APPENDIX B – SRTRUCTURAL DESIGN AND CONSTRUCTION STATEMENT

SINCLAIRJOHNSTON

STRUCTURAL DESIGN AND CONSTRUCTION STATEMENT FOR PLANNING
55 LANCASTER GROVE, NW3

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REVISIONS

Revision Schedule

Revision	Issue Date	Comments
-	20.02.15	Issued with BIA in support of planning.

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1. INTRODUCTION

The following Structural Design & Construction Statement has been prepared as part of the wider Basement Impact Assessment (BIA) undertaken for the planning application, submitted by Squire and Partners, for the proposed residential redevelopment at 55 Lancaster Grove, London, NW3 4HD.

The purpose of this report is to describe the existing site and ground conditions, to present the structural scheme to be adopted for the proposed development, and to describe the proposed construction methodology for the execution of the works. The report and information contained within has been prepared for planning purposes only.

This report should be read with Sinclair Johnston & Partners Basement Impact Assessment (BIA) report and all other Consultant's reports produced for the planning application.

The report has been prepared by Mr Nicholas King BEng MSc(Eng); Technical Director at Sinclair Johnston & Partners.

2. EXISTING SITE

The site address is 55 Lancaster Grove, London, NW3 4HD. The site is located within the Belsize ward. See Figure 1.

The property is not listed. The property is within the Belsize Park conservation area.

The existing site comprises:

- A three storey semi-detached house built around 1900.
- The house has a small font garden with a paved driveway, a paved side passage giving external access to the rear garden which is partly paved and partly grassed.
- The surrounding area consists primarily of residential streets large detached or semi-detached residential properties. The area appears to have been undeveloped prior to 1871, with the majority of the existing buildings constructed between 1871 and 1915.
- The existing house construction consists of loadbearing brickwork front, rear, party and flanks walls. The floors are timber joists spanning between the external masonry walls and internal timber stud partitions. The existing roof construction is a traditional cut timber roof, with tiles, battens on timber rafters supported on timber purlins and the external masonry wall. Second floor ceiling joists act as ties just above eaves level.
- Given the age, type and scale of the existing buildings adjoining the site, the construction will be of a similar nature with timber joisted floors spanning between loadbearing brick external walls and internal timber stud walls.
- The local area is generally flat, with a maximum surface slope of 3˚ to the south or south west.
- The existing ground floor is approximately level with the adjacent pavement and road.
- Lancaster Grove runs approximately east – west between Buckland Crescent and Eton Avenue. No 55 is located between the junctions with Lancaster Drive and Lambolle Place.
- As identified by the Flood Map for Planning (Rivers and Seas) the site within flood risk zone 1. This indicates that the risk of flooding is very unlikely (less than 1 in 1000).
- As indicated on the Camden SRFA Figure 6, the site is not located within a Local Flood Risk Zone. The site does lie within Critical Drainage Area Group 3_005.
- The site is in an area of very low risk of surface water flooding.
- The nearest surface water feature is located approximately 500m south.
- The Lost Rivers of London by N J Barton indicates that a headwater tributary of the Tyburn runs down Lancaster Drive, 75m to the west in a culvert.

