BASEMENT CONSTRUCTION METHODOLOGY

HARRIET WALK, LONDON

John Plummer

Job 2012-083

2nd Issue
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- 2834/03B
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- SK/11 (1st issue)
- SK/12 (1st issue)
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- SK/16 (1st issue)
- SK/17 (1st issue)
- SK/18 (1st issue)
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- FACTUAL GROUND INVESTIGATION REPORT AFH/13.038 (dated 11th March 2013)

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<th>DATE</th>
<th>DESCRIPTION</th>
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<td>19th March</td>
<td>1st issue – FOR INFORMATION</td>
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<td>26th April</td>
<td>2nd issue – SEE EXISTING BASEMENT AND ADJACENT STRUCTURES; TEMPORARY WORKS PROPOSALS; PERMANENT WORKS PROPOSALS; SEQUENCE OF CONSTRUCTION</td>
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EXISTING BASEMENT AND ADJACENT STRUCTURES

1. The existing basement walls retain the public highway (Harriet Walk) at street level (a retained height of circa 2.3m) and the courtyard at the rear (a retained height of circa 0.8m). The basement side walls are not believed to be retaining.

2. The existing basement walls are of solid masonry construction, generally 1½ bricks thick. The walls have negligible embedment below existing basement floor level, and are supported on corbelled spread footings. The retaining walls will be benefiting from propping action provided by both the existing ground and basement level concrete floor slabs.

3. Foundation loads from adjacent existing structures act in close proximity to the existing basement structure. The existing foundations are believed to be simple spread foundations.
EXISTING GROUND CONDITIONS

1. Two boreholes have been excavated from existing basement floor level, to depths of 4m and 5m. borehole logs are contained within this document.
2. Ground conditions are generally sand and gravel albeit a thin cohesive band was identified at approximately 3m depth (below existing basement floor level). Both boreholes were dry.
3. Both boreholes collapsed on themselves, posing significant doubt as to the ability of deep excavations to be ‘self-supporting’.
PERMANENT WORKS PROPOSALS

1. The intention is to lower the existing basement slab level by circa 0.7m. In addition a further basement storey is proposed to be constructed under part of the existing basement footprint.
2. The consequence of this will be that the basement walls on all elevations will be undermined. Removal of the existing basement floor slab will also eradicate the propping to the base of the retaining wall elements.
3. Remedial action is required to ensure that in both the temporary and permanent conditions, the retaining wall elements remain effectively propped at existing basement floor level, and that the risk of undermining is mitigated. The existing perimeter basement walls will continue to be vertically supported through the construction of reinforced concrete underpinning beneath the basement walls. The same underpinning will also serve to provide the ‘propping action’ to the base of the retaining wall elements (that is presently provided by the existing basement floor slab).
4. The underpinning will be positively connected to the new upper basement floor slab, which will prevent overturning and sliding.
5. A contiguous piled wall is to be constructed around the perimeter of the new basement storey, which will span vertically under lateral soil and surcharge loading. The piled wall will be propped by the upper and lower basement floor slabs.
6. Loads from foundations to adjacent structures will exert lateral pressures on the contiguous piled wall.
7. An insitu concrete facing will be constructed immediately in front of the contiguous piled wall, and will be positively connected to the piled wall.
8. The circular stairwell serving the new basement storey will be formed using precast concrete manhole rings with an insitu concrete internal facing. The rings will be cut in order to allow access into the basement storey. The edges of the cut rings will be positively connected into the ends of the contiguous piled wall, providing the necessary lateral support to soil and surcharge loading acting on the stairwell walls.
9. Both the upper and lower basement floor slabs will be constructed using insitu concrete.
TEMPORARY WORKS PROPOSALS

1. The existing basement wall elements must be provided with adequate vertical and lateral support at all times whilst the existing ground and basement level floor slabs are removed, the basement floor slab lowered and the new basement storey constructed.

2. Diagonal shoring of the highway retaining wall element will be provided before piling works are undertaken since the piling works will disrupt the existing ground floor slab, compromising its ability to provide propping action to the retaining walls.

3. Vertical support to the basement walls will be maintained during the underpinning process by constructing the underpinning in a traditional ‘hit and miss’ fashion.

4. The piles will be constructed as either CFA or insitu bored cased piles in order that stability of the pile shaft is maintained during pile construction. The chosen method will be determined by the Piling Sub-Contractor.

5. If piles are to be constructed from ground floor level then the existing ground floor slab will require comprehensive temporary vertical propping in order to ensure that the weight of the piling rig does not overstress the existing floor slab.

