Image 5: Retaining wall located at the rear of the property.

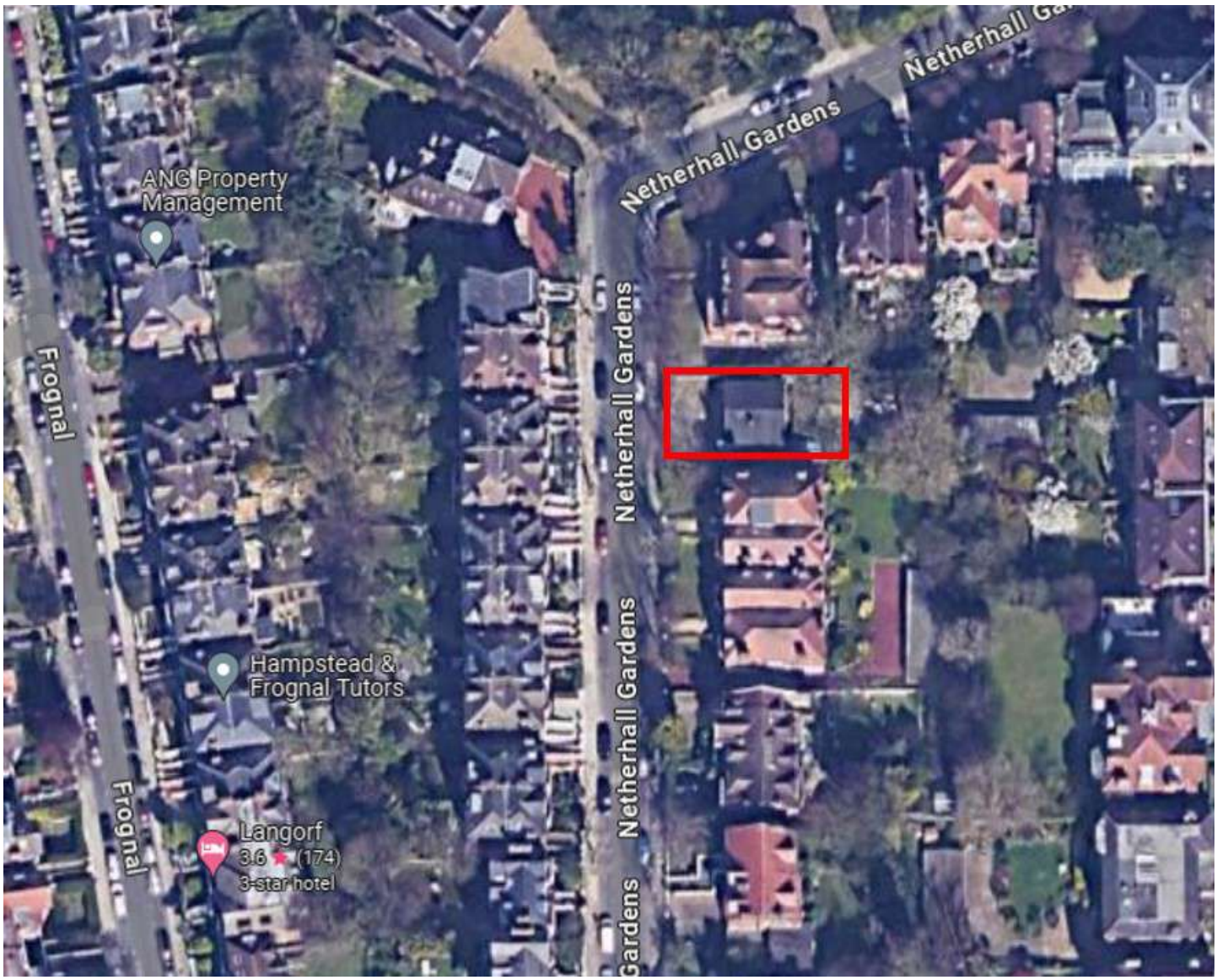
Appendix E: Regulatory Correspondence

Dustin Dela Cruz

From: Dustin Dela Cruz
Sent: 19 June 2024 11:15
To: 'Enquiries, Unit'
Cc: 'will.thistleton@a2-si.com'
Subject: Site Information Request - 34a Netherhall Gardens

Good morning,

A-squared Studio Engineers Ltd (A-squared) are preparing a geo-environmental desk study report. Please can you provide the requested information (see below) held by the Environment Agency (EA) with respect to the subject site shown on the below plans if information is available. The site boundary is as shown by the red line. The site is located at 34a Netherhall Gardens, London, NW3 5TP.



The site is located at approximate National Grid Reference: 526360, 185150.

The information specifically requested is any information held by the EA on the following bullet points, either for the site itself or within 500 m of the site boundary:
(information on the distance and direction to each identified feature is also requested)

- Background groundwater and surface water quality;
- Groundwater flow direction (for the various geological units) and general hydrogeological site setting / hydrogeological parameters;
- Licenced water abstractions (surface and groundwater) and details of the geological unit each abstracts from;
- Groundwater Source Protection Zones (SPZs);
- Licenced Discharge Consents;
- Records of any pollution incidents and remediation subsequently undertaken;
- Records of any 'Special Sites' as per Part 2a (EPA 1990);
- Details of any sites under consideration for investigation as a potential 'Special Site' as per Part 2a (EPA 1990);
- Records of current or historical landfill sites or waste sites;
- Details of any lined surface watercourses;
- Details of any culverted watercourses;
- Historical land uses (specifically for the site or immediately adjacent to it rather than within 500 m, in this case); and
- Any ground investigation data for the site or immediately surrounding area.

Kind regards,

Dustin Dela Cruz

MESci (Hons)
Geo-environmental Consultant
A squared Studio A squared Studio A squared Studio
[redacted]

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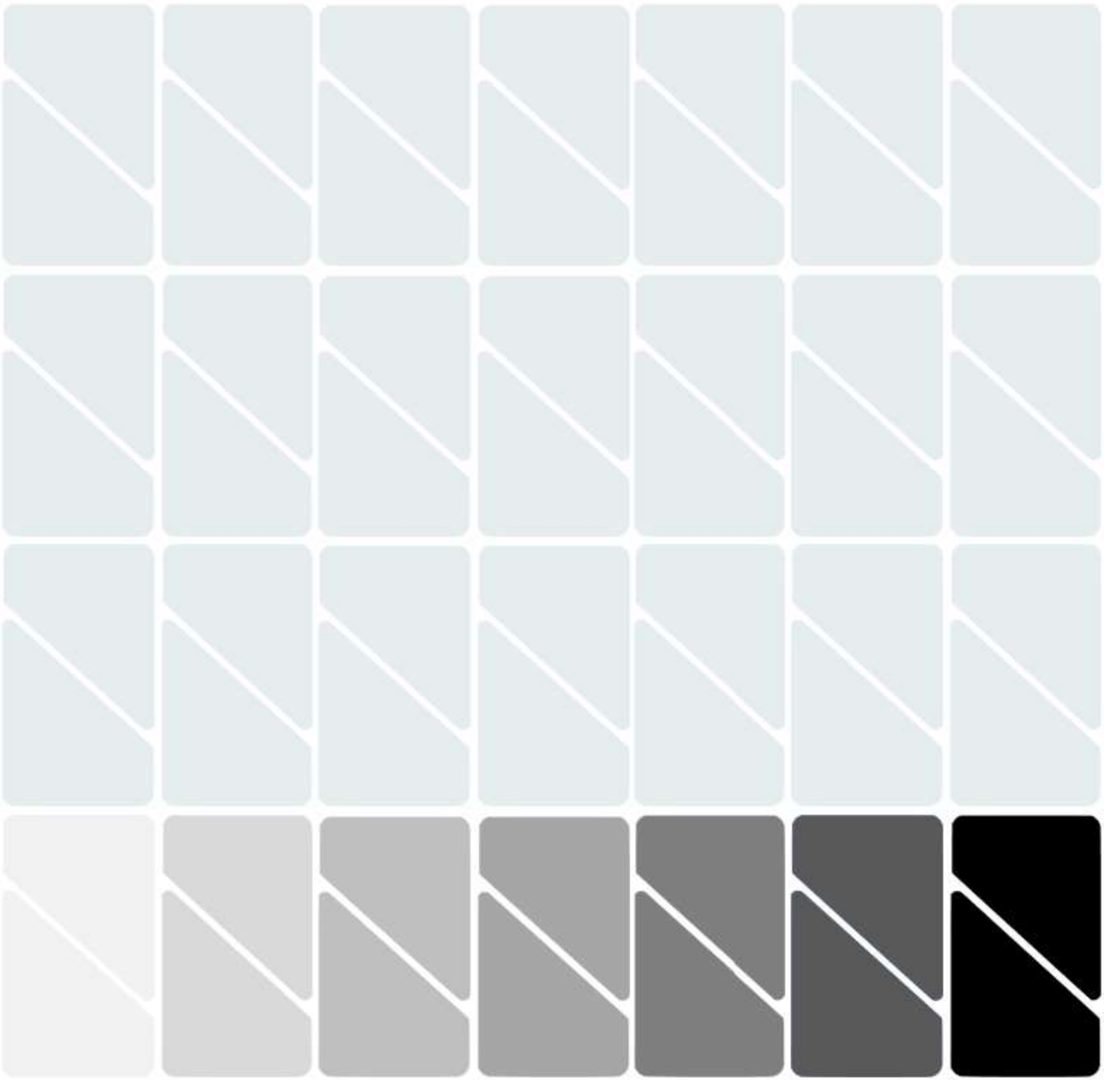

Appendix D: Flood Risk Assessment and Drainage Strategy Report

PJCE
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Flood Risk Assessment and Drainage Strategy Report

for

Proposed Development

at

34a Netherhall Gardens, London NW3 5TP

Document Prepared For:

Irena Kyuchukova & Nedko Kyuchukov

c/o Studio Three Architects,
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Reference: L2845-REP-001
Date: July 2024

Document Record

Document Revision	Comment	Author	Reviewer	Issue Date
01	First Issue Planning	Tim Seekings	Tom Marshall *MEng (Hons) CEng MIStructE*	July 2024

Contents Page

Appendices

1.0 Introduction

General

1.1.1 This Flood Risk Assessment (FRA) and Drainage Strategy (DS) report has been produced by Pringuer-James Consulting Engineers (PJCE) on behalf of Irena Kyuchukova & Nedko Kyuchukov to support a planning application for the development proposals at the site 34a Netherhall Gardens, London, NW3 5TP. Figure 1 below shows the location of the site.

Figure 1 – Site Location Plan

1.1.2 This FRA / DS had been prepared in accordance with the requirements of the National Planning Policy Framework (NPPF) and its planning practice guidance, national design standards, local surface water policies and nationally recognised SuDS Hierarchy, to demonstrate that the proposed development can be drained in an acceptable and sustainable manner and will not increase the risk of flooding to the site and surrounding area.

1.1.3 This report is not intended to provide the final details of the detailed drainage design for the proposed development. It rather provides essential information regarding the assessment of the potential risks of flooding from all sources and the design concepts and systematic approach used for the surface and foul water drainage strategy to meet the requirements of the relevant guidelines. The scope of this Report is as follows:

(i) Identification of the potential risk of flooding at the site from all sources (i.e. fluvial, tidal, pluvial, groundwater and surface water);

(ii) To show that flood risk from the site associated with surface water (pluvial) can be satisfactorily managed so that the site and adjacent land/ properties will not be subject to unacceptable flood risk whilst considering the potential allowance for climate change over the anticipated lifespan of the development. Developments must be appropriately resilient to the potential impacts of climate change;

(iii) To demonstrate that there will be no increased risk of flooding off site or on adjacent land and nearby property elsewhere; and

(iv) To demonstrate that wastewater and surface water runoff from the proposed development has satisfactory and achievable sustainable disposal strategies.

2.0 Site Parameters

Site Description

2.1.1 The site is located within the London Borough of Camden, at the address 34a Netherhall Gardens, London, NW3 5TP, it lies approximately 2.13km to the northwest of the Regent's Canal and 6.25km to the northwest of the River Thames at its nearest position. The existing site is currently occupied by a detached residential dwelling.

Site Topography

2.1.2 A topographical survey of the site was undertaken in February 2024 by Mobile CAD Surveying Solutions. The survey shows that the site slopes from east to west, with level of approximately 76m AOD by the entrance leading on to Netherhall Gardens, rising up to around 76.5m AOD at the front of the house, rising further to around 77m AOD to the rear of the property, where a retaining wall is present, which retains unmade earth with an average 78.5m AOD elevation. A copy of the sites topographical survey is included in **Appendix A**.

Site Geology

2.1.3 The British Geological Survey (BGS) indicates that the site sits on a sedimentary bedrock formation of Claygate Member, a mixture of clay, silt and sand, there aren't any superficial deposits shown on the mapping overlaying this.

2.1.4 The nearest known borehole information to the site available on the BGS website is located approximately 400m to the west of the site on Finchley Road, recorded in 1981. The borehole records show layers of predominantly clay.

2.1.5 Groundwater was struck at 1.5m below ground level (BGL) within one of the boreholes, whereas another recorded groundwater at 11.1m BGL, indicating the high level water strike was perched groundwater.

2.1.6 Defra Magic maps have been reviewed and show the site is not located within a source protection zone or above a designated aquifer. The maps also show the site to be located within an unproductive groundwater vulnerability zone. Despite this, the maps do show the site is in close proximity to high groundwater vulnerability areas as well as a Secondary A aquifer.

Development Proposals

2.1.7 The proposals will see the demolition of the existing detached property to construct a new detached dwelling with a basement. The existing and proposed site and basement plans are included in **Appendix B**.

3.0 Planning Policy Context

National Planning Policy Framework and Planning Practice Guidance

3.1.1 The National Planning Policy Framework (NPPF), originally published in 2012, was reissued in December 2023. The NPPF includes policies on flood risk and minimising the effect of flooding. The NPPF requires local authorities to adopt proactive strategies to mitigate and adapt to climate change, taking account of flood risk, coastal change and water supply and demand considerations.

3.1.2 Section 14 of this document list when a Flood Risk Assessment is required:

3.1.3 All development within Flood Zones 2 (Medium Risk) and 3 (High Risk);

3.1.4 In Flood Zone 1 an assessment should accompany all proposals involving:

- Sites of 1ha or more;
- Land identified by the Environment Agency as having critical drainage problems;
- Land identified in a Strategic Flood Risk Assessment as being at increased flood risk in future; or
- Land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

3.1.5 The NPPF goes on to state 'When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood risk assessment. Development should only be allowed in areas at risk of flooding where, in light of this assessment (and the sequential and exceptions tests, as applicable), it can be demonstrated that:

(a) *'Within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;*

(b) *The development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;*

(c) *It incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;*

(d) *Any residual risk can be safely managed; and*

(e) *Safe access and escape routes are included, where appropriate, as part of an agreed emergency plan'.*

3.1.6 Within the context of a drainage strategy the most applicable requirements of National and Local Planning Policy are that development should not cause new, or exacerbate, existing flooding problems either on the proposal site, or elsewhere, and should incorporate Sustainable Drainage Systems (SuDS) in order to restrict or reduce surface water run-off.

3.1.7 Planning Practice Guidance has been issued to ensure the effective implementation of the planning policies set out in the NPPF on development in areas at risk of flooding. The guidance sets out an expectation that for major development SuDS will be provided unless demonstrated inappropriate but also that SuDS may not be practical for all development types and this will depend upon the nature of the proposed, development, its location and the existing flood risk. New development will, however, only be considered appropriate if priority has been given to sustainable drainage. The Planning Practice Guidance to the NPPF outlines the following drainage hierarchy to be considered when disposing of surface water, with the aim of discharging as high up the hierarchy as possible:

- To the ground (infiltration)
- To a surface water body
- To a surface water sewer, highway drain or other drainage system
- To a combined sewer

3.1.8 The Planning Practice Guidance to the NPPF also provides an overview of the expected effect of climate change and, amongst other issues, recommends contingency allowances for peak rainfall intensities to be applied to drainage modelling based upon the expected lifetime of the development. Table 1 outlines the recommended peak rainfall intensity climate change allowances.

Allowance category (applies across all of England)	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper End	10%	20%	40%
Central	5%	10%	20%

Table 1 – Peak rainfall intensity climate change allowances for small and urban catchments

The Non-Statutory technical standards for sustainable drainage systems (2015)

3.1.9 In March, 2015, the Department for Environment, Food and Rural Affairs (DEFRA) published the Non-statutory technical standards for sustainable drainage systems; which are intended to be used in conjunction with the NPPF and the planning practice guidance. The Non-statutory technical standards for sustainable drainage systems provide guidance for developers to ensure that flood risk, from surface water, is managed appropriately so as not to lead to an increase in flood risk on and off site. This non-statutory guidance includes advisory standards on the peak flow rate, runoff volume and flood risk within the development. These standards also set out that that pumping would not normally be acceptable unless it is not reasonably practice to provide gravity drainage, that drainage systems should be structurally sound and that any damage from its construction must be minimised and rectified before the drainage system is considered completed.

The London Plan and supplementary planning guidance

3.1.10 The London Plan (2021), prepared by the Mayor of London, is the statutory Spatial Development Strategy for Greater London. The London Plan sets out the Mayors general policies for development and use of land within Greater London. The London Plan sets out specific polices with respect to flood risk and sustainable drainage. The most relevant of these policies to the current application are Policies SI 12 (Flood Risk Management) and SI 13 (Sustainable Drainage).

3.1.11 Policy SI 12 (Flood Risk Management) states that flood risk should "be managed in a sustainable and cost-effective way in collaboration with the Environment Agency, the Lead Local Flood Authorities, developers and infrastructure providers". The policy also states that "Mayor's Regional Flood Risk Appraisal and their Strategic

Flood Risk Assessment as well as Local Flood Risk Management Strategies", should be adhered to and that "Development proposals should ensure that flood risk is minimised and mitigated, and that residual risk is addressed".

3.1.12 Policy SI 13 (Sustainable Drainage) states that development should utilise Sustainable Urban Drainage Systems unless demonstrated impractical. In addition Policy SI 13 indicates that all developments, making no distinction between greenfield and brownfield sites, should aim to achieve greenfield runoff rates and that drainage should aim to deliver other policy objectives such as water use efficiency and quality, bio-diversity, amenity and recreation. Policy SI 13 also states that surface water run-off should be managed as close to source as possible, with preference for green over grey features, and sets out the following drainage hierarchy for the consideration of developments within London:

1. rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
2. rainwater infiltration to ground at or close to source.
3. rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
4. rainwater discharge direct to a watercourse (unless not appropriate)
5. controlled rainwater discharge to a surface water sewer or drain.
6. controlled rainwater discharge to a combined sewer

3.1.13 Key notes within this policy are:

- Development proposals for impermeable surfacing should normally be resisted unless they can be shown to be unavoidable, including on small surfaces such as front gardens and driveways.
- Drainage should be designed and implemented in ways that promote multiple benefits including increased water use efficiency, improved water quality, and enhanced biodiversity, urban greening, amenity and recreation.

London Borough of Camden – Local Plan (July 2017)

3.1.14 The local plan was adopted by The London Borough of Camden in July 2017 that will *'play an essential role in the delivery of the Camden Plan, which sets out the Council's vision for the borough, through 5 strategic objectives as set out in para 1.34. The Local Plan in particular will help deliver the objectives of creating the conditions for harnessing the benefits of economic growth, reducing inequality and securing sustainable neighbourhoods. It will also assist the delivery of other plans and strategies prepared by the Council and other service bodies, for example master plans and planning briefs.'*

3.1.15 Policy CC3 of this document relates to flood risk and sustainable drainage, stating:

3.1.16 *'The Council will seek to ensure that development does not increase flood risk and reduces the risk of flooding where possible. We will require development to:*

(a) *incorporate water efficiency measures;*

(b) *avoid harm to the water environment and improve water quality;*

(c) *consider the impact of development in areas at risk of flooding (including drainage);*

(d) *incorporate flood resilient measures in areas prone to flooding;*

(e) *utilise Sustainable Drainage Systems (SuDS) in line with the drainage hierarchy to achieve a greenfield run-off rate where feasible; and*

(f) *not locate vulnerable development in flood-prone areas.*

Where an assessment of flood risk is required, developments should consider surface water flooding in detail and groundwater flooding where applicable.

The Council will protect the borough's existing drinking water and foul water infrastructure, including the reservoirs at Barrow Hill, Hampstead Heath, Highgate and Kidderpore.'

3.1.17 Policy CC2 of this document relates to adapting to climate change, stating:

'The Council will require development to be resilient to climate change. All development should adopt appropriate climate change adaptation measures such as:

(a) *the protection of existing green spaces and promoting new appropriate green infrastructure;*

(b) *not increasing, and wherever possible reducing, surface water runoff through increasing permeable surfaces and use of Sustainable Drainage Systems;*

(c) *incorporating bio-diverse roofs, combination green and blue roofs and green walls where appropriate; and*

(d) *measures to reduce the impact of urban and dwelling overheating, including application of the cooling hierarchy.'*

London Borough of Camden – Camden Planning Guidance Water and Flooding (March 2019)

3.1.18 The London Borough of Camden –Planning Guidance Water and Flooding was produced in March 2019 and identifies different types of SuDS that can be utilised within the borough and provides council expectations. The document states: *'A drainage report is required for all major applications, basement development, and vulnerable development in areas identified as at risk of flooding (details of what this should include can be found in paragraph 8.67 of the Local Plan). The Council will expect plans and application documents to describe how water will be managed within the development, including an explanation of the proposed SuDS, the reasons why certain SuDS have been ruled out and detailed information on materials and landscaping.*

3.1.19 *The Council will expect developments to achieve a greenfield surface water run-off rate where feasible once SuDS have been installed.'*

Policy Analysis

3.1.20 As can be seen from the planning policies and guidance, the main requirements are that developments should not result in additional flood risk to the site and surrounding area. The policies stipulate that more vulnerable use classes should be located outside areas of greater flood risk, and that developments should be flood resilient, residual risk should be managed correctly and safe access and egress will be needed.

3.1.21 The drainage hierarchy presented by all levels of policy documents, largely follow the same concept. In line with the current London Plan the drainage hierarchy should be considered as following; re-use of water, infiltration to ground, rainwater attenuation in green infrastructure, rainwater discharge direct to a watercourse, controlled discharge to surface water sewers and finally controlled discharge to combined sewers.

3.1.22 The London Plan sets an expectation that, wherever possible, green infrastructure SuDS features and the multiple benefits they provide will be preferred, and that space should be made for water as part of the layout design.

3.1.23 There is an expectation that the Non-technical standards for sustainable drainage systems will be applied, alongside the more stringent expectations of the London Plans in regard to the greenfield runoff rate and potential betterment. Both local and national planning policy and guidance indicate that, wherever possible, developments should aim for discharge of surface water at greenfield rates regardless of development type. The different levels of policy and guidance vary as to what should be achieved in the case of brownfield sites, or where discharge at greenfield rates is not practical. It is, however, provided in Camden's advice note on surface water drainage that: *'Camden Planning Guidance 3 (CPG3) requires developments to achieve a greenfield run off rate once SuDS have been installed. Where it can be demonstrated that this is not feasible, a minimum 50% reduction in run off rate across the development is required.'*

3.1.24 Planning guidance indicates that supporting geological studies, information on maintenance arrangements, water quality and agreement, in principle, from the sewerage undertaker for any new connections should be provided as appropriate. In addition, where infiltration SuDS are not provided this should be justified by reference to relevant site-specific information.

4.0 Flood Risk

Fluvial / Tidal Flooding

4.1.1 The National Planning Policy Framework identify the Flood Zones as follows:

- Zone 1: 'Low Probability' This zone comprises land assessed as having a less than a 1 in 1000 annual probability of river or sea flooding (<0.1%) in any year.
- Zone 2: 'Medium Probability' – This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5%-0.1%) in any year.
- Zone 3a: 'High Probability' – This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
- Zone 3b: 'The Functional Floodplain' – This zone comprises land where water has to flow or be stored in times of flood. SFRAs should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes).

4.1.2 Figure 2 below has been extracted from the EA's flood map for planning and shows the various flood zone extents in the area around the site.

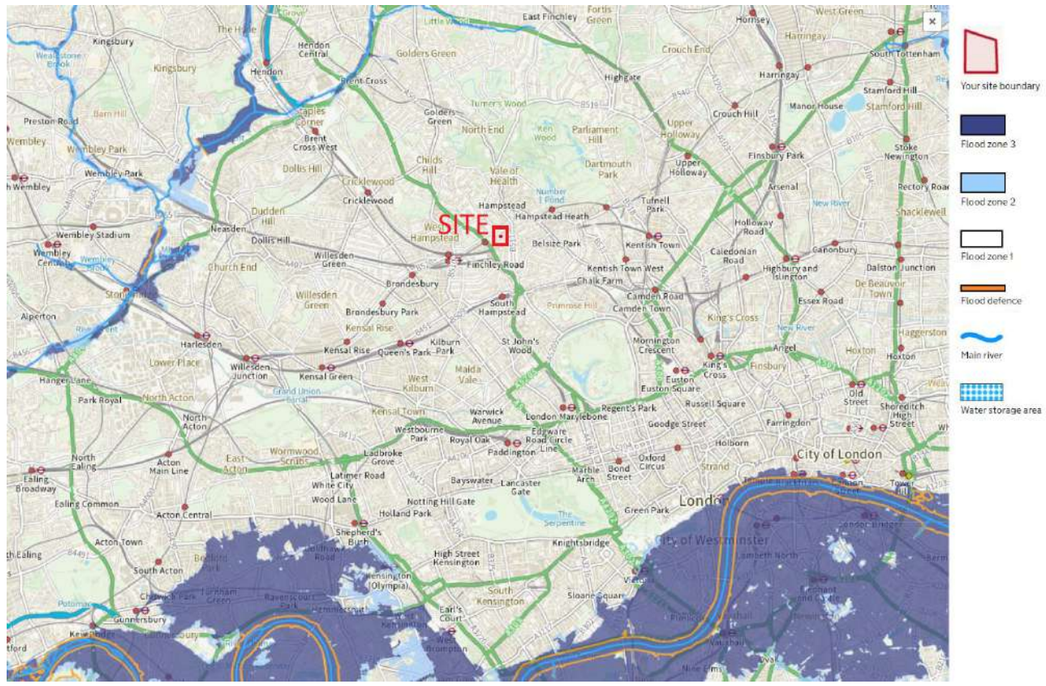


Figure 2 – EA Flood Map for Planning

4.1.3 As can be seen the site is shown to be located within Flood Zone 1, with the nearest areas of Flood Zone 3 4km to the northwest of the site near Brent Cross, emanating from the River Brent and 6km to the southeast, near Embankment, emanating from the River Thames.

Surface Water Flooding

4.1.4 Figure 3 below has been derived from the EA flood maps and shows the risk of flooding from surface water to the site and surrounding area.

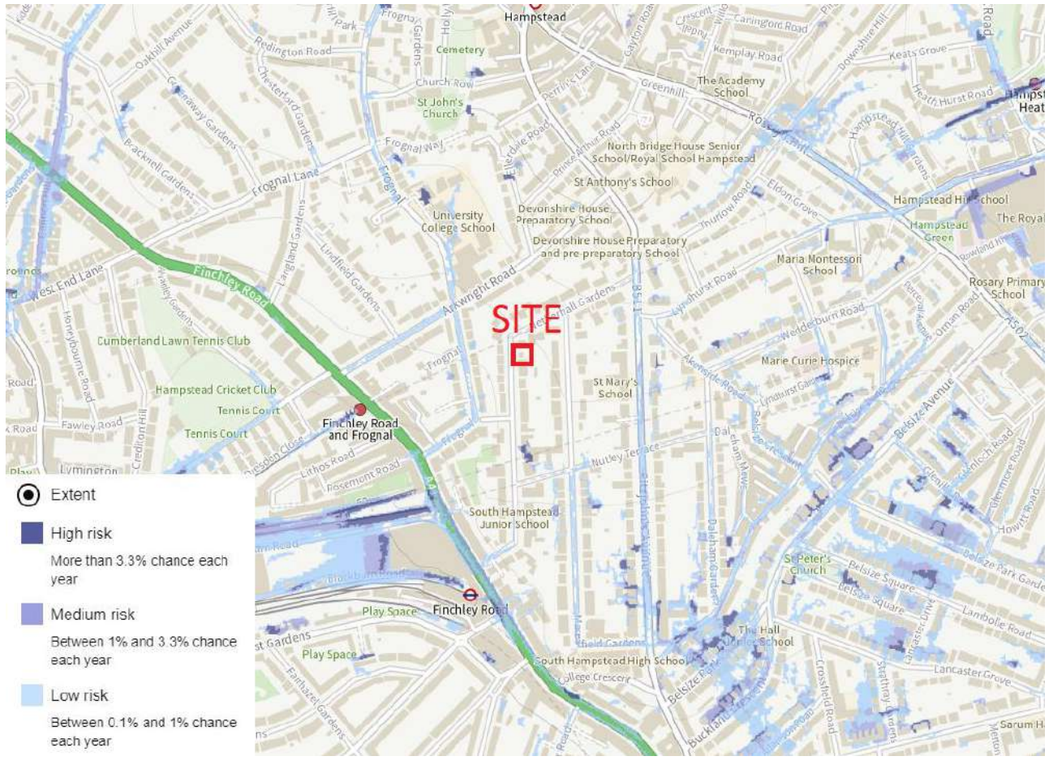


Figure 3 – EA Surface Water Flood Map

4.1.5 As can be seen, the site has a very low risk of surface water flooding as well as Netherhall Gardens and its surrounding area.

Groundwater Flooding

4.1.6 A Strategic Flood Risk Assessment (SFRA) was undertaken between Capita URS Infrastructure & Environment UK Ltd in July 2014 on behalf of London Borough of Camden. This document was produced to assess the risk of flooding to the Borough from a number of sources and provide key policies to the Borough in relation to drainage and flooding.

4.1.7 The SFRA states that groundwater flooding "usually occurs in low lying areas underlain by permeable rock and aquifers that allow groundwater to rise to the surface through the permeable subsoil following long periods of wet weather. Low lying areas may be more susceptible to groundwater flooding because the water table is usually at a much shallower depth and groundwater paths tend to travel from high to low ground."

4.1.8 Figure 4 below have been extracted from the London Borough of Camden (LBoC) SFRA and shows the susceptibility of groundwater flooding within the borough.

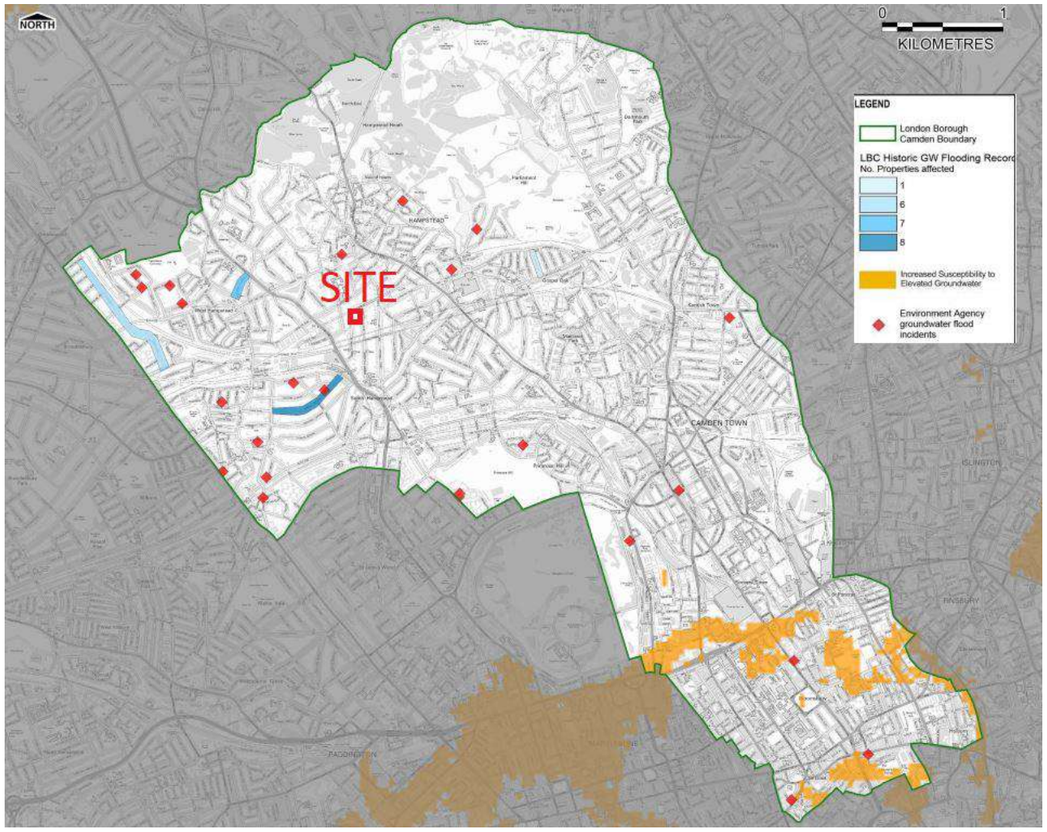


Figure 4 – LBoC SFRA Environment Agency Areas Susceptible to Groundwater Flooding

4.1.9 As can be seen, the site is shown to be in the least susceptible category of groundwater flooding. Defra Magic Mapping shows that the site is located an unproductive bedrock aquifer, an unproductive superficial aquifer and is located in a low groundwater vulnerability area however is in close proximity to high groundwater vulnerability areas as well as a Secondary A aquifer.

Sewer Flooding

4.1.10 The London Borough of Camden SFRA flood maps also include sewer flood events mapping based on postcode areas, from incident recordings provided by Thames Water. The mapping shows that the NW3 5 postcode area has had no recorded incidents of internal sewer flooding in the past 10 years (from the year of writing in 2014) and 1 recorded incident of external sewer flooding.

4.1.11 The SFRA notes that "TWUL target these areas for maintenance and improvements, areas that experienced flooding in the past may no longer be at greatest risk of flooding."

