CampbellReith
consulting engineers

73-75 Avenue Road, NW8 6JD

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12336-65

Revision: F1

Date: October 2016

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Project Number	12336-65
Project Name	73-75 Avenue Road , NW8 6JD
Planning Reference	2016/1808/P

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Appendix

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 73-75 Avenue Road, NW8 6JD (planning reference 2016/1808/P). The basement is considered to fall within Category C 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 Basement Impact Assessment (BIA) and Structural Method Statement (SMS) have been carried out by Heyne Tillett Steel with a ground movement assessment (GMA) undertaken by Geotechnical and Environmental Associates (GEA). With reference to the authors qualifications which are not strictly in accordance with CPG4, CR is satisfied that the screening and scoping has been undertaken adequately.

1.5. The proposed development comprises the demolition of the existing property and detached swimming pool, and their replacement with 2 semi-detached houses over a large double storey basement circa 8m deep formed in the ground which is to be sub-divided into two dwellings by a reinforced concrete wall from lower basement to ground floor level.

1.6. The BIA has confirmed that the proposed basement will be founded on the London Clay and that the surrounding slopes are stable.

1.7. It was reported that the River Tyburn may have formerly crossed the site, however no evidence was found during a targeted ground investigation. Localised perched groundwater may be encountered in the Made Ground above the London Clay and this will need to be controlled during excavation of the basement. It is accepted that there are no significant impacts on the groundwater regime.

1.8. The proposed basement will be constructed utilising a combination of bored piles with temporary propping to support the excavation with permanent support provided by reinforced concrete walls constructed within the line of the piles and horizontal props from the concrete floor slabs at basement, lower ground and ground floor levels.

1.9. The potential for surface water flooding as a result of the increased hard cover post development has been addressed in the Flood Risk Assessment and SUDS measures proposed.

Clarification was provided in the additional information contained in the e mails of 2nd August and the 11th October 2016.

1.10. It is noted that the basement layout contains kitchens, bathrooms and laundry rooms and this means that the basement drainage system will require protection against surcharging of the public sewers. The Client has subsequently advised in the 2nd August 2016 e mail that the basement drainage will be pumped and a non-return valve installed. The basement will therefore be protected from sewer surcharging.

1.11. A ground movement assessment (GMA) has been undertaken by GEA using Oasys Pdisp for the heave movements as a result of excavation and Xdisp for the vertical and horizontal movements as a result of pile installation and excavation.

1.12. Category 0 to 1 damage is anticipated for the neighbouring structures considered with the exception of the extension and main building to No 77 Avenue Road which are indicated to be Category 2. It is stated in the GMA report that the damage assessment is considered to be conservative and the damage to the neighbouring structures is unlikely to exceed Category 1. Despite queries with the modelling, this is accepted as reasonable provided that there is good control of workmanship and the affected buildings are in sound condition. The final GMA should be agreed with the party wall surveyor.

1.13. The SMS contains proposals for monitoring any movement in nearby structures and these recommendations should be adopted with details and trigger values to be agreed as part of the Party Wall awards.

1.14. Detailed proposals for the temporary propping and calculations for the piled foundations are to be agreed with the party wall consultants.

1.15. It is accepted that there are no significant impacts on slope stability.

1.16. It is accepted that the BIA and associated documents adequately identify the potential impacts of the proposed basement and, subject to the agreement of the Party Wall award, describe suitable mitigation.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 25th May 2016 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 73-75 Avenue Road, NW8 6JD, planning reference 2016/1808/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.

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 '*Demolition of existing building and pool house to provide two new detached single-family dwelling houses with subterranean basement storeys, formation of new access and hard and soft landscaping (Class use C3)'*

The Audit Instruction also confirmed 73-75 Avenue Road has no listed buildings nor is adjacent to any listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 14th June 2016 and gained access to the following relevant documents for audit purposes:

- Design Study & Basement Impact Assessment Report (BIA)
- Structural Method Statement (SMS)
- Planning Application Drawings consisting of

  Location Plan

  Existing Plans

  Demolition Plans

  Proposed Plans
- Design & Access Statement
- Flood Risk Assessment (FRA)
- Arboricultural Impact Assessment
- Planning Comments and Response
- Construction Management Plan (CMP)

2.7. Subsequent to the issue of the initial audit the following information has been provided by the Client and is considered with this current report.

