

**Mallinson Sports Centre,  
London, N6 4PB**

**Basement Impact Assessment  
Audit**

For  
London Borough of Haringey

Project No.  
13979-05

Date  
October 2024

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## DOCUMENT HISTORY AND STATUS

| Revision | Date       | Purpose/<br>Status                                  | File Ref                                         | Author | Check | Review |
|----------|------------|-----------------------------------------------------|--------------------------------------------------|--------|-------|--------|
| P1       | 07/12/2023 | Preliminary                                         | 13979-05-CRH-XX-XX-GE-RP-Mallinson Sports Centre | RA     | EMB   | EMB    |
| P2       | 25/10/2024 | For planning                                        | 13979-05-CRH-XX-XX-GE-RP-Mallinson Sports Centre | ME     | EMB   | EMB    |
| P3       | 29/10/2024 | Corrections to paras 1.11, 4.15, 4.27, 4.28 and 5.8 | 13979-05-CRH-XX-XX-GE-RP-Mallinson Sports Centre | ME     | EMB   | EMB    |

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### Document Details

|                 |                                                                  |
|-----------------|------------------------------------------------------------------|
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| Project Number  | 13979-05                                                         |
| Project Name    | Mallinson Sports Centre, London, N6 4PB                          |
| Revision        | P3                                                               |
| File Ref        | 13979-05-CRH-XX-XX-GE-RP-Mallinson Sports Centre                 |

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## 1.0 NON-TECHNICAL SUMMARY

- 1.1 CampbellReith was instructed by London Borough of Haringey, (LBH) to carry out an audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for Mallinson Sports Centre, London N6 4PB, planning reference HGY/2023/0338. The BIA revision reviewed for this audit report is Rev 06, reference 3244-A2S-XX-XX-RP-Y-0002-06.
- 1.2 The scope of the audit of the Basement Impact Assessment was agreed with Haringey as follows:
- Review for compliance with planning guidance and conditions stipulated by the London Borough of Haringey (policy DM8 of Haringey's Local Plan and policy DH7 of the Highgate Neighbourhood Plan).
  - Assess technical sufficiency of the submission, robustness of impact assessments and conclusions, and whether mitigation, where necessary, is described to avoid adversely affecting land stability and local ground and surface water conditions (noting that the Flood Risk Assessment has not been audited).
  - Present audit adopting the procedure presented in the Camden Planning Guidance: Basements (CPG) and Terms of Reference for BIA audits agreed with Camden.
- 1.3 The proposal includes the construction of two basements to depths of 3.70m and 4.00m below ground level. One basement will form the new Fives Court to the south (Phase 2A) with the other proposed to be beneath the new Sports Hall to the north (Phase 2B). The proposal also includes a sunken amphitheatre in the adjacent playing field.
- 1.4 Despite not comprising a basement, information regarding the amphitheatre is included in the revised BIA and the impact of its construction on stability has been considered. A separate Flood Risk Assessment (FRA) has been prepared and is deemed the more suitable document for assessing the impacts of the amphitheatre on ground and surface water.
- 1.5 The qualifications of the individuals involved in the production of the BIA are in accordance with LBH guidance.
- 1.6 Non-technical summaries are presented in the revised BIA.
- 1.7 The screening and scoping assessments were updated as part of the revised BIA, supported by desk study and intrusive ground investigation information which is included in Appendix C of the revised BIA. The ground model outlined in the screening responses has been updated in the revised BIA to align with the information provided in the BIA appendices.
- 1.8 The BIA confirms that the site is underlain by Made Ground, Head Deposits, Claygate Member and London Clay Formation. The geotechnical parameters are presented in the revised BIA and are accepted as being reasonable reflection of the ground conditions.
- 1.9 The BIA assumes that the basement construction will follow a top-down sequence with the excavation retained by embedded contiguous piled walls. An outline construction sequence

has been presented as part of the revised BIA in an updated Construction Management Plan, dated August 2024 (Appendix I).

- 1.10 A Flood Risk Assessment has been carried out by Eden Young attached in Appendix E of the revised BIA but has not been reviewed as part of this audit.
- 1.11 The hydrogeological assessment (Appendix H) suggests that the basement proposals may cause the groundwater level to rise by around 75mm upstream (southeast) and decrease by around 50mm downstream (northwest) at the neighbouring properties.
- 1.12 The stability assessment confirmed the removal of trees will not impact neighbouring properties (Appendix D).
- 1.13 A Ground Movement Assessment (Appendices F and G) has been undertaken to assess the impact on the neighbouring properties. The Building Damage Assessment predicts that damage to neighbouring buildings is not expected to exceed Burland Category 1 (Very Slight).
- 1.14 The GMA confirmed no unacceptable impacts to highways.
- 1.15 The GMA report indicates that a project specific monitoring scheme and action plan will be implemented. This has not been provided as part of the BIA submission.
- 1.16 Technical objections have been raised by neighbours to the scheme, which correspond to some queries raised during the audit process. These objections are discussed in Section 4 and Appendix 1 of this audit report.
- 1.17 Considering the revised BIA and additional information presented, it can be confirmed that, subject to the usual planning conditions, the BIA meets the requirements of Policy DM18 of Haringey's Development Management Plan, Policy DH7 of the Highgate Neighbourhood Plan, and Camden Planning Guidance: Basements.

## 2.0 INTRODUCTION

2.1 CampbellReith was instructed by London Borough of Haringey (LBH) on 17<sup>th</sup> November 2023 to carry out an audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for Mallinson Sports Centre, London N6 4PB, planning reference HGY/2023/0338.

2.2 The audit reviewed the BIA for potential impact on land stability and local ground and surface water conditions arising from basement development. An audit of land quality/contamination issues has not been undertaken and is outside the scope of this report.

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

- Development Management DPD. July 2017.
- Policy DH7 of the Highgate Neighbourhood Plan. May 2017.

2.4 The BIA should demonstrate that the scheme:

- a) maintains the structural stability of neighbouring properties;
- b) does not adversely affect drainage and run-off or cause other damage to the water environment;
- c) does not have a cumulative impact 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 and to make recommendations for the detailed design.

