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Your Ref:

Our Ref: **13/21450-2**
**December 2013**

# LAND ADJOINING 42 FALKLAND ROAD,

# KENTISH TOWN, LONDON, NW5 2PX

## BASEMENT IMPACT ASSESSMENT

**Prepared for**

**Martin Redston Associates Consulting Engineers**

**Acting on behalf of**

**Carltone Limited**

## CONTENTS

# 1.0 INTRODUCTION

## 1.1 Project Objectives

The purpose of this assessment is to consider the effects of a proposed basement construction on the local groundwater regime at the land adjoining 42 Falkland Road, London, NW5 2PX. For this assessment a representative of SAS Limited visited the property on 20th November 2013.

The recommendations and comments given in this report are based on the information contained from the sources cited and may include information provided by the client and other parties including anecdotal information. It must be noted that there may be special conditions prevailing at the site which have not been disclosed by the investigation and which have not been taken into account in the report. No liability can be accepted for any such conditions.

This report does not constitute a full environmental audit of either the site or its immediate environs.

## 1.2 Planning Policy Context

Camden Planning Guidance for Basements and Lightwells has been recently revised (CPG4, September 2013) and requires proposed developments to mitigate against the effects of ground and surface water flooding and to include drainage systems that do not impact neighbouring property of the site or the water environment by way of changing the groundwater regime.

Camden Guidance CPG4 sets out 5 Stages:

1. Screening
2. Scoping
3. Site Investigation
4. Impact Assessment
5. Review and decision making

This report is intended to address the scoping process set out in CPG4 and the Camden Geological, Hydrogeological and Hydrological Study (CGHHS). It will review existing site investigation data and provide a preliminary assessment of the issues identified by the Site Analytical Services Limited screening process.

This report also provides an impact assessment (4) of the geo-environmental impacts on adjacent structures and the surrounding area based on available site investigation data.

As part of this guidance a subterranean (groundwater) flow, slope stability and surface water and flooding screening chart is provided (CPG 4, Figures 1, 2 and 3 respectively). The completed charts in relation to this development are provided as Table 1, to this report.

## 2.0 SITE DETAILS

**(National Grid Reference: TQ 291 853)**

### 2.1 Site Location

The site is situated to the south of Falkland Road in the London Borough of Camden at approximate postcode NW5 2PX. This site comprises a disused former electricity sub-station and seven garages. It is located at the end of a terraced block of three storey properties facing onto Falkland Road.

The site covers an area of approximately 0.03 Hectares and the general area is under the authority of the London Borough of Camden.

### 2.2 Geology

The 1:50000 Geological Survey of Great Britain (England and Wales) covering the area (Sheet 256, 'North London', Solid and Drift Edition) indicates the site to be underlain by the London Clay Formation.

### 2.3 Site Layout

The site was attended on 20th November 2013 for the purposes of conducting the site walkover.

The site is entered via gated access from Falkland Road. The site currently comprises of lock-up garages adjacent to Falkland Road and to the south of the site area. An electrical sub-station is present at the west of the site, bordering 42 Falkland Road. The central site area is covered by tarmac hardstanding with occasional small saplings and bushes present along the site boundary, along with occasional weeds across the site area. A mature pollarded tree is present adjacent to the site along Falkland Road.

The site itself and surrounding area are essentially flat.

### 2.4 Proposed Development

Proposals for the site include the demolition of existing garages and sub-station and erection of 1 x 2 bed and 1 x 4 bed dwelling houses with basements. The maximum depth of the proposed basement floor level is approximately 3.1m below ground level.