6. The contiguous piled wall is to be propped until such time that the lower and upper basement floor slabs have been constructed (which act as permanent props to the contiguous piled wall).

7. The circular stairwell is to be dug out and internal insitu facings constructed before the lower basement is excavated, thereby avoiding the requirement for temporary propping of the manhole rings forming the circular stairwell.

8. Because of the criticality of the temporary works, in maintaining stability of the works, all temporary works should be subject to an engineering design.
SEQUENCE OF CONSTRUCTION

A. Temporary prop the ground floor slab. Install raking shores to the highway retaining wall. (SK/10).
B. Dismantle the perimeter garage walls generally down to ground floor slab level, with the exception of the wall adjoining the adjacent fire escape where the wall will be dismantled to a level circa 500mm above ground floor slab level (because of the adjacent ‘raised’ walkway). (SK/10).
C. Break out holes in ground and basement floor slabs for piles to be constructed. Includes cutting of existing concrete encased steel downstand beams within the ground floor slab. (SK/11).
D. Construct piles using mini-pile rig. (Using propped ground floor slab as platform for the piling rig). (SK/01, SK/11).
E. Remove existing ground floor slab, leaving in place the raking shores to the highway retaining wall. (SK/12).
F. Construct underpinning in hit and miss fashion, to the full perimeter of the basement. (SK/13).
G. Adjust the raking shores that are propping the highway retaining wall, so that they sit on the underpinning and not the existing basement floor slab. (SK/14).
H. Break out and reduce the remainder of the basement floor level down to top of underpinning/capping beam level. (SK/15).
I. Push and dig the manhole rings to the circular stairwell. Cut slots into the manhole rings, proceed to construct the lower basement floor slab and insitu facing (in lifts) within the circular stairwell. (SK/16).
J. Cut off the tops of the piles, cast the capping beam and connect it to the underpinning and insitu facing in the circular stairwell. (SK/16).
K. Dig out within the new basement storey. Temporary prop the top of the contiguous piled wall as excavation proceeds. (SK/16).
L. Once dug out, construct the lower basement floor slab. (SK/17).
M. Construct the insitu concrete facings. Positively connect the facings to the insitu concrete in the circular stairwell. (SK/18).
N. Cut the manhole rings. (SK/01).
O. Cast the upper basement floor slab. (SK/18).
P. Remove temporary propping to the contiguous piled wall. (SK/19).
Q. Construct the ground floor slab. (SK/19).
R. Remove the raking shores that are propping the highway retaining wall. (SK/19).
S. Proceed with the remainder of the building construction. (SK/19).
PARTICULAR CONSTRUCTION CONSIDERATIONS

DISMANTLING OF EXISTING CONSTRUCTION
1. Because of access constraints expect plan for all dismantling to be done by hand. At all times protection measures will need to be taken to ensure that the neighbouring properties are protected during the work and that the fire escape (rear and left side elevation) is safely and effectively maintained.
2. In order to avoid overloading of the existing ground floor slab, do not stockpile demolition arisings on top of the slab, unless the slab is fully propped beneath where the stockpile is to be formed.
3. Perimeter walls are to be broken down to street level (front elevation), rear courtyard level (rear elevation), top of raised walkway level (left side elevation).
4. The existing ground floor slab is believed to be ‘one way spanning’, spanning front to back with intermediate support provided by concrete encased steel beams embodied within the plane of the floor slab. The concrete slab elements should be broken out 1st, with the concrete encased steel beams broken out last. Care will need to be taken when breaking out the ground floor slab next to the raised walkway in order to avoid damaging the slab forming the raised walkway (the raised walkway slab is believed to be built into the left side elevation perimeter wall).

PILING
5. The method of piling construction adopted must ensure that stability of the pile excavations is maintained at all times. Ordinarily CFA piles would ensure excavation stability however, the use of CFA piling may be precluded because of the lack of space on and off site to site to park a concrete mixer during pile construction. Cased bored insitu piles may instead be preferred, noting that the casing would extend from existing ground floor level down to (probably) base of pile excavation. (Casing for CFA piles would also be needed, to bridge the ‘gap’ between ground and basement floor levels, but casings likely to be shorter than those required for a bored pile solution).
6. The proposals described assume that piling will be undertaken from ground floor level thereby avoiding the difficulties associated with getting a piling rig down to existing basement floor level. The existing ground floor slab will need to be comprehensively propped before piling operations commence. An engineering design of the temporary propping should be undertaken, given the criticality of the propping to the stability of the works.
7. The disposal of the arisings from the pile construction needs to be carefully planned, given the lack of space on site to stockpile arisings.
8. Expect circa 0.5m³ of arising per pile.
9. Close liaison with the Piling Sub-Contractor will be required

EXCAVATION IN THE BASEMENT
1. The excavations will generally be hand dug unless a mini-digger can be dropped into the basement. If one is dropped in then it must not be forgotten that it will also need to be lifted out before it is ‘built in’! There is little space to locate craneage to lift a mini-digger, which may therefore be the precluding factor.

