

C510 - Whitechapel and Liverpool Street Station Tunnels

Instrumentation and Monitoring Close Out Report

Block 07 Liverpool Street

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3. Acceptance by Crossrail:

>€			Crossrail Review and Acceptance	Decal								
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Reviewed/Accent	ed hy (signature)	Print Name:	Position:	Date:								
				30/10/17								
		lieve the designer/supplier from full or eveloped or selected by the designer/su		ot constitute Crossrail approval of design, details, calculations,								



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TABLE OF CONTENTS

1	Purpose of Close out Report	4
2	Scope of Monitoring Assessment for Close Out	5
3	Close Out Report Block Description and Location Plan	6
4	Construction Programme Influencing Block 07	
5	Monitoring Assessment of Block 07	11 15 18
6	Decommissioning Recommendations	23
7	Annendix 1	24



Tables and Figures

Figure 1- Liverpool St General Location Plan - including Block 07 monitoring area	6
Figure 2 - Block 07 ZOI Constructions	
Figure 3- LP10714 Located on Unstable Pavement	
Figure 4- LB Monitoring Sensor Settlement Status and Location Plan	20
Figure 5- LP Monitoring Sensor Settlement Status and Location Plan	
Figure 6- RP Monitoring Sensor Settlement Status and Location Plan	22
Graph 1- All Remaining Block 07 BREs (LB) Manual Monitoring History in Relation to Construction Graph 2- All Remaining Block 07 Road Studs (LP) Manual Monitoring History in Relation to Construction	on 13
Graph 3- All Remaining Block 07 3d Geodetic Prisms (RP) Automated Monitoring History in Relat Construction	
Table 1- Tunnel Advances Affecting Block 07	10
Table 2- Block 07 Decommissioning Status Tracker LB, LP and RP	



1

Purpose of Close out Report

Materials and Workmanship Specification - Instrumentation and Monitoring (C122-OVE-Z4-RSP-CR001-00007), section KX10.2114 specifies the requirement for a close out report prior to the decommissioning of monitoring sensors and instruments. It is therefore, the purpose of this close out report to gain acceptance to decommission identified monitoring sensors in Block 07 of Crossrail's C510 Liverpool St. Acceptance to decommission sensors will result in ceasing measurements, stopping the reporting and removing sensors.

To gain approval to decommission instrumentation and monitoring, the monitoring data will be analysed to demonstrate settlement does not breach specified rates after the minimum monitoring period is complete.

N.B. Monitoring sensors refers to all monitoring points; which includes BREs, road studs, extensometers, inclinometers, tilt meters, crack meters, retros (survey stickers) and prisms. Please note this is not an exhaustive list and does not include monitoring systems/equipment, such as communication boxes.



2 Scope of Monitoring Assessment for Close Out

Specification KX10.4103 of document C122-OVE-Z4-RSP-CR001-00007 states that to establish approval for decommissioning, the contractor is to produce a close out report which summarises the observations in correlation with the construction activities. The report is to demonstrate monitoring has reached acceptable settlement rates; whether to the specified rate, or where no rate is specified trigger values are evaluated against potential residual risks. I&M schedule C122-OVE-C2-DDJ-CR001-Z-31511 specifies the acceptable settlement rates with the requirements to monitor at different construction phases, and duration for completion. To summarise the I&M schedule states that the manual monitoring decommissioning specified rate is 2mm per year, following 16 months post construction monitoring (4 months step down and quarterly measurements for a minimum of 12 months long term monitoring). The I&M schedule does not identify the need for long term automated monitoring or specify a settlement rate requirement, it only states that monitoring must continue for 6 months post construction. At the 6 month juncture, agreement must be sought from the project manager to decommission automated monitoring programmes through a close out report or agreeing to cease the works with the project manager. In most cases decommissioning will be possible, as the residual risk will be captured through the remaining long term manual monitoring.

Contrary to the Specification for Instrumentation and Monitoring (C122-OVE-Z4-RSP-CR001-00007), the Project Managers Instruction (PMI) C510-PMI-01102 replaces long term monitoring with satellite interferometry (InSAR) for the areas agreed by the project manager. If long term monitoring responsibilities are removed from BBMV and covered by satellite interferometry, the specified settlement criteria may not be met by BBMV. If this occurs, reference to the agreement will be provided to state BBMV are no longer responsible for the sensors and consequently decommissioning acceptance will be proposed.

In some cases it may be agreed with the project manager to cease monitoring prior to meeting the specified rates. The close out report will be revised to incorporate these agreements prior to decommissioning. Due to multiple influencers and large construction monitoring zones, it may be prudent to submit successive document revisions for close out reports, where the specification is not met or the minimum post construction monitoring has not been achieved.



3 Close Out Report Block Description and Location Plan

3.1 Block 07 Location

Figure 1 shows the Liverpool St general location plan, C510 tunnel construction and where Block 07 is situated. Detailed location plans can be found within the installation reports and photomontages as listed in Section 3.2. Each monitoring sensor's location is shown within the assessment plans (Section 5.4).

Thames Water critical assets include 200mm and 400mm Stainless Steel water mains located on Liverpool Street within close proximity to Block 07. Other utilities in the vicinity of Block 07 include plastic gas mains, various water mains and a brick sewer. Location and details of these assets can be found in Instrumentation and Monitoring Plan: Liverpool Street Station Ground Movement and Asset Protection C122-OVE-C2-RGN-C101-50013 or the relevant C122 prepared Damage Assessment Reports.

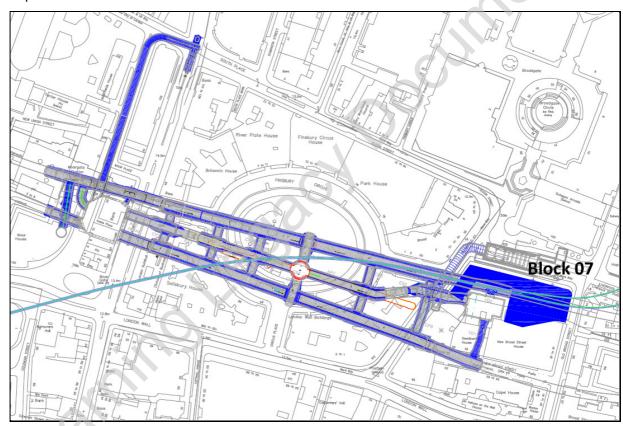


Figure 1- Liverpool St General Location Plan - including Block 07 monitoring area



3.2 **Block 07 Description**

Block 07 is located between Blomfield St and Old Broad St. The block is adjacent to C502's Broadgate Site and occupies The Railway Tavern and Crossrail's Blomfield St office. Block 07 contains the following types of monitoring sensors:

- Road Studs (LP) manual monitoring
- 3D Geodetic Prism Monitoring (RP) automated monitoring
- Tiltmeters (TB)- automated monitoring
- Building (BREs)- manual monitoring
- Water Settlement Cell- Electronic (SH)- automated monitoring

Each monitoring asset's details are listed within the Decommissioning Status Tracker (*Table 2*) and further relevant information can be sourced from the following reports.

Block 07 Report References:

- Monitoring Installation Report External LIV-LB-07-Liverpool Street CRL Document Number: C510-BBM-G-RGN-C101-50002
- Monitoring Installation Report Internal LIV-LB-07 Liverpool Street (1-14 Liverpool St)
 CRL Document Number: C510-BBM-C2-RGN-C101-50156
- Monitoring Installation Report LIV-LP-07 Liverpool Street CRL Document Number: C510-BBM-G-RGN-C101-50001
- Installation Report- (Block-7), Liverpool Street

CRL Document Number: C510-BBM-G-RGN-C101-50008

The Settlement Contour Drawing (C122-OVE-C2-DDA-CR001_Z-21313) predicts the Block 07 area to experience approximately 20-120mm of settlement.



4 Construction Programme Influencing Block 07

Extent of Influence (EOI) monitoring areas were established to record ground movements in relation to Crossrail construction. The EOI purpose is to ensure all assets and areas are adequately monitored for movement during construction, this is achieved by controlling when and how often monitoring occurs. The Asset Protection Instrument and Monitoring (I&M) Schedules (C122 –OVE-C2-DDJ-CR001_Z-31511) states the extent of influence (EOI) of an active tunnel is 2 x depth from the active tunnel face. The EOI is used to determine when monitoring sensors are no longer influenced by construction and can be considered for decommissioning.

The original specification received amendments to manual monitoring frequency within the EOI through several PMIs, with the latest PMI (C510-PMI-01103) establishing an Active ZOI (Zone of Influence) as 2 x tunnel diameter from the active tunnel face projected to the surface. The Active ZOI changed the rates of monitoring frequency, it did not replace EOI. The EOI is used to determine when a monitoring sensor is eligible for decommissioning. Whereas, active ZOI is used to analyse manual monitoring movement against construction.

To identify the tunnels that had the potential to significantly affect Block 07, a ZOI area was established by giving each monitoring sensor a radius of 2.0 x tunnel diameter. This area was then used to determine all the mining advances that occurred within its boundary, *Figure 2* shows the ZOI boundary (blue outline) and the tunnel constructions. Tunnel advance start and finish dates will be used in assessment of the monitoring data.



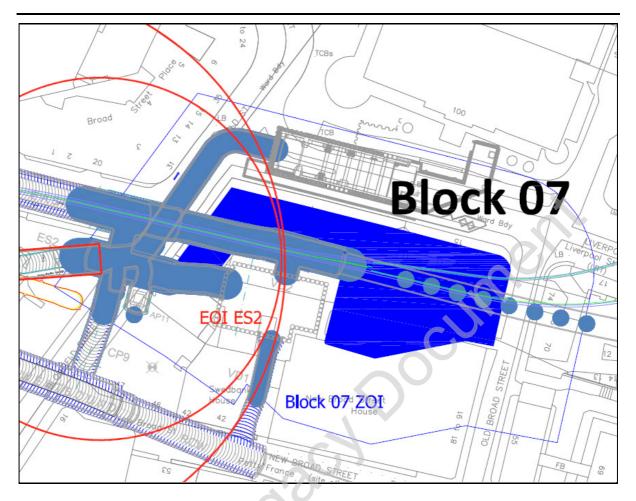


Figure 2 - Block 07 ZOI Constructions

N.B. ES2 EOI is represented in *Figure 2* to show the area of Block 07 that is within its boundary.

Figure 2 shows the Block 07 ZOI and the tunnel advances that occurred within its boundary. The construction advances within the ZOI that have the potential to affect Block 07 are listed and summarised in *Table 1*. Further evidence for construction dates can be seen in *Table 2*, which lists the latest tunnel advances for each point.

As the ES2 safe stop was completed on the 24th of November 2016, post construction monitoring has been completed for all of Block 07 with regards to ES2 EOI. Therefore, all monitoring sensors are eligible to be decommissioned, subject to meeting required settlement trends. Grouting facilities within the GAD adits were agreed to be decommissioned at the ERP meeting on 27/07/2017, and as such, all remaining automated sensors were agreed to be decommissioned. Under ss. KC21.3220(c) of the Crossrail document C122-OVE-Z4-RSP-CR001-00010, it states that automatic monitoring can be decommissioned at the same time as the grouting facilities. Further evidence for Block 07 sensors decommissioning status can be found in the decommissioning tracker.



4.1.1 Tunnel Advances Affecting Block 07

The information presented in *Table 1* is used in the monitoring graph (Section 5.1), to show the ground movements in relation to construction.

	TUNNEL ADVANCES STARTS & ENDS FOR GRAPHS													
Tunnel Code	Tunnel Reference	Primary Layer Type	Start Date	End Date	ZOI									
ES2-Enlargement	ES2	Enlargement	24/09/2016	24/09/2016	ZOI									
CH3-Enlargement	CH3	Enlargement	21/08/2016	28/08/2016	ZOI									
AP11-Enlargement	AP11	Enlargement	06/08/2016	14/08/2016	ZOI									
AP12-Enlargement	AP12	Enlargement	04/08/2016	04/08/2016	ZOI									
AP2-Enlargement	AP2	Enlargement	28/06/2016	21/06/2016	ZOI									
AP2-Pilot	AP2	Pilot	25/04/2016	31/05/2016	ZOI									
ES2-Pilot	ES2	Pilot	09/03/2016	24/04/2016	ZOI									
TBM-East-RC-Pilot	TBM-East-RC	Pilot	25/01/2015	31/01/2015	C305									
CP10-Enlargement	CP10	Enlargement	15/08/2014	17/08/2014	ZOI									
CP9-Enlargement	CP9	Enlargement	08/08/2014	12/08/2014	ZOI									
CP9-Pilot	CP9	Pilot	17/07/2014	19/07/2014	ZOI									
CP10-Pilot	CP10	Pilot	15/07/2014	16/07/2014	ZOI									
VD1-Enlargement	VD1	Enlargement	28/05/2014	08/06/2014	ZOI									
VD2-Enlargement	VD2	Enlargement	17/05/2014	17/05/2014	ZOI									
RCW-Enlargement	RCW	Enlargement	26/04/2014	26/04/2014	ZOI									
RCE-Enlargement	RCE	Enlargement	31/01/2014	05/03/2014	ZOI									
PTE-East-Enlargement	PTE-East	Enlargement	17/01/2014	30/01/2014	ZOI									
RCE-Pilot	RCE	Pilot	09/09/2013	26/09/2013	ZOI									
PTE-East-Pilot	PTE-East	Pilot	01/09/2013	09/09/2013	ZOI									
AP1a-Enlargement	AP1a	Enlargement	04/08/2013	14/08/2013	ZOI									
AP1b-Enlargement	AP1b	Enlargement	16/07/2013	04/08/2013	ZOI									
AP1a-Pilot	AP1a	Pilot	19/05/2013	07/06/2013	ZOI									
AP1b-Pilot	AP1b	Pilot	05/05/2013	18/05/2013	ZOI									

Table 1- Tunnel Advances Affecting Block 07

Heading Index:

AP - Access Passage

CH - Chamber

CP - Cross Passage

ES - Escalator

GAD - Grout Adit

LCE - Launch Chamber East

LCW – Launch Chamber West

PTE - Platform Tunnel East

PTW – Platform Tunnel West

RCE – Reception Chamber East

RCW – Reception Chamber West

TBM - Tunnel Boring Machine

VD – Ventilation Drive



5 Monitoring Assessment of Block 07

Evidence for decommissioning each monitoring sensor is shown through graphs, tables (decommissioning status tracker) and plans. Each element of assessment compliments the other and is used together to determine acceptance of decommissioning. The decommissioning status tracker (*Table 2*) highlights the monitoring sensors to be considered for decommissioning and provides supporting evidence for the decision. In some cases supplementary evidence is required to prove stability or provide reasoning for decommissioning.