### 2.5 Results of Basement Impact Assessment Screening

A screening process has been undertaken for the site and the results are summarised in Table 1 below:

## Table 1: Summary of screening results

| Item | Description | Response | Comment |
|---|---|---|---|
| Sub-terranean (Ground water Flow) | 1a. Is the site located directly above an aquifer. | No | The Bedrock geology underlying the site (London Clay Formation) is classified as Unproductive Strata; drift deposits or rock layers with low permeability that have negligible significance for water supply or river base flow. |
| | 1b. Will the proposed basement extend beneath the water table surface. | No | The maximum depth of the proposed basement floor level of 3.1m will be above the current water level of approximately 4.14m below ground level as encountered in Borehole 1. |
| | 2. Is the site within 100m of a watercourse, well (used / disused) or potential spring line. | No | The nearest surface water is recorded as being a pond 276m north of the site. According to publications regarding Lost Rivers of London (Barton, 1992) and (Talling, 2011), the site is not within 100m of a former river or watercourse. |
| | 3. Is the site within the catchment of the pond chains on Hampstead Heath. | No | The site is away from this area. |
| | 4. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas. | No | The amount of hardstanding on-site is not expected to change. |
| | 5. As part of 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 | Existing drainage paths are to be utilised where possible. Whether soakaways/SUDS are used on the proposed is to be confirmed (beyond the scope of this report). An appropriately qualified engineer should be engaged to ensure mandatory requirements are met. |
| | 6. Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond or spring line. | No | The nearest surface water is recorded as a small pond 276m north of the site. |
| Slope Stability | 1. Does the existing site include slopes, natural or man-made greater than 1 in 8. | No | The site is essentially flat. |
| | 2. Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 1 in 8. | No | Re-profiling of landscaping at the site is not proposed. |

| | | | |
|---|---|---|---|
| | 3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 1 in 8. | No | The surrounding area is essentially flat. The nearest railway is over 100m south-west of the site. |
| | 4. Is the site within a wider hillside setting in which the general slope is greater than 1 in 8. | No | There is a general slope across the wider area from north-west to south-east, but this is at angles of less than 5 degrees. |
| | 5. Is the London Clay the shallowest strata at the site. | No | The investigation found that the site is underlain by Made Ground overlying the London Clay Formation. |
| | 6. Will any trees be felled as part of the development and/or are any works proposed within any tree protection zones where trees are to be retained. | No | It is understood that no trees are to be felled as part of the development. |
| | 7. Is there a history of seasonal shink-swell subsidence in the local area and/or evidence of such effects at the site. | Yes– refer to Section 4.2 for scoping | The site lies above the London Clay Formation well know to have a high tendency to shrink and swell. |
| | 8. Is the site within 100m of a watercourse or a potential spring line. | No | The nearest surface water is recorded as being a pond 276m north of the site. According to publications regarding Lost Rivers of London (Barton, 1992) and (Talling, 2011), the site is not within 100m of a former river or watercourse. |
| | 9. Is the site within an area of previously worked ground. | Yes - refer to Section 4.3 for scoping | Made Ground has been encountered at the site. |
| | 10. Is the site within an aquifer. If so, will the proposed basement extend beneath the water table such that dewatering may be required during construction. | No | The Bedrock geology underlying the site (London Clay Formation) is classified as Unproductive Strata; drift deposits or rock layers with low permeability that have negligible significance for water supply or river base flow. |
| | 11. Is the site within 5m of a highway or pedestrian right of way. | Yes - refer to Section 4.4 for scoping | The site lies to the south of Falkland Road |

| | | | |
|---|---|---|---|
| | 11. Is the site within 50m of the Hampstead Heath ponds | No | The site is located over 100m from the pond chains on Hampstead Heath. |
| | 13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties. | Yes - refer to Section 4.5 for scoping | The development will increase the depths of foundation at the site, although the foundation depths of adjacent properties are not known. |
| | 13. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines. | Unknown / out of scope of report | A full statutory service search was out of scope of this report and must be completed prior to any excavations. |
| Surface Water and Flooding | 1. Is the site within the catchment of the pond chains on Hampstead Heath. | No | The site is located over 100m south from the pond chains on Hampstead Heath. |
| | 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 | The amount of hardstanding on-site is not changing therefore surface water will not be impacted by the development. |
| | 3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas. | No | The amount of hardstanding on-site is not expected to increase. |
| | 4. Will the proposed basement 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 | As no changes are occurring above the ground, surface water will not be impacted by the development. |
| | 4. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses. | No | As no changes are occurring above the ground, surface water will not be impacted by the development. |
| | 5. Is the site in an area known to be at risk from surface water flooding. | No | According to CPG4, September 2013, Falkland Road is not on the list of streets at risk from surface water flooding |

