 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

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


CMDL: C09.006

REVISION	DOCUMENT APPROVAL / REVISION RECORD DETAILS	DATE
1.0	Issued for CRL Acceptance	23/01/2015
2.0	CRL and TW comments incorporated, Issued for Acceptance	27/03/2015

Stakeholder (THAMES WATER) review required? Yes: x No: ...


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

Sign:	Name:	Date:			
Review by Stakeholder (if required): REFER LONG CONFIRMING ACCEPTANCE FROM TW					
Stakeholder organization	Job Title	Name	Signature	Date	Acceptance

		Crossrail Review and Acceptance Decal	
This decal is to be used for submitted documents requiring acceptance by Crossrail.			
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<input type="checkbox"/>	Code 2.	Not Accepted. Revise and resubmit. Work may proceed subject to incorporation of changes indicated	
<input type="checkbox"/>	Code 3.	Not Accepted. Revise and resubmit. Work may not proceed	
<input type="checkbox"/>	Code 4.	Received for information only. Receipt is confirmed	
Reviewed/Accepted by: (signature)	[Redacted Signature]		
Print Name	[Redacted Name]		
Position:	[Redacted Position]		Date: 29/3/15
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PREPARED BY: Monitoring Manager Print: [Redacted] Sign: [Redacted] Date: 27-03-2015	REVIEWED BY: HMJV Technical and Risk Manager Print: [Redacted] Sign: [Redacted] Date: 27-03-2015
REVIEWED BY: Construction Manager Tunnels Print: [Redacted] Sign: [Redacted] Date: 27-03-2015	APPROVED BY: HMJV Project Director Print: [Redacted] Sign: [Redacted] Date: 27-03-2015

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 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

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- 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-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

1.0 INTRODUCTION

The purpose of this report is to compile the individual Thames Water 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 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.

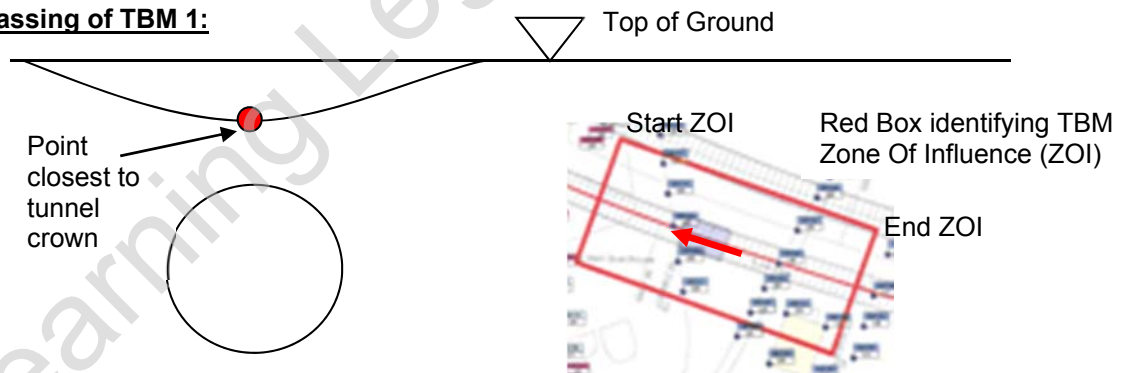
Each individual Close-out report contains

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

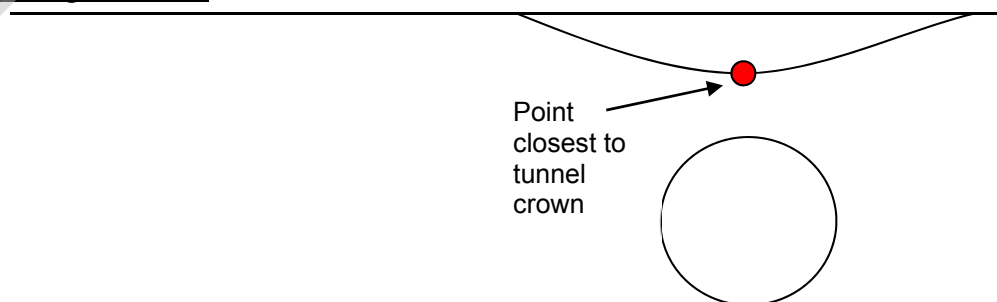
The Cover summary sheet entails:

- Information on location of Monitoring area and/or asset
- Reference C310 I&M drawing
- Relevant chainage
- Sensor type
- Trigger value
- Selected critical monitoring points following the logic illustrated below:


Passing of TBM 1:



Passing of TBM 2:

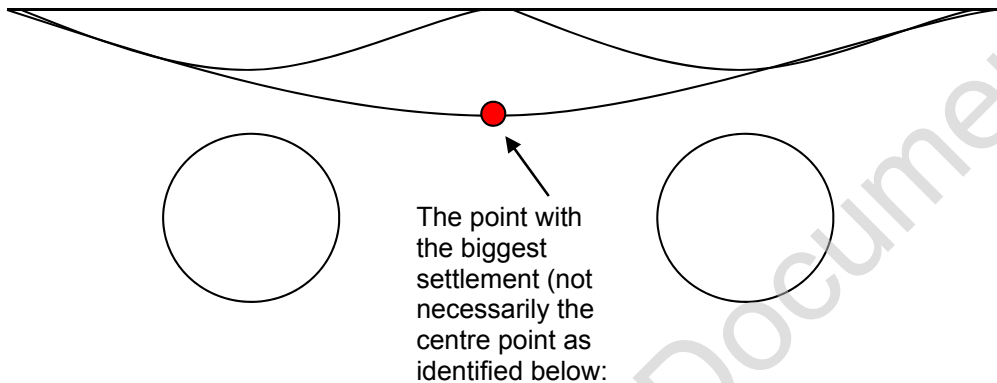


- Start and end date of relevant construction activity (other than TBM-Drive), where applicable.

		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
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- 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 Thames Water specific requirements:
 - Deflection ratio for surface monitoring (e.g. ground studs) to be presented if settlements are more than 10mm.
 - Movements at shallow datum to be checked with the similar movement trend as the monitoring on the surface.
 - [where applicable, a note stating that the](#) 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.

[Appendix 120](#) contains an overview of the rate of change for monitoring points, relating to TW assets. The table shows the rate of change per annum (partially pro-rated).

		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

2.0 REFERENCE DOCUMENTS

MPCGM C310-HTM-Z-STP-CR148-50058 Rev.14.0
MPCGM NWP C310-HTM-Z-STP-CR146-50002 Rev. 4.0


HMJV I&M Drawings:

C310-HTM-C-DWG-CR148_PT005-50010 Rev. 9.0
C310-HTM-C-DWG-CR146_ST004-70001 Rev. 7.0
C310-HTM-C-DWG-CR146_ST004-70002 Rev. 6.0
C310-HTM-C-DWG-CR146_ST004-70003 Rev. 12.0

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

3.0 APPENDICES

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- 19 Southern Outfall Sewer 1
- 20 Southern Outfall Sewer 2
- 21 Southern Outfall Sewer 3
- 22 Southern Outfall Sewer Pumping Station
- 23 Southern Outfall Sewer Extensometer
- 32 SOS Plumstead Road South
- 33 SOS Plumstead Road North
- 34 SOS Plumstead Road Extensometer
- 42 Wall Plumstead Road
- 50 I/O Center Car Park
- 51 CS12 - Cornwallis Road
- 65 CS 19 - Warren lane Car park
- 66 CS 20 - Warren lane Car park
- 67 CS 21 - Warren lane Car park
- 68 CS 22 - Warren lane roundabout
- 69 Warren lane Car park EB
- 70 Warren lane Car park WB
- 71 Extensometer Warren lane Car park
- 120 [overview of rate of change for monitoring of TW assets South of River Thames](#)

		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDIX 00

Overall Register / Close out report


Learning Legacy Document

Close Out report: processing status

last update: 13/11/2014

	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 - approx. 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				

Tunnel Drive T3 / Westbound & T4 / Eastbound	53	Building 11	Hydrostatic Levelling Cell	13.-17.09.2013	04.-09.02.2014	
	54	CS 15 - BH Hoarding	Levelling Studs	18.09.2013	10.02.2014	
	55	Verbrueggens House	Levelling Studs	22.-23.09.2013	11.-12.02.2014	
	56	CS 16 - Footpath Royal Arsenal	Levelling Studs	23.09.2013	12.02.2014	
	57	CS 17 - Footpath Royal Arsenal	Levelling Studs	25.09.2013	16.02.2014	
	58	Main Guard House	Hydrostatic Levelling Cell	28.09.-01.10.2013	17.-18.02.2014	
	59	Main Guard House	Tiltmeter	28.09.-01.10.2013	17.-18.02.2014	
	60	Royal Brass Foundry	Hydrostatic Levelling Cell	27.-29.09.2013	16.-17.02.2014	
	61	Royal Brass Foundry	Tiltmeter	27.-29.09.2013	16.-17.02.2014	
	62	CS Royal Arsenal Listed Wall	Levelling Studs	02.10.2013	21.02.2014	
	63	CS 18 - Warren lane	Levelling Studs	03.10.2013	22.02.2014	
	64	Hotel Warren lane	Levelling Studs	07.-23.10.2013	23.02.-05.03.2014	
	65	CS 19 - Warren lane Carpark	Levelling Studs	26.10.2013	08.03.2014	
	66	CS 20 - Warren lane Carpark	Levelling Studs	27.10.2013	09.03.2014	
	67	CS 21 - Warren lane Carpark	Levelling Studs	29.10.2013	11.03.2014	
	68	CS 22 - Warren lane roundabout	Levelling Studs	31.10.2013	11.03.2014	
	69	Warren lane Carpark EB	Levelling Studs	26.-31.10.2013	08.-13.03.2014	
	70	Warren lane Carpark WB	Levelling Studs	26.-31.10.2013	08.-13.03.2014	
	71	Extensometer Warren lane Carpark	Extensometer	26.-31.10.2013	08.-13.03.2014	
	72	CS 23 - southside retaining wall footpath	Levelling Studs	06.11.2013	16.03.2014	
	73	Southside retaining wall	Prisms	06.11.2013	17.03.2014	
	74	Northside retaining wall	Prisms	11.12.2013	13.04.2014	
	75	Northside Flood Wall	Hydrostatic Levelling Cell	10.-11.12.2013	13.-15.04.2014	
	76	CS Pier Road	Levelling Studs	12.12.2013	17.04.2014	
	77	Old Station Museum	Hydrostatic Levelling Cell	12.-14.12.2013	17.-19.04.2014	
	78	Old Station Museum	Tiltmeter	12.-14.12.2013	17.-19.04.2014	
	79	Old Station Museum, Listed Wall	Hydrostatic Levelling Cell	18.12.2013-09.01.2014	21.-25.04.2014	
	80	CS 24 - CP 16 - CH 89210	Levelling Studs	17.12.2013	21.04.2014	
	81	CS CP 16	Levelling Studs	Excavation Jun.-Jul.2014		
	82	Geotechnical Cross Section 3	Levelling Studs	07.01.2014	23.04.2014	
	83	CS TRM	Levelling Studs	07.01.2014	23.04.2014	
	84	TRM Carpark	Levelling Studs	09.01.-15.01.2014	24.-30.04.2014	
	85	Siding Apartments 1-16	Hydrostatic Levelling Cell	14.12.2013-06.01.2014	19.-21.04.2014	
	86	Siding Apartments 1-16	Tiltmeter	14.12.2013-06.01.2014	19.-21.04.2014	
	87	Siding Apartments 17-74	Hydrostatic Levelling Cell	06.-11.01.2014	22.-26.04.2014	
	88	Siding Apartments 17-74	Tiltmeter	06.-11.01.2014	22.-26.04.2014	
	89	Albert Road Building 171-209	Hydrostatic Levelling Cell	12.-14.01.2014	26.-29.04.2014	
	90	Albert Road Building 171-209	Tiltmeter	12.-14.01.2014	26.-29.04.2014	
	91	Albert Road Building 211-217	Hydrostatic Levelling Cell	15.-16.01.2014	29.-30.04.2014	
	92	Albert Road Building 211-217	Tiltmeter	15.-16.01.2014	29.-30.04.2014	
	93	TW Pumping Station	Hydrostatic Levelling Cell	16.-17.01.2014	30.04.-01.05.2014	
	94	TW Pumping Station	Tiltmeter	16.-17.01.2014	30.04.-01.05.2014	
	95	CS 25 - Old Station 1 - CH 89155	Levelling Studs	09.01.2014	25.04.2014	
	96	CS 26 - Old Station 2 - CH 89120	Levelling Studs	10.01.2014	26.04.2014	
	97	CS 27 - Old Station 3 - CH 89075	Levelling Studs	11.01.2014	28.04.2014	
	98	CS 28 - Pumping station - CH 89055	Levelling Studs	14.01.2014	29.04.2014	
	99	CS 29 - Store Road Sewer	Levelling Studs	16.01.2014	30.04.2014	
	100	Store Road Sewer - SAA	SAA	16.01.2014	01.05.2014	
	101	Store Road Sewer - SG	Strain Gauges	16.01.2014	01.05.2014	
	102	Store Road Sewer - FO SG	FO-Strain Gauges	16.01.2014	01.05.2014	
	103	Store Road Sewer - Extensometer	Extensometer	17.01.2014	02.05.2014	
	104	CS 30 - Store Road Sewer CL - CH 89025	Levelling Studs	16.01.2014	01.05.2014	
	105	Albert Road "2"	Levelling Studs	14.-31.01.2014	28.04.-17.05.2015	
	106	CS 31 - Store Road Sewer West - CH 89000	Levelling Studs	18.01.2014	02.05.2014	
	107	CS 32 - Factory Road 1 - CH 88970	Levelling Studs	19.01.2014	03.05.2014	
	108	Factory Road Extensometer / SD	Extensometer	19.-25.01.2014	03.-10.05.2014	
	109	Geotechnical Cross Section 4	Levelling Studs	19.01.2014	01.-03.05.2014	
	110	CS 33 - Factory Road 2 - CH 88935	Levelling Studs	21.01.2014	04.05.2014	
	111	CS 34 - Factory Road 3 - CH 88900	Levelling Studs	23.01.2014	06.05.2014	
	112	CS 35 - Factory Road 4 - CH 88870	Levelling Studs	25.01.2014	08.05.2014	
	North Woolwich Portal	113	CS Headwall	Levelling Studs	remoaval of last props - approx. Feb. 2015	
		114	Albert Road "1"	Levelling Studs		
		115	Factory Road	Levelling Studs		
		116	CS Headwall	Levelling Studs		
		117	Crane Slab	Levelling Studs		
		118	Extensometer Portal NWP - RDS	Extensometer		

		C310 THAMES TUNNEL REPORT			
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APPENDIX 08
White Hard Road

Learning Legacy Document

monitoring asset	White Hart Road		
reference monitoring drawing:	C310-HTM-C-DWG-CR148-PT005-50010		
name of monitoring section:	White Hart Road		
sensor type:	manual levelling studs		
chainage:	91760	point no.:	3004 0401- 3004 0407
trigger values: [mm]	green: +14 -14	amber: +17 -17	red: +21 -21
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	10/01/2013 21/01/2013	0.00			
TBM 1	start ZOI	18/01/13	-0.90	3004 0401	
	end ZOI	29/01/13	-2.11	3004 0401	breached not any trigger value
TBM 2	start ZOI	25/05/13	0.08	3004 0403	
	end ZOI	30/05/13	-4.48	3004 0403	breached not any trigger value
longterm	06/06/13	-4.66	3004 0403	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

Baseline reading for 3004 0401-0404 prior to TBM start on 10.01.2013
 Baseline reading for 3004 0405-0407 on demand from CRL on 21.01.2013
 Points 3004 0401-0404 digged out due to removal of ballasting the road.
 No further Thames Water monitoring requirement on 381 and 457 sewer, due to the fact that sewers were renewed.

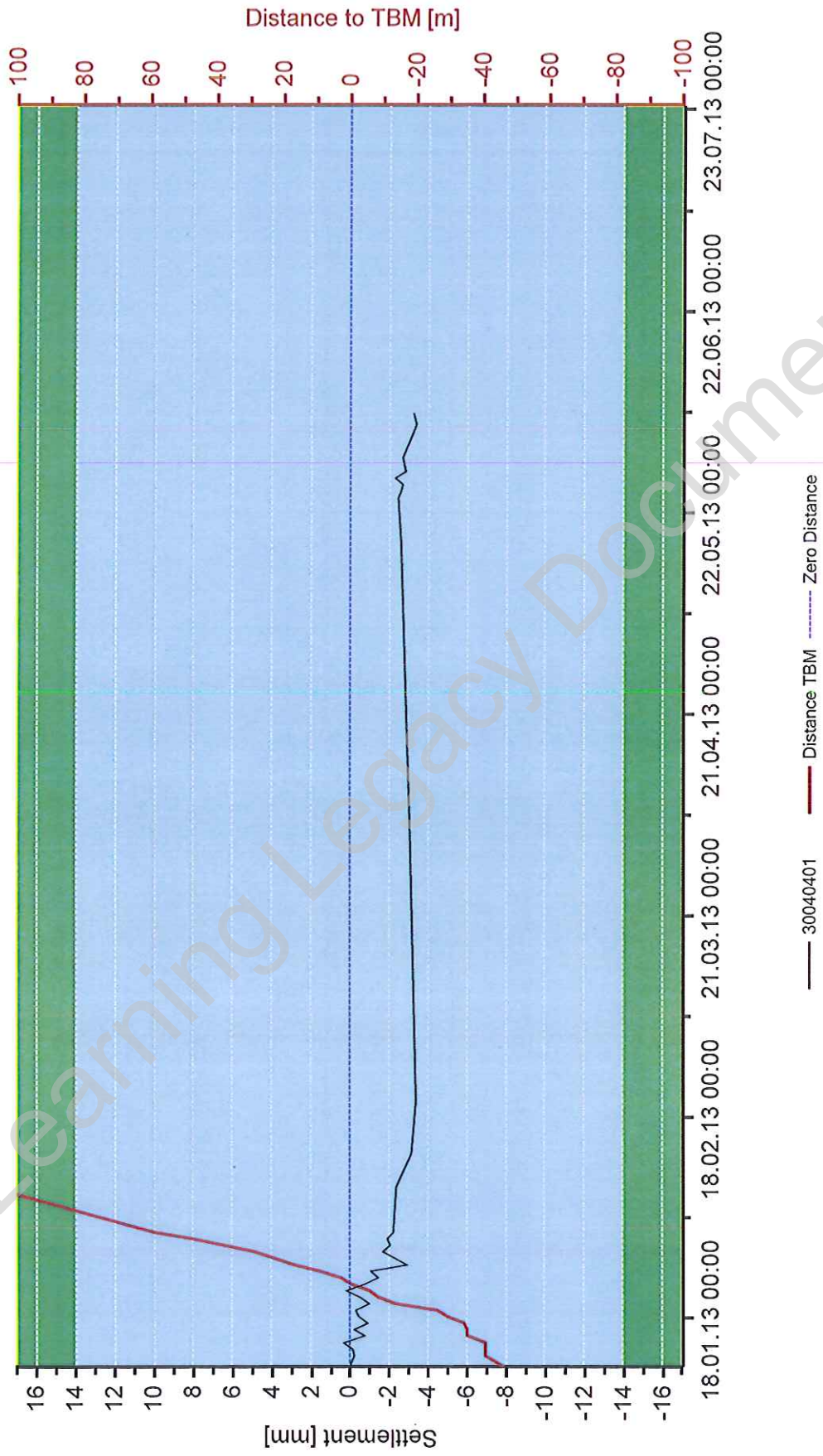
date / signature: 27/03/2015

print name:

HMJV project role:

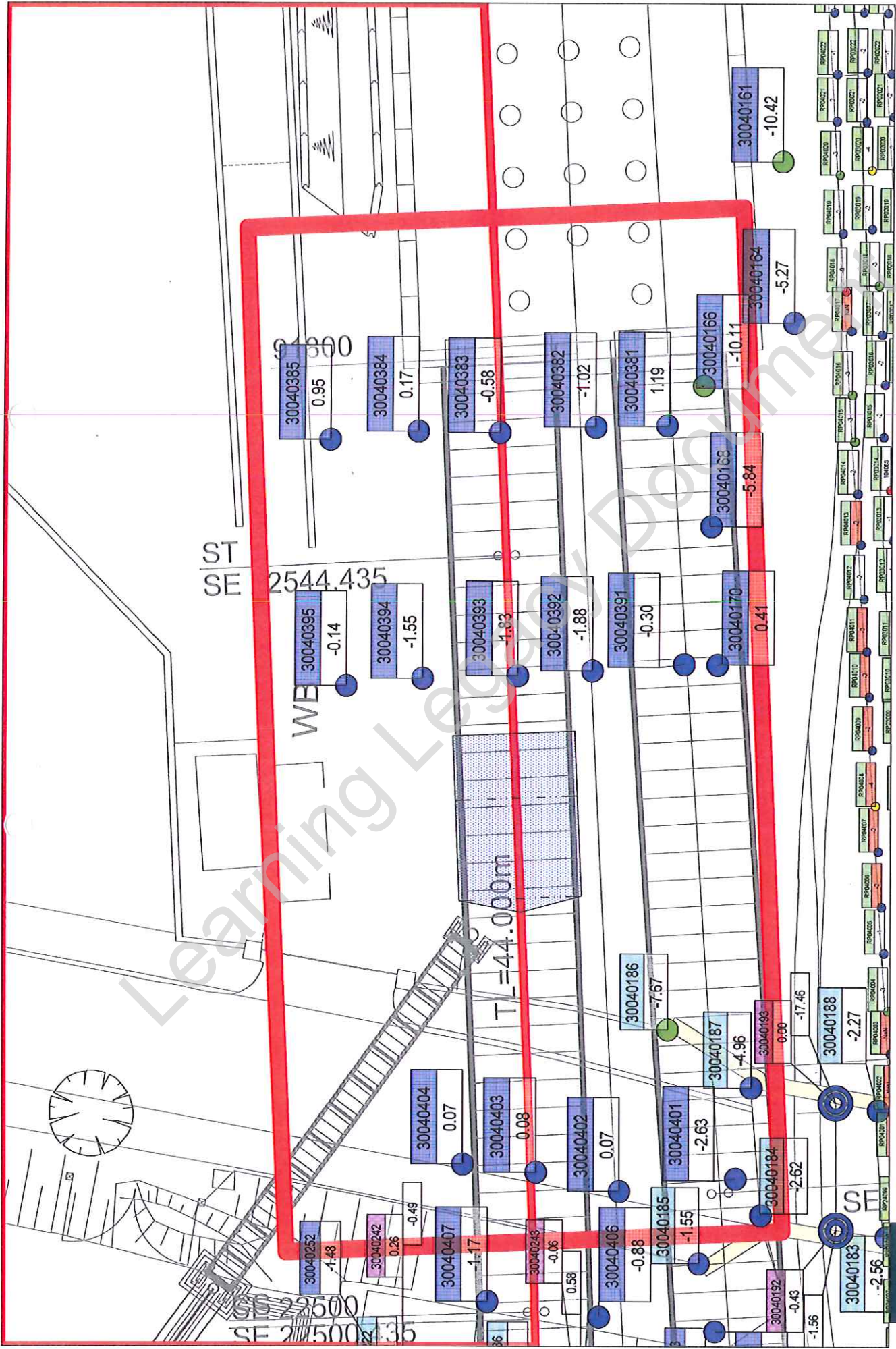
Monitoring & Survey engineer

Point: 30040401



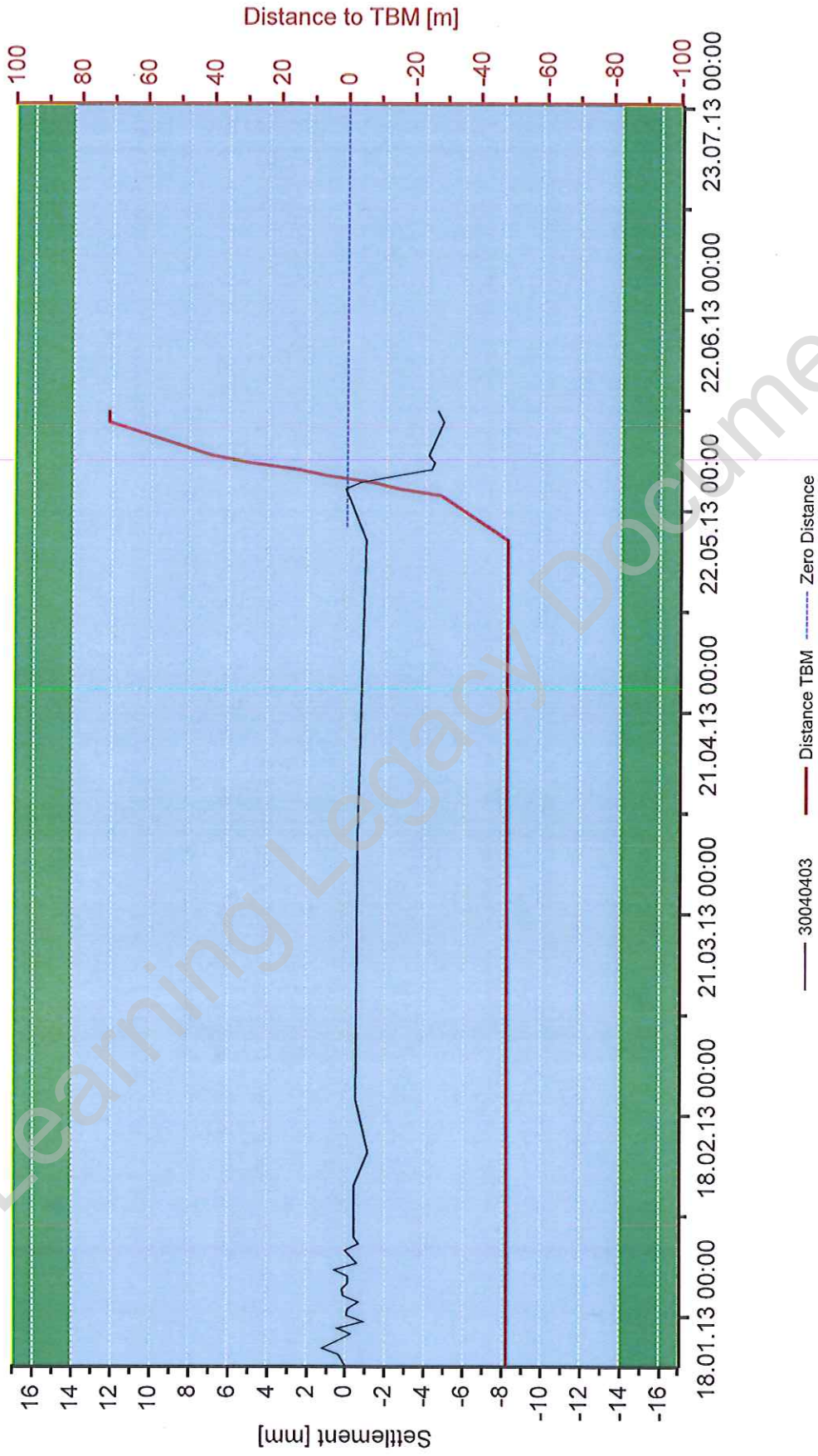
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - White Hard Road 10.01.2013 - 23.07.2013
date: 20.06.2014 12:01 current values: 20.06.2014 11:51





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive
 current values: 25.05.2013 09:00

Point: 30040403



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - White Hard Road 10.01.2013 - 23.07.2013
date: 20.06.2014 11:50 current values: 20.06.2014 11:44



Joint Venture

project: C310 Thames Tunnel

Joint Venture

project: C310 Thames Tunnel

No. of reading	structure: Cross Section WHR - levelling pins											
	1. following	2. following	3. following	4. following	5. following	6. following	7. following	8. following	9. following	10. following	11. following	12. following
date	12/01/2013	13/01/2013	14/01/2013	15/01/2013	16/01/2013	17/01/2013	18/01/2013	19/01/2013	20/01/2013	21/01/2013	22/01/2013	23/01/2013
Point No.	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	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	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 0401	103.382	103.382	103.382	103.381	103.382	103.381	103.382	103.382	103.381	103.382	103.382	103.381
3004 0402	103.586	103.586	103.587	103.586	103.586	103.586	103.586	103.586	103.586	103.586	103.587	103.586
3004 0403	103.475	103.476	103.477	103.475	103.476	103.474	103.475	103.475	103.475	103.475	103.476	103.475
3004 0404	103.560	103.560	103.561	103.560	103.561	103.559	103.560	103.560	103.560	103.560	103.560	103.560
3004 0405	103.349											
3004 0406	102.882											
3004 0407	102.534											

Legacy Document

monitoring table



monitoring table



project: C310 Thames Tunnel

Joint Venture

project: C310 Thames Tunnel

Joint Venture

No. of reading	13. following		14. following		15. following		16. following		17. following		18. following		19. following		20. following		21. following		22. following		23. following		24. following			
	baseline	24/01/2013	29/01/2013	29/01/2013	27/01/2013	28/01/2013	29/01/2013	29/01/2013	29/01/2013	30/01/2013	31/01/2013	31/01/2013	07/02/2013	12/02/2013	12/02/2013	20/02/2013	20/02/2013	20/02/2013	20/02/2013	20/02/2013	20/02/2013	20/02/2013	02/04/2013	02/04/2013		
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	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 0401	103.382	-1	103.381	0	-1	103.379	-2	-3	103.380	0	-2	103.380	0	-2	103.380	0	-2	103.380	0	-2	103.379	-1	-3	103.379	0	-3
3004 0402	103.586	0	103.587	1	1	103.585	-1	-1	103.587	1	1	103.586	0	0	103.586	0	0	103.586	0	0	103.585	-1	-1	103.586	1	0
3004 0403	103.475	0	103.476	1	1	103.475	-1	-1	103.476	1	0	103.475	-1	-1	103.475	0	0	103.475	0	0	103.474	-1	-1	103.475	1	-1
3004 0404	103.560	0	103.561	1	1	103.560	-1	0	103.561	1	1	103.560	0	0	103.560	0	0	103.560	0	0	103.559	-1	-1	103.560	-1	-1
3004 0405	103.949	0	103.949	0	0	103.948	-1	0	103.951	2	2	103.949	-2	0	103.949	3	0	103.948	-1	-1	103.947	-1	-2	103.948	0	-1
3004 0406	102.882	-1	102.880	-2	-2	102.879	-1	-3	102.882	1	1	102.882	-1	0	102.883	1	1	102.882	-1	-2	102.880	-2	-2	102.881	1	-1
3004 0407	102.534	-3	102.531	0	-3	102.533	2	-1	102.535	0	1	102.533	-2	-1	102.534	1	0	102.534	1	0	102.533	-2	-1	102.534	1	0

Legacy Document

project: C310 Thames Tunnel


Joint Venture

project: C310 Thames Tunnel

Joint Venture

No. of reading	25. following		26. following		27. following		28. following		29. following		30. following		31. following		32. following		33. following		34. following		35. following		36. following		
	baseline	21.01/2013	17/05/2013	24/05/2013	24/05/2013	25/05/2013	26/05/2013	26/05/2013	27/05/2013	28/05/2013	28/05/2013	29/05/2013	29/05/2013	30/05/2013	30/05/2013	04/06/2013	04/06/2013	04/06/2013	04/06/2013	04/06/2013	26/06/2013	26/06/2013	26/07/2013		
Point No.	elevation	elevation	elevation	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	deviation from last/ baseline	deviation from last/ baseline	deviation from last/ baseline	deviation from last/ baseline	deviation from last/ baseline	deviation from last/ baseline	deviation from last/ baseline	deviation from last/ baseline	deviation from last/ baseline	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	
3004 0401	103.382	103.379	0	-3	103.379	-0.1	-3	103.379	0	-3	103.380	0	-2	103.379	-1	-3	103.379	0	-3	103.379	0	-3	103.379	0	-3
3004 0402	103.586	103.585	-1	-1	103.586	0.3	0	103.586	-1	-1	103.585	-1	-1	103.583	-2	-3	103.584	1	-2	103.583	1	-3	103.583	0	-3
3004 0403	103.475	103.474	0	-1	103.475	0.1	0	103.475	-1	-1	103.473	-2	-2	103.471	-2	-4	103.471	0	-4	103.471	0	-4	103.471	0	-5
3004 0404	103.560	103.560	0	0	103.560	-0.4	0	103.560	0	0	103.559	-1	-1	103.558	-1	-2	103.558	-1	-2	103.557	-1	-3	103.558	1	-2
3004 0405	103.949	103.949	0	0	103.949	-0.2	0	103.949	0	0	103.949	0	0	103.948	-1	-1	103.948	1	0	103.947	-1	-2	103.947	1	-2
3004 0406	102.882	102.881	0	-1	102.881	-0.2	-1	102.882	1	1	102.883	1	1	102.881	-2	-1	102.879	-2	-3	102.879	0	-3	102.878	0	-4
3004 0407	102.534	102.532	-1	-2	102.533	0.0	-1	102.533	0	-1	102.532	0	-2	102.531	-1	-3	102.530	-2	-4	102.530	-1	-4	102.530	0	-4

Legacy Document

		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDICES 19
Southern Outfall Sewer 1

Learning Legacy Document

monitoring asset

Southern Outfall Sewer (SOS) + Pumpstation

reference monitoring drawing:

C310-HTM-C-DWG-CR146-ST004-70001

name of monitoring section:

Southern Outfall Sewer (SOS) 1

sensor type:

manual levelling studs

chainage:

91470

point no.:

3004 0501 - 3004 0509

trigger values:
[mm]

green: +12
-12

amber: +15
-15

red: +18
-18

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	12/12/2012		0		
	12/01/2013		0		
TBM 1	start ZOI	10/03/13	0.29	3004 0503	
	end ZOI	14/03/13	-1.75	3004 0503	breached not any trigger value
TBM 2	start ZOI	18/06/13	-2.59	3004 0507	
	end ZOI	20/06/13	-4.61	3004 0507	breached not any trigger value
longterm	06/02/14		-7.32	3004 0508	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

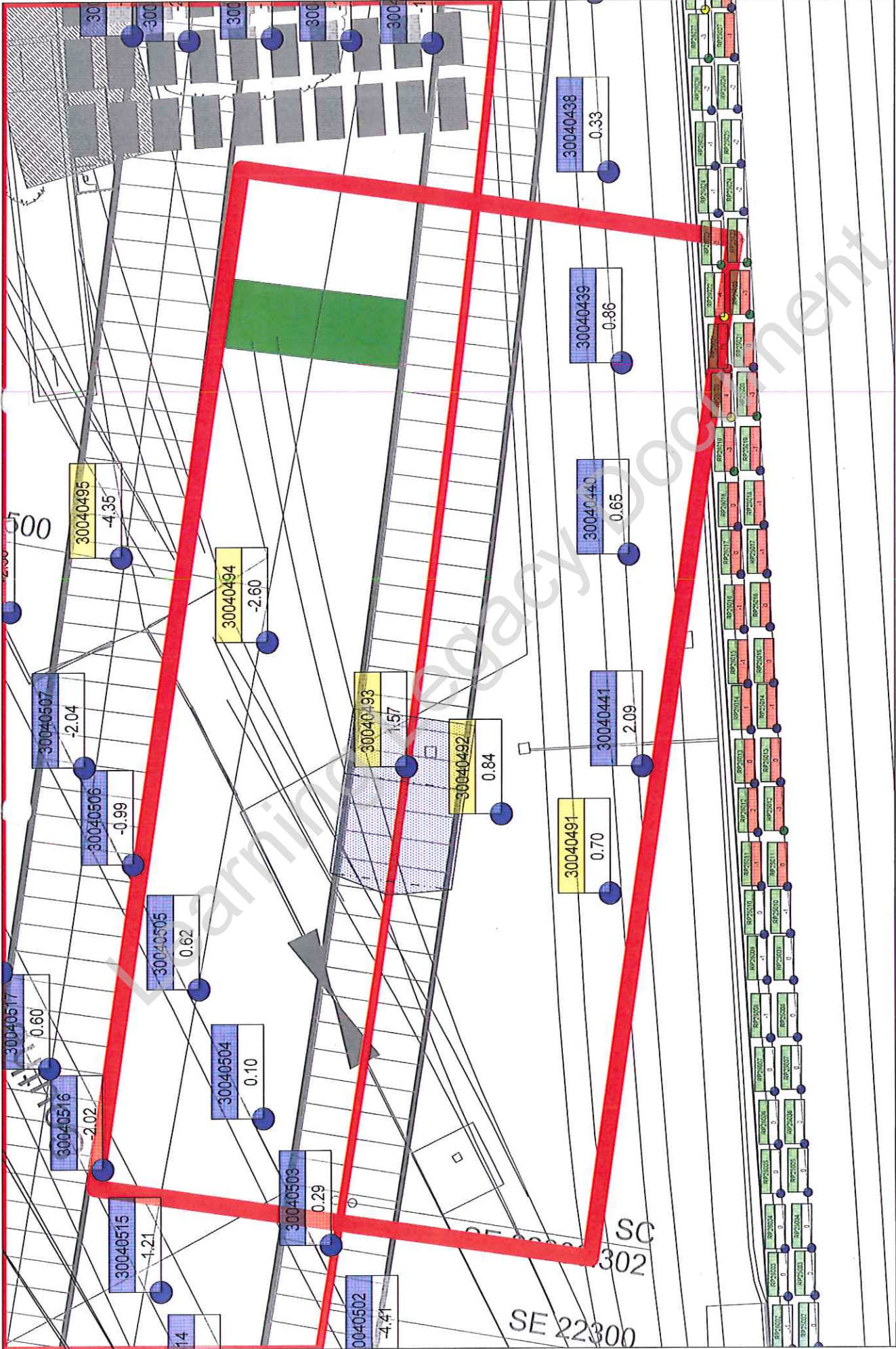
Several point where destroyed, reinstated and re-baselined during the time of monitoring. Overall, none of the points reached any trigger values. Over a period of approx. 6 month after TBM tunneling (TBM2) further settlement of approx. 2-3mm was observed. All points (including shallow datums) were destroyed due to Road reinstatement done by Others, shortly after last readings taken Feb 2014. Shallow datums demonstrate rate of change within specifications. Therefore C310 (HMJV & CRL) agreed to not reinstate and not continue monitoring.

date / signature: 27/03/2015

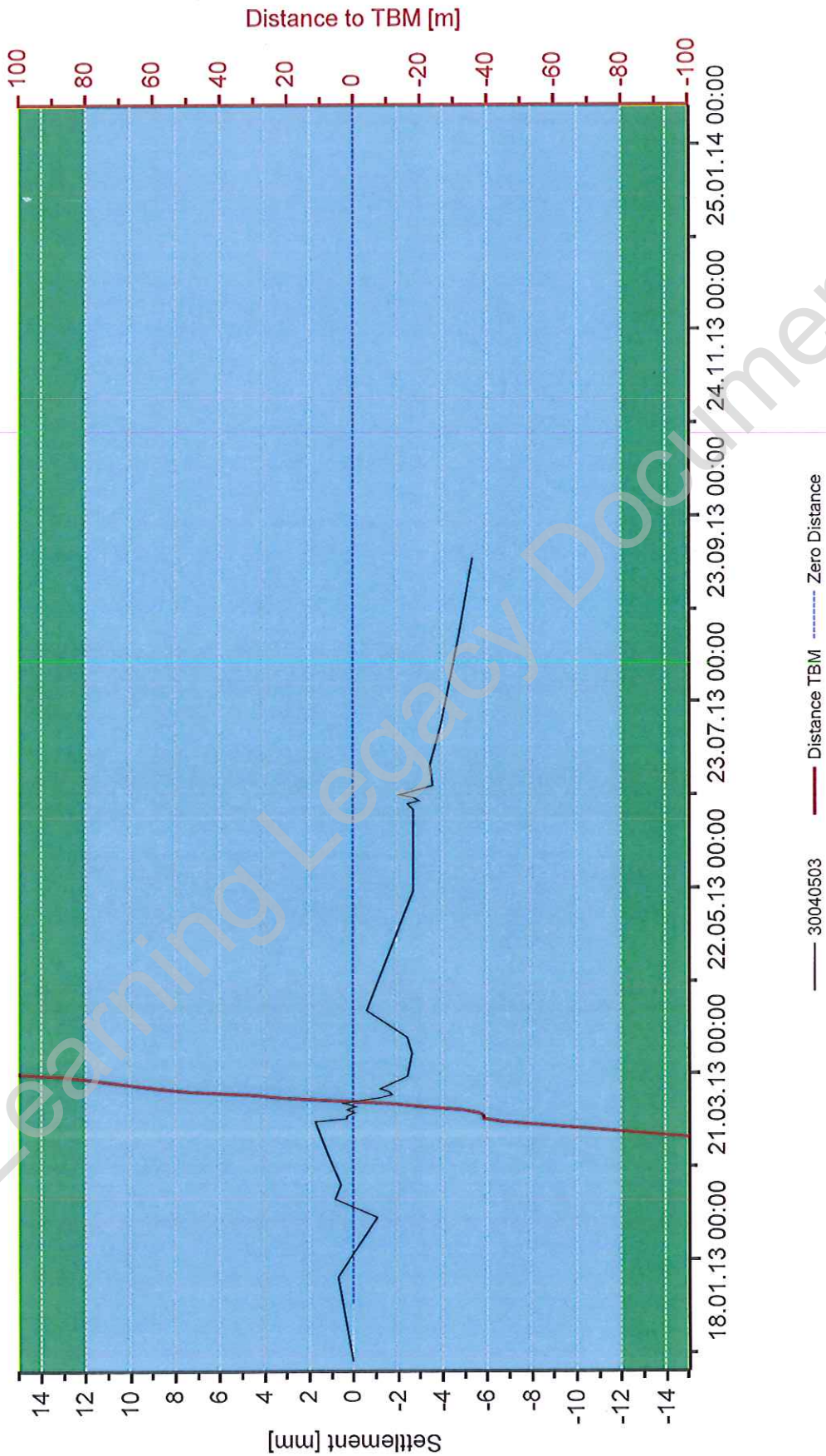
print name:

HMJV project role:

Monitoring & Survey engineer

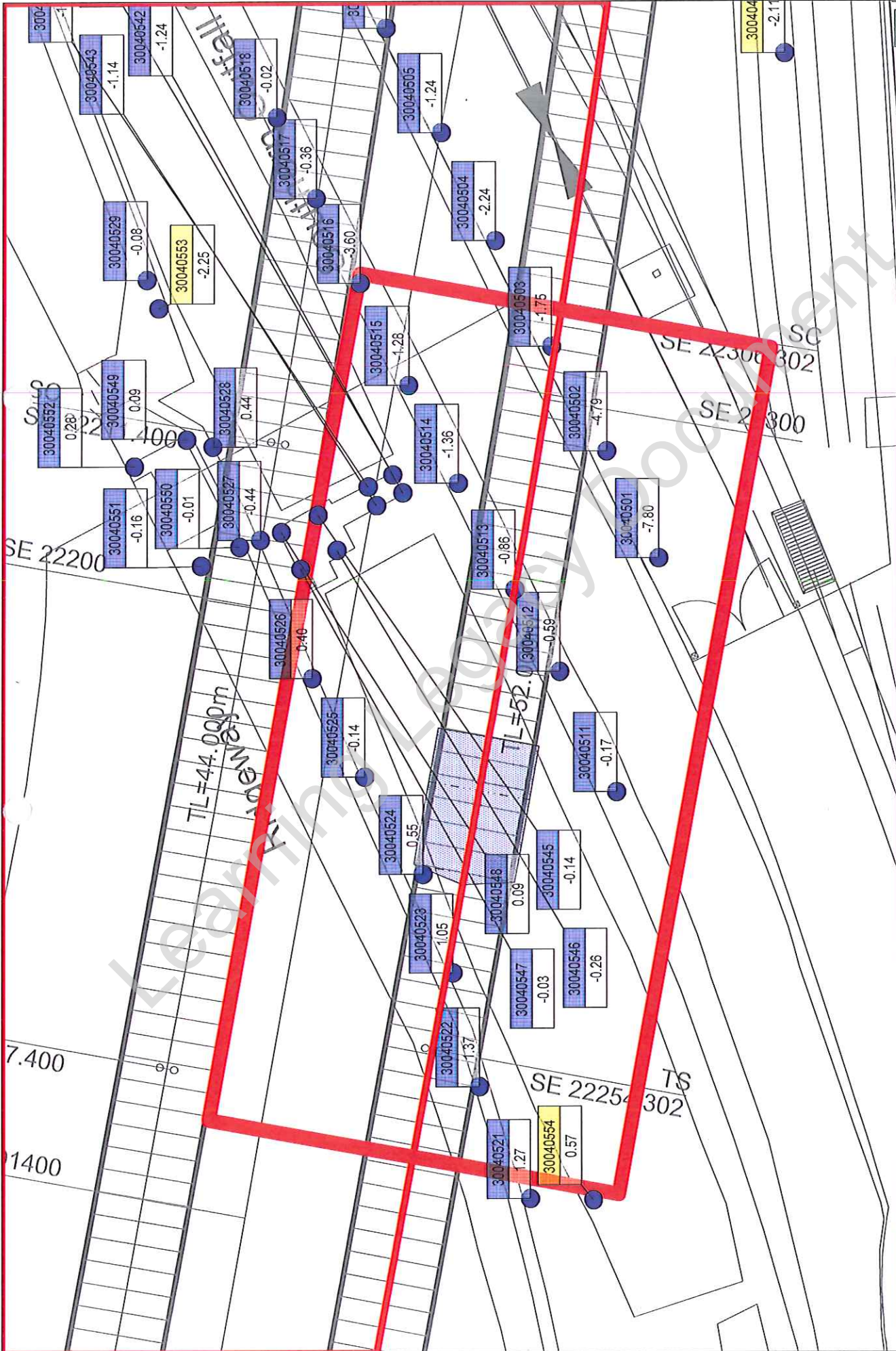


Point: 30040503

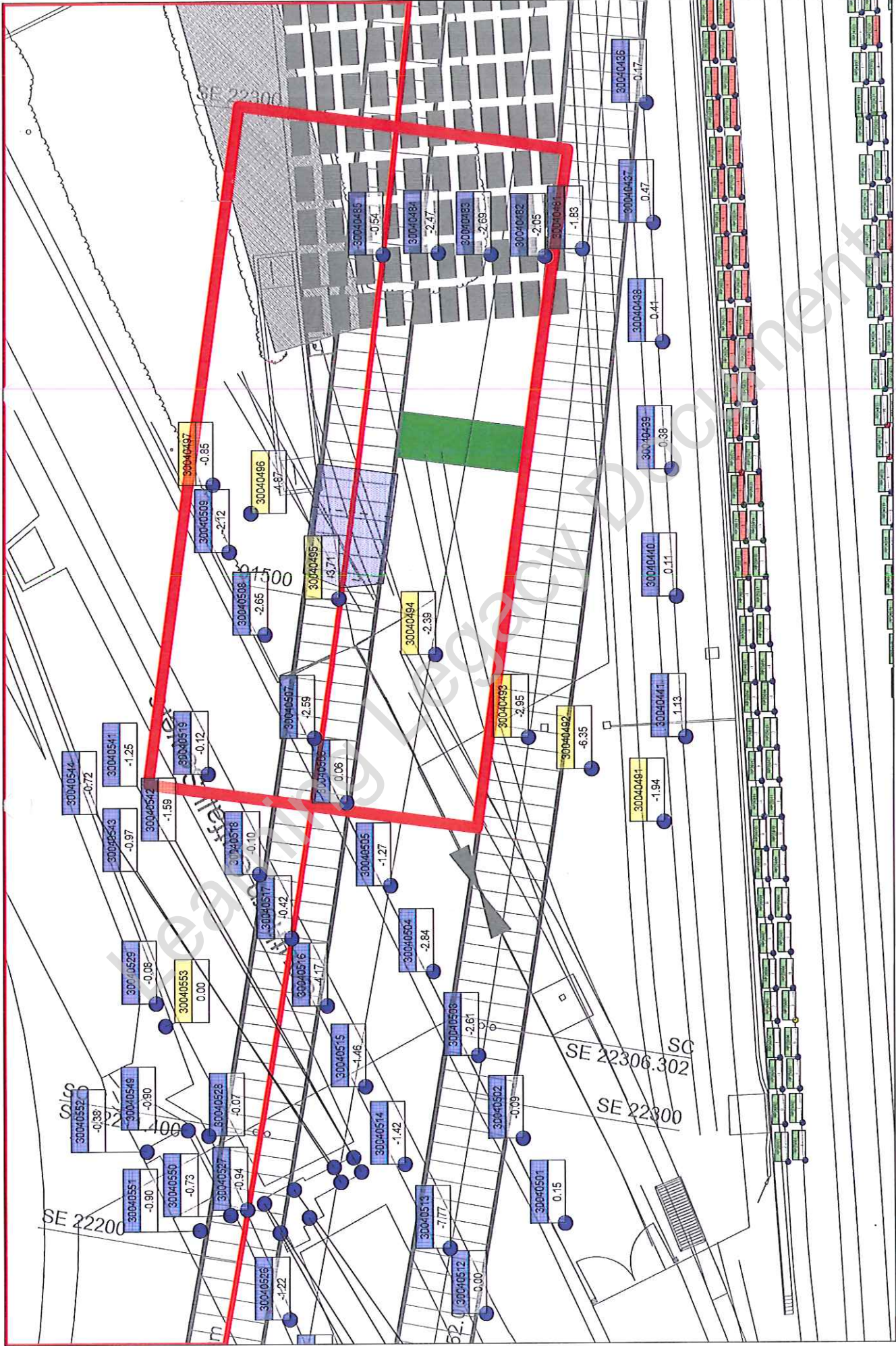


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Southern Outfall Sewer 1 12.12.2012 - 07.02.2014
date: 21.07.2014 13:18 current values: 21.07.2014 13:09



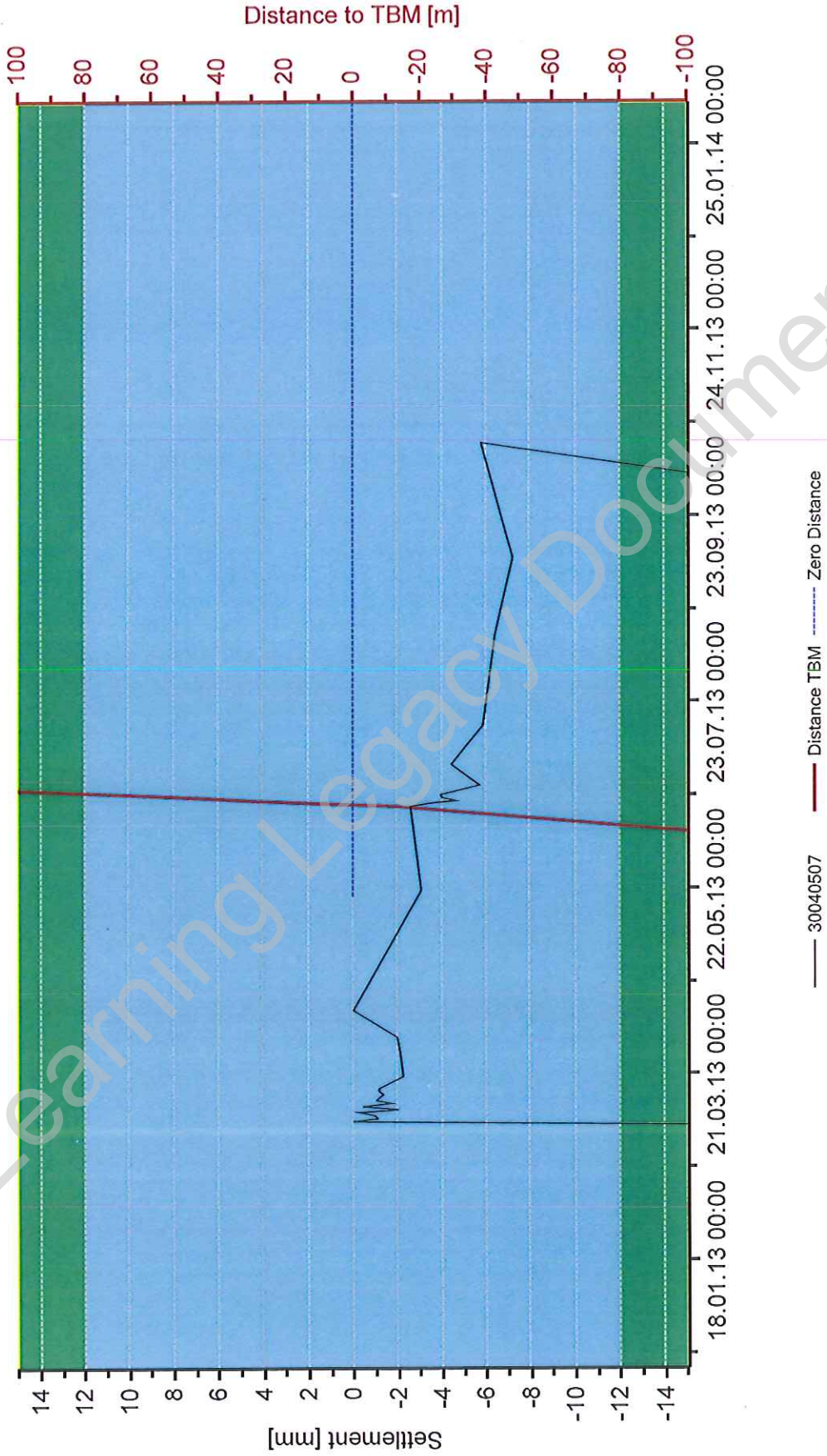


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive, portal excavation, construction base slab, lining walls and grouting
 current values: 14.03.2013 18:46



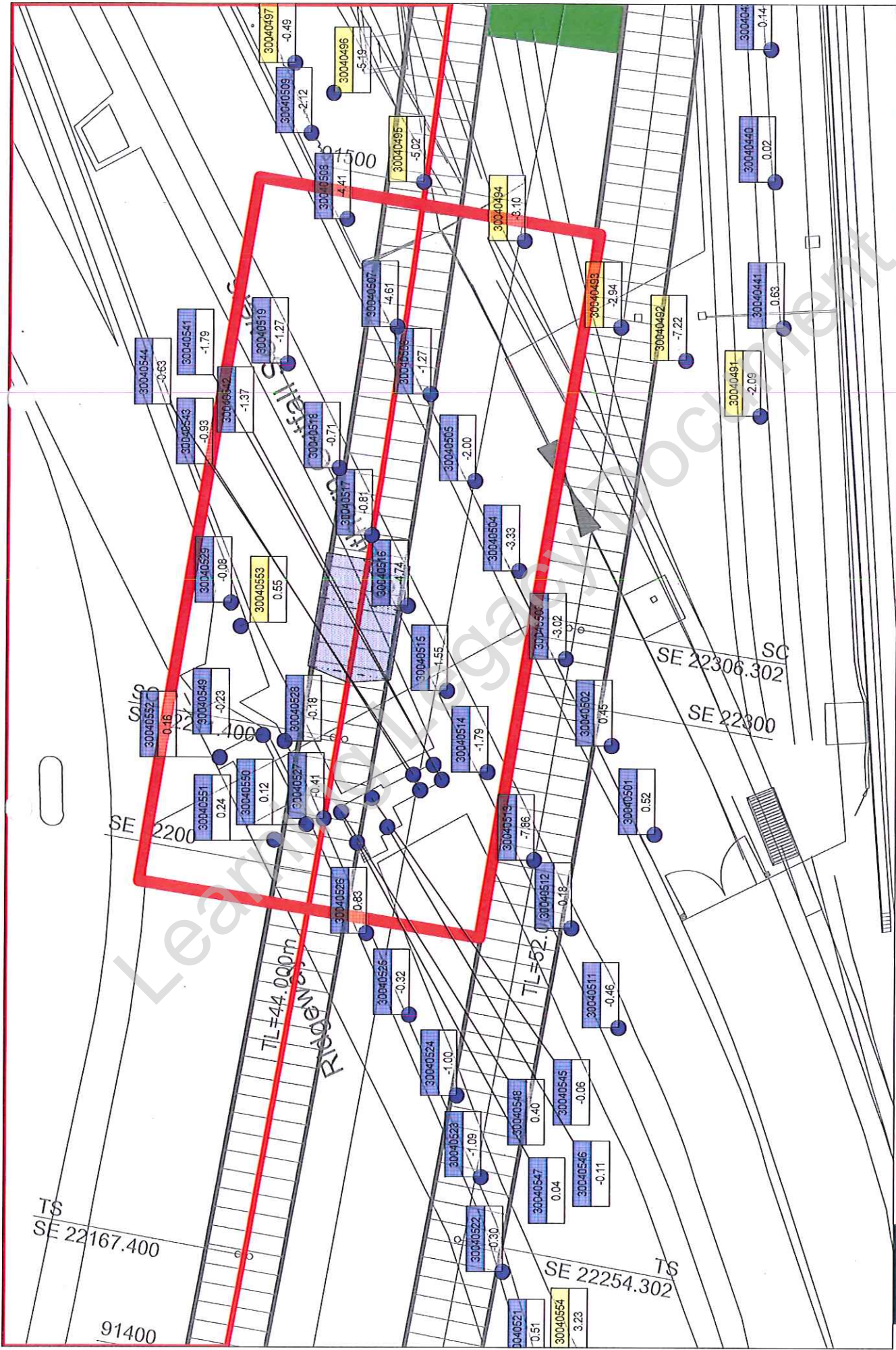
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 18.06.2013 09:00

Point: 30040507



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Southern Outfall Sewer 1 12.12.2012 - 07.02.2014
date: 29.07.2014 08:51 current values: 29.07.2014 08:28





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



monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: TW SOS 1 - 3

No. of reading	1. following		2. following		3. following		4. following		5. following		6. following	
	baseline	12/01/2013	19/01/2013	01/02/2013	06/02/2013	07/02/2013	12/02/2013					
date	15/12/2012 12/01/2013											
Point No.	elevation	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline					
3004 0501	103.275	103.274	0	103.269	2	103.269	0	103.267	-2	0		
3004 0502	103.238	103.238	0	103.233	2	103.233	0	103.234	-1	2		
3004 0503	103.150	103.150	1	103.149	-2	103.150	2	103.150	0	1		
3004 0504	103.118	103.119	1	103.117	-1	103.119	1	103.119	0	1		
3004 0505	103.100	103.101	1	103.099	-2	103.101	2	103.101	0	1		
3004 0506	102.996	102.997	0	102.995	-1	102.997	1	102.997	0	0		
3004 0507	102.964	102.965	0	102.963	-2	102.965	2	102.965	0	0		
3004 0508	102.972	102.972	0	102.971	-2	102.972	2	102.972	0	0		
3004 0509	102.972	102.972	0	102.970	-2	102.972	2	102.972	0	0		
3004 0511	107.025			107.025	0	107.030	5	107.030	0	5		
3004 0512	107.000			107.000	0	107.005	5	107.005	0	5		
3004 0513	106.967			106.967	0	106.966	0	106.971	0	5		
3004 0514	107.007			107.007	0	107.012	6	107.012	0	5		
3004 0515	107.038			107.038	0	107.037	-1	107.042	0	4		
3004 0516	106.944			106.944	0	106.944	0	106.949	0	5		
3004 0517	106.926			106.926	0	106.926	0	106.931	0	5		
3004 0518	106.957			106.956	0	106.957	0	106.961	0	5		
3004 0519	106.947			106.947	0	106.937	-1	106.942	0	5		
3004 0521	101.892			101.892	0	101.891	-1	101.892	0	1		
3004 0522	101.809			101.809	0	101.808	-1	101.809	0	1		
3004 0523	101.822			101.822	0	101.821	-1	101.822	0	0		
3004 0524	101.761			101.761	0	101.761	-1	101.761	0	0		
3004 0525	101.796			101.787	0	101.795	-1	101.797	0	1		
3004 0526	101.869			101.870	1	101.869	-2	101.870	1	1		
3004 0527	101.821			101.822	1	101.821	-1	101.822	1	0		
3004 0528	101.840			101.840	0	101.824	-1	101.825	1	1		
3004 0529	101.979			101.979	0	destroyed						
3004 0541	106.956			106.956	0	106.955	-1	106.961	0	5		
3004 0542	106.943			106.943	0	106.943	-1	106.948	0	5		
3004 0543	106.932			106.932	0	106.931	-1	106.937	0	5		
3004 0544	106.937			106.937	0	106.937	-1	106.942	0	5		
3004 0545	102.996			102.997	0	102.996	-1	102.997	1	0		
3004 0546	103.000			103.000	0	102.999	-1	103.001	1	1		
3004 0547	103.008			103.009	0	103.008	-1	103.009	1	0		
3004 0548	102.976			102.977	1	102.976	-1	102.977	1	0		
3004 0549	101.795			101.795	0	101.794	-1	101.795	1	0		
3004 0550	101.819			101.820	1	101.819	-1	101.819	1	0		
3004 0551	101.818			101.818	0	101.817	0	101.818	0	0		
3004 0552	101.794			101.794	0	101.793	0	101.794	1	0		

monitoring table



Joint Venture

project: C310 Thames Tunnel

No. of reading	baseline		7. following		8. following		9. following		10. following		11. following		12. 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	
3004 0501	15/12/2012	103.275	1	103.268	1	2	103.267	-2	0	103.267	0	0	103.267	0
3004 0502	12/01/2013	103.238	0	103.234	0	3	103.234	-2	1	103.234	0	1	103.234	0
3004 0503		103.150	1	103.151	1	2	103.150	-1	0	103.150	0	0	103.150	0
3004 0504		103.118	1	103.119	0	1	103.118	-2	0	103.118	0	0	103.118	0
3004 0505		103.100	1	103.101	1	103.102	0	1	103.100	-2	0	103.101	0	
3004 0506		102.996	-8	102.988	-8	102.982	new Baseline	-1	-1	102.981	0	-1	102.981	0
3004 0507		102.964		102.964		103.249	new Baseline	-1	-1	103.248	0	-1	103.249	0
3004 0508		102.972	-1	102.971	-1	103.230	new Baseline	-2	-2	103.229	0	-1	103.229	0
3004 0509		102.972	-2	102.970	-2		deleted							
3004 0511		107.025	-1	107.025	-1			107.026	1	1				
3004 0512		107.000	-1	107.001	-1			107.002	1	1				
3004 0513		106.967	-1	106.967	-1			106.968	1	1				
3004 0514		107.007	-1	107.007	-1			107.009	2	1				
3004 0515		107.038	-2	107.038	-2			107.039	2	1				
3004 0516		106.944	-4	106.941	-4			106.942	1	-2				
3004 0517		106.926	-1	106.926	-1			106.927	0	1				
3004 0518		106.957	-1	106.957	-1			106.957	0	1				
3004 0519		106.947	-1	106.947	-1			106.938	0	0				
3004 0521		101.892	0	101.891	0			101.893	2	1				
3004 0522		101.809	0	101.808	0			101.810	2	1				
3004 0523		101.822	0	101.822	0			101.823	2	1				
3004 0524		101.761	0	101.761	0			101.762	1	1				
3004 0525		101.796	1	101.796	1			101.797	1	0				
3004 0526		101.869	0	101.870	0			101.870	1	1				
3004 0527		101.821	0	101.822	1			101.822	1	1				
3004 0528		101.840	1	101.824	1			101.825	1	1				
3004 0529		101.979												
3004 0541		106.956	-1	106.956	-1			106.957	2	1				
3004 0542		106.943	-1	106.943	-1			106.945	2	1				
3004 0543		106.932	-2	106.932	-2			106.933	2	1				
3004 0544		106.937	-1	106.937	-1			106.939	2	1				
3004 0545		102.996	0	102.996	0			102.997	1	1				
3004 0546		103.000	1	103.000	1			103.000	0	0				
3004 0547		103.008	1	103.008	1			103.009	0	1				
3004 0548		102.976	1	102.976	1			102.978	1	1				
3004 0549		101.795	1	101.794	1			101.795	1	1				
3004 0550		101.819	1	101.819	1			101.820	1	1				
3004 0551		101.818	1	101.818	1			101.818	1	1				
3004 0552		101.794	1	101.794	1			101.794	1	1				

monitoring table



Joint Venture

project: C310 Thames Tunnel
structure: TW SOS 1 - 3

No. of reading	13. following		14. following		15. following		16. following		17. following		18. following	
	baseline	19/03/2013	11/03/2013	12/03/2013	13/03/2013	14/03/2013	15/03/2013	16/03/2013	17/03/2013	18/03/2013	19/03/2013	20/03/2013
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 0501	103.275	0	103.267	0	103.268	0	103.267	0	103.267	0	103.267	0
3004 0502	103.238	0	103.234	0	103.234	0	103.234	0	103.234	0	103.233	0
3004 0503	103.150	0	103.149	0	103.149	-1	103.148	-1	103.148	0	103.148	0
3004 0504	103.118	0	103.118	0	103.117	-1	103.116	0	103.116	0	103.116	0
3004 0505	103.100	0	103.100	0	103.099	-1	103.099	0	103.099	0	103.099	0
3004 0506	102.996	1	102.982	-2	102.980	-2	102.980	0	102.980	0	102.980	0
3004 0507	102.964	2	103.249	-2	103.248	1	103.248	0	103.248	0	103.248	0
3004 0508	102.972	2	103.230	-2	103.228	-1	103.229	0	103.229	0	103.229	0
3004 0509	102.972											
3004 0511	107.025		107.026	0	107.026	0	107.025	0	107.025	0	107.023	-2
3004 0512	107.000		107.001	0	107.001	0	107.001	-1	107.000	-1	106.998	-2
3004 0513	106.967		106.968	0	106.967	0	106.967	-1	106.966	-1	106.964	-3
3004 0514	107.007		107.008	0	107.007	-1	107.007	-1	107.006	-1	107.004	-3
3004 0515	107.038		107.039	0	107.039	-1	107.037	-1	107.037	-1	107.035	-3
3004 0516	106.944		106.942	0	106.942	0	106.940	-1	106.940	0	106.940	-1
3004 0517	106.926		106.926	0	106.927	0	106.926	0	106.926	0	106.925	-1
3004 0518	106.957		106.957	0	106.957	0	106.957	-1	106.957	0	106.956	-1
3004 0519	106.947		106.947	0	106.938	-1	106.937	-1	106.937	0	106.936	-1
3004 0521	101.892		101.893	0	101.893	0	101.892	0	101.893	1	101.892	-1
3004 0522	101.809		101.809	-1	101.810	0	101.810	0	101.810	1	101.809	-1
3004 0523	101.822		101.823	0	101.823	0	101.822	0	101.823	1	101.822	-1
3004 0524	101.761		101.762	-1	101.762	0	101.761	0	101.762	0	101.760	-1
3004 0525	101.796		101.797	0	101.797	0	101.796	-1	101.796	0	101.796	-1
3004 0526	101.869		101.870	0	101.871	0	101.869	-2	101.870	1	101.869	-1
3004 0527	101.821		101.822	0	101.822	0	101.821	-1	101.821	0	101.821	0
3004 0528	101.840		101.825	0	101.825	0	101.824	-1	101.825	1	101.824	0
3004 0529	101.979											
3004 0541	106.956		106.957	0	106.956	-1	106.955	-1	106.955	0	106.953	-3
3004 0542	106.943		106.944	0	106.943	-1	106.943	-1	106.942	-1	106.940	-3
3004 0543	106.932		106.932	0	106.932	-1	106.932	-1	106.931	-1	106.929	-3
3004 0544	106.937		106.938	0	106.937	-1	106.937	0	106.936	-1	106.935	-2
3004 0545	102.996		102.997	-1	102.997	0	102.996	-1	102.996	0	102.996	0
3004 0546	103.000		103.000	0	103.001	0	102.999	-1	102.999	0	102.999	0
3004 0547	103.008		103.009	0	103.009	0	103.008	-1	103.008	0	103.008	0
3004 0548	102.976		102.977	0	102.977	0	102.976	-1	102.976	0	102.976	0
3004 0549	101.795		101.795	-1	101.795	0	101.794	-1	101.795	1	101.794	-1
3004 0550	101.819		101.819	-1	101.819	0	101.819	-1	101.819	0	101.819	0
3004 0551	101.818		101.818	-1	101.818	0	101.817	-1	101.817	0	101.817	0
3004 0552	101.794		101.794	-1	101.794	1	101.793	-1	101.794	1	101.794	0

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: TW SOS 1 - 3

No. of reading	19. following		20. following		21. following		22. following		23. following		24. 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	
date	15/12/2013	16/03/2013	17/03/2013	18/03/2013	19/03/2013	20/03/2013	21/03/2013	22/03/2013	23/03/2013	24/03/2013			
3004 0501	103.275	103.287	0	-7					103.269	2	-6		
3004 0502	103.238	103.234	1	-4					103.232	-1	-6		
3004 0503	103.150	103.148	0	-1					103.147	-1	-2		
3004 0504	103.118	103.116	0	-2					103.115	-1	-3		
3004 0505	103.100	103.099	0	-1					103.098	-1	-2		
3004 0506	102.996	102.980	0	-2					102.979	-1	-3		
3004 0507	102.964	103.248	0	-1					103.247	-1	-2		
3004 0508	102.972	103.229	0	-1					103.227	-2	-3		
3004 0509	102.972												
3004 0511	107.025	107.024	1	-1	107.025	0	0	107.025	0	0			
3004 0512	107.000	106.999	1	-1	106.999	0	-1	107.000	1	-1			
3004 0513	106.967	106.965	1	-2	106.965	0	-2	106.965	0	-1			
3004 0514	107.007	107.005	1	-2	107.006	0	-2	107.006	0	-1			
3004 0515	107.038	107.036	1	-2	107.036	0	-2	107.037	1	-1			
3004 0516	106.944	106.940	0	-4	106.940	0	-4	106.940	1	-4			
3004 0517	106.926	106.925	0	-1	106.925	0	-1	106.926	1	0			
3004 0518	106.957	106.956	0	-1	106.956	1	0	106.957	1	0			
3004 0519	106.947	106.936	0	-1	106.937	0	-1	106.937	1	0			
3004 0521	101.892	101.892	0	1	101.892	0	0	101.892	0	0	101.892	0	0
3004 0522	101.809	101.808	-1	-1	101.809	1	0	101.809	0	0	101.808	0	0
3004 0523	101.822	101.822	0	0	101.822	0	0	101.822	0	0	101.821	0	-1
3004 0524	101.761	101.760	-1	-1	101.761	1	0	101.760	0	-1	101.760	0	-1
3004 0525	101.796	101.795	0	-1	101.796	1	0	101.795	-1	-1	101.795	0	-1
3004 0526	101.869	101.869	0	0	101.870	1	1	101.868	-1	-1	101.869	1	0
3004 0527	101.821	101.821	0	0	101.821	0	0	101.820	-1	-1	101.821	0	0
3004 0528	101.840	101.824	0	0	101.825	1	1	101.824	-1	0	101.824	0	0
3004 0529	101.979												
3004 0541	106.956	106.954	1	-2	106.955	0	-2	106.955	1	-1			
3004 0542	106.943	106.942	1	-2	106.942	0	-2	106.942	0	-1			
3004 0543	106.932	106.931	1	-1	106.931	0	-1	106.931	0	-1			
3004 0544	106.937	106.936	1	-1	106.936	0	-1	106.936	0	-1			
3004 0545	102.996	102.995	0	-1	102.996	0	0	102.995	-1	-1	102.995	0	-1
3004 0546	103.000	102.999	0	-1	102.999	0	0	102.999	-1	-1	102.999	0	-1
3004 0547	103.008	103.008	0	0	103.007	0	-1	103.007	0	-1	103.008	0	0
3004 0548	102.976	102.976	0	0	102.976	1	0	102.976	-1	-1	102.976	0	0
3004 0549	101.795	101.794	0	-1	101.794	0	0	101.794	0	0	101.794	0	0
3004 0550	101.819	101.818	0	-1	101.819	1	0	101.818	0	-1	101.818	0	-1
3004 0551	101.818	101.817	-1	-1	101.818	1	0	101.817	-1	-1	101.817	0	0
3004 0552	101.794	101.793	-1	-1	101.793	0	0	101.794	0	0	101.794	0	0

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: TW SOS 1 - 3

No. of reading	25. following		26. following		27. following		28. following		29. following		30. 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	15/12/2012 12/01/2013	22/03/2013	27/03/2013	02/04/2013	11/04/2013	21/05/2013	15/06/2013					
Point No.	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation
3004 0501	103.275		103.266	-3	-8	103.258	2	-7	103.258	-2	-8	
3004 0502	103.238		103.233	0	-5	103.233	2	-4	103.232	-2	-6	
3004 0503	103.150		103.147	0	-3	103.147	2	-1	103.147	-2	-3	
3004 0504	103.118		103.115	0	-3	103.115	1	-2	103.115	-2	-3	
3004 0505	103.100		103.097	-1	-3	103.098	1	-2	103.099	-2	-2	
3004 0506	102.996		102.979	0	-3	102.980	0	-3	102.981	1	-2	new Baseline
3004 0507	102.964		103.247	0	-2	103.247	2	0	103.249	2	0	103.246
3004 0508	102.972		103.228	1	-2	103.228	0	-3	103.229	1	-1	103.227
3004 0509	102.972		107.024	0	-1	107.025	1	0	107.025	0	0	107.024
3004 0511	107.025		106.963	-2	-4	106.963	0	-4	106.959	-4	-8	106.972
3004 0512	107.000		107.006	0	-1	107.007	1	-1	107.006	-1	-1	new Baseline
3004 0513	106.967		107.037	0	-1	107.038	1	0	107.037	-1	-1	107.036
3004 0514	107.007		106.940	-1	-4	106.941	1	-3	106.940	0	-4	106.940
3004 0515	107.038		106.925	-1	-1	106.927	1	1	106.925	-1	-1	106.926
3004 0516	106.944		106.956	-1	0	106.958	2	1	106.957	-1	0	106.956
3004 0517	106.926		106.937	0	-1	106.938	1	0	106.937	-1	0	0
3004 0518	106.957		101.892	0	0	101.891	0	0	101.892	1	1	101.891
3004 0519	106.947		101.809	0	0	101.808	0	-1	101.809	1	0	101.808
3004 0521	101.892		101.822	0	-1	101.821	-1	-1	101.822	1	0	101.820
3004 0522	101.809		101.760	-1	-1	101.760	0	-1	101.761	1	-1	101.759
3004 0523	101.822		101.796	0	-1	101.795	-1	-1	101.795	0	-1	101.796
3004 0524	101.761		101.870	0	1	101.869	-1	0	101.868	-1	-1	101.795
3004 0525	101.796		101.821	0	0	101.821	0	-1	101.821	0	-1	101.821
3004 0526	101.869		101.825	1	0	101.824	-1	0	101.824	0	0	101.824
3004 0527	101.821		106.955	0	-1	106.955	1	-1	106.955	-1	-1	0
3004 0528	101.840		106.942	0	-1	106.942	0	-1	106.942	-1	-1	0
3004 0529	101.979		106.932	0	-1	106.932	1	0	106.931	-1	-1	0
3004 0541	106.956		106.936	0	-1	106.937	1	0	106.936	0	-1	0
3004 0541	106.956		102.996	0	0	102.996	1	0	102.995	-1	0	102.995
3004 0542	106.943		103.000	1	0	102.999	-1	-1	102.999	0	-1	102.999
3004 0543	106.932		103.009	0	0	103.007	-1	-1	103.008	0	0	103.008
3004 0544	106.937		103.008	0	0	102.977	1	1	102.976	0	0	103.000
3004 0545	102.996		101.795	0	0	101.794	-1	-1	101.794	0	0	102.976
3004 0546	103.000		101.819	0	0	101.819	0	0	101.819	0	0	101.794
3004 0547	103.008		101.818	0	0	101.817	-1	-1	101.817	0	0	101.819
3004 0548	102.976		101.794	0	0	101.794	-1	-1	101.794	0	0	101.817
3004 0549	101.795		101.794	0	0	101.794	-1	-1	101.794	0	0	101.793
3004 0550	101.819		101.819	0	0	101.819	0	0	101.819	0	0	0
3004 0551	101.818		101.818	0	0	101.817	-1	-1	101.817	0	0	0
3004 0552	101.794		101.794	0	0	101.794	-1	-1	101.793	0	0	0

monitoring table



Joint Venture

Project: C310 Thames Tunnel

structure: TW SOS 1 - 3

No. of reading	31. following		32. following		33. following		34. following		35. following		36. following		
	baseline	17/06/2013	18/06/2013	19/06/2013	20/06/2013	21/06/2013	22/06/2013	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
date	15/12/2012 15/01/2013												
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 0501	103.275		103.267	1 -8	103.267	0 -7	103.267	0 -7	103.267	0 -8	103.267	1 -7	
3004 0502	103.238		103.233	0 -5	103.233	1 -5	103.233	0 -5	103.233	-1 -6	103.233	1 -5	
3004 0503	103.150	0 -3	103.147	0 -3	103.147	0 -2	103.147	-1 -3	103.147	0 -3	103.148	1 -2	
3004 0504	103.118	0 -3	103.115	1 -3	103.116	0 -3	103.115	-1 -3	103.115	0 -3	103.115	1 -3	
3004 0505	103.100	0 -2	103.098	0 -1	103.099	0 -1	103.098	-1 -2	103.098	0 -2	103.099	0 -2	
3004 0506	102.996	0 0	103.150	0 0	103.150	0 0	103.149	-1 -1	103.150	-1 -1	103.150	0 -1	
3004 0507	102.964		103.247	0 -3	103.246	-1 -3	103.245	-1 -5	103.245	-1 -4	103.245	0 -4	
3004 0508	102.972		103.228	1 -3	103.227	-1 -4	103.226	-1 -4			103.226	0 -4	
3004 0509	102.972												
3004 0511	107.025				107.024	0 -1	107.025	0 0	107.024	0 -1	107.025	1 0	
3004 0512	107.000				106.972	0 0	106.972	0 0	106.972	0 0	106.972	1 1	
3004 0513	106.967		106.959	1 -8	106.959	0 -8	106.959	0 -8	106.958	-1 -9	106.959	1 -8	
3004 0514	107.007		107.006	0 -1	107.005	-1 -2	107.005	0 -2	107.004	-1 -3	107.005	1 -2	
3004 0515	107.038		107.037	0 -1	107.036	0 -2	107.036	0 -2	107.035	-1 -3	107.036	1 -2	
3004 0516	106.944		106.940	0 -4	106.940	0 -4	106.939	-1 -5	106.938	-1 -6	106.939	0 -5	
3004 0517	106.926		106.926	0 0	106.925	0 -1	106.925	0 -1	106.924	-1 -2	106.924	0 -2	
3004 0518	106.957		106.956	0 0	106.957	0 -1	106.956	-1 -1	106.956	0 -1	106.956	0 -1	
3004 0519	106.947				106.936	-1 -1	106.936	0 -1	106.936	-1 -2	106.935	0 -2	
3004 0521	101.892		101.890	-1 -1	101.891	1 0	101.892	1 1	101.892	0 0	101.891	-1 -1	
3004 0522	101.809		101.808	0 -1	101.807	-1 -2	101.808	1 0	101.808	0 -1	101.808	0 0	
3004 0523	101.822		101.820	0 -2	101.821	0 -2	101.821	1 -1	101.821	0 -1	101.821	0 -1	
3004 0524	101.761		101.759	0 -2	101.759	0 -2	101.760	1 -1	101.760	0 -1	101.760	0 -1	
3004 0525	101.796		101.795	0 -1	101.795	-1 -2	101.796	1 0	101.796	0 0	101.795	-1 -1	
3004 0526	101.869		101.868	0 -1	101.869	1 0	101.870	1 1	101.870	0 1	101.869	-1 0	
3004 0527	101.821		101.821	0 -1	101.820	0 -1	101.821	1 0	101.822	1 0	101.820	-2 -1	
3004 0528	101.840		101.824	0 0	101.824	-1 -1	101.824	0 0	101.824	0 0	101.823	-1 -1	
3004 0529	101.979												
3004 0541	106.956		106.955	-1 -1	106.954	0 -2	106.954	0 -2	106.954	0 -2	106.955	1 -2	
3004 0542	106.943		106.942	-1 -2	106.941	-1 -2	106.942	1 -1	106.941	-1 -3	106.942	1 -2	
3004 0543	106.992		106.991	-1 -1	106.991	0 -1	106.991	0 -1	106.990	-1 -2	106.991	1 -2	
3004 0544	106.937		106.936	-1 -1	106.937	0 -1	106.936	0 -1	106.936	-1 -1	106.936	1 -1	
3004 0545	102.996		102.995	0 -1	102.995	0 -1	102.996	1 0	102.996	0 0	102.995	-1 -1	
3004 0546	103.000		102.999	0 -1	102.999	0 -1	103.000	1 0	103.000	0 0	102.999	-1 -1	
3004 0547	103.008		103.008	0 0	103.008	0 -1	103.008	1 0	103.008	-1 0	103.008	0 0	
3004 0548	102.976		102.976	0 0	102.976	0 -1	102.977	1 0	102.976	0 0	102.976	-1 -1	
3004 0549	101.795		101.794	0 -1	101.793	0 -1	101.794	1 0	101.794	0 0	101.793	-1 -1	
3004 0550	101.819		101.818	0 -1	101.818	0 -1	101.819	1 0	101.819	0 0	101.818	-1 -2	
3004 0551	101.818		101.817	0 -1	101.816	0 -1	101.818	1 0	101.818	0 1	101.817	-2 -1	
3004 0552	101.794		101.793	0 0	101.793	0 -1	101.794	1 0	101.794	0 0	101.793	0 0	

monitoring table




Joint Venture

Project: C310 Thames Tunnel

structure: TW SOS 1 - 3

No. of reading	baseline		37. following		38. following		39. following		40. following		41. following		42. following	
	date	elevation	date	deviation from last/ baseline	elevation	deviation from last/ baseline	date	deviation from last/ baseline	elevation	deviation from last/ baseline	date	deviation from last/ baseline	elevation	deviation from last/ baseline
	15/12/2012		23/02/2013		24/02/2013		25/02/2013		02/07/2013		03/07/2013		15/07/2013	
		elevation		elevation		elevation		elevation		elevation		elevation		elevation
3004 0501		103.275					103.266	-1	103.267	1			103.266	0
3004 0502		103.238					103.232	-1	103.232	1			103.232	0
3004 0503		103.150					103.146	-2	103.146	0			103.146	0
3004 0504		103.118					103.113	-2	103.114	1			103.113	-1
3004 0505		103.100					103.097	-2	103.097	1			103.097	-1
3004 0506		102.996					103.148	-2	103.149	2			103.148	-1
3004 0507		102.964					103.244	-2	103.245	1			103.244	-1
3004 0508		102.972					103.223	-3	103.226	3			103.224	-2
3004 0509		102.972												
3004 0511		107.025		-1			107.024	0					107.024	1
3004 0512		107.000		0			106.972	0					106.971	-1
3004 0513		106.967		0			106.958	0					106.958	-1
3004 0514		107.007		0			107.004	-1					107.004	0
3004 0515		107.038		0			107.036	-1					107.035	0
3004 0516		106.944		-5			106.938	-1					106.938	1
3004 0517		106.926		1			106.924	-1					106.924	1
3004 0518		106.957		0			106.955	0					106.955	-1
3004 0519		106.947		0			106.936	0					106.935	0
3004 0521		101.892		0			101.891	0					101.891	-1
3004 0522		101.809		0			101.808	0					101.808	0
3004 0523		101.822		-1			101.821	0					101.820	-2
3004 0524		101.761		-2			101.759	0					101.759	0
3004 0525		101.796		0			101.795	0					101.795	-1
3004 0526		101.869		0			101.869	0					101.869	0
3004 0527		101.821		1			101.820	0					101.820	0
3004 0528		101.840		0			101.823	0					101.822	-1
3004 0529		101.979												
3004 0541		106.956		0			106.954	-1					106.954	0
3004 0542		106.943		-1			106.941	-1					106.941	0
3004 0543		106.932		0			106.931	0					106.931	1
3004 0544		106.937		-1			106.935	-1					106.935	0
3004 0545		102.996		0			102.995	0					102.995	-1
3004 0546		103.000		-1			102.999	0					102.998	0
3004 0547		103.008		-1			103.007	-1					103.007	0
3004 0548		102.976		0			102.976	0					102.975	0
3004 0549		101.795		0			101.794	0					101.794	0
3004 0550		101.819		0			101.817	0					101.817	-1
3004 0551		101.818		0			101.817	0					101.818	1
3004 0552		101.794		0			101.793	0					101.793	0

		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDIX 20
Southern Outfall Sewer 2

Learning Legacy Document

monitoring asset	Southern Outfall Sewer (SOS) + Pumpstation		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70001		
name of monitoring section:	Southern Outfall Sewer (SOS) 2		
sensor type:	manual levelling studs		
chainage:	9+450	point no.:	3004 0511 - 3004 0519
trigger values: [mm]	green: +12 -12	amber: +15 -15	red: +18 -18
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	12/12/2012	0		
	12/01/2013	0		
TBM 1	start ZOI	12/03/13	0.92	3004 0513
	end ZOI	16/03/13	-1.96	3004 0513
TBM 2	start ZOI	18/06/13	-0.42	3004 0517
	end ZOI	22/06/13	-1.86	3004 0517
longterm	07/02/14	-7.33	3004 0516	last reading post tunneling, Cross section not longer measurable

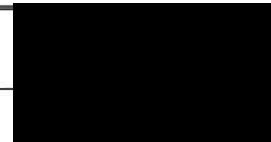
Evaluation of any potential residual risks	<input checked="" type="checkbox"/>	No residual risk since the Works have been completed by HMJV
	<input type="checkbox"/>	Yes, residual risk (see comment below)

summary / comments

Several point where destroyed and re-baselined during the time of monitoring.
 Overall, none of the points reached any trigger value.
 All points (including shallow datums) were destroyed due to Road reinstatement done by Others, shortly after last readings taken Feb 2014.
 Shallow datums demonstrate rate of change within specifications. Therefore C310 (HMJV & CRL) agreed to not reinstate and not continue monitoring.

date / signature: 27/03/2015

print name:

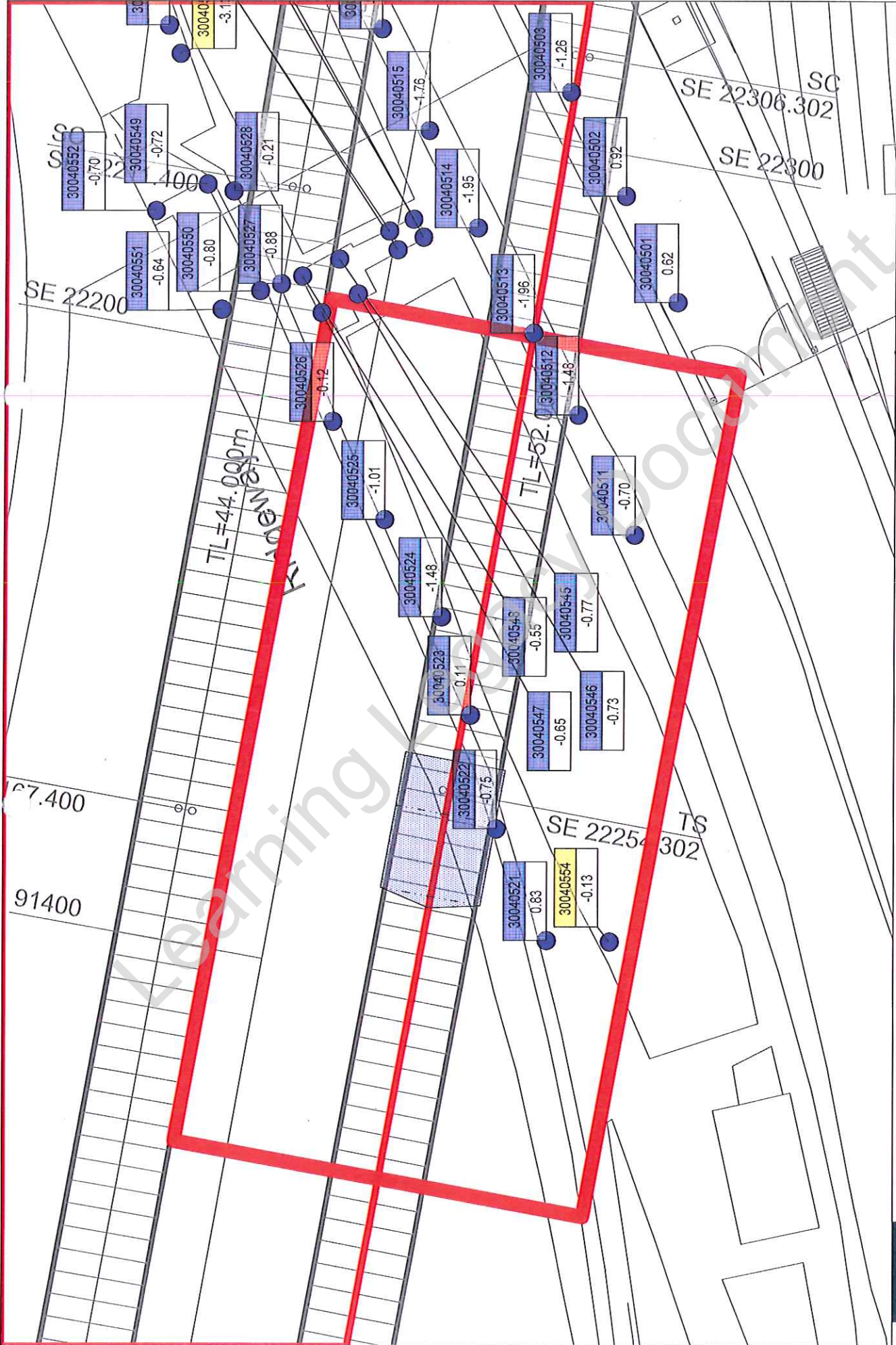


Point: 30040513



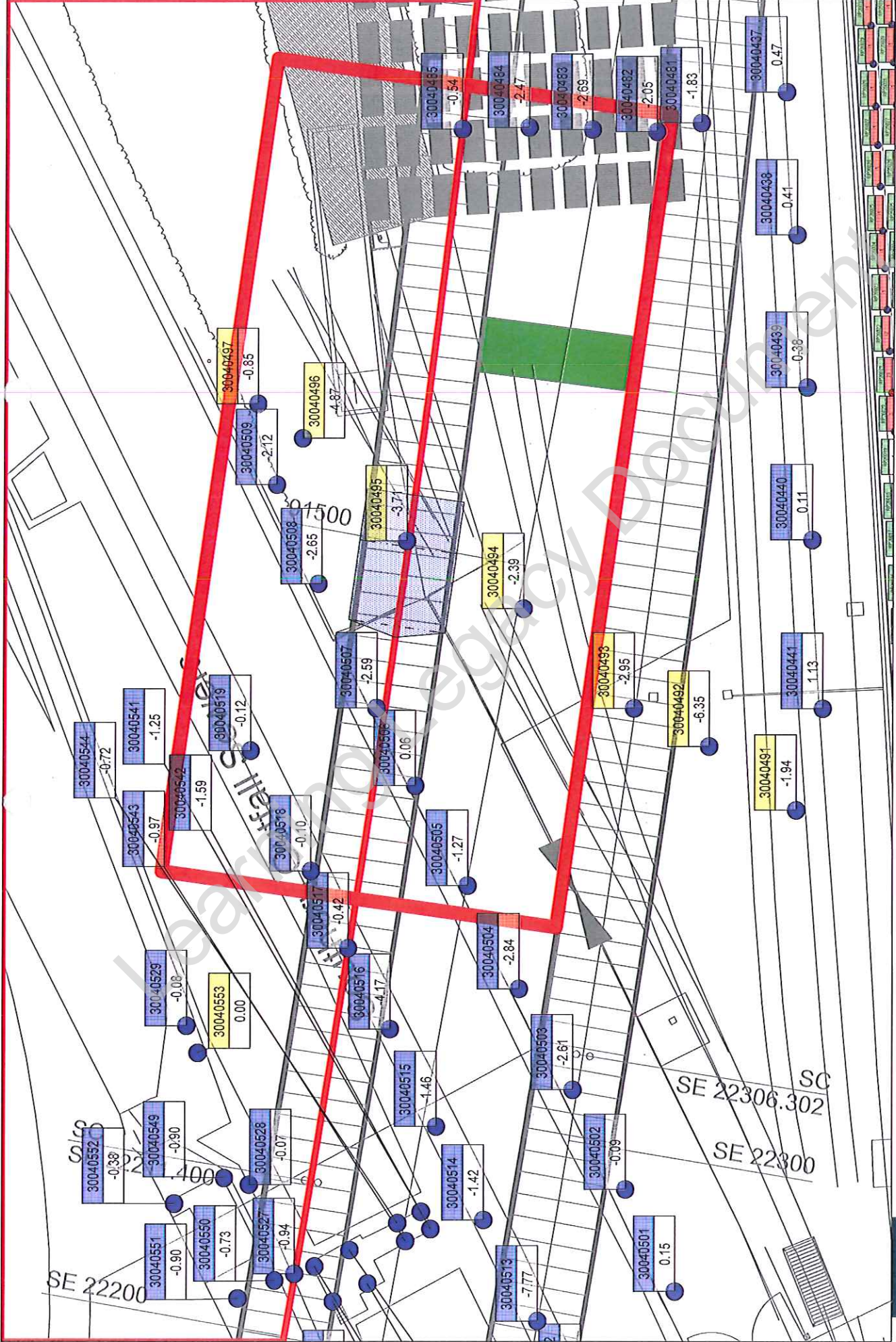
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Southern Outfall Sewer 2 12.12.2012 - 07.02.2014
date: 21.07.2014 16:18 current values: 21.07.2014 16:09



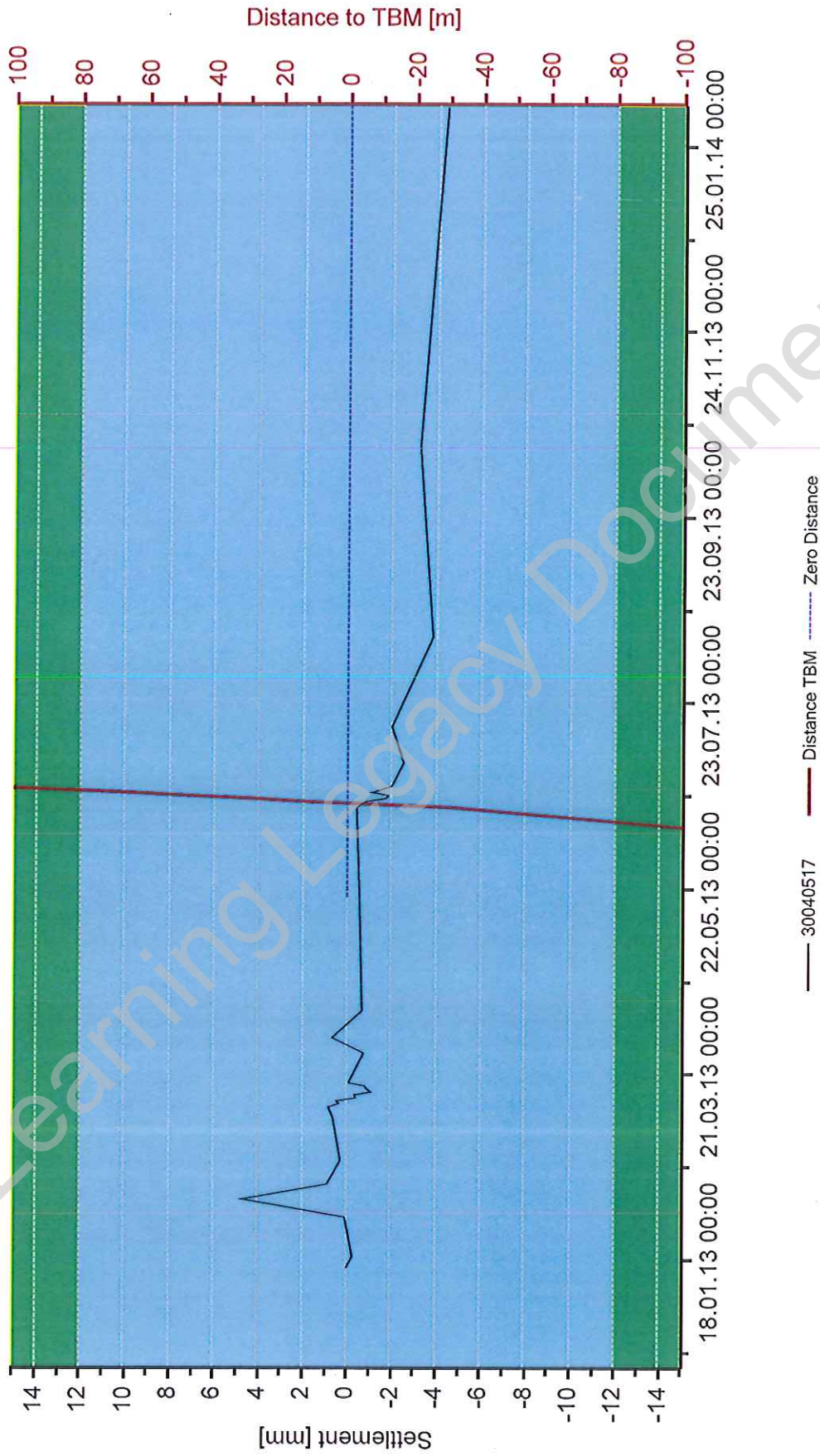


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive, portal excavation, construction base slab, lining walls and grouting
 current values: 16.03.2013 09:00