Summary

4.1.12 As detailed throughout this section, all sources of flooding that may affect the site are considered low to negligible.

5.0 Development Impact on Flooding

Impact on Flood Waters

5.1.1 The entire site is located within Flood Zone 1 and will not impact or restrict the flow of flood waters for an event with a probability of 0.1% or greater.

Impact on Flood Storage Volumes

5.1.2 The site is located fully within Flood Zone 1 and therefore does not accommodate any flood storage volumes for all events up to and including the 0.1% AEP event. The development proposals will therefore have no impact on flood storage volumes for all events with a probability of 0.1% or greater.

Access from site

5.1.3 Access from the proposed development is achievable via Netherhall Gardens, to the west. Access to and from the site, free from fluvial/tidal flood water up to and including the 0.1% AEP event can therefore be achieved via Netherhall Road.

Residual Risk

5.1.4 The site is located in Flood Zone 1, the property and surrounding infrastructure will be free from flood waters generated by a 1 in 100-year storm event. It is therefore concluded that the residual risk for this development will be low to negligible.

6.0 Existing Drainage

Public Sewers

6.1.1 Thames Water serves the site and surrounding area for the disposal of wastewater. Asset records have been obtained from Thames Water showing the public sewer networks surrounding the site, a copy of which is included in **Appendix C**. The records show the surrounding area is served by combined networks only, the closest being a 991mm x 610mm sewer directly to the west of the site, along Netherhall Gardens, flowing from north to south, with some unidentified public drainage also to the south of the site, within the adjacent property No 32 site.

Site Drainage

6.1.2 A drainage CCTV survey of the existing property was undertaken by Happy Drains. The survey shows that the property is served by a combined water network that drains around the north of the existing dwelling and is assumed to discharge to the Thames Water combined water sewer along Netherhall Gardens via a single connection. Rainwater gullies also connect into this system, therefore, there is no separate surface water sewers. A copy of the drainage CCTV survey report is included in **Appendix D**, with an interactive plan of the general arrangement, viewable here: Drainify.

6.1.3 An assessment has been undertaken to model the existing 260m² of hardstanding area, for the 1-, 30-, and 100-year intensities, the results are shown in Table 2 below, with a copy of the calculations included in **Appendix E**.

Storm Intensity	Flow Rate
1-year	2.3 l/s
30-year	5.5 l/s
100-year	7.2 l/s

Table 2 – Existing Surface Water Flow Rates

6.1.4 The total site area is approximately 320m² in area, an assessment has been undertaken to review the existing greenfield runoff rate from site via the ICP SUDS method, the results are shown in Figure 5 below:

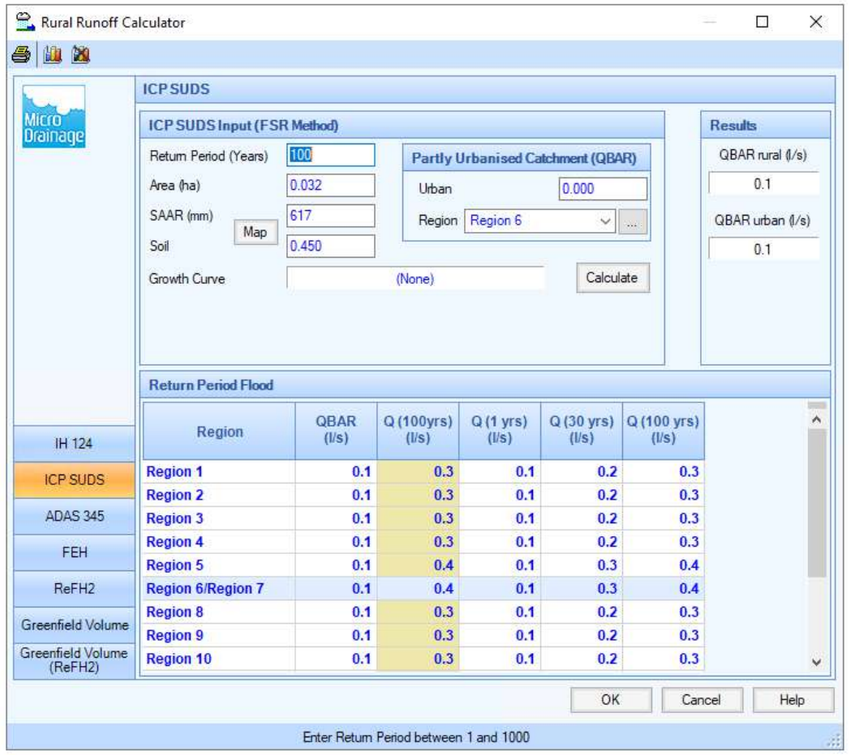


Figure 5 – Greenfield Runoff Rates

6.1.5 As can be seen the site is shown to have Greenfield runoff rates between 0.1l/s and 0.4l/s, depending on the return period.

7.0 SuDS Hierarchy

7.1.1 Table 3 has been produced and shows the SuDS Hierarchy in order along with comments specific to the development site and their suitability:

Discharge hierarchy	Viable	Comments
Rainwater use as a resource (for example rainwater harvesting), Blue and Green Roofs	Partially	Rainwater harvesting systems require full pipe networks in addition to drainage networks, to and from the buildings. Due to space constraints, incorporating an additional rainwater harvesting network will not be practical. Water butts, featuring overflow provisions, can be incorporated at down pipe locations, as a source of rainwater reuse.
Rainwater infiltration to ground at or close to source	No	The BGS shows the site sits on a bedrock formation of Claygate Member, a material unsuitable for infiltration due to its poor soakage potential. The use of infiltration as a means of surface water disposal is therefore not possible.
Rainwater discharge direct to a watercourse	No	No watercourses located within the immediate vicinity of the site to discharge to.
Controlled rainwater discharge to a surface water sewer or drain.	No	No surface water sewers located within the immediate vicinity of the site to discharge to.
Controlled rainwater discharge to a combined sewer	Yes	Utilisation of existing combined water connection to Thames Water combined sewer in Netherhall Gardens.

Table 3 – SuDS Hierarchy

8.0 Proposed Drainage

8.1.1 The existing site comprises of a residential dwelling with associated hard landscaping which has the potential to discharge at 7.2l/s for storm intensities of 100-years as shown on the existing drainage calculations in **Appendix E**. Greenfield runoff rates have been calculated between 0.1l/s, and 0.4l/s, depending on the return period.

8.1.2 Given the very low greenfield runoff rates, it is not considered that utilising greenfield runoff flow rates will be practical, as these will be prone to blockages causing greater risks of flooding, contrary to the intent of the initiative. As the site currently discharges at uncontrolled rates it is considered that a proposed surface water discharge rate of 2.0l/s would provide a betterment of the existing scenario, without reducing rates to a value that may cause maintenance issues on site due to blockages. Table 4 below shows the percentage improvement that the proposed 2.0l/s discharge rate would have from the existing scenario.

Storm Intensity	**Existing Flow Rate**	**Proposed Flow Rate**	**Percentage Betterment**
1-year	2.3 l/s	2.0 l/s	13%
30-year	5.5 l/s	2.0 l/s	64%
100-year	7.2 l/s	2.0 l/s	72%

Table 4 – Existing and Proposed Flow Rate Comparisons

8.1.3 As can be seen the proposed 2.0l/s would provide an improvement from the existing surface water flow rates, with a 72% betterment from the existing 7.2l/s generated from the 1 in 100-year event.

8.1.4 It is proposed that all surface water generated from the redevelopment will be stored within a new attenuation tank located at the front of the property. The proposed attenuation tank will be approximately 12m^2 x 0.8m deep to accommodate all runoff for the 100-year storm, including a 40% allowance for climate change, based on a maximum discharge rate of 2.0l/s. Due to uncertainty on the depth of the sites drainage discharge position, the attenuation could take the form of a more shallow structure, which will be confirmed at the detailed design stage.

8.1.5 It is proposed that the runoff stored within the attenuation tank will drain via the existing private combined drainage into the existing combined Thames Water sewer in Netherhall Gardens at a restricted flow rate of 2.0l/s.

8.1.6 Foul water will be collected through a number of pipes from the dwelling and discharged into the existing private combined network on site, that will be reutilised for foul alone, before discharging into the Thames Water combined sewer, via a combined connection, that will also serve the surface water.

8.1.7 As the proposals will feature a basement level, pumps and rising mains will be utilised, that will pump up to the respective surface water and foul runs at ground level.

8.1.8 A drainage strategy plan showing the indicative arrangement of the proposed foul and surface water network is included in **Appendix F**. MicroDrainage was used to assist in the design of the proposed attenuation tank, a copy of the preliminary network calculations is included in **Appendix G**.

9.0 SuDS Maintenance, Management & Construction

Maintenance & Management

9.1.1 It is recommended that catchpit sumps be monitored 3 monthly, and after periods of intense rainfall and cleared where required. Jetting of the pipework may be required on occasion, if and when a decrease in the performance of the drainage network has been identified. For the correct methods of maintenance on the various drainage features, refer to S.H.W., Volume 1, Series 500, Clauses 520, 521 and 526.

9.1.2 The following maintenance regime for tanks should be adopted to ensure efficient performance.

Attenuation Tanks

Maintenance Schedule	Required Actions	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter- remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/ or internal forebays	Annually, or as required
	System inspection after heavy storms	After every extreme storm event
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

9.1.3 It will be the duty of the site owner to ensure that the proposed surface water drainage system is maintained correctly during the lifetime of the site, as per the regime listed above, to mitigate the risk of drainage failure that may lead to flooding.

Construction Works

9.1.4 It will be the duty of the contractor to determine how the proposed drainage networks can be installed and maintained during construction.

9.1.5 Listed below are some potential risks that may be encountered during the construction of the new drainage network, and how these risks can be mitigated.

Item	Potential Effects	Recommended Actions
Deep excavations required for installation of drainage	Excavations required for drainage installation may be subject to collapse, and/or workers/plant/material falling in.	Temporary support to be provided along excavations. Edge support required along excavations.
Protection of installed infrastructure during work suspensions	During work suspensions, excavations and installed drainage that are exposed may be subject to ingress of debris and other material, also presenting risk to site operators.	Contractor to utilise appropriate protection measures including but not limited to temporary pipe stoppers and trench covers.
Storage of construction materials and surplus materials.	Construction materials and surplus materials to be exported from site may be obstructive to working areas and access routes.	Designated areas to store materials away from working areas and pedestrian/vehicle access routes to be provided.
Perched groundwater	Perched groundwater encountered during the construction phase may impact on work proposals	Appropriate dewatering techniques to be utilised to mitigate the risk of groundwater effects.

10.0 Summary / Conclusion

10.1.1 This report has been produced to assess the risk of flooding and review the proposed drainage strategy for the proposed development at 34a Netherhall Gardens, London, NW3 5TP. The development proposals will see the demolition of the existing detached dwelling to construct a new dwelling with a basement.

10.1.2 The site is located within Flood Zone 1, land assessed as having less than a 1 in 1000 annual probability of river or sea flooding (<0.1%) in any year. The risk of flooding affecting the site from surface water, ground water and all other sources is considered low to negligible.

10.1.3 The existing site is currently occupied by a detached residential dwelling and associated hard landscaping. There are existing drains within the site boundary that serves the property that flow unrestricted via a combined water connection to the adjacent Thames Water combined sewer in Netherhall Gardens.

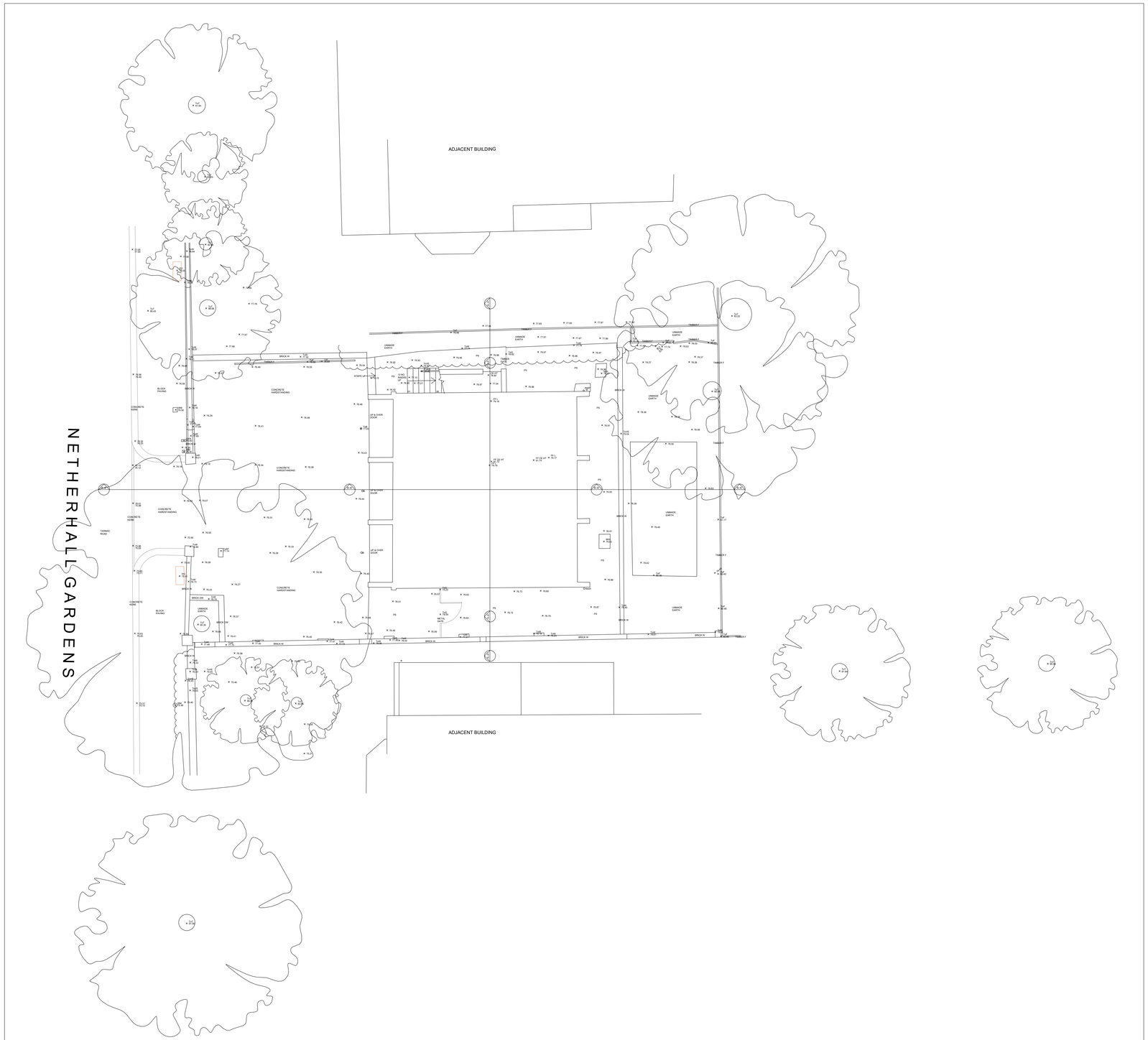
10.1.4 National and local policies have been reviewed regarding preferred methods of surface water disposal. The use of infiltration as a means of surface water disposal will not be possible due to the impermeable nature of the Claygate Member bedrock formation on site. The option of discharging to a watercourse or surface water sewer is not possible, as there are none within the vicinity of the site to discharge to.

10.1.5 It is proposed that surface water generated on site will be stored within an attenuation tank, before discharging to the Thames Water combined water sewer via an existing connection from the site. The surface water drainage network has been designed to cater for all flood events up to and including the 100-year storm, including a 40% allowance for climate change.

10.1.6 Surface water runoff from site is proposed to discharge at 2.0l/s, an improvement from the existing flow rates generated from the existing network and is considered the minimum flow rate achievable that won't be prone to blockages, that may cause flooding. The surface water will be restricted by a flow control unit.

10.1.7 This report clearly demonstrates that the proposed drainage strategy will represent a noticeable improvement to the existing scenario, reducing the risk of flooding to the site and surrounding area, also providing betterment and relief to the public sewer at which it currently discharges.

Appendix A – Topographical Survey



SITE PLAN
1:100 Scale

Note:
Areas drawn indicatively noted and indicated by grey dashed line as line below

LEVEL DATUM & ORIENTATION

N

GEOGRAPHICAL ORIENTATION & NORTH POINT SHOWN ARE INDICATIVE ONLY.

LEVELS CO-ORDINATED TO OSBM AT MARESFIELD GARDENS & LOCAL STATIONS POSITIONED ON SITE DURING SURVEY IN POSITIONS SHOWN ON PLAN.

GRID SHOWN IS BASED ON ARBITRARY CO-ORDINATES.

ABBREVIATIONS & LEGEND:

LEVELS & HEIGHTS

CL	-	COVER LEVEL
IL	-	INVERT LEVEL
L	-	LEVEL
HT	-	HEIGHT
STN	-	SURVEY STATION
BM	-	BEAM
CE	-	CEILING
J	-	JOISTS
RA	-	RAFTERS
E	-	EAVES
F	-	FENCE
U/S	-	UNDERSIDE OF
RL	-	RIDGE LINE
FR	-	FLAT ROOF
HL	-	HIP LINE
VL	-	VALLEY LINE
PW	-	PARAPET WALL
SL	-	SLAB
SF	-	SOFFIT
T	-	TREE
THR	-	THRESHOLD
To	-	TOP OF
W	-	WALL
HH	-	HEAD HEIGHT
OH	-	OPENING HEIGHT
SH	-	SILL HEIGHT

GENERAL NOTES

AB	-	ADVERTISING BOARD
AC	-	AIR CONDITIONING UNIT
AHU	-	AIR HANDLING UNIT
AP	-	INTRUDER ALARM PANEL
B	-	BOLLARD
BA	-	BARRIER
BE	-	BENCH
BS	-	BUS STOP
BLR	-	BOILER
BXO	-	BOXING OUT
CAH	-	CEILING ACCESS HATCH
CHY	-	CHIMNEY
CPD	-	CUPBOARD
DB	-	DOG WASTE BIN
DW	-	DWARF WALL
DK	-	DROP KERB
EDB	-	ELECTRICAL DISTRIBUTION BOARD
EG	-	EXTRACT GRILLE
EM	-	ELECTRIC METER
FB	-	FUSE BOX
FP	-	FIREPLACE
FU	-	FLUE
FAP	-	FIRE ALARM PANEL
GR	-	GRASS
GU	-	GUARDING
GM	-	GAS METER
HWC	-	HOT WATER CYLINDER
LB	-	LITTER BIN
LP	-	LAMP POST
PC	-	PELICAN CROSSING
PS	-	PAVING SLABS
PL	-	PAVEMENT LIGHT
PLT	-	PLANTING
PB	-	POST BOX
RG	-	RAILING
RS	-	ROAD SIGN
RFL	-	ROOF LIGHT
SB	-	SPEED BUMP
SG	-	SIGNAGE
SN	-	STREET NAME SIGN
SWR	-	SHOWER
SHV	-	SHELVING
TB	-	TELEPHONE BOX
THR	-	THRESHOLD
TL	-	TRAFFIC LIGHT
TM	-	TICKET MACHINE
TP	-	TELEGRAPH POLE
VE	-	VEGETATION
WA	-	WATER
WD	-	WARDROBE
WH	-	WATER HEATER
ZC	-	ZEBRA CROSSING

SERVICES

BT	-	BRITISH TELECOMS
CATV	-	CABLE TELEVISION
ER	-	EARTHING ROD
ES	-	ELECTRICAL SUPPLY
FH	-	FIRE HYDRANT
GAS	-	GAS SUPPLY
PO	-	POST OFFICE TELEPHONE
SV	-	STOP VALVE
TSSU	-	TRAFFIC LIGHT SIGNALS

DRAINAGE

DC	-	DRAINAGE CHANNEL
G	-	GULLY
I/C	-	INSPECTION CHAMBER
M/H	-	MANHOLE
RE	-	RODDING EYE
RWP	-	RAIN WATER PIPE
UTL	-	UNABLE TO LIFT
S+VP	-	SOIL & VENT PIPE
ST	-	STOP TAP
WM	-	WATER METER

TYPICAL DRAWING SYMBOLS

SPOT LEVEL × 96.256

SURVEY STATION STN.01 E 232193.251 N 515743.694 HT: 95.142

MANHOLE / INSPECTION CHAMBER I/C × CL=96.256 IL=94.824

SURVEY HEIGHT H=2.704

WINDOW TAG WINDOW 015 CH=1.800 SH=1.215

DOOR TAG DOOR 009 OH=1.820

RADIATOR TAG RADIATOR 005 LENGTH 0.500 BH=0.026 BH=0.200

TOP & BOTTOM OF KERB × 34.500 34.350

TOPOGRAPHICAL SYMBOLS

OVERHEAD ELECTRICAL

OVERHEAD TELEPHONE TEL TEL TEL

FENCE LINE

VEGETATION OUTLINE

SINGLE GATE

DOUBLE GATE

TREE

CONTOURS 92.000m

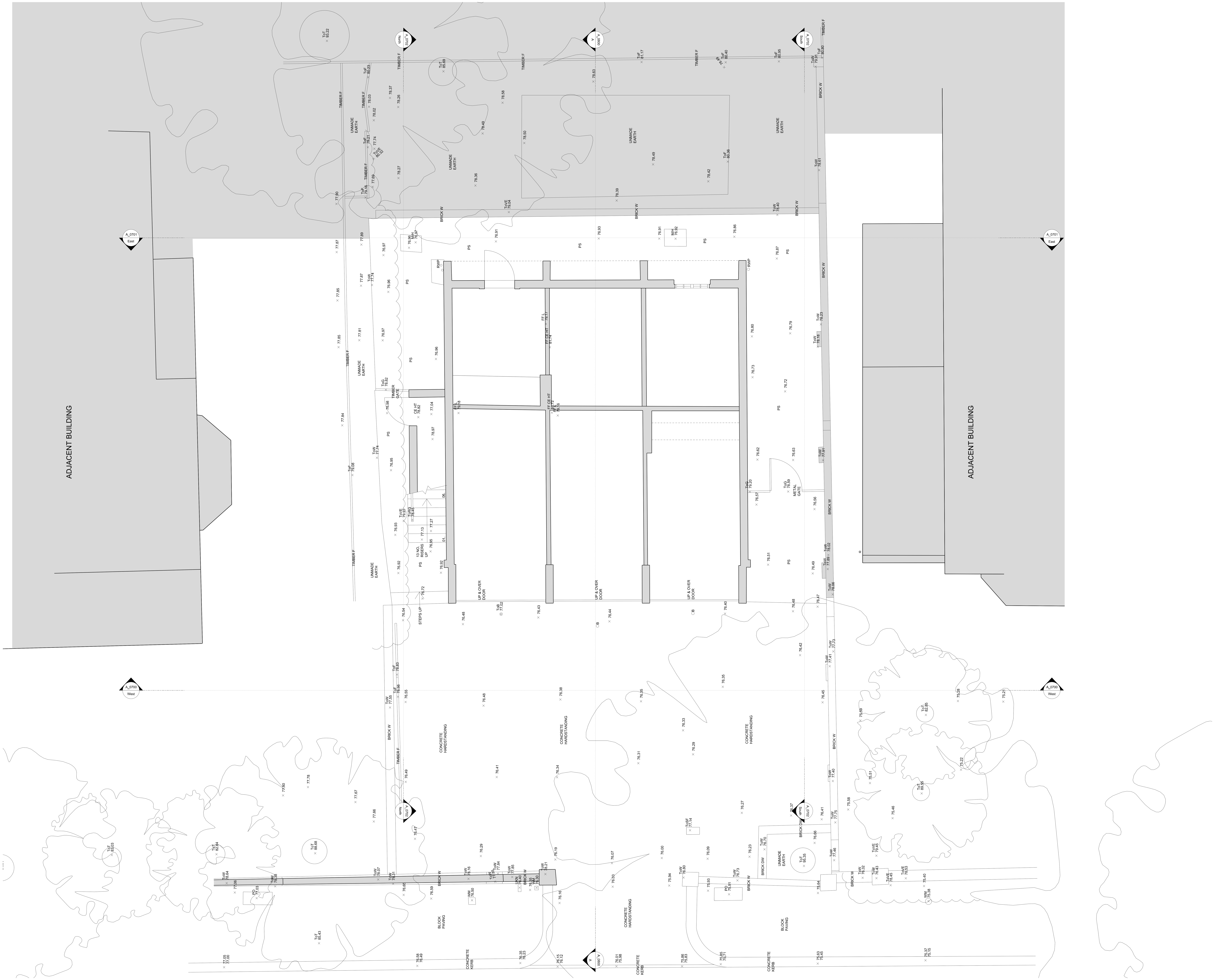
SLOPING DIRECTION LINE

REV	DATE	AMENDMENTS

MOBILE CAD Surveying Solutions
www.mobcad.co.uk
surveys@mobcad.co.uk
Pontefract Head Office:
Unit 10 & 11
2 Hampsnell Lane
Pontefract
West Yorkshire
WF8 1QY
01977 525 076
London Office
Kemp House
152 - 160 City Road
London
EC2V 2NX
020 3198 1197

PROJECT: MEASURED BUILDING SURVEY
ADDRESS: 34a NETHERHALL GARDENS, LONDON, NW3 5TP
DWG NO.: 4150 - 01
DWG TITLE: SITE PLAN
DWG DATE: FEBRUARY2024
DWG SIZE: 1:100 @ A1
DRAWN: CW | CHECKED: PC | ISSUE -

Appendix B – Existing & Proposed Site Plans



Rev.	Purpose	Date:
-	Issued for Planning	00.00.0000

Key:
Existing fabric

Phase
PLANNING

Drawing title
Existing Ground Floor Plan
DRAFT

Drawing No.	A_0600	Rev.	-
Drawn	VK	Approved	RD
First revision	31.05.2024	Updated	-

STUDIO THREE
97 Charlotte Street, London, W1T 4QA
https://www.studiothreearchtiects.com

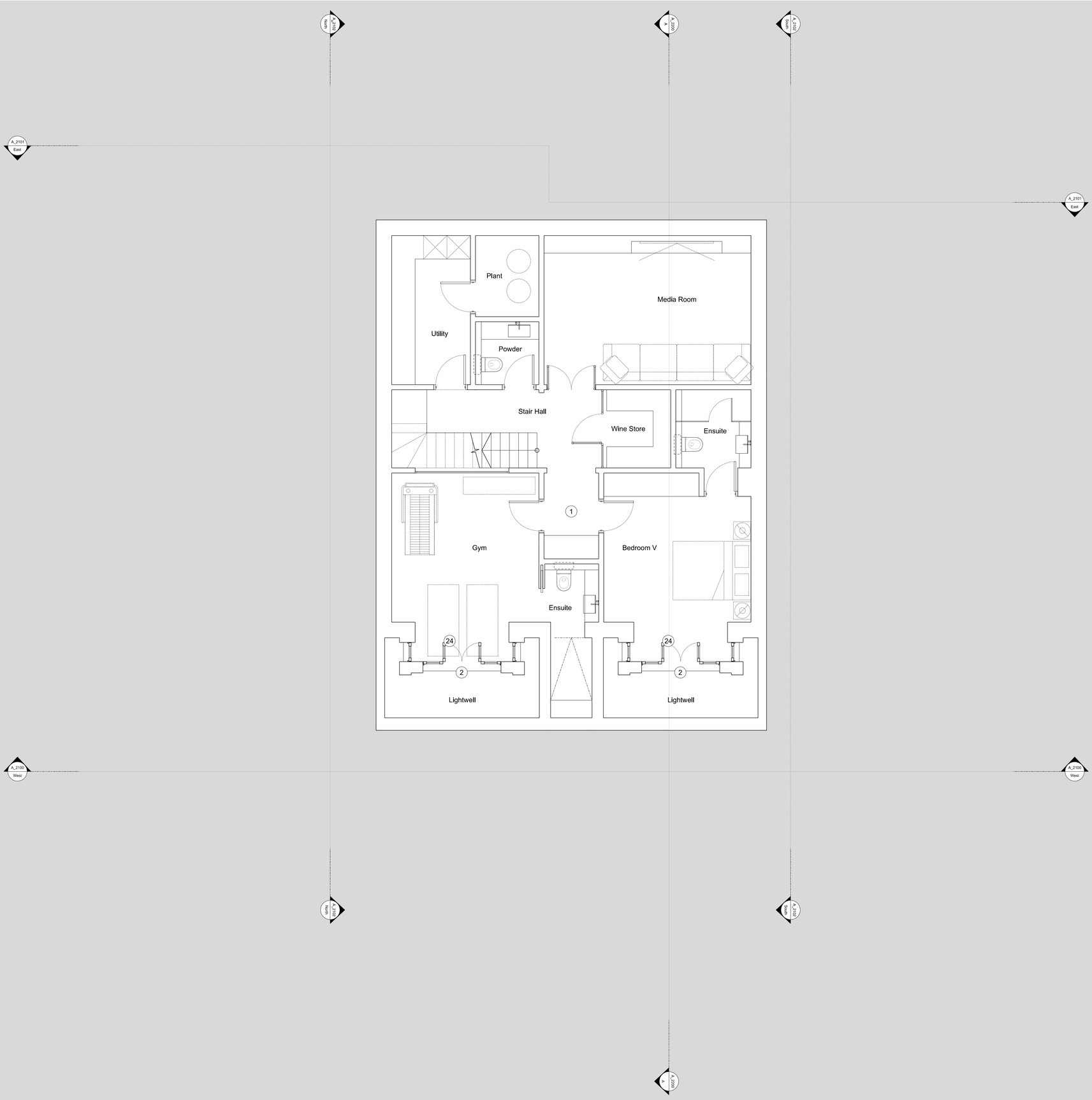
Project No. 23074
Address 34a Netherhall Gardens London NW3 5TP

Client Irena Kyuchukova & Nedko Kyuchukov

Scale 1:50 @ A1 / 1:100 @ A3

N

0m 1m 2m 4m 5m



Rev.	Purpose	Date:
-	Issued for Planning	00.00.0000

Key:

- Existing fabric
- Proposed wall
- Red brick selected to match neighbouring properties at 32 Netherhall Gardens and 34 Netherhall Gardens
- Wet cast masonry features (copings, sills, window surrounds) to suit the colour of the red brickwork
- Roof slates
- Porcelain tile paving

Notes:

1. Basement beneath the footprint of the existing house.
2. Front light wells.
3. Timber front door (level threshold). Paint finish.
4. Bay window: timber framed with wet cast masonry corner posts.
5. Timber-framed casement windows. Paint finish.
6. Timber-framed windows. Paint finish.
7. Aluminium tripartite sliding windows.
8. Rear terrace (lowered) with porcelain paviours.
9. Base of staircase finished in porcelain tile.
10. Metal staircase and railing. Paint finish.
11. External access stairs.
12. Metal railings. Paint finish.
13. Bi-folding vehicular access gates XXm tall.
14. Re-open existing pedestrian access and provide new metal railing pedestrian gate.
15. Parcel delivery box.
16. Bin Store (brick).
17. Cycle store (timber batten).
18. Reinstate brick pier and cast stone coping.
19. Re-construct garden wall to match the level of the remaining garden wall. Rebuild the brick pier with new cast stone coping.
20. Metal railings atop brick garden wall.
21. Fascia panel.
22. Rebuild existing timber garden fence.
23. Glazed, timber framed side access door (level threshold). Paint finish.
24. Glazed, timber framed French Doors. Paint finish.
25. Dormer window with painted timber fascia and panelled dormer cheeks.
26. Cast metal rainwater goods.
27. Cast stone coping to parapet wall.
28. Awning with fascia panel.
29. Timber Fascia Panel. Paint Finish.
30. Conservation roof light
31. Aluminium framed window
32. Photovoltaic panels
33. Obscured glazing

Phase

PLANNING

Drawing title

Proposed Basement Plan

DRAFT

Drawing No.	A_1999	Rev.	-
Drawn	VK	Approved	RD
First revision	31.05.2024	Updated	-

