



**Proposed Residential Development  
Torridon House Car Park, Westminster**  
**Remediation Strategy**

**Project reference: TCP-STN-XX-XX-RP-S-3501-S2**

On behalf of: **City of Westminster**



## Document Control Sheet

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<b>For and on behalf of Stantec UK Limited</b>				

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## 1.0 Introduction

### 1.1 Preamble

- 1.1.1 Stantec UK Limited (formerly Peter Brett Associates LLP) has been commissioned by Geoffrey Osborne Limited acting on behalf of the City of Westminster (the Client) to prepare a Remediation Strategy for the proposed residential development at Torridon House Car Park, Westminster.

### 1.2 Background

- 1.2.1 Previously a desk study review of readily available published information was carried out to assess the ground conditions on the Site and the potential for contamination to be present associated with previous and present uses of the Site and the surrounding areas. Thereby to enable a Tier 1 qualitative assessment of the geotechnical and geoenvironmental constraints to be made to inform the preliminary design of the proposed development. The findings of the study are presented in a separate Phase 1 Ground Condition Assessment prepared by Peter Brett Associates LLP (PBA, 2019) acting on behalf of the Client.
- 1.2.2 Subsequently, an intrusive ground investigation was carried out to provide information on the ground conditions, including the concentrations of potential contaminants, to inform the design of retaining walls, foundations and other geotechnical elements for the proposed redevelopment. The factual results of the investigation are presented in a separate factual Ground Investigation Report prepared by Concept Engineering Consultants Limited (CEC, 2019) acting on behalf of the Client. The fieldwork and laboratory testing were carried out under the technical direction of Peter Brett Associates.
- 1.2.3 Following completion of the ground investigation, an assessment of the ground conditions and measured concentrations of potential contaminants and hazardous ground gases was carried out to determine the associated risks to human health, the environment and the proposed structures. The findings of these assessments are presented in a separate interpretative Ground Investigation Report prepared by Peter Brett Associates LLP (PBA, 2020) acting on behalf of the Client.

### 1.3 Planning Consent

- 1.3.1 Details of the proposed development have been submitted to the City of Westminster as part of the planning application for the scheme (Application 19/09329/COFUL, dated 29 November 2019). Planning permission for the development has been granted by City of Westminster subject to a number of planning conditions as detailed in their decision notice. Condition 14 of the decision notice is related to land contamination and requires that:
- i) **Pre-Commencement Conditions** - Before any demolition or excavation works start a Phase 1 Desktop Study; Phase 2 Site Investigation; and Phase 3 Remediation Strategy shall be submitted to City of Westminster for approved.
  - ii) **Pre-Occupation Condition** - Following completion of the development but prior to occupation a Validation Report confirming completion and adequacy of the remediation scheme shall be submitted to City of Westminster for approved.

### 1.4 Scope of Work

- 1.4.1 The scope of work performed by Stantec comprises the preparation of this Remediation Strategy which, together with the Phase 1 Ground Condition Assessment (PBA, 2019) and Ground

Investigation Reports (CEC, 2019 and PBA, 2020), are intended to discharge the Pre-Commencement Conditions.

- 1.4.2 This Remediation Strategy presents a summary description of the Site, geoenvironmental conditions, and associated geoenvironmental risks together with the remediation measures required to bring the Site to a suitable condition for the intended use.

## **1.5 Limitations**

- 1.5.1 Unless stated otherwise, information from the previous studies and investigations has not been included in this report and, where referenced, the reports presenting this information should be read in conjunction with this report. Guidance on the context of this report and any general limitations or constraints on its content and usage are given in a separate guidance note included after the text of this report.

## 2.0 The Site

### 2.1 Site Location

- 2.1.1 The Site is centred at National Grid Reference TQ 256 832 about 0.6 km southeast of the historical village of Kilburn. The location of the Site is shown on a Site Location Plan presented as **Figure 1**.
- 2.1.2 The Site is rectangular in plan with overall dimensions of about 25 by 35 m. The Site is bounded by Andover Place to the northeast, a residential property (denoted Torridon House) with Randolph Gardens beyond to the southwest, residential properties fronting onto Andover Place and Randolph Gardens to the southeast and Kilburn Park Road and a primary school (denoted the Naima Preparatory School) to the northwest. The layout of the Site is shown on a Site Layout Plan presented as **Figure 2**.
- 2.1.3 The Site is situated on the gently undulating ground adjacent to the former Westbourne river which formerly flowed southwest about 125 m northwest of the Site. Natural ground levels in the vicinity of the Site are between about 32.0 and 33.0 m OD with a gentle fall to the northwest of about 1 vertical in 200 horizontal.

