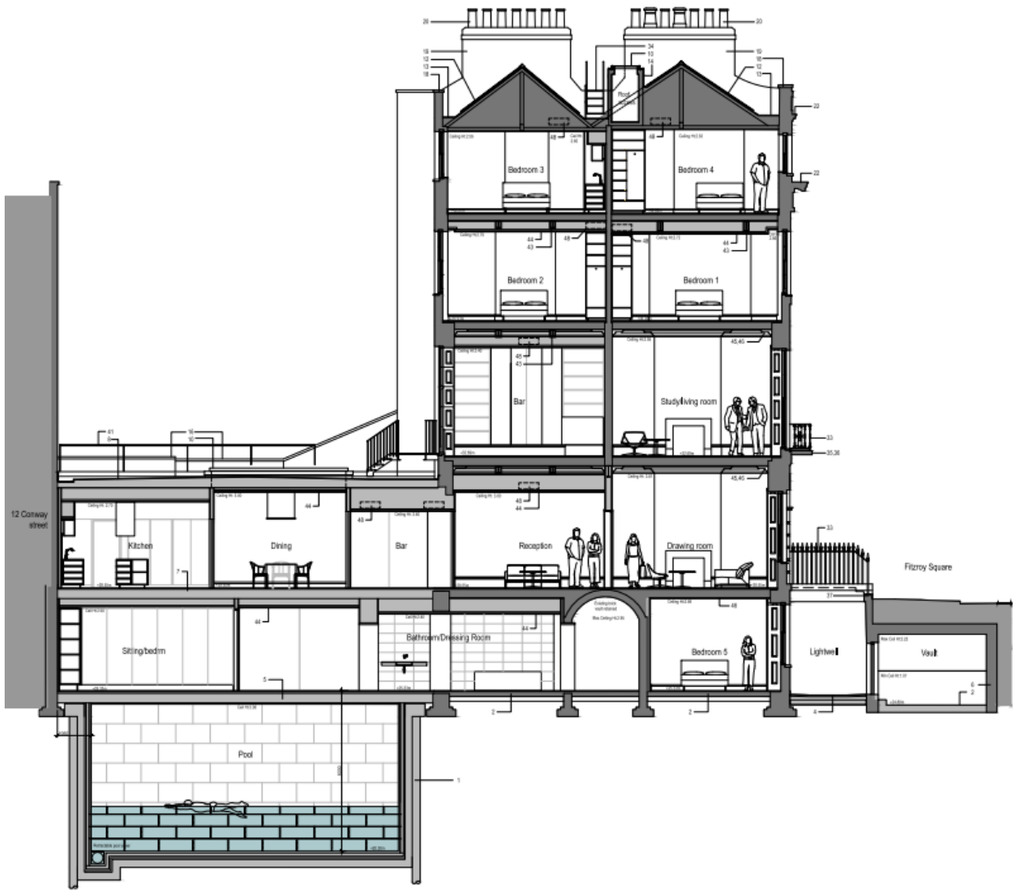
RWA London
Civil & Structural Engineers



19 Fitzroy Square
London W1T 6EQ

Planning Application
Basement Impact Assessment

Rev A

5th April 2016

SUMMARY

In accordance with London Borough of Camden Development Policy DP27 – Basements and Lightwells, and the recent LB Camden guidance document entitled “Camden geological, hydrogeological and hydrological study – Guidance for subterranean development”, an impact assessment for the proposed basement construction on this site is being undertaken for this project.

This report covers the initial desk study, screening process, site investigation and assessment of the impact of the basement.

The findings and opinions conveyed and summarised in this report are based on information obtained from a variety of sources as referenced within the report.

This report has been prepared by Conor O’Boyle and Stephen Thompson of RWA London LLP.

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REFERENCE DOCUMENTS

Documents prepared by RWA London and other parties have been presented as part of the planning application for 19 Fitzroy Square. These documents, to be read in conjunction with this report, are shown in the list below:

Jomas Associates Limited, “Desk Study, Ground Investigation & Basement Impact Assessment Report for 19 Fitzroy Square, London W1T 6EQ,” P9318J754

Andrew Lett Architects drawings:

14113_PL_01 (P1) Location Plan & Lower Ground Floor Plan as existing
14113_PL_02 (P1) Ground Floor Plan as existing
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14113_PL_04 (P1) 2nd, 3rd & Roof Plans as existing
14113_PL_06 (P1) Sections A, B & D as existing
14113_PL_07 (P1) Sections C & E as existing
14113_PL_08 (P1) Elevations to Conway Street and Fitzroy Square as existing

14113_PL_20 (P1) Demolition - LGF Plan
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14113_PL_22 (P1) Demolition - 1stF Plan
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14113_PL_30 (P1) Proposed - L-2 Plan
14113_PL_31 (P1) Proposed - LGF Plan
14113_PL_32 (P1) Proposed - GF Plan
14113_PL_36 (P1) Proposed - Sections A, B & D
14113_PL_37 (P1) Proposed - Sections C & E
14113_PL_38 (P1) Proposed - Elevations to Conway Street and Fitzroy Square

1 INTRODUCTION

1.1 Introduction

RWA London was appointed by Tamares Group to provide the necessary pre-planning information required to support the main application from Andrew Lett Architects.

The objective of this study was to produce an impact assessment for the proposed basement construction on this site in accordance with the requirements of the London Borough of Camden. Their requirements are set out within their Development Policy DP27 – Basements and Lightwells, and the recent LB Camden guidance document entitled "Camden geological, hydrogeological and hydrological study – Guidance for subterranean development".

This report covers the initial desk study, screening process, site investigation and assessment of the impact of the basement.

1.2 Scope

This report presents RWA London's interpretation of the report by Jomas Associates Ltd (JAL) detailing desk study findings, site investigation findings and impact assessment statements.

The extent of the proposed basement installation is set out in the Architect's Design Statement, and summarised in Section 2.3. This recommendations set out in this report is limited to the above mentioned development scheme.

2 THE SITE

2.1 Site Location

The site is referred to as 19 Fitzroy Square and is located on the north-western corner of Fitzroy Square in central London. The site is bounded to the south by Fitzroy Square and to the west by Conway Street.

It is approximately centred at National Grid reference 529074, 182121.

The site is rectangular in shape and measures approximately 9m x 26m.

The site presently contains Georgian house facing Fitzroy Square extending over lower ground, ground, and 1st, 2nd and 3rd floors. To the rear is a more recent addition extending over lower ground and ground floors and facing Conway Street.

The site has an approximate level of 25.22m OD at the Lower Ground level, and is bounded by:

- Similar four storey buildings with single storey lower ground floors to the east as part of the terrace on Fitzroy Square;
- Similar four storey buildings with single storey lower ground floors to the north as part of the terrace on Conway Street;
- The open space of Fitzroy Square to the south;
- Highway of Conway Street to the west.

A site location plan is presented as Appendix 1.

2.2 Historical Mapping Information

The historical development of the site and its surrounding areas was evaluated following the review of a number of Ordnance Survey historic maps, procured from GroundSure, and provided in Appendix 3 of JAL BIA report P9318J754.

Summarising the investigation of the historical development, there is evidence of a building developed that "appears to resemble the current one on site" from the first available map, dated 1873. Subsequent survey maps show "no significant changes" to the site until 1962, where properties 16 to 19 Fitzroy Square are labelled as "Fitzroy House (Nursing Home)," however the site "appears the same" as previous survey maps. This labelling is removed from maps dated 1964/69. Subsequent survey maps show "no significant changes" to the site through to 2014.

For information regarding the historical mapping of the area surrounding the site, refer to the above-mentioned appendix.

2.3 Proposed Development

The proposal is to refurbish the main house and replace the existing recent addition with a new structure extending over basement, lower ground and ground floors. The new structure will take the exact same form above ground and replicate the existing façade to Conway Street. The proposal therefore includes a new basement excavation below the rear addition. The basement includes a small pool.

The foot print of the new basement construction is to be offset away from the 5-storey main house facing Fitzroy Square and offset from the existing party walls to 18 Fitzroy Square and 12 Conway Street. The proposed level of the new basement is approximately 3.5m below the existing lower ground floor level. The pool and pool plant room extends a further 2.3m below this. Refer Andrew Lett Architects drawings attached to this application.

It is envisaged that the new basement will require construction of a piled retaining wall toeing into the London Clay due to the depth of the excavation. Appendix 2 shows the plan of the proposed basement overlain on the existing layout.

3 GROUND CONDITIONS

3.1 Published Geological Data

Summarising the information presented in the JAL BIA report P9318J754, information provided by the British Geological Survey indicate the site is underlain by superficial sand and gravel deposits of the Lynch Hill Gravel Member, underlain by clay, silt and sand of the London Clay Formation. Artificial deposits are not reported within the site.

A British Geological Survey borehole record was found to exist 49m south east of the site. The information presented has been summarised in the table below:

Depth Below Ground Level	Strata
0.00 – 0.69m	Fill
0.69 – 2.44m	Gravel and Sand
2.44 – 8.53m (End of Hole)	Clay

It is expected that similar conditions are present at the site. A site investigation was conducted to confirm the present ground conditions.

The following are brief findings extracted from the JAL BIA report P9318J754 Section 3 and Appendix 2, which relate to factors that may have a potential impact upon the engineering of the proposed development.