**The Screening Exercise has indentified the following potential issues which will be carried forward to the Scoping Phase**

*Slope Stability*

- Is there a history of seasonal shink-swell subsidence in the local area and/or evidence of such effects at the site.
- Is the site within an area of previously worked ground.
- Is the site within 5m of a highway or pedestrian right of way.
- Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties.

## 3.0 EXISTING SITE INVESTIGATION DATA

### 3.1 Records of site investigations

Ground conditions at the site were investigated by Site Analytical Services Limited in August 2013 (SAS Report Reference 13/21078) and again in November 2013 as part of this Basement Impact Assessment. The ground conditions revealed by the investigations are summarised in the following table.

| Strata | Depth to top of strata, mbgl | Description |
|---|---|---|
| Made Ground | 0.00 | Surface layer of tarmacadam overlying very loose silty clayey sand with brick and clinker fragments and roots up to 3mm in diameter to 0.60m depth |
| London Clay Formation | 0.90 | Soft to firm becoming stiff and then very stiff mottled silty clay with occasional partings of silty fine sand, occasional small gypsum crystals and claystone nodules |

Groundwater was not encountered during the drilling of Boreholes 1, 2 and A and the material remained essentially dry throughout.

Groundwater was subsequently found to have stabilised at a depth of 4.14m below existing ground level in the monitoring standpipe installed in Borehole A after a period of approximately four weeks.

## 4.0 SCOPING ASSESSMENT - SLOPE AND GROUND STABILITY

### 4.1 Introduction

This section addresses outstanding issues raised by the screening process regarding land stability (see Table 1).

### 4.2 Ground movements arising from basement excavation

During the August 2013 investigation (SAS Reference 21078) Atterberg Limit tests were conducted on three samples of cohesive soils taken from London Clay present in the boreholes. The results fall into Class CV according to the British Soil Classification System. These are fine grained silty clay soils of very high plasticity and as such generally have a low permeability and a high susceptibility to shrinkage and swelling movements with changes in moisture content, as defined by the NHBC Standards, Chapter 4.2.

The resulting removal of overburden due to excavation and subsequent reloading from the building may potentially cause some vertical ground movement in the underlying soils, the final magnitude depending on the net unloading applied at the same time. Consideration should, therefore, be given to providing heave protection measures to the floor slab and foundations to mitigate this.

### 4.3 Made Ground

In the boreholes drilled at the site, Made Ground was found to extend down to a depth of 0.90m below ground level.

A result of the inherent variability of uncontrolled fill, (Made Ground) is that it is usually unpredictable in terms of bearing capacity and settlement characteristics. Foundations should therefore, be taken through any Made Ground and either into, or onto suitable underlying natural strata of adequate bearing characteristics.

The bearing capacity of the Made Ground should therefore be assumed to be less than 50kN/$m^2$ because of the likelihood of extreme variability within the material.

Contamination testing of the Made Ground is likely to be required during any second phase of ground investigation.

### 4.4 Location of public highway

The proposed basement is not to be extended below the nearby Falkland Road and therefore it is suggested that the impact on these local access roads are likely to be minimal.

There is nothing unusual in the proposed development that would give rise to any concerns with regard to the stability of public highways.

### 4.5 Structural Stability of Adjacent Properties

The excavation and construction of the basement at the site has the potential to cause some movements in the surrounding ground. However, it is understood that ground movements and/or instability will be managed through the proper design and construction of mitigation measures.

The proposed development may also result in differential foundation depths between the site and adjacent property and as such it is recommended that the Party Wall Act will be used and considered during the design phase. For basement developments in densely built urban areas, the Party Wall Act (1996) will usually apply because neighbouring houses would typically lie within a defined space around the proposed building works. Specifically, the Party Wall Act applies to any excavation that is within 3m of a neighbouring structure; or that would extend deeper than that structure's foundation; or which is within 6m of the neighbouring structure and which also lies within a zone defined by a 45° line from the foundation of that structure. The party wall process should be followed and adhered to during this development.

