

**6 Parsifal Road
NW6 1UH**

**Basement Impact Assessment
Audit**

For
London Borough of Camden

Project Number: 12727-28
Revision: F1

February 2018

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F1	16/02/2018	Comment	JBrm12727-28-160218-6 Parsifal Road-F1.doc	JB	RM	RM

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Document Details

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Project Number	12727-28
Project Name	6 Parsifal Road, NW6 1UH
Planning Reference	2017/6647/P

Contents

1.0 Non-technical summary 1
2.0 Introduction 3
3.0 Basement Impact Assessment Audit Check List..... 5
4.0 Discussion 8
5.0 Conclusions 11

Appendix

- Appendix 1: Residents’ Consultation Comments
- Appendix 2: Audit Query Tracker
- Appendix 3: Supplementary Supporting Documents

1.0 NON-TECHNICAL SUMMARY

- 1.1. CampbellReith was instructed by London Borough of Camden, (LBC) to carry out an audit on the Basement Impact Assessment submitted as part of the Planning Submission documentation for 6 Parsifal Road, NW6 1UH (planning reference 2017/6647/P). The basement is considered to fall within Category B as defined by the Terms of Reference.
- 1.2. The Audit reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development in accordance with LBC's policies and technical procedures.
- 1.3. CampbellReith was able to access LBC's Planning Portal and gain access to the latest revision of submitted documentation and reviewed it against an agreed audit check list.
- 1.4. The BIA and SSR have been carried out by established firms of engineering consultants using individuals who possess suitable qualifications.
- 1.5. The proposal consists of lowering an existing partial basement level and extending it beneath the entire footprint of the existing building to a depth of between 2.30 and 2.50m below ground level.
- 1.6. The basement is proposed to be constructed of reinforced concrete utilising conventional basement construction methods. Suitable temporary works details have been provided.
- 1.7. A site investigation was carried out which has identified a made ground overlaying London Clay. Ground water was recorded at a moderately shallow depth.
- 1.8. Outline structural calculations have been provided to demonstrate the feasibility of the proposal.
- 1.9. A ground movement assessment has been produced that indicates an anticipated worst case damage category of 1 which is based on reasoned assumptions.
- 1.10. A proposed monitoring statement is provided.
- 1.11. It has been identified that the basement may be constructed beneath the ground water level, temporary works details are provided that take account of this.
- 1.12. It is accepted that the proposed basement is unlikely to significantly impact ground water flows.
- 1.13. The BIA advises the development proposal will not increase the impermeable areas of the site at surface level from the current situation. This is accepted.

- 1.14. It can be confirmed that the BIA has demonstrated adherence to the requirements of CPG4. A summary of closed queries can be found in Appendix 2.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 04/12/2017 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 6 Parsifal Road, London, NW16 1UH and 2017/6647/P.

2.2. The Audit was carried out in accordance with the Terms of Reference set by LBC. It reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development.

2.3. A BIA is required for all planning applications with basements in Camden in general accordance with policies and technical procedures contained within

- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.
- Camden Planning Guidance (CPG) 4: Basements and Lightwells.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water.
- Local Plan Policy A5 Basements.

2.4. The BIA should demonstrate that schemes:

- a) maintain the structural stability of the building and neighbouring properties;
- b) avoid adversely affecting drainage and run off or causing other damage to the water environment;
- c) avoid cumulative impacts upon structural stability or the water environment in the local area, and;

evaluate the impacts of the proposed basement considering the issues of hydrology, hydrogeology and land stability via the process described by the GSD and to make recommendations for the detailed design.

