
	baseline 15/12/12		7. following 31/01/2013		8. following 01/02/2013		9. following 02/02/2013		10. following 03/02/2013		11. following 04/02/2013		12. following 05/02/2013			
Point No.	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline		
3004 0451	103.885	-3	103.882	-4	103.881	-4	103.881	0	-4	103.881	0	-4	103.881	0	-4	
3004 0452	103.884	-2	103.881	-3	103.881	0	-3	103.881	1	-3	103.881	0	-3	103.881	0	-3
3004 0453	103.711	-1	103.709	-2	103.709	0	-1	103.710	1	-1	103.710	0	-1	103.710	0	-1
3004 0454	103.431	0	103.431	0	103.430	0	-1	103.431	1	0	103.432	1	0	103.432	1	0
3004 0455	103.224	0	103.219	-4	103.219	0	-4	103.220	1	-4	103.221	1	-3	103.221	1	-3
3004 0461	103.597	-1	103.597	0	103.597	0	0	103.598	1	1	103.599	1	1	103.598	-1	1
3004 0462	103.540	0	103.539	0	103.539	0	0	103.540	1	1	103.541	1	1	103.540	-1	1
3004 0463	103.590	-1	103.590	-1	103.590	0	0	103.591	1	1	103.592	1	2	103.591	-1	1
3004 0471	103.807	-1	103.805	-2	103.806	0	-2	103.806	1	-1	103.807	1	0	103.806	-1	-1
3004 0472	103.528	0	103.527	0	103.528	1	0	103.529	1	1	103.529	0	1	103.528	-1	0
3004 0473	103.361	0	103.361	0	103.361	0	0	103.362	1	0	103.362	0	1	103.361	-1	0
3004 0474	103.174															
3004 0475	103.047															
3004 0481	103.321				103.319	-2	-1									
3004 0482	103.217				103.215	-2	-2									
3004 0483	103.164				103.135	-2	-2									
3004 0484	103.137															
3004 0485	103.115															
3004 0486	103.110															
3004 0487	103.093															

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	13. following		14. following		15. following		16. following		17. following		18. following		
	baseline	06/02/2013	elevation	deviation from last/ baseline	07/02/2013	elevation	deviation from last/ baseline	08/02/2013	elevation	deviation from last/ baseline	09/02/2013	elevation	deviation from last/ baseline
	15/12/12												
Point No.	elevation												
3004 0451	103.885		103.883	1 -3									
3004 0452	103.884		103.883	2 -1									
3004 0453	103.711		103.712	2 1									
3004 0454	103.431		103.433	1 2									
3004 0455	103.224		103.222	1 -2									
3004 0461	103.597		103.599	0 2			103.599	0 2					
3004 0462	103.540		103.541	0 2			103.541	0 2					
3004 0463	103.590		103.592	0 2			103.592	0 2					
3004 0471	103.807		103.807	0 0			103.807	0 0					
3004 0472	103.528		103.529	0 1			103.529	0 1					
3004 0473	103.361		103.362	1 1			103.362	0 1					
3004 0474	103.174												
3004 0475	103.047												
3004 0481	103.321		103.321	2 0			103.321	0 0					
3004 0482	103.217		103.217	2 1			103.217	0 1					
3004 0483	103.164												
3004 0484	103.137		103.137	2 0			103.137	0 0					
3004 0485	103.115												
3004 0486	103.110												
3004 0487	103.093												

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	baseline		19. following		20. following		21. following		22. following		23. following		24. following	
	date	elevation	12/02/2013	deviation from last/ baseline	13/02/2013	deviation from last/ baseline	14/02/2013	deviation from last/ baseline	15/02/2013	deviation from last/ baseline	16/02/2013	deviation from last/ baseline	17/02/2013	deviation from last/ baseline
Point No.	elevation		elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885		103.882	0 -3	103.600	0 2	103.600	0 2	103.597	-3 -1	103.597	0 -1	103.597	0 -1
3004 0452	103.884		103.882	0 -1	103.542	0 2	103.542	0 2	103.539	-3 -1	103.539	0 0	103.539	-1 -1
3004 0453	103.711		103.712	0 1	103.593	0 2	103.593	0 2	103.590	-3 -1	103.590	0 0	103.590	0 -1
3004 0454	103.431		103.432	0 1	103.808	0 1	103.808	0 1	103.806	-2 -2	103.805	0 -2	103.805	0 -2
3004 0455	103.224		103.221	-1 -2	103.530	1 2	103.530	1 2	103.528	-3 -1	103.527	0 -1	103.527	0 -1
3004 0461	103.597		103.599	0 2	103.363	1 2	103.364	0 2	103.361	-3 0	103.360	-1 -1	103.360	0 -1
3004 0462	103.540		103.542	0 2										
3004 0463	103.590		103.593	0 2										
3004 0471	103.807		103.808	0 1										
3004 0472	103.528		103.530	-1 2										
3004 0473	103.361		103.363	-1 1										
3004 0474	103.174													
3004 0475	103.047													
3004 0481	103.321		103.320	-1 0										
3004 0482	103.217		103.216	-1 0										
3004 0483	103.164													
3004 0484	103.137		103.137	-1 -1										
3004 0485	103.115													
3004 0486	103.110													
3004 0487	103.093													

monitoring table



Joint Venture

Project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	baseline		25. following		26. following		27. following		28. following		29. following		30. following	
	date	elevation	18/02/2013	deviation from last/ baseline	19/02/2013	deviation from last/ baseline	20/02/2013	deviation from last/ baseline	21/02/2013	deviation from last/ baseline	22/02/2013	deviation from last/ baseline	23/02/2013	deviation from last/ baseline
Point No.	elevation	elevation	deviation from last/ baseline		elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885								103.879	-3				
3004 0452	103.884								103.879	-3				
3004 0453	103.711								103.708	-3				
3004 0454	103.431								103.429	-3				
3004 0455	103.224								103.218	-3				
3004 0461	103.597								103.596	0				
3004 0462	103.540								103.539	0				
3004 0463	103.590								103.590	0				
3004 0471	103.807								103.804	0				
3004 0472	103.528								103.527	0				
3004 0473	103.361								103.360	0				
3004 0474	103.174													
3004 0475	103.047													
3004 0481	103.321													
3004 0482	103.217													
3004 0483	103.164													
3004 0484	103.137													
3004 0485	103.115													
3004 0486	103.110													
3004 0487	103.093													

monitoring table



Joint Venture

Project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	baseline		31. following		32. following		33. following		34. following		35. following		36. following				
	date	elevation	24/02/2013	deviation from last/baseline	25/02/2013	elevation	deviation from last/baseline	26/02/2013	elevation	deviation from last/baseline	27/02/2013	elevation	deviation from last/baseline	28/02/2013	elevation	deviation from last/baseline	01/03/2013
Point No.																	
3004 0451	15/12/12	103.885										103.879	0	103.879	0		
3004 0452		103.884										103.879	0	103.879	0		
3004 0453		103.711										103.709	0	103.709	0		
3004 0454		103.431										103.429	0	103.429	0		
3004 0455		103.224										103.218	0	103.218	0		
3004 0461		103.597		-1		103.596	-1					103.596	0	103.596	0		
3004 0462		103.540		-1		103.538	-1					103.539	0	103.539	0		
3004 0463		103.590		-1		103.589	-1					103.590	0	103.590	0		
3004 0471		103.807		-2		103.805	-2					103.804	0	103.804	0		
3004 0472		103.528		0		103.527	-1					103.527	-1	103.527	-1		
3004 0473		103.361		0		103.360	0					103.360	-1	103.360	-1		
3004 0474		103.174		-1		103.362	1					103.361	0	103.361	0		
3004 0475		103.047															
3004 0481		103.321															
3004 0482		103.217										103.214	-3	103.214	-3		
3004 0483		103.164										103.156	-7	103.156	-7		
3004 0484		103.137										103.135	-3	103.135	-3		
3004 0485		103.115										103.118	3	103.118	3		
3004 0486		103.110										103.104	-6	103.104	-6		
3004 0487		103.093										103.104	0	103.104	0		

monitoring table



Joint Venture

Project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	37. following		38. following		39. following		40. following		41. following		42. following		
	date	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	07/03/2013	
	15/12/12												
Point No.		elevation	deviation from last/ baseline		deviation from last/ baseline		deviation from last/ baseline		deviation from last/ baseline		deviation from last/ baseline		
3004 0451		103.885										0	
3004 0452		103.884										1	
3004 0453		103.711										0	
3004 0454		103.431										1	
3004 0455		103.224										1	
3004 0461		103.597										0	
3004 0462		103.540										0	
3004 0463		103.590										0	
3004 0471		103.807										0	
3004 0472		103.528										-1	
3004 0473		103.361										-1	
3004 0474		103.174										1	
3004 0475		103.047										1	
3004 0481		103.321											
3004 0482		103.217	0	-3	103.212	-1	-5	103.212	0	-5	103.212	0	-5
3004 0483		103.164	0	-8	103.155	-1	-9	103.155	0	-9	103.155	0	-9
3004 0484		103.137	0	-6	103.131	-1	-6	103.131	0	-6	103.131	0	-6
3004 0485		103.115	0	-4	103.110	0	-5	103.110	0	-5	103.110	0	-5
3004 0486		103.110	0	-6	103.104	0	-6	103.104	0	-6	103.104	0	-6
3004 0487		103.093											

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	43. following		44. following		45. following		46. following		47. following		48. following	
	baseline	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
date	08/03/2013		09/03/2013		14/03/2013		20/03/2013		27/03/2013		27/05/2013	
Point No.	elevation											
3004 0451	103.885								103.880	1	103.882	1
3004 0452	103.884								103.881	1	103.882	1
3004 0453	103.711								103.710	1	103.711	2
3004 0454	103.431								103.431	1	103.432	1
3004 0455	103.224								103.219	0	103.220	1
3004 0461	103.597				103.597	0	-1	103.596	0	-1	103.599	1
3004 0462	103.540				103.539	0	-1	103.538	-1	-1	103.540	2
3004 0463	103.590				103.590	0	0	103.589	-1	-1	103.593	2
3004 0471	103.807				103.804	-2	-3	103.804	0	-3	103.805	-1
3004 0472	103.528				103.527	-1	-1	103.526	-1	-2	103.529	2
3004 0473	103.361				103.361	-1	0	103.360	-1	-1	103.363	1
3004 0474	103.174										103.143	-1
3004 0475	103.047										103.115	0
3004 0481	103.321										103.211	0
3004 0482	103.217	1	-4	103.213	0	-5	103.212	-1	-5	103.170	103.170	-5
3004 0483	103.164	0	-8	103.155	-1	-9	103.155	-1	-9	103.155	0	-9
3004 0484	103.137	0	-6	103.132	-1	-6	103.131	-1	-7	103.131	0	-7
3004 0485	103.115	0	-5	103.110	-1	-6					103.107	-7
3004 0486	103.110	-1	-11								103.094	-6
3004 0487	103.093								103.098	-1	-12	

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading date	49. following 28/05/2013		50. following 29/05/2013		51. following 30/05/2013		52. following 31/05/2013		53. following 01/06/2013		54. following 02/06/2013	
	baseline elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
Point No.	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885	0	103.882	0	103.882	0	103.881	-1	103.881	0	103.881	0
3004 0452	103.884	0	103.882	0	103.882	0	103.881	-1	103.881	1	103.881	0
3004 0453	103.711	1	103.711	-1	103.711	0	103.710	-1	103.710	0	103.709	-1
3004 0454	103.431	0	103.431	-1	103.431	0	103.430	-1	103.430	0	103.430	-1
3004 0455	103.224	0	103.220	-1	103.220	0	103.219	-1	103.220	1	103.220	0
3004 0461	103.597						103.599	0	103.599	0	103.598	0
3004 0462	103.540						103.541	0	103.541	0	103.541	0
3004 0463	103.590						103.592	-1	103.592	0	103.592	0
3004 0471	103.807						103.804	-1	103.804	0	103.805	0
3004 0472	103.528						103.529	0	103.529	0	103.529	0
3004 0473	103.361						103.362	-1	103.362	0	103.362	0
3004 0474	103.174						103.141	-2	103.142	0	103.142	0
3004 0475	103.047						destroyed					
3004 0481	103.321											
3004 0482	103.217											
3004 0483	103.164											
3004 0484	103.137											
3004 0485	103.115											
3004 0486	103.110											
3004 0487	103.093											

monitoring table



Joint Venture

Project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	baseline		55. following		56. following		57. following		58. following		59. following		60. following	
	date	elevation	03/06/2013	deviation from last/baseline	04/06/2013	deviation from last/baseline	05/06/2013	deviation from last/baseline	06/06/2013	deviation from last/baseline	07/06/2013	deviation from last/baseline	08/06/2013	deviation from last/baseline
Point No.		elevation	deviation from last/baseline	elevation	deviation from last/baseline	elevation	deviation from last/baseline	elevation	deviation from last/baseline	elevation	deviation from last/baseline	elevation	deviation from last/baseline	
3004 0451		103.885	-4	103.880	-1	103.881	0	103.881	0	103.881	0	103.881	1	-4
3004 0452		103.884	-3	103.880	-1	103.880	0	103.880	1	103.880	0	103.881	1	-2
3004 0453		103.711	-1	103.708	-1	103.709	0	103.709	0	103.709	1	103.710	1	-1
3004 0454		103.431	-1	103.429	-1	103.429	0	103.429	0	103.429	0	103.430	1	-1
3004 0455		103.224	-4	103.219	-1	103.219	0	103.219	0	103.219	0	103.220	1	-4
3004 0461		103.597	2	103.599	0	103.599	0	103.599	1	103.599	0	103.600	1	2
3004 0462		103.540	2	103.541	0	103.541	0	103.541	0	103.541	0	103.542	1	2
3004 0463		103.590	1	103.592	0	103.592	0	103.592	1	103.592	0	103.593	1	2
3004 0471		103.807	-2											3
3004 0472		103.528	1											0
3004 0473		103.361	1											2
3004 0474		103.174	2	103.142	1	103.142	0	103.142	1	103.143	1	103.143	0	2
3004 0475		103.047												3
3004 0481		103.321		103.213						103.213	-0.41			0
3004 0482		103.217		103.150						103.150	-0.21			0
3004 0483		103.164		103.120						103.120	-0.08			0
3004 0484		103.137		103.102						103.102	-0.42			0
3004 0485		103.115		103.090						103.090	-0.01			0
3004 0486		103.110												
3004 0487		103.093												

monitoring table



Joint Venture

project: C310 Thames Tunnel

No. of reading	structure: Cross Section 1 - 4 Area NR + Old Coalyard												
	baseline	61. following		62. following		63. following		64. following		65. following		66. following	
date	15/12/12	09/06/2013		10/06/2013		11/06/2013		12/06/2013		13/06/2013		14/06/2013	
Point No.	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885	103.881	0 -4	103.598	-2 0	103.598	0 0	103.598	0 1	103.598	0 0		
3004 0452	103.884	103.881	0 -3	103.540	-1 0	103.541	1 1	103.540	-1 0	103.540	0 1		
3004 0453	103.711	103.710	0 -1	103.592	-2 1	103.592	0 1	103.591	0 1	103.591	0 1		
3004 0454	103.431	103.430	0 -1	103.805	0 -2	103.805	0 -2	103.805	0 -3	103.804	-1 -4	103.803	0 -4
3004 0455	103.224	103.220	0 -3	103.529	0 1	103.529	0 1	103.529	-1 1	103.527	-1 -1	103.527	0 -1
3004 0461	103.597	103.599	1 2	103.363	0 2	103.364	1 3	103.362	-2 1	103.361	-1 -1	103.360	0 -1
3004 0462	103.540	103.542	1 2	103.142	0 -3	103.142	0 -2	103.142	0 -1	103.141	-1 -2	103.140	-1 -3.1
3004 0463	103.590	103.593	1 3										
3004 0471	103.807	103.806	0 -2										
3004 0472	103.528	103.529	0 1										
3004 0473	103.361	103.363	-1 2										
3004 0474	103.174	103.142	-1 -2										
3004 0475	103.047												
3004 0481	103.321												
3004 0482	103.217												
3004 0483	103.164												
3004 0484	103.137												
3004 0485	103.115												
3004 0486	103.110												
3004 0487	103.093												

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old CoalYard

No. of reading	67. following		68. following		69. following		70. following		71. following		72. following	
	baseline	15/06/2013	16/06/2013	17/06/2013	18/06/2013	25/06/2013	02/07/2013					
Point No.	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885								103.880	-1	103.881	0
3004 0452	103.884								103.879	-2	103.880	1
3004 0453	103.711								103.708	-2	103.709	1
3004 0454	103.431								103.429	-1	103.429	0
3004 0455	103.224								103.219	-1	103.220	1
3004 0461	103.597								103.597	-1	103.598	1
3004 0462	103.540								103.540	0	103.540	0
3004 0463	103.590								103.591	0	103.592	1
3004 0471	103.807	1	-3						103.804	0	103.804	0
3004 0472	103.528	1	-1						103.527	0	103.528	0
3004 0473	103.361	1	0						103.360	-2	103.361	1
3004 0474	103.174	0	-2						103.139	-2		
3004 0475	103.047											
3004 0481	103.321	0	0	103.212	-1	-2	103.211	0	103.208	-4	103.210	2
3004 0482	103.217	0	0	103.150	-1	-1	103.148	-1				
3004 0483	103.164	0	0	103.120	-2	-2	103.118	0				
3004 0484	103.137	0	-1	103.102	-2	-2	103.100	0				
3004 0485	103.115	0	0	103.090	-1	-1	103.089	0	103.083	-6		
3004 0486	103.110											
3004 0487	103.093											

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard


No. of reading	73. following		74. following		75. following		76. following		77. following		elevation	deviation from last/ baseline
	date	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation		
	15/12/12											
Point No.		elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	
3004 0451		103.881	0 -4	103.881	0 -4	103.881	-1 -5	103.880	-1 -5	103.796	-6 -11.82	
3004 0452		103.884	0 -3	103.881	0 -3	103.880	-1 -4	103.880	-1 -4	103.526	0 -1.93	
3004 0453		103.711	1 -1	103.710	0 -1	103.708	-2 -3	103.708	-2 -3	103.359	-1 -1.83	
3004 0454		103.431	1 -1	103.430	1 -1	103.431	1 0	103.429	-2 -3			
3004 0455		103.224	1 -3	103.221	0 -3	103.221	0 -3	103.219	-2 -5			
3004 0461		103.597	0 0	103.598	0 0	103.598	0 1	103.596	-2 -2			
3004 0462		103.540	0 0	103.540	0 0	103.540	0 0	103.538	-2 -2			
3004 0463		103.590	0 2	103.593	1 3	103.593	1 3	103.590	-2 0			
3004 0471		103.807	-1 -4	103.803	0 -4	103.803	0 -4	103.801	-2 -6			
3004 0472		103.528	0 0	103.528	0 0	103.528	0 0	103.527	-1 -2			
3004 0473		103.361	0 0	103.361	0 -1	103.361	0 -1	103.360	-1 -1			
3004 0474		103.174		103.137	-2 -6	103.137	-2 -6	103.130	-6 -13			
3004 0475		103.047			destroyed		destroyed		destroyed			
3004 0481		103.321	1 -2	103.210	-1 -3			103.210	0 -3			
3004 0482		103.217	-3 -5	103.146	-3 -5			103.145	0 -5			
3004 0483		103.164						103.113	0 -7			
3004 0484		103.137						103.095	0 -7			
3004 0485		103.115						103.087	0 -3			
3004 0486		103.110										
3004 0487		103.093										

point No.474 damaged

point No.471 damaged

point No.471 damaged

point No.471 damaged

		C310 THAMES TUNNEL REPORT		
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev 2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal			