## 5.0 CONCLUSIONS AND NON TECHNICAL SUMMARY

1. Proposals for the site include a basement excavation. The maximum depth of the proposed basement is assumed to be approximately 3.10m below the level of the existing ground floor.

2. Conditions at the site were investigated by Site Analytical Services Limited in August, November and December 2013. The exploratory holes revealed ground conditions that were consistent with the geological records and known history of the area and comprised up to 0.90m thickness of Made Ground overlying materials typical of the London Clay Formation.

3. The bedrock geology underlying the site is classified as unproductive Strata; drift deposits or rock layers with low permeability that have negligible significance for water supply or river base flow.

4. Water levels in the immediate vicinity of the property have been recorded below floor level of the proposed basement and therefore groundwater is unlikely to be encountered during the excavations.

5. Contamination testing of the Made Ground is likely to be required during any second phase of ground investigation.

6. There is nothing unusual in the proposed development that would give rise to any concerns with regard to the stability of public highways.

7. The excavation and construction of the basement at the site has the potential to cause some movements in the surrounding ground. However, it is understood that ground movements and/or instability will be managed through the proper design and construction of mitigation measures.

**p.p. SITE ANALYTICAL SERVICES LIMITED**

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A M Davidson BSc. (Hons), MSc. DIC.
Environmental Engineer

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2. British Standards Institution, 2007. Code of Practice for Site Investigations, BS5930, BSI, London

3. British Standards Institution, 2009. Code of Practice for Protection of Below Ground Structures Against Water from the Ground. BS 8102, BSI, London

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5. CIRIA Special Publication 69, 1989. The engineering implications of rising groundwater levels in the deep aquifer beneath London

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7. Environment Agency Status Report 2010. Management of the London Basin Chalk Aquifer. Environment Agency

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9. NHBC Standards, Chapter 4.1, "Land Quality - managing ground conditions", September 1999.

10. NHBC Standards, Chapter 4.2, "Building near Trees", April 2010.

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Appendix 1. Record of Borehole A drilled as part of the November 2013 investigation

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| | | | |
|---|---|---|---|
| **Site** LAND ADJOINING 42 FALKLAND ROAD, KENTISH TOWN, LONDON, NW5 2PX | | | **Borehole Number** BHA |
| **Boring Method** CONTINUOUS FLIGHT AUGER | **Casing Diameter** 100mm cased to 0.00m | **Ground Level (mOD)** | **Client** CARLTONE LIMITED | **Job Number** 1321450 |
| | **Location** TQ 291 853 | **Dates** 04/11/2013 | **Engineer** MARTIN REDSTON ASSOCIATES | **Sheet** 1/1 |

| Depth (m) | Sample / Tests | Casing Depth (m) | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | (0.20) 0.20 | MADE GROUND - tarmacadam over loose clayey silty sand, ashes, tarmac and brick fragments | | |
| | | | | | | (0.70) 0.90 | MADE GROUND - loose dark grey clayey silty fine to coarse sand with occasional brick and wood fragments | | |
| 1.00 | V1 93 | | | | | | Firm becoming stiff mottled brown, orange brown and blue grey silty CLAY with some partings of orange brown silty fine sand, scattered gypsum crystals and occasional claystone nodules and roots up to 1mm diameter to 1.5m | | |
| 1.50 | V2 108 | | | | | | | | |
| 2.00 | V3 128 | | | | | | | | |
| 2.50 | V4 130 | | | | | | | | |
| 3.00 | V5 138 | | | | | (4.10) | | | |
| 3.50 | V6 140 | | | | | | | | |
| 4.00 | V7 140+ | | | | | | | | |
| 5.00 | V8 140+ | | | | | 5.00 | Stiff to very stiff brown and mottled orange brown and veined blue grey silty CLAY with occasional partings of orange brown silty fine sand, scattered small gypsum crystals and occasional weak grey claystone nodules | | |
| 6.00 | V9 140+ | | | | | | | | |
| 7.00 | V10 140+ | | | | | | | | |
| 8.00 | V11 140+ | | | | | (5.00) | | | |
| 9.00 | V12 140+ | | | | | | | | |
| 10.00 | V13 140+ | | | 04/11/2013:DRY | | 10.00 | | | |

