

July 2024

The Aylesham Centre, Peckham

Basement Impact Assessment

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BASEMENT IMPACT ASSESSMENT

AYLESHAM CENTRE

July 2024

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Client
Berkeley Homes (Capital)
PLC



Engineer
The Clove Building
4 Maguire Street
London
SE1 2NQ

BASEMENT IMPACT ASSESSMENT

AYLESHAM CENTRE

Walsh have prepared this report in accordance with the instruction of our client: Berkeley Homes (Capital) PLC

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P01	26.04.24	First issue	MG	RB	RB
P02	05.06.24	BH comments addressed	MG	RB	RB
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1. Introduction

This Basement Impact Assessment has been prepared by Walsh to accompany an application for full planning permission being submitted by the Applicant, Berkeley Homes (Capital) PLC, to the London Borough of Southwark (LBS).

The following documents are referenced in this report.

Table 1. References

Ref	Reference	By	Date
Ref: 1 – Southwark Basement Guidance	Basements and Flooding - Guide for Developers	Southwark Council	Not dated
Ref: 2 – LiDAR	LiDAR compoSite DTM 2022 TQ37NW 1m tile	DEFRA	2022
Ref: 3 – BGS map	Geological Survey of England and Wales 1:63,360/1:50,000 geological map series, New Series – South London	British Geological Survey	1998
Ref: 4 – Flood Map for Planning	Flood Map For Planning (https://flood-map-for-planning.service.gov.uk/)	Environment Agency	Accessed 22.04.2024
Ref: 5 – FRA	Flood Risk Assessment Aylesham Centre Redevelopment Draft	RMA Environmental	May 2024
Ref: 6 – Southwark Flood Maps	Southwark Strategic Flood Risk Assessment Maps (Map A2, A4, A5)	Southwark	2016
Ref: 7 – Arboricultural report	Arboricultural Impact Assessment	Ground Control	07.06.24
Ref: 8 – Vibrations	Code of practice for noise and vibration control on construction and open Sites. Vibration (+A1:2014)	British Standards Institution	2014
Ref: 9 – C760	CIRIA C760 Guidance on embedded retaining wall design	CIRIA	2017
Ref: 10 – BDA 1	The allowable settlement of buildings	Skempton, A. W. and McDonald, D.H.	1956
Ref: 11 – BDA 2	Settlement of Buildings and Associated Damage	Burland, J. and Wroth, C.	1975
Ref: 12 – BDA 3	Behaviour of foundations and structures	Burland et al.	1977
Ref: 13 – BDA 4	Building Response to Excavation-Induced Settlement	Boscardin, M. and Cording, E.	1989

2. Site Context

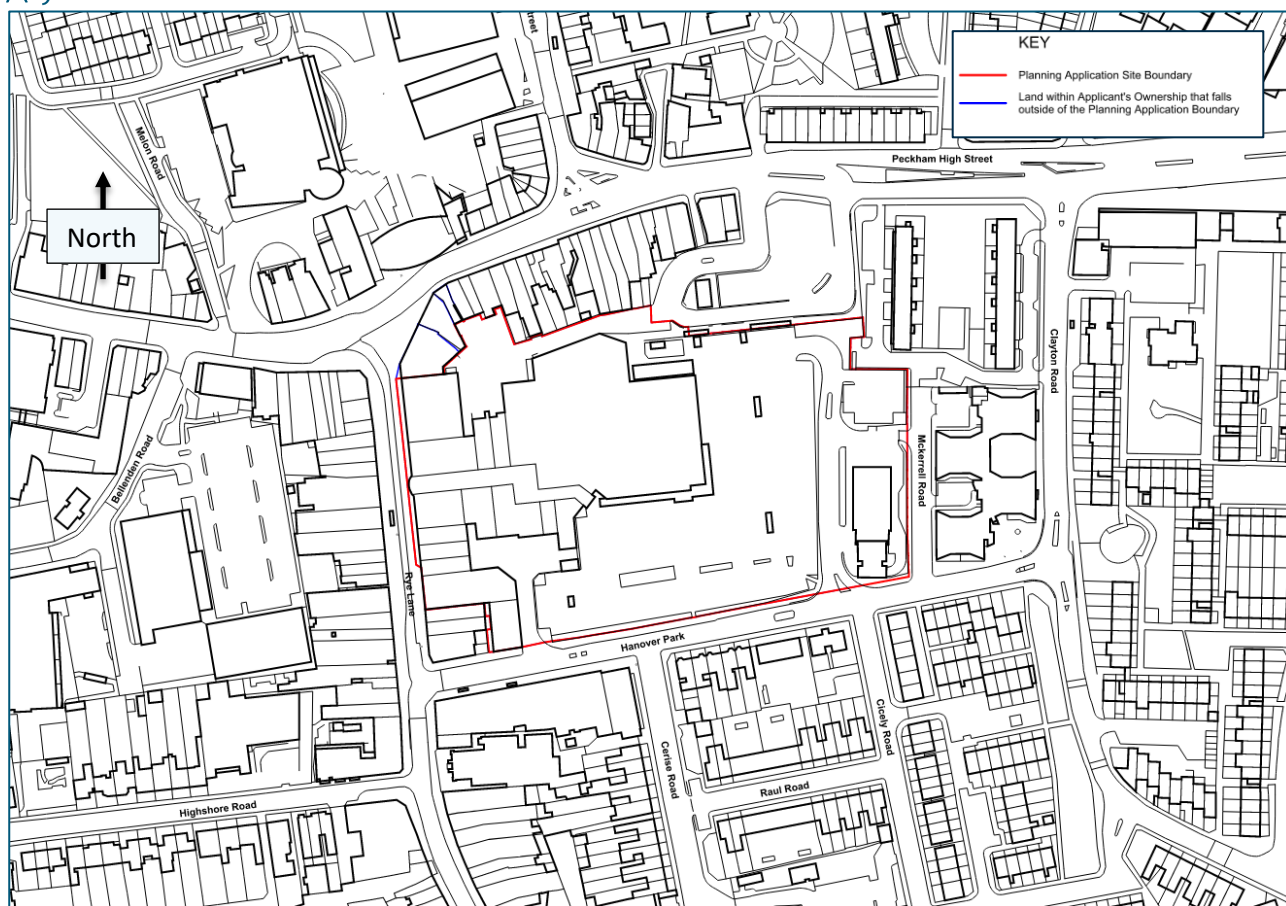
2.1. Site Location and Layout

The Site is located at the Aylesham Centre, Hanover Park, London SE15 5EW.

The Site is located within Peckham town centre within the administrative boundary of the London Borough of Southwark ('LBS') (the Local Planning Authority ('LPA')) Rye Lane bounds the Site to the west, Hanover Park to the south and Mckerrell Road to the east. Peckham Bus Station, fronting onto Peckham High Street, bounds the Site to the north.

The approximate grid reference is 534231 east, 176630 north.