APPENDIX 15
CS4 – Old Coal Yard

Learning Legacy Document

monitoring asset	Area of Old Coalyard		
reference monitoring drawing:	C310-HTM-C-DWG-CR148-PT005-50010		
name of monitoring section:	CS4- Old Coalyard area		
sensor type:	manual levelling studs		
chainage:	91520	point no.:	3004 0481 - 3004 0487
trigger values: [mm]	green: +16 -16	amber: +20 -20	red: +25 -25
reference document for trigger values:	Management Plan for Control of Ground Movement		
EB-no.:	C310-HTM-Z-STP-CR148-50058		
Appendix:	AAA		

monitoring data

	date	max. value	point no.	comments
baseline	15/12/12	0.00		
TBM 1	start ZOI	01/03/13	-0.16	3004 0482
	end ZOI	09/03/13	-1.51	3004 0482
TBM 2	start ZOI	15/06/13	0.05	3004 0485
	end ZOI	18/06/13	-0.54	3004 0485
longterm	24/09/13	-5.37	3004 0482	last reading 3 month post tunneling, Cross section not longer measurable
Evaluation of any potential residual risks	<input checked="" type="checkbox"/>	No residual risk since the Works have been completed by HMJV		
	<input type="checkbox"/>	Yes, residual risk (see comment below)		

summary / comments

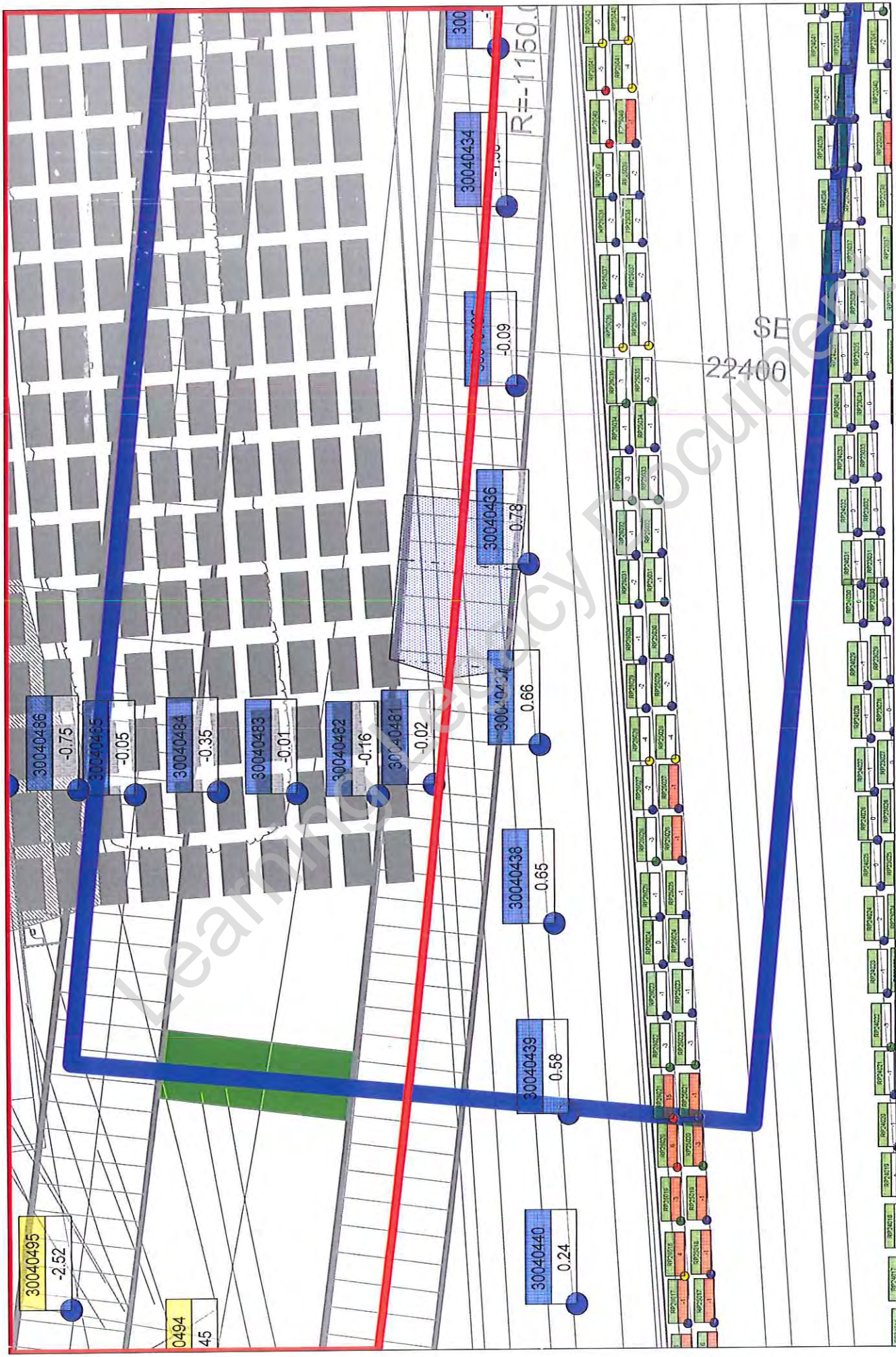
3004 0481 destroyed at 27.02.2013
 3004 0481-0485 reinstalled and rebaselined at 21.05.2013
 3004 0481-0485 2.nd time reinstalled and rebaselined at 04.06.2013
 3004 0483-0485 destroyed at 04.08.2013
 Cross section no longer measureable all points were destroyed.
 Under consideration of temperature differences, the surrounding ground condition and the achievable accuracy of the measurement, HMJV has no concern to cease the monitoring.
 The rate of change in the monitoring data is less than the required standards as per the specifications and drawings up to the time when the instrumentations have been damaged/destroyed.

date / signature: 31/03/2015

print name:

HMJV project role:

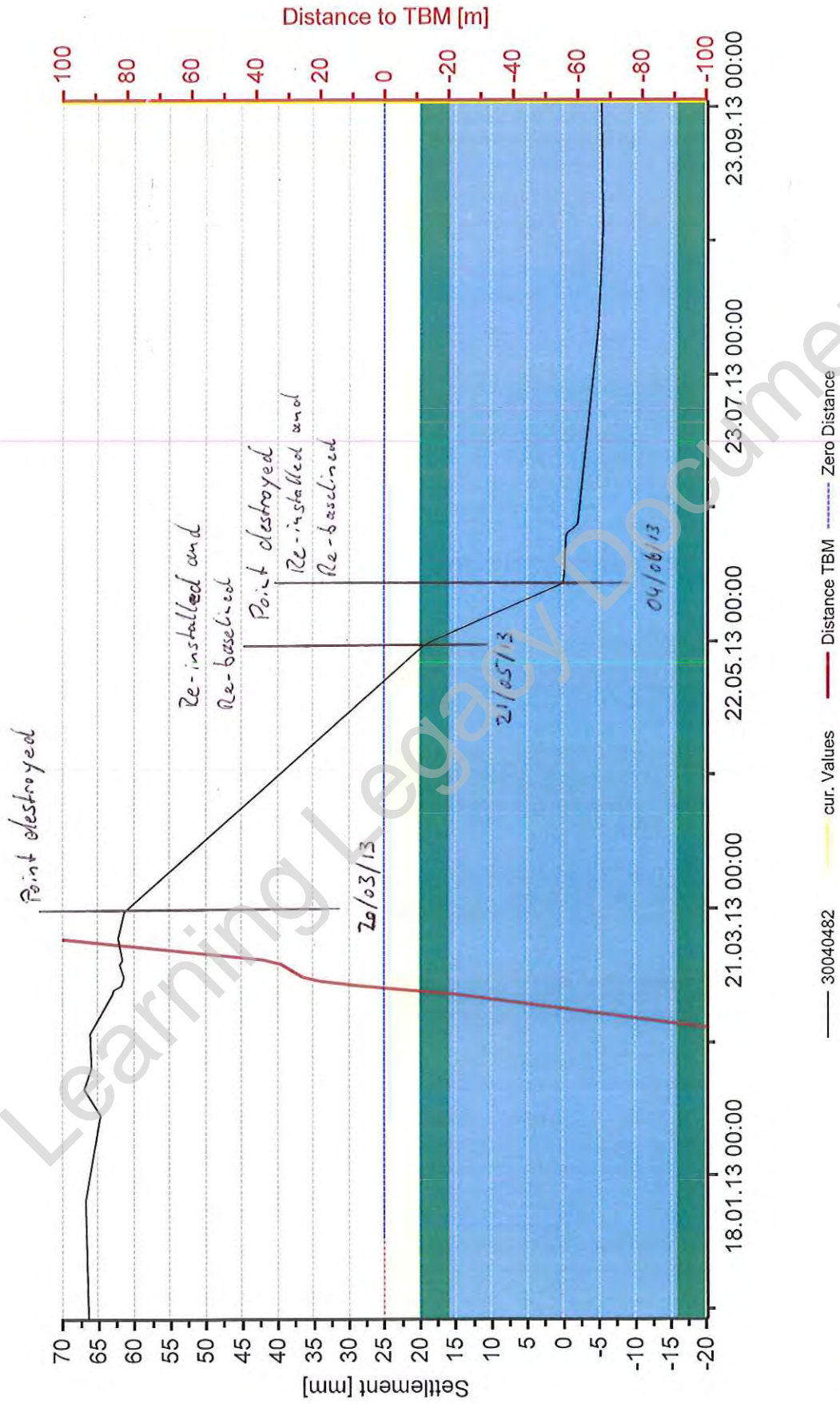
Monitoring & Survey engineer



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive, portal excavation, construction base slab, lining walls and grouting
 current values: 02.03.2013 07:00

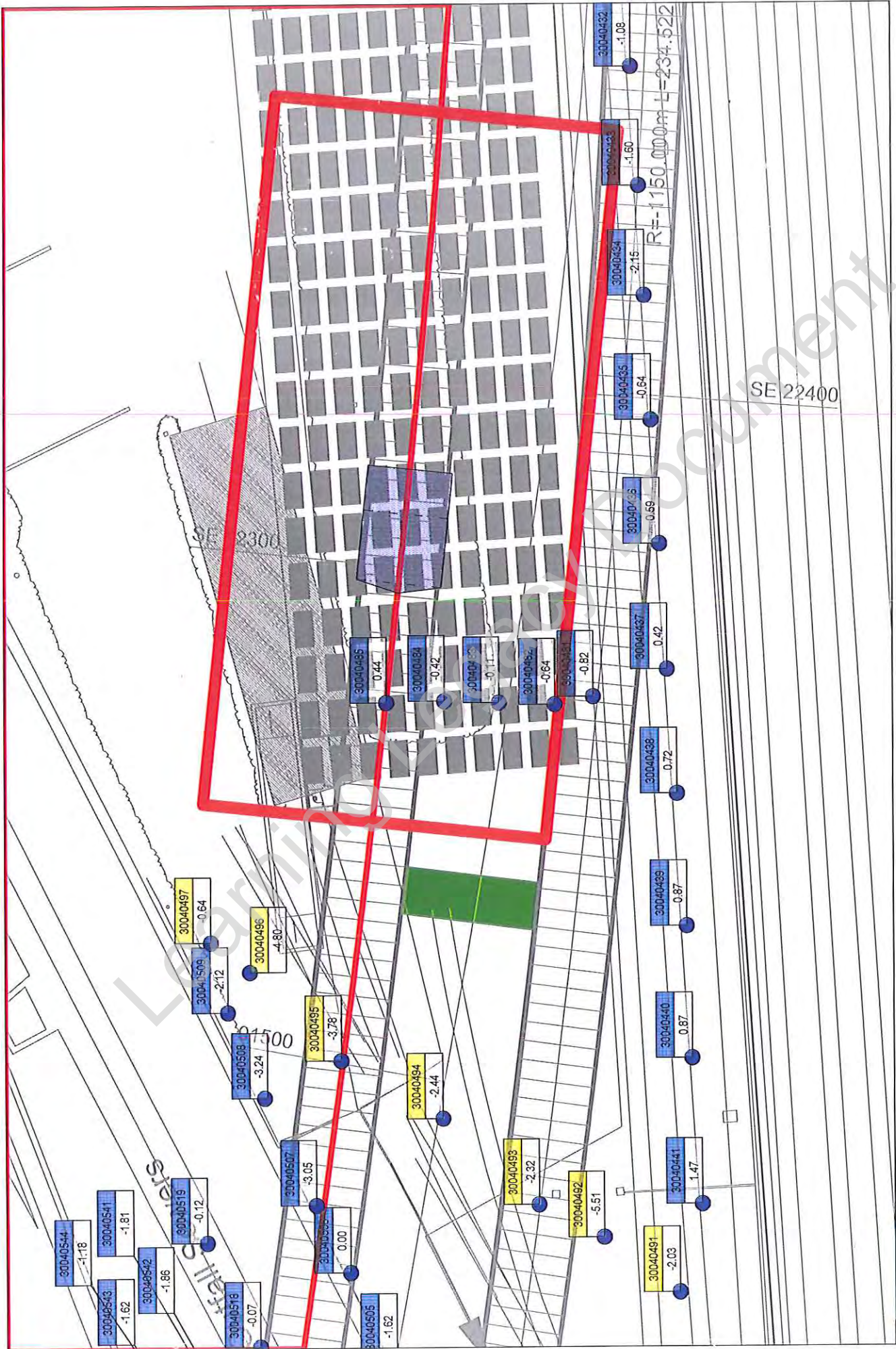


Point: 30040482



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - CS4 (Old Coalyard) 15.12.2012 - 24.09.2013
date: 17.06.2014 15:57 current values: 17.06.2014 15:46

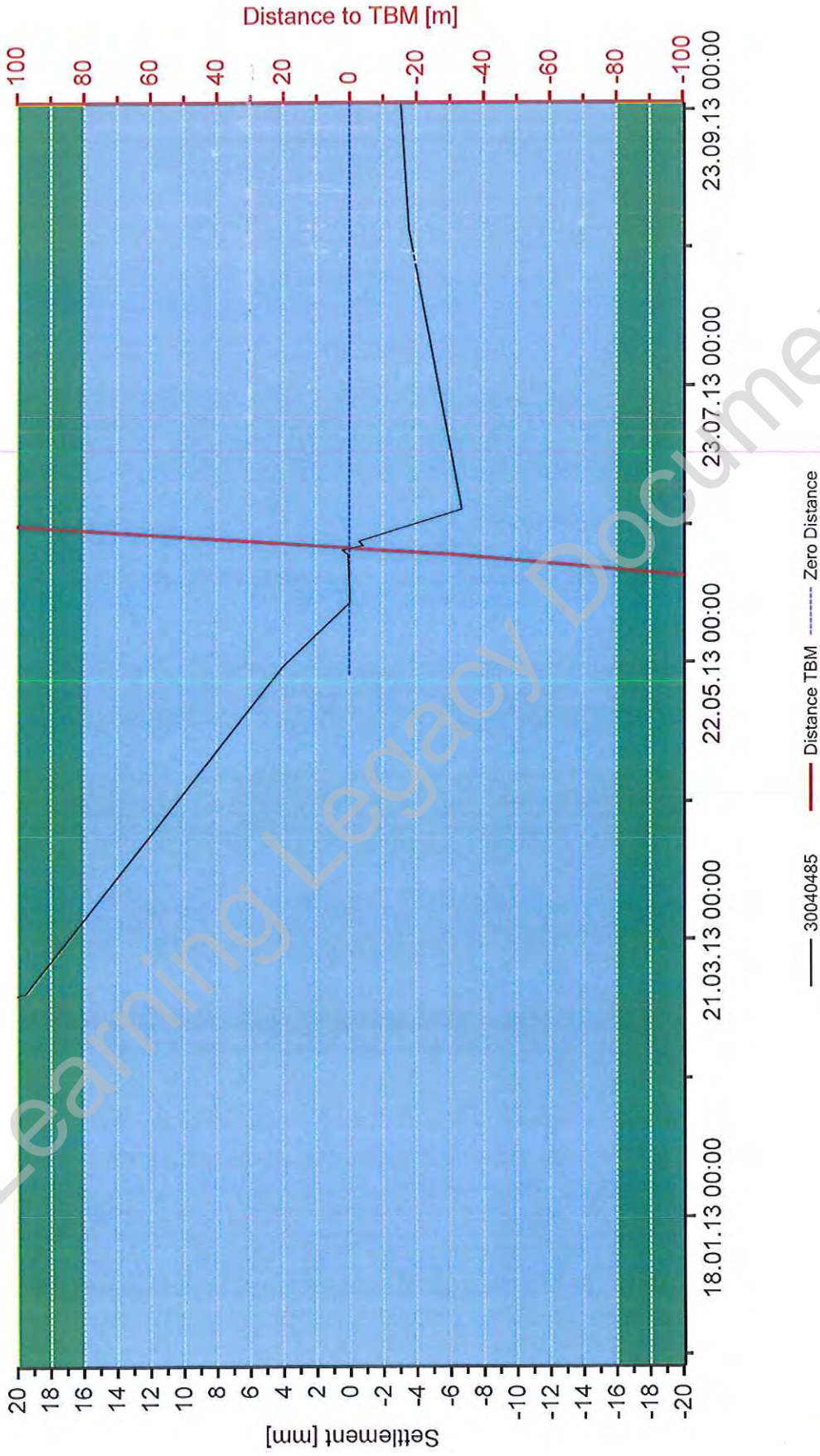




Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 16.06.2013 09:00



Point: 30040485



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - CS4 (Old Coalyard) 15.12.2012 - 24.09.213
date: 17.06.2014 16:03 current values: 17.06.2014 16:01



monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old CoalYard

No. of reading	baseline	1. following		2. following		3. following		4. following		5. following		6. following	
		15/12/12	12/01/2013	26/01/2013	27/01/2013	28/01/2013	29/01/2013	30/01/2013	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation
Point No.	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885	103.885	0	103.886	1	103.884	-2	103.885	1	103.886	1	103.885	-1
3004 0452	103.884	103.884	0	103.885	1	103.883	-1	103.884	0	103.884	1	103.883	-1
3004 0453	103.711	103.711	0	103.712	1	103.710	-1	103.711	0	103.711	1	103.710	-1
3004 0454	103.431	103.432	0	103.432	0	103.431	-1	103.431	1	103.432	1	103.431	-1
3004 0455	103.224	103.225	1	103.224	-1	103.221	-3	103.221	0	103.222	0	103.220	-2
3004 0461	103.597	103.599	1	103.599	0	103.597	-2	103.597	0	103.598	1	103.598	0
3004 0462	103.540	103.541	1	103.541	0	103.539	-2	103.539	1	103.540	1	103.540	0
3004 0463	103.590	103.592	1	103.591	0	103.590	-1	103.590	0	103.591	1	103.591	0
3004 0471	103.807	103.807	-1	103.807	0	103.806	-1	103.806	0	103.806	0	103.806	0
3004 0472	103.528	103.528	0	103.529	1	103.527	-2	103.528	2	103.528	0	103.528	-1
3004 0473	103.361	103.362	1	103.362	0	103.361	-1	103.362	1	103.362	0	103.360	-1
3004 0474	103.174	103.174	0	103.173	-1	103.172	-1	103.172	0	103.172	0	103.172	-1
3004 0475	103.047	103.047	0										
3004 0481	103.321	103.322	1										
3004 0482	103.217	103.217	0										
3004 0483	103.164	103.164	0										
3004 0484	103.137	103.138	0										
3004 0485	103.115	103.115	0										
3004 0486	103.110	103.109	-1										
3004 0487	103.093	103.093	0										

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	7. following		8. following		9. following		10. following		11. following		12. following	
	baseline	31/01/2013	01/02/2013	02/02/2013	03/02/2013	04/02/2013	05/02/2013					
date	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885	-3	103.881	-1	103.881	0	103.881	0	103.881	0	103.881	0
3004 0452	103.884	-2	103.881	0	103.881	1	103.881	0	103.881	0	103.881	0
3004 0453	103.711	-1	103.709	0	103.710	1	103.710	0	103.710	0	103.710	0
3004 0454	103.431	0	103.430	0	103.431	1	103.432	1	103.432	1	103.432	1
3004 0455	103.224	0	103.219	0	103.220	1	103.221	1	103.221	1	103.221	1
3004 0461	103.597	-1	103.597	0	103.598	1	103.599	1	103.599	1	103.598	0
3004 0462	103.540	0	103.539	0	103.540	1	103.541	1	103.541	1	103.540	0
3004 0463	103.590	-1	103.590	0	103.591	1	103.592	1	103.592	1	103.591	0
3004 0471	103.807	-1	103.806	0	103.806	1	103.807	1	103.806	-1	103.807	0
3004 0472	103.528	0	103.528	1	103.529	1	103.529	0	103.528	-1	103.529	0
3004 0473	103.361	0	103.361	0	103.362	1	103.362	0	103.361	-1	103.361	0
3004 0474	103.174											
3004 0475	103.047											
3004 0481	103.321		103.319	-2	-1							
3004 0482	103.217		103.215	-2	-2							
3004 0483	103.164		103.135	-2	-2							
3004 0484	103.137											
3004 0485	103.115											
3004 0486	103.110											
3004 0487	103.093											

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	baseline		13. following		14. following		15. following		16. following		17. following		18. following			
	date	elevation	06/02/2013	deviation from last/ baseline	07/02/2013	deviation from last/ baseline	08/02/2013	deviation from last/ baseline	09/02/2013	deviation from last/ baseline	10/02/2013	deviation from last/ baseline	11/02/2013	deviation from last/ baseline		
3004 0451	15/12/12	103.885			103.883	1	-3									
3004 0452		103.884			103.883	2	-1									
3004 0453		103.711			103.712	2	1									
3004 0454		103.431			103.433	1	2									
3004 0455		103.224			103.222	1	-2									
3004 0461		103.597			103.599	0	2	103.599	0	2	103.600	1	2	103.600	0	2
3004 0462		103.540			103.541	1	1	103.541	0	2	103.542	1	3	103.541	-1	2
3004 0463		103.590			103.592	1	2	103.592	0	2	103.593	1	2	103.592	-1	2
3004 0471		103.807			103.807	0	-1	103.807	0	0	103.808	1	0	103.808	0	0
3004 0472		103.528			103.529	0	1	103.529	0	1	103.530	1	2	103.530	-1	2
3004 0473		103.361			103.362	1	1	103.362	0	1	103.363	1	2	103.363	-1	1
3004 0474		103.174														
3004 0475		103.047														
3004 0481		103.321			103.321	2	0	103.321	0	0						
3004 0482		103.217			103.217	2	1	103.217	0	1						
3004 0483		103.164														
3004 0484		103.137			103.137	2	0	103.137	0	0						
3004 0485		103.115														
3004 0486		103.110														
3004 0487		103.093														

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	15/12/12		19. following		20. following		21. following		22. following		23. following		24. following	
	baseline	date	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885	12/02/2013	103.882	0 -3	103.600	0 2	103.597	0 2	103.597	-3 -1	103.597	0 -1	103.597	0 -1
3004 0452	103.884		103.882	0 -1	103.542	0 2	103.539	0 2	103.539	-3 -1	103.539	0 0	103.539	-1 -1
3004 0453	103.711		103.712	0 1	103.593	0 2	103.590	0 2	103.590	-3 -1	103.590	0 0	103.590	0 -1
3004 0454	103.431		103.432	0 1	103.808	0 1	103.806	0 1	103.806	-2 -2	103.805	0 -2	103.805	0 -2
3004 0455	103.224		103.221	-1 -2	103.530	0 2	103.528	0 2	103.528	-3 -1	103.527	0 -1	103.527	0 -1
3004 0461	103.597		103.599	0 2	103.363	1 2	103.361	0 2	103.361	-3 0	103.360	-1 -1	103.360	0 -1
3004 0462	103.540		103.542	0 2										
3004 0463	103.590		103.593	0 2										
3004 0471	103.807		103.808	0 1										
3004 0472	103.528		103.530	-1 2										
3004 0473	103.361		103.363	-1 1										
3004 0474	103.174													
3004 0475	103.047													
3004 0481	103.321		103.320	-1 0										
3004 0482	103.217		103.216	-1 0										
3004 0483	103.164													
3004 0484	103.137		103.137	-1 -1										
3004 0485	103.115													
3004 0486	103.110													
3004 0487	103.093													