### 2.2 Historical and Current Site Use

#### Site History

- 2.2.1 Historically the Site was undeveloped agricultural land to the south of the historical hamlet of Kilburn up to the early-1860s when the Site was developed with terraced properties fronting onto Andover Place. During World War II a number of buildings to the northwest of the Site were damaged beyond repair by bomb strikes whilst the adjacent buildings on the Site suffered general blast damage. By the late-1960s, the Site had been redeveloped as a car park associated with the adjacent Torridon House development.
- 2.2.2 A detailed site history and copies of historical mapping are included in the Phase 1 Ground Condition Assessment (PBA, 2019)

#### Current Site Use

- 2.2.3 The Site is currently occupied by the Torridon House car park comprising an at-grade car park with provision for off street parking. Access to the car park is through a gated entrances on Andover Place and Kilburn Park Road. A series of lockup stores are located along the southeast and northeast boundaries of the Site. An electrical substation is present on the western part of the Site.
- 2.2.4 The layout of the Site is shown on the Site Layout Plan presented as **Figure 2**.

### 2.3 Ground Conditions

#### Stratigraphy

- 2.3.1 The ground conditions in the area of the Site comprise Made Ground overlying the London Clay Formation. The ground conditions encountered in the ground investigations (CEC, 2019) are assessed in the Ground Investigation Report (PBA, 2020) and summarised in the following table.

### Summary of Ground Conditions

Formation	Top of Stratum, m bgl (m OD) <sup>(1)</sup>	Thickness, m	Description
Made Ground	Ground Level	0.5 to 1.5	Surface pavement of asphalt overlying thick beds (0.25 to 0.6 m) of intermixed SAND and GRAVEL of brick, concrete and clinker, locally containing beds (0.05 to 0.10 m) of concrete and asphalt. Generally underlain by firm brown slightly sandy CLAY with some gravel of brick, concrete and asphalt.
London Clay	0.5 to 1.5 (30.6 to 32.0)	~45.0 <sup>(2)</sup>	Firm brown CLAY grading with increasing depth to stiff and very stiff grey fissured CLAY.

Note: (1) Denotes metres below ground level and (metres relative to Ordnance Datum)

(2) Based on historical borehole and well records (PBA, 2019)

- 2.3.2 Recorded groundwater levels in the monitoring wells installed in the boreholes indicate groundwater level is typically between about 0.3 and 0.7 m below ground level (31.8 to 32.1 m OD). It should be noted, however that locally higher water levels may be present following periods of prolonged rainfall. In addition, local pockets of perched groundwater may be present within the Made Ground.

## 2.4 Proposed Development

- 2.4.1 The proposed development comprises the demolition of existing structures including storage sheds and redevelopment of existing car park to provide two blocks of three and five storeys residential units together with other associated works, including the provision of storage units, and at-grade car and cycle parking.
- 2.4.2 An area of at-grade communal open green space will be provided between the apartment blocks together with a border of soft landscaping along the southwest boundary of the Site.