MATERIALS DELIVERY
1. ‘Just in time’ delivery of materials should be planned for, given the lack of storage space on site.
2. Expect to have to provide concrete pumping for construction of the underpinning and other insitu concrete elements to the new basement storey and upper basement floor slab.
3. The precast concrete manhole rings will need to be craned into position. Each ring will weigh circa 1350 kg (assuming each ring is 500mm high.)
1. The existing floor levels to be maintained.
2. All structural details such as windows, doors, staircases, etc., must be checked and confirmed.
3. The existing arrangement of services such as water, drainage, and electrical must be checked and confirmed.
4. Where information or adjoining building details are contrary to the issued details, the Engineer is to be informed immediately.
5. All bolt connections to have a minimum of 2 bolts.
6. The foundations have been designed on allowable ground pressure of 100 KN/m² and this must be confirmed on any specialist drawings, together with any relevant additional Engineers specifications.
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General Notes:

- All Contractors are to check all dimensions & levels on site prior to commencing any construction or fabrication.
- One time then the regulations apply to the C.D.M. must be notified & a main contractor and planning supervisor thirty days or will involve more than five hundred person days of work or involve five or more persons on site at any time.

Date: [Signature]  
Client: [Client Name]

RS Baker & Sons Limited

New Mews House Development

Address: [Address]

Signed/checked:

[Signature]

Architectural Design, Building Surveyors and Planning Service

Building Plans Ltd

UNIT 1, MATCH HOUSE, TARLETON ROAD, NORTHORKA 8Q 8AN

Telephone: 0121 668 8888  Fax: 0121 668 8888

2.6.12 2012

2nd issue of Building Surveyors Methodology Document - Page 48 of 48
1. This drawing must not be scaled and if in doubt ask.

2. All Contractors are to check all dimensions & levels on site prior to commencing any construction or fabrication.

3. This drawing to be checked and read in conjunction with all Engineers, Architectural, Service Engineers and any specialist drawings, together with any relevant additional Engineers specifications.

4. Where site information or adjoining building details are contrary to issued details then the Engineer is to be informed immediately.

5. No structural members are to be cut, notched, or jointed unless shown on the Engineers details. Unless otherwise noted all connections of structural members including laps & anchorages of reinforcement shall be capable of mobilising the full structural capacity of the member.

6. All bolt connections to have a minimum of 2 bolts.

7. The foundations have been designed on allowable ground pressure of 100 KN/m² & this must be confirmed on site before casting of foundations. Unless informed to the contrary in writing it has been assumed that the sub-soil is not a clay soil that has been desiccated by trees & vegetation & that there is no possibility of heave or shrinkage.

8. Under the provisions of the Party Wall etc Act 1996 if the excavations are within 3m of adjacent buildings written agreement for the works from the owner & the tenant (if applicable) of adjacent buildings must be obtained before building works commence & one months notice must be given before building works commence. If the work applies to the party wall two months notice must be given. Note: If foundations are deeper than normal a further notice may have to be given & agreement received. Note: If foundations, soffits, gutters, etc encroach across the boundary a written agreement from the owner of the adjoining land / buildings must be obtained & the boundary agreed before building works commence.

9. Health & Safety: C.D.M. regulations may apply to this project. Generally if the construction work is likely to last for thirty days or will involve more than five hundred person days of work or involve five or more persons on site at any one time then the regulations apply to the C.D.M. must be notified & a main contractor and planning supervisor appointed by the client to oversee the whole contract under the provisions of the C.D.M. regulations for Health & Safety.

