STRUCTURAL STATEMENT & BASEMENT SCREENING IN RESPECT OF SUMMERHOUSE & TERRACE APPLICATION.

4 THE GROVE,

HIGHGATE, LONDON,

N6 6JU.

ISSUE RECORD

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NON-TECHNICAL SUMMARY.

The works comprise a lightweight structure forming the Summerhouse and a small above ground swimming pool and some modifications to the Garden Vaults to make them suitable for use.

This report summarises some of the structural elements of the works that may be pertinent to Planning and includes a Basement Screening Process demonstrating that a Basement Impact Assessment (BIA) is not required.

The location and nature of the works – lightweight and above ground (excepting foundations) dictates that the following will be achieved.

- Negligible impact on buildings within the site and neighbouring properties.
- Does not affect drainage and run off or cause other damage to the water environment.
- Avoids cumulative impacts upon structural stability or the water environment in the local area.

The effect of the proposed summerhouse on the hydrology, hydrogeology and land stability have been considered and found to be negligible.

Clause 1.8 of LB Camden's Planning Guidance Basements (January 2021) states:

Where a building is located on sloping land and there is a change in level across a site, a storey which is accessed at ground level at one side of the site (with no steps or ramp) will generally not be considered a basement, unless the site has been excavated to allow access to that floor.

The site slopes sufficiently that all new proposals (excepting foundations) are above ground including the swimming pool and consequently complies with the above definition. However, for the sake of completeness, a Screening Assessment has been completed.

INTRODUCTION.

Tier Consult have been appointed to provide engineering services and prepare technical documents in support of No. 4 The Grove, London, N6 6JU Planning Application.

This report assesses the impact of the proposed new Summerhouse & Swimming Pool and reviews key design and construction considerations, including site historical context, existing and proposed structures, site geology, hydrology, temporary & permanent works, ground movement, health & safety.

The Site.

The site is located at No. 4 The Grove, London, N6 6JU within the London Borough of Camden, approximately 450m East from Hampstead Heath Park, 200m West of Highgate Cemetery and approximately 950m South from Highgate station of the Northern Line.

Figure 1 – Site plan

The site comprises a Grade II* listed 4 storey terraced house measuring roughly 15m x 12m in plan, a front paved garden of 15m x 6m and a large two-level, L-shaped garden at the rear, with the upper-level measuring approximately 38m x 15m and rearmost lower level 25m x 28m.

The site is situated within the Camden APA 2.8 Highgate Tier 2 Archaeological Priority Area, as it has the potential to contain a range of medieval and post-medieval settlement remains. An Archaeological Desk Based Assessment report by Abrams Archaeology.

According to the Environmental Agency planning flood maps, the site has a Low Risk of Surface water flooding and a Very Low Risk of flooding from Rivers and the sea. This is discussed in more detail below.

INTRODUCTION CONT'D.