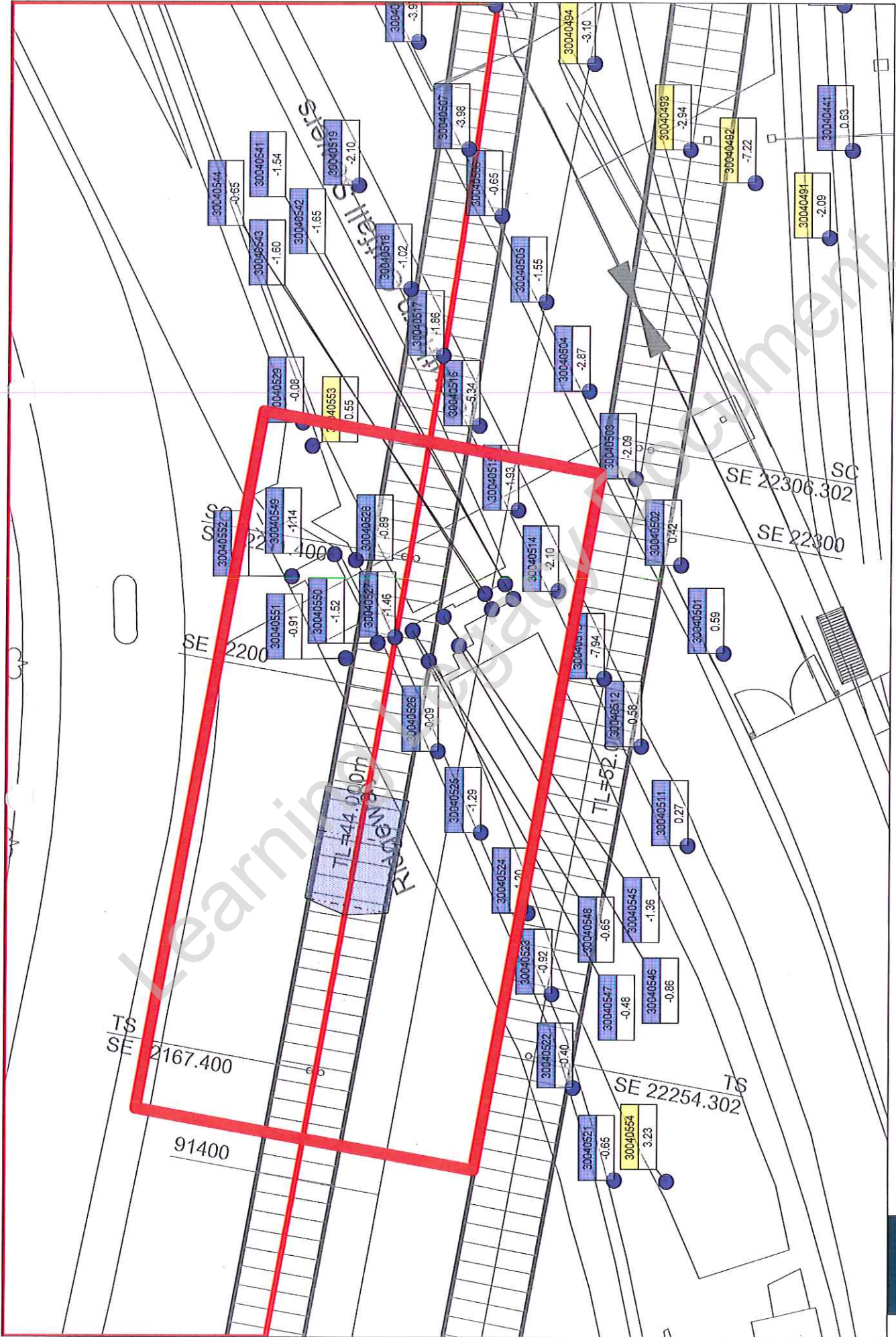


Point: 30040517



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Southern Outfall Sewer 2 12.12.2012 - 07.02.2014
date: 29.07.2014 08:46 current values: 29.07.2014 08:28





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 22.06.2013 09:00



monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: TW SOS 1 - 3

No. of reading	1. following		2. following		3. following		4. following		5. following		6. following	
	baseline elevation	12/01/2013	19/01/2013	01/02/2013	06/02/2013	07/02/2013	12/02/2013	12/02/2013	07/02/2013	12/02/2013	12/02/2013	12/02/2013
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
3004 0501	103.275	0	103.267	new Baseline	103.269	2	103.269	0	103.269	0	103.267	-2
3004 0502	103.238	0	103.233	new Baseline	103.235	2	103.235	0	103.235	0	103.234	-1
3004 0503	103.150	1	103.149	-2	103.150	2	103.150	0	103.150	0	103.150	0
3004 0504	103.118	1	103.117	-1	103.119	1	103.119	0	103.119	0	103.118	0
3004 0505	103.100	1	103.099	-2	103.101	2	103.101	0	103.101	0	103.100	0
3004 0506	102.986	0	102.985	-1	102.997	1	102.997	0	102.997	0	102.997	0
3004 0507	102.964	0	102.963	-2	102.965	2	102.965	0	102.965	0	102.964	-1
3004 0508	102.972	0	102.971	-2	102.972	2	102.972	0	102.972	0	102.972	0
3004 0509	102.972	0	102.970	-2	102.972	2	102.972	0	102.972	0	102.972	0
3004 0511	107.025	0	107.025	0	107.030	5	107.030	5	107.030	5	107.026	-4
3004 0512	107.000	0	107.000	0	107.005	5	107.005	5	107.005	5	107.001	-4
3004 0513	106.967	0	106.966	0	106.971	5	106.971	5	106.971	5	106.968	-3
3004 0514	107.007	0	107.006	-1	107.012	6	107.012	6	107.012	6	107.009	-3
3004 0515	107.038	0	107.037	-1	107.042	6	107.042	6	107.042	6	107.039	-3
3004 0516	106.944	0	106.944	0	106.949	5	106.949	5	106.949	5	106.945	-4
3004 0517	106.926	0	106.926	0	106.931	5	106.931	5	106.931	5	106.927	-4
3004 0518	106.957	0	106.956	0	106.957	0	106.957	0	106.957	0	106.958	1
3004 0519	106.947	0	106.947	0	106.942	5	106.942	5	106.942	5	106.938	-4
3004 0521	101.892	0	101.891	-1	101.892	0	101.892	0	101.892	0	101.891	-1
3004 0522	101.809	0	101.809	0	101.808	-1	101.808	-1	101.809	1	101.808	-1
3004 0523	101.822	0	101.822	0	101.821	-1	101.822	1	101.822	1	101.821	-1
3004 0524	101.761	0	101.761	0	101.761	-1	101.761	0	101.761	0	101.761	0
3004 0525	101.796	0	101.797	1	101.795	-1	101.797	1	101.797	1	101.796	-1
3004 0526	101.869	0	101.870	1	101.869	-2	101.869	-2	101.870	1	101.869	-1
3004 0527	101.821	0	101.822	1	101.821	-1	101.822	1	101.822	1	101.820	-1
3004 0528	101.840	0	101.824	new Baseline	106.942	5	106.942	5	106.942	5	101.824	-1
3004 0529	101.979	0	destroyed		101.979	0	destroyed		101.979	0	destroyed	
3004 0541	106.956	0	106.956	0	106.955	-1	106.956	5	106.961	5	106.957	-4
3004 0542	106.943	0	106.943	0	106.943	-1	106.948	5	106.948	5	106.944	-4
3004 0543	106.932	0	106.932	0	106.931	-1	106.937	5	106.937	5	106.933	-3
3004 0544	106.937	0	106.937	0	106.937	-1	106.942	5	106.942	5	106.938	-4
3004 0545	102.996	0	102.997	1	102.996	-1	102.997	1	102.997	1	102.996	-1
3004 0546	103.000	0	103.000	0	102.999	-1	103.001	1	103.001	1	102.999	-1
3004 0547	103.008	0	103.009	1	103.008	-1	103.009	1	103.009	1	103.008	-1
3004 0548	102.976	0	102.977	1	102.976	-1	102.977	1	102.977	1	102.976	-1
3004 0549	101.795	0	101.795	0	101.794	-1	101.794	-1	101.795	1	101.794	-1
3004 0550	101.819	0	101.820	1	101.819	-1	101.819	-1	101.819	1	101.819	-1
3004 0551	101.818	0	101.817	0	101.817	0	101.817	0	101.817	0	101.817	-1
3004 0552	101.794	0	101.794	0	101.793	0	101.793	0	101.794	1	101.793	-1

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: TW-SOS 1 - 3

No. of reading date	7. following 20/02/2013		8. following 05/03/2013		9. following 06/03/2013		10. following 07/03/2013		11. following 08/03/2013		12. following 09/03/2013	
	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	elevation	deviation from last/ baseline
3004 0501	105.275	1	105.269	1	103.267	-2	103.267	0	103.267	0	103.267	0
3004 0502	103.238	0	103.235	1	103.234	-2	103.234	0	103.234	0	103.234	0
3004 0503	103.150	1	103.151	1	103.150	-1	103.150	0	103.150	0	103.150	0
3004 0504	103.118	1	103.119	0	103.118	-2	103.118	0	103.119	0	103.118	0
3004 0505	103.100	1	103.102	0	103.100	0	103.101	0	103.101	1	103.101	0
3004 0506	102.988	-8	102.982	-8	102.981	-1	102.981	0	102.982	1	102.981	-1
3004 0507	102.964		103.249	new Baseline	103.245	-1	103.245	0	103.249	1	103.247	-2
3004 0508	102.972	-1	103.230	new Baseline	103.229	-2	103.229	0	103.229	0	103.228	-1
3004 0509	102.970	-2			electrodes							
3004 0511	107.025	-1	107.026	1	107.026	1	107.026	1				
3004 0512	107.000	-1	107.001	1	107.002	1	107.002	1				
3004 0513	106.967	-1	106.967	1	106.968	1	106.968	1				
3004 0514	107.007	-1	107.007	1	107.009	2	107.009	2				
3004 0515	107.038	-2	107.038	-2	107.039	2	107.039	2				
3004 0516	106.944	-4	106.941	-4	106.942	-2	106.942	-2				
3004 0517	106.926	-1	106.926	-1	106.927	0	106.927	0				
3004 0518	106.957	-1	106.957	-1	106.957	0	106.957	0				
3004 0519	106.947	-1	106.947	-1	106.937	0	106.937	0				
3004 0521	101.892	0	101.891	0	101.893	2	101.893	2				
3004 0522	101.809	0	101.808	0	101.810	2	101.810	2				
3004 0523	101.822	0	101.822	0	101.823	2	101.823	2				
3004 0524	101.761	0	101.761	0	101.762	1	101.762	1				
3004 0525	101.796	1	101.796	1	101.797	1	101.797	1				
3004 0526	101.869	0	101.870	0	101.870	1	101.870	1				
3004 0527	101.821	0	101.822	1	101.822	1	101.822	1				
3004 0528	101.840	1	101.824	1	101.825	1	101.825	1				
3004 0529	101.979											
3004 0541	106.956	-1	106.956	-1	106.957	2	106.957	2				
3004 0542	106.943	-1	106.943	-1	106.945	2	106.945	2				
3004 0543	106.932	-2	106.932	-2	106.933	2	106.933	2				
3004 0544	106.937	-1	106.937	-1	106.939	2	106.939	2				
3004 0545	102.996	1	102.996	1	102.997	1	102.997	1				
3004 0546	103.000	1	103.000	1	103.000	0	103.000	0				
3004 0547	103.008	1	103.008	1	103.009	0	103.009	0				
3004 0548	102.976	1	102.976	1	102.978	1	102.978	1				
3004 0549	101.795	1	101.794	1	101.795	1	101.795	1				
3004 0550	101.819	1	101.819	1	101.820	1	101.820	1				
3004 0551	101.819	1	101.818	1	101.818	1	101.818	1				
3004 0552	101.794	1	101.794	1	101.794	1	101.794	1				

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: TW SOS 1 - 3

No. of reading date	13. following 19/03/2013		14. following 11/03/2013		15. following 12/03/2013		16. following 13/03/2013		17. following 14/03/2013		18. following 15/03/2013	
	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	elevation	deviation from last/ baseline
3004 0501	103.275	0	103.267	0	103.258	0	103.267	0	103.267	0	103.267	0
3004 0502	103.238	0	103.234	0	103.234	0	103.234	0	103.233	0	103.233	0
3004 0503	103.150	0	103.149	0	103.149	-1	103.148	-1	103.148	0	103.148	0
3004 0504	103.118	0	103.118	0	103.117	-1	103.116	-2	103.116	0	103.116	0
3004 0505	103.100	0	103.101	0	103.099	-1	103.099	0	103.099	0	103.099	0
3004 0506	102.996	1	102.980	-2	102.980	0	102.980	0	102.980	0	102.980	0
3004 0507	102.964	2	103.249	-1	103.248	-1	103.248	0	103.248	0	103.248	0
3004 0508	102.972	2	103.220	-1	103.229	1	103.229	0	103.229	0	103.229	0
3004 0509	102.972											
3004 0511	107.025		107.026	0	107.026	0	107.025	0	107.025	0	107.023	-2
3004 0512	107.000		107.001	0	107.001	0	107.001	-1	107.000	-1	106.998	-2
3004 0513	106.967		106.968	0	106.967	0	106.967	-1	106.966	-1	106.964	-2
3004 0514	107.007		107.008	0	107.007	-1	107.007	-1	107.006	-1	107.004	-3
3004 0515	107.038		107.039	0	107.038	-1	107.037	-1	107.037	0	107.035	-1
3004 0516	106.944		106.942	0	106.942	0	106.940	-1	106.940	-1	106.940	-1
3004 0517	106.926		106.926	0	106.927	0	106.925	-1	106.926	0	106.925	-1
3004 0518	106.957		106.957	0	106.957	0	106.957	-1	106.957	0	106.956	-1
3004 0519	106.947		106.938	0	106.938	0	106.937	-1	106.937	0	106.936	-1
3004 0521	101.892		101.893	0	101.893	0	101.892	0	101.893	1	101.892	-1
3004 0522	101.809		101.809	-1	101.810	0	101.810	0	101.810	1	101.809	-1
3004 0523	101.822		101.823	0	101.823	0	101.822	0	101.823	1	101.822	-1
3004 0524	101.761		101.762	-1	101.762	0	101.761	0	101.762	1	101.760	-1
3004 0525	101.796		101.797	0	101.797	0	101.796	-1	101.796	0	101.796	-1
3004 0526	101.869		101.870	0	101.871	0	101.869	-2	101.870	1	101.869	-1
3004 0527	101.821		101.822	0	101.822	0	101.821	-1	101.821	0	101.821	0
3004 0528	101.840		101.825	0	101.825	0	101.824	-1	101.825	1	101.824	0
3004 0529	101.979											
3004 0541	106.956		106.957	0	106.956	-1	106.955	-1	106.955	0	106.953	-1
3004 0542	106.943		106.944	0	106.943	-1	106.943	-1	106.942	-1	106.940	-2
3004 0543	106.932		106.932	0	106.932	-1	106.932	-1	106.931	-1	106.929	-3
3004 0544	106.937		106.938	0	106.937	-1	106.937	0	106.936	-1	106.935	-1
3004 0545	102.996		102.997	-1	102.997	0	102.996	-1	102.996	0	102.996	0
3004 0546	103.000		103.000	0	103.001	0	102.999	-1	103.000	0	102.999	0
3004 0547	103.008		103.009	0	103.009	0	103.008	-1	103.008	0	103.008	0
3004 0548	102.976		102.977	0	102.977	0	102.976	-1	102.976	0	102.976	0
3004 0549	101.795		101.795	-1	101.795	0	101.794	-1	101.795	1	101.794	-1
3004 0550	101.819		101.819	-1	101.819	0	101.819	-1	101.819	0	101.819	0
3004 0551	101.818		101.818	-1	101.818	0	101.817	-1	101.817	0	101.818	0
3004 0552	101.794		101.794	-1	101.794	1	101.793	-1	101.794	1	101.794	0

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: TW SOS 1 - 3

No. of reading	19. following		20. following		21. following		22. following		23. following		24. following		
	baseline	16/03/2013	17/03/2013	18/03/2013	19/03/2013	20/03/2013	21/03/2013	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
		15/12/2012											
		16/03/2013											
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 0501	103.275	103.267	0 -7							103.269	2 -6		
3004 0502	103.238	103.234	1 -4							103.232	-1 -6		
3004 0503	103.150	103.148	0 -1							103.147	-1 -2		
3004 0504	103.118	103.116	0 -2							103.115	-1 -3		
3004 0505	103.100	103.099	0 -1							103.098	-1 -2		
3004 0506	102.996	102.980	0 -2							102.979	-1 -3		
3004 0507	102.964	103.248	0 -1							103.247	-1 -2		
3004 0508	102.972	103.229	0 -1							103.227	-2 -3		
3004 0509	102.972												
3004 0511	107.025	107.024	1 -1	107.025	0 0	107.025	0 0						
3004 0512	107.000	106.999	1 -1	106.999	0 -1	107.000	1 -1						
3004 0513	106.967	106.965	1 -2	106.965	0 -2	106.965	0 -1						
3004 0514	107.007	107.005	1 -2	107.006	0 -2	107.006	0 -1						
3004 0515	107.038	107.036	1 -2	107.036	0 -2	107.037	1 -1						
3004 0516	106.944	106.940	0 -4	106.940	0 -4	106.940	1 -4						
3004 0517	106.926	106.925	0 -1	106.925	0 -1	106.926	1 0						
3004 0518	106.957	106.956	0 -1	106.956	1 0	106.957	1 0						
3004 0519	106.947	106.936	0 -1	106.937	0 -1	106.937	1 0						
3004 0521	101.892	101.892	0 1	101.892	0 0	101.892	0 0	101.892	0 0	101.892	0 0	101.892	0 0
3004 0522	101.809	101.808	-1 -1	101.809	1 0	101.809	0 0	101.808	0 0	101.808	0 0	101.808	0 0
3004 0523	101.822	101.822	0 0	101.822	0 0	101.822	0 0	101.821	0 -1	101.821	0 -1	101.821	0 -1
3004 0524	101.761	101.760	-1 -1	101.761	1 0	101.761	1 0	101.760	0 -1	101.760	0 -1	101.760	0 -1
3004 0525	101.796	101.795	0 -1	101.796	1 0	101.795	-1 -1	101.795	0 -1	101.795	0 -1	101.795	0 -1
3004 0526	101.869	101.869	0 0	101.870	1 1	101.868	-1 -1	101.869	0 0	101.869	1 0	101.869	0 0
3004 0527	101.821	101.821	0 -1	101.821	0 0	101.820	-1 -1	101.821	0 -1	101.821	0 -1	101.821	0 0
3004 0528	101.840	101.824	0 0	101.825	1 1	101.824	-1 0	101.824	0 0	101.824	0 0	101.824	0 0
3004 0529	101.979												
3004 0541	106.956	106.954	1 -2	106.955	0 -2	106.955	1 -1						
3004 0542	106.943	106.942	1 -2	106.942	0 -2	106.942	0 -1						
3004 0543	106.932	106.931	1 -1	106.931	0 -1	106.931	0 -1						
3004 0544	106.937	106.936	1 -1	106.936	0 -1	106.936	0 -1						
3004 0545	102.996	102.995	0 -1	102.996	0 0	102.995	-1 -1	102.995	0 -1	102.995	0 -1	102.995	0 -1
3004 0546	103.000	102.999	0 -1	102.999	0 0	102.999	-1 -1	102.999	0 -1	102.999	0 -1	102.999	0 -1
3004 0547	103.008	103.008	0 -1	103.007	0 -1	103.007	0 -1	103.008	0 -1	103.008	0 -1	103.008	0 0
3004 0548	102.976	102.976	0 -1	102.976	1 0	102.976	-1 -1	102.976	1 0	102.976	0 0	102.976	0 0
3004 0549	101.795	101.794	0 -1	101.794	0 0	101.794	0 0	101.794	0 0	101.794	0 0	101.794	0 -1
3004 0550	101.819	101.818	0 -1	101.819	1 0	101.818	0 -1	101.818	0 -1	101.818	0 -1	101.818	0 0
3004 0551	101.818	101.817	-1 -1	101.818	1 0	101.817	-1 -1	101.817	-1 -1	101.817	0 0	101.817	0 0
3004 0552	101.794	101.793	-1 -1	101.793	0 0	101.794	0 0	101.794	0 0	101.794	0 0	101.793	-1 0

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: TW SOS 1 - 3

No. of reading	25. following		26. following		27. following		28. following		29. following		30. 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
date	15/12/2012	22/03/2013	27/03/2013	02/04/2013	11/04/2013	21/05/2013	15/06/2013					
3004 0501	103.275		103.266	-3 -8	103.266	0 -9	103.268	2 -7	103.266	-2 -8		
3004 0502	103.238		103.233	0 -5	103.233	0 -6	103.234	2 -4	103.232	-2 -6		
3004 0503	103.150		103.147	0 -3	103.147	0 -2	103.149	2 -1	103.147	-2 -3		
3004 0504	103.118		103.115	0 -3	103.115	0 -3	103.116	1 -2	103.115	-2 -3		
3004 0505	103.100		103.097	-1 -3	103.098	1 -2	103.100	2 0	103.099	-2 -2		
3004 0506	102.986		102.979	0 -3	102.980	0 -3	102.981	1 -2	103.150	new Baseline		
3004 0507	102.964		103.247	0 -2	103.247	0 -2	103.249	2 0	103.246	-3 -3		
3004 0508	102.972		103.228	1 -2	103.228	0 -3	103.229	1 -1	103.227	-2 -3		
3004 0509	102.972											
3004 0511	107.025		107.024	0 -1	107.025	1 0	107.025	0 0	107.024	-1 -1		
3004 0512	107.000		destroyed						106.972	new Baseline		
3004 0513	106.967		106.963	-2 -4	106.963	0 -4	106.959	-4 -8	106.958	-1 -9		
3004 0514	107.007		107.006	0 -1	107.007	1 -1	107.008	1 -1	107.005	-1 -2		
3004 0515	107.038		107.037	0 -1	107.038	1 0	107.037	-1 -1	107.036	0 -2		
3004 0516	106.944		106.940	-1 -4	106.941	-3	106.940	-1 -4	106.940	0 -4		
3004 0517	106.926		106.925	-1 -1	106.927	1 1	106.925	-1 -1	106.926	0 -1		
3004 0518	106.957		106.956	-1 0	106.958	2 1	106.957	-1 0	106.956	0 0		
3004 0519	106.947		106.937	0 -1	106.938	1 0	106.937	-1 0				
3004 0521	101.892	0 1	101.892	0 0	101.891	0 0	101.892	1 1	101.891	-1 0	101.891	0 -1
3004 0522	101.809	0 0	101.808	0 0	101.808	-1 -1	101.809	1 0	101.808	-1 -1	101.808	0 -1
3004 0523	101.822	0 0	101.821	0 -1	101.821	-1 -1	101.822	1 0	101.821	-1 -1	101.820	0 -2
3004 0524	101.761	0 0	101.760	-1 -1	101.760	0 -1	101.761	1 -1	101.760	-1 -1	101.759	-1 -2
3004 0525	101.796	0 -1	101.796	0 -1	101.795	-1 -1	101.795	0 -1	101.796	0 -1	101.795	0 -1
3004 0526	101.869	0 0	101.870	0 1	101.869	-1 0	101.868	-1 -1	101.870	2 1	101.868	-2 -1
3004 0527	101.821	0 -1	101.821	0 0	101.821	-1 -1	101.821	0 -1	101.821	1 0	101.821	-1 -1
3004 0528	101.840	1 0	101.825	0 1	101.824	-1 0	101.824	0 0	101.825	0 0	101.824	0 0
3004 0529	101.979											
3004 0541	106.956		106.955	0 -1	106.955	1 -1	106.955	-1 -1	106.954	0 -2		
3004 0542	106.943		106.942	0 -1	106.942	0 -1	106.942	-1 -1	106.942	0 -2		
3004 0543	106.932		106.931	0 -1	106.932	1 0	106.931	-1 -1	106.931	-1 -2		
3004 0544	106.937		106.936	0 -1	106.937	1 0	106.936	-1 -1	106.936	0 -1		
3004 0545	102.986	0 0	102.986	1 0	102.985	-1 -1	102.985	0 -1	102.986	1 0	102.985	-1 -1
3004 0546	103.000	0 0	103.000	1 0	102.999	-1 -1	102.999	0 -1	103.000	1 0	102.999	0 0
3004 0547	103.008	0 0	103.008	0 0	103.007	-1 -1	103.008	0 0	103.008	0 0	103.008	0 0
3004 0548	102.976	0 0	102.976	1 1	102.976	-1 0	102.976	0 0	102.977	1 0	102.976	-1 -1
3004 0549	101.795	1 0	101.795	0 0	101.794	-1 -1	101.794	0 -1	101.794	0 0	101.794	-1 -1
3004 0550	101.819	0 0	101.819	0 0	101.819	0 0	101.818	0 -1	101.819	1 0	101.819	0 0
3004 0551	101.818	0 0	101.817	0 0	101.817	-1 -1	101.817	-1 -1	101.818	1 0	101.817	0 0
3004 0552	101.794	0 0	101.794	0 0	101.794	-1 0	101.793	0 0	101.794	0 0	101.793	-1 -1

monitoring table



Joint Venture

project: C310 Thames Tunnel
structure: TW SOS 1-3

No. of reading	baseline elevation	31. following 17/06/2013		32. following 18/06/2013		33. following 19/06/2013		34. following 20/06/2013		35. following 21/06/2013		36. following 22/06/2013	
		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 0501	103.275	103.267	1 -8	103.267	0 -7	103.267	0 -7	103.267	0 -7	103.267	0 -8	103.267	1 -7
3004 0502	103.238	103.233	0 -5	103.233	0 -5	103.233	1 -5	103.233	0 -5	103.233	-1 -6	103.233	1 -5
3004 0503	103.150	103.147	0 -3	103.147	0 -3	103.147	0 -2	103.147	-1 -3	103.147	0 -3	103.148	1 -2
3004 0504	103.118	103.115	0 -3	103.115	1 -3	103.116	0 -3	103.115	-1 -3	103.115	0 -3	103.115	1 -3
3004 0505	103.100	103.098	0 -2	103.099	0 -1	103.099	0 -1	103.098	-1 -2	103.098	0 -2	103.099	0 -2
3004 0506	102.986	103.150	0 0	103.150	0 0	103.150	0 0	103.149	-1 -1	103.150	-1 -1	103.150	0 -1
3004 0507	102.964	103.247	0 -3	103.247	0 -3	103.246	-1 -3	103.245	-1 -5	103.245	-1 -4	103.245	0 -4
3004 0508	102.972	103.228	1 -3	103.227	-1 -4	103.227	-1 -4	103.226	-1 -4			103.226	0 -4
3004 0511	107.025					107.024	0 -1	107.025	0 0	107.024	0 -1	107.025	1 0
3004 0512	107.000					106.972	0 0	106.972	0 0	106.972	0 0	106.972	1 1
3004 0513	106.987	106.959	1 -8	106.959	0 -8	106.959	0 -8	106.959	0 -8	106.959	-1 -9	106.959	1 -8
3004 0514	107.007	107.006	0 -1	107.005	-1 -2	107.005	-1 -2	107.005	0 -2	107.004	-1 -3	107.005	1 -2
3004 0515	107.038	107.037	0 -1	107.036	0 -2	107.036	0 -2	107.036	0 -2	107.035	-1 -3	107.036	1 -2
3004 0516	106.944	106.940	0 -4	106.940	0 -4	106.940	0 -4	106.939	-1 -5	106.938	-1 -6	106.939	0 -5
3004 0517	106.926	106.926	0 0	106.925	0 -1	106.925	0 -1	106.924	0 -1	106.924	-1 -2	106.924	0 -2
3004 0518	106.957	106.956	0 0	106.957	0 0	106.957	0 0	106.956	-1 -1	106.956	0 -1	106.956	0 -1
3004 0519	106.947					106.936	-1 -1	106.936	0 -1	106.936	-1 -2	106.935	0 -2
3004 0521	101.892	101.890	-1 -1	101.891	1 0	101.892	1 1	101.892	1 1	101.892	0 0	101.891	-1 -1
3004 0522	101.809	101.808	0 -1	101.807	-1 -2	101.808	1 0	101.808	1 0	101.808	0 -1	101.808	0 0
3004 0523	101.822	101.820	0 -2	101.820	0 -2	101.820	0 -2	101.821	1 -1	101.821	0 -1	101.821	0 -1
3004 0524	101.761	101.759	0 -2	101.759	0 -2	101.760	1 -1	101.760	1 -1	101.760	0 -1	101.760	0 -1
3004 0525	101.796	101.795	0 -1	101.795	0 -1	101.795	-1 -2	101.796	1 0	101.796	0 0	101.795	-1 -1
3004 0526	101.869	101.868	0 -1	101.869	1 0	101.870	1 0	101.870	1 1	101.870	0 1	101.869	-1 0
3004 0527	101.821	101.821	0 -1	101.820	0 -1	101.820	0 -1	101.821	1 0	101.822	1 0	101.820	-2 -1
3004 0528	101.840	101.824	0 0	101.824	-1 -1	101.824	-1 -1	101.824	0 0	101.825	1 0	101.823	-1 -1
3004 0529	101.979												
3004 0541	106.956	106.955	-1 -1	106.954	0 -2	106.954	0 -2	106.954	0 -2	106.954	0 -2	106.955	1 -2
3004 0542	106.943	106.942	-1 -2	106.941	-1 -2	106.941	-1 -2	106.942	1 -1	106.941	-1 -3	106.942	1 -2
3004 0543	106.932	106.931	-1 -1	106.931	0 -1	106.931	0 -1	106.931	0 -1	106.930	-1 -2	106.931	1 -2
3004 0544	106.937	106.936	-1 -1	106.937	0 -1	106.936	0 -1	106.936	0 -1	106.936	-1 -1	106.936	1 -1
3004 0545	102.996	102.995	0 -1	102.995	0 -1	102.995	0 -1	102.996	0 0	102.996	0 0	102.995	-1 -1
3004 0546	103.000	102.999	0 -1	102.999	0 -1	102.999	0 -1	103.000	1 0	103.000	0 0	102.999	-1 -1
3004 0547	103.008	103.008	0 0	103.008	0 -1	103.008	0 -1	103.008	1 0	103.008	-1 0	103.008	0 0
3004 0548	102.976	102.976	0 0	102.976	0 -1	102.976	0 -1	102.977	1 0	102.976	0 0	102.976	-1 -1
3004 0549	101.795	101.794	0 -1	101.793	0 -1	101.794	1 0	101.794	1 0	101.795	0 0	101.793	-1 -1
3004 0550	101.819	101.818	0 -1	101.818	0 -1	101.818	0 -1	101.819	1 0	101.819	0 0	101.819	-1 -2
3004 0551	101.818	101.817	0 -1	101.816	0 -1	101.816	0 -1	101.818	1 0	101.818	0 1	101.817	-2 -1
3004 0552	101.794	101.793	0 0	101.793	0 -1	101.793	0 -1	101.794	1 0	101.794	0 0	101.793	0 0

monitoring table



Joint Venture

Project: C310 Thames Tunnel

structure: TW SOS 1 - 3

No. of reading	baseline		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	elevation	deviation from last/ baseline	date
	15/12/2012	103.275		103.266	-1	103.267	1	103.266	-1	103.267	1	103.266	0	15/07/2013
	12/01/2013	103.238		103.232	-1	103.232	1	103.232	-1	103.232	1	103.232	0	03/07/2013
3004 0502		103.150		103.146	-2	103.146	0	103.146	-2	103.146	0	103.146	0	
3004 0503		103.118		103.113	-2	103.114	1	103.113	-2	103.114	1	103.113	-1	
3004 0504		103.100		103.097	-2	103.097	1	103.097	-2	103.097	1	103.097	-1	
3004 0505		102.996		103.148	-2	103.149	2	103.148	-2	103.149	2	103.148	-1	
3004 0506		102.964		103.244	-2	103.245	1	103.244	-2	103.245	1	103.244	-1	
3004 0507		102.972		103.223	-3	103.226	3	103.223	-3	103.226	3	103.224	-2	
3004 0508		102.972		107.024	-1	107.024	0	107.024	-1	107.024	0	107.024	1	
3004 0509		107.025		106.972	0	106.972	0	106.972	0	106.971	-1	106.971	0	
3004 0510		106.987		106.959	0	106.959	0	106.958	-8	106.958	-1	106.959	1	
3004 0511		107.007		107.005	0	107.004	-1	107.004	-1	107.004	0	107.005	0	
3004 0512		107.038		107.036	0	107.036	-1	107.036	-1	107.036	0	107.036	1	
3004 0513		106.944		106.939	0	106.938	-1	106.938	-1	106.938	0	106.938	1	
3004 0514		106.926		106.925	1	106.924	-1	106.924	-1	106.924	-1	106.924	1	
3004 0515		106.957		106.955	0	106.955	0	106.955	0	106.955	-1	106.955	1	
3004 0516		106.947		106.936	0	106.936	0	106.936	0	106.935	-1	106.935	0	
3004 0517		101.892		101.891	0	101.892	1	101.892	1	101.891	-1	101.890	-1	
3004 0518		101.809		101.808	0	101.808	0	101.808	0	101.808	0	101.808	0	
3004 0519		101.822		101.820	-1	101.821	0	101.821	0	101.820	-1	101.818	-3	
3004 0520		101.761		101.759	-1	101.760	0	101.760	0	101.759	0	101.757	-2	
3004 0521		101.796		101.795	0	101.795	0	101.795	0	101.795	0	101.794	-1	
3004 0522		101.869		101.869	0	101.869	0	101.869	0	101.869	0	101.868	-1	
3004 0523		101.821		101.821	1	101.820	0	101.820	0	101.820	0	101.820	0	
3004 0524		101.840		101.823	0	101.824	0	101.824	0	101.822	-1	101.821	-1	
3004 0525		101.979												
3004 0526		106.956		106.954	0	106.954	-1	106.954	-1	106.954	0	106.954	0	
3004 0527		106.943		106.941	-1	106.941	-1	106.941	-1	106.941	0	106.941	0	
3004 0528		106.932		106.931	0	106.931	0	106.931	0	106.930	-1	106.931	1	
3004 0529		106.937		106.935	-1	106.935	0	106.935	0	106.935	0	106.935	0	
3004 0530		102.996		102.995	0	102.995	0	102.995	0	102.995	0	102.994	-1	
3004 0531		103.000		102.998	-1	102.998	0	102.998	0	102.998	0	102.998	0	
3004 0532		103.008		103.007	-1	103.007	0	103.007	0	103.007	-1	103.007	0	
3004 0533		102.976		102.976	0	102.976	0	102.976	0	102.975	0	102.975	0	
3004 0534		101.795		101.794	0	101.794	0	101.794	0	101.794	0	101.794	0	
3004 0535		101.819		101.817	0	101.817	0	101.817	0	101.817	-1	101.816	-1	
3004 0536		101.818		101.817	0	101.817	0	101.817	0	101.818	1	101.817	1	
3004 0537		101.794		101.793	0	101.793	0	101.793	0	101.793	0	101.793	0	


monitoring table



Joint Venture

project: C310 Thames Tunnel
structure: TW SOS 1 - 3

No. of reading	43. following		44. following		45. following		46. following		47. following		48. following		49. 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	elevation	deviation from last/ baseline
date	15/12/2012 12/01/2013	14/08/2013	19/08/2013	09/09/2013	16/09/2013	19/10/2013	06/02/2014	07/02/2014						
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	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0501	103.275	0	103.266	-1	103.266	-1	103.267	2	103.267	2	Point Lost			
3004 0502	103.238	-1	103.231	-7	103.231	-7	points lost due new laminae		points lost due new laminae					
3004 0503	103.150	-1	103.145	-5	103.144	-5	103.113	2	103.112	-5	103.112	-1.44	103.097	-3.28
3004 0504	103.118	-1	103.112	-6	103.111	-7	103.097	3	103.096	-3	103.096	-1.50	103.149	-3.28
3004 0505	103.100	-1	103.096	-4	103.095	-5	103.149	1	103.147	-2	103.147	-1.41	Point Damaged	
3004 0506	102.996	-1	103.148	-3	103.147	-3	103.244	1	103.244	-6	Point Damaged			
3004 0507	102.964	-1	103.243	-6	103.242	-7	103.224	0	103.224	-6	103.223	-0.86	103.224	-7.32
3004 0508	102.972	0	103.224	-6	103.224	-6	point lost		point lost					
3004 0509	102.972	0	103.224	-6	103.224	-6	107.024	1	107.024	-1	107.024	1	107.024	0
3004 0510	107.025	-2	107.023	-2	107.023	-2	106.971	1	106.971	-1	106.971	1	106.971	0
3004 0511	107.000	-2	106.970	-2	106.970	-2	106.957	2	106.957	-9	106.957	2	106.956	-10
3004 0512	106.967	-3	106.956	-11	106.956	-11	107.004	3	107.004	-3	107.004	3	107.004	-1
3004 0513	107.007	-3	107.002	-5	107.001	-6	107.035	2	107.035	-3	107.035	2	107.033	-1
3004 0514	107.038	-2	107.033	-5	107.032	-6	106.937	2	106.937	-7	106.937	2	106.937	0
3004 0515	106.944	-2	106.936	-8	106.935	-9	106.923	1	106.923	-3	106.923	-1	106.922	-1
3004 0516	106.926	-2	106.922	-4	106.922	-4	106.954	1	106.954	-3	106.954	1	106.954	0
3004 0517	106.957	-2	106.954	-3	106.953	-4	106.935	1	106.935	-3	106.935	1	106.935	0
3004 0518	106.947	-1	106.934	-3	106.934	-3	101.888	-2	101.888	-4	101.889	1	101.891	1
3004 0519	101.892	0	101.890	-1	101.890	-1	101.805	-1	101.805	-3	101.807	1	101.807	1
3004 0520	101.889	-1	101.806	-3	101.806	-3	101.811	-2	101.811	-11	101.814	3	101.820	6
3004 0521	101.822	-1	101.813	-9	101.813	-9	101.751	-3	101.751	-10	101.753	2	101.760	6
3004 0522	101.761	-1	101.754	-7	101.754	-7	101.791	-1	101.791	-7	101.791	2	101.794	3
3004 0523	101.796	-1	101.791	-5	101.791	-5	101.864	0	101.864	-5	101.865	1	101.868	3
3004 0524	101.869	-1	101.864	-5	101.864	-5	101.817	-1	101.817	-5	101.820	3	101.819	-1
3004 0525	101.821	-1	101.818	-3	101.818	-3	101.816	-2	101.816	-8	101.819	3	101.819	-1
3004 0526	101.840	-1	101.818	-6	101.818	-6	point lost		point lost					
3004 0527	101.979	-1	106.952	-5	106.951	-5	106.953	2	106.953	-3	106.953	0	106.953	0
3004 0528	106.956	-2	106.939	-5	106.938	-5	106.940	2	106.940	-3	106.940	2	106.940	-1
3004 0529	106.932	-3	106.928	-4	106.927	-5	106.929	2	106.929	-3	106.929	-1	106.929	-1
3004 0530	106.937	-2	106.933	-4	106.932	-5	106.935	2	106.935	-3	106.935	2	106.934	-1
3004 0531	102.996	0	102.994	-2	102.994	-2	102.998	-2	102.998	-2	102.998	2	102.997	-1
3004 0532	103.000	0	102.998	-2	102.998	-2	103.004	-2	103.004	-4	103.007	3	103.005	-1
3004 0533	103.008	-1	103.006	-2	103.006	-2	102.973	-2	102.973	-2	102.975	2	102.974	-1
3004 0534	102.975	-1	102.975	-1	102.975	-1	101.791	-2	101.791	-4	101.794	3	101.793	-1
3004 0535	101.795	-1	101.793	-2	101.793	-2	101.815	-2	101.815	-4	101.818	3	101.817	-1
3004 0536	101.819	-1	101.817	-2	101.817	-2	101.816	-2	101.816	-4	101.818	3	101.816	-1
3004 0537	101.818	-1	101.816	-2	101.816	-2	101.790	-2	101.790	-4	101.793	3	101.793	0
3004 0538	101.794	-1	101.792	-1	101.792	-1								

		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDIX 21
Southern Outfall Sewer 3

Learning Legacy Document

monitoring asset	Southern Outfall Sewer (SOS) + Pumpstation		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70001		
name of monitoring section:	Southern Outfall Sewer (SOS) 3		
sensor type:	manual levelling studs		
chainage:	91430	point no.:	3004 0521 - 3004 0529
trigger values: [mm]	green: +12 -12	amber: +15 -15	red: +18 -18
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	12/01/13	0.00		
TBM 1	start ZOI	14/03/13	0.36	3004 0523
	end ZOI	19/03/13	-0.60	3004 0523
TBM 2	start ZOI	20/06/13	-0.41	3004 0527
	end ZOI	23/06/13	-0.89	3004 0527
longterm	07/02/14	-2.37	3004 0527	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

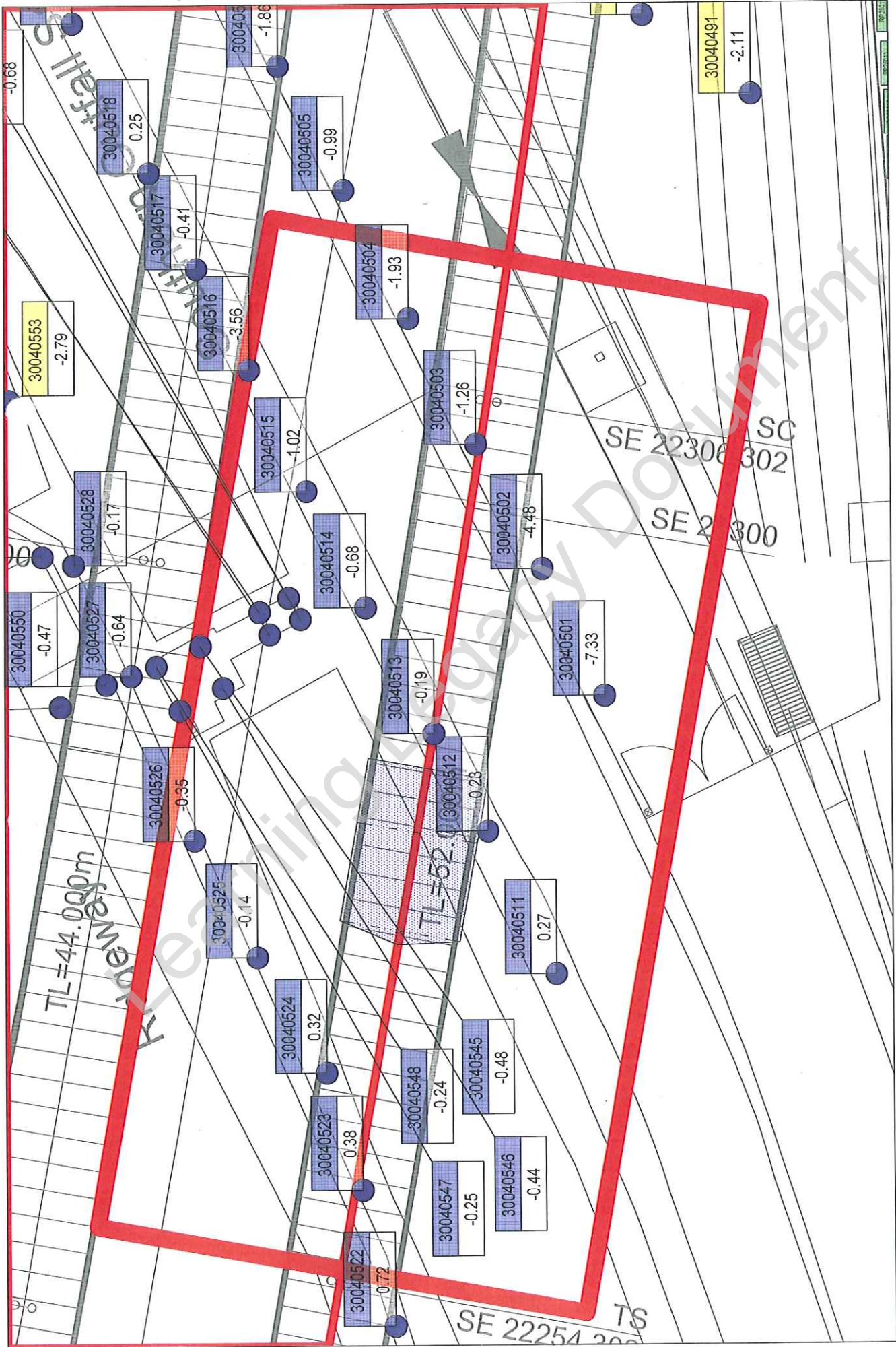
Several point where destroyed and re-baselined during the time of monitoring.
 Overall, none of the points reached any trigger value.
 Under consideration of temperature differences, the surrounding ground condition and the achievable accuracy of the measurement, HMJV has no concern to cease the monitoring. 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:

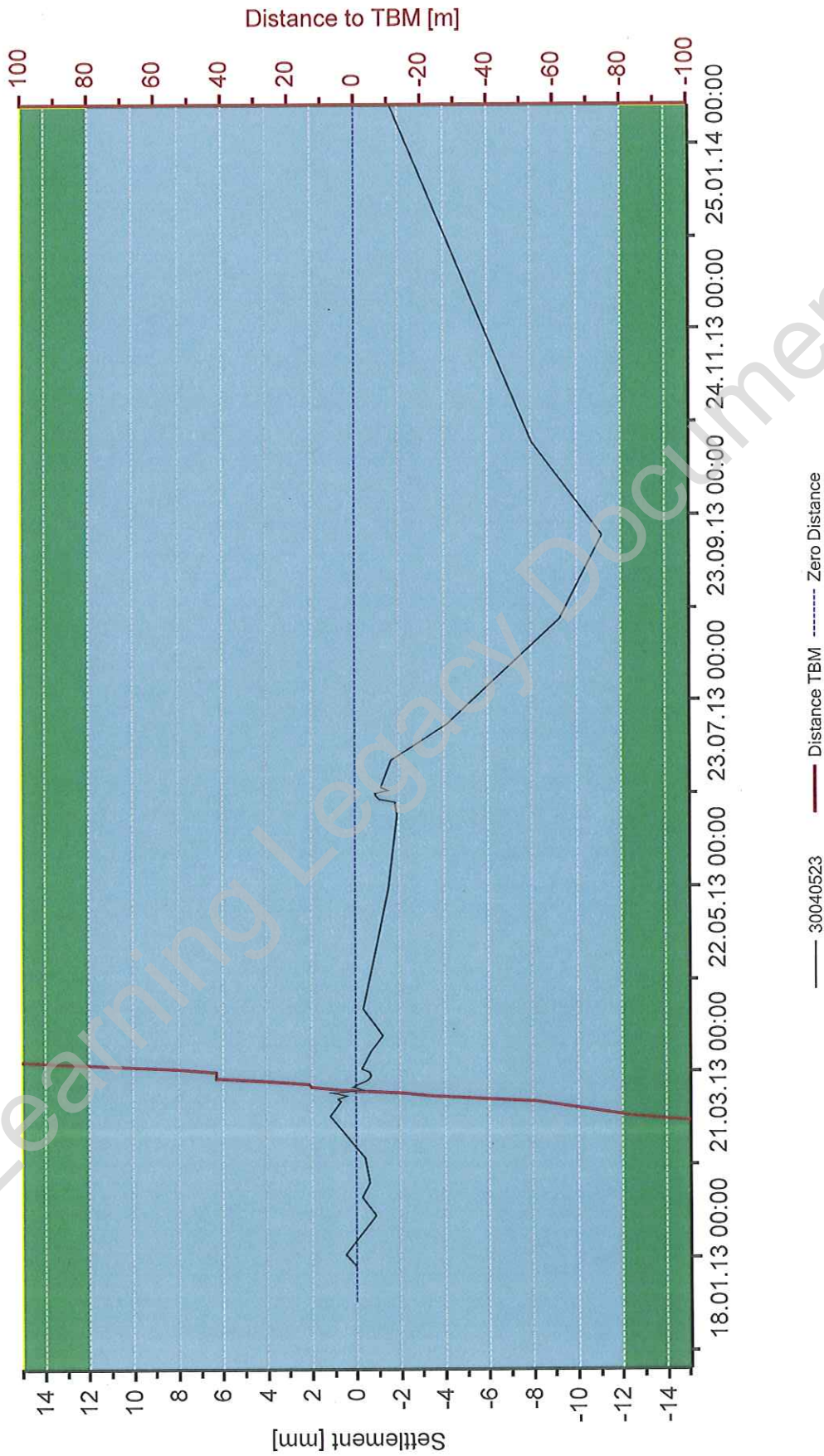
Monitoring & Survey engineer



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive, portal excavation, lining walls and grouting
 current values: 14.03.2013 07:58

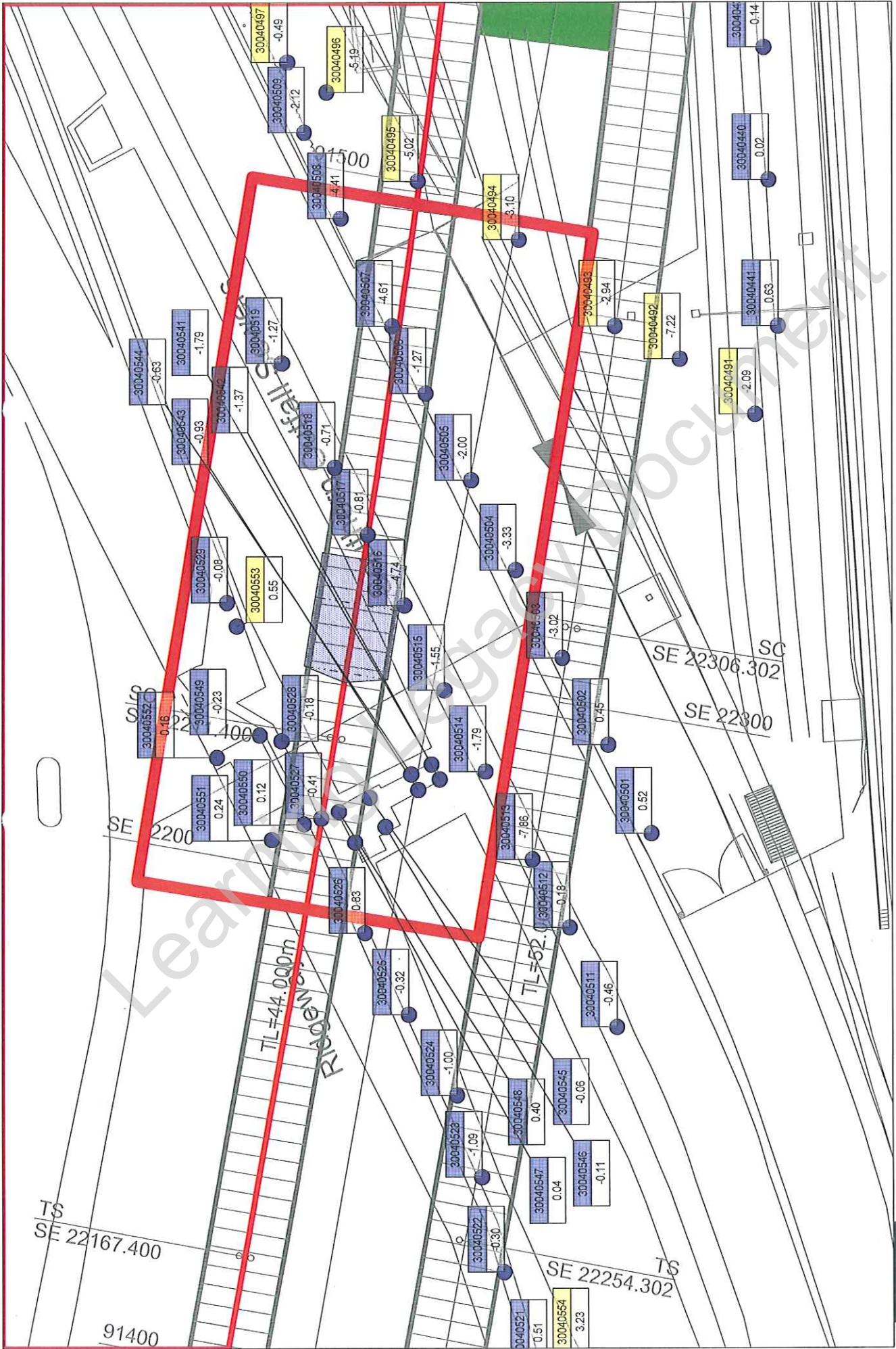


Point: 30040523



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Southern Outfall Sewer 3 12.12.2012 - 07.02.2014
date: 22.07.2014 09:25 current values: 22.07.2014 09:17





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: 30040527



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Southern Outfall Sewer 3 12.12.2012 - 07.02.2014
date: 29.07.2014 08:41 current values: 29.07.2014 08:28



monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: TW SOS 1-3

No. of reading date	1. following 12/01/2013		2. following 19/01/2013		3. following 01/02/2013		4. following 09/02/2013		5. following 07/02/2013		6. following 12/02/2013	
	baseline elevation	deviation from last/ baseline elevation	baseline elevation	deviation from last/ baseline elevation	baseline elevation	deviation from last/ baseline elevation	baseline elevation	deviation from last/ baseline elevation	baseline elevation	deviation from last/ baseline elevation	baseline elevation	deviation from last/ baseline elevation
3004 0501	103.275	103.274	103.267	new Baseline	103.269	2	103.269	2	103.269	0	103.267	-2
3004 0502	103.238	103.238	103.235	new Baseline	103.235	2	103.235	2	103.235	0	103.234	-1
3004 0503	103.150	103.150	103.149	-2	103.150	2	103.150	2	103.150	0	103.150	0
3004 0504	103.118	103.119	103.117	-1	103.119	1	103.119	1	103.119	0	103.118	0
3004 0505	103.100	103.101	103.099	-2	103.101	2	103.101	2	103.101	0	103.100	0
3004 0506	102.996	102.997	102.995	-1	102.997	1	102.997	1	102.997	0	102.997	0
3004 0507	102.964	102.965	102.963	-2	102.965	2	102.965	2	102.965	0	102.964	-1
3004 0508	102.972	102.972	102.971	-2	102.972	2	102.972	2	102.972	0	102.972	0
3004 0509	102.972	102.972	102.970	-2	102.972	2	102.972	2	102.972	0	102.972	0
3004 0511	107.025		107.025	0	107.025	5	107.030	5	107.030	0	107.025	-4
3004 0512	107.000		107.000	0	107.000	5	107.005	5	107.005	0	107.001	-4
3004 0513	106.967		106.967	0	106.966	0	106.971	5	106.971	0	106.968	-3
3004 0514	107.007		107.007	0	107.006	-1	107.012	6	107.012	0	107.009	-3
3004 0515	107.038		107.038	0	107.037	-1	107.042	6	107.042	0	107.039	-3
3004 0516	106.944		106.944	0	106.944	0	106.949	5	106.949	0	106.945	-4
3004 0517	106.926		106.926	0	106.926	0	106.931	5	106.931	0	106.927	-4
3004 0518	106.957		106.956	0	106.957	0	106.961	4	106.961	0	106.958	-4
3004 0519	106.947		106.947	0	106.937	new Baseline	106.942	5	106.942	0	106.938	-4
3004 0521	101.892		101.892	0	101.891	-1	101.892	1	101.892	0	101.891	-1
3004 0522	101.809		101.809	0	101.808	-1	101.809	1	101.809	1	101.808	-1
3004 0523	101.822		101.822	0	101.821	-1	101.822	1	101.822	1	101.821	0
3004 0524	101.761		101.761	0	101.761	-1	101.761	0	101.761	0	101.761	0
3004 0525	101.796		101.797	0	101.795	-1	101.797	1	101.797	0	101.796	-1
3004 0526	101.869		101.870	1	101.869	-2	101.870	1	101.870	1	101.869	-1
3004 0527	101.821		101.822	1	101.821	-1	101.822	1	101.822	1	101.820	-1
3004 0528	101.840		101.840	0	101.824	new Baseline	101.825	1	101.825	1	101.824	-1
3004 0529	101.979		101.979	0	destroyed							
3004 0541	106.956		106.956	0	106.955	-1	106.961	5	106.961	0	106.957	-4
3004 0542	106.943		106.943	0	106.943	-1	106.948	5	106.948	0	106.944	-4
3004 0543	106.932		106.932	0	106.931	-1	106.937	5	106.937	0	106.933	-3
3004 0544	106.937		106.937	0	106.937	-1	106.942	5	106.942	0	106.938	-4
3004 0545	102.996		102.997	0	102.996	-1			102.997	1	102.998	-1
3004 0546	103.000		103.000	0	102.999	-1			103.001	1	102.999	-1
3004 0547	103.008		103.009	0	103.008	-1			103.009	1	103.008	-1
3004 0548	102.976		102.977	1	102.976	-1			102.977	1	102.976	-1
3004 0549	101.795		101.795	0	101.794	-1			101.795	1	101.794	-1
3004 0550	101.819		101.820	1	101.819	-1			101.819	1	101.818	-1
3004 0551	101.818		101.818	0	101.817	0			101.818	0	101.817	-1
3004 0552	101.794		101.794	0	101.793	0			101.794	1	101.793	-1

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: TW SOS 1 - 3

No. of reading	7. following		8. following		9. following		10. following		11. following		12. 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	15/12/2012	20/02/2013	05/03/2013	06/03/2013	06/03/2013	07/03/2013	08/03/2013	08/03/2013	08/03/2013	09/03/2013	09/03/2013	09/03/2013
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 0501	103.275	1	103.269	1	103.267	-2	103.267	0	103.267	0	103.267	0
3004 0502	103.238	0	103.235	1	103.234	-2	103.234	0	103.234	0	103.234	0
3004 0503	103.150	1	103.151	1	103.150	-1	103.150	0	103.150	0	103.150	0
3004 0504	103.118	1	103.119	0	103.118	-2	103.118	0	103.118	0	103.118	0
3004 0505	103.100	1	103.102	0	103.100	-2	103.100	0	103.101	1	103.101	0
3004 0506	102.996	-9	102.982	new Baseline	102.981	-1	102.982	0	102.981	0	102.981	-1
3004 0507	102.964	-8	102.949	new Baseline	102.948	-1	102.948	0	102.949	1	102.947	-2
3004 0508	102.972	-1	103.230	new Baseline	103.229	-2	103.229	0	103.229	0	103.228	-1
3004 0509	102.972	-2										
3004 0511	107.025	-1	107.025	0	107.026	1	107.026	1	107.026	1	107.026	1
3004 0512	107.000	-1	107.001	0	107.002	1	107.002	1	107.002	1	107.002	1
3004 0513	106.967	-1	106.967	0	106.968	1	106.968	1	106.968	1	106.968	1
3004 0514	107.007	-1	107.007	0	107.009	2	107.009	2	107.009	2	107.009	2
3004 0515	107.038	-2	107.038	0	107.039	2	107.039	2	107.039	2	107.039	2
3004 0516	106.944	-4	106.941	-3	106.942	1	106.942	1	106.942	1	106.942	1
3004 0517	106.926	-1	106.926	0	106.927	0	106.927	0	106.927	0	106.927	0
3004 0518	106.957	-1	106.957	0	106.957	0	106.957	0	106.957	0	106.957	0
3004 0519	106.947	-1	106.947	0	106.938	-1	106.937	0	106.937	0	106.937	0
3004 0521	101.892	0	101.891	0	101.893	2	101.893	2	101.893	2	101.893	2
3004 0522	101.809	0	101.808	0	101.810	2	101.810	2	101.810	2	101.810	2
3004 0523	101.822	0	101.822	0	101.823	2	101.823	2	101.823	2	101.823	2
3004 0524	101.761	0	101.761	0	101.762	1	101.762	1	101.762	1	101.762	1
3004 0525	101.796	1	101.796	1	101.797	1	101.797	1	101.797	1	101.797	1
3004 0526	101.869	0	101.870	0	101.870	1	101.870	1	101.870	1	101.870	1
3004 0527	101.821	1	101.822	1	101.822	1	101.822	1	101.822	1	101.822	1
3004 0528	101.840	1	101.840	1	101.825	1	101.825	1	101.825	1	101.825	1
3004 0529	101.979	0	101.979	0	103.000	0	103.000	0	103.000	0	103.000	0
3004 0541	106.956	-1	106.956	-1	106.957	2	106.957	2	106.957	2	106.957	2
3004 0542	106.943	-1	106.943	-1	106.945	2	106.945	2	106.945	2	106.945	2
3004 0543	106.932	-2	106.932	-2	106.933	2	106.933	2	106.933	2	106.933	2
3004 0544	106.937	-1	106.937	-1	106.939	2	106.939	2	106.939	2	106.939	2
3004 0545	102.996	1	102.996	1	102.997	1	102.997	1	102.997	1	102.997	1
3004 0546	103.000	1	103.000	1	103.000	0	103.000	0	103.000	0	103.000	0
3004 0547	103.008	1	103.008	1	103.009	0	103.009	0	103.009	0	103.009	0
3004 0548	102.976	1	102.976	1	102.978	1	102.978	1	102.978	1	102.978	1
3004 0549	101.795	1	101.794	0	101.795	1	101.795	1	101.795	1	101.795	1
3004 0550	101.819	1	101.819	1	101.820	1	101.820	1	101.820	1	101.820	1
3004 0551	101.818	1	101.818	1	101.818	1	101.818	1	101.818	1	101.818	1
3004 0552	101.794	1	101.794	1	101.794	1	101.794	1	101.794	1	101.794	1

monitoring table



Joint Venture

project: C310 Thames Tunnel
structure: TW SOS 1 - 3

No. of reading	13. following		14. following		15. following		16. following		17. following		18. following	
	baseline	10/03/2013	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
Point No.	15/12/2012	12/01/2013	10/03/2013	11/03/2013	12/03/2013	13/03/2013	14/03/2013	15/03/2013	16/03/2013	17/03/2013	18/03/2013	
3004 0501	103.275	103.267	0	103.267	0	103.268	0	103.267	0	103.267	0	0
3004 0502	103.238	103.234	0	103.234	0	103.234	0	103.234	0	103.234	0	0
3004 0503	103.150	103.149	0	103.150	1	103.149	-1	103.148	-1	103.148	0	-2
3004 0504	103.118	103.118	0	103.118	0	103.117	-1	103.116	0	103.116	0	-2
3004 0505	103.100	103.101	0	103.100	-1	103.099	-1	103.099	0	103.099	0	-1
3004 0506	102.996	102.982	1	102.980	-2	102.980	-2	102.980	0	102.980	0	-2
3004 0507	102.964	103.249	2	103.248	-1	103.248	1	103.248	0	103.248	0	-1
3004 0508	102.972	103.230	2	103.228	-1	103.229	1	103.229	0	103.229	0	-2
3004 0509	102.972											
3004 0511	107.025			107.026	0	107.026	0	107.025	0	107.025	0	-2
3004 0512	107.000			107.001	0	107.001	0	107.001	-1	107.000	-1	-2
3004 0513	106.967			106.968	0	106.967	0	106.967	-1	106.966	-1	-3
3004 0514	107.007			107.008	0	107.007	-1	107.007	-1	107.006	-1	-3
3004 0515	107.038			107.039	0	107.038	-1	107.037	0	107.037	0	-3
3004 0516	106.944			106.942	0	106.942	0	106.940	-1	106.940	0	-4
3004 0517	106.926			106.926	0	106.927	0	106.926	-1	106.926	0	-1
3004 0518	106.957			106.957	0	106.957	0	106.957	-1	106.957	0	-1
3004 0519	106.947			106.937	0	106.938	1	106.937	-1	106.937	0	-1
3004 0521	101.892			101.893	0	101.893	0	101.892	0	101.893	1	1
3004 0522	101.809			101.809	-1	101.810	0	101.810	0	101.810	1	0
3004 0523	101.822			101.823	0	101.823	0	101.822	0	101.823	1	0
3004 0524	101.761			101.762	-1	101.762	0	101.761	0	101.762	0	-1
3004 0525	101.796			101.797	0	101.797	0	101.796	-1	101.796	0	-1
3004 0526	101.869			101.870	0	101.871	0	101.869	-2	101.870	1	0
3004 0527	101.821			101.822	0	101.822	0	101.821	-1	101.821	0	-1
3004 0528	101.840			101.825	0	101.825	0	101.824	-1	101.824	1	0
3004 0529	101.979											
3004 0541	106.956			106.957	0	106.956	-1	106.955	-1	106.955	0	-3
3004 0542	106.943			106.944	0	106.943	-1	106.943	-1	106.942	-1	-3
3004 0543	106.932			106.933	0	106.932	-1	106.932	-1	106.931	-1	-3
3004 0544	106.937			106.938	0	106.937	-1	106.937	0	106.936	-1	-2
3004 0545	102.996			102.997	-1	102.997	0	102.996	0	102.996	0	0
3004 0546	103.000			103.000	0	103.001	0	102.999	-1	103.000	0	0
3004 0547	103.008			103.009	0	103.009	0	103.008	-1	103.008	0	0
3004 0548	102.976			102.977	0	102.977	0	102.976	-1	102.976	0	0
3004 0549	101.795			101.795	-1	101.795	0	101.794	-1	101.795	1	0
3004 0550	101.819			101.819	-1	101.819	0	101.819	-1	101.819	0	0
3004 0551	101.818			101.818	-1	101.818	0	101.817	-1	101.817	0	0
3004 0552	101.794			101.794	-1	101.794	1	101.793	-1	101.794	1	0

monitoring table



Joint Venture

project: C310 Thames Tunnel

No. of reading	19. following		20. following		21. following		22. following		23. following		24. following		
	baseline	16/03/2013	17/03/2013	18/03/2013	19/03/2013	20/03/2013	21/03/2013	22/03/2013	23/03/2013	24/03/2013			
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 0501	103.275	103.267	0 -7							103.269	2 -6		
3004 0502	103.238	103.234	1 -4							103.232	-1 -6		
3004 0503	103.150	103.148	0 -1							103.147	-1 -2		
3004 0504	103.118	103.115	0 -2							103.115	-1 -3		
3004 0505	103.100	103.099	0 -1							103.098	-1 -2		
3004 0506	102.996	102.980	0 -2							102.979	-1 -3		
3004 0507	102.964	103.248	0 -1							103.247	-1 -2		
3004 0508	102.972	103.229	0 -1							103.227	-2 -3		
3004 0509	102.972												
3004 0511	107.025	107.024	1 -1	107.025	0 0	107.025	0 0						
3004 0512	106.999	106.999	1 -1	106.999	0 -1	107.000	1 -1						
3004 0513	106.967	106.965	1 -2	106.965	0 -2	106.965	0 -1						
3004 0514	107.007	107.005	1 -2	107.006	0 -2	107.006	0 -1						
3004 0515	107.038	107.036	1 -2	107.036	0 -2	107.037	1 -1						
3004 0516	106.944	106.940	0 -4	106.940	0 -4	106.940	1 -4						
3004 0517	106.926	106.925	0 -1	106.925	0 -1	106.926	1 0						
3004 0518	106.957	106.956	0 -1	106.956	1 0	106.957	1 0						
3004 0519	106.947	106.936	0 -1	106.937	0 -1	106.937	1 0						
3004 0521	101.892	101.892	0 1	101.892	0 0	101.892	0 0	101.892	0 0	101.892	0 0	101.892	0 0
3004 0522	101.809	101.808	-1 1	101.809	1 0	101.809	0 0	101.808	0 -1	101.808	0 0	101.808	0 0
3004 0523	101.822	101.822	0 0	101.822	0 0	101.822	0 0	101.821	0 -1	101.821	0 -1	101.821	0 -1
3004 0524	101.761	101.760	-1 1	101.761	1 0	101.761	0 -1	101.760	0 -1	101.760	0 -1	101.760	0 -1
3004 0525	101.796	101.795	0 -1	101.796	1 0	101.795	-1 1	101.795	0 -1	101.795	0 -1	101.795	0 -1
3004 0526	101.869	101.869	0 0	101.870	1 1	101.868	-1 1	101.869	0 0	101.869	1 0	101.869	0 0
3004 0527	101.821	101.821	0 -1	101.821	0 0	101.820	-1 1	101.821	0 -1	101.821	0 -1	101.821	0 0
3004 0528	101.840	101.824	0 0	101.825	1 1	101.824	-1 0	101.824	0 0	101.824	0 0	101.824	0 0
3004 0529	101.979												
3004 0541	106.956	106.954	1 -2	106.955	0 -2	106.955	1 -1						
3004 0542	106.943	106.942	1 -2	106.942	0 -2	106.942	0 -1						
3004 0543	106.932	106.931	1 -1	106.931	0 -1	106.931	0 -1						
3004 0544	106.937	106.936	1 -1	106.936	0 -1	106.936	0 -1						
3004 0545	102.996	102.995	0 -1	102.996	0 -1	102.995	-1 1	102.995	0 -1	102.995	0 -1	102.995	0 -1
3004 0546	103.000	102.999	0 -1	102.999	0 0	102.999	-1 1	102.999	0 -1	102.999	0 -1	102.999	0 -1
3004 0547	103.008	103.008	0 -1	103.007	0 -1	103.007	0 -1	103.008	0 -1	103.008	0 -1	103.008	0 0
3004 0548	102.976	102.976	0 -1	102.976	1 0	102.976	-1 1	102.976	1 0	102.976	0 0	102.976	0 0
3004 0549	101.795	101.794	0 -1	101.794	0 0	101.794	0 0	101.794	0 0	101.794	0 0	101.794	0 -1
3004 0550	101.819	101.818	0 -1	101.819	1 0	101.818	0 -1	101.818	0 -1	101.818	0 -1	101.819	0 0
3004 0551	101.818	101.817	-1 1	101.818	1 0	101.817	-1 1	101.817	0 0	101.817	0 0	101.817	0 0
3004 0552	101.794	101.793	-1 1	101.793	0 0	101.794	0 0	101.794	0 0	101.794	0 0	101.794	-1 0

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: TW SOS 1-3

No. of reading	25. following		26. following		27. following		28. following		29. following		30. 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
date	15/12/2012 12/01/2013	25/02/2013	27/03/2013	02/04/2013	11/04/2013	21/05/2013	15/06/2013					
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 0501	103.275		103.266	-3	103.266	0	103.268	2	103.266	-2		
3004 0502	103.238		103.233	0	103.233	0	103.234	2	103.232	-2		
3004 0503	103.150		103.147	0	103.147	0	103.149	2	103.147	-2		
3004 0504	103.118		103.115	0	103.115	0	103.116	1	103.115	-2		
3004 0505	103.100		103.097	-1	103.098	1	103.100	2	103.099	-2		
3004 0506	102.996		102.979	0	102.980	0	102.981	1	103.150	new Baseline		
3004 0507	102.964		102.947	0	102.947	0	102.949	2	103.245	-3		
3004 0508	102.972		103.228	1	103.228	0	103.229	1	103.227	-2		
3004 0509	102.972											
3004 0511	107.025		107.024	0	107.025	1	107.025	0	107.024	-1		
3004 0512	107.000		destroyed						106.972	new Baseline		
3004 0513	106.987		106.983	-2	106.983	0	106.959	-4	106.958	-1		
3004 0514	107.007		107.006	0	107.007	1	107.006	-1	107.005	-1		
3004 0515	107.038		107.037	0	107.038	1	107.037	-1	107.036	0		
3004 0516	106.944		106.940	-1	106.941	-3	106.940	-1	106.940	0		
3004 0517	106.926		106.925	-1	106.927	1	106.925	-1	106.928	0		
3004 0518	106.957		106.956	-1	106.958	2	106.957	-1	106.956	0		
3004 0519	106.947		106.937	0	106.938	1	106.937	-1	106.937	0		
3004 0521	101.892		101.892	0	101.891	0	101.892	1	101.891	-1		
3004 0522	101.809		101.808	0	101.808	-1	101.809	1	101.808	-1		
3004 0523	101.822		101.821	0	101.821	-1	101.822	1	101.821	-1		
3004 0524	101.761		101.760	-1	101.760	0	101.761	1	101.760	-1		
3004 0525	101.796		101.796	0	101.795	-1	101.795	0	101.796	0		
3004 0526	101.869		101.870	0	101.869	-1	101.868	-1	101.870	2		
3004 0527	101.821		101.821	0	101.821	-1	101.821	0	101.821	1		
3004 0528	101.840		101.825	1	101.824	-1	101.824	0	101.825	0		
3004 0529	101.979											
3004 0541	106.956		106.955	0	106.955	1	106.955	-1	106.954	0		
3004 0542	106.943		106.942	0	106.943	0	106.942	-1	106.942	0		
3004 0543	106.932		106.931	0	106.932	1	106.931	-1	106.931	-1		
3004 0544	106.937		106.936	0	106.937	1	106.936	-1	106.936	0		
3004 0545	102.996		102.996	0	102.995	-1	102.995	0	102.996	1		
3004 0546	103.000		103.000	1	102.999	-1	102.999	0	103.000	1		
3004 0547	103.008		103.008	0	103.007	-1	103.008	0	103.008	0		
3004 0548	102.976		102.976	1	102.976	-1	102.976	0	102.977	1		
3004 0549	101.795		101.795	1	101.794	-1	101.794	0	101.794	0		
3004 0550	101.819		101.819	0	101.819	0	101.818	0	101.819	1		
3004 0551	101.818		101.817	0	101.817	-1	101.817	0	101.817	1		
3004 0552	101.794		101.794	0	101.794	-1	101.794	0	101.794	0		

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: TW SOS 1 - 3

No. of reading	31. following		32. following		33. following		34. following		35. following		36. following		
	baseline	17/06/2013	16/06/2013	19/06/2013	20/06/2013	21/06/2013	22/06/2013	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0501	103.275	103.267	103.267	103.267	103.267	103.267	103.267	103.267	103.267	103.267	103.267	103.267	103.267
3004 0502	103.238	103.233	103.233	103.233	103.233	103.233	103.233	103.233	103.233	103.233	103.233	103.233	103.233
3004 0503	103.150	103.147	103.147	103.147	103.147	103.147	103.147	103.147	103.147	103.147	103.147	103.147	103.147
3004 0504	103.118	103.115	103.115	103.115	103.115	103.115	103.115	103.115	103.115	103.115	103.115	103.115	103.115
3004 0505	103.100	103.098	103.099	103.099	103.099	103.099	103.099	103.099	103.099	103.099	103.099	103.099	103.099
3004 0506	102.996	103.150	103.150	103.150	103.150	103.150	103.150	103.150	103.150	103.150	103.150	103.150	103.150
3004 0507	102.964	103.247	103.247	103.246	103.246	103.246	103.245	103.245	103.245	103.245	103.245	103.245	103.245
3004 0508	102.972	103.228	103.228	103.227	103.227	103.227	103.226	103.226	103.226	103.226	103.226	103.226	103.226
3004 0509	102.972												
3004 0511	107.025	107.025	107.024	107.024	107.024	107.024	107.025	107.025	107.025	107.025	107.025	107.025	107.025
3004 0512	107.000	106.972	106.972	106.972	106.972	106.972	106.972	106.972	106.972	106.972	106.972	106.972	106.972
3004 0513	106.967	106.959	106.959	106.959	106.959	106.959	106.959	106.959	106.959	106.959	106.959	106.959	106.959
3004 0514	107.007	107.006	107.006	107.005	107.005	107.005	107.005	107.004	107.004	107.004	107.004	107.004	107.004
3004 0515	107.038	107.037	107.037	107.036	107.036	107.036	107.036	107.035	107.035	107.035	107.035	107.035	107.035
3004 0516	106.944	106.940	106.940	106.940	106.940	106.940	106.939	106.939	106.939	106.939	106.939	106.939	106.939
3004 0517	106.926	106.926	106.926	106.926	106.926	106.926	106.926	106.926	106.926	106.926	106.926	106.926	106.926
3004 0518	106.957	106.956	106.956	106.957	106.957	106.957	106.956	106.956	106.956	106.956	106.956	106.956	106.956
3004 0519	106.947	106.936	106.936	106.936	106.936	106.936	106.936	106.936	106.936	106.936	106.936	106.936	106.936
3004 0521	101.892	101.891	101.891	101.891	101.891	101.891	101.892	101.892	101.892	101.892	101.892	101.891	101.891
3004 0522	101.809	101.808	101.808	101.807	101.807	101.808	101.808	101.808	101.808	101.808	101.808	101.808	101.808
3004 0523	101.822	101.820	101.820	101.820	101.821	101.821	101.821	101.821	101.821	101.821	101.821	101.821	101.821
3004 0524	101.761	101.759	101.759	101.759	101.760	101.760	101.760	101.760	101.760	101.760	101.760	101.760	101.760
3004 0525	101.796	101.795	101.795	101.795	101.796	101.796	101.796	101.796	101.796	101.796	101.796	101.795	101.795
3004 0526	101.869	101.868	101.868	101.869	101.869	101.869	101.870	101.870	101.870	101.870	101.870	101.869	101.869
3004 0527	101.821	101.821	101.821	101.820	101.821	101.821	101.821	101.822	101.822	101.822	101.822	101.820	101.820
3004 0528	101.840	101.824	101.824	101.824	101.824	101.824	101.824	101.824	101.825	101.825	101.825	101.823	101.823
3004 0529	101.979												
3004 0541	106.956	106.955	106.955	106.954	106.954	106.954	106.954	106.954	106.954	106.954	106.954	106.955	106.955
3004 0542	106.943	106.942	106.942	106.941	106.941	106.942	106.942	106.942	106.942	106.942	106.942	106.942	106.942
3004 0543	106.932	106.931	106.931	106.931	106.931	106.931	106.931	106.931	106.931	106.931	106.931	106.931	106.931
3004 0544	106.937	106.936	106.936	106.937	106.937	106.937	106.936	106.936	106.936	106.936	106.936	106.936	106.936
3004 0545	102.996	102.995	102.995	102.995	102.996	102.996	102.996	102.996	102.996	102.996	102.996	102.995	102.995
3004 0546	103.000	102.999	102.999	102.999	102.999	102.999	103.000	103.000	103.000	103.000	103.000	102.999	102.999
3004 0547	103.008	103.008	103.008	103.008	103.008	103.008	103.008	103.008	103.008	103.008	103.008	103.008	103.008
3004 0548	102.976	102.976	102.976	102.976	102.976	102.976	102.976	102.976	102.976	102.976	102.976	102.976	102.976
3004 0549	101.795	101.794	101.794	101.793	101.793	101.794	101.794	101.794	101.794	101.794	101.794	101.795	101.795
3004 0550	101.819	101.818	101.818	101.818	101.818	101.818	101.819	101.819	101.819	101.819	101.819	101.818	101.818
3004 0551	101.818	101.817	101.817	101.816	101.816	101.816	101.818	101.818	101.818	101.818	101.818	101.817	101.817
3004 0552	101.794	101.793	101.793	101.793	101.793	101.793	101.794	101.794	101.794	101.794	101.794	101.793	101.793

monitoring table



Joint Venture

project: C310 Thames Tunnel
structure: TW SOS 1-3

No. of reading date	baseline elevation	37. following		38. following		39. following		40. following		41. following		42. 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
	15/12/2012 12/01/2013												
3004 0501	103.275	103.266	-1	103.266	-1	103.266	-1	103.267	1	103.266	0	103.266	0
3004 0502	103.238	103.232	-1	103.232	-1	103.232	-1	103.232	1	103.232	0	103.232	0
3004 0503	103.150	103.146	-2	103.146	-2	103.146	-2	103.146	0	103.146	0	103.146	0
3004 0504	103.118	103.113	-2	103.113	-2	103.113	-2	103.114	1	103.113	-1	103.113	-1
3004 0505	103.100	103.097	-2	103.097	-2	103.097	-2	103.097	1	103.097	-1	103.097	-1
3004 0506	102.996	103.148	-2	103.148	-2	103.148	-2	103.149	2	103.148	-1	103.148	-1
3004 0507	102.964	103.244	-2	103.244	-2	103.244	-2	103.245	1	103.244	-1	103.244	-1
3004 0508	102.972	103.223	-3	103.223	-3	103.223	-3	103.226	3	103.224	-2	103.224	-2
3004 0509	102.972												
3004 0511	107.025	107.024	-1	107.024	0	107.024	0	107.024	0	107.024	0	107.024	1
3004 0512	107.000	106.972	0	106.972	0	106.972	0			106.971	-1	106.971	0
3004 0513	106.967	106.959	0	106.959	0	106.958	-8			106.958	-1	106.959	1
3004 0514	107.007	107.005	0	107.004	-1	107.004	-1			107.004	0	107.005	0
3004 0515	107.038	107.036	0	107.036	-1	107.036	-1			107.035	0	107.036	1
3004 0516	106.944	106.939	0	106.938	-1	106.938	-1			106.938	0	106.938	1
3004 0517	106.926	106.925	1	106.924	-1	106.924	-1			106.924	-1	106.924	1
3004 0518	106.957	106.955	0	106.955	0	106.955	0			106.955	-1	106.955	1
3004 0519	106.947	106.936	0	106.936	0	106.936	0			106.935	-1	106.935	0
3004 0521	101.892	101.891	0	101.892	1	101.892	1			101.891	-1	101.890	-1
3004 0522	101.809	101.808	0	101.808	0	101.808	0			101.808	0	101.808	0
3004 0523	101.822	101.820	-1	101.821	0	101.821	0			101.820	0	101.818	-3
3004 0524	101.761	101.759	-1	101.760	0	101.760	0			101.759	0	101.757	-2
3004 0525	101.796	101.795	0	101.795	0	101.795	0			101.795	0	101.794	-1
3004 0526	101.869	101.869	0	101.869	0	101.869	0			101.869	0	101.868	-1
3004 0527	101.821	101.821	1	101.820	0	101.820	0			101.820	0	101.820	0
3004 0528	101.840	101.823	0	101.824	0	101.824	0			101.822	-1	101.821	-1
3004 0529	101.979												
3004 0541	106.956	106.954	0	106.954	-1	106.954	-1			106.954	0	106.954	0
3004 0542	106.943	106.941	-1	106.941	-1	106.941	-1			106.941	0	106.941	0
3004 0543	106.932	106.931	0	106.931	0	106.931	0			106.930	-1	106.931	1
3004 0544	106.937	106.935	-1	106.935	-1	106.935	-1			106.935	0	106.935	0
3004 0545	102.996	102.995	0	102.995	0	102.995	0			102.995	0	102.994	-1
3004 0546	103.000	102.998	-1	102.999	0	102.999	0			102.998	0	102.998	0
3004 0547	103.008	103.007	-1	103.007	0	103.007	0			103.007	-1	103.007	0
3004 0548	102.976	102.976	0	102.976	0	102.976	0			102.975	0	102.975	0
3004 0549	101.795	101.794	0	101.794	0	101.794	0			101.794	0	101.794	0
3004 0550	101.819	101.817	0	101.817	0	101.817	0			101.817	-1	101.818	1
3004 0551	101.818	101.817	0	101.817	0	101.817	0			101.818	1	101.817	-1
3004 0552	101.794	101.793	0	101.793	0	101.793	0			101.793	0	101.793	0


monitoring table



Joint Venture

project: C310 Thames Tunnel
structure: TW SOS 1 - 3

No. of reading	43. following		44. following		45. following		46. following		47. following		48. following		49. following	
	baseline 15/12/2012 12/01/2013	14/08/2013	19/08/2013	08/09/2013	10/09/2013	18/10/2013	06/02/2014	07/02/2014						
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	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0501	103.275	0 -9	103.266	-1 -9	103.267	2 -8	Point Lost							
3004 0502	103.238	-1 -7	103.231	-1 -7	103.231	-1 -7	Point Lost							
3004 0503	103.150	-1 -5	103.144	-1 -5	103.144	-1 -5	Point Lost							
3004 0504	103.118	-1 -6	103.112	-1 -7	103.111	-1 -7	Point Lost							
3004 0505	103.100	-1 -5	103.096	-1 -6	103.095	-1 -6	Point Lost							
3004 0506	102.996	-1 -3	103.148	-1 -3	103.147	-1 -3	Point Lost							
3004 0507	102.964	-1 -6	103.243	-1 -6	103.242	-1 -7	Point Damaged							
3004 0508	102.972	0 -6	103.224	0 -7	103.224	0 -7	Point Lost							
3004 0509	102.972						Point Lost							
3004 0511	107.025	-2 -2	107.023	-1 -2	107.023	-1 -2	Point Lost							
3004 0512	107.000	-2 -2	106.970	-2 -2	106.970	-1 -2	Point Lost							
3004 0513	106.967	-3 -11	106.956	-2 -11	106.956	-2 -11	Point Lost							
3004 0514	107.007	-3 -5	107.002	-3 -5	107.001	-3 -6	Point Lost							
3004 0515	107.038	-2 -5	107.033	-2 -5	107.032	-3 -6	Point Lost							
3004 0516	106.944	-2 -8	106.936	-2 -8	106.935	-3 -9	Point Lost							
3004 0517	106.926	-2 -4	106.922	-2 -4	106.922	-2 -4	Point Lost							
3004 0518	106.957	-2 -3	106.954	-2 -3	106.953	-2 -4	Point Lost							
3004 0519	106.947	-1 -3	106.934	-1 -3	106.934	-1 -4	Point Lost							
3004 0521	101.892						Point Lost							
3004 0522	101.809						Point Lost							
3004 0523	101.822						Point Lost							
3004 0524	101.761						Point Lost							
3004 0525	101.796						Point Lost							
3004 0526	101.869						Point Lost							
3004 0527	101.821						Point Lost							
3004 0528	101.840						Point Lost							
3004 0529	101.979						Point Lost							
3004 0541	106.956	-2 -5	106.952	-2 -5	106.951	-1 -5	Point Lost							
3004 0542	106.943	-2 -5	106.939	-2 -5	106.938	0 -5	Point Lost							
3004 0543	106.932	-3 -4	106.928	-3 -4	106.927	-1 -5	Point Lost							
3004 0544	106.937	-2 -4	106.933	-2 -4	106.932	-1 -5	Point Lost							
3004 0545	102.996						Point Lost							
3004 0546	103.000						Point Lost							
3004 0547	103.008						Point Lost							
3004 0548	102.976						Point Lost							
3004 0549	101.795						Point Lost							
3004 0550	101.819						Point Lost							
3004 0551	101.818						Point Lost							
3004 0552	101.794						Point Lost							

		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDIX 22

Southern Outfall Sewer Pumping Station

Learning Legacy Document

monitoring asset	Southern Outfall Sewer (SOS) + Pumpstation		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70001		
name of monitoring section:	Southern Outfall Sewer Pumping Station		
sensor type:	manual levelling studs		
chainage:	91450	point no.:	3004 0541 - 3004 0552
trigger values: [mm]	green: +12 -12	amber: +15 -15	red: +18 -18
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	12/12/2012 12/01/2013	0 0			
TBM 1	start ZOI	11/03/13	0.94	3004 0541	
	end ZOI	15/03/13	-2.66	3004 0541	breached not any trigger value
TBM 2	start ZOI	19/06/13	-1.28	3004 0549	
	end ZOI	23/06/13	-0.88	3004 0549	breached not any trigger value
longterm	07/02/14	-3.61	3004 0542		
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

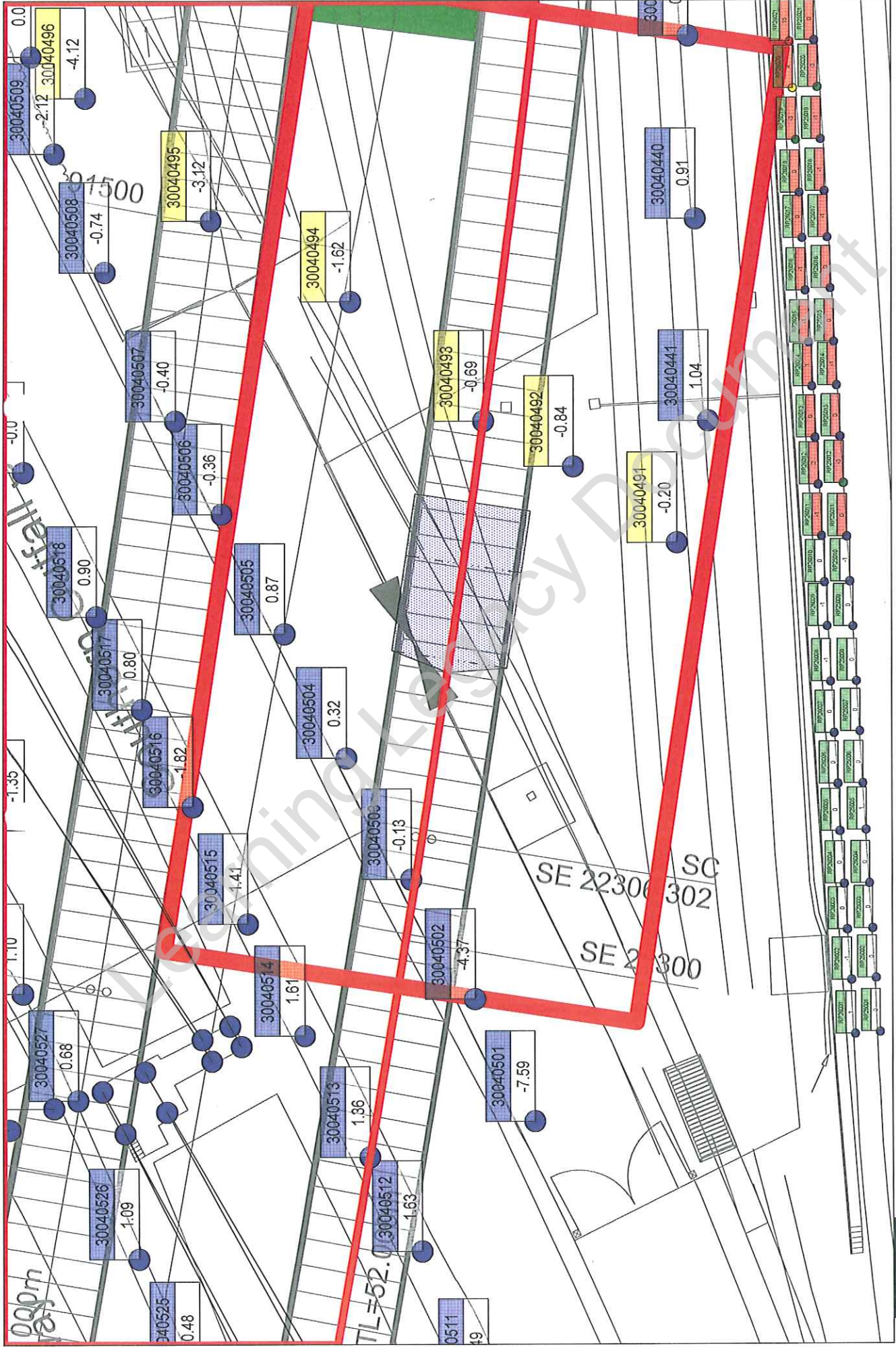
Overall, none of the points reached any trigger value.
 Under consideration of temperature differences, the surrounding ground condition and the achievable accuracy of the measurement, HMJV has no concern to cease the monitoring.
 The rate of change in the monitoring data is less than the required standards 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 Joint Venture
 current values: 11.03.2013 06:59