10. This drawing is Copyright.
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10. This drawing is Copyright.
575mm OVERALL ZONE FOR STRUCTURAL WALL
(MAX 475mm PILING ZONE)

200mm TUBE SUB OVER

250mm CONCRETE WALL THICKNESS

2.4m (internal d)
prefabricated manhole rings

DENOTES EXTENT TO BE CUT AWAY

LOWER BASEMENT STRUCTURE

SK/01 (1st)
2012-083
HARRIET WALK

BASEMENT CONSTRUCTION METHODOLOGY

SK1/13 (1st) STEP F

UNDERPINNING TO FULL PERIMETER OF BASEMENT, IN ‘HIT & MISS’ FASHION
A REPORT ON A FIRST PHASE GROUND INVESTIGATION AT HARRIET WALK, KNIGHTSBRIDGE, LONDON SW1

CLIENT: RS Baker & Sons Limited
ENGINEER: John Plummer Partnership

Date: 11 March 2013
Reference: AFH/13.038

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NR4 6UF

Tel: 01603 250754
Fax: 01603 250749
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   APPENDIX C: DRAWINGS
A REPORT ON A FIRST PHASE GROUND INVESTIGATION AT HARRIET WALK, KNIGHTSBRIDGE, LONDON SW1

Reference: AFH/13.038
Date: 11 March 2013

1. INTRODUCTION

It is proposed to re-develop an existing double garage at Harriet Walk, Knightsbridge, London SW1 (drawing 13.038/01) and to lower an existing basement level and create a possible second basement level.

At the instruction of John Plummer Partnership, acting on behalf of RS Baker & Sons Limited, a phased investigation was carried out to provide information on the subsoil conditions and relevant geotechnical parameters.

This report provides the factual details of a first phase of fieldwork undertaken to provide an initial assessment of the ground conditions pertinent to the proposed development.
2. FIELDWORK

Fieldwork was carried out on 5 March 2013 and comprised two window sample holes, referenced WS01 and WS02.

The exploratory hole positions were set out in general accordance with the requirements of John Plummer Partnership (JPP) as shown approximately on drawing 13.038/02. The positions were taped in on site by A F Howland Associates (AFHA).

Prior to commencement of the exploratory holes, a starter pit was excavated by others to a depth of 1.20 m to inspect for services. A cable avoidance tool (CAT) and other detection equipment were also used to sweep the pit and surrounding area to locate any services.

The window sample holes were advanced with a portable, hand held window sampling system to a maximum depth of 5.00 m. The system utilises a hand held electro-pneumatic hammer to drive sampling tubes into the ground which are then extracted and the continuous samples described. The soils at the window sample holes were described in general accordance with BS 5930: 1999+A2:2010 and small disturbed samples were taken for possible laboratory testing.

A proposal to install a standpipe piezometer was not carried out following an instruction given on site by the John Plummer Partnership.

Details of the strata encountered and the samples taken are shown on records appended to this report.
3. ENGINEERING INTERPRETATION

3.1 GENERAL

The proposed scheme includes the lowering of an existing basement floor by about a metre and the possible construction of a second basement level below that.

The comments and recommendations contained in the report are based on the data obtained from the relevant exploratory holes. Extrapolation between and to other parts of the site is considered within the light of the geological setting as interpreted, but no responsibility can be accepted for varying geological and geotechnical conditions from those on which the report is based. It should be noted that the solutions are discussed in principle only based on the design requirements as understood.

3.2 GENERAL GEOLOGY

The regional geology is mapped for the area by the British Geological Survey (BGS, 1998. and 2013) to show a solid geology of the London Clay Formation, which is indicated to be covered generally by superficial deposits consisting of the Kempton Park Gravel Formation, one of the post-diversionary Thames River Terrace Deposits. However, the site also lies on a ribbon of Alluvium associated with the course of the former River Westbourne, the valley of which holds the Serpentine in Hyde Park.

The London Clay Formation is a heavily overconsolidated clay of the Eocene Series. It contains varying amounts of silt and fine sand, with silt generally more abundant at the base and the top of the formation. In its unweathered state the London Clay is typically very stiff, fissured to a varying degree and dark grey or purplish grey in colour. Beds of calcareous concretions are found intermittently throughout the formation and local phosphatic and pyritic nodules also occur. Selenite crystals are characteristic in more weathered horizons where pyrite has reacted with calcium carbonate from fossil shell debris. Overall, the clay weathers to brown and the more sandy beds to an orange-brown colour, and can deteriorate in consistency to firm or even soft.

The London Clay is the most widespread of the Palaeogene deposits and is stratigraphically of significant thickness. At the scale of most sites it is often regarded as
homogeneous for much of this thickness with any variation generally related to the development of a weathering profile.