Figure 1. Site location (Extract from ASCP-DRM-XX-XX-DGA-A-001000_P0 included in Appendix A)

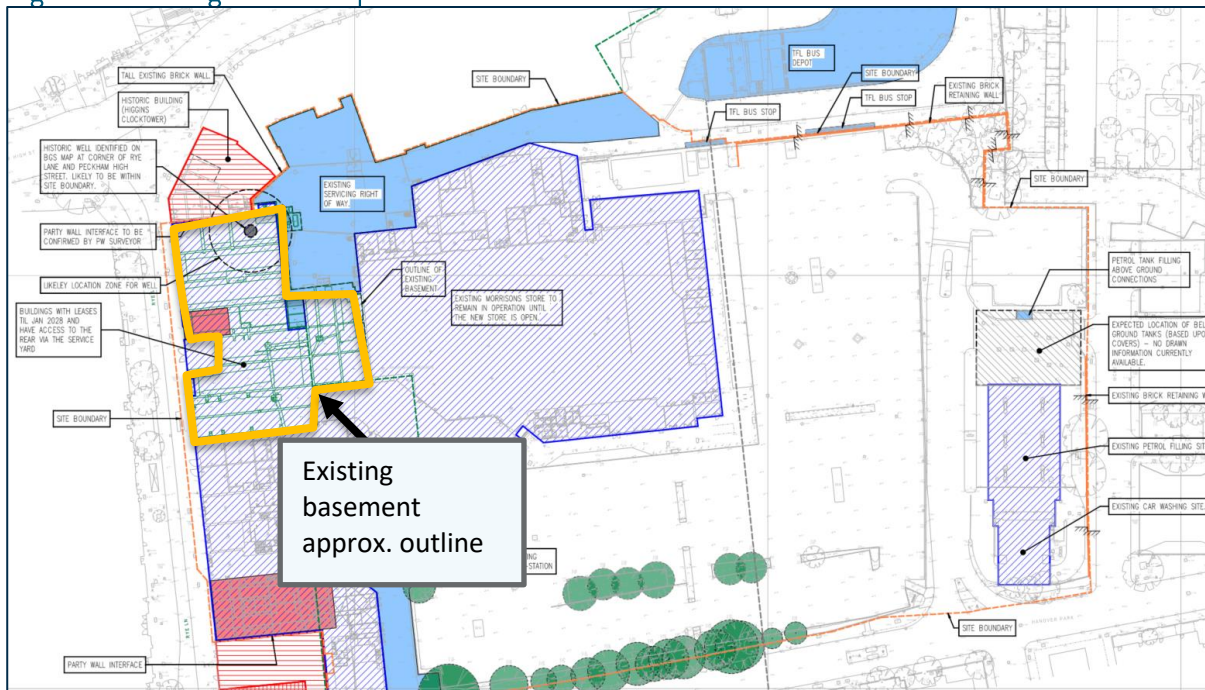


The Site accommodates the Aylesham Centre alongside an associated surface car park (353 spaces), service yard, and petrol filling station. The Aylesham Centre comprises retail units fronting on to Rye Lane with additional retail units within a covered mall, including a Morrison supermarket

The Aylesham Centre comprises a large two-to-three-storey shopping centre building with various occupants, including a Morrisons supermarket. The car park is tarmacked with a small number of trees in the south and along the southern boundary of the Site.

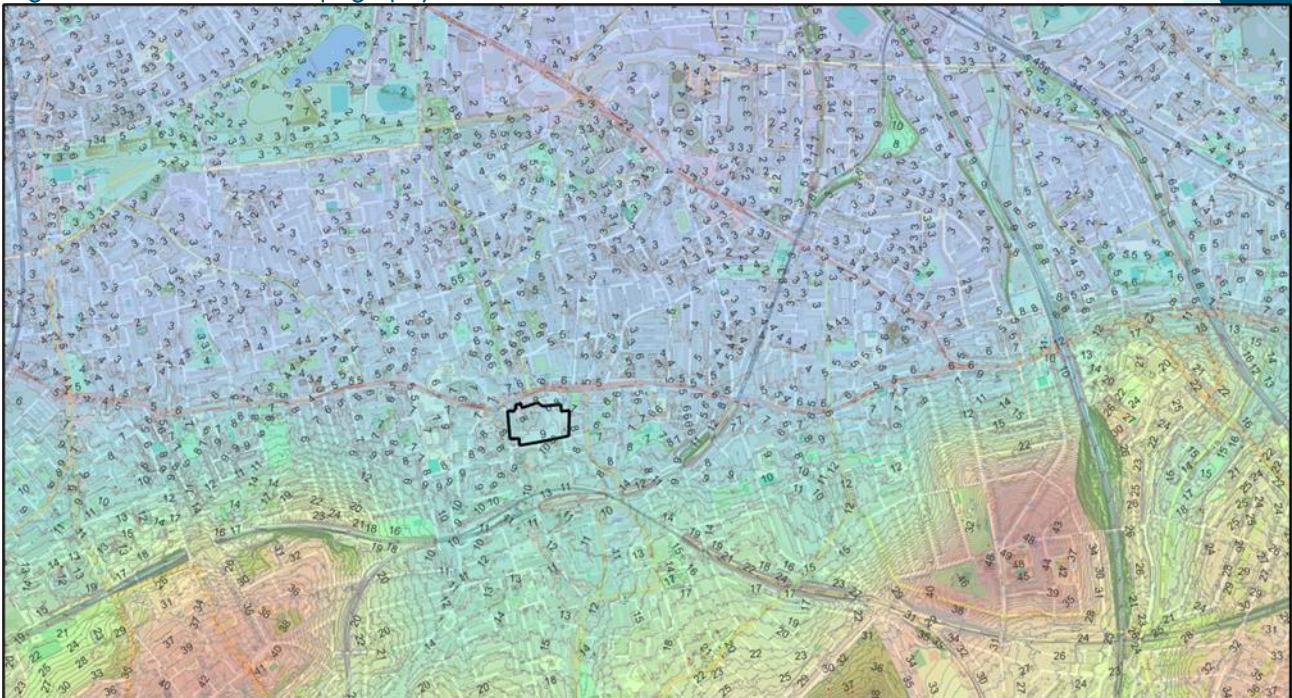
An existing high single level basement level is present on the west of the Site. A plan of the existing basement is included in Appendix A .

Figure 2. Existing basement position



The general topography of the Site is illustrated below based on available LIDAR data; the Site sits at the southern boundary of the historic River Thames floodplain at a level of between 7mOD to 9mOD. To the southwest, the ground rises to between 25mOD to >40mOD at Denmark Hill over 1km southwest of the Site; to the north there is a relatively consistent fall towards Bermondsey and the Thames to a general level of between 2mOD to 6mOD.

Figure 3. Site and local topography from LiDAR data (mOD)



2.2. Proposed Development

The Proposed Development at the Site is to comprise the demolition of existing buildings and phased redevelopment to provide a replacement supermarket and associated service yard and car parking (Use Class E(a)); flexible retail, leisure (including drinking establishment), and commercial accommodation (Use Class E/Sui Generis); dwellings (Use Class C3); landscaping; and associated works.

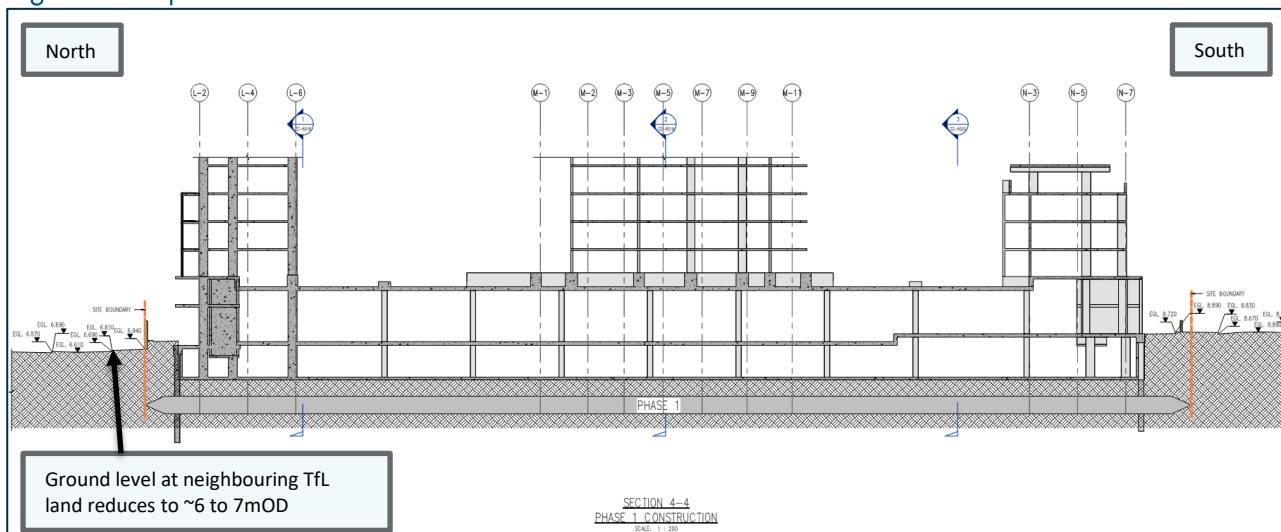
The development will comprise 16 Buildings. Buildings L,M,N,Q and P in the east will be connected by a single level basement. This area is referred to as the Phase 1 area and will be the focus of this report.

