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21 February 2024
MES/2402/JCB001

FAO: Haya AlRawaf

Ref: 42 Teddington High Street, TW11 8EW –
Basement Impact Assessment – Addendum to GGC18675/R1.1

Dear Ms AlRawaf

Further to your recent instruction, please find enclosed the Basement Impact Assessment (BIA) Addendum in regard to the changes proposed to the basement construction works at 42 Teddington High Street, London, TW11 8EW (the site, Figure 1).

Planning History / Previous Assessments

The following planning applications have been made to the London Borough of Richmond upon Thames (LBRUT):

- Planning reference 19/0511/FUL for the "Demolition of existing building to facilitate the erection of part 4 storey part 3 storey building comprising A3 restaurant use at basement and ground floor and eight residential units (6 x 1 bed and 2 x 2 bed) on upper floors with associated hard and soft landscaping, parking, cycle and refuse stores".

- Planning reference 21/0270/FUL for the "Redevelopment of site to provide a mixed-use development comprising class E at ground floor and basement and eight residential units above". This application was refused on 15 April 2021.

Whilst these Applications were refused, and the subsequent Appeals dismissed, these were not due to the proposed basement elements of the Applications. A BIA was submitted (Ref GGC18675/R1.1, November 2018, Gabriel Geo-Consulting Ltd) for the planning application in 2019 (ref 19/0511/FUL). The referenced BIA is appended and should be read in conjunction with this Addendum.

Scope of the BIA Addendum

The current basement proposals have been compared with the previous basement proposals and specifically with the assessments made within the Gabriel Geo-Consulting Ltd BIA. Where differences to the proposals or changes in Policy are relevant, these are detailed in this report, and the assessment has been checked and updated as required.

The purpose of this assessment is to consider the impacts of the proposed basement on the local hydrological, geological and hydrogeological environments, including potential impacts on neighbouring properties and the wider area.

The information contained within this BIA Addendum has been produced specifically to meet the requirements set out by the LBRUT (Good Practice Guide on Basement Developments, 2015; Basement Assessment User Guide, 2021) and to assist with their decision-making process.

The BIA has been reviewed and approved by:

- Chartered Civil Engineer Corrado Candian, MEng CEng MICE; and,
- Chartered Hydrogeologist Philip Lewis, BSc CGeol FGS.

In addition to being chartered professionals, both reviewers have more than 20 years' relevant experience of design and assessment of residential and commercial developments including basements in and around London.

The Supervising Engineer for the scheme is Green Structural Engineers Ltd, specifically chartered engineer Paul Bennett (CEng, MICE) who has reviewed the relevant geo-structural information and provided confirmation of the suitability and buildability of the scheme, as

presented in their Construction Method Statement (including Structural Impact Assessment) dated October 2018 (ref J001237, appended for reference).

Existing and Proposed Development

The site location plan is provided in Figure 1.

The Application site is a 1960s two-storey property with a purpose-built bank on the ground floor and ancillary offices and a one-bedroom flat on the first floor. A single-storey rear extension was added in the 1970s. The property is located on the south side of the High Street and on the west side of the junction with Cedar Road. The bank adjoins the east flank wall of the Teddington Arms public house. Externally, there is a brick paved parking area to the rear and side of the single-storey extension, and a fenced-off area alongside the original part of the building. The latter is surfaced with asphalt and can be accessed by a pedestrian gate. Three manhole covers are evident in these areas; it is understood that these drains serve only this site.

Teddington High Street is broadly level, at 8.20m to 8.70m Ordnance Datum (OD), except where it rises (to 13.40m OD) to cross the railway lines to the west of the site. External ground levels within the site vary from 8.12m to 8.31m OD.

