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Engineering - materials, energy, structure

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9 Parkhill Road

Basement Impact Assessment

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1. Introduction

It is proposed to lower the floor of an existing lower ground floor room by 400 mm and extend this outward and create a new external lightwell in the garden.

Ecos Maclean has been instructed to carry out a Basement Impact Assessment (BIA) to assess the potential impact on surrounding structures, hydrology and hydrogeology. The report has been reviewed and approved by the Principal Engineer at Ecos Maclean – Nick Maclean who has over forty years' experience as a practicing structural engineer in London and has extensive experience with basement construction in Camden. The report and project has been further reviewed and checked by Roger Gulhane MICE a chartered Engineer with extensive experience in structural and geotechnical matters and practices extensively in north west London. The summary of expertise is given at Appendix 1.

Camden Planning Guidance CPG4 Basements & Lightwells [1] requires that the impact of any new basement development in the borough be assessed according to the following 5 stages:

1. Screening
2. Scoping
3. Site investigation
4. Impact assessment
5. Review and decision making

This report is intended to address the screening, scoping, site investigation and impact assessment processes set out in CPG4 and the Camden geological, hydrogeological, and hydrological study (CGHHS) [2]. The screening process identifies key issues relating to land stability, hydrogeology and hydrology to be considered as part of any proposed basement development.

This report also provides an assessment of geotechnical impacts on adjacent structures and the surrounding area based on available site investigation data. This includes design checks of proposed and existing retaining walls below existing structure, and a damage assessment to predict the impact on adjacent properties.

The proposed basement will extend approximately 0.5 metres below the existing property ground floor level. In preparing this BIA a thorough review of published and unpublished sources of information on Geology, Hydrogeology, Hydrology and Flood Risk has been undertaken.

2. Site Context

2.1 Site Location

The site is located at 9 Parkhill Road. The site location is shown in figure 1.



Figure 1: Site location plan

2.2 Site Layout

The property is a detached dwelling with a side extension which abuts the party wall of No 11 Parkhill Road, the rear lightwell will abut and mirror a lightwell in the garden of No 11. The rear garden is enclosed by shrubs and fruit trees.

2.3 Proposed Development

Development plans and elevations, showing the site with existing and proposed condition, are included in main planning application submission. The structural details of the underpinning and typical retaining wall details are provided in Appendix 2. The project is to deepen the existing lower ground floor by approx 500mm of excavation beside the existing mass concrete underpin of the party wall. The lower ground floor will be extended under the existing glazed rear extension which will then be at the same level as the neighbouring property's sunken garden. In front of the newly extended lower ground floor will be a lightwell which has an external masonry steps running up to ground level beside the neighbour's garden. The extended lower ground floor, lightwell and

stairs are away from the neighbour's party wall and beside an existing sunken garden and so has minimal potential structural impact. A series of short sections in Appendix 2 show the relationship of the proposed excavation to the neighbouring property.

