BASEMENT IMPACT ASSESSMENT

FOR

PROPOSED BASEMENT WORKS

AT

24 REDINGTON GARDENS
LONDON
NW3 7RX

FOR

24 REDINGTON GARDENS LLP

Project No. P3311

ISSUE 1.1 – ISSUED FOR PLANNING

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DOCUMENT CONTROL SHEET

	24 Redington Gardens London NW3 7RX	**Project No.**	**P3311**
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NON-TECHNICAL EXECUTIVE SUMMARY

The proposed new detached house at 24 Redington Gardens will have a single storey basement (with swimming pool) below a lower ground floor set into the natural slope of the ground. Michael Alexander Ltd have been appointed to prepare a Basement Impact Assessment to addresses the key areas highlighted in Camden's Planning Guidance CPG4, which are 'Groundwater Flows', 'Ground Stability' and 'Surface Flow & Flooding'.

Groundwater flows

The data from ground water monitoring is used to establish any flow of water within the ground across the site. A hydrogeological assessment by a chartered geologist (GEA) has been carried out, which considers the cumulative impact of the proposed basement and other local basements and whether they will affect ground water flows and ground water levels. It concludes groundwater flows across the site are likely to be slow due to the nature of underlying soil strata, and hence it confirms the basement should not cause any adverse Impact.

Ground Stability

Since the proposed basement depth will be greater than the foundation depth to the existing buildings in the vicinity, detailed consideration has been required. A 'secant' piled wall (using interlocking piles) is proposed to the perimeter of the proposed excavation. This is a robust solution which retains the soil around the excavation and prevents water ingress into the basement 'box'. The piles will be propped to minimise ground movements during the works. The likely ground movements have been calculated by a geotechnical engineer and the potential for any damage to adjoining properties has been assessed. During the works, precise monitoring will be carried out at regular intervals by a specialist monitoring Contractor to check if the behaviour is in line with these predictions. If ground movements approach or exceed the predicted levels then mitigation measures will be implemented in accordance with a pre-agreed contingency plan. This procedure is in accordance with the requirements set out in CPG4.

Surface Flow and Flooding

The site has been found not to be at risk of Flooding from rivers, lakes or surface water.

The works will incorporate Sustainable Urban Drainage Systems (SUDS) to ensure that during storm events the flow of rainwater into the combined sewer is no greater after the works than the current condition. Therefore the potential for flooding resulting from overloading of sewers will not be increased by the proposed works.

Summary

A detailed Basement Impact Assessment has being produced in accordance with the Council's requirements, and will be assessed on submission of the planning application by their reviewing engineer. As for all sites, a number of considerations have been highlighted within the Screening Stage of the assessment but these have been addressed by investigation and detailed studies, so that any potential impact of the basement has been effectively mitigated.

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1.00 INTRODUCTION

1.01 Michael Alexander Consulting Engineers has been appointed to prepare a Basement Impact Assessment Report to support the Planning Application for the proposed basement extension at 24 Redington Gardens, London NW3 7RX.

1.02 This document has been prepared by Giovanni Sclavi BEng MSc(Hons) GIPENZ and reviewed by Isaac Hudson MEng MA(Cantab) CEng MIStructE who is a chartered structural engineer.

1.03 The existing detached property currently provides residential accommodation over two storeys and was built circa 1960.

1.04 The existing property is located within the Redington Frognal Conservation Area, but is not Listed.

1.05 The site is bounded by Redington Gardens to the front (south-east) and by 25-26 Redington Gardens to the right (east). To the rear of the property (north) the site is bounded by 2 and 4 Templewood Avenue and to the left of the site (west), 7 Redington Gardens.

1.06 The proposed works involve the construction of a new independent property including a lower ground floor and a basement under. This document addresses the specific issues relating to the basement construction, as described in Camden Planning Guidance CPG4.

2.00 BASEMENT PROPOSALS

2.01 The details of the proposals for the replacement houses are shown on the following de Metz Forbes Knight Architects drawings.

2.02 The details of the existing structure and site boundaries will be subject to detailed exploratory work prior to and during the works on-site.

2.03 The design and construction of the building structure shall be in accordance with current Building Regulations, British Standards, Codes of Practice, Health and Safety requirements and good building practice.

3.00 SUBTERRANEAN (GROUND WATER) FLOW

3.01 Stage 1: Screening

The impact of the proposed development on ground water flows is considered here as outlined in Camden Planning Guidance CPG 4. The references are to the screening chart Figure 1 in CPG4.

3.01.1 GW Q1a *Is the site located directly above an aquifer?*

Yes. With reference to the Camden Geological, Hydrogeological and Hydrological Study (Figure (a)) the site is located above an aquifer.

3.01.2 GW Q1b *Will the proposed basement extend beneath the water table surface?*

Yes. Site investigations carried out in the adjoining property (25-26 Redington Gardens) have established the local ground water level.

3.01.3 GW Q2 *Is the site within 100m of (i) a watercourse, (ii) a well (used or disused) or (iii) a potential spring line?*

With reference to the Camden Geological, Hydrogeological and Hydrological Study (Figures (b), (c) (d) and (e)),

(i) The nearest surface water feature appears to be a water feature located within a residential complex, located adjacent to Kidderpore Avenue, approximately 450m to the South West of the site.
The Hampstead pond chain catchment areas are located some distance away to the North, approximately 330m from the site.
The nearest 'lost' watercourse is the River Westbourne which ran in close proximity to the site. This will need further review at scoping and investigation stage, but it should be noted that most of the Lost Rivers now run in culverts.

(ii) From the British Geological Society 'Geoindex' the nearest water wells are remote from the site, on Hampstead High Street (approximately 920m to the East of the site).

(iii) The local geology suggests that the site may be located adjacent to a potential spring line.

3.01.4 GW Q3 *Is the site within the catchment of the pond chains of Hampstead Heath?*

No. With reference to the Camden Geological, Hydrogeological and Hydrological Study, the site is not within the catchment of the pond chains on Hampstead, nor the Golder's Hill Chain.

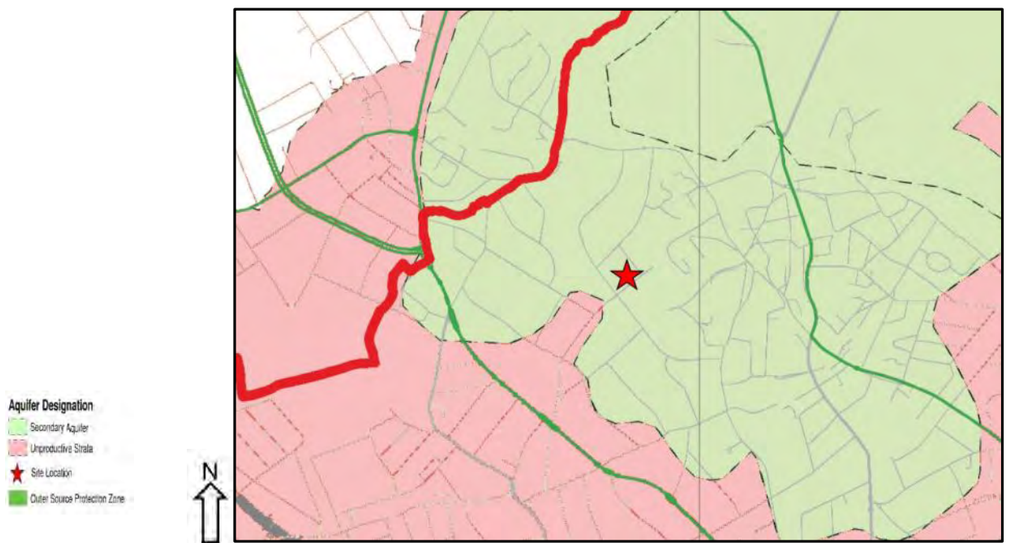


Figure (a)
Acquifer Designation Map
(Extract from Fig 8 of Camden Geological, Hydrogeological and Hydrological Study)

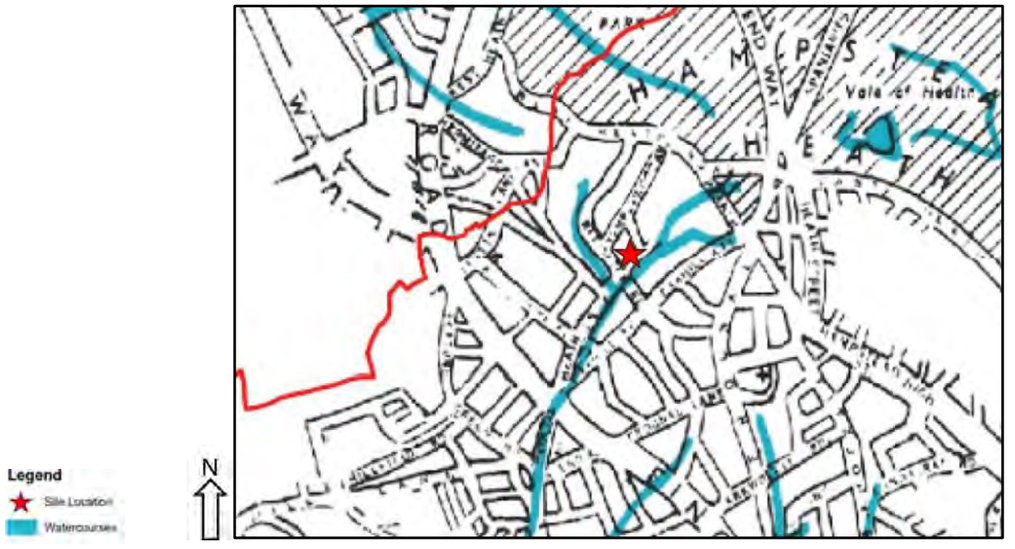


Figure (b)
Subsurface Watercourses
(Extract from Fig 11 of Camden Geological, Hydrogeological and Hydrological Study)

3.01.5 GW Q4 *Will the proposed basement development result in a change in the proportion of hard surface/paved areas?*

Yes. The footprint of the proposed replacement houses is greater than the existing properties. The proposed basement extends beyond the footprint of the house into the rear garden.