STUDIO THREE

97 Charlotte Street, London, W1T 4QA https://www.studiothreearchitects.com

Project No. 23074

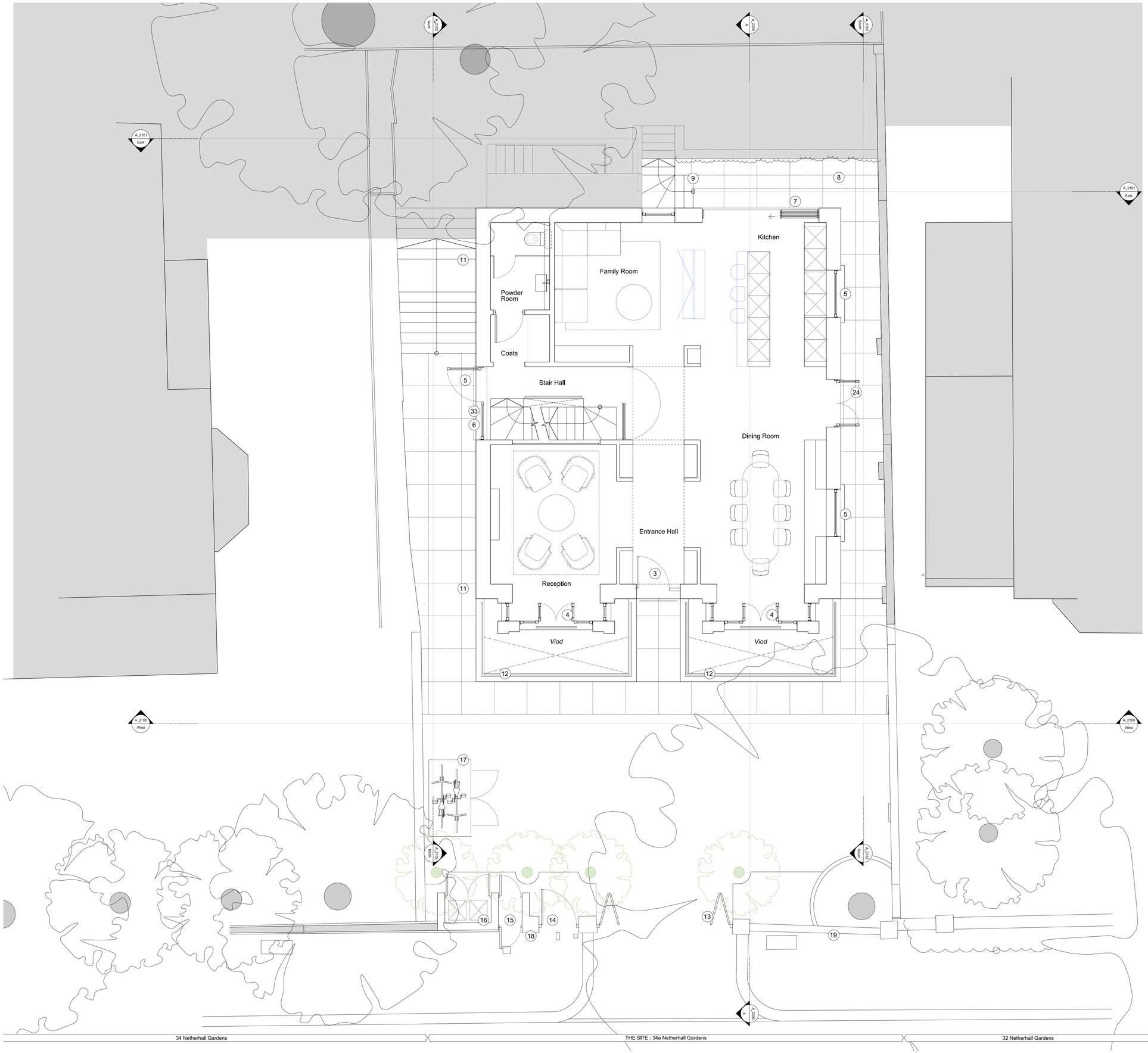
Address 34a Netherhall Gardens
London
NW3 5TP

Client Irena Kyuchukova & Nedko Kyuchukov

Scale 1:50 @ A1 / 1:100 @ A3

N

0m | 1m | 2m | 4m | 5m



Rev.	Purpose	Date:
-	Issued for Planning	00.00.0000

Key:

- Existing fabric
- Proposed wall
- Red brick selected to match neighbouring properties at 32 Netherhall Gardens and 34 Netherhall Gardens
- Wet cast masonry features (copings, sills, window surrounds) to suit the colour of the red brickwork
- Roof slates
- Porcelain tile paving

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29. Timber Fascia Panel. Paint Finish.
30. Conservation roof light
31. Aluminium framed window
32. Photovoltaic panels
33. Obscured glazing

Phase

PLANNING

Drawing title

Proposed Ground Floor Plan

DRAFT

Drawing No.	Rev.
A_2000	-
Drawn: VK	Approved: RD
First revision: 31.05.2024	Updated: -

STUDIO THREE

97 Charlotte Street, London, W1T 4QA https://www.studiothreearchitects.com

Project No.	Address
23074	34a Netherhall Gardens London NW3 5TP

Client: Irena Kyuchukova & Nedko Kyuchukov

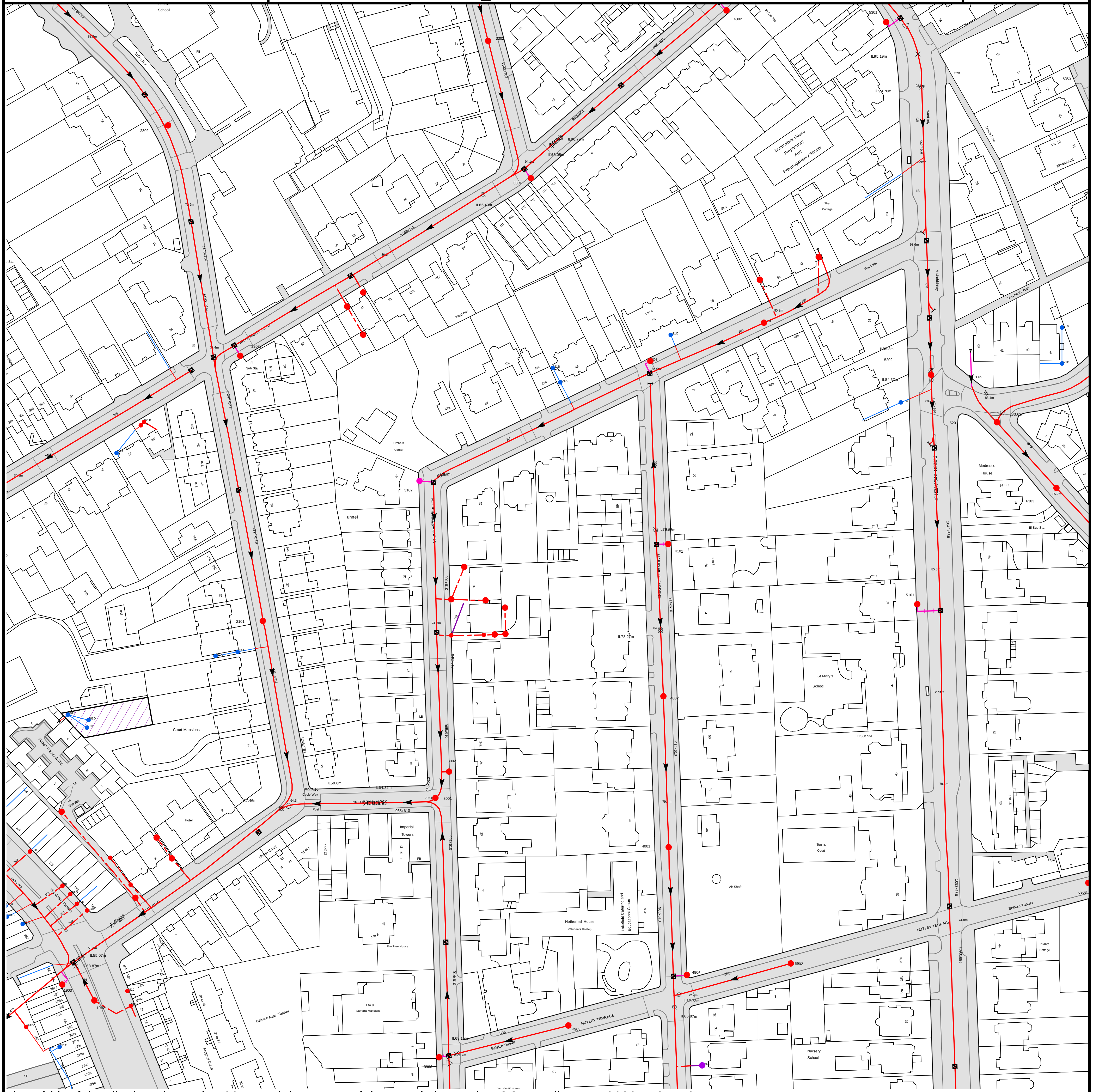
Scale: 1:50 @ A1 / 1:100 @ A3

N

0m | 1m | 2m | 4m | 5m

Appendix C – Thames Water Sewer Records

Asset Location Search Sewer Map - ALS/ALS Standard/2024_5004931



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 526391,185150

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

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
4302	n/a	n/a
5301	n/a	n/a
211A	n/a	n/a
2203	n/a	n/a
2101	69.04	62.55
2210	n/a	n/a
3201	n/a	n/a
3202	n/a	n/a
3102	n/a	n/a
3106	n/a	n/a
3112	n/a	n/a
3105	n/a	n/a
3111	n/a	n/a
3107	n/a	n/a
3110	n/a	n/a
3108	n/a	n/a
3109	n/a	n/a
3301	n/a	n/a
321B	n/a	n/a
321A	n/a	n/a
4201	n/a	n/a
4002	82.58	76.52
4101	n/a	n/a
421C	n/a	n/a
4206	n/a	n/a
421A	n/a	n/a
5211	n/a	n/a
521A	n/a	n/a
5101	n/a	n/a
5202	89.33	n/a
6903	75.62	71.38
6102	85.7	80.58
5201	87.83	83.39
621B	n/a	n/a
621A	n/a	n/a
2302	n/a	n/a
3302	n/a	n/a
221A	n/a	n/a
221B	n/a	n/a
191H	n/a	n/a
191B	n/a	n/a
191A	n/a	n/a
101B	n/a	n/a
1903	n/a	n/a
191E	n/a	n/a
191F	n/a	n/a
2901	n/a	n/a
191G	n/a	n/a
191I	n/a	n/a
1916	n/a	n/a
2008	n/a	n/a
1005	n/a	n/a
2007	n/a	n/a
1004	n/a	n/a
101C	n/a	n/a
101D	n/a	n/a
101E	n/a	n/a
201A	n/a	n/a
111A	n/a	n/a
191D	n/a	n/a
191C	n/a	n/a
291A	n/a	n/a
1902	57.86	54.02
191J	n/a	n/a
491A	n/a	n/a
3906	n/a	n/a
3903	72.04	69.19
4906	n/a	n/a
5902	73.36	69.41
4001	76.82	71.76
3001	70.81	64.89
3002	n/a	n/a

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.

Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

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

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

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

- Storm Sewer
- Sludge Sewer
- Foul Trunk Sewer
- Surface Trunk Sewer
- Combined Trunk Sewer
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Vacuum
- Thames Water Proposed
- Vent Pipe
- Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

- Sewer
- Culverted Watercourse
- Proposed
- Decommissioned Sewer
- Content of this drainage network is currently unknown
- Ownership of this drainage network is currently unknown

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
- Meter
- Dam Chase
- Vent
- Fitting

Operational Controls

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

- Ancillary
- Drop Pipe
- Control Valve
- 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.

- Inlet
- Outfall
- Undefined End

Other Symbols

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

- Change of Characteristic Indicator
- Public / Private Pumping Station
- Invert Level
- Summit

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Chamber
- Operational Site

Ducts or Crossings

- Casement

Ducts may contain high voltage cables. Please check with Thames Water.

- Conduit Bridge
- Subway
- Tunnel

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plan are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the 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 indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. 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, please contact Property Searches on 0800 009 4540.

Appendix D – CCTV Drainage Survey

Happy Drains

Sales-ABS@outlook.com

2024-03-21

C1011396/001

Domestic (MSCC5)

34a Netherhall Gardens, London, Greater London, NW3 5TP, United Kingdom

Supplier

Orgination **Happy Drains**
Engineer **Nathan Mead**
Surveyor certification number

Client

Name **Irena Kyuchukova**
Contact Phone Number **+44 07833295724**
Address **34a Netherhall Gardens, London, Greater London, NW3 5TP, United Kingdom**
Job Reference **C1011396/001**

Click below for the interactive

FULL REPORT & PLAN

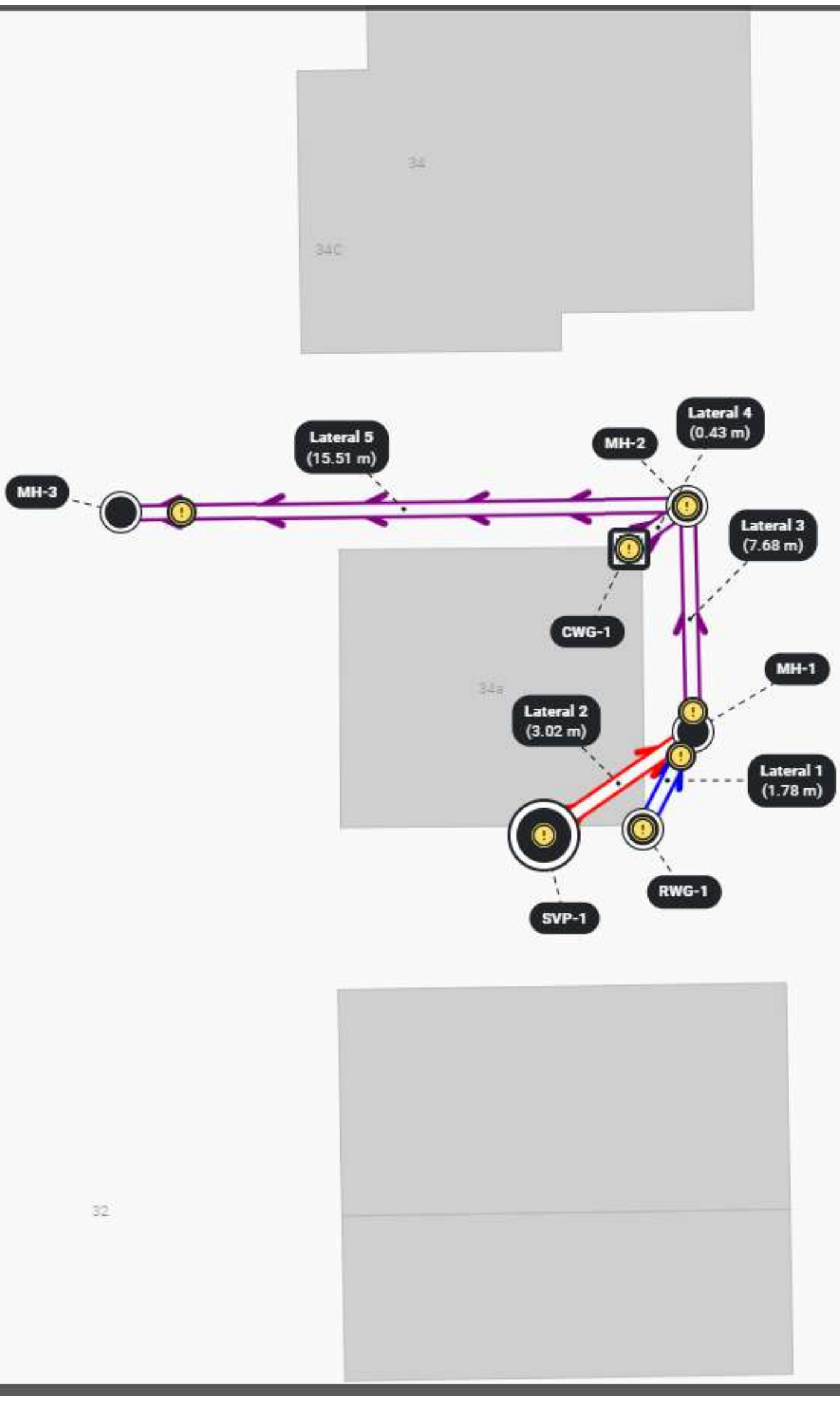

34
34C
Lateral 5
(15.51 m)
Lateral 4
(0.43 m)
MH-2
MH-3
Lateral 3
(7.68 m)
CWG-1
34a
MH-1
Lateral 2
(3.02 m)
Lateral 1
(1.78 m)
RWG-1
SVP-1
32

Table of contents

Section scores

Grade A
Best practice suggests consideration should be given to repairs in the medium term.

Grade B
Best practice suggests consideration should be given to repairs to avoid a potential collapse.

Grade C
Best practice suggests that this pipe is at risk of collapse at any time. Urgent consideration should be given to repairs to avoid total failure.
consideration should be given to repairs to avoid total failure.

Lateral 1	SERVICE B	STRUCTURAL A
Lateral 2	SERVICE A	STRUCTURAL A
Lateral 3	SERVICE B	STRUCTURAL A
Lateral 4	SERVICE A	STRUCTURAL A
Lateral 5	SERVICE B	STRUCTURAL A

Survey measurements

Number of sections
5

Total length of sewer network
28.42m

Total length of inspections
28.42m

Total abandoned inspections
X 0

Number of section inspection photos
12

Number of section inspection videos
0

Lateral 1

At a glance

Length	Diameter	Use	Material	Shape	Pipe type
1.78m	100mm	Surface Water	Vitrified Clay	Circular	Lateral

Depth

0.5m

Lateral 1

Observations

WL (Water Level)

Distance: 0m
Amount: 5%

STRUCTURAL A SERVICE A

DER (Deposits Coarse Settled)

Distance: 0.44m
Cross sectional loss: 15%
Remarks: Leaf matter and mud in drain

STRUCTURAL A SERVICE B

Finish

Distance: 1.78m

STRUCTURAL A SERVICE A

Lateral 2

At a glance

Length	Diameter	Use	Material	Shape	Pipe type
3.02m	100mm	Foul	Other	Circular	Lateral

Depth

0.5m

Lateral 2

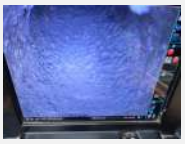
Observations

WL (Water Level)

Distance: 0m
Amount: 5%

STRUCTURAL A SERVICE A

Finish



Distance: 3.02m

STRUCTURAL A SERVICE A

Lateral 3

At a glance

Length	Diameter	Use	Material	Shape	Pipe type
7.68m	100mm	Combined	Other	Circular	Lateral

Depth

0.5m

Depth

0.7m

Lateral 3

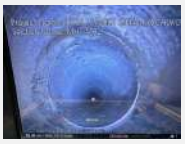
Observations

WL (Water Level)

Distance: 0m
Amount: 5%

STRUCTURAL A SERVICE A

RMJ (Root Mass Joint)



Distance: 0.67m
Cross sectional loss: 10%
Remarks: Roots in drain

STRUCTURAL A SERVICE B

Finish

Distance: 7.68m

STRUCTURAL A SERVICE A

Lateral 4

At a glance

Length	Diameter	Use	Material	Shape	Pipe type
0.43m	100mm	Combined	Other	Circular	Lateral

Depth

0.7m

Lateral 4

Observations

WL (Water Level)

Distance: 0m
Amount: 5%

STRUCTURAL A SERVICE A

Finish

Distance: 0.43m

STRUCTURAL A SERVICE A

Lateral 5

At a glance

Length	Diameter	Use	Material	Shape	Pipe type
15.51m	100mm	Combined	Other	Circular	Lateral

Depth

0.7m

Lateral 5

Observations

WL (Water Level)

Distance: 0m
Amount: 5%

STRUCTURAL A SERVICE A

RMJ (Root Mass Joint)

Distance: 13.84m
Cross sectional loss: 15%
Remarks: Roots in drain at this point

STRUCTURAL A SERVICE B

Node summary

MH-1

Depth	Remarks	Code	Material	Shape	Wall condition
0.5		MH			

Lateral connections	Surface type	Cover frame condition

Breadth	Width	Diameter	Benching condition

Lat	Lon
-0.17882774732952633	51.55107086984513

RWG-1

Depth	Remarks	Code	Material	Shape	Wall condition
		RWG			

Lateral connections	Surface type	Cover frame condition

Breadth	Width	Diameter	Benching condition

Lat	Lon
-0.17885266591564086	51.55104074106358

Node summary 2

SVP-1

Depth	Remarks	Code	Material	Shape	Wall condition
		SVP			

Lateral connections	Surface type	Cover frame condition

Breadth	Width	Diameter	Benching condition

Lat	Lon
-0.178901118721988	51.551039019418305

MH-2

Depth	Remarks	Code	Material	Shape	Wall condition
0.7		MH			

Lateral connections	Surface type	Cover frame condition

Breadth	Width	Diameter	Benching condition

Lat	Lon
-0.1788305160612902	51.5511397355567

Node summary 3

CWG-1

Depth	Remarks	Code	Material	Shape	Wall condition
		CWG			

Lateral connections	Surface type	Cover frame condition

Breadth	Width	Diameter	Benching condition

Lat	Lon
-0.17885958774513044	51.55112682324369

MH-3

Depth	Remarks
	Manhole is not visible checked underneath the car as well not there either

Code	Material	Shape	Wall condition	Lateral connections
MH				

Surface type	Cover frame condition	Breadth	Width

Diameter	Benching condition	Lat
		-0.17910971923141394

Lon
51.55113761617173

Disclaimer

The results in this report are considered the views of the suitably qualified engineer(s) you have employed to undertake the investigation. These findings are of on the day and time of the work.

This software has to be used by a qualified operative following the formal drainage standards of that specific geo-locations.

Visual investigations are an inspection of inside a drain/pie/sewer or conduit. CCTV drainage engineers are generally not qualified to comment other than pipe condition. They can only suggest required remedial actions appropriate for the pipes surveyed and not the structural integrity of a building.

A CCTV drainage survey is only part of a greater investigation of ground movement. Subsidence, for example, is a structural building issue which can have multiple causes

Pressure testing may be appropriate in certain cases, and you should be guided by a qualified professional, such as a structural engineer of the equivalent in your area.

If you have a specific requirement, please specify the data to capture any tolerances, and if possible, we will meet those requirements.

Where coordinates form part of this report, they may be of limited accuracy. A qualified technician can achieve pinpoint accuracy using 'Sonde and Trace' precision spotting techniques for record purposes or before excavations and installations.

Infographics

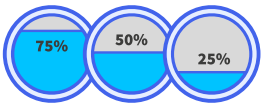
Observations in survey

R

Roots

Evidence of root ingress. Roots will normally infiltrate via bad joints, cracks, fractures, breaks etc

WL



Water level

Changes in water level. Shown at the beginning of every survey, if dry noted as 00. Described by percentage of height or diameter. Recorded in 5%

Appendix E – Existing Surface Water Flow Rates

	34a Netherhall Gardens London 1 in 1 Year	
Date 15/07/2024 File Brownfield Calculations...	Designed by TS Checked by TM	
XP Solutions	Source Control 2020.1.3	

Summary of Results for 1 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Summer	0.043	0.043	2.5	0.1	O K
60 min Winter	0.040	0.040	2.1	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Summer	13.524	0.0	2.6	32
60 min Winter	13.524	0.0	3.0	30

	34a Netherhall Gardens London 1 in 1 Year	
Date 15/07/2024 File Brownfield Calculations...	Designed by TS Checked by TM	
XP Solutions	Source Control 2020.1.3	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	21.000	Shortest Storm (mins)	60
Ratio R	0.437	Longest Storm (mins)	60
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.026

Time (mins) From:	To:	Area (ha)
0	4	0.026

	34a Netherhall Gardens London 1 in 1 Year	
Date 15/07/2024 File Brownfield Calculations...	Designed by TS Checked by TM	
XP Solutions	Source Control 2020.1.3	

Model Details

Storage is Online Cover Level (m) 1.500

Pipe Structure

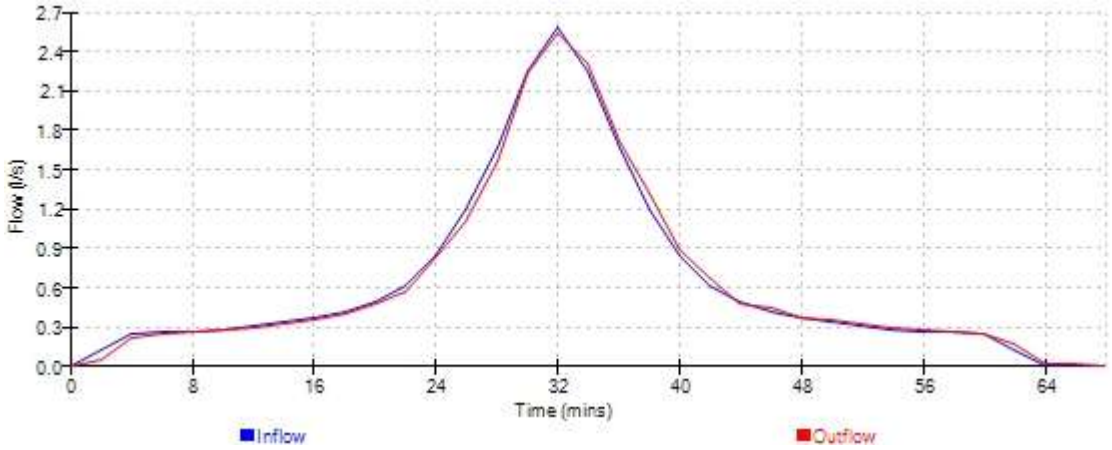
Diameter (m) 0.600 Length (m) 10.000
Slope (1:X) 100.000 Invert Level (m) 0.000

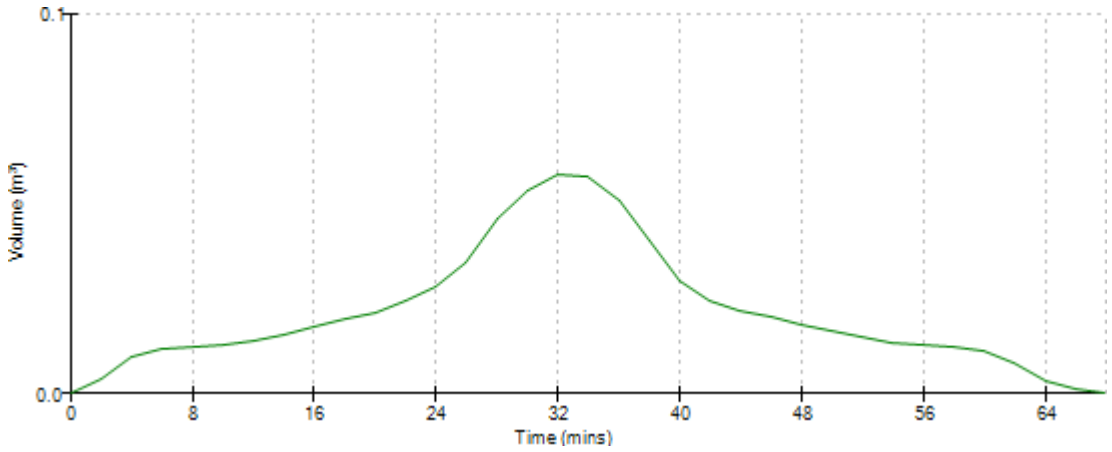
Pipe Outflow Control

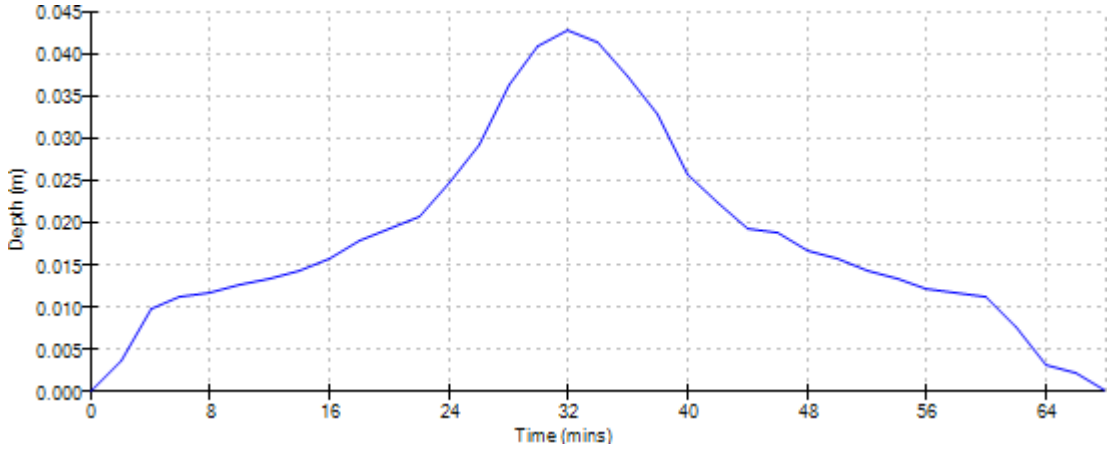
Diameter (m) 0.600 Entry Loss Coefficient 0.500
Slope (1:X) 100.0 Coefficient of Contraction 0.600
Length (m) 10.000 Upstream Invert Level (m) 0.000
Roughness k (mm) 0.600

	34a Netherhall Gardens London 1 in 1 Year	
Date 15/07/2024 File Brownfield Calculations...	Designed by TS Checked by TM	
XP Solutions	Source Control 2020.1.3	

Event: 60 min Summer

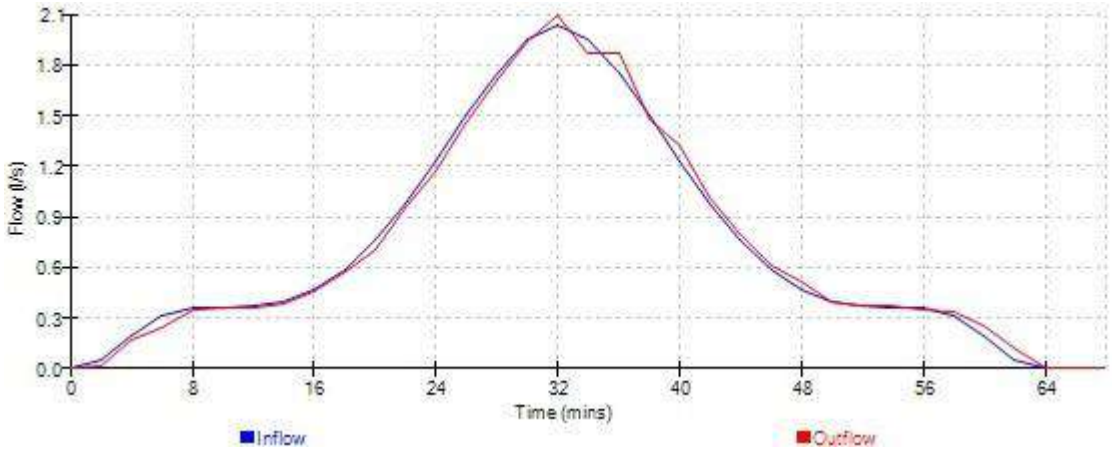


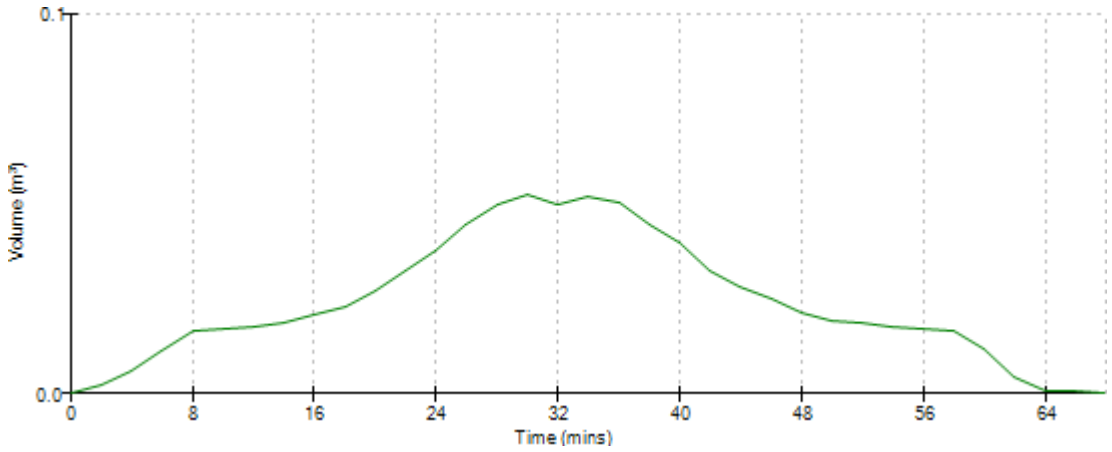


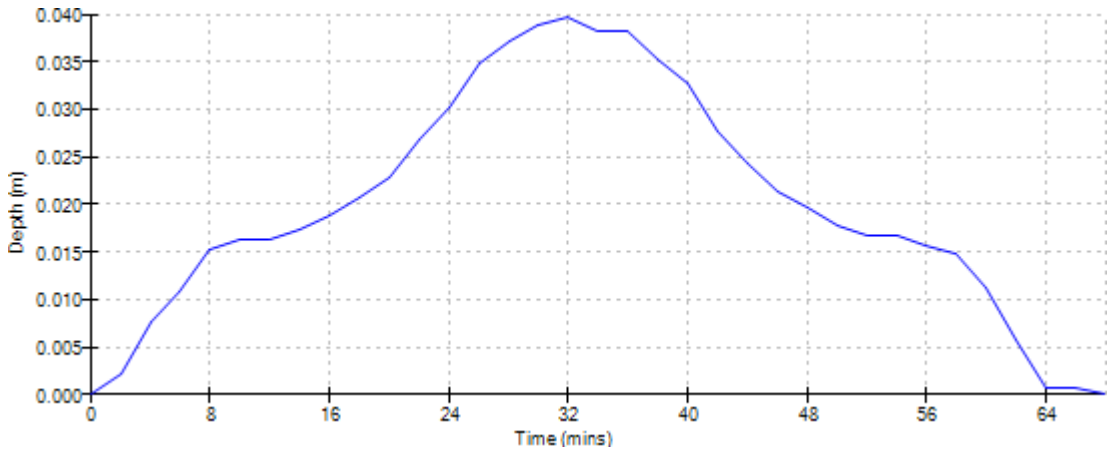


	34a Netherhall Gardens London 1 in 1 Year	
Date 15/07/2024 File Brownfield Calculations...	Designed by TS Checked by TM	
XP Solutions	Source Control 2020.1.3	

Event: 60 min Winter







	34a Netherhall Gardens London 1 in 30 Year	
Date 15/07/2024 File Brownfield Calculations...	Designed by TS Checked by TM	
XP Solutions	Source Control 2020.1.3	

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Summer	0.067	0.067	6.1	0.1	O K
60 min Winter	0.059	0.059	4.9	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Summer	32.372	0.0	6.3	32
60 min Winter	32.372	0.0	7.1	32

	34a Netherhall Gardens London 1 in 30 Year	
Date 15/07/2024 File Brownfield Calculations...	Designed by TS Checked by TM	
XP Solutions	Source Control 2020.1.3	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	21.000	Shortest Storm (mins)	60
Ratio R	0.437	Longest Storm (mins)	60
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.026

Time (mins) From:	To:	Area (ha)
0	4	0.026

	34a Netherhall Gardens London 1 in 30 Year	
Date 15/07/2024 File Brownfield Calculations...	Designed by TS Checked by TM	
XP Solutions	Source Control 2020.1.3	

