

**32-33 TORRINGTON SQUARE  
MONITORING**

**Monitoring Report  
SES-10215-MR06**

**Date of survey completion: 2<sup>nd</sup> July 2018**

## Executive Summary

### Instrumentation Installed

Targets, precise Level points have been installed at key locations on site.

#### Instrumentation:

**Total Station:** Leica TS30 Motorised Total Station  
Angular Standard Deviation  $\pm 0.5''$ arc  
Distance Standard Deviation  $\pm 0.5\text{mm}+1\text{ppm}$   
Absolute accuracy of horizontal readings:  $\pm 2\text{mm}$

**Level:** Leica DNA03 Precision Digital Level  
Leica GPCL2 Invar Bar Coded Staff  
Standard Deviation 0.4mm for a 1km double-run

### Summary of Results

#### ***Targets on Front Elevation of The Warburg Institute***

Targets are showing negligible horizontal movement.  
Targets are showing negligible vertical movement.

#### ***Targets on Side Elevation of The Warburg Institute***

Targets are showing negligible horizontal movement.  
Targets are showing negligible vertical movement.  
Targets 209,212 are destroyed

#### ***Targets on Rear Elevation of The Warburg Institute***

Targets are showing negligible horizontal movement.  
Targets are showing negligible vertical movement.

#### ***Targets on Staircase***

Targets are showing negligible horizontal movement.  
Targets are showing negligible vertical movement.

#### ***Targets on back garden of No. 31 Torrington Square***

Targets are showing horizontal movement of up to 6 mm in Eastings.  
Targets are showing negligible vertical movement.

#### ***Targets on back garden of No. 32 Torrington Square***

Targets are showing negligible horizontal movement.  
Targets are showing negligible vertical movement.  
Targets 233,234 are obstructed by leaves.

#### ***Targets on Rear Elevation of No. 32 Torrington Square***

Targets are showing negligible horizontal movement.  
Targets are showing negligible vertical movement.

## Executive Summary

### ***Targets on Side Elevation of No. 32 Torrington Square***

Targets are showing negligible horizontal movement.

Targets are showing negligible vertical movement.

### ***Targets on Front Elevation of No. 32 Torrington Square***

Targets are showing negligible horizontal movement.

Targets are showing negligible vertical movement.

Target 265 was found destroyed.

Targets 251 and 252 were found blocked by new pipe.

### ***Targets on Front Elevation of No. 31 Torrington Square***

Targets are showing negligible horizontal movement.

Targets are showing negligible vertical movement.

### ***Targets on Heating Tunnel***

Targets are showing negligible horizontal movement.

Targets are showing negligible vertical movement.

### ***Precise Level Points along courtyard***

Precise level points are showing negligible movement.

### ***Precise Level Points on Front Elevation of The Warburg Institute***

Precise level points are showing negligible movement.

### ***Precise Level Points on Side Elevation of The Warburg Institute***

Precise level points are showing negligible movement.

### ***Precise Level Points on Rear Elevation of The Warburg Institute***

Precise level points are showing negligible movement.

### ***Precise Level Points on Side Elevation of No. 32 Torrington Square***

Precise level points are showing negligible movement.

### ***Precise Level Points on Front Elevation of No. 32 Torrington Square***

Precise level points are showing negligible movement.

### ***Precise Level Points on Front Elevation of No. 31 Torrington Square***

Precise level points are showing negligible movement.

### ***Precise Level Points on Staircase***

Precise level points are showing negligible movement.

## Survey Schedule and Notes

Report No.	Quote / PCP Number	Quote Item Number	Date(s)	Type of Survey	Survey Description	Weather	Surveyor(s)
MIR	2222-SMrevA	1.2.1	02-04/05/18	Installation	Installation of Monitoring 3D Reflective Targets	Showers, 12°C	P. Le
	2222-SMrevA	1.2.2	08, 09, 11/05/18	Installation	Installation of Precise Level Points	Sunny, 25°C	
	2222-SMrevA	1.2.3	10, 11, 15, 17/05/18	Base Readings	Control establishment. Base readings of 3D Reflective Targets and Precise Level Points	Partly Sunny, 17°C	
1	2222-SMrevA	1.3.1	21/05/18	Targ+Lev	Monitoring Survey of 3D Reflective Targets and Precise Level Points	Partly Sunny, 20°C	P. Le
2	2222-SMrevA	1.3.1	04/06/18	Targ+Lev	Monitoring Survey of 3D Reflective Targets and Precise Level Points	Mostly Cloudy, 17°C	C. Ciuca
3	2222-SMrevA	1.3.1	11/06/18	Targ+Lev	Monitoring Survey of 3D Reflective Targets and Precise Level Points	Partly Sunny, 23°C	C. Ciuca
4	2222-SMrevA	1.3.1	18/06/18	Targ+Lev	Monitoring Survey of 3D Reflective Targets and Precise Level Points	Partly Sunny, 24°C	C. Ciuca
5	2222-SMrevA	1.3.1	25/06/18	Targ+Lev	Monitoring Survey of 3D Reflective Targets and Precise Level Points	Partly Sunny, 28°C	C. Ciuca
6	2222-SMrevA	1.3.2	02/07/18	Targ+Lev	Monitoring Survey of 3D Reflective Targets and Precise Level Points	Mostly Sunny, 24°C	C. Ciuca

Survey frequency: Weekly

### Notes:

Monitoring results are given as tabulated differences from base

For the purpose of monitoring an arbitrary local survey grid aligned to the structure has been implemented

Tabulated data is shown in millimetres, graphical data is plotted to 0.1mm

Absolute accuracy of readings: ±2mm

A positive value in the dE column, denotes positive movement in the Eastings coordinate plane and vice versa.

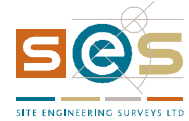
A positive value in the dN column, denotes positive movement in the Northings coordinate plane and vice versa.

A positive value in the dElev column, denotes heave and vice versa

Site Engineering Surveys Ltd.

32-33 Torrington Square

Job no. 10215



### 3D Position Monitoring

Point	Date of base readings	Average Base readings			Diff to base (mm)			Diff to base (mm)			Diff to base (mm)			Diff to base (mm)		
					11/06/18			18/06/18			25/06/18			02/07/18		
		Eastings	Northing	Level	dE	dN	dElev	dE	dN	dElev	dE	dN	dElev	dE	dN	dElev
<b>Targets on Front Elevation of The Warburg Institute</b>																
201	04/05/18	515.460	312.267	19.458	1	-1	0	1	-1	-1	1	-1	-1	1	-1	0
202	04/05/18	515.434	312.323	15.535	1	-1	0	1	-1	0	1	-1	0	1	-1	0
203	04/05/18	515.411	312.224	11.556	1	0	0	1	0	-1	1	-1	-1	1	-1	0
204	04/05/18	515.121	304.761	18.913	1	-1	0	1	0	0	1	-1	0	1	-1	0
205	04/05/18	515.126	304.854	15.647	1	-1	0	1	0	0	1	-1	0	1	-2	0
206	04/05/18	515.132	304.796	11.944	1	0	0	1	0	-1	1	-1	0	1	-1	0
<b>Targets on Side Elevation of The Warburg Institute</b>																
207	04/05/18	520.607	304.266	17.161	0	0	0	0	0	0	0	0	0	0	0	1
208	04/05/18	520.408	304.269	14.146	Obstructed by scaffold			Obstructed by scaffold			-1	0	0	-1	0	0
209	04/05/18	520.369	304.274	11.015	Destroyed			Destroyed			Destroyed			Destroyed		
210	04/05/18	525.513	304.152	18.053	0	0	0	-1	0	0	0	0	0	0	0	0
211	04/05/18	525.512	304.154	15.024	0	0	0	0	0	1	0	0	1	0	0	0
212	04/05/18	525.501	304.157	10.712	0	0	0	0	0	1	Destroyed			Destroyed		
<b>Targets on Rear Elevation of The Warburg Institute</b>																
213	04/05/18	525.600	309.001	19.410	0	0	0	0	0	0	0	0	0	0	0	0
214	04/05/18	525.602	309.021	16.662	0	0	0	0	0	0	0	0	0	0	0	0
215	04/05/18	525.611	309.370	10.468	0	0	0	0	0	0	0	0	0	0	0	0

Absolute accuracy of readings: ±2mm

A positive value in the dE column, denotes positive movement in the Eastings coordinate plane and vice versa.

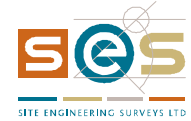
A positive value in the dN column, denotes positive movement in the Northings coordinate plane and vice versa.

A positive value in the dElev column, denotes heave and vice versa

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### 3D Position Monitoring

Point	Date of base readings	Average Base readings			Diff to base (mm)			Diff to base (mm)			Diff to base (mm)			Diff to base (mm)		
					11/06/18			18/06/18			25/06/18			02/07/18		
		Eastings	Northing	Level	dE	dN	dElev	dE	dN	dElev	dE	dN	dElev	dE	dN	dElev
<b>Targets on Staircase</b>																
216	04/05/18	526.630	304.479	18.167	0	0	0	-1	0	0	-1	0	0	0	0	-1
217	04/05/18	526.637	304.511	15.301	0	1	0	0	1	0	0	1	0	0	1	0
218	04/05/18	526.642	304.490	10.893	0	0	0	0	1	0	0	1	0	0	1	0
219	04/05/18	529.668	304.440	17.914	0	0	-1	-1	0	-1	0	0	0	0	0	0
220	04/05/18	530.462	304.445	14.594	0	0	-1	0	0	-1	0	0	0	0	0	-1
221	04/05/18	530.464	304.424	10.483	0	0	0	0	0	0	1	0	0	1	0	0
222	04/05/18	526.678	306.912	18.349	0	0	-1	0	0	0	0	0	0	0	0	0
223	04/05/18	526.679	306.960	15.330	1	0	0	1	0	0	1	0	0	1	0	0
224	04/05/18	526.692	306.951	10.921	0	0	0	0	0	0	0	0	0	0	0	0
225	04/05/18	529.716	306.897	17.946	-1	0	-1	-1	0	0	-1	0	0	-1	0	0
226	04/05/18	530.509	306.878	14.573	0	0	-1	0	0	0	0	0	0	0	0	0
227	04/05/18	530.518	306.877	10.398	0	0	-1	0	0	0	0	0	0	0	0	0
<b>Targets on back garden of No. 31 Torrington Square</b>																
228	04/05/18	535.556	284.820	11.483	3	0	0	5	-1	0	5	-1	-1	6	0	-1
<b>Targets on back garden of No. 32 Torrington Square</b>																
229	04/05/18	535.369	290.927	11.473	-2	-1	0	-1	0	0	-1	-1	0	-1	0	0
230	04/05/18	535.383	290.797	9.635	-1	0	0	0	0	1	0	-1	1	0	0	1
231	04/05/18	535.457	296.376	11.474	0	-1	0	0	0	0	1	0	0	1	0	0
232	04/05/18	535.455	296.367	9.482	0	0	0	0	0	0	0	0	0	0	0	0

Absolute accuracy of readings: ±2mm

A positive value in the dE column, denotes positive movement in the Eastings coordinate plane and vice versa.

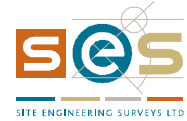
A positive value in the dN column, denotes positive movement in the Northings coordinate plane and vice versa.

A positive value in the dElev column, denotes heave and vice versa

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### 3D Position Monitoring

Point	Date of base readings	Average Base readings			Diff to base (mm)			Diff to base (mm)			Diff to base (mm)			Diff to base (mm)		
					11/06/18			18/06/18			25/06/18			02/07/18		
		Eastings	Northing	Level	dE	dN	dElev	dE	dN	dElev	dE	dN	dElev	dE	dN	dElev

#### Targets on Rear Elevation of No. 32 Torrington Square

233	04/05/18	529.166	290.701	16.136	Obstructed by leaves			Obstructed by leaves			Obstructed by leaves			Obstructed by leaves		
234	04/05/18	529.161	290.700	13.973	1	2	0	0	0	0	Obstructed by leaves			Obstructed by leaves		
235	04/05/18	529.205	293.076	16.097	-1	0	0	-1	0	0	-1	0	0	0	0	0
236	04/05/18	529.206	293.089	13.722	-1	0	0	-1	0	0	-1	0	0	0	1	0
237	04/05/18	524.917	293.273	21.612	-1	1	0	0	0	1	0	1	0	0	1	0
238	04/05/18	524.908	293.307	18.566	-1	0	1	-1	0	1	-1	0	0	0	1	0
239	04/05/18	524.942	294.721	21.677	-1	0	0	-1	0	0	-1	0	0	0	0	0
240	04/05/18	524.940	294.743	18.579	0	0	0	-1	0	0	-1	0	0	0	0	0
241	04/05/18	524.932	294.161	14.392	0	0	0	0	0	0	0	0	0	0	0	0
242	04/05/18	524.965	296.822	21.627	-1	0	0	-1	0	0	-1	1	0	0	1	-1
243	04/05/18	524.965	296.801	18.565	0	0	0	-1	0	0	0	0	0	0	0	0

#### Targets on Side Elevation of No. 32 Torrington Square

244	04/05/18	521.462	297.063	18.957	-1	0	0	-1	-1	0	-1	0	0	0	0	0
245	04/05/18	521.566	297.043	15.945	-1	0	0	-1	0	0	-1	0	0	0	0	0
246	04/05/18	521.591	297.024	12.581	-1	0	0	-1	0	0	-1	0	0	0	0	0
247	04/05/18	515.809	297.213	19.556	0	0	0	0	0	0	0	0	0	0	0	0
248	04/05/18	515.740	297.198	15.776	0	0	0	0	0	0	0	0	0	0	0	0
249	04/05/18	515.692	297.181	12.685	0	0	0	0	0	0	0	0	0	0	0	0

Absolute accuracy of readings: ±2mm

A positive value in the dE column, denotes positive movement in the Eastings coordinate plane and vice versa.

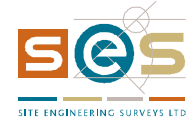
A positive value in the dN column, denotes positive movement in the Northings coordinate plane and vice versa.

A positive value in the dElev column, denotes heave and vice versa

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### 3D Position Monitoring

Point	Date of base readings	Average Base readings			Diff to base (mm)			Diff to base (mm)			Diff to base (mm)			Diff to base (mm)		
					11/06/18			18/06/18			25/06/18			02/07/18		
		Eastings	Northing	Level	dE	dN	dElev	dE	dN	dElev	dE	dN	dElev	dE	dN	dElev

#### Targets on Front Elevation of No. 32 Torrington Square

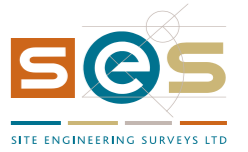
265	04/05/18	513.955	296.690	22.500	0	0	0	-1	-1	0	0	0	0	Destroyed		
250	15/05/18	513.981	296.649	18.591	0	0	0	0	-1	0	0	-1	0	-1	0	0
251	15/05/18	513.986	296.694	16.542	0	0	0	Blocked by new pipe			Blocked by new pipe			Blocked by new pipe		
252	15/05/18	513.970	296.684	14.150	1	-1	0	Blocked by new pipe			Blocked by new pipe			Blocked by new pipe		
266	04/05/18	513.818	293.332	22.522	1	-1	1	0	-1	1	0	0	0	0	0	0
253	15/05/18	513.912	293.142	18.604	0	0	0	0	0	0	0	0	0	0	0	0
254	15/05/18	513.897	293.252	16.485	0	0	1	0	-1	0	1	-1	0	1	-1	0
255	15/05/18	513.902	293.001	14.257	0	0	0	0	-1	0	0	0	0	0	0	0

#### Targets on Front Elevation of No. 31 Torrington Square

256	04/05/18	513.839	290.257	20.774	0	1	0	1	1	0	1	0	0	1	0	-1
257	04/05/18	513.833	290.239	17.719	-1	2	0	-1	2	0	0	1	1	0	0	0
258	04/05/18	513.811	290.209	14.841	0	1	0	0	2	0	1	0	0	1	0	0
259	04/05/18	513.785	287.788	20.598	0	1	0	0	1	0	0	0	0	0	0	0
260	04/05/18	513.761	287.756	17.761	0	1	0	0	1	0	1	0	0	1	0	0
261	04/05/18	513.745	287.788	14.813	0	1	0	0	2	0	1	0	0	1	0	0
262	04/05/18	513.696	284.941	20.730	0	1	0	0	1	0	1	0	0	1	0	0
263	04/05/18	513.700	285.000	17.724	0	1	0	0	1	0	2	0	0	1	0	-1
264	04/05/18	513.745	284.748	14.678	0	1	0	1	1	0	2	0	0	2	0	0

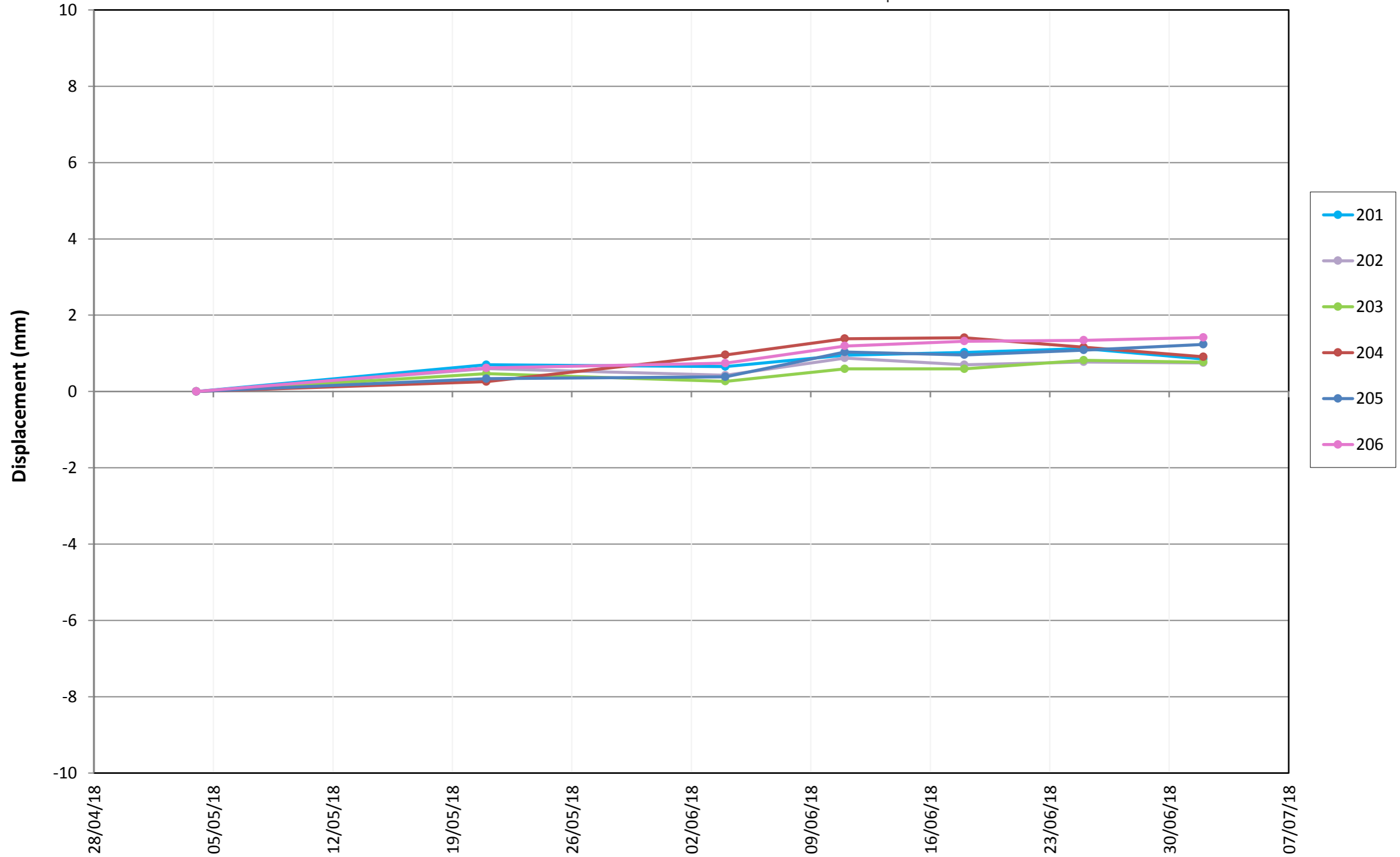


# Transverse Displacement Graph

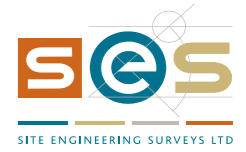


Graph 01T - Targets on Front Elevation of The Warburg Institute

Note: A positive value denotes movement in to site and vice versa.

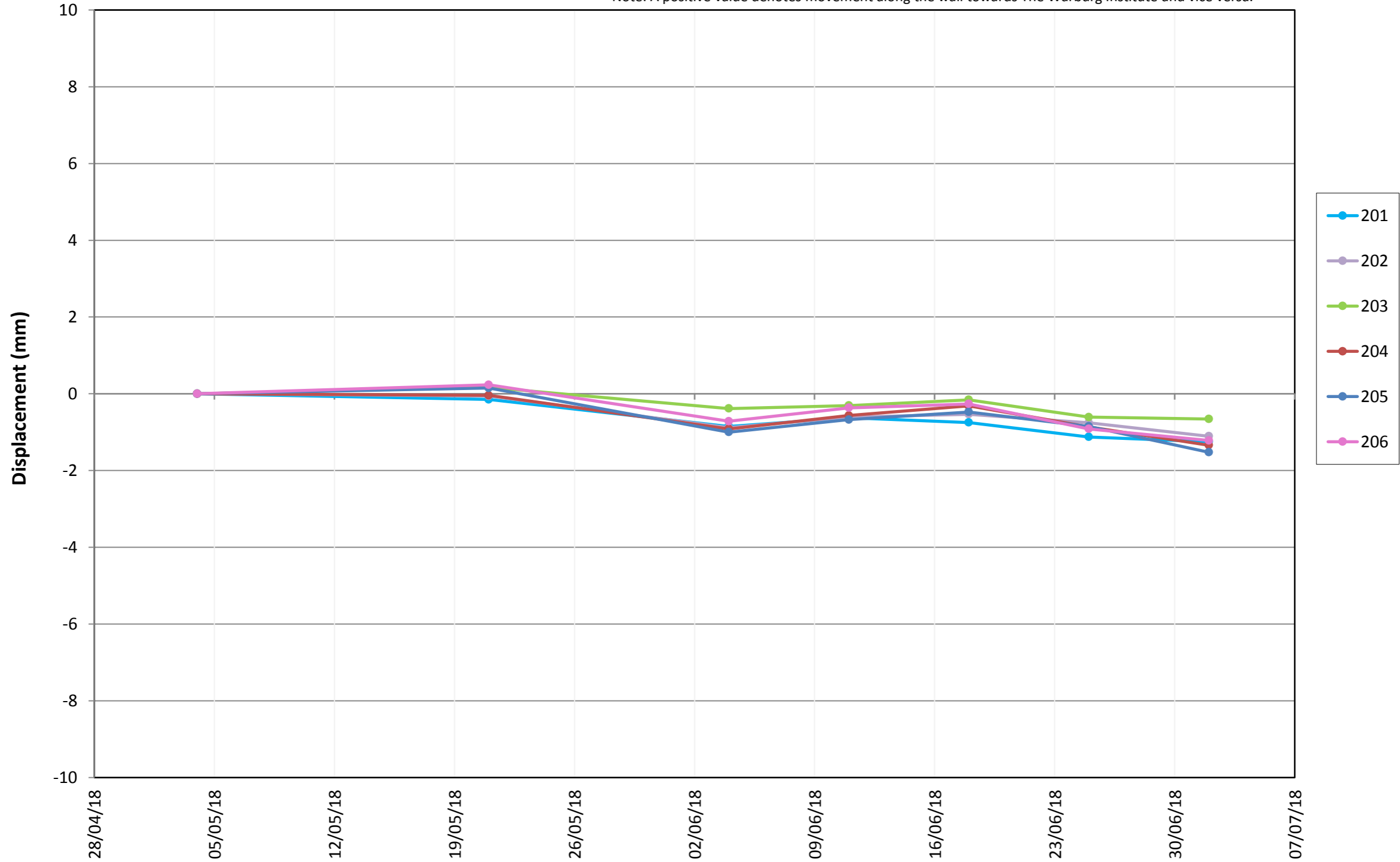


# Longitudinal Displacement Graph

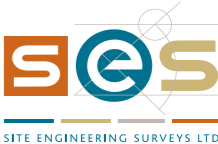


Graph 01L - Targets on Front Elevation of The Warburg Institute

Note: A positive value denotes movement along the wall towards The Warburg Institute and vice versa.

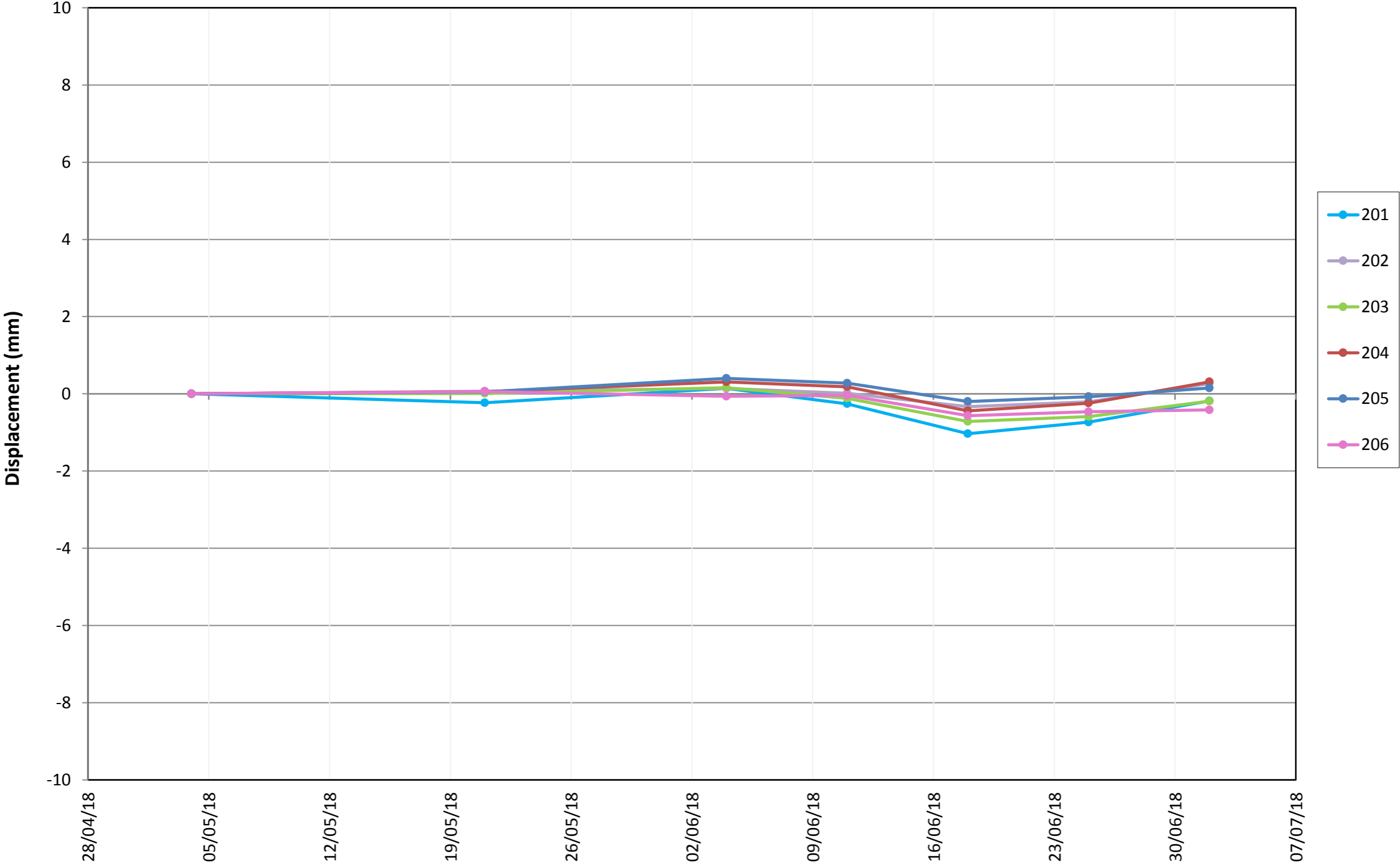


# Vertical Displacement Graph

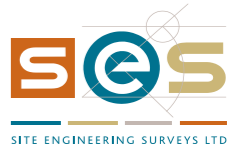


Graph 01V - Targets on Front Elevation of The Warburg Institute

Note: +ve value denotes heave, -ve value denotes settlement.

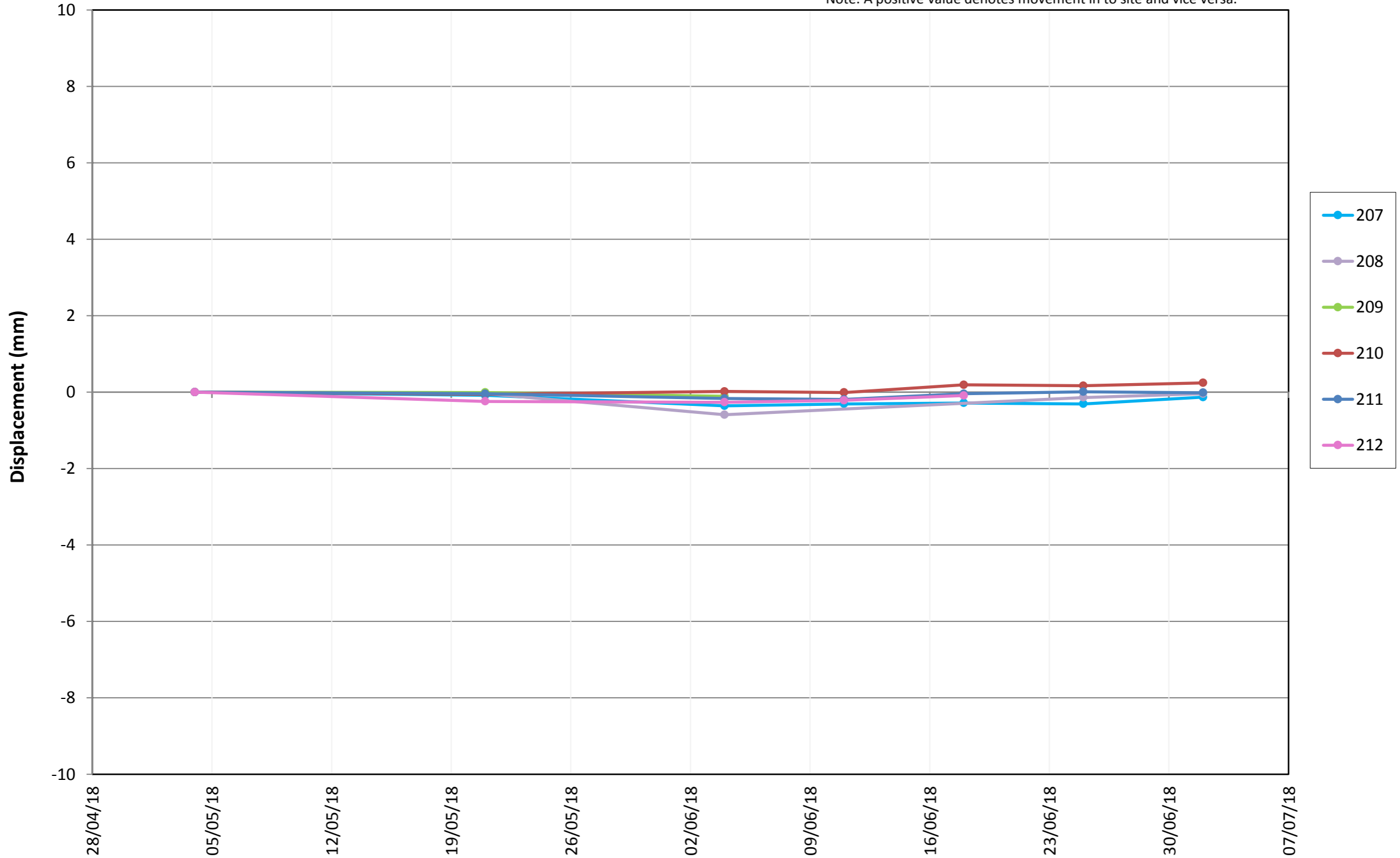


# Transverse Displacement Graph



Graph 02T - Targets on Side Elevation of The Warburg Institute

Note: A positive value denotes movement in to site and vice versa.