## 3.0 Land Contamination Risk Assessment

### 3.1 Geoenvironmental Conditions

- 3.1.1 The concentrations of potential contaminants and hazardous ground gases measured in the soils and groundwaters on the Site are assessed in the Ground Investigation Report (PBA, 2020) and summarised below.
- 3.1.2 **Soils** The measured concentrations of potential contaminants are generally below the selected assessment values appropriate for a residential with home grown produce land use (CL:AIRE, 2014 and CIEH, 2015). The exceptions comprise slightly elevated concentrations of lead and speciated PAH (dibenzo(a,h)anthracene) measured in separate samples of Made Ground. The elevated concentrations, together with other marginally elevated concentrations, are considered to be indicative of a general spread of isolated 'point' sources of potential contaminants consistent with the presence of scattered fragments of man-made materials in the Made Ground from the previous and current development and use of the Site.
- 3.1.3 Identifiable pieces of asbestos containing materials were not noted during the fieldwork, however asbestos containing material was identified in 1 of 12 soil samples screened prior to chemical analysis; the asbestos containing material comprised loose chrysotile fibres. Quantification analysis determined the proportion of asbestos to be about 0.006 per cent, that is marginally above the reported limit of detection for the quantification analysis.
- 3.1.4 **Groundwaters** The measured concentrations of potential contaminants are generally below the selected assessment criteria for assessing potential groundwater impacts on surface waters (DEFRA, 2010) and below the UK drinking water quality standards (DETR, 2000). The exceptions include marginally elevated concentrations of a number of heavy metals (cadmium, copper and selenium). A specific reason for the elevated concentrations is not known but they are expected to reflect the background quality of the groundwater in the vicinity of the Site owing to the general urban environment, rather than any contamination actually arising from the Site.
- 3.1.5 **Ground Gases** The measured concentrations of ground gases indicate predominantly near atmospheric conditions are present in the near-surface soils across the Site. The exceptions are locally marginally elevated concentrations of carbon dioxide and corresponding reduced levels of oxygen. Results of geochemical testing indicate the organic matter content of the Made Ground is typically less than 1.0 per cent although locally values up to 3.0 per cent were also measured. On this basis, it is expected that the elevated concentrations of carbon dioxide are associated with the biodegradation of organic matter within the near-surface soils.
- 3.1.6 Using the procedure for classifying gassing sites proposed by BS 8485 (2015), the monitoring data indicates the ground gases in the near-surface soils may be classified as Characteristic Situation 1. This Situation is representative of ground with a very low potential for gas generation. For Characteristic Situation 1, BS 8485 (2015) advise that gas protection measures are not required.

### 3.2 Assessed Land Contamination Risk

- 3.2.1 An assessment of the potential risk to the proposed development was carried out using a Conceptual Site Model to identify 'source-pathway-receptor' linkages, and is presented in the Phase 1 Ground Condition Assessment (PBA, 2019).
- 3.2.2 The findings of the ground investigation are in general agreement with the information available for the Phase 1 Ground Condition Assessment (PBA, 2019) and indicate that the potential for



significant contamination to be present on the Site is **Low** whilst the potential for any deleterious material producing hazardous ground gases to be present is **Very Low**.

- 3.2.3 It is expected that the formation level for the working platform required to construct the foundation piles will largely result in the existing Made Ground being excavated as part of the proposed development, thereby limiting the risk to future site users. Notwithstanding the removal of the Made Ground, the assessed land contamination risk is considered to remain as previously assessed in the Phase 1 Ground Condition Assessment (PBA, 2019). The previously assessed land contamination risks are summarised in the following table.

**Summary of Assessed Land Contamination Risks**

Potential Receptor	Risk Assessment	Description
Site Workers	Low	The risk to site workers will effectively be mitigated by wearing appropriate protective clothing and equipment, and adopting good standards of hygiene and good working practices to prevent prolonged skin contact, inhalation and ingestion of soils.
Future Site Users and Site Neighbours	Very Low	The proposed buildings and hard surfaces, together with the provision of a layer of clean soil cover to areas of soft landscaping will effectively mitigate the risk to future site users and neighbours. <sup>(1)</sup>
Groundwaters Resources	Very Low	The potential for any mobile contaminants to adversely affect the quality of groundwaters will be unaffected by the proposed development and is assessed to remain as Very Low.
Surface Water Resources	Very Low	The potential for any mobile contaminants to adversely affect the quality of surface waters will be unaffected by the proposed development and is assessed to remain as Very Low.
Ecology and Wildlife	Very Low	The potential for any mobile contaminants to adversely affect areas of environmental sensitivity will be unaffected by the proposed development and is assessed to remain as borderline Very Low.
Built Environment	Very Low	The assessed risk is assessed to be Very Low as potential contaminants are not expected to be present at concentrations that would have a deleterious affect on building materials.

