AXIOM
STRUCTURES

14 QUEEN'S GROVE
LONDON NW8 6EL

STRUCTURAL ENGINEER'S
METHODOLOGY STATEMENT

INDEX

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Structural Methodology Statement Criteria	Report section/ Alternative Consultant Report
A) A thorough desk study to include the site history, age for the property, historic river courses and underground infrastructure, including utilities services, drains and tunnels. This should also identify other basement developments in the area, so the cumulative effects can be considered.	Section 3
B) An appraisal of the existing structure including drawings to show the arrangement of the existing structures. The appraisal should identify previous alterations and any obvious defects. It should also assess the condition and location of the building with adjoining buildings.	Section 3, Appendix A
C) A site investigation which can be demonstrated to be relevant to the site together with trial pits to show the existing foundations and the material they are founded on, for all walls which may be impacted by the proposals. If groundwater is present, the levels should be monitored for the period of time.	Section 3, Appendix C
D) Details of the engineering design which should be advanced to detailed proposals stage. Relevant drawings should be provided to show how the designers have considered ground water, existing trees and infrastructure, drainage, flooding, vertical and horizontal loadings and structural engineering drawings.	Section 5, Appendix A&B
E) An analysis of the Upper Aquifer (when it exists) and how the basement may impact any ground water flow.	Section 4, Appendix C
F) Details of flood risk, surface water flooding, critical drainage areas explaining how these are addressed in the design. A full flood risk assessment should be carried out in those areas identified as requiring one as Figure 4 as per Westminster Guidance document	Section 3 & 4 and Flood Risk Assessment as necessary
G) Assessment of movements expected and how these will affect adjoining or adjacent properties. This needs to include both short and long term effects. The design and constructions should aim to limit damage to all buildings to a maximum of Cat 2 as set out in CIRIA Report 580.	Section 7, Appendix B
H) Details of sequences of construction and temporary propping to demonstrate how the basement can be built to prevent movements exceeding those predicted. It should show how the horizontal and vertical loads are supported and balanced at all stages of construction and consider the interaction between permanent works and temporary works.	Section 8, Appendix A

1.0 NON-TECHNICAL SUMMARY

1.1 The proposed development comprises subterranean extension under rear and front gardens. The project is not unusual and the underlying soil and groundwater conditions are well recorded in the area. The basement should have no adverse effect on the local hydrogeology and the supporting site investigation provides further evidence of this.

1.2 If the works noted above are properly undertaken by suitably qualified contractors, these works should pose no significant threat to the structural stability of the house or the adjoining properties. Based on our current knowledge of the building, site specific ground movement analysis and our extensive experience of projects of this type, if the works are carried out in this manner, then the likelihood of damage to the adjacent properties should be limited to Category 0/1 as set out in CIRIA report 580.

1.3 All reports have led to the same conclusion: the construction of the proposed basement should not have any significant adverse effect on the property, neighbouring properties, groundwater, surface water or slope stability.

2.0 INTRODUCTION

2.1 Axiom Structures Limited is a firm of consulting structural engineers and have been asked to consider structural issues surrounding the proposed basement extension and refurbishment works at the address. This is in support of an intended planning application to be made shortly.

2.2 The proposed development comprises construction of basement extensions under the front and rear garden. The proposed basement is part of general refurbishment works to the existing structure in line with Charles Brice Architects proposals.

2.3 A site specific ground investigation survey, walkover survey, desk studies and utility searches have been carried out (boreholes, trial pits, CCTV Survey). The extract from ground investigation is attached to this report, summary of findings from the desk studies is included in section 3 of this report.

2.4 We have visited site to assess the existing structure for alteration works and the structure is in sound condition.

2.5 In addition to the site specific ground investigations, drawings and scheme calculations this report addresses a series of requirements listed under City of Westminster Supplementary Planning Document - Basement Development in Westminster.

2.6 This construction method statement was prepared for planning purposes for and on behalf of the Client. It is for their use and the use of their professional advisors only and should not be relied upon by others. The scope of work is defined on Charles Brice Architects planning drawings.

3.0 EXISTING CONSTRUCTION / GROUND CONDITIONS/ DESK STUDIES

3.1 **Site Location:** Queen's Grove is a quiet residential street located in St. John's Wood. No 14 is a mid-terrace house located along the East side of the street.

Figure 1: Arial View.

3.2 Historical maps:

3.2.1 **Plan of London from Actual Survey 243**
From our research we have found that the land was agricultural until mid-19th century when the area was developed with residential houses. The historical map from 1832 doesn't show the location of the property or street line.

Figure 2: Plan of London from Actual Survey 243, issued 1832.

3.2.2 **Ordnance Survey Map Extract 1868**
This picture shows the composition and layout of the site in 1868. It shows the area resembling to what it looks like now.

Figure 3: Ordnance Survey Map Extract 1868.

3.3 **The Booth Poverty Map of 1898-99:** This map shows the general area as being predominately fairly comfortable with houses itself being middle class. The area around the property is also upper middle and upper classes.

