28 MAREFIELD GARDENS, LONDON. NW3 5SX

BASEMENT IMPACT ASSESSMENT

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APPENDICES

INTRODUCTION.

Vincent & Rymill, Consulting Engineers, have been appointed by the building owner to prepare a B.I.A. for Planning purposes. The author of this report T. J. Vincent Bsc (Hons) C.Eng M.I.Struct. E. first worked with The London Basement Company in 2004, designing and detailing such retro fitted basements all over London. Since that time T. J. Vincent has designed over 450 basements, both single and multi storey.

Site Investigation has been carried out by Messrs Ground and Water, signatory on report will be F. Williams C.Geol FGS CEnv AGS MSoBRA.

The property is a large four storied, detached dwelling probably constructed around the late 1800's. The new development proposal is to provide a basement to the rear of the property within the garden area combined with a lower ground floor level extension over.

Details of the proposals are shown by the relative Greenway Architects drawings.

The purpose of this report / statement is to provide details for the Basement Impact Assessment (BIA) as requested by the 'Camden Planning Guidance Basements and Light wells', together with details of the method and sequence of construction.

The figures referred to in the Screening section are those contained within the Arup Report, 'Camden Geological hydrogeological and hydrological study, and guidance for subterranean development.' The relevant figure used are appended to the end of this report.

NON TECHNICAL SUMMARY

Basement Impact assessment and Report for Groundwater has been carried out by Messrs. H. Frazer Consulting Ltd, their report is appended to the Planning application as a separate document.

Basement Impact assessment and Report for Land Stability has been carried out by Messrs. Ground and Project Consultants Ltd, their report is appended to the Planning application as a separate document.

SCREENING

The Camden screening flow charts were followed and four items were carried through to the scoping stage these being;

a) Will the proposed basement extend below the water table surface?
b) Will the basement development result in a change in the proportion of hard surface paved areas?
c) Is the London Clay the shallowest strata on site?
d) Will the propose basement significantly increase the differential depth of foundations to the relative properties?

SCOPING

Potential impacts of the four items taken forward from the screening stage above are commented upon within the scoping stage. The proposed scheme is further noted to have no impact upon the items listed.

V&R
VINCENT
& RYMILL

SITE INVESTIGATION

A site specific site investigation has been carried out by Messrs Ground and Water. The investigation shows that good ground conditions are present that will allow the formation of the new basement.

IMPACT ASSESSMENT

Assessments are made upon land stability, hydrogeological, hydrological and structural movements. The changes from the baseline are noted as nil change to insignificant change.

HYDROGEOLOGY, LAND STABILITY AND HYDROLOGY

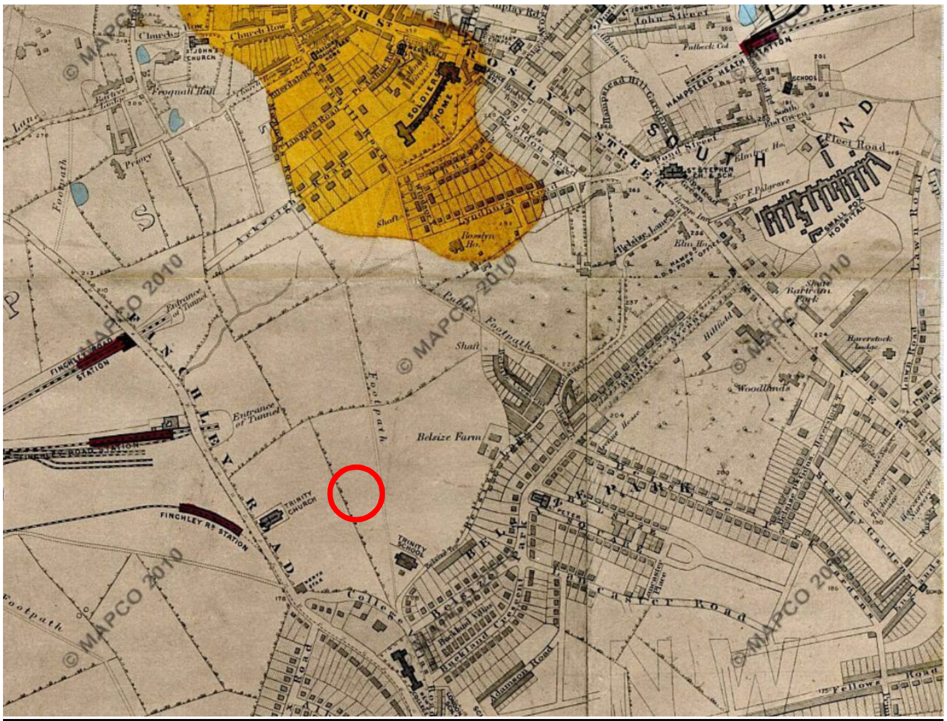
The site investigation confirmed the ground conditions shown by the British Geological Science viewer that is the London Clay Formation. A visual appraisal by the geotechnical engineer on site considered soils from both these beds to have low permeability.