Note (1) Assuming central management of gardens and no communal allotments/designated areas for growing fruit or vegetables for human consumption.

## 4.0 Remediation Strategy

### 4.1 Required Remediation/Mitigation Measures

- 4.1.1 The geoenvironmental risk assessment summarised in **Section 3.2** indicates that any potential contaminants in the ground or groundwater are unlikely to represent an unacceptable risk to human health, controlled waters or ecology and wildlife provided the following remediation measures are adopted.
- 4.1.2 The remediation measures required relate to:
- i) The risks to site workers associated with ingestion, inhalation or prolonged skin contact of contaminated material during the construction works.
  - ii) The risks to future site users associated with ingestion, inhalation or prolonged skin contact of contaminated material present in areas of soft landscaping following completion of the proposed development.
- 4.1.3 The remediation measures to be adopted are presented in the following sections. Remediation or mitigation measures in advance of or in addition to the construction works are not deemed to be required.

#### **Ingestion, Inhalation or Contact of Contaminated Material by Site Workers**

- 4.1.4 Measures to be adopted to mitigate the risk to site workers will include (i) informing the site workers of any potential contamination on the site and the potential health effects from exposure through site induction and 'tool box talks'; (ii) the provision of appropriate protective clothing and equipment to be worn by site workers; (iii) the adoption of good standards of hygiene to prevent prolonged skin contact, inhalation and ingestion of soils during construction.
- 4.1.5 In addition, in line with current regulations and good practice, (i) appropriate methods of working will be selected to limit disturbance to any potentially contaminated materials and the potential for air-borne dust to arise associated with the excavation and disturbance of the soils present on the site. and (ii) appropriate ventilation will be provided to all confined spaces and appropriate procedures adopted to ensure they are checked for hazardous gases prior to man-entry to ensure any potential risk associated with ground gases does not occur.
- 4.1.6 Although the provision of appropriate protective clothing and adoption of good standards of hygiene and appropriate methods of working will mitigate many of the significant effects, the potential risk to site workers during the construction works will, at worst, remain as **Low** owing to the potential for unidentified sources of contamination to be encountered during the works.

#### **Ingestion, Inhalation or Contact of Contaminated Material by Future Site Users**

- 4.1.7 To limit the potential risk of ingestion, inhalation or prolonged skin contact of contaminated material by future site users, a layer of clean soil cover is to be provided in any areas of soft landscaping.
- 4.1.8 The depth and form of the required soil cover depends on the risk associated with any potential contaminants and requirements for planting. From the available information the overall potential for significant contamination to be present on the Site is assessed to be low, and as such a 300 mm thick layer of clean soil cover placed on a geotextile separator layer is to be provided to soft landscaped areas to limit any risk of bulk movement of contaminated material to the surface

by burrowing animals or other similar activities (BRE, 2004). A greater depth of soil cover may be required in landscaped areas where trees or deep rooting shrubs are to be planted. The concentrations of potential contaminants in the clean soil cover are to be below the acceptability limits given in **Section 4.3**.

- 4.1.9 The geotextile separator layer will comprise Terram 3000 or equivalent installed in accordance with the manufacturer's instructions.
- 4.1.10 The depth of soil cover is to be verified by a photographic record with a clearly marked graduated depth scale showing the depth of soil cover placed.
- 4.1.11 The provision of a layer of clean soil cover will effectively limit the exposure of future site users to any potential contaminants such that the potential risk will be **Very Low**.

## 4.2 Management of Unexpected Sources of Contamination

- 4.2.1 There is a possibility that unexpected sources of contamination associated with, for example, disposal of asbestos and other construction material during previous construction works or any storage and use of fuel oils may be encountered during the site clearance or ground works.
- 4.2.2 Should visual and olfactory examination of any unusual solid materials or liquids encountered during the construction works identify areas of contamination specific management procedures will be adopted. These procedures will allow for the short-term storage of the suspected material in stockpiles and/or storage tanks while verification testing for potential contamination is carried out. The storage area will be contained to ensure that contamination does not migrate and affect other areas of the site.
- 4.2.3 Where remediation or mitigation of unexpected contaminants is required, an implementation and verification process will be established to identify the remediation activities required and to confirm that the remediation has been undertaken correctly. As part of this process, remediation objectives will be identified and remediation criteria selected for measuring compliance against these objectives in consultation with the Local Authority and other statutory consultees.