Figure 4. Aylesham Centre Blocks key plan



The proposed basement structural slab level (SSL) will be at 3.8mOD. The basement slab is proposed to be 300mm thick. The existing ground level in the basement area is ~7.9mOD to 8.7mOD (increasing from north to south), therefore approximately 4.1m to 4.9m of soil will be excavated to the basement SSL.

Figure 5. Proposed basement section



The basement is proposed to be excavated within a piled retaining wall. The wall may be contiguous or secant depending on groundwater conditions. An intrusive ground investigation will be carried out in due course to provide data to inform this decision. The wall will be propped by the ground floor slab in the permanent condition. In the temporary condition it will be either propped or constructed as a cantilever.

The Blocks within the Phase 1 area (over the basement) are proposed to be between 6 and 20 above ground storeys. The buildings will be founded on traditional piled foundations. It is understood that some load will be taken on the piled retaining walls around the blocks.

Proposed development plans are included in Appendix A .

2.3. Constraints

Constraints around the Phase 1 basement development works include:

- A TfL bus stop and road some 3.7m north of the basement,
- A building for the TfL bus depot some 15.5m north of the basement,
- Goldsmith Road approximately 1.8m northeast of the basement,
- *Purdon House* on Goldsmith Road some 9.6m north of the proposed basement,
- McKerrell Road some 3.5m to the east of the basement,
- 81 Hanover Park Apartments some 14m east of the basement across McKerrell Road,
- The highway of Hanover Park some 3.3m south of the basement,
- The existing Morrisons and Aylesham shopping centre some 12.3m west of the basement, the building / a temporary store will be in place during the Phase 1 works,
- Residential buildings across Hanover Park to the south, over 17m from the proposed basement, including 20 Robert Clean Close and 30-36 Hanover Park.

A plan of these Phase 1 constraints is included in Appendix B .

The proposed basement will be over 80m from the existing basement, therefore this is not considered a constraint.

Details of the constraint buildings are summarised below. It is noted that there are numerous buildings to the south of Hanover Road, however these are over 17m. Two of the closest buildings to the basement across Hanover Road will be assessed.

Table 2. Summary of buildings near proposed basement

Building	Min distance to basement (m)	Building width (perpendicular to basement) (m)	Building height (approx.)
Purdon House	9.6	54	6 storeys (~21m)
81 Hanover Park Apartments	14.0	23.7	6 storeys (~21m)
Existing Morrisons and Aylesham shopping centre	12.3	26.4 (note width is of eastern wing of shopping centre, rather	2 to 3 storeys (~10.5m)

Building	Min distance to basement (m)	Building width (perpendicular to basement) (m)	Building height (approx.)
		than full shopping centre width)	
TfL bus depot building	15.5	12	1 storey (~3.5m)
20 Robert Clean Close	17.6	38	2 storeys
30-36 Hanover Park	18.3	8.5	3 storeys

3. Ground Conditions

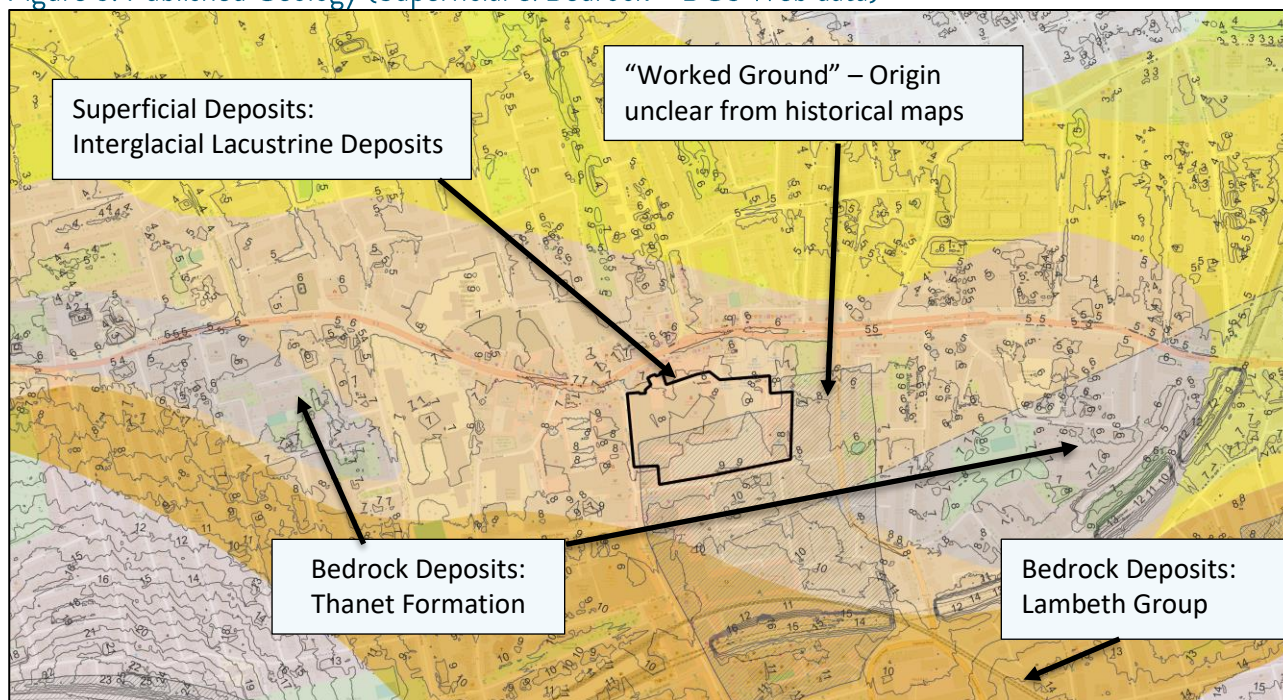
3.1. Published Geology

The Site is reported by the British Geological Survey (BGS) to be underlain by superficial deposits of Interglacial Lacustrine Deposits. The Langley Silt Member is mapped approximately 150m north of the Site. The Interglacial Lacustrine Deposits are expected based on the BGS records to overlay Kempton Park Gravels.

The BGS published maps show bedrock of the Lambeth Group (Woolwich and Reading Beds) underlain by the Thanet Sand and the Chalk at depth. A plan extract from BGS web data is illustrated below. The BGS data also indicate that the Site is within an area of 'Artificial Ground'. It is not clear what this is derived from as historical mapping does not indicate major excavations, landslides, or landfills in the area.

