 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50025	Rev	1.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works North Embankment River Thames - North Woolwich Portal (excl. Store Rd)				

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

CMDL: C09.006

REVISION	DOCUMENT APPROVAL / REVISION RECORD DETAILS	DATE
1.0	Issued for CRL Acceptance	11/02/2015


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.

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Review by Stakeholder (if required):

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 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)	
Print Name	
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PREPARED BY: HMJV Surveying and Monitoring Engineer Print:  Sign: _____ Date: 11-02-2015	REVIEWED BY: HMJV Technical and Risk Manager Print:  Sign: _____ Date : 11-02-2015
REVIEWED BY: HMJV Monitoring Manager Print:  Sign: _____ Date : 11-02-2015	APPROVED BY: HMJV Project Director Print:  Sign: _____ Date : 11-02-2015

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		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50025	Rev	1.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works North Embankment River Thames - North Woolwich Portal (excl. Store Rd)				

DISTRIBUTION LIST	HARD COPY REQUIRED? (If 'Yes' type the number of copies required, if 'No' leave blank)
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Monitoring Manager	
Quality Manager	
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- 2.0 Reference Documents
- 3.0 Appendices

Learning Legacy Document

		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50025	Rev	1.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works North Embankment River Thames - North Woolwich Portal (excl. Store Rd)				

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.

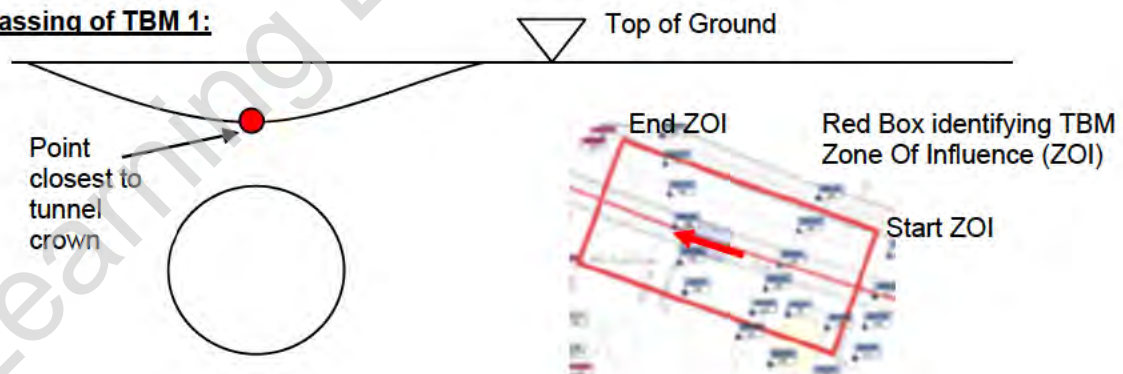
Each individual Close-out report contains

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

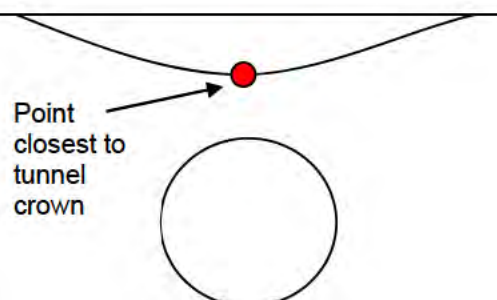
The Cover summary sheet entails:


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

Passing of TBM 1:



Passing of TBM 2:

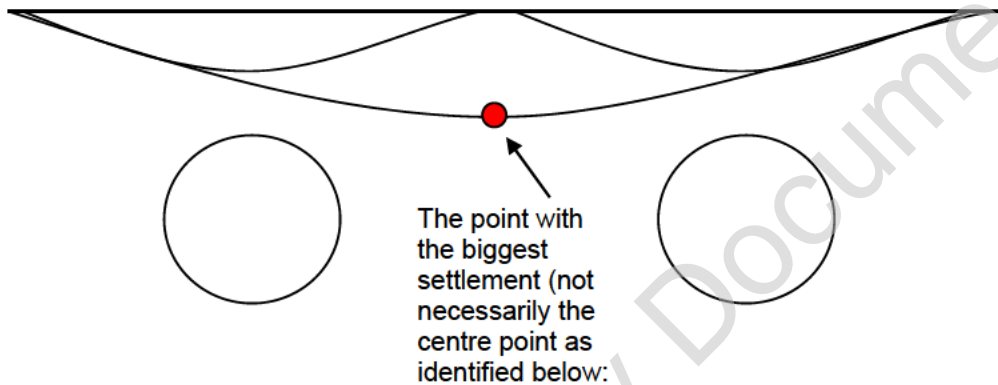


		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50025	Rev	1.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works North Embankment River Thames - North Woolwich Portal (excl. Store Rd)				

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

- Long-term: The monitoring point with the greatest confirmed value of vertical movement of the corresponding monitoring asset.

After Passage of TBM 1 and TBM 2




- Note on possible residual risks

- Supporting comments and conclusions that also focus on 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.
- 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.

 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50025	Rev	1.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works North Embankment River Thames - North Woolwich Portal (excl. Store Rd)				

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-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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 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
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TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works North Embankment River Thames - North Woolwich Portal (excl. Store Rd)				

APPENDIX 00

Overall Register / Close out report

Learning Legacy Document

 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50025	Rev	1.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works North Embankment River Thames - North Woolwich Portal (excl. Store Rd)				

APPENDIX 76

CS Pier Road

Learning Legacy Document

monitoring asset

Services underneath Pier Road

reference monitoring drawing:

C310-HTM-C-DWG-CR146-ST004-70003

name of monitoring section:

CS Pier Road

sensor type:

manual levelling studs

chainage:

89260

point no.:

3004 1501 - 3004 1510

trigger values:
[mm]

green: +16
-16

amber: +70
-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	01/10/13		0.00		
TBM 1	start ZOI	10/12/13	0.41	3004 1507	
	end ZOI	17/12/13	-8.41	3004 1507	breached not any trigger value
TBM 2	start ZOI	14/04/14	-1.70	3004 1503	
	end ZOI	21/04/14	-15.54	3004 1503	breached not any trigger value
longterm	21/11/14	-19.83	3004 1504	breached green trigger value	

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

The maximum deflection ratio is 1:8530 (3004 1506 - 3004 1507 - 3004 1508) - no TW trigger breached (TW alert value 1:1000).

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.

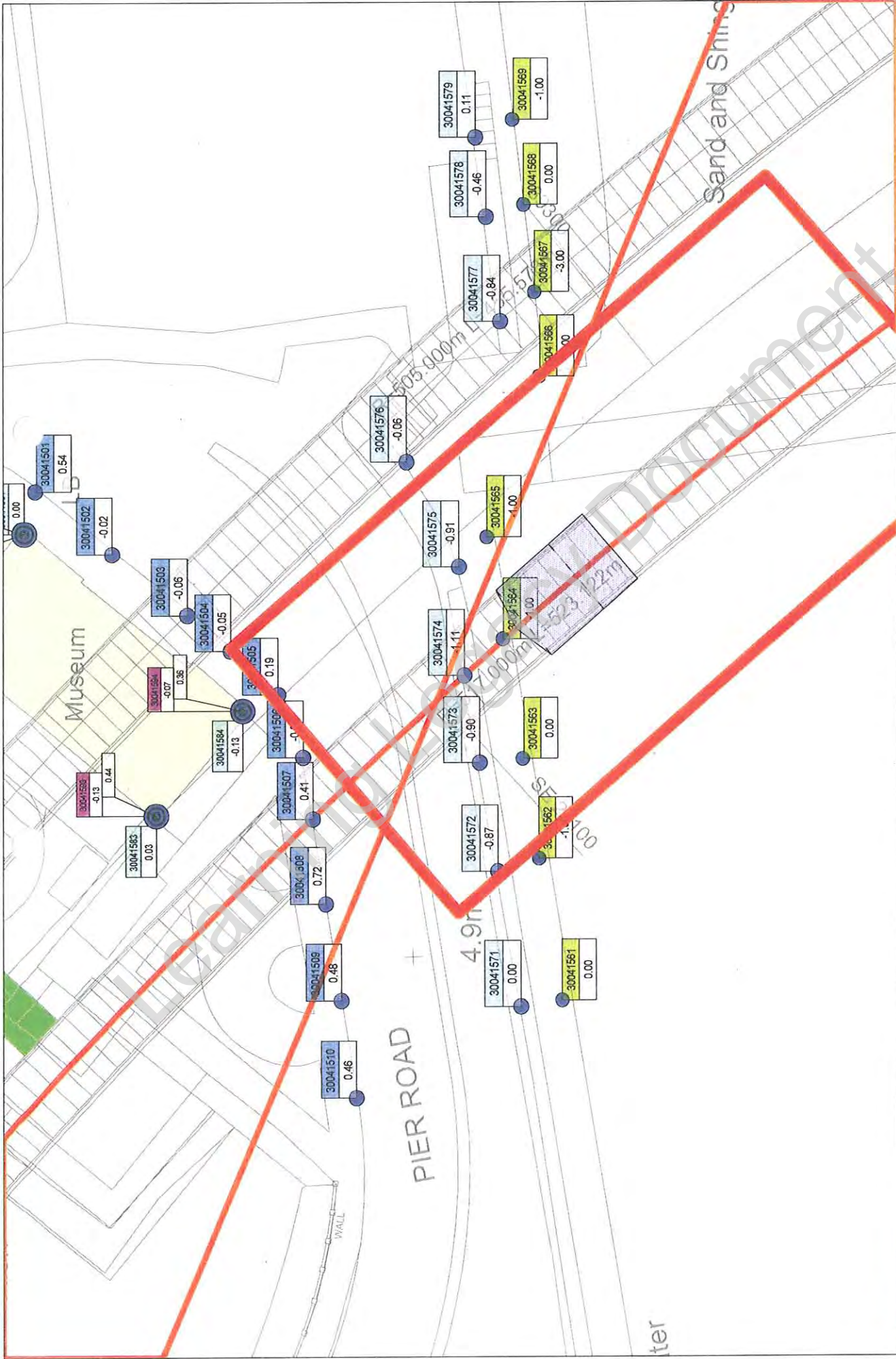
date / signature:

01/02/2015

print name:

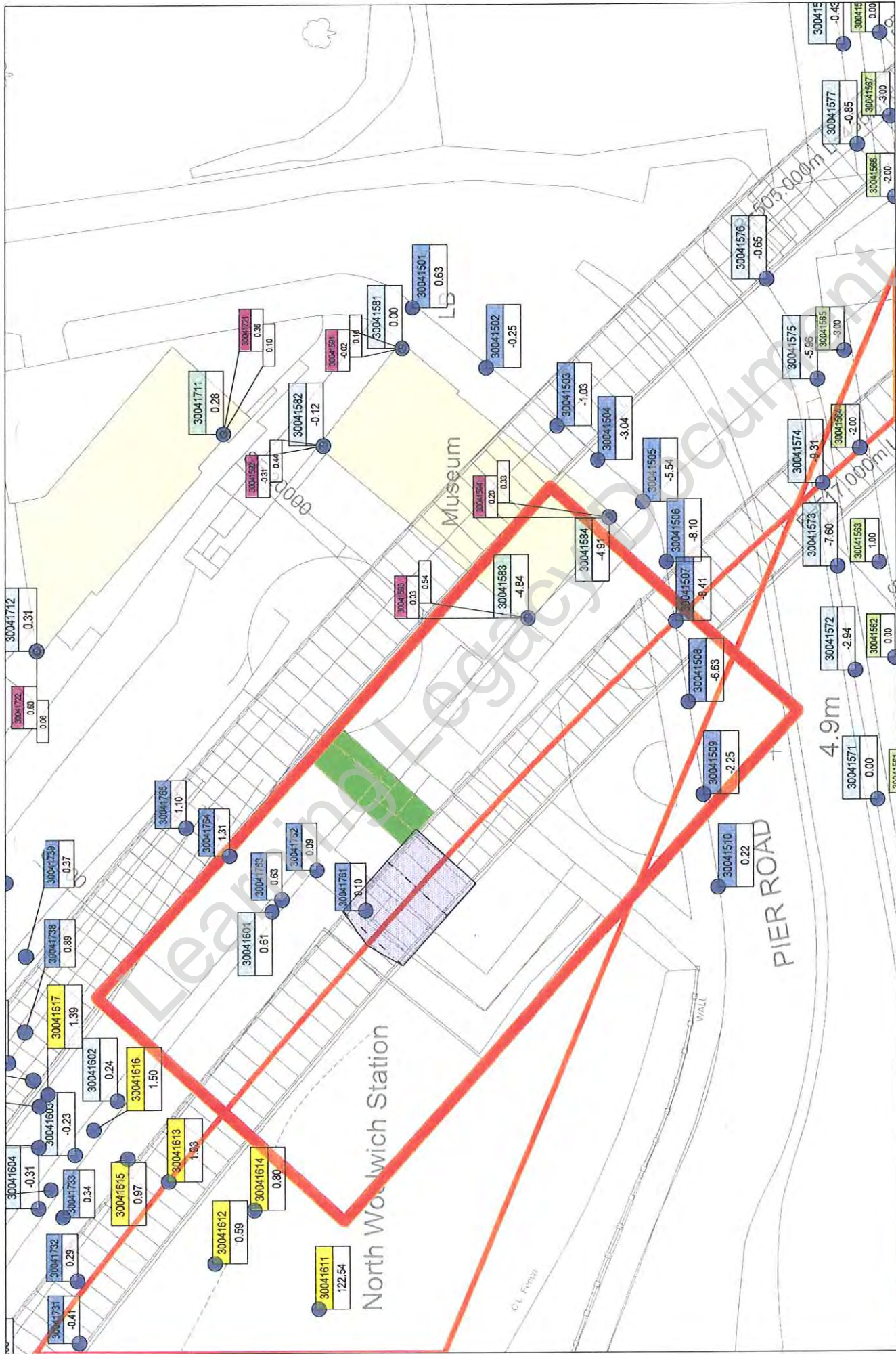
HMJV project role:

Monitoring & Survey engineer



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 10.12.2013 17:49

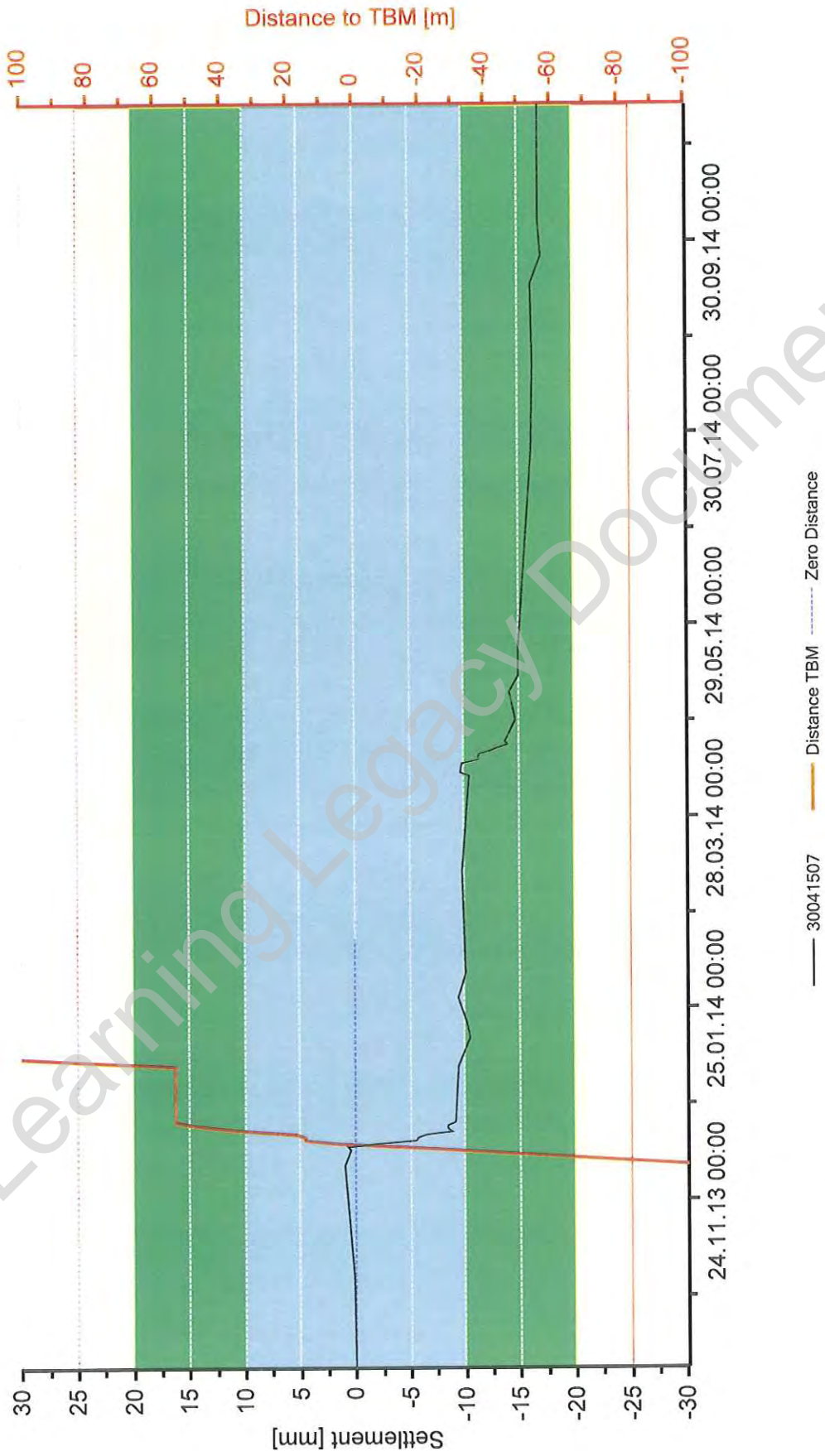




Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: portal excavation, construction base slab and capping beam
 current values: 17.12.2013 09:00



Point: 30041507

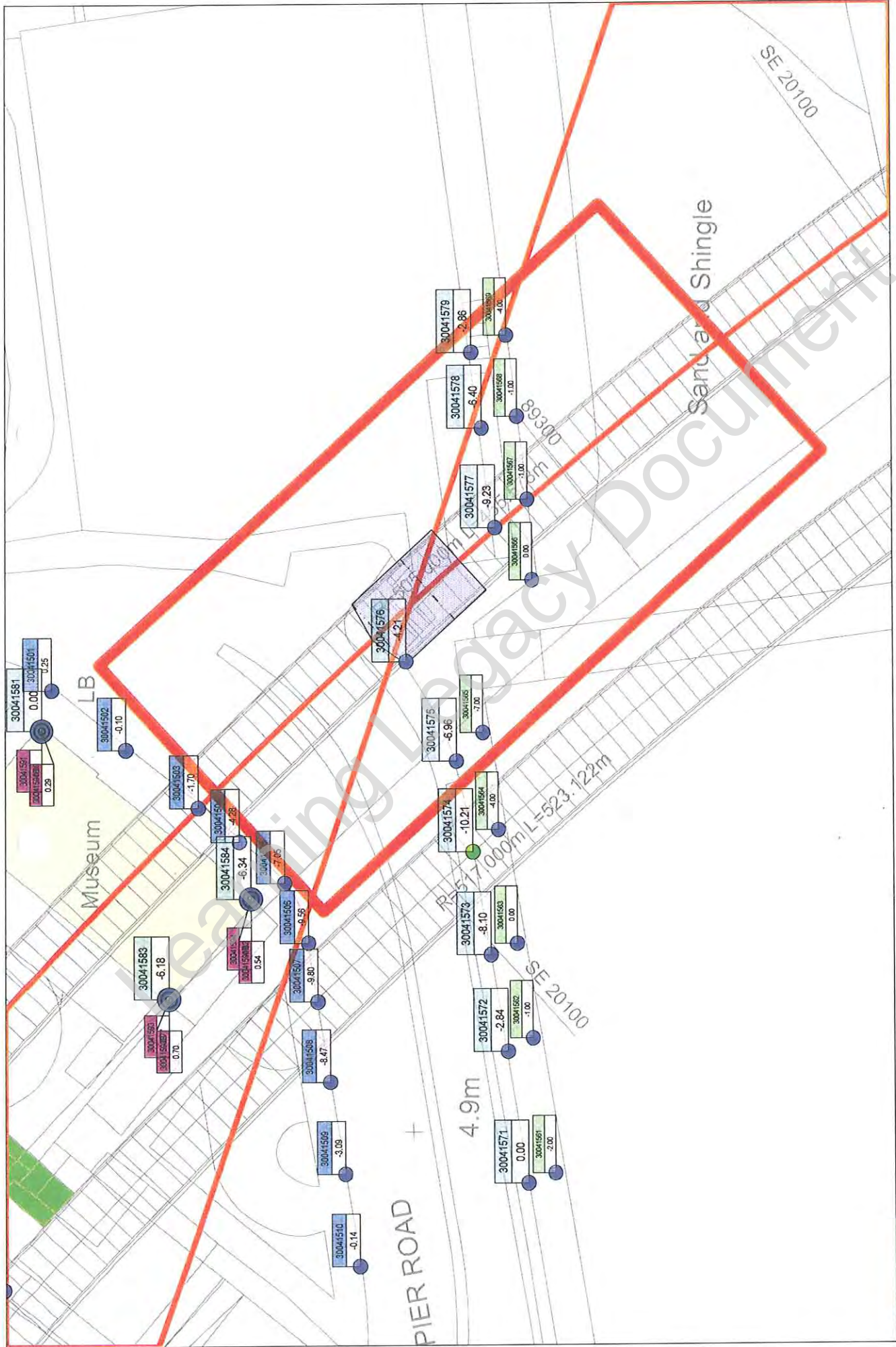


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

Close Out Report: WB Tunnel - CS Pier Road - 01.10.2013 - 13.11.2014

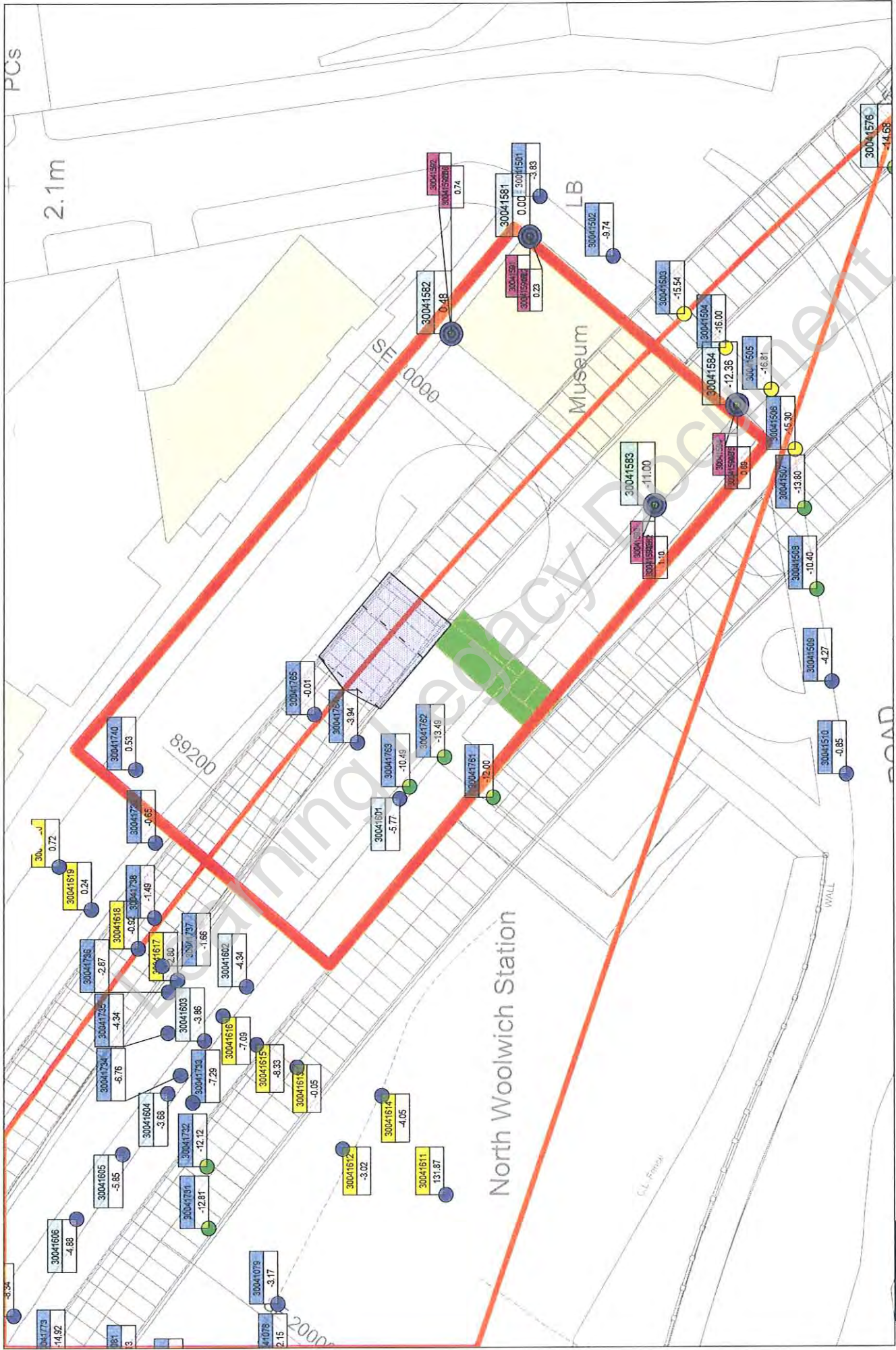
Date: 18.11.2014 10:45 Current Values: 18.11.2014 10:29





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 14.04.2014 09:20

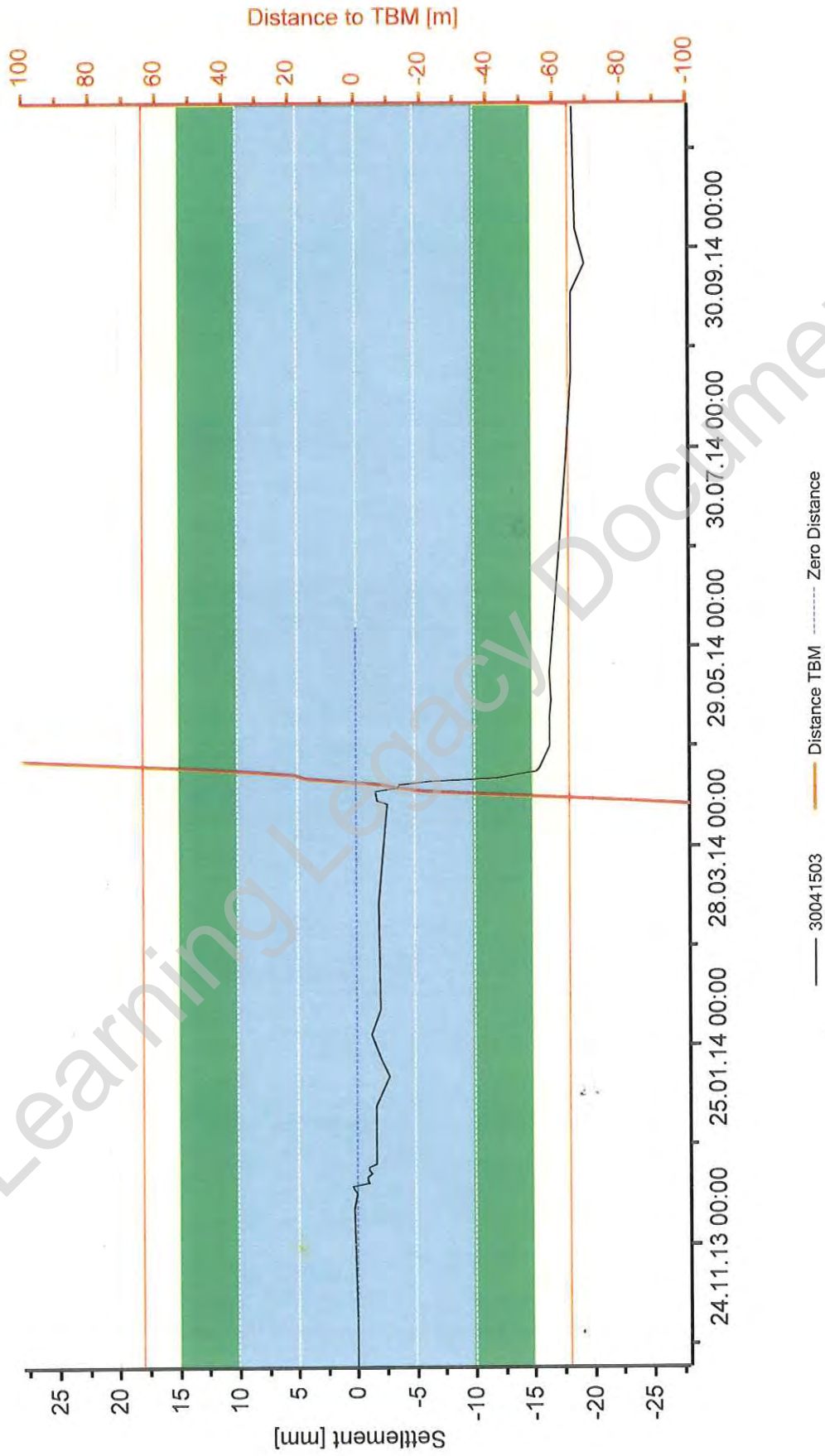




Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 21.04.2014 09:00



Point: 30041503



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

Close Out Report: EB Tunnel - CS Pier Road - 01.10.2013 - 13.11.2014

date: 17.11.2014 11:42 current values: 17.11.2014 11:21



monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross section Pier road

No. of reading	baseline		7. following		8. following		9. following		10. following		11. following		12. following	
	date	1/10/13	14/12/2013		15/12/2013		16/12/2013		17/12/2013		18/12/2013		19/12/2013	
No.	elevation	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
30041501	103.924	103.924	103.924	0	103.924	0	103.924	0	103.925	0	103.925	0	103.924	0
30041502	104.158	104.158	104.158	0	104.158	0	104.158	0	104.158	0	104.158	0	104.157	-1
30041503	104.390	104.389	104.389	-1	104.389	0	104.388	-1	104.389	0	104.389	0	104.388	-1
30041504	104.505	104.502	104.502	-2	104.502	0	104.502	-1	104.502	0	104.502	0	104.501	-1
30041505	104.622	104.617	104.617	-5	104.617	0	104.616	-1	104.616	0	104.616	0	104.616	-1
30041506	104.697	104.691	104.691	-6	104.690	-1	104.689	-1	104.689	0	104.689	0	104.688	-1
30041507	104.783	104.778	104.778	-6	104.777	-1	104.775	-2	104.775	0	104.775	0	104.774	-1
30041508	104.857	104.854	104.854	-3	104.853	-1	104.851	-3	104.851	0	104.851	0	104.850	-1
30041509	104.800	104.799	104.799	-1	104.799	0	104.797	-1	104.798	0	104.798	0	104.797	-1
30041510	104.829	104.829	104.829	0	104.829	0	104.829	-1	104.829	0	104.829	0	104.829	0

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Cross section Pier road

No. of reading	baseline		31. following		32. following		33. following		34. following		35. following		36. following			
	1/10/13	12/05/2014	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		
date	17/06/2014															
No.	21/05/2014															
	22/08/2014															
	16/09/2014															
30041501	103.924	103.920	103.920	-5	103.920	0	-5	103.919	0	-5	103.918	-1	-6	103.918	0	-6
30041502	104.158	104.147	104.147	-11	104.147	0	-11	104.148	0	-10	104.147	-1	-12	104.146	0	-12
30041503	104.390	104.373	104.373	-16	104.373	0	-16	104.373	0	-16	104.372	-1	-18	104.371	0	-18
30041504	104.505	104.488	104.488	-17	104.488	0	-17	104.483	0	-17	104.486	-2	-18	104.485	0	-19
30041505	104.622	104.604	104.604	-18	104.604	0	-18	104.604	1	-17	104.603	-2	-19	104.602	0	-20
30041506	104.697	104.680	104.680	-17	104.680	0	-17	104.681	1	-16	104.680	-2	-17	104.679	0	-18
30041507	104.783	104.768	104.768	-15	104.768	0	-15	104.769	1	-14	104.767	-2	-16	104.767	0	-16
30041508	104.857	104.846	104.846	-12	104.846	0	-11	104.846	0	-11	104.845	-1	-12	104.844	0	-13
30041509	104.800	104.794	104.794	-5	104.794	0	-5	104.795	0	-5	104.793	-2	-7	104.793	0	-7
30041510	104.829	104.827	104.827	-2	104.827	0	-2	104.828	0	-1	104.826	-2	-3	104.826	5	-3

monitoring table




Joint Venture

project: C310 Thames Tunnel

structure: Cross section Pier road

No. of reading	baseline	37. following		38. following		39. 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	1/10/13	25/09/2014		06/10/2014		21/11/2014							
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
30041501	103.924	103.918	-1	103.919	1	103.919	0	103.919	0	103.919	0	103.919	-6
30041502	104.158	104.145	-1	104.146	1	104.146	0	104.146	0	104.146	0	104.146	-13
30041503	104.390	104.370	-1	104.371	1	104.371	0	104.371	0	104.371	0	104.371	-18
30041504	104.505	104.485	-1	104.485	1	104.485	0	104.485	0	104.485	0	104.485	-20
30041505	104.622	104.601	-1	104.602	1	104.602	0	104.602	0	104.602	0	104.602	-19
30041506	104.697	104.678	-1	104.679	1	104.679	1	104.679	1	104.679	1	104.679	-18
30041507	104.763	104.766	-1	104.766	0	104.766	0	104.766	0	104.766	0	104.766	-17
30041508	104.857	104.844	-1	104.844	0	104.844	1	104.844	1	104.844	1	104.844	-13
30041509	104.800	104.792	0	104.793	0	104.793	0	104.792	0	104.792	0	104.792	-8
30041510	104.829	104.825	-1	104.826	0	104.826	0	104.825	0	104.825	0	104.825	-4

 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
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TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works North Embankment River Thames - North Woolwich Portal (excl. Store Rd)				

APPENDICES 83

CS TRM

Learning Legacy Document

monitoring asset	TW Twin Rising Main		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70003		
name of monitoring section:	CS Twin Rising Main		
sensor type:	manual levelling studs		
chainage:	89190	point no.:	3004 1731 - 3004 1740
trigger values: [mm]	green: +16 -16	amber: +20 00	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	14/11/13		0.00		
TBM 1	start ZOI	06/01/14	-0.05	30041732	
	end ZOI	10/01/14	-12.92	3004 1732	breached not any trigger value
TBM 2	start ZOI	21/04/14	-1.49	3004 1738	
	end ZOI	25/04/14	-10.51	3004 1738	breached not any trigger value
longterm		21/11/14	-16.11	3004 1734	breached green trigger value

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

summary / comments

The maximum deflection ratio is 1:3350 (3004 1732 - 3004 1733 - 3004 1734) - no trigger breached (TW alert value 1:1000).
 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.