## 4.3 Verification Plan

- 4.3.1 On completion of the remediation works a Verification Report will be prepared by the contractor or his appointed consultant to demonstrate full compliance with the requirements of the remediation strategy. The Verification Report will include, but not be limited to, provision of the following information:
  - i) Details of any unidentified sources of contamination encountered during the works, including details of (a) the location, nature and extent of the contamination; (b) the methods of treatment and/or excavation and off-site disposal carried out; and (c) verification and validation testing carried out. In the event that any unidentified source of contamination is not encountered, a statement to this effect shall be provided.
  - ii) Records demonstrating that all soil material transported off-site for treatment and/or disposal have been removed to an appropriately licensed facility approved by the Environment Agency in a safe and competent manner and in accordance with relevant Statutory Regulations. Such records to include but not be limited to (a) waste acceptance criteria (or other applicable) testing carried out to classify the material transported off-site and (b) waste transfer notes counter-signed by the receiving party.
  - iii) Records demonstrating that all soil materials imported on-site or relocated on site do not represent a potential risk to the proposed development. Such records to include but not be limited to (a) provenance certificate stating the natural soil type and the site from which it was obtained; (b) chemical analysis of all soil materials imported on-site to demonstrate they are inert as defined in Clause 7(4) of the Landfill (England and Wales) Regulations 2002;

(c) chemical analysis of all soil material placed in areas of soft landscaping with comparison of the results to appropriate criteria for a residential without homegrown produce land use, and (d) asbestos quantification of all soil material placed in areas of soft landscaping with a permissible asbestos content of less than 0.001% by weight asbestos. The locations and depths of the sample locations shall be recorded on a sample location plan. The frequency and schedule of testing shall be as detailed in the following table.

**Chemical Analysis of Fill Materials**

Source	Number of samples	Testing Schedule	Assessment Criteria
Virgin quarried material	Minimum 2 samples	Standard metals/metalloids (including As, Cd, Cr, CrVI, Cu, Hg, Ni, Pb, Se, Zn)	Limiting values appropriate for a residential without home grown produce land use (CL:AIRE, 2014 and CIEH, 2015).
Crushed hardcore, stone, brick	Minimum 3 or 1 per 1000 m <sup>3</sup> (whichever is greater)	Standard metals/metalloids (as above); PAH (16 USEPA speciation); asbestos screening	
Greenfield/ manufactured soils	Minimum 3 or 1 per 250m <sup>3</sup> (whichever is greater)	Standard metals/metalloids (as above); PAH (16 USEPA speciation); asbestos screening	All soil materials shall be inert as defined in the Landfill (England and Wales) Regulations 2002.
Brownfield/ screened soils	Minimum 6 or 1 per 100m <sup>3</sup> (whichever is greater)	Standard metals/metalloids (as above); PAH (16 USEPA speciation); TPH (CWG banded); asbestos screening	

- iv) Records demonstrating that a 300 mm thick layer of clean soil cover placed on a geotextile separator layer has been incorporated into areas of soft landscaping. Such records shall include but not be limited to (a) details and specification of all materials used, (b) a checklist and photographic evidence with a clearly marked graduated depth scale showing the depth of soil cover placed and (c) a site plan showing the areas of soft landscaping and the location and direction of each record photograph.

4.3.2 This Verification Report shall be submitted to the City of Westminster with the objective of completing the discharge Condition 14 of the decision notice.

