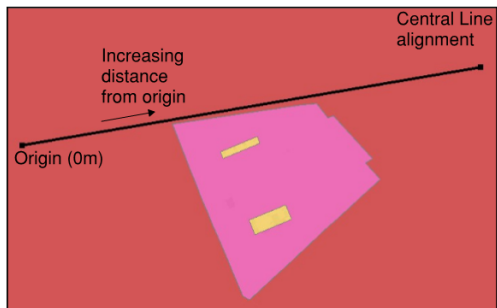
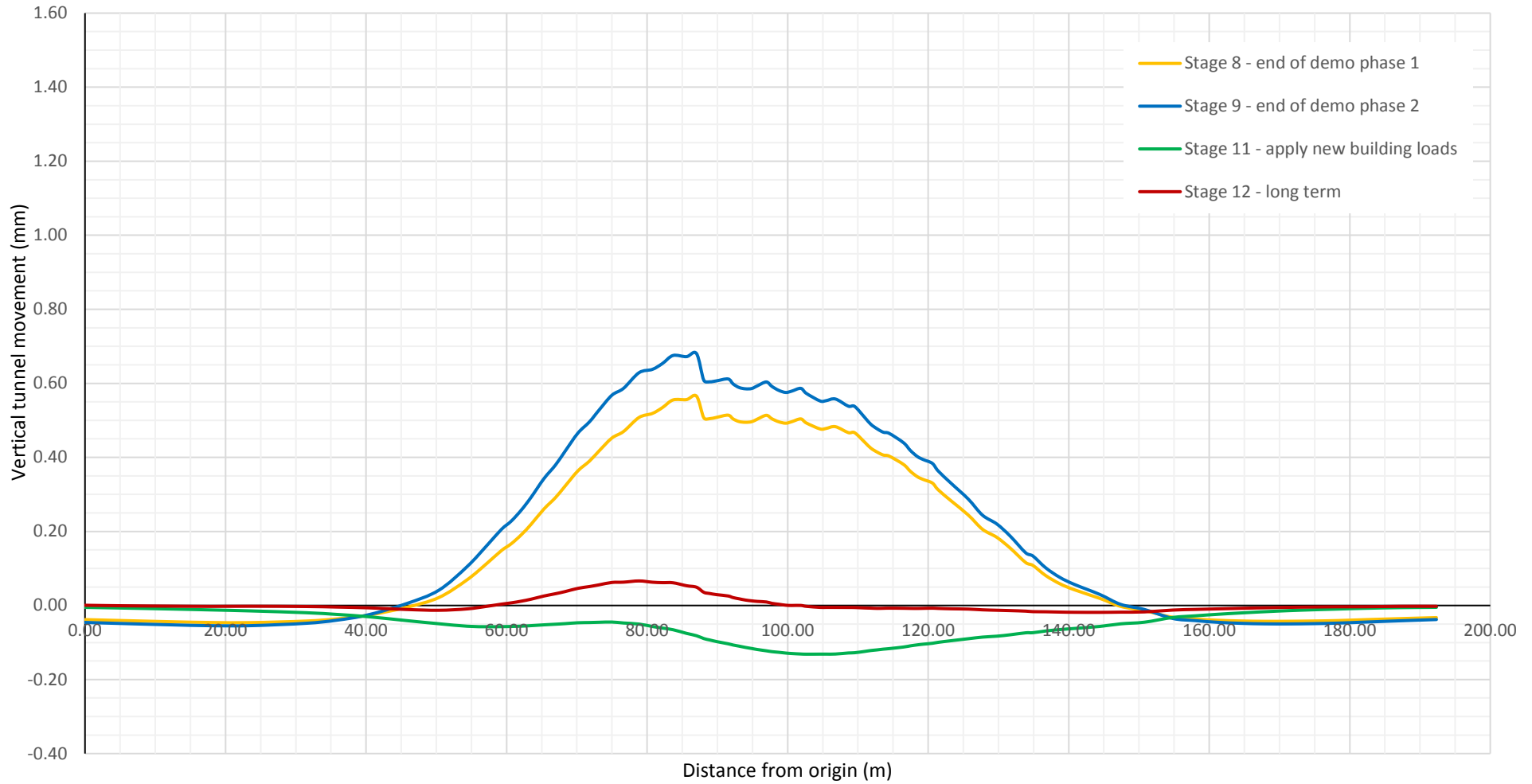


**Notes:**  
 Positive = Upwards displacement (heave)  
 Negative = Downwards displacement (settlement)  
 Cumulative displacement measured from tunnel construction (stage 3)