2.5. LBC's Audit Instruction described the planning proposal as "*Conversion of lower ground floor garage to habitable room and lowering of existing basement floor by 340mm; excavation of existing crawlspace to the rear to create additional basement room; alterations to front façade at lower ground floor level (replacement of garage doors with new windows, demolition of small single storey front extension and installation of new timber door); and repaving of front driveway.*

The Audit Instruction also confirmed 6 Parsifal Road did not involve or was a neighbour to listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 22 January 2018 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment Report (BIA) Rev 2 by Croft Structural Engineers dated September 2017;
- Ground Investigation & Basement Impact Assessment (BIA) Rev 1.01 by Ground & Water dated November 2017 and non-technical summary;
- Planning Application Drawings consisting of
Site Location Plan dated December 2009

Existing Plans and Sections 1.01, 1.02, 1.03 and 1.04 dated December 2017

Proposed Plans and Sections 2.01, 2.02, 2.03 and 2.04 dated December 2017
- Design & Access Statement dated November 2017
- 1x Response – Thameswater (Redacted)

2.7. Following the D1 issue of this report an addendum was received via email from Croft Structural Engineers on 14/02/18, which contained further information relating to the assumptions made in the ground movement assessment. This has been included in appendix 3 of this audit report.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	
Is data required by Cl.233 of the GSD presented?	Yes	
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	
Are suitable plan/maps included?	Yes	
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Is a conceptual model presented?	Yes	
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Is factual ground investigation data provided?	Yes	
Is monitoring data presented?	Yes	
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	
Is a geotechnical interpretation presented?	Yes	
Does the geotechnical interpretation include information on retaining wall design?	Yes	
Are reports on other investigations required by screening and scoping presented?	Yes	
Are the baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	N/A	The presence of neighbouring basements has not been discussed.
Is an Impact Assessment provided?	Yes	
Are estimates of ground movement and structural impact presented?	Yes	

Item	Yes/No/NA	Comment
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	
Has the need for monitoring during construction been considered?	Yes	
Have the residual (after mitigation) impacts been clearly identified?	No	None anticipated.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	
Are non-technical summaries provided?	Yes	Though missing residual (after mitigation) impacts.

4.0 DISCUSSION

- 4.1. The Basement Impact Assessment (BIA) comprises two reports prepared by Ground & Water Limited (G&W) covering the hydrogeological, hydrological aspects, and by Croft Structural Engineers (CE) covering the stability aspects of the proposal. Architectural drawings are provided by Stephen Fletcher Architects.
- 4.2. The qualifications of the author of the BIA and the associated reports are in compliance with the requirements of CPG4.
- 4.3. 6 Parsifal Road is an existing semi-detached four storey residential building with a partial basement under the northern part of the building. A garden is located to the rear of the property. The property is located in a residential area with No. 4 Parsifal Road to the west and No. 8 Parsifal Road, the attached property, to the east.
- 4.4. The proposed basement consists of a single storey construction formed by lowering an existing lower ground floor area beneath the front of the building by 300mm and extension of the basement/ lower ground floor to the rear of the property. The basement is anticipated to be formed at between 2.30 and 2.50m bgl.
- 4.5. The basement is proposed to be constructed of reinforced concrete underpinned cantilever retaining walls with a suspended basement RC slab. Where the basement is to be lowered by 300mm the proposed basement slab is to underpin the existing foundation without a cantilever stem.
- 4.6. A site specific site investigation was carried out comprising a single windowless sampler to a depth of 10mbgl along with gas and groundwater monitoring well to 5mbgl, with ground water monitored during a single repeat visit. Foundation inspection pits were excavated in three locations at the rear of the property.
- 4.7. The geology was identified as made ground to a depth of 1.00mbgl, overlaying London Clay proven to the full depth of the borehole, 10.00mbgl. Ground water was recorded at 1.10mbgl, falling to 1.25mbgl on the return visit after bailing.
- 4.8. The foundation inspection pits identified in the location the existing building that foundations are founded within the made ground, shortly above the London Clay formation. In one location was identified as being founded onto The London Clay.
- 4.9. Outline structural calculations for the full height basement walls have been provided, along with an indication that the basement slab will be designed to accommodate heave forces.