Potential Hazard	Site Check Hazard Rating	Details	Further Actions Required?
Shrink Swell	Moderate	Ground conditions predominantly high plasticity. Do not plant or remove trees or shrubs near to buildings without expert advice about their effect and management. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a probable increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a probable increase in insurance risk during droughts or where vegetation with high moisture demands is present.	Yes
Landslides	Very Low	Slope instability problems are unlikely to be present No special actions required to avoid problems due to landslide.	No
Ground Dissolution Soluble rocks	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks.	No
Compressible deposits	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required.	No
Collapsible rock	Very Low	Deposits with the potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required.	No
Running sand	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required to avoid problems due to running sand	No
Coal mining	No	There are no coal mining areas identified within 1000m of the site boundary.	No
Non-coal mining	No	-	No
Brine affected areas	No	-	No

4 HYDROGEOLOGY & HYDROLOGY

The following sections have been extracted from JAL BIA report P9318J754 Section 4.

4.1 Hydrogeology

The baseline hydrogeology of the site is based on available hydrogeological mapping, including the BGS online mapping, iGeology App and London Borough of Camden SFRA.

The available data indicates that the geology of the area is sand and gravel to approximately 2.5m then London Clay. If present groundwater will be within the sand and gravel.

Below the superficial deposits, the site will be underlain by solid deposits of the London Clay formation; this acts as an aquitard up to 150m in thickness to the main London chalk aquifer.

The existing lower ground floor is likely to be founded on the London Clay considering the thickness of the sand and gravel deposits in the nearby borehole. The excavation of the basement is not therefore expected to encounter the main aquifer as it will be within the clay. Any perched groundwater lenses that might be encountered can be dealt with appropriately through industry standard localised de-watering.

The proposed basement does not extend into a sensitive groundwater body; there is unlikely to be a risk posed to or from the development to groundwater based on following industry standard basement construction techniques.

No groundwater flows will be impeded by the basement.

4.2 Hydrology and Flood Risk

The table below summarises the review of the flood risks posed to and from the development. Refer JAL BIA report P9318J754 for full details regarding the investigation.

Flood Sources	Site Status	Comment on flood risk posed to / from the development
Fluvial / Tidal	Site is not within 250m of an Environment Agency Zone 2 or zone 3 floodplain. Risk of flooding from rivers and the sea (RoFRaS) rating very low.	Proposed development is to an existing property No increase in impermeable areas hence no additional SUDS required.
Groundwater	There are reported to be areas susceptible to groundwater flooding within 50m of the site related to superficial deposits flooding.	The proposed development will not increase the potential risk of groundwater flooding. Basement will be fully waterproofed as appropriate to industry standard
Artificial Sources	Regent's Park boating lake is located approximately 1km from site. No artificial sources within 250m	Low Risk
Surface Water / Sewer Flooding	The site is not within 250m of any surface water features. Condition, depth and location of surrounding infrastructure uncertain	No increase in impermeable areas – no SUDS required Development will utilise existing connection to sewers, gravity drainage and non-return valves Development unlikely to significantly increase the peak flow/volume of discharge from the site: Low Risk No further drainage assessment required
Climate Change	Included in the flood modelling extents Site not within climate change flood extent area	Development will not significantly increase the peak flow and volume of discharge from the site Low risk posed to and from the development

5 UNDERGROUND STRUCTURES

5.1 Basements

From a walkover of the site and its surrounds, it appears the majority of properties in the vicinity of Fitzroy Square have existing basement/lower ground floor levels. This can be identified by lightwells fronting the highway. Both the neighbouring properties 18 Fitzroy Square and 12 Conway Street are confirmed to have existing basement/lower ground floor levels.

5.2 London Underground Tunnels

The Groundsure report indicated the possibility of an underground train tunnel belonging to London Underground and serving the Victoria Line being present below the site.

A request for information was made to London Underground with regards to the specific location of the Underground Infrastructure and a map provided in response shows the tunnel to be located below Fitzroy Square itself, and not directly below site. Refer information presented in JAL BIA report P9318J754 Appendix 5. Although the map provided indicates the tunnel is not located below the site, London Underground will continue to be kept informed of plans and progression of work.

6 SCREENING EXERCISE

6.1 Surface Flow and Flooding

The screening assessment for Surface Flow and Flooding was undertaken by JAL and presented in report P9318J754. The findings are summarised in the table below:

Query	Yes/No	Comment
Is the site within the catchment of any ponds?	No	No evidence of any ponds or surface water features on historical or current OS maps.
As part of the site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially different from the existing route?	No	The proposed development will add a basement within the existing footprint and not affect the run off at ground level.
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	There are no nearby surface water features.
Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	No	No surface waters in the area to be impacted.
Is the site in an area known to be at risk from surface water flooding, or is it at risk from flooding, for example because the proposed basement is below the static water level of a nearby surface water feature?	No	No nearby surface water features.

6.2 Groundwater Flow

The screening assessment for Subterranean (Groundwater) Flow was undertaken by JAL and presented in report P9318J754. The findings are summarised in the table below:

Query	Yes/No	Comment
Is the site located directly above an aquifer?	Yes	The site is located above superficial deposits that represent a Secondary A aquifer.
Will the proposed basement extend below the surface of the water table?	Unknown	The position of the water table within the Secondary A aquifer is not known. Basement could be excavated into the clay beneath the aquifer.
Is the site within 100m of a watercourse, well (disused or used) or a potential spring line?	No	No nearby subterranean water features.
Is the site within the catchment of any pond?	No	No nearby water features.
Will the proposed basement development result in a change in the proportion of hard surfaced/paved areas?	No	The proposed development is to add a basement under an existing building.
As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	No	There is no reason to believe that more water than at present will be discharged to the ground.
Is the lowest point of the proposed excavation (allowing of any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond or spring line?	No	No nearby water features.

6.3 Slope Stability

The screening assessment for Slope Stability was undertaken by JAL and presented in report P9318J754. The findings are summarised in the table below:

Query	Yes/No	Comment
Does the existing site include slopes, natural or manmade, greater than 7 degrees?	Yes	The external patio area is level with the lower ground floor level approximately 3.15m below surface level. There is a retaining wall around the outside.
Will the proposed re-profiling of landscaping change slopes at the property to more than 7 degrees?	No	
Does the developments' neighbouring land include railway cuttings and the like, with a slope greater than 7 degrees?	No	Surrounding land is mostly residential in nature.
Is a clay stratum the shallowest stratum at the site?	No	The site is initially underlain by sand and gravel of the Lynch Hill Gravel Member.
Will any trees be felled as part of the proposed development and/or are any works proposed within any tree protection zones where trees are to be retained?	No	No trees will be felled as part of this development.
Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?	Yes	The site is reported to be in an area with moderate risk of shrink-swell.
Is the site within an area of previously worked ground?	No	There is no evidence from the historical data that the ground in this area has been worked other than regarding the existing residential development.

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?	Unknown	The basement will extend into/below a Secondary A aquifer, however the water level is unknown.
Is the site within 50m of ponds?	No	No natural ponds are identified.
Is the site within 5m of a pedestrian 'right of way'?	Yes	The site is on the corner of two streets.
Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Yes	It is likely that the basement foundations will increase the differential depth of foundations relative to neighbouring properties however this is dependent on the type of foundations used at the neighbouring properties and this is currently unknown.
Is the site over (or within the exclusion of) any tunnels e.g. railway lines?	No	A request for information was made to London Underground with regards to the specific location of the Underground Infrastructure and a map provided in response shows the tunnel to be located below Fitzroy Square itself, and not directly below site.

6.4 Conclusions from Screening

On the basis of the screening exercise, it has been identified that there are a number of items that will require further investigation as part of the scoping process.

It is required to assess the potential impact of the basement construction on groundwater levels in the upper aquifer. It is anticipated that the basement will extend through the Lynch Hill Gravel deposits which could have an influence on adjacent groundwater levels.

Furthermore, it is required to determine the impact of the basement construction on the stability of the existing retaining wall to Conway Street. Likewise, it is required to evaluate the effect on the structural integrity of the adjacent properties including 18 Fitzroy Square and 12 Conway Street.

Additionally, the proposed method of construction requires piling in close proximity to the Victoria Line Underground Tunnels. It is anticipated that London Underground will be kept informed during the detailed design phase of the project, and discussions will be had regarding piling works being conducted close to their assets.

7 SCOPING EXERCISE

To address the issues identified in the screening phase, a determination of the basement impact on groundwater conditions and adjacent structures is to be carried out. To this end, the following procedure will be followed:

1. Conduct ground investigation of site to determine extent of Lynch Hill Gravel deposit
2. Determine geotechnical properties of soils underlying the site
3. Determine groundwater conditions present at time of investigation
4. Monitor groundwater levels for a period of time and report changes in levels

Items 1-4 have been presented in detail in JAL BIA report P9318J754 Sections 8 to 13, and Appendices 6 to 8. A summary of the results of the site investigation, as well as engineering recommendations relating to construction of the basement, is presented in the subsequent sections.

8 19 FITZROY SQUARE SITE INVESTIGATION

The following sections have been extracted from JAL BIA report P9318J754 Section 7.

8.1 Scope of Ground Investigation

The ground investigation was undertaken on 21st December 2015 & 4th January 2016. The work was undertaken in accordance with BS5930 'Code of Practice for Site Investigation' and BS10175 'Investigation of Potentially Contaminated Sites'.

8.2 Investigation Results

Detailed results of the site investigation are summarised from JAL BIA report P9318J754 Section 8.

8.2.1 Site Soil Conditions

Ground conditions were logged in accordance with the requirements of BS5930:2015. The ground conditions encountered are summarised in, based on the strata observed during the investigation.

Stratum & Description	Encountered from (m BGL)	Base of Strata (m BGL)	Thickness Range (m)
MADE GROUND: Concrete over brick and ash	0.0	0.7	0.7
Yellow/brown very gravelly SAND	0.7	1.8 – 2.3	1.1 – 1.6
Firm to stiff light brown becoming grey sandy slightly gravelly CLAY Encountered to base of boreholes	1.8 – 2.3	>10.00 (encountered to terminal depth)	>7.7

8.2.2 Site Hydrogeology

Groundwater was encountered in window sampler hole WS1 during the course of the investigation at 7m BGL. The table below summarises the groundwater conditions encountered during the investigation.