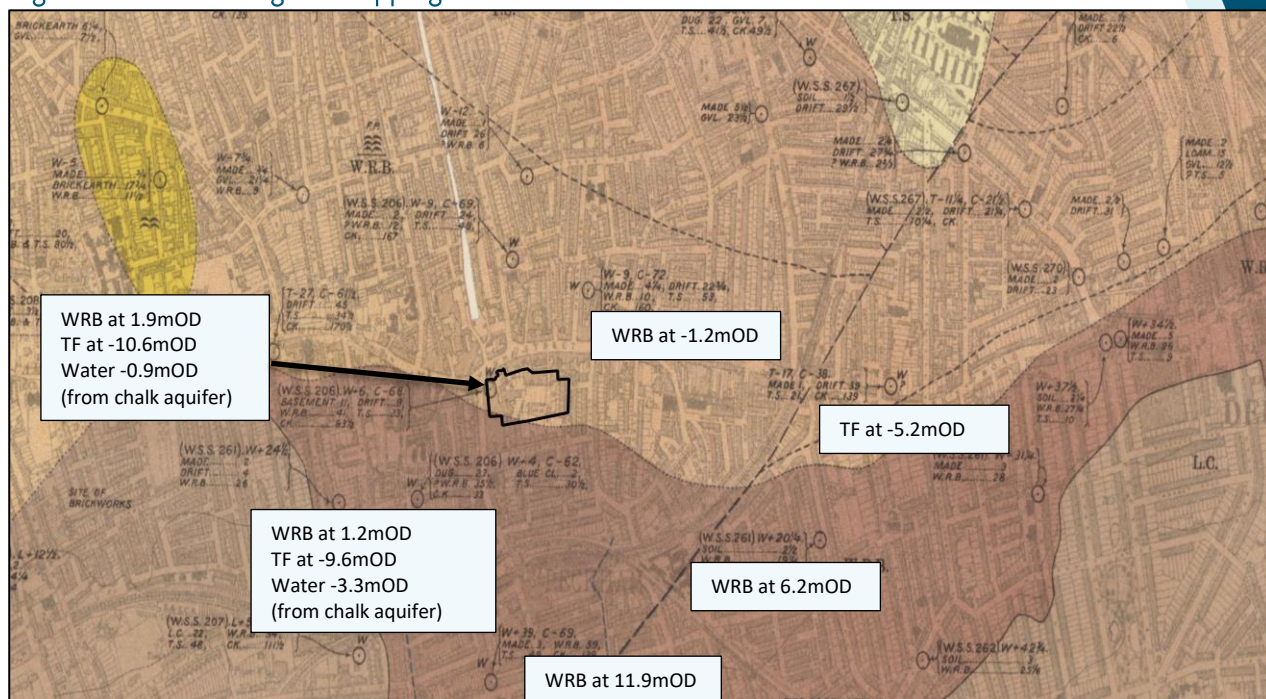
A fault is shown running NE to SW to the south of the Site.

Figure 6. Published Geology (Superficial & Bedrock – BGS Web data)



The 1:10,000 scale geological map for the area is illustrated below; elevations to the top of the Woolwich and Reading Beds and to the Thanet Formation are illustrated.

Figure 7. 1:10k Geological Mapping



3.2. Unpublished Geology

Ground investigations have been carried out for local developments as illustrated below; selected data are available and have been reviewed.