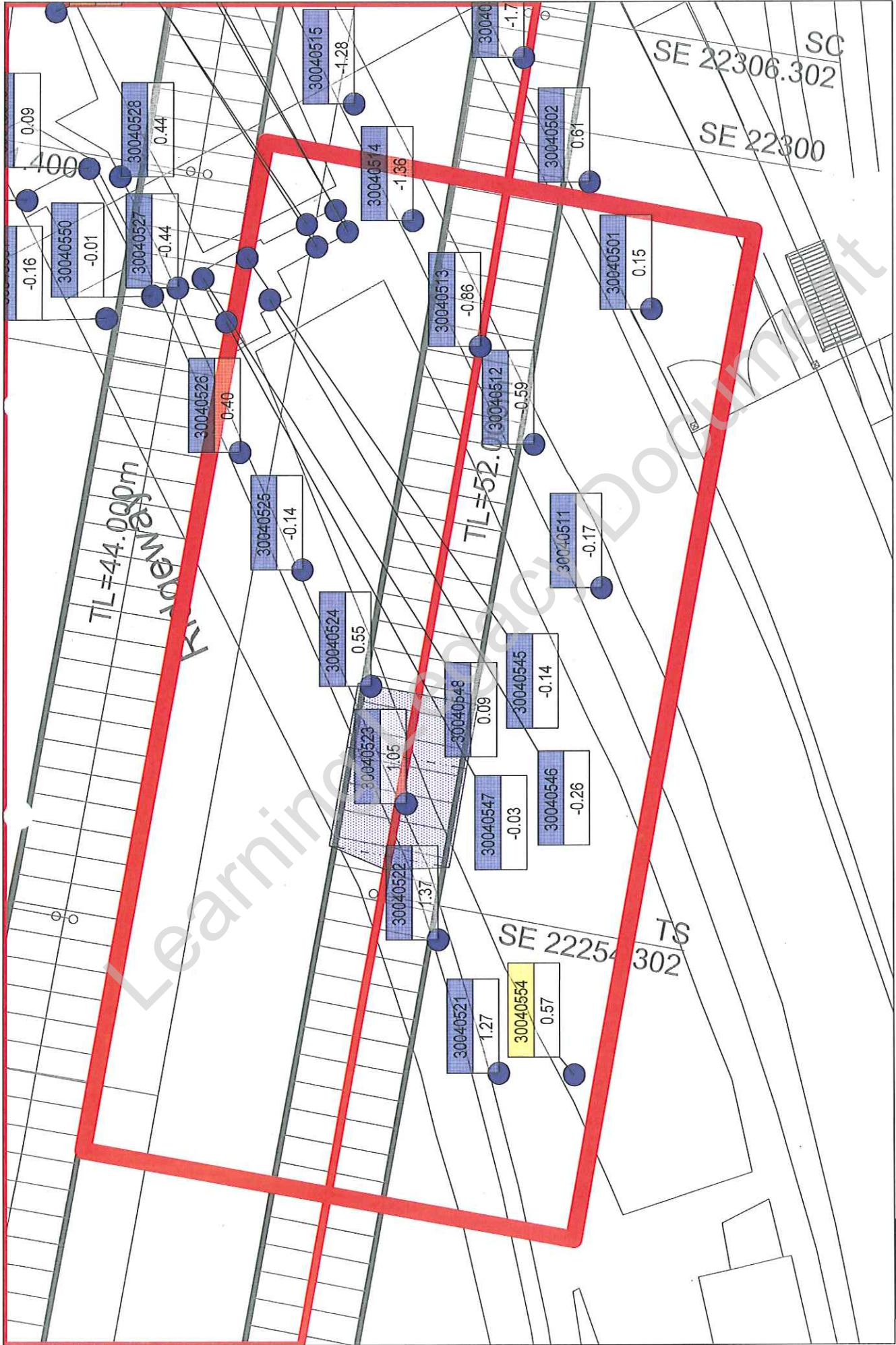


Point: 30040541

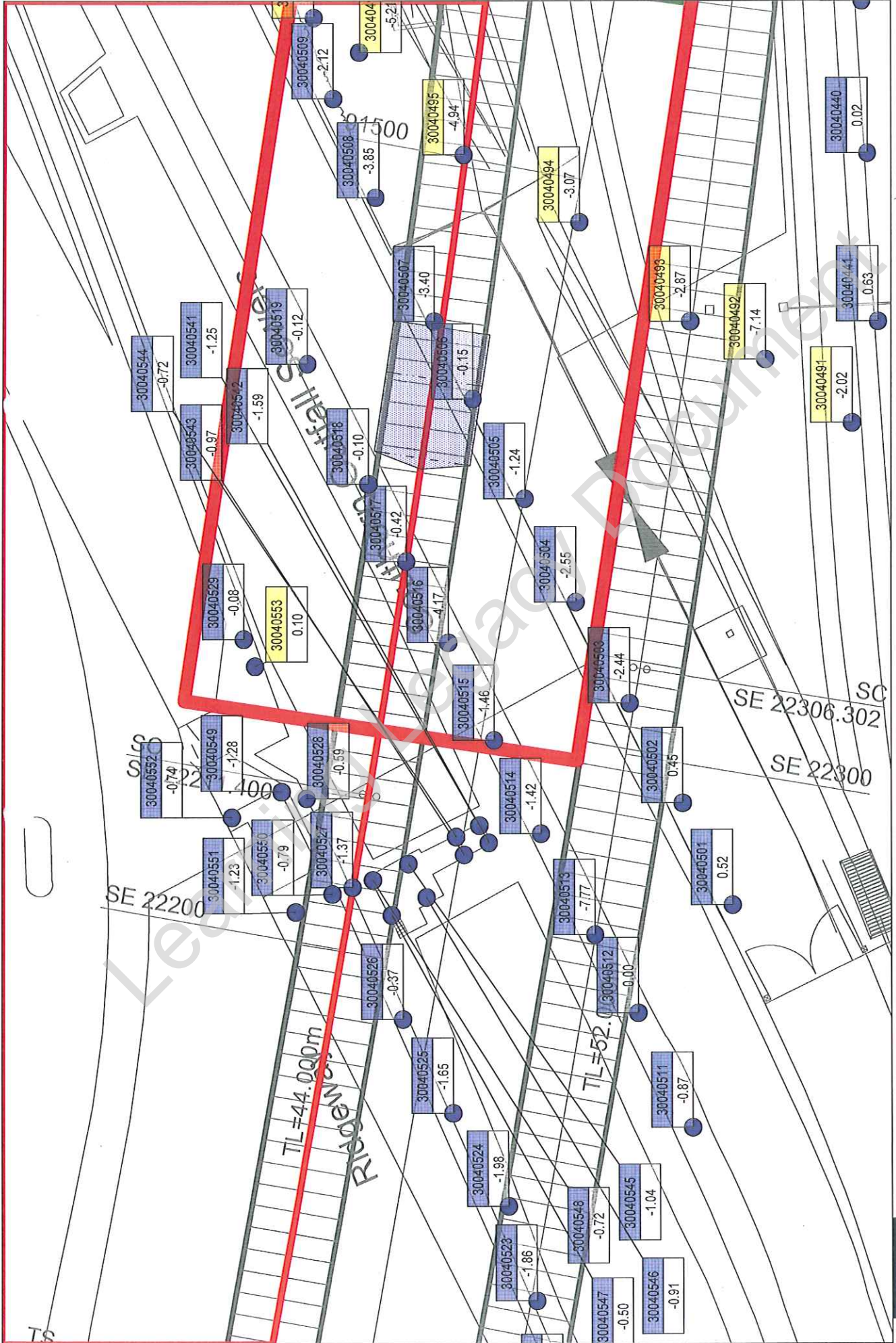


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Southern Outfall Sewer Pumping Station 12.12.2012 - 07.02.2014
date: 28.07.2014 14:39 current values: 28.07.2014 14:26





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive, portal excavation, lining walls and grouting
 current values: 15.03.2013 06:59



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 19.06.2013 09:00

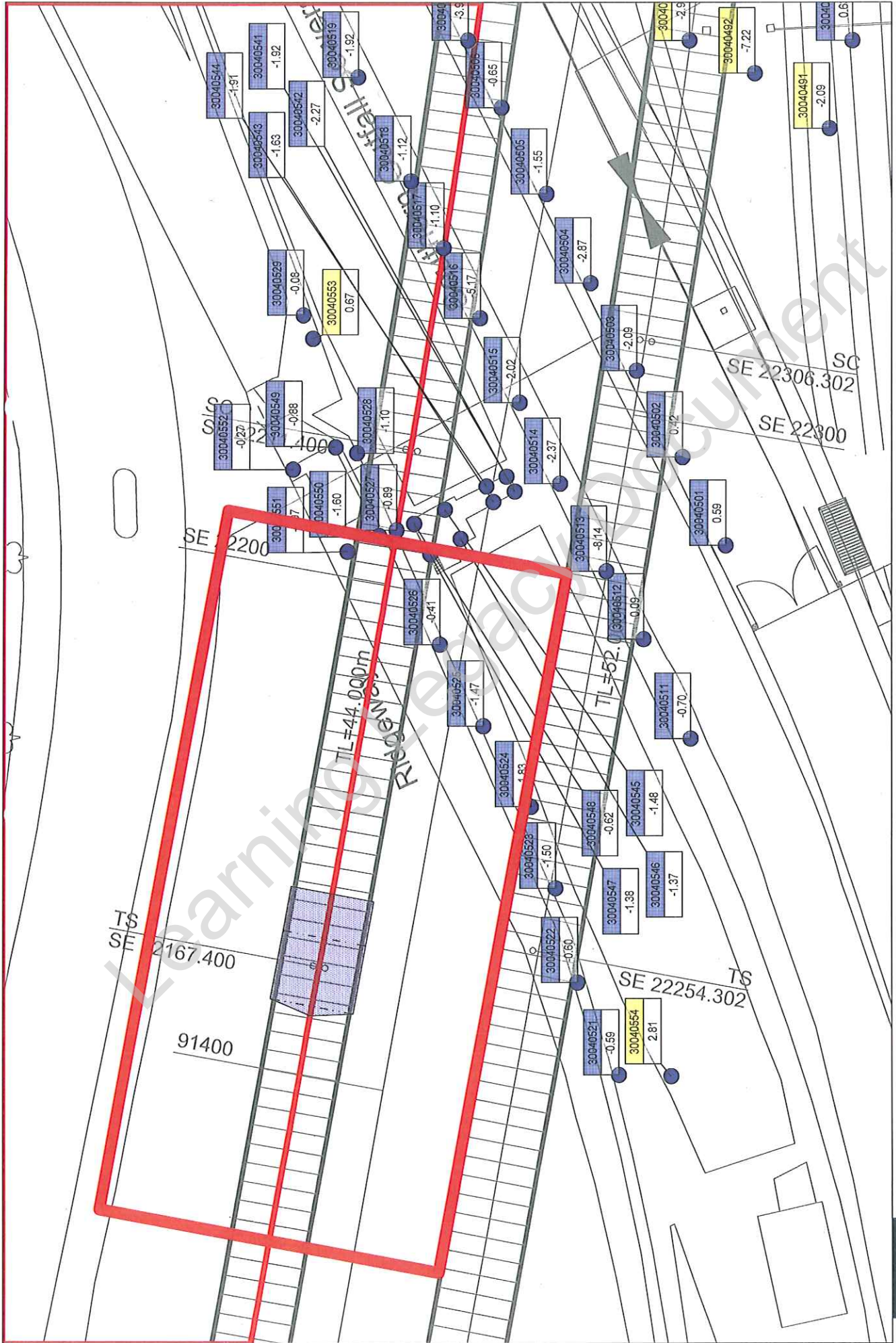


Point: 30040549



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Southern Outfall Sewer Pumping Station 12.12.2012 - 07.02.2014
date: 29.07.2014 08:36 current values: 29.07.2014 08:13





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 23.06.2013 09:00

monitoring table



Joint Venture

project: C310 Thames Tunnel
structure: TW SOS 1 - 3

No. of reading	7. following		8. following		9. following		10. following		11. following		12. following				
	baseline	15/12/2012 12074/2013	20/02/2013	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 0501	103.275	103.268	1	103.269	1	2	103.267	-2	0	103.267	0	0	103.267	0	0
3004 0502	103.238	103.234	0	103.235	1	3	103.234	-2	1	103.234	0	1	103.234	0	1
3004 0503	103.150	103.151	1	103.151	1	2	103.150	-1	0	103.150	0	0	103.150	0	0
3004 0504	103.118	103.119	1	103.119	0	1	103.118	-2	0	103.118	0	0	103.118	0	0
3004 0505	103.100	103.101	1	103.102	0	1	103.100	-2	0	103.101	0	0	103.101	1	1
3004 0506	102.996	102.988	-8	102.982	new Baseline	new Baseline	102.981	-1	-1	102.981	0	-1	102.981	0	-1
3004 0507	102.964			103.249	103.248	103.248	103.248	-1	-1	103.248	0	-1	103.247	-2	-1
3004 0508	102.972	102.971	-1	103.230	new Baseline	new Baseline	103.229	-2	-2	103.229	0	-1	103.228	-1	-1
3004 0509	102.972	102.970	-2				destroyed								
3004 0511	107.025	107.025	-1	0			107.026	1	1						
3004 0512	107.000	107.001	-1	0			107.002	1	1						
3004 0513	106.987	106.987	-1	0			106.988	1	1						
3004 0514	107.007	107.007	-1	0			107.009	2	1						
3004 0515	107.038	107.038	-2	0			107.039	2	1						
3004 0516	106.944	106.941	-4	-3			106.942	1	-2						
3004 0517	106.926	106.926	-1	0			106.927	0	1						
3004 0518	106.957	106.957	-1	0			106.957	0	1						
3004 0519	106.947	106.938	-1	0			106.937	0	0						
3004 0521	101.892	101.891	0	0			101.893	2	1						
3004 0522	101.809	101.808	0	0			101.810	2	1						
3004 0523	101.822	101.822	0	0			101.823	2	1						
3004 0524	101.761	101.761	0	0			101.762	1	1						
3004 0525	101.796	101.796	1	0			101.797	1	0						
3004 0526	101.869	101.870	0	0			101.870	1	1						
3004 0527	101.821	101.822	1	0			101.822	1	1						
3004 0528	101.840	101.824	1	0			101.825	1	1						
3004 0529	101.979														
3004 0541	106.956	106.956	-1	-1			106.957	2	1						
3004 0542	106.943	106.943	-1	0			106.945	2	1						
3004 0543	106.932	106.932	-2	0			106.933	2	1						
3004 0544	106.937	106.937	-1	0			106.939	2	1						
3004 0545	102.996	102.996	1	0			102.997	1	1						
3004 0546	103.000	103.000	1	0			103.000	0	0						
3004 0547	103.008	103.008	1	0			103.009	0	1						
3004 0548	102.976	102.976	1	0			102.978	1	1						
3004 0549	101.795	101.794	1	0			101.795	1	1						
3004 0550	101.819	101.819	1	0			101.820	1	1						
3004 0551	101.818	101.818	1	0			101.818	1	1						
3004 0552	101.794	101.794	1	0			101.794	1	1						

monitoring table



Joint Venture

project: C310 Thames Tunnel
structure: TW SOS 1-3

No. of reading	13. following		14. following		15. following		16. following		17. following		18. following	
	baseline	15/12/2012 1201/2013	11/03/2013	12/03/2013	13/03/2013	14/03/2013	15/03/2013	16/03/2013	17/03/2013	18/03/2013	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 0501	103.275	0	103.267	0	103.268	0	103.267	0	103.267	0	103.267	0
3004 0502	103.238	0	103.234	0	103.234	0	103.234	0	103.233	0	103.233	0
3004 0503	103.150	0	103.150	1	103.149	-1	103.148	-1	103.148	0	103.148	0
3004 0504	103.118	0	103.118	0	103.117	-1	103.116	-2	103.116	0	103.116	0
3004 0505	103.100	0	103.100	-1	103.099	-1	103.099	0	103.099	0	103.099	0
3004 0506	102.986	1	102.982	-2	102.980	-2	102.980	0	102.980	0	102.980	0
3004 0507	102.964	2	102.948	-2	102.948	1	102.948	0	102.948	0	102.948	0
3004 0508	102.972	2	102.928	-2	102.928	-1	102.929	0	102.929	0	102.929	0
3004 0509	102.972											
3004 0511	107.025		107.026	0	107.026	0	107.025	0	107.025	0	107.025	-2
3004 0512	107.000		107.001	0	107.001	0	107.001	-1	107.000	-1	106.998	-2
3004 0513	106.967		106.968	0	106.967	0	106.967	-1	106.966	-1	106.964	-2
3004 0514	107.007		107.008	0	107.007	-1	107.007	-1	107.006	-1	107.004	-1
3004 0515	107.038		107.039	0	107.038	-1	107.037	-1	107.037	0	107.035	-1
3004 0516	106.944		106.942	0	106.942	0	106.940	-4	106.940	0	106.940	-1
3004 0517	106.926		106.926	0	106.927	0	106.926	-1	106.926	0	106.925	-1
3004 0518	106.957		106.957	0	106.957	0	106.957	-1	106.957	0	106.956	-1
3004 0519	106.947		106.937	0	106.938	1	106.937	-1	106.937	0	106.936	-1
3004 0521	101.892		101.893	0	101.893	0	101.892	0	101.893	1	101.892	-1
3004 0522	101.809		101.809	-1	101.810	0	101.810	0	101.810	1	101.809	-1
3004 0523	101.822		101.823	0	101.823	0	101.822	0	101.822	1	101.822	-1
3004 0524	101.761		101.762	-1	101.762	0	101.761	0	101.762	0	101.760	-1
3004 0525	101.796		101.797	0	101.797	0	101.796	-1	101.796	0	101.796	-1
3004 0526	101.869		101.870	0	101.871	0	101.869	-2	101.870	1	101.869	-1
3004 0527	101.821		101.822	0	101.822	0	101.821	-1	101.821	0	101.821	0
3004 0528	101.840		101.825	0	101.825	0	101.824	-1	101.825	1	101.824	0
3004 0529	101.979											
3004 0541	106.956		106.957	0	106.956	-1	106.955	-1	106.955	0	106.953	-1
3004 0542	106.943		106.944	0	106.943	-1	106.943	-1	106.942	-1	106.940	-2
3004 0543	106.932		106.933	0	106.932	-1	106.932	-1	106.931	-1	106.929	-2
3004 0544	106.937		106.938	0	106.937	-1	106.937	0	106.936	-1	106.935	-1
3004 0545	102.996		102.997	-1	102.997	0	102.996	-1	102.996	0	102.996	0
3004 0546	103.000		103.000	0	103.001	0	102.999	-1	103.000	0	102.999	0
3004 0547	103.008		103.009	0	103.009	0	103.008	-1	103.008	0	103.008	0
3004 0548	102.976		102.977	0	102.977	0	102.976	0	102.976	0	102.976	0
3004 0549	101.795		101.795	-1	101.795	0	101.794	-1	101.795	1	101.794	-1
3004 0550	101.819		101.819	-1	101.819	0	101.819	-1	101.819	0	101.819	0
3004 0551	101.818		101.818	-1	101.818	0	101.817	-1	101.817	0	101.818	0
3004 0552	101.794		101.794	-1	101.794	1	101.793	-1	101.793	1	101.794	0

monitoring table



Joint Venture

project: C310 Thames Tunnel
structure: TW SOS 1-3

No. of reading date	18/03/2013		19/03/2013		20/03/2013		21/03/2013		22/03/2013		23/03/2013		24/03/2013			
	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	elevation	deviation from last/ baseline		
3004 0501	103.275	0	103.267	-7							103.269	2				
3004 0502	103.238	1	103.234	-4							103.232	-1				
3004 0503	103.150	0	103.148	-1							103.147	-1				
3004 0504	103.118	0	103.116	-2							103.115	-1				
3004 0505	103.100	0	103.099	-1							103.098	-1				
3004 0506	102.996	0	102.980	-2							102.979	-1				
3004 0507	102.964	0	102.948	-1							102.947	-1				
3004 0508	102.972	0	102.929	-1							102.927	-2				
3004 0509	102.972															
3004 0511	107.025	1	107.024	1	107.025	0	107.025	0	107.025	0						
3004 0512	107.000	1	106.999	-1	106.999	0	-1	107.000	1	-1						
3004 0513	106.987	1	106.985	-2	106.985	0	-2	106.985	0	-1						
3004 0514	107.007	1	107.005	-2	107.006	0	-2	107.006	0	-1						
3004 0515	107.038	1	107.036	-2	107.036	0	-2	107.037	1	-1						
3004 0516	106.944	0	106.940	-4	106.940	0	-4	106.940	1	-4						
3004 0517	106.926	0	106.925	-1	106.925	0	-1	106.925	1	0						
3004 0518	106.957	0	106.956	-1	106.956	1	0	106.957	1	0						
3004 0519	106.947	0	106.936	-1	106.937	0	-1	106.937	1	0						
3004 0521	101.892	0	101.892	0	101.892	0	0	101.892	0	0	101.892	0	0	101.892	0	0
3004 0522	101.809	-1	101.808	-1	101.809	1	0	101.809	0	0	101.808	0	0	101.808	0	0
3004 0523	101.822	0	101.822	0	101.822	0	0	101.822	0	0	101.821	0	-1	101.821	0	-1
3004 0524	101.761	-1	101.760	-1	101.761	1	0	101.760	0	-1	101.760	0	-1	101.760	0	-1
3004 0525	101.796	0	101.795	-1	101.796	1	0	101.795	-1	-1	101.795	0	-1	101.795	0	-1
3004 0526	101.869	0	101.869	0	101.870	1	1	101.868	-1	-1	101.869	0	0	101.869	1	0
3004 0527	101.821	0	101.821	0	101.821	0	0	101.820	-1	-1	101.821	0	-1	101.821	0	0
3004 0528	101.840	0	101.824	-1	101.825	1	1	101.824	-1	0	101.824	0	0	101.824	0	0
3004 0529	101.979															
3004 0541	106.956	1	106.954	-2	106.955	0	-2	106.955	1	-1						
3004 0542	106.943	1	106.942	-1	106.942	0	-2	106.942	0	-1						
3004 0543	106.932	1	106.931	-1	106.931	0	-1	106.931	0	-1						
3004 0544	106.937	1	106.936	-1	106.936	1	0	106.936	0	-1						
3004 0545	102.996	0	102.995	-1	102.996	0	0	102.995	-1	-1	102.995	0	-1	102.995	0	-1
3004 0546	103.000	0	102.999	-1	102.999	0	0	102.999	-1	-1	102.999	0	-1	102.999	0	-1
3004 0547	103.008	0	103.008	0	103.007	0	-1	103.007	0	0	103.008	0	0	103.008	0	0
3004 0548	102.976	0	102.976	0	102.976	0	0	102.976	-1	-1	102.976	0	0	102.976	0	0
3004 0549	101.795	0	101.794	-1	101.794	0	0	101.794	0	0	101.794	0	0	101.794	0	0
3004 0550	101.819	0	101.818	-1	101.819	1	0	101.818	0	-1	101.818	0	-1	101.818	0	-1
3004 0551	101.818	-1	101.817	-1	101.818	1	0	101.817	-1	-1	101.817	0	0	101.817	0	0
3004 0552	101.794	-1	101.793	-1	101.793	0	0	101.794	0	0	101.794	0	0	101.794	0	0

monitoring table



Joint Venture

project: C310 Thames Tunnel

No. of reading	25. following		26. following		27. following		28. following		29. following		30. following	
	baseline elevation	15/12/2012 12/01/2013	22/03/2013	27/03/2013	02/04/2013	11/04/2013	21/05/2013	15/06/2013	21/05/2013	15/06/2013	21/05/2013	15/06/2013
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 0501	103.275		103.266	-3	103.266	0	103.268	2	103.266	-2	103.266	-8
3004 0502	103.238		103.233	0	103.233	0	103.234	2	103.232	-2	103.232	-6
3004 0503	103.150		103.147	0	103.147	0	103.149	2	103.147	-2	103.147	-3
3004 0504	103.118		103.115	0	103.115	0	103.116	1	103.115	-2	103.115	-3
3004 0505	103.100		103.097	-1	103.098	1	103.100	2	103.099	-2	103.099	-2
3004 0506	102.996		102.979	0	102.980	0	102.981	1	102.981	0	103.150	new Baseline
3004 0507	102.964		103.247	0	103.247	0	103.249	2	103.246	-3	103.246	-3
3004 0508	102.972		103.228	1	103.228	0	103.229	1	103.227	-2	103.227	-3
3004 0511	107.025		107.024	0	107.025	1	107.025	0	107.025	0	107.024	-1
3004 0512	107.000		detroyed		106.983	-2	106.983	0	106.959	-4	106.972	new Baseline
3004 0513	106.967		107.006	0	107.007	1	107.006	-1	107.005	-1	107.005	-1
3004 0514	107.007		107.037	0	107.038	1	107.037	0	107.037	0	107.036	0
3004 0515	107.038		106.940	-1	106.941	1	106.940	-1	106.940	-1	106.940	-2
3004 0516	106.944		106.925	-1	106.927	1	106.925	-1	106.925	-1	106.926	0
3004 0517	106.926		106.956	-1	106.958	2	106.957	-1	106.956	0	106.956	0
3004 0518	106.957		106.937	0	106.938	1	106.937	-1	106.937	-1	106.937	-1
3004 0519	106.947		101.892	0	101.891	0	101.892	1	101.891	-1	101.891	0
3004 0521	101.892	0	101.892	0	101.891	0	101.892	1	101.891	-1	101.891	0
3004 0522	101.809	0	101.808	0	101.808	-1	101.809	1	101.808	-1	101.808	-1
3004 0523	101.822	0	101.821	0	101.821	-1	101.822	1	101.821	-1	101.820	-2
3004 0524	101.761	0	101.760	-1	101.760	0	101.761	1	101.760	-1	101.760	-1
3004 0525	101.796	0	101.796	0	101.795	-1	101.795	0	101.795	0	101.796	0
3004 0526	101.869	0	101.870	0	101.869	-1	101.868	-1	101.870	2	101.868	-2
3004 0527	101.821	0	101.821	0	101.821	-1	101.821	0	101.821	1	101.821	-1
3004 0528	101.840	0	101.825	1	101.824	-1	101.824	0	101.825	0	101.824	0
3004 0529	101.979											
3004 0541	106.956		106.955	0	106.955	1	106.955	-1	106.954	0	106.954	-2
3004 0542	106.943		106.942	0	106.943	0	106.942	-1	106.942	0	106.942	-2
3004 0543	106.932		106.931	0	106.932	1	106.931	-1	106.931	-1	106.931	-2
3004 0544	106.937		106.936	0	106.937	1	106.936	-1	106.936	0	106.936	0
3004 0545	102.996	0	102.996	1	102.995	-1	102.995	0	102.996	1	102.996	1
3004 0546	103.000	0	103.000	1	102.999	-1	102.999	0	103.000	1	102.999	0
3004 0547	103.008	0	103.008	0	103.007	-1	103.008	0	103.008	0	103.008	0
3004 0548	102.976	0	102.977	1	102.976	-1	102.976	0	102.977	1	102.976	-1
3004 0549	101.795	1	101.795	0	101.794	-1	101.794	0	101.794	0	101.794	-1
3004 0550	101.819	0	101.819	0	101.819	0	101.818	0	101.819	1	101.819	0
3004 0551	101.818	0	101.818	0	101.817	-1	101.817	0	101.818	1	101.817	0
3004 0552	101.794	0	101.794	0	101.794	-1	101.794	0	101.793	0	101.794	-1

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: TW SOS 1 - 3

No. of reading	baseline		31. following		32. following		33. following		34. following		35. following		36. 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
	15/12/2012	103.275		103.267	1	-8	103.267	0	-7	103.267	0	-7	103.267	0	-7
3004 0501	103.275			103.267	1	-8	103.267	0	-7	103.267	0	-7	103.267	0	-7
3004 0502	103.238			103.233	0	-5	103.233	0	-5	103.233	0	-5	103.233	0	-5
3004 0503	103.150			103.147	0	-3	103.147	0	-3	103.147	0	-3	103.147	0	-3
3004 0504	103.118			103.115	0	-3	103.115	0	-3	103.115	0	-3	103.115	0	-3
3004 0505	103.100			103.098	0	-2	103.098	0	-2	103.098	0	-2	103.098	0	-2
3004 0506	102.996			103.150	0	0	103.150	0	0	103.149	-1	-1	103.150	0	-1
3004 0507	102.964			103.247	0	-3	103.246	-1	-3	103.245	-1	-4	103.245	0	-4
3004 0508	102.972			103.228	1	-3	103.227	-1	-4	103.226	-1	-4	103.226	0	-4
3004 0509	102.972														
3004 0511	107.025			107.024	0	-1	107.024	0	-1	107.025	0	0	107.024	0	-1
3004 0512	107.000			106.972	0	-28	106.972	0	-28	106.972	0	-28	106.972	0	-28
3004 0513	106.967			106.959	1	-8	106.959	0	-8	106.959	0	-8	106.959	0	-8
3004 0514	107.007			107.006	0	-1	107.005	-1	-2	107.005	-1	-3	107.005	-1	-2
3004 0515	107.038			107.037	0	-1	107.036	0	-2	107.036	0	-2	107.035	-1	-2
3004 0516	106.944			106.940	0	-4	106.940	0	-4	106.939	-1	-5	106.938	0	-5
3004 0517	106.926			106.926	0	0	106.926	0	0	106.925	0	-1	106.924	-1	-2
3004 0518	106.957			106.956	0	0	106.957	0	0	106.956	-1	-1	106.956	0	-1
3004 0519	106.947			106.936	-1	-11	106.936	-1	-11	106.936	-1	-11	106.936	-1	-11
3004 0521	101.892			101.890	-1	-2	101.891	1	0	101.892	1	0	101.891	-1	-1
3004 0522	101.809			101.808	0	-1	101.807	-1	-2	101.808	1	0	101.808	0	0
3004 0523	101.822			101.820	0	-2	101.820	0	-2	101.821	1	-1	101.821	0	-1
3004 0524	101.761			101.759	0	-2	101.759	0	-2	101.760	1	-1	101.760	0	-1
3004 0525	101.796			101.795	0	-1	101.795	-1	-2	101.796	1	0	101.795	-1	-1
3004 0526	101.869			101.868	0	-1	101.869	1	0	101.870	1	1	101.870	0	0
3004 0527	101.821			101.821	0	-1	101.820	0	-1	101.821	1	0	101.820	-2	-1
3004 0528	101.840			101.824	0	0	101.824	-1	-1	101.824	0	0	101.823	-1	-1
3004 0529	101.979														
3004 0541	106.956			106.955	-1	-1	106.954	0	-2	106.954	0	-2	106.955	1	-2
3004 0542	106.943			106.942	-1	-2	106.941	-1	-2	106.942	1	-1	106.941	-1	-2
3004 0543	106.932			106.931	-1	-1	106.931	0	-1	106.931	0	-1	106.931	1	-2
3004 0544	106.937			106.936	-1	-1	106.937	0	-1	106.936	-1	-1	106.936	-1	-1
3004 0545	102.996			102.995	0	-1	102.995	0	-1	102.996	1	0	102.995	-1	-1
3004 0546	103.000			102.999	0	-1	102.999	0	-1	103.000	1	0	102.999	-1	-1
3004 0547	103.008			103.008	0	0	103.008	0	-1	103.008	1	0	103.008	0	0
3004 0548	102.976			102.976	0	0	102.976	0	-1	102.977	1	0	102.976	-1	-1
3004 0549	101.795			101.794	0	-1	101.793	0	-1	101.794	1	0	101.793	-1	-1
3004 0550	101.819			101.818	0	-1	101.818	0	-1	101.819	1	0	101.818	-1	-2
3004 0551	101.818			101.817	0	-1	101.816	0	-1	101.818	1	0	101.817	-2	-1
3004 0552	101.794			101.793	0	0	101.793	0	-1	101.794	1	0	101.794	0	0

monitoring table



Joint Venture

project: C310 Thames Tunnel
structure: TW SOS 1 - 3

No. of reading date	37. following 23/06/2013		38. following 24/06/2013		39. following 25/06/2013		40. following 02/07/2013		41. following 03/07/2013		42. following 15/07/2013	
	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 0501	103.275		103.266	-1	103.267	1	103.266	0	103.266	0	103.266	-9
3004 0502	103.238		103.232	-1	103.232	0	103.232	0	103.232	0	103.232	-6
3004 0503	103.150		103.146	-2	103.146	0	103.146	0	103.146	0	103.146	-4
3004 0504	103.118		103.113	-2	103.114	1	103.113	-1	103.113	-1	103.113	-5
3004 0505	103.100		103.097	-2	103.097	1	103.097	1	103.097	0	103.097	-3
3004 0506	102.996		103.148	-2	103.148	2	103.148	2	103.148	-1	103.148	-2
3004 0507	102.964		103.244	-2	103.245	1	103.244	-1	103.244	-1	103.244	-6
3004 0508	102.972		103.223	-3	103.226	3	103.224	-2	103.224	-2	103.224	-6
3004 0509	102.972											
3004 0511	107.025	-1	107.024	0	107.024	0	107.024	0	107.024	0	107.024	-1
3004 0512	107.000	0	106.972	0	106.972	0	106.971	-1	106.971	-1	106.971	0
3004 0513	106.967	0	106.959	0	106.958	0	106.958	-1	106.959	-1	106.959	-8
3004 0514	107.007	0	107.005	0	107.004	-1	107.004	0	107.005	0	107.005	-3
3004 0515	107.038	-2	107.036	-1	107.036	-1	107.035	0	107.036	0	107.036	-2
3004 0516	106.944	0	106.939	0	106.938	-1	106.938	0	106.938	-1	106.938	-6
3004 0517	106.926	0	106.925	1	106.924	-1	106.924	-1	106.924	-1	106.924	-2
3004 0518	106.957	0	106.955	0	106.955	0	106.955	-1	106.955	-1	106.955	-1
3004 0519	106.947	0	106.936	0	106.936	0	106.935	-1	106.935	-1	106.935	-2
3004 0521	101.892	0	101.891	0	101.892	1	101.891	-1	101.891	-1	101.890	-1
3004 0522	101.809	0	101.808	0	101.808	0	101.808	0	101.808	0	101.808	-1
3004 0523	101.822	-1	101.820	-1	101.821	0	101.820	0	101.820	-2	101.819	-3
3004 0524	101.761	-1	101.759	-2	101.760	0	101.759	0	101.759	0	101.757	-2
3004 0525	101.796	0	101.795	0	101.795	0	101.795	0	101.795	0	101.794	-1
3004 0526	101.869	0	101.869	0	101.869	0	101.869	0	101.869	0	101.868	-1
3004 0527	101.821	1	101.821	1	101.820	0	101.820	0	101.820	0	101.820	-2
3004 0528	101.840	0	101.823	0	101.824	0	101.823	-1	101.822	-1	101.821	-3
3004 0529	101.979											
3004 0541	106.956	0	106.954	0	106.954	-1	106.954	-1	106.954	0	106.954	-2
3004 0542	106.943	-1	106.941	-1	106.941	-1	106.941	-1	106.941	0	106.941	-3
3004 0543	106.932	0	106.931	0	106.931	0	106.931	0	106.931	-1	106.931	-2
3004 0544	106.937	-1	106.935	-1	106.936	0	106.936	0	106.935	0	106.935	-2
3004 0545	102.996	0	102.995	0	102.995	0	102.995	0	102.995	0	102.994	-1
3004 0546	103.000	-1	102.998	-1	102.999	0	102.998	0	102.998	0	102.998	-2
3004 0547	103.008	-1	103.007	-1	103.007	0	103.007	-1	103.007	-1	103.007	0
3004 0548	102.976	0	102.976	0	102.976	0	102.975	0	102.975	0	102.975	-1
3004 0549	101.795	0	101.794	0	101.794	0	101.794	0	101.794	0	101.794	0
3004 0550	101.819	0	101.817	0	101.817	0	101.817	-1	101.817	-1	101.818	-1
3004 0551	101.818	0	101.817	0	101.817	0	101.817	0	101.818	1	101.817	-1
3004 0552	101.794	0	101.793	0	101.793	0	101.793	0	101.793	0	101.793	0


monitoring table



Joint Venture

Project: C310 Thames Tunnel
structure: TW SOS 1 - 3

No. of reading date	baseline 15/12/2012 12/01/2013	43. following 14/02/2013		44. following 19/02/2013		45. following 09/03/2013		46. following 16/03/2013		47. following 18/10/2013		48. following 06/02/2014		49. following 07/02/2014	
		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 0501	103.275	103.266	0 -9	103.266	-1 -9	103.267	2 -8	103.267	2 -8	103.267	2 -8				
3004 0502	103.238	103.231	-1 -7	103.231	-1 -7										
3004 0503	103.150	103.145	-1 -5	103.144	-1 -5										
3004 0504	103.118	103.112	-1 -6	103.111	-1 -7										
3004 0505	103.100	103.096	-1 -5	103.095	-1 -6										
3004 0506	102.996	103.148	-1 -5	103.147	0 -3										
3004 0507	102.964	103.243	-1 -6	103.242	-1 -7										
3004 0508	102.972	103.224	0 -6	103.224	0 -7										
3004 0509	102.972														
3004 0511	107.025	107.023	-2 -2	107.023	-1 -2										
3004 0512	107.000	106.970	-2 -2	106.970	-1 -2										
3004 0513	106.967	106.956	-3 -11	106.956	-2 -11										
3004 0514	107.007	107.002	-3 -5	107.001	-3 -6										
3004 0515	107.038	107.033	-2 -5	107.032	-3 -6										
3004 0516	106.944	106.936	-2 -8	106.935	-3 -9										
3004 0517	106.926	106.922	-2 -4	106.923	-1 -3										
3004 0518	106.957	106.954	-2 -3	106.953	-2 -4										
3004 0519	106.947	106.934	-1 -3	106.934	-1 -4										
3004 0521	101.892														
3004 0522	101.809														
3004 0523	101.822														
3004 0524	101.761														
3004 0525	101.796														
3004 0526	101.869														
3004 0527	101.821														
3004 0528	101.840														
3004 0529	101.979														
3004 0541	106.956	106.952	-2 -5	106.951	-1 -5										
3004 0542	106.943	106.939	-2 -5	106.938	0 -5										
3004 0543	106.932	106.928	-3 -4	106.927	-1 -5										
3004 0544	106.937	106.933	-2 -4	106.932	-1 -5										
3004 0545	102.996														
3004 0546	103.000														
3004 0547	103.008														
3004 0548	102.976														
3004 0549	101.795														
3004 0550	101.819														
3004 0551	101.818														
3004 0552	101.794														

		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDIX 23

Southern Outfall Sewer Extensometer

Learning Legacy Document

monitoring asset	Southern Outfall Sewer (SOS) + Pumpstation		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70001		
name of monitoring section:	Southern Outfall Sewer Pumping Station		
sensor type:	Extensometer		
chainage:	91410 / 91460	point no.:	3004 0553 - 3004 0554
trigger values: [mm]	green: +12 -12	amber: +15 -15	red: +18 -18
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	30/01/2013 07/02/2013	0 0		
TBM 1	start ZOI 14/03/13	0.57	3004 0554	
	end ZOI 22/03/13	0.38	3004 0554	breached not any trigger value
TBM 2	start ZOI 19/06/13	0.10	3004 0553	
	end ZOI 22/06/13	0.55	3004 0553	breached not any trigger value
longterm	07/02/14	-0.60 +3.04	3004 0553 3004 0554	
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)		

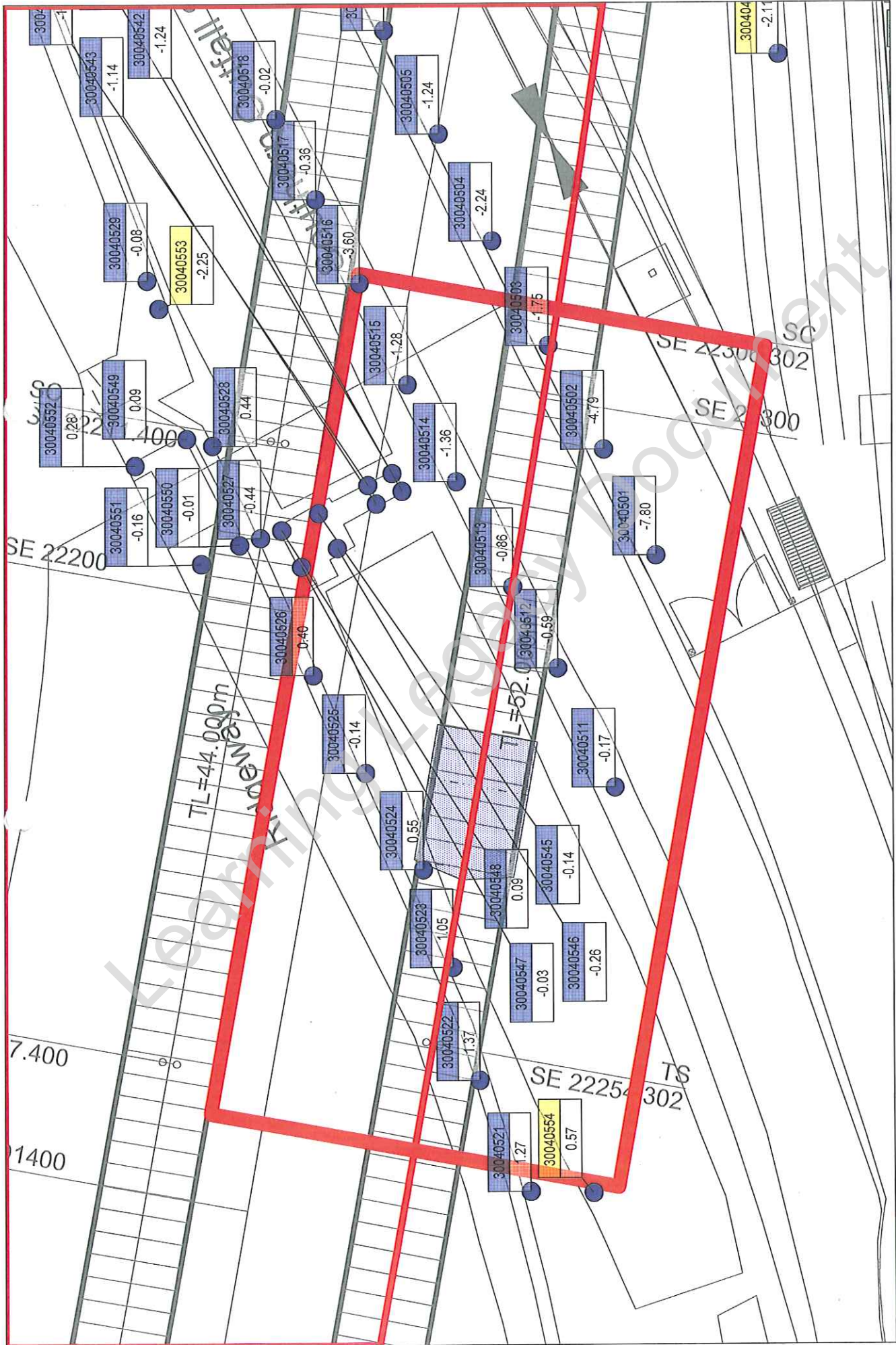
summary / comments

Both of the points were destroyed direct after installation, and point 3004 0553 a 2nd time on 22.05. and new baselined 15.06.2013
 Overall, none of the points reached any trigger 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.
 Monitoring data shows that shallow datum movements behaved similar to those on the surface.

date / signature: 22/01/2015

print name:

HMJV project role: Monitoring & Survey engineer

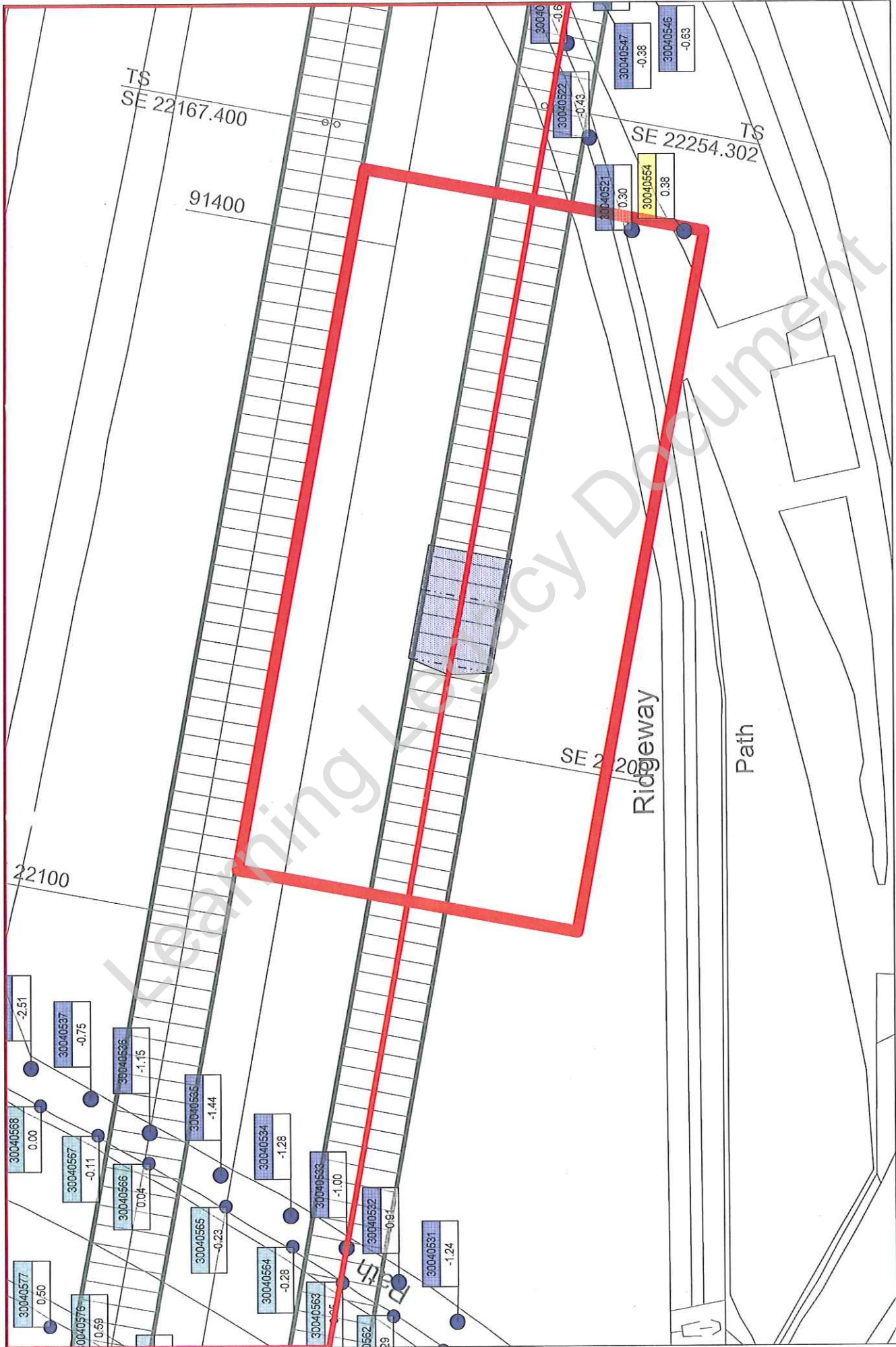


Point: 30040554



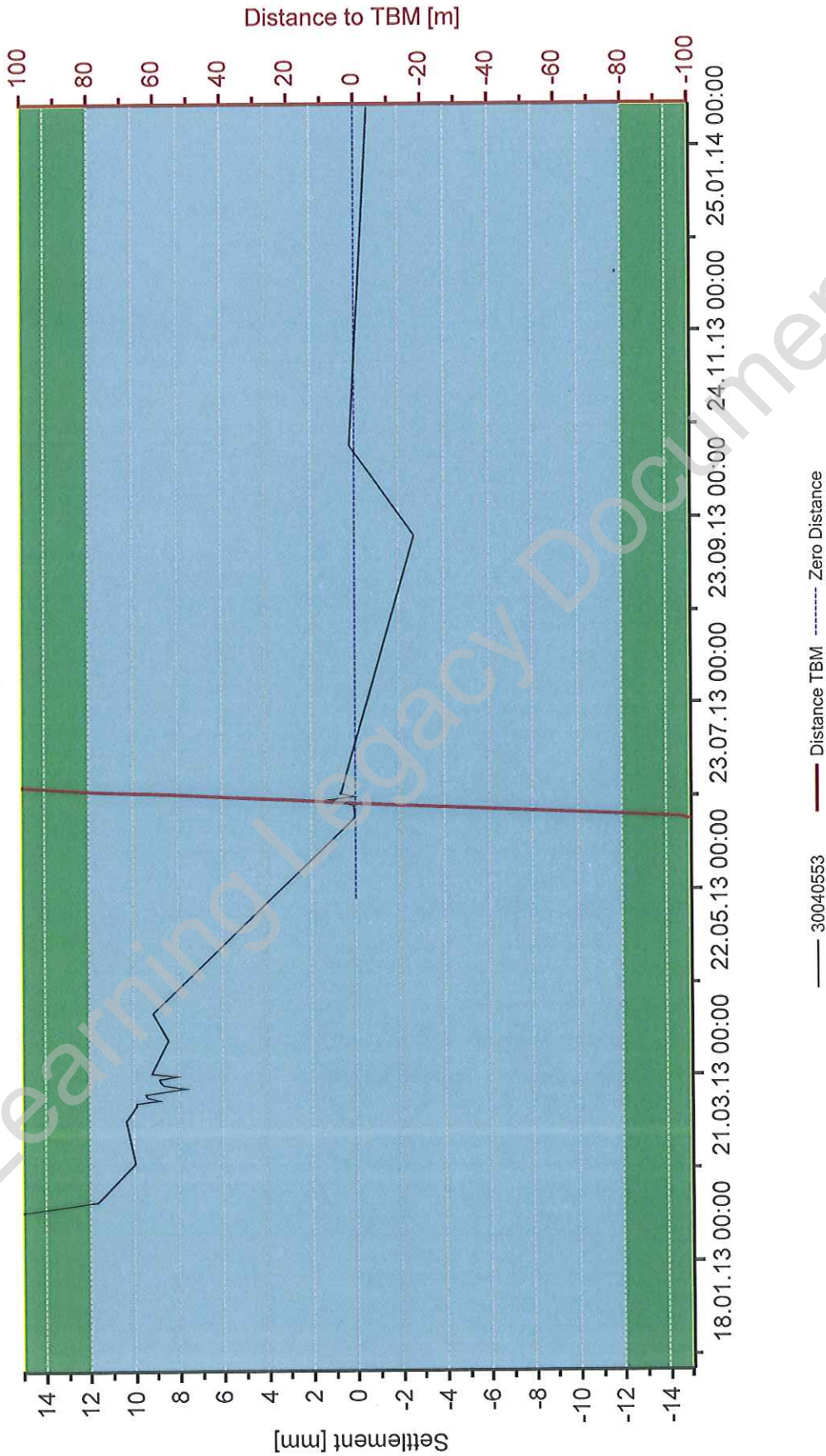
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Southern Outfall Sewer Extensometer 12.12.2012 - 07.02.2014
date: 28.07.2014 16:03 current values: 28.07.2014 15:52





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: 22.03.2013 08:17

Point: 30040553

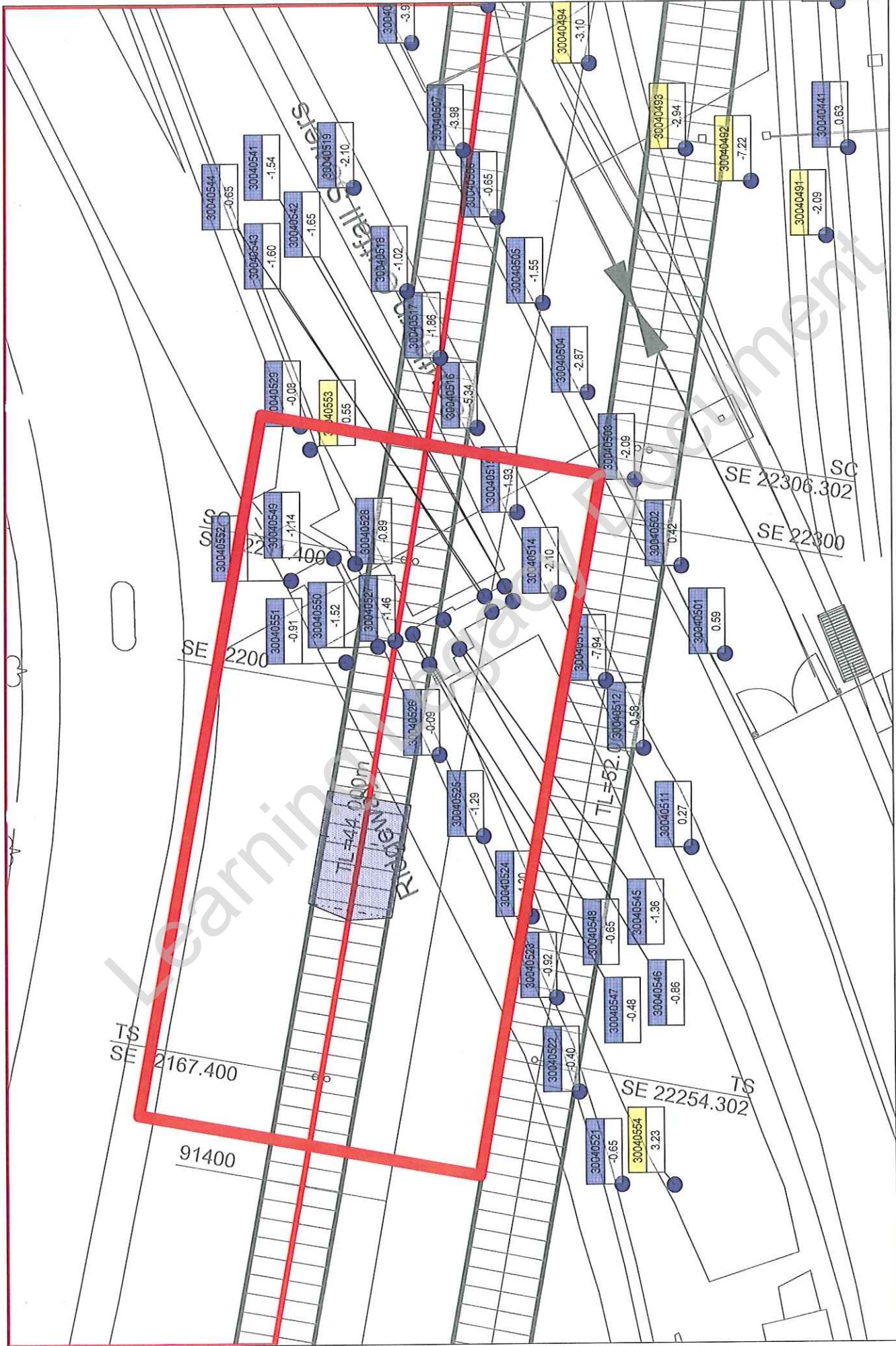


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

Close Out Report: EB Tunnel - Southern Outfall Sewer Extensometer 12.12.2012 - 07.02.2014

date: 29.07.2014 08:31 current values: 29.07.2014 08:13





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 22.06.2013 09:00

No. of reading date	Baseline			1. following			2. following			3. following			
	length of extensometer rod in m	elevation of head in mATD	calliper reading in mm	toe level of extensometer in mATD	elevation of head in mATD	calliper reading in mm	toe level of extensometer in mATD	elevation of head in mATD	calliper reading in mm	toe level of extensometer in mATD	elevation of head in mATD	calliper reading in mm	toe level of extensometer in mATD
			02/02/2013										
				07/02/2013 new Baseline									
30040553	6.0	102.37931	98.39	96.28092	102.37856	105.62	96.27294	102.37843	107.21	96.27122	102.37893	107.34	96.27159
30040554	6.0	102.38724	100.00	96.28724	102.38585	103.40	96.28245	102.39148	111.74	96.27974	102.39306	111.33	96.28173

reference points: 3000 H=102.36246
3001 H=102.41427

Legacy Document

Joint Venture

Joint Venture

project: C310 Thames Tunnel

project: C310 Thames Tunnel

No. of reading	structure: Extensometer / Shallow Datum in SOS																													
	baseline	1. following		2. following		3. following		4. following		5. following		6. following		7. following		8. following		9. following		10. following		11. following		12. following						
Date	30/1/13	05/02/2013		07/02/2013		10/02/2013		06/03/2013		11/03/2013		12/03/2013		13/03/2013		14/03/2013		16/03/2013		16/03/2013		17/03/2013		18/03/2013						
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	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				
30040553	96.281	0	96.273	new Baseline	96.271	-2	96.272	0	-1	96.271	0	-2	96.271	0	-2	96.271	1	-2	96.271	0	-2	96.270	-1	-3	96.269	-1	-4	96.270	1	-3
30040554	96.287	0	96.282	new Baseline	96.280	-3	96.282	2	-1	96.282	0	0	96.283	1	0	96.282	0	0	96.283	0	0	96.282	0	0	96.284	1	1	96.284	1	1

Engineering Legacy Document

Joint Venture

Joint Venture


project: C310 Thames Tunnel

project: C310 Thames Tunnel

Joint Venture

No. of reading file	25. following		26. following		27. following		28. following		29. following		30. following		31. following		32. following		33. following		34. following		35. following		36. 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		
30040553	96.281	1	96.261	-1	96.262	1	96.262	0	96.262	0	96.262	0	96.259	-3	96.261	3	96.261	0	96.261	-1						
30040554	96.287	2	96.286	1	96.285	3	96.286	1	96.287	0	96.287	0	96.283	-4	96.285	1	96.285	2	96.285	1						

Engineering Legacy Document

 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDIX 32
SOS Plumstead Road South

Learning Legacy Document

monitoring asset

Southern Outfall Sewer under Plumstead Road

reference monitoring drawing:

C310-HTM-C-DWG-CR146-ST004-70001

name of monitoring section:

SOS levelling studs Plumstead Road South

sensor type:

manual levelling studs

chainage:

90600 - 91100

point no.:

3004 0661 - 3004 0697

trigger values:
[mm]

green: +12
-12

amber: +15
-15

red: +18
-18

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	25/02/13	0.00		
TBM 1	start ZOI	04/04/13	0.71	3004 0661
		16/04/13	-0.30	3004 0679
		30/04/13	0.26	3004 0697
	end ZOI	07/04/13	-0.62	3004 0661
		22/04/13	-0.55	3004 0679
		04/05/13	0.65	3004 0697
TBM 2	start ZOI	09/07/13	1.45	3004 0661
		17/07/13	-1.06	3004 0679
		30/07/13	0.74	3004 0697
	end ZOI	11/07/13	1.45	3004 0661
		22/07/13	-1.62	3004 0679
		02/08/13	-0.23	3004 0697
longterm		10/03/15	-1.44	3004 0661
		10/03/15	-1.09	3004 0679
		13/11/13	-0.40	3004 0697
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

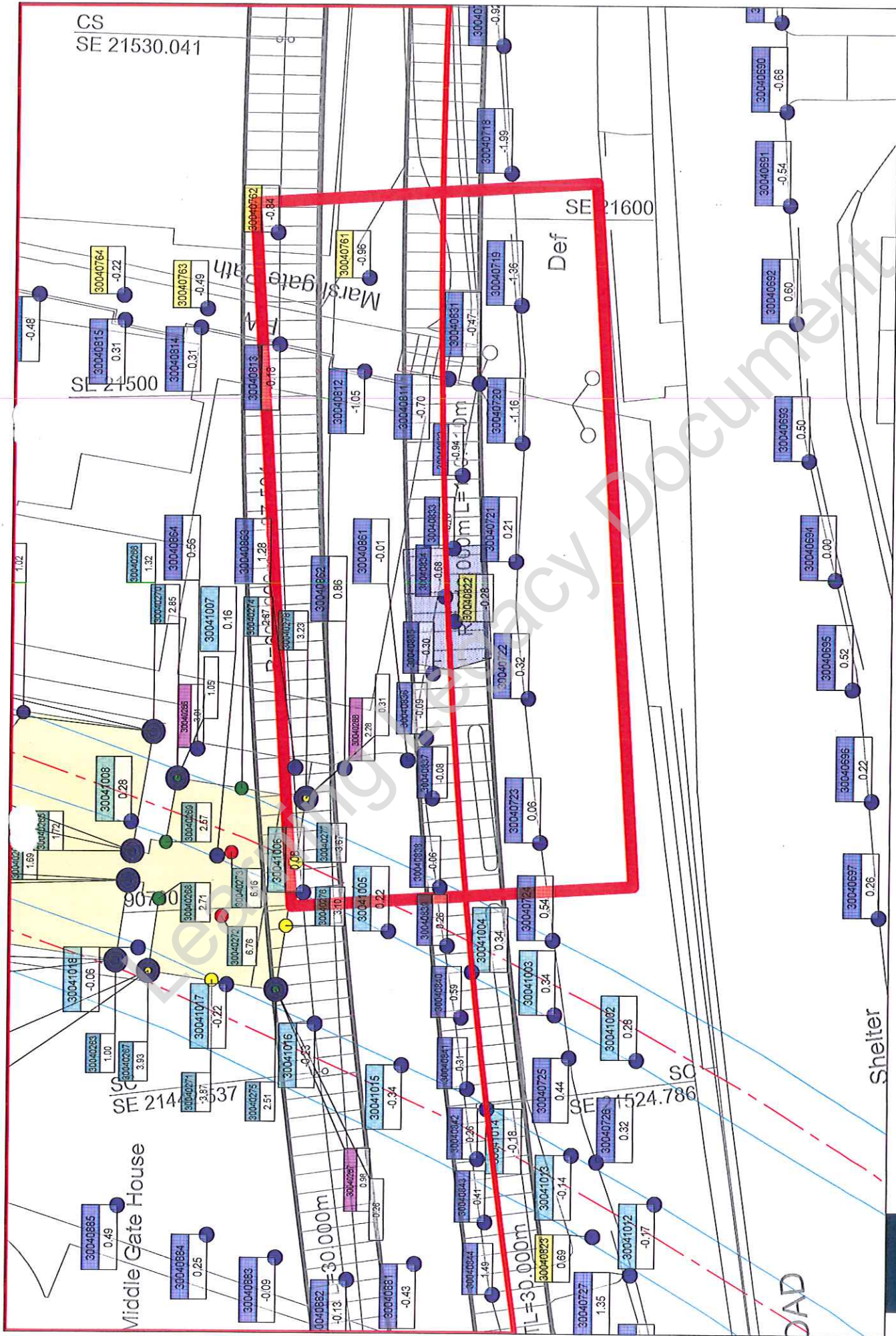
After passing with the first TBM it was jointly agreed between Thames Water, CRL and HMJV to continue monitoring only for the points 3004 0677 - 3004 0697 during and after 2nd TBM drive.
 The points 3004 0693 - 3004 0697 were damaged after the 13.11.2014 due to road works (curb stone renewal).
 Overall, none of the points reached any trigger 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: 12/03/2015

print name:

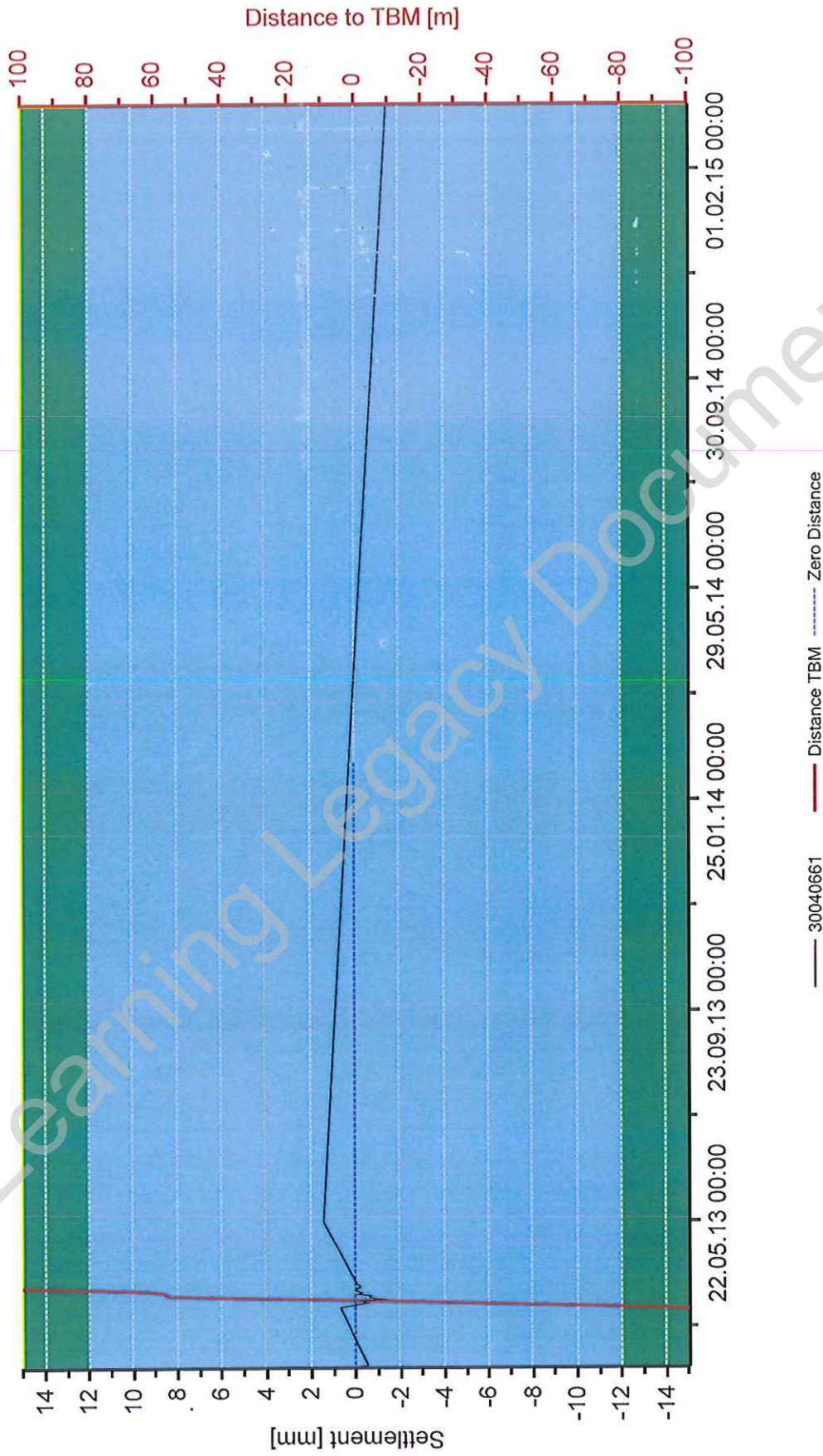
HMJV project role:

Monitoring & Survey engineer



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive
 current values: 30.04.2013 09:00

Profile: Measurement Point 30040661



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel- Plumstead Road South - 25.02.2013 - 10.03.2015
Date: 27.03.2015 15:54 Current Values: 27.03.2015 14:23



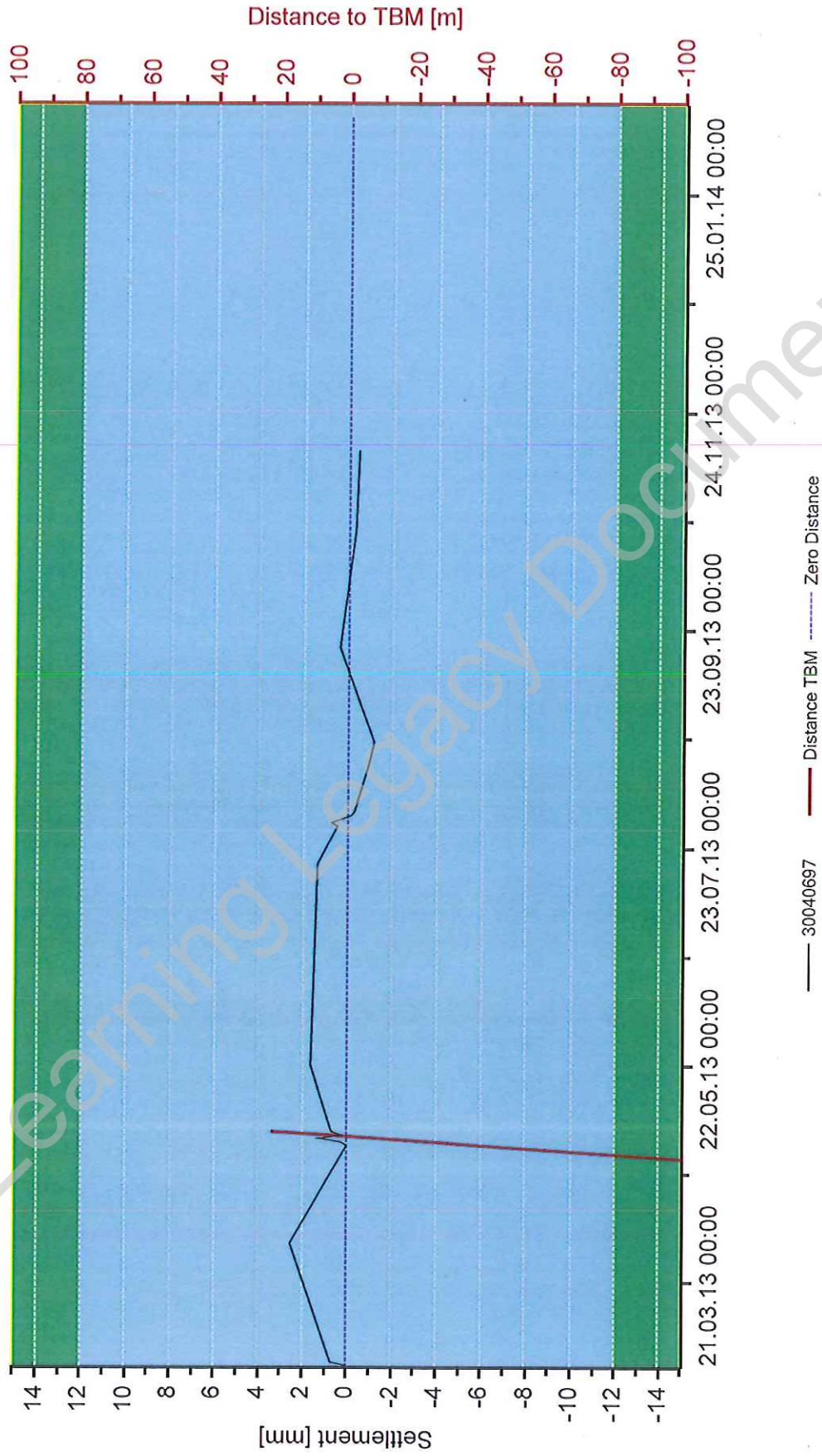
Profile: Measurement Point 30040679



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel- Plumstead Road South - 25.02.2013 - 10.03.2015
Date: 27.03.2015 15:52 Current Values: 27.03.2015 14:23

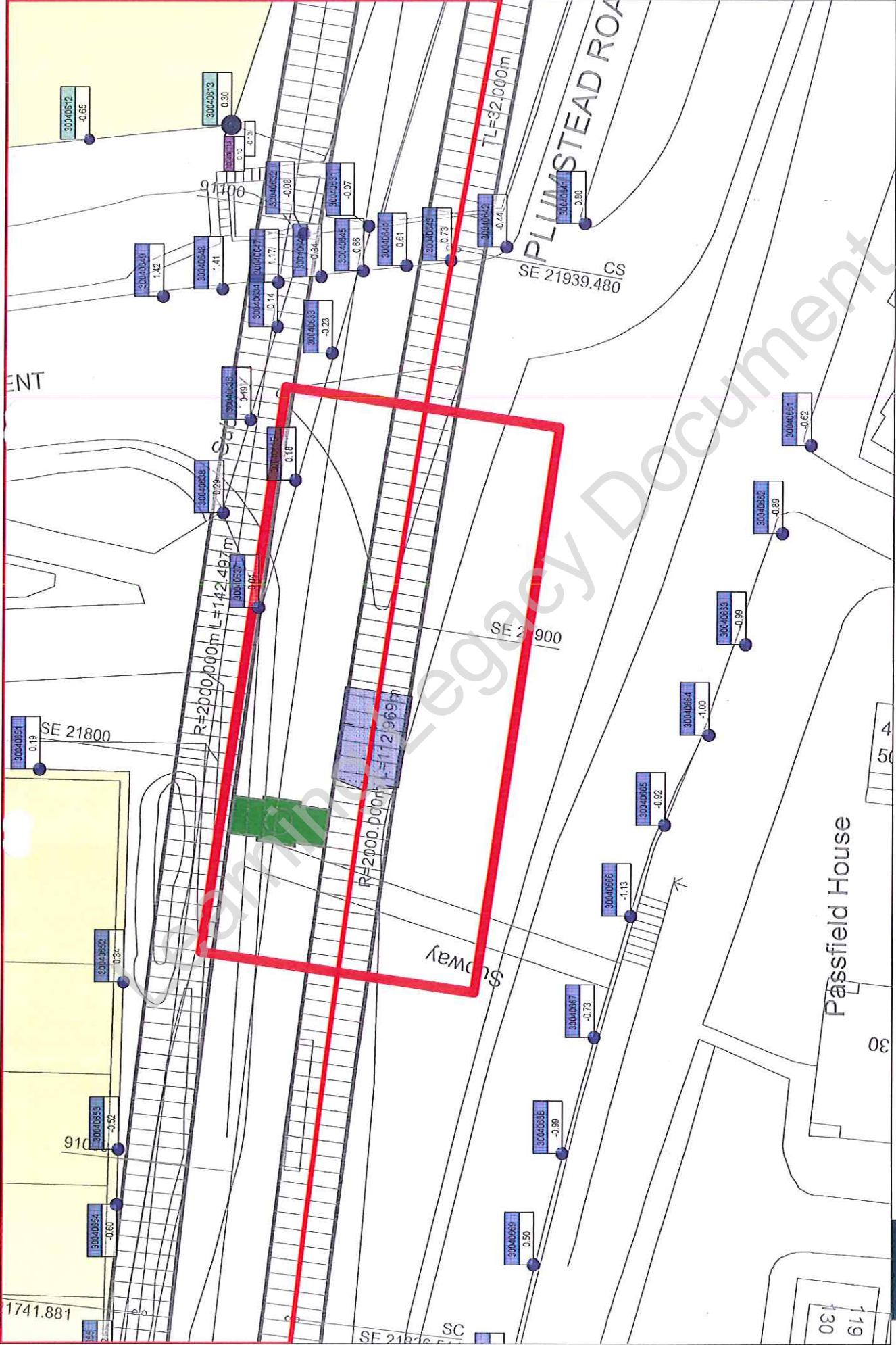


Point: 30040697

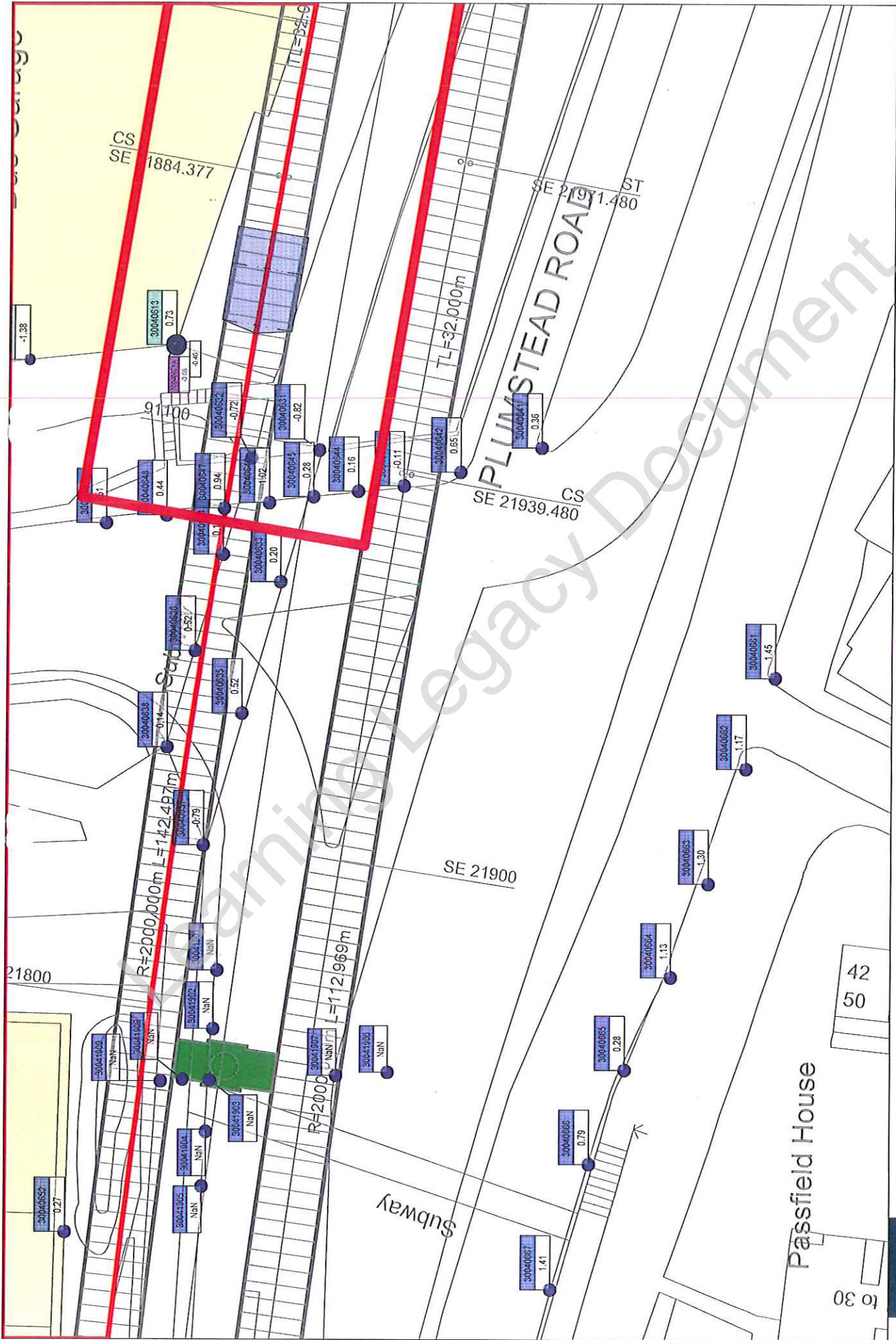


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Plumstead Road South 25.02.2013 - 20.02.2014
date: 06.08.2014 08:54 current values: 06.08.2014 08:34



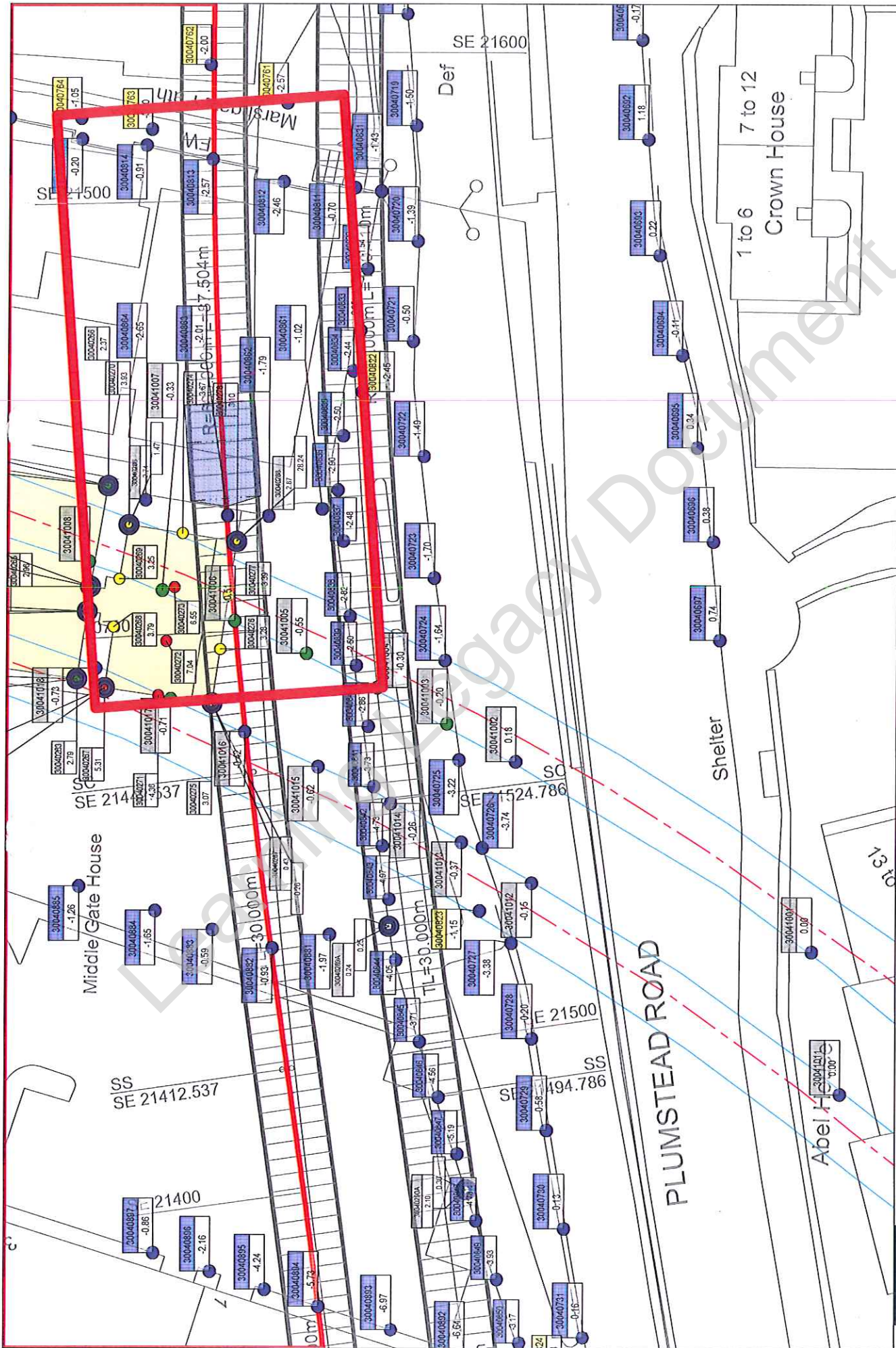


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive
 current values: 07.04.2013 17:32



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 Working activities: portal excavation, construction base slab and capping beam
 current values: 09.07.2013 17:59





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 Working activities: portal excavation, construction base slabs and capping beam
 current values: 30.07.2013 09:00



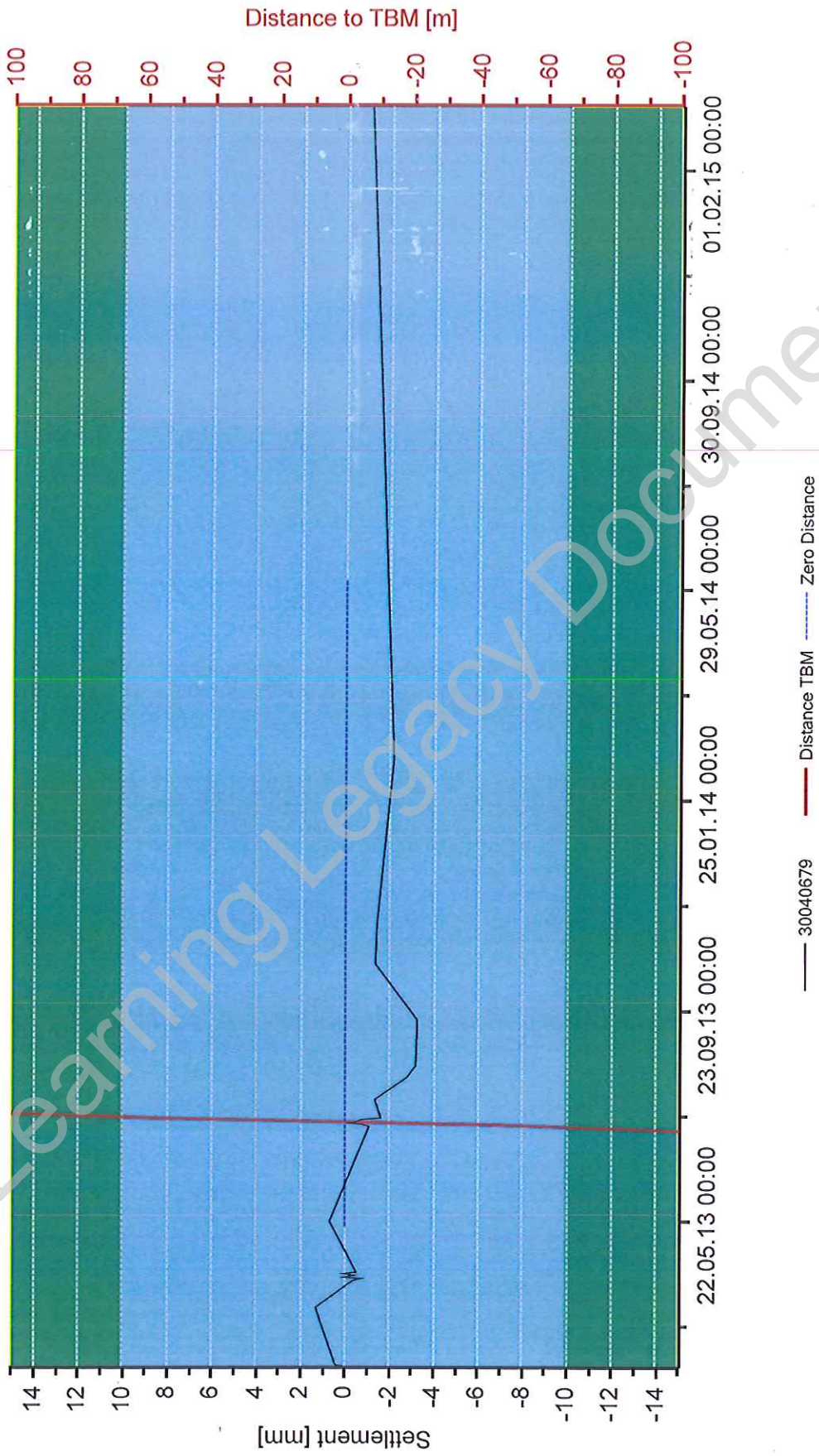
Profile: Measurement Point 30040661



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 Close Out Report: EB Tunnel - Plumstead Road South - 25.02.2013 - 10.03.2015
 date: 27.03.2015 15:22 current values: 27.03.2015 14:23

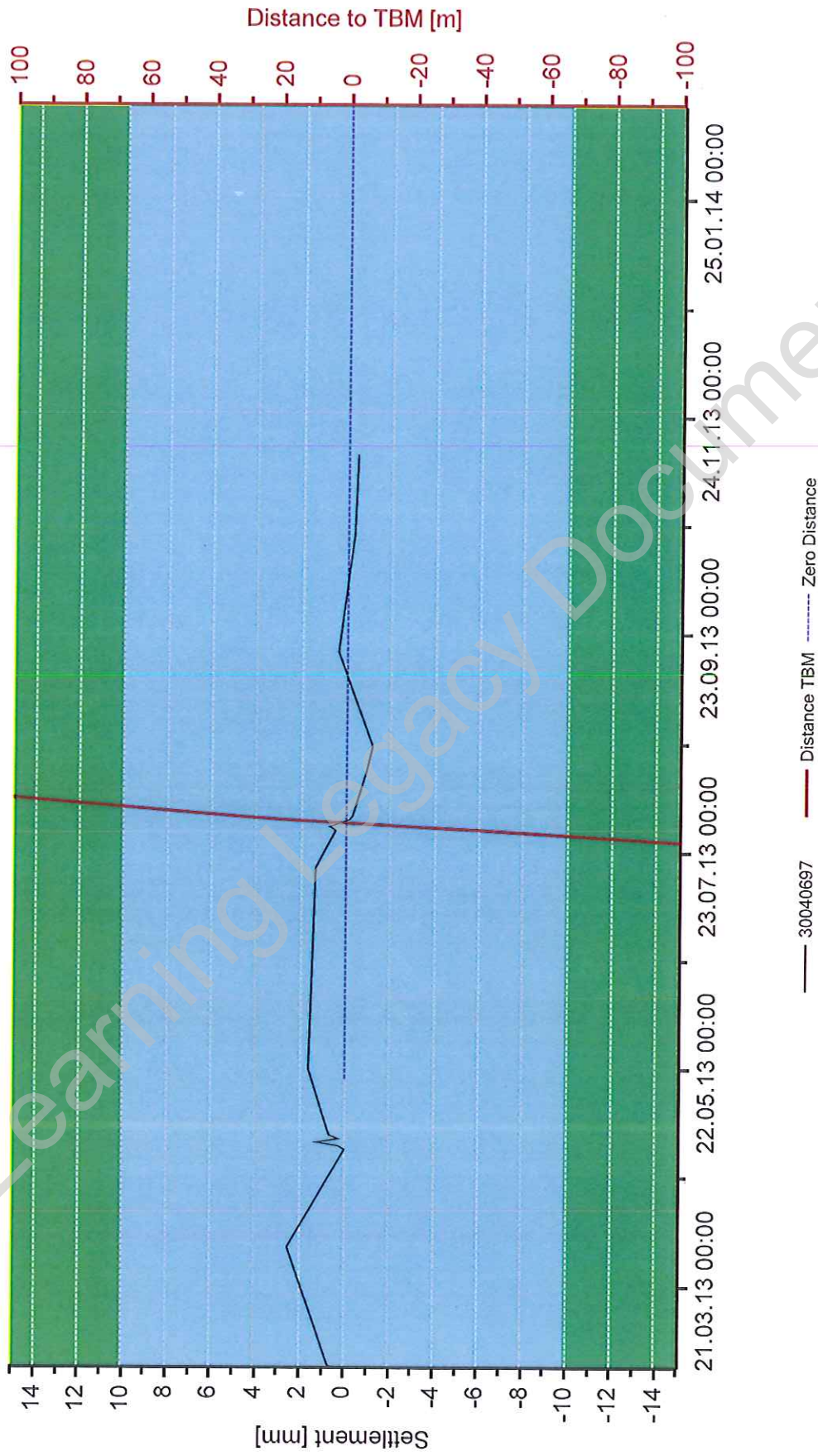


Profile: Measurement Point 30040679



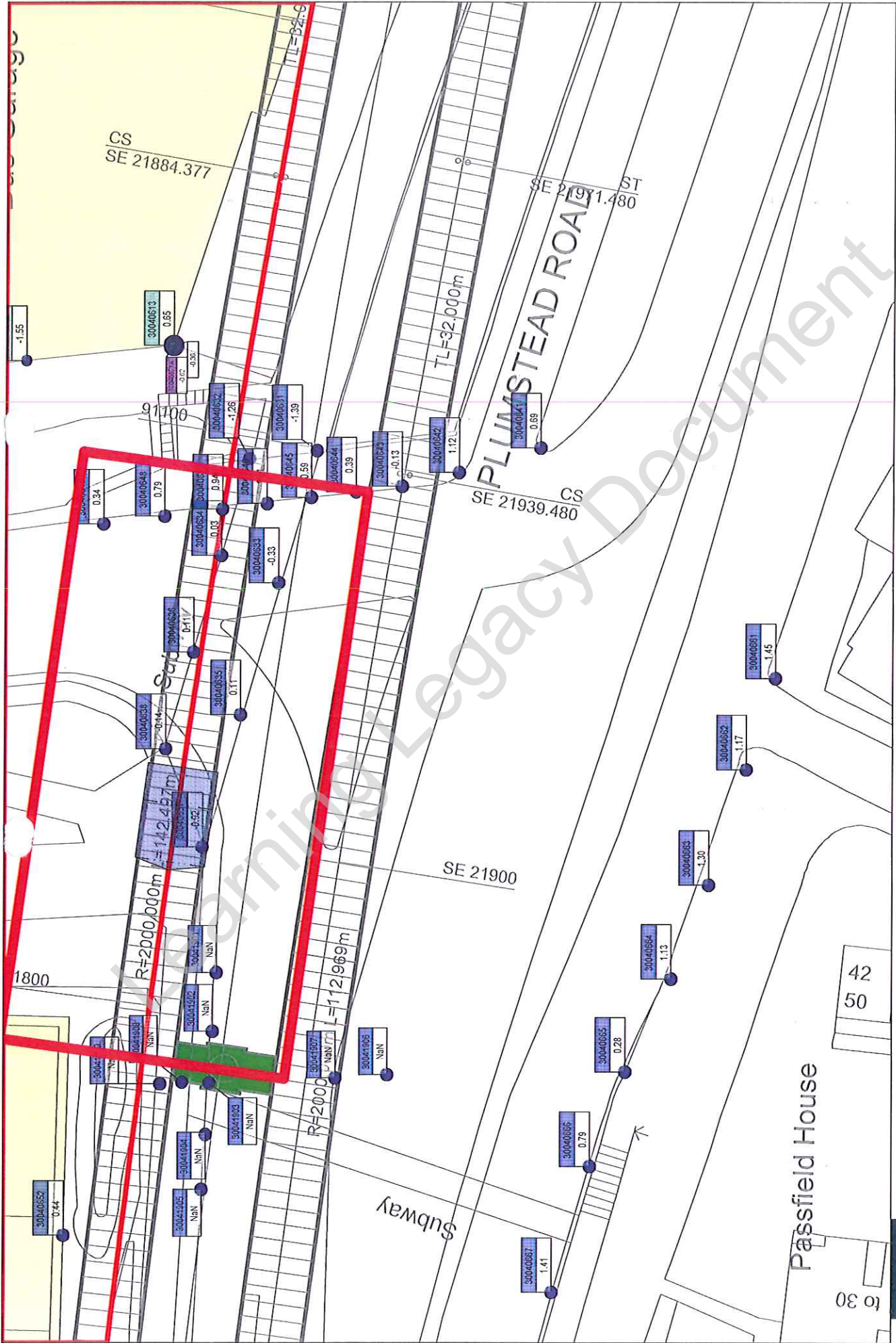
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Plumstead Road South - 25.02.2013 - 10.03.2015
date: 27.03.2015 15:20 current values: 27.03.2015 14:23

Point: 30040697



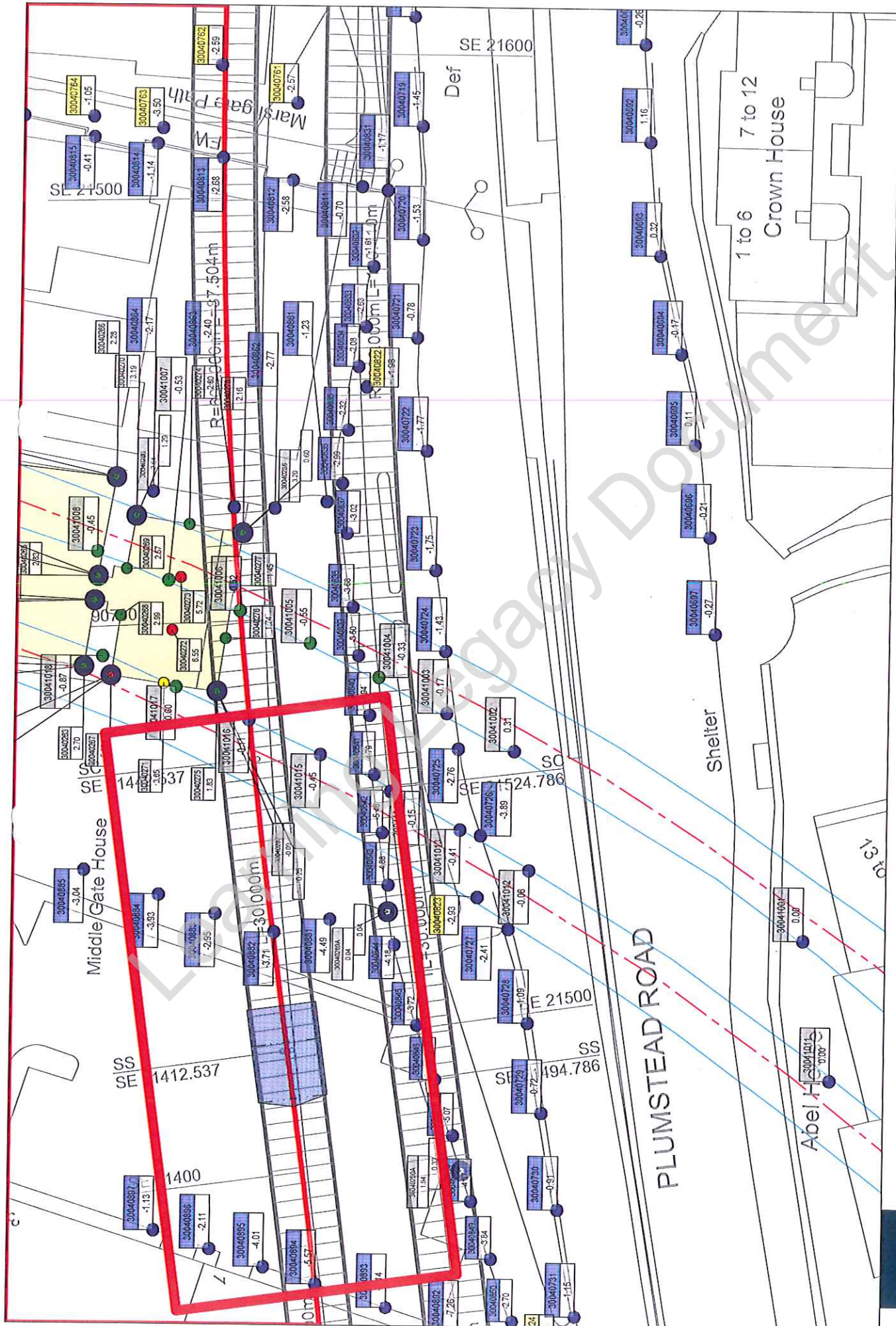
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Plumstead Road South 25.02.2013 - 20.02.2014
date: 06.08.2014 09:18 current values: 06.08.2014 08:49





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 Working activities: portal excavation, construction base slab and capping beam
 current values: 11.07.2013 19:29





