Document:	**Stage 1 Tier 1: Preliminary Risk Assessment (Desk Study) Report**
Project:	**The British Museum (East Road Building)**
Reference No:	**GL25617**
Date:	**November 2023**
Prepared For:	**Steadberry Restoration Ltd**

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FOREWORD

General Conditions Relating to a Stage 1 Tier 1: Preliminary Risk Assessment (Desk Study) Report

This investigation has been devised to generally comply with the relevant principles and requirements of BS10175:2011+A2:2017 'Investigation of potentially contaminated sites - Code of practice', the 'Land contamination: technical guidance' collection (Environment Agency, 2016) and 'Land Contamination Risk Management (LCRM)' (Environment Agency, 2020) and BS EN 1997 (Eurocode 7). This report is a preliminary stage of investigation designed to identify potential contamination hazards and undertake preliminary hazard assessment, as such it is possible that further work may be recommended based on the findings.

The recommendations made and opinions expressed in this report by the writers are based on the information obtained from the sources described using a methodology intended to provide reasonable consistency and robustness.

The desk study has been compiled and extended into hazard identification and assessment in line with the risk-based methods referred to in Part IIA of the Environment Protection Act 1990, introduced by section 57 of the Environment Act 1995 and brought into force in April 2000.

Information gained during the initial stages of the desk study was collated to form a conceptual ground model of the site, which detailed the characteristic ground conditions and the elements of the surrounding environment. The ground model assists with identifying the potential sources of contamination, the possible receptors to the contamination and the conceivable pathways between them. It is referred to as the source-pathway-receptor linkage (or pollutant linkage), and is defined in Part IIA of the Environment protection Act 1990, and is in accordance with BS10175:2011+A2:2017.

Some items of the desk study have been provided by third parties and whilst Harrison Group have no reason to doubt the accuracy, the items relied on have not been verified. No responsibility can be accepted for errors within third party items presented in this report.

Parts of the study based on non-invasive techniques cannot guarantee that the area investigated has the properties described in the report. Furthermore, there may be additional issues on the site, not foreseen during the survey, which involve potentially hazardous substances.

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Any advice, opinions, or recommendations within this document should be read and relied upon only in the context of the document as a whole. The contents of this document are not to be construed as providing legal, business or tax advice or opinion.

CLIENT SUMMARY

Location	The site was located within the grounds of the British Museum in central London. The site can be accessed from Montague Place, London, WC1B3QQ centred at approximate National Grid Reference (NGR) 530076, 181803.
Previous Site Use	The site is known to have been heavily influenced by human activity to as far back as the Roman period, and especially from c. 1643 onwards, when the large scale earthworks of the 'Lines of Communication' were undertaken in very close proximity to the site during the Civil War. Various incarnations of Montagu House and the British Museum followed, with the surrounding farmland yielding to urbanization by the turn of the 19th century until Montagu House was surrounded on all sides by high-status residential townhouses and their gardens. From the mapping available, the site is shown to have been part of the gardens of the terraced townhouses lining Montague Street, from the late 19th century until the 1960s. The British Museum expanded their site boundary at this time to incorporate much of these gardens, including the proposed site. The current East Road Building was shown to have been present on-site from the 1960s and has remained unchanged to the present day.
Current Site Use	At the time of the walkover the site was in active use as a single storey building, used for office space, material storage, and welfare facilities. Where not developed by buildings the site surface was primarily covered by asphalt hardstanding.
Proposed Site Usage	We understand it is proposed to construct a new two-storey service building, including a single storey basement as part of the South West Energy Centre (SWEC) development at the British Museum, as set out in the plans provided by Alan Baxter Associates (ABA).
Geology/Hydrogeology	The site is detailed to be underlain by superficial deposits of the Lynch Hill Gravel Member deposits (sand and gravel). Underlying the superficial deposits, the solid geology is detailed as the London Clay Formation. 1 No. borehole was recorded within 50m of the site. The closest BGS borehole (TQ38SW1171) was located 3m west of the site and detailed made ground overlying dense sands and gravels of the 'Taplow Gravel Member' to 6.20mbgl. London Clay Formation was recorded below to the final borehole depth of 10mbgl. Information from the historical boreholes indicates the water table is expected to be approximately 4.7mbgl, situated within the superficial Lynch Hill Gravel Member. The aquifer status of the site is linked to the underlying soil types. The superficial geology of the Lynch Hill Gravel Member is designated as a Secondary A aquifer and the solid geology London Clay Formation is classified as unproductive. A preliminary hydrological screening assessment has identified a number of potential impacts which require further consideration. A 3D model of the groundwater regime has been constructed and levels and groundwater flow directions extrapolated. It should be noted that we have in part relied upon the accuracy of third party sources, provided to us by the engineer, in relation to elements of this work. In summary it is concluded that the development will not result in any specific issues relating to hydrogeology and hydrology of the site. It is assumed that suitable and appropriate construction methods will be adopted to ensure that there will not be any negative impacts on the groundwater, slope stability or effects on adjacent properties or public highways.
Background Information	The closest active groundwater abstraction is located some 209m west of the site associated with a heat pump at the London School of Hygiene and Tropical Medicine. The closest historical tank was located 313m northwest of the site, an obsolete petrol station was recorded 297m west of the site and the closest historical garage was recorded 247m northwest of the site. No historical tanks were located within 250m of the site. 4 No. electrical substations were recorded within 250m of the site. The closest was situated 15m northwest of the site. No historical industrial land uses were recorded within 250m of the site. The closest was a hospital located 259m northeast of the site. 21 No. recent industrial land uses are recorded within 250m of the site. Examples of these include electronic stores, electrical substations, publishers, house clearance companies, vehicle hire, recording studios, machinery, and photographic stores. No surface water features are recorded within 250m of the site. It should be noted that the River Thames is located approximately 1.2km to the southeast of the site. The site is located within a coastal catchment of the Water Framework Directive. A negligible risk is considered from surface water flooding. A moderate risk is considered from groundwater flooding. The site is located within a SSSI Impact Risk Zone.

	The site is in an area where less than 1% of homes are affected by radon is recorded by data obtained from the British Geological Survey and Public Health England. As such, no further assessment is deemed necessary and radon protection measures are not required at this location. A Detailed Unexploded Ordnance Risk Assessment (Ref. 8189) has been carried out by MACC International Ltd. Records indicate that the British Museum did suffer enemy bombing and subsequent damage during WWII. However, damage was recorded to the upper floor of the Museum and it is considered unlikely for munitions for have fallen unnoticed within the footprint of 1940s buildings. However, UXO contamination is considered credible within 1940s undeveloped areas given the bombing density recorded in the immediate area. As such a Medium Risk was returned for any proposed drilling, sampling, bulk excavations or piling in any post war Un-worked Ground.
Geotechnical Hazards	The potential for uncontrolled backfill and relict structures have been identified as potential geotechnical hazards. An intrusive geotechnical investigation is recommended across the site prior to any construction, to allow for adequate design of foundations and to confirm the geology. The potential presence of a considerable thickness of dense granular Lynch Hill Gravel Member and the anticipated loads associated with the proposed structures are likely to make shallow foundations (including rafts) a suitable foundation solution. However, given the proposed designs include a single storey basement, it is likely that a piled foundation solution may be required. Consideration of the sulphate content of the soils should be given with respect to the grade of concrete suitable for use at this location. The density and permeability of shallow soils should be assessed in order to consider pavement and drainage design. The likely granular nature of the superficial deposits covering the site, suggest that conventional soakaways maybe suitable in the absence of significant made ground deposits. Although groundwater levels will need to be confirmed. Examination of available historic map data shows since the 1960s the site has been occupied by the existing East Road Building. Unless this building and all existing underground structures are thoroughly ‘grubbed out’, demolition of the existing buildings may lead to the presence of relict substructures. There is also the possibility for underground services to cross the site.
Contamination	At the time of the walkover the site was in active use as a single storey building, used for office space, material storage, and welfare facilities. From the mapping available, the site is shown to have been part of the gardens of the terraced townhouses lining Montague Street, from the late 19th century until the 1960s. The British Museum expanded their site boundary at this time to incorporate much of these gardens, including the proposed site. The current East Road Building was shown to have been present on-site from the 1960s and has remained unchanged to the present day. Given the time of construction it is possible that asbestos is present within the structure and within any made ground that may be present. Therefore, the soils should also be investigated for the potential presence of ACM. The potential for uncontrolled backfill on site, possible ACM in soil and ground gas generation from off-site sources were also noted. No historic or current underground or overground tanks were identified on-site. Prior to the commencement of any redevelopment, we would advocate direct investigation and assessment in order to identify whether contamination is present, and whether a significant risk exists to people using the site and to controlled waters (groundwater – secondary A aquifer).
Recommendations	Intrusive investigation is advised in order to assess the potential for the contaminative hazards identified above to impact sensitive receptors along with the identified geotechnical hazards. The engineer (ABA) has provided a scope for these works which are ongoing and will be reported under separate cover.