The Thames River Terrace Deposits are part of a superficial sequence of deposits laid down during the Pleistocene by the River Thames whilst it was flowing at a higher level and on a different course than it does today. Subsequent lowering of the base level has left the deposits as terraces along the valley sides. These features can generally be distinguished based on age and elevation, and it was indicated that the deposit in the area of interest is of the Kempton Park Formation which constitutes the lowest terrace above the floodplain of the Thames (Ellison et al, 2004). The grading of the Terrace materials is variable but is known to locally include occasional large boulder size clasts, but it can also be capped by finer alluvium although this is often removed by later erosion. The dominant gravel is flint and the maximum thickness of the Kempton Park Gravel Formation is in the order of 5 to 8 m.

The Alluvium comprises a sequence of Recent silty clays, silts and sands which can be found interspersed with subordinate and sometimes extensive peats. The Alluvium has been laid down since the end of the Pleistocene some 10,000 years ago following the associated general rise in sea level. It is typically normally consolidated and therefore in a soft condition, but at surface the effects of desiccation caused by intermittent drying by weather and vegetation often produces a firmer crust.

3.3 SITE GEOLOGY

Archive boreholes held by BGS in the vicinity of the site show a ground sequence which is generally consistent with that expected for the area from the mapping by the BGS. This was also the case at the two exploratory holes from the investigation. These proved a brown clayey sand and gravel immediately below the concrete base slab of the existing basement. This extended to 0.7 and 1.1 m at WS01 and WS02 respectively where they each gave way to a firm, or firm to stiff sandy gravelly clay.

At WS01 the clay extended to 2 m where it gave way to a firm sandy clay. In contrast, the clay at WS02 extended only to 1.5 m where it gave way to clayey very gravelly sand. This extended to 2.5 m where a sandy clay comparable to that at WS01 was proved.
At just over 3 m, the sandy clay gave way to a gravelly sand, which was proved to 5 m at WS01 and 4 m at WS02.

Neither exploratory hole encountered material that was considered consistent with the London Clay and is considered to have proved Alluvium overlying the River Terrace Deposits. Based on historic archived BGS borehole records it is possible that the London Clay may be some metres below that penetrated although no reliance should be based on this interpolation without confirmation by further investigation.

No groundwater was encountered during the investigation. However, groundwater observations will have been affected by the permeability of the ground, the rate of progress of the exploratory hole and the particular technique in operation. The general procedures used do not allow precise measurements of the groundwater conditions, but give only a general guide to the overall situation. Fluctuations in any groundwater table will occur as a result of seasonal or climatic effects, as well as other outside influences. In particular, the groundwater level in a small diameter borehole can also underplay its importance in a large scale excavation.

It should also be noted that the site lies within an historic stream valley and although a surface expression of the former stream may no longer exist, the feature can still represent a natural drainage path for groundwater.

3.4 PROPOSED LOWERING OF THE EXISTING BASEMENT

Proposals to lower the existing basement level by about a metre will create a new formation level that will be in the superficial soils, probably Alluvium. Where cohesive, this has been assessed to be of a firm consistency, suggesting an undrained shear strength of 40 kPa. No quantification of the granular soils was possible with the drilling technique used but a medium dense condition might be assumed to be reasonably expected, subject to confirmation.

The lowering of the basement will create a net unloading of the soil at the formation level and as such minimal geotechnical issues are foreseen within that context.

Although no groundwater was encountered during boring, the setting of the site is such that groundwater could reasonably be expected.
3.5 PROPOSED ADDITIONAL BASEMENT

Proposals to construct a further basement below the existing basement are expected to create a new formation which is approximately a further 3 m below the new lowered level of the existing basement. That is thus about 4m below the present basement level. This would place the formation level of the new basement in the gravelly sand, suspected to be the River Terrace Deposits.

The River Terrace Deposits are presumed to be in a medium dense condition and, allowing for the net unloading associated with the excavation for the basement are likely to have adequate bearing capacity. The exploratory holes suggest that a minimum of a metre of the gravelly sand may be present above the underlying London Clay.

Although the London Clay is likely to be in at least a firm condition and as such have an undrained shear strength of at least 40 kPa, in view of its depth below ground level, the possible unloading of 4 m of soil could induce a degree of heave that may need to be taken into account in design.

Based on the investigation to date, no groundwater presence is likely to affect construction, although this should be verified by investigation if the design or construction methodology is sensitive to the presence of groundwater. Nonetheless, provision should be made in the design of a possible future development of groundwater in the soils.
4. **SUMMARY**

1. The investigation established a sequence that was consistent with that expected for the area and showed Alluvium over River Terrace Deposits, which are expected to overly the London Clay at some depth.

