



Work Area: SMM
Work Type: I&M
Originator Company: GEOCISA UK

C435 Farringdon Main Station

CRL Lead reviewer: [REDACTED]
CRL Reviewer:

Monitoring Close-Out Report: Internal monitoring – Buildings between St John St and Charterhouse St

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 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
					<input type="checkbox"/>
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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 B.

- 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 report will provide justification for the decommissioning of the instruments.

B. INSTRUMENTS

B.1 Description of the Instruments

This Close-Out Report relates the monitoring located inside 16 St John St, 91-93 Charterhouse St, 99 Charterhouse St and 107 Charterhouse St building, consisting of Tiltmeters, refers to Table 1 below for the details

Sensor	Location	Type
C435-TB00601A	16 St John Street.	Tiltmeter
C435-TB00601B	16 St John Street.	Tiltmeter
C435-TB01401A	91-93 Charterhouse St	Tiltmeter
C435-TB01401B	91-93 Charterhouse St	Tiltmeter
C435-TB01402A	91-93 Charterhouse St	Tiltmeter
C435-TB01402B	91-93 Charterhouse St	Tiltmeter
C435-TB01001A	99 Charterhouse Street	Tiltmeter
C435-TB01001B	99 Charterhouse Street	Tiltmeter
C435-TB01002A	99 Charterhouse Street	Tiltmeter
C435-TB01002B	99 Charterhouse Street	Tiltmeter
C435-TB01003A	99 Charterhouse Street	Tiltmeter
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C435-TB01005A	99 Charterhouse Street	Tiltmeter
C435-TB01005B	99 Charterhouse Street	Tiltmeter
C435-TB01006A	99 Charterhouse Street	Tiltmeter
C435-TB01006B	99 Charterhouse Street	Tiltmeter
C435-TB01007A	99 Charterhouse Street	Tiltmeter
C435-TB01007B	99 Charterhouse Street	Tiltmeter
C435-TB00501A	107 Charterhouse St	Tiltmeter
C435-TB00501B	107 Charterhouse St	Tiltmeter

Table 1: Details of the Internal Monitoring instrumentation

Installation and as-built-details are available in the following documents:

Drawings:

- C435-BFK-C2-DWG-M123-50043. Automatic Internal Monitoring for Farringdon Station.

Installation Reports:

- C435-BFK-C2-RGN-M123-51000. Installation Report for internal monitoring in buildings between Charterhouse St and St John St.

B.2 Location of the Instruments

Buildings associated with this close out report are located on the plan below highlighted in yellow.

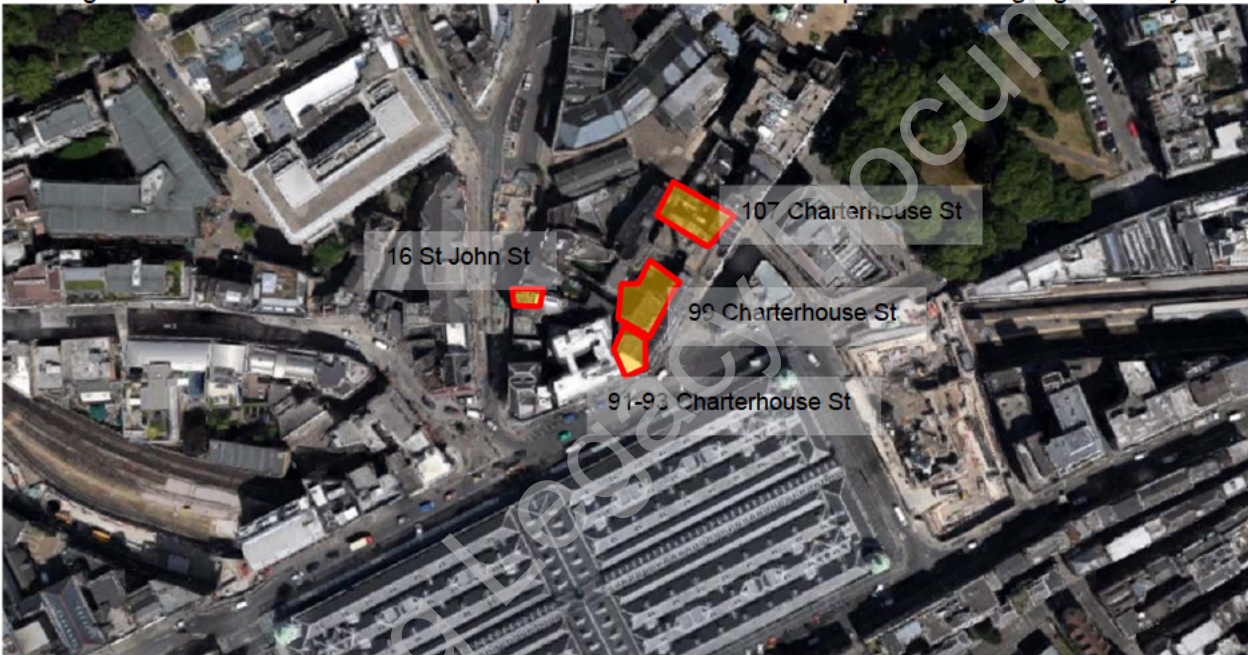


Figure 1 – Map showing the location of monitored building.

C. MOVEMENTS

C.1 Movements Resulting from Construction Activities

C.1.1 Relevant Crossrail (BFK) Works

The construction activities affecting these instruments are outlined in the table below.

ACTIVITY	START DATE	END DATE
EB TBM	16-01-2014	21-01-2014
PTE	03-09-2014	27-11-2014
CP6	14-11-2014	22-11-2014
CH2	19-01-2015	28-05-2015

Table 2 – Construction Activities associated with the devices

C.1.2 Resulting Movements

To analyse the results for the buildings will be assessed individually:

- 16 St John St.
- 91-93 Charterhouse St.
- 99 Charterhouse St.
- 107 Charterhouse St.

- **16 St John St.**

The monitoring data for the tiltmeters located at this building is shown in Appendix B.

- EB TBM caused maximum 0.20mm/m of horizontal displacement on 16-01-2014.
- PTE construction caused maximum 0.80mm/m of horizontal displacement from 03-09-2014 to 22-10-2014.
- Maximum horizontal displacement 0.9mm/m

- **91-93 Charterhouse St.**

The monitoring data for the tiltmeters located at this building is shown in Appendix B.

- EB TBM caused maximum 0.2mm/m of horizontal displacement from 17-01-2014 to 20-01-2014
- PTE caused maximum 0.4mm/m of horizontal displacement from 19-10-2014 to 09-01-2014.
- No horizontal displacement caused by the CP6 works.
- No horizontal displacement caused by the CH2 works.
- Maximum horizontal displacement 0.7mm/m.

- **99 Charterhouse St.**

The monitoring data for the tiltmeters located at this building is shown in Appendix B.

- EB TBM caused less than 0.5mm/m of horizontal displacement from 17-01-2014 to 20-01-2014.
- PTE construction caused maximum 0.5mm/m of horizontal displacement from 19-10-2014 to 09-11-2014
- CP6 tunnel caused less than 0.3mm/m of horizontal displacement from 14-11-2014 to 22-11-2014.
- CH2 construction caused maximum 0.2mm/m of horizontal displacement between 19-01-2015 and 25-05-2015.
- Maximum horizontal displacement 1.5mm/m

- **107 Charterhouse St.**

The monitoring data for the tiltmeters located at this building is shown in Appendix B.

- No significant movement captured by these devices during Crossrail works.
- Maximum horizontal displacement 1.3mm/m

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 works.

No triggers and default alerts were breached by these devices.

C.3 Significant Issues with the Instrumentation

The jumps and slow trends after the jumps in some devices are caused by the discharge of the batteries. The jumps are not related to Crossrail works.

C.4 Residual Risk

No risks remain

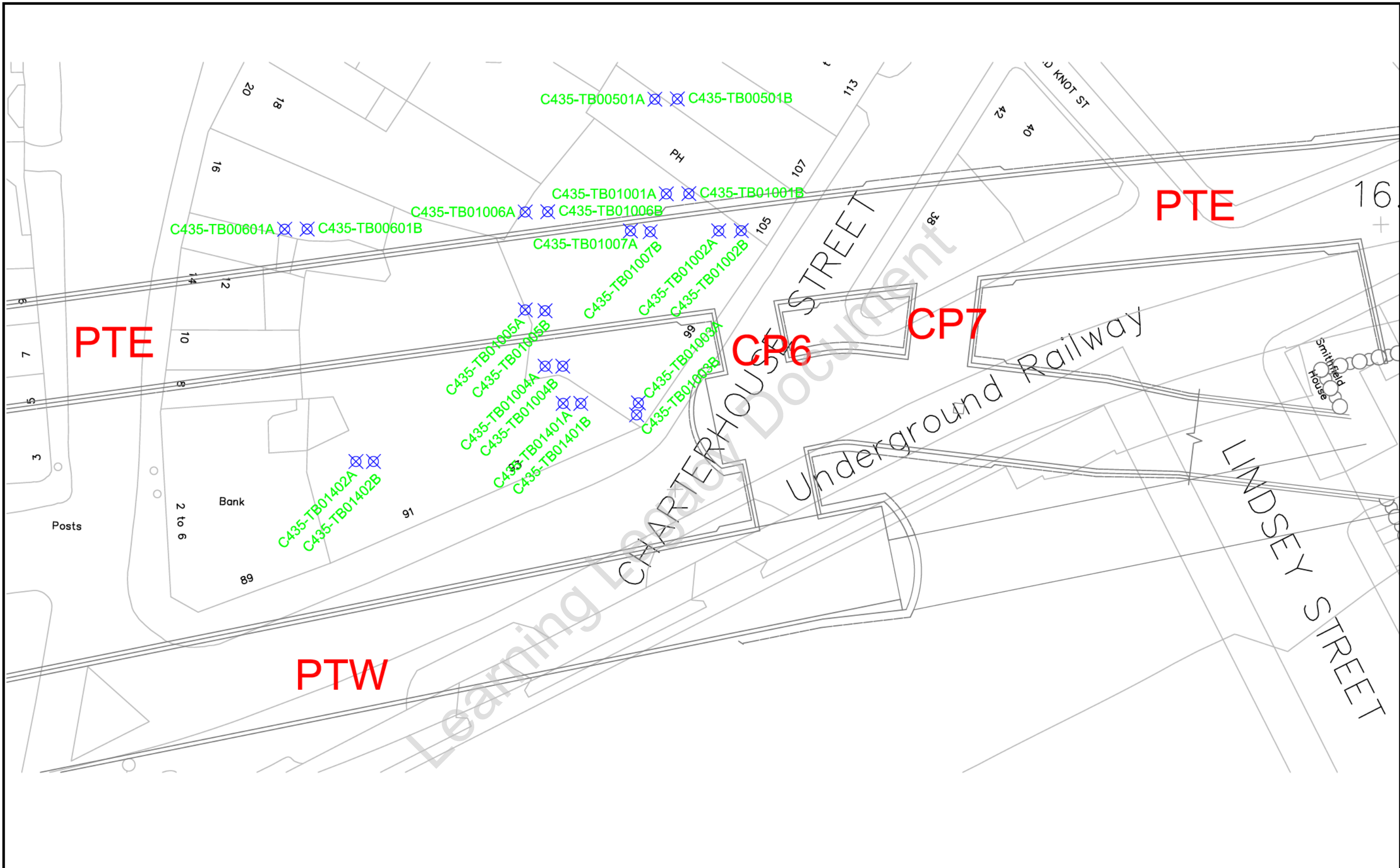
D. CONCLUSIONS

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

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APPENDIX A: DRAWINGS

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Rev.	Date	Description	By	Chkd	App	Auth