3.01.6 GW Q5 *As part of the site drainage, will more surface water (e.g. rainfall and-runoff) than at present be discharged to the ground (e.g. via soakaways and /or SUDS)?*

No. Currently no surface water from the site is discharged to the ground, and this will also be true after the proposed works.

3.01.7 GW Q6 *Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond (not just the pond chains on Hampstead Heath) or spring line?*

No. There are no local ponds in close vicinity to the site, and the nearby potential spring line is downhill from the site.

3.01.8 On the basis of items 3.01.1 to 3.01.7 above, and in reference to Figure 1 of CPG4, the aspects that should be carried forward to a scoping stage in respect of groundwater are:

- The site being located above an aquifer.
- The basement extending below the water table
- The site being in close proximity to a former watercourse.
- The site being located adjacent to a potential spring line.
- The change in the proportion of hard surface/paved areas

3.01.9 The Scoping Stage will identify the potential impacts of the above aspects in respect of the proposed basement proposals. Investigations will be carried out to establish the existing soil conditions and ground water levels. Within the Impact Assessment it will be demonstrated how the design has considered the above aspects and hence mitigated any adverse Impact.

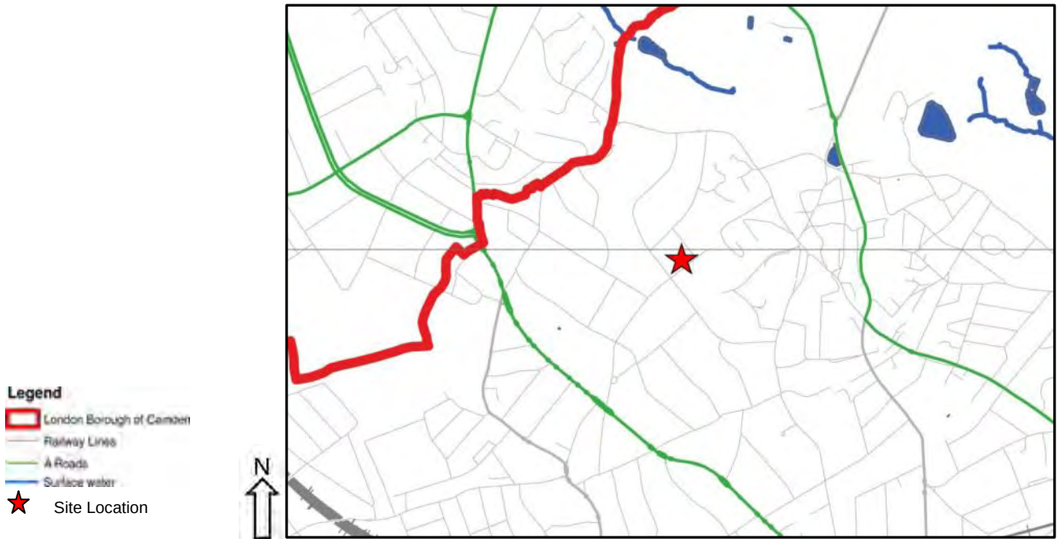


Figure (c)
Surface Water Features
(Extract from Fig 12 of Camden Geological, Hydrogeological and Hydrological Study)

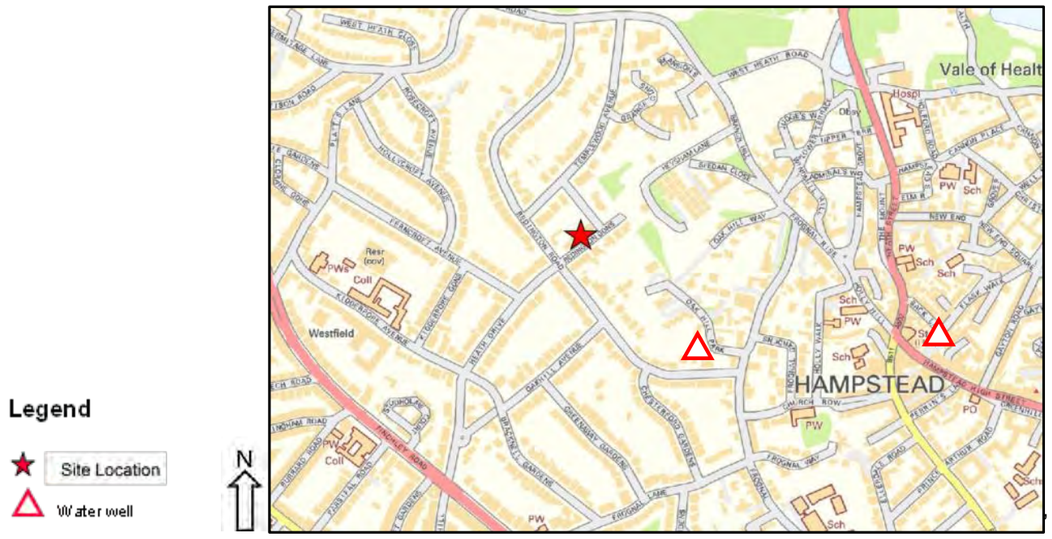


Figure (d)
Waterwells (also showing Infrastructure)

3.02 Stage 2: Scoping

3.02.1 With reference to the Camden Geological, Hydrogeological and Hydrological study Appendix F2, the potential impacts which will need to be considered will include:-

Whether the basement will impact on the groundwater flow regime.

The potential impact of the increased impermeable area on ground water flows and ground wetness.

Whether the nearby former watercourse will be diverted by the works.

Whether the basement will affect the flow from any spring lines or their water quality

3.02.2 In response to the above issues: -

An interpretive geotechnical report has been commissioned including a hydrogeological study.

3.03 Stage 3: Site Investigation and Study

3.03.1 A site investigation was carried out by GEA Ltd in February 2015 in the adjacent property (25-26 Redington Gardens) which included :-
- a deep borehole
- window samples
- trial pits
- measurement of groundwater levels

Refer to their report reference J15318 of December 2015.

3.03.2 Groundwater was measured at between 1 and 1.5m below external ground level in the investigations.

3.03.3 Further site specific investigations and monitoring are proposed within the 24 Redington Gardens site.

3.04 Stage 4: Impact Assessment

3.04.1 A hydrogeological assessment has been carried out by a chartered geologist and is included in section 7.6 of GEA's report.

3.04.2 The presence of alluvium soils suggests a tributary of the Westbourne may have run across the rear of the site. It is noted that these watercourses are no longer active as they were diverted and culverted upstream of the site at the end of the 19th century.

3.04.3 The GEA report notes that there is potential for groundwater flows within the alluvium layer. A granular trench will be incorporated around the basement to enable any groundwater flows within this strata to pass around the proposed basement.

3.04.4 Any groundwater flows across the site through the Claygate member are considered likely to be slow, due to the high Clay composition encountered within this strata, with more moderate inflows from the granular layers of Alluvium. The persistence of the inflows will depend on the connectivity between the granular pockets and sand partings, hence inflows may not be significant in volume. On the basis of the results of the adjacent site ground investigation, it is not considered that the proposed basement would result in a change to the groundwater flow regime or on the amount of annual recharge into Claygate Member.

3.04.5 It is possible that perched water could be encountered during the excavation within the made ground and alluvium strata. Provision for dealing with this water will need to be reflected in the proposed construction method – refer Appendix D.

3.04.6 The cumulative impact of the proposed basement and those in the local area has been considered. It is assumed that the basements will be of similar depth, and there are pathways for water to flow between them. Hence it is concluded that there will not any cumulative adverse impact.

4.00 GROUND STABILITY

4.01 Stage 1: Screening

4.01.1 GS Q1 *Does the existing site include slopes, natural or manmade, greater than 7˚?*

No. The site is generally level, with a fall of around 400mm from the road to the existing house. There are no slopes >7 degrees within the site.

4.01.2 GS Q2 *Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7˚?*

No. The basement construction will not change the profile of the ground at the boundaries of the property.

4.01.3 GS Q3 *Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7˚?*

Yes. With reference to the Camden Geological, Hydrogeological and Hydrological Study, (refer Figure (f)), the neighbouring areas to the west have slopes greater than 7 degrees.

4.01.4 GS Q4 *Is the site within a wider hillside setting in which the general slope is greater than 7˚?*

Yes. With reference to the Camden Geological, Hydrogeological and Hydrological Study, (refer Figure (f)), there are a number of slopes greater than 7 degrees are located to the land at the opposite end of Redington Gardens (south-east).

4.01.5 GS Q5 *Is the London Clay the shallowest strata at the site?*

No. With reference to Camden Geological, Hydrogeological and Hydrological Study, the underlying soil strata is indicated as being the Claygate Member (Figure (e)).

4.01.6 GS Q6 *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?*

There are two trees of small-moderate size (200mm maximum trunk girth) within the rear gardens of the existing house, which are proposed to be removed – refer Arboricultural Impact Assessment report by Landmark Trees dated October 2015, Ref. DMFK/24RG/AIA/01.

