



GCL Associates Ltd

Fitzroy Farm, Fitzroy Park,
Highgate, North West London

Geotechnical, Hydrogeological and
Geoenvironmental Site Investigation
Report

Project no.241529

July 2010

**Safeguarding
your business
environment**

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Correspondence with Statutory Authorities
BGS Borehole Log

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Borehole Records
Trial Pit Records
Photographic Record [on CD]
Water Monitoring Record Sheets

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Triaxial Test Results
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Appendix D Chemical Laboratory Test Records

Chemical Analysis of Soils
PAH double ratio plot

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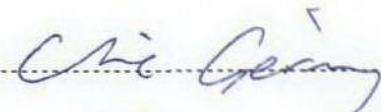

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1. INTRODUCTION

1.1 Instructions

On the instructions of Engineers Haskins Robinson Waters Limited, on behalf of GCL Associates (the 'Client'), RSK STATS Geoconsult (RSK) has carried out a Phase 1 and Phase 2 geotechnical, hydrogeological, and geoenvironmental site investigation of Fitzroy Farm, Fitzroy Park, located close to Highgate, North West London.

The project was commissioned in connection with the proposed redevelopment of Fitzroy Farm with a large detached property with a basement to replace the existing house on site. The site is located on the edge of Hampstead Heath, within an area of drainage which supports a chain of ponds (the Highgate Ponds), which lie topographically down-gradient of the subject site. An assessment of the hydrogeology of the site and the potential for the redevelopment to impact upon the groundwater regime is required to support the planning application. The project was also commissioned in order to identify the potential for hazardous substances or conditions to exist on, at or near the site and therefore, via the development of a Conceptual Site Model (CSM), identify the necessity for and extent of mitigation measures to be employed in relation to the proposed development of a residential property on the site.

By way of background, two previous phases of investigation have been undertaken at the site by Ove Arup & Partners Limited in support of previous Planning Applications for the site, as detailed below:

- Hydrogeological Desk Study Report, Job No. 120654, dated July 2006
- Hydrogeological Desk Study Report, Job No.120654, dated April 2007

These reports have been made available to RSK for review as part of this study.

1.2 Project Brief

The project was carried out to an agreed brief as set out in RSK's proposal letter of 6th April 2010.

The work undertaken included the following tasks:

(i) *Desk Study*

- A site walk-over reconnaissance survey;
- A study of the history of development and industry on the site, including reference to archival Ordnance Survey mapping and pre-OS maps of London;
- A search of Statutory Registers for potentially contaminative land uses and licences in the vicinity of the site, in the form of an environmental database report, and a search of the Environment Agency website;
- Direct enquiries made to statutory authorities, (i.e. the Local Authority Environmental Health Department);
- A study of the local geology, hydrology and hydrogeology of the site, including the identification of geological hazards and historic mining activities, and a search of the British Geological Survey database for relevant borehole logs; and
- A preliminary Conceptual Site Model (CSM) of contamination, identifying possible pollutant linkages.

(ii) *Site Investigation*

By means of:

- Light cable-percussive boreholes;
- Drive-in window sampler boreholes,
- Hand dug trial pits
- On-going monitoring of groundwater wells
- Off-site analysis for geotechnical and geoenvironmental purposes; and
- Interpretative reporting (including development of the CSM).

1.3 Standards

The project was designed generally to meet the objectives of a Preliminary (Phase 1) Investigation and an Investigation, as defined by BS 10175:2001 "Code of Practice for the Investigation of Potentially Contaminated Sites". Exploratory Investigations usually involve only limited intrusive/analytical work in which relatively few samples are collected for contamination identification/confirmation purposes. They play a role in establishing the potential for short-term exposure or other immediate risks to health and the environment, and they are used to generate initial gas, vapour and water quality data.

The intrusive aspects of the investigation were generally carried out following guidance given in BS 5930:1999 - Code of Practice for Site Investigations.

This report adopts the technical approach presented in Contaminated Land Report 11 "Model Procedures for the Management of Land Contamination" (Environment Agency 2004) for applying a risk management process when dealing with land affected by contamination.

The project and this report have been designed to fulfil the information requirements set out in the Environment Agency Guidance on Requirements for Land Contamination Reports (Environment Agency 2005).

1.4 Limitations

This report should be considered in the light of any changes in legislation, statutory requirement or industry practices that may have occurred subsequent to the date of issue.

The "vicinity" of the site for the purposes of this report, is defined as locations situated within an approximate 250m radius of the site, although certain sources of contamination and / or sensitive targets further than 250m may also have been considered.

The opinions and recommendations expressed in this report are based on the ground conditions encountered during the site work, the results of field and laboratory testing and interpretation between exploratory holes. The material encountered and samples obtained represent only a small proportion of the materials present on-site, therefore other conditions may prevail at the site which have not been revealed by this investigation.

