Form

19 PARK SQUARE EAST, LONDON, NW1

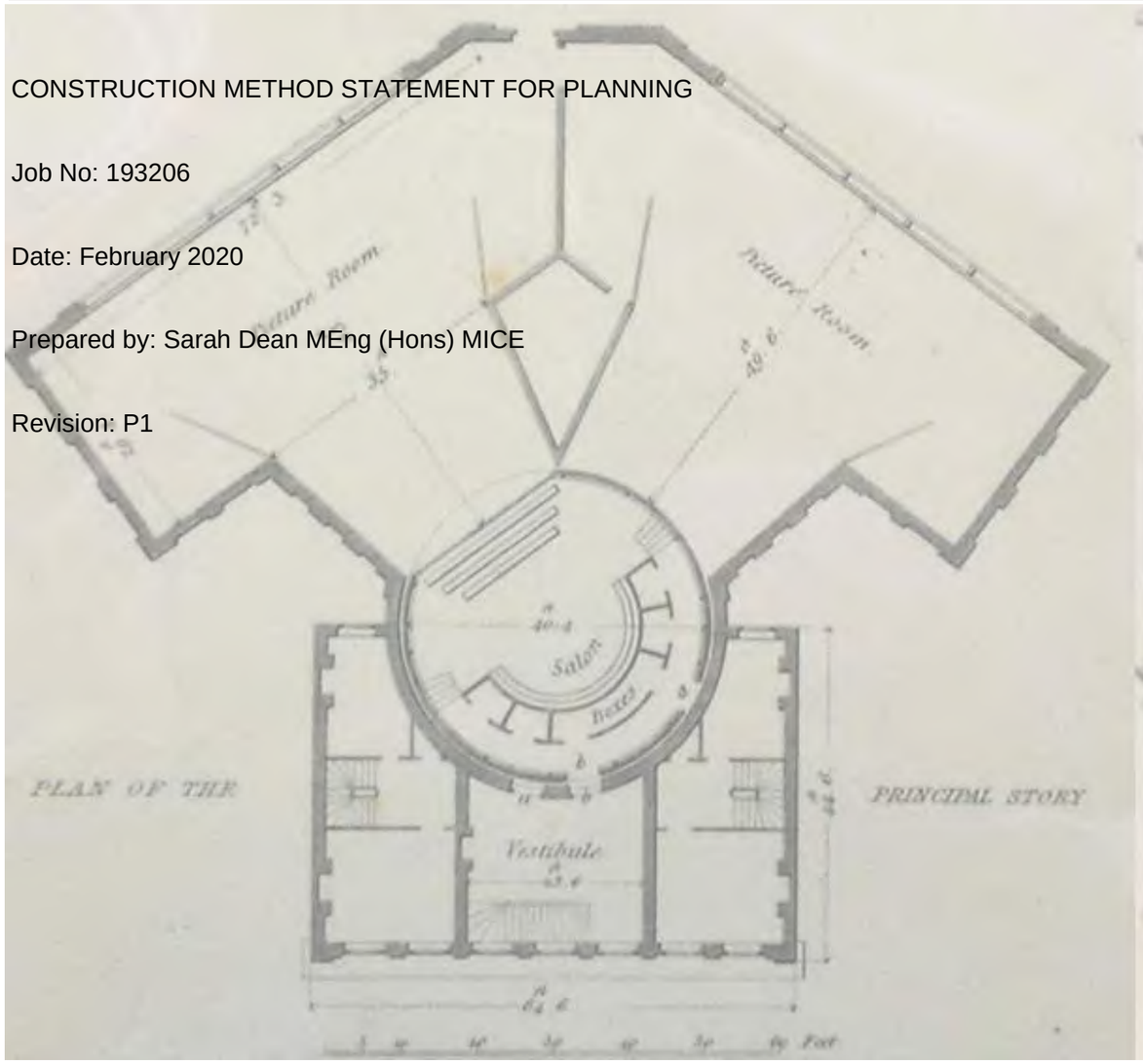
CONSTRUCTION METHOD STATEMENT FOR PLANNING

Job No: 193206

Date: February 2020

Prepared by: Sarah Dean MEng (Hons) MICE

Revision: P1



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Preamble

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ABOUT FORM SD

Form has undertaken over 300 projects involving subterranean development, both new build and retrospective, using numerous techniques and sequences of construction. This extensive design, site and local geology/hydrology experience has positioned the practice as one of London's leading subterranean engineering design consultants.

Many of our subterranean projects are in the London Boroughs of RBKC, Westminster, Camden, Hammersmith & Fulham and Wandsworth, making us familiar with the most recent requirements of subterranean development.

Form has designed multi-level basements using techniques including open dig, underpinning (mass and 'L' shaped R.C. special foundations), temporary and permanent steel sheet piling, temporary and permanent concrete piled retaining walls, top down construction and tunnelling.

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Contents

Introduction

1.1 Purpose of Report

This report has been prepared by Form Structural Design Ltd on the instructions of Marek Wojciechowski Architect's on behalf of the Client.

The following report has been prepared as a supporting document to the planning application for the redevelopment of the existing property at 19 Park Square East, London, NW1 and the construction of the new subterranean development. This report presents an outline structural scheme for the construction of the new basement and demonstrates that it is a viable proposal and can be constructed safely according to the London Borough of Camden's latest policy requirements.

This report and the structural information produced to date are based on a visual inspection of the existing building and review of the proposed architectural plans. A Structural Investigation has been undertaken to investigate the construction form and strength of key structural elements.

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1.2 Health and Safety

The consideration of Health and Safety, including all necessary risk assessments, will conform to the requirements of the Health and Safety Act 1974 and the Construction (Design and Management) Regulations 2015. The Planning Supervisor will be made aware of any consequences of the design to Health and Safety through risk assessments. The CDM risk register will be continuously updated during the project and at key stages such package tenders and the issue of construction status information. In-house quality assurance, calculation and drawing checking procedures, as well as our responsibility under the CDM regulations are set out in the FORM's Operational Procedures and ensure compliance with our ISO 9001:2015 & ISO 14001:2015 accreditation.

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2 Planning Policy

The table below provides a non-technical executive summary covering key aspects of the London Borough of Camden's planning requirements for Basements and Lightwells GPG4 and DP27, which also ties in with Camden's preferred policy DP20. The key aspects have been divided into specific headings to ensure all requested information has been provided for the planning application.

Extract Descriptions of Key Aspects from Camden Development Policies Basements and Lightwells GPG4 and DP27:	Reference Location within this Report	Compliance to GPG4/ DP27 Policy
A. The **Desk Study** information and an analysis of the findings in relation to the proposals. A thorough desk study has been completed and presented in the Construction Method Statement main text, it includes:		
a. The site history;	Section 3.2	
b. The age of the property;	Section 3.2	
c. The site survey;	Section 3.3	
d. The geology and ground conditions –from the site investigation and British Geological Society borehole logs;	Section 3.3, 3.4 and 3.5	
e. Historic River Courses;	Section 3.3	✓
f. Underground Infrastructure;	Section 7, 3.9 and 3.9	
i. Services;		
ii. Drains;		
iii. Tunnels;		
iv. Nearby basement developments in the area have been considered.	Section 3.9	
B. An appraisal of the **existing building structural arrangement** including previous alterations and any obvious defects, asses the condition and location of **adjoining buildings.**	Section 3 and 3.9	✓
C. Assessment of a **site investigation** which is demonstrated to be relevant to the site together with **trial pits** showing existing foundations and the material they are founded on, for all walls which may be impacted by the proposed scheme. If **groundwater** is present, levels are to be monitored for a period of time.	Section 3.3 and Appendix B, See also separate site investigation report	✓
D. Details of the engineering design which is advanced to detailed proposal stage a. Ground conditions and ground water; b. Existing trees and infrastructure; c. Drainage; d. Flooding; e. Vertical and horizontal loading; f. Structural engineering general arrangement and details; drawing showing underpinning, piled walls etc	Section 4	✓
E. An analysis of the **upper aquifer** (when it exists) and how the basement may impact any groundwater flow.	Section 3.5	✓
F. Details of **flood risk, surface water flooding, critical drainage areas** and how these have been addressed in the design. A full flood report assessment to represent areas determined to be at risk.	Section 3.4, see also Flood Risk Assessment	✓
G. An Assessment of **movement** expected and the effect of adjoining or adjacent properties, covering both short term and long term effects. Design and construction to limit damage to all buildings to a maximum of Category 2 as set out in CIRA Report 760	Refer to BIA Report	✓

3 Site Information

3.1 The Site, Location, and Existing Building

The site is located in the London Borough of Camden, adjacent to Regent's Park. The building is Grade I listed due to its John Nash designed Georgian terrace frontage.

The existing building is part of 17-19 Park Square East, The Diorama, which is currently a category B1 office and is 3-storeys plus basement. No. 19 has solid load-bearing masonry walls with timber floors.

There is an existing basement beneath the entire floorplan of No. 19 which is constructed with masonry retaining walls and concrete floors. The basement extends out to the front of the property beneath the public pavement which is supported by the masonry vaulted roof of the basement.

The building is listed as Grade I and is located in the Regent's Park Conservation Area. Therefore, the proposals will require listed building consent. Care will need to be taken to ensure the proposed structure is sympathetic to the building's historic listing.

The building has been vacant with a security presence since 2012.

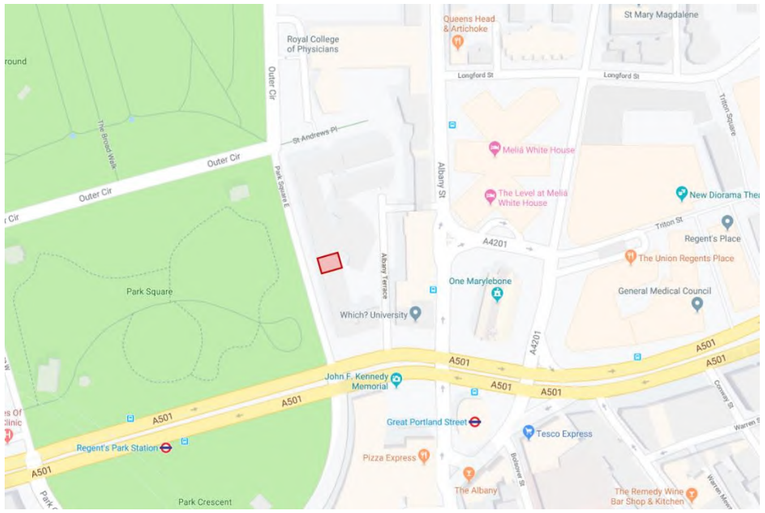


Figure 1: *Site Location Map*

Figure 2*: Front View of Site*

3.2 Site History

The Diorama has had a wide range of uses since its construction in 1823. These are summarised in bullet point form below. This has been gleaned from Historic Maps and archive drawings which show the development of the site.

- 19 Park Square East was constructed in 1823 as a flanking house to The Diorama
- The street façade was designed by John Nash and the interior by Charles Pugin. The John Nash façade has been given a Grade I listing by Historic England.
- In 1855, The Diorama was developed into a Baptist Church and the internal theatre removed. Masonry buttresses were constructed to the perimeter masonry walls.
- In 1922 The Diorama was redeveloped into a hospital and an internal atrium included.
- Since 1965, the building has been in commercial use by Bedford College, the Diorama Arts Centre and The Princes Trust.
- Through all these developments, the original plan interior of No. 19 appears to have been retained, although its latest use has been office space for The Prince's Trust.
- The building has been vacant since 2012.

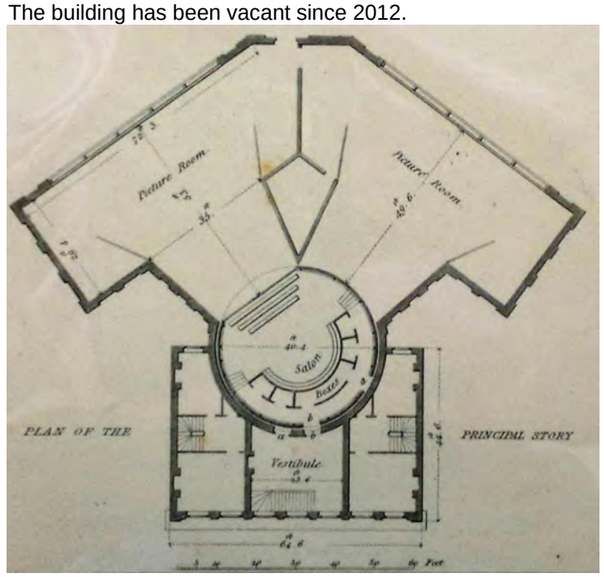


Figure 3: The Diorama,1823

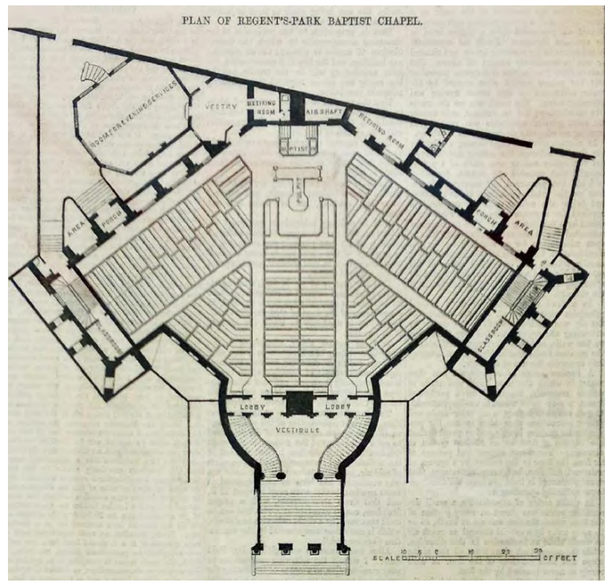


Figure 4: Diorama – Baptist Church, 1855

3.Site Information

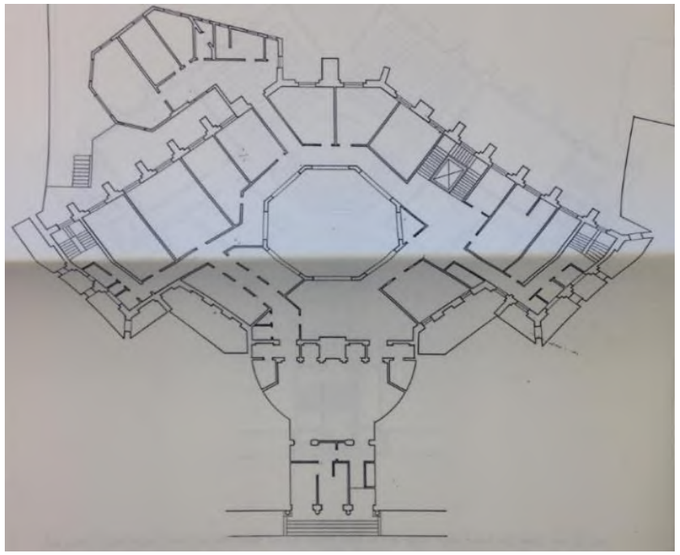


Figure 5: The Diorama - Hospital, 1922

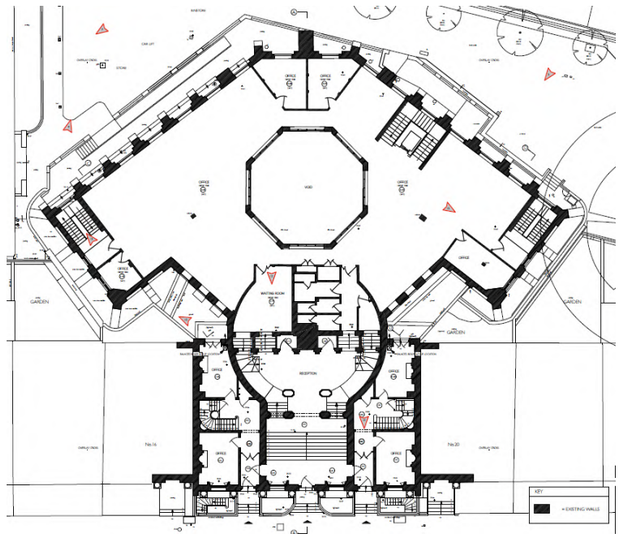


Figure 6: The Diorama - 2012 Survey

As can be seen from the bomb map in Figure 7, no bombs were dropped on the site during WW2. However, bombs did drop near the site. As seen by the map. The London County Council Bomb Damage Maps 1939-1945 (Figure 8) shows that there was blast damage – minor in nature to the property and the neighbouring properties.

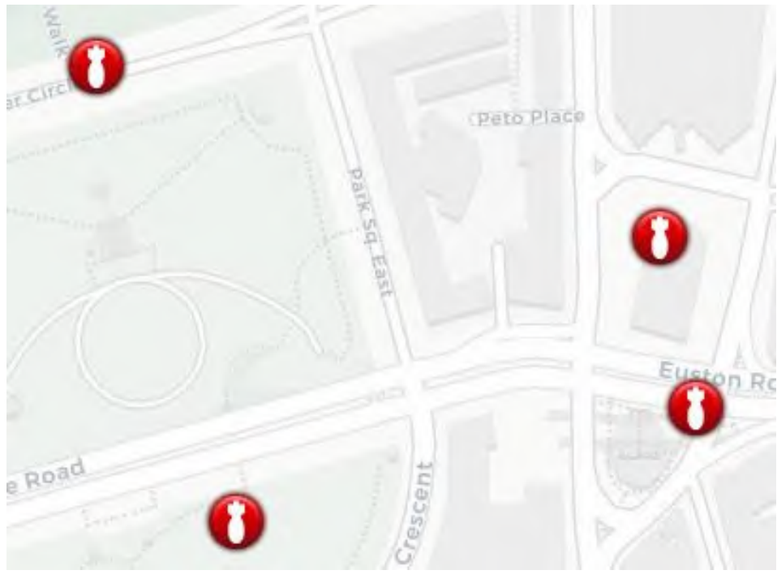


Figure 7: World War 2 Bomb Map

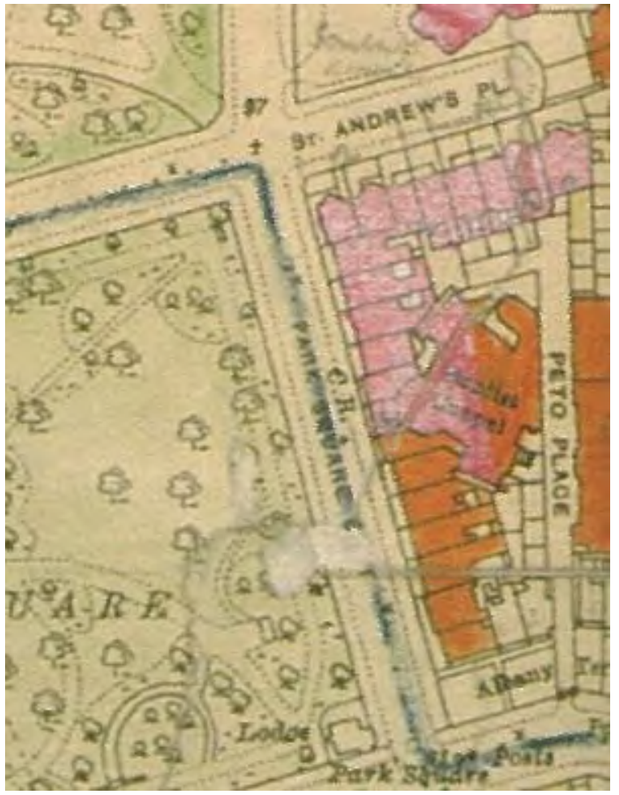


Figure 8: London County Council Bomb Damage Maps 1939-1945

3 Site Information

3.3 Ground Conditions/Geology

With reference to British Geological Survey website (BGS) the site is underlain by London clay bedrock – Clay, Silt and Sand (Figure 9). Superficial Deposits are Lynch Hill Gravel Member – Sands and Gravels.

A Site Investigation has been carried out by CET. This informs the geological conditions of the site and is used for the design of new foundations and strengthening the existing foundations where necessary.

Three boreholes were carried out to establish the soil conditions. **Table 1** shows a summary of the soil conditions found.

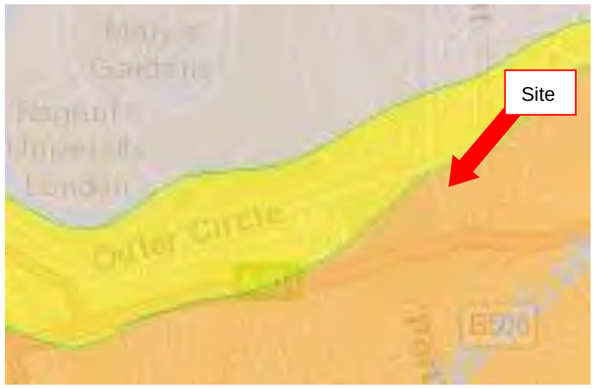


Figure 9: Bedrock Geology Underlying the Site

Groundwater was encountered during the site investigation carried out by CET in one of the boreholes. Subsequent readings were taken during to further monitoring visits in December 2019. This revealed groundwater levels from 21.65mAOD to 23.0mAOD in all boreholes. This indicates that the stratum is likely to be of very low permeability (seepage). To control any seepage sump pumps during construction can be used.

Table 1: *Summary of Soil condition logs*

Description of strata, datum	Level (mAOD)
MADE GROUND Clayey, slightly sandy, GRAVEL	30.00
LANGLEY SILT MEMBER Brown gravelly CLAY to sandy silty CLAY	28.20 - 28.25
LYNCH HILL GRAVEL MEMBER Sandy GRAVEL	27.00 – 25.78
LONDON CLAY FORMATION Stiff grey CLAY	21.30– 20.60

The construction methods proposed within this report and associated structural proposals are appropriate for the geology and are capable for supporting the structural loads of the subterranean development, the techniques that will be used for the construction are well established in the industry. Refer to Appendix A for the proposed sequence of works.

3.3.1 Slope Stability

A Topological survey of the site has been conducted. The site is considered to be generally level and not cut into the side of hills or valleys. Therefore, slope stability is not considered to be a problem.

3.4 Hydrology

A review of London's Lost Rivers reveals the site not to be located near to any underground watercourses.

A check on the Environment Agency website has shown that the site is within Flood Zone 1. This indicates that the site is considered to be at low risk of tidal and fluvial flooding.

An FRA report has been carried out by Form Structural Design Ltd and has been included in the planning application. The report demonstrates that the proposed development is at a low risk of flooding.

Figure 10: Environnent Agency Flood Zone Ma

3 Site Information

3.5 Hydrogeology

The hydrogeology of the site has been investigated using BGS Geology Viewer and the Environment Agency flood maps.

- The Environment Agency's Ground Water Source Protect Maps indicate that the site not located within an Environment Agency Source Protection Zone (SPZ).
- The Environment Agency has produced an aquifer designation system consistent with the requirements for the Water Framework Directive. The designations have been set out for superficial and bedrock geology and are based on the importance of aquifers for potable water supply, and their role in supporting surface water bodies and wetland ecosystems. With reference to Environment Agency mapping, the Taplow Gravel Formation is classified as a Secondary 'A' Aquifer; permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
- As groundwater levels do vary in elevations due to seasonal fluctuations, the contractor will be expected to confirm the ground water level prior to starting work on site. They will also be expected to consider suitable remediation measures should water be encountered during excavations.

3.6 Arboriculture

No trees are being removed as part of the works on the site. The nearest tree is located 17.8 m away from the basement area. An arboriculture expert will need to be consulted to ensure the basement works will not affect the tree though at this distance this is not expected to be problematic.

Existing Utilities

3.6.1 Mains Water

A Thames Water Asset Search has been carried out to locate the mains water and drainage routes within the site and near the site. The full results can be found in Appendix D which shows that there is not main water route running through the site (Figure 11) and therefore Thames Water will not need to be consulted.

Figure 11: Thames Water Mains Water Route Relevant to Site Location

3.6.2 Underground Drainage

The Thames Water Asset Search confirms that there is no combined sewer routes that run through the property as shown in Figure 12. Therefore, Thames Water will not need to be consulted.

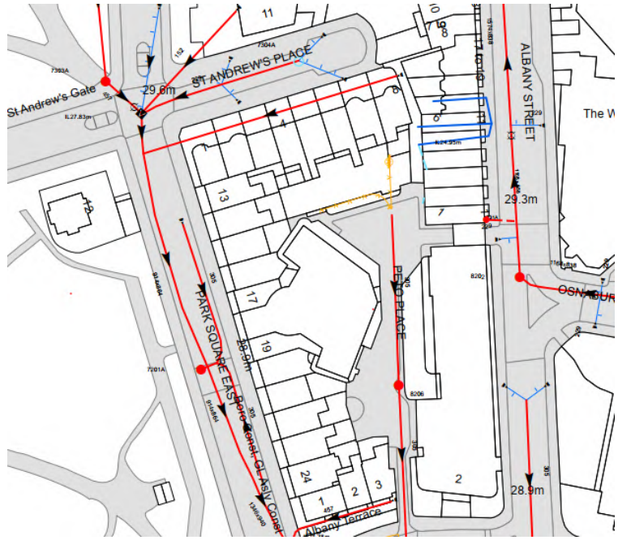


Figure 12: Thames Water Combined Sewer Route Relevant to Site Location

3.6.3 Gas and Electrical

A full utilities search has been carried out. This has been conducted to determine the location of the existing services to ensure the proposal does not affect the existing utilities and to determine if any require re-directing on the site. Any services that require to be diverted will be replaced by modern day standards where necessary as determined by the Mechanical and Electric Engineer for the project. All services that are required to pass through the new structure will be sleeved and articulated accordingly to allow for future movements and settlements of the surrounding structure.

3 Site information

3.7 Underground Structures

3.7.1 London Underground

It can be seen from Figure 14 below that the Circle, Hammersmith and City, Bakerloo and Metropolitan lines run approximately 100 m south of the site. London Underground Asset Protection Services have confirmed that the Underground Lines are unlikely to affect the proposed development at this distance.

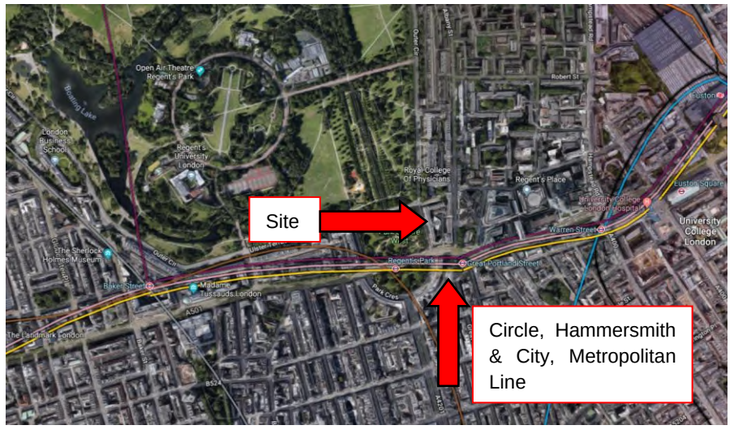


Figure 13: London Underground Lines in relation to the Site.

3.7.2 Crossrail 1 and Crossrail 2

The safeguarding zone for Crossrail 1 is located approximately 1.0km south-east of the site and the safeguarding zone for Crossrail 2 is located approximately 500m to the southeast of the site. As the site is a significant distance from the safeguarding zone, TFL will not need to be notified and construction of the basement will not affect or be affected by Crossrail 1 or 2.

3.8 Site Boundaries

The boundary conditions to the site are listed below.

- **North Boundary -**. The north of the property shares a party wall with 18 Park Square East at ground and first floor level. There is a Party Floor with 18 Park Square East at the second floor and a Party Wall with 17 Park Square East at second and third floor levels.
- **South Boundary -** The property shares a party wall with 20 Park Square East which is a residential property
- **East Boundary -** To the East of the site , there is a Party Wall with 18 Park Square East
- **West Boundary -** To the west of the site runs Park Square East which is adjacent to Regent's Park.

