CampbellReith
consulting engineers

58A Redington Road, London, NW3 7RS

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12985-36
Revision: F1

May 2019

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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 58A Redington Road, London, NW3 7RS (planning reference 2018/5112/P). The basement is considered to fall within Category C as defined by the Terms of Reference.

1.2. The initial 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. This audit considers the additional information presented in response to the initial audit queries.

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 qualifications of the individuals involved meet the LBC guidance requirements.

1.5. The property currently comprises a semi-detached house with split-level floors and a small subterranean extension below the front garden. It is proposed to demolish the existing structure, excluding the lower ground floor level below the front garden. This is to be extended with a new four-storey building constructed above it.

1.6. A ground investigation was carried out indicating that the property is underlain by Made Ground over the Claygate Member.

1.7. The construction methodology and outline temporary works proposals have been presented, including proposed underpinning sequencing and propping arrangements.

1.8. The previous audit requested resubmission of the structural calculations which have now been provided.

1.9. The revised BIA presents updated Screening responses and desk study information.

1.10. The revised BIA confirms that groundwater monitoring will be undertaken during the winter months and appropriate measures will be taken to prevent loss of fines during dewatering.

1.11. Clarification was requested on the percentage increase in impermeable surface area and the surface water management strategy. Soakaway drainage is proposed at the rear of the property. The final drainage design should be agreed with LBC and Thames Water.

1.12. The revised BIA states that the depth and nature of the neighbouring properties shall be confirmed prior to the works.

1.13. A utilities search is provided within the revised BIA.

1.14. The potential for volume change and any resulting effects is now discussed within the revised documents submitted and it is stated that the basement would be deeper than the zone of influence of trees on site. This is accepted.

1.15. The GMA predicts Category 1 (Very Slight) damage to neighbours and potential slope stability issues have been assessed. An outline temporary works proposal has been submitted. This GMA prediction is now accepted.

1.16. A movement monitoring and an outline proposal with trigger levels is presented. The detailed strategy should be agreed with the relevant parties prior to construction.

1.17. An indicative works programme is now presented with the revised BIA.

1.18. It is accepted that the site is not in an area prone to flooding and there are no slope stability concerns.

1.19. Queries and requests for additional information are discussed in Section 4 and summarised in Appendix 2. The BIA meets the requirements of Camden Planning Guidance: Basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 18 January 2019 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 58A Redington Road, London, NW3 7RS (Reference: 2018/5112/P).

2.2. The Audit was carried out in accordance with the Terms of Reference set by LBC. The initial audit (Reference: JBfd-12985-36-250219-58A Redington Road - D1 dated 25th February 2019) reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development. This current report is based on an audit of the additional information presented.

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 Basements. March 2018.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water.
- Local Plan 2017: 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;

d) 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 *"Erection four-storey dwelling house (including basement excavation) following demolition of existing dwelling house."*

2.6. The audit instruction also confirmed that the proposal does not involve any listed building.

2.7. CampbellReith accessed LBC's Planning Portal on 11 February 2019 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment by Elite Designers Ltd (ref: 2018 - 059), dated October 2018. Includes existing drawings in Appendix A and B:
  - Existing Garden Floor Layout (2018-059-20 Rev B)
  - Existing Lower Ground Floor Layout (2018-059-21 Rev B)
  - Existing Section (2018-059-25 to 28 Rev B)
  - Proposed Garden Floor Layout (2018-059-01 Rev B)
  - Proposed Lower Ground Floor Layout (2018-059-02 Rev C)
  - Proposed Sections (2018-059-06 to 12 Rev C)
- Structural Report on Proposed Demolition by Elite Designers Ltd (ref: 2018 – 059). Dated March 2018.
- Desk Study and Ground Investigation Report by Geotechnical & Environmental Associates Ltd (ref: J18142), dated October 2018.
- Ground Movement Report by Geotechnical Consulting Group (ref: 0814\10001), dated October 2018.
- Hydrogeological Impact Assessment by Geotechnical Consulting Group (ref: 0814\10001), dated October 2018.
- 1 No. (Pertinent) consultation comments.

2.8. The following additional documents were provided based on recommendations within the initial audit (Reference: JBfd-12985-36-250219-58A Redington Road- D1 dated 25th February 2019):

- Letter report dated 16th April 2019, prepared by Elite Designers Structural Engineers.
- Basement Impact Assessment Report (Revised A) dated April 2019, prepared by Elite Designers Ltd.
- Email 5th June 2019 to Campbell Reith from Elite Designers.
- GEA Infiltration Test Results.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	BIA & supporting documents.
Is data required by Cl.233 of the GSD presented?	Yes	Information requested as per prev. audit i.e. works programme is and a utilities search is now available.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	The following information previously requested, now stands clarified based on the revised BIA; • Clarification on the GEA report • Proposed propping sequence. • Management and monitoring of groundwater level will affect the proposed excavation level.
Are suitable plan/maps included?	Yes	Existing plans showing the subject site and immediate neighbouring properties Arup GSD map extracts are not included.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	BIA appendices.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Refer Page 20-26 of the revised BIA dated April 2019.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Confirmed based on the BIA dated April 2019.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Confirmed based on the BIA dated April 2019.