- Email of 2nd August 2016 (refer to Appendix 3)
- Email of 11th October 2016 (refer to Appendix 3)

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	It is accepted that the author has suitable experience.
Is data required by Cl.233 of the GSD presented?	Yes	Relevant information has been provided in the BIA and SMS. An indicative programme is contained in the CMP.
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	BIA section 4.4.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA section 4.2.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA section 4.3.
Is a conceptual model presented?	Yes	Ground investigation and commentary provided in BIA Appendix C.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA section 5.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA section 5.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA section 5.
Is factual ground investigation data provided?	Yes	Ground investigation report by GEA , BIA Appendix C.
Is monitoring data presented?	Yes	Ground investigation report by GEA , BIA Appendix C.
Is the ground investigation informed by a desk study?	Yes	BIA section 3.
Has a site walkover been undertaken?	Yes	GEA report Appendix C.
Is the presence/absence of adjacent or nearby basements confirmed?	No	Conservative assumption of no basements made.
Is a geotechnical interpretation presented?	Yes	GEA report Appendix C.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Included in the GMA report.
Are reports on other investigations required by screening and scoping presented?	Yes	Flood Risk Assessment, Arboricultural Impact Assessment and River Tyburn investigation.
Are the baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	Refer to comment above. No basements to neighbouring properties assumed.

Item	Yes/No/NA	Comment
Is an Impact Assessment provided?	Yes	BIA section 7.
Are estimates of ground movement and structural impact presented?	Yes	GEA Ground Movement Assessment, Appendix D of BIA, however, there are queries with regards to the analysis.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	BIA section 7.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Ground monitoring is proposed with actions to be taken depending on the scale of the movement, heave precautions are being specified and surface water flow rates controlled.
Has the need for monitoring during construction been considered?	Yes	Refer to comment above.
Have the residual (after mitigation) impacts been clearly identified?	Yes	
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Based on the assumptions made in the ground movement assessment (GMA), despite queries that remain (see Audit paragraph 4.8 to 4.11).
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Off-site flows are to be restricted to ensure no adverse effect on water environment.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	Although some queries remain on the GMA.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	GMA report Section 6.1 predicts mainly Category 0 (Negligible) to 1 (Very Slight) damage with Category 2 predicted for one of the properties (see Audit paragraphs 4.8 to 4.11).
Are non-technical summaries provided?	No	

4.0 DISCUSSION

4.1. The author is noted as being a Chartered Structural Engineer and a partner in the consulting engineering firm and is considered to be suitably qualified.

4.2. The proposed development comprises the demolition of the existing property and detached swimming pool, and their replacement with 2 semi-detached houses over a large double storey basement circa 8m deep formed in the ground which is to be sub-divided into two dwellings by a reinforced concrete wall from lower basement to ground floor level. The form of construction is a propped bored pile contiguous wall to act as the temporary support to the basement excavation and a reinforced concrete lining/permanent wall propped by the insitu concrete floor slabs at lower basement, basement and ground floor level. Above ground the building is steel framed with concrete floor slabs.

4.3. The basement will be founded in London Clay as confirmed by two boreholes taken to a depth of 25.4m. Made Ground was encountered above the London Clay to a depth of 0.9 to 2.3m. No water was encountered during the investigations, however standpipe monitoring recorded groundwater at 7.7m in borehole 1. The water strike is anticipated to be from a pocket of perched water in the local claystone but will require ongoing monitoring. It is also anticipated some local water may be encountered between the Made Ground and the London Clay that will need to be controlled through the construction phase.

4.4. A separate investigation was commissioned to investigate the possibility of the River Tyburn passing under the site, however no evidence of the former river was found during the study. It is accepted that there are no significant groundwater flows which could be adversely affected by the basement proposals.

4.5. The site has been subject to surface water flooding in 2002 caused by excessive rainfall being unable to enter the public sewer network. The areas of hard surfaced areas and consequent surface water flow are increased by the current proposals. A Flood Risk Assessment has been carried out and a SUDS design is proposed including attenuation and control of flow from the site into the existing public sewer system. Site flows are to be limited to greenfield rates. The proposed attenuation location is noted in the FRA and Heyne Tillett Steel drawings 1247/SK01 P2 and SK02 P2. It is considered that the proposals by the applicant to restrict the off site surface water discharge to 5 l/s and provide on site attenuation is acceptable.