Key

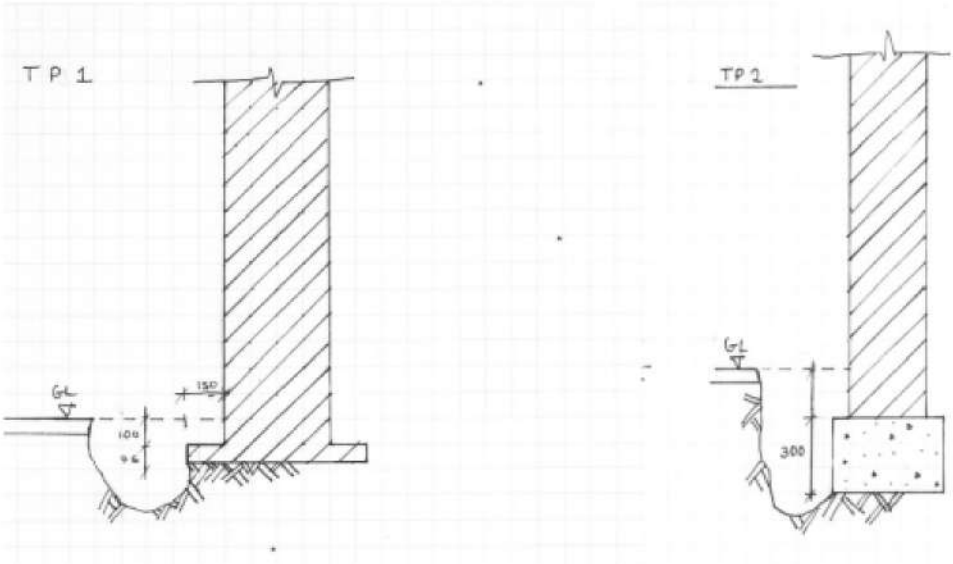
Yellow	Upper Middle and Upper Classes, Very wealthy
Red	Middle Classes, Well to do
Pink	Fairly Comfortable, good ordinary earnings
Purple	Mixed, some comfortable others poor
Light Blue	Poor, 18s to 21s a week for a moderate family
Dark Blue	Very Poor, casual. Chronic Want
Black	Lowest Class, vicious, semi-criminal

Figure 4: Booth Poverty Map, 1898

3.4 **Property details:** The property is a four-storey terrace single family house. The house consists of lower ground, ground, first floor and second floor. There are vaults located under part of front garden towards front steps.

Existing Construction: The building is traditionally constructed with load-bearing masonry external and internal walls and suspended timber floors generally. The internal load-bearing walls are studwork and masonry. The floor joists in the main building are likely to span from front to back, while in the rear closet wing the floor joists are likely to span from side to side. The span of joists to be confirmed at next stage of design. The roof is butterfly type with central gutter.

Stability: The overall stability of the building appears to be provided by the cellular layout of the masonry walls and the diaphragm action of the timber floors at each level.



Existing foundations are conventional corbelled strip footings and are founded on clay soil.

Figure 5: Trial Pits Information

3.5 **Boundaries and Adjoining Structures:** The existing building is mid-terrace and adjoins to no 13 and 15.

3.6 **Adjacent Basements and Excavations:** Following walkover survey and desk study, we anticipate similar depth of lower ground floor at no 15 Queen's Grove. This is subject to review at next stage, when we would access to the adjoining properties as part of Party Walls process.

We noted planning application dated 2015 for reducing lower ground floor level and excavation under front garden at 13 Queen's Grove. There are no previous planning permissions for the adjacent properties. The detailed verification of levels of adjacent basements is to be carried out at the next stage of the project when party walls surveyors are to be involved.

The surcharge loads from adjacent gardens and Highway are to be considered in the design of new retaining walls.

3.7 **Geology:** The desk studies of Geological Maps, site specific borehole and trial pits information indicate the following ground conditions; refer to Appendix C for extract from soils report:

- MADE GROUND up to 0.5m below level of front light-well
- Stiff to very stiff brown silty sandy LONDON CLAY to 10m (bottom of borehole)

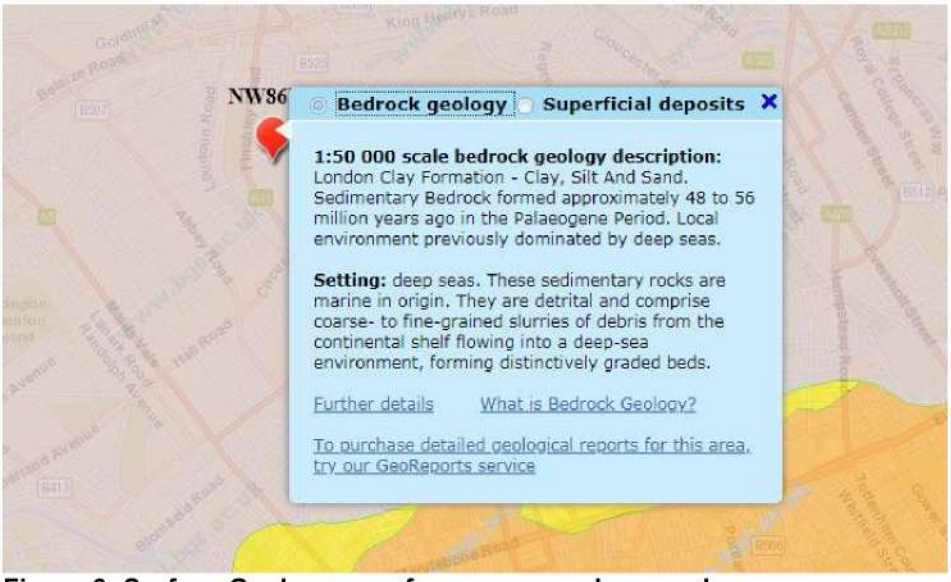


Figure 6: Surface Geology map from mapapps.bgs.ac.uk

3.8 **Subsidence and historical foundation issues:** As part of our walkover survey and visual investigation survey of the property, we have not recorded signs of ongoing or historical movement to suggest any subsidence or other foundation problems to the main building.