**Remarks**
Groundwater was not encountered during drilling
V = Vane Test - Result in kPa

| Scale (approx) | Logged By |
|---|---|
| 1:50 | JIP |

**Figure No.** 1321450.BHA

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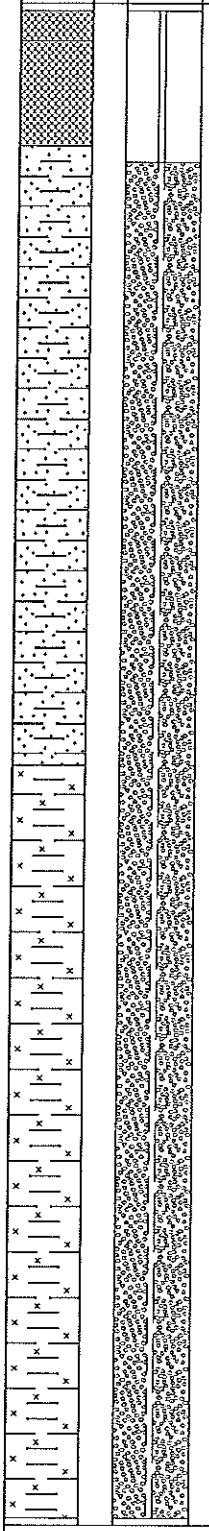
| | | |
|---|---|---|
| Site: LAND ADJOINING 42 FALKLAND ROAD, KENTISH TOWN, LONDON, NW5 2PX | | Borehole Number: BHA |
| Installation Type: MONITORING STANDPIPE | Dimensions: Internal Diameter of Tube [A] = 50 mm; Diameter of Filter Zone = 100 mm | Client: CARLTONE LIMITED / Job Number: 1321450 |
| Location: TQ 291 853 | Ground Level (mOD) | Engineer: MARTIN REDSTON ASSOCIATES / Sheet: 1/1 |



| Legend | Water | Instr (A) | Level (mOD) | Depth (m) | Description |
|---|---|---|---|---|---|
| | | | | | Bentonite Seal |
| | | | | 1.00 | |
| | | | | | Slotted Standpipe |
| | | | | 10.00 | |

**Groundwater Strikes During Drilling**

| Date | Time | Depth Struck (m) | Casing Depth (m) | Inflow Rate | Readings 5 min | Readings 10 min | Readings 15 min | Readings 20 min | Depth Sealed (m) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

**Groundwater Observations During Drilling**

| Date | Start of Shift: Time | Depth Hole (m) | Casing Depth (m) | Water Depth (m) | Water Level (mOD) | End of Shift: Time | Depth Hole (m) | Casing Depth (m) | Water Depth (m) | Water Level (mOD) |
|---|---|---|---|---|---|---|---|---|---|---|
| 04/11/13 | | | | DRY | | | 10.00 | | DRY | |

