Eastwood & Partners
CONSULTING ENGINEERS

BASEMENT IMPACT ASSESSMENT

2 BRITANNIA STREET, LONDON WC1X 9JE

FOR

TG STUDIO

ISSUE 2

36131-001(I2) **September 2013**

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2 BRITANNIA STREET, LONDON

FOR

TG STUDIO

ISSUE 2

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1.0 INTRODUCTION

1.1 Terms of Reference

This report presents the findings of a Basement Impact Assessment carried out by Eastwood & Partners (Consulting Engineers) Ltd for, and on the instructions of, TG Studio. Any other parties using the information in this report do so at their own risk and any duty of care is excluded.

1.2 Context

Where the site of proposed development includes a new or extended basement, a general statement on meeting the terms of Camden Development Policy 27 is required. This needs to address the impact of the proposals on the following:

- Surface water flow, drainage and flooding;
- Groundwater flow; and
- Structural stability.

A description of the proposed development, which includes the slight deepening of the existing basement, is provided in section 2.2.

1.3 Aims and Objectives

The aims and objectives of this assessment are to:

- Undertake a desktop study to assess the existing geological and hydrological conditions at the site and the wider area in order to identify areas susceptible to instability (ground and water movement) and localised flooding;
- To provide a detailed engineering study, including through the use of boreholes and trial pits, to assess local ground conditions, water movement, subsidence and drainage and potential impacts on adjoining/nearby properties;
- Identify suitable construction methods and mitigation measures for developments which may affect the stability of the host and neighbouring buildings and/or nearby structures, as well as hydrology (at the site and within the area), without placing additional pressure on other areas or on the local combined sewer network; and
- Devise a method for monitoring local ground conditions, water movement, subsidence and drainage.

1.4 Limitations of Investigation

Where assessments of site areas affected in particular ways are given, these are approximate.

All information, comments and opinions given in this report are based on the ground conditions encountered during the site work, on the results of laboratory testing carried out as part of the investigation and information gained from a historical, geological and environmental desk study. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata and water conditions between or below investigation points. It should also be noted that groundwater and gas levels vary due to seasonal or other effects, and may at times differ from those measured during the investigation.

2.0 THE SITE

2.1 Description of the Existing Development

The property comprises number 2 Britannia Street, which is located off Kings Cross Road, in the borough of Camden, London. It can also be located by grid reference 530686 182943.

The property is bounded to the north-east by Kings Cross Road, to the south-east by Britannia Street, and to the north-west by an adjacent building. A building is also present adjacent to the small yard to the south-west of the property.

The property is currently vacant, having previously been in use as a public house, with a bar on the ground floor, a beer cellar in the basement, and a yard which is used as a beer garden on the south-western side. The first and second floors have been converted into flats which were used for staff accommodation.

The construction is typical of Victorian London pubs, with solid masonry walls, timber floors on steel beams, and a cut timber roof.

2.2 Description of the Proposed Development

The existing façades on the south-eastern and north-eastern sides will be retained. The building will therefore have a new reinforced concrete frame, probably on piled foundations, with a reinforced concrete basement which is slightly deeper than the existing. The basement is not expected to extend below any landscaped areas. A new Mansard floor will be set back and constructed from a light steel frame. The existing basement walls will be underpinned and propped as required, then new concrete walls cast inside them. The existing façades on the south-eastern and north-eastern sides which are being retained will be temporarily supported during the reconstruction using suitable scaffolding or a temporary steel frame.

The proposed development is not expected to result in a change in the proportion of hard surfacing and more surface water than at present is not expected to be discharged to the ground i.e. infiltration drainage is not expected to be used.

2.3 History

Historical Ordnance Survey maps have been reviewed on the website old-maps.co.uk to assess the previous use of the site and surrounding area.

The earliest historical map, dated 1851, shows the layout of the streets in this area to be as present and the railway line, around 75 m south-east of the site, to be present. The next map, of 1874,

shows the public house and surrounding buildings to be as currently, although there does also appear to be a small building in the current yard and in the early 20th Century the yard appears to be filled in.

2.4 Geology

The geological map (Sheet 256 North London, 1:50,000 scale) and online viewer indicates the site to be underlain by London Clay. No superficial deposits are shown.

2.5 Hydrogeology

The geology is classified as Unproductive Strata. These are rock layers with low permeability that have negligible significance for water supply or river base flow. The site is therefore not located directly above an aquifer.

As detailed in section 3, the groundwater table was not encountered in the exploratory holes, which extended to 15 m deep, or within the monitoring well, which extended to 4 m, when it was monitored just under two weeks after installation. The proposed basement is therefore not expected to extend beneath the water table surface.

2.6 Hydrology

The nearest surface water watercourse appears to be Regent's Canal around 500 m north of the site. Figure 11 of the Camden Geological, Hydrogeological and Hydrological Study indicates that the river Fleet is located around 185 m south of the site. This is now within a culvert.

There is no reason to suspect that the site is within 100 m of a well or potential spring line. The site is also not within the catchment of the pond chains on Hampstead Heath.

2.7 Land Stability

The site and wider area is generally level. Figure 16 of the Camden Geological, Hydrogeological and Hydrological Study also does not show any significant slopes in the vicinity of the site.

The closest railway line is around 75 m south-east of the site. This appears to be an open line set below road level. This is at a depth and distance from the site which it would not be expected to have an impact.

The basement is considered will be founded below the depth where shrink-swell subsidence in the London Clay would be expected to be an issue.

Land/slope stability is therefore not considered will be a significant issue.