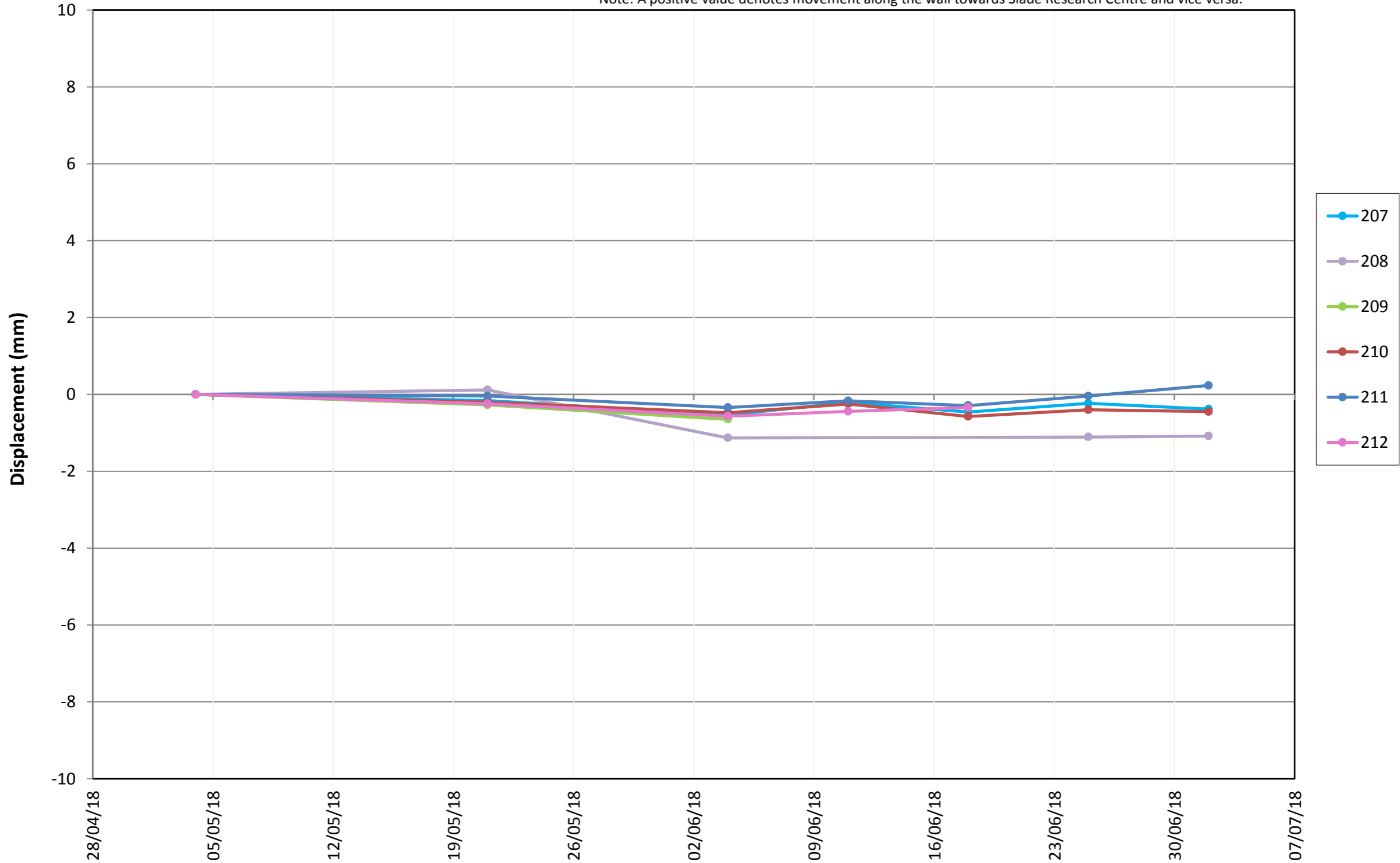


# Longitudinal Displacement Graph

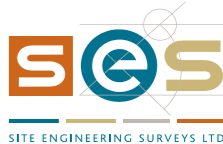


Graph 02L - Targets on Side Elevation of The Warburg Institute

Note: A positive value denotes movement along the wall towards Slade Research Centre and vice versa.

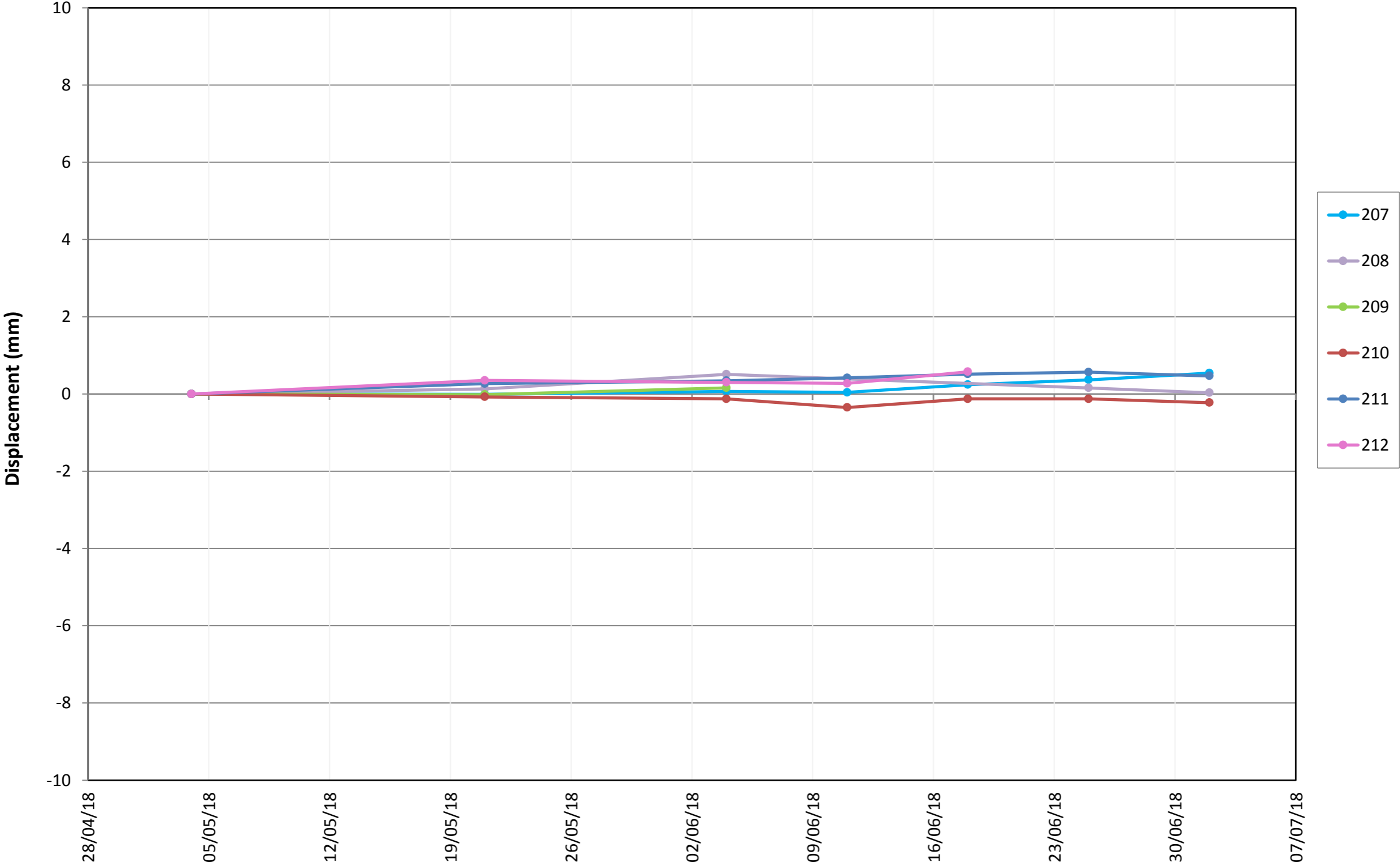


# Vertical Displacement Graph

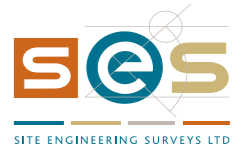


Graph 02V - Targets on Side Elevation of The Warburg Institute

Note: +ve value denotes heave, -ve value denotes settlement.

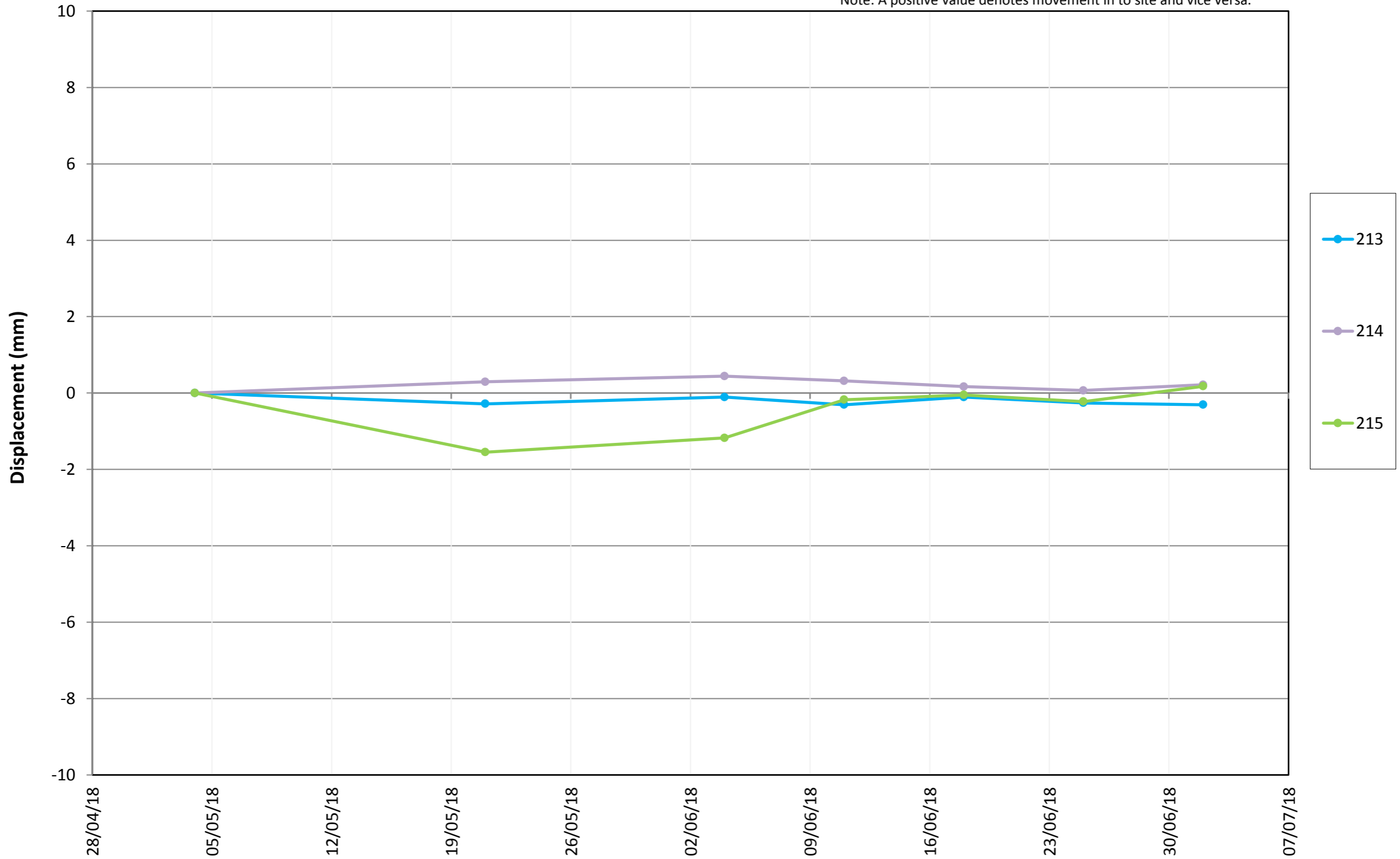


# Transverse Displacement Graph

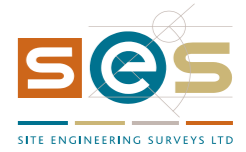


Graph 03T - Targets on Rear Elevation of The Warburg Institute

Note: A positive value denotes movement in to site and vice versa.

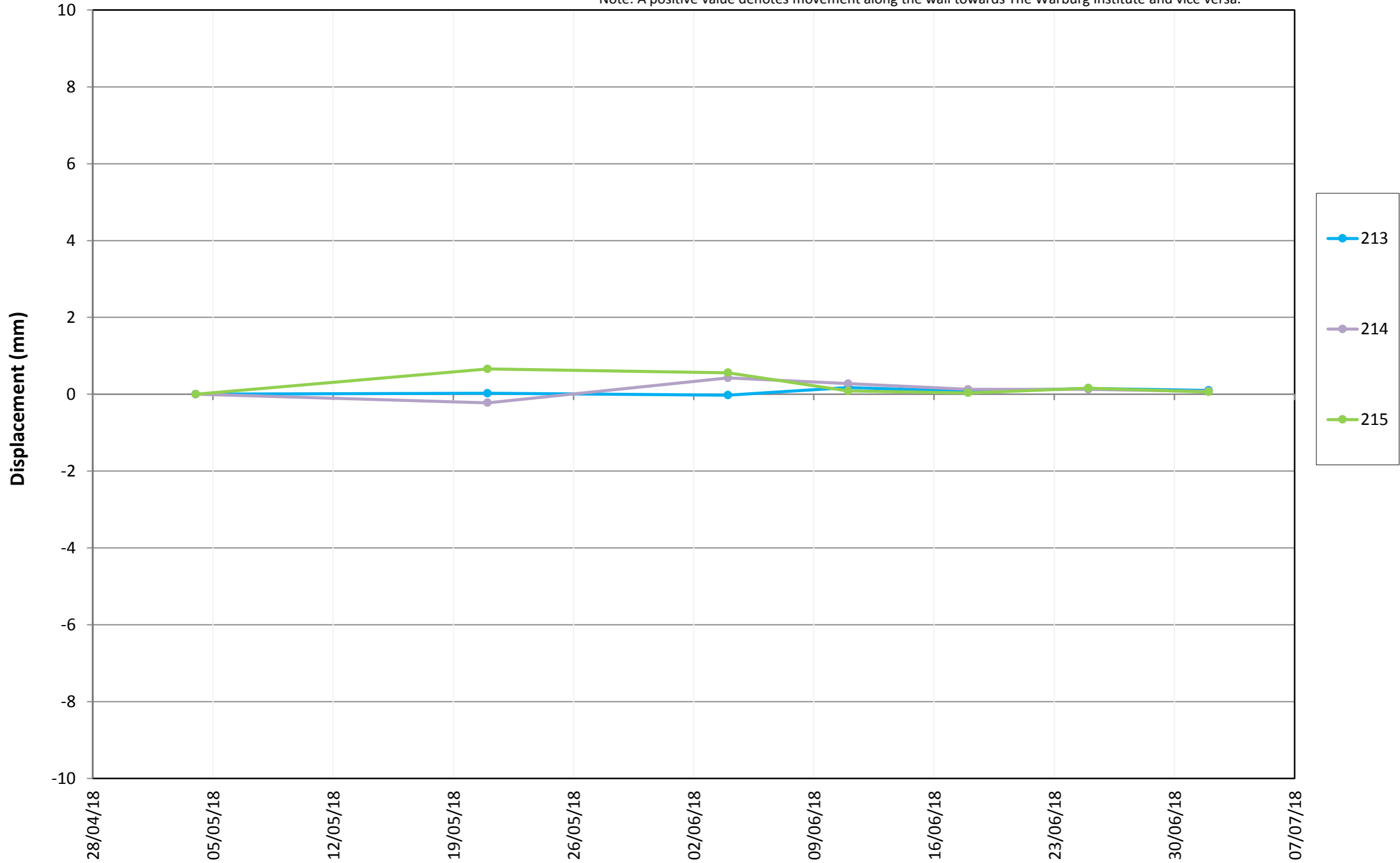


# Longitudinal Displacement Graph



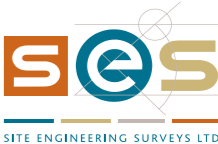
Graph 03L - Targets on Rear Elevation of The Warburg Institute

Note: A positive value denotes movement along the wall towards The Warburg Institute and vice versa.



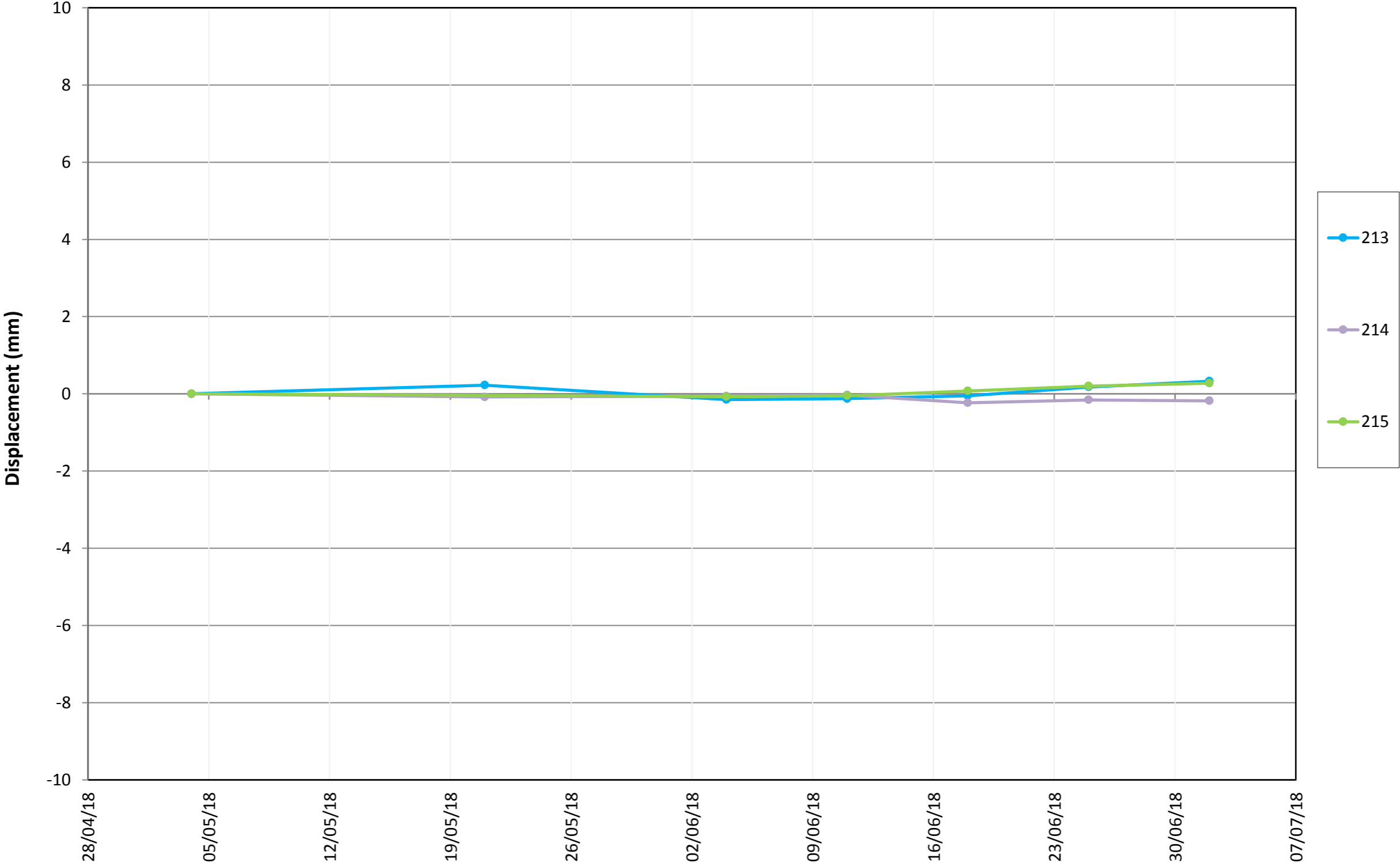


# Vertical Displacement Graph

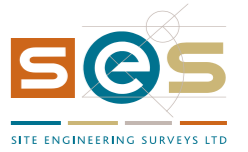


Graph 03V - Targets on Rear Elevation of The Warburg Institute

Note: +ve value denotes heave, -ve value denotes settlement.

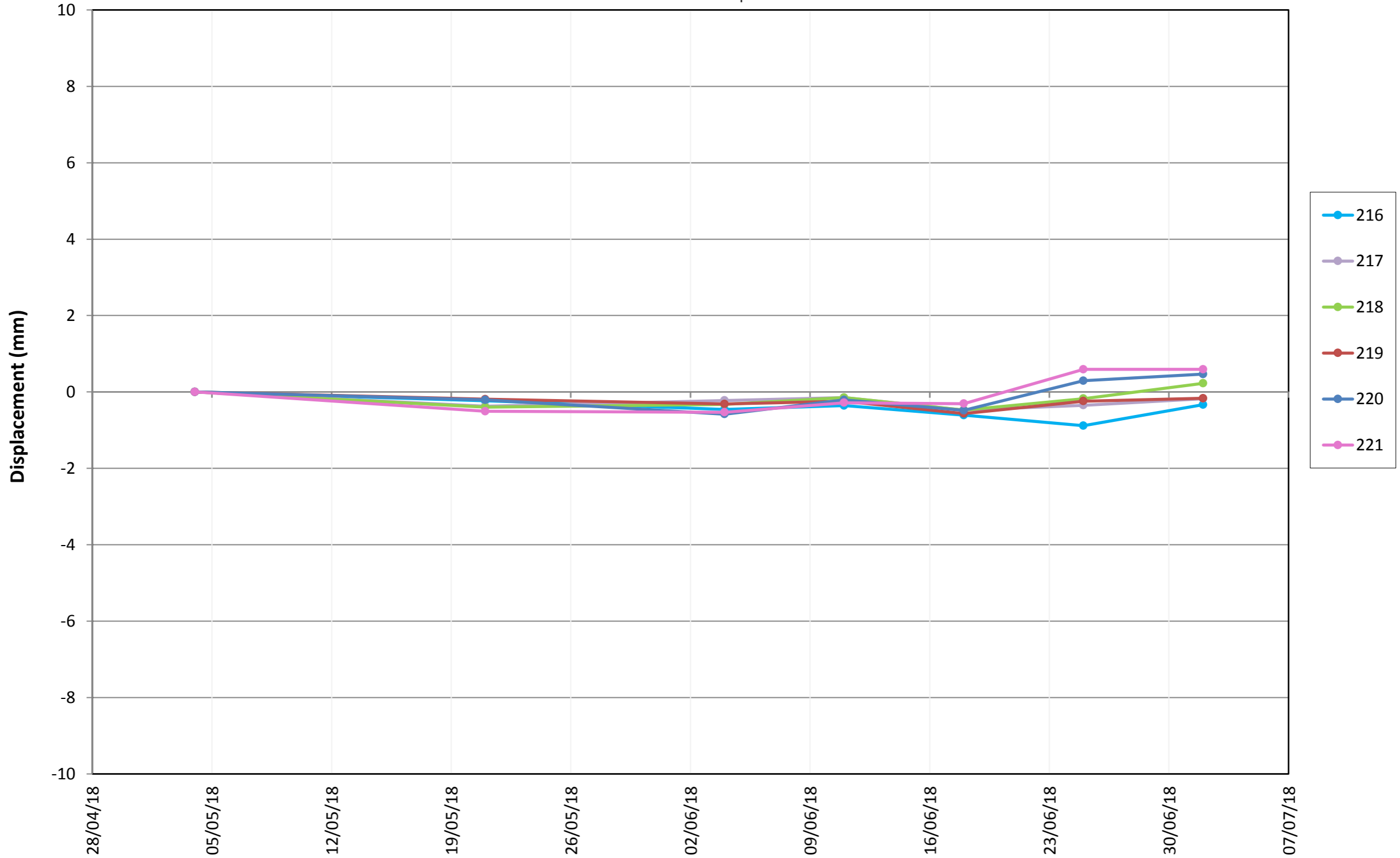


# Transverse Displacement Graph

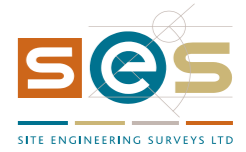


Graph 04T - Targets on Staircase

Note: A positive value denotes movement towards Slade Research Centre and vice versa.

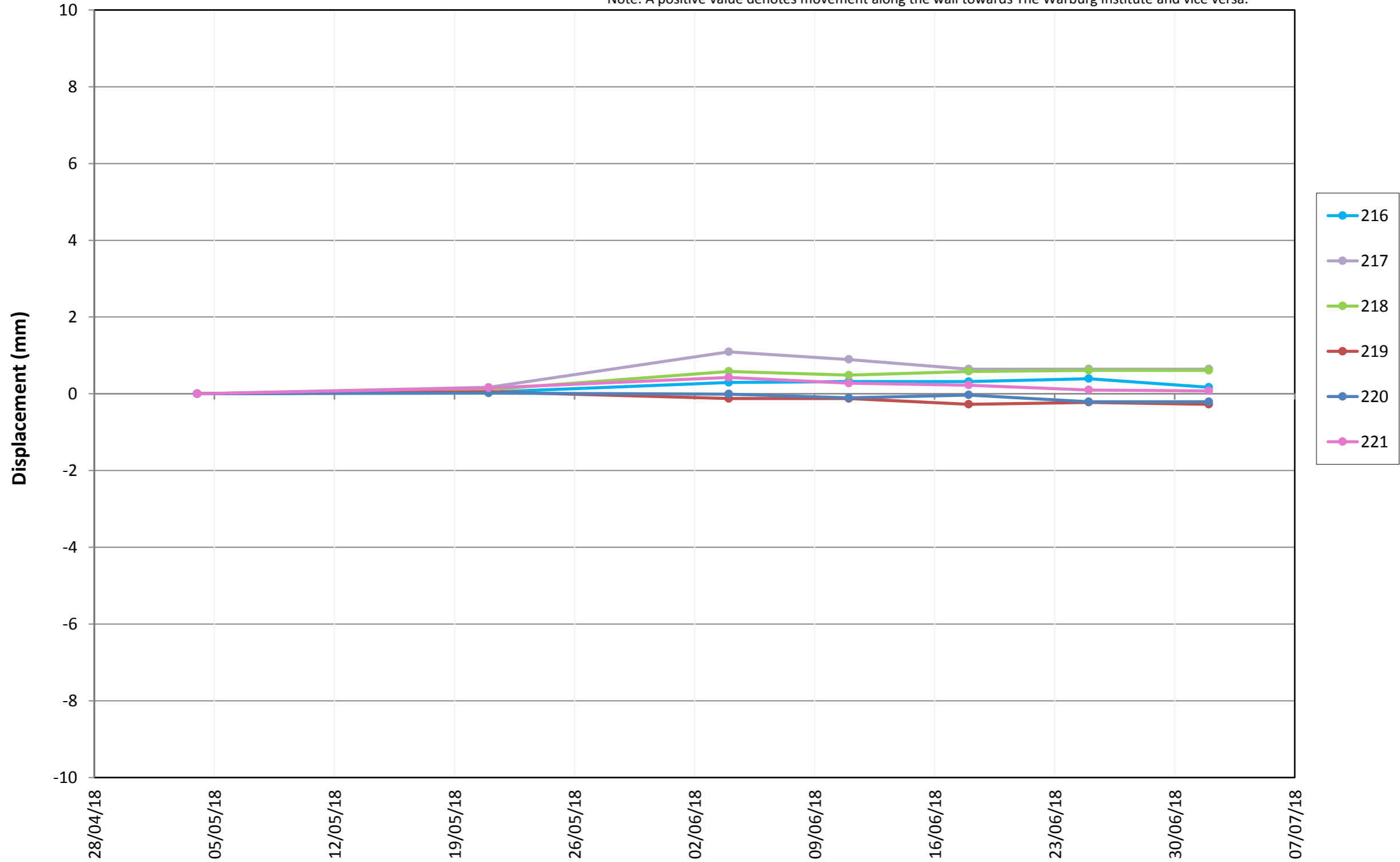


# Longitudinal Displacement Graph

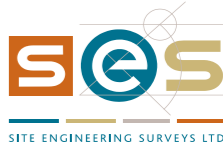


Graph 04L - Targets on Staircase

Note: A positive value denotes movement along the wall towards The Warburg Institute and vice versa.

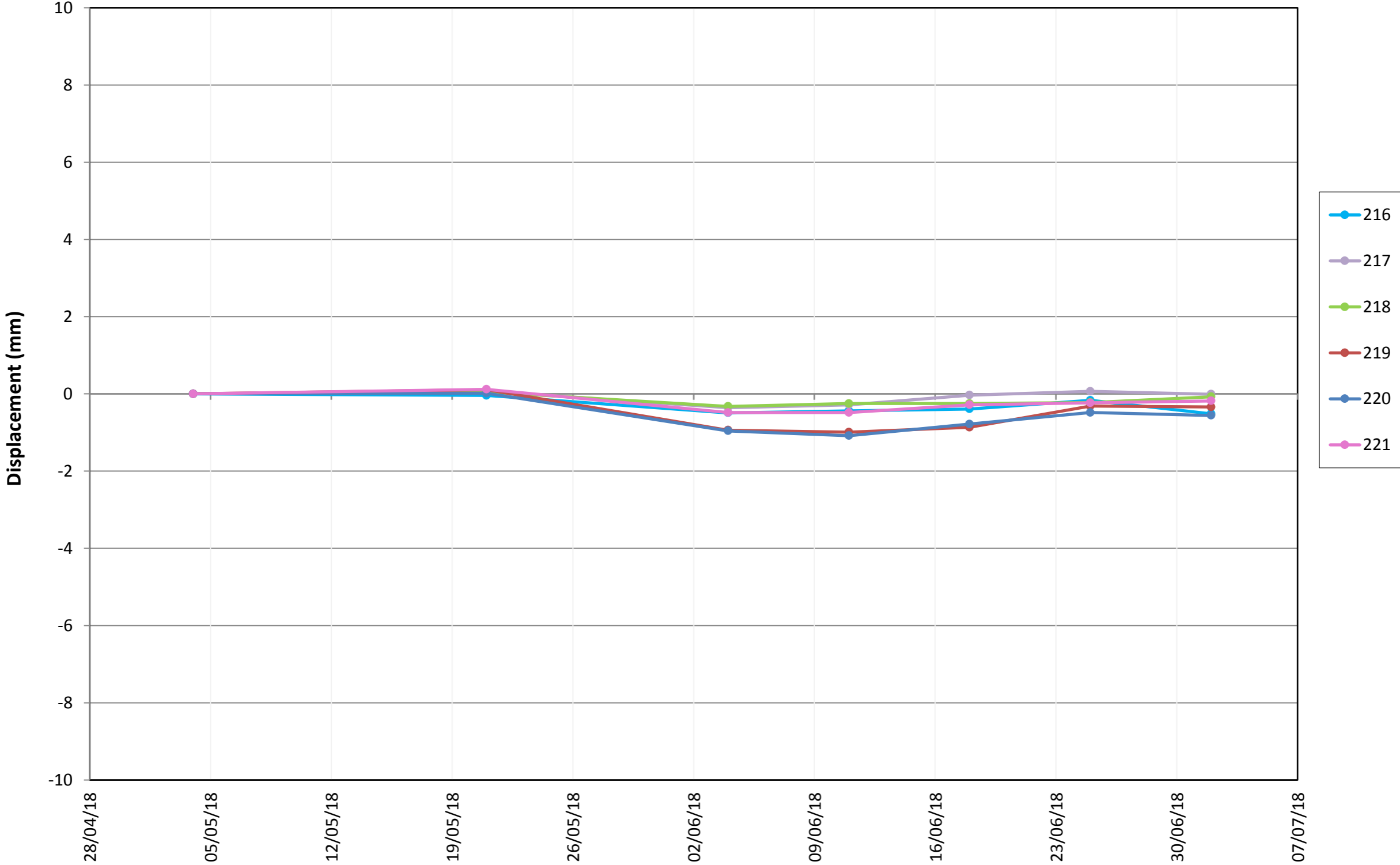


# Vertical Displacement Graph

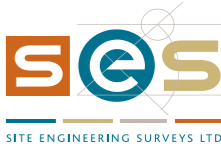


Graph 04V - Targets on Staircase

Note: +ve value denotes heave, -ve value denotes settlement.

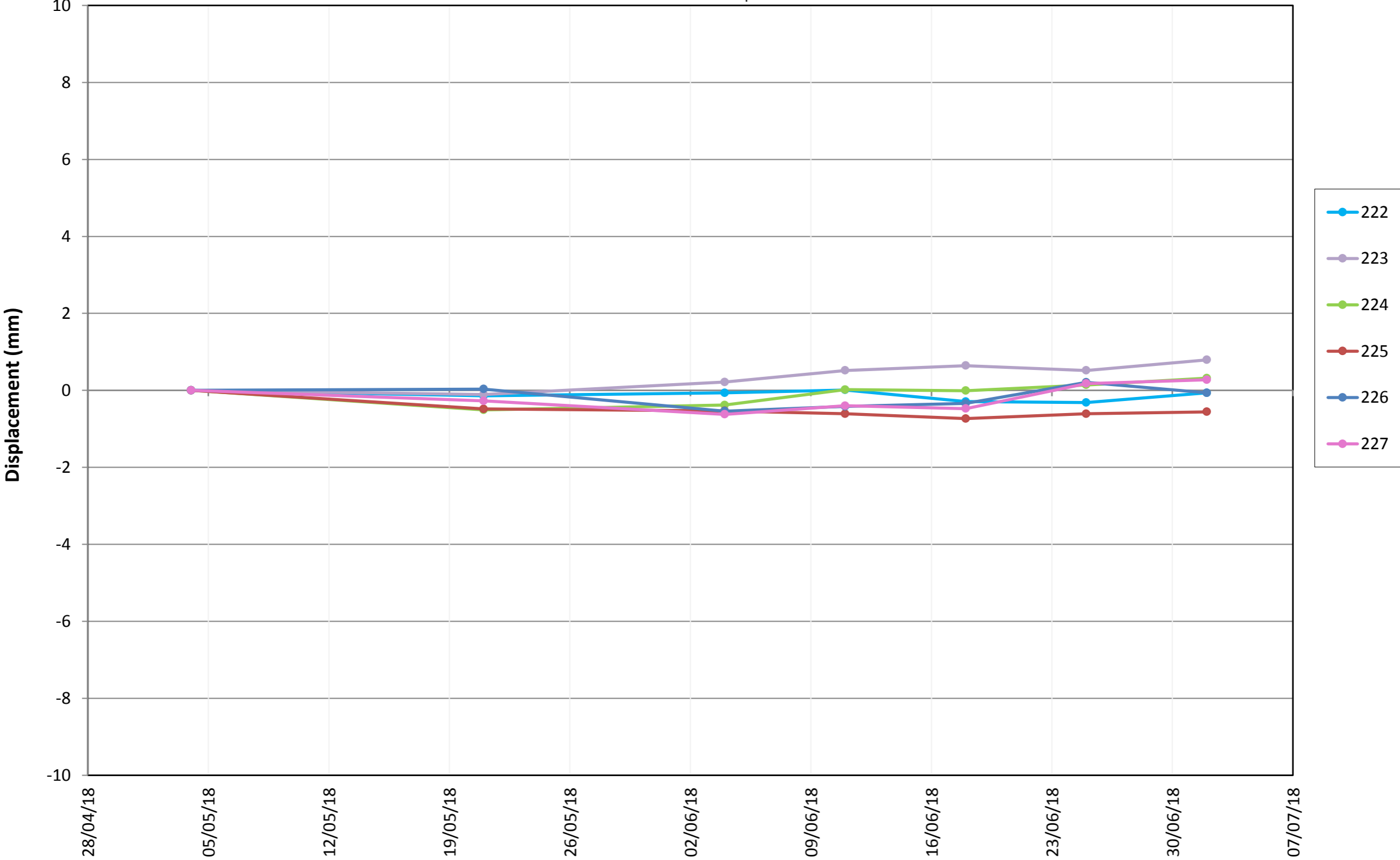


# Transverse Displacement Graph



Graph 05T - Targets on Staircase

Note: A positive value denotes movement towards Slade Research Centre and vice versa.