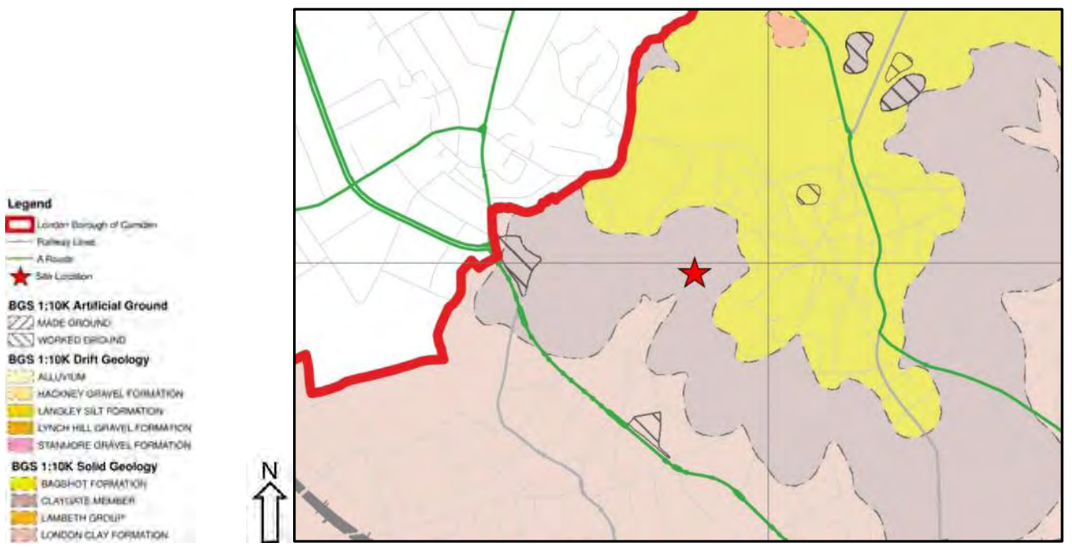


Figure (e)
Geological Map
(Extract from Fig 4 of Camden Geological, Hydrogeological and Hydrological Study)

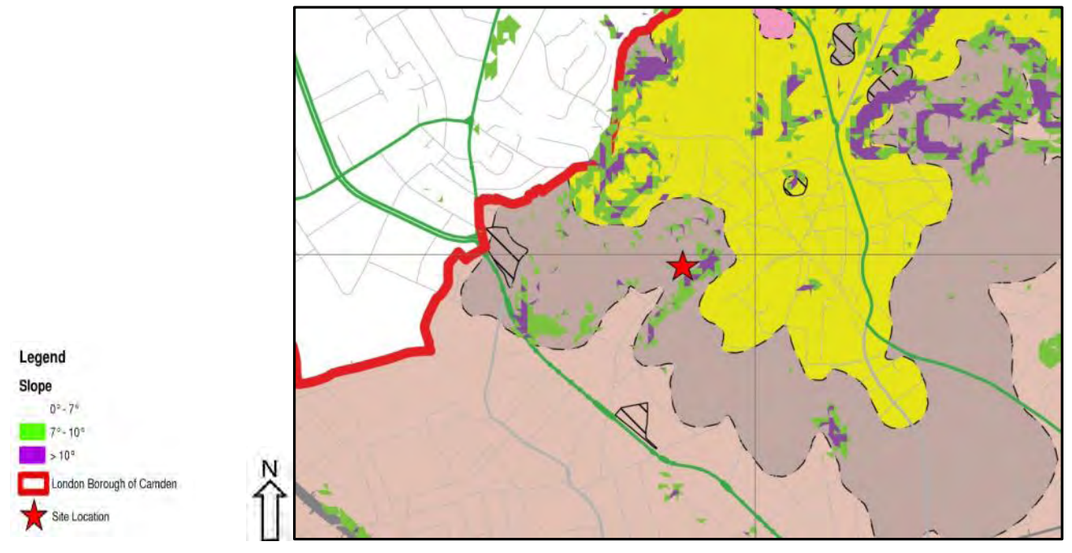


Figure (f)
Slope Angle Map
(Extract from Fig 16 of Camden Geological, Hydrogeological and Hydrological Study)

4.01.7 GS Q7 *Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?*

The Claygate member strata is generally considered to have medium volume change potential, although this can vary depending on the silt and sand content of the upper strata. There is therefore a risk of buildings founded in the Claygate member experiencing seasonal shrink-swell subsidence, although this risk is significantly lower than for buildings founded in London Clay.

4.01.8 GS Q8 *Is the site within 100m of a water course or a potential spring line?*

Yes. With reference to the Camden Geological, Hydrogeological and Hydrological Study (refer Figures (b) and (c)), the site is adjacent to the subterranean River Westbourne.

4.01.9 GS Q9 *Is the site within an area of previously worked ground?*

No. The site is not in close vicinity of any recorded areas of worked ground. With reference to the Camden Geological, Hydrogeological and Hydrological Study (figure (e)) the nearest recorded on the geological map are to the West of Platt's Lane (approximately 500m from the site).

4.01.10 GS Q10 *Is the site within an aquifer?*

Yes. With reference to the Camden Geological, Hydrogeological and Hydrological Study (Figure (a)) the site is located above an aquifer.

4.01.11 GS Q11 *Is the site within 50m of the Hampstead Heath ponds?*

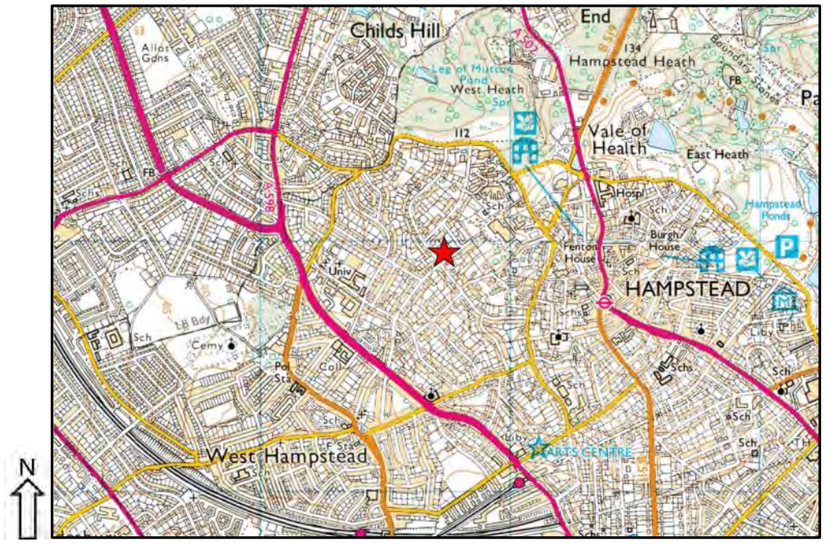
No. With reference to the Camden Geological, Hydrogeological and Hydrological Study, the Hampstead pond chains are located to the North of the site approximately 330m from the site.

4.01.12 GS Q12 *Is the site within 5m of a highway or pedestrian right of way?*

No. The proposed basement will be built approximately 6.3m from the footpath and approximately 9m from the the road.

4.01.13 GS Q13 *Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?*

Yes. The ground to no. 25-26 Redington Gardens is at a higher level than the garden of 24 Redington Gardens. Also no. 7 Redington Gardens has a garage at lower ground floor. However the proposed foundations are likely to be deeper than those of the adjoining properties.



Legend
★ Site Location

Figure (g)
Topography Map
(Extract from Ordnance Survey Mapping)

Figure (h)
1966-73 Map

4.01.14 GS Q14 *Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?*

With reference to Open Street Map and the British Geological Survey 'Geoindex' (Figures (d) and (i)), there are no tunnels located below the site. The nearest tunnel is about 450m to the East of the site (Northern Line).

The nearest over ground lines 950m to the south of the site (North London Line).

4.01.15 On the basis of items 4.01.01 to 4.01.14 above and in reference to Figure 2 of CPG4, the aspects that should be carried forward to a scoping stage in respect of land stability are:

- The site being above an aquifer.
- The site being adjacent to land at a slope greater than 7 degrees and being part of a hillside setting of slopes greater than 7 degrees
- Establishing whether differential foundation depths will be significantly impacted by the works.
- The Site being within 100m of a former watercourse.
- The potential impact on ground stability due to the removal of the trees within the rear gardens.

4.01.16 The Scoping Stage will identify the potential impacts of the above aspects in respect of the proposed basement proposals. Investigations will be carried out to establish the existing soil conditions and the topography. Within the Impact Assessment it will be demonstrated how the design has considered the above aspects and hence mitigated any adverse Impact.

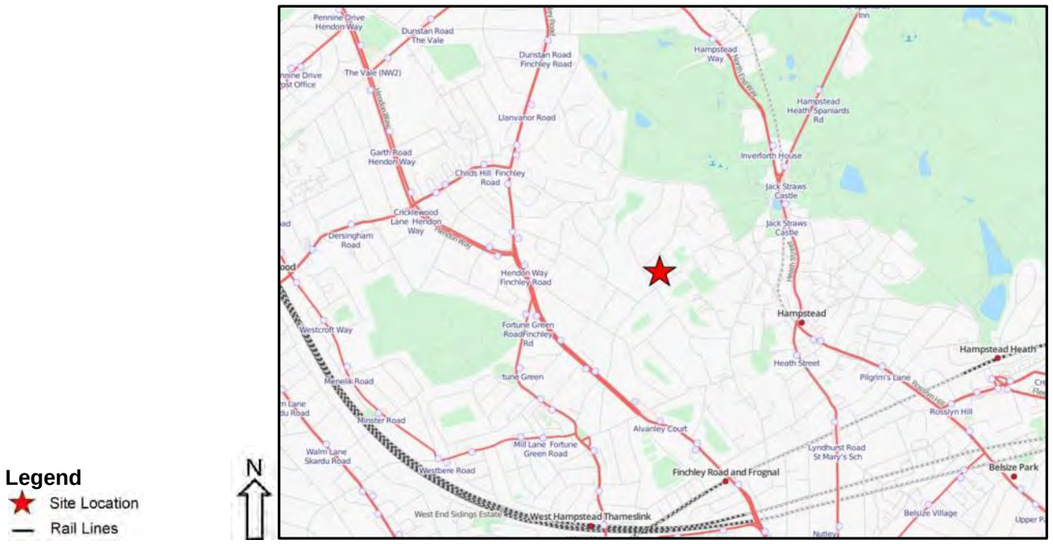


Figure (i)
Map of Underground Infrastructure
(Extract from Open Street Map)

4.02 Stage 2: Scoping

4.02.1 With reference to the Camden Geological, Hydrogeological and Hydrological study Appendix F3, the potential impacts which will need to be considered will include:-

- Whether the works will cause slope instability on neighbouring sites.
- Whether there will be any impact on the adjacent trees which lead to swelling of the soil and hence an impact on ground stability.
- Whether any changes to the ground water levels and flow regime will be caused which might affect slope stability
- Whether the construction of the basement will result in de-watering of the surrounding aquifer leading to settlement.
- The assessment of any structural damage which could be caused by excavation in proximity of buildings will shallow foundations.