2.4 Site History

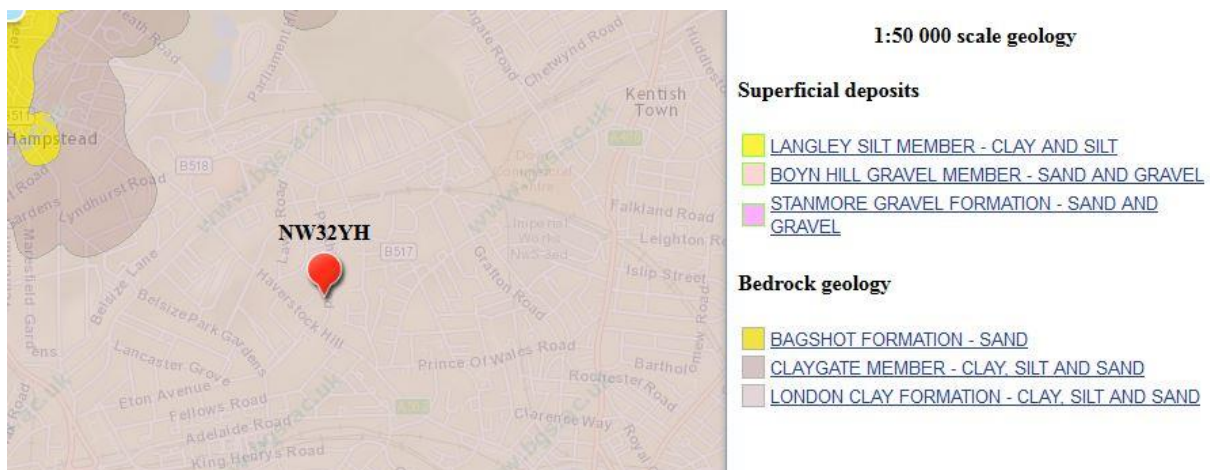
Maps of the site dating from 1871 have been reviewed and show the site has been part of a residential setting since that date and also show Parkhill Road in its present day alignment. The general arrangement of the residential dwellings along Parkhill Road has not changed since that date.

2.5 Topography

The site lies at an elevation of approximately 50mOD, is level and covers an area of 100 sq. m. Parkhill Road at this point follows the contour and the rear gardens to the west in which the property is located are approximately level with road level.

2.6 Published Geology

The British Geological Survey (BGS) of the area indicates the site to be underlain by the London Clay Formation. The London Clay Formation is an over consolidated firm to very stiff, becoming hard with depth, fissured, brown to grey silty clay of low to very high plasticity.



2.7 Published Geology and Site Investigation

There are two boreholes records within 100m of the site boundary and so a borehole investigation was commissioned. One from 1946 lacks sufficient precision to be relied upon. The other borehole report recovered from the British Geological Survey online resource is summaries below.

Table 1: Summary of published Borehole record – TQ 28SE1159

Stratum	Depth (m)
MADE GROUND	0 to 0.5 metres
Soft Orange brown silty sandy clay	0.5 to 1.1 metres
Stiff brown clay	1.1 to 4.0 metres
END	4.0

A site investigation was also commissioned and undertaken on 18th Feb by Site Investigations Ltd. The factual report and borehole log is enclosed as an annex to this report and the results summarised in the table below.

Table 2: Results of Borehole investigation from 18 Feb 2015 by Site Analytics

Stratum	Depth (m)
MADE GROUND	0 to 0.64
Stiff brown clay	0.64 to 1.2
Very stiff Brown clay	1.2 to 3.4
END	3.4

Access to the rear garden was only possible through the garden and so the borehole had to be made using a hand auger. For this reason the borehole investigation was not able to go beyond 3.4 metres in depth.

The borehole investigation identified the presence of London Clay Formation around the site, the geological properties of which have been widely studied and are well known [2]. Further borehole investigations are therefore deemed unnecessary. The full report from Site Analytics is included as a separate supporting document for this BIA.

2.8 Hydrogeology

The Environment Agency (EA) has classified the site location as unproductive strata. The borehole investigation included analysis for the presence of ground water. The factual report identified the presence of groundwater at 2 metres but this was considered moderate and no rising was recorded. The site is not within any groundwater source protection zones

2.9 Hydrology

The site is not located close to any rivers or drainage channels serving the borough of Camden. The garden is elevated from the road and protected from the road by the side extension. This forms a barrier for surface water flows and so the site is not vulnerable to surface water flooding.

2.10 Flood risk

With reference to the Environment Agency website Parkhill Road is not within a flood risk zone.