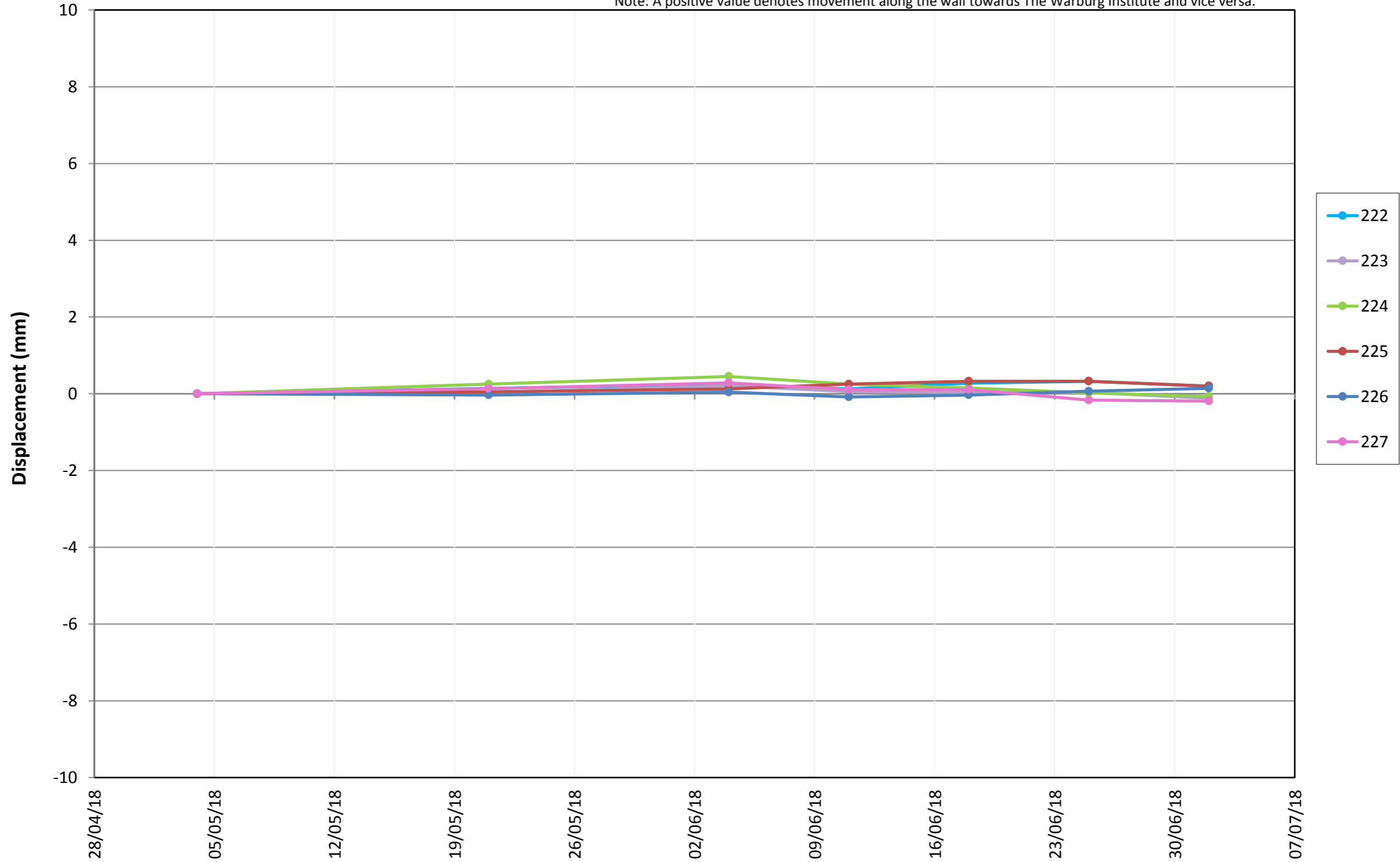


# Longitudinal Displacement Graph

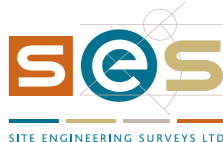


Graph 05L - Targets on Staircase

Note: A positive value denotes movement along the wall towards The Warburg Institute and vice versa.

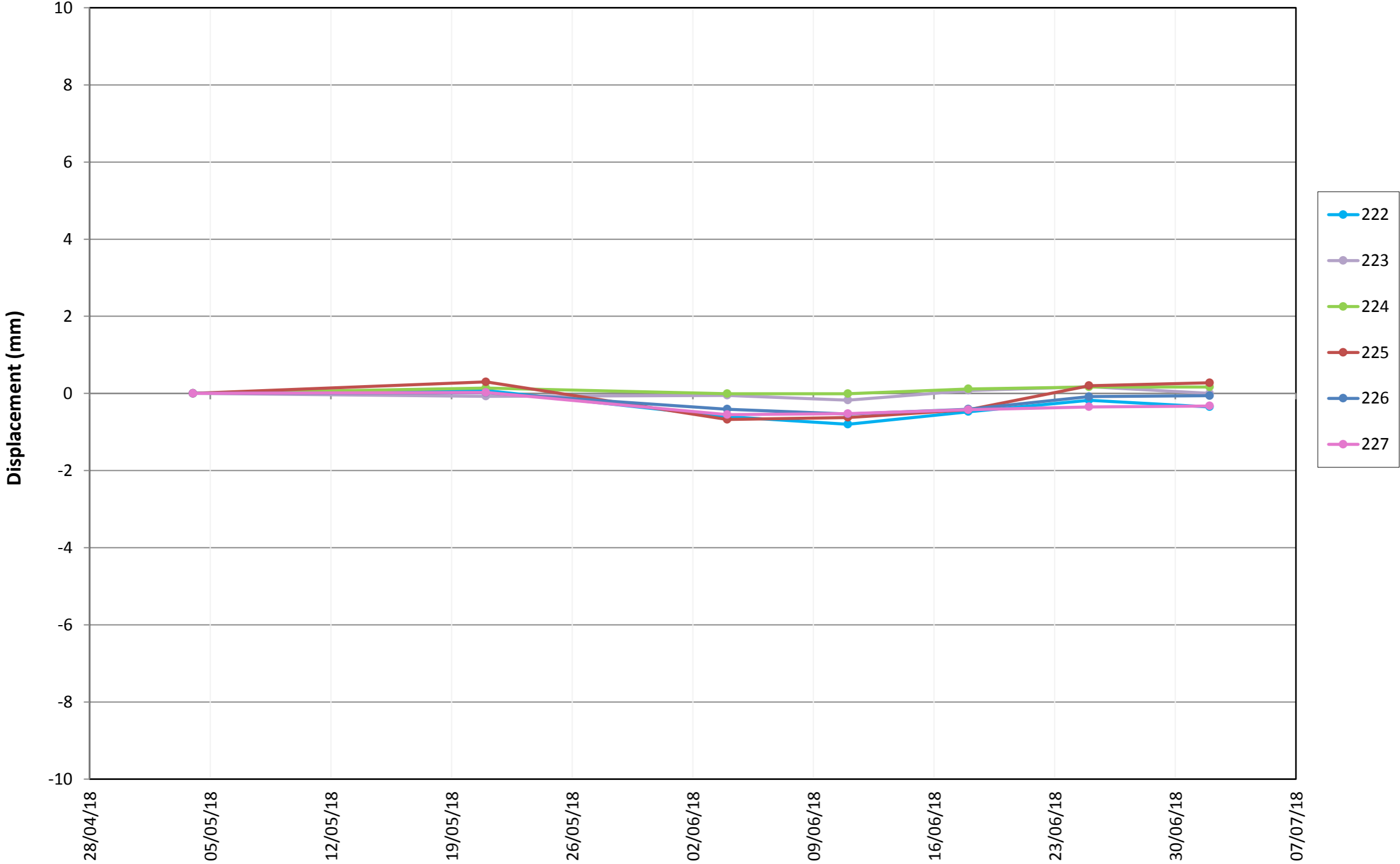


# Vertical Displacement Graph

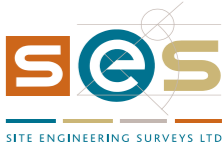


Graph 05V - Targets on Staircase

Note: +ve value denotes heave, -ve value denotes settlement.

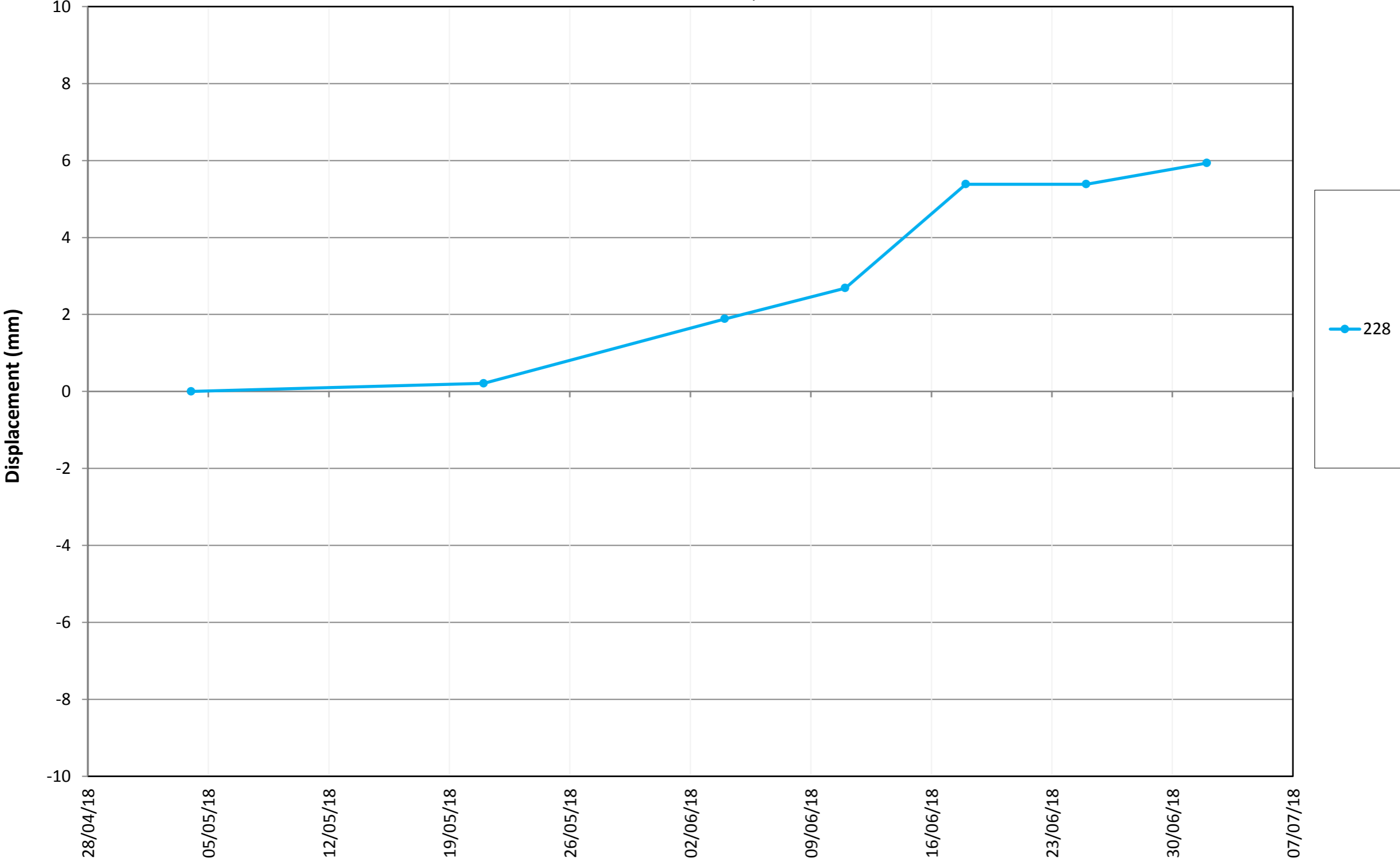


# Transverse Displacement Graph



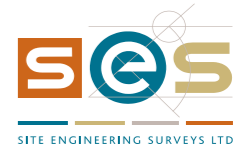
Graph 06T - Targets on back garden of No. 31 Torrington Square

Note: A positive value denotes movement towards Slade Research Centre and vice versa.



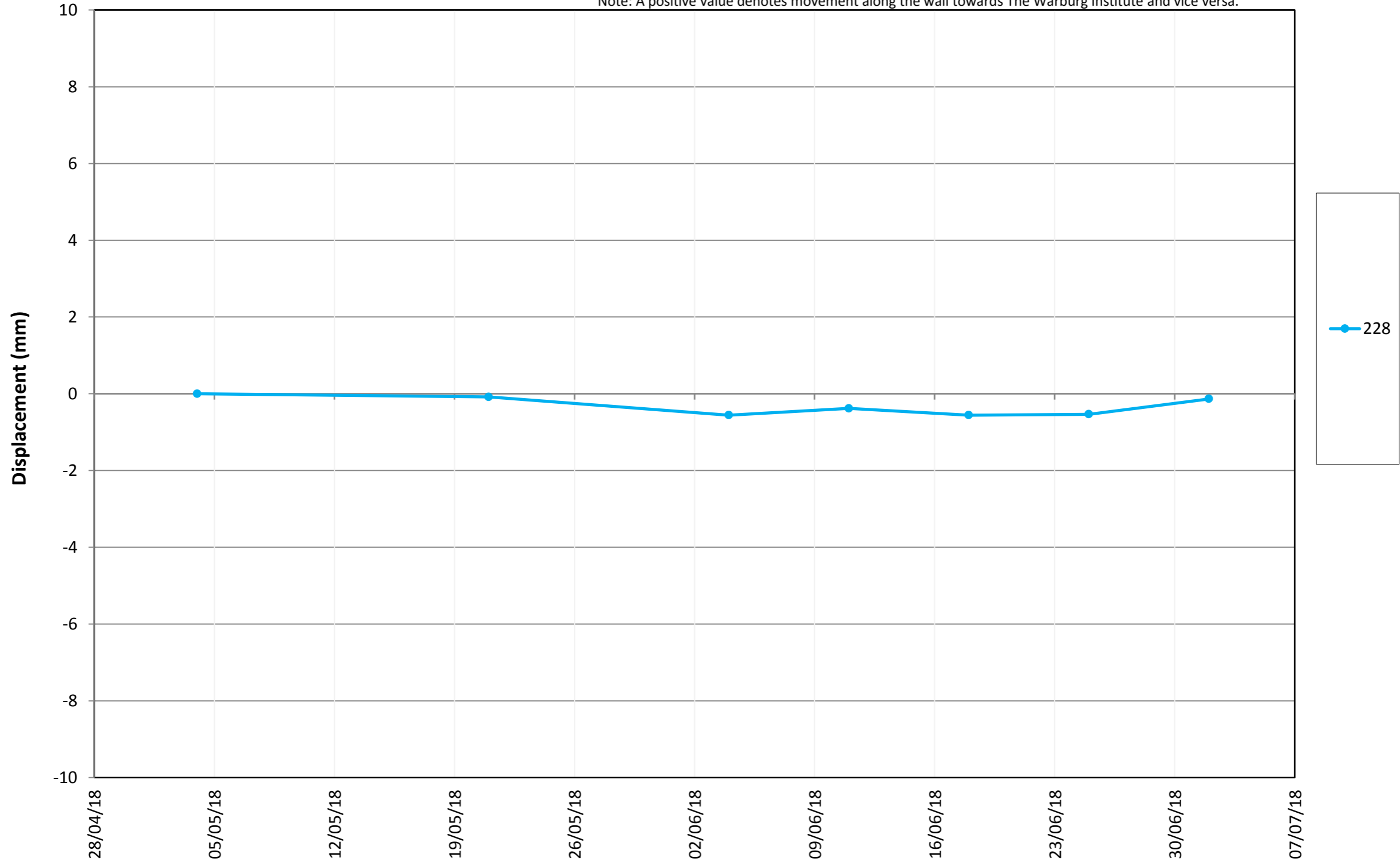


# Longitudinal Displacement Graph

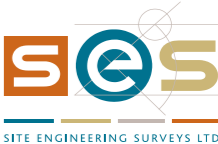


Graph 06L - Targets on back garden of No. 31 Torrington Square

Note: A positive value denotes movement along the wall towards The Warburg Institute and vice versa.

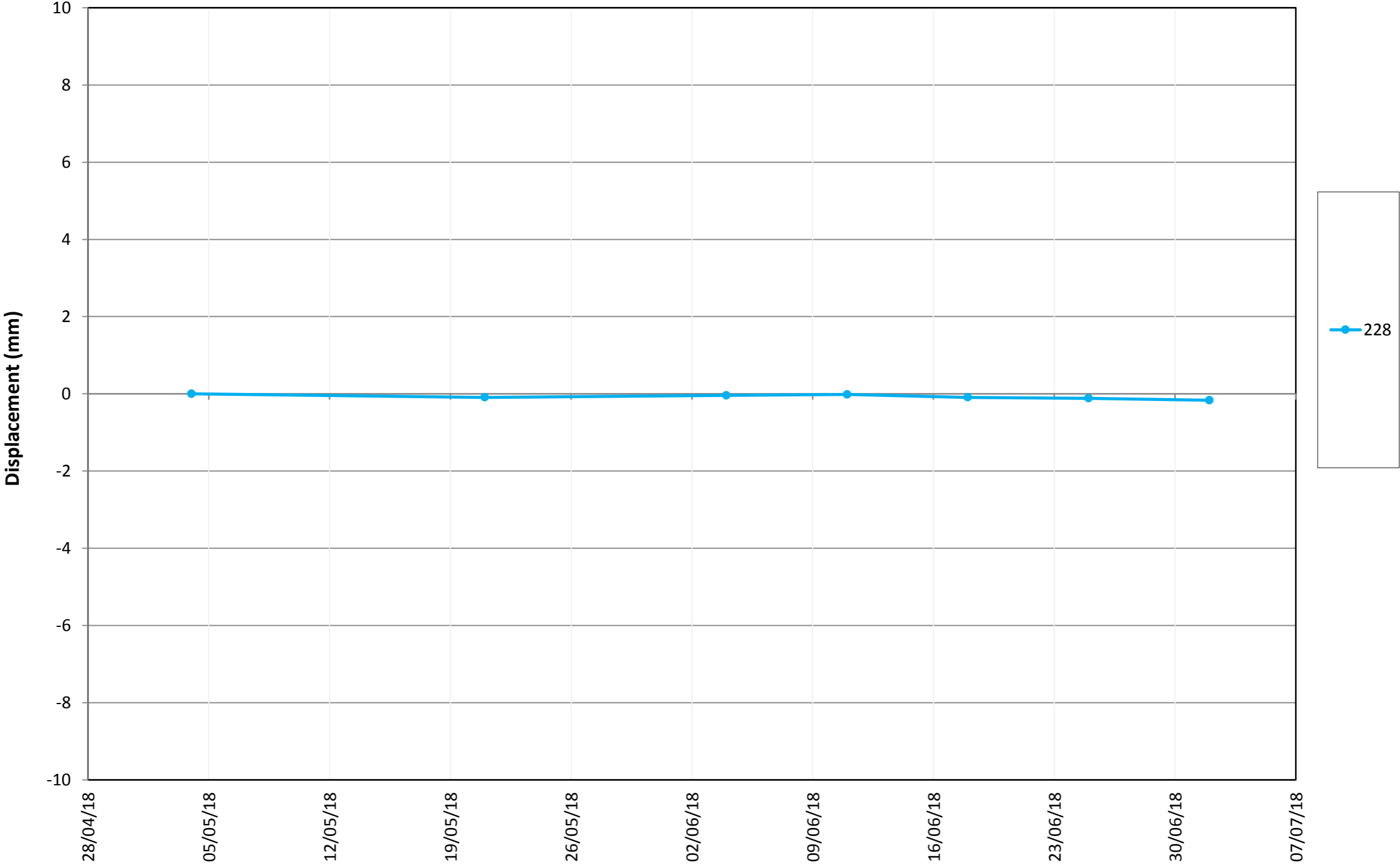


# Vertical Displacement Graph

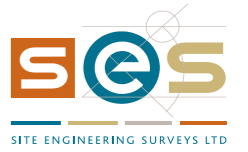


Graph 06V - Targets on back garden of No. 31 Torrington Square

Note: +ve value denotes heave, -ve value denotes settlement.

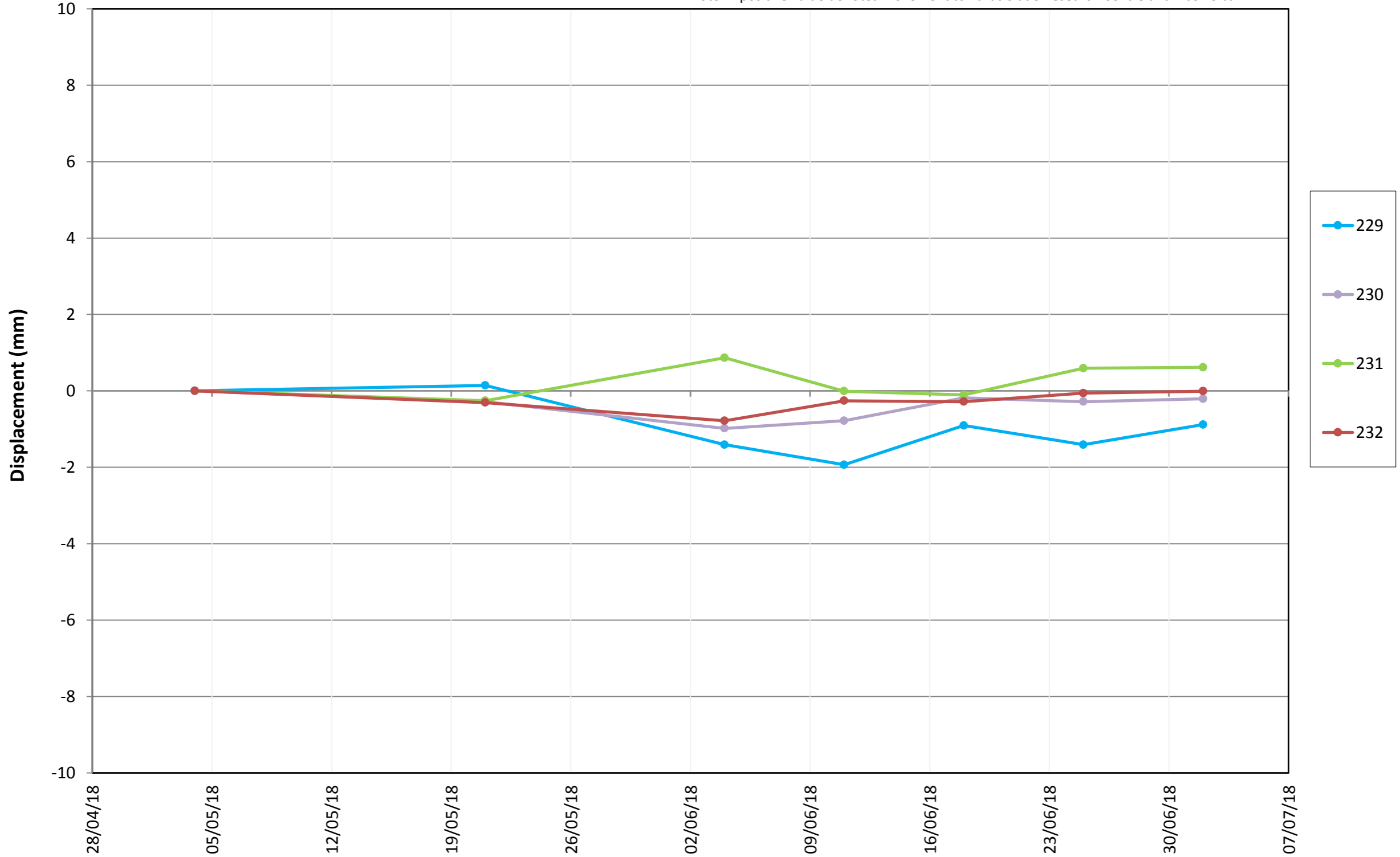


# Transverse Displacement Graph

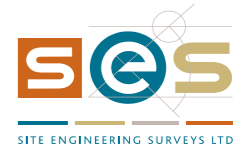


Graph 07T - Targets on back garden of No. 32 Torrington Square

Note: A positive value denotes movement towards Slade Research Centre and vice versa.

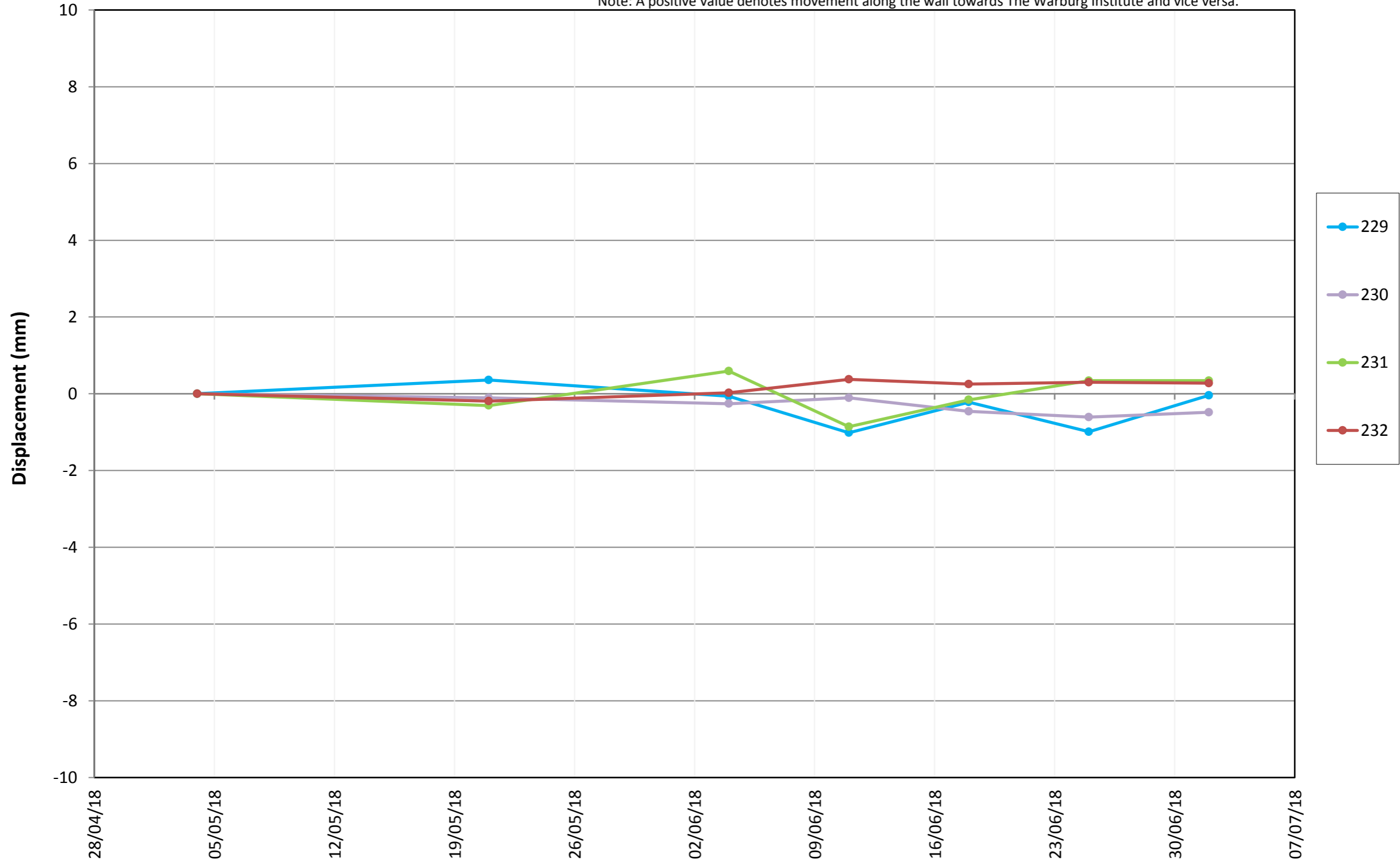


# Longitudinal Displacement Graph

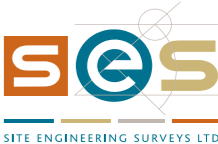


Graph 07L - Targets on back garden of No. 32 Torrington Square

Note: A positive value denotes movement along the wall towards The Warburg Institute and vice versa.

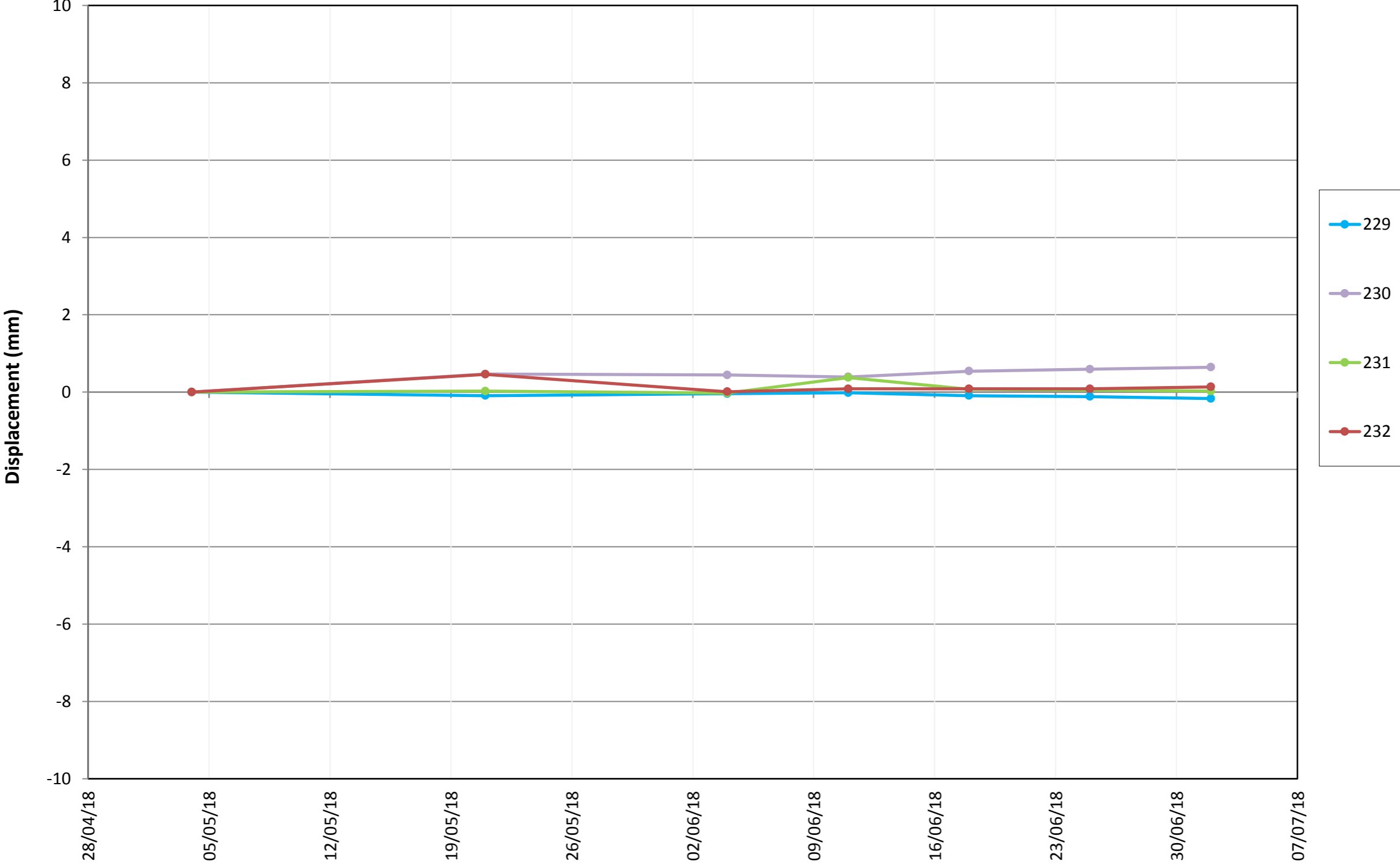


# Vertical Displacement Graph

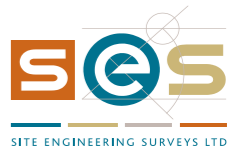


Graph 07V - Targets on back garden of No. 32 Torrington Square

Note: +ve value denotes heave, -ve value denotes settlement.