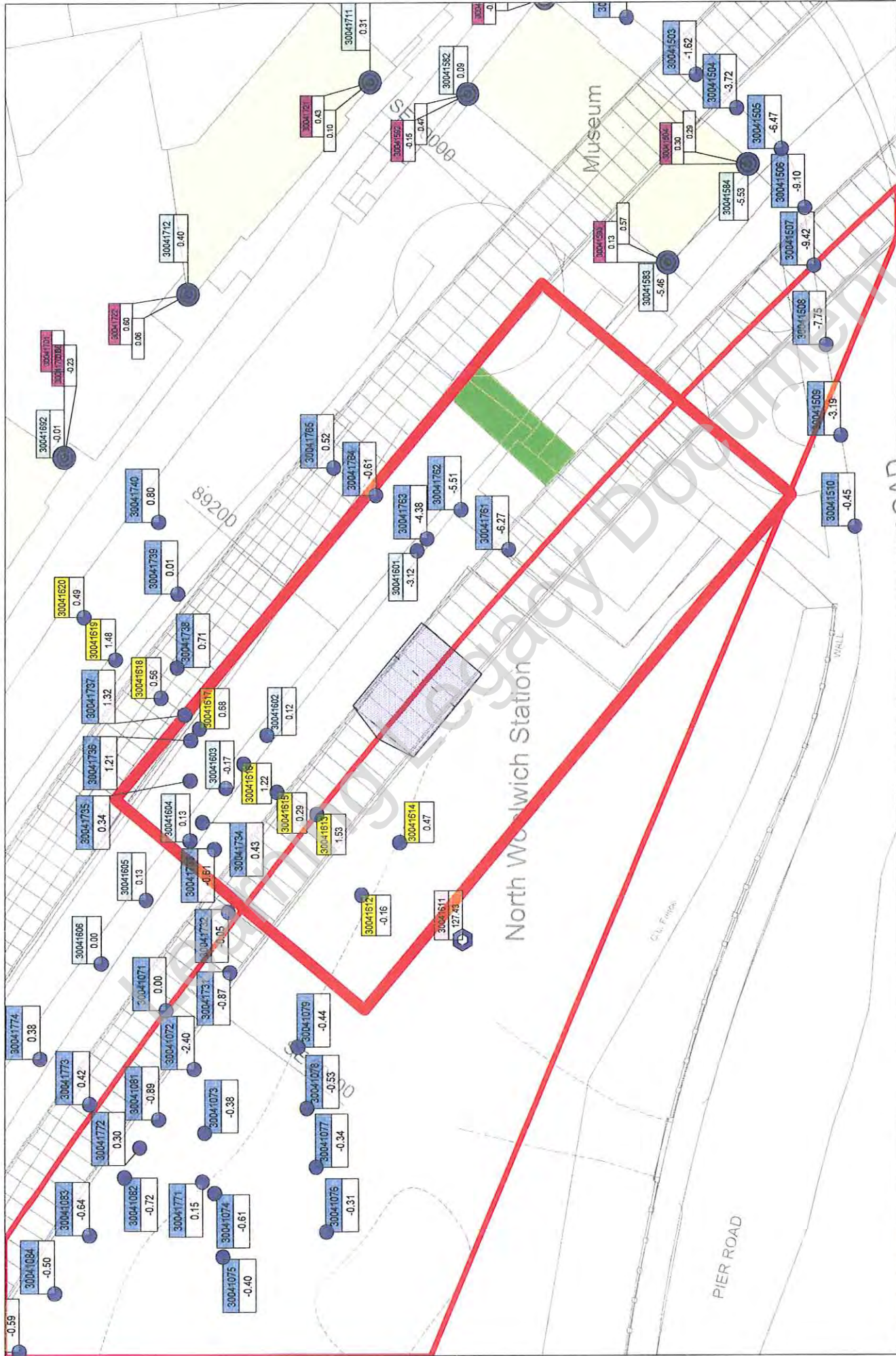
date / signature:

19/01/2015 

print name:

HMJV project role:

Monitoring & Survey engineer



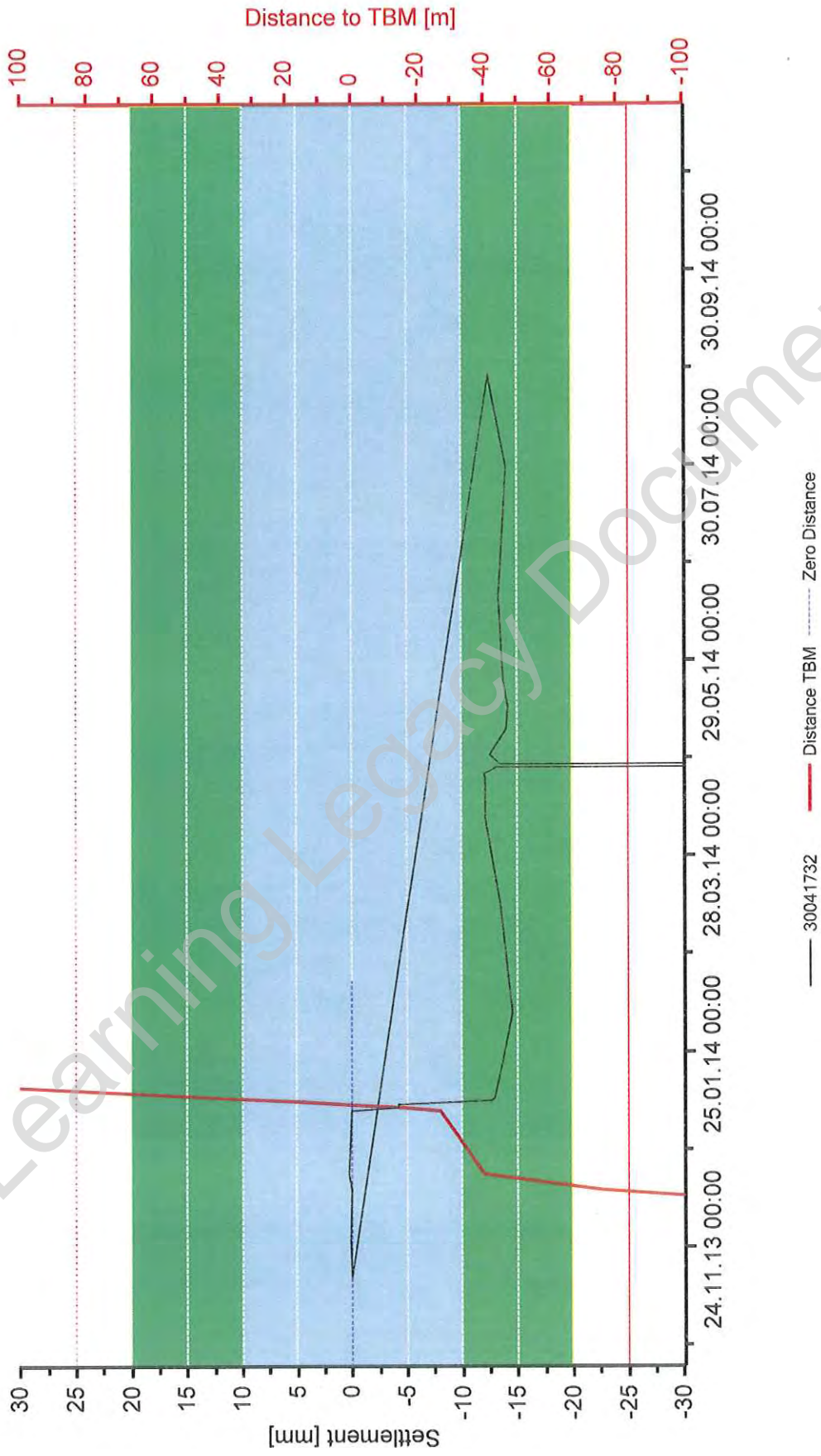
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

working activities: TBM drive WB

current values: 06.01.2014 15:00



Point: 30041732



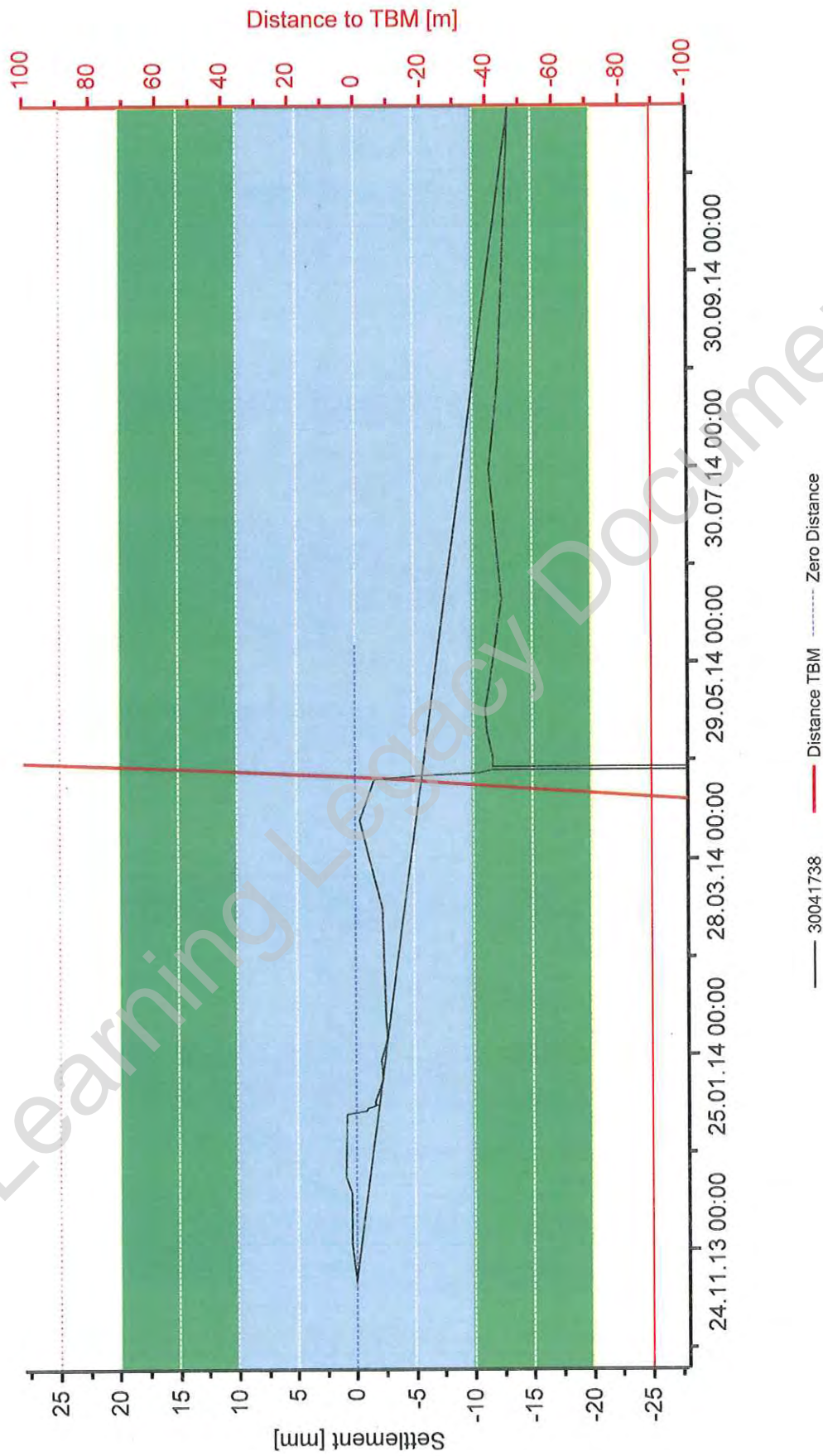
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

Close Out Report: WB Tunnel - CS TRM - 17.10.2013 - 21.11.2014

Date: 20.01.2015 09:46 Current Values: 20.01.2015 09:23



Point: 30041738



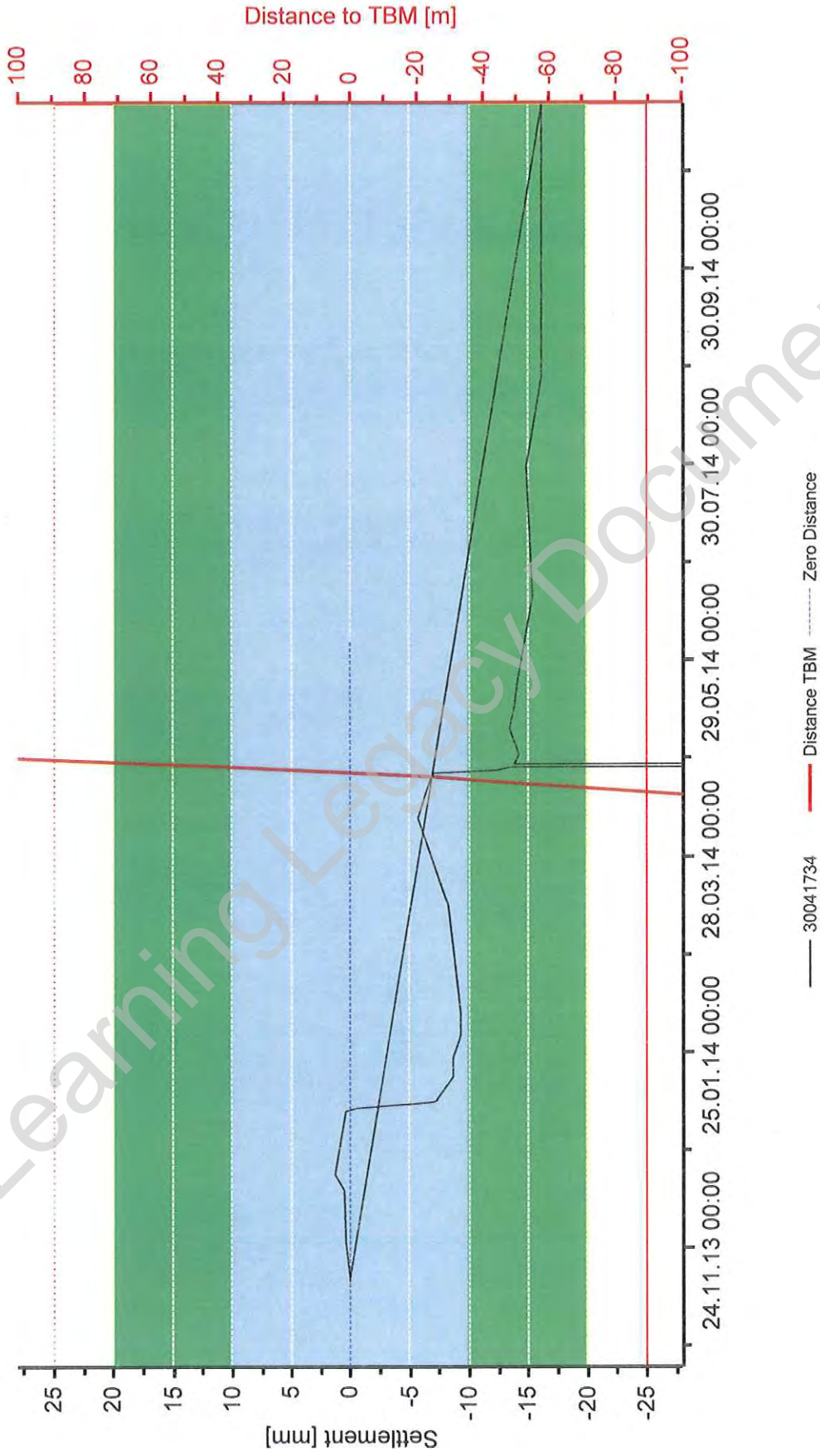
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

Close Out Report: EB Tunnel - CSTRM - 17.10.2013 - 21.11.2014

date: 20.01.2015 10:09 current values: 20.01.2015 09:39



Point: 30041734



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

Close Out Report: EB Tunnel - CSTRM - 17.10.2013 - 21.11.2014

date: 20.01.2015 10:14 current values: 20.01.2015 09:39



monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Twin Raising Mains Cross section

No. of reading	baseline		1. following		2. following		3. following		4. following		5. following		6. following			
	date	elevation	26/11/2013	deviation from last/baseline	12/12/2013	deviation from last/baseline	17/12/2013	deviation from last/baseline	06/01/2014	deviation from last/baseline	07/01/2014	deviation from last/baseline	08/01/2014	deviation from last/baseline		
30041731	102.585	102.584	0	0	102.584	0	0	102.584	0	-1	102.584	0	-1	102.582	-2	-3
30041732	102.546	102.546	0	0	102.546	0	0	102.546	0	0	flooded			102.542	-4	-4
30041733	102.595	102.595	0	0	102.594	0	0	102.594	-1	-1	102.595	1	0	102.590	-5	-5
30041734	103.776	103.776	0	0	103.776	0	1	103.777	1	1	103.776	-1	0	103.772	-3	-4
30041735	103.784	103.784	0	0	103.784	0	1	103.785	0	1	103.784	-1	0	103.781	-2	-3
30041736	103.873	103.873	0	0	103.874	1	1	103.874	0	1	103.874	0	1	103.871	-2	-2
30041737	102.761	102.762	1	1	102.762	0	1	102.762	1	1	102.762	0	1	102.759	-1	-1
30041738	102.758	102.759	0	0	102.759	0	0	102.759	0	1	102.759	0	1	102.757	0	-1
30041739	102.768	102.768	0	0	102.768	0	0	102.768	0	0	102.768	0	0	102.767	0	-1
30041740	103.867	103.868	0	0	103.868	0	1	103.868	0	1	103.868	0	1	103.867	0	0

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Twin Raising Mains Cross section

No. of reading	baseline		7. following		8. following		9. following		10. following		11. following		12. following	
	14/11/13		08/01/2014	deviation from last/ baseline	09/01/2014	deviation from last/ baseline	09/01/2014	deviation from last/ baseline	10/01/2014	deviation from last/ baseline	17/01/2014	deviation from last/ baseline	18/01/2014	deviation from last/ baseline
No.	elevation		elevation		elevation		elevation		elevation		elevation		elevation	
30041731	102.585		102.581	-4	102.575	-6	102.573	-2	102.572	-1	102.571	-1	102.572	0
30041732	102.546		102.540	-6	102.535	-5	102.533	-2	102.533	0			102.532	-1
30041733	102.595				102.586	-3	102.586	-1	102.585	0	102.585	-1	102.584	0
30041734	103.776		103.770	-5	103.769	-2	103.768	0	103.768	0	103.767	-1		
30041735	103.784		103.780	-4	103.779	-1	103.779	0	103.779	0	103.778	-1		
30041736	103.873		103.870	-3	103.869	-1	103.869	0	103.869	0	103.868	-1		
30041737	102.761		102.759	-2	102.758	0	102.759	0	102.758	0	102.758	-1		
30041738	102.758		102.757	-1	102.757	0	102.757	0	102.757	0	102.756	-1		
30041739	102.768		102.767	-1	102.766	0	102.766	0	102.767	0	102.766	-1		
30041740	103.867		103.867	0	103.866	-1	103.866	0	103.867	0	103.866	-1		

Copyright Document

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Twin Raising Mains Cross section

No. of reading	19. following		20. following		21. following		22. following		23. following		24. following	
	baseline	22/04/2014	23/04/2014	24/04/2014	25/04/2014	26/04/2014	27/04/2014	28/04/2014	29/04/2014	30/04/2014	01/05/2014	02/05/2014
No.	elevation	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
30041731	102.585	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed	destroyed
30041732	102.546	102.534	102.534	-12	102.533	-1	102.533	0	102.533	0	102.533	1
30041733	102.595	102.588	102.587	-7	102.584	-3	102.583	-1	102.583	0	102.583	0
30041734	103.776	103.769	103.769	0	103.763	-5	103.762	-1	103.762	0	103.761	0
30041735	103.784	103.779	103.779	0	103.772	-7	103.771	-1	103.770	-1	103.770	0
30041736	103.873	103.870	103.870	0	103.861	-9	103.860	-1	103.860	-1	103.859	0
30041737	102.761	102.759	102.756	-3	102.750	-6	102.749	-1	102.748	-1	102.748	0
30041738	102.758	102.757	102.753	-4	102.748	-5	102.747	-1	102.747	0	102.747	0
30041739	102.768	102.767	102.764	-3	102.760	-4	102.760	-1	102.759	0	102.759	0
30041740	103.867	103.868	103.866	-2	103.865	-1	103.865	0	103.864	0	103.864	0

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monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Twin Raising Mains Cross section

No. of reading	25. following		26. following		27. following		28. following		29. following		30. following					
	baseline	25. 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	14/11/13	07/05/2014	14/05/2014	22/05/2014	18/06/2014	29/07/2014	27/08/2014									
30041731	102.585	destroyed														
30041732	102.546	102.532	-1	-14	102.532	0	-14	102.533	0	-13	102.532	-1	-14	102.534	2	-12
30041733	102.595	102.582	-1	-13	102.581	0	-13	102.581	0	-13	102.579	-2	-15	102.580	1	-15
30041734	103.776	103.762	1	-13	103.761	0	-14	103.760	-1	-15	103.761	0	-15	103.759	-1	-16
30041735	103.784	103.771	1	-13	103.770	0	-13	103.769	-1	-15	103.770	1	-14	103.769	-1	-15
30041736	103.873	103.860	1	-13	103.860	0	-13	103.859	-1	-14	103.859	1	-13	103.858	-1	-15
30041737	102.761	102.749	1	-12	102.748	0	-12	102.747	-1	-14	102.748	1	-12	102.747	-1	-13
30041738	102.758	102.747	1	-11	102.747	0	-11	102.746	-1	-12	102.747	1	-11	102.746	-1	-12
30041739	102.768	102.760	1	-8	102.760	0	-7	102.759	-1	-9	102.761	2	-7	102.759	-1	-9
30041740	103.867	103.865	1	-2	103.865	0	-2	103.864	-1	-3	103.864	0	-3	103.863	-1	-5

monitoring table




Joint Venture

project: C310 Thames Tunnel

structure: Twin Raising Mains Cross section

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	elevation	deviation from last/baseline
		date	21/11/2014												
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
30041731	102.585		destroyed												
30041732	102.546		destroyed												
30041733	102.595		destroyed												
30041734	103.776	103.759	0	-16											
30041735	103.784	103.769	0	-15											
30041736	103.873	103.859	1	-14											
30041737	102.761		obstructed												
30041738	102.758	102.745	-1	-13											
30041739	102.768	102.759	0	-9											
30041740	103.867	103.862	0	-5											

Learning Legacy Document

 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50025	Rev	1.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works North Embankment River Thames - North Woolwich Portal (excl. Store Rd)				

APPENDIX 84
TRM Car park

Learning Legacy Document

monitoring asset	TW Twin Rising Main		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70003		
name of monitoring section:	Twin Rising Main - Carpark HMJV		
sensor type:	manual levelling studs		
chainage:	89190-89050	point no.:	3004 1071 - 3004 1100
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	25/11/13	0.00		
TBM 1	start ZOI	07/01/14	-1.33	3004 1081
		14/01/14	-1.93	3004 1097
	end ZOI	11/01/14	-12.59	3004 1081
		16/01/14	-6.36	3004 1097
breached not any trigger value				
TBM 2	start ZOI	23/04/14	-12.13	3004 1081
		28/04/14	-9.08	3004 1097
	end ZOI	26/04/14	-13.03	3004 1081
		30/04/14	-9.91	3004 1097
breached not any trigger value				
longterm	21/11/14	-21.99	3004 1085	breached amber trigger value

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

summary / comments

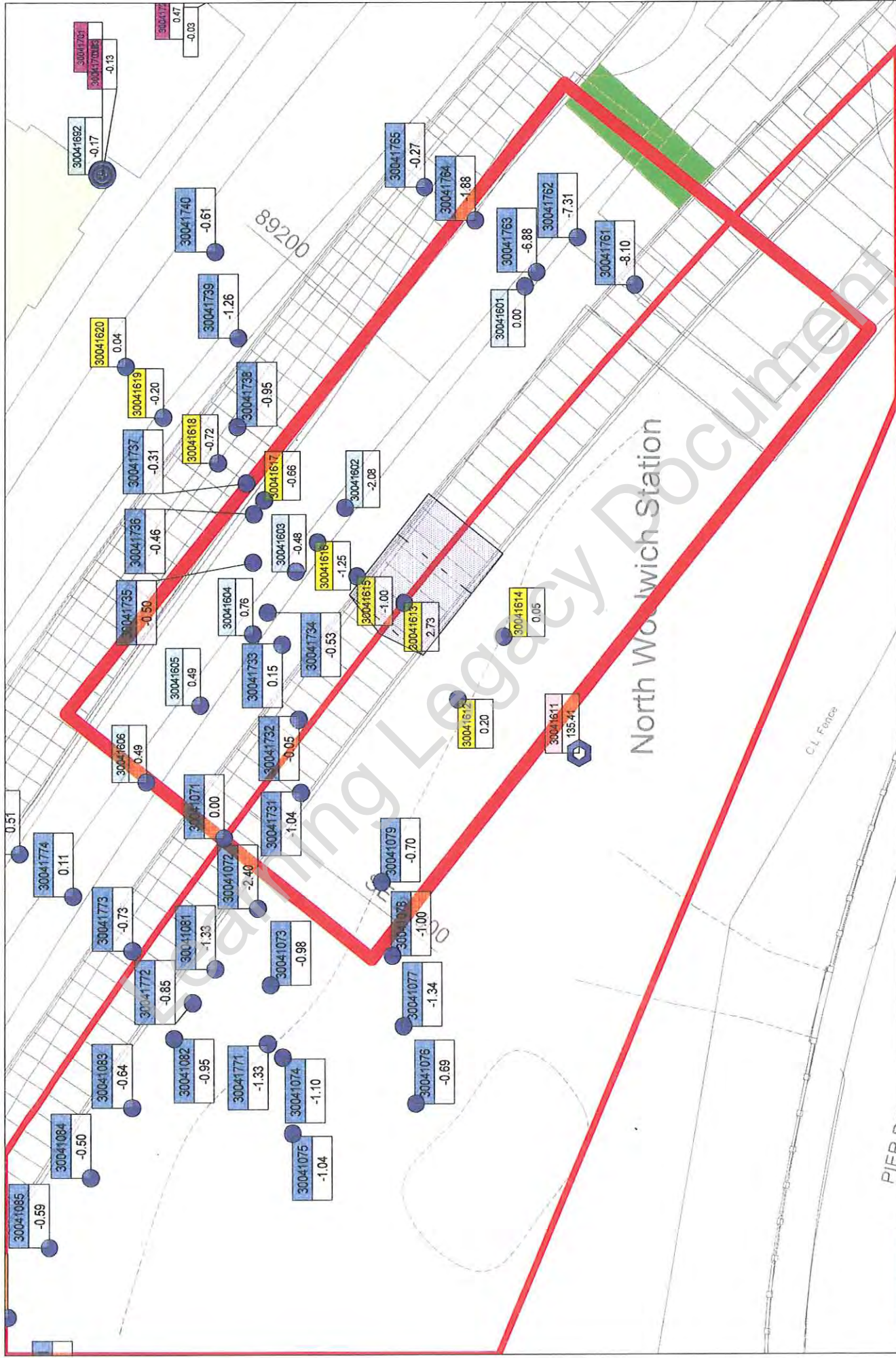
The maximum deflection ratio is 1:3960 (3004 1087 - 3004 1086 - 3004 1085) - no trigger breached (TW alert value 1:1000).
 Under consideration of temperature differences, the surrounding ground condition and the achievable accuracy of the measurement, HMJV has no concern to cease the monitoring.
 The rate of change in the monitoring data is less than the required standards as per the specifications and drawings.

date / signature: 19/01/2015

print name:

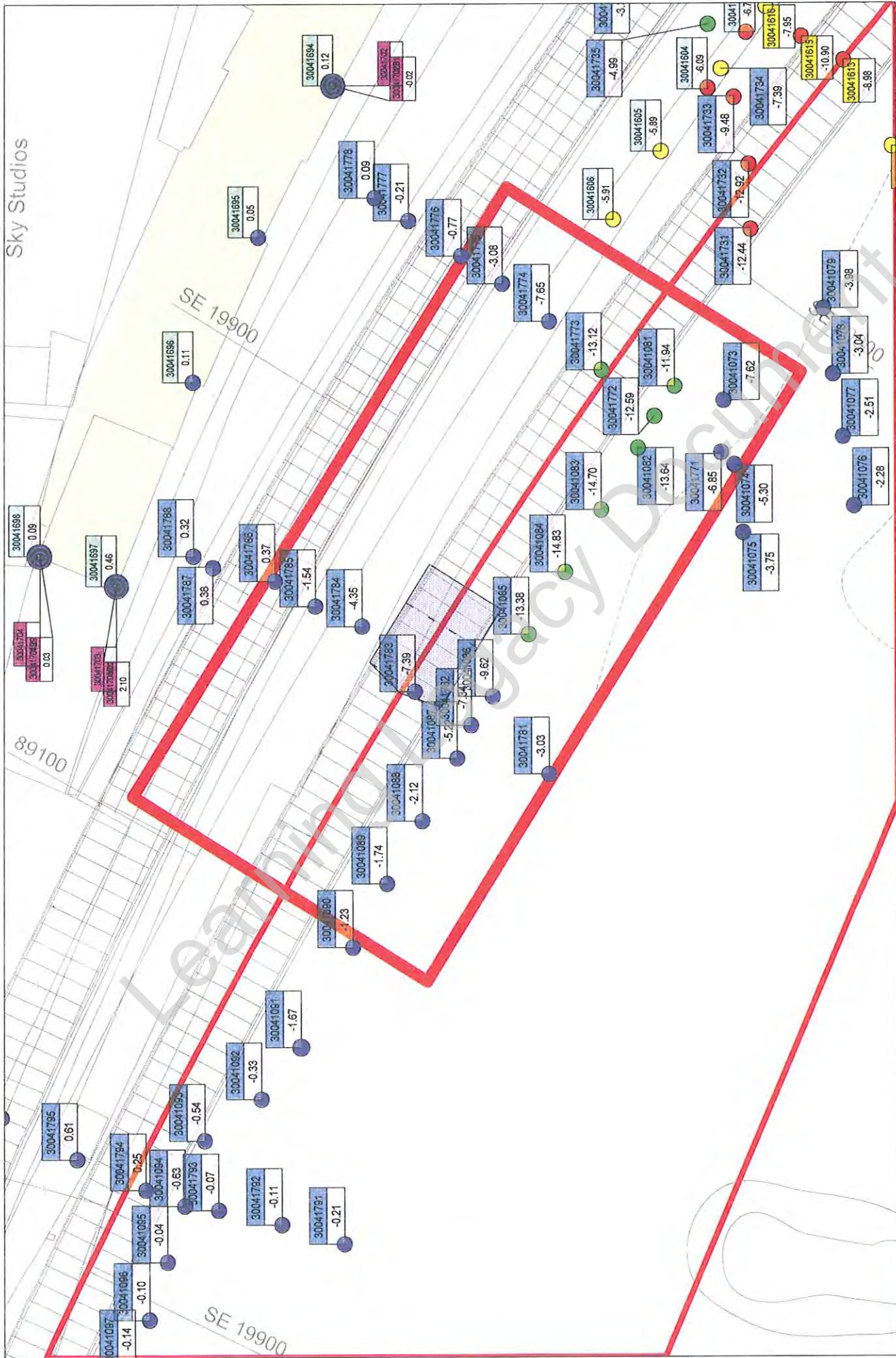
HMJV project role:

Monitoring & Survey engineer



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 07.01.2014 17:24



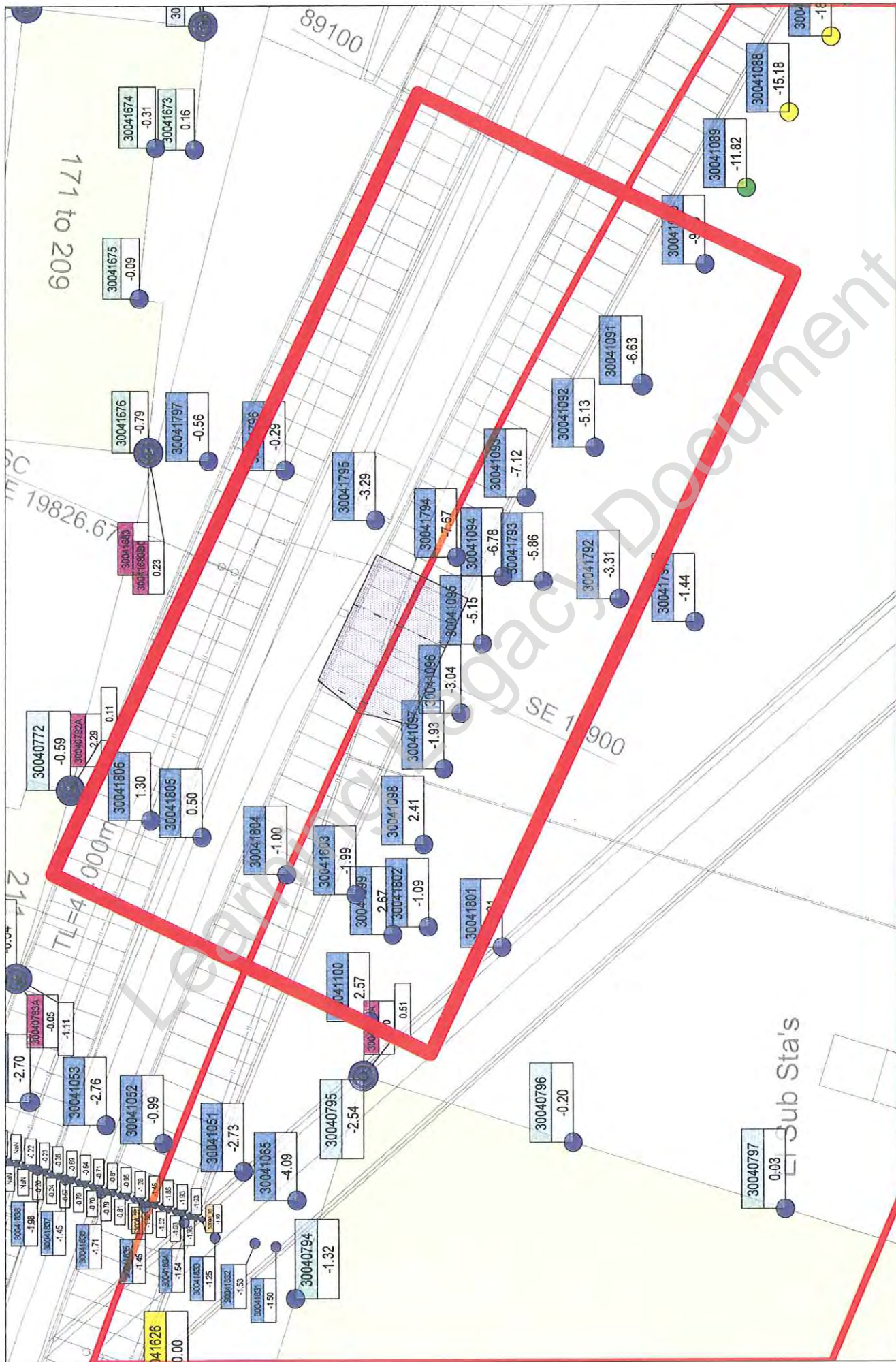


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

working activities: TBM drive WB

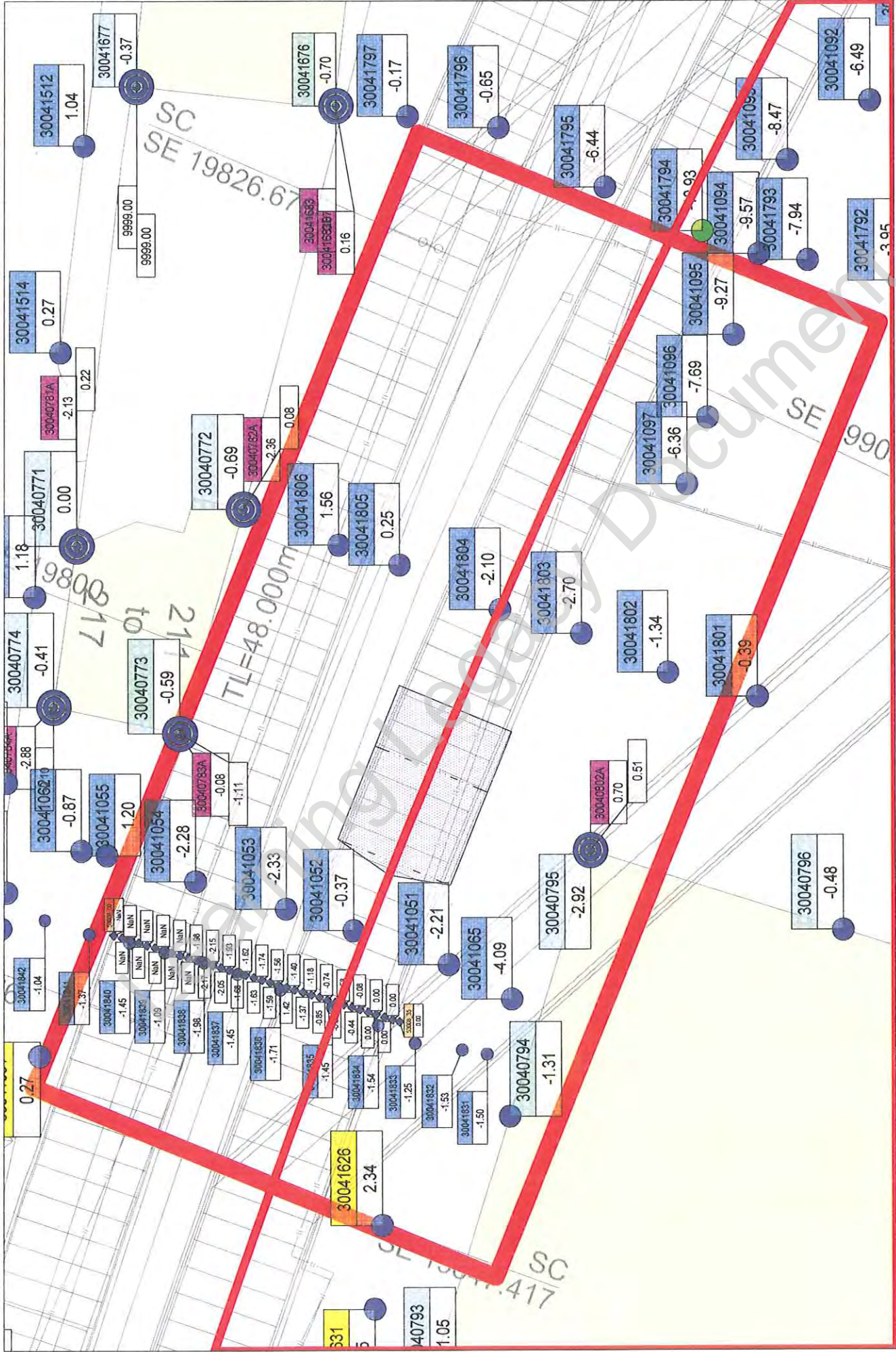
current values: 11.01.2014 09:00





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 14.01.2014 16:00

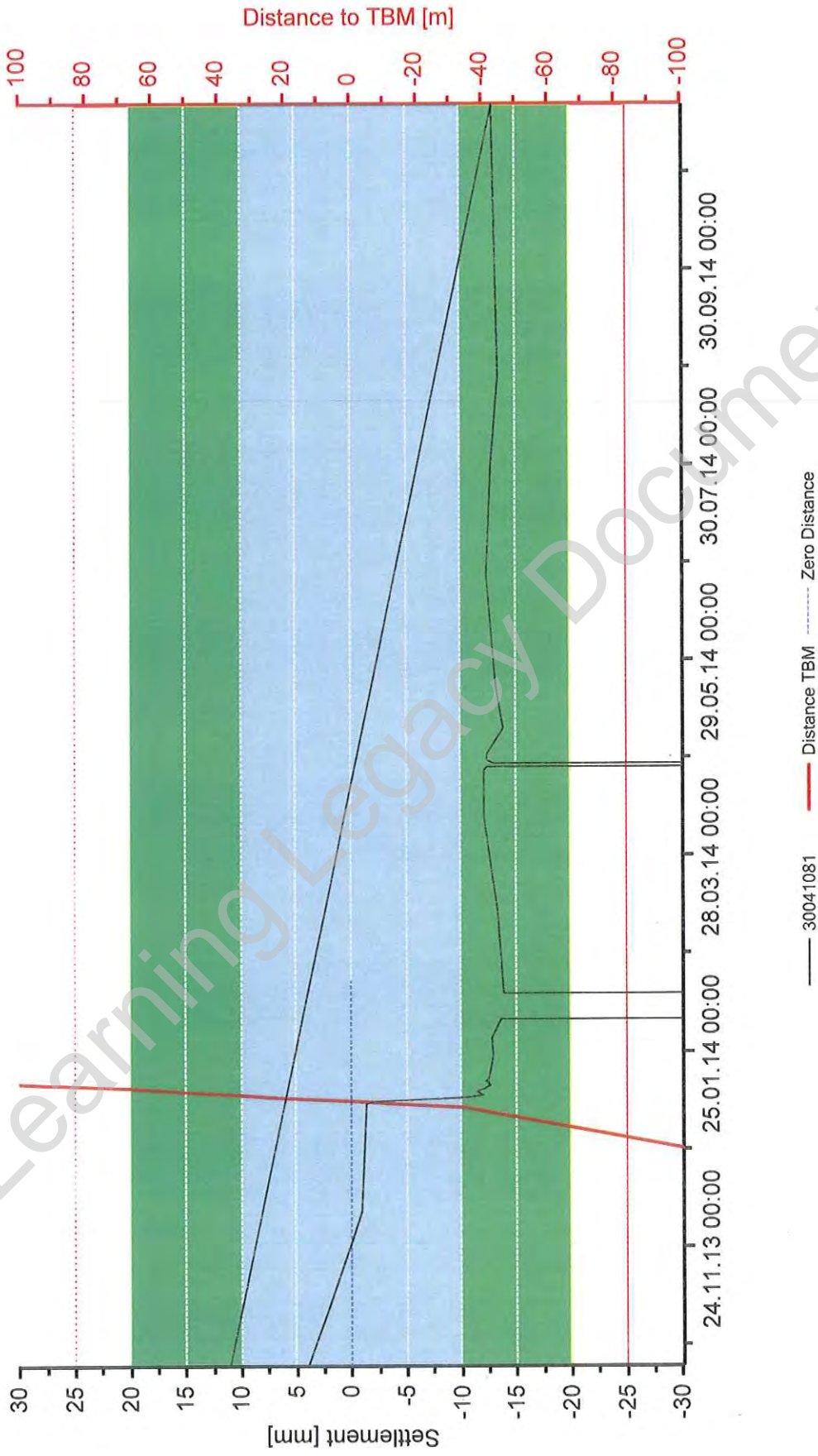




Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 16.01.2014 08:59



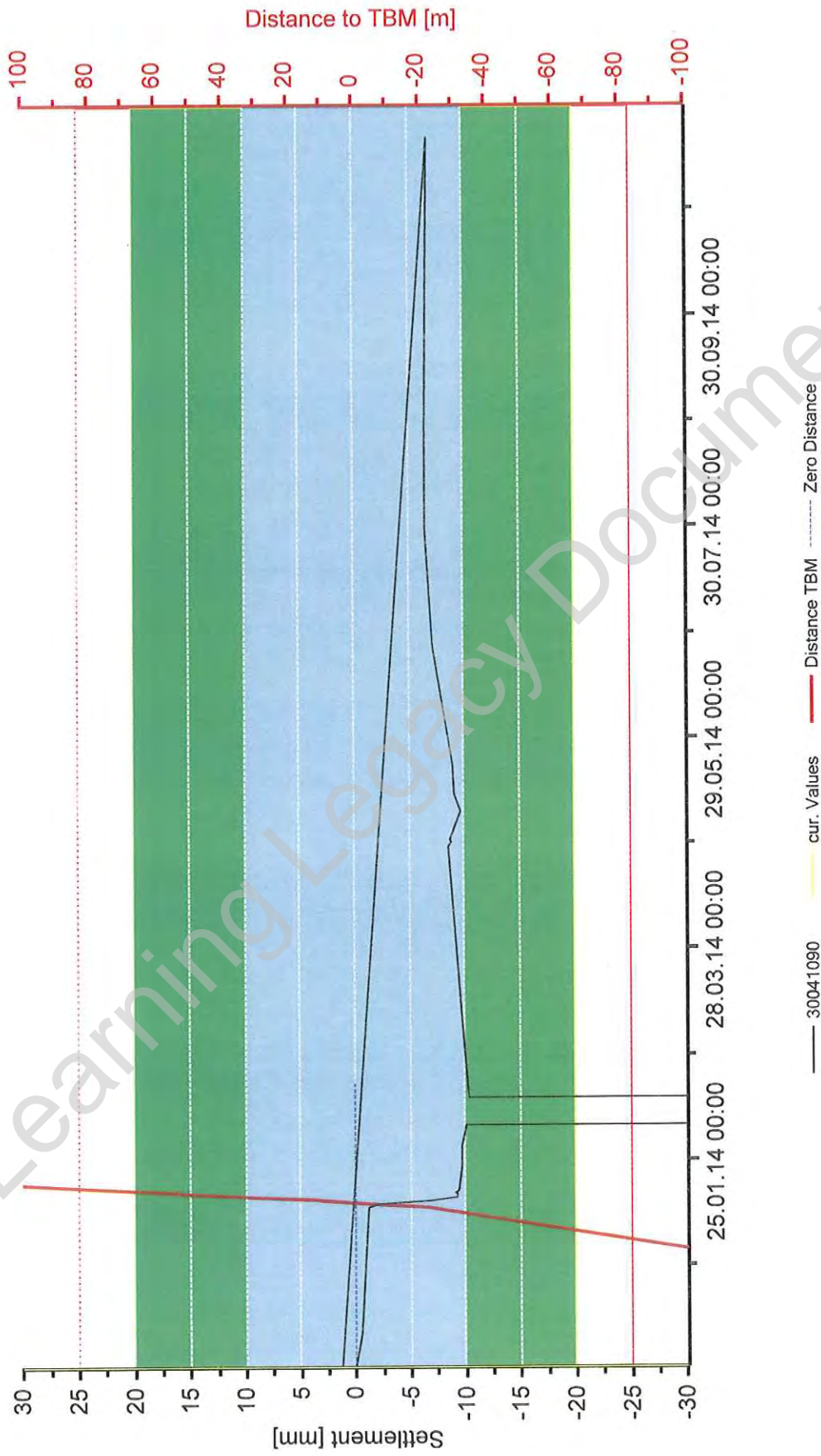
Point: 30041081



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - TRM Carpark - 17.10.2013 - 21.11.2014
Date: 20.01.2015 12:08 Current Values: 20.01.2015 11:53



Point: 30041090



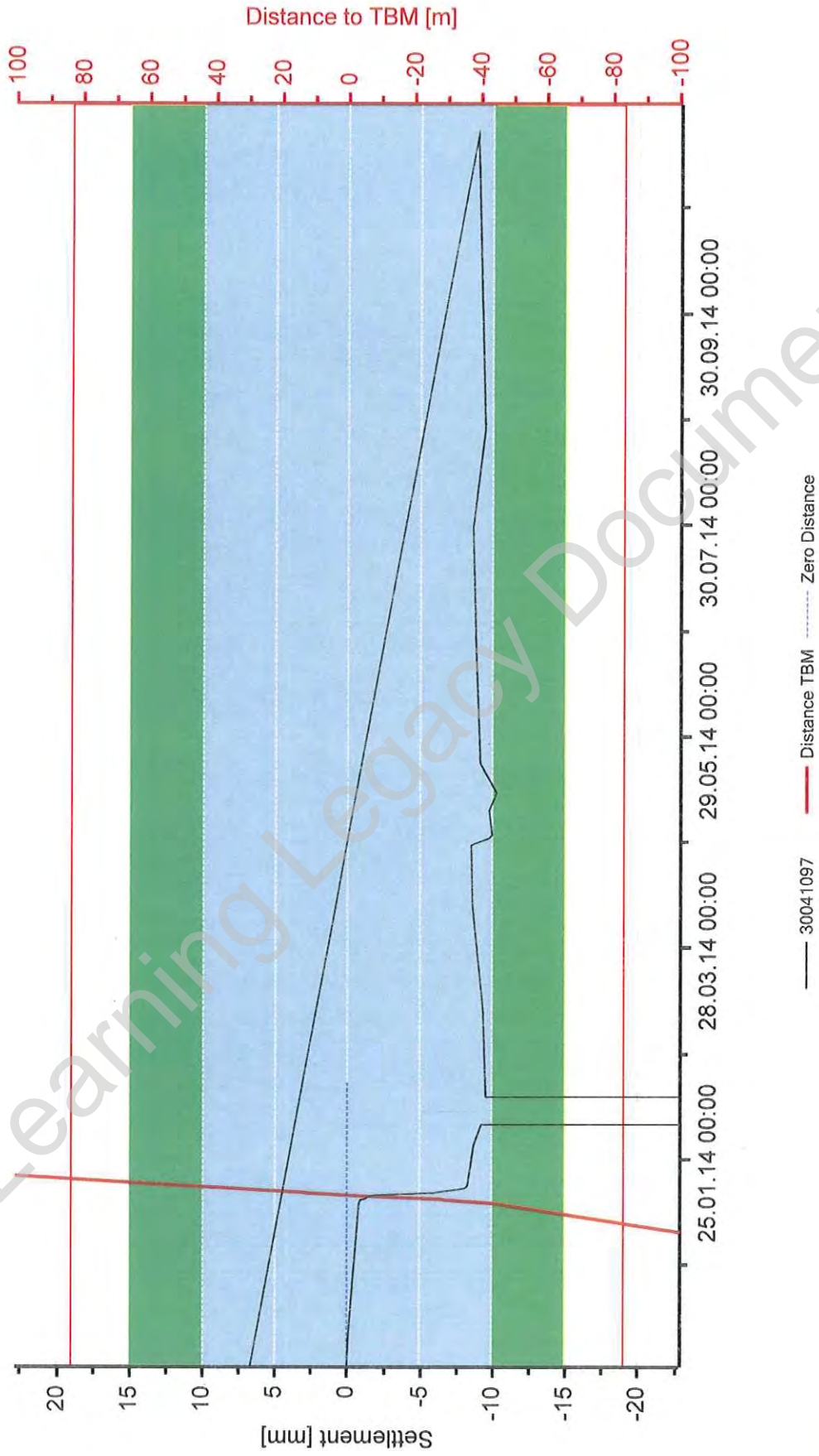
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

Close Out Report: WB Tunnel - TRM Carpark - 17.10.2013 - 21.11.2014

Date: 20.01.2015 12:11 Current Values: 20.01.2015 11:53

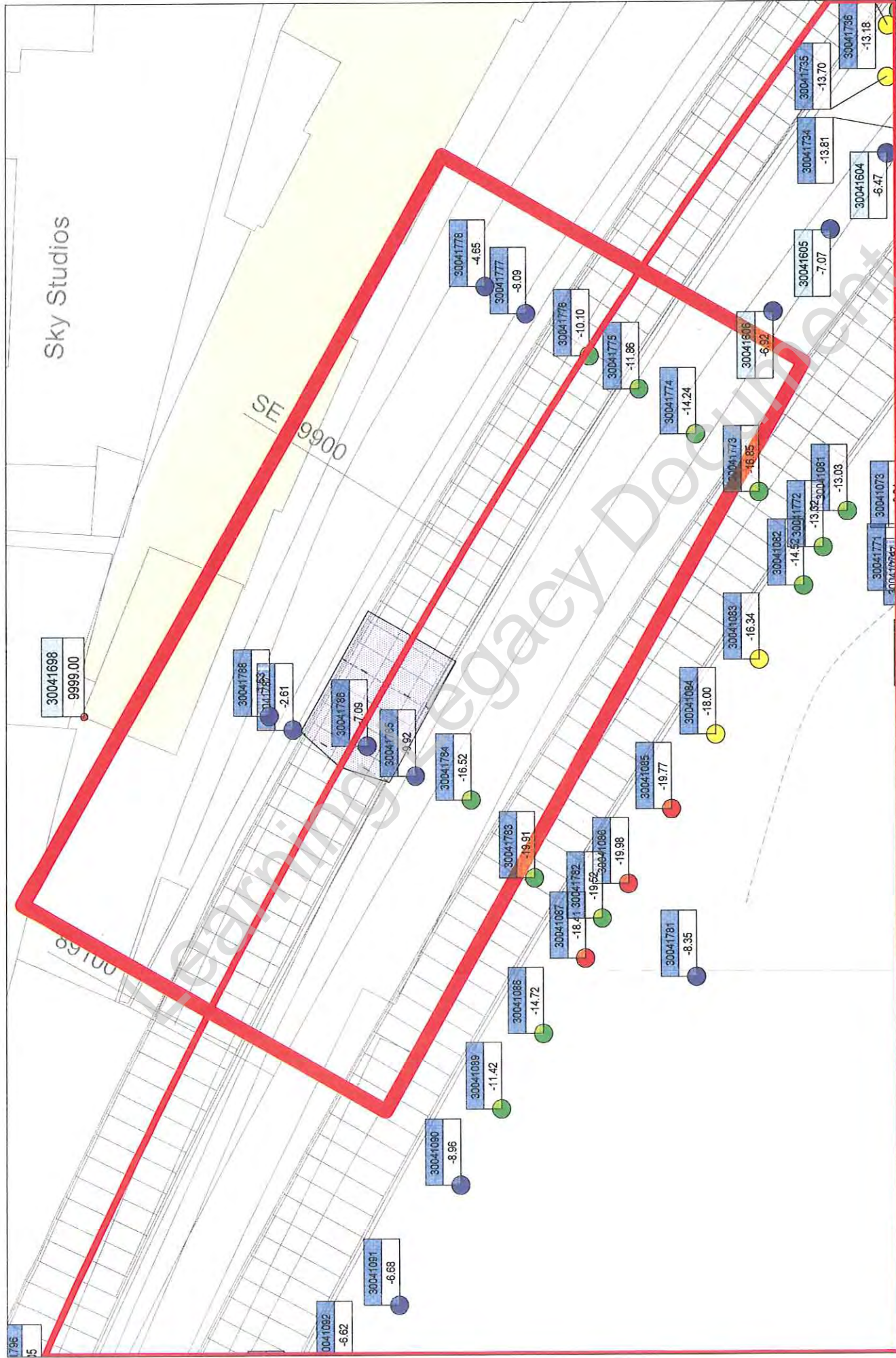


Point: 30041097



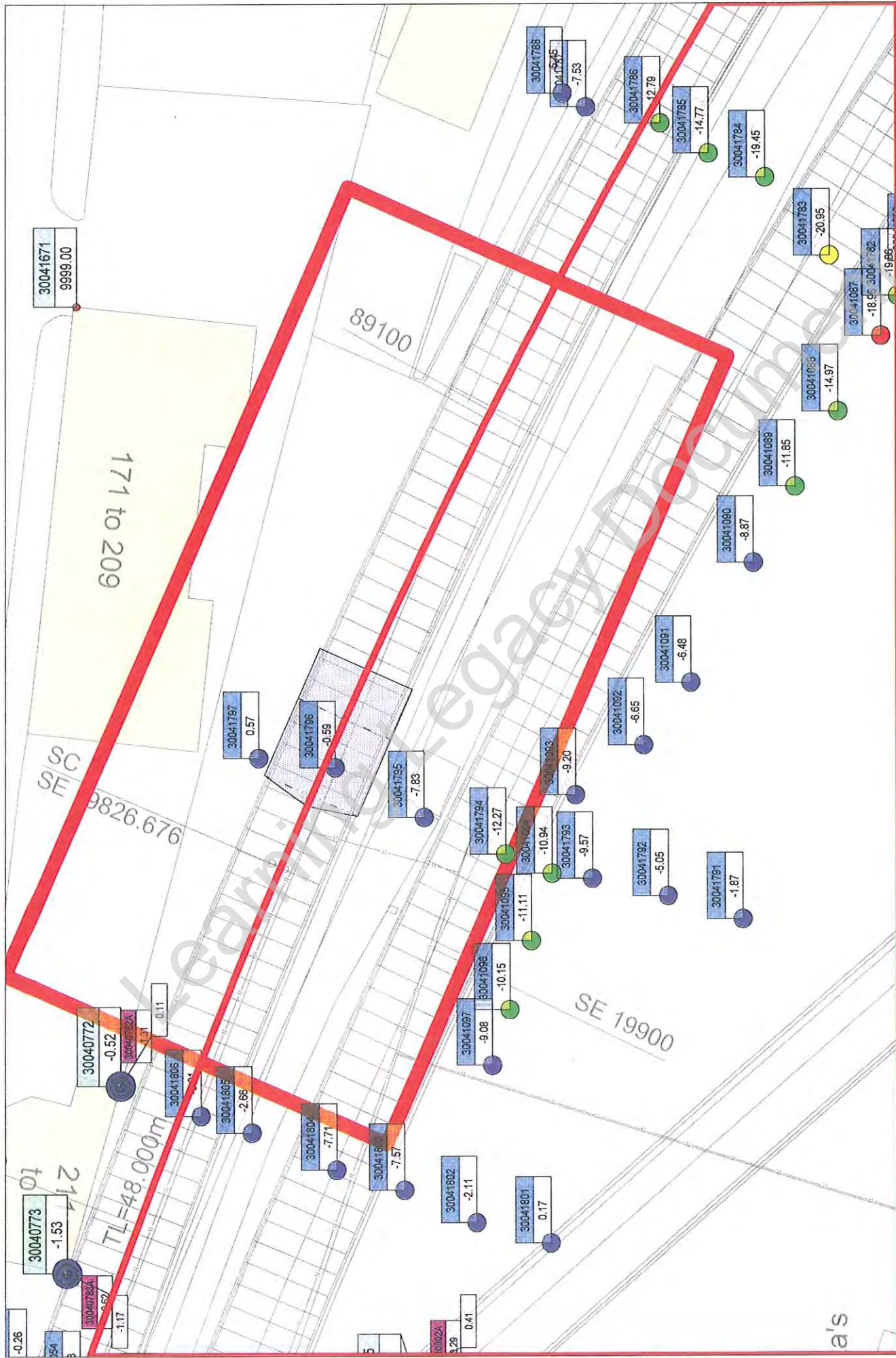
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - TRM Carpark - 17.10.2013 - 21.11.2014
Date: 20.01.2015 12:14 Current Values: 20.01.2015 12:06





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 26.04.2014 09:01

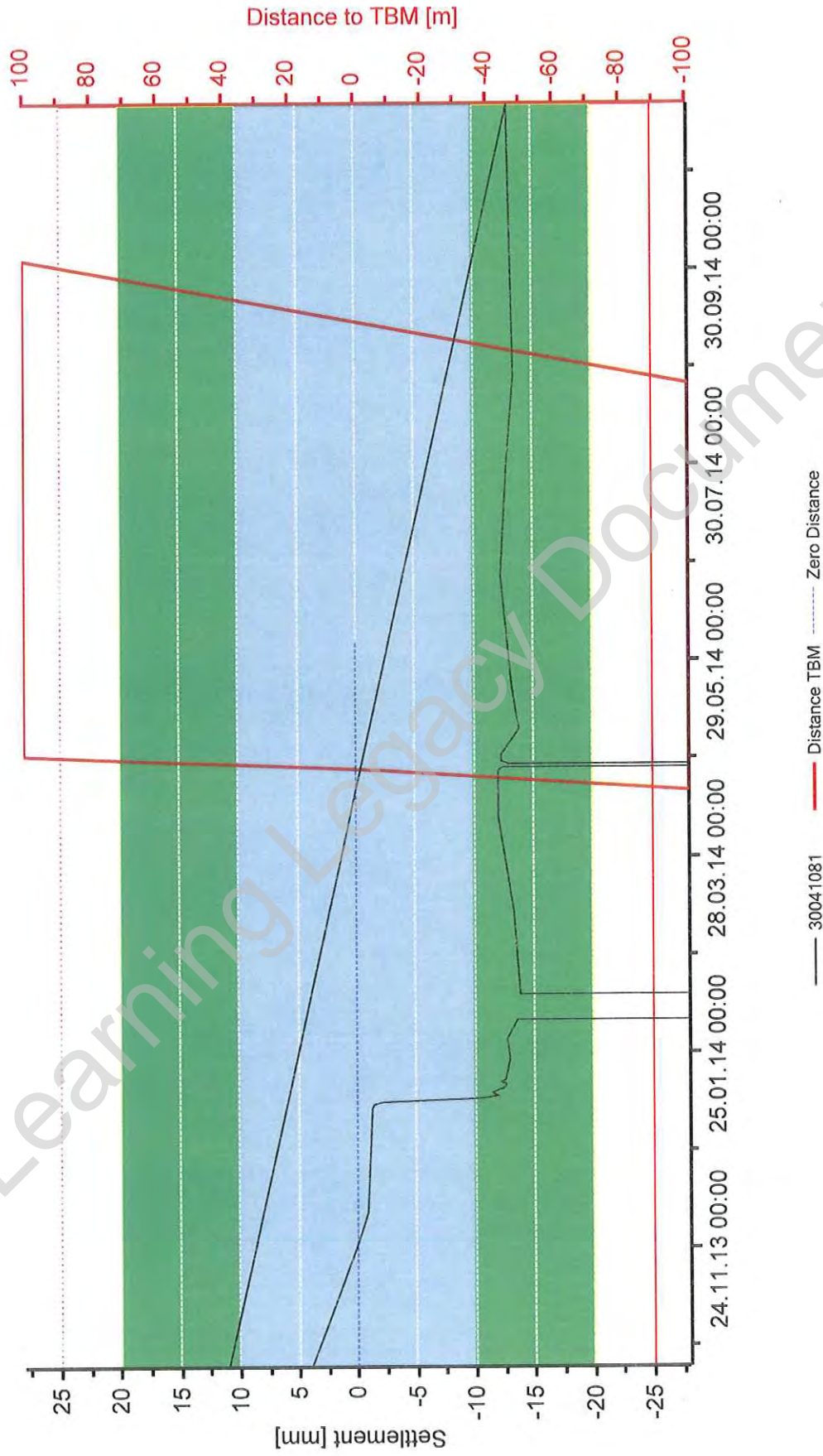




Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 28.04.2014 13:52



Point: 30041081



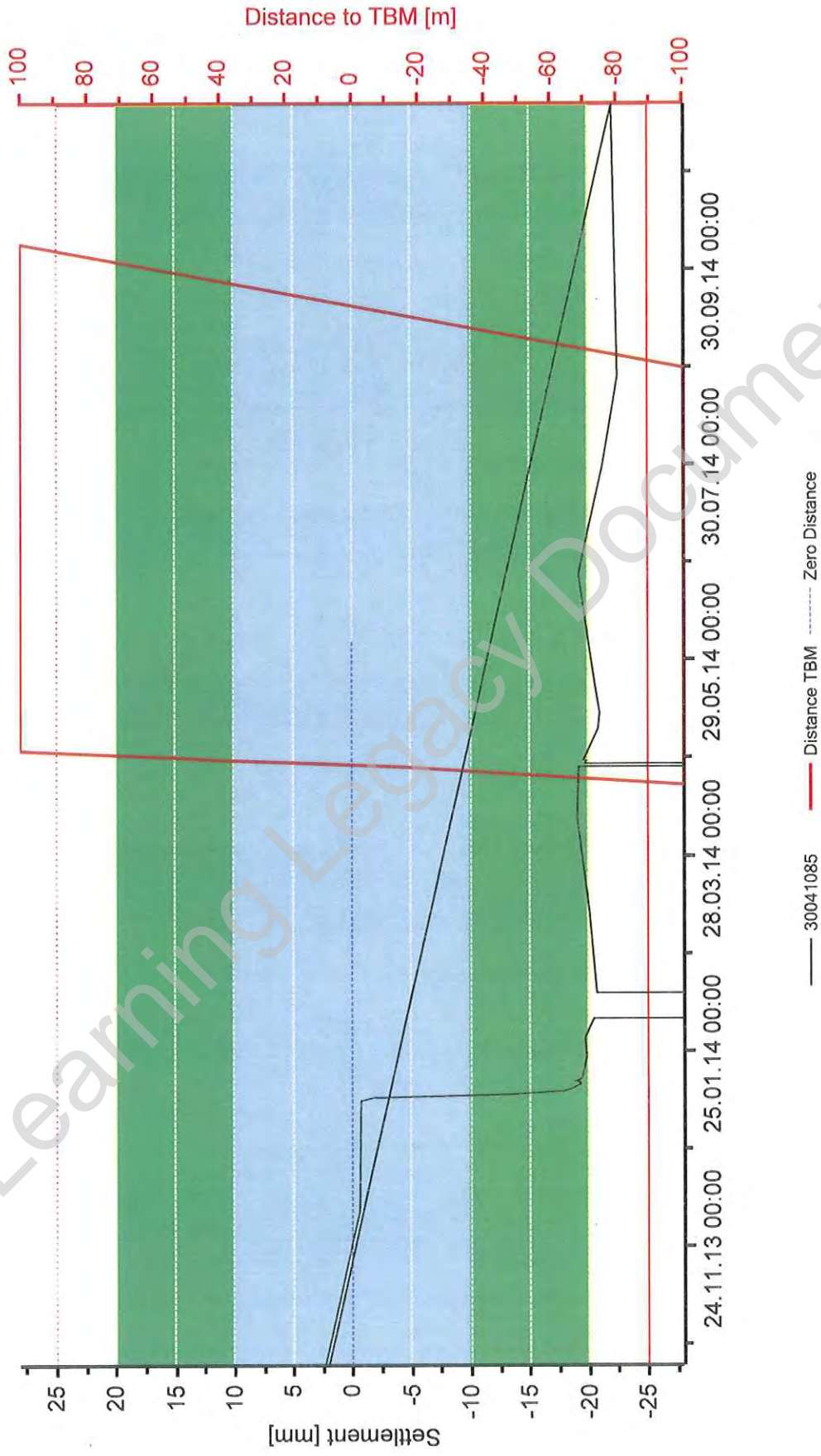
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

Close Out Report: EB Tunnel - TRM Carpark - 17.10.2013 - 21.11.2014

date: 20.01.2015 10:21 current values: 20.01.2015 09:39



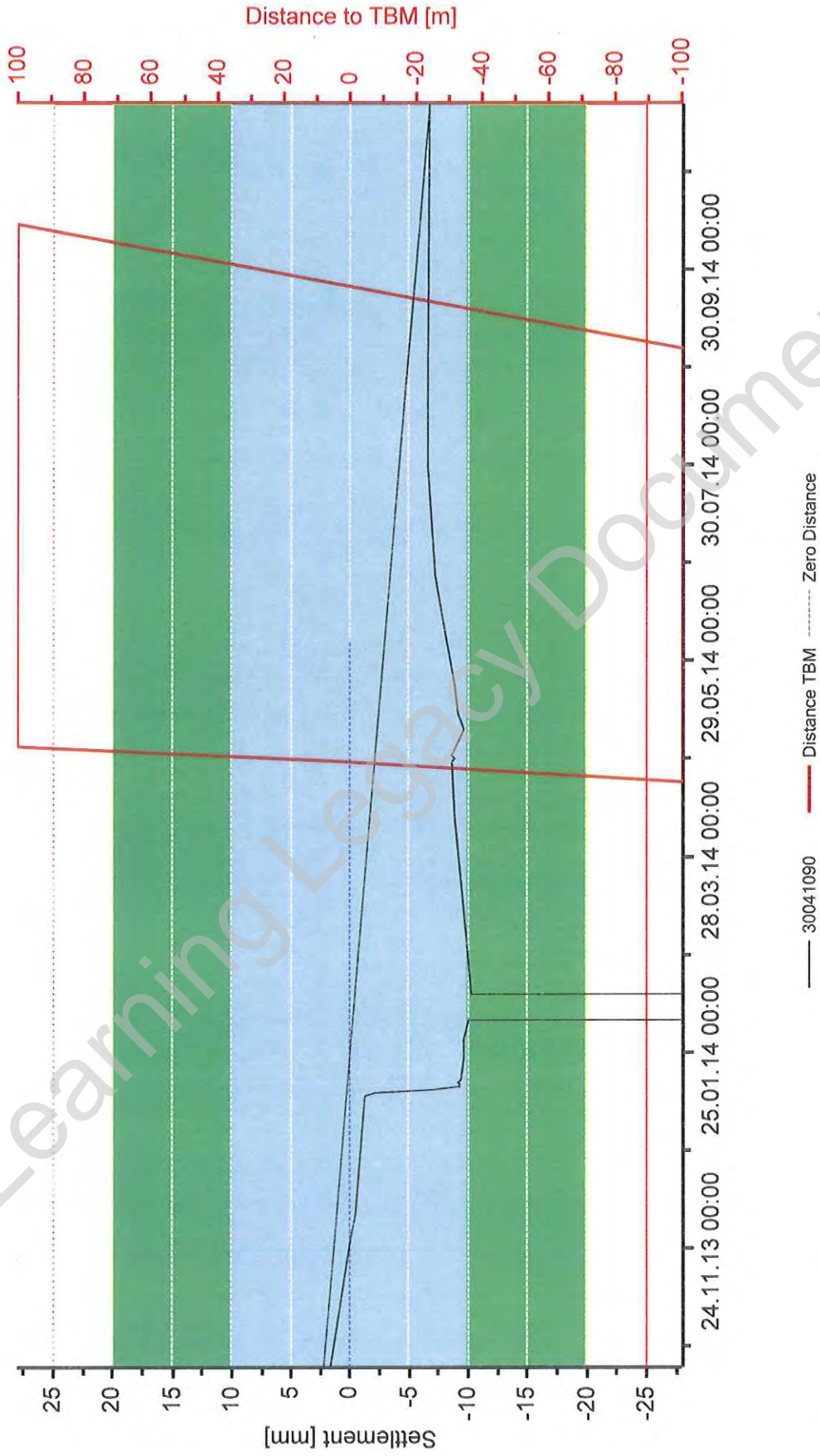
Point: 30041085



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - TRM Carpark - 17.10.2013 - 21.11.2014
date: 20.01.2015 10:24 current values: 20.01.2015 09:39



Point: 30041090

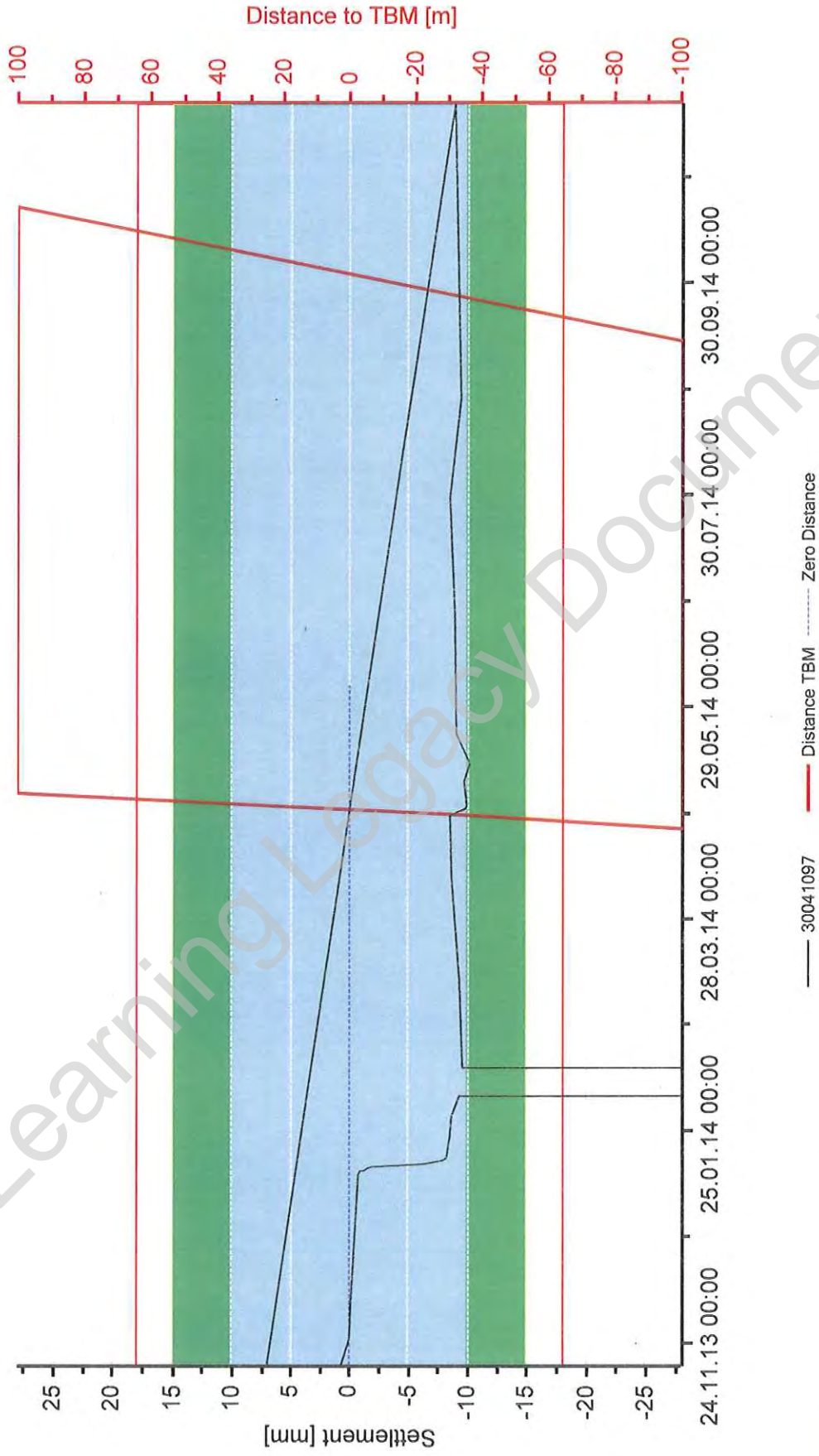


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

Close Out Report: EB Tunnel - TRM Carpark - 17.10.2013 - 21.11.2014

date: 20.01.2015 10:26 current values: 20.01.2015 09:39


Point: 30041097



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

Close Out Report: EB Tunnel - TRM Carpark - 17.10.2013 - 21.11.2014

date: 20.01.2015 10:32 current values: 20.01.2015 09:39

		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50025	Rev	1.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works North Embankment River Thames - North Woolwich Portal (excl. Store Rd)				

APPENDIX 93
TW Pumping Station - HLC

Learning Legacy Document

monitoring asset	TW Pumping Station		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70003		
name of monitoring section:	TW Pumping Station		
sensor type:	hydrostatic levelling cell (hlc)		
chainage:	89040	point no.:	3004 0791 - 3004 0799
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	08/03/13	0.00			
TBM 1	start ZOI	14/01/14	-2.54	3004 0795	
	end ZOI	19/01/14	-2.82	3005 0795	breached not any trigger value
TBM 2	start ZOI	29/04/14	-3.14	3006 0795	
	end ZOI	02/05/14	-2.80	3007 0795	breached not any trigger value
longterm	18/11/14	-1.91	3008 0795		