ES2 was the final construction activity to affect Block 07. The final construction activity affecting Block 07 took place on 24/09/2016; therefore, all sensors were eligible for decommissioning from 24/03/2017 provided the specified sensor meets the <2mm/year settlement requirement. As discussed in section 4, KC21.3220(c) states, however, that all automated sensors can be decommissioned at the same time as grouting regardless of the automated sensor's settlement rate.

Crossrail agreed at the ERP meeting held on the 20/06/2017 to decommission that grouting facilities within GAD2 tunnel and Blomfield Grout Box. As such, this allowed for decommissioning of all automated sensors within the influence area. It is therefore proposed that all remaining automated sensors within Block 07 be removed. See graphs, tables and plans for further details on the automated sensors.

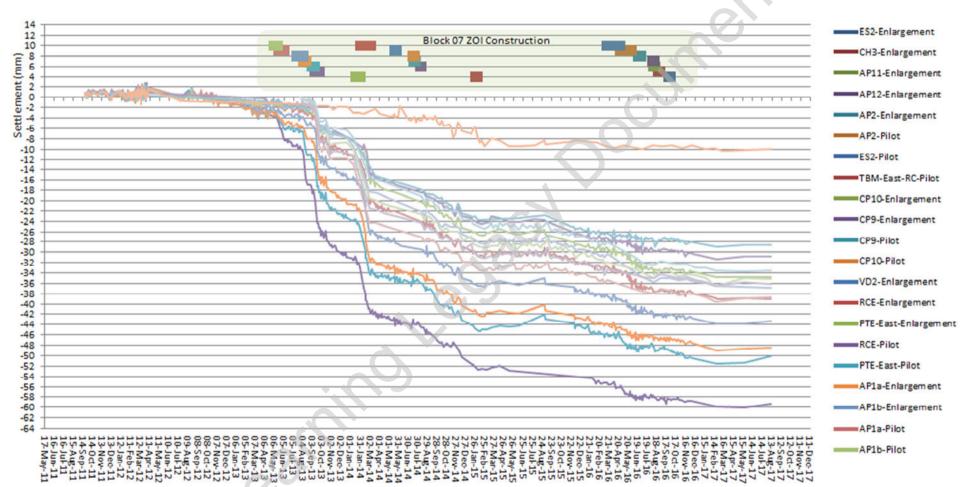
5.1 Time Graphs Monitoring Full History and Construction Durations

To assess the movement of Block 07 monitoring sensors; each monitoring sensor data type is displayed in a line graph, with a gantt chart (bar) representing the construction identified in Section 4:

- Graph 1- All Remaining Block 07 BREs (LB) Manual Monitoring History in Relation to Construction
- Graph 2- All Remaining Block 07 Road Studs (LP) Manual Monitoring History in Relation to Construction
- Graph 3- All Remaining Block 07 3d Geodetic Prisms (RP) Automated Monitoring History in Relation to Construction

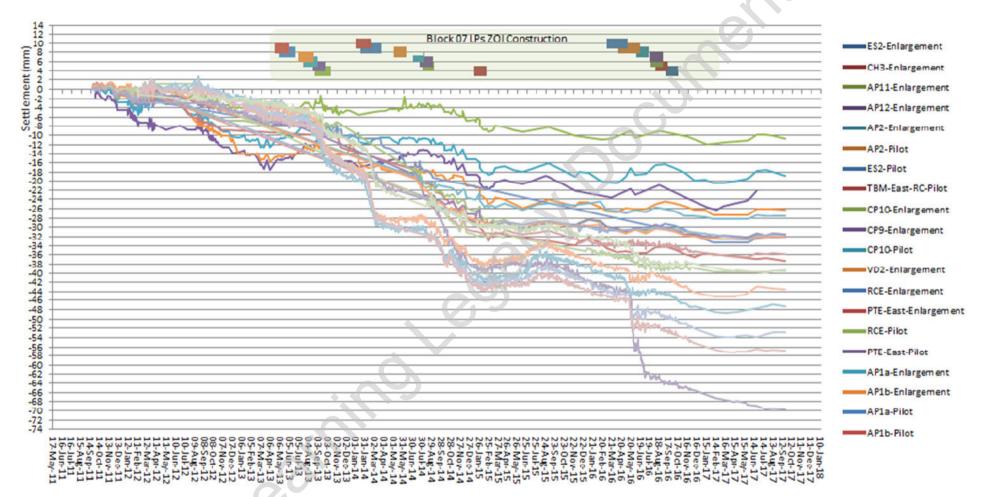


Graph 1- All Remaining Block 07 BREs (LB) Manual Monitoring History in Relation to Construction



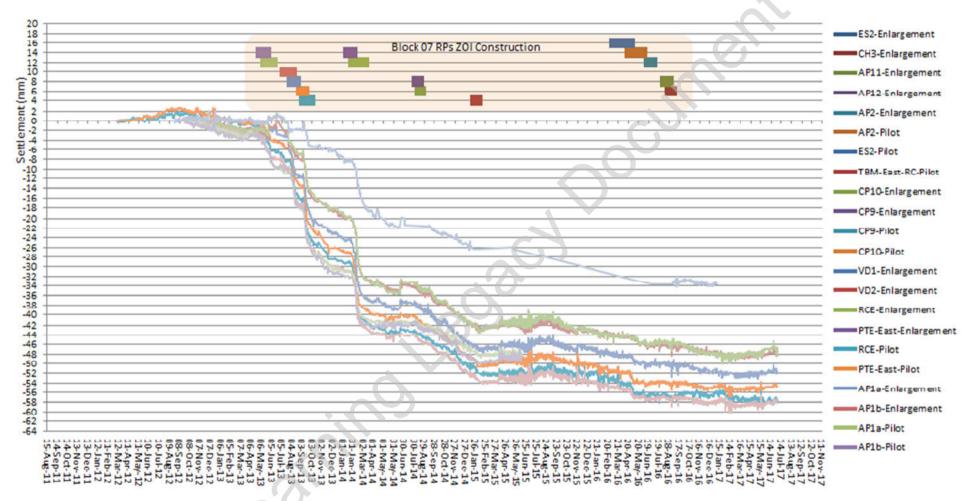


Graph 2- All Remaining Block 07 Road Studs (LP) Manual Monitoring History in Relation to Construction





Graph 3- All Remaining Block 07 3d Geodetic Prisms (RP) Automated Monitoring History in Relation to Construction





5.2 Block 07 Decommissioning Status Tracker

The decommissioning tracker (*Table 2*) identifies each monitoring sensor and provides the critical information to enable decommissioning assessment for each sensor. The initial fields shown in the tracker are descriptors of the monitoring sensor, whilst the remaining fields are the assessment for decommissioning. The purpose of the tracker is to provide Crossrail reviewers with sufficient information in conjunction with construction movement graphs and plots, to accept BBMV's proposal to decommission sensors on an individual basis.

Detailed explanation of the tracker column headers:

Tracker Column Header – Last Construction Date and Traffic Lights

For each sensor the EOI parameter is used to determine the last completed construction advance that had the potential to cause settlement. All construction tunnel advances that had the potential to affect a sensor through its EOI are listed for each sensor, from the list the latest advance is used as a construction completion indicator. A traffic light system is used to highlight when a sensor has surpassed defined monitoring time frames; 4 months (120 days), 6 months (180 days) and 16 months (480 days).

N.B. Each monitoring sensor's last affecting primary construction heading and advance number's completion date has been listed within the Decommissioning Status Tracker. The last construction heading listed, is not the closest to the monitoring sensor, but the last completed within the 2 x diameter radius.

Tracker Column Header – 120, 180 & 365 Days Average Settlement Trend

There are three average settlement trends, which tie into the defined monitoring time frames; 120, 180 and 365 days. The calculation used to determine the trend is the same for all three periods. It is a slope calculation (explained below) of the defined period, multiplied over one year. The trend is calculated from the latest reading and includes all readings within the defined period, which is averaged and then multiplied over 1 year. If there is no initial reading for the time frame date, the calculation will continue back to include the next available date. This is an important consideration when assessing the trend and to assist the reviewers, the time frame used within the calculation is included within the decommissioning tracker status table. Defined monitoring time frames:

- The 120 day average rate is used to show the completion of manual monitoring step down period, this is the minimum period of monitoring prior to InSAR taking monitoring responsibility.
- The 180 day average rate is the minimum monitoring period after construction for automated sensors.
- The 365 day average trend is a calculation to determine annual settlement rates using measurements taken across a full year. This measurement period is therefore the desired duration to be used to assess whether long term settlement meets the 2mm per annum specification.



Slope calculation Settlement Trend:

Description – The settlement trend calculates the slope of the linear regression line through data points in known_y's and known_x's. The slope is the vertical distance divided by the horizontal distance between any two points on the line, which is the rate of change along the regression line.

Calculation

$$b = \frac{\sum (x - \overline{x})(y - \overline{y})}{\sum (x - \overline{x})^2}$$

Example - If the calculated trend for a 6 month period is 1.5mm, it is multiplied into 365 days, to equal a projected settlement trend of 3mm over 1 year.

Tracker Column Header - ERP Ceased date

ERP and CTC meetings have identified project efficiencies, by ceasing manual monitoring programmes early, or prior to reaching 2mm/yr. InSAR may have taken responsibility of monitoring or the perceived risk may be low enough to warrant ceasing the monitoring. In these situations the cease date is provided, along with a comment explaining the reasoning. Monitoring that has been ceased still requires approval to decommission and will be identified within the decommissioning status tracker as proposed to decommission.

Tracker Column Header – Decommissioning Status

The status is the decommissioning situation for each sensor within Block 07. The different statuses are as follows:

- Outstanding Monitoring sensor has not met the close out requirements and approval to decommission will be sought in subsequent revisions of this close out report.
- Proposed the sensor is proposed to be decommissioned. Crossrail to accept the sensor can be decommissioned.
- Agreed Agreed to decommission through previous revision of the close out report. No
 further reporting or monitoring has taken place.
- Complete Monitoring sensor has been removed and evidence gathered during decommissioning.

N.B. When monitoring sensors have not met the requirements, it may still be appropriate to decommission. In this scenario supplementary evidence will be provided to explain the reasoning for decommissioning.