The environmental reconnaissance survey consisted of a general external inspection of the site aimed at identifying any obvious signs of potential sources of ground contamination. A detailed internal inspection of the buildings was outside the brief for the study.

As an Exploratory Investigation, the results may not provide sufficient data to make detailed estimates of the quantities involved in any remediation work, if required.

The results of RSK laboratory tests are covered by UKAS accreditation, but opinions and interpretations expressed in the report and on the site work records are outside the scope of this accreditation. Where laboratory testing has been carried out at a sub-contractor laboratory, this laboratory is an approved sub-contractor in accordance with the requirements of the RSK quality management system and is UKAS accredited for the relevant range of tests undertaken.

2. SITE DETAILS

2.1 Description and Geographic Setting

The site is located at National Grid reference TQ 277 871 and occupies an elevated position on the edge of Hampstead Heath in the Highgate area (**Figure 1**). The site is located between Millfield Lane to the southwest and Fitzroy Park to the northeast, with the North London Bowls Club pavilion and bowling green located to the immediate north of the site, and an area of open heathland to the northwest. Two residential properties adjoin the site's southeastern boundary; 'The Little House' is located adjacent to the site's entrance from Bowling Club Lane (via Fitzroy Park to the north), and the larger 'Wallace House' lies adjacent to the southeast. To the south of Millfield Lane is a wooded area beyond which lie a series of ponds (Highgate Ponds), the nearest of which to the site is the Highgate Ladies Bathing Pond. The site lies on a southwesterly facing slope, which descends towards Millfield Lane and the ponds beyond.

The site currently comprises a large detached residential property fronting on to a large garden area, with an area of informal gardens and a tennis court to the northwest (**Figure 2**).

2.2 Reconnaissance Survey

The site was visited on 16th April 2010. The characteristics of the site observed during the site reconnaissance visit and obtained from current Ordnance Survey maps are summarised in **Table 2.1**.

Table 2.1 – Site description

Feature	Description
Physical characteristics	
Area of site	Approximately 0.46 hectares.
Ground levels	The site lies on a southwesterly facing slope. Ground levels at the site range from an elevation of approximately 84mAOD at the site's northeastern boundary to approximately 81mAOD at the site's southwestern boundary. Ground levels adjacent to the current property are level at approximately 84mAOD, stepping down to a level of approximately 82.6mAOD in the garden area fronting onto the property.
Depressions in the ground surface	None observed.
Waterlogged or marshy ground	None observed.
Surface water	There are no streams or drainage ditches on the site. There is a stream immediately adjacent to the site's northwestern boundary. This stream flows in a southwesterly direction past the site boundary, is locally culverted below Millfield Lane, and issues at surface beyond Millfield Lane to flow into the northern end of the Highgate Ladies Bathing Pond.
Trees	Trees are present on site, as indicated on the site plan in Figure 2 . Within the vicinity of the current (and proposed) property, these include mature oak, ash, pine and laurel.
Existing buildings on site	The current property on site comprises a large, two-storey, brick-built mock-Elizabethan house of 1930s construction, founded on shallow spread foundations. A small single-storey brick-built outbuilding of unknown use is located to the immediate east of the main property, and a single-storey building formerly utilised as an office is located adjacent to the site's southeastern boundary. A small outbuilding is also present within the area of informal gardens in the northwest of the site.

Feature	Description
Basements on site	No evidence of existing or infilled basements was observed.
External hardstanding	<p>There are two concrete-surfaced drives, one either side of the garden area fronting onto the property, which slope gently to the southwest to gated entrances on Millfield Lane. Both are in a poor state of repair. A connection between these two drives in front of the property has been demolished and removed.</p> <p>There are piles of flagstones around the property, which appear to have been lifted and stockpiled.</p>
Retaining walls and adjacent buildings on or close to site boundary	<p>A retaining wall is present along most of the length of the site's northeastern boundary with the North London Bowls Club. This comprises a timber fence adjacent to the bowling club car park and a brick wall adjacent to the current property, with the bowling club pavilion immediately beyond. In the northeast of the site the retaining wall comprises mortared concrete blocks and a mass concrete wall adjacent to the bowling green. Site levels step down approximately 3m from the adjacent bowling green in the northern corner of the site.</p> <p>There is a brick-built retaining wall with weep-holes located along the site's southwestern boundary between the two gated entrances on Millfield Lane. Ground levels step down 1m from the site to the adjacent Millfield Lane. The area of the site comprising the informal gardens and tennis court is retained by wooden fence panelling, stepping down between 1.2m and 1.8m to the adjacent Millfield Lane.</p> <p>The site's northwestern boundary is also retained by a wooden fence, ground levels stepping down approximately 1.8m at its southwestern end adjacent to the surface watercourse. Ground levels to the northwest of the site boundary increase towards the northeast, reducing the level of step. The wooden fence is locally broken and in a poor state of repair.</p> <p>A residential property (The Little House) adjoins the site's southeastern boundary.</p>
Made ground and earthworks	The garden area to the front of the property appears to have been stripped and was observed to comprise elements of made ground, including demolition waste comprising concrete and brick. A large mound of soil was present in the southwestern corner of the garden area, most probably comprising the stripped topsoil from the garden area. Exposed material comprised brown clay with fragments of brick and concrete.
Potentially unstable slopes on or close to site	None observed. However, see Section 4.1.2 .
Buried services present	There are a number of manhole covers on site, serving drainage.
Environmental characteristics	
Tank storage and dispensing facilities	None observed.
Potentially hazardous materials storage and use	None observed.
Asbestos-containing materials	No obvious asbestos construction materials were observed but a detailed survey of the buildings would be required to confirm the presence or otherwise of asbestos-containing materials.
Waste storage	None observed.
Evidence of possible	None observed, although Made Ground with demolition waste (e.g. concrete