2.5 Although the site lies within the London Borough of Haringey, it was agreed that the audit of the screening, scoping and impact assessment would follow the procedure presented in the London Borough of Camden (LBC) Planning Guidance: Basements as it is widely known and is considered to provide a robust approach to the issues of concern.

2.6 The site is within the Highgate Neighbourhood Area.

2.7 LBH's Audit Instruction described the planning proposal as "Redevelopment of Mallinson Sport Centre, to include: 1) Partial demolition of existing structure, squash and fives buildings; 2) Refurbishment and extension of the remaining facilities, comprising new part single basement, new double height sports hall and new entrances, new teaching classrooms, offices, gym and exercise studios, circulation and ancillary accommodation; 3) New basement level outdoor covered fives courts; 4) External sunken oval sports pitch; and 5) Associated landscaping and improved provision for emergency services and servicing".

2.8 CampbellReith accessed LBH's Planning Portal on 28<sup>th</sup> November 2023 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment Report by Pringuer-James Consulting Engineers, reference L2384, revision A, dated June 2022.

- Drainage and SuDS Statement by Pringuer-James Consulting Engineers, reference L2384-REP-002, revision 04, dated 1<sup>st</sup> November 2022.
- Design and Access Statement by Ed Toovey Architects, dated January 2023.
- Flood Risk Assessment by EdenvaleYoung, reference EVY0753, revision F, dated January 2023.
- Surface Water Modelling Report by EdenvaleYoung, reference EVY0753, revision C, dated July 2022.
- Heritage Statement by Bidwells LLP, dated November 2022.
- Arboricultural Impact Assessment by SJ Stephens Associates, reference 380.1, dated 31<sup>st</sup> May 2022.
- Archaeological Desk-Based Assessment by Compass Archaeology dated October 2022.
- Utilities Assessment by Peter Deer and Associates, dated January 2023.
- Ecology Report by Applied Ecology Ltd, reference AEL0983, revision 2.0 dated 8<sup>th</sup> November 2023.
- Landscape Strategy Report by Robert Myers Associates, reference 733.01(PR)001, revision D, 21<sup>st</sup> November 2022.
- Existing and Proposed Architectural Drawings by Ed Toovey Architects including:
  - Location Plan existing
  - GIA and GEA Proposed and Existing Areas
  - Ground Floor Plan Level 2 Demolitions
  - Basement Plan Level 1 proposed
  - Part Ground Floor Plan Level 2 existing Interface of Proposals with MOL
  - Elevation existing and proposed (north/east/west/south)
  - Existing and proposed sections AA, BB, CC, DD, EE & FF
- Consultation responses. Those of note include:
  - Independent Review of BIA, FRA, SUDs by Haycock Environmental Consultants Ltd., revision 2.05, dated 15<sup>th</sup> June 2023.
  - Objection Letter from Highgate Society dated 9<sup>th</sup> May 2023.
  - Objection Letter from Highgate Society dated 13<sup>th</sup> September 2023.
  - Objection Letter from 18 Broadlands Road (Management) Ltd.

2.9 To address the queries raised in the previous version of this audit report (D1) and subsequent correspondence (refer to query tracker in Appendix 3). CampbellReith was later provided with the following relevant documents:

- Basement Impact Assessment Report by A-squared Studio Engineers Ltd, reference 3244-A2S-XX-XX-RP-Y-0002-02 to 3244-A2S-XX-XX-RP-Y-0002-06. Revision 6 (the subject of this audit) contained the following documents:
  - Site Investigation Report by Soil Consultants, reference 9916/JRCP/OT, first issue, dated 22<sup>nd</sup> February 2016.
  - Site Investigation Report by Soil Consultants, reference 9916A/MR/JRCP, first issue, dated 6<sup>th</sup> February 2019.
  - Site Investigation Report by Soil Consultants, reference 10930/OS, first issue, dated 22<sup>nd</sup> February 2024.
  - Arboriculturist Letter from S J Stephens Associates, dated 16<sup>th</sup> August 2024.
  - Flood Risk Assessment by EdenvaleYoung, reference EVY0753, revision J, dated 11 June 2024.
  - Buildings Ground Movement Assessment Report by A-squared Studio Engineers Ltd, reference 3244-A2S-XX-XX-RP-Y-0001-5dated October 2024.
  - Hydrogeological Assessment by A-squared Studio Engineers Ltd, reference 3244-A2S-XX-XX-TN-Y-0001-00, dated 24<sup>th</sup> August 2024.
  - Outline Construction Management Plan by Blue Sky Building, dated August 2024.
  - Structural Drawings by Pringuer-James Consulting Engineers.

### 3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

| Item                                                                                                                                                               | Yes/No/NA | Comment                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------------------------------------------------------------------|
| Are BIA Author(s) credentials satisfactory?                                                                                                                        | Yes       | The authors of the revised BIA hold the appropriate qualifications. |
| Is data required by Cl.233 of Arup's Guidance for Subterranean Development 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 plans/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:<br>Have appropriate data sources been consulted?<br>Is justification provided for 'No' answers?                                          | Yes       | Section 4.2 of the revised BIA.                                     |
| Hydrogeology Screening:<br>Have appropriate data sources been consulted?<br>Is justification provided for 'No' answers?                                            | Yes       | Section 4.1 of the revise BIA.                                      |
| Hydrology Screening:<br>Have appropriate data sources been consulted?<br>Is justification provided for 'No' answers?                                               | Yes       | Section 4.3 of the revised BIA.                                     |
| Is a conceptual model presented?                                                                                                                                   | Yes       | Section 6.0 of the revised BIA.                                     |