## References

- BRE (2004) Cover Systems for Land Regeneration, Thickness of Cover Systems for Contaminated Land. Building Research Establishment, Garston, Hertfordshire.
- BS 8485 (2015) Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings. British Standards Institution, London.
- CEC (2019) Site Investigation Report, Torridon House Car Park, Westminster. Report 19/3312 FR00 Concept Engineering Consultants Limited, London.
- CIEH (2015) The LQM/CIEH S4ULs for Human Health Risk Assessment. The Chartered Institute of Environmental Health, Nottingham.
- CL:AIRE (2014) Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination. Final Project Report SP1010 (Rev 2), Contaminated Land: Applications in Real Environments, London.
- DEFRA (2010) The River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) England and Wales) Direction 2010. Department of the Environment, Food and Rural Affairs, London.
- DETR (2000) The Water Supply (Water Quality) Regulations, 2000. Statutory Instrument 2000 No 3184. Department of the Environment, Food and Rural Affairs (formerly Department of the Environment, Transport and Regions), London.
- PBA (2019) Phase 1 Ground Condition Assessment, Proposed Residential Development, Torridon House Car Park, Westminster. Report 44802/3500/R003/rev0b, Stantec UK Limited (formerly Peter Brett Associates LLP), Reading, Berkshire.
- PBA (2020) Ground Investigation Report, Proposed Residential Development, Torridon House Car Park, Westminster Report 44802/3500/R005/rev1, Stantec UK Limited (formerly Peter Brett Associates LLP), Reading, Berkshire.

## Guidance Notes

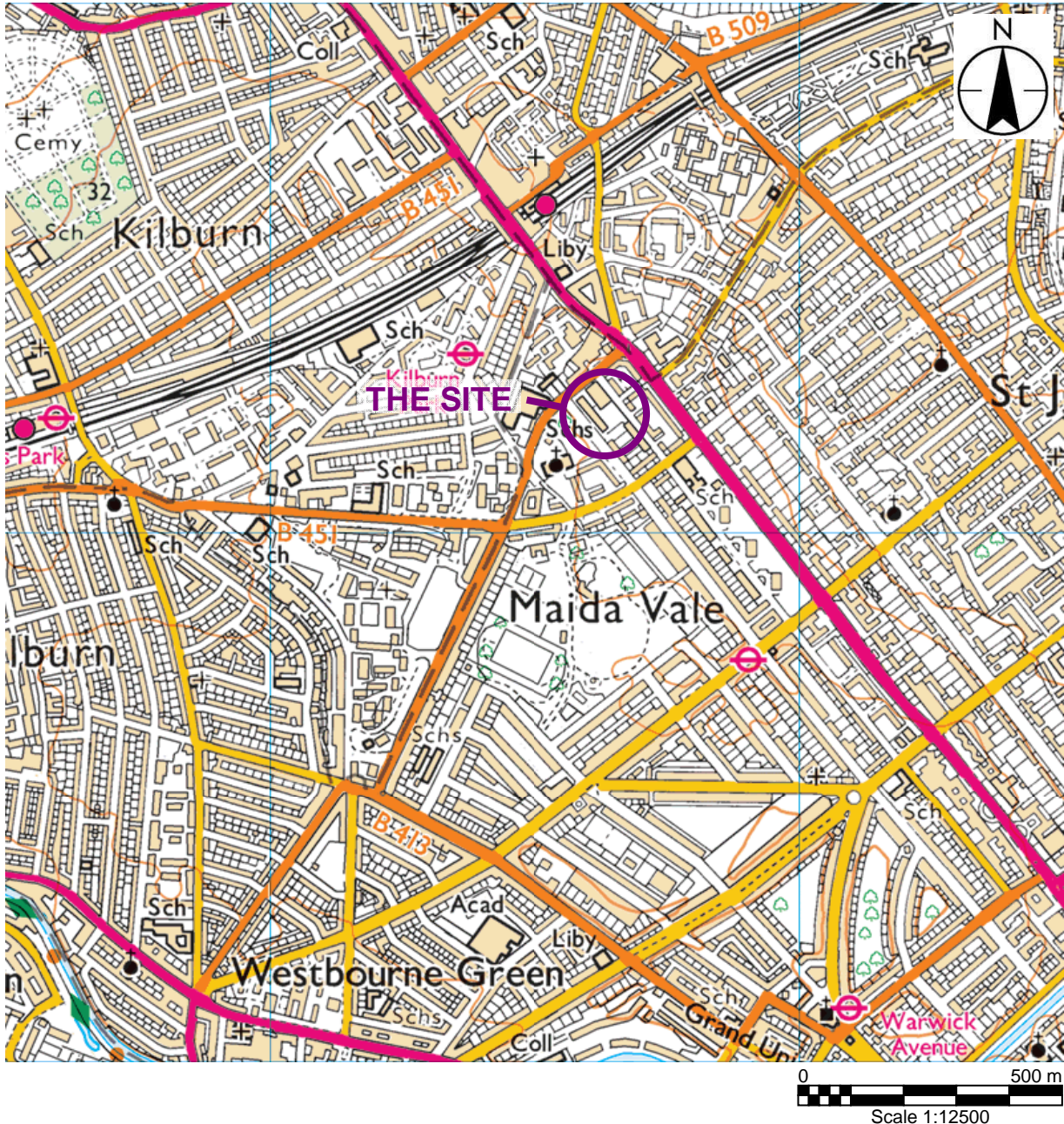
## Essential Guidance on the Context of the Report