4.6. It is noted that the basement layout contains kitchens, bathrooms and laundry rooms and this means that the basement drainage system will require protection against surcharging of the public sewers. The Client has advised in information provided in August that the basement drainage will be pumped with a non-return valve fitted which will provide protection against sewer surcharging.

4.7. Final details of the temporary pile design and detailed temporary works proposals are not included in the documentation and need to be agreed with the party wall consultants.

4.8. A ground movement analysis using Oasys Pdisp to estimate heave movements due to the excavation, Xdisp for vertical and horizontal movements as a result of the excavation and pile installation and resulting anticipated damage for the neighbouring properties has been undertaken by GEA. The damage assessment is based on an excavation depth of 8.50m and a contiguous piled wall with an embedment depth of 3.50m and does not include the heave movements. The calculations are based on the CIRIA C580 approach with high support stiffness assumed as the excavation will be propped throughout. Anticipated damage is given for neighbouring properties/structures which comprise the boundary walls, No 38 Queen's Grove, No 77 Avenue Road extension and No 77 Avenue Road main building.

4.9. The predicted damage for the neighbouring structures is between Category 0 (Negligible) and Category 1 (Very Slight) with the exception of the western elevations to the extension and main building to No 77 Avenue Road which are indicated to be Category 2 (Slight). CPG4 requires mitigation measures where damage exceeds Category 1 and the impacts to be re-evaluated.

4.10. Although, queries remain on the methodology adopted in the modelling, it is accepted that, provided there is good control of workmanship, ground movement, should remain within limits to be agreed as part of the party wall award to ensure that damage does not exceed Burland Category 1.

4.11. Confirmation on the wall embedment depth was requested and GEA have advised that the embedment depth is adequate for stability.

4.12. A preliminary movement monitoring strategy with trigger values is included in the Structural Method Statement. Details and trigger values should be agreed as part of the Party Wall awards, however, the trigger values may need revising based on the queries on the GMA as discussed above.

4.13. There is no significant impact on the stability of slopes in the area.

5.0 CONCLUSIONS

5.1. The BIA has been carried out by a firm of Consulting Engineers, Heyne Tillett Steel, who have employed the services of Geotechnical & Environmental Associates Ltd to advise on geotechnical matters.

5.2. Basement construction is shown as a bored pile wall which is temporarily propped during the basement excavation with permanent support provided in the form of a reinforced concrete retaining wall cast inside the line of the piles. The wall will be propped at the basement , lower ground floor and ground floor levels by the concrete floor slabs.

5.3. The detailed design of the temporary works including struts, props and the piles are not contained in the BIA documentation.

5.4. A ground movement assessment (GMA) has been undertaken by GEA using Oasys Pdisp for the heave movements as a result of excavation and Xdisp for the vertical and horizontal movements as a result of pile installation and excavation.

5.5. It has been confirmed that the soils which would be susceptible to heave in the long term due to demolition will be removed by the basement excavation and not present an issue.

5.6. Category 0 to 1 damage is anticipated for the neighbouring structures considered with the exception of the extension and main building to No 77 Avenue Road which are indicated to be Category 2. It is stated in the GMA report that the damage assessment is considered to be conservative and the damage to the neighbouring structures is unlikely to exceed Category 1. The applicant has advised that when the final pile design has been carried out, the piling proposals can be inputted into the ground model to provide an update to the GMA and enable site specific ground movement graphs to be generated. It is considered that at this stage the proposals are adequate, but that the updated GMA as noted above should be submitted prior to construction.

5.7. The SMS contains proposals for monitoring movement on nearby structures and these recommendations should be adopted with details and trigger values to be agreed as part of the Party Wall awards. The trigger values may need to be reconsidered following refinement of the ground movement analysis.

5.8. The FRA contains recommendations to limit the surface water run-off rate from the site post-development to greenfield rates in order to ensure no adverse impact on the public sewers. An indicative strategy indicating cellular attenuation, off site flow restriction and emergency storage in the basements has been provided and clarified in the 11th October email and is considered to address this issue.