3.9 **Geohydrology and ground water flow:** From the Borehole information there was no ingressive water as the soil is classified as stiff and impermeable clay.

3.10 **Source protection zone:** The site is not recorded as being located within or close to a zone protecting a potable water supply abstracting from a principle aquifer (i.e. a source protection zone).

3.11 **Floodplain information:** The site is located in flood Zone 1 (Low Probability) as set up by Environmental Agency.

Figure 7: Flood zone map from flood-map-for-planning.service.gov.uk

3.12 **Flooding from Reservoirs, Canals and other Artificial Sources:** According to strategic flood risk assessment for City of Westminster, the Grand Union Canal presents minimal flooding risk as they have limited surface water inputs and are no located on embankments. On this basis, it is considered unlikely the site is at risk of flooding from the Grand Union Canal.

3.13 **Flooding from Historic Water Courses:** According to the Lost Rivers of London map by Nicholas Barton, 1962 there are no historic or hidden watercourses within 300m of the site. The Tyburn runs to the East to the site.

Figure 8: Lost Rivers of London map by Nicholas Barton, 1962

3.14 **Flooding from groundwater:** There is a low risk of the groundwater flooding due to thick layer of impermeable Clays.

3.15 **Flooding from sewers:** there is a low risk of the sewer flooding in accordance with '*Strategic Flood Risk Assessment* Report' for City of Westminster. The property is located outside an area where properties have been recorded to historical flooding.

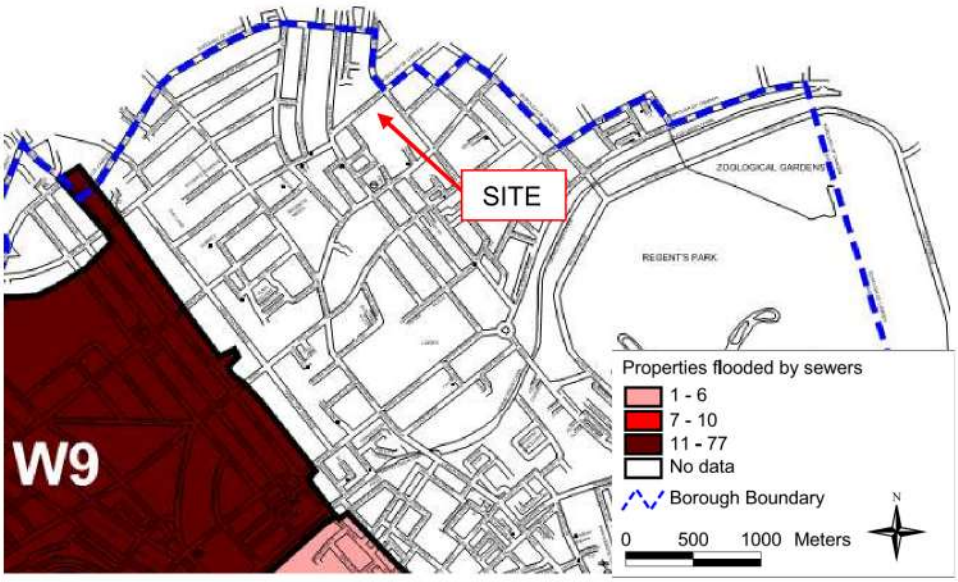


Figure 9: Map of Properties flooded by Sewers in last 10 years

3.16 **Flooding from surface water:** According to Westminster Surface Water Modelling Study, the site is away from Critical Surface Water Locations or Critical Flow Paths.