4.02.2 In response to the above issues: -

- The topography of the site and surrounding area will need to be considered
- The arboricultural report will be reviewed in terms of the ground stability implications.
- The site soil investigation will include ground water monitoring and a hydrogeological assessment.
- An outline construction method statement will be prepared taking on board the proximity of the adjoining buildings. A ground movement and building damage assessment will be prepared by a chartered geologist

4.03 Stage 3: Site Investigation and Study

4.03.1 The GEA Ltd site Investigation of February 2015 at the adjoining property (25-26 Redington Gardens) is summarised in their report reference J15318 dated December 2015. In summary of the findings: -

- A varying thickness of made ground was encountered over the sandy clays of the Claygate member over London Clay to the full depth of the investigation.
- A layer of alluvium was present over the Claygate Member to the North West of the site.
- Groundwater was recorded at depths of between 1m and 1.5m below existing ground level.
- The trial pits found the adjoining buildings to have shallow concrete foundations into the Claygate member.
- Additional site specific investigations and monitoring are proposed within 24 Redington Gardens.

4.04 Stage 4: Impact Assessment

4.04.1 The shallowest natural strata encountered in the boreholes was uniformly classified as the Claygate member strata. However this is a variable strata with silty clays and partings of silty sands. The soil tests demonstrated that the soil was generally of low to medium volume change potential and will have limited susceptibility to heave and seasonal shrinking and swelling, which will be to a lesser extent than London Clays. Where alluvium has been encountered it is fundamentally granular in nature and hence won't be susceptible to volume change.

4.04.2 The unloading of the ground due to the basement excavation may cause some heave of the underlying clay and Claygate member subsoils. The majority of the heave is likely to occur during excavation; however an allowance will be made for future uplift forces on the completed basement. Hydrostatic forces will also act on the basement due to the level of the water table. To a certain extent, heave and hydrostatic forces acting on the basement under the building will be counteracted by the weight of the building over. Any net uplift pressure cause by hydrostatic pressure will be resisted by internal tension piles, and tension forces in the perimeter secant piling while the anticipated long term heave will be accommodated suspending the basement raft on void formers.

4.04.3 There are several viable methods of temporary support to the surrounding ground, during the excavation of the basement. The proximity of adjoining buildings dictates that the most appropriate method will be the use of augured concrete piles around the perimeter of the new basement. It is anticipated that this piling will be carried out from a temporary piling platform close to the existing external ground level.
Augered concrete piling is a non-percussive method which will minimise the disruption to the surrounding ground and ensure that the impact on the adjoining properties is minimal. The piles will be designed as propped cantilevers with temporary supports inside the area of excavation, which will be installed close to the proposed ground floor level, as the excavation progresses. To minimise water ingress into the basement during construction, hard-soft secant piling is likely to be required.

4.04.4 The ground in the vicinity of the site slopes generally down in a south-westerly direction. The locally steeply sloping areas are located the other side of Redington Gardens to the south east of the site.

Since the steep slopes are not immediately uphill of the site, the excavation for the basement will not lead to instability of these slopes.

4.04.5 With reference to the Arboricultural Impact Assessment report by Landmark Trees, dated December 2015, it is noted that a number of small trees are being removed as part of the works. The soil that could have been affected by the trees will in general be removed by the excavation of the proposed basement.

The trees to be removed are sufficiently remote from the adjoining buildings such that their removal is unlikely to have any significant impact in terms of recovery of the ground. The area around the tree is generally level and hence there will not be any implications for ground/slope stability.

The larger tree that is to be retained will be protected as set out in Landmark Trees' report.

4.04.6 Local de-watering of the soils outside of the site, during excavation of the basement, is to be minimised by use of appropriate techniques for the basement construction. Hard-soft secant piles interlock to prevent water ingress, and the toes of these piles will key into the impermeable London Clay strata below

4.04.7 A construction method for the basement has been developed to limit the potential for ground movements and hence potential for damage to adjoining properties. We have set out the principles for this method in Appendix C of this report; this will be developed in detail by the appointed Contractor in due course.

A ground movement analysis and building damage assessment has been carried out by Byland Engineering Ltd and the results are presented in their report (project reference 1248). Mitigation measures will be employed to limit ground movements as much as is practically possible, but in all cases building damage will be no greater than category 2 'Slight', as defined by Burland, when combining the effects of piles installation and basement excavation.

A monitoring regime will be established and agreed through the Party Wall process. This will include a combination of targets fixed to adjoining buildings, and inclinometers cast within the piles. These will be monitored against target values agreed in advance. If movements exceed 'Amber' values then this will be reported and more frequent monitoring agreed, with consideration of mitigating measures. If 'Red' values are reached then further excavation will stop to enable implementation of contingency plans such as further propping.

4.04.8 Consideration has been given to the possibility that the construction works at 24 Redington Gardens and 25-26 Redington Gardens could be carried out at the same time, or with the programme of basement works overlapping to some extent.

The analysis carried out for no. 24 Redington Gardens shows that the largest tensile strains and hence greatest potential damage predictions are for 25 Redington Gardens. This predicted damage, whilst within normally acceptable limits, would clearly be obviated if the works to replace this property were to be carried out at the same time as the works at 24 Redington Gardens.

In respect of the other adjoining properties there would be an altered settlement profile if the two sites were to be constructed concurrently, compared to each project being carried out in isolation. Therefore, if in due course if it is agreed to carry out the works to the two properties at the same time then an additional ground movement analysis and building damage assessment will be carried out and submitted as part of the 'Detailed Basement Construction Plan', with all required mitigation to ensure any building damage will remain within acceptable limits.

4.04.9 The hydrogeological statement in section 7.6 of GEA's report note that the amount of annual recharge into the Claygate member will not be affected by the proposed basement works. On this basis the aquifer will not be dewatered and hence the ground stability will not be impacted.

5.00 SURFACE FLOW AND FLOODING

5.01 Stage 1: Surface Flow and Flooding Screening

5.01.1 SF Q1 *Is the site within the catchment of the pond chains on Hampstead Heath?*

No. With reference to the Camden Geological, Hydrogeological and Hydrological Study, the site is not within the catchment of the pond chains on Hampstead, nor the Golder's Hill Chain.

5.01.2 SF Q2 *As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?*

No. On completion of the development, the surface water flows will be routed in the same way as the existing condition, with rainwater run-off collected in a surface water drainage system and discharged to the combined sewer in Redington Gardens (Refer to Thames Water Asset Search in Appendix A).

5.01.3 SF Q3 *Will the proposed basement development result in a change in the proportion of hard surface/paved external areas?*

Yes. The footprint of the proposed replacement houses is greater than the existing properties. However where the basement extends beyond the footprint of the house into the rear garden, it will be covered by minimum 1m of soil to allow water infiltration into the adjoining garden.

5.01.4 SF Q4 *Will the proposed basement result in changes to the profile of inflows (instantaneous and l ong term) of surface water being received by adjacent properties or downstream watercourses?*

No. SUDS measures will be adopted to ensure the proposal will not change the profile of the surface water flows.

5.01.5 SF Q5 *Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream water courses?*

No. The surface water quality will not be affected by the development, as in the permanent condition collected surface water will be generally be from roofs, or external hard landscaping as existing.

Figure (j)
Areas at Risk of Flooding from Rivers or Sea
(Extract from Environment Agency flood map)

Figure (k)
Areas at Risk of Flooding from Reservoirs
(Extract from Environment Agency flood map)

5.01.6 On the basis of items 5.01.1 to 5.01.5 above and in accordance with the Figure 3 in Camden Planning Guidance CPG 4, the aspects that should be carried forward to a scoping stage in respect of Surface Flow and Flooding are:

- The increase in the proportion of hard landscaping.

5.01.7 The Scoping Stage will identify the potential impacts of the above aspects in respect of the proposed basement proposals. Within the Impact Assessment it will be demonstrated how the design has considered the above aspects and hence mitigated any adverse Impact.

5.01.7 SF Q6 *Is the site in an area known to be at risk from surface water flooding, such as South Hampstead, West Hampstead, Gospel Oak and King's Cross, 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?*

Redington Gardens is not one of the streets noted within the Camden Planning Guidance CPG 4 (2013 Revision) as a street "at risk of surface water flooding" (Figure (m)). The street was not affected by floods in 1975 and 2002 due to overloading of the public sewers during a storm event.

A 'Sewer History' enquiry to Thames Water (Appendix A) gave no record of surcharge of sewers having previously affected the adjoining properties.

With reference to the EA Rivers and Sea Flood Maps (Figure (k)), the site is not located within a flood risk zone. The EA Reservoir flood map (Refer figure (l)), shows that the site is not at risk of flooding from reservoirs.

With reference to the EA surface water flooding maps (Figure (n)) the site is at 'low risk' of flooding.

5.01.8 On the basis of the above and in accordance with the Figure 3 in Camden Planning Guidance CPG 4, a flood risk assessment in accordance with PPS25 is not required.