3.8.1 Party Walls

The following party walls bound the site:

- Party walls with 17, 28 and 20 Park Square East to the north, east and south,
- Party floor with 18 Park Square East at second floor level.

The basement is to be extended to the rear of the property adjacent to the Party Wall with No. 18 and may require lowering of the foundations. Similarly, the floor of the basement will be lowered at the vaulted area to the front of the property and this is adjacent to the party walls with 17 and 20 Park Square East.

The party floor at second floor level above 18 Park Square East requires lowering and the party wall with 17 Park Square East at second floor level needs to be moved.

Party Wall processes will need to be followed accordingly.

4 Development Proposals

4.1 The Proposal

The proposed works to No. 19 entail a change of use from office to residential. The proposed structural works are relatively minor and include:

- Removal of internal partitions - it is required to ensure that these partitions are not load bearing at soft strip, prior to their demolition.
- Creation of new risers – structural trimming to floors may be required.
- New openings formed in internal masonry walls – lintels required
- Lowering of basement in vaults to front of property – reinforced concrete underpin required
- Extension of basement to rear of property – reinforced concrete underpin required.
- Creation of new party floor with 18 Park Square East at second floor level.
- Creation of new party wall with 17 Park Square East at second floor level

Prior to demolition and to facilitate detailed design and construction sequencing, it is required to ensure that no load bearing elements are to be removed where not adequately supported. A structural investigation has been undertaken by RSK which provides some clarity on the existing structure, however, the full extents and details of the structure will not be known until strip out has occurred. Following strip out the structural proposals will be reviewed to ensure they are compatible with the existing structure.

The provisional scope of structural work can be found in Appendix A.

Once the structural strip out has occurred, it should be fully inspected and measures taken to repair any existing defects.

All of the works, particularly the sub-structure, are to be carried out in a manner which minimises any noise and vibration that may affect the neighbouring properties.

For the rear basement, the following briefly summarises the sequence of works to achieve the proposals:

1) Excavate the existing fill in the courtyard and demolish the now redundant retaining walls supporting this landscaping.
2) The foundations will then be underpinned using a 12345 construction sequence and will be reinforced as required.
3) The ground level will be excavated down to formation level and a reinforced concrete slab and walls to form a basement structure will be built from bottom up.

For the vaults to the front of the property, the following briefly summarises the sequence of works to achieve the proposals:

4) Underpin the perimeter walls to extend the existing foundations downwards to enable the ground slab to be lowered.
5) The underpins will be formed of reinforced concrete and constructed in a 12345 sequence.
6) The basement slab will then be constructed.

4.2 Substructure and Basement Construction Constraints

The structural proposals are described within the report and on the drawings contained within **Appendix A**. They have been developed by Form-SD in conjunction with the architects to address the specific site constraints and characteristics including:

- The ground conditions
- The stability of the neighbouring properties
- Health and Safety considerations
- The physical site constraints

During the site set up the contractor will insure that the main access route through the existing property is cleared.

To reduce the impact of the development during construction we have identified several simple general measures that the contractor will be expected to undertake:

Noise:

- For all operations identify working method that use equipment or modes of operation that produce less noise.
- Reduce the need for noisy assembly practices by assembling off site where possible.
- Keep noisy plant as far away as possible from the site boundaries.
- Adopt working hours to restrict noisy activities to certain periods of the day.
- Minimise the drop height into hoppers, lorries or other plant.

Dust:

- Reduce the amount of dust through, cutting, grinding, and sawing by assembling off site where possible.
- Equipment fitted with dust suppression or a dust collection facility should be used
- Stockpiles of sand or similar dust generating materials will be covered.

Vibration:

- For all operations identify working method that use equipment or modes of operation that do not vibrate.
- Reduce the need for assembly practices by assembling off site where possible.

Vibration and the monitoring there of is discussed further in Section below.

4.3 Sub Structure and Basement Construction Techniques

Due to the close adjacency of the neighbouring properties and the sensitivity of the site location within a residential area, the demolition, excavation, and piling works have been identified as particularly sensitive operations and the following precautions outlined below will be taken.

Prior to any of these operations commencing the site will be inspected by a Structural Engineer to ensure that procedures have been satisfactorily implicated. Further regular site inspections will be made by the Structural Engineer to supervise throughout the duration of these operations.

4.3.1 Excavation

During the underpinning excavation will be undertaken by the use of hand tools.

Access to the basement site is limited. The spoil will be transported through the building and removed from site using a dumper truck, likely from the rear of the site on Peto Place. The frequency of vehicle movement will be confirmed by the chosen contractor and approved by the council before works commence.

The site will be inspected by a Structural Engineer prior to the commencement of any excavation to ensure the following procedures have been implicated:

- All excavation shall be carried out by hand or utilising a micro excavator (maximum operating weight of 1.5 tonnes).
- Any compaction of hardcore shall only be carried out using non-vibrating methods.

Contamination issues have not been identified during the Site Investigation so special disposal methods are not currently proposed.

4 Development Proposals

4.3.2 Underpinning

The perimeter walls require underpinning where the basement ground level is being lowered.

The excavation of the underpin will be carried out by the use of hand tools.

Prior to the works commencing, all neighbouring occupiers will be consulted to ensure that the construction process results in minimal disruption/disturbance.

4.4 Potential Ground Movement and Monitoring of Adjoining Properties

The underpinning described may cause localised settlements to party walls. Anticipated movements are outlined in the Basement Impact Assessment. The damage category to CIRIA 760 has been limited to 1 owing to the Grade 1 listing of the building.

Monitoring of the neighbouring buildings will be carried out during the works to assess possible movements and the findings will be reported to the adjoining surveyors periodically. The details of the monitoring regime will be agreed with the adjoining owners' surveyors as part of the party wall approval process. Form will produce a monitoring specification which will form part of the party wall documentation. This will detail, amongst other things, the frequency of monitoring, tolerances and location of monitoring points. Monitoring points will be placed in multiple locations at high and low levels in order to monitor vertical and lateral movement of all structures within the zone of influence of the works. Trigger levels will be suggested and agreed with the adjoining owners' surveyors. These trigger levels will set out quantities of settlement at which the adjoining owners will be notified and works on site reviewed by the project engineer. The damage Classification of visible damage to walls (after Burland et al, 1977, Boscardin and Cording, 1989, and Burland, 2001) will be used to access and damage.

4.5 Waterproofing and Drainage systems

Given the proposed residential use of the basement, the internal area will be classed as Grade 3 (habitable) as described in BS 8102 and therefore water ingress is not permittable.

The proposed basement is not located beneath the water table, based upon the site investigation information. However, waterproofing will be provided to ensure a watertight space.

Waterproofing methods are to be agreed with a specialist but will likely consist of a tanked system with a waterproof membrane applied internally to the structural elements. The reinforced concrete structural slab and wall elements will also be designed as a water retaining structure in accordance with BS EN 1992 and detailed with hydrophilic strips at construction joints in order to minimise any water ingress.

4.6 Superstructure

The main structural works to the superstructure are relatively minor.

The second floor is to be lowered to create the required level for the party floor with Number 18. Steel beams will frame the floor plate and support the timber floor joists. These beams will be supported on padstones on the existing masonry walls. This will not increase the load on the foundations as the existing floor is already supported by these walls

The new party wall between number 17 and number 19 will be formed in blockwork and be supported on a steel beam.

These proposals are preliminary and will be developed further following soft strip when the existing building layout and condition can be reviewed.

5 Site Management

This section of the report has been produced at planning stage and before the main Contractor has been fully appointed. It sets out the systems and procedures that the Contractor will utilise in controlling the construction operations on site, to ensure progress of the project in the most safe and efficient manner possible and to minimise impacts on the local environment and surrounding amenity.

Tendering Contractors will be made aware of the contents below (alongside any planning conditions). Once planning permission is granted, the appointed contractor will be responsible for the submission of a Construction Traffic Management Plan prior to commencement of development.

The engineer will make a site visit at each of the points detailed in the sequence of construction. The ground worker will provide detailed method statements for the works and temporary propping to the basement for approval by the engineer prior to commencement of the works.

5.1 Excavation of Soil

Access to the basement site is limited. As such, excavation will occur via small excavators or by hand and transferred to ground level using conveyors. The spoil will then be transported through the building and removed from site using a dumper truck, likely from the rear of the site on Peto Place. The frequency of vehicle movement will be confirmed by the chosen contractor and approved by the council before works commence.

The footpath and street adjacent to the site will be cleaned each evening. Further information on the management of site activities is detailed in the Construction Management Plan.

5.2 Local Environmental Considerations

All of the works, particularly the sub-structure, are to be carried out in a manner which minimises any noise, dust, and vibration that may affect the neighbouring properties.

We have identified a number of simple general measures that the contractor will be expected to undertake to minimise theses impacts including:

5.2.1 Demolition

The demolition works are to take place within the hoarded confines of the site. Any scaffolding on the site perimeter is to be clad with monoflex sheeting above the 6-foot plywood hoarding line to minimise any dust or debris from falling onto the neighbouring streets.

To minimise dust and dirt from demolition, the following measures shall be implemented:

- All brickwork and concrete demolition work is to be constantly watered to reduce any airborne dust.
- Demolished materials are to be removed to a skip placed in the front of the site within the site boundaries, which will be emptied daily.
- The pavement to the front of the property is to be washed and cleaned down each day.
- Any debris or dust / dirt falling on to the street and public highway will be cleared as it occurs by designated cleaners and washed down fully every night.

5.2.2 Noise

The following measures should be followed to minimise noise due to demolition or construction:

- For all operations identify working method that use equipment or modes of operation that produce less noise.
- Reduce the need for noisy assembly practices by assembling off site where possible.
- Keep noisy plant as far away as possible from the site boundaries.
- Adopt working hours to restrict noisy activities to certain periods of the day.
- Minimise the drop height into hoppers, lorries or other plant.

5.2.3 Dust

The following measures should be followed to minimise dust due to demolition or construction:

- Reduce the amount of dust through, cutting, grinding, and sawing by assembling off site where possible.
- Equipment fitted with dust suppression or a dust collection facility should be used
- Stockpiles of sand or similar dust generating materials will be covered.

5.2.4 Vibration

The following measures should be followed to minimise vibration due to demolition or construction:

- For all operations identify working method that use equipment or modes of operation that do not vibrate.
- Reduce the need for assembly practices by assembling off site where possible.

Building work which can be heard at the boundary of the site will not be carried out on Sundays and Bank Holidays and will be carried out within working hours as agreed with the council.

5.2.5 Rubbish Removal and Recycling:

An important part of the site management process involves site cleansing, rubbish removal, and recycling.

Materials such as stock-bricks, re-useable timbers, steel beams etc are to be recycled where possible.

To reduce and manage site waste:

- All material removed from site is to be taken to waste recycling stations and separated for recycling where possible. Records of the waste recycling will be provided by the recycling stations.
- Waste types to facilitate recycling activities.
- All Duty of Care and other legal requirements are complied with during the disposal of wastes.
- Suppliers are to be consulted to determine correct / appropriate disposal routes for waste products and containers.

It will be the responsibility of each contractor to keep the site area under his control safe from build-up of rubbish.

Appendix A - FORM SD PRELIMINARY STRUCTURAL DRAWINGS

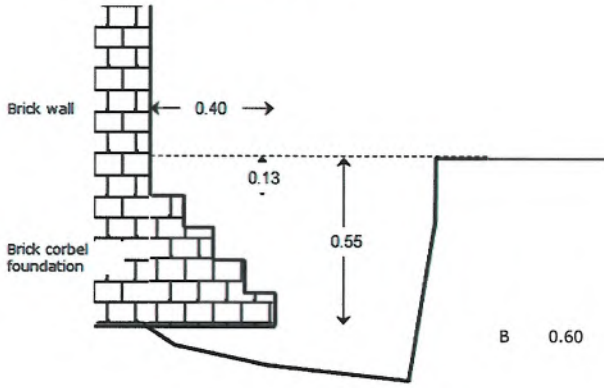
Form

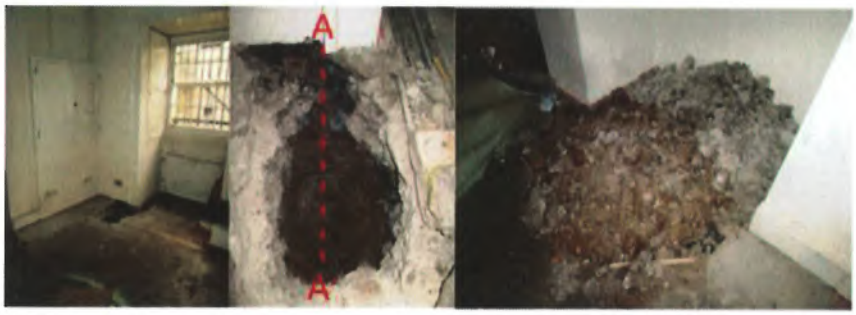
Appendix B –TRIAL PITS

Site & Location:	**The Diorama** **18 Park Square East, London NW1 4LH**	Trial Pit No:	**TP01**
Client:	**The Crown Estate**	Coordinates: 528763E, 182266N	Sheet 1 of 1
Engineer:	**Waterman Structures Ltd**	Ground Level: +26.17mOD	Report No: 9409B/MC

Construction	Samples & Tests Type	Depth (m)	Field Test Results	Legend	Strata Descriptions	Strata Depth (m)	Strata Level (mD)
					MADE GROUND: Concrete slab over rubberised membrane. Reinforced with steel bars.		
					Orange-brown, very sandy GRAVEL of fine to coarse, sub-angular to sub-rounded, flint.	0.27	25.90
	B	0.60				0.75	25.42

SECTION A-A'





Key: B = Bulk D = Small disturbed W = Water ES = Glass jar & plastic tub E = Glass jar HV = Hand Vane[(kPa] PP = Pocket penetrometer [kg/cm²]
PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp]

Date:	23/09/2015	Groundwater details	Trial Pit No: **TP01**
Equipment:	Hand tools	Dry	
Stability:	Stable		Logged by: MC
Remarks:	Backfilled with arisings on completion. Ground level and co-ordinates interpolated from On Centre Surveys' drawings 20710A/1-3, dated 8 May 2012		

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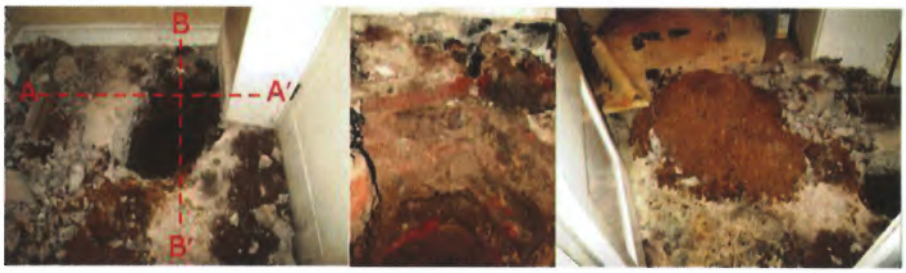
Site & Location:	**The Diorama** **18 Park Square East, London NW1 4LH**	Trial Pit No:	**TP02**
Client:	**The Crown Estate**	Coordinates: 528770E, 182287N	Sheet 1 of 1
Engineer:	**Waterman Structures Ltd**	Ground Level: +26.20mOD	Report No: 9409B/MC

Construction	Samples & Tests Type	Depth (m)	Field Test Results	Legend	Strata Descriptions	Strata Depth (m)	Strata Level (mD)
SECTION A-A' (SECTION B-B' identical) Brick wall ← 0.35 → Brick corbel foundation 0.65	B	0.65			MADE GROUND: Concrete slab over rubberised membrane. Reinforced with steel bars.	0.17	26.03
					Orange-brown, slightly silty, very sandy GRAVEL of fine to coarse, sub-angular to sub-rounded, flint.	0.80	25.40



Key: B = Bulk D = Small disturbed W = Water ES = Glass jar & plastic tub E = Glass jar HV = Hand Vane[(kPa] PP = Pocket penetrometer [kg/cm²]
PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp]

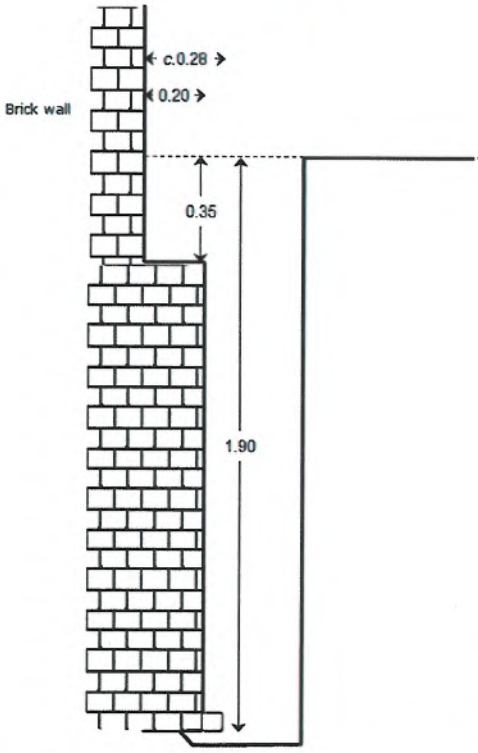
Date:	23/09/2015	Groundwater details	Trial Pit No: **TP02**
Equipment:	Hand tools	Dry	
Stability:	Stable		Logged by: MC
Remarks:	Backfilled with arisings on completion. Ground level and co-ordinates interpolated from On Centre Surveys' drawings 20710A/1-3, dated 8 May 2012		

Soil Consultants

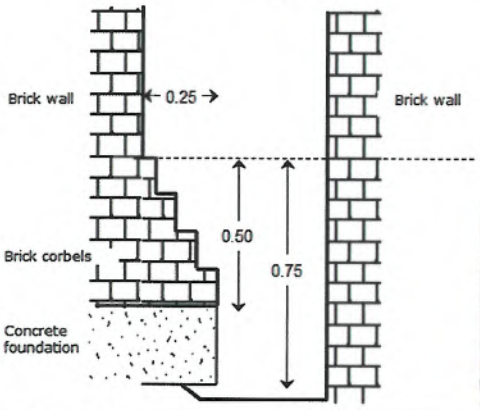
Site & Location:	**The Diorama** **18 Park Square East, London NW1 4LH**	Trial Pit No:	**TP03**
Client:	**The Crown Estate**	Coordinates: 528769E, 182295N	Sheet 1 of 1
Engineer:	**Waterman Structures Ltd**	Ground Level: +28.65mOD	Report No: 9409B/MC

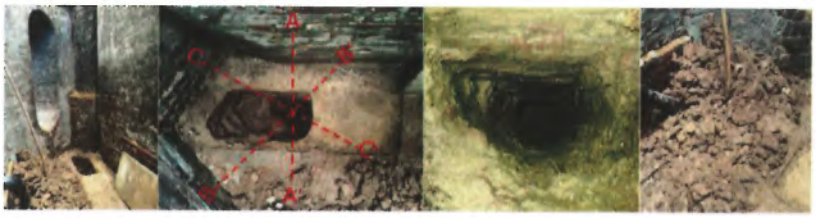
Construction	Samples & Tests Type	Depth (m)	Field Test Results	Legend	Strata Descriptions	Strata Depth (m)	Strata Level (mD)
					MADE GROUND: Stone paving slab (50mm) over bedding sand.		
					MADE GROUND: Firm, orange-brown, slightly sandy, silty clay, with occasional cobbles of flint and brick.	0.35	28.30
	D	1.90			Light orange-brown, slightly gravelly SAND.	1.90 1.95	26.75 26.70

SECTION A-A'



SECTION B-B'
(SECTION C-C' similar)





Key: B = Bulk D = Small disturbed W = Water ES = Glass jar & plastic tub E = Glass jar HV = Hand Vane[(kPa] PP = Pocket penetrometer [kg/cm²]
PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp]

Date:	06/10/2015	Groundwater details	Trial Pit No: **TP03**
Equipment:	Hand tools	Dry	
Stability:	Stable		Logged by: MC
Remarks:	Backfilled with arisings on completion. Ground level and co-ordinates interpolated from On Centre Surveys' drawings 20710A/1-3, dated 8 May 2012		

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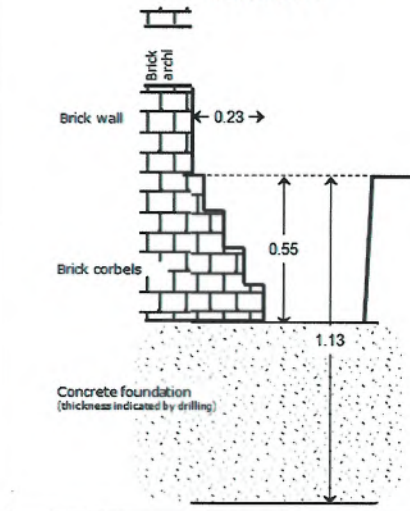
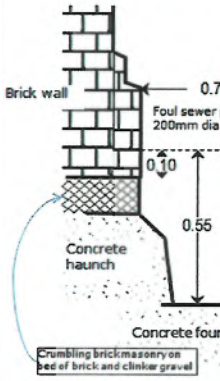
Site & Location:	**The Diorama** **18 Park Square East, London NW1 4LH**	Trial Pit No:	**TP04**
Client:	**The Crown Estate**	Coordinates: 528779E, 182262N	Sheet 1 of 1
Engineer:	**Waterman Structures Ltd**	Ground Level: +27.04mOD	Report No: 9409B/MC

Construction	Samples & Tests Type	Depth (m)	Field Test Results	Legend	Strata Descriptions	Strata Depth (m)	Strata Level (mD)
					MADE GROUND: Stone paving slab (50mm) over bedding sand.	0.15	26.89
					MADE GROUND: Orange-brown, sand, locally with pockets of brown gravel of brick and slag	0.55	26.49
					MADE GROUND: Concrete slab. (Thickness indicated by small-diameter drilling)	1.13	25.91

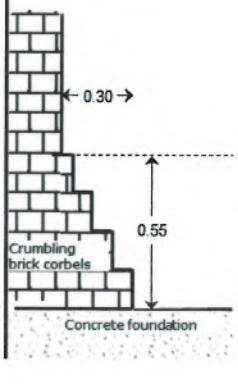
SECTION A-A'



SECTION B-B'



SECTION C-C'



Key: B = Bulk D = Small disturbed W = Water ES = Glass jar & plastic tub E = Glass jar HV = Hand Vane[(kPa] PP = Pocket penetrometer [kg/cm²]
PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp]

Date:	07/10/2015	Groundwater details	Trial Pit No: **TP04**
Equipment:	Hand tools	Dry	
Stability:	Stable		Logged by: MC
Remarks:	Backfilled with arisings on completion. Ground level and co-ordinates interpolated from On Centre Surveys' drawings 20710A/1-3, dated 8 May 2012		

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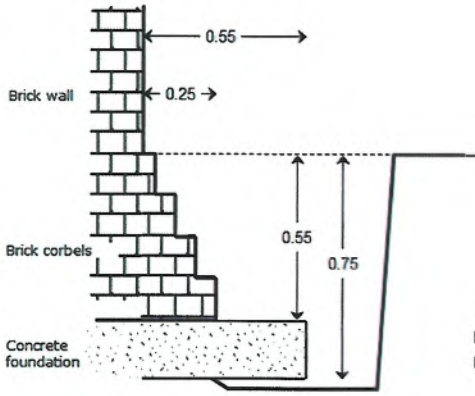
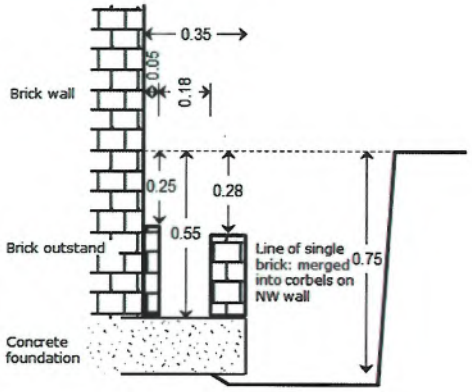
Site & Location:	**The Diorama** **18 Park Square East, London NW1 4LH**	Trial Pit No:	**TP05**
Client:	**The Crown Estate**	Coordinates: 528779E, 182303N	Sheet 1 of 1
Engineer:	**Waterman Structures Ltd**	Ground Level: +28.12mOD	Report No: 9409B/MC

Construction	Samples & Tests Type	Depth (m)	Field Test Results	Legend	Strata Descriptions	Strata Depth (m)	Strata Level (mD)
	D	0.55			MADE GROUND: Stone paving slab (50mm) over bedding sand and plastic sheet.	0.15	27.97
	PP	0.60	2.6		MADE GROUND: Firm, orange-brown, slightly sandy, silty clay, with occasional cobbles of flint and brick.	0.40	27.72
	PP	0.70	2.7		Firm, orange-brown, slightly sandy, silty CLAY.	0.80	27.32

SECTION A-A'



SECTION B-B'



Key: B = Bulk D = Small disturbed W = Water ES = Glass jar & plastic tub E = Glass jar HV = Hand Vane[(kPa] PP = Pocket penetrometer [kg/cm²]
PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp]

Date:	06/10/2015	Groundwater details	
Equipment:	Hand tools	Dry	Trial Pit No: **TP05**
Stability:	Stable		
Remarks:	Backfilled with arisings on completion. Ground level and co-ordinates interpolated from On Centre Surveys' drawings 20710A/1-3, dated 8 May 2012		Logged by: MC

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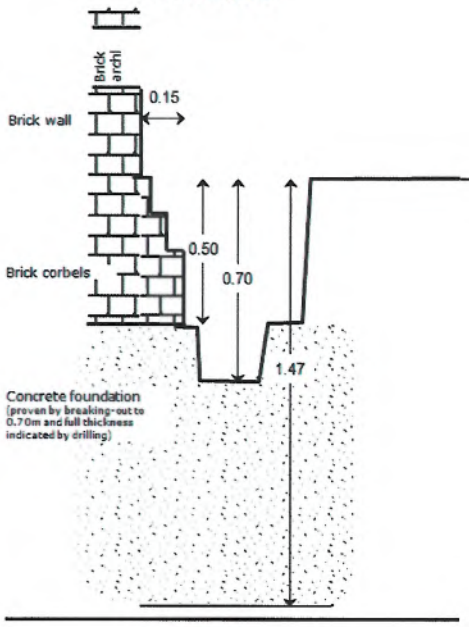
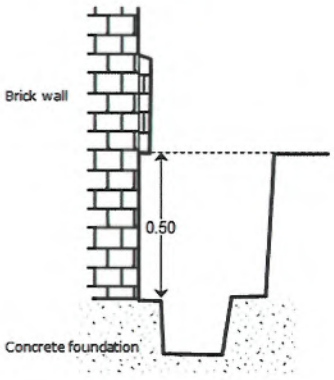
Site & Location:	**The Diorama** **18 Park Square East, London NW1 4LH**	Trial Pit No:	**TP06**
Client:	**The Crown Estate**	Coordinates: 528786E, 182259N	Sheet 1 of 1
Engineer:	**Waterman Structures Ltd**	Ground Level: +27.04mOD	Report No: 9409B/MC

Construction	Samples & Tests Type	Depth (m)	Field Test Results	Legend	Strata Descriptions	Strata Depth (m)	Strata Level (mD)
					MADE GROUND: Stone paving slab (50mm) over bedding sand.	0.15	26.89
					MADE GROUND: Firm, orange-brown, slightly sandy, silty clay, with occasional cobbles of flint and brick.	0.70	26.34
					MADE GROUND: Concrete slab. (Thickness indicated by small-diameter drilling)	1.47	25.57

SECTION A-A'



SECTION B-B'



Key: B = Bulk D = Small disturbed W = Water ES = Glass jar & plastic tub E = Glass jar HV = Hand Vane[(kPa] PP = Pocket penetrometer [kg/cm²]
PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp]

Date:	07/10/2015	Groundwater details	Trial Pit No: **TP06**
Equipment:	Hand tools	Dry	
Stability:	Stable		Logged by: MC
Remarks:	Backfilled with arisings on completion. Ground level and co-ordinates interpolated from On Centre Surveys' drawings 20710A/1-3, dated 8 May 2012		