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

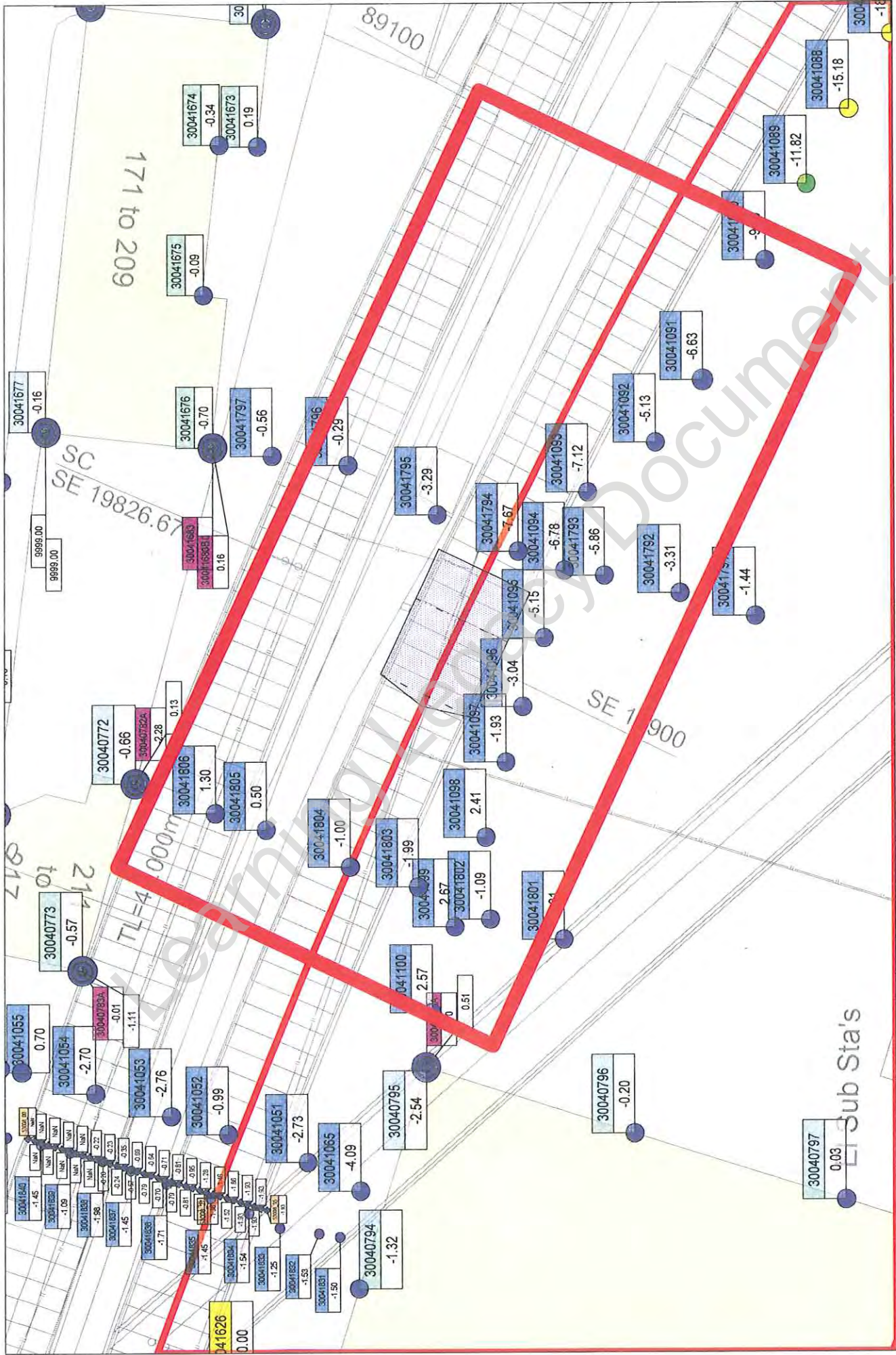
Under consideration of temperature differences and the achievable accuracy of the system, HMJV has no concern to cease the monitoring.
The rate of change in the monitoring data is less than the required standards as per the specifications and drawings.

date / signature: 19/11/2015

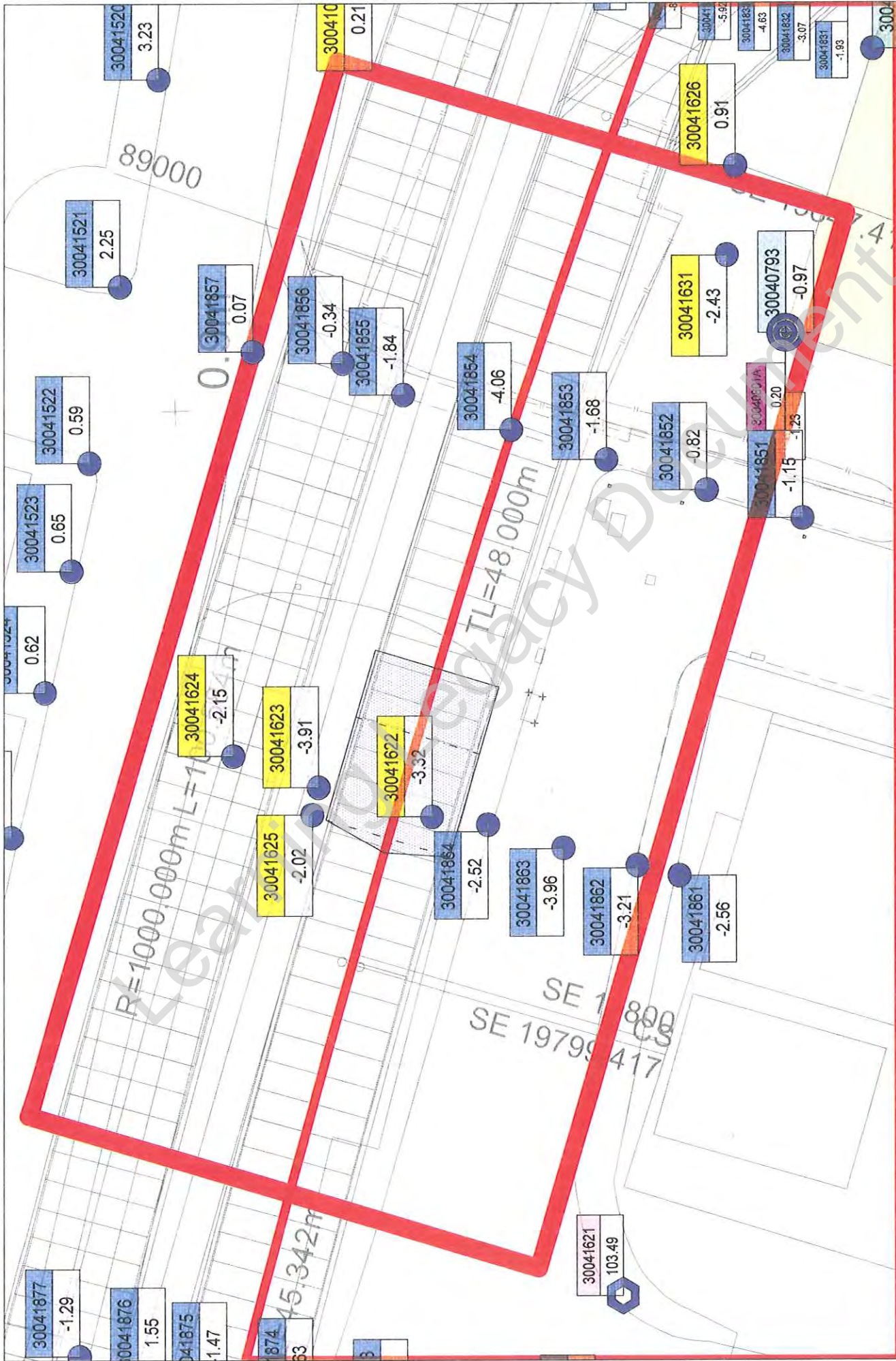
print name:

HMJV project role:

Monitoring & Survey Engineer

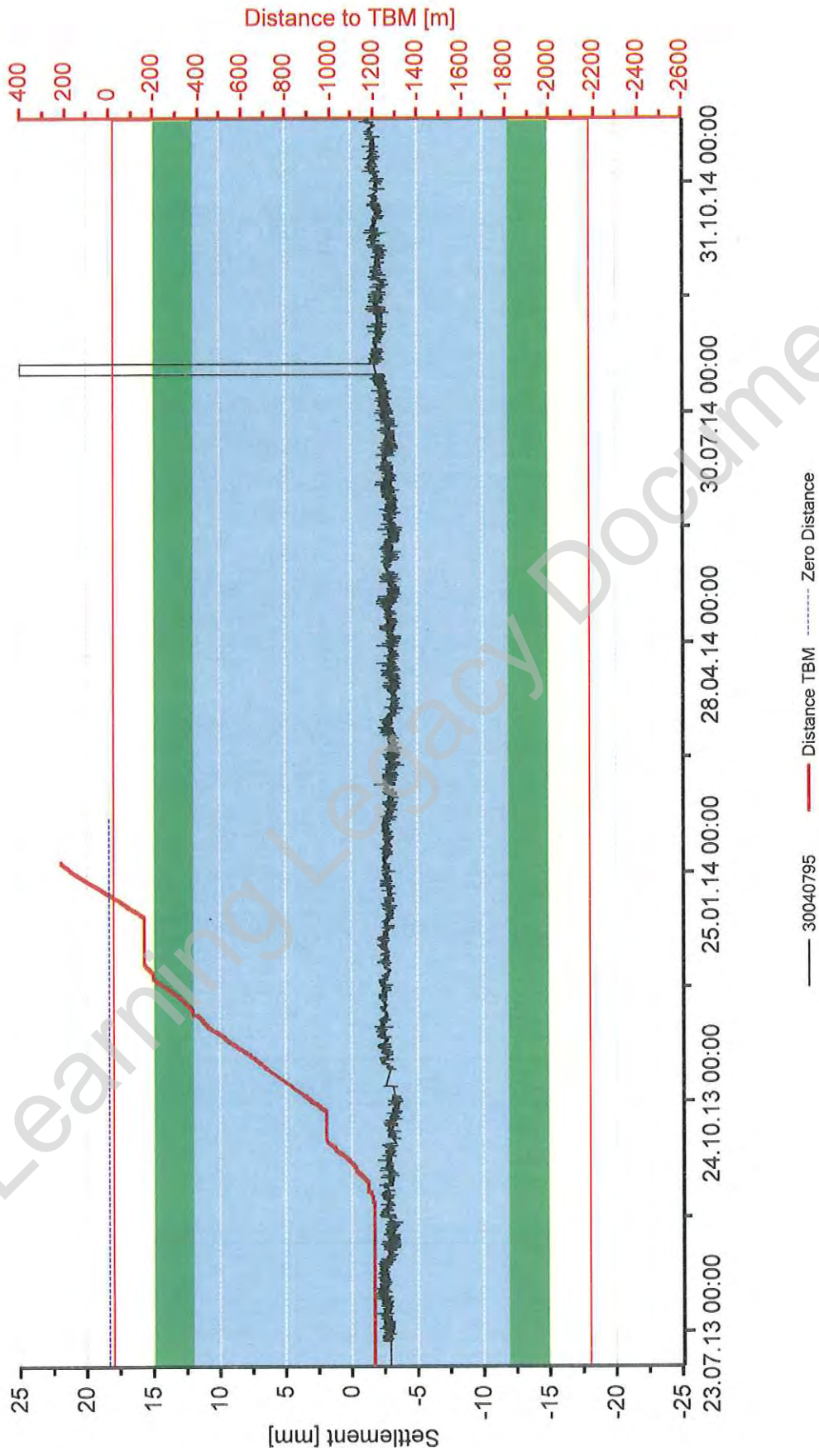


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 14.01.2014 17:37



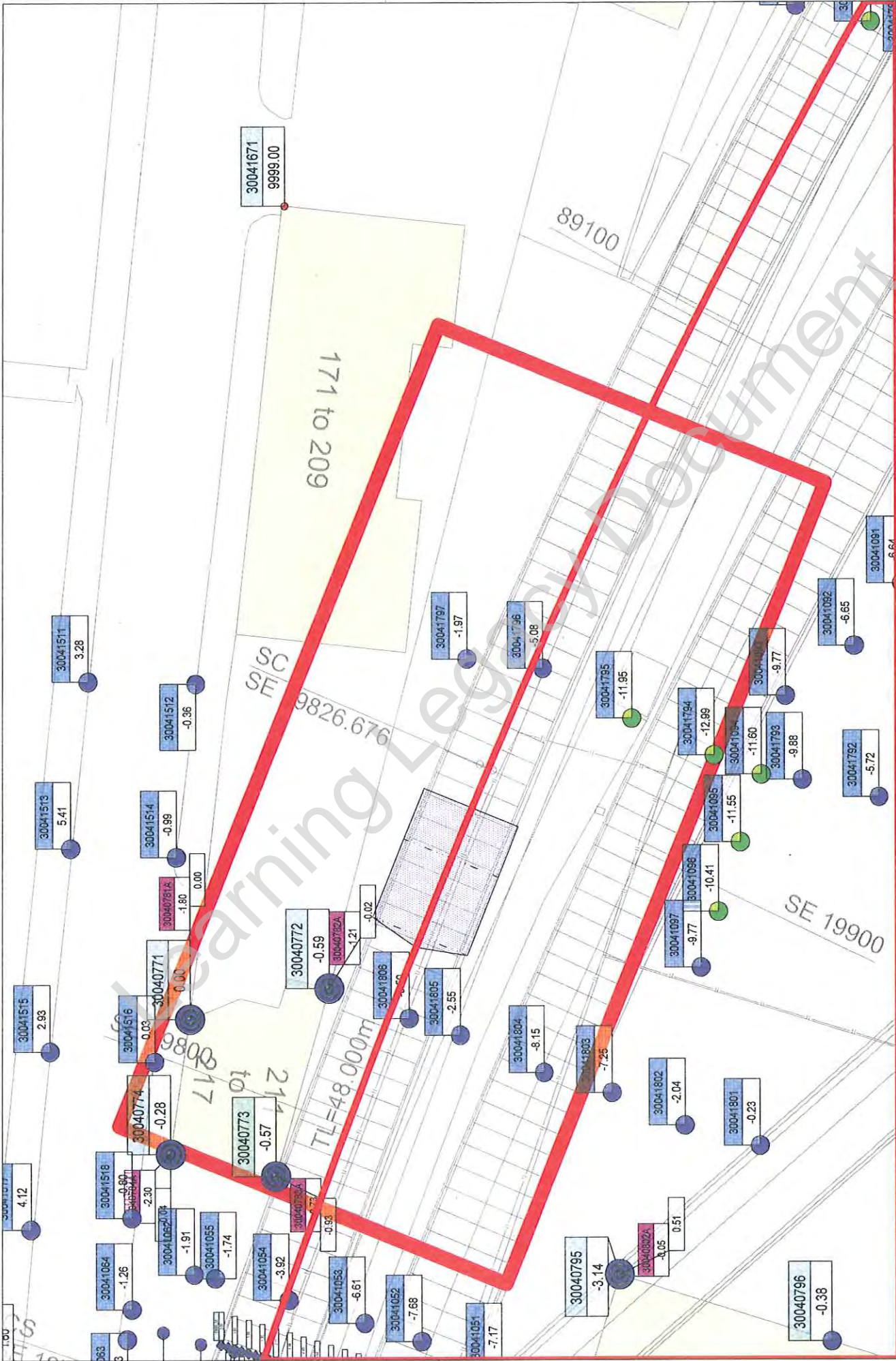
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 19.01.2014 18:06

Point: 30040795

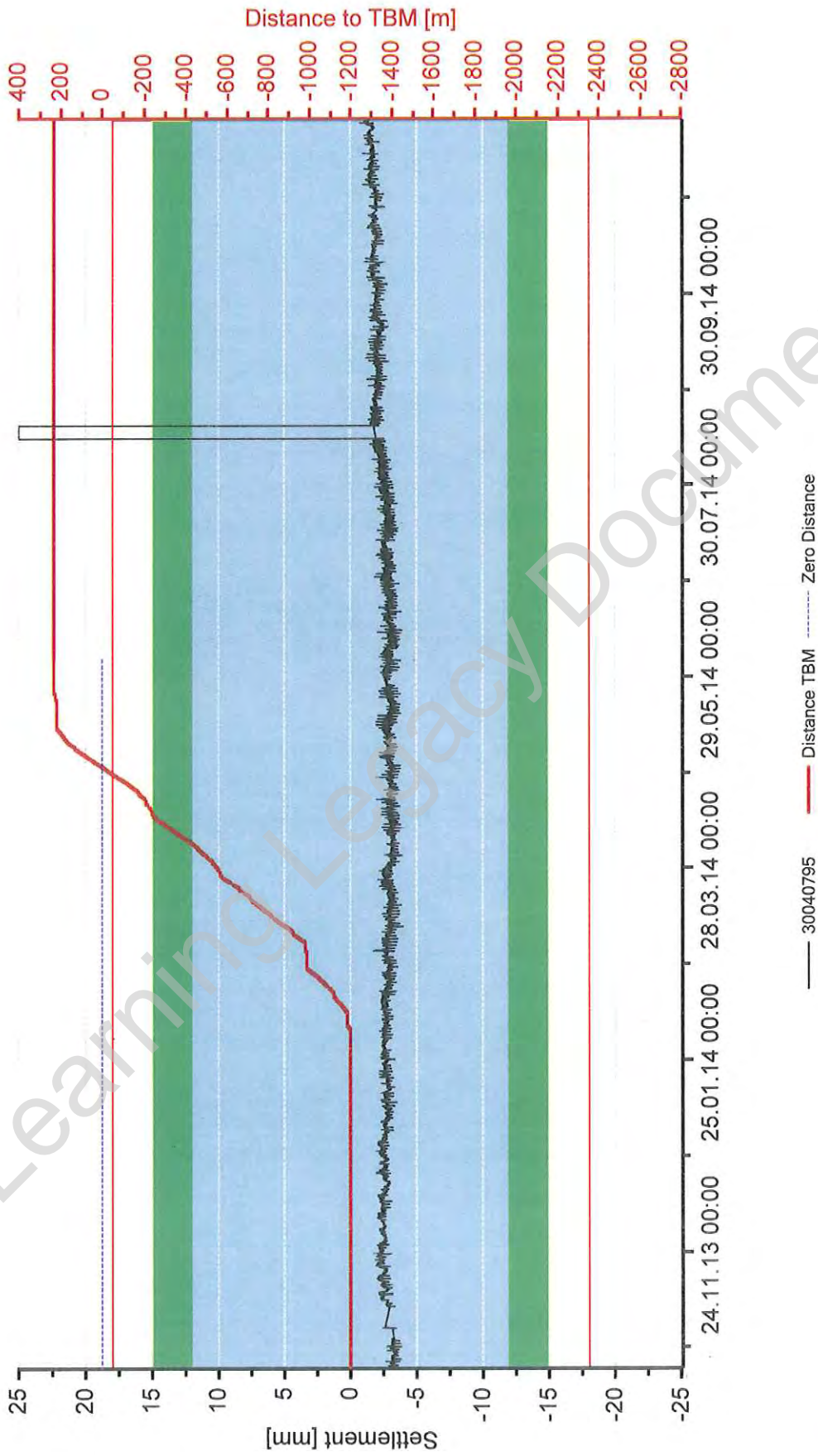


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel- TW Pumping station - 17.10.2013 - 21.11.2014
Date: 22.01.2015 10:06 Current Values: 22.01.2015 09:52






Point: 30040795



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - TW Pumping station - 17.10.2013 - 21.11.2014
date: 22.01.2015 09:57 current values: 22.01.2015 09:39



 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50025	Rev	1.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works North Embankment River Thames - North Woolwich Portal (excl. Store Rd)				

APPENDIX 94
TW Pumping Station - TM

Learning Legacy Document

monitoring asset	TW Pumping Station		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70003		
name of monitoring section:	TW Pumping Station		
sensor type:	tiltmeter		
chainage:	89040	point no.:	3004 0801 - 3004 0802
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	08/03/13	0.00			
TBM 1	start ZOI	14/01/14	0.90	3004 0802A	
	end ZOI	19/01/14	0.77	3005 0802A	breached not any trigger value
TBM 2	start ZOI	29/04/14	-0.05	3006 0802A	
	end ZOI	02/05/14	0.15	3007 0802A	breached not any trigger value
longterm	18/11/14	0.64	3008 0802A		

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)

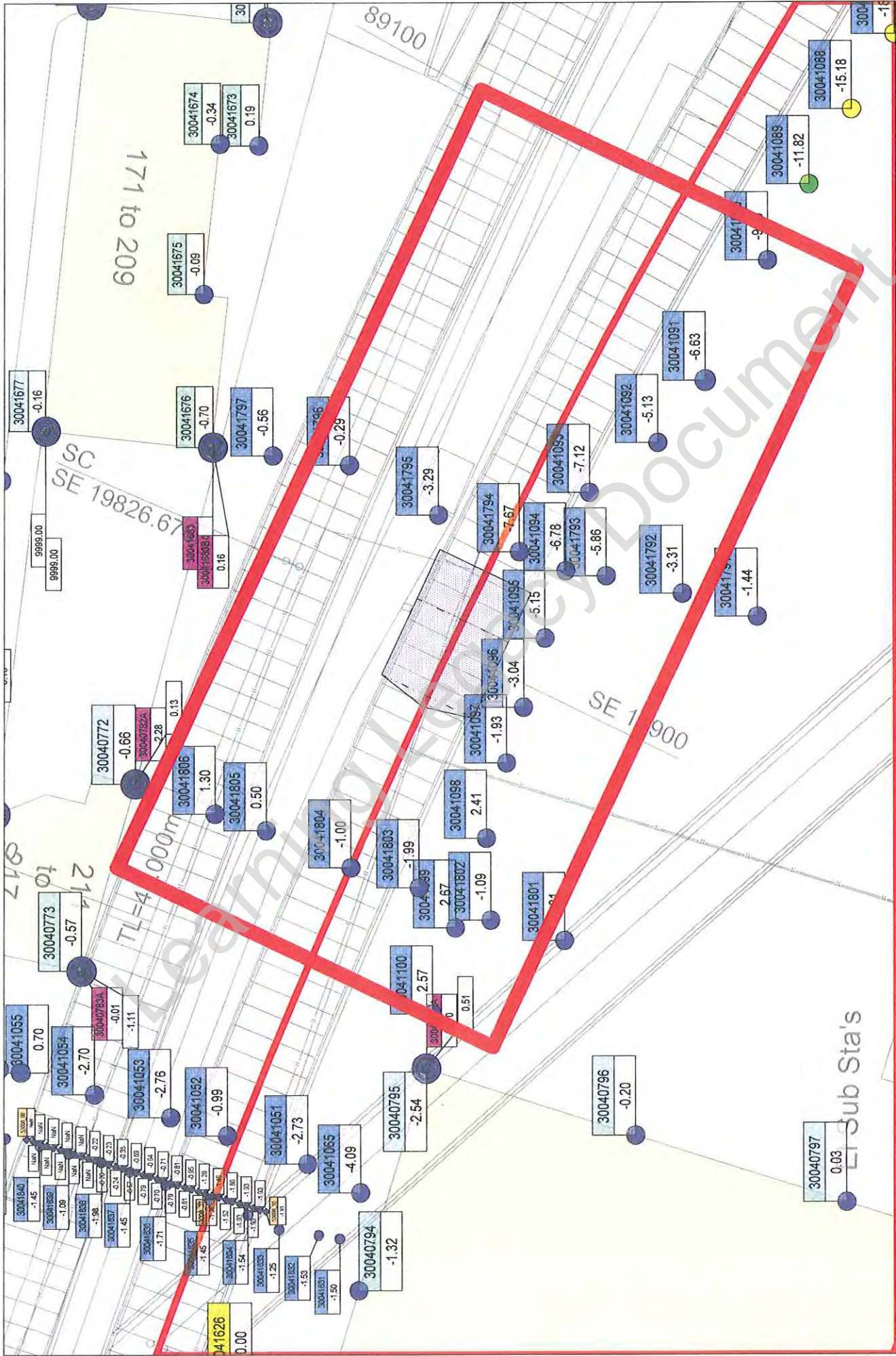
summary / comments

Under consideration of temperature differences and the achievable accuracy of the system, HMJV has no concern to cease the monitoring.
The rate of change in the monitoring data is less than the required standards as per the specifications and drawings.

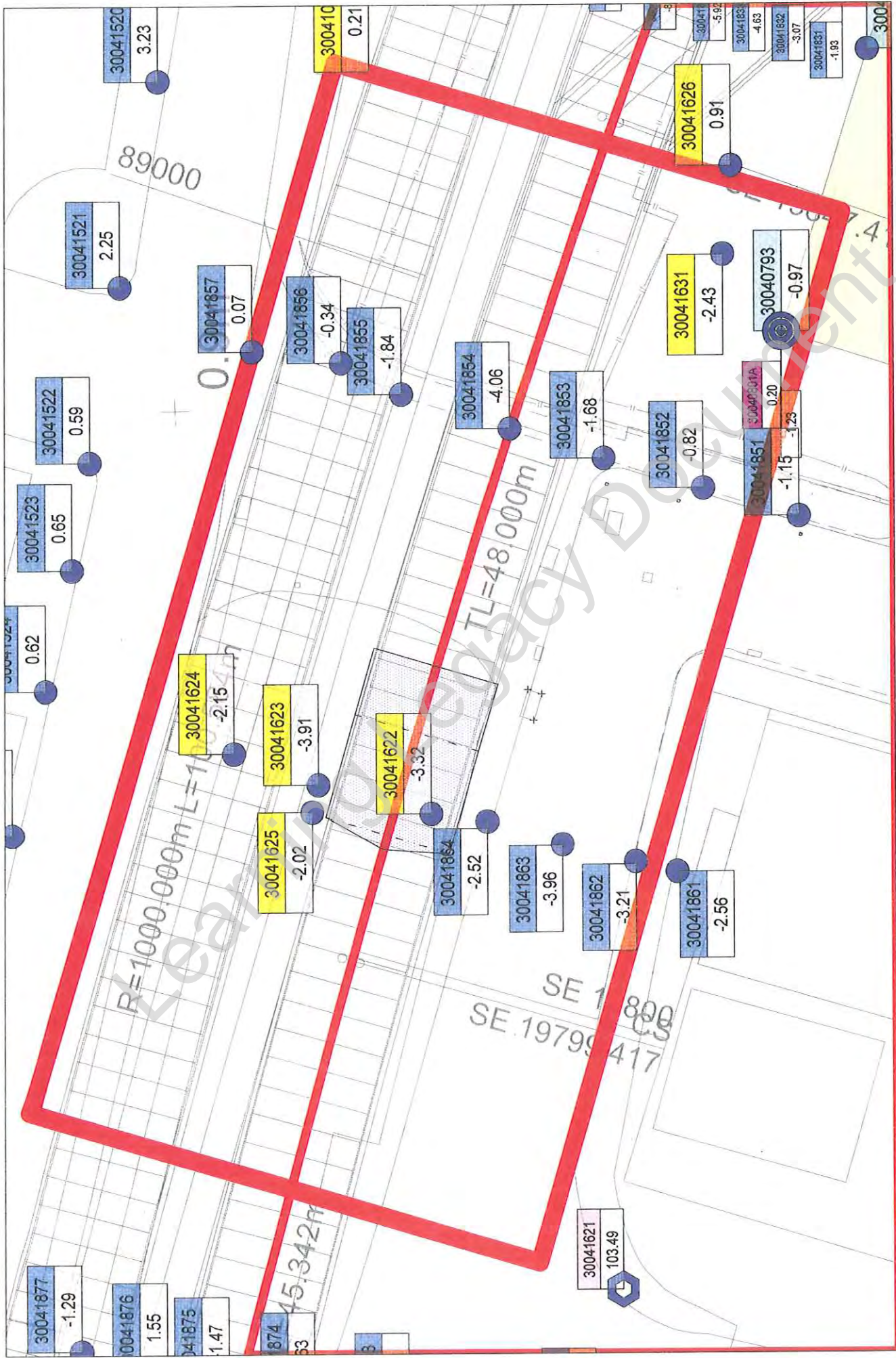
date / signature: 19/09/2015

print name: [REDACTED]

HMJV project role: Monitoring & Survey Engineer



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 14.01.2014 17:37



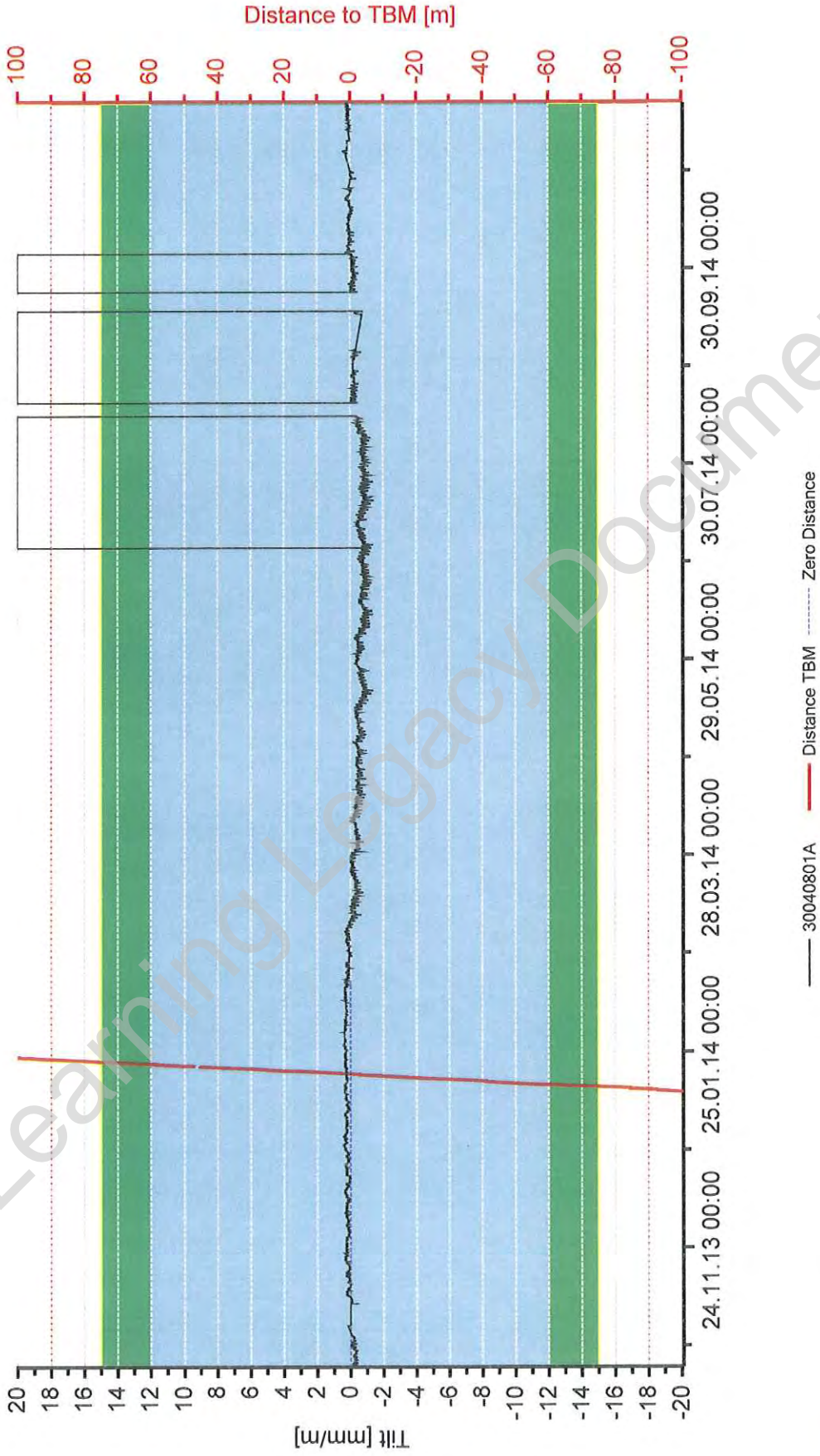
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

working activities: TBM drive WB

current values: 19.01.2014 18:06

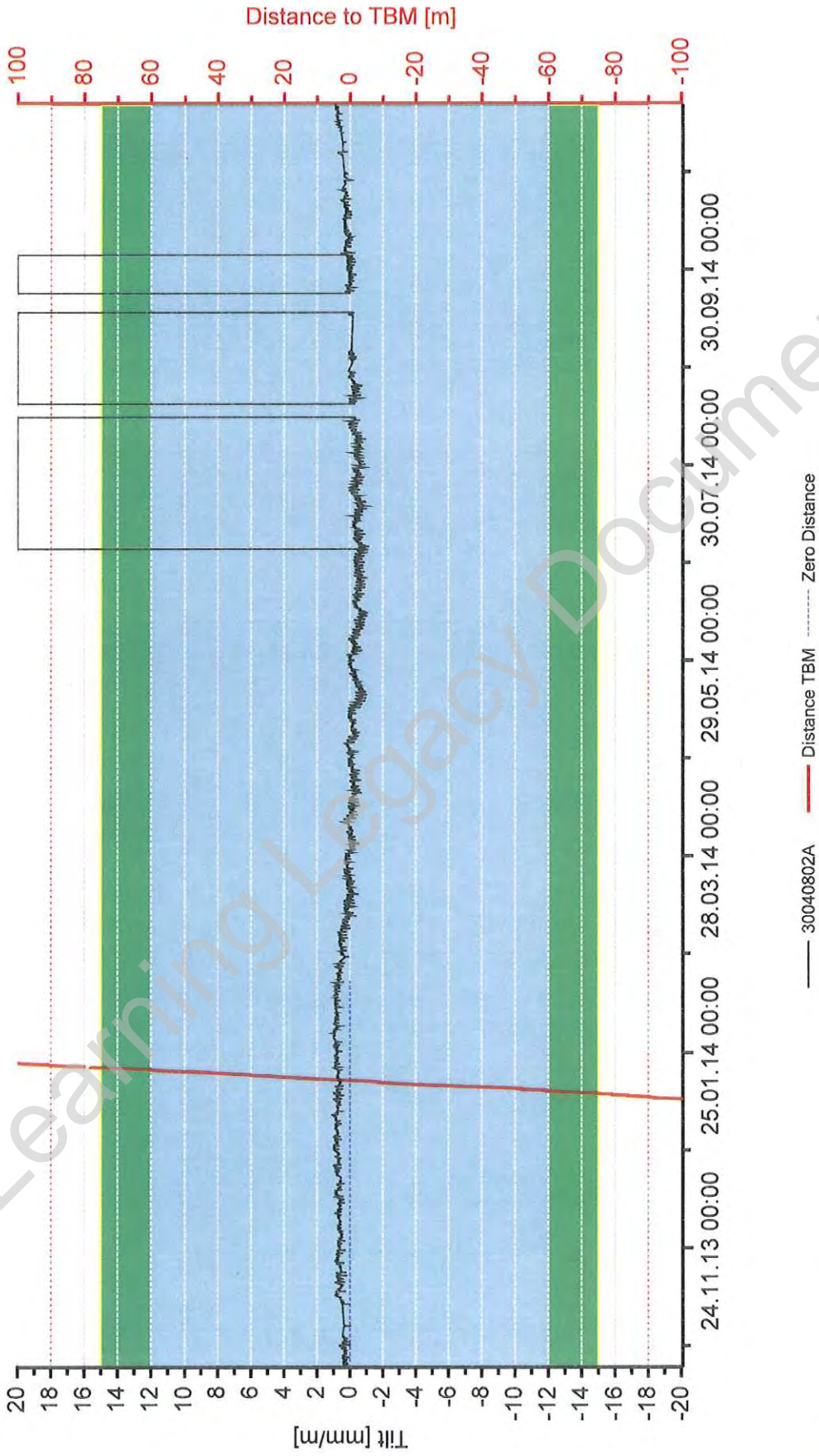


Point: 30040801A

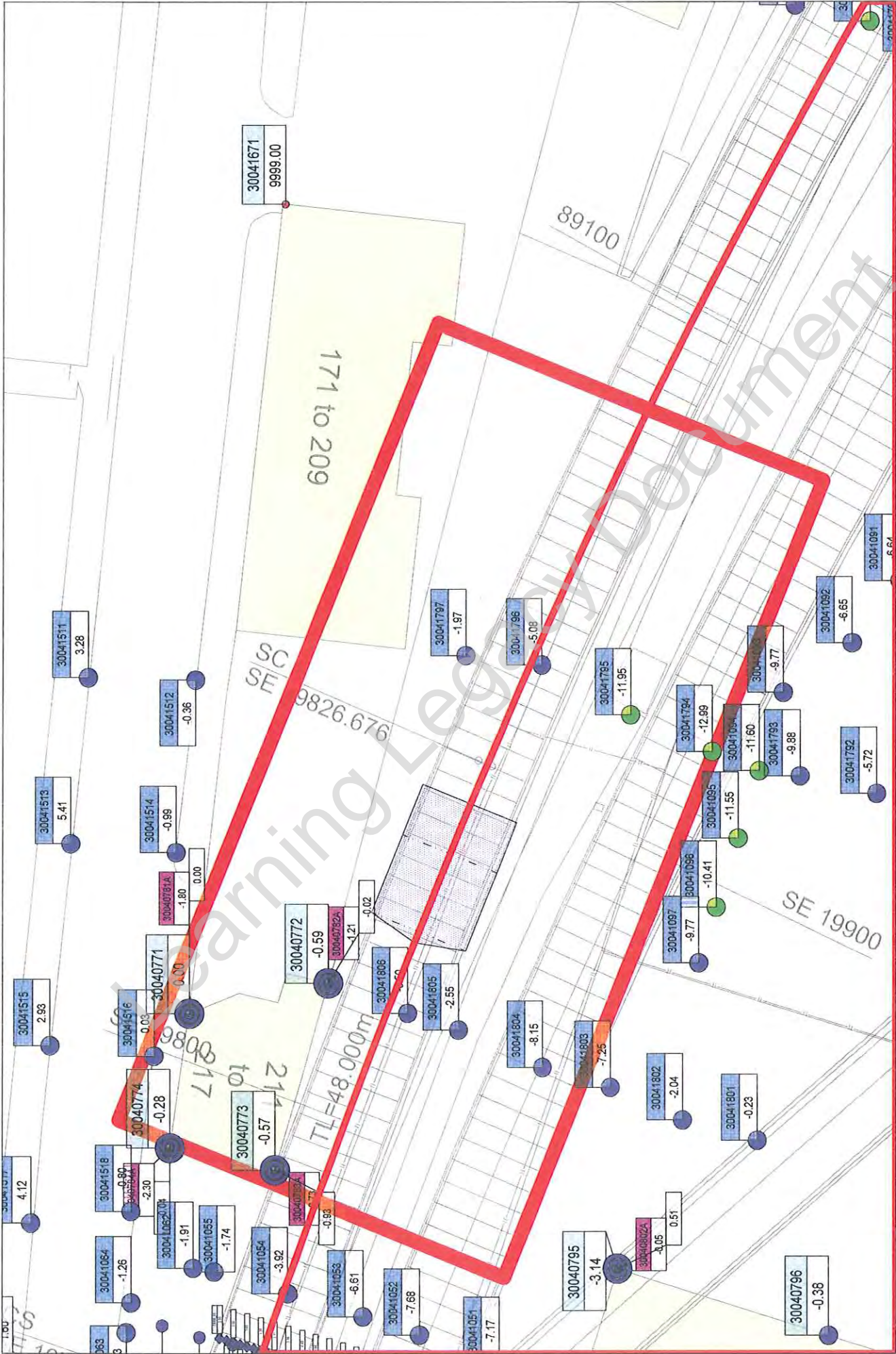


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - TW Pumping station - 17.10.2013 - 21.11.2014
Date: 20.01.2015 14:23 Current Values: 20.01.2015 13:28