Item	Yes/No/NA	Comment
Is a conceptual model presented?	Yes	Ground Investigation Report
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Updated comments provided within the BIA on the site being located within a Secondary A Aquifer.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Confirmed based on the BIA dated April 2019.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Increase in hardstanding has been identified and carried forward.
Is factual ground investigation data provided?	Yes	Although the investigation of neighbouring/party wall foundations was not undertaken successfully.
Is monitoring data presented?	Yes	Ground Investigation Report.
Is the ground investigation informed by a desk study?	Yes	Appendix F of the BIA dated October 2018.
Has a site walkover been undertaken?	Yes	Confirmed based on the BIA dated April 2019.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Appendix A of the BIA dated April 2019.
Is a geotechnical interpretation presented?	Yes	Appendix F of the BIA dated October 2018.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Appendix H of the BIA dated October 2018.
Are reports on other investigations required by screening and scoping presented?	Yes	Ground Investigation Report and Ground Movement Assessment (GMA) and Hydrogeological study.
Are the baseline conditions described, based on the GSD?	Yes	Page 14 and 15 BIA. The utilities search is available under Appendix M of BIA dated April 2019.

Item	Yes/No/NA	Comment
Do the base line conditions consider adjacent or nearby basements?	Yes	Ground Movement Assessment.
Is an Impact Assessment provided?	Yes	Page 15 BIA dated October 2018.
Are estimates of ground movement and structural impact presented?	Yes	Ground Movement Assessment.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	Confirmed based on the BIA dated April 2019.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Confirmed based on the BIA dated April 2019.
Has the need for monitoring during construction been considered?	Yes	Ground movement assessment Section 6.2.
Have the residual (after mitigation) impacts been clearly identified?	Yes	Confirmed based on the BIA dated April 2019.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Confirmed based on the BIA dated April 2019.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Confirmed based on the BIA dated April 2019.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	Confirmed based on the BIA dated April 2019.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	See Audit paragraph 4.23.
Are non-technical summaries provided?	Yes	Page 5 BIA.

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) was undertaken by Elite Designers Ltd. A ground investigation report was undertaken by Geotechnical & Environmental Associates Ltd (GEA). A Ground Movement Assessment (GMA) and a Hydrogeological Assessment undertaken by GCG is also provided and the individuals concerned in their production have suitable qualifications.

4.2. The site is a three storey semi-detached residential property built into a slope with a subterranean extension below the front garden. The adjoining semi-detached property to the south west comprises number 48 and 48A Redington Road, an upper and lower ground floor flat that shares a party wall with the site.

4.3. The LBC Instruction to proceed with the audit identified that the basement proposal neither involves, nor is neighbouring to, a listed building.

4.4. The development proposal comprises demolition of the existing building but with the retention of the existing lower ground floor subterranean extension below the front garden. Construction will comprise a new basement below the footprint of the existing building alongside a widening of the property by 1m along a 10m central portion on the north western side of site. The basement will also extend into the rear garden by approximately 60 to 70m^2. The new super-structure will then be constructed over the proposed basement.

4.5. It is confirmed that the underside of the existing structure varies between 43.85m and 44.85m TBM. The proposed basement formation level is typically 41.50m TBM, with a sump chamber formed at 40.50m TBM.

4.6. It is proposed to construct the basement with reinforced concrete underpins. An outline construction sequence is described in the revised BIA with supporting figures. 'Temporary Works Ground Support, Movement Monitoring Plans and Underpin Generic Sequence' documents have been provided in the updated submissions.

4.7. The scheme structural calculations are presented and are found to be satisfactory.

4.8. The Arup GSD map extracts and other relevant figures with the site location indicated are provided and referenced in the BIA to support the responses to the screening questions.

4.9. The Landmark Report included as part of the Desk Study (Part 5 'Bedrock Aquifer Designation) identifies that a Secondary A Aquifer exists below the site, associated with the Claygate Member. The BIA has now been updated to reflect the same based on the comments within the previous audit.

4.10. The BIA and Hydrogeological Assessment has identified that water will be encountered during basement excavation but describe the groundwater as perched. It was noted that groundwater

monitoring was undertaken in August and early September (the late summer) but will continue until basement construction takes place. Response no. 8 within the letter, dated 16th April by Elite Designers Ltd., states that the representative ground water level is at 42.6m TBM relative to the proposed excavation level of 41.4m TBM. It is also stated that the ongoing water level monitoring has been carried out and seasonal fluctuations were noted.