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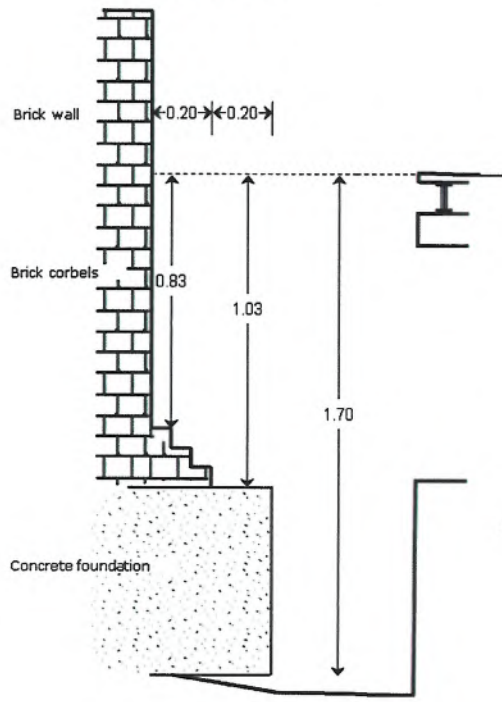
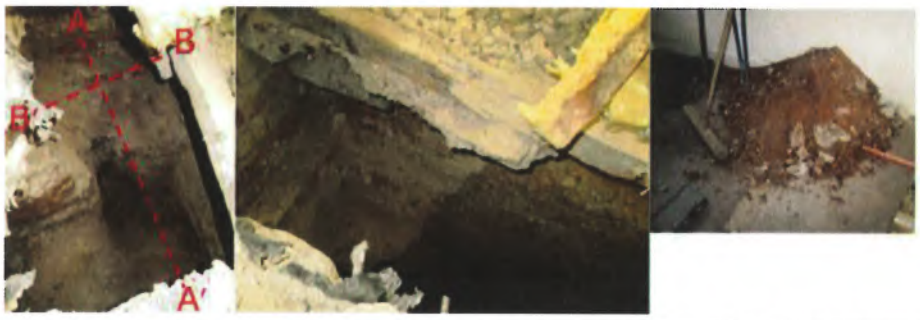
Site & Location:	**The Diorama** **18 Park Square East, London NW1 4LH**	Trial Pit No:	**TP07**
Client:	**The Crown Estate**	Coordinates: 528791E, 182278N	Sheet 1 of 2
Engineer:	**Waterman Structures Ltd**	Ground Level: +28.52mOD	Report No: 9409B/MC

Construction	Samples & Tests Type	Depth (m)	Field Test Results	Legend	Strata Descriptions	Strata Depth (m)	Strata Level (mD)
					MADE GROUND: Suspended floor: carpet tiles; chipboard floor tiles (35mm), over void.	0.14	28.38
					MADE GROUND: Concrete slab over rubberised membrane. Reinforced with steel bars.	0.23	28.29
					Underfloor void.		
					Stiff, orange-brown, slightly gravelly, slightly sandy, silty CLAY. Desiccated.	1.03	27.49
	E	1.20					
						1.80	26.72

SECTION A-A'





Key: B = Bulk D = Small disturbed W = Water ES = Glass jar & plastic tub E = Glass jar HV = Hand Vane[(kPa] PP = Pocket penetrometer [kg/cm²]
PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp]

Date:	23/09/2015	Groundwater details	Trial Pit No: **TP07**
Equipment:	Hand tools	Dry	
Stability:	Stable		Logged by: MC
Remarks:	Backfilled with arisings on completion. Ground level and co-ordinates interpolated from On Centre Surveys' drawings 20710A/1-3, dated 8 May 2012		

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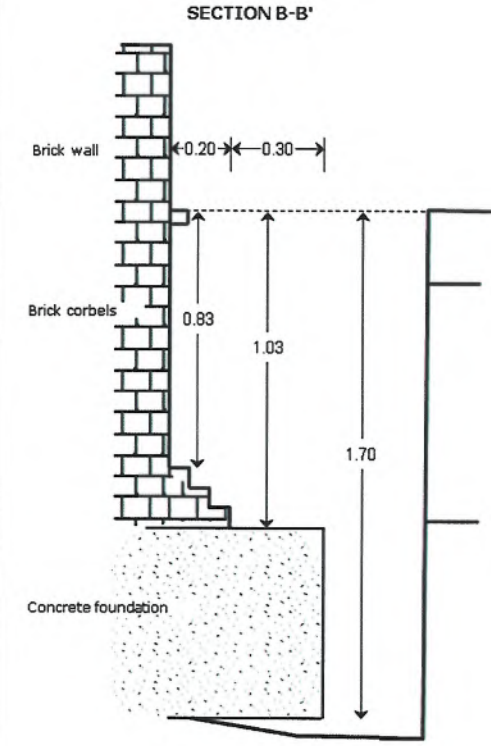
Site & Location:	**The Diorama** **18 Park Square East, London NW1 4LH**	Trial Pit No:	**TP07**
Client:	**The Crown Estate**	Coordinates: 528791E, 182278N	Sheet 2 of 2
Engineer:	**Waterman Structures Ltd**	Ground Level: +28.52mOD	Report No: 9409A/MC

Construction	Samples & Tests Type	Depth (m)	Field Test Results	Legend	Strata Descriptions	Strata Depth (m)	Strata Level (mD)
SECTION B-B'					MADE GROUND: Suspended floor: carpet tiles; chipboard floor tiles (35mm), over void.	0.14	28.38
					MADE GROUND: Concrete slab over rubberised membrane. Reinforced with steel bars.	0.23	28.29
					Underfloor void.		
					Stiff, orange-brown, slightly gravelly, slightly sandy, silty CLAY. Desiccated.	1.03	27.49
	E	1.20				1.80	26.72



Views beneath suspended concrete floor

Key: B = Bulk D = Small disturbed W = Water ES = Glass jar & plastic tub E = Glass jar HV = Hand Vane[(kPa] PP = Pocket penetrometer [kg/cm²]
PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp]

Date:	23/09/2015	Groundwater details	
Equipment:	Hand tools	Dry	Trial Pit No: **TP07**
Stability:	Stable		
Remarks:	Backfilled with arisings on completion. Ground level and co-ordinates interpolated from On Centre Surveys' drawings 20710A/1-3, dated 8 May 2012		Logged by: MC

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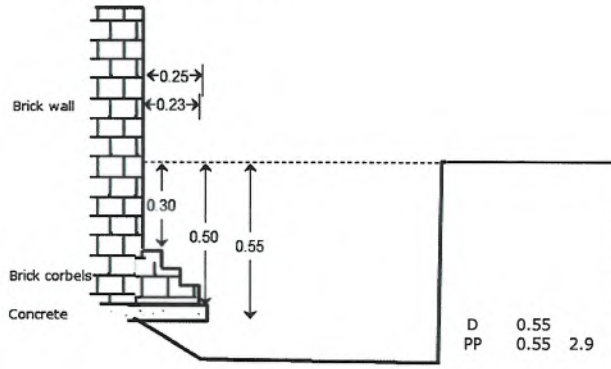
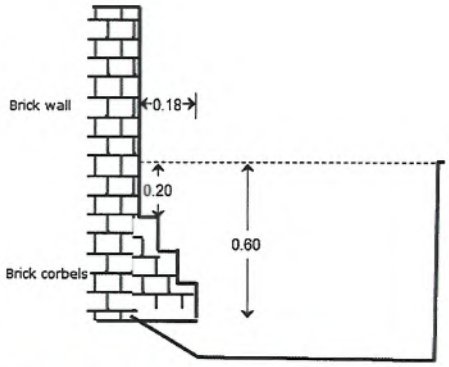
Site & Location:	**The Diorama** **18 Park Square East, London NW1 4LH**	Trial Pit No:	**TP08**
Client:	**The Crown Estate**	Coordinates: 528798E, 182286N	Sheet 1 of 1
Engineer:	**Waterman Structures Ltd**	Ground Level: +28.14mOD	Report No: 9409B/MC

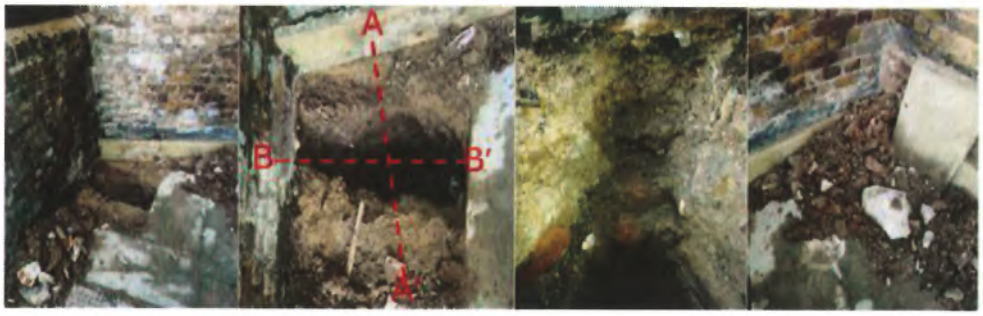
Construction	Samples & Tests Type	Depth (m)	Field Test Results	Legend	Strata Descriptions	Strata Depth (m)	Strata Level (mD)
	D	0.55			MADE GROUND: Stone paving slab (50mm) over bedding sand.	0.15	27.99
	PP	0.55	2.9		MADE GROUND: Firm, orange-brown, slightly sandy, silty clay, with occasional cobbles of flint and brick.	0.40	27.74
					Firm, orange-brown, slightly sandy, silty CLAY.	0.70	27.44

SECTION A-A'



SECTION B-B'





Key: B = Bulk D = Small disturbed W = Water ES = Glass jar & plastic tub E = Glass jar HV = Hand Vane[(kPa] PP = Pocket penetrometer [kg/cm²]
PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp]

Date:	06/10/2015	Groundwater details	Trial Pit No: **TP08**
Equipment:	Hand tools	Dry	
Stability:	Stable		Logged by: MC
Remarks:	Backfilled with arisings on completion. Ground level and co-ordinates interpolated from On Centre Surveys' drawings 20710A/1-3, dated 8 May 2012		

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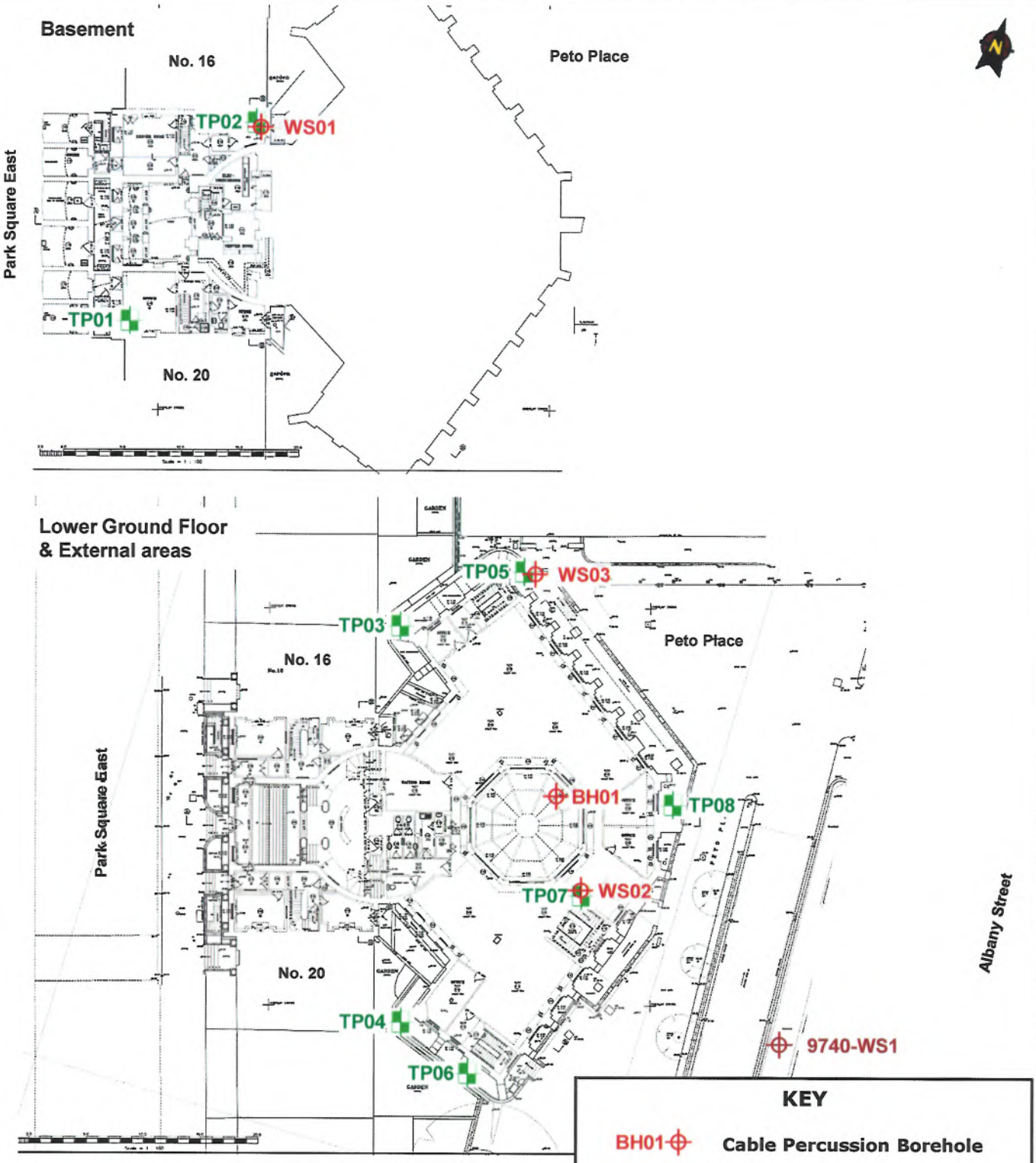
Site & Location	The Diorama 18 Park Square East, London NW1 4LH	Report No: 9409B/MC

Site Plan – showing exploratory hole locations



KEY

BH01	Cable Percussion Borehole
WS01	Window Sample borehole/dynamic probe test
TP01	Foundation Inspection Pit
9740-WS1	Window sample borehole from SCL report 9740

0 Scale: 1:500 @A4 40m

Based on extract from On Centre Surveys' drawings 20710A/1-3, dated 8 May 2012

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Appendix C – GROUND INVESTIGATION REPORT

GEOTECHNICAL REPORT ON
GROUND INVESTIGATION

19 PARK SQUARE EAST, LONDON

FOR

19 PARK SQUARE EAST LTD

Giving our all

CONTENTS

FIGURES

APPENDICES

APPROVAL & DISTRIBUTION SHEET

PROJECT DETAILS	
CET LEAD NO.	1038915
JOB NAME	The Diorama
CLIENT	19 Park Square East Ltd
STATUS	Final
VERSION	V0

DISTRIBUTION			
Date:	Issued to:	Name:	No:
January 2020	Quartz Project Services	Paddy Donaghy	1
January 2020	CET Infrastructure	File	1

PREPARED BY:

APPROVED BY:

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Geotechnical Engineer

Phil West BSc, MSc, CEng, MICE
Consultancy Manager

Issued for and on behalf of CET Structures Ltd

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FOREWORD

This document has been prepared by CET Infrastructure with all reasonable skill, care and diligence within the terms of the contract with the Client and within the limitations of the resources devoted to it by agreement with the Client. Any interpretation included herein is outside the scope of CET Infrastructure's UKAS accreditation.

This document is confidential to the Client and CET Infrastructure accepts no responsibility whatsoever to third parties to whom this document, or any part thereof, is made known. Any such party relies upon the document at their own risk.

This document shall not be used for engineering or contractual purposes unless signed above by the author and the approver for and on behalf of CET Infrastructure and unless the document status is 'Final'.

1. INTRODUCTION

This interpretative report has been prepared upon the written instruction of Quartz Project Services Ltd. acting on behalf of 19 Park Square East Ltd, on 3rd of October 2019.

The subject site is located at 19 Park Square East, London and comprises a five-storey former office building. It is proposed to redevelop the site by extending the existing basement beneath the existing courtyard area. Information provided by the Structural Engineer indicates that the foundations are to have line loadings between 320kN/m and 19.8kN/m.

A ground investigation was requested by the client, to provide information on the ground conditions underlying the site to inform the design of the structure.

The fieldwork was undertaken in October 2019 and comprised one 20.45m deep cable percussion borehole and two modular windowless sampler boreholes to 18m and 20m below ground level. This report is based upon the above fieldwork and subsequent geotechnical laboratory testing programme.

A Preliminary Risk Assessment and waste classification has also been carried out by CET and will be reported separately. A separately report Basement Impact Assessment (BIA) has been produced and should be read in conjunction with this report.

Attention is drawn to the fact that whilst every effort has been made to ensure the accuracy of the data supplied and any analysis derived from it, there is a potential for variations in ground and groundwater conditions between and beyond the specific locations investigated. No liability can be accepted for any such variations. Furthermore, any recommendations are specific to the client's requirements as detailed herein and no liability will be accepted should these be used by third parties without prior consultation with CET Structures Limited.

A desk study as recommended in BS5930 "Code of practice for site investigations" was not requested and has therefore not been carried out.

2. SITE SETTINGS

The subject site is located at approximate Ordnance Survey grid reference TQ 287822 (see Figure 1) and comprises a five-storey disused office building located roughly in the centre of Park Square East, NW1.

The terraced building occupies the majority of the site footprint, with the remaining part of the site being occupied by soft landscaped courtyard areas. The property is bordered to the south and north by No. 20 and No. 18 Park Square East respectively and to the east and west by the public carriageways of Park Square East and Albany Terrace respectively. There are no trees within the site boundary or the neighbouring properties.

The subject site is essentially level at around 30mAOD, which is generally in keeping with the surrounding area.

Reference to the publications of the British Geological Survey indicates that the site is underlain by the deposits of the London Clay Formation, which is mantled by superficial deposits of Lynch Hill Gravel Member. Typically, these deposits may be described as follows: -

Stratum	Description
Lynch Hill Gravel Member	Sand and gravel, locally with lenses of silt, clay or peat. Rests on bedrock geology of London Clay, or Woolwich and Reading Beds. Average thickness 6m, but much thicker where infilling deep hollows.
London Clay Formation	Grey overconsolidated clay that weathers to a characteristic brown colour where it outcrops. Layers of claystone (septarian) nodules are common place within the London Clay Formation, as is the presence of selenite.

The ground investigation ascertained that the site was underlain by deposits of London Clay Formation, mantled by superficial deposits of Langley Silt Member over Lynch Hill Gravel Member. These deposits were mantled by Made Ground to a maximum depth of 1.9m m below ground level in BH03.

3. GROUND INVESTIGATION

The fieldwork was undertaken in October 2019 and comprised one 20.45m deep cable percussion borehole and two modular windowless sampler boreholes to 18m and 20m below ground level. The approximate locations of the exploratory holes are shown on Figure 2.

Prior to commencing each exploratory hole, the locations were scanned for services with a Cable Avoidance Tool (CAT) by the CET engineer. The locations with hard surfaced material were then cored out using a concrete coring rig.

Details of the ground conditions encountered in the exploratory holes are presented on the engineer's logs in Appendix A. Reference should be made to these logs for detailed descriptions of the strata penetrated and the results of any in situ tests carried out. A summary only of the ground conditions encountered in the exploratory holes is presented below:-

Strata name	Approximate level to top of strata (mAOD)	Thickness (m)	Description
Made Ground	30	0.25 to 1.9	Very clayey, slightly sandy GRAVEL of angular to rounded, fine to coarse flint and brick. Low cobble content of angular brick.
Langley Silt Member	28.2 to 28.25	1.2 to 1.75m	Firm and firm becoming stiff with depth, brown, slightly gravelly CLAY. Gravel is angular to rounded, fine and medium flint. Or Soft, brown, slightly fine sandy, silty CLAY.
Lynch Hill Gravel Member	27 to 25.78	5.18 to 5.9m	Loose to very dense, brown, very fine to coarse sandy, locally sandy and slightly sandy GRAVEL of sub-angular to rounded, fine to coarse flint.
Weathered and Relatively	21.3 to 20.6	Not proved.	Stiff, brown mottled grey, becoming brown and grey mottled CLAY with occasional sand size selenite and silt

Unweathered London Clay Formation.			partings. Or Stiff, grey, very closely to closely fissured CLAY with rare fine and medium sand size selenite.

From ground level, Made Ground was encountered locally to a maximum depth of 1.9m below ground level in BH03. Typically, this material was encountered as Very clayey, slightly sandy GRAVEL. This material was only present within the courtyard area. As this material will be removed during the basement excavation it will likely not have any impact on the basement design.

Deposits of the Langley Silt Member were found locally in BH01 and BH03 beneath a mantle of concrete or Made Ground respectively to a maximum depth of 3.1m below ground level. Typically, this material was encountered as brown, slightly gravelly CLAY or brown, slightly fine sandy, silty CLAY.

Beneath the Langley Silt Member and locally beneath a mantle of concrete deposits the Kempton Park Gravel Member were encountered to a maximum depth of 9m depth as Loose to very dense, brown, very fine to coarse sandy, locally sandy and slightly sandy GRAVEL.

The deposits of the weathered and relatively unweathered London Clay Formation were penetrated below the Lynch Hill Gravel Member deposits. These deposits were proved to a maximum depth of 20.45m below ground level.

Roots and rootlets were not observed in any of the exploratory holes.

Groundwater was encountered in BH01 at a depth of 9.5m, rising to 8m below ground level after 20 minutes of monitoring. Subsequent readings of the piezometers installed in the boreholes made during two post site work monitoring visits can be found summarised in the below table:-

Standpipe ID	BH01		BH02		BH03	
Date of Monitoring Visit.	05/12/2019	12/12/2019	05/12/2019	12/12/2019	05/12/2019	12/12/2019
Level (mAOD)	Dry	21.65	21.72	21.74	22.42	23.0

LABORATORY TESTING

The following geotechnical laboratory testing programme was carried out to provide further information on the engineering properties of the subsoil. Unless stated otherwise, these tests were carried out in accordance with BS 1377 "Methods of Test for Soils for Civil Engineering Purposes".

No.	Test	UKAS Accreditation
6	Moisture content determination	CET Supplier
8	Atterberg limits	CET Supplier
9	PSD Wet Sieving	CET Supplier
4	Water soluble sulphate	CET Supplier
4	pH	CET Supplier
4	BRE SD1 Suite	CET Supplier

4. DISCUSSION AND RECOMMENDATIONS

GENERAL

The subject site is located at 19 Park Square East, London and comprises a five storey former office building. It is proposed to redevelop the site by extending the existing basement beneath the existing courtyard area. Information provided by the Structural Engineer indicates that the foundations are to have a bearing pressure between 320kN/m and 19.8kN/m. A ground investigation was requested by the client, to provide information on the ground conditions underlying the site to inform the design of the structure.

The fieldwork was undertaken in October 2019 and comprised one 20.45m deep cable percussion borehole and two modular windowless sampler boreholes to 18m and 20m below ground level.

The works established that the site is locally underlain by Made Ground to a maximum depth of 1.9m below ground level. Underlying this are superficial deposits of the Langley Silt Member over deposits of Lynch Hill Gravel Member. Superficial deposits were encountered to a maximum depth of 9.2m below ground level. Underlying superficial deposits, the weathered and relatively unweathered deposits of the London Clay Formation were penetrated to a maximum depth of 20.45m below ground level.

Groundwater was encountered in BH01 at a depth of 9.5m below ground level rising to 8m after 20 minutes during the course of the fieldwork. However, post site work monitoring of the well recorded a water level at a depth of between 23mAOD and 21.65mAOD.

Roots and rootlets were not encountered in any of the exploratory holes.

FOUNDATION RECCOMENDATIONS

In light of foundation design documents provided by the structural engineer a series of ‘hit and miss underpinning blocks is the proposed method of construction. The underpinned walls will form the permanent retaining structure and therefore no temporary works are likely to be required.

In choosing an appropriate underpinning method the contractor must take into account the ability of the relevant company and the available equipment in being able to provide the required working loads within the settlement tolerances allowed by Camden Borough Council.

The recommendations made herein are based on underpinning blocks with a minimum width of 1m and a founding depth of 25mAOD. The maximum line loadings on the walls provided by the structural engineer

indicate loadings of 320kN/m run spread over a 1m wide footing. Based on an average SPT 'N' value for the Lynch Hill Gravel Member a presumed net allowable bearing capacity of 320kN/m^2 could be accommodated adopting a factor of safety of 3.

For likely settlements as a result of the basement construction the Ground Movement Assessment section of the BIA should be consulted.

RETAINING WALL DESIGN AND EXCAVATION SUPPORT

Due to the nature of the Lynch Hill Gravel Member deposits encountered on site continuous support of these materials will be required to maintain the stability of excavations through these deposits. Any loss of support will result in catastrophic settlement to the neighbouring structures. As such Lynch Hill Gravel Member deposits should not be left unsupported for any length of time. One prospective method of construction, among other methods, that will preclude loss of support include injection grouting.

The permanent basement walls will need to be designed as permanent retaining structures. With reference to the laboratory test results and BS8002: 2015, the design parameters in the below table are appropriate for the design of retaining walls.

The design of retaining walls should adopt k_0, the lateral earth pressure at rest, to mitigate the risk of lateral movement and damage to adjacent structures.

Material	$Ø'_{crit}$	c'	ϒ
Langley Silt Member	21.5°	0	18kN/m^3
Lynch Hill Gravel Member	30°	0	20kN/m^3

FLOOR SLAB DESIGN

Based on drawings provided by the structural engineer the anticipated formation level of the ground floor slab will be within the Lynch Hill Gravel Member deposits. Based on the SPT results from the formation level of the slab a ground bearing floor slab design may be adopted for this scheme.

CONCRETE BELOW GROUND

Chemical testing was carried out on soil samples recovered from the Langley Silt Member, Lynch Hill Gravel Member and London Clay Formation encountered in the three cable percussion boreholes. However based on the current design of the basement deposits of the London Clay Formation Will not be penetrated and therefore concrete will not come in to contact with soils from this strata.

The underlying groundwater condition within the Lynch Hill Gravel Member is likely to be classified as 'mobile', while the Langley Silt and London Clay Formation are likely to be classified as 'static' as defined in BRE Special Digest 1:2005 Third Edition "Concrete in Aggressive Ground".

In accordance with BRE Special Digest 1:2005 Third Edition "Concrete in Aggressive Ground", Table C2 "Aggressive Chemical Environment for Concrete (ACEC) classification for brownfield locations", the Design Sulphate Class and ACEC Class have been established based upon the available laboratory results.

The results of the water-soluble sulphate, for Langley Silt Member and strata indicate that the concrete could be designed to Design Sulphate Class DS-1 and ACEC Class AC-1s. While deposits of the Lynch Hill Gravel Member could be designed to Class DS-1 and ACEC Class AC-1.