5.9. A Ground Investigation was carried out to attempt to identify whether the River Tyburn formerly crossed the site. No evidence was found. Limited groundwater strikes were observed indicating that these relate to discrete bodies of perched water. Groundwater ingress will have to be prevented during construction and GEA propose further groundwater monitoring to confirm the groundwater regime

5.10. It is noted that the basement layout contains kitchens, bathrooms and laundry rooms and this means that the basement drainage system will require protection against surcharging of the public sewers. It has been confirmed in the 2nd August 2016 email response that basement drainage will be pumped with a non-return valve fitted.

5.11. It is accepted that there are no significant impacts on either groundwater or slope stability.

Appendix 1: Residents' Consultation Comments

None

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Qualifications	Further information required on author experience in engineering geology and hydrogeology	Closed.	17th August 2016
2	Surface flow and flooding	Clarification on proposed attenuation measures for green field run-off as there are inconsistencies between the FRA and the structural / landscape drawings	Closed – Heyme Tillett Steel drawings 1247/SK01 P2 and SK02 P2 provide further detail on attenuation and clarification noted in email of 11/10/16.	21st October 2016
3	Stability	Unloading as a result of demolition does not appear to be considered	Closed.	17th August 2016
4	Stability	Modelling for damage assessment to be refined as discussed in Section 4	Closed – Whilst queries remain it is accepted that it should be possible to design and construct the temporary and permanent works to restrict damage to Burland Category 1. The final GMA should be agreed with the party wall surveyor.	21st October 2016
5	Stability	Clarification on wall embedment depth as discussed in Section 4	Closed.	17th August 2016
6	Surface flow and flooding	Basement contains bathrooms etc and details of protection against surcharging are required	Closed – Client has advised basement drainage is pumped and non-return valve fitted in email of 02 August 2016.	2nd August 2016

Appendix 3: Supplementary Supporting Documents

Email responses received

- From Savills containing HTS responses on surface water, Basement protection and ground movement analysis; dated 2nd August 2016
- From Savills containing HTS responses on surface water, And GEA on ground movement analysis; dated 11th October 2016

FW: 73-75 Avenue Road 2016/1808/P BIA 2nd review
Skelli-Yaoz, Tania to: LizBrown@campbellreith.com 02/08/2016 17:56
Cc: "camdenaudit@campbellreith.com"

Dear Liz,

In response to your email of 1/7 please see applicants' additional details below.

Please let me know if additional fee is required.

Thanks

Tania Skelli-Yaoz
Senior Planning Officer (Mon-Wed)

Telephone: 020 7974 6829

You can sign up to our new and improved planning e-alerts to let you know about new planning applications, decisions and appeals.
From: Pearce Gunne-Jones [mailto:PGunneJones@savills.com]
Sent: 02 August 2016 17:32
To: Skelli-Yaoz, Tania
Cc: Charlotte Handscomb
Subject: FW: 73-75 Avenue Road

Dear Tania,

Further to your email dated 6th July, please find below responses from the respective consultants in relation to the Basement Impact Assessment, which should hopefully address the comments received from your independent assessor.

The revised CMP should be sent through shortly.

I would be grateful if you could confirm this is now acceptable, prior to going on annual leave?

Kind regards,
Pearce

Pearce Gunne-Jones BA (Hons) MA MRTPI
Planner
Planning Central West

Savills, 33 Margaret Street, London, W1G 0JD

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Alun,

Please find attached responses to BIA queries in blue.

Are BIA Author(s) credentials satisfactory. Further information is required on the author's experience in regard
to experience in engineering geology and hydrogeology.

Authors credentials have not changed since last approval by Campbell Reith.

4.5. The site has been subject to surface water flooding in 2002 caused by excessive rainfall being unable to enter the public sewer network. The areas of hard surfaced areas and consequent surface water flow are increased by the current proposals. A Flood Risk Assessment has been carried out and a SUDS design is proposed including attenuation and control of flow from the site into the existing public sewer system. Site flows are to be limited to greenfield rates. The proposed attenuation location noted in the FRA does not accord with the landscaping proposals. Clarification is required on the nature of the attenuation which on the structural drawings is noted as being located beneath the basement slab.

The surface water attenuation is located at ground level at the front of each property (refer to SK01) This is provided using attenuation crates, which support the ground finishes above whilst containing within the cellar matrix the attenuated surface water.
In addition, each basement contains an storage tank designed to store the surface water which has been routed to the basement level in the event the pump fails. In normal use the tank is not used for attenuation purposes and discharges into the ground level attenuation crate at the front of the property.