For Hydrogeology and hydrology refer to Messrs. Ground and Water and H. Frazer Consultants reports.

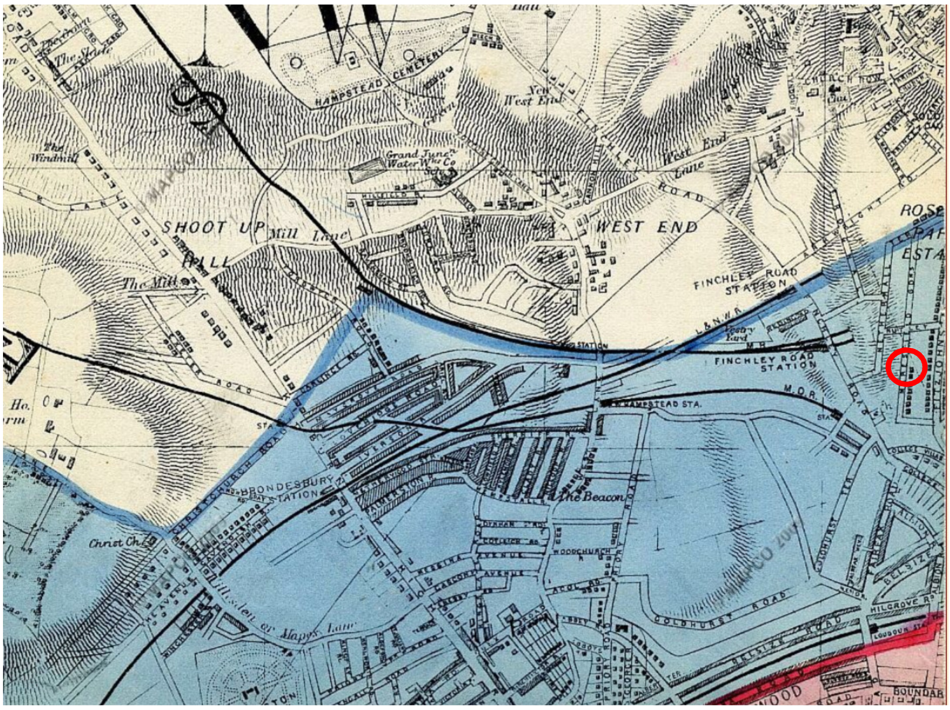
For land stability refer to Ground and Project Consultants report.

