Appendix B

Geotechnical Investigations (GEA)

DESK STUDY & GROUND INVESTIGATION REPORT

13 Regent's Park Road
London
NW1 7TL

Client: Charles Blackburn

J21011

March 2021




GEA

Document Control

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This report is intended as a Ground Investigation Report (GIR) as defined in BS EN1997-2, unless specifically noted otherwise. The report is not a Geotechnical Design Report (GDR) as defined in EN1997-2 and recommendations made within this report are for guidance only.

CONTENTS

EXECUTIVE SUMMARY

This executive summary contains an overview of the key findings and conclusions. No reliance should be placed on any part of the executive summary until the whole of the report has been read. Other sections of the report may contain information that puts into context the findings that are summarised in the executive summary.

BRIEF

This report describes the findings of a site investigation carried out by Geotechnical and Environmental Associates Limited (GEA) on the instructions of Morph Structures, on behalf of Charles Blackburn, with respect to the lowering of the existing lower ground floor, and the construction of a single-storey basement below, to provide a gym, changing room, cinema room and bar. The purpose of the investigation has been to research the history of the site with respect to possible contaminative uses, to determine the ground conditions, to assess the extent of any contamination and to provide information to assist with the design of retaining walls and foundations.

SITE HISTORY

Greenwood's map of London, dated 1827, shows that the site was part of an undeveloped field to the west of Camden Town and the north of The Regent's Park and Regent's Canal. Regent's Park Road, at that time called Queen's Road, is shown on a road map dated 1851, together with several other existing local streets, and the map dated 1872 shows that the existing house and the majority of those in the local area had been constructed. A pond is shown in the rear garden on the 1872 map, but was subsequently removed. Reference to online planning records shows that planning permission for a rear conservatory at the site was granted in August 1991, and that the existing single storey rear extension, permission for which was granted in 2013, replaced the conservatory. A mature lime tree was evidently growing in the rear garden at this time, but was felled at sometime after December 2018.

GROUND CONDITIONS

The investigation encountered a variable thickness of made ground overlying the London Clay Formation. The made ground generally comprised brown and grey very gravelly sand, or sandy gravelly clay, with occasional fragments of brick, coal and concrete, and extended to depths of between 0.13 m (45.97 m TBM) and 1.20 m (46.78 m TBM). The London Clay comprised an initial horizon of firm fissured brown mottled grey slightly silty clay with selenite crystals, which extended to a depth of 10.50 m (37.48 m TBM), whereupon stiff fissured greyish brown clay with grey veining extended to the full depth of the investigation of 11.00 m (36.98 m TBM).

Groundwater was encountered as localised seepages within several of the trial pits, but no groundwater table is present. Contamination testing has revealed elevated concentrations of lead and sulphide within the made ground.

RECOMMENDATIONS

It is understood that the new basement will extend to a depth of approximately 4.50 m below the existing lower ground floor level, and will therefore have a foundation level or around 42.00 m TBM, within the firm London Clay, which will provide a suitable bearing stratum for underpinned moderate width strip or pad foundations. Piled foundations may alternatively be used.

On the basis of the fieldwork and subsequent monitoring, groundwater is only likely to be encountered as seepages of perched water within the basement excavation, and should be adequately dealt with using sump pumping.

The proposed development will not result in any increased risk of exposure of end users to contaminants within the made ground. A programme of working should be followed to protect workers handling any soil.

Part 1: INVESTIGATION REPORT

This section of the report details the objectives of the investigation, the work that has been carried out to meet these objectives and the results of the investigation. Interpretation of the findings is presented in Part 2.

1.0 INTRODUCTION

Geotechnical and Environmental Associates Limited (GEA) has been commissioned by Morph Structures, on behalf of Charles Blackburn, to carry out a desk study and ground investigation at 13 Regent's Park Road, London NW1 7TL.

1.1 Proposed Development

It is understood that it is proposed to lower the existing lower ground floor and construct a single-storey basement below, to provide a gym, changing room, cinema room and bar. Spread or raft foundations are the preferred solution, but information is also required to facilitate piled foundation design, if required.

This report is specific to the proposed development and the advice herein should be reviewed if the development proposals are amended.