**THE POST BUILDING  
 Horizontal Displacement**

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**Figure 18**

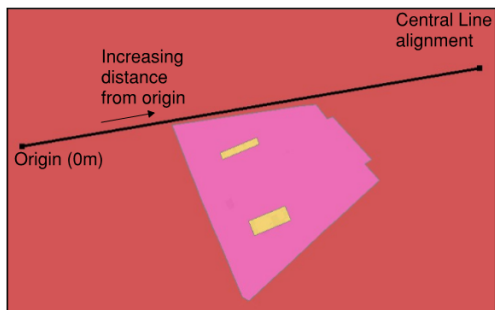
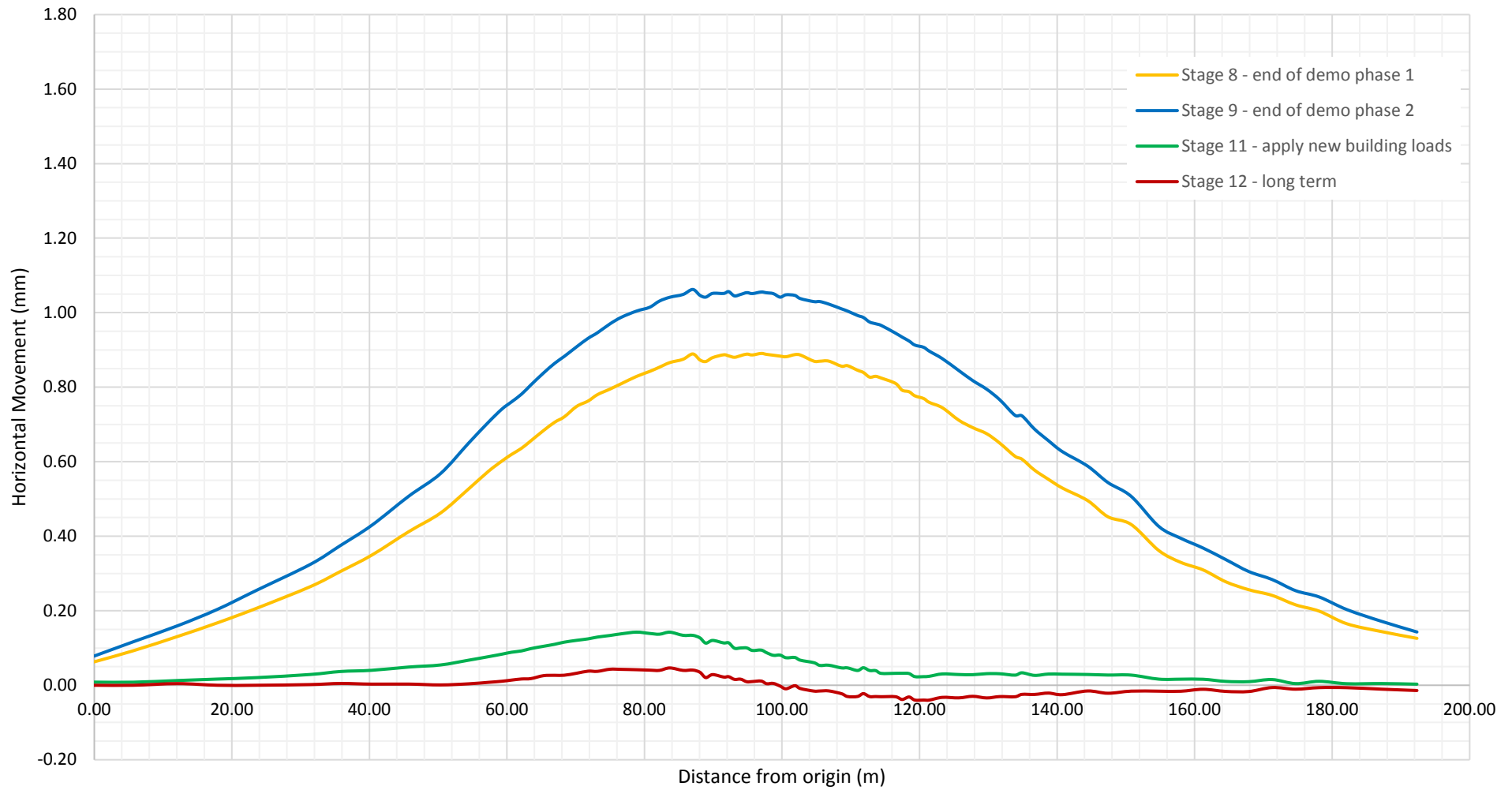


**Notes:**  
 Positive = Upwards displacement (heave)  
 Negative = Downwards displacement (settlement)  
 Cumulative displacement measured from current conditions (stage 7)

**THE POST BUILDING  
 Longitudinal Vertical Displacement  
 - from current conditions (stage 7)**

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**Figure 19**



**Notes:**  
 Positive = Upwards displacement (heave)  
 Negative = Downwards displacement (settlement)  
 Cumulative displacement measured from current conditions (stage 7)

**THE POST BUILDING**  
**Horizontal Displacement - from current conditions (stage 7)**

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Figure 20

## Appendix A

BRICK parameters

## A1 BRICK input parameters

The BRICK parameters used in this model are as follows.

Table 10: BRICK Model Parameters for London Clay and Lambeth Group <sup>[13]</sup>.

Parameter	Definition	Value
$\lambda$	Gradient of the normal consolidation line	0.1
$\kappa$	Gradient of the swelling and recompression line	0.02
$\iota$	Gradient of the pure elastic behaviour line in log-log space	0.0019
$\beta_G$	The effect of overconsolidation on the increase in stiffness.	4
$\beta_\phi$	The effect of overconsolidation on the increase in failure angle	3
pre-consolidation pressure	Maximum previous vertical effective stress	2,000kPa

Table 11: Stiffness degradation parameters <sup>[13]</sup>.

Strain	G/Gmax
6.09E-05	0.75
0.000101	0.53
0.000121	0.29
0.000820	0.13
0.00171	0.075
0.00352	0.044
0.00969	0.017
0.02223	0.0035
0.0646	0

London Clay and Lambeth Group were assumed to behave in an undrained manner in the short term. A suction limit of 100kPa has been used for all undrained stages.