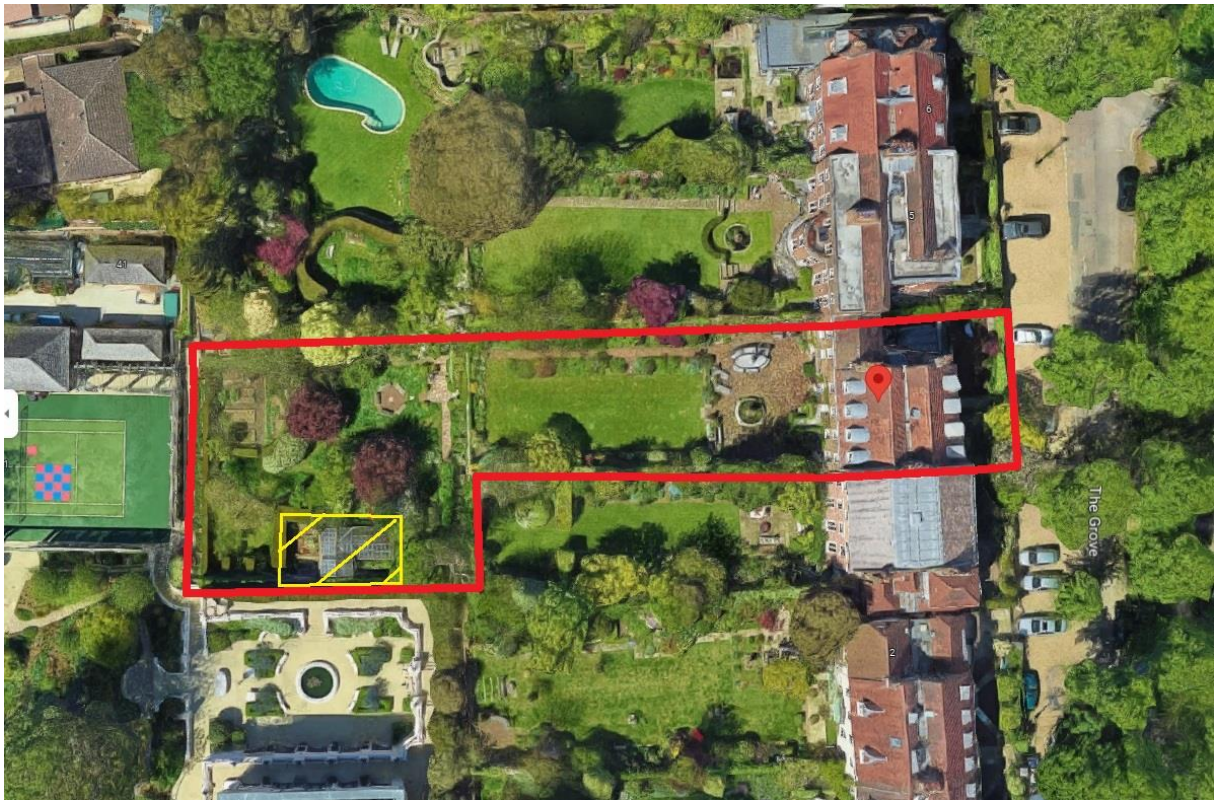

Figure 2 – Site Satellite photo & Proposed Summerhouse Location (hatched).

Report Authors.

This report has been prepared by Tier Consult, the Authors and their qualifications are noted in the Issue Record of this document.

Sources of Information.

Flood risk mapping – Environment Agency & LB of Camden SFRA.

LB Camden, Strategic Flood Risk Assessment (produced by URS, 2014).

LB Camden, Floods in Camden, Report of the Floods Scrutiny Panel (2013).

LB Camden, Planning Guidance (CPG) – Basements (March 2018).

LB Camden, Camden Geological, Hydrogeological and Hydrological Study – Guidance for Subterranean Development (produced by Arup, 2010).

LB Camden, Local Plan Policy A5 Basements (2017).

INTRODUCTION CONT'D.

Existing Building(s).

The existing property is a Grade II* listed house built in 1688 of traditional masonry construction with timber flooring, consisting of a lower ground floor and 3 storeys above ground.

Based on the initial visual examination at the time of our site visit on 26th January 2023, the structure appears to be in relatively good condition, with no obvious signs of structural cracking or damage.

Outline Development Proposal.

The development proposal comprises a light refurbishment of the Garden Vaults to facilitate more productive use of the same. This is illustrated in Figure 3 below.

A new Summerhouse and Terrace is proposed to replace an existing greenhouse. Set within the terrace at the western most end is a small swimming pool. As a result of the natural slope of the ground, the swimming pool will sit above ground with only foundations set within the ground. This is illustrated in Figure 4 below.