Notes:






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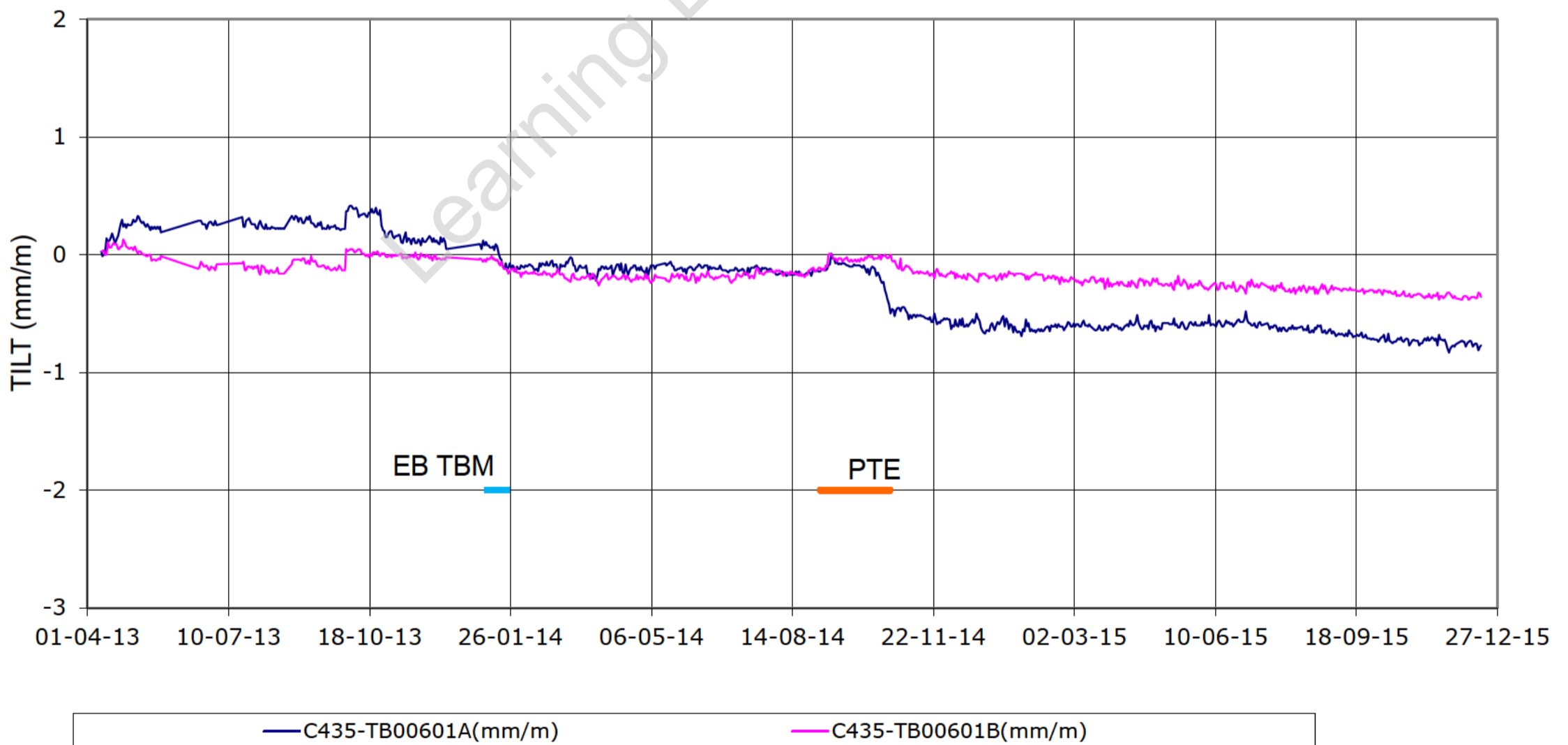
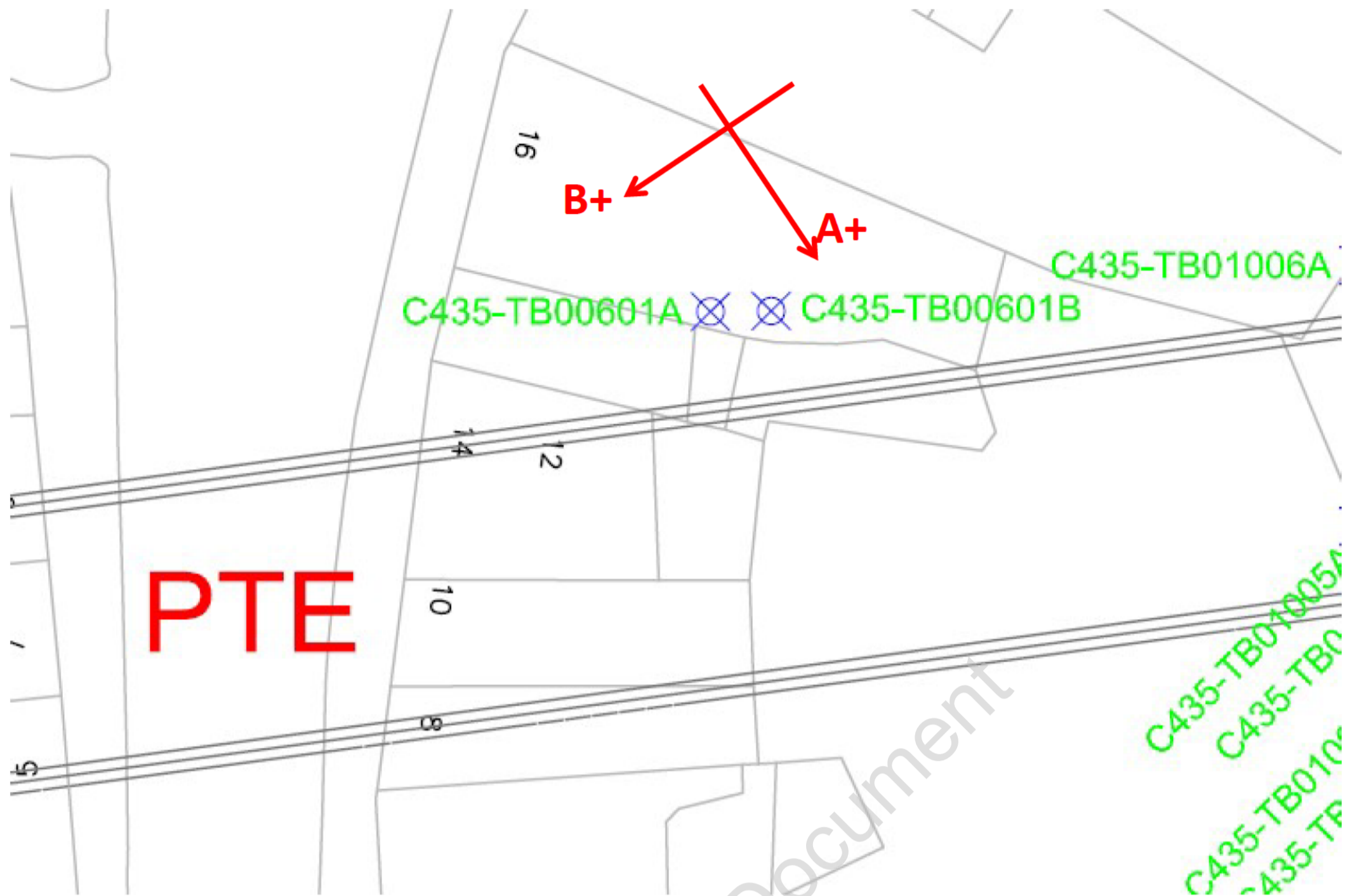
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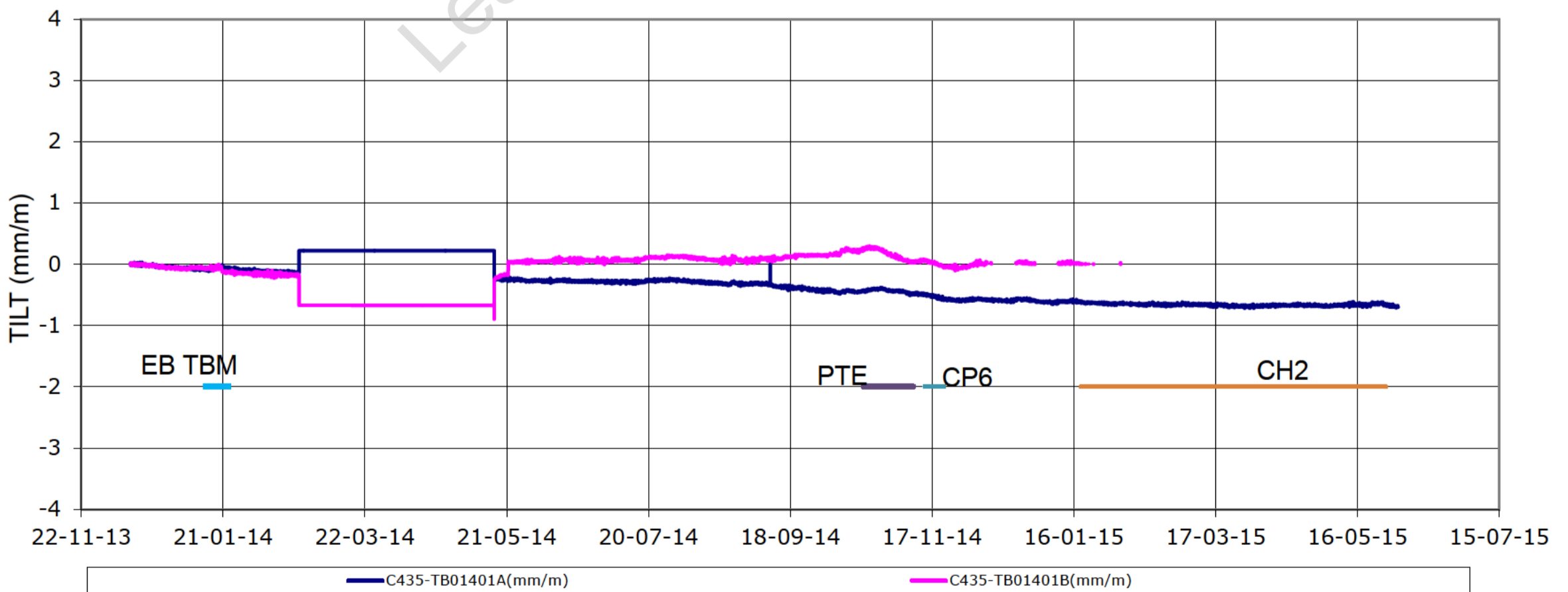
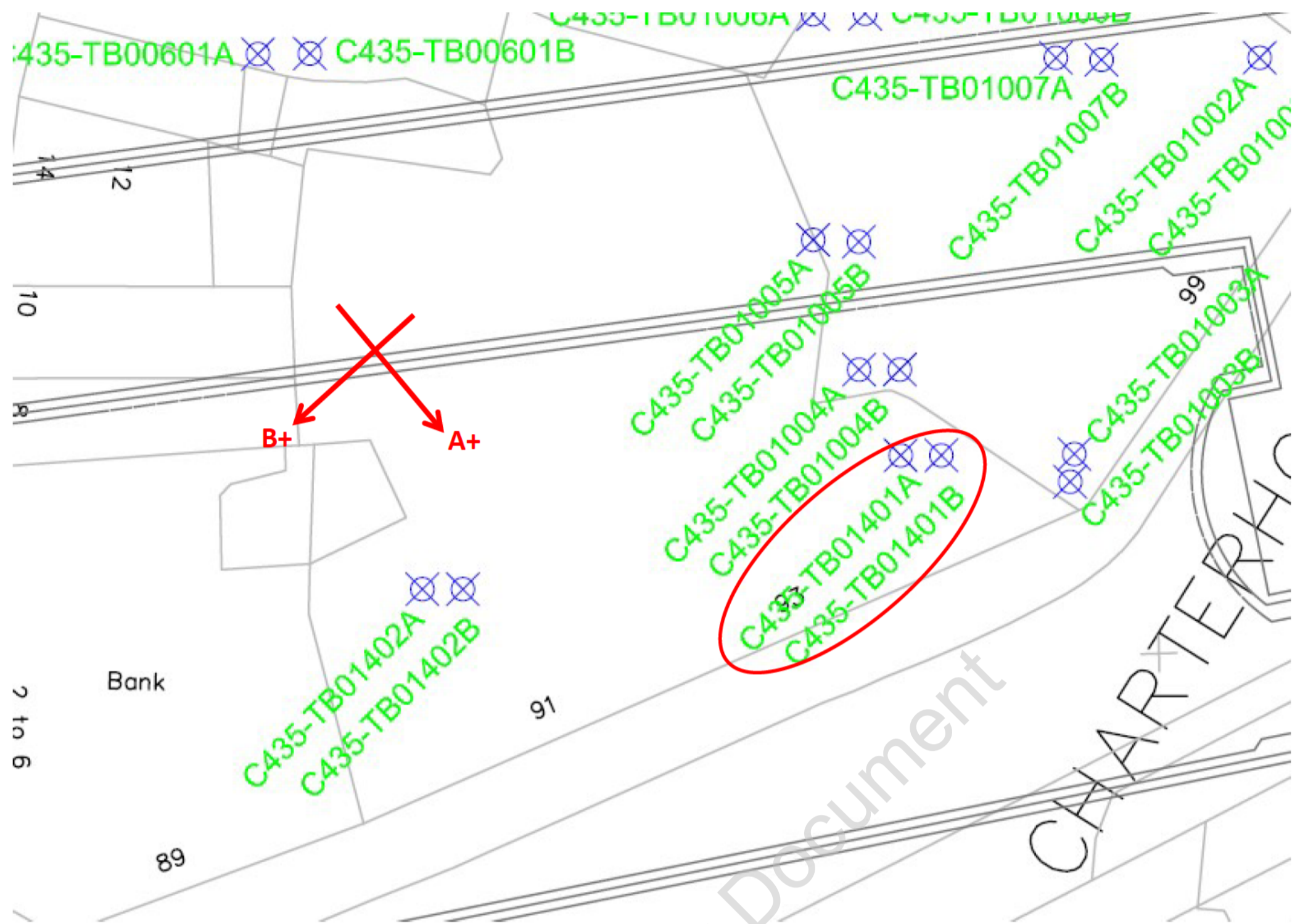
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Location : CROSSRAIL GENERAL		App	
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Drg No : C435-BFK-C2-DWG-M123-50043	Rev :	Sult :	