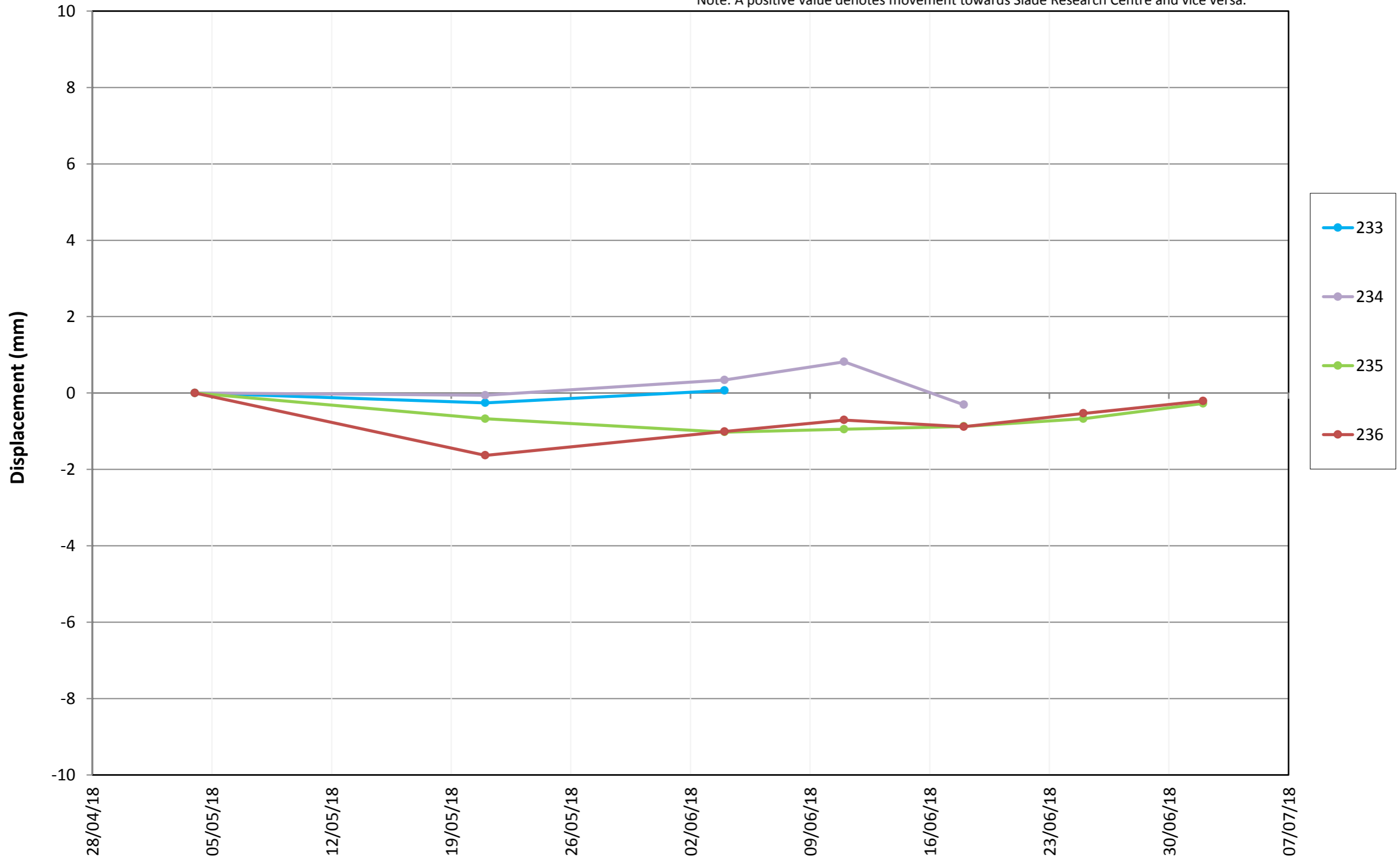


# Transverse Displacement Graph

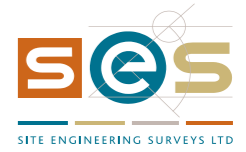


Graph 08T - Targets on Rear Elevation of No. 32 Torrington Square

Note: A positive value denotes movement towards Slade Research Centre and vice versa.

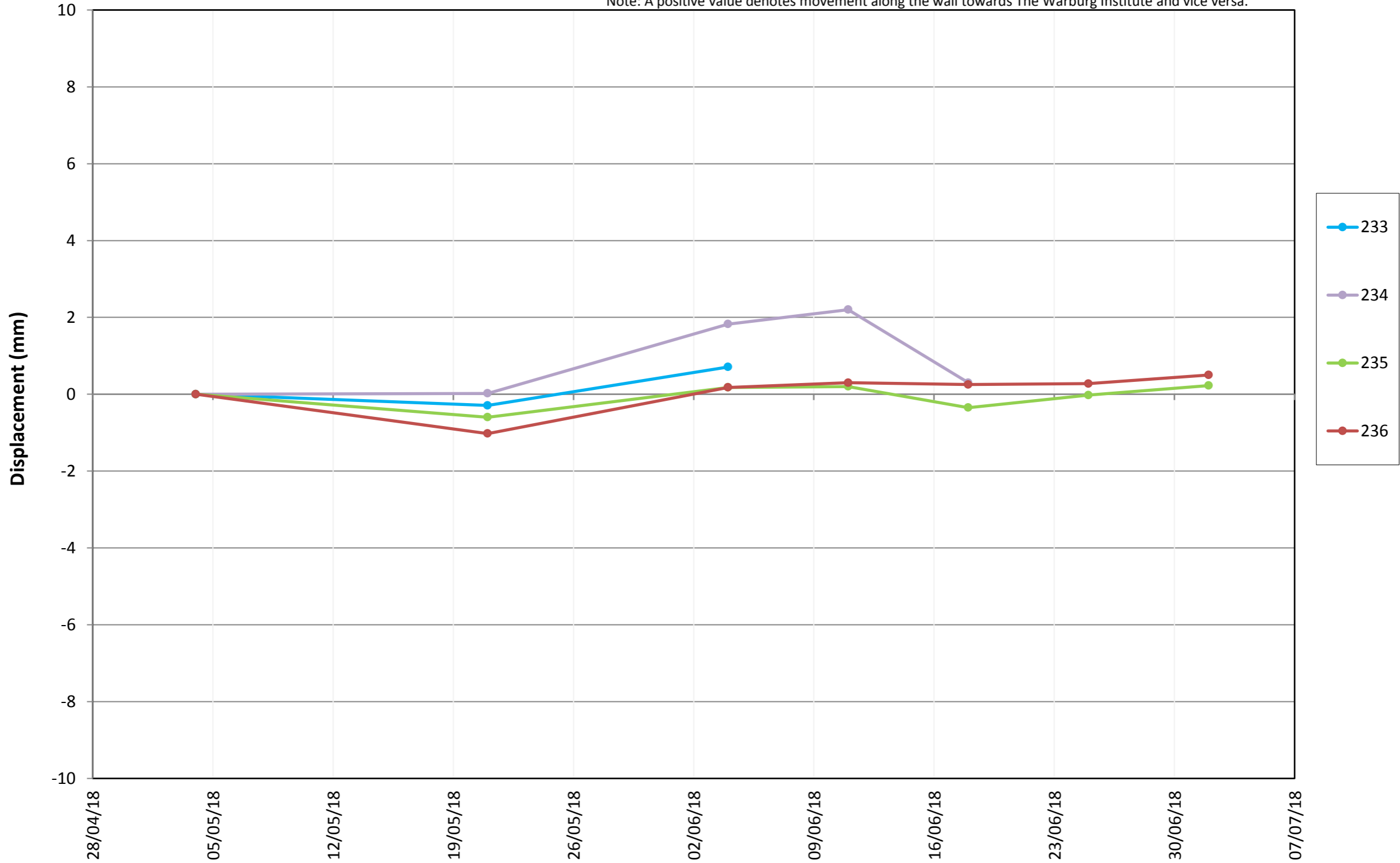


# Longitudinal Displacement Graph

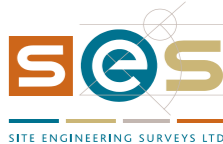


Graph 08L - Targets on Rear Elevation of No. 32 Torrington Square

Note: A positive value denotes movement along the wall towards The Warburg Institute and vice versa.

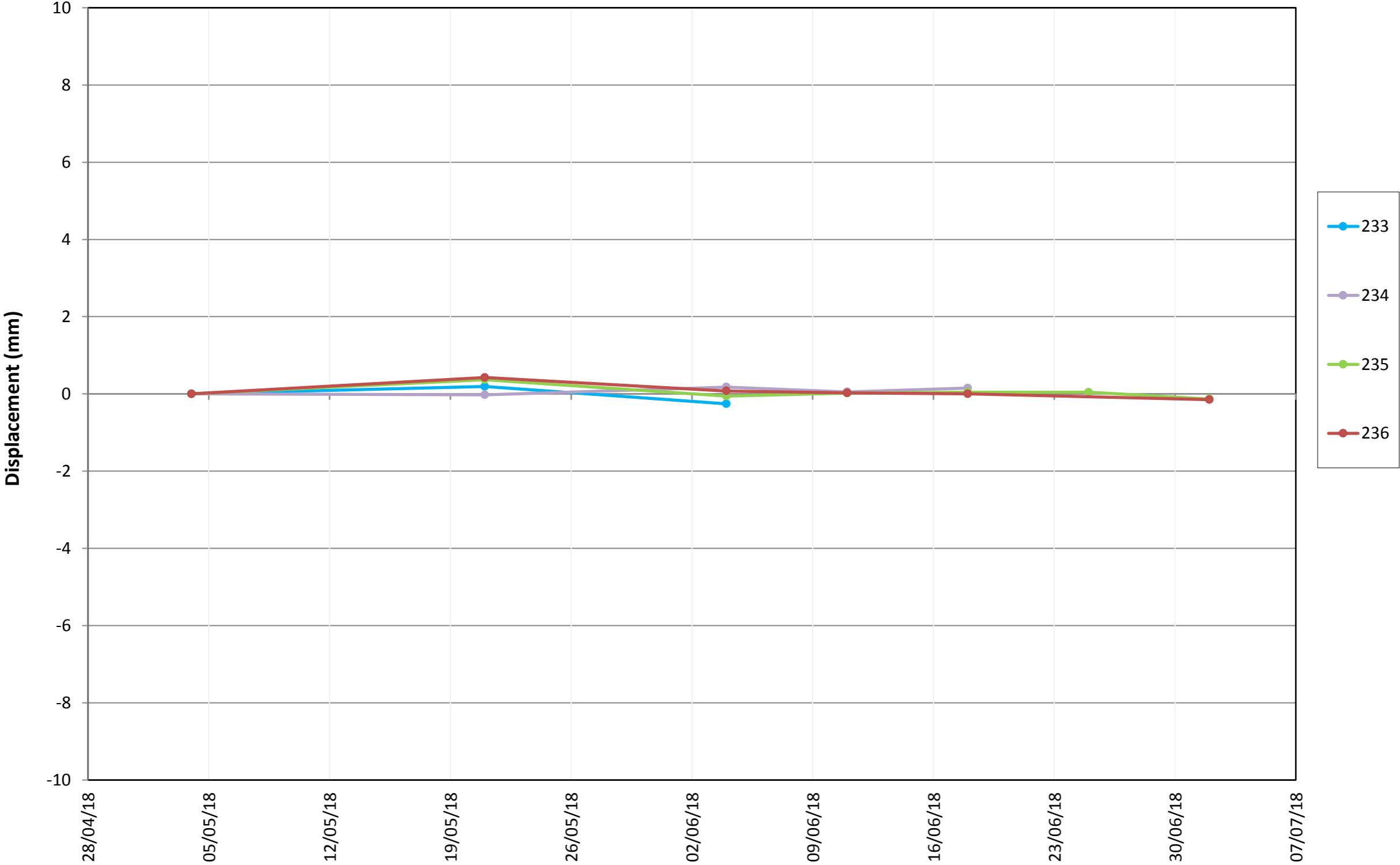


# Vertical Displacement Graph



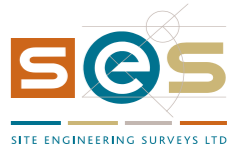
Graph 08V - Targets on Rear Elevation of No. 32 Torrington Square

Note: +ve value denotes heave, -ve value denotes settlement.



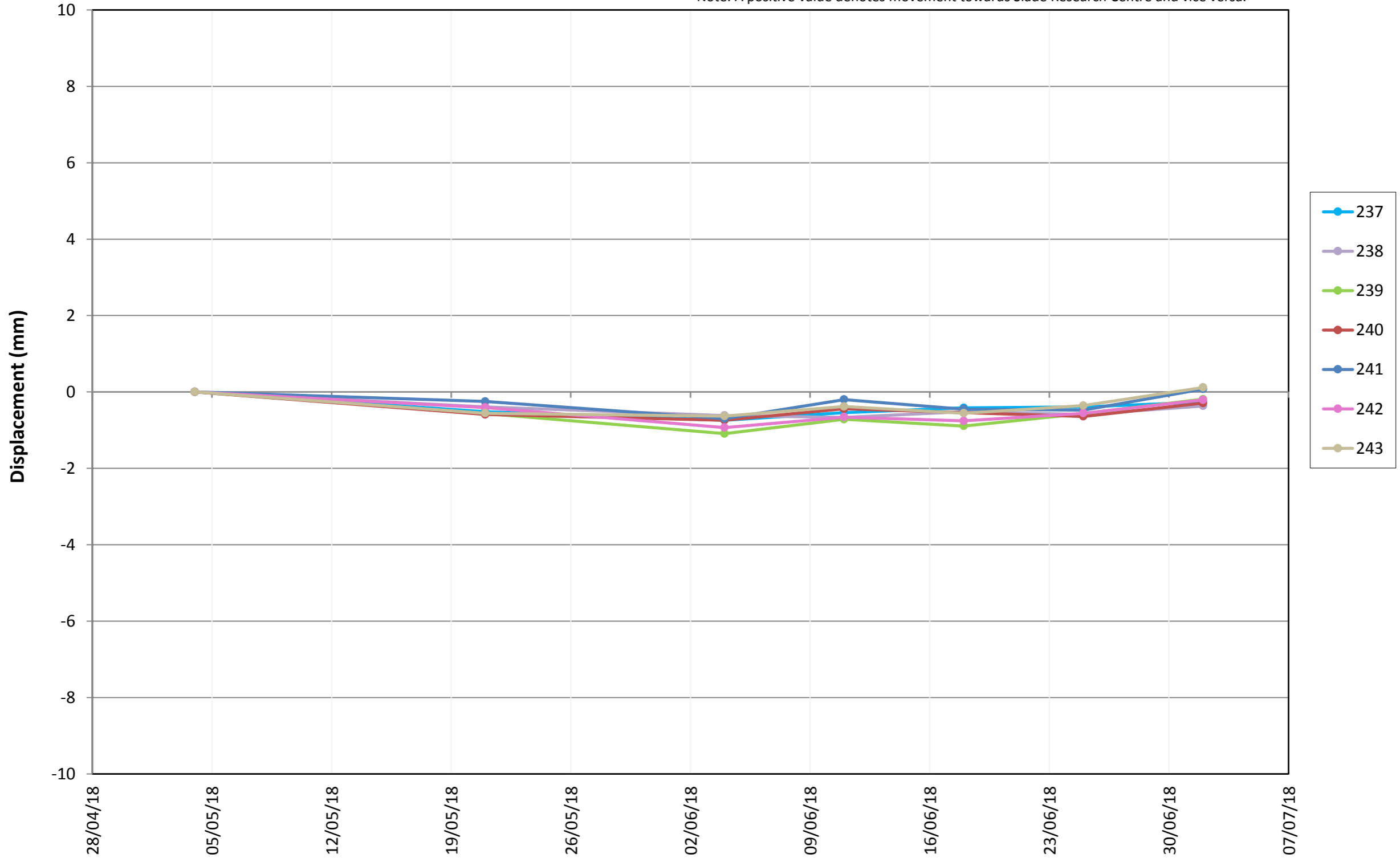


# Transverse Displacement Graph

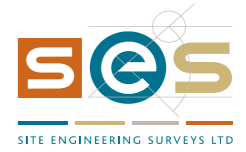


Graph 09T - Targets on Rear Elevation of No. 32 Torrington Square

Note: A positive value denotes movement towards Slade Research Centre and vice versa.

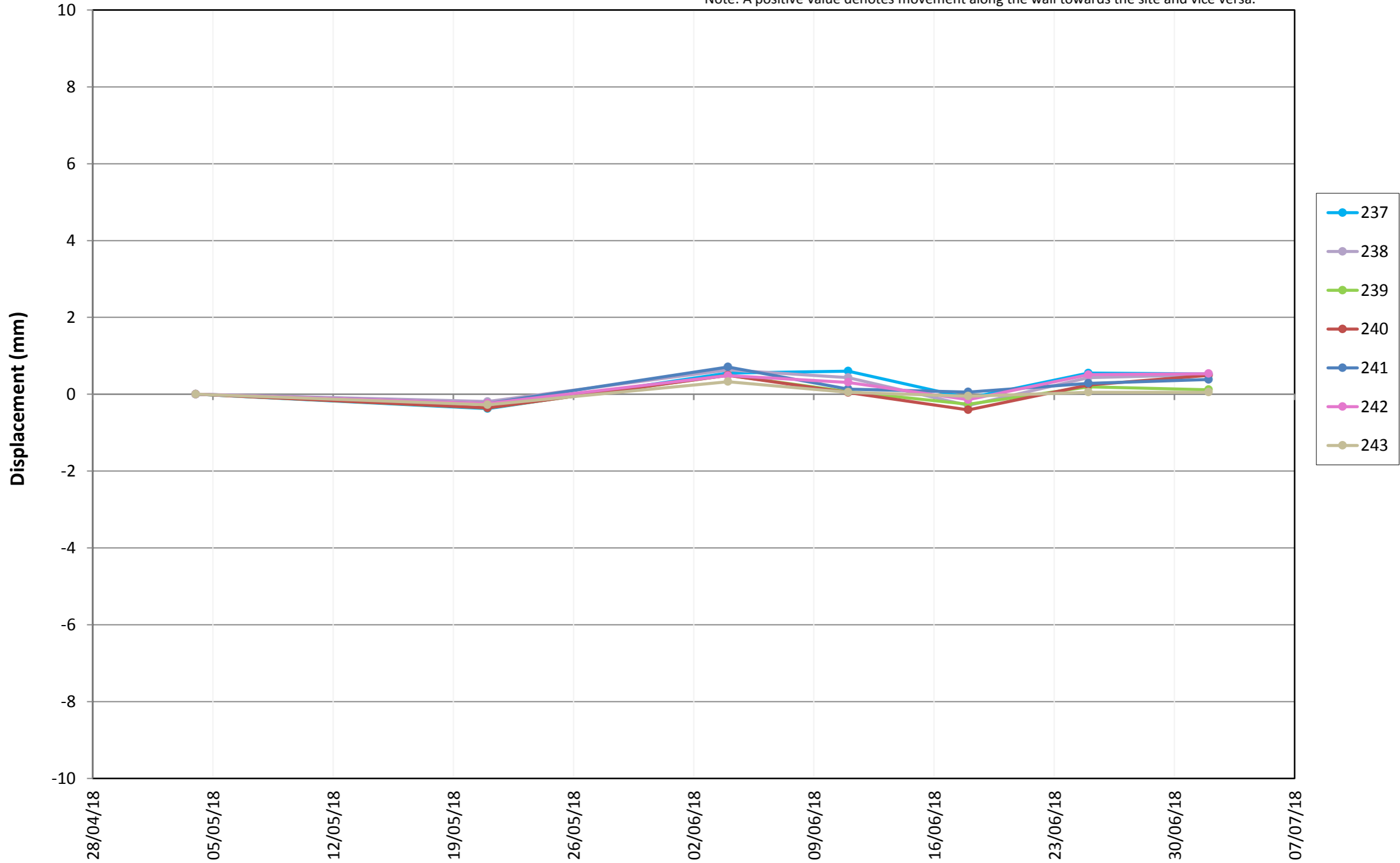


# Longitudinal Displacement Graph

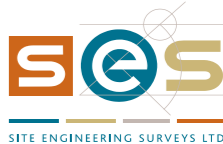


Graph 09L - Targets on Rear Elevation of No. 32 Torrington Square

Note: A positive value denotes movement along the wall towards the site and vice versa.

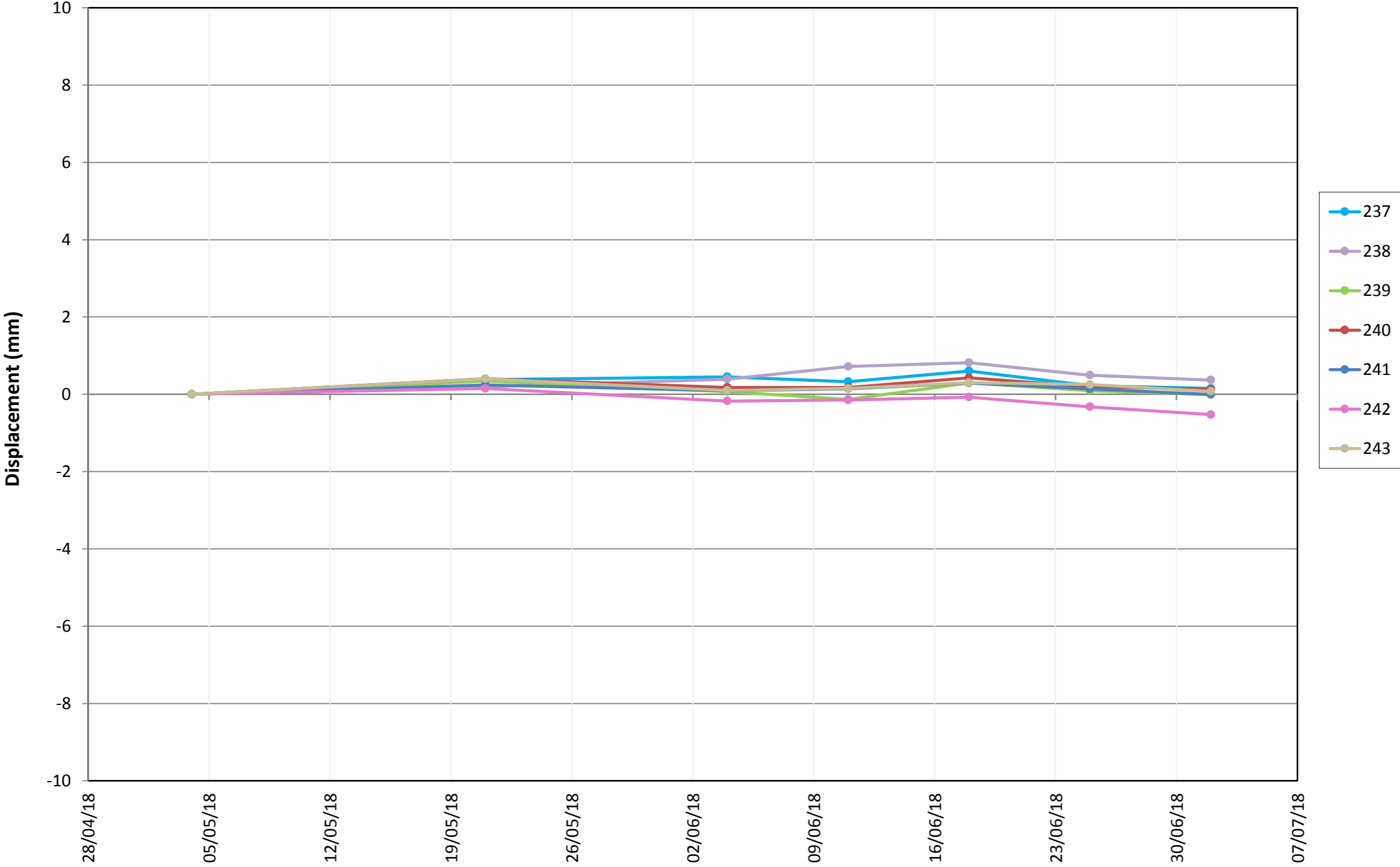


# Vertical Displacement Graph

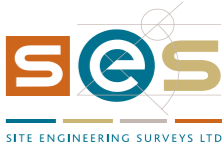


Graph 09V - Targets on Rear Elevation of No. 32 Torrington Square

Note: +ve value denotes heave, -ve value denotes settlement.

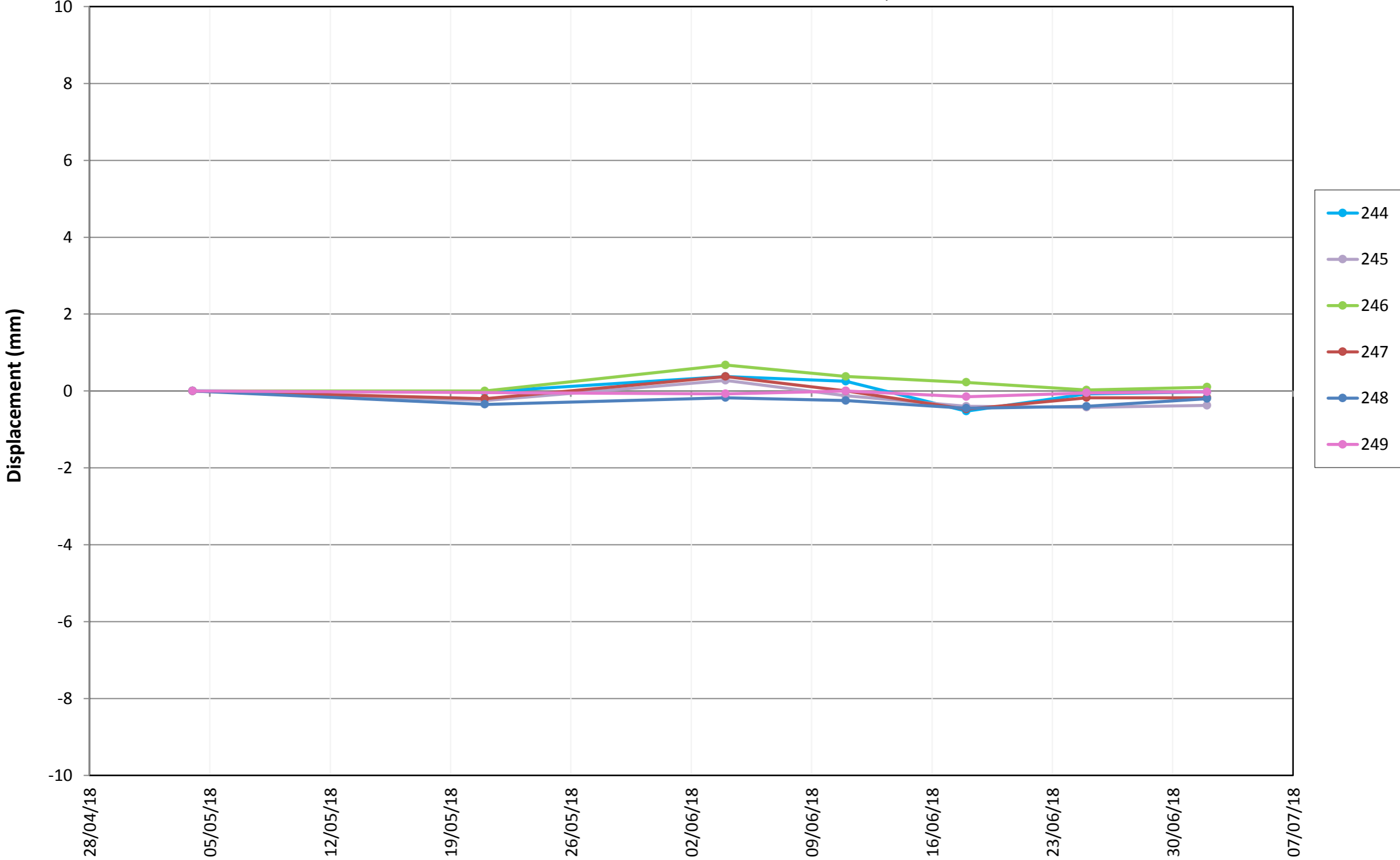


# Transverse Displacement Graph

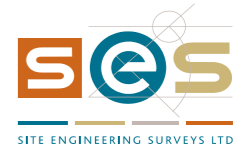


Graph 10T - Targets on Side Elevation of No. 32 Torrington Square

Note: A positive value denotes movement in to site and vice versa.

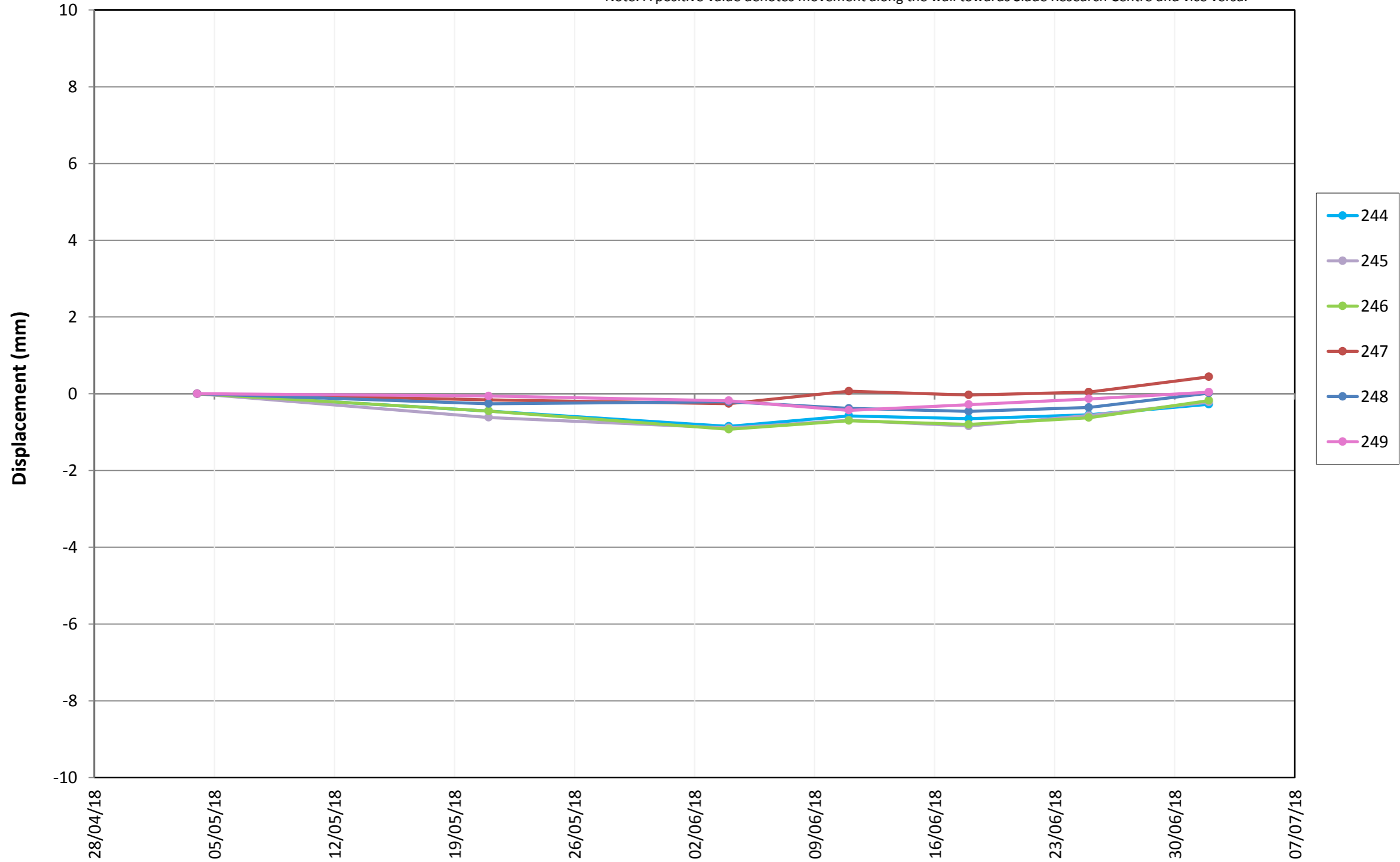


# Longitudinal Displacement Graph

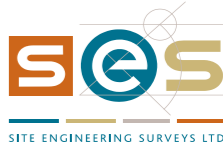


Graph 10L - Targets on Side Elevation of No. 32 Torrington Square

Note: A positive value denotes movement along the wall towards Slade Research Centre and vice versa.