STAGE 1 TIER 1: PRELIMINARY RISK ASSESSMENT (DESK STUDY) REPORT

FOR A SITE AT

THE BRITISH MUSEUM (EAST ROAD BUILDING)

1 TERMS OF REFERENCE & INTRODUCTION

The work covered by this report was undertaken on behalf of Steadberry Restoration Ltd (Client), in accordance with Harrison Geotechnical Engineering (HGE) quotation GL25617 - The British Museum - Rev 2 dated 4th December 2022. The work was undertaken in accordance with the relevant specification *Ref. 1910-41-S01-A - Proposed Site Investigations* issued by Alan Baxter Ltd (ABA) who acted as the engineer.

The site is located within the grounds of the British Museum in central London. The site can be accessed from Montague Place, London, WC1B 3DG centred at approximate National Grid Reference (NGR) 530053, 181723. The site boundary is indicated on drawing GL25617-DR001 presented in the appendix.

We understand it is proposed to construct a new two-storey service building, including a single storey basement as part of the SWEC development at the British Museum, as set out in the plans provided by ABA. The basement development is modest in size such that it does not extend beyond the footprint of the building and is no deeper than one full story below ground level (approximately 3m in depth). We also understand that there will be no soft landscaped areas in the final proposed design.

The purpose of the report was to provide environmental and geotechnical information for a site referred to as The British Museum (East Road Building) in order to inform the client of possible hazards prior to potential redevelopment as well as for submission to the local authority as part of the planning process.

2 BACKGROUND INFORMATION

2.1 Site Description

The site under consideration is located in the northeast corner of the British Museum grounds. The site covers an area of approximately 0.03ha and can be identified by National Grid Reference 530076, 181803.

A Topographical Survey for the subject site was provided by ABA, Ref*: VF02_Base Model*. Examination of the supplied topographical survey shows elevation of the site as approximately 24.5 metres above Ordnance Datum (maOD).

The site was bounded to the southwest by a service road and the main Grade I listed buildings of the British Museum, and to the north and east by large townhouses and associated gardens and basements along Montague Street.

At the time of our assessment the site was occupied by the main structure of the East Road Building, which was roughly rectangular in shape and of brick construction. The structure was a single storey in height but was also raised approximately 1.5m above the surrounding ground level supported by a retaining wall and associated walkway ramp. The building had a flat roof with skylights and was primarily used for storage, office, welfare and workshop space.

A site walkover was undertaken on 31st January 2023 and the findings are presented in Table 2.1 overleaf, which should be read in conjunction with the appended annotated site plan (GL25617-DR002). Representative site photos are presented in the appendix as site walkover photograph plates.

Current Uses	At the time of the walkover the site was in active use as a single storey building, used for storage, office, welfare and workshop space.
Access	The main access to the site was located to the northwest via an asphalt service road which led from the North East Gate on Montague Place. Secondary pedestrian access to the site was available via the East Road and from the main British Museum buildings.
Vegetation	No vegetation was present on site, however there were a series of gardens with mature trees to the southeast. Some of the trees in close proximity to the site are known to have Tree Preservation Orders (TPO).
Topography	Examination of the supplied topographical survey shows elevation of the site as approximately 24 - 26m above Ordnance Datum (maOD).
Existing buildings/structures	At the time of our assessment the site was occupied by the main structure of the East Road Building, which was roughly rectangular in shape and of brick construction. The structure was a single storey in height but was also raised approximately 1.5m above the surrounding ground level, supported by a retaining wall and associated walkway ramp. The building had a flat roof with skylights and was primarily used for storage, office, welfare and workshop space.
Site surface	The areas of the site not occupied by buildings primarily consisted of asphalt and concrete hardstanding.
Above/below ground tanks	No tanks were noted above or below ground during the walkover.
Services	Overhead services were not observed on site. Service covers were noted during the walkover, in addition to mounted pipework and cable trays on the outside of the building.
Surface Water	No surface water was present on site.
Surrounding Area	The site was bounded to the southwest by a service road and the main Grade I listed buildings of the British Museum, and to the north and east by large townhouses and associated gardens and basements along Montague Street.

Table 2.1: Details of the site walkover

2.2 Environmental Setting

The environmental setting background information (geology, hydrology, hydrogeology and database information) and site history have been researched as part of this report. A summary of the environmental and geological setting is given in the following sections.

Table 2.2 below gives background information from mapping, online and literature sources.

	Data Source	Data Summary
Topography	Survey provided by ABA (Ref: VF02_Base Model)	Examination of the supplied topographical survey shows elevation of the site as approximately 24 - 26m above Ordnance Datum (maOD).
Geology	1:50,000 BGS Digital Mapping. GroundSure Report Reference GS-9365610 BGS Borehole Reference: TQ38SW1171	The site is detailed to be underlain by superficial deposits of the Lynch Hill Gravel Member deposits (sand and gravel). Underlying the superficial deposits, the solid geology is detailed as the London Clay Formation. 12 No. boreholes are recorded within 100m of the site. The closest BGS borehole (TQ38SW1171) was located 3m to the west of the site and detailed made ground to 2.74mbgl, overlying dense sands and gravels of the Taplow Gravel Member to 6.25mbgl. London Clay Formation was recorded below to the final borehole depth of 9.98mbgl.

	Data Source	Data Summary
Hydrogeology	GroundSure Report Reference GS-9365610 BGS Borehole Reference: TQ38SW1171	Information from the historical boreholes indicates the water table is expected to be approximately 4mbgl, situated within the superficial Lynch Hill Gravel Member. The aquifer status of the site is linked to the underlying soil types. The superficial geology of the Lynch Hill Gravel Member is designated as a Secondary A aquifer and the solid geology London Clay Formation is classified as unproductive. 2 No. active groundwater abstraction licences (above $20m^3$ per day) were recorded within 250m of the site, the closest was located 209m west of the site associated with a heat pump at the London School of Hygiene and Tropical Medicine. No surface water abstractions or potable abstractions were noted within 250m of the site. The site is not situated within a source protection zone.
Hydrology	GroundSure Report Reference GS-9365610	No surface water features are recorded within 250m of the site. It should be noted that the River Thames is located approximately 1.2km to the southeast of the site. The site is located within a coastal catchment of the Water Framework Directive. No records of flooding from rivers and the sea or historical flood events within 250m of the site. A negligible risk is considered from surface water flooding. A moderate risk is considered from groundwater flooding. The site is located within a SSSI Impact Risk Zone.
Geotechnical Hazards	GroundSure Report Reference GS-9365610	The hazard rating for shrink swell clays, compressible deposits and ground dissolution of soluble rocks is considered negligible on site. The hazard rating for running sands, collapsible deposits and landslides is considered to be very low.
Radon Potential	GroundSure Report Reference GS-9365610	The site is in an area where less than 1% of homes are affected by radon is recorded by data obtained from the British Geological Survey and Public Health England. As such, no further assessment is deemed necessary and radon protection measures are not required at this location.
Unexploded Ordnance	A Detailed Unexploded Ordnance Risk Assessment (MACC Ref. 8189)	Records indicate that the British Museum did suffer enemy bombing and subsequent damage during WWII. However, damage was recorded to the upper floor of the Museum and it is considered unlikely for munitions for have fallen unnoticed within the footprint of 1940s buildings. However, UXO contamination is considered credible within 1940s undeveloped areas given the bombing density recorded in the immediate area. A Medium Risk was returned for any proposed drilling, sampling, bulk excavations or piling in any post war Un-worked Ground.
Environmental Database Information	GroundSure Report Reference GS-9365610	No historical industrial land uses were recorded within 250m of the site. The closest recorded was a Hospital located 259m northeast of the site. No historical tanks were located within 250m of the site. The closest was located 313m northwest of the site. 4 No. electrical substations were recorded within 250m of the site. The closest was situated 15m northwest of the site. No historical petrol stations were recorded within 500m of the site. 2 No. historical garages were located within 250m of the site. The closest was recorded 247m northwest of the site. No historical or active records of landfill were recorded within 500m of the site. 1 No. licensed waste site was recorded 247m south of the site, detailed as a mobile plant treatment for soil. 5 No. waste exemptions are recorded within 250m of the site, the nearest being situated 112m northwest of the site, for crushing waste fluorescent tubes.