1.2 Purpose of Work

The principal technical objectives of the work carried out were as follows:

- to check the history of the site with respect to previous contaminative uses;
- to determine the ground conditions and hydrogeology and their engineering properties;
- to assess the risk of encountering unexploded ordnance (UXO);
- to provide an indication of the degree of soil contamination present; and
- to assess the risk that any such contamination may pose to the proposed development, its users or the wider environment.

1.3 Scope of Work

In order to meet the above objectives, a desk study was carried out, followed by a ground investigation. The desk study comprised:

- a review of historical Ordnance Survey (OS) maps and environmental searches sourced from the Envirocheck database;
- a review of readily available geology maps; and
- a walkover survey of the site carried out in conjunction with the fieldwork.

In the light of this desk study an intrusive ground investigation was carried out which comprised, in summary, the following activities:

- a single borehole advanced to a depth of 11.00 m (36.98 m AD) using a opendrive percussive sampler;
- standard penetration tests (SPTs) carried out at regular intervals within the borehole to provide quantitative data on the strength of the soils;
- manual excavation of nine trial pits to explore the foundations of the existing building;
- the installation of a groundwater monitoring standpipe and a subsequent programme of groundwater monitoring, comprising two visits in total;
- testing of selected soil samples for contamination and geotechnical purposes; and
- provision of a report presenting and interpreting the above data, together with our advice and recommendations with respect to the proposed development.

This report includes a contaminated land assessment which has been undertaken by a suitably qualified and competent professional in accordance with the methodology presented by the Environment Agency in their Land contamination risk assessment (LCRM)[1] published 8 October 2020. This involves identifying, making decisions on, and taking appropriate action to deal with, land contamination in a way that is consistent with government policies and legislation within the United Kingdom. Risk management is divided into three stages; Risk Assessment, Options Appraisal and Remediation, and each stage comprises three tiers. The Risk Assessment stage includes preliminary risk assessment (PRA), generic quantitative risk assessment (GQRA) and detailed quantitative risk assessment (DQRA)and this report includes the PRA and GQRA.

The exploratory methods adopted in this investigation have been selected on the basis of the constraints of the site including but not limited to access and space limitations, together with any budgetary or timing constraints. Where it has not been possible to reasonably use an EC7 compliant investigation technique a practical alternative has been adopted to obtain indicative soil parameters and any interpretation is based upon engineering experience, local precedent where applicable and relevant published information.

1.4 Limitations

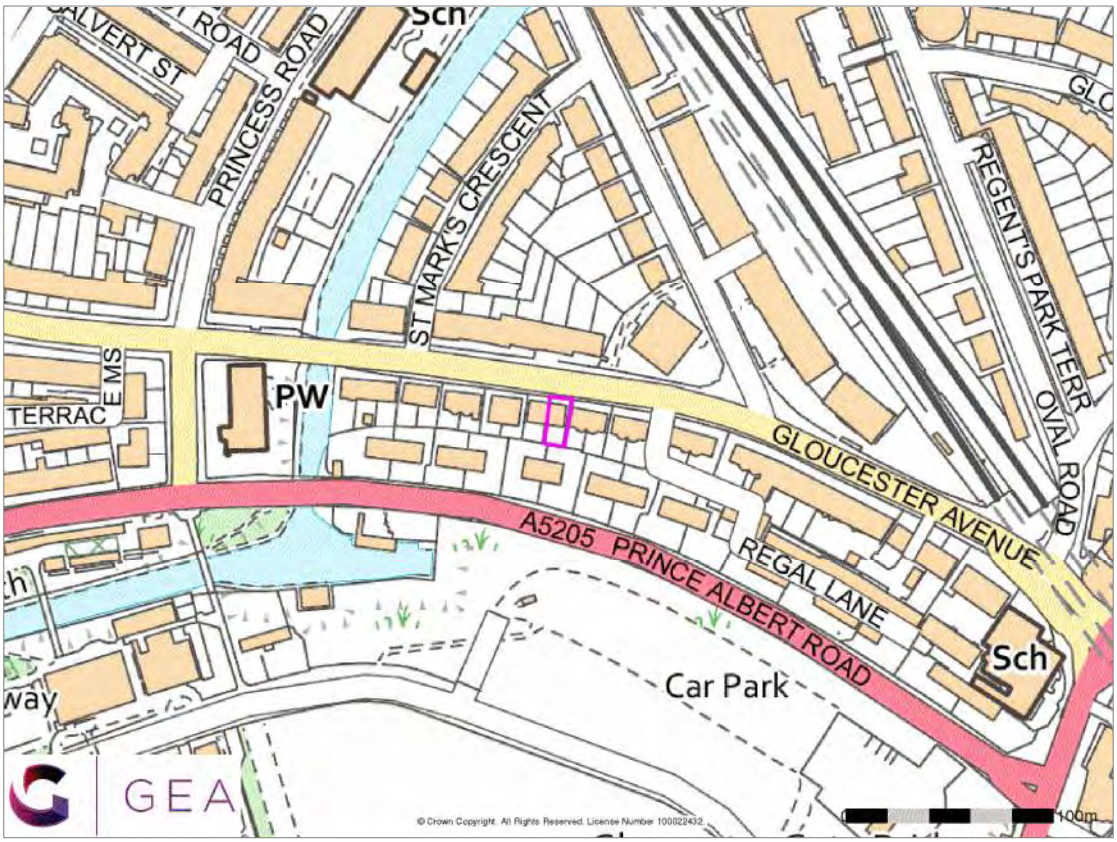
The conclusions and recommendations made in this report are limited to those that can be made on the basis of the investigation. The results of the work should be viewed in the context of the range of data sources consulted, the number of locations where the ground was sampled and the number of soil, gas or ground water samples tested. No liability can be accepted for conditions not revealed by the sampling or testing. Any comments made on the basis of information obtained from third parties are given in good faith on the assumption that the information is accurate; no independent validation of third party information has been made by GEA.