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 Working activities: portal excavation, construction base slab and capping beam
 current values: 02.08.2013 18:59



monitoring table



monitoring table



project: C310 Thames Tunnel structure: TW Plumstead Road Southside

project: C310 Thames Tunnel structure: TW Plumstead Road Southside

project: C310 Thames Tunnel structure: TW Plumstead Road Southside

No. of reading GSD	26/02/2013		26/02/2013		01/03/2013		01/03/2013		01/03/2013		01/03/2013		01/03/2013		01/03/2013		01/03/2013		01/03/2013		
	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	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	
30040661	106.501	106.501	106.502	1	106.501	-1	106.501	1	106.501	0	-1	106.501	0	-1	106.501	0	106.501	0	106.501	0	0
30040662	106.495	106.495	106.496	0	106.495	-1	106.495	1	106.494	0	-1	106.494	0	-1	106.494	0	106.494	0	106.494	0	-1
30040663	106.310	106.310	106.311	1	106.311	0	106.309	-2	106.309	-1	-2	106.309	-1	-2	106.310	0	106.310	0	106.310	0	-1
30040664	106.217	106.218	106.218	0	106.216	-2	106.216	0	106.216	-1	-2	106.216	-1	-2	106.217	0	106.217	0	106.217	0	-1
30040665	106.153	106.152	106.153	0	106.152	-1	106.152	2	106.152	-2	-2	106.151	-1	-2	106.151	0	106.151	0	106.151	0	-1
30040666	106.085	106.084	106.085	0	106.085	0	106.084	-1	106.084	1	-1	106.083	0	-1	106.083	0	106.084	0	106.083	-1	-2
30040667	106.030	106.030	106.031	1	106.031	0	106.031	1	106.030	0	-1	106.030	0	-1	106.030	0	106.030	0	106.030	0	-1
30040668	105.977	105.977	105.977	0	105.977	0	105.977	1	105.976	-2	-1	105.976	0	-1	105.976	0	105.976	0	105.976	0	-1
30040669	105.943	105.943	105.943	0	105.944	1	105.944	0	105.944	0	0	105.944	0	0	105.944	0	105.944	0	105.944	0	-1
30040670	105.959	105.959	105.959	0	105.958	-1	105.958	1	105.958	1	1	105.958	1	1	105.957	0	105.957	0	105.957	0	-1
30040671	105.063	105.063	105.063	0	105.064	1	105.064	1	105.064	1	1	105.064	1	1	105.064	-2	105.064	-2	105.064	-2	-1
30040672	105.961	105.961	105.961	0	105.961	0	105.961	0	105.961	0	0	105.961	0	0	105.961	0	105.961	0	105.961	0	-1
30040673	105.960	105.961	105.961	1	105.962	1	105.962	1	105.962	1	1	105.962	1	1	105.962	1	105.962	1	105.962	1	-2
30040674	106.061	106.061	106.061	0	106.061	0	106.061	1	106.061	1	1	106.061	1	1	106.061	1	106.061	1	106.061	1	-2
30040675	106.104	106.104	106.104	0	106.105	1	106.105	1	106.105	1	1	106.105	1	1	106.105	1	106.105	1	106.105	1	-2
30040676	106.118	106.118	106.118	0	106.118	0	106.118	0	106.118	0	0	106.118	0	0	106.118	0	106.118	0	106.118	0	-2
30040677	106.040	106.040	106.040	0	106.040	0	106.040	0	106.040	0	0	106.040	0	0	106.040	0	106.040	0	106.040	0	-2
30040678	105.077	105.079	105.079	0	105.078	0	105.078	0	105.078	0	0	105.078	0	0	105.078	0	105.078	0	105.078	0	-2
30040679	105.987	105.988	105.988	0	105.989	1	105.989	1	105.989	1	1	105.989	1	1	105.989	1	105.989	1	105.989	1	-2
30040680	106.090	106.090	106.090	0	106.091	1	106.091	2	106.091	2	2	106.091	2	2	106.091	2	106.091	2	106.091	2	-2
30040681	106.170	106.169	106.169	0	106.170	1	106.170	1	106.170	1	1	106.170	1	1	106.170	1	106.170	1	106.170	1	-2
30040682	106.261	106.261	106.261	0	106.262	1	106.262	1	106.262	1	1	106.262	1	1	106.262	1	106.262	1	106.262	1	-2
30040683	106.319	106.318	106.318	0	106.319	1	106.319	1	106.319	1	1	106.319	1	1	106.319	1	106.319	1	106.319	1	-2
30040684	106.377	106.376	106.376	-1	106.377	1	106.377	1	106.377	1	1	106.377	1	1	106.377	1	106.377	1	106.377	1	-2
30040685	106.576	106.576	106.576	0	106.577	1	106.577	1	106.577	1	1	106.577	1	1	106.577	1	106.577	1	106.577	1	-2
30040686	106.574	106.574	106.574	0	106.576	2	106.576	2	106.576	2	2	106.576	2	2	106.576	2	106.576	2	106.576	2	-2
30040687	106.546	106.546	106.546	0	106.548	2	106.548	2	106.548	2	2	106.548	2	2	106.548	2	106.548	2	106.548	2	-2
30040688	106.592	106.592	106.592	0	106.594	2	106.594	2	106.594	2	2	106.594	2	2	106.594	2	106.594	2	106.594	2	-2
30040689	106.691	106.691	106.691	0	106.692	1	106.692	1	106.692	1	1	106.692	1	1	106.692	1	106.692	1	106.692	1	-2
30040690	106.795	106.795	106.795	0	106.797	2	106.797	2	106.797	2	2	106.797	2	2	106.797	2	106.797	2	106.797	2	-2
30040691	106.746	106.745	106.745	0	106.748	2	106.748	2	106.748	2	2	106.748	2	2	106.748	2	106.748	2	106.748	2	-2
30040692	106.864	106.865	106.865	1	106.867	2	106.867	2	106.867	2	2	106.867	2	2	106.867	2	106.867	2	106.867	2	-2
30040693	106.836	106.837	106.837	1	106.839	2	106.839	2	106.839	2	2	106.839	2	2	106.839	2	106.839	2	106.839	2	-2
30040694	106.833	106.834	106.834	1	106.835	2	106.835	2	106.835	2	2	106.835	2	2	106.835	2	106.835	2	106.835	2	-2
30040695	107.002	107.002	107.002	0	107.004	2	107.004	2	107.004	2	2	107.004	2	2	107.004	2	107.004	2	107.004	2	-2
30040696	107.059	107.059	107.059	0	107.061	2	107.061	2	107.061	2	2	107.061	2	2	107.061	2	107.061	2	107.061	2	-2
30040697	107.106	107.107	107.107	1	107.109	2	107.109	2	107.109	2	2	107.109	2	2	107.109	2	107.109	2	107.109	2	-2

monitoring table

project: C310 Thames Tunnel
TW Plumstead Road Southside



Joint Venture

project: C310 Thames Tunnel
TW Plumstead Road Southside

Joint Venture

monitoring table

project: C310 Thames Tunnel
TW Plumstead Road Southside

Joint Venture

No. of reading date	37. following 1/02/2013		38. following 10/02/2013		39. following 18/02/2013		40. following 26/02/2013		41. following 27/02/2013		42. following 27/02/2013		43. following 27/02/2013		44. following 28/02/2013		45. following 26/02/2013		46. following 26/02/2013		47. following 27/02/2013		48. following 26/02/2013			
	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	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		
30040661	106.501																									
30040662	106.405																									
30040663	106.310																									
30040664	106.217																									
30040665	106.163																									
30040666	106.095																									
30040667	106.030																									
30040668	105.977																									
30040669	105.942																									
30040670	105.898																									
30040671	105.823																									
30040672	105.901																									
30040673	105.860																									
30040674	106.061																									
30040675	106.104																									
30040676	106.118																									
30040677	106.040																									
30040678	105.977																									
30040679	105.987																									
30040680	106.090																									
30040681	106.170																									
30040682	106.261																									
30040683	106.310																									
30040684	106.318																									
30040685	106.377																									
30040686	106.576																									
30040687	106.574																									
30040688	106.546																									
30040689	106.592																									
30040690	106.691																									
30040691	106.785																									
30040692	106.746																									
30040693	106.666																									
30040694	106.696																									
30040695	106.923																									
30040696	107.002																									
30040697	107.009																									
30040698	107.000																									
30040699	107.107																									
30040700	107.100																									


project: C310 Thames Tunnel
Bauwerk: TW Plumstead Road Southside

Joint Venture

project: C310 Thames Tunnel
Bauwerk: TW Plumstead Road Southside

Joint Venture

No. of reading date	baseline elevation	49. following		50. following		51. following		52. following		53. following		54. following		55. following		56. following		57. following		58. following		59. 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
30040661	106.501																						
30040662	106.405																						
30040663	106.310																						
30040664	106.217																						
30040665	106.153																						
30040666	106.085																						
30040667	106.030																						
30040668	105.977																						
30040669	105.943																						
30040670	105.958																						
30040671	105.963																						
30040672	105.961																						
30040673	105.960																						
30040674	106.061																						
30040675	106.104																						
30040676	106.118																						
30040677	106.040																						
30040678	105.977																						
30040679	105.987																						
30040680	106.090																						
30040681	106.170																						
30040682	106.251																						
30040683	106.319																						
30040684	106.377																						
30040685	106.576																						
30040686	106.574																						
30040687	106.546																						
30040688	106.592																						
30040689	106.691																						
30040690	106.785																						
30040691	106.746																						
30040692	106.664																						
30040693	106.836																						
30040694	106.933																						
30040695	107.002																						
30040696	107.059																						
30040697	107.106																						

		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDIX 33
SOS Plumstead Road North

Learning Legacy Document

monitoring asset	Southern Outfall Sewer under Plumstead Road		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70001		
name of monitoring section:	SOS levelling studs Plumstead Road North		
sensor type:	manual levelling studs		
chainage:	90600 - 91100	point no.:	3004 0701 - 3004 0734
trigger values: [mm]	green: +12 -12	amber: +15 -15	red: +18 -18
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	25/02/13	0.00		
TBM 1	start ZOI	14/04/13	1.12	3004 0701
		06/05/13	0.73	3004 0734
	end ZOI	19/04/13	-0.26	3004 0701
		09/05/13	2.20	3004 0734
TBM 2	start ZOI	16/07/13	-0.11	3004 0701
		05/08/13	-0.15	3004 0734
	end ZOI	19/07/13	-1.75	3004 0701
		08/08/13	0.78	3004 0734
longterm		10/03/15	-3.27	3004 0701
			-0.45	3004 0734
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)	

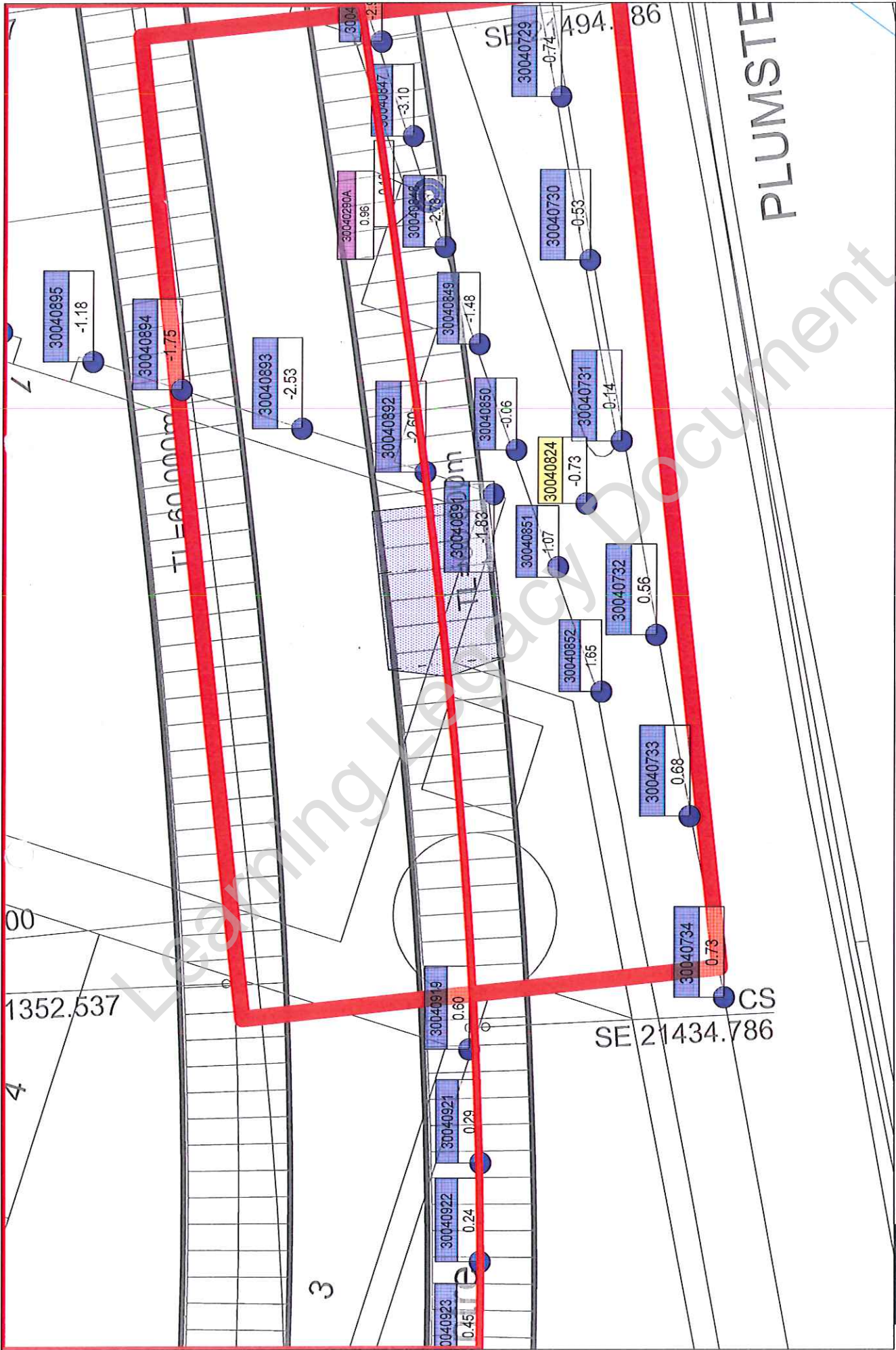
summary / comments

Overall, none of the points reached any trigger 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: 12/03/2015

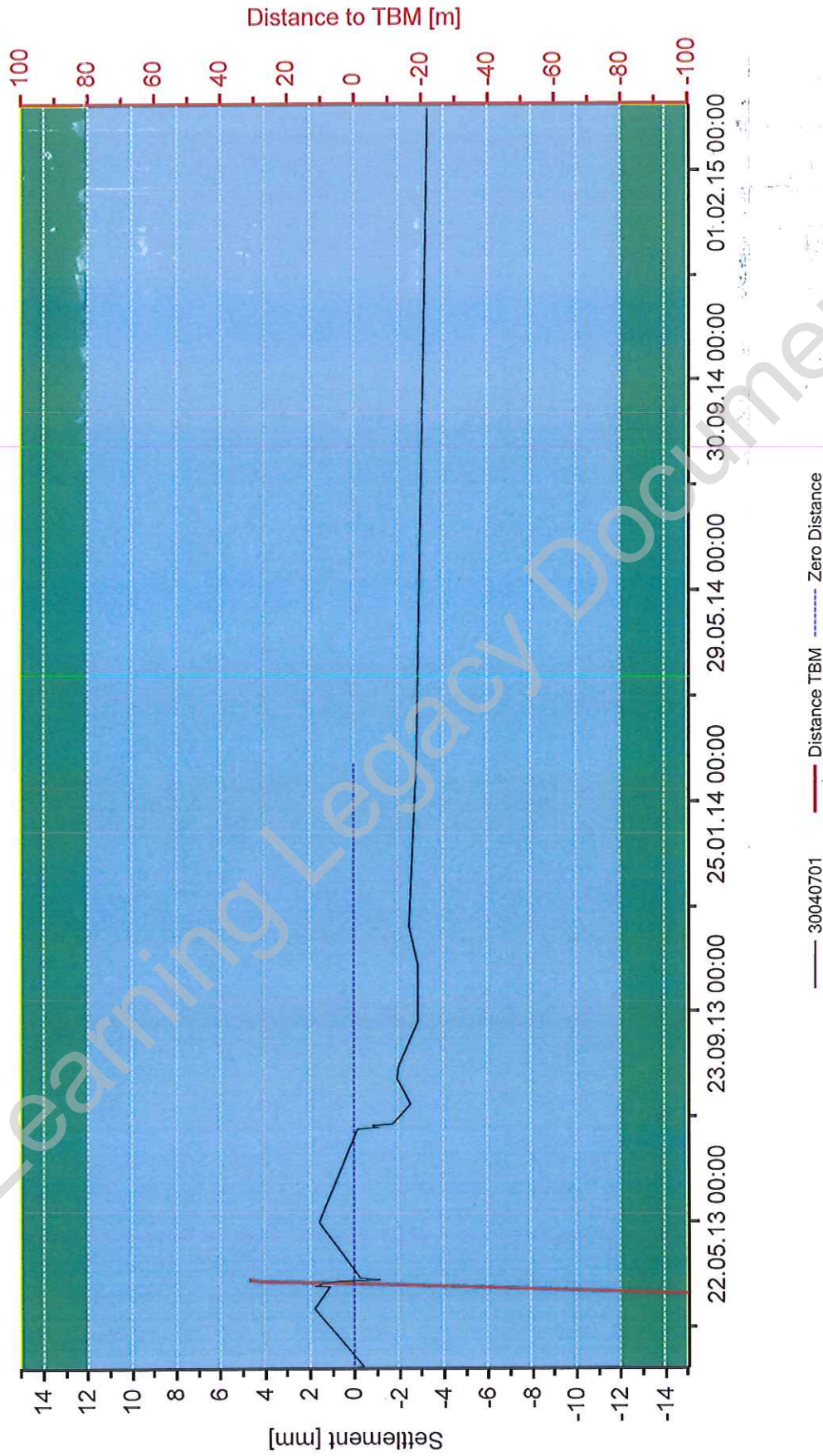
print name:

HMJV project role: Monitoring & Survey engineer



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive
 current values: 06.05.2013 18:00

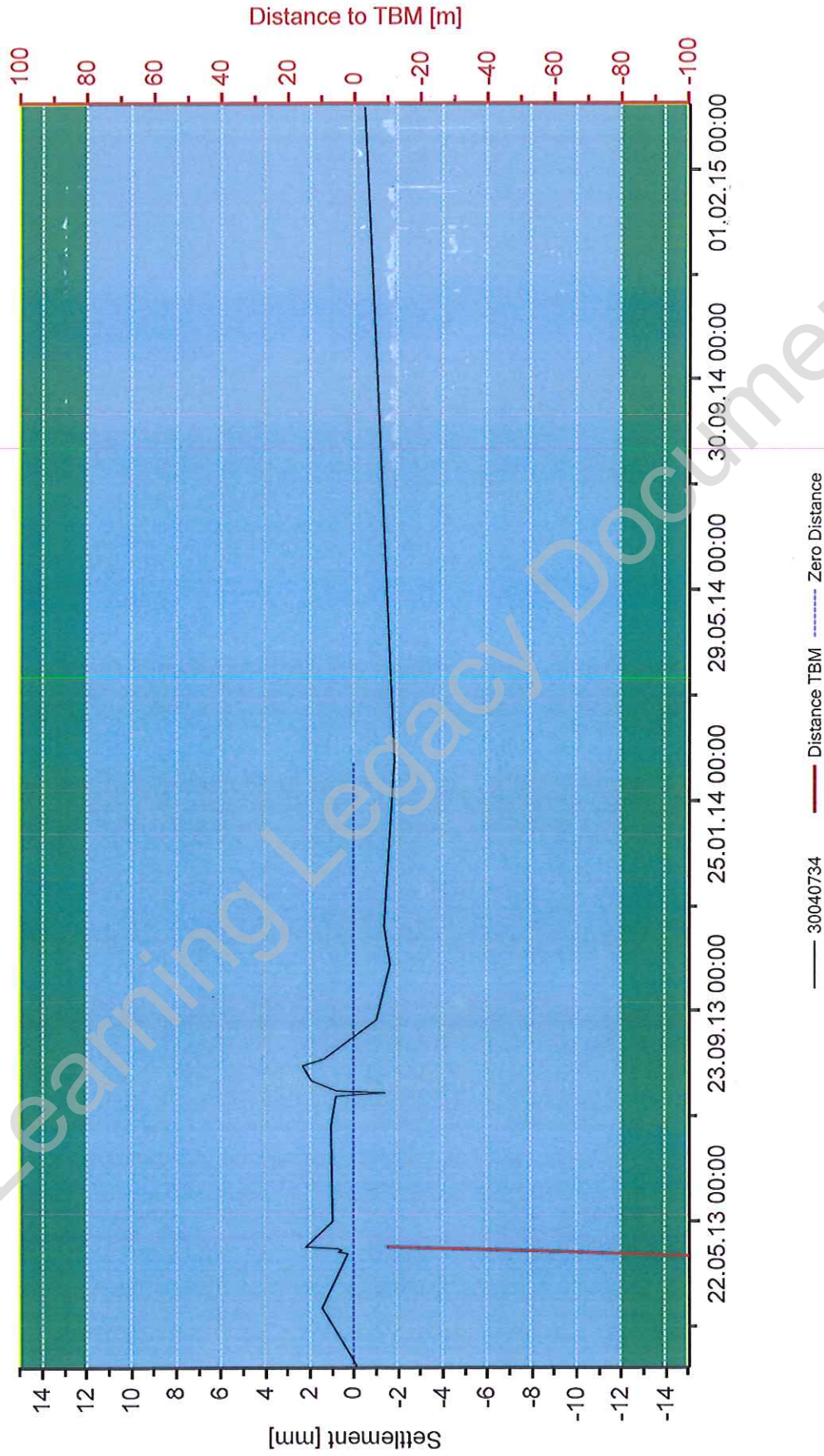
Profile: Measurement Point 30040701



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel- Plumstead Road North - 25.02.2013 - 10.03.2015
Date: 27.03.2015 15:58 Current Values: 27.03.2015 14:23

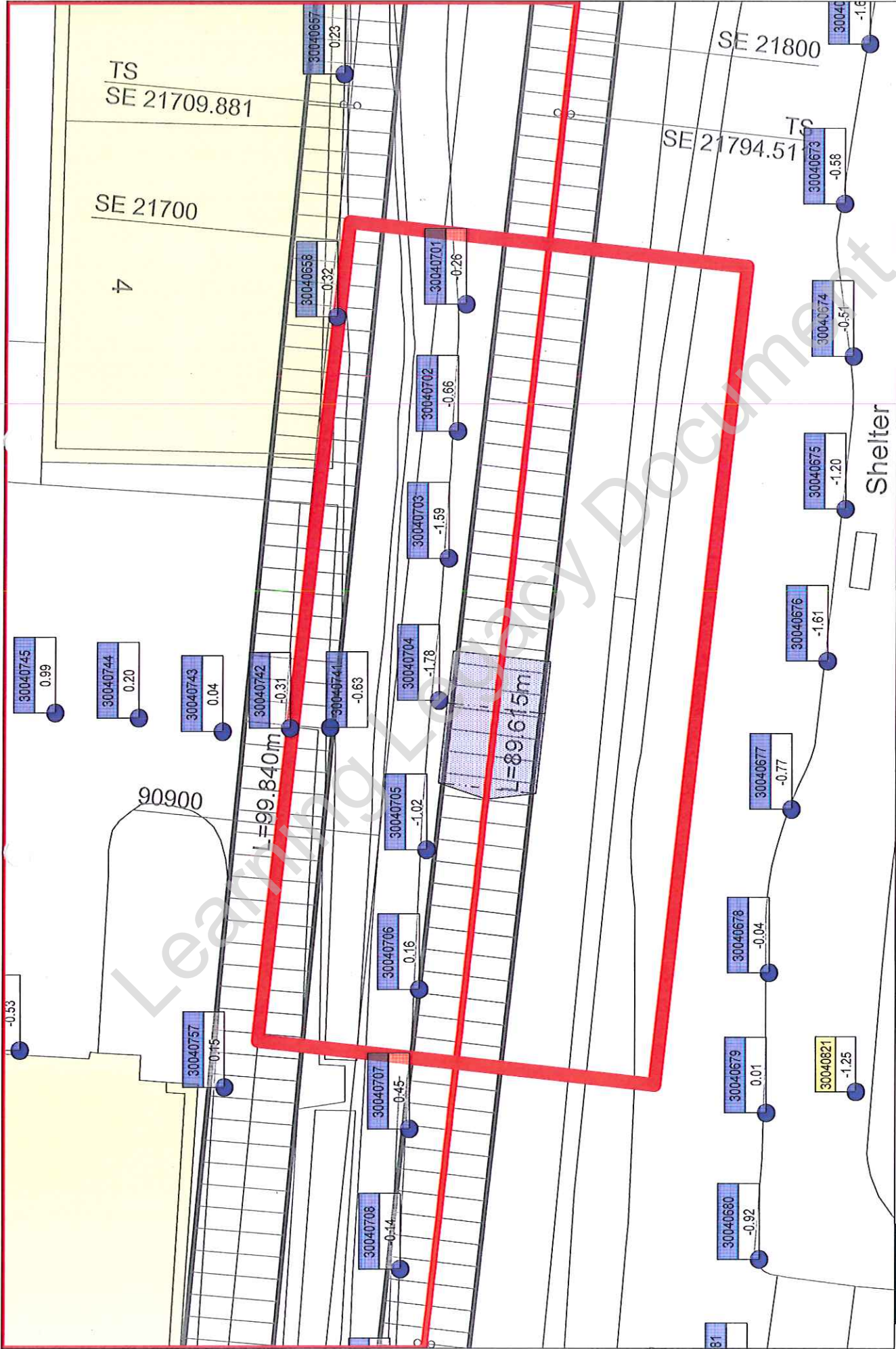


Profile: Measurement Point 30040734



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 Close Out Report: WB Tunnel- Plumstead Road North - 25.02.2013 - 10.03.2015
 Date: 27.03.2015 16:00 Current Values: 27.03.2015 14:23

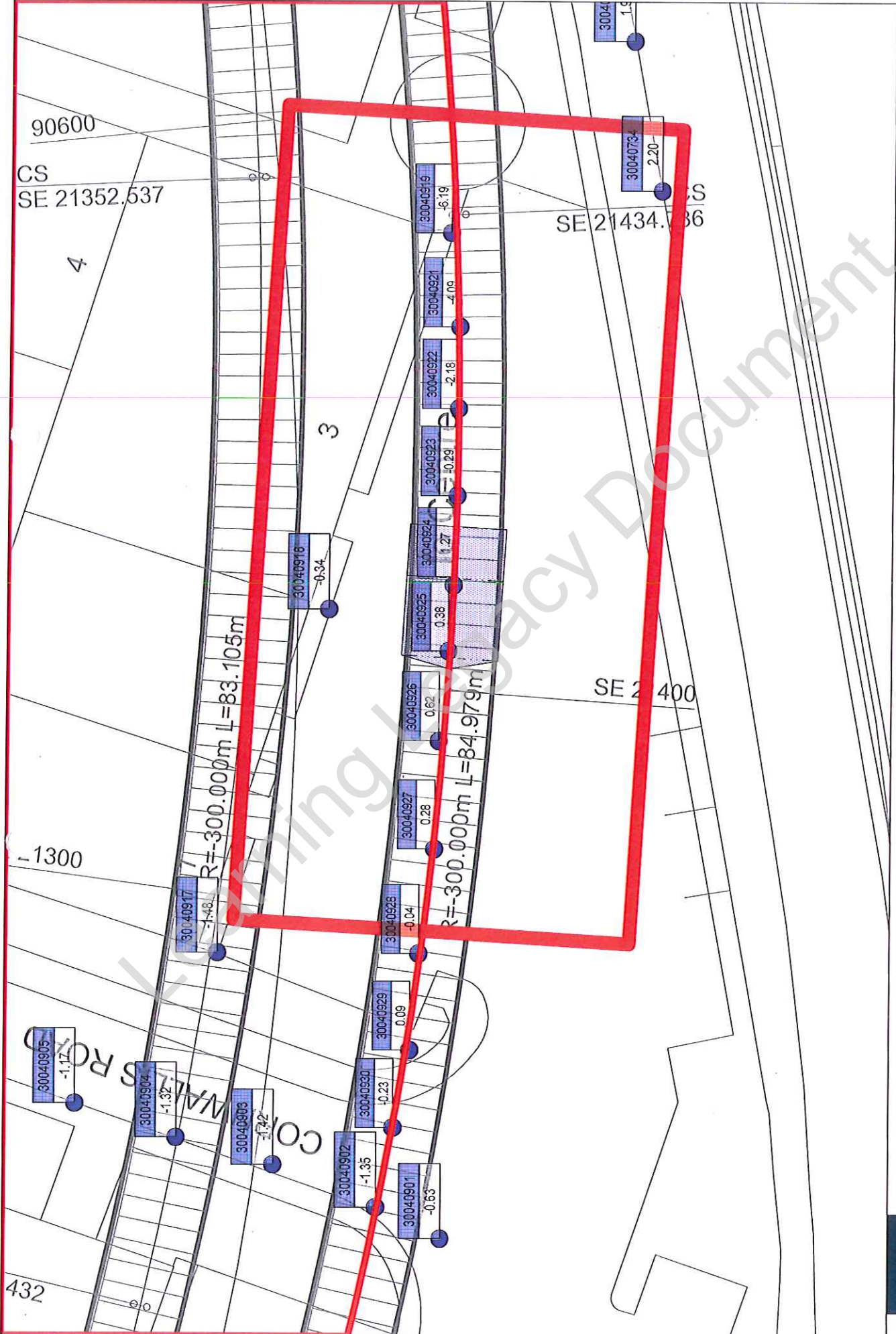




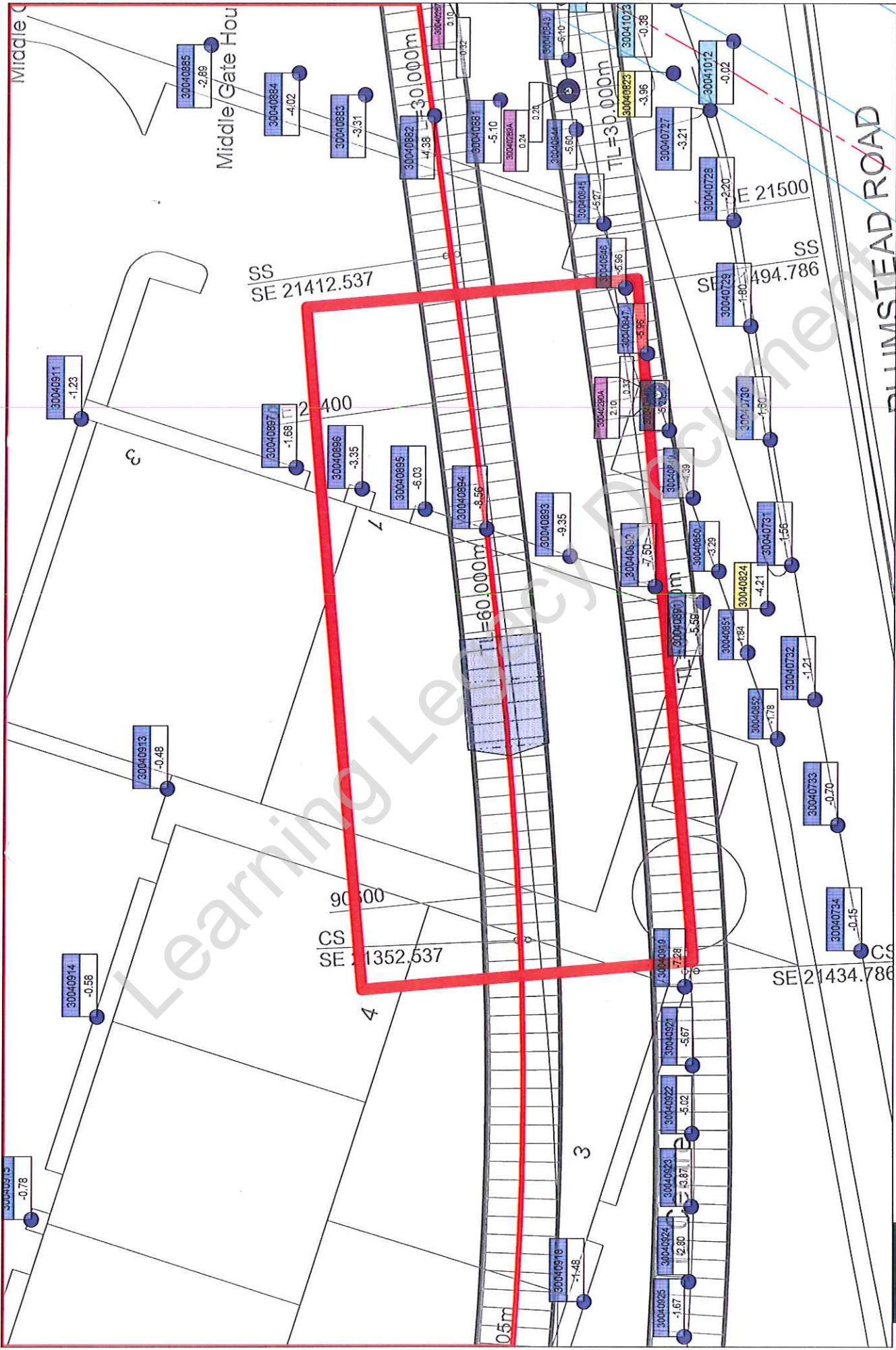
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

working activities: TBM drive

current values: 19.04.2013 17:33



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive
 current values: 09.05.2013 18:48



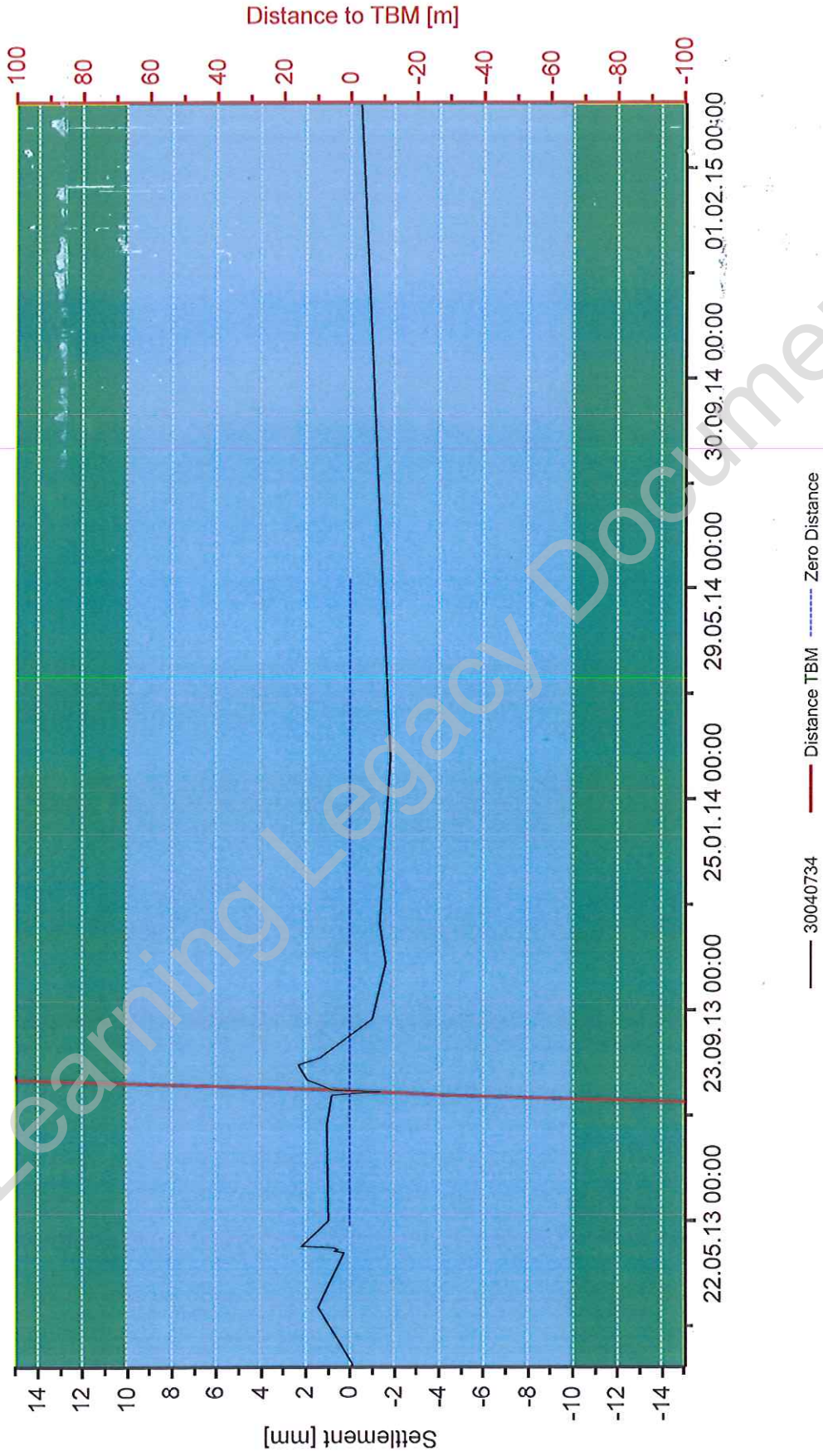
Profile: Measurement Point 30040701



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 Close Out Report: EB Tunnel - Plumstead Road North - 25.02.2013 - 10.03.2015
 date: 27.03.2015 15:12 current values: 27.03.2015 14:23

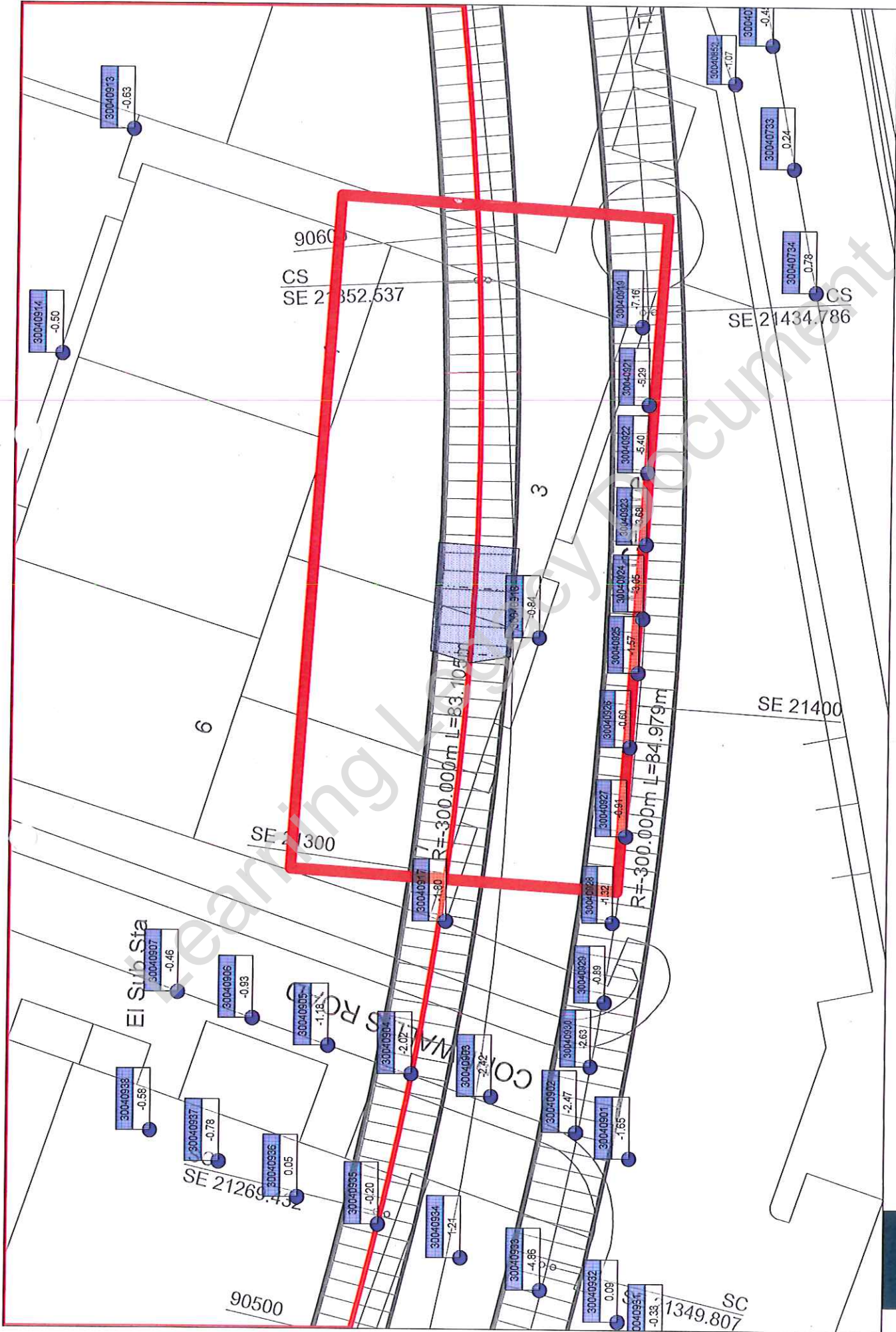


Profile: Measurement Point 30040734



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Plumstead Road North - 25.02.2013 - 10.03.2015
date: 27.03.2015 15:15 current values: 27.03.2015 14:23





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 08.08.2013 18:04



Joint Venture

Joint Venture

project: C310 Thames Tunnel

project: C310 Thames Tunnel

structure: TW Plumstead Road Northside

structure: TW Plumstead Road Northside

No. of reading date	1. following 24.02.2013		2. following 01.03.2013		3. following 14.03.2013		4. following 14.03.2013		5. following 14.03.2013		6. following 14.03.2013		7. following 17.04.2013		8. following 18.04.2013		9. following 11.04.2013		10. following 20.04.2013		11. following 27.04.2013		12. following 25.04.2013			
	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	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		
30040701	106.634	0	106.636	2	106.635	-1	106.636	1	106.636	0	106.635	0	106.635	-1	106.633	-2	106.634	1	106.634	0	106.633	-1	106.634	1	106.634	0
30040702	106.624	0	106.627	2	106.626	-1	106.626	0	106.626	0	106.626	0	106.626	0	106.623	-2	106.624	1	106.624	0	106.623	-1	106.624	1	106.624	0
30040703	106.625	0	106.626	2	106.626	0	106.626	0	106.626	0	106.626	0	106.626	0	106.623	-2	106.623	0	106.623	0	106.623	-1	106.623	0	106.623	0
30040704	106.598	0	106.599	2	106.599	0	106.599	0	106.599	0	106.599	0	106.599	0	106.596	-2	106.596	0	106.596	0	106.595	-1	106.596	0	106.596	0
30040705	106.571	0	106.572	1	106.572	0	106.572	0	106.572	0	106.572	0	106.572	0	106.571	-2	106.571	0	106.570	-1	106.570	-1	106.569	-1	106.569	-2
30040706	106.554	0	106.555	2	106.555	0	106.555	0	106.555	0	106.555	0	106.555	0	106.554	-1	106.554	0	106.554	0	106.553	-1	106.551	-2	106.552	-2
30040708	106.600	0	106.610	2	106.610	2	106.610	2	106.610	2	106.610	2	106.610	2	106.608	0	106.608	0	106.608	0	106.608	0	106.607	-1	106.607	-1
30040709	106.635	0	106.637	2	106.637	2	106.637	2	106.637	2	106.637	2	106.637	2	106.635	0	106.635	0	106.635	0	106.634	0	106.634	0	106.634	0
30040710	106.719	0	106.721	2	106.721	2	106.721	2	106.721	2	106.721	2	106.721	2	106.718	-3	106.718	-3	106.718	-3	106.718	-1	106.719	1	106.719	0
30040711	106.801	0	106.802	2	106.802	2	106.802	2	106.802	2	106.802	2	106.802	2	106.800	0	106.800	0	106.800	0	106.800	0	106.800	0	106.800	0
30040712	106.978	0	106.979	1	106.979	1	106.979	1	106.979	1	106.979	1	106.979	1	106.977	-2	106.977	-2	106.977	-2	106.977	-1	106.977	-1	106.977	-1
30040713	106.972	0	106.972	0	106.972	0	106.972	0	106.972	0	106.972	0	106.972	0	106.972	0	106.972	0	106.972	0	106.972	0	106.972	0	106.972	0
30040714	107.021	0	107.022	1	107.022	1	107.022	1	107.022	1	107.022	1	107.022	1	107.022	1	107.022	1	107.022	1	107.022	1	107.022	1	107.022	1
30040715	107.057	0	107.057	0	107.057	0	107.057	0	107.057	0	107.057	0	107.057	0	107.057	0	107.057	0	107.057	0	107.057	0	107.057	0	107.057	0
30040716	107.058	0	107.058	0	107.058	0	107.058	0	107.058	0	107.058	0	107.058	0	107.058	0	107.058	0	107.058	0	107.058	0	107.058	0	107.058	0
30040717	107.040	0	107.041	1	107.041	1	107.041	1	107.041	1	107.041	1	107.041	1	107.041	1	107.041	1	107.041	1	107.041	1	107.041	1	107.041	1
30040718	106.951	0	106.952	0	106.952	0	106.952	0	106.952	0	106.952	0	106.952	0	106.952	0	106.952	0	106.952	0	106.952	0	106.952	0	106.952	0
30040719	106.987	0	106.987	0	106.987	0	106.987	0	106.987	0	106.987	0	106.987	0	106.987	0	106.987	0	106.987	0	106.987	0	106.987	0	106.987	0
30040720	106.924	0	106.925	1	106.925	1	106.925	1	106.925	1	106.925	1	106.925	1	106.925	1	106.925	1	106.925	1	106.925	1	106.925	1	106.925	1
30040721	106.965	0	106.966	2	106.966	2	106.966	2	106.966	2	106.966	2	106.966	2	106.966	2	106.966	2	106.966	2	106.966	2	106.966	2	106.966	2
30040722	106.974	0	106.975	1	106.975	1	106.975	1	106.975	1	106.975	1	106.975	1	106.975	1	106.975	1	106.975	1	106.975	1	106.975	1	106.975	1
30040723	107.007	0	107.007	0	107.007	0	107.007	0	107.007	0	107.007	0	107.007	0	107.007	0	107.007	0	107.007	0	107.007	0	107.007	0	107.007	0
30040724	107.040	0	107.042	2	107.042	2	107.042	2	107.042	2	107.042	2	107.042	2	107.042	2	107.042	2	107.042	2	107.042	2	107.042	2	107.042	2
30040725	107.090	0	107.092	2	107.092	2	107.092	2	107.092	2	107.092	2	107.092	2	107.092	2	107.092	2	107.092	2	107.092	2	107.092	2	107.092	2
30040726	107.105	0	107.107	2	107.107	2	107.107	2	107.107	2	107.107	2	107.107	2	107.107	2	107.107	2	107.107	2	107.107	2	107.107	2	107.107	2
30040727	107.123	0	107.124	2	107.124	2	107.124	2	107.124	2	107.124	2	107.124	2	107.124	2	107.124	2	107.124	2	107.124	2	107.124	2	107.124	2
30040728	107.172	0	107.173	2	107.173	2	107.173	2	107.173	2	107.173	2	107.173	2	107.173	2	107.173	2	107.173	2	107.173	2	107.173	2	107.173	2
30040729	107.256	0	107.258	2	107.258	2	107.258	2	107.258	2	107.258	2	107.258	2	107.258	2	107.258	2	107.258	2	107.258	2	107.258	2	107.258	2
30040730	107.344	0	107.346	2	107.346	2	107.346	2	107.346	2	107.346	2	107.346	2	107.346	2	107.346	2	107.346	2	107.346	2	107.346	2	107.346	2
30040731	107.440	0	107.442	2	107.442	2	107.442	2	107.442	2	107.442	2	107.442	2	107.442	2	107.442	2	107.442	2	107.442	2	107.442	2	107.442	2
30040732	107.483	-1	107.483	1	107.483	1	107.483	1	107.483	1	107.483	1	107.483	1	107.483	1	107.483	1	107.483	1	107.483	1	107.483	1	107.483	1
30040733	107.488	0	107.488	0	107.488	0	107.488	0	107.488	0	107.488	0	107.488	0	107.488	0	107.488	0	107.488	0	107.488	0	107.488	0	107.488	0
30040734	107.504	0	107.505	2	107.505	2	107.505	2	107.505	2	107.505	2	107.505	2	107.505	2	107.505	2	107.505	2	107.505	2	107.505	2	107.505	2

No. of reading	baseline	13. following		14. following		15. following		17. following		18. following		19. following		20. following		21. following		22. following		23. following		24. following		
		BAUWK: TW Plumstead Road Northside	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
GRIP	222913	25042013	24042013	24042013	26042013	26042013	26042013	26042013	26042013	26042013	26042013	26042013	26042013	26042013	26042013	26042013	26042013	26042013	26042013	26042013	26042013	26042013	26042013	26042013
Point No.																								
30040701	106.634																							
30040702	106.624																							
30040703	106.625																							
30040704	106.598																							
30040705	106.571																							
30040706	106.554																							
30040707	106.554	106.552	-1	106.551	0	-3																		
30040708	106.609	106.607	0	106.606	0	-2																		
30040709	106.635	106.634	0	106.634	-1	-2	106.633	-1	-2															
30040710	106.719	106.718	0	106.718	-1	-2	106.717	0	-2	106.717	-1	-3												
30040711	106.801	106.801	-1	106.800	-1	-1	106.800	0	-1	106.800	0	-1	106.800	0	-1									
30040712	106.878	106.878	-1	106.877	-1	-1	106.877	0	-1	106.877	0	-1	106.877	0	-1									
30040713	106.972	106.972	-1	106.972	0	-1	106.971	-1	-1	106.971	-1	-2												
30040714	107.021	107.021	-1	107.021	0	0	107.020	-1	-1	107.019	-1	-2												
30040715	107.057	107.057	-2	107.057	0	0	107.056	-1	-2	107.056	1	-1	107.056	1	-1									
30040716	107.056	107.056	-2	107.056	0	0	107.056	0	0	107.057	-1	-1	107.058	0	0									
30040717	107.040																							
30040718	106.951																							
30040719	106.987																							
30040720	106.924																							
30040721	106.965																							
30040722	106.974																							
30040723	107.007																							
30040724	107.040																							
30040725	107.090																							
30040726	107.105																							
30040727	107.123																							
30040729	107.256																							
30040730	107.344																							
30040731	107.440																							
30040732	107.463																							
30040733	107.488																							
30040734	107.504																							

Joint Venture

Project: C310 Thames Tunnel
Bauwerk: TW Plumstead Road Northside

Joint Venture

No. of reading Point No.	25. following 05/05/2013		26. following 06/05/2013		27. following 07/05/2013		28. following 22/05/2013		29. following 14/07/2013		30. following 17/07/2013		31. following 14/07/2013		32. following 14/07/2013		33. following 09/07/2013		34. following 21/07/2013		35. following 22/07/2013		36. following 05/07/2013			
	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	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		
30040701	106.634		106.636	2	106.633	-1	106.623	-1	106.624	-2	106.623	-1	106.633	0	106.632	-1	106.623	-1	106.623	-1	106.623	-1	106.623	-1	106.623	-1
30040702	106.624		106.625	1	106.623	-1	106.623	0	106.624	-2	106.623	-1	106.624	1	106.623	-1	106.623	-1	106.624	1	106.624	1	106.624	1	106.624	1
30040703	106.508		106.507	-1	106.505	-1	106.505	-1	106.504	-1	106.505	-1	106.506	0	106.505	-1	106.506	-2	106.503	-2	106.503	-2	106.503	-2	106.503	-2
30040704	106.571		106.571	-1	106.569	-2	106.569	-2	106.569	-2	106.569	-2	106.569	0	106.568	-1	106.568	-2	106.568	-2	106.568	-2	106.568	-2	106.568	-2
30040705	106.554		106.553	-1	106.553	-1	106.553	-1	106.553	-1	106.553	-1	106.551	1	106.551	-1	106.551	-1	106.550	-1	106.550	-1	106.550	-1	106.548	-1
30040706	106.609		106.608	1	106.608	1	106.608	1	106.608	1	106.608	1	106.605	-2	106.605	-2	106.605	-2	106.605	-2	106.605	-2	106.605	-2	106.603	-1
30040709	106.635		106.635	1	106.635	1	106.635	1	106.635	1	106.634	-1	106.634	-1	106.634	-1	106.634	-1	106.633	-1	106.633	-1	106.633	-1	106.632	0
30040710	106.719		106.719	3	106.719	3	106.719	3	106.719	3	106.717	-2	106.717	-2	106.718	1	106.718	1	106.718	0	106.717	-1	106.716	-1	106.716	0
30040711	106.801		106.802	2	106.802	2	106.802	2	106.802	2	106.800	-2	106.800	-2	106.800	-2	106.800	-2	106.799	-1	106.799	-1	106.799	-1	106.799	0
30040712	106.878		106.878	2	106.878	2	106.878	2	106.878	2	106.877	-3	106.877	-3	106.877	-3	106.877	-3	106.877	-3	106.877	-3	106.877	-3	106.876	-1
30040713	106.972		106.973	3	106.973	3	106.973	3	106.973	3	106.973	3	106.973	3	106.971	-2	106.971	-2	106.971	-2	106.971	-2	106.971	-2	106.970	0
30040714	107.021		107.021	2	107.021	2	107.021	2	107.021	2	107.019	-2	107.019	-2	107.019	-2	107.019	-2	107.019	-2	107.019	-2	107.019	-2	107.019	0
30040715	107.057		107.057	1	107.057	1	107.057	1	107.057	1	107.056	-2	107.056	-2	107.056	-2	107.056	-2	107.056	-2	107.056	-2	107.056	-2	107.056	0
30040716	107.058		107.058	1	107.058	1	107.058	1	107.058	1	107.057	-2	107.057	-2	107.057	-2	107.057	-2	107.057	-2	107.057	-2	107.057	-2	107.056	0
30040717	107.040		107.041	2	107.041	2	107.041	2	107.041	2	107.039	-2	107.039	-2	107.039	-2	107.039	-2	107.039	-2	107.039	-2	107.039	-2	107.038	0
30040718	106.951		106.952	2	106.952	2	106.952	2	106.952	2	106.950	-2	106.950	-2	106.950	-2	106.950	-2	106.950	-2	106.950	-2	106.950	-2	106.950	0
30040719	106.987		106.987	2	106.987	2	106.987	2	106.987	2	106.985	-2	106.985	-2	106.985	-2	106.985	-2	106.985	-2	106.985	-2	106.985	-2	106.985	0
30040720	106.924		106.924	1	106.924	1	106.924	1	106.924	1	106.923	-1	106.923	-1	106.923	-1	106.923	-1	106.923	-1	106.923	-1	106.923	-1	106.923	0
30040721	106.965	106.964	0	-1	106.966	2	106.966	2	106.966	2	106.965	-1	106.965	-1	106.965	-1	106.965	-1	106.965	-1	106.965	-1	106.965	-1	106.965	0
30040722	106.974	106.972	0	-2	106.974	2	106.974	2	106.974	2	106.973	-1	106.973	-1	106.973	-1	106.973	-1	106.973	-1	106.973	-1	106.973	-1	106.973	0
30040723	107.007	107.005	-1	-2	107.005	1	107.005	1	107.005	1	107.006	-1	107.006	-1	107.006	-1	107.006	-1	107.006	-1	107.006	-1	107.006	-1	107.006	0
30040724	107.040	107.038	-1	-2	107.038	1	107.038	1	107.038	1	107.039	-1	107.039	-1	107.039	-1	107.039	-1	107.039	-1	107.039	-1	107.039	-1	107.039	0
30040725	107.090	107.087	-1	-3	107.088	1	107.088	1	107.088	1	107.088	-1	107.088	-1	107.088	-1	107.088	-1	107.088	-1	107.088	-1	107.088	-1	107.088	0
30040726	107.105	107.101	-1	-4	107.102	1	107.102	1	107.102	1	107.102	0	107.102	0	107.102	0	107.102	0	107.102	0	107.102	0	107.102	0	107.102	0
30040727	107.123	107.121	-1	-2	107.122	1	107.122	1	107.122	1	107.122	0	107.122	0	107.122	0	107.122	0	107.122	0	107.122	0	107.122	0	107.122	0
30040728	107.172	107.171	-1	-1	107.171	1	107.171	1	107.171	1	107.173	1	107.173	1	107.173	1	107.173	1	107.173	1	107.173	1	107.173	1	107.173	0
30040729	107.256	107.256	0	0	107.255	0	107.255	0	107.257	1	107.257	1	107.257	1	107.257	1	107.257	1	107.257	1	107.257	1	107.257	1	107.257	0
30040730	107.344	107.344	-1	-1	107.343	-1	107.344	1	107.344	1	107.344	1	107.344	1	107.344	1	107.344	1	107.344	1	107.344	1	107.344	1	107.344	0
30040731	107.440	107.441	0	1	107.440	-1	107.440	-1	107.440	-1	107.441	1	107.441	1	107.440	0	107.440	0	107.440	0	107.440	0	107.440	0	107.440	0
30040732	107.483	107.484	0	1	107.484	0	107.484	1	107.484	1	107.484	1	107.484	1	107.483	-1	107.483	-1	107.483	-1	107.483	-1	107.483	-1	107.483	0
30040733	107.488	107.489	0	1	107.489	0	107.489	1	107.488	-1	107.488	1	107.488	1	107.488	1	107.488	1	107.488	1	107.488	1	107.488	1	107.488	0
30040734	107.504	107.504	0	1	107.504	0	107.504	1	107.505	-1	107.505	-1	107.505	-1	107.505	-1	107.505	-1	107.505	-1	107.505	-1	107.505	-1	107.505	0

project: C310 Thames Tunnel
Bauwerk: TW Plumstead Road Northside

Joint Venture

project: C310 Thames Tunnel
Bauwerk: TW Plumstead Road Northside

Joint Venture

No. of reading	baseline	37. following		38. following		39. following		40. following		41. following		42. following		43. following		44. following		45. following		46. following		47. following		48. 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
30040701	106.634																								
30040702	106.624																								
30040703	106.625																								
30040704	106.598																								
30040705	106.571																								
30040706	106.554																								
30040707	106.544																								
30040708	106.609	0	-6																						
30040709	106.635	0	-4																						
30040710	106.719	0	-3																						
30040711	106.801	106.799	0	-2																					
30040712	106.879	106.877	0	-2	106.876	0	-2																		
30040713	106.872	106.870	0	-2	106.870	0	-2																		
30040714	107.921	107.019	0	-2	107.019	0	-2	107.019	0	-1	107.010	0	-2												
30040715	107.057	107.056	0	-1	107.056	0	-1	107.057	1	-1	107.058	1	-1												
30040716	107.058	107.057	0	-1	107.057	0	-1	107.058	1	-1	107.058	1	-1												
30040717	107.040	107.039	0	-1	107.039	0	-1	107.040	1	-1	107.040	0	0												
30040718	106.951	106.950	1	-1	106.950	0	-1	106.951	0	0	106.951	0	0												
30040719	106.987	106.986	1	-1	106.986	0	-1	106.986	0	-1	106.986	1	0												
30040720	106.924	106.923	0	-1	106.923	0	-1	106.923	1	-1	106.923	0	0												
30040721	106.965	106.965	0	0	106.964	-1	-2	106.965	1	-1	106.965	0	0												
30040722	106.974	106.973	0	-1	106.972	-1	-2	106.973	1	-1	106.974	1	0												
30040723	107.007	107.006	0	-1	107.006	0	-1	107.005	-1	-2	107.005	0	-2												
30040724	107.040																								
30040725	107.090																								
30040726	107.105																								
30040727	107.123																								
30040728	107.172																								
30040729	107.256																								
30040730	107.344																								
30040731	107.440																								
30040732	107.483																								
30040733	107.488																								
30040734	107.504																								


project: C310 Thames Tunnel

Joint Venture

project: C310 Thames Tunnel

Joint Venture

No. of reading	49. following		50. following		51. following		52. following		53. following		54. following		55. following		56. following		57. following		58. following		59. following		60. 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		
date	25/2/13	05/04/2013	05/04/2013	13/06/2013	13/06/2013	13/06/2013	22/08/2013	22/08/2013	22/08/2013	22/08/2013	22/08/2013	22/08/2013	22/08/2013	22/08/2013	22/08/2013	22/08/2013	22/08/2013	22/08/2013	22/08/2013	22/08/2013	22/08/2013	22/08/2013	22/08/2013	22/08/2013	22/08/2013		
30040701	106.634			106.632	1	-2	106.632	0	-2	106.631	-1	-3	106.631	0	-3	106.631	0	-3	106.631	0	-2	106.631	0	-3	106.631	0	-3.27
30040702	106.624			106.622	0	-3	106.622	0	-2	106.621	-1	-4	106.621	0	-3	106.621	0	-3	106.621	0	-3	106.621	0	-3	106.621	0	-3.87
30040703	106.625			106.621	0	-4	106.621	0	-4	106.619	-2	-5	106.621	1	-4	106.621	0	-4	106.621	0	-4	106.621	0	-5	106.621	0	-4.86
30040704	106.598			106.592	-1	-6	106.592	0	-6	106.591	-1	-7	106.592	1	-7	106.592	1	-7	106.592	1	-7	106.592	1	-7	106.592	1	-7.84
30040705	106.571			106.563	-1	-8	106.563	-1	-9	106.563	-1	-8	106.564	1	-7	106.564	0	-7	106.564	0	-7	106.564	0	-7	106.564	0	-9.23
30040706	106.554			106.545	-2	-9	106.545	0	-9	106.546	1	-8	106.546	0	-8	106.545	1	-8	106.545	1	-8	106.545	1	-8	106.544	1	-9.54
30040707	106.554			106.546	-2	-9	106.546	0	-8	106.547	1	-7	106.547	0	-8	106.546	0	-8	106.546	0	-8	106.546	0	-8	106.546	0	-8.72
30040708	106.609			106.601	-2	-8	106.601	1	-7	106.602	1	-7	106.602	0	-7	106.602	0	-7	106.602	0	-7	106.602	0	-7	106.601	0	-7.59
30040709	106.635			106.630	-1	-5	106.630	0	-5	106.630	0	-5	106.631	0	-5	106.631	0	-5	106.631	0	-5	106.631	0	-5	106.631	0	-4.51
30040710	106.719			106.714	-2	-5	106.714	0	-5	106.715	1	-5	106.716	1	-4	106.714	-1	-5	106.714	-1	-5	106.715	1	-4	106.715	0	-4.24
30040711	106.801			106.799	-3	-5	106.796	0	-5	106.798	2	-3	106.798	1	-3	106.798	0	-2	106.798	0	-2	106.798	0	-3	106.798	0	-2.91
30040712	106.972			106.965	-4	-6	106.966	0	-6	106.969	3	-3	106.969	0	-3	106.969	0	-3	106.969	0	-3	106.969	0	-3	106.969	0	-3.02
30040714	107.021			107.016	-3	-5	107.016	0	-5	107.019	3	-2	107.019	3	-2	107.019	3	-2	107.019	3	-2	107.018	0	-3	107.018	0	-2.80
30040715	107.057			107.053	-2	-4	107.053	0	-4	107.056	3	-2	107.056	3	-2	107.056	3	-2	107.055	-1	-3	107.055	0	-2	107.055	0	-2.58
30040716	107.058			107.055	-2	-3	107.055	1	-3	107.056	1	-2	107.055	1	-2	107.055	1	-2	107.055	1	-2	107.055	1	-3	107.055	1	-2.26
30040717	107.040			107.036	-2	-4	107.036	0	-4	107.037	1	-3	107.038	0	-3	107.038	0	-3	107.038	0	-3	107.038	0	-2	107.037	0	-2.19
30040718	106.951			106.947	-3	-4	106.947	-1	-5	106.949	2	-3	106.949	2	-3	106.949	2	-3	106.949	2	-3	106.949	2	-3	106.949	2	-1.90
30040719	106.987			106.982	-3	-4	106.982	0	-5	106.984	1	-4	106.984	1	-4	106.984	1	-4	106.984	1	-4	106.984	1	-4	106.984	1	-1.50
30040720	106.924			106.922	0	-2	106.922	-1	-2	106.920	-2	-4	106.922	2	-2	106.922	2	-2	106.922	2	-2	106.922	2	-2	106.922	2	-1.61
30040721	106.985			106.984	0	-1	106.984	0	-1	106.981	-3	-4	106.984	2	-1	106.984	2	-1	106.984	2	-1	106.984	2	-1	106.984	2	-1.15
30040722	106.974			106.972	0	-2	106.972	0	-2	106.971	-3	-4	106.971	1	-3	106.971	1	-3	106.971	1	-3	106.971	1	-3	106.971	1	-2.44
30040723	107.007			107.005	-1	-2	107.005	0	-2	107.005	0	-2	107.003	-2	-4	107.003	-2	-4	107.003	-2	-4	107.003	-2	-4	107.003	-2	-3.09
30040724	107.040			107.038	0	-2	107.038	0	-2	107.038	0	-2	107.036	-2	-3	107.036	-2	-3	107.036	-2	-3	107.036	-2	-3	107.036	-2	-2.84
30040725	107.090			107.087	0	-3	107.087	0	-3	107.088	1	-3	107.088	1	-3	107.088	1	-3	107.088	1	-3	107.088	1	-3	107.088	1	-4.79
30040726	107.105			107.101	0	-4	107.101	0	-4	107.101	0	-4	107.098	-3	-7	107.098	-3	-7	107.098	-3	-7	107.098	-3	-7	107.098	-3	-5.80
30040727	107.123			107.120	-1	-3	107.120	0	-3	107.120	0	-3	107.118	-2	-5	107.118	-2	-5	107.118	-2	-5	107.118	-2	-5	107.118	-2	-3.94
30040728	107.172			107.169	-1	-2	107.171	2	-1	107.170	-1	-2	107.168	-2	-4	107.168	-2	-4	107.170	1	-3	107.169	-1	-4	107.170	1	-2.61
30040729	107.256			107.254	-2	-2	107.255	-1	-1	107.254	-1	-1	107.252	-2	-4	107.252	-2	-4	107.254	2	-2	107.253	-1	-3	107.254	1	-1.78
30040730	107.344			107.342	-1	-2	107.343	2	-1	107.343	0	-1	107.340	-3	-4	107.340	-3	-4	107.342	2	-2	107.342	2	-2	107.341	1	-1.63
30040731	107.440			107.437	-1	-2	107.439	2	-1	107.440	1	0	107.436	-3	-4	107.436	-3	-4	107.438	2	-2	107.437	0	-3	107.439	1	-1.50
30040732	107.483			107.482	-1	-1	107.483	2	0	107.483	0	0	107.482	-1	-1	107.482	-1	-1	107.481	-2	-3	107.481	-2	-3	107.481	-2	-1.49
30040733	107.488			107.487	-1	-1	107.488	1	0	107.489	0	1	107.489	0	1	107.489	0	1	107.486	-1	-1	107.486	0	-2	107.486	0	-0.83
30040734	107.504			107.504	-1	0	107.502	-1	1	107.506	2	1	107.506	2	1	107.506	2	1	107.502	-1	-2	107.502	-1	-2	107.502	-1	-0.45

		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDIX 34

SOS Plumstead Road Extensometer

Learning Legacy Document

monitoring asset

Southern Outfall Sewer under Plumstead Road

reference monitoring drawing:

C310-HTM-C-DWG-CR146-ST004-70001

name of monitoring section:

SOS Extensometer Plumstead Road

sensor type:

Extensometer

chainage:

90600 - 91100

point no.:

3004 0821 - 3004 0824

trigger values:
[mm]

green: +12
-12

+15
-15

red: +18
-18

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	14/03/13	0.00		
TBM 1	start ZOI	19/04/13 05/05/13	-0.23 -0.73	3004 0821 3004 0824
	end ZOI	22/04/13 08/05/13	-0.74 -1.56	3004 0821 3004 0824
TBM 2	start ZOI	19/07/13 03/08/13	-1.39 -3.37	3004 0821 3004 0824
	end ZOI	21/07/13 07/08.13	-1.48 -3.66	3004 0821 3004 0824
longterm	19/03/15	-3.98	3004 0821	breached not any trigger value
		-6.31	3004 0824	

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

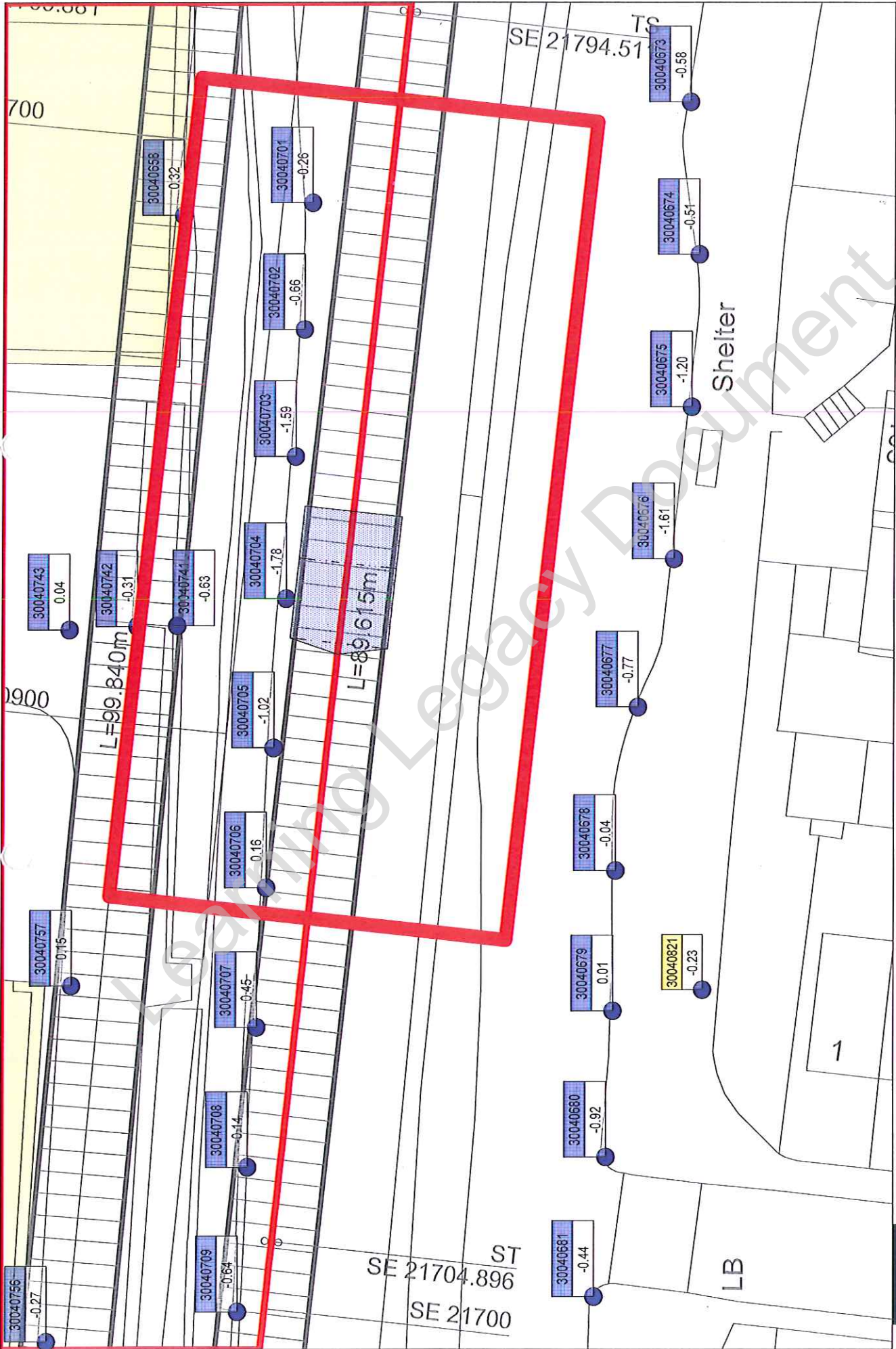
Overall, none of the points reached any trigger value. Under consideration of temperature differences, the surrounding ground condition and the achievable accuracy of the measurement, HMJV has no concern to cease the monitoring. The rate of change in the monitoring data is less than the required standards as per the specifications and drawings. Monitoring data shows that shallow datum movements behaved similar to those on the surface.

date / signature: 20/03/2015

print name:

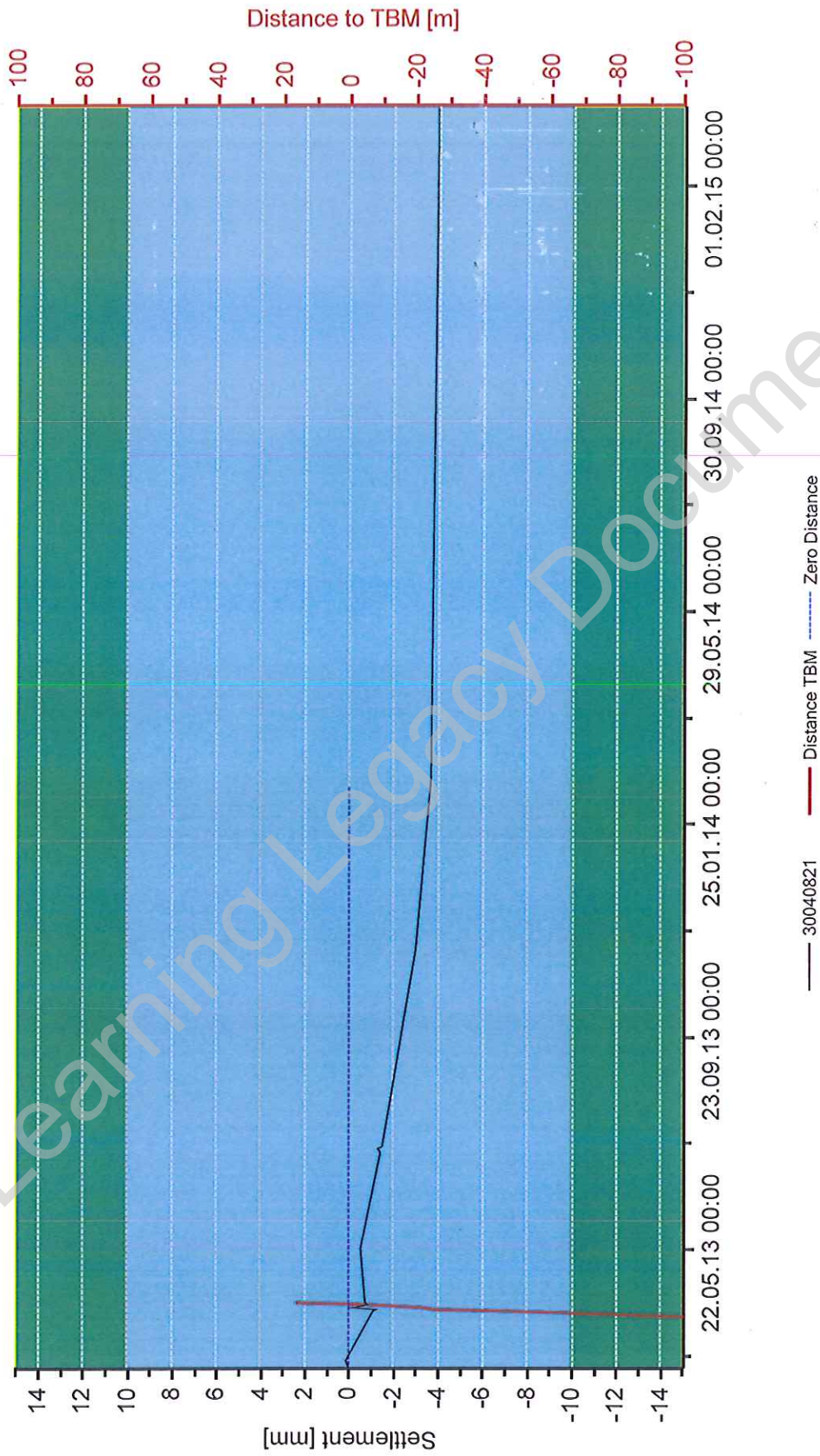
HMJV project role:

Monitoring & Survey engineer



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 19.04.2013 09:00

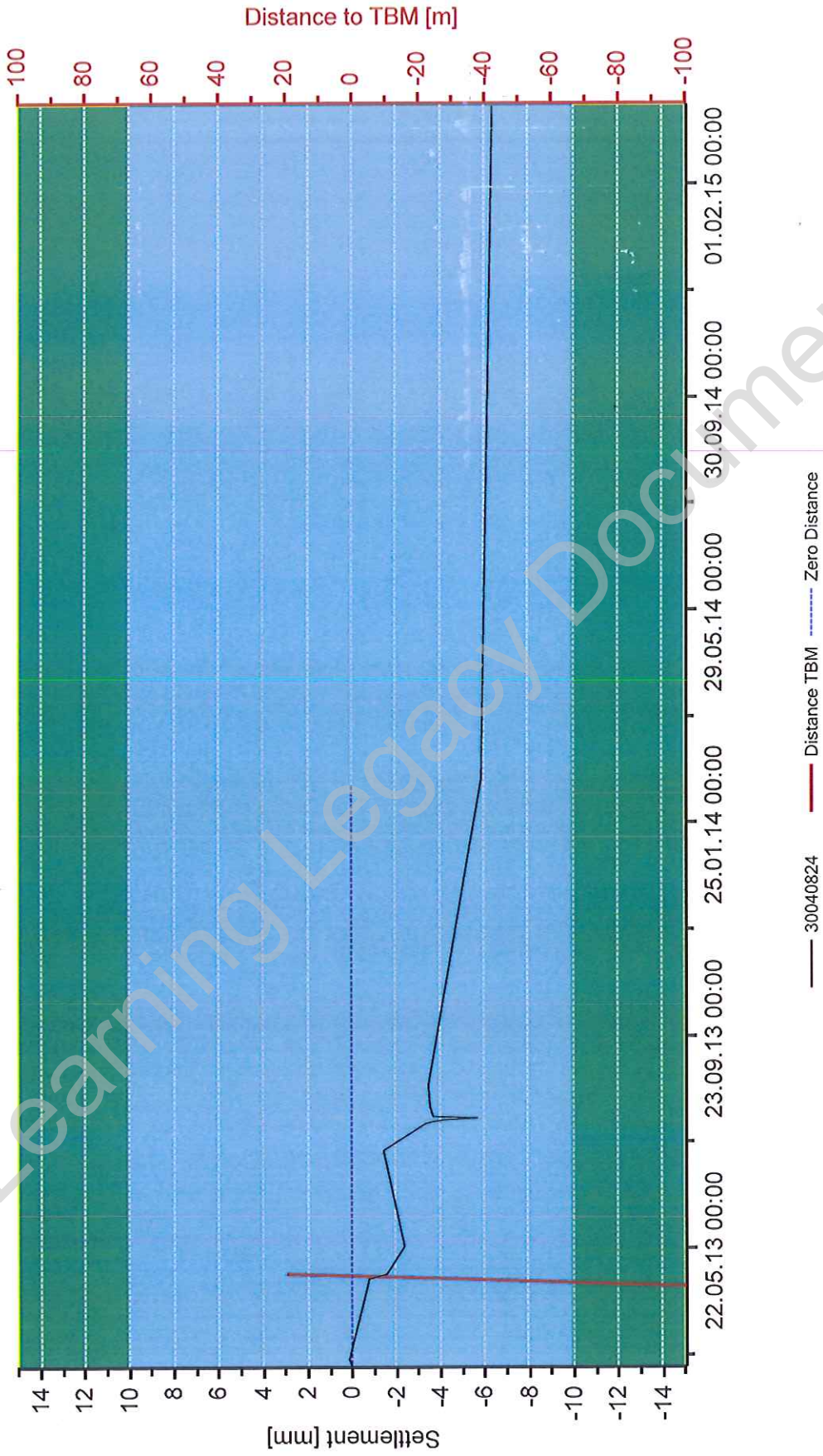
Profile: Measurement Point 30040821



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel- Plumstead Road Extensometer - 14.03.2013 - 19.03.2015
Date: 27.03.2015 16:06 Current Values: 27.03.2015 14:23

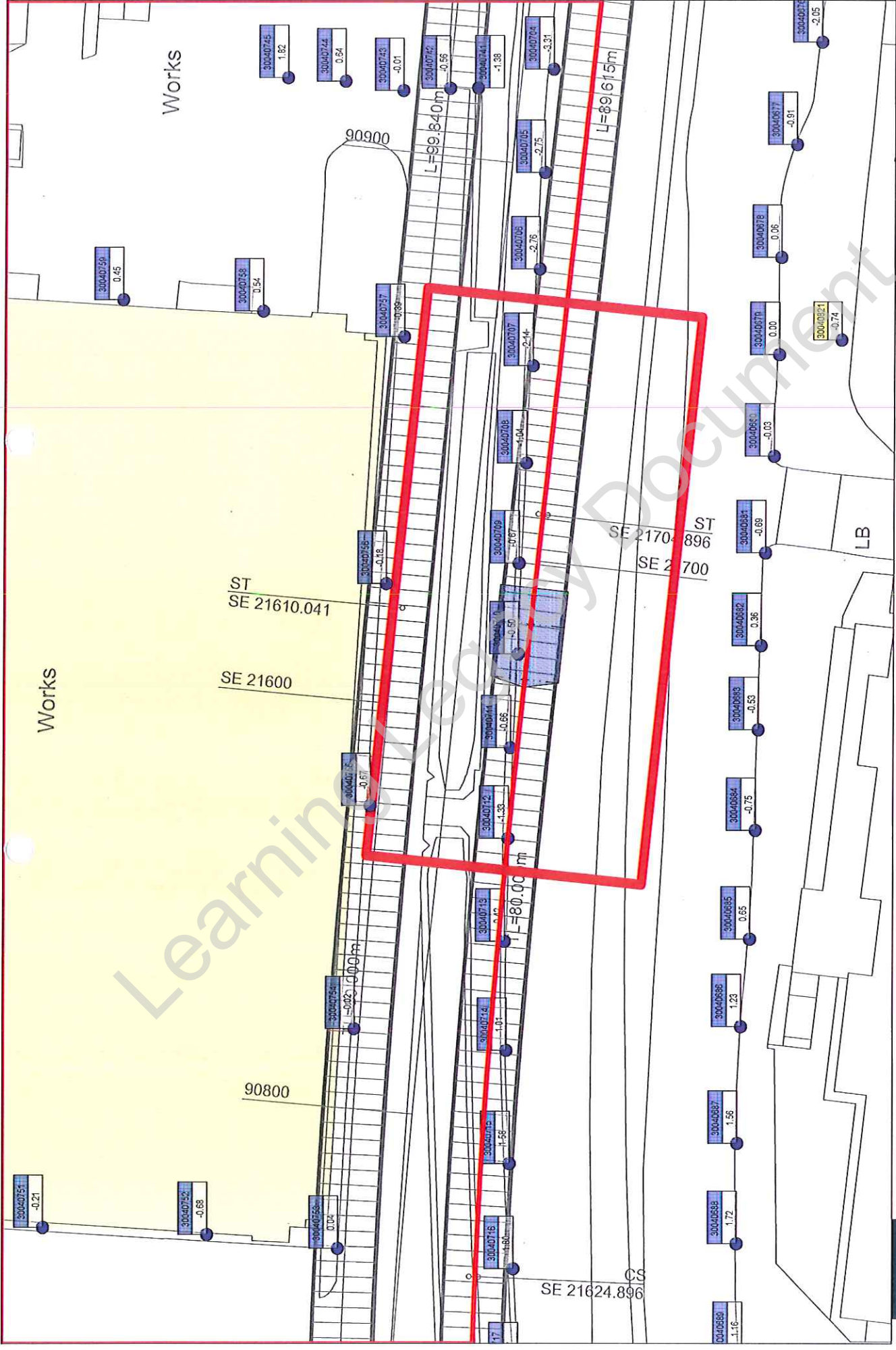


Profile: Measurement Point 30040824



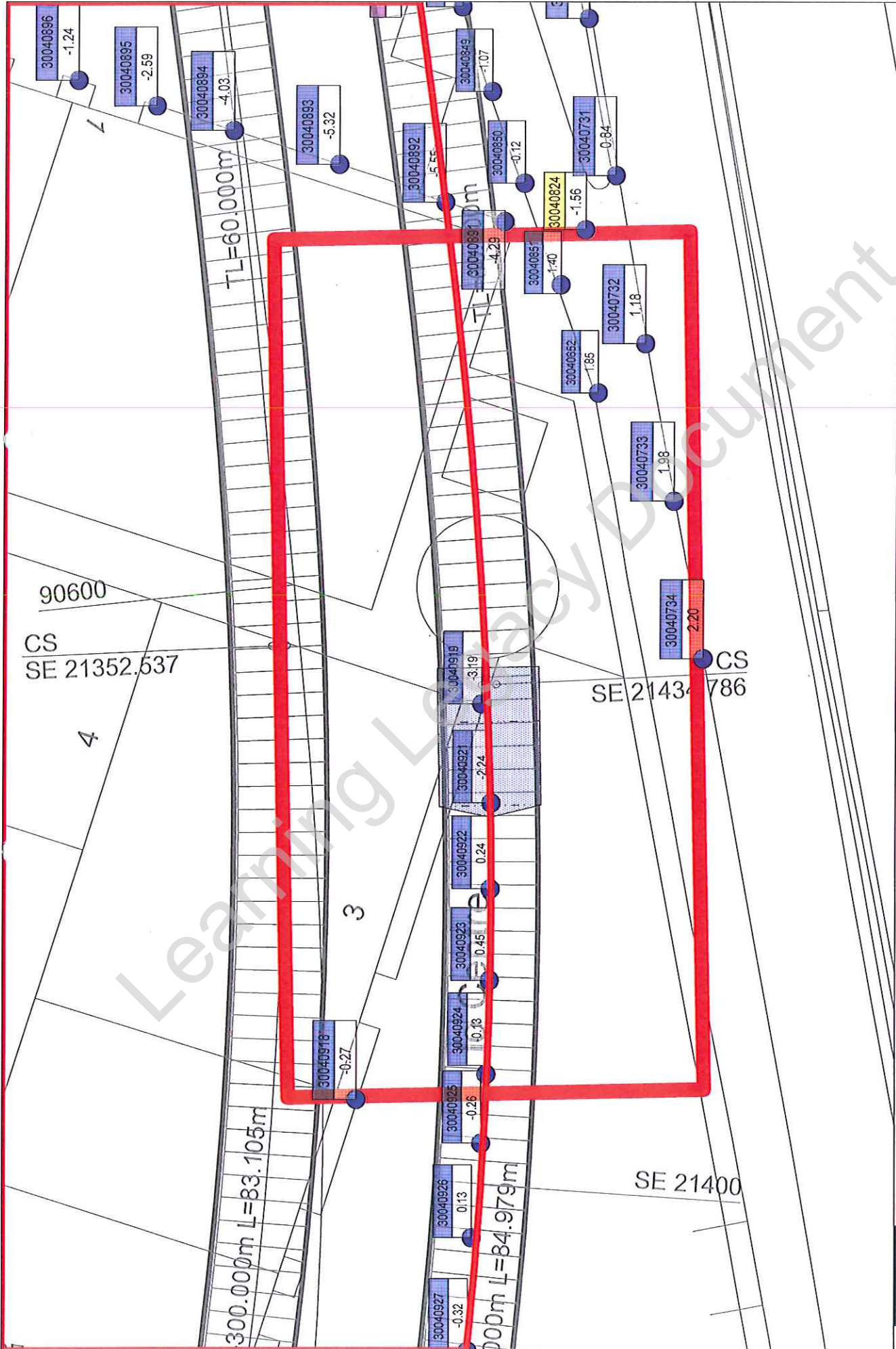
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel- Plumstead Road Extensometer - 14.03.2013 - 19.03.2015
Date: 27.03.2015 16:05 Current Values: 27.03.2015 14:23





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

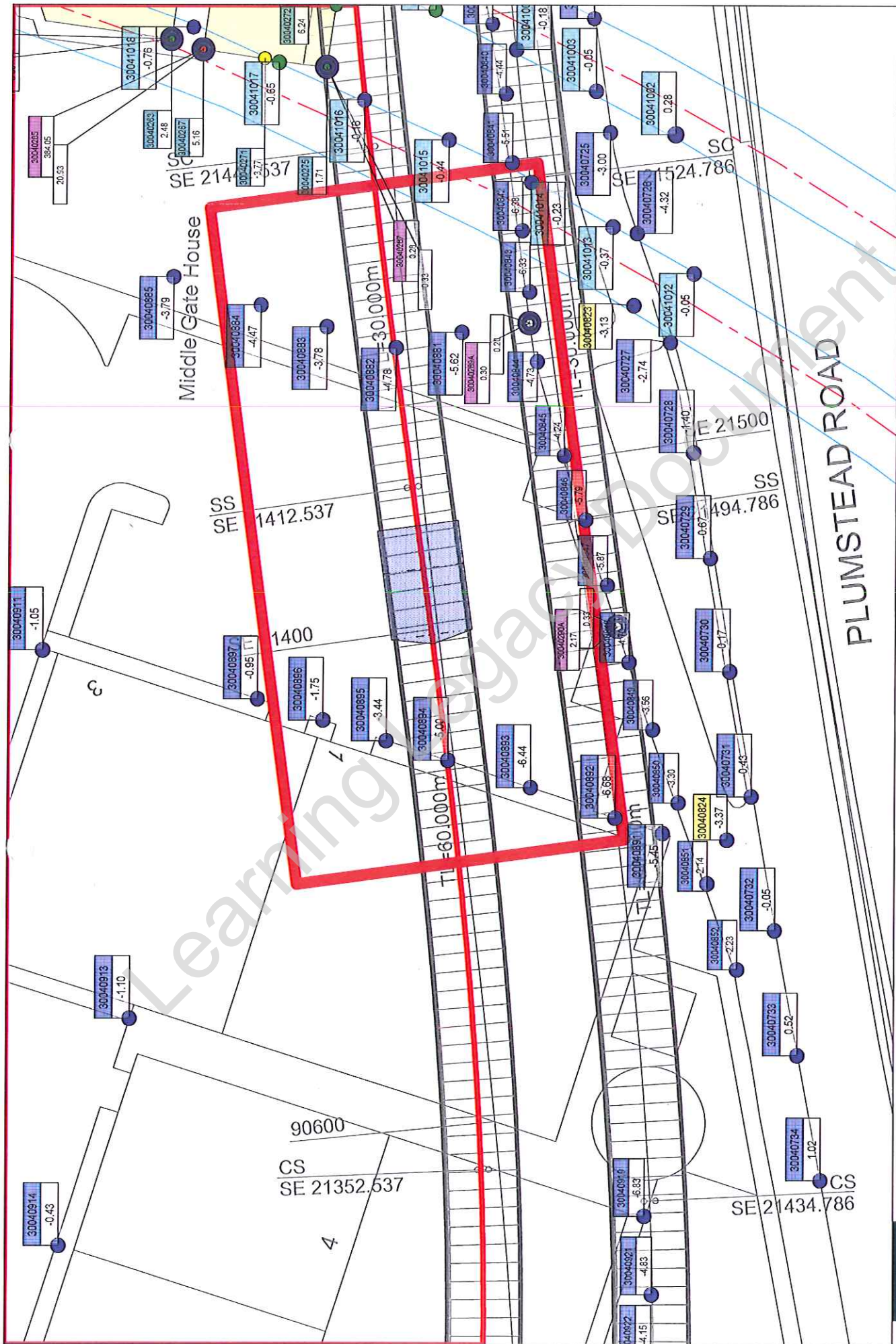
working activities: TBM drive
 current values: 22.04.2013 06:59



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

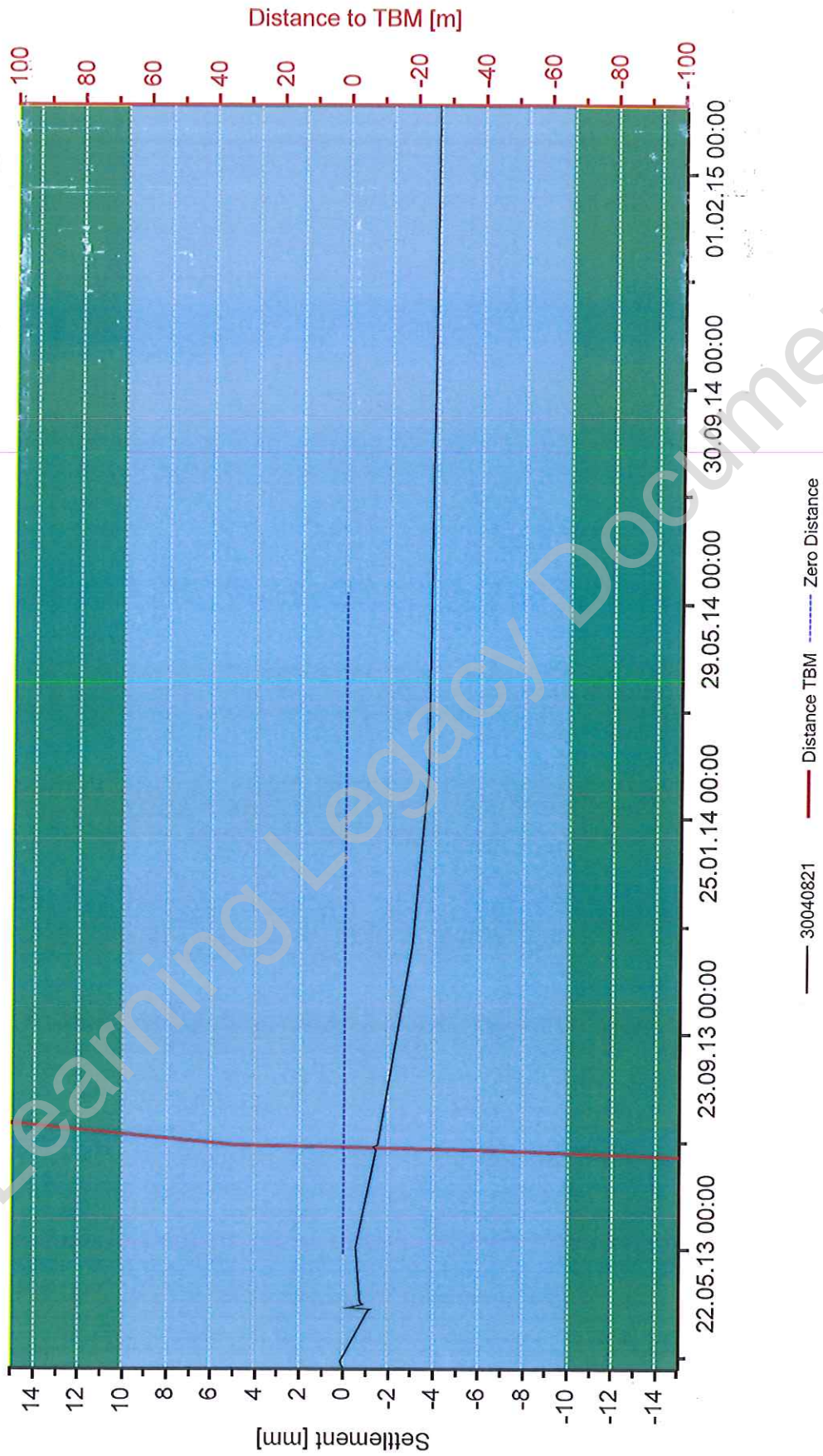
working activities: TBM drive

current values: 08.05.2013 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: 03.08.2013 09:00

