| | |
|---|---|
| **Work Area:** SMM | |
| **Work Type:** I&M | |
| **Originator Company:** GEOCISA | |

# C435
# Farringdon Main Station

| | |
|---|---|
| **CRL Lead reviewer:** [redacted] | |
| **CRL Reviewer:** | |

# Monitoring Close-Out Report:
# In-ground Monitoring Section F

## CRL Document Number: C435-BFK-C2-RGN-M123-51656

**Supplier Document Number: N/A**

**Contract MDL reference C13.012**

### 1. Contractor Document Submittal History:

| Revision: | Date: | Prepared by: | Checked by: | Approved by: | Reason for Issue: |
|---|---|---|---|---|---|
| 1.0 | 26-04-2016 | [redacted] | | | For acceptance |
| 2.0 | 26-05-2016 | | | | For acceptance |
| | | | | | |

### 2a. Stakeholder Review Required? YES ☐ NO ☒

Stakeholder submission required: LU ☐ RfL ☐ Purpose of submission: For no objection ☐
NR ☐ LO ☐ For information ☐
DLR ☐ Other: _____

This document has been reviewed by the following individual for coordination, compliance, integration and acceptance and is acceptable for transmission to the above stakeholder for the above stated purpose.

Sign: _____ Role: _____ Name: _____ Date: _____

Sign: _____ Role: _____ Name: _____ Date: _____

### 2b. Review by Stakeholder (if required):

| Stakeholder Organisation | Job Title | Name | Signature | Date | Acceptance |
|---|---|---|---|---|---|
| | | | | | ☐ |
| | | | | | ☐ |
| | | | | | ☐ |

[redacted] compliance with their contractual obligations and does not constitute
ds or materials developed or selected by the designer/supplier.

### 3. Acceptance by *Crossrail:*

[redacted]
13/10/2016

[redacted]

## Contents

# A. INTRODUCTION

In line with the C122 – M&W Specification KX10 – Instrumentation & Monitoring C122-OVE-Z4-RSP-CR001-00007, this Close-Out Report aims to address the following points in relation to the instrumentation defined in Section 2.

Identify movements observed by the relevant instruments;

Relate these movements to construction activities, where applicable;

Identify trigger breaches that may have occurred;

Demonstrate that the rate of change of the data is either in line with the required rate or such that residual risks are minimal;

Identify any such residual risks should there be considered to be any.

Based on the above points, this close out reports will provide justification for the decommissioning of the instruments.

# B. INSTRUMENTS

## B.1 Description of the Instruments

This Close-Out Report relates the In-ground Monitoring Section F, consisting of 1No Extensometer located in St John St. See table 1 below with details.

| Instrument | Depth (m) | Easting (m) | Northing (m) | Elevation (mATD) | Description |
|---|---|---|---|---|---|
| C435-XR17000 | 7, 13, 17, and 21m | 82150.0488 | 36552.0820 | 115.3088 | Manual extensometer |

*Table 1: Details of the device installed on Section F.*

The extensometer installed on the Section E is shown in the following documents:

*Drawings:*

- C122-OVE-C2-DDA-CR001_Z-31531. Asses Protection I&M Ground surface and In-ground
- C435-BFK-C2-DWG-M123-50042. In ground devices installed for Farringdon Station.

*Installation Reports:*

- C435-BFK-C2-RGN-M123-50930. Installation Report- In ground monitoring- Extensometer XR17000.

### B.2 Location of the Instruments

In ground device associated with Section F is located on the plan below highlighted in yellow.