- 4.10. A Ground Movement Assessment (GMA) is provided by G&W. The GMA has assumed basements are not present beneath adjacent properties and that they have foundations are on shallow foundations to a nominal depth. It has been assumed that the basement walls will be propped in the permanent and temporary case therefore can be considered as 'stiffly' propped.
- 4.11. The GMA has carried out 4 assessments using varying parameters, one assuming stiff clay, and three assuming soft to firm clay with three different parameters used for vertical movement which have been referred to as 'conservative', 'moderate', and 'realistic'. The analysis using 'conservative' parameters for soft clay calculates Burland category 2, whereas the other analyses calculate Burland damage categories of 0 or 1. It has been concluded that the damage category is 'likely' to fall within 0 or 1 given the conservative parameters which would not be anticipated to be realistic. This is accepted assuming good workmanship and the adherence to best practises in order to limit movements to those associated with 'moderate' and 'realistic' parameters.
- 4.12. The use of CIRIA C760 is accepted as a conservative analogy when applied to underpinning walls. The GMA has used parameters relating a high stiffness wall which requires a permanent high level prop. The addendum to the BIA indicates that steel beams provided to support the timber floor are to provide an element of high level propping in the permanent case, with the wall spanning horizontally between props. A deflection calculation has been provided to indicate that if acting fully cantilevered the basement walls will deflect a maximum of 1.7mm at the head, indicating a high level of stiffness of the system even where acting as unpropped. The parameters used in the calculation of the GMA are therefore accepted as reasonable.
- 4.13. The Structural Method Statement contains a description of existing conditions and a description of the proposed works, a construction programme and a construction plan. A proposed monitoring statement is also provided.
- 4.14. The construction method describes the basement walls as being constructed in a hit and miss sequence but generally sequential from the front to the rear of the property, with the existing suspended timber floor to remain in place and supported on new beams as required. Generic temporary works details are provided that indicate that cantilever basement walls and soil faces are to be propped in the temporary case. While the temporary works details are not bespoke to the project, they can be considered acceptable due to the smaller scale of the proposal and shallow depth of underpinning required for much of the property.
- 4.15. The G&W report indicates that the ground water identified during monitoring is perched water on top of the impermeable London Clay Strata, which has been identified as an unproductive stratum. It has been noted that perched ground water may be encountered during construction and that local dewatering via pumping may be required. The Croft report indicates that ground water is anticipated at a depth of 6.30mbgl, however this is assumed to be an error as it is

inconsistent with the G&W report. It is accepted that wider ground water flows are unlikely to be disrupted by the proposed basement construction.

- 4.16. The BIA considers the basement is under the footprint of the property and will therefore not affect the surface water flow or surface water sewer discharge.

5.0 CONCLUSIONS

- 5.1. The BIA and SSR have been carried out by established firms of engineering consultants using individuals who possess suitable qualifications.
- 5.2. The proposal consists of lowering an existing partial basement level and extending it beneath the entire footprint of the existing building to a depth of between 2.30 and 2.50m bgl.
- 5.3. The basement is proposed to be constructed of reinforced concrete underpinned cantilever retaining walls with a suspended basement RC slab. Suitable temporary works details have been provided.
- 5.4. A site specific site investigation was carried out which has identified a moderate depth of made ground overlaying London Clay. Ground water was recorded at 1.10mbgl, falling to 1.25mbgl on a return visit.
- 5.5. Outline structural calculations for the full height basement walls have been provided, along with an indication that the basement slab will be designed to accommodate heave forces.
- 5.6. A ground movement assessment has been produced that indicates an anticipated worst case damage category of 1, based on analysis of several parameters. This is accepted and the parameters used in the calculation of the GMA are accepted as being based on reasonable assumptions of the proposed structure.
- 5.7. A proposed monitoring statement is provided.
- 5.8. The BIA has confirmed that the proposed basement will be founded within the London Clay. Groundwater monitoring has indicated water may be encountered during basement construction. Proposals for dewatering are presented and accepted.
- 5.9. Ground water has been identified as perched water rather than contributing to wider strategic ground water flows. It is therefore accepted that the impact on ground water will not be significant.
- 5.10. The BIA advises the development proposal will not increase the impermeable areas of the site at surface level from the current situation. This is accepted.
- 5.11. It can be confirmed that the BIA has demonstrated adherence to the requirements of CPG4. A summary of closed queries can be found in Appendix 2.