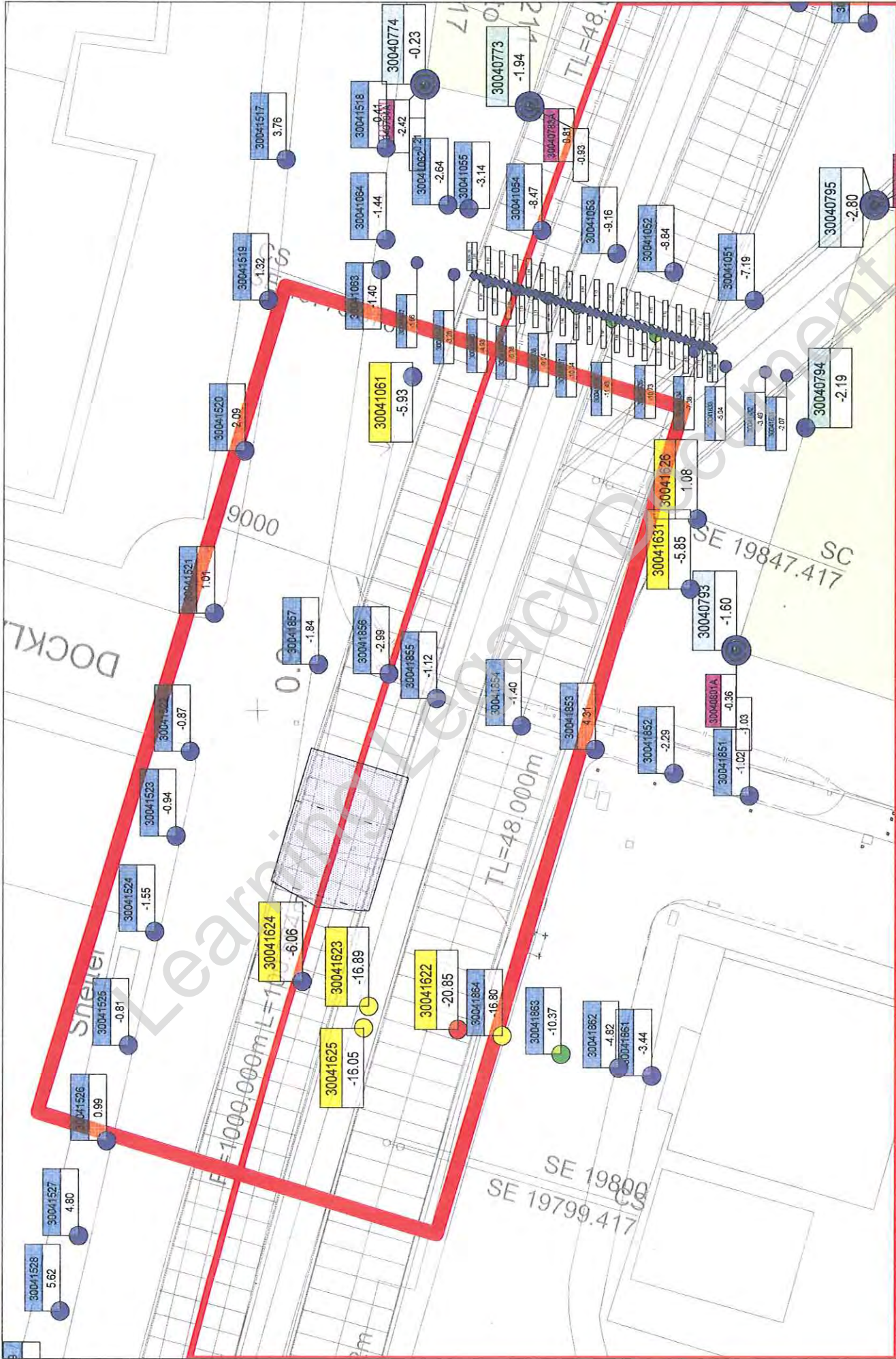
Point: 30040802A



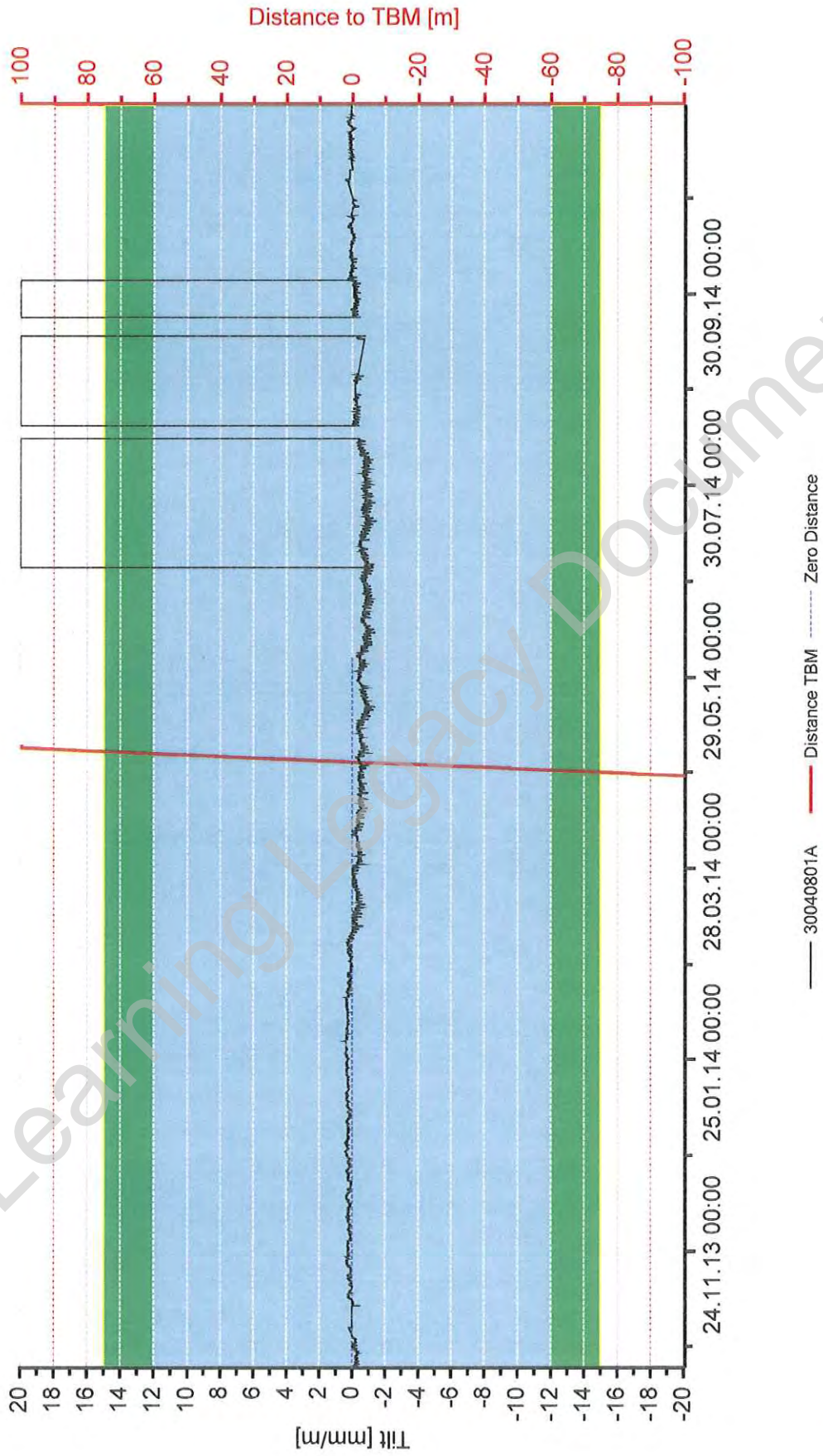
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - TW Pumping station - 17.10.2013 - 21.11.2014
Date: 20.01.2015 14:21 Current Values: 20.01.2015 13:28



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 29.04.2014 09:57



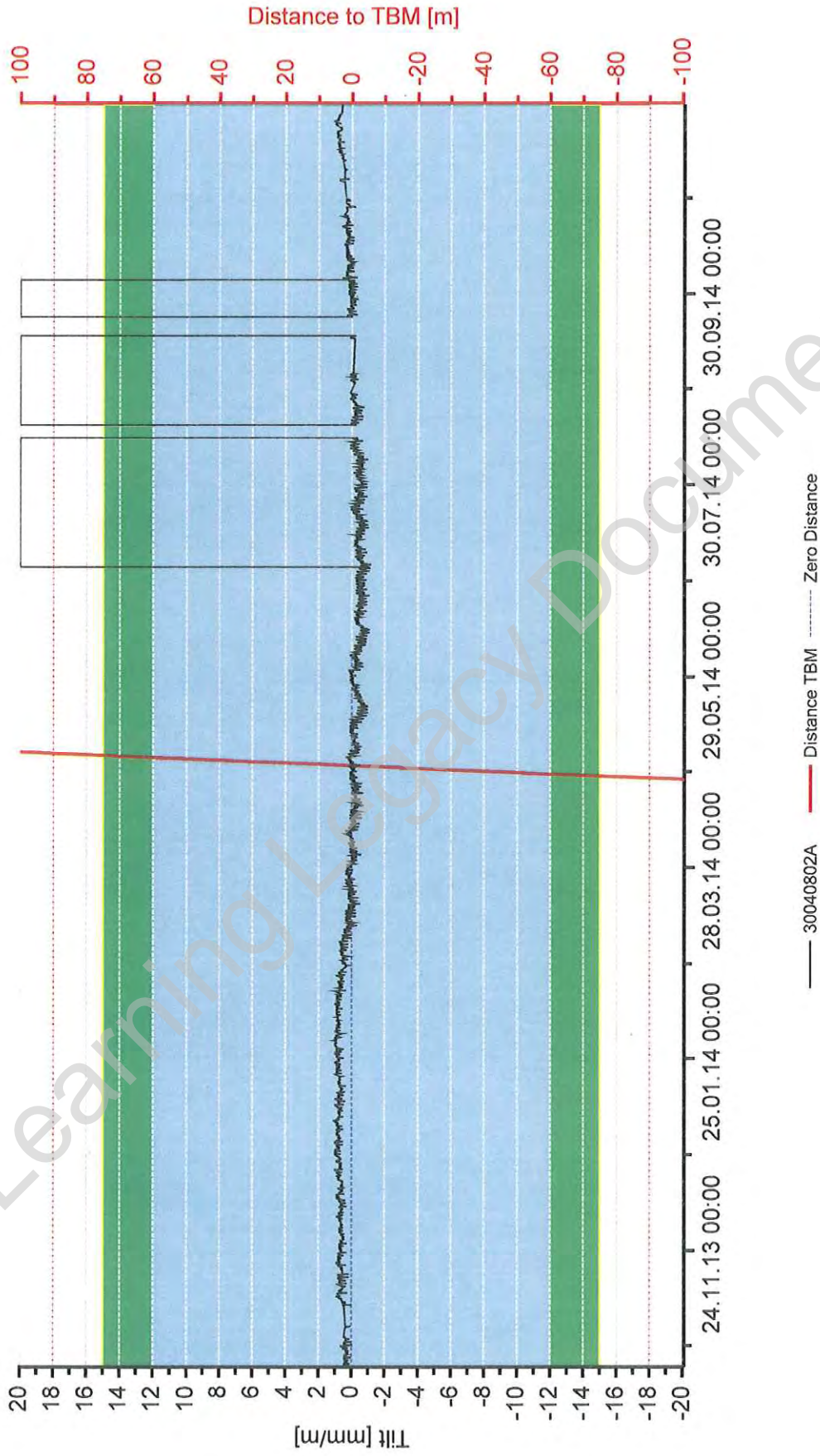
Point: 30040801A



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - TW Pumping station - 17.10.2013 - 21.11.2014
date: 20.01.2015 16:17 current values: 20.01.2015 13:28




Point: 30040802A



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - TW Pumping station - 17.10.2013 - 21.11.2014
date: 20.01.2015 16:19 current values: 20.01.2015 13:28



 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50025	Rev	1.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works North Embankment River Thames - North Woolwich Portal (excl. Store Rd)				

APPENDIX 98

CS 28 – Pumping Station – CH 89055

Learning Legacy Document

monitoring asset	TW Pumping Station		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70003		
name of monitoring section:	CS 28 Pumping Station		
sensor type:	manual levelling studs		
chainage:	89055	point no.:	3004 1801 - 3004 1806
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	14/11/13		0.00		
TBM 1	start ZOI	14/01/14	-1.00	3004 1804	
	end ZOI	17/01/14	-7.65	3005 1804	breached not any trigger value
TBM 2	start ZOI	28/04/14	-0.01	3006 1806	
	end ZOI	01/05/14	-5.70	3007 1806	breached not any trigger value
longterm	21/11/14		-5.50	3008 1804	

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)

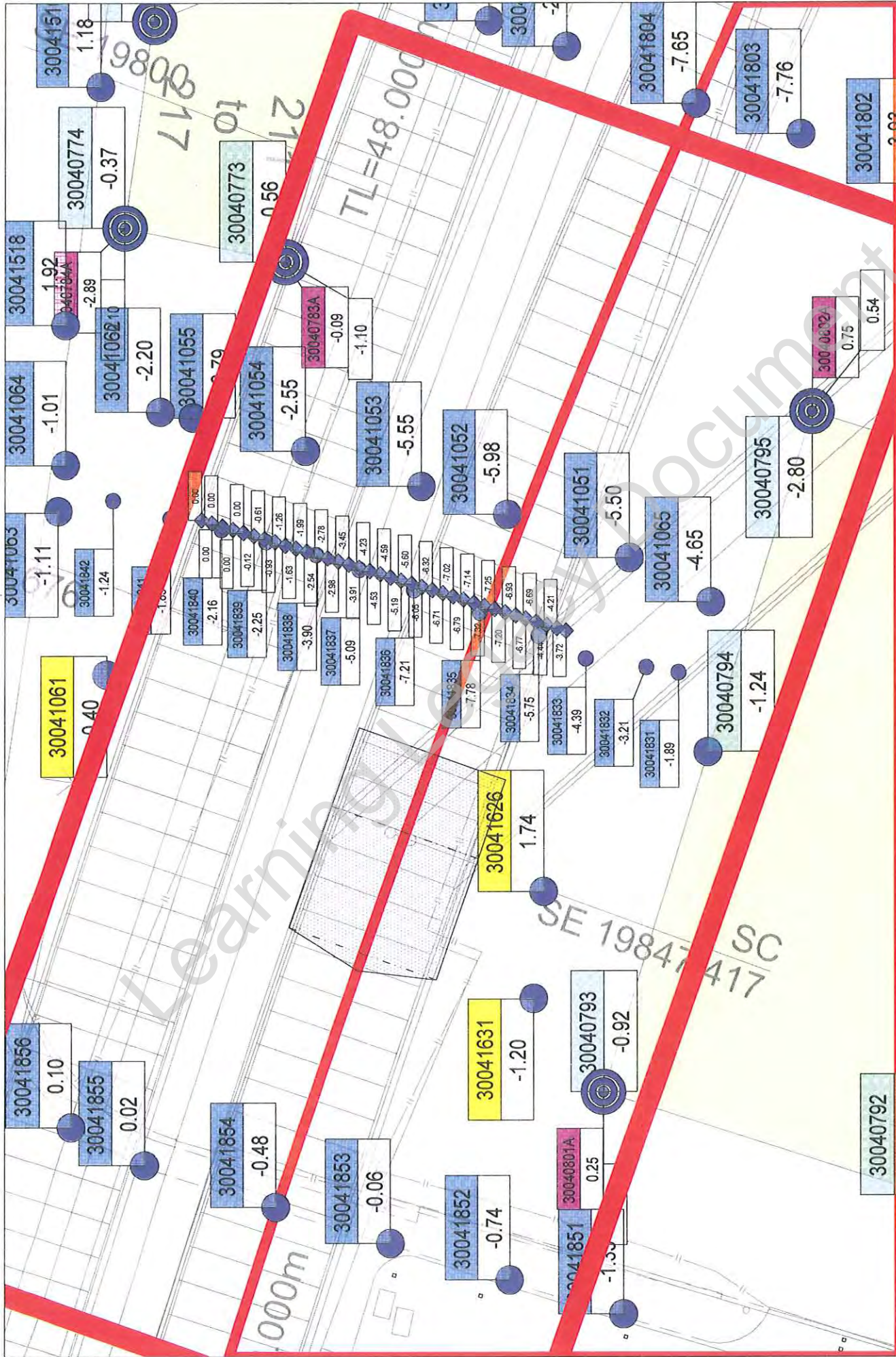
summary / comments

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: 19/11/2015

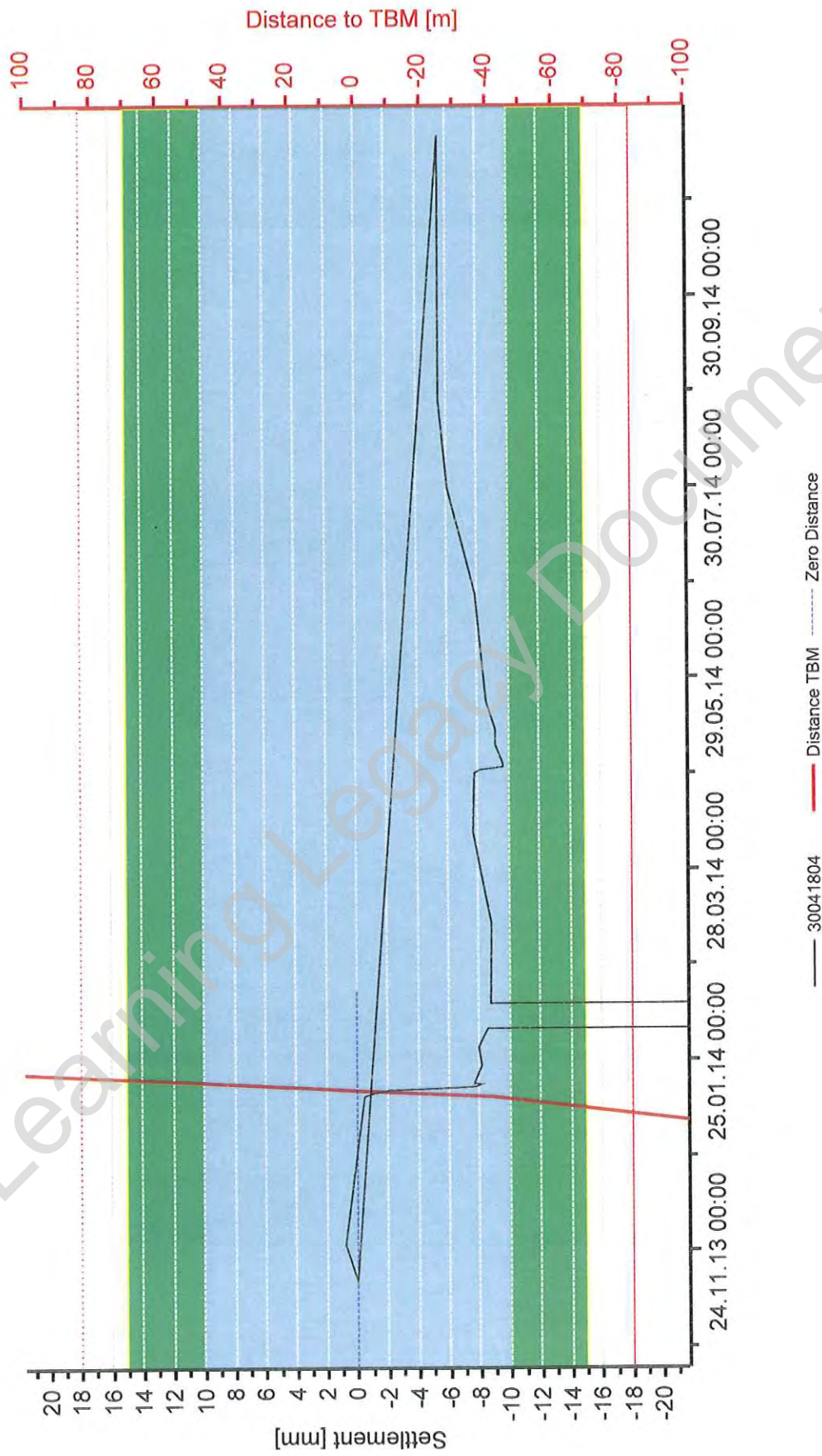
print name:

HMJV project role: Monitoring & Survey engineer



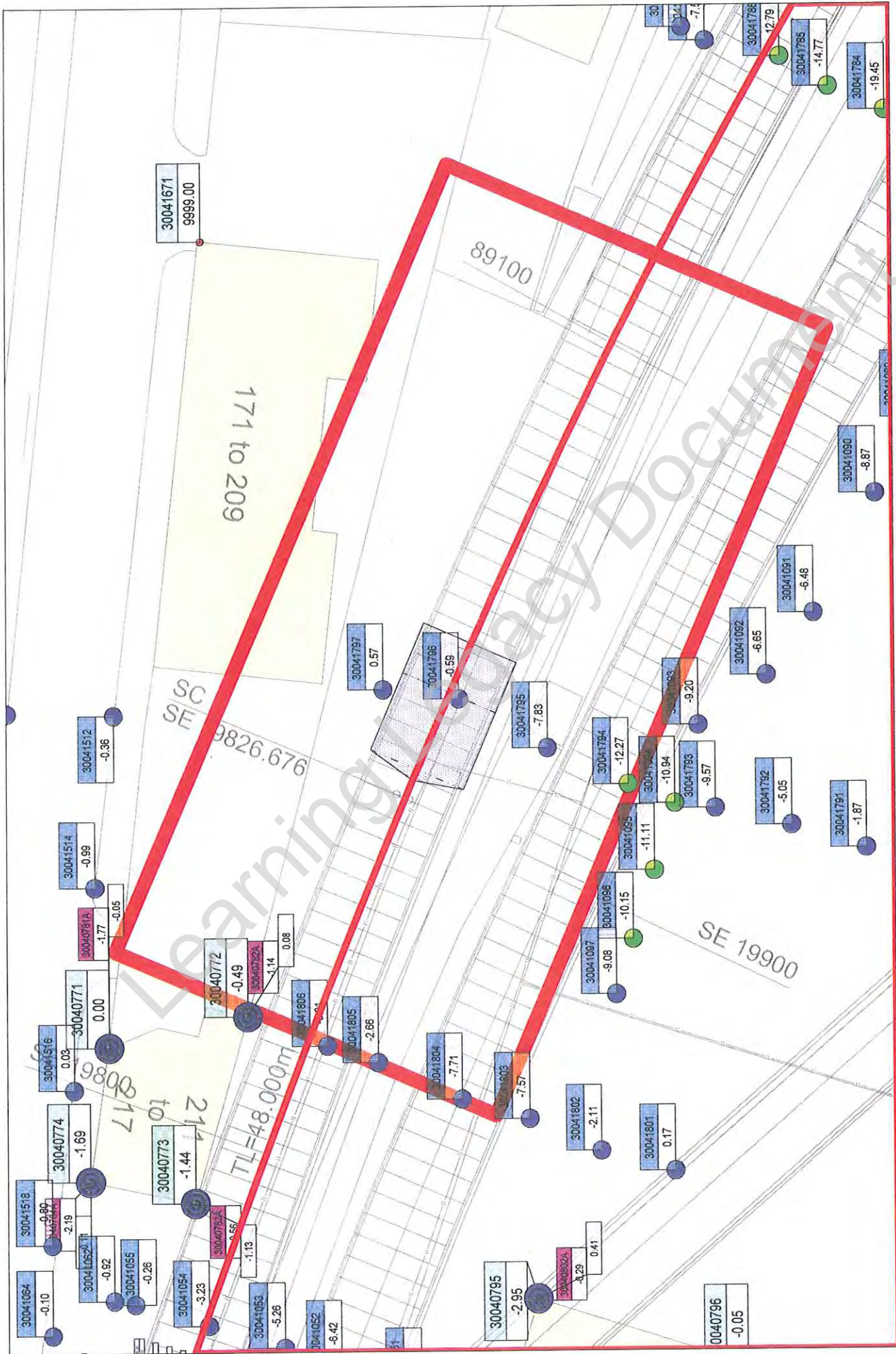
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 17.01.2014 17:26

Point: 30041804



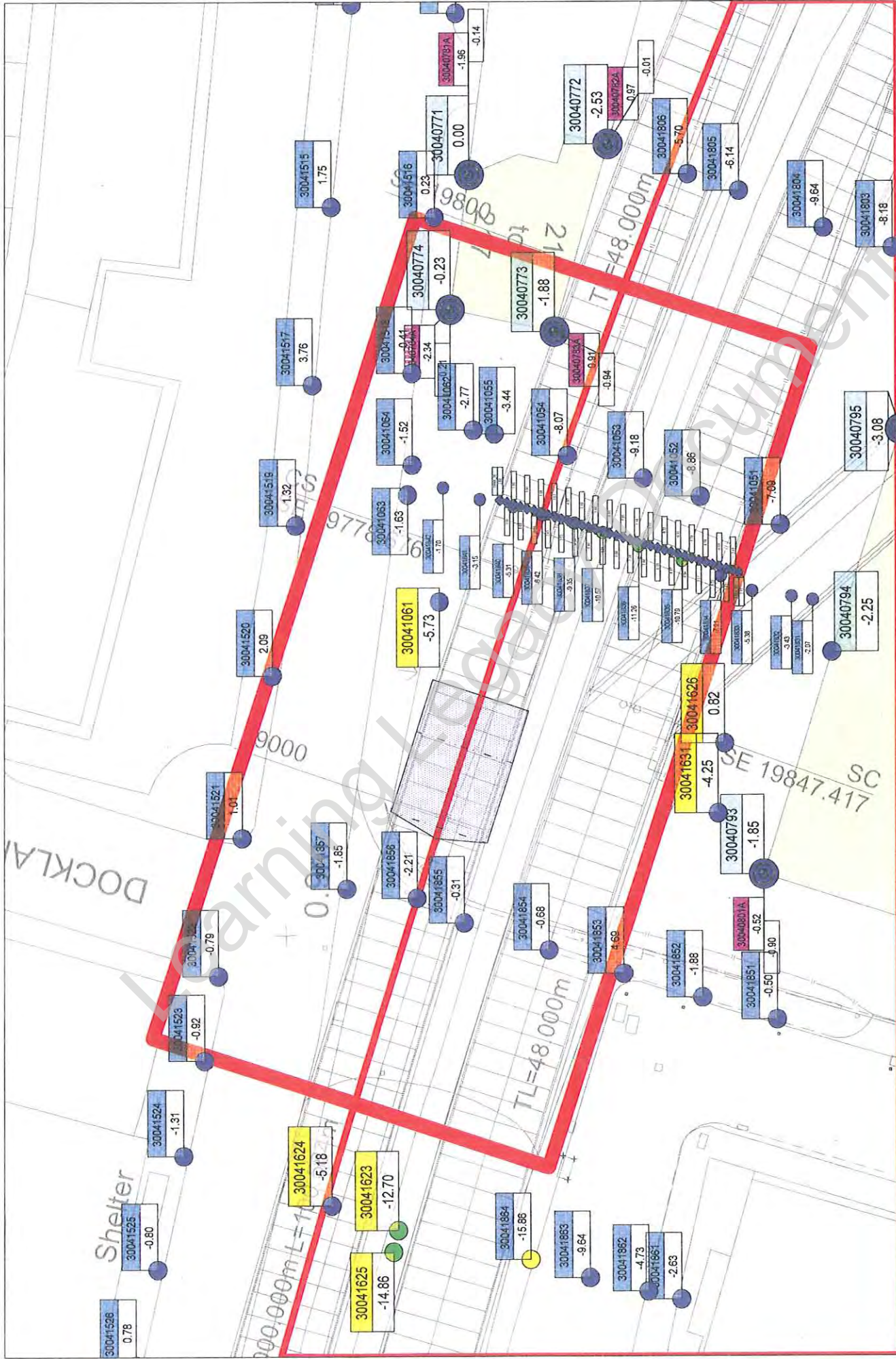
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - CS28 Pumping station - 17.10.2013 - 21.11.2014
Date: 20.01.2015 12:42 Current Values: 20.01.2015 12:22



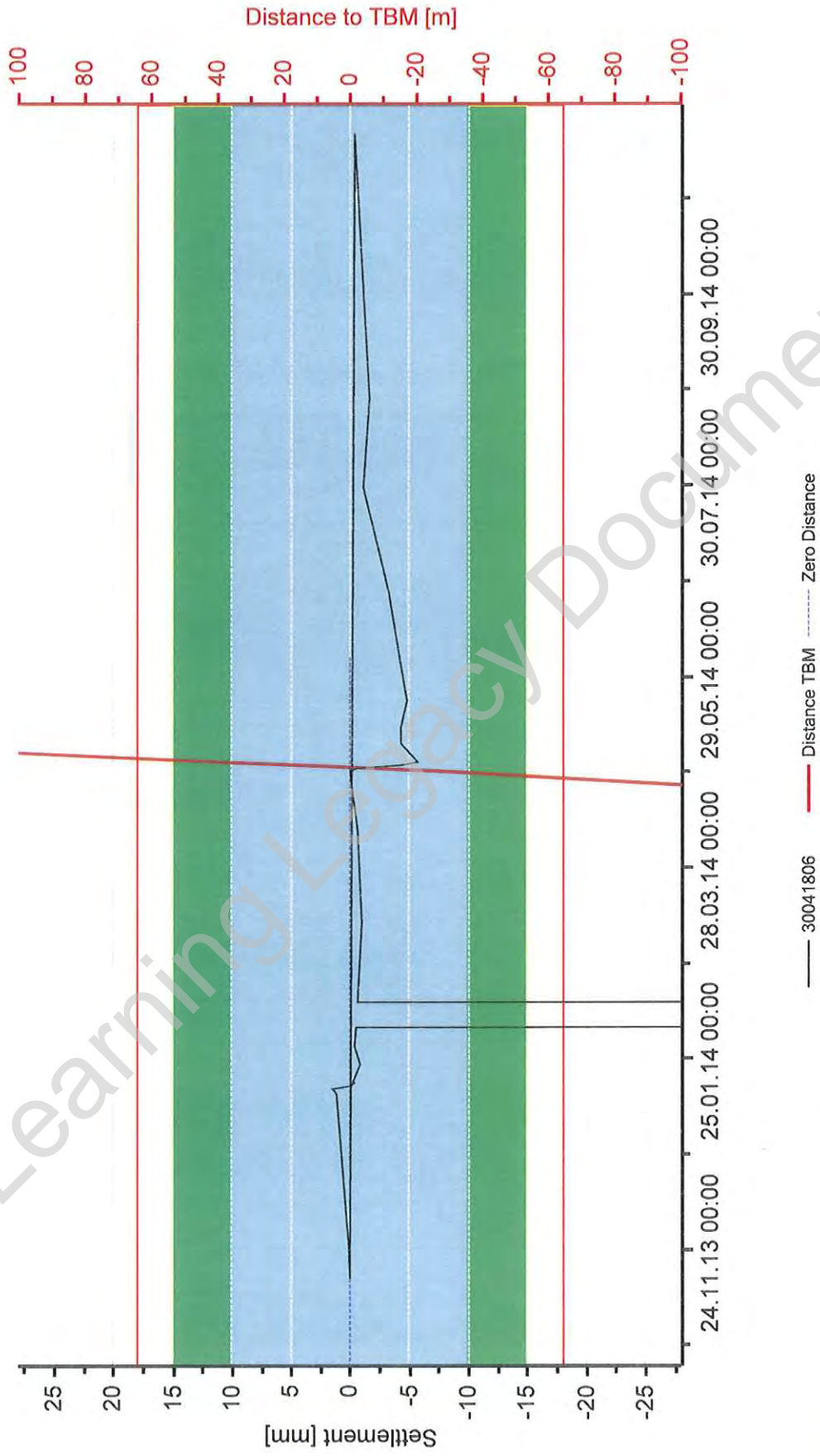


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 28.04.2014 17:52





Point: 30041806



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - CS 28 Pumping station - 17.10.2013 - 21.11.2014
date: 20.01.2015 11:47 current values: 20.01.2015 11:21

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: CS28 Pumping Station

No. of reading	baseline		1. following		2. following		3. following		4. following		5. following		6. following	
	date	elevation	date	elevation	date	elevation	date	elevation	date	elevation	date	elevation	date	elevation
No.	14/11/13		26/11/2013	deviation from last/baseline	13/01/2014	deviation from last/baseline	14/01/2014	deviation from last/baseline	15/01/2014	deviation from last/baseline	15/01/2014	deviation from last/baseline	15/01/2014	deviation from last/baseline
30041801	101.388	0	101.388	0	101.388	0	101.387	0	101.388	0	101.387	-1	101.387	0
30041802	101.383	0	101.382	0	101.382	0	101.382	-1	101.382	0	101.380	-2	101.379	0
30041803	101.566	0	101.565	-1	101.564	-1	101.564	-1	101.564	-1	101.560	-4	101.559	0
30041804	101.951	1	101.951	1	101.950	0	101.950	0	101.949	-1	101.944	-5	101.943	-1
30041805	101.722	0	101.723	1	101.723	1	101.723	0	101.723	0	101.720	-3	101.720	0
30041806	101.616	0	101.617	1	101.617	1	101.617	0	101.618	0	101.616	-2	101.616	0

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: CS28 Pumping Station

No. of reading	7. following		8. following		9. following		10. following		11. following		12. following		
	baseline	17/01/2014	elevation	deviation from last/ baseline	17/01/2014	elevation	deviation from last/baseline	29/01/2014	elevation	deviation from last/baseline	04/02/2014	elevation	deviation from last/baseline
date	14/11/13												
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
30041801	101.388	101.386	-1	101.387	0	101.386	0	101.386	-1	101.386	0	101.385	0
30041802	101.383	101.379	-1	101.379	0	101.379	0	101.379	0	101.379	0	101.379	0
30041803	101.566	101.559	0	101.559	0	101.559	0	101.559	0	101.558	-1	101.558	0
30041804	101.951	101.943	0	101.943	0	101.943	0	101.943	0	101.943	-1	101.942	0
30041805	101.722	101.719	0	101.720	0	101.719	-1	101.719	0	101.719	0	101.718	0
30041806	101.616	101.616	0	101.616	0	101.615	-1	101.616	1	101.615	0	101.615	0

Legacy Document

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: CS28 Pumping Station

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		
	14/1/13	101.388	101.387	1	101.388	1	-1	101.388	1	0	101.388	0	0	101.388	0	0
		101.383	101.380	1	101.381	1	-2	101.381	0	-2	101.381	0	-2	101.381	0	-2
		101.566	101.558	0	101.559	1	-7	101.559	0	-8	101.559	0	-7	101.559	0	-8
		101.951	101.942	0	101.943	1	-8	101.943	0	-8	101.943	0	-8	101.941	0	-10
		101.722	101.719	0	101.720	1	-2	101.720	0	-3	101.720	0	-3	101.717	-3	-6
		101.616	101.615	0	101.615	0	-1	101.616	1	-0.01	101.615	0	-1	101.612	-4	-6