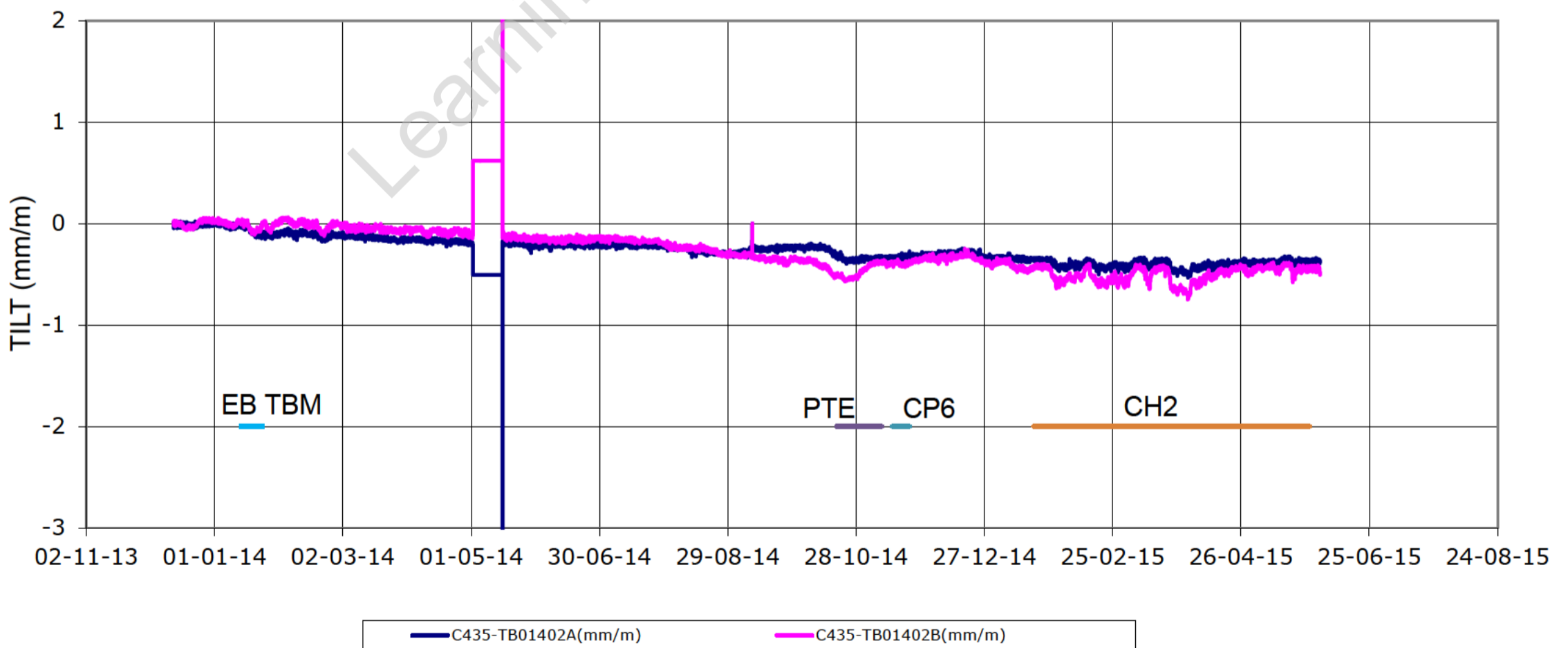
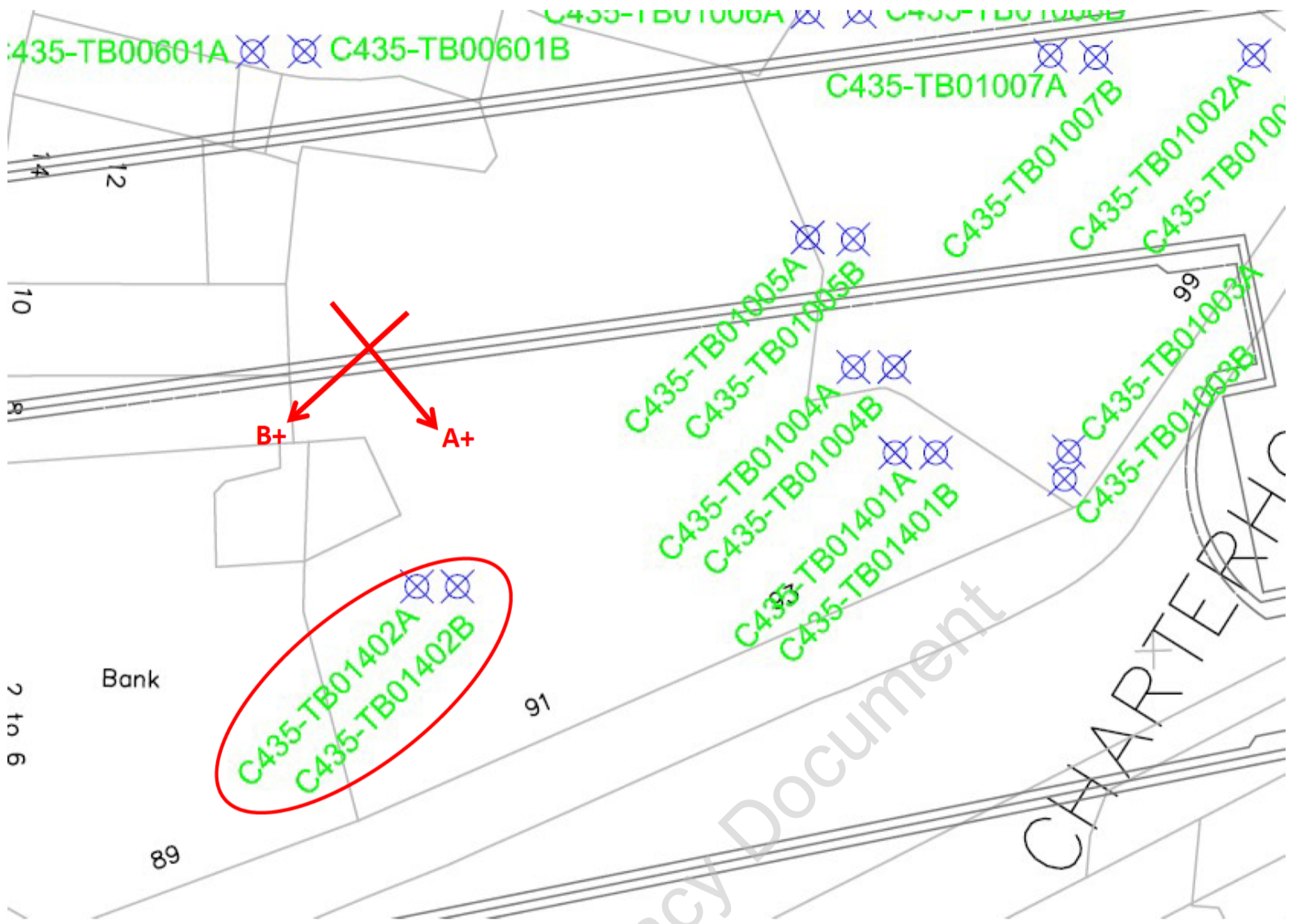
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APPENDIX B: GRAPHS