Table 2 -	Block 07	7 Decommi	ssioninç	g Statu	s Track	er LB, LP a	and RP		20/10/201	7		n GREEN	< 3.5 mm	n AMBER	> 3.5 mr	n F	RED		
			_						•		AVERAGE SETTL	EMENT TREND				•			
C510 Sensor Name	Block	Section	Int / Ext	Measureme Type	ent Sensor Type	Sensor Description	Asset/Location	EOI Last Primary Layer Construction	Last Construction Dat	te Latest Surveyed Date	kep 021 120 Days	120 Day & Second Calculation Period	180 Days	180 Day Calculation Period	365 Days	365 Day Calculation Period	Ceased Date	General Comment	Decommissioning Status
C510-LB10701	Block 107	S10701	External	Manual	LB	BRE	1-14 Liverpool St	LIV_ES2_Enlargement_Adv-16	24/09/2016	11/08/2017	1.06	171	-0.93	249	-1.69	368		<2mm per annum specification met	Proposed
C510-LB10702	Block 107	S10701	External	Manual		BRE	1-14 Liverpool St	LIV_CH3_Enlargement_Adv-9	27/08/2016	11/08/2017	2.98	171		249	-3.05	368		Stable 6 month trend	Proposed
C510-LB10703	Block 107	\$10701	External	Manual		BRE	1-14 Liverpool St	LIV_AP11_Enlargement_Adv-7	06/08/2016	11/08/2017	1.28	171		249	-2.52	368			Proposed
C510-LB10704 C510-LB10705	Block 107	S10701	External External	Manual		BRE BRE	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-12	09/07/2016	11/08/2017 11/08/2017	1.28	171 Q		249	-1.86	368		<2mm per annum specification met	Proposed
C510-LB10705	Block 107 Block 107	S10701 S10701;S10702	External	Manual Manual	LB LB	BRE	1-14 Liverpool St 1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8 LIV_AP2_Enlargement_Adv-8	25/06/2016 25/06/2016	11/08/2017	0.00	171 Q		203	-2.05 -1.86	368 368		Stable 6 month trend	Proposed Proposed
C510-LB10707	Block 107	\$10702	External	Manual		BRE	1-14 Liverpool St	LIV AP2 Enlargement Adv-8	25/06/2016	11/08/2017	1.50	171		249	-1.66	368		╡	Proposed
C510-LB10708	Block 107	\$10702	External	Manual		BRE	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	11/08/2017	1.07	171		249	-1.20	368		1	Proposed
C510-LB10714	Block 107	S10702	External	Manual	LB	BRE	1-14 Liverpool St	LIV_TBM-East-RC_Pilot_Adv-3909	31/01/2015	11/08/2017	0.96	151	-0.11	207	-0.89	372			Proposed
C510-LB10736	Block 107	S10701	Internal	Manual		BRE	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	11/08/2017	-0.63	173		203	-1.81	368		<2mm per annum specification met	Proposed
C510-LB10737	Block 107		Internal	Manual		BRE	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	11/08/2017	2.12	173		203	-1.51	368			Proposed
C510-LB10738	Block 107	S10701	Internal	Manual		BRE	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	11/08/2017	2.57	173		203	-1.31	368		4	Proposed
C510-LB10739 C510-LB10740	Block 107 Block 107	S10701 S10701	Internal	Manual Manual	LB LB	BRE BRE	1-14 Liverpool St 1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8 LIV_AP2_Enlargement_Adv-8	25/06/2016 25/06/2016	11/08/2017 11/08/2017	0.65	173 C		203	-1.68 -1.91	368 368		_	Proposed
C510-LB10740	Block 107	S10701 S10701	Internal External	Manual	LP	Road Stud	Old Broad St	LIV_AP2_Enlargement_Adv-6 LIV TBM-East-RC Pilot Adv-3890	27/01/2015	18/10/2017	-2.20	121		225	0.00	428			Proposed Proposed
C510-LP10702	Block 107	S10701	External	Manual		Road Stud	Old Broad St	LIV TBM-East-RC Pilot Adv-3890	27/01/2015	19/06/2017	10.31	126		216	-1.77	383		4	Proposed
C510-LP10703	Block 107	\$10701	External	Manual	LP	Road Stud	Old Broad St	LIV_TBM-East-RC_Pilot_Adv-3890	27/01/2015	18/10/2017	-3.78	121	0.00	225	0.48	379			Proposed
C510-LP10704	Block 107	S10701	External	Manual	LP	Road Stud	Old Broad St	LIV_TBM-East-RC_Pilot_Adv-3890	27/01/2015	18/10/2017	-1.42	121		225	-0.57	379			Proposed
C510-LP10705	Block 107	S10701	External	Manual		Road Stud	Old Broad St	LIV_TBM-East-RC_Pilot_Adv-3890	27/01/2015	18/10/2017	-0.14	121		225	-1.61	379			Proposed
C510-LP10706	Block 107	S10702	External	Manual	LP	Road Stud	Liverpool St	LIV_TBM-East-RC_Pilot_Adv-3890	27/01/2015	18/10/2017	-1.68	121		282	-1.84	379			Proposed
C510-LP10707	Block 107	\$10702	External	Manual	LP	Road Stud	Liverpool St	LIV_TBM-East-RC_Pilot_Adv-3895	27/01/2015	18/10/2017	-0.07	121	0.01	225	-0.73	379		<2mm per annum specification met	Proposed
C510-LP10708 C510-LP10709	Block 107 Block 107	S10702 S10702	External External	Manual Manual	LP LP	Road Stud Road Stud	Liverpool St	LIV_TBM-East-RC_Pilot_Adv-3905 LIV_TBM-East-RC_Pilot_Adv-3909	31/01/2015 31/01/2015	18/10/2017 18/10/2017	-0.87 -0.96	121 C		225	-0.35 -0.45	379 379		4	Proposed
C510-LP10709	Block 107	S10702 S10702	External	Manual	LP	Road Stud	Liverpool St Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	18/10/2017	-0.51	121		225	-0.58	379		-	Proposed Proposed
C510-LP10711	Block 107	S10702	External	Manual	LP	Road Stud	Liverpool St	LIV AP2 Enlargement Adv-8	25/06/2016	18/10/2017	-0.41	121		428	-1.39	428		4	Proposed
C510-LP10712	Block 107	S10702	External	Manual	LP	Road Stud	Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	18/10/2017	-0.85	121		218	-1.35	367			Proposed
C510-LP10713	Block 107	S10702	External	Manual	LP	Road Stud	Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	18/10/2017	0.67	121	0.48	250	-0.89	367			Proposed
C510-LP10714	Block 107	S10702	External	Manual	LP	Road Stud	Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	18/10/2017	-2.59	121	-4.03	183	-5.73	367		Trend anomolous with adjacent sensors. Located on unstable seal patch. See Supplementary Evidence.	Proposed
C510-LP10732	Block 107	S10705	External	Manual		Road Stud	Bloomfield St	LIV_ES2_Enlargement_Adv-45	28/10/2016	18/10/2017	1.16	121	2.81	183	-1.11	367		<2mm per annum specification met	Proposed
C510-LP10733	Block 107	\$10705	External	Manual		Road Stud	Bloomfield St	LIV_ES2_Enlargement_Adv-45	28/10/2016	18/10/2017	-1.85	121		183	-0.88	367		ZEMM por annum opcomoation mot	Proposed
C510-LP10734 C510-LP10735	Block 107	\$10705	External	Manual	LP	Road Stud	Bloomfield St Bloomfield St	LIV_ES2_Enlargement_Adv-45	28/10/2016 09/07/2016	18/10/2017 18/10/2017	2.22	121	1.01	183	-3.05 -3.69	367		Chalala O manufak kunund	Proposed Proposed
C510-LP10735	Block 107 Block 107	\$10705 \$10705	External External	Manual Manual	LP LP	Road Stud Road Stud	Bloomfield St Bloomfield St	LIV_AP2_Enlargement_Adv-12 LIV AP2 Enlargement Adv-8	25/06/2016	18/10/2017	1.49	121		183	-2.14	367 367		Stable 9 month trend	Proposed
C510-LP12001	Block 107		N/A	Manual	LP	Road Stud	Queen Victoria Tunnels (QVT)	LIV TBM-East-RC Pilot Adv-3909	31/01/2015	02/05/2012	#N/A	121	#N/A	163	#N/A	307			Agreed
C510-LP12002	Block 120	N/A	N/A	Manual	LP	Road Stud	Queen Victoria Tunnels (QVT)	LIV TBM-East-RC Pilot Adv-3909	31/01/2015	02/05/2012	#N/A		#N/A		#N/A			╡	Agreed
C510-LP12003	Block 120	N/A	N/A	Manual	LP	Road Stud	Queen Victoria Tunnels (QVT)	LIV_TBM-East-RC_Pilot_Adv-3905	31/01/2015	02/05/2012	#N/A		#N/A		#N/A			1	Agreed
C510-LP12004	Block 120		N/A	Manual	LP	Road Stud	Queen Victoria Tunnels (QVT)	LIV_TBM-East-RC_Pilot_Adv-3905	31/01/2015	02/05/2012	#N/A		#N/A		#N/A				Agreed
C510-LP12005	Block 120	_	N/A	Manual		Road Stud	Queen Victoria Tunnels (QVT)	LIV_TBM-East-RC_Pilot_Adv-3895	27/01/2015	02/05/2012	#N/A		#N/A		#N/A				Agreed
C510-LP12006	Block 120		N/A	Manual	LP	Road Stud	Queen Victoria Tunnels (QVT)	LIV_TBM-East-RC_Pilot_Adv-3895	27/01/2015	02/05/2012	#N/A		#N/A		#N/A				Agreed
C510-LP12007	Block 120		N/A	Manual		Road Stud	Queen Victoria Tunnels (QVT)	LIV_TBM-East-RC_Pilot_Adv-3895	27/01/2015	02/05/2012	#N/A		#N/A		#N/A			_	Agreed
C510-LP12008 C510-LP12009	Block 120 Block 120	N/A N/A	N/A N/A	Manual Manual	LP LP	Road Stud Road Stud	Queen Victoria Tunnels (QVT) Queen Victoria Tunnels (QVT)	LIV_TBM-East-RC_Pilot_Adv-3895 LIV_TBM-East-RC_Pilot_Adv-3895	27/01/2015 27/01/2015	02/05/2012 02/05/2012	#N/A #N/A		#N/A #N/A		#N/A #N/A			_	Agreed Agreed
C510-LP12010	Block 120		N/A	Manual		Road Stud	Queen Victoria Tunnels (QVT)	LIV_TBM-East-RC_Pilot_Adv-3895	27/01/2015	02/05/2012	#N/A				#N/A #N/A			-	Agreed
C510-LP12011	Block 120		N/A	Manual		Road Stud	Queen Victoria Tunnels (QVT)	LIV TBM-East-RC Pilot Adv-3895	27/01/2015	02/05/2012	#N/A		#N/A		#N/A			-	Agreed
C510-LP12012	Block 120	_	N/A	Manual	LP	Road Stud	Queen Victoria Tunnels (QVT)	LIV_TBM-East-RC_Pilot_Adv-3895	27/01/2015	02/05/2012	#N/A		#N/A		#N/A			Within Queen Victoria Tunnels (QVT). Tunnel partially filled with concrete	
C510-LP12013	Block 120		N/A	Manual		Road Stud	Queen Victoria Tunnels (QVT)	LIV_TBM-East-RC_Pilot_Adv-3885	26/01/2015	02/05/2012	#N/A		#N/A		#N/A			by c503. Check with QVT to see if points need to be removed	Agreed
C510-LP12014	Block 120	N/A	N/A	Manual	LP	Road Stud	Queen Victoria Tunnels (QVT)	LIV_TBM-East-RC_Pilot_Adv-3885	26/01/2015	02/05/2012	#N/A		#N/A		#N/A				Agreed
C510-LP12015	Block 120		N/A	Manual		Road Stud	Queen Victoria Tunnels (QVT)	LIV_TBM-East-RC_Pilot_Adv-3895	27/01/2015	02/05/2012	#N/A		#N/A		#N/A		ļ	4	Agreed
C510-LP12016	Block 120		N/A	Manual		Road Stud	Queen Victoria Tunnels (QVT)	LIV_TBM-East-RC_Pilot_Adv-3895	27/01/2015	02/05/2012	#N/A		#N/A		#N/A		1	-	Agreed
C510-LP12017 C510-LP12018	Block 120 Block 120		N/A N/A	Manual Manual	LP LP	Road Stud Road Stud	Queen Victoria Tunnels (QVT) Queen Victoria Tunnels (QVT)	LIV_TBM-East-RC_Pilot_Adv-3895 LIV_TBM-East-RC_Pilot_Adv-3895	27/01/2015 27/01/2015	02/05/2012	#N/A #N/A	+	#N/A #N/A	+ +	#N/A #N/A		 	-	Agreed
C510-LP12018	Block 120		N/A N/A	Manual	LP	Road Stud	Queen Victoria Tunnels (QVT) Queen Victoria Tunnels (QVT)	LIV_TBM-East-RC_Pilot_Adv-3890	27/01/2015	02/05/2012	#N/A #N/A		#N/A #N/A	+	#N/A #N/A		+		Agreed Agreed
C510-LP12020	Block 120	N/A	N/A	Manual	LP	Road Stud	Queen Victoria Tunnels (QVT)	LIV TBM-East-RC Pilot Adv-3890	27/01/2015	02/05/2012	#N/A		#N/A		#N/A			-	Agreed
C510-LP12021	Block 120		N/A	Manual		Road Stud	Queen Victoria Tunnels (QVT)	LIV_TBM-East-RC_Pilot_Adv-3890	27/01/2015	02/05/2012	#N/A		#N/A		#N/A				Agreed

#N/A

0.14

1.11 0.72

2.67

0.47 -0.25

-0.58 #N/A

#N/A

#N/A

180

180

180 180

180

180

180

180

191

180

120

120

120 120

120

120

120

120

120

#N/A

-1.70

-2.95 -2.54 -2.19

-3.06

-1.71 #N/A

#N/A

365

365

365 365

365

365 365

365

599

365

Agreed Agreed

Agreed

Agreed

Agreed

Agreed

Agreed to decommission automated sensors at ERP Meeting 27/07/2017.