Figure (l)
Flood Map
(Extract from Fig 15 of Camden Geological, Hydrogeological and Hydrological Study)

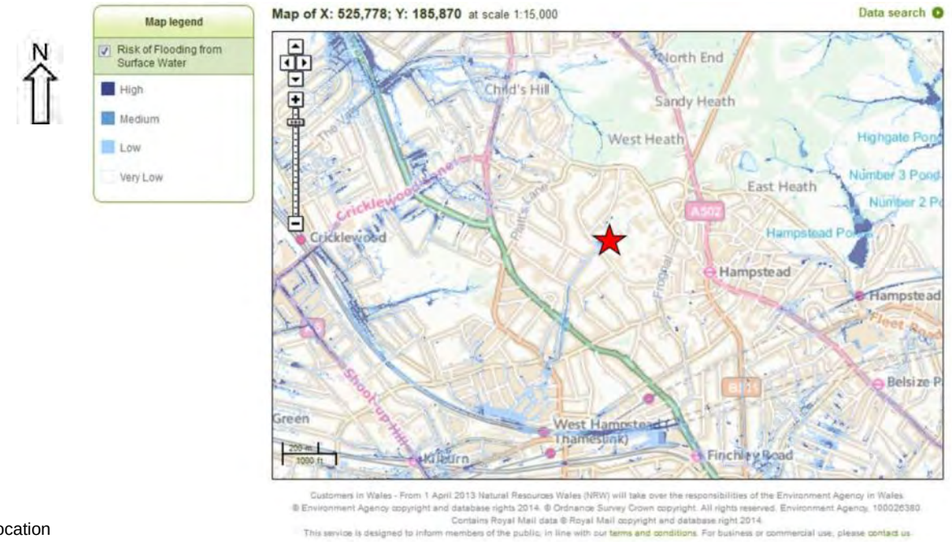


Figure (m)
Flooding from Surface Water
(Extract from Environment Agency flood map)

5.02 **Stage 2: Scoping**

5.02.1 With reference to the Camden Geological, Hydrogeological and Hydrological study Appendix F1, the potential impacts which will need to be considered will include:-

- Whether the change in the proportion of hard-landscaped areas will change the way surface water is received by underlying aquifers, adjacent properties and the public sewer.

5.02.2 In response to the above, an assessment of the impermeable areas will be made for the existing and proposed conditions.

5.03 **Stage 3: Site Investigation and Study**

5.03.1 The existing impermeable areas have been calculated by reference to the survey plans and our site visit. Refer figure (n).

The site area is approximately 478m^2 (0.0478 Ha) and the impermeable area is currently a total of 311m^2 (166m^2 buildings and 145m^2 hard landscaping), representing 65% of the total site area.

Figure (n)
Existing Impermeable Areas

5.03.2 The proposed impermeable areas have been calculated based on the proposed landscaping plan included in DMFK's Design & Access Statement. Refer figure (o).

Soft landscaping over basement areas is assumed to free-drain to adjoining soft landscaped areas.

The proposed impermeable area from hard landscaping is 108m^2 and the proposed houses is 222 m^2, a total of 330 m^2 and representing 69% of the site area.

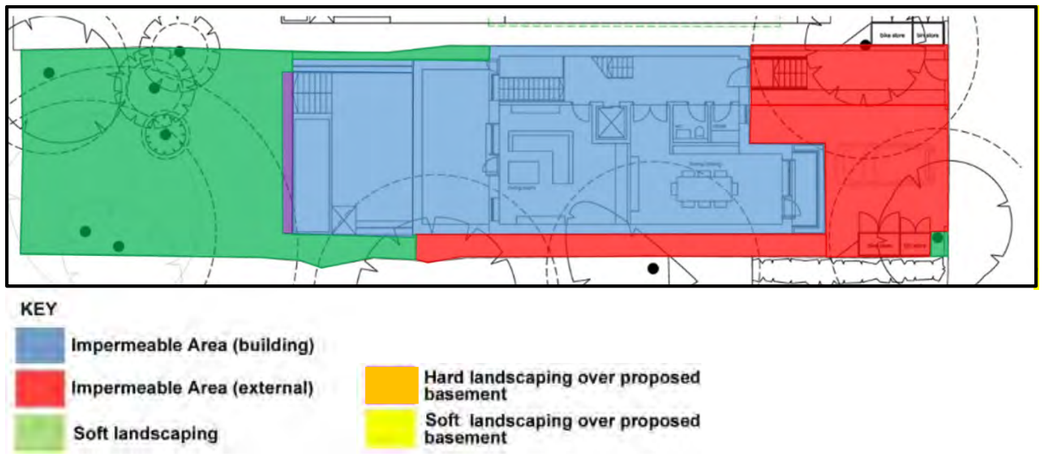


Figure (o)
Proposed Impermeable Areas

5.04 **Stage 4: Impact Assessment**

5.04.1 The impermeable area for the proposed scheme is slightly higher than the existing condition, and hence the collected surface water will be increased by the proposed works, but not significantly.

5.04.2 We understand the environmental and sustainable performance of the building is a key part of the design approach. Code for Sustainable Homes (CfSH) is being used as a benchmark to measure this performance, and this will include measures in respect of sustainable drainage.

5.04.3 SUDS measures that will be considered during the detailed design will include the use of lined permeable paving systems which will act to attenuate the flows from hard landscaped areas.

5.04.4 By the use of SUDS measures the peak flows into the public sewer will not be increased from the existing condition.

APPENDIX A

THAMES WATER RECORDS

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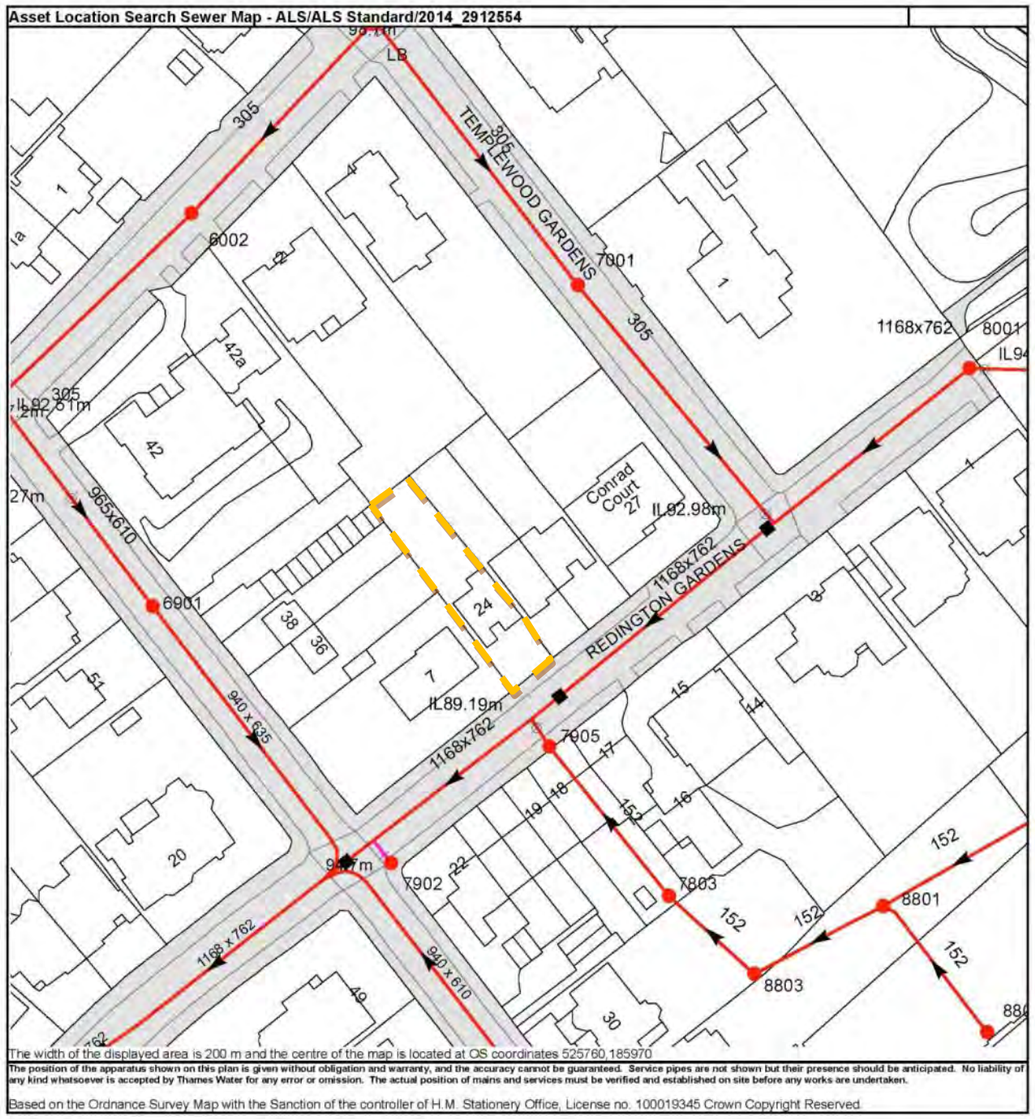