	Data Source	Data Summary
Environmental Database Information	GroundSure Report Reference GS-9365610	21 No. recent industrial land uses are recorded within 250m of the site. Examples of these include electronic stores, electrical substations, publishers, house clearance companies, vehicle hire, recording studios, machinery, and photographic stores. An obsolete petrol station was recorded 297m west of the site. 2 No. licensed pollutant release (Part A(2)/B) installations were recorded 237m northeast of the site relating to Dry Cleaning. 4 No. radioactive substance authorisations were located within 250m of the site, all of which were recorded 90m south at the British Museum. 2 No. licensed discharges to controlled waters were located within 250m of the site. The closest was recorded 238m west of the site, detailed as trade discharges – cooling water. No pollution incidents were recorded within 250m of the site. A London Underground railway (Piccadilly Line) is detailed as being located 220m northeast of the site. Historical railway sidings were recorded 134m south of the site from maps dating to 1896. The site is located within a conservation zone, detailed as Bloomsbury. 48 No. listed buildings are located within 250m of the site. This includes the British Museum itself, designated as Grade I listed. Russell Square, Bedford Square and Bloomsbury Square are located within 250m of the site and are registered parks and gardens.
Regulator Contact	London Borough of Camden Petroleum Office	Direct contact was not made.
Additional Background	***Excavations at the British Museum:*** *An Archaeological and Social History of Bloomsbury* by Rebecca Haslam and Victoria Ridgeway	Given the nature of the site in question, being a part of the grounds of the British Museum, we were provided with an extensive document by the Museum detailing past excavations and known history of the site (ref: *Excavations at the British Museum: An Archaeological and Social History of Bloomsbury*). The below is an extract from the summary of this document: *'The results of these studies suggest that the Bloomsbury area may have begun the transformation from undeveloped land to farmland as early as the Roman period and had certainly made that transition before the Norman Conquest. It remained rural in character until c. 1643, then the outer ring of London's Civil War defences was constructed the future site of the British Museum estate. The monumental earthworks that formed part of those 'Lines of Communication' remained fully extant for only a handful of years before the area was returned to pastoral use in the wake of the conflict.* *The next major event to affect the evolution of the British Museum site involved the construction of Montagu House and its grounds in 1675-7. Built by the famous architect and polymath Robert Hooke, this structure was commissioned as the London residence of the Montagus, an important landowning family. Although the building burned down just nine years after its completion, it was rapidly rebuilt in a similar style and served as an aristocratic residence into the 18th century. After a brief period of abandonment, the sale of the mansion to the government in 1754 propelled it to international fame after it was converted into the first incarnation of the British Museum.* *The ensuing decades saw the surrounding farmland yield to urbanization as the growth of London's wealthy western suburbs gathered pace, and by the turn of the 19th century Montagu House was surrounded on all sides by high-status residential townhouses and their gardens.* *As the remit of the institution grew in tandem with the size of its collections, Montagu House was demolished so that the core of the British Museum as we know it today could be constructed according to the designs of the architect Robert Smirke. During the next decades his creation was modified and extended as the Museum strived to acquire the resources and space it needed to display, curate and care for its collections. Inevitably this impacted upon the surrounding residential properties and their grounds, some of which were subsumed as it was enlarged.*

	Data Source	Data Summary
Additional Background	***Excavations at the British Museum:*** *An Archaeological and Social History of Bloomsbury* by Rebecca Haslam and Victoria Ridgeway	*Thanks to repeated waves of expansion throughout the 19th, 20th and 21st centuries, the most recent of which involved the construction of the Great Court and the World Conservation and Exhibitions Centre, the British Museum has maintained its status as home of the world's leading depositories of archaeological and ethnographic treasures from around the globe. Its success has greatly influenced the development of Bloomsbury itself, which, thanks to the arrival of the plethora of universities and colleges that followed in the wake of the Museum and the Library, is now an area of London that most Britons immediately associate with intellectualism and academia.'*

Table 2.2: Background Information

2.3 Site History

In addition to the information contained within "Excavations at the British Museum" the history of the site has also been researched from commercially available historical mapping sources. Copies of the Ordnance Survey maps examined have been presented in the appendix and a summary is provided in table 2.3.

Date of Mapping	Scale of Mapping	Detail
1875 1882	1:1,056 1:10,560	**On-site:** The site comprised of gardens and associated boundary walls belonging to the terraced townhouses lining Montague Street. At this stage, the site lay outside of the grounds of the British Museum. **Off-site:** The main buildings of the British Museum were recorded immediately to the southwest of the site. Russell Square was located approximately 50m to the north of the site, and Bedford Square and Bloomsbury Square were located approximately 200m to the southwest and southeast of the site. The surrounding area mainly comprised of terraced residential housing, with a few commercial premises. A hospital was recorded approximately 300m northeast of the site.
1896 1894-1895	1:1,056 1:10,560	**On-site:** No significant changes were recorded. **Off-site:** A building approximately 75m southeast of the site was recorded as a Savings Bank. A building formerly described as the Printing Department of the British Museum approximately 100m to the southeast of the site was shown to have been redeveloped and extended.
1916 1920	1:2,500 1:10,560	**On-site:** No significant changes were recorded. **Off-site:** Charlotte Street approximately 200m to the southwest is now called Bloomsbury Street. An area of previously empty land approximately 250m southwest of the site has been infilled by Bedford Avenue and other buildings. Notable change was recorded approximately 25m to the west of the site where the British Museum has extended to take over some terraced housing along Montague Place. Approximately 100m to the northwest a large area of terraced housing has been cleared to make way for British Museum Avenue.
1938	1:10,560	**On-site:** No significant changes were recorded. **Off-site:** No significant changes were recorded.
1951 1948-1951	1:2,500 1:10,560	**On-site:** The site is still shown to have been located in the rear gardens of the terraced townhouses along Montague Street, however the houses appear to have been merged to form Montague House, with some extension to the rear recorded. **Off-site:** The British Museum is shown to have been further developed off-site, with the western section of the Museum extended towards the terraced townhouses on the western boundary, incorporating much of their gardens. The central square Reading Room block is shown to have changed shape. A number of hotels are recorded in the surrounding area for the first time, including the White Hall Hotel approximately 25m south east of the site. Approximately 100m to the northwest of the site Senate House was recorded as a part of the University of London. Notably the surrounding area shows a number of Ruins or empty plots of land, likely to have been caused by bombing during WWII.
1966-1968 1972 - 1973	1:1,250	**On-site:** The current East Road Building is recorded on-site for the first time. **Off-site:** The British Museum was shown to have been altered further, including the central section.
1982-1987 1992-1995	1:1,250	**On-site:** No significant changes were recorded. **Off-site:** Buildings approximately 200m to the south of the site, within the grounds of the British Museum were shown to have been redeveloped.

Date of Mapping	Scale of Mapping	Detail
2003 *British Museum website*	1:1,250	**On-site:** No significant changes were recorded. **Off-site:** The British Museum was shown to have been further redeveloped, based around the central portion of the site. It is known that the Great Court was the library for the Museum up until 1997, with work starting in 1999 to convert the space into a new public space incorporating a new iconic domed glass and steel roof.
2010	1:10,000	**On-site:** No significant changes were recorded. **Off-site:** No significant changes were recorded.
2023	1:10,000	**On-site:** No significant changes were recorded. **Off-site:** The main buildings of the British Museum are shown to have been extended, covering the north-eastern half of the wider site.