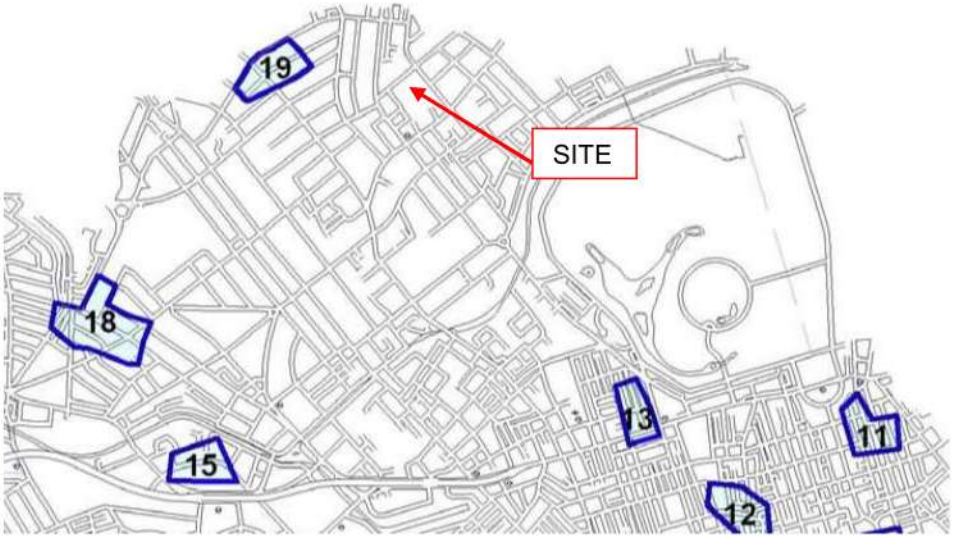


Figure 10: Critical Surface Water Locations

3.17 **Existing Underground Structures:** There is expected underground tunnel (Jubilee Line) which runs below proposed front subterranean extension. The tunnel is at east 14m below surface of front garden. LUL (London Underground Lines) has been contacted and relevant approvals are to be processed as part of next stage of the project.

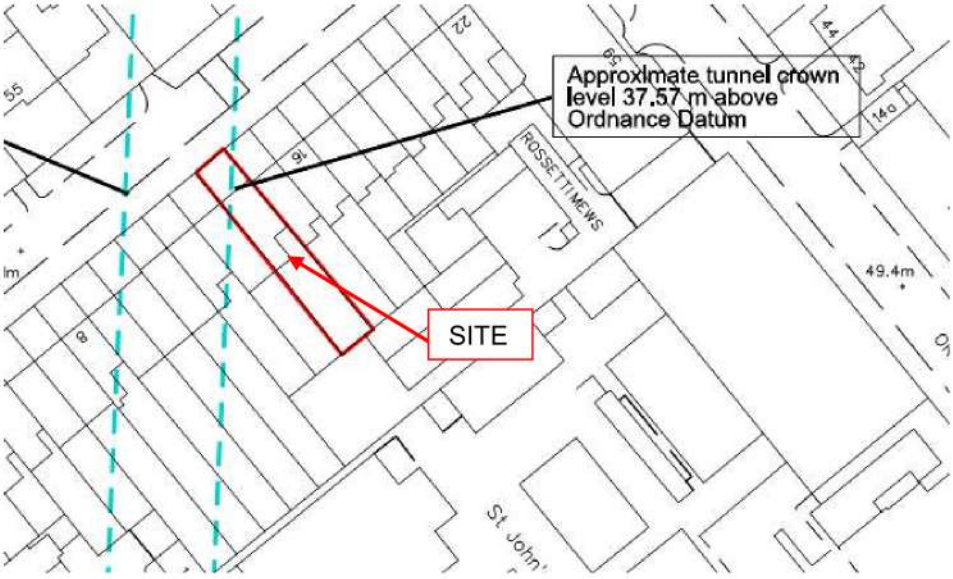


Figure 11: Extract from LUL location plan

3.18 **Unexploded Ordnance:** The WW2 bomb census shows that there were was strikes within 100m with the nearest recorded on the adjacent road, Finchley Road.

Figure 12: Mapping of the World War 2 Blitz Bomb Census

3.19 **Quarrying/mining:** Coal Authority web site shows that the area has not been subject to exploitation of coal or brine. Inspection of old Ordnance Survey maps dating back to the first editions (late 1800s) does not record any quarrying activities within 250m of the property.

3.20 **Land contamination:** The land was occupied by current buildings since 1860 and it is unlikely that the site has previously been used to produce a chemical contaminants. Environment Agency Recorded Pollution Incidents were not recorded within 1km from site. No visual or old factory evidence of any contamination was identified within the trial pits excavated at the property.

3.21 **Trees**: The site and adjacent lands are well away from trees and hedges, the proposed excavations will be outside tree protection zone. The excavations are carried out in short sections and with controlled pours of concrete hence there is very limited risk for any trees. Please refer to specialist reports for details of tree protection as necessary.

4.0 GEOLOGICAL AND HYDROLOGICAL STATEMENT

4.1 Refer to detailed ground investigation report prepared by Card Geotechnics Ltd (CGL) for details of geology and hydrology at the above site. Extract from full site investigation is appended to this report.

Geological statement

4.2 Ground investigations and desk studies indicate that there is uniform stiff CLAY soil under the property and generally in the surrounding area. This type of soil is able to support loadings from domestic houses and should not cause issues during excavation works.

4.3 The proposed basement excavation is to adopt conventional spread type foundations on similar ground as per the existing house. Borehole from CGL notes that the soil is consistent to the proposed depth of the excavation with good allowable bearing pressures.

4.4 The topography of the area is reasonably flat and no landslides are envisaged.

4.5 The soil is classified as stiff CLAY. While the soil is classified as highly-shrinkable soil, we did not recorded signs of historical ground movement in the property. The depth of existing foundations is at least 0.4m below lower ground floor level (1.8m below front garden). Proposed basement formation level is at about 5.2m below external rear garden level and it should be well below level of influence of seasonal variation in moisture content that may cause movements. Refer to sections of CGL site Investigation report for further explanation.