Feature	Description
land contamination on site	and brick) was noted to the front of the current property.
Potential off-site sources of ground contamination	None observed.

No potentially significant ground contamination issues were identified during the site reconnaissance survey.

2.3 Information from Environmental Searches

2.3.1 Environmental Database Report and Environment Agency (EA) information

Details on the presence of industries with pollution-related licences, landfill sites and pollution incidents have been obtained via an environmental database report and from a search of information publicly available on the EA website. A copy of the environmental database report is included in **Appendix A**. Salient information from these sources is as follows:

- There are no records of landfill sites (former or current) within 250m of the site (i.e. within the Planning Consultation Zone). Furthermore, there are no records of landfills within a 1km radius of the site.
- There are no records of facilities currently operating under an Integrated Pollution Prevention and Control (IPPC) or a Local Authority Pollution Prevention and Control (LAPPC) authorisation within 500m of the site.
- There is one record of a pollution incident upstream of the site, dated October 1993. This was located approximately 240m northeast of the site, involved oils as a pollutant, and was categorised as a Significant Incident (Category 2).
- There are no records of pollution incidents attributable to the site itself, and no records of prosecution or enforcement action against the site with respect to environmental issues.
- There are no Contemporary Trade Directory Entries or Fuel Station Entries within 250m of the site.

2.3.2 Local Authority Environmental Health Department Information

The Environmental Health Department (EHD) of the London Borough of Camden has no records of contamination in connection with the site and has confirmed that the site has not been identified under Part IIA of the Environmental Protection Act as requiring inspection or investigation.

The Council states that there are no known landfills within 500m of the site.

A copy of the EHD's response is included in **Appendix A**.

3. DEVELOPMENT HISTORY

3.1 Sources of Information

The history of the site's land-use and development from Victorian times onwards has been researched from:

- Early Ordnance Survey (OS) maps; and
- Pre-Ordnance Survey (County Series) maps.

Copies of OS and County Series maps are included in the environmental database report in **Appendix A**. Reference to historical maps provides invaluable information regarding the land use history of the site, but historical evidence may be incomplete for the period pre-dating the first edition and between successive maps.

The development history of the site and surrounding area from the above sources is summarised below.

3.2 Summary of Development History

3.2.1 *The Site*

From mid-Victorian times, the site lay within the wider Fitzroy Park Farm, which extended to the north and east of the present site boundary, and appears to have been bounded to the northeast and southwest by the roads of Fitzroy Park and Millfield Lane, respectively. A large courtyard surrounded by buildings occupied the centre of the site and the northeastern half of the site was covered by mixed woodland.

No significant changes occurred at the site until the early-1930s, when the farm buildings were demolished and the current detached residential property was constructed. The site attained its approximate current configuration at this time. By the early-1950s, a small ornamental pond was present within the gardens fronting onto the house, although this water feature was not evident during the site works (April 2010).

With regards to redevelopment, no further significant changes appear to have taken place at the site since the 1930s.

3.2.2 *The Surrounding Area*

From mid-Victorian times, the site lay within the wider Fitzroy Park Farm, and was surrounded by open heathland to the north, south and west with large detached residential properties ('Lodges') to the east, set in large gardens and surrounded by fields / open land. Urban development was present 750m northeast (Highgate), 1km southwest (Hampstead), and 1km southeast (Dartmouth Park) of the site. The Highgate Ponds were present to the southwest of the site (the closest to the site being the Ladies Bathing Pond, located approximately 60m southwest), the ponds being shown as the property of the 'New River Company's Water Works'. A large pond was also present within the gardens of a residential property ('Fitzroy Farm Cottage') located 70m southeast of the site.

No significant changes occurred in the site's vicinity, until the early-1910s, when a bowling green was constructed to the immediate north of the site. This area appears to have been raised and levelled at that time to form the development platform. A 'miniature rifle range' was also present at this time, located approximately 150m southeast of the site, adjacent to the Wildfowl Reserve Pond.