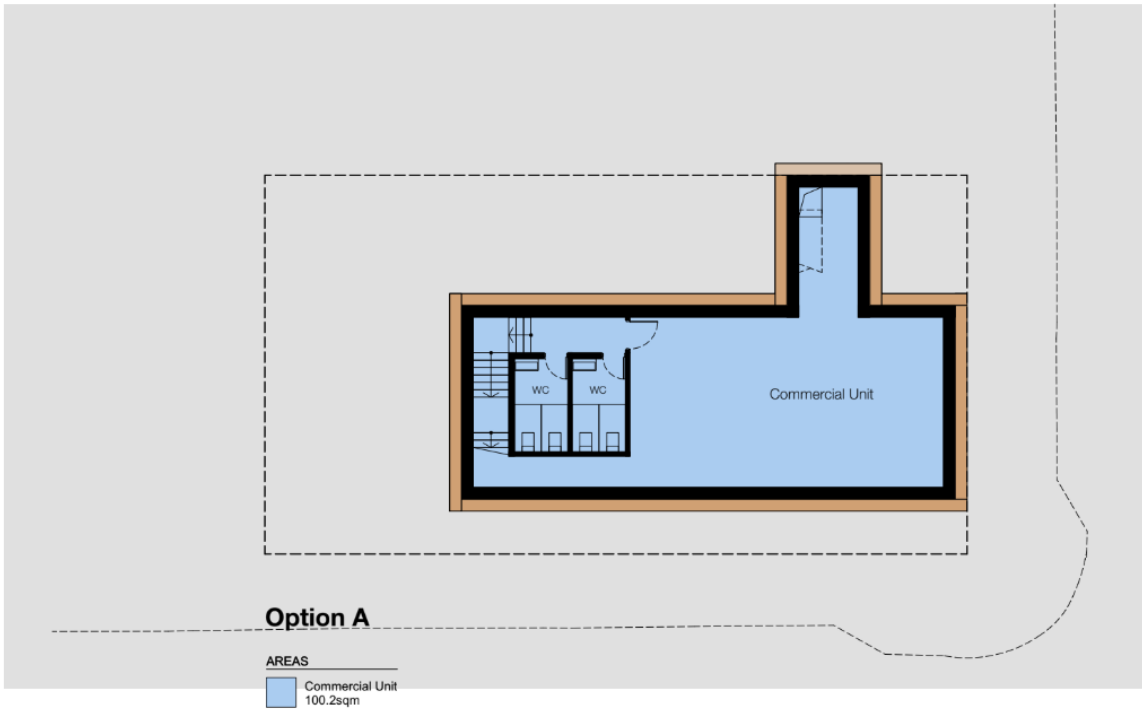
The previously proposed development for which planning permission had been sought comprised the demolition of the existing bank building, including the parapet wall against the east gable wall of the Teddington Arms, and the construction of a new three/four-storey building plus basement. The extent of single-storey basement was proposed to be smaller than the ground floor of the new building, such that most of its perimeter walls would not align with the ground floor footprint.

The current proposed development works to 42 Teddington High St (Figure 2 and appended) will involve the underpinning of the existing party wall with the Teddington Arms in shallow reinforced concrete 'L'- shaped underpins cast in 1m wide sections and designed to be stable in their own right. The new basement will be constructed in reinforced concrete with the basement slabs tied into the new retaining walls to provide lateral support in the permanent case.

A finished floor level (FFL) of 5.23m OD for the basement (3.06m below the proposed ground floor FFL at 8.29m OD) is proposed. With an allowance of 0.15m for insulation, cavity drainage and floor structure, and 0.40m for underpin/retaining wall bases as advised by Green Structural Engineering, the formation level of the proposed basement's retaining walls are anticipated to be 4.68m OD. The depths of excavation required to achieve this formation level would be 3.44m to 3.63m from external ground levels and 3.76m from most of the internal FFL (at 8.44m OD), which is assumed to be ground-bearing based on the absence of air bricks in the external walls of the property. The depth of excavation from the floor within the bank's vault (8.47m AOD) would be approximately 3.79m.

Figure 1: Site Location (Red Line Boundary)