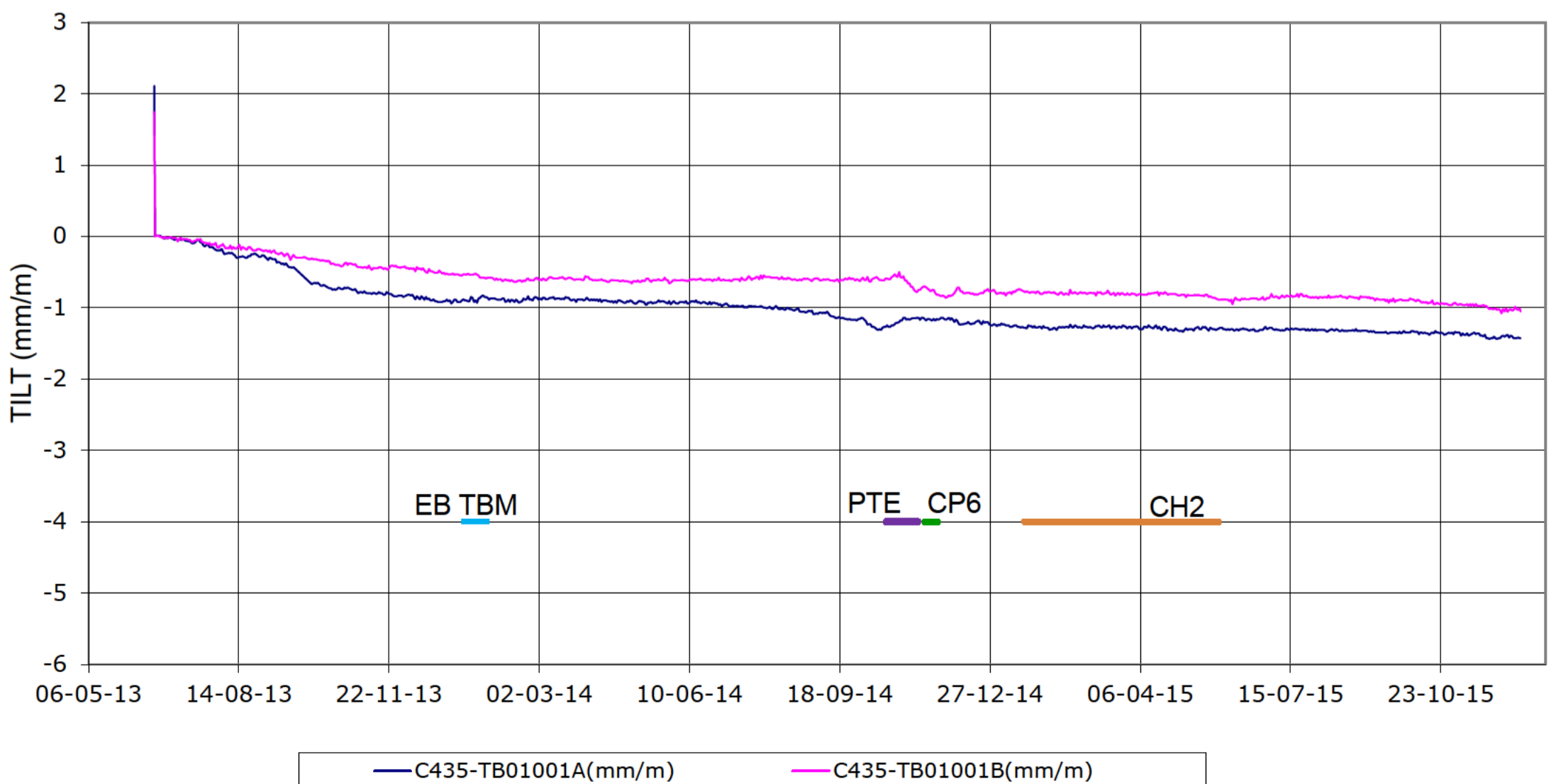
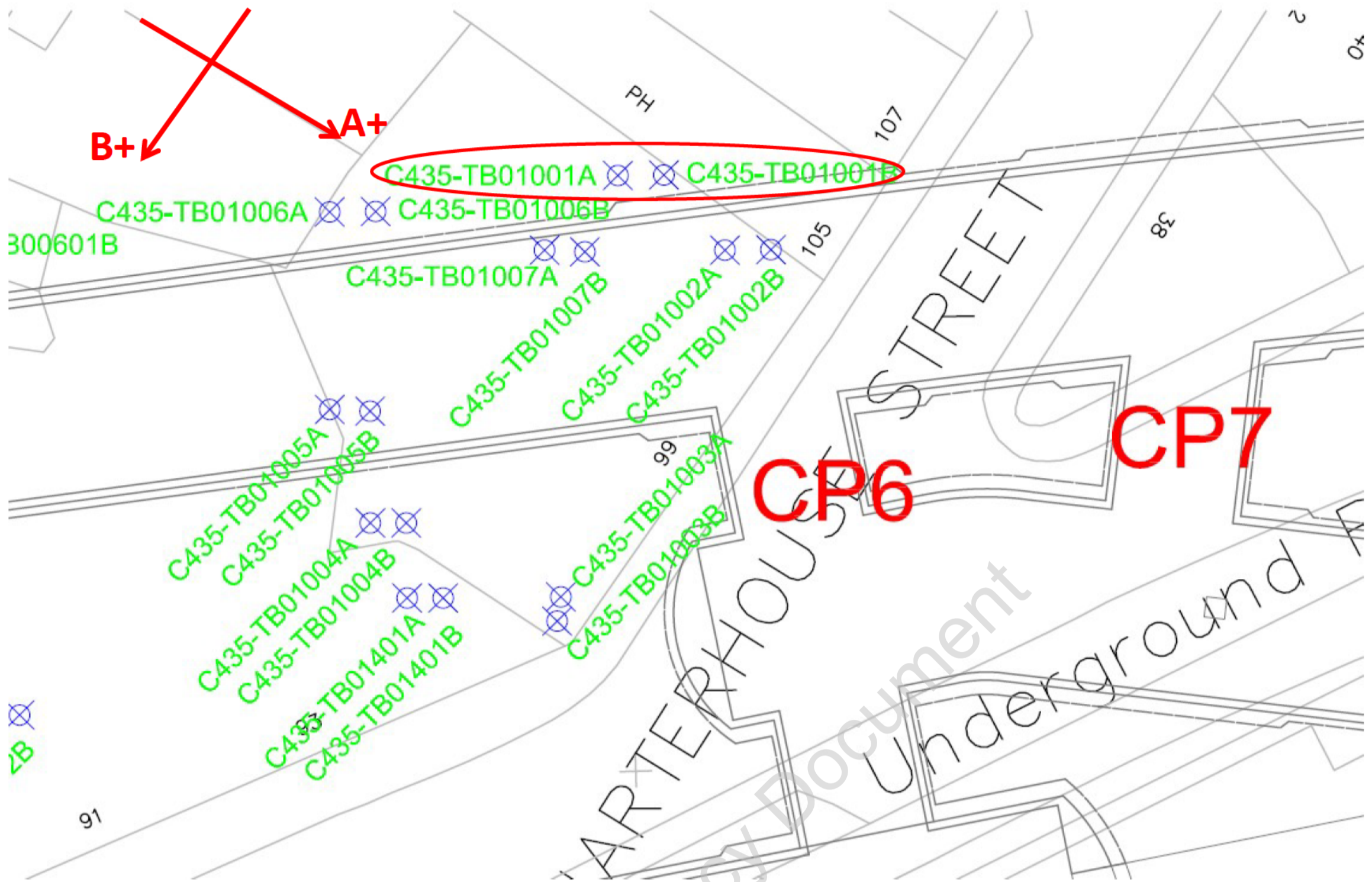
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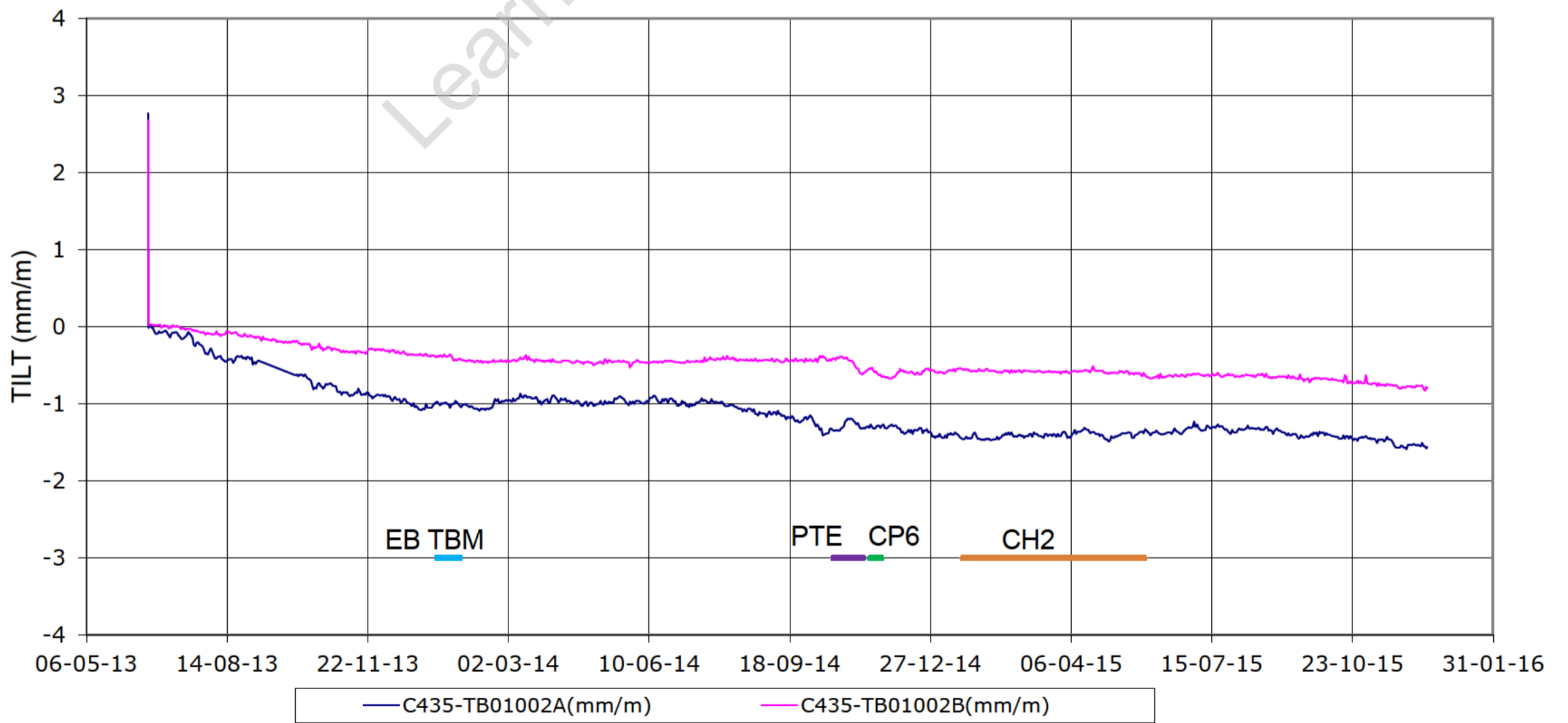
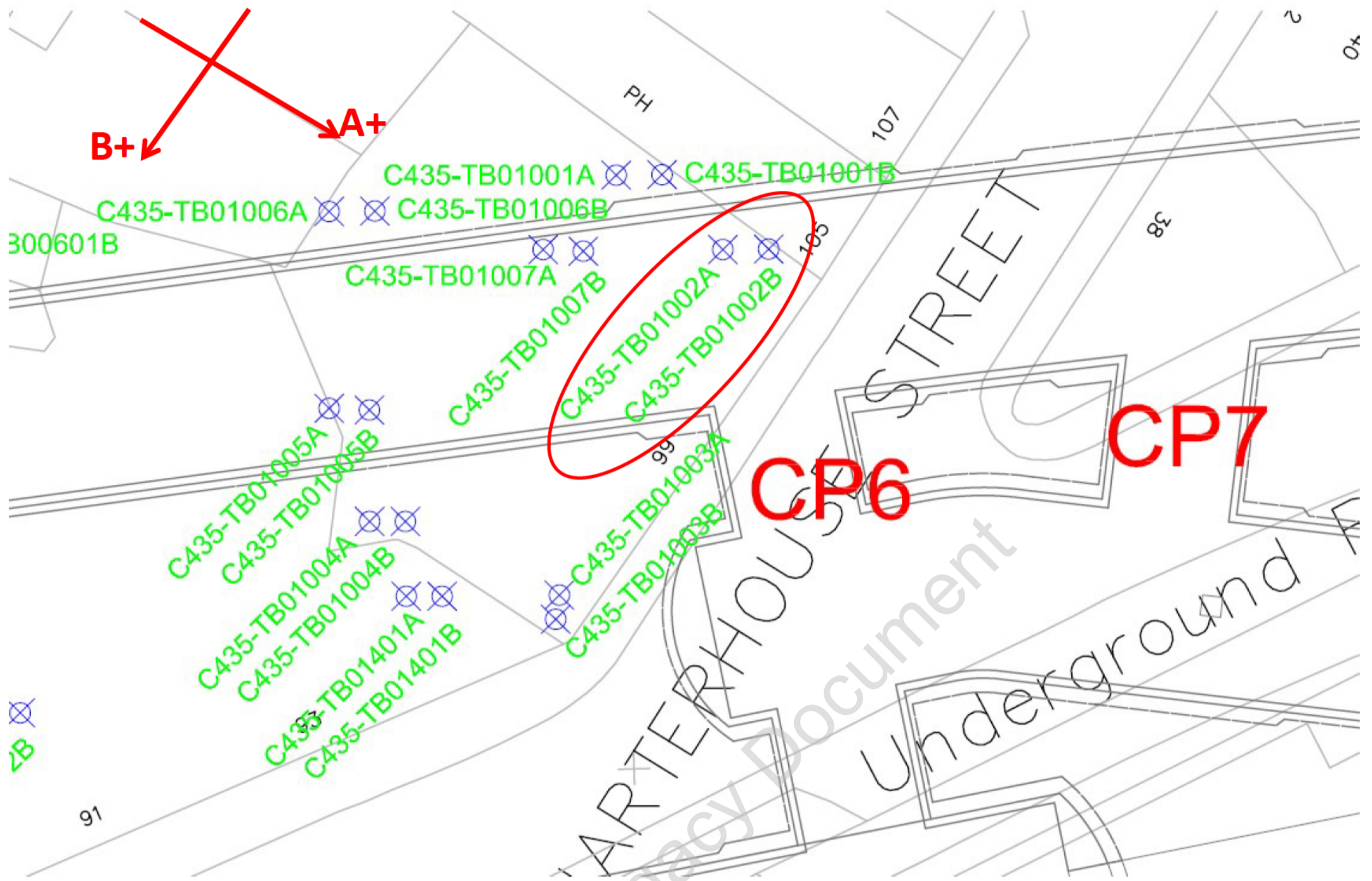