4.6. It is noted that the basement layout contains kitchens, bathrooms and laundry rooms and this means that the basement drainage system will require protection against surcharging of the public sewers. No information on how this is to be achieved has been provided and further details are required.

Basement drainage is pumped and is fitted with a non return valve.

Regards

Andy

Andrew Elder
HEYNE TILLETT STEEL
4 Pear Tree Court, T: 020 7870 8050
London, EC1R 0DS M: 07908192752
hts.uk.com

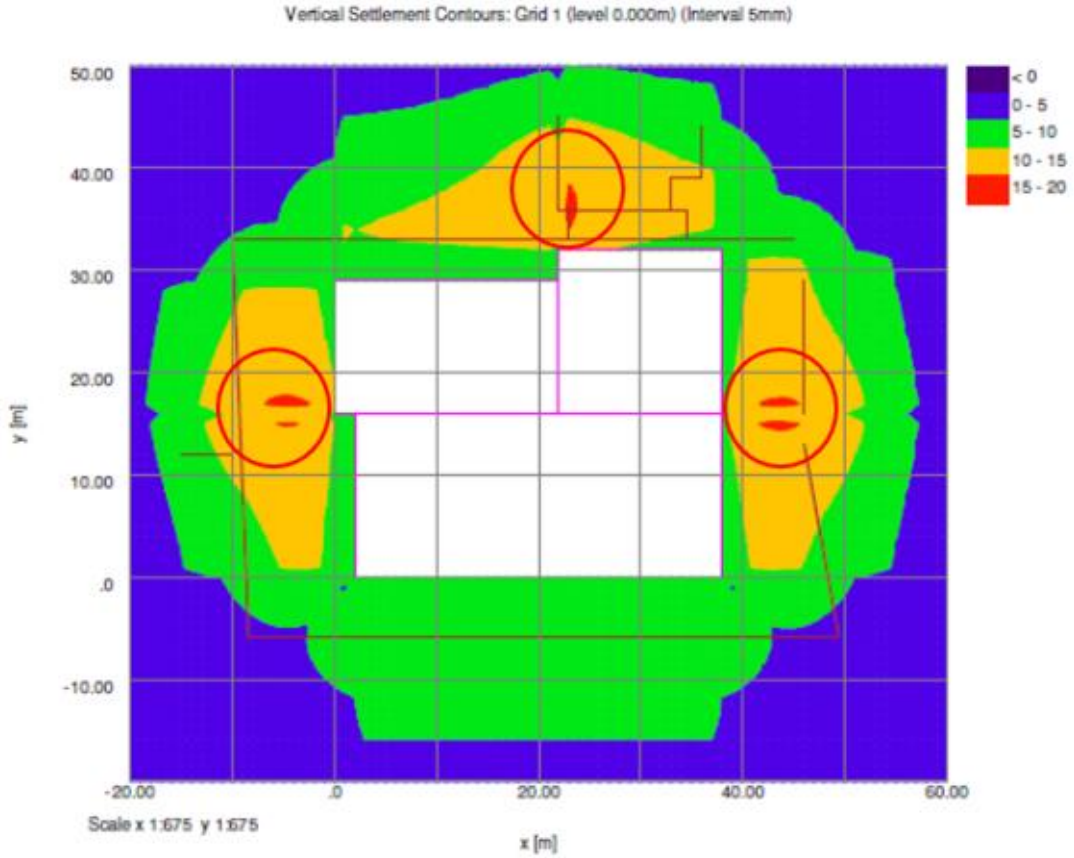
From: Matthew Penfold [mailto:Matthew@gea-ltd.co.uk]
Sent: 29 July 2016 16:54
To: Andrew Elder <AElder@hts.uk.com>; Neil Cameron <NCameron@hts.uk.com>
Cc: Steve Branch <Steve@gea-ltd.co.uk>; Aimee Bickerton <Aimee@mdesignlondon.com>; Alun Dawson <Alun@mdesignlondon.com>; Martin Cooper <Martin@gea-ltd.co.uk>
Subject: RE: 73-75 Avenue Road.

Andrew,

We have reviewed the comments made within the Campbell Reith Audit document and provide the following responses.