Figure 8. Ground conditions/boreholes from planning applications

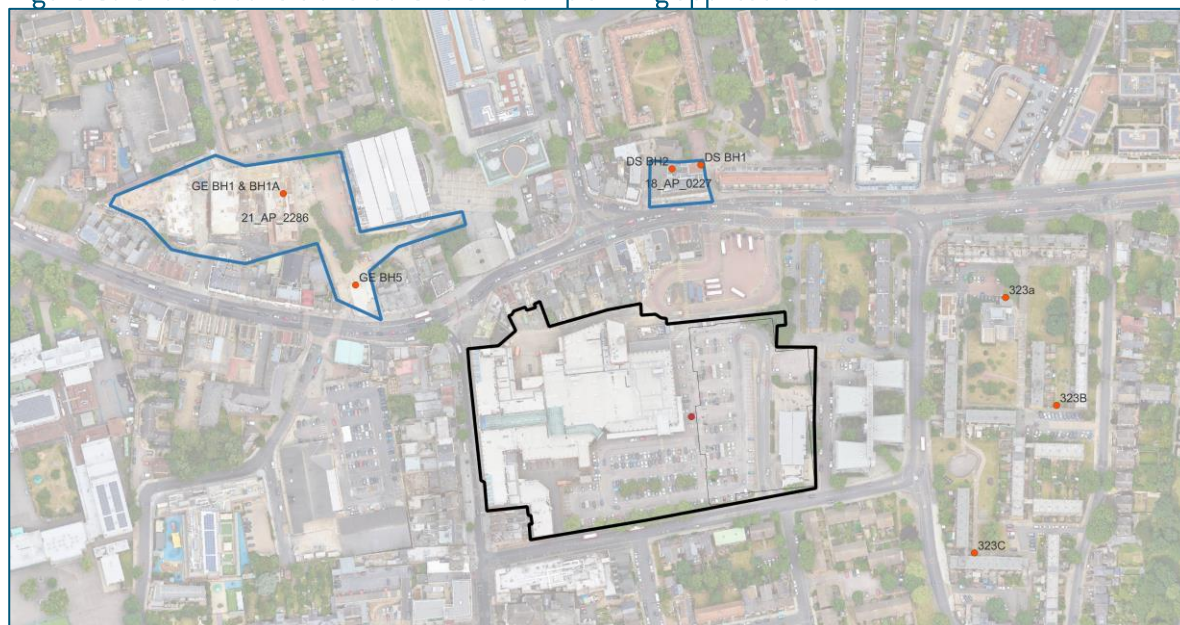
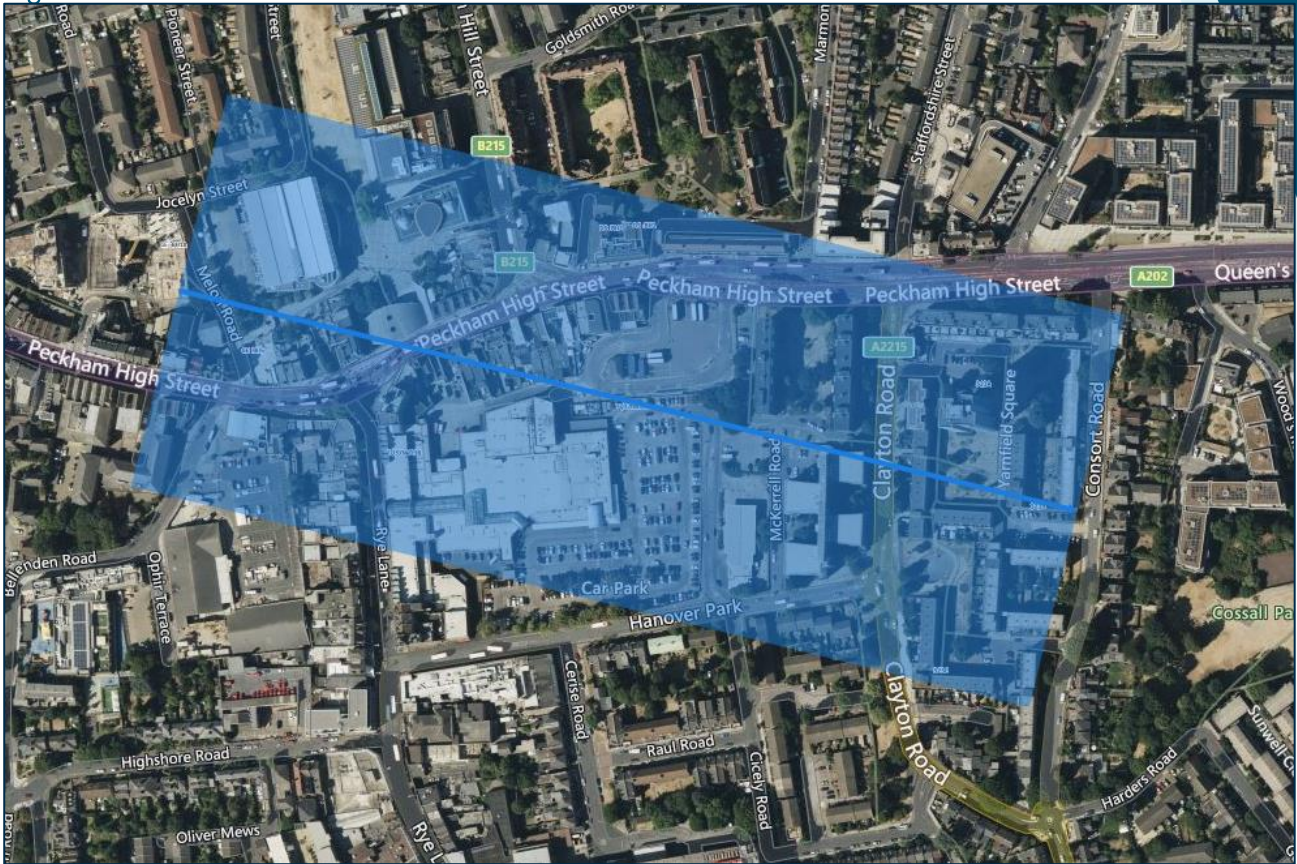
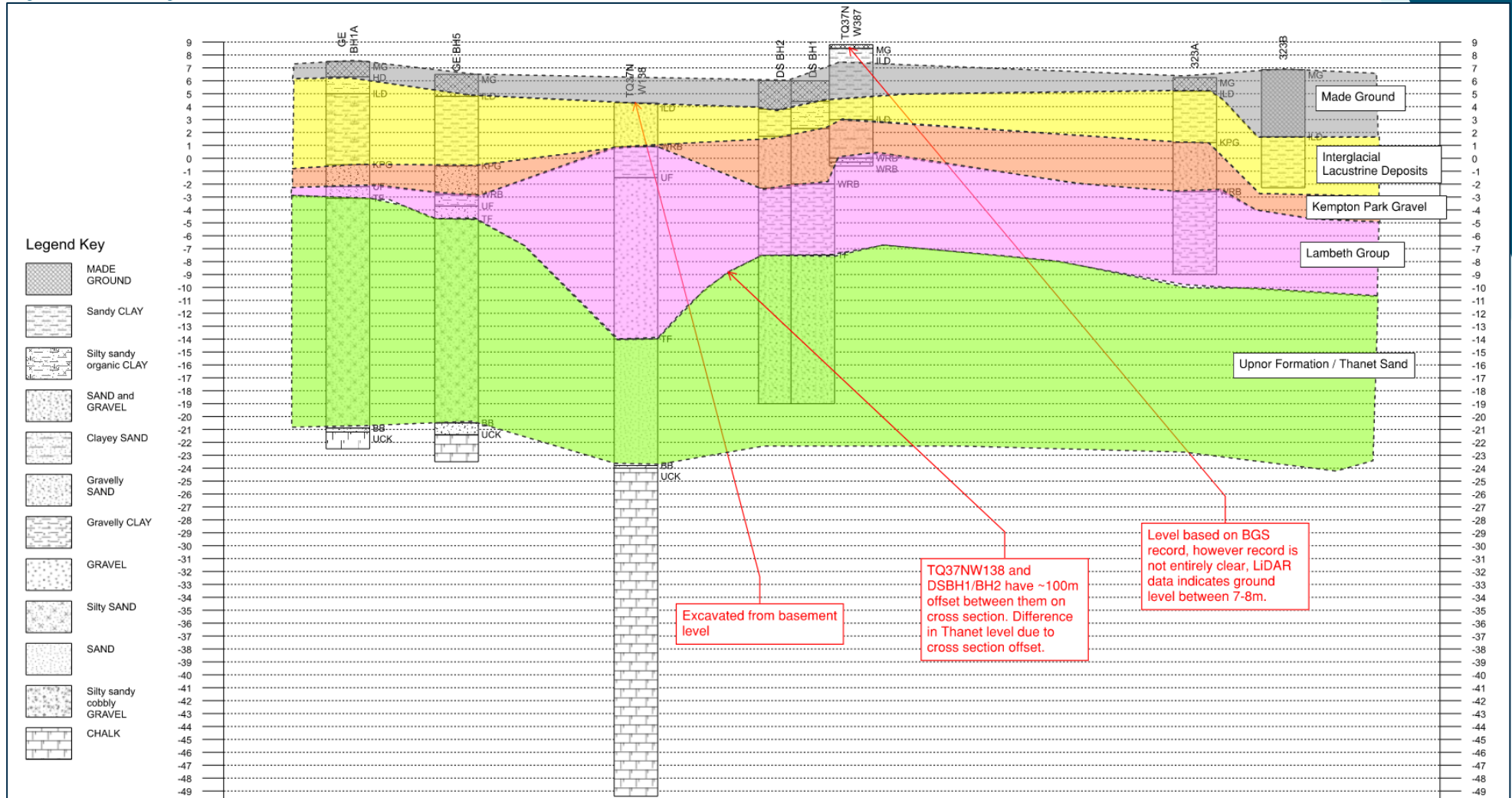


Figure 9. Cross Section Position



The cross section is provided below. There is a significant offset to some of the boreholes giving an unrealistic variation in levels of the Woolwich and Reading Beds; therefore, this information should be considered preliminary at this time.

Figure 10. Geological cross section



3.3. Soil parameters

Preliminary geotechnical design parameters are provided below. These are preliminary only based on typical values for the London geology as site specific investigation data is not yet available.

Table 3: Geotechnical Design Parameters (PRELIMINARY)

Stratum	Design Level (mOD)	Bulk Unit Wt (kN/m ³)	Cohesion (c _u) kPa [c'] kPa	Friction angle ϕ (°)	Young's Modulus E _u (MPa) [E']
Made Ground	8.1	19	n/a	30	- [10]
Interglacial Lacustrine Deposits	7	19	40 [0]	24 ^a	24 ^c [18] ^d
Kempton Park Gravel	3	19	- [0]	35 ^b	- [50]
Lambeth Group (mixed)	0	20	200 [5]	24 ^a	150 ^e [112.5] ^d
Thanet Formation	-11	20	n/a	40 ^a	200

a – BS 8002:2015 Code of practice for Earth retaining structures, British Standards institution

b – Peck, R.B., Hanson, W.E., and Thornburn, T.H., Foundation Engineering, 2nd Edn, John Wiley, New York, 1967, p.310

c – Based on 600c_u - Burland, Standing J.R., and Jardine F.M. (eds) (2001), Building response to tunnelling, case studies from construction of the Jubilee Line Extension London, CIRIA Special Publication 200

d – Based on 0.75E_u - Burland, Standing J.R., and Jardine F.M. (eds) (2001), Building response to tunnelling, case studies from construction of the Jubilee Line Extension London, CIRIA Special Publication 200

e – Based on 750c_u - Burland, Standing J.R., and Jardine F.M. (eds) (2001), Building response to tunnelling, case studies from construction of the Jubilee Line Extension London, CIRIA Special Publication 200

3.4. Hydrology and Hydrogeology

The closest surface water body to the Site is located some 1.45km to the north in Burgess Park. The closest main river (as described by the EA) is the Ravensbourne River, some 3km east of the Site. A 'lost watercourse' is located approximately 370m south of the Site, known as the 'River Peck' which is culverted/routed underground [Ref: 5].

The man made Surrey Canal Peckham Branch was historically present some 200mm north of the Site.

The Site is located over an Environment Agency designated Secondary 'A' aquifer in the Lambeth Group and Thanet Sand Formation. The underlying Chalk is classified as a Principal Aquifer. The Lambeth / Thanet Formation and the Chalk are likely to be hydraulic continuity. The superficial deposits at the Site are designated as Unproductive aquifers.