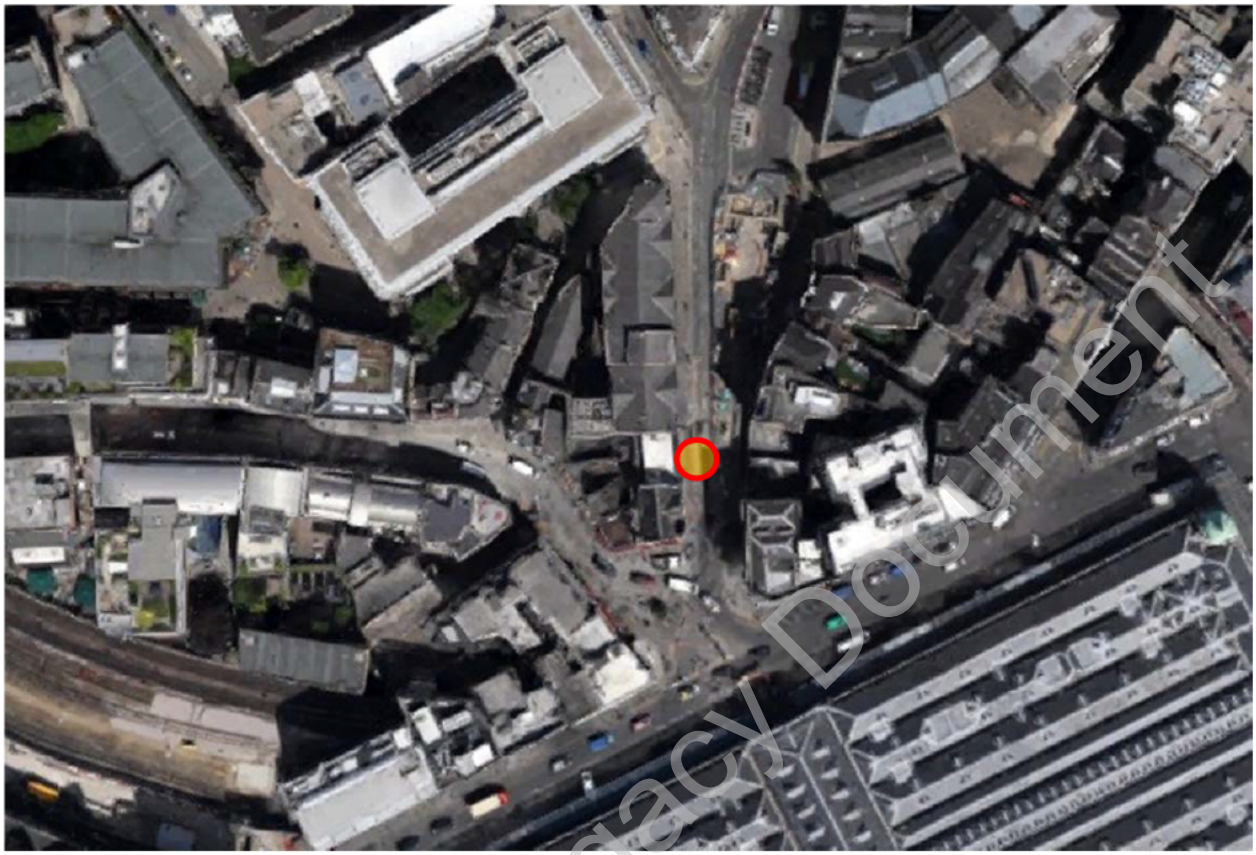


*Figure 1 – Plan showing the Location for the device on Section F.*



## C. MOVEMENTS

### C.1 Movements Resulting from Construction Activities

#### C.1.1 Relevant Crossrail (BFK) Works

The construction activities affecting this instrument are outlined in the table below.

| Activity | Start Date | End Date |
|---|---|---|
| **EB TBM passage** | 14/01/2014 | 19/01/2014 |

*Table 2 – Construction Activities associated to Section F*

#### C.1.2 Resulting Movements

The monitoring data for the extensometer is shown in Appendix B.

- TAM's drilling from Moorgate Shaft 1 caused 2mm maximum of settlement captured on the deeper anchor on 24-07-2013.
- Compensation grouting caused 2-3mm of heave on 06-11-2013.
- EB TBM caused maximum 6-7mm of settlement from 14-01-2014 to 19-01-2014.
- Residual settlement caused 2mm of settlement.
- Maximum settlement captured by the extensometer -12mm

### C.2 Trigger Breaches

The Instrumentation and Monitoring Plan: Farringdon Station Ground Movement and Asset Protection C122-OVE-C2-RGN-M123-50013 outlines the triggers associated with the device. No triggers have been defined for the instrument included in this report.

### C.3 Significant Issues with the Instrumentation

The manhole where the extensometer was installed was covered by asphalt during the street works carried out on St John St. The asphalt resurfacing damaged the extensometer and was therefore not possible to take further readings. Therefore PTE excavation was not captured. The works carried out on St John St was on August 2014.