3. SCREENING

3.1 Subterranean (ground water) flow screening - Fig 1 [1]

	Question	Response	Justification	Reference
1a	Is the site located directly above an aquifer?	No	The site is located on unproductive strata as defined by the Environment Agency with low permeability that has negligible significance for water supply or river base flow.	Fig. 8 CGHH
1b	Will the proposed development extend beneath the water table surface?	No	The water table is below the impermeable clay which is below the level of the basement excavations	Table 1 Borehole Data
2	Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	No	Evidence from maps and site walk over shows that there is no record or evidence of a well or spring line	Fig. 8, 11 and 12 CGHH [5] [6]
3	Is this site within the catchment of the pond chains on Hampstead Heath	No	Evidence from Map	Fig. 14 CGHH
4	Will the proposed development change the proportion of hard surfaced/paved areas?	No	The basement will occupy the footprint of the existing conservatory and the new lightwell will be surfaced with a permeable substrate	Appendix 1
5	As part of the site drainage, will more surface water than at present be discharged to the ground (e.g. via soak ways and/or SUDS)?	No	The plans show that the area of existing and proposed impermeable surface will not increase.	Appendix 1
6	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	The site is a long way from ponds or any spring lines.	Fig. 11 and 12 CGHH

3.2 Slope stability screening - Fig 2 [1]

	Question	Response	Justification	Reference
1	Does the existing site include slopes, natural or manmade, greater than 7°? (approximately 1 in 8)	No	The slope of land around the site is less than 7°.	Site survey Fig. 16 CGHH [7]
2	Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7°?	No	The slopes at the property boundary will be unaffected by the development.	Appendix 1
3	Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°?	No	Evidence from site location plan	
4	Is the site within a wider hillside setting in which the general slope is greater than 7°?	No	Evidence from site plan and site walk over	
5	Is the London Clay the shallowest strata at the site?	Yes	Evidence from BGS geology map	Fig. 2 CGHH
6	Question 6: Will any tree/s 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	Evidence from site walk over	
7	Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?	No	There is no evidence to suggest any history of shrink-swell subsidence from inspection of the property and neighbouring properties	
8	Is the site within 100m of a watercourse or a potential spring line?	No	Evidence from maps and site walk over	Fig. 8, 11 and 12 CGHH [5] [6]
9	Is the site within an area of previously worked ground?	No	Evidence from maps and site walk over	[8]
10	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?	No	The site is situated on unproductive strata with negligible permeability that has a negligible significance for water supply or river base flow	Fig. 8 CGHH
11	Is the site within 50m of the Hampstead Heath ponds?	No	Evidence from map	Fig. 2 CGHH

12	Is the site within 5m of a highway or pedestrian right of way?	No	The front of the building is set back from the highway	
13	Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	No	The foundation of the deepened and enlarged lower ground floor will extend less than 1 metre below the foundations of the party wall with No 11. The foundation of the lightwell wall will be at the same level as the lightwell in the garden of No 11.	Plans from previous side extension showing mass concrete underpin
14	Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	No	Evidence from location map	

3.3 Surface flow and flooding screening - Fig 3 [1]

	Question	Response	Justification	Reference
1	Is the site within the catchment of the pond chains on Hampstead Heath?	No	Evidence from location map	Fig. 14 CGHH
2	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	Site drainage will be channelled along the existing routes.	Appendix 1
3	Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?	No	The basement will occupy the footprint of the existing conservatory and the new lightwell will be surfaced with a permeable substrate	Appendix 1
4	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	Evidence from plan of existing and proposed	Appendix 1
5	Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	No	Existing surface water drainage arrangements will be maintained	Appendix 1
6	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?	No	Evidence from location map	Fig. 14 CGHH

Table 5: Surface Flow and Flooding Screening

4. SCOPING

4.1 Introduction

This section of the report covers the scoping process of the BIA, which is used to identify potential impacts of the proposed scheme on the groundwater, slope stability and surface water flow identified as risks in the screening stage. The scoping stage also informs the scope of any necessary site investigations and is used to establish a Conceptual Site Model (CSM).

4.2 Groundwater

The screening questions and the site investigation report found no evidence of ground water and the design is too shallow to impact on the ground water below the overlying London Clay formation.