| Item                                                                               | Yes/No/NA | Comment                                                                                                                                                                                                                             |
|------------------------------------------------------------------------------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Land Stability Scoping Provided?<br>Is scoping consistent with screening outcome?  | Yes       | Section 5.0 of the revised BIA.                                                                                                                                                                                                     |
| Hydrogeology Scoping Provided?<br>Is scoping consistent with screening outcome?    | Yes       | Section 5.0 of the revised BIA.                                                                                                                                                                                                     |
| Hydrology Scoping Provided?<br>Is scoping consistent with screening outcome?       | Yes       | Section 5.0 of the revised BIA.                                                                                                                                                                                                     |
| Is factual ground investigation data provided?                                     | Yes       | Ground Investigation Reports presented under Appendix C of the revised BIA.                                                                                                                                                         |
| Is monitoring data presented?                                                      | Yes       | Appendix C of the revised BIA.                                                                                                                                                                                                      |
| Is the ground investigation informed by a desk study?                              | Yes       | Appendix C of the revised BIA.                                                                                                                                                                                                      |
| Has a site walkover been undertaken?                                               | Yes       | Site walkover undertaken as part of the desk study and ground investigation report.                                                                                                                                                 |
| Is the presence/absence of adjacent or nearby basements confirmed?                 | No        | The neighbouring properties are assumed to be founded at ground level for the ground movement/building damage assessment. For the hydrogeological assessment, it is assumed that all surrounding structures have a single basement. |
| Is a geotechnical interpretation presented?                                        | Yes       | Section 6.0 of the revised BIA.                                                                                                                                                                                                     |
| Does the geotechnical interpretation include information on retaining wall design? | Yes       |                                                                                                                                                                                                                                     |

| Item                                                                                                                                         | Yes/No/NA | Comment                                                                                                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Are reports on other investigations required by screening and scoping presented?                                                             | Yes       | Flood Risk Assessment, Ground Investigation Reports, Arboriculturist Letter and Ground Movement Assessment Report.                                                                                                                  |
| Are the baseline conditions described, based on the GSD?                                                                                     | Yes       |                                                                                                                                                                                                                                     |
| Do the baseline conditions consider adjacent or nearby basements?                                                                            | Yes       | The neighbouring properties are assumed to be founded at ground level for the ground movement/building damage assessment. For the hydrogeological assessment, it is assumed that all surrounding structures have a single basement. |
| Is an Impact Assessment provided?                                                                                                            | Yes       | Section 8.0 of the revised BIA.                                                                                                                                                                                                     |
| Are estimates of ground movement and structural impact presented?                                                                            | Yes       | Section 5.0 of the revised GMA report.                                                                                                                                                                                              |
| Is the Impact Assessment appropriate to the matters identified by screening and scoping?                                                     | Yes       |                                                                                                                                                                                                                                     |
| Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?                               | Yes       | Dewatering and ground movements monitoring.                                                                                                                                                                                         |
| Has the need for monitoring during construction been considered?                                                                             | Yes       | Section 6.0 of the revised BIA.                                                                                                                                                                                                     |
| 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       |                                                                                                                                                                                                                                     |

| Item                                                                                                              | Yes/No/NA | Comment                               |
|-------------------------------------------------------------------------------------------------------------------|-----------|---------------------------------------|
| 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       | Section 6.0 of the revised GMA report |
| Are non-technical summaries provided                                                                              | Yes       | Section 1.0 of the revised BIA        |

## 4.0 DISCUSSION

- 4.1 The BIA has been carried out by A-squared Studio Engineers on behalf of Pringuer-James Consulting Engineers (PJCE). The individuals involved hold the qualifications required by LBH policy.
- 4.2 A Construction Management Plan (CMP) has been produced by Blue Sky Building which reflects the proposed construction methodology.
- 4.3 Non-technical summaries are presented in the revised BIA. A site walkover was conducted as part of the desk study and ground investigation, and this is referenced in the ground investigation report included in Appendix C of the revised BIA.
- 4.4 The proposed redevelopment of the site includes the partial demolition of existing structures and the refurbishment and extension of the remaining facilities along with the construction of two basements. One basement will form the new Fives Court to the south (Phase 2A) directly adjacent to the existing Sports Hall, with a maximum depth of approx. 4.00m. The other basement will be beneath the new Sports Hall to the north (Phase 2B) directly adjacent to the existing Pool Hall Block, with a maximum depth of approximately 3.70m. Both basements will be formed with contiguous piled walls with internal reinforced concrete (RC) walls except for the southern edge of the new five courts, which will be supported by in-situ RC retaining walls.
- 4.5 The proposed development also includes construction of a 1.50m deep sunken amphitheatre in the adjacent playing fields that is to act as a flood storage attenuation. Information regarding the amphitheatre is included in the revised BIA, and it is noted that, while not a basement, it may still impact stability, hydrogeology, and hydrology. A Flood Risk Assessment (FRA) has been prepared considering the impact of the amphitheatre on ground and surface water. These aspects of the development have not been reviewed as part of this audit.
- 4.6 The BIA report outlines that Broadlands Road and Bishopswood Road run along the north and west boundaries of site respectively. To the south of the site is open ground used as playing fields, and to the east are sports grounds belonging to Highgate School.
- 4.7 The following neighbouring buildings are included in the Ground Movement Assessment (GMA) and Hydrogeological Assessment: Field House, Pre-Prep School, Grindal House, and Nos. 19, 20c, 21, 22, 22a, 23, 24, 25 and 27 Broadlands Road. These buildings are conservatively assumed to be founded at ground level for the purposes of ground movement and damage impact assessments. For the hydrogeological assessment, they are conservatively assumed to have a 4m deep single basement.
- 4.8 The screening and scoping assessments were updated as part of the revised BIA. The screening assessment now identifies that the site is underlain by Head Deposits and the Claygate Member, both classified as Secondary A aquifers. It also confirms that the proposed basements will extend below the water table and that the development will lead to an increase in hardstanding. The updated scoping assessment includes the proximity of the site to highways and indicates that this aspect will be evaluated in the Ground Movement Assessment (GMA).