2.8 Flooding

The Environment Agency website indicates the site is not within or near a flood plain. Figure 15 of the Camden Geological, Hydrogeological and Hydrological Study however, indicates that the site is on the edge of, or just beyond, an area with the potential to be at risk of surface water flooding. Surface water flooding occurs when existing water infrastructure is not able to cope with surface and foul water during heavy rain. There are however, no streets within this area recorded as having been flooded in 1975 or 2002.

The basement itself will be in watertight construction, for example by using reinforced concrete walls linked to the basement floor, and all cast using a proprietary waterproof concrete such as Pudlo or Caltite. The only other risk is shallow floodwater in the street overtopping the stairway to the basement. In order to mitigate this risk, we recommend that the ground floor is set at least 300 mm above street level.

The new development would also not be expected to significantly increase the risk of surface water flooding to this or any other neighbouring developments. The rate of surface water runoff will be suitably attenuated, so that the overall load on the local sewer network is reduced, which will make flooding in the area less likely. If flooding does occur, there is currently a small storage volume for floodwater in the pub basement, which would fill up quickly if there was floodwater in the street. This will of course be removed once a new waterproof basement with a suitable threshold level is constructed. However, this small loss of storage volume is minimal in terms of the overall catchment, and it is extremely unlikely that this would significantly increase the risk of flooding elsewhere.

2.9 Sewers

We have obtained an Asset Location Search from Thames Water. A copy of this is provided in the Appendix. This indicates that there is a combined sewer within Kings Cross Road. This is adjacent to the footpath off the property's western corner. The invert level of this is around 10.48 m and it is therefore around 3.6 m deep. There is also a combined sewer in roughly the centre of Britannia Street and one which passes just beyond the western edge of the current building, below the yard, and connects into that beneath Britannia Street, which in turn connects into that beneath Kings Cross Road.

There are also a number of water mains in Kings Cross Road and Britannia Street.

2.10 Transport for London and Camden Building Control

We also contacted Transport for London regarding any information they may have on underground lines or maintenance tunnels and Camden Borough Council Building Control regarding any information they may have on the hydrological conditions in the vicinity of the site, such as historical watercourses in the area and the expected level of the groundwater table. Neither was able to provide any information.

3.0 INTRUSIVE INVESTIGATION

The intrusive investigation comprised two parts, a borehole investigation and trial pit investigation. These are detailed in the following sections.

3.1 Borehole Investigation

The borehole investigation was undertaken between 3 and 5 September 2013 and involved the completion of a cable percussion borehole in the yard to the south-west of the building. A copy of the borehole log is provided in the Appendix.

The ground conditions comprised reinforced concrete at the surface, the thickness of which was 0.2 m. This was underlain by made ground of gravelly clay to a depth of 2.15 m below ground level (bgl). The natural ground below comprised firm brown clay, becoming stiff and grey below 5.2 m bgl. The borehole was terminated in this strata at 15 m bgl.

No water strikes were recorded in the borehole during the works and a monitoring standpipe was installed to a depth of 4 m bgl. The screened section of this was between 1 m and 4 m bgl.

The well was dipped on 18 September 2013 and was found to be dry.

3.1.1 Geotechnical Testing

One sample of natural clay from the borehole at a depth of 3 m bgl was sent for geotechnical testing to determine the plasticity. A copy of the results is included in the Appendix. These demonstrate that the natural clay below the site is of high volume change potential, as would be expected.

3.1.2 Chemical Testing

Two samples of made ground and one sample of natural ground were sent for chemical testing. Each sample was tested for the following suite of contaminants:

Contaminant Type	Actual Contaminants
Metals/Metalloids	Arsenic, cadmium, chromium (III and VI), lead, mercury, nickel, selenium, copper and zinc
pH	pH
PAHs	Speciated polycyclic aromatic hydrocarbons
TPH	Total petroleum hydrocarbon screen
Sulphates	Water soluble sulphate, acid soluble sulphate, sulphur
Asbestos	Asbestos screen

A copy of the results are included in the Appendix, these were compared with the assessment criteria relating to a residential end use. This is considered to be a conservative end use for the proposed development, as significant landscaping is not proposed and the residents would be expected would not be allowed to grow their own produce.

The following contaminants were found to be elevated:

- Lead – this was found to be elevated in both samples of made ground with concentrations of 1325 mg/kg and 574 mg/kg recorded compared to the generic assessment concentration of 450 mg/kg.
- Total petroleum hydrocarbons (TPH) – The sample of made ground from 1.95 m bgl recorded a total TPH concentration of 477.5 mg/kg.

No external landscaping areas are present and consequently there will be no exposure pathway for the concentrations of Lead and TPH to affect human health through ingestion and direct contact. The inhalation of indoor air pathway is also considered would be removed by the installation of a water tight basement. The concentrations would also not be expected to pose significant risks to construction workers during development, although they should be made aware of the elevated levels and appropriate measures such as washing their hands before eating should be adopted. No remediation measures are therefore considered necessary.

The concentration of total potential sulphate was calculated to be between 0.72% and 0.96%. This would result in a Design Sulphate Class of DS-3. The pH means that an Aggressive Chemical Environment for Concrete (ACEC) class AC-3 is suitable. These precautions should be implemented for all concrete in contact with the ground.

3.2 Trial Pit Investigation

Two hand-excavated trial pits were completed on 18 September 2013. These were undertaken within the basement to investigate the nature of the existing foundations, as well as the founding material. A plan showing the location of the trial pits is included in the Appendix, along with a copy of the logs.

Each pit was taken to the base of the existing foundation and then terminated. The walls of the basement were found to extend to between 0.09 m and 0.14 m below the existing ground level at which point brickwork was encountered, stepping out in single courses to depths of between 0.34 m and 0.45 m bgl. The concrete foundation was then encountered. This was found to be between

90 mm and 150 mm thick and extended between 400 mm and 510 mm out from the internal basement wall. The base of the footing was found at depths of 510 mm and 540 mm bgl.