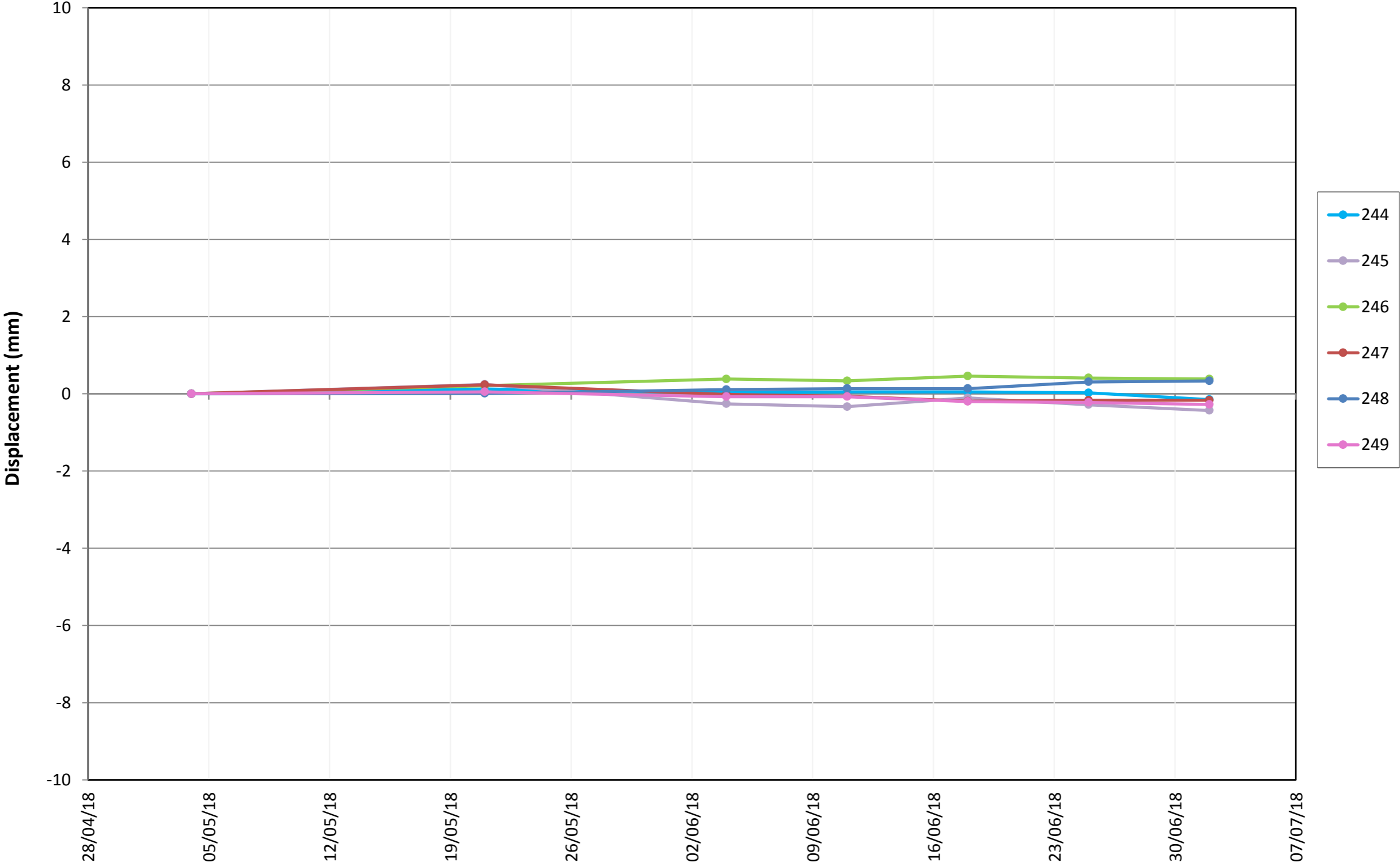


# Vertical Displacement Graph

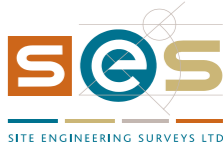


Graph 10V - Targets on Side Elevation of No. 32 Torrington Square

Note: +ve value denotes heave, -ve value denotes settlement.

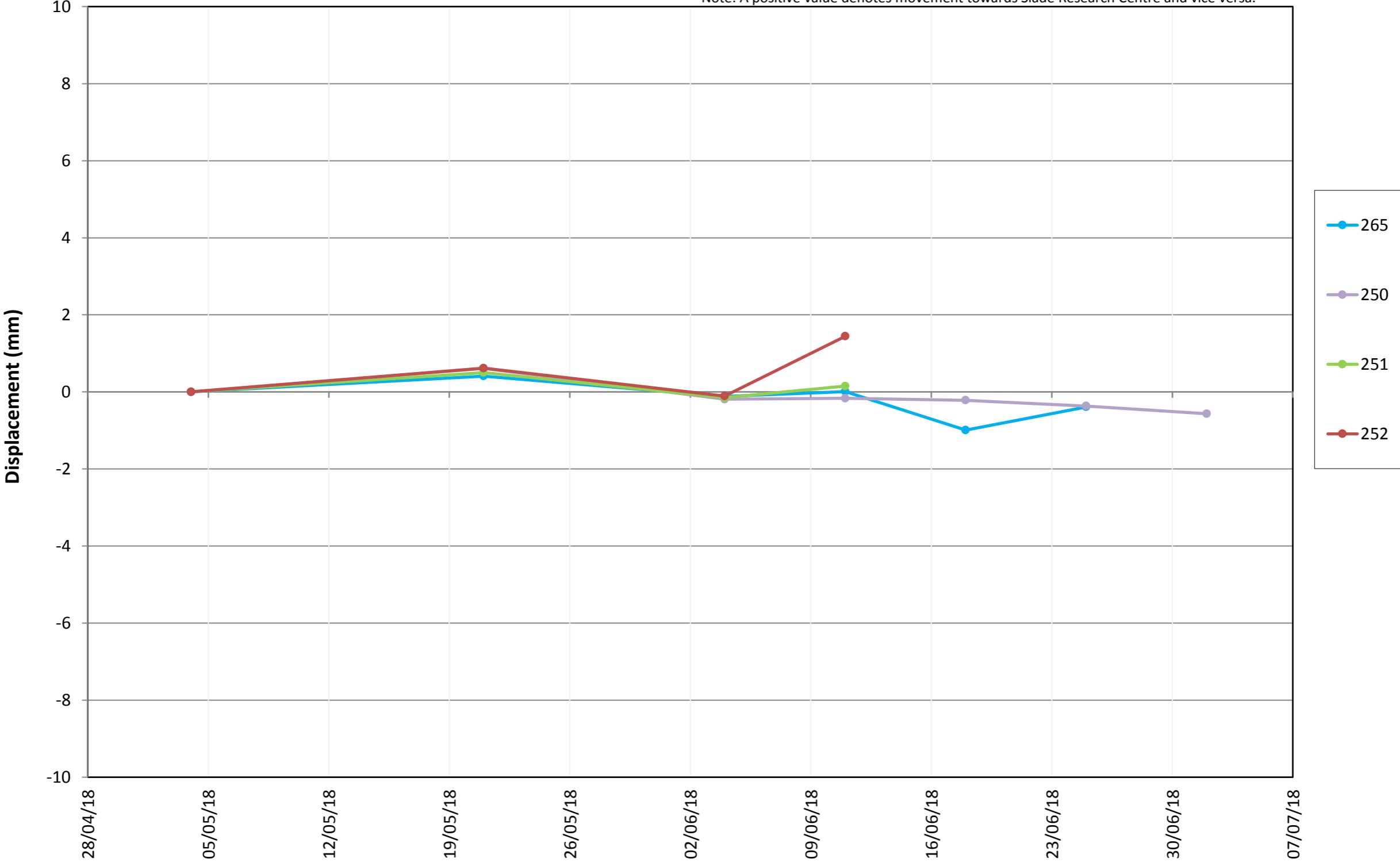


# Transverse Displacement Graph

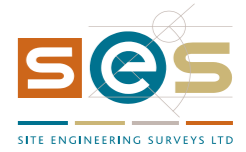


Graph 11T - Targets on Front Elevation of No. 32 Torrington Square

Note: A positive value denotes movement towards Slade Research Centre and vice versa.

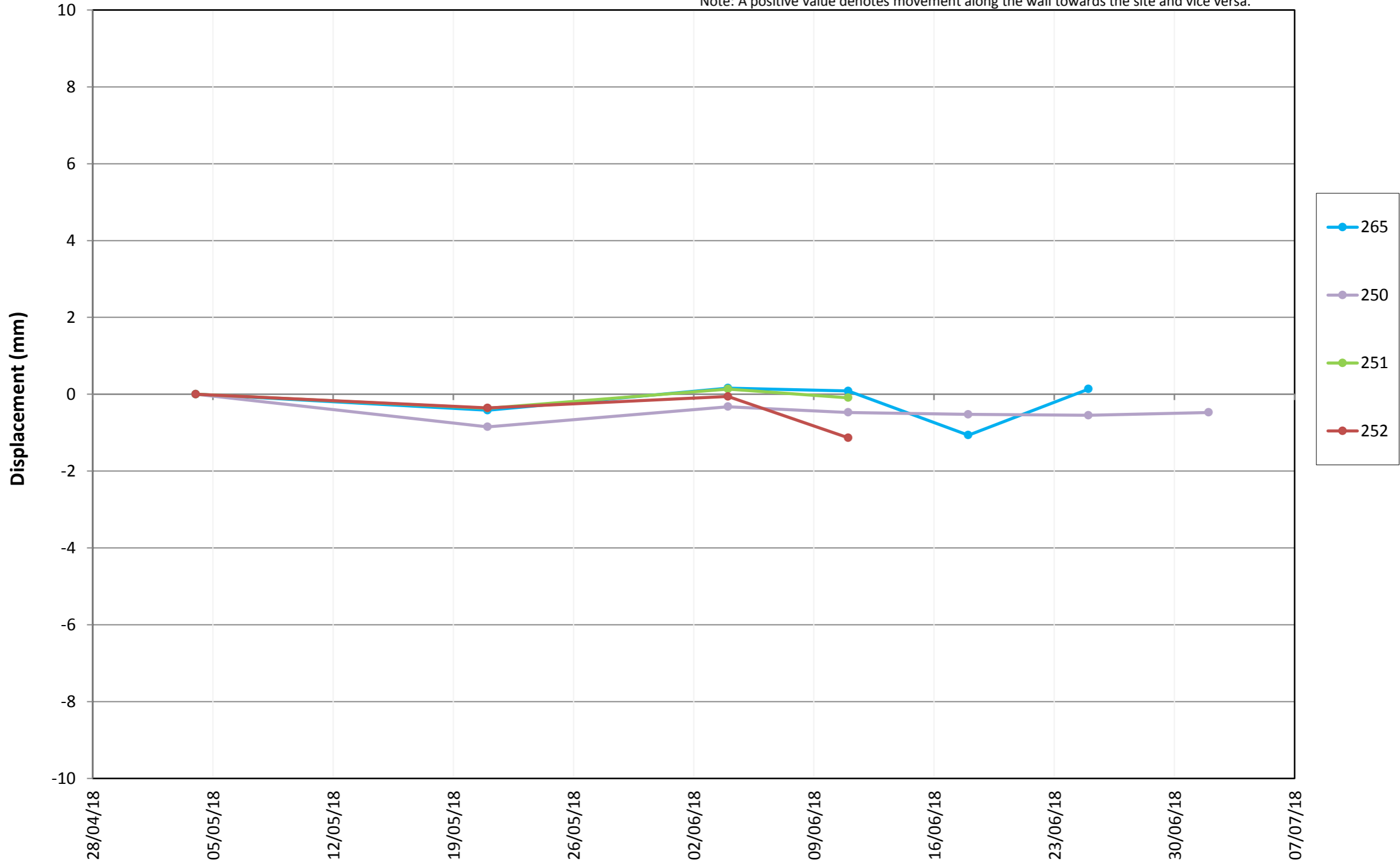


# Longitudinal Displacement Graph



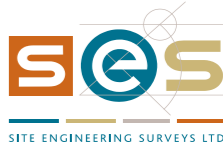
Graph 11L - Targets on Front Elevation of No. 32 Torrington Square

Note: A positive value denotes movement along the wall towards the site and vice versa.



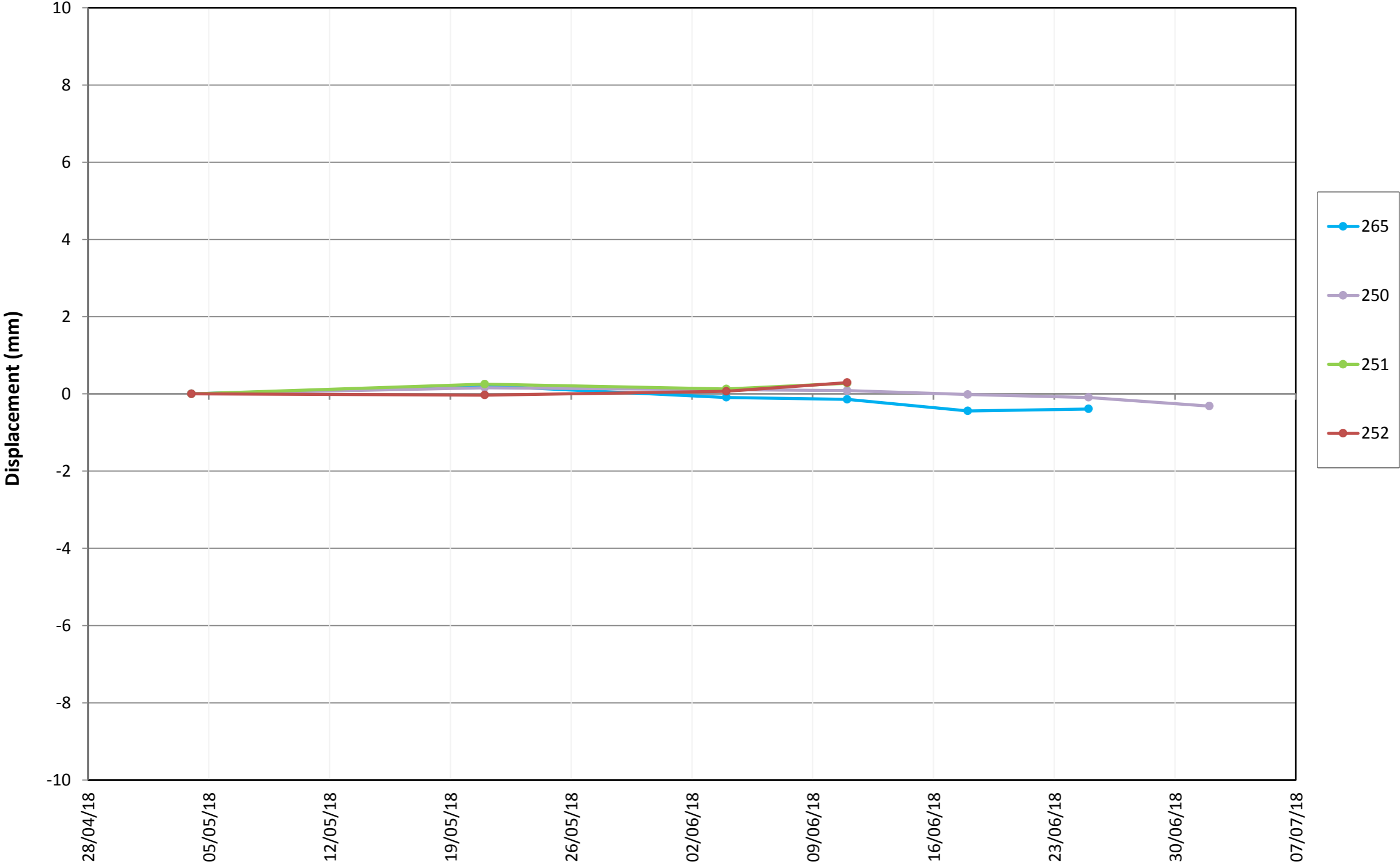


# Vertical Displacement Graph

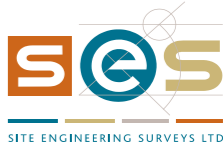


Graph 11V - Targets on Front Elevation of No. 32 Torrington Square

Note: +ve value denotes heave, -ve value denotes settlement.

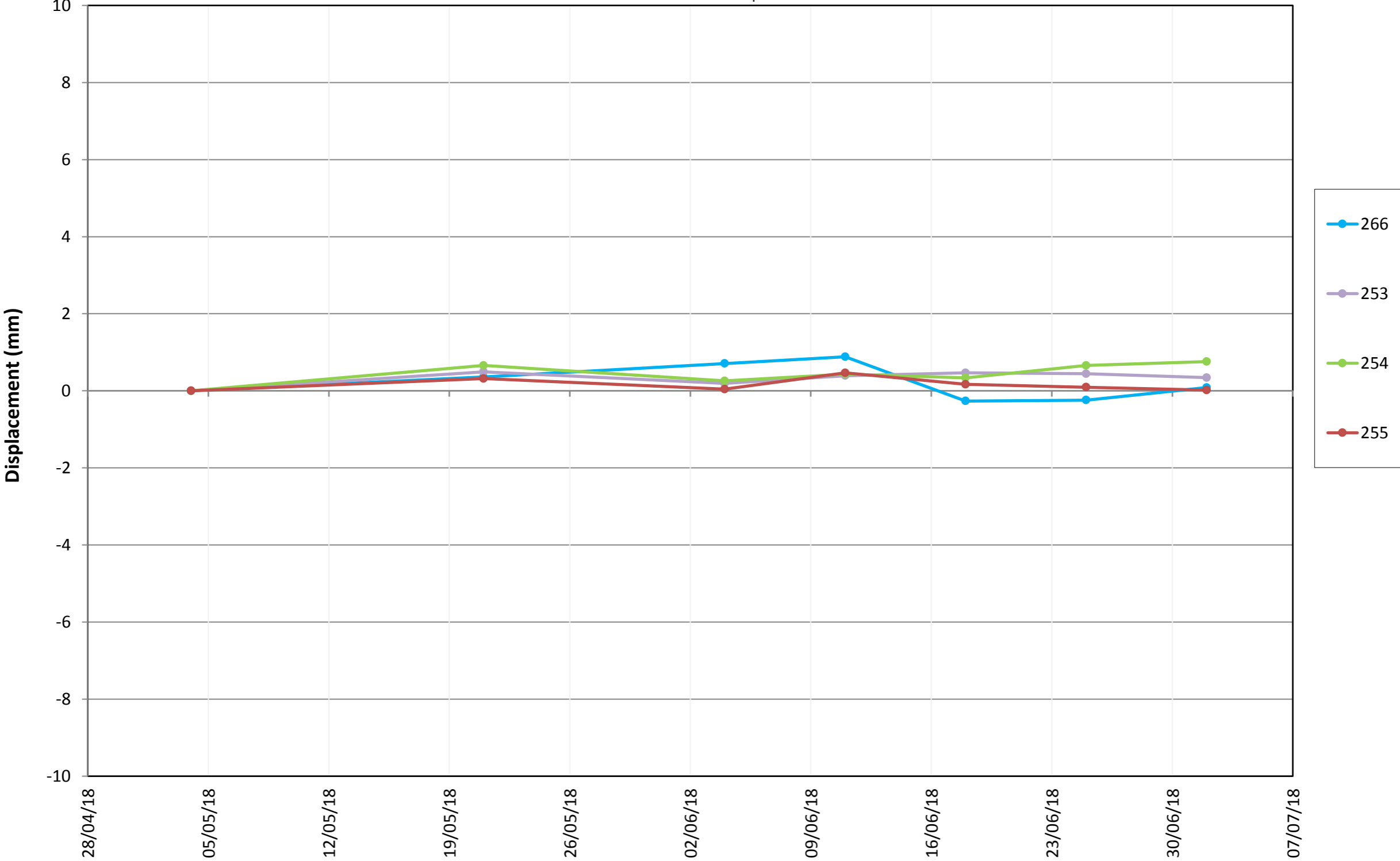


# Transverse Displacement Graph

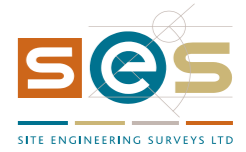


Graph 12T - Targets on Front Elevation of No. 32 Torrington Square

Note: A positive value denotes movement towards Slade Research Centre and vice versa.

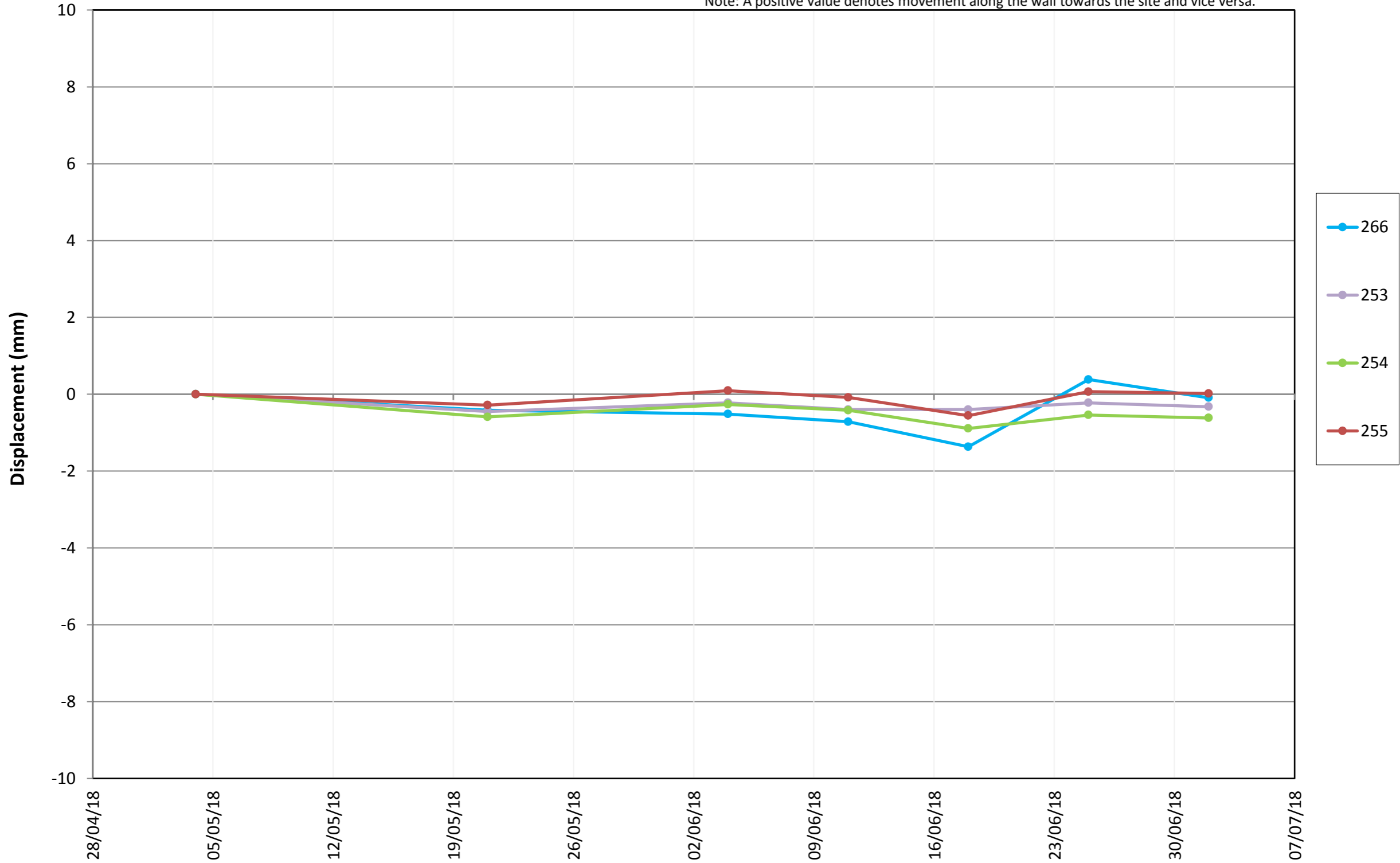


# Longitudinal Displacement Graph

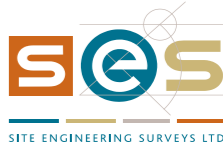


Graph 12L - Targets on Front Elevation of No. 32 Torrington Square

Note: A positive value denotes movement along the wall towards the site and vice versa.

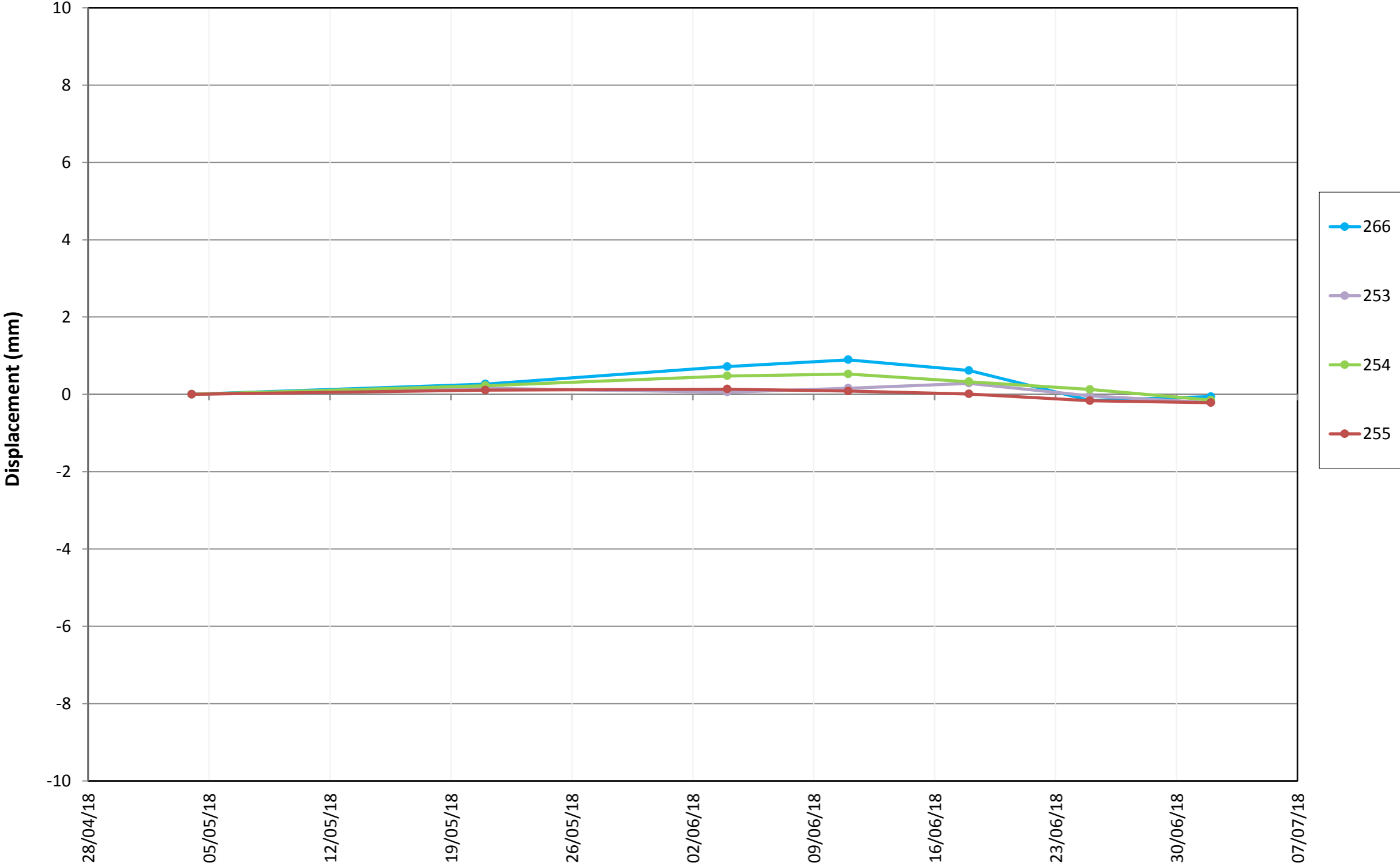


# Vertical Displacement Graph

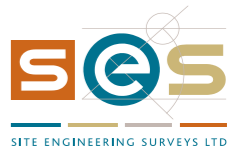


Graph 12V - Targets on Front Elevation of No. 32 Torrington Square

Note: +ve value denotes heave, -ve value denotes settlement.

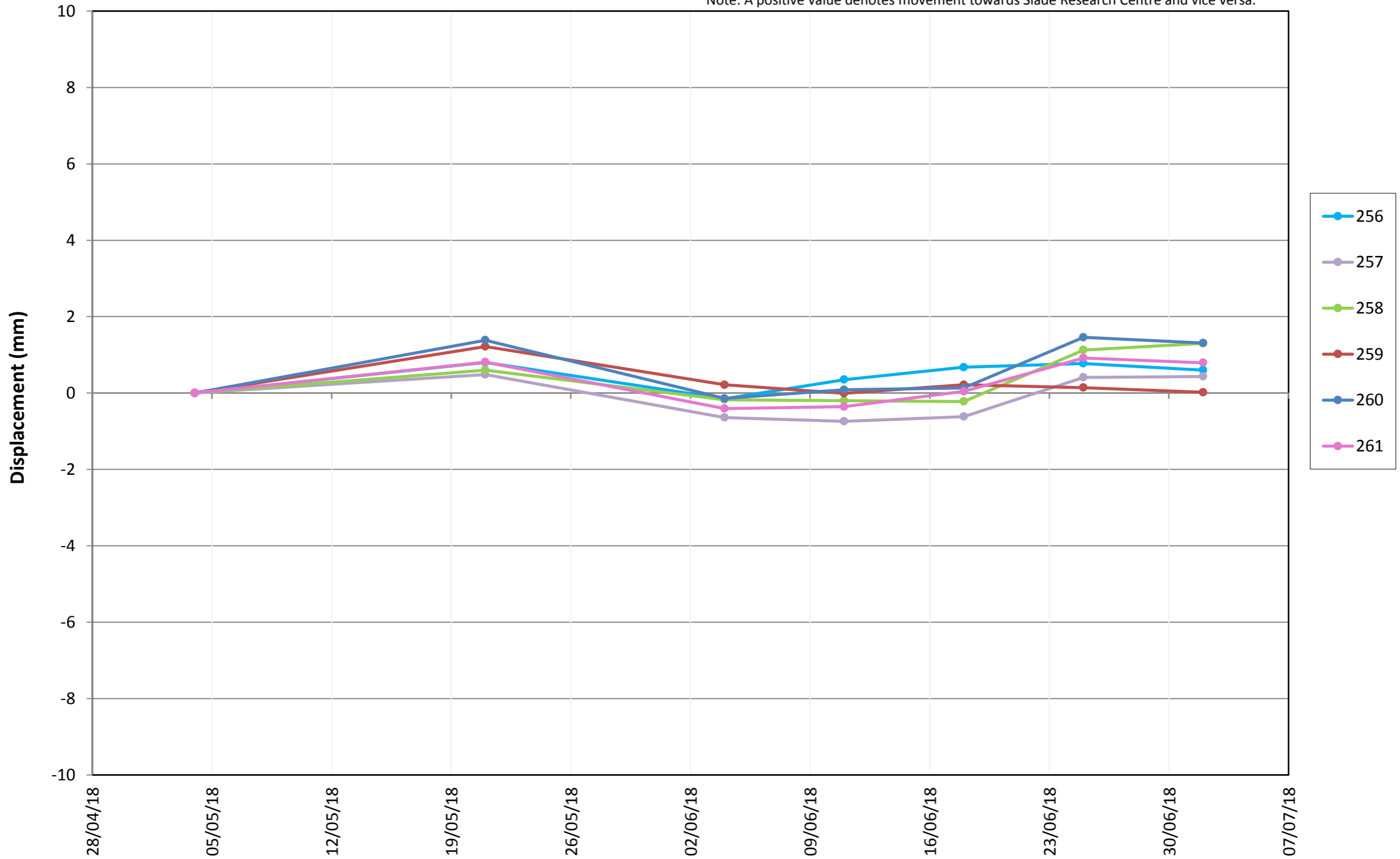


# Transverse Displacement Graph



Graph 13T -Targets on Front Elevation of No. 31 Torrington Square

Note: A positive value denotes movement towards Slade Research Centre and vice versa.

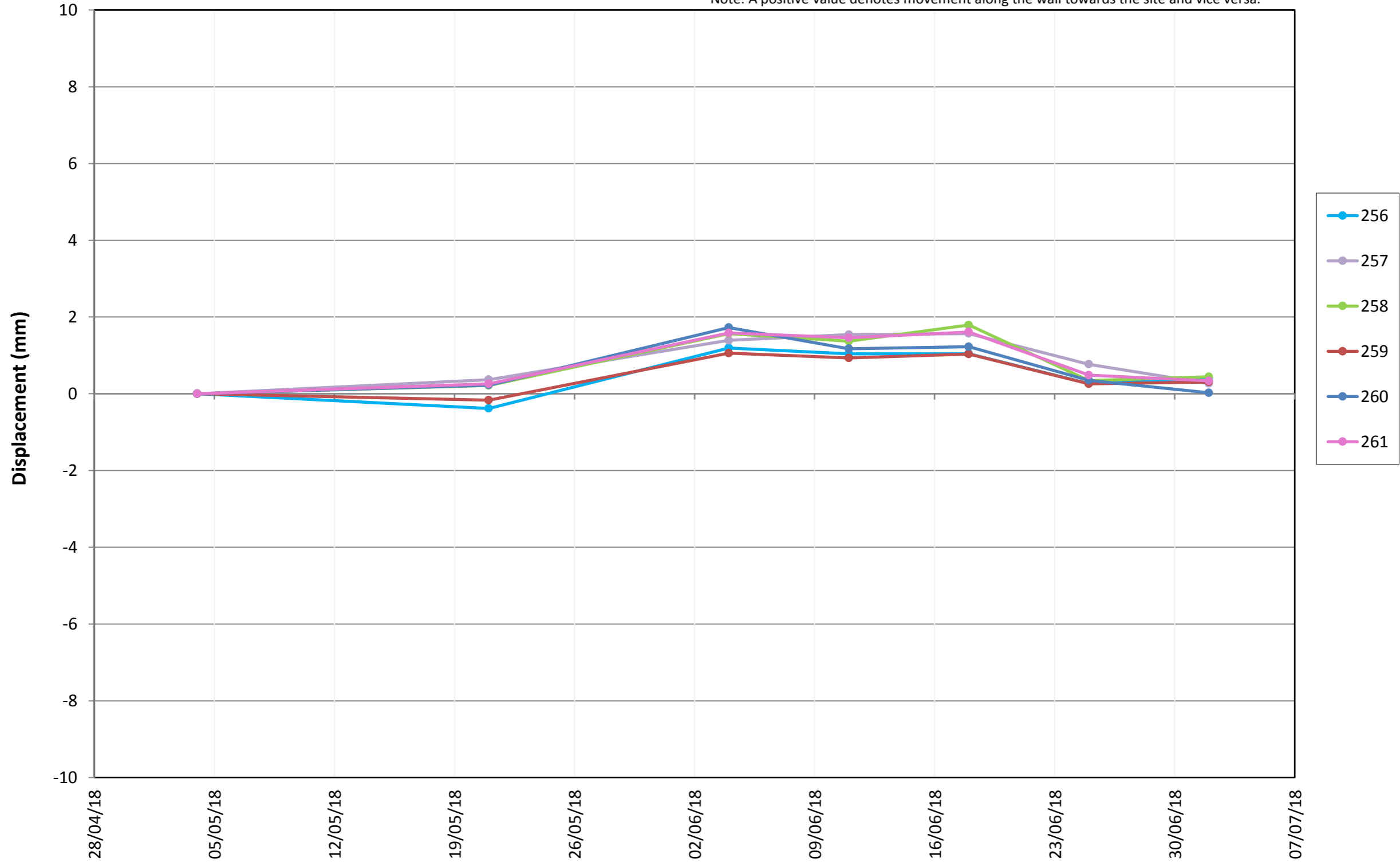


# Longitudinal Displacement Graph

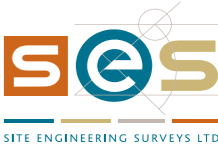


Graph 13L -Targets on Front Elevation of No. 31 Torrington Square

Note: A positive value denotes movement along the wall towards the site and vice versa.