Appendix 1: Residents' Consultation Comments

None

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA	Clarification regarding use of high stiffness parameters in calculation of ground movement assessment.	Closed	16/02/18

Appendix 3: Supplementary Supporting Documents

14 February 2018

Addendum

The retaining walls for the permanent structure will have a high level of stiffness.

This can be achieved by propping the wall at the head by the ground floor structure:

- Steel beams at the head of the retaining walls provide the propping required.
- The distance between the adjoining steel beams are considered small enough to allow the retaining walls to span between them and transfer horizontal loads to the ground floor steelwork
- The steel arrangement is shown on revised drawings (SL-10-Rev2 and SL-20-Rev2)

An alternative design solution is to design the walls to be stiff enough to reduce the deflections to an acceptable minimum, without the need for propping at the head. The following calculations show that the deflection resulting ground movements will be close to negligible.

For both options, the predicted Damage Category will be 0 or 1.

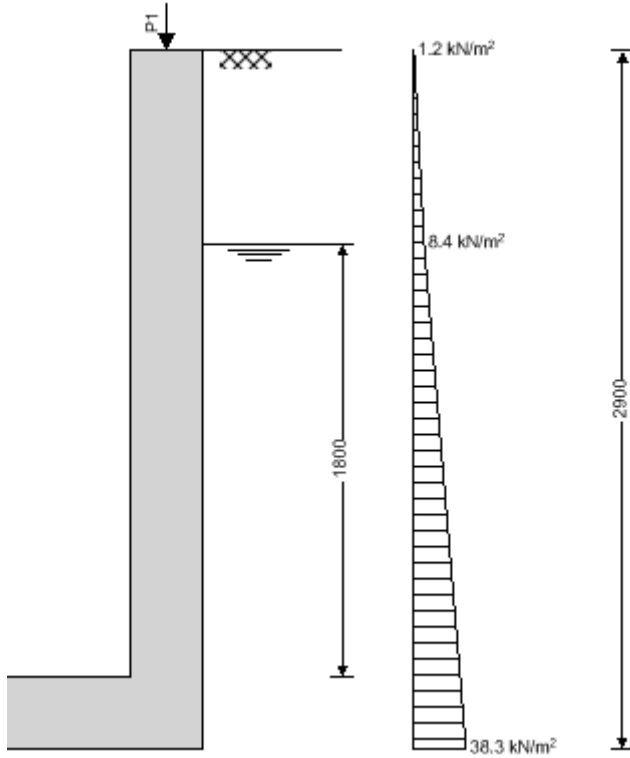


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Project 6 Parsifal road				Job Ref. 170823	
Section Structural calculation for BIA				Sheet no./rev. 14	
Calc. by EP	Date 14/02/2018	Chk'd by	Date	App'd by	Date

RETAINING WALL DEFLECTION

Similar loads will be applied as shown in the previously submitted calculations walls, ie



For permanent structure, there is structural continuity between the base of the wall and the basement slab. The wall is now analysed as a cantilevered beam. Calculations below are for SLS to find deflections.

CONCRETE BEAM ANALYSIS

Concrete beam dimensions:-

Beam width $b = 1000$ mm

Beam depth $h = 300$ mm

Cross-section area $A = b \times h = 300000$ mm²

Major axis second moment of area $I_{xx} = b \times h^3 / 12 = 2.25 \times 10^9$ mm⁴