4.11. Considering the construction method to be adopted, and the BIA's proposal on page 22 to control water ingress into excavations by pumping from local sumps, it was recommended within the previous audit that the potential loss of fines during dewatering should be considered as it may affect the stability of excavations. Response no. 9 of the letter report, dated 19th April by Elite Designers Ltd., indicates that mitigation measures would be employed to prevent the loss of fines and associated instability.

4.12. The previous audit requested further clarification regarding the increase of impermeable surface area following the development, the use of SUDs system and the in-situ testing carried out to assess the suitability of the underlying strata for infiltration. From additional information provided, it is understood that the impermeable surface area will increase from 18% to 26% following the development. It is proposed to control the additional increase in surface water flow using a soak-away (located in the rear garden). It is stated in the letter report and the revised BIA that the suitability of the ground (i.e. infiltration capacity) was assessed using a 'falling head' water test carried out in each of the four boreholes on site. Whilst the tests indicate marginal suitability for soakaway drainage, in discussion with Elite Designers (and via email, Appendix 3) it is recognised that the intent of the soakaway drainage design will be to provide adequate storage capacity to accommodate storm events in accordance with relevant best practice guidance. The final design should be agreed with Thames Water and LBC.

4.13. It is stated under 'Walk-over survey' section of the revised BIA that the houses to either side of No. 58a do not have basements and that their floor levels have been surveyed. The sectional details for the same has been included within the appendices to the BIA.

4.14. A site specific Desk Study and Ground Investigation was undertaken and included four boreholes to a depth of 15.45m bgl to determine the site geology and five foundation inspection pits to 1.20m bgl to investigate the foundations of the existing and neighbouring properties. The boreholes identified Claygate Member over London Clay.

4.15. A utilities search is now presented within Appendix M of the BIA. It is stated in the BIA that the proposed basement is *'more than 5m away from the highway therefore there is no risk to the integrity or support of the highway'*. Established guidance on ground movements suggests that any buildings and infrastructure within a distance of 4 x excavation depth could experience ground movements. Although the assets running beneath the pavements are subject to separate approvals, the roadway is within this distance based on an excavation depth of

c.3.20m, therefore it was suggested in the previous audit that the potential for movement of the road and utilities running beneath it should be assessed. It is stated within the revised BIA that the excavation will not cause any impact on the highway or the utilities running along it. It is also stated that the existing water and gas mains are laid in HDPE and PE pipes respectively, and therefore would be more tolerant of movements. Relevant asset owners should be consulted and asset protection strategies adopted, as required by the asset owners.

4.16. A geotechnical assessment is included in the ground investigation report and separate ground movement impact assessment (GMA) provided.

4.17. The presence of trees within the vicinity of the proposed basement is identified in the BIA text and on the site plan (S01) provided. It has been confirmed based on laboratory testing undertaken as part of the Ground Investigation that the clay on site has a 'moderate volume change potential' as per NHBC guidance. It is accepted that the proposed foundations will be beyond the zone of influence of shrink-swell effects. Suspended floor slabs have been suggested to mitigate any residual impacts.

4.18. The previous audit queried whether secant pile walls are being used in the rear garden, based on the previous drawings. It is confirmed within the letter report that the use of such a retaining structure would cause a dis-proportionate increase in cost for the short length of the wall and that it is no longer under consideration.

4.19. Vertical movements have been estimated due to unloading as a result of the removal of the existing building and due to the excavation of the basement. Estimated movements have been provided and a calculation undertaken in OASYs PDISP®. Whilst the tabular input from the software is not provided, a summary is provided in Appendix A.1 of the GMA.

4.20. The GMA describes that 'shallow underpinning of relatively lightly loaded (underpins) carried out with good workmanship and in the dry can induce localised settlements of the wall in the order of 5-10mm'. Movements from underpinning are largely dependent on good workmanship and the predicted movements are considered to be reasonable based on those assumptions. The values of expected movements are provided under Section 5.2.3 of the GMA.

4.21. The effects of ground movements on adjacent structures is provided and determined to be no more than Category 1 (Very Slight) of the Burland Scale. An outline temporary works proposal has been provided.

4.22. Potential slope stability issues have been assessed and addressed in the GMA.

4.23. The BIA recommends movement monitoring and includes an outline proposal to control ground movements. The GMA references the predicted movements and includes trigger level values.

4.24. An indicative works programme has been presented

4.25. It is accepted that the site is not in an area prone to flooding.

5.0 CONCLUSIONS

5.1. The qualifications of the individuals involved meet the LBC guidance requirements.

5.2. The proposed development includes a basement to be constructed by underpinning.

5.3. Sufficient structural and temporary works information has been presented for review.

5.4. Clarifications requested in the previous audit in regards to the site investigation and ground conditions have been provided.

5.5. Queries related to groundwater monitoring and subsequent precautions to be taken during dewatering have been appropriately addressed.

5.6. A surface water management strategy is presented. The final design should be agreed with Thames Water and LBC.

5.7. The absence of basements underneath the adjacent properties have been confirmed.

5.8. A utilities search has been provided, as requested.

5.9. Clarification was provided regarding the volume change potential of the underlying soil stratum, and the mitigation measures proposed are accepted.