- 4.9 A desk study has been undertaken as part of the ground investigation and is included in Appendix C of the revised BIA. The ground model outlined in the screening responses has also been updated in the revised BIA to align with the information provided in the BIA appendices.
- 4.10 The ground investigation reports, including factual data and groundwater monitoring results, are presented in the revised BIA and have been used to develop the site's ground model.
- 4.11 Intrusive site investigations were carried out by Soil Consultants in four phases. The initial phases took place in February 2016 and February 2019, prior to the preparation of the BIA, to investigate the ground conditions surrounding the school buildings. A third phase was undertaken in February 2024 to cover the flood storage basin area which will be formed through cut and fill operation. No groundwater monitoring was undertaken as part of these phases of the GI, so another phase was undertaken in August 2024 which comprised additional boreholes near the school buildings and proposed flood storage basin, with groundwater monitoring included. The ground conditions in the revised BIA are described as comprising 0.30m thick Made Ground followed by 2.10m of Head Deposits, 5.10m of Claygate Member and London Clay Formation to the depth of the investigation.
- 4.12 The GI borehole logs frequently mention groundwater seepages or inflows at shallow depths, as shallow as 0.30m bgl. During the investigation in February 2024, the GI report noted that a large portion of the site was waterlogged, with pooled water on the ground surface. Due to the very soft ground conditions, access was limited, preventing the completion of boreholes BH01 and BH02. Although monitoring wells appear to have been installed in several boreholes, no groundwater monitoring data was recorded prior to August 2024.
- 4.13 Groundwater monitoring was carried out between 08 August 2024 and 28 August 2024 over 4 visits, and it was found to be present between c. 105m to 108mOD (1.25m to 2.70m bgl) flowing in a north westerly direction.
- 4.14 Section 5.1.8 of the revised BIA states the Claygate Member at the location of the site is a cohesive material. Any groundwater detected during the site investigation is likely perched water within the sandy horizons of this unit and is not able to maintain any significant groundwater flow.
- 4.15 A site-specific hydrogeological assessment, conducted using PLAXIS 3D, evaluated the cumulative impact of both existing and proposed basements on the groundwater regime. The updated assessment considered the additional groundwater and surface water observations and confirmed the proposed basement will obstruct groundwater flow, diverting it around the development. This is predicted to result in a rise in groundwater elevation upstream (southeast) and a decrease downstream (northwest). The maximum groundwater head rise was reported to be around 75mm, while the maximum fall was around 50mm at the neighbouring properties. The assessment concluded that the wider hydrogeological regime would remain largely unchanged after the construction of the proposed basement.
- 4.16 The revised BIA indicates that the site is susceptible to surface water flooding. It confirms that the flood storage basin (sunken amphitheatre) and earth bund have been designed to intercept and manage water flowing from the upstream catchment area, thereby mitigating

the surface water flood risk. As a result, the risk of flooding to neighbouring properties is reported to either remain the same or decrease. A Flood Risk Assessment has been carried out by Edenvale Young, attached in Appendix E of the revised BIA but not reviewed as part of this audit.

- 4.17 A response from Thames Water, available on the planning portal, dated 8<sup>th</sup> March 2023 states that they would not have any objection to the planning application in respect of foul drainage. With regards to surface water drainage, Thames Water advises that discharge to a public sewer requires prior approval from Thames Water Developer Services.
- 4.18 The Thames Water response also includes a note to highlight that there are public sewers crossing or close to the development. Any impact on underground assets within the zone of influence of the basement is outside the scope of this report but will require approval from the asset owner.
- 4.19 The screening in the original BIA submission identified that the proposed basements are within 5m of a highway and significantly increase the differential depths of foundations to neighbouring properties. Clarification was sought as to the anticipated differential depth with the Pool Hall Block. The revised BIA clearly states the assumptions made with respect to foundations depths and the query is no longer relevant.
- 4.20 Section 7 of the revised BIA details that the basement construction will follow a top-down sequence, with the excavation supported by a 7.80m long, 450mm diameter contiguous piled wall spaced at 600mm centre-to-centre. This wall is not expected to be load-bearing, and the basement will remain largely unpropped in its permanent condition. Groundwater control will be managed through pumping during excavation, along with the injection of an inert material behind the contiguous piled wall to prevent any locally increased rates of groundwater inflow through finite granular horizons or bands.
- 4.21 The CMP contained within Revision 06 of the BIA reflects the proposed scheme.
- 4.22 The geotechnical parameters presented in the revised GMA report are considered appropriately conservative. Outline retaining wall calculations were performed using WALLAP.
- 4.23 The revised BIA evaluated the impact of tree removal on neighbouring properties and concluded that it would be insignificant. There is little evidence of soil desiccation on-site, and neighbouring properties lie outside the root zones of the trees to be felled. Additionally, the properties are at a lower elevation due to the site's slope. The Arboriculturist Letter supports this, noting that the trees being removed for the flood storage basin are 59m from properties on Broadlands Road and 16m from the tennis court. The trees on Bishopswood and Broadlands Roads are separated by roads, so their removal will not adversely affect adjacent properties.
- 4.24 A Ground Movement Assessment (GMA) and damage assessment are provided to demonstrate that ground movements and consequential damage to neighbouring properties will meet the requirements of LBH's policy and Highgate Neighbourhood plan.
- 4.25 The GMA assessed the impacts of various construction stages using two methods: analysing the effects of unloading, overburden removal, demolition, and additional structural loading

with PDisp; and evaluating wall-induced ground movements and excavation movements using empirical CIRIA curves in XDisp.