Carrying Capacity Document

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: CS20 Pumping Station

No. of reading	baseline		19. following		20. following		21. following		22. following		23. following		24. 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			
	14/11/13																
30041801		101.388	101.389	1	101.389	0	1	101.390	1	101.390	0	2	101.392	2	101.394	2	6
30041802		101.383	101.381	-2	101.381	0	-2	101.381	0	101.381	0	-2	101.382	0	101.383	1	0
30041803		101.566	101.559	-8	101.559	0	-8	101.560	1	101.560	0	-6	101.560	0	101.561	1	-5
30041804		101.951	101.942	-9	101.942	0	-9	101.943	1	101.944	1	-8	101.943	0	101.945	2	-6
30041805		101.722	101.716	-6	101.716	0	-6	101.717	1	101.718	1	-5	101.718	0	101.720	2	-2
30041806		101.616	101.612	-4	101.612	0	-4	101.611	-1	101.613	2	-3	101.613	0	101.615	2	-1

Legacy Document

monitoring table




Joint Venture

project: C310 Thames Tunnel

structure: CS28 Pumping Station

No. of reading date	baseline 14/11/13	25. following 27/08/2014		26. following 29/09/2014		27. following 21/11/2014		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						
30041801	101.388	101.393	0	5	destroyed								
30041802	101.383	101.383	0	1	destroyed	due to reinstatement works							
30041803	101.566	101.561	0	-5	destroyed	due to reinstatement works							
30041804	101.951	101.946	1	-5		due to reinstatement works	101.946	0	-5				
30041805	101.722	101.720	0	-2			101.720	0	-2				
30041806	101.616	101.614	-1	-2			101.616	1	0				

Legacy Document

 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50025	Rev	1.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works North Embankment River Thames - North Woolwich Portal (excl. Store Rd)				

APPENDIX 106

CS 31 – Store Road Sewer West – CH 89000

Learning Legacy Document

monitoring asset

TW Store Road Sewer

reference monitoring drawing:

C310-HTM-C-DWG-CR146-ST004-70003

name of monitoring section:

CS 31 Store Road Sewer West

sensor type:

manual levelling studs

chainage:

89000

point no.:

3004 1851 - 3004 1857

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	16/12/13		0.00		
TBM 1	start ZOI	17/01/14	-0.48	3004 1854	
	end ZOI	20/01/14	-4.35	3004 1854	breached not any trigger value
TBM 2	start ZOI	30/04/14	-2.92	3004 1856	
	end ZOI	03/05/14	-4.16	3004 1856	breached not any trigger value
longterm	21/11/14		-2.87	3004 1856	

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

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:

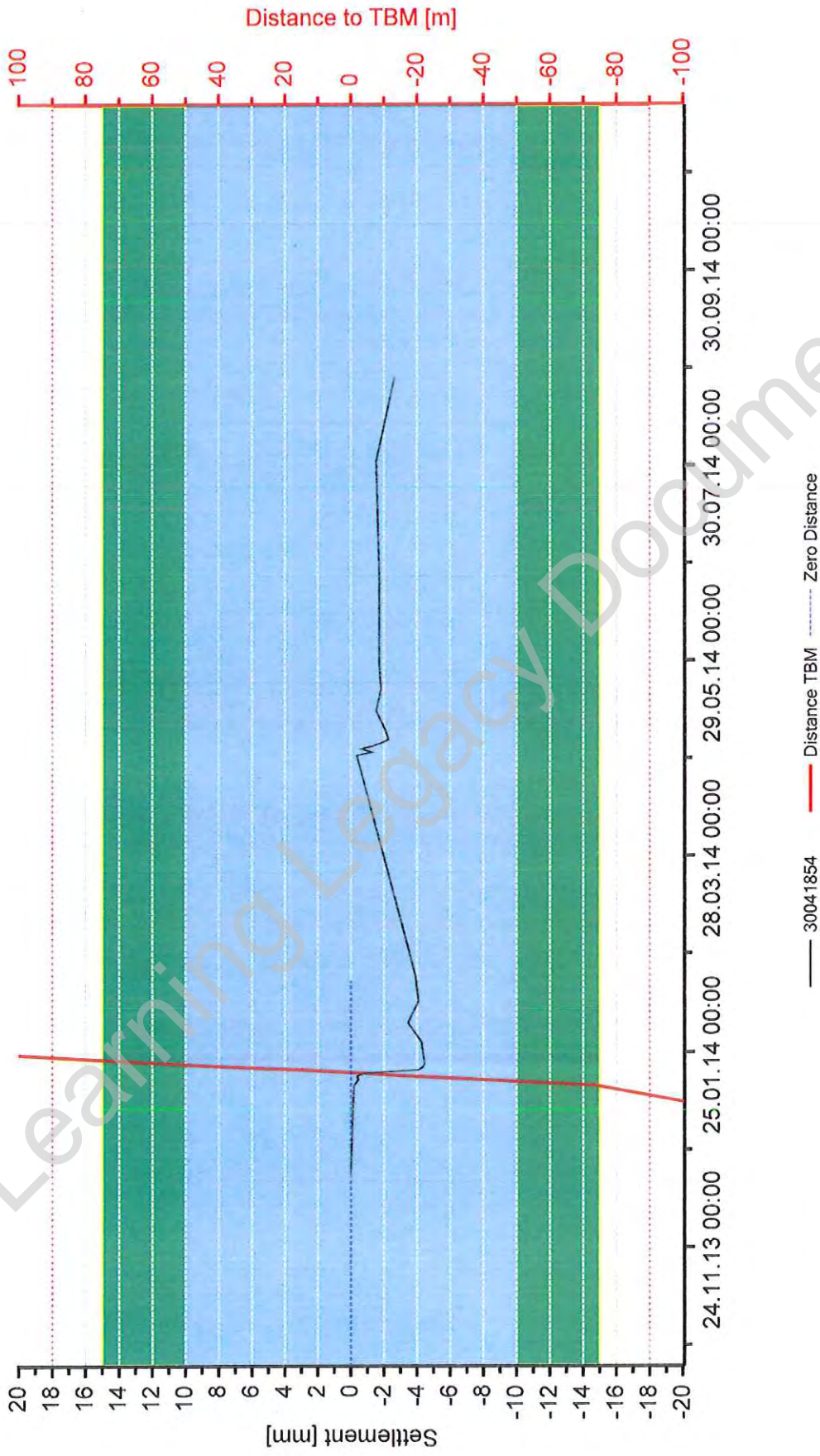
02/02/2015

print name:

HMJV project role:

Monitoring & Survey engineer

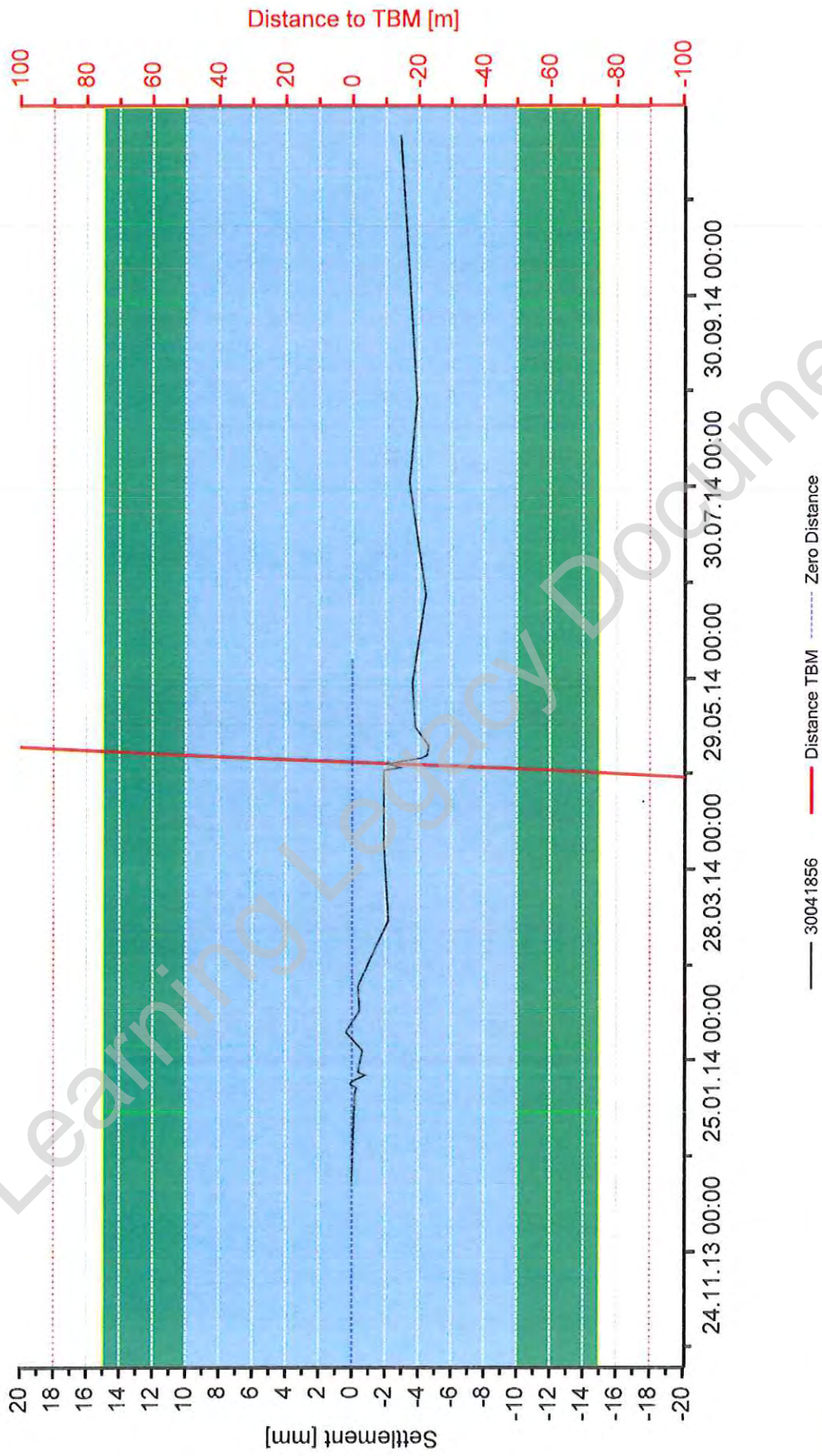
Point: 30041854



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - CS 31 Store Road sewer West - 17.10.2013 - 21.11.2014
Date: 20.01.2015 13:57 Current Values: 20.01.2015 13:28



Point: 30041856



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: EB Tunnel - CS 31 Store road Sewer West - 17.10.2013 - 21.11.2014
date: 20.01.2015 11:52 current values: 20.01.2015 11:21



monitoring table




Joint Venture

project: C310 Thames Tunnel
structure: CS 31 Store Road

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	16/12/13	02/05/2014		09/05/2014		04/05/2014		07/05/2014		13/05/2014		20/05/2014	
30041851	101.069	101.028	-1 -2	101.028	0 -1	101.028	0 -1	101.028	0 -1	101.029	0 -1	101.026	-2 -3
30041852	101.166	101.164	0 -2	101.164	0 -3	101.164	0 -2	101.164	0 -2	101.164	0 -2	101.164	0 -2
30041853	101.177	101.181	0 4	101.181	0 4	101.180	0 4	101.180	0 4	101.181	1 4	101.181	0 4
30041854	101.130	101.129	-1 -1	101.128	0 -2	101.128	0 -2	101.128	0 -2	101.128	1 -2	101.128	0 -2
30041855	101.104	101.021	-1 -1	101.021	-1 -2	101.020	-1 -3	101.020	1 -2	101.021	0 -2	101.021	0 -2
30041856	101.092	101.089	-1 -3	101.088	-1 -4	101.087	0 -5	101.087	0 -5	101.088	1 -4	101.088	0 -4
30041857	100.938	100.936	0 -2	100.936	-1 -3	100.935	0 -3	100.936	0 -3	100.936	0 -3	100.936	0 -2

Learning Technology Document

 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50025	Rev	1.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works North Embankment River Thames - North Woolwich Portal (excl. Store Rd)				

APPENDIX 108

Factory Road Extensometer / SD

Learning Legacy Document

monitoring asset	TW Royal Dock Sewer		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70003		
name of monitoring section:	Factory Road Extensometer		
sensor type:	extensometer		
chainage:	89000-88850	point no.:	3004 1631 - 3004 1634
trigger values: [mm]	green: +12 -12	yellow: +11 -11	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, ZZ		

monitoring data

	date	max. value on surface	max. value toe of Royal Dock sewer	point no.	comments	
baseline	14/11/13	0.00	0.00			
TBM 1	start ZOI	16/01/14	-1.34	+2.85	3004 1631	
		20/01/14	-2.70	-2.86	3004 1632	
		20/01/14	-3.51	-4.40	30041633	
		24/01/14	-1.32	-2.46	30041634	
	end ZOI	20/01/14	-2.43	-2.31	3004 1631	breached not any trigger value
		24/01/14	-0.71	-1.74	3004 1632	
		24/01/14	-4.82	-5.08	30041633	
		03/02/14	-0.72	-2.32	30041634	
TBM 2	start ZOI	30/04/14	-5.55	-2.54	3004 1631	values for 30041634 are from the last measurement which was possible on 05/02/2014 due to disassembly of TBM 1 this sensor was permanently covered (see also comment box)
		03/05/14	-0.78	-1.81	3004 1632	
		04/05/14	-7.35	-4.72	30041633	
		07/05/14	-0.72	-2.32	30041634	
	end ZOI	03/05/14	-5.29	-2.10	3004 1631	breached not any trigger value
		07/05/14	-0.80	-3.22	3004 1632	
		07/05/14	-11.24	-8.08	30041633	
		22/05/14	-9.20	-4.47	30041634	
longterm	21/11/14		-5.62	-7.65	3004 1631	
			-3.45	-6.09	3004 1632	
			-7.21	-7.24	30041633	
			-9.11	-7.27	30041634	

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

Due to different site activities some of the points were damaged/destroyed/permanently covered (TBM disassembly). See datatable for more details.

The "max. value on surface" shows the movement of each sensor at the surface which was potentially caused by site activities and "heavy" traffic on Factory Road e.g. during TBM disassembly.

The "max. value toe of Royal Dock Sewer" shows the movement in a depth of approx. 18m, which is the level of the Royal Dock Sewer invert / toe. The maximum **deflection ratio** in the relevant elevation (bottom of Royal Dock Sewer) is **1:11855** (3004 1632 - 3004 1633 - 3004 1634) - **no TW trigger breached** (TW alert value for Royal Dock Sewer is 1:11600).

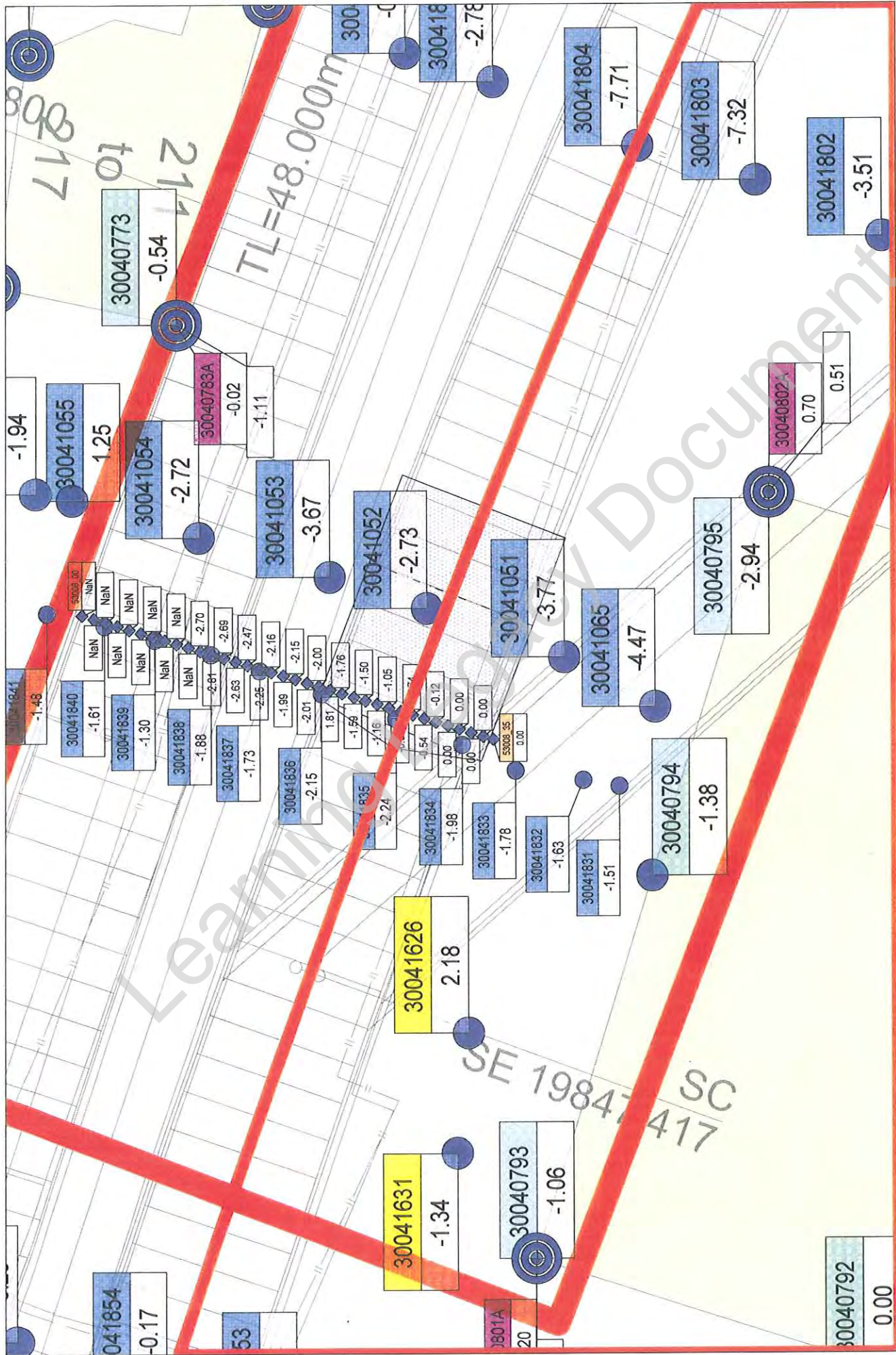
Under consideration of temperature differences, the surrounding ground condition and the achievable accuracy of the measurement, HMJV has no concern to cease the monitoring.

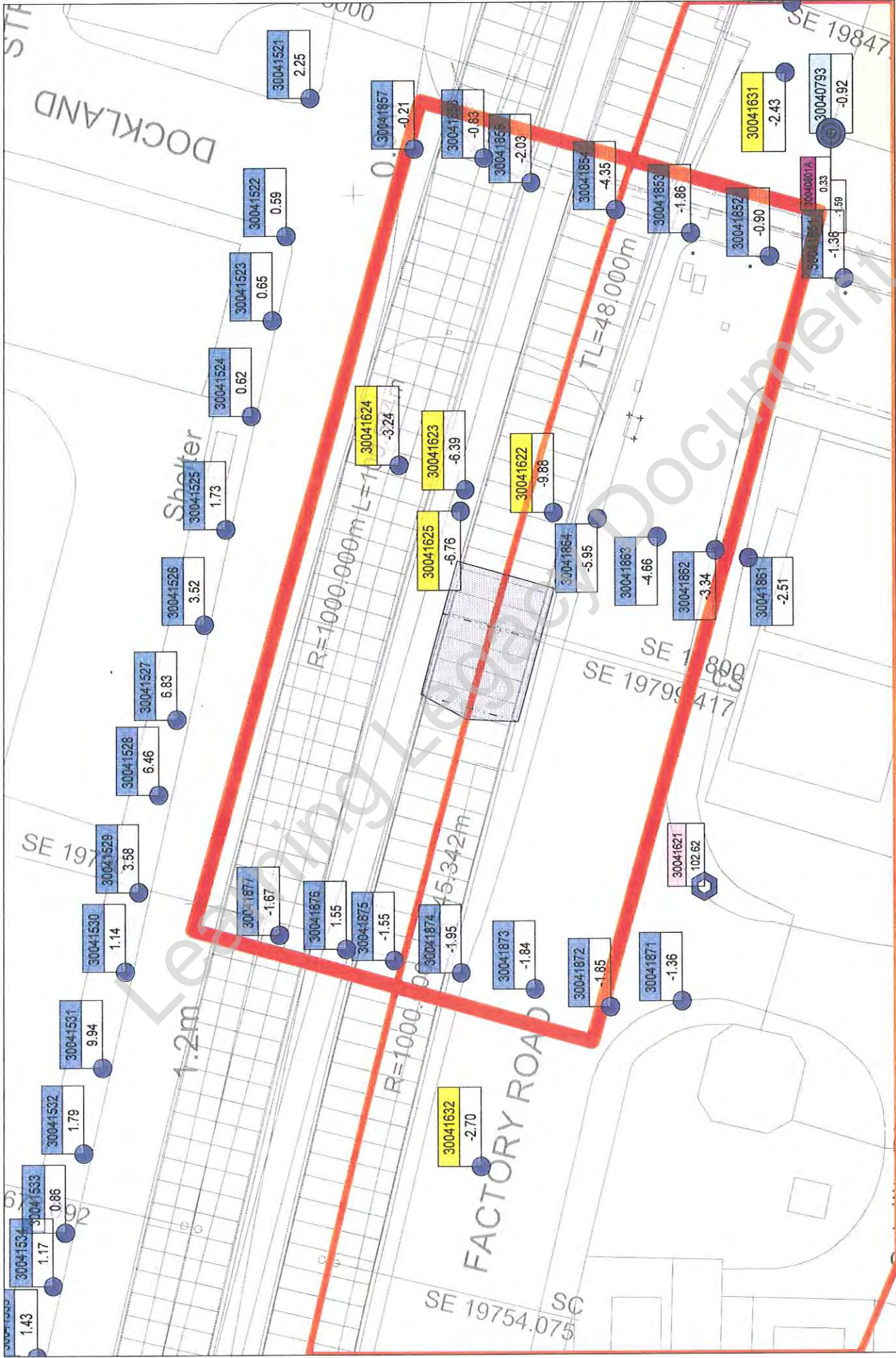
The rate of change in the monitoring data is less than the required standards as per the specifications and drawings.

date / signature: 16/02/2015

print name:

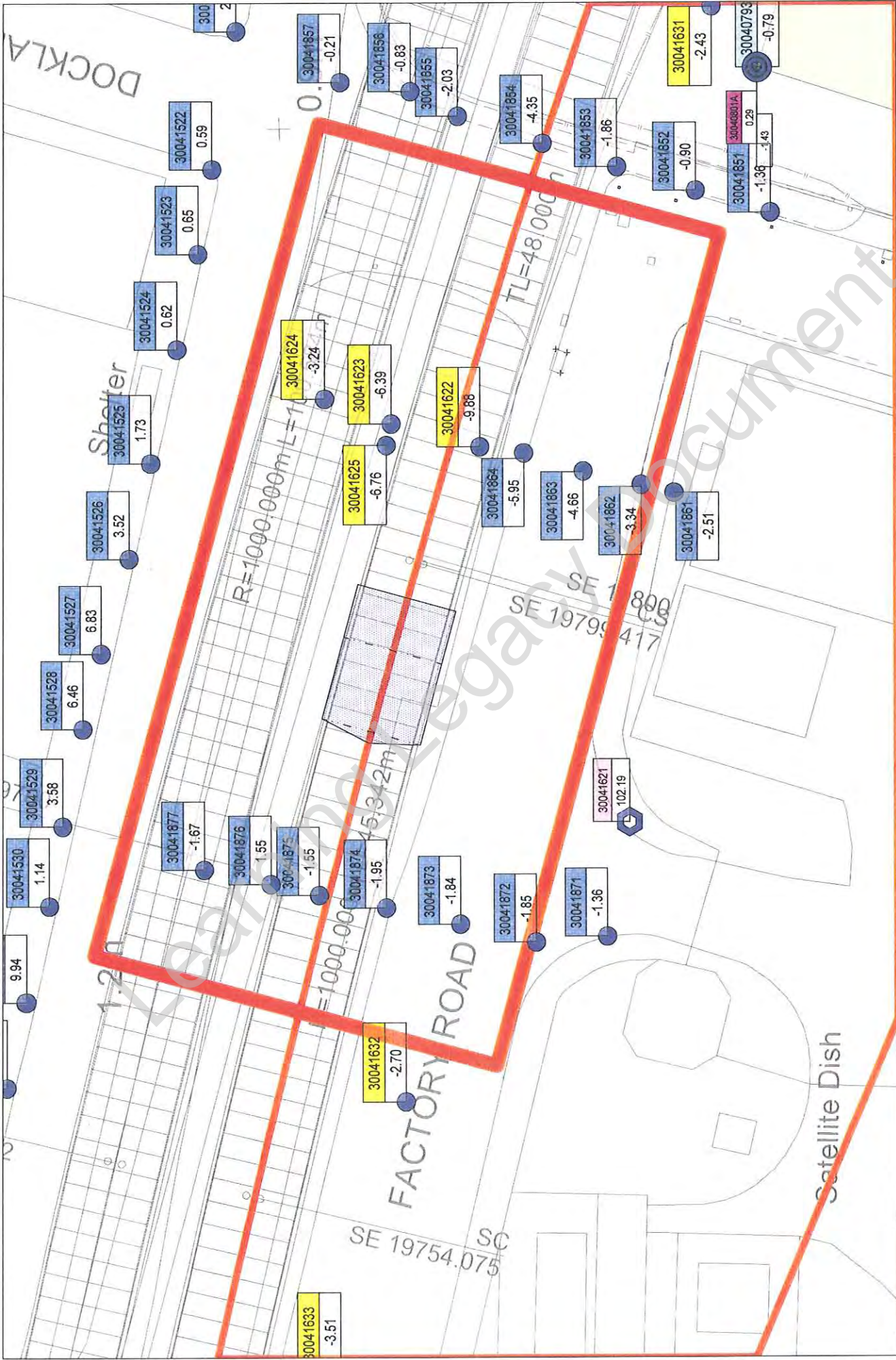
HMJV project role: Monitoring & Survey engineer





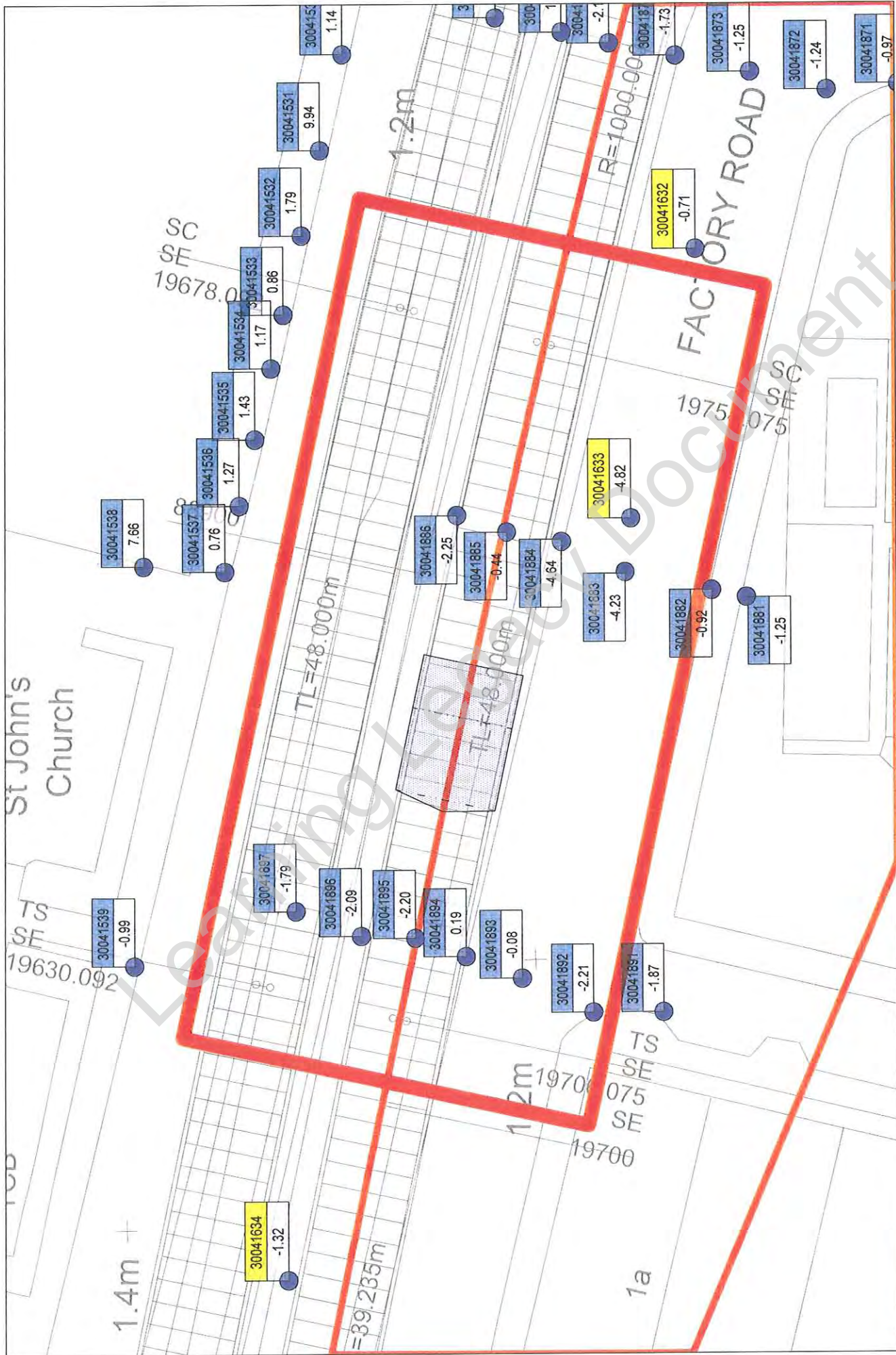
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 20.01.2014 09:00