5.10. It is confirmed that underpinning is the proposed construction method and not secant piling.

5.11. The effects of ground movements on adjacent structures is provided and determined to be no more than Category 1 (Very Slight) of the Burland Scale.

5.12. The BIA recommends movement monitoring and includes an outline proposal with trigger levels to control ground movements.

5.13. An indicative works programme has now been presented and is accepted.

5.14. It is accepted that the site is not in an area prone to flooding and there are no slope stability concerns.

5.15. The additional information requested has been provided. The BIA meets the requirements of Camden Planning Guidance: Basements.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Taylor	Redacted	December 2018	Arboricultural Report is absent.	Section 4

Appendix 2: Audit Query Tracker

CampbellReith
consulting engineers

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Baseline conditions	Utilities search not undertaken. Clarity required on the GEA Desk Study.	Closed	June 2019
2	Stability	Additional detail on construction methodology to be provided. Construction sequence sketches or underpinning bay sequence plan to be provided. Secant wall indicated in the GMA text.	Closed	June 2019
3	Stability	Structural calculations are not readable and should be resubmitted at a higher resolution.	Closed	June 2019
4	Stability/Hydrogeology	Responses to Q10 of land stability and Q1b of hydrogeology screening not accepted.	Closed	June 2019
5	Stability	Potential 'shrink swell' in Claygate Member not sufficiently addressed.	Closed	June 2019
6	Stability	Nature and depth of party wall foundations not established	Closed	June 2019
7	Stability/Movement monitoring	Outline proposals with trigger values presented in GMA.	Closed	June 2019
8	Hydrogeology	Groundwater monitoring during the winter months should be undertaken.	Note only- to be undertaken prior to construction.	N/A
9	Hydrology	Clarification required on SUDs scheme.	Closed	June 2019
10	BIA format	Outline works programme required.	Indicative works programme provided	June 2019

Appendix 3: Supplementary Supporting Documents

Letter to CampbellReith date 16th April 2019 prepared by Elite Designers Structural Engineers

Email 5th June 2019 to Campbell Reith from Elite Designers

GEA Infiltration Test Results

Elite Designers Structural Engineers
3 Princeton Court 55 Felsham Road, London SW15 1AZ
+44 (0)20 8785 4499 hello@elitedesigners.co.uk elitedesigners.co.uk

J Brown
Campbell Reith Hill LLP
Friars Bridge Court
41-45 Blackfriars Road
London
SE1 8NZ

16th April 2019

Dear Mr Brown,

58A Redington Road, London, NW3 7RS

We refer to your audit of the submitted Basement Impact Assessment for the proposed works to this property, dated February 2019. We have reviewed your comments and addressed them as requested. Using your references in your audit query tracker, our responses are as follows:-

1 Baseline conditions.

A utilities search has been carried out, and their report is attached. These confirm that the main highway has a combined public sewer, and a 150mm water main in HDPE at 900mm depth. It also has rain-water gullies. In the public footpath there are various telecoms assets, electricity cables, and a low pressure gas main in PE. All of these assets are at last 5m from the nearest point of the proposed basement and separated from it by the existing subterranean extension built over thirty years ago.

The topographical survey of the property has been extended to include the first few metres of the properties to each side. This confirms the existing rear garden level to be approximately 44.85m at the paving slabs adjacent to the rear French windows. Structural drawing 2018-059-07 notes the FFL as 41.90m, the SSL as 41.75m, with a slab thickness of 0.35m. Thus, the formation level would be 41.4m. Section 7.1 of the GEA report states that the excavation would be to 'around 41.5m'. This is within 0.1m so does not inform a different conclusion to their evaluation and recommendations. We have therefore not revised the submitted documents and trust that this will be acceptable.

2 Stability

Messrs GEA have confirmed that they used a Cu of 75 kN/m2, an Nc value of 6, and a Factor of Safety of 3 to establish the safe bearing capacity of the soils for 1m wide footings at the depth of the excavation. The test results for the materials at formation level had a range of Cu values between 70-90 kN/m2.

The temporary works lateral propping of the r.c. basement walls will be designed by the Principle Contractor's temporary works designer. It is anticipated that some areas may only require one level of propping (e.g. at section B), but other areas will require multiple levels (e.g. at section D). The layout of walings and props is anticipated to be similar at each level, as per the submitted plan. Generic sequence sketches have been submitted, suitable for a typical 1-in-5 sequence i.e. 1-4-2-5-3. The Principle Contractor will compile a bay layout plan for review in due course. A generic sequence plat is now attached, as requested.

Although a secant pile wall solution could be used in the rear garden, it is presumed that it would be dis-proportionately costly for a short length of wall, therefore we have shown the basement walls to be constructed in sections, in r.c. as per the submitted plans and sections.