This report has been prepared within an agreed timeframe and to an agreed budget that will necessarily apply some constraints on its content and usage. The remarks below are presented to assist the reader in understanding the context of this report and any general limitations or constraints. If there are any specific limitations and constraints they are described in the report text.

- 1) The opinions and recommendations expressed in this report are based on statute, guidance, and appropriate practice current at the date of its preparation. Stantec UK Limited (Stantec) does not accept any liability whatsoever for the consequences of any future legislative changes or the release of subsequent guidance documentation, etc. Such changes may render some of the opinions and advice in this report inappropriate or incorrect and we will be pleased to advise if any report requires revision due to changing circumstances. Following delivery of the report Stantec has no obligation to advise the Client or any other party of such changes or their repercussions.
- 2) Some of the conclusions in this report may be based on third party data. No guarantee can be given for the accuracy or completeness of any of the third party data used. Historical maps and aerial photographs provide a “snap shot” in time about conditions or activities at the site and cannot be relied upon as indicators of any events or activities that may have taken place at other times.
- 3) The conclusions and recommendations made in this report and the opinions expressed are based on the information reviewed and/or the ground conditions encountered in exploratory holes and the results of any field or laboratory testing undertaken. There may be ground conditions at the site that have not been disclosed by the information reviewed or by the investigative work undertaken. Such undisclosed conditions cannot be taken into account in any analysis and reporting.
- 4) Unless specifically stated to the contrary, this report does not purport to be a “Geotechnical Design Report” as defined in Clause 2.8 of Eurocode 7 (Geotechnical Design BS EN 1997-1:2004). Some of the data contained herein and used to support any geotechnical assessment presented in this report may be historical or for other reasons not fully compliant with the requirements of that code.
- 5) It should be noted that groundwater levels, groundwater chemistry, surface water levels, surface water chemistry, soil gas concentrations and soil gas flow rates can vary due to seasonal, climatic, tidal and man made effects.
- 6) If the report indicates that asbestos has been identified within the ground, any work that involves, or is likely to involve, contact with asbestos must be undertaken in accordance with the Control of Asbestos Regulations 2012, particularly in regard to risk assessment, licensing and training. A risk assessment should be carried out prior to any activities that could lead to the disturbance of asbestos materials, either buried or on the ground surface and should include appropriate mitigation measures, such as damping down to prevent the spread of asbestos, air monitoring and minimum PPE and/or RPE requirements for the work proposed.
- 7) This report has been written for the sole use of the Client stated at the front of the report in relation to a specific development or scheme. The conclusions and recommendations presented herein are only relevant to the scheme or the phase of project under consideration. This report shall not be relied upon or transferred to any other party without the express written authorisation of Stantec. Any such party relies upon the report at its own risk.
- 8) The interpretation carried out in this report is based on scientific and engineering appraisal carried out by suitably experienced and qualified technical consultants based on the scope of our engagement. We have not taken into account the perceptions of, for example, banks, insurers, other funders, lay people, etc, unless the report has been prepared specifically for that purpose. Advice from other specialists may be required such as the legal, planning and architecture professions, whether specifically recommended in our report or not.
- 9) Public or legal consultations or enquiries, or consultation with any Regulatory Bodies (such as the Environment Agency, Natural England or Local Authority) have taken place only as part of this work where specifically stated.