SITE DESK TOP STUDY

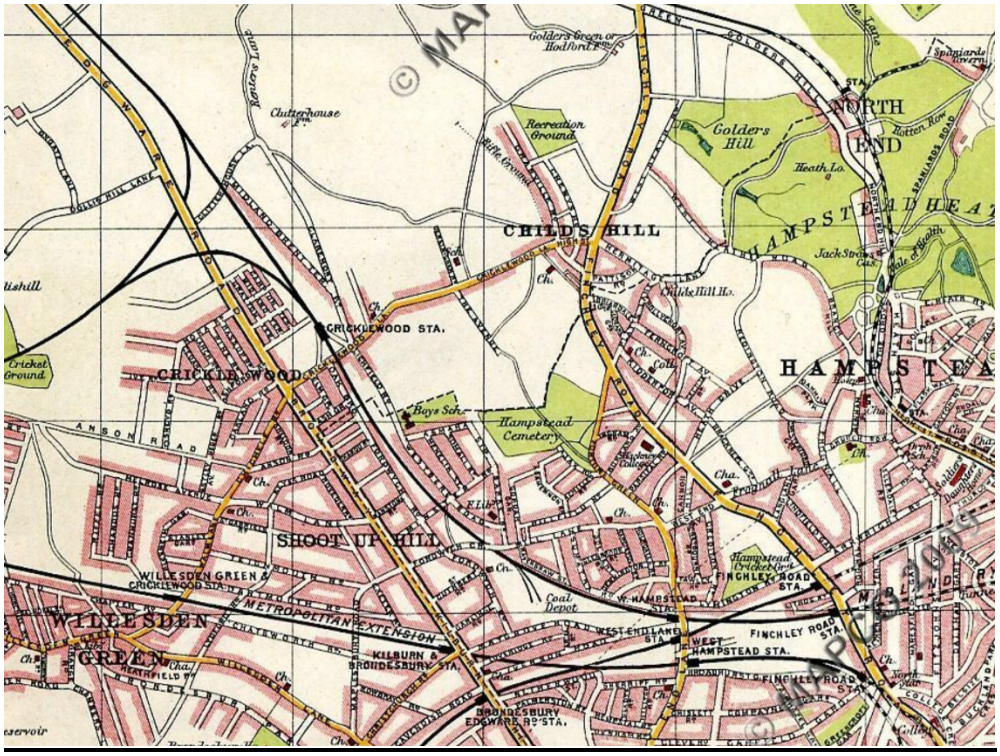
History



1878 Map of London shows the site as undeveloped, probably still part of the fields belonging to Belsize Farm..

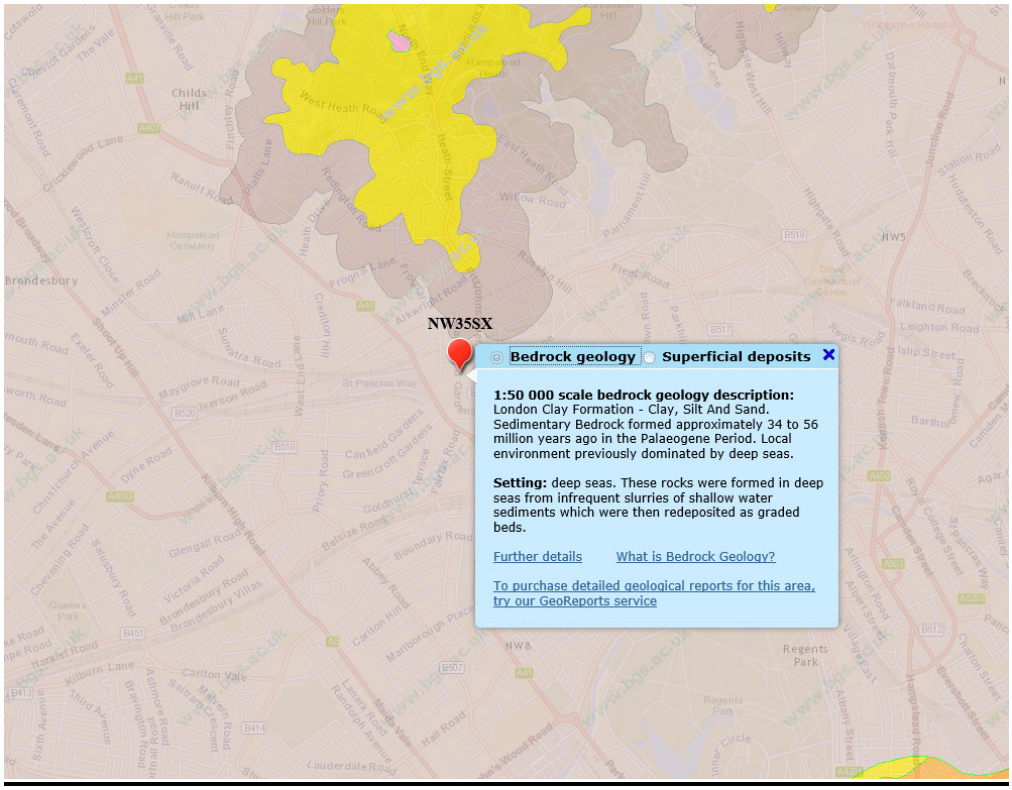


1886 Map, shows Marefield Gardens now developed, shading probably denotes housing starting to be built.