Please refer to the attached assessment of the likely influence of the trees, associated with the Medium shrinkage potential of the soils. This demonstrates that foundations of only 1.05m depth would suffice, therefore our previous conclusion that the basement would be of such a depth as to be deeper than the zone of influence of the existing trees was correct. The existing house is even further from the trees, and therefore the statement that the existing property is not affected by seasonal movements is correct. The extension is now shown not to be affected by the trees too. Therefore, the previous conclusion still holds true.

3 Stability

A better copy of the structural calculations has been submitted to you, which we trust is both legible and acceptable.

4 Stability / Hydrogeology

Please refer to the Reports compiled by Messrs GCG, which includes various relevant map extracts (from the Arup Guide to Subterranean Developments, and others), with the location of the property identified. We confirm that we have referred to the Arup GSD map extracts when considering the screening questions, and the answers accord. Q1b and Q10 have been corrected to note that the upper strata is deemed an aquifer and the basement would encroach into it.

5 Stability

As noted at '2' above, please refer to the assessment of the trees in the vicinity and the Medium shrinkage potential of the soils, which confirm that the basement would be deeper than the zone of influence.

6 Stability

The nature of the adjoining foundations will be confirmed by trial pits, after the works commence.

7 Stability / Movement Monitoring

The detailed monitoring regime will be agreed between Party Wall Surveyors before the works commence.

8 Hydrogeology

Ongoing water level monitoring has been carried out and seasonal fluctuations noted. These are recorded in the revised GEA Report and discussed in detail in the revised GCG Report, all as attached (or submitted under separate cover). In summary, the representative ground water level is taken at a level of 42.6m, relative to the proposed excavation level of 41.4m. Heavy rainfall events were noted to raise the level but with the general level being re-established shortly after, through natural drainage.

9 Hydrogeology

Small, local sumps at each under-pinning access pit would incorporate a fine filter material such that 'fines' would not be encouraged to flow into the sumps, thus any risk of settlement would be minimised.

A 'falling head' water test has been carried out in each of the four boreholes. The results are consistent for the three bores in the rear garden and confirm that the upper materials are sufficiently porous that soak-aways would be viable. The final type and size of the soak-away will be determined by the Manufacturer's designer, matched to the soil characteristics determined in the tests. The results are included in the revised GEA Report, attached.

10 BIA Format

An outline works programme is now appended in the revised BIA Report, and is enclosed.

We trust that these responses fully address the issues that you high-lighted, but if not then do please call in the first instance, so that we can address them to your satisfaction.

Kind regards

Bruce Huxtable
Associate - Elite Designers Ltd

Cc TAG Architects

Encs as noted.

FW: 58A Redington Road J18142 - results Ref: 12985-36Bruce Huxtable to: GrahamKite@campbellreith.com 05/06/2019 10:28
Cc: "tag.arch@virgin.net", "Apollonia Gasparre", "Gwen McDougal"
From: "Bruce Huxtable" <bruce@elitedesigners.co.uk>
To: "GrahamKite@campbellreith.com" <GrahamKite@campbellreith.com>
Cc: "tag.arch@virgin.net" <tag.arch@virgin.net>, "Apollonia Gasparre" <a.gasparre@gcg.co.uk>, "Gwen McDougal" <gemcdougal@gmail.com>

1 Attachment

J18142 SoakageTesting 010419 (Sec).pdf

Dear Graham,

Further to your email querying the proposals for the disposal of rain water from the proposed enlarged house, please refer to the email, below, and the attached falling head test results. These show that the ground of the rear garden is sufficiently permeable and thus soak-aways would be a viable method of attenuating flows from the increased roof areas to the remainder of the rear gardens. The test results would be used in the design of the proprietory soak-away (by Messrs Waven, or similar), and this would be done during the detailed design phase of the works.

Both Messrs GCG's and Elite's reports propose the attenuation of rain-water run off from the increased roof areas, so are not contradictory. The increased roof areas extend into the large rear gardens, so the total quantity of rain that would be discharged to the same ground would be identical. The attenuation is required to reduce the rate of run-off to similar (or less) than at present. Soak-aways are an appropriate method used in SuDS strategies, and would be entirely appropriate for this situation.

I would be pleased to discuss this with you should you require further clarification, but we trust that you now have sufficient data to agree that the proposals are well-considered, appropriate and viable.

Could you please now confirm that all of your queries and comments have been fully and satisfactorily addressed?

Your assistance is appreciated.