- 4.26 For the latter, an analysis of the retaining walls was carried out using the WALLAP software assuming an unpropped retaining wall solution led for the temporary stage and allowing groundwater to rise to ground level in the long term. Building damage was assessed using XDisp but with the ground movements increased over the standard predictions for low-stiffness walls in stiff clays to reflect the WALLAP analyses. Ground movements associated with the installation of the contiguous piled wall were modelled using the curves for contiguous pile walls in stiff clay.
- 4.27 The results of the Building Damage Assessment currently indicate damage to neighbouring buildings will not exceed Category 1 (Very Slight) for all but a portion of two walls of "27 Broadlands Road" where Category 2 (Slight) damage is predicted. For these particular walls, the damage category was reduced to Burland Category 0 (Negligible) by combining two segments of wall. Noting that the segments of wall predicted to experience Category 2 damage were insignificant (<10mm in an overall length of more than 16m and c200mm in a wall of 9.50m length), combining these segments is deemed acceptable in this case.
- 4.28 An assessment of the impact of the proposed development on the adjacent roads has been carried out as part of the GMA and it included Broadlands Road and Bishopswood Road. The BIA reported displacements along the neighbouring highways to be no more than 10mm both horizontally and vertically.
- 4.29 The GMA report indicates that a project-specific monitoring regime and Action Plan will be implemented. This plan will outline lines of responsibility, establish trigger levels consistent with those in the GMA, and define appropriate mitigation measures. These have not been provided as part of the BIA submission.
- 4.30 A number of technical objections have been raised by neighbours to the scheme, many of which correspond with queries raised by this audit. Objection letters issued by The Highgate Society Planning Committee on 9<sup>th</sup> May and 13<sup>th</sup> September 2023 and by 18 Broadlands Road (Management) Ltd (undated) also outline concerns that the hydrology assessment within the BIA has not considered suitable sources of information; these include assessments of neighbouring sites undertaken by Alan Baxter and Haycock Environmental Consultants Ltd (HECL). In addition, an independent review of the BIA was carried out by HECL issued in June 2023. The report raises concerns regarding the flood risk mitigation measures involving using the sunken amphitheatre as a flood attention basin and highlights that the management of groundwater has not been considered in the BIA.
- 4.31 The current revision of the BIA (06) has been updated to reflect concerns of waterlogging and shallow groundwater/surface water observations raised by neighbours. The contribution of the amphitheatre to flood risk mitigation is not considered as part of this audit.

## 5.0 CONCLUSIONS

- 5.1 The proposal includes the construction of two basements to depths of 3.70m and 4.00m below ground level. One basement will form the new Fives Court to the south (Phase 2A) with the other proposed to be beneath the new Sports Hall to the north (Phase 2B). The proposal also includes a sunken amphitheatre in the adjacent playing field.
- 5.2 The qualifications of the individuals involved in the production of the BIA are in accordance with LBH guidance. Non-technical summaries are presented in the revised BIA.
- 5.3 Information regarding the amphitheatre is included in the revised BIA. A separate Flood Risk Assessment (FRA) has been prepared which considers the mitigation offered for surface water flows by the amphitheatre. It is not included in this audit.
- 5.4 The screening and scoping assessments were updated as part of the revised BIA, supported by desk study and intrusive ground investigation information.
- 5.5 The BIA confirms that the site is underlain by Made Ground, Head Deposits, Claygate Member and London Clay Formation.
- 5.6 The BIA assumes that the basement construction will follow a top-down sequence with the excavation retained by embedded contiguous piled walls. An outline construction sequence has been presented as part of the revised BIA and in a new Construction Management Plan.
- 5.7 A desk study has been undertaken as part of the ground investigation and is included in Appendix C of the revised BIA. The ground model outlined in the screening responses has also been updated in the revised BIA to align with the information provided in the BIA appendices.
- 5.8 The hydrogeological assessment suggests that groundwater may rise by around 75mm upstream (southeast) and decrease by around 50mm downstream (northwest) at the neighbouring properties.
- 5.9 The geotechnical parameters are presented in the revised BIA and are accepted as being reasonable reflection of the ground conditions.
- 5.10 The BIA confirmed the removal of trees is not expected to impact neighbouring properties.
- 5.11 A Ground Movement Assessment has been undertaken to assess the impact on the neighbouring properties. The Building Damage Assessment shows that damage to neighbouring buildings is not expected to exceed Burland Category 1 (Very Slight). The GMA confirmed no unacceptable impacts to highways.
- 5.12 The GMA report indicates that a project specific monitoring scheme and action plan will be implemented. This has not been provided as part of the BIA submission.
- 5.13 Technical objections have been raised by neighbours to the scheme and are discussed in Section 4 and Appendix 1 of this audit report.
- 5.14 Considering the revised BIA and additional information presented, it can be confirmed that, subject to the usual planning conditions, the BIA meets the requirements of Policy DM18 of

Haringey's Development Management Plan, Policy DH7 of the Highgate Neighbourhood Plan,  
and Camden Planning Guidance: Basements.



CampbellReith  
consulting engineers

## Appendix 1

### **Residents' Consultation Comments**

### Residents Consultation Comments

| Surname             | Company/ Address | Date                      | Issued Raised                                                                                                                                                                                                                                                                                                     | Response                                                                                                                                   |
|---------------------|------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Pierce              |                  | 18/04/2023                | The proposed mitigation measures for surface water management may negatively impact the surface water flow in the area.                                                                                                                                                                                           | Outside the scope of this audit.                                                                                                           |
| Koritsas/ Hammerson | Highgate Society | 09/05/2023 and 13/09/2023 | The surface water flow to the neighbouring properties (specifically the gardens) may be impacted.<br>Land stability (specifically neighbouring foundations) may be impacted.<br>Previous investigations, in proximity to site, have identified shallow groundwater flow which has not been identified in the BIA. | Surface water is outside the scope of this audit. Stability and groundwater impacts have been assessed and reported to comply with policy. |
| Menton              |                  | 12/05/2023                | The surface water flow may be negatively impacted in the surrounding area.                                                                                                                                                                                                                                        | Outside the scope of this audit.                                                                                                           |
| Bitran              |                  | 16/05/2023                |                                                                                                                                                                                                                                                                                                                   |                                                                                                                                            |
| O'Brien & Carey     |                  | 19/05/2023                | The subterranean flow may be impacted in the surrounding area.                                                                                                                                                                                                                                                    | Groundwater impacts have been assessed and reported to comply with policy.                                                                 |

| Surname                      | Company/ Address                      | Date       | Issued Raised                                                                                                                                                                                                                                                                                                                                                                          | Response                                                                                                                                                                                                                                      |
|------------------------------|---------------------------------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Highgate Neighbourhood Forum |                                       | 22/05/2023 | The subterranean flow may be impacted in the surrounding area.                                                                                                                                                                                                                                                                                                                         | Groundwater impacts have been assessed and reported to comply with policy.                                                                                                                                                                    |
| Haycock                      | Haycock Environmental Consultants Ltd | 15/06/2023 | <p>The proposed mitigation measures for surface water management may negatively impact the surface water flow and subterranean flow in the area.</p> <p>The ground model is not accurate and contradicts published guidance and previous investigations carried out in proximity to the site.</p> <p>The development may impact the subterranean flow around the surrounding area.</p> | <p>Surface water is outside the scope of this audit. The ground model has been updated to reflect site specific ground investigation information. Impacts to subterranean flows have been updated and are reported to comply with policy.</p> |