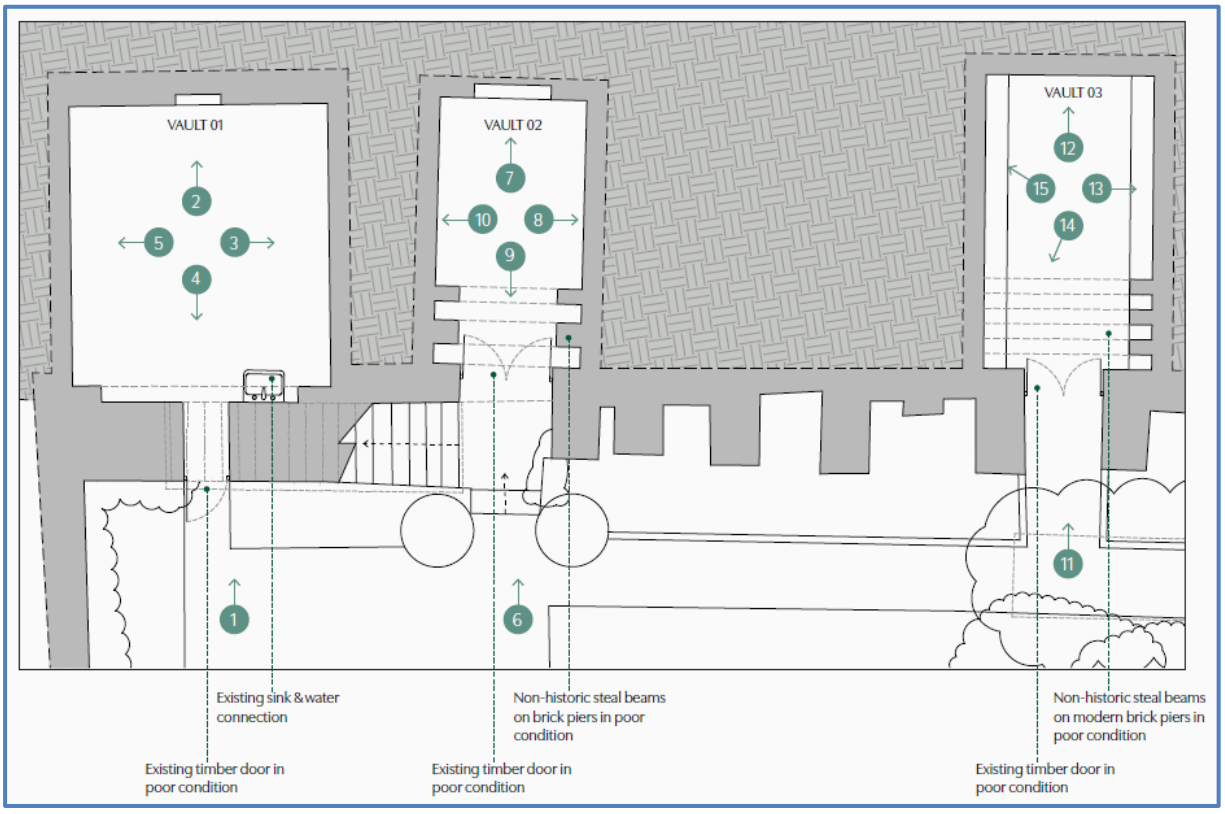

Figure 3 – Proposed Vault Renovations.