02/05/2012 #N/A

02/05/2012 #N/A

03/07/2017 2.26 09/06/2015 #N/A 14/01/2016 #N/A

14/01/2016 #N/A

2 49

3.47 2.38

1.44

-3.03

02/05/2012

03/07/2017

03/07/2017

03/07/2017

03/07/2017

03/07/2017

03/07/2017

03/07/2017

06/01/2017

N/A Manual LP Road Stud Queen Victoria Tunnels (QVT) LIV_TBM-East-RC_Pilot_Adv-3890 27/01/2015

1-14 Liverpool St

LIV_TBM-East-RC_Pilot_Adv-3880 26/01/2015

26/01/2015

24/09/2016

24/09/2016

24/09/2016

06/08/2016

06/08/2016

09/07/2016

25/06/2016

25/06/2016

25/06/2016

24/09/2016

24/09/2016

24/09/2016

LIV_ES2_Enlargement_Adv-16 24/09/2016 09/06/2015 #N/A

24/09/2016

LIV_TBM-East-RC_Pilot_Adv-3885

LIV_ES2_Enlargement_Adv-16

LIV_ES2_Enlargement_Adv-16

LIV_ES2_Enlargement_Adv-16

LIV_AP11_Enlargement_Adv-7

LIV_AP11_Enlargement_Adv-7

LIV_AP2_Enlargement_Adv-12

LIV_AP2_Enlargement_Adv-8

LIV_AP2_Enlargement_Adv-8

LIV_AP2_Enlargement_Adv-8

LIV_ES2_Enlargement_Adv-16

LIV_ES2_Enlargement_Adv-16

LIV_ES2_Enlargement_Adv-16

LIV_ES2_Enlargement_Adv-16

N/A Manual LP Road Stud Queen Victoria Tunnels (QVT)

N/A Manual LP Road Stud Queen Victoria Tunnels (QVT)

C510-LP12022 Block 120

C510-LP12023 Block 120

C510-LP12024 Block 120

C510-RP10702 Block 107

C510-RP10703A Block 107

C510-RP10704A Block 107

C510-RP10705A Block 107

C510-RP10706A Block 107

C510-RP10707B Block 107

C510-RP10708B Block 107

N/A

N/A

N/A

S10701 S10701

S10701

S10701

S10701

C510-RP10701 Block 107 S10701 External Automated RP 3D Geodetic prism

C510-RP10709 Block 107 S10702 External Automated RP 3D Geodetic prism

C510-RP10755 Block 107 S1070.1 External Automated RP 3D Geodetic prism

C510-RP10756 Block 107 S1070.1 External Automated RP 3D Geodetic prism

C510-RP10756A1 Block 107 S1070.1 External Automated RP 3D Geodetic prism

C510-RP10756B Block 107 S1070.1 External Automated RP 3D Geodetic prism

C510-RP10757 Block 107 S1070.1 External Automated RP 3D Geodetic prism

S10701 External Automated RP 3D Geodetic prism

S10701 External Automated RP 3D Geodetic prism



5.3 Supplementary Evidence for Decommissioning

In some cases supplementary evidence will be provided to support the decommissioning evidence.

Road Stud LP10714

LP10714 has not met any trend requirements; however, the surrounding studs have all met the allowable trend for a minimum of 180/365 days. It can be seen in Figure 3 below that the circled road stud is located on a section of asphaltic concrete pavement. It is likely that the small area of differing pavement is within a vicinity of recent utility works, and in turn, may have led to greater settlement than the adjacent area (e.g. due to poor compaction). Therefore, the settlement trend may not be a true reflection of the absolute ground movement caused by Crossrail works in the area. It should be noted that the sensor has met stable trend requirements for 90 days.

Based on the adjacent road studs' settlement trends, it is proposed that LP10714 should be considered as unreliable with regards to settlement trends caused by tunnelling construction and that the sensor should be decommissioned.



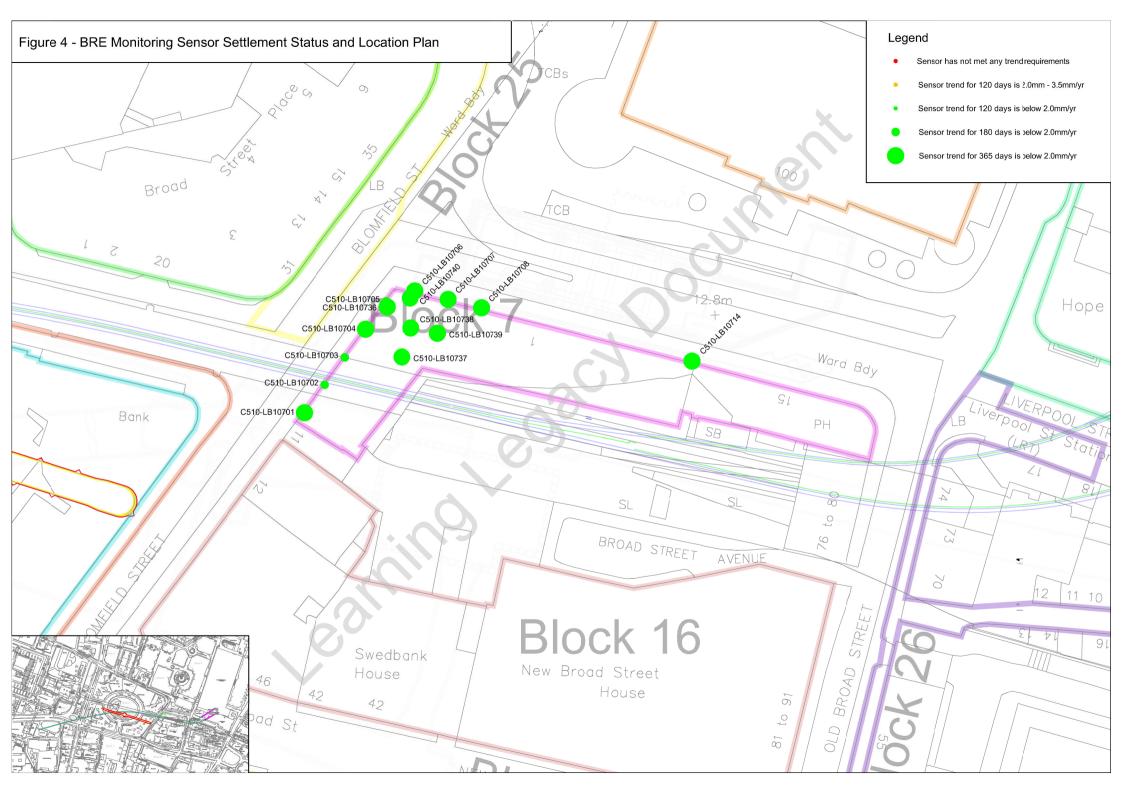
Figure 3- LP10714 Located on Unstable Pavement

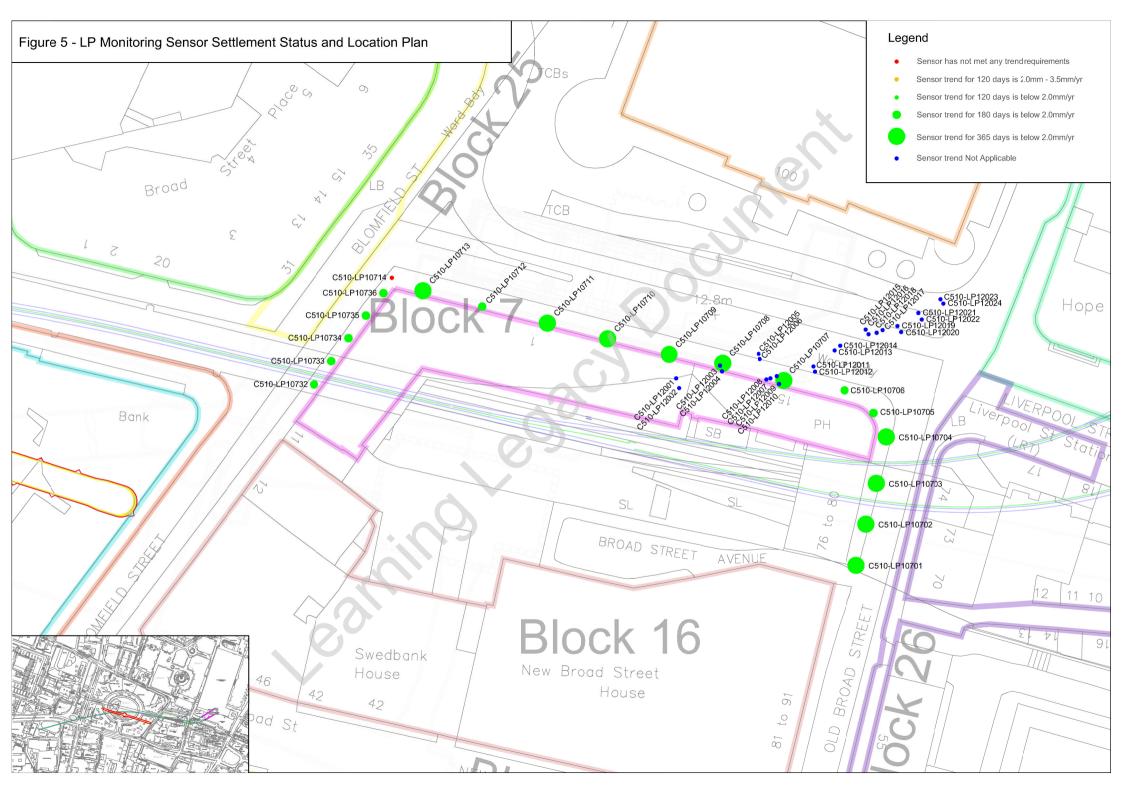


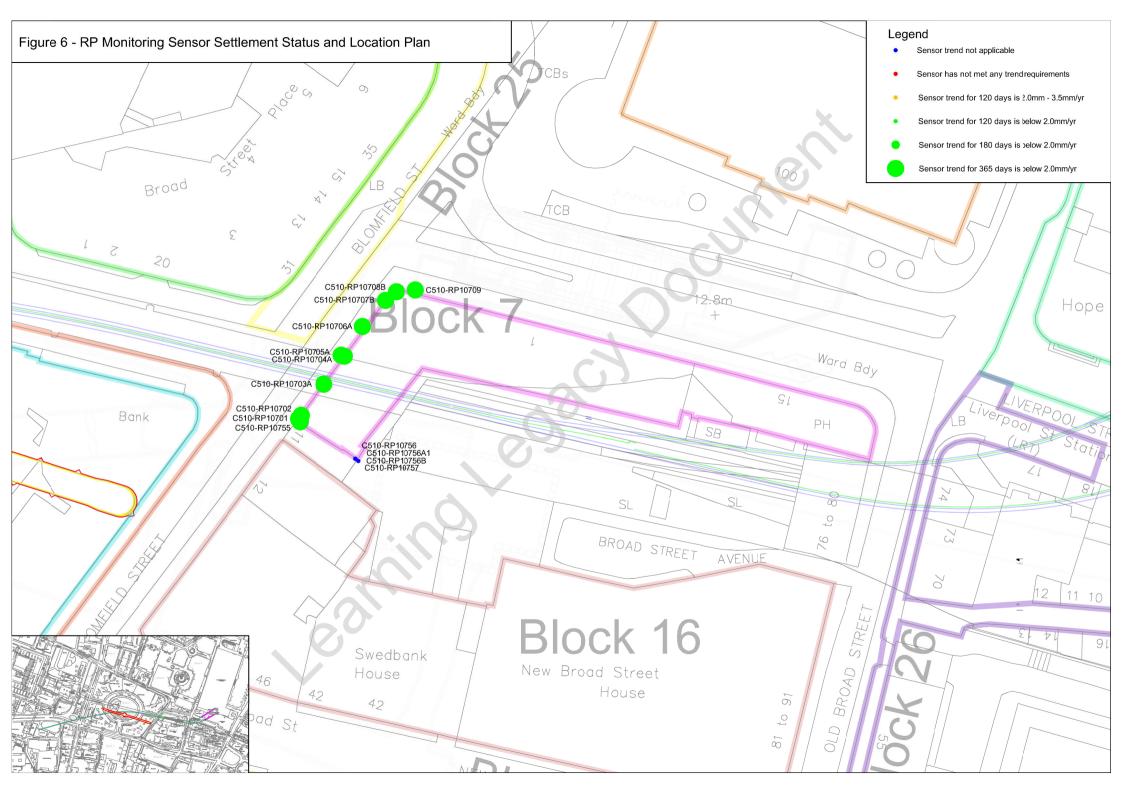
5.4 Monitoring sensor Location Plan and Decommissioning Status

The following plots provide a visual representation of all Block 07 monitoring sensors with a colour circle that defines its settlement status. A green circle represents when a trend is below 2mm/yr and the larger the circle the greater the trend period. When a trend has not been met, a small red circle will represent the monitoring sensor.

- Figure 4- LB Monitoring Sensor Settlement Status and Location Plan
- Figure 5- LP Monitoring Sensor Settlement Status and Location Plan
- Figure 6- RP Monitoring Sensor Settlement Status and Location Plan









6 Decommissioning Recommendations

Revision 2 of Block 07 close out report requests all monitoring sensors to be decommissioned. The decommissioning status tracker (*Table 2*) identifies the monitoring sensors to be agreed for decommissioning.