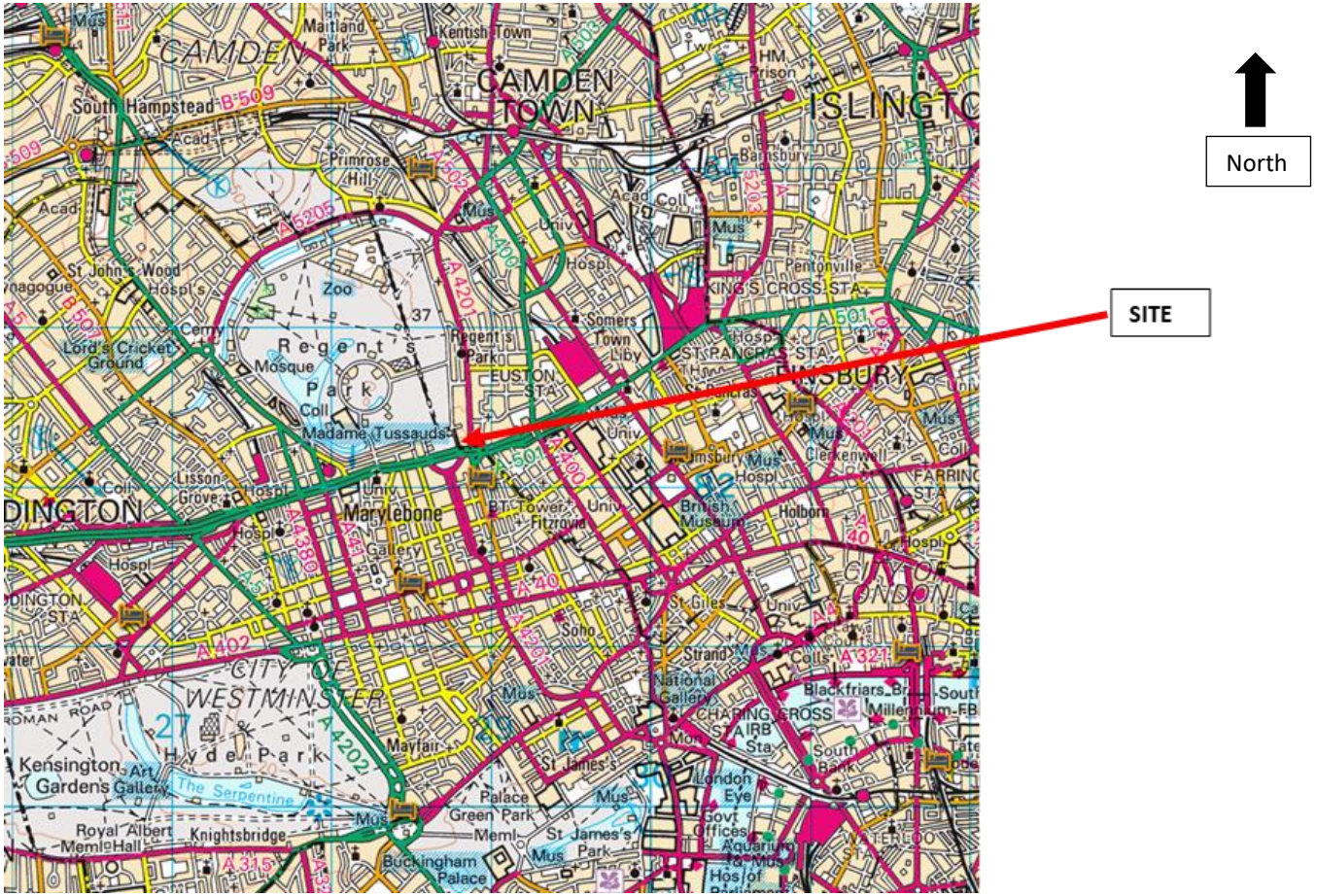
FIGURES

INFRASTRUCTURE
Giving our all

Northdown House, Ashford Road, Harrietsham, Maidstone
Kent, ME17 1QW
Telephone: 01622 858545 Facsimile: 01622 858544

The Diorama

Lead No.	Created By:	Checked:	Approved:	Date:
1038915	**JM**	**PJW**	**PJW**	**November 2019**



Site Location Plan

Scale: Not to Scale

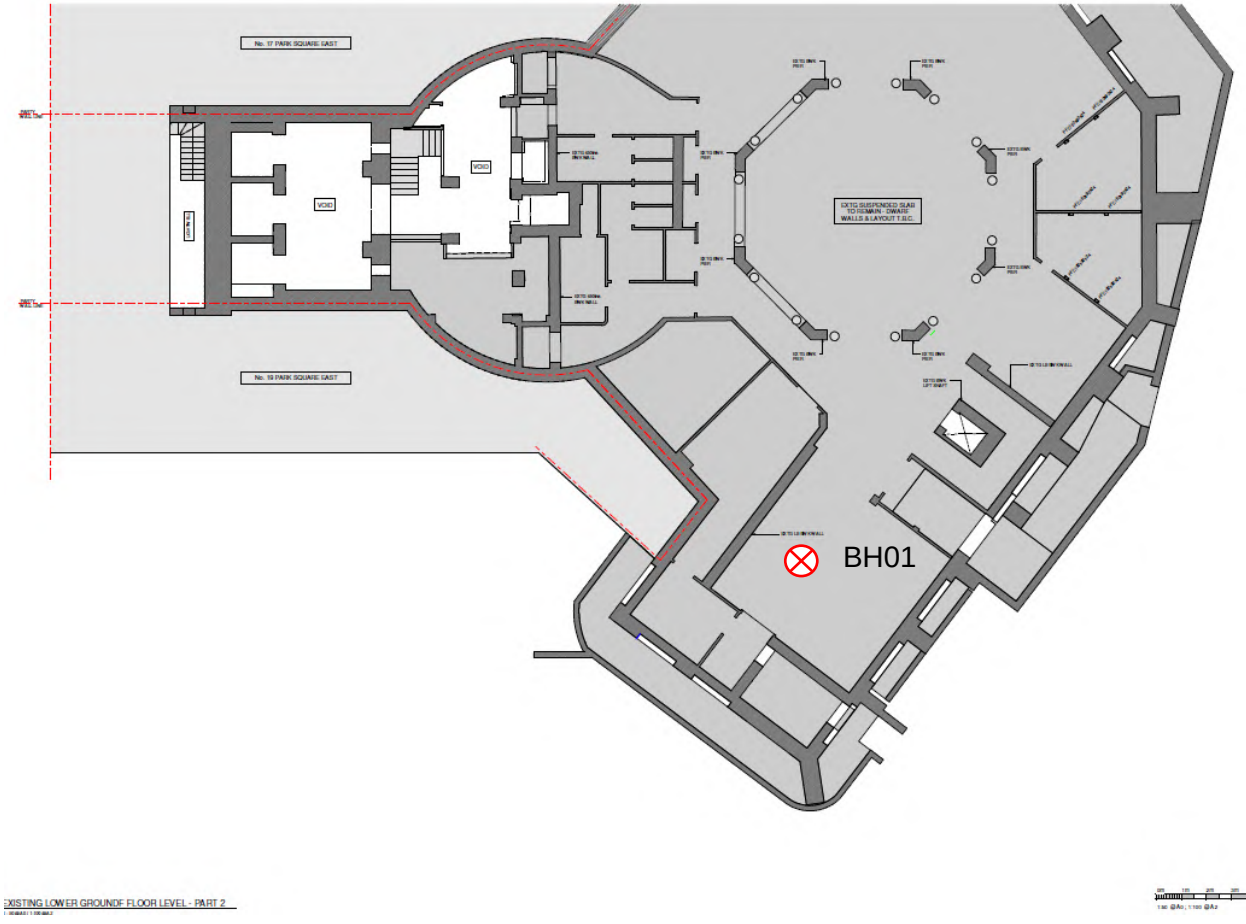
FIGURE 1

INFRASTRUCTURE
Giving our all

Northdown House, Ashford Road, Harrietsham, Maidstone
Kent, ME17 1QW
Telephone: 01622 858545 Facsimile: 01622 858544

The Diorama

Lead No.	Created By:	Checked:	Approved:	Date:
1038915	**JM**	**PJW**	**PJW**	**November 2019**



Approximate Exploratory Hole Location Plan

Scale: Not to Scale

FIGURE 2 (page 1 of 3)

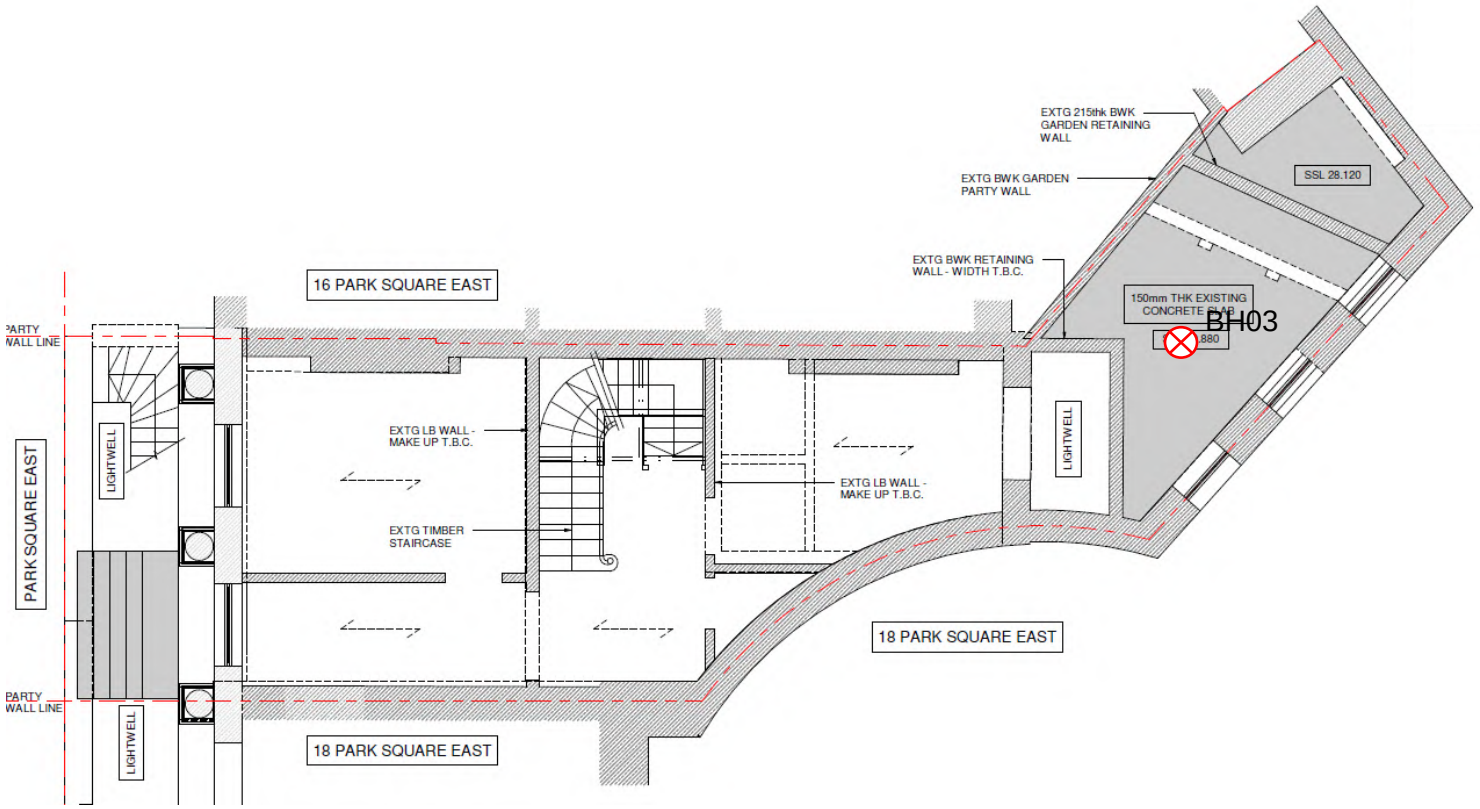
INFRASTRUCTURE
Giving our all

Northdown House, Ashford Road, Harrietsham, Maidstone
Kent, ME17 1QW
Telephone: 01622 858545 Facsimile: 01622 858544

The Diorama

Lead No. **1038915**

Created By:	Checked:	Approved:	Date:
JM	**PJW**	**PJW**	**November 2019**



Approximate Exploratory Hole Location Plan

Scale: Not to Scale

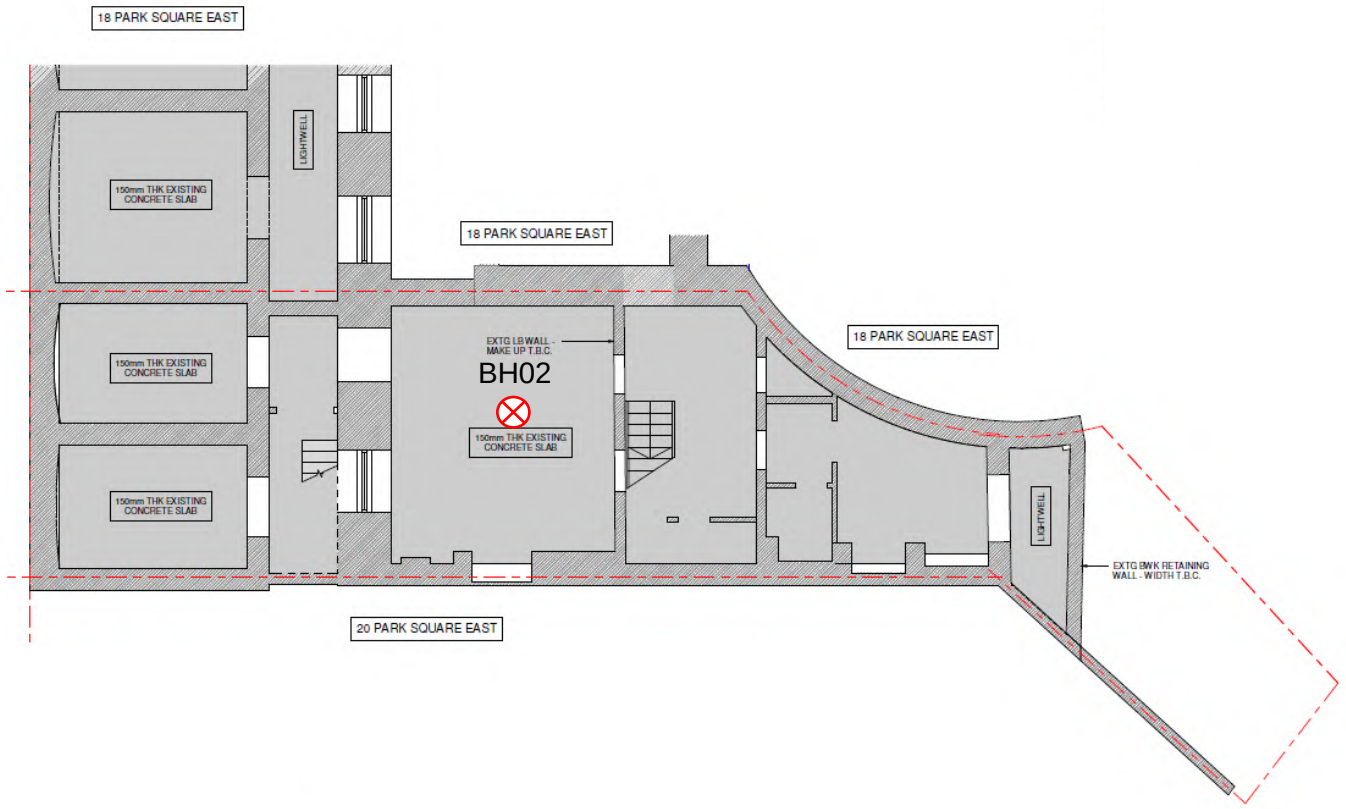
FIGURE 2 (page 2 of 3)

INFRASTRUCTURE
Giving our all

Northdown House, Ashford Road, Harrietsham, Maidstone
Kent, ME17 1QW
Telephone: 01622 858545 Facsimile: 01622 858544

The Diorama

Lead No.	Created By:	Checked:	Approved:	Date:
1038915	**JM**	**PJW**	**PJW**	**November 2019**



Approximate Exploratory Hole Location Plan

Scale: Not to Scale

FIGURE 2 (page 3 of 3)

APPENDIX A

Fieldwork

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**	Hole Diameter (mm): 100 to 20.45m	BOREHOLE NUMBER **BH01**
Method: Cable Percussion	Casing Dia. (mm): 150 to 7.50m	
Date Started: 14/10/2019 Co-ordinates	Ground Level (m AOD) 28.50 Ref. No: **1038915**	Sheet 1 of 3

Backfill/Well Depth (m)	Backfill/Well Legend	Water Depth (m)	Samples Depth (m)	Samples Type	In Situ Tests Type	In Situ Tests Results	Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
			0.00 - 1.00	B			28.50	(0.25)	Concrete.	
0.50			0.50	D			28.25	0.25	Firm, brown, slightly gravelly CLAY. Gravel is angular to rounded, fine and medium flint. (Langley Silt Member)	
			1.20	D	C	N = 4		(1.45)		
			1.70	D			26.80	1.70		
2.00			2.00	D	C	N = 8		(0.30)	Soft, brown slightly fine sandy, silty CLAY. (Langley Silt Member)	
			2.50	D			26.50	2.00	Loose to medium dense, brown, slightly fine sandy, becoming very sandy at 4m below ground level GRAVEL of sub-angular to rounded, fine to course flint. Low cobble content of rounded flint. (Lynch Hill Gravel Member)	
			3.00	D	C	N = 8				
			3.00 - 4.00	B						
			3.50	D						
			4.00	D	C	N = 18				
			4.50	D				(5.20)		
			5.00	D	C	N = 23				
			6.00	D						
			6.00 - 7.00	B						
			6.50	D	C	N = 24				
7.00	W						21.30	7.20	Stiff brown mottled grey, becoming brown and grey mottled at 9m below ground level, CLAY with occasional sand size selenite and silt partings. (Weathered London Clay Formation)	
7.50			7.50	D						
		8.00	8.00	D	C	N = 12		(2.80)		
			9.00	D						
		9.50	9.50	D	C	N = 13				

General Remarks:

1. Water strike at 9.5m rising to 8m below ground level after 20 minutes.

Driller:	LH	**BOREHOLE RECORD** Scale 1:50 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A1**
Appr'd:			

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**	Hole Diameter (mm): 100 to 20.45m	BOREHOLE NUMBER **BH01**
Method: Cable Percussion	Casing Dia. (mm): 150 to 7.50m	
Date Started: 14/10/2019 Co-ordinates	Ground Level (m AOD) 28.50 Ref. No: **1038915**	Sheet 2 of 3

Backfill/Well Depth (m)	Backfill/Well Legend	Water Depth (m)	Samples Depth (m)	Samples Type	In Situ Tests Type	In Situ Tests Results	Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
			10.50	D			18.50	10.00	Stiff, grey, very closely to closely fissured CLAY with rare fine and medium sand size selenite. (London Clay Formation)	
			11.00	D	C	N = 18				
			11.00 - 12.00	B						
			12.50	D	C	N = 19				
			13.50	D						
					C	N = 19				
								(10.45)		
					C	N = 24				
			16.00 - 17.00	B						
					C	N = 27				
					C	N = 25				

General Remarks:

1. Water strike at 9.5m rising to 8m below ground level after 20 minutes.

Driller:	LH	**BOREHOLE RECORD** Scale 1:50 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A1**
Appr'd:			

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**	Hole Diameter (mm): 100 to 20.45m	BOREHOLE NUMBER **BH01**
Method: Cable Percussion	Casing Dia. (mm): 150 to 7.50m	
Date Started: 14/10/2019 Co-ordinates	Ground Level (m AOD) 28.50 Ref. No: **1038915**	Sheet 3 of 3

Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results				
20.00					C	N = 28	8.05	20.45	End of Borehole at 20.45m	

General Remarks:

1. Water strike at 9.5m rising to 8m below ground level after 20 minutes.

Driller:	LH	**BOREHOLE RECORD** Scale 1:50 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A1**
Appr'd:			

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**	Hole Diameter (mm): 75mm tapering with depth to 18.45m	BOREHOLE NUMBER **BH02**
Method: Windowless Sampler		
Date Started: 21/10/2019 Co-ordinates	Ground Level (m AOD) 26.10 Ref. No: **1038915**	Sheet 1 of 3

Backfill/Well Depth (m)	Backfill/Well Legend	Water Depth (m)	Samples Depth (m)	Samples Type	In Situ Tests Type	In Situ Tests Results	Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
							26.10	(0.32)	Concrete.	
0.50							25.78	0.32	Dense to very dense, brown, very fine to coarse sandy, locally sandy GRAVEL of sub-rounded to rounded, fine to coarse flint. (Lynch Hill Gravel Member)	
1.00			1.00 - 2.00	B	S	N = 58				
			2.00 - 3.00	B	S	N = 42				
			3.00 - 4.00	B	S	N = 47		(5.18)		
			4.00 - 5.00	B	S	N = 43				
			5.00 - 6.00	B	S	N = 14				
							20.60	5.50	Stiff, brown mottled grey CLAY with rare silty fine sand partings. (Weathered London Clay Formation)	
								(0.40)		
6.00	W		6.00 - 7.00	B	S	N = 25	20.20	5.90	Stiff, grey, very closely to closely fissured CLAY with rare fine and medium sand size selenite. (London Clay Formation)	
6.50										

General Remarks:
1. Gravel transitioning to Clay at 5.0m below ground level, inferred from drop in SPT N value.

Driller:	AR	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A2**
Appr'd:			

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**	Hole Diameter (mm): 75mm tapering with depth to 18.45m	BOREHOLE NUMBER **BH02**
Method: Windowless Sampler		
Date Started: 21/10/2019 Co-ordinates	Ground Level (m AOD) 26.10 Ref. No: **1038915**	Sheet 2 of 3

Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results				
			7.00 - 8.00	B	S	N = 24				
			8.00 - 9.00	B	S	N = 26				
			9.00 - 10.00	B	S	N = 24				
			10.00 - 11.00	B	S	N = 29				
			11.00 - 12.00	B	S	N = 33				
			12.00 - 13.00	B	C	N = 38		(12.55)		
			13.00 - 14.00	B	S	N = 38				

General Remarks:
1. Gravel transitioning to Clay at 5.0m below ground level, inferred from drop in SPT N value.

Driller:	AR	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A2**
Appr'd:			

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**	Hole Diameter (mm): 75mm tapering with depth to 18.45m	BOREHOLE NUMBER **BH02**
Method: Windowless Sampler		
Date Started: 21/10/2019 Co-ordinates	Ground Level (m AOD) 26.10 Ref. No: **1038915**	Sheet 3 of 3

Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results				
			14.00 - 15.00	B	S	N = 44				
			15.00 - 16.00	B						
			16.00 - 17.00	B	S	N = 44				
			17.00 - 18.00	B						
					S	N = 52				
							7.65	18.45	End of Borehole at 18.45m	

General Remarks:
1. Gravel transitioning to Clay at 5.0m below ground level, inferred from drop in SPT N value.

Driller:	AR	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A2**
Appr'd:			

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**	Hole Diameter (mm): 75mm tapering with depth to 20m	BOREHOLE NUMBER **BH03**
Method: Windowless Sampler		
Date Started: 25/10/2019 Co-ordinates	Ground Level (m AOD) 30.10 Ref. No: **1038915**	Sheet 1 of 4

Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results				
			0.00 - 1.00	B			30.10	(0.10)	Decorative gravel.	
0.50							30.00	0.10	Loose, dark brown mottled red, very clayey, slightly fine to coarse sandy GRAVEL of angular to rounded, fine to coarse flint and brick. Low cobble content of angular brick. (Made Ground)	
			1.00 - 2.00	B	S	N = 4		(1.80)		
2.00			2.00 - 3.00	B	S	N = 14	28.20	1.90	Firm becoming stiff with depth, brown, slightly gravelly CLAY. Gravel is angular to rounded, fine and medium flint. (Langley Silt Member)	
			3.00 - 4.00	B	S	N = 51		(1.20)		
			4.00 - 5.00	B	S	N =50/160mm	27.00	3.10	Very dense, brown, very fine to coarse sandy, locally sandy GRAVEL of sub-rounded to rounded, fine to coarse flint. (Lynch Hill Gravel Member)	
			5.00 - 6.00	B	S	N =50/275mm				
			6.00 - 7.00	B	S	N = 50		(5.90)		

General Remarks:

Driller:	MW	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A3**
Appr'd:			

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**	Hole Diameter (mm): 75mm tapering with depth to 20m	BOREHOLE NUMBER **BH03**
Method: Windowless Sampler		
Date Started: 25/10/2019 Co-ordinates	Ground Level (m AOD) 30.10 Ref. No: **1038915**	Sheet 2 of 4

Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results				
			7.00 - 8.00	B	S	N = 62				
			8.00 - 9.00	B	S	N = 50				
			9.00 - 10.00	B	S	N = 22	21.10	9.00	Stiff, brown mottled grey CLAY with rare silty fine sand partings. (Weathered London Clay Formation)	
								(0.80)		
10.00	W		10.00 - 11.00	B	S	N = 33	20.30	9.80	Stiff, grey, very closely to closely fissured CLAY with rare fine and medium sand size selenite. (London Clay Formation)	
10.50										
			11.00 - 12.00	B	S	N = 25				
			12.00 - 13.00	B	S	N = 28				
			13.00 - 14.00	B	S	N = 35				

General Remarks:

Driller:	MW	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A3**
Appr'd:			

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**			Hole Diameter (mm): 75mm tapering with depth to 20m		BOREHOLE NUMBER **BH03**
Method: Windowless Sampler					Sheet 3 of 4
Date Started: 25/10/2019	Co-ordinates		Ground Level (m AOD) 30.10	Ref. No: **1038915**	

Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results				
			14.00 - 15.00	B	S	N = 42				
			15.00 - 16.00	B	S	N =50/95mm		(10.20)		
			16.00 - 17.00	B						
			17.00 - 18.00	B	S	N = 21				
			18.00 - 19.00	B						
			19.00 - 20.00	B	S	N = 33				

General Remarks:

Driller:	MW	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A3**
Appr'd:			

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**	Hole Diameter (mm): 75mm tapering with depth to 20m	BOREHOLE NUMBER **BH03**
Method: Windowless Sampler		Sheet 4 of 4
Date Started: 25/10/2019 Co-ordinates	Ground Level (m AOD) 30.10	Ref. No: **1038915**

Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results				
							10.10	20.00	End of Borehole at 20.00m	

General Remarks:

Driller:	MW	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A3**
Appr'd:			

APPENDIX B

Laboratory Testing

SUMMARY OF GEOTECHNICAL TESTING

Sample details							Classification Tests					Density Tests		Undrained Triaxial Compression				Chemical Tests			Other tests and comments
Borehole / Trial Pit	Depth (m)	Sample Ref	Type	Spec. Ref	Spec. Depth (m)	Description	WC (%)	LL (%)	PL (%)	PI (%)	<425 µm (%)	Bulk Mg/m³	Dry Mg/m³	Condition	Cell Pressure kPa	Deviator Stress kPa	Shear Stress kPa	pH	2:1 W/S SO4 (g/L)	W/S Mg (mg/L)	
BH01	0.50		B			Greyish brown slightly sandy gravelly silty CLAY with rare cobbles. Gravel includes brick fragments with traces of bitumen.															Particle Size Distribution
BH01	1.20		D			Brown slightly fine sandy silty CLAY with rare fine chalk gravel.	29.0	62	19	43	99										
BH01	3.00-4.00		B			Orangish brown very sandy GRAVEL.															Particle Size Distribution
BH01	6.00-7.00		B			Yellowish brown very gravelly SAND.															Particle Size Distribution
BH01	8.00		D			Brown and dark brown slightly fine sandy silty CLAY with rare fine gravel.	29.3	80	26	54	99										
BH01	10.50		D			Dark grey and dark brown slightly fine sandy silty CLAY with rare fine gravel.	30.5	74	25	49	99										
BH02	1.00-2.00		WS			Orangish brown SAND and GRAVEL.															Particle Size Distribution
BH02	4.00-5.00		WS			Orangish brown very gravelly SAND.															Particle Size Distribution
BH02	5.00-6.00		WS		5.50	Dark brown and dark greyish brown slightly sandy slightly gravelly silty CLAY.	28.2	72	29	43	92										
BH02	6.00-7.00		WS			Dark brown slightly fine sandy silty CLAY.	26.7	74	25	49	100										

Sample type: B (Bulk disturb.) BLK (Block) C (Core) D (Disturbed) LB (Large Bulk dist.) U (Undisturbed)

Checked and Approved by

S Burke

S Burke - Senior Technician
18/12/2019

Project Number:

GEO / 30305

Project Name:

THE DIORAMA
1038915

GEOLABS®

SUMMARY OF GEOTECHNICAL TESTING

Sample details							Classification Tests					Density Tests		Undrained Triaxial Compression				Chemical Tests			Other tests and comments
Borehole / Trial Pit	Depth (m)	Sample Ref	Type	Spec. Ref	Spec. Depth (m)	Description	WC (%)	LL (%)	PL (%)	PI (%)	<425 µm (%)	Bulk Mg/m³	Dry Mg/m³	Condition	Cell Pressure kPa	Deviator Stress kPa	Shear Stress kPa	pH	2:1 W/S SO4 (g/L)	W/S Mg (mg/L)	
BH03	2.00-3.00		WS			Dark brown and yellowish brown slightly sandy silty CLAY with rare gravel.		71	20	51	97										
BH03	3.00-4.00		WS			Orangish brown very sandy GRAVEL.															Particle Size Distribution
BH03	4.00-5.00		WS			Orangish brown SAND and GRAVEL.															Particle Size Distribution
BH03	5.00-6.00		WS			Yellowish brown very sandy GRAVEL.															Particle Size Distribution
BH03	7.00-8.00		WS			Orangish brown SAND and GRAVEL.															Particle Size Distribution
BH03	9.00-10.00		WS			Dark brown slightly fine sandy silty CLAY.		81	26	55	100										
BH03	11.00-12.00		WS			Dark brown slightly fine sandy silty CLAY.	22.9	71	22	49	100										

Sample type: B (Bulk disturb.) BLK (Block) C (Core) D (Disturbed) LB (Large Bulk dist.) U (Undisturbed)

Checked and Approved by

S Burke

S Burke - Senior Technician
18/12/2019

Project Number:

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Project Name:

THE DIORAMA
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BS EN ISO 17892-4 : 2016

PARTICLE SIZE DISTRIBUTION

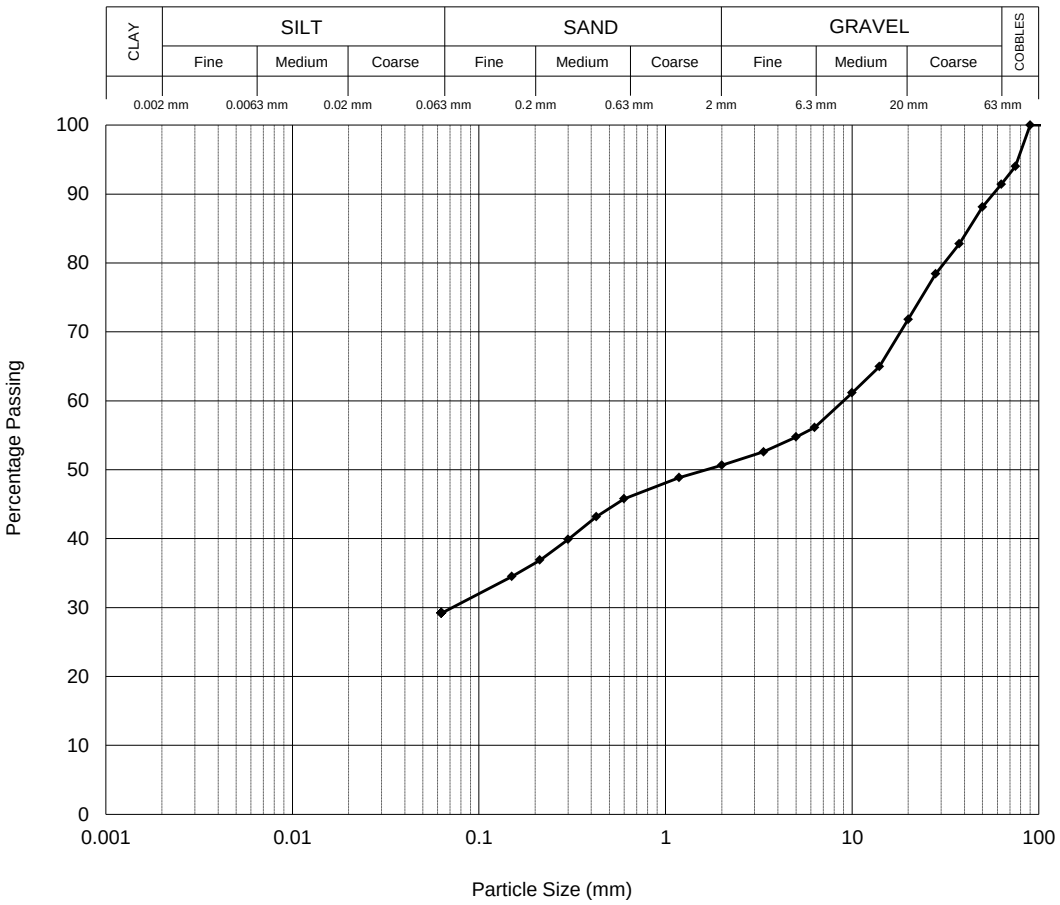
BH / TP No.	BH01
Depth (m)	0.50
Sample Type	B

Description

Greyish brown slightly sandy gravelly silty CLAY with rare cobbles. Gravel includes brick fragments with traces of bitumen.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	94
63.0 mm	91
50.0 mm	88
37.5 mm	83
28.0 mm	78
20.0 mm	72
14.0 mm	65
10.0 mm	61
6.30 mm	56
5.00 mm	55
3.35 mm	53
2.00 mm	51
1.18 mm	49
600 µm	46
425 µm	43
300 µm	40
212 µm	37
150 µm	34
63 µm	29



Particle Proportions	
Cobbles	9
Gravel	41
Sand	21
Silt & Clay	29

Checked and Approved by

S Burke

S Burke - Senior Technician
18/12/2019

Project Number:

GEO / 30305

Project Name:

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BS EN ISO 17892-4 : 2016

PARTICLE SIZE DISTRIBUTION

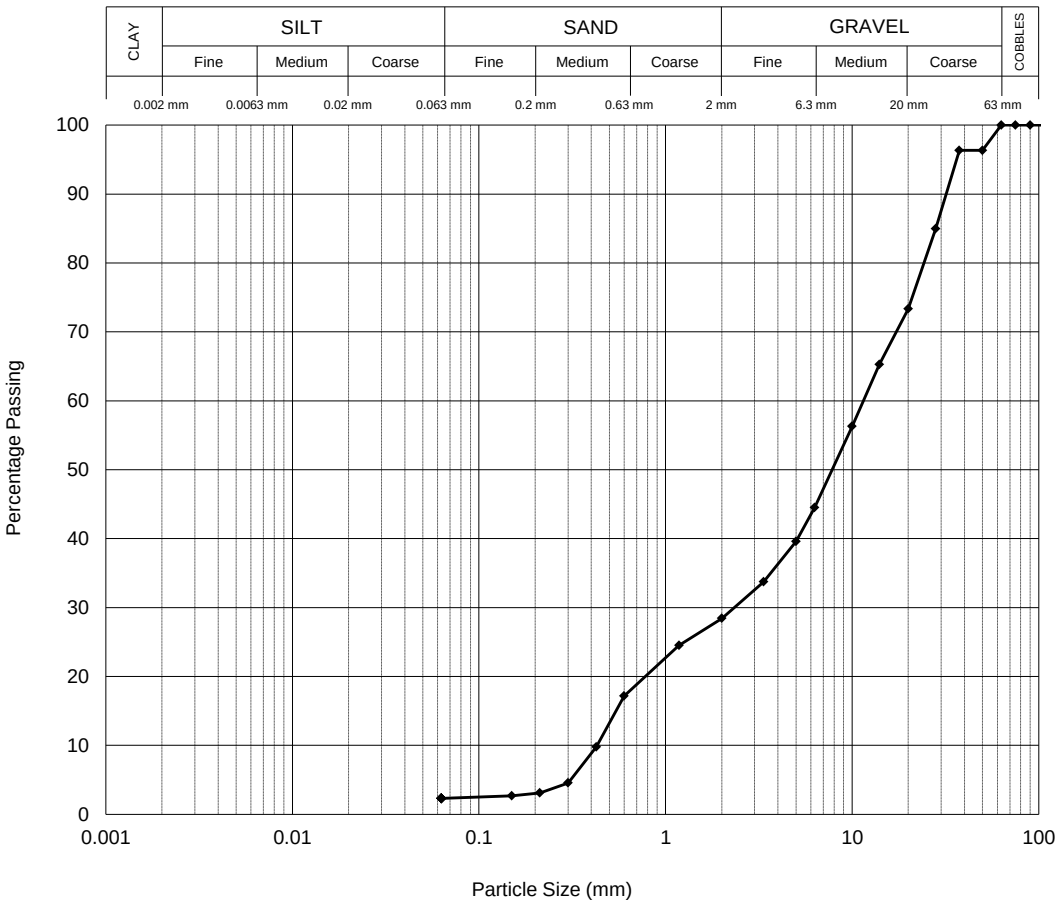
BH / TP No.	BH01
Depth (m)	3.00-4.00
Sample Type	B

Description

Orangish brown very sandy GRAVEL.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Dry Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	96
37.5 mm	96
28.0 mm	85
20.0 mm	73
14.0 mm	65
10.0 mm	56
6.30 mm	45
5.00 mm	40
3.35 mm	34
2.00 mm	28
1.18 mm	25
600 µm	17
425 µm	10
300 µm	5
212 µm	3
150 µm	3
63 µm	2



Particle Proportions	
Cobbles	0
Gravel	72
Sand	26
Silt & Clay	2

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S Burke

S Burke - Senior Technician
18/12/2019

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BS EN ISO 17892-4 : 2016

PARTICLE SIZE DISTRIBUTION

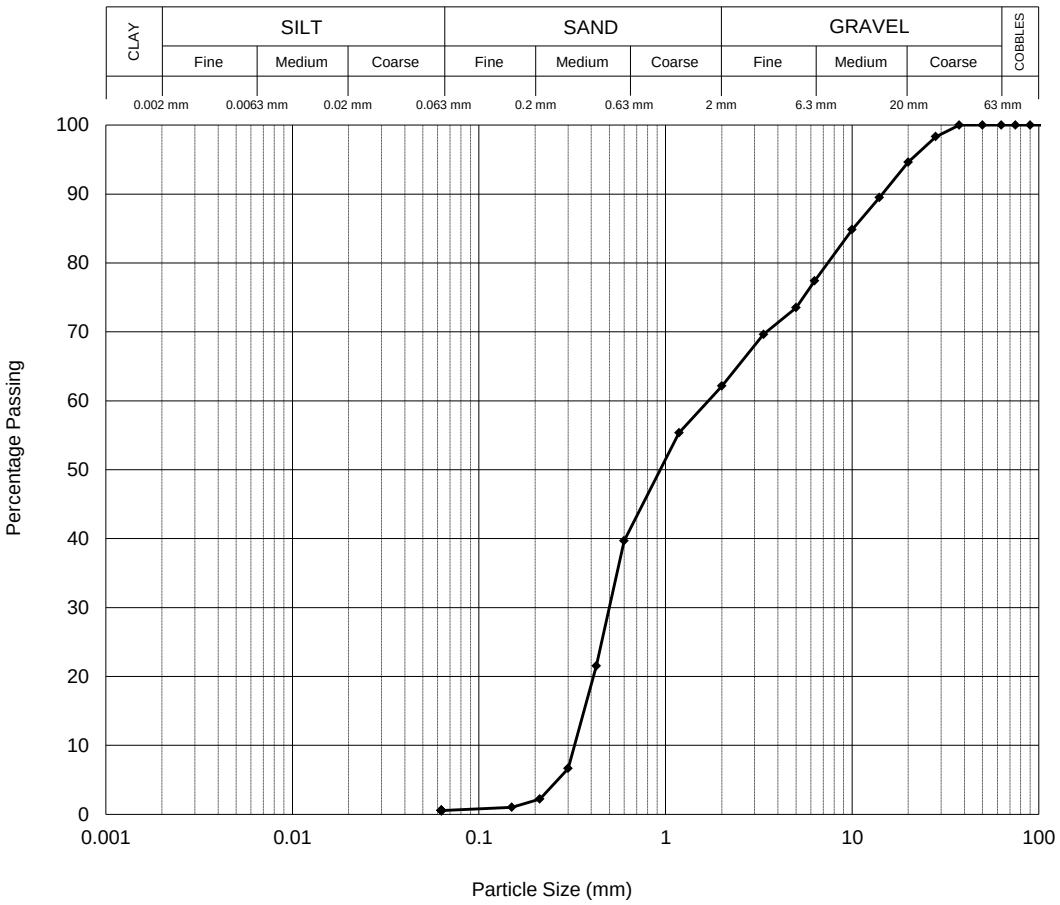
BH / TP No.	BH01
Depth (m)	6.00-7.00
Sample Type	B

Description

Yellowish brown very gravelly SAND.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Dry Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	98
20.0 mm	95
14.0 mm	89
10.0 mm	85
6.30 mm	77
5.00 mm	73
3.35 mm	70
2.00 mm	62
1.18 mm	55
600 µm	40
425 µm	22
300 µm	7
212 µm	2
150 µm	1
63 µm	1



Particle Proportions	
Cobbles	0
Gravel	38
Sand	62
Silt & Clay	0

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S Burke

S Burke - Senior Technician
18/12/2019

Project Number:

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BS EN ISO 17892-4 : 2016

PARTICLE SIZE DISTRIBUTION

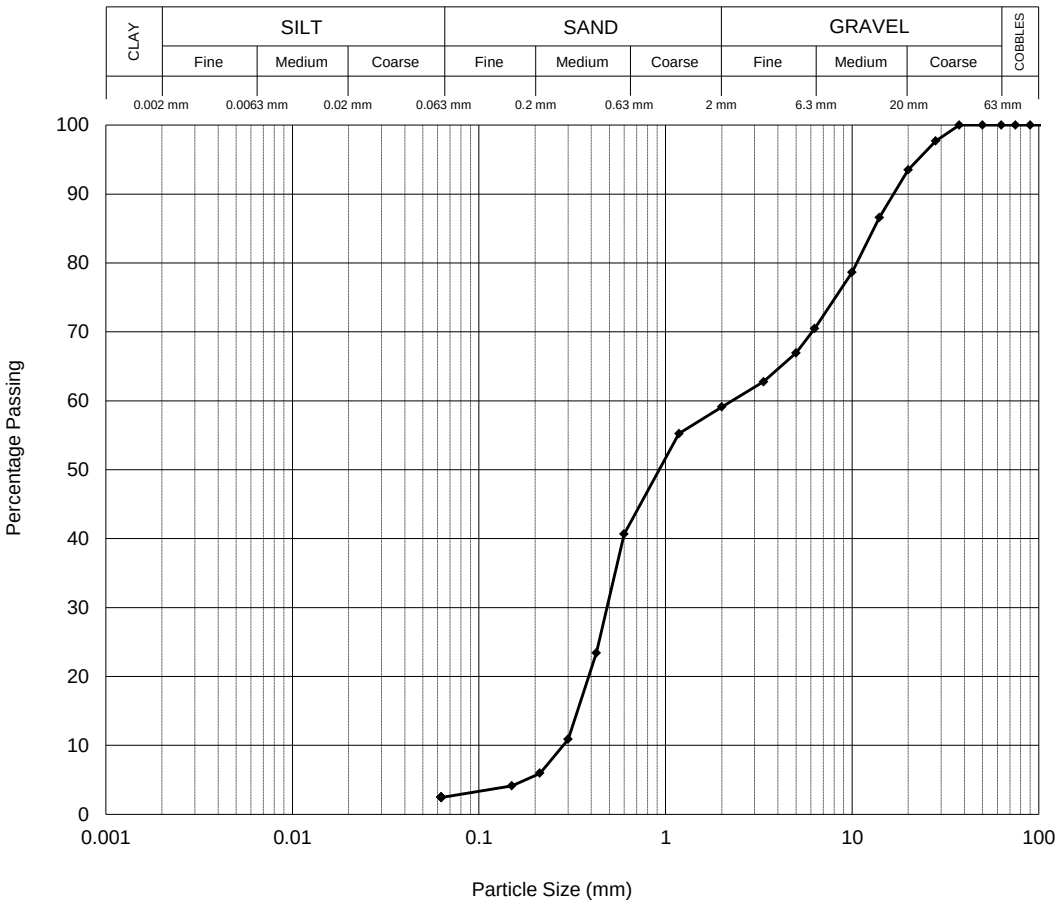
BH / TP No.	BH02
Depth (m)	1.00-2.00
Sample Type	WS

Description

Orangish brown SAND and GRAVEL.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Dry Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	98
20.0 mm	94
14.0 mm	87
10.0 mm	79
6.30 mm	70
5.00 mm	67
3.35 mm	63
2.00 mm	59
1.18 mm	55
600 µm	41
425 µm	23
300 µm	11
212 µm	6
150 µm	4
63 µm	2



Particle Proportions	
Cobbles	0
Gravel	41
Sand	57
Silt & Clay	2

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S Burke

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BS EN ISO 17892-4 : 2016

PARTICLE SIZE DISTRIBUTION

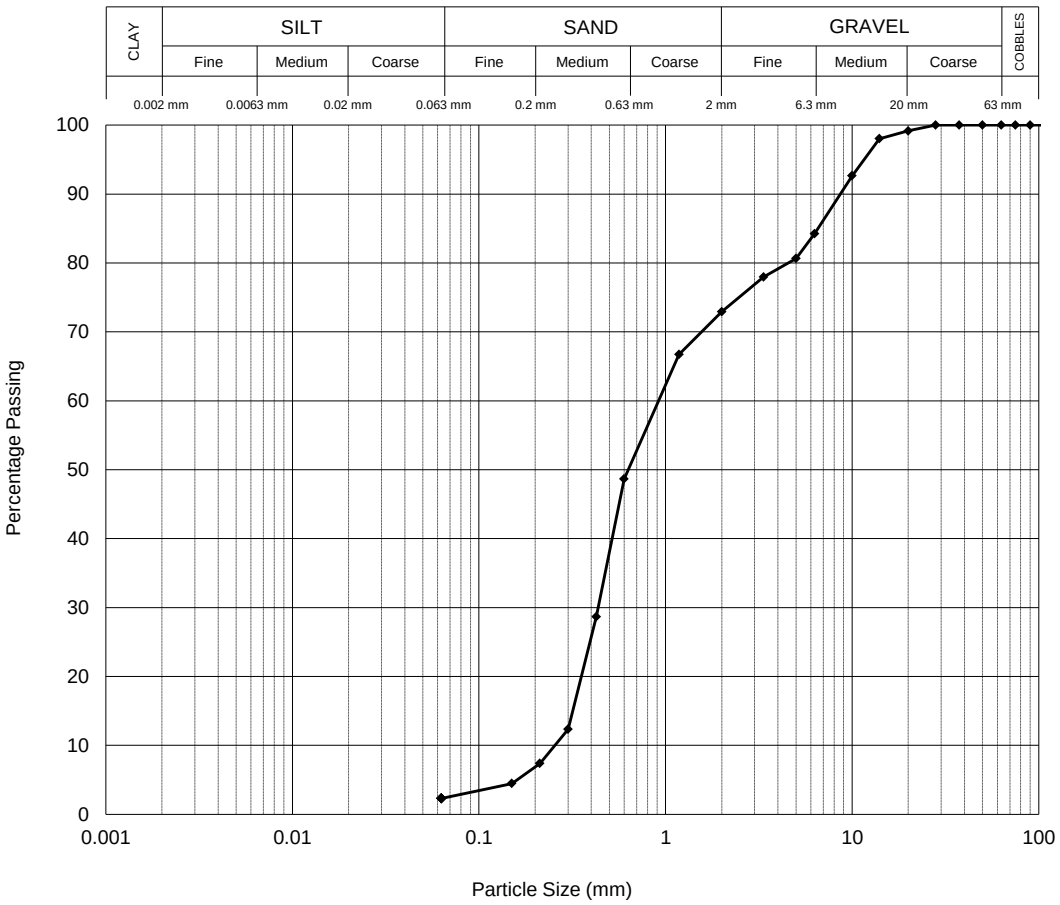
BH / TP No.	BH02
Depth (m)	4.00-5.00
Sample Type	WS

Description

Orangish brown very gravelly SAND.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Dry Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	99
14.0 mm	98
10.0 mm	93
6.30 mm	84
5.00 mm	81
3.35 mm	78
2.00 mm	73
1.18 mm	67
600 µm	49
425 µm	29
300 µm	12
212 µm	7
150 µm	4
63 µm	2



Particle Proportions	
Cobbles	0
Gravel	27
Sand	71
Silt & Clay	2

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S Burke

S Burke - Senior Technician
18/12/2019

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BS EN ISO 17892-4 : 2016

PARTICLE SIZE DISTRIBUTION

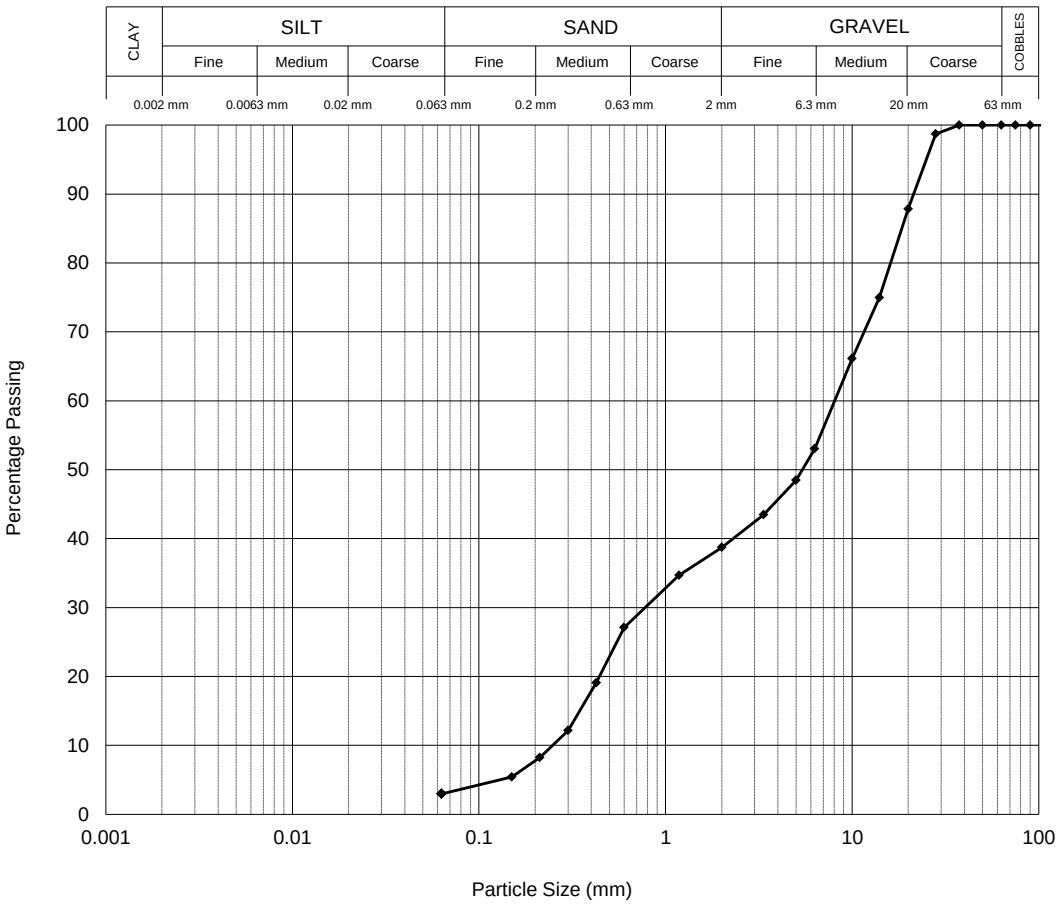
BH / TP No.	BH03
Depth (m)	3.00-4.00
Sample Type	WS

Description

Orangish brown very sandy GRAVEL.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Dry Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	99
20.0 mm	88
14.0 mm	75
10.0 mm	66
6.30 mm	53
5.00 mm	48
3.35 mm	43
2.00 mm	39
1.18 mm	35
600 µm	27
425 µm	19
300 µm	12
212 µm	8
150 µm	5
63 µm	3



Particle Proportions	
Cobbles	0
Gravel	61
Sand	36
Silt & Clay	3

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S Burke

S Burke - Senior Technician
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BS EN ISO 17892-4 : 2016

PARTICLE SIZE DISTRIBUTION

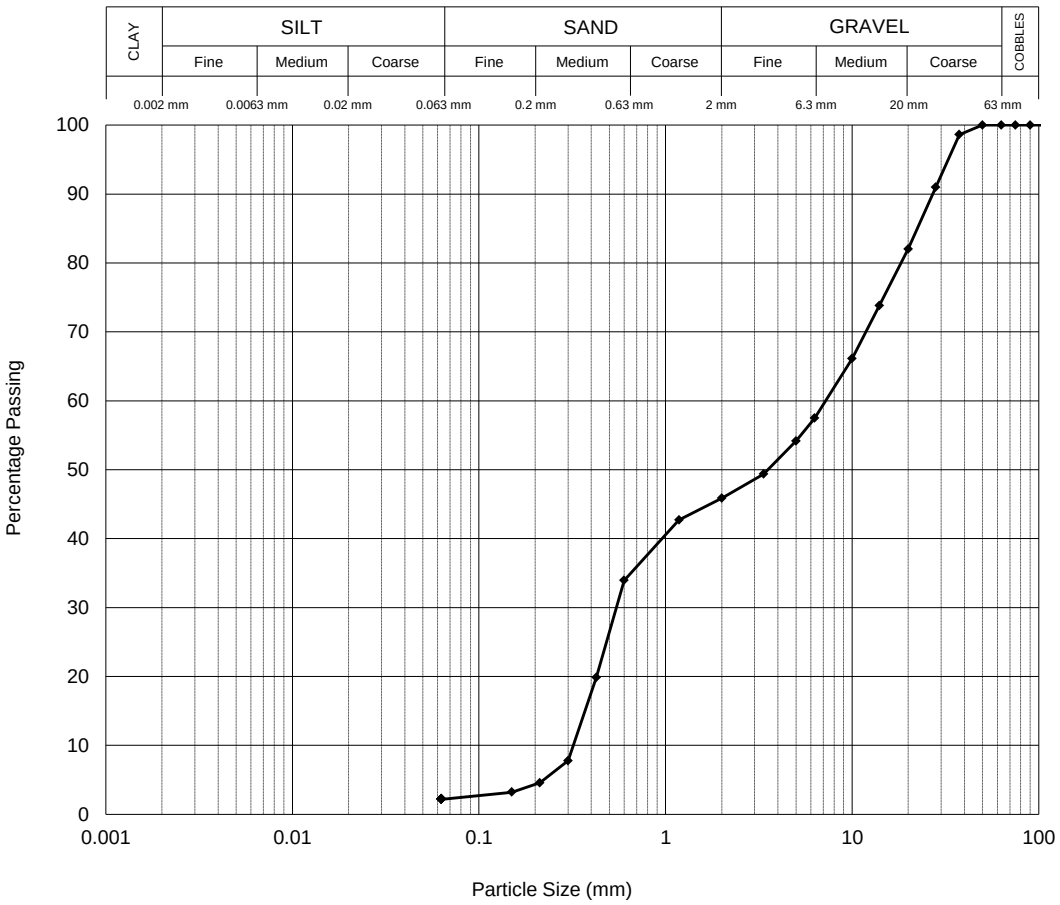
BH / TP No.	BH03
Depth (m)	4.00-5.00
Sample Type	WS

Description

Orangish brown SAND and GRAVEL.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Dry Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	99
28.0 mm	91
20.0 mm	82
14.0 mm	74
10.0 mm	66
6.30 mm	57
5.00 mm	54
3.35 mm	49
2.00 mm	46
1.18 mm	43
600 µm	34
425 µm	20
300 µm	8
212 µm	5
150 µm	3
63 µm	2



Particle Proportions	
Cobbles	0
Gravel	54
Sand	44
Silt & Clay	2

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S Burke

S Burke - Senior Technician
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BS EN ISO 17892-4 : 2016