INTRODUCTION CONT'D

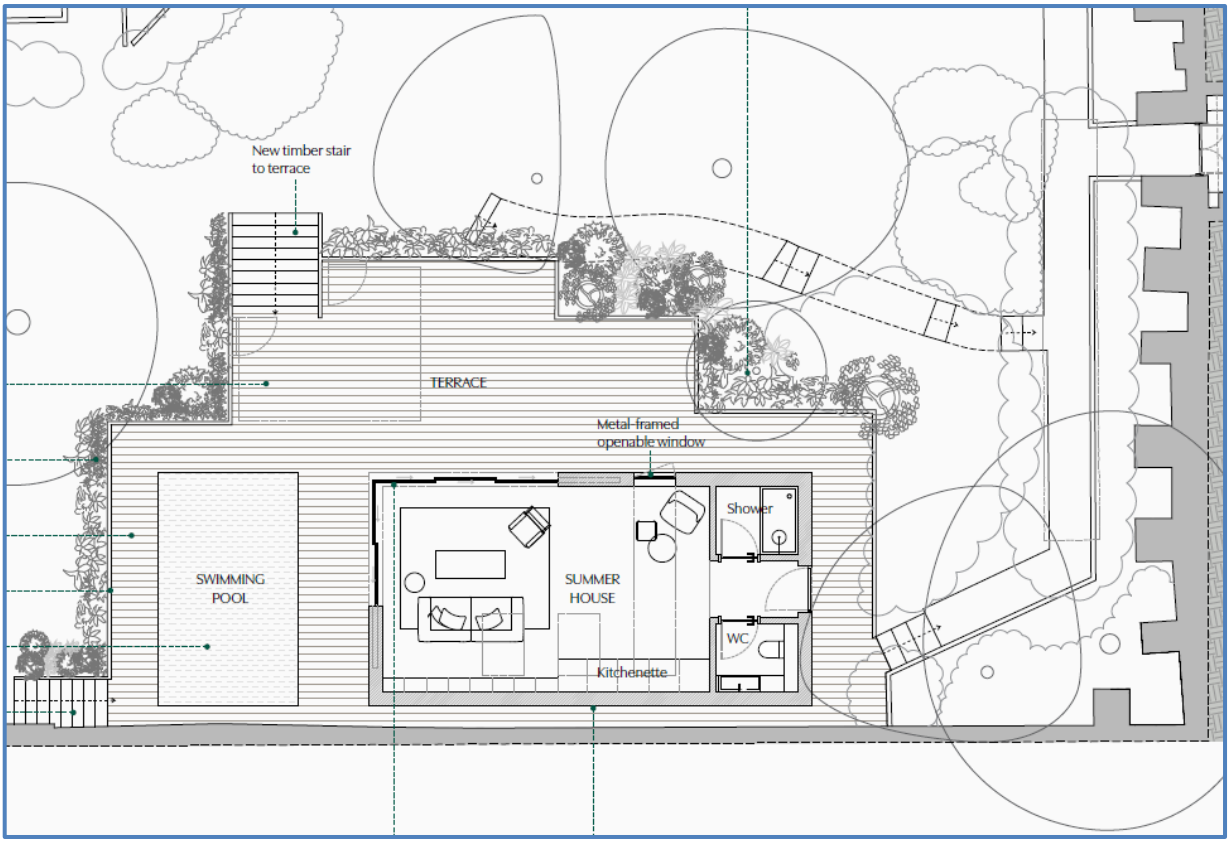

Figure 4 – Proposed Terrace & Summerhouse.

DESK STUDY.

Site History.

The earliest maps, dating from 1870, show the existing property as semi-detached with the existing gardens similar to their current layout, with the property forming one of several such semi-detached (existing) properties along the Grove to the north and south.

An existing greenhouse within the lower terraced garden was shown on maps dating from 1896.

The existing road layout and properties were shown to the east, with a 'Waterworks' (covered), or reservoir on later maps, located approximately 90m to the northeast. A large residential property, identified as Parkfield, was shown approximately 90m to the south. To the west was open parkland belonging to Fitzroy Park with two large pools approximately 50m from the western site-boundary. Several glass houses were shown immediately adjacent to and approximately 30m to the north and west.

Maps dated from around 1938 onwards show the existing house and neighbouring properties had been joined to form a single terrace. Parkfield had been replaced with a much larger building, identified as the existing Witanhurst Mansion, the grounds to which were shown bounding the site to the west. The pools and glasshouses to the north and west were no longer shown on maps dating from this time.

The property (No. 4 The Grove) is a Grade II* listed terraced house that was likely built around 1688.

Geology.

The site is situated on elevated ground that falls towards the southwest.

The published British Geological Survey (BGS) map Sheet 256, "North London", dated 2006 and information contained within the Groundsure report (Appendix C of SI Report), indicate the site to be devoid of superficial deposits. The underlying bedrock is shown to be the Bagshot Formation, which is Eocene in age and formed under alternating fluvial and shallow marine conditions.

The BGS Geo-Index website (www.webapps.bgs.ac.uk), generally describes this stratum as 'pale yellow-brown to pale grey or white, locally orange or crimson, fine- to coarse-grained sand that is frequently micaceous and locally clayey, with sparse glauconite and sparse seams of gravel'.

Underlying this stratum is clay strata belonging to the Claygate Member (part of the London Clay Formation). The Claygate Member is generally described as 'dark grey clays with sand laminae, passing up into thin alternations of clays, silts and fine-grained sand, with beds of bioturbated silt'.

Historical BGS borehole records located approximately 32m northwest and 155m southwest recorded Made Ground to 1.00m depth overlying London Clay to between 127m and 129m depth. This was in turn underlain by Thanet Sands, to between 144m and 147m depth, and Chalk with Flints which was recorded to a maximum borehole depth at 206m. No groundwater observations were given.

No records for faults or other major geological structures are shown either on-site or within 250m of the site.