Basement



Ground Floor

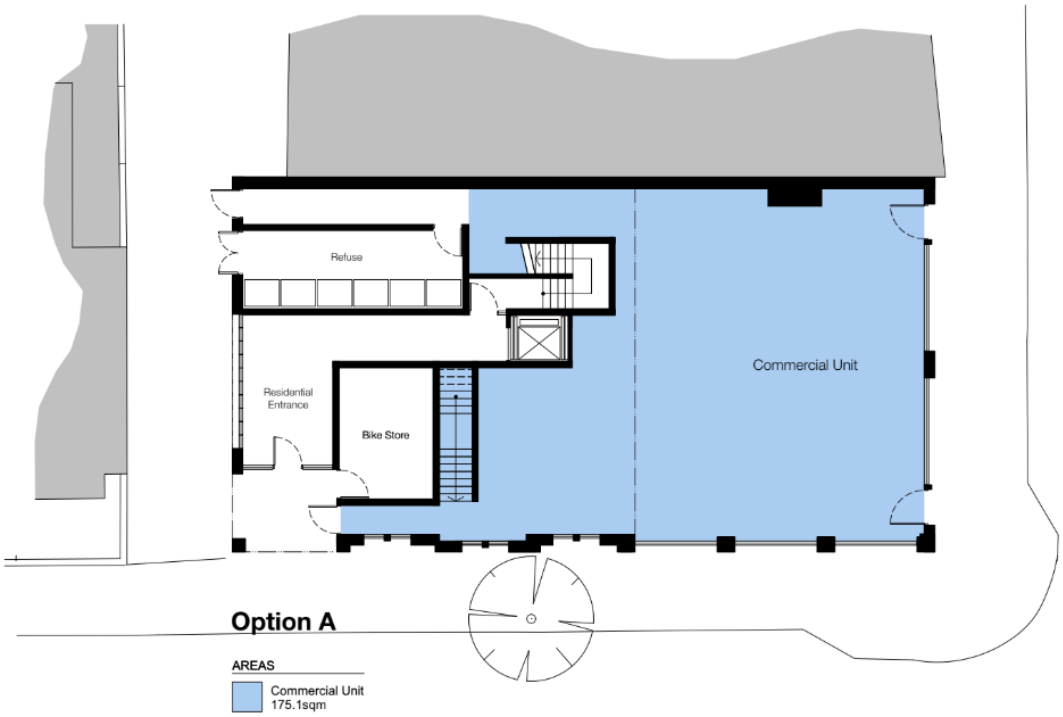


Figure 2: Basement and ground floor plan of proposed development

Ground and Groundwater Conditions

The BIA confirmed the underlying ground conditions to comprise Kempton Park Gravel Member, overlying the London Clay Formation. The River Terrace Deposits are classified by the Environment Agency as a superficial 'Principal Aquifer' and the underlying London Clay is classified as 'Unproductive Stratum'.

For an area within 50m of the site, the BGS has classified the susceptibility to groundwater flooding as 'Potential at Surface', at a 'Moderate' confidence level. Such groundwater flooding is defined as "the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded". This classification relates to the groundwater in the River Terrace Deposits.

Ground investigation

A site ground investigation was carried out on 12 October 2018, which consisted of one cable percussion borehole (BH1), drilled within the parking area to the rear of the property. The site's geology comprised:

- 0 to 0.11m: Surfacing: Brick pavers laid on sharp sand bedding.
- 0.11 to 0.50m: Made Ground.
- 0.50 to 4.10m: Kempton Park Gravel Member.
- 4.10 to 4.40m: Weathered London Clay Formation.

On completion, a groundwater standing level of 3.31m bgl was recorded. Monitoring readings taken on 19 October 2018 recorded the groundwater level at 3.23m bgl (4.99m OD).

Two further rounds of groundwater monitoring were undertaken, in accordance with the LBRUT guidance, on 5 December 2023 and 21 December 2023 which recorded the groundwater level at 3.17m bgl and 3.15m bgl respectively (5.05m and 5.07m OD).

Screening Assessment

Since the preparation of the original BIA, the LBRUT have set out further requirements regarding basement construction, specifically 2021 guidance – Basement Assessment User Guide. The Basement Assessment process enables the LBRUT to assess the potential impacts of a proposed subsurface development. The purpose of the Screening Assessment is to identify if there are any potential issues which would require a more detailed investigation

into the suitability of a proposed development. LBRUT require the following questions to be answered as part of the Screening Assessment:

Subterranean Characteristics

• Does the recorded water table extend above the base of the proposed subsurface structure?

Yes. The proposed formation level is 4.68m OD and the highest monitored groundwater level (in 2018 and 2023) is recorded as 5.07m OD. Groundwater is anticipated to be approximately 0.40m higher than the basement formation level. The basement FFL of 5.23m OD is marginally higher than the highest monitored groundwater level.

• Is the proposed subsurface development structure within 100m of a watercourse or spring line?

No. The nearest watercourse is the River Thames located 620m northeast.

• Are infiltration methods proposed as part of the site's drainage strategy?

No. The SuDS assessment (see SuDS Strategy ref MES/2402/JB002) confirms that infiltration drainage is not feasible at the site. Attenuation SuDS is proposed.

• Does the proposed excavation during the construction phase extend below the local water table level or spring line (if applicable)?

Yes. The proposed formation level is 4.68m OD and the highest monitored groundwater level (in 2018 and 2023) is recorded as 5.07m OD. Groundwater is anticipated to be approximately 0.40m higher than the basement formation level in the temporary case.