Figure A1 - Extract from Thames Water Asset Search showing a combined sewer

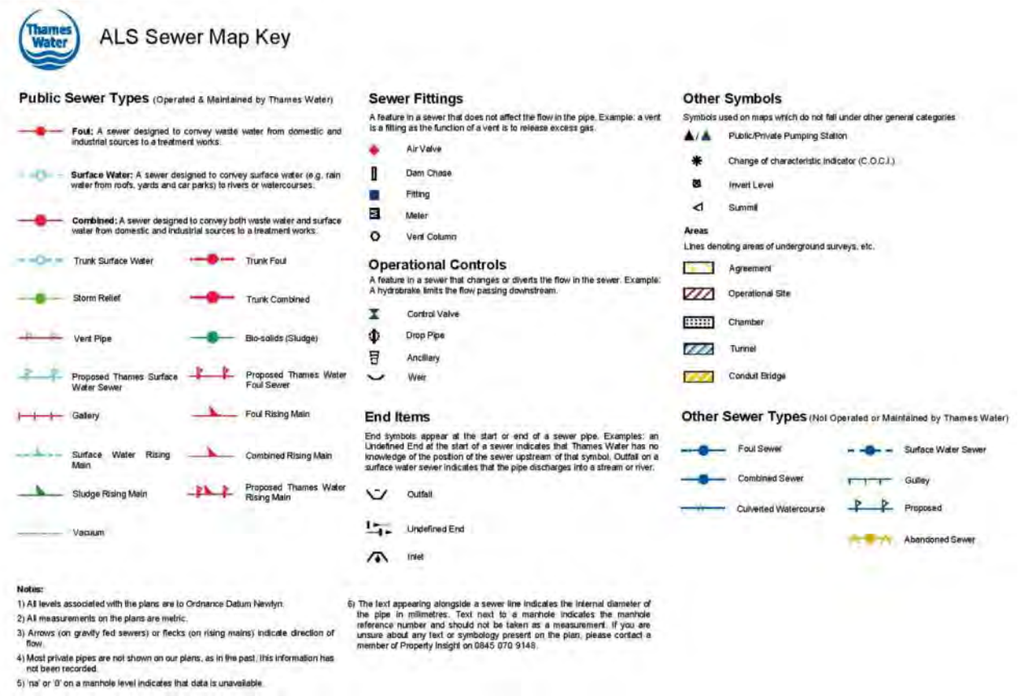


Figure A2 - Key to Thames Water Asset Search

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
6901	94.97	89.34
6002	98.22	93.36
7902	n/a	n/a
7905	95.22	92.93
7001	97.5	93.19
7803	99.6	98.05
8803	102.9	99.02
8801	n/a	n/a
8001	98.44	94.08
8805	n/a	n/a

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Figure A3 - Manhole Invert and Cover Levels

Sewer Flooding
History Enquiry

Michael Alexander Consulting Engineers

Search address supplied 25-26
Redington Gardens
London
NW3 7RX

Your reference P3034 25-26 Redington Gardens NW3

Our reference SFH/SFH Standard/2014_2912551

Received date 14 November 2014

Search date 14 November 2014

Thames Water Utilities Ltd

Property Searches
PO Box 3189
Slough SL1 4WW

DX 151280 Slough 13

T 0118 925 1504
E searches@thameswater.co.uk
I www.thameswater-propertysearches.co.uk

Sewer Flooding
History Enquiry

History of Sewer Flooding

Is the requested address or area at risk of flooding due to overloaded public sewers?

The flooding records held by Thames Water indicate that there have been no incidents of flooding in the requested area as a result of surcharging public sewers.

For your guidance:

- A sewer is "overloaded" when the flow from a storm is unable to pass through it due to a permanent problem (e.g. flat gradient, small diameter). Flooding as a result of temporary problems such as blockages, siltation, collapses and equipment or operational failures are excluded.
- "Internal flooding" from public sewers is defined as flooding, which enters a building or passes below a suspended floor. For reporting purposes, buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.
- "At Risk" properties are those that the water company is required to include in the Regulatory Register that is presented annually to the Director General of Water Services. These are defined as properties that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system more frequently than the relevant reference period (either once or twice in ten years) as determined by the Company's reporting procedure.
- Flooding as a result of storm events proven to be exceptional and beyond the reference period of one in ten years are not included on the At Risk Register.
- Properties may be at risk of flooding but not included on the Register where flooding incidents have not been reported to the Company.
- Public Sewers are defined as those for which the Company holds statutory responsibility under the Water Industry Act 1991.
- It should be noted that flooding can occur from private sewers and drains which are not the responsibility of the Company. This report excludes flooding from private sewers and drains and the Company makes no comment upon this matter.
- For further information please contact Thames Water on Tel: 0800 316 9800 or website www.thameswater.co.uk

Thames Water Utilities Ltd

Property Searches
PO Box 3189
Slough SL1 4WW

DX 151280 Slough 13

T 0118 925 1504
E searches@thameswater.co.uk
I www.thameswater-propertysearches.co.uk

Registered in England and Wales
No. 2366661, Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

EXTRACT OF THE SEWER FLOODING HISTORY REPORT PREVIOUSLY COMMISSIONED FOR THE ADJOING PROPERTY

APPENDIX B

PHOTOGRAPHS

Photograph 1

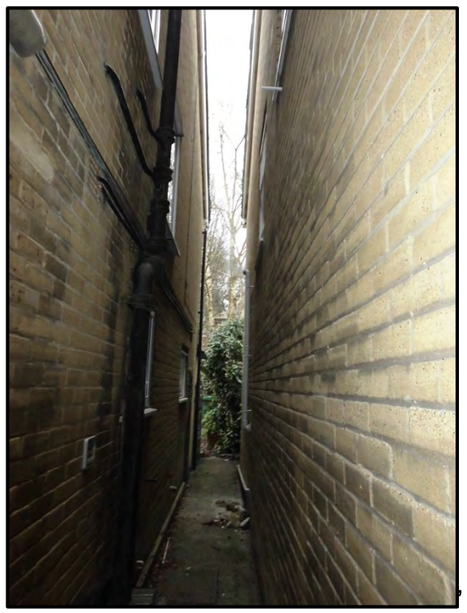
Photograph 2

Photograph 3

Photograph 4

Photograph 5 – Front Elevation of Property

Photograph 6 – Adjoining property rear garden (25 Redington Gardens)



Photograph 7 – View of the existing gap between 24 and 25 Redington Gardens

APPENDIX C

CONSTRUCTION METHOD STATEMENT

CONSTRUCTION METHOD STATEMENT

C.01 The following provides an outline Method Statement for the construction of the basement. This will be developed and finalised by the appointed Contractor, once the detailed design is complete.

C.02 Notices of the basement work will be served on the adjoining owners and schedules of condition will be carried out to the adjoining properties in accordance with the requirements of the Party Wall etc. Act 1996

C.03 Precise monitoring points will be fixed to the party walls and adjoining buildings in accordance with an agreed 'Monitoring and Contingency Plan'. Initial 'base' readings will be taken.

C.04 The site boundary will be established and safety fencing and hoarding shall be installed around the site perimeter.

C.05 Tree protection zones will be installed in accordance with Landmark Trees advice and in accordance with BS 5837:2012 - Trees in Relation to Construction.

C.06 Careful demolition of the existing houses will be carried out ensuring that dust and vibration is controlled at all times.

C.07 A key consideration in limiting movements of the surrounding ground will be the installation of effective temporary and permanent props, close to the existing ground level ('high level' as described in CIRIA C580); to achieve this, two principal methods of construction will be considered as follows:

- Open and propped excavation
- Top-down construction.

It is assumed at this stage that the Contractor will adopt the Open and propped excavation method, as described below. The approach for 'Top-down' construction would be similar, with provision of high level propping to minimise ground movements, but in that case the prop would be provided by the new ground floor slab.

C.08 For the open excavation method, the perimeter piles will be installed from a piling mat at close to existing ground level. A guide wall will be used to ensure accurate alignment of the pile wall. It is likely also at this stage that the internal tension piles will be installed from this level.

C.09 Reinforced concrete capping beams will be constructed. Temporary works will be required locally to install the capping beams as they will be set at close to proposed lower ground floor slab level, which will be below the external ground levels generally. Lateral props to the capping beams will be installed, either spanning across the site or the across the corners of the excavation. The detailed design of the piles, propping and method of construction will be developed in conjunction with the specialist piling and groundworks contractor.

C.10 Bulk excavation will then commence. Although water inflows into the basement will be limited due to the secant piles, any groundwater which is trapped within the confines of the secant piled wall will be collected in sumps and pumped. All arisings will be disposed of in accordance with the Waste Acceptance Criteria (WAC) test results. Regular monitoring readings will be taken and compared with 'Red' and 'Amber' trigger levels.

C.11 When bulk excavation is complete to general basement level, the bottom surface of the excavation will be immediately blinded. Tension piles will be broken down to the required level. The basement raft slab will then be constructed over heave protection measures.

C.12 The excavation of the lower sections of basement, for the swimming pools, will then proceed. The lower basement slab will then be constructed.

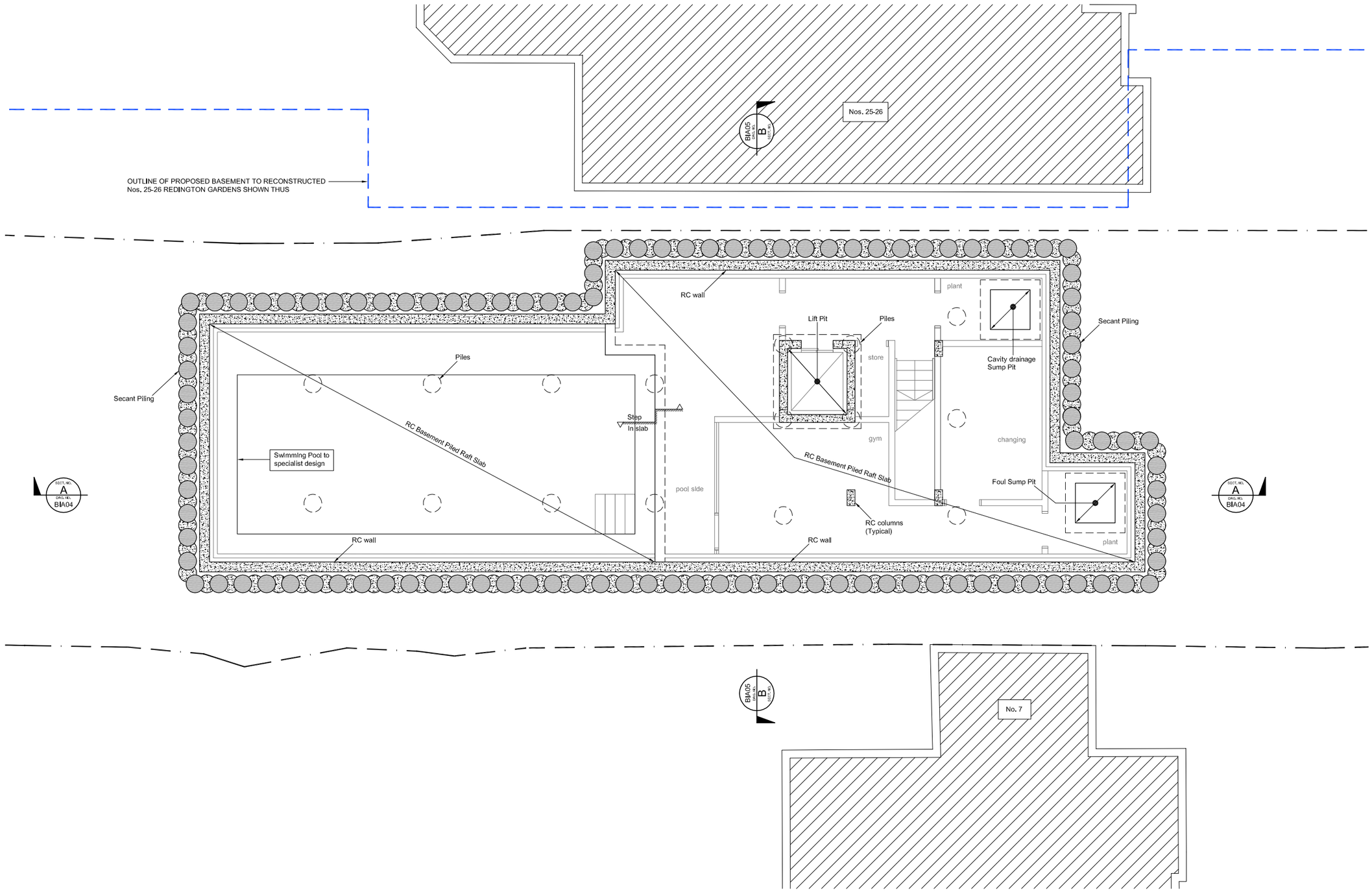
C.13 Works can then proceed with the reinforced concrete liner walls.