The Site is not located within a groundwater Source Protection Zone.

The Site is located within a Flood Zone 1 (“low” probability of flooding from rivers and the sea) based on the Environment Agency Flood Map for Planning [Ref: 4].

Southwark Flood Maps [Ref: 6] indicate the Site generally has a very low surface flood risk, however the mapping indicates there is an area of ponding with up to a high surface water flood risk in the central western area of the Site, this is discussed in more detail in the FRA [Ref: 5]. The area of high surface water flood risk is not within the Phase 1 basement area.

The London Borough of Southwark Strategic Flood Risk Assessment indicates that the Site is located in an area that is not at risk of groundwater flooding [Ref: 6].

3.5. Groundwater

Groundwater was recorded to the north of the Site at a level of between 3mOD to 4.5mOD, some 1.74 to 3.93m below ground level in that location however these are likely perched water levels local to those positions; regional groundwater from deeper boreholes is more likely to be at ~0mOD within the Kempton Park Gravels based on local data.

4. Basement Impact Assessment–Screening and Scoping

Southwark Guidance [Ref: 1] provides specific screening criteria as a set of questions to be answered by the applicant.

It is noted that the Southwark Guidance does not include screening questions for land stability, however typical screening criteria from other London boroughs have been used for the purpose of this assessment.

4.1. Subterranean (Ground Water) Flow Screening & Scoping

4.1.1. Is the Site located directly above an aquifer?

Yes – the Site sits above the Lambeth Group – a Secondary ‘A’ Aquifer.

4.1.2. Will the proposed basement extend beneath the water table surface?

No – The proposed basement SSL is 3.8mOD. Local site investigation data indicates the groundwater table is at approximately 0mOD in the Kempton Park Gravel.

A site-specific investigation is to be carried out including boreholes with groundwater monitoring standpipes to confirm groundwater assumptions.

4.1.3. Is the Site within 100m of a watercourse, well (used/disused) or potential spring line?

No – The closest current surface water feature is a lake ~1.45km from the Site. The River Thames is over 3km from the Site. The historical lost river the River Peck flowed broadly south to north some 950m east of the Site.

4.1.4. Will the proposed basement development result in a change in the proportion of hard surfaces/paved areas?

No - The Site is currently covered with hard-standing, the proposed new structure also covers the entire Site.

4.1.5. As part of the Site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground?

No – Drainage to be discharged to sewer and attenuated on Site in accordance with current regulations.

4.1.6. Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond or spring line?

No – There are no known local ponds or spring lines near the Site.

4.2. Surface Water Flow – Screening and Scoping

4.2.1. As part of the proposed Site drainage, will surface water flow paths be materially changed?

No – currently surface drainage is to public sewers this will not change.

4. 2. 2. Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas (including impermeable basement rooftops beneath garden areas)

No – The Site is currently covered with hard-standing, the proposed new structure also covers the entire Site.

4. 2. 3. Will the proposed basement development result in changes to the profile of inflows of surface water being received by adjacent properties or downstream watercourses?

No

4. 2. 4. Will the proposed development result in changes to the quality of surface water being received by adjacent properties or downstream watercourses.

No – The demolition of the existing petrol station and excavation of Made Ground soils in the basement area would be expected to have a beneficial impact if any on surface water quality.

4. 2. 5. Is the Site in an area identified as having surface water flood risk according to either the Local Flood Risk Management Strategy or SFRA?

No – The Site is generally shown by Southwark surface flood mapping to have a negligible risk of surface water flooding. A Flood Risk Assessment will be carried out by others.

4. 2. 6. Is there a history of flooding/ponding across the Site?

Unknown – A Flood Risk Assessment is being provided for the Site by others.

4. 3. Slope Stability Screening and Scoping

4. 3. 1. Does the existing Site include slopes, natural or manmade, greater than 1:8?

No

4. 3. 2. Will the proposed re-profiling of landscaping at Site change slopes at the property boundary to more than 1:8?

No

4. 3. 3. Does the development neighbour land including railway cuttings and the like with a slope greater than 1:8?

No

4. 3. 4. Is the Site within a wider hillside setting in which the slope is greater than 1:8?

No – The Site is ~300mm east of the toe of the slope from Denmark Hill to the south west.

4. 3. 5. Is the London Clay the shallowest formation on Site?

No

4. 3. 6. Will any trees be felled as part of the proposed development and/or are any works proposed within any tree protection zones where trees are to be retained?

Yes – Some trees will be removed on the east of the site, near the eastern proposed basement wall

as part of the development [Ref: 7]. The proposed basement wall and building foundations will be piled and therefore are not considered to be sensitive to shrink / swell movements from moisture content changes in the soils around removed trees. Additionally, the proposed basement SSL at 3.8mOD is ~0.8m above the anticipated level of the Kempton Park Gravel and ~4.1m to 4.9m below ground level. The risk of shrink / swell at this depth and with limited thickness of cohesive superficial deposits below basement level is considered very low.

Where trees are to be retained, the proposed basement development works will not extend into root protection areas. Encroachments of precautionary root protection areas by landscaping elsewhere on the site (not in the basement area) are discussed in the Arboricultural Impact Assessment [Ref: 7].

4. 3. 7. Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the Site?

No

4. 3. 8. Is the Site within 100m of a watercourse or a potential spring line?

No – see previous responses.

4. 3. 9. Is the Site within an area of previously worked ground?

No – The BGS data indicates that the Site is within an area of ‘Artificial Ground’. It is not clear what this is derived from as historical mapping does not indicate major excavations, landslides, or landfills in the area

4. 3. 10. Is the Site within an aquifer? If so, will the proposed basement extend beneath the water table such that dewatering may be required during construction?

No – The Site is over a Secondary ‘A’ aquifer in the Lambeth Group, however the basement will not extend into this stratum. The local groundwater table in the Kempton Park Gravel deposits is expected to be at 0mOD, which is ~3.8m below the proposed basement SSL of 3.8mOD. The basement is expected to be excavated within a contiguous wall, not requiring de-watering.

Should groundwater from Site investigations indicate that a contiguous wall is not feasible due to higher than expected groundwater levels, local dewatering internal to the secant piling will be required – wider dewatering that could affect local groundwater levels will **Not** be required.

4. 3. 11. Is the Site within 5m of a highway or pedestrian right of way?

Yes – Impact Assessment will be carried out.

4. 3. 12. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?

Yes – Impact Assessment will be carried out.

4. 3. 13. Is the Site over (or within the exclusion zone of) any tunnels or railway lines?

No

4. 4. Screening and scoping Non-Technical Summary

In summary, the proposed basement is not expected to extend below the groundwater table and sits within a relatively non-sensitive environment regarding impacts on groundwater, adjacent

properties, and surface water. The following items will be taken into consideration in more detail based on the screening and scoping exercise carried out.

Table 4: Screening and Scoping Summary

Section	Aspect to be considered
Ground Water Flow	<p>The Site is above a Secondary 'A' aquifer in the Lambeth Group, the basement will not be below this. The proposed basement is not expected to be below the local groundwater level in the Kempton Park Gravel (an unproductive aquifer at the Site).</p> <p>A site specific investigation is to be carried out including boreholes with groundwater monitoring standpipes to confirm groundwater assumptions.</p> <p>The impact of the proposed basement on the Secondary 'A' aquifer is considered to be negligible as set out in preceding report sections. No further assessment is proposed.</p>
Slope Stability	<p>The proposed development will increase relative depths between foundations. Impact assessment is proposed.</p> <p>The proposed basement is within 5m of a public footpath and road. Impact assessment is proposed.</p>
Surface Flow and Flooding	No impacts identified at screening stage.