N.B. When required, decommissioning and re-instatement evidence will be collected during the removal of monitoring sensors, which will be included within the final report.



7

Appendix 1

Appendix 1 includes the decommissioning tracker table, plots and graphs that were used as evidence to agree decommissioning in Revision 1 of Block 07 close out report.

Table 2 - Block 07 Decommissioning Status Tracker RP

AVERAGE SETTLEMENT TREND C510 Senso Int / Ext Block Section Asset/Location EOI Last Primary Laver Construction Construction 120 Davs 180 Davs 365 Davs Calculati Ceased Dat General Comment Sensor Type alculati Calculation g Status n Perio 1.19 in ES2 EOI (Finished mining 24/11/2016 1-14 Liverpool S 2 EOI (Finished mining 24/11/2016 3D Geodetic 1-14 Liverpool S LIV ES2 Er ent Adv-16 -3.42 thin ES2 EOI (Finished mining 24/11/2016 120 1-14 Liverpool S 120 -3.09 thin FS2 FOI (Finished mining 24/11/2016 -2.37 -2.19 External 3D Geodetic prism 8-10 Bloomfield LIV AP2 Enlarge ment Adv-8 25/06/2016 -1.87 -3.29 Block 10 Within ES2 EOI (Finished mining 24/11/2016 180 Block 107 S10702 External Automated 3D Geodetic prism 8-10 Bloomfield LIV AP2 Enlargement Adv-8 25/06/2016 10/01/2016 120 365 ATS 118 Decommissioned due to Octagon building demolition 03/01/2017 510-RP10711 Block 107 S10702 Automated 3D Geodetic prism 8-10 Bloomfield LIV AP2_Enlargement_Adv-8 25/06/2016 10/01/2016 121 180 365 ATS 118 Decommissioned due to Octagon building demolition 03/01/2017 External 510-RP10712 RP N/A Block 107 S10702 External Automated 3D Geodetic prism 8-10 Bloomfield LIV_AP2_Enlargement_Adv-8 25/06/2016 13/11/2012 N/A N/A Trends Not Apllicable- Prism not measured since 13/11/2012 510-RP10713 Block 107 S10702 External Automated 3D Geodetic prism 8-10 Bloomfield LIV_AP2_Enlargement_Adv-8 25/06/2016 10/01/2016 120 180 ATS 118 Decommissioned due to Octagon building demolition 03/01/2017 Block 107 S10702 External Automated RP 3D Geodetic prism 8-10 Bloomfield LIV_AP2_Enlargement_Adv-8 25/06/2016 13/11/2012 N/A Trends Not Apllicable- Prism not measured since 13/11/2012 180 510-RP10715 S10702 3D Geodetic prism 8-10 Bloomfield LIV AP2 Enlargement Adv-8 25/06/2016 10/01/2016 121 365 ATS 118 Decommissioned due to Octagon building demolition 03/01/2017 Block 107 External Automated -1.47 180 RP -1.60 365 ATS 118 Decommissioned due to Octagon building demolition 03/01/2017 510-RP10716 S10702 LIV AP2 Enlargement Adv-8 120 Block 107 External Automated 3D Geodetic prism 8-10 Bloomfield 25/06/2016 10/01/2016 3D Geodetic prism 510-RP10717 Block 107 S10702 External Automated RP 8-10 Bloomfield LIV AP2 Enlargement Adv-8 25/06/2016 10/01/2016 0.23 120 0.16 180 -1.81 365 ATS 118 Decommissioned due to Octagon building demolition 03/01/2017 C510-RP10718 S10702 External 3D Geodetic prism LIV_TBM-East-RC_Pilot_Adv-3909 10/01/2016 122 180 ATS 118 Decommissioned due to Octagon building demolition 03/01/2017 -0.70 365 C510-RP10719 S10702 3D Geodetic prism 8-10 Bloomfield LIV_TBM-East-RC_Pilot_Adv-3909 31/01/2015 10/01/2016 120 -1.43 180 ATS 118 Decommissioned due to Octagon building demolition 03/01/2017 Block 107 External Automated 120 -0.42 365 -1.00 365 510-RP10720 Block 107 S10702 External Automated RP 3D Geodetic prism 8-10 Bloomfield LIV TBM-East-RC Pilot Adv-3909 31/01/2015 10/01/2016 2.60 1.76 180 ATS 118 Decommissioned due to Octagon building demolition 03/01/2017 120 3D Geodetic prism 1.76 510-RP10721 Block 107 \$10702 External Automated RP 8-10 Bloomfield LIV TBM-East-RC Pilot Adv-3909 31/01/2015 10/01/2016 180 ATS 118 Decommissioned due to Octagon building demolition 03/01/2017 510-RP10722 S10702 RP 8-10 Bloomfield LIV_TBM-East-RC_Pilot_Adv-3909 31/01/2015 -1.99 120 -0.31 -0.01 365 Block 107 External Automated 3D Geodetic prism 10/01/2016 180 ATS 118 Decommissioned due to Octagon building demolition 03/01/2017 10-RP10723 Railway Tavern LIV_TBM-East-RC_Pilot_Adv-3909 180 430 ATS 118 Decommissioned due to Octagon building demolition 03/01/2017 External Automated 3D Geodetic prism 1.13 120 Block 107 S10703 10/01/2016 120 -0.87 431 C510-RP10724 S10703 RP 10/01/2016 -1.25 -0.19 180 Block 107 External Automated 3D Geodetic prism Railway Tayern LIV TBM-East-RC Pilot Adv-3905 31/01/2015 ATS 118 Decommissioned due to Octagon building demolition 03/01/2017 C510-RP10725 Block 107 S10703 External Automated RP 3D Geodetic prism Railway Tavern LIV TBM-East-RC Pilot Adv-3905 31/01/2015 10/01/2016 -0.75 120 0.04 180 -1.47 435 ATS 118 Decommissioned due to Octagon building demolition 03/01/2017 510-RP10726 Block 107 S10703 External Automated RP 3D Geodetic prism Railway Tavern LIV TBM-East-RC Pilot Adv-3895 10/01/2016 120 180 431 ATS 118 Decommissioned due to Octagon building demolition 03/01/2017 3D Geodetic prism N/A 510-RP10727 Block 107 S10703 External Automated Railway Tavern LIV TBM-East-RC Pilot Adv-3895 27/01/2015 07/11/2014 Trends Not Apllicable- Prism not measured since 07/11/2012 N/A N/A Trends Not Apllicable- Prism not measured since 18/04/2015 10-RP10728 RP Railway Tayem LIV TBM-East-RC Pilot Adv-3895 N/A Block 107 S10703 External Automated 3D Geodetic prism 27/01/2015 18/04/2015 510-RP10729 Block 107 S10703 External Automated RP 3D Geodetic prism Railway Tayern LIV TBM-East-RC Pilot Adv-3895 27/01/2015 01/05/2015 N/A N/A N/A Trends Not Apllicable- Prism not measured since 01/05/2015 C510-RP10730 S10703 RP N/A Block 107 External Automated 3D Geodetic prism Railway Tavern LIV_TBM-East-RC_Pilot_Adv-3895 27/01/2015 02/05/2015 N/A Trends Not Apllicable- Prism not measured since 02/05/2015 510-RP10731 Railway Tavern 1.43 120 0.67 ATS 118 Decommissioned due to Octagon building demolition 03/01/2017 S10703 3D Geodetic prism LIV_TBM-East-RC_Pilot_Adv-3890 27/01/2015 180 432 Block 107 External Automated 10/01/2016 C510-RP10732 S10703 RP N/A Trends Not Apllicable- Prism not measured since 02/05/2016 Block 107 External Automated 3D Geodetic prism Railway Tayern LIV TBM-East-RC Pilot Adv-3890 27/01/2015 02/05/2015 510-RP10733 Block 107 \$10703 External Automated RP 3D Geodetic prism Railway Tavern LIV TBM-East-RC Pilot Adv-3890 27/01/2015 14/02/2014 N/A N/A N/A Trends Not Apllicable- Prism not measured since 14/02/2016 510-RP10734 Block 107 S10703 External Railway Tavern LIV TBM-East-RC Pilot Adv-3890 10/01/2016 ATS 118 Decommissioned due to Octagon building demolition 03/01/2017 120 510-RP10735 S10704 3D Geodetic prism LIV TBM-East-RC Pilot Adv-3890 180 0.72 436 Block 107 Automated Railway Tavern 18/12/2016 1.65 6 months automated monitoring specification complete 02/08/2016 External 120 510-RP10736 Block 107 S10704 External Automated RP 3D Geodetic prism Railway Tayern LIV TBM-East-RC Pilot Adv-3890 27/01/2015 18/12/2016 -0.56 1.07 180 1.24 6 months automated monitoring specification complete 02/08/2016 3D Geodetic prism 510-RP10737 Block 107 S10704 External Automated RP Railway Tavern LIV TBM-Fast-RC Pilot Adv-3890 19/08/2015 N/A Trends Not Applicable- No Data Since 19/08/2015 27/01/2015 Railway Tavern LIV_TBM-East-RC_Pilot_Adv-3890 11/05/2015 510-RP10738 Block 107 S10704 External Automated RP 3D Geodetic prism 27/01/2015 N/A N/A N/A Trends Not Applicable- No Data Since 11/05/2015 10-RP10739 LIV_TBM-East-RC_Pilot_Adv-3890 120 3D Geodetic prism 76-80 Old Broad St 18/12/2016 180 6 months automated monitoring specification complete 11/01/2016 Block 107 S10705 External 27/01/2015 Automated -0.74 RP 1 35 C510-RP10739A S10705 76-80 Old Broad St LIV TBM-East-RC Pilot Adv-3890 27/01/2015 18/12/2016 2.00 Block 107 External Automated 3D Geodetic prism 6 months automated monitoring specification complete 11/01/2016 C510-RP10740 Block 107 S10705 External Automated RP 3D Geodetic prism 76-80 Old Broad St LIV TBM-East-RC Pilot Adv-3890 27/01/2015 18/12/2016 -1.35 120 0.76 180 6 months automated monitoring specification complete 11/01/2016 C510-RP10740A S10705 External 76-80 Old Broad St LIV_TBM-East-RC_Pilot_Adv-3890 18/12/2016 6 months automated monitoring specification complete 11/01/2016 120 510-RP10741 S10705 76-80 Old Broad St LIV_TBM-East-RC_Pilot_Adv-3890 -2.49 -0.14 180 Block 107 External Automated 3D Geodetic prism 27/01/2015 18/12/2016 365 6 months automated monitoring specification complete 11/01/2016 10-RP10741A S10705 RP 3D Geodetic prism 76-80 Old Broad St LIV TBM-East-RC Pilot Adv-3890 18/12/2016 Block 107 External Automated 27/01/2015 -0.126 months automated monitoring specification complete 11/01/2016 -2 14 1.87 6 months automated monitoring specification complete 11/01/2016 C510-RP10742 Block 107 \$10705 External Automated 3D Geodetic prism 76-80 Old Broad St LIV TBM-East-RC Pilot Adv-3890 27/01/2015 18/12/2016 120 -0.03 180 365 S10705 -1.46 120 365 510-RP10743 Block 107 External Automated RP 3D Geodetic prism 76-80 Old Broad St LIV TBM-East-RC Pilot Adv-3890 27/01/2015 18/12/2016 0.21 180 1.75 6 months automated monitoring specification complete 11/01/2016 10-RP10744 76-80 Old Broad St LIV TBM-East-RC Pilot Adv-3890 180 365 S10705 External 3D Geodetic prism 18/12/2016 120 6 months automated monitoring specification complete 11/01/2016 Block 107 Automated 120 -0.84 0.39 1.70 365 C510-RP10745 Block 107 S10705 RP 3D Geodetic prism 76-80 Old Broad St LIV TBM-East-RC Pilot Adv-3890 27/01/2015 18/12/2016 180 External Automated 6 months automated monitoring specification complete 11/01/2016 Automated 3D Geodetic prism 120 C510-RP10746 Block 107 S10705 External RP 76-80 Old Broad St LIV TBM-East-RC Pilot Adv-3890 27/01/2015 18/12/2016 0.40 1.30 180 1.53 365 6 months automated monitoring specification complete 11/01/2016 510-RP10747 Block 107 S10706 External RP 3D Geodetic prism 76-80 Old Broad St LIV_TBM-East-RC_Pilot_Adv-3890 27/01/2015 18/12/2016 120 180 6 months automated monitoring specification complete 11/01/2016 18/12/2016 0.77 120 1.49 180 1.00 510-RP10748 S10706 3D Geodetic prism 76-80 Old Broad St LIV_TBM-East-RC_Pilot_Adv-3895 27/01/2015 365 6 months automated monitoring specification complete 11/01/2016 Block 107 External Automated 120 1 44 365 10-RP10749 Block 107 S10706 External Automated RP 3D Geodetic prism 76-80 Old Broad St LIV TBM-East-RC Pilot Adv-3895 27/01/2015 18/12/2016 -0.42 0.60 180 6 months automated monitoring specification complete 11/01/2016 3D Geodetic prism 1.53 510-RP10749A Block 107 S10706 External Automated RP 76-80 Old Broad St LIV TBM-East-RC Pilot Adv-3890 27/01/2015 18/12/2016 -1 29 0.09 6 months automated monitoring specification complete 11/01/2016 C510-RP10749B S10706 RP 76-80 Old Broad St LIV_TBM-East-RC_Pilot_Adv-3890 N/A N/A N/A Block 107 External Automated 3D Geodetic prism 27/01/2015 28/09/2015 Trends Not Applicable- No Data Since 28/09/2015 510-RP10750 S10706 3D Geodetic prism 76-80 Old Broad St LIV_TBM-East-RC_Pilot_Adv-3890 18/12/2016 1.76 180 6 months automated monitoring specification complete 11/01/2016 Block 107 External Automated 27/01/2015 120 120 C510-RP10751 S10706 RP 76-80 Old Broad St LIV TBM-East-RC Pilot Adv-3890 2.00 180 -0.19 365 Block 107 External Automated 3D Geodetic prism 27/01/2015 08/07/2016 6 months automated monitoring specification complete 11/01/2016 C510-RP10751A Block 107 S10706 External Automated RP 3D Geodetic prism 76-80 Old Broad St LIV TBM-East-RC Pilot Adv-3890 27/01/2015 30/09/2015 N/A N/A N/A Trends Not Applicable- No Data Since 28/09/2015 -0.53 510-RP10752 Block 107 S10706 External Automated 76-80 Old Broad St LIV TBM-East-RC Pilot Adv-3890 18/12/2016 120 6 months automated monitoring specification complete 11/01/2016 Trends Not Applicable- No Data Since 28/09/2015 S10706 3D Geodetic prism 76-80 Old Broad St LIV TBM-East-RC Pilot Adv-3890 N/A Block 107 External Automated RP 6 months automated monitoring specification complete 11/01/2016 510-RP10753 Block 107 S10705 External Automated 3D Geodetic prism 76-80 Old Broad St LIV TBM-East-RC Pilot Adv-3890 27/01/2015 18/12/2016 -0.90 120 0.49 180 1.73 365 -1.82 32 EOI (Finished mining 24/11/2016) 1.21 thin ES2 EOI (Finished mining 24/11/2016 0.58 -0.05 Within FS2 FOI (Finished mining 24/11/2016) 1-14 Liverpool St Within FS2 FOI (Finished mining 24/11/2016) LIV ES2 Enlarg