The site geology and the findings of the Site-Specific Ground Investigation are recorded in the Tier Environmental Report - Ground Investigation Report, 4 The Grove, Highgate, London N6 6JU Reference TE1723-TE-00-XX-RP-GE-001 V01.

DESK STUDY CONT'D.

Hydrogeology.

The site is situated on elevated ground at between roughly 127m AOD and 122m AOD, with ground elevations sloping towards the southwest. Topographic and geological information indicate that groundwater is likely to occur at depth and within the Thanet Sands that underlie the London Clay Formation.

Perched groundwater might be anticipated to be present within granular pockets and horizons associated with the Bagshot Formation and some was found during the site investigation. However, this perched water was only found at depth. Both the Bagshot Formation and Claygate Members have been designated by the Environment Agency as Secondary A Aquifers.

There are no groundwater source protection zones (SPZs) located either on-site or within 250m of the site.

Hydrology, Drainage and Flood Risk.

A Site-Specific Flood Risk Assessment (FRA) has been prepared for the site Flood Risk Assessment at 4 The Grove, Highgate, London, N6 6JU – Reference TE1723-TE-00-XX-RP-GE-002-V01 dated 22nd May 2023. A summary of some of the key points has been outlined below.

The site is situated on elevated ground with on-site ground surfaces sloping very gently towards the west. The front garden area is currently paved with brick hardstanding. Surface water drainage in this area of the property is expected to be via downpipes leading from the roof and to occur as overground flow to existing drainage networks.

The rear garden area is predominantly covered with grassy terraced lawns with an existing greenhouse on the lower western terrace. Surface water drainage within the rear garden area is expected to be predominantly directed into the ground where it will migrate vertically downwards before encountering the underlying clay rich bedrock. A small surface water volume will drain directly from the existing greenhouse area into the surrounding soils. On encountering the clay rich bedrock, surface water will continue to drain as through flow down topographic gradient which falls gently towards the west.

There are no surface watercourses within 250m of the site. A covered, below ground reservoir, is the nearest surface water feature to the site, located approximately 90m to the northeast. Various minor water courses and the 'Highgate Ponds' are located downslope and over 300m to the southwest, which are anticipated to be features sat on top of the underlying clay strata belonging to the Claygate Member.

The proposed development involves less than 10 dwellings, has an area less than 1ha and floor space less than 1,000m^2, is not in an area at risk from flooding and will not result in an increase in impermeable areas.

There will be no increase in the volume or runoff rate of surface water from the site and therefore, no increase in flooding to people or property off-site as a result of the development.

Surface water falling onto the rear garden area will continue to drain naturally through the free draining near surface/ shallow soils down the topographic gradient to the west.

DESK STUDY CONT'D.

Hydrology, Drainage and Flood Risk Cont'd.

All sources of flooding have been considered, including fluvial (river) flooding, tidal (coastal) flooding, groundwater flooding, surface water (pluvial) flooding, sewer flooding and flooding from artificial drainage systems/infrastructure failure.

The site would be expected to remain dry in all but the most extreme conditions. The flood risk from all sources is minimal, the consequences of flooding are therefore acceptable, and the development is in accordance with the requirements of the NPPF.

The FRA demonstrates that the proposed development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of the NPPF. The development should not therefore be precluded on the grounds of flood risk.

Existing Utilities & Underground Services

A Utility Search has been carried out, supplemented by a Utility Mapping GPR survey and CCTV survey of the drainage. The new development will interact with certain services, but only those serving the property. The works may therefore take place with out affecting services serving other properties.

SCREENING.

Introduction.

The Screening Assessment below is taken from the Camden "Basement Impact Assessment Pro Forma". The intention is to demonstrate that the proposal will have negligible impact on the buildings within the site and neighbouring properties.

Subterranean (Ground Water) Screening Assessment.