PARTICLE SIZE DISTRIBUTION

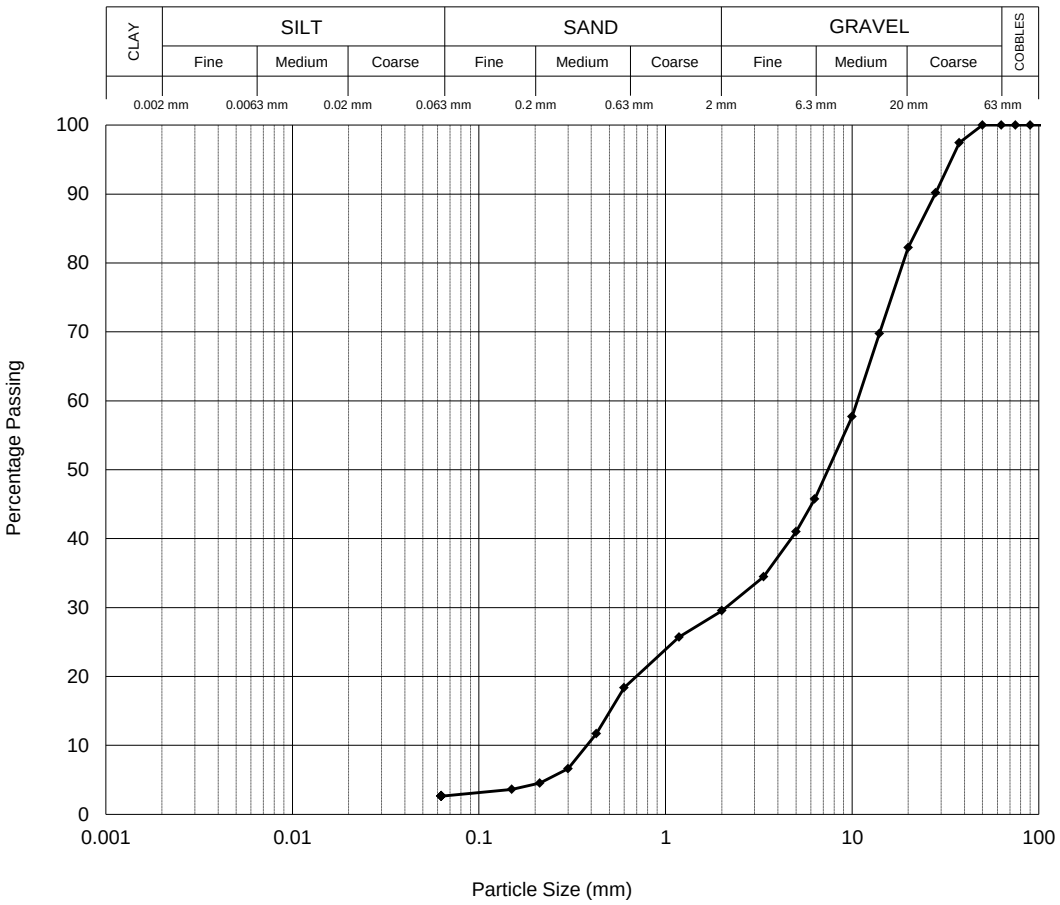
BH / TP No.	BH03
Depth (m)	5.00-6.00
Sample Type	WS

Description

Yellowish brown very sandy GRAVEL.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Dry Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	97
28.0 mm	90
20.0 mm	82
14.0 mm	70
10.0 mm	58
6.30 mm	46
5.00 mm	41
3.35 mm	34
2.00 mm	30
1.18 mm	26
600 µm	18
425 µm	12
300 µm	7
212 µm	5
150 µm	4
63 µm	3



Particle Proportions	
Cobbles	0
Gravel	70
Sand	27
Silt & Clay	3

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S Burke

S Burke - Senior Technician
18/12/2019

Project Number:

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PARTICLE SIZE DISTRIBUTION

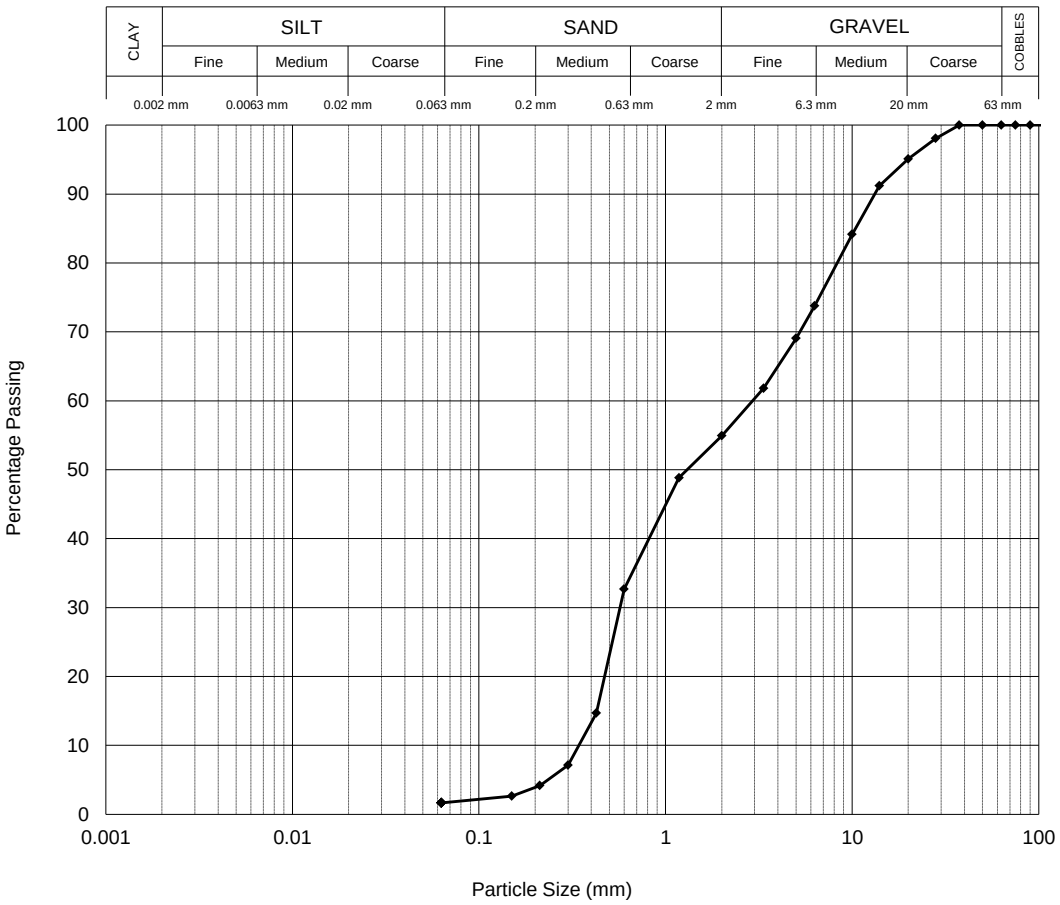
BH / TP No.	BH03
Depth (m)	7.00-8.00
Sample Type	WS

Description

Orangish brown SAND and GRAVEL.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Dry Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	98
20.0 mm	95
14.0 mm	91
10.0 mm	84
6.30 mm	74
5.00 mm	69
3.35 mm	62
2.00 mm	55
1.18 mm	49
600 µm	33
425 µm	15
300 µm	7
212 µm	4
150 µm	3
63 µm	2



Particle Proportions	
Cobbles	0
Gravel	45
Sand	53
Silt & Clay	2

Checked and Approved by

S Burke

S Burke - Senior Technician
18/12/2019

Project Number:

GEO / 30305

Project Name:

THE DIORAMA
1038915

GEOLABS

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Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

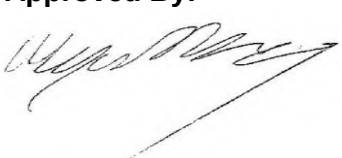
UKAS TESTING
2183

Final Report

Report No.:	19-41044-1
Initial Date of Issue:	31-Dec-2019
Client	GEOLABS Limited
Client Address:	Bucknalls Lane Garston Watford Hertfordshire WD25 9XX
Contact(s):	ChemResults
Project	GEO/30305 Park Square East

Quotation No.:	Q17-10216	**Date Received:**	06-Dec-2019
Order No.:	GEO/30305	**Date Instructed:**	09-Dec-2019
No. of Samples:	10		
Turnaround (Wkdays):	5	**Results Due:**	13-Dec-2019
Date Approved:	31-Dec-2019		

Approved By:



Details: Glynn Harvey, Laboratory Manager

Chemtest
The right chemistry to deliver results

Results - Soil

Project: GEO/30305 Park Square East

Client: GEOLABS Limited				**Chemtest Job No.:**	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044
Quotation No.: Q17-10216				**Chemtest Sample ID.:**	939523	939524	939525	939526	939527	939528	939529	939530	939531	939532
Order No.: GEO/30305				Client Sample Ref.:	D1									B
				Client Sample ID.:	344348	344383	344391	344387	344381	344392	344369	344365	344372	344749
				Sample Location:	BH01	BH02	BH02	BH02	BH02	BH03	BH03	BH03	BH03	BH01
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.50	1.00	2.00	5.00	12.00	2.00	4.00	9.00	11.00	0.50
				Bottom Depth (m):		2.00	3.00	6.00	13.00	3.00	5.00	10.00	12.00	
				Asbestos Lab:	COVENTRY									COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
ACM Type	U	2192		N/A	-									-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected									No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-									-
Moisture	N	2030	%	0.020	17	1.9	2.5	18	15	13	3.0	17	17	15
Chromatogram (TPH)	N			N/A	See Attached									See Attached
pH	U	2010		4.0	[A] 9.2			[A] 9.2	[A] 9.1			[A] 8.9	[A] 8.8	[A] 9.8
pH (2.5:1)	N	2010		4.0		[A] 9.1	[A] 8.6			[A] 8.4	[A] 9.4			
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	< 0.40									0.87
Magnesium (Water Soluble)	N	2120	g/l	0.010				0.99	2.3			2.2	6.2	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.16	0.027	0.063	0.017	0.099	< 0.010	< 0.010	0.076	0.39	0.40
Total Sulphur	U	2175	%	0.010				[A] 0.046	[A] 0.41			[A] 0.18	[A] 0.78	
Chloride (Water Soluble)	U	2220	g/l	0.010				[A] < 0.010	[A] 0.016			[A] < 0.010	[A] 0.029	
Nitrate (Water Soluble)	N	2220	g/l	0.010				< 0.010	< 0.010			< 0.010	< 0.010	
Cyanide (Free)	U	2300	mg/kg	0.50	[A] < 0.50									[A] < 0.50
Ammonium (Water Soluble)	U	2120	g/l	0.01				0.90	0.44			0.42	0.62	
Sulphate (Total)	U	2430	%	0.010				[A] 0.038	[A] 0.82			[A] 0.33	[A] 1.1	
Arsenic	U	2450	mg/kg	1.0	8.1									15
Cadmium	U	2450	mg/kg	0.10	0.20									0.26
Chromium	U	2450	mg/kg	1.0	12									23
Copper	U	2450	mg/kg	0.50	8.6									34
Mercury	U	2450	mg/kg	0.10	< 0.10									0.13
Nickel	U	2450	mg/kg	0.50	16									22
Lead	U	2450	mg/kg	0.50	11									560
Selenium	U	2450	mg/kg	0.20	0.20									< 0.20
Zinc	U	2450	mg/kg	0.50	25									90
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50									< 0.50
Total Organic Carbon	U	2625	%	0.20	[A] 0.23									[A] 0.48
Fuel Type	N	2670		N/A	N/A									N/A
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0

Chemtest
The right chemistry to deliver results

Results - Soil

Project: GEO/30305 Park Square East

Client: GEOLABS Limited					**Chemtest Job No.:**	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044
Quotation No.: Q17-10216					**Chemtest Sample ID.:**	939523	939524	939525	939526	939527	939528	939529	939530	939531	939532
Order No.: GEO/30305					Client Sample Ref.:	D1									B
					Client Sample ID.:	344348	344383	344391	344387	344381	344392	344369	344365	344372	344749
					Sample Location:	BH01	BH02	BH02	BH02	BH02	BH03	BH03	BH03	BH03	BH01
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.00	2.00	5.00	12.00	2.00	4.00	9.00	11.00	0.50
					Bottom Depth (m):		2.00	3.00	6.00	13.00	3.00	5.00	10.00	12.00	
					Asbestos Lab:	COVENTRY									COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**											
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[AC] < 5.0									[AC] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[AC] < 5.0									[AC] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[AC] < 10									[AC] < 10
Naphthalene	U	2700	mg/kg	0.10	[A] < 0.10									[A] < 0.10
Acenaphthylene	U	2700	mg/kg	0.10	[A] < 0.10									[A] < 0.10
Acenaphthene	U	2700	mg/kg	0.10	[A] < 0.10									[A] < 0.10
Fluorene	U	2700	mg/kg	0.10	[A] < 0.10									[A] < 0.10
Phenanthrene	U	2700	mg/kg	0.10	[A] < 0.10									[A] < 0.10
Anthracene	U	2700	mg/kg	0.10	[A] < 0.10									[A] < 0.10
Fluoranthene	U	2700	mg/kg	0.10	[A] < 0.10									[A] < 0.10
Pyrene	U	2700	mg/kg	0.10	[A] < 0.10									[A] < 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	[A] < 0.10									[A] < 0.10
Chrysene	U	2700	mg/kg	0.10	[A] < 0.10									[A] < 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	[A] < 0.10									[A] < 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	[A] < 0.10									[A] < 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	[A] < 0.10									[A] < 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	[A] < 0.10									[A] < 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	[A] < 0.10									[A] < 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	[A] < 0.10									[A] < 0.10
Coronene	N	2700	mg/kg	0.10	[A] < 0.10									[A] < 0.10
Total Of 17 PAH's	N	2700	mg/kg	2.0	[A] < 2.0									[A] < 2.0
Benzene	U	2760	µg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Toluene	U	2760	µg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Ethylbenzene	U	2760	µg/kg	1.0	[AC] < 1.0									[AC] < 1.0
m & p-Xylene	U	2760	µg/kg	1.0	[AC] < 1.0									[AC] < 1.0
o-Xylene	U	2760	µg/kg	1.0	[AC] < 1.0									[AC] < 1.0
PCB 28	U	2815	mg/kg	0.010	[AC] < 0.010									[AC] < 0.010
PCB 52	U	2815	mg/kg	0.010	[AC] < 0.010									[AC] < 0.010
PCB 90+101	U	2815	mg/kg	0.010	[AC] < 0.010									[AC] < 0.010

Chemtest
The right chemistry to deliver results

Results - Soil

Project: GEO/30305 Park Square East

Client: GEOLABS Limited					**Chemtest Job No.:**	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044
Quotation No.: Q17-10216					**Chemtest Sample ID.:**	939523	939524	939525	939526	939527	939528	939529	939530	939531	939532
Order No.: GEO/30305					Client Sample Ref.:	D1									B
					Client Sample ID.:	344348	344383	344391	344387	344381	344392	344369	344365	344372	344749
					Sample Location:	BH01	BH02	BH02	BH02	BH02	BH03	BH03	BH03	BH03	BH01
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.00	2.00	5.00	12.00	2.00	4.00	9.00	11.00	0.50
					Bottom Depth (m):		2.00	3.00	6.00	13.00	3.00	5.00	10.00	12.00	
					Asbestos Lab:	COVENTRY									COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**											
PCB 118	U	2815	mg/kg	0.010	[AC] < 0.010										[AC] < 0.010
PCB 153	U	2815	mg/kg	0.010	[AC] < 0.010										[AC] < 0.010
PCB 138	U	2815	mg/kg	0.010	[AC] < 0.010										[AC] < 0.010
PCB 180	U	2815	mg/kg	0.010	[AC] < 0.010										[AC] < 0.010
Total PCBs (7 Congeners)	N	2815	mg/kg	0.10	[AC] < 0.10										[AC] < 0.10
Total Phenols	U	2920	mg/kg	0.30	< 0.30										< 0.30

TPH Chromatogram on Soil Sample: 939523

TPH Chromatogram on Soil Sample: 939532

Results - Single Stage WAC

Project: GEO/30305 Park Square East

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	19-41044						
Chemtest Sample ID:	939523						
Sample Ref:	D1						
Sample ID:	344348						
Sample Location:	BH01						
Top Depth(m):	0.50						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.23	3	5	6
Loss On Ignition	2610	U	%	2.7	--	--	10
Total BTEX	2760	U	mg/kg	[AC] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[AC] < 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	U		9.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.017	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.013	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	0.0014	< 0.050	0.5	10	70
Copper	1450	U	0.0011	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0042	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0014	0.014	0.1	0.5	7
Zinc	1450	U	0.0034	< 0.50	4	50	200
Chloride	1220	U	9.2	92	800	15000	25000
Fluoride	1220	U	1.6	16	10	150	500
Sulphate	1220	U	68	680	1000	20000	50000
Total Dissolved Solids	1020	N	160	1600	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	7.8	78	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	17

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: GEO/30305 Park Square East

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	19-41044						
Chemtest Sample ID:	939532						
Sample Ref:	B						
Sample ID:	344749						
Sample Location:	BH01						
Top Depth(m):	0.50						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.48	3	5	6
Loss On Ignition	2610	U	%	1.5	--	--	10
Total BTEX	2760	U	mg/kg	[AC] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[AC] < 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	U		9.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.049	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	0.0062	0.062	0.5	2	25
Barium	1450	U	0.013	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	0.0021	< 0.050	0.5	10	70
Copper	1450	U	0.0013	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0011	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0027	< 0.50	4	50	200
Chloride	1220	U	2.4	24	800	15000	25000
Fluoride	1220	U	0.067	< 1.0	10	150	500
Sulphate	1220	U	44	440	1000	20000	50000
Total Dissolved Solids	1020	N	120	1200	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	6.1	61	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	15

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
939523	D1	344348	BH01		AC	Plastic Tub 500g
939524		344383	BH02		A	Plastic Bag
939525		344391	BH02		A	Plastic Bag
939526		344387	BH02		A	Plastic Bag
939527		344381	BH02		A	Plastic Bag
939528		344392	BH03		A	Plastic Bag
939529		344369	BH03		A	Plastic Bag
939530		344365	BH03		A	Plastic Bag
939531		344372	BH03		A	Plastic Bag
939532	B	344749	BH01		AC	Plastic Bag

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection

Test Methods

SOP	Title	Parameters included	Method summary
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Form

Appendix D – BASEMENT IMPACT ASSESSMENT

Form

Appendix E - THAMES WATER ASSET SEARCH

CommercialDW
Multisite Drainage & Water Enquiry

Thames Water Property Searches

42
Kings Hill Avenue
Kings Hill
West Malling
ME19 4AJKent

Search address supplied	MULTISITESEARCH, Park Square East, London, NW1 4LH
Your reference	VIT001-0018-EMB
Our reference	CDWS/CDWS Standard/2019_3980221
Received date	2 April 2019
Search date	4 April 2019

Keeping you up-to-date

Notification of Price Changes

From 1 September 2018 Thames Water Property Searches will be increasing the price of its Residential CON29DW and Commercial Drainage & Water Enquiries in line with RPI at 3.23%.

For further details on the price increase, please visit our website: www.thameswater-propertysearches.co.uk Please note that any orders received with a higher payment prior to the 1 September 2018 will be non-refundable.

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0845 070 9148

COMMERCIALDW
DRAINAGE AND WATER ENQUIRY

searchcode

CommercialDW
Multisite Drainage & Water Enquiry

Thames Water Property Searches

Search address supplied: MULTISITESEARCH, Park Square East, London, NW1 4LH

Any new owner or occupier will need to contact Thames Water on 0800 316 9800 or log onto our website www.thameswater.co.uk and complete our online form to change the water and drainage services bills to their name.

The following records were searched in compiling this report: - the map of public sewers, the map of waterworks, water and sewer billing records, adoption of public sewer records, building over public sewer records, the register of properties subject to internal foul flooding, the register of properties subject to poor water pressure and the drinking water register. Thames Water Utilities Ltd (TWUL) holds all of these.

TWUL, trading as Property Searches, are responsible in respect of the following:-

(i) any negligent or incorrect entry in the records searched

(ii) any negligent or incorrect interpretation of the records searched

(iii) any negligent or incorrect recording of that interpretation in the search report

(iv) and compensation payments

Please refer to the attached Terms & Conditions.

CoPSO EXECUTIVE MEMBER

Thames Water Property Searches is an Executive member of CoPSO (Council of Property Search Organisations).

Maps, Wayleaves, Easements, Manhole Cover and Invert levels

1.1 Where relevant, please include a copy of an extract from the public sewer map.

A copy of an extract of the public sewer map is included, showing the public sewers, disposal mains and lateral drains in the vicinity of the properties.

1.2 Where relevant, please include a copy of an extract from the map of waterworks.

A copy of an extract from the map of waterworks is included, showing water mains, resource mains or discharge pipes in the vicinity of the properties.

1.3 Wayleaves & Easements

Is there a wayleave/easement agreement giving Thames Water the right to lay or maintain assets or right of access to pass through private land in order to reach the Company's assets?

Yes, records indicate that there is a wayleave and/or an easement affecting this site. Please note that if you require further information about wayleaves and/or easements, these enquiries can not be dealt with over the phone and are dealt with by post only. To request more details about the wayleave and/or an easement please send a copy of your site plan, with the site clearly marked on it, together with copies of the Thames Water plans provided from this search to: Thames Water Property, Clearwater Court, Reading, RG1 8DB, and we will endeavour to respond within 14 days. Alternatively, for further information, please contact either treasa.walsh@thameswater.co.uk or linda.rushton@thameswater.co.uk.

1.4 Manhole

On the copy extract from the public sewer map, please show manhole cover, depth and invert levels where the information is available.

Details of any manhole cover and invert levels applicable to this site are enclosed.

Drainage

2.1 Does foul water from the properties drain to a public sewer?

Records indicate that foul water from all of the properties drains to a public sewer.

2.2 Does surface water from the properties drain to a public sewer?

Records indicate that surface water from all of the properties drains to a public sewer.

2.3 Is a surface water drainage charge payable?

Records confirm that a surface water drainage charge is applicable for the following properties:
19, Park Square East, London, NW1 4LH
Records indicate that Thames Water does not levy charges direct to the following properties, a third party is billed for the water and/or sewerage charges. It is recommended therefore that the charging situation is checked with the vendor:
17, Park Square East, London, NW1 4LH
17, Park Square East, London, NW1 4LH

2.4 Does the public sewer map indicate any public sewer, disposal main or lateral drain within the boundaries of the properties?

The public sewer map indicates that there are no public sewers, disposal mains or lateral drains within the boundaries of the property. However, from the 1st October 2011 there may be lateral drains and/or public sewers which are not recorded on the public sewer map but which may prevent or restrict development of the property.

2.4.1 Does the public sewer map indicate any public pumping station or any other ancillary apparatus within the boundaries of the property?

The public sewer map included indicates that there is no public pumping station within the boundaries of the property.

2.5 Does the public sewer map indicate any public sewer within 30.48 metres (100 feet) of any buildings within the properties?

The public sewer map included indicates that there is a public sewer within 30.48 metres (100 feet) of a building within the property.

2.5.1 Does the public sewer map indicate any public pumping station or any other ancillary apparatus within 50 metres of any buildings within the property?

The public sewer map included indicates that there is no public pumping station within 50 metres of any buildings within the property.

2.6 Are any sewers or lateral drains serving or which are proposed to serve the properties the subject of an existing adoption agreement or an application for such an agreement?

Records confirm that Foul sewers serving the development, of which the property forms part are not the subject of an existing adoption agreement or an application for such an agreement.

The Surface Water sewer(s) and/or Surface Water lateral drain(s) are not the subject of an adoption agreement.

2.7 Has a sewerage undertaker approved or been consulted about any plans to erect a building or extension on the properties over or in the vicinity of a public sewer, disposal main or drain?

There are no records in relation to any approval or consultation about plans to erect a building or extension on the property over or in the vicinity of a public sewer, disposal main or drain. However, the sewerage undertaker might not be aware of a building or extension on the property over or in the vicinity of a public sewer, disposal main or drain.

2.8 Is the building which is or forms part of the properties, at risk of internal flooding due to overloaded public sewers?

The property is not recorded as being at risk of internal flooding due to overloaded public sewers.

From the 1st October 2011 most private sewers, disposal mains and lateral drains were transferred into public ownership It is therefore possible that a property may be at risk of internal flooding due to an overloaded public sewer which the sewerage undertaker is not aware of. For further information it is recommended that enquiries are made of the vendor.

2.9 Please state the distance from the property to the nearest boundary of the nearest sewage treatment works.

The nearest sewage treatment works is OLYMPIC PARK BLACKWATER PLANT which is 8.732 kilometres to the east of the property.

Water

3.1 Are the properties connected to mains water supply?

Records indicate that all of the properties are connected to the mains water supply.

3.2 Are there any water mains, resource mains or discharge pipes within the boundaries of the properties?

The map of waterworks indicates that there are water mains, resource mains or discharge pipes within the boundaries of the property.

3.3 Is any water main or service pipe serving or which is proposed to serve the properties the subject of an existing adoption agreement or an application for such an agreement?

Records confirm that water mains or service pipes serving all of the properties are not the subject of an existing adoption agreement or an application for such an agreement.

3.4 Are the properties at risk of receiving low water pressure or flow?

Records confirm that the property is not recorded on a register kept by the water undertaker as being at risk of receiving low water pressure or flow.

3.5 What is the classification of the water supply for the property?

The water supplied to the property has an average water hardness of 108.6mg/l calcium which is defined as HARD by ThamesWater.

3.6 Please include details of the location of any water meter serving the properties.

Records indicate that the following properties are not served by a water meter.
17, Park Square East, London, NW1 4LH
17, Park Square East, London, NW1 4LH
Records indicate that the following properties are served by a water meter, which is located within the property.
19, Park Square East, London, NW1 4LH

Charging

4.1.1 – Who is responsible for providing the sewerage services for the property?

Thames Water Utilities Limited, Clearwater Court, Reading, RG1 8DB is the sewerage undertaker for the area.

4.1.2 – Who is responsible for providing the water services for the property?

Thames Water Utilities Limited, Clearwater Court, Reading, RG1 8DB is the water undertaker for the area.

4.2 Who bills the properties for sewerage services?

If you wish to know who bills the sewerage services for this property then you will need to contact the current owner. For a list of all potential retailers of sewerage services for the property please visit www.open-water.org.uk

4.3 Who bills the properties for water services?

If you wish to know who bills the water services for this property then you will need to contact the current owner. For a list of all potential retailers of water services for the property please visit www.open-water.org.uk

4.4 Is there a meter installed at this property?

Records indicate that there is a no meter installed at the following properties:
17, Park Square East, London, NW1 4LH
17, Park Square East, London, NW1 4LH
Records indicate that there is a meter installed at the following properties:
19, Park Square East, London, NW1 4LH

4.5 Trade Effluent Consent

Are there any trade effluent consents relating to this site/property for disposal of chemically enhanced waste?