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	25. following		26. following		27. following		28. following		29. following		30. following		
	baseline	18/02/2013	19/02/2013	20/02/2013	21/02/2013	22/02/2013	23/02/2013	24/02/2013	25/02/2013	26/02/2013	27/02/2013	28/02/2013	
Point No.	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885							103.879	-3				
3004 0452	103.884							103.879	-3				
3004 0453	103.711							103.708	-3				
3004 0454	103.431							103.429	-3				
3004 0455	103.224							103.218	-3				
3004 0461	103.597	103.597	0	103.596	0	-1	103.596	0	-1	103.596	0	103.597	0
3004 0462	103.540	103.539	0	103.539	0	-1	103.538	0	-1	103.539	0	103.539	0
3004 0463	103.590	103.590	0	103.589	-1	-1	103.589	0	-1	103.590	0	103.590	0
3004 0471	103.807	103.805	0	103.805	0	-3	103.805	0	-3	103.804	0	103.805	1
3004 0472	103.528	103.527	0	103.527	0	-1	103.527	0	-2	103.527	0	103.527	1
3004 0473	103.361	103.360	-1	103.360	1	-1	103.360	0	-1	103.360	0	103.361	1
3004 0474	103.174												
3004 0475	103.047												
3004 0481	103.321			103.321	0	0							
3004 0482	103.217			103.217	0	0							
3004 0483	103.164												
3004 0484	103.137			103.137	0	0							
3004 0485	103.115												
3004 0486	103.110												
3004 0487	103.093												

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	baseline		37. following		38. following		39. following		40. following		41. following		42. following	
	date	elevation	date	deviation from last/ baseline	date	deviation from last/ baseline	date	deviation from last/ baseline	date	deviation from last/ baseline	date	deviation from last/ baseline	date	deviation from last/ baseline
	15/12/12		02/03/2013		03/03/2013		04/03/2013		05/03/2013		06/03/2013		07/03/2013	
Point No.	elevation		elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885												103.880	0 -6
3004 0452	103.884												103.880	1 -4
3004 0453	103.711												103.709	0 -2
3004 0454	103.431												103.430	1 -1
3004 0455	103.224												103.219	1 -5
3004 0461	103.597												103.597	0 -1
3004 0462	103.540												103.539	0 -1
3004 0463	103.590												103.590	0 -1
3004 0471	103.807												103.806	0 -1
3004 0472	103.528												103.527	-1 -1
3004 0473	103.361												103.362	1 1
3004 0474	103.174													
3004 0475	103.047													
3004 0481	103.321													
3004 0482	103.217		103.213	0 -3	103.212	-1 -5	103.212	0 -5	103.212	0 -5	103.212	0 -5		
3004 0483	103.164		103.156	0 -8	103.155	-1 -9	103.155	0 -9	103.155	0 -9	103.155	0 -9	103.155	0 -9
3004 0484	103.137		103.132	0 -6	103.131	-1 -6	103.131	0 -6	103.131	0 -7	103.131	0 -6	103.131	0 -6
3004 0485	103.115		103.111	0 -4	103.110	0 -5	103.111	0 -5	103.110	0 -5	103.110	0 -5	103.111	1 -5
3004 0486	103.110		103.104	0 -6	103.104	0 -6	103.104	0 -6	103.103	-1 -7	103.100	-3 -10		
3004 0487	103.093													

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	43. following		44. following		45. following		46. following		47. following		48. following		
	baseline	08/03/2013	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	
date	15/12/12	08/03/2013		09/03/2013		14/03/2013		20/03/2013		27/03/2013		21/05/2013	
Point No.	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	
3004 0451	103.885								103.880	1	103.882	1	-3
3004 0452	103.884								103.881	1	103.882	1	-2
3004 0453	103.711								103.710	1	103.711	2	1
3004 0454	103.431								103.431	1	103.432	1	0
3004 0455	103.224								103.219	0	103.220	1	-3
3004 0461	103.597				103.597	0	-1	103.596	0	-1	103.599	1	2
3004 0462	103.540				103.539	0	-1	103.538	-1	-1	103.540	2	1
3004 0463	103.590				103.590	0	0	103.589	-1	-1	103.591	2	1
3004 0471	103.807				103.804	-2	-3	103.804	0	-3	103.806	2	-1
3004 0472	103.528				103.527	-1	-1	103.526	-1	-2	103.529	2	1
3004 0473	103.361				103.361	-1	0	103.360	-1	-1	103.362	2	1
3004 0474	103.174											103.143	-1
3004 0475	103.047											103.115	0
3004 0481	103.321											103.211	0
3004 0482	103.217	1	-4	103.212	0	-5	103.213	1	-4	103.212	-1	-5	-5
3004 0483	103.164	0	-8	103.155	-1	-9	103.155	1	-8	103.155	0	-9	-9
3004 0484	103.137	0	-6	103.131	-1	-6	103.131	0	-6	103.131	0	-7	-7
3004 0485	103.115	0	-5	103.109	-1	-6						103.107	-6
3004 0486	103.110	103.099	-1	-11								103.094	-6
3004 0487	103.093								103.098	-1	-12		

reinstated and ebaselined

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	baseline	49. following		50. following		51. following		52. following		53. following		54. following	
		elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
date	15/12/12	28/05/2013		29/05/2013		30/05/2013		31/05/2013		01/06/2013		02/06/2013	
3004 0451	103.885	103.882	0 -3	103.882	0 -3	103.882	0 -4	103.881	-1 -4	103.881	0 -4	103.881	0 -4
3004 0452	103.884	103.882	0 -2	103.882	0 -2	103.882	0 -2	103.881	-1 -3	103.881	1 -3	103.881	0 -3
3004 0453	103.711	103.712	1 1	103.711	-1 0	103.711	0 0	103.710	-1 -1	103.710	0 -1	103.709	-1 -2
3004 0454	103.431	103.432	0 1	103.431	-1 0	103.431	0 0	103.430	-1 -1	103.430	0 -1	103.430	1 -1
3004 0455	103.224	103.220	0 -3	103.220	-1 -4	103.220	0 -4	103.219	-1 -4	103.220	1 -4	103.220	0 -4
3004 0461	103.597							103.599	0 1	103.599	0 1	103.598	0 1
3004 0462	103.540							103.541	0 1	103.541	0 1	103.541	0 1
3004 0463	103.590							103.592	-1 1	103.592	0 2	103.592	0 2
3004 0471	103.807							103.804	-1 -3	103.804	0 -3	103.805	0 -3
3004 0472	103.528							103.529	0 1	103.529	0 0	103.529	0 1
3004 0473	103.361							103.362	-1 1	103.362	0 1	103.362	0 1
3004 0474	103.174							103.141	-2 -3	103.142	0 -3	103.142	0 -3
3004 0475	103.047							destroyed					
3004 0481	103.321												
3004 0482	103.217												
3004 0483	103.164												
3004 0484	103.137												
3004 0485	103.115												
3004 0486	103.110												
3004 0487	103.093												

monitoring table



Joint Venture

Project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	55. following		56. following		57. following		58. following		59. following		60. following	
	baseline	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
date	03/06/2013		04/06/2013		05/06/2013		06/06/2013		07/06/2013		08/06/2013	
Point No.	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885	0	103.880	-1	103.881	0	103.881	0	103.881	0	103.881	1
3004 0452	103.884	0	103.880	-1	103.880	0	103.880	1	103.880	0	103.881	1
3004 0453	103.711	0	103.708	-1	103.709	0	103.709	0	103.709	1	103.710	1
3004 0454	103.431	0	103.429	-1	103.429	0	103.429	0	103.429	0	103.430	1
3004 0455	103.224	0	103.219	-1	103.219	0	103.219	0	103.219	0	103.220	1
3004 0461	103.597	1	103.599	0	103.599	0	103.599	1	103.599	0	103.600	1
3004 0462	103.540	1	103.541	0	103.541	0	103.541	0	103.541	0	103.542	1
3004 0463	103.590	1	103.592	0	103.592	0	103.593	1	103.592	0	103.593	1
3004 0471	103.807	1										
3004 0472	103.528	1										
3004 0473	103.361	1										
3004 0474	103.174		103.142	1	103.142	0	103.143	1	103.143	0		
3004 0475	103.047											
3004 0481	103.321		103.213						103.213	-0.41		
3004 0482	103.217		103.150						103.150	-0.21		
3004 0483	103.164		103.120						103.120	-0.08		
3004 0484	103.137		103.102						103.102	-0.42		
3004 0485	103.115		103.090						103.090	-0.01		
3004 0486	103.110											
3004 0487	103.093											

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	baseline date	61. following 09/05/2013		62. following 10/06/2013		63. following 11/06/2013		64. following 12/06/2013		65. following 13/06/2013		66. following 14/06/2013	
		elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885	103.881	0	-4	103.598	-2	0	103.598	0	0	103.598	0	0
3004 0452	103.884	103.881	0	-3	103.540	-1	0	103.541	1	1	103.540	0	1
3004 0453	103.711	103.710	0	-1	103.592	-2	1	103.592	0	1	103.591	0	1
3004 0454	103.431	103.430	0	-1	103.805	0	-2	103.805	0	-3	103.804	-1	-4
3004 0455	103.224	103.220	0	-3	103.529	0	1	103.529	0	1	103.527	-1	-1
3004 0461	103.597	103.599	1	2	103.363	0	2	103.364	1	3	103.361	-1	-1
3004 0462	103.540	103.542	1	2	103.142	0	-3	103.142	0	-2	103.141	-1	-2
3004 0463	103.590	103.593	1	3									
3004 0471	103.807	103.806	0	-2									
3004 0472	103.528	103.529	0	1									
3004 0473	103.361	103.363	-1	2									
3004 0474	103.174	103.142	-1	-2									
3004 0475	103.047												
3004 0481	103.321												
3004 0482	103.217												
3004 0483	103.164												
3004 0484	103.137												
3004 0485	103.115												
3004 0486	103.110												
3004 0487	103.093												

monitoring table



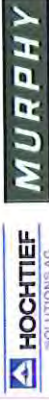
Joint Venture

project: C310 Thames Tunnel

structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	67. following		68. following		69. following		70. following		71. following		72. following		
	baseline	15/06/2013	16/06/2013	17/06/2013	18/06/2013	25/06/2013	02/07/2013						
date	15/12/12	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0451	103.885							103.880	-1	103.881	0	103.881	0
3004 0452	103.884							103.879	-2	103.880	1	103.880	1
3004 0453	103.711							103.708	-2	103.709	1	103.709	1
3004 0454	103.431							103.429	-1	103.429	0	103.429	0
3004 0455	103.224							103.219	-1	103.220	1	103.220	1
3004 0461	103.597							103.597	-1	103.598	1	103.598	1
3004 0462	103.540							103.540	0	103.540	0	103.540	0
3004 0463	103.590							103.591	0	103.592	1	103.592	1
3004 0471	103.807							103.804	0	103.804	0	103.804	0
3004 0472	103.528							103.527	0	103.528	0	103.528	0
3004 0473	103.361							103.362	1	103.360	-2	103.361	1
3004 0474	103.174							103.174	0	103.139	-2	103.139	-2
3004 0475	103.047												
3004 0481	103.321							103.213	0	103.212	0	103.211	0
3004 0482	103.217							103.150	0	103.149	-1	103.148	-1
3004 0483	103.164							103.120	0	103.118	-2	103.118	-2
3004 0484	103.137							103.102	0	103.100	-2	103.100	-2
3004 0485	103.115							103.090	0	103.089	-1	103.089	-1
3004 0486	103.110												
3004 0487	103.093												

monitoring table



Joint Venture

project: C310 Thames Tunnel


structure: Cross Section 1 - 4 Area NR + Old Coalyard

No. of reading	73. following		74. following		75. following		76. following		77. following		elevation	deviation from last/ baseline
	baseline elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline		
date	15/12/12	04/08/2013	27/02/2013	28/02/2013	24/09/2013	06/02/2014						
Point No.	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline		
3004 0451	103.885	0 -4	103.881	0 -4	103.880	-1 -5	103.880	-1 -4				
3004 0452	103.884	0 -3	103.881	0 -3	103.880	-1 -4	103.880	-1 -4				
3004 0453	103.711	1 -1	103.710	0 -1	103.708	-2 -3	103.708	-2 -3				
3004 0454	103.431	1 -1	103.430	1 -1	103.431	1 0	103.429	-2 -3				
3004 0455	103.224	1 -3	103.221	0 -3	103.221	0 -3	103.219	-2 -5				
3004 0461	103.597	0 0	103.598	0 0	103.598	0 1	103.596	-2 -2				
3004 0462	103.540	0 0	103.540	0 0	103.540	0 0	103.538	-2 -2				
3004 0463	103.590	0 2	103.592	0 2	103.593	1 3	103.590	-2 0				
3004 0471	103.807	-1 -4	103.803	0 -4	103.803	0 -4	103.801	-2 -6				
3004 0472	103.528	0 0	103.528	0 0	103.528	0 0	103.527	-1 -2				
3004 0473	103.361	0 0	103.361	0 0	103.361	0 -1	103.360	-1 -1				
3004 0474	103.174		103.137	-2 -5	103.137	-2 -5	103.130	-6 -13				
3004 0475	103.047				destroyed							
3004 0481	103.321	1 -2	103.210	-1 -3			103.210	0 -3				
3004 0482	103.217	-3 -5	103.146	-1 -6			103.145	0 -5				
3004 0483	103.164	Tops of survey points 483-485 lost due to	103.113	-5 -8			103.113	0 -7				
3004 0484	103.137	frontloading shovel	103.095	-4 -7			103.095	0 -7				
3004 0485	103.115	scrapping surface	103.086	-3 -4			103.087	0 -3				
3004 0486	103.110				destroyed							
3004 0487	103.093											

point No.471 damaged

point No.474 damaged

point No.471 damaged

		C310 THAMES TUNNEL REPORT		
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev 2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal			

APPENDIX 16

APB Sidings – Old Coal Yard

Learning Legacy Document

monitoring asset	Area of Old Coalyard / NR sidings		
reference monitoring drawing:	C310-HTM-C-DWG-CR148-PT005-50010		
name of monitoring section:	APB Sidings - Old Coalyard area		
sensor type:	manual levelling studs		
chainage:	91480 - 91700	point no.:	3004 0421 - 3004 0441
trigger values: [mm]	green: +16 -16	amber: +20 -20	red: +25 -25
reference document for trigger values:	Management Plan for Control of Ground Movement		
EB-no.:	C310-HTM-Z-STP-CR148-50058		
Appendix:	AAA		


monitoring data

	date	max. value	point no.	comments
baseline	15/12/12	0		
TBM 1	start ZOI	29/01/13 04/03/13	0.01 1.04	3004 0421 3004 0441
	end ZOI	03/02/13 12/03/13	2.09 -3.63	3004 0421 3004 0441
TBM 2	start ZOI	30/05/13 18/06/13	-2.66 1.13	3004 0421 3004 0441
	end ZOI	09/06/13 20/06/13	-2.81 0.63	3004 0421 3004 0441
longterm	06/02/14	-6.46	3004 0429	this is the localised settlement for this point only. Adjacent monitoring points show less than 1mm settlement between 09/2013-02/2014
Evaluation of any potential residual risks	<input checked="" type="checkbox"/>	No residual risk since the Works have been completed by HMJV		
	<input type="checkbox"/>	Yes, residual risk (see comment below)		

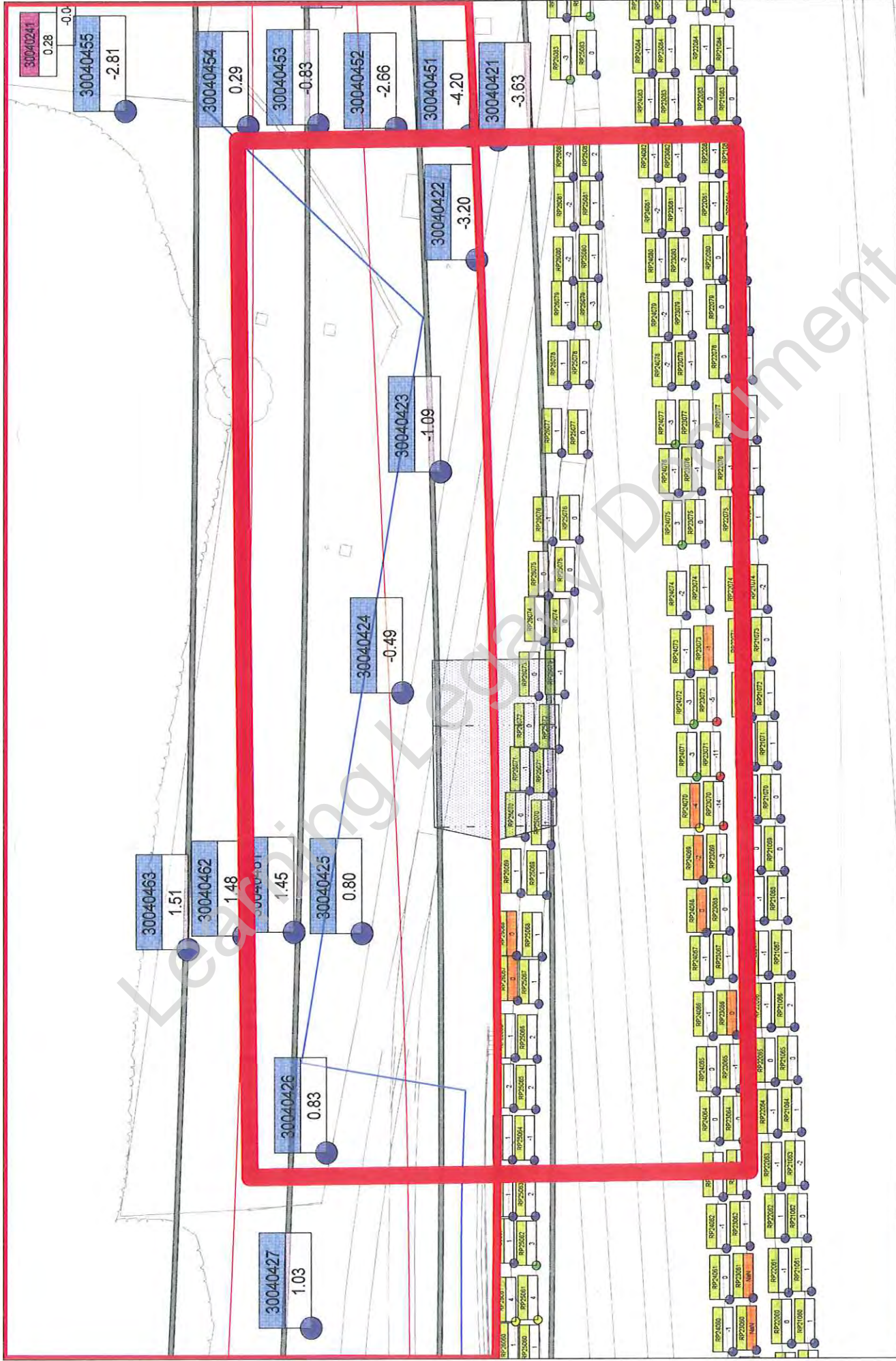
summary / comments

Points no. 3004 0440 & 3004 0441 were tracked over by heavy machine 24/09/2014.
(not useable for longterm value)
Under consideration of temperature differences, the surrounding ground condition and the achievable accuracy of the measurement, HMJV has no concern to cease the monitoring.
The rate of change in the monitoring data is less than the required standards as per the specifications and drawings.