The ground conditions were found to comprise concrete at the surface underlain by made ground of sandy, gravelly clay. The natural ground was then encountered in TP1 at a depth of 0.55 m bgl. This was described as grey/brown sandy clay. The natural ground was not encountered in TP2.

4.0 NON-TECHNICAL SUMMARY

It is considered that the development, which will comprise the slight deepening of the existing basement, will not have a significant impact on the following:

- Surface water flow, as the nearest surface water watercourse appears to be Regent's Canal around 500 m north of the site and the nearest subterranean water course is the river Fleet within a culvert around 185 m south of the site;
- Flooding, as the site is not within a flood zone and the risk of surface water flooding is not considered will be exacerbated by the proposed development;
- Groundwater flow, as the geology is Unproductive Strata and groundwater was not encountered in the borehole taken to 15 m bgl.

Any impacts on structural stability of the host and neighbouring buildings, and also nearby structures, are considered will be mitigated through suitable construction methods. We recommend that piling should be by a suitable low impact method such as continuous flight auger. The old basement walls will need to be adequately propped from before demolition begins until the new construction is in place, so as to minimise the risk of ground movements affecting neighbouring properties or the street. It is likely that the permanent design will require the ground floor slab to prop the basement walls against the earth forces, so the temporary props must remain in place until after the ground floor slab has been cast.

It is not yet known whether the existing buildings to the west and north have basements. If they do not, any walls that are right on the boundary will need to be underpinned in short lengths by traditional methods. Where adjacent buildings are set back from the boundary, the limited area of new excavation below the pub yard will need to be made within a suitable temporary retaining structure such as contiguous piles, or steel sheet piles installed using hydraulic methods so as to avoid excessive vibration. This temporary retaining structure will need to be propped at about existing ground level to reduce deflections and hence minimise the risk of movement affecting the adjoining buildings. If the adjoining buildings already have basements at about the same level as that of the proposed development, it may be possible to just build up against them. This will of course be investigated fully and appropriate action be taken as part of the Party Wall Award process.

With the exception of vigilance during the construction for any potential issues, the monitoring of local ground conditions, water movement, subsidence and drainage is not considered would be required.

Appendix

Asset Location Search

Katherine Daddo-Langlois
Eastwood & Partners (Consulting Engineers) Ltd
St Andrews House
23 Kingsfield Road
SHEFFIELD
S11 9AS

Search address supplied 530686 182943
2
Britannia Street
London
WC1X 9JE

Your reference N/A

Our reference ALS/ALS Standard/2013_2535857

Search date 31 July 2013

You are now able to order your Asset Location Search requests online by visiting
www.thameswater-propertysearches.co.uk

Thames Water Utilities Ltd

Property Searches
PO Box 3189
Slough SL1 4WW

DX 151280 Slough 13

T 0845 070 9148
E searches@thameswater.co.uk
I www.thameswater-propertysearches.co.uk

Registered in England and Wales
No. 2366661, Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

searchcode

Asset Location Search

Search address supplied: 530686 182943, 2, Britannia Street, London, WC1X 9JE

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This search provides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0845 070 9148, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk
Web: www.thameswater-propertysearches.co.uk

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Asset Location Search

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an ‘as constructed’ record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0845 920 0800. The Customer Centre can

Thames Water Utilities Ltd

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PO Box 3189
Slough SL1 4WW

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Reading RG1 8DB

Asset Location Search

also arrange for a full flow and pressure test to be carried out for a fee.

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

An invoice is enclosed. Please send remittance to Thames Water Utilities Ltd., PO Box 3189, Slough, SL1 4WW.

Thames Water Utilities Ltd

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Asset Location Search

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0845 850 2777
Email: developer.services@thameswater.co.uk

Should you require any further information regarding budget estimates, diversions or stopping up notices then please contact:

DevCon Team
Asset Investment
Thames Water
Maple Lodge STW
Denham Way
Rickmansworth
Hertfordshire
WD3 9SQ

Tel: 01923 898 072
Email: devcon.team@thameswater.co.uk

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Asset Location Search

Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0845 850 2777
Email: developer.services@thameswater.co.uk