| Surname                             | Company/ Address | Date       | Issued Raised                                                                                                                                                                                                                                                                                                                                             | Response                                                                                                                                                                                                                                      |
|-------------------------------------|------------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Highgate Society                    |                  | 13/09/2023 | <p>The proposed mitigation measures for surface water management may negatively impact the surface water flow and subterranean flow of the area.</p> <p>The ground model is not accurate and contradicts findings from previous investigations carried out in proximity to the site.</p> <p>The subterranean flow may be impacted by the development.</p> | <p>Surface water is outside the scope of this audit. The ground model has been updated to reflect site specific ground investigation information. Impacts to subterranean flows have been updated and are reported to comply with policy.</p> |
| 18 Broadlands Road (Management) Ltd |                  | Not dated  | <p>Surface water flow may be impacted in the surrounding area.</p> <p>Land Stability (specifically neighbouring foundations) may be impacted.</p> <p>Previous investigations carried out in proximity to site have identified shallow groundwater flow which has not been discussed in the BIA.</p>                                                       | <p>Surface water is outside the scope of this audit. The ground model has been updated to reflect site specific ground investigation information. Impacts to subterranean flows have been updated and are reported to comply with policy.</p> |

## Appendix 2

### **Audit Query Tracker**

Audit Query Tracker

| Query No | Subject            | Query                                                                                                                                                                                                | Status     | Date closed out |
|----------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------------|
| 1        | Qualification      | The subterranean and land stability assessments should be reviewed by qualified professionals as per LBH guidance.                                                                                   | Closed out | September 2024  |
| 2        | BIA                | Provide non-technical summaries within the BIA and clarify if a site walkover has been undertaken.                                                                                                   | Closed out | September 2024  |
| 3        | BIA                | Include consideration of the impacts of the sunken amphitheatre to the subterranean flow, land stability and surface flow & flooding.                                                                | Closed out | September 2024  |
| 4        | Ground Conditions  | Provide the ground investigation reports including groundwater monitoring data.                                                                                                                      | Closed out | September 2024  |
| 5        | Ground Model       | Undertake a review of available desktop study and site investigation information (to include suitable data sources) and produce a revised ground model that is consistent and accurate.              | Closed out | September 2024  |
| 6        | Land stability     | Revise the screening and scoping responses following the ground model being updated.                                                                                                                 | Closed out | September 2024  |
| 7        | Subterranean Flow  | Revise the screening and scoping responses following the ground model being updated.                                                                                                                 | Closed out | September 2024  |
| 8        | Surface water flow | Update screening response of Q6 to reflect current conditions and bring through to scoping. Ensure mitigation methods are consistent with the Flood Risk Assessment and Drainage and SuDS Statement. | Closed out | September 2024  |
| 9        | Construction       | Provide further details of the construction methodology of the basements and justification that the proposed methodology is suitable for the ground conditions present at the site.                  | Closed out | October 2024    |
| 10       | Impact Assessment  | Confirm the distance and foundation depths of the neighbouring properties.                                                                                                                           | Closed out | September 2024  |

| Query No | Subject           | Query                                                                                                                                                                                                                                                     | Status     | Date closed out |
|----------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------------|
| 11       | Impact Assessment | Clearly identify any structures and/or infrastructures potentially affected by the development. Undertake a ground movement assessment and provide a building damage assessment using suitably cautious or moderately conservative engineering estimates. | Closed out | October 2024    |