date / signature: 08/01/2015

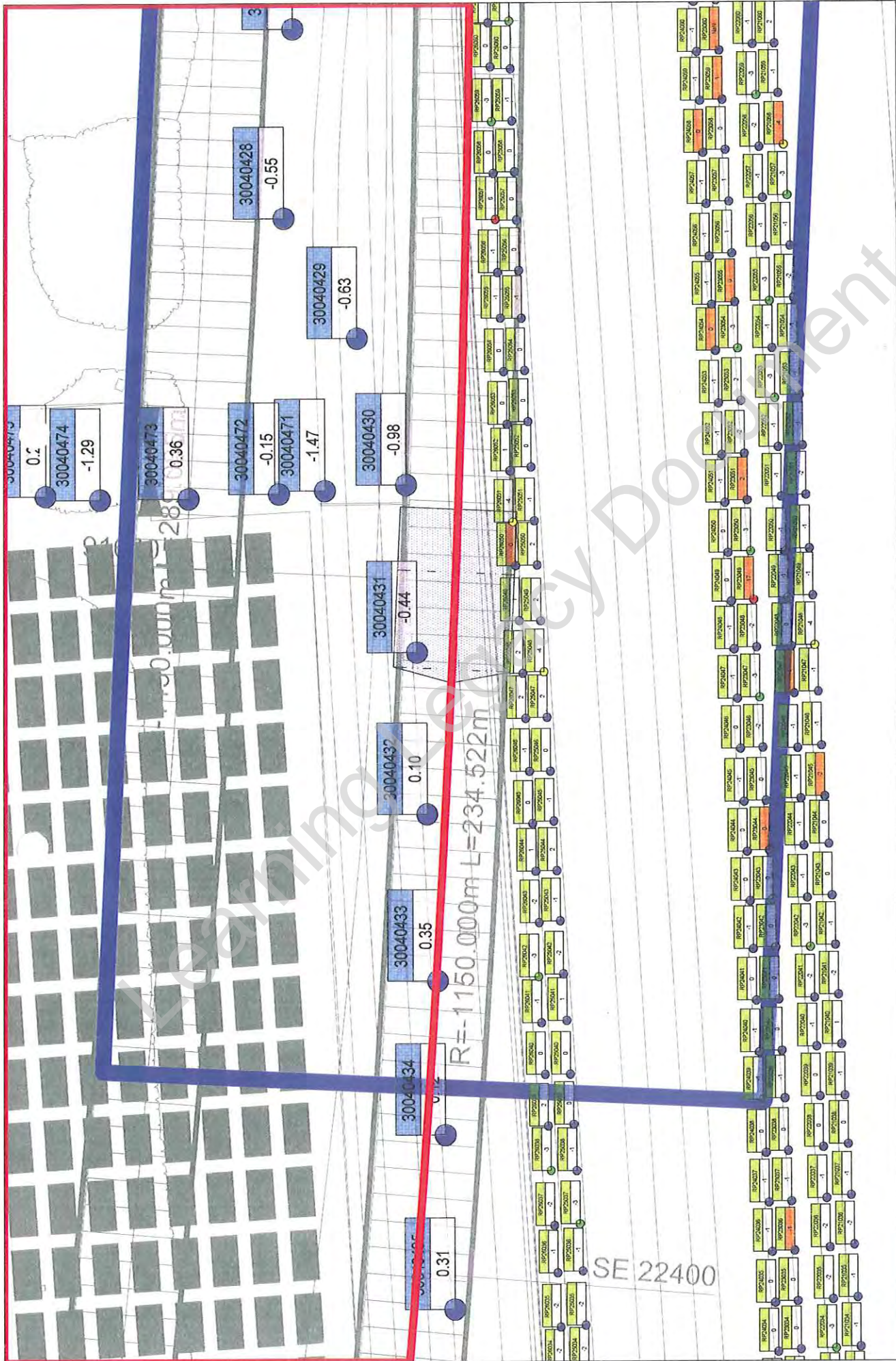
print name: 

HMJV project role: Monitoring & Survey engineer



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive, portal excavation, construction base slab, lining walls and grouting
 current values: 03.02.2013 10:48



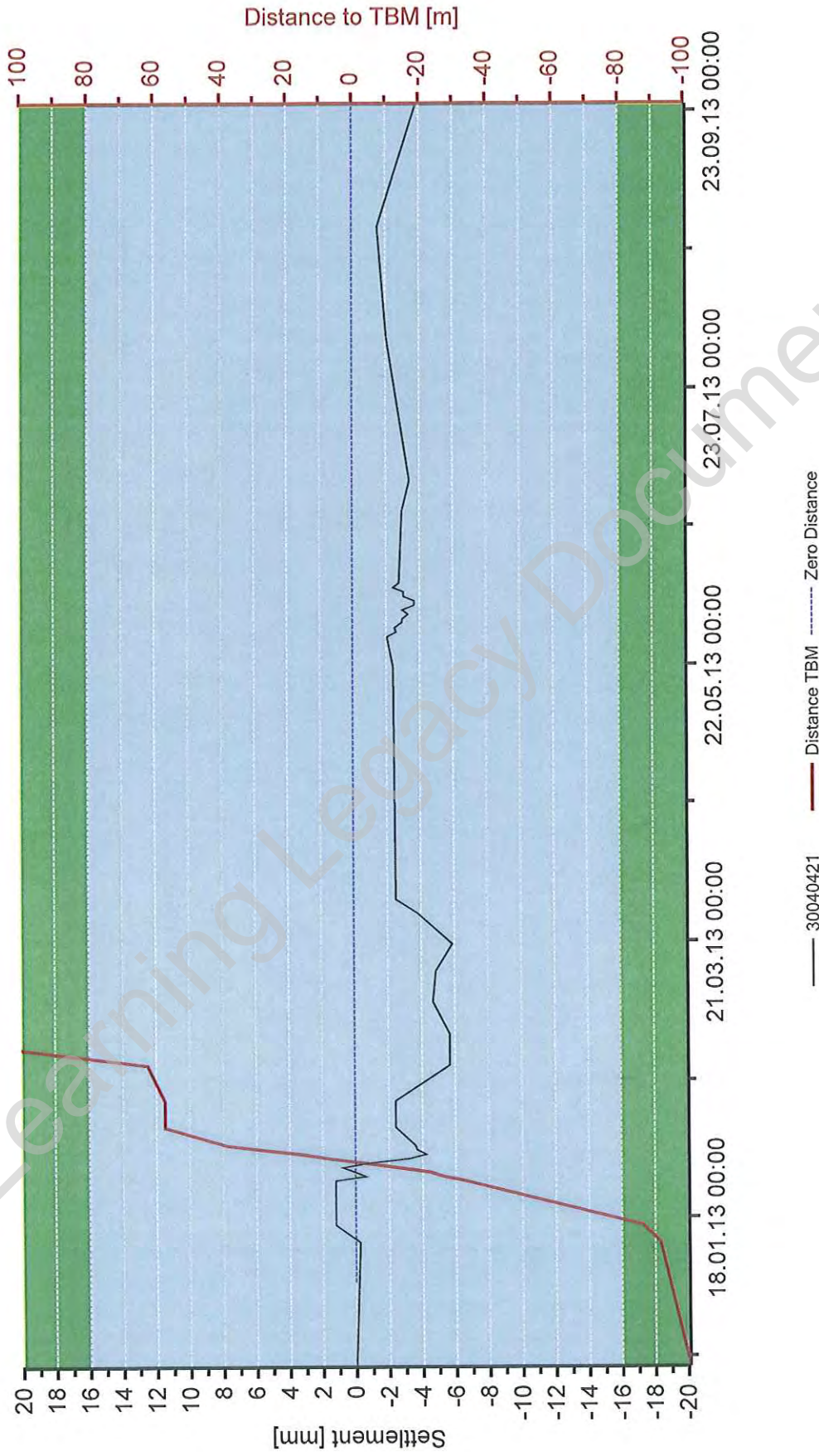


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

working activities: TBM drive, portal excavation, construction base slab, lining walls and grouting

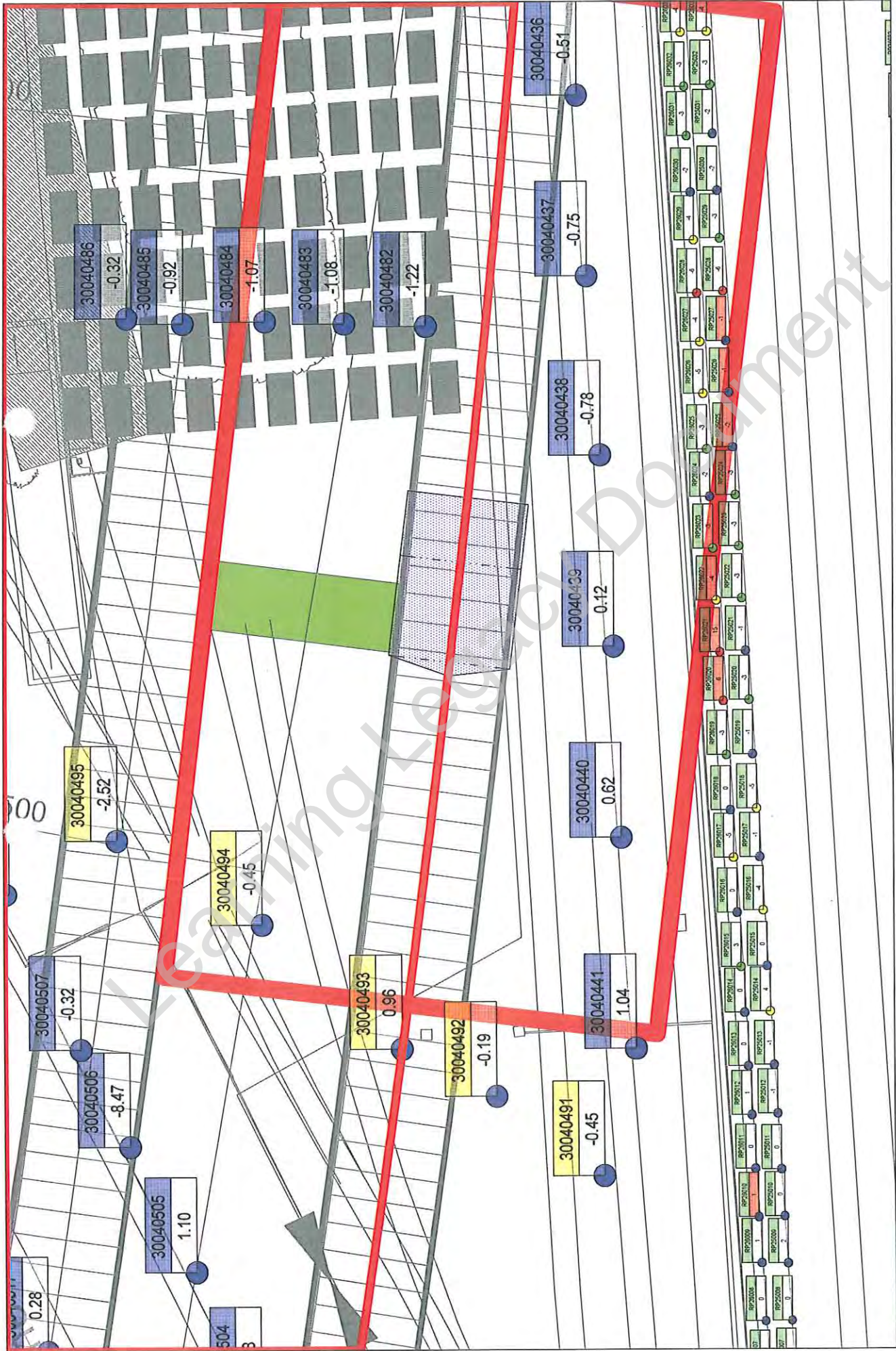
current values: 26.02.2013 09:38

Point: 30040421

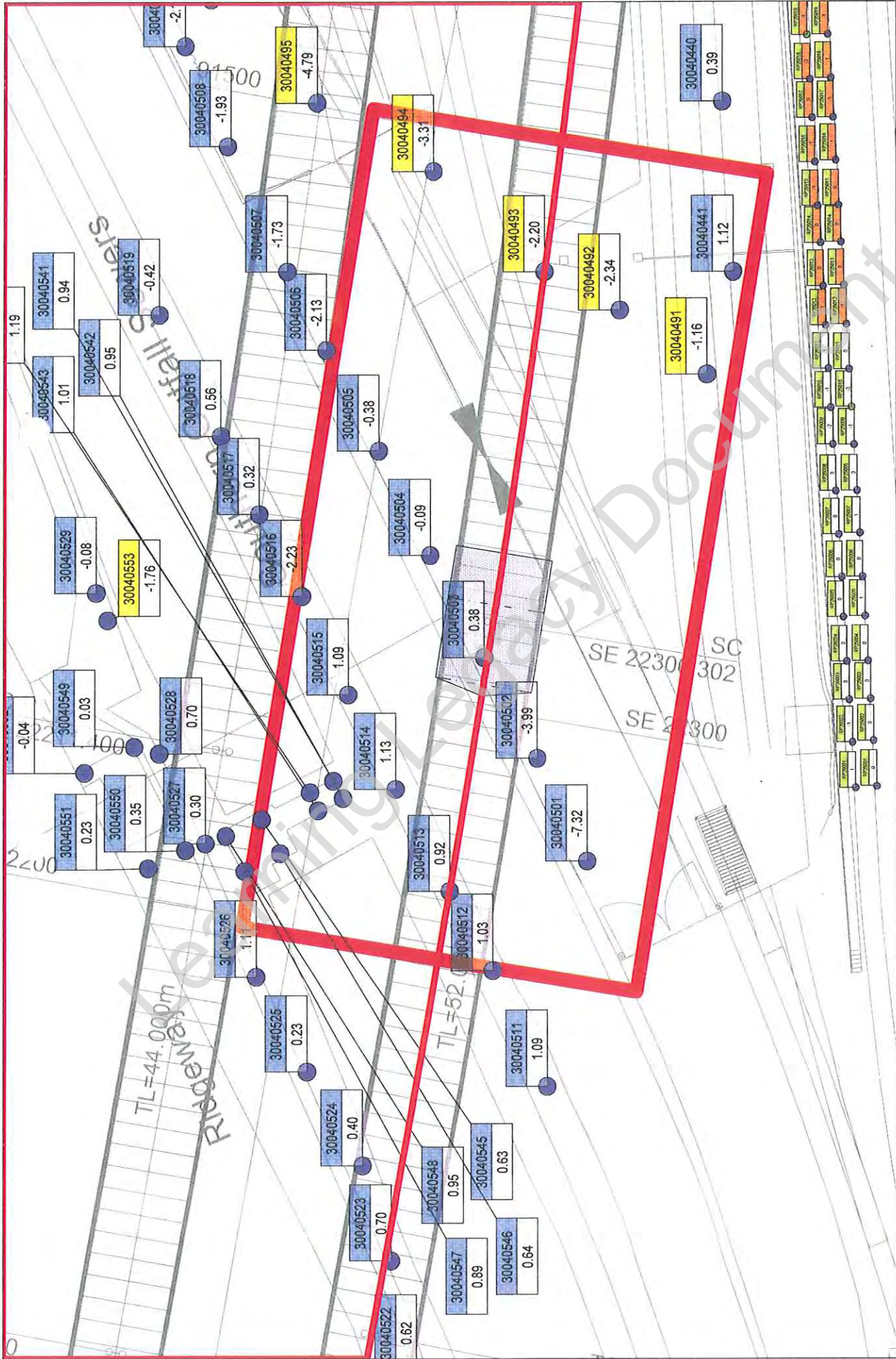


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - APB Sidings (Old Coalyard) 15.12.2012 - 24.09.2013
date: 17.06.2014 17:32 current values: 17.06.2014 17:25





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive, portal excavation, construction base slab, lining walls and grouting
 current values: 04.03.2013 08:56



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive, portal excavation, construction base slab, lining walls and grouting
 current values: 12.03.2013 07:00



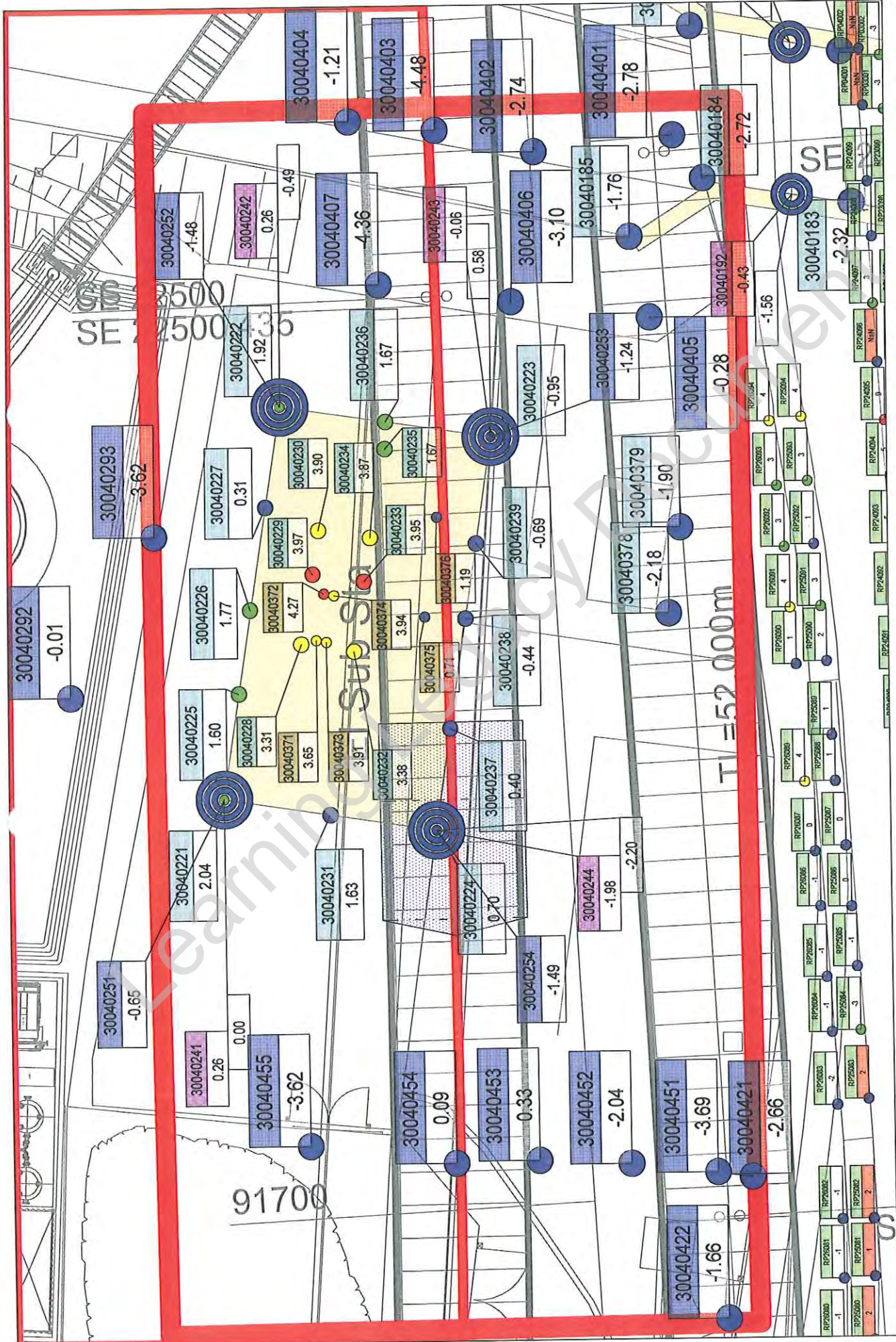
Joint Venture

Point: 30040441



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - APB Sidings (Old Coalyard) 15.12.2012 - 24.09.2013
date: 17.06.2014 17:39 current values: 17.06.2014 17:25