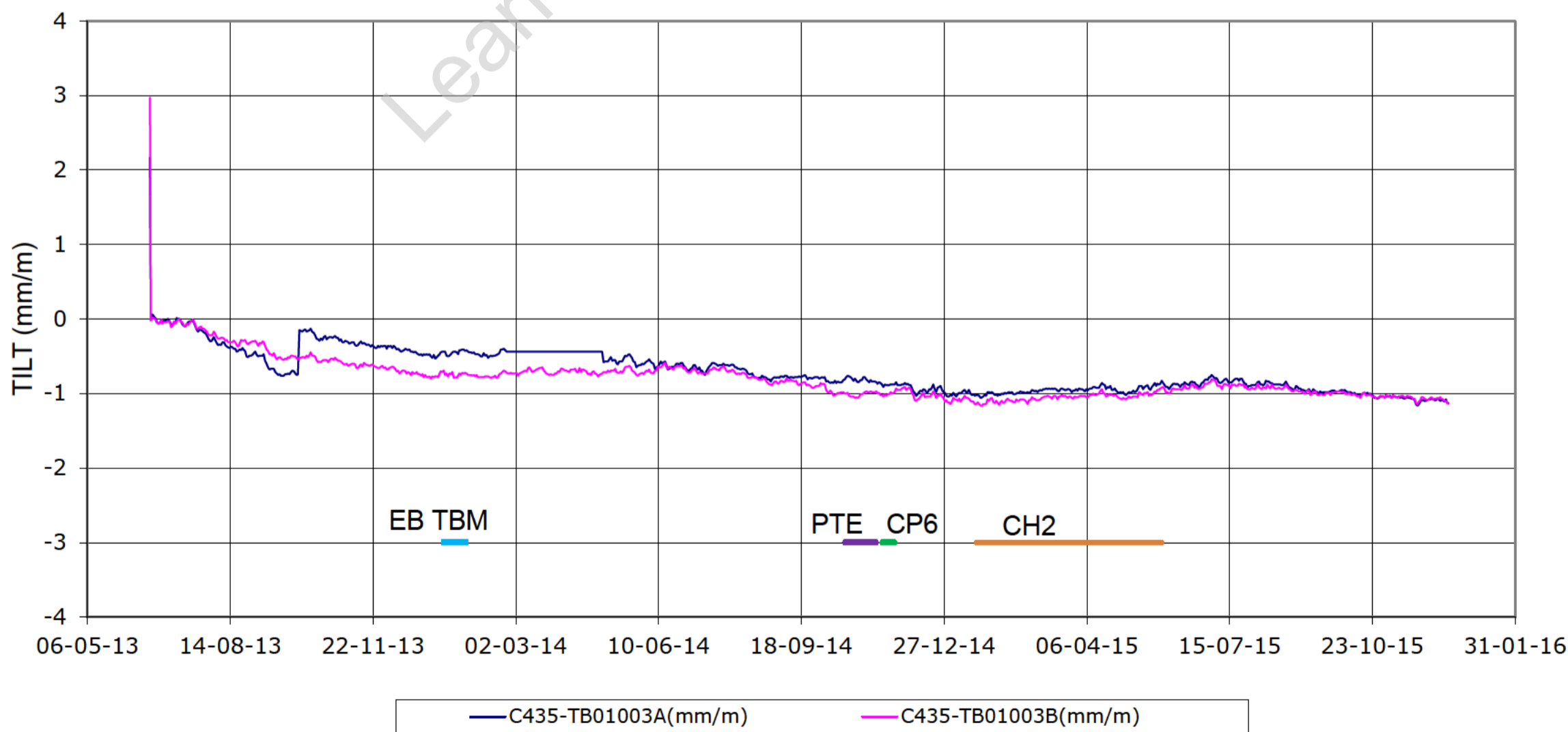
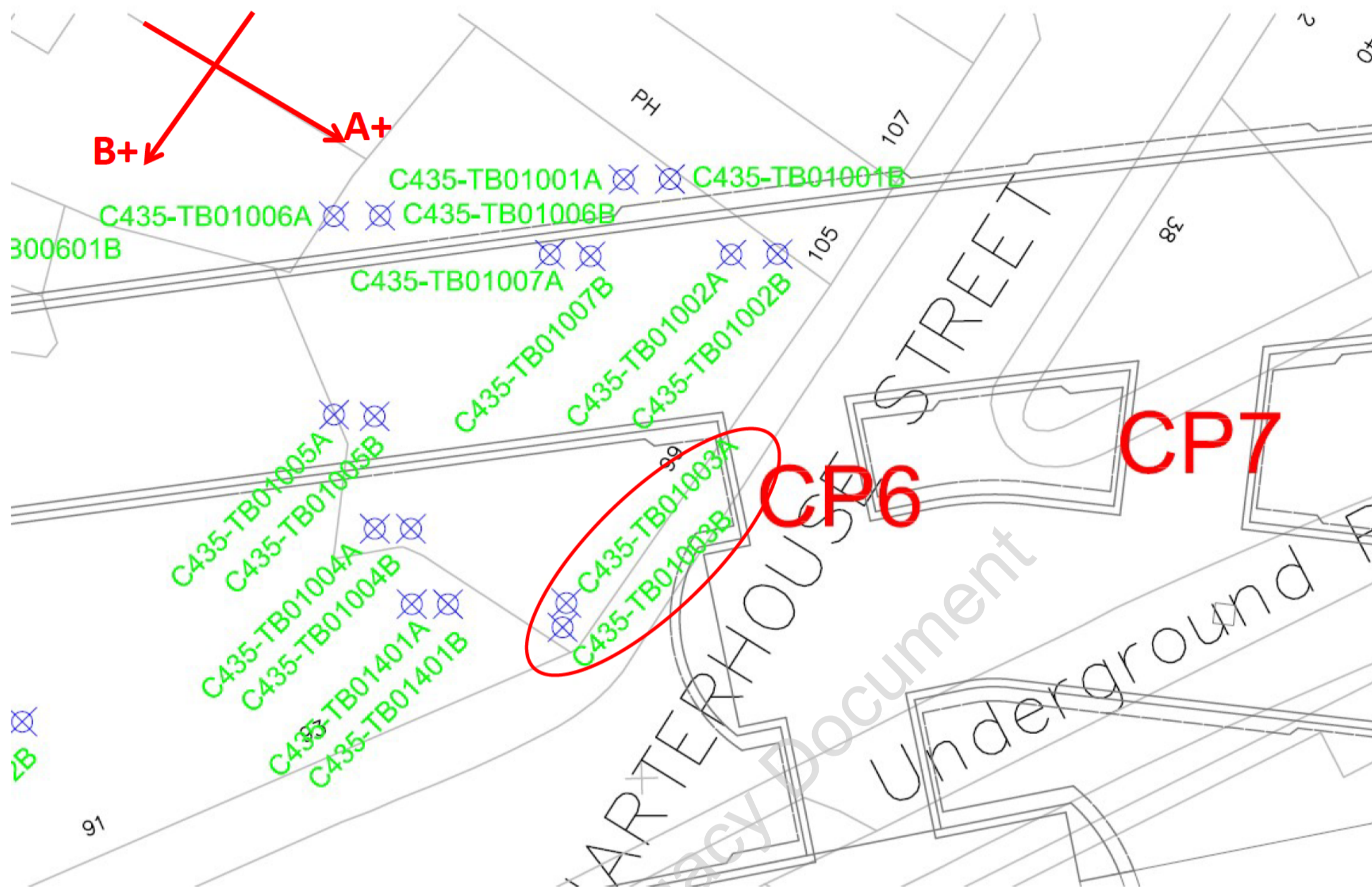