[1] https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm

2.0 THE SITE

2.1 Site Description

The site is located in the London Borough of Camden, approximately 60 m north of Regent's Park, 100 m east of the Grand Union Canal and 550 m west of Camden Town London Underground station. It fronts onto Regent's Park Road to the north and is bound to the west by the adjoining house of No 15 Regent's Park Road; a similar pair of semi-detached houses fronting onto Regent's Park Road (Nos 9 and 11) bounds the east of the site. To the south, the site is bounded by the rear gardens of three-storey houses fronting onto Prince Albert Road (Nos 10 and 11), which include accommodation at roof level. The site may be additionally located by National Grid Reference 528400, 183720 and is shown on the map extract below.



A walkover of the site was carried out by a geotechnical engineer from GEA at the time of the fieldwork. The site is rectangular in shape and measures approximately 10 m east-west by 23 m north-south. It is occupied by a four-storey house including a lower ground floor level, and the house is divided into two apartments, one on the ground and lower ground floors and another on the upper two storeys. A short flight of steps leads up from street level, which is at approximately 33 m OD, to ground floor level, and a flight of steps in the northeast corner of the site leads down from street level to the lower ground floor.

The centre of the rear garden is laid to a patio at lower ground floor level, with brick-built raised flowerbeds along the rear (southern) and eastern boundary retaining walls, most of the western boundary being abutted by a single storey rear extension at lower ground floor level. Much of the front lightwell is essentially at street level, with only a narrow channel at lower ground floor level along the front of the house. A raised flowerbed abuts the front boundary wall and a sapling had been removed from this flowerbed prior to the site walkover. At the

time of the walkover, an internal site strip of the ground floor and lower ground floor apartment was underway, and the internal fixtures and fittings and lower ground floorboards had been removed. The upper floor apartment was occupied.

2.2 Site History

The site history has been researched by reference to internet sources and historical Ordnance Survey (OS) maps obtained from the Envirocheck database.

Greenwood's map of London, dated 1827, shows that the site was part of an undeveloped field to the west of Camden Town and the north of The Regent's Park and Regent's Canal, later renamed the Grand Union Canal. Albert Road, at that time called Primrose Hill Road, bounded the northern side of the park as at present, and Greenwood's map shows a second bridge across the Regent's Canal, just to the north of Albert Road. This crossing developed into Queen's Road, which is shown on a road map dated 1851, together with several other existing local streets including Gloucester Road and the North Western Railway, the latter in its present location around 150 m to the northeast of the site. No details of buildings are shown.