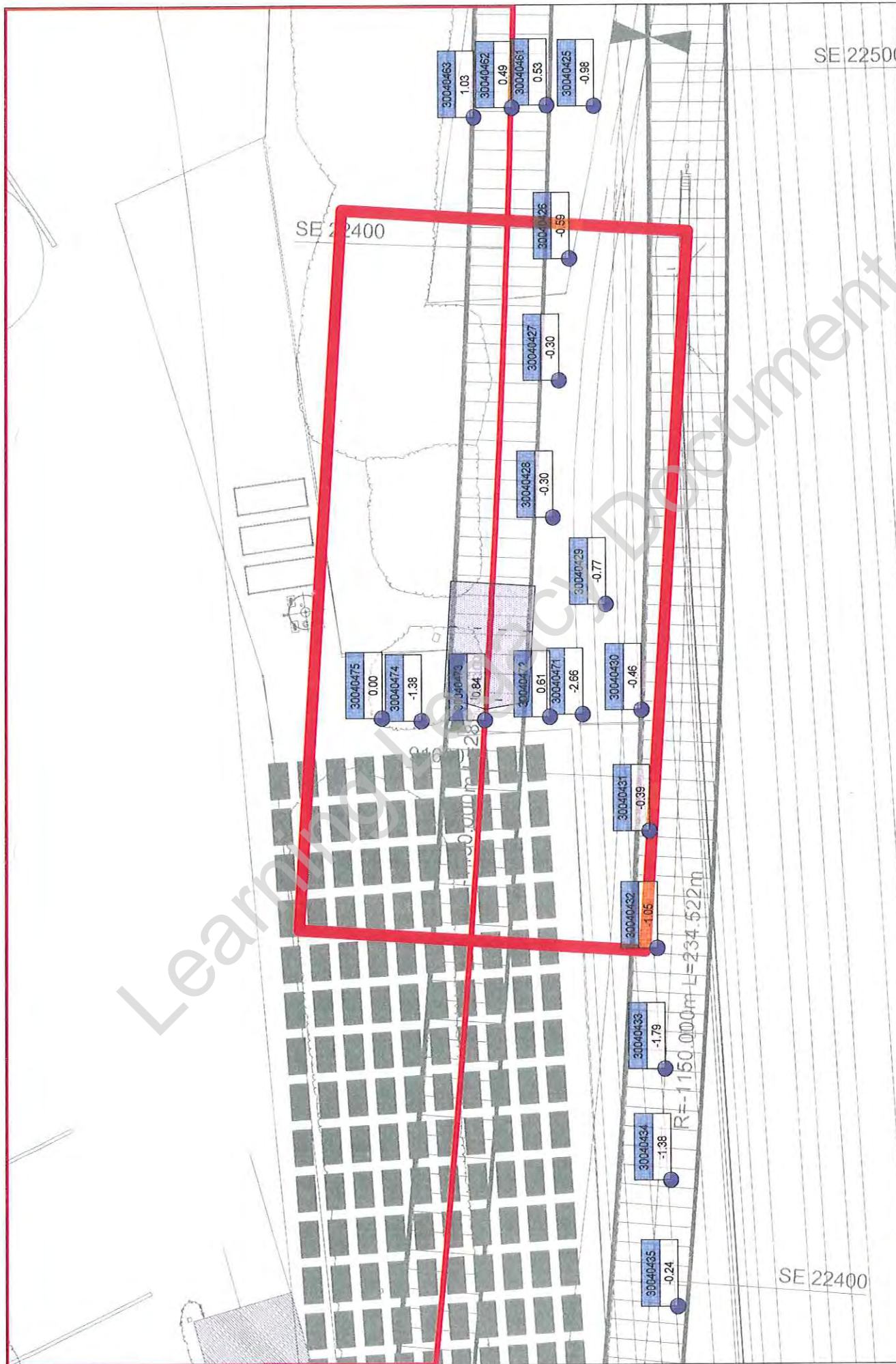




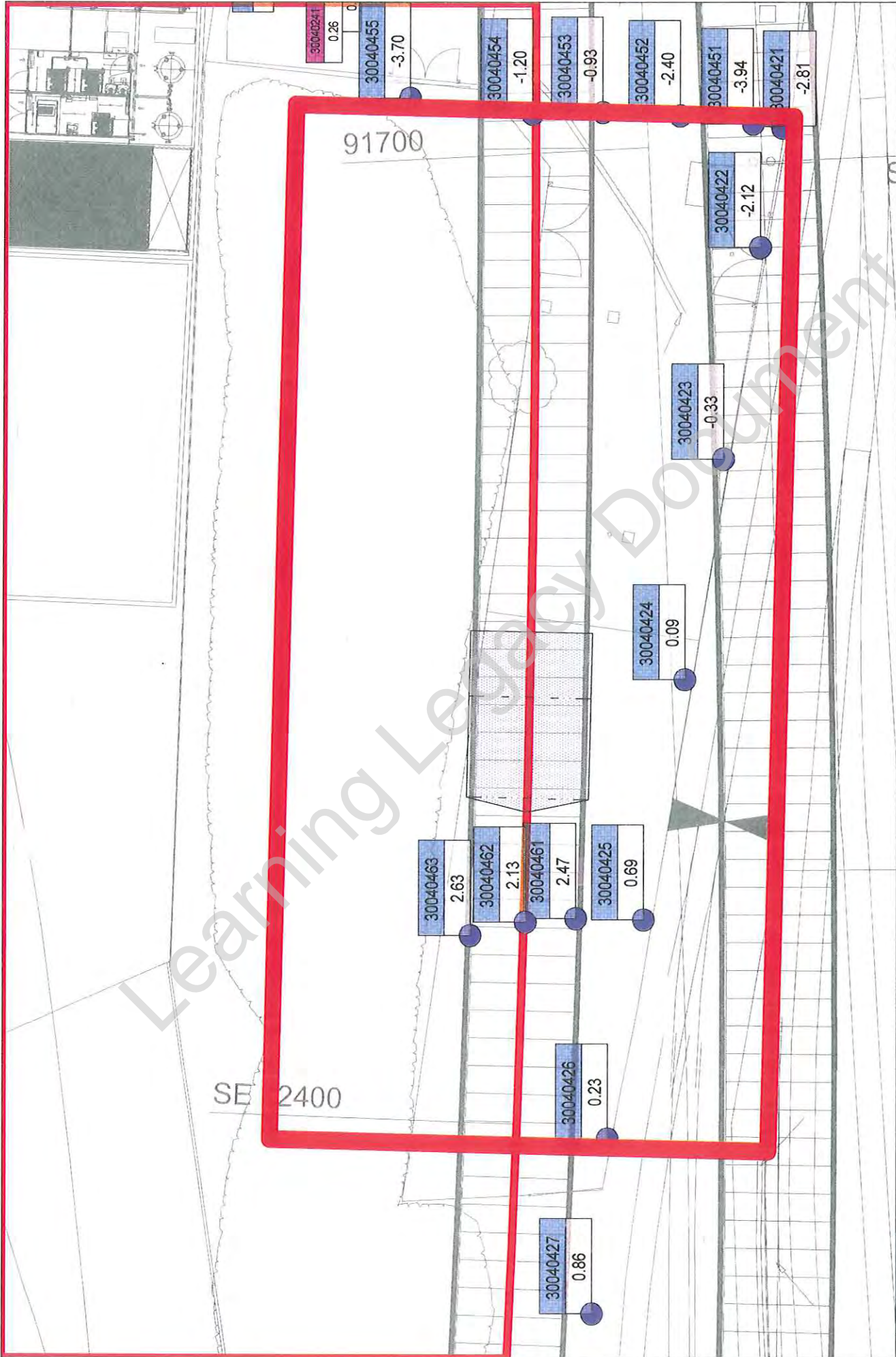
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

working activities: TBM drive

current values: 30.05.2013 09:00

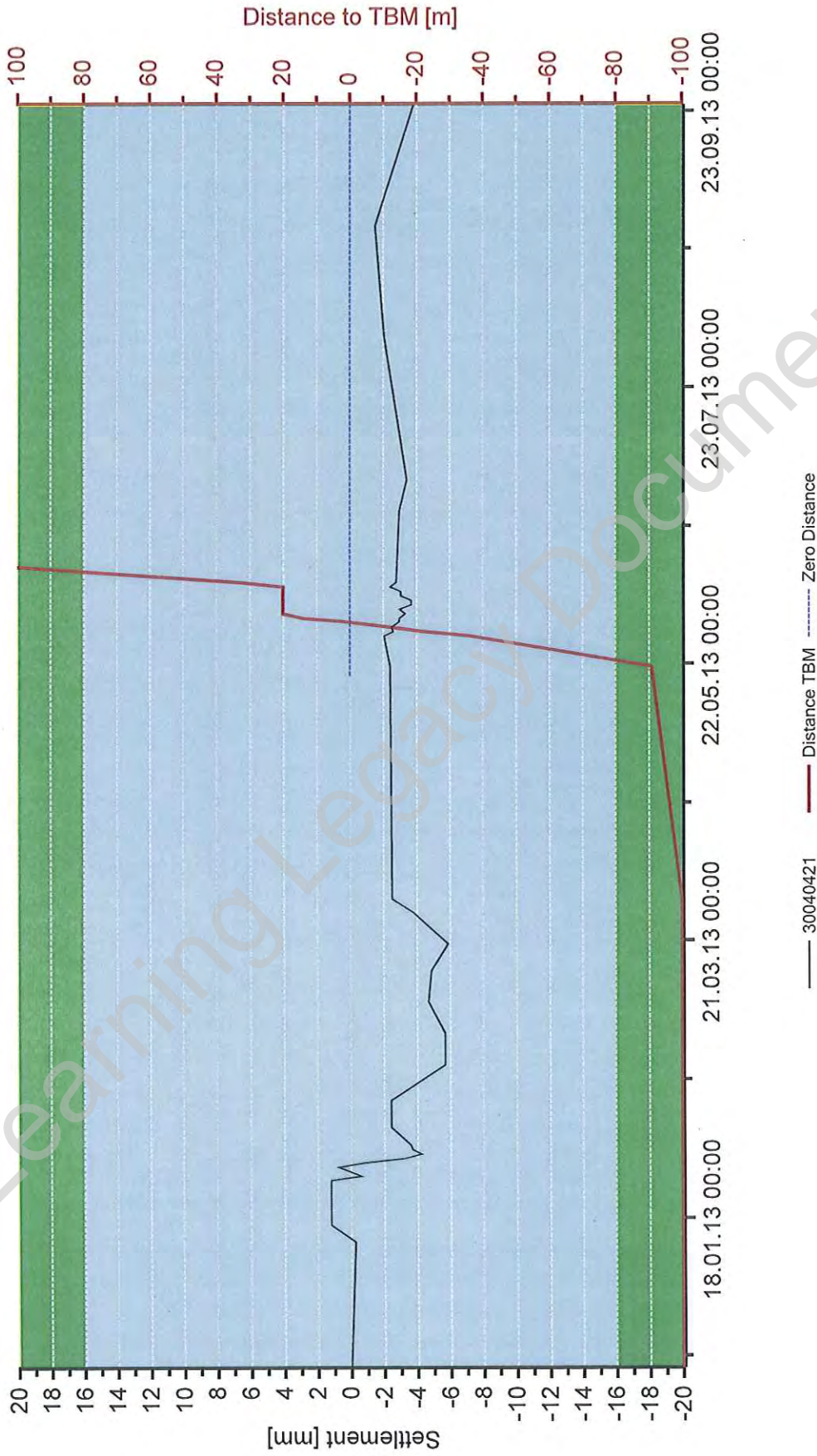


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 12.06.2013 17:59



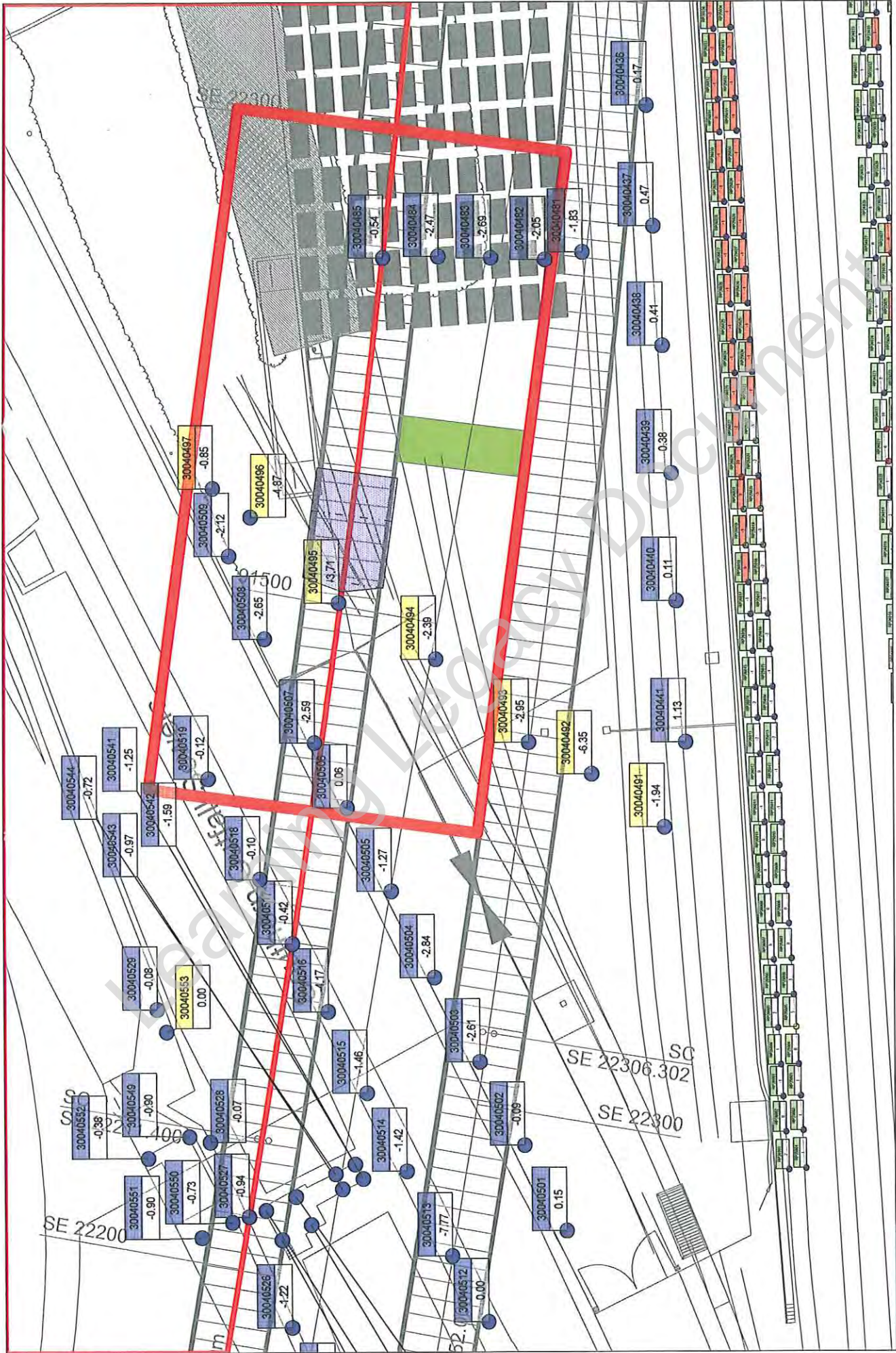
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 01.08.2013 09:00

Point: 30040421



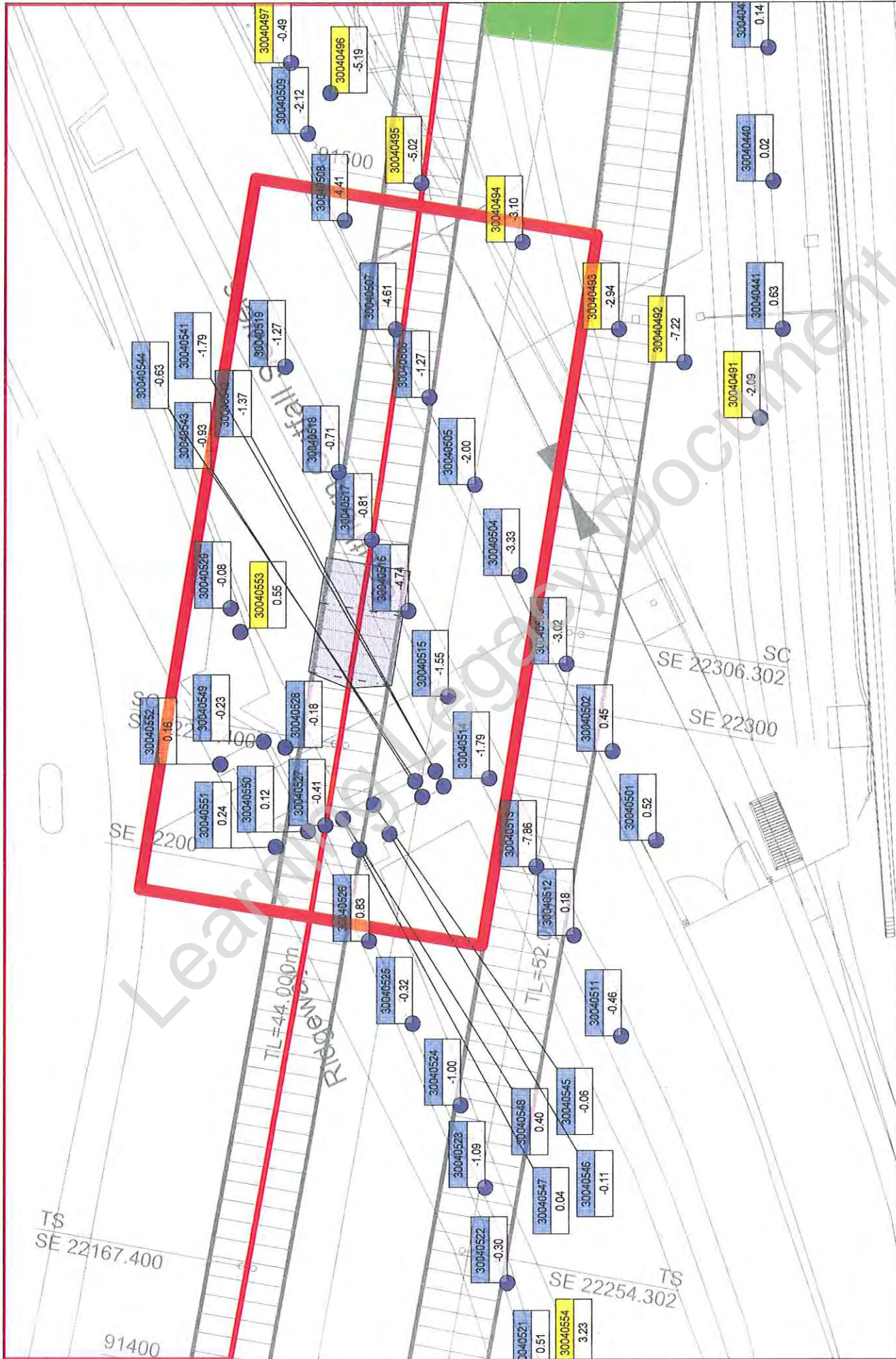
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - APB Sidings (Old Coalyard) 15.12.2012 - 24.09.213
date: 18.06.2014 08:27 current values: 18.06.2014 08:19





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 18.06.2013 09:00





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 20.06.2013 09:00

Point: 30040441



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - APB Sidings (Old Coalyard) 15.12.2012 - 24.09.213
date: 18.06.2014 08:37 current values: 18.06.2014 08:19



monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: APB Near Sidings NR Area CSS - Old Coalyard

No. of reading	baseline	1. following		2. following		3. following		4. following		5. following		6. following	
		12/01/2013	15/12/12	26/01/2013	27/01/2013	28/01/2013	29/01/2013	30/01/2013	29/01/2013	30/01/2013	29/01/2013	30/01/2013	29/01/2013
Point No.	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0421	104.344	104.344	0	104.345	1	104.343	-2	104.344	1	104.345	1	104.343	-1
3004 0422	104.283	104.283	0	104.284	1	104.282	-2	104.283	1	104.283	1	104.282	-1
3004 0423	104.226	104.226	0	104.227	1	104.225	-2	104.226	1	104.226	1	104.225	-1
3004 0424	104.120	104.120	0	104.120	0	104.119	-1	104.120	1	104.120	1	104.119	-1
3004 0425	103.903	103.903	0	103.902	0	103.901	-2	103.902	1	103.902	1	103.902	0
3004 0426	103.881	103.882	1	103.881	-1	103.879	-2	103.881	2	103.881	1	103.880	-1
3004 0427	103.599	103.600	1	103.599	-1	103.599	-1	103.599	0	103.599	1	103.599	-1
3004 0428	103.593	103.594	0	103.593	0	103.593	-1	103.592	0	103.593	1	103.592	-1
3004 0429	103.989	103.990	0	103.990	0	103.989	-1	103.990	1	103.989	0	103.989	0
3004 0430	103.769	103.770	0	103.770	0	103.768	-1	103.769	1	103.769	0	103.768	-1
3004 0431	103.767	103.767	0										
3004 0432	103.740	103.739	-1										
3004 0433	103.721	103.721	0										
3004 0434	103.641	103.641	0										
3004 0435	103.616	103.617	1										
3004 0436	103.670	103.671	1										
3004 0437	103.603	103.603	0										
3004 0438	103.628	103.628	0										
3004 0439	103.551	103.551	0										
3004 0440	103.508	103.508	0										
3004 0441	103.419	103.419	0										

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: APB Near Sidings NR Area CSS - Old Coalyard

No. of reading	baseline date	7. following 31/01/2013		8. following 01/02/2013		9. following 02/02/2013		10. following 03/02/2013		11. following 04/02/2013		12. following 05/02/2013	
		elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0421	104.344	104.341	-3	104.340	-1	104.340	1	104.340	0	104.340	0	104.119	-1
3004 0422	104.283	104.281	-2	104.279	-2	104.279	1	104.279	0	104.279	0	104.119	-1
3004 0423	104.226	104.225	0	104.225	0	104.224	0	104.225	0	104.225	0	104.119	-1
3004 0424	104.120	104.119	-1	104.119	0	104.120	1	104.120	0	104.120	0	104.119	-1
3004 0425	103.903	103.901	-1	103.901	0	103.903	1	103.903	1	103.903	1	103.903	0
3004 0426	103.881	103.880	-1	103.880	0	103.882	2	103.882	0	103.882	0	103.881	-1
3004 0427	103.599	103.598	-1	103.598	0	103.600	2	103.600	0	103.600	0	103.599	-1
3004 0428	103.593	103.592	-1	103.593	1	103.594	1	103.594	1	103.594	1	103.593	-1
3004 0429	103.989	103.988	-1	103.989	1	103.990	1	103.990	1	103.990	1	103.990	0
3004 0430	103.769	103.768	0	103.769	0	103.769	1	103.769	1	103.770	1	103.769	-1
3004 0431	103.767			103.767	0	103.767	0						
3004 0432	103.740			103.739	0	103.739	0						
3004 0433	103.721			103.721	0	103.721	0						
3004 0434	103.641			103.640	0	103.640	0						
3004 0435	103.616			103.616	-1	103.616	0						
3004 0436	103.670			103.671	-1	103.671	0						
3004 0437	103.603			103.603	0	103.603	0						
3004 0438	103.628			103.628	-1	103.628	-1						
3004 0439	103.551			103.551	0	103.551	0						
3004 0440	103.508			103.508	0	103.508	0						
3004 0441	103.419			103.419	0	103.419	0						

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: APB Near Sidings NR Area CSS - Old Coalyard

No. of reading	baseline	13. following		14. following		15. following		16. following		17. following		18. following		
		date	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
		15/12/12												
Point No.	elevation		elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0421	104.344		104.341	1 -2	104.120	0	104.121	1 0	104.120	0	104.120	0	104.120	0
3004 0422	104.283		104.281	1 -2	103.903	0	103.903	0 0	103.904	1 1	103.903	-1 1	103.903	0 1
3004 0423	104.226		104.226	1 0	103.882	1 1	103.882	0 1	103.883	1 2	103.882	-1 1	103.883	1 1
3004 0424	104.120		104.121	1 0	103.600	0 1	103.600	0 1	103.601	1 2	103.600	-1 1	103.601	1 2
3004 0425	103.903		103.903	0 0	103.594	0 1	103.594	0 1	103.595	1 2	103.595	-1 1	103.596	1 2
3004 0426	103.881		103.882	0 0	103.991	1 1	103.990	0 1	103.991	1 2	103.991	-1 1	103.992	1 2
3004 0427	103.599		103.600	0 1	103.770	1 1	103.770	0 1	103.771	1 2	103.770	-1 1	103.771	1 2
3004 0428	103.593		103.594	1 1	103.769	2 1	103.769	2 1						
3004 0429	103.989		103.991	0 1	103.741	2 2	103.741	2 2						
3004 0430	103.769		103.770	0 1	103.723	2 2	103.723	2 2						
3004 0431	103.767		103.769	2 1	103.642	2 2	103.642	2 2						
3004 0432	103.740		103.741	2 2	103.617	1 2	103.617	1 2						
3004 0433	103.721		103.723	2 2	103.672	1 1	103.672	1 1						
3004 0434	103.641		103.642	2 2	103.605	1 1	103.605	1 1						
3004 0435	103.616		103.617	1 2	103.629	2 1	103.629	2 1						
3004 0436	103.670		103.672	1 1	103.553	2 2	103.553	2 2						
3004 0437	103.603		103.605	1 1	103.510	2 1	103.510	2 1						
3004 0438	103.628		103.629	2 1	103.420	1 1	103.420	1 1						
3004 0439	103.551		103.553	2 2										
3004 0440	103.508		103.510	2 1										
3004 0441	103.419		103.420	1 1										