Profile: Measurement Point 30040821



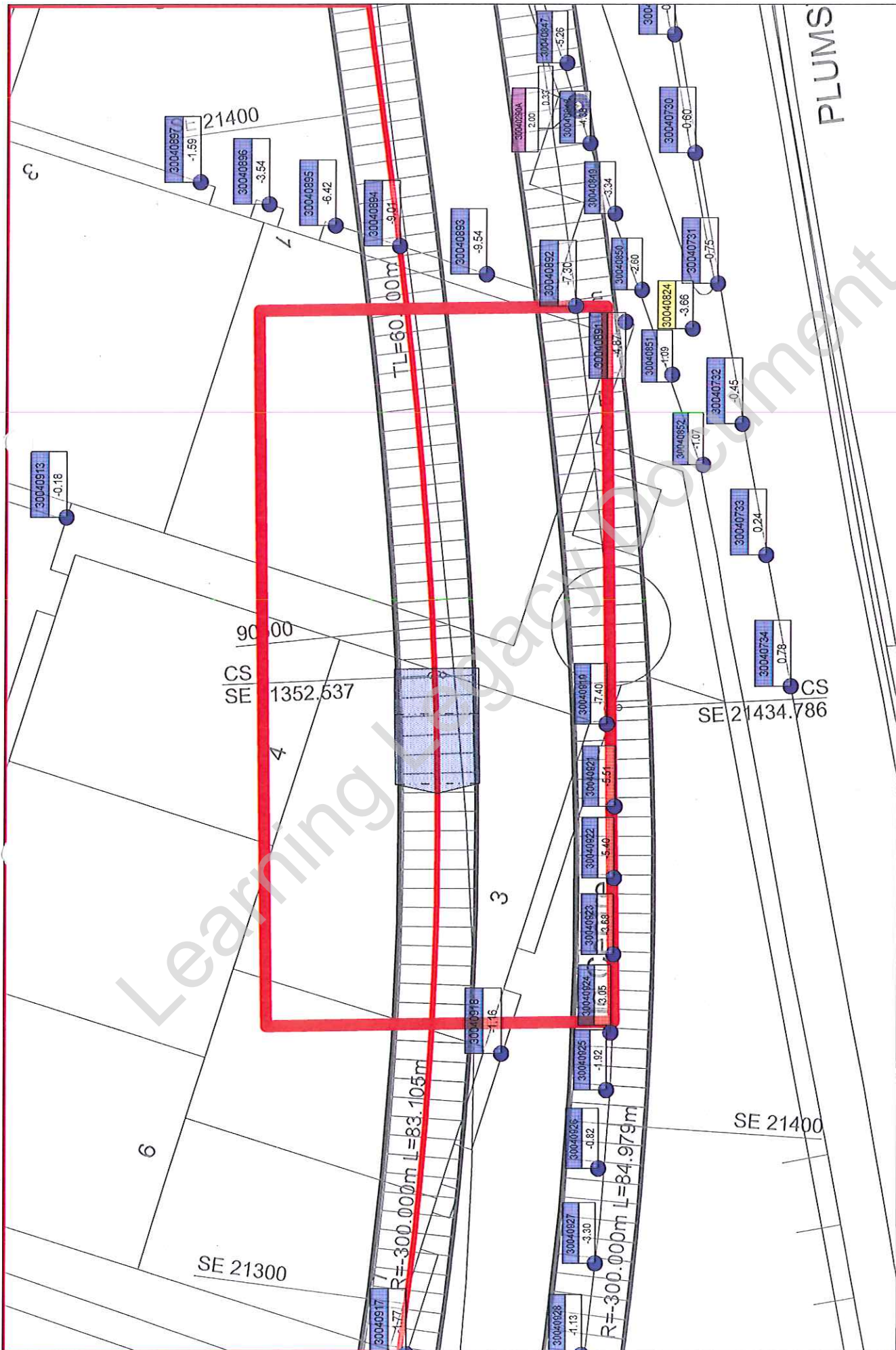
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Plumstead Road Extensometer - 14.03.2013 - 19.03.2015
date: 27.03.2015 15:04 current values: 27.03.2015 14:23

Profile: Measurement Point 30040824



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Plumstead Road Extensometer - 14.03.2013 - 19.03.2015
date: 27.03.2015 15:01 current values: 27.03.2015 14:23





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 07.08.2013 18:04



Joint Venture

Joint Venture


project: C310 Thames Tunnel

project: C310 Thames Tunnel

Joint Venture

No. of reading GPR	baseline 14.2.13		1. following 10.02.2013		2. following 17.02.2013		3. following 24.02.2013		4. following 03.03.2013		5. following 10.03.2013		6. following 17.03.2013		7. following 24.03.2013		8. following 31.03.2013		9. following 07.04.2013		10. following 14.04.2013		11. following 21.04.2013		12. following 28.04.2013					
	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	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				
30040821	95.862	0	95.861	-1	95.861	0	95.861	0	95.861	0	95.862	1	95.861	-1	95.861	0	96.641	-2	96.642	1	96.642	0	96.640	-1	96.641	0	96.641	0		
30040822	96.641	0	96.643	2	96.643	2	96.643	2	96.643	2	96.640	0	96.643	2	96.643	2	96.643	2	96.643	2	96.643	2	96.643	2	96.643	2	96.643	2	96.643	2
30040823	96.823	0	96.826	3	96.826	3	96.826	3	96.826	3	96.826	3	96.826	3	96.826	3	96.826	3	96.826	3	96.826	3	96.826	3	96.826	3	96.826	3	96.826	3
30040824	96.749	0	96.748	-1	96.748	-1	96.748	-1	96.748	-1	96.748	-1	96.748	-1	96.748	-1	96.748	-1	96.748	-1	96.748	-1	96.748	-1	96.748	-1	96.748	-1	96.748	-1

Monitoring Legacy Document

 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDIX 42

Wall Plumstead Road

Learning Legacy Document

monitoring asset	Wall Plumstead Road		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70001		
name of monitoring section:	Wall Plumstead Road		
sensor type:	manual levelling studs		
chainage:	90610 - 90750	point no.:	3004 0831 - 3004 0852
trigger values: [mm]	green: +12 -12	amber: +15 -15	red: +18 -18
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	14/03/13	0.00		
TBM 1	start ZOI	27/04/13	0.74	3004 0831
		30/04/13	0.31	3004 0841
		05/05/13	1.63	3004 0852
end ZOI	01/05/13	-0.47	3004 0831	breached not any trigger value
	06/05/13	-2.76	3004 0841	
	08/05/13	1.85	3004 0852	
TBM 2	start ZOI	25/07/13	-0.65	3004 0831
		30/07/13	-3.73	3004 0841
		03/08/13	-2.23	3004 0852
end ZOI	30/07/13	-1.43	3004 0831	breached not any trigger value
	03/08/13	-5.51	3004 0841	
	08/08/13	-1.07	3004 0852	
longterm	11/03/15	-1.15	3004 0831	
		-4.58	3004 0841	
		-0.81	3004 0852	

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

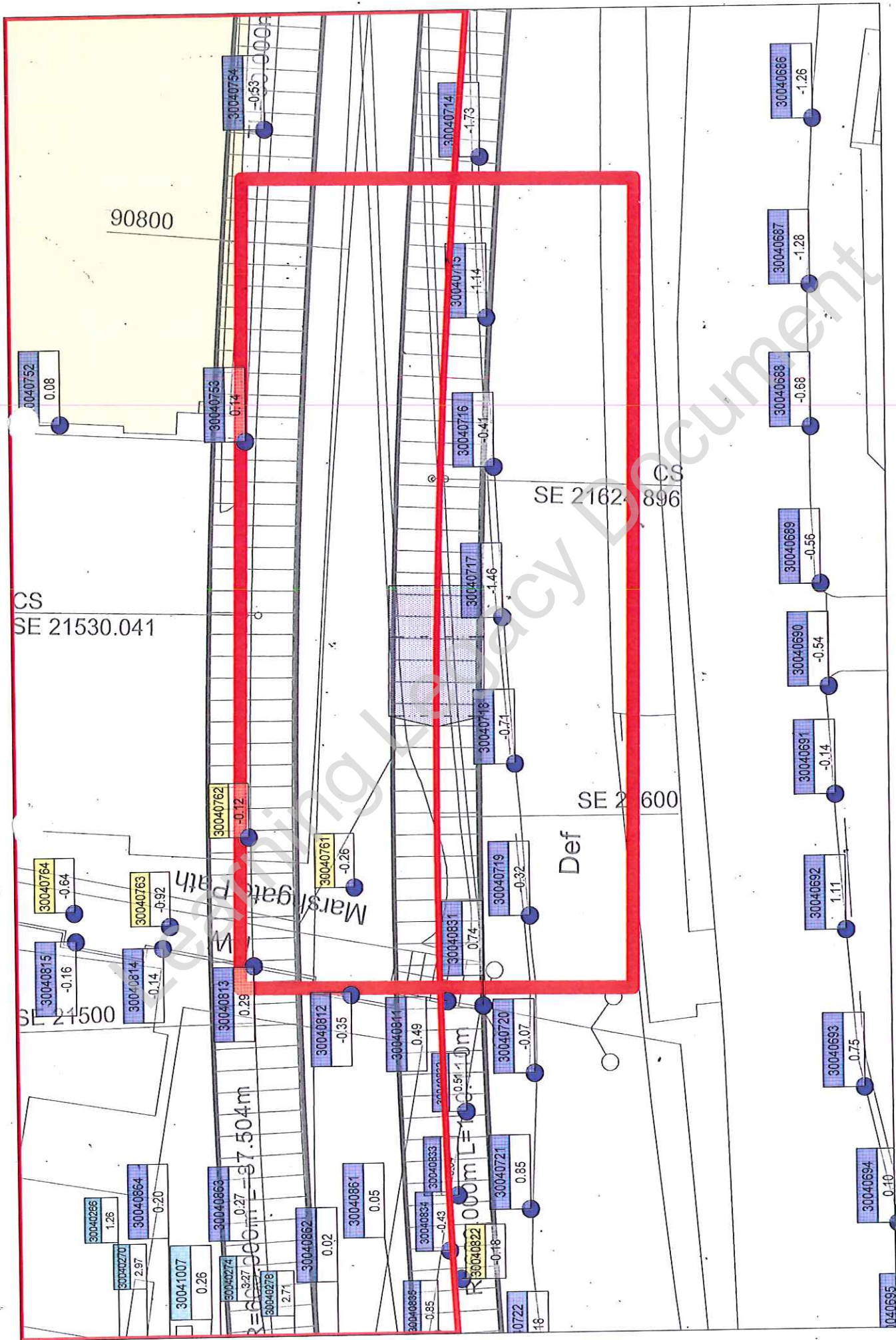
Overall, none of the points reached any trigger value.
 Under consideration of temperature differences, the surrounding ground condition and the achievable accuracy of the measurement, HMJV has no concern to cease the monitoring.
 The rate of change in the monitoring data is less than the required standards as per the specifications and drawings.

date / signature: 12/05/2015

print name:

HMJV project role:

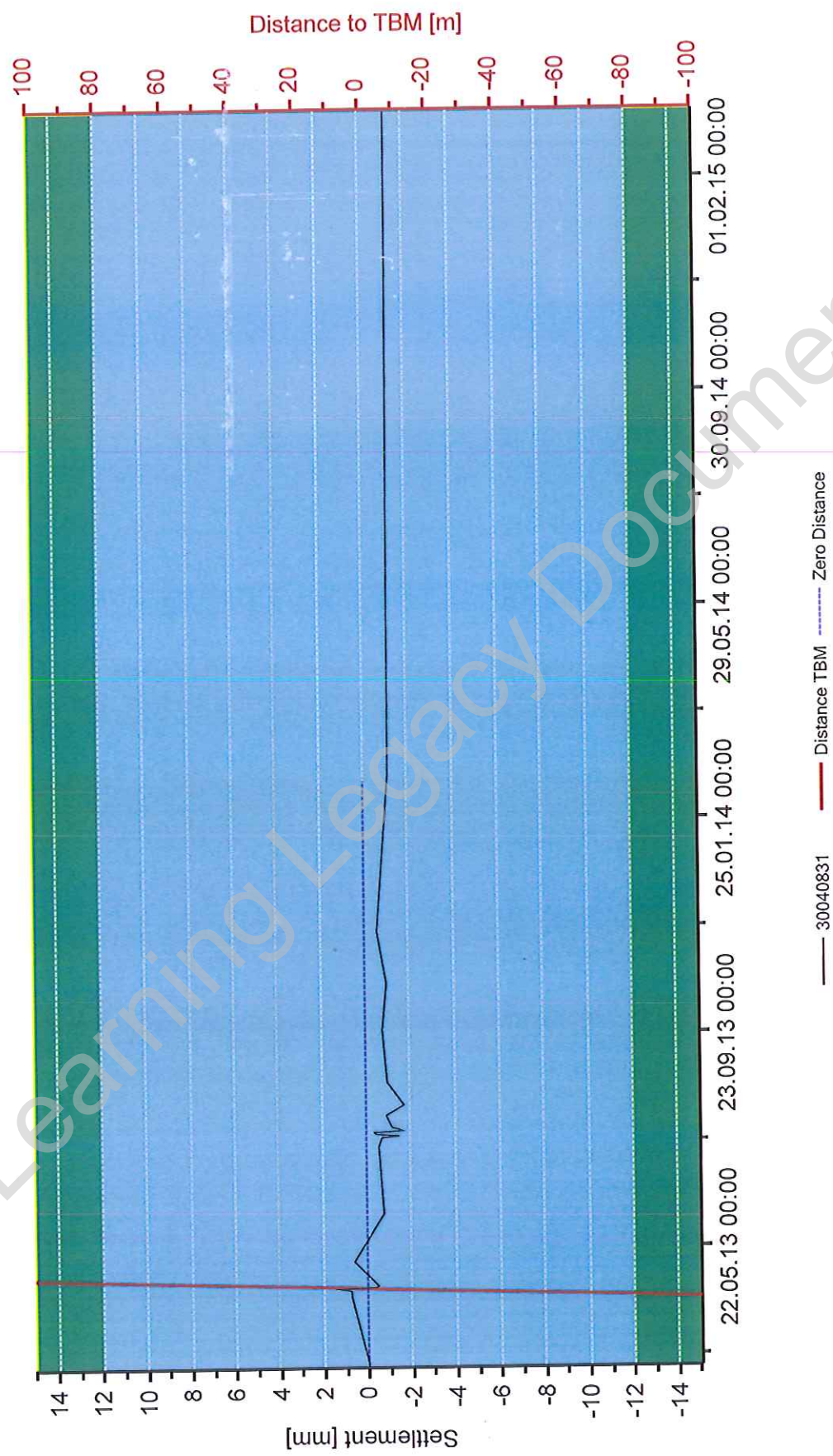
Monitoring & Survey engineer



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive
 current values: 27.04.2013 09:00



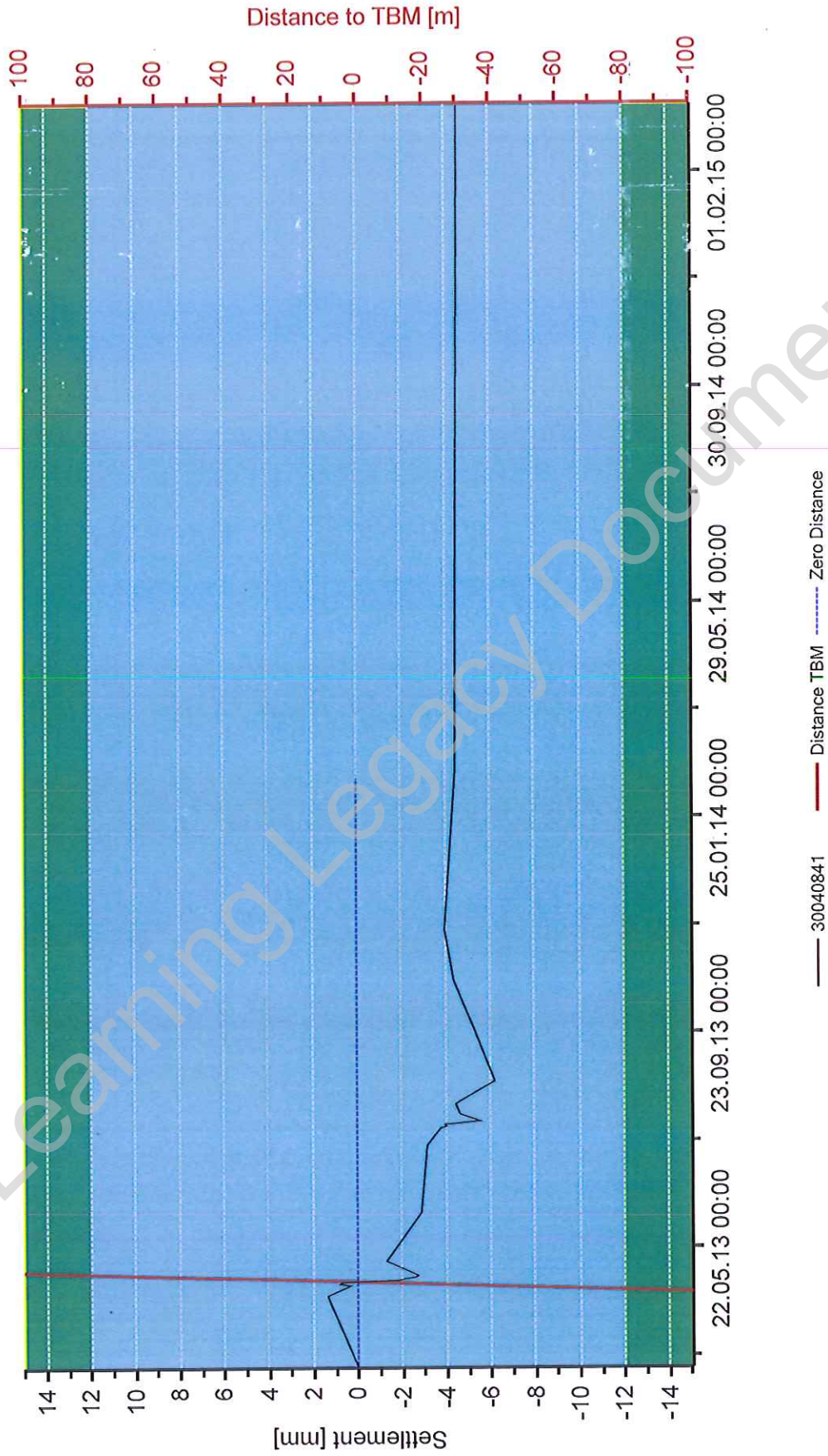
Profile: Measurement Point 30040831



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel- Wall Plumstead Road - 14.03.2013 - 11.03.2015
Date: 27.03.2015 16:10 Current Values: 27.03.2015 14:23



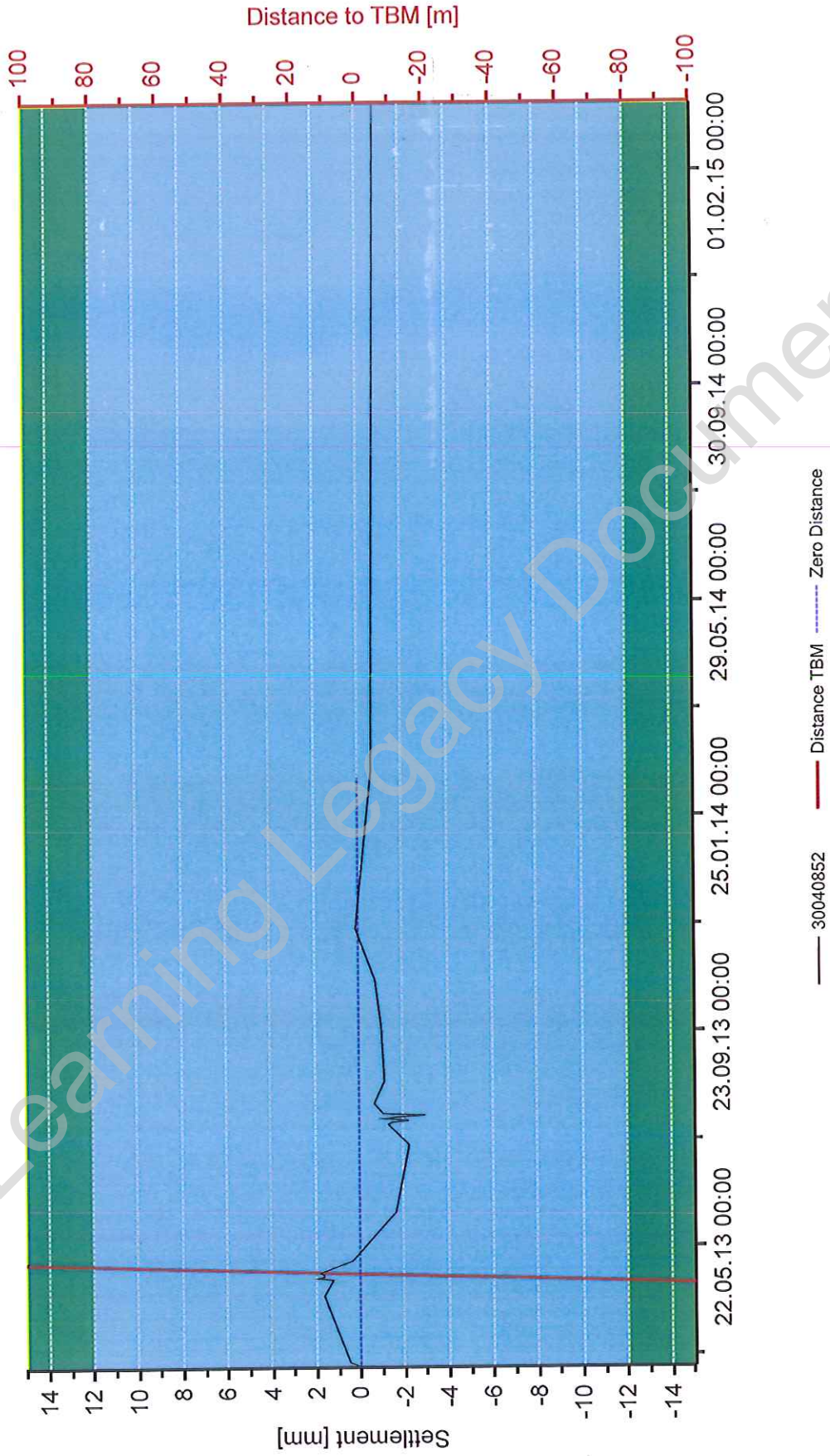
Profile: Measurement Point 30040841



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel- Wall Plumstead Road - 14.03.2013 - 11.03.2015
Date: 27.03.2015 16:12 Current Values: 27.03.2015 14:23

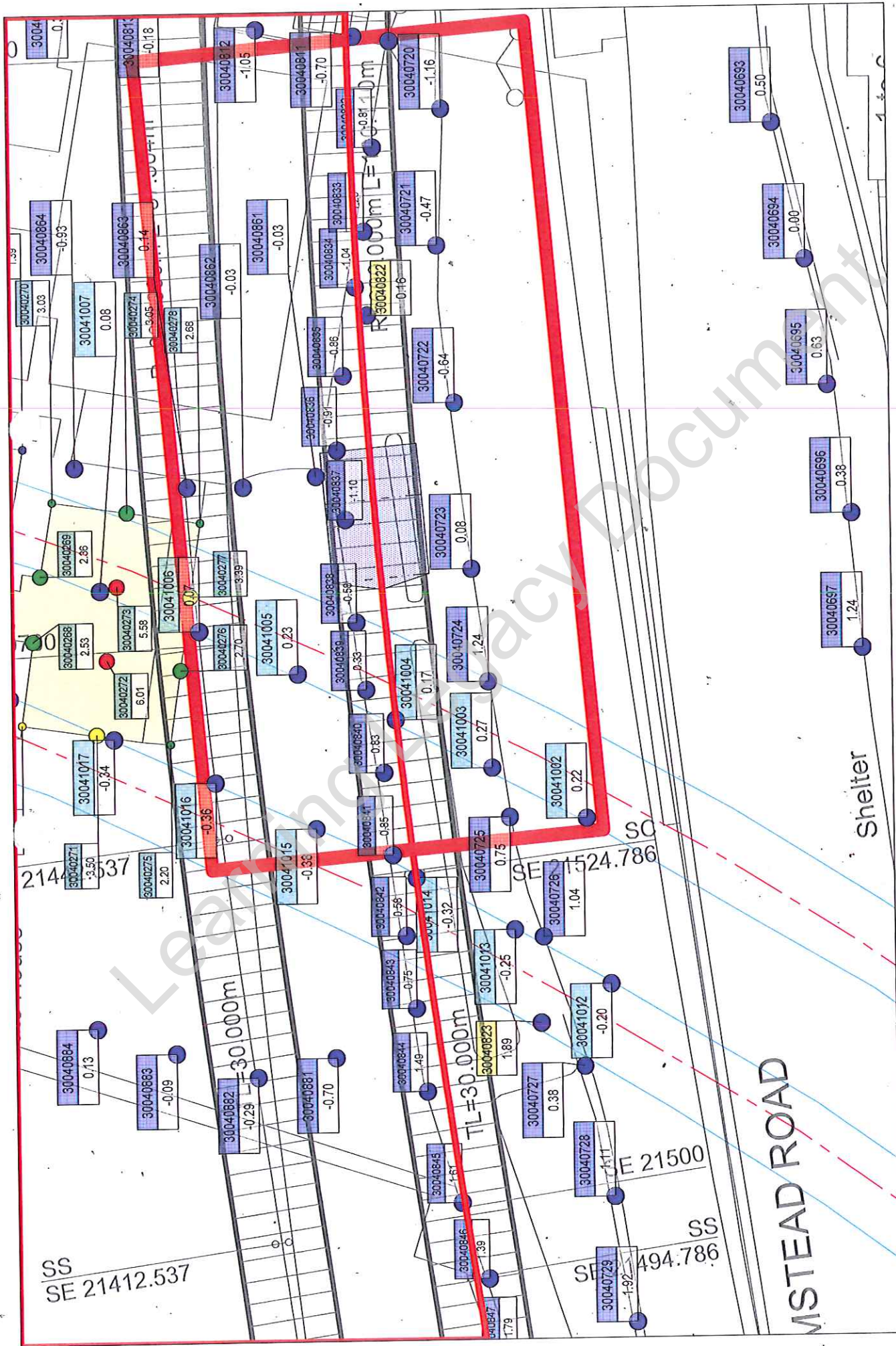


Profile: Measurement Point 30040852



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel- Wall Plumstead Road - 14.03.2013 - 11.03.2015
Date: 27.03.2015 16:13 Current Values: 27.03.2015 14:23

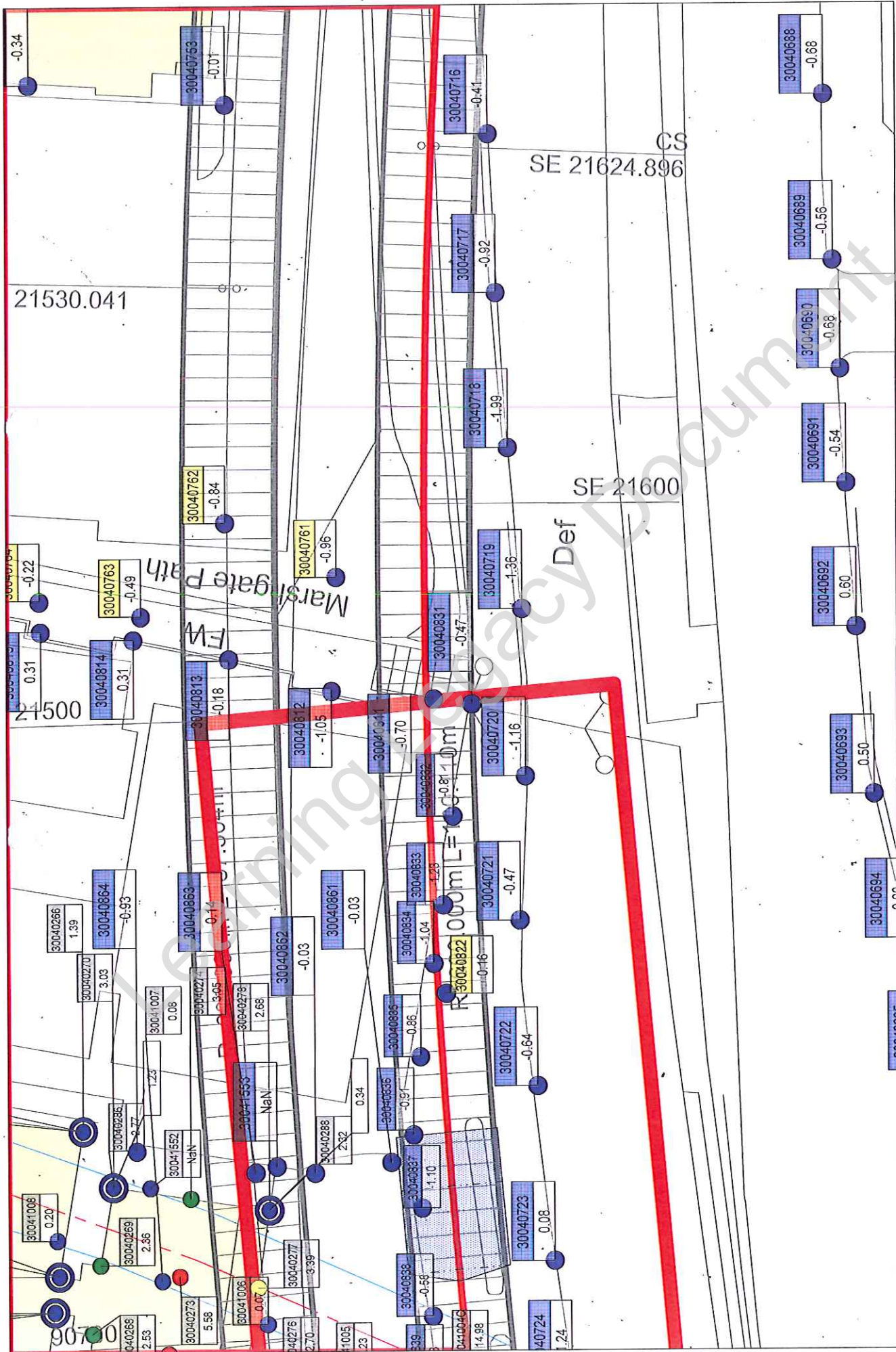




Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

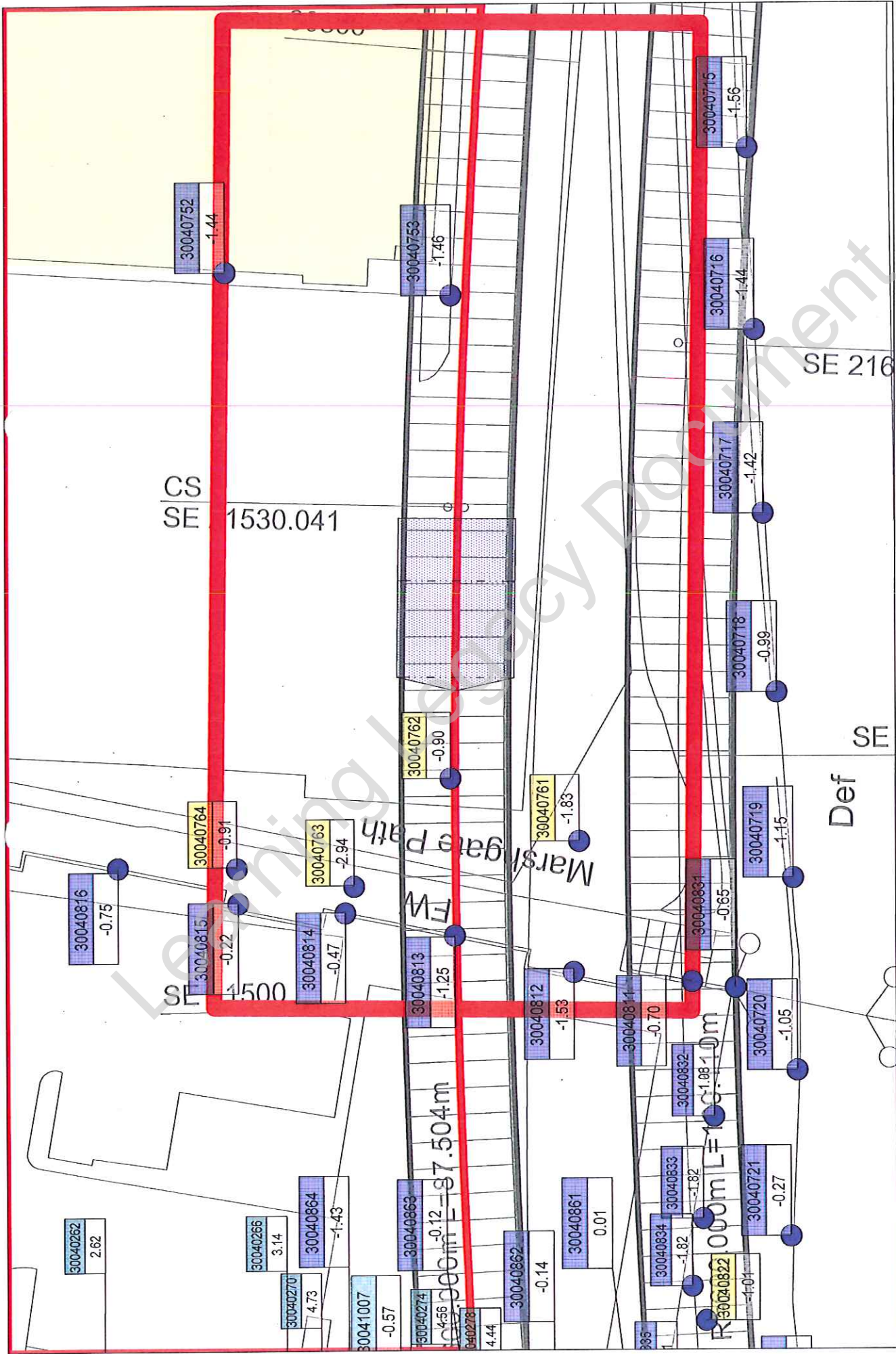
working activities: TBM drive

current values: 01.05.2013 09:00



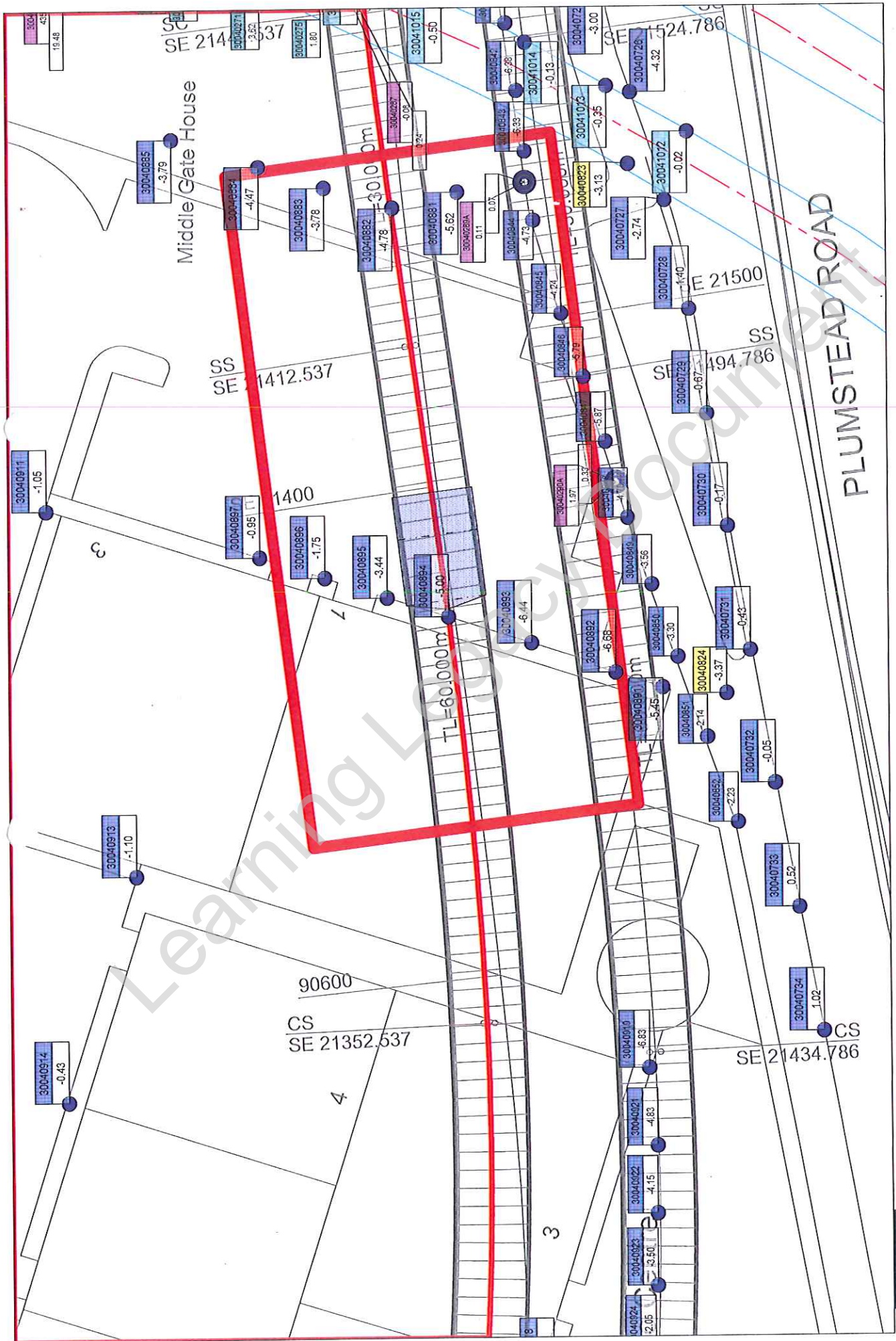
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB.
 current values: 01.05.2013 09:00



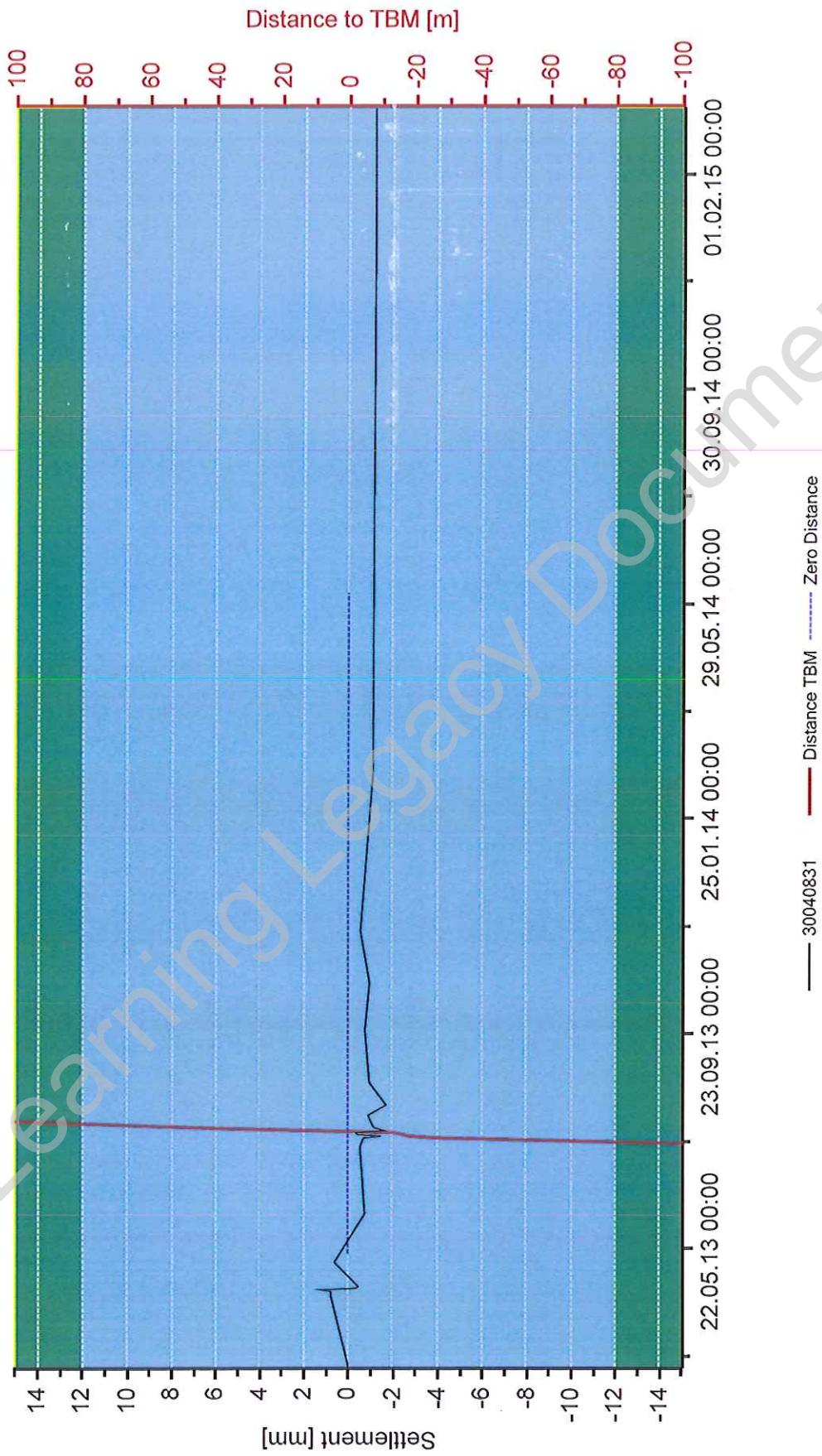


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 25.07.2013 19:09





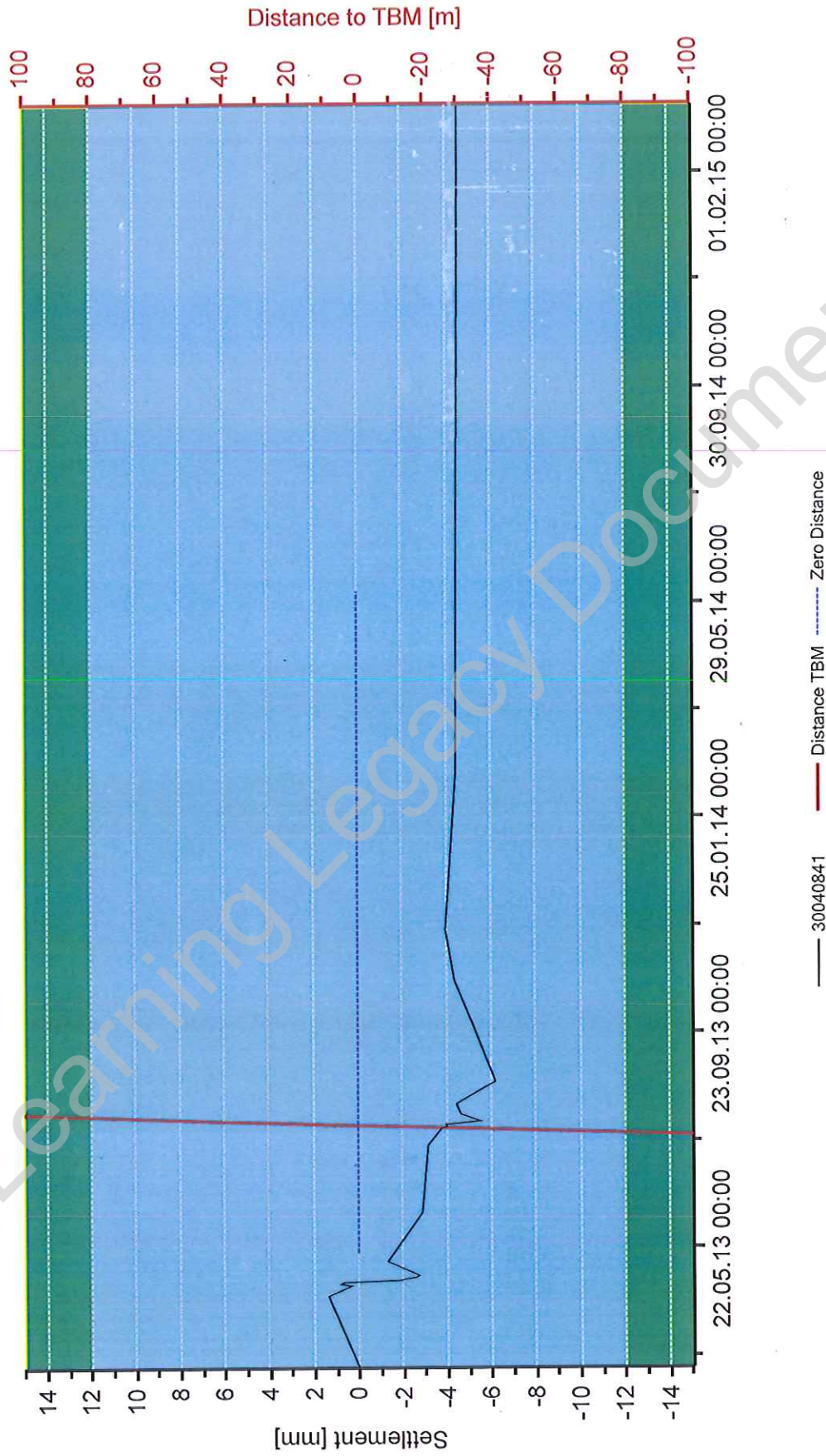
Profile: Measurement Point 30040831



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Wall Plumstead Road - 14.03.2013 - 11.03.2015
date: 27.03.2015 14:52 current values: 27.03.2015 14:23



Profile: Measurement Point 30040841



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Wall Plumstead Road - 14.03.2013 - 11.03.2015
date: 27.03.2015 14:50 current values: 27.03.2015 14:23

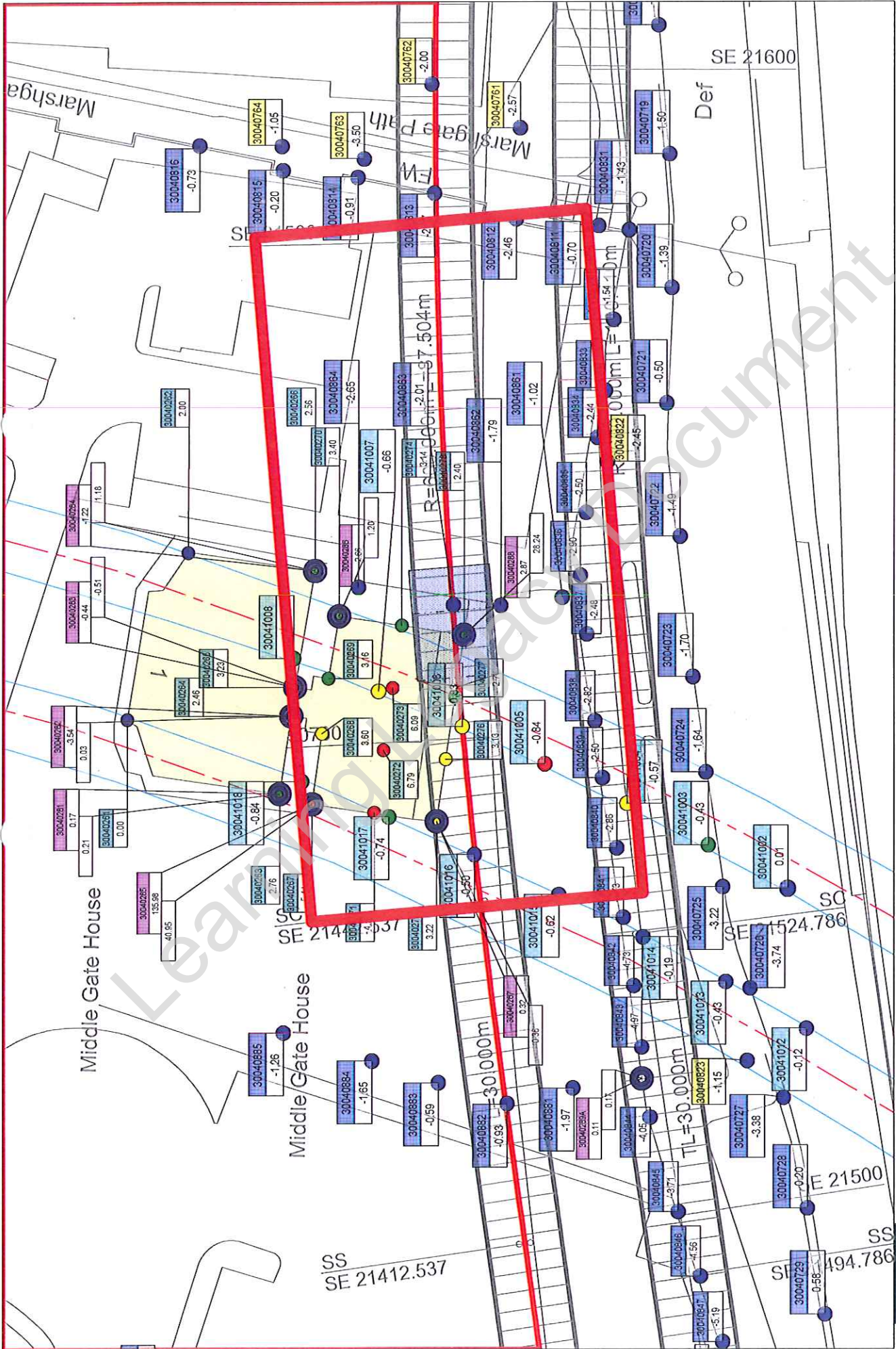


Profile: Measurement Point 30040852



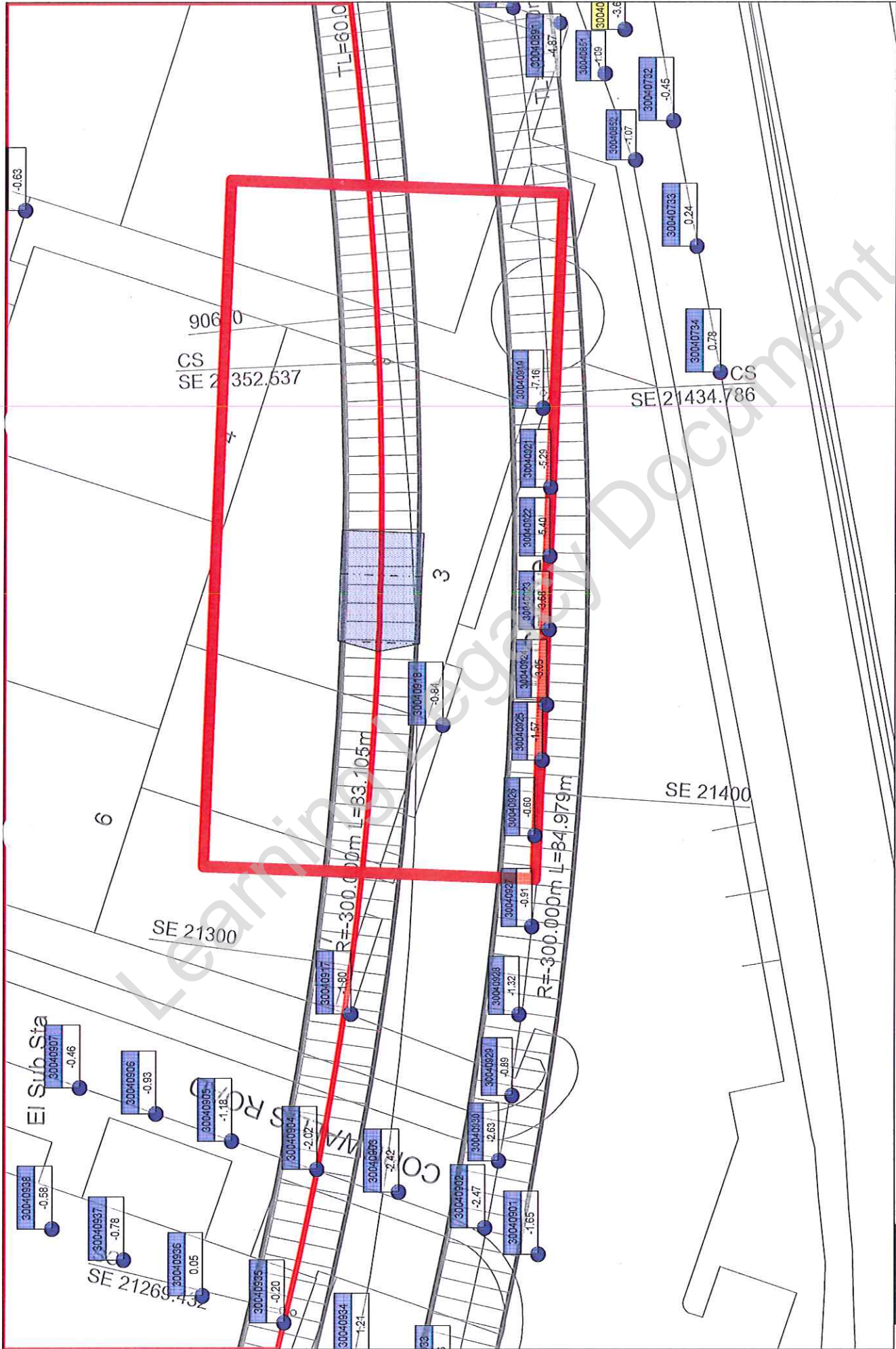
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Wall Plumstead Road - 14.03.2013 - 11.03.2015
date: 27.03.2015 14:45 current values: 27.03.2015 14:23





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 30.07.2013 18:00

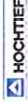




Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 08.08.2013 09:00

monitoring table

monitoring table



Joint Venture

Project: C310 Thames Tunnel

Joint Venture

Project: C310 Thames Tunnel

No. of reading	13. following		14. following		15. following		16. following		17. following		18. following		19. following		20. following		21. following		22. following		23. following		24. following		
	baseline	07/06/2013	14/06/2013	21/06/2013	28/06/2013	05/07/2013	12/07/2013	19/07/2013	26/07/2013	02/08/2013	09/08/2013	16/08/2013	23/08/2013	30/08/2013	06/09/2013	13/09/2013	20/09/2013	27/09/2013	04/10/2013	11/10/2013	18/10/2013	25/10/2013	01/11/2013	08/11/2013	
Point No.	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	elevation	
30040031	107.048	107.048	107.048	107.048	107.047	107.047	107.046	107.046	107.047	107.047	107.046	107.046	107.046	107.046	107.046	107.047	107.046	107.046	107.046	107.046	107.046	107.046	107.046	107.046	107.046
30040032	107.043	107.043	107.043	107.043	107.042	107.042	107.041	107.041	107.042	107.042	107.041	107.041	107.041	107.041	107.041	107.042	107.041	107.041	107.041	107.041	107.041	107.041	107.041	107.041	107.041
30040033	107.018	107.018	107.018	107.018	107.017	107.017	107.015	107.015	107.016	107.016	107.015	107.015	107.015	107.015	107.015	107.016	107.015	107.015	107.015	107.015	107.015	107.015	107.015	107.015	107.015
30040034	107.013	107.013	107.013	107.013	107.012	107.012	107.011	107.011	107.011	107.011	107.011	107.011	107.011	107.011	107.011	107.012	107.011	107.011	107.011	107.011	107.011	107.011	107.011	107.011	107.011
30040035	107.021	107.021	107.021	107.021	107.020	107.020	107.019	107.019	107.019	107.019	107.019	107.019	107.019	107.019	107.019	107.020	107.019	107.019	107.019	107.019	107.019	107.019	107.019	107.019	107.019
30040036	107.002	107.002	107.002	107.002	107.000	107.000	106.999	106.999	107.000	107.000	106.999	106.999	106.999	106.999	107.000	106.999	106.999	106.999	106.999	106.999	106.999	106.999	106.999	106.999	106.999
30040037	106.989	106.989	106.989	106.989	106.987	106.987	106.986	106.986	106.987	106.987	106.987	106.987	106.987	106.987	106.987	106.988	106.987	106.987	106.987	106.987	106.987	106.987	106.987	106.987	106.987
30040038	106.950	106.950	106.949	106.949	106.948	106.947	106.947	106.947	106.948	106.948	106.947	106.947	106.947	106.947	106.948	106.947	106.947	106.947	106.947	106.947	106.947	106.947	106.947	106.947	106.947
30040039	106.908	106.907	106.907	106.907	106.906	106.905	106.905	106.905	106.906	106.906	106.905	106.905	106.905	106.905	106.906	106.905	106.905	106.905	106.905	106.905	106.905	106.905	106.905	106.905	106.905
30040040	106.843	106.842	106.842	106.842	106.841	106.840	106.840	106.840	106.841	106.841	106.840	106.840	106.840	106.840	106.841	106.840	106.840	106.840	106.840	106.840	106.840	106.840	106.840	106.840	106.840
30040041	106.802	106.801	106.801	106.801	106.799	106.799	106.799	106.799	106.799	106.799	106.799	106.799	106.799	106.799	106.799	106.799	106.799	106.799	106.799	106.799	106.799	106.799	106.799	106.799	106.799
30040042	106.756	106.754	106.754	106.754	106.752	106.752	106.752	106.752	106.752	106.752	106.752	106.752	106.752	106.752	106.752	106.752	106.752	106.752	106.752	106.752	106.752	106.752	106.752	106.752	106.752
30040043	106.889	106.886	106.886	106.886	106.884	106.884	106.884	106.884	106.884	106.884	106.884	106.884	106.884	106.884	106.884	106.884	106.884	106.884	106.884	106.884	106.884	106.884	106.884	106.884	106.884
30040044	106.890	106.879	106.879	106.879	106.877	106.876	106.876	106.876	106.876	106.876	106.876	106.876	106.876	106.876	106.876	106.876	106.876	106.876	106.876	106.876	106.876	106.876	106.876	106.876	106.876
30040045	106.807	106.865	106.865	106.865	106.864	106.864	106.863	106.863	106.863	106.863	106.863	106.863	106.863	106.863	106.863	106.863	106.863	106.863	106.863	106.863	106.863	106.863	106.863	106.863	106.863
30040046	106.949	106.947	106.947	106.947	106.945	106.945	106.945	106.945	106.945	106.945	106.945	106.945	106.945	106.945	106.945	106.945	106.945	106.945	106.945	106.945	106.945	106.945	106.945	106.945	106.945
30040047	107.065	107.062	107.062	107.062	107.060	107.060	107.060	107.060	107.060	107.060	107.060	107.060	107.060	107.060	107.060	107.060	107.060	107.060	107.060	107.060	107.060	107.060	107.060	107.060	107.060
30040048	107.102	107.102	107.102	107.102	107.101	107.101	107.101	107.101	107.101	107.101	107.101	107.101	107.101	107.101	107.101	107.101	107.101	107.101	107.101	107.101	107.101	107.101	107.101	107.101	107.101
30040049	107.237	107.235	107.235	107.235	107.233	107.233	107.233	107.233	107.233	107.233	107.233	107.233	107.233	107.233	107.233	107.233	107.233	107.233	107.233	107.233	107.233	107.233	107.233	107.233	107.233
30040050	107.314	107.314	107.314	107.314	107.311	107.311	107.311	107.311	107.311	107.311	107.311	107.311	107.311	107.311	107.311	107.311	107.311	107.311	107.311	107.311	107.311	107.311	107.311	107.311	107.311
30040051	107.460	107.442	107.442	107.442	107.439	107.439	107.439	107.439	107.439	107.439	107.439	107.439	107.439	107.439	107.439	107.439	107.439	107.439	107.439	107.439	107.439	107.439	107.439	107.439	107.439
30040052	107.543	107.545	107.545	107.544	107.542	107.541	107.541	107.541	107.541	107.541	107.541	107.541	107.541	107.541	107.541	107.541	107.541	107.541	107.541	107.541	107.541	107.541	107.541	107.541	107.541

monitoring table



monitoring table



Joint Venture

Joint Venture

Joint Venture

Joint Venture

No. of reading	25. following		26. following		27. following		28. following		29. following		30. following		31. following		32. following		33. following		34. following		35. following		36. 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	
30040031	107.048		107.047	0	-1	107.046	-1	-2	107.047	1	-1	107.047	0	-1	107.047	0	-1	107.047	0	-1	107.046	-1	-1	107.046	-1
30040032	107.042		107.042	0	-1	107.041	0	-1	107.042	0	-1	107.042	0	-1	107.042	0	-1	107.042	0	-1	107.042	0	-1	107.042	0
30040033	107.018		107.016	0	-2	107.015	0	-3	107.016	0	-2	107.016	0	-2	107.015	0	-2	107.015	0	-2	107.015	0	-1	107.015	-1
30040034	107.013		107.011	-1	-3	107.010	-1	-4	107.011	-1	-2	107.011	-1	-2	107.011	-1	-2	107.011	-1	-2	107.011	-1	-1	107.012	0
30040035	107.021		107.018	0	-3	107.017	-1	-4	107.017	0	-4	107.017	0	-4	107.018	2	-2	107.019	0	-2	107.019	0	-1	107.019	0
30040036	107.002		106.999	0	-3	106.990	-1	-4	106.997	-2	-6	107.000	3	-3	107.000	3	-3	107.000	3	-3	107.000	3	-2	107.000	0
30040037	106.989		106.986	0	-3	106.986	-1	-3	106.987	-1	-5	106.985	-1	-5	106.989	4	-1	106.989	4	-1	106.989	4	0	106.989	-1
30040038	106.950		106.947	0	-4	106.946	-1	-4	106.947	0	-3	106.945	-1	-6	106.940	3	-3	106.940	3	-3	106.940	3	-2	106.940	0
30040039	106.908		106.904	-1	-4	106.904	0	-4	106.905	1	-3	106.905	0	-3	106.904	2	-3	106.904	2	-3	106.905	0	-2	106.905	-1
30040040	106.843		106.839	-1	-4	106.838	0	-4	106.839	1	-4	106.837	-2	-5	106.837	-2	-5	106.837	-2	-5	106.839	1	-4	106.840	-1
30040041	106.802		106.797	-1	-5	106.797	-1	-6	106.797	1	-5	106.796	-2	-6	106.797	1	-5	106.797	1	-5	106.798	0	-4	106.798	0
30040042	106.756		106.751	-1	-5	106.750	-1	-6	106.750	1	-6	106.750	0	-6	106.750	0	-6	106.750	0	-6	106.751	1	-5	106.752	0
30040043	106.889		106.884	-1	-5	106.882	-1	-6	106.882	-1	-6	106.883	1	-5	106.883	0	-5	106.884	0	-5	106.884	0	-4	106.884	0
30040044	106.880		106.876	-1	-4	106.876	-1	-4	106.875	2	-5	106.874	-1	-5	106.874	-1	-5	106.874	-1	-5	106.876	2	-4	106.877	1
30040045	106.867		106.863	0	-4	106.863	-1	-4	106.862	-1	-5	106.861	-1	-5	106.862	-1	-5	106.862	-1	-5	106.863	2	-4	106.863	2
30040046	106.849		106.844	0	-5	106.844	1	-5	106.842	-1	-6	106.842	-1	-6	106.843	-1	-6	106.843	-1	-6	106.844	0	-5	106.844	0
30040047	107.005		107.000	0	-5	107.000	0	-5	107.000	0	-5	107.000	0	-5	107.000	0	-5	107.000	0	-5	107.000	0	-4	107.000	0
30040048	107.162		107.157	0	-5	107.157	0	-5	107.157	0	-5	107.156	-1	-6	107.156	-1	-6	107.156	-1	-6	107.156	-1	-6	107.156	-1
30040049	107.237		107.233	0	-4	107.233	0	-4	107.232	-1	-5	107.232	-1	-5	107.232	-1	-5	107.232	-1	-5	107.232	-1	-4	107.232	-1
30040050	107.314		107.311	0	-3	107.311	1	-3	107.311	2	-3	107.311	2	-3	107.311	2	-3	107.311	2	-3	107.311	2	-3	107.311	2
30040051	107.440		107.439	0	-1	107.439	0	-1	107.437	-1	-2	107.437	-1	-2	107.439	2	-1	107.439	2	-1	107.439	2	-1	107.439	-1
30040052	107.543		107.542	0	-2	107.542	0	-2	107.542	2	-1	107.542	2	-1	107.542	2	-1	107.542	2	-1	107.542	2	-1	107.542	-1

monitoring table




Joint Venture

project: C310 Thames Tunnel

Bauwerk: Wall Plumstead Road

No. of reading	baseline	37. 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
	14/3/13	11/03/2015	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	
30040831	107.048	107.046	0	-1.15									
30040832	107.043	107.042	0	-1.01									
30040833	107.018	107.016	0	-2.41									
30040834	107.013	107.012	0	-1.37									
30040835	107.021	107.020	1	-0.84									
30040836	107.002	107.001	1	-1.85									
30040837	106.989	106.992	3	2.34									
30040838	106.950	106.949	1	-1.08									
30040839	106.908	106.906	1	-1.89									
30040840	106.843	106.839	0	-3.59									
30040841	106.802	106.797	0	-4.58									
30040842	106.756	destroyed											
30040843	106.889	106.885	0	-3.79									
30040844	106.880	106.876	0	-4.04									
30040845	106.867	106.862	-1	-5.21									
30040846	106.949	106.944	0	-5.20									
30040847	107.065	107.060	0	-4.57									
30040848	107.162	107.158	0	-3.92									
30040849	107.237	107.233	0	-3.61									
30040850	107.314	107.311	0	-2.95									
30040851	107.440	107.440	0	-0.97									
30040852	107.543	107.543	0	-0.81									

		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDIX 50

I/O Center Car Park

Learning Legacy Document

monitoring asset	Water Main under I/O Center Car Park		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70002		
name of monitoring section:	I/O Center Car Park		
sensor type:	manual levelling studs		
chainage:	90530 - 90590	point no.:	3004 0921 - 3004 0930
trigger values: [mm]	green: +22 -22	amber: +28 -28	red: +35 -35
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	22/04/13	0.00		
TBM 1	start ZOI	07/05/13	0.69	3004 0921
		10/05/13	-0.02	3004 0930
	end ZOI	10/05/13	-4.31	3004 0921
		14/05/13	-1.18	3004 0930
breached not any trigger value				
TBM 2	start ZOI	05/08/13	-5.67	3004 0921
		09/08/13	-2.63	3004 0930
	end ZOI	09/08/13	-5.29	3004 0921
		12/08/13	-2.20	3004 0930
breached not any trigger value				
longterm	20/02/14	-5.66 -1.46	3004 0921 3004 0930	points no. 3004 0921 + 3004 0930 were not accessible/covered, highest value point no 3004 0922 with -4.83mm settlement

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)

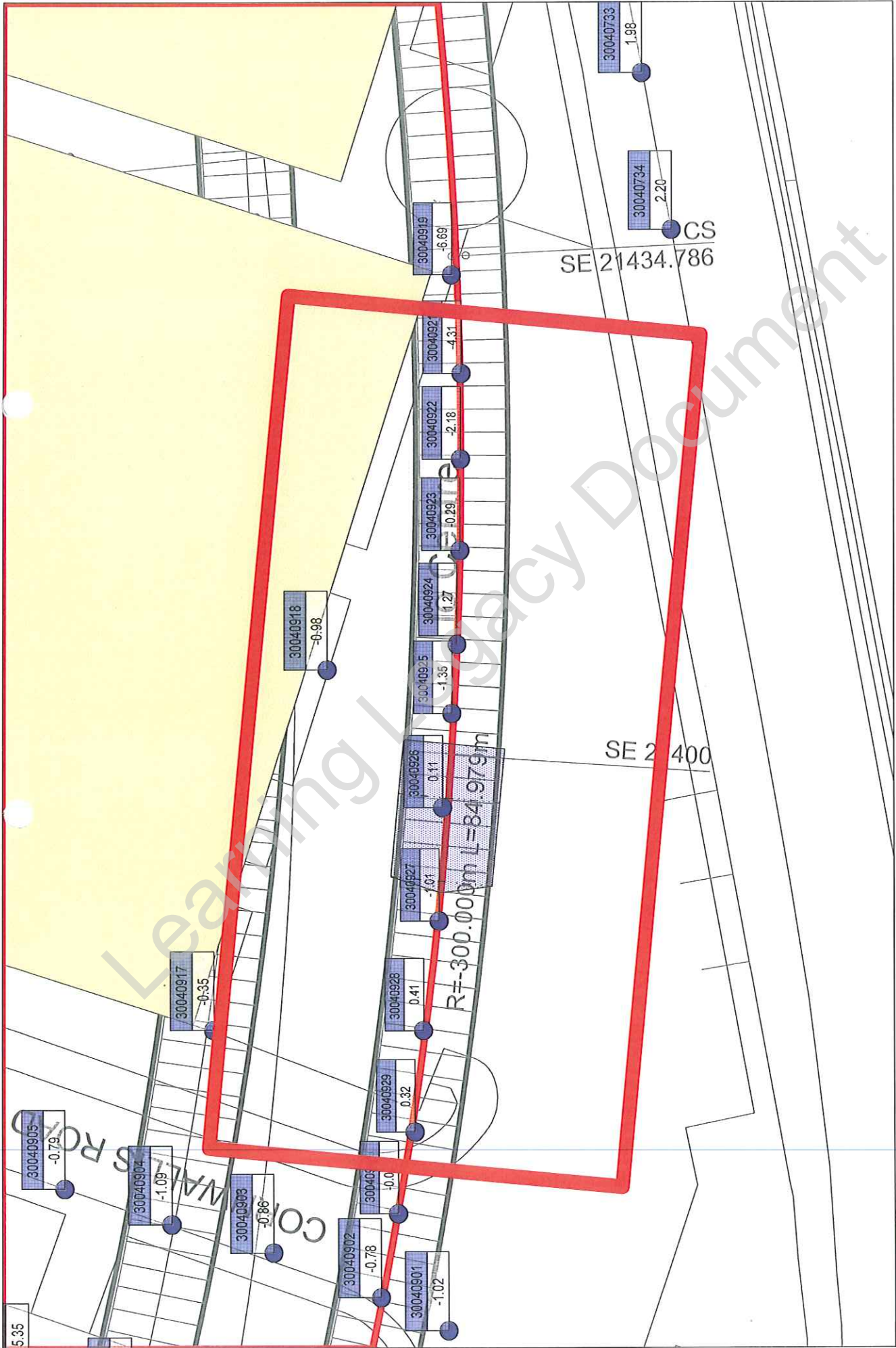
summary / comments

Overall, none of the points reached any trigger 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: 12/03/2015

print name:

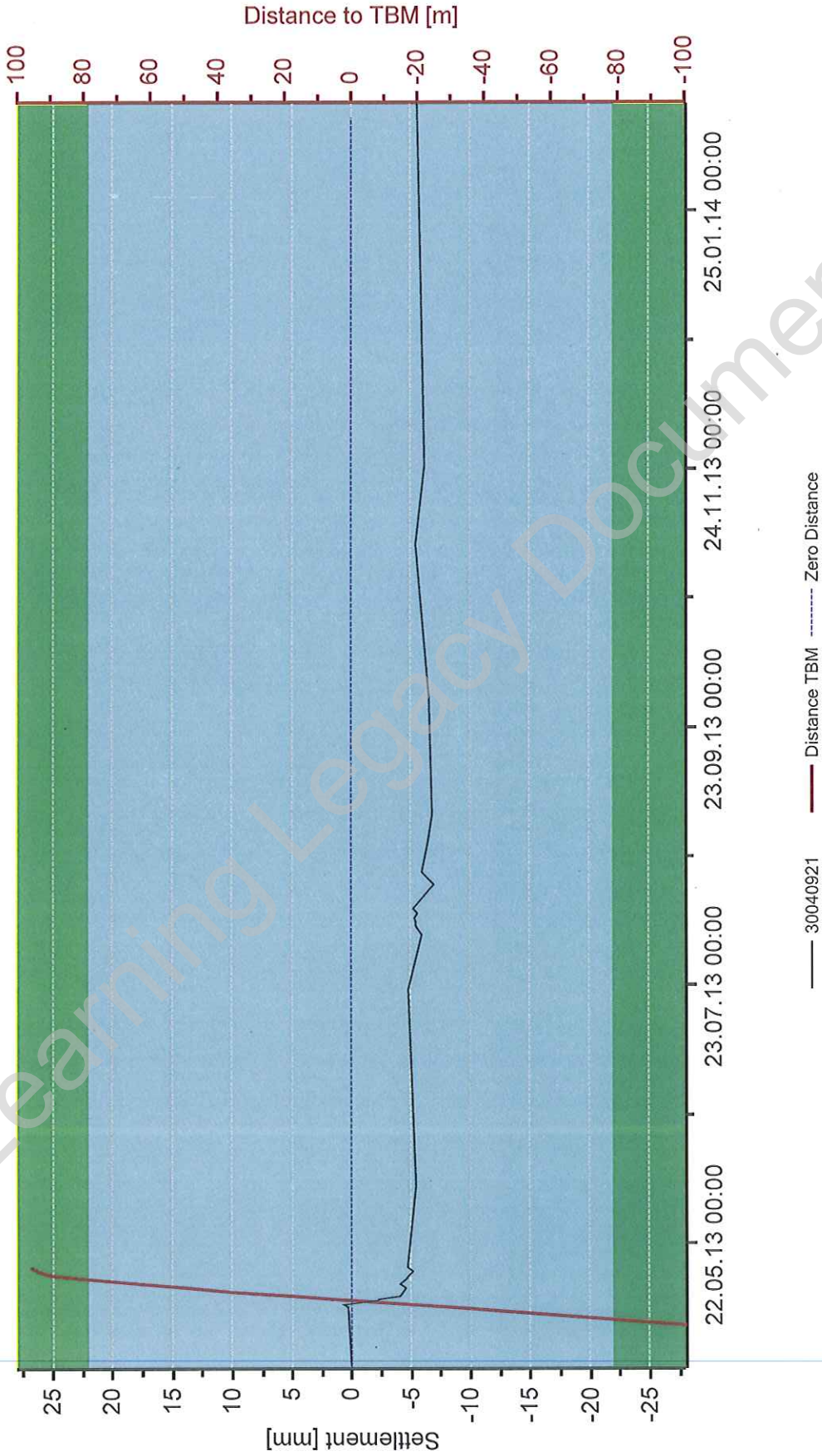
HMJV project role: Monitoring & Survey engineer



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 10.05.2013 09:00



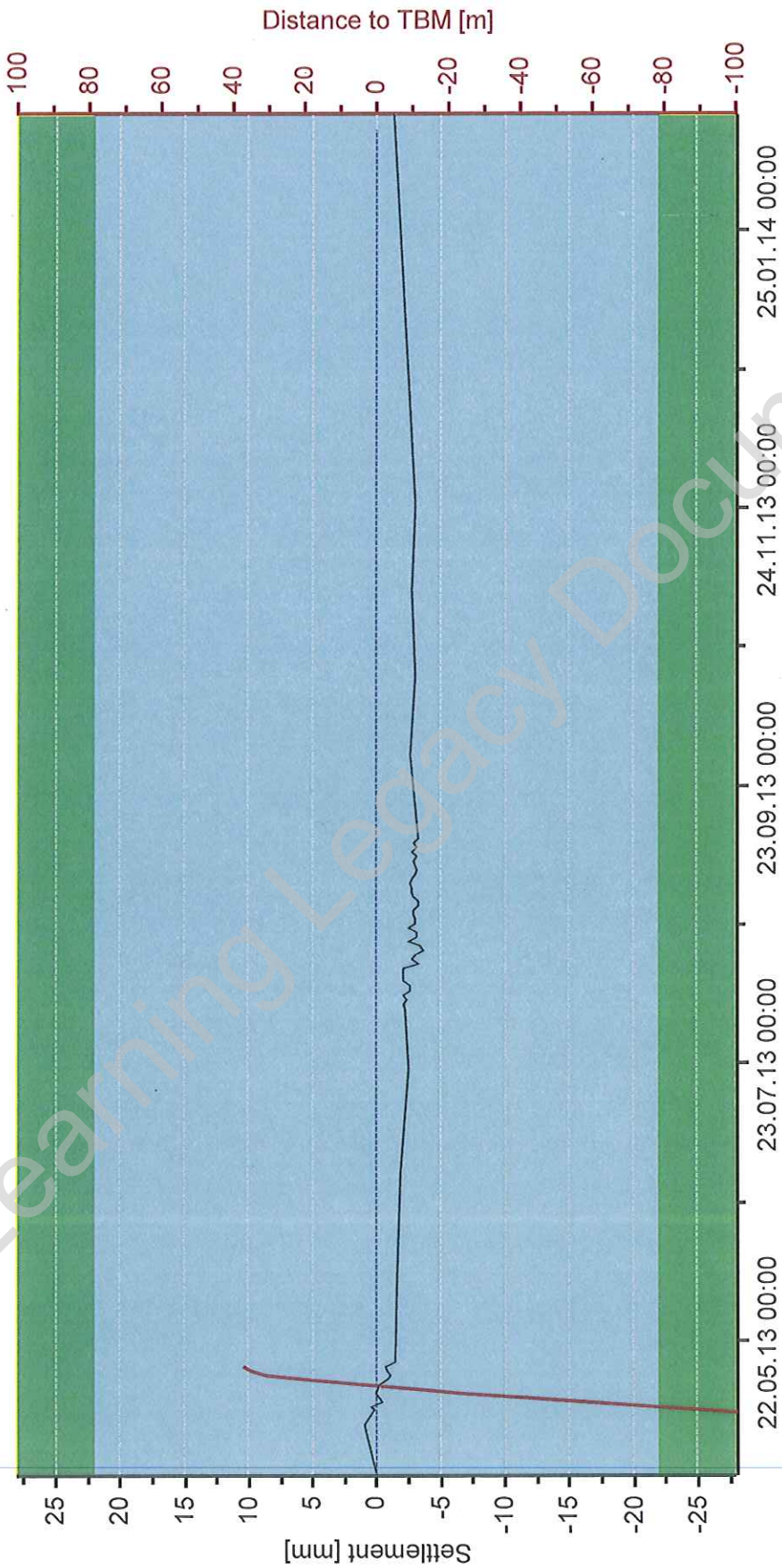
Point: 30040921



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - I/O Center Car Park 22.04.2013 - 20.02.2014
date: 18.08.2014 14:46 current values: 18.08.2014 14:23



Point: 30040930



— 30040930 — Distance TBM - - - - - Zero Distance

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

Close Out Report: WB Tunnel - I/O Center Car Park 22.04.2013 - 20.02.2014

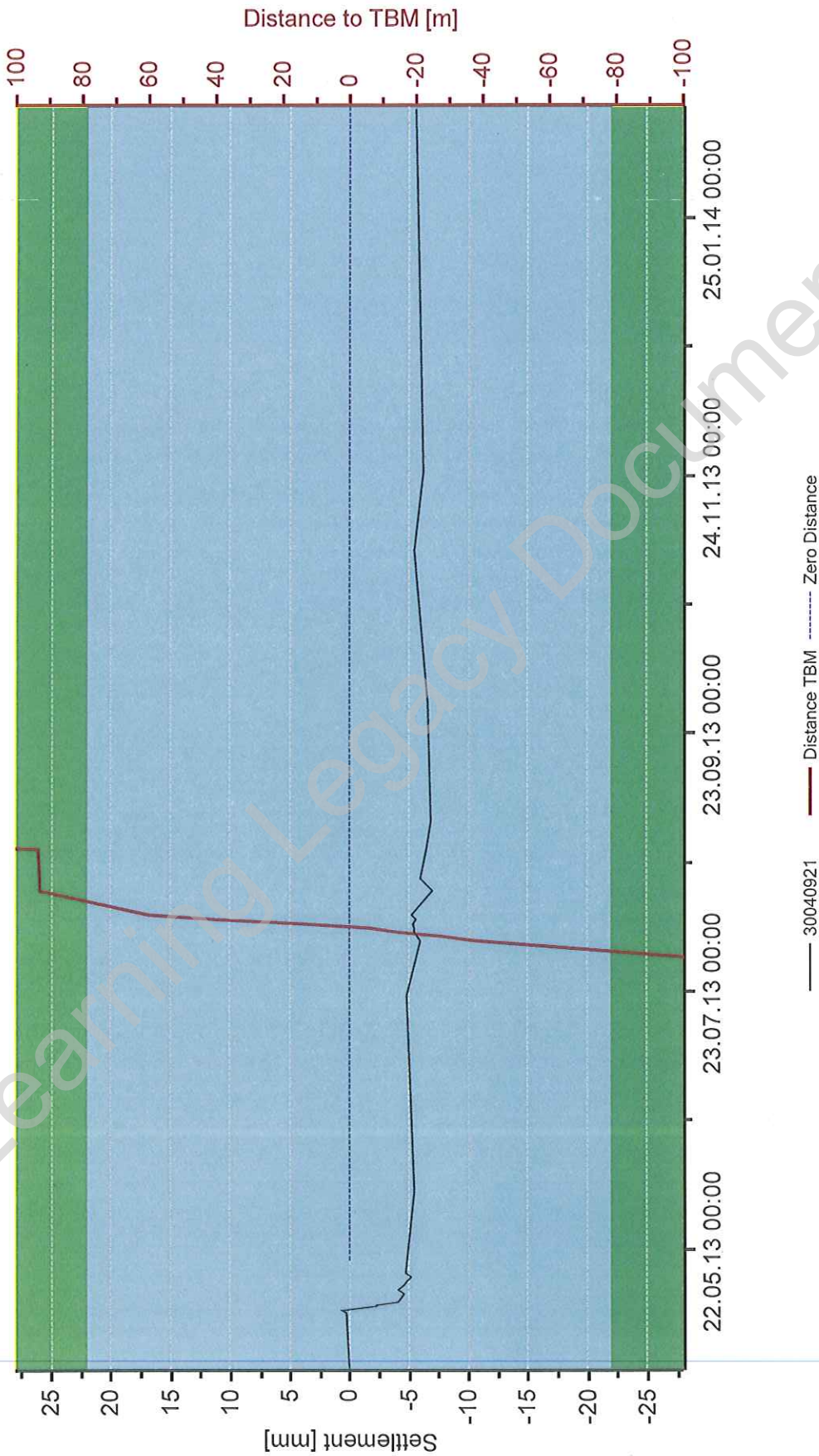
date: 18.08.2014 14:49 current values: 18.08.2014 14:23





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive
 current values: 14.05.2013 17:34

Point: 30040921

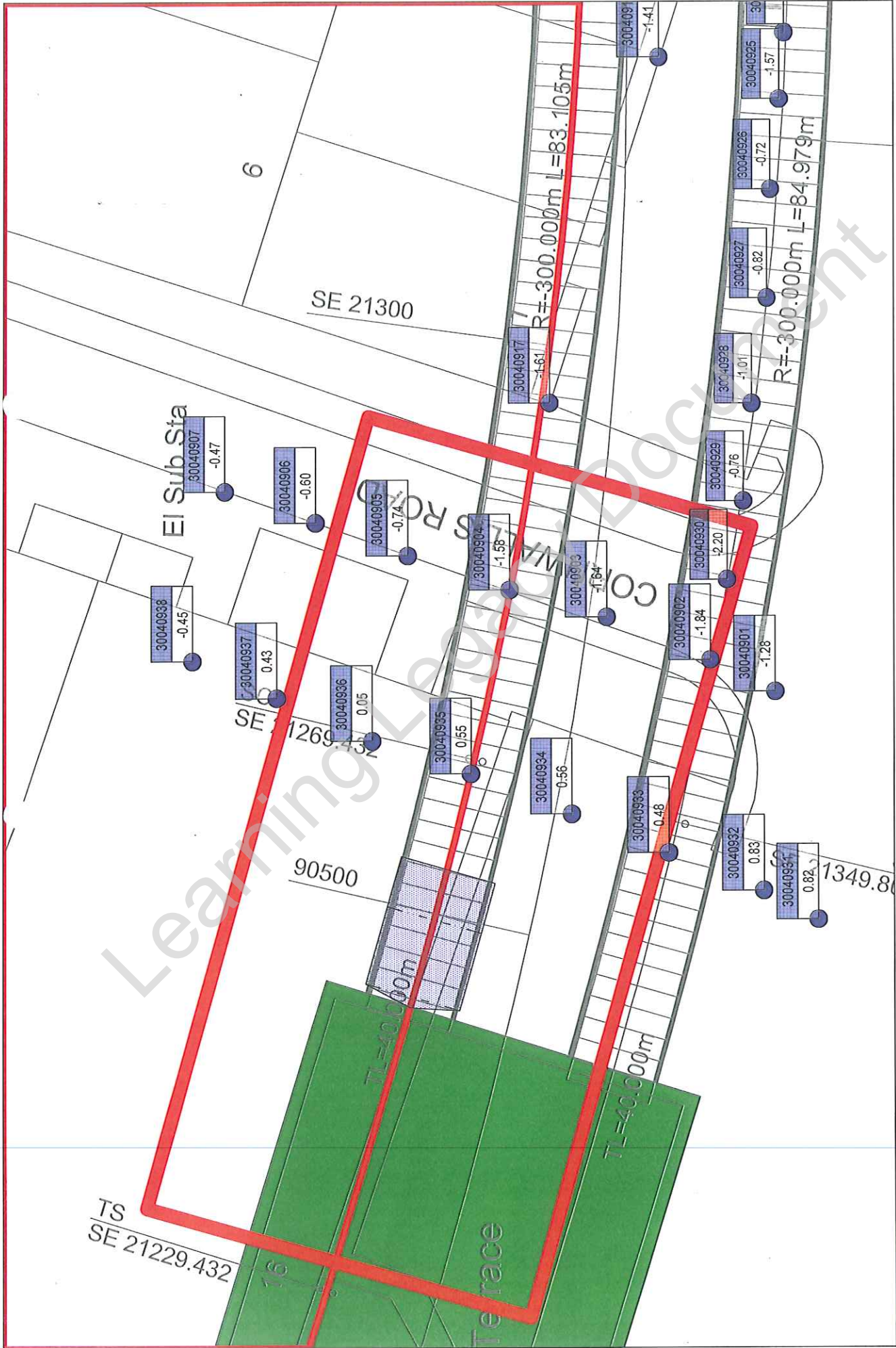


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - I/O Center Car Park 22.04.2013 - 20.02.2014
date: 18.08.2014 15:29 current values: 18.08.2014 15:11



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 09.08.2013 08:36





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 12.08.2013 09:23

project: C310 Thames Tunnel

Joint Venture

project: C310 Thames Tunnel

Joint Venture

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	2/4/13	08/02/2013	08/02/2013	08/02/2013	08/02/2013	08/02/2013	08/02/2013	08/02/2013	08/02/2013	08/02/2013	08/02/2013	08/02/2013	08/02/2013	08/02/2013	08/02/2013	08/02/2013	08/02/2013	08/02/2013	08/02/2013	08/02/2013	08/02/2013	08/02/2013	08/02/2013	08/02/2013		
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	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 0921	106.042	106.042	0	106.042	0	106.042	0	106.042	-3	-2	106.038	-2	-4	106.038	0	-4	106.037	0	-5	106.038	1	-4	106.037	-1	-5	106.037	0	-5
3004 0922	106.118	106.119	0	106.119	0	106.119	0	106.119	0	0	106.116	-3	-2	106.115	-1	-4	106.115	-1	-4	106.116	1	-3	106.114	-1	-4	106.114	-1	-4
3004 0923	106.187	106.188	0	106.188	0	106.189	1	106.189	1	0	106.187	-1	0	106.185	-2	-3	106.185	-2	-3	106.185	1	-2	106.185	-1	-3	106.185	-1	-3
3004 0924	106.263	106.263	0	106.263	0	106.263	0	106.265	1	1	106.265	1	1	106.263	-3	-2	106.261	-3	-2	106.262	1	-1	106.262	-1	-2	106.262	-1	-2
3004 0925	106.284	106.283	0	106.283	0	106.284	1	106.284	1	1	106.284	0	0	106.284	0	-1	106.283	0	-1	106.283	0	-1	106.283	0	-1	106.282	-1	-2
3004 0926	106.343	106.343	0	106.343	0	106.344	1	106.343	-1	0	106.343	0	0	106.343	0	0	106.343	0	0	106.344	1	1	106.343	-1	-1	106.342	-1	-2
3004 0927	106.445	106.445	0	106.445	0	106.445	0	106.445	-1	0	106.445	1	0	106.445	1	-1	106.445	1	0	106.444	0	0	106.445	0	0	106.444	0	0
3004 0928	106.646	106.646	0	106.647	0	106.647	0	106.646	-1	0	106.646	0	0	106.646	0	0	106.647	0	0	106.647	0	0	106.647	0	0	106.646	0	0
3004 0929	107.070	107.070	0	107.070	-1	107.069	-1	107.069	-1	0	107.070	0	0	107.070	0	0	107.070	0	0	107.070	0	0	107.069	-1	-1	107.069	-1	-1
3004 0930	107.035	107.036	-1	107.036	-1	107.036	0	107.035	-1	0	107.035	0	0	107.035	0	0	107.035	0	0	107.035	0	0	107.035	-1	-1	107.034	-1	-1

No. of reading	date	13. following		14. following		15. following		15. 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					
3004 0921	29/4/13	106.042	106.037	106.037	106.036	106.037	106.037	106.037	106.036	106.036	106.037	106.036	106.036	106.037	106.037	106.037	106.037	106.037	106.037	106.037	106.037	106.037	106.037	106.036	106.036	0	-6			
3004 0922		106.118		106.114	106.114	106.114	106.114	106.114	106.114	106.114	106.114	106.114	106.113	106.113	106.113	106.113	106.113	106.113	106.113	106.113	106.113	106.113	106.113	106.113	106.113	106.113	106.113	0	-4	
3004 0923		106.187		106.184	106.184	106.184	106.184	106.184	106.184	106.184	106.184	106.184	106.183	106.183	106.183	106.183	106.183	106.183	106.183	106.183	106.183	106.183	106.183	106.183	106.183	106.184	106.184	0	-4	
3004 0924		106.203	106.201	106.200	106.200	106.200	106.200	106.200	106.200	106.200	106.200	106.200	106.200	106.200	106.200	106.200	106.200	106.200	106.200	106.200	106.200	106.200	106.200	106.200	106.200	106.200	106.200	106.200	0	-3
3004 0925		106.284	106.283	106.282	106.282	106.282	106.282	106.282	106.282	106.282	106.282	106.282	106.281	106.281	106.281	106.281	106.281	106.281	106.281	106.281	106.281	106.281	106.281	106.281	106.281	106.281	106.281	106.281	0	-2
3004 0926		106.343	106.343	106.342	106.342	106.342	106.342	106.342	106.342	106.342	106.342	106.342	106.342	106.342	106.342	106.342	106.342	106.342	106.342	106.342	106.342	106.342	106.342	106.342	106.342	106.342	106.342	106.342	0	-2
3004 0927		106.445	106.444	106.444	106.444	106.444	106.444	106.444	106.444	106.444	106.444	106.444	106.443	106.443	106.443	106.443	106.443	106.443	106.443	106.443	106.443	106.443	106.443	106.443	106.443	106.444	106.444	0	-1	
3004 0928		106.646	106.646	106.645	106.645	106.645	106.645	106.645	106.645	106.645	106.645	106.645	106.645	106.645	106.645	106.645	106.645	106.645	106.645	106.645	106.645	106.645	106.645	106.645	106.645	106.645	106.645	106.645	0	-1
3004 0929		107.070	107.069	107.068	107.068	107.068	107.068	107.068	107.068	107.068	107.068	107.068	107.068	107.068	107.068	107.068	107.068	107.068	107.068	107.068	107.068	107.068	107.068	107.068	107.068	107.068	107.068	107.068	0	-1
3004 0930		107.035	107.035	107.035	107.035	107.034	107.034	107.034	107.034	107.034	107.034	107.033	107.033	107.033	107.033	107.033	107.033	107.033	107.033	107.033	107.033	107.033	107.033	107.033	107.033	107.033	107.033	107.033	0	-3

Legacy Document

Joint Venture

project: C310 Thames Tunnel
structure: IO Centre car park

Joint Venture

project: C310 Thames Tunnel
structure: IO Centre car park

No. of reading	date	25. following		27. following		28. following		30. following		31. following		32. following		33. following		34. following		35. following		36. 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		
3004 0921	22/4/13	106.042	0	-5	106.035	-2	-7	106.026	1	-6	106.026	1	-6	106.026	1	-6	106.026	1	-6	106.026	1	-6	
3004 0922		106.116	1	-4	106.114			106.114	-1	-5	106.114	-1	-5	106.114	-1	-5	106.114	-1	-5	106.114	-1	-5	
3004 0923		106.187	1	-3	106.184			106.184			106.184			106.184			106.184			106.184			
3004 0924		106.263	1	-3	106.261			106.261			106.261			106.261			106.261			106.261			
3004 0925		106.284	1	-3	106.282			106.282			106.282			106.282			106.282			106.282			
3004 0926		106.343	0	-1	106.342	0	-2	106.342	0	-2	106.342	0	-2	106.342	0	-2	106.342	0	-2	106.342	0	-2	
3004 0927		106.445	0	-1	106.444	-1	-2	106.444	-1	-2	106.444	-1	-2	106.444	-1	-2	106.444	-1	-2	106.444	-1	-2	
3004 0928		106.646	0	-1	106.645	-1	-2	106.645	-1	-2	106.645	-1	-2	106.645	-1	-2	106.645	-1	-2	106.645	-1	-2	
3004 0929		107.070	107.069	0	-1	107.068	-1	-2	107.068	-1	-2	107.068	-1	-2	107.068	-1	-2	107.068	-1	-2	107.068	-1	-2
3004 0930		107.035	107.033	1	-2	107.032	-1	-3	107.032	0	-3	107.032	0	-3	107.032	0	-3	107.032	0	-3	107.032	0	-3

Joint Venture

project: C310 Thames Tunnel
structure: IO Centre car park

project: C310 Thames Tunnel
structure: IO Centre car park

Joint Venture

No. of reading	baseline	37. following		38. following		39. following		40. following		41. following		42. following		43. following		44. following		45. following		46. following		47. following		48. following	
		date	elevation	deviation from last/ baseline	date	elevation	deviation from last/ baseline	date	elevation	deviation from last/ baseline	date	elevation	deviation from last/ baseline	date	elevation	deviation from last/ baseline	date	elevation	deviation from last/ baseline	date	elevation	deviation from last/ baseline	date	elevation	deviation from last/ baseline
3004 0921	106.042																								
3004 0922	106.118																								
3004 0923	106.187																								
3004 0924	106.263																								
3004 0925	106.284																								
3004 0926	106.343																								
3004 0927	106.445																								
3004 0928	106.646																								
3004 0929	107.070	107.069	0	-1	107.068	-1	-1	107.068	0	-1	107.068	0	-2	107.068	0	-2	107.068	0	-1	107.068	0	-1	107.068	0	-2
3004 0930	107.035	107.032	-1	-3	107.032	0	-3	107.033	0	-3	107.032	0	-3	107.032	0	-3	107.033	0	-3	107.033	0	-3	107.033	0	-3

Legacy Document

Joint Venture

project: C310 Thames Tunnel

Joint Venture

project: C310 Thames Tunnel

Joint Venture

No. of reading	baseline	45. following		50. following		51. following		52. following		53. following		54. following		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	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
	22/4/13																									
3004 0921	106.042																									
3004 0922	106.118																									
3004 0923	106.187																									
3004 0924	106.263																									
3004 0925	106.284																									
3004 0926	106.343																									
3004 0927	106.445																									
3004 0928	106.646																									
3004 0929	107.070	107.068	0	-1	107.068	0	-1	107.068	0	-1	107.068	0	-1	107.068	0	-1	107.068	0	-1	107.068	0	-1	107.068	0	-1	107.068
3004 0930	107.035	107.032	0	-3	107.032	0	-3	107.032	0	-3	107.032	0	-3	107.032	0	-3	107.032	0	-3	107.032	0	-3	107.032	0	-3	107.032

Legacy Document

monitoring table




Joint Venture

project: C310 Thames Tunnel

structure: IO Centre car park

No. of reading	date	baseline elevation	61. following		62. 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								
	22/4/13		20/02/2014		11/03/2015									
Point No.														
3004 0921		106.042	106.036	1	-5.69	covered								
3004 0922		106.118	106.114	1	-4.71	106.114	0	-4.83						
3004 0923		106.187	106.183	0	-3.89	106.183	0	-4.08						
3004 0924		106.263	106.261	1	-2.61	106.261	0	-2.64						
3004 0925		106.284	Covered			106.281	-1	-2.36						
3004 0926		106.343	106.344	1	0.57	covered								
3004 0927		106.445	106.445	1	0.05	covered								
3004 0928		106.646	106.647	2	0.25	106.646	-1	-0.33						
3004 0929		107.070	107.071	2	0.94	107.068	-2	-1.43						
3004 0930		107.035	107.034	2	-1.46	covered								

Legacy Document

		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDIX 51

CS12 - Cornwallis Road

Learning Legacy Document

monitoring asset	Cornwallis Road		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70002		
name of monitoring section:	CS12 - Cornwallis Road		
sensor type:	manual levelling studs		
chainage:	90520	point no.:	3004 0901 - 3004 0907
trigger values: [mm]	green: +22 -22	amber: +28 -28	red: +35 -35
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	25/03/13		0.00		
TBM 1	start ZOI	11/05/13	-0.96	3004 0902	
	end ZOI	19/05/13	-2.11	3004 0902	breached not any trigger value
TBM 2	start ZOI	09/08/13	-2.02	3004 0904	
	end ZOI	17/08/13	-2.24	3004 0904	breached not any trigger value
longterm	20/02/14		-1.58	3004 0904	
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

