

BASEMENT FLAT, 39 ROSSLYN HILL, NW3

Structural Engineering considerations associated with the Basement Impact Assessment and Basement Construction Plan.

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1.0 INTRODUCTION

- 1.1 It is proposed to construct a new detached single storey rear extension connected to the 'Basement Flat' set at lower ground floor of this Victorian four storey property. This is also set at the lower ground floor level and built into the garden area, which presently steps up and then slopes up to the garden wall to the rear of properties on Eldon Grove.
- 1.2 The drawings illustrating the proposed arrangement and design access statement are in Square Feet Architects planning submission.
- 1.3 This report responds to the following London Borough of Camden documents:
 - 1.3.1 Camden Development Policy DP27 relating to Basements and Lightwells.
 - 1.3.2 Camden Planning Guidance 4 : Basement and Lightwells (rev. July2015)
 - 1.3.3 Camden geological, hydrogeological and hydrological study Guidance for subterranean development by Arup.
- 1.4 This report and associated documentation specifically address the comments raised in the Independent Review undertaken by LBH Wembley, for London Borough of Camden, ref LBH 4315 dated May 2015. Their comments were:
 - Further hydrogeological assessment and proposals for any groundwater drainage mitigation that may be required, including consideration of potential cumulative impacts.
 - An assessment of slope stability, taking into consideration the situation on Nos. 29 to 30a Thurlow Road and nos. 10b to 10d Eldon Grove.
 - A definitive construction methodology including a temporary works design and sequence.
 - A monitoring and contingency plan.
- 1.5 This report considers the structural engineering issues relating to ground stability and construction methodology (Appendix D) with supporting scheme design stage drawings and calculations (Appendices B and G respectively). It also explains the monitoring and contingency plan with the location sketch in Appendix E. The Basement Impact Assessment is now a separate document prepared by GEA, as referred to below.
- 1.6 39 Rosslyn Hill is located with an arrow on the relevant Figures of the Camden Geological, Hydro-geological and Hydrological Study, appended to this report, Appendix A.
- 1.7 An initial baseline Desk Study was carried out by ESG Associates in October 2014 and is appended to this report, Appendix F. The details of their site investigation and other local data are in Appendix C.

- 1.8 Geotechnical and Environmental Associates (GEA) have undertaken a further Ground Investigation and Basement Impact Assessment Report ref: J15027 November 2015, to be read with this report. It concludes:
 - The works will not impact the hydrological or hydrogeological setting
 - Ground movement analysis predicts category 0, 'negligible' damage, to neighbouring properties, so is within acceptable limits and the works are not a risk.
 - Analysis demonstrates the existing slope is in stable condition and the proposed development is likely to provide an increased stability to the slope.
- 1.9 An Arboricultural Impact Analysis that has been prepared by Skerratt and concludes that;
 - "Subject to adequate protection of retained trees during development and to mitigation planting to provide successors for the eventual loss of T001 and T004, the proposed development will not have a significant adverse impact upon public visual amenity.
 - Protective measures and appropriate working practices are set out in an Arboricultural method statement.
 - As the site is in a conservation area no works should be carried out to any trees referred to in this report without prior written agreement of the local authority
- 1.10 A draft Construction Management Plan has been prepared by Paul Mew Associates using Camden pro-forma v2.0 and this will be developed by the Principal Contractor when appointed.
- 1.11 A separate Project Note has been prepared in response to Martin McNair's e-mail expressing concerns to Gideon Whittingham dated 5th January 2015.
- 1.12 This report and Associated documents referred to above address the Key Messages of CPG 4 and show that the proposed development does not:
 - Cause harm to the built and natural environment and local amenity;
 - Result in flooding; or
 - Lead to ground instability.

Furthermore the methodologies included demonstrate that the scheme;

- Maintains the structural stability of the building and neighbouring properties;
- Avoids adversely affecting the drainage and run off or causing other damage to the water environment; and
- Avoids cumulative impacts upon structural stability or water environment in the local area.