Model Details

Storage is Online Cover Level (m) 1.500

Pipe Structure

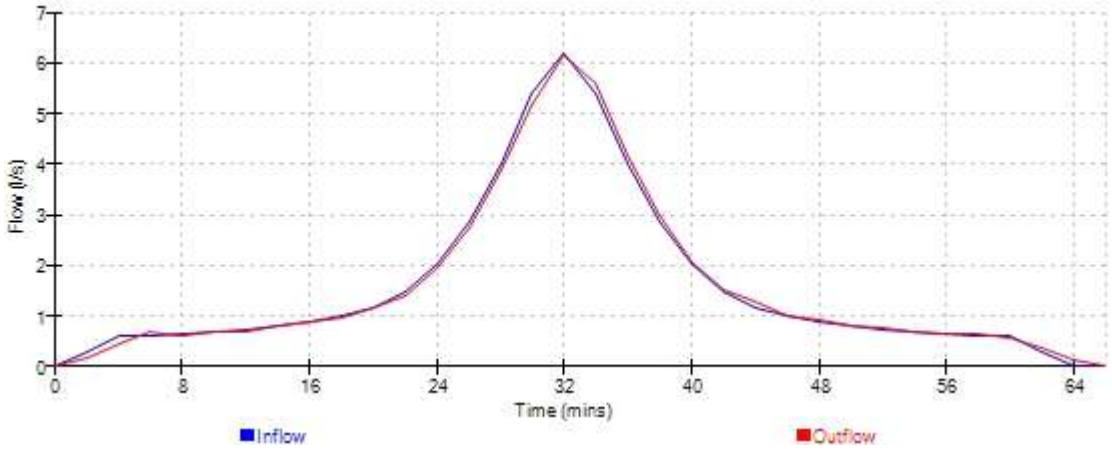
Diameter (m) 0.600 Length (m) 10.000
Slope (1:X) 100.000 Invert Level (m) 0.000

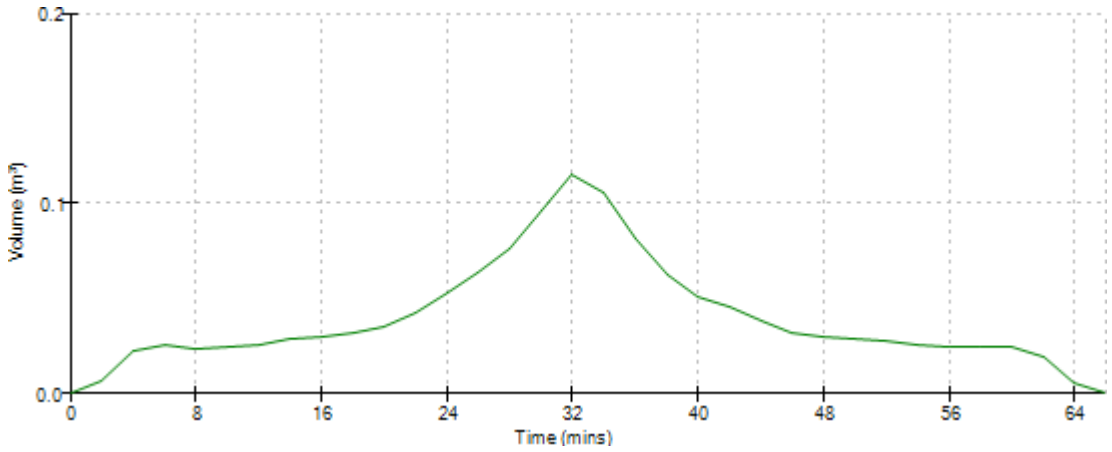
Pipe Outflow Control

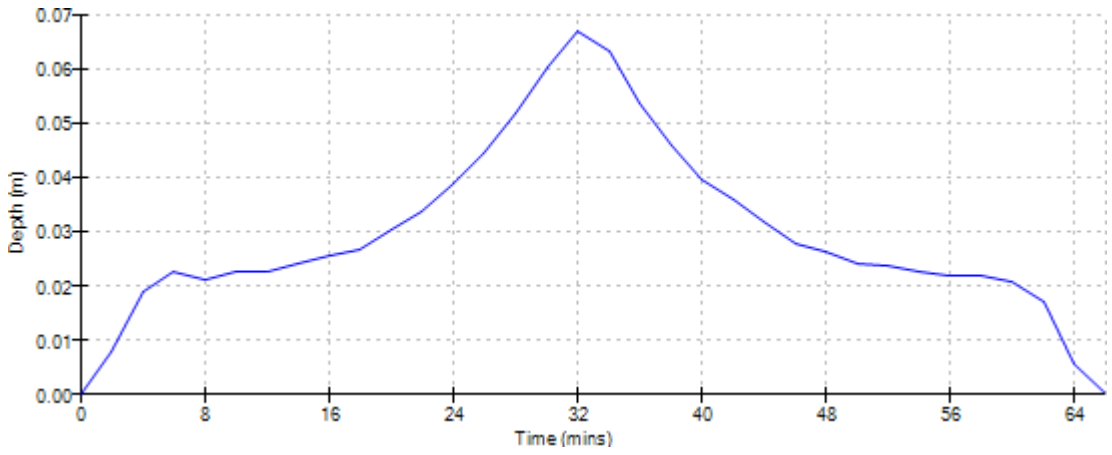
Diameter (m) 0.600 Entry Loss Coefficient 0.500
Slope (1:X) 100.0 Coefficient of Contraction 0.600
Length (m) 10.000 Upstream Invert Level (m) 0.000
Roughness k (mm) 0.600

	34a Netherhall Gardens London 1 in 30 Year
Date 15/07/2024	Designed by TS
File Brownfield Calculations...	Checked by TM
XP Solutions	Source Control 2020.1.3

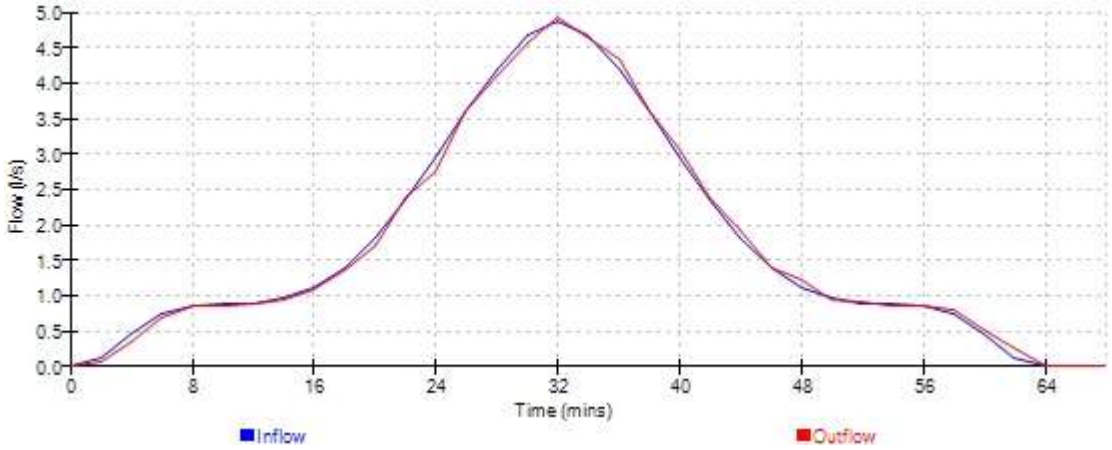
Event: 60 min Summer

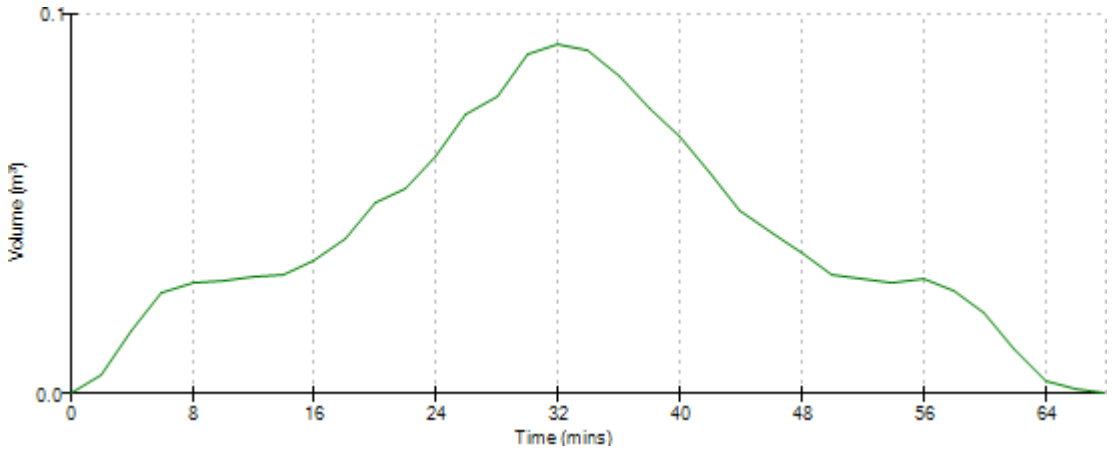


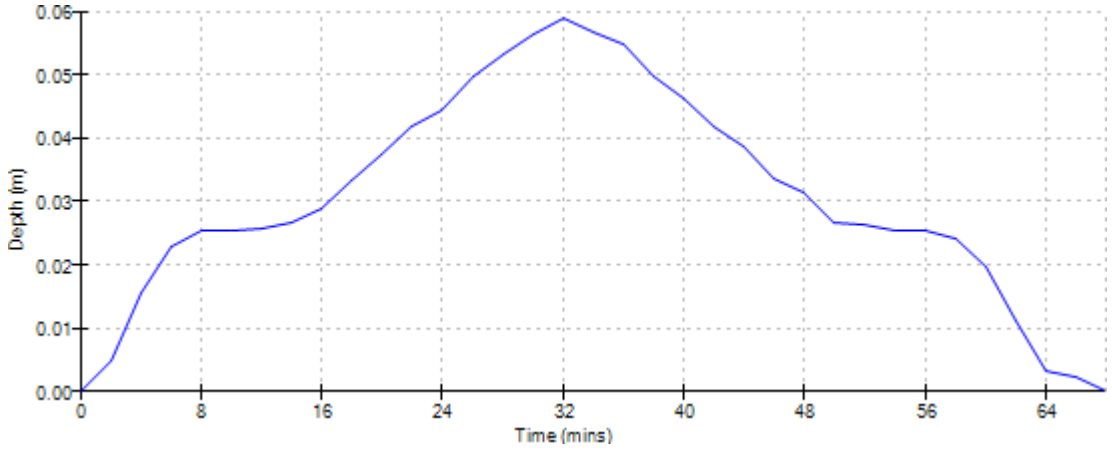




Event: 60 min Winter







	34a Netherhall Gardens London 1 in 100 Year	
Date 15/07/2024 File Brownfield Calculations...	Designed by TS Checked by TM	
XP Solutions	Source Control 2020.1.3	

Summary of Results for 100 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Summer	0.079	0.079	8.0	0.2	O K
60 min Winter	0.069	0.069	6.4	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Summer	42.578	0.0	8.3	32
60 min Winter	42.578	0.0	9.3	32

	34a Netherhall Gardens London 1 in 100 Year	
Date 15/07/2024 File Brownfield Calculations...	Designed by TS Checked by TM	
XP Solutions	Source Control 2020.1.3	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	21.000	Shortest Storm (mins)	60
Ratio R	0.437	Longest Storm (mins)	60
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.026

Time (mins) From:	To:	Area (ha)
0	4	0.026

	34a Netherhall Gardens London 1 in 100 Year	
Date 15/07/2024 File Brownfield Calculations...	Designed by TS Checked by TM	
XP Solutions	Source Control 2020.1.3	

Model Details

Storage is Online Cover Level (m) 1.500

Pipe Structure

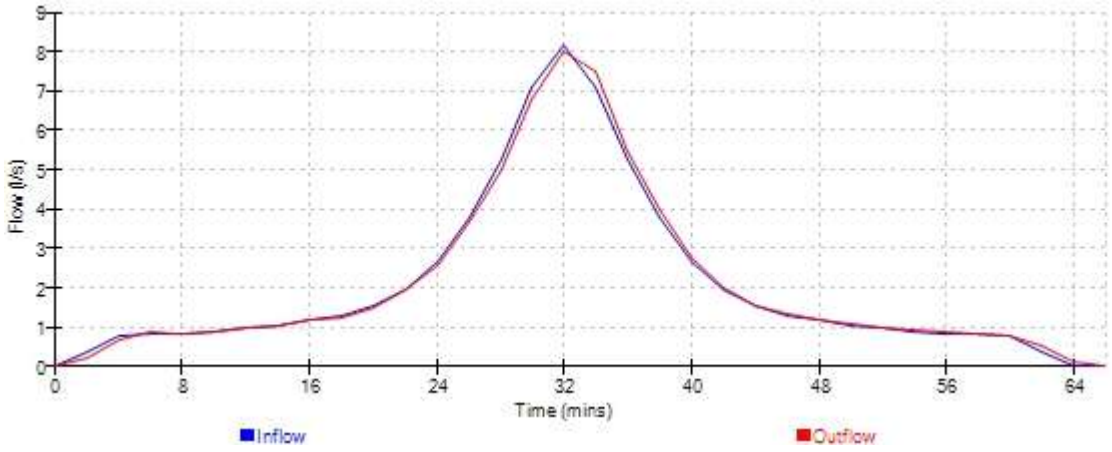
Diameter (m) 0.600 Length (m) 10.000
Slope (1:X) 100.000 Invert Level (m) 0.000

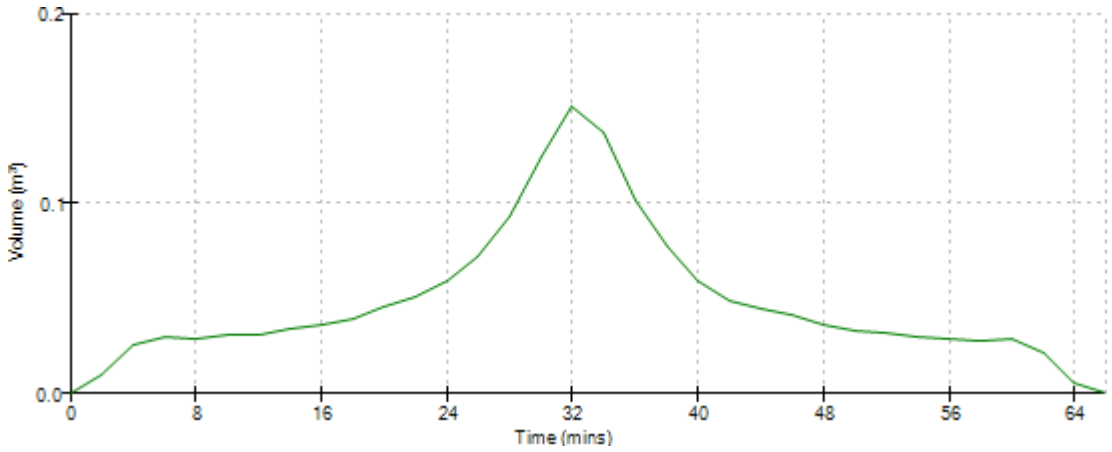
Pipe Outflow Control

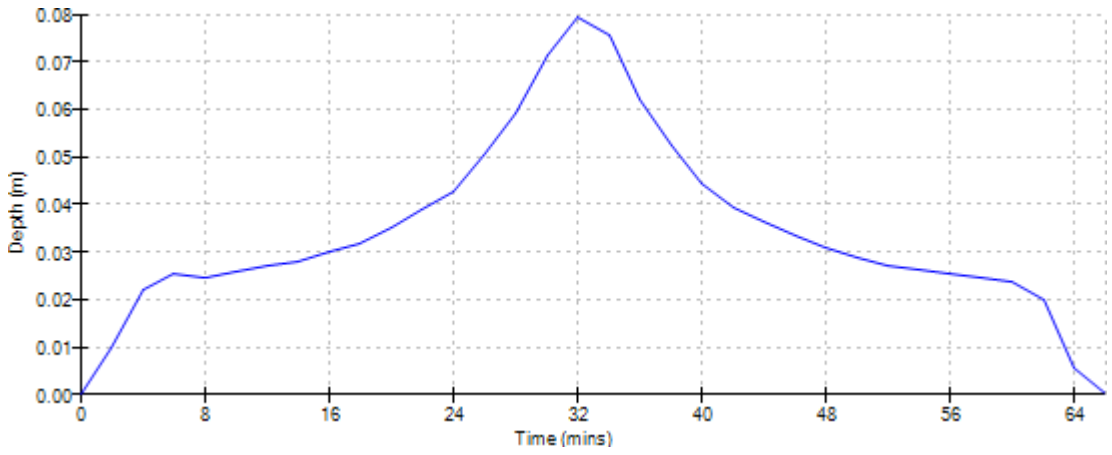
Diameter (m) 0.600 Entry Loss Coefficient 0.500
Slope (1:X) 100.0 Coefficient of Contraction 0.600
Length (m) 10.000 Upstream Invert Level (m) 0.000
Roughness k (mm) 0.600

	34a Netherhall Gardens London 1 in 100 Year
Date 15/07/2024 File Brownfield Calculations...	Designed by TS Checked by TM
XP Solutions	Source Control 2020.1.3

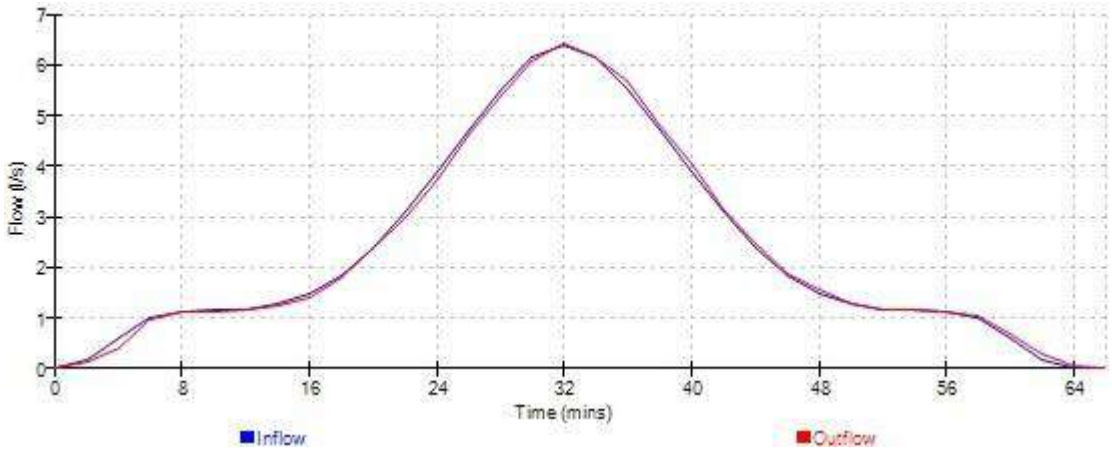
Event: 60 min Summer

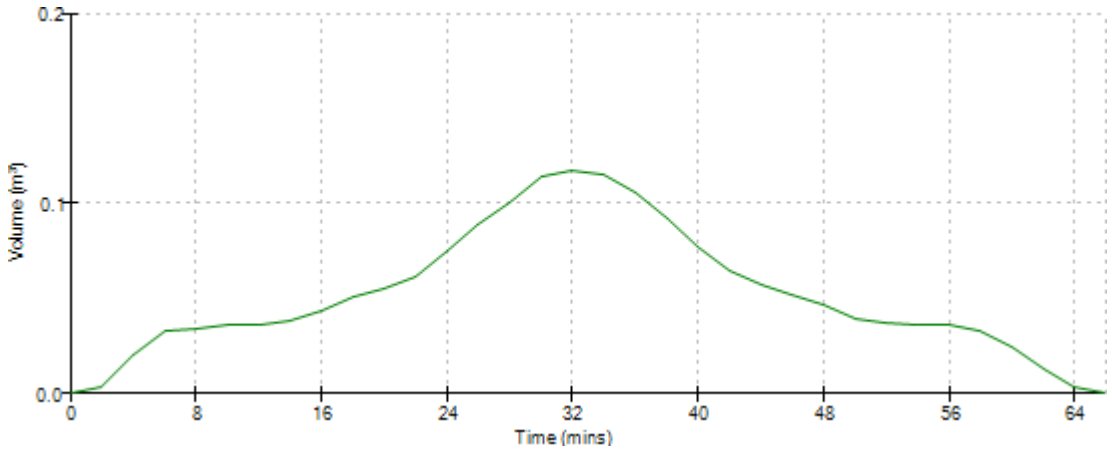


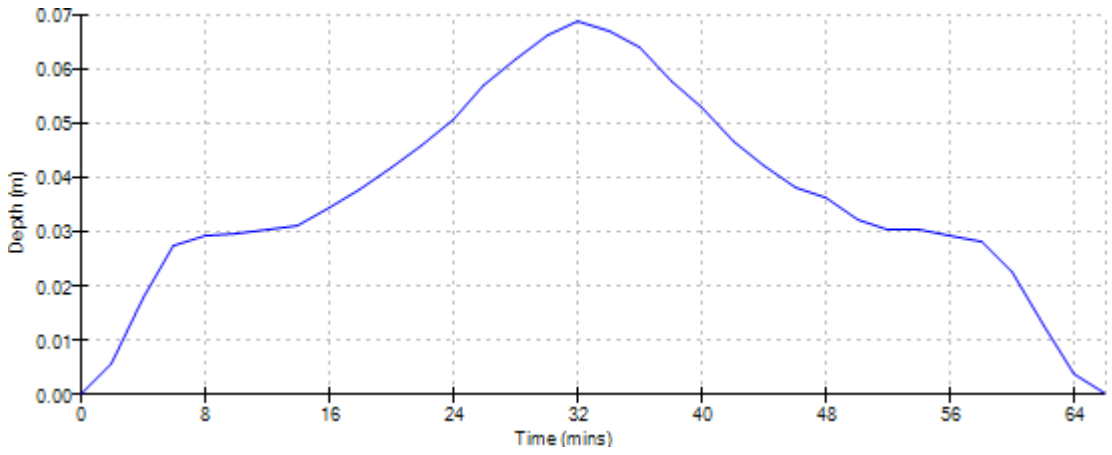




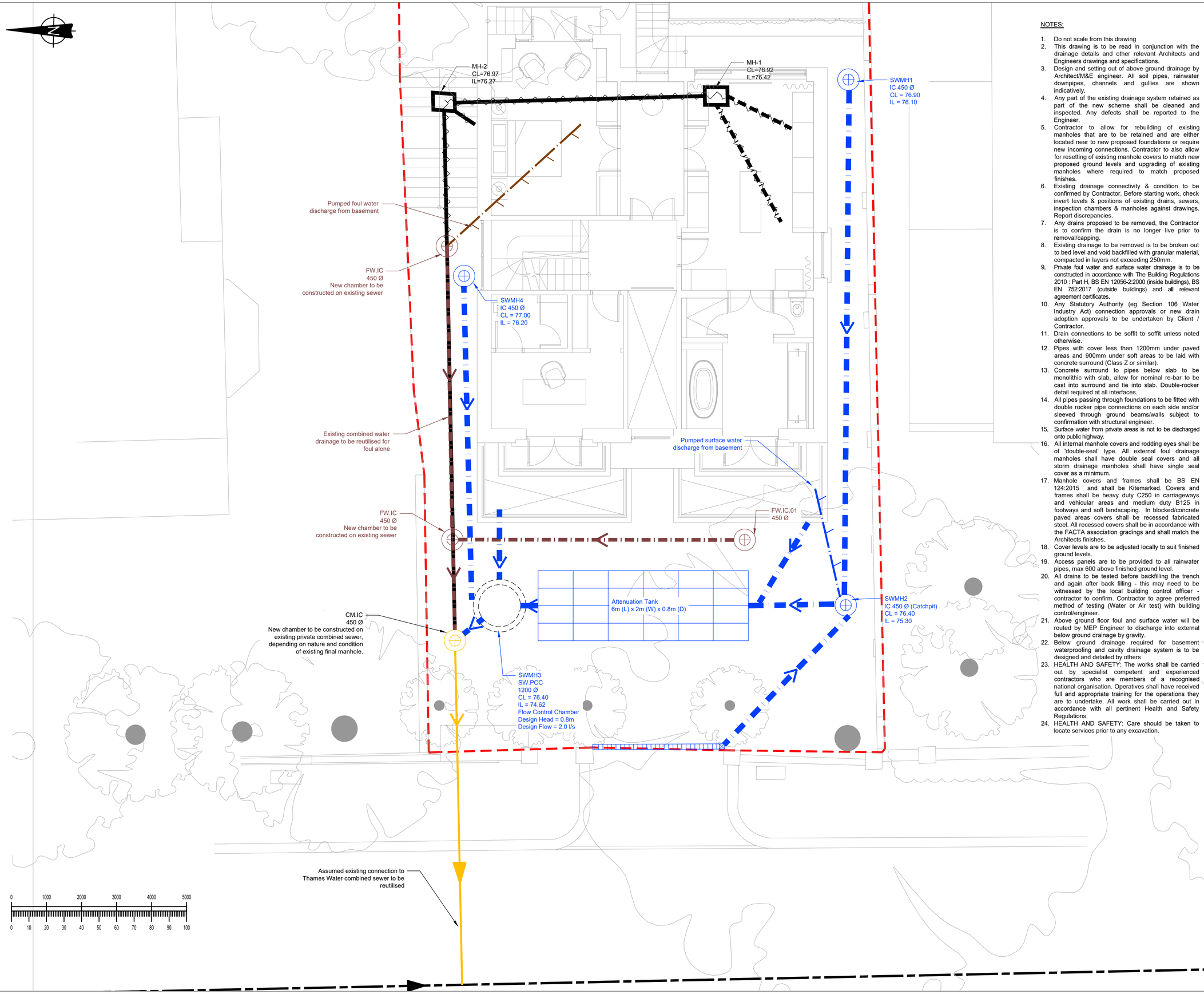
Event: 60 min Winter







Appendix F – Drainage Strategy Plan



NOTES:

1. Do not scale from this drawing
2. This drawing is to be read in conjunction with the drainage details and other relevant Architects and Engineers drawings and specifications.
3. Design and setting out of above ground drainage by Architect/M&E engineer. All soil pipes, rainwater downpipes, channels and gullies are shown indicatively.
4. Any part of the existing drainage system retained as part of the new scheme shall be cleaned and inspected. Any defects shall be reported to the Engineer.
5. Contractor to allow for rebuilding of existing manholes that are to be retained and are either located near to new proposed foundations or require new incoming connections. Contractor to also allow for resetting of existing manhole covers to match new proposed ground levels and upgrading of existing manholes where required to match proposed finishes.
6. Existing drainage connectivity & condition to be confirmed by Contractor. Before starting work, check invert levels & positions of existing drains, sewers, inspection chambers & manholes against drawings. Report discrepancies.
7. Any drains proposed to be removed, the Contractor is to confirm the drain is no longer live prior to removal/capping.
8. Existing drainage to be removed is to be broken out to bed level and void backfilled with granular material, compacted in layers not exceeding 250mm.
9. Private foul water and surface water drainage is to be constructed in accordance with The Building Regulations 2010 : Part H, BS EN 12056-2:2000 (inside buildings), BS EN 752:2017 (outside buildings) and all relevant agreement certificates.
10. Any Statutory Authority (eg Section 106 Water Industry Act) connection approvals or new drain adoption approvals to be undertaken by Client / Contractor.
11. Drain connections to be soffit to soffit unless noted otherwise.
12. Pipes with cover less than 1200mm under paved areas and 900mm under soft areas to be laid with concrete surround (Class Z or similar).
13. Concrete surround to pipes below slab to be monolithic with slab, allow for nominal re-bar to be cast into surround and tie into slab. Double-rocker detail required at all interfaces.
14. All pipes passing through foundations to be fitted with double rocker pipe connections on each side and/or sleeved through ground beams/walls subject to confirmation with structural engineer.
15. Surface water from private areas is not to be discharged onto public highway.
16. All internal manhole covers and rodding eyes shall be of 'double-seal' type. All external foul drainage manholes shall have double seal covers and all storm drainage manholes shall have single seal cover as a minimum.
17. Manhole covers and frames shall be BS EN 124:2015 and shall be Kitemarked. Covers and frames shall be heavy duty C250 in carriageways and vehicular areas and medium duty B125 in footways and soft landscaping. In blocked/concrete paved areas covers shall be recessed fabricated steel. All recessed covers shall be in accordance with the FACTA association gradings and shall match the Architects finishes.
18. Cover levels are to be adjusted locally to suit finished ground levels.
19. Access panels are to be provided to all rainwater pipes, max 600 above finished ground level.
20. All drains to be tested before backfilling the trench and again after back filling - this may need to be witnessed by the local building control officer - contractor to confirm. Contractor to agree preferred method of testing (Water or Air test) with building control/engineer.
21. Above ground floor foul and surface water will be routed by MEP Engineer to discharge into external below ground drainage by gravity.
22. Below ground drainage required for basement waterproofing and cavity drainage system is to be designed and detailed by others
23. HEALTH AND SAFETY: The works shall be carried out by specialist competent and experienced contractors who are members of a recognised national organisation. Operatives shall have received full and appropriate training for the operations they are to undertake. All work shall be carried out in accordance with all pertinent Health and Safety Regulations.
24. HEALTH AND SAFETY: Care should be taken to locate services prior to any excavation.

LEGEND

Boundary Line

Existing

- Existing TW Combined Sewer
- Existing Private FW Sewer
- Existing Drainage to be Abandoned

Proposed

- Foul Water Sewer
- Surface Water Sewer
- Combined Water Sewer
- Foul Water Rising Main (indicative)
- Surface Water Rising Main (indicative)
- FW.IC.XX Foul Water Inspection Chamber
- CM.IC.XX Foul Water Inspection Chamber
- SW.IC.XX Foul Water Inspection Chamber
- SW.PCC.XX Surface Water Precast Concrete Manhole
- Linear Drainage Channel

Rev.	Date	Drawn	Chk	Amendment
P01	30.07.24	TS	TM	Issued For Information

PJCE
Pringuer-James Consulting Engineers
Overseas House, Elm Grove, London, SW19 4HE
Phone:+44 (020) 8940 4159 Email:mail@pjce.com Website:www.pjce.com

Irena & Nedko Kyuchukova

34a Netherhall Gardens
LONDON, NW3 5TP

PROPOSED DRAINAGE STRATEGY LAYOUT

Status : FOR INFORMATION

Scales : 1:50 @ A1			Date : JUL. 24
Drawn : TS		Engineer : TM	Checked : TM

Drawing No. L2845-PJC-DR01 P01

Appendix G – MicroDrainage Calculations

	34a Netherhall Gardens London, NW3 5TP Surface Water Drainage Calcs
Date 30/07/2024 17:27 File Surface Water Network.MDX	Designed by TS Checked by TM
Innovyze	Network 2020.1

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	14.400	0.300	48.0	0.006	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	5.000	0.050	100.0	0.008	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	2.000	0.020	100.0	0.006	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	1.000	0.010	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	9.000	0.090	100.0	0.012	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	1.000	0.010	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.16	76.100	0.006	0.0	0.0	0.0	1.46	25.7	0.8
2.000	50.00	5.08	75.350	0.008	0.0	0.0	0.0	1.00	17.8	1.1
1.001	50.00	5.20	75.300	0.020	0.0	0.0	0.0	1.00	17.8	2.7
1.002	50.00	5.21	74.630	0.020	0.0	0.0	0.0	1.00	17.8	2.7
3.000	50.00	5.15	76.200	0.012	0.0	0.0	0.0	1.00	17.8	1.6
1.003	50.00	5.23	74.620	0.032	0.0	0.0	0.0	1.00	17.8	4.3

34a Netherhall Gardens
London, NW3 5TP
Surface Water Drainage Calcs

Date 30/07/2024 17:27
File Surface Water Network.MDX

Designed by TS
Checked by TM

Innovyze
Network 2020.1

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
SWMH1	76.900	0.800	Open Manhole	450	1.000	76.100	150				
CD	76.000	0.650	Junction		2.000	75.350	150				
SWMH2	76.400	1.100	Open Manhole	450	1.001	75.300	150	1.000	75.800	150	500
								2.000	75.300	150	
Tank	76.400	1.770	Junction		1.002	74.630	150	1.001	75.280	150	650
SWMH4	77.000	0.800	Open Manhole	450	3.000	76.200	150				
SWMH3	76.400	1.780	Open Manhole	1200	1.003	74.620	150	1.002	74.620	150	
								3.000	76.110	150	1490
	76.000	1.390	Open Manhole	0		OUTFALL		1.003	74.610	150	

No coordinates have been specified, layout information cannot be produced.