Table 2.3: Historical setting from maps

2.4 Summary of Background Research

At the time of our assessment the site was occupied by the main structure of the East Road Building, which was roughly rectangular in shape and of brick construction. The structure was a single storey in height but was also raised approximately 1.5m above the surrounding ground level (c. 24 - 26m AOD), supported by a retaining wall and associated walkway ramp. The building had a flat roof with skylights and was primarily used for storage, office, welfare and workshop space.

The site was bounded to the southwest by a service road and the main Grade I listed buildings of the British Museum, and to the north and east by large townhouses and associated gardens and basements along Montague Street.

The geology underlying the site is detailed to comprise superficial Lynch Hill Gravel Member overlying London Clay Formation.

The site area is detailed as having a Secondary A aquifer designation (Lynch Hill Gravel Member). The underlying solid geology (London Clay Formation) is identified as unproductive. The site does not lie within a source protection zone.

No surface water features are recorded within 250m of the site. It should be noted that the River Thames is located approximately 1.2km to the southeast of the site.

A negligible risk of flooding from either rivers or the sea was identified on site. However, a moderate risk is considered from groundwater flooding.

The site is located within a SSSI Impact Risk Zone and a conservation zone.

The closest active groundwater abstraction is located some 209m west of the site associated with a heat pump at the London School of Hygiene and Tropical Medicine.

The closest historical tank was located 313m northwest of the site, an obsolete petrol station was recorded 297m west of the site and the closest historical garage was recorded 247m northwest of the site. No historical tanks were located within 250m of the site.

4 No. electrical substations were recorded within 250m of the site. The closest was situated 15m northwest of the site.

No historical industrial land uses were recorded within 250m of the site. The closest was a hospital located 259m northeast of the site.

21 No. recent industrial land uses are recorded within 250m of the site. Examples of these include electronic stores, electrical substations, publishers, house clearance companies, vehicle hire, recording studios, machinery, and photographic stores.

When considering the possibility of encountering UXO a Medium Risk was returned for any proposed drilling, sampling, bulk excavations or piling in any post war Un-worked Ground.

The site is known to have been heavily influenced by human activity to as far back as the Roman period, and especially from c. 1643 onwards, when the large scale earthworks of the ‘Lines of Communication’ were undertaken in very close proximity to the site during the Civil War. Various incarnations of Montagu

House and the British Museum followed, with the surrounding farmland yielding to urbanization by the turn of the 19th century until Montagu House was surrounded on all sides by high-status residential townhouses and their gardens.

From the mapping available, the site is shown to have been part of the gardens of the terraced townhouses lining Montague Street, from the late 19th century until the 1960s. The British Museum expanded their site boundary at this time to incorporate much of these gardens, including the proposed site. The current East Road Building was shown to have been present on-site from the 1960s and has remained unchanged to the present day.

3 HAZARD IDENTIFICATION AND ASSESSMENT

Contamination hazard identification has been undertaken and this has been developed to include source-pathway-receptor principles. Geotechnical hazards are also identified and commented upon.

3.1 Geotechnical Hazard Identification

Table 3.1 below contains an initial assessment of the geotechnical hazards that could be present at the site.

Hazard	Requires further consideration?	Comment
Shrink/swell potential	No	Granular soils of the superficial Lynch Hill Gravel Member are expected to be present on-site. The hazard rating of shrink swell potential is considered to be negligible.
Sulphate bearing soils	**Yes**	Sulphate bearing soils of the London Clay Formation are expected to be present at approximately 5mbgl. Ground investigation should be undertaken to confirm the soil types present on the site, with geotechnical testing and assessment to allow for appropriate foundation design.
High groundwater level/flooding	**Yes**	No surface water features are recorded within 250m of the site. The site is not recorded as being within a flood risk zone, with negligible risk considered from surface water. A moderate risk is considered from groundwater flooding, therefore a ground investigation should be undertaken to confirm groundwater levels.
Slope Stability	No	The site is relatively flat. Therefore, there is no potential risk posed from slope instability. There is a very low risk of landslides and collapsible deposits on site.
Poor drainage	No	The expected superficial deposits of the Lynch Hill Gravel Member are considered to offer high to very high permeability rates and good drainage characteristics.
Dissolution Features	No	The potential hazard presented by ground dissolution is considered negligible. Soluble rocks are thought not to be present.
Potential variable deposits	**Yes**	Given the historical land uses identified on-site, variable made ground is expected across the site from previous development and demolition.
Unexploded ordnance	**Yes**	A UXO study suggests a Medium Risk for any proposed drilling, sampling, bulk excavations or piling in any post war Un-worked Ground.
Uncontrolled backfill/Potential for unknown made/filled ground	**Yes**	Due to the current and past site uses, there is potential for unknown, and variable made ground throughout the site.
Relict foundations/ below ground structures and tanks.	**Yes**	Examination of available historic map data shows since the late 19th century the site was occupied by gardens, boundary walls and garden outbuildings. Unless they and all existing underground structures are thoroughly 'grubbed out', demolition of the existing buildings may lead to the presence of relict substructures. There is also the possibility for underground services to cross the site.

Table 3.1: Initial geotechnical hazard identification

This table is based on local empirical knowledge, geology and topography; however, it should be revised if additional relevant data was identified at any time.

3.2 Environmental Hazard Identification

In this part of the report, environmental hazard identification is undertaken, leading to the development of a conceptual ground model for the site. Contamination sources are specified based on the information previously presented in this report as well as identified receptors, in association with a list of potential contaminants.

As an initial step, the viability of the potential sources are considered in table 3.2a below.

Potential Source	Distance (m)	Direction	Initial Assessment	Requires Further Consideration?
Historic Site Usages Gardens and garden outbuildings Residential basement construction	On site	-	Contamination may have been caused by the storage, use, or spillage of fuels or chemicals used during the historic uses of the site. In addition, on site disposal activities may also have been a cause of soil contamination hazards and includes possible waste. Possible contaminants - Petroleum hydrocarbons (diesel, lubricating oils, greases and/or petrol). Polycyclic Aromatic Hydrocarbons (PAH). Metals. Coal Ground Gases.	**Yes**
Curent Site Usages East Road Building Service road	On Site	-	Contamination may have been caused by the storage, use, or spillage of fuels or chemicals used during the historic uses of the site. Possible contaminants - Petroleum hydrocarbons (diesel, lubricating oils, greases and/or petrol). Polycyclic Aromatic Hydrocarbons (PAH). Metals. Coal. Ground Gases.	**Yes**
Asbestos	On Site	-	Asbestos containing materials (e.g., cement asbestos building products) within structures and made ground across site.	**Yes**
Electrical substations	15	NW	Possible source of Polychlorinated biphenyls (PCBs) due to the proximity to site.	**Yes**
8 No. current publishers	85, 142, 176, 204, 234, 237, 241, 245	NE, W, SE, SW, S	Localised metals, acids and solvents.	No
Historical railway sidings	134	S	May be considered a low risk source of a general suite of contaminates and ground gas. Metals. Hydrocarbons., Volatile Organic Compounds, Asbestos, Polycyclic Aromatic Hydrocarbons. Likely to be down gradient from the site.	No

Table 3.2a: Initial assessment of potential sources of contamination

Of these potential sources, made ground associated with the historic nature of the site, the current site usages and possible asbestos (buried from historic buildings) are believed to be the most significant sources of potential contamination and will be considered further in the assessment process.

The hazard identification is based on the assumptions presented below:

- The site under consideration is proposed for redevelopment for commercial / industrial use and is assumed that no soft landscaped or private gardens will be associated with the development.
- The site will be assessed based on its former and proposed use from information provided in 'Land contamination: risk management' (EA/DEFRA, 2019) and science report SC050021/SR3 'Updated technical background to the CLEA model' (Environment Agency, 2008).
- Drinking water will be from mains supply.

In addition to the assessment on the current buildings on-site detailed in table 3.2a, older buildings on site could have contained ACM, which could be present in the immediate surrounding made ground.

The identified contamination hazards/sources and sensitive receptors are summarised in tables 3.2b and 3.2c below.