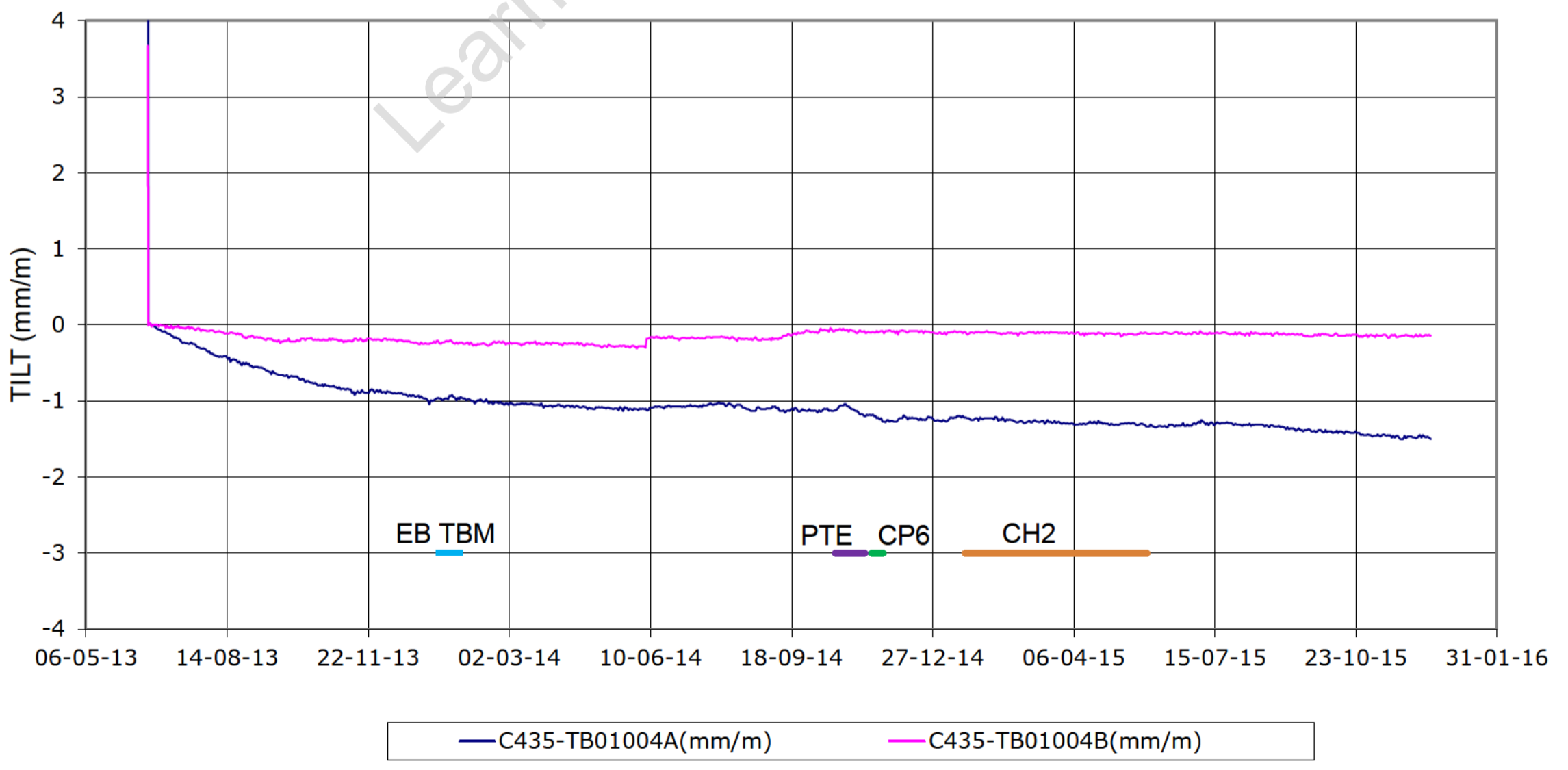
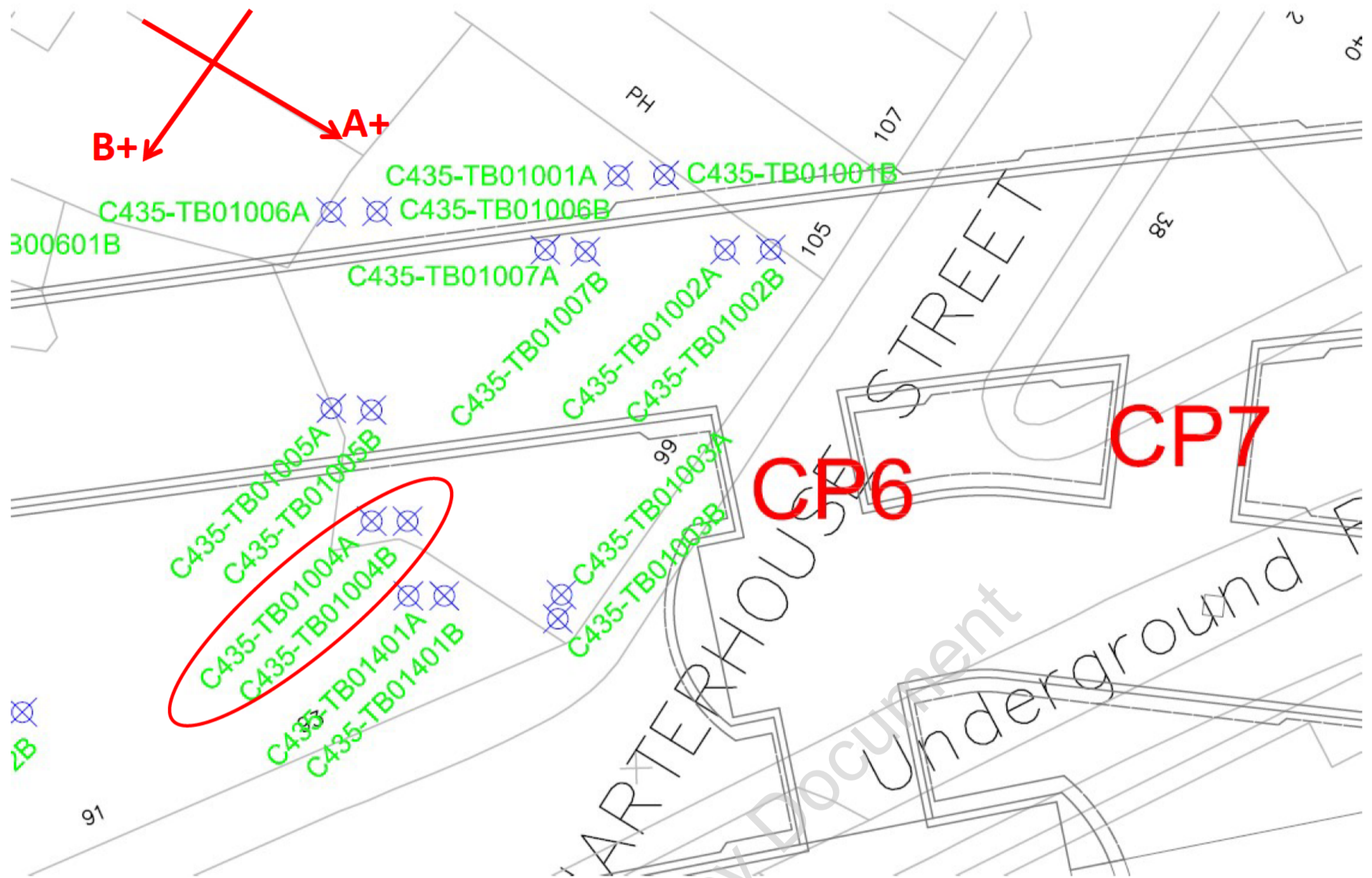