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: APB Near Sidings NR Area CSS - Old Coalyard

No. of reading	15/12/12		12/02/2013		13/02/2013		14/02/2013		15/02/2013		16/02/2013		17/02/2013	
	baseline	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
Point No.														
3004 0421	104.344	104.341	104.341	0	104.341	0	-2							
3004 0422	104.283	104.281	104.281	0	104.281	0	-2							
3004 0423	104.226	104.225	104.225	0	104.225	0	0							
3004 0424	104.120	104.120	104.120	0	104.120	0	0			104.117	-3.22	104.118	1	-2
3004 0425	103.903	103.903	103.903	-1	103.903	1	1			103.900	-2.95	103.901	0	-2
3004 0426	103.881	103.882	103.882	-1	103.883	0	1			103.880	-2.84	103.881	1	-1
3004 0427	103.599	103.601	103.601	0	103.601	1	2			103.598	-2.84	103.599	1	-1
3004 0428	103.593	103.595	103.595	-1	103.595	1	2			103.593	-2.27	103.593	0	-1
3004 0429	103.989	103.991	103.991	-1	103.991	1	2			103.989	-1.76	103.989	0	-1
3004 0430	103.769	103.770	103.770	-1	103.772	1	3			103.768	-3.06	103.767	-1	-2
3004 0431	103.767				103.769	1	2							
3004 0432	103.740				103.742	0	2							
3004 0433	103.721				103.723	0	2							
3004 0434	103.641				103.643	1	2							
3004 0435	103.616				103.618	1	3							
3004 0436	103.670				103.673	1	2							
3004 0437	103.603				103.605	0	1							
3004 0438	103.628				103.630	1	2							
3004 0439	103.551				103.554	1	2							
3004 0440	103.508				103.510	1	2							
3004 0441	103.419				103.421	1	2							

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: APB Near Sidings NR Area CSS - Old Coalyard

No. of reading	25. following		26. following		27. following		28. following		29. following		30. following		
	baseline	18/02/2013	19/02/2013	20/02/2013	21/02/2013	22/02/2013	23/02/2013	24/02/2013	25/02/2013	26/02/2013	27/02/2013	28/02/2013	
Point No.	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0421	104.344							104.338	-3				
3004 0422	104.283							104.277	-3				
3004 0423	104.226							104.223	-3				
3004 0424	104.120	104.118	0	104.117	-1	104.117	0	104.117	0	104.117	0	104.118	0
3004 0425	103.903	103.901	0	103.900	-1	103.900	0	103.900	0	103.900	0	103.900	0
3004 0426	103.881	103.880	0	103.879	-1	103.879	0	103.879	0	103.879	0	103.880	1
3004 0427	103.599	103.598	0	103.597	-1	103.598	0	103.598	0	103.597	0	103.598	1
3004 0428	103.593	103.592	0	103.592	0	103.592	0	103.592	0	103.592	0	103.592	1
3004 0429	103.989	103.988	0	103.988	0	103.988	0	103.988	0	103.988	0	103.988	1
3004 0430	103.769	103.768	0	103.767	0	103.767	0	103.767	0	103.767	0	103.768	0
3004 0431	103.767							103.766	-3				
3004 0432	103.740							103.739	-3				
3004 0433	103.721							103.720	-3				
3004 0434	103.641							103.640	-3				
3004 0435	103.616							103.615	-4				
3004 0436	103.670							103.669	-3				
3004 0437	103.603							103.602	-3				
3004 0438	103.628							103.627	-3				
3004 0439	103.551							103.550	-3				
3004 0440	103.508							103.507	-4				
3004 0441	103.419							103.418	-3.54				

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: APB Near Sidings NR Area CSS - Old Coalyard

No. of reading	15/12/12		24/02/2013		25/02/2013		26/02/2013		27/02/2013		28/02/2013		01/03/2013		
	baseline	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	
Point No.															
3004 0421	104.344														
3004 0422	104.283														
3004 0423	104.226														
3004 0424	104.120														
3004 0425	103.900	0	-3												
3004 0426	103.881	0	-2	103.879	0	-2	103.880	1	-1						
3004 0427	103.599	0	-2	103.597	0	-2	103.599	1	0	103.597	-2	-2	103.597	0	-2
3004 0428	103.593	0	-1	103.591	-1	-2	103.593	1	-1	103.592	-1	-2	103.591	0	-2
3004 0429	103.989	0	-1	103.988	0	-1	103.989	1	-1	103.986	-2	-3	103.987	1	-2
3004 0430	103.769	0	-1	103.768	0	-2	103.768	1	-1	103.767	-1	-2	103.768	1	-2
3004 0431	103.767	-1	-2	103.765	0	-2	103.767	1	0	103.765	-2	-2	103.766	1	-2
3004 0432	103.740						103.740	1	0	103.737	-3	-2	103.738	1	-2
3004 0433	103.721						103.722	1	0	103.720	-2	-1	103.719	-1	-2
3004 0434	103.641						103.641	1	0	103.639	-1	-1	103.639	0	-1
3004 0435	103.616						103.616	1	0	103.615	-1	0	103.616	1	0
3004 0436	103.670									103.670	1	0	103.671	1	1
3004 0437	103.603									103.602	0	-1	103.603	1	0
3004 0438	103.628												103.628	1	0
3004 0439	103.551												103.551	1	0
3004 0440	103.508												103.508	2	0
3004 0441	103.419												103.420	2.13	1

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: APB Near Sidings NR Area CSS - Old Coalyard

No. of reading	baseline		37. following		38. following		39. following		40. following		41. following		42. following	
	date	elevation	02/03/2013	deviation from last/ baseline	03/03/2013	deviation from last/ baseline	04/03/2013	deviation from last/ baseline	05/03/2013	deviation from last/ baseline	06/03/2013	deviation from last/ baseline	07/03/2013	deviation from last/ baseline
3004 0421	15/12/12	104.344												
3004 0422		104.283												
3004 0423		104.226												
3004 0424		104.120												
3004 0425		103.903												
3004 0426		103.881												
3004 0427		103.599												
3004 0428		103.593												
3004 0429		103.989												
3004 0430		103.769	103.768	-1	103.767	0	-2							
3004 0431		103.767	103.766	0	-1									
3004 0432		103.740	103.738	0	-2									
3004 0433		103.721	103.719	-1	-2									
3004 0434		103.641	103.638	-1	-3	103.638	0	-3						
3004 0435		103.616	103.614	-1	-1	103.614	0	-1	103.616	1.53	0			
3004 0436		103.670	103.670	-1	0	103.670	0	-1	103.671	1.50	1	103.671	0	1
3004 0437		103.603	103.603	-1	0	103.603	-1	-1	103.604	0.51	0	103.604	1	1
3004 0438		103.628	103.628	-1	0	103.627	0	-1	103.629	1.85	1	103.627	0	1
3004 0439		103.551	103.552	0	0	103.552	0	0	103.552	1.01	1	103.551	-1	0
3004 0440		103.508	103.509	1	1	103.509	0	1	103.510	1.34	2	103.508	-2	0
3004 0441		103.419	103.420	0	1	103.420	0	1	103.421	1.13	2	103.420	-1	1

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: APB Near Sidings NR Area CSS - Old Coalyard

No. of reading	43. following		44. following		45. following		46. following		47. following		48. following	
	baseline	08/03/2013	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
date	15/12/12	08/03/2013		09/03/2013		10/03/2013		11/03/2013		12/03/2013		14/03/2013
Point No.	elevation											
3004 0421	104.344											104.339 0 -5
3004 0422	104.283											104.278 0 -4
3004 0423	104.226											104.223 0 -2
3004 0424	104.120											104.118 0 -2
3004 0425	103.903											103.901 0 -2
3004 0426	103.881											103.880 0 -2
3004 0427	103.599											103.598 -1 -2
3004 0428	103.593											103.591 -1 -2
3004 0429	103.989											103.987 -1 -2
3004 0430	103.769											103.767 -1 -2
3004 0431	103.767											103.765 -2 -2
3004 0432	103.740											103.737 -2 -2
3004 0433	103.721											103.718 -2 -3
3004 0434	103.641											103.637 -2 -3
3004 0435	103.616											103.614 -1 -2
3004 0436	103.670											103.670 -1 -1
3004 0437	103.603											103.602 1 -1
3004 0438	103.628											103.627 0 -1
3004 0439	103.551											103.551 0 0
3004 0440	103.508											103.508 1 0
3004 0441	103.419											103.419 1 0

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: APB Near Sidings NR Area CSS - Old Coalyard

No. of reading	15/12/12		20/03/2013		27/03/2013		21/05/2013		28/05/2013		29/05/2013		30/05/2013					
	baseline elevation	49. following elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline			
3004 0421	104.344	104.338	-1	104.340	2	-4	104.341	1	-2	104.342	0	-2	104.341	-1	-3	104.341	0	-3
3004 0422	104.283	104.277	-1	104.279	2	-3	104.281	2	-2	104.281	0	-1	104.281	0	-2	104.281	0	-2
3004 0423	104.226	104.222	-1	104.225	2	-1	104.226	2	0	104.227	1	1	104.226	-1	0	104.226	-1	0
3004 0424	104.120	104.117	-1	104.119	2	-1	104.121	2	1							104.121	0	1
3004 0425	103.903	103.900	0	103.902	2	-1	103.903	1	1									
3004 0426	103.881	103.879	-1	103.881	2	-1	103.882	1	1									
3004 0427	103.599	103.597	-1	103.599	2	-1	103.600	1	1									
3004 0428	103.593	103.590	-1	103.593	3	0	103.595	2	2									
3004 0429	103.989	103.987	0	103.989	2	0	103.990	1	1									
3004 0430	103.769	103.766	-1	103.768	2	-1	103.769	1	0									
3004 0431	103.767	103.765	0	103.766	1	-1	103.767	1	0									
3004 0432	103.740	103.737	-1	103.738	1	-2	103.739	2	-1									
3004 0433	103.721	103.717	-1	103.718	1	-3	103.720	2	-1									
3004 0434	103.641	103.637	-1	103.637	1	-3	103.639	2	-1									
3004 0435	103.616	103.613	-1	103.614	1	-2	103.615	1	0									
3004 0436	103.670	103.669	-1	103.670	1	-1	103.671	1	0									
3004 0437	103.603	103.602	0	103.602	0	-1	103.604	2	1									
3004 0438	103.628	103.627	-1	103.627	0	-1	103.629	2	1									
3004 0439	103.551	103.551	0	103.551	0	-1	103.553	2	1									
3004 0440	103.508	103.507	0	103.507	0	-1	103.509	2	1									
3004 0441	103.419	103.419	0	103.419	0	0	103.420	1	1									

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: APB Near Sidings NR Area CSS - Old Coalyard

No. of reading	baseline		55. following		56. following		57. following		58. following		59. following		60. following	
	date	elevation	31/05/2013	deviation from last/ baseline	01/06/2013	deviation from last/ baseline	02/06/2013	deviation from last/ baseline	03/06/2013	deviation from last/ baseline	04/06/2013	deviation from last/ baseline	05/06/2013	deviation from last/ baseline
Point No.		elevation												
3004 0421		104.344	104.341	0	-3	104.341	0	-3	104.341	0	-3	104.340	0	-4
3004 0422		104.283	104.280	-1	-2	104.280	0	-3	104.280	0	-2	104.279	0	-3
3004 0423		104.226	104.225	0	0	104.225	-1	-1	104.225	0	-1	104.224	0	-1
3004 0424		104.120	104.120	0	0	104.120	0	0	104.121	0	1	104.120	0	0
3004 0425		103.903	103.902	0	0	103.903	0	0	103.903	1	0	103.902	0	0
3004 0426		103.881	103.882	0	0	103.882	0	0	103.882	1	1	103.881	0	0
3004 0427		103.599	103.600	0	1	103.601	0	1	103.601	1	2	103.600	0	0
3004 0428		103.593	103.594	-1	1	103.594	0	1	103.595	1	2			
3004 0429		103.989	103.989	-1	0	103.990	1	0	103.990	1	1			
3004 0430		103.769				103.769	0	0	103.768	-1	-1			
3004 0431		103.767												
3004 0432		103.740												
3004 0433		103.721												
3004 0434		103.641												
3004 0435		103.616												
3004 0436		103.670												
3004 0437		103.603												
3004 0438		103.628												
3004 0439		103.551												
3004 0440		103.508												
3004 0441		103.419												

monitoring table



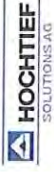
Joint Venture

project: C310 Thames Tunnel

structure: APB Near Sidings NR Area CSS - Old Coalyard

No. of reading	baseline		61. following		62. following		63. following		64. following		65. following		66. following			
	15/12/12	elevation	06/06/2013	deviation from last/ baseline	07/06/2013	deviation from last/ baseline	08/06/2013	deviation from last/ baseline	09/06/2013	deviation from last/ baseline	10/06/2013	deviation from last/ baseline	11/06/2013	deviation from last/ baseline		
Point No.	elevation	elevation	deviation from last/ baseline	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline		
3004 0421	104.344	104.341	1	-3	104.341	0	-3	104.341	1	-2	104.341	0	-3	104.341	0	-3
3004 0422	104.283	104.280	1	-3	104.280	0	-3	104.281	1	-2	104.280	0	-2	104.280	-1	-3
3004 0423	104.226	104.225	1	-1	104.225	0	-1	104.225	0	-1	104.225	0	0	104.225	0	-1
3004 0424	104.120	104.120	0	0	104.120	0	0	104.121	1	1	104.120	-1	0	104.120	0	-1
3004 0425	103.903	103.903	1	0	103.903	1	1	103.903	0	1	103.903	0	1	103.902	-1	-1
3004 0426	103.881	103.882	1	1	103.882	0	1	103.883	1	1	103.882	-1	0	103.882	-1	0
3004 0427	103.599	103.600	1	1	103.600	0	1	103.601	1	2	103.600	-1	1	103.600	0	1
3004 0428	103.593							103.595	0	2	103.595	-1	1	103.594	0	1
3004 0429	103.989							103.991	0	1	103.990	-1	1	103.989	0	0
3004 0430	103.769							103.770	0	1	103.769	-1	0	103.769	0	0
3004 0431	103.767													103.770	1	0
3004 0432	103.740													103.767	0	-1
3004 0433	103.721															
3004 0434	103.641															
3004 0435	103.616															
3004 0436	103.670															
3004 0437	103.603															
3004 0438	103.628															
3004 0439	103.551															
3004 0440	103.508															
3004 0441	103.419															

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: APB Near Sidings NR Area CSS - Old Coalyard

No. of reading	67. following		68. following		69. following		70. following		71. following		72. following		
	baseline	12/06/2013	13/06/2013	14/06/2013	15/06/2013	16/06/2013	17/06/2013	16/06/2013	17/06/2013	16/06/2013	17/06/2013	17/06/2013	
Point No.	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0421	104.344												
3004 0422	104.283												
3004 0423	104.226												
3004 0424	104.120	104.119	0	-1									
3004 0425	103.903	103.902	0	-1	103.902	0	-1						
3004 0426	103.881	103.881	0	0	103.881	0	0						
3004 0427	103.599	103.599	0	0	103.599	0	-1	103.598	0	-1			
3004 0428	103.593	103.593	-1	0	103.593	0	0	103.592	-1	-1			
3004 0429	103.989	103.988	0	-1	103.988	0	-1	103.988	-1	-1			
3004 0430	103.769	103.769	-1	0	103.768	-1	-1	103.768	0	-1	103.769	1	0
3004 0431	103.767	103.767	0	0	103.766	-1	-1	103.766	0	-2	103.767	1	0
3004 0432	103.740	103.739	0	-1	103.738	0	-1	103.738	-1	-2	103.739	1	-1
3004 0433	103.721	103.719	-1	-2	103.719	0	-2	103.719	0	-3	103.720	1	-2
3004 0434	103.641				103.638	-1	-2	103.638	-1	-3	103.639	1	-2
3004 0435	103.616				103.614	-1	-2	103.614	0	-2	103.615	2	0
3004 0436	103.670										103.671	0	1
3004 0437	103.603										103.604	0	1
3004 0438	103.628										103.629	0	1
3004 0439	103.551										103.552	0	1
3004 0440	103.508										103.509	0	1
3004 0441	103.419										103.420	1	1
											103.420	0	1

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: APB Near Sidings NR Area CSS- Old Coalyard

No. of reading	73. following		74. following		75. following		76. following		77. following		78. following	
	baseline	18/06/2013	19/06/2013	25/06/2013	02/07/2013	04/08/2013	28/08/2013					
date	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0421	104.344			104.341	0	-3	104.340	-1	104.342	1	104.342	1
3004 0422	104.283			104.280	0	-3	104.279	0	104.281	1	104.281	0
3004 0423	104.226			104.224	-1	-1	104.224	0	104.226	1	104.226	0
3004 0424	104.120			104.120	0	-1	104.120	0	104.121	1	104.121	1
3004 0425	103.903			103.902	0	-1	103.902	0	103.902	0	destroyed	
3004 0426	103.881			103.881	0	-1	103.881	0	103.881	0	103.882	1
3004 0427	103.599			103.599	1	0	103.599	0	103.600	1	103.600	0
3004 0428	103.593			103.593	1	0	103.593	0	103.593	1	103.593	-1
3004 0429	103.989			103.989	1	-1	103.989	0	103.989	0	103.989	0
3004 0430	103.769			103.768	0	-1	103.768	0	103.769	0	103.769	0
3004 0431	103.767			103.767	0	-1	103.766	0	103.767	0	103.767	0
3004 0432	103.740			103.738	-1	-2	103.738	0	103.739	0	103.738	0
3004 0433	103.721			103.719	0	-2	103.719	0	103.720	0	103.718	-1
3004 0434	103.641			103.638	0	-2	103.638	0	103.639	0	103.637	-2
3004 0435	103.616			103.614	-1	-1	103.614	0	103.615	0	103.613	-2
3004 0436	103.670	0	0	103.670	0	0	103.670	0	103.671	0	103.669	-2
3004 0437	103.603	0	0	103.603	0	0	103.603	0	103.604	1	103.603	-1
3004 0438	103.628	0	0	103.628	0	0	103.628	0	103.629	0	103.628	-1
3004 0439	103.551	0	0	103.552	0	0	103.552	0	103.552	0	103.551	-1
3004 0440	103.508	-1	0	103.508	-1	0	103.508	1	103.509	1	103.507	-2
3004 0441	103.419	0	1	103.420	0	1	103.419	-1	103.420	1	103.420	0

monitoring table




Joint Venture

project: C310 Thames Tunnel

structure: APB Near Sidings NR Area CSS - Old Coalyard

No. of reading	baseline		79. following		80. following										
	date	elevation	date	elevation	date	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
	15/12/12		24/09/2013		06/02/2014										
Point No.	elevation		deviation from last/ baseline		deviation from last/ baseline										
3004 0421	104.344	104.340	-2	-4											
3004 0422	104.283	104.278	-3	-4											
3004 0423	104.226	104.223	-3	-3											
3004 0424	104.120	104.119	-3	-1											
3004 0425	103.903		destroyed												
3004 0426	103.881	103.879	-4	-3											
3004 0427	103.599	103.598	-2	-2											
3004 0428	103.593	103.592	0	-1											
3004 0429	103.989	103.987	-2	-2											
3004 0430	103.769	103.768	-1	-2											
3004 0431	103.767	103.766	-1	-1											
3004 0432	103.740	103.738	0	-2											
3004 0433	103.721	103.719	1	-2											
3004 0434	103.641	103.638	1	-3											
3004 0435	103.616	103.614	1	-2											
3004 0436	103.670	103.669	0	-1											
3004 0437	103.603	103.603	0	0											
3004 0438	103.628	103.628	0	0											
3004 0439	103.551	103.551	0	0											
3004 0440	103.508	103.498	-10	-11											
3004 0441	103.419	103.401	-19	-18											

points no. 440 & 441 were tracked over by heavy machine

 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50031	Rev	2.0
TITLE	Monitoring Close-Out Reports for Network Rail assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box - North Woolwich Portal				

APPENDIX 18

Geotechnical Cross section 1

Learning Legacy Document

monitoring asset	Area of Old Coalyard		
reference monitoring drawing:	C310-HTM-C-DWG-CR148-PT005-50010		
name of monitoring section:	Geotechnical Cross Section 1		
sensor type:	manual levelling studs piezometer, inclinometer and extensometer		
chainage:	91500	point no.:	3004 0491 - 3004 0497
trigger values: [mm]	green: +16 -16	amber: +20 -20	red: +25 -25
reference document for trigger values:	Management Plan for Control of Ground Movement		
EB-no.:	C310-HTM-Z-STP-CR148-50058		
Appendix:	AAA		

monitoring data

	date	max. value	point no.	comments	
baseline	05/02/13	0.00			
TBM 1	start ZOI	04/03/13	0.96	3004 0493	
	end ZOI	12/03/13	-2.47	3004 0493	breached not any trigger value
TBM 2	start ZOI	17/06/13	-4.08	3004 495	
	end ZOI	20/06/13	-5.02	3004 0495	breached not any trigger value
longterm	06/02/14	-8.48	3004 0495	last reading 3 month post tunneling, Cross section not longer measurable	