5.5 – The loads of the existing structures are currently supported on shallow spread foundation and only account for a relatively small area when compared to the overall basement excavations. The soils immediately around these structures will of course start to heave following demolition. However, as this area is entirely within the footprint of the proposed basement, such that these soils will be removed as part of the development, any potential impact will be quickly be superseded by the heave that will occur as a result of the 8.5 m deep excavations and therefore have negligible impact on the overall results.

5.6 – There appears to be a bit of a miss-interpretation of precisely what we meant by 'overlap' within our report. It is not the separate rectangles themselves that overlap, nor is it anything to do with the area in-between, as the comments in 4.11 of the audit suggest, but the areas beyond the basement where there is overlap in the predicted movements (see the circled areas below) that leads to an overestimation, as defined by the irregular areas of high movement (in red, with yellow beyond) which are not seen on the 'unbroken' wall along the bottom edge of the proposed basement. A similar issue is also seen in the contour plots displaying the horizontal movements and in both cases this issue is not affected by whether the corners are stiffened or not, so this does not represent a potential cause or solution to the issue.



With particular respect to the Western elevations of No 77, where Category 2 (Slight) damage has been predicted, it can clearly be seen that these structures cross through one of the circled areas and are therefore likely to have been affected by these overestimations. The more likely categories are expected to be more consistent with the similar structures at the eastern end of the extension and main building, where Category 1 (Very Slight) damage has been predicted.

As per the conclusions in our report, the results discussed above provide a conservative estimate of the behaviour of each of the sensitive structures and that in reality the predicted movements are unlikely to be fully realised. It is therefore considered that the predicted damage categories represent an overestimate and that the maximum damage potential is unlikely to exceed Category 1 (Very Slight).

It is therefore considered that the damage that will inevitably occur as a result of such an excavation will fall within the acceptable limits, although monitoring and adequate propping should still be implemented to ensure that no excessive movements occur that would lead to damage in excess of these limits.

For the purpose of the analysis it is assumed that the piled retaining walls will be multi-propped and will not be required to reach a certain depth in order to create a cut-off. Under such circumstances we would typically adopt an embedment of between 3.0 m and 4.0 m (depending on the depth of excavation), as this is typically the minimum embedment required in order to ensure stability.

Regards,

Matt

Geotechnical & Environmental Associates
Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

tel 01727 824666

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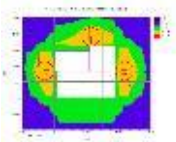

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73-75 Avenue Road - planning reference 2016/1808/P
Ros Graham
to:
'greggacheson@campbellreith.com'
11/10/2016 12:08
Cc:
"'LizBrown@campbellreith.com'", "'FatimaDrammeh@campbellreith.com'", "'Skelli-Yaoz@camden.gov.uk'"
Hide Details
From: Ros Graham <REGraham@savills.com>
To: "'greggacheson@campbellreith.com'" <greggacheson@campbellreith.com>
Cc: "'LizBrown@campbellreith.com'" <LizBrown@campbellreith.com>, "'FatimaDrammeh@campbellreith.com'" <FatimaDrammeh@campbellreith.com>, "'Skelli-Yaoz@camden.gov.uk'" <Skelli-Yaoz@camden.gov.uk>

Dear Gregg

I write further to your email of 25 August setting out your points of query in respect of the submitted BIA for the above planning application. All of the points have now been addressed except for 2 and 4 which are dealt with by this email and the associated attachments. I take each of the points in turn and set out the relevant responses accordingly:

2. Surface flow and flooding - the response does not provide the clarification requested. SK01 does not indicate cellular storage as noted and the provision of the basement attenuation is not clearly identified in the surface water management

Attached are drawings SK001 and SK002 which have been prepared by Heyne Tillett Steel and show the following in response to the above point:

SK001 - This shows the layout of Suds system which is created using stormblok modules beneath the driveway area of each property. These have been sized to provide the required attenuation as set out in the SWMP through the use of a Hydrobrake flow control manhole at the outlet.

SK002 – This shows the tank layout at basement (note that these tanks do not contribute to the attenuation volume and are include to provide the necessary storage for rainwater in the event that the pumps fail. The outlets from these pumps feeds into the attenuation tanks on SK001 to provide the required attenuation.

These drawings provide all the relevant information and details relating to the surface water management as requested in point 2 above.