$f_{cu} = 35$ N/mm²

$E = 20$ kN/mm² + $200 \times f_{cu} = 27.0$ kN/mm²

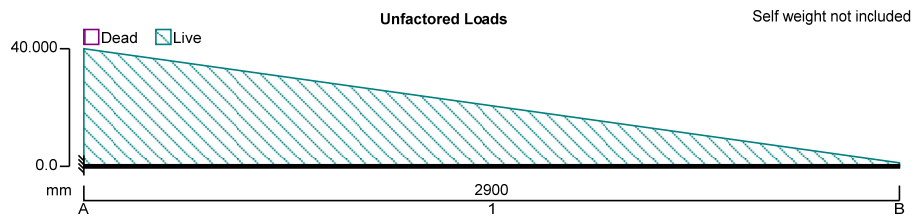
$\rho = \rho_{C,norm} = 2400$ kg/m³

Ref BS8110:1985:Pt 2 - Eq 17



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Project 6 Parsifal road				Job Ref. 170823	
Section Structural calculation for BIA				Sheet no./rev. 15	
Calc. by EP	Date 14/02/2018	Chk'd by	Date	App'd by	Date



CONTINUOUS BEAM ANALYSIS - INPUT

BEAM DETAILS

Number of spans = 1

Material Properties:

Modulus of elasticity = 27 kN/mm²

Material density = 2400 kg/m³

Support Conditions:

Support A Vertically "**Restrained**"

Rotationally "**Restrained**"

Support B Vertically "**Free**"

Rotationally "**Free**"

Span Definitions:

Span 1 Length = 2900 mm

Cross-sectional area = 300000 mm²

Moment of inertia = 2.25×10⁹ mm⁴

LOADING DETAILS

Beam Loads:

Load 1 VDL Live load 40.0 kN/m to 1.2 kN/m

LOAD COMBINATIONS

Load combination 1

Span 1 1×Dead + 1×Live

CONTINUOUS BEAM ANALYSIS - RESULTS

Support Reactions - Combination Summary

Support A Max react = -59.7 kN Min react = -59.7 kN

Max mom = -59.4 kNm Min mom = -59.4 kNm

Support B Max react = 0.0 kN Min react = 0.0 kN

Max mom = 0.0 kNm Min mom = 0.0 kNm

Beam Max/Min results - Combination Summary

Maximum shear = 59.7 kN

Minimum shear F_{min} = 0.0 kN

Maximum moment = 0.0 kNm

Minimum moment = -59.4 kNm

Maximum deflection = 1.7 mm

Minimum deflection = 0.0 mm

Span Max/Min results - Combination Summary

Span 1 Maximum shear = 59.7 kN at 0.000 m

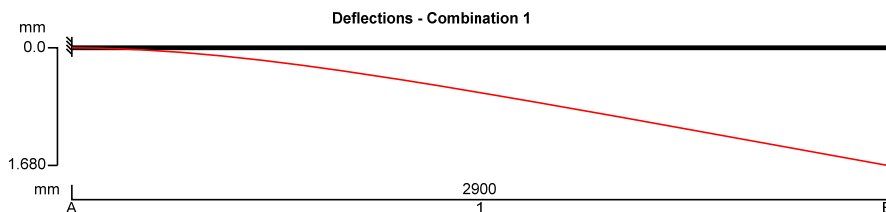
Minimum shear = 0.0 kN at 2.900 m

Maximum moment = 0.0 kNm at 2.900 m

Minimum moment = -59.4 kNm at 0.000 m

Maximum deflection = 1.7 mm at 2.900 m

Minimum deflection = 0.0 mm at 0.000 m

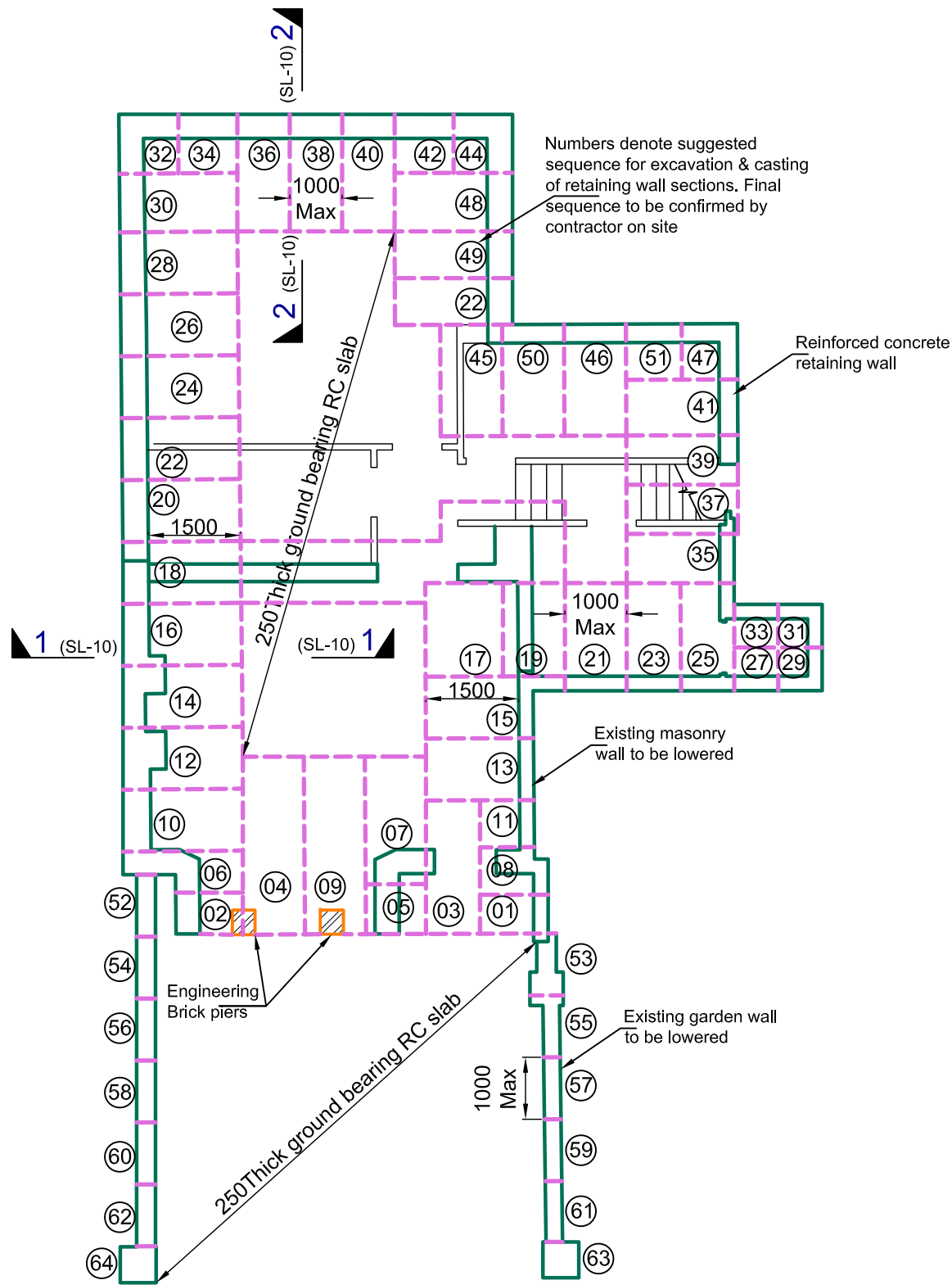