**Instrument Groundwater Observations**

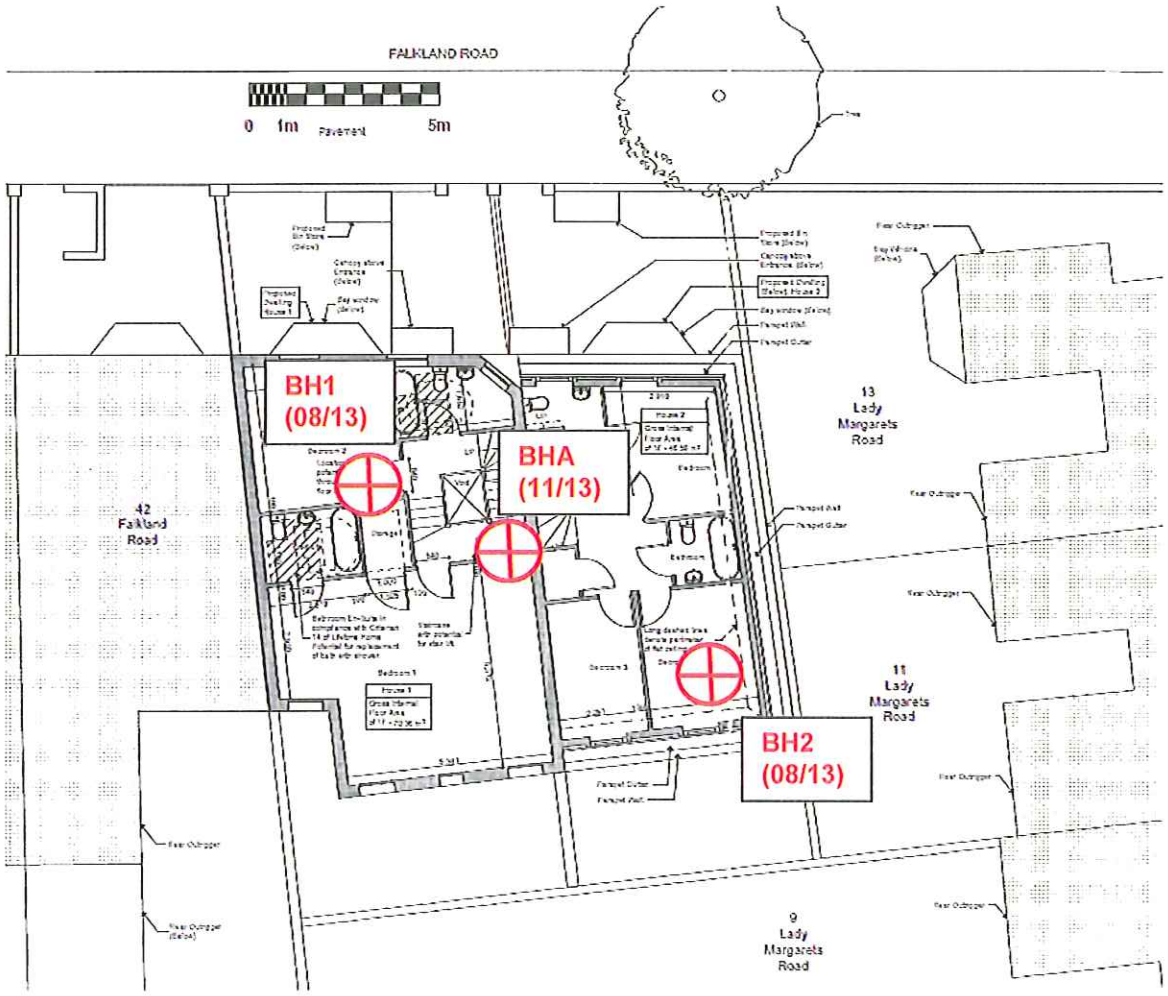
Inst. [A] Type : SINGLE STANDPIPE

| Date | Instrument [A] Time | Depth (m) | Level (mOD) | Remarks |
|---|---|---|---|---|
| | | | | |

**Remarks**

Lockable cover set in concrete
Gas valve fitted

Appendix B. Location Plan of August 2013 and November 2013 Boreholes
(set on proposed drawing and indicating drilling date)



Appendix C. Groundwater monitoring Data from November 2013 investigation

| | | |
|---|---|---|
| **MONITORING DATE** | 20th November 2013 | |
| **BOREHOLE REF:** | | **BH1** |
| Water Level | (m.bgl) | 4.38 |

**Table 1**

| | | |
|---|---|---|
| **MONITORING DATE** | 2nd December 2013 | |
| **BOREHOLE REF:** | | **BH1** |
| Water Level | (m.bgl) | 4.14 |

**Table 1a**