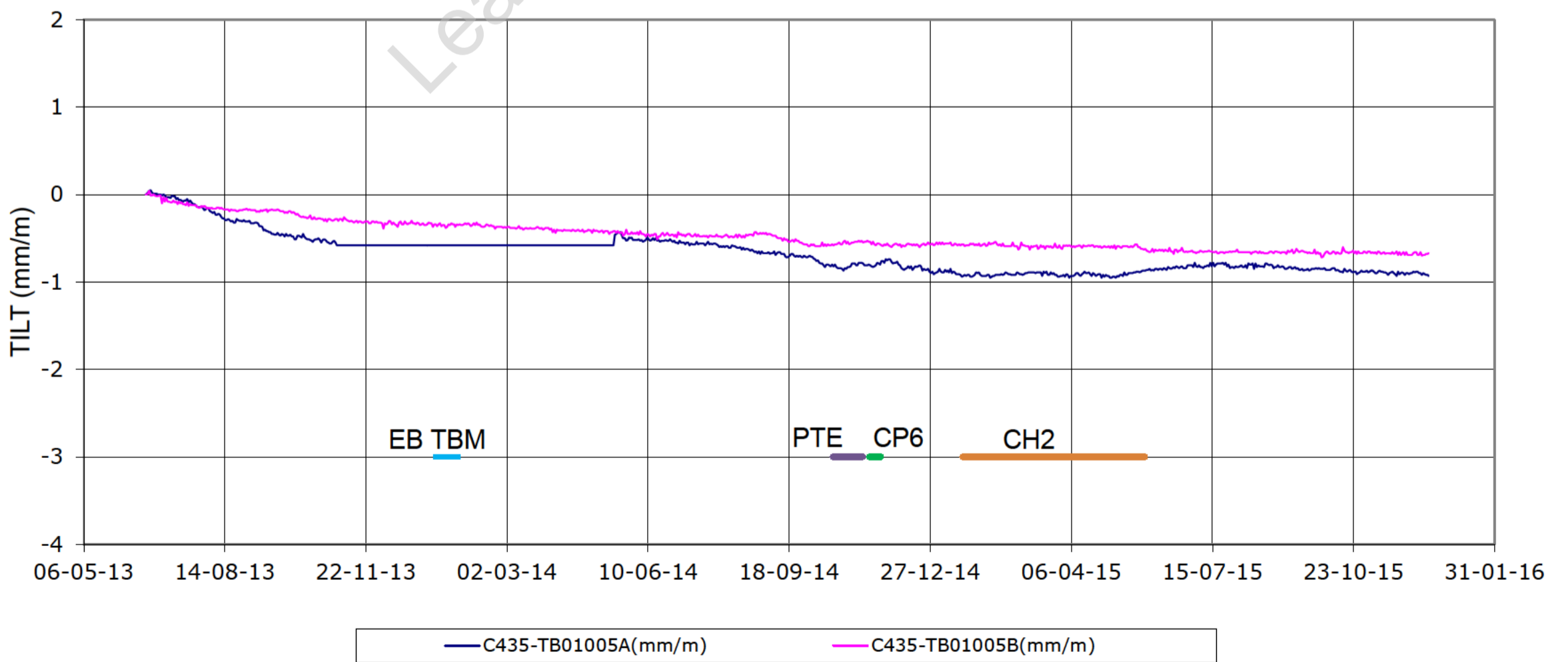
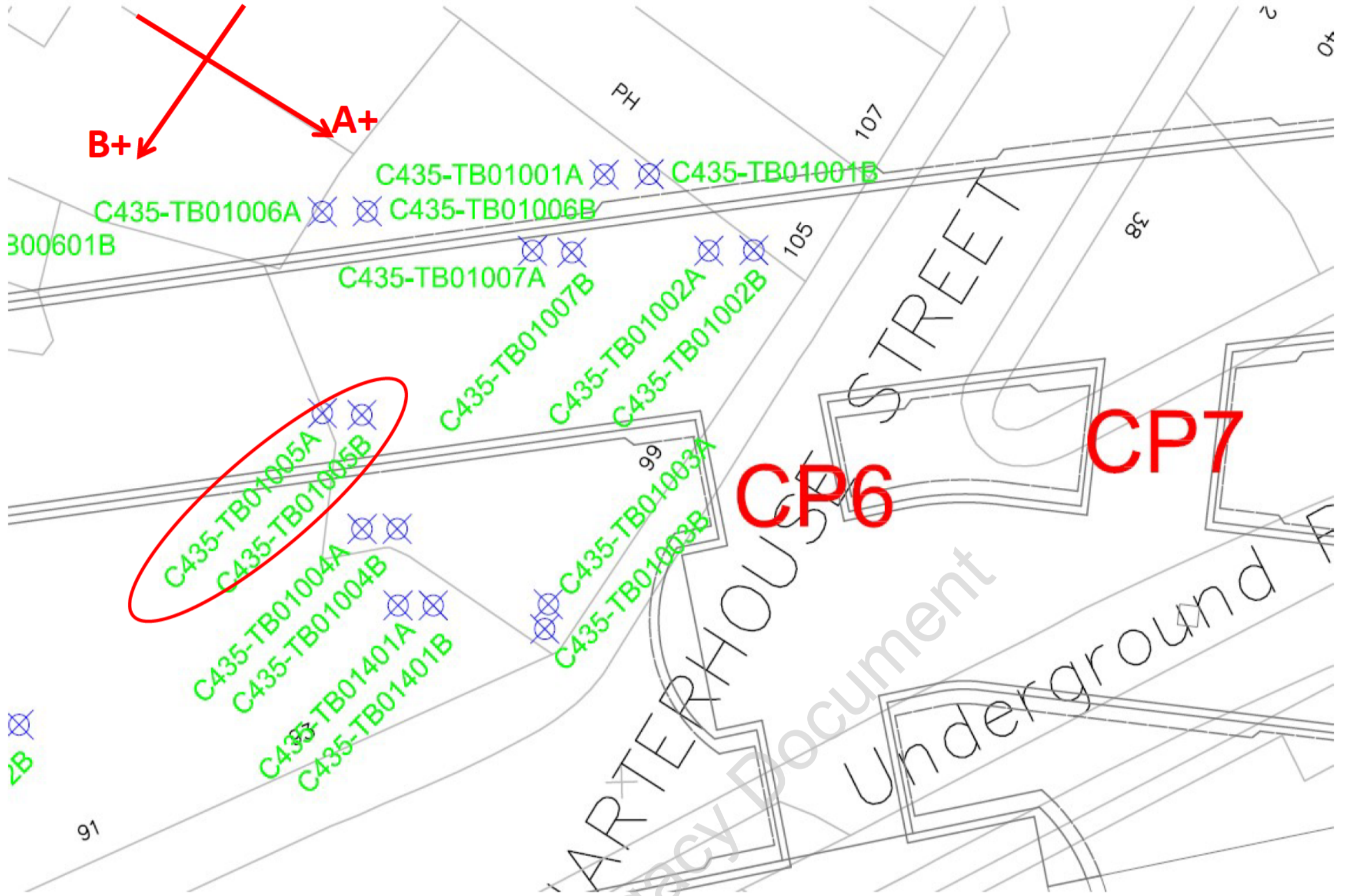
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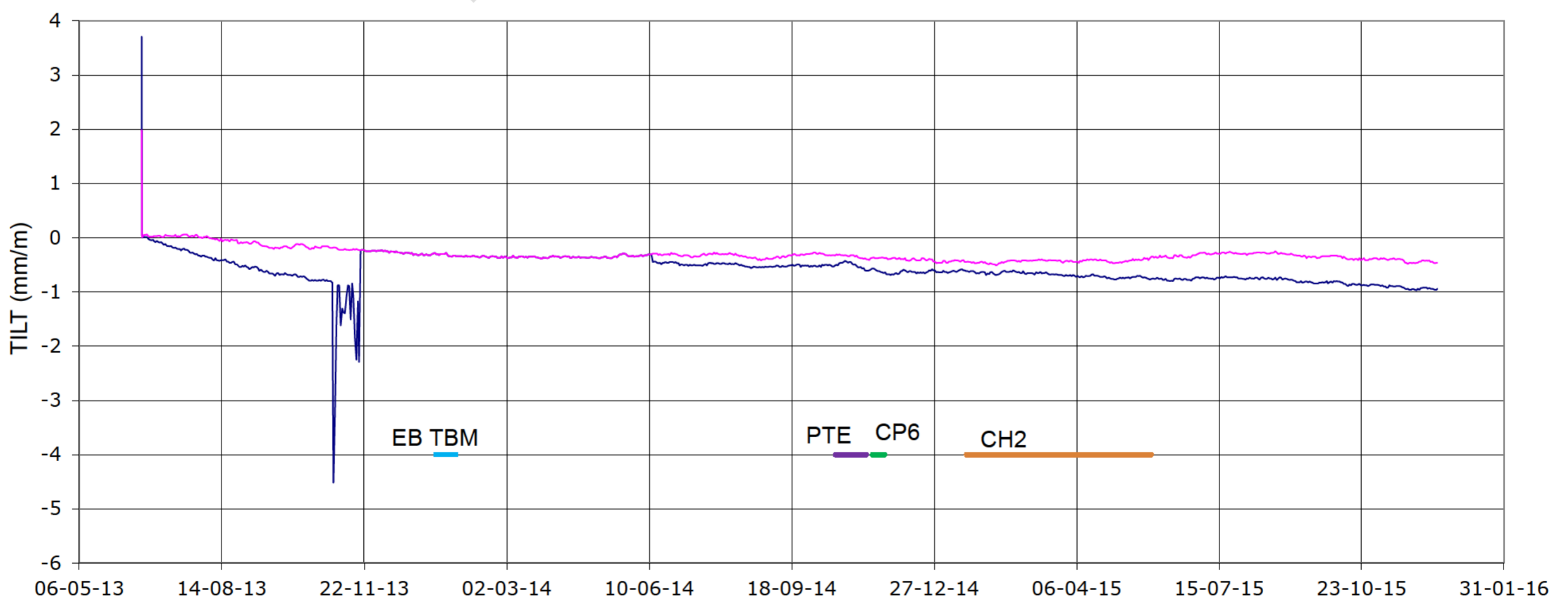
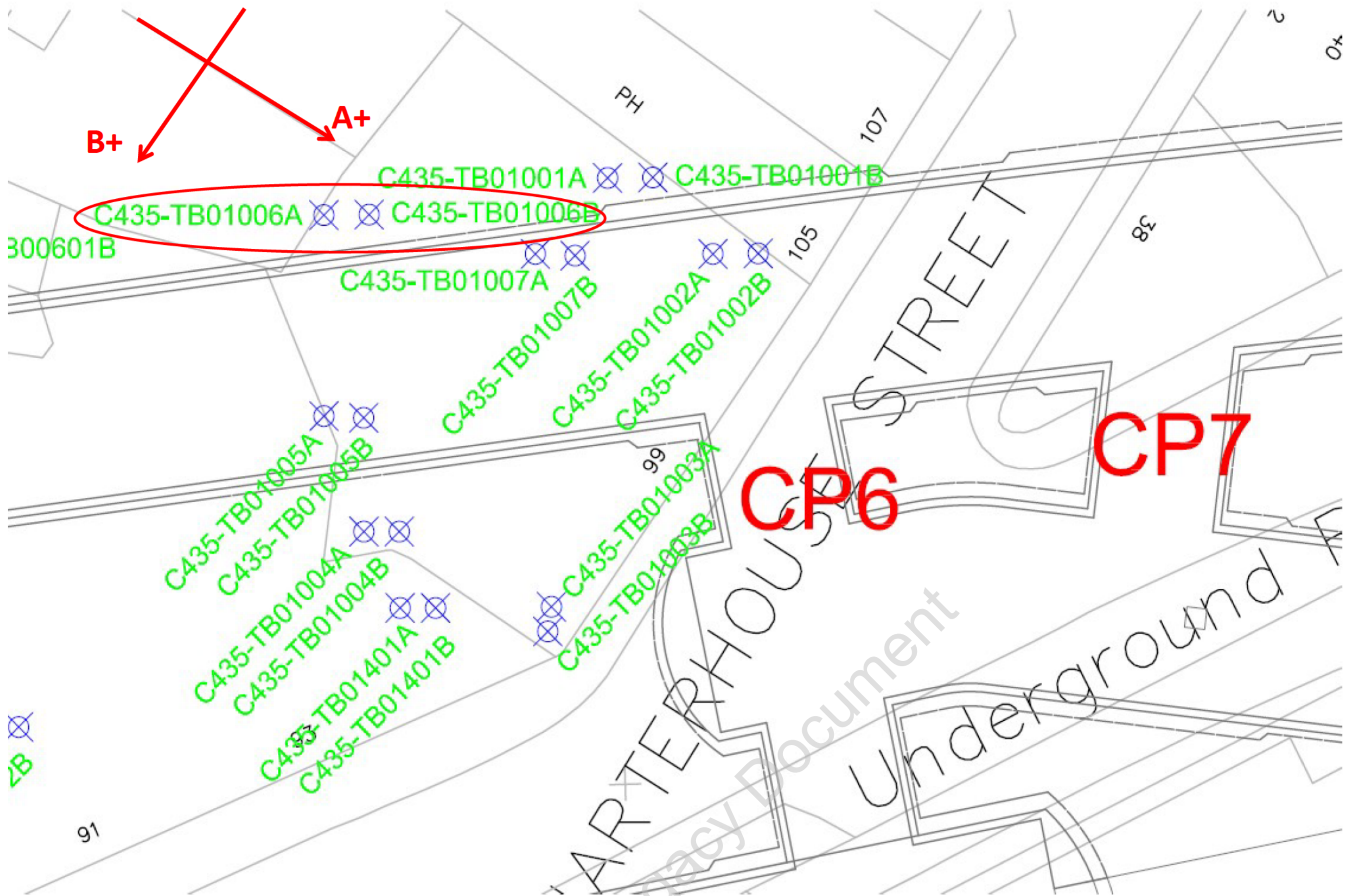