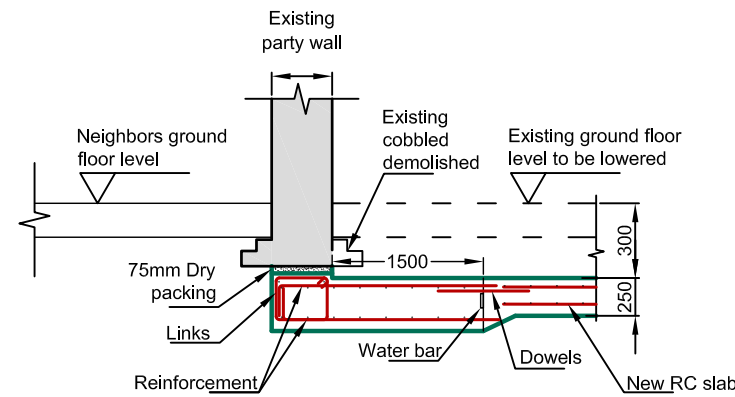
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Project				Job Ref.	
6 Parsifal road				170823	
Section				Sheet no./rev.	
Structural calculation for BIA				16	
Calc. by	Date	Chk'd by	Date	App'd by	Date
EP	14/02/2018				

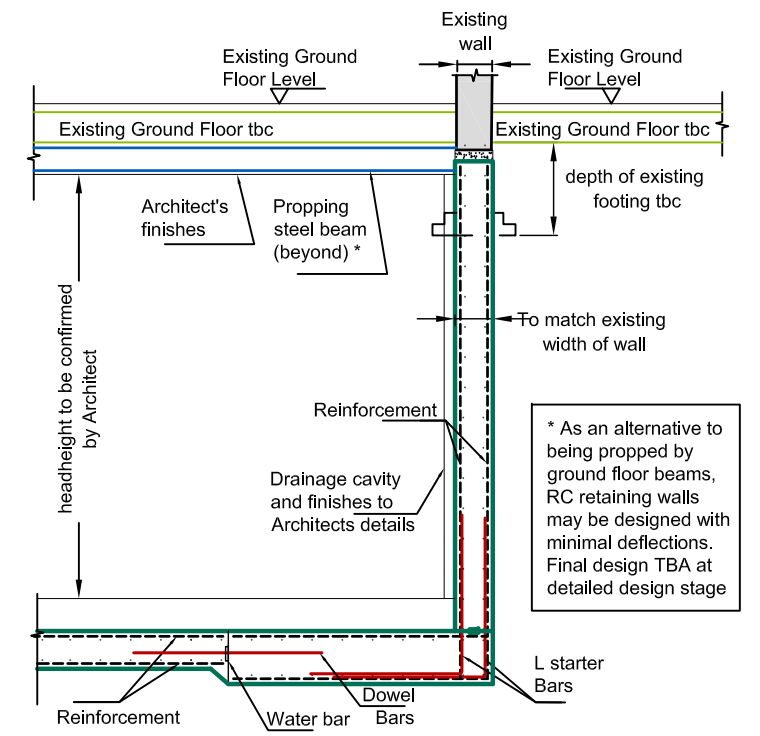
Deflection at top of wall is less than 1.7mm. This does not account for the vertical load applied to the top of the retaining wall, which would limit the deflection further. By inspection, the deflection of a 300mm thick reinforced concrete wall will not give rise to ground movements and resulting damage categories greater than Category 1.



Basement Plan
Scale 1:100



Section 1-1
Scale 1:50



Section 2-2
(Scale 1:50)

**Planning issue
Not for construction**

Rev	Date	Amendments
2	14/02/18	Minor amendment to Section 2-2 to show wall propping option
1	16/10/17	minor amendments to Architects comments
-	06/10/17	First issue preliminary to Architect