Hydrological statement

4.6 The ground investigation carried out by by Card Geotechnics has indicated that there will be no significant water encountered during the excavation of the basement down to formation level. While the return visits to monitor groundwater level are scheduled over next months the impermeable nature of Clays and nominal depth of made up ground, it suggests no issues with the hydrology.

4.7 The property is constructed well within the clay soil which are highly impermeable. The preliminary soil report notes that there was no presence of water in the borehole above formation level or there was slow influx of ground water which suggests good ground conditions and therefore there is no impact from the development on groundwater flow.

4.8 The proposed works will not significantly change the proportions of hard surfaces or paved areas to impact on the volume of surface water that may drain to the ground.

4.9 Arup's Subterranean Development Scoping Study (para 5.1), June 2008, notes that the impact of subterranean development on groundwater flows is negligible as groundwater flows will find an alternative route if blocked by a subterranean structure.

5.0 DETAILS OF PROPOSED CONSTRUCTION

5.1 **Introduction:** The proposed development involves the construction of the basements under the front garden and under part of the rear garden. The excavation is to be up to about 4.7m below lower ground floor level.

5.2 **Proposed basements construction:** The underground structures are to be in conventional reinforced concrete walls and robust slabs. Steel beams and columns are to be adopted as necessary to support the existing structure above. Refer to Appendix A for proposed works drawings.

5.3 **Retaining walls:** The permanent structural works will involve the construction of reinforced concrete walls in short sections. New reinforced concrete walls will be monolithically connected to the new reinforced concrete basement slab to provide robust and watertight construction. The walls could be formed as the underpinning structure subject to Party Wall agreements. The underpinning will be constructed in a hit and miss sequence to minimise ground movements. The new basement is a naturally rigid structure and will be designed to accommodate the horizontal ground forces imposed via the underpins to the perimeter, potential for upwards and lateral water pressures as well as the vertical loads from above. The new walls adjacent to highways are to be designed to sustain heavy surcharge loads from the road traffic.

5.4 **Soil-structure interaction:** The underpinning works to the existing boundary walls foundations will provide robust foundations on a denser natural soil than original. New structure will be supported on new foundations. Preliminary estimates suggest that the weight of the new basement will be less than the weight the soil removed and structure above. The stiff reinforced concrete box structure, designed with propped walls, would limit the horizontal movement and consequent impact to the adjacent structures.

5.5 There are no public utilities identified within the site and those within the pavement or road to the front and rear will not be affected by the proposed development. The new basement walls are to be designed to satisfy surcharges that may happen at road or adjacent sites. There should be no impact from the proposed development.

5.6 With respect to the adjacent structures natural ability to move this should not be affected by the proposed development. The borehole information indicates that the existing and adjacent buildings are founded on clay soils. While these soils at shallow depths are susceptible to seasonal movement, in the above property the foundations are well below the ground level and these movement are likely to be nominal, even more there are no trees in close proximity.

5.7 The new underpins to the boundary walls and existing foundations will be similarly supported off the same natural soils or designed to limit differential settlement. There will be no additional negative effect of any heave movement as the new basement will be isolated from the existing foundations. Due to the proposed structure being lighter than the soil removed, then this means the existing soil will have sufficient capacity and is unlikely to suffer settlement. Therefore the effect on the surrounding buildings should be negligible by adoption of proposed method of construction.

5.8 However, should there be on-going nominal movements experienced by the structure above and the adjacent buildings (due to variations in moisture content of the building fabric, temperature variations or nominal ground movements) then there will be insignificant impact on these movements from the proposed development.

5.9 Following ground movement analysis, we do not envisage that the works would exceed category of damage 1 as defined in BRE Digest 251 when works are carried out in accordance with our specification. Category 1 is defined as visual damage to walls such as fine cracks which can be treated easily using normal decoration. Damage generally restricted to internal wall finishes; cracks rarely visible in the external brickwork. Typical crack widths up to 1 mm. Refer to Appendix C for extract from CGL ground movement

report for details.

5.10 **Temporary Works to boundary structures:** The proposed works include underpinning of the party wall as well as basement walls construction in the rear garde. The existing party walls will be founded on the dense soil (as they are at present) and minimal differential movement would be anticipated. The actual process of underpinning can cause some minor cracking in the wall being underpinned and intersecting walls, although if carried out in accordance with the specification and back-propped on completion to minimise the risk of horizontal movement, such movement normally goes undetected. Refer to following sections and Appendix A for outline sequence of works and temporary works.

5.11 **Groundwater:** The groundwater is not considered issue due to there being no presence of high water flow in the borehole.

5.12 **Drainage by others.** The proposed below ground drainage will be separated into foul and surface water wherever possible before connecting through the Thames Water combined sewer network. Existing connections to the public sewer will be retained and reused if possible to minimise disruption outside of the site boundary. A combined water demarcation manhole will be required within the site boundary. This may need to be a suspended manhole in the front lightwell if there is not sufficient space to locate the manhole externally.

It is assumed that all surface water and the foul water drainage above ground floor level will drain via gravity to the Thames Water sewer network. Foul water drainage from the lower levels will be pumped to high level through a dual pumping station.