2.0 SITE INFORMATION

- 2.1 39 Rosslyn Hill is an early Victorian 'villa' style property, four storey semi-detached build circa 1850s. 39 Basement Flat is the lower ground floor of this four storey building. The construction is typical for buildings of this era with load bearing masonry walls and timber floors. The proposed development is structurally isolated from the main property connected only by a link corridor which is as the level of the existing patio.
- 2.2 Rosslyn Hill lies within the generally sloped setting of Hampstead, although the area to either side of no 39 is relatively flat, with the land that forms the garden sloping up from the rear towards Eldon Grove.



- 2.3 Neighbouring the property on either side are No's 37 and 41 Rosslyn Hill, with 39 being semi-detached with No. 37 and No. 41 being a detached property. Both of these properties are four storeys including their lower ground levels, level with the basement flat of No. 39 and the floor level of the proposed development. Both have similar 'terraced' and then sloped gardens to the rear, up to Eldon Grove / Thurlow Road.



Mark up of location plan to highlight relationship of neighbours to proposed development.

- 2.4 Eldon Grove lies uphill to the rear of Rosslyn Hill. No.10d Eldon Grove's garden backs on to No 39's garden, as does part of No 30 Thurlow Road, which runs between Rosslyn Hill and Eldon Grove. Both 10d Eldon Grove and 30 Thurlow Road lie over 7.5m from the proposed development. No.30a Thurlow road is 4.5m away from the dwelling, 3m from a proposed garden retaining wall. Only 30A Thurlow Road is within a 45 degree line from the deepest part of the proposed excavation – however this property is already piled and therefore considered at negligible risk from the works.
- 2.5 The ground investigation by GEA records thinner layers of made ground then Claygate member (predominantly clay with lenses of silts and sands) over London Clay.

- 2.6 Reference to the Environment Agency maps, as well as the maps appended, locate the site away from the ground source protection zones, however just within a secondary aquifer as seen on the Environment Agency Map, below and Figure 8, appended. See Figs 1 & 2 overleaf. This is discussed within GEA's Report.