4. Stability - Ground Modelling Assessment. Whilst there are queries on the ground movement analysis, it is accepted that the anticipated damage is likely to fall within Cat 1 . However there are areas where Cat 2 damage is expected. CPG4 requires mitigation measures where anticipated damage is Cat 1 or higher and the changes in attributes and impact re-evaluated following their inclusion.

Geotechnical & Environmental Associates who assisted in the preparation of the Basement Impact Assessment have reviewed the query set out in point 4 and make the following response:

"It is considered that the predicted movements in our existing ground movement assessment represent an overestimate, particularly the area where Category 2 (slight) damage has been predicted, such that the worst case movements are therefore unlikely to exceed Category 1 (Very Slight).

Furthermore, and as noted in our report and the previous response on this matter, monitoring and mitigation measures should be implemented to ensure that no unacceptable movements occur. Acceptable movements,

which will restrict damage within Category 1 (Very Slight), will need to be agreed in due course through the party wall agreement, although an outline of the measures should be included at this stage within the CMS.

At present the existing analysis is considered to represent a reasonable estimate of movements and offer a simple 'global' view of the movement contours around the site, which should be sufficient at this stage. Once a formal pile design has been undertaken, the results can be used to update the existing analysis by generating site specific ground movement curves that account for the temporary propping and will typically reduce movement predictions below the values used in this assessment."

The above provides an accurate and full response to both of the points raised by you and as such there should be no further outstanding issues on the Basement Impact Assessment.

I would be grateful if you can confirm receipt of this information and please do not hesitate to contact me should you wish to discuss the above further.

Kind regards

Ros

Ros Graham BA (Hons)
Associate
Planning

Savills, 33 Margaret Street , London W1G 0JD
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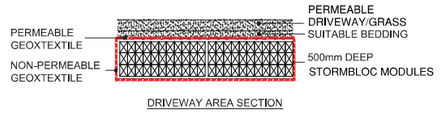
OUTLINE DRAINAGE DESIGN SHOWN ONLY

FINAL MANHOLE AND RAINWATER PIPE LOCATIONS TO BE CONFIRMED.

EXISTING SEWER DEPTH TO BE CONFIRMED.

REFER TO SURFACE WATER MANAGEMENT REPORT FOR ATTENUATION VOLUME DETAILS



DRIVEWAY AREA SECTION

LEGEND

- PERMEABLE AREA WITH ATTENUATION CRATES BELOW
- SW MANHOLE
- SW FLOW CONTROL MANHOLE
- PERFORATED PIPE
- CONVENTIONAL PIPE
- BASEMENT OUTLINE

SURFACE WATER MANHOLE

RWP

Rising main discarghes site attenuation area

PERFORATED PIPE

FLOW CONTROL CHAMBER - 5l/s

100Ø OUTFALL PIPE

EXISTING PUBLIC SEWER MANHOLE

SURFACE WATER MANHOLE

RWP

RWP

Rising main discarghes site attenuation area

PERFORATED PIPE

RWP

SURFACE WATER MANHOLE

100mm @ A1 (50mm @ A3)

NOTES

Rev	Date	Drawn	Eng	Amendments
P2	16.09.16	AE	NC	INFORMATION
P1	12.02.15	MS	NC	INFORMATION