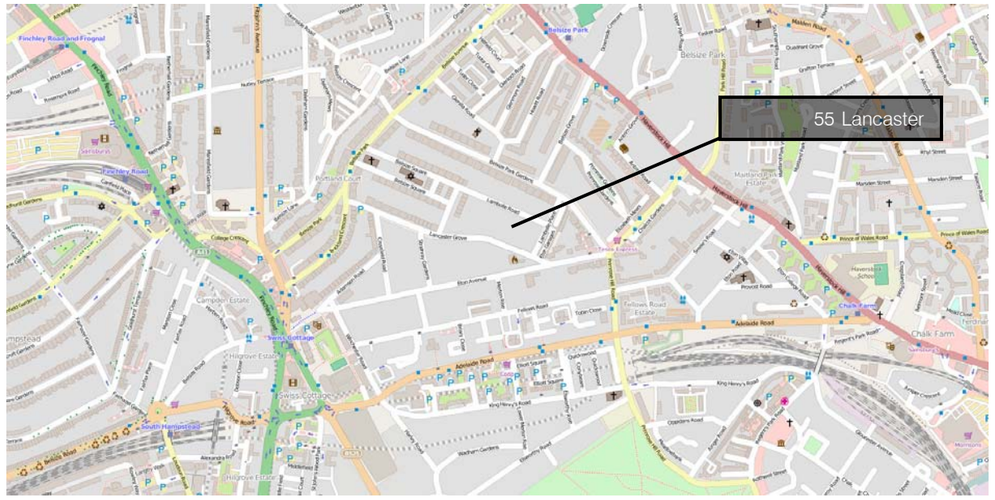

Figure 1 Site Location Map

Figure 2 Aerial View of Site looking North

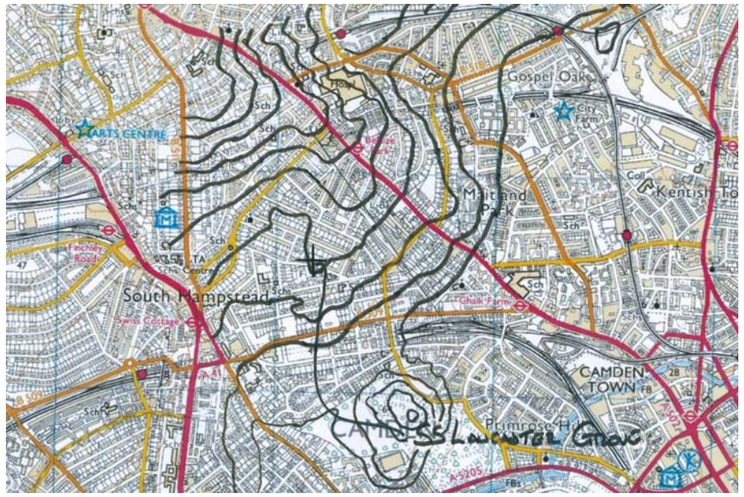

Figure 3 Approximate Ground Surface Contours

Figure 4 Front Elevation of 55 Lancaster Grove

Figure 5 Rear Elevation of 55 Lancaster Grove

Figure 6 Lancaster Grove Looking East

3. SITE GROUND CONDITIONS

The following is a brief description of the site ground conditions. An intrusive site investigation has been undertaken by GEA Geotechnical and Environmental Associates Limited. For detailed information reference should be made to their site investigation report reference J14387, included in Appendix C of this report.

In summary the site ground profile comprises:

Ground	Depth below ground level (m)	Thickness (m)	Notes
Made ground	0	0.5 to 0.95	Brown clay / clayey sand with rootlets and gravel and occasional fragments of brick, coal, and concrete.
London Clay	0.5 to 0.95	>15m	An upper weathered horizon of generally firm becoming stiff fissured high strength becoming very high strength brown mottled grey brown silty clay with occasional to abundant partings of fine sand and silt, selenite crystals and mica. Below this depth stiff fissured very high strength grey silty clay with abundant grey partings of fine sand and silt.

Figure 7 – Summary of Ground Conditions

3.1 TIDAL AND FLUVIAL FLOOD RISK

The site is not located with the Environment Agency's Flood Zones 2 or 3. There is therefore a very low risk (annual probability less than 1 in 1000 (0.1%)) of tidal or fluvial flooding at the site.

3.2 GROUNDWATER FLOOD RISK

Groundwater was not encountered during drilling. During subsequent monitoring, groundwater was measured in the standpipes at depths of between 0.72m and 5.18m. This is most likely to be water lying on the surface of the London Clay and filling the standpipes rather than a true representation of the groundwater levels within the London Clay formation.

Perched groundwater was encountered during the excavation of the trial pits.

The site is classified by the Environment Agency as 'non-productive' strata.

The site is located within a Groundwater Source Protection Zone.

The site is located 75 m to the east of a former tributary of the River Tyburn. This tributary is no longer present at surface and has been culverted below ground to form a surface water drain. It is therefore unlikely to have any inmpact on groundwater flows.

There are no natural surface water features within 500m of the site.