DURING DRILLING			
Exploratory Hole ID	**Depth Encountered (m BGL)**	**Depth After 20mins (m BGL)**	**Stratum**
BH1	-	-	-
WS1	7.0	Not recorded	Sandy Gravelly CLAY
POST DRILLING / RETURN MONITORING			
Exploratory Hole ID	**Depth Encountered (m BGL)**	**Depth After 20mins (m BGL)**	**Stratum**
BH1	0.98 – 1.05	8.12	Sand and Gravel
WS1	1.4 – 1.45	7.06	Sand and Gravel

Groundwater encountered within WS1 at 7m BGL during drilling is considered to represent water accumulated within sandy pockets/lenses within the London Clay. The water will be limited in volume and is expected to be very slow to recharge.

During the post drilling monitoring groundwater was recorded at shallower depths and is considered to represent the groundwater within the sand and gravel superficial deposits of the Lynch Hill Gravel.

8.2.3 Adjacent Building Footings

The two hand excavated pits were undertaken to exposed limited foundations of existing party walls. HTP1 excavated in the corner of the room exposed 0.29m of brickwork down on to two brick corbels which were then founded in the sand and gravel. HTP2 did not expose any foundations with the brick wall seated directly on the underlying ground once the concrete floor slab had been removed.

Refer Appendix 4 for a plan layout of the investigation and details of existing footings.

8.3 Geotechnical Engineering Recommendations

The following sections have been extracted from JAL BIA report P9318J754 Section 13.

8.3.1 Foundations

Based upon the information obtained to date it is considered that conventional foundations may be suitable for the proposed development. Based on SPT N values of 13 at 3.0m BGL and 17 at 4.0m BGL it is considered that an allowable bearing capacity of 150kPa at 3.5m BGL is possible.

The above comments are indicative only based on limited ground investigation data. Foundations should be designed by a suitably qualified Engineer. Once structural loads have been fully determined a full design check in accordance with BS EN 1997 should be undertaken to confirm suitability of foundation choice.

8.3.2 Concrete in Ground

Sulphate attack on building foundations occurs where sulphate solutions react with the various products of hydration in Ordinary Portland Cement (OPC) or converted High-Alumina Cement (HAC). The reaction is expansive, and therefore disruptive, not only due to the formation of minute cracks, but also due to loss of cohesion in the matrix.

In accordance with BRE Special Digest 1, in a data set where there are more than 10 results available, assessment should be undertaken against the average of the highest 20% of values. Where there are less than 10 results in a data set the highest value is taken.

The below table summarises the analysis of the aggressive nature of the ground for each of the stratum encountered within the ground investigation.

Stratum	No. Samples	pH Range	WS Sulphate (ave 20% / highest)	Design Sulphate Class	ACEC Class
Made Ground	1	7.9	90	DS-1	AC-1
Gravelly SAND	1	8.1	70	DS-1	AC-1
London CLAY	2	7.6 – 8.1	250	DS-1	AC-1s

8.3.3 Ground Floor Slabs

Formations of the structures should be inspected by a competent person. Any loose or soft material should be removed and replaced with well-graded, properly compacted granular fill or lean mix concrete. The formation should be blinded if left exposed for more than a few hours or if inclement weather is experienced.

Following excavation of the basement the floor slab will be founded upon London Clay strata. It is expected that a small amount of heave will occur due to the removal of the overlying ground and the slab construction should be design to accommodate this.

8.3.4 Excavations

Excavations will be required at the site for services and construction works. These are anticipated to remain stable for the short term only.

It is recommended that the stability of all excavations should be assessed during construction. The sides of any excavations into which personnel are required to enter, should be assessed and where necessary fully supported or battered back to a safe angle.

In addition, the basement excavation will be located beneath an existing structure. The progression of the basement excavation will need to consider the potential impact to existing structures both on and off site and provide adequate and appropriate support.

8.3.5 Groundwater Control

During the investigation groundwater was not observed although the sand within BH1 was reported to be wet.

During return monitoring groundwater levels were recorded between 0.98m and 1.45m below ground level.

Subject to seasonal variations, any groundwater encountered during site works should be readily dealt with by conventional pumping from a sump.

9 ASSESSMENT OF IMPACT

The following sections have been extracted from JAL BIA report P9318J754 Section 14.

9.1 Geological Impact

The published geological maps indicate that the Lynch Hill Gravel directly underlies the site, with the London Clay underlying the gravels. The available geological information indicates that the Lynch Hill Gravel are present to 2.44m BGL with London Clay beneath. The lower ground floor of the site, which extends to approximately 3.15m below street level, means that there is a reduced thickness of the Lynch Hill Gravel present. The proposed basement will be founding within the underlying London Clay.

The London Clay is unlikely to be prone to seasonal shrinkage and swelling that arises due to changing water content in the soil. This is due to a lack of significant vegetation capable of removing water within the zone of influence and extensive hard cover minimising the amount of water entering the ground.

9.2 Hydrology and Hydrogeology Impact

Based on all the information available at the time of writing, the risk of flooding from groundwater is considered to be low. The proposed basement is unlikely to have a detectable impact on the local groundwater regime. Appropriate water proofing measures should be included within the whole of the proposed basement wall/floor design as a precaution.

The Lynch Hill Gravel is classed as a Secondary A aquifer but the creation of the basement is considered unlikely to have any impact upon the hydrogeology of the area.

The proposed dwelling will lie outside of flood risk zones and is therefore assessed as being at a very low probability of fluvial flooding.

There are no surface water features on or in the immediate vicinity of the site. It is therefore not anticipated that the site will make any impact upon the hydrology of the area.

The information available suggests that the site lies in an area that is not at risk of surface water flooding. Flooding via this source is therefore considered to be low.

The proposed basement construction is considered unlikely to create a reduction of impermeable area in the post development scenario.

No risk of flooding to the site from artificial sources has been identified.

9.3 Adjacent Properties and Pavement Impact

The proposed basement excavation will be within 5m of a public pavement. It is also within 5m from neighbouring properties. Unavoidable lateral ground movements associated with the basement excavations must be controlled during temporary and permanent works so as not to impact adversely on the stability of the surrounding ground and any associated services and structures.

It is recommended that the site is supported by piled walls during construction with a basement box construction inside the piles. This will ensure that the adjacent land is adequately supported in the temporary and permanent construction. Alternatively, the excavation should proceed in a manner that maintains the integrity of the ground on all sides.

10 PROPOSED BASEMENT CONSTRUCTION METHODOLOGY

10.1 Construction Sequence Methodology

The proposed sequence of construction has been outlined in Appendix 3.

10.2 Structural Stability Principles

The initial works to the site consist of demolition of the existing two-storey rear projection and demolition of a section of the retaining wall to Conway Street. The demolition of both structures will be conducted in a sequential manner, from the top down.

A concrete thrust block will be cast at the lower ground floor level central to the section of Conway St retaining wall to be demolished. This is to act as a support to allow the use of temporary props. Trench sheeting will be advanced as the demolition of the retaining wall progresses, with walers and temporary props installed between the trench sheeting and the thrust block.

The proposed development consists of a new basement approximately 5.5m below the existing lower ground finished floor level.

Due to the presence of groundwater approximately 1.0 – 1.4m below the existing lower ground floor level, the new basement will require construction via a watertight formation. It is envisaged that the basement will be constructed using a piled wall. This would be designed to resist the lateral forces imposed from ground and water pressures and the adjacent properties. The section of wall along Conway Street will designed to also resist surcharge loading from the roadway.

As the piles are formed through drilling and not driven through hammer or vibratory means, minimal vibration would be transmitted through the ground, posing a negligible risk of damage to existing structures.

The top of the piled wall forming the basement will be supported laterally via temporary propping during construction, and by the reinstated lower ground floor slab in the permanent condition. The retaining wall to Conway Street will be reinstated as a cantilevered reinforced concrete wall subsequent to the completion of the piling works.

The extent and nature of propping, and the size and detail of the piled wall will be explored during the detailed design phase of the works in order to allow discussions with the party wall surveyor to occur.

Throughout the construction phase, the party walls of 18 Fitzroy Square and 12 Conway Street would be monitored for both movement and vibration to make sure these are within acceptable limits.

11 ASSESSMENT OF ADVERSE EFFECTS

As a result of the impact assessment presented in previous sections of this report, it was concluded that the London Clay is unlikely to be prone to seasonal shrinking or swelling, thus the geological impact of the basement is negligible. Additionally, the impact assessment concluded that the construction of the basement is unlikely to impact upon the hydrogeology and hydrology of the site, and does not pose a flooding risk from any source.

The impact assessment identified lateral ground movements associated with the excavation of the basement as a potential adverse effect of the basement construction. To control this and mitigate any damage associated with the basement excavation, a method of construction was recommended.

The proposed construction methodology is outlined in Appendix 3 RWA London Proposed Basement Construction Sequence as well as previously in Section 10.2. It should be noted that this conforms to the recommendations outlined by JAL in BIA report P9318J754. Furthermore, temporary propping shall be provided to laterally support existing structures, which shall be design by the Temporary Works Contractor and reviewed by RWA London. The temporary works, correctly design and installed, should limit damage to cosmetic cracking, corresponding to a Burland Scale category of 0 to 1.