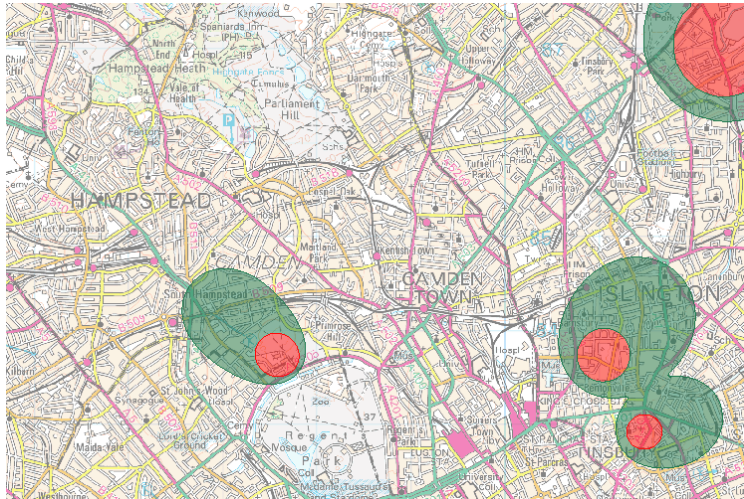


FIG 1. GROUND SOURCE PROTECTION ZONES

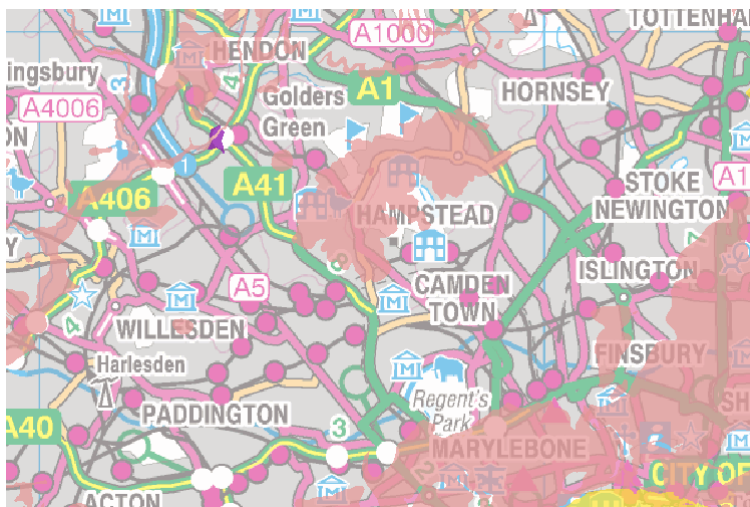
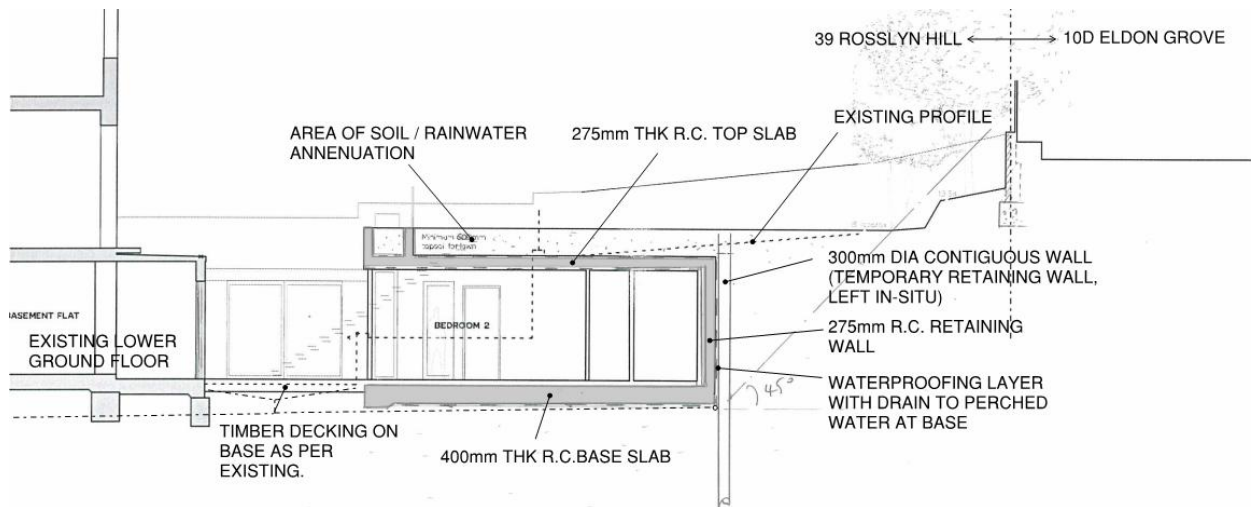


FIG 2. AQUIFER MAP BEDROCK DESIGNATION – PINK IS SECONDARY 'A'



PART SECTION A-A (see S200)

3.0 PROPOSED SCHEME - STRUCTURE

- 3.1 It is proposed to form a reinforced concrete box within the existing sloped rear garden. A contiguous piled wall is to be formed as a temporary retaining wall which will be left in-situ.
- 3.2 On the No. 37/39 Rosslyn Hill boundary, the garden wall is to be underpinned and supported during construction, with a reinforced concrete retaining wall formed to No.37 side, tied into the rear retaining wall and propped by the concrete roof, which forms the deck to support 600mm of top soil for a lawn / planted areas.
- 3.3 A similar r.c. planter to the existing one is to be formed to no 41 Rosslyn Hill/30a Thurlow Road side in a staged form in sections of no more than 1m wide sections to avoid undermining the garden.
- 3.4 The retaining walls and basement slab are designed to take into account ground water and to accommodate ground heave, due to the removal of soil, using information and advice in the ground investigation by GEA.
- 3.5 A Structural Scheme for the basement is appended to this report, Appendix B and construction sequence drawings are in Appendix D.