2.0 mm GREEN

> 3.5 mm

11/01/2016

Table 3 - Block 07 Decommissioning Status Tracker LB & SH

< 2.0 mm

03/04/2017

< 3.5 mm AMBER > 3.5 mm

mm RED

											AVERAGE SET	TLEMENT TREND							
C510 Sensor Name	Block	Section	Int / Ext	Measuremen Type	Sensor Type	Sensor Description	Asset/Location	EOI Last Primary Layer Construction	Last Construction Date	Latest Surveyed &	120 Days	120 Day Calculation Period	180 Days	Calculation Period	365 Days	365 Day Calculation Period	Ceased Date	General Comment	Decommissioning Status
C510-LB10701	Block 107	S10701	External	Manual	LB	BRE	1-14 Liverpool St	LIV_ES2_Enlargement_Adv-45	28/10/2016	21/02/2017	-4.40	124	-2.16	183	-4.33	369		Within ES2 EOI- Reassess in Rev 2	Outstanding
C510-LB10702	Block 107	S10701	External	Manual	LB	BRE	1-14 Liverpool St	LIV_ES2_Enlargement_Adv-45	28/10/2016	21/02/2017	-5.91	124	-6.89	183	-5.14	369		Within ES2 EOI- Reassess in Rev 2	Outstanding
C510-LB10703	Block 107	S10701	External	Manual	LB	BRE	1-14 Liverpool St	LIV_ES2_Enlargement_Adv-45	28/10/2016	21/02/2017	-6.01	124	-4.04	183	-4.52	369		Within ES2 EOI- Reassess in Rev 2	Outstanding
C510-LB10704	Block 107	S10701	External	Manual	LB	BRE	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-12	09/07/2016	21/02/2017	-4.87	124	-3.13	183	-5.94	369		Within ES2 EOI- Reassess in Rev 2	Outstanding
C510-LB10705	Block 107	S10701	External	Manual	LB	BRE	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	21/02/2017	-4.30	124	-2.79	183	-6.76	369		Within ES2 EOI- Reassess in Rev 2	Outstanding
C510-LB10706	Block 107	S10701;S1070	2 External	Manual	LB	BRE	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	21/02/2017	-4.25	124	-3.07	183	-6.46	369		Within ES2 EOI- Reassess in Rev 2	Outstanding
C510-LB10707	Block 107	S10702	External	munuun	LB	BRE	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	21/02/2017	-4.66	124	-3.82	183	-3.96	369		Within ES2 EOI- Reassess in Rev 2	Outstanding
C510-LB10708	Block 107	S10702	External	Manual	LB	BRE	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	21/02/2017	-3.65	124	-3.19	183	-2.40	369		Within ES2 EOI- Reassess in Rev 2	Outstanding
C510-LB10709	Block 107	S10702	External		LB	BRE	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	19/03/2014	N/A		N/A	<u> </u>	N/A			No access- Trends Not Applicable- Last measured 19/03/2014	Proposed
C510-LB10710	Block 107	S10702	External		LB	BRE	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	05/04/2012	N/A		N/A		N/A			No access- Trends Not Applicable- Last measured 05/04/2012	Proposed
C510-LB10711	Block 107	S10702	External		LB	BRE	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	05/04/2012	N/A		N/A	<u> </u>	N/A			No access- Trends Not Applicable- Last measured 05/04/2012	Proposed
C510-LB10712	Block 107	S10702	External		LB	BRE	1-14 Liverpool St	LIV_TBM-East-RC_Pilot_Adv-3909	31/01/2015	05/04/2012	N/A		N/A		N/A			No access- Trends Not Applicable- Last measured 05/04/2012	Proposed
C510-LB10713	Block 107	S10702	External		LB	BRE	1-14 Liverpool St	LIV_TBM-East-RC_Pilot_Adv-3909	31/01/2015	05/04/2012	N/A	107	N/A	400	N/A	070		No access- Trends Not Applicable- Last measured 05/04/2012	Proposed
C510-LB10/14	Block 107	S10702	External	Manual	LB	BRE	1-14 Liverpool St	LIV_TBM-East-RC_Pilot_Adv-3909	31/01/2015	13/03/2017	-1.82	127 127	-1.47	190	-0.50	376 376		Continue to monitor until Section 1 BREs meet specification	Outstanding
C510-LB10715	Block 107	S10703	External		LB	BRE BRF	Railway Tavern	LIV_TBM-East-RC_Pilot_Adv-3909	31/01/2015	13/03/2017	-0.96 -3.51	127	-3.17 -4.81	190	-1.49 -1.79	376		Met 2mm per annum specification	Proposed
C510-LB10716 C510-LB10717	Block 107 Block 107	S10703 S10703	External External		LB	BRE	Railway Tavern Railway Tavern	LIV_TBM-East-RC_Pilot_Adv-3905 LIV_TBM-East-RC_Pilot_Adv-3895	31/01/2015 27/01/2015	13/03/2017	-3.51	127	-4.81	190	-1.79	376		Met 2mm per annum specification	Proposed Proposed
C510-LB10717	Block 107	S10703 S10703	External		LB LB	BRE	Railway Tavern	LIV_TBM-East-RC_Pilot_Adv-3895 LIV_TBM-East-RC_Pilot_Adv-3895	27/01/2015	13/03/2017	-5.09	127	-4.06 -4.42	190	-1.90	376		Met 2mm per annum specification Met 2mm per annum specification	Proposed Proposed
		S10703			LB	BRE					-4.55	127	-4.42	190	-1.70	376			
C510-LB10719 C510-LB10720	Block 107 Block 107	S10703 S10703	External External		LB	BRE	Railway Tavern Railway Tavern	LIV_TBM-East-RC_Pilot_Adv-3895 LIV_TBM-East-RC_Pilot_Adv-3890	27/01/2015 27/01/2015	13/03/2017 13/03/2017	-5.20	127	-4.62 -4.75	190	-1.00	376		Met 2mm per annum specification Met 2mm per annum specification	Proposed Proposed
C510-LB10720	Block 107	S10703 S10703	External		LB	BRE	Railway Tavern	LIV_TBM-East-RC_Pilot_Adv-3690	27/01/2015	13/03/2017	-6.90	127	-4.75 -5.36	190	-1.53	376		Met 2mm per annum specification	Proposed
C510-LB10721	Block 107	S10703 S10703	External		LB	BRE	Railway Tavern	LIV_TBM-East-RC_Pilot_Adv-3890	27/01/2015	13/03/2017	-6.29	127	-5.73	190	-1.53	376		Met 2mm per annum specification	Proposed
C510-LB10723	Block 107	S10703	External		LB	BRE	Railway Tavern	LIV TBM-East-RC Pilot Adv-3890	27/01/2015	13/03/2017	-4.96	127	-5.33	190	-0.97	376		Met 2mm per annum specification	Proposed
C510-LB10724	Block 107	S10703	External		LB	BRE	76-80 Old Broad St	LIV TBM-East-RC Pilot Adv-3890	27/01/2015	02/03/2016	-5.20	182	-5.20	182	-1.05	372	10.03.2016	Ceased in ERP 10.03.2016+ Below 2mm/yr	Proposed
C510-LB10725	Block 107	S10704 S10704	External		LB	BRE	76-80 Old Broad St	LIV TBM-East-RC Pilot Adv-3890	27/01/2015	16/02/2016	-3.73	167	-1.87	250	-1.03	372	10.03.2016	Ceased in ERP 10.03.2016+ Below 2mm/yr	Proposed
C510-LB10726	Block 107	S10704	External		LB	BRE	76-80 Old Broad St	LIV TBM-East-RC Pilot Adv-3890	27/01/2015	16/02/2016	-3.29	167	-1.53	250	-0.20	372	10.03.2016	Geased in ERP 10.33.2016+ Below 2mm/yr	Proposed
C510-LB10727	Block 107	S10704	External		LB	BRE	76-80 Old Broad St	LIV TBM-East-RC Pilot Adv-3890	27/01/2015	16/02/2016	-1.32	167	-0.40	250	-0.57	372	10.03.2016	Ceased in ERP 10.03.2016+ Below 2mm/yr	Proposed
C510-LB10728	Block 107	S10704	External		LB	BRE	76-80 Old Broad St	LIV TBM-East-RC Pilot Adv-3890	27/01/2015	16/02/2016	-1.54	167	0.40	250	-0.57	372	10.03.2016	Geased in ERP 10.03.2016+ Below 2mm/yr	Proposed
C510-LB10729	Block 107	S10704	External		LB	BRE	76-80 Old Broad St	LIV TBM-East-RC Pilot Adv-3895	27/01/2015	16/02/2016	1.31	167	1.20	250	-0.20	379	10.03.2016	Ceased in ERP 10.03.2016+ Below 2mm/yr	Proposed
C510-LB10730	Block 107	S10701	Internal		LB	BRF	Railway Tayern	LIV TBM-East-RC Pilot Adv-3890	27/01/2015	27/09/2016	-1.38	212	-1.38	212	1.48	388		Met 2mm per annum specification	Proposed
C510-LB10731	Block 107	S10701	Internal		LB	BRE	Railway Tavern	LIV TBM-East-RC Pilot Adv-3890	27/01/2015	27/09/2016	-0.59	212	-0.59	212	1.88	388		Met 2mm per annum specification	Proposed
C510-LB10732	Block 107	S10701	Internal		LB	BRF	Railway Tayern	LIV TBM-East-RC Pilot Adv-3895	27/01/2015	27/09/2016	0.53	212	0.53	212	2.61	388		Met 2mm per annum specification	Proposed
C510-LB10733	Block 107	S10701	Internal		LB	BRE	Railway Tavern	LIV TBM-East-RC Pilot Adv-3895	27/01/2015	18/01/2013	N/A		N/A		N/A	000		Not accessable, no data since 18/01/2013. 18/10/2016- Trends Not Applicable	Proposed
C510-LB10734	Block 107	S10701	Internal		LB	BRE	Railway Tayern	LIV TBM-East-RC Pilot Adv-3895	27/01/2015	02/06/2012	N/A	0	N/A	0	N/A			Not accessable, no data since 02/06/2012. 18/10/2016- Trends Not Applicable	Proposed
C510-LB10736	Block 107	S10701	Internal	Manual	LB	BRE	1-14 Liverpool St	LIV AP2 Enlargement Adv-8	25/06/2016	19/02/2017	-3.46	146	-1.98	195	-6.28	370		Within ES2 EOI- Beassess in Rev 2	Outstanding
C510-LB10737	Block 107	S10701	Internal	Manual	LB	BRE	1-14 Liverpool St	LIV AP2 Enlargement Adv-8	25/06/2016	19/02/2017	-4.39	146	-3.31	195	-3.69	370		Within ES2 EOI- Reassess in Rev 2	Outstanding
C510-LB10738	Block 107	S10701	Internal	Manual	LB	BRE	1-14 Liverpool St	LIV AP2 Enlargement Adv-8	25/06/2016	19/02/2017	-5.40	146	-3.03	195	-4.13	370		Within ES2 EOI- Reassess in Rev 2	Outstanding
C510-LB10739	Block 107	S10701	Internal	Manual	LB	BRE	1-14 Liverpool St	LIV AP2 Enlargement Adv-8	25/06/2016	19/02/2017	-4.19	146	-2.94	195	-2.43	370		Within ES2 EOI- Reassess in Rev 2	Outstanding
C510-LB10740	Block 107	S10701	Internal	Manual	LB	BRE	1-14 Liverpool St	LIV AP2 Enlargement Adv-8	25/06/2016	19/02/2017	-3.59	146	-2.54	195	-5.42	370		Within ES2 EOI- Reassess in Rev 2	Outstanding
C510-SH10701	Block 107	S10701	Internal	Automated	SH	Settlement Cell-Electronic	Railway Tavern	LIV TBM-East-RC Pilot Adv-3895	27/01/2015	10/01/2017	-0.81	121	0.54	180	-0.65	365		6 months automated monitoring specification complete 02/08/2016	Proposed
C510-SH10702	Block 107	S10701	Internal	Automated	SH	Settlement Cell-Electronic	Railway Tayern	LIV_TBM-East-RC_Pilot_Adv-3895	27/01/2015	10/01/2017	3.51	121	2.18	180	-1.78	365		6 months automated monitoring specification complete 02/08/2016	Proposed
C510-SH10703	Block 107	S10701	Internal	Automated	SH	Settlement Cell-Electronic	Railway Tavern	LIV TBM-East-RC Pilot Adv-3895	27/01/2015	10/01/2017	10.31	121	8.46	180	0.97	365		6 months automated monitoring specification complete 02/08/2016	Proposed
C510-SH10704	Block 107	S10701	Internal	Automated	SH	Settlement Cell-Electronic	Railway Tavern	LIV_TBM-East-RC_Pilot_Adv-3890	27/01/2015	10/01/2017	2.27	121	1.21	180	-3.25	365		6 months automated monitoring specification complete 02/08/2016	Proposed
C510-SH10705	Block 107	S10701	Internal	Automated	SH	Settlement Cell-Electronic	Railway Tavern	LIV_TBM-East-RC_Pilot_Adv-3890	27/01/2015	10/01/2017	2.76	121	1.79	180	-4.47	365		6 months automated monitoring specification complete 02/08/2016	Proposed
C510-SH10711	Block 107	S10702	Internal	Automated	SH	Settlement Cell-Electronic	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	03/04/2017	-4.69	121	-5.49	180	-4.38	365		Agreed to cease in CTC meeting 04/04/2017	Proposed
C510-SH10712	Block 107	S10702	Internal	Automated	SH	Settlement Cell-Electronic	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	03/04/2017	-4.32	121	-5.09	180	-4.64	365		Agreed to cease in CTC meeting 04/04/2017	Proposed
C510-SH10713	Block 107	S10702	Internal	Automated	SH	Settlement Cell-Electronic	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	03/04/2017	-4.96	121	-5.17	180	-4.57	365		Agreed to cease in CTC meeting 04/04/2017	Proposed
C510-SH10714	Block 107	S10702	Internal	Automated	SH	Settlement Cell-Electronic	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	03/04/2017	-6.56	121	-6.55	180	-5.53	365		Agreed to cease in CTC meeting 04/04/2017	Proposed
C510-SH10715	Block 107	S10702	Internal	Automated	SH	Settlement Cell-Electronic	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	03/04/2017	-4.95	121	-5.27	180	-4.01	365		Agreed to cease in CTC meeting 04/04/2017	Proposed
C510-SH10716	Block 107	S10702	Internal	Automated	SH	Settlement Cell-Electronic	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	03/04/2017	-3.49	121	-4.22	180	-3.55	365		Agreed to cease in CTC meeting 04/04/2017	Proposed