Regards,

Bruce

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——
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GEA
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Borehole Soakage Test

Site	58A Redington Road, London NW3 7RS
Client	Gwen McDougal & Daniel Belov
Engineer	Elite Designers Structural Engineers

Job Number J18142

Sheet 1/2

Date: 01 April 2019

Borehole No: 1 **Test No:** 1

Test Data

Before start of test:

Borehole depth (m): 5.82
Casing depth (m):
Water level (m): 5.10

Time (mins)	Depth to Water (m)	Depth of Water (m)
0	0	5.82
1	0.56	5.26
2	1.05	4.77
3	1.22	4.60
5	1.25	4.57
10	1.26	4.56
20	1.31	4.51
30	1.44	4.38
40	1.62	4.20
50	1.84	3.98
60	1.99	3.83
120	3.24	2.58
180	4.01	1.81
240	4.44	1.38

Soakage Calculation

Borehole Diameter (m)	0.1500
Borehole Area (m)	0.0177
Borehole Perimeter (m)	0.471

From Plot:	D1 (m)	4.56
	D2 (m)	1.81
	T1 (min)	10
	T2 (min)	180

Soakage Volume (m^3)	0.049
Soakage Area (m^2)	1.52
Time (min)	170

Soakage rate (m/sec)	3.13741E-06
Soakage rate (m/day)	0.271071966

Remarks:

GEA
Herts | 01727 824666
Notts | 01509 674888

Borehole Soakage Test

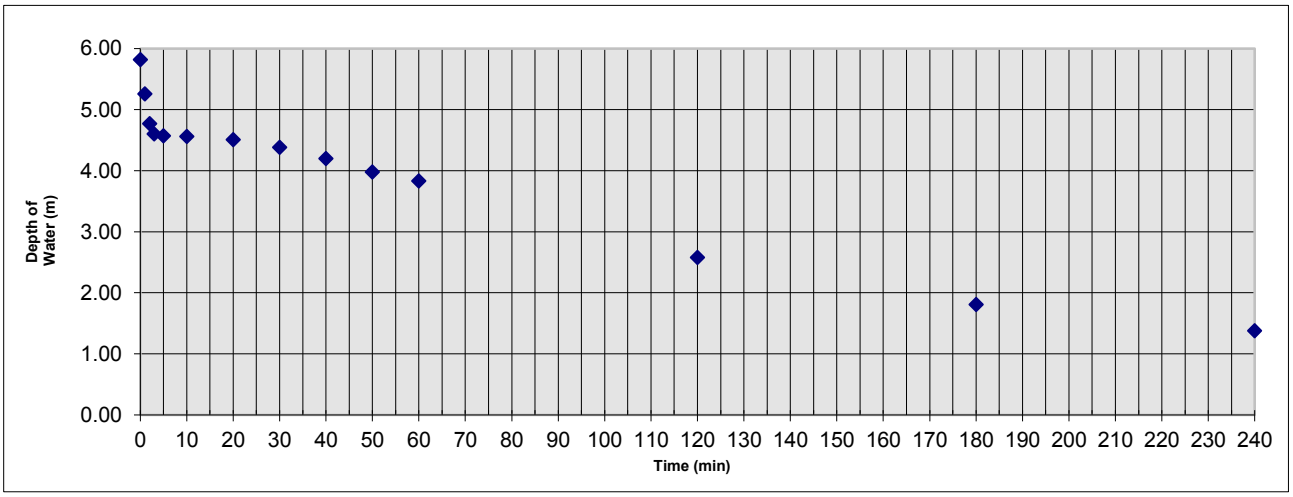
Site	58A Redington Road, London NW3 7RS
Client	Gwen McDougal & Daniel Belov
Engineer	Elite Designers Structural Engineers

Job Number J18142

Sheet 2/2

Soakage Graph

Test No: 1



Remarks:

GEA
Herts | 01727 824666
Notts | 01509 674888

Borehole Soakage Test

Site	58A Redington Road, London NW3 7RS
Client	Gwen McDougal & Daniel Belov
Engineer	Elite Designers Structural Engineers

Job Number J18142

Sheet 1/2

Date: 01 April 2019

Borehole No: 2 **Test No:** 1

Test Data

Before start of test:

Borehole depth (m): 5.86
Casing depth (m):
Water level (m): 3.33

Time (mins)	Depth to Water (m)	Depth of Water (m)
0	0	5.86
1	0.02	5.84
2	0.07	5.79
3	0.27	5.59
5	0.39	5.47
10	0.68	5.18
20	0.80	5.06
30	0.88	4.98
40	0.95	4.91
50	1.01	4.85
60	1.07	4.79
120		
180		
240		

Soakage Calculation

Borehole Diameter (m)	0.1500
Borehole Area (m)	0.0177
Borehole Perimeter (m)	0.471

From Plot:		
	D1 (m)	5.59
	D2 (m)	4.85
	T1 (min)	3
	T2 (min)	50

Soakage Volume (m^3)	0.013
Soakage Area (m^2)	2.48
Time (min)	47

Soakage rate (m/sec)	1.87169E-06
Soakage rate (m/day)	0.161714268

Remarks:

GEA
Herts | 01727 824666
Notts | 01509 674888

Borehole Soakage Test

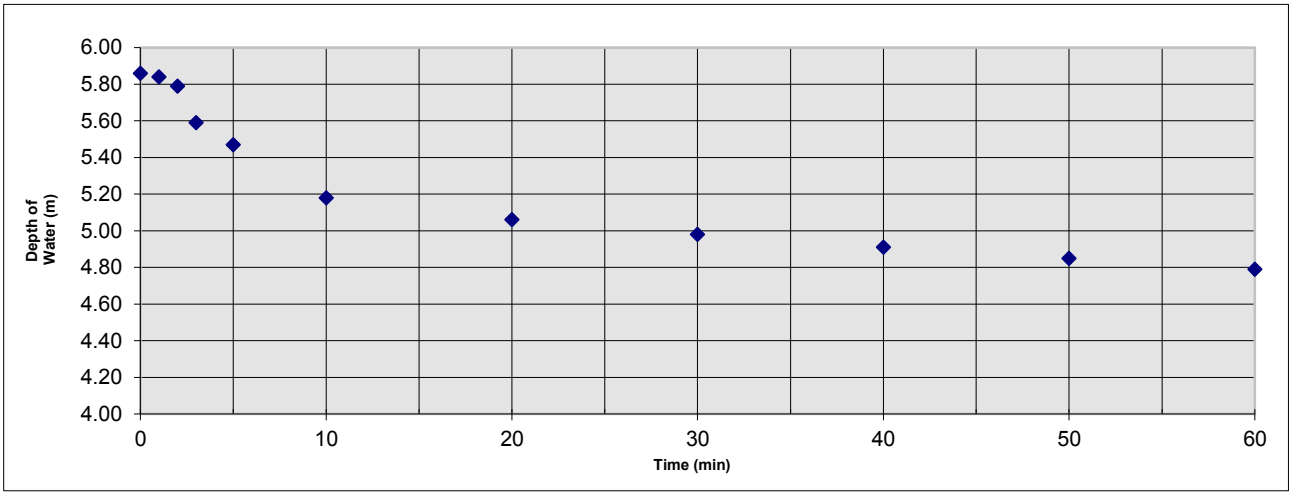
Site	58A Redington Road, London NW3 7RS
Client	Gwen McDougal & Daniel Belov
Engineer	Elite Designers Structural Engineers

Job Number J18142

Sheet 2/2

Soakage Graph

Test No: 1



Remarks:

GEA
Herts | 01727 824666
Notts | 01509 674888

Borehole Soakage Test

Site	58A Redington Road, London NW3 7RS
Client	Gwen McDougal & Daniel Belov
Engineer	Elite Designers Structural Engineers

Job Number J18142

Sheet 1/2

Date: 01 April 2019

Borehole No: 3 **Test No:** 1

Test Data

Before start of test:

Borehole depth (m): 5.83
Casing depth (m):
Water level (m): 5.77

Time (mins)		Depth to Water (m)	Depth of Water (m)
0	0		5.83
1	0.58		5.25
2	0.66		5.17
3	0.69		5.14
5	0.81		5.02
10	1		4.83
20	1.25		4.58
30	1.54		4.29
40	2.03		3.80
50	2.76		3.07
60	3.16		2.67
120			
180			
240			

Soakage Calculation

Borehole Diameter (m)	0.1500
Borehole Area (m)	0.0177
Borehole Perimeter (m)	0.471

From Plot:	D1 (m)	5.25
	D2 (m)	2.67
	T1 (min)	1
	T2 (min)	60

Soakage Volume (m^3)	0.046
Soakage Area (m^2)	1.88
Time (min)	59

Soakage rate (m/sec)	6.8369E-06
Soakage rate (m/day)	0.590708176

Remarks:

GEA
Herts | 01727 824666
Notts | 01509 674888

Borehole Soakage Test

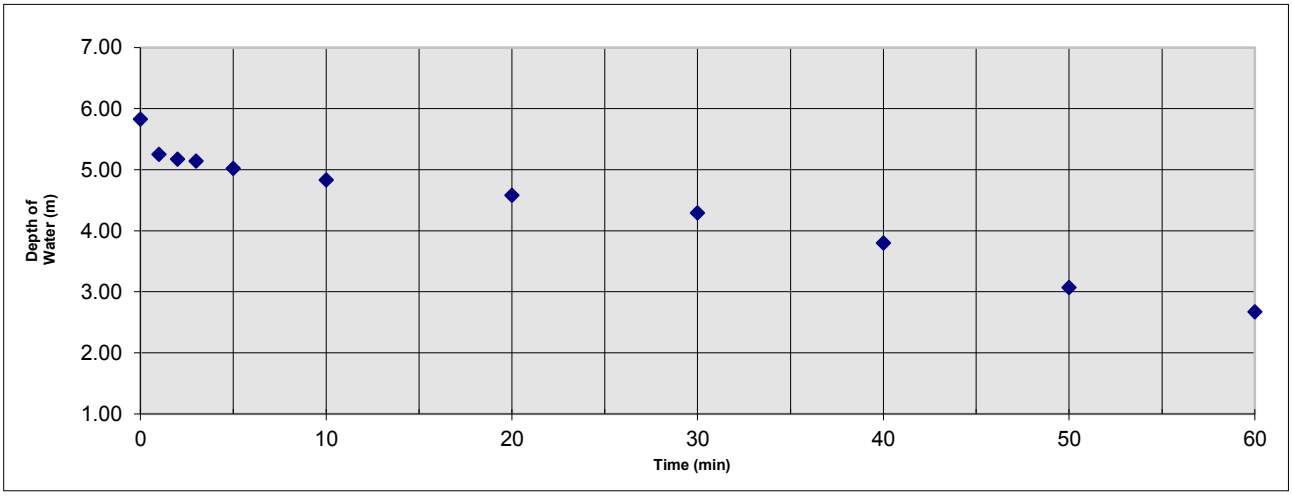
Site	58A Redington Road, London NW3 7RS
Client	Gwen McDougal & Daniel Belov
Engineer	Elite Designers Structural Engineers