2. No groundwater was encountered during the investigation, but its presence cannot be categorically ruled without further investigation. Any design or construction proposals that are sensitive to the presence of groundwater should be modified accordingly in the absence of further investigation.

3. The soils are likely to provide no bearing capacity issues for the reduction in the level of the existing basement and groundwater is unlikely to be encountered during excavation.

4. The soils below the formation of the proposed lower basement are likely to be granular for a depth of at least a metre but may give way to London Clay at any depth below that.

5. The granular soils are likely to provide no bearing capacity issues for the lower basement. However, as the soils will be unloaded by the excavation, if the clay is close to the formation level, some heave is possible.
APPENDIX A: REFERENCES


BRITISH GEOLOGICAL SURVEY. 2013. OpenGeoscience web site. Geology of Britain Viewer and Borehole Scans. www.bgs.ac.uk/opengeoscience


APPENDIX B: WINDOW SAMPLE HOLE RECORDS

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<th>Description</th>
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<tr>
<td>B</td>
<td>Bulk disturbed sample</td>
</tr>
<tr>
<td>D</td>
<td>Small disturbed sample</td>
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**dd/mm/yy: 1.0** Date, water level at the window sample hole depth at the end of shift and the start of the following shift

Each sample type is numbered sequentially with depth and relates to the depth range quoted.

All depths and measurements are given in metres, except as noted.

Strata descriptions compiled by visual examination of liner samples obtained after BS 5930:1999+A2:2010 and modified in accordance with laboratory test results where applicable.
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<td>Brown slightly clayey fine to coarse SAND and angular to subrounded fine to coarse flint GRAVEL. With rare cobbles of flint</td>
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<td>Firm to stiff and friable in places, brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to medium flint and rare siltstone</td>
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<td></td>
<td>(1.20)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.20</td>
<td>Yellowish brown slightly silty gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to medium flint. Becoming very gravelly in places</td>
</tr>
</tbody>
</table>

**Remarks**
1. Hand dug inspection pit to 1.20 m. No services detected.
2. No groundwater encountered.
3. On completion, hole backfilled with arisings.

**Figure No.**
13.038.WS01

**Scale (approx)**
1:25 AHm

---

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**Excavation Method**
Drive-in Window Sampler (hand held electro-pneumatic hammer)

**Dimensions**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Water Depth (m)</th>
<th>Field Records</th>
<th>Level (mOD)</th>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.15-1.10</td>
<td>D1</td>
<td></td>
<td>(0.15)</td>
<td>0.15</td>
<td>CONCRETE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.95)</td>
<td></td>
<td>Brown clayey fine to coarse SAND and subangular to subrounded fine to coarse flint GRAVEL.</td>
</tr>
<tr>
<td>1.10-1.50</td>
<td>D2</td>
<td></td>
<td>1.10</td>
<td>(0.40)</td>
<td>Firm brown slightly sandy gravelly CLAY. Gravel is angular to subrounded fine to medium flint</td>
</tr>
<tr>
<td>1.50-2.50</td>
<td>D3</td>
<td></td>
<td>1.50</td>
<td>(1.00)</td>
<td>Brown slightly clayey very gravelly fine to coarse SAND. Gravel is subangular to rounded fine to medium flint</td>
</tr>
<tr>
<td>2.50-3.10</td>
<td>D4</td>
<td></td>
<td>2.50</td>
<td>(0.60)</td>
<td>Firm brown slightly sandy CLAY</td>
</tr>
<tr>
<td>3.10-4.00</td>
<td>D5</td>
<td></td>
<td>3.10</td>
<td>(0.90)</td>
<td>Brown mottled orange slightly silty gravelly fine to coarse SAND. Gravel is angular to subrounded fine to medium flint</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.00</td>
<td></td>
<td>Complete at 4.00m</td>
</tr>
</tbody>
</table>

**Remarks**
1. Hand dug inspection pit to 1.20 m. No services detected.
2. No groundwater encountered.
3. On completion, hole backfilled with arisings
## APPENDIX C: DRAWINGS

<table>
<thead>
<tr>
<th>Drawing Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drawing 13.038/01</td>
<td>Site Location Plan</td>
</tr>
<tr>
<td>Drawing 13.038/02</td>
<td>Window Sample Hole Location Plan</td>
</tr>
</tbody>
</table>