5. Ground Movement Assessment

5.1. Construction method and sequencing

The basement and proposed development will be designed to provide stability and limit ground movements both in the short term and over the long term.

5.2. Perimeter walls

The basement will be constructed within a piled perimeter wall. A site-specific investigation is to be carried out including boreholes with groundwater monitoring standpipes to confirm groundwater assumptions. The wall may be contiguous or secant, depending on groundwater conditions.

5.3. Construction sequence

Broadly the construction sequence is anticipated to comprise of the following stages:

1. Piled retaining wall and bearing piles installed from ground level;
2. Capping beam constructed and excavation taken to basement level.
3. Construct basement pile / core caps and basement structure, then proceed with ground and above construction.

5.4. Sources of ground movement

Sources of ground movement associated with the proposed basement construction are summarised below:

1. Demolition of existing petrol station building;
2. Installation movements from piled wall construction;
3. Movements caused by retaining wall deflection during excavation;
4. Short term heave movements caused by basement excavation;
5. Long-term heave/settlement of the building.

It is noted that if a secant wall is required due to groundwater levels being above the basement, this will create a sealed box. Dewatering will not affect external water levels and therefore this is not considered as a potential mechanism for the generation of ground movements. If the groundwater levels are below the basement level as expected, the basement is anticipated to be constructed within a contiguous pile wall and de-watering would not be carried out.

5.5. Demolition of existing buildings

The existing petrol station building is single storey. The demolition of these is not expected to give rise to heave movements or general ground settlements. It is noted that excavations will be required to remove these tanks. Localised temporary works may be required for these excavations, however the excavations are not expected to extend beyond the Site boundary.

Vibrations generated during demolition will be managed by the demolition contractor and with reference to appropriate party wall agreements.

5.6. Installation movements

The amount of movement generated by piled wall construction is highly dependent on workmanship and methodology. Typically, displacements caused in this manner are estimated with reference to published data from CIRIA C760¹ and modified with reference to published case histories^{2,3}. Estimates are based on the bored length of pile as below. Modified values are adopted based on established case studies and in the recognition that piling techniques and construction control have advanced since the time of publication of the CIRIA C760 data. It is noted that as a worst-case assessment, a secant piled wall is assumed.

Table 5: Ground surface movements due to bored pile installation in stiff clay (adapted from CIRIA C760 Table 6.1)

Wall Type	Horizontal surface movement wall (% of wall depth)	Distance to negligible movement (multiple of wall depth)	Vertical surface movement at wall (% of wall depth)	Distance to negligible movement (multiple of wall depth)
Secant	0.08 (CIRIA C760) 0.04 (modified)	1.5	0.05 (CIRIA C760) 0.04 (modified)	2
Contiguous	0.04 (CIRIA C760) 0.02 (modified)	1.5	0.04 (CIRIA C760) 0.02 (modified)	2

Assuming a secant pile wall, where the secant piled wall is to be load-bearing; it is assumed that the piles will be 25m to 28m long – the typical capability of a Continuous Flight Auger (CFA) rig, therefore predicted installation movements are of the order of **10mm** to **11mm**. Assuming a contiguous pile wall, the predicted installation movements at the wall are of the order of **6mm**.

Displacements are anticipated to decay hyperbolically with distance from the retaining wall to zero at a theoretical maximum distance of some 56m from the basement wall for vertical movements and 42m for horizontal movements.

5.7. Deflection movements

Deflection movements occur as soil support is removed from the front face of the basement wall and load is taken up on the rear of the wall. The amount of movement depends on the stiffness of the wall support system and the depth of the excavation. First order estimates of deflection movements have been made based on data reported in CIRIA C760 as below.

Table 6: Ground surface movements due to excavation in front of piled walls embedded in competent ground.

Movement type	Surface movement of wall (% of max. excavation depth)	Distance behind wall to negligible movement (multiple of max. excavation depth)
Horizontal	0.15 (High Support Stiffness) 0.4 (Low Support Stiffness)	2 (for Coarse Grained Soils)

¹ CIRIA C760 – Guidance on embedded retaining wall design, CIRIA 2017.

² Langdon, N.J., Giles, D.P., and Ball R.J., Technical paper: Ground movement prediction for a piled basement: A case study from Garlickhythe, City of London, UK.

³ Ball, R.J., Langdon, N.J., and Creighton M., Technical Paper: Prediction of party wall movements using CIRIA report C580.

Movement type	Surface movement of wall (% of max. excavation depth)	Distance behind wall to negligible movement (multiple of max. excavation depth)
Vertical	0.1 (High Support Stiffness) 0.35 (Low Support Stiffness)	2 (for Coarse Grained Soils)

On the basis of the above, assuming an excavation of 4.6m (to basement slab formation level of 3.5mOD, allowing for typical excavation depth of ~4.3m) with low support stiffness, the predicted maximum horizontal and vertical movements are of the order of up to **18mm** lateral movement and **16mm** vertical movement, dissipating to zero at a maximum distance of some 16m from the basement wall.

It is noted that the CIRIA C760 approach accounts for short term heave movements from basement excavation.

5. 8. Long Term Heave/Settlement

The proposed development is to be on piled foundations. The retaining wall will be propped by the ground floor slab in the permanent condition. Long term settlement and heave will therefore be negligible with permanent loads / tension from excavation taken by the piled foundations to deeper soils.

5. 9. Ground Movements and Building Damage Assessment

Plots of displacements (installation stage and combined installation and deflection movements) at ground level based on CIRIA C760 calculations assuming worst case conditions (secant wall, all secant piles 28m long and low support stiffness) are provided in Appendix B. The plots show the worst case of vertical and horizontal movements.

Predicted ground movements at the assets around the basement are summarised below. There are numerous buildings to the south of Hanover Road, however these are over 17m from the proposed basement. Two of the closest buildings to south of Hanover Road have been assessed, and impacts have been found to be negligible, therefore assessments are not carried out for each individual building across the Hanover Road.

Table 7. Predicted displacements

Building	Min distance to basement (m)	Maximum displacement Installation stage (mm) vertical	Maximum displacement Installation + deflection (mm) vertical	Maximum displacement Installation stage (mm) horizontal	Maximum displacement Installation + deflection (mm) horizontal
Purdon House	9.6	7.7	7.7	6.7	6.7
81 Hanover Park Apartments	14.0	6.3	6.3	5.0	5.0
Existing Morrisons and Aylesham shopping centre	12.3	6.8	6.8	5.6	5.6
TfL Bus Stop	3.7	9.8	15.5	9.3	15.9
Goldsmith Road	2.2	10.3	19.7	10.1	20.7
McKerrell Road	3.5	9.8	16.0	9.4	16.5

Building	Min distance to basement (m)	Maximum displacement Installation stage (mm) vertical	Maximum displacement Installation + deflection (mm) vertical	Maximum displacement Installation stage (mm) horizontal	Maximum displacement Installation + deflection (mm) horizontal
Hanover Park	3.3	9.9	16.5	9.5	17.1
TfL bus depot Building	15.5	5.9	5.9	4.5	4.5
20 Robert Clean Close	17.6	5.3	5.3	3.8	3.8
30-36 Hanover Park	18.3	5.1	5.1	3.6	3.6

The predicted maximum differential displacements over the neighbouring buildings of *Purdon House*, 81 Hanover Park Apartments, the TfL depot building and the Morrisons building have been used to calculate angular distortion and horizontal strain across the buildings. It is noted that the differential displacement at the Morrisons building is taken over the width of the shopping centre eastern wing, rather than the full shopping centre width. This provides a more conservative estimate of strain than using the full building width.