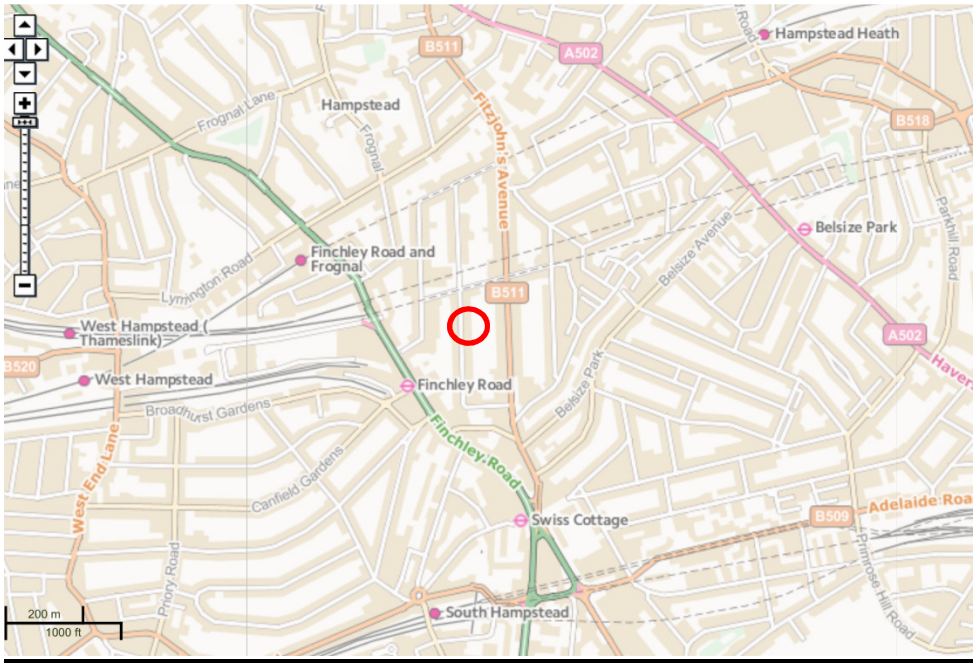
The 1908 map of London shows, by the shading, Marefield Gardens to be now developed. The general area has now developed also.

Geology



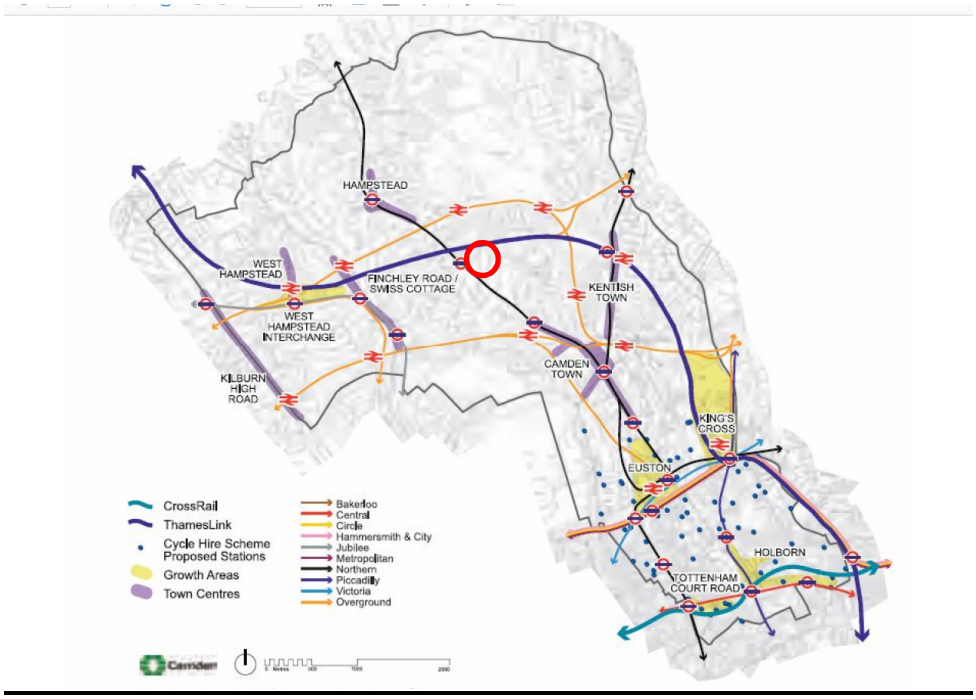
British Geological Science Viewer shows the site to overlay the London Clay Formation.