	34a Netherhall Gardens London, NW3 5TP Surface Water Drainage Calcs
Date 30/07/2024 17:27 File Surface Water Network.MDX	Designed by TS Checked by TM
Innovyze	Network 2020.1

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	SWMH1	76.900	76.100	0.650	Open Manhole	450
2.000	o	150	CD	76.000	75.350	0.500	Junction	
1.001	o	150	SWMH2	76.400	75.300	0.950	Open Manhole	450
1.002	o	150	Tank	76.400	74.630	1.620	Junction	
3.000	o	150	SWMH4	77.000	76.200	0.650	Open Manhole	450
1.003	o	150	SWMH3	76.400	74.620	1.630	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	14.400	48.0	SWMH2	76.400	75.800	0.450	Open Manhole	450
2.000	5.000	100.0	SWMH2	76.400	75.300	0.950	Open Manhole	450
1.001	2.000	100.0	Tank	76.400	75.280	0.970	Junction	
1.002	1.000	100.0	SWMH3	76.400	74.620	1.630	Open Manhole	1200
3.000	9.000	100.0	SWMH3	76.400	76.110	0.140	Open Manhole	1200
1.003	1.000	100.0		76.000	74.610	1.240	Open Manhole	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	21.000	Storm Duration (mins)	30
Ratio R	0.436		

34a Netherhall Gardens
London, NW3 5TP
Surface Water Drainage Calcs

Date 30/07/2024 17:27
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Network 2020.1

Online Controls for Storm

Hydro-Brake® Optimum Manhole: SWMH3, DS/PN: 1.003, Volume (m³): 2.2

Unit Reference	MD-SHE-0070-2000-0800-2000
Design Head (m)	0.800
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	70
Invert Level (m)	74.620
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	2.0	Kick-Flo®	0.504	1.6
Flush-Flo™	0.240	2.0	Mean Flow over Head Range	-	1.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.8	0.800	2.0	2.000	3.0	4.000	4.2	7.000	5.5
0.200	2.0	1.000	2.2	2.200	3.2	4.500	4.4	7.500	5.6
0.300	2.0	1.200	2.4	2.400	3.3	5.000	4.7	8.000	5.8
0.400	1.9	1.400	2.6	2.600	3.4	5.500	4.9	8.500	6.0
0.500	1.6	1.600	2.7	3.000	3.7	6.000	5.1	9.000	6.2
0.600	1.8	1.800	2.9	3.500	3.9	6.500	5.3	9.500	6.3

	34a Netherhall Gardens London, NW3 5TP Surface Water Drainage Calcs
Date 30/07/2024 17:27 File Surface Water Network.MDX	Designed by TS Checked by TM
Innovyze	Network 2020.1

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 21.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.436 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	SWMH1	15 Winter	100	+40%					76.142	-0.108	0.000	0.17
2.000	CD	15 Winter	100	+40%					75.481	-0.019	0.000	0.38
1.001	SWMH2	15 Winter	100	+40%	100/15 Summer				75.472	0.022	0.000	1.24
1.002	Tank	60 Winter	100	+40%	30/15 Summer				75.397	0.617	0.000	0.19
3.000	SWMH4	15 Winter	100	+40%					76.277	-0.073	0.000	0.52
1.003	SWMH3	60 Winter	100	+40%	30/15 Summer				75.415	0.645	0.000	0.18

PN	US/MH Name	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SWMH1			4.1	OK	
2.000	CD			5.4	OK*	
1.01	SWMH2			13.4	SURCHARGED	
1.02	Tank		56	2.1	SURCHARGED*	
3.000	SWMH4			8.1	OK	
1.003	SWMH3			2.0	SURCHARGED	

Appendix E: Factual Report

A2 Site Investigation

Netherhall Gardens

Factual Report

July 2024

50124-A2SI-XX-XX-RP-X-0002-00

Project Name	Netherhall Gardens
Project Number	50124
Client	Nedko Kyuchukov
Document Name	Factual Report

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Document Reference	Status	Notes	Revision	Issued by	Date
50124-A2SI-XX-XX-RP-X-0002-00	First Issue		00	JAS	26/07/2024

Contents

Appendices

Abbreviations

Abbreviation	Full name	Abbreviation	Full name
ACM	Asbestos-containing Material	PL	Plastic Limit
BGS	British Geological Survey	PI	Plasticity Index
BH	Borehole	PSD	Particle Size Distribution
BRE	Building Research Establishment	SGV	Soil Guideline Value
BSI	British Standards Institution	SOM	Soil Organic Matter
BS	British Standard	SPT	Standard Penetration Test
CIRIA	Construction Industry Research and Information Association	SPZ	Source Protection Zone
GAC	Generic Assessment Criteria	SVOC	Semi-volatile Organic Compounds
LL	Liquid Limit	TPH	Total Petroleum Hydrocarbon
m bgl	Metres Below Ground Level	UST	Underground Storage Tank
m OD	Metres Ordnance Datum	UXO	Unexploded Ordnance
PAH	Polycyclic Aromatic Hydrocarbons	VOC	Volatile Organic Compound
PCB	Polychlorinated Biphenyl	WAC	Waste Acceptance Criteria
PID	Photo Ionisation Detector		

1. Introduction

A2 Site Investigation (A2SI) were appointed to undertake a ground investigation at 34a Netherhall Gardens. The ground investigation was specified by A-squared Studio, who also acted as Investigation Supervisor. This first draft issue of the report describes the work undertaken and presents the findings to date.

A desk study has been completed for the site in conjunction with this investigation, (report ref 50124-A2SI-XX-XX-RP-Y-0001-00, dated July 2024), which has been referred to in this report.

2. Site Location

The site is situated at 34a Netherhall Gardens, London, NW3 5TP, as presented in Figure 2.1. The site is located at National Grid Reference 526360, 185150. The site falls within the administrative boundaries of the London Borough of Camden and currently includes a 2-floor residential dwelling with a garage on ground floor.

Figure 2.1 Site location and extent shown in red

3. Proposed Development

The scheme for the proposed development comprises the complete demolition of the existing residential dwelling followed by the construction of a new three-storey detached house over a single-story basement. The footprint of the proposed basement matches that of the overlying residential development. A 'conservative approach' has been assumed based on the provided plans that the development scheme will include areas of soft landscaping.

4. Scope and Purpose of the Investigation

A2SI have been commissioned to undertake a site investigation at the site comprising:

- 2 No. modular cable percussion boreholes; 1 No to 15.00m bgl and 1 No. to 8.00m bgl.
- 6 No. foundation inspection pits up to 1.50m bgl along boundary walls and the walls of the structure to be demolished. The pits shall record the foundations dimensions, depth, condition and founding strata. 1 No. environmental sample pit.

4.1. Investigation Strategy

Table 4.1 summarises the strategy for the phases of the intrusive investigation.

Table 4.1 Summary of investigation strategy

Location ID	Method	Purpose/Comments
BH01- BH02	Modular Cable Percussion boreholes to 15.00m bgl and 8.00m bgl respectively	To determine the deeper ground conditions in order to facilitate geotechnical design and to facilitate sampling for testing. To facilitate the install of monitoring wells.
TP01-06	Hand excavated structural inspection pits up to 1.20m bgl	To determine the foundation depths and dimensions.
TP07	Hand excavated environmental pit	To facilitate environmental sampling for testing.

5. Anticipated Ground Conditions

Table 5.1 presents a review of available geological maps and memoirs, including the online British Geological Survey (BGS) “Geology Viewer”, previous site investigations and other relevant data.

According to the BGS, the site is indicated to be underlain by the London Clay Formation. Also given the history of the site it is anticipated that Made Ground would be present in varying thickness.

Table 5.1 Anticipated geological sequence

Unit	Depth[1] (m bgl)	Thickness (m)	Description
Made Ground	0.00	1.0	Various anthropological deposits. Typically sandy clays with fragments of flints and bricks.
London Clay Formation	1.0	103.0	Weathered London Clat Formation found to be 9m thick and typically consists of firm to stiff mottled brown and blue-grey clay with small gypsum crystals. London Clay Formation consisted of grey stiff and fairly silty well fissured clays with occasional fossil shell fragments and small nodules of pyrite. Extreme fissures at deeper depth.

1. Depths refer to top of stratum.

6. Limitations of Report

This report has been prepared in accordance with the specification provided by the client. The data reported relates to the specific locations where each exploratory hole was formed and may not represent the ground and groundwater conditions of the site as a whole. Furthermore, it should be considered that groundwater levels may vary throughout the year due to seasonal conditions and other influences such as flooding, leaking mains, storm drainage and foul water systems.

7. Standards

The site investigation, soil descriptions and laboratory testing were undertaken in accordance with following standards:

- AGS Assessment and Control of Asbestos Risk in Soil – Part 1: Protection of Personnel working on Ground Investigations, May 2021.
- BGS Geology Viewer: 2022. https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/. British Geological Survey.
- BGS GeoIndex: 2022. https://www.bgs.ac.uk/map-viewers/geoindex-onshore/. British Geological Survey.
- British Standards Institution BS 10175:2011+A2:2017, Investigation of potentially contaminated sites – code of practice.
- British Standards Institution BS 5930:2015+A1:2020, Code of practice for site investigations.
- British Standards Institution BS 1377-2:2022, Methods of test for soils for civil engineering purposes – Part 2: Classification tests and determination of geotechnical properties.
- British Standards Institution BS 1377-9:1990, Methods for test for soils for civil engineering purposes - In-situ tests.
- British Standards Institution BS 8576:2013 Guidance on investigations for ground gas - permanent gases and volatile organic compounds (VOCs).
- British Standards Institution BS EN ISO 14688-1:2018, Geotechnical investigation and testing – identification and classification of soil. Identification and description.
- British Standards Institution BS EN ISO 22475-1: 2021 : Geotechnical investigation and testing – Sampling methods and groundwater measurements - Part 1 Technical principles for execution.
- British Standards Institution BS EN ISO 5667-1:2023 Water quality. Sampling - Guidance on the design of sampling programmes and sampling techniques.
- Building Research Establishment (2005), BRE Special Digest 1: Concrete in aggressive ground.
- Norbury, D. (2010), Soil and Rock Description in Engineering Practice (Caithness: Whittles).
- UK Specification for Ground Investigation 3rd Edition, published by ICE Publishing (2022).

8. Ground Investigation Summary

8.1. Fieldwork Overview

The fieldwork was carried out between 1st and 2th July 2024. A site walkover was conducted prior to the commencement of the ground investigation and confirmed the anticipated layout of the site.

Up to date utility drawings were procured prior to the site work and can be downloaded using the following link - Statutory Utility Drawings.

A preliminary Unexploded Ordnance (UXO) Risk Assessment for the site was carried out by Brimstone in accordance with CIRIA C681 Guidelines: 'Unexploded Ordnance, a Guide for the construction Industry' (published in 2009) and is included in the previous Phase I Desk Study. The report's findings have concluded the risk of UXO on site is not considered to be significantly elevated above the background level. No further measures are required to mitigate the risk from UXO across the site.

The preliminary UXO risk assessment is presented in Appendix I.

After reviewing all available service information and site reconnaissance, all locations were scanned using Ground Penetrating Radar (GPR) & Electromagnetic (CAT & Genny) techniques, to check for services within proximity to exploratory hole locations. All positions were surveyed to determine the National Grid coordinates.

The specific details of the investigation undertaken are discussed throughout Section 8 and comprised:

- 2 No. modular cable percussion boreholes (BH01 and BH02); BH01 to 15.00m bgl and BH02 to 8.00m bgl.
- 6 No. foundation inspection pits up to 1.50m bgl along boundary walls and the walls of the structure to be demolished. The pits shall record the foundations dimensions, depth, condition and founding strata. 1no environmental sample pit.
- 1 No. shallow hand excavated pit to facilitate environmental sampling
- Appropriate sampling in the form of undisturbed thin wall samples (UT100), small disturbed samples, and bulk samples
- Geotechnical in situ testing
- Geotechnical/geoenvironmental laboratory testing
- Instrumentation and monitoring of groundwater levels and ground gas concentrations (3 No. visits over three weeks)

All works were supervised by an experienced ground engineer.

An exploratory hole location plan and detailed exploratory hole logs are presented in Appendices B and C respectively.

8.2. Cable Percussion Boreholes

2 No. cable percussion boreholes (BH01 and BH02). BH01 was completed to 15.00m bgl. BH02 was completed to 8.00m bgl.

UT100 sampling and SPT testing were undertaken at alternate 1.00m intervals in cohesive soils until 5.00m below top of stratum, then alternate 1.50m intervals. All soils encountered were logged on site and sub-sampled accordingly for geotechnical and geoenvironmental laboratory analysis.

A standpipe was installed in both boreholes for monitoring of ground gas and groundwater levels.

8.3. Trial Pits

A total of 7 no. hand excavated trial pits (TP01-TP07) were completed to a maximum depth of 1.20m bgl to determine the extent and thickness of existing foundation structures and for geoenvironmental sampling. A summary of the findings is presented in Table 8.1.

Where the concrete was found such as in TP02, a probe hole was carried out using a Hilti drill or similar to determine the slab thickness across the proposed pitting location.

TP07 was hand excavated to 0.60m bgl to facilitate environmental sampling.

All soils encountered were logged on site.

Table 8.1 Trial Pit locations

Exploratory Hole Reference	General Findings	Bearing Stratum	Notes
TP01	Concrete foundations to a depth of 1080mm	Brownish orange silty CLAY	Telecoms services found at a depth of 250mm

Exploratory Hole Reference	General Findings	Bearing Stratum	Notes
TP02	Concrete foundation found at depth of 980mm.	Orange mottled brown slightly gravelly slightly sandy silty CLAY.	Drill probe proved thickness of concrete to be 500mm
TP03	Concrete foundation to a depth of 1040mm	Brown orange mottled grey very gravelly slightly sandy silty CLAY.	
TP04	A metal cage filled with loosely placed bricks was encountered at 230mm	Greyish brown slightly gravelly fine sandy SILT.	Two drill probs to 1200mm only encountered bricks.
TP05	No foundations where found	Orange mottled grey silty CLAY.	A drill probe was angled into the wall 500mm and no foundations were found.
TP06	Concrete foundations found to a depth of 390mm	Brown slightly gravelly slightly fine sandy silty CLAY.	

8.4. Gas and Groundwater Monitoring Installations

2 No. combined gas and groundwater monitoring pipes were installed (BH01 – BH02). The monitoring installations comprise of a 50mm internal diameter HDPE casing and well screen. Details are presented in Table 8.3.

Table 8.2 Gas, groundwater and pore water monitoring installations

Location Ref	Base of Borehole (m bgl)	Installation Diameter (mm)	Type of Installation	Top of Response Zone (m bgl)	Bottom of Response Zone (m bgl)	Target Strata
BH01	15	50	SP/G	0.8	9.00	Claygate Member
BH02	8	50	SP/G	1.00	7.50	Claygate Member

Key

SP/G – Standpipe with Gas monitoring valve

9. Ground Conditions

The ground conditions generally confirm the published geological records, comprising of Made Ground overlying Claygate Member with London Clay Formation being encountered at 9.00m bgl in BH01 and 7.50m bgl in BH02, the extent of the London Clay were not proven.

The full set of exploratory hole logs are presented in Appendix C.

Encountered ground conditions are presented in Table 9.1 and a cross section is presented in Figure 9.1.

9.1. Encountered Geology

The following ground conditions were encountered at the site. Detailed exploratory hole logs are presented in Appendix C. A photographic record is presented in Appendix D.

Table 9.1 Ground conditions encountered

Unit	Depth (m bgl)	Elevation (m OD)	Strata Thickness (m)	Description
	min – max(1)	min – max(1)		
Made Ground – Paving Slab & Concrete Surfacing	0.00	76.36-76.79	0.00 – 0.30	Weak yellowish grey CONCRETE, 70% aggregate of sub-rounded fine to coarse flint and limestone. Partially weathered toward base.
Made Ground	0.00	76.37 – 78.63	0.00 - 0.50	Soft greyish brown slightly gravelly fine sandy SILT, with brick slate and occasional ceramic, concrete and plastic. and Medium dense brownish grey silty fine sandy GRAVEL with brick, sandstone, slate and occasional concrete and flint. and Soft to firm brown mottled grey very gravelly slightly sandy silty CLAY with brick, flint occasional roots.
Made Ground - Reworked Ground	0.23 - 0.35	76.06 – 76.58	0.10-0.86	Firm orangish brown mottled dark grey slightly gravelly slightly sandy silty CLAY. Sand is fine. Gravel is sub-angular to sub-rounded flint, brick, wood and rare concrete.
London Clay Formation - Claygate Member	0.45 – 0.80	75.56 – 76.09	0.64 – 8.20	Soft to firm orangish brown mottled reddish orange and blueish grey slightly sandy silty CLAY with occasional organic fragments (<20mm), Sand is fine to medium.
London Clay Formation	7.50-9.00	67.36-69.29	Not proven	Soft to firm brownish grey silty CLAY with rare pockets of fine sand (<80mm).

(1) Depth / elevation refers to top of stratum.

Figure 9.1 Geological cross-section

10. In Situ Testing

10.1. Standard Penetration Testing

Standard Penetration Tests were completed in all cable percussion boreholes. The tests were completed in accordance with BS EN ISO 22476-3.

Figure 10.1 presents the SPT versus Elevation plot for the site. Detailed SPT results are presented in Appendix C.

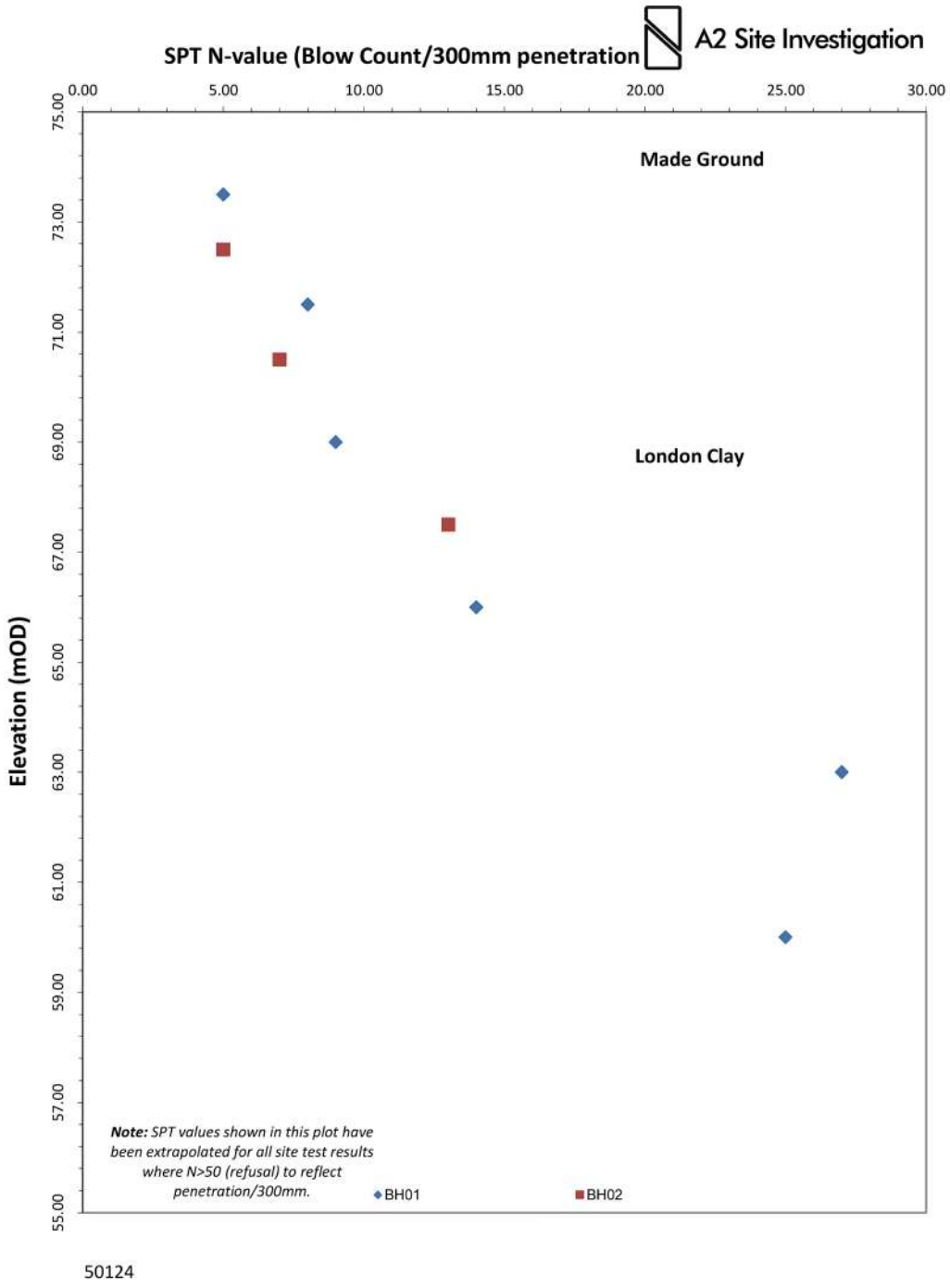


Figure 10.1 SPT/ Elevation plot

11. Laboratory Testing

11.1. Geotechnical Laboratory Testing

Geotechnical laboratory testing was undertaken by i2 Analytical, a United Kingdom Accreditation Service (UKAS) accredited laboratory, in accordance with relevant standards.

The following type and number of tests scheduled are presented in Table 11.1. The results summary is presented in Table 11.2 and detailed results are presented in Appendix E.

Table 11.1 Geotechnical laboratory testing summary

Test description	Number of tests
Natural moisture content *BS 1377:1990 - Part 2 : 3.2*	8
4 Point Liquid and Plastic Limit *BS 1377:1990 - Part 2: 4.3 and 5.3*	4
Particle Size Distribution Wet Sieve Method *BS 1377:1990 - Part 2*	1
Suite D (brownfield, pyrite present)(1)	4
Quick Undrained Triaxial – 100mm or 38mm single stage *BS 1377:1990 - Part 7 : 8*	4

(1) Includes *pH, water & acid soluble sulphate, total sulphur, magnesium, chloride and nitrate*

Table 11.2 Summary of the geotechnical laboratory test results

Strata	Parameter	Value (min -max)
Made Ground	Water Soluble Sulphate (g/L)	0.031 – 0.130
Claygate Member	Moisture Content (%)	27.5 – 34.9
	Plasticity Index (%)	40 – 43
	Undrained Shear Strength (kPa)	47 – 68
	pH	8.0 – 8.3
London Clay Formation	Moisture Content (%)	18.0 – 43.6
	Plasticity Index (%)	44
	Undrained Shear Strength (kPa)	83 – 136

Strata	Parameter	Value (min -max)
	pH	8.6 – 9.1

11.2. Geoenvironmental Laboratory Testing

Selected soil and groundwater samples were sent for geoenvironmental laboratory testing which was undertaken by i2 Analytical, a United Kingdom Accreditation Service (UKAS) accredited laboratory. The following type and number of tests scheduled is presented in Table 11.3 and the results are presented in Appendix F.

Table 11.3 Geonvironmental testing - soil

Test description	Number of tests
A2SI RA Suite (1)	4
WAC (full)	1

(1) A2SI Risk Assessment Suite includes: *Asbestos Identification, Metals, Anions. Inorganics, Fraction of Organic Carbon, pH, Soil Organic Matter, Total Organic Carbon, Polyaromatic Hydrocarbons (PAH16-MS), VPH/EPH (TPH CWG incl BTEX); Speciated Phenols by HPLC or GCMS, Total Cyanide, Sulphide (acid soluble), Sulphate (water soluble)*

12. Groundwater Monitoring

3 No. rounds of groundwater monitoring visits have been undertaken between 9th July 2024 and 22nd July 2024. A summary is presented in Table 12.1. The results are presented in Appendix E.

12.1. Groundwater Monitoring

The groundwater levels and any free-phase liquids were measured using a calibrated Geotech Oil/Water Interface meter. Groundwater levels were recorded in the monitoring wells during the monitoring visits and the results are presented in Table 12.1.

Table 12.1 Groundwater monitoring results

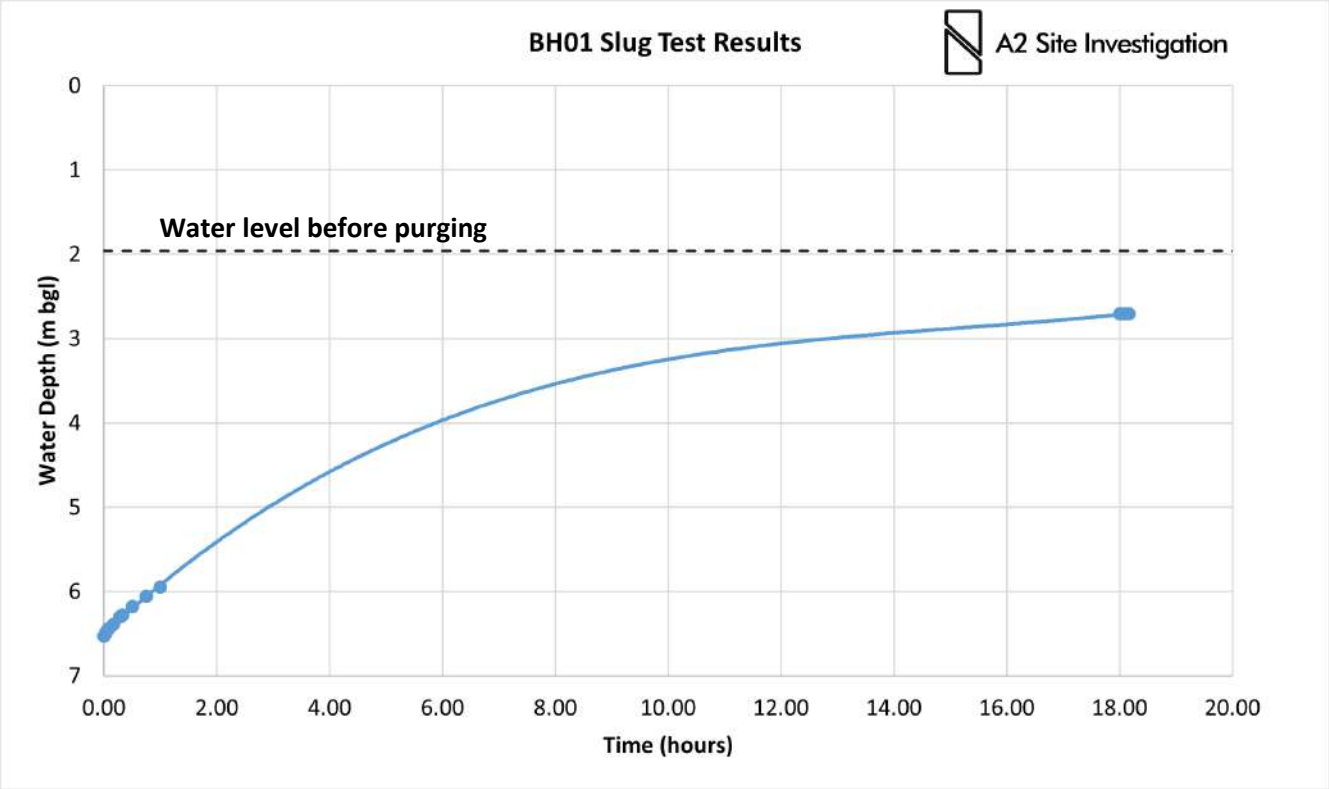
Exploratory hole reference	Depth of monitoring well (m bgl)	Round 1 09/07/2024 (m bgl)	Round 2 15/07/2024 (m bgl)	Round 3 22/07/2024 (m bgl)	Notes
BH01	9.20	1.83	1.90	1.96	Slug test carried out on third visit
BH02	7.56	6.59	6.51	3.68	

12.2. Slug Test

1 No. slug test was carried out within BH01 on 22nd July 2024. Before the test, the groundwater level was measured at 1.96m bgl. The borehole was purged of water, and the rising groundwater level was measured.

Figure 12.2 presents the results of the slug test.

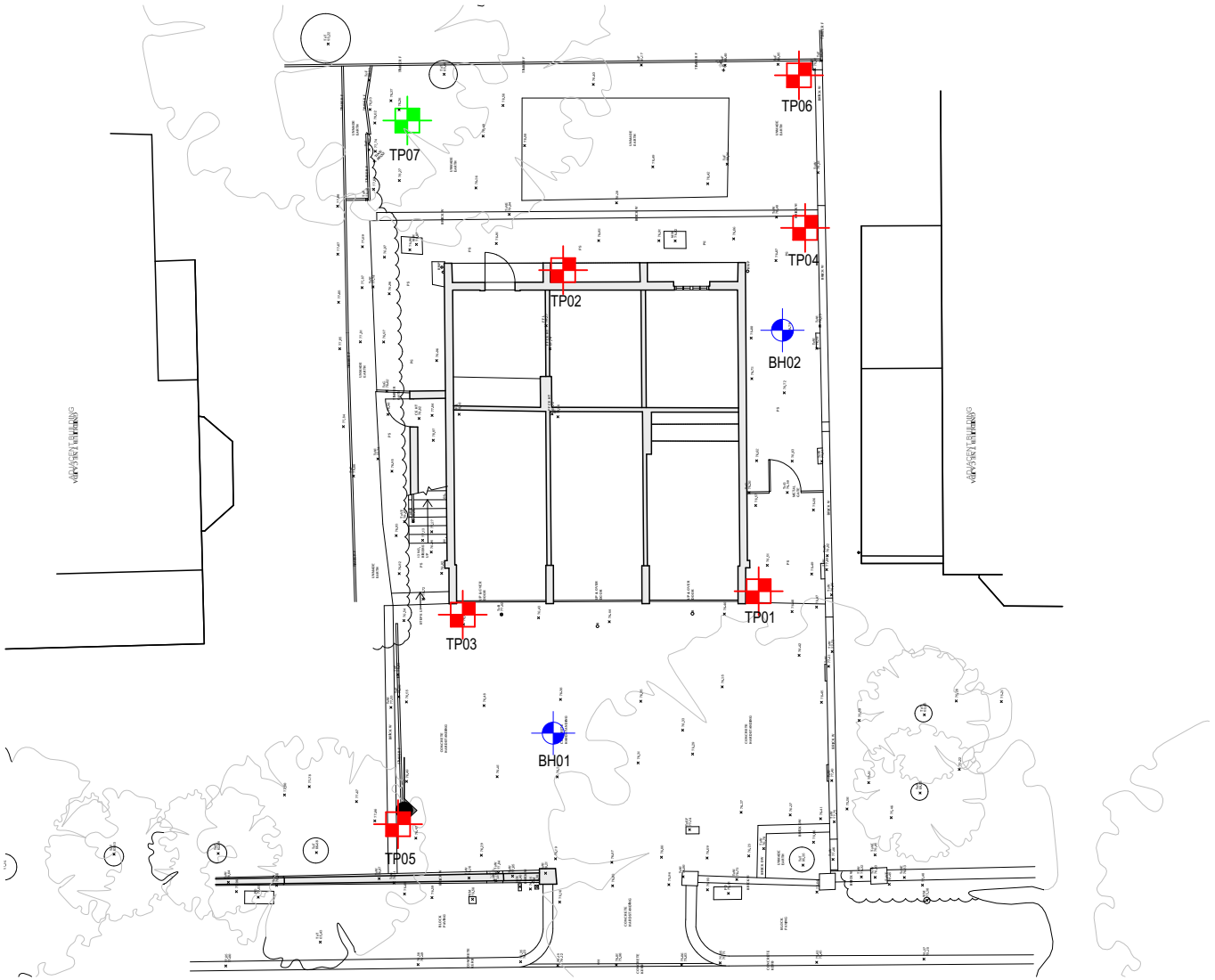
Figure 12.2 Slug test results



Appendix A: Summary of Exploratory Holes

Location ID	Location Type	Status	Easting	Northing	Ground Level	Final Depth	Date Start	Date End
BH01	CP	FINAL	526351.00	185149.00	76.36	15.00	01/07/2024	01/07/2024
BH02	CP	FINAL	526361.00	185143.00	76.79	8.00	02/07/2024	02/07/2024
TP01	TP	FINAL	526355.00	185144.00	76.48	1.09	01/07/2024	01/07/2024
TP02	TP	FINAL	526365.00	185149.00	76.93	0.98	01/07/2024	01/07/2024
TP03	TP	FINAL	526355.00	185152.00	76.48	1.20	02/07/2024	02/07/2024
TP04	TP	FINAL	526366.00	185144.00	76.87	0.40	02/07/2024	02/07/2024
TP05	TP	FINAL	526350.00	185184.00	76.47	0.33	02/07/2024	02/07/2024
TP06	TP	FINAL	526375.00	185144.00	78.63	0.44	02/07/2024	02/07/2024
TP07	TP	FINAL	526373.00	185154.00	78.26	0.50	01/07/2024	01/07/2024

Appendix B: Exploratory Hole Location Plan



Location ID	Easting	Northing	mOD
TP01	526355.00	185144.00	76.36
TP02	526365.00	185149.00	76.79
TP03	526355.00	185152.00	76.48
TP04	526366.00	185144.00	76.93
TP05	526350.00	185154.00	76.48
TP06	526375.00	185144.00	76.87
TP07	526373.00	185154.00	76.47
BH01	526351.00	185149.00	78.63
BH02	526361.00	185143.00	78.26

Key:

Cable Precussion

Trial Pit

Enviromental Trial Pit

Rev	Date	By	Chkd	Appd
00	15/07/24	WF	WT	DS

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Client

Nedko Kyuchukov

Project Title

Netherhall Gardens

Drawing Title

Site Plan

A2SI Project Number

50124

Rev

00

Drawing Number

50124-XX-XX-
DR-Y-0001-00

Appendix C: Exploratory Hole Logs and In Situ Testing Results

A2 Site Investigation

Borehole Log

Project				Borehole No
Netherhall Gardens				BH01
Job No	Start / End	Ground Level (mOD)	Co-ordinates (Local Grid)	Depth (m)
50124	Start 01/07/2024 End 01/07/2024	76.36	E 526351.00 N 185149.00	15.00
Client				Status
Nedko Kyuchukov				FINAL

Standard Penetration Test Summary

Test Type	Depth Top	Depth Casing	Depth Water	Penetration Total	N60 Value	N Value	Reported Result
S	1.50	1.00		450	7	5	N=5 (1,1/1,1,2,1)
S	3.50	1.00		450	11	8	N=8 (1,1/2,2,2,2)
S	6.00	1.00		450	12	9	N=9 (2,2/2,2,3,2)
S	9.00	1.00		450	19	14	N=14 (3,3/3,4,3,4)
S	12.00	1.00		450	36	27	N=27 (7,13/11,6,5,5)
S	15.00	1.00		450	33	25	N=25 (4,5/6,6,6,7)

Installation / Instrument Details

Date	Instr. Type	To (m)	Response Zone (m)	Remarks
01/07/2024	GWMP	9.00	0.80-9.00	

Chiselling

Depth (m)	Duration

Water Added

From	To

Boring Progress and Backfill

Drilling Progress			Water	Casing		Backfill	
Date	Time	Depth (m)	Depth (m)	Depth (m)	Dia (mm)	Depth (m)	Backfill
07/01/2024	08:00	0.00	Dry	1.00	150	0.00 - 0.10	CONCRETE
07/01/2024	05:00	15.00	Dry			0.10 - 0.80	BENTONITE
						0.80 - 9.00	GRAVEL
						9.00 - 15.00	BENTONITE

General Remarks

1. Borehole scanned with GPR, CAT & Genny prior to excavation.
2. Hand excavated inspection pit to 1.20m.
3. Installation: 0.00-0.80m plain pipe, 0.80-9.00m slotted pipe.
4. No groundwater strikes encountered.