The surface water drainage strategy may incorporate SuDS where require and this is subject to design by others.

5.13 **Grade of Basement - Water Resistance / Proofing:** The proposed basement will be designed to achieve a Grade 3 level of waterproofing protection as outlined in BS 8102:2009.

Reinforced concrete basement structure with sealed joints would provide barrier against moisture and water ingress. Secondary drain cavity system is proposed as belt and braces measure in case any nominal leak in the concrete joint would happen.

6.0 PARTY WALL MATTERS

6.1 The proposed works development falls within the scope of the Party Walls Act 1996. Procedures under the act will be dealt with in full by the Employers Party Wall Surveyor. The Party Wall Surveyor will prepare and serve necessary notices under the provisions of the Act and agree Party Wall awards.

The Contractor will be required to provide the Party Wall Surveyor with appropriate drawings, method statements and other relevant information covering the works that are notifiable under the Act. The resolution of matters under the Act and provisions of the Party Wall Awards will protect the interests of the owners.

The proposed works on the site of No. 14 Queen's Grove will be developed so as not to inhibit any works on the adjoining properties. This will be verified by the Surveyors as part of the process under the Act.

7.0 GROUND MOVEMENT ASSESSMENT

7.1 A ground movement assessment has been carried out by CGL and cover page of summary is included in Appendix C. Refer to full CGL report for details.

7.2 Based on the assessment, our current knowledge of the building and ground conditions as well as our extensive experience of projects of this type, if the works are carried out in the prescribed manner using fully shored solution then we expect the likelihood of damage to the adjacent properties should be limited to Category 1 as set out in CIRIA report 580 and within the acceptable damage levels set out in WCC's subterranean development policies.

8.0 CONSTRUCTION METHOD STATEMENT

Construction Method Statement (to be read in conjunction with drawings in Appendix A)

Some of the issues that affect the sequence of works on this project are:

- The stability of the existing building;
- The stability of adjoining and adjacent buildings;
- Forming sensible access onto the site to minimise disruption to the neighbouring residents; and
- Providing a safe working environment.

The current proposals are for a new single storey sub-basement to be constructed under front and rear gardens. It is expected that the basement works will be completed in a "bottom up" construction sequence.

The undertaking of such projects to existing buildings is a specialist work and we expect the experienced contractor with the relevant expertise and experience to be employed.

Once the works commence project structural engineer will have an on-going role on site to monitor that the works are being carried out generally in accordance with design and specification. This role will typically involve frequent site visits. A written report of each site visit is provided for the Design Team, Contractor and Party Wall Surveyor.

The Contractor is entirely responsible for maintaining the stability of all existing buildings and structures, within and adjacent to the works, and of all the works from the date of possession of the site until practical completion of the works.

A full set of temporary works drawings and calculations would be provided by the Contractor and will be reviewed by project engineers prior to works starting on site.

Please refer to section 11.0 for noise, vibration and dust assessment with proposed associated mitigation methodologies.

Stage 1: Site Set-Up

Erect a fully enclosed painted plywood site hoarding.

The services within the site should be identified and isolated as necessary. All below ground obstructions should also be removed to allow the works to progress.

Stage 2: Enabling Works

All walls proposed for demolition as part of the works should be accurately surveyed prior to demolition with materials retained where possible.

A movement monitoring system will be installed to the homeowner's and adjoining building at No. 13 and 15 Queen's Grove. A detailed specification for the monitoring will be provided at next stage of the project, refer to section 10 for outline proposals.

Install lateral shoring to perimeter walls at lower ground floor level and ensure that perimeter walls (at upper ground floor level) are laterally restrained.

Install enabling works underpinning (EW) at critical locations and in fully shored shafts as noted in stage 5.

Stage 3: Demolition of Existing Structure and Internal Soft Strip

Install flying shores between existing neighbouring closet wings and carefully demolish existing rear addition.

Carefully break out the appropriate area of existing lower ground floor slab to allow the underpinning / basement works to commence. Remove the existing drainage where necessary.

Stage 4: Construct Transfer Beams and Stability Frames in the Lower Ground Floor to Open up the Area for Basement Construction at the Rear.

Install rear box frames at lower ground floor to open up the space for underpinning works. Use conventional steel needles and props fully laterally braced in both cross directions. Back prop on completion to distribute the loads.

Consider to install Lower ground floor transfer beams from as constructed enabling works underpins. Allow for back propping to ends of permanent / temporary bases.

REAR BASEMENT CONSTRUCTION

Stage 5: Construct 1st Stage Reinforced Concrete basement walls – Refer to TW-400 for details (separate numbering sequence)

Construct basement high level walls in short sections in fully shored trenches to create ring beam.

Install cross shores in localised trenches - TW-01 & TW-02.

DIG 1: Reduce ground level to existing lower ground floor and prepare area for underpinning.

Stage 6: Construct 2nd Stage Reinforced Concrete basement walls and 1st stage of underpinning to existing party walls

Underpin perimeter walls with reinforced concrete / mass concrete as noted. Carry out works in 1-5 hit and miss sequence as per items below.