Flood Risk



E.A. map shows the site to not be in a flood risk area

Underground / Railway



From Figure 18, Arup Report, and from maps of the local area. The Thames link rail line runs west / east just directly to the north of the property. However the depth / proximity of the tunnel will not have any influence on the basement.

Other Utilities

Only utilities that cross the site are those which serve the dwelling, gas, water, electric. Telecom.

Refer also to Groundsure output in H. Frazer report.

STAGE 1 - SCREENING FOR BIA- Reference Camden Planning Guidance Basements and Lightwells

Figure 1. Subterranean (ground water) flow screening chart.

REFER TO H. FRAZER CONSULTING REPORT DATED SEPTEMBER 2016

Figure 2. Slope Stability Screening Flow Chart.

REFER TO GROUND AND PROJECT CONSULTANTS REPORT DATED SEPEMBER 2016.

Figure 3. Surface Flow and Flooding Screening Flowchart.

Q1. Is the site within the catchment of the pond chains on Hampstead Heath.
NO. Site is not within the catchment area of the pond chains on Hampstead Heath.

Q2. As part of the proposed site drainage will surface water flows be materially changed from the existing route?
NO. The existing surface water routes will not be changed by the development.

Q. 3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas.
NO. The development does not increase the impermeable paved areas.

Q4. Will the basement result in changes to the profiles of the inflows of surface water being received by adjacent properties or downstream watercourses.
NO. The development does not increase the impermeable paved areas.

Q5. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses.
NO. The presence of the basement structure will not alter the quality of the surface water.

Q6. Is the site in an area known to be at risk of flooding?
NO. Camden Planning Guidance does not list Marefield Gardens as being previously flooded.

Items to be Taken Forward to Stage 2 – Scoping

There are 4 items to be taken forward to the Scoping Stage, see Messrs. H. Frazer Consulting and Ground and Project Consulting reports.

STAGE 2 - SCOPING FOR BIA- Reference Camden Planning Guidance Basements and Lightwells

REFER TO H. FRAZER CONSULTING AND GROUND AND PROJECT CONSULTANTS REPORTS.

STAGE 3 - SITE INVESTIGATION AND STUDY- Reference Camden Planning Guidance Basements and Lightwells

The site is assessed as low risk.

A geological desk top study and a site specific Site Investigation has been completed by Messrs. Ground and Water. Site ground conditions are during investigation, however return investigation of standpipes has indicated groundwater levels at approx. 2.50m below ground level, these are likely to be 'perched' water levels.

Refer to Ground and Waters interpretive report.

STAGE 4 - IMPACT ASSESSMENT- Reference Camden Planning Guidance Basements and Lightwells

Attribute	Change from baseline	Comment
Geological / land stability	Nil	Ground is flat lying to rear of of property. Sub soils are the London Clay, described by site geotechnical engineer of having medium to high shrinkage capability. These soils are over consolidated and excavtion into this soil can cause over burden relief leading to heave of the clay at formation. Structural design of the basement will cater for this.
Hydrogeological	Nil to not significant	Site investigation did not reveal any water table down to 10.40m below garden level therefore new construction will be above any water table. See also H. Frazer report.
Hydrological (surface water)	Nil	There is negligible increase in impermeable area. The lightwell area replaces existing areas of hard standing.
Structural to own property	Nil	The existing foundations are formed onto the London Clay at about 0.80m below existing rear garden level. Walls common to new basement and existing property will be underpinned to new basement formation, with transition pins between the new and exsiting. Differential movement between the existing and new foundations will be insignificant.
Structural to neighbouring properties / highway	Nil / improve	'Structural design of the temporary and permanent structures will take into account loads from neighbouring properties.