Evaluation of any potential residual risks	<input checked="" type="checkbox"/>	No residual risk since the Works have been completed by HMJV
	<input type="checkbox"/>	Yes, residual risk (see comment below)

summary / comments

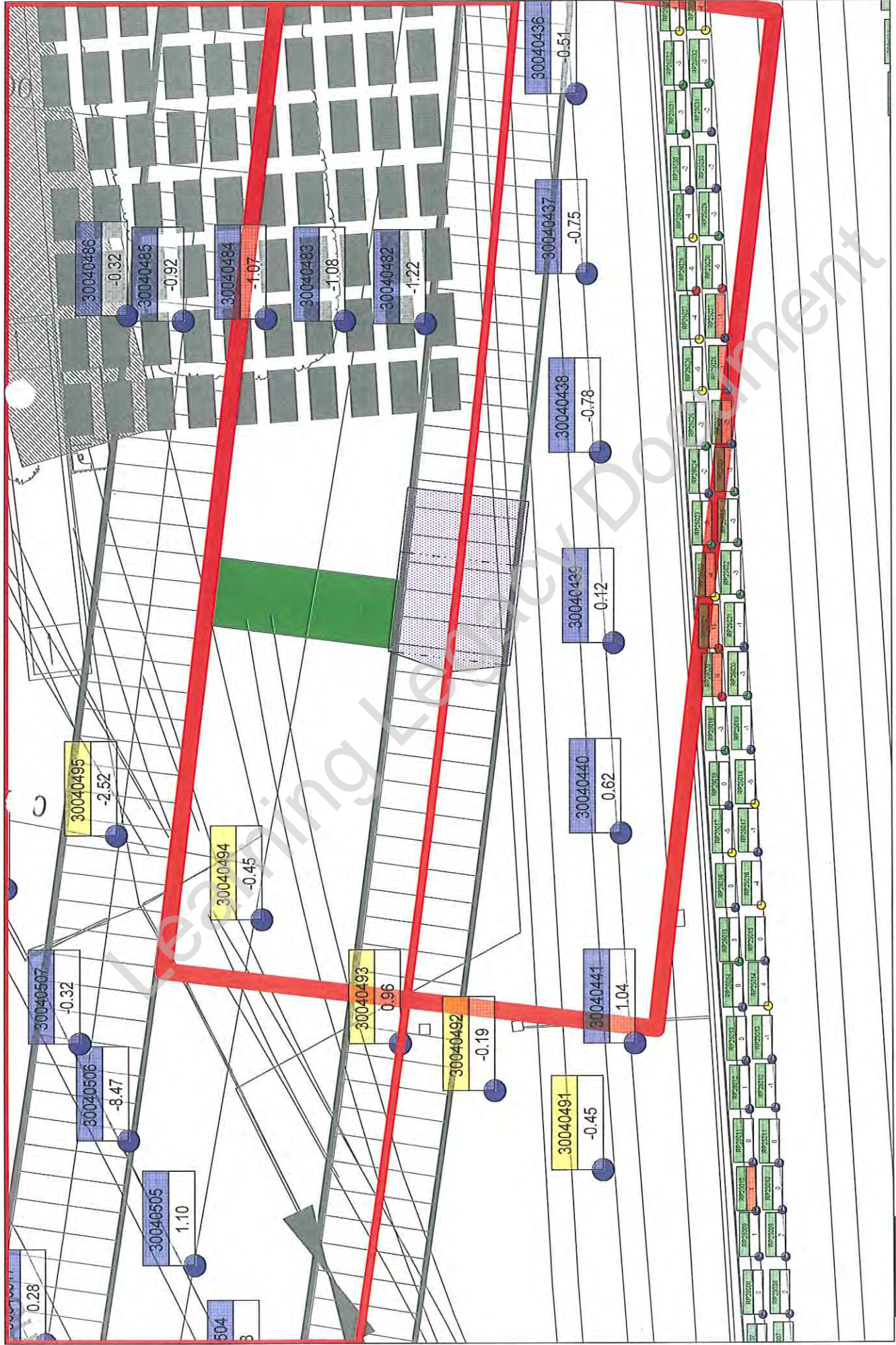
the Geotechnical Cross Section 1 depends out of 3no extensometer(3004 0493, 3004 0494 and 3004 0495), 2no inclinometer(3004 0492 and 3004 0496) and 2no piezometer(3004 0491 and 3004 0497) - on every location of the in-ground instruments is also a precise levelling surface point
both of the inclinometer show a movement of less than +/- 2mm, the inclinometer tubes were since the 24/09/13 not usable any more.
Under consideration of the temperatur differences, the related ground condition and the accuracy of the measurement HMJV has no concern to cease the monitoring.
The rate of change in the monitoring data is less than the required standards as per the specifications and drawings

date / signature: 09/01/15

print name:

HMJV project role:

Monitoring & Survey engineer



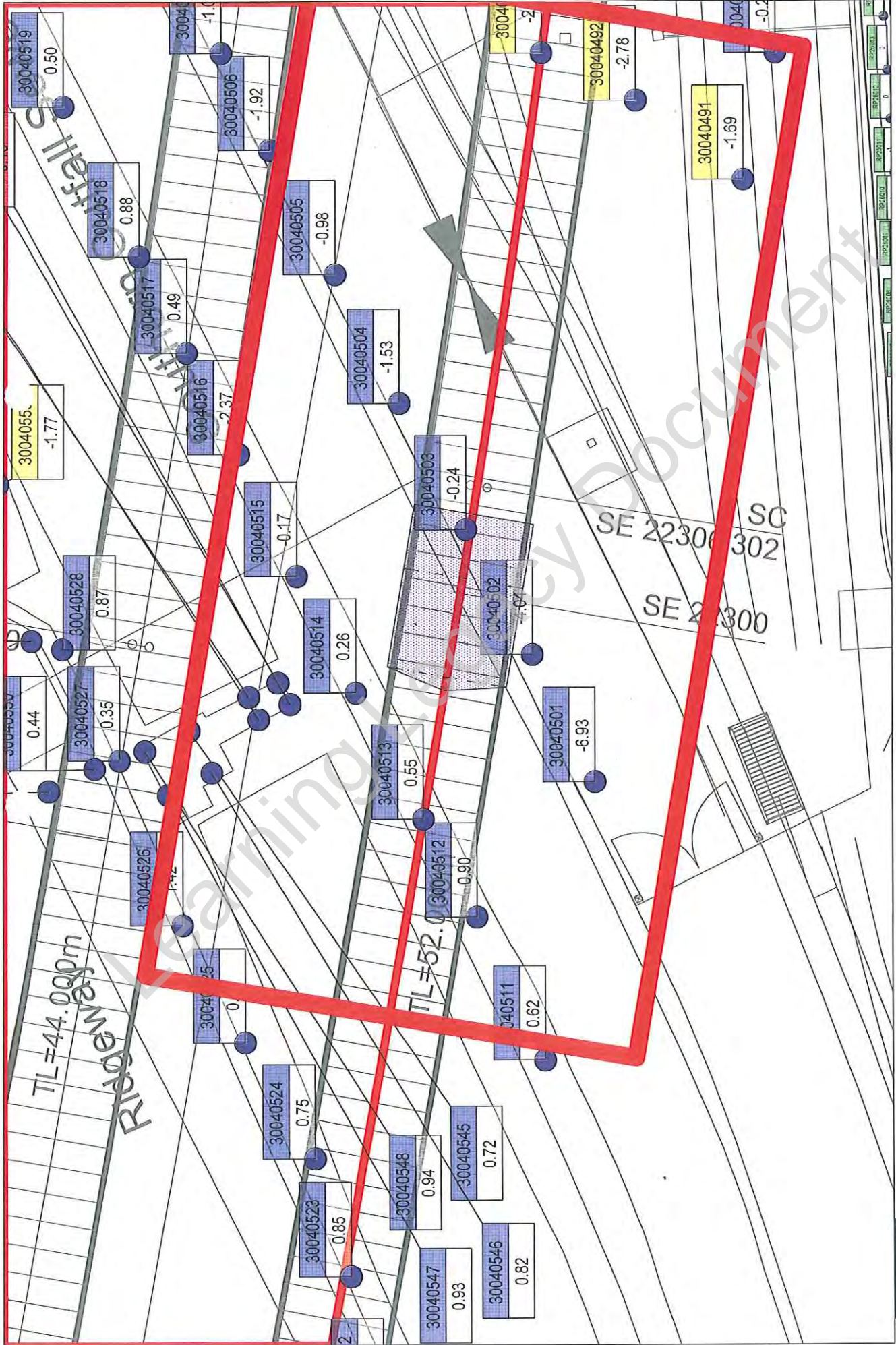
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive, portal excavation, construction base slab, lining walls and grouting
 current values: 04.03.2013 08:56

Point: 30040493



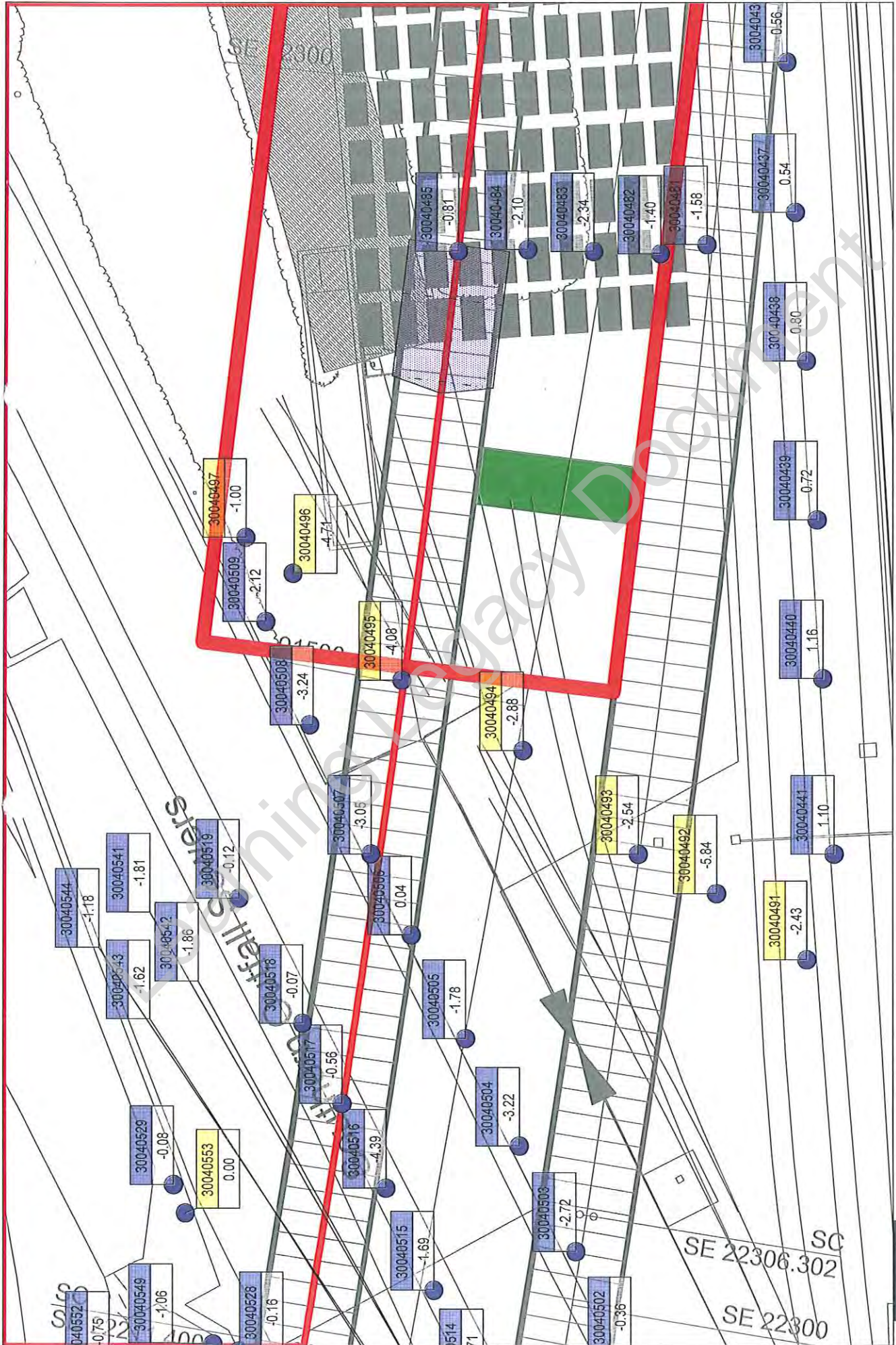
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Geotechnical Cross Section 1 05.02.2013 - 06.02.2014
date: 17.07.2014 16:03 current values: 17.07.2014 15:53



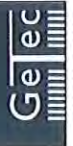


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive, portal excavation, construction base slab, lining walls and grouting
 current values: 12.03.2013 18:14





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 17.06.2013 09:00

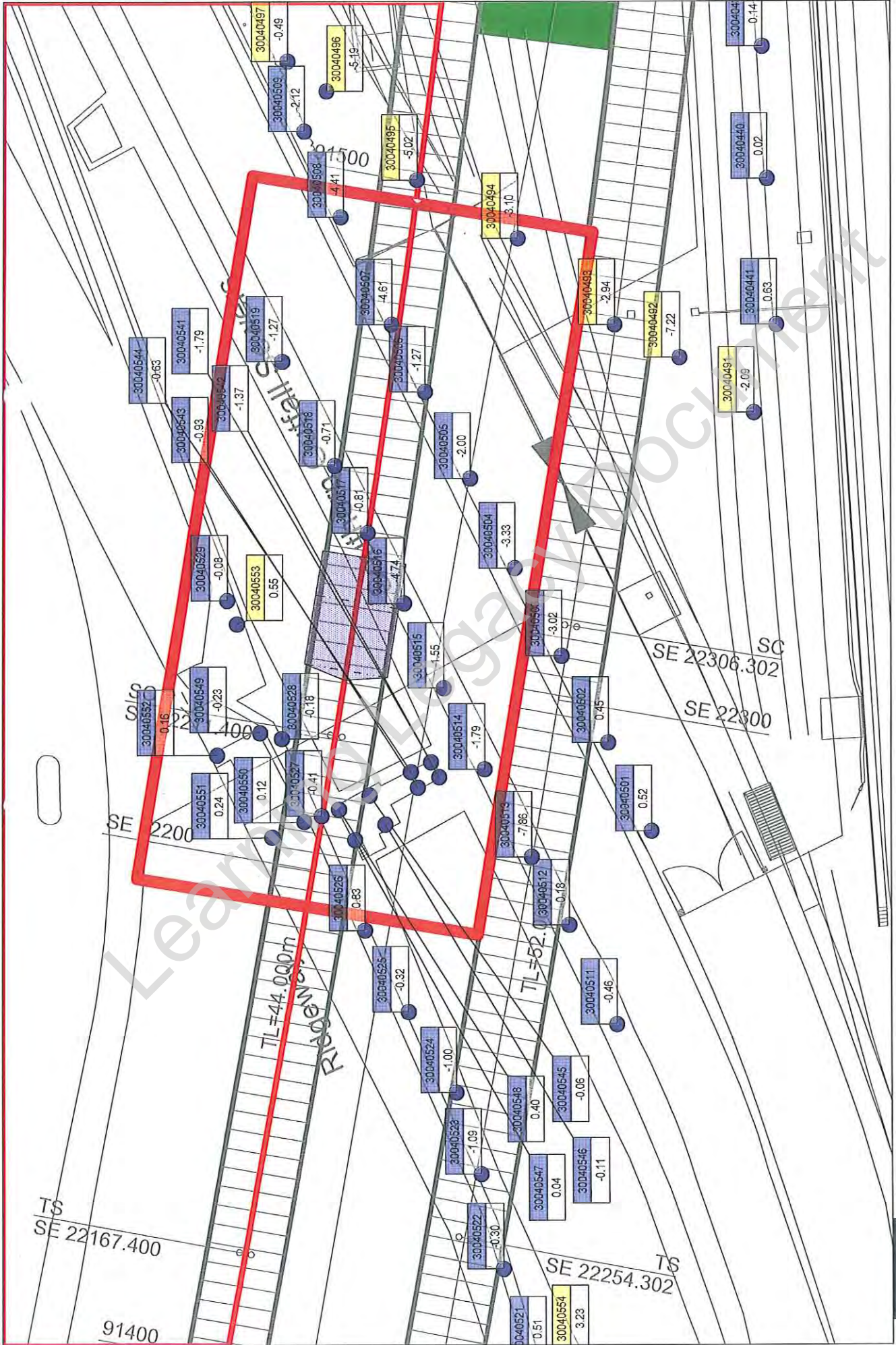


Point: 30040495



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Geotechnical Cross section 1 05.02.2013 - 06.02.2014
date: 21.07.2014 09:08 current values: 21.07.2014 08:57





Joint Venture

project: C310 Thames Tunnel
structure: Geotechnical Cross Section 1 (near CP 19)

Joint Venture

project: C310 Thames Tunnel
structure: Geotechnical Cross Section 1 (near CP 19)

No. of reading	date	1. following		2. following		3. following		4. following		5. following		6. following		7. following		8. following		9. following		10. following		11. following		12. following							
		elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline						
		5.213																													
3004 0491		103.559	103.559	0	103.559	1	0	103.559	0	0	103.559	-1	-1	103.558	1	-1	103.558	0	1	103.558	-1	0	103.558	-1	-1	103.557	-1	-2	103.557	0	-2
3004 0492		103.473	103.473	0	103.473	1	1	103.473	-1	1	103.472	-1	-1	103.474	2	1	103.472	-2	1	103.472	-2	-1	103.470	-1	-2	103.470	0	-3	103.469	0	-3
3004 0493		103.518	103.518	0	103.519	1	2	103.519	-1	1	103.518	0	1	103.518	0	1	103.517	-2	2	103.517	-2	-1	103.515	-2	-2	103.515	0	-2	103.515	-1	-3
3004 0494		103.319	103.320	1	103.318	-1	-1	103.318	0	-1	103.317	-1	-2	103.318	1	-1	103.317	-1	-3	103.317	1	-2	103.316	-2	-3	103.316	-2	-3	103.316	-1	-3
3004 0495		103.395	103.395	-2	103.391	-1	-3	103.391	0	-3	103.391	-1	-4	103.391	0	-4	103.392	1	-4	103.392	1	-3	103.390	-2	-5	103.391	1	-4	103.390	0	-4
3004 0496		103.042	103.042	0	103.041	-1	-1	103.037	-3	-4	103.037	0	-5	103.037	0	-4	103.037	0	-4	103.037	0	-4	103.036	-1	-5	103.037	1	-5	103.037	0	-5
3004 0497		102.997	102.997	0	102.997	0	0	102.996	0	-1	102.996	0	-1	102.997	1	0	102.997	1	0	102.997	1	0	102.996	-1	-1	102.996	1	-1	102.996	0	-1

Legacy Document

project: C310 Thames Tunnel Joint Venture
 structure: Geotechnical Cross Section 1 (near CP 19)

No. of reading	baseline	13. following		14. following		15. following		16. following		17. following		18. following		19. following		20. following		21. following		22. following		23. following		24. following			
		date	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	
	5210																										
3004 0491	103.559	103.557	0	-2	103.557	0	-2	103.557	0	-2	103.556	-2	103.557	0	-2	103.557	0	-2	103.557	0	-2	103.557	0	-2	103.556	-1	-3
3004 0492	103.473	103.469	0	-4	103.469	0	-4	103.472	2	-1	103.468	-4	103.467	-1	-6	103.466	-1	-6	103.466	-1	-7	103.465	0	-7	103.464	-1	-9
3004 0493	103.518	103.514	0	-4	103.514	0	-4	103.516	2	-1	103.515	-2	103.515	1	-2	103.515	0	-3	103.515	0	-3	103.515	0	-3	103.514	0	-3
3004 0494	103.319	103.315	0	-4	103.316	0	-3	103.317	1	-2	103.316	-1	103.317	0	-2	103.317	0	-2	103.316	0	-2	103.317	0	-2	103.315	-1	-4
3004 0495	103.395	103.390	-1	-5	103.391	0	-4	103.392	1	-3	103.391	-1	103.391	0	-4	103.391	0	-4	103.391	0	-4	103.390	0	-5	103.388	-2	-7
3004 0496	103.042	103.036	0	-6	103.037	1	-4	103.038	1	-3	103.037	-1	103.037	0	-5	103.037	0	-5	103.037	0	-5	103.037	0	-5	103.036	-1	-6
3004 0497	102.997	102.996	0	-1	102.997	1	0	102.998	1	1	102.997	-1	102.996	0	-1	102.996	0	-1	102.996	0	-1	102.997	0	0	102.995	-1	-2

Legacy Document

monitoring table



Joint Venture

Project: C310 Thames Tunnel

No. of reading	structure: Geotechnical Cross Section 1 (near CP 19)													
	date	baseline	25. following		26. following		27. following		28. following		29. following			
Point No.	elevation	elevation	elevation	deviation from last/ baseline	elevation	elevation	deviation from last/ baseline	elevation	elevation	deviation from last/ baseline	elevation	elevation	deviation from last/ baseline	
	5/2/13	103.559	103.556	0	-3	103.554	-2	-5	103.554	0	-5	103.554	0	-5
3004 0491		103.473	103.461	-3	-12	103.459	-3	-14	103.459	0	-14	103.458	-1	-15
3004 0492		103.518	103.515	1	-3	103.513	-2	-5	103.513	0	-5	103.511	-2	-5
3004 0493		103.319	103.315	0	-4	103.313	-2	-5	103.314	-1	-5	103.314	0	-5
3004 0494		103.305	103.309	0	+6	103.308	-1	-7	103.306	-1	-8	103.306	0	-8
3004 0495		103.042	103.036	0	-6	103.035	-1	-7	103.034	-1	-8	103.034	0	-8
3004 0496		102.997	102.996	1	-1	102.995	-1	-2	102.994	-1	-3	102.994	0	-3
3004 0497														