- Underpinning to be carried out in maximum 1.2m sections in shaft excavations.
- Provide approx. 2m deep underpins in hit and miss as per typical elevation. Where poor ground conditions are noted consider two stage pins subject to temporary works engineers approval as additional shoring is to be required.

6.1 Install trench sheeting, struts and walings as excavation proceeds for underpins in localised shafts.

6.2 Cast 1st stage underpinning stem, dry pack on hardened concrete between new and existing foundations.

6.3 Back prop constructed pins with Acrow jacks at 1.0m vertical centres continue the underpinning to the perimeter until all the underpinning is completed,

The removal of spoil to be carried out as detailed in the Construction Traffic Management Plan.

This method of construction will be used to limit any horizontal ground movement associated with the construction of the underpins and limits the risk of the underpinning works on the neighbouring buildings.

Stage 7: Install Main Shoring TW-03 and associated walling beams

Following completion of perimeter 2nd stage underpinning, the installation of main shoring to front, rear and opposite walls to commence. The shores TW-03 are to be installed in localised fully braced trenches. Additional install TW-02 up against mass concrete underpinning

Temporary works co-ordinator to inspect the works and issue permit to excavate.

Stage 8: Bulk Excavation – DIG 2

DIG 2: Reduce ground level to about 2m using mini excavators.

Stage 9: Construct 3rd Stage Underpins to Perimeter Walls

Underpin perimeter walls with reinforced concrete to formation level.
Carry out works in 1-5 hit and miss sequence as per items below.

- Underpinning to be carried out in maximum 1.2m sections in shaft excavations.
- Provide full depth underpins in hit and miss as per typical elevation. Where poor ground conditions are noted consider two stage pins subject to SE approval as additional shoring is to be required.
- Sections of concrete to be staggered with referenced to walls above.
- Underside of the as constructed concrete to be cleaned and hydrophilic strip to be installed. Reinforcement between vertical sections of underpinning is to be fully tension lapped as specified on the permanent works drawings.

9.1 Install trench sheeting, struts and walings as excavation proceeds for underpins in localised shafts.

9.2 Cast 3rd stage underpinning base and then stem

9.3 Back prop constructed pins with Acrow jacks at 1.0m vertical centres continue the underpinning to the perimeter until all the underpinning is completed

9.4. Pre-bent bars are to be provided I bases to tie foundations.

The removal of spoil to be carried out as detailed in the Construction Traffic Management Plan.

This method of construction will be used to limit any horizontal ground movement associated with the construction of the underpins and limits the risk of the underpinning works on the neighbouring buildings.

The removal of spoil to be carried out as detailed in the Construction Traffic Management Plan.

Stage 10: Bulk Excavation – DIG 3 Basement Level

DIG 3: Reduce ground level to formation level under the garden using mini excavators.

Blind the ground and control short-term heave effects; install underground drainage and heave formers as require.

The removal of spoil to be carried out as detailed in the Construction Traffic Management Plan.

Stage 11: Basement Rafts and Lower Ground Floors Construction

11.1 Install reinforcement, hydrophilic strips and tie with perimeter bases and cast concrete rafts. Leave to cure.

11.2 Install reinforced concrete podium slabs.

Stage 12: Permit to unload. Remove temporary works when the slabs gained sufficient strength.

Seek permit from Temporary Works co-ordinator before shores are removed.

Stage 13: Completion of Works

The superstructure works to the building and in the garden area can be commenced following the completion of the basement works. These works are not unusual for a competent contractor for a residential building of this scale.

FRONT BASEMENT CONSTRUCTION

The works to the front basement can be carried out simultaneously with rear basement works subject to site and traffic management arrangements.

Sequence of works and method of construction would be similar to the rear basement using multi-stage hit and miss sequence in short sections in bottom-up construction.

Refer to TW-401 for illustration of sequence of works.

9.0 NOISE, VIBRATION AND DUST CONTROL

The Supplementary Planning Document "Basement Development in Westminster" states that any basement works should be completed in such a way as to ensure that "suitable measures to control the emission of dust and dirt during construction and ensure works will not generate noise audible at the site boundaries outside of permitted working hours" are in place.

The current proposals are for a new single storey basement to be constructed under front and rear gardens.

The construction works involve the demolition of existing concrete floor slabs, underpinning beneath party wall as well as excavation and the construction of the basement shell. A more detailed sequence of the works has been given in section 8.0. Those most likely to be affected by noise, dust and vibration will be the immediate neighbours at No. 13 and 15 Queen's Grove.

The properties opposite side of the street are slightly more remote from the proposed development and are therefore less likely to be affected, however need to be considered. There may be some impact on other residents within Queen's Grove due to the related construction traffic but this is addressed by Traffic Management Construction Plan.

We have described the mitigation measures that are proposed to keep noise, dust and vibration to acceptable levels.

9.1 Mitigation Measures for Demolition of Existing Slab

The breaking out of existing structures shall be carried out by diamond saw cutting and hydraulic bursting where possible to minimise noise and vibration to the adjacent properties. All demolition and excavation work will be undertaken in a carefully controlled sequence, taking into account the requirement to minimise vibration and noise. The contractor will need to utilise non-percussive breaking techniques where practicable.