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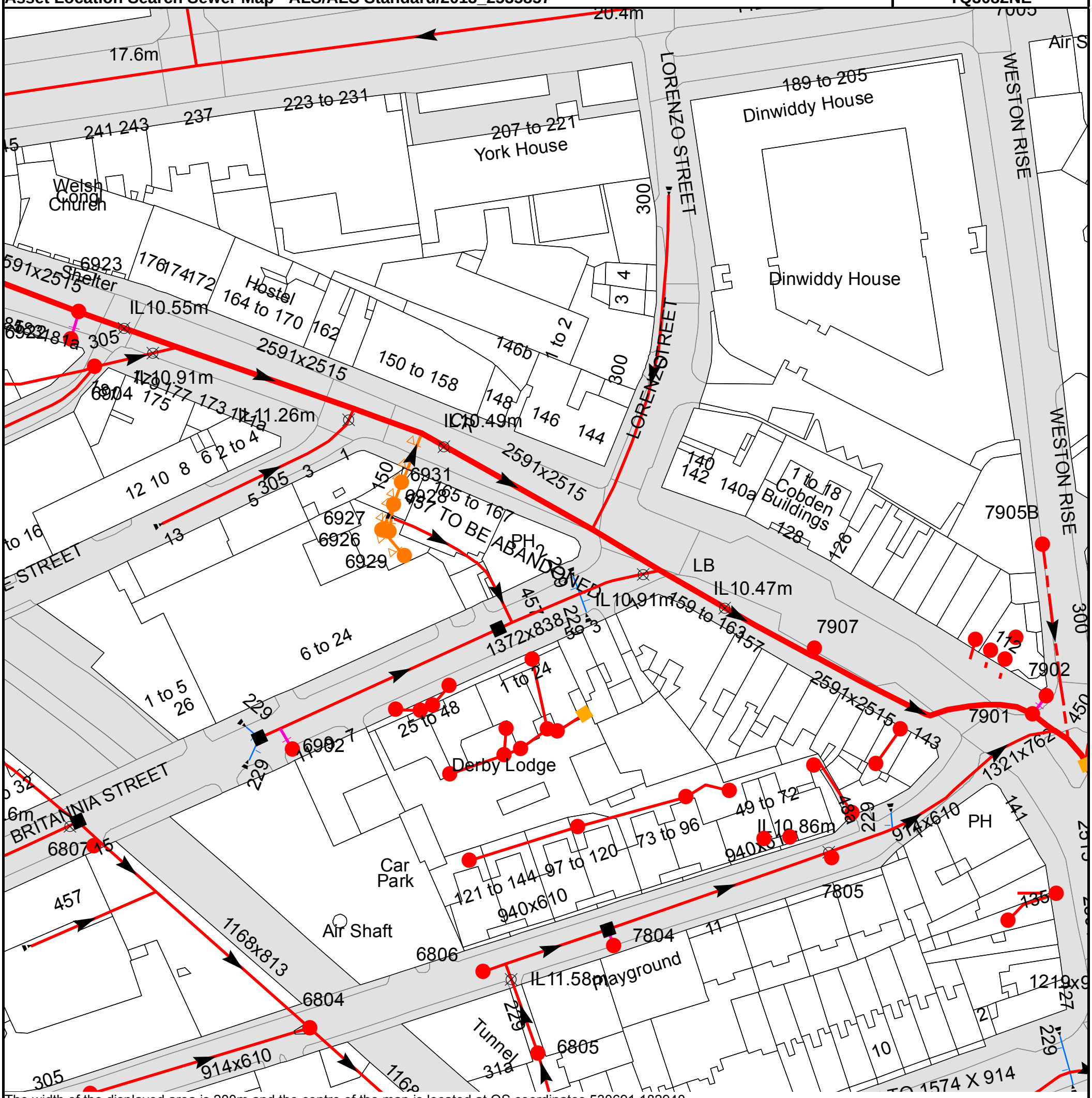
Asset Location Search Sewer Map - ALS/ALS Standard/2013_2535857	TQ3082NE



The width of the displayed area is 200m and the centre of the map is located at OS coordinates 530691,182940

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
7804	n/a	n/a
7805	14.23	n/a
78EI	n/a	n/a
78EC	n/a	n/a
78CC	n/a	n/a
78CD	n/a	n/a
68CE	n/a	n/a
78CE	n/a	n/a
78CI	n/a	n/a
78BF	n/a	n/a
79AB	n/a	n/a
78FB	n/a	n/a
69CC	n/a	n/a
69AE	n/a	n/a
79AH	n/a	n/a
7901	14.34	10.46
7902	n/a	n/a
7910	n/a	n/a
7909	n/a	n/a
7907	14.08	n/a
7908	n/a	n/a
7911	n/a	n/a
7905B	16.14	11.17
68CC	n/a	n/a
69CA	n/a	n/a
6902	n/a	n/a
69CD	n/a	n/a
69BJ	n/a	n/a
69BF	n/a	n/a
69BE	n/a	n/a
69BB	n/a	n/a
69BA	n/a	n/a
69AF	n/a	n/a
6929	14.22	13.32
6926	14.1	12.25
6927	14.1	13.25
6928	n/a	n/a
6931	n/a	n/a
6904	14.32	10.95
6922	n/a	n/a
6923	14.46	n/a
6805	14.57	12.78
6804	14.5	10.94
6806	14.33	11.19
68CD	n/a	n/a
6807	n/a	n/a

ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

Air Valve

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

Control Valve

Drop Pipe

Ancillary

Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

Outfall

Undefined End

Inlet

Other Symbols

Symbols used on maps which do not fall under other general categories

Public/Private Pumping Station

Change of characteristic indicator (C.O.C.I.)

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

Proposed

Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.

2) All measurements on the plans are metric.