HEYNE|TILLETT|STEEL
STRUCTURAL ENGINEERS

Job Name:
73 - 75 AVENUE ROAD
LONDON

Drawing Title:
SURFACE WATER MANAGEMENT STRATEGY LAYOUIT

Scale: 1:100 @ A1, 1:200 @ A3

Purpose of Issue: INFORMATION

Drawing No.: 1247 / SK01

Rev.: P2

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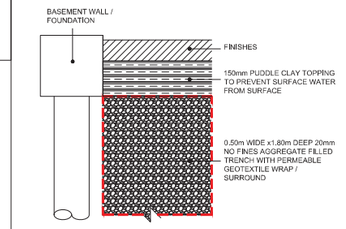
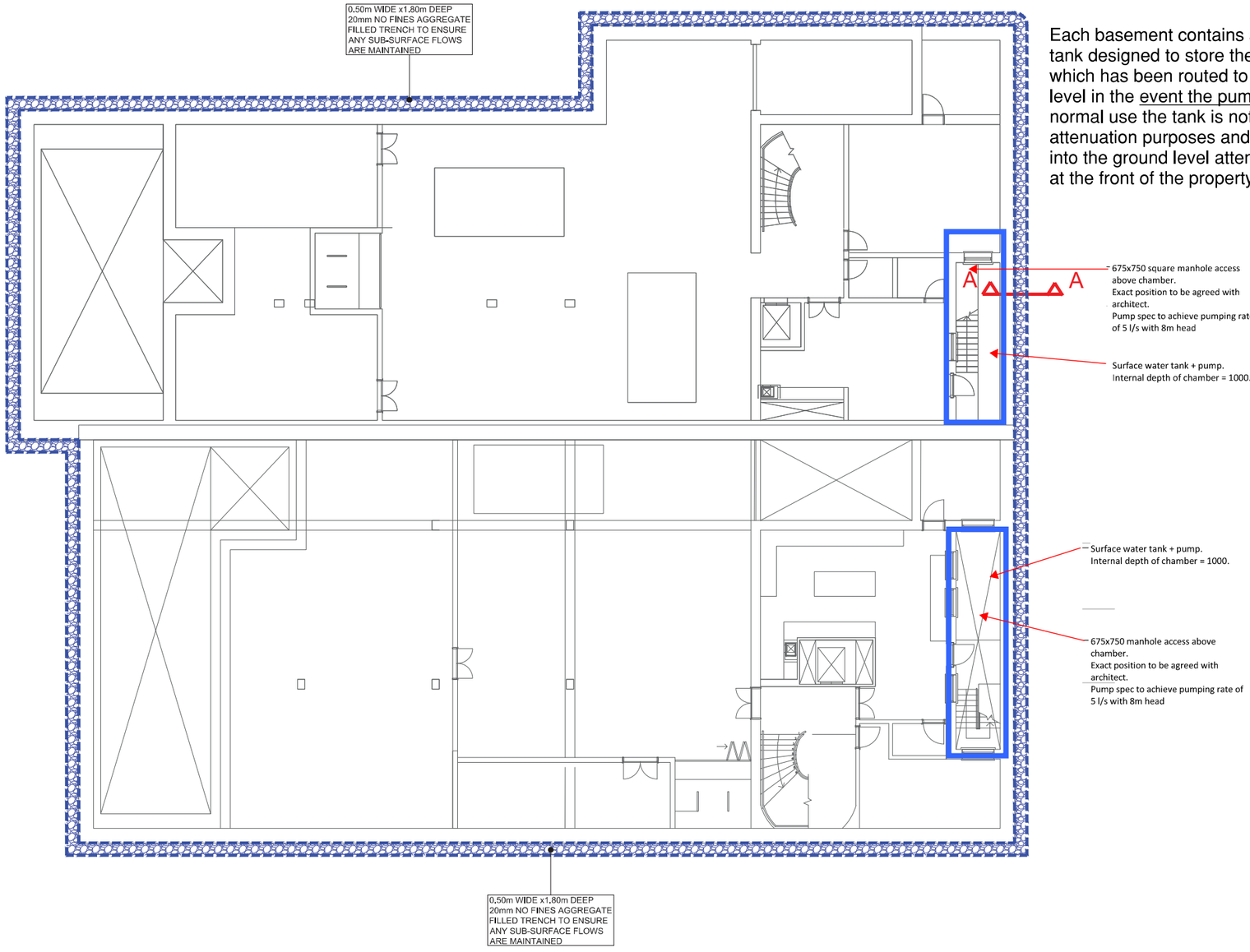
100mm @ A1 (50mm @ A3)

LEGEND

TRENCH ALONG BASEMENT WALL / FOUNDATIONS



SECTION A - A



Each basement contains an storage tank designed to store the surface water which has been routed to the basement level in the event the pump fails. In normal use the tank is not used for attenuation purposes and discharges into the ground level attenuation crates at the front of the property

NOTES

Rev	Date	Drawn	Eng	Amendments
P2	16.09.16	AE	NC	INFORMATION
P1	12.02.15	MS	NC	CONSTRUCTION ISSUE

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STRUCTURAL ENGINEERS

Job Name:
73 - 75 AVENUE ROAD
LONDON

Drawing Title:
SURFACE WATER MANAGEMENT STRATEGY BASEMENT LAYOUIT

Scale: 1:100 @ A1, 1:200 @ A3

Purpose of Issue: INFORMATION

Drawing No. 1247 / SK02

Rev. P2

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