12 AREAS OF FURTHER INVESTIGATION

The following list is a summary of the information requiring investigation subsequent to the completion of the Basement Impact Assessment:

- Main contractor to undertake pre-condition survey of adjacent structures
- Main contractor to investigate methods for monitoring the movement of adjacent structures during construction, as well as any pre-existing cracks detected as part of the pre-condition survey
- Detailed design of the piled wall and internal basement wall, as well as the retaining wall to Conway Street
- Temporary works contractor to design works to mitigate the lateral ground movements

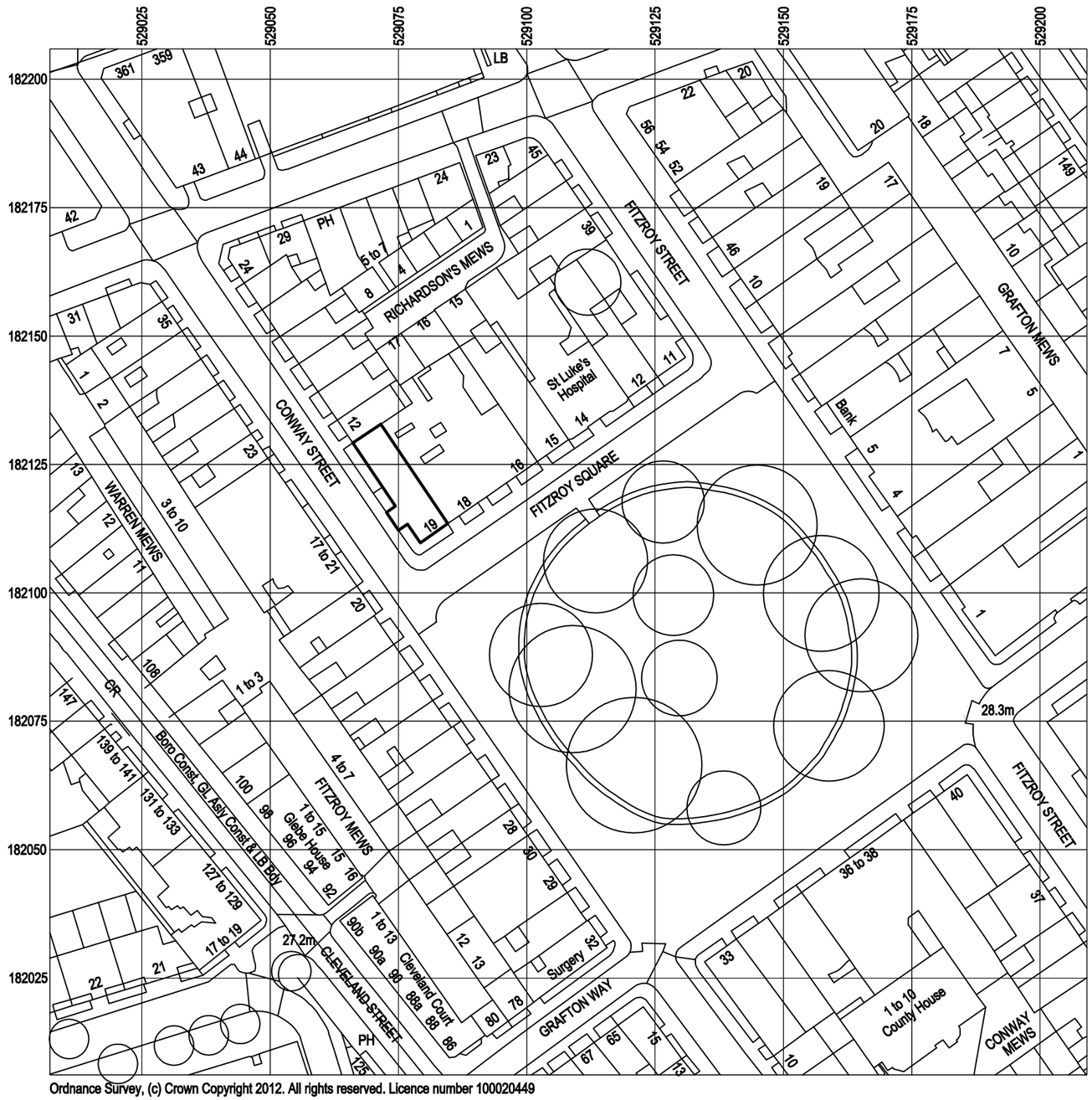
All works designed by contractors to be reviewed by RWA prior to implementation.

During the course of the desktop study and site investigation, information was obtained such that a Ground Movement Assessment can be undertaken. Because of the methods proposed to construct the basement, ground movements should be limited to localised heaving within the footprint of the basement, and deflection of the piled wall which will be controlled by temporary propping. Due to the localised and controlled nature of the ground movements, a Ground Movement Assessment has not been undertaken. However if during the audit process it is decided that a Ground Movement Assessment is necessary, it can be undertaken.

13 CONCLUSION

An assessment of the impact of the proposed basement construction has been carried out and indicates that there will be no geological, hydrological or hydrogeological impact as a result of its construction. Lateral ground movements as a result of excavation of the basement shall be mitigated through the use of temporary propping and the implementation of the recommended construction methodology outlined within the impact assessment.

APPENDIX 1 – SITE LOCATION PLAN



Site Location Plan
Scale 1:1000

Rev	Date
-	8/3/2016

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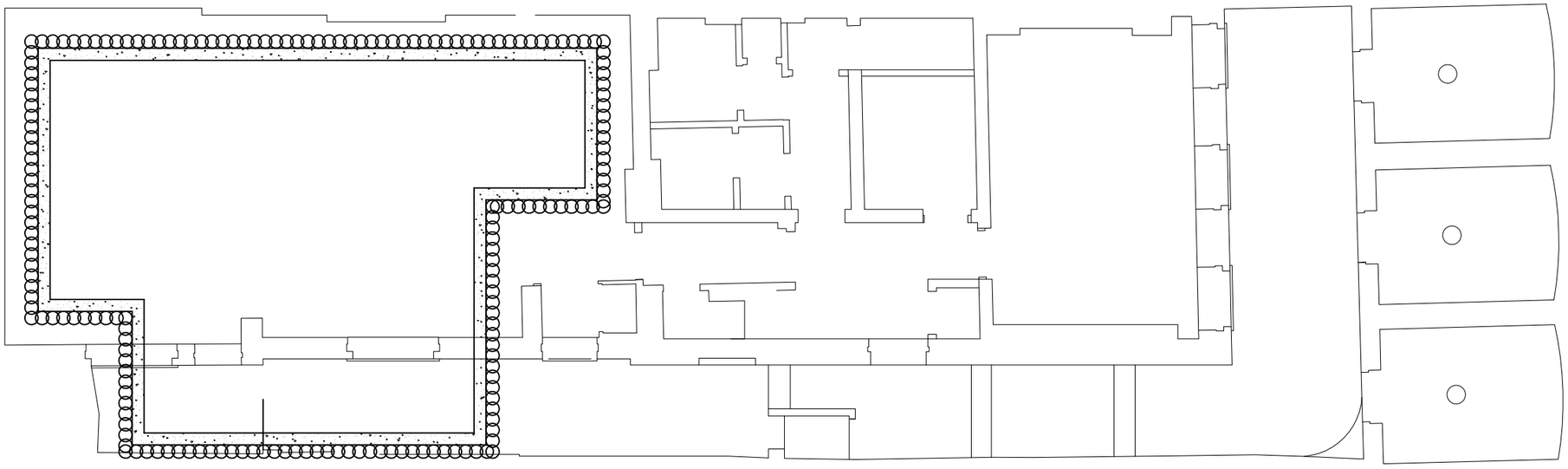
Information Only

19 Fitzroy Square

Site Location Plan

3532 0001 -

APPENDIX 2 – BASEMENT LAYOUT RELATIVE TO EXISTING



Plan Basement Location to
Existing Lower Ground Floor

Rev	Date	
A	10/03/2016	Information Issue

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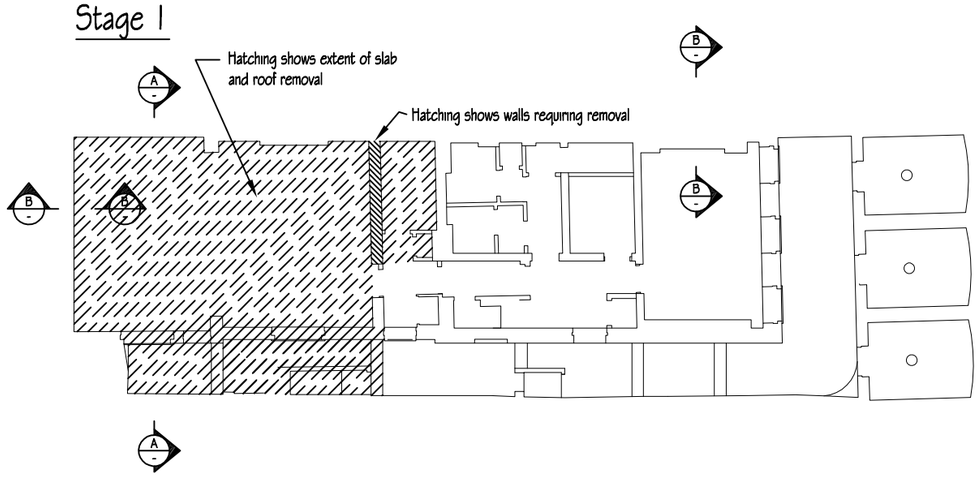
Basement Location Plan