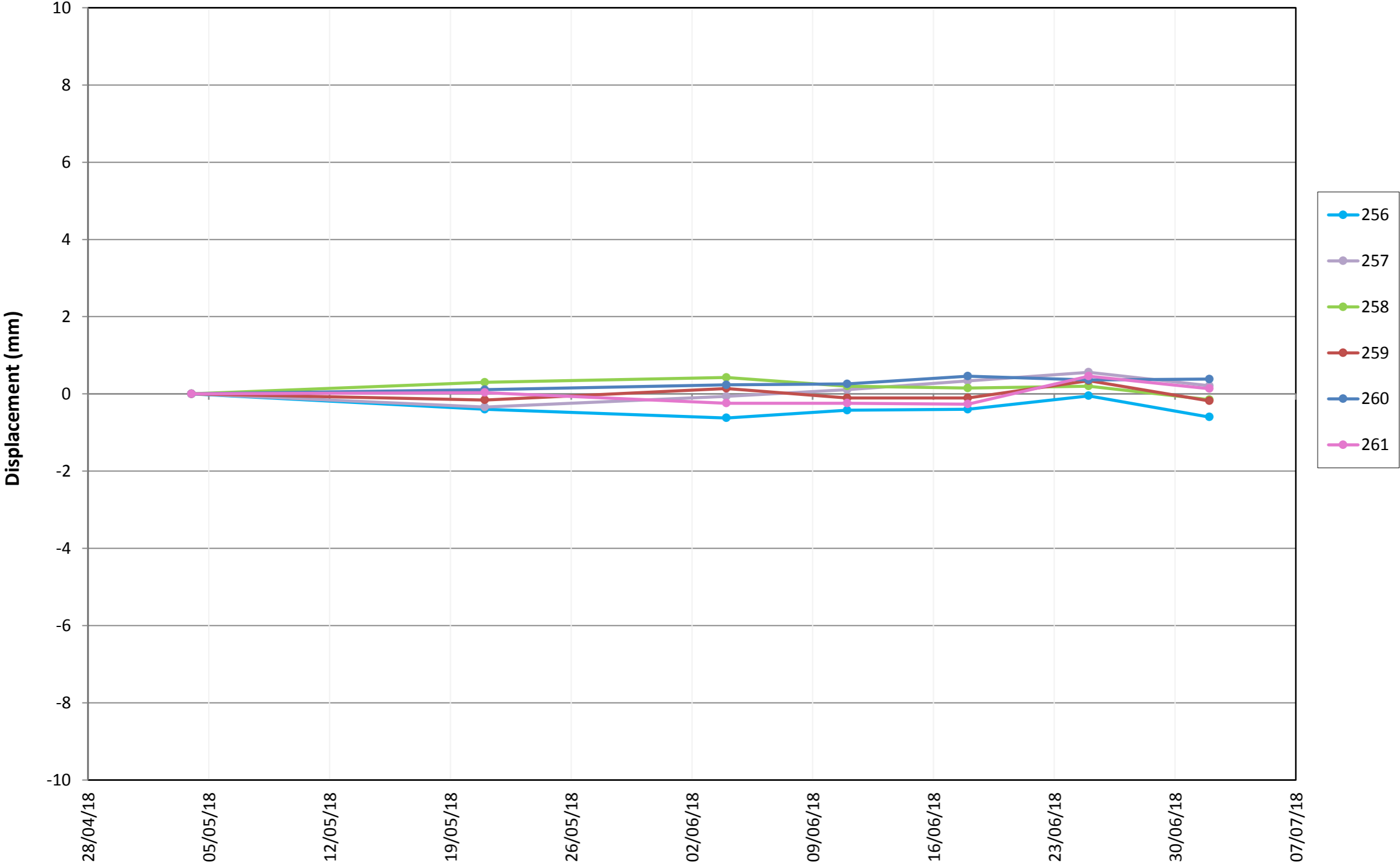


# Vertical Displacement Graph

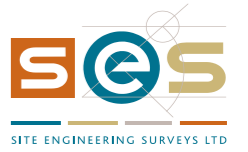


Graph 13V -Targets on Front Elevation of No. 31 Torrington Square

Note: +ve value denotes heave, -ve value denotes settlement.

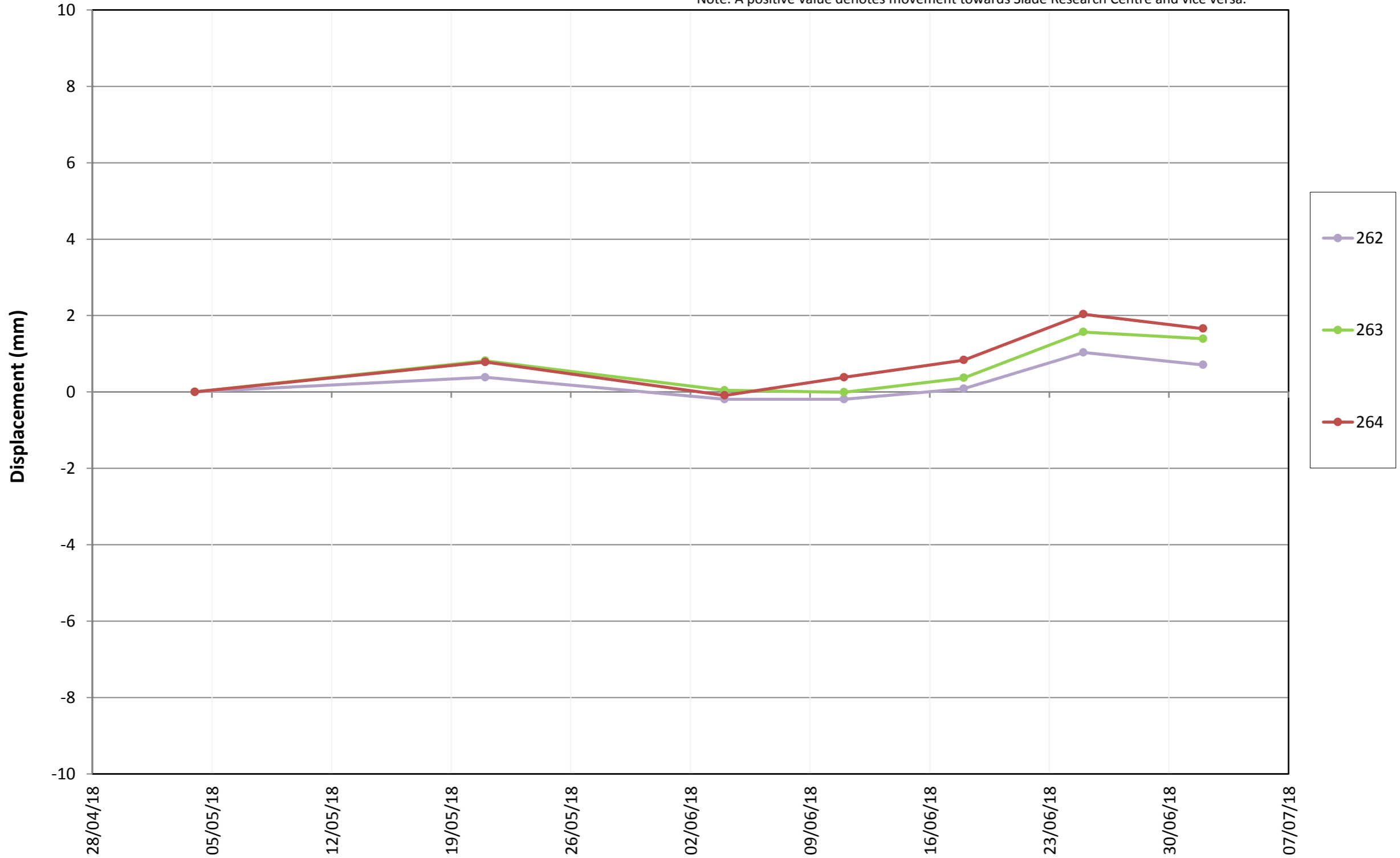


# Transverse Displacement Graph



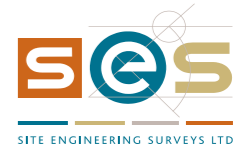
Graph 14T - Targets on Front Elevation of No. 31 Torrington Square

Note: A positive value denotes movement towards Slade Research Centre and vice versa.



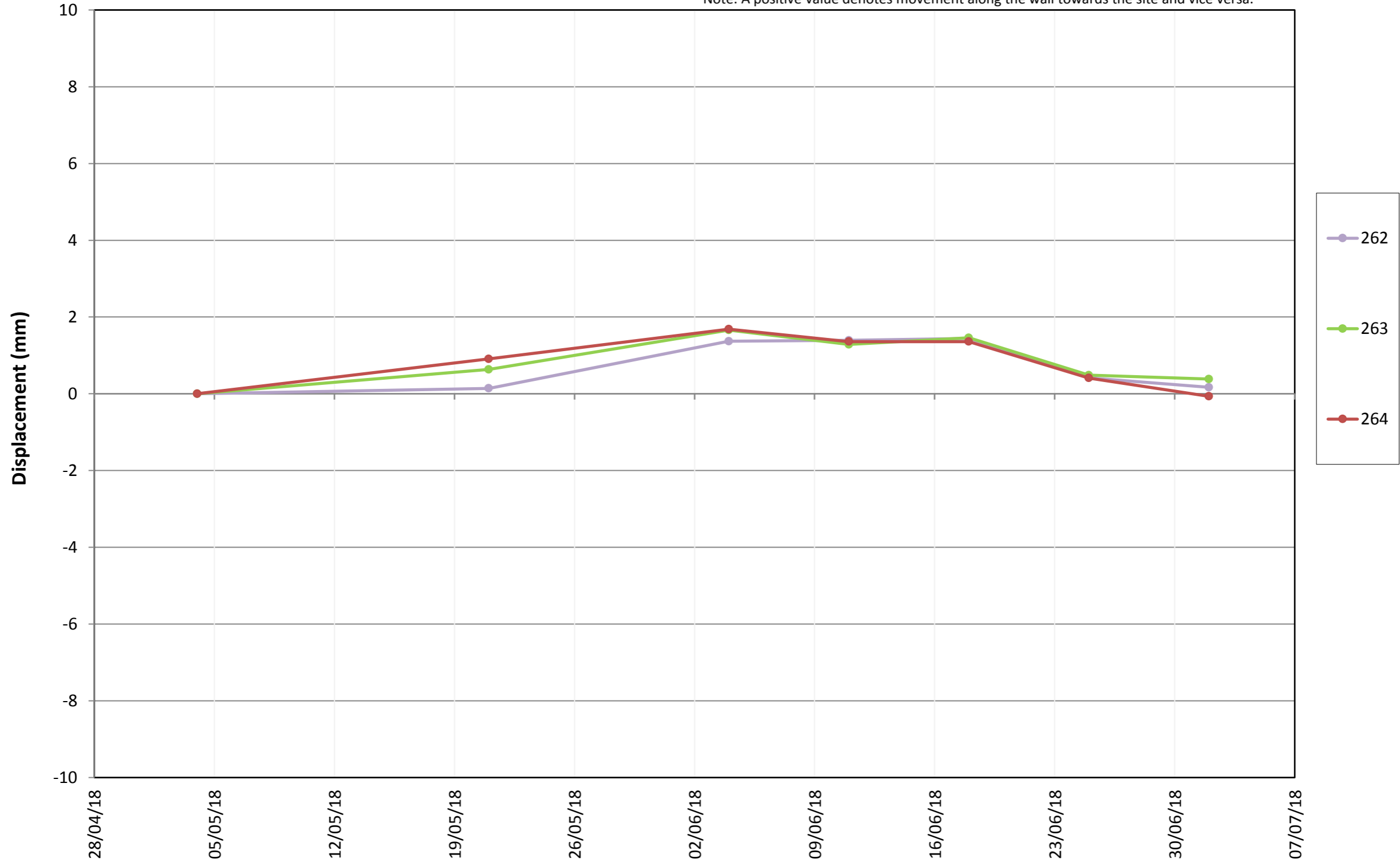


# Longitudinal Displacement Graph

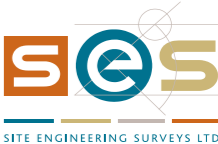


Graph 14L - Targets on Front Elevation of No. 31 Torrington Square

Note: A positive value denotes movement along the wall towards the site and vice versa.

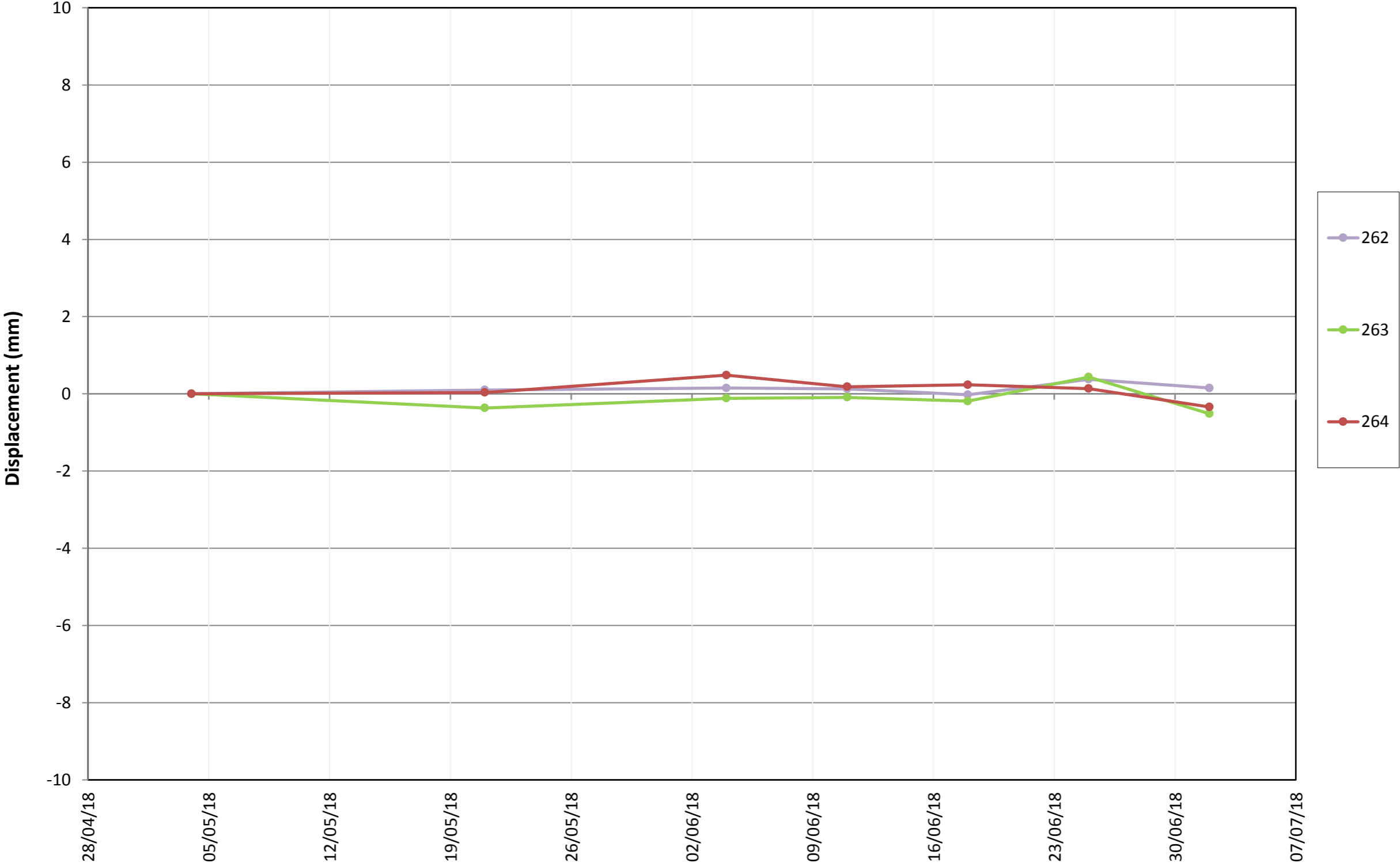


# Vertical Displacement Graph



Graph 14V - Targets on Front Elevation of No. 31 Torrington Square

Note: +ve value denotes heave, -ve value denotes settlement.



Absolute accuracy of readings: ±2mm

A positive value in the dE column, denotes positive movement in the Eastings coordinate plane and vice versa.

A positive value in the dN column, denotes positive movement in the Northings coordinate plane and vice versa.

A positive value in the dElev column, denotes heave and vice versa

Site Engineering Surveys Ltd.

32-33 Torrington Square

Job no. 10215

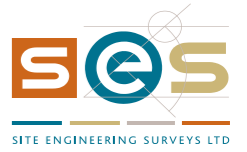


Point	Date of base readings	Average Base readings			Diff to base (mm)			Diff to base (mm)			Diff to base (mm)			Diff to base (mm)		
					11/06/18			18/06/18			25/06/18			02/07/18		
		Easting	Northing	Level	dE	dN	dElev	dE	dN	dElev	dE	dN	dElev	dE	dN	dElev

**Targets on Heating Tunnel**

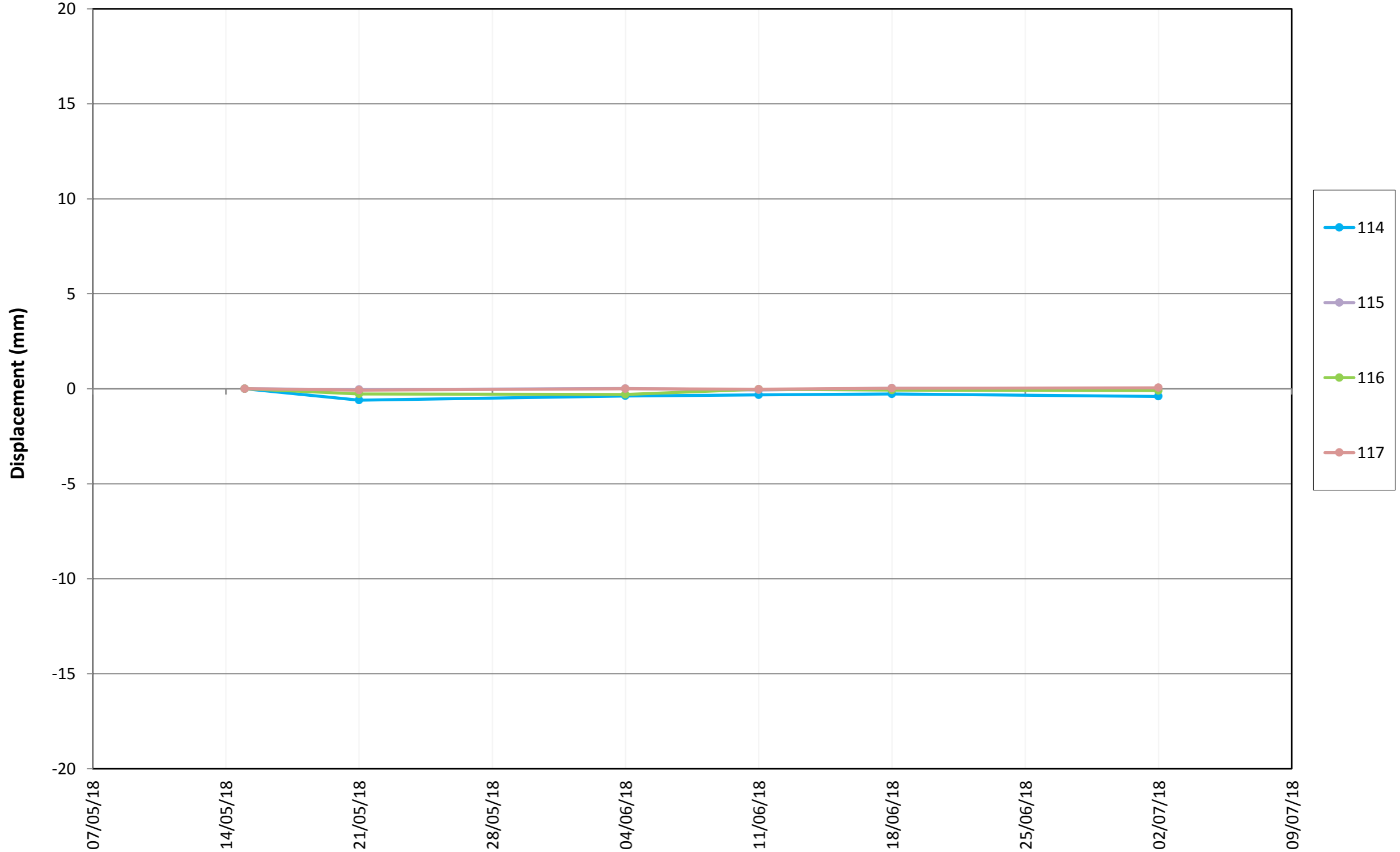
114	15/05/18	511.079	295.654	9.701	1	0	0	1	0	0	No access- Asbestos removal	1	0	0
115	15/05/18	512.070	295.486	8.437	1	0	0	1	0	0		1	0	0
116	15/05/18	509.279	295.930	9.424	-1	0	0	0	0	0		1	0	0
117	15/05/18	508.847	296.036	7.905	1	0	0	1	0	0		1	0	0
118	15/05/18	506.347	296.876	8.966	1	0	0	1	0	0		1	0	0
119	15/05/18	507.339	296.759	6.969	1	0	0	1	0	0		1	0	0
120	15/05/18	503.972	296.967	9.551	1	0	0	1	0	0		1	0	0
121	15/05/18	504.162	297.123	6.820	1	0	0	1	0	0		1	0	0

# Transverse Displacement Graph

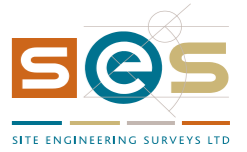


Graph 16T - Targets on Heating Tunnel

Note: A positive value denotes movement towards The Warburg Institute and vice versa.

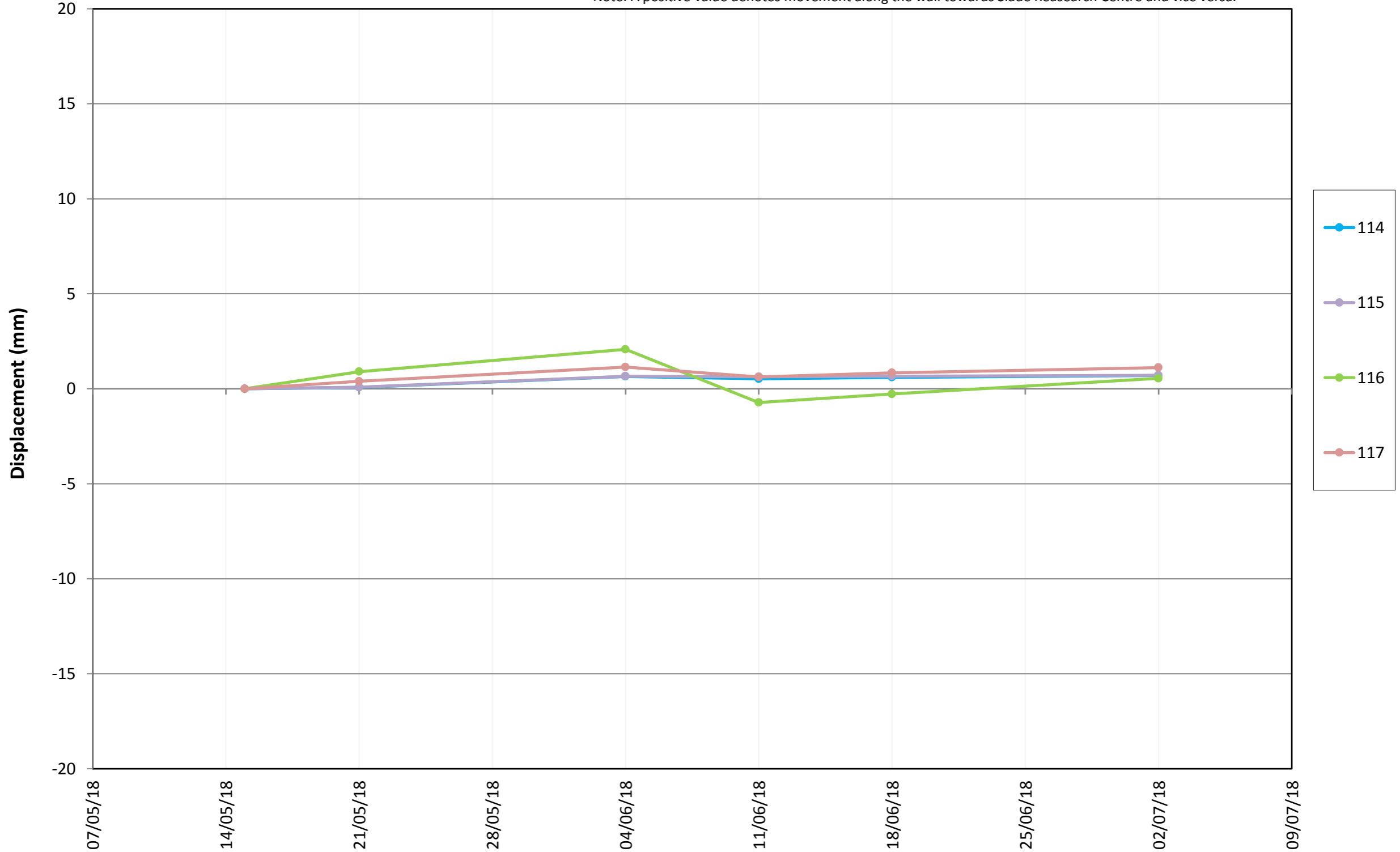


# Longitudinal Displacement Graph

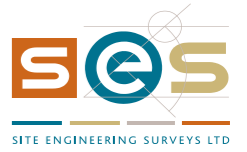


Graph 16L - Targets on Heating Tunnel

Note: A positive value denotes movement along the wall towards Slade Research Centre and vice versa.

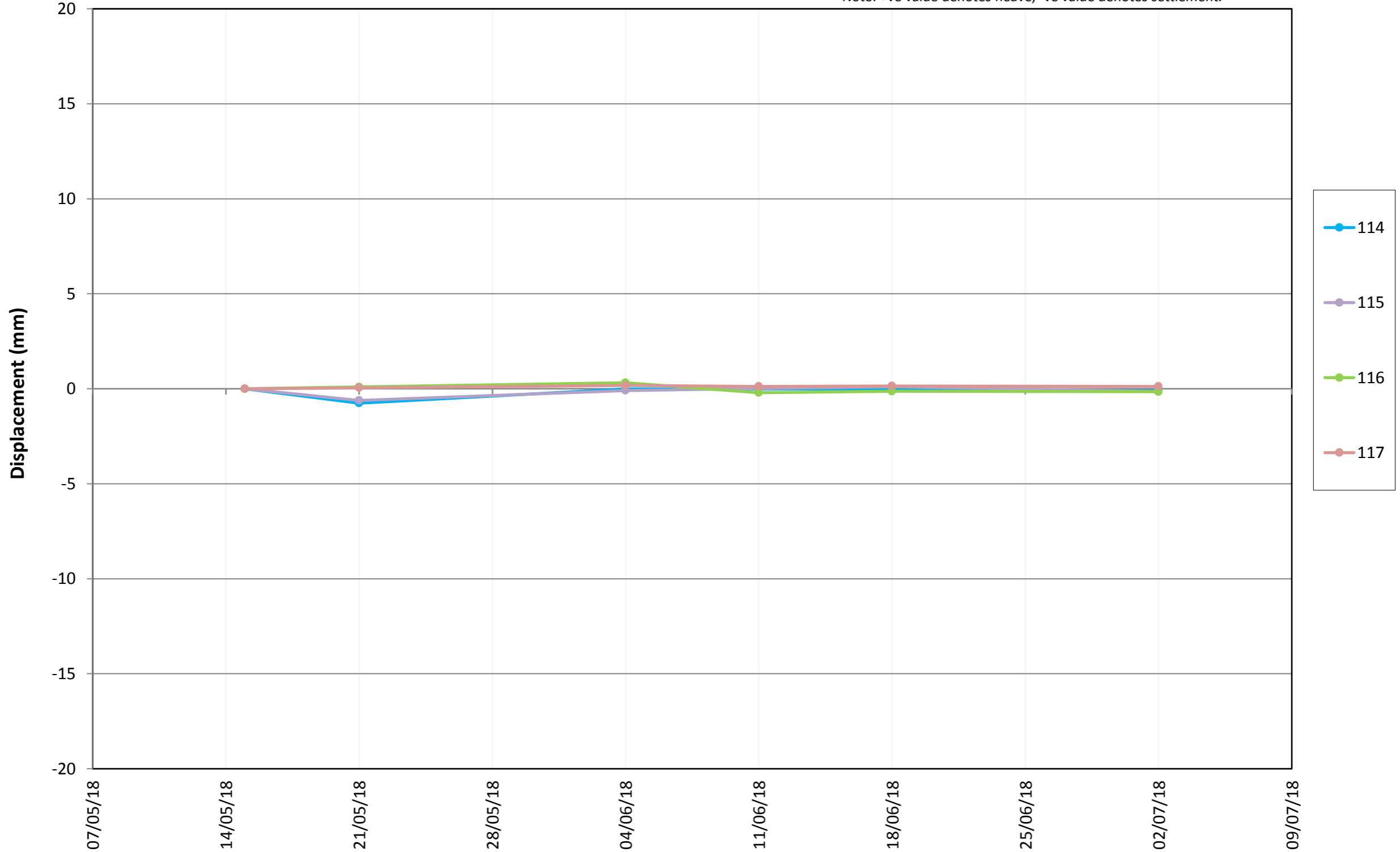


# Vertical Displacement Graph

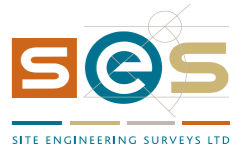


Graph 16V - Targets on Heating Tunnel

Note: +ve value denotes heave, -ve value denotes settlement.