4.0 CONSTRUCTION METHOD STATEMENTS

- 4.1 Within the design, there are forms of construction which require either a staged sequence, such as underpinning or building in front of an existing garden wall, or temporary works to enable a continuous reinforced retaining wall to be formed.
- 4.2 The nearest property 'above' the levels of the dig which may be affected as it lies on the 45 degree line is 30A Thurlow Road. However this property is presently on a piled raft slab, and so is considered at negligible risk from the proposed works. The contractor will be required to establish a monitoring regime as discussed in section 6.0, to be agreed upon during party wall agree negotiations.
- 4.3 The following is a suggested construction sequence which will be appropriate for the variety of situations- boundary conditions – and how a contractor might approach the works. A final method statement will need to be prepared by the principal contractor as it will be their responsibility to ensure the construction is executed in accordance with the design and without detriment to surrounding structures or features. Refer also to the suggested sequencing drawings in Appendix D.
- 4.4 ***Boundary to 37. Rosslyn Hill. Underpinning and forming a reinforced concrete retaining wall to the inside face. Refer to sequence A, SSK003, Appendix D.***
 - 4.4.1 Dig out section of soil below the garden wall, no longer than 1m wide, ensure flush face with rear of wall and suitable width of footing at base.
 - 4.4.2 Pour concrete (with reinforcement to the No.39 side, if necessary), set, dry pack up to base of garden wall.
 - 4.4.3 Once cured for 48 hrs, prop 1m section of retaining wall back to shear blocks formed in dug out base, or to shoring if in two depth 'hits'.
 - 4.4.4 Continue 5.3.1 to 5.3.3 in sequence to ensure no adjacent pins are undertaken after one another, and a minimum of two metres remains between any pins/gaps being worked on. Shear keys to be provided between pins.
 - 4.4.5 Once fully propped & underpinned wall, set up reinforcement cage for base of retaining wall, cast with appropriate starter bars / kicker for retaining wall over.
 - 4.4.6 From upright of retaining wall, with water bars in any joints. Once permanent roof slab in place, temporary props removed and the holes made good.

4.5 *Rear and in-boundary side of new room; temporary retaining wall, Refer to sequence B, SSK004, Appendix D:*

- 4.5.1 Contiguous piled wall to form temporary retaining structure.
- 4.5.2 Soil then dug out to front of temporary piled retaining wall with wailers, shear blocks and props added during dig.
- 4.5.3 Facing concrete, blinding layer, drainage and DPM placed. (Drainage runs into existing terrace drainage arrangement).
- 4.5.4 Reinforcement for base & wall starters placed; cast.
- 4.5.5 Once base slab as required strength, reinforcement for wall & top starter bars placed; cast.
- 4.5.6 Once retaining wall at required strength, top slab reinforcement placed and cast.
- 4.5.7 Any prop holes made good.
- 4.5.8 Insulation, dpm and soil as necessary placed on top slab, lightly compacted.

4.6 *Planters to boundary with 30 Thurlow Road / 41 Rosslyn Hill. There is an existing concrete block retaining wall to No.39's side, the line of which is to mover slightly nearer to the boundary wall. Refer to sequence C, SSK005, Appendix D:*

- 4.6.1 The existing retaining wall to be propped either side of 1m sections.
- 4.6.2 1m max section of existing wall to be removed, area prepared to form new r.c. base and retaining wall.
- 4.6.3 Concrete cast and set for min 48 hours prop to any adjacent section.
- 4.6.4 The whole wall to be worked in this process.

5.0 MONITORING AND CONTINGENCY PLAN

- 5.1 While the only property within a 45 degree line of the proposed development is piled and therefore at negligible risk of movement due to the works, there are a number of garden walls that are within the 45 degrees slope of the proposed excavation. It is suggested that a monitoring regime is put in place, with points on 30A Thurlow Road, 30 Thurlow Road 10d Eldon Grove.
- 5.2 It is noted that the GEA ground movement analysis concludes that expected movements on adjacent building structures are negligible. However it must also be noted that all shallowly founded structures on clay subsoils, in the vicinity of trees are subject to seasonal movement. The garden walls may be monitored with this in mind.
- 5.3 Please refer to SSK006 in Appendix E for mark up of the proposed monitoring points.
- 5.4 Points will be fixed prior to the start of works on site to allow a 'base reading', taken from a fixed point on/near to No.39 Rosslyn Hill which should not change throughout the construction.
- 5.5 Monitoring will take place at weekly intervals; with intermediate readings taken if/as more substantial digs are made.
- 5.6 As is typical a contingency 'traffic light' system of movement allowances will be agreed at party wall award stage, and with reference to the ground movement analysis by GEA, with a likely scenario of:
 - *Green.* Equipment tolerance, seasonal variation and fine cracking possible.
 - *Amber.* Movement not structurally significant, with the cause for movement ascertained by the contractor and structural engineers and guidance put in place to address causes and concerns. Party wall representatives informed.
 - *Red.* Works to stop on site and the cause for movement ascertained by the contractor and structural engineers. Remedial action made. Party wall representatives informed immediately.
- 5.6.1 The figures will depending on the type of structure each point is fixed too, as some structures e.g. garden walls may have greater seasonal / surface variation.