Contamination Hazards/Sources			
On Site		**Off Site**	
Source	**Implication**	**Source**	**Implication**
Made ground	Soils and groundwater impacted by total & leachable contaminants. Ground gas/vapour generation.	Historical and Current Potential Sources as detailed in table 3.2a	Soil and groundwater are impacted by total & leachable contaminants. Ground gas/vapour generation.
Historical and Current Potential Sources as detailed in table 3.2a	Soil and groundwater impacted by total & leachable contaminants. Ground gas/vapour generation.		
Possible asbestos containing materials in historical buildings or in soils.	Inhalation of fibres if disturbed during demolition, refurbishment, or development.		

Table 3.2b: Potential contamination sources and implications

Sensitive Receptors
Humans using the site during development (groundworkers) and post development (staff)
Groundwater (The Lynch Hill Gravel Member is considered a Secondary A aquifer).
Proposed buildings and services (including water pipes)
Local flora & fauna.

Table 3.2c: Potential sensitive receptors

3.3 Key Contaminants List

The investigation of the site history and the has indicated potentially contaminative past and current uses associated with the site as detailed in section 3.2.

It is normal to consider the contamination implications of a specific land use to formulate a list of key contaminants, using documents such as CLR 8 ‘Potential Contaminants for the Assessment of Land’, and the relevant Department of the Environment Industry Profiles.

Potential contaminants identified based on the current and previous use could include but not inclusive to metals/metalloids and their compounds, inorganic compounds, total petroleum hydrocarbons (TPH), and polycyclic aromatic hydrocarbons (PAH).

It is recommended that the potential for ACMs within buildings and structures proposed for demolition or refurbishment are assessed through an appropriate survey, with removal and disposal undertaken in accordance with the ‘Duty of Care’ and applicable legislation.

An asbestos fibre screen should be included as part of the recommended suite to rule out its’ presence within the near surface soils where physical contact is anticipated with future site users.

If visually contaminated or malodourous material is encountered during development, or other observations suggest the potential presence of other contaminants, additional analysis may be advised. These are not suggested as part of initial testing, but in some cases, may form part of follow-up analysis, particularly where initial test results indicate greater potential for other contaminants.

3.4 Schematic Section

In order to identify potential pollutant linkages, a schematic section has been included below as figure 3.4b, with figure 3.4a showing the trend line for the section.

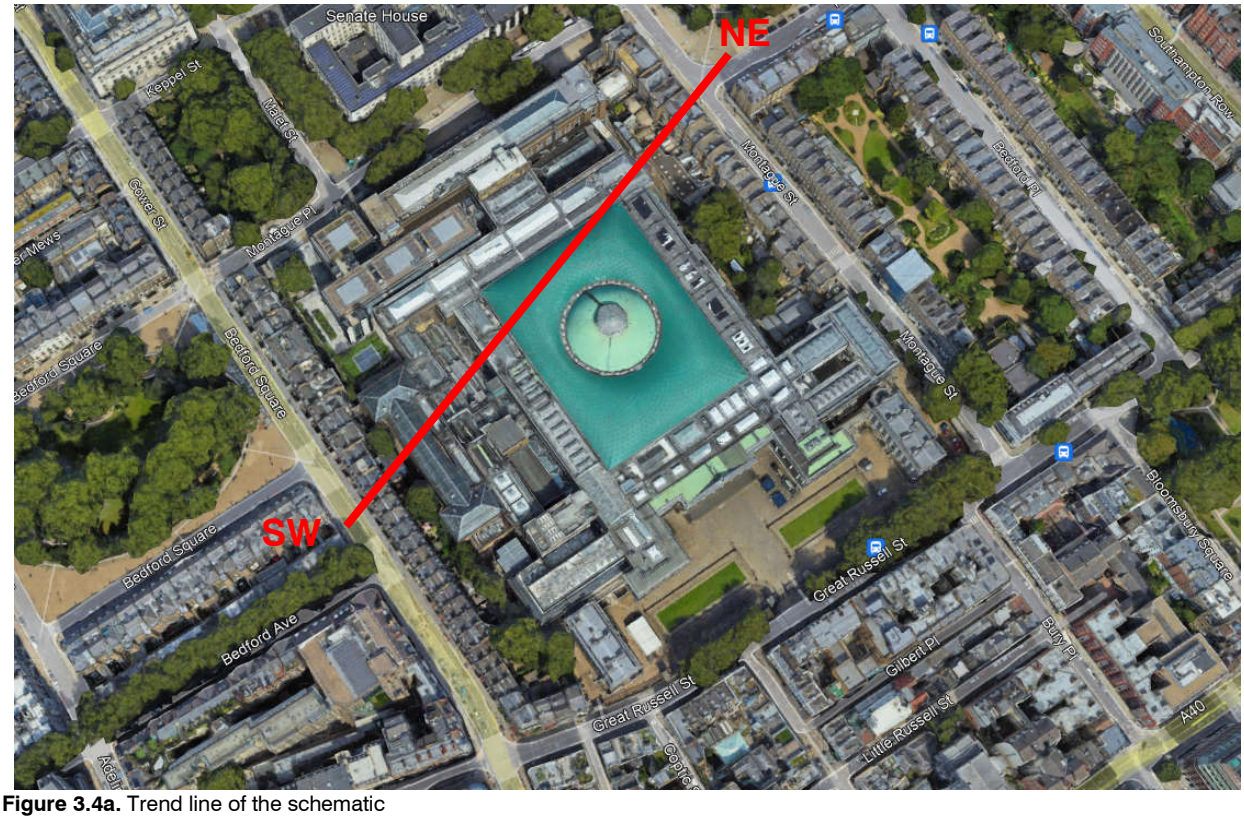

Figure 3.4a. Trend line of the schematic

The model shows predicted geology and topography, potential contamination sources and receptors from data present in the report. Generalised pathways are shown, which are discussed throughout the report and are developed in section 3.5 to allow an initial hazard assessment. The schematic section should not be considered to scale. The section should be revisited and updated if the proposed use changes, or if additional information comes to light.

3.5 Hazard Assessment

An initial assessment of the risk posed by each pollutant linkage has been carried out. This is included as table 3.5 below and identifies a medium to high hazard with recommended subsequent activity having the potential to include:

- Action required (AR) in the short term to break existing source-pathway-receptor link;
- Site investigation (SI) with objectives for risk estimation, or;
- No action (NA) at this stage