• Is the most shallow geological strata at the site London Clay?

No. The site investigation has confirmed the site to be underlain by Made Ground and the Kempton Park Gravel Member which is further underlain by the London Clay.

• Is the site underlain by an aquifer and/or permeable geology?

Yes. The Kempton Park Gravel Member is classified by the Environment Agency as a superficial 'Principal Aquifer'.

Land Stability

• Does the site, or neighbouring area, topography include slopes that are greater than 7° ?

No. Teddington High Street is broadly level, at 8.20m to 8.70m OD, except where it rises to cross the railway lines to the west of the site (>150m). External ground levels within the site vary from 8.12m to 8.31m OD.

• Will changes to the site's topography result in slopes that are greater than 7° ?

No, The proposed development will not change the site's topography.

• Will the proposed subsurface structure extend significantly deeper underground compared to the foundations of the neighbouring properties?

Yes. There are no plans available on the LBRUT's planning portal for the adjoining Teddington Arms (No.40 High Street). During a site inspection in 2018 it was reported by the owner that the pub had a cellar but that it was located to the rear of the property, not adjacent to the party wall with No.42. It is likely that the proposed basement structure will be deeper compared to the adjacent foundations.

• Will the implementation of the proposed subsurface structure require any trees to be felled or uprooted?

No. The canopy of the Sycamore pavement tree close to the site's Cedar Road frontage appeared to overlap the site slightly. An arboricultural impact analysis and a draft arboricultural method statement have already been prepared for this tree by Raphael Skerratt; the recommendations given in those reports should be followed. Additionally, the recommendation given in the current edition of NHBC Standards Chapter 4.2 should be followed for any shallow footings which are founded within the

zone of influence of this tree, including heave protection on the inside face of foundations where they pass through clays.

• *Has the ground at the site been previously worked?*

No. Confirmed in Section 4.7 of the BIA.

• *Is the site within the vicinity of any tunnels or railway lines?*

No. Confirmed in Section 4.7 of the BIA and theTransport for London Asset map.

Flood Risk and Drainage

• *Will the proposed subsurface development result in a change in impermeable area coverage on the site?*

No. The site will remain 100% impermeable.

• Will the proposed subsurface development impact the flow profile of throughflow, surface water or groundwater to downstream areas?

No. Groundwater flow will continue below and around the proposed basement through the permeable soils of the Kempton Park Gravel Member. Surface water will continue to be positively drained. However, adoption of attenuation drainage will provide betterment (see SuDS Strategy, MES/2402/JCB002).

• Will the proposed subsurface development increase throughflow or groundwater flood risk to neighbouring properties?

No. Groundwater flow will continue below and around the proposed basement through the permeable soils of the Kempton Park Gravel Member. Surface water will continue to be positively drained. However, adoption of attenuation drainage will provide betterment (see SuDS Strategy, MES/2402/JCB002).

Basement Impact Assessment

For all Screening Assessment questions where the response is “yes”, or where the answer is currently unknown, these matters should be taken forward and investigated as part of the Basement Impact Assessment. Additionally, further clarity is provided for some “no” responses.

Subterranean Characteristics (Groundwater Flow)

There will be no adverse impact to groundwater flow.

No planning consents have been identified for modern basements in the vicinity of the site. Enquiries were made at the Teddington Arms and the staff reported that there is no cellar/basement beneath that building. It is understood that No.36 High Street has a basement and therefore the remainder of the terrace which adjoins the west side of the Teddington Arms may have similar cellars/basements. Based on typical head height of one storey cellars / basements (of 2.00m to 3.00m), these existing basements are likely to be approximately at or above the groundwater levels recorded by the ground investigation and subsequent monitoring in 2023. Given the thickness and mapped extent of the Kempton Park Gravel Member, which allows for a substantially unobstructed large volume of permeable soil both vertically (ie below the basements) and laterally (ie around the basements), these basements are unlikely to influence the groundwater flow regime.

The proposed basement at the site will be formed approximately 0.40m below the groundwater surface in the Upper Aquifer. However, flow would still be able to continue through the gravel beneath the completed basement and around the perimeter, so no adverse impact is expected other than a slight rise in groundwater level on the up-gradient side of the basement. The proposed basement is not expected to create any cumulative effect on groundwater flow because no other adjoining or sufficiently close / deep basements have been identified.