C.14 Following completion of the lower ground floor slab, which acts as a permanent prop to the excavation, the temporary propping can be removed.

C.15 The superstructure of the new building can then be progressed.

APPENDIX D

OUTLINE STRUCTURAL DRAWINGS



PROPOSED BASEMENT PLAN

Scale 1:50

NOTES

1. This drawing shall be read in conjunction with all relevant Architects & Engineers drawings and specifications.
2. Do not scale any dimensions. All dimensions to be checked on site.

LEGEND

RC Structure

Rev.	Date	Description	By
A	08.12.2015	ISSUED FOR BIA REPORT	SP

ISSUED FOR BIA

Architect

DMFK

Project Title

24 REDINGTON GDNS
LONDON, NW3 7RX

Drawing Title

BASEMENT
GENERAL ARRANGEMENT

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web www.meaengineers.com

Drawn		Checked	
SP	Nov 2015	IH	Nov 2015

Scale	Size
1:50	A1
1:100	A3

Project No.	Drawing No.	Rev.
P3311	BIA01	A

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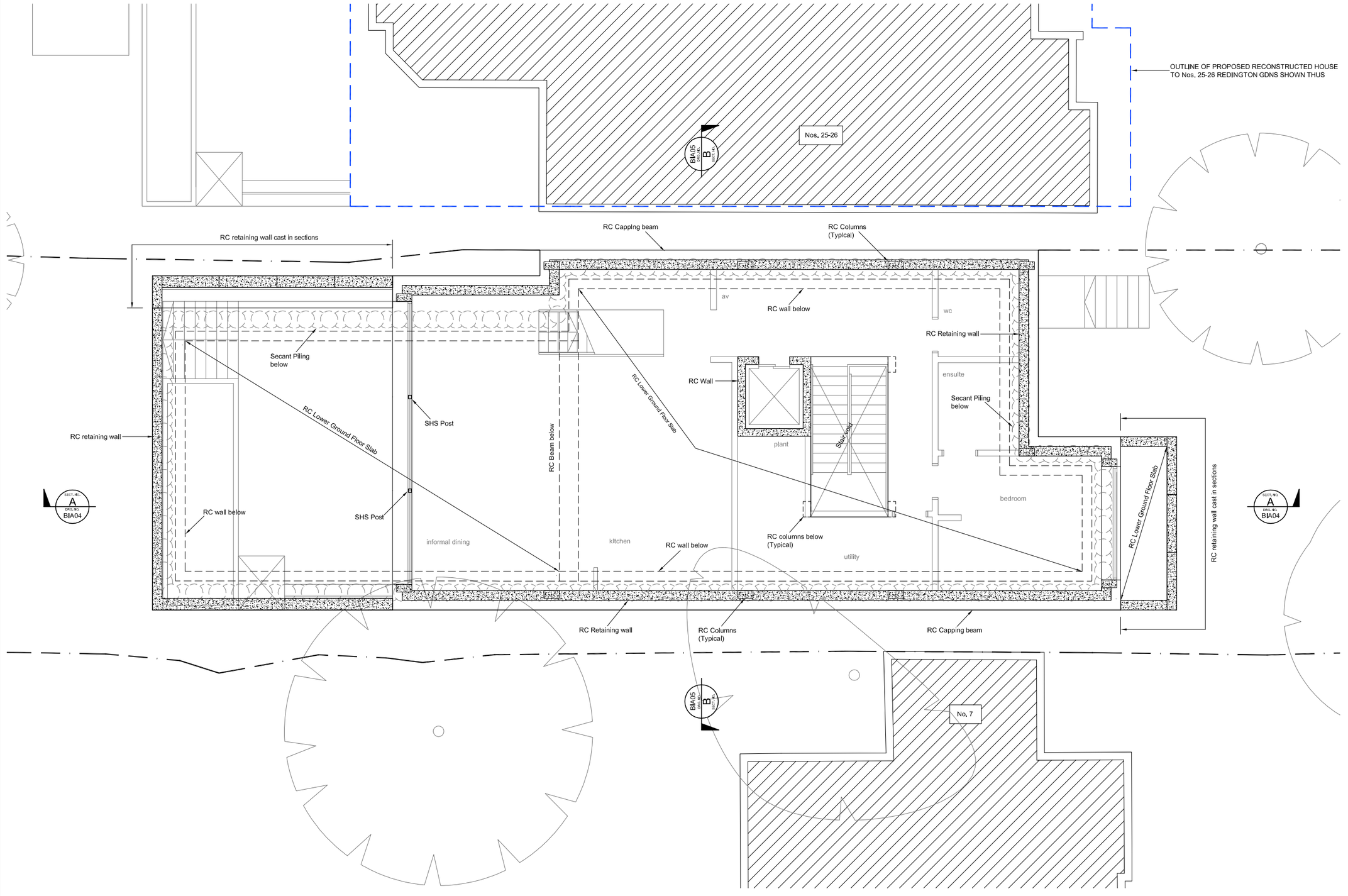

PROPOSED LOWER GROUND FLOOR PLAN

Scale 1:50

NOTES

1. This drawing shall be read in conjunction with all relevant Architects & Engineers drawings and specifications.
2. Do not scale any dimensions. All dimensions to be checked on site.

LEGEND

- RC Structure
- Structure below
- Masonry wall
- FRJ — Indicates span direction of new timber flat roof joists

Rev.	Date	Description	By
A	08.12.2015	ISSUED FOR BIA REPORT	SP

ISSUED FOR BIA

Architect
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Drawing Title
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GENERAL ARRANGEMENT

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Project No.	Drawing No.	Rev.
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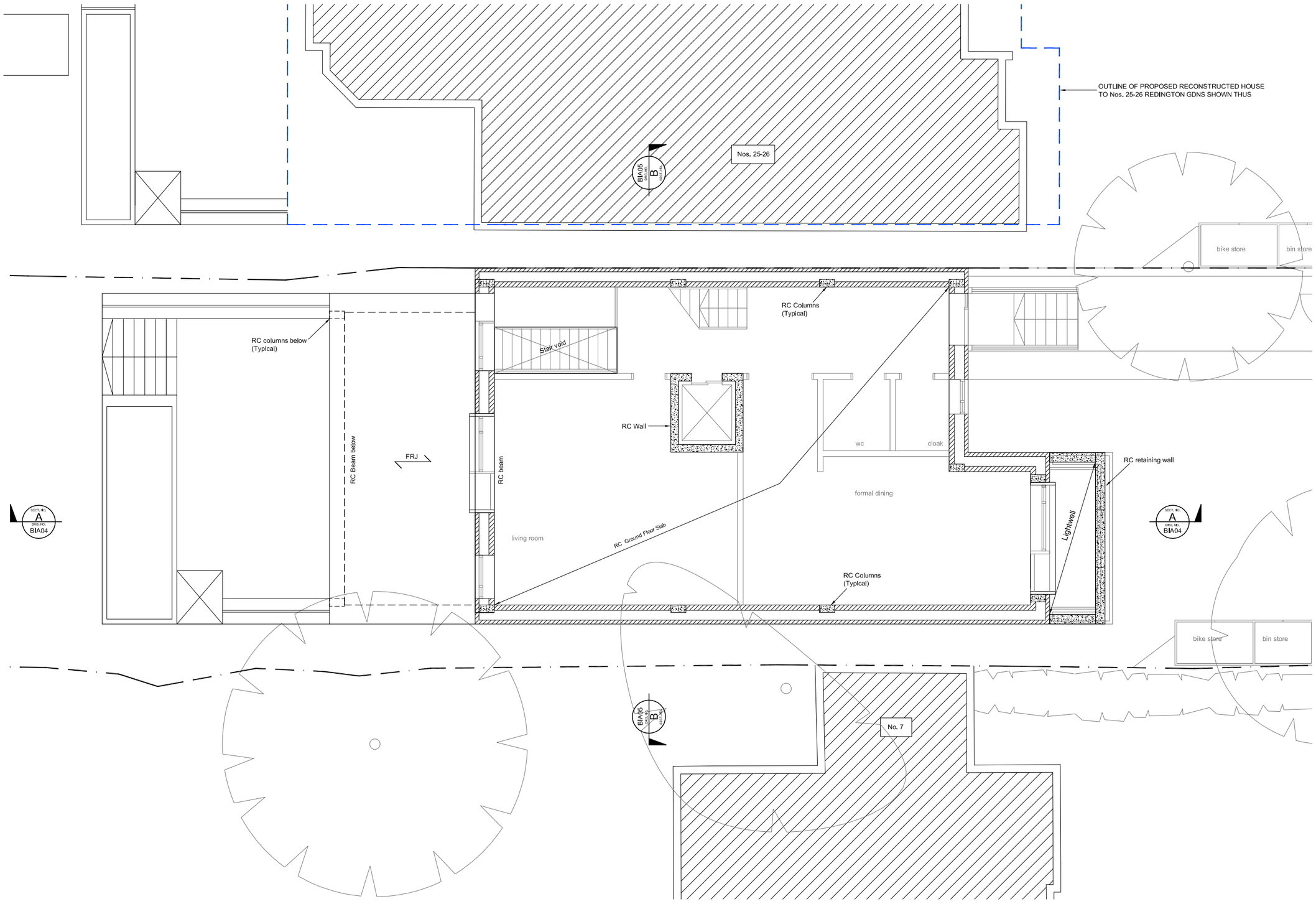