The local area is generally flat, with a fall of approximately 3˚ to the south or south west.

Development in the local area is predominantly residential properties, intersected by highways. The residential buildings in the local area are large detached or semi-detached houses with private gardens

The current surface water flow regimes can therefore be summarised as follows:

- Rain water falling onto hard standing surfaces and roofs discharging directly into the existing drainage system and some being taken up in evaporation.
- Rain water falling onto landscaped or garden areas percolation into the made ground and gravels. The water is held on top of the clay and either flows over the clay surface to rivers or is taken up by trees and vegetation and transpired into the atmosphere.

Spaces between buildings for streets, gardens and squares form continuous pathways between and around buildings for groundwater flows. The proposals do not materially alter the existing surface water flow path.

Subterranean ground water flow paths are most likely to be in an approximate southerly or south-easterly direction with water gently flowing along the top of the Clay towards the historic course of the Tyburn and into the Thames. The proposals would appear not to materially affect these potential flows, with water flowing around the proposed development, before continuing along its current flow path.

3.3 SLOPE STABILITY

The surrounding area is generally gently sloping towards the south or south west with a maximum surface slope of approximately 3˚.

The uppermost soils stratum is London Clay, which at a slope of 3˚ is not generally susceptible to slope instabilities. The proposed works do not alter the ground profile on the site or adjacent to the site boundaries, and as such do not alter the risk of slope instability.

London Clay is a soil with high shrinkage potential and is subject to changes in volume with changes in moisture content. Changes in moisture occur seasonally with changes in the levels of rainfall and changes in water uptake by large deep rooted trees. The proposed works do not alter the infiltration or run-off characteristics of the site and there is no proposed removal or work to significant trees, and therefore the risk of damage to buildings as a result of clay shrinkage is unchanged.

Inspection of the existing building, internally and externally, and the front elevations of the adjoining buildings from the street has not identified any signs of damage as a result of soil movement.

3.4 SEWER AND SURFACE WATER FLOOD RISK

The site is not situated within the catchment of the chain of ponds on Hampstead Heath.

The proposals do not significantly change the total impermeable area of the site. The extent of the proposed basement is contained generally within the footprint of the existing house, single storey rear extension and paved rear patio. The proposed rear paving is detailed as timber decking with gaps between the adjacent planks allowing water to percolate through to the ground beneath.

The volumes and rate of surface water run-off from the site will therefore be unchanged by the proposed development. Consequently there will be little or no effect to the surface water flows or quality within the catchment.

Lancaster Grove suffered flooding in the floods of August 1975 flood incident. However Environment Agency Flood Map for Planning (Rivers and Sea) indicates the site is not in flood risk zones 2 or 3. The London Borough of Camden Strategic Flood Risk Assessment Figure 3v indicates that the site is in an area of very low risk (<1 in 1000 year) risk of flooding.

4. PROPOSED DEVELOPMENT

The description of the proposed development given below is provided to give context to the following sections of the report. For a detailed description of the various disciplines proposals reference should be made to the various reports submitted with the planning application.

The proposed development comprises:

- Retention of the existing building.
- Demolition of the existing single storey rear extension.
- Construction of a single storey basement beneath the footprint of the existing building and extending into the rear garden, including lightwells to the front of the building.
- Construction of a single storey rear extension.
- Internal reorganisation and refurbishment.

5. STRUCTURAL PROPOSALS

5.1 DESCRIPTION OF PROPOSED STRUCTURE

Drawings describing the structural proposals are provided in Appendix A.

The works to the superstructure for the internal alterations have not been developed and are not considered in this report.

The substructure comprises:

- Contiguous bored piled retaining walls to form the walls to the front lightwells and basement to the rear of the existing building. The contiguous piled walls provide temporary and permanent earth support.
- Reinforced concrete underpinning along the flank wall and party wall lines. These will be installed in a 1 – 3 – 5 – 2 – 4 sequence so that no two adjacent sections of wall are underpinned concurrently.
- The sub-basement slab will be a reinforced concrete raft slab providing lateral propping to the base of the underpinning and piled retaining walls. This will also provide a spread foundation for the building and will be designed to resist uplift due to water pressure and heave.
- The ground floor and basement floor slabs will be reinforced concrete supported on steel beams. As well as providing suspended floor slabs, these will provide high level and intermediate lateral propping the basement retaining walls.