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 20.01.2014 17:43

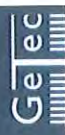


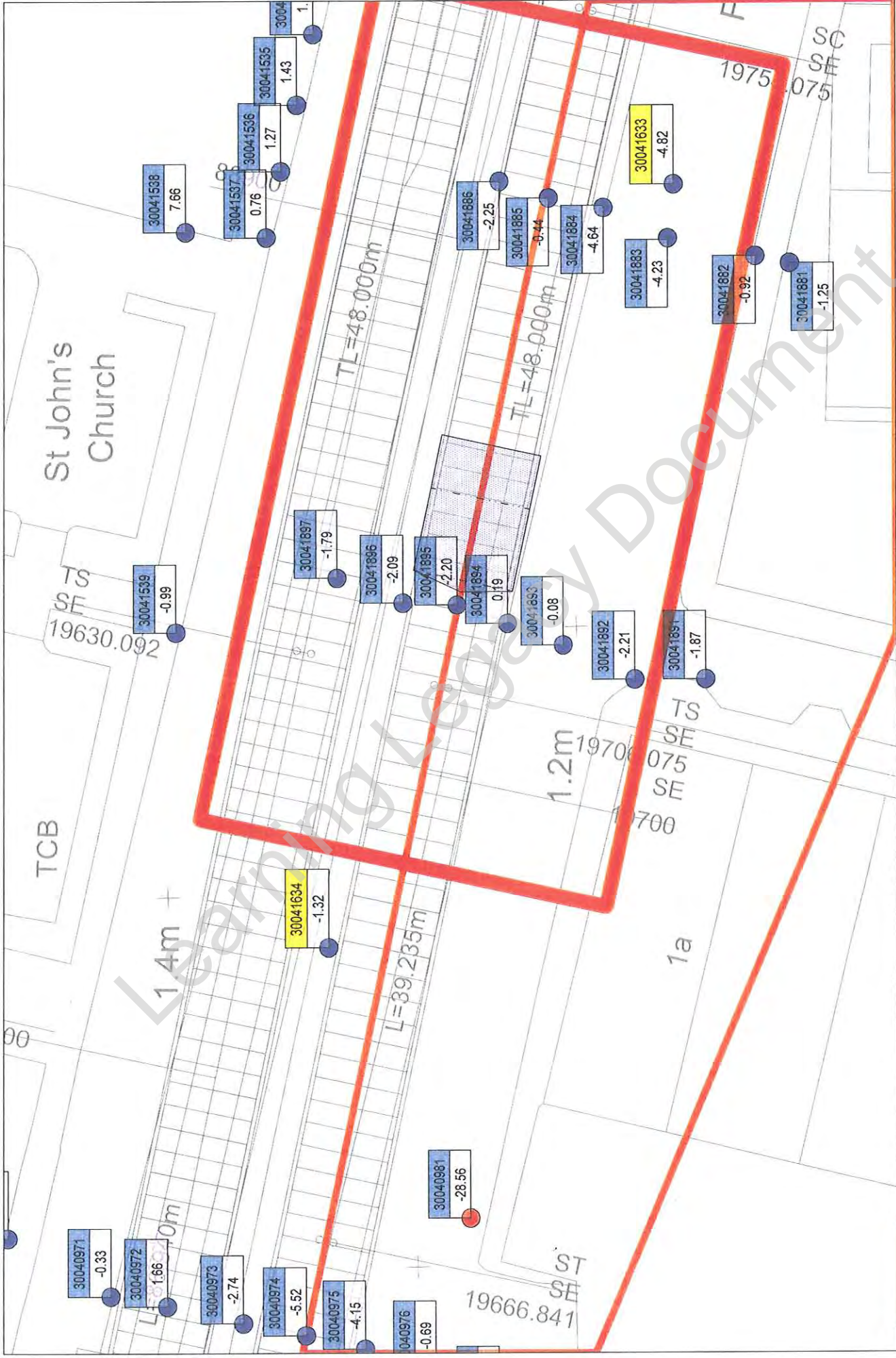


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

working activities: TBM drive WB

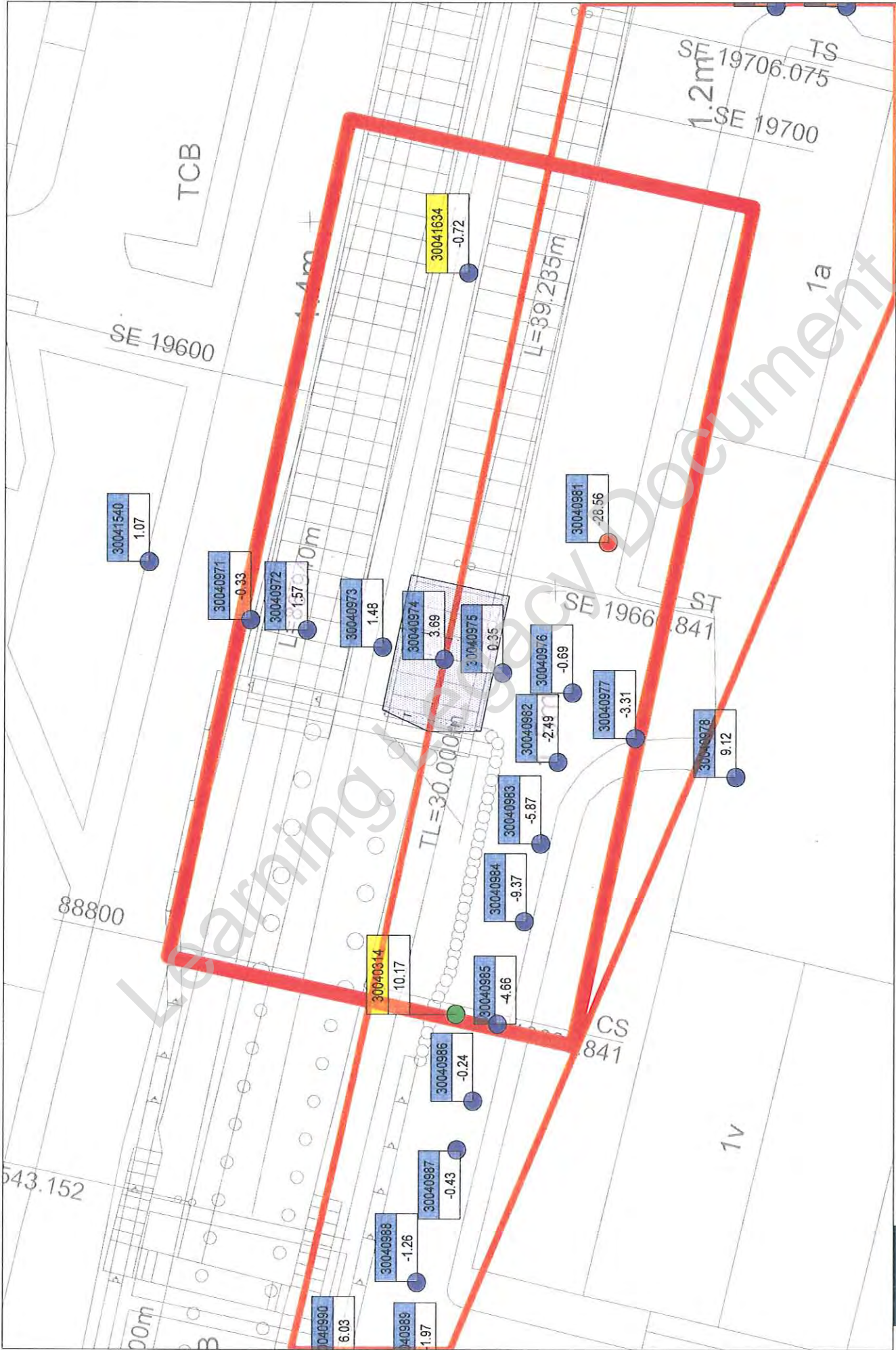
current values: 24.01.2014 09:00





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 24.01.2014 19:18

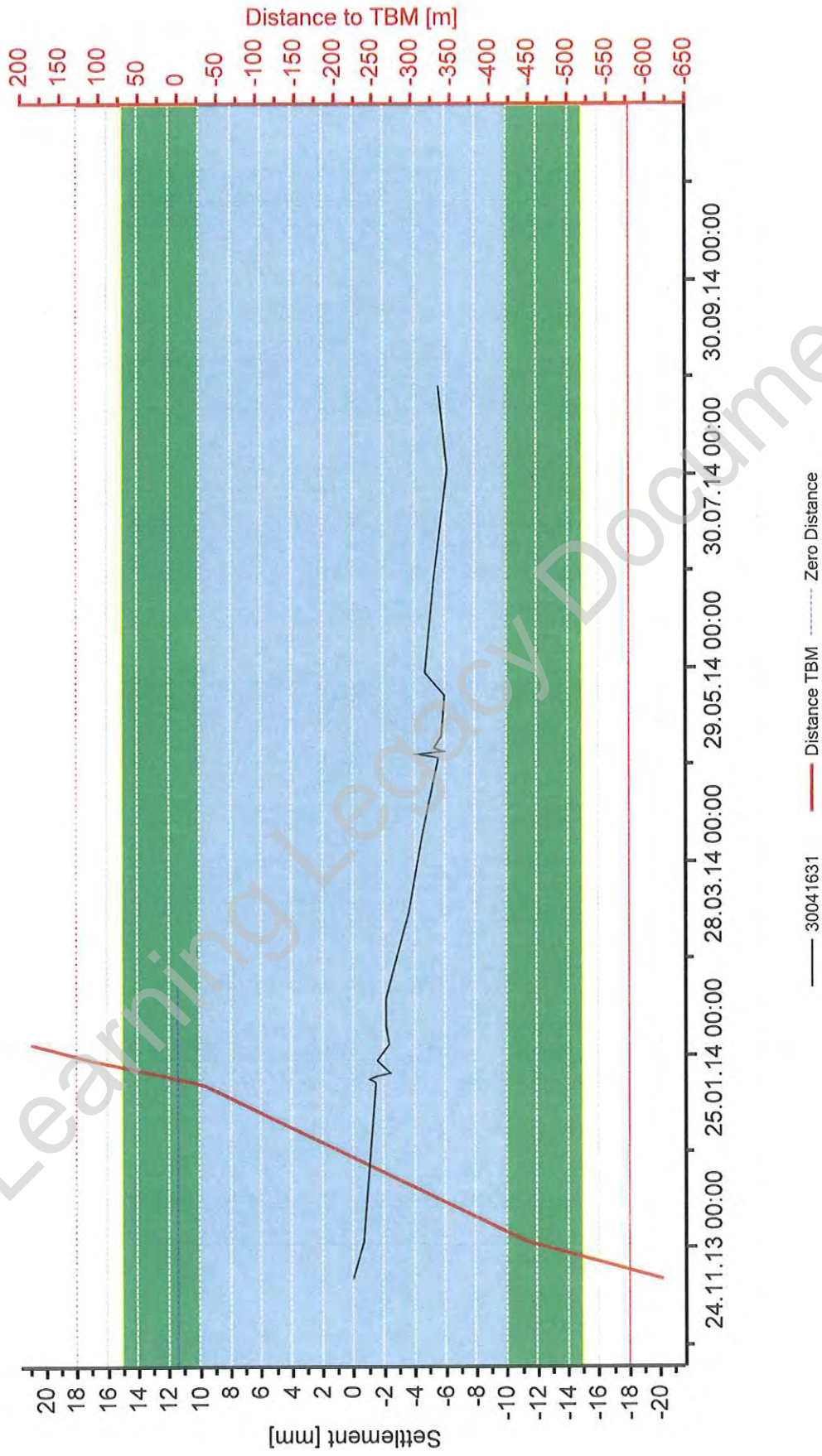




Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 05.02.2014 10:11



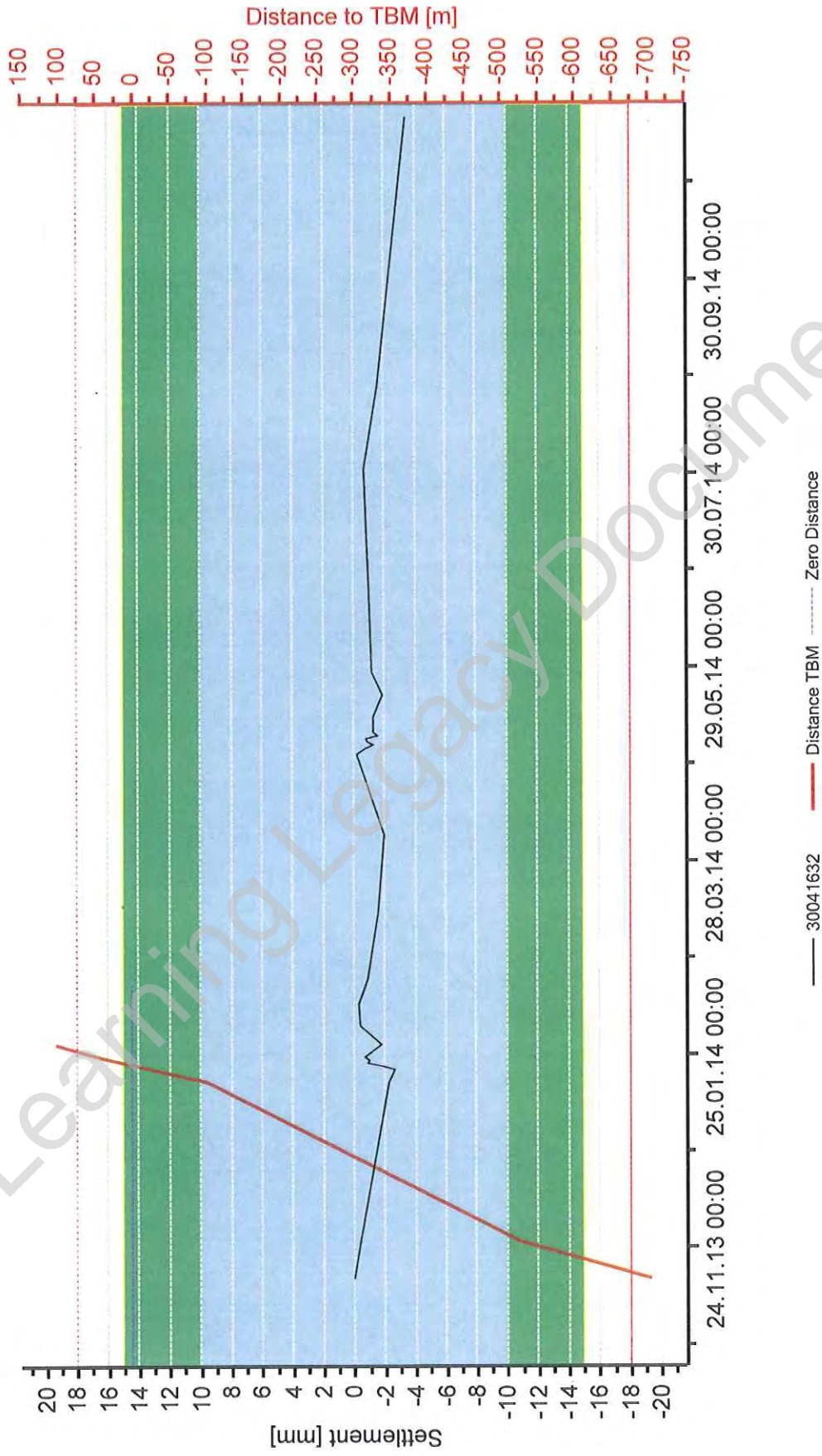
Point: 30041631



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - SD Factory Road - 17.10.2013 - 21.11.2014
Date: 21.01.2015 10:14 Current Values: 21.01.2015 10:06



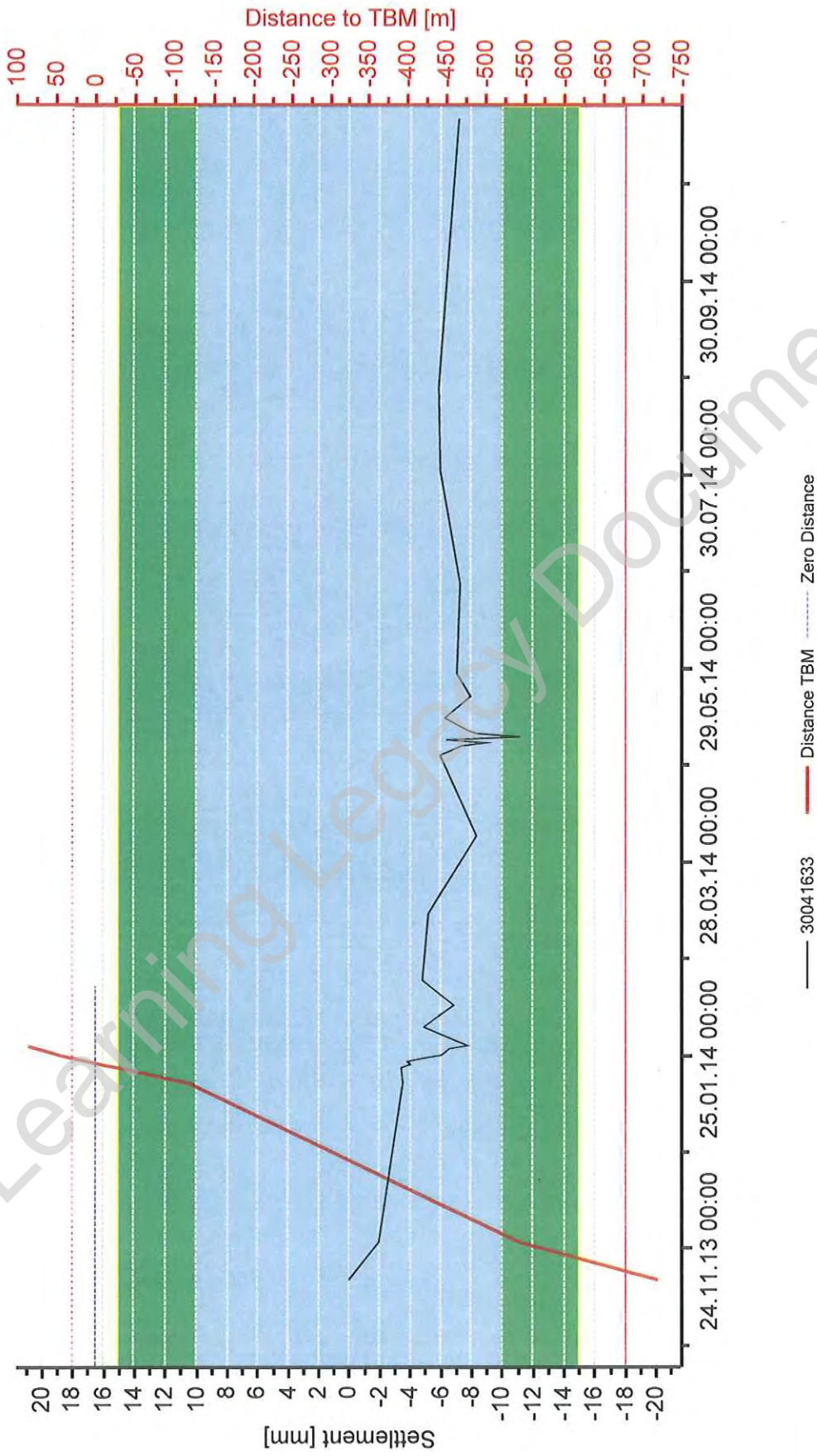
Point: 30041632



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - SD Factory Road - 17.10.2013 - 21.11.2014
Date: 21.01.2015 10:13 Current Values: 21.01.2015 10:06



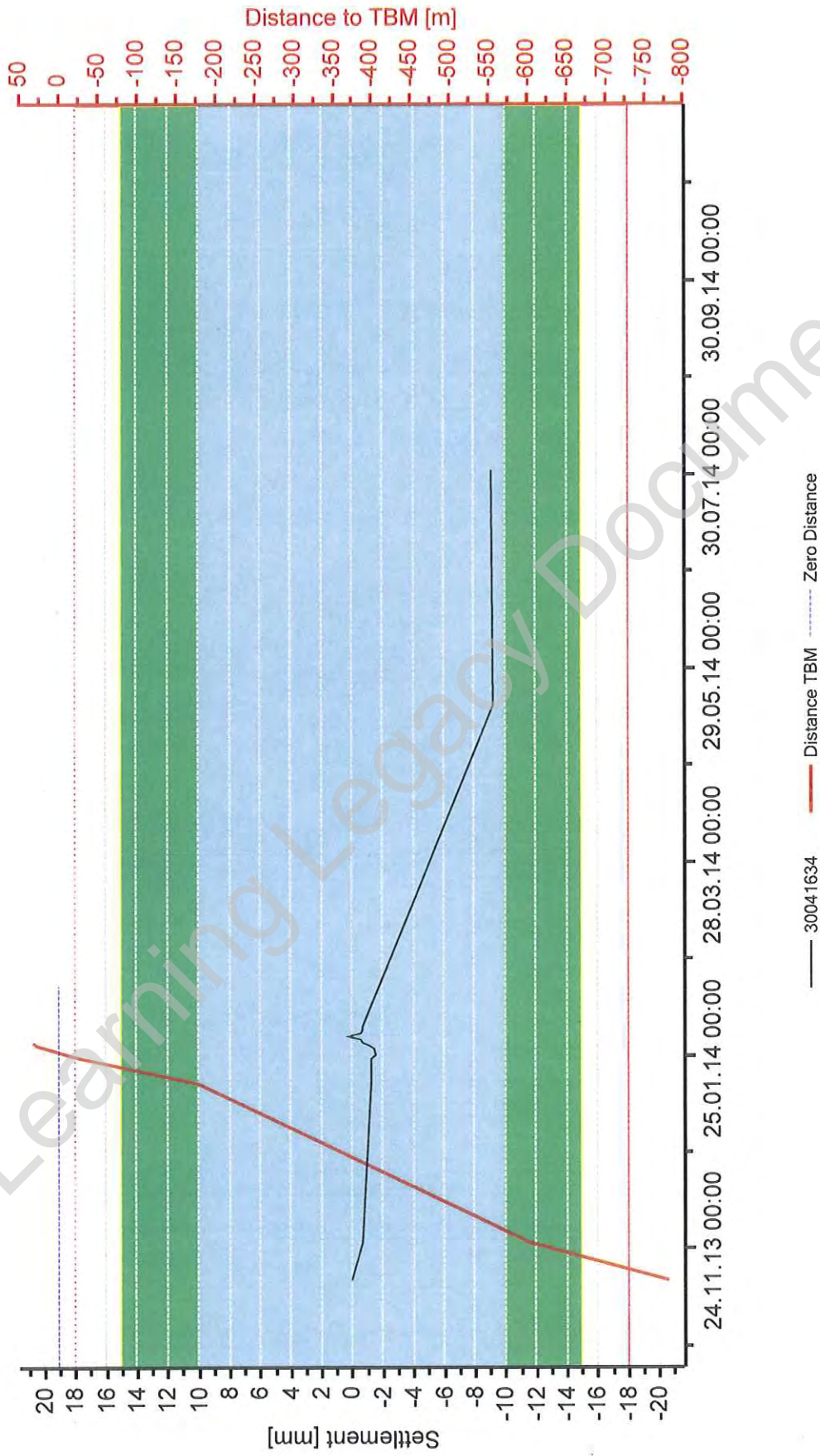
Point: 30041633



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - SD Factory Road - 17.10.2013 - 21.11.2014
Date: 21.01.2015 10:11 Current Values: 21.01.2015 10:06

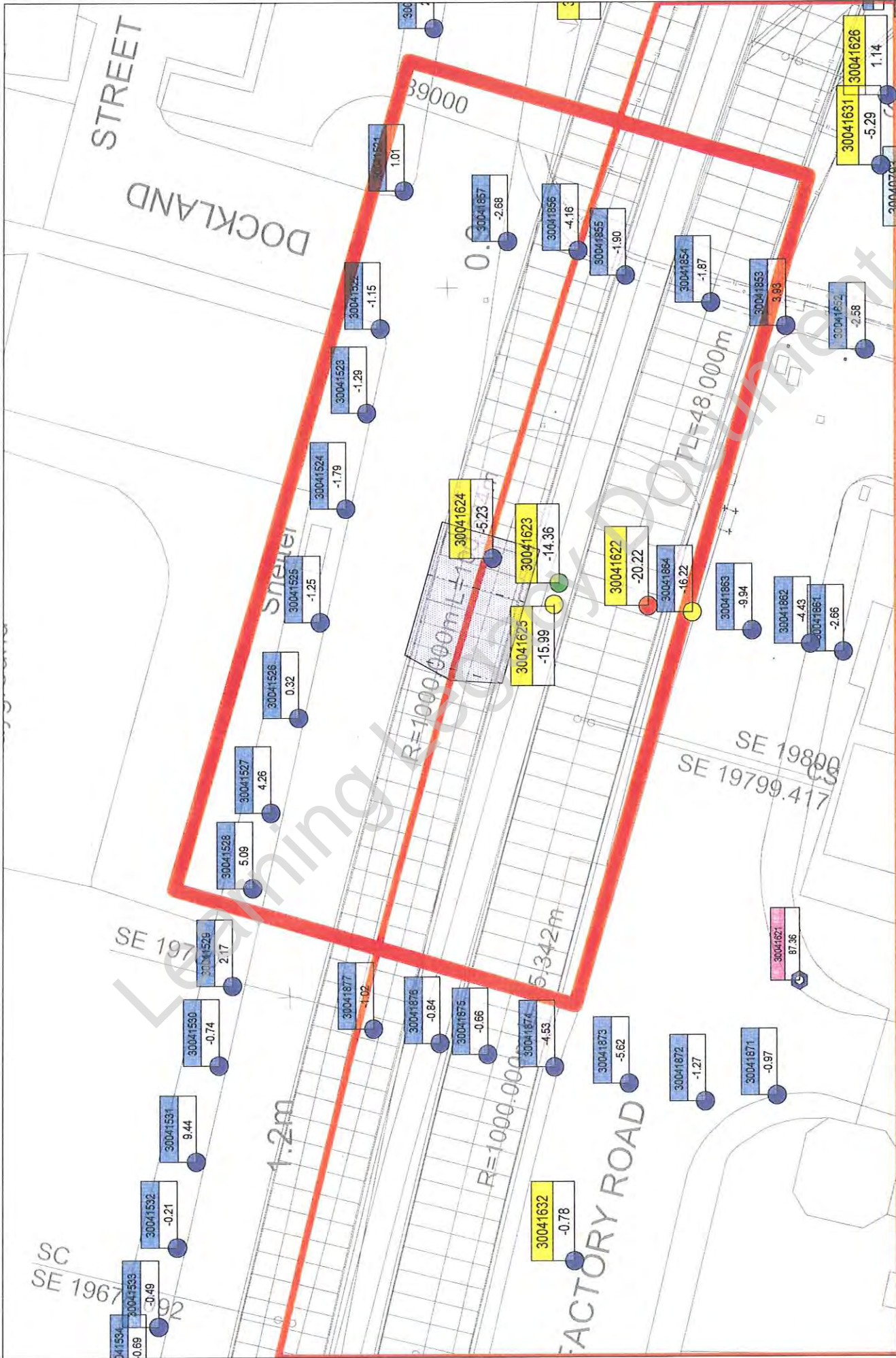


Point: 30041634

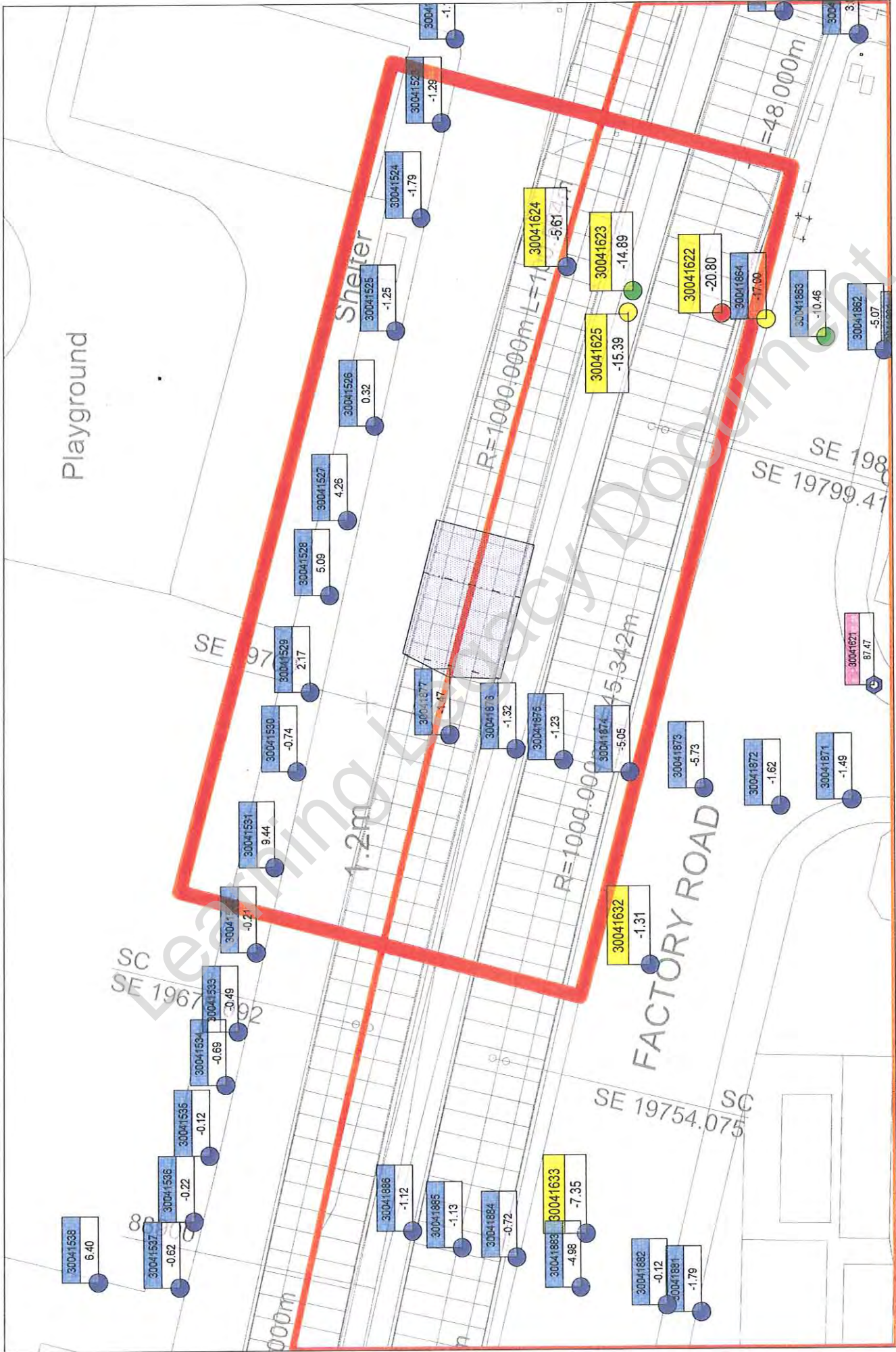


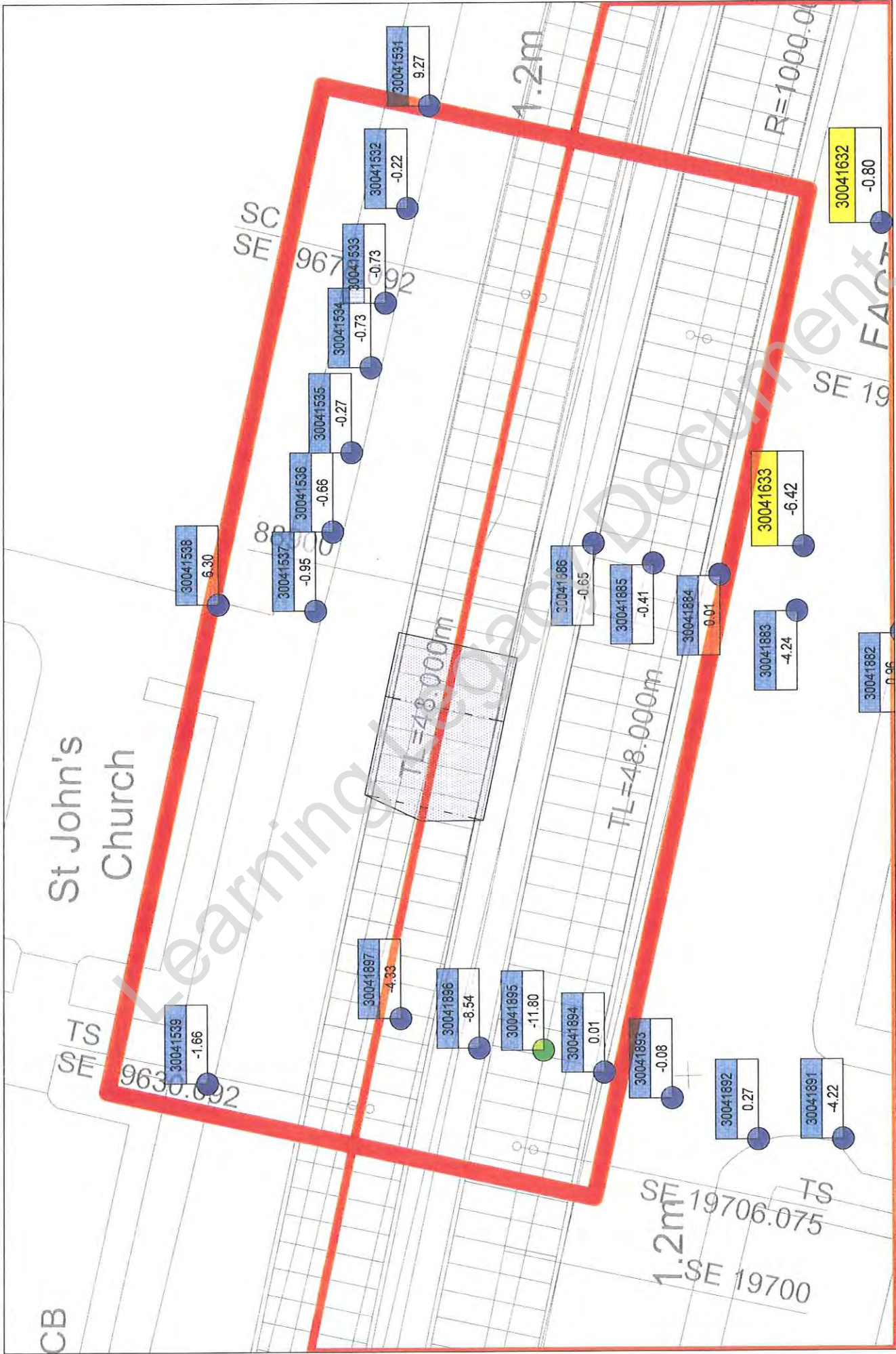
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - SD Factory Road - 17.10.2013 - 21.11.2014
Date: 21.01.2015 10:09 Current Values: 21.01.2015 09:51



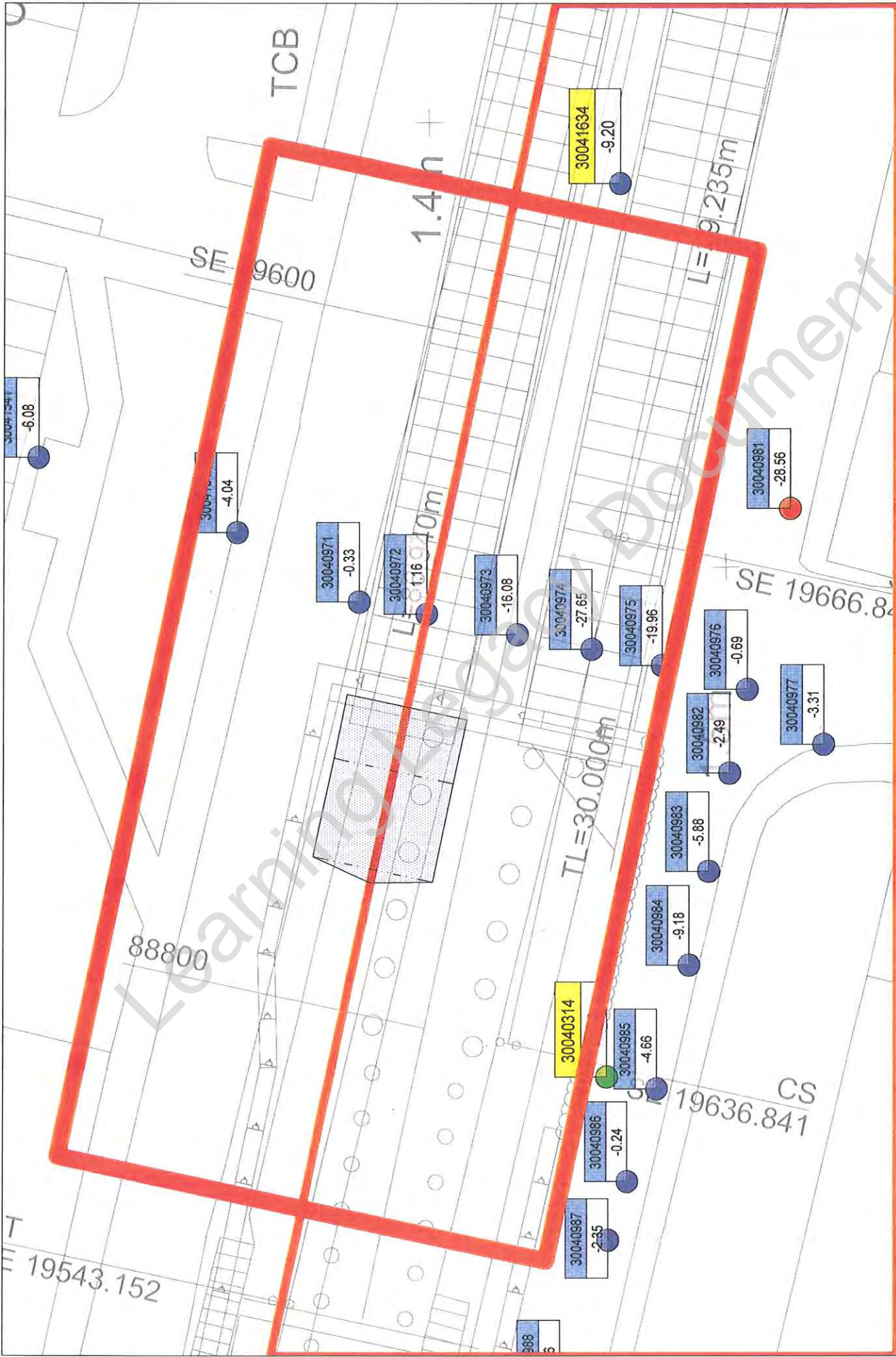


Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 03.05.2014 09:00





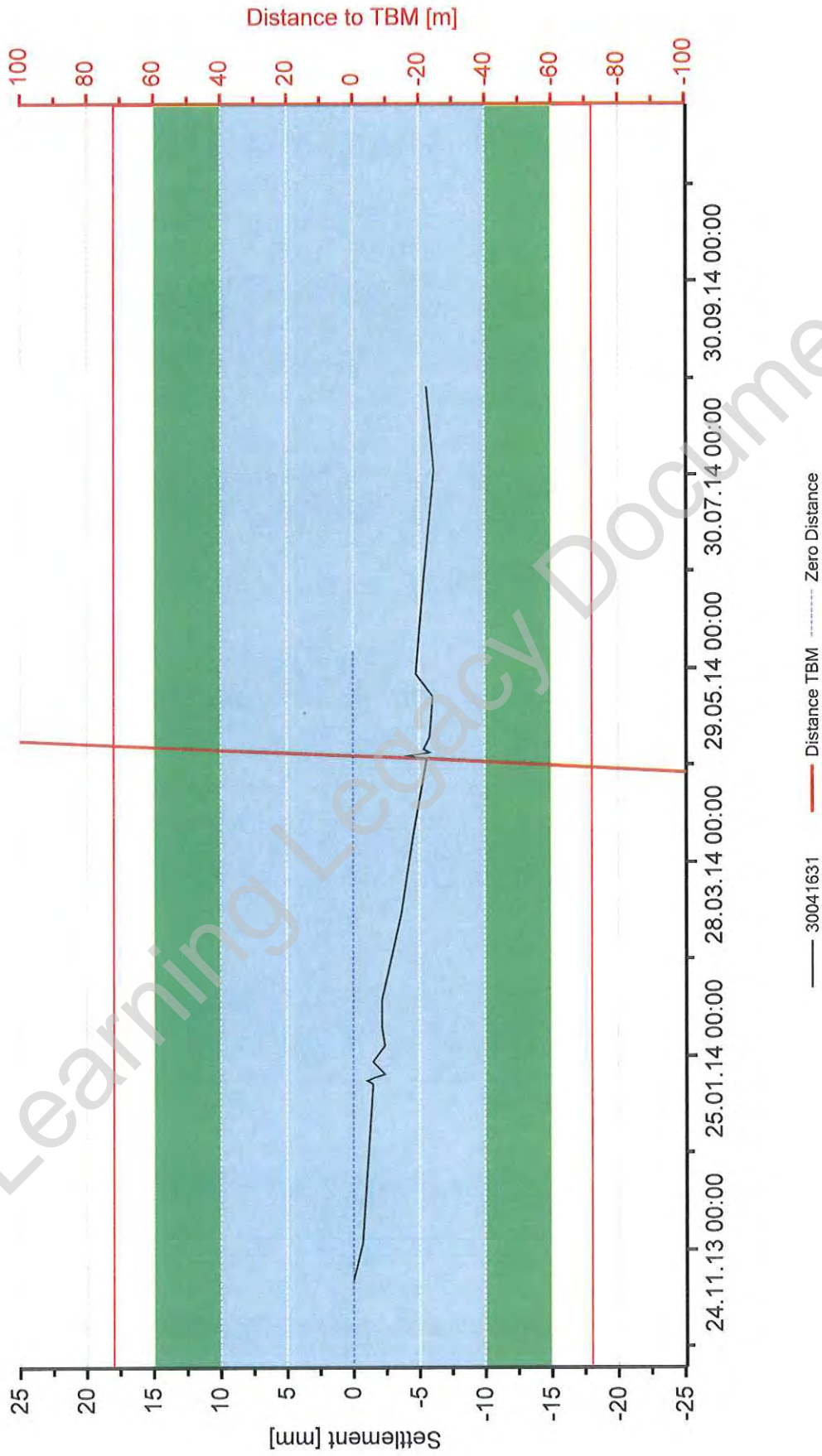
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 07.05.2014 09:00