Water Observations

Date/Time	Depth Strike (m)	Depth Casing (m)	Time Elapsed (min)	Depth Sealed (m)	Rose To (m)
01/07/2024 12:00:00	5.80	1.00	10		5.80

Keys

SAMPLES
ES - Environmental Sample (Tub, Vial, Jar)
AZCL:Assumed Zone of Core Loss
U - 100mm Diameter Undisturbed Sample
UT - 100mm Diameter Thin Wall Undisturbed Sample
U38 - 38mm Diameter Undisturbed Sample
D - Disturbed Sample, B-Bulk Sample,
LB - Large Bulk Sample, BLK-Block Sample
C - Core Sample, W-Water Sample, R-Root Sample

TESTS
S/C-SPT / CPT, V-Shear Vane, PP-Pocket Penetrometer,
MP - Mackintosh Probe, VOC-Volatile Organic Compound

INSTALLATION DETAILS
SPIE - Standpipe Piezometer
SPGW - Groundwater Monitor Standpipe
SPG/GW - Gas / Groundwater Monitor Standpipe
VWP - Vibrating Wire Piezometer
ICM - Inclinometer
Hole Type
IP - Inspection Pit, TP-Trial Pit TT - Trial Trench
CP - Cable Percussion, RC-Rotary Coring, R/S-Rotary/Sonic
DS - Dynamic Sampling, DS/R-Dynamic Sampling / Rotary
DC -Diamond Coring, CP/R-Cable Percussion Rotary follow on

All dimensions in metres Scale 1:50	Contractor	A2 Site Investigation	Method	Cable Percussion	Logged by	Approved by
					CM	WT

A2 Site Investigation

Borehole Log

Project	Borehole No
Netherhall Gardens	BH01

Job No	Start / End	Ground Level (mOD)	Co-Ordinates (Local Grid)	Depth (m)
50124	Start 01/07/2024 End 01/07/2024	76.36	E 526351.00 N 185149.00	15.00

Client	SPT Energy Ratio %	Sheet	Status
Nedko Kyuchukov	80	Sheet 1 of 2	FINAL

SAMPLES & TESTS			Stratum Description	Depth (thickness)	Reduced Level	Water	Legend	Instrument / Backfill
Depth (m)	Type No	Test Result						
0.20 - 0.50	BRE 1		Weak yellowish grey CONCRETE. 70% aggregate of subrounded fine to coarse flint and limestone gravels Partially weathered towards base.	0.00				
			[MADE GROUND: PAVING SLAB]	(0.30)				
0.40	ES 2			0.30	76.06			
0.50 - 1.00	BRE 3		Soft orangish brown mottled dark grey slightly gravelly slightly sandy silty CLAY. Gravel is subangular to subrounded fine to coarse of flint, brick and rare concrete. Sand is fine to coarse.	(0.50)				
			[REWORKED GROUND]	0.80	75.56			
			Soft orangish brown mottled reddish orange and bluish grey slightly sandy silty CLAY with occasional organic fragments (<20mm). Sand is fine to medium.					
1.50	SPT	N=5 (1,1/1,1,2,1)	[LONDON CLAY FORMATION: CLAYGATE MEMBER]					
2.50 - 2.95	U 4	Ublow= 16 100%rec						
3.00	D 5							
3.50	SPT	N=8 (1,1/2,2,2,2)						
4.00	BRE 6							
4.50 - 4.95	U 7	Ublow= 24 100%rec						
5.00	D 8			(8.20)				
5.50	D 9							
			5.80 to 6.00m - …with claystone band encountered					
6.00	SPT	N=9 (2,2/2,2,3,2)						
7.00	BRE 10		*7.00 to 8.00m - …becoming brown*					
7.00 - 7.50	BRE 11							
7.50	ES 12	Ublow= 27						
7.50 - 7.95	U 13	100%rec						
8.00	D 14		*8.00 to 9.00m - …becoming greyish brown*					
8.50	D 15							
9.00	SPT	N=14 (3,3/3,4,3,4)		9.00	67.36			
			Soft to firm brownish grey silty CLAY with rare pockets of fine sand (<80mm).					
			[LONDON CLAY FORMATION]					
10.00	BRE 16							

All dimensions in metres Scale 1:50	Contractor	Method	Logged By	Approved by
	A2 Site Investigation	Cable Percussion	CM	WT

A2 Site Investigation

Borehole Log

Project				Borehole No
Netherhall Gardens				BH01
Job No	Start / End	Ground Level (mOD)	Co-Ordinates (Local Grid)	Depth (m)
50124	Start 01/07/2024 End 01/07/2024	76.36	E 526351.00 N 185149.00	15.00
Client		SPT Energy Ratio %	Sheet	Status
Nedko Kyuchukov		80	Sheet 2 of 2	FINAL

SAMPLES & TESTS			Stratum Description	Depth (thickness)	Reduced Level	Water	Legend	Instrument / Backfill
Depth (m)	Type No	Test Result						
10.00	D 17		Soft to firm brownish grey silty CLAY with rare pockets of fine sand (<80mm). [LONDON CLAY FORMATION]					
10.50 - 10.95	U 18	Ublow= 29 100%rec	*10.00 to 13.00m - …becoming slightly micaceous* *10.00 to 15.00m - …becoming firm and dark grey* *10.50 to 12.00m - …with occasional pockets of light grey and dark grey silt (<20mm)*					
11.00	D 19							
11.50	D 20							
12.00 12.00	SPT BRE 21	N=27 (7,13/11,6,5,5)	*12.00 to 12.20m - …with claystone band encountered*	(6.00)				
13.00	D 22		*13.00 to 15.00m - ..becoming stiff*					
13.50 - 13.95	U 23	Ublow= 38 70%rec						
14.00	D 24							
14.50	D 25							
15.00 15.00	SPT BRE 26	N=25 (4,5/6,6,6,7)	End of Borehole at 15.00m		61.36			

All dimensions in metres Scale 1:50	Contractor	Method	Logged By	Approved by
	A2 Site Investigation	Cable Percussion	CM	WT

A2 Site Investigation

Borehole Log

Project	Borehole No
Netherhall Gardens	BH02

Job No	Start / End	Ground Level (mOD)	Co-ordinates (Local Grid)	Depth (m)
50124	Start 02/07/2024 End 02/07/2024	76.79	E 526361.00 N 185143.00	8.00

Client	Status
Nedko Kyuchukov	FINAL

Standard Penetration Test Summary

Test Type	Depth Top	Depth Casing	Depth Water	Penetration Total	N60 Value	N Value	Reported Result
S	2.50	1.00		450	7	5	N=5 (1,1/2,1,1,1)
S	4.50	1.00		450	9	7	N=7 (1,2/2,1,2,2)
S	7.50	1.00		450	17	13	N=13 (2,3/3,3,3,4)

Installation / Instrument Details

Date	Instr. Type	To (m)	Response Zone (m)	Remarks
02/07/2024	GWMP	7.50	1.00-7.50	

Chiselling

Depth (m)	Duration

Water Added

From	To

Boring Progress and Backfill

Drilling Progress			Water	Casing		Backfill	
Date	Time	Depth (m)	Depth (m)	Depth (m)	Dia (mm)	Depth (m)	Backfill
07/01/2024	08:00	0.00	Dry	1.00	150	0.00 - 0.10	CONCRETE
07/01/2024	05:00	8.00	Dry			0.10 - 1.00	BENTONITE
						1.00 - 7.50	GRAVEL
						7.50 - 8.00	BENTONITE

General Remarks

1. Borehole scanned with GPR, CAT & Genny prior to excavation.
2. Hand excavated inspection pit to 1.20m.
3. Installation: 0.00-1.00m plain pipe, 1.00-7.50m slotted pipe.
4. No groundwater strikes encountered.

Water Observations

Date/Time	Depth Strike (m)	Depth Casing (m)	Time Elapsed (min)	Depth Sealed (m)	Rose To (m)

Keys

SAMPLES
ES - Environmental Sample (Tub, Vial, Jar)
AZCL:Assumed Zone of Core Loss
U - 100mm Diameter Undisturbed Sample
UT - 100mm Diameter Thin Wall Undisturbed Sample
U38 - 38mm Diameter Undisturbed Sample
D - Disturbed Sample, B-Bulk Sample,
LB - Large Bulk Sample, BLK-Block Sample
C - Core Sample, W-Water Sample, R-Root Sample

TESTS
S/C-SPT / CPT, V-Shear Vane, PP-Pocket Penetrometer,
MP - Mackintosh Probe, VOC-Volatile Organic Compound

INSTALLATION DETAILS
SPIE - Standpipe Piezometer
SPGW - Groundwater Monitor Standpipe
SPG/GW - Gas / Groundwater Monitor Standpipe
VWP - Vibrating Wire Piezometer
ICM - Inclinometer
Hole Type
IP - Inspection Pit, TP-Trial Pit TT - Trial Trench
CP - Cable Percussion, RC-Rotary Coring, R/S-Rotary/Sonic
DS - Dynamic Sampling, DS/R-Dynamic Sampling / Rotary
DC -Diamond Coring, CP/R-Cable Percussion Rotary follow on

All dimensions in metres Scale 1:50	Contractor	A2 Site Investigation	Method	Cable Percussion	Logged by	Approved by
					CM	WT

A2 Site Investigation

Borehole Log

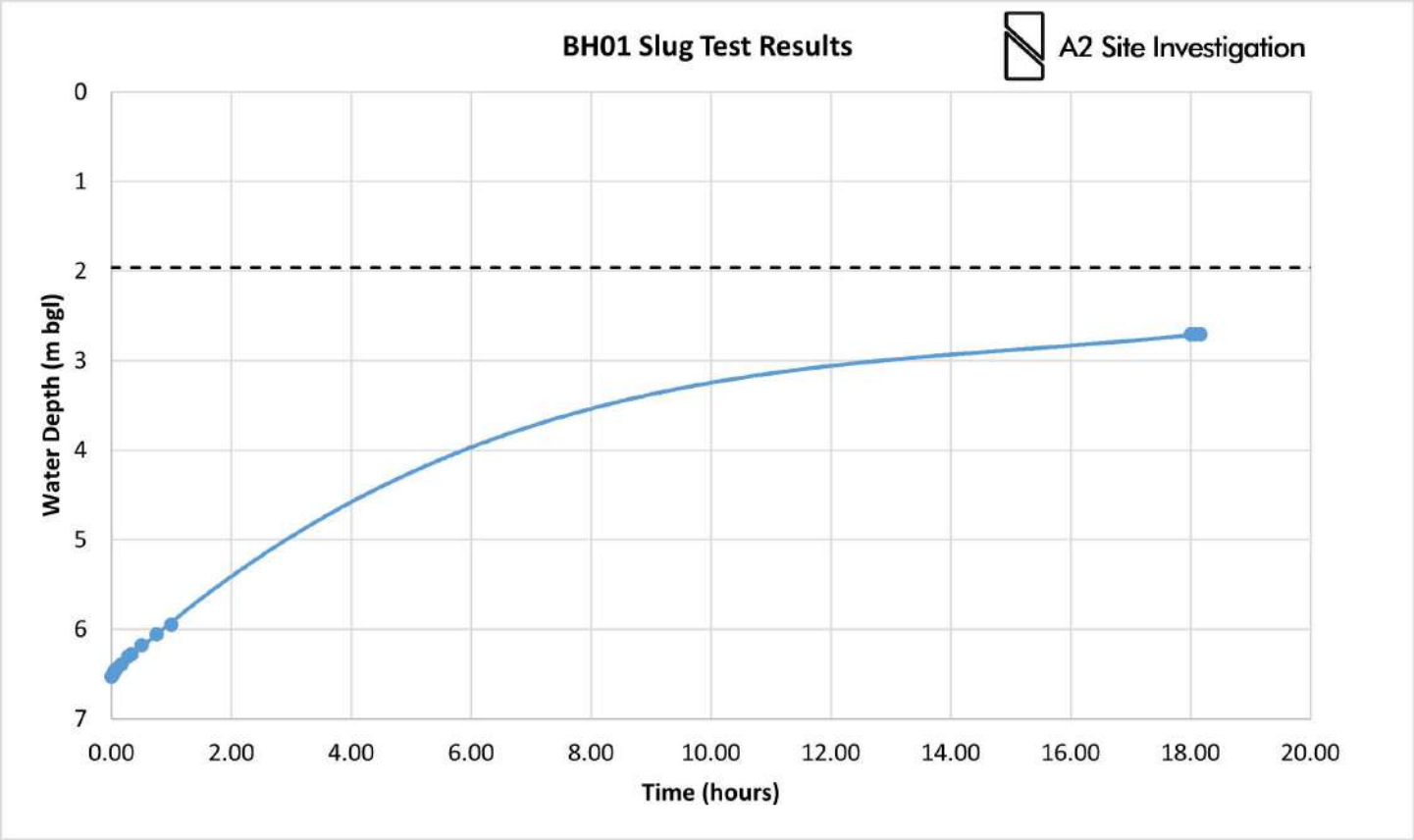
Project	Borehole No
Netherhall Gardens	BH02

Job No	Start / End	Ground Level (mOD)	Co-Ordinates (Local Grid)	Depth (m)
50124	Start 02/07/2024 End 02/07/2024	76.79	E 526361.00 N 185143.00	8.00

Client	SPT Energy Ratio %	Sheet	Status
Nedko Kyuchukov	80	Sheet 1 of 1	FINAL

SAMPLES & TESTS			Stratum Description	Depth (thickness)	Reduced Level	Water	Legend	Instrument / Backfill
Depth (m)	Type No	Test Result						
			Greyish yellow SANDSTONE.	0.00	76.73			
0.20	B 2		[MADE GROUND: PAVING SLAB]	(0.06)				
0.20 - 0.50	ES 1		Medium dense dark grey slightly sandy gravelly SILT. Gravel is subangular to subrounded fine to coarse of brick, flint and rare glass. Sand is fine to medium.	0.06	76.49			
0.50	B 4			(0.24)				
0.50 - 1.00	ES 3		[MADE GROUND]	0.30	76.09			
			Firm brownish orange mottled grey silty CLAY with rare gravel. Gravel is subangular to subrounded fine to coarse of flint and brick. Sand is fine to coarse.	(0.40)				
			[REWORKED GROUND]	0.70				
1.50 - 1.95	U 5	Ublow= 16 100%rec	Soft to firm brownish orange mottled bluish grey silty CLAY. [LONDON CLAY FORMATION: CLAYGATE MEMBER]					
2.00	D 6		*2.00 to 7.50m - …with pocket of yellow and grey fine sand (approximately 5-20mm)*					
2.50	SPT	N=5 (1,1/2,1,1,1)						
2.50	BRE 7							
3.50 - 3.95	U 8	60%rec						
4.00	D 9			(6.80)				
4.50	SPT	N=7 (1,2/2,1,2,2)						
			5.00 to 7.50m - …becoming slightly orangish brown mottled dark bluish grey					
5.50	D 10							
5.70	BRE 11							
6.00	BRE 12	100%rec						
6.00 - 6.45	U 13							
6.50	D 14							
7.00	BRE 16							
7.00	D 15		*7.00 to 7.50m - …becoming brown*					
7.50	SPT	N=13		7.50	69.29			
7.50	BRE 17	(2,3/3,3,3,4)	Firm greyish brown silty CLAY with occasional pockets of fine sand (5-20mm approximately). [LONDON CLAY FORMATION]	(0.50)				
8.00	BRE 19		End of Borehole at 8.00m		68.79			
8.00	D 18							

All dimensions in metres Scale 1:50	Contractor	Method	Logged By	Approved by
	A2 Site Investigation	Cable Percussion	CM	WT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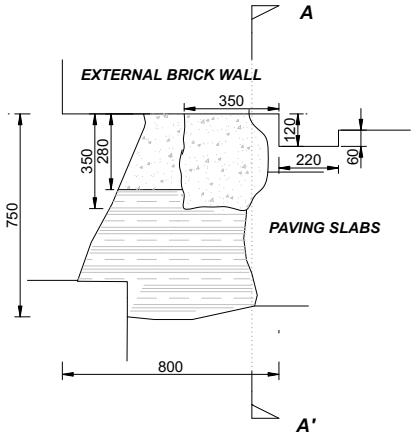
A2 Site Investigation
Water Depth (m bgl)
0
1
2
3
4
5
6
7
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
Time (hours)

TP01 PLAN VIEW



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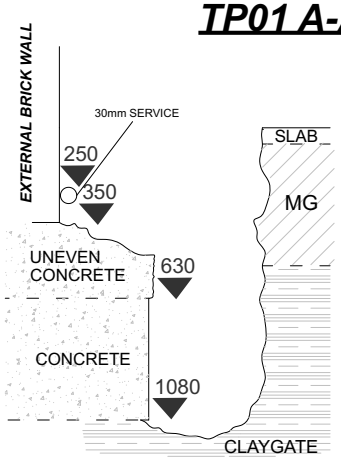

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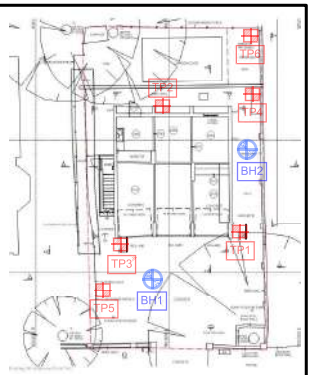

Rev	Date	By	Chkd	Appd
00	05/07/24	WF	WT	DS

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Project Title
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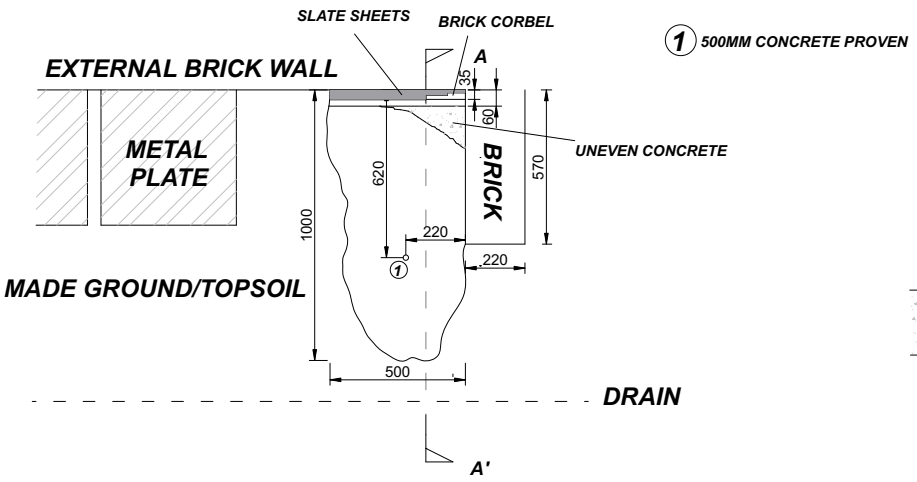
Drawing Title
Trial Pit 01

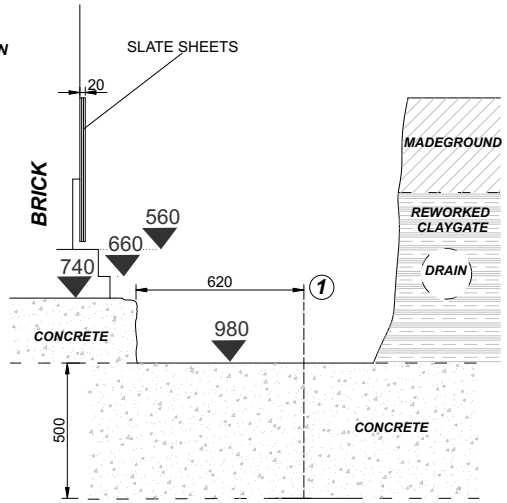
A2SI Project Number	Rev
50124	00

Drawing Number
50124-A2SI-XX-XX-DR-Y-0001-00

TP02 PLAN VIEW



TP02 A-A' SKETCH



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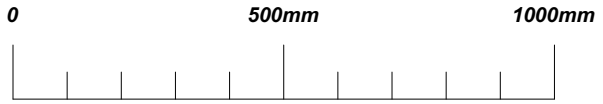

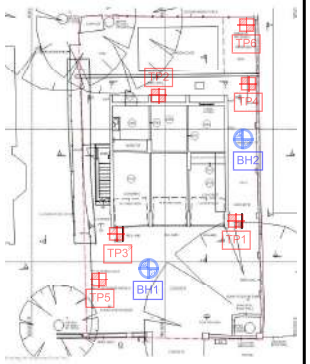

Rev	Date	By	Chkd	Appd
00	05/07/24	WF	WF	DS

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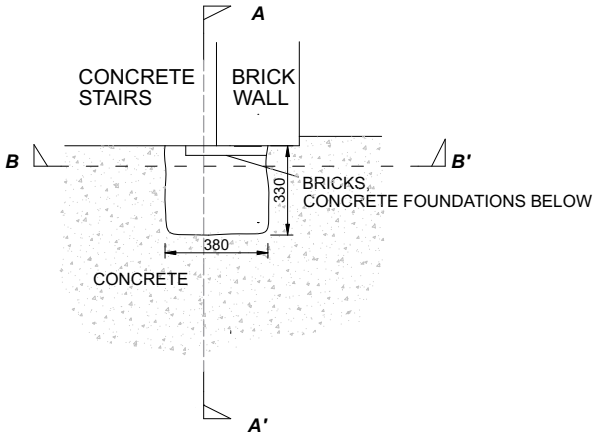
Project Title
Netherhall Gardens

Drawing Title
Exploratory Hole Plan

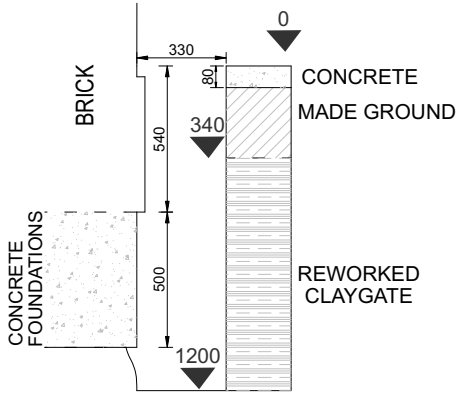
A2SI Project Number	Rev
50124	00

Drawing Number
50124-A2SI-XX-XX-DR-Y-0001-00

TP03 PLAN VIEW



TP03 A-A' SKETCH



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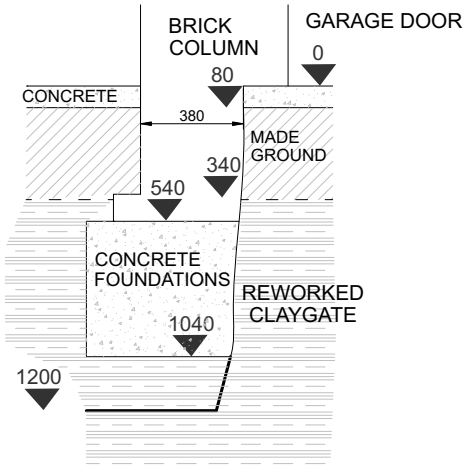

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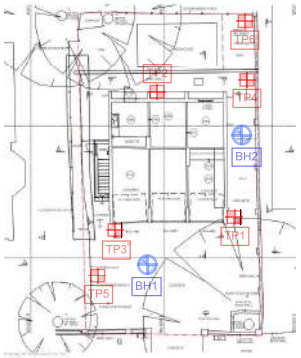

Rev	Date	By	Chkd	Appd
00	08/07/24	WF	WT	DS

A2 Site Investigation

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Client
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Project Title
Netherhall Gardens

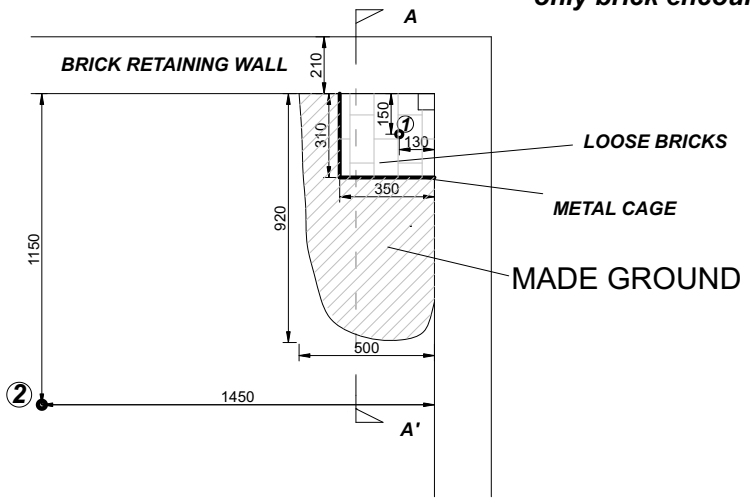
Drawing Title
Trail Pit 03

A2SI Project Number	Rev
50124	00

Drawing Number
50124-A2SI-XX-XX-DR-Y-0001-00

TP04 PLAN VIEW

1./2. Drill probe to 1200
only brick encountered



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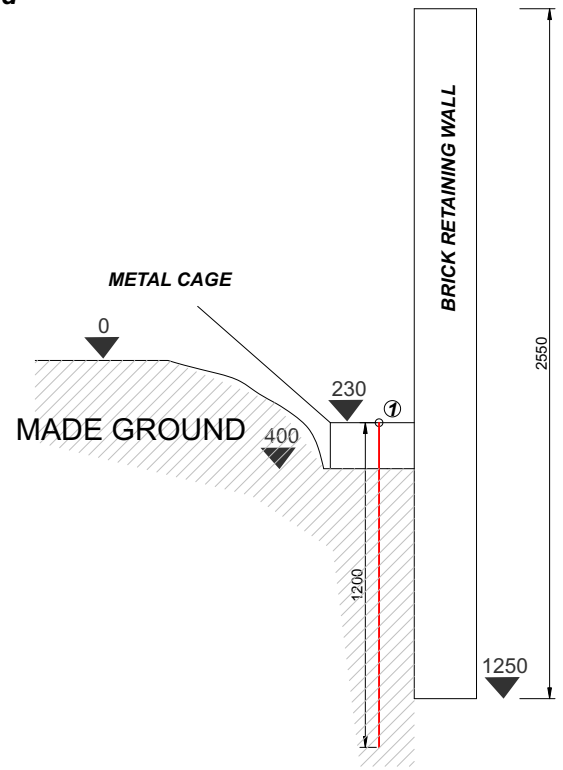

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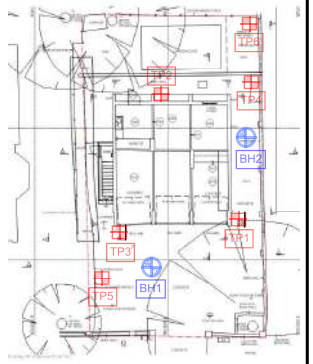

Rev	Date	By	Chkd	Appd
00	09/07/24	WF	WT	DS

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Client
Nedko Kyuchukov

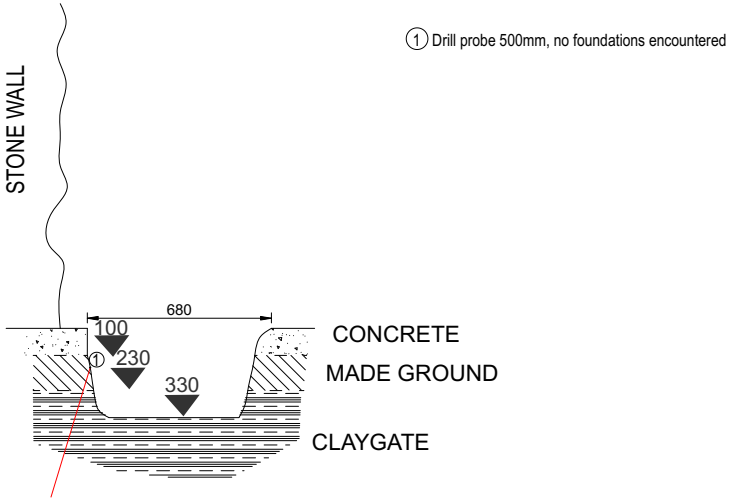
Project Title
Netherhall Gardens

Drawing Title
Trial Pit 04

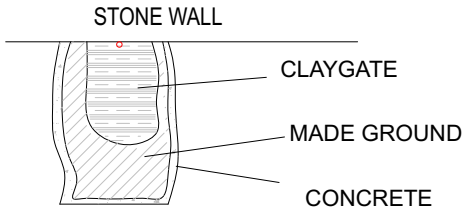
A2SI Project Number	Rev
50124	00

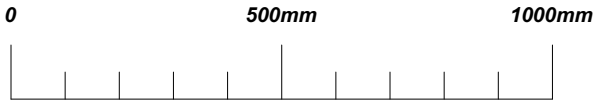
Drawing Number
50124-A2SI-XX-XX-DR-Y-0001-00

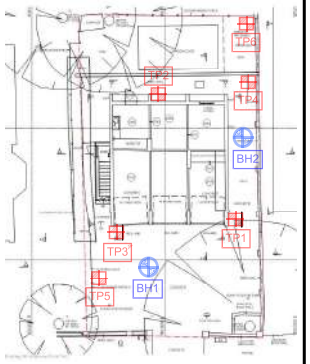
TP05 PLAN VIEW



TP05 A-A' SKETCH







Rev	Date	By	Chkd	Appd
00	09/07/24	WF	WT	DS

A2 Site Investigation

One Westminster Bridge Rd
London SE1 7XW
+44(0)20 7021 0396
www.a2-si.com

Client
Nedko Kyuchukov

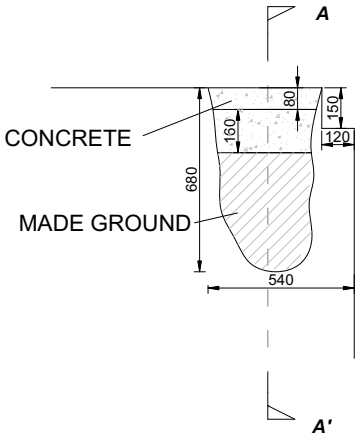
Project Title
Netherhall Gardens

Drawing Title
Trial Pit 05

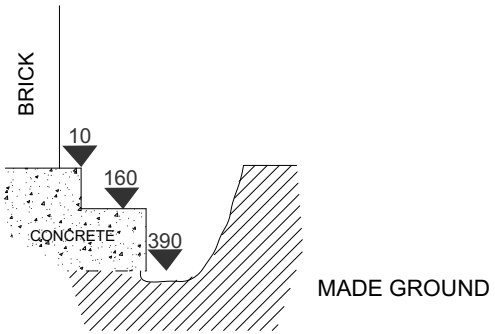
A2SI Project Number	Rev
50124	00

Drawing Number
50124-A2SI-XX-XX-DR-Y-0001-00

TP06 PLAN VIEW

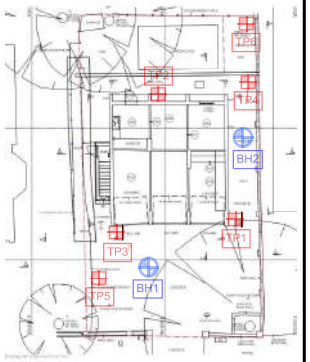


TP06 A-A' SKETCH



PHOTOGRAPH

0 500mm 1000mm



Rev	Date	By	Chkd	Appd
00	09/07/24	WF	WT	DS

A2 Site Investigation

One Westminster Bridge Rd
London SE1 7XW
+44(0)20 7021 0396
www.a2-si.com

Client
Nedko Kyuchukov

Project Title
Netherhall Gardens

Drawing Title
Trial Pit 06

A2SI Project Number	Rev
50124	00

Drawing Number
50124-A2SI-XX-XX-DR-Y-0001-00

Appendix D: Geotechnical Laboratory Testing Results

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022, cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