## Appendix 3

### **Supplementary Supporting Documents**

Audit Query Tracker and  
Correspondence

| Query No. | Subject            | Query                                                                                                                                                                                                                                                     | Agreed action                                                                                                                                                                                                 | CRIH Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Status as of 11.07.24 | Agreed action         | Status as of 02.09.24 | CRIH Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Agreed action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Status as of 26.09.24 | CRIH Comments                                                                                                                                                                                                                                                                                                                                        | Status as of 25.10.24 | CRIH Comments                                                                                                                                                                                                                                                                                      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|-----------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--|
| 1         | Qualification      | The subterranean and land stability assessments should be reviewed by qualified professionals as per LBH guidance.                                                                                                                                        | BIA report has now been reviewed by a chartered geologist.                                                                                                                                                    | The authors of the new A Squared Studio Engineers BIA have the appropriate qualifications. This item is now closed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Closed out            | Revised BIA submitted | Closed out            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Closed out            |                                                                                                                                                                                                                                                                                                                                                      | Closed out            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |  |
| 2         | BIA                | Provide non-technical summaries within the BIA and clarify if a site walkover has been undertaken.                                                                                                                                                        | Non technical summary has been provided.                                                                                                                                                                      | Non-Technical summary provided in Section 1of the A Squared Studio Engineers BIA. A walkover survey has been undertaken on the 4th January 2016 and reported in the Site Investigation Report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Closed out            | Revised BIA submitted | Closed out            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Closed out            |                                                                                                                                                                                                                                                                                                                                                      | Closed out            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |  |
| 3         | BIA                | Include consideration of the impacts of the sunken amphitheatre to the subterranean flow, land stability and surface flow & flooding.                                                                                                                     | The sunken amphitheatre is a Flood retention basin. This has now been considered in the assessment.                                                                                                           | It is noted that the amphitheatre is not a basement although it can impact stability and hydrogeology/hydrology. It's understood that an FRA has been prepared and is being audited separately and it is considered that this is a more appropriate place to identify the impacts to the water environment. However, the land stability impact to surrounding structures should be considered.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Closed out            | Revised BIA submitted | Closed out            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Closed out            |                                                                                                                                                                                                                                                                                                                                                      | Closed out            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |  |
| 4         | Ground Conditions  | Provide the ground investigation reports including groundwater monitoring data.                                                                                                                                                                           | GI reports have now been referenced within and appended to the BIA.                                                                                                                                           | The ground investigation report is appended to the BIA. Many of the logs mention groundwater seepage/inflow at shallow depths. The BIA summarizes that groundwater was encountered between 2.20m and 3.60m bgl in the Claygate Member. However, groundwater monitoring data is not provided and is requested.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Open                  | Revised BIA submitted | Closed out            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Closed out            |                                                                                                                                                                                                                                                                                                                                                      | Closed out            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |  |
| 5         | Ground Model       | Undertake a review of available desktop study and site investigation information (to include suitable data sources) and produce a revised ground model that is consistent and accurate.                                                                   | Desk study (Groundsure Report) was included in the GI reports which has now been provided. A-squared have derived a ground model based on GI data.                                                            | Revised ground model provided in Section 6 of the A Squared Studio Engineers BIA comprises Made Ground to 1.10m bgl, overlying the Claygate Member to 4.00m bgl, and London Clay to 20.00m bgl (maximum depth of ground investigation). The ground investigation works found groundwater within the Claygate Member between approximately 2.20 to 3.60m bgl. The BIA states that any groundwater detected during the site investigation is likely perched water within the sandy horizons of the Claygate Member, which is predominantly coarse and unable to maintain significant groundwater flow. It proceeds to identify that groundwater flow direction is generally to the west. A groundwater elevation contour plot has been produced and included in the BIA, showing that the groundwater elevation varies between 104.80mOD and 106.80mOD. The BIA identifies the nearest neighbouring property in the direction of potential groundwater flow is 50m away from the proposed development and asserts that any change in groundwater elevation due to the proposed basement is expected to be minimal, with groundwater largely recovering to its existing elevation in the vicinity of neighbouring properties. The BIA concludes that the impact of the basement penetrating any local groundwater table is expected to be minimal.<br><br>However, the area surrounding the southern part of Broadlands Road historically contained meadows with watercourses and springs, and the playing fields behind numbers 13-17 were described as waterlogged. In addition, groundwater seepage and inflows were mentioned in the 2016, 2019 and 2024 ground investigations. The latest GI works in February 2024 reported that two boreholes were not possible due to water-logged ground. The groundwater monitoring data is not presented and is requested. Whilst it is accepted that there will be no significant impacts to the water hydrogeology, further consideration of the groundwater regime is requested with mitigation measures for groundwater control to be provided.<br><br>The borehole logs provided in the GI reports describe the top 3m of the ground as gravelly Clay. This description is more similar to Head Deposits than the Claygate Member and the geology should be confirmed as these two strata may have different engineering properties.<br><br>The Ground Model presented in Section 6 of the BIA is different from that in Section 3 of the GMA report, which is based solely on the 2016 GI data and does not take into consideration the 2019 and 2024 ground investigations. Clarifications are requested regarding this inconsistency, and the ground model should be consistent across all reports. | Open                  | Revised BIA submitted | Open                  | The groundwater model should be confirmed by reference to the all the groundwater observations made at the site (monitoring, groundwater observations made during the site works, strata descriptions and site observations such as waterlogging) and other technical information provided by 3rd parties in response to the planning application. The assumptions made in the PLANS 3D groundwater modelling should be provided eg. sequence of strata and permeability. | Other observations, as well as those provided by third parties regarding waterlogging of the area surrounding the flood storage basin have been included in the determination of the groundwater model.<br><br>Sedimentology and permeabilities have been provided in the hydrogeological study report.<br><br>Groundwater has been raised in the hydrogeological study analysis to +100mOD in the area behind the proposed development due to account for potential waterlogging of this area.                                                                                                                                                                         | Closed out            | Ground/groundwater model clarified. Revised hydrogeol assessment increases GWL beneath sports pitch to reflect observations of waterlogging. Also includes both basements. Revised assessment concludes GWL will rise 77mm upstream (SE) and fall 53mm (NW)                                                                                          | Closed out            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Closed out |  |
| 6         | Land stability     | Revise the screening and scoping responses following the ground model being updated.                                                                                                                                                                      | A-squared have derived a ground model based on GI data upon which screening & scoping is based.                                                                                                               | The scoping assessment of the A Squared Studio Engineers BIA states that trees will be felled as part of the proposed development and indicates some evidence of desiccation of soil on site. It also mentions that the neighbouring properties are outside the root zone of any trees to be felled and that the impact of tree removal on neighbouring properties is expected to be insignificant. Justification for this statement is required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Open                  | Revised BIA submitted | Closed out            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Closed out            |                                                                                                                                                                                                                                                                                                                                                      | Closed out            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |  |
| 7         | Subterranean Flow  | Revise the screening and scoping responses following the ground model being updated.                                                                                                                                                                      | A-squared have derived a ground model based on GI data upon which screening & scoping is based.                                                                                                               | As stated in Query 5, the Ground Model presented in Section 6 of the BIA is different from that in Section 3 of the GMA report, which is based solely on the 2016 GI data and does not take into consideration the 2019 and 2024 ground investigations. Clarifications are requested regarding this inconsistency, and the ground model should be consistent across all reports.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Open                  | Revised BIA submitted | Closed out            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Closed out            |                                                                                                                                                                                                                                                                                                                                                      | Closed out            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |  |