The impact of the development is considered low and a full BIA is not considered necessary

STRUCTURAL DESIGN PHILOSOPHY

External Walls

New concrete walls below the property are designed as propped (at the base) cantilevers in reinforced concrete, the lower ground floor slab acting as the lateral prop at wall base level. The walls will be designed using the soil parameters relative to the site. The walls will be designed for a water table at 1.0m below ground level.

Remaining walls forming the basement will be designed as vertical spanning propped between the basement roof and base slabs.

The surcharge load allowed on the external walls of the property will be 10KN/m^2 . The party wall bounding will have a surcharge load of 10.00KN/m^2 for adjoining floor and partition wall construction and will also take into account any loads from adjoining foundations.

The roof slab will be designed for the soil and finish over and an imposed load of 5.00KN/m^2

Basement Slab

The slab will be formed in reinforced concrete. It will be designed for uplift due to water pressure or clay heave from below, or as a clear span as appropriate. The basement slab will act as a prop to the base of the basement walls. Ground floor slabs will be protected from heave by Cordek.

Design Criteria.

Basement walls and bases will be designed using the parameters for the retained soils and bearing soils as indicated by the Site Investigation.. The design is in accordance with BS 8002:1994.

The design will accomodate active and passive earth pressures. Pressure coeficients in the design will adopt ' at rest pressures'.

The wall and base in designed for the following

1. Vertical loads from walls above.
2. Party wall will be designed for a surcharge loading of 10kN/m^2.
3. Other external will be designed with a surcharge load of 10.00KN/m^2.
4. The design adopts a water head behind the wall to 1.0m below ground level.

The sub soils at new lower ground floor formation level will be London Clay, an SBP of 125KN/m^2 will be used in the design to limit differential foundation movements.

Concrete will generally be grade RC35/45 and Class 1 to BRE Digest 363. Reinforcement will be grade 500N/mm^2.

Existing brickwork assumes 7N bricks in a lime mortar, CP.111 gives basic compressive stress for this makeup of 0.45N/mm^2, and therefore allowable bearing stress will be 0.45N/mm^2. Any bearings into existing external or party wall masonry will take account of this allowable stress.

Mortar will be class (ii) or (iii) as required.

Relevant Codes of Practice and British Standards

B.S. 8002	Code of Practise for Earth Retaining Structures
B.S. 8004	Code of Practice For Foundations
B.S. 6031	Code of Practice For Earthworks
B.S. 8110	Structural Use of Concrete
B.S. 5750	Structural Use of Steelwork in Buildings

PREDICTION OF DAMAGE TO ADJOINING PROPERTIES

Works to form the basement will have construction sequenced in short sections, in excavations to form the walls and bases all soil faces will be continually temporarily laterally or vertically propped to avoid movement of soil during the construction stage. Permanent works will be designed to resist both pressures from the soils or structural loads from nearby buildings as appropriate. Strict control of the construction method together with the structural design will limit any potential damage to the adjoining garage to categories 0 (nil) or 1 (slight) of the Burland Scale. Or none, or at worst, 'aesthetic' as described by the BRE document for movement in buildings.

Refer also to Ground and Water Ground Movement calculations.

BRIEF METHOD STATEMENT FOR CONSTRUCTION .

The exact sequence of works will be agreed with Main Contractor and Structural Engineer, clauses for a typical Contruction Method Statement for the works could be as follows.

