

## Part 4: BASEMENT IMPACT ASSESSMENT

This section of the report evaluates the direct and indirect implications of the proposed project, based on the findings of the previous screening and scoping, site investigation and ground movement assessment.

### 13.0 INTRODUCTION

The screening identified a couple of potential impacts. The desk study and ground investigation information has been used below to review the potential impacts, to assess the likelihood of them occurring and the scope for reasonable engineering mitigation.

#### 13.1 Potential Impacts

The table below summarises the previously identified potential impacts and the additional information that is now available from the ground investigation in consideration of each impact.

Potential Impact	Site Investigation Conclusions
Site is underlain by Secondary 'A' Aquifer	Groundwater has been measured at depths of between 3.80 (14.39 m OD) m and 5.49 m (15.85 m OD) from within the Lynch Hill Gravel.
The proposed basement could extend into the water table.	Formation level for the proposed new raft foundation will be at 17.0 m OD to 16.5 m OD, such that it should not extend below the water table and therefore intercept groundwater flows.
The site is located within 5 m of a highway or pedestrian right of way	The site fronts onto Clerkenwell Road and Grays Inn Road. However, the proposed basement is not considered to be unusual and ground movements as a result of the excavation are unlikely to result in any damage.

The results of the site investigation have therefore been used below to review the remaining potential impacts, to assess the likelihood of them occurring and the scope for reasonable engineering mitigation.

*Proposed basement structure is located over Secondary 'A' Aquifer / The proposed basement could extend below the water table.*

The proposed excavations to deepen the existing basement are understood to extend to depths of between 0.5 m to 1.0 m below existing basement level, such that formation level will be within the Lynch Hill Gravel at a level of 17.0 m OD to 16.5 m OD.

Groundwater has been measured within the Lynch Hill Gravel at depths of between 3.8 m (14.39 m OD) m and 5.49 m (15.85 m OD), such that the proposed excavations are unlikely to extend below the water table.

As the interface between the Lynch Hill Gravel and the essentially impermeable London Clay is expected to be present at a level of about 14.5 m OD, deepening of the existing basement will not provide a cut-off to groundwater flows by keying into the London Clay, such that there will be sufficient space for groundwater to continue flowing beneath the new structure.

In conclusion, as the new basement does not close a pathway, it is considered that the groundwater will continue to follow a pathway below the proposed basement and will not

build up significantly behind it. The basement should not, therefore, have a significant effect on groundwater flow.

#### *Location of public highway*

The existing basement structure is bounded by Clerkenwell Road to the north and Gray's Inn Road to the west. However, there is nothing unusual or exceptional in the proposed development or the findings of the investigation that give rise to any concerns with regard to stability over and above any development of this nature.

Provided that the design of the retaining walls considers any loading from the adjacent highway and the construction work is carried out in accordance with best practice, resulting ground movements and any associated damage should be within normal tolerable limits, as demonstrated by the ground movement assessment in Part 3.

### 13.2 BIA Conclusion

A Basement Impact Assessment has been carried out following the information and guidance published by the London Borough of Camden.

It is concluded that the proposed development is unlikely to result in any significant groundwater, surface water or slope stability issues.

### 13.3 Non-Technical Summary of Evidence

This section provides a short summary of the evidence acquired and used to form the conclusions made within the BIA.

#### 13.3.1 Screening

The following table provides the evidence used to answer the surface water flow and flooding screening questions.

Question	Evidence
1. Is the site within the catchment of the pond chains on Hampstead Heath?	Topographical maps acquired as part of the desk study and Figures 12, 13 and 14 of the Arup report.
2. As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?	A site walkover and existing plans of the site have confirmed that the proposed basement scheme will not increase the amount of hardstanding.
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	
4. Will the proposed basement development result in changes to the profile of the inflows (instantaneous and long term) of surface water being received by adjacent properties or downstream watercourses?	As above.
5. Will the proposed basement result in changes to the quantity of surface water being received by adjacent properties or downstream watercourses?	
6. Is the site in an area known to be at risk from surface water flooding such as South Hampstead, West Hampstead, Gospel Oak and Kings Cross, or is it at risk of flooding because the proposed basement is below the static water level of a nearby surface water feature?	Flood risk maps acquired from the Environment Agency as part of the desk study, Figure 15 of the Arup report, the Camden Flood Risk Management Strategy dated 2013 and SFRA dated 2014.

The following table provides the evidence used to answer the subterranean (groundwater flow) screening questions.

Question	Evidence
1a. Is the site located directly above an aquifer?	Aquifer designation maps acquired from the Environment Agency as part of the desk study and Figures 3 and 8 of the Arup report.
1b. Will the proposed basement extend beneath the water table surface?	BGS archive borehole records.
2. Is the site within 100 m of a watercourse, well (used/disused) or potential spring line?	Topographical and historical maps acquired as part of the desk study, Figures 11 and 12 of the Arup report and the Lost Rivers of London book.
3. Is the site within the catchment of the pond chains on Hampstead Heath?	Topographical maps acquired as part of the desk study and Figures 12, 13 and 14 of the Arup report.
4. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	A site walkover and existing plans of the site have confirmed that the basement development will only replace existing hardstanding areas.
5. As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	The details of the proposed development do not indicate the use soakaway drainage.
6. Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to or lower than, the mean water level in any local pond or spring line?	Topographical maps acquired as part of the desk study and Figures 11 and 12 of the Arup report.