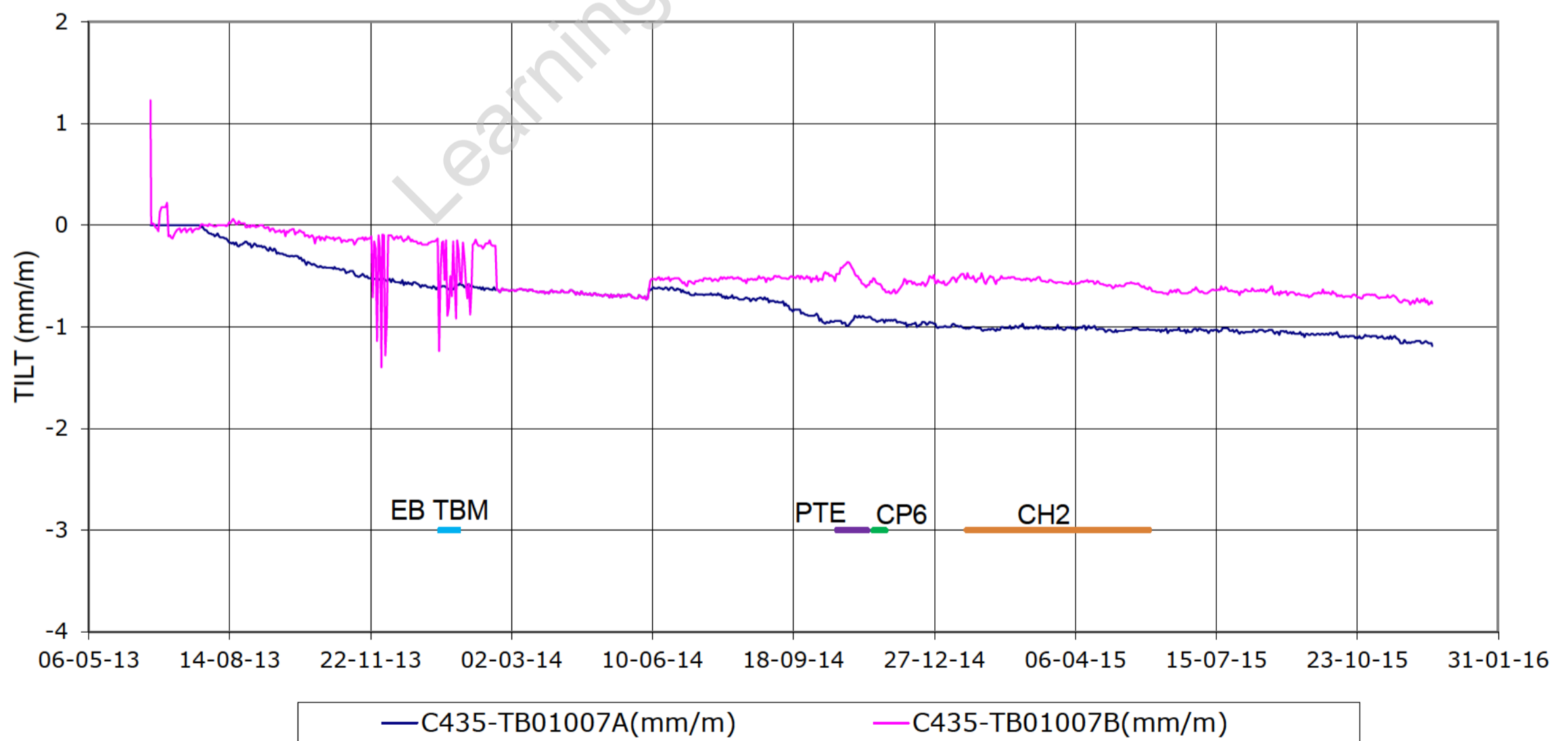


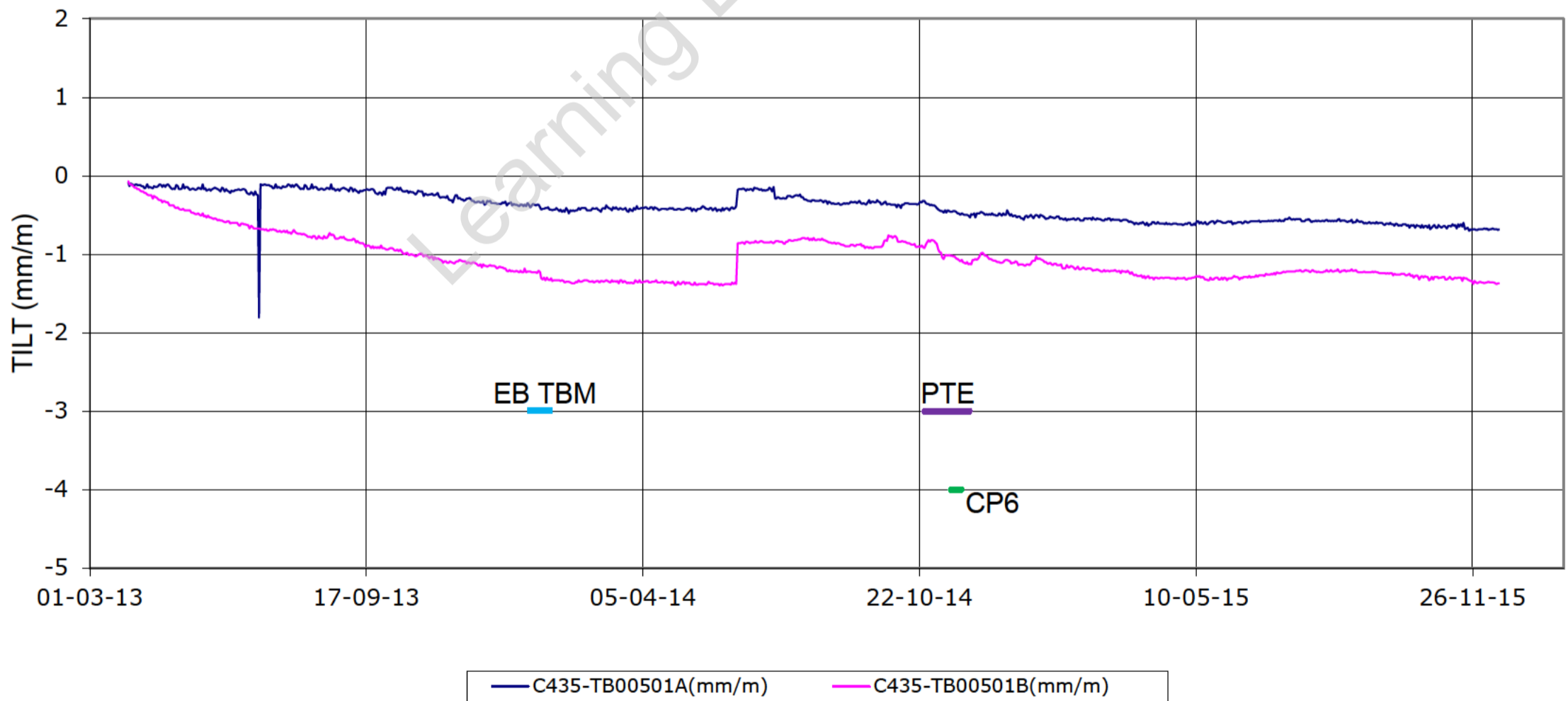
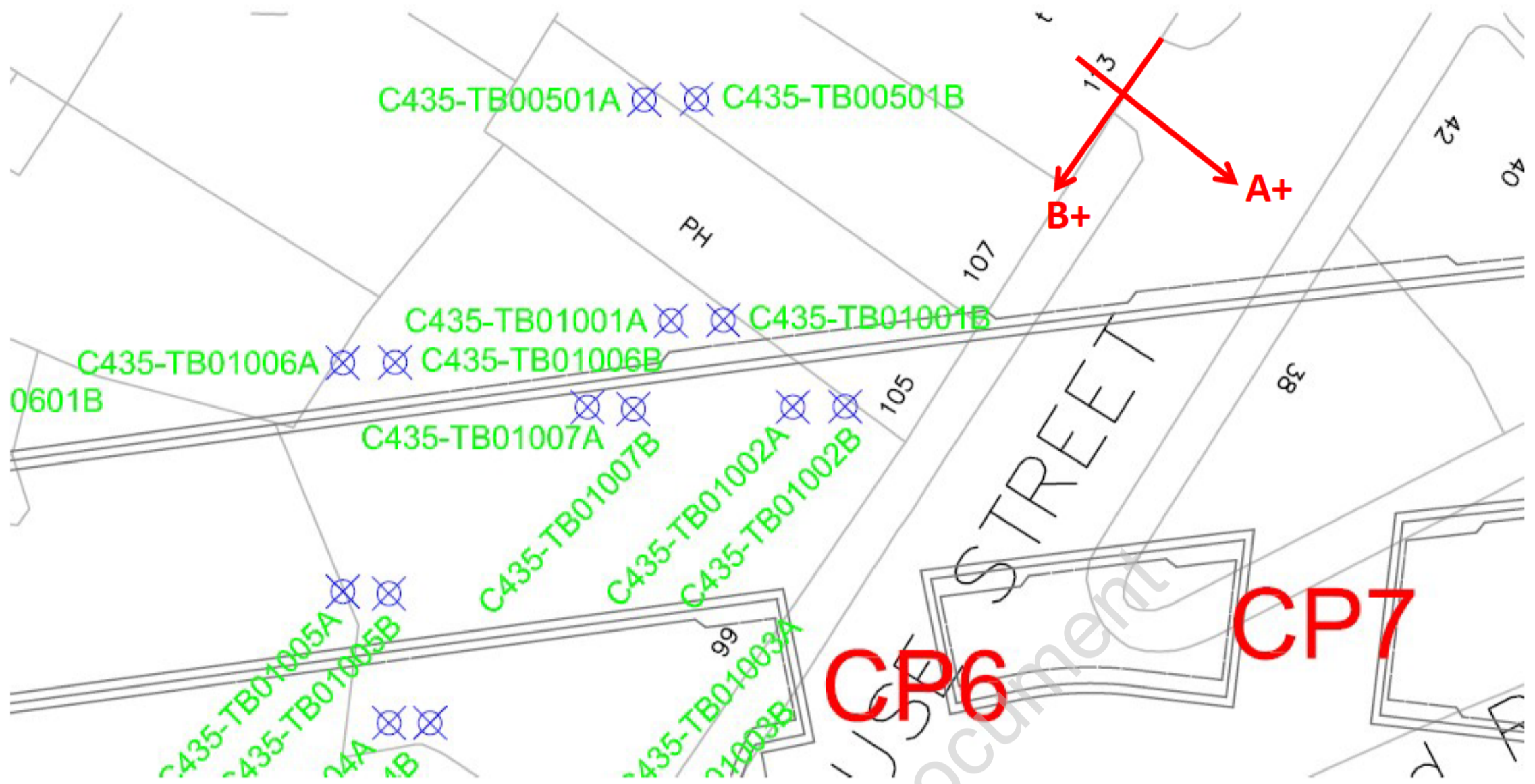






— C435-TB01006A(mm/m) — C435-TB01006B(mm/m)





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
- RTE Running Tunnel East.
- ES Escalator Shaft.
- TaM Tube a Manchette.

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