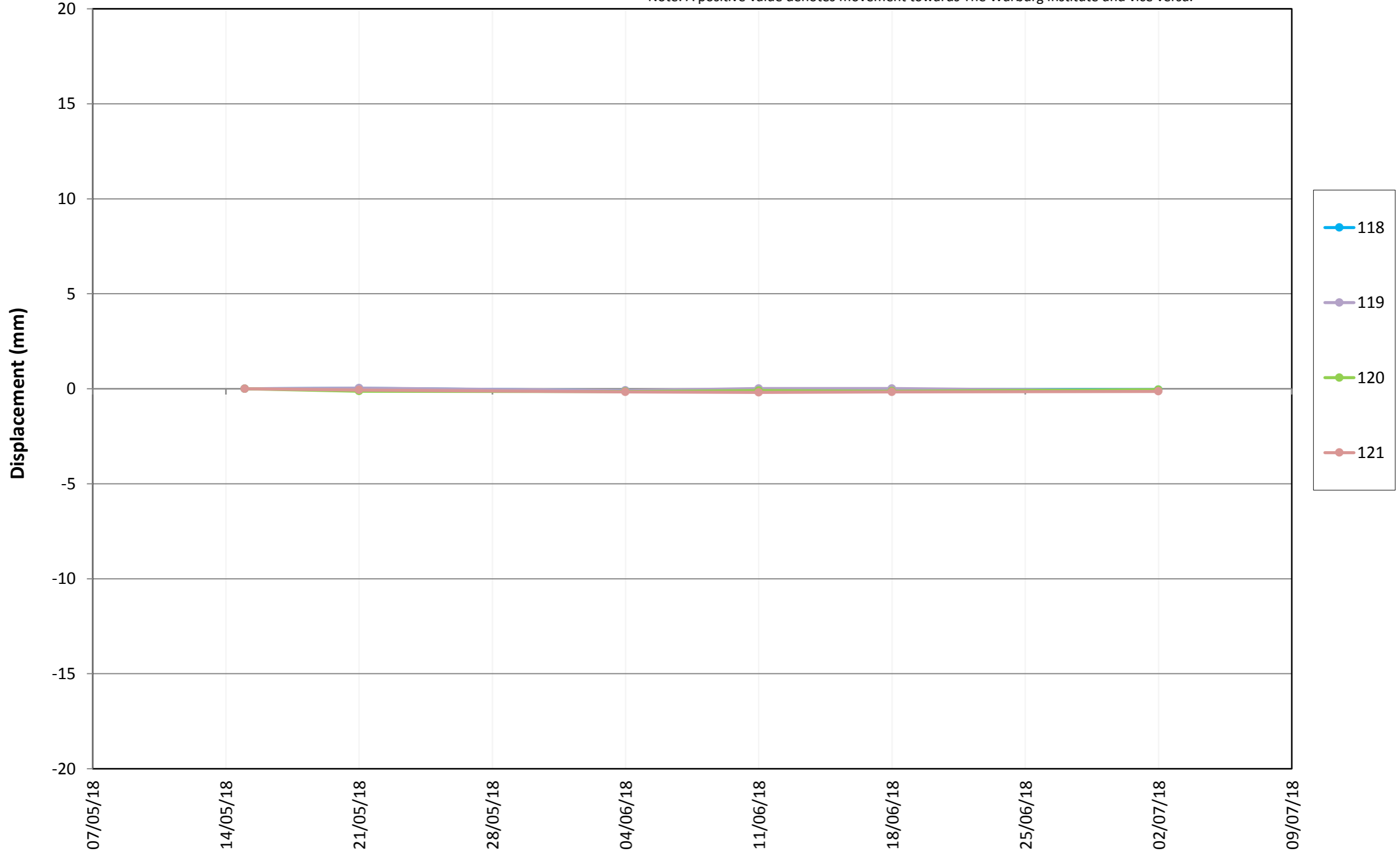


# Transverse Displacement Graph



Graph 17T - Targets on Heating Tunnel

Note: A positive value denotes movement towards The Warburg Institute and vice versa.

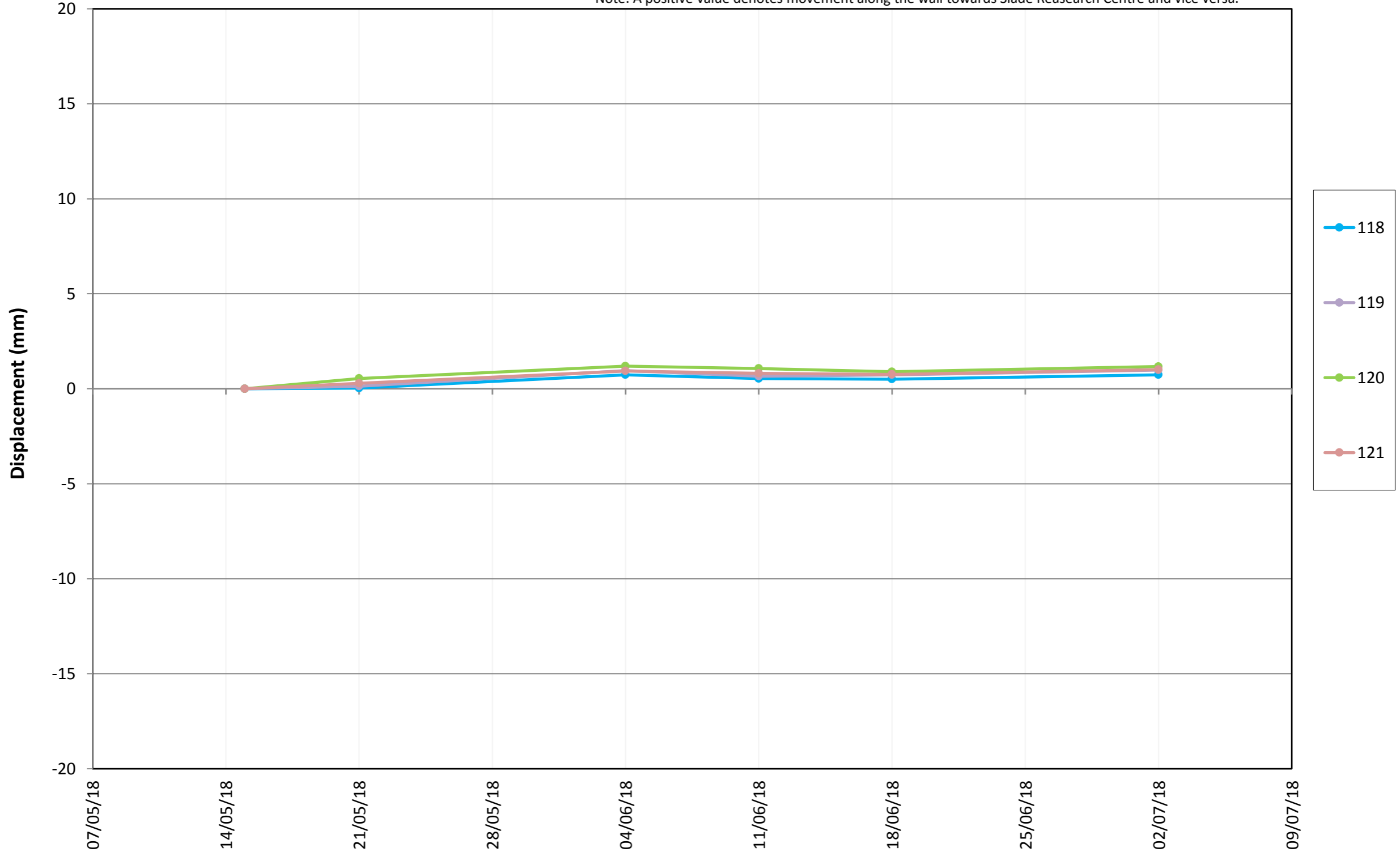


# Longitudinal Displacement Graph



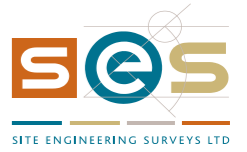
Graph 17L - Targets on Heating Tunnel

Note: A positive value denotes movement along the wall towards Slade Research Centre and vice versa.



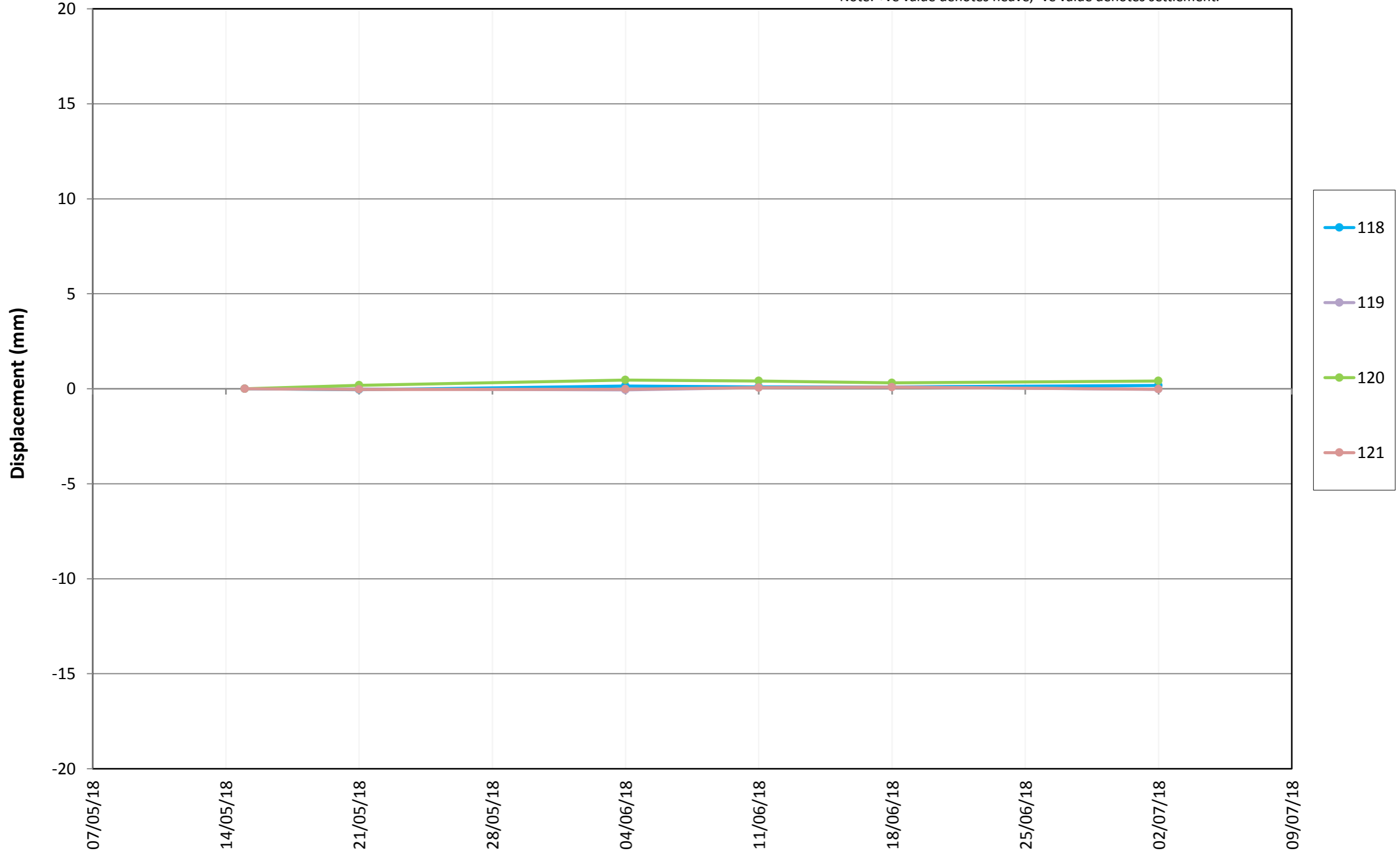


# Vertical Displacement Graph



Graph 17V - Targets on Heating Tunnel

Note: +ve value denotes heave, -ve value denotes settlement.



Notes: A positive difference denotes heave and vice versa

Site Engineering Surveys Ltd.  
32-33 Torrington Square  
Job no. 10215



## Precise Levels

Point	Type	Date of base readings	Average	Level	Diff (mm)	Level	Diff (mm)	Level	Diff (mm)	Level	Diff (mm)	Level	Diff (mm)	Level	Diff (mm)
				21/05/18	04/06/18	11/06/18	18/06/18	25/06/18	02/07/18						
<b>Precise Level Points along Torrington Square</b>															
101	Stud	10/05/18	10.1537	10.1541	0.4	10.1541	0.3	10.1540	0.2	10.1544	0.6	10.1542	0.5	10.1544	0.6
102	Stud	10/05/18	10.1406	10.1411	0.5	10.1413	0.6	10.1412	0.5	10.1412	0.6	10.1409	0.3	10.1410	0.4
103	Stud	10/05/18	10.2904	10.2906	0.2	10.2908	0.4	10.2908	0.4	10.2907	0.3	10.2906	0.2	10.2904	0.0
104	Stud	10/05/18	10.3225	10.3227	0.2	10.3227	0.2	10.3231	0.6	10.3229	0.4	10.3233	0.8	10.3226	0.1
105	Stud	10/05/18	10.3768	10.3770	0.2	10.3772	0.4	10.3773	0.5	10.3771	0.4	10.3776	0.8	10.3770	0.3
106	Stud	10/05/18	10.3685	10.3684	-0.1	10.3683	-0.2	10.3686	0.2	10.3687	0.2	10.3688	0.4	10.3683	-0.2
107	Stud	10/05/18	10.4464	10.4465	0.1	10.4468	0.4	10.4471	0.7	10.4468	0.5	10.4472	0.9	10.4468	0.4
108	Stud	10/05/18	10.4890	10.4888	-0.2	10.4890	0.0	10.4893	0.4	10.4890	0.1	10.4893	0.4	10.4891	0.1
<b>Precise Level Points along courtyard</b>															
109	Stud	10/05/18	7.3923	7.3924	0.1	7.3924	0.2	7.3927	0.4	7.3925	0.2	7.3925	0.3	7.3925	0.2
110	Stud	10/05/18	7.4089	7.4092	0.2	7.4092	0.2	7.4091	0.2	7.4089	-0.1	7.4092	0.3	7.4091	0.2
111	Stud	10/05/18	7.3493	7.3499	0.5	Disturbed		7.3496	0.3	7.3494	0.1	7.3497	0.4	7.3496	0.2
112	Stud	10/05/18	7.3331	7.3336	0.5	7.3332	0.1	7.3333	0.3	7.3331	0.1	7.3333	0.2	7.3328	-0.2
113	Stud	10/05/18	7.3241	7.3246	0.5	7.3246	0.5	7.3245	0.4	7.3244	0.3	7.3247	0.6	7.3247	0.6
<b>Precise Level Points on Front Elevation of The Warburg Institute</b>															
301	Barcode	17/05/18	11.3331	11.3333	0.2	11.3333	0.2	11.3336	0.5	11.3334	0.3	11.3332	0.1	11.3332	0.1
302	Barcode	17/05/18	11.5600	11.5600	0.0	11.5598	-0.2	11.5600	-0.1	11.5598	-0.2	11.5595	-0.5	11.5597	-0.4
<b>Precise Level Points on Side Elevation of The Warburg Institute</b>															
303	Barcode	17/05/18	10.5505	10.5502	-0.3	10.5503	-0.2	10.5505	0.0	10.5504	-0.1	10.5505	0.0	10.5507	0.2
<b>Precise Level Points on Rear Elevation of The Warburg Institute</b>															
304	Barcode	10/05/18	7.5766	7.5768	0.2	7.5766	0.0	7.5768	0.3	7.5767	0.1	7.5769	0.3	7.5767	0.1
305	Barcode	10/05/18	7.4026	7.4028	0.2	7.4029	0.3	7.4028	0.2	7.4029	0.3	7.4033	0.7	7.4030	0.4
<b>Precise Level Points on Side Elevation of No. 32 Torrington Square</b>															
306	Barcode	10/05/18	11.6650	11.6648	-0.2	11.6650	0.0	11.6653	0.3	11.6650	0.0	11.6655	0.4	11.6648	-0.2
307	Barcode	10/05/18	11.6995	11.6995	0.0	11.6995	0.0	11.6999	0.5	11.6996	0.1	11.7000	0.6	11.6992	-0.2

Notes: A positive difference denotes heave and vice versa

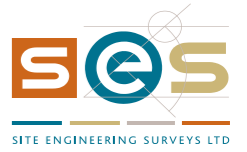
Site Engineering Surveys Ltd.  
32-33 Torrington Square  
Job no. 10215



## Precise Levels

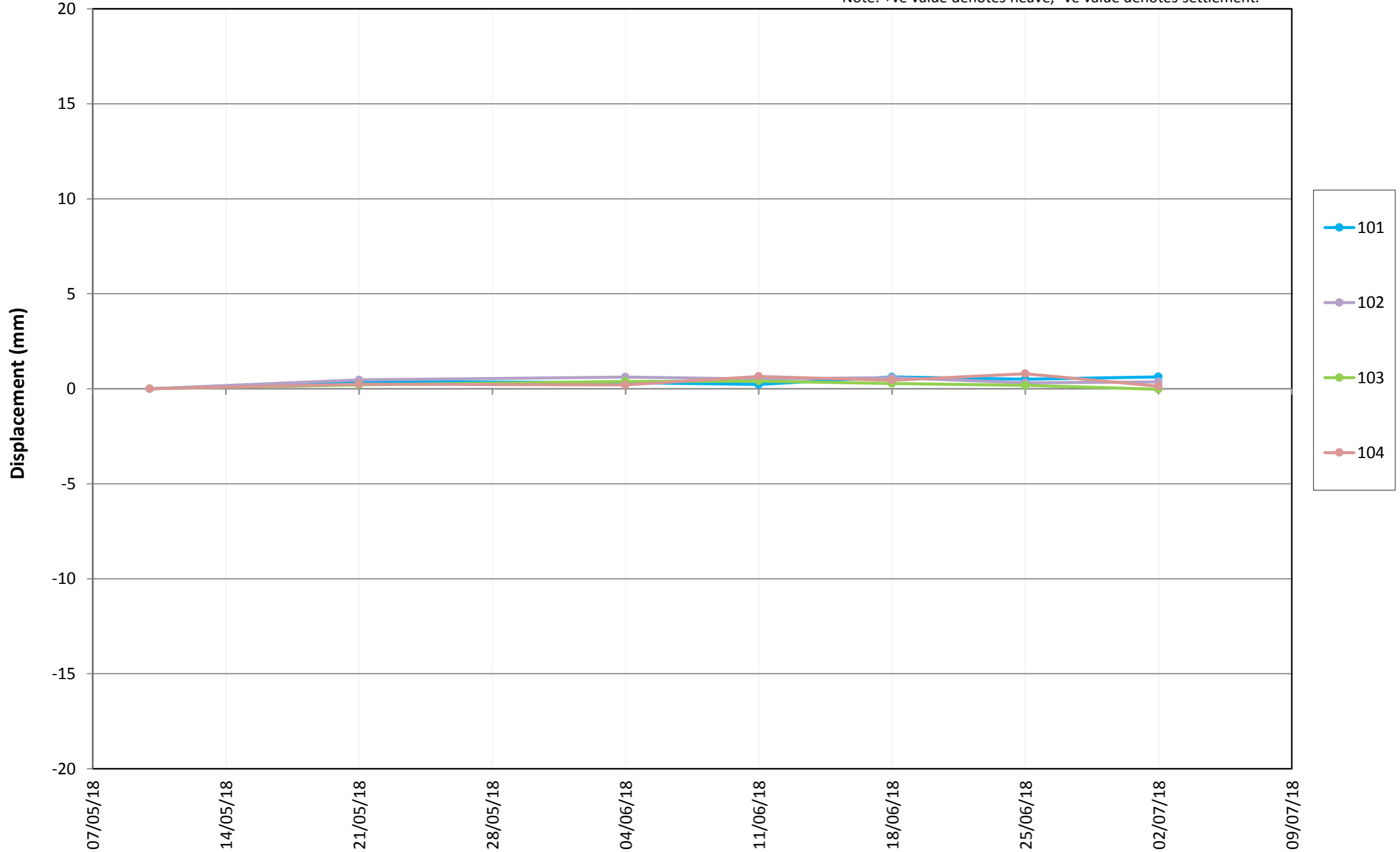
Point	Type	Date of base readings	Average	Level	Diff (mm)	Level	Diff (mm)	Level	Diff (mm)	Level	Diff (mm)	Level	Diff (mm)	Level	Diff (mm)
				21/05/18	04/06/18	11/06/18	18/06/18	25/06/18	02/07/18						
<b>Precise Level Points on Front Elevation of No. 32 Torrington Square</b>															
308	Barcode	17/05/18	11.7717	11.7717	0.0	11.7717	0.0	11.7719	0.3	11.7720	0.3	Asbestos works		11.7715	-0.2
309	Barcode	17/05/18	11.3719	11.3714	-0.4	11.3719	0.0	11.3719	0.1	11.3721	0.2	11.3720	0.1	11.3718	-0.1
<b>Precise Level Points on Front Elevation of No. 31 Torrington Square</b>															
310	Barcode	10/05/18	11.2639	11.2639	0.1	11.2643	0.4	11.2643	0.5	11.2644	0.5	11.2646	0.8	11.2639	0.0
311	Barcode	10/05/18	11.5500	11.5502	0.2	11.5504	0.4	11.5503	0.3	11.5503	0.3	11.5505	0.5	11.5501	0.1
312	Barcode	10/05/18	11.3591	11.3595	0.3	11.3595	0.4	11.3596	0.5	11.3594	0.3	11.3588	-0.4	11.3592	0.1
<b>Precise Level Points on Staircase</b>															
313	Barcode	17/05/18	8.4376	8.4374	-0.1	8.4373	-0.3	8.4374	-0.2	8.4373	-0.2	8.4378	0.2	8.4374	-0.2
314	Barcode	17/05/18	8.4817	8.4817	-0.1	8.4816	-0.2	8.4817	0.0	8.4815	-0.2	8.4821	0.4	8.4818	0.1
315	Barcode	17/05/18	8.5875	8.5873	-0.2	8.5872	-0.3	8.5872	-0.3	8.5871	-0.4	8.5877	0.2	8.5873	-0.2
316	Barcode	17/05/18	8.5552	8.5552	0.0	8.5549	-0.2	8.5550	-0.2	8.5550	-0.2	8.5555	0.3	8.5551	-0.1
<b>Benchmarks</b>															
1001	Stud	10/05/18	9.7800	9.7800	0.0	9.7800	0.0	9.7800	0.0	9.7800	0.0	9.7800	0.0	9.7800	0.0
1002	Stud	10/05/18	9.4801	9.4802	0.1	9.4801	0.0	9.4801	-0.1	9.4805	0.4	9.4801	0.0	9.4800	-0.1
1003	Stud	10/05/18	9.8229	9.8231	0.2	9.8231	0.2	9.8230	0.2	9.8229	0.1	9.8232	0.3	9.8230	0.1
1004	Stud	10/05/18	7.6630	7.6630	0.0	7.6630	0.0	7.6630	0.0	7.6630	0.0	7.6630	0.0	7.6630	0.0
1005	Stud	10/05/18	7.7993	7.7996	0.2	7.7996	0.2	7.7996	0.2	7.7995	0.1	7.7994	0.0	7.7992	-0.1

# Vertical Displacement Graph

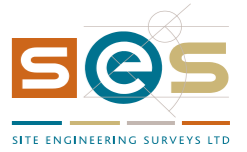


Graph 01 - Precise Level Points along Torrington Square

Note: +ve value denotes heave, -ve value denotes settlement.

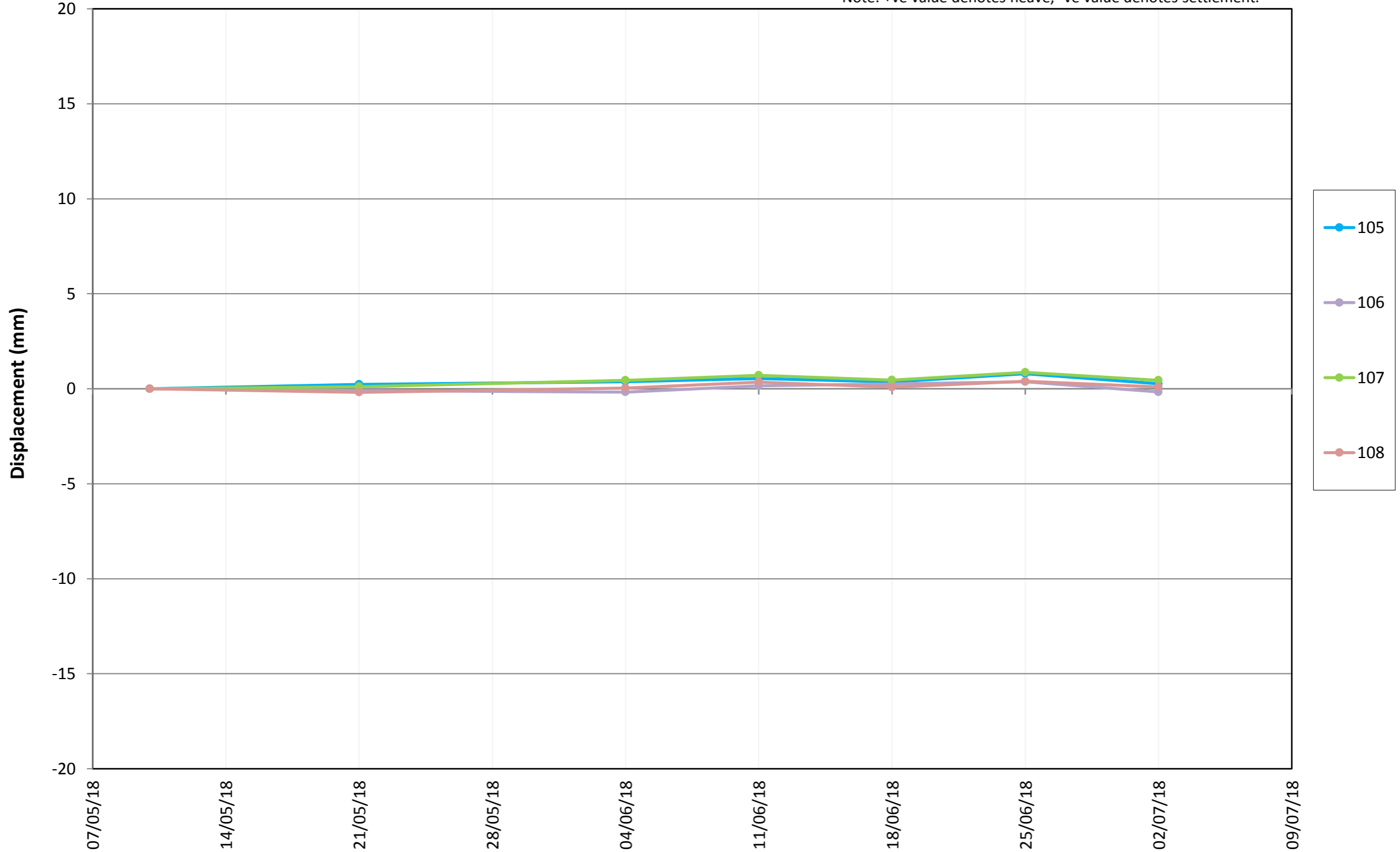


# Vertical Displacement Graph

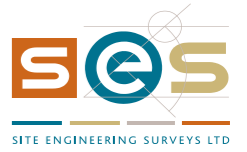


Graph 02 - Precise Level Points along Torrington Square

Note: +ve value denotes heave, -ve value denotes settlement.

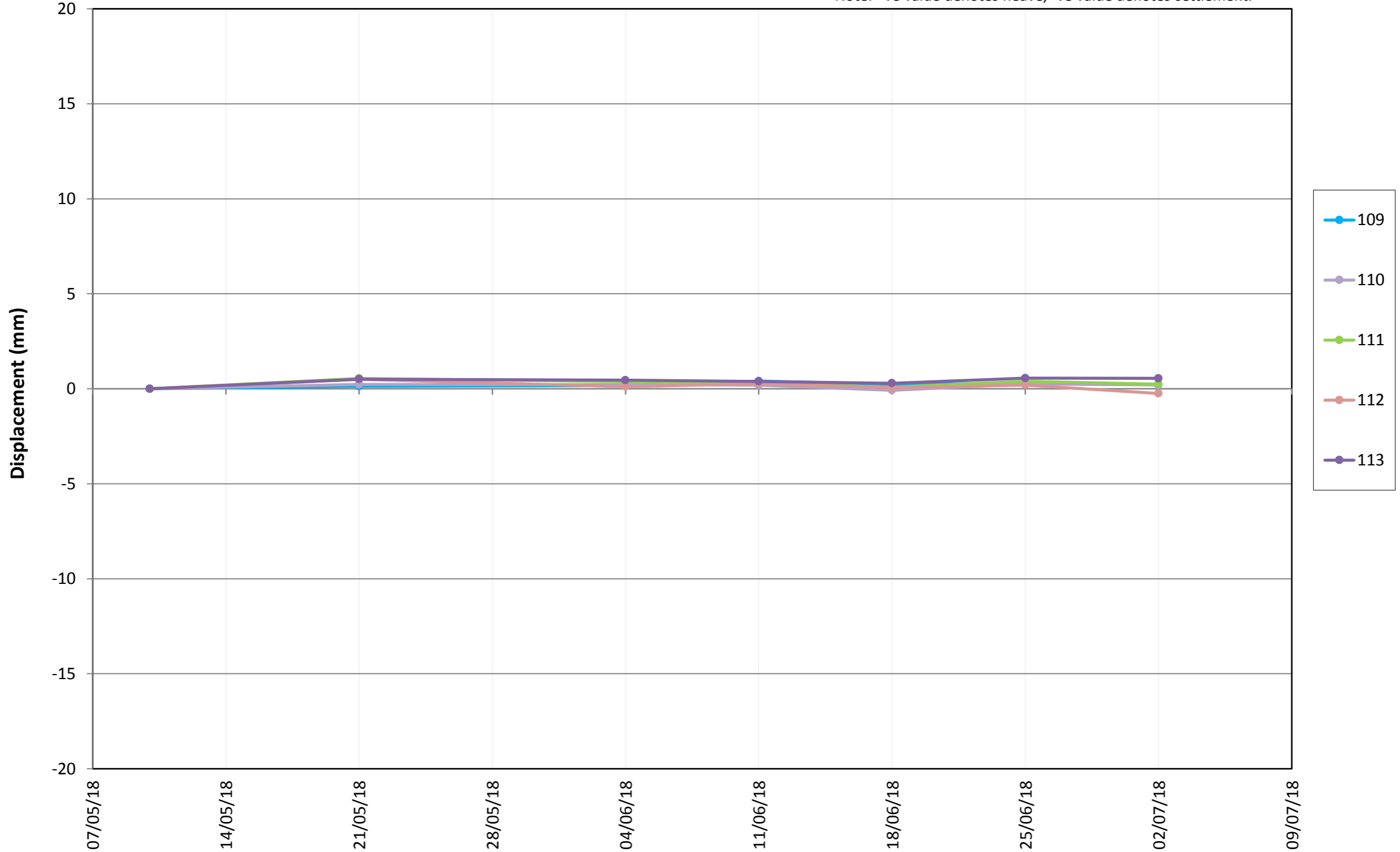


# Vertical Displacement Graph

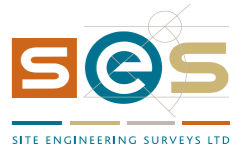


Graph 03 - Precise Level Points along courtyard

Note: +ve value denotes heave, -ve value denotes settlement.

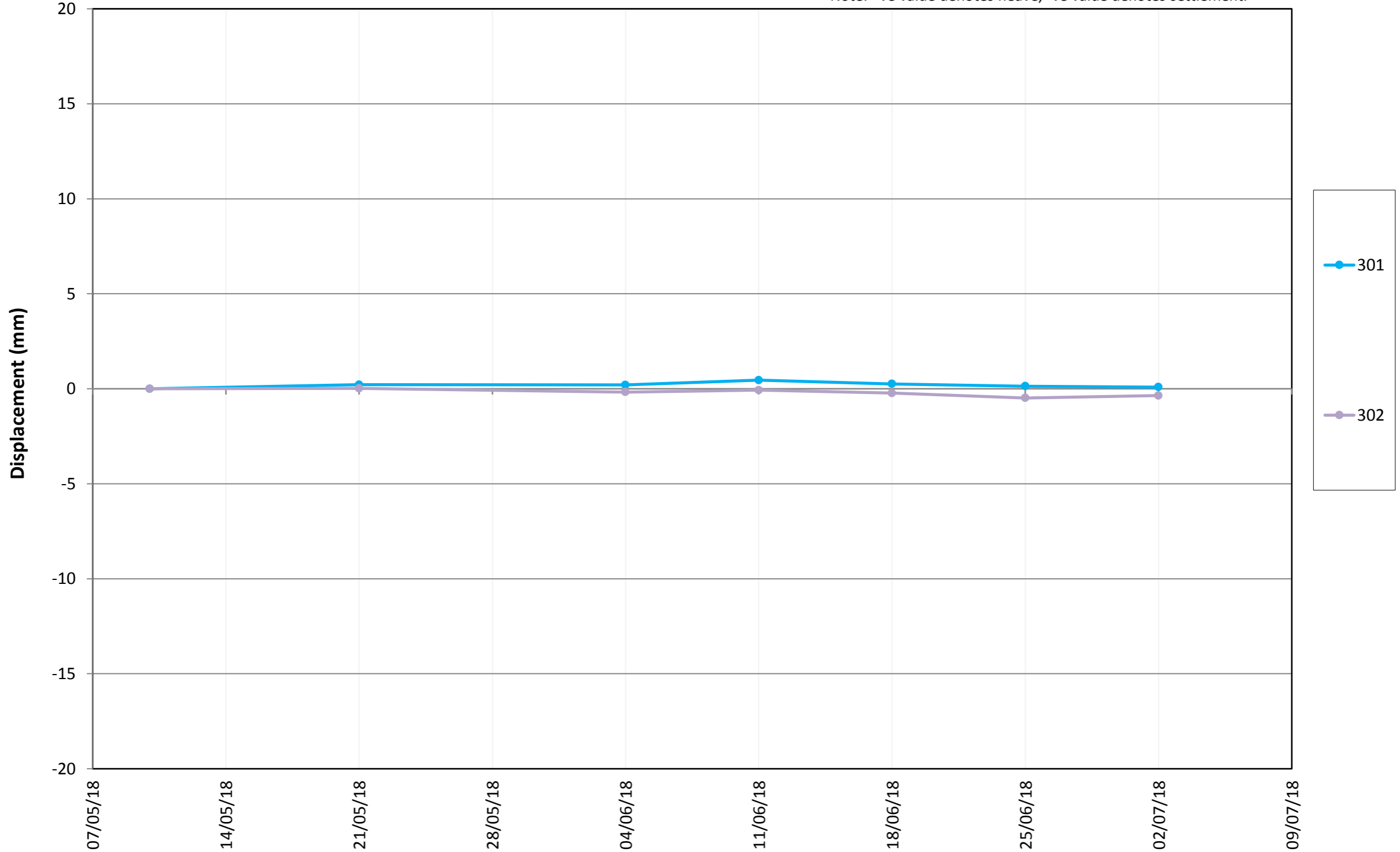


# Vertical Displacement Graph



Graph 04 - Precise Level Points on Front Elevation of The Warburg Institute

Note: +ve value denotes heave, -ve value denotes settlement.