Question	Response / Details
1a. Is the site located directly above an aquifer?	Yes. The site is underlain by the Bagshot Formation which is designated a Secondary 'A' Aquifer by the Environment Agency. Aquifer designation maps from the Environment Agency and Figures 3, 4 and 8 of the Arup report confirm this to be the case.
1b. Will the "proposed basement" extend beneath the water table surface?	No. The site investigation recorded the highest perched water at 117.04m AOD. The new Summerhouse sits at approximately 121.5m AOD, some 4.5m above this.
2. Is the site within 100m of a watercourse, well (used / disused) or potential spring line?	No. Figure 2 of the URS, London Borough of Camden, SFRA and Figures 11 and 12 of the Arup report confirm this to be so.
3. Is the site within the catchment of the pond chains on Hampstead Heath?	No. The site lies outside the Highgate Chain catchment area shown on Figure 14 of the Arup report.
4. Will the proposed "basement" development result in a change in the proportion of hard surfaced / paved areas?	No. There is an existing greenhouse that is of similar size. Water falling on this hardstanding area flows off to the surrounding soft landscaping. This will continue to be the case for the summerhouse with the decking allowing infiltration to the ground below. The proportion of hardstanding will therefore remain unchanged.
5. As part of 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)?	No. The volume of surface water discharged to the ground is unchanged as currently all water falling onto the lower garden discharges into the ground, and this will remain the case.
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 (not just the pond chains on Hampstead Heath) or spring line?	No. There are no local ponds near to the new summerhouset. As noted above the perched water is approximately 4.5m below the bottom of the Summerhouse. Figures 11 and 12 of the Arup report confirm this to be so.

Slope Stability Screening Assessment

Question	Response / Details
1. Does the existing site include slopes, natural or man-made greater than 7 degrees (approximately 1 in 8)?	No. Figure 16 of the Arup report does not show the site to be in an area with slopes greater than 7°. The Topographic Survey shows the site enjoys a natural slope somewhat less than 1 in 8.
2. Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7 degrees (approximately 1 in 8)?	No. There is no re-profiling proposed for the site. There are therefore no changes of slope.
3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 degrees (approximately 1 in 8)?	No. 3 and 5 The Grove do not have significant slopes. This is confirmed by Figure 16 of the Arup Report.
4. Is the site within a wider hillside setting in which the general slope is greater than 7 degrees (approximately1 in 8)?	No. Figure 16 of the Arup report shows the site to be a significant distance from areas with sustained slopes of greater than 7°.
5. Is the London Clay the shallowest strata at the site?	No. The Site Investigation Report, Figure 2 of the Arup report and the BGS Map Sheet 256 of the area show the shallowest strata to be the Bagshot Formation.
6. Will any trees be felled as part of the development and/or are any works proposed within any tree protection zones where trees are to be retained?	No, some Category C, young shrubs with a stem diameter less than 150mm diameter are to be removed. Refer to the Arboriculturist's Report by SJ Stephens Associates.
7. Is there a history of seasonal shrink-swell subsidence in the local area and/or evidence of such effects at the site?	No. Information in the Groundsure Report confirms that the site is not in an area susceptible to ground shrinkage or swelling. This is supported by the findings of the Site Investigation; samples taken of the Bagshot formation show that there is a high proportion of granular materials, and these are not susceptible to shrink / swell.
8. Is the site within 100m of a watercourse or a potential spring line?	No. Figure 2 of the URS (SFRA) Report, Figure 12 of the Arup report, and extracts from the Groundsure report confirm that this is not the case.
9. Is the site within an area of previously worked ground?	No. Figures 3 and 4 of the Arup Report do not indicate any previously worked ground. This is supported by the Site-Specific Site Investigation.
10. Is the site within an aquifer. If so, will the proposed basement extend beneath the water table such that dewatering may be required during construction?	No. Whilst the site is underlain by the Bagshot Formation which is classified as a Secondary 'A' Aquifer by the Environment Agency (EA), the water table (perched water) is some 7.5m below ground level; dewatering will not therefore be required during construction.
11. Is the site within 50m of the Hampstead Heath Ponds?	No. Figure 14 of the Arup report confirms this to be the case.
12. Is the site within 5m of a highway or pedestrian right of way?	No.
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	No. All construction is above ground except for the foundations. These will be no deeper than any surrounding foundations
14. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	No. The Groundsure Report and Figure 18 of the Arup report confirm that this is not the case.

SCREENING CONT'D.

Surface Water and Flooding Screening Assessment.