5.2 STRUCTURAL STABILITY

A combination of contiguous piled retaining walls and reinforced concrete underpinning is proposed to the basement perimeter walls. The final design for the contiguous piles is to be undertaken by a specialist piling contractor sub-contracted to the main contractor. At the pre-planning stage the main contractor and their appointed sub-contractors are not appointed. Therefore, preliminary piling designs have been investigated at the planning stage using previous experience and generally the approach set out in CIRIA C580. The form of retaining wall proposed has been successfully used on many similar basement projects and the performance characteristics of such walls in London Clay are well documented and understood.

All retaining structures are to be designed to support the lateral pressures resulting from earth, surcharge and transient hydrostatic loads. Pressures are to be calculated using the geotechnical parameters set out in the GEA site investigation report. A design ground water level of -1.0m below the retained earth level is to be adopted for the design of all retaining structures. A minimum surcharge pressure of 10kN/m^2 is to be adopted over and above any adjacent foundation surcharge loads.

The embedded retaining walls are to be propped in the temporary and permanent cases. Temporary propping is to take the form of proprietary struts and waling beams or structural steelwork. Permanent propping is provided by the reinforced concrete ground bearing basement slabs and reinforced concrete suspended floor slabs.

The ground investigation found ground water at between 0.7m and 5.2m below the existing ground level. These readings are likely due to minor seepages of ground water within permeable Silty lens present within the Clay. It anticipated that there will not be significant groundwater inflows during construction

The excavation required to form the basement results in the removal of the original over-burden pressure. This results in the bottom of the excavation rising a phenomenon commonly known as ‘heave’. Initially this heave is unrestrained as the site is an open excavation. During construction of the new building the weight of the new structure resists any on-going heave.

5.3 PREDICTED STRUCTURAL DAMAGE TO NEIGHBOURING PROPERTY

An initial prediction of structural damage to neighbouring properties has been undertaken in general accordance with CIRIA publication C580. Calculations are provided in Appendix B. This constitutes a Stage 2 assessment in accordance with CIRIA C580.

CIRIA C580 provides guidance on possible ground movements due to excavation and construction of embedded retaining walls within clay ground. The use of the procedures and guidance set out in CIRIA C580 is therefore considered to be highly applicable in this instance.

5.4 DESCRIPTION OF NEIGHBOURING PROPERTIES

The adjoining properties at 53 and 57 Lancaster Grove are practically identical to 55 Lancaster Grove. The properties appear to have been constructed around the same time and are of load bearing masonry construction most likely with timber floors. For the purposes of the category of damage prediction No. 57&59 are considered to be a single structure.

A visual inspection of No’s 53, 55 and 59, undertaken from street level, did not identify any apparent defects or evidence of historic movement. Post-planning, as part of the party wall process, a more detailed structural inspection of the adjacent properties including internal inspections will be undertaken prior to completing the detailed ground movement analysis.

5.5 CATEGORY OF DAMAGE (BURLAND ET AL.)

The category of damage to 53 Lancaster Grove, as classified under Burland et al, anticipated from the proposed construction of the new basement is predicted to be category 1 to 2 slight to very slight.

The category of damage to 57&59 Lancaster Grove, as classified under Burland et al, anticipated from the proposed construction of the new basement is predicted to be no worse than category 1 very slight.

As the predicted level of damage is within acceptable limits, a stage 3 analysis is not required.

5.6 MOVEMENT MONITORING

The Contractor will be required to monitor ground movements at the head of the excavations during the works to check the validity of the ground movement analysis and the performance of the temporary works and working methods. A 'traffic light' system of green, amber, red trigger values will be set with specific Contractor actions set against each trigger values.

The monitoring method is to be developed further during detailed design but may take the form of precise levelling, geospatial surveying, inclinometers, tiltmeters or electrolevel beams, or extensometer's or a combination of these methods. The monitoring will be undertaken prior to installation of the piled walls and continue through to completion of the basement structure and until the ground movement has ceased.