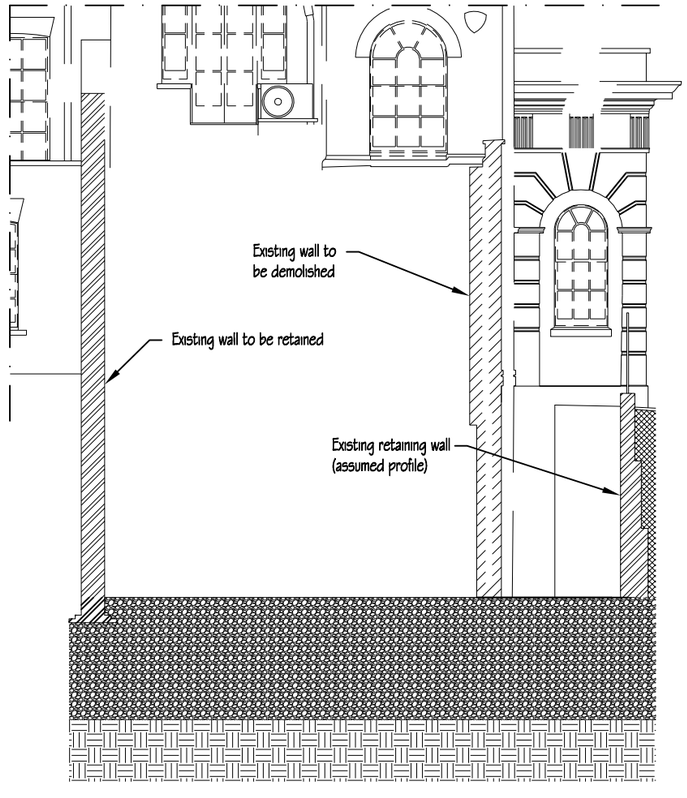
3532 0002 A

APPENDIX 3 – RWA LONDON PROPOSED BASEMENT CONSTRUCTION SEQUENCE DRAWINGS

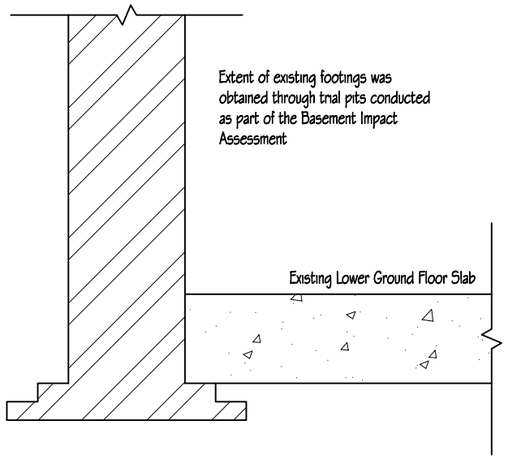
Stage 1



Plan - Lower Ground Floor



Section A



Section B - Existing Wall Footing

NOTES

Plans and sections are indicative only. Do not scale from this drawing

Refer Andrew Lett Architects Drawings
Planning Issue (P1) Full Set

Stage 1

a. Internal strip-out and removal of non-structural walls
b. Internal propping at roof and ground floor levels if required
c. Removal of roof and ground floor slab
d. Demolition of lower ground floor slab
e. Demolition of rear projection external wall facing Conway St.

Rev	Date	
C	10/03/2016	Construction Sequence and Layout Amended
B	08/02/2016	Secant Pile Wall Amended
A	01/02/2016	Planning Issue

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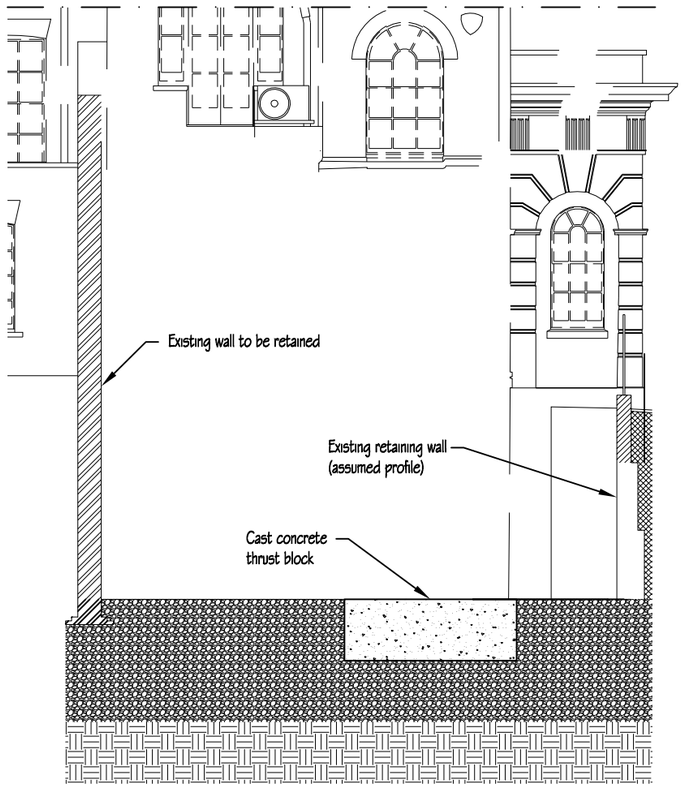
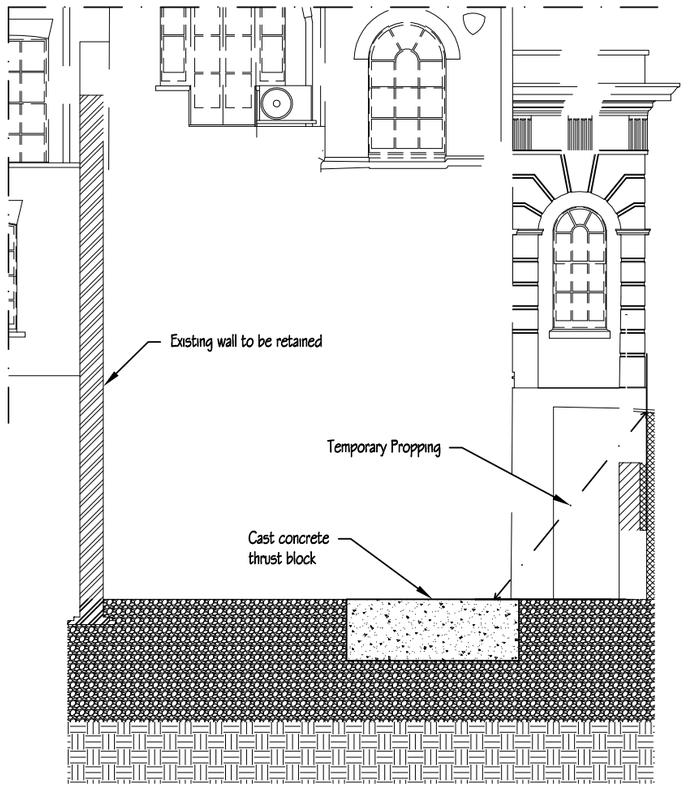
Proposed Basement Construction Sequence Sheet 1 of 5