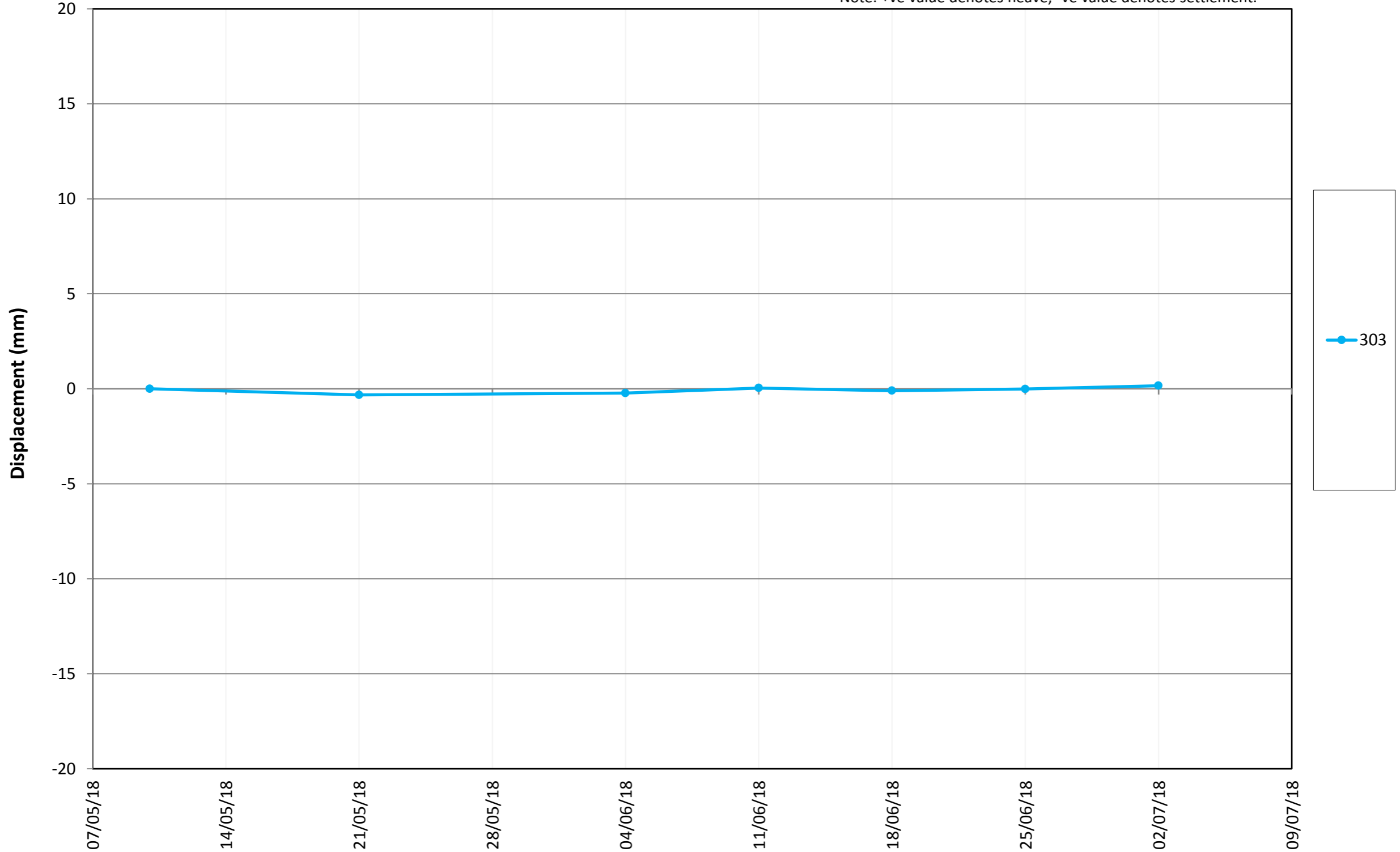


# Vertical Displacement Graph



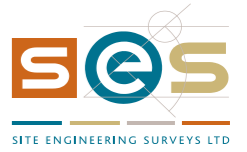
Graph 05 - Precise Level Points on Side Elevation of The Warburg Institute

Note: +ve value denotes heave, -ve value denotes settlement.



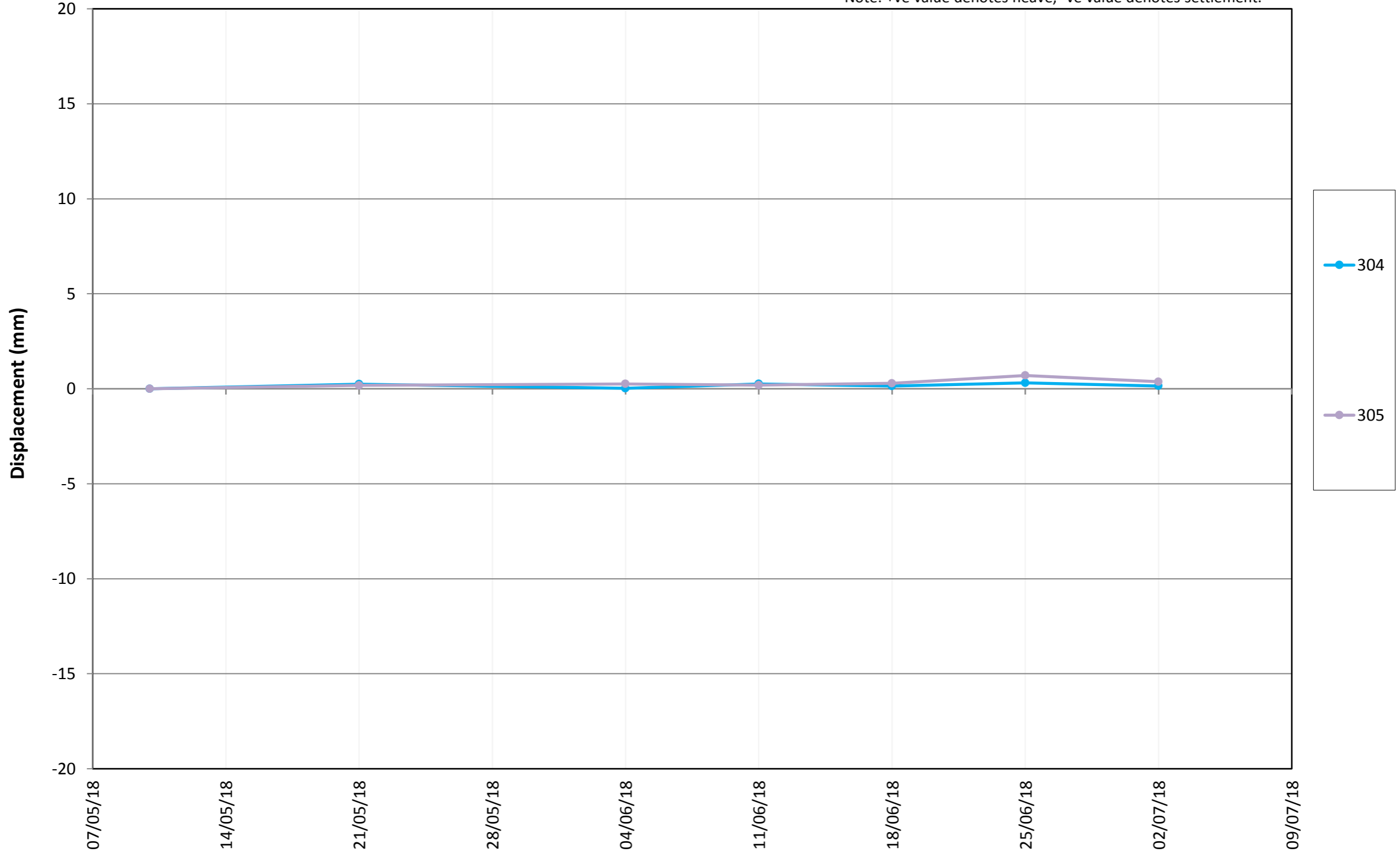


# Vertical Displacement Graph

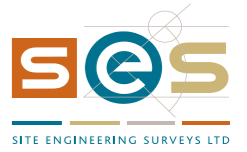


Graph 06 - Precise Level Points on Rear Elevation of The Warburg Institute

Note: +ve value denotes heave, -ve value denotes settlement.

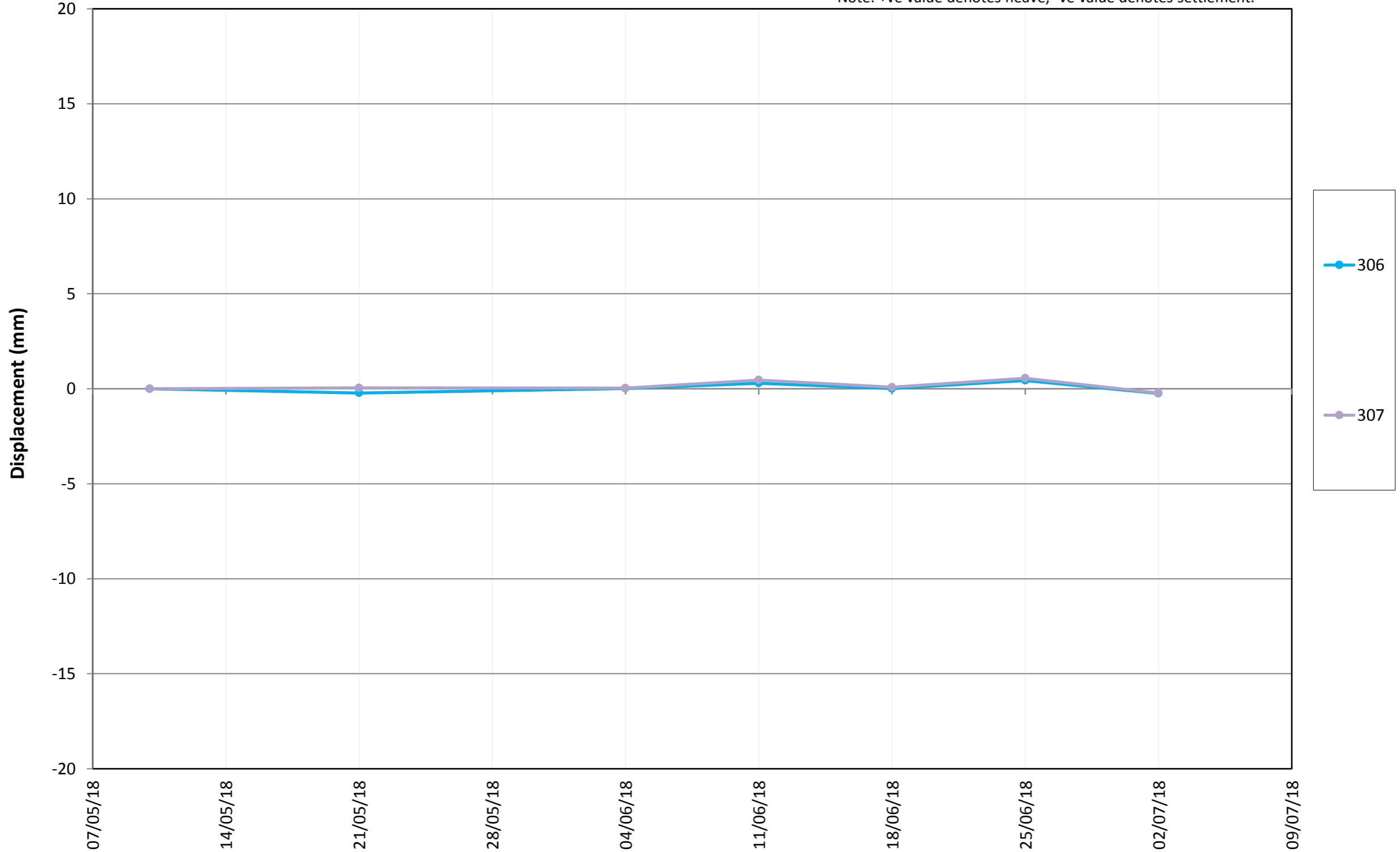


# Vertical Displacement Graph

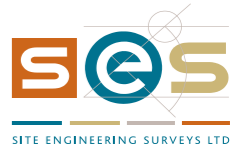


Graph 07 - Precise Level Points on Side Elevation of No. 32 Torrington Square

Note: +ve value denotes heave, -ve value denotes settlement.

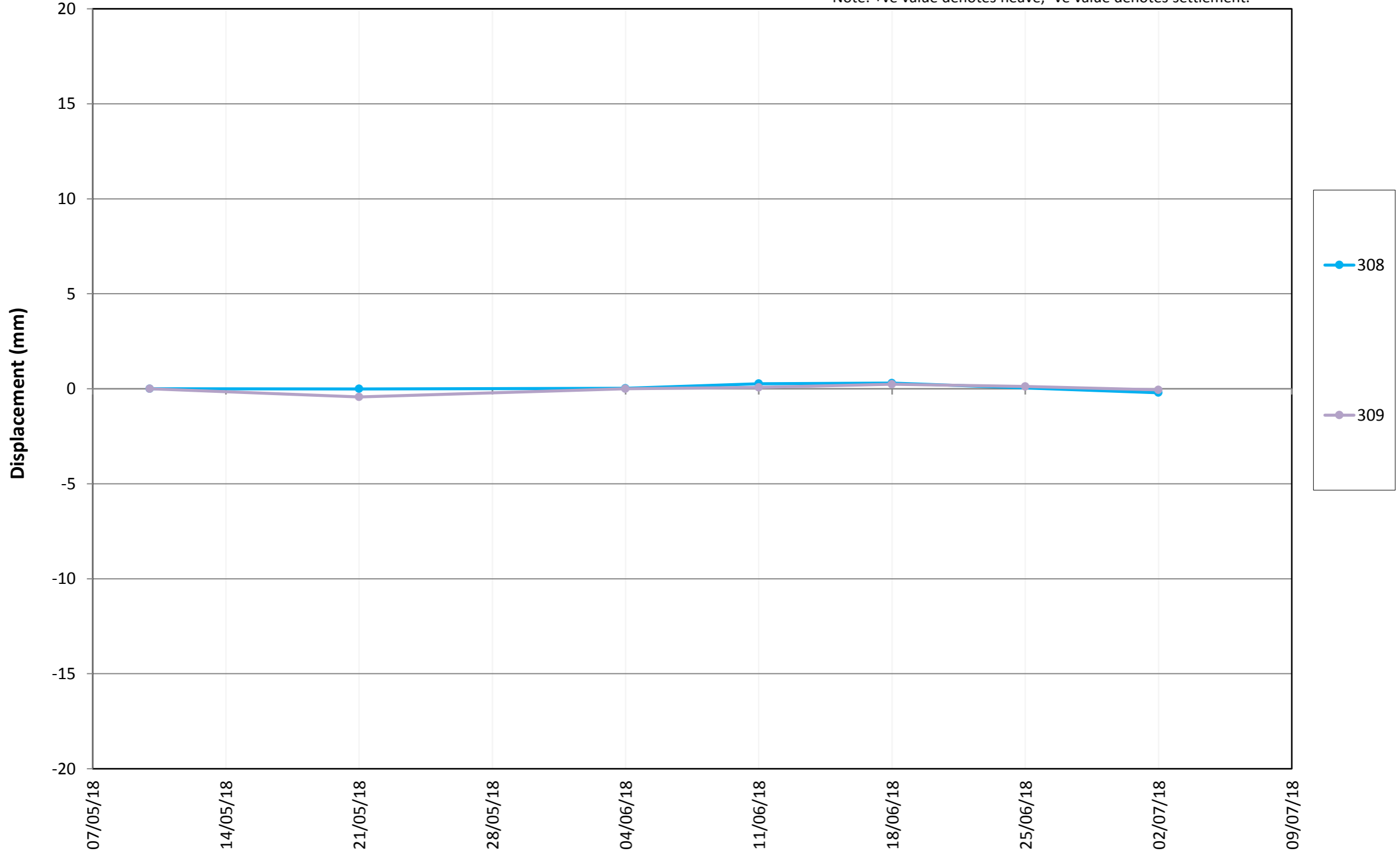


# Vertical Displacement Graph

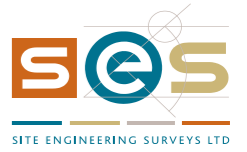


Graph 08 - Precise Level Points on Front Elevation of No. 32 Torrington Square

Note: +ve value denotes heave, -ve value denotes settlement.

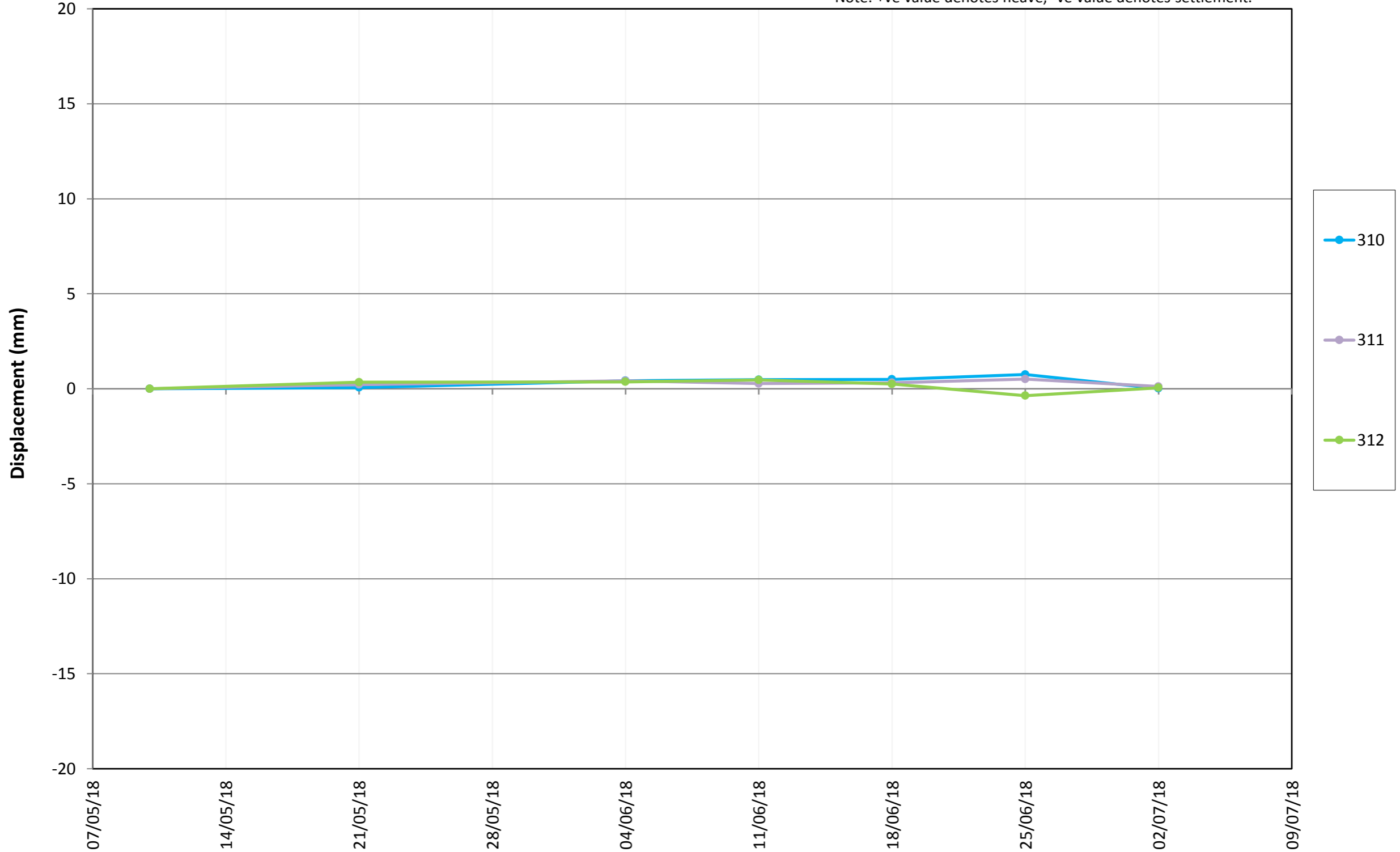


# Vertical Displacement Graph

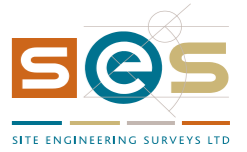


Graph 09 - Precise Level Points on Front Elevation of No. 31 Torrington Square

Note: +ve value denotes heave, -ve value denotes settlement.

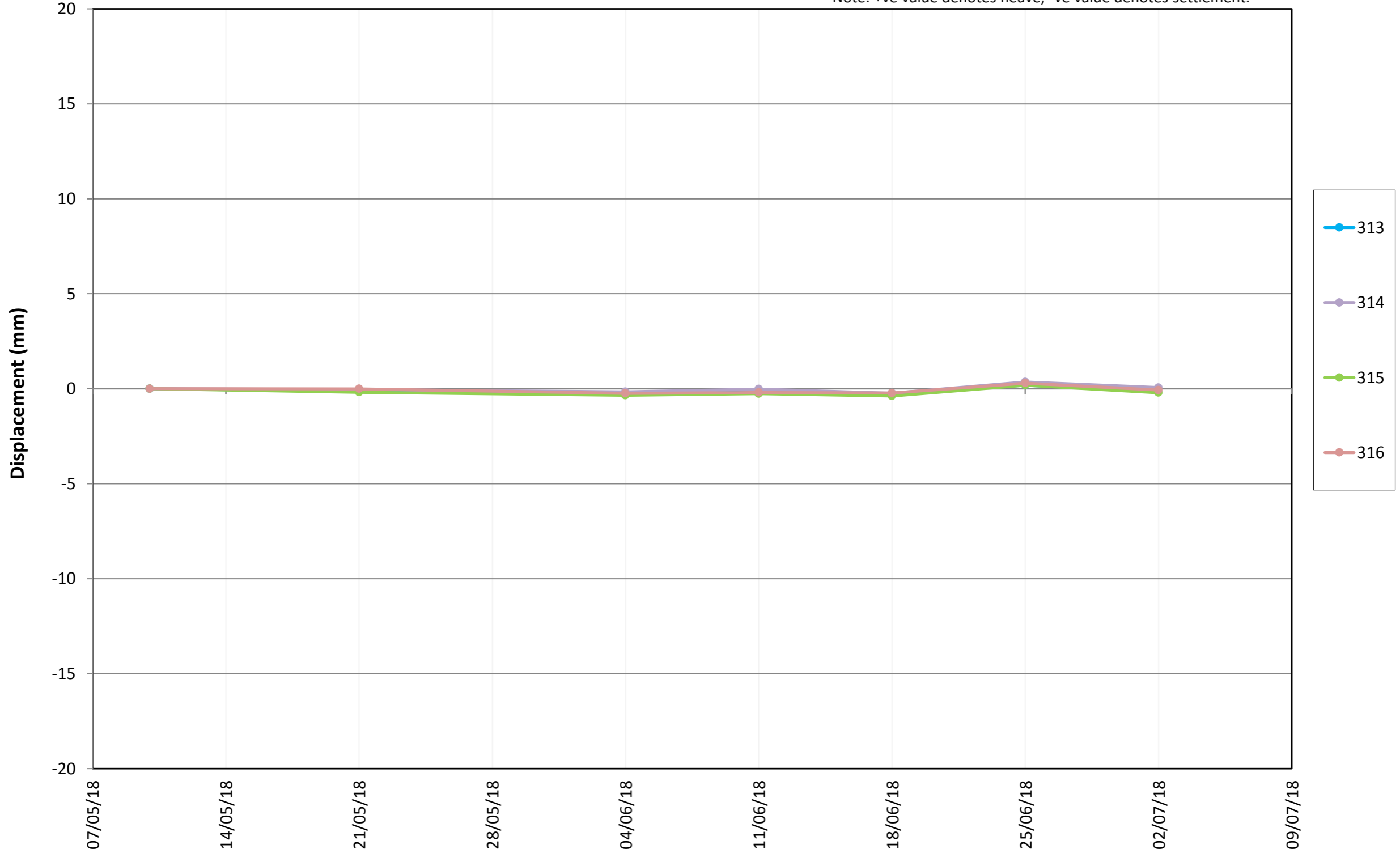


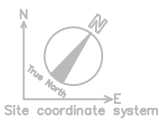
# Vertical Displacement Graph



Graph 10 - Precise Level Points on Staircase

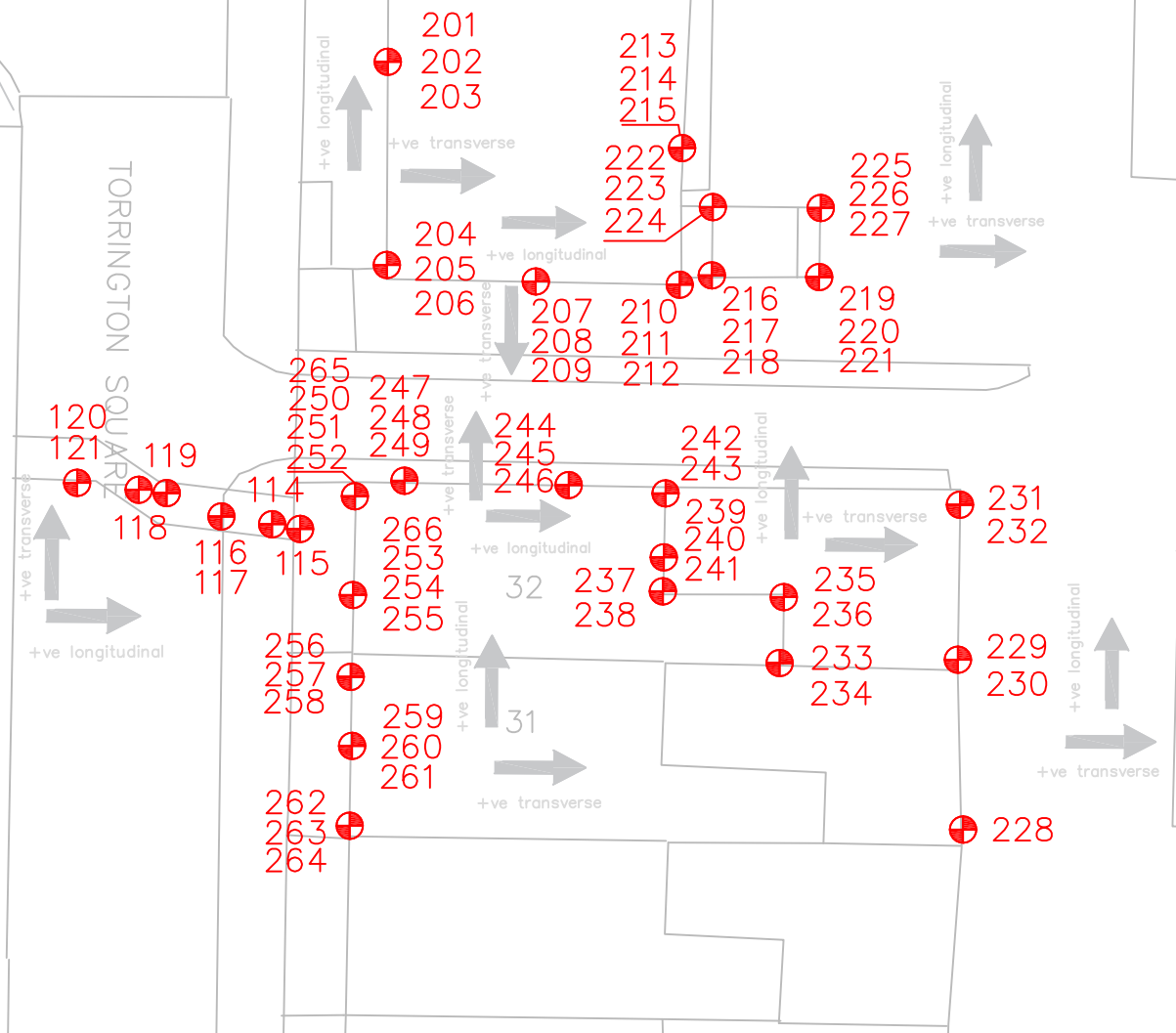
Note: +ve value denotes heave, -ve value denotes settlement.





# The Warburg Institute

TORRINGTON SQUARE



NOTES:

**Legend:**

- Monitoring target

Coordinate system orientated to be square with elevation of Nos. 32-33 Torrington Square

NO	REVISIONS	DATE	BY
01	Arrows added	06/06/18	DD
	Issued to client	23/05/18	IP

CLIENT

**8 Build**

PROJECT TITLE

**32-33 Torrington Square**

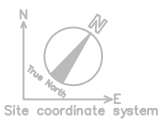
TITLE

**Monitoring 3D Targets Location Plan**

SURVEYED	DRAWN	CHECKED	DATE	SCALE @A3
PL	IP	-	17/05/18	NTS

16 Tiller Court  
Tiller Road  
London E14 8PX  
Tel: (020) 7538 0870  
Fax: (020) 7537 4355  
Email: office@sesltd.uk.com

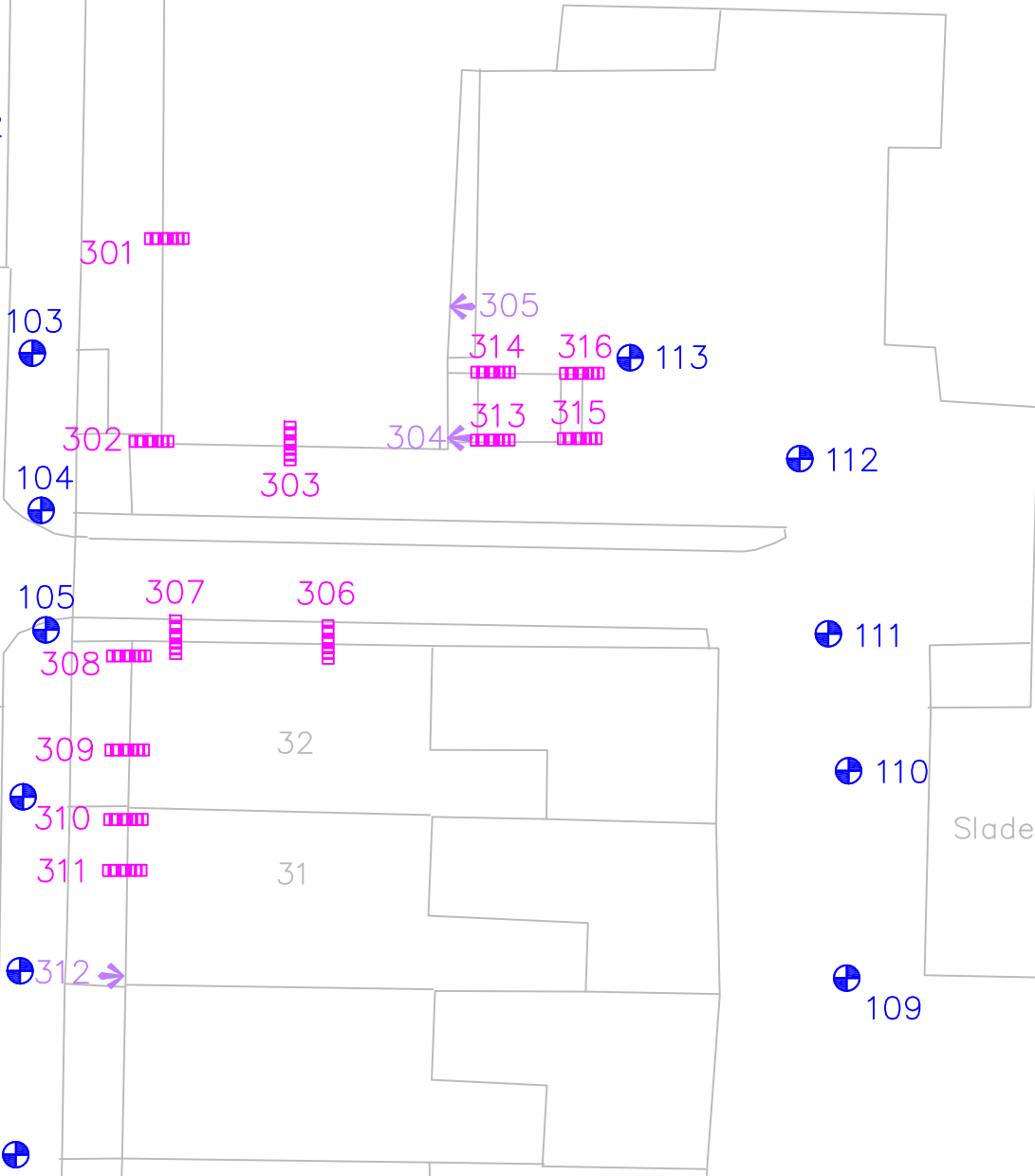
JOB No	DRAWING No	REV
10215	SES/10215/MON1	01



101  
102  
103  
104  
105  
106  
107  
108

TORRINGTON SQUARE

The Warburg Institute



Slade Research Centre

NOTES:

Legend:

- Barcode
- BRE
- Stud

Issued to client	23/05/18	IP
REVISIONS	DATE	BY

CLIENT

8 Build

PROJECT TITLE

32-33 Torrington Square

TITLE

Monitoring PLPs Location Plan

SURVEYED	DRAWN	CHECKED	DATE	SCALE @A3
PL	IP	-	17/05/18	NTS



**SITE ENGINEERING SURVEYS LTD**

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Fax: (020) 7537 4355  
Email: office@sesltd.uk.com

JOB No	DRAWING No	REV
10215	SES/10215/MON2	