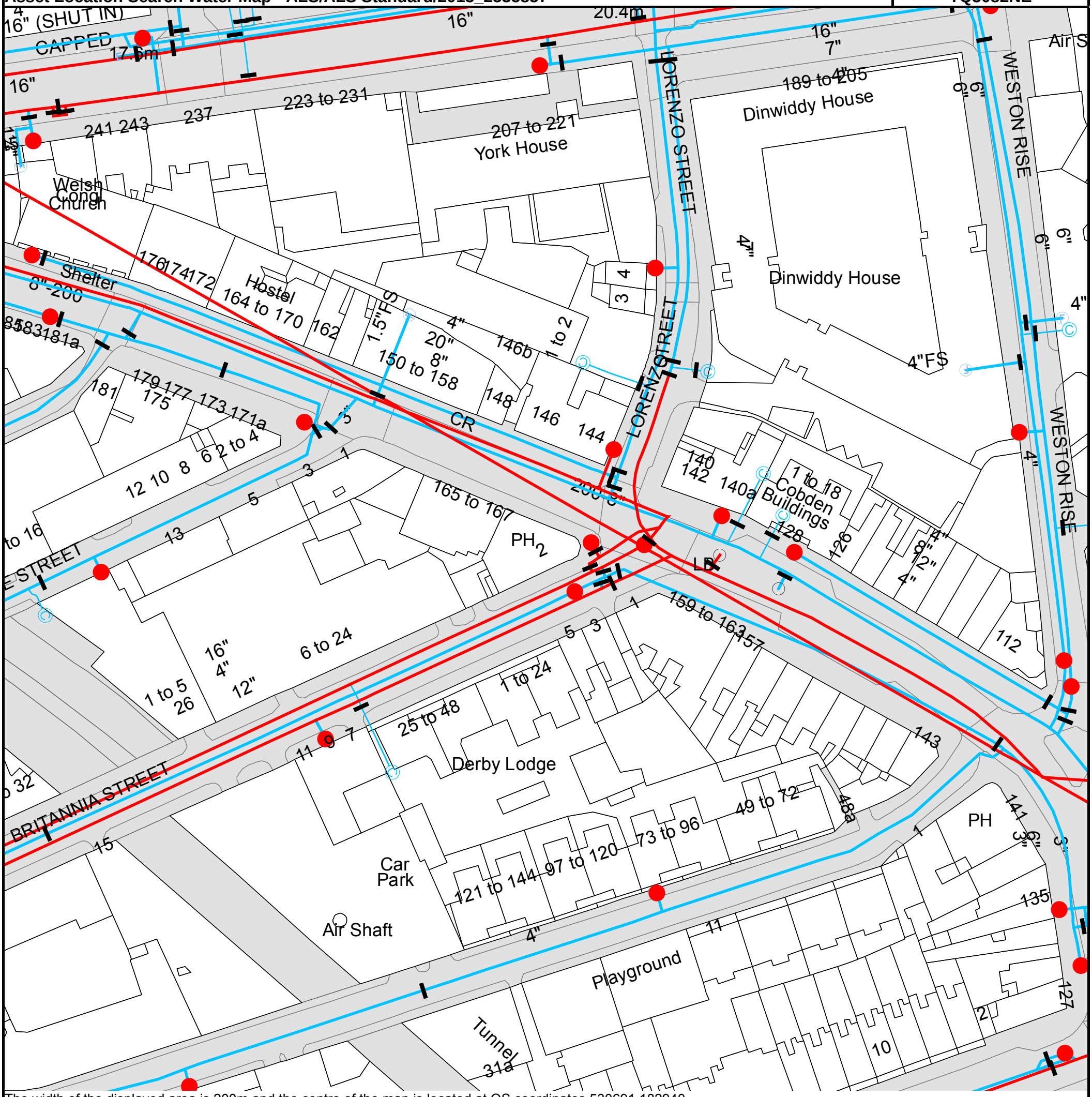
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.

4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

5) 'na' or '0' on a manhole level indicates that data is unavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

Asset Location Search Water Map - ALS/ALS Standard/2013_2535857 | **TQ3082NE**



The width of the displayed area is 200m and the centre of the map is located at OS coordinates 530691,182940

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

4"

Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.

16"

Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.

3" SUPPLY

Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.

3" FIRE

Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.

3" METERED

Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.

Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.

Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Valves

- General Purpose Valve
- Air Valve
- Pressure Control Valve
- Customer Valve

Hydrants

- Single Hydrant

Meters

- Meter

End Items

Symbol indicating what happens at the end of a water main.

- Blank Flange
- Capped End
- Emptying Pit
- Undefined End
- Manifold
- Customer Supply
- Fire Supply

Operational Sites

- Booster Station
- Other
- Other (Proposed)
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

- Data Logger

Other Water Pipes (Not Operated or Maintained by Thames Water)

Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.

Private Main: Indiates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL`s terms and conditions shall apply.
6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0845 9200 800.

If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to him at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	**BACS Payment**	**Telephone Banking**	**Cheque**
Call **0845 070 9148** quoting your invoice number starting CBA or ADS.	Account number **90478703** Sort code **60-00-01** A remittance advice must be sent to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW.** or email **ps.billing@thameswater.co.uk**	By calling your bank and quoting: Account number **90478703** Sort code **60-00-01** and your invoice number	Made payable to '**Thames Water Utilities Ltd**' Write your Thames Water account number on the back. Send to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW** or by DX to **151280 Slough 13**

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.

Search Code

IMPORTANT CONSUMER PROTECTION INFORMATION

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The Search Code:

- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom
- sets out minimum standards which firms compiling and selling search reports have to meet
- promotes the best practise and quality standards within the industry for the benefit of consumers and property professionals
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.

By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

The Code's core principles

Firms which subscribe to the Search Code will:

- display the Search Code logo prominently on their search reports
- act with integrity and carry out work with due skill, care and diligence
- at all times maintain adequate and appropriate insurance to protect consumers
- conduct business in an honest, fair and professional manner
- handle complaints speedily and fairly
- ensure that products and services comply with industry registration rules and standards and relevant laws
- monitor their compliance with the Code

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Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.

TPOs Contact Details

The Property Ombudsman scheme
Milford House
43-55 Milford Street
Salisbury
Wiltshire SP1 2BP
Tel: 01722 333306
Fax: 01722 332296
Email: admin@tpos.co.uk

You can get more information about the PCCB from www.propertycodes.org.uk

PLEASE ASK YOUR SEARCH PROVIDER IF YOU WOULD LIKE A COPY OF THE SEARCH CODE

AP GEOTECHNICS
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Site	Borehole Number
2 BRITANNIA STREET, LONDON WC1X 9JE	BH1