By 1872, Queen's Road had been renamed Regent's Park Road. The 1872 map shows the existing house to have been constructed by this time, with a pond in the rear garden. Regent's Park Road and the surrounding streets are also shown lined with houses, the majority of which are still existing. The pond is not shown in subsequent maps, but this may be due to a lesser level of detail being depicted, rather than establishing the date it was removed.

Between 1951 and 1954, part of the Grand Union Canal, eastwards from a point around 80 m to the south of the site, was infilled, and a pumping station was constructed on the southern bank of the canal, around 120 m to the southwest of the site. Cecil Sharp House, located at the junction of Gloucester Avenue and Regent's Park Road and around 50 m to the northeast of the site, was constructed during this period, on the site of two former houses. In addition, the 1954 map shows No 10 Regent's Park Road, virtually opposite the site, in outline only. Reference to online planning records detailed in Section 2.2.1, shows that planning permission for redevelopment of No 10 with a block of flats was granted in April 1952 under reference TP62539/1599. The completed flats are shown on the next map, dated 1969.

Reference to online planning records shows that planning permission for a rear conservatory at the site was granted in August 1991, and that the existing single storey rear extension, permission for which was granted in 2013, replaced the conservatory. A mature lime tree was evidently growing in the rear garden at this time, but was felled at sometime after December 2018.

2.2.1 Planning History

Reference to records of planning applications published online by Camden Borough Council has shown the following records pertaining to the site. Records of refused or withdrawn applications have not been included. Records for approval of submissions pursuant to a planning condition are shown in brackets.

Application reference	Details	Date of permission
2018/5224/T	REAR GARDEN: 1 x Lime (T1) - Fell to as close to ground level as possible	04/12/2018
2017/1694/T	REAR GARDEN: 1 x Lime - Reduce to previous points	05-05-2017
2013/6901/P (2014/3284/P)	Erection of single storey rear extension at lower ground floor level with terrace above, replacing the existing conservatory and terrace above	04/11/2013 (06/01/2015)

Application reference	Details	Date of permission
2013/1172/T	REAR GARDEN: 1 x Lime - Remove new growth of about half a meter.	04/03/2013
2003/1101/T	REAR GARDEN 1 x Lime - crown reduce by 30% and trim the lower growth on neighbours side (No.15)	30/07/2003
9100926	Erection of a conservatory extension at rear lower ground floor; side infill at lower ground floor level rear balcony at ground floor level and velux windows in rear roof in connection with the use of the building as 3 self-contained dwelling units as shown on drawing nos. RPR/PL/01B P/02B S/01 S/02. revised by letter 02.01.92.	15/08/1991

The following records of have been found pertaining to the adjacent properties; records of refused or withdrawn applications have not been included:

Location	Application reference	Details	Date of permission
15 Regent's Park Road	No permitted applications listed		
11 Regent's Park Road	2015/4209/T	(TPO Ref. C1151) REAR GARDEN: 1 x Horse Chestnut - crown reduce by 2- 3 metres with a maximum diameter cut of 4cm.	29/10/2015
	2015/3162/T	REAR GARDEN: 1 x Ash - Fell. 1 x Horse Chestnut - Fell.	Part granted/refused 22/07/2015
	PEX0200736	Installation of velux roof lights to the front/side and rear roof slope. (Revised Plans submitted).	22/09/2003
	PEX0200783	The insertion of new timber sash window on the side elevation at 2nd. Floor level.	16/12/2002
	9492049	Seeking permission to carry out the following tree works (1).Ash:Fell to ground level as undesirable species for location.(2).Privet Hedge:Trim to shape and reduce over- hang to pavement.(3) x1 Ash x1 Horse Chestnut (Rear gdn) Crown reduce and shape by 30-35% thin by 25-30% remove deadwood and stubs.	03/03/1994
	9292069	Pruning of Ash and Chestnut	01/04/1992
	8892003	Prune Ash tree at rear.	20/01/1988
	8701198	Minor external alterations as part of refurbishment as shown on drawing nos.1039/01A 02C 03 and 03F and as revised on 14th January 1988.	10/12/1988
	8770188	Internal and external alterations as part of refurbishment as shown on drawing nos.1039/01A 02C 03 and 03F and as revised on 14th January 1988.	10/02/1988
	TP37157/5869	Tewn and Coustry Planning Act, 1947. 11, Regents Park Road, St. Pancras.	06/08/1949
	TPBR37157/11660	The conversion of 11, Regent's Park Road, St. Pancras, into four self-contained flats,	05/05/1947
11a Regent's Park Road	2004/3959/T	REAR GARDEN 1 x Ash, 1 x Horse Chestnut - reduce by 25% and crown lift 3m	19/10/2004
	TC9806113	Reduction works to one Ash and one Chestnut in rear garden.	24/03/1998