Question	Details
1. Is the site within the catchment of the ponds chains on Hampstead Heath?	No. Figure 14 of Arup report confirms that the site is not located within this catchment area.
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?	No. Currently all surface water is discharged to or infiltrated by the soft landscaping. Therefore, no additional surface water will be generated, nor will the existing route of surface water flows be materially changed.
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?	No. The new summerhouse replaces an existing greenhouse.
4. Will the proposed basement result in changes to the profile of the inflows (instantaneous and long-term) of surface water being received by adjacent properties or downstream watercourses?	No. The inflows (instantaneous and long-term) of surface water being received by adjacent properties or downstream watercourses are unchanged by the proposals.
5. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	No. The quality of surface water being received by adjacent properties or downstream watercourses is unchanged by the proposals.
6. Is the site in an area identified to have surface water flood risk according to either the Local Flood Risk Management Strategy or the Strategic Flood Risk Assessment or is it at risk from flooding, for example because the proposed basement is below the static water level of nearby surface water feature.	No. Figures 3iii, 4e, 5a and 5b of the SFRA dated 2014, in addition to the Environment Agency online flood maps show that the site has a low flooding risk from surface water, groundwater, sewers, reservoirs (and other artificial sources), and fluvial/tidal watercourses. A Site-Specific FRA, has been submitted, as part of the Planning Application, to provide more detail on this subject.

Summary Of Screening Process.

The screening process above has demonstrated that the proposal is likely to have minimal impact on its surroundings. The site is over an aquifer, but the perched water table is many metres below the depth of the works. The above demonstrates that no further consideration is required for this development.

SITE INVESTIGATION

A site investigation (including a desk-based assessment) was carried out by Tier Environmental on 27th February 2023. The objectives of the investigation were:

- To determine the historical and current land use.
- To establish the environmental setting of the Site.
- To evaluate whether past mining or other extractive industries could have an influence on the Site.
- To determine current ground and groundwater conditions.
- To determine the potential risks to human health within a proposed growing area.
- To provide a preliminary waste soils classification.
- To provide preliminary geotechnical parameters to inform foundation design recommendations.

The report has been submitted as part of this Application – "Ground Investigation Report, 4, The Grove, Highgate, London, N6 6JU. (TE1723-TE-XX-RP-GE-001-V01).

The conclusions are:

- Historically the site has remained relatively unchanged since the existing residential property was constructed around 1688.
- The site is situated on elevated ground and terraced with the house dominating the eastern end, at roughly 127.8m AOD, with a brick paved front garden and rear gardens dominating the western two thirds with the lower terrace at roughly 122.7m AOD to 119.1m AOD.
- The proposed development will include replacing the existing greenhouses with a new Summerhouse..
- Encountered ground conditions include a granular and clay rich Made Ground cover overlying predominantly clay rich Bagshot Formation with granular pockets and horizons.
- Perched groundwater was recorded at 114.55m AOD with some seepage recorded nearby at 117.04m AOD in the rear garden area. No water was recorded in and around the proposed basement.
- Due to the Made Ground and granular soils, excavations will require appropriate support to remain open and may require limited groundwater control during inclement weather.
- Slope stability is not considered to be an issue at the site.
- A Design Sulphate and Aggressive Chemical Environment for Concrete (ACEC) Class of DS-1 / AC-1 is considered appropriate for all on-site soils.

SITE INVESTIGATION (CONCLUSIONS) CONT'D.

- All foundations should be taken through the Made Ground to found upon the underlying clay rich and granular Bagshot Formation soils. Over deepened footings to around 2.00m depth will be suitable for the summerhouse, or alternatively a raft could be employed.

- Made Ground for off-site disposal would be classed as non-hazardous waste and natural soils as inert waste.

STRUCTURAL CONSIDERATIONS.

Vaults Refurbishment – Structural Issues.

Minimal structural works are required. There are some heavily corroded beams supporting elements of the vaults. An assessment of the degree of corrosion will be required. Assuming the Net Remaining Section remains adequate application of corrosion protection will be adequate treatment.

Summerhouse & Swimming Pool – Civil & Structural Issues.

The new development largely replaces an existing greenhouse and ancillary structures. If possible, the existing ground slab and foundations will be modified and re-used. New foundations will be designed to complement any retained structures and work around the root protection zones utilising the methods noted in the Arboricultural Survey Report undertaken by S.J. Stephen Associates.