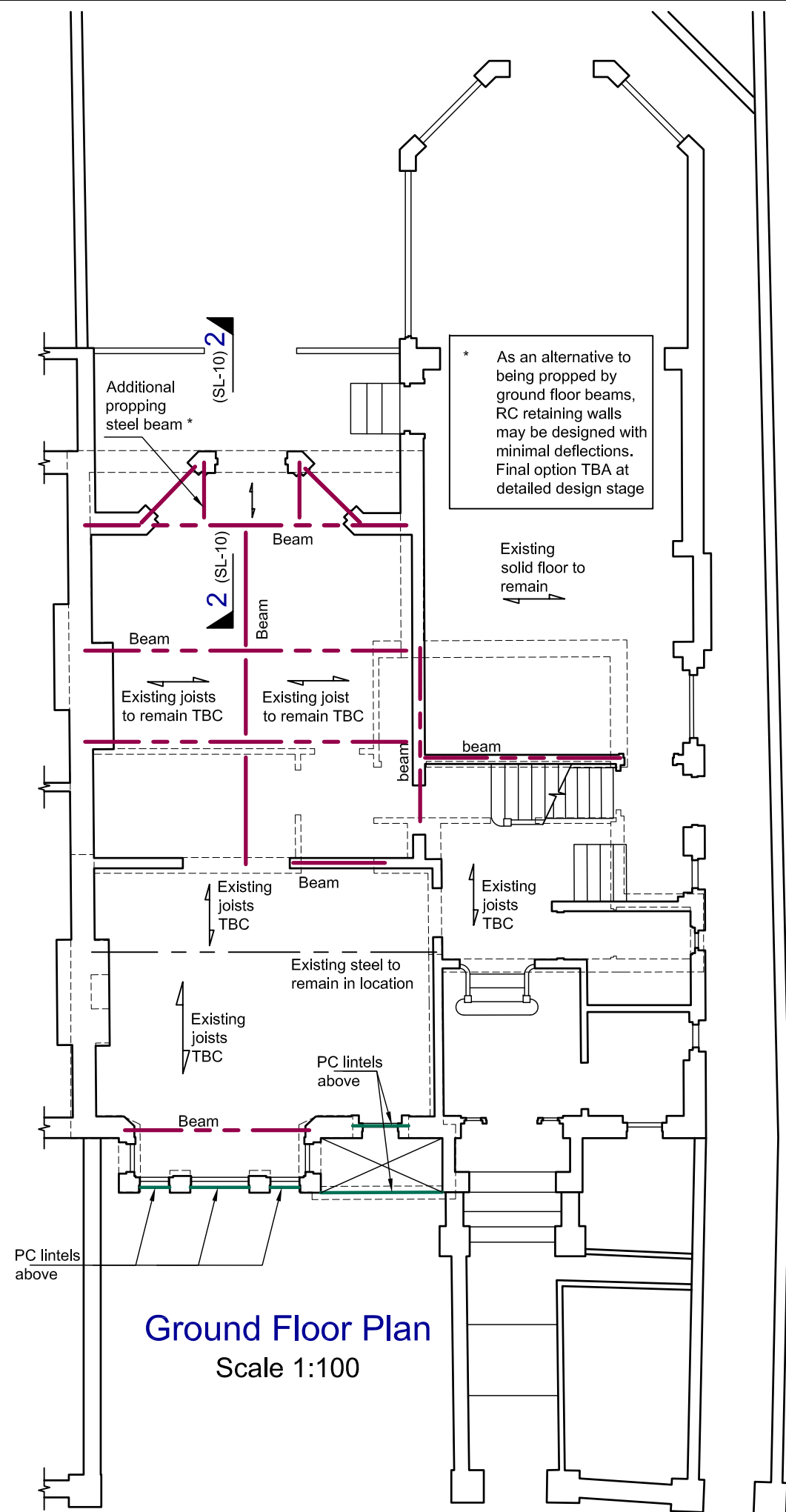
Job Number 170823	Date Oct '17
Dwg Number SL-10	Rev 2
Drawn SB	Chkd EP
Scale As shown @ A3	

Client: Stephan Wilcke
Project: 6 Parsifal Rd
Title : Basement Plan and Section

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Planning issue
Not for construction



Rev	Date	Amendments
2	14/02/18	Steel work altered to show wall propping option
1	16/10/17	minor amendments to Architects comments
-	06/10/17	First issue preliminary to Architect

Job Number 170823	Date Oct '17
Dwg Number SL-20	Rev 2
Drawn SB, GW	Chkd EP, GW
Scale As shown @ A3	

Client: **Stephan Wilcke**
Project: **6 Parsifal Rd**
Title : **Ground Floor Plan**

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