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm cased to 3.20m		Eastwood & Partners	3970
	Location See site plan	**Dates** 03/09/2013-05/09/2013	**Engineer**	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(0.20)	Reinforced CONCRETE			
0.30	D1					0.20	MADE GROUND: Clay with brick, pottery, bones, chalk, slate and gravel			
0.50	C2									
1.00-1.45	SPT(C) N=4	1.00	DRY	1/1,,1,2		(1.70)				
1.00	D3									
						1.90				
1.95	C4					(0.25)	MADE GROUND: Damp dark grey clay, ash, brick, coal, chalk and gravel			
2.00-2.45	SPT(C) N=10	2.00	DRY	1/1,2,3,4		2.15				
2.15	D5						Firm brown and grey mottled silty CLAY with gravel			
2.20	C6					(0.65)				
2.80	D7					2.80				
3.00-3.45	SPT N=8	2.90	DRY	1,1/1,2,2,3			Firm brown fissured CLAY and blue veins			
3.00	D8									
4.00-4.45	SPT N=11	3.20	DRY	1,1/2,2,3,4		(2.40)				
4.00	D9									
5.00-5.45	SPT N=12	3.20	DRY	1,2/2,3,3,4						
5.00	D10					5.20				
5.20	C11						Stiff grey fissured CLAY			
6.00-6.45	SPT N=14	3.20	DRY	2,2/3,3,4,4						
6.00	D12									
7.00-7.45	SPT N=15	3.20	DRY	4,5/4,4,3,4			...mudstone 7.05m - 7.15m		▽1	
7.00	D13			nil(1) at 7.15m, rose to 0.00m in 20 mins.						
8.00-8.45	SPT N=16	3.20	DRY	2,3/3,4,4,5						
8.00	D14									
9.00-9.45	SPT N=17	3.20	DRY	2,2/3,4,5,5						
9.00	D15									
10.00-10.45	SPT N=22	3.20	DRY	2,3/4,5,6,7						

Remarks
PRELIMINARY - Drillers description only
Borehole dry
Existing padlock broken off and replaced with ours
Breaking out from 0.00m to 0.20m for 1.0 hour. Excavating from 0.20m to 1.00m for 0.50 hours.

Scale (approx)	Logged By
1:50	LJS

Figure No. 3970.BH1

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Site	Borehole Number
2 BRITANNIA STREET, LONDON WC1X 9JE	BH1

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm cased to 3.20m		Eastwood & Partners	3970
	Location See site plan	**Dates** 03/09/2013-05/09/2013	**Engineer**	**Sheet** 2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
10.00	D16						Stiff grey fissured CLAY			
11.00-11.45 11.00	SPT N=27 D17	3.20	DRY	3,5/5,6,7,9						
12.00-12.45 12.00	SPT N=26 D18	3.20	DRY	3,4/5,6,7,8		(9.80)				
13.00-13.45 13.00	SPT N=28 D19	3.20	DRY	3,4/6,7,7,8						
14.00-14.45 14.00	SPT N=31 D20	3.20	DRY	3,4/6,7,9,9						
15.00-15.45 15.00	SPT N=34 D21	3.20	DRY	4,5/7,8,8,11		15.00	Complete at 15.00m			

Remarks

Scale (approx)	Logged By
1:50	LJS

Figure No. 3970.BH1

SUMMARY OF GEOTECHNICAL TESTS

Project: 2 BRITANNIA STREET, LONDON WC1X 9JE
Client: Eastwood & Partners

Project No: 3970
Sheet No: 1/1

Location	Sample No	Depth m	Description	CLASSIFICATION							TRIAXIAL COMPRESSION - TOTAL STRESS							CHEMICAL		
				Natural Moisture Content %	Liquid Limit %	Plastic Limit %	Plast. Index %	Passing 425µm %	Mod. Plast. Index %	Class	Type	Moisture Content %	Bulk Density Mg/m³	Radial Stress kPa	Deviator Stress kPa	Cohesion cu, kPa assuming Øu = 0	Cohesion cu, kPa Øu, deg	Sulphate (SO4) Water g/l	Sulphate (SO4) Soil (Sol) g/l	pH
BH1	D8	3.00		34	74	28	46	100	46	CV										

Note: Soil Classification based upon unmodified Plasticity Index

CONTAMINANTS IN SOIL

Project: 2 BRITANNIA STREET, LONDON WC1X 9JE
Client: Eastwood & Partners

Project No: 3970
Sheet No: 1/1

Location	Sample	Depth	Arsenic	Cadmium	Chromium	Lead	Mercury	Nickel	Copper	Zinc	Selenium	Boron	Sulphate	Sulphate	Sulphur	TPH by GCMS						Chromium	pH
		m					inorganic					water sol.	total, %	water sol., mg/l	elemental	C8 - C10	C10 - C12	C12 - C16	C16 - C21	C21 - C35	Total >C8 - <C40	Hexavalent	value
BH1	C2	0.50	15.5	1.1	17	1325	3.5	17	97	127	5.0		0.32	314	<10						9.5	<2	8.3
BH1	C4	1.95	17.8	1.5	15	574	3.5	18	145	108	8.2		0.24	109	<10						477.5	<2	7.9
BH1	C6	2.20	12.4	<0.5	37	80	<0.5	22	26	75	14.9		0.25	67	<10						31.9	<2	8.0
GAC[1]	residential			3	627				2330	3750		291											
	commercial			348	8840				71700	665000		192000											
CLEA[2]	residential		32				170	130			350												
	commercial		640				3600	1800			13000												

Notes

1. LQM/CIEH GAC given at 1% soil organic matter
2. CLEA SGVs given at 6% soil organic matter

All units are mg/kg dry weight of soil unless otherwise stated, except for pH which is dimensionless

Exceptions denoted thus: Residential XX
Commercial XX

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Site	Trial Pit Number
2 BRITANNIA STREET, LONDON WC1X 9JE	TP1

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
By hand			Eastwood & Partners	3970
	Location	**Dates**	**Engineer**	**Sheet**
	See site plan	18/09/2013		1/2

