

## The Diorama

### Responses to CampbellReith Audit Queries

- 5.1** The revised BIAs have now been checked and reviewed by a chartered geologist and signed accordingly
- 5.6.** The Flood Risk Assessment undertaken by Form Structural Design provides details of the required mitigation measures, please refer to this report for these measures.
- 5.7.** It is understood that the proposed contiguous bored pile walls will be constructed using 350mm diameter piles. Detailed design of these piles will need to be carried out by the appointed piling contractor. For preliminary analysis of the ground movement only it has been assumed that these piles will be founded at a level of 22.2m AOD. Based on an N value of 24 at founding level these piles should be able to develop a working load capacity of about 145kN which exceeds the required capacity advised by Form of 80kN. Analysis based on considering an isolated pile and a 2:1 vertical : horizontal load distribution indicates that a single pile would result in an increased stress at the top of the London Clay of 84kN/m<sup>2</sup>. Considering the piles as a continuous strip foundation 350mm wide the increased stress at the surface of the London Clay would be 153kN/m<sup>2</sup>. Bearing capacity analysis based on an undrained shear strength of 54kN/m<sup>2</sup> indicates a nett allowable bearing value of 159kN/m<sup>2</sup> should be achievable at the surface of the London Clay. This analysis is based on the piles as vertical load carrying components only and does not consider performance as a retaining structure. If the piles need penetrate the London Clay in order to develop adequate resistance to overturning/rotation then the settlement is likely to be lower than for short piles bearing in the gravel. The pile lengths presented within the BIA are indicative only.
- 5.8.** Pdisp input sheets have been provided for each of the three models indicating depths of strata and Poisson's ratio used in each model.
- 5.9.** Formation levels and not SSL levels have been used in the models. Please refer to the PDISP input sheets. As per CampbellReith's requirement 5mm of horizontal movement over a 2.5m depth has been prorated to the relative depths of excavation.
- 5.10.** It is the responsibility of the underpinning and/or temporary works contractor to determine what measures will be put in place for maintaining the stability of excavations. The geotechnical report suggests the possible use of injection grouting which could be used to stabilise the gravel prior to excavation and could potentially be considered as a method of underpinning. Whatever method of excavation support is adopted it must be installed prior to any excavation and must not have the potential to yield as this will result in ground loss and potentially undue settlement. This is covered in the geotechnical report which states: 'Due to the nature of the Lynch Hill Gravel Member deposits encountered on site continuous support of these materials will be required to maintain the stability of excavations through these deposits. Any loss of support will result in catastrophic settlement to the neighbouring structures. As such Lynch Hill Gravel Member deposits should not be left unsupported for any length of time. One prospective method of construction, among other methods, that will preclude loss of support is injection grouting to form the underpinning blocks. Additionally, injection grouting could be utilised to support material between the gaps in the contiguous bored pile wall.'

The analysis assumes that, in the absence of the known method for construction of the underpins, the above stated method for maintaining excavation support has been carried out precluding the use of an unloading stage in the first instance.

- 5.11.** Consideration has now been added to include public highways and services in the BIA.

#### **Additional Comments**

- 4.16:** The levels have been changed in the reports to be consistent throughout.
- 4.17:** Underpinning depths/levels are presented consistently throughout.
- 4.20:** Further details are provided in the revised reports
- 4.21** Further details are provided in the revised reports
- 4.22** The full depth of the underpinning has not been considered on the basis of the recommendation for pre-grouting the Lynch Hill Gravel to maintain excavation support. Alternative temporary works solutions may be considered providing that they are preinstalled prior to excavation and that they cannot yield, to result in ground loss.
- 4.23** Levels have been amended in the reports
- 4.25** In some instance it has been necessary to extend the underpinning beyond the extent of the excavation in order to reduce the damage category to acceptable levels. The additional underpinning has been included in Form SD's design.
- 4.26** The exact location of the Thames Water asset is not known nor the movement tolerances however the settlement profile has been prepared and reported in the BIA.