PROPOSED UPPER GROUND FLOOR PLAN

Scale 1:50

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NOTES

1. This drawing shall be read in conjunction with all relevant Architects & Engineers drawings and specifications.
2. Do not scale any dimensions. All dimensions to be checked on site.

LEGEND

- RC Structure
- Structure below
- Masonry wall
- FRJ — Indicates span direction of new timber flat roof joists

Rev.	Date	Description	By
A	08.12.2015	ISSUED FOR BIA REPORT	SP

ISSUED FOR BIA

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Drawing Title
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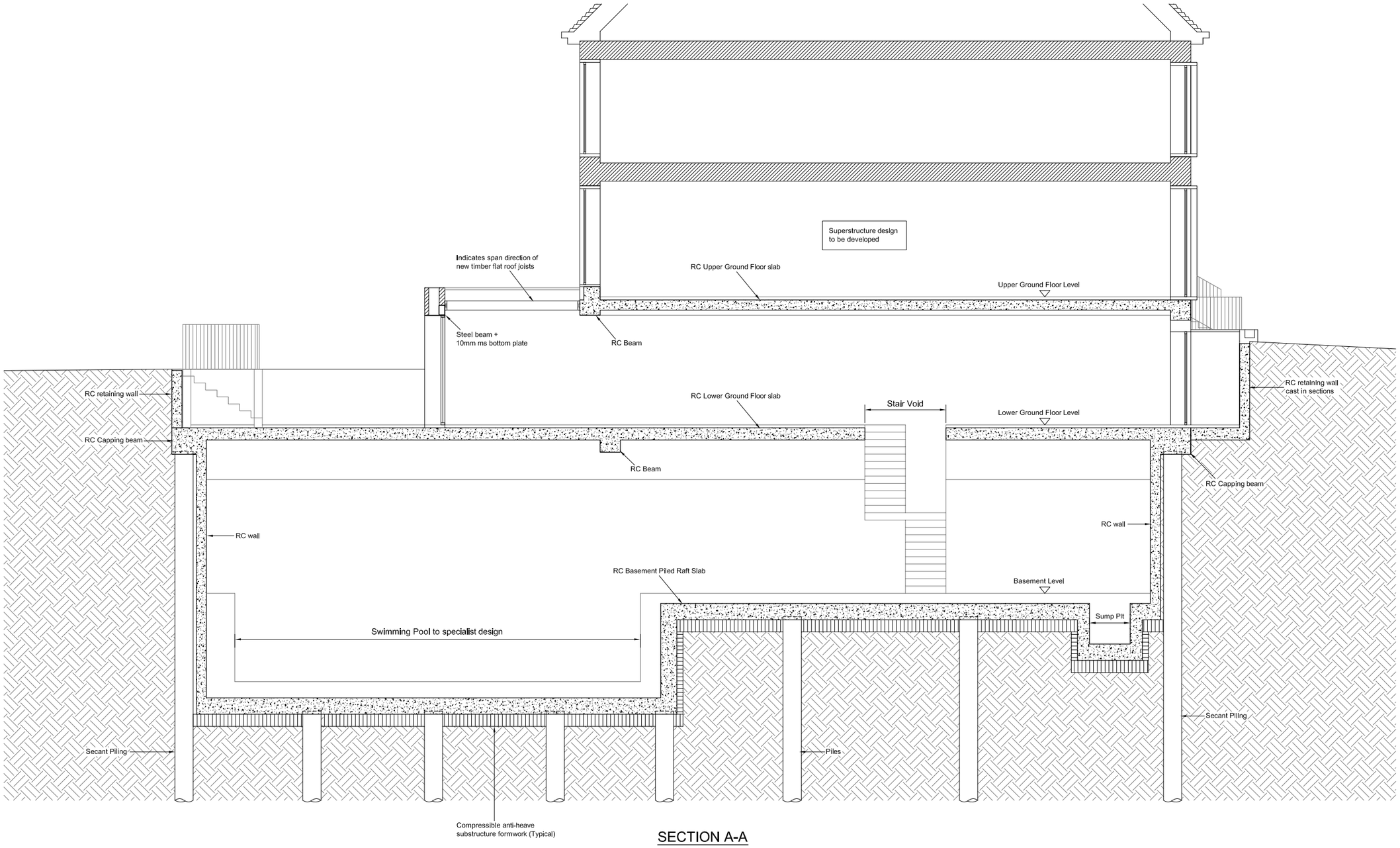

SECTION A-A

Scale 1:50

NOTES

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2. Do not scale any dimensions. All dimensions to be checked on site.

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Drawing No.	BIA04
Rev.	A

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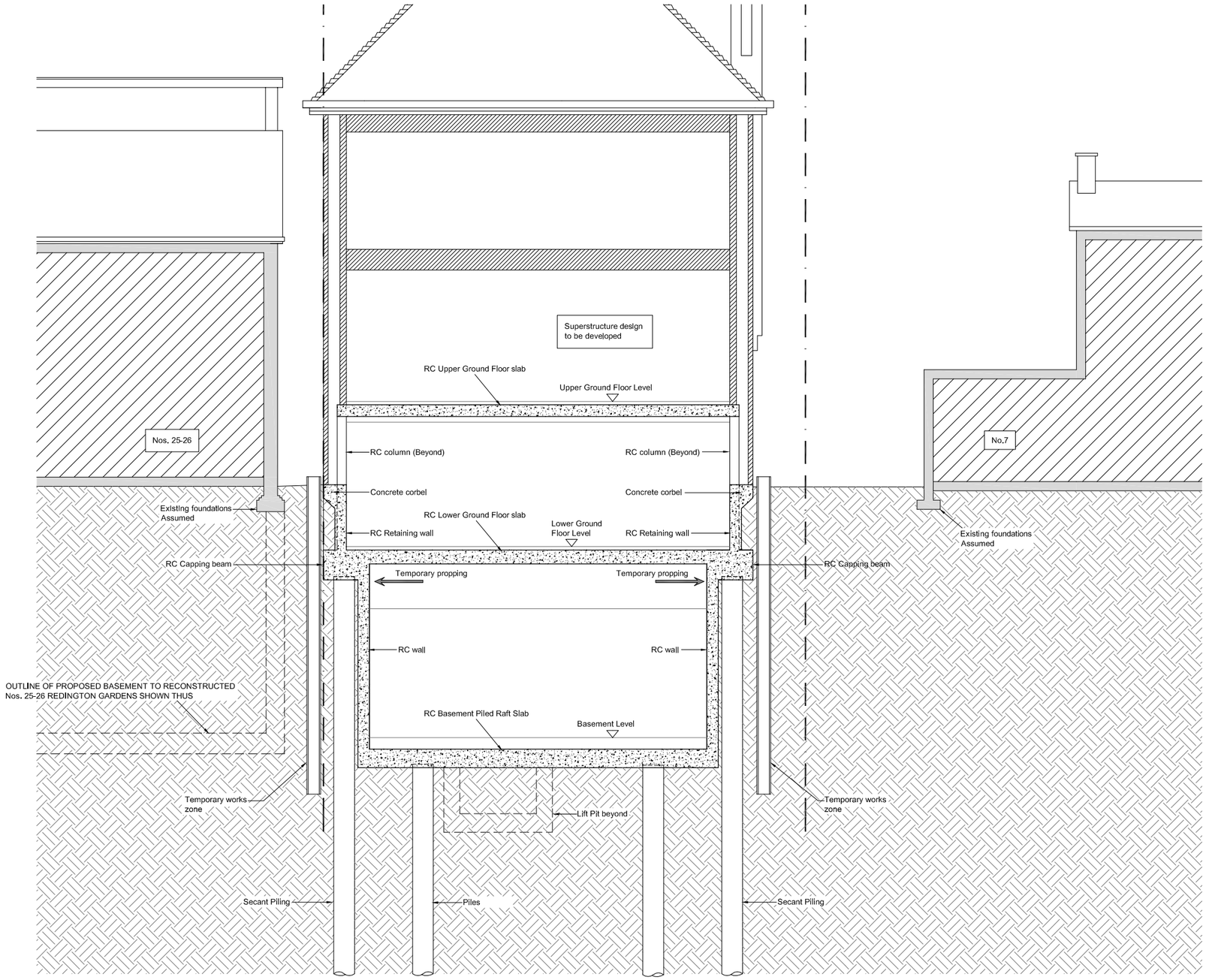

SECTION B-B

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NOTES

1. This drawing shall be read in conjunction with all relevant Architects & Engineers drawings and specifications.
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Checked	IH Nov 2015
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Size	A1 A3
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Drawing No.	BIA05
Rev.	A