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 22.05.2014 17:49



Point: 30041631



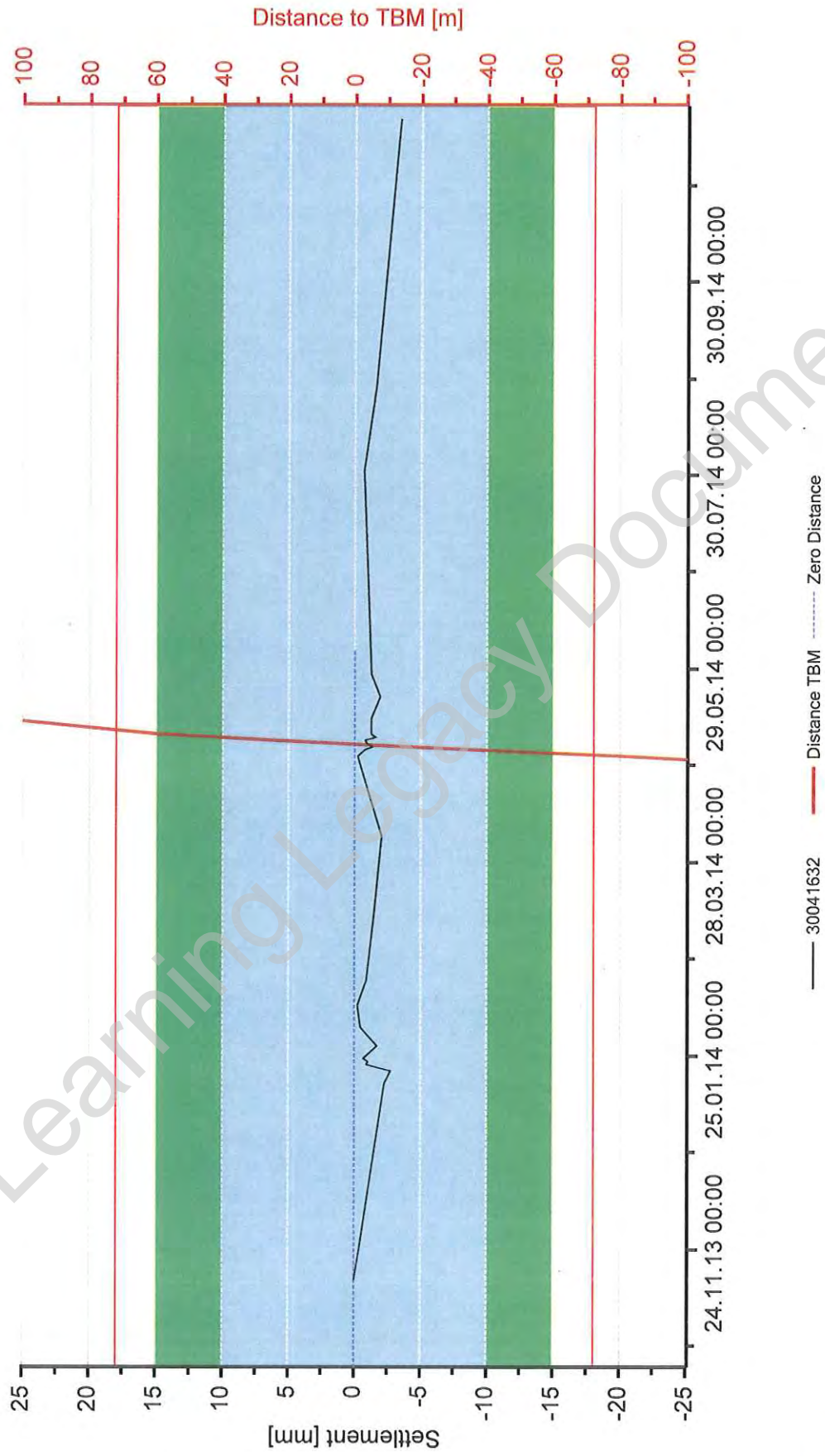
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

Close Out Report: SD Factory Road 1 - 17.10.2013 - 21.11.2014

date: 21.01.2015 11:18 current values: 21.01.2015 11:06



Point: 30041632



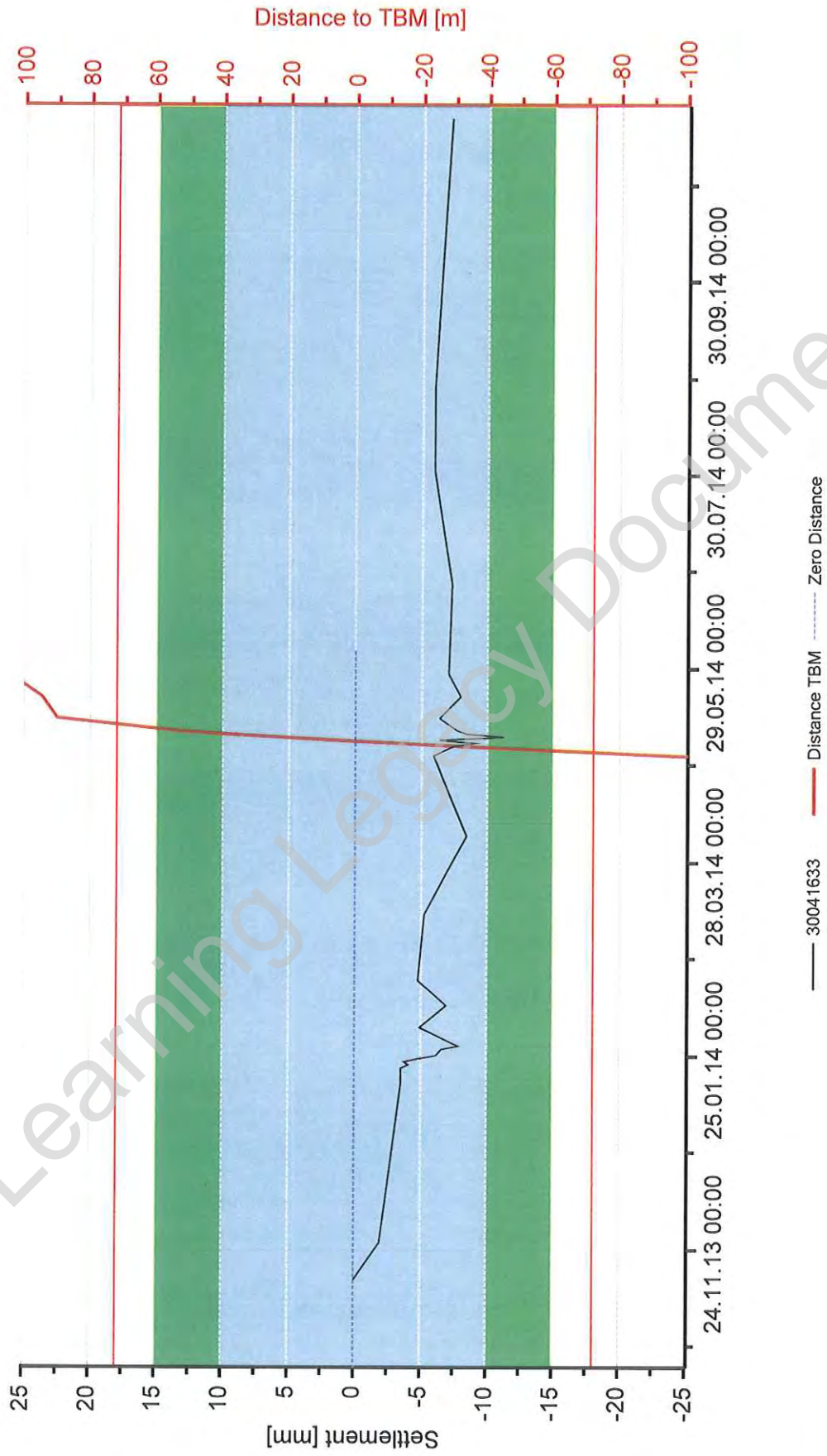
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal

Close Out Report: SD Factory Road - 17.10.2013 - 21.11.2014

date: 21.01.2015 11:20 current values: 21.01.2015 11:06

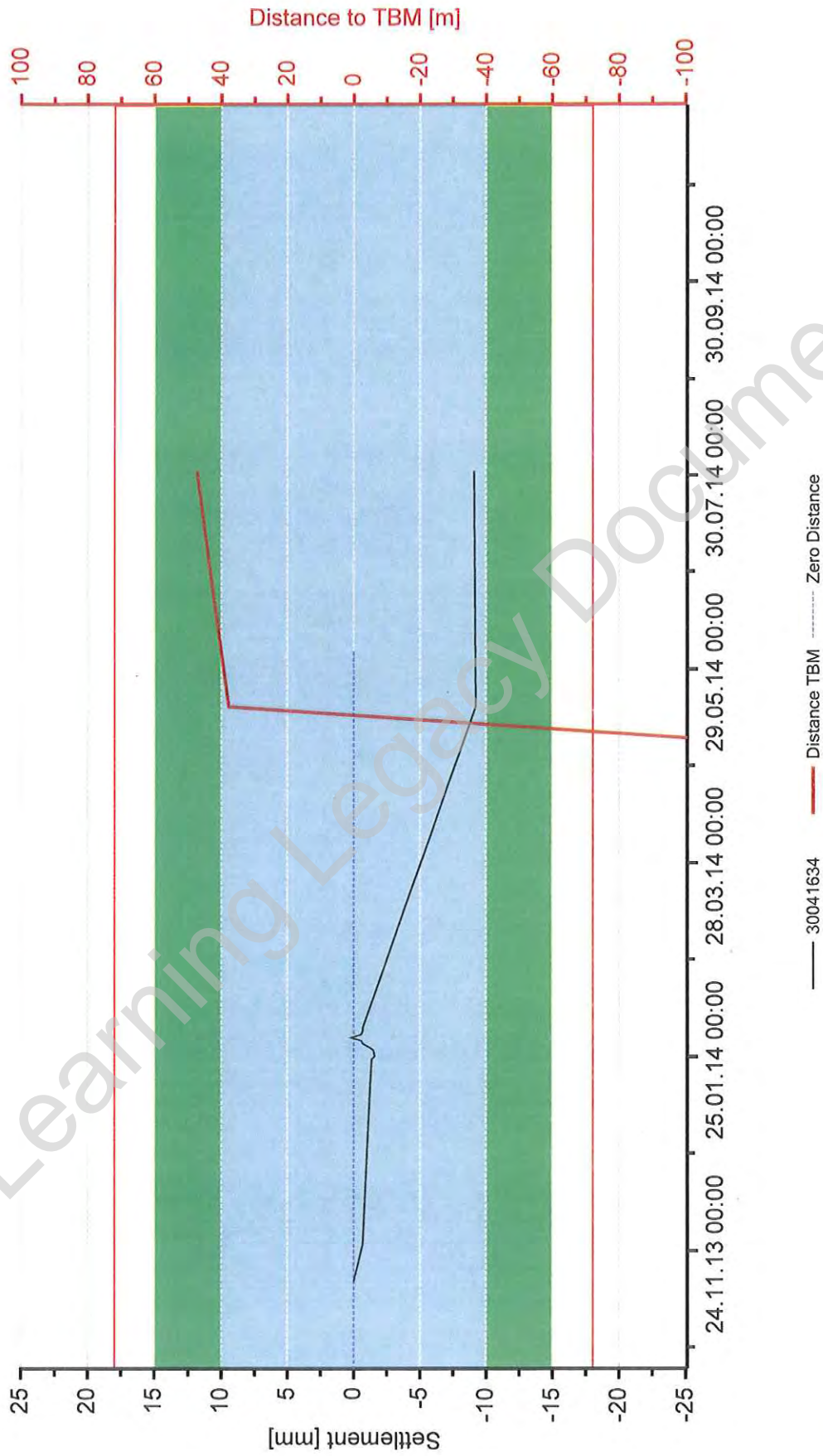


Point: 30041633



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: SD Factory Road - 17.10.2013 - 21.11.2014
date: 21.01.2015 11:21 current values: 21.01.2015 11:06

Point: 30041634



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

Close Out Report: SD Factory Road - 17.10.2013 - 21.11.2014

date: 21.01.2015 11:23 current values: 21.01.2015 11:06

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Shallow Datums, Factory Road

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
	14/11/13													
30041631		101.169	101.167	0	101.166	-1	101.254	0	101.255	1	101.256	1	101.167	1
30041632		101.257											101.256	0
30041633		101.120											101.116	-1
30041634		101.549											101.116	0
30041631(1)		96.087	96.085	0	96.084	-1							96.085	1
30041631(2)		91.086	91.083	0	91.082	-1							91.084	1
30041631(3)		83.084	83.083	-4	83.081	-2							83.083	1
30041632(1)		96.163					96.159	-1	96.160	1	96.161	1	96.160	0
30041632(2)		91.169					91.166	0	91.167	1	91.168	1	91.167	-1
30041632(3)		83.180					83.177	0	83.178	1	83.179	1	83.178	-1
30041633(1)		96.036							96.032	0	96.031	-1	96.031	1
30041633(2)		91.034							91.030	0	91.030	-1	91.030	1
30041633(3)		83.039							83.035	0	83.034	-1	83.035	0
30041634(1)		96.464												
30041634(2)		91.468												
30041634(3)		83.465												

monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: Shallow Datums, Factory Road

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	10/02/2014
	14/11/13													
30041631		101.169												
30041632		101.257												
30041633		101.120												
30041634		101.549	0 -1	101.548	1 0	101.548	-1 -1	101.548	0 -1	101.548	0 -1	101.548	0 -1	covered
30041631(1)		96.087												
30041631(2)		91.086												
30041631(3)		83.084												
30041632(1)		96.163												
30041632(2)		91.169												
30041632(3)		83.180												
30041633(1)		96.036												
30041633(2)		91.034												
30041633(3)		83.039												
30041634(1)		96.464	0 -3	96.461	0 -2	96.461	-1 -3	96.461	0 -3	96.461	0 -3	96.461	0 -3	
30041634(2)		91.468	-1 -3	91.464	1 -2	91.465	-1 -3	91.465	0 -3	91.465	0 -3	91.465	0 -3	
30041634(3)		83.465	0 -3	83.463	1 -2	83.463	-1 -2	83.463	0 -2	83.463	0 -2	83.463	0 -2	


monitoring table



Joint Venture

project: C310 Thames Tunnel
structure: Shallow Datums, Factory Road

No. of reading	baseline	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
date	14/11/13	08/05/2014		09/05/2014		13/05/2014		17/05/2014		20/05/2014		27/05/2014	
30041631	101.169					101.163	0 -6			101.163	0 -6	101.164	1 -5
30041632	101.257	101.255	0 -1			101.255	0 -1			101.255	-1 -2	101.255	1 -1
30041633	101.120	101.111	3 -8	101.112	1 -8	101.114	1 -6			101.112	-2 -8	101.113	1 -7
30041634	101.549		covered		covered		covered	101.540	-8 -9		covered		covered
30041631(1)	96.087					96.083	0 -4			96.082	0 -5	96.083	1 -4
30041631(2)	91.086					91.081	0 -4			91.081	0 -4	91.081	0 -4
30041631(3)	83.084					83.081	0 -3			83.082	1 -2	83.080	-2 -4
30041632(1)	96.163	96.154	0 -9			96.154	0 -9			96.153	-1 -10	96.154	1 -9
30041632(2)	91.169	91.166	1 -4			91.166	0 -4			91.165	-1 -4	91.164	-1 -5
30041632(3)	83.180	83.177	0 -3			83.177	0 -3			83.176	-1 -4	83.176	-1 -4
30041633(1)	96.036	96.026	3 -8	96.028	0 -8	96.030	2 -6			96.028	-2 -8	96.028	0 -8
30041633(2)	91.034	91.027	3 -7	91.028	1 -6	91.029	1 -5			91.027	-2 -7	91.026	-1 -8
30041633(3)	83.039	83.033	2 -6	83.034	1 -6	83.035	1 -4			83.034	-1 -5	83.033	-1 -7
30041634(1)	96.464							96.459	-2 -5				
30041634(2)	91.468							91.461	-4 -7				
30041634(3)	83.465							83.461	-2 -4				

 HOCHTIEF MURPHY Joint Venture		C310 THAMES TUNNEL REPORT			
EMPLOYER	CROSSRAIL	eB NO	C310-HTM-C-RGN-CR148-50025	Rev	1.0
TITLE	Monitoring Close-Out Reports for Thames Water assets relating to Tunnelling Works North Embankment River Thames - North Woolwich Portal (excl. Store Rd)				

APPENDIX 112

CS 35 – Factory Road 4 – CH 88870

Learning Legacy Document

monitoring asset	Area Factory Road / TW Henley Road		
reference monitoring drawing:	C310-HTM-C-DWG-CR146-ST004-70003		
name of monitoring section:	CS 35 Factory Road 4 - Ch88870		
sensor type:	manual levelling studs		
chainage:	88870	point no.:	3004 1891 - 3004 1897
trigger values: [mm]	green: +12 -12		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	16/12/13	0.00		
TBM 1	start ZOI	23/01/14	-1.98	3004 1895
	end ZOI	27/01/14	-7.44	3004 1895
TBM 2	start ZOI	06/05/14	-4.33	3004 1897
	end ZOI	11/05/14	-2.83	3004 1897
longterm	21/11/14	-13.82	3004 1895	breached green trigger value
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

Due to different site activities some of the points were damaged/destroyed and also reinstalled. See datatable for more details. It wasn't possible to reinstall point 3004 1894.
 The maximum deflection ratio is 1:1372. (3004 1894 - 3004 1895 - 3004 1896) - no TW trigger breached (TW alert value 1:1000).
 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.

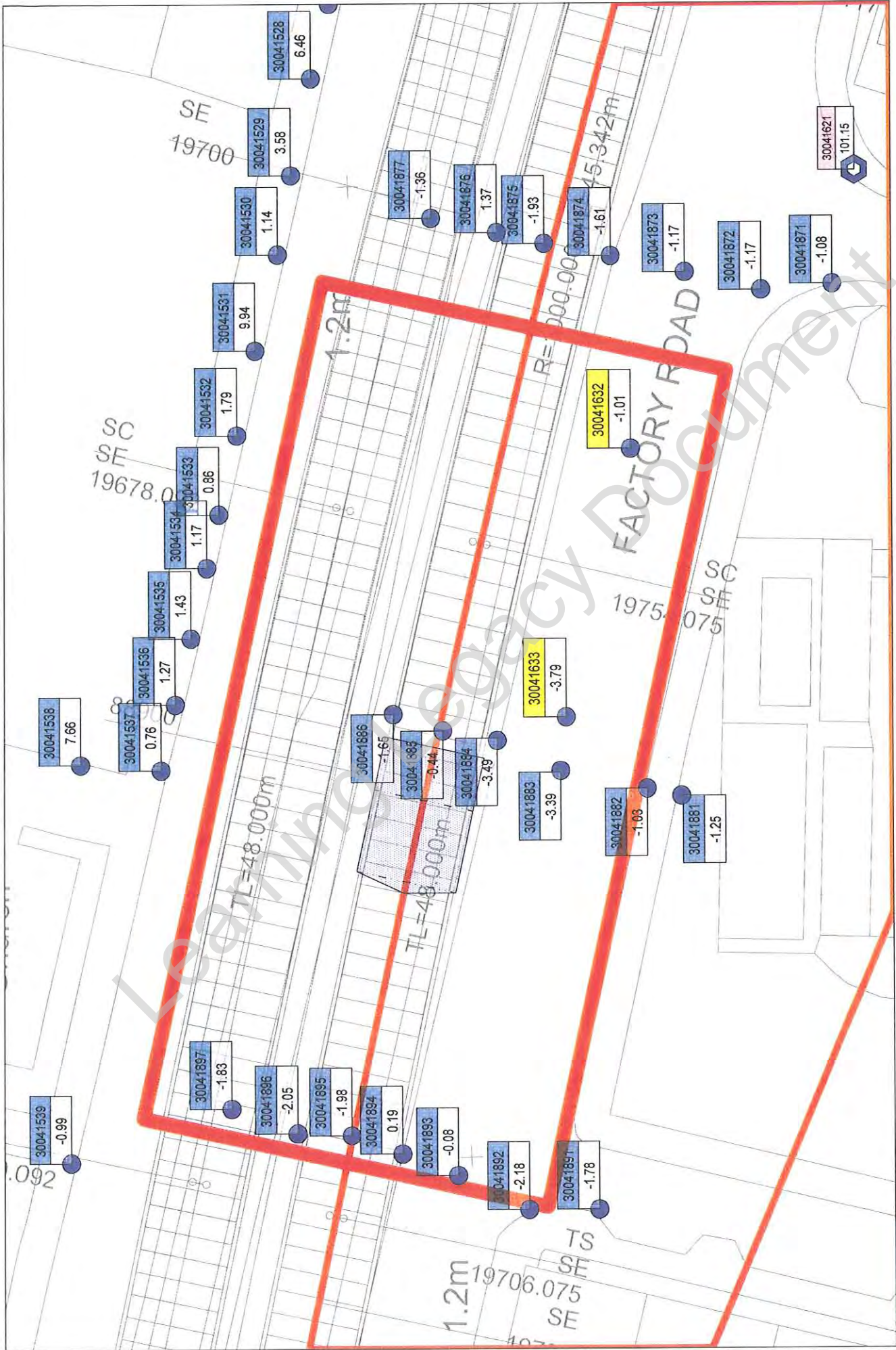
date / signature:

print name:

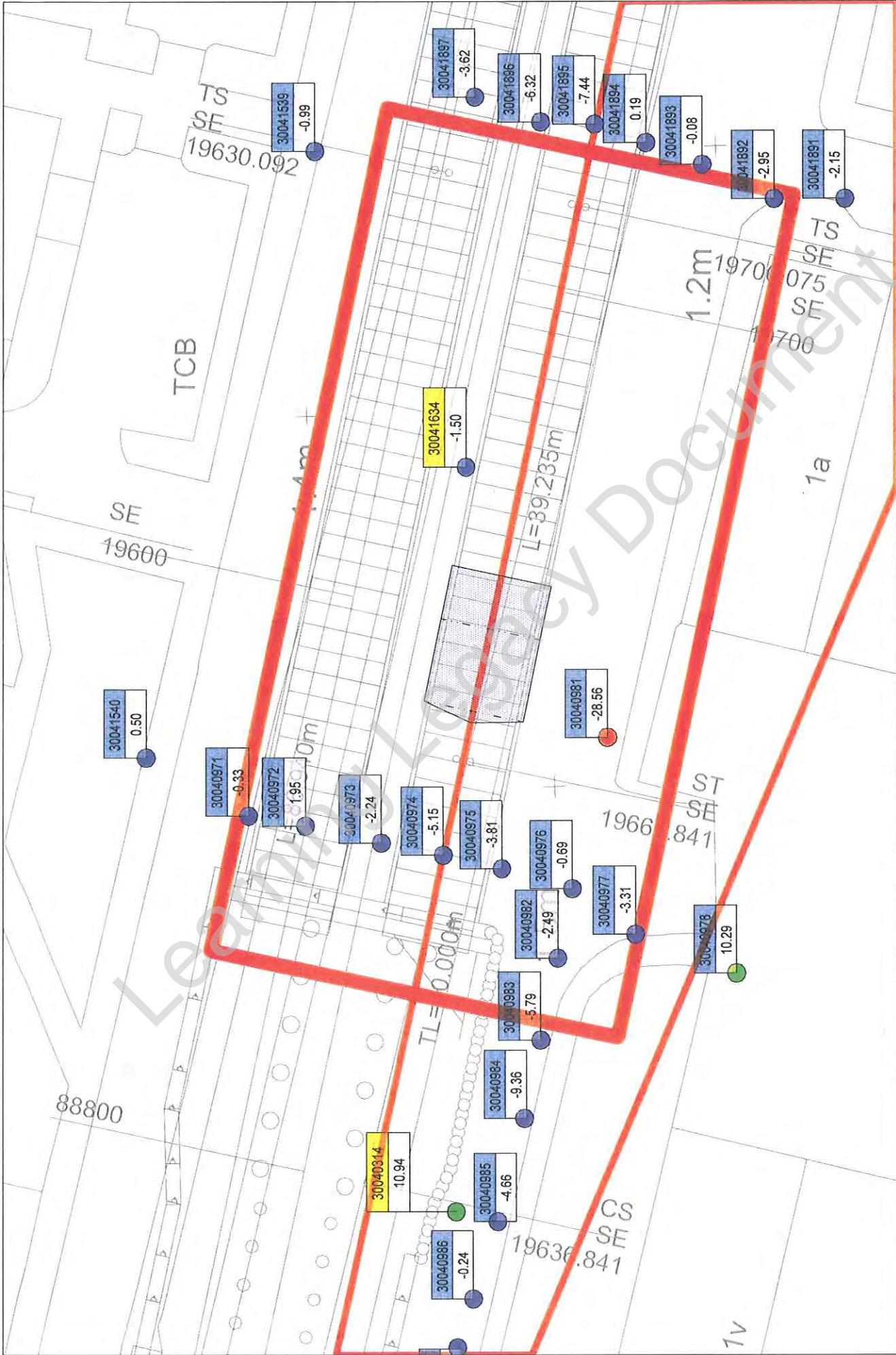
HMJV project role:



Monitoring & Survey engineer



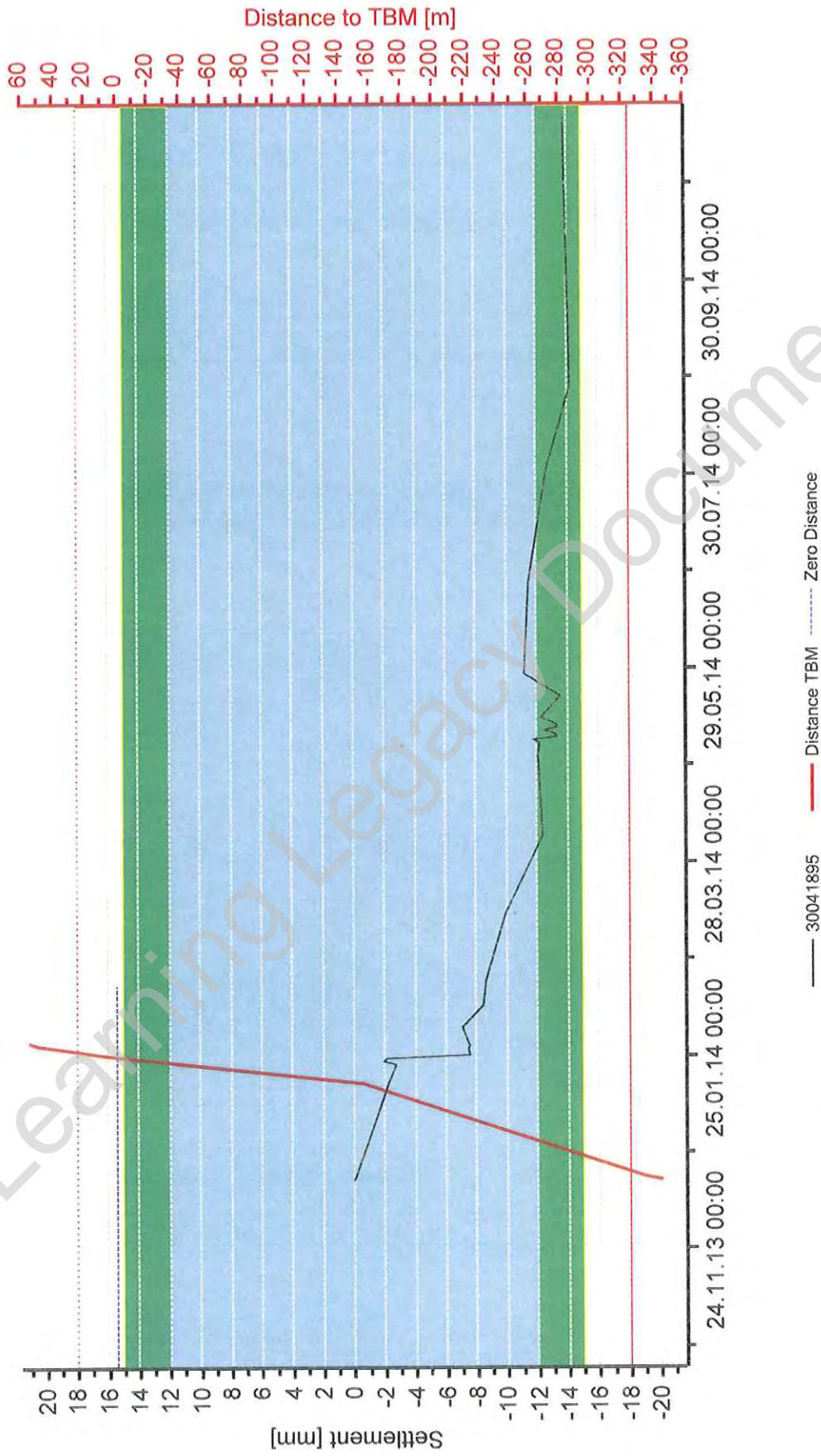
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 23.01.2014 19:26



Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: TBM drive WB
 current values: 27.01.2014 15:00

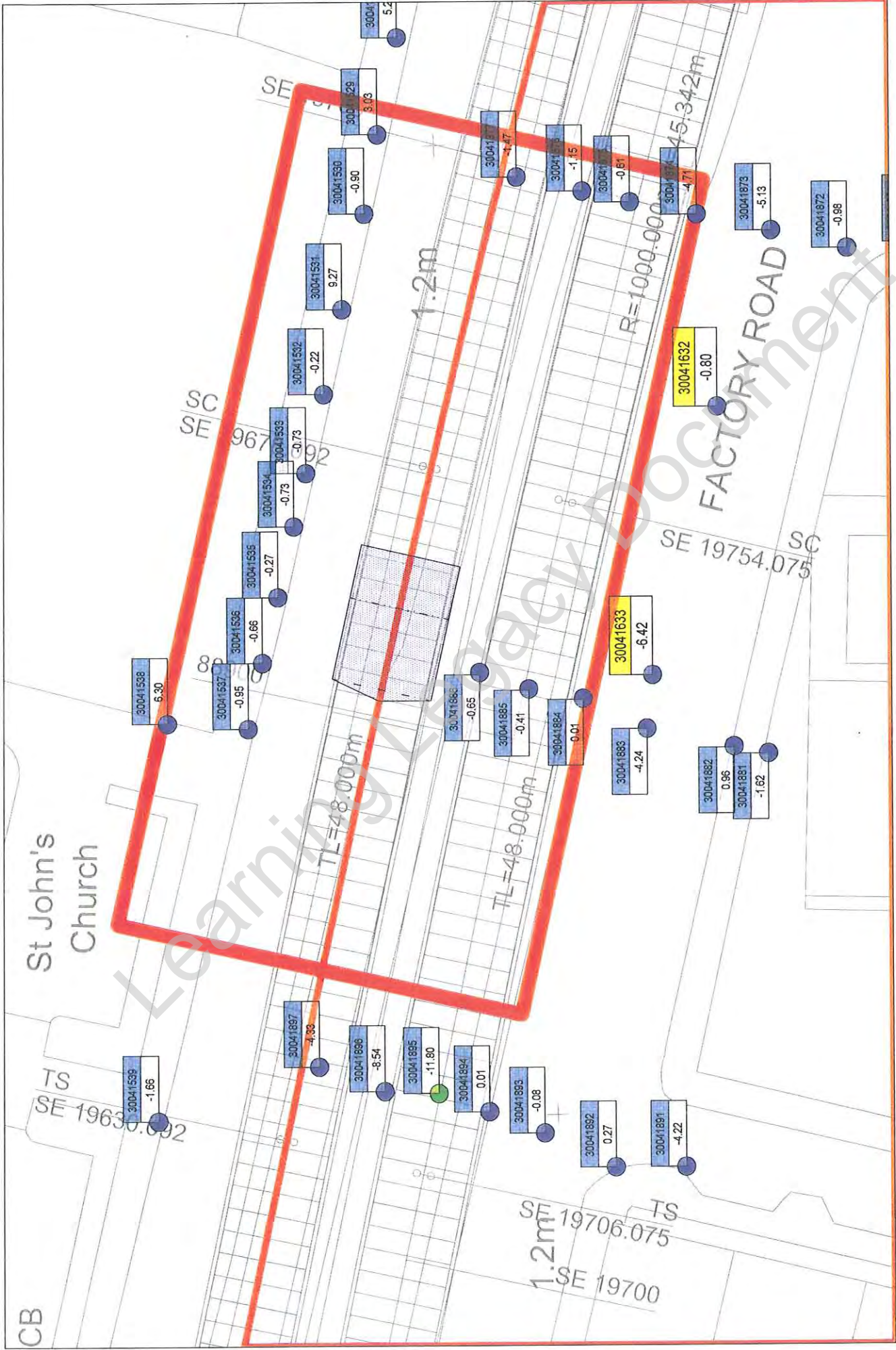


Point: 30041895



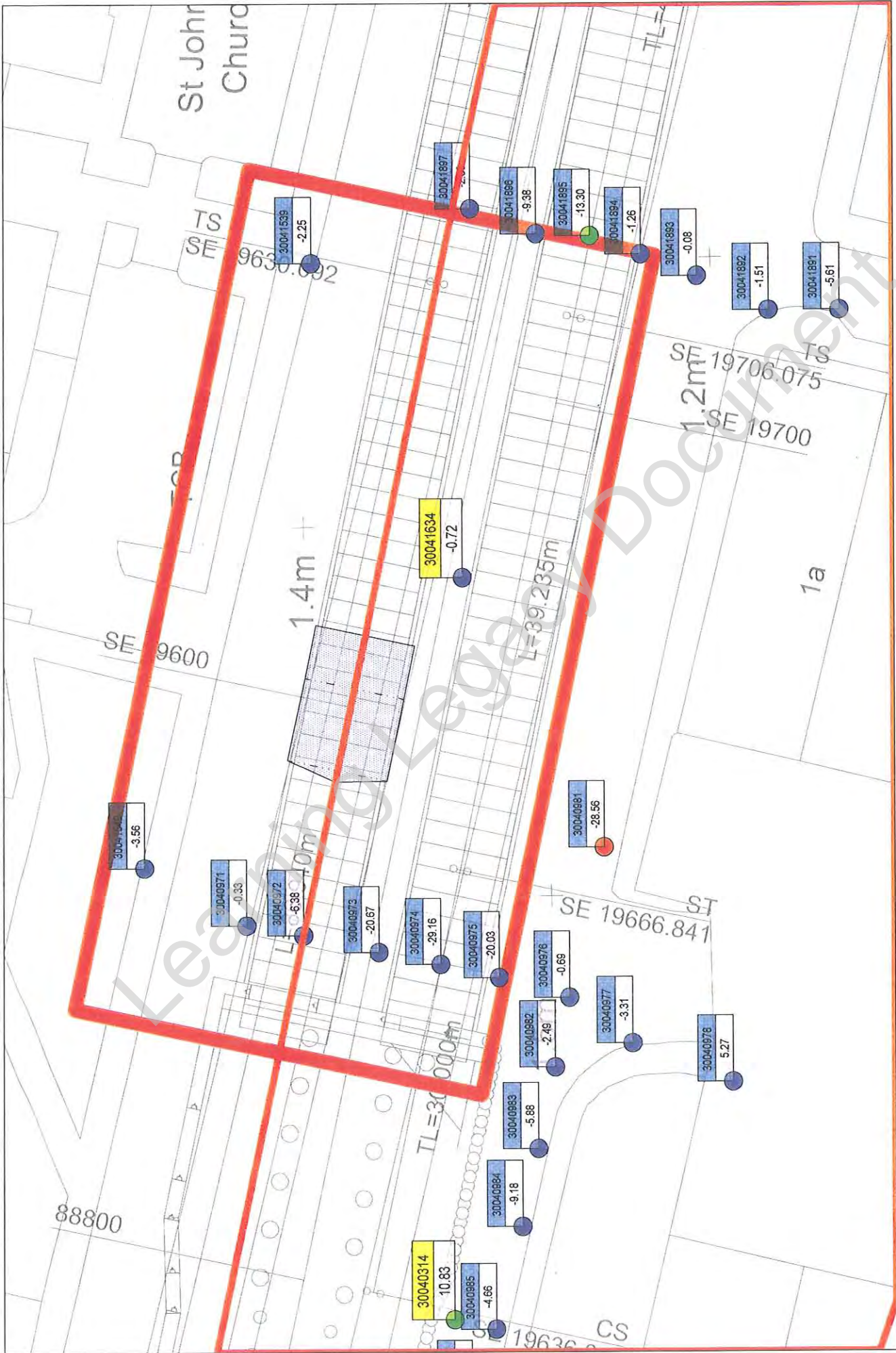
Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
Close Out Report: WB Tunnel - CS 35 Factory Road 4 - 17.10.2013 - 21.11.2014
Date: 21.01.2015 10:05 Current Values: 21.01.2015 09:51





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 06.05.2014 17:20





Project: C310 Thames Tunnel - Plumstead Portal to North Woolwich Portal
 working activities: C310 EB tunnel drive; NWP: portal excavation, construction base slab
 current values: 11.05.2014 08:55



monitoring table



Joint Venture

project: C310 Thames Tunnel

structure: CS 35 Factory Road 4

No. of reading		25. following		26. following		27. following		28. following		29. following		30. following	
date		20/05/2014		27/05/2014		25/06/2014		31/07/2014		27/08/2014		21/11/2014	
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
30041891	101.154	101.148	-1 -6	101.151	3 -3	101.150	-1 -5	101.149	-1 -5	101.149	0 -5	101.150	1 -4
30041892	101.159	101.150	-1 -2	destroyed		101.151	1 0	101.150	-1 -2	covered		destroyed	
30041893	101.203	destroyed		destroyed		destroyed		destroyed		destroyed		destroyed	
30041894	101.237	101.568	-1 -2	101.570	3 1	101.569	-2 -1	101.567	-1 -2	101.566	-1 -3	destroyed	
30041895	101.940	101.926	-1 -14	101.929	2 -11	101.928	0 -12	101.927	-1 -13	101.926	-2 -14	101.926	0 -14
30041896	101.855	101.846	-1 -10	101.848	3 -7	101.849	0 -7	101.848	-1 -8	101.846	-1 -9	101.846	0 -9
30041897	101.837	101.833	-2 -4	101.835	2 -1	101.834	-1 -2	101.834	-1 -3	101.833	-1 -4	destroyed	
30041898													
30041899													

Learning Legal Document