Any water encountered on site will therefore be surface water and is dealt with in the surface water scoping below.

4.3 Slope Stability

The shallowest strata at the site is London Clay which is known to be a consolidated clay formation and is therefore subject to some changes in volume when excavating. The potential impact of excavating is the possibility of volume changes causing movement and cracking of existing structures. However, the site is not into the over-consolidated London Clay, merely the 'weathered' brown London Clay which has no significant potential for volume change that might affect the adjoining structures or this new structure.

4.4 Surface Water Flow and Flooding

It was found in the screening stage that is no risk of flooding or history of flooding in Parkhill Road. The quantity or quality of surface water flows will be unaffected by this scheme and so existing arrangements for surface water drainage will be maintained to drain the site.

4.5 Consultation with local residents

In early February 2015 a letter and a copy of the plan was sent to the immediate neighbour at No 11 Parkhill Rd and the freeholder and leaseholders at No. 9 and they were invited to comment on the proposed development. No comments were received. A dialogue will be maintained during the planning of the project and the details agreed as part of a Party Wall Agreement with these neighbours.

4.4 Conceptual Site model

A conceptual site model before and after the proposed development has been formed based on a thorough investigation of the site and the surrounding area, in accordance with the recommendations of the Camden geological, hydrogeological, and hydrological study it is summarised in sections 4.5.1 and 4.5.2 below.

The site is located in the London Borough of Camden on Parkhill Road. Below the main ground is the London Clay Formation assumed to be at least approximately 25 M thick, designated by the Environment Agency as unproductive strata in terms of ground water flow. The water table lies at least 25m below the current level of the site.

Hard surfacing is the predominant surface covering in the local area apart from the gardens to the west of the property. The majority of rainfall incident on the surrounding area will run-off into local guttering and drainage system surrounding the site, with a proportion evaporating, a small proportion retained in the soil and root layer, and a very small proportion being absorbed by the London Clay.

The property and the neighbouring properties are constructed on shallow stepped or corbelled foundations underpinned at the party wall with No. 11 with mass concrete.

4.5.1 Existing

1. Made Ground to 1 metre depth
2. The London Clay Formation below Made Ground to at least 25 m depth.
3. Rainwater is channelled as surface run-off into the main drainage system, with a small proportion being evaporated.
4. Vertical load from party wall between No 9 & 11 Parkhill restrained by mass concrete underpinning

4.5.2 Proposed

1. Excavation of approx. 2m of London Clay from below existing glazed extension.
2. Lowered ground floor occupies the footprint of the existing property.
3. Rainwater is channelled as surface run-off into the main drainage system, with a small proportion being evaporated.

5. Site Investigations

5.1 Geotechnical Information

It is not considered necessary to carry out further borehole investigation; the borehole investigation gives sufficient information for the lightwell wall and underpinning to be designed.

5.2 Subterranean (Groundwater) Flow

The site is located above London Clay which presents an almost complete barrier to groundwater. The development will have a negligible impact on the groundwater flow as the site is identified as being unproductive strata. British Geological Survey boreholes in the local area indicate that the water table is at least 25m below the level of Parkhill Road.

It is concluded that the proposed development will have no detrimental effects on the subterranean water flow and risk mitigation measures are not required.

5.3 Slope (Land Stability) Assessment

Adjacent Structures

The adjacent property is known to be founded on mass concrete underpin. The introduction of a lowered floor has no potential to have a structural impact on the neighbouring properties because of the existing structure and the shallowness of the additional excavation.

Damage Category Assessment

The construction scheme as currently envisaged to will ensure that there is negligible risk of cracking (Burland Category - 0) or other potential damage that may be caused to neighbouring structures and infrastructure.