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.03)	CONCRETE		
					0.03	MADE GROUND: Dark brown sandy gravelly clay and brick fragments		
0.10	D1				(0.17)			
					0.20	MADE GROUND: Dark brown slightly gravelly sandy clay and small brick fragments, ash and rare shells		
0.35	D2				(0.35)			
0.50	D3				0.55			
					(0.06)	Grey brown and brown very sandy CLAY		
0.60	D4				0.61			
						Complete at 0.61m		

Plan

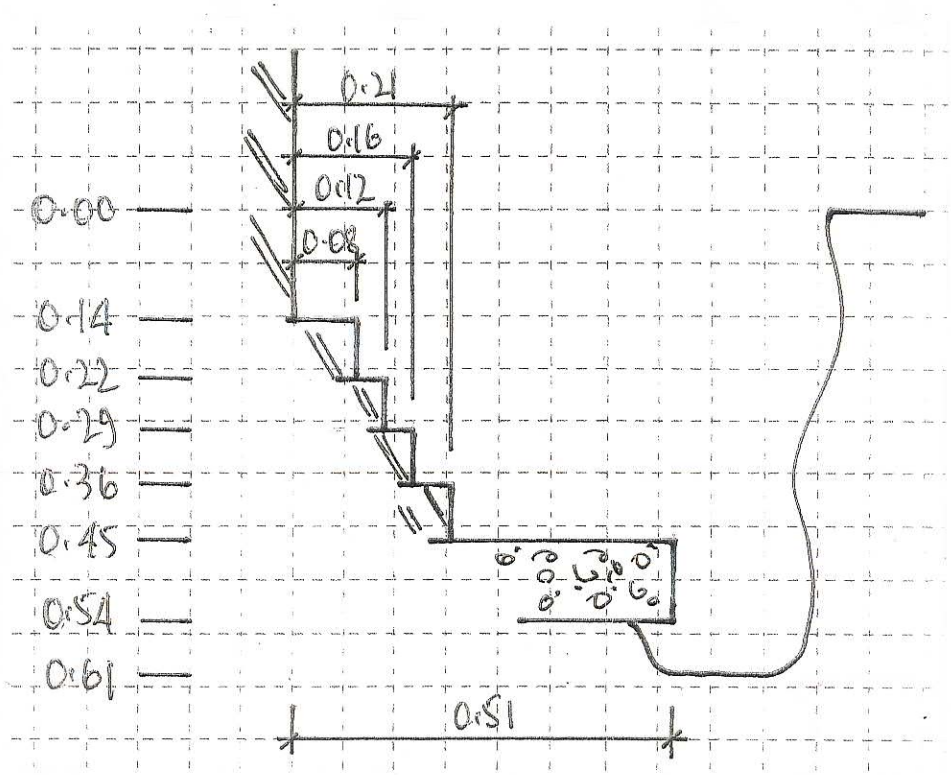
Remarks

Pit dry
Backfilled with spoil

Scale (approx)	Logged By	Figure No.
1:10	LJS	3970.TP1

AP GEOTECHNICS	T 01932 848460 F 01932 851255 E mail@apgeotechnics.co.uk	Site 2 BRITANNIA STREET, LONDON WC1X 9JE	Trial Pit Number TP1

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
By hand			Eastwood & Partners	3970
	Location See site plan	**Dates** 18/09/2013	**Engineer**	**Sheet** 2/2



	Scale (approx)	Logged By	Figure No.
	1:10	LJS	3970.TP1

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Site	Trial Pit Number
2 BRITANNIA STREET, LONDON WC1X 9JE	TP2

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
By hand			Eastwood & Partners	3970
	Location See site plan	**Dates** 18/09/2013	**Engineer**	**Sheet** 1/2

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.11)	CONCRETE		
					0.11			
0.15	D1					MADE GROUND: Dark brown sandy gravelly clay, small brick fragments and rare pottery		
					(0.44)			
0.50	D2							
					0.55	Complete at 0.55m		