Table 4 - Block 07 Decommissioning Status Tracker LP & TB

03/04/2017

< 2.0 mm GREEN < 3.5 m

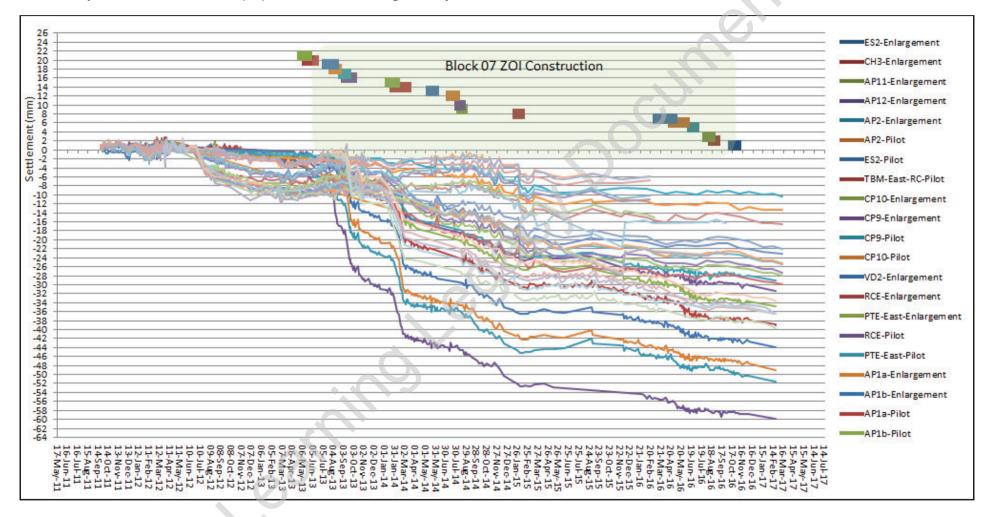
< 3.5 mm AMBER > 3.5 mm

RED

Column C	AVERAGE SETTLEMENT TREND																			
Column C	C510 Sensor Name	Block	Section	in Int / Ext	Measuremen Type	nt Sensor Type		Asset/Location	EOI Last Primary Layer Construction			Ag 120 Days		180 Days	Calculation	365 Days		Ceased Date	General Comment	Decommissioning Status
Company Comp	C510-LP10701	Block 107	S1070)1 External	Manual	LP	Road Stud	Old Broad St	LIV_TBM-East-RC_Pilot_Adv-3890	27/01/2015	07/03/2017	-5.13	203	-5.13		-1.38	384		Continue to monitor until Section 1 LPs meet specification- Reassess in Rev 2	Outstanding
Section Sect	C510-LP10702	Block 107	S1070)1 External	Manual	LP			LIV_TBM-East-RC_Pilot_Adv-3890	27/01/2015	07/03/2017	-9.24		-9.24	203	-3.06			Has not achieved 2mm per annum specication- Reassess in Rev 2	Outstanding
Section Sect	C510-LP10703		S1070	01 External	_	LP					07/03/2017	-6.27		-8.65						Outstanding
Column C			S1070)1 External		LP		0.0 0.000				-5.50		-6.00						Outstanding
The column	0010 El 10100	DIOOK 101	S1070	01 External	manadi	LP			ETY_TBIN Edot TtO_T Not_TtoY 0000	E110 11E0 10	01100/E011	-9.04				0.00				Outstanding
	C510-LP10706		S1070			LP					09/01/2017									Outstanding
	C510-LP10/0/		\$1070			LP					07/03/2017			-3.97	101					Outstanding
The column The			01070	Z EXCOTTO		LP					0170312011			-3.00						Outstanding
The column	0010 E1 10100	Diook ioi	\$1070	12 External	manadi	LP	11000 0100	Entropourot	ETY_TBIII Edot Tto_T liot_7tav 0000		00/02/2011									Outstanding Outstanding
Part			S1070	12 External		I.P.														Outstanding
The column The	C510-I P10712	Block 107	S1070)2 External	Manual	I.P.	Road Stud			25/06/2016	14/03/2017	-3.96	126	=						Outstanding
Company Comp	C510-LP10713	Block 107	S1070	02 External	Manual	LP		Liverpool St	LIV AP2 Enlargement Adv-8		10/02/2017	-2.65		-0.65						Outstanding
Section Control Cont	C510-LP10714	Block 107	S1070	02 External	Manual	LP	Road Stud	Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	14/03/2017			·7.77		-35.83	366			Outstanding
Part	C510-LP10715	Block 107	S1070	3 External	Manual	LP	Road Stud	Liverpool St	LIV_TBM-East-RC_Pilot_Adv-3895	27/01/2015	06/01/2013	■ N/A		O N/A		N/A		14.04.2016	ERP - No longer monitored due to Bloomfield Box (sensor destroyed)	Proposed
Section Sect	C510-LP10716	Block 107	S1070	3 External	Manual	LP	Road Stud	Liverpool St	LIV_TBM-East-RC_Pilot_Adv-3895	27/01/2015	29/10/2012	■ N/A		O N/A		N/A		14.04.2016	ERP - No longer monitored due to Bloomfield Box (sensor destroyed)	Proposed
Section Sect		Block 107	S1070	03 External	Manual	LP	Road Stud	Liverpool St	LIV_TBM-East-RC_Pilot_Adv-3885	26/01/2015	18/11/2011	■ N/A		■ N/A		N/A		14.04.2016	ERP - No longer monitored due to Bloomfield Box (sensor destroyed)	Proposed
Section Control Cont	C510-LP10718	Block 107	S1070	3 External	Manual	LP	Road Stud	Liverpool St	LIV_TBM-East-RC_Pilot_Adv-3885	26/01/2015	07/12/2011			14//1				14.04.2016		Proposed
Decomposity								Liverpool St								1477				Proposed
Section Process Proc						_														Proposed
State Stat																				Proposed
Section Sect																14//1				Proposed
Section Process Proc						_									-					Proposed
Stock Stoc														N/A N/A						Proposed Proposed
Section Sect											_			N/A		1477				Proposed
Stock Stoc																14/71				Proposed
SSE-PPOW See No. 10 STORP Chew Che																14//1				Proposed
Sec. 1979 Sec. 1970		Block 107												N/A		N/A				Proposed
Security 1979 Security	C510-LP10730	Block 107	S1070)4 External	Manual	LP	Road Stud	Broad St Ave	LIV TBM-East-RC Pilot Adv-3909	31/01/2015	19/03/2012	N/A		O N/A		N/A		14.04.2016		Proposed
SECURITY Description Des												O N/A		O N/A		N/A				Proposed
Section 1907 1908 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909 1909	C510-LP10732	Block 107	S1070	05 External	Manual	LP	Road Stud	Bloomfield St		28/10/2016	14/03/2017	-5.45	126	-9.33	181	-7.54	366			Outstanding
Story Part Story	C510-LP10733	Block 107	S1070	05 External	Manual	LP	Road Stud	Bloomfield St	LIV_ES2_Enlargement_Adv-45	28/10/2016	14/03/2017	-6.44	126	-9.20	181	-5.37	366		Has not achieved 2mm per annum specication- Reassess in Rev 2	Outstanding
Sect 10 Sect	C510-LP10734	Block 107	S1070	05 External	Manual	LP	Road Stud	Bloomfield St	LIV_ES2_Enlargement_Adv-45	28/10/2016		-8.31		-9.64		0.02	366			Outstanding
Second	C510-LP10735	DIOUR TOT	S1070	05 External	manadi	LP	11000 0100	Diodilliola ot	ETT_711 E_ETHORGOTHOTIC_7107 TE	00/01/2010	14/03/2017	-8.76	126	-9.64	101	-12.75	366			Outstanding
Social Points Social Point	C510-LP10736		S1070)5 External		LP		Diodifficia ot		LOIDOILOID	14/03/2017	-4.94	126	-1.98	181	-7.86	366		The state of the s	Outstanding
Section Sect														- 14//1						Proposed
Social Policy Book 107 Simple Social Policy Social Polic														- 14//						Proposed
Sout 107 Story 107041 Block 107 Story 10705 Etheral Manual P Read Stud Blood 80 Alve UV_REAL Enterpret Alve-8 25002/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10702/16 10														N/A						Proposed
SSULPHONE Block 107 St0706 Eternal Manual LP Road Stad Broad St Ave UVTBM-Easted Pick App. 3990 270102015 17052016 D. 458 371 D. 459 D.														IN/A						Proposed Proposed
Schort Display Sect Stort St													271		271	1077	271	14.04.2016		Proposed