Job Number J18142

Sheet 2/2

Soakage Graph

Test No: 1



Remarks:

GEA
Herts | 01727 824666
Notts | 01509 674888

Borehole Soakage Test

Site	58A Redington Road, London NW3 7RS	**Job Number**	J18142
Client	Gwen McDougal & Daniel Belov	**Sheet**	1/2
Engineer	Elite Designers Structural Engineers		

Date: 01 April 2019

Borehole No: 4 **Test No:** 1

Test Data

Before start of test:

Borehole depth (m): 5.62
Casing depth (m):
Water level (m): 4.16

Time (mins)	Depth to Water (m)	Depth of Water (m)
0	0.85	4.77
1	0.85	4.77
2	0.85	4.77
3	0.86	4.76
5	0.87	4.75
10	0.87	4.75
20	0.99	4.63
30	1.26	4.36
40	2.56	3.06
50	3.38	2.24
60	3.62	2.00
120	4.07	1.55
180	4.11	1.51

Soakage Calculation

Borehole Diameter (m)	0.1500	
Borehole Area (m)	0.0177	
Borehole Perimeter (m)	0.471	
From Plot:	D1 (m)	4.75
	D2 (m)	1.55
	T1 (min)	5
	T2 (min)	120
Soakage Volume (m^3)	0.057	
Soakage Area (m^2)	1.50	
Time (min)	115	

Soakage rate (m/sec)	5.4561E-06
Soakage rate (m/day)	0.47140665

Remarks:

Water escaping rapidly into permeable layer at 0.85 m; unable to fill borehole to top

GEA
Herts | 01727 824666
Notts | 01509 674888

Borehole Soakage Test

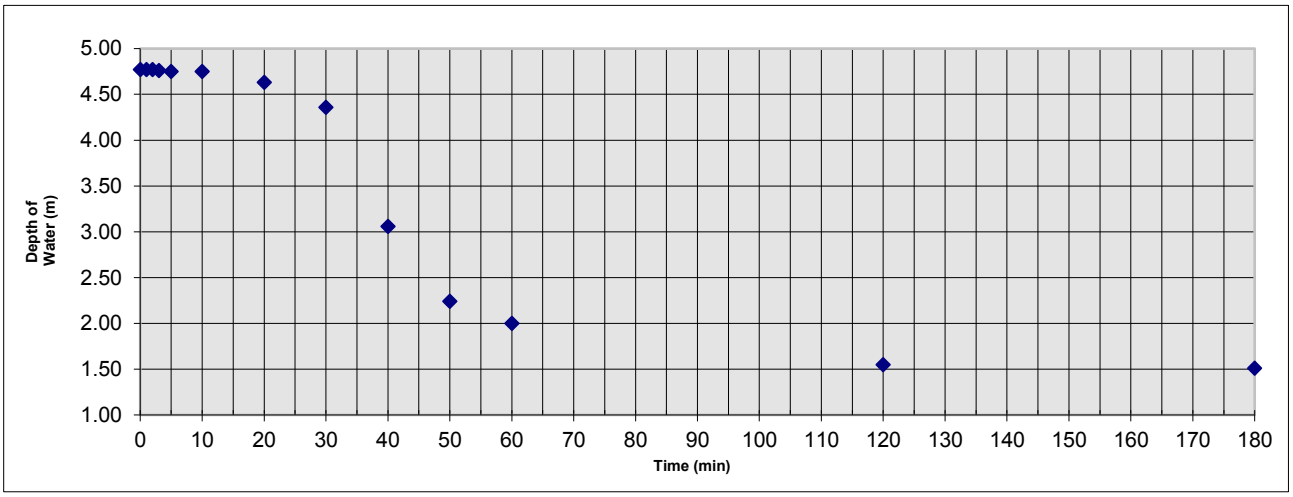
Site	58A Redington Road, London NW3 7RS
Client	Gwen McDougal & Daniel Belov
Engineer	Elite Designers Structural Engineers

Job Number J18142

Sheet 2/2

Soakage Graph

Test No: 1



Remarks:

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