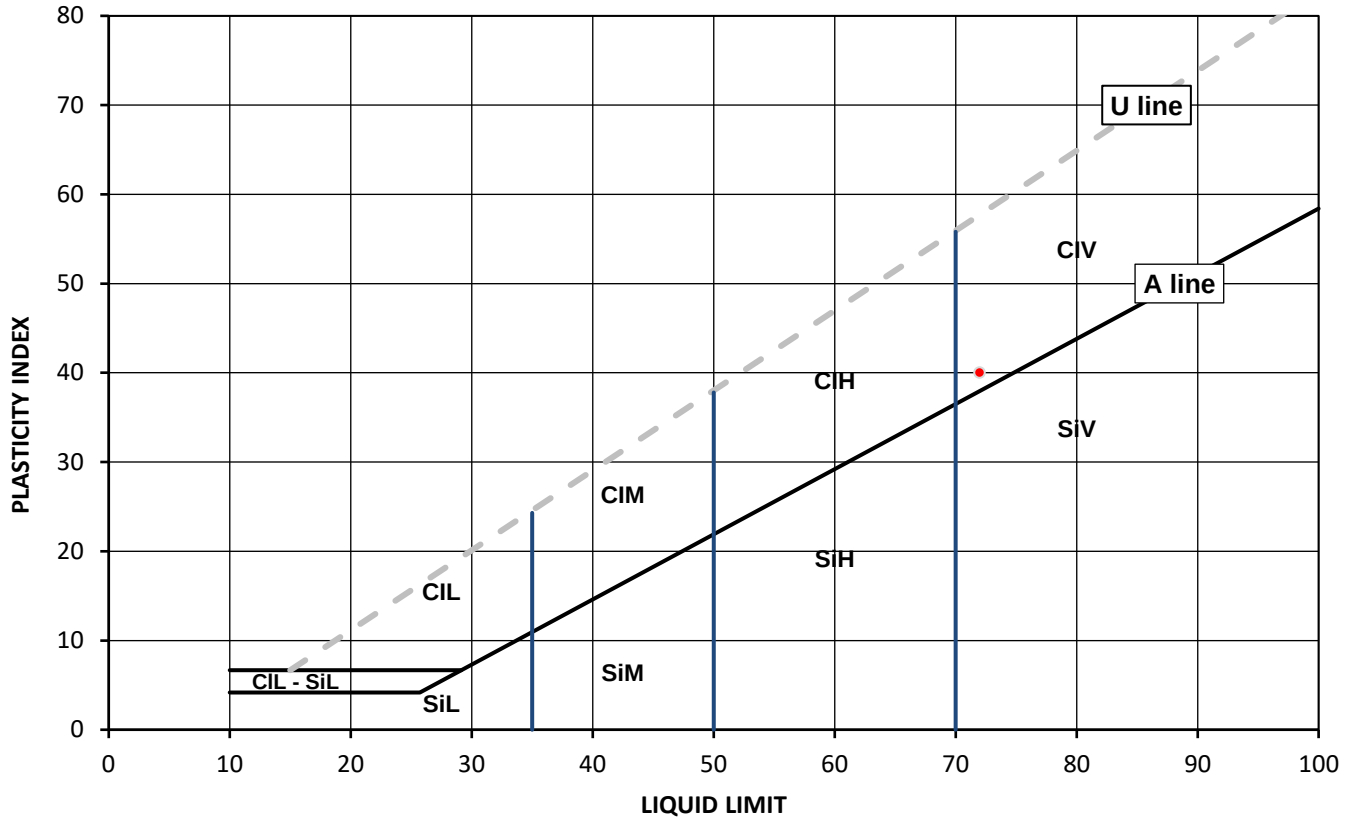
Client:	A2 Site Investigation Limited	Client Reference:	50124
Client Address:	One Westminster Bridge Road, South Bank, London, SE1 7XW	Job Number:	24-029861-1
		Date Sampled:	01/07/2024
		Date Received:	03/07/2024
Contact:	Charlie Mason	Date Tested:	16/07/2024
Site Address:	Netherhall Gardens	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	252685	Depth Top [m]:	7.00
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Greyish brown silty CLAY		
Sample Preparation:	Tested in natural condition; The water content in the sample was increased		
Cone Type:	80g/30deg		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity Index [IL] % #	Consistency Index [IC] % #	% Passing 425µm BS Test Sieve
34.9	72	32	40	0.08	0.93	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS EN 17892-1: 2014; # Non accredited

Remarks:

Signed:

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 23/07/2024

GF 337.13

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022, cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

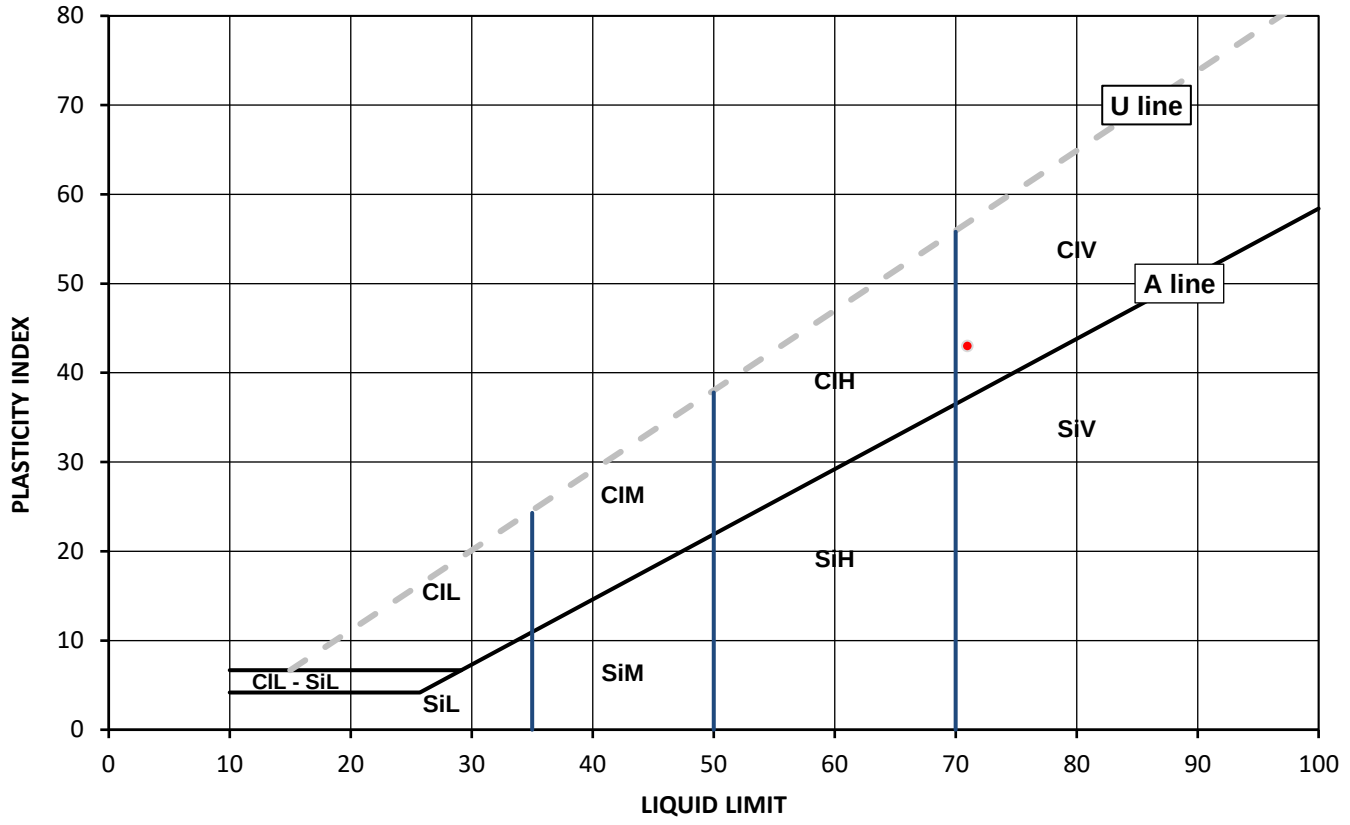
Client:	A2 Site Investigation Limited	Client Reference:	50124
Client Address:	One Westminster Bridge Road, South Bank, London, SE1 7XW	Job Number:	24-029861-1
		Date Sampled:	01/07/2024
		Date Received:	03/07/2024
Contact:	Charlie Mason	Date Tested:	16/07/2024
Site Address:	Netherhall Gardens	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	252687	Depth Top [m]:	8.50
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Greyish brown CLAY		
Sample Preparation:	Tested in natural condition; The water content in the sample was increased		
Cone Type:	80g/30deg		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity Index [IL] % #	Consistency Index [IC] % #	% Passing 425µm BS Test Sieve
33.9	71	28	43	0.14	0.86	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
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		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS EN 17892-1: 2014; # Non accredited

Remarks:

Signed:

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 23/07/2024

GF 337.13

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022, cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

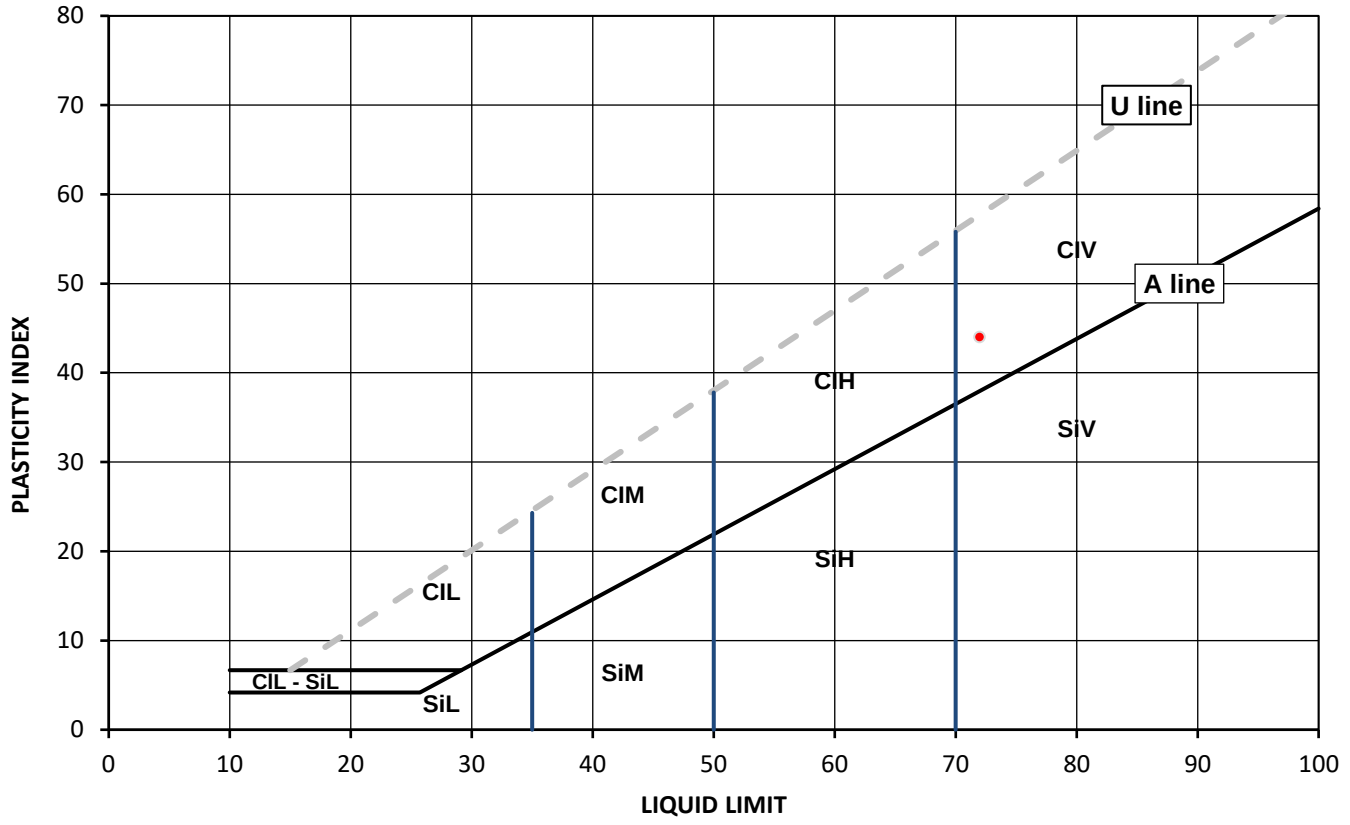
Client:	A2 Site Investigation Limited	Client Reference:	50124
Client Address:	One Westminster Bridge Road, South Bank, London, SE1 7XW	Job Number:	24-029861-1
		Date Sampled:	01/07/2024
		Date Received:	03/07/2024
Contact:	Charlie Mason	Date Tested:	16/07/2024
Site Address:	Netherhall Gardens	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	252689	Depth Top [m]:	13.00
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Greyish brown CLAY		
Sample Preparation:	Tested in natural condition; The water content in the sample was increased		
Cone Type:	80g/30deg		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity Index [IL] % #	Consistency Index [IC] % #	% Passing 425µm BS Test Sieve
43.6	72	28	44	0.36	0.64	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS EN 17892-1: 2014; # Non accredited

Remarks:

Signed:

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 23/07/2024

GF 337.13

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022, cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

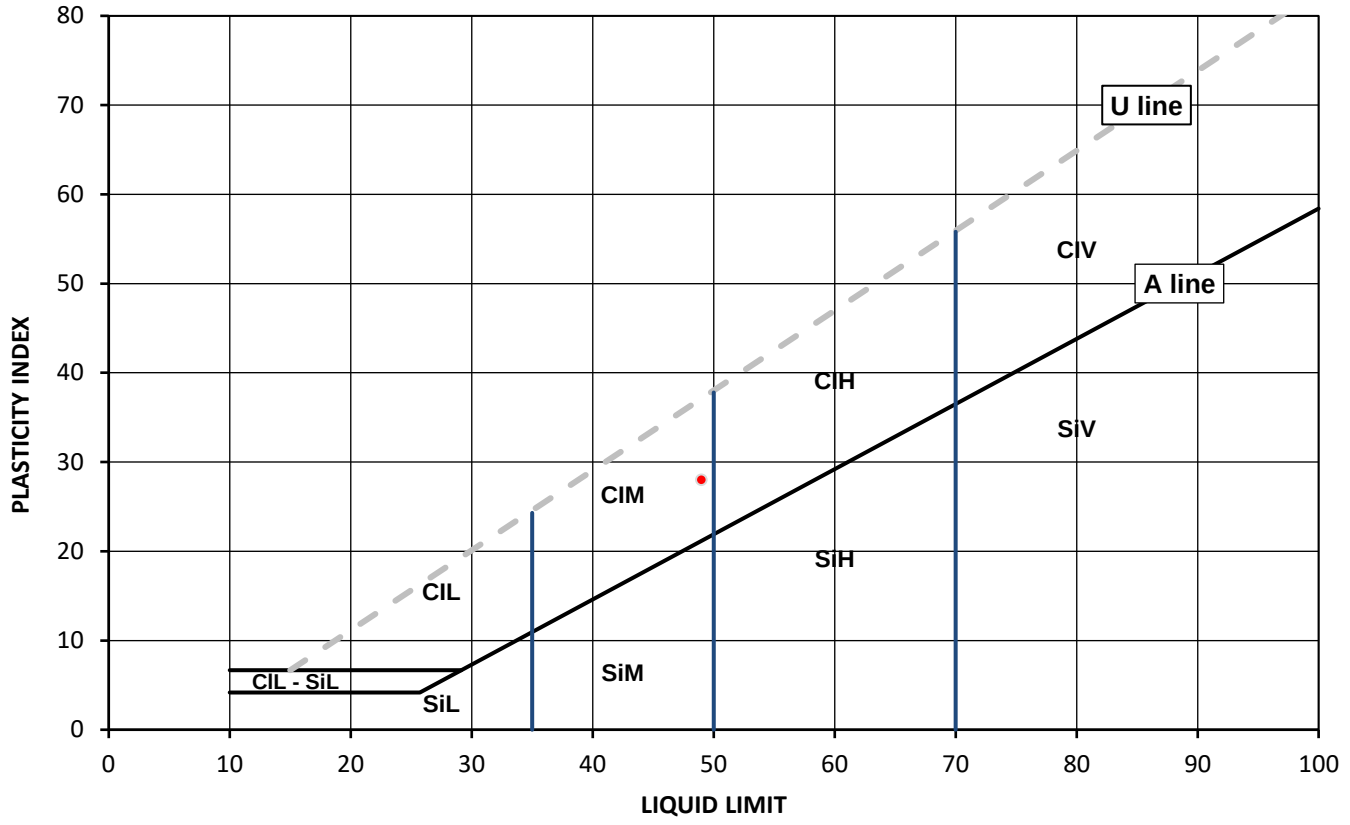
Client:	A2 Site Investigation Limited	Client Reference:	50124
Client Address:	One Westminster Bridge Road, South Bank, London, SE1 7XW	Job Number:	24-029861-1
		Date Sampled:	01/07/2024
		Date Received:	03/07/2024
Contact:	Charlie Mason	Date Tested:	18/07/2024
Site Address:	Netherhall Gardens	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	252692	Depth Top [m]:	0.50
Hole No.:	BH02	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Yellowish Brown slightly gravelly slightly sandy CLAY		
Sample Preparation:	Tested after washing to remove >0.425mm; The water content in the sample was increased		
Cone Type:	80g/30deg		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity Index [IL] % #	Consistency Index [IC] % #	% Passing 425µm BS Test Sieve
7.5	49	21	28	-0.46	1.46	96



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS EN 17892-1: 2014; # Non accredited

Remarks:

Signed:

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 23/07/2024

GF 337.13

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

BS EN ISO 17892-12:2018+A2:2022 cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6. W by BS EN ISO 17892-1:2014+A1:2022.

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client: A2 Site Investigation Limited

Client Address: One Westminster Bridge Road, South Bank,
London, SE1 7XW

Contact: Charlie Mason

Site Address: Netherhall Gardens

Client Reference: 50124
Job Number: 24-029861-1
Date Sampled: 01/07/2024
Date Received: 03/07/2024
Date Tested: 18/07/2024
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	W	Liquid & Plastic Limit							Density		
		Reference	Depth Top m	Depth Base m	Type			%	% Passing 425um %	WL* %	Correlation Factor	Wp %	Ip %	Cone type	Sample Preparation	bulk Mg/m3	dry Mg/m3	PD Mg/m3
252683	BH01	Not Given	2.50	Not Given	U	Yellowish brown CLAY		27.5										
252684	BH01	Not Given	4.50	Not Given	U	Yellowish brown CLAY		33.4										
252685	BH01	Not Given	7.00	Not Given	D	Greyish brown silty CLAY	Atterberg 4 Point	34.9	100	72	-	32	40	80g/30 deg	N / I			
252687	BH01	Not Given	8.50	Not Given	D	Greyish brown CLAY	Atterberg 4 Point	33.9	100	71	-	28	43	80g/30 deg	N / I			
252688	BH01	Not Given	10.50	Not Given	U	Dark grey CLAY		31.5										
252689	BH01	Not Given	13.00	Not Given	D	Greyish brown CLAY	Atterberg 4 Point	43.6	100	72	-	28	44	80g/30 deg	N / I			
252691	BH01	Not Given	14.50	Not Given	D	Brown CLAY		30.0										
252692	BH02	Not Given	0.50	Not Given	B	Yellowish Brown slightly gravelly slightly sandy CLAY	Atterberg 4 Point	7.5	96	49	-	21	28	80g/30 deg	W / I			

Note: # Non accredited; NP - Non plastic; N - Tested in natural condition, R - Tested after >0,425mm removed by hand, W - Tested after washing to remove >425mm; I - The water content in the sample was increased , D - The water content in the sample was decreased; * - One point liquid limit corrected as per the report Correlation Factor by Clayton C.R.I and Jukes A.W (1978)

Comments:

Signed:

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 23/07/2024 **GF 362.15**

TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS EN ISO 17892-4:2016, BS 1377-2:2022 cl. 10

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

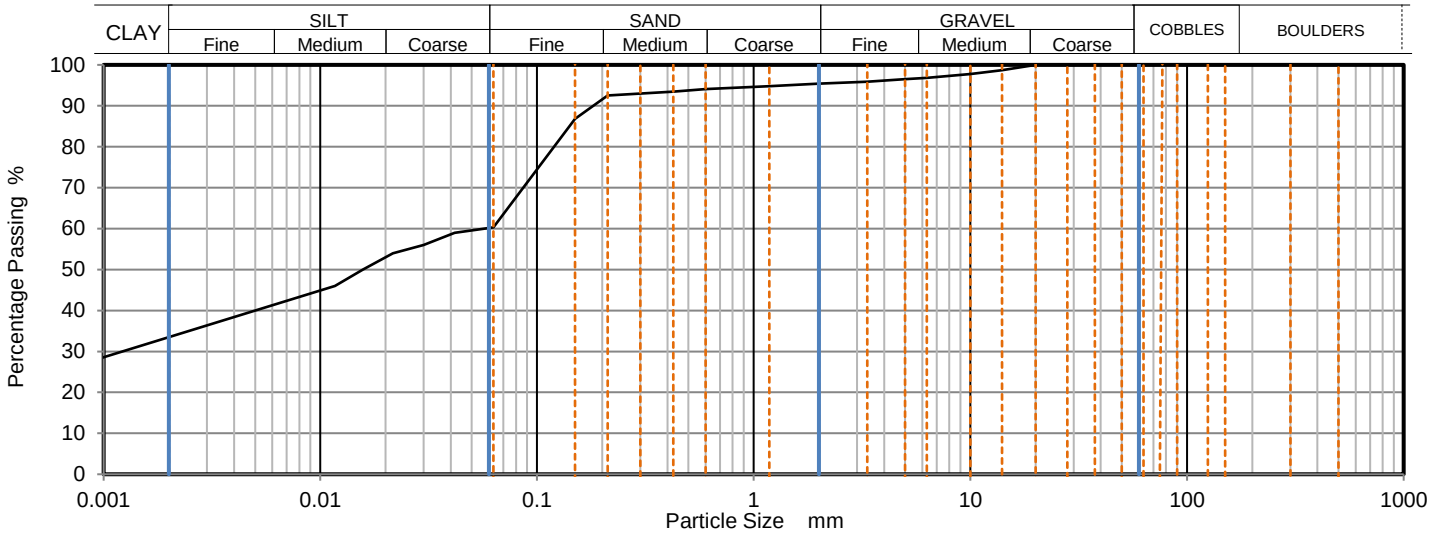
4041

Client:	A2 Site Investigation Limited	Client Reference:	50124
Client Address:	One Westminster Bridge Road, South Bank, London, SE1 7XW	Job Number:	24-029861-1
		Date Sampled:	01/07/2024
		Date Received:	03/07/2024
Contact:	Charlie Mason	Date Tested:	18/07/2024
Site Address:	Netherhall Gardens	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	252692	Depth Top [m]:	0.50
Hole No.:	BH02	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Yellowish brown slightly gravelly slightly sandy CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.8 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100	0.0417	59
300	100	0.0300	56
150	100	0.0216	54
125	100	0.0157	50
90	100	0.0117	46
75	100	0.0008	27
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	98		
6.3	97		
5	97		
3.35	96		
2	95		
1.18	95		
0.6	94	Particle density	(assumed)
0.425	94	2.65	Mg/m3
0.3	93		
0.212	93		
0.15	87		
0.063	60		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	5.00
Sand	34.00
Silt	27.00
Clay	34.00

Grading Analysis		
D100	mm	20
D60	mm	0.0578
D30	mm	0.00123
D10	mm	
Uniformity Coefficient		0.92
Curvature Coefficient		

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with ISO 17892 -4, by sieving and hydrometer sedimentation

Remarks:

Signed:

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 23/07/2024

GF 366.11

TEST CERTIFICATE

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Tested in Accordance with: BS EN ISO 17982-8:2018, BS 1377-2 Cl. 28:2022

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client:	A2 Site Investigation Limited	Client Reference:	50124
Client Address:	One Westminster Bridge Road, South Bank, London, SE1 7XW	Job Number:	24-029861-1
		Date Sampled:	01/07/2024
		Date Received:	03/07/2024
Contact:	Charlie Mason	Date Tested:	18/07/2024
Site Address:	Netherhall Gardens	Sampled By:	Not Given

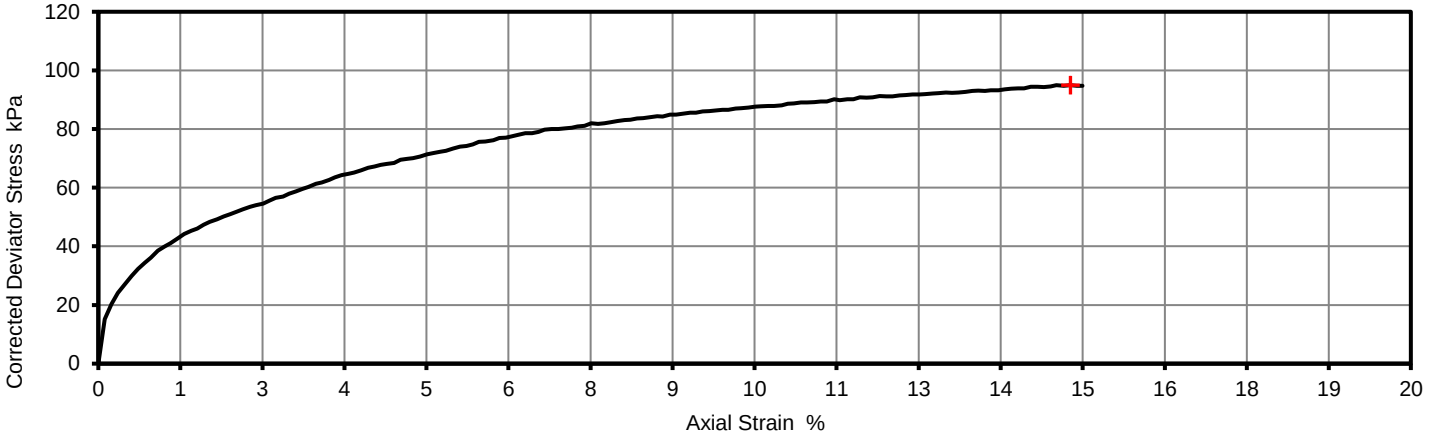
Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

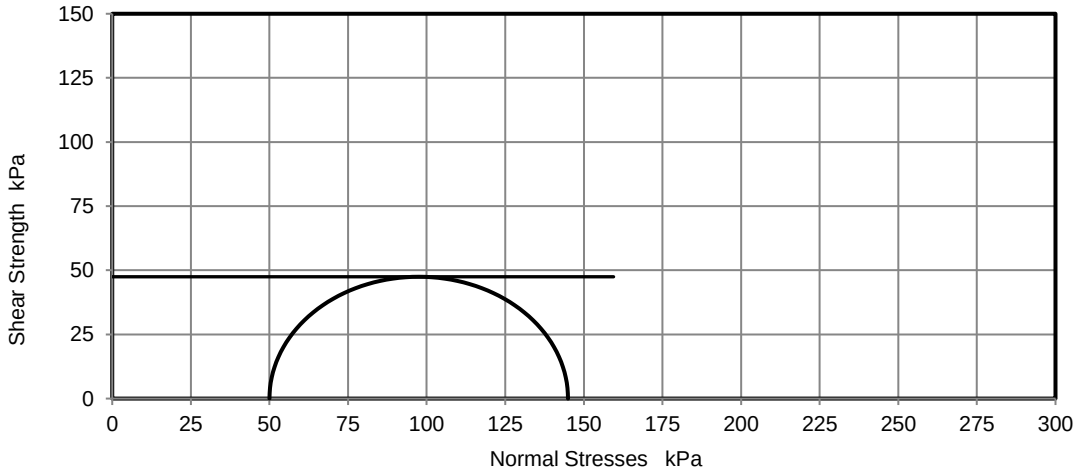
Laboratory Reference:	252683	Depth Top [m]:	2.50
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Yellowish brown CLAY		
Sample Preparation:	Sample prepared in accordance with BS EN ISO 17892-8: 2018 Clause 6.2.		

Test Number	1		Rate of Strain	2.00	%/min
Depth within Sample	-	m	Cell Pressure	50	kPa
Length	205.19	mm	Axial Strain at Failure	14.8	%
Diameter	102.89	mm	Deviator Stress, (σ1 - σ3)f	95	kPa
Length Prior to Shearing	205.18	mm	Undrained Shear Strength, cu	47	kPa ½(σ1 - σ3)f
Bulk Density	1.98	Mg/m3	Mode of Failure	Compound	
Initial Water Content	27.5	%	Membrane Thickness	0.27	mm
Final Water Content	27.4	%	Membrane Correction	2.24	kPa
Dry Density	1.55	Mg/m3			

Deviator Stress v Axial Strain



Mohr Circles



Position within sample

Note: Deviator stress corrected for area change and membrane effects.

Remarks:

Signed: Katarzyna Koziel

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 23/07/2024

GF 463.4

TEST CERTIFICATE

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Tested in Accordance with: BS EN ISO 17982-8:2018, BS 1377-2 Cl. 28:2022

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client:	A2 Site Investigation Limited	Client Reference:	50124
Client Address:	One Westminster Bridge Road, South Bank, London, SE1 7XW	Job Number:	24-029861-1
		Date Sampled:	01/07/2024
		Date Received:	03/07/2024
Contact:	Charlie Mason	Date Tested:	18/07/2024
Site Address:	Netherhall Gardens	Sampled By:	Not Given

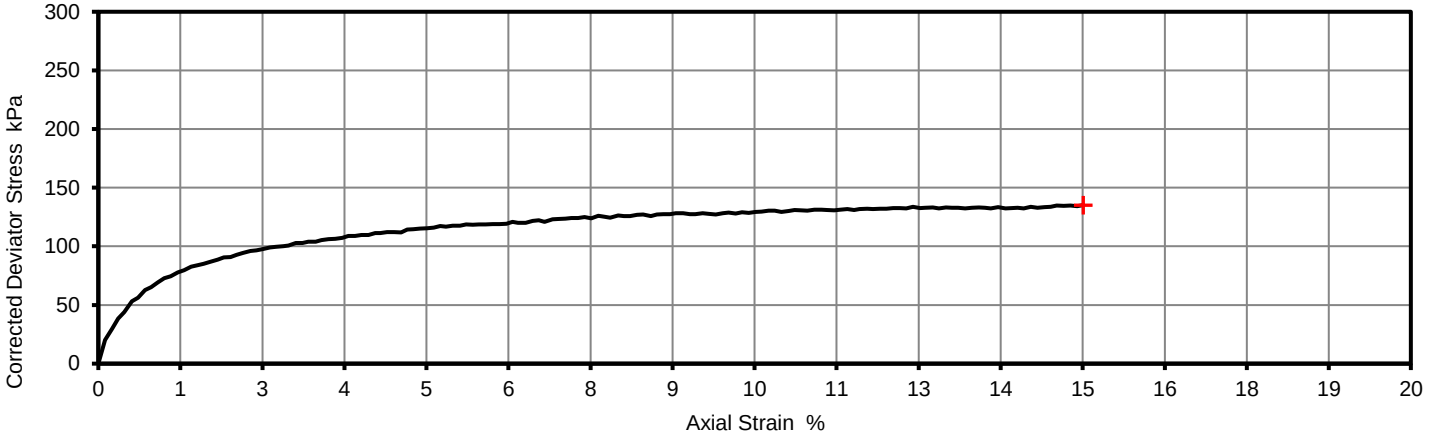
Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

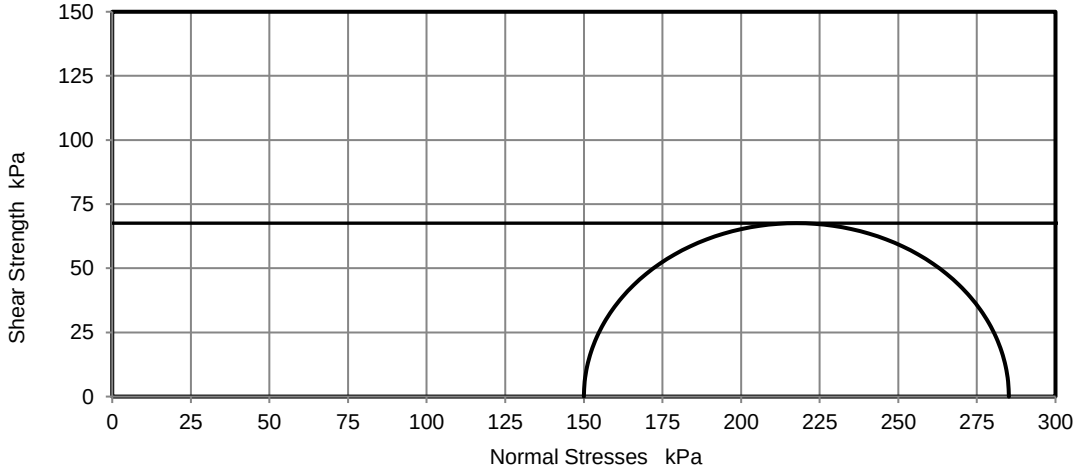
Laboratory Reference:	252686	Depth Top [m]:	7.50
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Dark brown CLAY		
Sample Preparation:	Sample prepared in accordance with BS EN ISO 17892-8: 2018 Clause 6.2.		

Test Number	1		Rate of Strain	2.00	%/min
Depth within Sample	-	m	Cell Pressure	150	kPa
Length	139.15	mm	Axial Strain at Failure	15.0	%
Diameter	70.20	mm	Deviator Stress, (σ1 - σ3)f	135	kPa
Length Prior to Shearing	139.14	mm	Undrained Shear Strength, cu	68	kPa ½(σ1 - σ3)f
Bulk Density	1.93	Mg/m3	Mode of Failure	Brittle	
Initial Water Content	29.0	%	Membrane Thickness	0.24	mm
Final Water Content	28.1	%	Membrane Correction	2.96	kPa
Dry Density	1.50	Mg/m3			

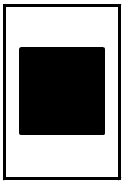
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects.