Solid Pilot Block 107 Strong Ethernal Menual LP Road Stud Broad Stave LV TBM-East-RC Pilot An-3895 2701/2015 1706/2016 CS104-1Pilot Block 107 Strong Ethernal Menual LP Road Stud Broad Stave LV TBM-East-RC Pilot An-3895 2701/2015 1002/2016 CS104-1Pilot Block 107 Strong Ethernal Menual LP Road Stud Broad Stave LV TBM-East-RC Pilot An-3995 3101/2015 1002/2016 CS104-1Pilot Block 107 Strong Ethernal Menual LP Road Stud Broad Stave LV TBM-East-RC Pilot An-3995 3101/2015 1002/2016 CS104-1Pilot Block 107 Strong Ethernal Menual LP Road Stud Broad Stave LV TBM-East-RC Pilot An-3995 3101/2015 CS104-1Pilot Block 107 Strong Ethernal Menual LP Road Stud Broad Stave LV TBM-East-RC Pilot An-3995 3101/2015 CS104-1Pilot Block 107 Strong Ethernal Menual LP Road Stud Broad Stave LV TBM-East-RC Pilot An-3995 3101/2015 CS104-1Pilot Block 107 Strong Ethernal Menual LP Road Stud Broad Stave LV TBM-East-RC Pilot An-3995 3101/2015 CS104-1Pilot Block 107 Strong Ethernal Menual LP Road Stud Broad Stave LV TBM-East-RC Pilot An-3995 3101/2015 CS104-1Pilot Block 107 Strong Ethernal Menual LP Road Stud Broad Stave LV TBM-East-RC Pilot An-3995 3101/2015 CS104-1Pilot Block 107 Strong Ethernal Menual LP Road Stud Broad Stave LV TBM-East-RC Pilot An-3995 3101/2015 CS104-1Pilot CS104-1Pilot Block 107 Strong Ethernal Menual LP Road Stud Broad Stave LV TBM-East-RC Pilot An-3995 3101/2015 CS104-1Pilot CS104-1Pilot Block 107 Strong Ethernal Menual LP Road Stud Broad Stave LV TBM-East-RC Pilot An-3995 3101/2015 CS104-1Pilot CS104-1Pilot Block 107 Strong CS104-1Pilot CS104												0.45		0.43						Proposed
SSIQ-PIPTAYS Block 107 S10706 External Manual LP Road Stud Block 107 Road Stud Block 107 Road Stud LP Road S												0.00		-0.26						Proposed
CSIOL-PIDTAGE Block 107 S10706 External Manual LP Road Stud Broad St.Ave LIV_TBM-East-RC_Piot_Adv-3005 3101/2015 1502/2016 CSIOL-PIDTAT Block 107 S10706 External Manual LP Road Stud Broad St.Ave LIV_TBM-East-RC_Piot_Adv-3005 3101/2015 1502/2016 CSIOL-PIDTAT Block 107 S10706 External Manual LP Road Stud Broad St.Ave LIV_TBM-East-RC_Piot_Adv-3005 3101/2015 1705/2016 CSIOL-PIDTAT Block 107 S10706 External Manual LP Road Stud Broad St.Ave LIV_TBM-East-RC_Piot_Adv-3005 3101/2015 1705/2016 CSIOL-PIDTAT Block 107 S10706 External Manual LP Road Stud Broad St.Ave LIV_TBM-East-RC_Piot_Adv-3005 3101/2015 1705/2016 CSIOL-PIDTAT Block 107 S10706 External Manual LP Road Stud Broad St.Ave LIV_TBM-East-RC_Piot_Adv-3005 3101/2015 1705/2016 CSIOL-PIDTAT Block 107												-0.24		0.30		-0.23	370			Proposed
Side Property Side Property Side	C510-LP10746	Block 107	S1070	06 External	Manual	LP	Road Stud	Broad St Ave		31/01/2015	16/02/2016			0.31				14.04.2016		Proposed
Side Piropara Block 107 Si0706 External Manual LP Road Stud Broad St.Ave LIV_TBMEastRC_Plot_Adv-3005 3101/2015 1705/2016 2 4.88 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 259 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2 4.58 2	C510-LP10747	Block 107	S1070	06 External	Manual	LP	Road Stud	Broad St Ave	LIV TBM-East-RC Pilot Adv-3909	31/01/2015	16/02/2016	-0.67	168	0.32		0.25	370	14.04.2016		Proposed
Siting High Properties Siting High Propert	C510-LP10748	Block 107	S1070	06 External	Manual	LP	Road Stud	Broad St Ave	LIV_TBM-East-RC_Pilot_Adv-3905	31/01/2015	17/05/2016	-1.38	259	-1.38	259	-0.27	371	14.04.2016		Proposed
CSI0-TBI0701B Si0-TBI0702A Si0	C510-LP10749	Block 107	S1070	06 External	Manual	LP	Road Stud	Broad St Ave	LIV_TBM-East-RC_Pilot_Adv-3909	31/01/2015	17/05/2016	○ -1.59	259	-1.59	259	-0.38	371	14.04.2016	ERP - Ceased, <2mm/yr achieved	Proposed
CS10-TB107102A Block 107 TB107112 External Automated TB Tillmeter-Biaxial T-14 Liverpool St LIV_AP2_Enlargement_Adv-8 2506/2016 US04/2017 US		Block 107	TB107	01 Internal	Automated	тв	Tiltmeter-Biaxial	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	03/04/2017		120		180		365		Agreed to cease in CTC meeting 04/04/2017 (values are tilt mm/m)	Proposed
CSI0-TBI0711B	C510-TB10702A	Block 107	TB107	02 Internal	Automated	I TB	Tiltmeter-Biaxial	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	03/04/2017		120	***	180		365		Agreed to cease in CTC meeting 04/04/2017 (values are tilt mm/m)	Proposed
CS10-TB10712B Block 107 TB10712 External Automated TB Tilmeter-Biaxial Hallway lavem LIV_TBM-East-RC_Plot_Adv-3905 31/01/2015 03/04/2017 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 120 0.68 0	C510-TB10711B	Block 107	TB107	11 External	Automated	тв	Tiltmeter-Biaxial	Railway Tavem	LIV_TBM-East-RC_Pilot_Adv-3895	27/01/2015	03/04/2017	0.22	120	0.18	180	-0.01	365		6 months automated monitoring specification complete 02/08/2016 (values are tilt mm/m)	Proposed
CS10-TB10713A Block 107 TB10714 Fytemal Automated TB Titmeter-Biavial 1-14 Liverpool St LIV_AP2_Enlargement_Adv-8 2506/2016 0304/2017 (Values are tilt mm/m) CS10-TB10714A Block 107 TB10714 Fytemal Automated TB Titmeter-Biavial 1-14 Liverpool St LIV_AP2_Enlargement_Adv-45 2506/2016 0304/2017 (Values are tilt mm/m) Agreed to cease in CTC meeting 04/04/2017 (Values are tilt mm/m) Agreed to cease in CTC meeting 04/04/2017 (Values are tilt mm/m)	C510-TB10712B	Block 107	TB107	12 External	Automated	I TB	Tiltmeter-Biaxial	Railway Tavem	LIV_TBM-East-RC_Pilot_Adv-3905	31/01/2015	03/04/2017	0.63	120	0.34 0.58	180	-0.03	365		6 months automated monitoring specification complete 02/08/2016 (values are tilt mm/m)	Proposed
	C510-TB10713A	Block 107	TB107	13 External	Automated	тв	Tiltmeter-Biaxial	1-14 Liverpool St	LIV_AP2_Enlargement_Adv-8	25/06/2016	03/04/2017	0.54	120	-0.24	180	-0.37	365		Agreed to cease in CTC meeting 04/04/2017 (values are tilt mm/m)	Proposed
		Block 107	TB107	14 External	Automated	I ТВ	Tiltmeter-Biaxial	1-14 Liverpool St	LIV_ES2_Enlargement_Adv-45	28/10/2016	03/04/2017	-6.25 0.22	120	-2.59 0.12	180		365		Agreed to cease in CTC meeting 04/04/2017 (values are tilt mm/m)	Proposed

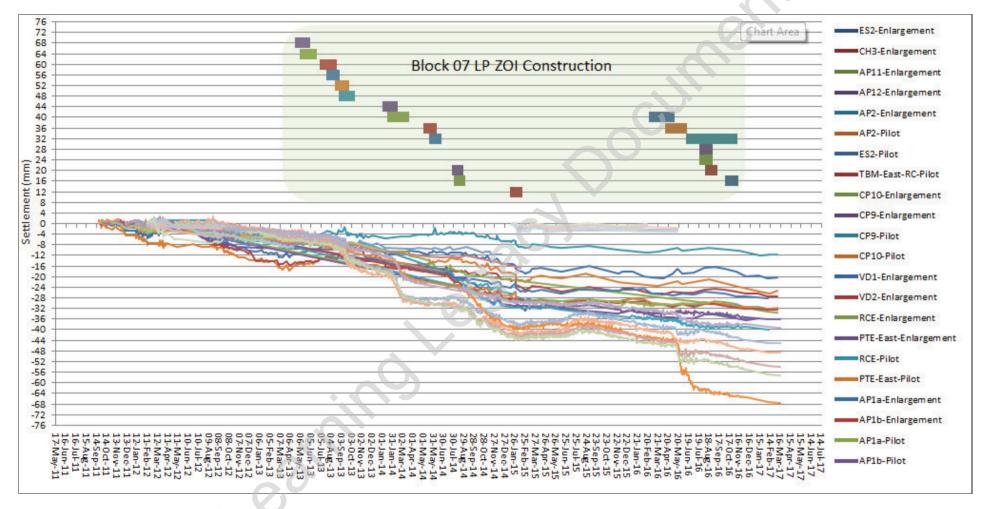


Graph 1- All Block 07 BREs (LB) Manual Monitoring History in Relation to Construction



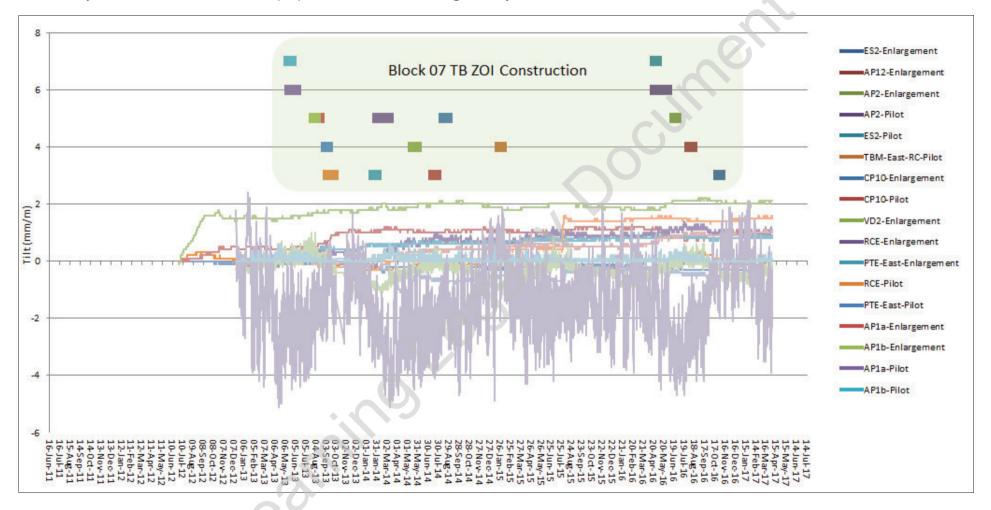


Graph 2- All Block 07 Road Studs (LP) Manual Monitoring History in Relation to Construction



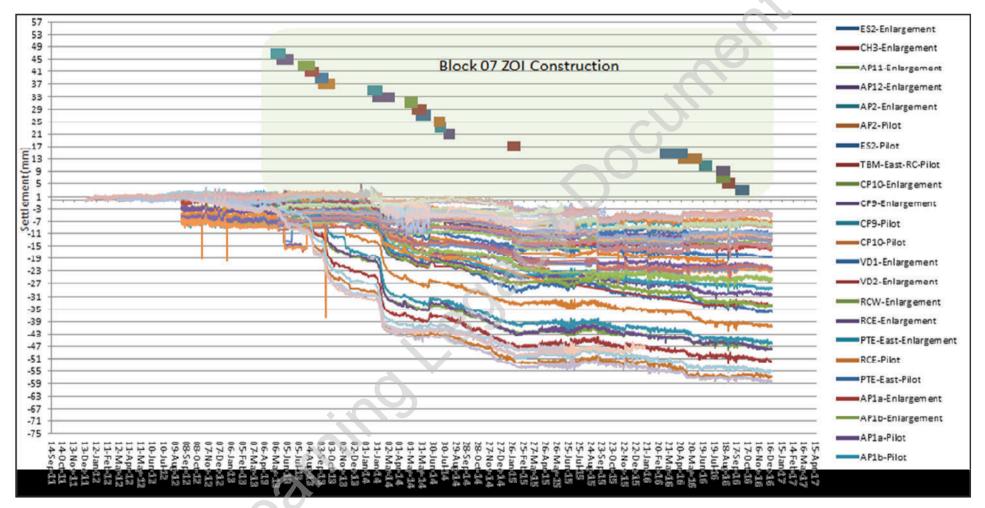


Graph 3- All Block 07 Tiltmeters (TB) Automated Monitoring History in Relation to Construction





Graph 4- All Block 07 3d Geodetic Prisms (RP) Automated Monitoring History in Relation to Construction





Graph 5- All Block 07 Water Cells (SH) Manual Monitoring History in Relation to Construction