5.4 Surface Flow and Flooding

Parkhill Road is outside the EA flood risk zone. The basement will be protected from water ingress by internal tanking and a drained cavity which are to be specified by the architect. All the surface run-off from the garden can be transmitted to the existing drainage by gravity

6. Impact Assessment

The findings of this Basement Impact Assessment are informed by site investigation for the site and structural drawings and calculations. The screening stage identified no significant issues for further investigation. The site has been investigated through desk study, site walk over and site investigation and no issues have been identified.

The report has been prepared and reviewed by two engineers with many decades of experience with structural engineering and engineering geology and the site investigation undertaken by a practice with a Mr A Smith of Site Analytics who is a FGeog.

The development is also modest in scope, being shallow and a small additional area and so it is considered that the proposed development will not have a detrimental effect on groundwater or surface flooding in the vicinity of the site. The construction of the basement will not generate ground movements or impacts on the adjacent properties.

7. References

1. Camden Planning Guidance, CPG4, Basements and Lightwells, Sept 2013.
2. Advance Laboratory Characterisation of London Clay, Apollonia Gasparre, July 2005
3. Environment Agency, Risk of Flooding from Rivers and Sea, February 2013.
4. Ove Arup and Partners, Camden geological, hydrogeological, and hydrological study. Guidance for subterranean development, November 2010.
5. Environment Agency, Drinking Water Protected Areas, February 2013.
6. BGS Onshore Geoindex – Water Wells, February 2013.
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9. Burland, J.B., and Wroth, C.P. (1974). *Settlement of buildings and associated damage*, State of the art review. Conf on Settlement of Structures, Cambridge, Pentech Press, London, pp611-654
10. Boscardin, M.D., and Cording, E.G., (1989). *Building response to excavation induced settlement*. J Geotech Eng, ASCE, 115 (1); pp 1-21.
11. Burland, Standing J.R., and Jardine F.M. (eds) (2001), *Building response to tunnelling, case studies from construction of the Jubilee Line Extension London*, CIRIA Special Publication 200.