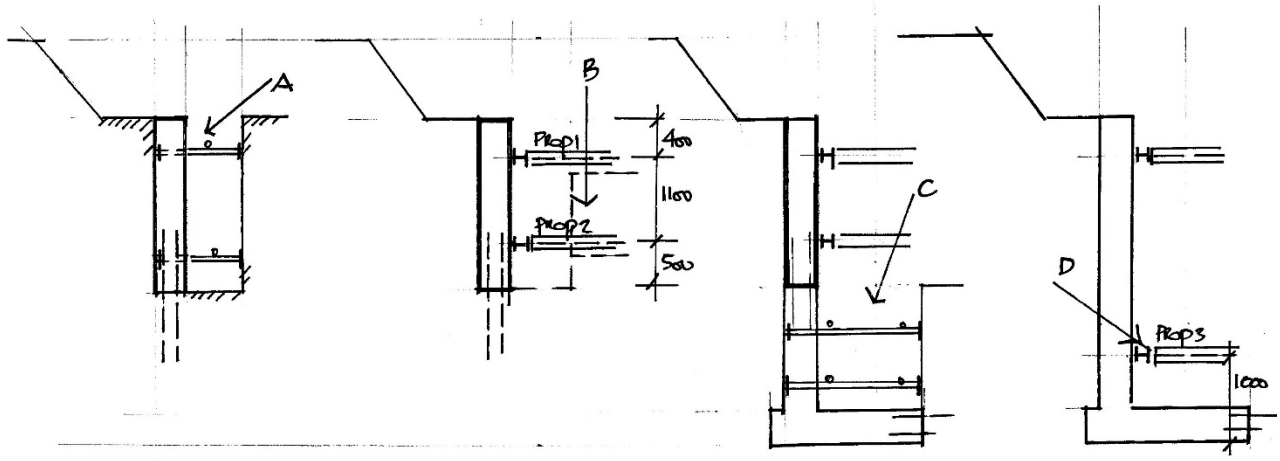
a) The walls to the perimeter of the existing rooms will be underpinned in reinforced concrete. Underpins will take the vertical loads from the walls and horizontal loads from the earth. During their construction the walls and bases will require laterally propping in the temporary condition; propping will be made against the central earth pudding.
b) Underpinning legs will be excavated in short sections not exceeding 1200mm in width.
c) The sequence of the underpinning will be in the 1, 3, 5, 2, 4 sequence and such that any given underpin will be completed, dry packed, and a minimum period of 48 hours lapsed before an adjacent excavation commenced to form another underpin.

d) In the event that the existing foundations to the wall are found to be unstable, sacrificial steel jacks will be installed underneath the foundation to prop the bottom few courses of bricks. These steel jacks will be left in place and will be incorporated into the concrete stem.
e) Whilst forming the wall and in the event that the vertical soil face is unstable, lateral propping will be provided as required to the excavation and to the sides of the working trench. The front and side faces of the excavation will be propped using a sacrificial inert board and acrow props as appropriate.
f) Concrete will be chuted from the point of delivery into a 'holding bath' within the working areas and placed by wheelbarrow and /or bucket, or mixed on site. The exact arrangement will be finalised when works commence on site.
g) Concrete will be placed within 30 minutes of batching on site, or delivery by lorry, concrete will be compacted with a mechanical hand held vibrator.
h) Excavation for an underpin section will be excavated in a day, and the concrete to the base poured by the end of the same day.
i) The concrete to the wall of the underpin will be poured the following day. This will be poured up to within 50 – 75mm of the underside of the existing wall foundations.
j) On the following day, the gap between the concrete and the underside of the existing foundation will be dry packed with a mixture of sharp sand and cement (ratio 3 : 1).
k) Once the dry pack has gained sufficient strength, any protrusions of the footings into the site will be carefully trimmed back using hand tools to avoid causing any damage to the foundation. The protrusions will be trimmed back to be flush in-line with the face of the wall above.
l) A minimum of 48 hours will be allowed before adjacent sections will be excavated to form a new underpin.
m) Once all pins are complete a temporary cross propping system will be introduced between the walls to allow bulk excavation will be carried out down to formation level.
n) The below – slab drainage for foul & ground water, sumps and pumps will then be installed. The pumps will discharge the foul / ground water into the sewer system to the front of the properties. The drainage layout will be designed in due course.
o) The basement slab will then be constructed, once cured this will provided the designed propping to the walls and the temporary cross propping can be removed.
p) A cavity drainage layer will be laid to the slabs and walls.

CONSTRUCTION SEQUENCE

1. Site set up will include a hoarding to the front garden; placement for skips will either be made within the front garden or on the public highway subject to Camden approval.
2. The site is only accessible from Marefield Gardens, and therefore all site deliveries and operations will take place from here. This entrance will be manned throughout operational hours by a banksman to ensure construction deliveries do not pose a risk to other users of Marefield Gardens
3. Construct site hoarding, entrance gates to provide protection to passers-by from site operations. Site accommodation including welfare facilities will be confined to the main building throughout the site works.
4. Terminate / protect any incoming services temporarily divert any active drainage.
5. Install any tree protection measures as necessary.
6. Install enclosed skip to front on property and install conveyor to remove excavated soil to discharge soil into skip.