2.3 Other Information

A search of public registers and databases has been made via the Envirocheck database and relevant extracts from the search are appended. Full results of the search can be provided if required.

The Envirocheck report has not indicated any landfill sites located within 1 km of the site. A waste management / transfer site was located around 405 m to the northeast of the site, at 28 Jamestown Road, but the licence was surrendered in 1997. Similarly, Regents Park Zoo, located around 425 m to the southwest of the site, has an expired waste treatment or disposal licence for incineration; the expiration date is not given but the licence was dated 1st June 1983. A single area of potentially infilled land is listed within 250 m of the site, located 56 m to the south, relating to infilling of part of the Grand Union Canal.

Three discharge consents are listed within 500 m of the site, with the nearest located 190 m to the north, concerning the discharge of cooling water into the Grand Union Canal.

Two pollution incidents to controlled waters have been recorded within 500 m of the site, the closest of which occurred 90 m to the west, in April 1999, and was classified as a Category 3 – Minor Incident. The nature of the pollutant is not given. This is highly unlikely to have impacted the site.

The site is not within an area shown by the Environment Agency to be at risk from flooding from rivers or the sea and does not lie within any known areas of sensitive land use. However, the site is within Primrose Hill Conservation Area, as designated by Camden Borough Council.

Of the entries in the Contemporary Trade Directory, the most pertinent are for an inactive printers 179 m to the northeast of the site and an active dry cleaners 209 m to the northwest of the site.

The nearest fuel station listed is 240 m to the northeast of the site, although this is listed as obsolete; the nearest open fuel station listed is 549 m to the north.

Reference to records compiled by the Health Protection Agency (formerly the National Radiological Protection Board) indicates that the site falls within an area where less than 1% of homes are affected by radon emissions and therefore radon protective measures will not be necessary.

2.4 Preliminary UXO Risk Assessment

A Preliminary UXO Risk Assessment has been completed by 1st Line Defence (report ref EP12716-00, dated 22nd January 2021), and the report is included in the appendix. The risk assessment has been carried out in accordance with the guidelines provided by CIRIA, which state that the likelihood of encountering and detonating UXO below a site should be assessed along with establishing the consequences that may arise. The first phase comprises a preliminary risk assessment, which should be undertaken at an early stage of the development planning. If such an assessment identifies a high level of risk then a detailed risk assessment should be carried out by a UXO specialist, which will identify an appropriate course of action with regard to risk mitigation.

The report indicates that, during World War II (WWII), the site was located within the Metropolitan Borough of St Pancras, which sustained a very high bomb density. A set of incendiary bombs is recorded to have been dropped to the south of the site, although the

record also shows that these are likely to have malfunctioned and been removed without detonating. There are no records of any bomb strikes across the site and the site does not appear to have sustained any significant bomb damage. Therefore, no elevated risk of encountering unexploded ordnance has been identified for the site and no further action is recommended in this respect.

2.5 Geology

The British Geological Survey (BGS) map of the area indicates that the site is directly underlain by the London Clay Formation.

According to the BGS memoir, the London Clay is homogenous, slightly calcareous silty clay to very silty clay, with some beds of clayey silt grading to silty fine-grained sand.

GEA has carried out previous investigations at both Nos 11 and 13 Prince Albert Road. No 11 borders the southwest of the site and No 13 is located around 40 m to the southwest. Investigations at both sites encountered a moderate to significant thickness of made ground, overlying the London Clay. The made ground extended to depths of between 0.40 m and 3.00 m, beneath which the London Clay generally initially comprised firm fissured brown mottled grey clay with partings of silt and sand, bluish grey staining along fissures, and selenite crystals. This weathered layer extended to a depth of around 13.00 m, beneath which stiff fissured grey clay was encountered to the maximum depth investigated, of 20.00 m.