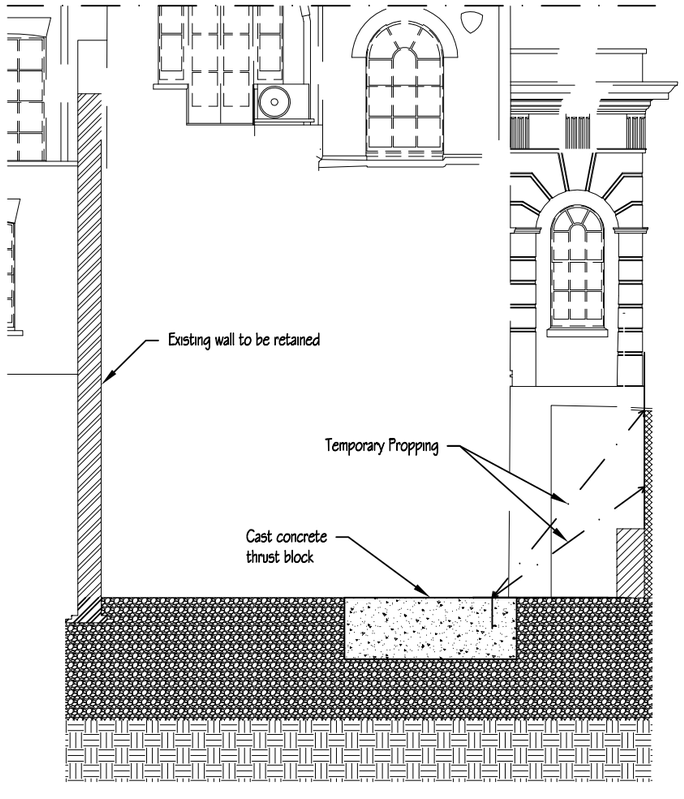
3532 001 C



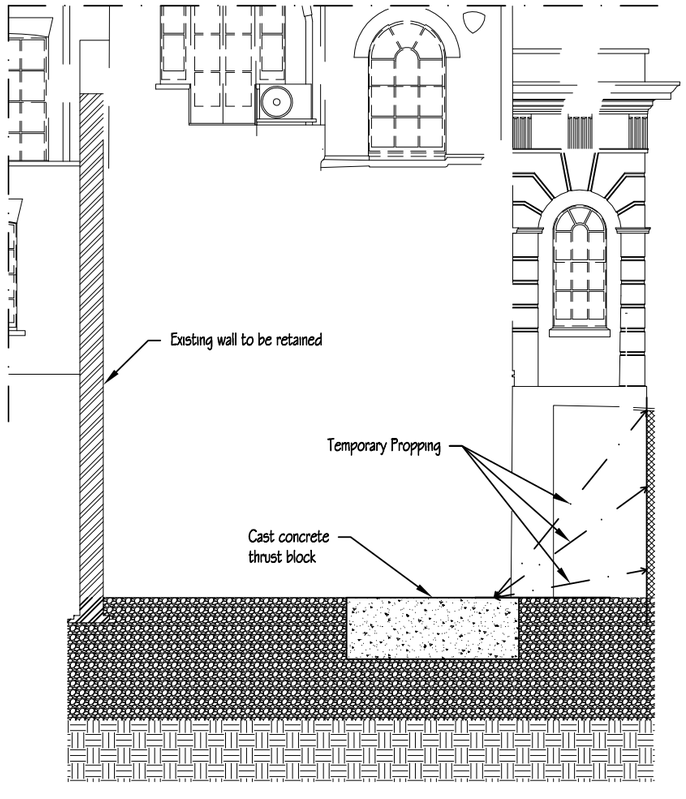
Stage 2A



Stage 2B

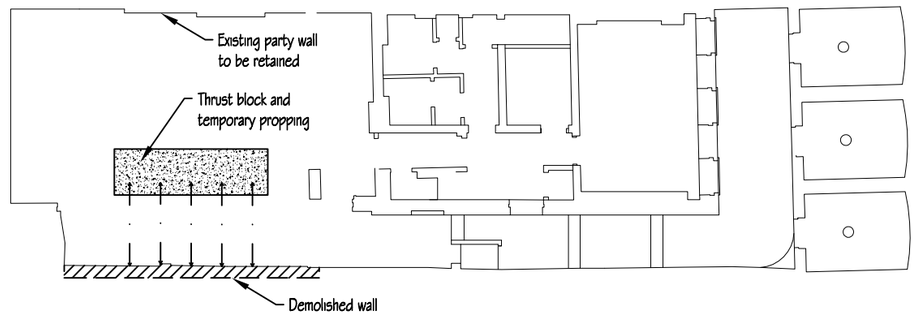


Stage 2C



Stage 2D

Stage 2



Plan - Lower Ground Floor

NOTES

Plans and sections are indicative only. Do not scale from this drawing

Refer Andrew Lett Architects Drawings
Planning Issue (P1) Full Set

Stage 2

a. Temporary propping at Lower Ground Floor level if required. Cast thrust block central to Conway St. retaining wall to be demolished
b. Sequentially demolish section of Conway St. retaining wall while advancing trench sheeting and temporary propping
c. Install additional temporary props as demolition of wall progresses
d. Follow sequence 2B and 2C until required length of Conway St. retaining wall is demolished

Rev	Date	
C	10/03/2016	Construction Sequence and Layout Amended
B	08/02/2016	Secant Pile Wall Amended
A	01/02/2016	Planning Issue

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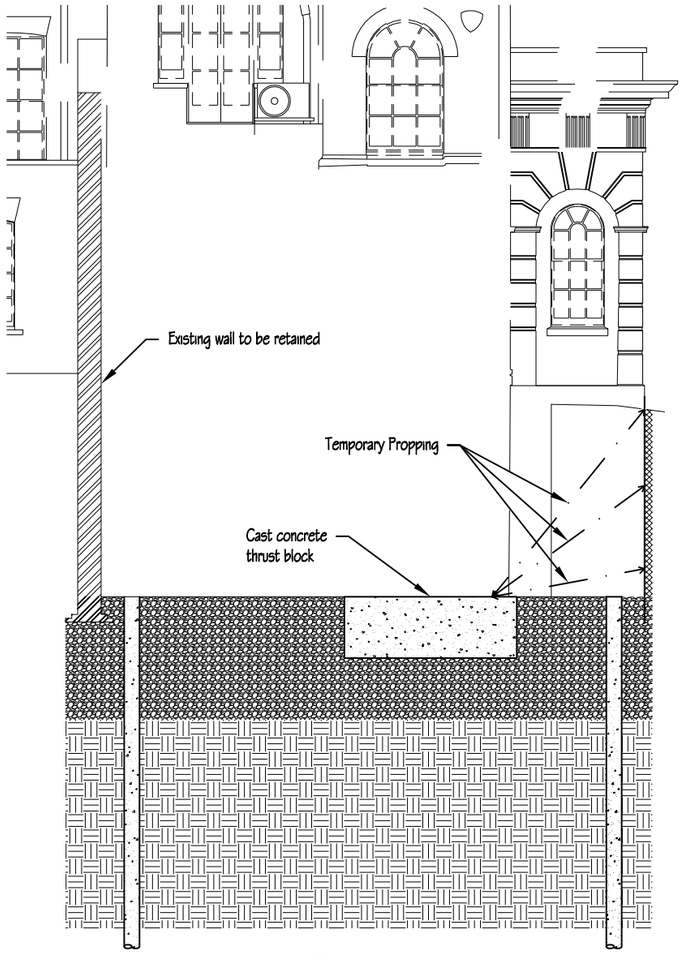
Planning Issue

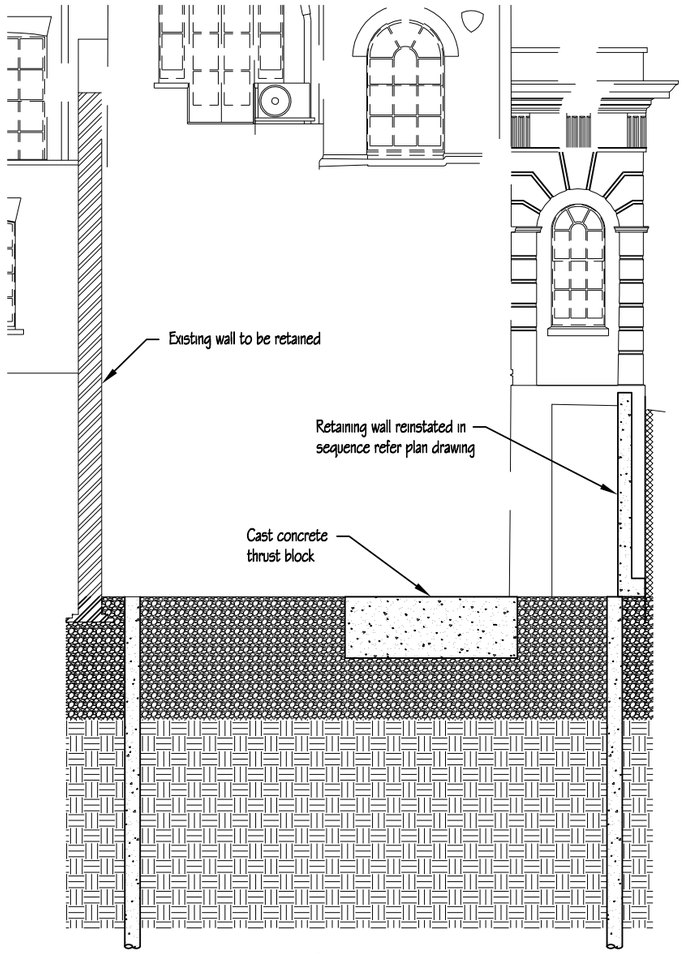
19 Fitzroy Square

Proposed Basement Construction Sequence Sheet 2 of 5

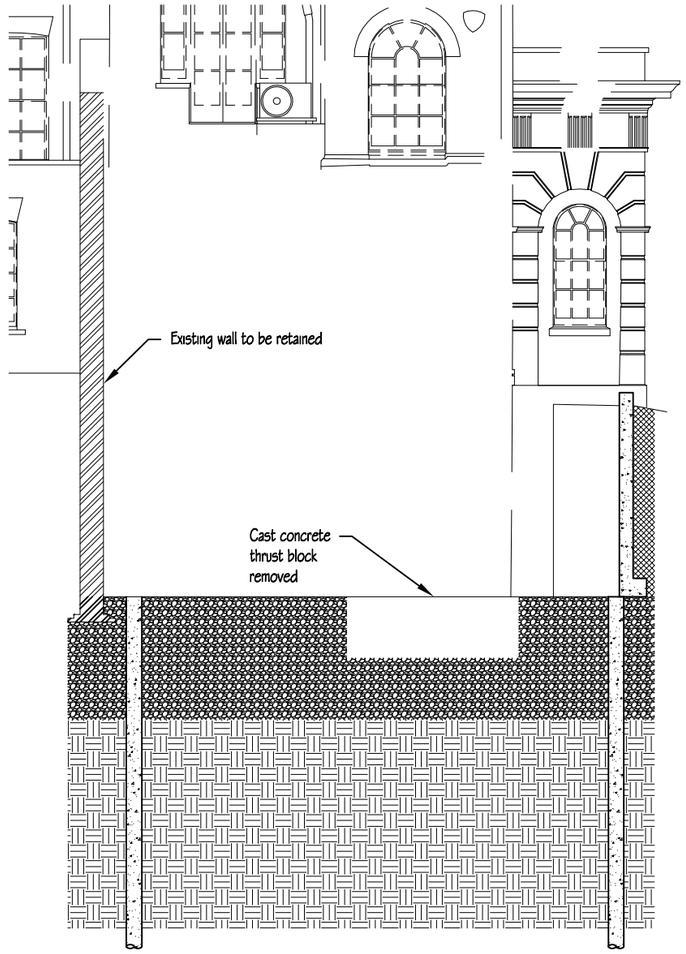
3532 002 C



Stage 3A

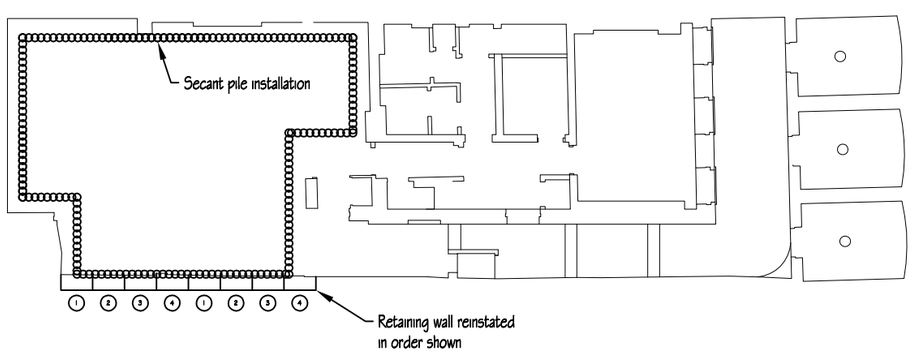


Stage 3B



Stage 3C

Stage 3



Plan - Lower Ground Floor

NOTES

Plans and sections are indicative only. Do not scale from this drawing

Refer Andrew Lett Architects Drawings
Planning Issue (P1) Full Set

Stage 3

a. Secant piling works commence to install continuous retaining wall providing full cut off from groundwater ingress
b. Remove temporary props from 1 metre section of trench sheeting and cast new retaining wall. Repeat in sequence as shown in plan drawing
c. Backfill any open excavation if required and remove trench sheeting and thrust block