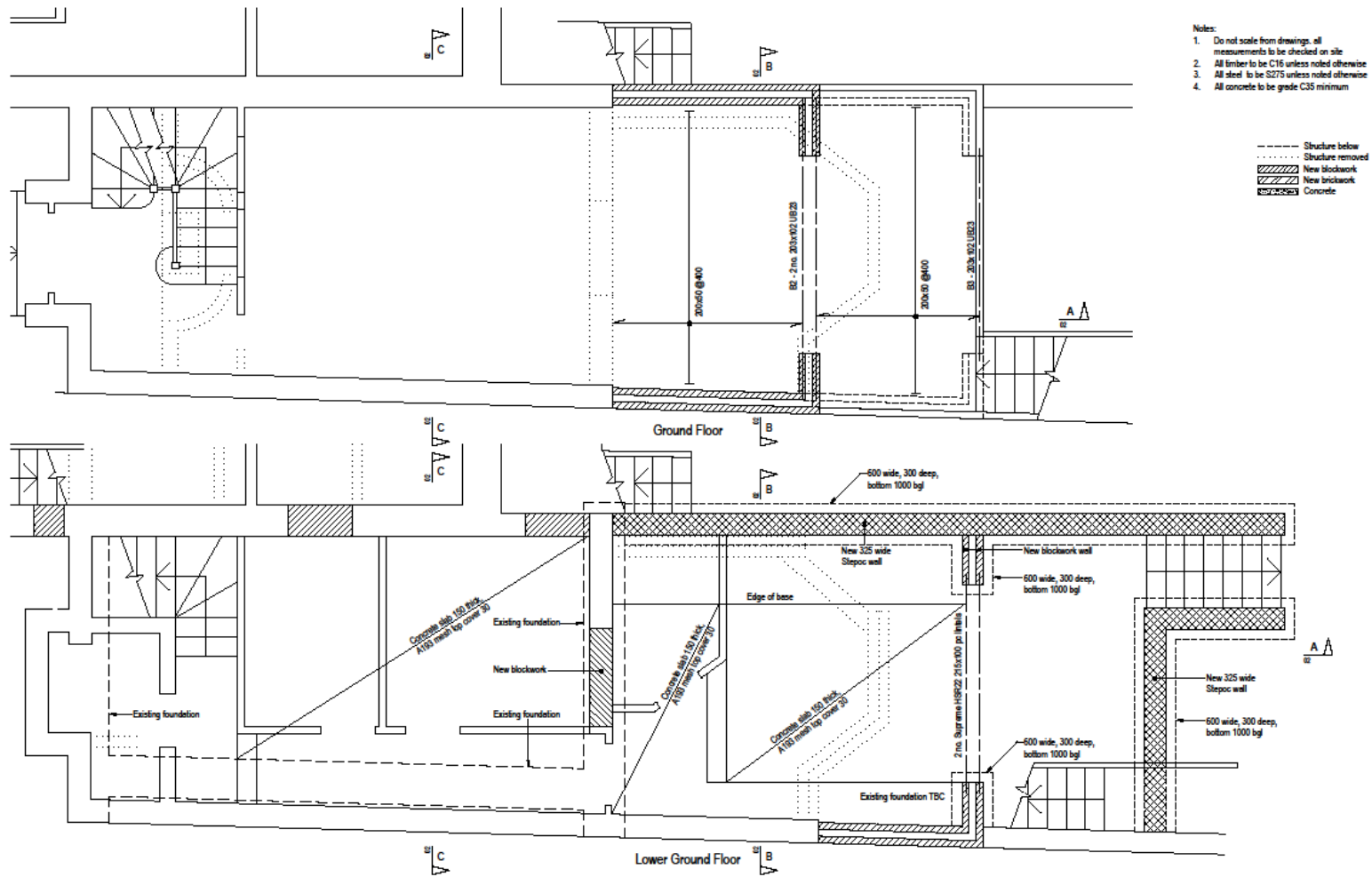
Appendix 1 - The Engineer

Nick Maclean an engineer with over 40 years of experience has approved the basement impact assessment. He has above average experience of basements, commencing with being the Assistant Resident Engineer on the Barbican Arts Centre Site in 1973, ie 40 years, specifically tasked there with investigating and overseeing remedial works to the myriad defects in retaining walls and 1.5m thick cross site, jacked prop walls, which defects delayed the project for so long. This basement was up to 30m below street level, below the piled foundations of the adjacent 140m high Tower Blocks and the adjacent Metropolitan & Circle line tunnels.

Additionally, he has in the last 28 years in Private Consultancy been involved in numerous basements in Camden and other Inner London Boroughs, with two under construction presently and three in the design phase. Additionally he is active acting as checking engineer for Party Wall Matters on two basements where his intervention to refine the design is resulting in less excavation and steel.

Roger Gulhane MICE – an engineer in private practice for two decades having previously been a chartered engineer in Ove Arup specialist structures division. His practice is based in Camden and has worked on several basement projects in North London in the last decade.