It is noted that these calculations assume worst case conditions (28m long piles along the retaining wall and low support stiffness). Depending on groundwater conditions the basement is likely to be excavated within a contiguous wall. Additionally, the retaining wall piles will only be required to take axial load at certain sections of wall, elsewhere the pile toe levels will be governed by stability of the wall and are likely to be shorter than 28m. The assumption of a cantilevered, low support stiffness wall will require review once Site specific ground condition data is available.

Table 8. Angular distortion and horizontal strain

Building	Min distance to basement (m)	Maximum displacement Installation + deflection (mm) vertical	Maximum displacement Installation + deflection (mm) horizontal	Minimum vertical displacement (mm)	Minimum horizontal displacement (mm)	Angular distortion (1/)	Horizontal strain (%) (based on worst case displacement)
Purdon House	9.6	7.7	6.7	0.0	0.0	7023	0.012%
81 Hanover Park Apartments	14.0	6.3	5.0	1.2	0.1	4643	0.021%
Existing Morrisons and Aylesham shopping centre	12.3	6.8	5.6	1.1	0.1	4590	0.021%
TfL Bus Depot Building	15.5	5.9	4.5	2.9	1.4	4086	0.026%
20 Robert Clean Close	17.6	5.3	3.8	0.0	0.0	7216	0.010%
30-36 Hanover Park	18.3	5.1	3.6	3.0	1.5	4185	0.025%

Skempton and MacDonald (1956) demonstrated the onset of cosmetic and structural building damage to occur at angular distortions of 1/300 and 1/150, respectively. Rankin's (1988) proposed movement

acceptance criteria and contingency actions for various risk categories are summarised below. See Table 1 for literature references.

Table 9. Rankin (1988) Building Damage Classifications

Category	Limiting settlement (mm)	Limiting angular distortion	Damage
1 (Negligible)	10	Shallower than 1/500	Negligible – superficial damage unlikely
2 (Slight)	50	Shallower than 1/200	Slight – possible superficial damage which is unlikely to have any structural significance
3 (Moderate)	75	Shallower than 1/50	Moderate – expected superficial damage and possible structural damage to buildings.

Burland and Wroth (1974) identified that the main cause of structural damage to a building is through tensile strain and Burland et al (1977) presented a damage classification system for masonry structures based upon observed crack width and ease of repair. Limiting tensile strains appropriate for each damage classification, were derived by Boscardin and Cording (1989). See Table 1 for literature references.

Table 10. Classification of damage visible to Walls (Table 2.5, CIRIA C760)

Category	Damage	Limiting tensile strain, ϵ_{lim} (%)
0 (Negligible)	Negligible – hairline cracks	0.00 to 0.05
1 (Very slight)	Fine cracks that can easily be treated during normal decoration (crack width <1mm)	0.05 to 0.075
2 (Slight)	Cracks easily filled, redecoration probably required. Some repointing may be required externally (crack width <5mm).	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 linings. Repointing of external brickwork and possible a small amount of brickwork to be replaced (crack width 5mm to 15mm of a number of cracks >3mm).	0.15 to 0.3
4 (Severe)	Extensive repair work involving breaking out and replacing of sections of walls, especially over doors and windows (crack width 15mm to 25mm but also depends on number of cracks).	>0.3

Based on the data summarised above, predicted angular distortions and horizontal strains caused by the basement construction can be controlled to remain within '**Category 0**' values and the risk of damage to neighboring structures can be managed to remain '*negligible*' to '*very low*'.

Displacements at the Tfl bus stop are predicted to be less than 16mm. The bus stop is a small steel shelter structure, and would not be expected to be sensitive to movements of this magnitude, therefore risk to the bus stop is considered negligible.

Predicted displacements at roads around the Site are less than 25mm, and would not be expected to have a significant impact on the roads. Risk to the roads is considered negligible. Where utilities are present in the pavements they will be assessed independently and subject to agreement with the relevant authority. Control of impacts to the pavement and carriageway will be further secured through the TfL AIP process.

6. Non-technical summary

A site-specific investigation will be required to confirm the assumptions on ground conditions and groundwater conditions made in this report.

However, based on the available information it is considered that the proposed basement has a **Negligible** impact on groundwater flooding risk, surface water flow and flooding.

A preliminary ground movement assessment and building damage assessment have been carried out, demonstrating that the building can be constructed without generating significant risk to adjacent properties.

On the basis of this report, and the associated Flood Risk Assessment, it is considered that the impacts of the proposed basement fall within the requirements of the *Southwark Basement and Flooding Guide for Developers*. It is recognised that further security regarding basement impacts will be obtained through the developer's requirement to engage with the highways AIP process and with utility providers regarding potential impacts to their assets.

Appendix A Proposed Development Plans



CLIENT:

BERKELEY HOMES

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ANY OMISSIONS OR DISCREPANCIES BETWEEN DRAWING INFORMATION SHOULD BE BROUGHT TO THE ATTENTION OF THE CONTRACT ADMINISTRATOR.
CDM REGISTER: FLAGGED HAS ISSUES RELATING TO CONSTRUCTION (DESIGN AND MANAGEMENT) TO BE ADDRESSED DURING DESIGN DEVELOPMENT TO BE READ IN CONJUNCTION WITH DESIGN RISK REGISTER AND RESIDUAL RISK REGISTER.
FURNITURE LOCATIONS ARE ILLUSTRATIVE.

NOTES:

KEY

- Block Reference
- Planning Application Site Boundary
- Primary Entrance
- 1B1P
- 1B2P
- 2B3P
- 2B4P
- 3B5P
- 3B6P
- 2B3P-Duplex
- 2B4P-Duplex
- 3B5P-Duplex
- 3B6P-Duplex
- Wheelchair Accessible Home
- Ancillary/Plant/Back of House
- Flexible Retail/Leisure/Commercial/Workspace
- Residential Cycle Store
- Supermarket
- Supermarket Service Yard/Plant
- Roof Garden (Residential Amenity)
- Podium (Residential Amenity)
- Green Roof
- Indicative MEP/PV
- 900mm offset

NOTES

- Context information is illustrative only.
- Spot heights (AOD) are indicative and subject to Landscape and Servicing design development.
- Architectural design subject to ongoing design development through subsequent RIBA work stages.
- Structure information is illustrative only, for more information refer to Structure Engineer package.
- Servicing/Transport information is illustrative only, for more information refer to Transport Statement.
- Landscape information is illustrative only, for more information refer to Landscape package.
- Each building is served by at least one core, other than A, B and C which together share two access cores.
- For residential layout details, refer to 1:100 Drawings in Appendix to the Design and Access Statement.
- Where shown, areas are in m2, elevation in m, and dims in mm.

NOT FOR CONSTRUCTION

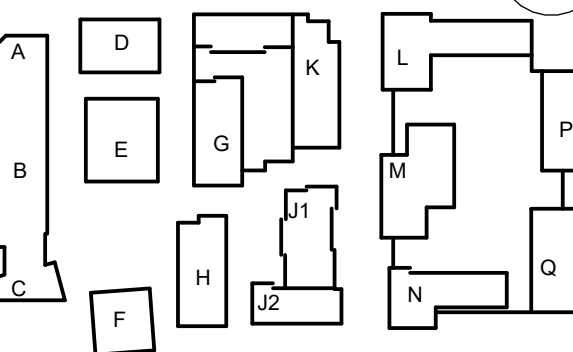
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dRMM Ltd
Magdalen House
136-148 Colindale Avenue
London SE5 7TU UK
+44 (0)20 7803 0177
mail@dmmstudio.com
www.dmmstudio.com

KEY



TITLE
PLAN - SITEWIDE - GROUND FLOOR

PROJECT
AYLESHAM CENTRE PECKHAM

PROJECT STATUS SCALE SIZE
PLANNING 1 : 500 A1

DRAWING NO REVISION
ASCP-DRM-XX-00-DGA-A- 002050 P0