Rev	Date	
C	10/03/2016	Construction Sequence and Layout Amended
B	08/02/2016	Secant Pile Wall Amended
A	01/02/2016	Planning Issue

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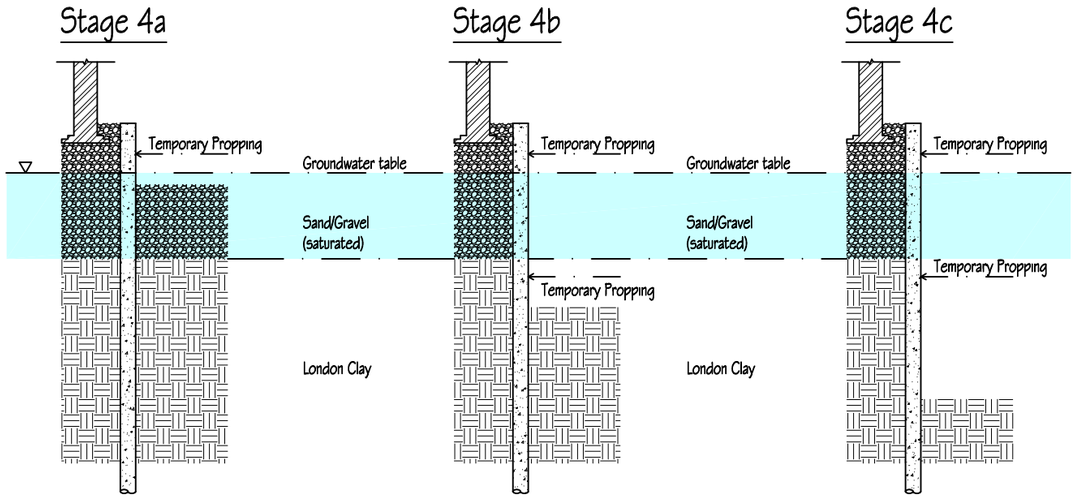
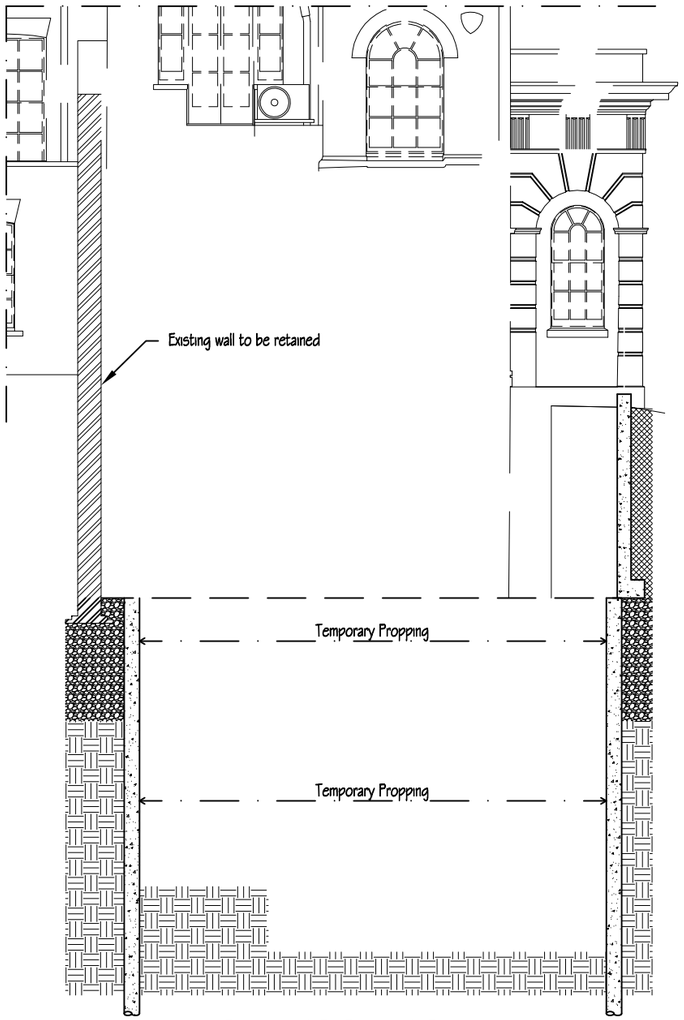
19 Fitzroy Square

Proposed Basement Construction Sequence Sheet 3 of 5

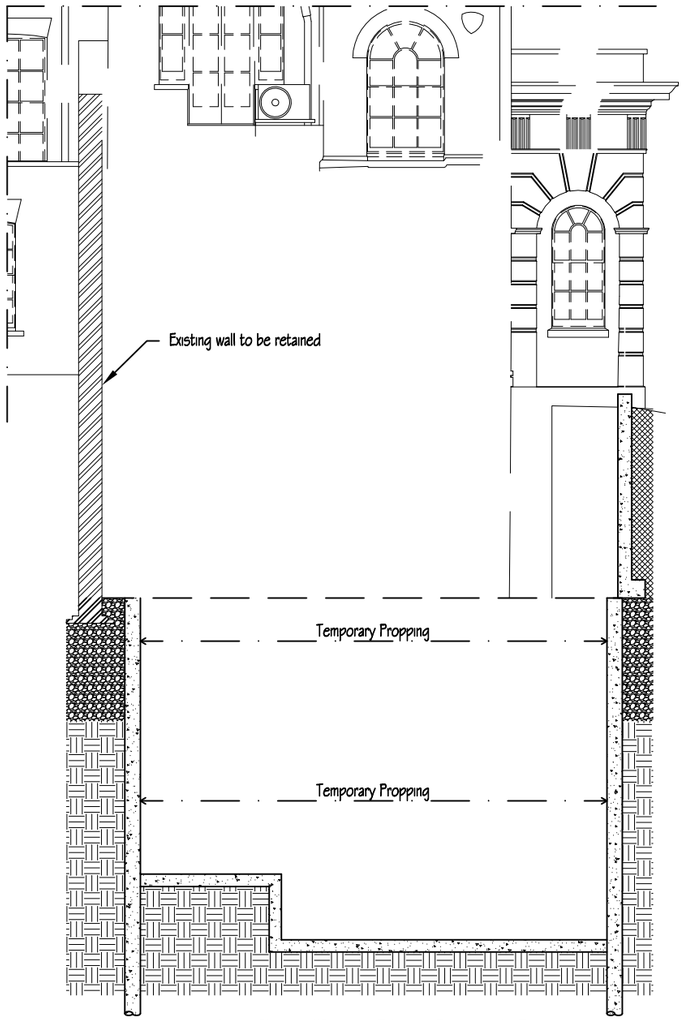
3532 003 C



Excavation Sections Typical



Stage 4C Typical Section



Stage 5 - Floor/Pool Slab Typical Section

NOTES

Plans and sections are indicative only. Do not scale from this drawing

Refer Andrew Lett Architects Drawings
Planning Issue (P1) Full Set

Stage 4

a. Excavate basement to underside of 1st propping level, and install 1st level of temporary props
b. Excavate basement to underside of 2nd propping level, and install 2nd level of temporary props
c. Excavate down to basement/pool formation level