| 8         | Surface water flow | Update screening response of Q6 to reflect current conditions and bring through to scoping. Ensure mitigation methods are consistent with the Flood Risk Assessment and Drainage and SuDS Statement.                                                      | Response to this question has been updated and brought through to scoping.                                                                                                                                    | This has been carried forward to scoping in the A Squared Studio Engineers BIA. It states that the flood storage basin may change the profile of surface water and inflows received by neighbouring properties but is designed to intercept and receive water flowing from the upstream catchment area, so the risk of flooding to neighbouring properties will remain the same or be reduced. We understand that a Flood Risk Assessment is being audited separately.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Closed out            | Revised BIA submitted | Closed out            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Closed out            |                                                                                                                                                                                                                                                                                                                                                      | Closed out            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |  |
| 9         | Construction       | Provide further details of the construction methodology of the basements and justification that the proposed methodology is suitable for the ground conditions present at the site.                                                                       | Construction methodology has been provided including sequencing.                                                                                                                                              | The CMP includes mention of some basement excavation along the front of the existing pool building. Underpinning to support the existing foundations is indicated as part of these works. Further clarification of the proposed basement works in this area is required, along with confirmation of the depth and methodology of the proposed underpinning. The GMA should be updated to consider the underpinning works if needed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Open                  | Revised BIA submitted | Open                  | Revised CMP has not been provided and is requested. Clarifications regarding underpinning is requested.                                                                                                                                                                                                                                                                                                                                                                   | CMP has been included in Appendix I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Closed out            |                                                                                                                                                                                                                                                                                                                                                      | Closed out            | Noted that revised CMP provided and references to underpinning in BIA and supporting documents have been removed                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |  |
|           |                    |                                                                                                                                                                                                                                                           |                                                                                                                                                                                                               | No information regarding the construction methodology of the amphitheatre and how it might affect surrounding buildings has been provided and is requested.                                                                                                                                                                                                                                                                                                                                                               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| 10        | Impact Assessment  | Confirm the distance and foundation depths of the neighbouring properties.                                                                                                                                                                                | Distance to nearby structures has been provided on plan.                                                                                                                                                      | The BIA states that the foundation depths of the neighbouring are unknown, and they have been assumed to be founded at ground level for the purposes of the GMA. This item is closed out.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Closed Out            | Revised BIA submitted | Closed Out            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Closed Out            |                                                                                                                                                                                                                                                                                                                                                      | Closed Out            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |  |
| 11        | Impact Assessment  | Clearly identify any structures and/or infrastructures potentially affected by the development. Undertake a ground movement assessment and provide a building damage assessment using suitably cautious or moderately conservative engineering estimates. | Conceptual site model has been provided with a markup of nearby structures and assessment(GI) undertaken. Ground movement assessment has been undertaken using analysis with multiple layers of conservatism. | Outline calculations are required to support assumptions regarding embedded retaining wall pile length.<br><br>Clarification is requested regarding the determination of the undrained and drained Young's Modulus values of the ground model.<br><br>The Pdpq and Xdpq input and output have not been presented and are requested.<br><br>Clarification regarding the underpinning works along the front of the existing pool building is requested in query 9. If underpinning is to be undertaken, the GMA needs to be updated to include the movements along that edge.<br><br>Ground movements resulting from contiguous piled wall installation in stiff clay have been reduced by 50% to what is suggested by CIRIA C760 based on the Bat & Langdon (2014). It is requested that the analysis be undertaken using the full CIRIA C760 Curves in order to provide a moderately conservative approach.<br><br>Ground movements have been further reduced by 50% in addition to the 50% in order to achieve a damage classification of Category 1 (Very slight) of the neighbouring property 2 Broadlands Road. The assessment should be based on moderately conservative assumptions and the impacts quantified. Where the impacts are not acceptable to the local authority mitigation measures should be provided.<br><br>The BIA notes that the proposed development is adjacent to public highways; however, this has not been assessed as part of the GMA and is required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Open                  | Revised BIA submitted | Open                  | The ground model adopted in the Wallap analysis is different than that reported in the GMA report (strata depths and geotechnical parameters) and should be updated. The groundwater level adopted in the analysis is deeper than what the groundwater monitoring suggests.<br><br>New outline drawings have been included.                                                                                                                                               | The WALLAP analysis has been updated. Horizontal stiffness of the Head Deposits and Claygate Member have been derived using the relationship $E_{scl} = 0.8 \cdot \sigma'_{vm} \cdot G_{max}$ . Made Ground has been taken as 10MPa.<br><br>Groundwater has been applied at ground level on the active side in WALLAP.                                                                                                                                                                                                                                                                                                                                                  | Open                  | Updated WALLAP not presented                                                                                                                                                                                                                                                                                                                         | Closed Out            | Revision 6 of BIA (2044-A25-X-XX-RP-V-0002-06) issued 21 October 2024<br>Soil parameters updated to reflect reported ground model                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |  |
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                                                                                                                                        | Open                  | Revised BIA submitted | Open                  | Subject to submission of revised CMP                                                                                                                                                                                                                                                                                                                                                                                                                                      | CMP has been included in Appendix I                                                                                                                                                                                                                                                                                                        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| 12        | Surface water flow | -                                                                                                                                                                                                                                                         | -                                                                                                                                                                                                             | The old revision of the Surface Water Modelling report dated May 2019, as opposed to the updated February 2022 version, is appended in the latest submission. Clarification is requested.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Open                  | Revised BIA submitted | Closed out            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Closed out            |                                                                                                                                                                                                                                                                                                                                                      | Closed out            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |  |
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The purpose of the GMA was initially to set a deflection limit for the contractor to design to, and as the vL2 comments suggested removing any scaling down of CRHA curves, it would be unreasonable to assume an average ground level as basement depth and damage to neighbouring properties would be over estimated. The ground level surrounding to the basements has been adopted in this iteration. There are no changes to the design.<br><br>The fives court basement has been included. | Open                  | GI around proposed basement reported as 106.80m. SSL of basement scaled from Fig 2.4 in GMA to be c103.10m. Therefore excavation depth c4m.<br><br>BIA no longer states it considers only 2B (fives court) GMA and hydrogeological assessment clearly model 2A and 2B basements.<br><br>Query can be closed once impact of revised Wallap confirmed. | Closed out            | Revision 6 of BIA (2044-A25-X-XX-RP-V-0002-06) issued 21 October 2024<br>Updated WALLAP predicts increased wall movement.<br>XDmap updated to include Fives Court. XDmap ground movement curves increased from standard curves to reflect WALLAP output. Slight damage predicted for insignificant length of Wall 4 of 27 Broadlands Road (10mm). Predicted damage for fill wall length (16.70m) is negligible. Noted that report text refers to Category 2 'slight' damage. A-Squared have advised this is a typo which will be corrected in the final issue of the BIA. |            |  |

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