As the property is terraced, careful consideration needs to be given to minimise noise and vibration transfer to the adjoining properties. The contractor should ensure that where any slab is adjacent to the boundary the concrete slab should be diamond saw cut first along the boundary to isolate the slab from any adjoining structures.

Dust suppression equipment should be used during the demolition process to ensure that any airborne dust is kept to a minimum. Where practical, concrete should also be wetted down prior to and during breakout to further inhibit airborne dust.

9.2 Mitigation Measures for Underpinning works to the Perimeter

The underpin shafts will be excavated using hand tools where possible. At the base of the underpin shaft it may be found that compressed air tools are required due to the compaction of the ground. Care should be taken in selecting a suitable air compressor that keeps noise to a minimum. The air compressor should be located within the site and behind a hoarding to minimise noise transfer to the adjoining properties.

The spoil will be removed from the excavation using an electrically powered conveyor. The contractor will need to ensure that this is regularly serviced and inspected to ensure any noise from this is kept to a minimum. The conveyor will be located as far from the neighbouring properties as practicable. In order to minimise dust, skips and conveyors should be covered or completely enclosed to ensure that dust cannot escape.

9.3 Mitigation Measures for Bulk Excavation

Due to the size of the basement it is likely that some mechanical plant will be required to complete the bulk excavation. The contractor should ensure that any mechanical plant is switched off when not in use and is subject to regular maintenance checks and servicing. An electrically powered conveyor will be used as detailed above.

9.4 Mitigation Measures for the Construction of the Concrete Basement Shell

The contractor should ensure that any concrete pours are completed within the permitted hours for noise generating works. The contractor should allow for a contingency period to ensure that concrete pours can be completed within these hours regardless of unforeseen circumstances such as batching plant delays and traffic congestion.

The fabrication and cutting of steelwork for the reinforced concrete underpins and slabs shall take place off site. If any rebar needs to be trimmed on site this should be completed using hydraulic or pneumatic tools instead of angle grinders.

9.5 Dust Control

In order to reduce the amount of dust generated from the site, the contractor should ensure that any cutting, grinding and sawing should be completed off site where practicable. If cutting, grinding and sawing is being carried out on site, surfaces are to be wetted down prior to and during these types of work whenever possible. Any equipment used on site should be fitted with dust suppression or a dust collection facility.

The contractor will be responsible for ensuring good practice with regards to dust and should adopt regular sweeping, cleaning and washing down of the hoardings and scaffolding to ensure that the site is kept within good order. The Contractor selected will be a member of the Considerate Contractors Scheme. Contact details of the contractor who will be responsible for containing dust and emissions within the site will be displayed on the site boundary so that the local residents can contact the contractor to raise any concerns regarding noise and dust.

The building will be enclosed within suitable scaffold sheeting and any stockpiles of sand or dust-generating materials will be covered. Cement, fine aggregates, sand and other fine powders should be sealed after use.

10.0 MONITORING AND LIMITS ON GROUND MOVEMENTS DURING EXCAVATION AND CONSTRUCTION

10.1 The Contractor shall provide monitoring to the front, rear and party walls of No 14 Queen's Grove throughout their height as well as the immediate front and rear elevation walls of No 13 and No15 during the basement construction.

10.2 Monitoring shall be completed as follows:
1) Two separate sets of readings one month prior to any works being started to provide a base reading.
2) Fortnightly readings during the structurally critical phases, such as excavation and basement construction.
3) On a monthly basis thereafter for a 6 month period following completion of the notifiable works.
Note: Contingency should be set aside to allow for additional visits at increased frequencies, should trigger values be exceeded.

10.3 Cumulative movement of survey points must not exceed:
a. Vertical Settlement
Code amber trigger values: +/-6mm
Code red trigger values: +/-10mm
b. Lateral displacement
Code amber trigger values: +/-4mm
Code red trigger values: +/-8mm

10.4 Movement approaching critical values:

Code amber trigger value:
All interested parties, including the Adjoining Owner's Surveyor and his Engineer should be informed and further actions immediately agreed between two of the three Surveyors and implemented by the Building Owner. Notwithstanding the Party Wall requirements, the Contractor is to appoint, and to have permanently on site, a suitably qualified Structural Engineer who will be responsible for the reviewing of the movement monitoring results at the start and end of each day and provide immediate advice, remedial works and design as necessary in the event of movement being noted.

The Contractor is to ensure that he has 24 hour/7 days a week access to emergency support provision including but not limited to additional temporary props, needles, waling beams and concrete supply at the start of the excavation and prior to any likelihood of this trigger value being reached. If this value is reached the Contractor, and his Engineer, must without delay provide all interested parties with his plan to implement any emergency remedial and supporting works deemed necessary.

The Contractor must be ready to carry out these works without delay if the movement continues and approaches the trigger value above.

Code red trigger value:
All interested parties including Adjoining Owner's Surveyor and Engineer will be informed immediately. Works will stop and be made safe using methods and equipment agreed at the above stage. The Contractor is to ensure that the movement has stopped as a result of the implemented remedial works designed and installed at this stage. The requirements of the Party Wall Act will also ensure that two of the three Surveyors and their advising Engineers shall then enter into an addendum Award, setting out whether or not the Building Owner's works can re-commence and when, and if so agree addition