Stage 5

a. Cast pool/basement slab

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A	10/03/2016	Planning Issue

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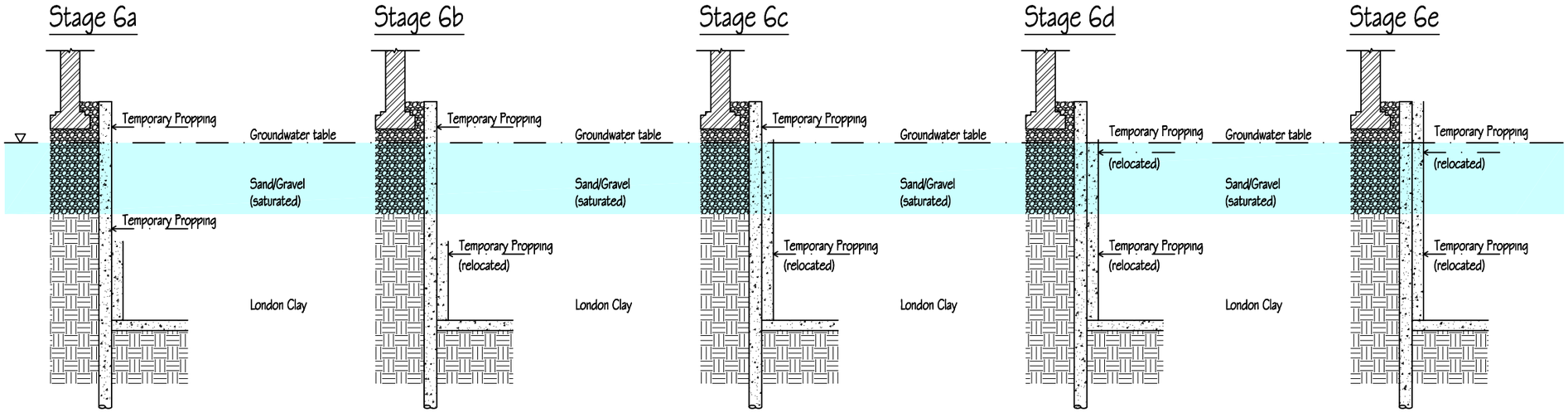
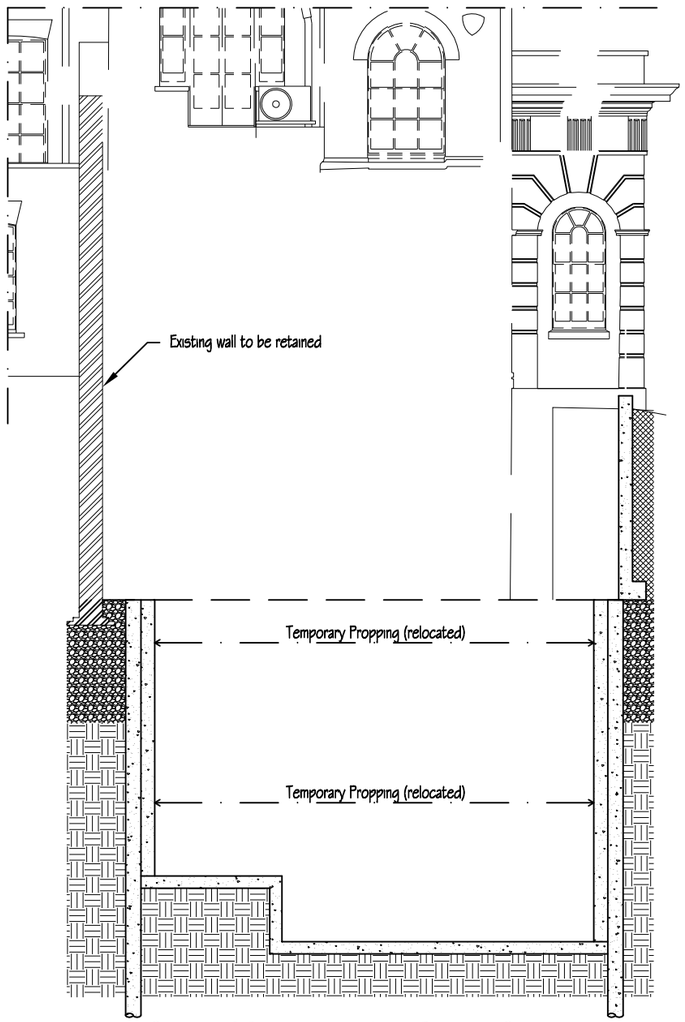
Proposed Basement Construction Sequence Sheet 4 of 5

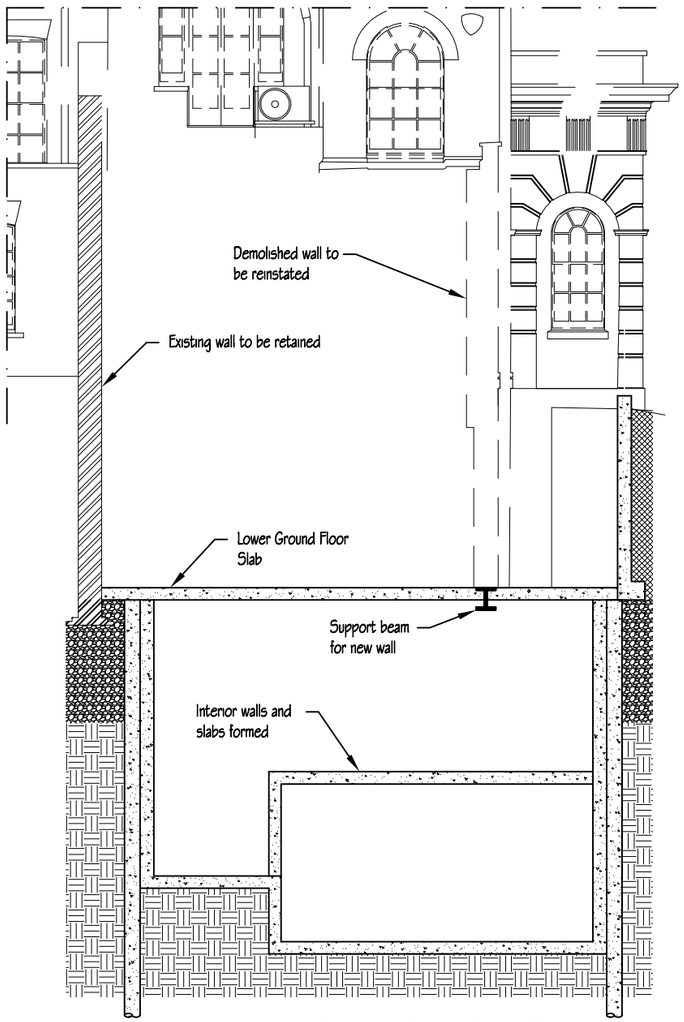
3532 004 A



Interior Wall Construction Sections



Stage 6E- Interior Wall Typical Section



Stage 7 - Lower Ground Floor Slab Section

NOTES

Plans and sections are indicative only. Do not scale from this drawing

Refer Andrew Lett Architects Drawings
Planning Issue (P1) Full Set

Stage 6

a. Cast interior wall to underside of 2nd row of temporary propping
b. Relocate 2nd row of propping
c. Cast interior wall to underside of 1st row of temporary propping
d. Relocate 1st row of propping
e. Cast interior wall to Lower Ground slab formation level

Stage 7

a. Cast interior walls and floors
b. Install support beam for new external wall
c. Cast Lower Ground floor slab

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A	10/03/2016	Planning Issue

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Planning Issue

19 Fitzroy Square

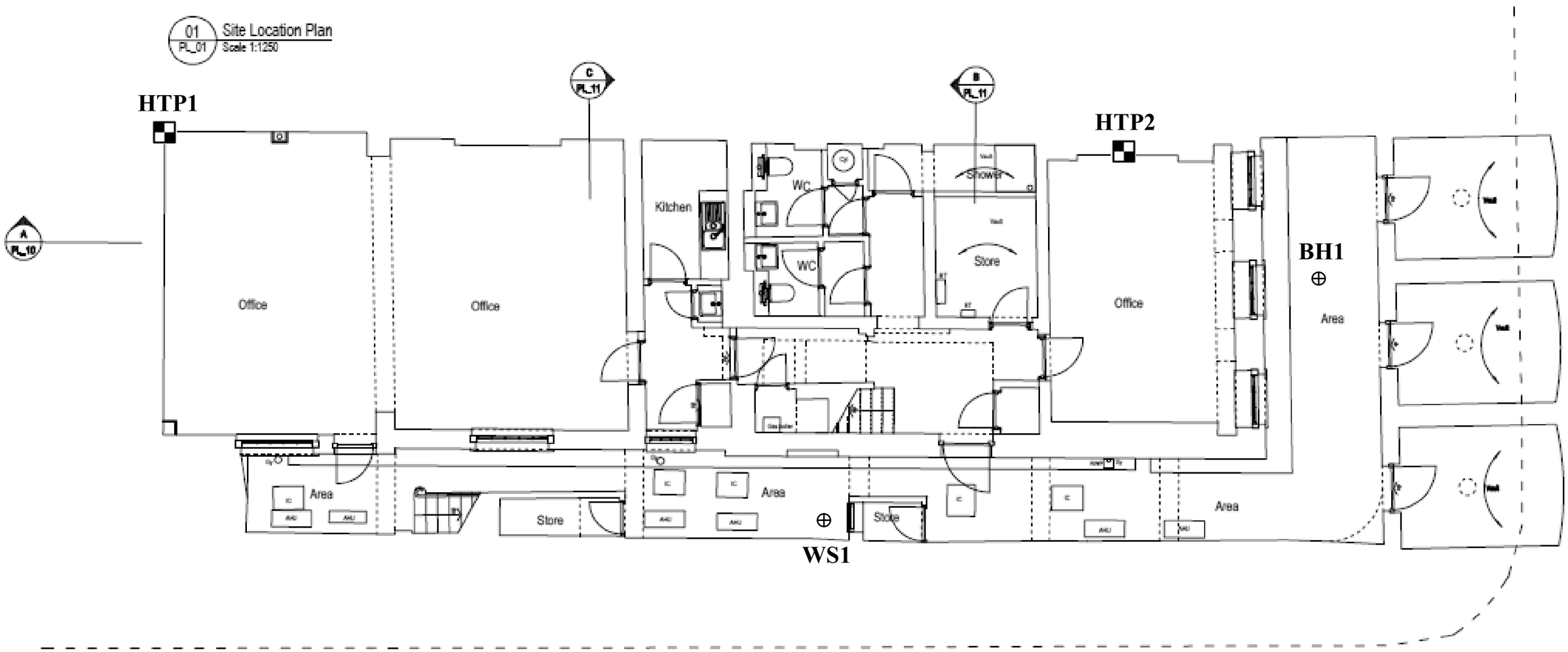
Proposed Basement Construction
Sequence Sheet 5 of 5

3532 005 A

APPENDIX 4 – INVESTIGATION LAYOUT AND EXISTING FOUNDATION DETAILS

JOMAS ASSOCIATES LTD

Project Name	19 Fitzroy Square	**Client**	RWA London LLP
Title	Exploratory Holes - Locations	**Dwg No.**	P9318J754



JOMAS ASSOCIATES LTD

Project Name	19 Fitzroy Square	**Client**	RWA London LLP
Title	Exploratory Trial Pit Logs	**Dwg No.**	P9318J754 – January 2016