2.6 Hydrology and Hydrogeology

The London Clay Formation is classified as an Unproductive Stratum, rather than its former classification as a non-aquifer, referring to rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow. The London Clay cannot support a water table or effectively transmit groundwater flow because of its low permeability and cohesive nature. The permeability will be predominantly secondary, through fissures in the clay. Published data indicates the horizontal permeability of the London Clay to generally range between 1 x 10^{-11} m/s and 1 x 10^{-9} m/s.

The nearest surface water feature is the Grand Union Canal, subtitled and historically called the Regent's Canal, which at its closest point is located approximately 74 m to the southwest of the site.

Historically[2], a tributary of the Tyburn, one of London's "lost rivers", issued from the northeast corner of Regent's Park, around 300 m to the southwest of the site, and flowed southwards towards the boating lake in the southwest of the park, from whence the main Tyburn River flowed south-southeastwards towards the River Thames. Groundwater is likely to be flowing in a roughly southerly or southwesterly direction, towards the historical source of the Tyburn tributary, although such flow is likely to be extremely slow due to the low permeability of the London Clay.

The nearby previous GEA investigations encountered a seepage of groundwater within one of the boreholes, within the London Clay, at a depth of 4.00 m below lower ground floor level. Otherwise, groundwater was not encountered, and standpipes installed during the investigations were found to be dry during subsequent monitoring.

[2] Barton, N, & Meyers, S (2016) *The Lost Rivers of London (revised and extended edition with colour maps).* Historical Publications Ltd.

The site is almost entirely covered by the existing building and hardstanding and therefore infiltration of rain water into the ground beneath the site is limited such that the majority of surface runoff is likely to drain into combined sewers in the road.

2.7 Preliminary Risk Assessment

Part IIA of the Environmental Protection Act 1990, which was inserted into that Act by Section 57 of the Environment Act 1995, provides the main regulatory regime for the identification and remediation of contaminated land. The determination of contaminated sites is based on a "suitable for use" approach which involves managing the risks posed by contaminated land by making risk-based decisions. This risk assessment is carried out on the basis of a source-pathway-receptor approach.

2.7.1 Source

The desk study findings indicate that the site does not have a potentially contaminative history as it has been developed with the existing house since sometime during the first half of the 19th Century and has remained in residential use throughout its history. Similarly, the surrounding area has remained dominantly residential; no potentially contaminative activities are indicated within the local area on the historical maps. The businesses listed in the Contemporary Trade Directory are not considered to represent viable sources of potential pollution that might affect the site and no other viable potential sources of contamination have been identified.

Infilling of the Grand Union Canal from around 80 m to the south of the site is not considered to represent a viable source of ground gas given the time that has elapsed since the ground was infilled, the distance from the site, and the relatively impervious nature of the intervening geology. No other potential sources of ground gas have been identified.

2.7.2 Receptor

The building will continue to be used for residential purposes and end users represent relatively high sensitivity receptors. Adjacent sites are considered to be moderately sensitive receptors. Buried services are likely to come into contact with any contaminants present within the soils through which they pass and site workers are likely to come into contact with any contaminants present in the soils during construction works.

2.7.3 Pathway

The presence of negligibly permeable London Clay beneath the site will limit the potential for groundwater percolation into the underlying strata, and thus a pathway is not considered likely to exist to the major aquifer at depth. Within the site, end users will be isolated from direct contact with any contaminants present within the made ground by the presence of the buildings and the extent of the hardstanding, but they will potentially be exposed in areas of soft landscaping. Buried services may be exposed to any contaminants present within the soil through direct contact and site workers will come into contact with the soils during construction works. There is thus considered to be a low potential for a contaminant pathway to be present between any potential contaminant source and a target for the particular contaminant.

2.7.4 Preliminary Risk Appraisal

On the basis of the above it is considered that there is a VERY LOW risk of there being a significant contaminant linkage at this site which would result in a requirement for major remediation work.

No potential sources of ground gas have been identified, such that ground gas monitoring is not considered to be necessary.