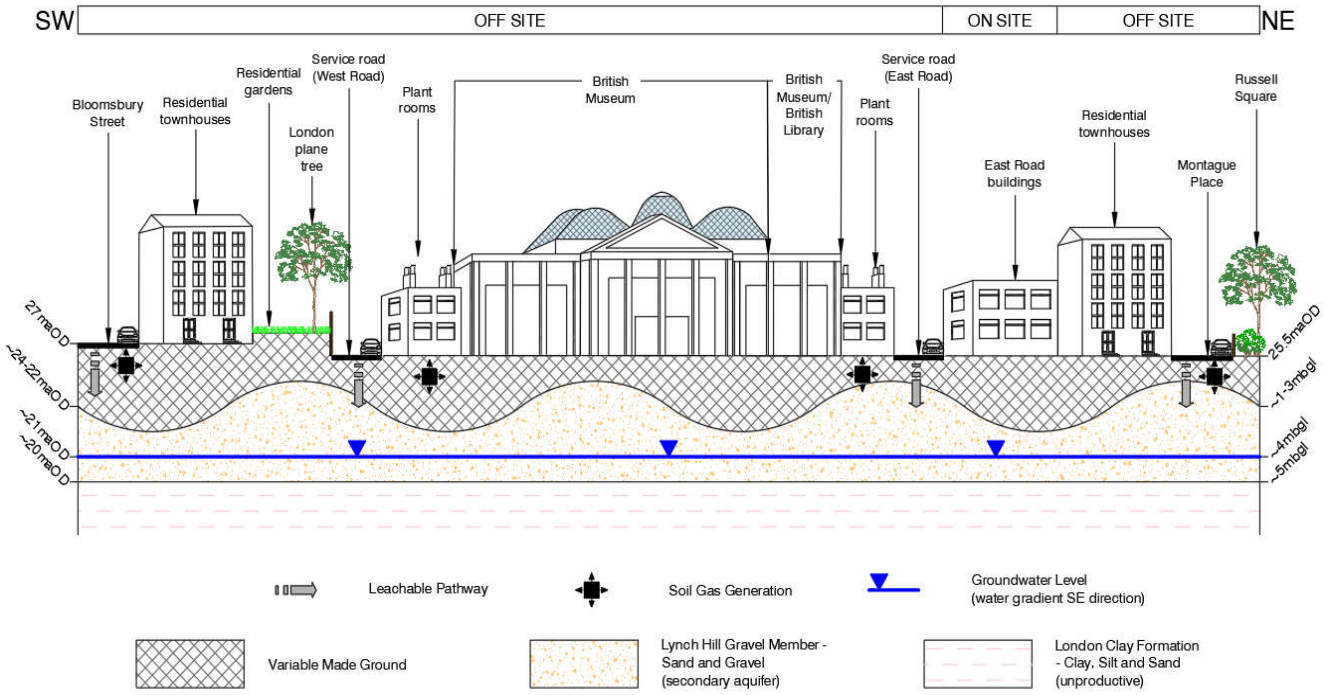

Figure 3.5: Schematic Section

Most pollutant linkages (source-pathway-receptor relationships) have been assessed to require further action. Recommendations for further work are largely with regard to the investigation of the ground conditions; these are discussed in section 4.

Hazard Identification				Hazard Assessment			
Link No.	**Source/ Hazard**	**Pathway**	**Receptor**	**Probability**	**Consequence**	**Hazard Ranking**	**Hazard Assessment:** - **Action required (AR)** - **Site Investigation (GI)** - **No Action (NA)**
1	Hazardous vapours / soil gas from made ground, volatile hydrocarbons/free product or migrating to site from backfill material	Ingress into excavations, structures and confined spaces, and subsequent inhalation.	People on the site during development construction.	Low Likelihood	Minor	Very Low Risk	**GI** - Ground gas monitoring/assessment with ground worker risk assessment required.
2		Ingress into structures and confined spaces, and subsequent inhalation.	People using the site post development construction.	Low Likelihood	Mild to Medium	Moderate / Low Risk	
3	Contaminated soil from previous and present contamination sources both on and off site	Ingestion of soil through direct contact, eating with dirty hands and dust inhalation.	People on the site during development construction.	Low Likelihood	Minor	Low Risk	**GI** - Possibility of contamination across the site. Requires quantification through investigation and chemical testing followed by ground worker risk assessment.
4			People using the site post development construction. Human end users and neighbours post development construction.	Low Likelihood	Minor	Low Risk	**GI** - Possibility of contamination across the site. Requires quantification through investigation and chemical testing followed by ground worker risk assessment.
5							
6		Leaching.	Groundwater – Secondary A aquifer superficial deposits. Surface Waters - The River Thames Off-site human receptors and infrastructure.	Low Likelihood	Mild to Medium	Moderate / Low Risk	**GI -** Possibility of contamination across the site which could be affecting groundwater and surface waters. Groundwater chemical analysis and leachate soil analysis should be undertaken as part of intrusive investigation with subsequent assessment. There could be a requirement for DQRA depending on the conditions encountered and the results of the proposed chemical analysis.
7		Infiltration					
8		Via service pipes.	People using site after development completion.	Low Likelihood	Medium	Moderate / Low Risk	**GI** - Chemical testing and assessment of risk required only if significantly deleterious conditions encountered during invasive investigation works and/or in proposed landscape and garden areas. This excludes private gardens which is considered under link 2.
9		Plant uptake.	Local flora and fauna.	Low Likelihood	Minor	Very Low Risk	NA - Chemical testing and assessment of risk required only if significantly deleterious conditions encountered during invasive investigation works.

10		Direct Contact	Building structures	Low Likelihood	Minor	Very Low Risk	**GI** - Chemical testing and assessment of risk required only if significantly deleterious conditions encountered during invasive investigation works and/or in proposed structure areas.
11	Potential asbestos containing materials within Made Ground soils	Inhalation of dust.	Humans on and in the vicinity of the site during demolition/ development construction.	Low Likelihood	Severe	Moderate Risk	**GI -** Possibility of asbestos in existing Made Ground and so it is recommended that the potential for ACMs is assessed through an appropriate survey, with removal and disposal undertaken in accordance with the 'Duty of Care' and applicable legislation.

Table 3.5: Initial Hazard Identification and Hazard Assessment (Table of Pollutant Links)

4 GROUNDWATER SCREENING

4.1 Screening Assessment

The London Borough of Camden guidance suggests that any development proposal that includes a subterranean basement should be screened to determine whether or not a full Basement Impact Assessment is required.

The following comments are designed to contribute to this initial screening exercise.

HGE has modelled the site using both our own archive and historic BGS boreholes. Details of groundwater strikes and the on going monitoring have also been used, in conjunction with online mapping resources to develop this model, links to which are included in the appendix.

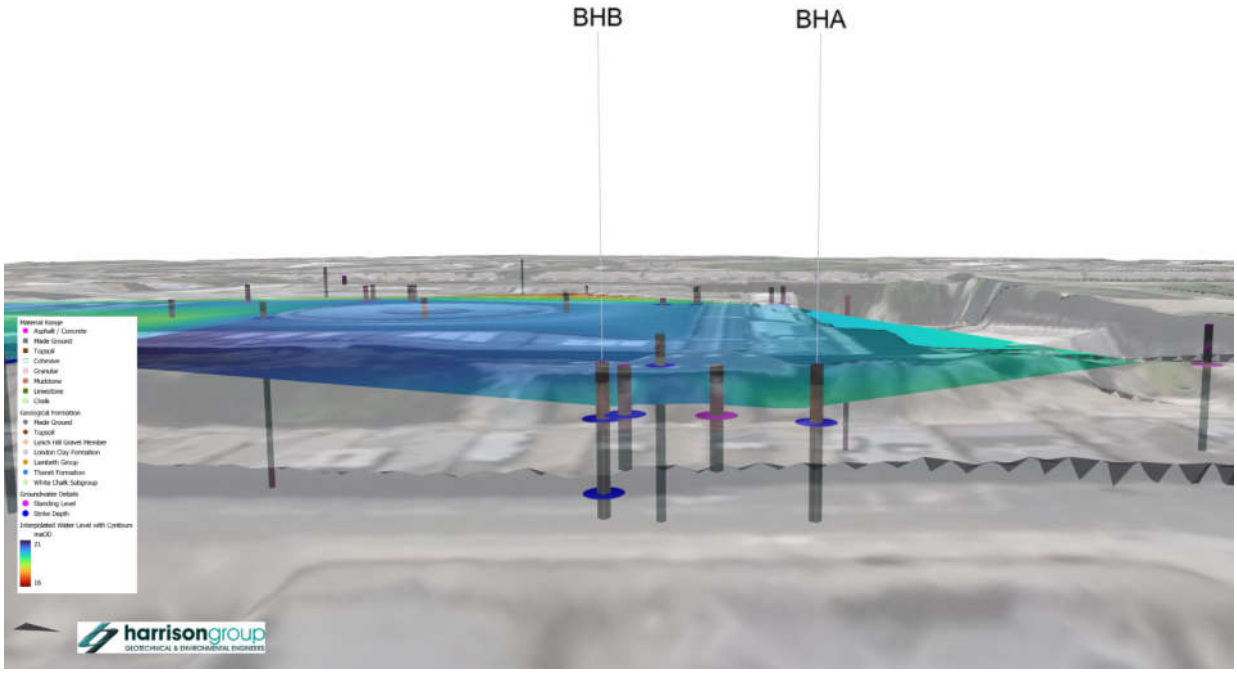

Figure 4.1a Ground model showing contoured phreatic surface.

The above figure shows the phreatic surface modelled from nearby borehole logs and our ongoing monitoring programme. In the wider area the groundwater is shown dipping very slightly to the west, albeit with a gradient magnitude of <0.01, although this is largely influenced by a single historic borehole (TQ28SE778) which may represent an outlier. In the area of the East Road Building the groundwater is shown as largely level / dipping very gently to the north.

We have also modelled the interface between the Terrace Gravel and the underlying London Clay as the groundwater flows through and is perched within the granular unit.