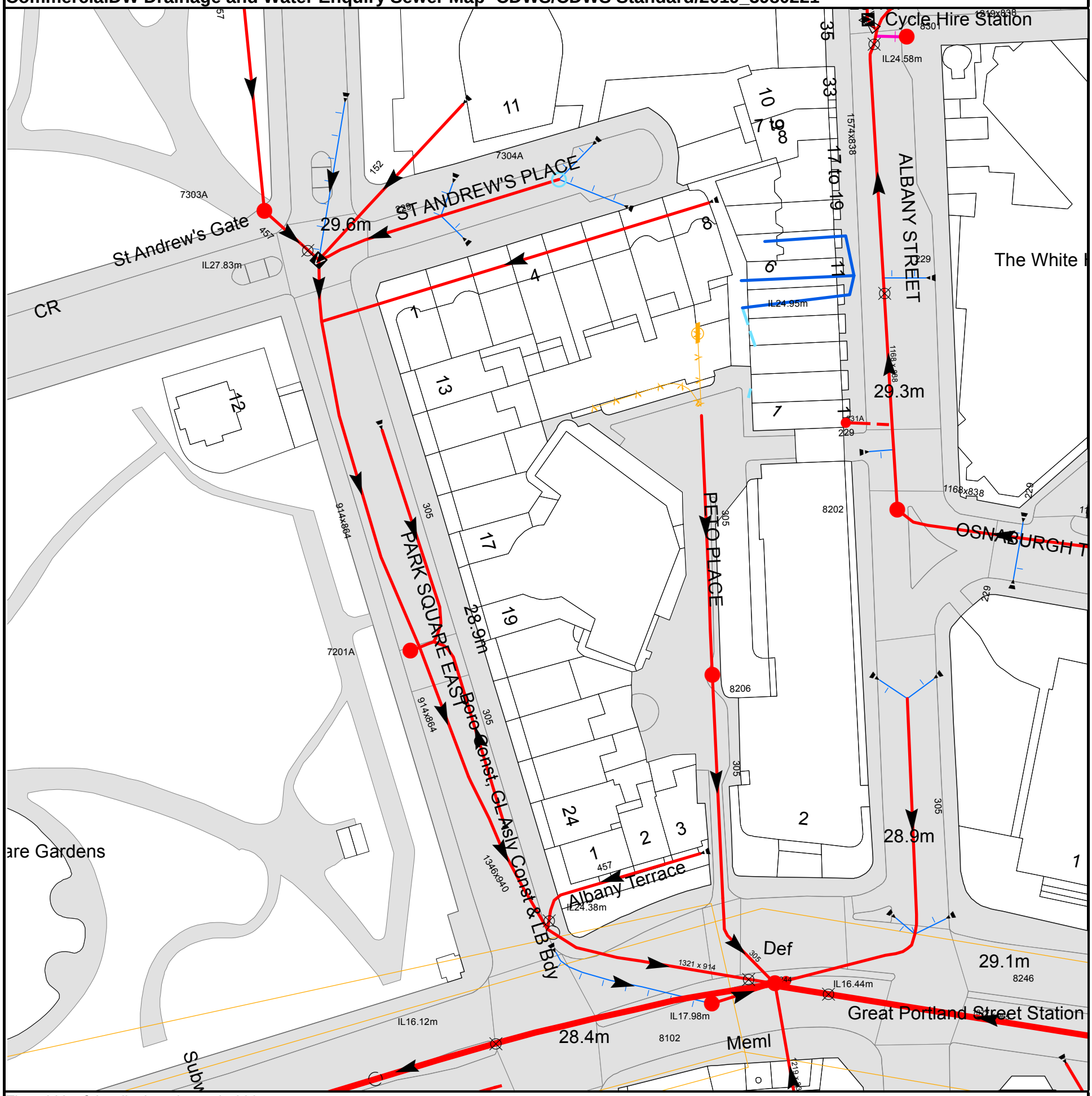
The following properties do not have a trade effluent consent:
19, Park Square East, London, NW1 4LH
17, Park Square East, London, NW1 4LH
17, Park Square East, London, NW1 4LH

Payment for this Search

The charge will be added to the NLIS Account. This search was ordered through National Land Information Services, Russell Square House, 10-12 Russell Square, London WC1B 5LF.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information.

CommercialDW Drainage and Water Enquiry Sewer Map- CDWS/CDWS Standard/2019_3980221



The width of the displayed area is 200m

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.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
7304A	29.43	28.27
8102	28.38	26.65
8206	29.07	25.33
8244	28.55	16.35
831A	n/a	n/a
8202	n/a	25.24
8301	n/a	n/a
7303A	29.79	28.18
7201A	28.76	18.36

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.

Sewer Key - Commercial Drainage and Water Enquiry

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.

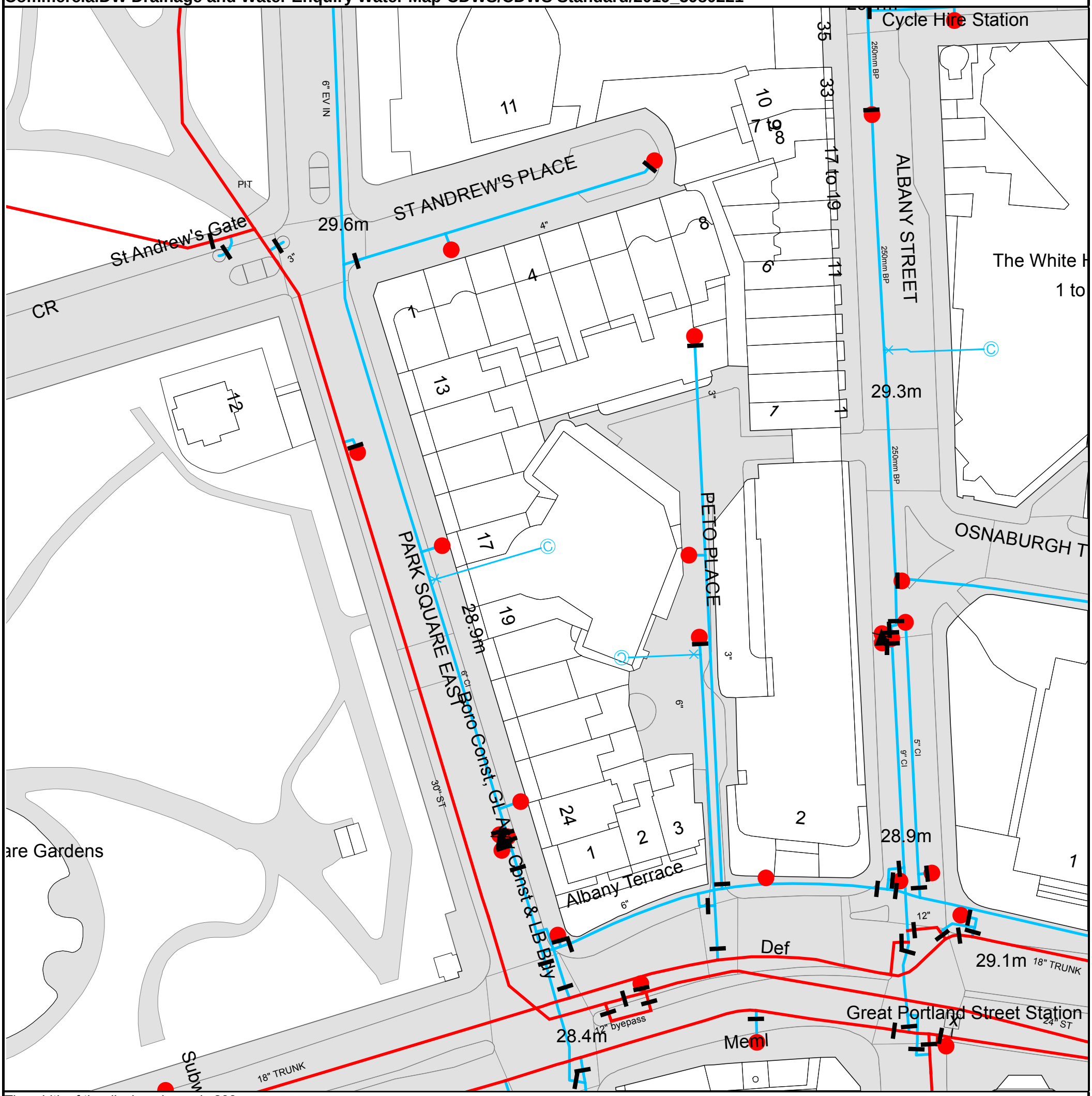
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.

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 Searches on 0118 925 1504.

CommercialDW Drainage and Water Enquiry Water Map-CDWS/CDWS Standard/2019_3980221



The width of the displayed area is 200m

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.

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Waterworks Key - Commercial Drainage and Water Enquiry

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.

For your guidance:

- Thames Water Property Searches Complaints Procedure:
  - Thames Water Property Searches offers a robust complaints procedure. Complaints can be made by telephone, in writing, by email (searches@thameswater.co.uk) or through our website (www.thameswater-propertysearches.co.uk)

As a minimum standard Thames Water Property Searches will:

- endeavour to resolve any contact or complaint at the time of receipt. If this isn't possible, we will advise of timescales;
- investigate and research the matter in detail to identify the issue raised (in some cases third party consultation will be required);
- provide a response to the customer within 10 working days of receipt of the complaint;
- provide compensation, if no response or acknowledgment that we are investigating the case is given within 10 working days of receipt of the complaint;
- keep you informed of the progress and, depending on the scale of investigation required, update with new timescales as necessary;
- provide an amended search, free of charge, if required;
- provide a refund if we find your complaint to be justified; take the necessary action within our power to put things right.

If you want us to liaise with a third party on your behalf, just let us know.

If you are still not satisfied with the outcome provided, we will refer the matter to a Senior Manager, for resolution, who will respond again within 5 working days.

If you remain dissatisfied with our final response you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). Please refer to the final page of the search for further details.

Question 1.1

For your guidance:

- The Water Industry Act 1991 defines Public Sewers as those which Thames Water have responsibility for. Other assets and rivers, watercourses, ponds, culverts or highway drains may be shown for information purposes only.
- 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.
- Assets other than public sewers may be shown on the copy extract, for information.

Question 1.2

For your guidance:

- The “water mains” in this context are those, which are vested in and maintainable by the water company under statute.
- Assets other than public water mains may be shown on the plan, for information only.
- Water companies are not responsible for private supply pipes connecting the property to the public water main and do not hold details of these. These may pass through land outside of the control of the seller, or may be shared with adjacent properties. The buyer may wish to investigate whether separate rights or easements are needed for their inspection, repair or renewal.
- 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.

Question 2.1

For your guidance:

- Water companies are not responsible for any private drains that connect the property to the public sewerage system and do not hold details of these. The property owner will normally have sole responsibility for private drains serving the property. These may pass through land outside the control of the seller and the buyer may wish to investigate whether separate rights or easements are needed for their inspection, repair or renewal.
- If foul water does not drain to the public sewerage system, the property may have private facilities in the form of a cesspit, septic tank or other type of treatment plant.
- An extract from the public sewer map is enclosed. This will show known public sewers in the vicinity of the property and it should be possible to estimate the likely length and route of any private drains and/or sewers connecting the property to the public sewerage system.

Question 2.2

For your guidance:

- Sewerage Undertakers are not responsible for any private drains that connect the property to the public sewerage system, and do not hold details of these.
- The property owner will normally have sole responsibility for private drains serving the property. These private drains may pass through land outside of the control of the seller and the buyer may wish to investigate whether separate rights or easements are needed for their inspection, repair or renewal.
- In some cases, 'Sewerage Undertakers' records do not distinguish between foul and surface water connections to the public sewerage system.
- At the time of privatisation in 1989, Sewerage Undertakers were sold with poorly-kept records of sewerage infrastructure. The records did not always show which properties were connected for surface water drainage purposes. Accordingly, billing records have been used to provide an answer for this element of the drainage and water search.
- Due to the potential inadequacy of 'Sewerage Undertakers' infrastructure records with respect to surface water drainage, it is the customer's responsibility to inform the Sewerage Undertaker that they do not receive the surface water drainage service. If on inspection, the buyer finds that surface water from the property does not drain to a public sewer, then the property may be eligible for a rebate of the surface water drainage charge. If you wish to know who bills the sewerage services for this property then you will need to contact the current owner. For a list of all potential retailers of sewerage services for the property please visit www.open-water.org.uk.
- If surface water from the property does not drain to the public sewerage system, the property may have private facilities in the form of a soakaway or private connection to a watercourse.
- An extract from the public sewer map is enclosed. This will show known public sewers in the vicinity of the property and it should be possible to estimate the likely length and route of any private drains and/or sewers connecting the property to the public sewerage system.

Question 2.3

For your guidance:

- If surface water from the property drains to a public sewer, then a surface water drainage charge is payable.
- Where a surface water drainage charge is currently included in the property's water and sewerage bill but, on inspection, the buyer finds that surface water from the property does not drain to a public sewer, then the property may be eligible for a rebate of the surface water drainage charge. If you wish to know who bills the sewerage services for this property then you will need to contact the current owner. For a list of all potential retailers of sewerage services for the property please visit www.open-water.org.uk.

Question 2.4

For your guidance:

- Thames Water has a statutory right of access to carry out work on its assets. Employees of Thames Water or its contractors may, therefore, need to enter the property to carry out work.
- Please note if the property was constructed after 1st July 2011 any sewers and/or lateral drain within the boundary of the property are the responsibility of the householder.
- The approximate boundary of the property has been determined by reference to the Ordnance Survey Record or the map supplied.
- The presence of a public sewer running within the boundary of the property may restrict further development. The Company has a statutory right of access to carry out work on its assets, subject to notice. This may result in employees of the Company, or its contractors, needing to enter the property to carry out work.
- 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.

Question 2.4.1

For your guidance:

- Private pumping stations installed before 1st July 2011 will be transferred into the ownership of the sewerage undertaker.
- From the 1st October 2016 private pumping stations which serve more than one property have been transferred into public ownership but may not be recorded on the public sewer map.
- The approximate boundary of the property has been determined by reference to the Ordnance Survey Record or the map supplied.
- The presence of a public pumping station within the boundary of the property may restrict further development. The company has a statutory right of access to carry out work on its assets, subject to notice. This may result in employees of the company, or its contractors, needing to enter the property to carry out work.
- 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.

Question 2.5

For your guidance:

- From the 1st October 2011 there may be additional lateral drains and/or public sewers which are not recorded on the public sewer map but are also within 30.48 metres (100 feet) of a building within the property.
- The presence of a public sewer within 30.48 metres (100 feet) of the building(s) within the property can result in the local authority requiring a property to be connected to the public sewer.
- The measurement is estimated from the Ordnance Survey record, between the building(s) within the boundary of the property and the nearest public sewer.
- 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.

Question 2.5.1

For your guidance:

- Private pumping stations installed before 1st July 2011 will be transferred into the ownership of the sewerage undertaker.
- From the 1st October 2016 private pumping stations which serve more than one property have been transferred into public ownership but may not be recorded on the public sewer map.
- The presence of a public pumping station within 50 metres of the building(s) within the property can result in the local authority requiring a property to be connected to the public sewer.
- The measurement is estimated from the Ordnance Survey record, between the building(s) within the boundary of the property and the nearest public sewer.
- 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.

Question 2.6

For your guidance:

- Any sewers and/or lateral drains within the boundary of the property are not the subject of an adoption agreement and remain the responsibility of the householder. Adoptable sewers are normally those situated in the public highway.
- This enquiry is of interest to purchasers who will want to know whether or not the property will be linked to a public sewer.
- Where the property is part of a very recent or ongoing development and the sewers are not the subject of an adoption application, buyers should consult with the developer to ascertain the extent of private drains and sewers for which they will hold maintenance and renewal liabilities.
- Final adoption is subject to the developer complying with the terms of the adoption agreement under Section 104 of the Water Industry Act 1991 and meeting the requirements of 'Sewers for Adoption' 6th Edition.

Question 2.7

For your guidance:

- From the 1st October 2011 most private sewers, disposal mains and lateral drains were transferred into public ownership and the sewerage undertaker may not have been approved or consulted about any plans to erect a building or extension on the property over or in the vicinity of these.
- Buildings or extensions erected over a sewer in contravention of building controls may have to be removed or altered.

Question 2.8

For your guidance:

- For reporting purposes buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.
- A sewer is "overloaded" when the flow from a storm is unable to pass through it due to a permanent problem (e.g. flat gradient, small diameter). Flooding as a result of temporary problems such as blockages, siltation, collapses and equipment or operational failures are excluded.
- "Internal flooding" from public sewers is defined as flooding, which enters a building or passes below a suspended floor. For reporting purposes, buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.
- "At Risk" properties are those that the water company is required to include in the Regulatory Register that is presented annually to the Director General of Water Services. These are defined as properties that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system more frequently than the relevant reference period (either once or twice in ten years) as determined by the Company's reporting procedure.
- Flooding as a result of storm events proven to be exceptional and beyond the reference period of one in ten years are not included on the At Risk Register.
- Properties may be at risk of flooding but not included on the Register where flooding incidents have not been reported to the Company.
- Public Sewers are defined as those for which the Company holds statutory responsibility under the Water Industry Act 1991.
- It should be noted that flooding can occur from private sewers and drains which are not the responsibility of the Company. This report excludes flooding from private sewers and drains and the Company makes no comment upon this matter.
- For further information please contact Thames Water Utilities Ltd on Tel: 0800 316 9800 or website www.thameswater.co.uk

Question 2.9

For your guidance:

- The nearest sewage treatment works will not always be the sewage treatment works serving the catchment within which the property is situated.
- The sewerage undertaker's records were inspected to determine the nearest sewage treatment works.
- It should be noted that there may be a private sewage treatment works closer than the one detailed above that has not been identified.
- As a responsible utility operator, Thames Water Utilities Ltd seeks to manage the impact of odour from operational sewage works on the surrounding area. This is done in accordance with the Code of Practice on Odour Nuisance from Sewage Treatment Works issued via the Department of Environment, Food and Rural Affairs (DEFRA). This Code recognises that odour from sewage treatment works can have a detrimental impact on the quality of the local environment for those living close to works. However DEFRA also recognises that sewage treatment works provide important services to communities and are essential for maintaining standards in water quality and protecting aquatic based environments. For more information visit www.thameswater.co.uk

Question 3.1

For your guidance:

- The Company does not keep details of private supplies. The situation should be checked with the current owner of the property.

Question 3.2

For your guidance:

- The boundary of the property has been determined by reference to the plan supplied. Where a plan was not supplied, the Ordnance Survey Record was used. If the Water undertaker mentioned in Question 4.1.2 is not Thames Water Utilities Ltd the boundary of the property has been determined by the Ordnance Survey.
- The presence of a public water main within the boundary of the property may restrict further development within it. Water companies have a statutory right of access to carry out work on their assets, subject to notice. This may result in employees of the Company, or its contractors, needing to enter the property to carry out work.

Question 3.3

For your guidance:

- This enquiry is of interest to purchasers who will want to know whether or not the property will be linked to the mains water supply.

Question 3.4

For your guidance:

- "Low water pressure" means water pressure below the regulatory reference level, which is the minimum pressure when demand on the system is not abnormal.
- Water Companies are required to include in the Regulatory Register that is presented annually to the Director General of Water Services, properties receiving pressure below the reference level, provided that allowable exclusions do not apply (i.e. events which can cause pressure to temporarily fall below the reference level)
- The reference level of service is a flow of 9 litres/minute at a pressure of 10metres / head on the customer's side of the outside stop valve (osv). The reference level of service must be applied on the customer's side of a meter or any other company fittings that are on the customer's side of the main stop tap. The reference level applies to a single property. Where more than one property is served by a common service pipe, the flow assumed in the reference level must be appropriately increased to take account of the total number of properties served. For two properties, a flow of 18 litres/minute at a pressure of 10metres/head on the customers' side of the osv is appropriate. For three or more properties the appropriate flow should be calculated from the standard loadings provided in BS806-3 or the Institute of Plumbing handbook.
- **Allowable exclusions** The Company is required to include in the Regulatory Register properties receiving pressure below the reference level, provided that allowable exclusions listed below do not apply.
- **Abnormal demand:** This exclusion is intended to cover abnormal peaks in demand and not the daily, weekly or monthly peaks in demand, which are normally expected. Companies should exclude from the reported figures properties which are affected by low pressure only on those days with the highest peak demands. During the report year companies may exclude, for each property, up to five days of low pressure caused by peak demand.
- **Planned maintenance:** Companies should not report low pressures caused by planned maintenance. It is not intended that companies identify the number of properties affected in each instance. However, companies must maintain sufficiently accurate records to verify that low-pressure incidents that are excluded because of planned maintenance are actually caused by maintenance.
- **One-off incidents:** This exclusion covers a number of causes of low pressure; mains bursts; failures of company equipment (such as pressure reducing valves or booster pumps); firefighting; and action by a third party. However, if problems of this type affect a property frequently, they cannot be classed as one-off events and further investigation will be required before they can be excluded.
- **Low-pressure incidents of short duration:** Properties affected by low pressure, which only occur for a short period, and for which there is evidence that incidents of a longer duration would not occur during the course of the year, may be excluded from the reported figures.
- Please contact your water undertaker mentioned in Question 4.1.2 if you require further information on water pressure.

Question 3.5

For your guidance:

- Water hardness can be expressed in various indices for example the hardness settings for dishwashers are commonly expressed in Clark's degrees, but check with the manufacturer as there are also other units. The following table shows the normal ranges of hardness.

Thames Water Hardness Category	Calcium (mg/l)	Calcium Carbonate (mg/l)	English Clarke degrees	French degrees	General/ German degrees
Soft	0 to 40	0 to 100	0 to 7	0 to 10	0 to 5.6
Medium	41 to 80	101 to 200	8 to 14	11 to 20	5.7 to 11.2
Hard	Over 80	Over 200	Over 14	Over 20	over 11.2

- Please contact your water undertaker mentioned in Question 4.1.2 if you require further information on water hardness.

Question 3.6

For your guidance:

- Where a meter does not serve the property and the customer wishes to consider this method of charging, they should contact the current owner if they wish to know who bills the water services for this property. For a list of all potential retailers of water services for the property please visit www.open-water.org.uk.

Question 4.4

For your guidance:

- The Water Industry Act 1991 Section 150, The Water Resale Order 2001 provides protection for people who buy their water or sewerage services from a person or company instead of directly from a water or sewerage company. Details are available from the Office of Water Services (OFWAT) website is www.ofwat.gov.uk.
- The Company may install a meter at the premises where a buyer makes a change of use of the property or where the buyer uses water for:
  - Watering the garden other than by hand (this includes the use of sprinklers).
  - Automatically replenishing a pond or swimming pool with a capacity greater than 10,000 litres.
  - A bath with a capacity in excess of 230 litres.
  - A reverse osmosis unit
- Where a meter does not serve the property and the customer wishes to consider this method of charging, they should contact the current owner if they wish to know who bills the sewerage and water services for this property. For a list of all potential retailers of sewerage and water services for the property please visit www.open-water.org.uk.

Question 4.5

For your guidance:

- If a Trade effluent consent applies to the premises which are the subject of this search, it is for the applicant to satisfy itself as to the suitability of the consent for its client's requirements. The occupier of any trade premises in the area of a sewerage undertaker may discharge any trade effluent proceeding from those premises into the undertaker's public sewers if he does so with the undertaker's consent. If, in the case of any trade premises, any trade effluent is discharged without such consent or other authorisation, the occupier of the premises shall be guilty of an offence.
- Please note any existing consent is dependent on the business being carried out at the property and will not transfer automatically upon change of ownership.
- For further information regarding Trade Effluent consents please contact: Trade Effluent Control, Crossness STW, Belvedere Road, Abbey Wood London SE2 9AQ.

Customer and Clients are asked to note these terms, which govern the basis on which this CommercialDW Drainage & Water Enquiry is supplied

Definitions

'Client' means the person, company or body who is the intended recipient of the Report with an actual or potential interest in the Property.
'Company' means a water service company or their data service provider producing the Report.
'Customer' means the person, company, firm or other legal body placing the Order, either on their own behalf as Client, or, as an agent for a Client.
'Order' means any request completed by the Customer requesting the Report.
'Property' means the address or location supplied by the Customer in the Order.
'Report' means the drainage and/or water report prepared by The Company in respect of the Property.
'Thames Water" means Thames Water Utilities Limited registered in England and Wales under number 2366661 whose registered office is at Clearwater Court, Vastern Road, Reading, Berks, RG1 8DB;

Agreement

1 Thames Water agrees to supply the Report to the Customer and the Client subject to these terms. The scope and limitations of the Report are described in paragraph 2 of these terms. Where the Customer is acting as an agent for the Client then the Customer shall be responsible for bringing these terms to the attention of the Client. The Customer and Client agree that the placing of an Order for a Report indicates their acceptance of these terms.

The Report

2. Whilst Thames Water will use reasonable care and skill in producing the Report, it is provided to the Customer and the Client on the basis that they acknowledge and agree to the following:-

2.1 The information contained in the Report can change on a regular basis so Thames Water cannot be responsible to the Customer and the Client for any change in the information contained in the Report after the date on which the Report was produced and sent to the Client.

2.2 The Report does not give details about the actual state or condition of the Property nor should it be used or taken to indicate or exclude actual suitability or unsuitability of the Property for any particular purpose, or relied upon for determining saleability or value, or used as substitute for any physical investigation or inspection. Further advice and information from appropriate experts and professionals should always be obtained.

2.3 The information contained in the Report is based upon the accuracy, completeness and legibility of the address and other information supplied by the Customer or Client.

2.4 The Report provides information as to the location and connection of existing services and should not be relied on for any other purpose. The Report may contain opinions or general advice to the Customer and the Client and Thames Water cannot ensure that any such opinion or general advice is accurate, complete or valid and accepts no liability therefore.

2.5 The position and depth of apparatus shown on any maps attached to the Report are approximate, and are furnished as a general guide only, and no warranty as to its correctness is given or implied. The exact positions and depths should be obtained by excavation trial holes and the maps must not be relied on in the event of excavation or other works made in the vicinity of apparatus shown on any maps.

Liability

3 Thames Water shall not be liable to the Client for any failure, defect or non-performance of its obligations arising from any failure of, or defect in any machine, processing system or transmission link or anything beyond Thames Water's reasonable control or the acts or omissions of any party for whom Thames Water are not responsible.

3.1 Where the Customer sells this report to a Client (other than in the case of a bona fide legal adviser recharging the cost of the Report as a disbursement) Thames Water shall not in any circumstances (whether for breach of contract, negligence or any other tort, under statute or statutory duty or otherwise at all) be liable for any loss or damage whatsoever and the Customer shall indemnify Thames Water in respect of any claim by the Client.

3.2 Where a report is requested for an address falling within a geographical area where Thames Water and another Company separately provide Water and Sewerage Services, then it shall be deemed that liability for the information given by Thames Water or the Company as the case may be will remain with Thames Water or the Company as the case may be in respect of the accuracy of the information supplied. Where Thames Water is supplying information which has been provided to it by another Company for the purposes outlined in this agreement Thames Water will therefore not be liable in any way for the accuracy of that information and will supply that information as agent for the Company from which the information was obtained.

3.3 Except in respect of death or personal injury caused by negligence, or as expressly provided in these Terms:

3.3.1 The entire liability of Thames Water or the Company as the case may be in respect of all causes of action arising under or in connection with the Report (whether for breach of contract, negligence or any other tort, under statute or statutory duty or otherwise at all) shall not exceed £2,000,000 (two million pounds); and

3.3.2 Thames Water shall not in any circumstances (whether for breach of contract, negligence or any other tort, under statute or statutory duty or otherwise at all) be liable for any loss of profit, loss of goodwill, loss of reputation, loss of business or any indirect, special or consequential loss, damage or other claims, costs or expenses;

Copyright and Confidentiality

4. The Customer and the Client acknowledge that the Report is confidential and is intended for the personal use of the Client. The copyright and any other intellectual property rights in the Report shall remain the property of Thames Water or the Company as the case may be. No intellectual or other property rights are transferred or licensed to the Customer or the Client except to the extent expressly provided

4.1 The Customer or Client is entitled to make copies of the Report but is not permitted to copy any maps contained in, or attached to the Report

4.2 The maps contained in the Report are protected by Crown Copyright and must not be used for any purpose outside the context of the Report.

4.3 The Customer and Client agree (in respect of both the original and any copies made) to respect and not to alter any trademark, copyright notice or other property marking which appears on the Report.

Payment

5. Unless otherwise stated all prices are inclusive of VAT. The Customer shall pay for the price of the Report specified by Thames Water, without any set off, deduction or counterclaim.

5.1 Unless payment has been received in advance, Customers shall be invoiced for the agreed fee once their request has been processed. Any such invoice must be paid within 14 days. Where the Customer has an account with Thames Water, payment terms will be as agreed with Thames Water.

5.2 No payment shall be deemed to have been received until Thames Water has received cleared funds.

5.3 If the Customer fails to pay Thames Water any sum due Thames Water shall be entitled but not obliged to charge the Customer interest on the sum from the due date for payment at the annual rate of 2% above the base lending rate from time to time of Natwest Bank, accruing on a daily basis until payment is made. Thames Water reserves the right to claim interest under the Late Payment of Commercial Debts (Interest) Act 1998.

5.4 Thames Water reserves the right to increase fees on reasonable prior written notice at any time.

Cancellations or Alterations

6. Once an Order is placed, Thames Water shall not be under any obligation to accept any request to cancel that Order and payment for the Order shall still be due upon completion of the Report. In cases where an error has been made in the original Order (e.g. the Customer has supplied an incorrect address), the Customer will need to place a second Order, detailing the correct information, and shall be liable to pay a second charge in accordance with clause 5 above.