The following table provides the evidence used to answer the slope stability screening questions.

Question	Evidence
1. Does the existing site include slopes, natural or manmade, greater than 7°?	Topographical maps and Figures 16 and 17 of the Arup report and confirmed during a site walkover.
2. Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7°?	The details of the proposed development provided do not include the re-profiling of the site to create new slopes.
3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°?	Topographical maps and Figures 16 and 17 of the Arup report and confirmed during a site walkover.
4. Is the site within a wider hillside setting in which the general slope is greater than 7°?	
5. Is the London Clay the shallowest strata at the site?	Geological maps and Figures 3 and 8 of the Arup report.
6. Will any trees be felled as part of the proposed development and / or are any works proposed within any tree protection zones where trees are to be retained?	Absence of trees confirmed during the site walkover.
7. Is there a history of seasonal shrink-swell subsidence in the local area and / or evidence of such effects at the site?	Knowledge on the ground conditions of the area and reference to NHBC guidelines were used to make an assessment of this, in addition to a visual inspection of the buildings carried out during the site walkover.
8. Is the site within 100 m of a watercourse or potential spring line?	Topographical maps acquired as part of the desk study, Figures 11 and 12 of the Arup report and the Lost Rivers of London book.
9. Is the site within an area of previously worked ground?	Geological maps and Figures 3 and 8 of the Arup report.
10. Is the site within an aquifer?	Aquifer designation maps acquired from the Environment Agency as part of the desk study and Figures 3 and 8 of the

Question	Evidence
	Arup report.
11. Is the site within 50 m of Hampstead Heath ponds?	Topographical maps acquired as part of the desk study and Figures 12, 13 and 14 of the Arup report.
12. Is the site within 5 m of a highway or pedestrian right of way?	Site plans and the site walkover.
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Camden planning portal and the site walkover confirmed the position of the proposed basement relative the neighbouring properties.
14. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	Maps and plans of infrastructure tunnels were reviewed.

### 13.3.2 Scoping and Site Investigation

The questions in the screening stage that there were answered ‘yes’, were taken forward to a scoping stage and the potential impacts discussed in Section 4.0 of this report, with reference to the possible impacts outlined in the Arup report.

A ground investigation has been carried out, which has allowed an assessment of the potential impacts of the basement development on the various receptors identified from the screening and scoping stages. Principally the investigation aimed to establish the ground conditions, including the groundwater level and the engineering properties of the underlying soils to enable suitable design of the basement development.

The findings of the investigation are discussed in Part 2 of this report and summarised in the Executive Summary.

### 13.3.3 Impact Assessment

Section 14.0 of this report summarises whether, on the basis of the findings of the investigation, the potential impacts still need to be given consideration and identifies ongoing risks that will require suitable engineering mitigation. Section 9.0 of this report also provides recommendations for the design of the proposed development.

A ground movement analysis and building damage assessment will be carried out in due course and will be issued as an addendum to this report.

## 14.0 OUTSTANDING RISKS AND ISSUES

This section of the report aims to highlight areas where further work is required as a result of limitations on the scope of this investigation, or where issues have been identified by this investigation that warrant further consideration. The scope of risks and issues discussed in this section is by no means exhaustive but covers the main areas where additional work may be required.

The ground is a heterogeneous natural material and variations will inevitably arise between the locations at which it is investigated. This report provides an assessment of the ground conditions based on the discrete points at which the ground was sampled, but the ground conditions should be subject to review as the work proceeds to ensure that any variations from the Ground Model are properly assessed by a suitably qualified person.

Monitoring of the standpipes should be continued to provide additional assurance of the water levels beneath the site.

The investigation has not identified the presence of any significant contamination and as the majority of the made ground will be removed from this site through the excavation of the proposed basement, remedial measures should not be required. However, as with any site there is a potential for further areas of contamination to be present within the made ground beneath parts of the site not covered by the investigation it is recommended that a watching brief is maintained during any groundworks for the proposed new foundations and that if any suspicious soils are encountered that they are inspected by a geoenvironmental engineer and further assessment may be required.

The Detailed UXO Risk recommended that site specific UXO awareness briefings should be given to all personnel conducting intrusive works and UXO mitigation measures were recommended for all intrusive works to be carried out on site, which comprise magnetometer scanning for borehole / pile locations to be carried out by an on-site UXO specialist.

These items of doubt should be drawn to the attention of prospective contractors and further investigation will be required or sufficient contingency should be provided to cover the outstanding risk.