6. PARTY WALL MATTERS

The works comprise the underpinning of the party wall with No 53 Lancaster Grove and excavation for a new basement adjacent to the site boundaries and within close proximity to No 57 Lancaster Grove. Procedures under The Party Wall etc Act 1996 are therefore required.

The structural scheme adopted has been designed with due regard to maintaining the structural stability and integrity of neighbouring buildings & structures and surrounding land. The structural form of the basement and the method of construction have been developed to ensure that lateral deflections, and associated ground movements, are kept within acceptable limits. An initial assessment of the predicted ground surface movements using the approach set out in CIRIA C850 has indicated that the predicted category of damage to adjacent properties would be no worse than category 2 – slight.

7. CONSTRUCTION METHODOLOGY

7.1 CONSTRUCTION SEQUENCE.

The proposed sequence of works given below has been assumed for the purposes of undertaking the planning stage structural design of the building and is provided to demonstrate that the works can be executed with due regard to the local amenity.

Proposed Sequence of Works

a) Set up site compound, including hoardings to front and rear gardens to provide site security and screening. Establish movement monitoring regime, reference points and take initial baseline readings.

b) Soft strip internally and externally. Remove or protect existing windows and shore up and cover over existing window openings.

c) Demolish existing single storey rear extension.

d) Remove existing ground floor construction and excavate down to a minimum of 150m above the existing footing levels.

e) Site to be cleared and piling platform installed.

f) Install contiguous bored pile retaining walls to front lightwells and rear basement and internal piles to provide support to existing loadbearing walls.

g) Install temporary works to support internal and rear elevation loadbearing walls.

h) Construct underpinning to party wall and flank wall

i) Capping beams to contiguous piled walls to be constructed. Monitoring equipment to capping beams to be installed and base line readings taken. Regular monitoring to be undertaken throughout the works.

j) Excavate internally sufficient to install high level temporary lateral propping to contiguous piled walls and underpinning.

k) Continue excavation to above basement slab level and install low level lateral propping to underpinning and contiguous piled retaining walls.

l) Continue excavation to formation level and construct sub-basement raft slab.

m) Install internal columns and construct basement level slab and cure.

n) Remove low level lateral propping.

o) Construct ground floor level slab and cure.

p) Remove high level propping.

7.2 CONSTRUCTION GENERALLY

The works are required to be undertaken in accordance with all statutory legislation relating to construction works.

The Contractor will be required to demonstrate a positive attitude and commitment toward minimising environmental disturbance to local residents and will be required to be registered with the Considerate Contractors Scheme.

Noise, dust and vibration will be controlled by employing Best Practicable Means (BPM) as prescribed in the following legislative documents and the approved code of practice BS 5228:

The Control of Pollution Act 1972

The Health & Safety at Work Act 1974

The Environmental Protection Act 1990

Construction (Design and Management) Regulations 1994

The Clean Air Act 1993

General measures to be adopted by the Contractor to reduce noise, dust and vibration include:

- Erection of site hoarding to act as minor acoustic screen.
- Use of super silenced plant where feasible.
- Use of well-maintained modern plant.
- Site operatives to be well trained to ensure that noise minimisation and BPM's are implemented.
- Effective noise and vibration monitoring to be implemented.
- Reducing the need to adopt percussive and vibrating machinery.
- Bored piling techniques to be adopted to reduce piling induced vibration.
- Piles to be broken down using non-percussive techniques.
- Vehicles not to be left idling.
- Vehicles to be washed and cleaned effectively before leaving site.
- All loads entering and leaving the site to be covered.
- Measures to be adopted to prevent site runoff of water or mud.
- Water to be used as a dust suppressant.

- Cutting equipment to use water as suppressant or suitable local exhaust ventilation system.
- Skips to be covered.
- Drop heights to be minimised during deconstruction.
- Use of agreed wet cleaning methods or mechanical road sweepers on all roads around site.
- Set up and monitor effective site monitoring of dust emissions.
- Working hours to be restricted as required by the Local Auhtority.

7.3 CONSTRUCTION BEST PRACTICE

The Contractor will be required to be registered with the Considerate Contractor scheme.