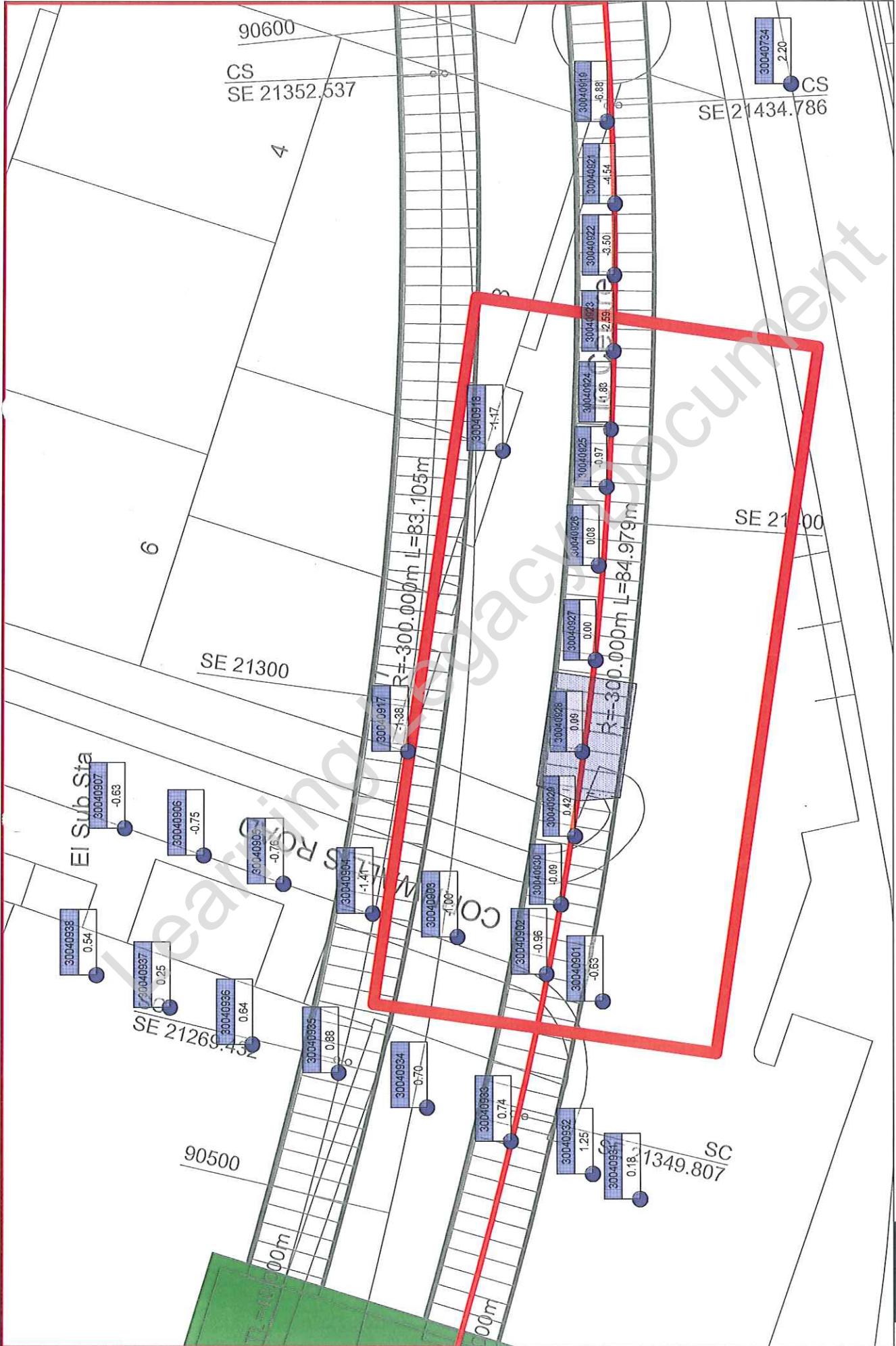
Overall, none of the points reached any trigger value.
 Under consideration of temperature differences, the surrounding ground condition and the achievable accuracy of the measurement, HMJV has no concern to cease the monitoring.
 The rate of change in the monitoring data is less than the required standards as per the specifications and drawings.

date / signature: 12/01/15

print name:

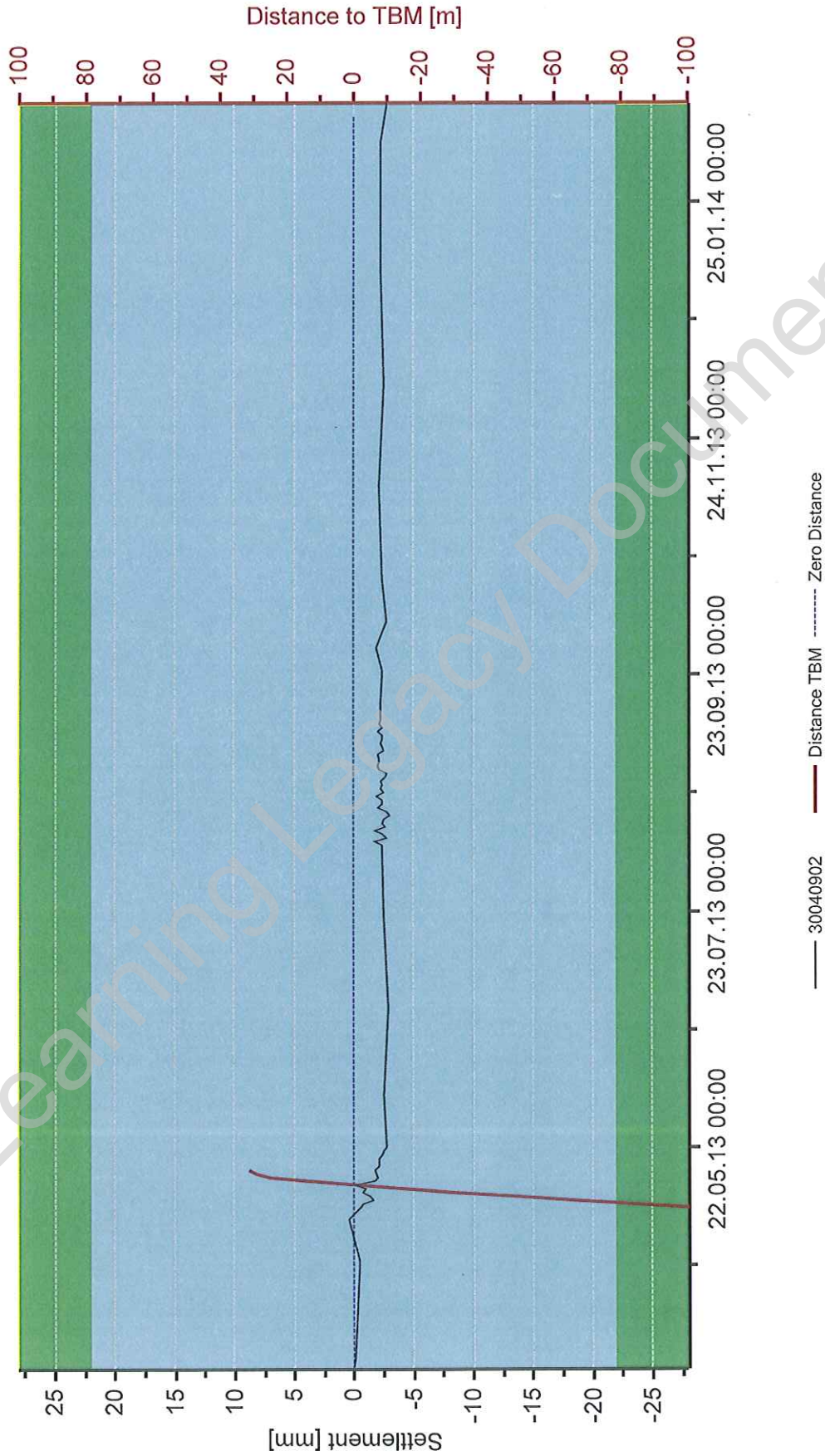
HMJV project role:

Monitoring & Survey engineer



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive
 current values: 11.05.2013 09:01

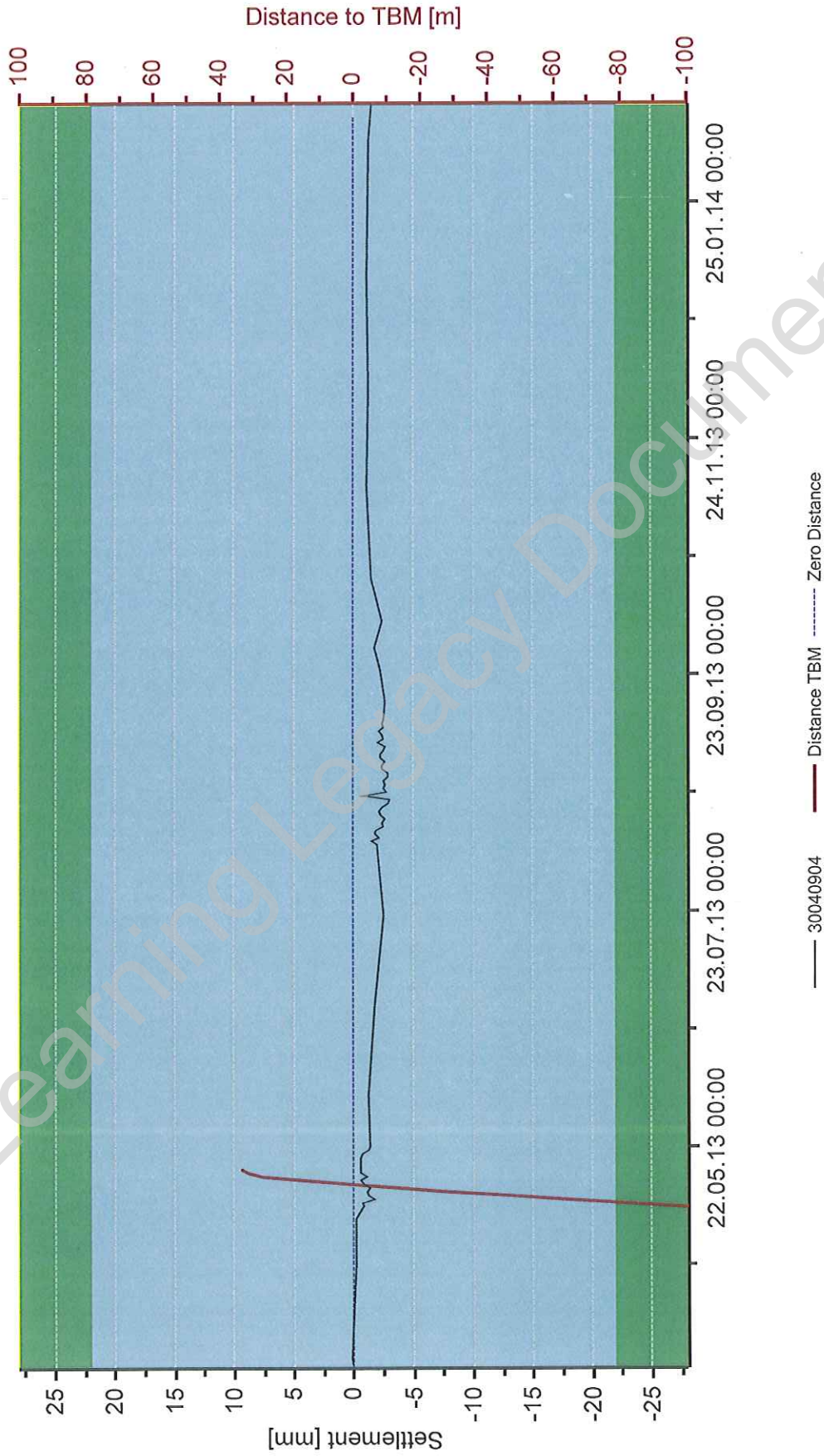
Point: 30040902



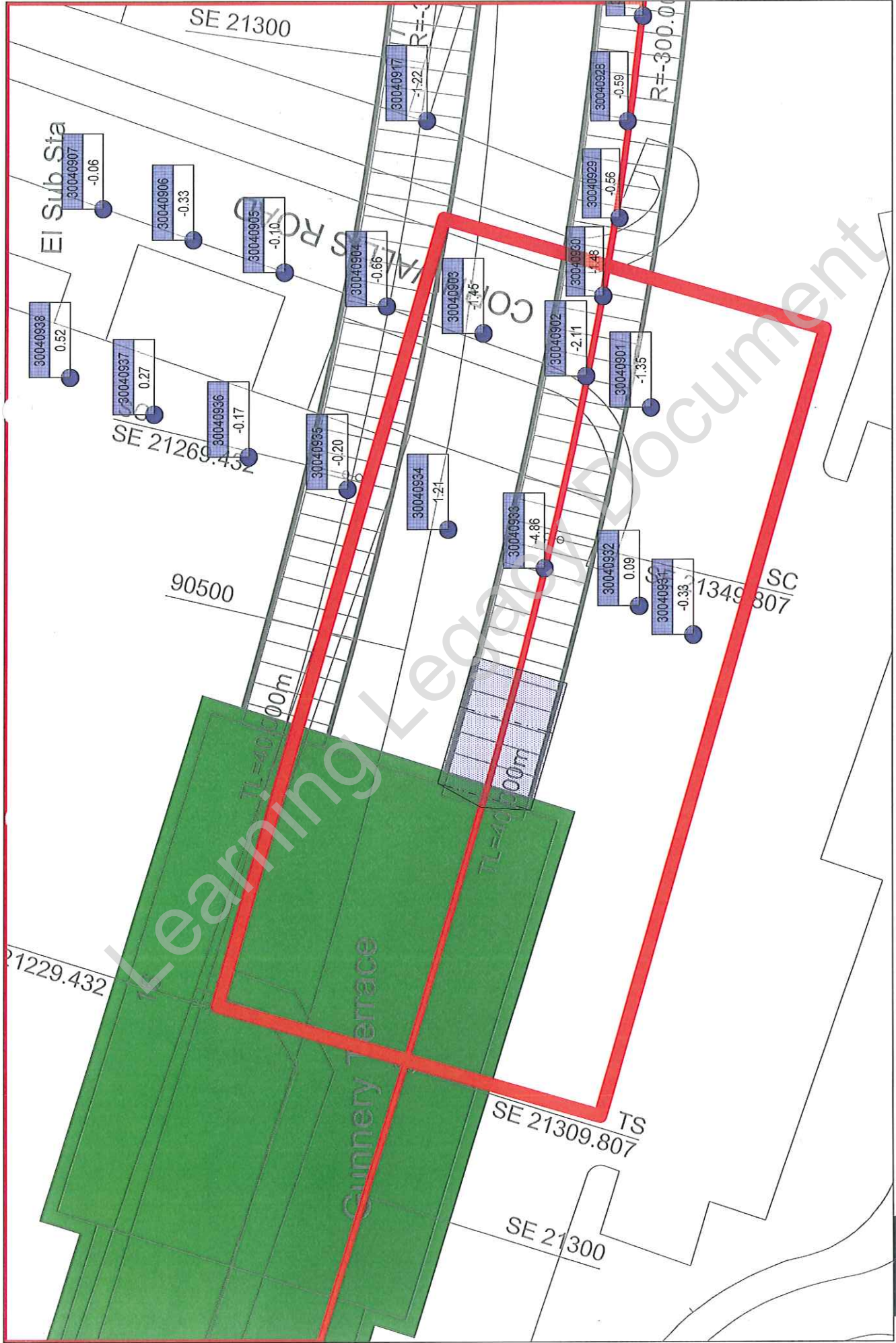
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - CS12 - Cornwallis Road 25.03.2013 - 20.02.2014
date: 18.08.2014 16:36 current values: 18.08.2014 16:24



Point: 30040904



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - CS12 - Cornwallis Road 25.03.2013 - 20.02.2014
date: 18.08.2014 16:39 current values: 18.08.2014 16:24



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive
 current values: 19.05.2013 10:00



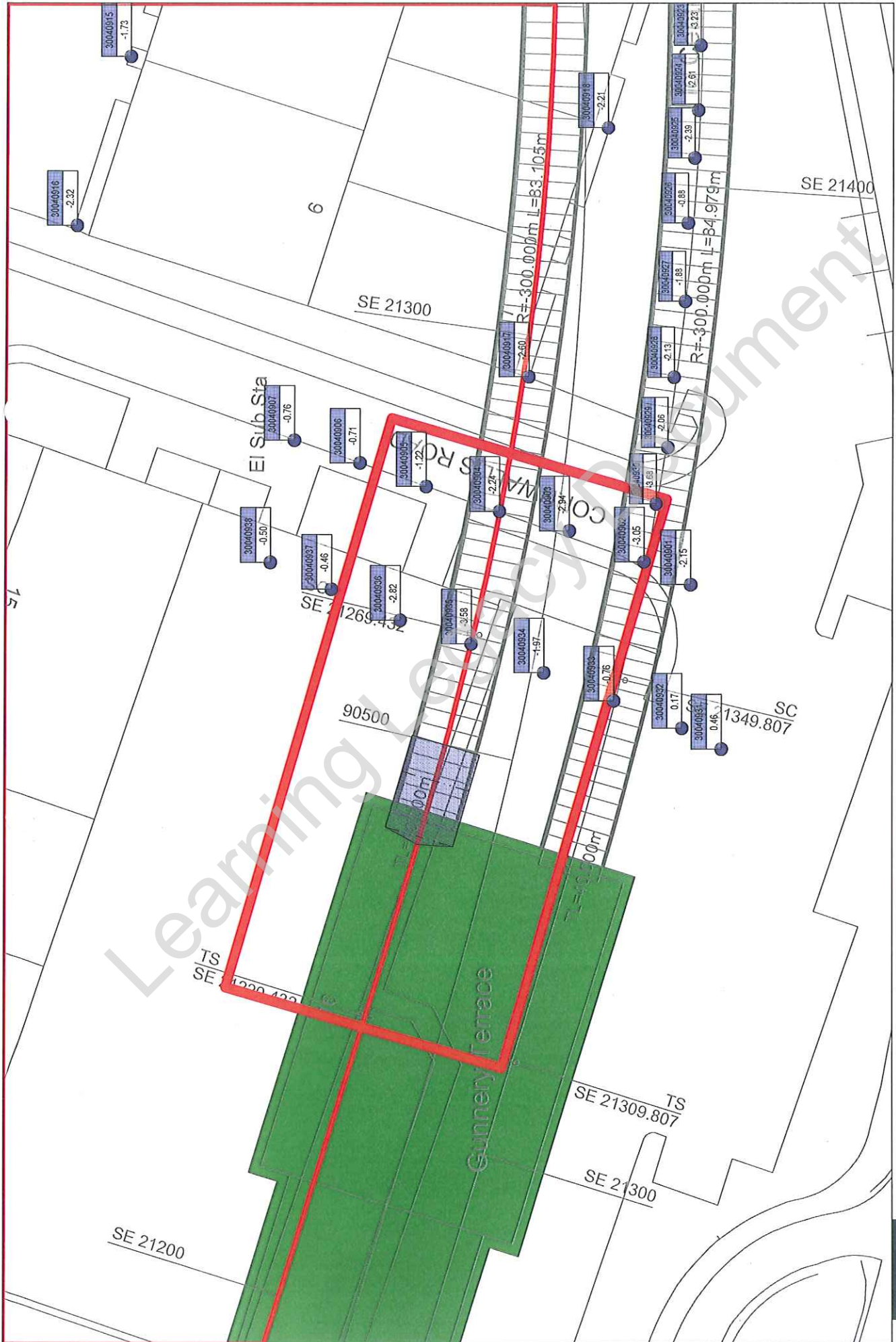
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 09.08.2013 08:36

Point: 30040904



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - CS12 - Cornwallis Road 25.03.2013 - 20.02.2014
date: 18.08.2014 16:31 current values: 18.08.2014 16:24





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 17.08.2013 09:00

Joint Venture

project: C310 Thames Tunnel
structure: CS Cornwallis Road

Joint Venture

project: C310 Thames Tunnel
structure: CS Cornwallis Road

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	
3004 0901	25/04/13	107.195	0	107.194	0	107.196	1	107.194	0	-1	107.194	-1	107.194	0	107.194	1	107.194	0	-1	107.194	0	107.194	-1	107.193	0	-2
3004 0902		107.057	0	107.057	0	107.058	1	107.057	0	-1	107.056	-1	107.057	0	107.056	0	107.057	1	0	107.056	-2	107.056	-2	107.055	0	-2
3004 0903		106.868	0	106.868	0	106.868	0	106.867	-1	-1	106.867	0	106.867	0	106.866	0	106.867	1	-1	106.867	0	106.867	0	106.867	0	-1
3004 0904		106.740	0	106.740	0	106.740	0	106.739	-1	-1	106.739	-1	106.739	0	106.739	1	106.739	0	-1	106.739	0	106.740	0	106.739	0	-1
3004 0905		106.651	0	106.651	0	106.651	0	106.651	0	0	106.650	-1	106.650	0	106.650	0	106.650	0	-1	106.650	0	106.651	0	106.650	0	-1
3004 0906		106.601	0	106.600	0	106.600	-1	106.600	-1	-1	106.600	0	106.599	-1	106.600	0	106.600	0	-1	106.600	0	106.600	1	106.600	0	-1
3004 0907		106.335	0	106.335	0	106.334	-1	106.335	-1	-1	106.335	-1	106.334	-1	106.335	0	106.335	0	-1	106.335	0	106.335	0	106.334	0	-1

Legacy Document

Joint Venture

Project: C310 Thames Tunnel
Structure: CS Cornwallis Road

Joint Venture

Project: C310 Thames Tunnel
Structure: CS Cornwallis Road

No. of reading	date	13. following		14. following		15. following		15. 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		
3004 0901	25/01/13	107.195	107.194	107.194	0	-1	107.194	0	-1	107.193	0	-1	107.193	-1	-2	107.193	0	-2	107.193	0	-2	107.193	1	-2	107.193	0	-2
3004 0902	25/01/13	107.057	107.056	107.056	0	-2	107.055	0	-2	107.055	0	-3	107.055	0	-3	107.055	0	-3	107.055	0	-3	107.055	0	-2	107.055	0	-2
3004 0903	25/01/13	106.868	106.867	106.867	0	-1	106.866	0	-1	106.866	0	-2	106.866	0	-2	106.866	0	-2	106.866	0	-2	106.865	0	-3	106.865	0	-2
3004 0904	25/01/13	106.740	106.740	106.740	0	-1	106.740	0	-1	106.740	0	-1	106.739	0	-1	106.739	0	-1	106.739	-1	-2	106.738	-1	-3	106.738	1	-2
3004 0905	25/01/13	106.651	106.651	106.651	0	0	106.651	0	0	106.651	0	0	106.651	0	0	106.651	0	0	106.650	-1	-2	106.650	0	-1	106.650	0	-1
3004 0906	25/01/13	106.601	106.600	106.600	0	0	106.600	0	0	106.600	0	-1	106.600	-1	-1	106.600	0	0	106.600	0	-1	106.599	-1	-2	106.599	1	-1
3004 0907	25/01/13	106.335	106.335	106.335	1	0	106.335	0	0	106.335	0	0	106.335	0	-1	106.335	0	0	106.335	0	-1	106.334	0	-1	106.335	1	0

Legacy Document

Joint Venture

Project: C310 Thames Tunnel
structure: CS Cornwallis Road

Joint Venture

Project: C310 Thames Tunnel
structure: CS Cornwallis Road

No. of reading date	baseline 2/2/13	25. following 10/02/2013		26. following 11/02/2013		27. following 12/02/2013		28. following 13/02/2013		29. following 14/02/2013		30. following 15/02/2013		31. following 16/02/2013		32. following 17/02/2013		33. following 18/02/2013		34. following 19/02/2013		35. following 20/02/2013		36. following 21/02/2013							
		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	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 0901	107.195	107.194	1	-1	107.193	-1	-2	107.194	1	-1	107.192	-2	-3	107.194	1	-1	107.193	-1	-2	107.193	0	-2	107.194	1	-1	107.193	-1	-2	107.193	0	-2
3004 0902	107.057	107.056	1	-2	107.055	-1	-3	107.056	1	-2	107.055	-1	-3	107.055	0	-2	107.054	-1	-3	107.055	0	-3	107.055	1	-2	107.055	0	-2	107.055	0	-2
3004 0903	106.869	106.866	1	-2	106.865	-1	-3	106.866	1	-2	106.865	-1	-3	106.865	0	-3	106.865	0	-3	106.865	0	-3	106.866	0	-2	106.865	0	-2	106.865	-1	-3
3004 0904	106.740	106.739	0	-2	106.738	-1	-2	106.739	0	-2	106.738	-1	-3	106.738	0	-3	106.738	0	-2	106.738	0	-2	106.738	0	-2	106.738	0	-2	106.737	-1	-3
3004 0905	106.651	106.650	1	-1	106.650	0	-1	106.650	0	-1	106.649	0	-2	106.649	0	-2	106.649	1	-1	106.650	0	-1	106.650	0	-1	106.649	-1	-3	106.649	-1	-3
3004 0906	106.601	106.600	0	-1	106.600	0	-1	106.599	-1	-2	106.598	-1	-2	106.598	0	-2	106.598	0	-2	106.600	2	-1	106.600	0	-1	106.598	-2	-2	106.598	-1	-3
3004 0907	106.535	106.535	0	0	106.535	0	-1	106.533	0	-1	106.533	0	-2	106.533	0	-2	106.535	2	-1	106.535	0	-1	106.535	0	-1	106.533	-1	-2	106.532	0	-3

Joint Venture

project: C310 Thames Tunnel
structure: CS Cornwallis Road

Joint Venture

project: C310 Thames Tunnel
structure: CS Cornwallis Road

Joint Venture

No. of reading	baseline	37. following		38. following		39. following		40. following		41. following		42. following		43. following		44. following		45. following		46. following		47. following		48. 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			
3004 0001	107.105	107.194	1	-1	107.193	-1	-2	107.194	0	-1	107.194	0	-2	107.193	0	-2	107.194	0	-1	107.194	1	-1	107.194	0	-1	107.194	0	-1
3004 0002	107.057	107.055	1	-2	107.055	-1	-3	107.055	0	-2	107.055	0	-3	107.055	0	-3	107.055	1	-2	107.055	0	-2	107.055	0	-2	107.055	0	-2
3004 0003	106.868	106.866	1	-2	106.865	-1	-3	106.865	0	-3	106.865	0	-3	106.865	0	-3	106.865	0	-3	106.866	0	-3	106.866	0	-2	106.866	0	-2
3004 0004	106.740	106.739	2	-1	106.738	-2	-3	106.738	0	-3	106.738	0	-3	106.737	0	-3	106.738	1	-2	106.738	0	-2	106.738	0	-2	106.738	0	-2
3004 0005	106.651	106.651	2	0	106.649	-2	0	106.649	0	-2	106.649	0	-2	106.649	0	-2	106.649	0	-2	106.649	0	-2	106.649	0	-2	106.649	0	-2
3004 0006	106.601	106.600	2	0	106.598	-2	-3	106.598	0	-3	106.598	0	-3	106.598	0	-3	106.599	1	-1	106.598	-1	-2	106.598	1	-2	106.598	0	-2
3004 0007	106.335	106.335	2	-1	106.333	-2	-3	106.333	0	-2	106.333	0	-3	106.333	0	-3	106.335	2	-1	106.333	-2	-2	106.333	1	-2	106.334	1	-1

Legacy Document

monitoring table



monitoring table



Joint Venture

project: C310 Thames Tunnel

Joint Venture

project: C310 Thames Tunnel

structure: CS Cornwallis Road

No. of reading	baseline	43. following		50. following		51. following		52. following		53. following		54. following		55. following		56. following		57. following		58. following		59. following		60. following		
		date	elevation	deviation from last/ baseline	date	elevation	deviation from last/ baseline	date	elevation	deviation from last/ baseline	date	elevation	deviation from last/ baseline	date	elevation	deviation from last/ baseline	date	elevation	deviation from last/ baseline	date	elevation	deviation from last/ baseline	date	elevation	deviation from last/ baseline	
	25/0/13	107.195	107.193	0	-1	107.194	0	-1	107.194	0	-1	107.194	0	-1	107.194	0	-1	107.194	0	-1	107.194	0	-1	107.194	0	-1
3004 0901		107.057	107.055	-1	-3	107.055	0	-2	107.055	0	-2	107.055	0	-2	107.055	0	-2	107.055	0	-2	107.055	0	-2	107.055	0	-2
3004 0902		106.868	106.865	0	-3	106.865	0	-3	106.865	0	-3	106.865	0	-3	106.865	0	-3	106.865	0	-3	106.865	0	-3	106.865	0	-3
3004 0903		106.740	106.738	0	-3	106.738	0	-3	106.738	0	-3	106.738	0	-3	106.738	0	-3	106.738	0	-3	106.738	0	-3	106.738	0	-3
3004 0904		106.651	106.649	0	-2	106.650	1	-1	106.650	-1	-2	106.649	-1	-2	106.649	-1	-2	106.649	-1	-2	106.649	-1	-2	106.649	-1	-2
3004 0905		106.601	106.598	0	-3	106.598	0	-3	106.598	-1	-3	106.599	1	-1	106.598	0	-2	106.598	0	-2	106.598	0	-2	106.598	0	-2
3004 0906		106.335	106.333	-1	-2	106.334	1	-2	106.333	-1	-2	106.335	2	0	106.335	2	0	106.333	0	-2	106.333	0	-2	106.333	0	-2
3004 0907																										

monitoring table




Joint Venture

project: C310 Thames Tunnel

No. of reading	structure: CS Cornwallis Road		62. following		63. following		64. following		65. following		66. following		67. following		structure: CS Cornwallis Road	
	baseline	25/3/13	07/10/2013	18/10/2013	10/11/2013	09/12/2013	07/01/2014	10/02/2014	20/02/2014							
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	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline	elevation	deviation from last/ baseline
3004 0901	107.185	0	107.194	-1	107.194	0	107.194	0	107.195	1	107.194	-1	107.194	0	107.194	0
3004 0902	107.057	-1	107.055	0	107.055	-2	107.055	0	107.055	0	107.055	0	107.055	0	107.055	0
3004 0903	106.868	-1	106.866	1	106.866	-2	106.866	0	106.866	0	106.866	0	106.866	0	106.866	0
3004 0904	106.740	-1	106.739	1	106.739	0	106.739	0	106.739	0	106.739	0	106.739	0	106.739	0
3004 0905	106.651	-1	106.650	1	106.651	0	106.650	0	106.650	0	106.650	0	106.650	0	106.650	0
3004 0906	106.601	-1	106.600	1	106.600	0	106.600	0	106.600	0	106.600	0	106.600	0	106.600	0
3004 0907	106.335	-1	106.335	2	106.335	0	106.335	0	106.335	0	106.335	0	106.335	0	106.335	0

Legacy Document

		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDIX 65

CS 19 - Warren lane Car park

Learning Legacy Document

monitoring asset	Services underneath Warren Lane Carpark		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70002		
name of monitoring section:	CS 19 - Warren Lane Carpark		
sensor type:	manual levelling studs		
chainage:	89930	point no.:	3004 1301 - 3004 1308
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	26/08/13	0.00		
TBM 1	start ZOI	24/10/13	1.20	3004 1303
	end ZOI	28/10/13	0.85	3004 1303
TBM 2	start ZOI	07/03/14	1.75 0.77	3004 1306 3004 1307
	end ZOI	10/03/14	1.13 -0.02	3004 1306 3004 1307
longterm	08/10/14	-1.40	3004 1304	

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 1301 - 3004 1308

Overall, none of the points reached any trigger value.

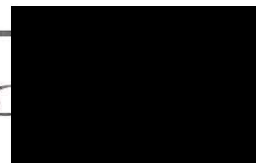
Under consideration of temperature differences, the surrounding ground condition and the achievable accuracy of the measurement, HMJV has no concern to cease the monitoring.

The rate of change in the monitoring data is less than the required standards as per the specifications and drawings.

date / signature:

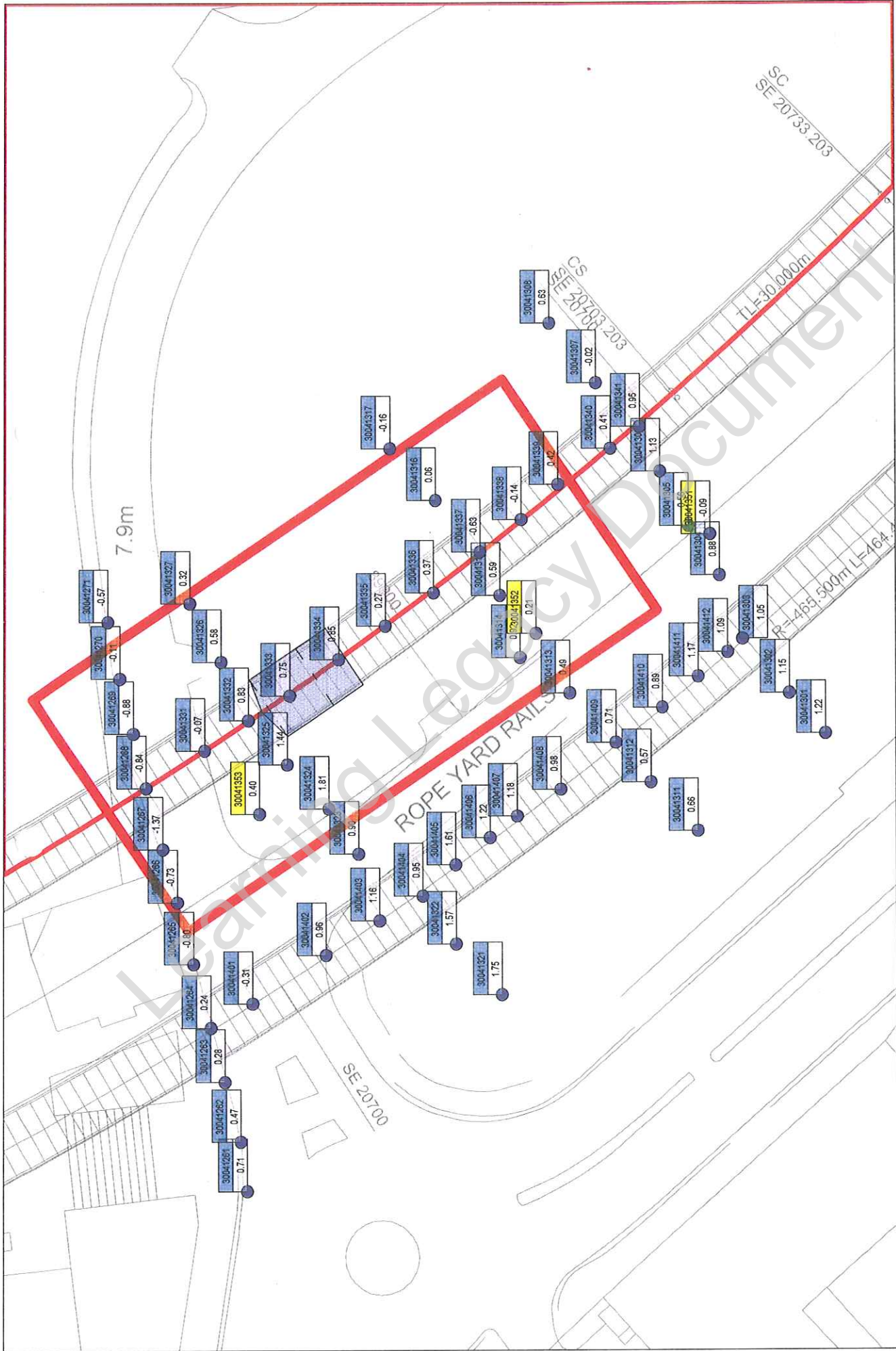
09/01/15

print name:



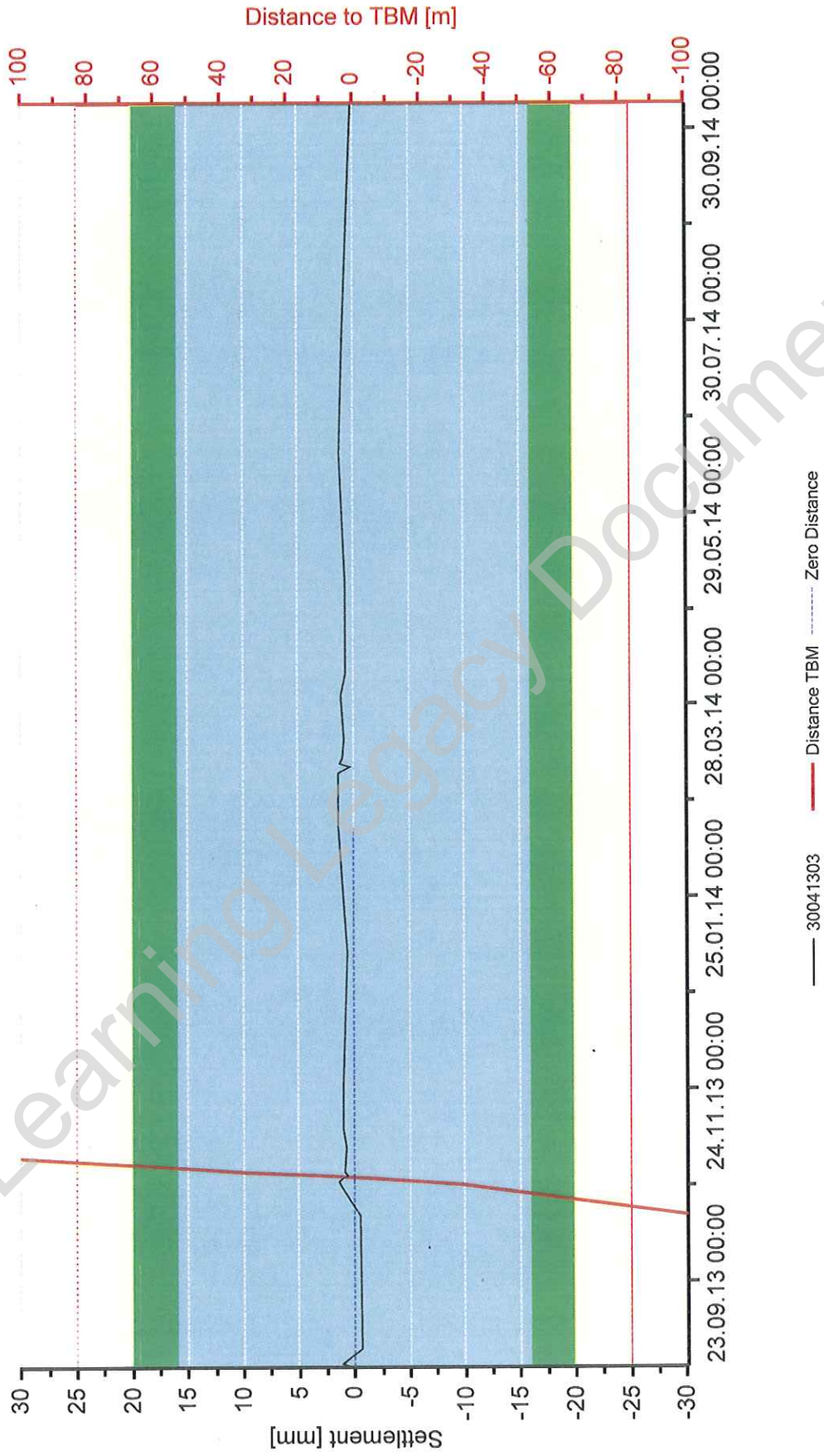
HMJV project role:

Monitoring & Survey engineer



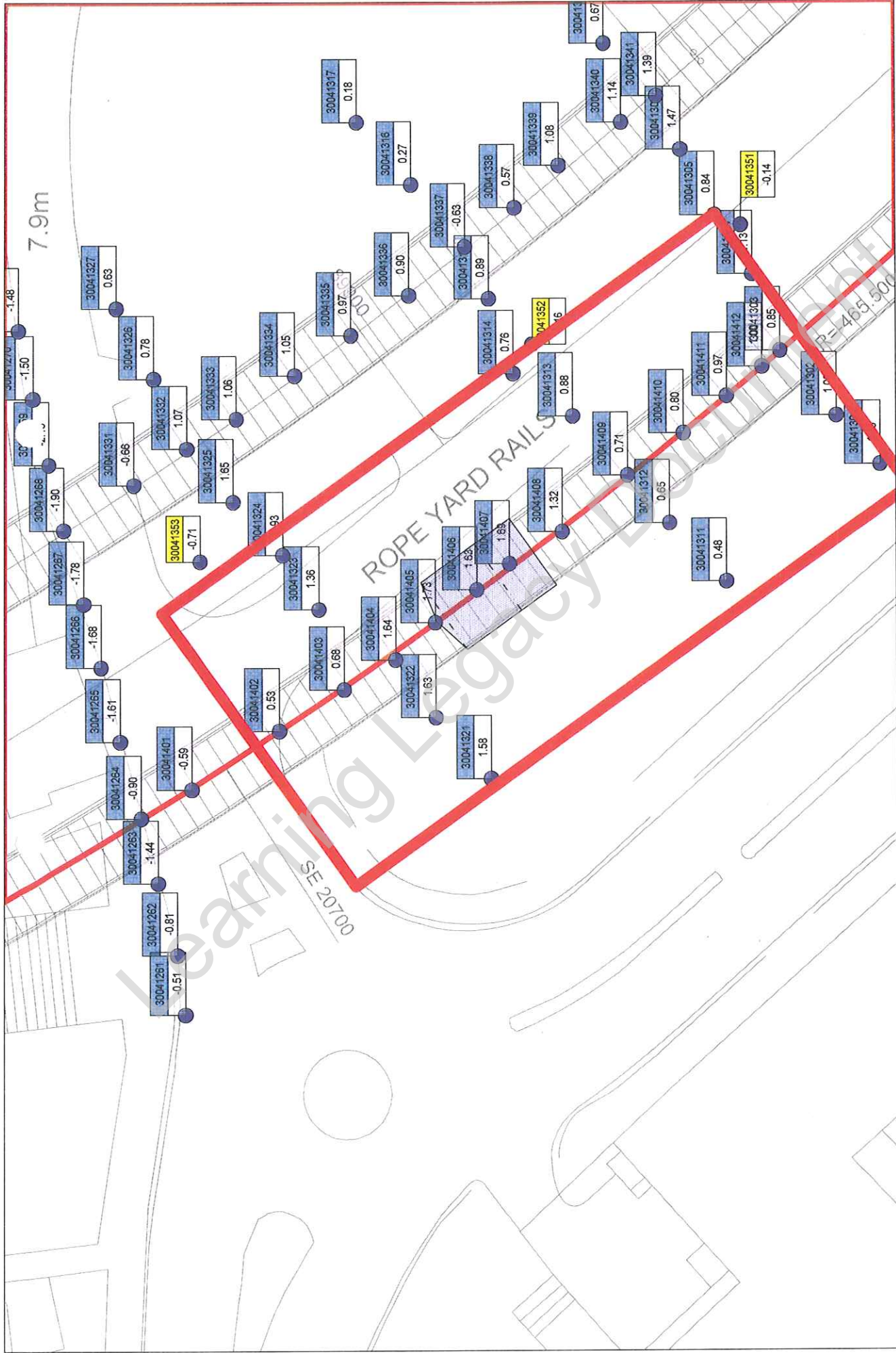
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 10.03.2014 18:02

Point: 30041303



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - CS 19 - Warren Lane Carpark 26.08.2013 - 08.10.2014
Date: 23.10.2014 17:56 Current Values: 23.10.2014 17:49

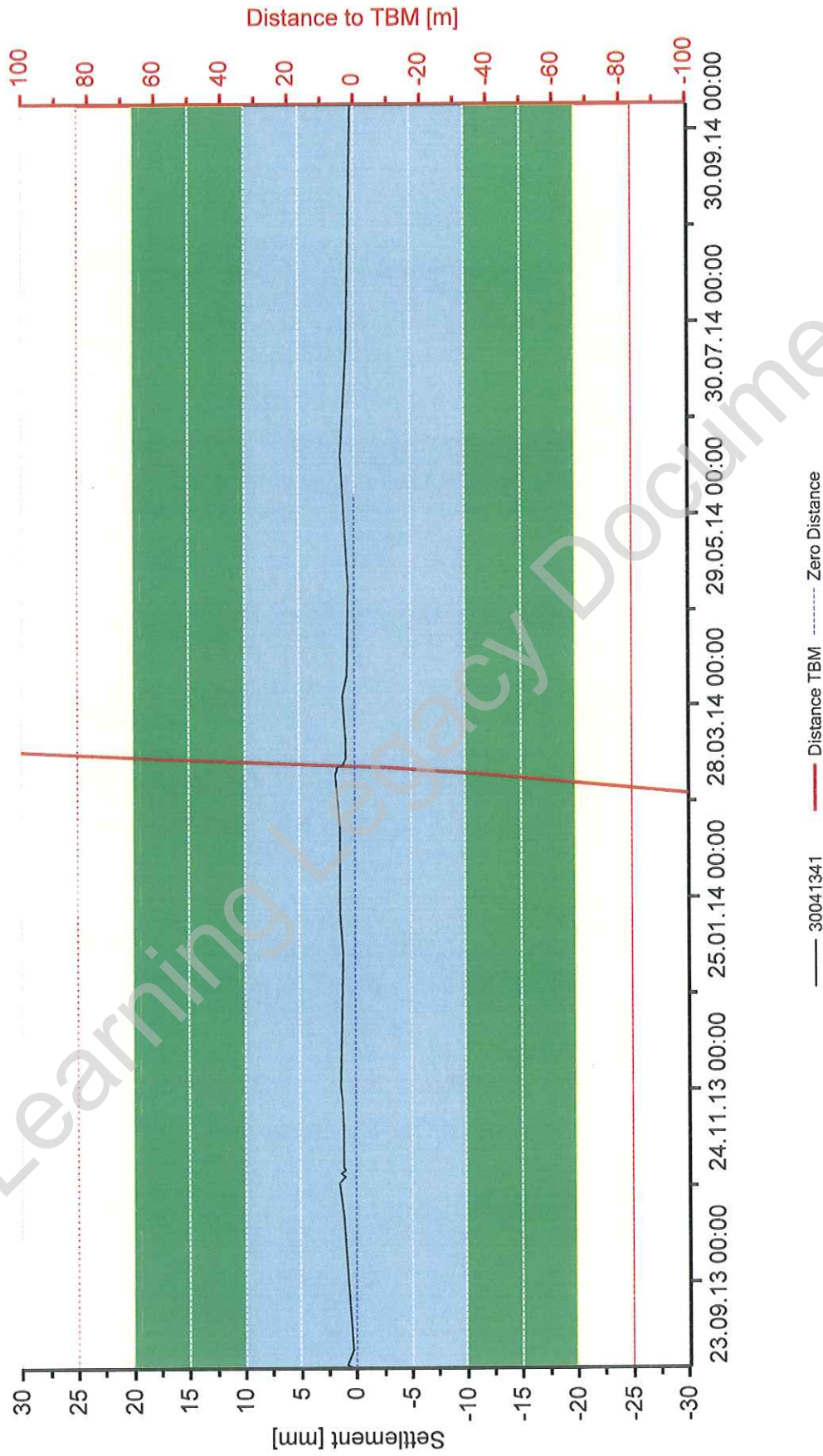




Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 28.10.2013 18:06



Point: 30041341



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - CS 19 - Warren Lane Carpark 26.08.2013 - 08.10.2014
date: 19.10.2014 17:08 current values: 19.10.2014 16:56



monitoring table



Joint Venture

project: **C310 Thames Tunnel**

structure: **CS19 WarrenLane CarPark**

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
date	26/8/13	24/03/2014		31/03/2014		07/04/2014		06/05/2014		17/06/2014		22/07/2014	
3004 1301	109.514	109.515	0	109.515	0	109.515	0	109.515	0	109.515	1	109.515	-1
3004 1302	109.360	109.361	0	109.361	0	109.361	0	109.361	0	109.362	1	109.361	0
3004 1303	109.318	109.319	0	109.319	0	109.319	0	109.319	0	109.319	1	109.319	0
3004 1304	109.348	109.349	0	109.350	0	109.349	-1	109.349	0	109.349	0	109.348	-1
3004 1305	109.414	109.415	0	109.415	0	109.415	-1	109.415	0	109.415	0	109.415	0
3004 1306	109.217	109.218	0	109.218	0	109.218	-1	109.218	0	109.218	0	109.217	0
3004 1307	108.885	108.884	0	108.885	0	108.884	0	108.884	0	108.885	0	108.884	0
3004 1308	108.876	108.876	0	108.876	0	108.876	0	108.876	0	108.877	0	108.876	0

monitoring table




Joint Venture

project: C310 Thames Tunnel

structure: CS19 WarrenLane CarPark

No. of reading	baseline	31. following		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	08/10/2014											
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 1301	109.514	109.514	-1	0										
3004 1302	109.360	109.361	0	0										
3004 1303	109.318	109.318	-1	0										
3004 1304	109.348	109.347	-1	-1										
3004 1305	109.414	109.414	-1	0										
3004 1306	109.217	109.217	0	0										
3004 1307	108.885	108.884	0	0										
3004 1308	108.876	108.876	0	0										

 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDIX 66

CS 20 - Warren lane Car park

Learning Legacy Document

monitoring asset	Services underneath Warren Lane Carpark		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70002		
name of monitoring section:	CS 20 - Warren Lane Carpark		
sensor type:	manual levelling studs		
chainage:	89910	point no.:	3004 1311 - 3004 1317
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	26/08/14		0.00		
TBM 1	start ZOI	26/10/13	1.14	3004 1409	
	end ZOI	30/10/13	0.38	3004 1409	breached not any trigger value
TBM 2	start ZOI	09/03/14	0.99	3004 1336	
	end ZOI	11/03/14	0.23	3004 1336	breached not any trigger value
longterm	08/10/14	1.41 -1.19	3004 1315 3004 1312		
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 1311 - 3004 1317

Overall, none of the points reached any trigger 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:

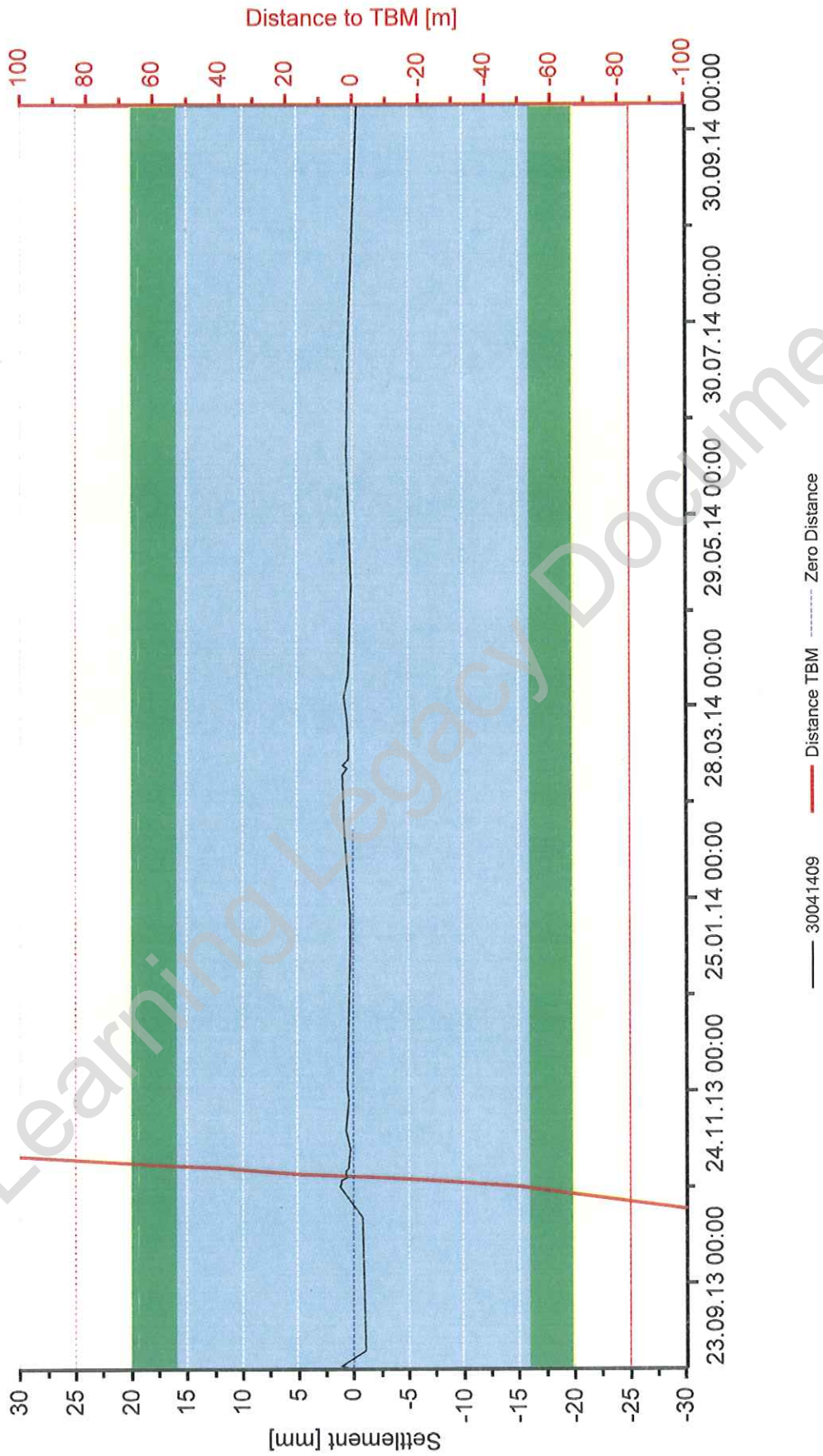
08/10/15

print name:

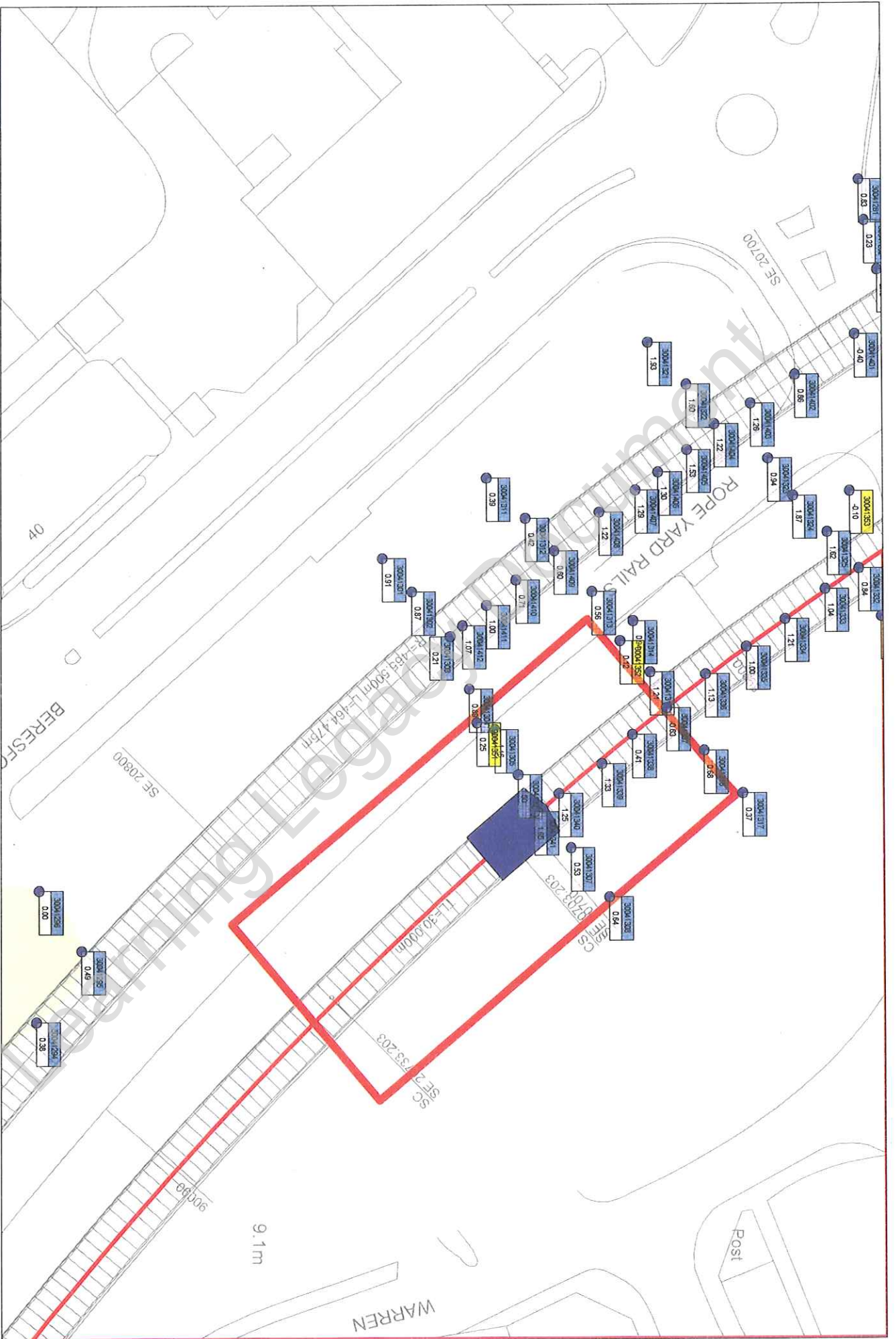
HMJV project role:

Monitoring & Survey engineer

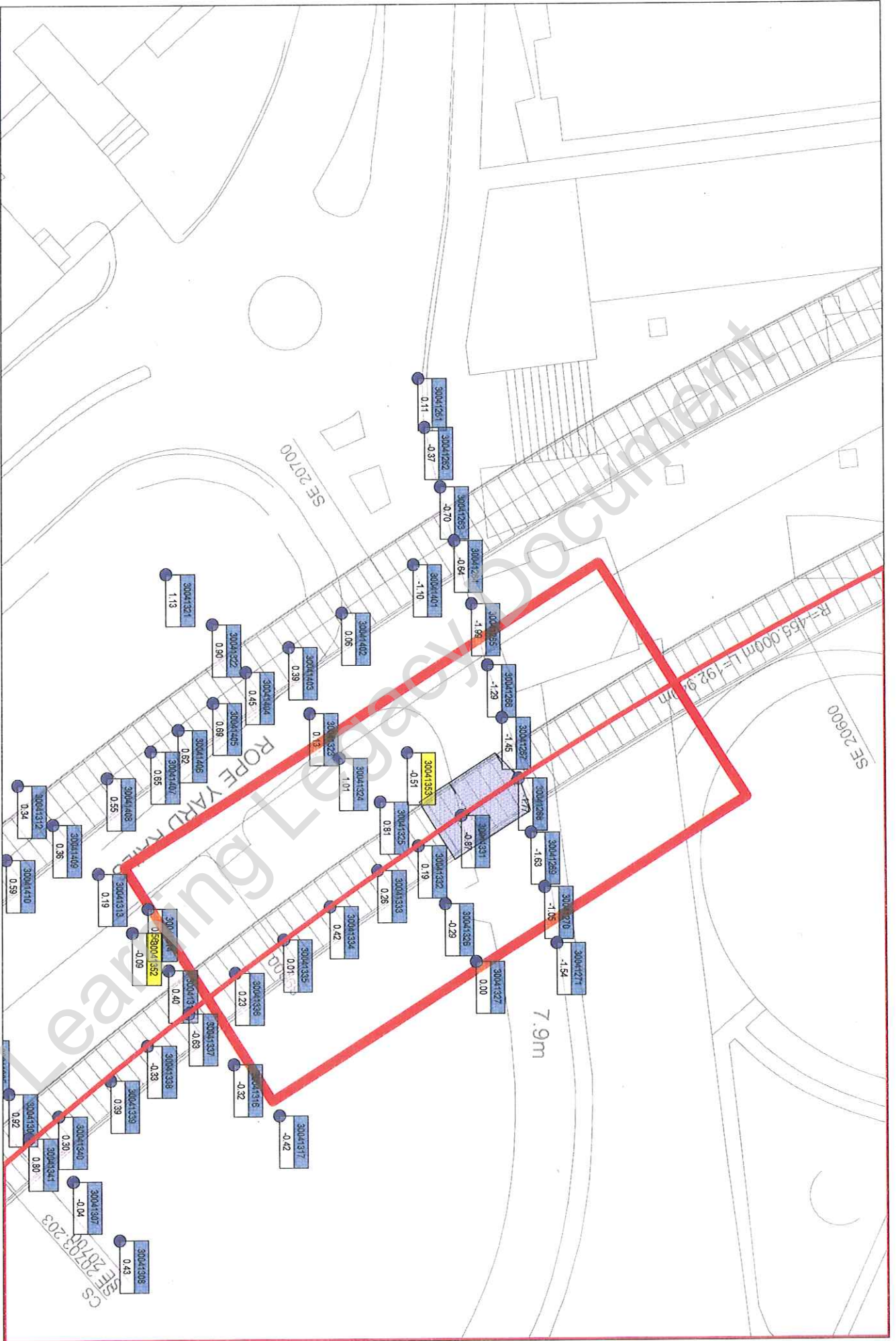
Point: 30041409



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - CS 20 - Warren Lane Carpark 26.08.2013 - 08.10.2014
Date: 23.10.2014 17:54 Current Values: 23.10.2014 17:34

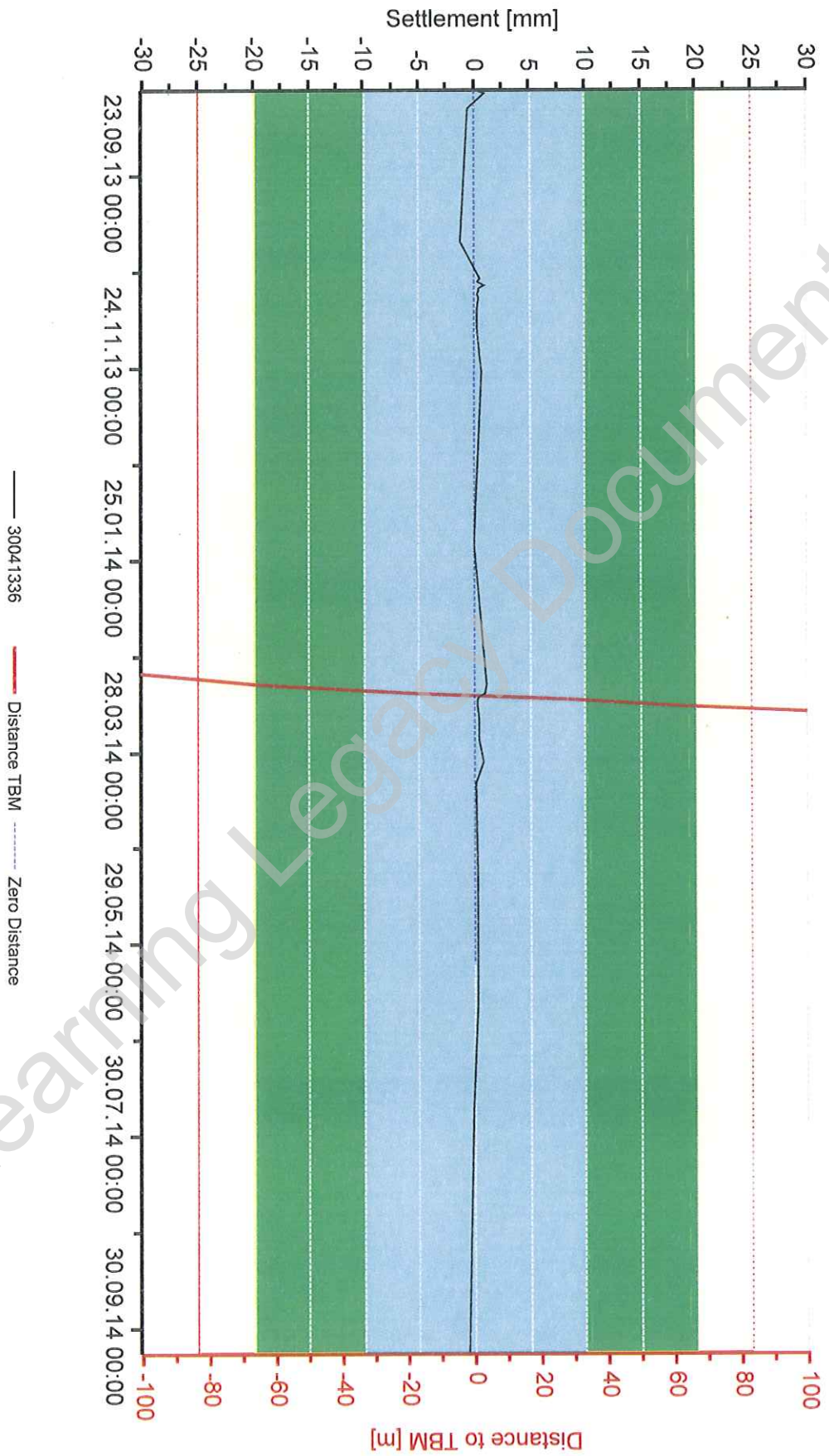


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 09.03.2014 15:59



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 11.03.2014 18:04

Point: 30041336



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

Close Out Report: EB Tunnel - CS 20 - Warren Lane Carpark 26.08.2013 - 08.10.2014

date: 19.10.2014 17:05 current values: 19.10.2014 16:56



monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: CS20 WarrenLane CarPark

No. of reading	baseline		1. following		2. following		3. following		4. following		5. following		6. following		
	date	elevation	26/8/13	27/08/2013	01/09/2013	01/09/2013	23/09/2013	23/09/2013	14/10/2013	14/10/2013	24/10/2013	24/10/2013	25/10/2013	25/10/2013	
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 1311		109.350	0	109.351	0	109.349	-1	109.350	1	109.349	-1	109.351	2	109.351	0
3004 1312		109.176	1	109.177	1	109.175	-2	109.176	1	109.175	-1	109.177	2	109.176	0
3004 1313		109.239	1	109.240	1	109.238	-2	109.240	1	109.238	-2	109.240	2	109.240	0
3004 1314		109.366	0	109.366	0	109.366	-1	109.367	1	109.366	-1	109.367	2	109.367	0
3004 1315		108.997	1	108.998	1	108.996	-2	108.998	1	108.996	-1	108.998	2	108.998	0
3004 1316		108.713	1	108.714	1	108.713	-1	108.714	1	108.712	-1	108.713	1	108.713	0
3004 1317		108.656	0	108.656	0	108.656	0	108.656	1	108.655	-1	108.656	1	108.655	0

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: CS20 WarrenLane CarPark

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
	26/8/13													
3004 1311		109.350	109.351	0	109.350	0	109.351	0	109.351	0	109.350	0	109.351	0
3004 1312		109.176	109.176	0	109.176	0	109.177	0	109.176	0	109.176	0	109.176	0
3004 1313		109.239	109.240	0	109.240	0	109.240	0	109.240	0	109.239	0	109.239	0
3004 1314		109.366	109.367	0	109.367	0	109.367	0	109.367	0	109.367	0	109.367	0
3004 1315		108.997	108.998	0	108.997	0	108.998	0	108.998	0	108.997	0	108.997	0
3004 1316		108.713	108.713	0	108.713	0	108.713	0	108.713	0	108.713	-1	108.713	0
3004 1317		108.656	108.656	0	108.655	0	108.656	0	108.655	0	108.655	0	108.655	0

Woolwich Box to Thames Southside levelling

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: CS20 WarrenLane CarPark

No. of reading	baseline	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					
		26/8/13			08/03/2014			09/03/2014			10/03/2014			11/03/2014			17/03/2014		
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	elevation	deviation from last/baseline	elevation	deviation from last/baseline	
3004 1311	109.350		109.351	0	1	109.351	0	0	1	109.351	0	1	109.351	0	0	109.351	0	0	0
3004 1312	109.176		109.177	0	1	109.176	0	0	1	109.176	0	1	109.176	0	0	109.176	0	0	0
3004 1313	109.239		109.240	0	1	109.240	0	1	1	109.240	0	0	109.239	0	0	109.239	0	0	0
3004 1314	109.366		109.367	0	1	109.367	0	1	1	109.367	0	1	109.367	0	1	109.367	0	0	0
3004 1315	108.997		108.998	0	1	108.998	0	1	1	108.997	-1	1	108.997	0	0	108.997	0	1	1
3004 1316	108.713		108.714	0	1	108.714	0	1	1	108.714	0	1	108.713	0	0	108.713	0	0	0
3004 1317	108.656		108.656	0	0	108.656	0	0	0	108.656	0	0	108.655	0	0	108.655	0	0	0

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: CS20 WarrenLane CarPark

No. of reading	baseline	31. 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
		date	date										
		26/8/13	08/10/2014										
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 1311	109.350	109.350	-1 0										
3004 1312	109.176	109.175	-1 -1										
3004 1313	109.239	109.239	-1 0										
3004 1314	109.366	109.366	-1 0										
3004 1315	108.997	108.998	1 1										
3004 1316	108.713	108.713	0 0										
3004 1317	108.656	108.655	0 0										

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: WarrenLane CarPark Eastbound

No. of reading	baseline	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
date	26/8/13	26/10/2013		27/10/2013		28/10/2013		29/10/2013		30/10/2013		31/10/2013	
	elevation												
3004 1331	108.404			108.404	1	-1							
3004 1332	108.698	108.699	2	1	108.699	0	0	108.699	1	1	108.699	-1	0
3004 1333	108.649	108.650	2	1	108.649	0	0	108.650	1	1	108.649	-1	0
3004 1334	108.711	108.712	2	1	108.712	0	1	108.712	0	1	108.712	0	1
3004 1335	108.755	108.756	2	1	108.756	0	0	108.756	1	1	108.756	-1	0
3004 1336	108.808	108.808	0	1	108.808	0	0	108.808	1	1	108.808	0	0
3004 1337	108.849		destroyed			destroyed						destroyed	
3004 1338	108.913	108.913	0	0	108.913	0	0	108.913	1	1	108.913	-1	0
3004 1339	108.951	108.952	0	1	108.951	0	1	108.952	0	1	108.951	0	1
3004 1340	109.047	109.047	0	1	109.047	0	1	109.048	1	1	109.047	-1	1
3004 1341	109.090	109.091	0	1	109.091	0	1	109.091	0	1	109.091	0	1

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: WarrenLane CarPark Eastbound

No. of reading	baseline		13. following		14. following		15. following		16. following		17. following		18. 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
	26/8/13													07/01/2014
3004 1331		108.404	108.404	0	108.404	0	108.404	0	108.404	0	108.404	0	108.404	0
3004 1332		108.698	108.699	0	108.699	0	108.699	0	108.699	0	108.699	0	108.699	0
3004 1333		108.649	108.649	0	108.649	0	108.649	0	108.649	0	108.650	0	108.649	0
3004 1334		108.711	108.712	0	108.712	0	108.711	0	108.712	0	108.712	0	108.712	0
3004 1335		108.755	108.756	0	108.756	0	108.756	0	108.756	0	108.756	0	108.756	-1
3004 1336		108.808	108.808	0	108.808	0	108.808	0	108.808	0	108.808	0	108.808	-1
3004 1337		108.849		destroyed		destroyed		destroyed		destroyed		destroyed		destroyed
3004 1338		108.913	108.913	0	108.913	0	108.913	0	108.913	0	108.913	0	108.913	-1
3004 1339		108.951			108.951	0	108.951	0	108.952	0	108.952	0	108.951	-1
3004 1340		109.047			109.047	0	109.047	0	109.048	0	109.047	0	109.047	0
3004 1341		109.090			109.091	0	109.091	0	109.091	0	109.091	0	109.091	0

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: WarrenLane CarPark Eastbound

No. of reading	baseline	31. following		32. following		33. following		34. following		35. following		36. 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	26/6/13	31/03/2014		07/04/2014		06/05/2014		17/06/2014		22/07/2014		08/10/2014	
	elevation												
3004 1331	108.404	108.404	0	108.404	0	108.403	0	108.403	0	108.404	0	108.403	0
3004 1332	108.698	108.699	0	108.699	0	108.699	0	108.699	0	108.699	0	108.698	0
3004 1333	108.649	108.650	0	108.650	0	108.650	0	108.649	0	108.649	0	108.649	0
3004 1334	108.711	108.712	0	108.712	0	108.712	0	108.711	0	108.711	0	108.711	0
3004 1335	108.755	108.756	0	108.756	0	108.756	0	108.755	0	108.755	0	108.755	0
3004 1336	108.808	108.808	0	108.808	-1	108.808	0	108.808	0	108.807	0	108.807	0
3004 1337	108.849	destroyed		destroyed		destroyed		destroyed		destroyed		destroyed	
3004 1338	108.913	108.913	0	108.912	-1	108.912	0	108.912	0	108.912	0	108.912	0
3004 1339	108.951	108.951	0	108.951	-1	108.951	0	108.951	0	108.951	0	108.950	-1
3004 1340	109.047	109.047	0	109.047	-1	109.047	0	109.047	0	109.047	0	109.046	-1
3004 1341	109.090	109.091	0	109.090	0	109.090	0	109.091	1	109.090	0	109.090	0

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: WarrenLane CarPark Westbound

No. of reading	7. following		8. following		9. following		10. following		11. following		12. following	
	baseline	26/8/13	26/10/2013	27/10/2013	28/10/2013	29/10/2013	29/10/2013	29/10/2013	29/10/2013	29/10/2013	30/10/2013	30/10/2013
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 1401	109.250		109.250	1			109.250	0	109.250	0	109.250	0
3004 1402	109.298	2	109.298	0			109.299	1	109.299	0	109.298	0
3004 1403	109.446	2	109.447	0			109.447	0	109.447	0	109.447	0
3004 1404	109.355	2	109.356	0	1	2	109.356	0	109.356	0	109.355	0
3004 1405	109.250	2	109.251	0	1	2	109.251	0	109.251	0	109.251	0
3004 1406	109.322	2	109.324	0	1	2	109.324	0	109.323	0	109.323	0
3004 1407	109.145	1	109.147	2	2	2	109.146	0	109.146	0	109.145	0
3004 1408	109.140	1	109.143	3	1	1	109.141	0	109.141	0	109.141	0
3004 1409	109.236	0	109.237	0	1	1	109.237	0	109.237	0	109.237	0
3004 1410	109.248	0	109.249	0	1	1	109.249	0	109.248	0	109.248	0
3004 1411	109.277	0	109.278	0	1	1	109.277	0	109.277	0	109.277	0
3004 1412	109.305	0	109.307	0	2	1	109.306	0	109.306	0	109.306	0

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: WarrenLane CarPark Westbound

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		
	26/8/13															
		31/10/2013														
				01/11/2013												
						05/11/2013										
								11/11/2013								
													25/11/2013			
3004 1401	109.250	109.249	0	-1	109.250	0	-1	109.249	0	-1	109.250	0	-1	109.250	0	0
3004 1402	109.298	109.298	0	0	109.298	0	0	109.298	0	0	109.298	0	0	109.299	0	1
3004 1403	109.446	109.447	0	0	109.447	0	0	109.447	0	0	109.447	0	0	109.447	0	1
3004 1404	109.355	109.355	0	1	109.355	0	1	109.355	0	0	109.356	0	1	109.356	0	1
3004 1405	109.250	109.251	0	1	109.251	0	1	109.251	0	1	109.251	0	1	109.251	0	1
3004 1406	109.322	109.323	0	1	109.323	0	1	109.323	0	1	109.323	0	1	109.323	0	1
3004 1407	109.145	109.145	0	1	109.145	0	1	109.145	0	1	109.145	0	1	109.146	0	1
3004 1408	109.140	109.141	0	1	109.141	0	1	109.141	0	1	109.141	0	1	109.141	0	1
3004 1409	109.236	109.237	0	0				109.236	0	0	109.237	0	1	109.237	0	1
3004 1410	109.248	109.248	0	1				109.248	0	1	109.249	0	1	109.248	0	1
3004 1411	109.277	109.277	0	1				109.277	0	1	109.278	0	1	109.277	0	1
3004 1412	109.305	109.306	0	1				109.306	0	1	109.307	0	1	109.307	0	1

monitoring table



Joint Venture

project: **C310 Thames Tunnel**
structure: **WarrenLane CarPark Westbound**

No. of reading	25. following		26. following		27. following		28. following		29. following		30. 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
date	26/8/13												
3004 1401	109.250	109.250	0	109.249	-1	109.249	0	109.249	0	109.249	0	109.250	0
3004 1402	109.298	109.299	0	109.298	-1	109.298	0	109.298	0	109.298	0	109.298	0
3004 1403	109.446	109.447	0	109.446	-1	109.447	0	109.447	0	109.447	0	109.447	0
3004 1404	109.355	109.356	0	109.356	0	109.355	0	109.356	0	109.355	0	109.356	0
3004 1405	109.250	109.251	0	109.251	-1	109.251	0	109.251	0	109.251	0	109.251	0
3004 1406	109.322	109.323	0	109.323	-1	109.323	0	109.323	0	109.323	0	109.323	0
3004 1407	109.145	109.146	0	109.146	0	109.145	0	109.146	0	109.145	0	109.146	0
3004 1408	109.140	109.141	0	109.141	0	109.141	0	109.141	0	109.141	0	109.141	0
3004 1409	109.236	109.237	0	109.237	0	109.237	0					109.237	0
3004 1410	109.248	109.249	0	109.249	0	109.248	0					109.248	0
3004 1411	109.277	109.278	0	109.278	0	109.277	0					109.277	0
3004 1412	109.305	109.307	0	109.307	0	109.306	0					109.306	0

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: WarrenLane CarPark Westbound

No. of reading	baseline		31. following		32. following		33. following		34. following		35. following		36. following			
	date	elevation	date	deviation from last/baseline	date	elevation	deviation from last/baseline	date	elevation	deviation from last/baseline	date	elevation	deviation from last/baseline	date	elevation	deviation from last/baseline
	26/8/13		24/03/2014		31/03/2014		07/04/2014		05/05/2014		17/06/2014		22/07/2014			
3004 1401	109.250	109.250	0	-1	109.250	0	0	109.249	0	-1	109.250	0	-1	109.249	-1	-2
3004 1402	109.298	109.298	0	1	109.299	0	1	109.298	-1	0	109.299	0	1	109.298	0	1
3004 1403	109.446	109.447	0	1	109.447	0	1	109.446	-1	0	109.447	0	1	109.447	-1	0
3004 1404	109.355	109.356	0	1	109.356	0	1	109.355	-1	0	109.356	0	1	109.355	-1	0
3004 1405	109.250	109.251	0	1	109.251	0	1	109.251	-1	1	109.251	0	1	109.251	0	1
3004 1406	109.322	109.323	0	1	109.323	0	1	109.323	-1	1	109.324	0	1	109.323	-1	1
3004 1407	109.145	109.145	0	1	109.146	0	1	109.145	0	1	109.146	0	1	109.146	0	1
3004 1408	109.140	109.141	0	1	109.141	1	1	109.141	-1	1	109.141	1	1	109.141	0	1
3004 1409	109.236	109.237	0	1	109.237	0	1	109.237	0	0	109.236	0	0	109.237	0	0
3004 1410	109.248	109.248	0	1	109.249	0	1	109.248	0	1	109.248	0	0	109.248	0	0
3004 1411	109.277	109.277	0	1	109.278	0	1	109.277	-1	1	109.277	0	1	109.277	0	1
3004 1412	109.305	109.306	0	1	109.307	0	1	109.306	0	1	109.306	0	1	109.306	0	1

monitoring table




Joint Venture

project: C310 Thames Tunnel

structure: WarrenLane CarPark Westbound

No. of reading	baseline		37. following		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
	date	26/8/13	08/10/2014	deviation from last/ baseline										
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 1401	109.250	109.248	0	-2										
3004 1402	109.298	109.298	-1	0										
3004 1403	109.446	109.446	-1	0										
3004 1404	109.355	109.355	0	0										
3004 1405	109.250	109.250	-1	0										
3004 1406	109.322	109.322	-1	0										
3004 1407	109.145	109.145	-1	0										
3004 1408	109.140	109.140	-1	0										
3004 1409	109.236	109.236	-1	0										
3004 1410	109.248	109.247	-1	-1										
3004 1411	109.277	109.277	0	0										
3004 1412	109.305	109.305	-1	0										

		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDIX 67

CS 21 - Warren lane Car park

Learning Legacy Document

monitoring asset	Services underneath Warren Lane Carpark		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70002		
name of monitoring section:	CS 21 - Warren Lane Carpark		
sensor type:	manual levelling studs		
chainage:	89880	point no.:	3004 1321 - 3004 1327
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	26/08/14	0.00		
TBM 1	start ZOI	27/10/13	0.74	3004 1404
	end ZOI	31/10/13	0.51	3004 1404
TBM 2	start ZOI	09/03/14	0.63	3004 1332
	end ZOI	12/03/14	0.19	3004 1332
longterm	08/10/14	0.44	3004 1324	
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 1321 - 3004 1327

Overall, none of the points reached any trigger value.

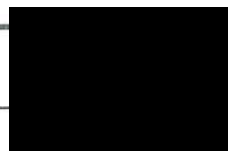
Under consideration of temperature differences, the surrounding ground condition and the achievable accuracy of the measurement, HMJV has no concern to cease the monitoring.

The rate of change in the monitoring data is less than the required standards as per the specifications and drawings.

date / signature:

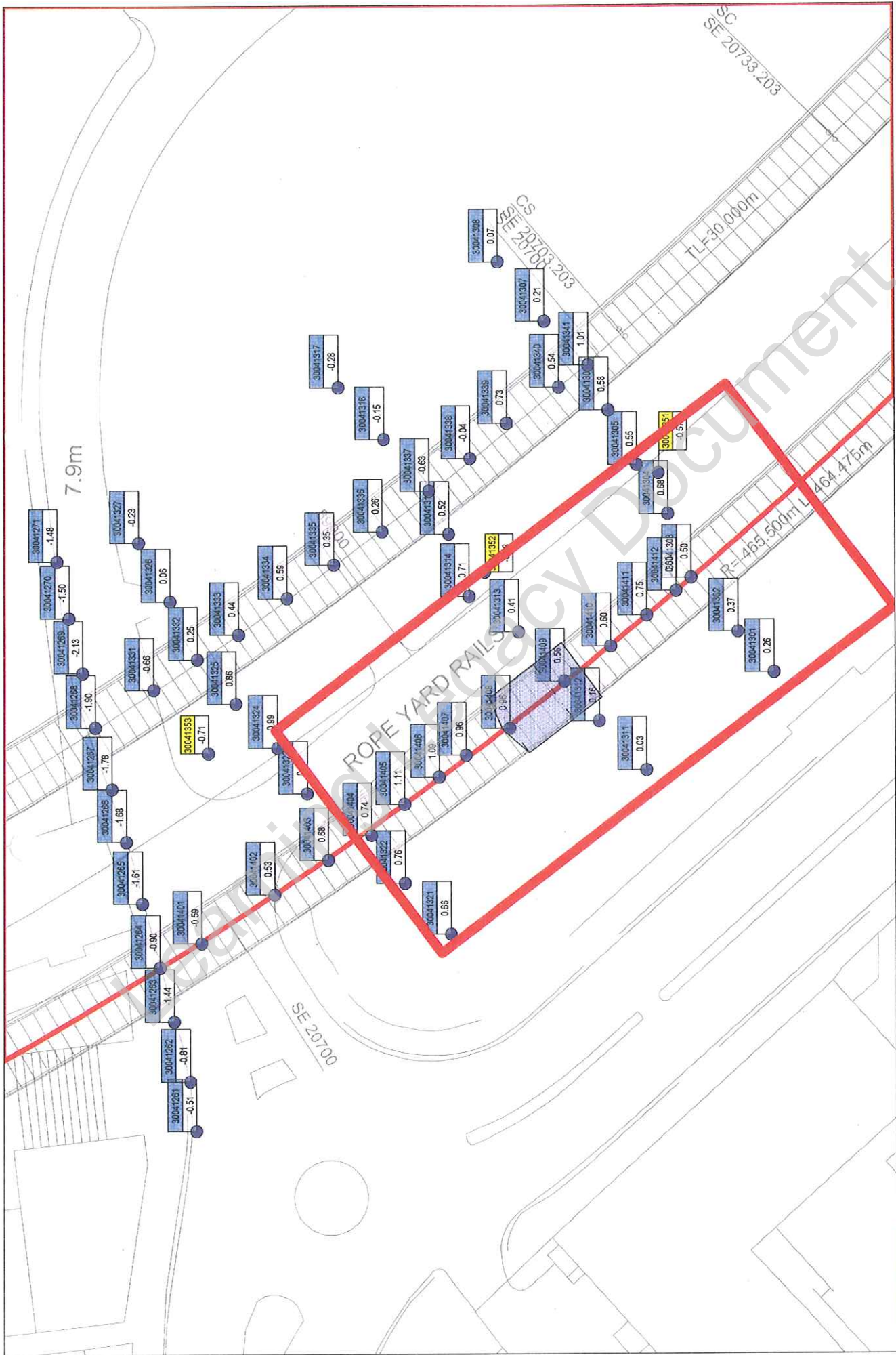
08/11/15

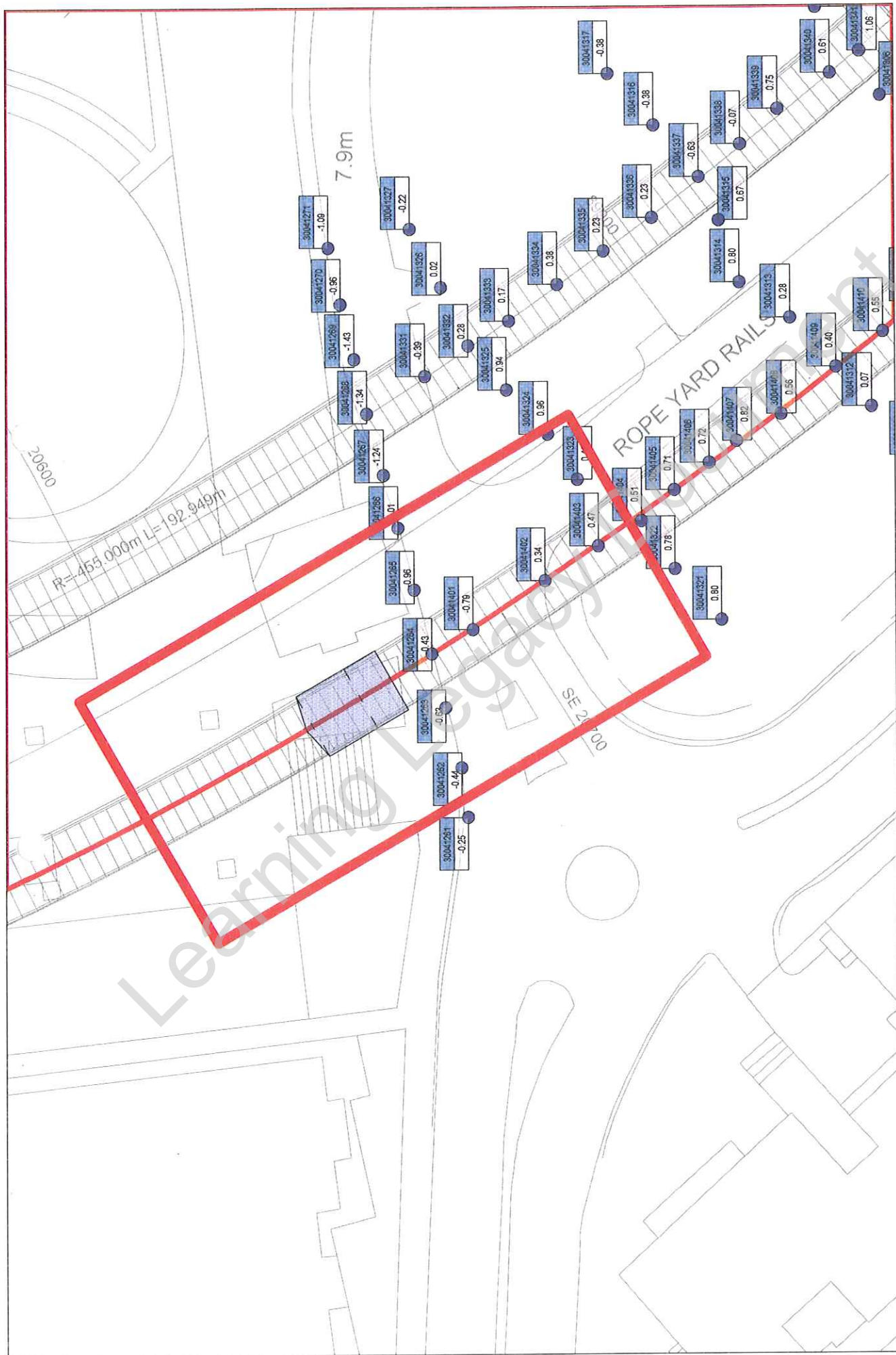
print name:



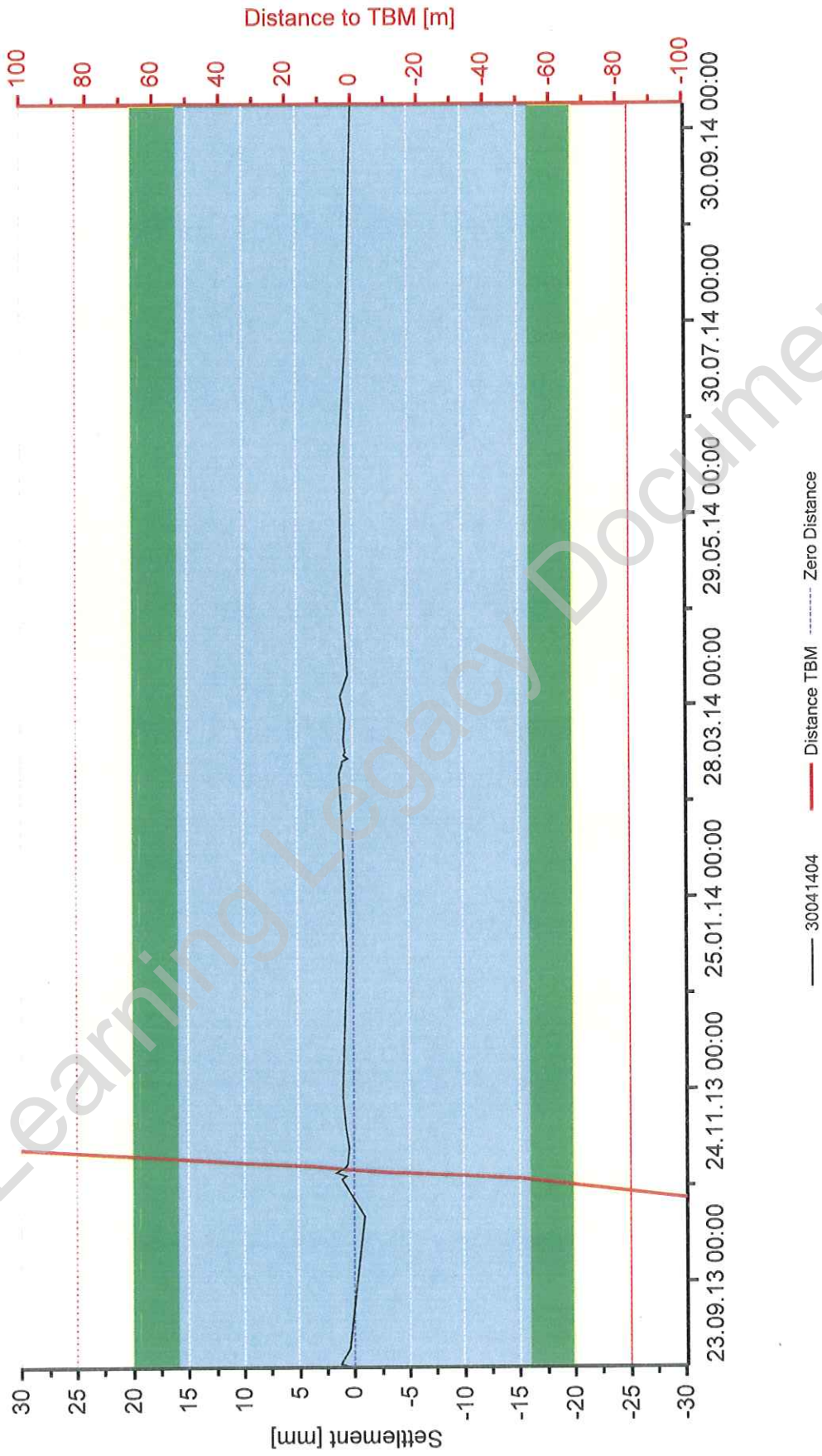
HMJV project role:

Monitoring & Survey engineer



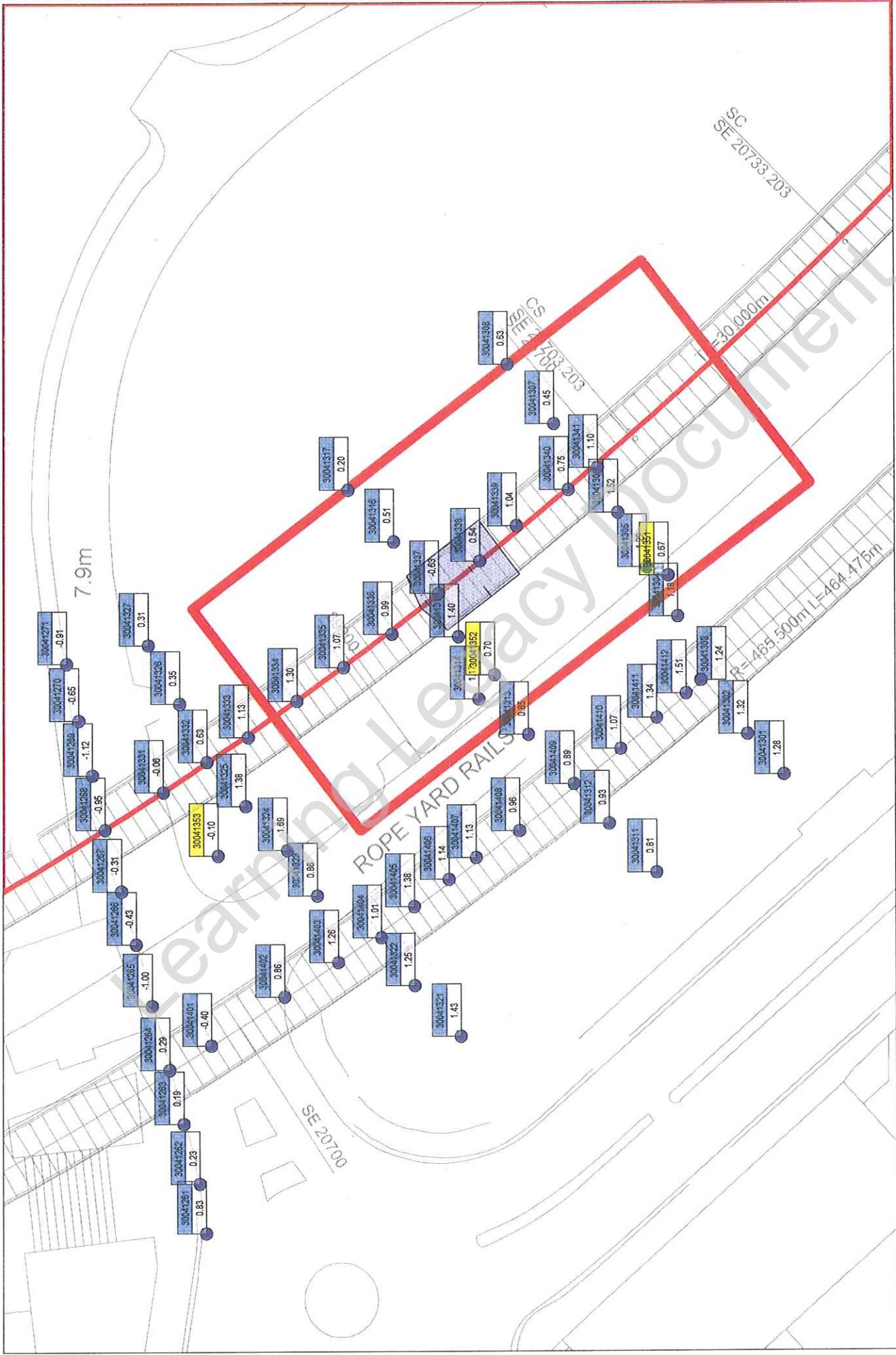


Point: 30041404



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - CS 21 - Warren Lane Carpark 26.08.2013 - 08.10.2014
Date: 23.10.2014 17:50 Current Values: 23.10.2014 17:34