### C.4 Residual Risks

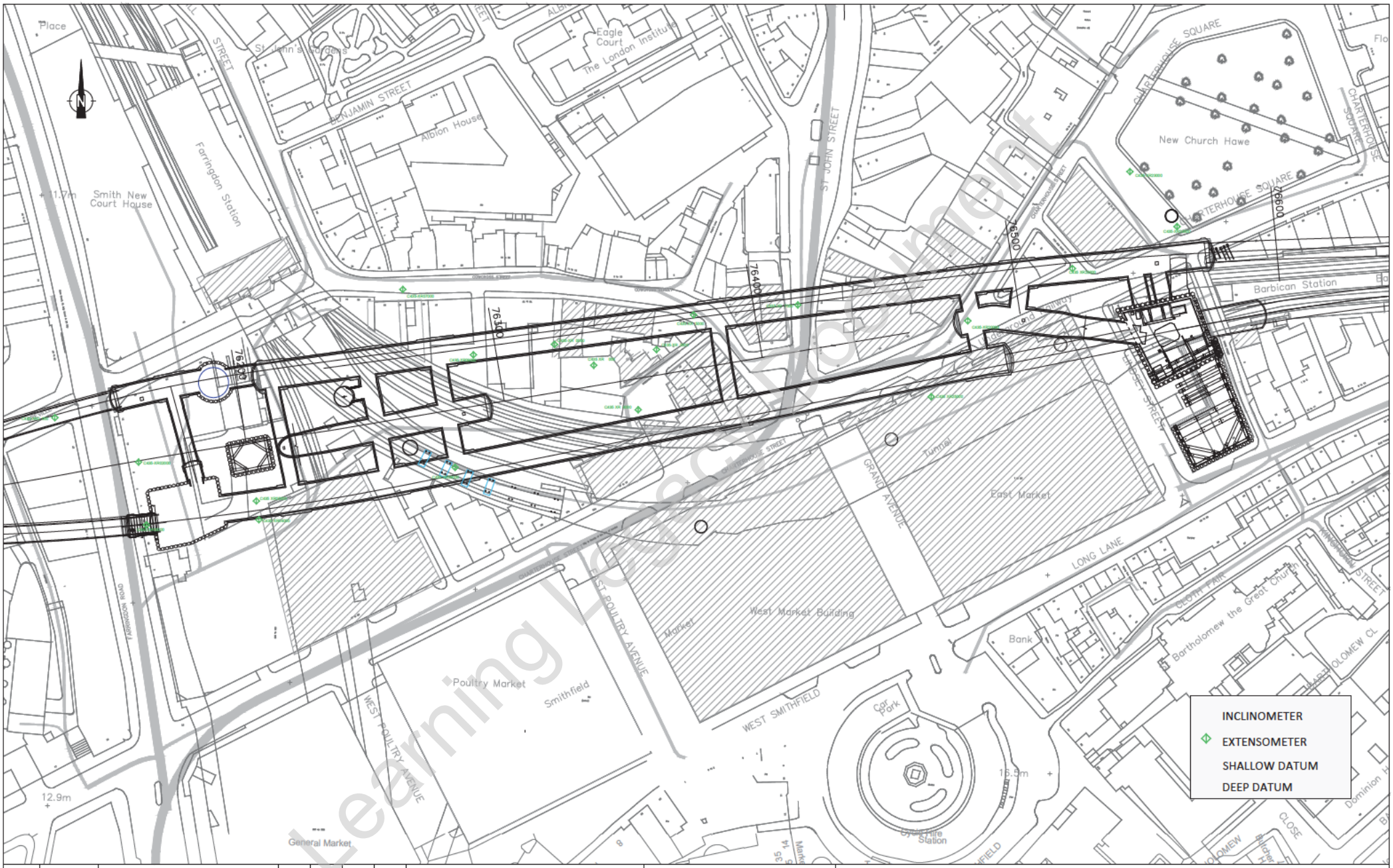
No risks remain.

## D. CONCLUSIONS

No triggers breached, monitoring stable. No residual risks remain. Long term monitoring to be completed by Crossrail.

As per C435-PMI-00549 the Long Term Monitoring has been ceased in this area and subsequently all monitoring associated is no longer undertaken by BFK. The last measurement carried out for these devices on 08-08-2014.

APPENDIX A: DRAWINGS






| Rev. | Date | Description | By | Chkd | App | Auth |
|---|---|---|---|---|---|---|
| 1 | 15-11-2013 | | | | | |

Notes:

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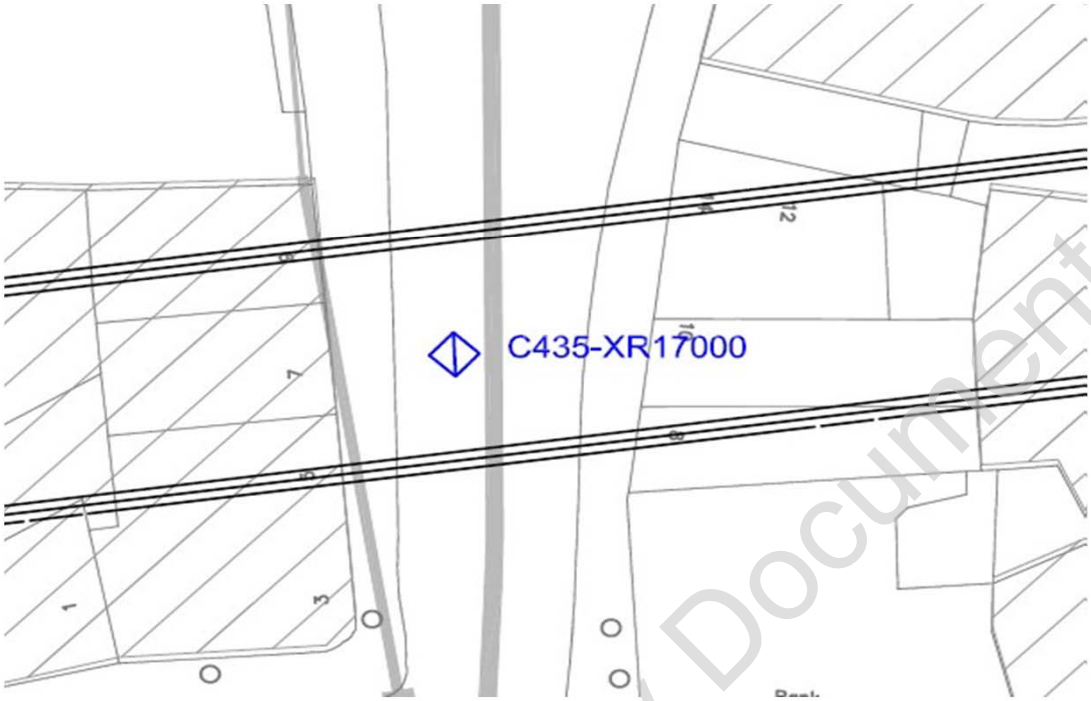
Contract : C435 FARRINGDON STATION
Originator : GEOCISA
Location : CROSSRAIL GENERAL
Title : IN-GROUND DEVICES INSTALLED FOR FARRINGDON STATION.
By : -
Chk : -
App : -
Scale : @ A3
Drg No : - C435-BFK-C2-DWG-M123-50042
Rev :
Suit :
Auth : GEOCISA

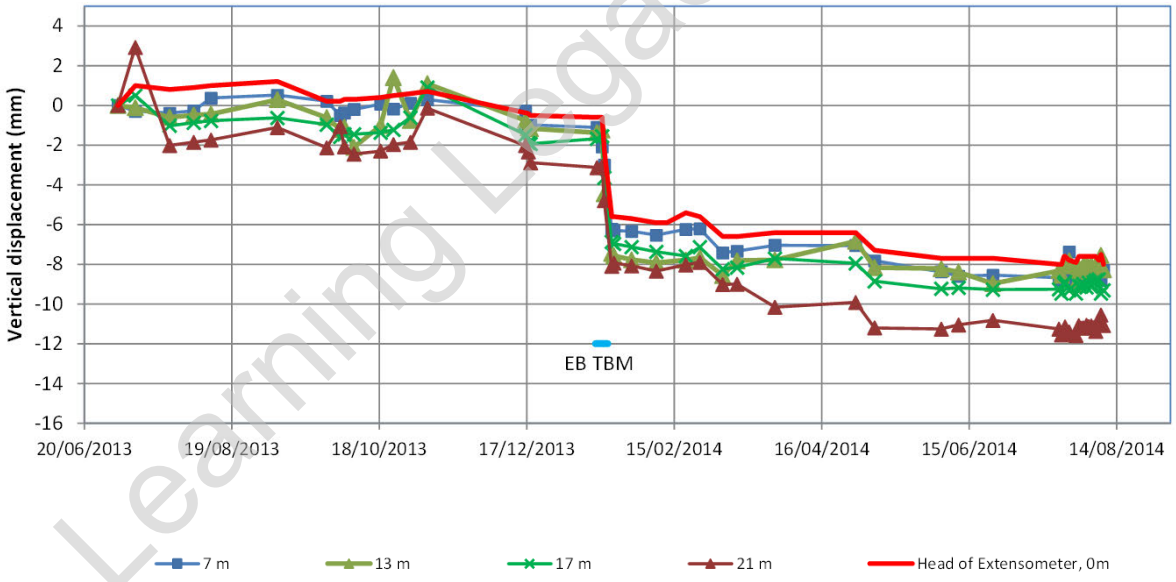
$Eby$

APPENDIX B: GRAPHS

**REPORT:** In-ground monitoring
**AREA:** St. Johns Street
**DEVICE:** Extensometer




**Extensometer C435-XR17000**






REMARKS:
08-08-14 Extensometer has been covered by asphalte due street works carried out on St John St.

## APPENDIX C: GLOSSARY

| | |
|---|---|
| • ATS | Automatic Total Station. |
| • ETH | Eastern Ticket Hall. |
| • WB | Westbound. |
| • TBM | Tunnel Boring Machine. |
| • EB | Eastbound. |
| • PTW | Platform Tunnel West. |
| • PTE | Platform Tunnel East. |
| • CP | Cross passages. |
| • CH | Concourse Hall. |
| • VA | Ventilation Adit. |
| • STE | Stub Tunnel East. |
| • STW | Stub Tunnel West. |
| • RTE | Running Tunnel East. |
| • ES | Escalator Shaft. |
| • TAM | Tube a Manchette. |