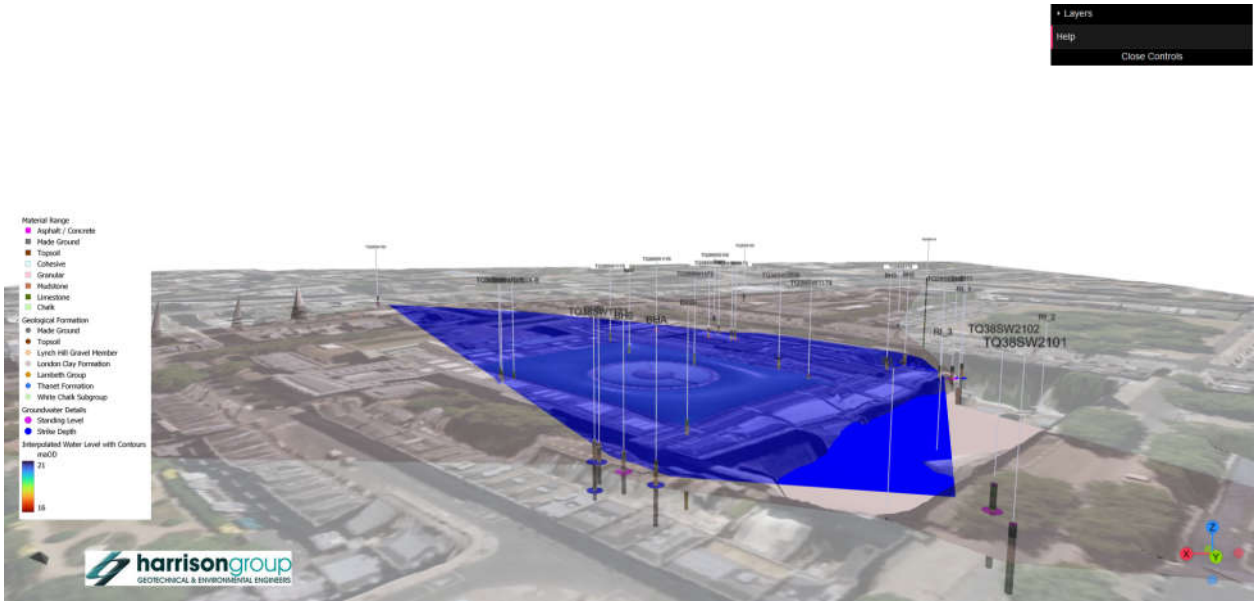

Figure 4.1b Ground model showing Terrace Gravel / London Clay interface beneath the groundwater level.

In and around the subject site the interface between these two horizons is relatively flat, around 22m to 23mAOD with no significant features being evident.

A number of screening tools are included in the Guidance for Subterranean Development prepared by Arup and reference has been made to these. These consist of a series of questions with a screening flow chart relating to groundwater flow, land stability and surface water flow.

In addition to the information presented above and our groundwater model we have referenced ABAs drawing Nos. in preparing the following.

- BMERB-AB-XX-00-DR-S-0009-P01 - Basement Plan
- BMERB-AB-XX-01-DR-S-0010-P01 - Ground Floor Plan
- BMERB-AB-XX-XX-DR-S-0015-P01 - Proposed Structure - Section A

4.1.1 Subterranean (ground water) flow screening developments

Question	Response
1a. Is the site located directly above an aquifer?	**Yes** – Secondary A aquifer (Lynch Hill Gravel Member) although it is noted that Camden Planning Guidance "Basement" January 2021 classes all areas where the London Clay does not outcrop as aquifers.
1b. Will the proposed basement extend beneath the water table surface?	Unknown – The proposed basement design is not expected to extend beneath the water table, however piled foundations may.
2. Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	No known river, pond, reservoir, spring or well within 100 m of the site.
3. Is the site within the catchment of the pond chains on Hampstead Heath?	No.
4. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	No - The basement does not extend beyond the footprint of the existing building.
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 (e.g. via soakaways and/or SUDS)?	No - Development should not result in additional surface water discharge. It is assumed that any surface water will be discharged via existing surface water sewers.

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 (not just the pond chains on Hampstead Heath) or spring line?	Not to our understanding.

Table 4.1.1: Summary of Slope Stability and Subterranean Developments.

The above assessment has identified the following potential issues that need to be assessed:

- The site is underlain by a Secondary "A" Aquifer
- While the basement would not extend beneath the groundwater table elements of its foundations e.g., piles may.

4.1.2 Stability Screening Assessment

Question	Response
1. Does the existing site include slopes, natural or manmade, greater than 7°? (approximately 1 in 8)	No although some small garden retaining walls border the site to the east (Rear of Monague St.)
2. Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7°? (approximately 1 in 8)	No.
3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°? (approximately 1 in 8)	No.
4. Is the site within a wider hillside setting in which the general slope is greater than 7°? (approximately 1 in 8)	No.
5. Is the London Clay the shallowest strata at the site?	No – The Lynch Hill Gravel Member is known to be present from historical borehole information. Varied Made Ground is also expected to be present.
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? (Note that consent is required from LB Camden to undertake work to any tree/s in a Conservation Area if the tree is over certain dimensions.)	No – However, mature trees with a TPO are located in close proximity to the site.
7. Is there a history of seasonal shrink-swell subsidence in the local area and / or evidence of such effects at the site?	No - Unlikely given our understanding of the near surface geology.
8. Is the site within 100m of a watercourse or potential spring line?	No.
9. Is the site within an area of previously worked ground?	No.
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?	**Yes** – Secondary A aquifer (Lynch Hill Gravel Member). The proposed basement design is not expected to extend beneath the water table, however piled foundations may.
11. Is the site within 50m of Hampstead Heath ponds?	No.
12. Is the site within 5m of a highway or pedestrian right of way?	No – However, the site borders and is accessed via a private service road within the grounds of the British Museum.
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Unknown – We understand that neighbouring properties have existing basements. The proposed works therefore would not necessarily increase, and may even decrease, the differential depths of any foundations.
14. Is the site over (or within the exclusion zone of) any tunnels, e.g., railway lines?	No.

Table 4.1.2: Stability Screening Assessment.

The above assessment has identified the following potential issues that need to be considered:

- The site is underlain by a Secondary "A" Aquifer.
- The foundation arrangement and extent of basements under adjacent properties needs to be determined and given due consideration.

4.1.3 Surface Flow and Flooding Screening Assessment

Question	Response
1. Is the site within the catchment of the pond chains on Hampstead Heath?	No.
2. As part of the proposed site drainage, will surface water flows (e.g., volume of rainfall and peak run-off) be materially changed from the existing route?	No.
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	No - The basement does not extend beyond the footprint of the existing building.
4. Will the proposed basement development result in changes to the profile of the inflows (instantaneous and long term) of surface water being received by adjacent properties or downstream watercourses?	No.
5. Will the proposed basement result in changes to the quantity of surface water being received by adjacent properties or downstream watercourses?	No.
6. Is the site in an area identified to have surface water flood risk according to either the Local Flood Risk Management Strategy or the Strategic Flood Risk Assessment or is it at risk from flooding, for example because the proposed basement is below the static water level of nearby surface water feature?	No for the site itself, although the Camden SFRA indicates that the site is within a Critical Drainage Area (CDA) Group3 _005 and that the land directly adjacent to the site has a medium risk of flooding from surface water.

Table 4.1.3: Surface Flow and Flood Screening Assessment

The above assessment has not identified any potential issues that need further consideration.

4.2 Conclusions

The basement development is modest in size such that it does not extend beyond the footprint of the building and is no deeper than one full story below ground level (approximately 3m in depth).

The initial screening assessment has identified a number of potential impacts which require further consideration. The table below summarises these and details the possible consequences.