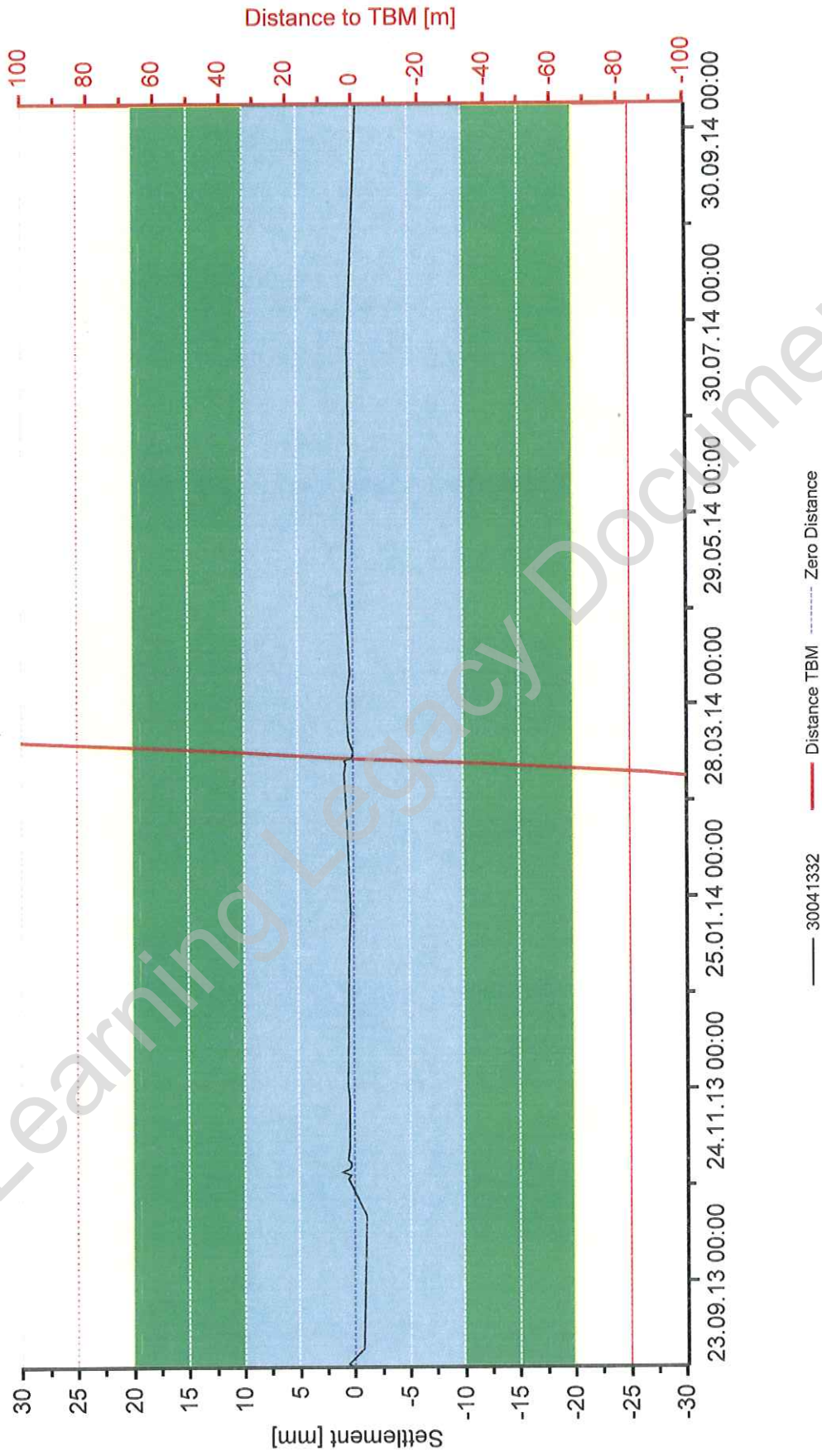




Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 09.03.2014 17:10



Point: 30041332



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - CS 21 - Warren Lane Carpark 26.08.2013 - 08.10.2014
date: 19.10.2014 16:55 current values: 19.10.2014 16:41



monitoring table



Joint Venture

project: **C310 Thames Tunnel**

structure: **CS21 WarrenLane CarPark**

No. of reading	baseline	7. following		8. following		9. following		10. following		11. following		12. following	
		date	26/8/13	28/10/2013	29/10/2013	29/10/2013	29/10/2013	30/10/2013	30/10/2013	31/10/2013	31/10/2013	01/11/2013	
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 1321	110.068	110.070	1	110.069	0	110.069	0	110.069	0	110.069	0	110.069	0
3004 1322	109.893	109.894	1	109.894	0	109.894	0	109.893	0	109.893	0	109.893	0
3004 1323	109.165	109.167	1	109.166	0	109.166	0	109.166	0	109.166	0	109.166	0
3004 1324	109.145	109.147	1	109.147	0	109.147	0	109.146	0	109.146	0	109.146	0
3004 1325	108.905	108.907	1	108.907	0	108.906	0	108.906	0	108.906	0	108.906	0
3004 1326	108.709	108.710	1	108.709	0			108.709	0	108.709	0	108.709	0
3004 1327	108.393	108.393	1	108.393	0			108.393	0	108.393	0	108.393	0

monitoring table



Joint Venture

project: **C310 Thames Tunnel**

structure: **CS21 WarrenLane CarPark**

No. of reading	baseline	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		
	26/8/13															
		17/02/2014			06/03/2014		09/03/2014		10/03/2014		11/03/2014		12/03/2014			
No.	elevation															
3004 1321	110.068	110.070	-1	2	110.070	0	2	110.070	-1	1	110.070	0	2	110.070	0	1
3004 1322	109.893	109.894	0	1	109.894	0	2	109.894	0	1	109.894	0	2	109.894	0	1
3004 1323	109.165	109.166	0	1	109.166	0	1	109.166	0	1	109.166	0	1	109.166	0	1
3004 1324	109.145	109.147	0	2	109.147	0	2	109.147	0	2	109.146	-1	1	109.147	0	1
3004 1325	108.905	108.906	0	1	108.907	0	2	108.906	0	1	108.906	-1	1	108.906	0	1
3004 1326	108.709	108.709	0	0	108.709	0	0	108.709	0	1	108.709	-1	0	108.709	0	0
3004 1327	108.393	108.393	0	0	108.393	0	0	108.393	0	0	108.393	0	0	108.393	0	0

Woolwich Box to Thames Southside levelling

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: CS21 WarrenLane CarPark

No. of reading	baseline		31. following		32. following		33. following					
	26/8/13	17/06/2014	17/06/2014	deviation from last/ baseline	elevation	deviation from last/baseline	elevation	deviation from last/baseline	elevation	deviation from last/baseline	elevation	deviation from last/baseline
No.	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
3004 1321	110.068		110.069	0	1	110.069	0	1	110.068	-1	0	
3004 1322	109.893		109.894	0	2	109.894	0	1	109.893	-1	0	
3004 1323	109.165		109.166	0	1	109.166	0	1	109.165	0	0	
3004 1324	109.145		109.147	0	1	109.147	0	1	109.146	-1	0	
3004 1325	108.905		108.906	0	1	108.906	0	1	108.905	-1	0	
3004 1326	108.709		108.709	0	0	108.710	0	1	108.709	0	0	
3004 1327	108.393		108.393	0	0	108.393	0	0	108.393	0	0	

Learning Document

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: WarrenLane CarPark Westbound

No. of reading	baseline		7. following		8. following		9. following		10. following		11. following		12. following			
	26/8/13	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	26/8/13															
No.																
3004 1401	109.250				109.250	1	-1			109.250	0	0	109.250	0	0	
3004 1402	109.298	109.299	2	1	109.298	0	1			109.299	1	1	109.298	0	0	
3004 1403	109.446	109.447	2	1	109.447	0	1			109.447	0	1	109.447	0	1	
3004 1404	109.355	109.356	2	1	109.356	0	1	109.356	1	2	109.356	0	1	109.355	0	1
3004 1405	109.250	109.251	2	1	109.251	0	1	109.252	1	2	109.251	0	1	109.251	0	1
3004 1406	109.322	109.324	2	1	109.323	0	1	109.324	1	2	109.323	0	1	109.323	0	1
3004 1407	109.145	109.147	1	2	109.145	-1	1	109.146	1	2	109.146	0	1	109.145	0	1
3004 1408	109.140	109.143	1	3	109.141	-2	1	109.142	0	1	109.141	0	1	109.141	0	1
3004 1409	109.236	109.237	0	1	109.237	-1	1	109.237	0	1	109.237	0	1	109.237	0	0
3004 1410	109.248	109.249	0	1	109.248	-1	1	109.249	0	1	109.248	0	1	109.248	0	0
3004 1411	109.277	109.278	0	1	109.277	-1	1	109.277	0	1	109.277	0	1	109.277	0	1
3004 1412	109.305	109.307	0	2	109.306	-1	1	109.306	0	1	109.306	0	1	109.306	0	1

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: WarrenLane CarPark Westbound

No. of reading	baseline	37. 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
		date	08/10/2014										
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 1401	109.250	109.246	0	-2									
3004 1402	109.298	109.298	-1	0									
3004 1403	109.446	109.446	-1	0									
3004 1404	109.355	109.355	0	0									
3004 1405	109.250	109.250	-1	0									
3004 1406	109.322	109.322	-1	0									
3004 1407	109.145	109.145	-1	0									
3004 1408	109.140	109.140	-1	0									
3004 1409	109.236	109.236	-1	0									
3004 1410	109.248	109.247	-1	-1									
3004 1411	109.277	109.277	0	0									
3004 1412	109.305	109.305	-1	0									

monitoring table



Joint Venture

project: **C310 Thames Tunnel**

structure: **WarrenLane CarPark Eastbound**

No. of reading	baseline		13. following		14. following		15. following		16. following		17. following		18. 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
	28/8/13													
3004 1331		108.404	108.404	0	108.404	0	108.404	0	108.404	0	108.404	0	108.404	0
3004 1332		108.698	108.699	0	108.699	0	108.699	0	108.699	0	108.699	0	108.699	0
3004 1333		108.649	108.649	0	108.649	0	108.649	0	108.649	0	108.650	0	108.649	0
3004 1334		108.711	108.712	0	108.712	0	108.711	0	108.712	0	108.712	0	108.712	0
3004 1335		108.755	108.756	0	108.756	0	108.756	0	108.756	0	108.756	0	108.756	-1
3004 1336		108.808	108.808	0	108.808	0	108.808	0	108.808	0	108.808	0	108.808	-1
3004 1337		108.849		destroyed		destroyed		destroyed		destroyed		destroyed		destroyed
3004 1338		108.913	108.913	0	108.913	0	108.913	0	108.913	0	108.913	0	108.913	-1
3004 1339		108.951			108.951	0	108.951	0	108.952	0	108.952	0	108.951	-1
3004 1340		109.047			109.047	0	109.047	0	109.048	0	109.047	0	109.047	0
3004 1341		109.090			109.091	0	109.091	0	109.091	0	109.091	0	109.091	0

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: WarrenLane CarPark Eastbound

No. of reading	baseline	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
		28/8/13			17/02/2014		06/03/2014		07/03/2014		08/03/2014		09/03/2014
3004 1331	108.404		0	-1	108.404	0	0	108.404	0	0			
3004 1332	108.698		0	0	108.699	0	0	108.699	0	1			108.699 0 1
3004 1333	108.649		0	0	108.650	0	1	108.650	0	1			108.650 0 1
3004 1334	108.711		0	0	108.712	0	1	108.712	0	1			108.712 0 1
3004 1335	108.755		0	0	108.756	0	1	108.756	0	1			108.757 0 1
3004 1336	108.808		0	0	108.808	0	1	108.809	0	1			108.809 0 1
3004 1337	108.849		destroyed		destroyed		destroyed						destroyed
3004 1338	108.913		0	0	108.913	0	0	108.913	0	1			108.913 0 1
3004 1339	108.951		0	1	108.952	0	1	108.952	0	1			108.952 0 1
3004 1340	109.047		0	1	109.048	0	1	109.048	0	1			109.047 -1 1
3004 1341	109.090		0	1	109.091	0	1	109.091	0	2			109.091 -1 1

monitoring table



Joint Venture

project: **C310 Thames Tunnel**

structure: **WarrenLane CarPark Eastbound**

No. of reading	25. following		26. following		27. following		28. following		29. following		30. following		
	baseline	10/03/2014	11/03/2014	12/03/2014	13/03/2014	17/03/2014	24/03/2014						
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 1331	108.404	108.404	0	108.403	0	108.403	0	108.403	0	108.404	1	108.404	0
3004 1332	108.698	108.698	0	108.698	0	108.698	0	108.698	0	108.699	0	108.699	0
3004 1333	108.649	108.650	0	108.649	0	108.649	0	108.649	0	108.650	0	108.650	0
3004 1334	108.711	108.712	0	108.712	0	108.712	0	108.712	0	108.712	0	108.712	0
3004 1335	108.755	108.756	-1	108.756	0	108.756	0	108.756	0	108.756	0	108.756	0
3004 1336	108.808	108.808	-1	108.808	0	108.808	0	108.808	0	108.808	0	108.808	0
3004 1337	108.849	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed
3004 1338	108.913	108.913	-1	108.913	0	108.913	0	108.913	0	108.913	0	108.913	0
3004 1339	108.951	108.951	-1	108.951	0	108.951	0	108.951	0	108.951	0	108.951	0
3004 1340	109.047	109.047	0	109.047	0	109.047	0	109.047	0	109.047	0	109.047	0
3004 1341	109.090	109.091	0	109.091	0	109.090	0	109.090	0	109.090	0	109.091	0

monitoring table




Joint Venture

project: **C310 Thames Tunnel**

structure: **WarrenLane CarPark Eastbound**

No. of reading	baseline		31. following		32. following		33. following		34. following		35. following		36. 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
	26/8/13													
3004 1331		108.404	108.404	0	108.404	0	108.403	0	108.403	0	108.404	0	108.403	-1
3004 1332		108.698	108.699	0	108.699	0	108.699	0	108.699	0	108.699	0	108.698	-1
3004 1333		108.649	108.650	0	108.650	0	108.650	0	108.649	0	108.649	0	108.649	0
3004 1334		108.711	108.712	0	108.712	0	108.712	0	108.711	0	108.711	0	108.711	0
3004 1335		108.755	108.756	0	108.756	0	108.756	0	108.755	0	108.755	0	108.755	0
3004 1336		108.808	108.808	0	108.808	0	108.808	0	108.808	0	108.807	0	108.807	0
3004 1337		108.849		destroyed		destroyed		destroyed		destroyed		destroyed		destroyed
3004 1338		108.913	108.913	0	108.912	-1	108.912	0	108.912	0	108.912	0	108.912	0
3004 1339		108.951	108.951	0	108.951	-1	108.951	0	108.951	0	108.951	0	108.950	-1
3004 1340		109.047	109.047	0	109.047	-1	109.047	0	109.047	0	109.047	0	109.046	-1
3004 1341		109.090	109.091	0	109.090	0	109.090	0	109.091	1	109.090	0	109.090	0

		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDIX 68

CS 22 - Warren lane roundabout

Learning Legacy Document

monitoring asset	Area Royal Arsenal		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70002		
name of monitoring section:	CS 22 - Warren Lane roundabout		
sensor type:	manual levelling studs		
chainage:	89880	point no.:	3004 1261 - 3004 1271
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	13/08/13	0.00		
TBM 1	start ZOI	29/10/13	0.37	3004 1264
	end ZOI	02/11/13	0.14	3004 1264
TBM 2	start ZOI	10/03/14	-0.84	3004 1268
	end ZOI	13/03/14	-1.44	3004 1268
longterm	24/09/14	-1.51	3004 1268	
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)		

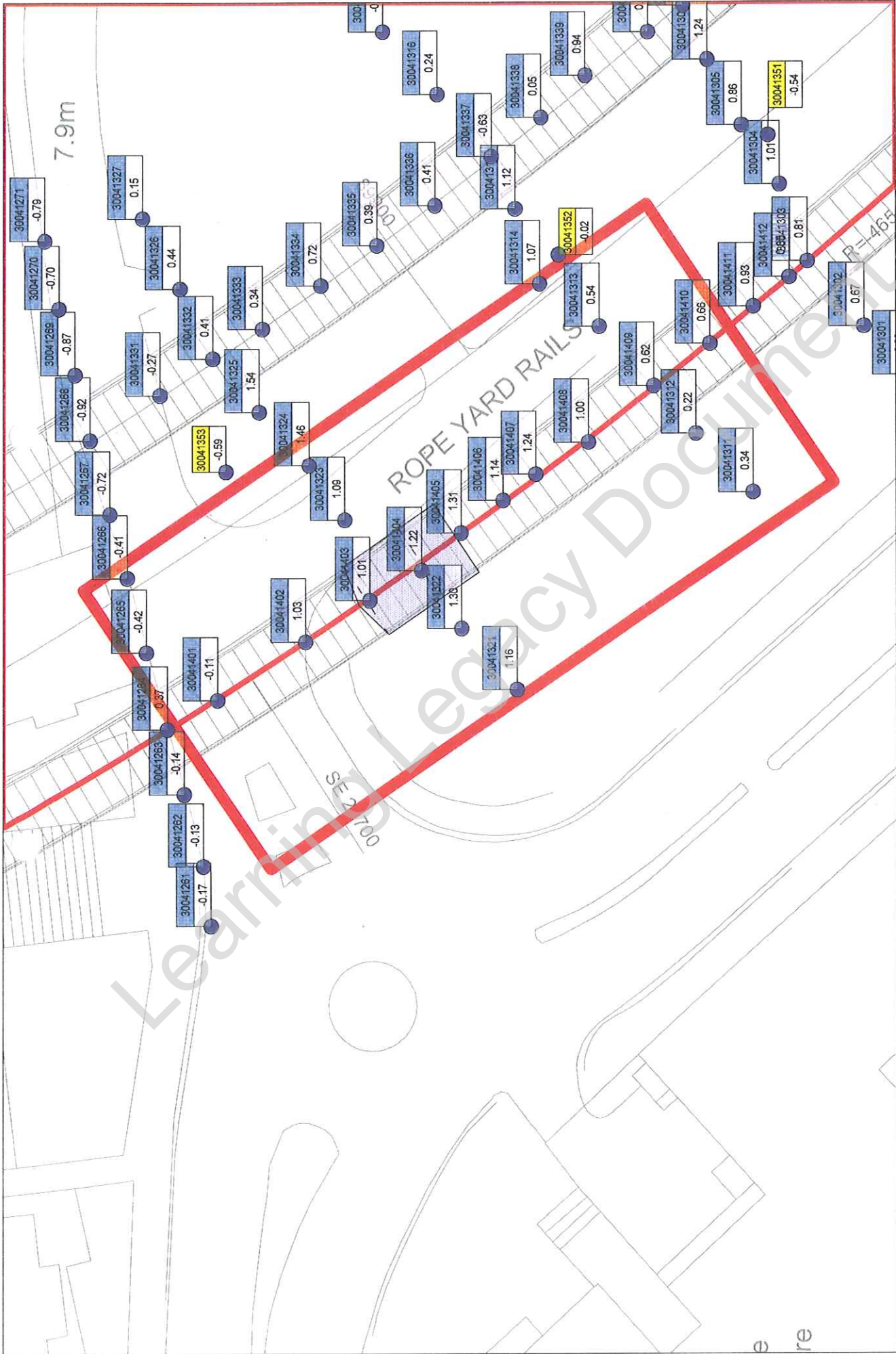
summary / comments

3004 1261 - 3004 1271
 Overall, none of the points reached any trigger 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: 08/10/15

print name: 

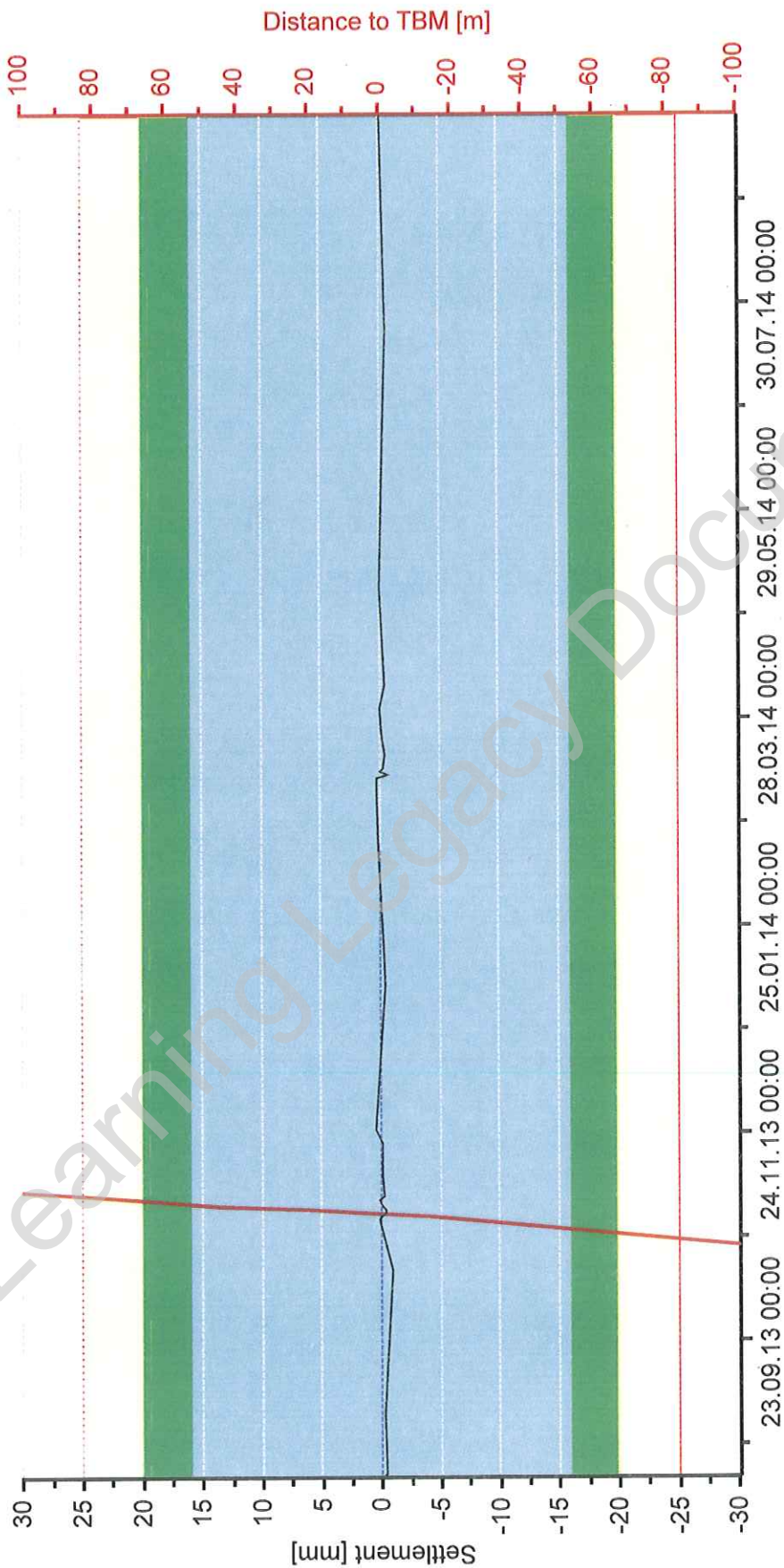
HMJV project role: Monitoring & Survey engineer



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 29.10.2013 09:00



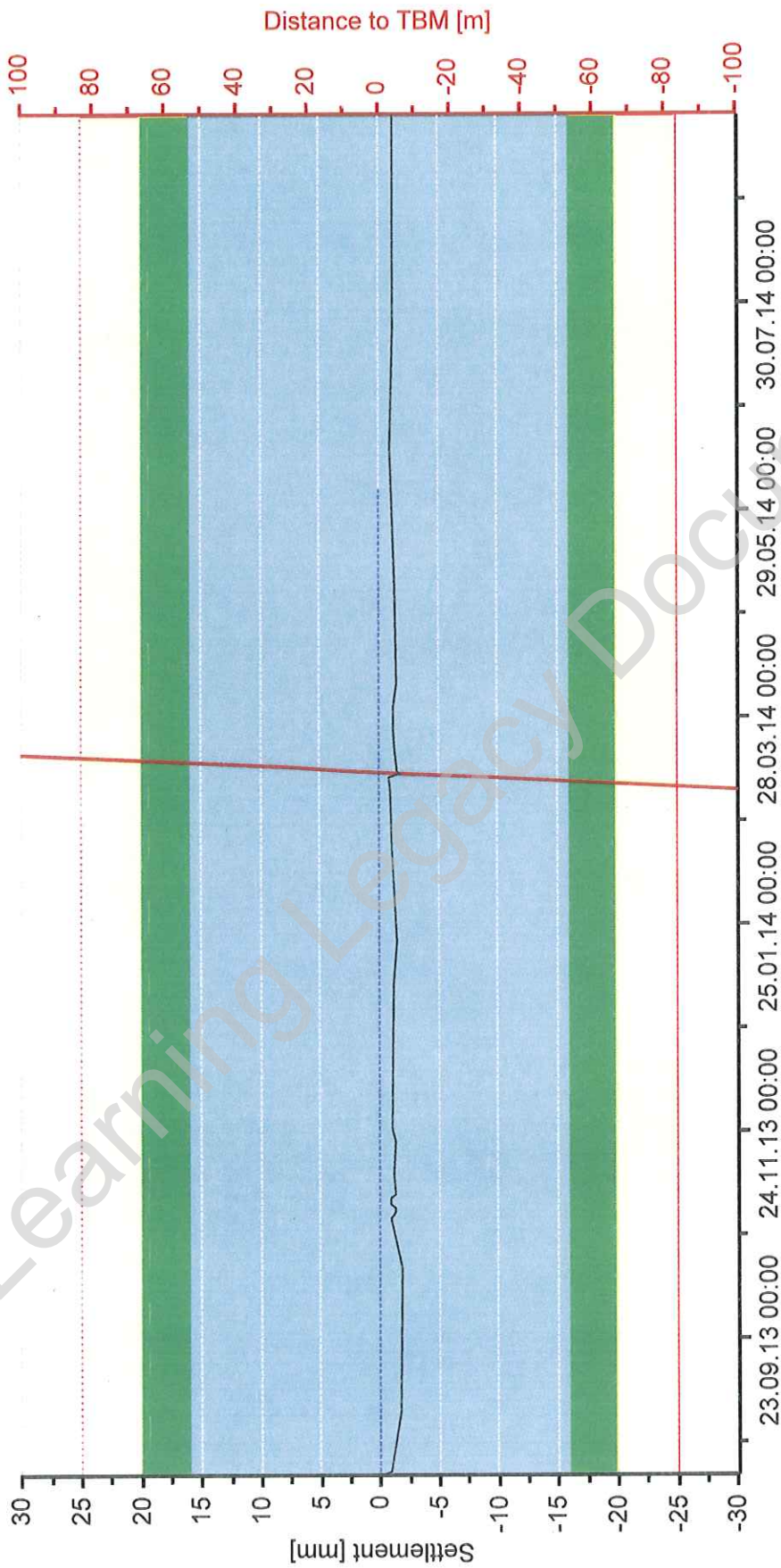
Point: 30041264



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - CS 22 - Warren Lane Roundabout 13.08.2013 - 24.09.2014
Date: 23.10.2014 17:40 Current Values: 23.10.2014 17:19



Point: 30041268



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - CS 22 - Warren Lane Roundabout 13.08.2013 - 24.09.2014
date: 19.10.2014 16:51 current values: 19.10.2014 16:41

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: CS22 WarrenLane Roundabout

No. of reading	baseline	1. following		2. following		3. following		4. following		5. following		6. 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	13/8/13	14/08/2013		01/09/2013		23/09/2013		14/10/2013		29/10/2013		29/10/2013	
	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 1261	109.964	109.964	0	109.964	0	109.964	0	109.963	-1	109.964	0	109.964	0
3004 1262	109.688	109.688	0	109.688	0	109.688	0	109.687	-1	109.688	1	109.688	0
3004 1263	109.423	109.422	0	109.423	0	109.423	0	109.421	-2	109.422	1	109.422	0
3004 1264	109.167	109.166	0	109.166	0	109.167	0	109.166	-1	109.167	1	109.167	0
3004 1265	108.942	108.941	-1	108.940	-1	108.941	0	108.940	-1	108.941	1	108.941	0
3004 1266	108.661	108.660	-1	108.659	-1	108.659	0	108.659	0	108.660	1	108.660	0
3004 1267	108.584	108.583	-1	108.582	-1	108.582	0	108.582	0	108.583	1		
3004 1268	108.484	108.483	-1	108.483	-1	108.482	0	108.482	0	108.483	1		
3004 1269	108.439	108.438	-1	108.437	-1	108.437	0	108.437	0	108.438	1		
3004 1270	108.400	108.399	-1	108.399	0	108.399	0	108.399	0	108.400	1		
3004 1271	108.356	108.355	-1	108.355	0	108.355	-1	108.355	0	108.356	1		

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: CS22 WarrenLane Roundabout

No. of reading	baseline	13. following		14. following		15. following		16. following		17. following		18. 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	13/8/13	11/11/2013		21/11/2013		25/11/2013		07/01/2014		20/01/2014		17/02/2014	
3004 1261	109.964	109.964	0	109.964	0	109.964	0	109.964	0	109.964	0	109.964	0
3004 1262	109.688	109.688	0	109.688	0	109.688	0	109.688	0	109.688	0	109.688	0
3004 1263	109.423	109.422	0	109.422	0	109.422	0	109.422	0	109.422	0	109.422	0
3004 1264	109.167	109.166	0	109.166	0	109.167	1	109.166	-1	109.166	0	109.167	0
3004 1265	108.942	108.941	0	108.941	0	108.941	0	108.941	0	108.940	0	108.940	0
3004 1266	108.661	108.660	0	108.660	0	108.660	0	108.660	0	108.660	0	108.660	0
3004 1267	108.584	108.583	0	108.583	0	108.583	1	108.583	0	108.583	0	108.583	0
3004 1268	108.484	108.483	0	108.483	0	108.483	0	108.483	0	108.483	0	108.483	0
3004 1269	108.439	108.438	0	108.438	0	108.438	0	108.438	0	108.438	0	108.438	0
3004 1270	108.400	108.399	0	108.399	0	108.400	0	108.399	0	108.400	0	108.400	0
3004 1271	108.356	108.355	0	108.355	0	108.355	0	108.355	0	108.355	0	108.355	0

monitoring table



Joint Venture

project: **C310 Thames Tunnel**

structure: **CS22 WarrenLane Roundabout**

No. of reading	baseline	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			
date	13/8/13	06/03/2014		10/03/2014		11/03/2014		12/03/2014		13/03/2014		17/03/2014				
3004 1261	109.964	109.965	1	109.964	0	1	109.964	-1	0	1	109.964	0	1	109.964	-1	0
3004 1262	109.688	109.688	0	109.688	0	0	109.688	-1	0	0	109.688	0	0	109.688	0	0
3004 1263	109.423	109.423	0	109.423	0	0	109.422	-1	-1	0	109.422	0	0	109.422	0	0
3004 1264	109.167	109.167	0	109.167	0	0	109.166	-1	-1	1	109.167	0	0	109.166	0	0
3004 1265	108.942	108.941	1	108.941	0	-1	108.940	-1	-2	1	108.940	0	-1	108.940	0	-1
3004 1266	108.661	108.660	0	108.660	0	-1	108.659	-1	-1	0	108.660	0	-1	108.660	0	-1
3004 1267	108.584	108.584	0	108.583	-1	-1	108.583	0	-1	1	108.583	0	-1	108.583	0	-1
3004 1268	108.484	108.483	0	108.483	0	-1	108.482	-1	-2	0	108.483	0	-1	108.483	0	-1
3004 1269	108.439	Covered		108.438	0	-1	108.437	-1	-2	0	108.438	0	-1	108.438	0	-1
3004 1270	108.400	Covered		108.400	1	0	108.399	-1	-1	0	108.400	0	-1	108.400	0	0
3004 1271	108.356	Covered		108.356	0	-1	108.355	-1	-2	0	108.355	0	-1	108.355	0	-1

monitoring table



Joint Venture

project: **C310 Thames Tunnel**
 structure: **CS22 WarrenLane Roundabout**

No. of reading date	baseline 13/8/13	25. following 24/03/2014		26. following 31/03/2014		27. following 07/04/2014		28. following 06/05/2014		29. following 17/06/2014		30. following 22/07/2014	
		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 1261	109.964	109.964	0	109.964	0	109.964	0	109.964	0	109.965	1	109.963	-1
3004 1262	109.688	109.688	0	109.688	0	109.688	0	109.688	0	109.688	0	109.688	0
3004 1263	109.423	109.422	0	109.422	0	109.422	0	109.422	0	109.423	1	109.422	-1
3004 1264	109.167	109.166	0	109.167	0	109.166	-1	109.167	0	109.166	0	109.166	0
3004 1265	108.942	108.940	0	108.941	0	108.940	-1	108.941	0	108.941	0	108.940	-1
3004 1266	108.661	108.660	0	108.660	0	108.660	0	108.660	0	108.660	0	108.660	0
3004 1267	108.584	108.583	0	108.583	0	108.583	0	108.583	0	108.583	0	108.583	0
3004 1268	108.484	108.483	0	108.483	0	108.483	0	108.483	0	108.483	0	108.483	0
3004 1269	108.439	108.438	0	108.438	0	108.438	0	108.437	-2	108.438	1	108.438	0
3004 1270	108.400	108.400	0	108.400	0	108.400	0	108.400	0	108.400	0	108.400	0
3004 1271	108.356	108.356	0	108.355	0	108.356	0	108.356	0	108.356	0	108.356	0


monitoring table



Joint Venture

project: C310 Thames Tunnel
structure: CS22 WarrenLane Roundabout

No. of reading	baseline		31. following		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
	13/8/13	24/09/2014	13/8/13	24/09/2014										
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 1261	109.964	1	109.965	1										
3004 1262	109.688	0	109.688	0										
3004 1263	109.423	0	109.422	0										
3004 1264	109.167	1	109.167	1										
3004 1265	108.942	0	108.941	0										
3004 1266	108.661	0	108.660	0										
3004 1267	108.584	0	108.583	0										
3004 1268	108.484	0	108.483	0										
3004 1269	108.439	0	108.438	0										
3004 1270	108.400	-1	108.399	-1										
3004 1271	108.356	-1	108.355	-1										

 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDIX 69

Warren lane Car park EB

Learning Legacy Document

monitoring asset	Services underneath Warren Lane Carpark		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70002		
name of monitoring section:	Warren lane Carpark EB Tunnel		
sensor type:	manual levelling studs		
chainage:	89880 - 89930	point no.:	3004 1331 - 3004 1341
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	26/08/13	0.00		
TBM 1	start ZOI	24/10/13	1.03	3004 1341
		28/10/13	-0.66	3004 1331
	end ZOI	29/10/13	0.93	3004 1341
		01/11/13	-0.38	3004 1331
breached not any trigger value				
TBM 2	start ZOI	07/03/14	1.78	3004 1341
		10/03/14	0.07	3004 1331
	end ZOI	10/03/14	0.95	3004 1341
		13/03/14	-0.92	3004 1331
breached not any trigger value				
longterm	08/10/14	-1.44	3004 1331	

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)

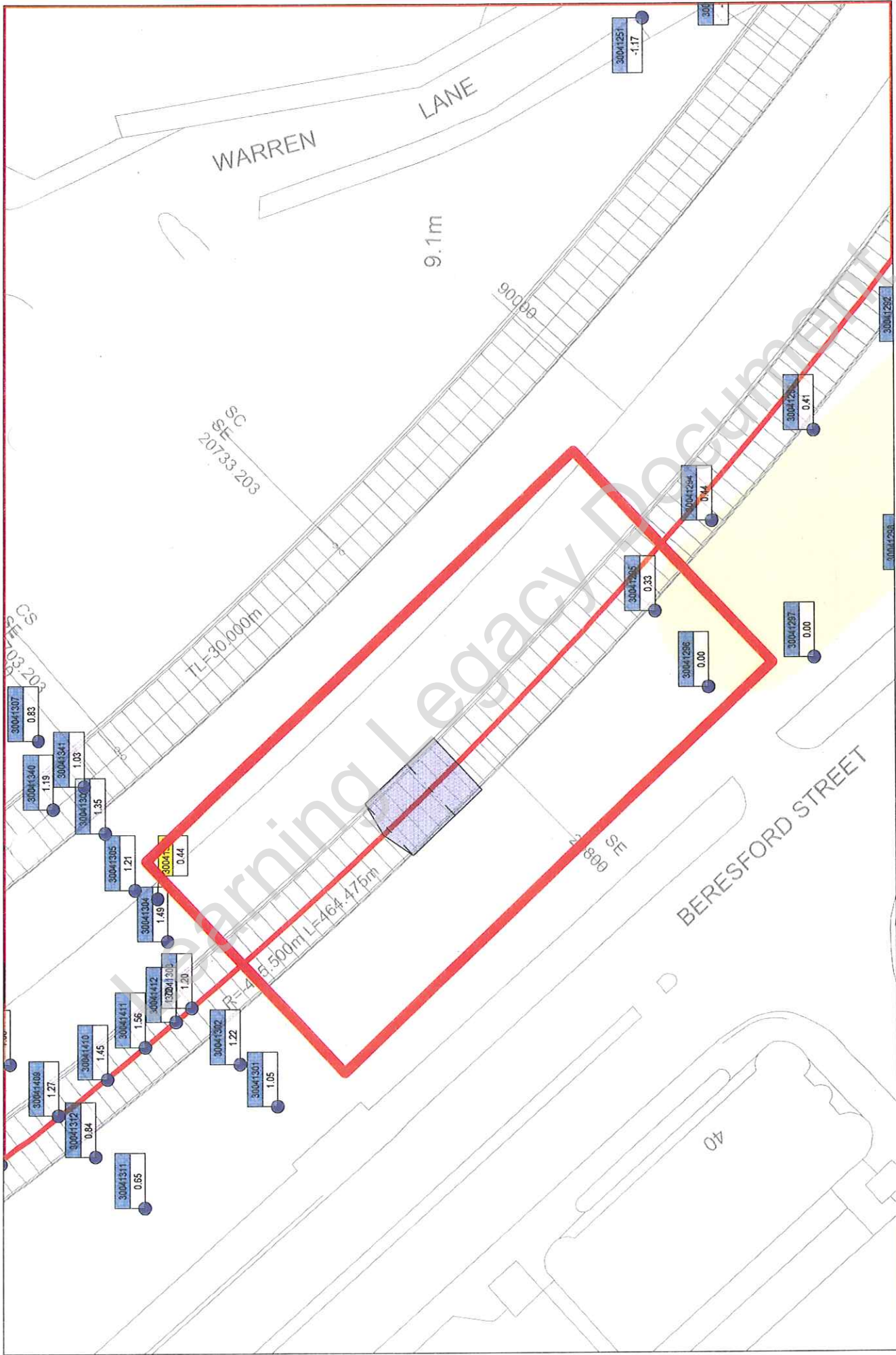
summary / comments

3004 1331 - 3004 1341
 Point no. 3004 1337 destroyed
 Overall, none of the points reached any trigger 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: 08/01/15

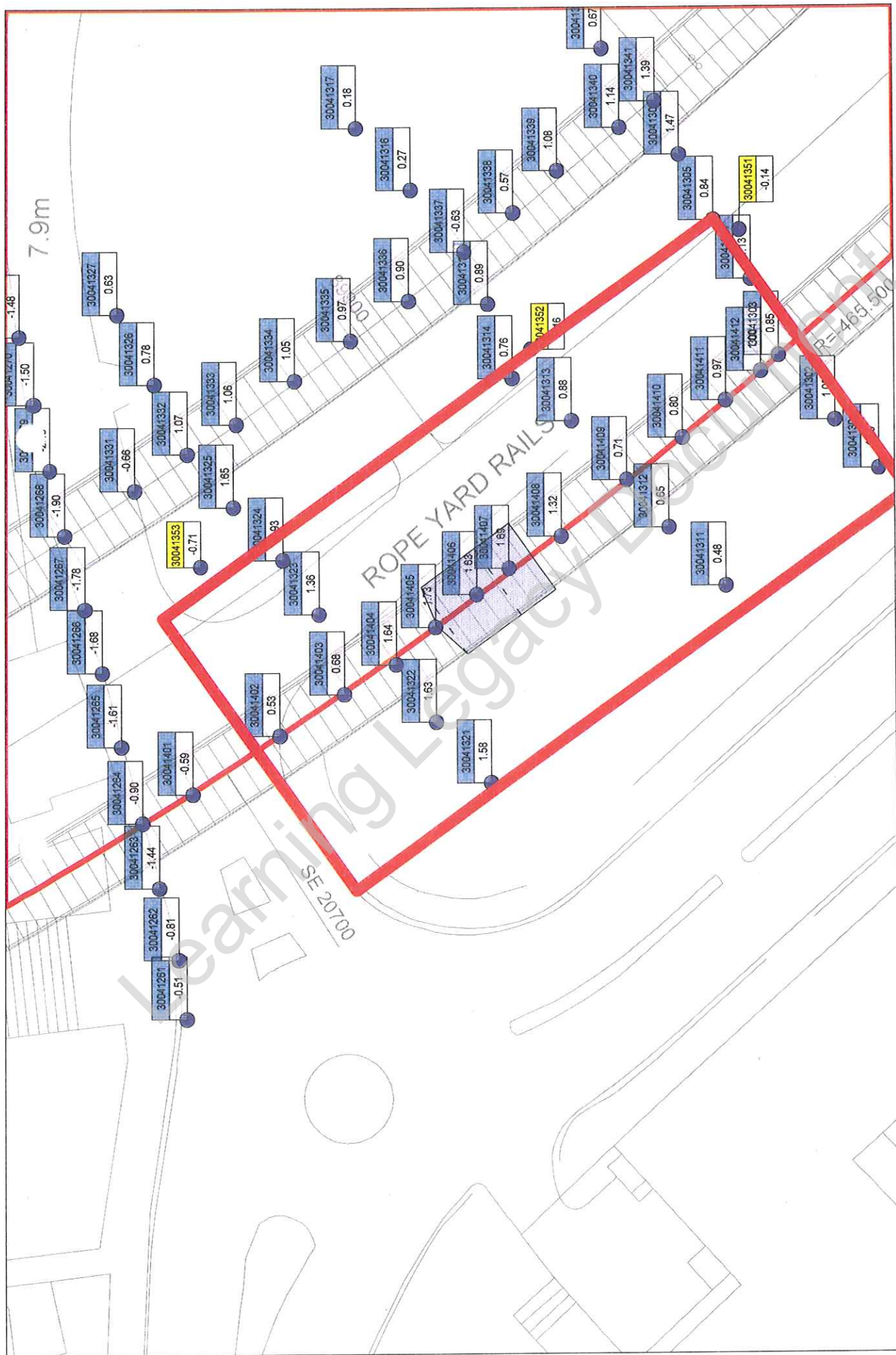
print name: _____

HMJV project role: Monitoring & Survey engineer



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 24.10.2013 18:30



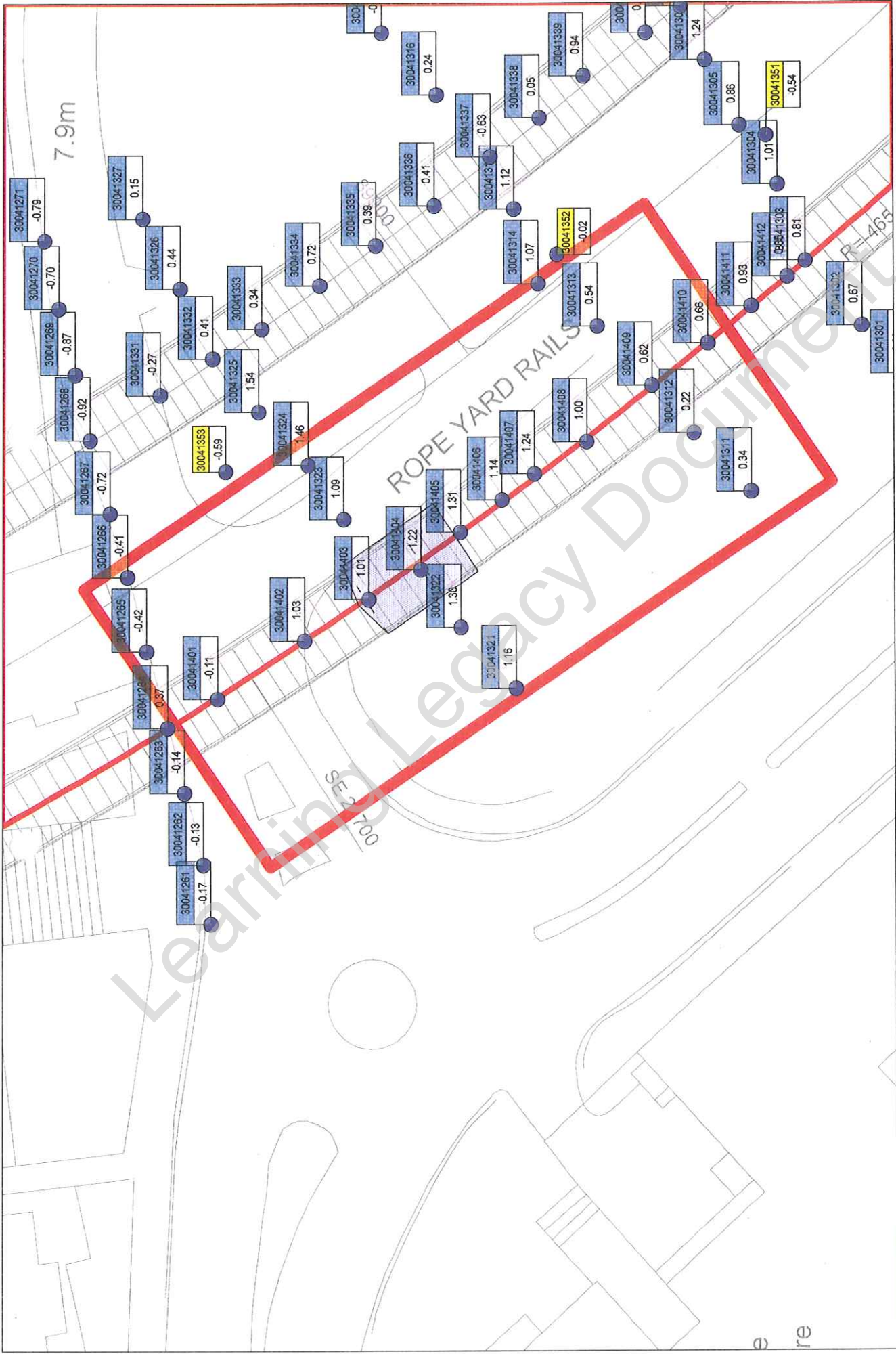


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

working activities: TBM drive WB

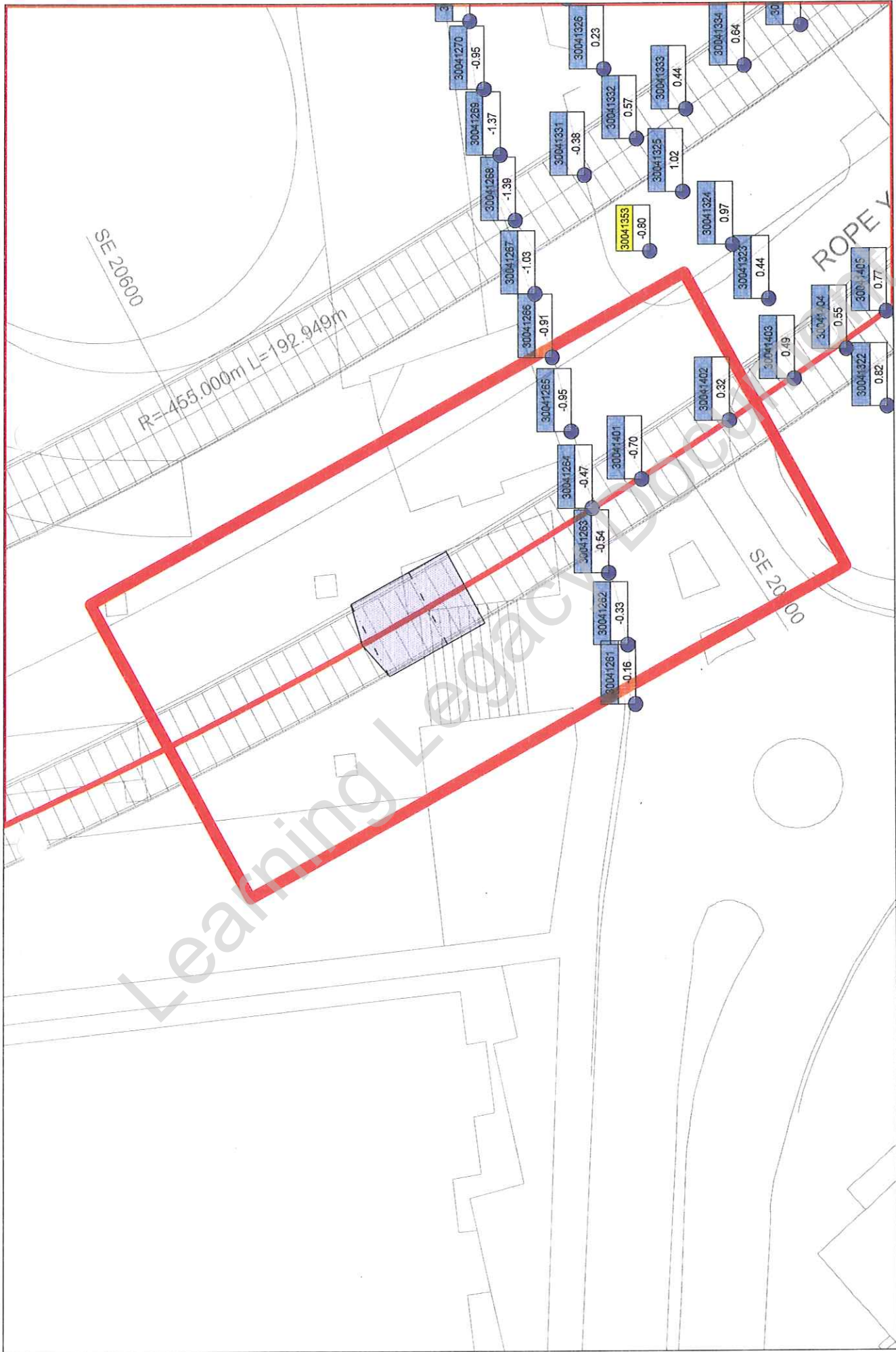
current values: 28.10.2013 18:06





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 29.10.2013 09:00

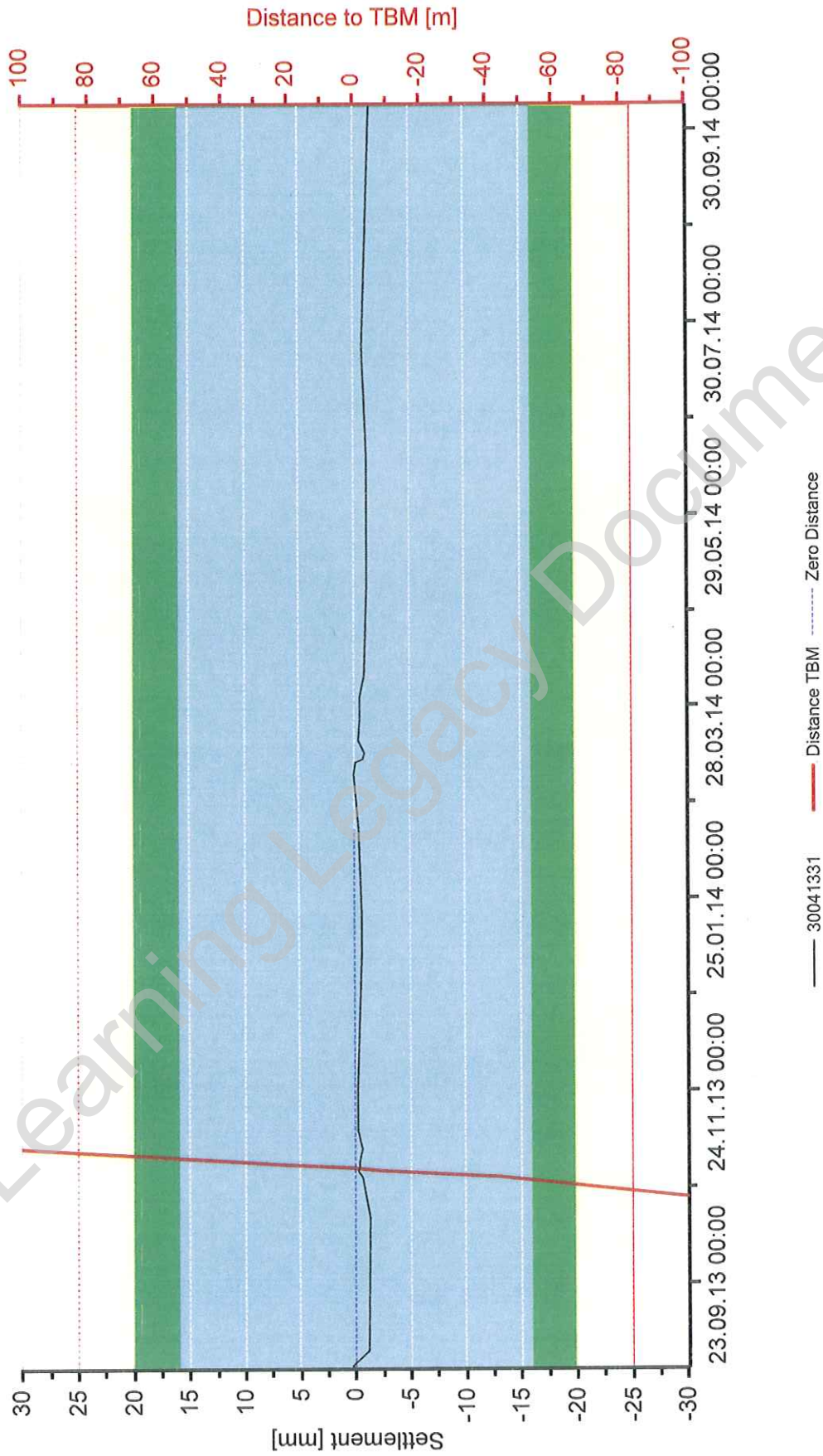




Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 01.11.2013 09:00



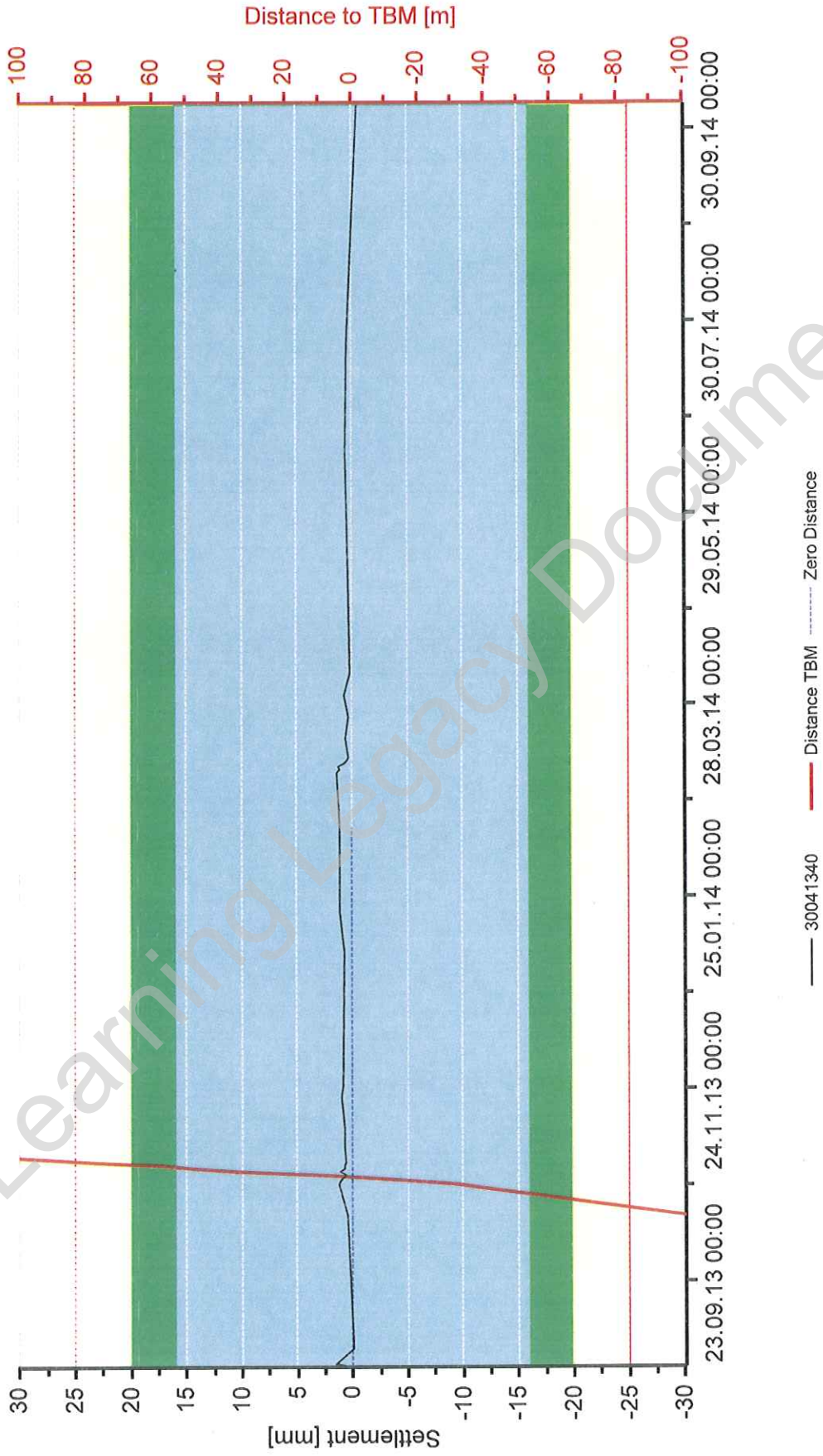
Point: 30041331



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Warren Lane Carpark EB 26.08.2013 - 08.10.2014
Date: 28.10.2014 08:54 Current Values: 28.10.2014 08:34

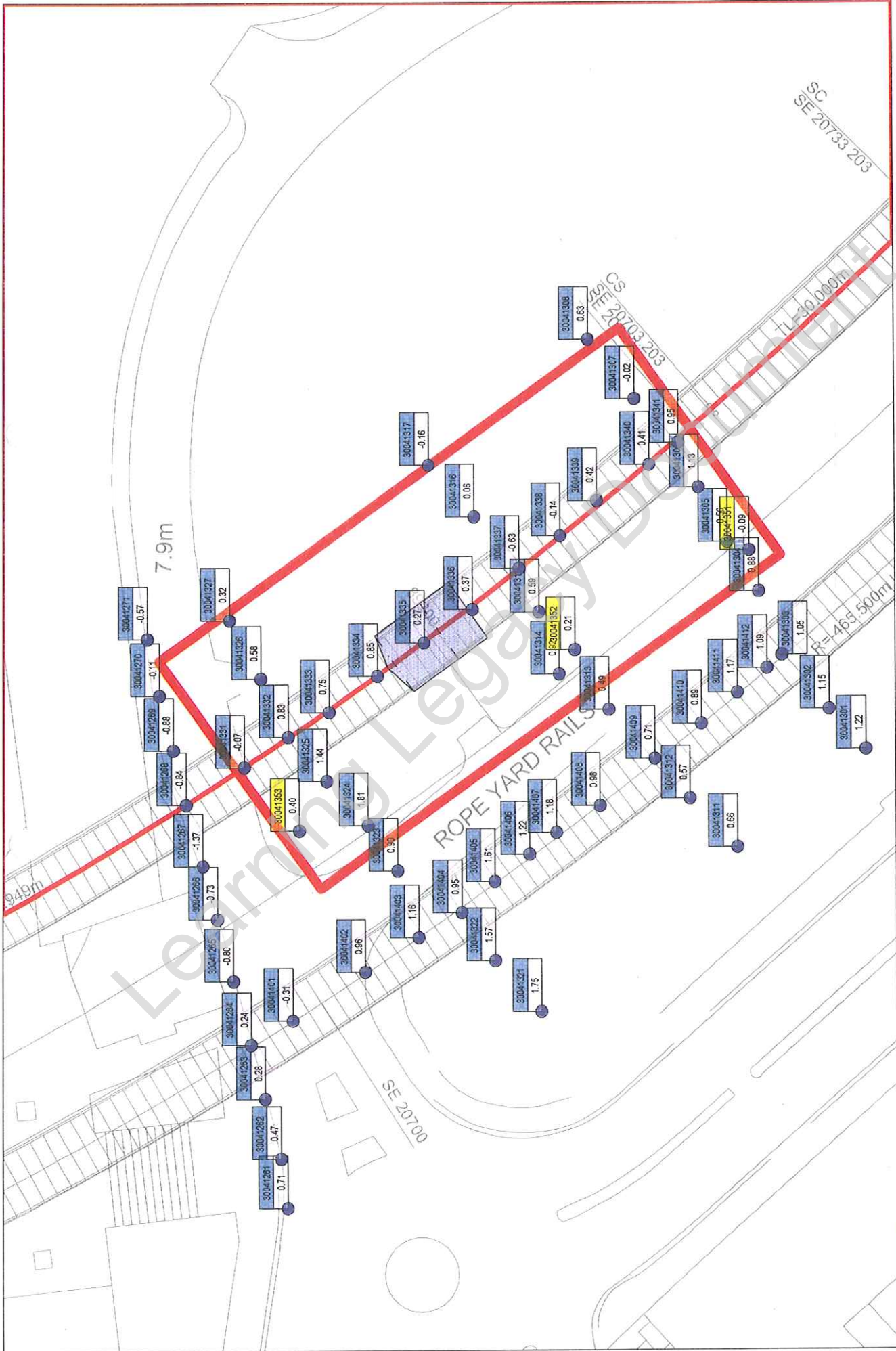


Point: 30041340



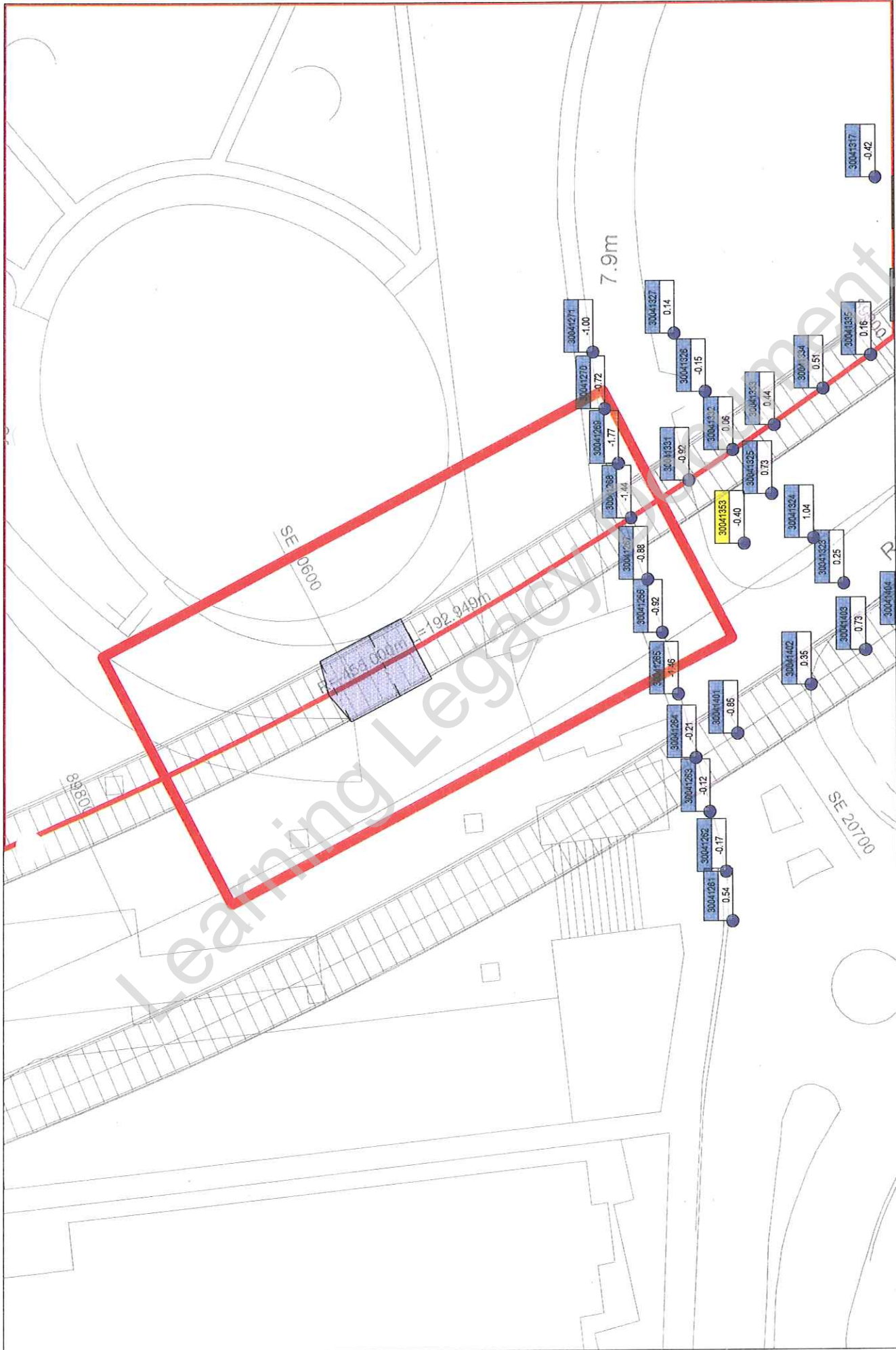
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Warren Lane Carpark EB 26.08.2013 - 08.10.2014
Date: 28.10.2014 08:55 Current Values: 28.10.2014 08:49





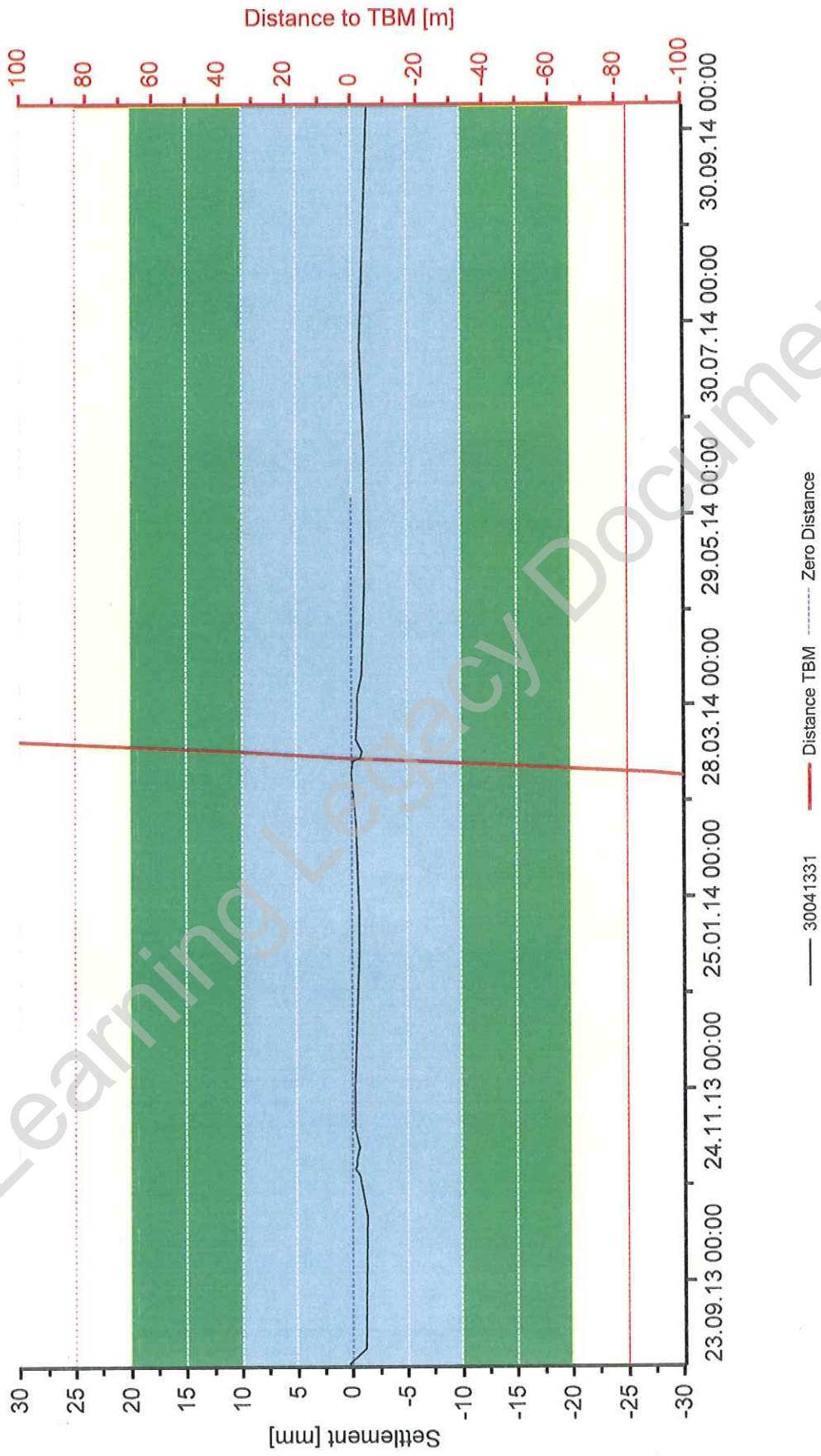
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 10.03.2014 09:00





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 13.03.2014 17:59

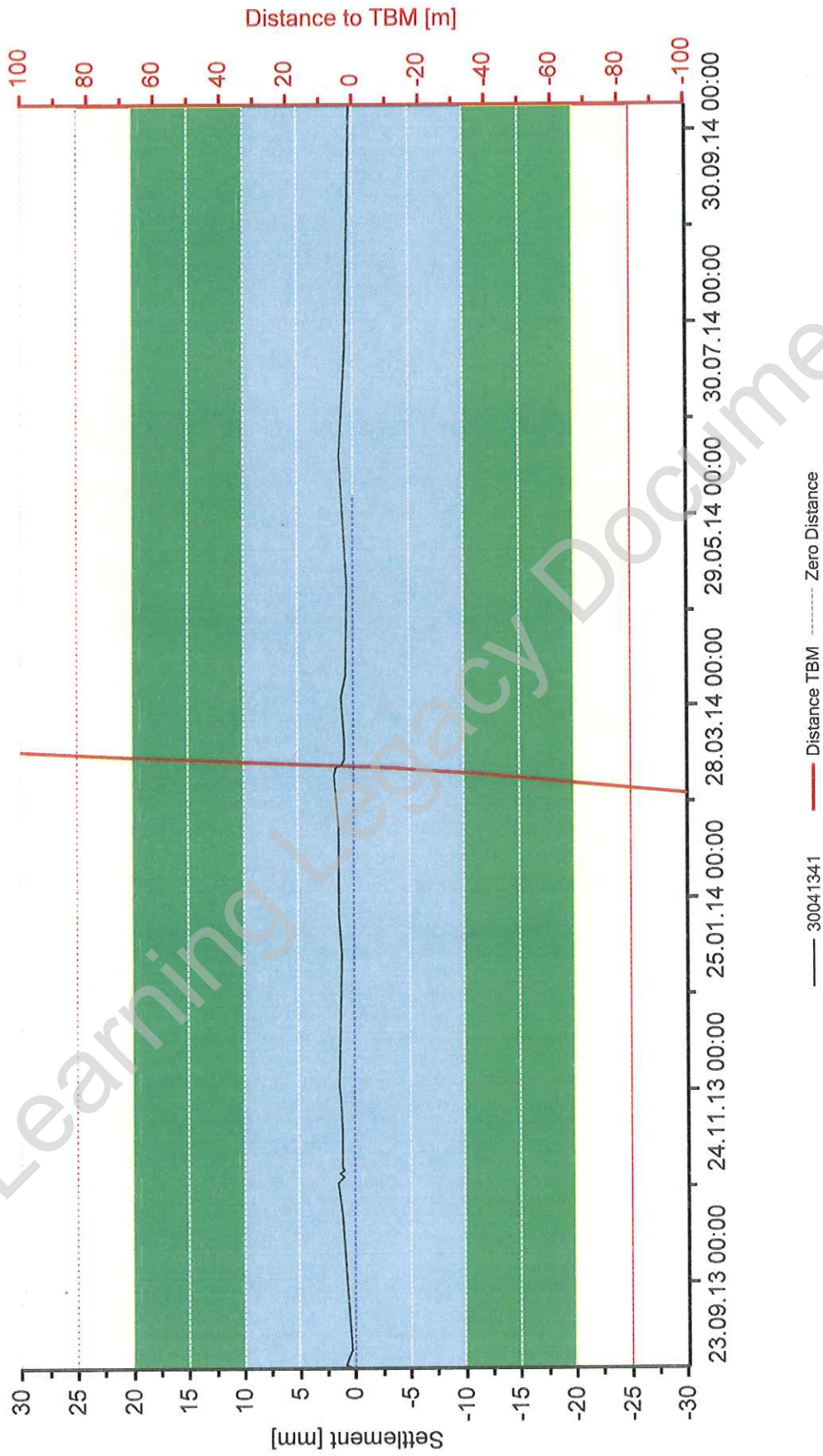
Point: 30041331



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Warren Lane Carpark EB 26.08.2013 - 08.10.2014
date: 22.10.2014 12:32 current values: 22.10.2014 12:28



Point: 30041341



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Warren Lane Carpark EB 26.08.2013 - 08.10.2014
date: 22.10.2014 12:33 current values: 22.10.2014 12:28



monitoring table



Joint Venture

project: **C310 Thames Tunnel**

structure: **WarrenLane CarPark Eastbound**

No. of reading	baseline		13. following		14. following		15. following		16. following		17. following		18. 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
	28/8/13													
3004 1331		108.404	108.404	0	108.404	0	108.404	0	108.404	0	108.404	0	108.404	0
3004 1332		108.698	108.699	0	108.699	0	108.699	0	108.699	0	108.699	0	108.699	0
3004 1333		108.649	108.649	0	108.649	0	108.649	0	108.649	0	108.649	0	108.649	0
3004 1334		108.711	108.712	0	108.712	0	108.711	0	108.712	0	108.712	0	108.712	0
3004 1335		108.755	108.756	0	108.756	0	108.756	0	108.756	0	108.756	0	108.756	-1
3004 1336		108.808	108.808	0	108.808	0	108.808	0	108.808	0	108.808	0	108.808	-1
3004 1337		108.849	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed
3004 1338		108.913	108.913	0	108.913	0	108.913	0	108.913	0	108.913	0	108.913	-1
3004 1339		108.951			108.951	0	108.951	0	108.952	0	108.952	0	108.951	-1
3004 1340		109.047			109.047	0	109.047	0	109.048	0	109.047	0	109.047	0
3004 1341		109.090			109.091	0	109.091	0	109.091	0	109.091	0	109.091	0

monitoring table



Joint Venture

project: **C310 Thames Tunnel**
structure: **WarrenLane CarPark Eastbound**

No. of reading	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
	26/8/13	20/01/2014										09/03/2014
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
3004 1331	108.404		108.404	0	108.404	0						
3004 1332	108.698		108.699	0	108.699	0					108.699	0
3004 1333	108.649		108.649	0	108.650	1					108.650	0
3004 1334	108.711		108.712	0	108.712	1					108.712	0
3004 1335	108.755		108.756	0	108.756	1					108.757	0
3004 1336	108.808		108.808	0	108.809	1					108.809	0
3004 1337	108.849		destroyed	destroyed	destroyed	destroyed					destroyed	
3004 1338	108.913		108.913	0	108.913	0		108.913	0		108.913	0
3004 1339	108.951		108.952	0	108.952	0		108.952	0		108.952	0
3004 1340	109.047		109.048	0	109.048	0		109.048	0		109.047	-1
3004 1341	109.090		109.091	0	109.091	0		109.091	0		109.091	-1


monitoring table



Joint Venture

project: **C310 Thames Tunnel**
 structure: **WarrenLane CarPark Eastbound**

No. of reading	baseline		25. following		26. following		27. following		28. following		29. following		30. 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	
	26/8/13														
3004 1331		108.404	108.404	0	108.404	-1	108.403	0	-1	108.403	0	-1	108.404	0	-1
3004 1332		108.698	108.699	0	108.698	-1	108.698	0	0	108.698	0	0	108.699	0	1
3004 1333		108.649	108.650	0	108.649	0	108.649	0	0	108.649	0	0	108.650	0	1
3004 1334		108.711	108.712	0	108.712	0	108.712	0	1	108.712	0	1	108.712	0	1
3004 1335		108.755	108.756	-1	108.755	0	108.756	0	0	108.756	0	0	108.756	0	0
3004 1336		108.808	108.808	-1	108.808	0	108.808	0	0	108.808	0	0	108.808	0	0
3004 1337		108.849		destroyed		destroyed		destroyed			destroyed			destroyed	
3004 1338		108.913	108.913	-1	108.912	0	108.913	0	0	108.913	0	0	108.913	0	0
3004 1339		108.951	108.951	-1	108.951	0							108.951	0	1
3004 1340		109.047	109.047	0	109.047	0							109.047	0	1
3004 1341		109.090	109.091	0	109.090	0							109.090	0	1

		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDIX 70

Warren lane Car park WB

Learning Legacy Document

monitoring asset	Services underneath Warren Lane Carpark		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70002		
name of monitoring section:	Warren lane Carpark WB Tunnel		
sensor type:	manual levelling studs		
chainage:	89880 - 89930	point no.:	3004 1401 - 3004 1414
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	26/08/13	0.00		
TBM 1	start ZOI	25/10/13	1.66	3004 1412
		28/10/13	-0.59	3004 1401
	end ZOI	29/10/13	0.85	3004 1412
		01/11/13	-0.70	3004 1401
breached not any trigger value				
TBM 2	start ZOI	07/03/14	0.98	3004 1412
		10/03/14	-0.31	3004 1401
	end ZOI	10/03/14	1.09	3004 1412
		13/03/14	-0.85	3004 1401
breached not any trigger value				
longterm	08/10/14	-1.94	3004 1401	

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

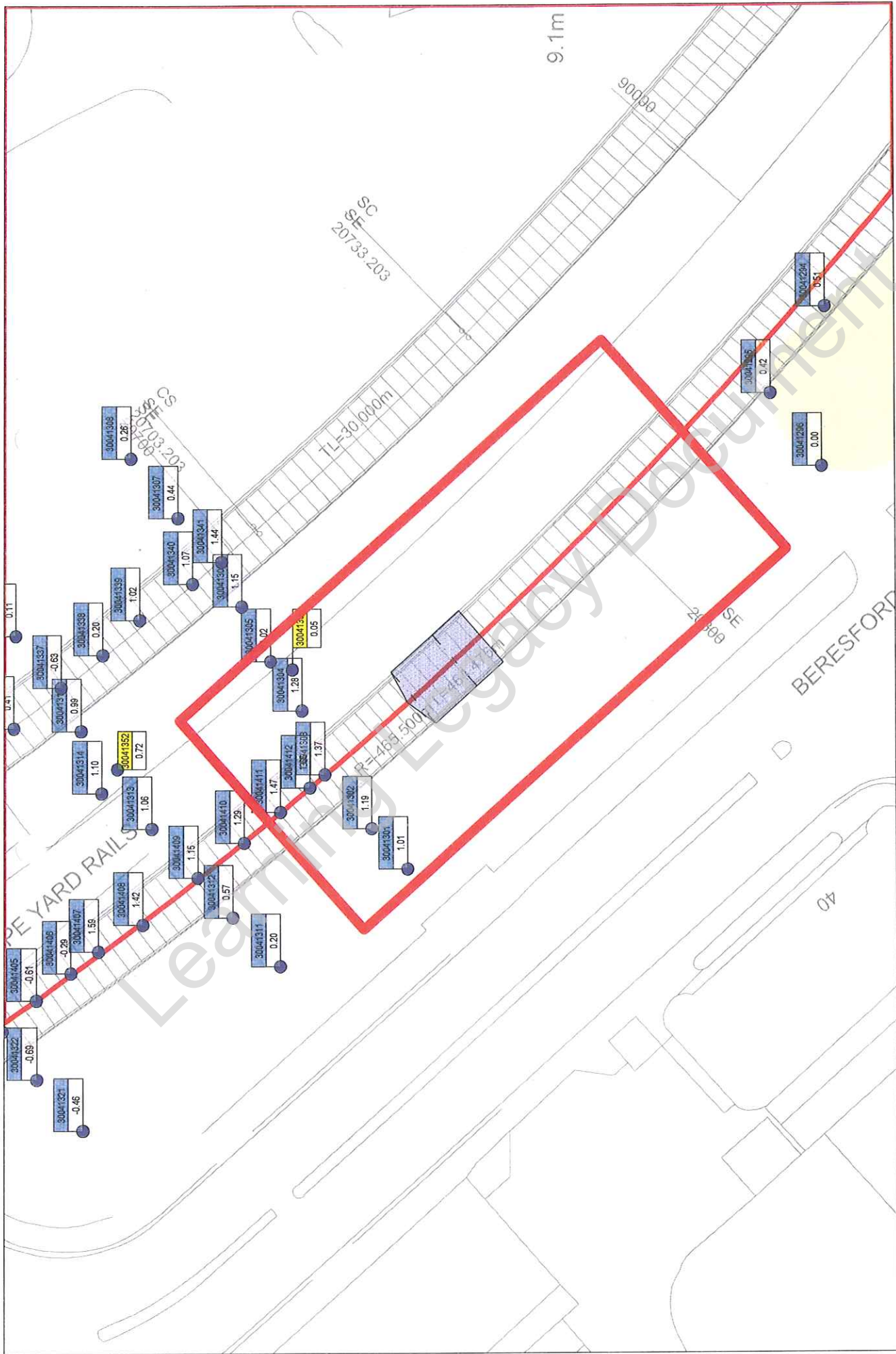
3004 1401 - 3004 1414

Overall, none of the points reached any trigger 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: 09/10/14

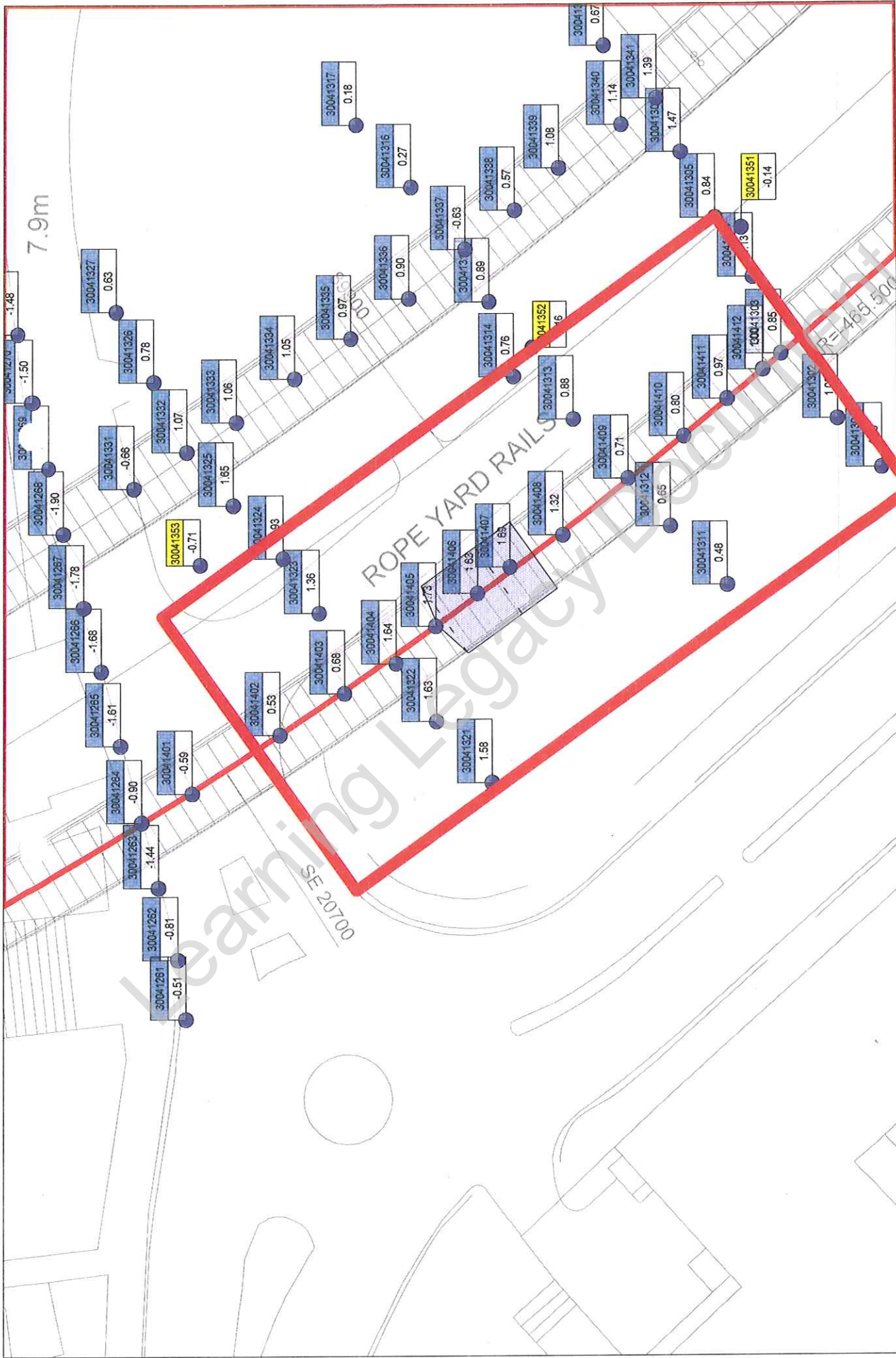
print name: 

HMJV project role: Monitoring & Survey engineer



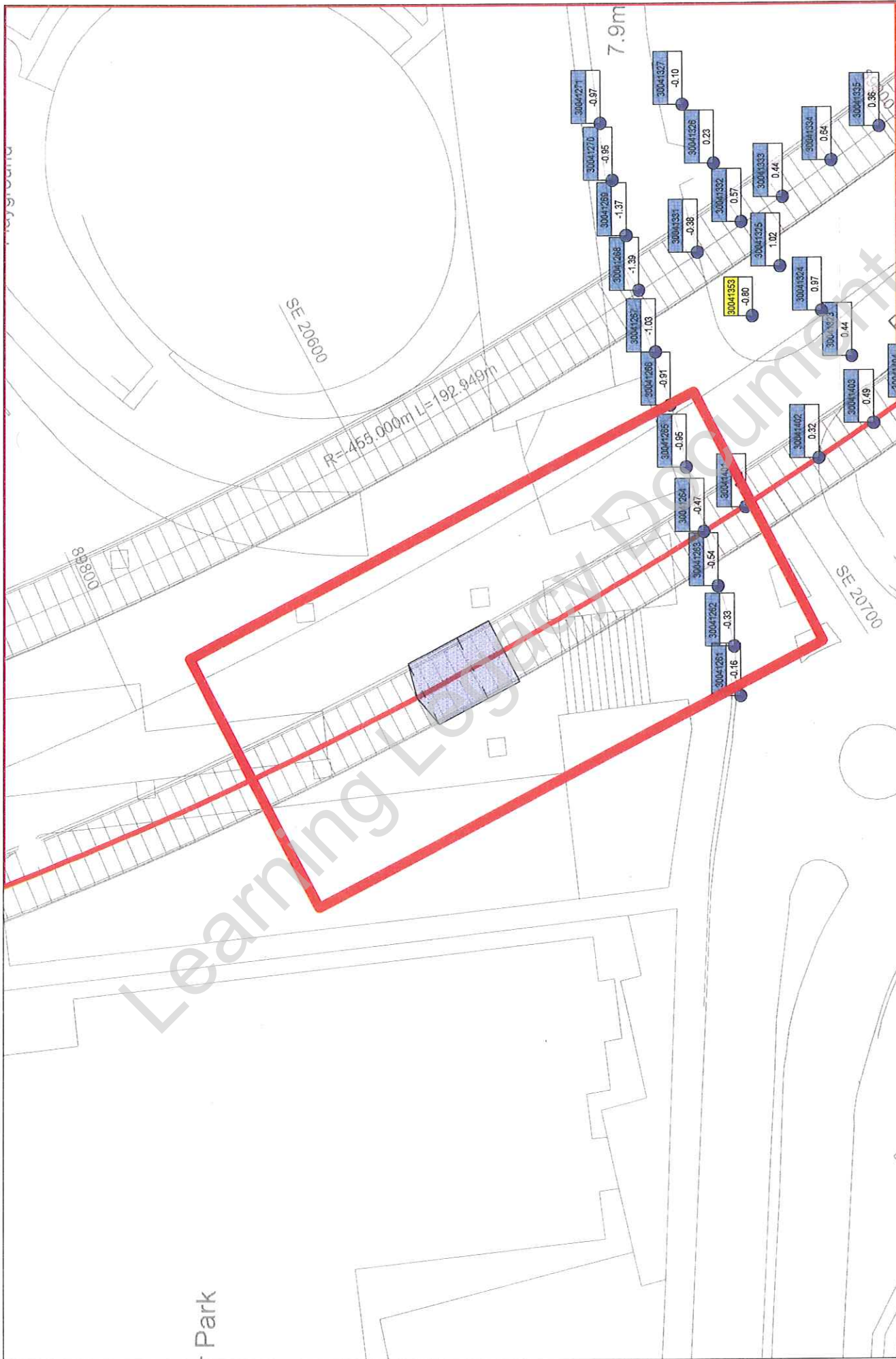
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 25.10.2013 18:42





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 28.10.2013 18:06

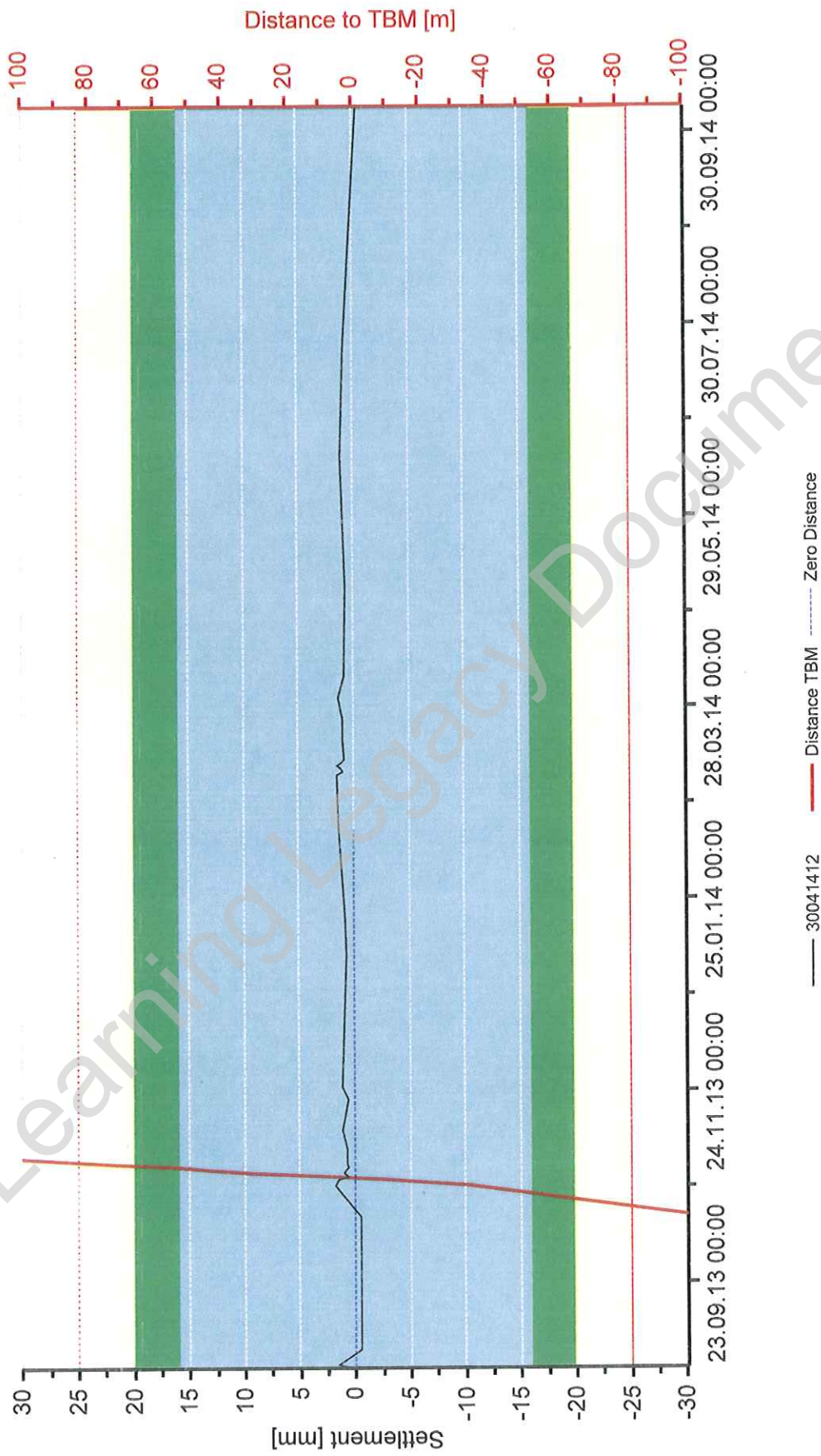




Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 01.11.2013 18:05



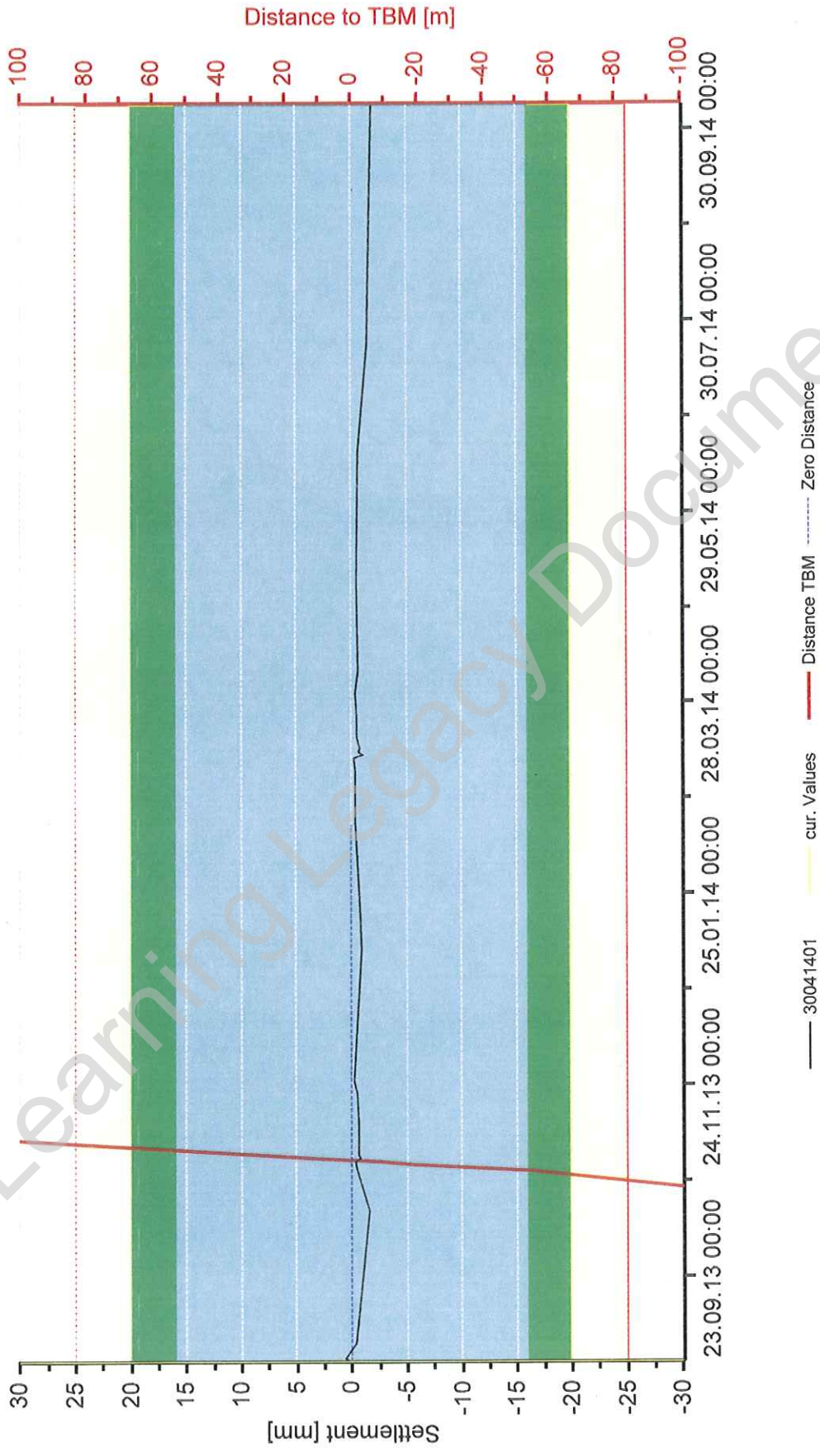
Point: 30041412



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Warren Lane Carpark WB 26.08.2013 - 08.10.2014
Date: 28.10.2014 08:51 Current Values: 28.10.2014 08:34