Foundations will comprise pad and strip footings supplemented by Screw Piles in root protection zones. The superstructure will be modular to facilitate construction. Access to this part of the garden is quite limited and so all construction materials will need to be “hand balled” to the location.

As such all materials will need, as far as possible, to be lightweight. A composite timber / steel structural frame is likely to fulfil the above criteria.

HEALTH, SAFETY AND CARE OF NEIGHBOURS.

All work to be carried out in accordance with the current Health and Safety legislation, including The Construction (Design and Management) Regulations 2015, the Health and Safety at Work Act 1974, and the Management of Health and Safety at Work Regulations 1999.

Full care and consideration shall be given to neighbours to avoid disturbance resulting from the works. All construction and demolition processes shall be in accordance with the Considerate Constructors Scheme standards and have regard to the Guide for Contractors working in Camden, Feb 2008, and to the GLA's best practice guidance document The Control of Dust and Emissions from Construction and Demolition.

A construction Management Plan will be developed to manage and mitigate construction impacts. The CMP shall include the following.

- Outline Programming and phasing of the works.
- Site management, safety, and supervision.
- The management of construction traffic, deliveries, parking, etc.
- The management of noise, vibration, and dust.
- Waste management.
- A detailed construction sequence to ensure the continued stability of buildings during the course of the works.
- Proportionate provisions for movement monitoring.
- Working hours – noisy construction and Saturday working.

HEALTH, SAFETY AND CARE OF NEIGHBOURS CONT'D.

Noise, Vibration and Dust.

Noise and vibration can cause disturbance to activities in neighbouring buildings. All Contractors will be required to control and minimise as much as possible any noise and vibration by using 'best practicable means'. The implemented measures will be consistent with the documents noted above and in addition have regard to the following standards:

- BS 5228:2009 - Noise and Vibration control on construction and open sites.
- BS 6472:2008 - Guide to evaluation of human exposure to vibration in buildings.
- Control of Pollution Act 1974.
- Mayor of London policy and guidance on reducing and managing noise and vibration.

Most of the noise pollution will come from mechanical plant such as excavators, hydraulic breakers, compressors, pumps, etc, therefore measures shall be put in place to keep the level of noise as low as reasonably practicable.

All machinery and plant to be used for the works to be properly maintained and silenced where appropriate. Engines to be switched off when not in use and where practicable to do so.

Loading and unloading of vehicles, dismantling of equipment such as scaffolding or moving equipment or materials around the site to be conducted in such a manner as to minimise noise generation and where practical will be conducted away from noise sensitive areas.

The Contractor to make use of quiet working methods and noise suppressing equipment where practicable. Sound reducing equipment should be utilised and regularly maintained to reduce noise emissions.

In the event of a complaint raised by neighbours, a site noise review will be completed to determine if and how sound pollution can be reduced.

Regarding vibration generally, all available techniques should be used to minimise, as far as is appropriate, the level of vibration to which operators and others in the neighbourhood of site operations will be exposed.

Liaison with neighbours, likely to be affected by works, is an essential element of 'best practicable means' and will be undertaken before commencing works. The Contractors will be expected to engage with interested parties, respond to complaints and resolve them where possible. As part of neighbour liaison, the Contractor should ensure that contact numbers, in case of an emergency, are available and displayed on the site hoarding.

Dust emissions from construction and other civil engineering activities are a common and well recognised issue. The Contractor will be required to take the necessary steps to control dust pollution and make sure the emissions are within acceptable limits. Suggested dust suppression methods include watering i.e. damp down clouds of dust or local exhaust ventilation systems.

HEALTH, SAFETY AND CARE OF NEIGHBOURS CONT'D.

Waste Management

A waste management strategy should be developed to promote recycling and re-use materials wherever possible. Waste disposed of at legally designated sites should be minimised. Waste should be sorted and segregated on site so that disruption of traffic in the surrounding area as a result of waste collection is minimised.

Loading and unloading will take place in nominated areas which will be identified by warning signs and barriers where appropriate.

Party Wall Matters

Where applicable, Party Wall notices shall be served on affected properties in accordance with the Party Wall Act 1996. Party Wall agreements, together with schedules of condition, should be in place before commencing construction works.

Existing Trees

An arboricultural survey was undertaken by SJ Stephen Associates on 23rd February 2023. This forms part of the submission documentation.