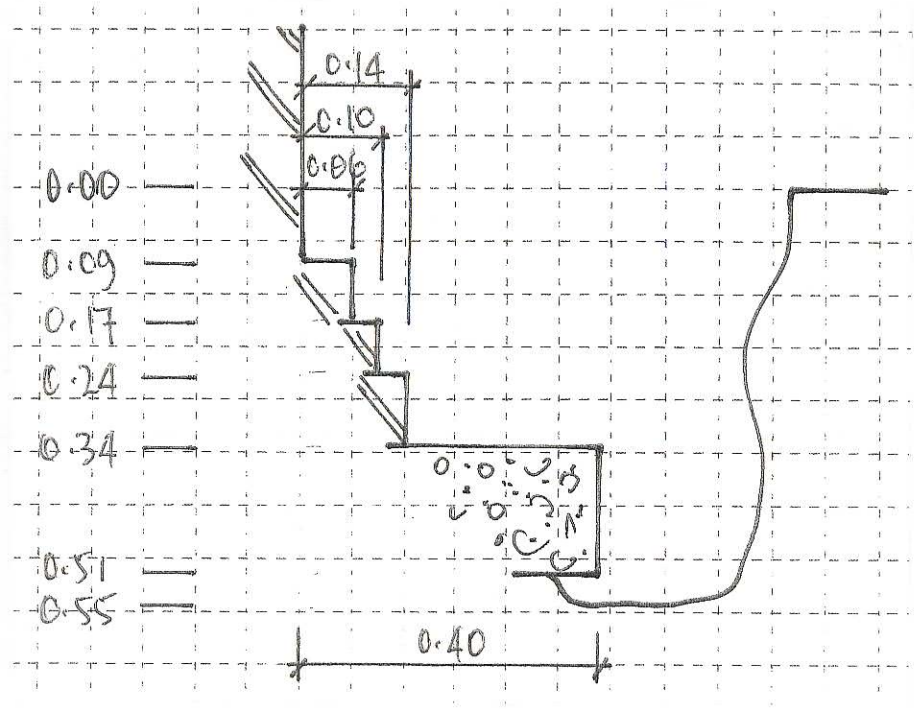
Plan

Remarks

Pit dry
Backfilled with spoil

Scale (approx)	Logged By	Figure No.
1:10	LJS	3970.TP2

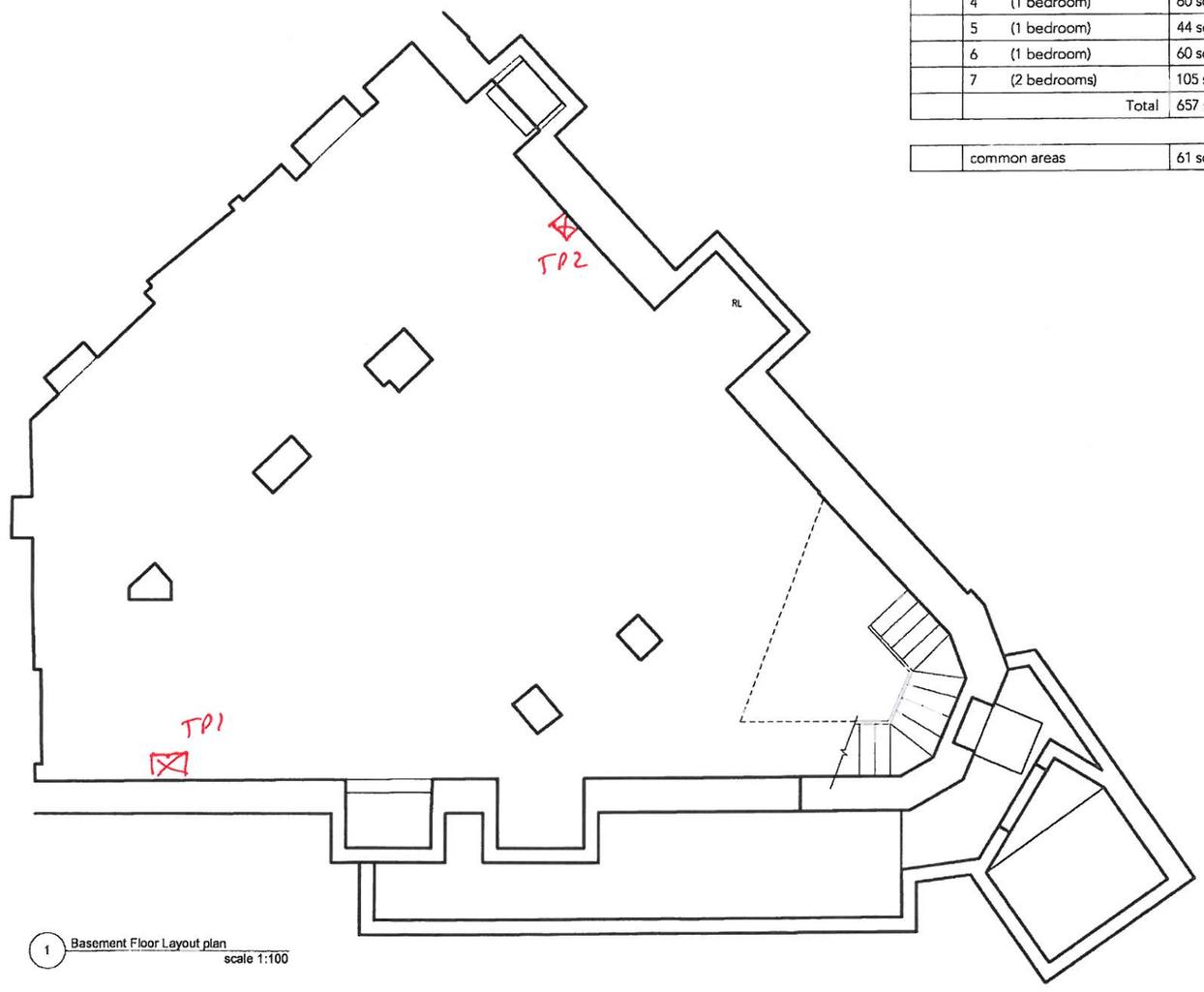
AP GEOTECHNICS	T 01932 848460 F 01932 851255 E mail@apgeotechnics.co.uk	Site 2 BRITANNIA STREET, LONDON WC1X 9JE	Trial Pit Number TP2
Excavation Method By hand	**Dimensions**	**Ground Level (mOD)**	**Client** Eastwood & Partners	**Job Number** 3970
	Location See site plan	**Dates** 18/09/2013	**Engineer**	**Sheet** 2/2



	Scale (approx)	Logged By	Figure No.
	1:10	LJS	3970.TP2

	Flat		Area (sq. m/sq. ft)
	1	(triplex, 2 bedrooms)	106 sq m/ 1141 sq ft
	2	(duplex, 3 bedrooms)	231 sq m/ 2486 sq ft
	3	(1 bedroom)	51 sq m/ 549 sq ft
	4	(1 bedroom)	60 sq m/ 646 sq ft
	5	(1 bedroom)	44 sq m/ 474 sq ft
	6	(1 bedroom)	60 sq m/ 646 sq ft
	7	(2 bedrooms)	105 sq m/ 1130 sq ft
		Total	657 sq m/ 7072 sq ft

	common areas	61 sq m/ 657 sq ft



1 Basement Floor Layout plan
scale 1:100

2 BRITANNIA STREET WC1X 9JE

STUDIO