Local water ingress into the basement construction site area may occur from perched groundwater in the Made Ground. Standard groundwater control methods such as sump pumping should be adequate to deal with such ingress. The lower part of the excavations for the basement will encounter groundwater of the Upper Aquifer. The gravels are expected to have moderate to high permeabilities, so pumping to dewater the excavations for underpinning or construction of retaining walls could require a specialist groundwater control contractor to design and install an appropriate groundwater control system.

The proposed basement will need to be fully waterproofed in order to provide adequate long-term control of moisture ingress from groundwater and infiltrating surface water. Watertight seals will be required at all construction joints, including where any sumps extend below the basement slab. Cavity drainage and sump pumps shall also be provided as additional flood risk mitigation, complete with non-return valves.

Land Stability

Section 8.6 (Ground Stability and Bearing Capacity) of the BIA remains relevant and the conclusions unchanged; no significant impacts will result.

Section 8.7 (PDISP Heave/Settlement Assessment) and 8.8 (Damage Category Assessment) of the BIA include a ground movement assessment (GMA) and damage category assessment and the conclusions remain unchanged. The results of the assessment indicate that the flank wall of No. 40 will experience damage Burland Category 1 – Very Slight due to the construction works.

Category of damage	Description of typical damage (ease of repair is underlined)	Approximate crack width (mm)	Limiting tensile strain, ε_{lim} (%)
0 Negligible	Hairline cracks of less than about 0.1 mm are classed as negligible	<0.1	0.0 to 0.05
1 Very slight	**Fine cracks that can easily be treated during normal decoration.** Perhaps isolated slight fracture in building. Cracks in external brickwork visible on inspection	<1	0.05 to 0.075
2 Slight	**Cracks easily filled. Redecoration probably required.** Several slight fractures showing inside of building. Cracks are visible externally and **some repointing may be required externally** to ensure weathertightness. Doors and windows may stick slightly.	<5	0.075 to 0.15
3 Moderate	**The cracks require some opening up and can be patched by a mason. Recurrent cracks can be masked by suitable lining. Repointing of external brickwork and possibly a small amount of brickwork to be replaced.** Doors and windows sticking. Service pipes may fracture. Weathertightness often impaired.	5 to 15 or a number of cracks >3	0.15 to 0.3
4 Severe	**Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows.** Windows and frames distorted, floor sloping noticeably. Walls leaning or bulging noticeably, some loss of bearing in beams. Services pipes disrupted.	15 to 25, but also depends on number of cracks	>0.3
5 Very severe	**This requires a major repair, involving partial or complete rebuilding.** Beams lose bearings, walls lean badly and require shoring. Windows broken with distortion. Danger of instability.	Usually >25, but depends on numbers of cracks	

Table 1: The Burland Scale of Damage Classification.

Flood Risk and Drainage (Surface Water Flow)

There will be no adverse impacts to surface water flows.

The conclusions of the original BIA remain valid. Reference should also be made to the SuDS Strategy (MES/2402/JCB002). It is not considered that the proposals would result in an increased risk of flooding at the property location or surrounding area or that the effects of climate change will significantly change the current day regime. The surface water management measures to be adopted will provide betterment compared to the existing run-off drained from site.

Recommendations

During the works, a structural monitoring strategy should be adopted. The purpose of the monitoring strategy is to control the excavation and construction works adequately to prevent excessive ground movements that will cause unacceptable impacts to the neighbouring building.

Structural monitoring is recommended of the subject property and the neighbouring property and neighbouring highway in conjunction with visual inspection on a regular basis. Any cracks that do develop should be monitored also.

The Contractor is advised to a develop an appropriate contingency action plan, such as the implementation of additional propping or modification of work sequencing, to implement (with the agreement of the Engineer and relevant parties) should trigger values be breached.

Summary

The assessments undertaken indicate that the conclusions of the BIA remain valid and that there will be no adverse impacts to groundwater or surface water flow, no increase in flood risk, and no significant impacts to neighbouring structures as a result of the proposed works. Therefore, the works are considered to be compliant with LBRUT's policies and guidance.

Yours faithfully,

Graham Kite
Director

Corrado Candian
Chartered Geotechnical Engineer CEng MICE

Encs:

- BIA, ref GGC18675/R1.1, November 2018, Gabriel Geo-Consulting Ltd
- SuDS Strategy and Flood Risk Assessment, ref MES/2402/JBC002, February 2024, Milvum Engineering Services Ltd
- Construction Method Statement, ref J001237, October 2018, Green Structural Engineers Ltd
- Proposed Development Drawings