Appendix 2 - Engineering design



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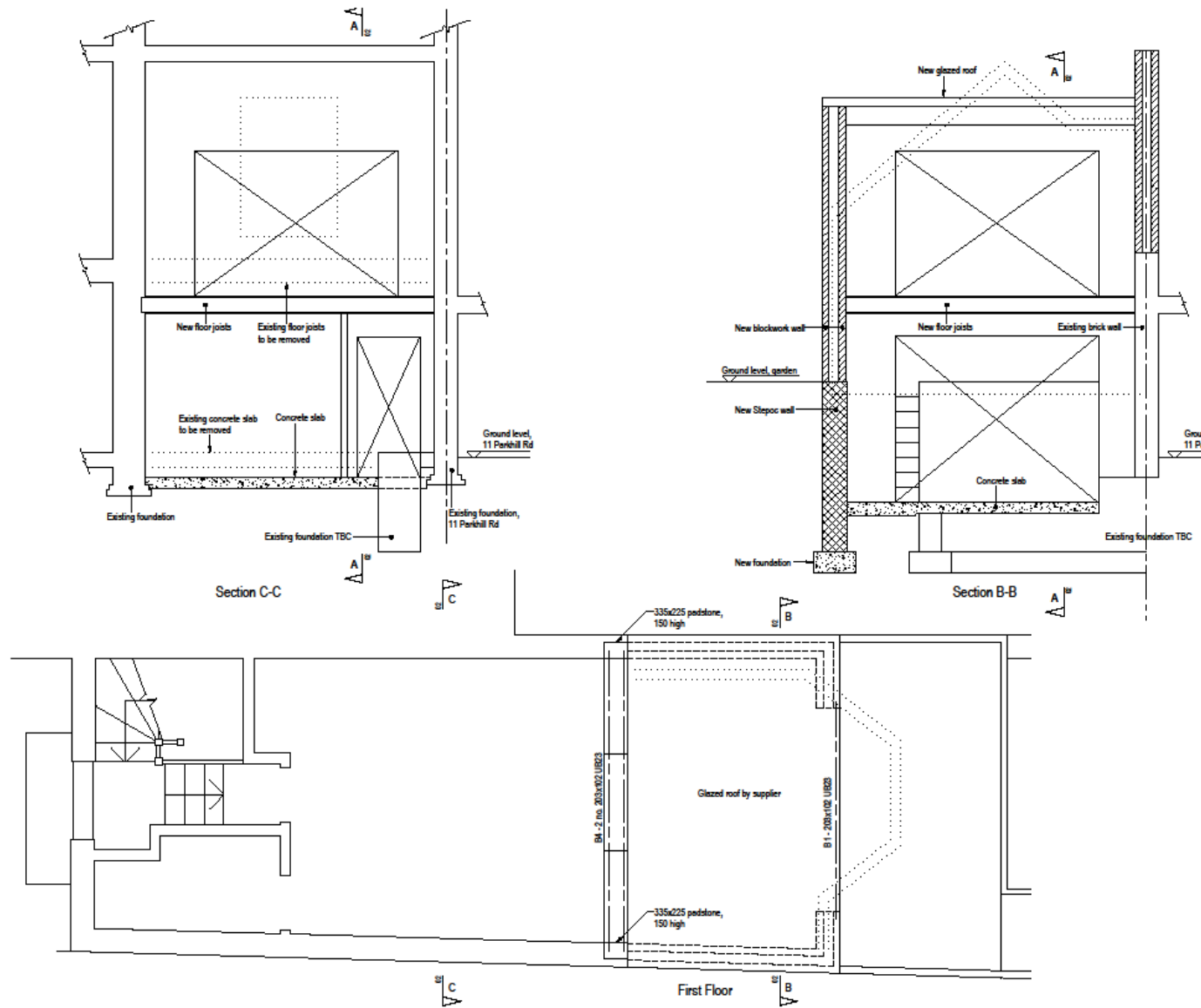
9 Parkhill Rd
 NW3 2YH

Lower Ground and Ground
 Floor Plans - Proposed

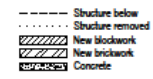
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Date	Jan 2015	Drawn by	JGS	Checked	NDM
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				Revision	01



- Notes:
1. Do not scale from drawings, all measurements to be checked on site
 2. All timber to be C16 unless noted otherwise
 3. All steel to be S275 unless noted otherwise
 4. All concrete to be grade C35 minimum