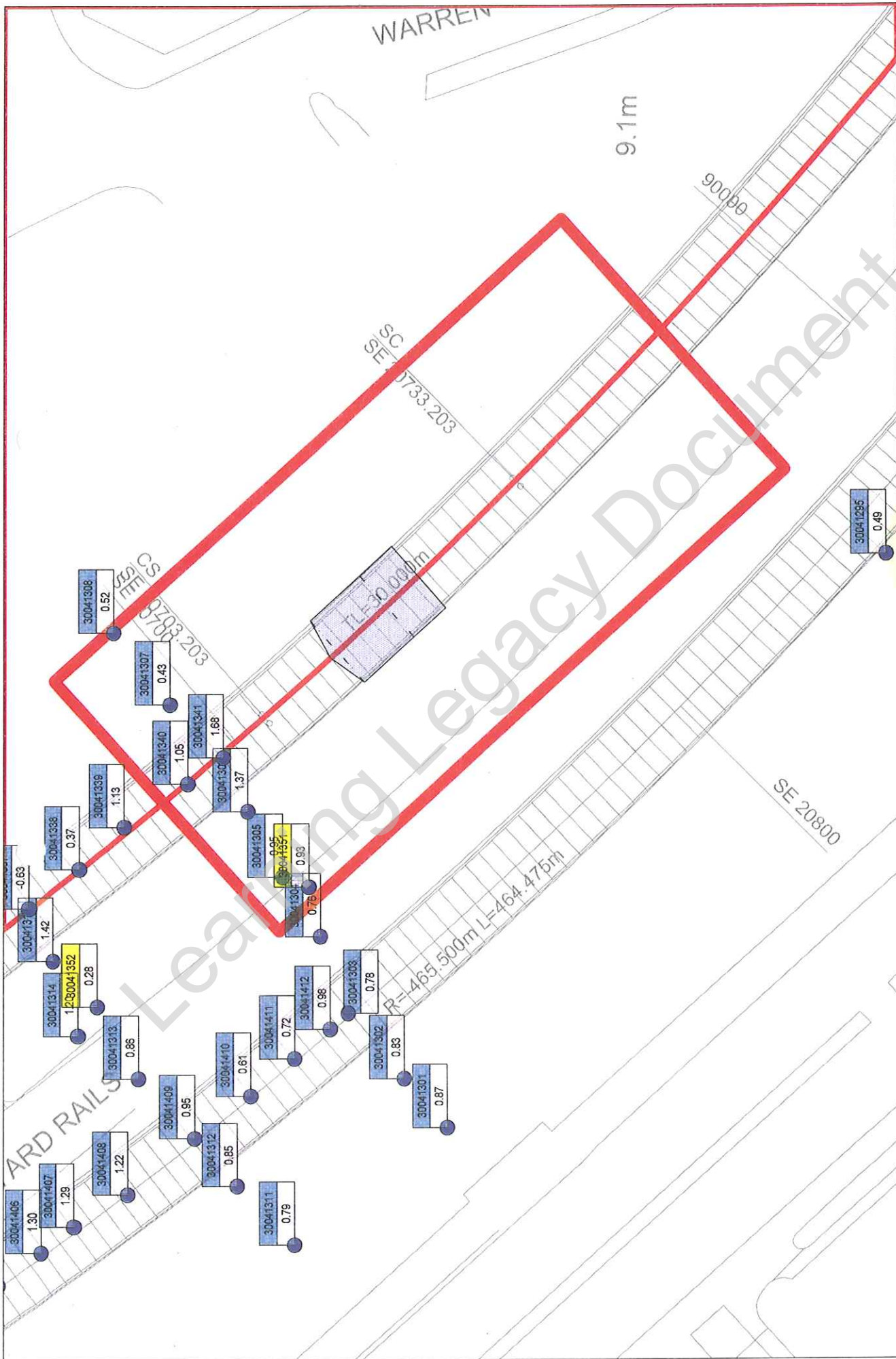


Point: 30041401



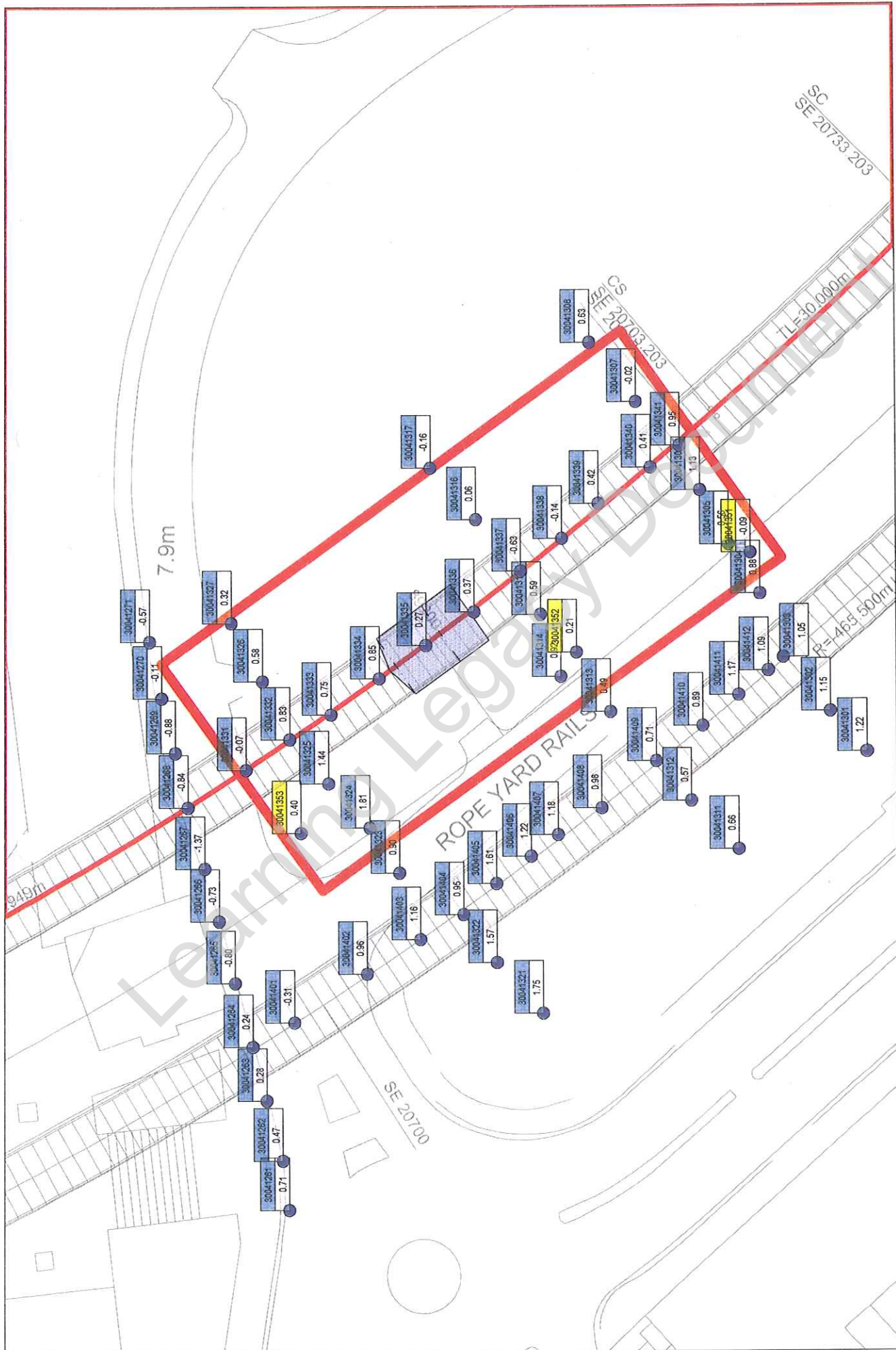
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Warren Lane Carpark WB 26.08.2013 - 08.10.2014
Date: 28.10.2014 08:45 Current Values: 28.10.2014 08:34





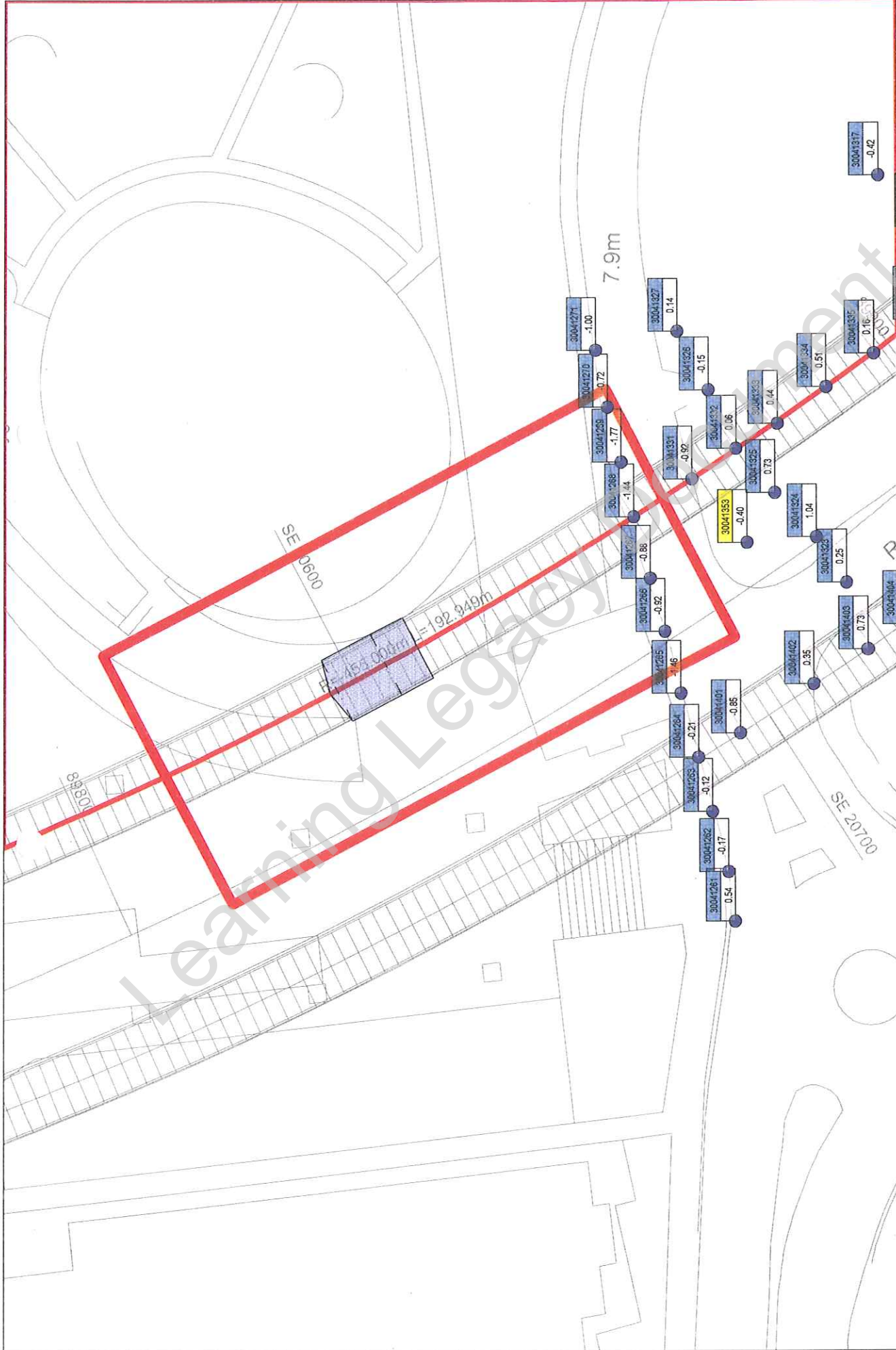
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 09.03.2014 15:59





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 10.03.2014 09:00

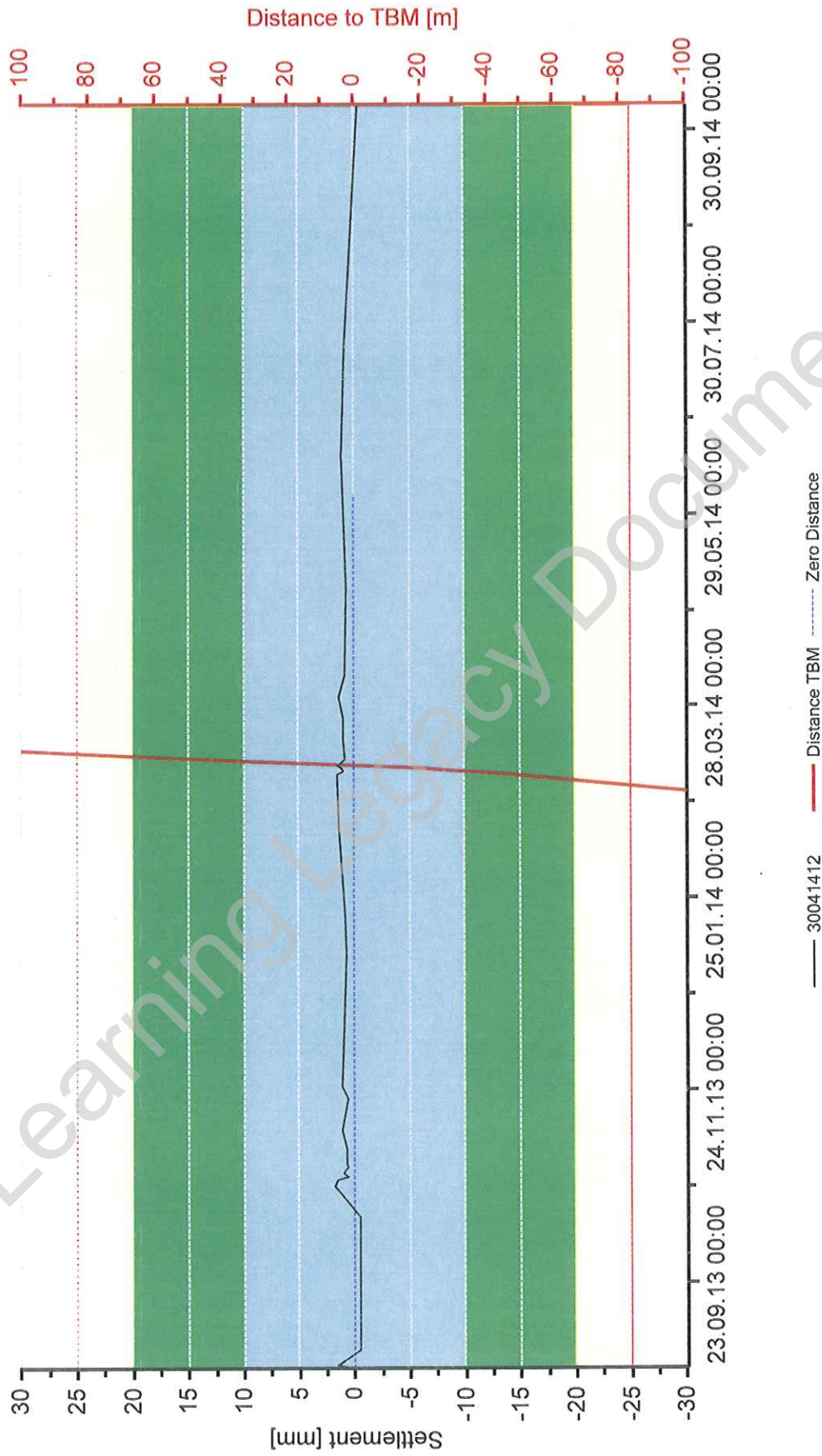




Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 13.03.2014 17:59



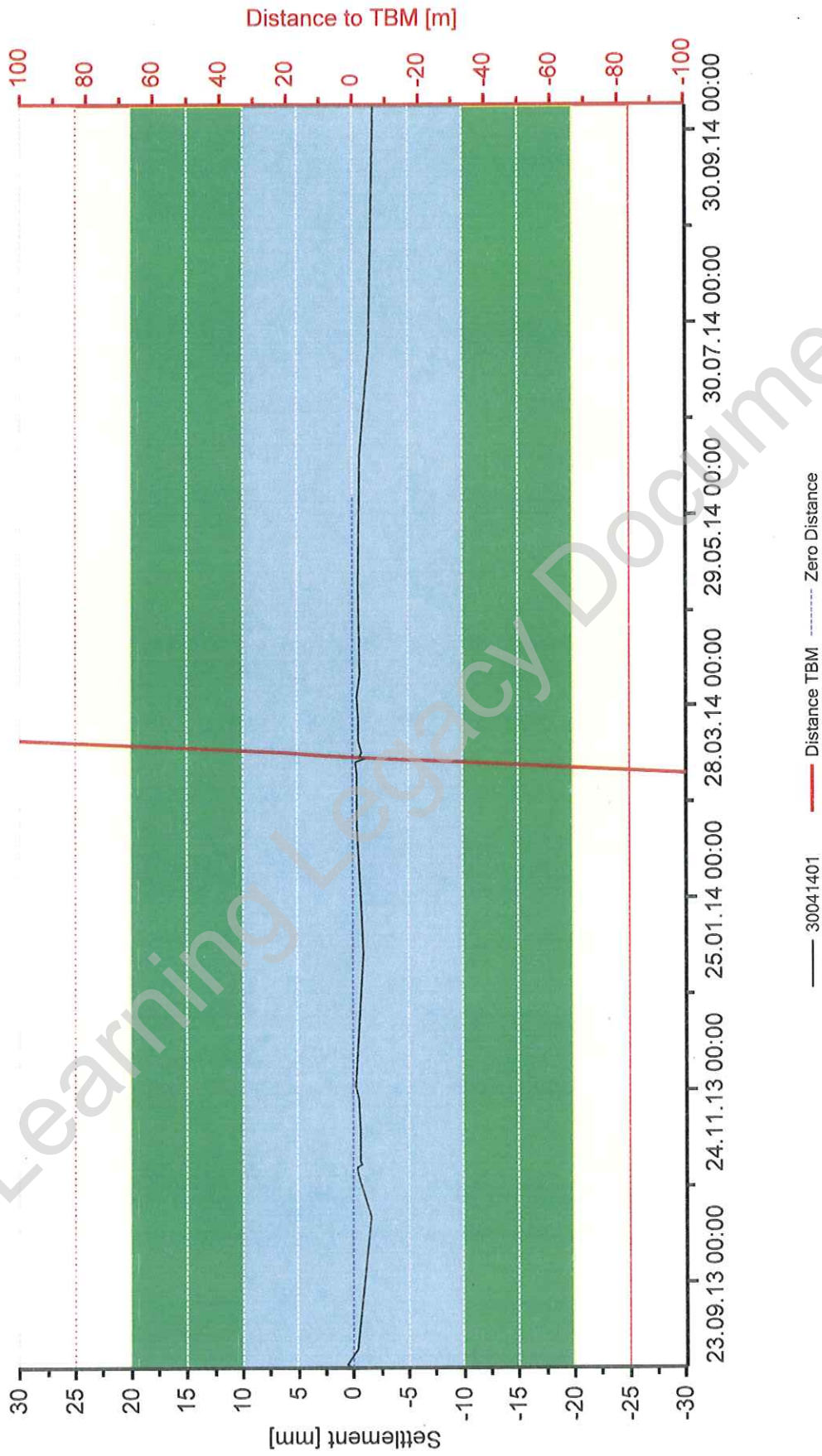
Point: 30041412



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Warren Lane Carpark WB 26.08.2013 - 08.10.2014
date: 22.10.2014 12:40 current values: 22.10.2014 12:28



Point: 30041401



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Warren Lane Carpark WB 26.08.2013 - 08.10.2014
date: 22.10.2014 12:38 current values: 22.10.2014 12:28



monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: WarrenLane CarPark Westbound

No. of reading	7. following		8. following		9. following		10. following		11. following		12. 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	
	26/8/13													
3004 1401		109.250		109.250	1	-1		109.250	0	0		109.250	0	0
3004 1402		109.298	2	109.298	0	1		109.299	1	1		109.298	0	0
3004 1403		109.446	2	109.447	0	1		109.447	0	1		109.447	0	1
3004 1404		109.355	2	109.356	0	1	109.356	1	2	0	1	109.356	0	1
3004 1405		109.250	2	109.251	0	1	109.252	1	2	0	1	109.251	0	1
3004 1406		109.322	2	109.324	0	1	109.324	1	2	0	1	109.323	0	1
3004 1407		109.145	1	109.147	1	2	109.146	1	2	0	1	109.145	0	1
3004 1408		109.140	1	109.143	1	3	109.142	0	1	0	1	109.141	0	1
3004 1409		109.236	0	109.237	0	1	109.237	0	1	0	1	109.237	0	0
3004 1410		109.248	0	109.249	0	1	109.249	0	1	0	1	109.248	0	0
3004 1411		109.277	0	109.278	0	1	109.277	0	1	0	1	109.277	0	1
3004 1412		109.305	0	109.307	0	2	109.306	0	1	0	1	109.306	0	1

monitoring table



Joint Venture

project: **C310 Thames Tunnel**
structure: **WarrenLane CarPark Westbound**

No. of reading	baseline	25. following		26. following		27. following		28. following		29. following		30. 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
	26/8/13													
3004 1401	109.250		109.250	0	0	109.249	-1	-1	109.249	0	-1	109.250	0	-1
3004 1402	109.298		109.299	0	1	109.298	-1	0	109.298	0	1	109.298	0	0
3004 1403	109.446		109.447	0	1	109.446	-1	0	109.447	0	1	109.447	0	1
3004 1404	109.355		109.356	0	1	109.355	0	0	109.356	0	1	109.356	0	1
3004 1405	109.250		109.251	0	1	109.251	-1	1	109.251	0	1	109.251	0	1
3004 1406	109.322		109.323	0	1	109.323	-1	1	109.323	0	1	109.323	0	1
3004 1407	109.145		109.146	0	1	109.145	-1	1	109.146	0	1	109.146	0	1
3004 1408	109.140		109.141	0	1	109.141	0	1	109.141	0	1	109.141	0	1
3004 1409	109.236		109.237	0	1	109.237	0	0				109.237	0	0
3004 1410	109.248		109.249	0	1	109.248	0	1				109.248	0	0
3004 1411	109.277		109.278	0	1	109.277	0	1				109.277	0	1
3004 1412	109.305		109.307	0	2	109.306	0	1				109.306	0	1

monitoring table



Joint Venture

project: **C310 Thames Tunnel**
structure: **WarrenLane CarPark Westbound**

No. of reading	baseline		31. following		32. following		33. following		34. following		35. following		36. 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
	26/8/13													
3004 1401		109.250	109.250	0	109.250	0	109.249	0	109.250	0	109.250	0	109.249	-1
3004 1402		109.298	109.298	0	109.299	0	109.298	-1	109.298	1	109.299	0	109.298	0
3004 1403		109.446	109.447	0	109.447	0	109.446	-1	109.447	0	109.447	0	109.447	-1
3004 1404		109.355	109.356	0	109.356	0	109.355	-1	109.356	0	109.356	0	109.355	-1
3004 1405		109.250	109.251	0	109.251	0	109.251	-1	109.251	0	109.251	0	109.251	0
3004 1406		109.322	109.323	0	109.323	0	109.323	-1	109.323	0	109.324	0	109.323	-1
3004 1407		109.145	109.145	0	109.146	0	109.145	0	109.146	0	109.146	0	109.146	0
3004 1408		109.140	109.141	0	109.141	1	109.141	-1	109.141	0	109.141	1	109.141	0
3004 1409		109.236	109.237	0	109.237	0	109.237	0	109.236	0	109.237	0	109.237	0
3004 1410		109.248	109.248	0	109.249	0	109.248	0	109.248	0	109.248	0	109.248	0
3004 1411		109.277	109.277	0	109.278	0	109.277	-1	109.277	0	109.277	0	109.277	0
3004 1412		109.305	109.306	0	109.307	0	109.306	0	109.306	0	109.307	0	109.306	0

monitoring table




Joint Venture

project: C310 Thames Tunnel

structure: WarrenLane CarPark Westbound

No. of reading	baseline	37. 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
		date	08/10/2014										
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 1401	109.250	109.248	0	-2									
3004 1402	109.298	109.298	-1	0									
3004 1403	109.446	109.446	-1	0									
3004 1404	109.355	109.355	0	0									
3004 1405	109.250	109.250	-1	0									
3004 1406	109.322	109.322	-1	0									
3004 1407	109.145	109.145	-1	0									
3004 1408	109.140	109.140	-1	0									
3004 1409	109.236	109.236	-1	0									
3004 1410	109.248	109.247	-1	-1									
3004 1411	109.277	109.277	0	0									
3004 1412	109.305	109.305	-1	0									

		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDIX 71

Extensometer Warren lane Car park

Learning Legacy Document

monitoring asset	Services underneath Warren Lane Carpark		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70002		
name of monitoring section:	Warren lane Carpark Shallow datum		
sensor type:	manual levelling studs		
chainage:	89880 - 89930	point no.:	3004 1351 - 3004 1353
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	23/09/13	0.00		
TBM 1	start ZOI	07/03/13	0.34	3004 1351
		07/03/13	0.19	3004 1352
		10/03/13	-0.71	3004 1353
	end ZOI	10/03/13	-0.14	3004 1351
		10/03/13	-0.24	3004 1352
		13/03/13	-0.80	3004 1353
TBM 2	start ZOI	07/03/13	0.36	3004 1351
		07/03/13	0.28	3004 1352
		10/03/13	0.40	3004 1353
	end ZOI	10/03/13	-0.09	3004 1351
		10/03/13	0.21	3004 1352
		13/03/13	-0.40	3004 1353
longterm	08/10/14	-0.58	3004 1351	
		0.73	3004 1353	

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 1351 - 3004 1353

Overall, none of the points reached any trigger 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.

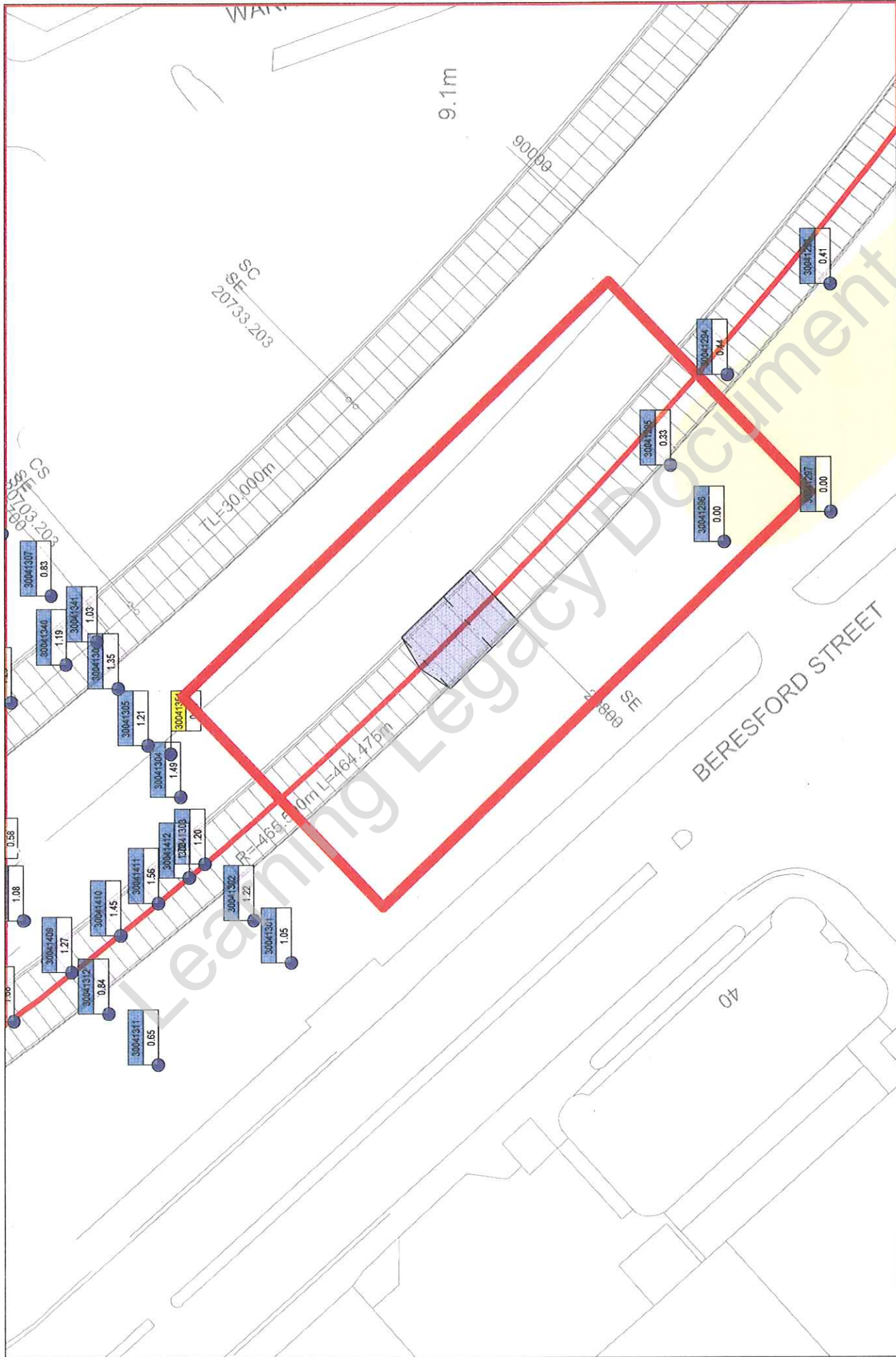
The rate of change in the monitoring data is less than the required standards as per the specifications and drawings.

Monitoring data shows that shallow datum movements behaved similar to those on the surface.

date / signature: 22/01/2015 

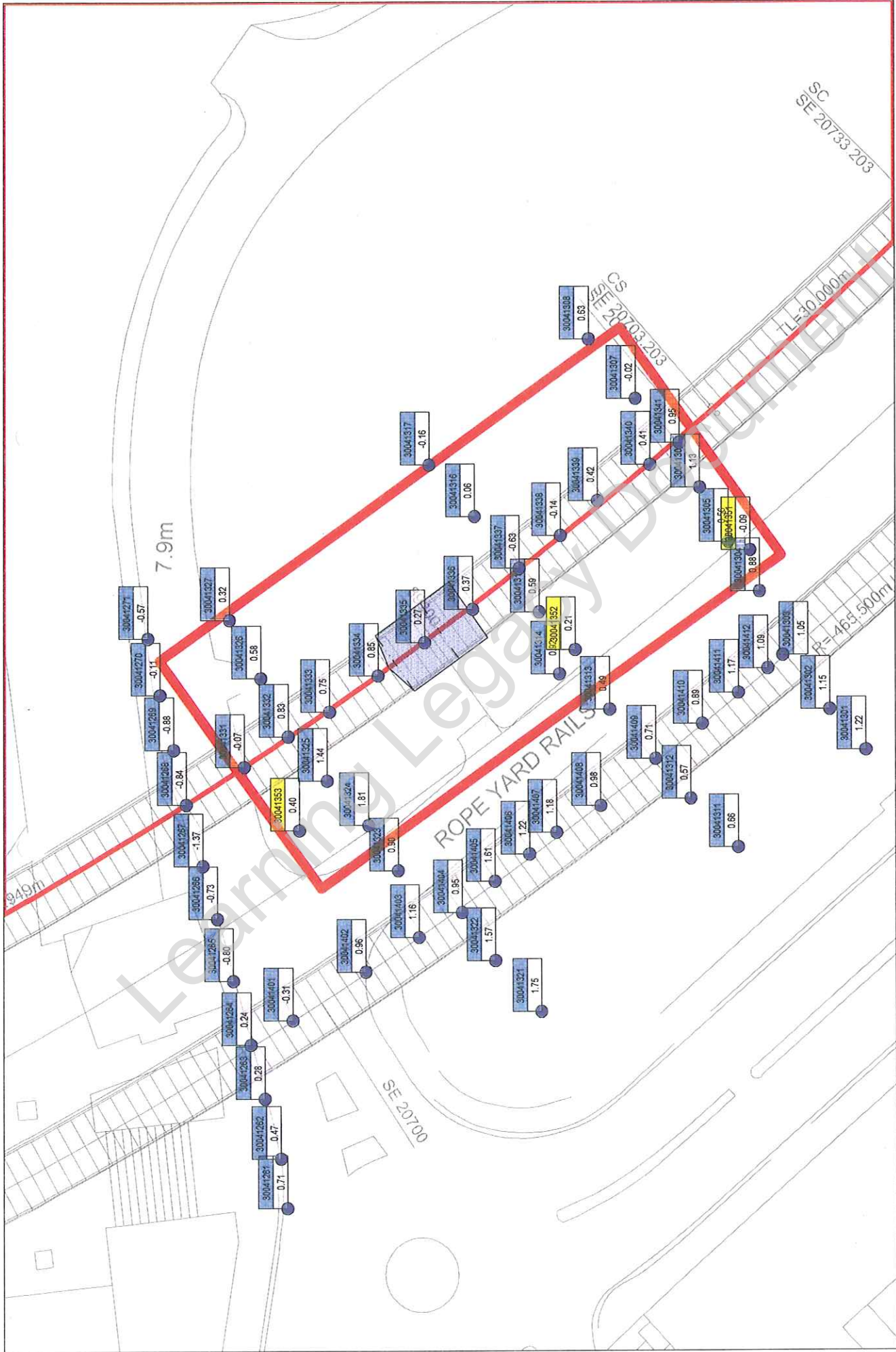
print name: 

HMJV project role: Monitoring & Survey engineer

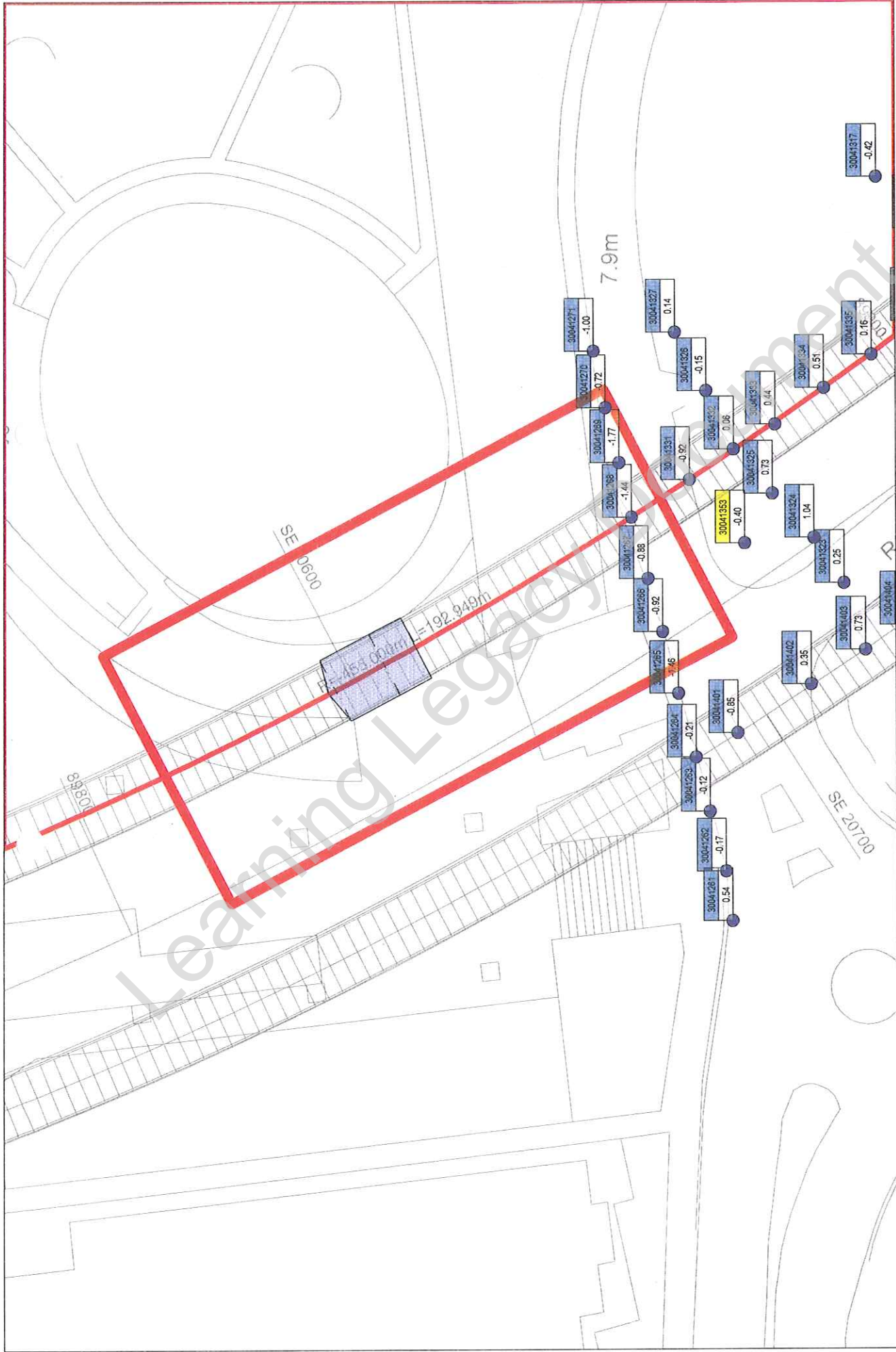


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 24.10.2013 09:00





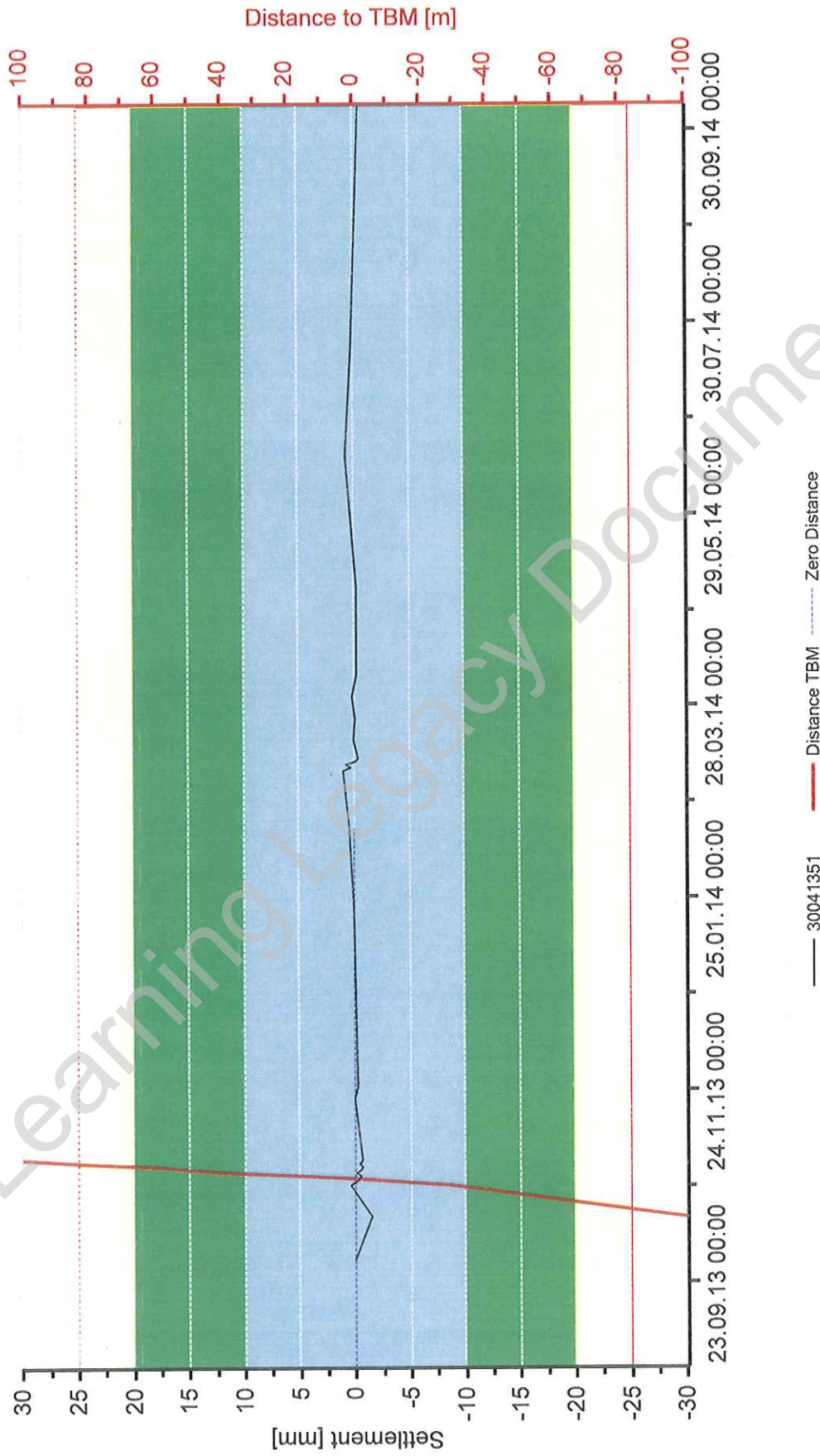
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 10.03.2014 09:00



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 13.03.2014 17:59



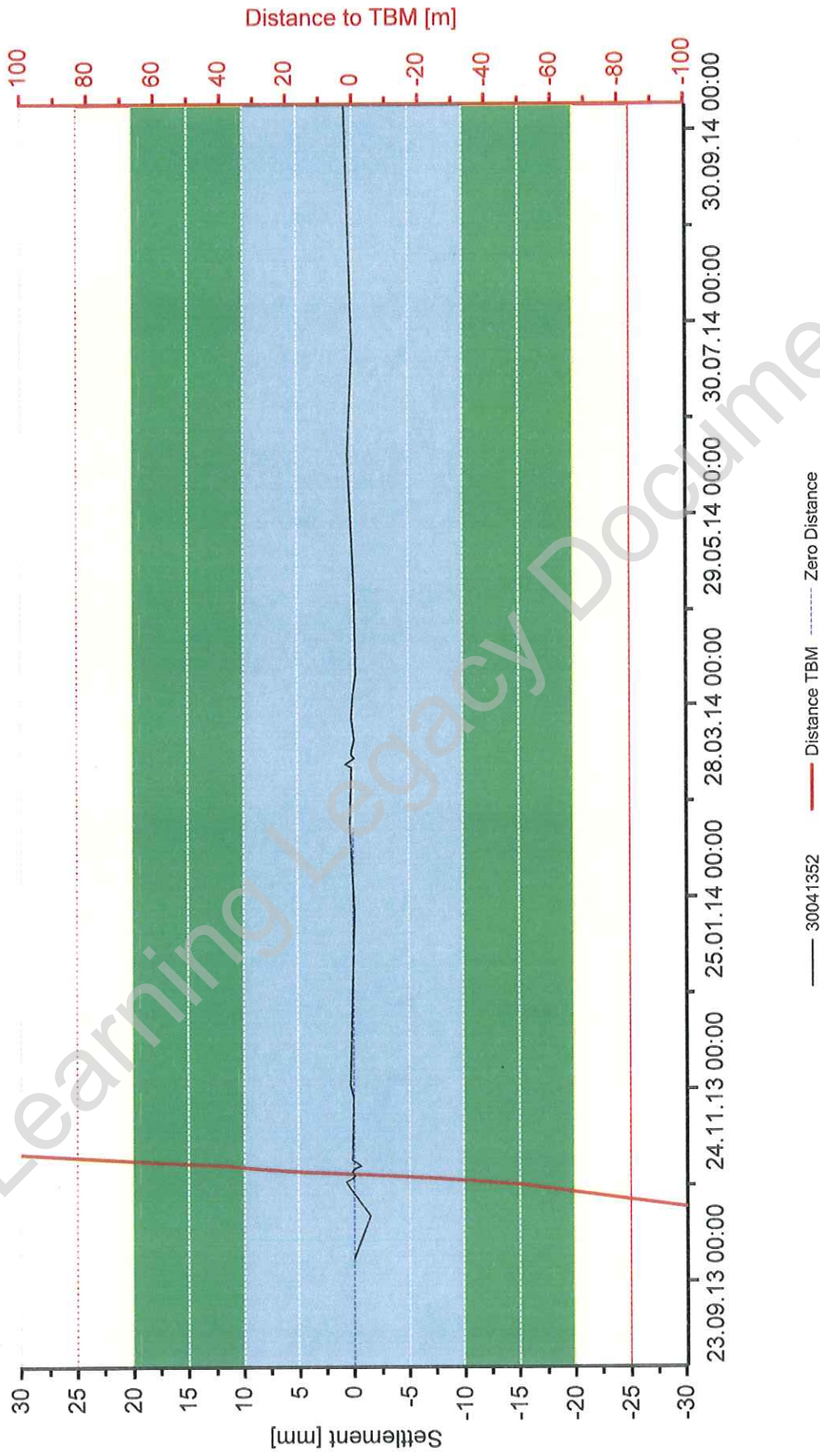
Point: 30041351



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Shallow Datum Warren Lane Carpark 23.09.2013 - 08.10.2014
Date: 23.10.2014 18:05 Current Values: 23.10.2014 17:49



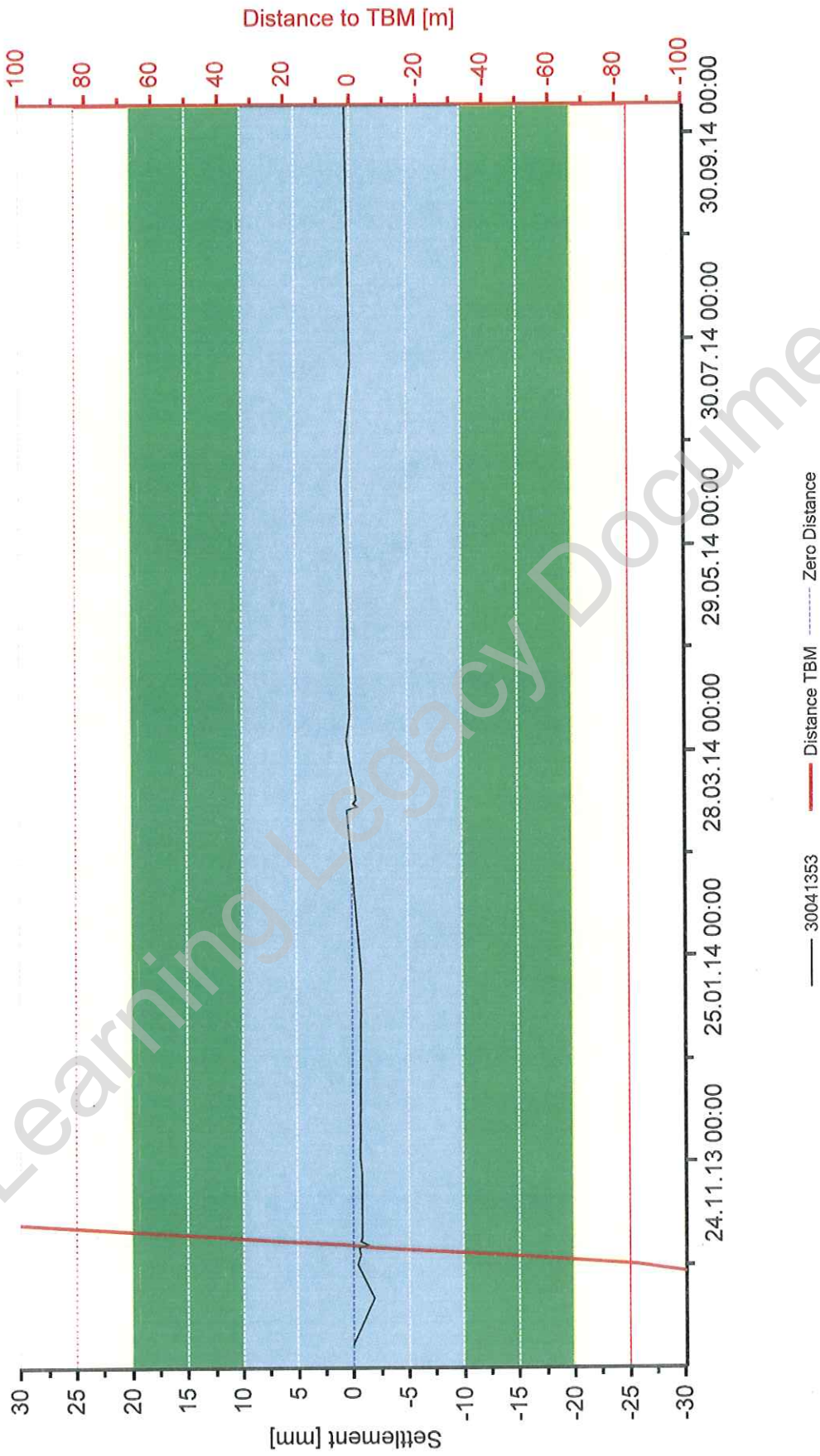
Point: 30041352



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Shallow Datum Warren Lane Carpark 23.09.2013 - 08.10.2014
Date: 23.10.2014 18:07 Current Values: 23.10.2014 17:49

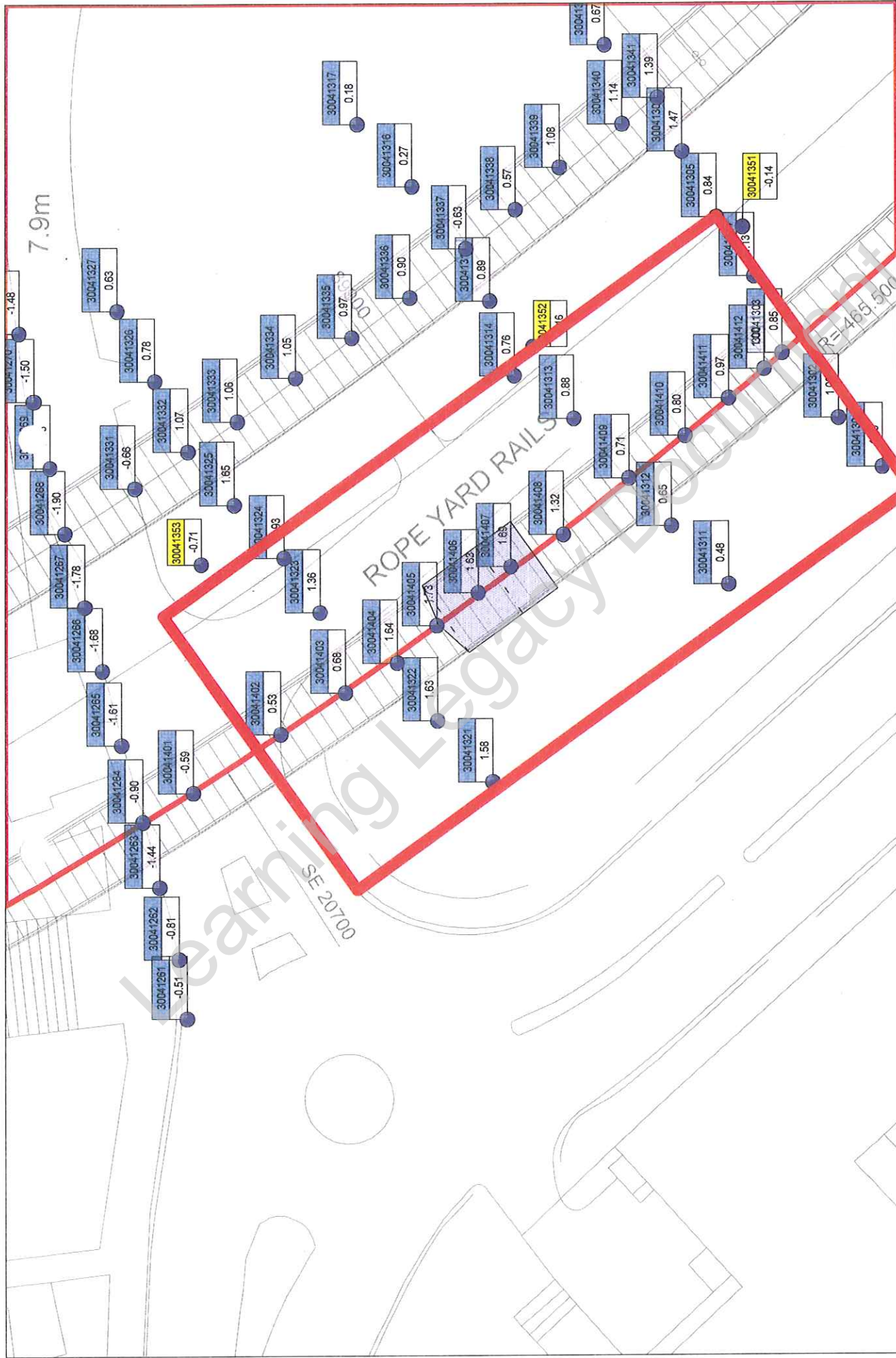


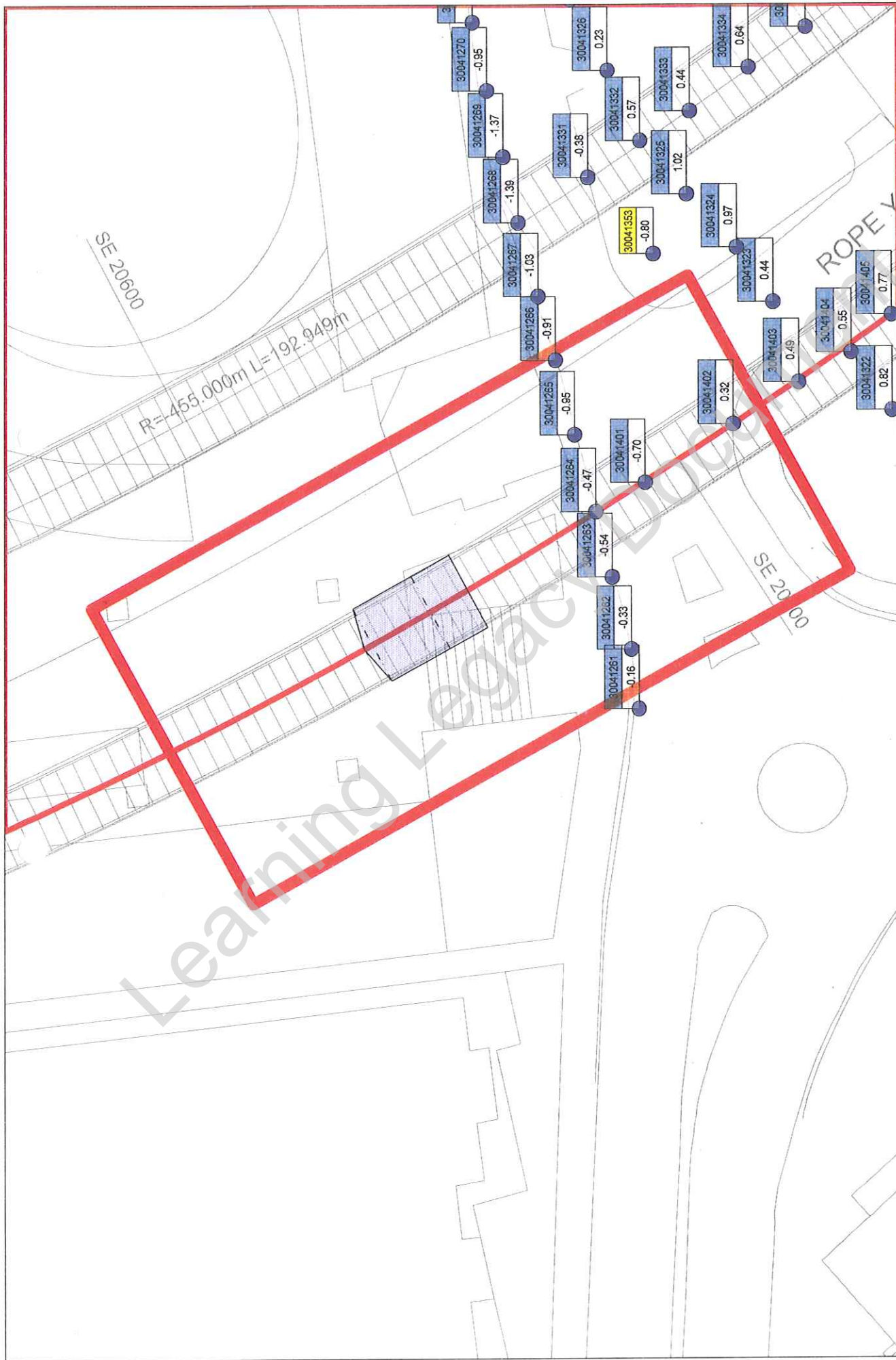
Point: 30041353



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - Shallow Datum Warren Lane Carpark 23.09.2013 - 08.10.2014
Date: 23.10.2014 18:09 Current Values: 23.10.2014 18:04



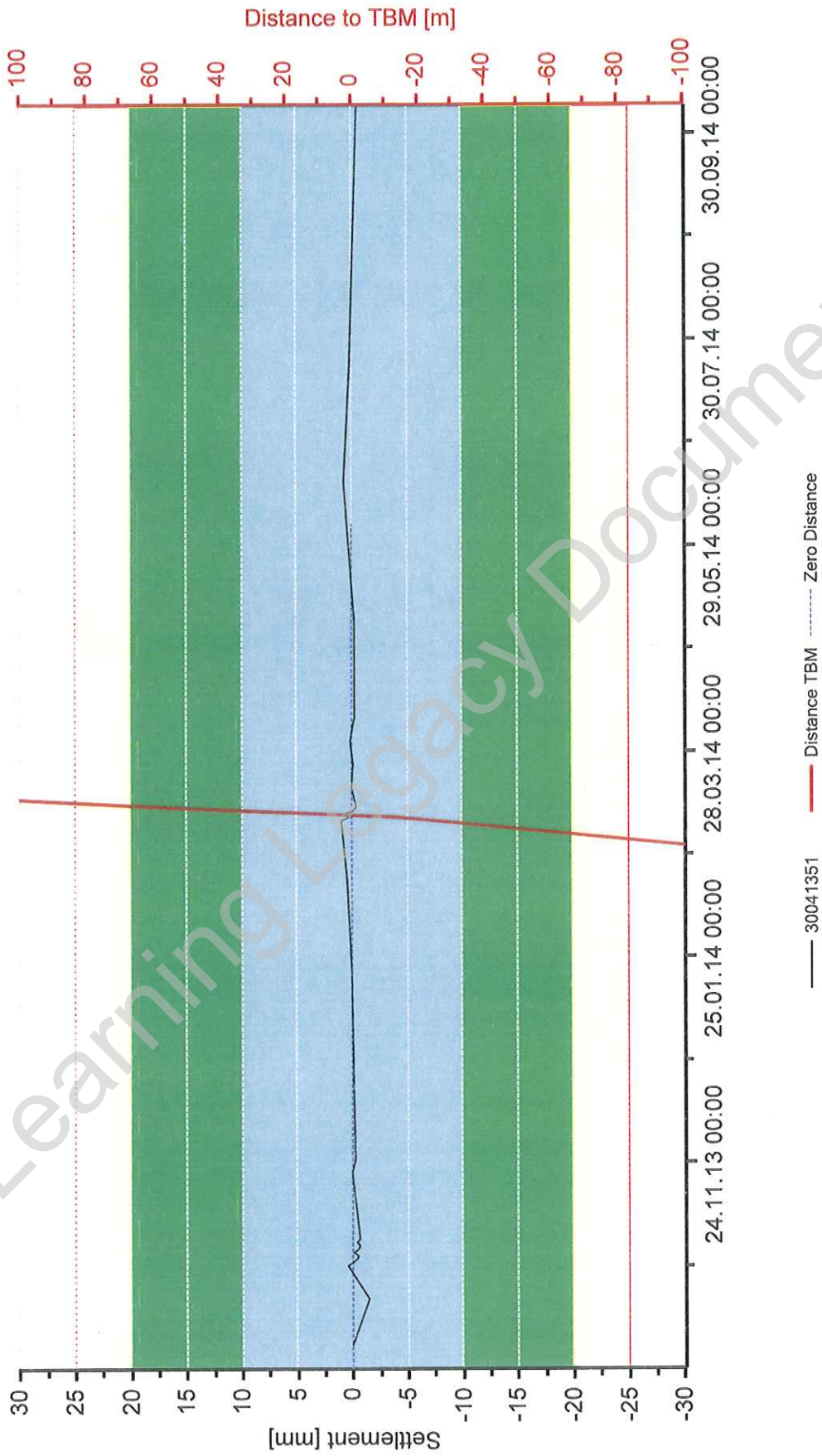




Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 01.11.2013 09:00



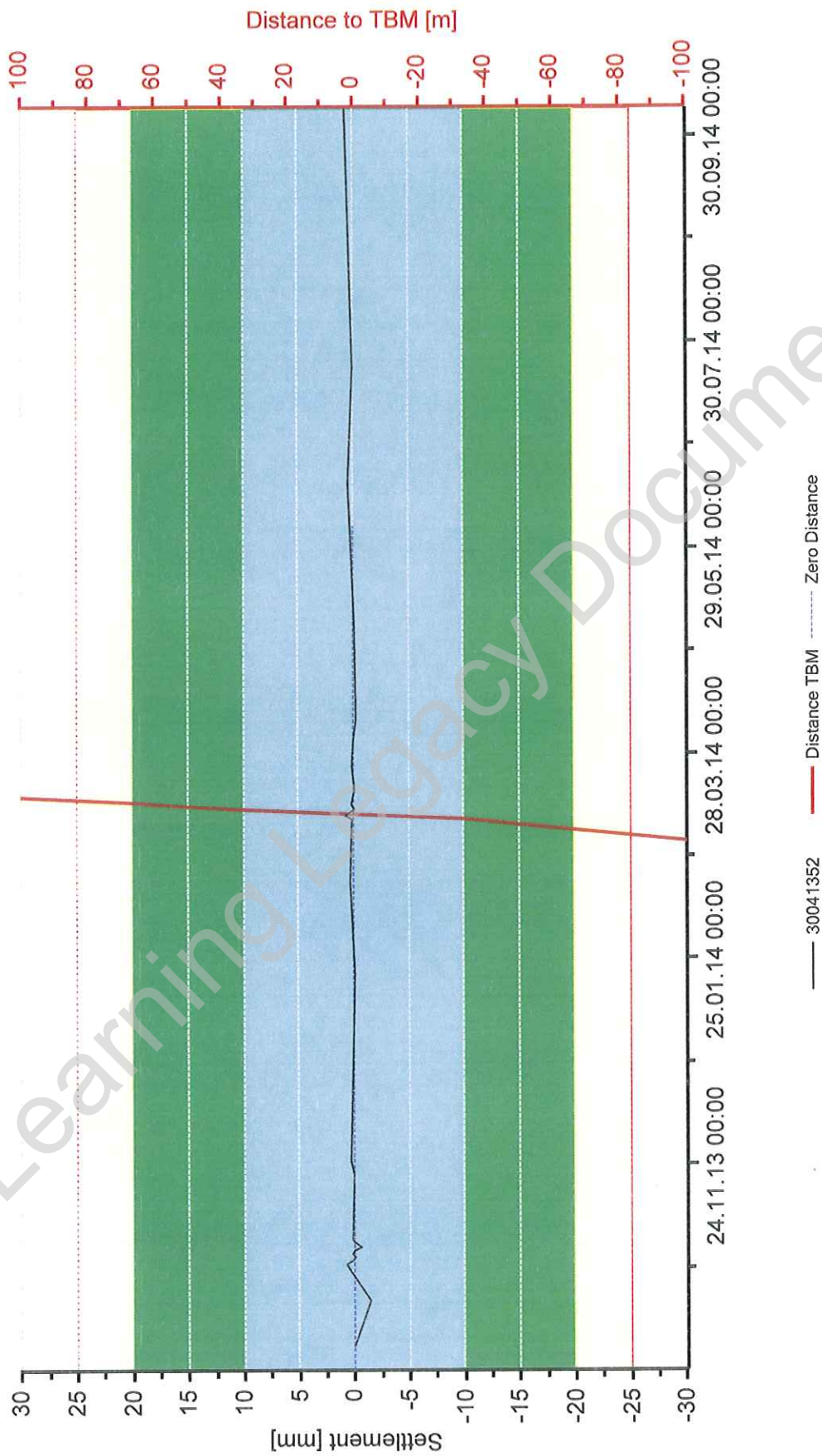
Point: 30041351



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Shallow Datum Warren Lane Carpark 23.09.2013 - 08.10.2014
date: 22.10.2014 12:23 current values: 22.10.2014 12:13



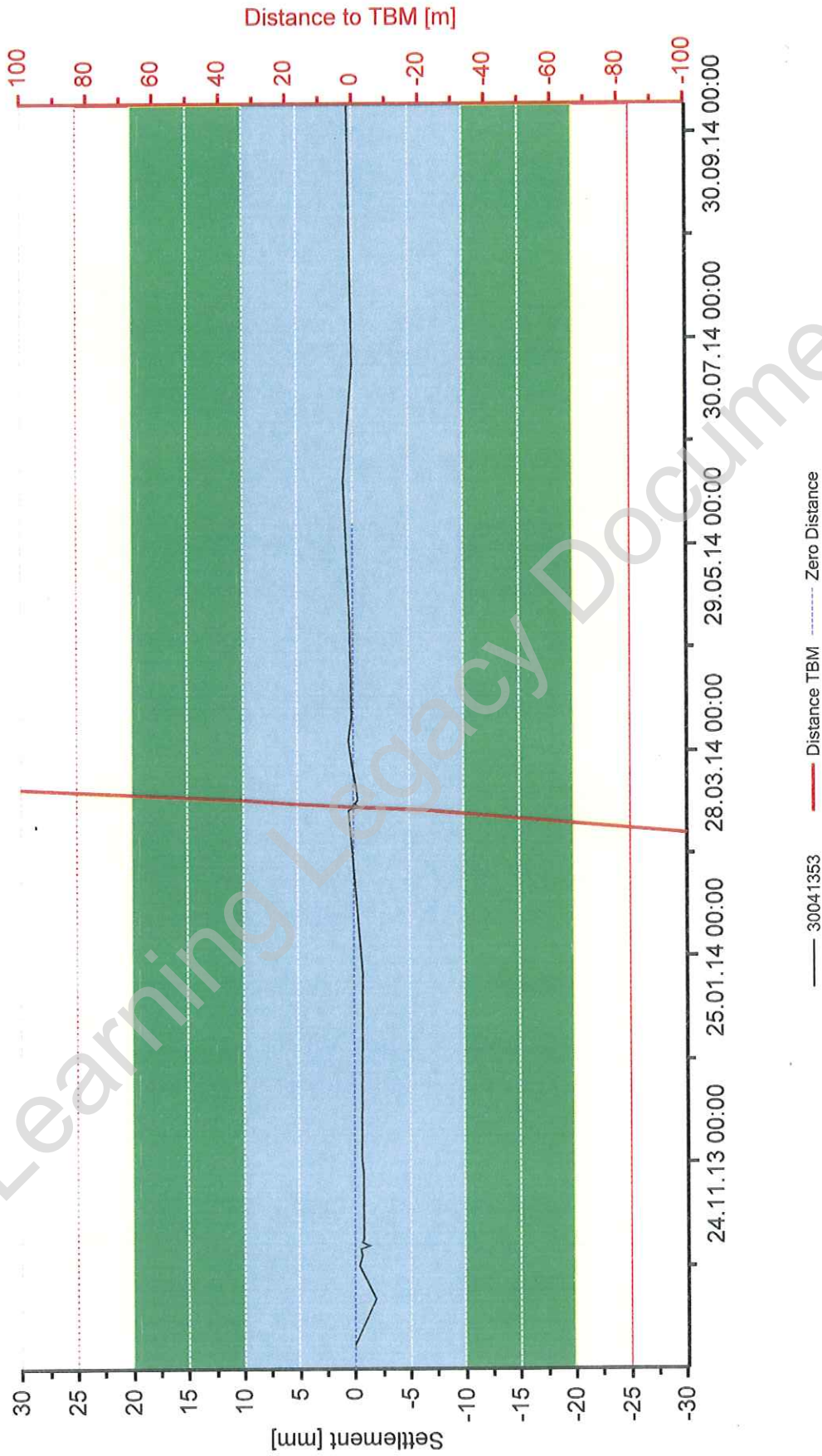
Point: 30041352



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Shallow Datum Warren Lane Carpark 23.09.2013 - 08.10.2014
date: 22.10.2014 12:26 current values: 22.10.2014 12:13



Point: 30041353



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - Shallow Datum Warren Lane Carpark 23.09.2013 - 08.10.2014
date: 22.10.2014 12:25 current values: 22.10.2014 12:13



monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Warrenlane Shallow Datums

No. of reading	baseline		13. following		14. following		15. following		16. following		17. following		18. 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
	23/9/13													
			05/11/2013		11/11/2013		21/11/2013		25/11/2013		07/01/2014		20/01/2014	
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	elevation
3004 1351	102.688	102.688	0	-1		102.688	0	0	102.688	0	0	102.688	0	0
3004 1352	102.437	102.436	0	0		102.436	0	0	102.436	0	0	102.436	0	-1
3004 1353	102.040	102.040	0	0		102.040	0	-1	102.040	0	0	102.039	0	-1

Learning Legacy Document

monitoring table




Joint Venture

project: **C310 Thames Tunnel**

structure: Warrenlane Shallow Datums																									
No. of reading	baseline	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											
	23/9/13	17/02/2014	102.688	0	0	06/03/2014	102.690	1	1	07/03/2014	102.689	-1	1	08/03/2014	102.689	-1	0	09/03/2014	102.689	0	1	10/03/2014	102.688	-1	0
3004 1351	102.688		102.689	0	0		102.690	1	1		102.689	-1	1		102.689	-1	0		102.689	0	1		102.688	-1	0
3004 1352	102.437		102.437	0	0		102.437	0	0		102.437	0	0		102.437	0	0		102.437	1	0		102.436	0	0
3004 1353	102.040		102.040	1	0		102.041	1	1		102.041	1	1		102.041	1	1		102.041	1	0		102.041	0	1

Learning Legacy Document

 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50023	Rev	2.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works Plumstead Portal – Woolwich Station Box – South of River Thames				

APPENDIX 120

Overview of rate of change for monitoring of TW assets South of River Thames

Learning Legacy Document

Overview of rate of change for monitoring of TW assets													
Appendix	Name of Cross section	chainage	point no.	End ZOI TBM 2		longterm			deviation during monitoring [mm]	calculated rate of change for 12 month after TBM passing (end of ZOI TBM2) green: below 2.5mm amber: 2.5-5mm red: above 5mm	remarks	<2mm/annum deviation as per specification	
				date	settlement [mm]	date	duration [days]	settlement [mm]					
8	White Hard Road	91760	3004 0401	30/05/2013	-2.71	06/06/2013	7	-3.26	-0.55	-28.6	directly after passing, the additional ballast placed on White Hart Road was removed and in course of that work the levelling pins were also digged out	not achieved	
			3004 0402	30/05/2013	-2.11	06/06/2013	7	-2.88	-0.77	-40.0			
			3005 0403	30/05/2013	-4.16	06/06/2013	7	-4.66	-0.5	-26.0			
			3005 0404	30/05/2013	-2.01	06/06/2013	7	-1.98	0.03	1.6			
			3006 0405	30/05/2013	-1.01	06/06/2013	7	-1.68	-0.67	-34.8			
			3006 0406	30/05/2013	-2.71	06/06/2013	7	-3.59	-0.88	-45.8			
			3007 0407	30/05/2013	-3.09	06/06/2013	7	-4.06	-0.97	-50.4			
19	Southern Outfall Sewer 1	91470	3004 0501	20/06/2013	-7.43						All points (including shallow datums - see item 23) were destroyed due to Road reinstatement done by Others, shortly after last readings taken Feb 2014.	not achieved, longterm monitoring to continue	
			3004 0502	20/06/2013	-4.95								
			3004 0503	20/06/2013	-3.02								
			3004 0504	20/06/2013	-3.33	06/02/2014	231	-6.39	-3.06	-4.8			
			3004 0505	20/06/2013	-2	06/02/2014	231	-4.32	-2.32	-3.7			
			3004 0506	20/06/2013	-1.27	06/02/2014	231	-3.28	-2.01	-3.2			
			3004 0507	20/06/2013	-4.61								
20	Southern Outfall Sewer 2	91450	3004 0511	22/06/2013	0.27	07/02/2014	230	-0.93	-1.2	-1.9	Shallow datums demonstrate rate of change within specifications. Therefore C310 (HMJV & CRL) agreed to not reinstate and not continue monitoring.		
			3004 0512	22/06/2013	0.58	07/02/2014	230	-0.7	-1.28	-2.0			
			3004 0513	22/06/2013	-7.94	07/02/2014	230	-10.29	-2.35	-3.7			
			3004 0514	22/06/2013	-2.1	07/02/2014	230	-3.66	-1.56	-2.5			
			3004 0515	22/06/2013	-1.93	07/02/2014	230	-4.72	-2.79	-4.4			
			3004 0516	22/06/2013	-5.34	07/02/2014	230	-7.33	-1.99	-3.1			
			3004 0517	22/06/2013	-1.86	07/02/2014	230	-4.33	-2.47	-3.9			
21	Southern Outfall Sewer 3	91430	3004 0521	23/06/2013	-0.59	07/02/2014	229	-0.74	-0.15	-0.2		achieved, monitoring finished	
			3004 0522	23/06/2013	-0.6	07/02/2014	229	-1.36	-0.76	-1.2			
			3004 0523	23/06/2013	-1.5	07/02/2014	229	-1.61	-0.11	-0.2			
			3004 0524	23/06/2013	-1.83	07/02/2014	229	-1.55	0.28	0.4			
			3004 0525	23/06/2013	-1.47	07/02/2014	229	-2.04	-0.57	-0.9			
			3004 0526	23/06/2013	-0.41	07/02/2014	229	-1.23	-0.82	-1.3			
			3004 0527	23/06/2013	-0.89	07/02/2014	229	-2.37	-1.48	-2.4			
22	Southern Outfall Sewer Pumping Station	91450	3004 0528	23/06/2013	-1.1	07/02/2014	229	-2.08	-0.98	-1.6		only 2 points out of all cannot demonstrate the required <2mm/year, but considering the adjacent points demonstrating that, therefore HMJV propose to cease monitoring	
			3004 0529	23/06/2013	-1.92	07/02/2014	229	-3.51	-1.59	-2.5			
			3004 0541	23/06/2013	-2.27	07/02/2014	229	-3.61	-1.34	-2.1			
			3004 0543	23/06/2013	-1.63	07/02/2014	229	-3.42	-1.79	-2.8			
			3004 0544	23/06/2013	-1.91	07/02/2014	229	-3.07	-1.16	-1.8			
			3004 0545	23/06/2013	-1.48	07/02/2014	229	-2.46	-0.98	-1.6			
			3004 0546	23/06/2013	-1.37	07/02/2014	229	-2.81	-1.44	-2.3			
23	Southern Outfall Sewer Extensometer	91460	3005 0553	22/06/2013	0.06	07/02/2014	230	-0.6	-0.66	-1.0	destroyed	achieved, monitoring finished	
		91410	3005 0554	22/06/2013	3.3	07/02/2014	230	3.04	-0.26	-0.4	damaged		
32	SOS Plumstead Road South	90600 - 91100	30040661	22/05/2013	1.45	10/03/2015	657	-1.44	-2.89	-1.6		achieved, monitoring finished	
			30040662	22/05/2013	1.17								
			30040663	22/05/2013	1.3	10/03/2015	657	-1.23	-2.53	-1.4			
			30040664	22/05/2013	1.13	10/03/2015	657	-0.88	-2.01	-1.1			
			30040665	22/05/2013	0.28	10/03/2015	657	0.68	0.4	0.2			
			30040666	22/05/2013	0.79	10/03/2015	657	-2.67	-3.46	-1.9			
			30040667	22/05/2013	1.41	10/03/2015	657	-1.51	-2.92	-1.6			
			30040668	22/05/2013	1.53	10/03/2015	657	-1.42	-2.95	-1.6			
			30040669	22/05/2013	0.93								
			30040670	22/05/2013	-0.16	10/03/2015	657	-1.4	-1.24	-0.7			
			30040671	22/05/2013	0.38	10/03/2015	657	-1.1	-1.48	-0.8			
			30040672	22/05/2013	0.5	10/03/2015	657	-0.97	-1.47	-0.8			
			30040673	22/05/2013	1.16	10/03/2015	657	-0.44	-1.6	-0.9			
			30040674	22/05/2013	0.77	10/03/2015	657	-1.03	-1.8	-1.0			
			30040675	19/07/2013	-0.89	10/03/2015	599	-1.39	-0.5	-0.3			
			30040676	19/07/2013	-0.73	10/03/2015	599	-1.39	-0.66	-0.4			
			30040677	21/07/2013	-1.61	10/03/2015	597	-1.89	-0.28	-0.2			
			30040678	21/07/2013	-0.54	10/03/2015	597	-2.13	-1.59	-1.0			
			30040679	22/07/2013	-1.62	10/03/2015	596	-1.09	0.53	0.3			
			30040680	24/07/2013	-1.45	10/03/2015	594	-2.21	-0.76	-0.5			
			30040681	24/07/2013	-1.45	10/03/2015	594	-2.27	-0.82	-0.5			
			30040682	24/07/2013	-1.19	10/03/2015	594	-1.47	-0.28	-0.2			
			30040683	26/07/2013	-1.42	10/03/2015	592	-2.41	-0.99	-0.6			
			30040684	26/07/2013	-1.46	10/03/2015	592	-1.18	0.28	0.2			
			30040685	26/07/2013	-1.2	10/03/2015	592	-1.35	-0.15	-0.1			
			30040686	28/07/2013	-0.11	10/03/2015	590	-0.69	-0.58	-0.4			
			30040687	28/07/2013	0.59	10/03/2015	590	0.09	-0.5	-0.3			
			30040688	28/07/2013	0.83	10/03/2015	590	0.08	-0.75	-0.5			
			30040689	29/07/2013	-0.3	10/03/2015	589	-0.03	0.27	0.2			
			30040690	30/07/2013	-0.77	10/03/2015	588	0.34	1.11	0.7			
30040691	30/07/2013	-0.17	10/03/2015	588	0.36	0.53	0.3						
30040692	30/07/2013	1.18	10/03/2015	588	1.3	0.12	0.1						
30040693	02/08/2013	0.32	13/11/2014	468	0.21	-0.11	-0.1						
30040694	02/08/2013	-0.17	13/11/2014	468	0.12	0.29	0.2						
30040695	02/08/2013	0.11	13/11/2014	468	0.11	0	0.0						
30040696	02/08/2013	-0.21	13/11/2014	468	-0.22	-0.01	0.0						
30040697	02/08/2013	-0.27	13/11/2014	468	-0.4	-0.13	-0.1						
33	SOS Plumstead Road North	90600 - 91100	30040701	19/07/2013	-1.73	10/03/2015	599	-3.27	-1.54	-0.9		achieved, monitoring finished	
			30040702	19/07/2013	-1.73	10/03/2015	599	-3.67	-1.94	-1.2			
			30040703	19/07/2013	-1.74	10/03/2015	599	-4.86	-3.12	-1.9			
			30040704	20/07/2013	-5.23	10/03/2015	598	-7.84	-2.61	-1.6			
			30040705	21/07/2013	-6.43	10/03/2015	597	-9.23	-2.8	-1.7			
			30040706	21/07/2013	-5.59	10/03/2015	597	-9.54	-3.95	-2.4			
			30040707	23/07/2013	-7.89	10/03/2015	595	-8.72	-0.83	-0.5			
			30040708	24/07/2013	-5.61	10/03/2015	594	-7.59	-1.98	-1.2			
			30040709	24/07/2013	-3.79	10/03/2015	594	-4.51	-0.72	-0.4			
			30040710	24/07/2013	-3.16	10/03/2015	594	-4.24	-1.08	-0.7			
			30040711	24/07/2013	-1.93	10/03/2015	594	-2.91	-0.98	-0.6			
			30040712	26/07/2013	-1.88	10/03/2015	592	-2.92	-1.04	-0.6			
			30040713	26/07/2013	-1.9	10/03/2015	592	-3.02	-1.12	-0.7			
			30040714	28/07/2013	-1.52	10/03/2015	590	-2.8	-1.28	-0.8			
			30040715	28/07/2013	-0.87	10/03/2015	590	-2.58	-1.71	-1.1			
			30040716	28/07/2013	-0.36	10/03/2015	590	-2.26	-1.9	-1.2			
			30040717	29/07/2013	-2.43	10/03/2015	589	-2.19	0.24	0.1			
			30040718	29/07/2013	-1.42	10/03/2015	589	-1.9	-0.48	-0.3			
			30040719	31/07/2013	-1.45	10/03/2015	587	-1.58	-0.13	-0.1			
			30040720	31/07/2013	-1.53	10/03/2015	587	-1.61	-0.08	0.0			
			30040721	31/07/2013	-0.78	10/03/2015	587	-1.15	-0.37	-0.2			
			30040722	02/08/2013	-1.77	10/03/2015	585	-2.44	-0.67	-0.4			
			30040723	02/08/2013	-1.75	10/03/2015	585	-3.09	-1.34	-0.8			
			30040724	03/08/2013	-1.46	10/03/2015	584	-2.84	-1.38	-0.9			
			30040725	03/08/2013	-3	10/03/2015	584	-4.79	-1.79	-1.1			
			30040726	03/08/2013	-4.32	10/03/2015	584	-5.8	-1.48	-0.9			
			30040727	07/08/2013	-2.28	10/03/2015	580	-3.84	-1.56	-1.0			
			30040728	07/08/2013	-1.11	10/03/2015	580	-2.61	-1.5	-0.9			
			30040729	07/08/2013	-0.55	10/03/2015	580	-1.78	-1.23	-0.8			
			30040730	07/08/2013	-0.6	10/03/2015	580	-1.63	-1.03	-0.6			
30040731	07/08/2013	-0.75	10/03/2015	580	-1.5	-0.75	-0.5						
30040732	07/08/2013	-0.45	10/03/2015	580	-1.49	-1.04	-0.7						
30040733	07/08/2013	0.24	10/03/2015	580	-0.93	-1.17	-0.7						
30040734	07/08/2013	0.78	10/03/2015	580	-0.45	-1.23	-0.8						

Overview of rate of change for monitoring of TW assets				End ZOI TBM 2		longterm			deviation during monitoring [mm]	calculated rate of change for 12 month after TBM passing (end of ZOI TBM2) green: below 2.5mm amber: 2.5-5mm red: above 5mm	remarks	<2mm/annum deviation as per specification
Appendix	Name of Cross section	chainage	point no.	date	settlement [mm]	date	duration [days]	settlement [mm]				
34	SOS Plumstead Road Extensometer	90600 - 91100	30040821	21/07/2013	-1.48	19/03/2015	606	-3.98	-2.5	-1.5	currently blocked	achieved, monitoring finished
			30040822	31/07/2013	-1.98	19/03/2015	596	-2.46	-0.48	-0.3		
			30040823	06/08/2013	-5.05	19/03/2015	590	-4.04	1.01	0.6		
			30040824	07/08/2013	-3.66	19/03/2015	589	-6.31	-2.65	-1.6		
42	Wall Plumstead Road	90610 - 90750	30040831	31/07/2013	-1.17	11/03/2015	588	-1.15	0.02	0.0	only 2 points out of all cannot demonstrate the required <2mm/year, but considering the adjacent points demonstrating that,therefore HMJV propose to cease monitoring	
			30040832	31/07/2013	-1.61	11/03/2015	588	-1.01	0.6	0.4		
			30040833	31/07/2013	-2.63	11/03/2015	588	-2.41	0.22	0.1		
			30040834	01/08/2013	-2.08	11/03/2015	587	-1.37	0.71	0.4		
			30040835	01/08/2013	-2.32	11/03/2015	587	-0.84	1.48	0.9		
			30040836	01/08/2013	-2.99	11/03/2015	587	-1.85	1.14	0.7		
			30040837	02/08/2013	-3.02	11/03/2015	586	2.34	5.36	3.3		
			30040838	02/08/2013	-3.68	11/03/2015	586	-1.08	2.6	1.6		
			30040839	03/08/2013	-3.82	11/03/2015	585	-1.89	1.93	1.2		
			30040840	03/08/2013	-4.44	11/03/2015	585	-3.59	0.85	0.5		
			30040841	03/08/2013	-5.51	11/03/2015	585	-4.58	0.93	0.6		
			30040842	03/08/2013	-6.38	20/02/2014	201	-4.91	1.47	1.7		
			30040843	05/08/2013	-6.1	11/03/2015	583	-3.79	2.31	1.4		
			30040844	07/08/2013	-4.95	11/03/2015	581	-4.04	0.91	0.6		
			30040845	07/08/2013	-4.62	11/03/2015	581	-5.21	-0.59	-0.4		
			30040846	07/08/2013	-5.28	11/03/2015	581	-5.2	0.08	0.1		
			30040847	07/08/2013	-5.26	11/03/2015	581	-4.57	0.69	0.4		
			30040848	07/08/2013	-4.38	11/03/2015	581	-3.92	0.46	0.3		
30040849	07/08/2013	-3.34	11/03/2015	581	-3.61	-0.27	-0.2					
30040850	07/08/2013	-2.6	11/03/2015	581	-2.95	-0.35	-0.2					
30040851	07/08/2013	-1.09	11/03/2015	581	-0.97	0.12	0.1					
30040852	07/08/2013	-1.07	11/03/2015	581	-0.81	0.26	0.2					
50	I/O Center Car Park	90530 - 90590	3004 0921	10/08/2013	-5.17	20/02/2014	194	-5.66	-0.49	-0.9	destroyed	only 2 points out of all cannot demonstrate the required <2mm/year, but considering the adjacent points demonstrating that,therefore HMJV propose to cease monitoring
			3004 0922	10/08/2013	-4.11	11/03/2015	578	-4.83	-0.72	-0.5		
			3004 0923	10/08/2013	-3.23	11/03/2015	578	-4.08	-0.85	-0.5		
			3004 0924	10/08/2013	-2.61	11/03/2015	578	-2.64	-0.03	0.0		
			3004 0925	11/08/2013	-2.62	11/03/2015	577	-2.36	0.26	0.2		
			3004 0926	11/08/2013	-1.8	20/02/2014	193	0.57	2.37	1.7		
			3004 0927	11/08/2013	-1.83	20/02/2014	193	0.05	1.88	1.2		
			3004 0928	11/08/2013	-2.04	11/03/2015	577	-0.33	1.71	1.1		
			3004 0929	11/08/2013	-1.7	11/03/2015	577	-1.43	0.27	0.2		
3004 0930	13/08/2013	-2.13	20/02/2014	191	-1.46	0.67	1.3					
51	CS12 - Cornwallis Road	90520	3004 0901	17/08/2013	-2.15	20/02/2014	187	-1.19	0.96	1.9	achieved, monitoring finished	
			3004 0902	17/08/2013	-3.05	20/02/2014	187	-2.83	0.22	0.4		
			3004 0903	17/08/2013	-2.94	20/02/2014	187	-1.87	1.07	2.1		
			3004 0904	17/08/2013	-2.24	20/02/2014	187	-1.58	0.66	1.3		
			3004 0905	17/08/2013	-1.22	20/02/2014	187	-1	0.22	0.4		
			3004 0906	17/08/2013	-0.71	20/02/2014	187	-0.7	0.01	0.0		
			3004 0907	17/08/2013	-0.76	20/02/2014	187	-0.3	0.46	0.9		
65	CS 19 - Warren lane Car park	88930	3004 1301	10/03/2014	1.22	08/10/2014	212	0.17	-1.05	-1.8	all points in the area of Warren Lane Car park are destroyed, due to construction works carried out by Others	only 3 points out of all cannot demonstrate the required <2mm/year, but considering the adjacent points demonstrating that, thereore HMJV propose to cease monitoring
			3004 1302	10/03/2014	1.15	08/10/2014	212	0.42	-0.73	-1.3		
			3004 1303	10/03/2014	1.05	08/10/2014	212	0.12	-0.93	-1.6		
			3004 1304	10/03/2014	0.88	08/10/2014	212	-1.4	-2.28	-3.9		
			3004 1305	10/03/2014	0.56	08/10/2014	212	-0.43	-0.99	-1.7		
			3004 1306	10/03/2014	1.13	08/10/2014	212	-0.35	-1.48	-2.5		
			3004 1307	10/03/2014	-0.02	08/10/2014	212	-0.2	-0.18	-0.3		
			3004 1308	10/03/2014	0.63	08/10/2014	212	-0.2	-0.83	-1.4		
66	CS 20 - Warren lane Car park	88910	3004 1311	11/03/2014	0.41	08/10/2014	211	-0.47	-0.88	-1.5	all points in the area of Warren Lane Car park are destroyed, due to construction works carried out by Others	
			3004 1312	11/03/2014	0.34	08/10/2014	211	-1.19	-1.53	-2.6		
			3004 1313	11/03/2014	0.19	08/10/2014	211	-0.43	-0.62	-1.1		
			3004 1314	11/03/2014	0.56	08/10/2014	211	-0.15	-0.71	-1.2		
			3004 1315	11/03/2014	0.4	08/10/2014	211	1.41	1.01	1.7		
			3004 1316	11/03/2014	-0.32	08/10/2014	211	-0.26	0.06	0.1		
			3004 1317	11/03/2014	-0.42	08/10/2014	211	-0.43	-0.01	0.0		
67	CS 21 - Warren lane Car park	88880	3004 1321	12/03/2014	1.49	08/10/2014	210	0.12	-1.37	-2.4		
			3004 1322	12/03/2014	1.27	08/10/2014	210	0.24	-1.03	-1.8		
			3004 1323	12/03/2014	0.56	08/10/2014	210	0.21	-0.35	-0.6		
			3004 1324	12/03/2014	1.38	08/10/2014	210	0.44	-0.94	-1.6		
			3004 1325	12/03/2014	1.06	08/10/2014	210	0.25	-0.81	-1.4		
			3004 1326	12/03/2014	-0.16	08/10/2014	210	0.23	0.39	0.7		
			3004 1327	12/03/2014	-0.05	08/10/2014	210	-0.22	-0.17	-0.3		
68	CS 22 - Warren lane roundabout	88860	3004 1261	13/03/2014	0.54	24/09/2014	195	0.66	0.42	0.8	only 3 points out of all cannot demonstrate the required <2mm/year, but considering the adjacent points demonstrating that, thereore HMJV propose to cease monitoring	
			3004 1262	13/03/2014	-0.17	24/09/2014	195	0.23	0.4	0.7		
			3004 1263	13/03/2014	-0.12	24/09/2014	195	-0.09	0.03	0.1		
			3004 1264	13/03/2014	-0.21	24/09/2014	195	0.06	0.27	0.5		
			3004 1265	13/03/2014	-1.46	24/09/2014	195	-0.99	0.47	0.9		
			3004 1266	13/03/2014	-0.92	24/09/2014	195	-1.09	-0.17	-0.3		
			3004 1267	13/03/2014	-0.88	24/09/2014	195	-1.49	-0.61	-1.1		
			3004 1268	13/03/2014	-1.44	24/09/2014	195	-1.22	0.22	0.4		
			3004 1269	13/03/2014	-1.77	24/09/2014	195	-1.51	0.26	0.5		
			3004 1270	13/03/2014	-0.72	24/09/2014	195	-0.96	-0.24	-0.4		
3004 1271	13/03/2014	-1	24/09/2014	195	-1.33	-0.33	-0.6					
69	Warren lane Car park EB	88880 - 88930	3004 1331	10/03/2014	-0.07	08/10/2014	212	-1.44	-1.37	-2.4	all points in the area of Warren Lane Car park are destroyed, due to construction works carried out by Others	
			3004 1332	10/03/2014	0.83	08/10/2014	212	-0.36	-1.19	-2.0		
			3004 1333	10/03/2014	0.75	08/10/2014	212	-0.17	-0.92	-1.6		
			3004 1334	10/03/2014	0.85	08/10/2014	212	-0.41	-1.26	-2.2		
			3004 1335	10/03/2014	0.27	08/10/2014	212	-0.54	-0.81	-1.4		
			3004 1336	10/03/2014	0.37	08/10/2014	212	-0.5	-0.87	-1.5		
			3004 1337	11/03/2014	-0.33	08/10/2014	211	-0.97	-0.64	-1.1		
			3004 1339	11/03/2014	0.39	08/10/2014	211	-0.56	-0.95	-1.6		
			3004 1340	11/03/2014	0.3	08/10/2014	211	-0.58	-0.88	-1.5		
			3004 1341	11/03/2014	0.8	08/10/2014	211	0.31	-0.49	-0.8		
70	Warren lane Car park WB	88880 - 88930	3004 1401	12/03/2014	-0.72	08/10/2014	210	-1.94	-1.22	-2.1	all points in the area of Warren Lane Car park are destroyed, due to construction works carried out by Others	
			3004 1402	12/03/2014	0.53	08/10/2014	210	-0.22	-0.75	-1.3		
			3004 1403	12/03/2014	0.8	08/10/2014	210	-0.04	-0.84	-1.5		
			3004 1404	12/03/2014	0.76	08/10/2014	210	0.04	-0.72	-1.2		
			3004 1405	12/03/2014	1.14	08/10/2014	210	-0.12	-1.26	-2.2		
			3004 1406	12/03/2014	1.05	08/10/2014	210	0.03	-1.02	-1.8		
			3004 1407	12/03/2014	1.03	08/10/2014	210	0.22	-0.81	-1.4		
			3004 1408	12/03/2014	0.79	08/10/2014	210	-0.3	-1.09	-1.9		
			3004 1409	10/03/2014	0.36	08/10/2014	212	-0.35	-0.71	-1.2		
			3004 1410	10/03/2014	0.59	08/10/2014	212	-0.64	-1.23	-2.1		
			3004 1411	10/03/2014	0.83	08/10/2014	212	0.49	-0.34	-0.6		
3004 1412	10/03/2014	0.8	08/10/2014	212	-0.44	-1.24	-2.1					
71	Extensometer Warren lane Car park	88880 - 88930	3004 1351	10/03/2014	-0.19	08/10/2014	212	-0.58	-0.39	-0.7		
			3004 1352	10/03/2014	-0.18	08/10/2014	212	0.36	0.54	0.9		
			3004 1353	13/03/2014	-0.13	08/10/2014	209	0.73	0.86	1.5		