Delivery

7. On receiving your order the reports will be posted to you within 10 working days from receipt.

7.1 Delivery is subject to local post conditions and regulations. All items should arrive within 12 working days, but Thames Water cannot be held responsible should delays be caused by local post conditions, postal strikes or other causes beyond the control of Thames Water.

General

8. If any provision of these terms is or becomes invalid or unenforceable, it will be taken to be removed from the rest of these terms to the extent that it is invalid or unenforceable. No other provision of these terms shall be affected.

8.1 These terms shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts.

8.2 Nothing in this notice shall in any way restrict the Customer or Clients statutory or any other rights of access to the information contained in the Report.

These Terms & Conditions are available in larger print for those with impaired vision.

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 TWUL 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. TWUL 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 TWUL's discretion for increased administration costs.

A copy of TWUL'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 0800 316 9800.

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 her 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 Water Industry Act 1991, and you remain dissatisfied you can refer your complaint to CC Water on 0845 039 2837 (it will cost you the same as a local call) or write to them at 11 Belgrave Road, London SW1V 1RB.

Ways to pay your bill

By Post – Cheque only, made payable to 'Thames Water Utilities Ltd' writing your Thames Water account number on the back. Please fill in the payment slip below and send it with your cheque to Thames Water Utilities Ltd., PO Box 223, Swindon SN38 2TW	**By BACS Payment** direct to our bank on account number 90478703, sort code 60-00-01 may be made. A remittance advice must be sent to Thames Water Utilities Ltd., PO Box 223, Swindon SN38 2TW. Or fax to 01793 424599 or email: cashoperations@thameswater.co.uk	**Telephone Banking** By calling your bank and quoting your invoice number and the Thames Water`s bank account number 90478703 and sort code 60-00-01	**By Swift Transfer** You may make your payment via SWIFT by quoting **NWBKGB2L** together with our bank account number 90478703, sort code 60-00-01 and invoice number

Search Code

IMPORTANT CONSUMER PROTECTION INFORMATION

This search has been produced by Thames Water Property Searches, Clearwater Court, Vastern Road, Reading RG1 8DB, which is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

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

Complaints

If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award compensation of up to £5,000 to you if the Ombudsman finds that you have suffered actual loss and/or aggravation, distress or inconvenience as a result of your search provider failing to keep to the code.

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
Web site: www.tpos.co.uk
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

Appendix F - BUILDING DAMAGE CLASSIFICATION TABLE

Classification of visible damage to walls (after Burland et al, *1977, Boscardin and Cording, 1989; and Burland, 2001)*

Category of damage	Description of typical damage (ease of repair is underlined)	Approximate crack width (mm)	Limiting tensile strain ε_{lim} (per cent)
0 Negligible	Hairline cracks of less than about 0.1 mm are classed as negligible.	< 0.1	0.0–0.05
1 Very slight	Fine cracks that can easily be treated during normal decoration. Perhaps isolated slight fracture in building. Cracks in external brickwork visible on inspection.	< 1	0.05–0.075
2 Slight	Cracks easily filled. Redecoration probably required. Several slight fractures showing inside of building. Cracks are visible externally and some repointing may be required externally to ensure weathertightness. Doors and windows may stick slightly.	< 5	0.075–0.15
3 Moderate	The cracks require some opening up and can be patched by a mason. Recurrent cracks can be masked by suitable linings. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Doors and windows sticking. Service pipes may fracture. Weathertightness often impaired.	5–15 or a number of cracks > 3	0.15–0.3
4 Severe	Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Windows and frames distorted, floor sloping noticeably. Walls leaning or bulging noticeably, some loss of bearing in beams. Service pipes disrupted.	15–25 but also depends on number of cracks	> 0.3
5 Very severe	This requires a major repair involving partial or complete rebuilding. Beams lose bearings, walls lean badly and require shoring. Windows broken with distortion. Danger of instability.	usually > 25 but depends on number of cracks.	

Notes

1. In assessing the degree of damage, account must be taken of its location in the building or structure.
2. Crack width is only one aspect of damage and should not be used on its own as a direct measure of it.

Appendix G – STRUCTURAL CALCULATIONS

JOB TITLE:	JOB NUMBER / FILE:	CALCULATION NUMBER:		Form
19 PARK SQUARE EAST	193206			
CALCULATION:	CALCULATION BY:	DATE:	CHECKED BY:	
GROUND BEARING BASEMENT SLAB	SD	DEC '19		

CALCULATIONS:

REF

OUTPUT

THE SLAB IN THE FRONT VAULTS IS LOWERED TO 25.3 m AOD

THIS SLAB IS GROUND BEARING.

150 mm DP, RC 32/40

LOADS DEAD LOAD = $0.15 \times 25 = 3.75$
$0.075 \times 20 = 1.2$
4.95 kN/m²

IMPOSED LOAD = 1.5 kN/m² (DOMESTIC)

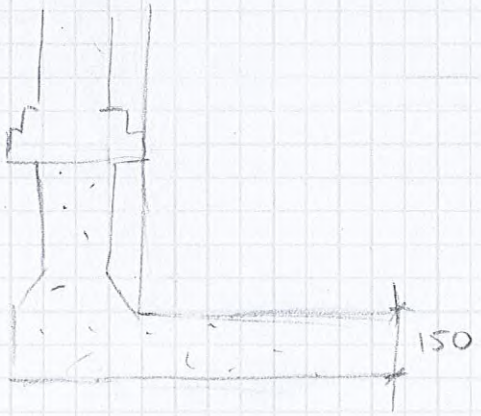
HYDROSTATIC → ASSUME ACCIDENTAL SITUATION WHERE WATER TABLE IS AT GROUND LEVEL

GL = 28.9m − 25.3m = 3.6m bgl

10 kN/m² × 3.6m = 36.0 kN/m

SEE TEDDS CALC. FOR DESIGN TO TR34.

SLAB TIED TO UNDERPIN TO PREVENT FLOTATION



THE SLAB IN THE REAR IS ALSO BEING LOWERED. LEVEL IS HIGHER SO HYDROSTATIC LOAD IS LESSER. ∴ THE SLAB IN THE VAULTS IS THE WORST CASE.

CONCRETE INDUSTRIAL GROUND FLOOR SLAB DESIGN

In accordance with TR34, 4th Edition 2013

Tedds calculation version 2.0.01

Design summary

Load 1 -UDL Dead

Description	Unit	Provided	Required	Utilisation	Result
Slab capacity in flexure	kN/m^2	58.3	8.7	0.149	PASS

Load 2 -UDL Live

Description	Unit	Provided	Required	Utilisation	Result
Slab capacity in flexure	kN/m^2	58.3	1.5	0.026	PASS

Load 3 -UDL 36 kN/m^2

Description	Unit	Provided	Required	Utilisation	Result
Slab capacity in flexure	kN/m^2	58.3	36.0	0.617	PASS

Slab details

Reinforcement type	Fabric
Concrete class	C32/40
Slab thickness	h = **150** mm
Fabric reinforcement type	A393
Characteristic strength of reinforcement	f_{yk} = **500** N/mm^2
Area of bottom steel provided	$A_{s,prov}$ = **393** mm^2/m
Diameter of reinforcement	ϕ_s = **10** mm
Nominal cover	c_{nom_b} = **50** mm
Effective depth of reinforcement	d = h - c_{nom_b} - ϕ_s = **90** mm

Partial safety factors

Concrete (with or without fibre)	γ_c = **1.50**
Reinforcement (bar or fabric)	γ_s = **1.15**
Permanent	γ_G = **1.20**
Variable	γ_Q = **1.50**
Dynamic loads	γ_D = **1.60**

Subgrade reaction

Modulus of subgrade reaction	k = **0.030** N/mm^3

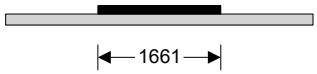
Concrete details - Table 6.1. Strength properties for concrete

Characteristic compressive cylinder strength	f_{ck} = **32** N/mm^2
Characteristic compressive cube strength	f_{cu} = **40** N/mm^2
Mean value of compressive cylinder strength	$f_{cm} = f_{ck}$ + 8 N/mm^2 = **40** N/mm^2
Mean value of axial tensile strength	f_{ctm} = 0.3 N/mm^2 × (f_{ck}/ 1 N/mm^2)$^{2/3}$ = **3.0** N/mm^2
Flexural tensile strength	$f_{ctd,fl} = f_{ctm}$ × (1.6 - h / 1m) / γ_c = **2.9** N/mm^2
Design concrete compressive strength (cylinder)	$f_{cd} = f_{ck}$ / γ_c = **21.3** N/mm^2
Secant modulus of elasticity of concrete	E_{cm} = 22 kN/mm^2×[f_{cm}/ 10 N/mm^2]$^{0.3}$ = **33** kN/mm^2
Poisons ratio	ν = **0.2**
Radius of relative stiffness (Eqn. 20)	l = [E_{cm} × h^3 / (12 × (1 - ν^2) × k)]$^{0.25}$ = **755** mm
Characteristic of system (Eqn. 33)	λ = (3 × k / (E_{cm} × h^3))$^{0.25}$ = **0.946** m^{-1}

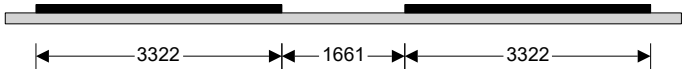
Moment capacity

Negative moment capacity (Eqn. 2)	$M_n = M_{un} = f_{ctd,fl}$ × (h^2 / 6) = **11.0** kNm/m
Positive moment capacity (Eqn. 3)	$M_p = M_{pfab}$ = 0.95 × $A_{s,prov}$ × f_{yk} × d / γ_s =**14.6** kNm/m

Load 1 - UDL Dead



Maximum positive bending moment loading pattern



Maximum negative bending moment loading pattern

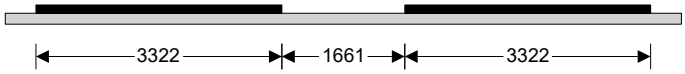
Working load capacity of UDL

UDL	U_k = **8.7** kN/m^2
Critical aisle width	$l_{crit} = \pi / (2 \times \lambda)$ = **1661** mm
Loaded width of single UDL (max positive moment)	$l_{load\_p} = \pi / (2 \times \lambda)$ = **1661** mm
Loaded width of dual UDL (max negative moment)	$l_{load\_n} = \pi / \lambda$ = **3322** mm
Working load capcity of slab	$q = 5.95 \times \lambda^2 \times M_n$ = **58.3** kN/m^2
Utilisation	U_k / q = **0.149**

PASS - Total slab capacity exceeds applied load

Load 2 - UDL Live

Maximum positive bending moment loading pattern



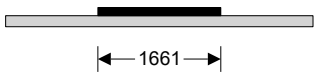
Maximum negative bending moment loading pattern

Working load capacity of UDL

UDL	U_k = **1.5** kN/m^2
Critical aisle width	$l_{crit} = \pi / (2 \times \lambda)$ = **1661** mm
Loaded width of single UDL (max positive moment)	$l_{load\_p} = \pi / (2 \times \lambda)$ = **1661** mm
Loaded width of dual UDL (max negative moment)	$l_{load\_n} = \pi / \lambda$ = **3322** mm
Working load capcity of slab	$q = 5.95 \times \lambda^2 \times M_n$ = **58.3** kN/m^2
Utilisation	U_k / q = **0.026**

PASS - Total slab capacity exceeds applied load

Load 3 - UDL 36 kN/m^2



Maximum positive bending moment loading pattern

Maximum negative bending moment loading pattern

Working load capacity of UDL

UDL	U_k = **36.0** kN/m^2
Critical aisle width	$l_{crit} = \pi / (2 \times \lambda)$ = **1661** mm
Loaded width of single UDL (max positive moment)	$l_{load\_p} = \pi / (2 \times \lambda)$ = **1661** mm
Loaded width of dual UDL (max nagative moment)	$l_{load\_n} = \pi / \lambda$ = **3322** mm
Working load capcity of slab	$q = 5.95 \times \lambda^2 \times M_n$ = **58.3** kN/m^2
Utilisation	U_k / q = **0.617**

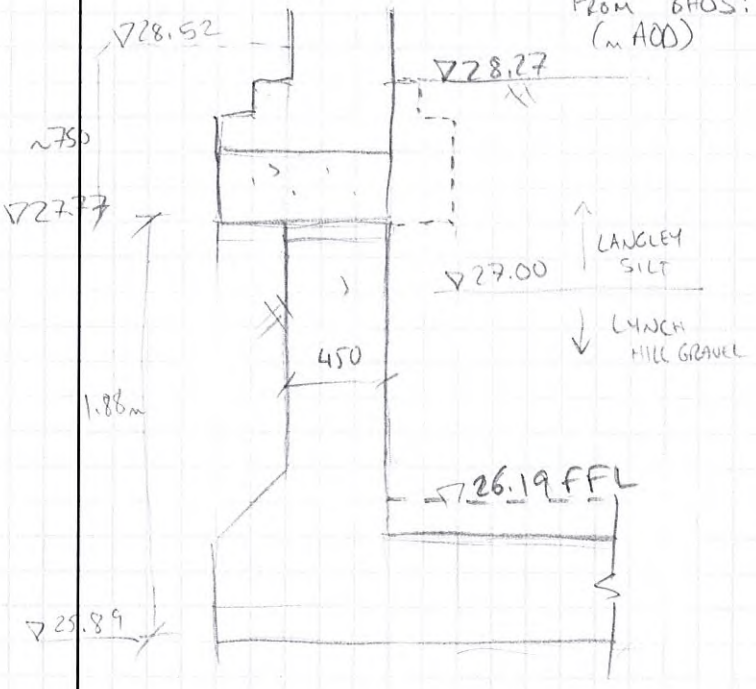
PASS - Total slab capacity exceeds applied load

JOB TITLE:	JOB NUMBER / FILE:	CALCULATION NUMBER:		Form
19 PARK SQUARE EAST	193206	—		
CALCULATION:	CALCULATION BY:	DATE:	CHECKED BY:	
RETAINING WALL	SD	DEC '19	BR	

CALCULATIONS:

REF

WITHIN THE COURTYARD THE NEW BASEMENT LEVEL IS 26.19 m AOD. THE FOUNDING LEVEL IS APPROXIMATELY 750mm bgl = 27.77 m AOD.
HEIGHT OF UNDERPIN: 1.88 m



FROM BH03: (m AOD)
30.10 → 28.20 MADE GROUND
28.20 → 27.00 LANGLEY SILT MEMBER
27.00 → 21.10 LYNCH HILL GRAVEL MEMBER

RETAINING LOADS = HYDROSTATIC, SURCHARGE AND SOIL RETENTION.

HYDROSTATIC → TAKE AS GROUND LEVEL IN ABSENCE OF LONG TERM MONITORING. $\gamma = 10\ kN/m^3$

SURCHARGE → $10\ kN/m^2$

SOIL LOADS → LANGLEY SILT MEMBER
$\phi'_{crit} = 21.5°$ $\gamma = 18\ kN/m^3$
$\phi'_{crit} = 30°$ $\gamma = 20\ kN/m^3$ → LYNCH HILL GRAVELS

LANGLEY SILT: $k_o = 0.63$
LYNCH HILL GRAVELS: $k_o = 0.50$

OUTPUT

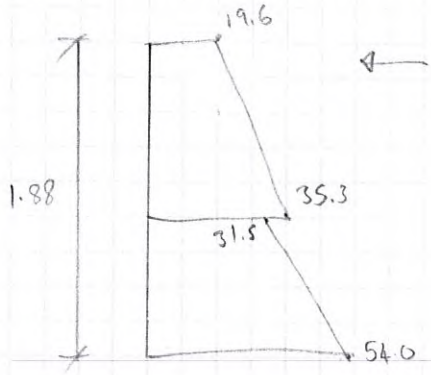
JOB TITLE:	JOB NUMBER / FILE:	CALCULATION NUMBER:		Form
19 PARK SQUARE EAST	193206	—		
CALCULATION:	CALCULATION BY:	DATE:	CHECKED BY:	
UNDERPIN	SD	DEC '19	BR	

CALCULATIONS:

REF

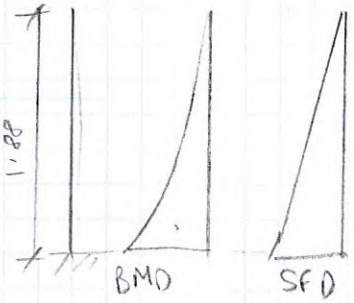
LATERAL AT REST PRESSURES:

	DEPTH	γ_B	$\int\gamma z$	$\sum$	u	q	σ'_v	ϕ'_k	k_o	σ'_h (SLS)	σ'_h (ULS)
LANGLEY SILT	0	18	0	0	0	10	10	21.8	0.63	6.3 kN/m²	9.5 kN/m²
	0.5	18	9	0.5	5	10	14	21.8	0.63	13.8 kN/m²	19.6 kN/m²
	1.27	18	22.9	1.27	12.7	10	20.2	21.8	0.63	25.4 kN/m²	35.3 kN/m²
LYNCH HILL	1.27	20	22.9	1.27	12.7	10	20.2	30	0.5	22.8 kN/m²	31.5 kN/m²
	2.38	20	45.1	2.38	23.8	10	31.3	30	0.5	39.5 kN/m²	54.0 kN/m²



← LATERAL PRESSURES ON WALL

THE UNDERPIN IS DESIGNED AS A CANTILEVER:



SLS M_{ed} = 39.5 kNm/m
SFD = 49.7 kN/m
δ =

ULS M_{ed} = 54.8 kNm/m
SFD = 68.6 kN/m

SEE TEDDS CALC → WALL REQUIRES H16 @ 100 c/c and H10 @ 200 HORIZONTAL BARS.

CRACK WIDTH LIMITED TO 0.2mm

OUTPUT

RC BEAM DESIGN

In accordance with EN1992-1-1:2004 incorporating Corrigenda January 2008 and the UK national annex

Tedds calculation version 3.3.00

Concrete details - Table 3.1. Strength and deformation characteristics for concrete

Concrete strength class	C32/40
Aggregate type	Quartzite
Aggregate adjustment factor - cl.3.1.3(2)	AAF = **1.0**
Characteristic compressive cylinder strength	f_{ck} = **32** N/mm^2
Mean value of compressive cylinder strength	$f_{cm} = f_{ck} + 8$ N/mm^2 = **40** N/mm^2
Mean value of axial tensile strength	$f_{ctm} = 0.3$ N/mm^2 $\times$ $(f_{ck}/ 1$ N/mm$^2)^{2/3}$ = **3.0** N/mm^2
Secant modulus of elasticity of concrete	$E_{cm} = 22$ kN/mm$^2 \times [f_{cm}/10$ N/mm$^2]^{0.3} \times$ AAF = **33346** N/mm^2
Ultimate strain - Table 3.1	ε_{cu2} = **0.0035**
Shortening strain - Table 3.1	ε_{cu3} = **0.0035**
Effective compression zone height factor	λ = **0.80**
Effective strength factor	η = **1.00**
Coefficient k_1	k_1 = **0.40**
Coefficient k_2	$k_2 = 1.0 \times (0.6 + 0.0014 / \varepsilon_{cu2})$ = **1.00**
Coefficient k_3	k_3 = **0.40**
Coefficient k_4	$k_4 = 1.0 \times (0.6 + 0.0014 / \varepsilon_{cu2})$ = **1.00**
Partial factor for concrete -Table 2.1N	γ_C = **1.50**
Compressive strength coefficient - cl.3.1.6(1)	α_{cc} = **0.85**
Design compressive concrete strength - exp.3.15	$f_{cd} = \alpha_{cc} \times f_{ck} / \gamma_C$ = **18.1** N/mm^2
Compressive strength coefficient - cl.3.1.6(1)	α_{ccw} = **1.00**
Design compressive concrete strength - exp.3.15	$f_{cwd} = \alpha_{ccw} \times f_{ck} / \gamma_C$ = **21.3** N/mm^2
Maximum aggregate size	h_{agg} = **20** mm
Monolithic simple support moment factor	β_1 = **0.25**

Reinforcement details

Characteristic yield strength of reinforcement	f_{yk} = **500** N/mm^2
Partial factor for reinforcing steel - Table 2.1N	γ_S = **1.15**
Design yield strength of reinforcement	$f_{yd} = f_{yk} / \gamma_S$ = **435** N/mm^2

Nominal cover to reinforcement

Nominal cover to top reinforcement	c_{nom_t} = **50** mm
Nominal cover to bottom reinforcement	c_{nom_b} = **25** mm
Nominal cover to side reinforcement	c_{nom_s} = **25** mm

Fire resistance

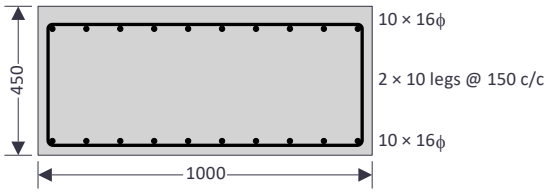
Standard fire resistance period	R = **60** min
Number of sides exposed to fire	3
Minimum width of beam - EN1992-1-2 Table 5.5	b_{min} = **120** mm

Section 1 - Underpin

Rectangular section details

Section width	b = **1000** mm
Section depth	h = **450** mm

PASS - Minimum dimensions for fire resistance met



Positive moment - section 6.1

Design bending moment	$M = M_{pos\_s1}$ = **54.8** kNm
Effective depth of tension reinforcement	d = **407** mm
Redistribution ratio	$\delta = \min(\delta_{pos\_s1}, 1)$ = **1.000**
	$K = M / (b \times d^2 \times f_{ck})$ = **0.010**
	$K' = (2 \times \eta \times \alpha_{cc} / \gamma_C) \times (1 - \lambda \times (\delta - k_1) / (2 \times k_2)) \times (\lambda \times (\delta - k_1) / (2 \times k_2))$ = **0.207**
	K' > K - No compression reinforcement is required
Lever arm	$z = \min(0.5 \times d \times [1 + (1 - 2 \times K / (\eta \times \alpha_{cc} / \gamma_C))^{0.5}], 0.95 \times d)$ = **387** mm
Depth of neutral axis	$x = 2 \times (d - z) / \lambda$ = **51** mm
Area of tension reinforcement required	$A_{s,req} = M / (f_{yd} \times z)$ = **326** mm²
Tension reinforcement provided	10 × 16ϕ
Area of tension reinforcement provided	$A_{s,prov}$ = **2011** mm²
Minimum area of reinforcement - exp.9.1N	$A_{s,min} = \max(0.26 \times f_{ctm} / f_{yk}, 0.0013) \times b \times d$ = **640** mm²
Maximum area of reinforcement - cl.9.2.1.1(3)	$A_{s,max} = 0.04 \times b \times h$ = **18000** mm²
	PASS - Area of reinforcement provided is greater than area of reinforcement required

Crack control - Section 7.3

Maximum crack width	w_k = **0.2** mm
Design value modulus of elasticity reinf – 3.2.7(4)	E_s = **200000** N/mm²
Mean value of concrete tensile strength	$f_{ct,eff} = f_{ctm}$ = **3.0** N/mm²
Stress distribution coefficient	k_c = **0.4**
Non-uniform self-equilibrating stress coefficient	$k = \min(\max(1 + (300\ mm - \min(h, b)) \times 0.35 / 500\ mm, 0.65), 1)$ = **0.90**
Actual tension bar spacing	$s_{bar} = (b - (2 \times (c_{nom\_s} + \phi_{s1\_v}) + \phi_{s1\_b\_L1} \times N_{s1\_b\_L1})) / (N_{s1\_b\_L1} - 1) + \phi_{s1\_b\_L1}$ = **101.6** mm
Maximum stress permitted - Table 7.3N	σ_s = **160** N/mm²
Steel to concrete modulus of elast. ratio	$\alpha_{cr} = E_s / E_{cm}$ = **6.00**
Distance of the Elastic NA from bottom of beam	$y = (b \times h^2 / 2 + A_{s,prov} \times (\alpha_{cr} - 1) \times (h - d)) / (b \times h + A_{s,prov} \times (\alpha_{cr} - 1))$ = **221** mm
Area of concrete in the tensile zone	$A_{ct} = b \times y$ = **221025** mm²
Minimum area of reinforcement required - exp.7.1	$A_{sc,min} = k_c \times k \times f_{ct,eff} \times A_{ct} / \sigma_s$ = **1495** mm²
	PASS - Area of tension reinforcement provided exceeds minimum required for crack control
Quasi-permanent moment	$M_{QP} = M_{pos\_QP\_s1}$ = **49.7**kNm
Permanent load ratio	$R_{PL} = M_{QP} / M$ = **0.91**
Service stress in reinforcement	$\sigma_{sr} = f_{yd} \times A_{s,req} / A_{s,prov} \times R_{PL}$ = **64** N/mm²
Maximum bar spacing - Tables 7.3N	$s_{bar,max}$ = **200** mm
	PASS - Maximum bar spacing exceeds actual bar spacing for crack control

Minimum bar spacing (Section 8.2)

Top bar spacing $s_{top} = (b - (2 \times (c_{nom\_s} + \phi_{s1\_v}) + \phi_{s1\_t\_L1} \times N_{s1\_t\_L1})) / (N_{s1\_t\_L1} - 1) =$ **85.6** mm

Minimum allowable top bar spacing $s_{top,min} = \max(\phi_{s1\_t\_L1} \times k_{s1}, h_{agg} + k_{s2}, 20mm) =$ **25.0** mm

PASS - Actual bar spacing exceeds minimum allowable

Bottom bar spacing $s_{bot} = (b - (2 \times (c_{nom\_s} + \phi_{s1\_v}) + \phi_{s1\_b\_L1} \times N_{s1\_b\_L1})) / (N_{s1\_b\_L1} - 1) =$ **85.6** mm

Minimum allowable bottom bar spacing $s_{bot,min} = \max(\phi_{s1\_b\_L1} \times k_{s1}, h_{agg} + k_{s2}, 20mm) =$ **25.0** mm

PASS - Actual bar spacing exceeds minimum allowable

Section in shear (section 6.2)

Angle of comp. shear strut for maximum shear $\theta_{max} = 45$ deg

Strength reduction factor - cl.6.2.3(3) $v_1 = 0.6 \times (1 - f_{ck} / 250\ N/mm^2) =$ **0.523**

Compression chord coefficient - cl.6.2.3(3) $\alpha_{cw} =$ **1.00**

Minimum area of shear reinforcement - exp.9.5N $A_{sv,min} = 0.08\ N/mm^2 \times b \times (f_{ck} / 1\ N/mm^2)^{0.5} / f_{yk} =$ **905** mm^2/m

Design shear force at support $V_{Ed,max} = V_{Ed,max\_s1} =$ **69** kN

Min lever arm in shear zone $z =$ **387** mm

Maximum design shear resistance - exp.6.9 $V_{Rd,max} = \alpha_{cw} \times b \times z \times v_1 \times f_{cwd} / (\cot(\theta_{max}) + \tan(\theta_{max})) =$ **2158** kN

PASS - Design shear force at support is less than maximum design shear resistance

Design shear force $V_{Ed} =$ **69** kN

Design shear stress $v_{Ed} = V_{Ed} / (b \times z) =$ **0.177** N/mm^2

Angle of concrete compression strut - cl.6.2.3 $\theta = \min(\max(0.5 \times \text{Asin}(\min(2 \times v_{Ed} / (\alpha_{cw} \times f_{cwd} \times v_1), 1)), 21.8\ deg), 45deg) =$ **21.8** deg

Area of shear reinforcement required - exp.6.8 $A_{sv,des} = v_{Ed} \times b / (f_{yd} \times \cot(\theta)) =$ **163** mm^2/m

Area of shear reinforcement required $A_{sv,req} = \max(A_{sv,min}, A_{sv,des}) =$ **905** mm^2/m

Shear reinforcement provided 2 × 10 legs @ 150 c/c

Area of shear reinforcement provided $A_{sv,prov} =$ **1047** mm^2/m

PASS - Area of shear reinforcement provided exceeds minimum required

Maximum longitudinal spacing - exp.9.6N $s_{vl,max} = 0.75 \times d =$ **286** mm

PASS - Longitudinal spacing of shear reinforcement provided is less than maximum