6.0 CONCLUSIONS

- 6.1 This report and associated documentation specifically address the comments raised in the Independent Review undertaken by LBH Wembley, for London Borough of Camden, ref LBH 4315 dated May 2015. Their comments were:
- Further hydrogeological assessment and proposals for any groundwater drainage mitigation that may be required, including consideration of potential cumulative impacts.
 - An assessment of slope stability, taking into consideration the situation on Nos. 29 to 30a Thurlow Road and nos. 10b to 10d Eldon Grove.
 - A definitive construction methodology including a temporary works design and sequence.
 - A monitoring and contingency plan.
- 6.2 In the BIA document prepared by GEA they consider the ground condition and surface run off and conclude that the development '*will not impact on the hydrogeological setting*'. In this report we have identified that the setting will be enhanced by mitigation measures that enhance the drainage situation by the use of a green roof over the development, vertical drainage behind the structural wall and the ground infill using granular material which attenuate and positively direct the surface and limited ground water flows respectively.
- 6.3 The screening and scoping flow charts in the BIA by GEA has highlighted the potential impact, '*Excavations being below adjacent foundations*', that is addressed within this report:
- 6.3.1 The GEA ground movement analysis and building damage assessment concludes that; *anticipated damage to nearby structures will be negligible, identified as category '0' on the basis of the classification given in Table 2.5 of C5801.*
- 6.3.2 Other potential impacts are also addressed within GEA report, including a slope stability analysis which concludes; "*The proposed development is considered to provide an increased stability to the slope and will therefore not have an impact on the properties up slope of the development.*"
- 6.4 The suggested construction method statements and design provided by this report, as well as ground movement analysis by GEA, demonstrate that it is possible for a competent experienced contractor to form the proposed development without any significant structural impact on adjoining properties or structures. The mitigation measures incorporated into the scheme will ensure against significant ground movement or instability of adjacent structures.
- 6.5 In addition, a monitoring and contingency plan has been provided which is to be agreed in detail as part of a part wall agreement. This specifically addresses the further information required by LBH Wembley.

- 6.6 An Arboricultural Impact Analysis that has been prepared by Skerratt and concludes that;
- “Subject to adequate protection of retained trees during development and to mitigation planting to provide successors for the eventual loss of T001 and T004, the proposed development will not have a significant adverse impact upon public visual amenity.
 - Protective measures and appropriate working practices are set out in an Arboricultural method statement.
 - As the site is in a conservation area no works should be carried out to any trees referred to in this report without prior written agreement of the local authority
- 6.7 This report, that of Skerratt and the BIA by GEA have clearly demonstrated and explained that the design and construction conform with the Key Messages of CPG 4 and will not:
- Cause harm to the built and natural environment and local amenity
 - Result in flooding
 - Lead to ground instability.

Furthermore the methodologies included demonstrate that the scheme;

- Maintains the structural stability of the building and neighbouring properties;
- Avoids adversely affecting the drainage and run off or causing other damage to the water environment; and
- Avoids cumulative impacts upon structural stability or water environment in the local area.



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LIST OF APPENDICES:

APPENDIX A – MARK UP HYDRO-GEOLOGICAL FIGURES

APPENDIX B– STRUCTURAL SCHEME

APPENDIX C– SUBSOIL INFORMATION

APPENDIX D – CONSTRUCTION METHOD STATEMENT

APPENDIX E – MONITORING ARRANGEMENT SKETCH

APPENDIX F – ESG DESK STUDY

APPENDIX G –CALCULATIONS