7. Construction under the property and garden will commence by reducing ground levels to just above existing foundation formation.



A; Reduce levels and excavate trench to form r.c. wall. Laterally prop trench sides. Fix rebar and shutter concrete wall.

B; Reduce ground levels in sequence and fix lateral propping systems, prop 1 and prop2.

C; In sequence underpin formed wall (drive 2) propping sides of excavation.

D; Reduce level and fix props 3, remove props 2. Reduce to formation.

8. Underpins will be carried out in the usual 1, 3, 5, 2, 4 underpinning sequence, the construction sequence for forming the pin is shown on the Vincent & Rymill drawings submitted for planning. Backfilling of the excavation will be made after each pin has been formed.
9. The first drive in the garden area will be formed as a reinforced concrete wall formed in a trench. Walls can be formed up to say 3.00m long. The second drive will then be formed in sequence under the wall in lengths not exceeding 1200mm.
10. The wall will be formed in two drives, vertical joints between the 1st and 2nd drive pins will be staggered on plan. A thickening will be formed at the back of the first drive.
11. Each underpin excavations will require lateral propping to the rear and to the sides of the excavated working trench. The front and side faces of the excavation will be propped using steel trench sheeting. Props will be Acrow trench props as suitable and appropriate. Sacrificial trench sheets, or non-compressible inert boards will be used to the rear face of the excavation as necessary, these sheets being compressed against earth face by adjustable props to ensure there are no voids behind the sheets.
12. Concrete forming the permanent works will be grade RC35/40 and will generally be ready mixed delivered to site. Some areas that only require small volumes of concrete may use a site hand batched mix. Ready mixed concrete will be pumped directly into the form. Concrete will be compacted in the form using a hand held mini vibrating poker.
13. Continuity reinforcement will be fixed into the sides of the form. Reinforcement will be driven into the side of the form to provide reinforcement continuity to the adjacent section to be cast later
14. The concrete to the stem of the 1st drive underpin will be be poured up to within 50 – 75mm of the underside of the existing wall foundations.
15. On the following day, the gap between the concrete and the underside of the existing foundation will be dry packed with a mixture of sharp sand and cement (ratio 3 : 1).

16. The horizontal construction joint between the first and second underpin drives will either be formed by a) the concrete of the following level of underpins being placed by flooding up to the underside of the preceding level underpins or, b) by leaving a roughly 50mm gap and using dry pack with a waterproof additive. If flooded, the underside of the preceding level underpin will be broken away to give a slight angle inwards and the following drive underpins using a bird beak chute to increase pressure of the concrete during placement, and
17. A proprietary concrete waterproofing product will be applied to the underside of the first drive underpins. This product seals construction joints by reacting with water ingress through cracks or joints to grow waterproof crystals. This produce will seal cracks of 0.5mm width.
18. In either method the upper 30mm of the exposed vertical reinforcement from the first drive will have high build waterproof black paint applied to protect the reinforcement from rusting.
19. Vertical reinforcement shall continue across all horizontal joints as described on the drawings. Continuity reinforcement will be same diameter and spacing as shown on the drawings and shall have minimum lap lengths of 45 bar diameters,
20. Once the dry pack has gained sufficient strength, any protrusions of the footings into our site will be carefully trimmed back using hand tools to avoid causing any damage to the foundation. The protrusions will be trimmed back to be flush in-line with the face of the wall above.
21. A minimum of 48 hours will be allowed before adjacent sections will be excavated to form a new underpin.
22. Bulk excavation will be carried out down to basement slab formation level. Muck will continue to be removed from site via the conveyor belt.
23. The below – slab drainage for foul & ground water, sumps and pumps will then be installed. The pumps will discharge the foul / ground water into the sewer system to the front of the properties. The drainage layout will be designed in due course.
24. The basement slab (ground – bearing slab) will then be constructed.
25. After the new basement slabs have cured, the cross propping will be removed.
26. A drained – cavity layer will be laid to the slabs and walls.

T. J. Vincent

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1 Sept 2016