## Figures





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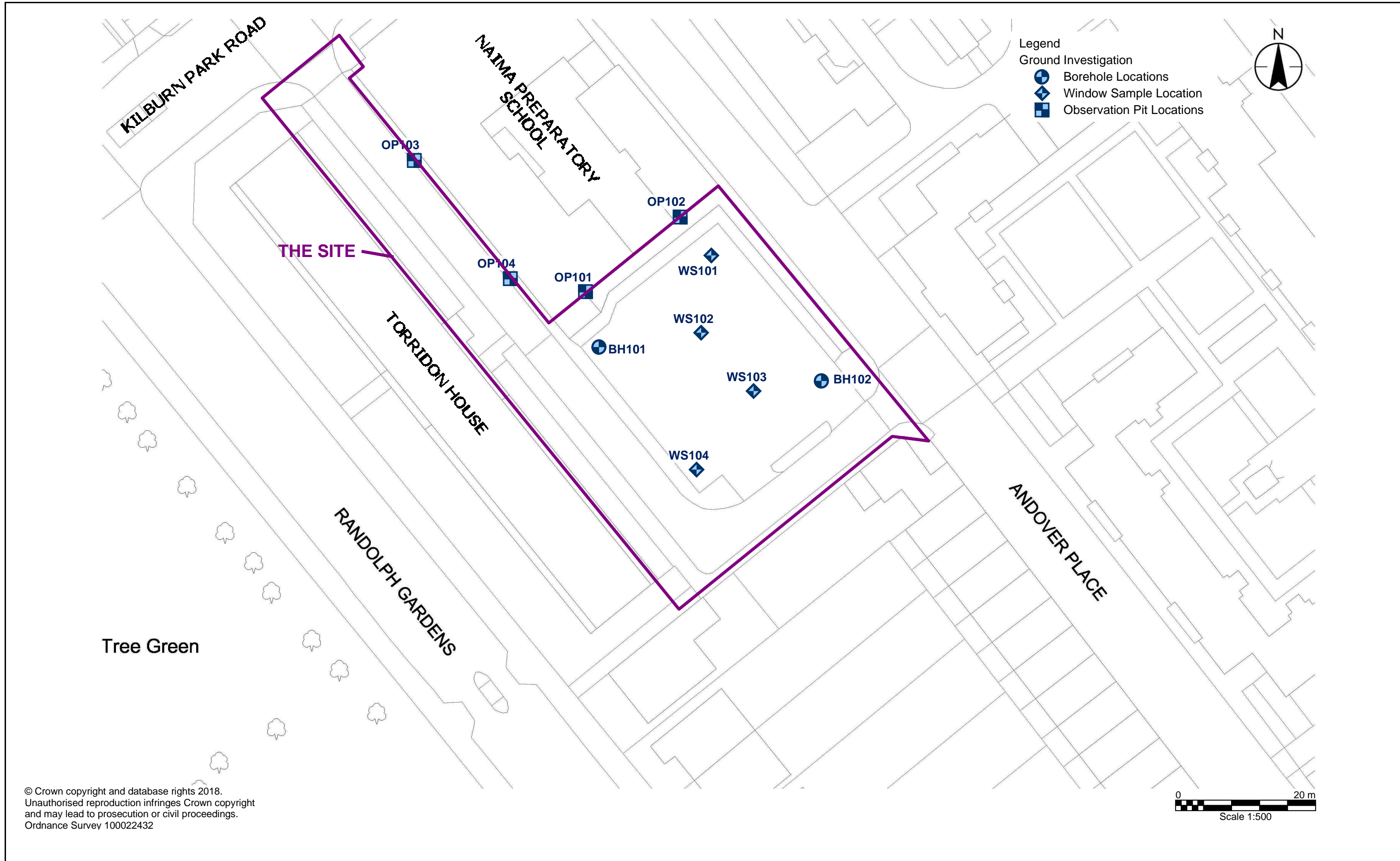
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**CITY OF WESTMINSTER**  
**TORRIDON HOUSE CAR PARK,**  
**WESTMINSTER**

Prepared: mdh  
 Checked:  
 Date: Feb 2021

Title  
**SITE LAYOUT PLAN**

Revision: RS-00  
 Figure 1



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