Remarks:

Signed: Katarzyna Koziel

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 23/07/2024

GF 463.4

TEST CERTIFICATE

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Tested in Accordance with: BS EN ISO 17982-8:2018, BS 1377-2 Cl. 28:2022

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client:	A2 Site Investigation Limited	Client Reference:	50124
Client Address:	One Westminster Bridge Road, South Bank, London, SE1 7XW	Job Number:	24-029861-1
		Date Sampled:	01/07/2024
		Date Received:	03/07/2024
Contact:	Charlie Mason	Date Tested:	18/07/2024
Site Address:	Netherhall Gardens	Sampled By:	Not Given

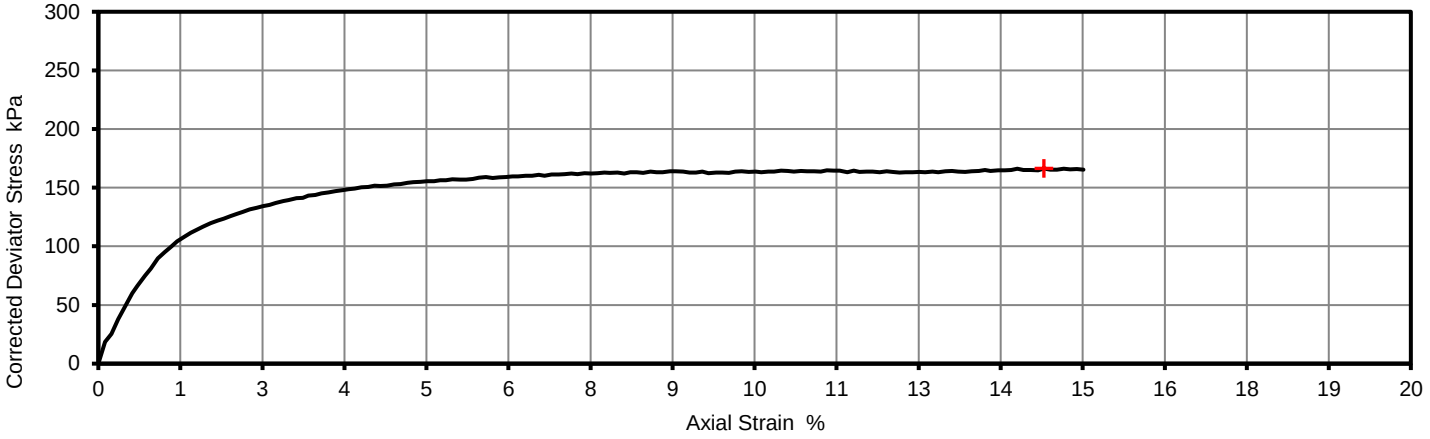
Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

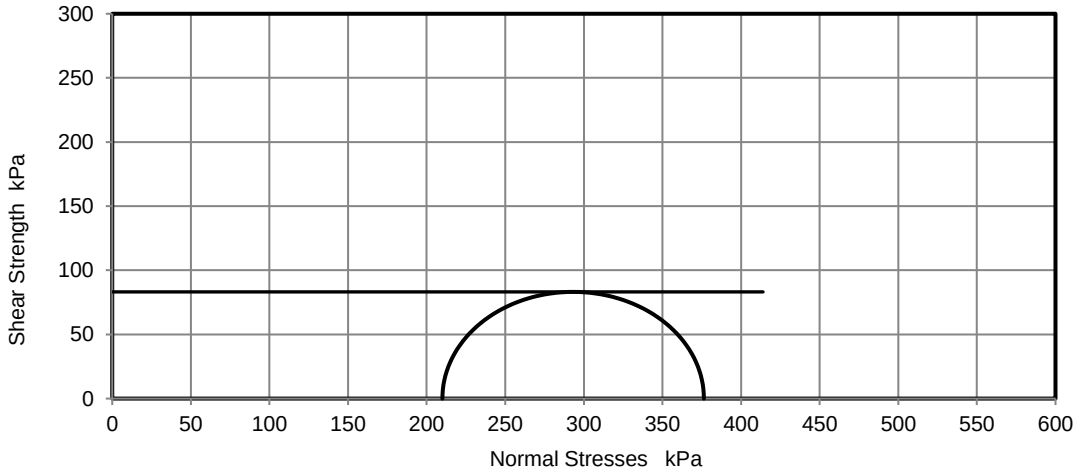
Laboratory Reference:	252688	Depth Top [m]:	10.50
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Dark brown CLAY		
Sample Preparation:	Sample prepared in accordance with BS EN ISO 17892-8: 2018 Clause 6.2.		

Test Number	1		Rate of Strain	2.00	%/min	
Depth within Sample	-	m	Cell Pressure	210	kPa	
Length	139.16	mm	Axial Strain at Failure	14.4	%	
Diameter	69.50	mm	Deviator Stress, (σ1 - σ3)f	166	kPa	
Length Prior to Shearing	139.16	mm	Undrained Shear Strength, cu	83	kPa	½(σ1 - σ3)f
Bulk Density	1.95	Mg/m3	Mode of Failure	Compound		
Initial Water Content	31.4	%	Membrane Thickness	0.24	mm	
Final Water Content	30.0	%	Membrane Correction	2.87	kPa	
Dry Density	1.48	Mg/m3				

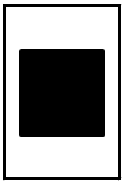
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects.

Remarks:

Signed: Katarzyna Koziel

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 23/07/2024

GF 463.4

TEST CERTIFICATE

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Tested in Accordance with: BS EN ISO 17982-8:2018, BS 1377-2 Cl. 28:2022

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client:	A2 Site Investigation Limited	Client Reference:	50124
Client Address:	One Westminster Bridge Road, South Bank, London, SE1 7XW	Job Number:	24-029861-1
		Date Sampled:	01/07/2024
		Date Received:	03/07/2024
Contact:	Charlie Mason	Date Tested:	18/07/2024
Site Address:	Netherhall Gardens	Sampled By:	Not Given

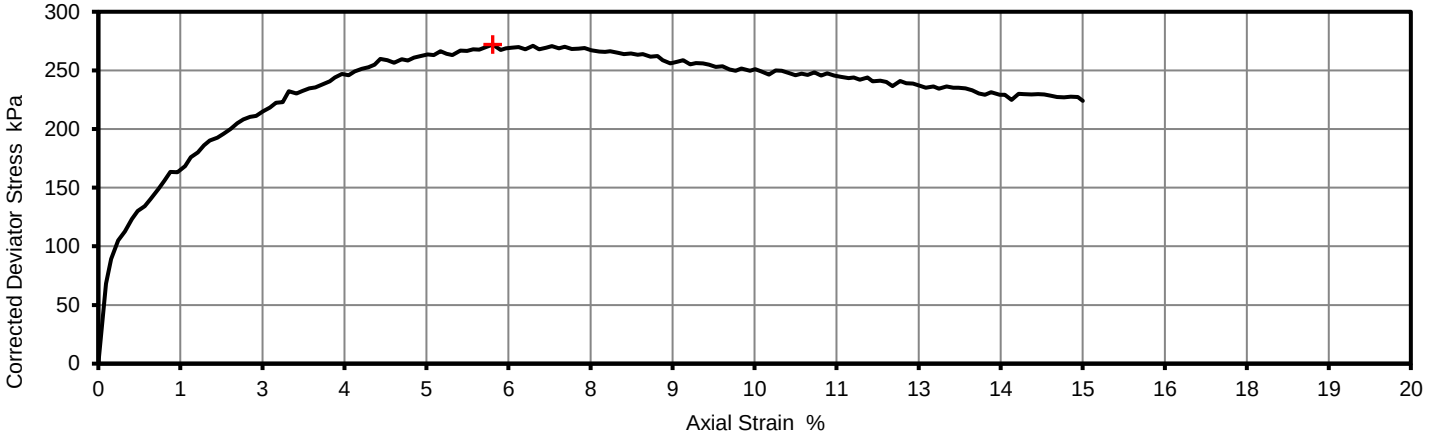
Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

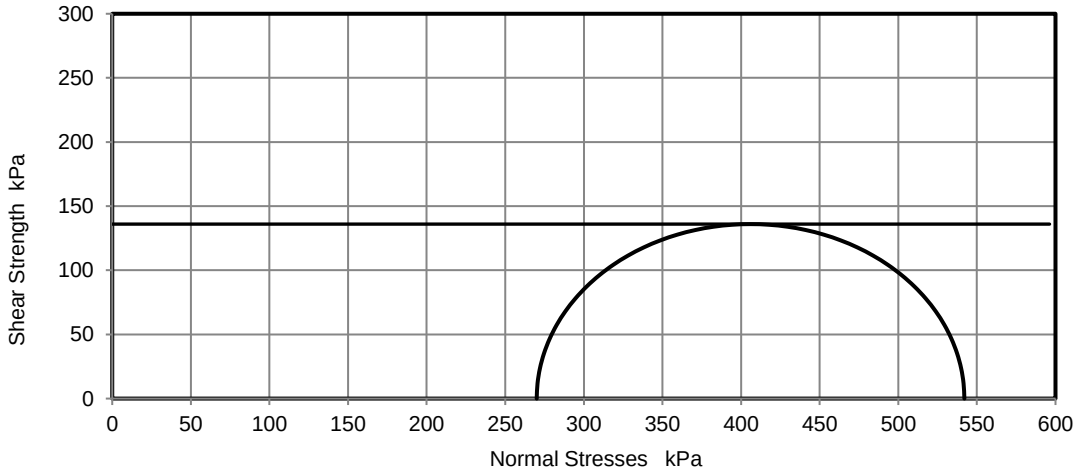
Laboratory Reference:	252690	Depth Top [m]:	13.50
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Dark brown CLAY		
Sample Preparation:	Sample prepared in accordance with BS EN ISO 17892-8: 2018 Clause 6.2.		

Test Number	1		Rate of Strain	2.00	%/min
Depth within Sample	-	m	Cell Pressure	270	kPa
Length	76.54	mm	Axial Strain at Failure	6.0	%
Diameter	37.90	mm	Deviator Stress, (σ1 - σ3)f	272	kPa
Length Prior to Shearing	76.53	mm	Undrained Shear Strength, cu	136	kPa ½(σ1 - σ3)f
Bulk Density	1.97	Mg/m3	Mode of Failure	Compound	
Initial Water Content	28.7	%	Membrane Thickness	0.22	mm
Final Water Content	28.4	%	Membrane Correction	2.01	kPa
Dry Density	1.53	Mg/m3			

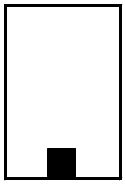
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects.

Remarks:

Signed: Katarzyna Koziel

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 23/07/2024

GF 463.4

Appendix E: Geoenvironmental Laboratory Testing Results

A2 Site Investigation Limited
Broom House 39-43 London Road
Hadleigh
Benfleet
SS7 2QL

e: charlotte.mason@a2-si.com
labs@a2-si.com

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 24-028978

Project / Site name:	Netherall Gardens	**Samples received on:**	03.07.2024
Your job number:	50124	**Samples instructed on/ Analysis started on:**	04.07.2024
Your order number:	PO3638-I2-01	**Analysis completed by:**	10.07.2024
Report Issue Number:	1	**Report issued on:**	11.07.2024
Samples Analysed:	8 soil samples		

Signed:

Rafał Szczepańczyk
Technical Reviewer
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 24-028978
Project / Site name: Netherall Gardens
Your Order No: PO3638-I2-01

Lab Sample Number				247879	247880	247881	247882	247883
Sample Reference				TP01	BH01	BH01	BH01	TP03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	4.00	10.00	15.00	0.30
Date Sampled				01/07/2024	01/07/2024	01/07/2024	01/07/2024	02/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	7.9	21	18	18	13
Total mass of sample received	kg	0.1	NONE	1.1	0.9	0.9	0.6	1.1
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	-	-	-	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	DSO	-	-	-	DSO
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	11.2	8.3	8.6	9.1	9.1
Total Sulphate as SO_4	%	0.005	MCERTS	-	0.04	0.104	0.071	-
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	130	140	960	650	120
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0636	-	-	-	0.0609
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	63.6	68.4	479	324	60.9
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	7.4	42	27	-
Total Sulphur	mg/kg	50	MCERTS	-	250	7900	4500	-
Total Sulphur	%	0.005	MCERTS	-	0.025	0.785	0.452	-
Organic Matter (automated)	%	0.1	MCERTS	0.9	-	-	-	1.1
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.0055	-	-	-	0.0063
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.5	-	-	-	0.6
Water Soluble Nitrate (2:1) as N	mg/kg	2	NONE	-	< 2.0	< 2.0	< 2.0	-
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	< 2.0	< 2.0	< 2.0	-
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.31	-	-	-	0.29
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.56	-	-	-	0.47
Pyrene	mg/kg	0.05	MCERTS	0.47	-	-	-	0.41
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.25	-	-	-	0.27
Chrysene	mg/kg	0.05	MCERTS	0.31	-	-	-	0.25
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.33	-	-	-	0.33
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.18	-	-	-	0.13
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.27	-	-	-	0.25
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.18	-	-	-	0.16
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.2	-	-	-	0.16
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	3.07	-	-	-	2.72

Analytical Report Number: 24-028978
Project / Site name: Netherall Gardens
Your Order No: PO3638-I2-01

Lab Sample Number				247879	247880	247881	247882	247883
Sample Reference				TP01	BH01	BH01	BH01	TP03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	4.00	10.00	15.00	0.30
Date Sampled				01/07/2024	01/07/2024	01/07/2024	01/07/2024	02/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15	-	-	-	14
Barium (aqua regia extractable)	mg/kg	1	MCERTS	96	-	-	-	84
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.92	-	-	-	0.95
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	-	-	-	0.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	-	-	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	-	-	-	< 1.8
Chromium (III)	mg/kg	1	NONE	34	-	-	-	38
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	34	-	-	-	38
Copper (aqua regia extractable)	mg/kg	1	MCERTS	33	-	-	-	39
Lead (aqua regia extractable)	mg/kg	1	MCERTS	310	-	-	-	190
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	-	-	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	1.1	-	-	-	1.1
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	20	-	-	-	24
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	-	-	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	57	-	-	-	60
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	220	-	-	-	430
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	16	36	15	-
Magnesium (water soluble)	mg/kg	5	NONE	-	32	72	30	-
Petroleum Hydrocarbons								
TPHCWG - Aliphatic >EC5 - EC6 $_{HS\_1D\_AL}$	mg/kg	0.02	NONE	< 0.020	-	-	-	< 0.020
TPHCWG - Aliphatic >EC6 - EC8 $_{HS\_1D\_AL}$	mg/kg	0.02	NONE	< 0.020	-	-	-	< 0.020
TPHCWG - Aliphatic >EC8 - EC10 $_{HS\_1D\_AL}$	mg/kg	0.05	NONE	< 0.050	-	-	-	< 0.050
TPHCWG - Aliphatic >EC10 - EC12 $_{EH\_CU\_1D\_AL}$	mg/kg	1	MCERTS	< 1.0	-	-	-	< 1.0
TPHCWG - Aliphatic >EC12 - EC16 $_{EH\_CU\_1D\_AL}$	mg/kg	2	MCERTS	< 2.0	-	-	-	< 2.0
TPHCWG - Aliphatic >EC16 - EC21 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	< 8.0	-	-	-	< 8.0
TPHCWG - Aliphatic >EC21 - EC35 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	< 8.0	-	-	-	< 8.0
TPHCWG - Aliphatic >EC35 - EC40 $_{EH\_CU\_1D\_AL}$	mg/kg	10	NONE	< 10	-	-	-	< 10
TPHCWG - Aliphatic >EC5 - EC40 $_{EH\_CU+HS\_1D\_AL}$	mg/kg	10	NONE	< 10	-	-	-	< 10
TPHCWG - Aromatic >EC5 - EC7 $_{HS\_1D\_AR}$	mg/kg	0.01	NONE	< 0.010	-	-	-	< 0.010
TPHCWG - Aromatic >EC7 - EC8 $_{HS\_1D\_AR}$	mg/kg	0.01	NONE	< 0.010	-	-	-	< 0.010
TPHCWG - Aromatic >EC8 - EC10 $_{HS\_1D\_AR}$	mg/kg	0.05	NONE	< 0.050	-	-	-	< 0.050
TPHCWG - Aromatic >EC10 - EC12 $_{EH\_CU\_1D\_AR}$	mg/kg	1	MCERTS	< 1.0	-	-	-	< 1.0
TPHCWG - Aromatic >EC12 - EC16 $_{EH\_CU\_1D\_AR}$	mg/kg	2	MCERTS	< 2.0	-	-	-	< 2.0
TPHCWG - Aromatic >EC16 - EC21 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	< 10	-	-	-	< 10
TPHCWG - Aromatic >EC21 - EC35 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	< 10	-	-	-	< 10
TPHCWG - Aromatic >EC35 - EC40 $_{EH\_CU\_1D\_AR}$	mg/kg	10	NONE	< 10	-	-	-	< 10
TPHCWG - Aromatic >EC5 - EC40 $_{EH\_CU+HS\_1D\_AR}$	mg/kg	10	NONE	< 10	-	-	-	< 10
TPH Total >EC5 - EC40 $_{EH\_CU+HS\_1D\_TOTAL}$	mg/kg	10	NONE	< 10	-	-	-	< 10

Analytical Report Number: 24-028978
Project / Site name: Netherall Gardens
Your Order No: PO3638-I2-01

Lab Sample Number				247879	247880	247881	247882	247883
Sample Reference				TP01	BH01	BH01	BH01	TP03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	4.00	10.00	15.00	0.30
Date Sampled				01/07/2024	01/07/2024	01/07/2024	01/07/2024	02/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	-	-	-	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	-	-	-	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	-	-	-	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	-	-	-	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	-	-	-	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	-	-	-	< 5.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 24-028978
Project / Site name: Netherall Gardens
Your Order No: PO3638-I2-01

Lab Sample Number				247884	247885	247886
Sample Reference				TP06	BH02	BH02
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.50	3.00
Date Sampled				02/07/2024	02/07/2024	02/07/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	15	15	15
Total mass of sample received	kg	0.1	NONE	1.1	1.1	0.8
Asbestos						
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	-
Asbestos Analyst ID	N/A	N/A	N/A	DSO	DSO	-
General Inorganics						
pH (L099)	pH Units	N/A	MCERTS	8.3	8.3	8
Total Sulphate as SO_4	%	0.005	MCERTS	-	-	0.015
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	31	38	86
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0154	0.0188	-
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	15.4	18.8	42.8
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	-	5.4
Total Sulphur	mg/kg	50	MCERTS	-	-	60
Total Sulphur	%	0.005	MCERTS	-	-	0.006
Organic Matter (automated)	%	0.1	MCERTS	2.2	1	-
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.013	0.0058	-
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.3	0.6	-
Water Soluble Nitrate (2:1) as N	mg/kg	2	NONE	-	-	< 2.0
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	-	< 2.0
Speciated PAHs						
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Phenanthrene	mg/kg	0.05	MCERTS	0.24	0.06	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Fluoranthene	mg/kg	0.05	MCERTS	0.53	0.15	-
Pyrene	mg/kg	0.05	MCERTS	0.48	0.11	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.32	0.1	-
Chrysene	mg/kg	0.05	MCERTS	0.32	0.08	-
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.38	0.12	-
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.14	0.06	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.33	0.11	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.15	0.05	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.19	0.06	-
Total PAH						
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	3.09	0.89	-

Analytical Report Number: 24-028978
Project / Site name: Netherall Gardens
Your Order No: PO3638-I2-01

Lab Sample Number				247884	247885	247886
Sample Reference				TP06	BH02	BH02
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.50	3.00
Date Sampled				02/07/2024	02/07/2024	02/07/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15	25	-
Barium (aqua regia extractable)	mg/kg	1	MCERTS	85	81	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.4	0.92	-
Boron (water soluble)	mg/kg	0.2	MCERTS	1.6	0.6	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	-
Chromium (III)	mg/kg	1	NONE	44	39	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	44	39	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	32	26	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	150	96	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	0.92	1	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	29	20	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	69	61	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	94	83	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	-	13
Magnesium (water soluble)	mg/kg	5	NONE	-	-	26
Petroleum Hydrocarbons						
TPHCWG - Aliphatic >EC5 - EC6 $_{HS\_1D\_AL}$	mg/kg	0.02	NONE	< 0.020	< 0.020	-
TPHCWG - Aliphatic >EC6 - EC8 $_{HS\_1D\_AL}$	mg/kg	0.02	NONE	< 0.020	< 0.020	-
TPHCWG - Aliphatic >EC8 - EC10 $_{HS\_1D\_AL}$	mg/kg	0.05	NONE	< 0.050	< 0.050	-
TPHCWG - Aliphatic >EC10 - EC12 $_{EH\_CU\_1D\_AL}$	mg/kg	1	MCERTS	< 1.0	< 1.0	-
TPHCWG - Aliphatic >EC12 - EC16 $_{EH\_CU\_1D\_AL}$	mg/kg	2	MCERTS	< 2.0	< 2.0	-
TPHCWG - Aliphatic >EC16 - EC21 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	< 8.0	< 8.0	-
TPHCWG - Aliphatic >EC21 - EC35 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	< 8.0	< 8.0	-
TPHCWG - Aliphatic >EC35 - EC40 $_{EH\_CU\_1D\_AL}$	mg/kg	10	NONE	< 10	< 10	-
TPHCWG - Aliphatic >EC5 - EC40 $_{EH\_CU+HS\_1D\_AL}$	mg/kg	10	NONE	< 10	< 10	-
TPHCWG - Aromatic >EC5 - EC7 $_{HS\_1D\_AR}$	mg/kg	0.01	NONE	< 0.010	< 0.010	-
TPHCWG - Aromatic >EC7 - EC8 $_{HS\_1D\_AR}$	mg/kg	0.01	NONE	< 0.010	< 0.010	-
TPHCWG - Aromatic >EC8 - EC10 $_{HS\_1D\_AR}$	mg/kg	0.05	NONE	< 0.050	< 0.050	-
TPHCWG - Aromatic >EC10 - EC12 $_{EH\_CU\_1D\_AR}$	mg/kg	1	MCERTS	< 1.0	< 1.0	-
TPHCWG - Aromatic >EC12 - EC16 $_{EH\_CU\_1D\_AR}$	mg/kg	2	MCERTS	< 2.0	< 2.0	-
TPHCWG - Aromatic >EC16 - EC21 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	< 10	< 10	-
TPHCWG - Aromatic >EC21 - EC35 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	< 10	< 10	-
TPHCWG - Aromatic >EC35 - EC40 $_{EH\_CU\_1D\_AR}$	mg/kg	10	NONE	< 10	< 10	-
TPHCWG - Aromatic >EC5 - EC40 $_{EH\_CU+HS\_1D\_AR}$	mg/kg	10	NONE	< 10	< 10	-
TPH Total >EC5 - EC40 $_{EH\_CU+HS\_1D\_TOTAL}$	mg/kg	10	NONE	< 10	< 10	-

Analytical Report Number: 24-028978
Project / Site name: Netherall Gardens
Your Order No: PO3638-I2-01

Lab Sample Number				247884	247885	247886
Sample Reference				TP06	BH02	BH02
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.50	3.00
Date Sampled				02/07/2024	02/07/2024	02/07/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
VOCs						
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	-
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	-
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	-
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	-
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	-
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	-

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 24-028978
Project / Site name: Netherall Gardens

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
247879	TP01	None Supplied	0.3	Brown clay and sand with vegetation and rubble
247880	BH01	None Supplied	4	Brown clay and sand
247881	BH01	None Supplied	10	Brown clay and sand
247882	BH01	None Supplied	15	Brown clay
247883	TP03	None Supplied	0.3	Brown clay and sand with vegetation and rubble
247884	TP06	None Supplied	0.3	Brown clay and loam with gravel and vegetation
247885	BH02	None Supplied	0.5	Brown clay and sand with gravel and vegetation
247886	BH02	None Supplied	3	Brown clay and sand

Analytical Report Number : 24-028978
Project / Site name: Netherall Gardens

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in Soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES	In-house method based on Second Site Properties version 3	L038B	D	MCERTS
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES	In-house method based on TRL 447	L038B	D	NONE
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES	In-house method	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES	In-house method	L038B	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons with carbon banding by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L076B/L088	D/W	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction	L078B	W	NONE
Chromium III in soil	In-house method by calculation from total Cr and Cr VI	In-house method by calculation	L080	W	NONE

Analytical Report Number : 24-028978
Project / Site name: Netherall Gardens

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method	L080	W	MCERTS
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser	In-house method	L082B	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	D	MCERTS
Fraction Organic Carbon FOC Automated	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate	In-house method	L009B	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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Analytical Report Number : 24-028980

Project / Site name:	Netherall Gardens	**Samples received on:**	03.07.2024
Your job number:	50124	**Samples instructed on/ Analysis started on:**	04.07.2024
Your order number:	PO3638-I2-01	**Analysis completed by:**	10.07.2024
Report Issue Number:	1	**Report issued on:**	10.07.2024
Samples Analysed:	1 10:1 WAC sample		

Signed:

Rafał Szczepańczyk
Technical Reviewer
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 24-028980
Project / Site name: Netherall Gardens
Your Order No: PO3638-I2-01

Lab Sample Number				247892
Sample Reference				BH02
Sample Number				None Supplied
Depth (m)				0.50
Date Sampled				02/07/2024
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	15
Total mass of sample received	kg	0.1	NONE	1.1
General Inorganics				
pH (L005B)	pH Units	N/A	MCERTS	8
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.6
Loss on Ignition @ 450°C	%	0.2	MCERTS	2.8
Acid Neutralisation Capacity	+/- mmol/kg	-9999	NONE	3.1
Speciated PAHs				
Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.07
Anthracene	mg/kg	0.05	MCERTS	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.12
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.1
Chrysene	mg/kg	0.05	MCERTS	0.11
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.13
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.07
Coronene	mg/kg	0.05	NONE	< 0.05
Total PAH				
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80
Total WAC-17 PAHs	mg/kg	0.85	NONE	< 0.85
Petroleum Hydrocarbons				
Mineral Oil (EC10 - EC40) EH_CU_1D_AL	mg/kg	10	NONE	< 10
VOCs				
Benzene	µg/kg	5	MCERTS	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0
Total BTEX	µg/kg	5	MCERTS	< 5.0

Analytical Report Number: 24-028980
Project / Site name: Netherall Gardens
Your Order No: PO3638-I2-01

Lab Sample Number				247892
Sample Reference				BH02
Sample Number				None Supplied
Depth (m)				0.50
Date Sampled				02/07/2024
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
PCBs by GC-MS				
PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001
Total PCBs	mg/kg	0.007	MCERTS	< 0.007

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Waste Acceptance Criteria Analytical Results

Report No:	**24-028980**						
					Client:	**A2SITEIN**	
Location	**Netherall Gardens**						
Lab Reference (Sample Number)	247892				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	02.07.2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	BH02						
Depth (m)	0.50						
Solid Waste Analysis							
TOC (%)**	0.6				3%	5%	6%
Loss on Ignition (%) **	2.8				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	8.0				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	3.1				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.00222			0.0222	0.5	2	25
Barium *	0.00822			0.0822	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	0.00065			0.0065	0.5	10	70
Copper *	0.0052			0.052	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.0121			0.121	0.5	10	30
Nickel *	0.00033			0.0033	0.4	10	40
Lead *	0.0018			0.018	0.5	10	50
Antimony *	0.0035			0.035	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0020			0.020	4	50	200
Chloride *	2.6			26	800	15000	25000
Fluoride*	1.1			11	10	150	500
Sulphate *	2.8			28	1000	20000	50000
TDS*	63			630	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	12.3			123	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.1						
Dry Matter (%)	85						
Moisture (%)	15						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation

** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Analytical Report Number : 24-028980
Project / Site name: Netherall Gardens

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
247892	BH02	None Supplied	0.5	Brown clay and sand with gravel and vegetation

Analytical Report Number : 24-028980
Project / Site name: Netherall Gardens

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH at 20°C in soil	Determination of pH in soil by addition of water followed by electrometric measurement	In-house method	L005B	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with hexane followed by GC-MS	In-house method based on USEPA 8082	L027B	D	MCERTS
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031B	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination	L033B	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR Analyser	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	NONE
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Sample Preparation		In-house method	L043B	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance	L046B	W	NONE
Loss on ignition of soil @ 450°C	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	In-house method	L047	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088	D/W	NONE
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025

Analytical Report Number : 24-028980
Project / Site name: Netherall Gardens

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser	In-house based on MEWAM Method ISBN 0117516260	L082B	W	ISO 17025

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

Appendix F: Groundwater Monitoring Results

A2 Site Investigation

Project Number	50124	**Install Depth (m)**	9.00
Project Name	Netherhall Gardens	**Plain (m)**	0.80
Borehole Number	BH01	**Slotted (m)**	8.20
Borehole Depth (m)	15.00		

Visit	Date	Engineer	Atmospheric Pressure (mbar)	Weather condtion	Water level (m)	Base of Well (m)
1	09/07/2024	FA/AN/AR	1002.00	Rainy	1.83	9.20
2	15/07/2024	FA	1008.00	Overcast	1.90	9.20
3	22/07/2024	FA/AN/AR	1006.00	Sunny	1.96	9.20
4						
5						
6						

Ground Water Levels

Instrument	Model	S/N
Interface Meter	DIP-100	5569

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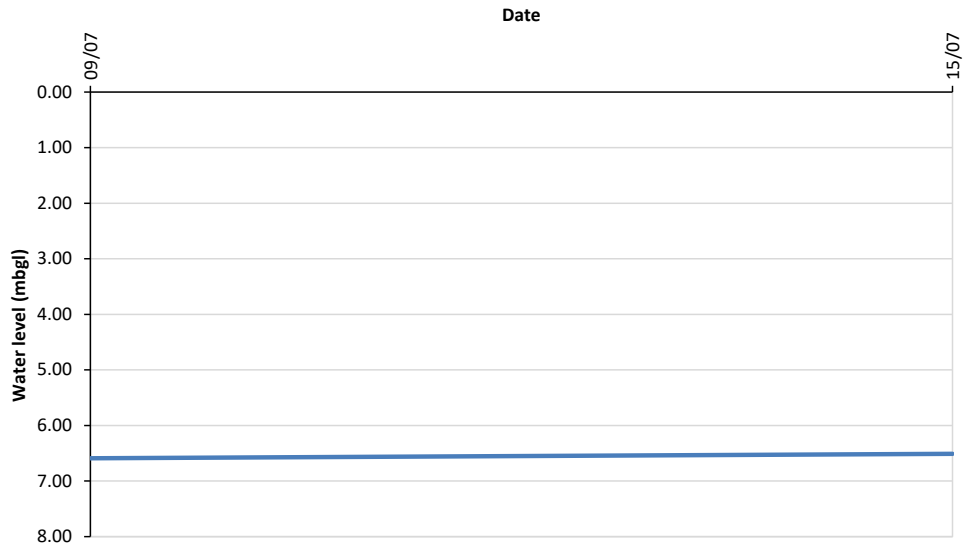
Project Number	50124	**Install Depth (m)**	9.00
Project Name	Netherhall Gardens	**Plain (m)**	0.80
Borehole Number	BH02	**Slotted (m)**	8.20
Borehole Depth (m)	8.00		

Visit	Date	Engineer	Atmospheric Pressure (mbar)	Weather condtion	Water level (m)	Base of Well (m)
1	09/07/2024	FA/AN/AR	1002.00	Rainy	6.59	7.56
2	15/07/2024	FA	1008.00	Overcast	6.51	7.56
3	22/07/2024	FA/AN/AR	1006.00	Sunny	3.68	7.56
4						
5						
6						

Ground Water Levels



Instrument	Model	S/N
Interface Meter	DIP-100	5569

A2 Site Investigation

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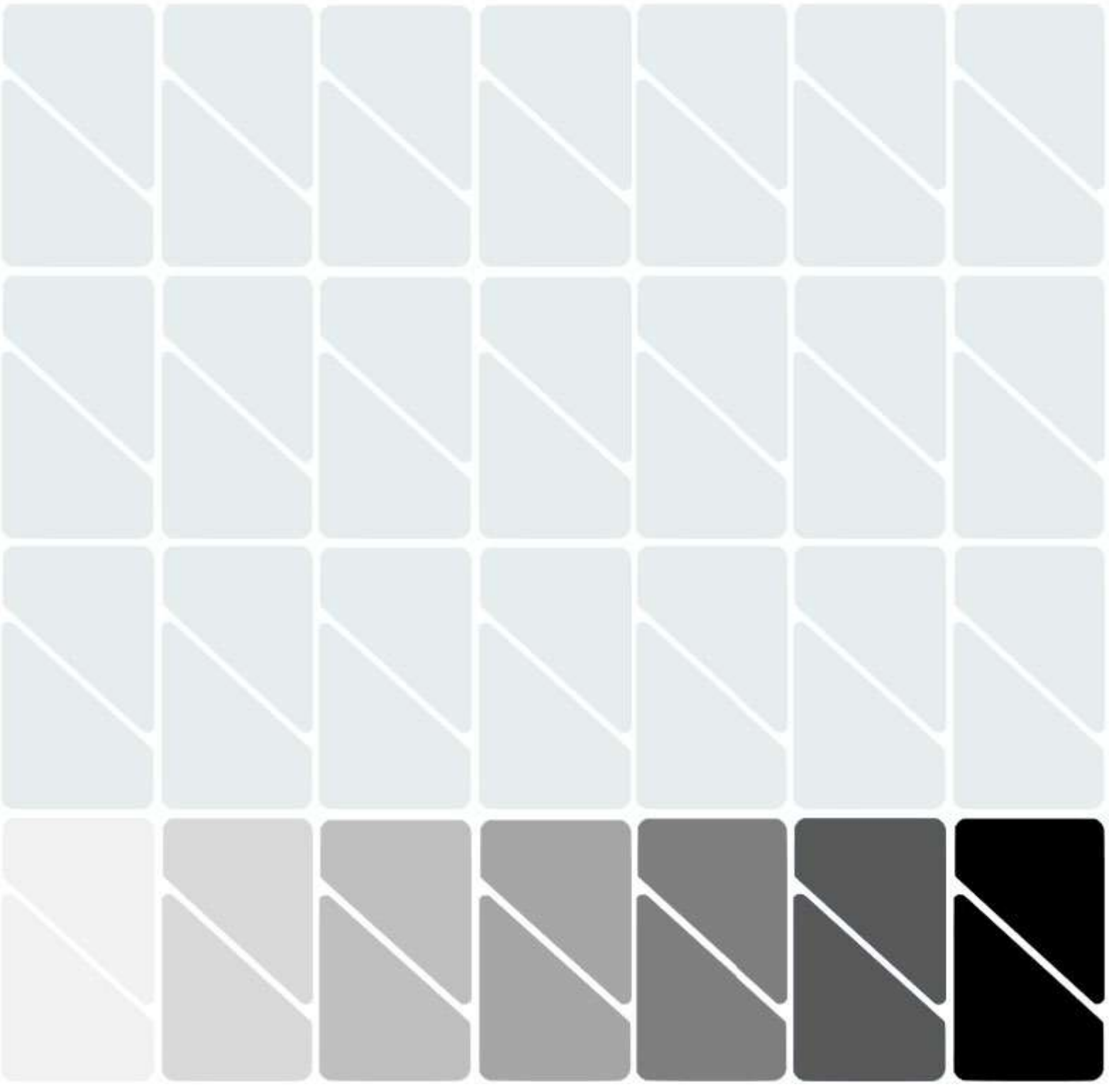

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