The Piling Contractor is to be a registered member of the Federation of Piling Specialists.

Impacts on the local amenity will be strictly controlled and managed by the Contractor.

Working hours will be restricted as required by the Local Authority.

The Contractor will be required to provide a Construction Management Plan prior to undertaking the works. The contents of this plan must be agreed with the Local Authority and complied with unless otherwise agreed with the Council.

The Contractor will be required to provide a Site Waste Management Plan describing how site waste is to be minimised and dealt with.

Ground water is well below the proposed basement formation level. Therefore, ground water will not be significant during execution.

7.4 TEMPORARY WORKS

The Contractor will be required to appoint a Temporary Works Co-ordinator to advise, design, co-ordinate and oversee all temporary works aspects. All temporary works are to be in accordance with BS 5975 'Code of practice for temporary works procedures and the permissible stress design of falsework'.

The planning stage structural design has highlighted the following specific temporary works that will need to be further developed during detailed design and construction:

Temporary lateral propping to be installed to support the contiguous piled retaining walls and underpinning. This propping is required to prevent significant lateral movement of the retaining walls. The propping is to be kept in place until the permanent propping (reinforced concrete slabs) is constructed.

Temporary vertical support to the existing rear elevation walls and internal loadbearing walls. This is required to support the existing structure during the excavation of the basement beneath the existing foundations. The propping is to remain in place until the permanent support is in place. To enable the basement to be excavated without modification to the temporary works, it is envisaged that the props will be supported on temporary piles. These will be removed once the temporary supports are dismantled.

7.5 CONSTRUCTION TRAFFIC MANAGEMENT

The Contractor will be required to develop a Construction Traffic Management Plan for submission and agreement with the Local Authority. This Traffic Management Plan is to be in accordance with Camden Planning Guidance 6 Section 8.

Spoil removal from the excavation will be via conveyor to either skips or tipper lorries located in the front garden. Dwell time for lorries is expected to be 30 to 40 minutes per vehicle.

Access to and from the site over the footway will be controlled by banksmen.

In order to access the site it will be necessary to suspended parking in the residents parking bays in front of the site

It is anticipated that access to the site from the trunk road network will be off the A41 at Swiss Cottage and via the B511, Buckland Crescent and Lancaster Grove. Return to the strategic road network will be via Lancaster Grove, Eton Avenue, Primrose Hill Road and the B509 to the A41 at Swiss Cottage. This routing of construction vehicles avoids the need to turn vehicles in Lancaster grove.

Deliveries to the site will be scheduled take place between 10:00 and 15:00. Deliveries will be scheduled and booked a time slot to reach the site to ensure that vehicles do not queue in Lancaster Grove or the surrounding streets.

Concrete will be delivered to site from concrete batching plants by concrete delivery wagons. Concrete will be pumped into site by a concrete pump parked in in the front garden.

8. CONCLUSIONS

The structural proposals and construction methodology for the redevelopment at 55 Lancaster Grove have been developed with due regard to the existing site constraints, the site specific and local ground conditions, the local amenity and the local highways.

The ground conditions are well understood and have been investigated by GEA and are described within their report reference J14387

Ground water was monitored at .07m and 5.2m below ground level. Significant dewatering of the site is not likely to be required.

The structure has been designed to maintain the stability and integrity of the surrounding land and neighbouring buildings, structures and below ground services.

The basement is to be formed using combination of contiguous bored piling and underpinning. The retaining walls are to be propped in the temporary case by steel waling beams and cross props and in the permanent case by reinforced concrete slabs. This form of construction has been successfully used on many similar basement projects and the performance characteristics of such walls in London Clay are well documented and understood.

Anticipated ground movements associated with the works can be limited to acceptable values by a combination of the proposed structure and suitably designed temporary works. The predicted category of damage to the adjacent buildings has been estimated to be no worse than category 2 – slight as defined by Burland et al.

This report demonstrates that by adopting good construction practices the works can be executed in a safe manner while minimising the impact on the local amenity.

The use of front garden is to be used for delivery of ,materials and removal of spoil ensure that vehicles do not block Lancaster Grove.