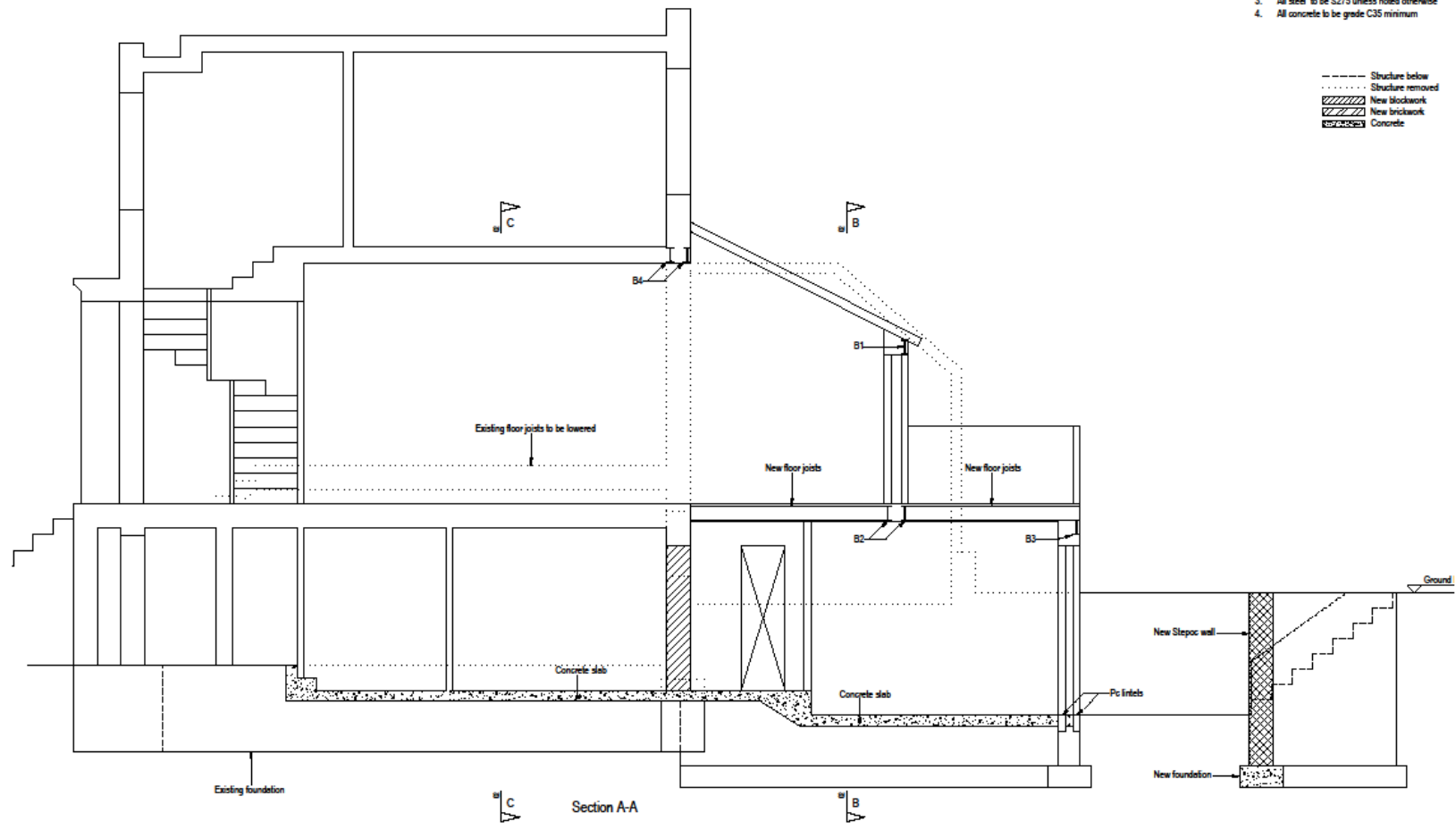


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01	29/02/15	JG	Section C-C added
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9 Parkhill Rd NW3 2YH			
Lower Ground and Ground Floor Plans - Proposed			
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NDM		Revision	01
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- Structure below
- Structure removed
- //// New blockwork
- \\\\\\ New brickwork
- |||| Concrete



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Section A-A
 Proposed

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