Joint Venture

project: C310 Thames Tunnel

Joint Venture

structure: Extensometer Geotechnical Cross Section no. 1

No. of reading	date	1. following		2. following		3. following		4. following		5. following		6. following		7. following		8. following		9. following		10. following		11. following		12. following			
		baseline elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline		
30040493	103.518	103.518	0	103.519	-1	1	103.518	0	1	103.518	0	1	103.518	0	1	103.519	0	2	103.517	-2	1	103.515	-2	0	103.515	-1	-3
30040493-1	98.443	98.443	0	98.444	1	1	98.444	0	0	98.444	0	0	98.444	0	0	98.444	1	1	98.442	-2	-1	98.439	-3	-4	98.439	-1	-5
30040493-2	93.448	93.448	0	93.449	1	1	93.448	-1	0	93.448	-1	0	93.448	0	0	93.449	1	1	93.447	-2	-2	93.445	-2	-3	93.445	0	-4
30040493-3	89.442	89.442	0	89.443	1	1	89.442	0	0	89.442	0	0	89.442	0	0	89.442	0	0	89.438	-4	-4	89.436	-3	-7	89.434	-1	-9
30040494	103.319	103.320	1	103.319	-1	0	103.318	-1	-1	103.317	-1	-2	103.316	-2	-3	103.318	0	-1	103.317	1	-2	103.316	-2	-3	103.317	1	-2
30040494-1	97.242	97.243	0	97.242	-1	0	97.242	0	0	97.241	-1	-1	97.242	1	0	97.241	-2	-1	97.242	1	-1	97.240	-2	-2	97.242	2	-1
30040494-2	91.237	91.238	1	91.236	-1	0	91.237	0	0	91.236	-1	-1	91.237	1	0	91.237	0	0	91.237	2	0	91.235	-2	-2	91.237	2	0
30040494-3	85.240	85.241	1	85.240	-1	0	85.240	0	0	85.239	-1	-1	85.240	1	0	85.240	1	1	85.239	-2	-1	85.239	-1	-1	85.240	1	0
30040495	103.395	103.395	0	103.392	-2	-3	103.391	-1	-3	103.391	-3	-3	103.391	0	-4	103.392	1	-3	103.382	1	-3	103.390	-2	-5	103.391	1	-4
30040495-1	98.308	98.307	-1	98.304	-3	-3	98.304	-1	-4	98.303	-1	-5	98.303	0	-5	98.304	1	-4	98.304	1	-4	98.302	-2	-6	98.303	1	-5
30040495-2	93.314	93.314	0	93.311	-3	-3	93.312	1	-2	93.311	-1	-3	93.311	0	-3	93.312	1	-2	93.312	1	-2	93.310	-2	-4	93.311	1	-3
30040495-3	89.319	89.319	0	89.317	-2	-2	89.318	1	-1	89.317	-1	-1	89.317	0	-1	89.318	1	0	89.319	1	0	89.317	-2	-2	89.317	1	-1

Legacy Document

Joint Venture

project: C310 Thames Tunnel
structure: Extensometer Geotechnical Cross Section no. 1

Joint Venture

project: C310 Thames Tunnel
structure: Extensometer Geotechnical Cross Section no. 1

No. of reading	baseline elevation	13. following		14. following		15. following		16. following		17. following		18. following		19. following		20. following		21. following		22. following		23. following		24. following		
		elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	
date		30/03/2013		27/02/2013		02/04/2013		11/04/2013		21/05/2013		10/06/2013		17/06/2013		10/06/2013		29/06/2013		09/07/2013		24/09/2013				
30040493	103.518	103.514	0	103.514	0	103.514	0	103.515	1	103.515	-2	103.515	1	103.515	0	103.515	0	103.514	0	103.514	0	103.514	0	103.513	-1	-5
30040493-1	98.443	98.438	-1	98.440	2	98.440	2	98.440	2	98.439	-2	98.439	1	98.439	0	98.439	0	98.439	-1	98.439	0	98.439	0	98.438	-1	-6
30040493-2	93.448	93.444	0	93.445	2	93.445	2	93.444	1	93.443	-2	93.444	1	93.444	0	93.444	0	93.443	-1	93.443	0	93.443	0	93.442	-1	-7
30040493-3	85.442	85.433	0	85.435	2	85.435	2	85.433	1	85.433	-2	85.433	1	85.434	0	85.433	0	85.433	-1	85.433	0	85.432	0	85.431	-1	-11
30040494	103.319	103.316	0	103.317	1	103.317	1	103.316	-1	103.316	-1	103.317	0	103.316	0	103.316	-1	103.317	0	103.315	-1	103.315	1	103.314	-2	-5
30040494-1	97.242	97.240	0	97.242	1	97.242	1	97.241	0	97.241	-1	97.242	0	97.241	-1	97.242	0	97.240	-1	97.240	-1	97.241	1	97.240	-1	-2
30040494-2	91.237	91.236	0	91.236	1	91.236	1	91.237	0	91.237	0	91.237	1	91.237	0	91.237	0	91.236	-1	91.236	-1	91.237	1	91.236	-1	-1
30040494-3	85.240	85.238	-1	85.239	1	85.239	1	85.241	1	85.240	-1	85.241	1	85.241	0	85.241	0	85.239	-1	85.239	-1	85.240	1	85.239	-1	-1
30040495	103.395	103.390	-1	103.390	0	103.391	1	103.391	1	103.391	-1	103.391	0	103.391	0	103.391	-1	103.389	-2	103.388	-2	103.389	1	103.386	-3	-8
30040495-1	98.308	98.302	-1	98.303	1	98.303	1	98.304	1	98.304	-1	98.304	1	98.304	0	98.304	0	98.304	-1	98.303	-1	98.302	1	98.300	-2	-8
30040495-2	93.314	93.310	-1	93.311	0	93.311	0	93.313	0	93.312	-1	93.313	0	93.313	0	93.313	-1	93.311	-2	93.310	-2	93.311	1	93.309	-2	-5
30040495-3	89.319	89.316	-1	89.317	1	89.318	1	89.319	1	89.319	-1	89.319	1	89.319	0	89.319	0	89.319	0	89.318	-1	89.316	1	89.313	-4	-5

Legacy Document

monitoring table



Joint Venture

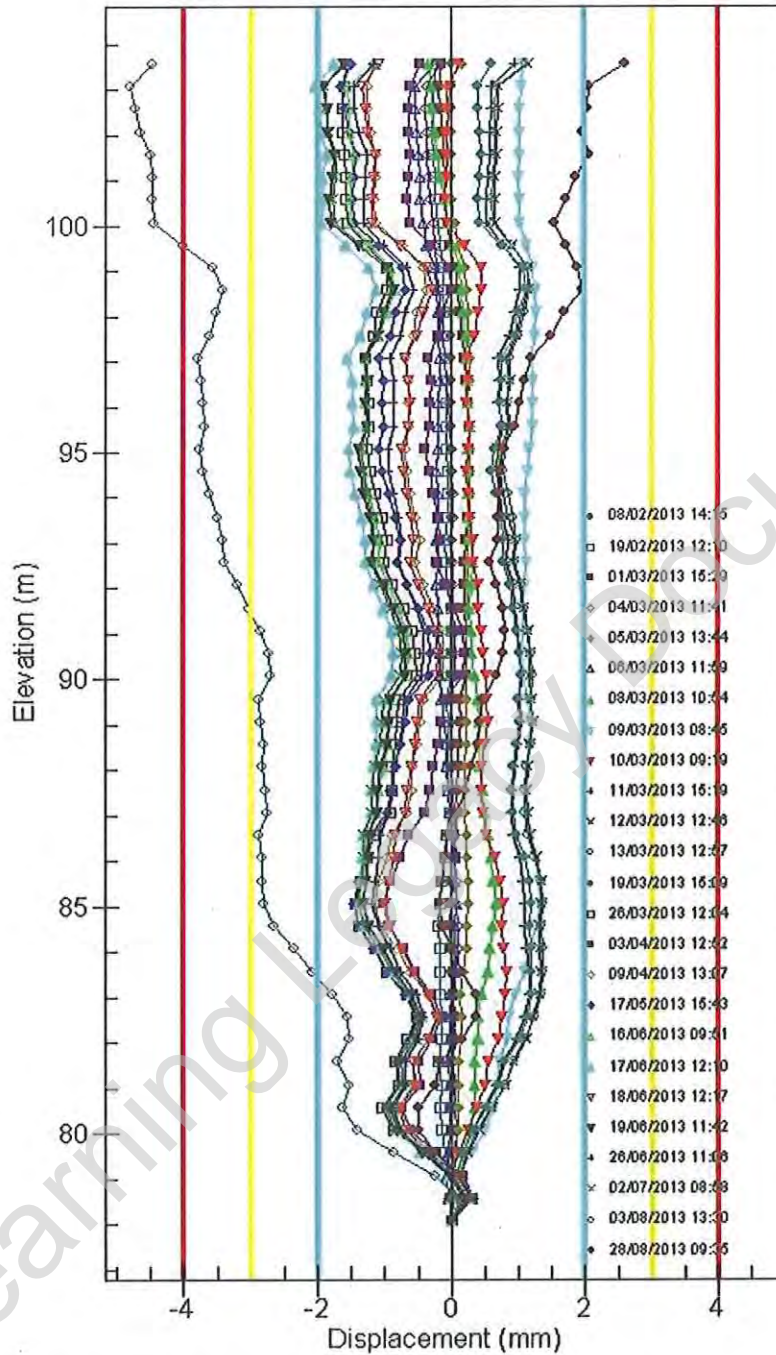
project: C310 Thames Tunnel
structure: Extensometer Geotechnical Cross Section no. 1

No. of reading	baseline	25. following		26. following		27. following		28. following		29. following		30. following	
		elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
0510	52713		00022014										
Point No.	elevation		deviation from last/ baseline		deviation from last/ baseline		deviation from last/ baseline		deviation from last/ baseline		deviation from last/ baseline		deviation from last/ baseline
30040493	103.518	103.511	-2	-6									
30040493-1	98.443	98.437	-1	-7									
30040493-2	93.448	93.440	-2	-8									
30040493-3	89.442	89.429	-2	-13									
30040494	103.319	103.314	0	-5									
30040494-1	97.242	97.240	0	-3									
30040494-2	91.237	91.236	0	-1									
30040494-3	85.240	85.240	0	0									
30040495	103.395	103.386	0	-8									
30040495-1	98.308	98.300	-1	-8									
30040495-2	93.314	93.309	0	-4									
30040495-3	89.319	89.313	0	-5									

Legacy Document

c310:wb0492 - A Axis Cumulative

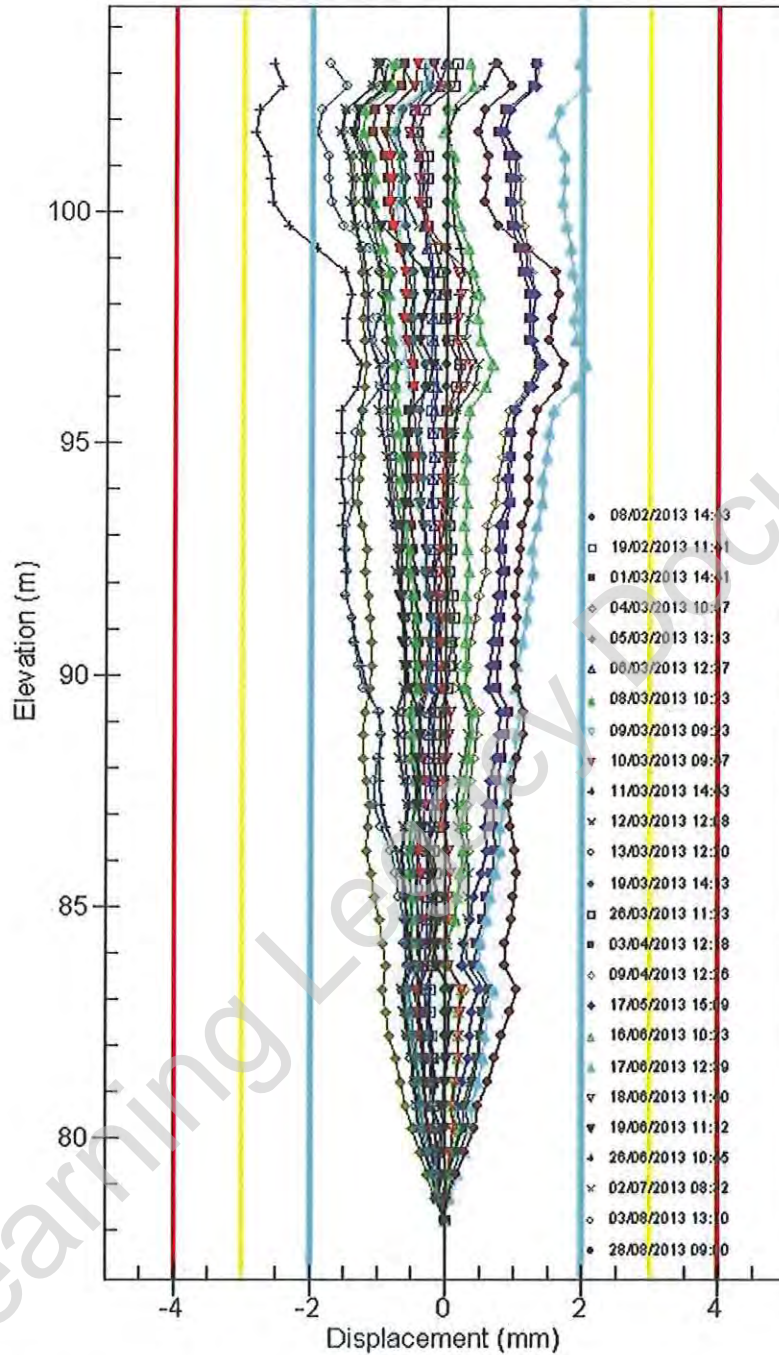
Initial survey: 08/02/2013 14:15



PROJECT: C310
 SITE: Geotechnical Cross Section No.1
 INSTALLATION: Inclinometer WB0492
 COMPANY: HMJV
 CLIENT: Crossrail
 NOTE: Manual Inclinometer
 Geotechnical Cross Section No. 1
 westbound tunnel
 Direction of displacement perpendicular to tunnel alignment
 positive value - deviation towards tunnel center line

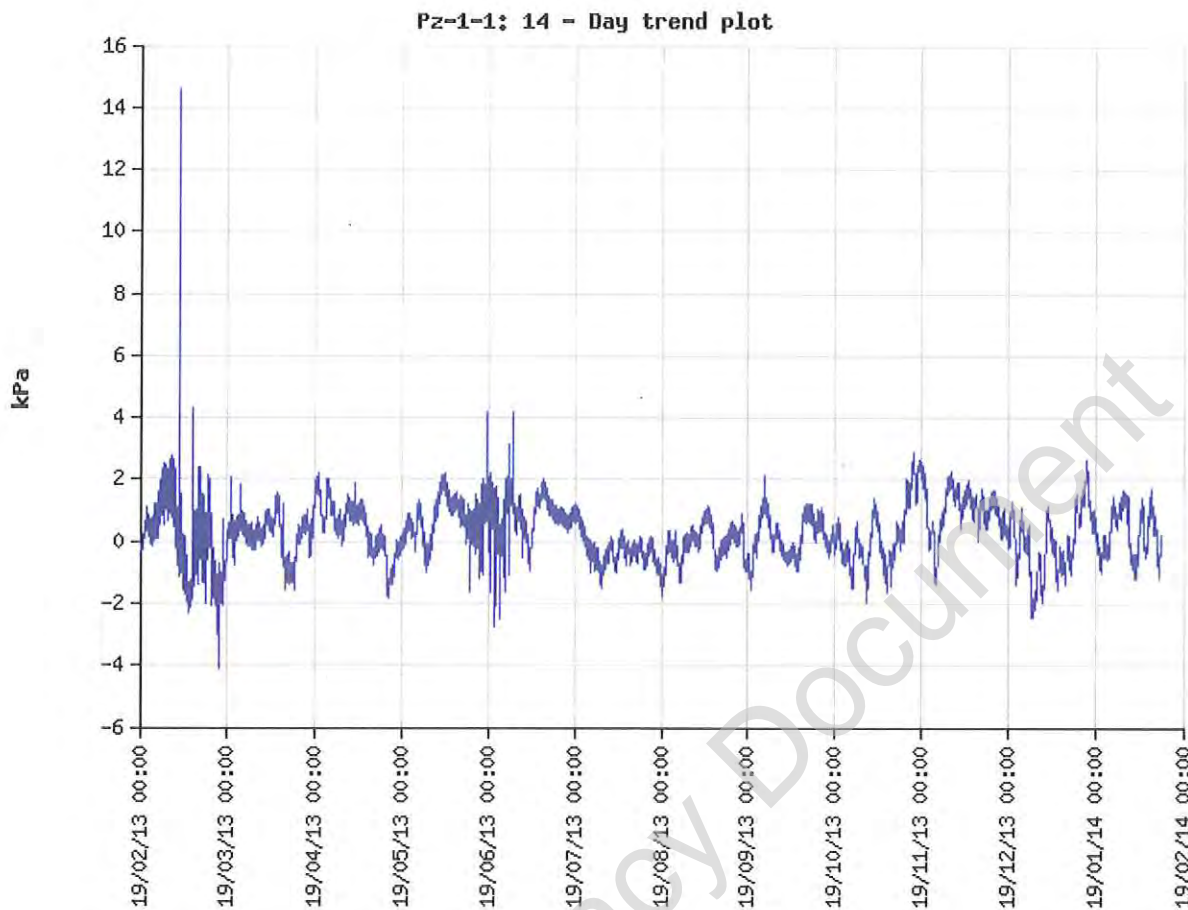
c310:eb0496 - A Axis Cumulative

Initial survey: 08/02/2013 14:43

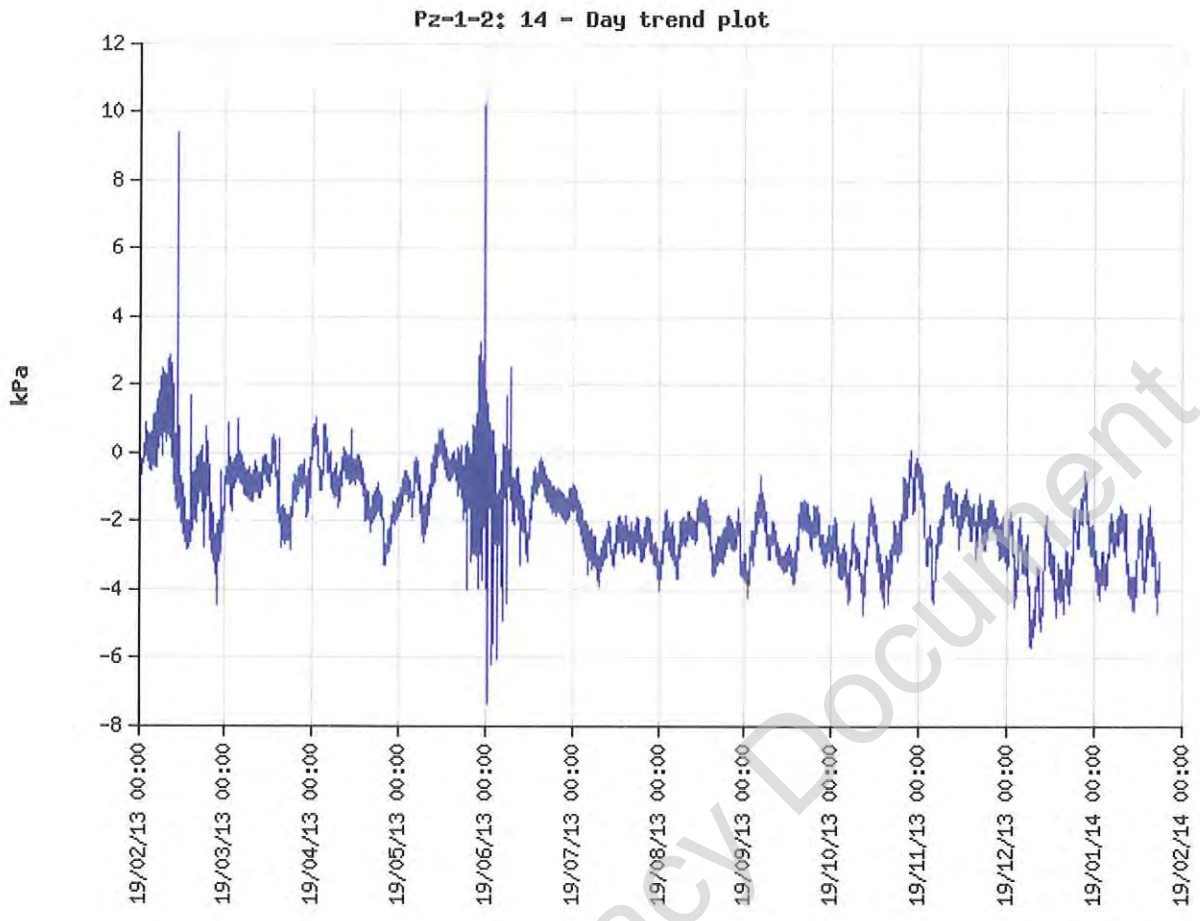


PROJECT: C310
 SITE: Geotechnical Cross Section No.1
 INSTALLATION: Inclinometer EB0496
 COMPANY: HMJV
 CLIENT: Crossrail

NOTE: Manual Inclinometer
 Geotechnical Cross Section No. 1
 eastbound tunnel
 Direction of displacement perpendicular to tunnel alignment
 positive value - deviation towards tunnel center line



Geotechnical Cross Section 1
Point no. 3004 & 491
Piezometer



Geotechnical Cross Section 1
Point no.: 3004 0497
Piezometer