Potential Impact	Possible Consequence
The site is situated over a secondary "A" Aquifer (Terrace Gravel)	Altering groundwater flows including dewatering of excavations during construction can result in the removal of fines leading to ground settlement. The zone of settlement will extend over the dewatering zone, and thus could extend beyond a site boundary and affect neighbouring structures. Conversely, an increase in water levels can have a detrimental effect on stability. The construction of the basement should be designed to minimize any requirement for dewatering.
Will the proposed basement extend beneath the water table surface?	We understand that the basement itself is to be constructed above the groundwater table. However, if a piled retaining wall is utilised as part of the construction, then this may extend below the groundwater level altering the direction of groundwater flow. As a detached structure of limited footprint, we would expect any groundwater to flow around the structure with minimal effect.
The proposed basement may significantly increase the differential depth of foundations relative to neighbouring properties?	Unknown – We understand that neighbouring properties have existing basements the extents of which are not all known. Where doubt exists the extents of these structures should be ascertained, and any new structures be designed in such a way that additional loadings both of these structures and their founding soils are limited. A Ground Movement Analysis (GMA) should be carried as part of the design process.

Table 4.2 Summary of findings of initial screening assessment.

In summary it is concluded that the development will not result in any specific issues relating to hydrogeology and hydrology of the site. It is assumed that suitable and appropriate construction methods will be adopted to ensure that there will not be any negative impacts on the groundwater, slope stability or effects on adjacent properties or public highways.

Dependent upon discussions with the regulatory authority it may be that additional documentation and /or a site specific ground investigation will be required to satisfy planning considerations and support some of the assumptions made as part of this appraisal.

5 DISCUSSION & RECOMMENDATIONS

5.1 Discussion

This Tier 1 contamination and geotechnical assessment was undertaken for a site located within the grounds of the British Museum in central London. The site can be accessed from Montague Place, London, WC1B 3DG. The stage one investigation was undertaken in order to establish how potential contamination and geotechnical hazards could impact the future development of the site. The proposed end use of the site is for commercial / industrial purposes, and this has been considered throughout this report. It is assumed no soft landscaped areas will be associated with the development.

At the time of our assessment the site was occupied by the main structure of the East Road Building, which was roughly rectangular in shape and of brick construction. The structure was a single storey in height but was also raised approximately 1.5m above the surrounding ground level (c. 24 - 26m AOD), supported by a retaining wall and associated walkway ramp. The building had a flat roof with skylights and was primarily used for storage, office, welfare and workshop space.

The site was bounded to the southwest by a service road and the main Grade I listed buildings of the British Museum, and to the north and east by large townhouses and associated gardens and basements along Montague Street.

The main access to the site was located to the northwest via an asphalt service road which led from the North East Gate on Montague Place. Secondary pedestrian access to the site was available via the East Road and from the main British Museum buildings.

The site is detailed to be underlain by superficial deposits of the Lynch Hill Gravel Member deposits (sand and gravel). Underlying the superficial deposits, the solid geology is detailed as the London Clay Formation.

The most sensitive receptors identified were humans using the site during development (construction workers) and post development (end-users), the groundwater (secondary A aquifer).

No intrusive investigation has been undertaken as part of the phase one assessment. Based on the site history and background information, it is deemed necessary to consider an investigation in relation to the potential for contamination and the assessment of geotechnical issues.

It should be made clear that the contamination hazards may not prove to be significant, but their nature and number lead us to recommend site investigation in order to properly assess them. Intrusive investigation of the site should be reserved by a pre-commencement condition.

5.2 Geotechnical Risks

The potential for uncontrolled backfill and relict structures have been identified as potential geotechnical hazards. An intrusive geotechnical investigation is recommended across the site prior to any construction, to allow for adequate design of foundations and to confirm the geology.

The potential presence of a considerable thickness of dense granular Lynch Hill Gravel Member and the anticipated loads associated with the proposed structures are likely to make shallow foundations (including rafts) a suitable foundation solution. However, given the proposed designs include a single storey basement, it is likely that a piled foundation solution may be required.

Consideration of the sulphate content of the soils should be given with respect to the grade of concrete suitable for use at this location. The density and permeability of shallow soils should be assessed in order to consider pavement and drainage design. The likely granular nature of the superficial deposits

covering the site, suggest that conventional soakaways maybe suitable in the absence of significant made ground deposits. Although groundwater levels will need to be confirmed.

Examination of available historic map data shows since the 1960s the site has been occupied by the existing East Road Building. Unless this building and all existing underground structures are thoroughly 'grubbed out', demolition of the existing buildings may lead to the presence of relict substructures. There is also the possibility for underground services to cross the site.

5.3 Environmental Risks

At the time of the walkover the site was in active use as a single storey building, used for office space, material storage, and welfare facilities.

From the mapping available, the site is shown to have been part of the gardens of the terraced townhouses lining Montague Street, from the late 19th century until the 1960s. The British Museum expanded their site boundary at this time to incorporate much of these gardens, including the proposed site. The current East Road Building was shown to have been present on-site from the 1960s and has remained unchanged to the present day.

Given the time of construction it is possible that asbestos is present within the structure and within any made ground that may be present. Therefore, the soils should also be investigated for the potential presence of ACM.

The potential for uncontrolled backfill on site, possible ACM in soil and ground gas generation from off-site sources were also noted.

No historic or current underground or overground tanks were identified on-site.

Prior to the commencement of any redevelopment, we would advocate direct investigation and assessment in order to identify whether contamination is present, and whether a significant risk exists to people using the site and to controlled waters (groundwater – secondary A aquifer).

5.4 Site Investigation Strategy

A Ground Investigation has been scoped by Alan Baxter Ltd (Ref. 1910-41-S01-A - Proposed Site Investigations) with the purpose to:

- Verify the ground conditions across the site.
- Derive soil parameters for the geotechnical design of the proposed structures.

The Scope of the Investigation will include:

- Excavation of 5 No. foundation inspection pits.
- Liaison and negotiation to secure access to borehole location.
- Construction of 2 No. exploratory borehole to depths of 15m using cable percussive technique.
- Completion of field testing within the boreholes, to include Standard Penetration tests (SPT) at 1.5m intervals.
- Recovery of disturbed and undisturbed samples.
- Logging and photographing of samples.
- Installation and monitoring of standpipes, gas monitoring standpipes and piezometers.
- Monitoring and sampling of groundwater to determine chemistry, including for aggressive ground conditions and for geo-environmental purposes to detect and determine the nature of any groundwater contamination.
- Sampling of hazardous or volatile materials for chemical analysis, including headspace analysis of samples on site using PID and/or FID methods (if necessary).
- Monitoring and, if applicable, sampling of gas wells for vapours and land gases.
- Laboratory testing including, but not limited to classification tests; triaxial tests; chemical testing and groundwater chemistry.

- The presentation of field and laboratory data in digital and paper format in a draft format as soon as practical during the works and subsequently a factual report including data and drawings in digital format.
- The scoping and carrying out of a geo-environmental investigation and the production of an interpretative report to address geo-environmental issues.

Harrison Group feel the scope detailed above would be currently adequate for an initial assessment of potentially contaminated land and for providing a geotechnical hazard assessment for the proposed development.

5.5 Summary and Implications

The basic requirement for redevelopment standards in the UK is that land should be 'suitable for use' or 'fit for purpose', rather than apply a blanket 'clean' or 'all uses policy'. It is important to consider the limited nature of this investigation, and the possibility of as yet unknown contaminant sources existing.

The potentially contaminative uses and geotechnical hazards identified on site lead us to the conclusion that intrusive investigation is appropriate before the site can be considered suitable without remedial action. The investigation should include an assessment of the potential for contaminated soil and groundwater from the historic uses of the site and the potential for migration of contamination from surrounding areas. However, based on the information available, it is not considered likely that gross contamination is likely to be present which may otherwise limit the development potential. Intrusive investigation of the site should be reserved by a pre-commencement condition.

The initial groundwater screening assessment has identified a number of potential impacts which require further consideration as detailed in section 4.2. However, none of these would prevent development of the scheme as envisaged.

Dependent upon discussions with the regulatory authority it may be that additional documentation and /or a site specific ground investigation will be required to satisfy planning considerations and support some of the assumptions made as part of this appraisal.

Harrison Group Environmental Limited would be pleased to offer further assistance with the recommended works if requested, and if the client or regulators have any comments or questions, we would be glad to discuss them.

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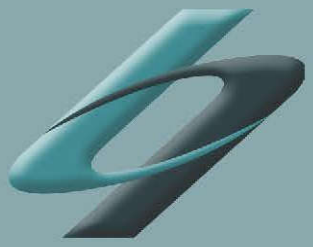

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